Rancho Santiago Community College District
Santa Ana College Science Center

1530 W. 17th St., Santa Ana, CA

Specifications

DSA APPROVAL SET
Volume One
Divisions 00 - 14

Architecture | Engineering | Planning

Hammel, Green and Abrahamson, Inc.
Architects and Engineers
1918 Main St., Third Floor
Santa Monica, California 90405
(310) 557-7600

HGA Commission Number
3584-001-00

July 06, 2017

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CERTIFICATIONS PAGE

ARCHITECTURAL

FILE NUMBER: 30-C2

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT

APP. NO: 04 - 115788 INCR : 0

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DATE 7/14/2017

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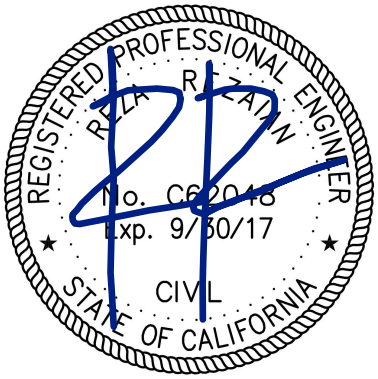

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SECTION 011100

SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

A. The Project consists of a 65,000 SF, three (3) story New Science Building that will provide state-of-the art labs and classrooms for Chemistry, Biology, Physics, Earth Sciences and Engineering for Rancho Santiago Community College District and to be constructed, in compliance with the Contract Documents and Code requirements. The Project also includes a new 890 SF Greenhouse. The site development will include demolition of existing buildings, and existing site utility removal and relocations. The new site will require new site fire water, domestic water, sanitary sewer, storm drain, electrical distribution, natural gas, telecommunications service, site chilled water mechanical system and an internal-building provided hydronic heated mechanical system.

B. The furnishing of all labor, materials, equipment, services, and incidentals necessary for Work of Santa Ana College Science Center, located at 1530 West 17th Street, Santa Ana, California 92706.

1.02 RELATED DOCUMENTS

A. Facilities Lease Agreement

B. Drawings

C. Specifications

1.03 USE OF PREMISES

A. Contractor shall sequence, coordinate, and perform the Work to impose minimum impact on the operation and use of the facilities and/or Project site. Contractor shall install all necessary protection for existing improvements, Project site, property, and new Work against dust, dirt, weather, damage, vandalism, and maintain and relocate all protection to accommodate progression of the Work.

B. Contractor shall confine entrance and exiting to the Project site and/or facilities to routes designated by the District Representative.

C. Contractor to coordinate with District Representative to obtain keys. Contractor will be required to sign a release form. Key requests need to be made three (3) days in advance. If Contractor loses a key or fails to return a key to the District, Contractor shall be fined $1,000 for each key lost.

D. Obtain and pay for the use of field offices, storage, work areas, or parking needed for operations or Contractor's employees. Obtain and pay for all public right of way fees associated with utility connections, street use permits and protective canopies over public right of ways.

E. Within existing facilities, District Representative may remove portable equipment, furniture, and supplies from Work areas prior to the start of Work. Contractor shall cover and protect remaining items in areas of the Work.

F. Provide and maintain unimpeded access for police, fire fighting, or rescue equipment.

G. Contractor is advised school will be in session during performance of the Work. Contractor shall utilize all available means to prevent generation of unnecessary noise/vibrations and maintain noise/vibration levels to a minimum. When required by the District Representative, Contractor shall immediately discontinue noise-generating activities and/or provide alternative methods to minimize noise generation. Contractor shall install and maintain air compressors, tractors, cranes, hoists, vehicles, and other internal combustion engine equipment with mufflers, including

unloading cycle of compressors. Contractor shall discontinue operation of equipment producing objectionable noise as determined by District Representative and/or District Representative. When applicable, District Representative will provide a testing schedule to indicate when work may not occur.

H. Contractor shall furnish, install, and maintain adequate supports, shoring, and bracing to preserve structural integrity and prevent collapse of existing improvements and/or Work modified and/or altered as part of the Work.

I. Contractor shall secure site, building entrances, exits, and Work areas with locking devices in an acceptable manner to District Representative.

J. Contractor assumes custody and control of Owner property, both fixed and portable, remaining in existing facilities vacated during the Work.

K. Contractor shall cover, maintain, and protect surfaces of rooms and spaces in existing facilities turned over for the Work, including Owner property remaining within as required to prevent soiling or damage from dust, dirt, water, and/or fumes. Contractor shall protect areas adjacent to the Work in a similar manner. Prior to Owner occupancy, Contractor shall clean all surfaces including Owner property.

L. Contractor shall protect all surfaces, coverings, materials, and finished Work from damage. Mobile equipment shall be provided with pneumatic tires.

M. The District reserves the right to place and install equipment in areas of the Project prior to Substantial Completion provided that it doesn't interfere with the completion of the Work. This partial occupancy shall not constitute acceptance of the Work by the District Representative.

N. Contractor shall not permit the use of portable and/or fixed radio's or other types of sound producing devices including Walkman's, iPod's, and similar devices.

1.04 EXISTING CONDITIONS

A. Contractor shall document the existing site and produce still photographs or video recording on DVD, sufficiently detailed, of existing conditions of adjoining construction, roads, and site improvements that might be misconstrued as damage caused by construction operations.

B. Contractor shall protect items indicated to remain against damage and soiling during construction.

C. Contractor shall protect existing IT equipment indicated to remain by properly covering and ventilating the equipment. Coordinate procedures with District Representative and District ITS Department.

D. Contractor shall sequence work in a manner that will prevent any damage upon new construction elements.

E. Contractor shall replace any items damaged during construction.

1.05 WORK NOT IN CONTRACT

A. The term "NIC" shall be construed to mean that portions of the Project are not to be furnished, installed or performed by the Contractor. The term shall mean "Not in Contract" or Not a Part of the Work to be performed by the Contractor" except that coordination and installation of certain NIC items specified shall be the Contractor's responsibility. District will award separate contracts for products and installation for the following work and other work as may be indicated on Drawings as NIC (Not in Contract), including:

a. Performing tests and inspections specified in the Contract Documents.

b. Furniture & Equipment, unless otherwise noted in the Contract Documents

B. When the work of this Contract requires the Contractor to make allowance for the above in his work, and to provide supports, power, conduits, stub-outs and other services to these items, the drawings, manufacturer's data and other information necessary for the Contractor's work will be provided by the District Representative upon request.

1.06 OWNER FURNISHED CONTRACTOR INSTALLED (OFCI) MATERIALS

A. Certain materials identified in the Contract Documents as Owner Furnished Contractor Installed (OFCI) will be delivered to the Project site by the District Representative. Contractor shall unload, store, uncrate, assemble, install, and connect Owner supplied materials.

B. One-Hundred working days before the date the Contractor needs to have the OFCI materials on site, Contractor shall notify District Representative of the scheduled date for needed OFCI materials. Upon delivery to Project site, Contractor shall store OFCI materials inside rooms and/or protected spaces and will be responsible for security of OFCI materials until Substantial Occupancy. District Representative will sign receipt or bill of lading as applicable.

C. Contractor shall, within ten days after delivery, uncrate and/or unpack OFCI materials in presence of District Representative who shall inspect delivered items. District Representative shall prepare an inspection report listing damaged or missing parts and accessories. District Representative shall transmit one copy of the report to Contractor. District Representative will procure and/or replace missing and or damaged OFCI materials, as indicated in inspection report.

D. Contractor shall install OFCI materials in the locations and orientation as indicated in the Contract Documents. Contractor shall verify exact locations with District Representative before final installation of OFCI materials.

E. If required, District Representative will furnish setting and or placement drawings for OFCI materials.

F. Contractor shall install OFCI materials by proper means and methods to ensure an installation as recommended by the manufacturer. Contractor shall furnish and install all necessary fasteners and required blocking to properly install OFCI materials.

G. Contractor shall install OFCI materials with manufacturer recommended fasteners for the type of construction to which the OFCI materials are being fastened and/or anchored.

H. Contractor shall provide final connections of any electrical, signal, gas, water, waste, venting and/or similar items to OFCI materials. Contractor shall, prior to final connection, verify the operating characteristics of OFCI materials are consistent with the designated supply.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION (Not applicable)

END OF SECTION 011100

SECTION 011216

PHASING OF THE WORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Requirements for phasing of the Work include logistics, phasing, and completion of designated phases prior to commencement of subsequent phases.

1.02 RELATED SECTIONS

A. Section 01 11 00: Summary of Work.

B. Section 01 31 13: Project Coordination.

C. Section 01 32 13: Construction Schedule.

D. Section 01 33 00: Submittal Procedures.

E. Section 01 50 00: Construction Facilities and Temporary Controls.

F. Section 01 77 00: Closeout Procedures.

1.03 SUBMITTALS

A. Contractor shall submit a Project site logistics plan in accordance with and as required by this Section.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 LOGISTICS

A. Prior to commencement of the Work, Contractor shall prepare and submit to the District Representative, a detailed Project site logistic plan, in the same size and scale of the Drawings, setting forth Contractor plan of the Work relative to the following, but not limited to, items:

1. In accordance with local ordinances a truck access route to and from the Project site.
2. The identification of any overhead wire restrictions for power, street lighting, signal, and/or cable.
3. Local sidewalk access and street closure requirements.
4. Protection of sidewalk pedestrians and vehicular traffic.
5. Project site fencing and access gate locations.
6. Construction parking.
7. Material staging and/or delivery areas.
8. Material storage areas.
9. Temporary trailer locations.
10. Temporary service location and proposed routing of all temporary utilities.
11. Location of temporary and/or accessible fire protection
12. Trash removal and location of dumpsters.
13. Concrete pumping locations.
14. Crane locations.

15. Location of portable sanitary facilities.
16. Mixer truck wash out locations.
17. Traffic control signage.
18. Perimeter and site lighting.
19. Stockpile and/or lay down areas.
20. Emergency Vehicle Access Routes.

B. A revised Project site logistic plan may be required by the District Representative for separately identified phases of the Work as set forth in this Section.

C. Contractor is responsible for securing and obtaining all approvals and permits from authorities having jurisdiction relative to logistic plan activities.

3.03 PHASING OF THE WORK

A. Project will be constructed in separate Milestone increments, as identified or as described in this Section and/or the Contract Documents. Phasing will also delineate Work to be completed in each designated phase. Unless otherwise approved or directed by the District Representative, each phase shall be completed according to the approved Construction Schedule prior to the commencement of the next subsequent phase. Contractor shall incorporate and coordinate the Work of Separate Work Contracts relative to this Project into the Phasing and Construction Schedule.

B. Contractor shall install all necessary Work for phased Work before completion of the designated phase.

3.04 PHASING OF THE WORK – GENERAL

A. Contractor shall prepare the Milestone Schedule in order to complete the Work and related activities in accordance with the phasing plan. Contractor shall include all costs to complete all Work within the Milestones and Contract Time.

B. Owner will be seriously damaged by not having all Work completed within the Milestones and/or Contract Time. It is mandatory the Work be complete within the Milestones and Contract Time.

3.05 PHASING OF THE WORK – SPECIFIC

A. Contractor shall prepare Construction Schedule, and shall complete the Milestones indicated in the Facilities Lease Agreement, Exhibit F.

END OF SECTION 011216

SECTION 011419
USE OF SITE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Use of site
   2. Site management and requirements.
   3. Work hours.

B. Related Sections:
   1. Refer to Sections 011100, 013113, 013213, and 015000 for special requirements, constraints, timing of work, scheduling of work, hazardous material protection, enclosures and similar requirements relating to this Section.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 SITE MANAGEMENT AND REQUIREMENTS

A. General: Upon commencement of Work at site, Contractor assumes site management at areas within construction limits, other areas where work is to be performed and adjacent storage areas, to provide proper direction to subcontractors and workers.
   1. Coordinate site management with Owner and include maintaining areas as specified and required to be free of construction activity, parking and storage where it is necessary to provide clear access and areas for Owner's functions.

B. Responsibilities:
   1. Site management and maintenance shall include, but not be limited to:
      a. Enforcement of access, parking, delivery, storage, noise and other restrictions;
      b. Maintenance of fences in good condition; providing and maintaining site and safety lighting;
      c. Providing and maintaining temporary facilities as specified;
      d. Dewatering excavations, except water in trenches and excavations made by subcontractors solely for their own work;
      e. Protection of adjacent structures which could be damaged by water; overall fire and safety management; protection for site features to remain;
      f. Temporary partitions, closures, dust barriers and similar to separate work areas in existing building from other occupied areas, as well as between new additions and existing building spaces;
      g. Similar overall or general management of the site and adjacent public and other property to fulfill the obligations of this Contract.

C. Fencing: Refer to Section 015000 for fencing to be provided at areas of construction and storage.

D. Use of Streets: Where conduct of work requires obstruction or use of public street, it shall be responsibility of Contractor to secure necessary permits from Department of Public Works.

E. Be responsible for protection of public in vicinity of work; nothing in these specifications shall be construed to relieve that responsibility.
   1. Protective devices shall conform to requirements of State Highway Department and proper public authorities and shall be installed as required by Department of Public Works.

F. Coordinate use of premises under direction of Owner.

G. Limits of Work: Confine operations to general areas for work as shown on Drawings. Work within limits approved in writing by Owner's Representative when necessary to work outside general areas in order to comply with Contract Documents.

H. Noise: Keep noise to minimum by use of adequate mufflers and other appropriate means. Limit A-weighted noise levels to 80 dBA when measured at a distance of 100 feet. Noise in excess of these limits shall be approved by Owner's Representative.

3.2 WORK HOURS

A. Working Hours: Work done outside of normal work hours, 7:00 am to 7:00pm on holidays or weekends shall be authorized in writing by Owner's Representative. Refer to Shutdown Procedures in Section 013113 – Project Management and Coordination, and as stated below:

B. Contract Work: Perform work outside of normal hours as a planned single unit of work, during staged shifts of work or during split shifts of work. This work shall be a basic part of construction contract. Contract cost shall not be increased because of work outside normal work hours.

3.3 SITE STORAGE

A. General: Restricted site provides very limited area for storage, offices, sheds and operations, and shall be taken into consideration by Contractor and subcontractors in scheduling their work and their deliveries.

B. Obtain and pay for use of additional storage or work areas needed for operations under this Contract, if required.

C. All parties shall cooperate and coordinate to use available areas most effectively and be concerned with sequences of work of Contract, which will best benefit overall job progress.

1. Establish and govern use of available space, with consideration to needs of subcontractors to work effectively on site.

D. Storage Areas: As determined by Contractor and Owner.

3.4 CONDITION AND CARE OF SITE

A. General: Confine apparatus, materials, equipment, sheds and operations of workers at site to construction limits indicated on Drawings, or otherwise imposed by law or ordinance, and other adjacent areas permitted for storage.

B. Site and Project shall not be unreasonably encumbered with materials and equipment. Stockpile neatly and orderly and maintain other operations; regularly remove debris from the site.

1. Protect and restore features on or about site.
2. Owner and Architect may caution Contractor about conditions which they observe, but shall not be held responsible to provide such advice or for enforcing protection.

C. Site Protection: Protect existing trees and other plantings not to be removed and features of adjacent buildings, paved surfaces which are to remain and are susceptible to damage from ordinary operations of Contractor, trucking, or other activity.

D. Access: Maintain fire protection and access. Permit immediate access by fire fighting equipment.

E. Hazardous Protection: Warning signals, barricades and other protective measures for hazard shall be in place and operate 24 hours per day.

3.5 EXISTING UTILITIES AND SERVICES

A. General: Exercise care to prevent interruption of existing services. Protect from damage utilities or other services which are shown, or not shown but encountered or otherwise found, from excavation or other work and operations of this Contract, unless or until they are abandoned. Refer to Section 013113 – Project Management and Coordination for shutdown procedures.

1. If the utilities or services are not abandoned, or to be abandoned, immediately restore damage from work or operations to place utilities and service in an equal or better condition than that which existed.

2. Where utilities or services are shown to be abandoned or moved, they shall remain in service, and be protected by Contractor, until new utilities and services have been provided, tested and are ready for use. Lines or mains of utility companies or Municipality shall be replaced or repaired as directed by them.

B. Unknown Utilities: In the event unknown mains or lines are uncovered, stop work in that area and notify the utility company, Architect and Owner to obtain information on how to proceed.

3.6 EROSION CONTROL

A. Refer to Division 31 - Earthwork for additional requirements.

END OF SECTION

SECTION 012100

ALLOWANCES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements governing Contract allowances.

1. Allowances as set forth in the Contract Documents are to be used as compensation for items as set forth in this Section. The amounts listed in the Contract Documents are to be included in the base bid and shall be listed separately in the Schedule of Values and Application for Payment.

1.02 RELATED SECTIONS

A. Section 01 29 73: Schedule of Values Procedures.

B. Section 01 29 76: Progress Payment Procedures.

C. Section 01 32 13: Construction Schedule.

D. Section 01 50 00: Construction Facilities and Temporary Controls.

1.03 ALLOWANCES

A. Use the allowances only as authorized for Owner purposes and only by submitting a form that indicates the amounts to be charged to the respective allowance amount to the District Representative.

B. District Representative and Architect will review Contractor's basis for its use of any Allowance costs included in Contract Sum as required, and prior to the execution of Work described in Allowances.

1.04 ALLOWANCE DISBURSEMENT

A. Contractor shall submit a request for allowance disbursement to the District Representative. Include all substantiating and/or required data along with the request.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.01 SCHEDULE OF ALLOWANCES

A. Include in the base bid the allowances noted in the Contract Documents.

A.

END OF SECTION 012100

SECTION 012300

ALTERNATES

PART 1 – GENERAL

1.01 SECTION INCLUDES:

A. This Section specifies administrative and procedural requirements governing alternate bid items.

1.02 RELATED SECTIONS:

A. Instructions to Bidders.

B. Bid Form and Designation of Subcontractors.

C. Section 01 11 00: Summary of Work.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 SPECIFIC

A. Bid alternate item is an amount proposed by bidder and stated on the Bid and Acceptance Form for certain Work defined in the Bidding Documents that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change in either the amount of Work to be completed, the Contract Documents, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The amount added or deducted from the base bid is the net addition to or deducted from the base bid to incorporate bid item Work into the Work. Unless noted otherwise, no other adjustments are made to the Contract Amount, Milestones, or the Contract Time.

3.02 PROCEDURES

A. Contractor shall modify or adjust affected adjacent Work as necessary to completely and fully integrate Owner accepted bid alternate Work.

1. Include as part of each bid alternate item, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the bid alternate item.

B. Accepted bid alternate items are subject to the same terms and conditions as other Work of the Contract Documents.

3.03 SCHEDULE OF BID ALTERNATE ITEMS: (See the Contract Documents for Additional Information)

A. Alternate 1 (ADD): Provide a 3-year extended warranty for the following work categories: Site Utilities, Landscape, Elevator, Plumbing, HVAC, Electrical, Communications, Laboratory Equipment, Laboratory Fume Hoods, and General Contractor.

B. Alternate 2 (ADD): Use composite metal roofing to match the rest of the north canopy instead of using <TPO-1> thermoplastic single ply roofing.

C. Alternate 3 (DEDUCT): Use high performance paint on steel handrails for all stairs instead of stainless steel handrails.

D. Alternate 4 (DEDUCT):

END OF SECTION 012300

SECTION 012613

REQUEST FOR INFORMATION PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Procedure for requesting information of the intent of the Contract Documents.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement

B. Section 01 11 00: Summary of Work.

C. Section 01 31 13: Project Coordination.

D. Section 01 32 13: Construction Schedule.

D. Section 01 77 00: Contract Closeout.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PROCEDURE

A. Contractor shall prepare a Request for Information. Refer to Appendix A for a sample RFI form. Contractor shall transmit the Request for Information to Architect with sketches, pictures and a suggested solution (if applicable) with a concurrent copy to the District Representative.

B. Architect response is a clarification of the intent of the Contract Documents and does not authorize changes in the Contract Amount, Milestones, and/or Contract Time.

C. A Request for Information may be returned with a stamp or notation "Not Reviewed," if:

1. The requested information is ambiguous or unclear.

2. The requested information is equally available to the requesting party by researching and/or examining the Contract Documents.

3. Contractor has not reviewed the Request for Information prior to submittal.

D. Review Time: After receipt by Architect and District Representative, allow **ten (10)** calendar days for response time by Architect. Contractor shall verify and is responsible for verifying Architect and District Representative receipt of a Request for Information.

E. Subcontractor-Initiated and Supplier-Initiated RFIs: RFIs from subcontractors and material suppliers shall be submitted through, be reviewed by and be attached to an RFI prepared, signed and submitted by Contractor. RFIs submitted directly by subcontractors or material suppliers will be returned unanswered to the Contractor.

1. Contractor shall review all subcontractor and supplier initiated RFIs and take actions to resolve issues of coordination, sequencing, and layout of the Work.

2. RFIs submitted to request clarification of issues related to means, methods, techniques and sequences of construction or for establishing trade jurisdictions and scopes of subcontracts will be returned without interpretation. Such issues are solely the Contractor’s responsibility.

3. Contractor shall be responsible for delays resulting from the necessity to resubmit an RFI due to insufficient or incorrect information presented in the RFI.

F. RFI Log: Contractor shall prepare and maintain a log of RFIs, and at any time requested by the Architect, Project Inspector, or District Representative, the Contractor shall furnish copies of the log showing all outstanding RFIs.

END OF SECTION 012613

APPENDIX A – Sample RFI Form

REQUEST FOR INFORMATION *(RFI)*

School Name: _____ RFI Number: _____

Project Name: _____ Date: _____

Contractor: _____ Project No.: _____

Issued To: _____ DSA No.: _____

(Architect) Contract No.: _____

_____ _____ _____

Drawing Number Detail Drawing Page Specification

SUBJECT: _____

Information Requested:

Suggested Course of Action:

Schedule Impact: ☐ YES ☐ NO Cost Impact: ☐ YES ☐ NO

Request Issued By: _____ _____ _____

Contractor's Signature *Name (Printed)* *Date*

Response:

Response Issued By: _____ _____ _____

Architect's Signature *Name (Printed)* *Date*

Responses Reviewed By: _____ _____ _____

Architect's Signature *Name (Printed)* *Date*

Proceeding with the Work in accordance with the above information indicates the Contractor's acknowledgement that there will be no change in the Contract Sum or Contract Time. If the Contractor considers that a change in Contract Sum or Contract Time is required, before proceeding with the work obtain authorization from the Owner by notifying the Owner and the Architect within five (5) working days and submit an itemized proposal within ten (10) days.

cc:

SECTION 012973

SCHEDULE OF VALUES PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Procedure for submission of a Schedule of Values for review and approval by the District Representative.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement

B. Section 012100: Allowances.

C. Section 012300: Alternates.

D. Section 012976: Progress Payment Procedures.

E. Section 013113: Project Coordination.

F. Section 013213: Construction Schedule.

G. Section 013229: Project Forms.

H. Section 013300: Submittal Procedures.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PREPARATION

A. In accordance with the Facilities Lease Agreement, Contractor shall commence preparation of a Schedule of Values on the form included in Section 013229.

B. Contractor shall coordinate the preparation of a Schedule of Values with preparation of the Construction Schedule as set forth in Section 013213.

C. Round amounts to the nearest whole dollar; the total shall equal the Contract Amount.

D. Provide a breakdown of the Contract Amount in enough detail acceptable to District Representative to facilitate continued evaluation of Tenant Improvement Payment Application and progress reports. Coordinate with the Project Manual table of contents and Schedule of Values form under Section 013229. Provide breakdown of all subcontract amounts.

E. Provide separate line items for items in the Schedule of Values for total installed value of that part of the Work.

F. Provide separate line item for labor and material when applicable.

G. Each item in the Schedule of Values and Tenant Improvement Payment Application shall be complete. Include total cost and proportionate share of general overhead and profit for each item except the amounts shown as separate line items as indicated under Schedule of Values form.

H. Temporary facilities and other cost items that are not direct cost of actual work-in-place shall be shown as separate line items as indicated under Schedule of Values form.

I. If at any time, District Representative determines, in its reasonable discretion, that the Schedule of Values does not approximate the actual cost being incurred by Contractor to perform the Work, Contractor shall prepare, for District Representative approval, a revised

Schedule of Values, which then shall be used as the basis for future progress payments. Without changing the Contract Amount, District Representative reserves the right to require Contractor:

1. To increase or decrease amounts within the line items in the Schedule of Values; and,

2. To conform the price breakdown to Owner accounting practice.

END OF SECTION 012973

SECTION 012976

PROGRESS PAYMENT PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements relative to a Tenant Improvement Payment Application.

1. Coordinate the Schedule of Values and Tenant Improvement Payment Application for payment with, but not limited to, the Construction Schedule, submittal log, and list of Subcontractors.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement

B. Section 012100: Allowances.

C. Section 012300: Alternates.

D. Section 012973: Schedule of Values Procedures.

E. Section 013213: Construction Schedule.

F. Section 013229: Project Forms.

G. Section 017419: Construction and Demolition Waste Management.

H. Section 017700: Contract Closeout.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 TENANT IMPROVEMENT PAYMENT APPLICATION

A. Each Tenant Improvement Payment Application shall be consistent with previous applications and payments as reviewed by Project Inspector, Architect, and District Representative. The following Tenant Improvement Payment Applications involve additional requirements:

1. The Initial Application for Payment

2. The Final Application for Payment

B. Payment Application Times: The period of Work covered by each Application for Payment is the payment date for each progress payment as specified in the General Conditions. The period covered by each Application for Payment is the previous month.

C. Contractor shall submit a draft Application for Payment seven (7) days prior to the first of each month, to be reviewed by the Architect, District Representative, and Project Inspector.

D. Payment Application Checklist: Use required form for the Application for Payment per Section 013229.

E. Application Preparation: Complete every entry on the form. Include execution by a person authorized to sign legal documents on behalf of Contractor.

F. Transmittal: Submit a minimum of three (3) wet signature originals of each Tenant Improvement Payment Application to the District Representative. All copies shall be complete, including releases and similar attachments.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to District Representative.

G. *Initial Tenant Improvement Payment Applications*: Administrative actions and submittals, that must precede or coincide with submittal for the first Tenant Improvement Payment Application include, but are not limited to, the following:

1. Schedule of Values.
2. Construction Schedule.
3. Submittal Schedule.
4. Emergency Contact List.
5. OCIP Enrollment.
6. Cal/OHSA Trenching Permit and Named Competent Person.
7. Storm Water Pollution Prevention Plan (SWPPP).
8. CSWPA forms.
9. Local Hire Policy Forms.
10. Releases.
11. Resume of Contractor's Project Manager, Job Site Superintendent, and Land Surveyor.

H. *Tenant Improvement Payment Applications*: Administrative actions and submittals that must precede or coincide with submittal of Progress Tenant Improvement Payment Applications include, but are not limited to, the following:

1. Certified Payroll (submitted directly to Labor Compliance Consultant in electronic format as specified by District Representative).
2. Updated and current Project Record Drawings (as-built). Visual verification necessary only.
3. Monthly Construction Schedule (updated, submitted and approved).
4. Approved Schedule of Values.
5. List of Subcontractors (Payments Summary).
6. Storm Water Pollution Prevention Plan (SWPPP) – Site Monitoring Report.
7. Waste Management Progress Report.
8. Waivers and Releases.
9. Updated Submittal Schedule.
10. Material invoices, evidence of equipment purchases, rentals, and other backup materials to support cost as requested by the District Representative.

I. *Final Tenant Improvement Payment Applications*: Administrative actions and submittals that must precede or coincide with submittal of the Final Tenant Improvement Payment Application include, but are not limited to, the following:

1. Project Inspector's sign-off and final approval of Project's DSA Form(s) 152.
2. Contractor's submission of Contractor's Verified Report DSA Form 6-C.
3. Completion of Contract Closeout requirements.
4. Updated and Final As-Built drawings – in accordance with Facilities Lease Agreement.
5. Completion and acceptance of final punch list items.
6. Delivery of extra materials, products, and/or stock.
7. Identification of unsettled claims.

8. Proof that taxes, fees, and similar obligations are paid.
9. Operating and maintenance instruction manuals.
10. Consent of surety to final payment.
11. Waivers and releases.
12. Warranties, guarantees and maintenance agreements.
13. Training.
14. Removal of temporary facilities and services.
15. Removal of surplus materials, rubbish, and similar elements.
16. Deductive items pursuant to the Facilities Lease Agreement.
17. Completion and submission of all final change orders for the project.
18. Disabled Veteran Business Enterprise (DVBE) Contractor closeout statement.

J. Any payments made to Contractor where criteria set forth above have not been met shall not constitute a waiver of said criteria by District Representative. Instead, such payment shall be construed as a good faith effort by District Representative to resolve differences so Contractor may pay its Subcontractors and suppliers and that Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

END OF SECTION 012976

SECTION 013113

PROJECT COORDINATION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:

1. General coordination procedures.

2. Coordination drawings.

1.02 RELATED SECTIONS

A. Section 011216: Phasing of the Work.

B. Section 013119: Project Meetings.

C. Section 013213: Construction Schedule.

D. Section 013300: Submittal Procedures.

E. Section 014523: Testing and Inspection.

F. Section 017329: Cutting and Patching.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 COORDINATION

A. It is the Contractor's responsibility to coordinate the Work to minimize conflicts and optimize efficiency.

B. School occupancy will remain in session during the Project.

C. The placement of pipes, conduits, other materials, and the locations, size and reinforcement of holes in the building structure shall conform to the structural Drawings and Specifications. When the requirements of the Mechanical, Electrical or other sections of the Specifications or Drawings are in conflict with the structural requirements, the structural requirements shall take precedence. The Contractor shall take all precautions prior to coring into a building structure. The Contractor must notify the structural engineer and obtain written approval prior to completing any structural penetrations if the structural integrity of an existing building structure is compromised. Refer to section 01 73 29, Cutting and Patching.

D. Verify that utility, and other building system requirement characteristics of operating equipment are compatible with existing utilities, and other existing building systems. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Contractor shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:

1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.

3. Provide provisions to accommodate items scheduled for later installation.

4. Prepare and administer provisions for coordination drawings.

F. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required in notices, reports, attendance at meetings, and:

1. Prepare similar memoranda for District Representative and Separate Work Contract where coordination of their Work is required.

G. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.

2. Installation, relocation, and removal of temporary facilities.

3. Delivery and processing of submittals.

4. Progress meetings.

5. Project closeout activities.

H. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:

1. Salvage materials and equipment involved in performance of, but not actually incorporated into Work.

I. Contractor shall provide advance notice (minimum of two (2) working days) to District Representative of any required electrical or HVAC shut down activities for the District to properly prepare for these activities and the down time that will occur.

J. Contractor shall provide advance notice (minimum of two (2) working days) to District Representative of any required testing of active cabling for the District to properly prepare for these activities and the down time that will occur.

3.02 SUBMITTALS

A. Coordination Drawings: Contractor shall prepare coordination drawings to coordinate the installation of products and materials fabricated, furnished and installed by separate entities, under different parts of the Contract. Contractor shall notify District Representative and Architect of all major conflicts in writing in a timely manner so that the design team can respond without construction delays. Coordination drawings shall address the following at a minimum:

1. Limitations in available space for installation or service. Contractor shall overlay plans of each trade and verify space requirements and conflicts between trades. Minor changes and adjustments that do not affect design intent shall be made by Contractor and shall be highlighted for Architect's review.

2. Incompatibility between items provided under different trades (such as difference in voltage between equipment specified under Divisions 22 and 23 and electrical power provided under Division 26.)

3. Inconsistencies between drawings, specifications and codes (between trades and within each trade).

4. Additional items required for existing facilities construction projects shall be designed and prepared from available as-built drawings that are verified through non-invasive and non-destructive, visual observation only. Contractor shall field verify actual existing conditions during and upon completion of demolition work and incorporate findings into preparation of coordination drawings. Minor changes and adjustments that do not affect design intent shall be made by Contractor and shall be highlighted for District Representative and Architect's reviews.

B. Contractor and each Subcontractor shall provide and forward reproducible copies and AutoCAD or Revit drawing files in the order described here:

1. Structural shop drawings shall indicate location and sizes of columns, beams and other structural members, as well as wall, roof and slab penetrations, and will be provided to mechanical, electrical, low voltage and plumbing Subcontractors for coordination. Structural items shall be indicated using black lines.

2. HVAC Subcontractor will indicate all ductwork, piping and equipment complete with installation and dimensioned service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger and support locations. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be highlighted for District Representative and Architect's reviews. Forward drawings to plumbing Subcontractor for further coordination. HVAC items shall be indicated using orange lines.

3. Plumbing Subcontractor will indicate all plumbing lines, and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger/support locations Coordinate with HVAC Subcontractor. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be highlighted for District Representative and Architect's reviews. Upon completion, drawings shall be forwarded to Fire Sprinkler Subcontractor for further coordination. All Plumbing items shall be indicated using blue lines.

4. Fire sprinkler Subcontractor will indicate fire sprinkler piping and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger or support locations. Coordinate with Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-Contractors and shall be highlighted for District Representative and Architect's reviews. Upon completion drawings shall be forwarded to Electrical Contractor for further coordination. Fire sprinkler equipment shall be indicated using red lines.

5. Electrical and Low Voltage Subcontractors will indicate service and feeder conduit runs and other electrical equipment complete, including low voltage with installation and dimensioned service clearances, sizes, top or bottom of conduit and rack elevations, distances of conduits and equipment from building reference points and hanger and support locations. Coordinate with Fire Sprinkler, Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-Contractors and shall be highlighted for District Representative and Architect's reviews. Upon completion drawings shall be forwarded to Contractor for further coordination. Electrical work shall be indicated in dark green lines. Low voltage work shall be indicated in light green lines.

6. Contractor will be responsible for the overall coordination review. As each coordination drawing is completed, Contractor will meet with Architect and/or District Representative to review and resolve conflicts on coordination drawings.

7. Coordination meetings will be held in Project field office of Contractor. Contractor is required to distribute Shop Drawings, cut sheets and submittals to Subcontractors where appropriate. Reviewed coordination drawings will be maintained in Project field office of Contractor. Meeting minutes shall be developed by Contractor and submitted to District Representative within five (5) days.

8. All Contractors shall review and sign the final coordinated set of drawing(s) prior to construction of system(s) depicted in the drawing(s).

C. If Contractor is utilizing Building Information Modeling (BIM), such as 3D Clash Coordination, the Contractor must submit a BIM Project Execution Plan for District Representative and Design Professional review. The plan shall at minimum include the following items.

1. Project Information: Key project contacts shall be provided including project name, contract type, delivery method, project description, project schedule, phases, and milestones.

2. Key Project Contacts: Key contact information such as Project Managers, BIM Manager, Trade BIM Managers, Superintendents and other major project roles shall be provided.

3. BIM Information Exchanges: The team shall identify the information exchanges created as part of the planning process in the BIM Project Execution Plan. The information exchanges will illustrate the model elements by discipline, level of detail, and any specific attributes important to the project.

4. Collaboration Procedures: The team must develop their electronic and activity collaboration procedures. This includes model management and standard meeting actions and agendas.

5. Quality Control: Project teams should determine and document their overall strategy for quality control of the model.

6. Model Structure: The team must identify the methods to ensure model accuracy and comprehensiveness.

7. Project Deliverables: The project shall identify project deliverables as required by the District Representative.

8. Field Execution of final BIM product: Outline how the final BIM deliverables will be executed to reduce construction errors, change orders, and trade scheduling issues.

END OF SECTION 013113

SECTION 013119

PROJECT MEETINGS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements for Project meetings, including but not limited to, the following:

1. Preconstruction meeting.
2. Pre-installation conferences.
3. Progress meetings.
4. Meetings as required by District Representative.

1.02 RELATED SECTIONS

A. Section 011216: Phasing of the Work.

B. Section 013113: Project Coordination.

C. Section 013213: Construction Schedule.

D. Section 013300: Submittal Procedures.

E. Division 2 - 33

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PRECONSTRUCTION MEETING

A. District Representative will schedule a preconstruction meeting before starting the Work, at a time and date determined by District Representative. Meeting shall be held at the Project site or another location as determined by District Representative. Meeting will be held in order to review responsibilities, procedures, and other administrative requirements contained within the Contract Documents. Major trades may attend.

B. Authorized representatives of District, Project Inspector, Architect, Contractor and other parties shall attend the meeting. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda items shall include significant items which could affect progress of the Work, including, but not limited to the following:

1. Identification of District Representative, key team members, and roles/responsibilities
2. Preliminary Construction Schedule.
3. Critical work sequencing and coordination of other work on campus.
4. Designation of responsible personnel and emergency contacts.
5. Procedures for processing field decisions.
6. Request for Proposal.
7. Request for Information.
8. Construction Change Directive, Immediate Change Directive, and Change Order.

9. Procedures for processing Tenant Improvement Payment Applications.

10. Labor Compliance and Wage Determinations.

11. Submittal and review of Shop Drawings, Product Data, material lists, and Samples.

12. Preparation of project record documents.

13. Use of the Project site and/or premises, staging plan, trucking routes, haul routes, etc.

14. Parking availability.

15. Office, work, and storage areas.

16. Equipment deliveries and priorities.

17. Safety procedures.

18. Emergency response.

19. First Aid.

20. Security.

21. Housekeeping.

22. Working hours.

23. Insurance Services including OCIP.

24. Environmental Health and Safety / Import and Export Testing Requirements.

25. Substantial Occupancy, Administrative Closeout and Contract Completion requirements and procedures.

26. Storm Water Pollution Prevention Plan (SWPPP).

27. CEQA Compliance.

28. Community and Student Workforce Project Agreement (CSWPA) Compliance.

D. District Representative shall prepare and issue meeting minutes to attendees and interested parties no later than three (3) calendar days after the meeting date.

3.02 PRE-INSTALLATION CONFERENCES

A. Contractor shall coordinate and conduct pre-installation conferences at the Project site as required by related Sections of the Contract Documents.

B. Contractor, manufacturers, and fabricators involved in or affected by the installation and its coordination or integration with other preceding and/or subsequent installations of Work shall attend the meeting. Contractor shall advise District Representative, Project Inspector, and Architect of scheduled meeting dates and provide an agenda 48 hours prior to meeting.

1. Contractor shall review the progress of construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:

a. Contract Documents.

b. Options.

c. Related Construction Change Directives and Change Orders.

d. Purchases.

e. Deliveries.

f. Shop Drawings, Product Data, and quality-control samples.

g. Review of mockups.

h. Possible conflicts.

i. Compatibility problems.

j. Time schedules and work sequence.

k. Weather limitations.

l. Manufacturer's recommendations.

m. Warranty requirements.

n. Compatibility of materials.

o. Acceptability of substrates.

p. Temporary facilities.

q. Space and access limitations.

r. Governing regulations.

s. Safety.

t. Inspecting and testing requirements.

u. Required performance results.

v. Recording requirements.

w. Protection.

2. Contractor shall record significant discussions and directives received from each conference. Contractor shall, within three (3) calendar days after the meeting date, distribute the minutes of the meeting to all concerned parties, including but not limited to, District Representative, Project Inspector, and Architect.

3.03 PROGRESS MEETINGS

A. Progress meetings will be held at the Project site at regular intervals, weekly, as determined by the District Representative.

B. In addition to representatives of Contractor, District Representative, and Architect, each Subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of the Work shall, if requested by District Representative, be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to conclude all matters relating to the Work.

C. Failure of Contractor to be so represented at any progress meeting which is held at a mutually agreed time or for which a written notice is given, shall not relieve Contractor from abiding by any and all District Representative determinations or directives issued at such meeting.

D. District Representative will review and correct or approve minutes of the previous progress meeting and will review other significant items affecting progress. Topics for discussion as appropriate to the status of the Project include but are not limited to:

1. Safety (OCIP).

2. DSA Field Engineer notes.

3. Interface requirements.

4. Construction Schedule.

5. Sequence and coordination.

6. Status of submittals / RFIs.

7. Deliveries.

8. Off-site fabrication.

9. Access.

10. Site utilization.
11. Temporary Construction Facilities and Controls.
12. Hours of work.
13. Hazards and risks.
14. Housekeeping.
15. Quality of materials, fabrication, and execution.
16. Unforeseen conditions.
17. Testing and Inspection.
18. Defective Work.
19. Construction Change Directive.
20. Request for Proposal.
21. Change Order Proposals and Change Orders.
22. Documentation of information for payment requests.
23. Tenant Improvement Payment Application.
24. Other items as required or as brought forth.
25. Initial Notice of Start of Issue.
26. Final Notice of End of Issue.
27. Storm Water Pollution Prevention Plan.
28. CEQA Compliance.
29. CSWPA Compliance.

A. No later than three (3) calendar days after each progress meeting, District Representative will prepare and distribute minutes of the meeting to each present and absent party.

1. Schedule Updating: Contractor shall revise the Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized, and issue the revised schedule at the next scheduled progress meeting.

3.04 ADDITIONAL MEETINGS

A. Upon notice to the intended parties and without further obligation, District Representative may require additional meetings to discuss Work and/or Project related activities.

END OF SECTION 013119

SECTION 013213

CONSTRUCTION SCHEDULE

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Required procedures, preparation, submittals, reviews, updates, and revisions to the construction schedule.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 011100: Summary of Work.

C. Section 011216: Phasing of the Work.

D. Section 012300: Alternates.

E. Section 012973: Schedule of Values Procedures.

F. Section 012976: Progress Payment Procedures.

G. Section 013113: Project Coordination.

H. Section 013300: Submittal Procedures.

I. Section 014523: Testing and Inspection.

J. Section 015000: Construction Facilities and Temporary Controls.

K. Section 017836: Warranty Procedures.

PART 2 – PRODUCTS

2.01 SCHEDULING SOFTWARE

A. Contractor shall utilize Primavera Project Planner™ for Windows® (P6) software (latest version) by Primavera Systems, Inc., or equivalent scheduling software to employ the Critical Path Method (CPM) in the development and maintenance of the construction schedule network using the Precedence Diagram Mode (PDM). The scheduling software shall be capable of being resource loaded with manpower and materials. It shall also be capable of generating time-scaled logic diagrams, resource histograms and profiles, bar charts, layouts and reports with any and/or all activity detail.

PART 3 – EXECUTION

3.01 SUBMITTALS

A. Contractor shall retain a construction scheduler to work in enough capacity to perform all of the requirements outlined in this Section. Scheduler shall have a minimum of five (5) years' experience. The Scheduler shall be able to plan, coordinate, execute, and monitor a CPM schedule as required for this Project. Scheduler will cooperate with District Representative and shall be available on site for monitoring, maintaining and updating schedules in a timely manner. District Representative has the right to refuse to accept the Scheduler based upon a lack of experience as required by this Section or based on lack of performance and timeliness of schedule submittals and of fragments on past projects. If District Representative does not accept the proposed Scheduler, Contractor shall within one (1) week of disapproval, propose another scheduler who meets the experience requirements stated above.

B. Contractor shall submit two originals and three copies of all bar charts, reports and/or other required schedule data as outlined in this Section. Contractor shall electronically deliver the schedule file in its original format at the time of submittal (PDF and PRX file formats).

C. Contractor shall submit the Proposed Baseline Schedule within the time period indicated in the Facilities Lease Agreement, Exhibit F.

D. Contractor shall submit the Monthly Schedule Updates, Four-Week Rolling Schedules, and Recovery Schedules as required.

3.02 [RESERVED]

3.03 BASELINE SCHEDULE CPM NETWORK

A. Within time period indicated in the Facilities Lease Agreement, Contractor shall submit a detailed Proposed Baseline Schedule that covers the entire duration of the Project. This schedule shall convey Contractor's plan for organizing, managing, and executing the Work.

B. The Proposed Baseline Schedule shall include activity descriptions, sequencing, logic relationships, duration estimates, by CSI section, resource loading, and other information as set forth in this Section.

1. The Proposed Baseline Schedule shall include all Milestones stipulated in Specification Section 011216, the Facilities Lease Agreement, as well as all activities required to achieve timely completion of the Milestones.

2. The Proposed Baseline Schedule shall include activities for: all construction activities, the NTP, Milestones, submittals, coordination drawings, re-submittals, procurement of materials and equipment, manufacturing, fabrication & delivery, owner furnished contractor installed items (OFCI), access restrictions, work restrictions, phased occupancy, testing, start-up, and contract closeout activities. The Proposed Baseline Schedule shall allow a period for District Representative and Architect to review each submittal, as required by Section 013300 and other sections which require additional time for District Representative reviews and deferred submittal reviews by Division of State Architect (DSA).

3. The Proposed Baseline Schedule shall include start and completion dates for: temporary facilities, construction of mock-ups, prototypes, samples, punch list, District Representative interfaces and furnishing of items, separate work contracts, regulatory agency approvals, and permits required for performance of the Work.

4. The Proposed Baseline Schedule shall allow for all foreseeable factors and risks which affect performance of the Work. Include allowances for weather conditions, applicable laws, transportation, traffic, air quality, noise, or any other applicable regulatory requirements, regulations or collective bargaining agreements pertaining to labor.

5. Contractor shall not use any float suppression techniques such as preferential sequencing or logic, special lead/lag constraints or unjustifiable over-estimating of activity durations in preparing the Proposed Baseline Schedule except that "Finish No Later Than" constraints are permitted for Milestones. No "Zero Free Float" constraints, No "Early" Constraints, and No "Mandatory Finish" constraints shall be utilized.

6. The Proposed Baseline Schedule shall include activity durations based on the crew sizes and equipment utilization that Contractor will maintain during the Project. No activity durations shall exceed fifteen (15) working days unless approved by the District Representative. Non-construction activities such as procurement, delivery, or submittal activities are exempted.

7. Contractor shall include with the Proposed Baseline Schedule a written narrative report sufficiently comprehensive to explain the rationale behind Contractor's approach to the Work including but not limited to: activity durations, manpower flow, average crew sizes, equipment requirements, production rates, constraints, holidays and other non-work days,

potential problem areas, permits, coordination with regulatory authorities, utilities, separate work contracts and other parties, and long lead delivery items requiring more than thirty (30) days from the date of order to delivery to the Project site.

C. At the District Representative's request, furnish a detailed written explanation of Contractor's basis for specific durations, logic, phasing, or other information. Such an explanation shall include Contractor's rationale for selecting the number of crews, crew composition, number of shifts per day, number of hours in a shift, number of work days per week, construction equipment, and similar factors.

D. The Proposed Baseline Schedule activities shall contain the following data:

1. Activity ID numbers shall consist of no more than eight alphanumeric characters. Following District Representative acceptance of the Baseline Schedule, Activity ID numbers shall not be changed.

2. Activity Descriptions shall provide adequate information that readily identifies each activity, work scope, and location.

3. Activity codes specified in Section 3.03.G shall be applied to each activity.

E. At District Representative's request, furnish a written explanation for each lead or lag relationship and each constrained date. Unjustifiable leads, lags, and constraints may result in District Representative's rejection of the Proposed Baseline Schedule.

F. Calendar Identification: In the scheduling software, identify all activities that will require overtime shifts, double shifts, and work on weekends or holidays. Identify non-work days and holidays in the schedule calendar. All milestones stipulated in the Facilities Lease Agreement shall be placed on a calendar with seven days per week. No holiday or non-work day restrictions are permitted on this calendar.

G. Activity Codes: As a minimum, the Activity Codes shown in Table 1 below shall be assigned to each activity.

Table 1

Name	Length	Description
TYPE	2	Type of activity (for example: mobilization, submittals, procurement/fabrication, construction, milestones, etcetera.)
AREA	2	Area or Building (for example: Bldg A, Building B, Courtyard, Athletic Fields, Street Work, etcetera.)
STAG	2	Stage (for example: Foundations, Superstructure, Exterior, Interior, Roof, Floor Number etcetera.)
SBST	2	Substage (a specific area within a stage such as: main electrical room, kitchen, room number, etcetera.)
RESP	7	Responsible Party (subcontractor and/or trade)
SPEC	5	CSI section number

1. District Representative may require additional coding of activities. The mandatory activity code requirements listed in Table 1 are not to be construed as setting limits on Contractor's management and coordination responsibilities, but are intended to guide Contractor in the administration of its contractual responsibilities.

H. Milestones are designated dates in which Work or portions thereof are required to start and complete in accordance with the Contract Documents.

1. Where the term completion or similar terms are used in regards to a Milestone, it shall be construed to mean all portions of the Work in the indicated phase, area, and zone are complete and acceptable to District Representative. Where the term start or similar terms

are used in the designation of a Milestone, it shall be construed to mean a portion of the Work in the indicated phase, area, or zone is required to be commenced.

2. A Proposed Baseline Schedule extending beyond the Milestones or Contract Time will not be acceptable.

3. Finish Milestones shall be constrained with Late Finish (Finish No Later Than) type constraints in accordance with the dates stipulated in Specification Section 011216, Phasing of the Work, Appendix A.

4. In the scheduling software, in the "Project Overview" menu, assign the "Project Must Finish By" date to match the Substantial Completion and Contract Completion Milestone dates stipulated in Specification Section 011216, Phasing of the Work.

5. A Proposed Baseline Schedule indicating Work completed in less time than the Milestones and/or Contract Time will not be acceptable. Rather, Contractor shall show any unused contract time as float.

6. Milestones shall be placed on a calendar with seven days per week. No Holiday or non-work day restrictions are permitted on this calendar.

I. The Critical Path shall be clearly indicated on all schedules submitted. An activity is defined as critical when its Total Float is less than or equal to zero (0) days.

J. Contractor shall allow Float time for Inclement Weather, Government Delay, and Free Float in the Baseline Schedule in accordance with the Facilities Lease Agreement.

K. Contractor shall submit computer generated reports and plots with the Proposed Baseline Schedule submittal package. Format shall display the following columns: Activity ID, Activity Description, Original Duration, Remaining Duration, Percent Complete, Early Start, Early Finish, Late Start, Late Finish, and Total Float. Unless otherwise noted, bar charts and reports shall be on 8 ½ by 11 paper and bound.

1. Bar charts shall be generated separately for:

   a. Milestones only.

   b. Activities sorted by Early Start date and organized by Project, Area, Stage, and Substage. (The network shall show continuous flow of all activities from left to right).

   c. Activities sorted by Responsibility.

   d. Summary level of all activities sorted by craft/trade and area.

2. Tabular Reports:

   a. Total Float sorted low to high

   b. Predecessors and Successors sorted by Activity ID.

3. Electronic data: Provide an electronic file in its original format of the Proposed Baseline Schedule. The electronic P6 files shall be saved in ".XER" and/or ".STX" type format.

4. Plots: Produce a color bar chart on E-size paper (30-inch by 42-inch) organized (at a minimum) by project, area, stage, and substage.

L. District Representative will notify Contractor of any adjustments that are required for the Proposed Baseline Schedule to be accepted. Contractor shall perform any required adjustments to the Proposed Baseline Schedule and resubmit it for acceptance certifying in writing that all information contained therein complies with the Contract Documents. District Representative will review the Proposed Baseline Schedule for accuracy, reasonableness, and conformance with the Contract Documents and shall provide comments within ten days of receipt. Within five days after receiving District Representative comments, Contractor shall both incorporate changes to address District Representative concerns and resubmit the Proposed Baseline Schedule for District Representative back-check. This process will continue until the Proposed Baseline Schedule is

accepted as the Baseline Schedule. Once accepted by District Representative, the Baseline Schedule will be the basis upon which Contractor shall prepare updates that record and report actual performance and progress. The accepted Baseline Schedule and subsequent Monthly Updates shall be the basis for consideration and analysis of requests for time extensions and Contractor progress payments.

M. District Representative acceptance of the Baseline Schedule or Contractor's failure to identify or include an element of the Contract, shall not release Contractor's obligation to complete all required Work in accordance with the Contract Documents.

3.04 REQUIREMENTS FOR MONTHLY/WEEKLY SCHEDULE UPDATING

A. Once the Baseline Schedule is accepted by District Representative, Contractor shall submit Monthly Schedule Updates beginning with month No. 1. The current month's schedule update cannot be accepted until the previous Monthly Schedule Update has been accepted by District Representative.

B. Monthly Schedule Update Format

1. Initially, the Contractor shall status a current Monthly Schedule Update with actual Work progress only. No logic ties shall be modified. Status all Actual Start and Finish dates, adjust Remaining Durations where needed, and update Percent Completion of activities. If Contractor chooses to modify logic or add activities (other than out-of-sequence corrections) it shall be done in accordance with Section 3.06.

2. Once the schedule is statused in accordance with Section 3.04.B.1, Contractor shall print (and submit with Monthly Schedule Update) a report of "out-of-sequence" logic that results from the updating process. Contractor shall then correct all "out-of-sequence" logic to reflect Contractor's actual Work sequence.

3. During construction, Contractor may desire to break down specific activities into greater detail. If greater detail is necessary, then Contractor shall identify expanded activities such that the Baseline Schedule activities that the expanded activities originated from are readily apparent. Contractor shall not allow the aggregate duration of the expanded activities to exceed the duration assigned to the Baseline Schedule activity unless permitted by District Representative in writing.

4. The Data Date for the Monthly Schedule Updates shall be the last day of the month. At a minimum, three days prior to the submission of the Monthly Schedule Update, Contractor shall meet in person with District Representative to present the proposed Percentages of Completion and Actual Start and Actual Finish dates. If the District Representative takes no exceptions to the percentages of completion and actual dates then the Monthly Schedule Update may be implemented.

5. Written Narrative Report: Contractor shall include a written report to explain the Monthly Schedule Update. The narrative shall, at a minimum include the following headings with appropriate discussions of each topic:

a. Introduction.

b. A Summary of Work which was on-going This Pay Period.

c. Problem Areas and Proposed Solutions.

d. Critical Path.

e. Current and Anticipated Delays.

f. Coordination of Work with Others.

g. Milestone Status.

h. Denote changes in logic and added Fragnets.

i. Denote additions/deletions of activities.

6. In updating the Schedule, Contractor shall not modify Activity ID numbers, schedule calculation rules/criteria, or the Activity Coding Structure required.

7. Submit bar charts, tabular reports, written narrative, electronic data, and plots in accordance with this Section.

C. Four-Week Rolling Schedule: At each Weekly Progress Meeting, Contractor shall present a Four-Week Schedule in Bar Chart format. It shall show one (1) week of actual and three (3) weeks of forecasted progress. The Four-Week Rolling Schedule shall be used as a basis for discussing progress and work planned during the three (3) weeks.

1. The Four-Week Rolling Schedule shall be based on the most recent District Representative Accepted Monthly Schedule Update. It shall include weekly updates to all construction, submittal, fabrication and procurement, and separate work contract activities. Contractor shall ensure that it accurately reflects the current progress of the Work.

2. Contractor shall discuss actual dates and any variances to critical or near critical activities.

3. Upon request by District Representative, Contractor shall provide the Four-Week Rolling Schedule in electronic format.

4. If the Four-Week Rolling Schedule indicates activities are behind schedule, Contractor shall provide a Recovery Schedule in accordance with Section 3.05.

3.05 RECOVERY SCHEDULES

A. If a Monthly Schedule Update indicates negative float greater than ten (10) workdays on a critical path, as result of events not predicated by the Facilities Lease Agreement, Contractor shall prepare a Proposed Recovery Schedule demonstrating Contractor's plan to regain the time lost. The Recovery Schedule shall be submitted either in advance of or concurrent with the Monthly Schedule Update and Contractor progress request. Both the Monthly Schedule Update and the Proposed Recovery Schedule shall be based on the same percentages of completion and actual dates accepted by District Representative under Section 3.05 B.

B. The Proposed Recovery Schedule shall be based on a copy of the Monthly Schedule Update for the calendar month during which the negative float first appears.

C. The Proposed Recovery Schedule shall include a narrative that identifies the causes of the negative float on the critical path and provides Contractor's proposed corrective action to ensure timely completion of all Milestones and the Substantial Completion Date. Contractor's corrective actions shall include but are not limited to increasing concurrent operations, increasing labor, adding multiple shifts in a 24-hour period, and adding overtime.

D. During any period of time when Contractor is found to be behind schedule by District Representative, the Monthly Schedule Update described above shall become a weekly requirement to provide a greater degree of focus on the timely completion of the Work. These Updates shall be submitted to District Representative every Monday morning. When Contractor is deemed by District Representative to be back on schedule, Contractor may revert to submitting the schedule monthly.

E. Contractor's progress payment may not be processed until District Representative accepts the Proposed Recovery Schedule. Following such an acceptance, the Proposed Recovery Schedule will be known as the Recovery Schedule and future Work will be performed by Contractor in accordance with it.

3.06 FRAGNETS AND TIME EXTENSION REQUESTS

A. Float is not for exclusive use or benefit of either District Representative or Contractor but is an expiring resource available to both parties on a non-discriminatory basis. If required to meet specified Milestones, either party may utilize float. Adjustments to Milestones or Contract Time will only be authorized by Change Order and only to the extent the claimed adjustments exceed

total float along the most critical path of the current Monthly Schedule Update in effect at the time of the claimed adjustments. The claimed adjustments to the Milestones and/or Contract Time must also cause the Beneficial Completion Date to exceed that currently indicated in the Monthly Schedule Update. Contractor alleged claimed adjustments to an existing negative float path will not receive consideration until the activity with the highest negative float is driven even further negative.

1. Alleged Claimed adjustments to the Milestones or Contract Time will be administered in conjunction with those set forth in the Facilities Lease Agreement.

B. Pursuant to the float sharing requirements of this Section, the use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, and extended activity times or durations are prohibited. The use of float time disclosed or implied by the use of alternate float suppression techniques shall be proportionally shared to benefit District Representative and Contractor. The use of any technique solely for the purpose of suppressing float will result District Representative rejection of the submitted Monthly Schedule Update.

C. In the event Contractor believes the Project has suffered an adverse impact arising from events predicated by the Facilities Lease Agreement, Contractor may prepare a Time Extension Request by submitting a Schedule Fragnet and a written narrative outlining the detail of the impact. A Schedule Fragnet must demonstrate a critical path delay. Such a delay must adversely impact the Substantial Completion Date for Contractor to receive a time extension. To demonstrate such an impact successfully, Contractor shall prepare a Schedule Fragnet based on a copy of District Representative accepted Monthly Schedule Update for the calendar month during which the adverse impact occurred. This "copy" of the District Representative accepted Monthly Schedule Update shall however first be updated (by District Representative and Contractor jointly) with both Percentages of Completion and Actual Dates up to the day the delay commenced. This process will provide the "pre-delay" project status. Once District Representative and Contractor have agreed to the "pre-delay" project status, Contractor should make a copy of this "pre-delay" schedule and this copy is to be the starting point for Contractor's Schedule Fragnet development. District Representative will evaluate the activities, logic, durations, etcetera, in the Schedule Fragnet and will evaluate if the adverse impact arose from events described by the Facilities Lease Agreement. The Fragnet shall also include Contractor-caused delays that affect the critical or near critical path in the network and should be accounted for in the Time Impact Analysis if overlapped at any point in time with District Representative -caused delay. If rain impact days were granted between the Start and Finish of District Representative -caused delay period, they should be accounted for in the Time Impact Analysis as well. Provided District Representative determines such an impact occurred, Contractor may be due a time extension equal to the number of proportioned days of variance/delay that resulted to the Substantial Completion Date.

D. Activities added into a Schedule Fragnet to demonstrate the impact of adverse event shall be assigned a unique activity code. The Schedule shall be organized by this unique activity code.

E. The Schedule Fragnet shall incorporate logic that accurately ties reflective of the adverse event to pre-event predecessor activities and post event successor activities.

F. The format and components of a Schedule Fragnet submittal shall be in accordance with this Section and the Facilities Lease Agreement. It is crucial for the Fragnet to be submitted within the same month of discovery so it can be resolved during the monthly schedule update review. The notice shall be transmitted to District Representative within the stipulations outlined in the Facilities Lease Agreement.

G. If District Representative accepts Contractor's Schedule Fragnet and an extension is granted, a Change Order will be prepared. District Representative will advise what change order number the time extension will become. When Contractor receives this Change Order number, all the activities added to the Schedule Fragnet shall be given Activity Identification Numbers that corresponds with the Change Order number. Contractor shall resource-load the activities if required by District Representative. If resource loading is required, the resource loading shall include a breakdown of labor, material, and equipment quantities.

H. If District Representative rejects Contractor's Schedule Fragnet in part based on improper forecast logic or activity tasks then it shall be revised accordingly to conform to District Representative review comments and resubmitted. If the forecast logic and activity tasks cannot be agreed to then the pre-delay schedule outlined in Section 3.06.C shall be compared to the actual as-built data in the succeeding month of the encountering issue, event, condition, circumstance, and/or cause. The variance to the project between the pre-delay and post delay schedules shall be discussed in Contractor's written narrative and proportioned between the different parties involved in the delay.

I. If District Representative rejects Contractor's Schedule Fragnet in whole then Contractor may follow the procedures set forth in the Facilities Lease Agreement.

3.07 FAILURE TO COMPLY WITH REQUIREMENTS

A. At any time during the project if Contractor fails to comply with the specified requirements, District Representative reserves the right to engage independent estimating and scheduling consultants to fulfill these requirements. Upon notice to Contractor, District Representative shall assess against Contractor, incurred costs for these additional services.

B. In such an event, District Representative will require, and Contractor shall participate and provide requested information to ensure the resulting Milestones Schedule accurately reflects Contractor's plan to execute the Work in compliance with the Contract Documents. If it becomes necessary for District Representative to recommend logic or duration revisions as a result of Contractor failure to furnish acceptable data, and if Contractor has objections to the recommendations, Contractor shall provide notice to District Representative within three (3) days and Contractor shall provide an acceptable alternate plan. If Contractor fails to so note any objections and provide an acceptable alternate plan, or if Contractor implements the recommendations of District Representative without so noting any objections, Contractor will be deemed to have waived all objections and concurred with the recommended logic/duration revisions provided by Architect and/or District Representative

C. Submittal of any Monthly Schedule Updates are subject to review and acceptance by District Representative. District Representative retains the right, including, but not limited to the Facilities Lease Agreement, to withhold progress payments in whole or part until Contractor submits a Monthly Schedule Update acceptable to District Representative.

3. 08 CONTRACTOR RESPONSIBILITY

A. Nothing in this Section shall be construed to be a usurpation of Contractor authority, responsibility, and obligation to plan and schedule Work as Contractor deems necessary, subject to all other requirements of the Contract Documents.

B. Contractor shall involve the subcontractors, manufacturers, and suppliers in the development and periodic updating of the schedule.

3.09 RECORD DOCUMENTS

A. Prior to Contract Completion of the Work, Contractor shall submit an as-built time-scaled network diagram reflecting the actual dates of all activities.

END OF SECTION 013213

SECTION 013229

PROJECT FORMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. The following District administrative forms and documents listed in this Section, but not limited to, shall be utilized in the administration of the Work.

B. Electronic versions of these forms are available from the District Representative, if requested by Contractor.

C. From time to time, Owner may release new revisions and new Project Forms. At any time during the Project, if requested by District Representative, Contractor shall use the newly released Project Forms.

1.02 RELATED DOCUMENTS

A. Facilities Lease Agreement.

B. Division 01.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 FORMS: Contractor to utilize the following District standard forms:

A. Tenant Improvement Payment Application / Schedule of Values

B. Change Order

C. Conditional Waiver and Release – Final Payment

D. Conditional Waiver and Release – Progress Payment

E. Immediate Change Directive

F. Unconditional Waiver and Release – Final Payment

G. Unconditional Waiver and Release – Progress Payment

H. Construction Waste Management Plan

I. Construction Waste Management Progress Report

J. Letter of Ascent (CSWPA)

K. CSWPA Craft Request

L. Core Employees List (CSWPA)

M. Monthly Employee Utilization (CSWPA)

N. Modified Certified Payroll Form (CSWPA)

O. Checklist of Labor Law Requirements

P. Certificate of Substantial Completion

Q. Warranty Guarantee Form

3.02 PROCEDURES

A. Tenant Improvement Payment Application / Schedule of Values: This form is used in requesting a progress payment and to establish the basis of the certified application for payment.

B. Change Order: This form is used to adjust the Contract Amount, Milestones and/or the Contract Time.

C. Conditional Waiver and Release: Use this form when the claimant is required to execute a waiver and release in exchange for or in order to induce the payment of a progress payment and the claimant has not been paid.

D. [RESERVED]

E. Immediate Change Directive: This form is used to issue an Immediate Change Directive.

F. Unconditional Waiver and Release: Use this form when the claimant is required to execute a waiver and release in exchange for or in order to induce payment of a progress payment and the claimant asserts in the waiver that he or she has in fact been paid the progress payment.

G. [RESERVED]

H. Construction Waste Management Plan: This form is used to provide a Waste Management Plan, submitted in accordance with Specification Section 017419 and prior to any waste removal.

I. Construction Waste Management Progress Report: This form is used to provide a Waste Management Monthly Progress Report, summarizing waste generated by Project and submitted monthly with Application for Payment.

J. Letter of Assent: This form is to be signed by all Contractors awarded work covered by the Community and Student Workforce Project Agreement (CSWPA).

K. CSWPA Craft Request Form: This form is to be used to request Craft Workers from the applicable union that will fulfill all hiring requirements for the project.

L. Core Employee List: This form is to be completed by All Prime Contractors/Consultants, Subcontractor/Sub-consultants intending to employ core workers. Complete this list and then forward to the District's Labor Compliance Consultant.

M. Monthly Employee Utilization Form: This form is to be completed monthly and then to be forwarded to the District's Labor Compliance Consultant.

N. Modified Certified Payroll Form: This form is to be completed monthly and then to be forwarded to the District's Labor Compliance Consultant in addition to the electronic Certified Payroll.

O. Checklist of Labor Law Requirements: This is to be completed by all Contractors, acknowledging and understanding the Federal and State Labor Law.

P. Certificate of Substantial Completion: This form is to be completed and signed by all parties once project has been determined to be substantially complete.

Q. Warranty Guarantee Form: This form shall be filled out and signed by Contractor and Subcontractors prior to completion of closeout activities.

END OF SECTION 013229

Project Name: _____

Project No.: _____ DSA Application No. _____

Conditional Waiver and Release Upon Final Payment

CALIFORNIA CIVIL CODE SECTION 8136

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: _____

Check Payable To: _____

Exceptions

This document does not affect any of the following: Disputed claims for extras in the amount of $_____.

Date: _____ _____
(Company Name)

BY: _____
(Signature)

_____
(Title)

Project Name: _____

Project No.: _____ DSA Application No. _____

Conditional Waiver and Release Upon Progress Payment

CALIFORNIA CIVIL CODE SECTION 8132

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

Through Date: _____

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: _____

Check Payable To: _____

Exceptions

This document does not affect any of the following: (1) Retentions; (2) Extras for which claimant has not received payment; (3) The following progress payments for which the claimant has previously provided a conditional waiver and release but has not received payment: Date(s) of waiver and release: _____, Amount(s) of unpaid progress payment(s): $_____; (4) Contract rights including: (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Date: _____ _____
(Company Name)

BY: _____
(Signature)

_____
(Title)

RSCCD – *CSWPA Project*
Checklist of Labor Law Requirements

The federal and state labor law requirements applicable to the contract are composed of but not limited to the following items. Please check to indicate that you understand:

□ The contractor's **duty to pay prevailing wages** under Labor Code Section 1770 et seq., should the project exceed the exemption amounts;

□ The contractor's **duty to employ registered apprentices** on the public works project under Labor Code Section 1777.5;

□ The **penalties for failure to pay prevailing wages** (for non-exempt projects) **and employ apprentices** including forfeitures and debarment under Labor Code Sections 1775 and 1777.7;

□ The requirement to **keep and submit copies upon request of certified payroll records** under Labor Code Section 1776, and penalties for failure to do so under Labor Code Section 1776(g);

□ The **prohibition against employment discrimination** under Labor Code Section 1777.6; the Government Code, and Title VII of the Civil Rights Act of 1964;

□ The **prohibition against accepting or extracting kickback from employee wages** under Labor Code Section 1778;

□ The **prohibition against accepting fees** for registering any person for public work under Labor Code Section 1779; or for filling work orders on public works under Labor Code Section 1780;

□ The **requirement to list all subcontractors** under Public Contracts Code Section 4104;

□ The **requirement to be properly licensed** and to require all subcontractors to be properly licensed and the penalty for employing workers while unlicensed under Labor Code Section 1021 and under the California Contractors License Law, found at Business and Professions Code Section 7000 et seq;

□ The **prohibition against unfair competition** under Business and Professions Code Sections 17200-17208;

□ The **requirement that the contractor be properly insured for Workers Compensation** under Labor Code Section 1861;

□ The **requirement that the contractor abide by the Occupational, Safety and Health laws and regulations** that apply to the particular construction project;

□ The **federal prohibition against hiring undocumented workers**, and the requirement to secure proof of eligibility/citizenship from all workers.

□ The **requirement to provide itemized wage statements** to employees under Labor Code Section 226.

I acknowledge that I have been informed and am aware of the foregoing requirements and that I am authorized to make this certification on behalf of my company.

Date	Signature
Company Name	License Number
Phone Number	E-Mail Address

CORE EMPLOYEES LIST

TO BE COMPLETED BY ALL PRIME CONTRACTORS/CONSULTANTS, SUBCONTRACTORS/SUBCONSULTANTS INTENDING TO EMPLOY CORE WORKERS

FIRM NAME: _____

PROJECT: _____ **CONTRACT NO.:** _____

PRIME CONTRACTOR: _____ **TELEPHONE NO.:** _____

The following is a list of anticipated "Core Employees" which are defined by the Community and Student Workforce Project Agreement (§5.6), have been on the active payroll for at least **thirty (30) out of the last one hundred eighty (180) days** prior to the award, and have been **residents of Orange County** for the one hundred eighty (180) working days prior to the award of the contract. Pursuant to the requirements of SB 1362 and California Labor Code section 3099.2, all employees performing **electrical work** for a subcontractor holding a C-10 license **must be certified**. If employees working on project are found to be not certified, they shall be immediately removed. Failure to provide proof of this documentation on all anticipated employees will be considered a violation and subject the subcontractor to corrective action up to and including being removed from the project.

The prime contractor/consultant and any subcontractor/subconsultant, at any tier, must submit this prior to commencing work on the project [§7.1].

Name	Last 4 Digits of SSN	Trade	ZIP Code of residence	Certificate # (Electricians only)

Certification:
I certify that the information contained hereon is true and correct.

Signature: _____ **Date:** _____

Name/Title: _____

SUBMIT ORIGINAL TO:

The Solís Group
RSCCD CSWPA Administrator
131 N. El Molino Ave., #100, Pasadena, CA 91101
FAX: (626) 685-6985 ● PHONE: (626) 698-8751

CSWPA CRAFT REQUEST FORM

TO THE CONTRACTOR: Please complete and fax this form to the applicable union to request craft workers that fulfill all hiring requirements for this project. A duplicate fax request is to be sent to the Project Labor Coordinator. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax Transmission Verification Reports and keep copies for your records.

The Rancho Santiago Community College District (District) Community and Student Workforce Project Agreement sets the goal that 66% of all of the labor and craft positions shall be from workers residing in the County of Orange and 50% of the positions are filled by residents of the District's service area which covers the following zip codes:

92602	92606	91610	92612	92614	91618 92620	92686	92627	92660
92675	92676	92679 92688	92701	92703	92704	92705	92706	92707
92707	92708	92780	92782	92802	92805 92806	92807	92808	92840
92843	92861	92862	92865	92866	92867	92868	92869	92883 92887

TO THE UNION: Please complete the "Union Use Only" section on the next page and fax this form back to the requesting Contractor. Be sure to retain a copy of this form for your records and send a copy to Project Labor Coordinator.

CONTRACTOR USE ONLY

To: Union Local # _____ Fax:_____ Date:_____

Cc: Project Labor Coordinator

From: Company:_____ Issued By:_____
Contact Phone: _____ Contact Fax:_____

PLEASE PROVIDE ME WITH THE FOLLOWING UNION CRAFT WORKERS

Craft Classification (i.e., plumber, painter, etc.)	Journeyman or Apprentice	Local Resident	Number of workers needed	Report Date	Report Time
TOTAL WORKERS REQUESTED = _____					

Please have worker(s) report to the following work address indicated below:
Project Name:_____ Site:_____ Address:_____
Report to:_____ On-site Tel:_____ On-site Fax:_____

Comment or Special Instructions:_____

UNION USE ONLY

Date dispatch request rec'd:
Dispatch received by:
Classification of worker requested:
Classification of worker dispatched:

WORKER REFERRED

Name:			
Date worker was dispatched:			
Is the worker referred a:		(check all that apply)	
District (zip code) resident	(See zip code list above)	Yes _____	No_____
Veteran		Yes _____	No _____
Graduate of District's JATC	(Carp, Elect & O.E., only)	Yes _____	No _____
Current District JATC apprentice	(Carp, Elect & O.E., only)	Yes _____	No _____
Orange County resident		Yes _____	No _____
Regular dispatch from out of work list		Yes _____	No_____

[This form is not intended to replace a Local Union's Dispatch or Referral Form normally given to the employee when being dispatched to the jobsite.]

REVISED April 2017 **MONTHLY EMPLOYEE UTILIZATION REPORT**

Contractor/Subcontractor Name:

Project Name: Central Plant

Reporting Period **From:** **To:**

	Employee Last Name:	Employee First Name:	Craft Classification:	Write 'A' for Apprentice or 'J' for Journeyperson	Zip Code:	**Core or Referred Employee (C or R?)**	Are you a U.S. Veteran? (Y/N)	**Are you currently enrolled or have you graduated from an apprentice program at an RSCCD school site? (Y/N) *See apprentice programs**	District Resident?	Orange County Resident?	Worked During This Period? (Y/N)
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											

Print Name and Title

Signature

Date

***Carpentry (SW Carpenters Local 2361 and 803)** - Acoustical Tile, Drywall/Lather, Drywall Finisher, Plastering, Concrete, Finish Carpentry, Framing, Tilt-up, Millright and Pile Driver
Electrician (IBEW Local 441 and OC NECA) - Inside Wireman and Sound Installer
Operating Engineers (Local 12) - Heavy Equipment Operator, Heavy Duty Repair, Inspection and Rock Products Industry
Surveying (Local 12) - Survey Chainman, Rodman and Chief of Party

The Monthly Employee Utilization Report (MEUR) reports onsite employee utilization for each contractor each month. Each employee used onsite is to be listed along with the criteria detailed below.

Basic Information

Contractor/Subcontractor Name: The name of the firm reporting work performed should be listed here.

Reporting Period: MEURs are to be submitted monthly. First date the month should be listed after "From" and last date should be listed after "To."

Employee Information

First & Last Name: Employee's first and last name should be listed here. Each employee who performed onsite craft work during the month should be listed.

Craft Classification: Craft Classification listed for each employee should be a recognized craft by the California Department of Industrial Relations (Carpenter, Electrician, Operating Engineer, etc.)

Apprentice/Journeyperson: Apprentices are employees registered and participating in Joint Labor Management Apprentice Programs approved by the California Apprenticeship Council and the Department of Industrial Relations of the State of California. All other employees are considered Journeypersons.

Zip Code: Enter the zip code where the employee resides

Core or Referred Employee: For non-union contractors, a Core Employee is a worker who is currently employed by a contractor (on their active payroll) who is a resident of the District or Orange County for thirty (30) of the last one-hundred eighty (180) working days before award of project work, or has been a resident of the District or Orange County for one-hundred eighty (180) days prior to award of project work. Referred Workers are workers who were dispatched from the union hall.

US Veteran: Put "Y" for all workers who are veterans of the US Armed Forces

RSCCD Apprentice Programs: Put "Y" for all workers who have graduated from or are currently enrolled in the District's Joint Labor Management Apprentice Program

District Resident: Residents living in any zip code within the jurisdictional boundary of the District, or, regardless of residence: Veterans of the U.S. Armed Forces and “RSCCD Program Participants”, defined as Apprentices currently enrolled and participating in the Joint Labor Management Apprentice Program through the District, or graduates of the District’s Joint Labor Management Apprentice Program. **The formula in this cell automatically determines if a worker qualifies as a District Resident based on information already entered.**

Orange County Resident: Workers residing within the borders of Orange County. **The formula in this cell will automatically determine if the worker is an Orange County Resident based on the zip code entered.**

Worked this Period?: Enter "Y" if the worker did perform work during the reporting period and "N" if they did not.

Zip	PO Name	County		District ZIP Codes	
10000				10000	
90620	Buena Park	OR		92602	
90621	Buena Park	OR		92606	
90622	Buena Park	OR		92610	
90623	La Palma	OR		92612	
90624	Buena Park	OR		92614	
90630	Cypress	OR		92618	
90631	La Habra	OR		92620	
90632	La Habra	OR		92626	
90633	La Habra	OR		92627	
90680	Stanton	OR		92660	
90720	Los Alamitos	OR		92675	
90721	Los Alamitos	OR		92676	
90740	Seal Beach	OR		92679	
90742	Sunset Beach	OR		92688	
90743	Surfside	OR		92701	
92602	Irvine	OR		92703	
92603	Irvine	OR		92704	
92604	Irvine	OR		92705	
92605	Huntington Beach	OR		92706	
92606	Irvine	OR		92707	
92607	Laguna Niguel	OR		92708	
92609	El Toro	OR		92780	
92610	Foothill Ranch	OR		92782	
92612	Irvine	OR		92802	
92614	Irvine	OR		92805	
92615	Huntington Beach	OR		92806	
92616	Irvine	OR		92807	
92617	Irvine	OR		92808	
92618	Irvine	OR		92840	
92619	Irvine	OR		92843	
92620	Irvine	OR		92861	
92623	Irvine	OR		92862	
92624	Dana Point	OR		92865	
92625	Corona Del Mar	OR		92866	
92626	Costa Mesa	OR		92867	
92627	Costa Mesa	OR		92869	
92628	Costa Mesa	OR		92883	
92629	Dana Point	OR		92887	
92630	Lake Forest	OR			
92637	Laguna Woods	OR			
92646	Huntington Beach	OR			
92647	Huntington Beach	OR			

92648	Huntington Beach	OR			
92649	Huntington Beach	OR			
92650	Irvine	OR			
92651	Laguna Beach	OR			
92652	Laguna Beach	OR			
92653	Laguna Hills	OR			
92654	Laguna Woods	OR			
92655	Midway City	OR			
92656	Laguna Hills	OR			
92657	Newport Beach	OR			
92658	Newport Beach	OR			
92659	Newport Beach	OR			
92660	Newport Beach	OR			
92661	Newport Beach	OR			
92662	Newport Beach	OR			
92663	Newport Beach	OR			
92672	San Clemente	OR			
92673	San Clemente	OR			
92674	San Clemente	OR			
92675	Mission Viejo	OR			
92676	Silverado	OR			
92677	Laguna Niguel	OR			
92678	Trabuco Canyon	OR			
92679	Trabuco Canyon	OR			
92683	Westminster	OR			
92684	Westminster	OR			
92685	Westminster	OR			
92688	Rancho Santa Margarita	OR			
92690	San Juan Capistrano	OR			
92691	Mission Viejo	OR			
92692	Mission Viejo	OR			
92693	San Juan Capistrano	OR			
92694	Mission Viejo	OR			
92697	Irvine	OR			
92698	Aliso Viejo	OR			
92701	Santa Ana	OR			
92702	Santa Ana	OR			
92703	Santa Ana	OR			
92704	Santa Ana	OR			
92705	Santa Ana	OR			
92706	Santa Ana	OR			
92707	Santa Ana	OR			
92708	Santa Ana	OR			

92711	Santa Ana	OR			
92712	Santa Ana	OR			
92725	Santa Ana	OR			
92728	Santa Ana	OR			
92735	Santa Ana	OR			
92780	Tustin	OR			
92781	Tustin	OR			
92782	Tustin	OR			
92799	Santa Ana	OR			
92801	Anaheim	OR			
92802	Anaheim	OR			
92803	Anaheim	OR			
92804	Anaheim	OR			
92805	Anaheim	OR			
92806	Anaheim	OR			
92807	Anaheim	OR			
92808	Anaheim	OR			
92809	Anaheim	OR			
92811	Atwood	OR			
92812	Anaheim	OR			
92814	Anaheim	OR			
92815	Anaheim	OR			
92816	Anaheim	OR			
92817	Anaheim	OR			
92821	Brea	OR			
92822	Brea	OR			
92823	Brea	OR			
92825	Anaheim	OR			
92831	Fullerton	OR			
92832	Fullerton	OR			
92833	Fullerton	OR			
92834	Fullerton	OR			
92835	Fullerton	OR			
92836	Fullerton	OR			
92837	Fullerton	OR			
92838	Fullerton	OR			
92840	Garden Grove	OR			
92841	Garden Grove	OR			
92842	Garden Grove	OR			
92843	Garden Grove	OR			
92844	Garden Grove	OR			
92845	Garden Grove	OR			
92846	Garden Grove	OR			
92850	Anaheim	OR			

92856	Orange	OR			
92857	Orange	OR			
92859	Orange	OR			
92861	Orange	OR			
92862	Orange	OR			
92863	Orange	OR			
92864	Orange	OR			
92865	Orange	OR			
92866	Orange	OR			
92867	Orange	OR			
92868	Orange	OR			
92869	Orange	OR			
92870	Placentia	OR			
92871	Placentia	OR			
92885	Yorba Linda	OR			
92886	Yorba Linda	OR			
92887	Yorba Linda	OR			
92899	Anaheim	OR			

CSWPA LETTER OF ASSENT

To be signed by all Contractors awarded work covered by the Community and Student Workforce Project Agreement prior to commencing work.

[CONTRACTOR'S LETTERHEAD]

[DATE]

The Solís Group
131 N. El Molino Ave., #100
Pasadena, CA 91101
Attention: RSCCD CSWPA Administrator

Re: Rancho Santiago Community College District Community and Student Workforce Project Labor Agreement

Dear Sir:

This is to confirm [Name of Company] agrees to be party to and bound by the Rancho Santiago Community College District Community and Student Workforce Project Agreement – for School Construction Major Rehabilitation Funded by Measure Q effective _____, as such Agreement may from time to time be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the Agreement undertaken by this Company on the Project pursuant to [Contract No. _____ and Name of Project/School], and this Company shall require all of its subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical Letter of Assent prior to their commencement of work.

Sincerely,

[Name of Construction Company]

By:
[Name and Title of Authorized Executive]

[Copies of this Letter must be submitted to the Project Labor Coordinator and to the Council consistent with Article 4, Section 4.4(b)]

ATTACHMENT B - CSWPA CRAFT REQUEST FORM

TO THE CONTRACTOR: Please complete and fax this form to the applicable union to request cralt workers that fulfill all hiring requirements for this project. A duplicate fax request is to be sent to the Project Labor Coordinator. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax Transmission Verification Reports and keep copies for your records.

The Rancho Santiago Community College District (District) Community and Student Workforce Project Agreement sets the goal that 66'3» of all of the labor and cmft positions shall be from workers residing in the County of Orange and 50°Jo of the positions are filled by residents of the District's service area which covers the following zip codes:

92602	926M	91610	92612	92614	91618 92620	92686	92627	92660
92675	**92676**	**92679** **92688**	**92701**	**92703**	**92704**	**92705**	**92706**	92707
92707	**92708**	**92780**	**92782**	**92802**	**92805** 9JN06	**92807**	**92808**	**92840**
92843	**92861**	**92862**	**92865**	**92866**	**92867**	**92868**	**92869**	**928M** 92887

TO THE UNION: Please complete the "Union Use Only" section on the next page and fax this form back to the requesting Contractor. Be sure to retain a copy of this form for your records and send a copy to Project Labor Coordinator.

CONTRACTOR USE ONLY

To: Union Local # _____ **Fax# (___)** _____ Date: _____

Cc: Project Labor Coordinator

From: Company: _____ Issued By: _____

Contact Phone: 1 3 _____ Contact Fax: I I _____

PLEASE PROVIDE ME WITH THE FOLLOWING UNION CRAFT WORKERS.

Craft Classification (i.e., plumber, painter, etc.)	Journeyman or Apprentice	Local Residen t	Number of workers needed	Report Date	Report Time
TOTAL WORKERS REQUESTED = _____					

Please have worker(s) report to the following work address indicated below:

Project Name: _____ Site: _____ Address: _____

Report to: _____ On-site Tel: _____ On-site Fax: _____

Comment or Special Instructions: _____

Facility Planning, District Construction & Support Services
2323 North Broadway, Suite 112
Santa Ana, CA 92706-1640

Immediate Change Directive

Date: _____
Project Name: _____ Change Directive No.: _____
Project No.: _____ Reference RFI No.: _____
Architect: _____ Reference COR No.: _____
Contractor: _____ **Initiated By:** ☐ District ☐ Architect ☐ Contractor ☐ Other: _____

WORK REQUIRED:

REASON FOR CHANGE DIRECTIVE:

STATUS OF WORK/CONSTRUCTION ACTIVITIES AFFECTED:

CONTRACTOR IS AUTHORIZED TO PROCEED WITH THE WORK PURSUANT TO THE CONSTRUCTION SERVICES AGREEMENT IN THE FOLLOWING MANNER:

☐ *Not to Exceed, Time & Materials (T&M)* _____ Additional Days Required: _____
Complete work within dollar limit stated, submit daily time tickets — Days beyond Approved Contract Completion Date

☐ *Guaranteed Unit Price* _____
Complete work for agreed amount (Unit Price) — Schedule Activity Nos. Affected: _____

☐ *Lump Sum, Not to Exceed:* _____

THE ADDITIONAL COST AND/OR CREDIT FOR THE ADDITIONAL AND/OR DELETED WORK SCOPE SHALL BE APPLIED TO PROJECT ALLOWANCES AND/OR CONTINGENCIES AS FOLLOWS:

This Immediate Change Directive (ICD) authorizes the Contractor to proceed with the work as described herein. Contractor agrees to furnish all labor and material and perform all of the above described work in accordance with the above terms in compliance with the applicable sections of the Contract Documents. By signing this ICD, the Contractor agrees with the compensation indicated herein. If Contractor disagrees with the compensation indicated herein, Contractor may file a Claim pursuant to the Contract. If this ICD is issued on a T&M basis, the Contractor shall notify the District immediately when 80% of the NTE amount is reached. The ICD is not valid until signed by both the Architect and the Construction Manager on behalf of the Rancho Santiago Community College District governing Board. Signature below represents approval of this ICD. Provisions herein for adjustment of compensation and/or time shall constitute mutual accord and full satisfaction with respect to all impacts, disruptions, delays of costs (including, without limitations, any home office, overhead, whatsoever related to the change specified herein.

CONTRACTOR: _____ DISTRICT CM: _____
Approved By: _____ Approved By: _____
Date: _____ Date: _____
ARCHITECT: _____
Approved By: _____
Date: _____

MODIFIED CERTIFIED PAYROLL

NAME OF CONTRACTOR/SUBCONTRACTOR	ADDRESS	CONTRACTOR'S LICENSE #/SPECIALTY LICENSE #	
		WORKERS COMPENSATION POLICY #	
PAYROLL NO.	FOR WEEK ENDING	PROJECT NAME AND LOCATION	CONTRACT NO.

(1) NAME, ADDRESS, AND SOCIAL SECURITY NUMBER OF EMPLOYEE	(2) No. of W/H Exmptn	(3) Work Classification	(4) Veteran or RSCCD Program Participant Status (Y/N)	OT or ST	(5) Day and Date							(6) Hour Total	(7) Pay Rate	(8) Gross Amount Earned										
					Hours Worked Daily									This Project	All Projects	Federal Tax	FICA	State Tax	SDI	VAC	Other	Total Deduction	(9) Net Wages Paid for Week	Check No.
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				
			Veteran?	OT																				
			RSCCD Program?	ST																				

Modified Certified Payroll Report Instructions

Certified Payroll Reports (CPRs) are required by California Labor Code §1776 in order to report payment of prevailing wage. They are to be submitted weekly starting with the first week of work and are accompanied by a Statement of Compliance. Non-Performance statements can be submitted for weeks where no work is performed.

Basic Information:

Name of Contractor/Subcontractor - List the name of the contractor

Address - List the address of the contractor

Contractors License #/Specialty License # - List the contractors License # as issued by the California State Licensing Board and any other specialty licenses

Payroll No. - 1st payroll to be marked "1" and so on. Please also add "Final" for the contractor's final payroll on the project

For Week Ending - the date of the last day in the weekly pay period

Project Name and Location - List the name of the project and an address (or approximate address if none exists)

Contract No. - For general contractor, list the contract # for the contract with the awarding agency. For subcontractors, list contract # for contract with prime contractor

(1) NAME, ADDRESS, AND SOCIAL SECURITY NUMBER OF EMPLOYEE - California Labor Code §1776 requires that the correct name, address, and social security number be reported.

(2) No. of W/H Exemptn - List number of withholding exemptions for the employee

(3) Work Classification - Please list a DIR-recognized work classification (i.e. Electrician Inside Wireman, Laborer Group 1, Ironworker Apprentice 3, etc.) as listed on the DIR website: http://www.dir.ca.gov/oprl/DPreWageDetermination.htm

(4) Veteran or RSCCD Program Participant Status - The CSWPA counts veterans of the U.S. Armed forces and RSCCD Apprentice Program Participants as District Residents. Mark "Y" if the worker is a veteran of the U.S. Armed Forces or "N" if they are not. RSCCD Program Participants are workers who have either graduated from or are currently enrolled in one of District's sponsored apprentice programs. These programs are:

Carpentry (SW Carpenters Local 2361 and 803) - Acoustical Tile, Drywall/Lather, Drywall Finisher, Plastering, Concrete, Finish Carpentry, Framing, Tilt-up, Millwright, and Pile Driver
Electrician (IBEW Local 441 and OC NECA) - Inside Wireman and Sound Installer
Operating Engineers (Local 12) - Heavy Equipment Operator, Heavy Duty Repair, Inspection, and Rock Products Industry
Surveying (Local 12) - Survey Chainman, Rodman and Chief of Party

(5) Day and Date - List the day and date for each day of the week. Then for each worker, list the straight time and overtime hours worked for each day. It is recommended to confirm the straight time and overtime rules for the employee's work classification as posted on the DIR website http://www.dir.ca.gov/oprl/DPreWageDetermination.htm

(6) Hour Total - Report the total straight time and overtime hours worked for the week.

(7) Pay Rate - List the worker's basic hourly rate for straight time and overtime

(8) Gross Amount
This Project - total gross amount earned for this pay period for this project
All Projects - total amount earned for all projects (if employee worked on other projects for the week
Federal tax, FICA, State Tax, SDI, WAC, Other - list all deductions taken out of employee's gross pay, amounts listed under "Other" deductions
Total Deductions - List total amount deducted from employee's paycheck

(9) Net Wages Paid for Week - Amount paid to the employee. Gross wages minus all deductions.

Check No. - Please list the check number for the employee's weekly paycheck

REQUEST FOR EXPORT MATERIALS TESTING FORM

Date:	
Project Name:	
RSCCD Project No.:	
Contractor:	
School Site Exporting Material (Name and Address):	

Location of Soil Receiving Site:	
Receiving Site Address:	
Receiving Site City:	
Major Cross Streets:	

Receiving Site Owner Information:	
Owner Name:	
Contact Name:	
Contact Phone Number:	

Receiving Site History:	
Describe Current Site Use:	
Describe Site History:	
Available Environmental Documents:	

Export Soil Description:		
Material Type:		
Import Soil Volume:		(Tonnage)
If in place material, depth and acres of excavation:		
❑ Only portion of material is available or ❑ All required material is available		❑ Stockpile or ❑ In Place
Area ready on Import Site?	❑ Yes ❑ No	

Schedule:	
Date and time when results are needed:	
Date formal report is needed:	

Comments:

Note: Contractor shall submit receiving facilities profile along with this testing form. Requests for export materials testing must be received a minimum of two (2) weeks in advance of material needing to be exported.

REQUEST FOR IMPORT MATERIALS TESTING FORM

Date:	
Project Name:	
RSCCD Project No.:	
Contractor:	
School Site Receiving Import (Name and Address):	

Location of Soil Borrow Site:	
Borrow Site Address:	
Borrow Site City:	
Major Cross Streets:	

Soil Owner Information:	
Soil Owner Name:	
Contact Name:	
Contact Phone Number:	

Site History:	
Describe Current Site Use:	
Describe Site History:	
Available Environmental Documents:	

Borrow Soil Description:		
Material Type:	❑ Fill Soil	
	❑ Other:	
Import Soil Volume:		(Tonnage)
If in place material, depth and acres of excavation:		
❑ Only portion of material is available or ❑ All required material is available		❑ Stockpile or ❑ In Place
Materials already on Import Site?	❑ Yes ❑ No	

Schedule:	
Date and time when results are needed:	
Date formal report is needed:	

Comments:

Note: Requests for testing at District pre-tested sites must be received four (4) weeks in advance of material being needed on site. Requests for non-pre-tested sites must be received eight (8) weeks in advance of material being needed on site.

Facility Planning, District Construction & Support Services
2323 North Broadway, Rm 112
Santa Ana, CA 92706

Board Date: January 0, 1900

Project Name: 0 | **Project/Bid No.** 0

Contractor: 0 | **Site:** 0

Contract #: 0 | **Change Order (CO) No. :** 0

Contract Schedule Summary

Notice to Proceed Date	Original Contract Duration (Days)	Original Contract Completion Date	Previous Extension Days Approved	Proposed CO Days Requested	New Revised Completion Date
01/00/00	0	01/00/00	0	0	1/0/1900

Change Order Summary

Description	Number	Amount	% of Contract
Original Contract Amount		$0.00	
Previous Change Orders	0	$0.00	#DIV/0!
This Change Order	**0**	**$0.00**	**#DIV/0!**
Total Change Order (s)		**$0.00**	**#DIV/0!**
Revised Contract Amount		**$0.00**	

Items in Change Order

Item No.	Description	Requester	Reason	Ext. Day	Credit	Add	Net
1	0	0	0	1/0/1900	$0.00	$0.00	**$0.00**
							$0.00
							$0.00
			Subtotal		$0.00	$0.00	**$0.00**
			Grand Total				**$0.00**

1- CODE REQUIREMENT
2 - FIELD CONDITION
3 - INSPECTION REQUIREMENT
4 - DESIGN REQUIREMENT
5 - OWNER REQUIREMENT

RANCHO SANTIAGO
Community College District

Facility Planning, District Construction & Support Services
2323 North Broadway, Rm 112
Santa Ana, CA 92706

Board Date: _____

Project Name: _____ **Project/Bid No.** _____

Contractor: _____ **Site:** _____

Contract #: _____ **Change Order (CO) No. :** _____

Contract Schedule Summary					
Notice to Proceed Date	**Original Contract Duration (Days)**	**Original Contract Completion Date**	**Previous Extension Days Approved**	**Proposed CO Days Requested**	**New Revised Completion Date**

Change Order Summary			
Description	**Number**	**Amount**	**% of Contact**
Original Contract Amount			
Previous Change Orders			#DIV/0!
This Change Order			**#DIV/0!**
Total Change Order (s)			**#DIV/0!**
Revised Contract Amount			

Items in Change Order

Item No.	Description	Requester	Reason	Ext. Day	Credit	Add	Net
						$ -	**$ -**
2							**0**
5							**0**
			Subtotal		$ -	$ -	**$ -**
			Grand Total				**$ -**

1- CODE REQUIREMENT
2 - FIELD CONDITION
3 - INSPECTION REQUIREMENT
4 - DESIGN REQUIREMENT
5 - OWNER REQUIREMENT

The Contractor is to provide a complete description and specification of work involved and reason. The documents supporting this Change Order, including any drawings and estimates of that cost are attached hereto and made a part thereof.

Contractor agrees to furnish all labor and materials and perform all of the above described work in accordance with the above terms in compliance with applicable sections of the Contract Documents. The amount of the charges under this Change Order is limited to the charges allowed under the General Conditions. The adjustment in the contract sum, if any, and the adjustment in the contract time, if any, set out in this Change Order shall constitute the entire compensation and/or adjustment in the contract time and contract sum due to the Contractor arising out of the change in the work covered by this Change Order, unless otherwise provided in this Change Order. It is understood that this Change Order shall be effective upon approval of

Contractor **Date**

Architect **Date**

Inspector **Date**

RSCCD Project Manager **Date**

RSCCD Director **Date**

Carri M. Matsumoto
RSCCD Assistant Vice Chancellor **Date**

Peter J. Hardash
RSCCD Vice Chancellor **Date**

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

TENANT IMPROVEMENT PAYMENT NO. _____

For the period: _____ to _____ DSA # _____
Contractor: _____ Project Name _____
Address: _____ P.O. No. _____
Phone: _____ Vendor # _____

A. ANALYSIS OF ADJUSTED CONTRACT AMOUNT TO DATE

1.	Original contract amount	$ -
2.	Change made from Approved Change Orders	$ -
3.	Adjusted contract amount to date	$ -

B. COMPUTATION OF PAYMENT DUE

1.	Work completed to date on original contract	$ -
2.	Extra work performed to date	$ -
3.	Total work performed to date	$ -
4.	Less: 5% retained	$ -
5.	Net amount earned to date	$ -
6.	Amount to be withheld because of: _____	$ -
7.	Balance	$ -
8.	Less: Amount of previous payments	$ -
9.	Amount due this payment	$ -
10.	Unpaid balance on RSCCD amount of $0.00	

C. CERTIFICATION OF CONTRACTOR OR HIS DULY AUTHORIZED REPRESENTATIVE

To the best of my knowledge and belief, I certify that all items and prices of work and material shown on this periodical estimate are correct; that all work has been performed and materials supplied in full accordance with the terms and conditions of the construction contract documents covering the work of the indicated contract, and all change orders approved by the **Board of Trustees**; that this is a true and correct statement of the contract account up to and including the last day of the period covered by this estimate and that no part of the amount "Amount Due This Payment" has been received.

I further certify that this payment will be used to pay all just and lawful bills against the undersigned for labor, materials and expendable equipment employed in the performance of the indicated contract.

Contractor	Date	Director	Date
Inspector	Date	Asst. Vice Chancellor	Date
Architect	Date	Vice Chancellor	Date
Construction Sprvsr/Mngr.	Date		

E. CERTIFICATE OF PAYMENT

This is to certify that 0
Contractor is entitled to a payment of $0.00

For the work performed at the 0 Completion Accepted

in accordance with terms of contract dated _____ _____

RSCCD _____ Date

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signing Certification, is attached. In tabulation below, amounts are stated to the nearest dollar. Use Column 1 and Contract where variable retainage for line items may apply

Application No.:	0
Application Date:	1/0/1900
Period To:	1/0/1900

A	B	C			D	E	F	G		H	I
					WORK COMPLETED			TOTAL			
ITEM NO.	DESCRIPTION OF WORK	ORIGINAL CONTRACT AMOUNT	CREDIT ALLOCATION AMOUNT	CURRENT CONTRACT AMOUNT	FROM PREVIOUS APPLICATIONS (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C-G)	RETAINAGE (IF VARIABLE RATE)
	GENERAL CONDITIONS										
	Rental Payment			$ -				$ -	#DIV/0!	$ -	$ -
	General Conditions			$ -				$ -	#DIV/0!	$ -	$ -
	General Requirements			$ -				$ -	#DIV/0!	$ -	$ -
	Bond			$ -				$ -	#DIV/0!	$ -	$ -
	Insurance			$ -				$ -	#DIV/0!	$ -	$ -
	Fee			$ -				$ -	#DIV/0!	$ -	$ -
	SUBTOTAL GENERAL CONDITIONS	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**
	SUBCONTRACTORS										
				$ -				$ -	#DIV/0!	$ -	$ -
				$ -				$ -	#DIV/0!	$ -	$ -
				$ -				$ -	#DIV/0!	$ -	$ -
				$ -				$ -	#DIV/0!	$ -	$ -
				$ -				$ -	#DIV/0!	$ -	$ -
				$ -				$ -	#DIV/0!	$ -	$ -
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				$ -				$ -	#DIV/0!	$ -	$ -

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signing Certification, is attached. In tabulation below, amounts are stated to the nearest dollar. Use Column 1 and Contract where variable retainage for line items may apply

Application No.: 0
Application Date: 1/0/1900
Period To: 1/0/1900

A	B	C			D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	ORIGINAL CONTRACT AMOUNT	CREDIT ALLOCATION AMOUNT	CURRENT CONTRACT AMOUNT	WORK COMPLETED FROM PREVIOUS APPLICATIONS (D + E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C-G)	RETAINAGE (IF VARIABLE RATE)
				$ -				$ -	#DIV/0!	$ -	$ -
	SUBTOTAL SUBCONTRACTORS	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**
	ALLOWANCES										
1				$ -				$ -	#DIV/0!	$ -	$ -
2				$ -				$ -	#DIV/0!	$ -	$ -
3				$ -				$ -	#DIV/0!	$ -	$ -
4				$ -				$ -	#DIV/0!	$ -	$ -
5				$ -				$ -	#DIV/0!	$ -	$ -
6				$ -				$ -	#DIV/0!	$ -	$ -
7				$ -				$ -	#DIV/0!	$ -	$ -
8				$ -				$ -	#DIV/0!	$ -	$ -
9				$ -				$ -	#DIV/0!	$ -	$ -
10				$ -				$ -	#DIV/0!	$ -	$ -
	SUBTOTAL ALLOWANCES	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**
	CONTINGENCY										
	Construction Contingency			$ -				$ -	#DIV/0!	$ -	$ -
	SUBTOTAL CONTINGENCY	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**
	GMP SUBTOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**
	DISTRICT CONTINGENCY ALLOCATION		**DISTRICT CONT. ALLOCATION**								
1	DCA-1			$ -				$ -	#DIV/0!	$ -	$ -
2	DCA-2			$ -				$ -	#DIV/0!	$ -	$ -
3	DCA-3			$ -				$ -	#DIV/0!	$ -	$ -
4	DCA-4			$ -				$ -	#DIV/0!	$ -	$ -
5	DCA-5			$ -				$ -	#DIV/0!	$ -	$ -
6	DCA-6			$ -				$ -	#DIV/0!	$ -	$ -
7	DCA-7			$ -				$ -	#DIV/0!	$ -	$ -
8	DCA-8			$ -				$ -	#DIV/0!	$ -	$ -
9	DCA-9			$ -				$ -	#DIV/0!	$ -	$ -
10	DCA-10			$ -				$ -	#DIV/0!	$ -	$ -
	SUBTOTAL DISTRICT CONTINGENCY ALLOCATION		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signing Certification, is attached. In tabulation below, amounts are stated to the nearest dollar. Use Column 1 and Contract where variable retainage for line items may apply

Application No.: 0
Application Date: 1/0/1900
Period To: 1/0/1900

A	B	C			D	E	F	G		H	I
					WORK COMPLETED			TOTAL			
ITEM NO.	DESCRIPTION OF WORK	ORIGINAL CONTRACT AMOUNT	CREDIT ALLOCATION AMOUNT	CURRENT CONTRACT AMOUNT	FROM PREVIOUS APPLICATIONS (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C-G)	RETAINAGE (IF VARIABLE RATE)
	Unallocated District Contingency		$ -	$ -							
	Current Billing Totals	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**$ -**	**$ -**

		Retention held on previous payment	$ -	Minus retention	$ -
Base Contract	$ -			Previously paid	$ -
District Contingency	#REF!			Holds	
Amt. of PO	#REF!			Amount this payment	$ -

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

Allowance Tracker

PAYMENT NO. 0

For the period 1/0/1900 to 1/0/1900 DSA # 0
Contractor 0 Project Name 0
Address 0 P.O. No. 0
Phone 0 Contract # 0

ITEM NO. (1)	DESCRIPTION OF ITEM (2)	ALLOWANCE (3)	TOTAL COMPLETED TO DATE		
			Allocation (4)	Billed to Date (5)	
				Previously Billed	This Period	Total Complete
1		**$ -**	#DIV/0!	**$ -**	**$ -**	
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
	Allowance # 01 Balance	$ -			*Total Billed to Date:*	$ -
2		**$ -**	#DIV/0!	**$ -**	**$ -**	
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
	Allowance # 02 Balance	$ -			*Total Billed to Date:*	$ -
3		**$ -**	#DIV/0!	**$ -**	**$ -**	
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
	Allowance # 02 Balance	$ -			*Total Billed to Date:*	$ -
4		**$ -**	#DIV/0!	**$ -**	**$ -**	
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
	Allowance # 04 Balance	$ -			*Total Billed to Date:*	$ -
5		**$ -**	#DIV/0!	**$ -**	**$ -**	
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
	Allowance # 05 Balance	$ -			*Total Billed to Date:*	$ -
6		**$ -**	#DIV/0!	**$ -**	**$ -**	
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
			#DIV/0!			$ -
	Allowance # 06 Balance	$ -			*Total Billed to Date:*	$ -

7		**$**	**-**	#DIV/0!	**$**	**-**	**$**	**-**
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
	Allowance # 07 Balance	$	-			*Total Billed to Date:*	$	-
8		**$**	**-**	#DIV/0!	**$**	**-**	**$**	**-**
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
	Allowance # 08 Balance	$	-			*Total Billed to Date:*	$	-
9		**$**	**-**	#DIV/0!	**$**	**-**	**$**	**-**
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
	Allowance # 09 Balance	$	-			*Total Billed to Date:*	$	-
10				#DIV/0!	**$**	**-**	**$**	**-**
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
				#DIV/0!			$	-
	Allowance # 10 Balance	$	-			*Total Billed to Date:*	$	-
	ALLOWANCE TOTALS:	**$**	**-**	#DIV/0!	**ALLOWANCES BILLED TO DATE:**		**$**	**-**
	ALLOWANCE BALANCE:	**$**	**-**					

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

Construction Contingency Tracker

PAYMENT NO. 0

For the period 1/0/1900 to 1/0/1900
Contractor 0
Address 0
Phone 0

DSA # 0
Project Name 0
P.O. No. 0
Contract # 0

ITEM NO.	DESCRIPTION OF ITEM	CONSTRUCTIO CONTINGENCY	TOTAL COMPLETED TO DATE		
			% complete	Billed to Date	
(1)	(2)	(3)	(4)	(5)	
	TOTAL CONSTRUCTION CONTINGENCY	**$ -**			
	Construction Contingency Allocation			Previously Billed	This Period	Total Complete
1			#DIV/0!			$ -
2			#DIV/0!			$ -
3			#DIV/0!			$ -
4			#DIV/0!			$ -
5			#DIV/0!			$ -
6			#DIV/0!			$ -
7			#DIV/0!			$ -
8			#DIV/0!			$ -
9			#DIV/0!			$ -
10			#DIV/0!			$ -
11			#DIV/0!			$ -
12			#DIV/0!			$ -
13			#DIV/0!			$ -
14			#DIV/0!			$ -
15			#DIV/0!			$ -
16			#DIV/0!			$ -
17			#DIV/0!			$ -
18			#DIV/0!			$ -
19			#DIV/0!			$ -
20			#DIV/0!			$ -
21			#DIV/0!			$ -
22			#DIV/0!			$ -
23			#DIV/0!			$ -
24			#DIV/0!			$ -
25			#DIV/0!			$ -
26			#DIV/0!			$ -
27			#DIV/0!			$ -
28			#DIV/0!			$ -
29			#DIV/0!			$ -
30			#DIV/0!			$ -
31			#DIV/0!			$ -
32			#DIV/0!			$ -
33			#DIV/0!			$ -
34			#DIV/0!			$ -
35			#DIV/0!			$ -
36			#DIV/0!			$ -
37			#DIV/0!			$ -
38			#DIV/0!			$ -
39			#DIV/0!			$ -
40			#DIV/0!			$ -
41			#DIV/0!			$ -
42			#DIV/0!			$ -
43			#DIV/0!			$ -
44			#DIV/0!			$ -
45			#DIV/0!			$ -
46			#DIV/0!			$ -
47			#DIV/0!			$ -
48			#DIV/0!			$ -
49			#DIV/0!			$ -
	TOTALS APPROVED:	**$ -**	#DIV/0!	**$ -**	**$ -**	**$ -**

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

Credit Allocation Tracker
(For Construction Contingency ONLY)

PAYMENT NO. 0

For the period	1/0/1900	to	1/0/1900	DSA #	0
Contractor	0			Project Name	0
Address	0			P.O. No.	0
Phone	0			Contract #	0

ITEM NO. (1)	PROJECT CONTINGENCY TRACKER ITEM NO.	DESCRIPTION OF ITEM (2)	CREDIT ALLOCATION (3)		
		Credit Allocation			
1		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
2		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
3		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
4		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
5		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
6		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
7		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
8		Subcontractor Name:			
		Scope of Work:			
		Credit for: a)			
		Credit for: b)			
		Credit for: c)			
		Credit for: d)			
9					
		TOTALS CREDIT APPROVED:	**$ -**		

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

Change Order Tracker

PAYMENT NO. 0

For the period	1/0/1900	to	1/0/1900	DSA #	0
Contractor	0			Project Name	0
Address	0			P.O. No.	0
Phone	0			Contract #	0

CHANGE ORDER				ADDITIONS		
NO.	DATE	DESCRIPTION	Percentage Complete	CO AMOUNT ($)	COMPLETED TO DATE ($) (6)	
					Previous Period	This Period
(1)	(2)	(3)	(4)	(5)		
1		DCA-1	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
2		DCA-2	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
3		DCA-3	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
4		DCA-4	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

Change Order Tracker

PAYMENT NO. 0

For the period	1/0/1900	to	1/0/1900	DSA #	0
Contractor	0			Project Name	0
Address	0			P.O. No.	0
Phone	0			Contract #	0

CHANGE ORDER				ADDITIONS		
NO.	DATE	DESCRIPTION	Percentage Complete	CO AMOUNT ($)	COMPLETED TO DATE ($) (6)	
(1)	(2)	(3)	(4)	(5)	Previous Period	This Period
5		DCA-5	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
6		DCA-6	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
7		DCA-7	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
8		DCA-8	**#DIV/0!**	$ -	$ -	$ -
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -

Rancho Santiago Community College District
2323 North Broadway
Santa Ana, CA 92706

Change Order Tracker

PAYMENT NO. 0

For the period	1/0/1900	to	1/0/1900	DSA #	0
Contractor	0			Project Name	0
Address	0			P.O. No.	0
Phone	0			Contract #	0

CHANGE ORDER				ADDITIONS		
NO.	DATE	DESCRIPTION	Percentage Complete	CO AMOUNT ($)	COMPLETED TO DATE ($) (6)	
(1)	(2)	(3)	(4)	(5)	Previous Period	This Period
9		DCA-9	**#DIV/0!**	**$ -**	**$ -**	**$ -**
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -
10		DCA-10	**#DIV/0!**	**$ -**	**$ -**	**$ -**
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
			#DIV/0!			
					COMPLETED TO DATE ($)	$ -

Change Orders Total	$ -	Matches SOV
Previous Period Total	$ -	Matches SOV
This Period Total	$ -	Matches SOV
Completed to Date Total	$ -	Matches SOV

Project Name: _____

Project No.: _____ DSA Application No. _____

Unconditional Waiver and Release Upon Final Payment

CALIFORNIA CIVIL CODE SECTION 8138

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: Disputed claims for extras in the amount of $_____.

Date: _____ _____
(Company Name)

BY: _____
(Signature)

_____
(Title)

Project Name: _____

Project No.: _____ DSA Application No. _____

Unconditional Waiver and Release
Upon Progress Payment
CALIFORNIA CIVIL CODE SECTION 8134

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

Through Date: _____

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: $_____.

Exceptions

This document does not affect any of the following: (1) Retentions; (2) Extras for which claimant has not received payment; (3) Contract rights including: (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Date: _____ _____
(Company Name)

BY: _____
(Signature)

_____
(Title)

Instructions regarding Form:

1. General:
   a. Attach proposed Recycling and Waste Bin Location Plan.
   b. Attach name and contact data for each recycling or disposal destination to be used.
2. Column 1: "Material Types" – Enter types of materials targeted for recycling, reuse, and/or salvage, either on or off-site, and include a category for waste materials requiring disposal.
3. Columns 2 – 4: "Estimated Generation" – Enter estimated quantities (tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated and state number of salvageable items.
4. Column 5: "Estimated Landfill" – Enter quantities (tons) of materials to be disposed in landfill.
5. Column 6: "Disposal Location" – Enter end-destination of recycled, salvaged, and disposed materials.

(DELETE TEXT BOX BEFORE PROVIDING TO DISTRICT REPRESENTATIVE)

CONSTRUCTION WASTE MANAGEMENT PLAN

PROJECT NAME: _____

PROJECT SITE ADDRESS: _____

PROJECT NO: _____

NAME OF COMPANY: _____

CONTACT PERSON: _____

TELEPHONE: _____

PROJECT TYPE: ☐ NEW CONSTRUCTION ☐ DEMOLITION ☐ RENOVATION / ALTERATION PROJECTS

PROJECT SIZE (SQ. FT.): _____

DATE & ESTIMATED PERIOD: _____

(1) Material Type	(2) Tons Estimated Recycle	(3) Tons Estimated Reuse	(4) Tons Estimated Salvage	(5) Tons Estimated Landfill	(6) Proposed Disposal or Recycling Facility (e.g., Onsite, Name of Facility)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					=

Signature	Title	Date

Instructions regarding Form:

1. General:
   a. Attach proposed Recycling and Waste Bin Location Plan.
   b. Attach name and contact data for each recycling or disposal destination to be used.
2. Column 1: "Material Types" – Enter types of materials targeted for recycling, reuse, and/or salvage, either on or off-site, and include a category for waste materials requiring disposal.
3. Columns 2 – 4: "Estimated Generation" – Enter estimated quantities (tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated and state number of salvageable items.
4. Column 5: "Estimated Landfill" – Enter quantities (tons) of materials to be disposed in landfill.
5. Column 6: "Disposal Location" – Enter end-destination of recycled, salvaged, and disposed materials.

(DELETE TEXT BOX BEFORE PROVIDING TO DISTRICT REPRESENTATIVE)

CONSTRUCTION WASTE MANAGEMENT PROGRESS REPORT

PROJECT NAME: _____

PROJECT SITE ADDRESS: _____

PROJECT NO: _____

NAME OF COMPANY: _____

CONTACT PERSON: _____

TELEPHONE: _____

PROJECT TYPE: ☐ NEW CONSTRUCTION ☐ DEMOLITION ☐ RENOVATION / ALTERATION PROJECTS

PROJECT SIZE (SQ. FT.): _____

PERIOD: _____

(1) Material Type	(2) Tons Actual Recycle	(3) Tons Actual Reuse	(4) Tons Actual Salvage	(5) Tons Actual Landfill	(6) Disposal or Recycling Facility (e.g., Onsite, Name of Facility)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					=

Signature	Title	Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE:

SITE:	CONTRACT #:	
PROJECT NAME:	PROJECT ID#:	DSA#:
CONTRACTOR:	CONTRACT DATE:	

- ❑ This Certificate of Substantial Completion applies to ***all work*** under the Contract Documents.
- ❑ This Certificate of Substantial Completion applies to ***the following specific parts*** of the Contract Documents:

The work performed under the above-referenced Contract has been reviewed and found, by the signatory's (below) best knowledge, information and belief, to be "Substantially Completed" as defined in the Contract. The Substantial Completion Date of the Project or portion thereof designated above is hereby established as _____, 20___.

- ❑ The completion of the Punch List for Final Completion is attached hereto

This list may not be inclusive, and the failure to include an item on such list does not alter the responsibility of the Contractor to reach Final Completion of all work in accordance with the Contract Documents. Such work shall be completed or corrected to the satisfaction of the District within the number of days provided in the Contract for Punch List work.

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of the Contract's obligation to complete the Work in accordance with the Contract Documents.

Contractor	Date	RSCCD Project Manager	Date
Inspector	Date	RSCCD Director	Date
Architect	Date		

WARRANTY GUARANTEE FORM

The following is a warranty and guarantee by the undersigned for warranty of the work installed/completed at (description of the location. Capitalized terms not defined herein shall have the meanings assigned to them in the Contract Documents applicable to the Warranted Work at the time it was furnished and installed at the Project.

The undersigned hereby warrants and guarantees that: 1) the Warranted Work (including, without limitation, all pieces and parts thereof that are incorporated into the Warranted Work), unless otherwise expressly permitted or required by the Contract Documents, is of first-class quality and new; and 2) the Warranted Work conforms with the requirements of the Contract Documents and Applicable Laws; and 3) the Contractor agrees to repair or replace all of the Work that may prove to be defective in workmanship or material and any other adjacent Work that may be displaced in connection with such replacement within a period of **two (2) years** from the date of Final Completion as defined in the Contract, ordinary wear and tear and unusual abuse or neglect excepted.

The date of Final Completion is _____, 20___.

SYSTEM OR ITEM	WARRANTY DURATION (YEARS)

In the event the Contractor fails to comply with the above-mentioned conditions within a reasonable period of time, as determined by the District, but not later than seven (7) calendar days after being notified in writing by the District, the Contractor authorizes the District to proceed to repair or replace the defective Work at the expense of the Contractor. The Contractor shall pay the costs and charges therefor upon demand.

Warranties shall provide by written endorsement that if warranted Work fails and is replaced, removed or substantially rebuilt, that the original warranty on such Work shall be renewed, whereas the full warranty periods starts over again, commencing from when Work covered by warranty was corrected.

The responsibility of the undersigned under this warranty includes, without limitation, replacement, removal and repair not only of the Warranted Work, but also of related or adjoining portions of work, equipment, materials or property as necessary to provide access for correction of the Warranted Work, as well as any other loss or damage (including, without limitation, economic loss) resulting directly or indirectly to the District from the failure of the Warranted Work to comply with the terms of this warranty. All costs, expenses, damages and other losses to the District due to the failure of the Warranted Work to comply with the terms of this warranty shall be deemed to be expenses of undersigned and shall be paid by the undersigned to the District upon demand.

***Signatures are on the next page**

Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of General Contractor	Date

Representative to be contacted for Service Subject to the Terms of Contract:		
Name:	Phone #	Email
For After Hours Emergency Contact		
Name	Phone#	Email

Representative to be contacted for Service Subject to the Terms of Contract:		
Name:	Phone #	Email
For After Hours Emergency Contact		
Name	Phone#	Email

END OF DOCUMENT

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for submittals required for the Work, including but not limited to; Shop Drawings, Product Data, Samples, material lists, and quality control items as required by the Contract Documents.

B. Wherever possible, throughout the Contract Documents, the minimum acceptable quality of workmanship and products has been defined by the name and catalog number of a manufacturer and by reference of recognized industry standards.

C. To ensure that specified products are furnished and installed in accordance with the design intent, Facility Design Standards and procedures have been established for submittal of design data and for its review by District Representative, Architect, and/or others.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 011216: Phasing of the Work.

C. Section 012973: Schedule of Values Procedures.

D. Section 012976: Progress Payment Procedures.

E. Section 013113: Project Coordination.

F. Section 013213: Construction Schedule.

G. Section 014523: Testing and Inspection.

H. Section 015000: Construction Facilities and Temporary Controls.

I. Division 2 through Division 33.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS AND PROCEDURES

A. Contractor shall package each submittal appropriately for transmittal and handling and will then send Architect, Cx Agent, and District Representative submittal for review per the Project plans and specifications. Submittals will not be accepted from sources other than from Contractor.

1. All data active infrastructure and structured cabling submittals must also be provided to RSCCD ITS Department for electronic review in PDF format.

B. Contractor shall clearly identify any deviations from the Contract Documents on each submittal. Any deviation not so noted, even if stamped reviewed, is not acceptable.

C. After Architect review, Architect shall transmit submittals to Contractor, District Representative, and Project Inspector. Contractor shall further distribute to Subcontractors and others as required. Work shall not commence, unless otherwise approved by District Representative, and/or Architect until approved submittals are transmitted to Contractor.

D. Contractor's Review and Approval: Every submittal upon which proper execution of the Work is dependent shall bear the Contractor's review and approval stamp, dated and signed by Contractor. Certifying that Contractor (a) has reviewed, checked, and approved the submittal and has coordinated the submittal contents with requirements of Work and Contract Documents including related Work, (b) Contractor coordinated with all other shop drawings received to date and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the engineers on this project, (c) determined and verified quantities, field measurements, construction criteria, materials, equipment, catalog numbers and identifications, and similar data, or will do so, and (d) states the Work illustrated or described in the submittal is recommended by Contractor and the Contractor's warranty will fully apply thereto.

E. Contractor shall coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities requiring sequential activity.

F. Timing of Submittals:

2. Submittals shall not delay the construction schedule and shall be submitted in timely manner in accordance with Facilities Lease Agreement.

3. In accordance with Facilities Lease Agreement, Contractor shall submit to the Architect, those Shop Drawings, Product Data, diagrams, materials lists, Samples and other submittals required by the Contract Documents.

4. The Contractor shall submit an itemized listing of required submittals with a scheduled date for each submittal, in accordance with the Facilities Lease Agreement. The schedule of submittals shall provide adequate time between submittals in order to allow for proper review without negative impact to the Construction Schedule.

5. Schedule of submittals shall be related to Work progress, and shall be so organized as to allow sufficient time for transmitting, reviewing, corrections, resubmission, and re-reviewing.

6. Contractor shall coordinate submittal of related items and Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by Architect.

7. Contractor shall revise, update and submit submittal schedule to District Representative and Architect on the first of each month, or as required by the District Representative.

8. Contractor shall allow in the Construction Schedule, at least ten (10) calendar days for Architect review following Architect receipt of submittal. For mechanical, plumbing, electrical, structural, and other submittals requiring joint review with Architect's Consultants, and/or others, Contractor shall allow a minimum of fourteen (14) calendar days following Architect receipt of submittal. Submittals will be reviewed with reasonable promptness, but Architect reserves the right of additional time where required based on but limited to submittal size, complexity, etc.

9. No adjustments to the Contract Time and/or Milestones will be authorized because of a failure to transmit submittals to Architect sufficiently in advance of the Work to permit review and processing.

10. In case of product substitution, Shop Drawing preparation shall not commence until such time Architect and District Representative reviews said submittal relative to the General Conditions.

G. If required, resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such. Review times for re-submitted items shall be as per the time frames for initial submittal review.

H. Architect, or authorized agent, will stamp each submittal with a uniform, action stamp. Architect, or authorized agent, will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When Architect, or authorized agent, marks a submittal "Reviewed" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. Final-But-Restricted Release: When Architect, or authorized agent, marks a submittal "Reviewed as Noted" the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

3. Returned for Re-submittal: When Architect, or authorized agent, marks a submittal "Rejected, Revise and Resubmit" do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat as necessary to obtain different action mark. In case of multiple submittals covering same items of Work, Contractor is responsible for any time delays, schedule disruptions, out of sequence Work, or additional costs due to multiple submissions of the same submittal item. Do not use, or allow others to use, submittals marked "Rejected, Revise and Resubmit" at the Project site or elsewhere where Work is in progress.

4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Architect, or authorized agent, will return the submittal marked "Action Not Required".

I. Review of Submittals by the Architect: Submittals will be reviewed but only for conformance with the design concept of the Project and with the information indicated on the Drawings and stated in the Specifications. Review of a separate item as such will not indicate approval of the assembly in which the item functions. Review of submittals shall not relieve the Contractor of responsibility for any deviations from requirements of the Contract Documents or any revisions in resubmittals unless Contractor has given written notice of such deviation or revision at the time of submission or resubmission and written approval has been given to the specific deviation or revision, nor shall approval relieve the Contractor of responsibility for error or omissions in the submittals or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, functioning, and completion to the Work.

J. All costs for the preparation, correction, delivery, and return of the submittals shall be borne by the Contractor.

K. Submission:

1. Submission is primarily electronic to the Architect, District, Project Inspector, and Cx Agent. Electronic submittals shall be submitted as source PDFs with word-searchable text.

2. Certain shop drawings will be required to be submitted in hard copy, in addition to PDF format (i.e. structural steel, metal fabrications, etc.). When hard copies are required, Contractor shall submit sufficient number to allow for adequate Contractor, Subcontractor, supplier, manufacturer and fabricators distribution plus two (2) sets to be retained by Architect.

3.02 SHOP DRAWINGS

A. Shop Drawings are original drawings prepared by Contractor, Subcontractor, supplier, or distributor illustrating some portion of Work by showing fabrication, layout, setting, or erection details. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Copies of the Contract Drawing marked to show Shop Drawing information are not acceptable and will be not be reviewed and will be promptly returned to the Contractor.

B. Produce Shop Drawings to an accurate scale that is large enough to indicate all pertinent features and methods. Submit Shop Drawings on sheets at least 8-1/2 x 11 inches but no larger than 30 x 42 inches.

C. Shop Drawings shall include, at a minimum, fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

1. Dimensions
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

C. Provide two (2) spaces, approximately 4 by 5 inches, on the label or beside the title block on Shop Drawings to record Contractor and Architect review, and the action taken. Include the following information on the label for processing and recording action taken:

1. Project name.
2. Project number.
3. Date.
4. Name and address of Architect.
5. Name and address of Contractor.
6. Name and address of Subcontractor.
7. Name and address of supplier.
8. Name and address of manufacturer.
9. Name and title of appropriate Specification section.
10. Drawing number and detail references, as appropriate.

3.03 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of Work or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, wiring diagrams, schedules, illustrations, or performance curves.

1. Mark each copy to show or delineate pertinent materials, products, models, applicable choices, or options. Where Product Data includes information on several products that are not required, clearly mark copies to indicate the applicable information. Include the following information:
    a. Manufacturer's printed recommendations.
    b. Compliance with trade association standards.
    c. Compliance with recognized testing agency standards.
    d. Application of testing agency labels and seals.
    e. Notation of dimensions verified by field measurement.
    f. Notation of coordination requirements.
    g. Notation of dimensions and required clearances.
    h. Indicate performance characteristics and capacities.
    i. Indicate wiring diagrams and controls.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

C. Required Copies and Distribution: Same as denoted in Section 3.01, K.

3.04 SAMPLES

A. Submit Samples of sufficient size, quantity (minimum of three), cured and finished and physically identical to the proposed product or material. Samples include partial or full sections or range of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches denoting color, texture, and/or pattern.

1. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:

   a. Specification section number and reference.

   b. Generic description of the Sample.

   c. Sampling source.

   d. Product name or name of manufacturer.

   e. Compliance with recognized standards.

   f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

   a. Where variations in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show the approximate limits of the variations.

   b. Refer to other Specification sections for requirements for Samples that illustrate workmanship, fabrication techniques, assembly details, connections, operation, and similar construction characteristics.

   c. Refer to other sections for Samples to be returned to Contractor for incorporation into the Work. Such Samples must be undamaged at time of installation. On the transmittal indicate special requests regarding disposition of Sample submittals.

   d. Samples not incorporated into the Work, or otherwise not designated as Owner property, remain the property of Contractor and shall be removed from the Project site prior to Substantial Completion.

3. Color and Pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to Architect for review and selection by Architect and District Representative.

B. When specified, erect field Samples and mock-ups at the Project site to illustrate products, materials, or workmanship and to establish standards by which completed Work shall be judged.

C. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of the Work. Sample sets may be used to obtain final acceptance of the Work associated with each set.

3.05 DEFERRED SUBMITTAL REQUIREMENTS

A. Installation of deferred submittal items shall not be started until detailed plans, specifications, and engineering calculations have been: 1) accepted by the Architect or Engineer in general responsible charge of design, 2) signed by a California registered Architect or professional engineer who has been delegated responsibility covering the work shown on a particular plan or specification, and 3) approved by the Division of the State Architect (DSA). Deferred submittal items for this Project are as indicated in the Contract Documents.

B. Deferred submittal drawings and specifications become part of the approved documents for the Project when they are submitted to and approved by DSA.

C. Submit material using submittal process as defined above.

D. Identify and specify all supports, fasteners, spacing, penetrations, etc., for each of the deferred submittal items, including calculations for each and all fasteners.

E. Submit documents to Architect for review prior to requesting that the Architect forward it to the DSA.

F. Documents shall bear the stamp and signature of the Structural, Mechanical, or Electrical Engineer licensed in California who is responsible for that work.

G. Architect and its subconsultants will review the documents only for conformance with design concept. The Architect will then forward the Submittal to DSA for approval.

H. Contractor shall respond to review comments made by DSA and revise and resubmit submittal to the Architect for re-submittal to DSA for final approval.

3.06 QUALITY CONTROL SUBMITTALS

A. Submit quality control submittals, including design data, certifications, manufacturer's field reports, and other quality control submittals as required under other sections of the Contract Documents.

B. When other sections of the Contract Documents require manufacturer's certification of a product, material, and/or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

C. Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the represented company.

D. Requirements for submittal of inspection and test reports are specified in other sections of the Contract Documents.

3.07 CERTIFICATES

A. Submit all certificates in triplicate to Project Inspector, in accordance with requirements of each Specification Section.

END OF SECTION 013300

SECTION 013310
SUBMITTAL TRANSMITTAL

To: Hammel Green and Abrahamson, Inc.
Attn: Submittals Coordinator
1918 Main St. Third Floor
Santa Monica, California 90405
Email: Submittals@ HGA.com

From: (Contractor)
(Address)
(Address)
(City, State)

Owner: Rancho Santiago Community College District
Project: Santa Ana College Science Center
HGA No.: 3584-001-00

Submittal Date: _____
Previous Submittal Date: _____

Incomplete submittals will be returned "Not Accepted." See General Conditions and 013300 for requirements.

The following submittal(s) is (are) attached for your review as required by the Contract Documents.

SHOP DRAWINGS

___ No. copies submitted. Submit minimum 1 PDF per 013300; complete the following information:

☐Partial ☐Complete ☐Preliminary ☐Final ☐LEED

List of Drawings: _____

Specification Section: _____ Article & Paragraph: _____

Description of Item: _____

Manufacturer: _____

Supplier's Name: _____ Telephone Number: _____

PRODUCT DATA AND QUALITY CONTROL

___ No. copies submitted. Submit minimum 1 PDF per 013300; complete the following information:

☐Partial ☐Complete ☐Preliminary ☐Final ☐LEED

List of Items: _____

Specification Section: _____ Article & Paragraph: _____

Description of Item: _____

Manufacturer: _____

Supplier's Name: _____ Telephone Number: _____

SAMPLES

___ No. copies submitted. Submit minimum 3 copies per 013300; complete the following information:

☐Partial ☐Complete ☐Preliminary ☐Final ☐LEED

List of Items: _____

Specification Section: _____ Article & Paragraph: _____

Description of Item: _____

Manufacturer: _____

Supplier's Name: _____ Telephone Number: _____

Submitted By: Company Name: _____
Phone: _____

Signature: _____

Send to: Submittals@hga.com

SECTION 013501

OWNER'S CONTROLLED INSURANCE PROGRAM (OCIP)

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements governing Insurance requirements.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 012973: Schedule of Values Procedures.

C. Section 012976: Progress Payment Procedures.

D. Section 013213: Construction Schedule.

E. Section 015000: Construction Facilities and Temporary Controls.

1.03 OWNER'S CONTROLLED INSURANCE PROGRAM (OCIP)

A. Insurance. The District will centralize the purchase of insurance for the activities of the Contractor and Subcontractors of every tier for Work performed for the Project. This consolidated purchase of insurance shall be known as Owner Controlled Insurance Program ("OCIP"). Contractor shall comply with the insurance requirements of the Facilities Lease and the terms of the OCIP, attached as Exhibit K to the Facilities Lease, which include the scopes of insurance that are NOT within the OCIP.

B. Contractor OCIP Obligations.

1. Compliance with OCIP Requirements. Contractor agrees to comply with any and all terms and conditions of the policies of insurance provided by the District and to comply with any and all claims handling procedures, loss prevention programs and other programs required by or related to the District's OCIP as set forth herein. Contractor shall require Subcontractors and Sub-Subcontractor and all others covered by the District's OCIP insurance policies to so comply.

2. Contractor Furnishing of Information. Contractor, its Subcontractor and Sub-Subcontractors shall furnish to the District, the Architect, the OCIP Administrator, its designees or the insurers under the OCIP policies, all information and documentation that such entity may require from time to time in connection with the issuance of policies under this Contract or the administration of the OCIP in such form and substance as such entity may prescribe and promptly comply with the recommendations of the OCIP insurers.

3. No Violation of OCIP Insurance Policy Conditions. Contractor shall not violate, or knowingly permit to be violated; any conditions of the policies of insurance provided by the District hereunder and shall at all times satisfy the requirements of the insurers issuing them. Contractor shall assure that all OCIP requirements imposed upon, assumed and performed by each Subcontractor and Sub-Subcontractor.

4. District Rights. If the Contractor, Subcontractors, Sub-Subcontractors, or Excluded Parties should fail to comply with the Non-OCIP Insurance requirements, the District may withhold payment due to the Contractor or suspend the Work at the Contractors' sole expense and without adjustment of the Contract Price or Contract Time until such time as the Contractor, its Subcontractor, Sub-Subcontractors, and/or Excluded Parties have performed such obligations to the reasonable satisfaction of the District.

5. Withholding of Progress Payments/Final Payment. In addition to the rights of the District to withhold all or portions of Progress Payments or the Final Payment set forth elsewhere in the Contract Documents, the District may withhold Progress Payments or the Final Payment for the failure or refusal of the Contractor to comply with OCIP requirements, including without limitation, the reporting requirements set forth in the OCIP Program description or the OCIP insurance policies. Amounts withheld by the District pursuant to the preceding will be released only after the Contractor and/or Subcontractors' compliance with OCIP requirements, less costs and expenses incurred by the District in securing such compliance.

C. Contractor/Subcontractor Provided Insurance Requirements. The Contractor and Subcontractors shall obtain and maintain for the duration of the Work each of the Contractor/Subcontractor Provided insurance policies as set forth in the OCIP. Prior to the Contractor or Subcontractor performance of Work at the Site, the Contractor shall deliver Certificates of Insurance to the District evidencing that the Contractor and applicable Subcontractor(s) have obtained the Contractor/Subcontractor Provided insurance policies required by the OCIP.

D. No Waiver Created through Payments. The making of Progress Payments of the GMP to the Contractor shall not be construed as creating an insurable risk interest by or for the District or be construed as relieving the Contractor or his subcontractors of responsibility for loss from any direct physical loss, damage, or destruction occurring prior to completion of the work by the District.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

A. Refer to "Appendix A" for OCIP requirements.

END OF SECTION 013501

013501 – OCIP

APPENDIX A

EXHIBIT K
TO FACILITIES LEASE

OWNER CONTROLLED INSURANCE PROGRAM ("OCIP")

(FOR SCIENCE CENTER AT SANTA ANA COLLEGE)

1. **Overview**. California Education Code §81330 permits the governing board of a school district, without advertising for bids, to lease to any person, firm, or corporation any real property owned by the school district if the instrument by which such property is leased requires the lessee to construct on the leased premises, or provide for the construction thereon, of a building for the use of the school district, during the term of the lease, and provides that title to that building shall vest in the school district prior to or at the expiration of the lease. In conjunction with the approval of this Construction Services Agreement, (the "District") will enter into a site lease with Contractor, under which it will lease to the Contractor a portion of the District School site, and improvements thereon, in order for Contractor to construct improvements to this existing school site.

The District is a participant in an Owner Controlled Insurance Program (the "OCIP") that has been established by the Alliance of Schools for Cooperative Insurance Programs ("ASCIP"). In accordance with the provisions of Government Code §4420.5, Labor Code §§6300, et seq. and Title 8 of the California Code of Regulations, the District has elected to include the Project in the OCIP. This means that the District will provide some of the insurance policies that would normally be provided by the Contractor and its Subcontractors and Sub-Subcontractors for construction of the Project. In accordance with the District's OCIP, the District shall purchase, provide and maintain for the benefit of the Contractor, its Subcontractors and Sub-Subcontractors certain insurance as more particularly set forth in this Exhibit, and subject to the terms and conditions of this Exhibit, the Contract Documents and any addenda to the Contract Documents, for claims which arise out of the Insured Work performed by the Contractor, its Subcontractors and Sub-Subcontractors for which the Contractor, its Subcontractors and Sub-Subcontractors may be legally liable. Because the District will provide certain insurance coverage through an OCIP, the Contractor's Guaranteed Maximum Price ("GMP"), and it's Subcontractors' base bids must be calculated to exclude all insurance costs for coverage provided by the OCIP, as described in Section 4.1 and summarized in Section 4.2 herein. Additionally, the Contractor and its Subcontractors' must meet certain insurance-related qualification criteria in order to qualify for coverage under the OCIP. The Contractor and its Subcontractors and Sub-Subcontractors must comply with all safety programs established and/or adopted by the District in connection with the OCIP must and comply with all other requirements related to the OCIP.

The OCIP is more fully described in the "Insurance Manual", and the policies and endorsements ("OCIP Coverages"). The OCIP Coverages have precedence and supersede any conflicting provisions contained in the Contract Documents or in the Insurance Manual. In addition, District has arranged for Builder's Risk insurance. By submitting its GMP, the Contractor is deemed to have agreed and acknowledged that it has reviewed the Insurance Manual, the OCIP Coverages, and the Builder's Risk insurance. The OCIP will provide to the Enrolled Contractors/Subcontractors, as defined below, in connection with performance of the Insured Work, the OCIP Coverages. Enrolled Contractors/Subcontractors are responsible for maintaining the insurance coverage described in Section 4.3 below and in the Insurance Manual. The OCIP does not cover Excluded Parties, defined below. Excluded Parties and parties no longer covered by the OCIP shall maintain, and shall require each of their Subcontractors and Sub-Subcontractors to obtain and maintain, the insurance coverage described in Section 4.4 below and in the Insurance Manual.

2. **Definitions**. Capitalized terms not otherwise defined herein shall have the meanings set forth in this Agreement,

2.1 **Excluded Work**. The term "Excluded Work" as used herein means Project-related work that is not conducted at the Project Site is excluded from coverage under the OCIP and the OCIP Insurance. The District is not providing general liability or workers compensation insurance for Project-related, off-Site operations and the District is not providing automobile insurance; Enrolled Contractors/Subcontractors must purchase this insurance and must provide the District with an ACORD 25-S Certificate of Insurance indicating evidence of (a) primary automobile insurance coverage, and (b) proof of general liability and workers compensation insurance for off-Site operations. Refer to Sections **16.12** through **16.19** below.

2.2 Excluded Parties. The term "Excluded Parties" as used herein means (1) vendors; (2) suppliers; (3) contract haulers; (4) equipment owners/operators; (5) those performing surveying services; (6) those performing soil testing; and (7) those solely loading, transporting or unloading materials, personnel, parts or equipment or any other items to, from or within the Site.

2.3 Enrolled Contractors/Subcontractors: The term "Enrolled Contractors/Subcontractors" as used herein means those Contractors, Subcontractors and Sub-Subcontractors who have submitted enrollment forms and have been accepted into the District's OCIP as evidenced by a Certificate of Insurance for OCIP policies.

2.4 Insured Parties: The term "Insured Parties" as used herein means the District and Enrolled Contractors/Subcontractors named in one or more of the District's OCIP policies or named in one or more Certificate of Insurance signed by a duly authorized representative of an OCIP insurer.

2.5 Insured Work: The term "Insured Work" as used herein means Work performed on the Site. Any type or description, surveying, soil testing, and solely loading, transporting or unloading of materials, personnel, parts or equipment or any other items to, from or within the Site is excluded.

2.6 OCIP Administrator: The term "OCIP Administrator" means Arthur J. Gallagher & Co. or such other company or entity as may be designated by the District. The OCIP Administrator is an independent contractor retained by the joint powers authority ASCIP, of which the District is a Member, to administer the District's OCIP. The OCIP Administrator is authorized and empowered to act on behalf of the District to the extent set forth herein and in the Contract Documents. The removal or replacement of the designated OCIP Administrator shall not result in adjustment of the Contract Price or Contract Time or otherwise affect, limit or restrict Contractor's obligations under the Contract Documents.

3. Guaranteed Maximum Price, Base Bid Insurance Costs:

3.1 Contractor and Subcontractors Must Exclude Certain Insurance Costs. The Contractor's GMP, and all Subcontractors' base bids, must exclude all insurance costs for Workers' Compensation, Employers Liability, General Liability, and Excess Liability OCIP Coverages and Builder's Risk insurance for operations conducted on-Site for all eligible Contractors, Subcontractors and Sub-Subcontractors who will perform Insured Work on the Project Site as summarized in Section **4.2** below and more fully described in the OCIP Coverages. No Subcontractor will be permitted to change the pricing included in its base bid.

4. Insurance:

4.1 OCIP Insurance Policies Establish OCIP Coverages. The OCIP Coverages and exclusions from coverage are summarized in this Section, in the Insurance Manual, and other Contract Documents and are set forth in full in their respective insurance policy forms. The summary descriptions of the OCIP Coverages in this **Exhibit** and in the Insurance Manual are not intended to be complete or alter or amend any provision of the actual OCIP insurance policies. Enrolled Contractors/Subcontractors must review the insurance policies for actual terms and conditions. In the event any provision of this Exhibit, the Insurance Manual, or the Contract Documents, conflicts with the any of the OCIP insurance policies, the OCIP insurance policies shall govern. Enrolled Contractors/Subcontractors shall be deemed to have reviewed, understood and agreed to all terms and conditions of the OCIP insurance policies, including exclusions from coverage. The OCIP insurance policies are available for inspection upon request.

4.2 Summary of OCIP Coverages Provided by District. The following summary of OCIP Coverages will be provided only to eligible and Enrolled Contractors/Subcontractors during the term of initial construction. Coverage is provided for warranty or correction work after completion of the Project:

4.2.1	**Workers Compensation Insurance** In accordance with limits established by law.	Statutory Limits
4.2.2	**Employers Liability Insurance:**	$1,000,000

4.2.3 **Commercial General Liability Insurance (excluding Automobile Liability)**

Per Occurrence	$2,000,000
Aggregate	$4,000,000
Products/Completed Operations Aggregate*	$4,000,000

* 10 years Extended Products/Completed Operations Coverage commences upon Substantial Completion of the Project.

4.2.4 **Excess Liability Insurance**

Per Occurrence	$15,000,000
Aggregate	$15,000,000

4.2.5	**Builder's Risk Insurance**	Project Limits
4.2.6	**Contractors Pollution Liability**	$5,000,000

4.3 Insurance Provided by Contractors/Subcontractors: The Contractor, all Subcontractors and Sub-Subcontractors (except Excluded Parties covered under Section **16.19**) shall provide and maintain the following insurance coverages for off-Site operations, with minimum coverage amounts as set forth below:

4.3.1 **Workers Compensation Insurance**

In accordance with limits established by law.	Statutory Limits

4.3.2	**Employers Liability Insurance**	$1,000,000

4.3.3 **Commercial General Liability Insurance**

Per Occurrence	$2,000,000
Aggregate	$4,000,000

4.3.4 **Automobile Liability Insurance**

Bodily Injury/Property Damage per Occurrence	$1,000,000

4.4 Insurance Provided by Excluded Parties.

Pursuant to Section **16.19** the Excluded Parties shall provide and maintain the following insurance coverages, with minimum coverage amounts as set forth below:

4.4.1 **Workers Compensation Insurance**

In accordance with limits established by law.	Statutory Limits

4.4.2	**Employers Liability Insurance**	$1,000,000

4.4.3 **Commercial General Liability Insurance**

Per Occurrence	$1,000,000
Aggregate	$2,000,000

4.4.4 **Automobile Liability Insurance**

Bodily Injury/Property Damage per Occurrence	$1,000,000

4.4.5 **Aircraft Liability Insurance (if applicable)**

Per Occurrence	$5,000,000
Aggregate	$5,000,000

4.5 Pollution Legal Liability Insurance.

Pursuant to Section **16.22**, the Excluded Parties shall provide and maintain the following insurance coverages, with minimum coverage amounts as set forth below:

Per Occurrence	$5,000,000
Aggregate	$5,000,000

4.6 Duration and Extent of Insurance Coverage Provided by OCIP.

4.6.1 **Term and Extent of Coverage for Contractor or Prime Contractor**. Upon the District's acceptance of Substantial Completion of the Agreement and of the work required of the Contractor under the Agreement, all coverage afforded to the Contractor under the OCIP will be automatically terminated without further notice or action, with the exception of a ten (10) year extension of coverage for Products and Completed Operations which commences upon Substantial Completion of the Project. Corrective work, performed after Substantial Completion of the Work pursuant to continuing warranty obligations, is covered by the OCIP. Evidence of Contractor's Non-OCIP Insurance, as described in Section **16.13** must be in place before Contractor commences corrective work during the warranty period.

4.6.2 **Term and Extent of Coverage for Subcontractors**. When a Subcontractor or Sub-Subcontractor completes its punch list work, submits Form 6 as described in the Insurance Manual and the District accepts as complete the performance of the Subcontractor or Sub-subcontractor on the Project, all coverage afforded to that Subcontractor or Sub-Subcontractor under the OCIP will be terminated without further notice or action, with the exception of a ten (10) year extension of coverage for Products and Completed Operations which commences upon Substantial Completion of the Project. Corrective work, performed after Substantial Completion of the Work pursuant to continuing warranty obligations, is covered by the OCIP. Evidence of Subcontractors and Sub-Subcontractors Non-OCIP Insurance, as described in Section **16.14** must be in place before Subcontractors and Sub-Subcontractors commence corrective work during the warranty period.

5. Minimum Safety Requirements

5.1 Minimum qualifications for Contractor/Subcontractor OCIP enrollment these safety requirements cannot be modified.

- Drug Program – Pre Assignment (Oratect or similar) within three days of assignment
- 6' Fall Protection, harnesses and lanyards required in lieu of other protective means. Exceptions: ladders, scissor lifts, aerial baskets or scaffolding
- OSHA "Serious" Violations - No more than 5 serious violations within 5 years with no more than 2 serious repeats in 5 years
- OSHA "Willful" Violations – NONE
- Hardhats & Safety Glasses are required at all times & other Personal Protective Equipment (PPE) required by work being conducted

5.2 Contractor's and Listed Subcontractors' Minimum Safety Requirements.

The Contractor must meet the Minimum Safety Requirements. In addition, in order to be considered a responsive Bid, the Bidder must establish that Listed Subcontractors, who, in the aggregate, will perform at least sixty-five percent (65%) of the Work of the total Bid Amount, inclusive of all additive alternates but exclusive of hazardous materials abatement costs, meet or exceed the Minimum Safety Requirements.

6. Safety Program and Industrial Safety Record Requirements. Bidders must submit all of the following information to the District within 48 hours after the District's request. The District reserves the right to reject a Bid if any of that information discloses that a Bidder is not eligible for OCIP Insurance pursuant to criteria established by the District, OCIP Administrator, ASCIP or the OCIP's underwriter, Liberty Mutual Insurance Company ("**Insurance Carrier**").

6.1 A copy of a written Injury and Illness Prevention Program ("**IIPP**"), or, if a Bidder does not have a written IIPP, a detailed narrative statement of the IIPP that the Bidder intends to use in connection with the Work on the Project Site.

6.2 A written statement identifying any and all instances during the last five (5) years in which the Bidder was convicted in a state or federal court or administrative action of a "serious violation" and/or "willful violation" of health and safety statutes, regulations, ordinances, orders or other laws. As to each such conviction, the Bidder must include a detailed description of the facts upon which such conviction was based. A Bidder will be ineligible to receive OCIP Insurance (and will therefore be ineligible to be awarded the contract for the Project) if, within the last five (5) years, you have had (a) more than five (5) "serious" violations, (b) more than two occurrences of the same type of "serious" violation (*i.e.* more than two "serious repeat" violations) or (c) any "willful" violation.

6.3 Bidder's latest Worker's Compensation "Experience Modification Factor" or "Experience Modification Rate" as defined by the State of California Workers' Compensation Insurance Rating Bureau (WCIRB). A Bidder will be ineligible to receive OCIP Insurance (and will therefore be ineligible to be awarded the contract for the Project) if its Experience Modification Factor or Experience Modification Rate, including the rates of listed Subcontractors and Sub-Subcontractors exceeds 1.25.

6.4 The Bidder must meet the Minimum Safety Requirements. In addition, in order to be considered a responsive Bid Proposal, the Bidder must establish that Listed Subcontractors and Sub-Subcontractors totaling at least sixty-five percent (65%) of the Bidder's total Bid Amount, exclusive of hazardous materials abatement costs, meet or exceed the Minimum Safety Requirements.

7. **Additional Information**. The District may request additional information from any Bidder to the extent such information is reasonably necessary to allow the District to determine whether Contractor, Subcontractor or Sub-Subcontractor qualifies to receive OCIP Insurance under the OCIP. If any Bidder cannot or will not provide such information within the time requested by the District, the District may reject that Bid as non-responsive.

8. **District's Election to Substitute, Modify or Discontinue OCIP Coverages.** District reserves the right, at its option and without obligation to do so, to modify the OCIP Coverages, however ASCIP and Arthur J. Gallagher must be notified prior to any changes. Or any portion thereof, to procure alternative coverages (provided such coverage is not less than that specified in the Contract Documents), or to request Contractor or any of its Subcontractors or Sub-Subcontractors to withdraw from the OCIP. Upon District's thirty (30) day prior written notice, Contractor, Subcontractors and Sub-Subcontractors, as specified by District in such notice, shall obtain and thereafter maintain during the performance of the Work, Workers Compensation, Employer's Liability and General Liability OCIP Coverages and Builder's Risk Insurance with limits as summarized in Subsections **4.2.1, 4.2.2**, **4.2.3** and **4.2.5**, and with the scope summarized in Subsection **16.12.2** below all as more fully described in the OCIP Coverages. In such event, District shall select the additive Alternate Bid Item for the price stated in the Bid form at the time of award (provided such premium prices are substantiated by Bidder), or if the District makes this election after award, the District shall increase the Contract Price by change order by the pro rata amount of the substantiated premium price attributable to the remaining Work to be performed by Contractor and any designated Subcontractors and Sub-Subcontractors. All insurance secured by the Contractor, Subcontractors or Sub-Subcontractors pursuant to this Article shall be in policies subject to the prior written approval of the District as to form, content, limits of liability, cost and issuing company.

9. **The Contractor is required to provide documentation of the following insurance coverages and limits.**

The apparent lowest Bidder must do all of the following within **48 hours** of the District's request and as a condition to award of the Contract. Failure to comply with the requirements of this section may result in rejection of the Bid.

9.1 Complete and deliver to the OCIP administrator an insurance application in the form of "Form 2 – Insurance Application" (found in the sample manual), which will be provided upon Notice of Award, providing information pertaining to you (that is, the corporation, partnership, limited liability company, individual, or other entity submitting the Bid as the prospective Contractor). That information includes, without limitation, the Bidder's

industry classification code(s) for work on the Project Site, the Bidder's projected payroll for the Project, and the Bidder's experience modification factor.

9.2 Cause each of the Subcontractors and Sub-Subcontractors who will perform work or provide materials or services to you in connection with the Project to complete an insurance application in that same form with respect to those subcontractors upon Notice of Award;

9.3 Provide a certificate (or certificates) of insurance evidencing that you have obtained the insurance required for Enrolled Contractors/Subcontractors.

9.4 Provide a certificate (or certificates) of insurance evidencing that you have the current ability to obtain insurance required for Excluded Parties.

10. **Audit of Contractor's Project Payroll**. The OCIP Administrator or the Insurance Carrier will conduct an audit of Contractor's Project payroll and that of its Subcontractors of every tier. This service will be provided as part of the OCIP as a means in which to segregate the portion of payroll attributable to the Project and covered by the OCIP Insurance ("**OCIP Payroll**") from that of other operations not covered by the OCIP. There are two reasons for this audit. First, the Insurance Carrier is required to report this information to the Workers' Compensation Insurance Rating Bureau (WCIRB) for calculation of the "Experience Modifier" of Contractor and Subcontractors. Second, and more importantly, it provides Contractor with the necessary documentation to ensure that it will not be charged by its regular Workers' Compensation carrier for payroll generated under the OCIP.

11. **Do Not Report OCIP Payroll to Regular Carriers**. If you are awarded the contract and enrolled in the OCIP, you should not report your OCIP Payroll to your regular Workers' Compensation and General Liability insurance carriers. You do not have to (and should not) report this, because the Project-Site insurance premiums, relative to the OCIP Insurance will be paid for by the District under the OCIP. You should not be charged premiums for the Project by your insurance carrier(s). Thus, insurance is a breakeven line item for you on this Project.

12. **Monthly Payroll Report Forms**. The Contractor all Subcontractors of every tier must, on a monthly basis not later than the tenth (10^{th}) calendar day of each month, complete and deliver to the District and OCIP Administrator a Monthly Payroll Report Form for the preceding calendar month to be provided by the OCIP Administrator upon Contractor enrollment in the OCIP.

13. **Notice of Work Completion**. Not later than ten (10) calendar days after the Contractor's completion of its Work (as defined in the Project Documents) on the Project, the Contractor shall prepare and deliver to the District and OCIP Administrator a "Form 4 – Notice of Work Completion" to be provided by OCIP Administrator upon Contractor enrollment in the OCIP. The Contractor shall cause each of its subcontractors on the Project to prepare and deliver that form to the District and OCIP Administrator within ten (10) calendar days following the completion of the subcontractor's Work on the Project.

14. **Drug Screening Program**. The Contractor shall submit to any drug-testing and/or drug-free workplace program instituted by the District and/or OCIP Administrator in connection with the OCIP relative to the Project. (See Sample Insurance Manual for a copy of the drug screening policy)

15. **Professional Safety Consultant/Compliance with Safety Requirements**. The OCIP Administrator will provide a professional safety consultant to oversee safety procedures on the Project. The Contractor must comply, and must cause its Subcontractors to comply, with the recommendations of that safety consultant and any state or federal OSHA requirements. The safety consultant's recommendations may exceed state or federal OSHA standards.

16. **Insurance**

16.1 Evidence of OCIP Coverage.

16.1.1 **Evidence of Contractor's OCIP Insurance:** Provided that the Contractor has supplied to the District its completed OCIP Enrollment Form within 5-days of the Notice of Award, the District shall deliver to the Contractor Certificates of Insurance evidencing the insurance coverages provided under Section 4.2

for only the Contractor prior to issuance of the Contractor's Notice to Proceed. Failure or refusal of the Contractor to timely and properly deliver its OCIP Enrollment Form may be deemed by the District to be a default of a material obligation of the Contractor, and thereupon the District may proceed to exercise any right or remedy provided for under the Contract Documents or at law.

16.1.2 **Evidence of Subcontractors' OCIP Insurance:** At least five (5) working days prior to any Subcontractor's or Sub-Subcontractor's commencing Work on the Site, the Contractor shall provide the District with an OCIP Enrollment Form completed and executed by such Subcontractor or Sub-Subcontractor. Provided that the Contractor has timely provided such OCIP Enrollment Form, the District shall deliver to the Contractor a Certificate of Insurance evidencing the insurance coverages provided under Section 4.1 for such Subcontractor or Sub-Subcontractor prior to commencement of such Subcontractor's or Sub-Subcontractor's Work at the Site.

16.1.3 **No Work at the Site without OCIP Insurance**: Under no circumstances shall any Contractor, Subcontractor or Sub-Subcontractor eligible for coverage under the District's OCIP commence Work at the Site without having submitted to the District a completed and executed OCIP Enrollment Form and without having an OCIP Certificate of Insurance issued in the name of such Contractor, Subcontractor or Sub-Subcontractor. It is the sole responsibility of the Contractor to ensure that all Insured Contractors/Subcontractors performing Insured Work of the Project are properly and timely enrolled in the District's OCIP program. Contractor's failure or refusal concerning Contractor's obligations in this regard may be deemed by the District to be a default of a material obligation. Under no circumstances shall Contractor's failure or refusal to ensure that all Insured Contractors/Subcontractors are properly and timely enrolled in the District's OCIP result in any adjustment of the Contract Price or Contract Time.

16.2 Maintenance of Insurance: The District shall maintain insurance as set forth in Subsections 4.2.1 through 4.2.5, inclusive, without interruption for the date of commencement of the work until the time set forth in Subsections 46.1 and 4.6.2. The District shall maintain Completed Operations coverage for a period of ten (10) years after completion.

16.3 Substitute Insurance: In the event the District is unable to furnish, or after commencement of the Work elects not to furnish or to continue to furnish the insurance coverage described in Section **4.2**, or any portion thereof, and upon thirty (30) days' written notice from the District to the Insured Contractors / Subcontractors, the District may, in its sole discretion (a) procure and provide to Insured Contractors/Subcontractors at the District's expense substantially similar insurance reasonably available at such time; or (b) require the Contractor to secure and maintain all or as much of the insurance herein described as the District designates at the District's cost as provided in Section 8 above. All insurance secured by the Contractor, Subcontractors or Sub-Subcontractors pursuant to this Section shall be in policies subject to the prior written approval of the District as to form, content, limits of liability, cost and issuing company.

16.4 No Waiver of Contract Obligations: Nothing contained in this Section shall be construed to relieve or limit the Contractor, Subcontractors, Sub-Subcontractors or Excluded Parties of responsibility or obligations imposed by the Contract Documents or in equity or at law, including but not limited to the extent to which the Contractor may be held legally liable for damages to persons or property. Nothing contained in this Section shall be construed as the District's assumption of any responsibility for construction means, methods, techniques, sequences, procedures, safety precautions or programs for the Project, all of which remain the sole responsibility of Contractor, or for acts or omissions of the Contractor, Subcontractors, Sub-Subcontractors, Excluded Parties, or their respective agents or employees, or of any other persons performing portions of the Work.

16.5 Waivers of Subrogation: Contractor hereby waives, and shall require all Subcontractors and Sub-Subcontractors to waive, all rights against the District, its officers, agents, employees, representatives and consultants, Project Manager, Architect, CM, IOR and OCIP Administrator, and their respective agents, officers, employees and representatives, for recovery of damages to the extent those damages are covered by policies of insurance obtained pursuant to Section **4.2**.

16.6 District's Right to Audit: The Contractor warrants to the District the accuracy of the information provided in connection with its participation in the District's OCIP and agrees that the District, its officers, agents, representatives, insurance carriers and OCIP Administrator may audit the records, including but not limited to payroll records and insurance records of the Contractor, Subcontractors and Sub-Subcontractors to confirm the accuracy of information provided and to evaluate the effect, if any, on insurance resulting from changes in the Work. Any such audits will be conducted during the Contractor's normal business hours at the office of the Contractor or at another mutually agreeable location. The Contractor shall maintain or cause to be maintained sufficient records as may be necessary to audit its compliance and that of Subcontractors and Sub-Subcontractors with the requirements of the OCIP.

16.7 Assignment of OCIP Refunds and Dividends: Contractor, its Subcontractors and Sub-Subcontractors, in consideration of the agreement of District to arrange insurance and pay premiums as provided by Section **4.2** for the Contractor, Subcontractors and Sub-Subcontractors, and for other good and valuable consideration, assigns to District all return premiums, premium refunds, dividends, and any monies due or to become due under the OCIP policies. Contractor shall require all Subcontractors and Sub-Subcontractors to assign to District all return premiums, premium refunds, dividends, and any monies due or to become due under the OCIP policies.

16.8 Deductible for Builder's Risk Insurance: Contractor shall be responsible for the amount required by the District for each loss or damage covered by the Builder's Risk Insurance provided by the District which is caused by the Contractor or any Subcontractor or Sub-Subcontractor or for which the Contractor, Subcontractor or Sub-Subcontractor is liable, and for all uninsured losses. No loss or damage, if any, incurred hereunder shall excuse Contractor's complete and satisfactory performance of the provisions of the Contract Documents.

16.9 Contractor Responsibility to Repair Damaged Work: Notwithstanding the provisions of this Insurance Requirements Exhibit, and until Final Acceptance of the Work by the District, the Contractor shall have full and complete charge and care of and shall bear all risk of loss of, and injury or damage to, the Work or any portion thereof (including District furnished supplies, material, equipment or other items to be utilized with or incorporated in the Work) to the fullest extent of the law. The Contractor shall rebuild, repair, restore and make good losses of, and injuries or damages to, the Work or any portion thereof (including District furnished supplies, material, equipment or other items to be utilized with or incorporated in the Work) before Final Acceptance of the Work. Such rebuilding, repair or restoration shall be at the Contractor's sole cost and expense; provided, however, that District will make available applicable proceeds from the Builder's Risk policy provided under the District's OCIP

16.10 Adjustment of OCIP Claims: The Contractor, Subcontractors, Sub-Subcontractors and Excluded Parties shall assist the District, its agents and the OCIP Administrator and provide the utmost cooperation in the adjustment of claims arising out of the operations conducted under, or in connection with, the Project and shall cooperate with the District's Insurers in claims and demands that arise out of the work and that the Insurers are called upon to adjust or resist.

16.11 OCIP Coverages; No District Warranty: The District does not warrant or represent that the OCIP coverages constitute an insurance portfolio that adequately addresses the risks of the Contractor, Subcontractors or Sub-Subcontractors. The Contractor, Subcontractors and Sub-Subcontractors shall satisfy themselves as to the existence, extent and adequacy of the OCIP coverages prior to the commencement of work under the Contract.

16.12 Insurance Provided by Contractor / Subcontractors: The Contractor shall, for the duration of the Contract, provide and maintain insurance and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Section **16.19**) to provide and maintain insurance of the type and in the limits as set forth below and in Section **4.3.** Except as otherwise provided by Builder's Risk Policy, the Non-OCIP Insurance is intended to cover employee injury, personal injury, bodily injury and property damage liability for work performed away from the Project Site and for Work of the Project performed after the warranty period expires. Such insurance may be provided in single policy or multiple policies (primary and excess), including an umbrella form and is subject to the following:

16.12.1 In the event one of the insureds incurs liability to any other of the Insureds, these policies shall provide protection for each insured against which claim is or may be made, including claims by other insureds in the same manner as if separate policies had been issued to each insured.

16.12.2 Notice of occurrences or claims under the policies shall be made to the District's Representative.

(a) Workers' Compensation/Employer's Liability Insurance: The Contractor shall provide and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Section **16.19**) to provide Workers' Compensation/Employer's Liability insurance in the statutory limits of the workers' compensation laws of the State of California, including Coverage B – Employers Liability, in an amount not less than that specified in the Supplemental Conditions and Subsections 4.3.1 and 4.3.2, for Project-related operations occurring away from the Project Site and for Work of the Project after Substantial Completion.

(b) Commercial General Liability Insurance: The Contractor shall provide and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Section **16.19**) to provide Commercial General Liability insurance in a form providing coverage not less than that of an ISO Commercial General Liability coverage form (occurrence form) 1998 edition or later for all operations of the party required to furnish same, including hazards of operations (including explosion, collapse and underground coverage), elevators, independent contractors, employees as additional insureds, completed operations, with contractual liability coverage (for contracts related to the Work), personal injury liability and excess Employer's Liability, for personal injury, bodily injury and property damage arising out of the Work, for operations away from the Project Site and after Substantial Completion in policies of insurance with limits in an amount not less than that specified in the Supplemental Conditions and Subsection 4.3.3

(c) Automobile Liability Insurance: The Contractor shall provide and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Section **16.19**) to provide Automobile Liability insurance covering all owned, non-owned and hired automobiles, trucks, and trailers of the Contractor, Subcontractors and Sub-Subcontractors. Such insurance shall provide coverage not less than that of the Standard Comprehensive Automobile Liability policy with limits not less than that specified in the Supplemental Conditions and Subsection 4.3.4 for occurrences both at and away from the Project Site.

(d) Aircraft Liability Insurance: If aircraft are used by the Contractor, Subcontractors, Sub-Subcontractors or anyone else on their behalf, such Contractor, Subcontractor, Sub-Subcontractor or other entity shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury or property damage arising from aircraft owned, used, operated or hired in connection with the work of the Contractor, Subcontractor, Sub-Subcontractor or anyone else, with limits in an amount not less than that specified in the Supplemental Conditions and Subsection 4.3.5.

16.13 Evidence of Contractor's Non-OCIP Insurance: Concurrently with delivery of the executed Contract, Contractor shall deliver to the District Certificates of Insurance evidencing the Contractor's Non-OCIP Insurance coverage required by Sections **4.3** and **16.1.1**. Failure or refusal of the Contractor to so deliver Certificates of Insurance may be deemed by the District to be a default of a material obligation of the Contractor under the Contract Documents, and thereupon the District may proceed to exercise any right or remedy provided for under the Contract Documents or at law. Under no circumstances shall Contractor commence Work at the Site without having submitted to the District Certificates of Insurance for all Non-OCIP Insurance provided by the Contractor. Contractor's failure to timely provide the District with all Non-OCIP Certificates of Insurance shall not result in any adjustment of the Contract Price or Contract Time. The Certificates of Insurance and the insurance policies required by Sections **4.3** and **16.1.1** shall contain a provision that coverage afforded under such polices will not be canceled or allowed to expire without at least thirty (30) days' prior written notice to: District, District Service Center, attn:

Contracts Administrator. Should any policy of insurance required under Section **4.3** be canceled and the Contractor fails to immediately procure replacement insurance as required, the District reserves the right to procure such insurance and to deduct the premium cost thereof and other costs incurred by the District in connection therewith from any sum then or thereafter due the Contractor under the Contract Documents. Upon District's request, the Contractor shall furnish satisfactory proof of coverage of each type of Non-OCIP Insurance required by the Contract Documents, including copies of the insurance policies or renewals or replacements in form and content acceptable to the District; failure of the Contractor to comply with the District's request may be deemed to be a default of a material obligation of the Contract Documents.

16.14 Evidence of Subcontractors' Non-OCIP Insurance: Contractor shall require that every Subcontractor or Sub-Subcontractor (except Excluded Parties covered under Section **16.19**) obtain and maintain the policies of insurance set forth in Section **4.3** herein. The limits of liability of such policies shall be as set forth in Section **4.3**. Each of the policies of insurance obtained and maintained by a Subcontractor or Sub-Subcontractor hereunder shall conform to the requirements of Section **16.1.2**. Upon request of the District, Contractor shall promptly deliver Certificates of Insurance evidencing that the Subcontractors and Sub-Subcontractors have obtained and maintained policies of insurance in conformity with the requirements of Section **16.1.2**. Failure or refusal of the Contractor to provide the District with such Certificates of Insurance may be deemed to be a material default of Contractor under the Contract Documents.

16.15 No Work at the Site without Non-OCIP Insurance: Under no circumstances shall any Contractor, Subcontractor or Sub-Subcontractor (except Excluded Parties) commence Work at the Site without having all Non-OCIP Insurance issued and in effect in accordance with the provisions of Section **16.12**. Contractor's failure or refusal concerning Contractor's obligations in this regard may be deemed by the District to be a default of a material obligation. Under no circumstances shall Contractor's failure or refusal in this regard result in any adjustment of the Contract Price or Contract Time.

16.16 Contractor Insolvency: In the event that a General Contractor or a Prime Contractor defaults on their financial obligation to the District, it is the responsibility of the District to notify the ASCIP OCIP of the default. Before a new contractor is selected by the surety, the contractor must meet the ASCIP OCIP safety requirements before they can be considered for replacement.

16.17 Additional Insurance: Pursuant to the provisions of Government Code §4420(b) (5), nothing contained in the Contract Documents or otherwise shall prohibit the Contractor, its Subcontractors, any Sub-Subcontractor or any other entity providing or performing Work of the Project from purchasing any additional insurance or coverage which he, she or it believes is necessary to protect such person or entity from any liability arising under the Contract Documents, the Project or the Work. Any such additional insurance procured by such person or entity shall be at the procuring party's sole expense.

16.18 Waivers of Subrogation: Contractor hereby waives, and shall require all Subcontractors and Sub-Subcontractors to waive, all rights against the District, its officers, agents, employees, representatives and consultants, Project Manager, Architect, CM, IOR and OCIP Administrator, and their respective agents, officers, employees and representatives, for recovery of damages to the extent those damages are covered by policies of insurance obtained pursuant to Sections **4.3** and **4.4**.

16.19 Insurance Provided by Excluded Parties: The Contractor shall require all Excluded Parties to provide and maintain insurance of the type and limits set forth below and in the Section **4.4**. Such insurance shall name the parties required to secure same as insureds and shall be in a form and through issuing companies acceptable to the District. Such insurance may be provided in single policy or multiple policies (primary and excess), including an umbrella form. Such insurance shall contain a defense of suits provision and shall provide the coverages set forth in Section **4.4** under the following conditions:

(a) Notwithstanding any inconsistent statement in the policies obtained by Contractor and/or Excluded Parties, or any endorsement or certificate attached thereto, it is agreed that the District, its officers, agents, employees and representatives, Project Manager, Architect, IOR and OCIP Administrator, and their

respective officers, agents, employees and representatives, are additional insureds (for all coverages except Workers' Compensation/Employer's Liability), and that coverage is provided for all operations, uses, occupation, acts and activities of such insureds under the Contract Documents, as may be amended or adjusted, regardless of whether liability is attributable to the insured or a combination of the insured and one or more additional insureds. The Contractor shall name, and shall require the Excluded Parties to name, the District, its officers, agents, employees and representatives, the Project Manager, Architect, IOR and OCIP Administrator, and their respective officers, agents, employees and representatives, as additional insureds under the policies required pursuant to Section **4.4**. As to the insurance required by Section **16.19.2**, such additional insured status shall be provided and maintained using ISO additional insured endorsement CG 20 10 (11/85 edition), or a substitute providing equivalent coverage. The additional insured status required herein as to Section **16.19.2** shall be maintained on behalf of all specified parties for a period of ten (10) years after Final Acceptance of the Work. Upon the District's request, the Contractor and/or Excluded Party shall provide copies of all additional insured endorsements procured pursuant to this Section.

(b) The coverage provided by the policies obtained by Contractor and/or Excluded Parties is primary coverage and non-contributing with insurance, if any, carried by the District, its officers, agents, employees and representatives, the Project Manager, Architect, IOR or OCIP Administrator, and their respective officers, agents, employees and representatives. All such additional insured endorsements issued thereon shall be so endorsed.

(c) In the event one of the insureds incurs liability to any other of the insureds, these policies shall provide protection for each insured against which claim is or may be made, including claims by other insureds in the same manner as if separate policies had been issued to each insured.

(d) Notice of occurrences or claims under the policies shall be made to the District's Representative.

16.19.1 **Workers' Compensation/Employer's Liability Insurance:** The Contractor shall require all Excluded Parties to provide Workers' Compensation/Employer's Liability insurance in the statutory limits of the workers' compensation laws of the State of California, including Coverage B – Employer's Liability, in an amount not less than that specified in the Supplemental Conditions and Subsections 4.4.1 and 4.4.2, covering operations of the party in connection with the work both at and away from the Project Site.

16.19.2 **Commercial General Liability Insurance:** The Contractor shall require all Excluded Parties to provide Commercial General Liability Insurance in a form providing coverage not less than that of an ISO Commercial General Liability coverage form (occurrence form) 1998 edition or later for all operations of the party required to furnish same, including hazards of operations (including explosion, collapse and underground coverage), elevators, independent contractors, employees as additional insureds, products and completed operations (for ten (10) years after Final Acceptance of the Work), with contractual liability coverage (for contracts related to the Work), personal injury liability and excess Employer's Liability, for personal injury, bodily injury and property damage arising out of the Work in policies of insurance with limits in an amount not less than that specified in the Supplemental Conditions and Subsection 4.4.3.

16.19.3 **Automobile Liability Insurance:** The Contractor shall require all Excluded Parties to provide Automobile Liability Insurance covering all owned, non-owned and hired automobiles, trucks and trailers of the Excluded Parties. Such insurance shall provide coverage not less than that of the Standard Comprehensive Automobile Liability policy with limits in an amount not less than that specified in the Supplemental Conditions and Subsection 4.4.4 for occurrences both at and away from the Project Site.

16.19.4 **Aircraft Liability Insurance:** If aircraft are used by an Excluded Party or anyone else on their behalf, such Excluded Party or other entity shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury or property damage arising from aircraft owned, used, operated or hired in connection with the work

of the Excluded Party or anyone else, with limits in an amount not less than that specified in the Supplemental Conditions and Subsection 4.4.5.

16.20 Evidence of Excluded Parties' Insurance: Contractor shall require that every Excluded Party obtain and maintain the policies of insurance set forth in Sections **4.4** and **16.19.1** through **16.19.4** herein. The limits of liability of such policies shall be as set forth in Section **4.4**. Each of the policies of insurance obtained and maintained by an Excluded Party hereunder shall conform to the requirements of Section **16.19**. Upon request of the District, Contractor shall promptly deliver Certificates of Insurance evidencing that the Excluded Parties have obtained and maintained policies of insurance in conformity with the requirements of Section **16.18**. Failure or refusal of the Contractor to provide the District with such Certificates of Insurance may be deemed to be a material default of Contractor under the Contract Documents.

16.21 No Work at the Site without Excluded Parties' Insurance: Under no circumstances shall any Excluded Party commence Work at the Site without having all insurance issued and in effect in accordance with the provisions of Section 16.19. Contractor's failure or refusal concerning Contractor's obligations in this regard may be deemed by the District to be a default of a material obligation. Under no circumstances shall Contractor's failure or refusal in this regard result in any adjustment of the Contract Price or Contract Time.

16.22 Pollution Legal Liability Insurance: Contractor (if performing or providing any hazardous waste services, abatement or otherwise, of any type or description for the Project) shall provide and maintain, and shall require any other person or entity performing such services to provide and maintain (hereinafter collectively referred to as "Hazardous Waste Contractor"), insurance covering losses caused by pollution conditions that arise from the operations, including the completed operations, of such Hazardous Waste Contractor. Such insurance shall apply to bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured, cleanup costs and defense, including costs and expenses incurred in the investigation, defense or settlement of claims. The policies of insurance affording these coverages shall be written with limits in an amount not less than that set forth in the Supplemental Conditions. Coverage shall apply to sudden and non-sudden pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants. The policies of insurance issued hereunder shall be written by an insurer acceptable to the District and shall be endorsed to include as insureds the District, its officers, agents, employees and representatives, Project Manager, Architect, CM, IOR and OCIP Administrator, and their respective officers, agents, employees and representatives. If coverage is written on a claims-made basis, the Hazardous Waste Contractor shall warrant that any retroactive date applicable to coverage under the policy precedes the effective date of this Contract and that continuous coverage will be maintained, or an extended discovery period will be exercised, for a period of ten (10) years from Final Acceptance of the Work. If coverage is written on an occurrence basis, the District, its officers, agents, employees and representatives, Project Manager, Architect, CM, IOR and OCIP Administrator, and their respective officers, agents, employees and representatives, shall be named as insureds on the Hazardous Waste Contractor's pollution legal liability policies for operations, including completed operations, relating to, or arising out of, work for the Project for a period of ten (10) years after Final Acceptance of the Work. At least five (5) working days' prior to any Hazardous Waste Contractor's commencing Work on the Site; Contractor shall provide the District with Certificates of Insurance evidencing the coverage required hereunder.

16.23 Contractor Obligations: Contractor agrees to comply with any and all terms and conditions of the policies of insurance provided by District and to comply with any and all claims handling procedures, loss prevention programs and other programs required by or related to the District's OCIP as set forth herein. Contractor shall require Subcontractors, Sub-Subcontractors and all others covered by the District's OCIP insurance policies to so comply. Contractor, its Subcontractors and Sub-Subcontractors shall furnish to the District, its OCIP Administrator, its designee or the insurers under the OCIP policies all information and documentation that such entity may require from time to time in connection with the issuance of policies under this Contract or the administration of the OCIP in such form and substance as such entity may prescribe and promptly comply with the recommendations of the OCIP insurers. Contractor shall not violate, or knowingly permit to be violated; any conditions of the policies of insurance provided by the District hereunder and shall at all times satisfy the requirements of the insurers issuing them. Contractor shall assure that all OCIP requirements imposed upon and to be performed by the Contractor shall

likewise be imposed upon, assumed and performed by each Subcontractor and Sub-Subcontractor. If the Contractor, Subcontractors, Sub-Subcontractors or Excluded Parties should fail to comply with the requirements of this Section, the District may withhold payment due to the Contractor or suspend the work at the Contractor's sole expense and without adjustment of the Contract Price or Contract Time until such time as the Contractor, its Subcontractors, Sub-Subcontractors and/or Excluded Parties have performed such obligations to the reasonable satisfaction of the District.

16.24 Minimum safety requirements cannot be changed by the district and or by the district representatives.

Disclaimer

It is recommended that these documents be reviewed by counsel before insertion into the bid specifications. Any changes to these documents must be reviewed by our office before including in any bid specifications. No changes can be made to any of the safety requirements listed herein.

Please send a copy of your final Bid Language regarding OCIP Insurance provision to Arthur J. Gallagher & Co.

How do I remove the insurance cost relating to the OCIP from my Bid? You will need to determine what you will pay for insurance for this particular project if your regular insurance carrier(s) were to provide the coverage for your work.

PROJECTED WORKER'S COMPENSATION INSURANCE COST

STEPS 1 - Determine the on-Site payroll for the job by multiplying the total estimated job hours and the prevailing wage rate.

BEFORE YOU BEGIN…
If you do not already have a copy of your own Workers' Compensation & General Liability Policy, you should contact your Workers' Compensation and General Liability broker and obtain the rates and credits that apply on your existing policies.

Labor Description	Worker's Comp Class Code	Total Estimated Job Hours	Multiply by Wage Rate	Total Estimated Payroll
Masonry > $19 hr	5028	300	$23.05	$6,915

STEP 2 – Multiply the Estimated Payroll by your regular Workers' Compensation Rate and Divide by 100.

Worker's Comp Class Code	Total Estimated Payroll	Rate per $100 payroll		WC Premium
5028	6,915	20.91	a)	1,445.92
STEP 3 – If you have Employer Liability on regular Work Comp policy, multiply this amount by your EL Increased Limit rate (For this example use 3.30) and divide by 100. $1,445.92 x 3.30 = $4,771.53 $4,771.53 ÷100 = $47.71			b)	47.71
Article 6 SUBTOTAL				**1,493.63**
STEP 4 – Take the Experience Modifier Rate shown on your Work Comp policy and multiply it by the subtotal above. (For this example use 1.25) $1,493.63 x 1.25 = $1,867.03			**Modified Premium**	**1,867.03**
NOTE – In addition to the above basic calculation, your existing work comp carrier may apply various credits (which reduce your Modified Premium) or debits (which increase your Modified Premium). Please contact your agent or call the OCIP Administrator (949) 349-9859 if you require assistance.				

PROJECTED GENERAL LIABILITY INSURANCE COST

STEP 5 – To determine the cost associated with General Liability coverage, you must know the rate and premium basis that your insurance carrier uses. General Liability premiums can be based on payroll, contract value, or receipts and the premium rates can be applied per 100 or per 1,000.

Class Code	Premium Basis	Rate per $100 or per $1000	GL Premium
97447	Estimated Payroll: $6,915	2.98 Per 100	$206.06
$6,915 x 2.98 = $20,606.70 $20,606.70 ÷ 100 = $206.06			
NOTE – In addition to the above basic calculation, your existing General Liability carrier may apply various credits (which reduce your Modified Premium) or debits (which increase your Modified Premium). Please contact your agent or call the OCIP Administrator (949) 349-9859 if you require assistance.			

STEP 6 – Combine Project Workers' Compensation Insurance Cost and General Liability Insurance Cost.

Workers' Compensation Insurance Cost	1,867.03
General Liability Insurance Cost	206.06
TOTAL INSURANCE COST FOR OCIP PROJECT	2,073.09

STEP 7 – Estimate your costs for the job and subtract insurance cost for coverage provided by the OCIP.

Original Bid Amount	$24,000.00
Projected Insurance Cost	-2,073.09
Adjusted Bid Amount **	$21,926.91

If you have any question regarding the above calculations please determine the total work hours for this project and contact your insurance broker for assistance in determining your Bid deductions. If you leave your insurance cost in the Bid and your competitor removes it he/she should be the lower Bidder with all factors being equal.

Form Completion Instructions - Insurance Cost Worksheet
These costs should NOT be included in your bid. The purpose of this worksheet is to identify the cost that you have or will exclude from your bid.

COMPLETION INSTRUCTIONS

1. **Contractor/Subcontractor Information:**
   - ❑ Fill in your company's complete legal name and d.b.a. including names of partners, sole proprietor's name, or joint venture partners.
   - ❑ Enter your appropriate Federal Employers Identification (if you are a sole proprietor, this may be your social security number)
2. **Bid Information:**
   - ❑ Contract Amount = your gross contract value before you subtract the amount you will subcontract.
   - ❑ Self Performed = the dollar amount or percentage of the Contract Amount that you will retain.
   - ❑ Subcontracted = the dollar amount or percentage of the Contract Amount that you will subcontract. If you enter an amount here, please be sure to complete Section 7 so that we can get the appropriate enrollment forms to your subcontractors.
3. **Your Contact Information:**
   - ❑ If you enter an email address for one of your contacts, we will attempt to send future correspondence to you at that email address. If you do not have an email account, or prefer to be contacted via fax, please leave the email address blank.
4. **Workers' Compensation Insurance Information:**
   - ❑ You will need to enter each WC Class Code that will apply to your work related to this contract. Enter the estimated payroll for this contract for each Class Code.
   - ❑ In general, to calculate your Worker's Compensation Premium you will need to make the following calculations:
     i. (Rate per $100 of Payroll X Estimated Payroll/100) = WC Premium.
     ii. WC Premium X Increased Limits Factor = Limits Premium
     iii. Subtotal of WC Premium + Limits Premium X Experience Modifier = Modified Premium
     iv. Profit & overhead = the amount of profit & overhead charged to this job.

	❑ In addition to the above basic calculations, your insurance company may apply various credits (which reduce your Modified Premium) or debits (which increase your Modified Premium). ❑ Include the Profit & Overhead charge you would include if your insurance costs were included in your bid. ❑ You may want to have your insurance agent help you fill out this section as each insurance company calculates premium in a slightly different manner. ❑ If you do not have an insurance agent or just want to have help filling this section out, please contact us. ❑ Please attach a photocopy of your Worker's Compensation policy's declarations page.
5. **Subcontracted Work associated with this Contract:**	❑ Please include as much information as you can about the work you intend to subcontract so that we can get the appropriate enrollment forms to your subcontractors.

An authorized representative of your company must sign and date this worksheet.

1. Contractor Information **Federal ID # _____**

Company Name: _____

Address: _____

City, State, Zip: _____

2. Bid Information - see section 5 if you are subcontracting any work

Contract/Bid#_____

Scope of Work: _____

If you are a subcontractor, who are you contracted with?_____

Contract Amt: _____
Self-Performed: _____
Subcontracted: _____

Contract awarded on (date): _____
This work expected to start (date): _____

3. Your contact Information *Please indicate the person responsible for each item below:*

Contact Type	Name	Telephone#	Fax #	Email
Payroll				
Insurance				

4. Worker's Compensation Insurance Information

WC Class Code	Labor Description	Estimated Job Hours	Estimated Payroll	Rate per $100 Payroll	WC Premium = (Payroll/100 X Rate)

Sub-Total:	
Employer's Liability Increased Limits Factor	
Limits Premium= (Sub-Total X Increased Limits Factor):	
(WC Premium Sub-total + Limits Premium) = Sub-Total:	
Experience Modifier:	
Modified Premium = (Limits Premium X Experience Modifier):	
Describe other credit or debit applied: _____	
Describe other credit or debit applied: _____	
Describe other credit or debit applied: _____	
Describe other credit or debit applied: _____	
Profit & Overhead:_____	
Premium Total = (Modified Premium X credits & debits+ Profit & Overhead):	

5. Subcontracted Work associated with this Contract:

Subcontractor Name	Contract #	Contract Amt	Contact Name	Contact Phone #

I hereby warrant that this worksheet accurately reflects the total projected insurance costs (for bidder and all subcontractors associated with this work) that would apply if my regular insurance program were to provide coverage for this work. Attached are the worksheets for the subcontractors associated with this work.

Signature: _____ Date: _____

Printed Name: _____

Title: _____

ALLIANCE OF SCHOOLS FOR COOPERATIVE INSURANCE PROGRAMS
(ASCIP)

SAMPLE OWNER CONTROLLED INSURANCE PROGRAM (OCIP) MANUAL

RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

Site Code: TBD

PREPARED BY:

ARTHUR J. GALLAGHER & CO. – ORANGE COUNTY
18201 Von Karman Ave., Suite 200
Irvine, CA 92612

CONTRACTOR INSURANCE MANUAL

ASCIP - OCIP

TABLE OF CONTENTS

I. INTRODUCTION

The District has implemented an Owner Controlled Insurance Program (OCIP) for the construction of this project. This manual was prepared by Arthur J. Gallagher & Co., who is the insurance broker and OCIP administrator for this project. The manual is designed to identify, define and assign responsibilities for the administration of the OCIP.

What this Manual Does:

- Generally describes the OCIP
- Identifies responsibilities of the various parties involved in the OCIP
- Describes some audit and administrative procedures
- Provides answers to basic questions about the OCIP

What this Manual Does Not Do:

- Provide coverage interpretations. The actual terms and conditions of the OCIP policy will determine coverage.
- Provide complete information about coverages
- Provide answers to specific claims questions.

Certain insurance coverages are being provided for the term of your contract at no cost to you. These manual details the coverages provided the steps necessary to enroll, and the procedures in the event of a claim. Since the District will pay the insurance premiums for the OCIP coverages described in this manual, you should notify your insurer(s) to delete from your insurance program charges and coverage for the on-site activities of this Project that are covered under the OCIP.

Note: Insurance coverage and limits provided by the OCIP are specific to this project. Your insurance representative should review this information. Any additional coverage you may wish to purchase will be at your option and expense.

The District reserves the right to terminate or modify the OCIP or any portion thereof. If the District exercises this right, Enrolled Contractors and Subcontractors of any tier will be provided notice as required by the terms of their individual Contracts. At its option, the District may procure alternate coverage or may require Contractors and Subcontractors of any tier to procure and maintain alternate insurance coverage.

To enroll in the program, the "Request for Insurance" Form 2, included in this manual, must be completely filled out and returned to Arthur J. Gallagher & Co. along with the insurance.

Certificate described in Section IV, Enrollment Procedures. Coverage under the OCIP is mandatory but not automatic for all eligible Contractors. Your participation in the OCIP is not complete until you receive confirmation from the OCIP Administrator at Arthur J. Gallagher & Co.

Since your subcontractors will also be covered by the OCIP while performing work at the project site, it is important that you provide a list of all subcontractors to the Construction Manager and Arthur J. Gallagher & Co. Once identified, your subcontractors will receive a copy of this manual.

Should you have any questions regarding the OCIP, please contact:

Heather Lawson
(800) 877-8218 ext. 2205
(866) 741-2481 Fax
Arthur J. Gallagher & Co.
National Wrap up Administration
12444 Powerscourt Drive
St. Louis, Mo. 63131

Arthur J. Gallagher & Co.
18201 Von Karman, Suite 200
Irvine, CA 92612
(949) 349-9800

Ryan Jacques	(949) 349-9831
John G. Chino	(949) 349-9827
Marco Guardi	(949) 349-9884

ASCIP, the District and Arthur J. Gallagher & Co. are committed to safety on the job site, and expect all contractors to share in this commitment.

II. COVERAGE SUMMARY

This section outlines the coverages provided for you by the OCIP. The District makes no warranty or representation that the OCIP coverages constitute an insurance portfolio, which adequately addresses all the risks faced by the contractor. Permission is granted by the District should you desire to supplement coverages provided by the OCIP at your expense.

Disclaimer: The information in this manual is intended to outline the OCIP. IF any conflict exists between this manual and the OCIP insurance policies or Contracts between the District and Contractor, the policies or Contracts will govern.

WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY

Insurance Carrier: Liberty Insurance Corporation

Policy Term: Date of Contract until project completion

*Named Insured: ASCIP (Alliance of Schools for Cooperative Insurance Programs and any tier of contractor, subcontractor and sub-subcontractors thereof, or other entity or person while performing work at an ASCIP project and for whom the Owner has agreed by contract to provide an Owner Controlled Insurance Program).

Interest: Covering only on-site operations related to the ASCIP project.

Limits of Liability: Workers' Compensation
Statutory Benefits - Applicable States

Employers Liability:

Bodily Injury by Accident	$1,000,000 Each Accident
Bodily Injury by Disease	$1,000,000 Each Employee
Bodily Injury by Disease	$1,000,000 Policy Limit

Coverage Exclusions:

Contractual liability
Punitive or exemplary damages
Injury to illegally employed persons (under certain circumstances)
Injuries covered by the workers' compensation statute or similar laws
Intentional injury
Injuries sustained outside the United States, its territories or possessions, or Canada, except with respect to citizens of the United States or Canada who are temporarily outside of these countries
Employment-related practices
Fines or penalties imposed for a violation of a federal or state law
Injuries covered under a federal compensation act
Designated Workplaces Exclusion Endorsement
Employee Insured by General Employer Excluded

* There will be a separate policy issued to each contractor or subcontractor as individual Named Insured. You will receive your policy after all the necessary forms have been completed and your enrollment has been confirmed. The OCIP Insurance Carrier will track Worker's Compensation losses associated with this project along with your payroll and will submit this information for inclusion in the calculation of your Experience Modifier.

NOTE: This policy applies only to operations related to the project conducted at the location designated below and operations necessary or incidental thereto:

District: Rancho Santiago Community College District
Project: Science Center
Project Address: 1530 W. 17th Street, Santa Ana, CA 92706-3398

Coverage Extensions:

Voluntary Compensation
USL&H Coverage - If Any
Other States Coverage
Voluntary Compensation
Broad Named Insured
Knowledge of Occurrence
Unintentional Failure to Disclose Hazards
Maritime Exclusion
Notice of Occurrence
Joint Ventures as Insureds

COMMERCIAL GENERAL LIABILITY

Insurance Carrier: Liberty Mutual Fire Insurance Company

Policy Term: From start of project until substantial completion plus 10 years completed operations.

Named Insured:
(1) Alliance of Schools for Cooperative Insurance Programs (ASCIP) and
(2) All tiers of contractors, subcontractors and sub-subcontractors as their interests may appear, who work on the project and for whom ASCIP Member as agreed by contract to provide coverage under the Owner Controlled Insurance Program.

Interest: This policy applies only to operations related to the project conducted at the location designated below and operations necessary or incidental thereto:

District: Rancho Santiago Community College District
Project: Science Center
Project Address: 1530 W. 17th Street, Santa Ana, CA 92706-3398

Limits of Liability:

Primary:
$4,000,000 General Aggregate, per project
$4,000,000 Products/Completed Operations Aggregate
$2,000,000 Personal Injury and Advertising Injury
$2,000,000 Each Occurrence
$ 100,000 Damages to Premises Rented to You Limit (any one premises and subject to occurrence limit)
$ 5,000 Medical Expense Limit (any one person and subject to occurrence limit

Coverage:
Products/Completed Operations - coverage to be extended for 120 months after completion of all work at project site.
Broad Form Named Insured
Bodily Injury Redefined
Advertisement Redefined
Unintentional Failure to Disclose Hazards
Notice of Occurrence (see Coverage Glossary) Knowledge of Occurrence (see Coverage Glossary) Reasonable Force
Broaden Damage to Premise Rented to You Coverage
Professional Health Care Srvs by Employees Coverage
Bodily Injury to Co-Employees Coverage
Non-Cumulation of Liability
Designated unmanned aircraft
Liability arising from warranty period work

Limitations:

This policy **does not** apply to any of the following as Insureds:

(1) Any person or organization while fabricating or manufacturing materials away from the designated locations,

(2) Any contractor, subcontractor, supplier, vendor, or common carrier who will have employees engaged in work at the project location who are not provided Workers' Compensation and Employer's Liability coverage under the Owner Controlled Insurance Program,

(3) Any architect, engineer, or surveyor and their consultant, relating to professional liability,

(4) Any other person or organization while transporting equipment to or from the designated location,

(5) ***Any person or organization that has not completed enrollment in the OCIP***.

Key Exclusions:

Aircraft, Auto or Watercraft (drones covered under endorsement)
Employment Related Practices
Broad Form Nuclear
Engineers, Architects or Surveyors Professional Liability
Asbestos
Discrimination
Total Pollution
Exclusion of Certified Acts of Terrorism
Alaska Exclusion of Certified Acts of Terrorism
Nuclear Energy Liability Exclusion
Fungi, Bacteria or Mold
Abuse or Molestation
Rip & Tear
Professional Liability
Recording and Distribution of Material or Information in Violation of Law

COVERAGE GLOSSARY

Notice of Occurrence

The rights of the Named Insured shall not be prejudiced under this policy, if there is a failure to give notice of an occurrence solely due to the Insured's reasonable belief that bodily injury or property damage is not covered under this policy.

Knowledge of Occurrence

Coverage is to be modified so that it is understood and agreed that knowledge of an occurrence by the agent, servant or employee of the insured shall not in itself constitute knowledge to the insured unless the Insured's corporate insurance department shall have received first notice from its agent, service or employee.

Unintentional Non-Disclosure of Hazards

The unintentional failure of the Named Insured to disclose all hazards existing as of the effective date of this policy shall not prejudice any insured with respect to the insurance afforded by the policy.

EXCESS LIABILITY

Insurance Carrier:	Westchester Surplus Specialty Lines Insurance Company
Policy Term:	From date bound until project substantial completion plus 10 years completed operations
Named Insured:	Alliance of Schools for Cooperative Insurance Programs (ASCIP) and all tiers of enrolled contractors and subcontractors
Interest:	Coverage in respect of the Insured's on-site operations, solely with respect to the construction of the specified ASCIP projects.
Limits of Liability:	$15,000,000 per Occurrence $15,000,000 in the Aggregate
Conditions:	Terms and conditions per policy on file with ASCIP and the District
Exclusions:	Asbestos CCC (R&P) Discrimination Aircraft products Employment related practices Total pollution Nuclear Professional liability Violation of communication laws

CONTRACTORS POLLUTION LIABILITY

Insurance Carrier:	Navigators Specialty Insurance Co
Policy Term:	August 1, 2016 to July 1, 2020
Named Insured:	(1) Alliance of Schools for Cooperative Insurance Programs (ASCIP) and (2) All tiers of contractors, subcontractors and sub-subcontractors as their interests may appear, who work on the project and for whom ASCIP Member as agreed by contract to provide coverage under the Owner Controlled Insurance Program.
Limit of Liability	$5,000,000 Each Claim $5,000,000 Policy Aggregate

Notable Endorsements & Exclusions:

Contractual Liability Exclusion
Damage to Your Product and Your Work Exclusion
Employers Liability Exclusion
Insured vs. Insured Exclusion
Intentional and Illegal Acts Exclusion
Known Circumstances and Non Disclosure Exclusion
Non Compliance Exclusion
Owned Property Exclusion
Products Liability Exclusion
Professional Services Exclusion
Radioactive Matter Exclusion
Related or Affiliated Entities Exclusion
Vehicle Exclusion
Transported Materials Exclusion
Workers' Compensation Exclusion
Certified Acts of Terrorism Exclusion
Terrorism Exclusion
U.S. Economic and Trade Sanctions Endorsement
Biological Contamination Coverage Extension
Bodily Injury – Amendment of Definition Endorsement
Service of Suit Clause Endorsement

BUILDER'S RISK INSURANCE

ASCIP has arranged necessary Builder's Risk insurance for the project during the entire construction phase for ASCIP Member District*. The coverage protects the interest of all involved parties including the District, ASCIP and all contractors and subcontractors. This insurance does not protect certain property of contractors used at the construction site, including contractors' tools and equipment (including office trailers, tool sheds and any other temporary structures) not intended to become a permanent part of the project. The following are details of the coverage:

Named Insured:	Alliance of Schools for Cooperative Insurance Programs (ASCIP)
Contractor's Interest:	Contractor's Interest in property covered to the extent of the Insured's liability by law or assumed by contract whether written or oral.
Property Insured:	Real and Personal Property including construction materials intended to become a permanent part of the project.
Location Insured:	Specified project site.
Property Not Insured:	Including, but not limited to, all property of contractors and subcontractors which is not incorporated into the project. Examples of this are contractors' tools, scaffolds, machinery, cranes, earthmoving equipment, consumables, office trailers, tool sheds and any other temporary structures not intended to become a permanent part of the project. Property in transit, including while at contractors' shops during fabrication and/or at temporary storage locations, is not insured, unless property is stored in a certified bonding warehouse.
Valuation:	Repair or replacement coverage on all insured property.
Limit of Protection:	$50,000,000 per occurrence blanket real and personal property damage caused by "All Risk" perils per policy form.
Deductible:	TBD

*** The Builders Risk coverage shall only apply for those ASCIP Member Districts participating in the ASCIP Core Property Program.**

III. COVERAGES NOT INCLUDED IN THE OCIP

1. Automobile Insurance
   The OCIP does not include Automobile Liability and Physical Damage Insurance for licensed vehicles.

2. Off-Site Workers' Compensation
   The OCIP only covers work-related injuries occurring at the work site. It does not cover Workers' Compensation risks associated with your other jobs or activities.

3. Off-Site General Liability
   The OCIP only covers third-party liability claims arising from activities at the work site. It does not cover liability risks associated with your other jobs or activities.

4. Tools, Equipment and Machinery
   The OCIP does not cover loss of, or damage to, your tools and equipment at the job site. Nor does it cover your employee's tools or equipment. Other property such as scaffolds, machinery, crane, earth-moving equipment, consumables, office trailers, tool sheds and any other temporary structures not intended to become a permanent part of the project is not covered under this OCIP.

   Property in transit, including while at contractor's shops during fabrication and/or at temporary storage locations, is not insured.

IV. ENROLLMENT PROCEDURES

1. Complete attached application (Request for Insurance Form 2) and fax or (e) mail to:

Heather Lawson
Arthur J. Gallagher & Co.
National Wrap up Unit
12444 Powerscourt Drive
St. Louis, Mo. 63131
(800) 877-8218 ext. 2205
(866) 741-2481 Fax
heather_lawson@ajg.com

2. Attach a certificate of insurance in accordance with the OCIP enrollment provisions in this Agreement evidencing primary Auto Liability and Workers' Compensation, and General Liability for Project-Related Operations performed away from the OCIP Project Site. *Contact your Insurance Agent for this certificate (a sample is included). It is your responsibility to notify your Insurance Agent to exclude all work to be done at this Project Site from your regular GL and WC policies.*

3. Arthur J. Gallagher will send a Certificate of Insurance evidencing your coverage under the ASCIP/OCIP program. This certificate is required by the District to obtain access to the job site. You should keep this certificate as evidence of your participation in the OCIP. It may be required by your regular insurance company to avoid duplication of insurance charges.

Form Completion Instructions

(a) Insurance Application

It will be the responsibility of each contractor to see that each of its subcontractors complete the required forms. Failure of a subcontractor to complete these forms could result (at Owner's discretion) in payments to contractor and/or subcontractor being withheld.

The forms are used to determine a firm's eligibility for coverage under the OCIP. Completion of the forms does not guarantee enrollment into the program.

FORM 2: OCIP Insurance Application

This form must be submitted to AJGCo. For each contract issued by the successful Contractor and/or Subcontractor prior to site mobilization. AJGCo. Will determine eligibility and issue a certificate of insurance showing the insurance coverage being provided under the CIP.

COMPLETION INSTRUCTIONS

1. **Contractor/Subcontractor Information:**
   - ❑ Fill in your company's complete legal name and d.b.a. including names of partners, sole proprietor's name, or joint venture partners.
   - ❑ Fill in your company's complete address.
   - ❑ Fill in name of field, payroll and insurance contact information: name, telephone, fax number and email address.
   - ❑ Fill in your federal identification number and SIC code.
   - ❑ Input your experience mod effective date
   - ❑ Input your Bureau (NCCI) ID number
   - ❑ Input your workers compensation policy period
   - ❑ "Circle the appropriate field describing status
2. **Bid Information:**
   - ❑ Fill in type of services your firm will be doing at the project site.
   - ❑ Fill in the Bid Pack number
   - ❑ Fill in any contract or specification number under which your contract falls.
   - ❑ Fill in the estimated start date of your work.
   - ❑ Fill in the estimated completion date of your work.
   - ❑ Fill in the dollar amount of your contract.
   - ❑ Fill in the dollar amount of your contract that you will be subcontracting to others.
   - ❑ Fill in the dollar amount of your payroll for work performed by your own labor.
3. **Workers' Compensation Insurance Information:**
   - ❑ Identify the Workers' Compensation Labor Descriptions - Can be obtained from your Workers' Compensation policy.
4. **WC Class Code Number:**
   - ❑ Fill in appropriate class code - Can be obtained from your Workers' Compensation policy or from your insurance agent.

5. **On Site Job Hours:**
   - ❑ Fill in the estimated on-site man-hours by workers' compensation classification
6. **Wage Rate:**
   - ❑ Fill in the applicable wage rate by workers' compensation classification.
7. **Payroll Estimate:**
   - ❑ Fill in the estimated payroll at the job site per workers' compensation class code.
8. **Total On Site Hours:**
   - ❑ Fill the total on site hours
9. **Total Payroll:**
   - ❑ Fill in the total payroll
10. **Subcontractor Information:**
   - ❑ List the name of all subcontractors associated with your work at the project site
   - ❑ List the subcontractors contact name and telephone number
   - ❑ List the subcontractor's contract number and contract amount.

Form 2 – Insurance Application	WC Policy No. Assigned:

Your Company Name: _____ FEIN#_____ (Tax ID #)

Address: _____ City: _____ State: _____ Zip code

Your WC Experience Mod. Rating Factor: _____ Your Exp. Mod Effective Date: _____ (usually your WC effective date)

Bureau ID # (NCCI): _____ Policy Period: From _____ to _____

Status: ☐ Construction Manager ☐ General Contractor ☐ Subcontractor of (name) _____

Name	Phone#	Fax#	Email Address
Proj.Mgr.			
Payroll			
Insurance			
Safety			

Scope of Work to be performed: _____ Bid Pack #: _____ Contract #: _____

Estimated Start date: _____ Estimated Completion Date: _____

Total Contract Amount: $_____ Amount Subcontracted to Others: $_____

Amount Self Performed: $_____ Payroll For Self Performed Work: $_____

a) WORKERS' COMPENSATION & EMPLOYER'S LIABILITY – For Self Performed Work at the Project Site

Labor Classification	WC Code	On-site Job Hours	Wage Rate	Payroll Estimate
Total Onsite Hours			**Total Payroll**	

List the Subcontractors and corresponding contract numbers and values associated with your work.				
Name of Subcontractor	Contact Name	Phone No	Contract Number	Contract Amount

CONTRACTOR'S INSURANCE INFORMATION

Each contractor must attach a certificate of insurance evidencing off-site coverage for Workers' Compensation, General Liability and Auto Liability coverage and indicate that your GL and WC coverages exclude your work on the Port of Elizabeth-Zurich. Contact your insurance agent for this certificate. It is your responsibility to notify your insurance agent to exclude all work to be done from your regular WC and GL policies. This certificate *must* also name Sponsor as an additional insured. A sample certificate of insurance is included with this package.

ASSIGNMENT BY CONTRACTOR OR SUBCONTRACTOR FOR SPONSOR CONTROLLED INSURANCE PROGRAM

The undersigned, a contractor or subcontractor under construction contract with **Sponsor** in consideration of the agreement of **Sponsor** to arrange insurance and pay premiums as provided by said contractor for the contractor and for each subcontractor for any tier thereunder, and for other good and valuable consideration hereby assigns to sponsor all return premiums, premium refunds, dividends, and any monies due or to become due to the undersigned in connection with said insurance.

Authorized Contractor Representative_____**Date**_____

This insurance application – Form 2, along with the off-site certificate of insurance must be sent to:

Heather Lawson
Arthur J. Gallagher & Co.
National Wrap Up Unit
12444 Powerscourt Dr.
St Louis, Mo. 63131
800-877-8218 X2205
866-741-2481 Fax

_____
Approved By

_____
Date

ACORD CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 01/01/1001

PRODUCER
Your Insurance Agent

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED
Your Company Name

INSURERS AFFORDING COVERAGE	NAIC #
INSURER A: Your Insurance Company	
INSURER B: Your Insurance Company	
INSURER C:	
INSURER D:	
INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	☐	GENERAL LIABILITY ☑ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ☑ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☑ PRO-JECT ☐ LOC	123456789	01/01/1001	01/01/1001	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 50,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 1,000,000
A	☐	AUTOMOBILE LIABILITY ☑ ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS	***THIS IS A SAMPLE DOCUMENT ONLY*** ***Certificate of Insurance must be issued by your primary insurance agent and include the specific wording shown at the bottom of this sample.*** ***Mail or fax to Arthur J. Gallagher & Co., OCIP Dept.***			COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ 0 $ 0 $ 0
	☐	GARAGE LIABILITY ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EA ACC AGG	$ $ $
A	☐	EXCESS/UMBRELLA LIABILITY OCCUR ☐ CLAIMS MADE DEDUCTIBLE RETENTION $	123456789	01/01/1001	01/01/1001	EACH OCCURRENCE AGGREGATE	$ $
A		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below	123456789	01/01/1001	01/01/1001	WC STATU-TORY LIMITS / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
		OTHER					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

District - Project - Endorsements required: Additional Insured for off site general liability and both on and off site auto liability, waiver of subrogation for off site workers' compensation in favor of District, CG, and Arthur J. Gallagher Risk Management Services, Inc.; additional endorsement required - primary and non-contributory. Please note, it is your responsibility to notify your insurance agent to exclude all on site work for this job site from your regular WC and GL policies once you receive a CIP certificate from AJG.

CERTIFICATE HOLDER

Alliance of Schools For Cooperative Insurance Program
C/O: Arthur J. Gallagher & Company
12444 Powerscourt Drive
Suite 500
St. Louis, MO 63131

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

V. MONTHLY PAYROLL REPORTING AND FINAL AUDIT

The ASCIP/ District require that all contractors submit a monthly report of man-hours and payroll to Arthur J. Gallagher & Co. as per the following form.

"WE DON'T AND WON'T ACCEPT CERTIFIED PAYROLL REPORTS"

It is the Prime Contractor's responsibility to insure that this information is provided monthly by all subs.

THE CONTRACTORS AND ALL TIERS OF SUBCONTRACTORS WILL MAKE THEIR PAYROLL RECORDS AVAILABLE TO THE INSURANCE COMPANY AUDITOR AT ANY TIME DURING THE POLICY PERIOD AND UP TO THREE YEARS AFTER COMPLETION OF THE PROJECT.

Payroll: Payroll shall include the total remuneration and hours worked for all employees working on the Project Site, including the cost of board and lodging where it is considered part of an employee's earnings.

Payroll Records: All payroll records on ASCIP projects should be kept separate from all other work. This will make the audit process easier and will permit your regular insurance company to exclude this payroll from your off-site insurance charges.

Payroll Reports: Payroll reports should be sent to Arthur J. Gallagher within two weeks following end of prior month. You should use the same workers' compensation codes and classifications as shown on your current workers' compensation policy. Show only total hours and total payroll for each classification of employees. The report can be handwritten and faxed, hold the original copy in your file. If you have more than one contract and/or work order, please either 1) complete a Form for each awarding contractor or, 2) show which payroll applies to which contract.

Overtime: Earnings for overtime should be included only at the normal hourly rate. Overtime means those hours in excess of 8 hours worked each day, 40 hours in any week or on Saturdays, Sundays, or holidays, but only when there is an increase in the hourly rate to work such hours. If you do not wish to make this conversion, include overtime and double time in the boxes provided on the form and we will calculate straight time for you. Job Hours reports should include overtime hours.

This form must be completed monthly by all contractors and subcontractors for **each** contract awarded. The completed form is to be faxed or mailed to us within two weeks following the end of the payroll-reporting period. The Contractor will be responsible to enforce the submission of this form by their subcontractors. Computer generated payroll reports are acceptable if similar information is provided. We will forward your company a supply of these forms.

COMPLETION INSTRUCTIONS

1.	**Month Ending:**	Indicate the month for which you are reporting payroll. If payroll is not reported monthly, indicate payroll duration.
2.	**Contractor Name:**	Your firm's name.
3.	**Your Contract With:**	Insert whom your contract is with.
4.	**Contract #:**	Contract or Specification number under which your work may fall.
5.	**Workers' Comp. Classification Code:**	Can be obtained from your Workers' Compensation policy, your insurance agent or the information you supplied on the enrollment form you completed (Form 2).
6.	**Man-hours and Payroll:**	List man-hours and Gross Payroll including overtime, indicating the amount that is overtime or double time for each class code. List one cumulative monthly figure for all employees who fall under each class code. There is no need to breakout figure on a per employee basis.

7. **Sign and Date Form.**

RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

(Complete a Separate Form for Each Contract)

CONTRACTOR OR SUBCONTRACTOR WILL NOT BE PAID IF THIS REPORT IS NOT SUBMITTED WITHIN THE ALLOTTED TIME FRAME

MONTH: _____ -OR- FROM: _____ to: _____

MONTHLY ON-SITE PAYROLL REPORT

WRAP-UP INSURANCE PROGRAM

CONTRACTOR NAME:_____

WORKING UNDER CONTRACT WITH:_____

CONTRACT #:_____

WORKERS' COMPENSATION CLASSIFICATION CODES	GROSS RAW LABOR UNBURDENED PAYROLL	OVERTIME	DOUBLE TIME	**Section 1.02 HOURS**
	$	$	$	

* You do not need to list out individual employee payroll information. Summarize employee payrolls by class code and only report one payroll amount per code.

I CERTIFY THAT THE DATA SHOWN ABOVE IS CORRECT.

Signed_____ Title_____

Date_____

Return Form to:

Heather Lawson
Arthur J. Gallagher & Co.
National Wrap up Unit
12444 Powerscourt Drive
St. Louis, MO 63131
(800) 877-8218 x2205
(866) 741-2481 Fax
heather_lawson@ajg.com

Note: Payroll reports are due to AJGCo. Prior to the 15th of every month. If you choose to fax your monthly payroll reports you will not need to mail a copy.

FORM 6: Notice of Work Completion

Contractor needs to complete this form when submitting final payroll report for verification that all requirements of the Wrap-Up have been met.

1. **Contract #:**	The Contract or Specification number(s) relating to the work at the Job Site(s).
2. **Contractor:**	Construction Manager, Contractor, Subcontractor, Sub-subcontractor.
3. **Job Site:**	The description of Project Site.
4. **Work Performed:**	Type of work performed. (Example: Concrete, Excavation, Supervisory, etc.)
5. **Work Completed By:**	Display names of Construction Manager, Contractor, Subcontractor or Sub-subcontractor as completing work.
6. **Date Contract Completed:**	Fill in appropriate date the work on this contract was completed.
7. **Date Total Work Completed:**	Fill in appropriate date that all work at the Site was completed. NOTE: If only one contract, these dates are the same. If more than one contract, this is the date **ALL** work at the Site is complete.
8. **Subcontractors or Sub-Subcontractors included in the work:**	Names of all Subcontractors of all tiers and associated with the terminating Construction Manager, Contractor or Subcontractor of all tiers.
9. **Location of Payroll:**	Location of payroll records for Construction Manager, Contractor, and Subcontractors of all tiers.
10. **Sign Form:**	Signature of Project Manager.
11. **Return Completed Form:**	Return the completed form to AJGCo. For our verification that Contractor or Subcontractor has complied with the Wrap-Up document requirements.

NOTICE OF WORK COMPLETION
Form 6

1. Contract #: _____
2. Contractor: _____
3. Job site: District
4. Work Performed: _____
5. The following Contractor or Subcontractor has completed his Work at the Project Site and is being processed for final payment: (Indicate whether Contractor or Subcontractor)

   _____ Contractor

   _____ Subcontractor (Tier)

6. Date this contract completed: _____
7. Date total work completed: _____ Final Payroll Amount: _____
8. Final Contract Value: _____

   Subcontractors of all tiers, which are included in this Work
   (Add attachment if more space is needed)

   Name _____

   Name _____ _____

   Name _____

9. Final Insurance Audits may be made from payroll and other records located at:

   Contractor: _____

   Subcontractor: _____

10. (Signed By) _____
    Authorized Representative
11. Return completed form to:

Heather Lawson
(Arthur J. Gallagher & Co.
National Wrap up Unit
12444 Powerscourt Drive
St. Louis, MO 63131
(800) 877-8218 ext. 2205
866-741-2481 Fax

VII. CONTRACTORS' SAFETY REQUIREMENTS

Minimum Safety Requirements:
Minimum qualifications for contractor enrollment are subject to the following:

EMR- 1.25 as defined and reported by the WCIRB
Drug Program Pre-Assignment to job site
6' Fall Protection, harnesses and lanyards required if other protective means are not used
No more than 5 serious violations within 5 years
No more than 2 serious repeat in 5 years
No willful violations
Hardhats & Safety Glasses are required at all times & other Personal Protective Eyewear (PPE) as required by work being conducted

Medical Provider Network:
California's workers' compensation law, specifically SB 899, allows insurers and self-insured employers to direct injured employees to a medical provider network (MPN) for medical treatment if they receive state approval for the network.

The OCIP program has chosen the Liberty Mutual Group MPN. For all work-related injury or illness, the physicians and providers in the Liberty Mutual Group MPN will provide you with medical treatment and services.

A summary of the Liberty Mutual Group MPN and your responsibilities in the MPN program can be found at the end of this exhibit.

EMPLOYEE NOTIFICATION CONFIRMATION:
Upon employee injury, notification of the MPN program must be made to the injured employee. This can be facilitated using Form B on the following pages.

PROVIDER PREDESIGNATION:
Your employees may have already predesignated physicians to provide care. This predesignation is still in effect under the MPN program.

WORK-RELATED INJURY OR ILLNESS:
If emergency care is needed, send injured employees to the posted medical center then report the incident to (800) 641-1723 as soon as possible but no later than forty-eight hours after emergency treatment. For non-emergency situations, send injured employees to the identified clinic or the employee's pre-designated physician. For initial treatment, the MPN physician will schedule an appointment for you within 3 business days from the date you request treatment within the MPN. If additional care is needed beyond the initial visit, the MPN will arrange for the employee to use any provider, appropriate to the injury, within the MPN.

For any questions relating to the MPN, Compensability, Benefits, Continuity of Care Plan or Transfer of Care Plan please contact your supervisor or your Claims Case Manager.

To report a workers' compensation injury or illness, please immediately contact your employer or the Claims Case Manager at the above listed telephone number.

Safety Programs:
Each contractor will have a written safety program on the job site.

- Each prime contractor is completely responsible for compliance of all its sub-contractors safety requirements.
- District Project Construction Manager will be provided with a copy of all programs.
- Each contractor will maintain on-site a written Hazard Communication/Employer Right-to-Know Program. A copy will be provided for District's Construction Manager.

- Each contractor's safety activities will be audited based on requirements of its own safety program. Certain minimum standards will apply.
- Subcontractors or sub-subcontractors, which may not now have a written program, may elect to fall under their prime's safety program.
- Should that option be used, each sub or sub-sub is required to submit a letter to the District's Construction Manager indicating it will use that option, that he has a copy of the program and is familiar with the safety requirements under that program and intends to comply with it. Those subs and sub-subs will be held to the same standard as the prime whose program they elect to use.
- Should a prime or subcontractor not currently have a written safety and hazard communication program, Arthur J. Gallagher & Co. will provide an outline of a generic program for use by the contractor in structuring its own version, should it chose.
- Straight adoption of these programs will not be an acceptable option. Each contractor's safety program must be tailored by that contractor to reflect the specific exposures encountered by its tradesmen. Arthur J. Gallagher & Co. and Liberty Mutual Insurance Company will offer assistance in this area if requested.
- All contractors should submit their safety programs to the District's Construction Manager before they begin work.

Safety Committee:

Each prime and those major subcontractors selected by the ASCIP's Construction Manager will appoint a Safety Coordinator.

- Safety Coordinators will be required to attend a Safety Training Session by Arthur J. Gallagher & Co. and Liberty Mutual Insurance at the time of the pre-construction conference.
- The Safety Coordinators will form the Safety Committee.
- Safety Committee Meetings will be held as called by the District's Construction Manager. These meetings will usually occur once each month. Attendance by Safety Coordinators is mandatory.
- Safety Coordinators will be required to accompany Arthur J. Gallagher and Liberty Mutual on tours of the job site for the purpose of training in hazard recognition.
- Superintendents/supervisors will be permitted to act as Safety Coordinators.

Accident Investigations:

Each contractor and subcontractor is required to submit written accident investigations.

- Liberty Mutual Insurance Company and/or Arthur J. Gallagher representatives will make accident investigation forms available for any contractor who does not currently have them.
- Arthur J. Gallagher and/or Liberty Mutual Insurance Company representatives will review all accident investigation reports for quality.

Safety Meetings:

Each contractor, subcontractor and sub-subcontractor is required to conduct safety meetings on the job site as directed by its established safety program.

- Minimum standards for number and quality of these meetings will be established for the job.
- A notebook of safety talk topics will be maintained the Construction Office for those companies who wish access to additional topics.
- Joint safety meetings may be conducted by or with the prime and/or other subs.
- The resulting safety meeting report must clearly identify each employee listed - by contractor, subcontractor or sub-sub.
- All safety-meeting reports may be reviewed by safety representatives from Arthur J. Gallagher & Co. and/or Liberty Mutual Insurance for quality and timeliness. The results of those reviews will be submitted to ASCIP's Construction Manager for his actions.

Self-Inspections:

Each prime and subcontractor must conduct job-site inspections on a regular basis. While these inspections may conform to the requirements of the contractor's own safety program, they are subject to minimum standards established for the job.

- Joint inspections or inspections conducted by a prime contractor for a sub must be identified as such. Documentation of these inspections must clearly identify the name of the person who did the inspection and each of the contractors, subcontractors, and sub-sub for whom the inspection was made.
- Inspection follow-up will be performed by each contractor to ensure corrections have been accomplished.
- The quality of inspections will be audited by Arthur J. Gallagher & Co. and Liberty Mutual Insurance Company loss control personnel and results of those audits provided to the ASCIP Member's Construction Manager for his action.

Job Surveys:

- Liberty Mutual Insurance and/or Arthur J. Gallagher & Co.'s representatives will conduct job-site surveys monthly, in the company of the members of the Safety Committee for the purpose of training these individuals in hazard recognition.
- Suggestions and recommendations resulting from those surveys will be discussed with contractor representatives at the time of the survey where appropriate. Recommendations and suggestions will be discussed during the regular monthly Safety Committee Meetings.
- Findings will be submitted in the loss prevention report directed to the ASCIP Member's Construction Manager for his action.

Record Keeping and Files:

IF IT IS NOT RECORDED IN THE PROJECT'S CONSTRUCTION OFFICE, IT HAS NOT BEEN COMPLETED!

The following required documentation must be in the contractor's safety file in the ASCIP Member's Construction Office. Representatives of Liberty Mutual and Arthur J. Gallagher will review safety program documentation. It is very important that any contractor with questions regarding record keeping contact ASCIP's Construction Manager, Arthur J. Gallagher & Co. or Liberty Mutual Insurance Company's loss control representative for clarification. The following documentation is required:

- A written safety program
- A written hazard/employee right-to-know program
- Material safety data sheets conforming to the above hazard communication program
- Job-site safety meeting reports
- Accident investigations
- Job-site inspections

File Audits:

- Safety files may be reviewed by Liberty Mutual and/or Arthur J. Gallagher & Co.'s loss control representatives monthly.
- Comments as to the quantity and quality of contractor's documentation will be addressed to ASCIP Member's Construction Manager for his action.
- Contractors are encouraged to discuss safety record-keeping problems with the representatives of Arthur J. Gallagher & Co. and Liberty Mutual Insurance Company.

  Arthur J. Gallagher & Co. and/or Liberty Mutual Insurance Company representatives will make a decision each month as to the contractor with the best quality records for the previous month. That information will be made known to ASCIP Member's Construction Manager for appropriate action relative to the job's safety incentive activities.

DISTRICT

PRE-ASSIGNMENT SCREENING and POST ACCIDENT DRUG TESTING PROGRAM

Purpose:
The Sponsor of the **Owner Controlled Insurance Program (OCIP)** is committed to protecting people and property and providing a safe working environment. The purpose of this policy is to establish a drug-free, alcohol-free, safe and healthy work environment for each employee working at the project premises.

Policy:
The **OCIP Sponsor** prohibits the use, possession, distribution, or sale on the project premises, facilities, or work places of any of the following: alcoholic beverages, intoxicants, drugs and related drug paraphernalia.

Employees must not report for duty or perform work while under the influence of any drug, alcoholic beverage, or intoxicant. Employees on the project premises may be subject to search as provided herein. Applicants and employees will be required to consent to drug and alcohol screening or an oral fluid drug screen as provided herein.

Definitions:
When used herein, the following terms will have the meanings given below:

a. Company – **General Contractor and/or Prime Contractor** Company and sponsored joint ventures.

b. OCIP- Owner Controlled Insurance Program

c. OCIP Sponsor - Alliance of Schools for Cooperative Insurance Programs with its representative and OCIP Administrator, Arthur J. Gallagher & Co.

d. Alcohol - Ethyl (Ethanol). References to use or possession of alcohol include the use of any beverage, mixture, or preparation containing alcohol.

e. Drug - Any substance (other than alcohol) including prescription drugs which may impair mental or motor function; including, but not limited to, any psychoactive substance, controlled substance, marijuana, or designer or simulated drugs. This definition does not apply to prescription drugs which have been disclosed to the Company and the Controlling Employer by the employee and are approved for use within prescription limits.

f. Employee - Any individual, salaried or hourly, who actually performs work for a Controlling Employer on the project premises.

g. Controlling Employer - Any individual or firm that provides employees to perform work on the project premises and is responsible for their hiring, advancement, payment, discipline, and termination. This shall include all contractors, all subcontractors, and all sub-tier subcontractors who are enrolled in the OCIP Program.

h. Applicant - Any individual who is referred or makes application for employment on the project premises.

i. Project Premises - All parts of any office, work site, or other work location, including parking lots under the control of the **General Contractor and/or Prime Contractor Company**.

j. Testing Facilities - A NIDA certified laboratory where a specimen can be tested for drugs and alcohol within threshold limits according to standards established by the U. S. Department of Transportation or oral fluid drug test which meets or exceeds the D.O.T. threshold.

k. Contraband - Considered to include but not limited to the following: drugs, alcohol, and drug paraphernalia.

l. Drug Paraphernalia - Any article for the use, storage, or sale of drugs.

m. Accident - Any event resulting in injury to a person or property to which the Company believes an employee contributed as a direct or indirect cause.

n. Incident - Any event which the Company determines has all the attributes of an accident, except that no harm was caused to personnel or property.

Right to Search:
The OCIP has the right to search any personal effects, vehicles, lockers, baggage, lunch boxes, toolboxes, etc., for contraband. An individual who has notice of this rule and enters the project premises is deemed to consent to this safety procedure. Searches will be conducted on an "as needed" basis as determined after consultation with the OCIP and Company regional and corporate management. There will be an employee representative and/or other witnesses, which may include law enforcement officers, to all searches conducted by the OCIP or the Company.

An employee who refuses to submit to a search as described in this policy is subject to disciplinary action, up to and including immediate discharge by the Controlling Employer. Contractors and/or employees who refuse to submit to a search are subject to removal and denial of future access to the project premises.

An employee on the project premises, facility, or work place in possession of contraband is subject to disciplinary action, up to and including immediate termination by the Controlling Employer. Contractors and/or employees who are in possession of contraband are subject to removal and denial of future access to the project premises.

Prescription Drugs:
Any employee using a prescription drug which may impair mental or motor function shall, as soon as possible, complete Section 3 of the Consent for Alcohol and Drug Test and Pre-Hire Form. For the safety of all employees, the Company may direct the Controlling Employer to not permit the employee on the project premises until released as fit for duty by the prescribing physician. The Company reserves the right to obtain a confirming medical opinion before allowing the employee to return to duty.

Post-Accident Employee Testing:
After an accident or incident, the OCIP will ask the Controlling Employer to test all those involved. The OCIP will also ask the Controlling Employer to test employees when a reasonable suspicion exists that the employee has been using drugs or alcohol, or is in possession of contraband. Procedure for reasonable cause will consist of one supervisor observing employee demonstrating signs and symptoms of impairment. A second observation will be made by another supervisor independently of the first supervisor. Both supervisors must agree that the employee is exhibiting signs of impairment before the employee will be required to be tested. This test must be conducted in an approved clinic.

Pre-Assignment Screening:
The OCIP requires evidence of negative screening results from employees using the *Oratect*® or similar method for drug screening within 72 hours prior to assignment to the project's premises. Controlling employers are expected to arrange for screening its employees and provide screening results to Company as part of the employee assignment process. Employees without evidence of negative screening prior to assignment are not permitted on the project premises. Employees that have received negative results arising from their controlling employers' random or pre-employment drug screening programs within six months prior to assignment are exempt from this requirement. Again, evidence of such results is required to be provided as part of the assignment process.

Discipline and Rehabilitation:
All employees who refuse to submit to a drug and alcohol test, or who fail to pass a drug and alcohol test will be removed from the project premises by the Controlling Employer and will be referred to their personnel management for disciplinary action.

Confidentiality:
The OCIP and the Company will take steps to maintain the confidentiality of information generated by the implementation and enforcement of this policy and these procedures. Disclosure will be made only in appropriate circumstances. The Controlling Employer shall be responsible for maintaining the confidentiality of all information generated by the implementation and enforcement of this policy and these procedures for their own employees. The Company shall have the right to audit compliance with this policy and these procedures by the Controlling Employer, which shall include access to this confidential information.

Subcontractors and Suppliers:
The Company and all Contractors will include the provisions of this policy and these procedures, or another acceptable program, in their contracts with subcontractors, suppliers, consultants, agents, and others involved in providing goods or services on the project premises, and will require that they do the same with respect to

their lower-tier subcontractors, suppliers, etc.

Posting and Distribution:
Significant sections of this policy and these procedures are available to each employee. The OCIP may revise and amend this policy and these procedures as required.

Procedures for Examination:
Post-Accident Screening When Required by the Company (Personal injury or vehicle/equipment accident)

1. A **General Contractor and/or Prime Contractor** Company supervisor is to accompany injured **General Contractor and/or Prime Contractor** employee(s) or those involved in the accident or incident to the clinic or medical facility. A Controlling Employer's supervisor will be required to accompany their injured employee(s) to the medical facility. Controlling Employers shall certify any employee(s) involved in an accident or incident tested negative for drugs and alcohol prior to allowing them to return to the project Premises. The procedures, which follow, outline the steps necessary to assure proper handling of Company post-accident testing.
2. The **General Contractor and/or Prime Contractor** Company supervisor will take the employee to the industrial clinic.
3. If the injured employee refuses to give a specimen of body fluid, the supervisor is to call the Project Manager and/or Project Superintendent. The Project Superintendent and/or Project Manager are to advise the employee again that the refusal to submit to drug screening is a violation of the Project Safety Plan's drug, alcohol and other prohibited articles safety policy and that refusal will result in termination.
4. If the injured employee continues to refuse to submit to drug screening, the doctor or clinic shall be advised to treat the employee for his/her injuries.
5. The supervisor should return to the project, meet with the Project Superintendent and Project Manager and prepare appropriate termination forms. Cause for termination should state - "Employee refuses to comply with written Project Safety Plan."
6. A copy of this termination form should be attached to the employee's First Report of Injury Form.
7. The doctor will sign all "chain of custody" documents and ship the specimen to the designated laboratory system.
8. The laboratory will run a confirmation test on the sample if the first test indicates a chemical in the system.
9. The employee will be contacted by the Medical Review Officer if there is a positive indication from the drug test. If there is need for additional contact, it will be by the Corporate Human Resources.
10. Results of all drug screenings and analyses must remain strictly confidential.
11. Employees must report all injuries immediately to their supervisor, whether the injury requires medical treatment or first aid only. Late reporting may result in denial of a claim.

Employee Agreement with Policy and Consent for Alcohol and Drug Tests:
The following form is to be completed for all **General Contractor and/or Prime Contractor** employees. All Controlling Employers shall obtain and submit to **General Contractor** a completed consent form from each employee who will be working on the project premises. This form can be attached to the employee’s safety pledge

CONSENT FOR ALCOHOL AND DRUG TESTS POST ACCIDENT AND PRE-ASSIGNMENT

To:
Name of General Contractor and/or Prime Contractor Company

From: Employee Name: _____

Occupation: _____

Social Security #_____

Company Badge #_____

Home Address _____

Phone (___) _____

1. As an Employee, I hereby consent and agree to give specimens of my urine or oral fluid (saliva) to any medical facility, laboratory, medical person, or certified personnel designated by **the OCIP**. These specimens shall be used to detect the presence of alcohol (post-accident only), marijuana and/or other drugs in my body. I further consent and agree that the results will be furnished to my employer by the testing facility, and my employer may inform the Union hiring hall (if applicable) which referred me of my pass/fail results.

2. If APPROVED for ASSIGNMENT or PRESENTLY EMPLOYED and in the event that I am directly or indirectly involved in a work-related accident or incident, or the OCIP/company has reasonable suspicion of a drug or alcohol problem involving me, I consent and agree to screening for the presence of alcohol and drugs in my body. The screening facility is authorized to release the results of such screens to my employer. I, further acknowledge that I have received a copy of a summary of the **OCIP's** policy on drugs, alcohol and other prohibited articles and agree to screening in accordance with this policy. If any screens and confirming results are positive, **the OCIP and the General Contractor** may refuse to permit me access to the project premises. My signature below acknowledges that I have read and understand the foregoing statements and the consent given herein.

3. Are you, at the present time, taking any medicine, tranquilizers, sedatives, pills, capsules, tablets, or liquids that may impair your ability to safely work on the project premises?

YES__. NO __.

Medication Prescribing Doctor

_____

_____

_____

READ BEFORE SIGNING
IF YOU DON'T UNDERSTAND, ASK FOR AN EXPLANATION.

4. Signature:_____Date:_____

_____Date:

_____

Employer's Authorized Company Representative

Medical Provider Network:

Recent changes in California's workers' compensation law, specifically SB 899, now allow insurers and self- insured employers to direct injured employees to a medical provider network (MPN) for medical treatment if they receive state approval for the network.

In response to these changes, your employer has implemented a MPN, effective February 3, 2005 for any workers' compensation claims. Your employer has chosen the Liberty Mutual Group MPN that has been approved by the state. For all work-related injury or illness the physicians and providers in the Liberty Mutual Group MPN will provide you with medical treatment and services.

Below is a summary of the Liberty Mutual Group MPN and your responsibilities if you have a work-related injury or illness. You have also received more detailed information regarding the MPN with this letter.

PROVIDER PREDESIGNATION - You may pre-designate your physician(s) prior to injury if you have previously received care with the physician(s). The attached form (Form A) must be signed you and the physician(s) must agree to be your primary treating physician. If the physician(s) does not agree to continue as your primary treating physician then you will be required to seek medical care with a physician in the MPN.

IF YOU HAVE A WORK-RELATED INJURY OR ILLNESS - If you need emergency care go to the nearest medical center and contact the number above as soon as possible but no later than forty-eight hours after emergency treatment. For non-emergency situations, you may use either your pre-designated physician or contact your supervisor to find out which initial treating MPN provider is available. The MPN has primary treating physicians and providers that are available within 15 miles or 30 minutes or specialty care within 30 miles or 60 minutes from your work or residence. For initial treatment the MPN physician will schedule an appointment for you within 3 business days from the date you request treatment within the MPN. If you require additional services beyond your initial visit, you may use any provider, appropriate to your injury, within the MPN. If you have difficulty in getting an appointment or need any assistance in locating a provider contact your supervisor or the Claims Case Manager.

IF YOU ALREADY HAVE A WC CLAIM AT THE TIME YOU RECEIVE THIS NOTICE - Contact your supervisor. You may qualify to continue treatment with your current provider under the Liberty Mutual Group MPN Transfer of Care Plan if your condition is acute, serious or chronic, if treatment is for remission, is to prevent deterioration, is a terminal illness or for a scheduled surgery or procedure that will occur within 180 days. Contact your supervisor or Claims Case Manager for questions or advice on your options.

OBTAINING AUTHORIZATION PRIOR TO TREATMENT - Your treating physician must obtain prior authorization for medical treatment and services. The following requests should be directed through Liberty Mutual 's Utilization Management department by calling the toll-free number of 1-800-664-CARE (2273): Diagnostic tests, in-patient hospitalization, occupational therapy, out-patient surgery & procedures and pain management including; IDET and nucleoplasty procedures, injections, acupuncture, morphine pumps and spinal cord stimulators, physical therapy, psychiatric treatment and work conditioning and work hardening. The Liberty Mutual Utilization Review Unit will review your physician's treatment or service request to determine the medical necessity and will render a certified (approval) or non-certified (non-approval) decision. You and your physician will receive a utilization review determination notification letter. Non-utilization review treatment areas that the Liberty Mutual Claims Case Manager or Nurse Case Manager may review include: Durable Medical Equipment, Home Nursing Care, Medications, Office Visits, except psychiatric treatment, routine laboratory tests and treatment evaluations other than physical therapy, occupational therapy and chiropractic evaluations. For these non-utilization review treatment areas you will be notified as to the authorization or non-authorization of your physician's request by the Claims Case Manager or Nurse Case Manager.

APPEAL PROCESS FOR NON-CERTIFICATIONS - If your medical treatment or service request is non-certified you may request an appeal by following the Appeal instructions in the utilization review determination notification letter.

PHYSICAN CHANGE AND REQUESTS FOR A SECOND OR THIRD OPINION - You may change physicians within the MPN at any time as long as the provider is appropriate to treat your injury. If you dispute the diagnosis or treatment prescribed by your treating physician, you may request two additional opinions from other MPN physicians. To file a dispute, you must inform your employer or the Claims Caseanager that you dispute your treating physician's opinion and request a second or third opinion. You must select a physician or specialist from the list that your employer has of the available MPN providers and make an appointment with the second or third opinion physician within 60 days. You must notify the Claims Case Manager of your appointment date. If the appointment is not scheduled within 60 days of receipt of the list of the available MPN providers, then you will have waived your rights to the second and third opinion process with regard to this disputed diagnosis or treatment of this treating physician. During this process, you must continue your treatment with your current treating physician or with another physician of your choice within the MPN. At the time of selection of the third opinion physician, if you dispute the second physician's opinion, the Claims Case Manager will notify you about the Independent Medical Review process and provide you with an "Application for Independent Review" form. If you need assistance contact your supervisor or your Claims Case Manager.

TERMINATED MPN PROVIDERS AND CONTINUITY OF CARE - If your physician terminates from the MPN, we will advise you on your options for continued treatment as approved under the Liberty Mutual Group MPN Continuity of Care Plan. In some instances, the terminated physician may continue to treat you through the Continuity of Care plan. Copies of the plan are available upon request. Contact your supervisor or Claims Case Manager if you have questions or need advice on your options.

CONFIRMATION OF RECEIPT OF NOTIFICATION INFORMATION - In order to confirm that you have received appropriate notification regarding the Liberty Mutual Group MPN pleases complete and signs the attached form (Form B). Form B must be returned to your supervisor or Claims Case Manager at the time you first receive employee notification information about the MPN. This may occur at the time your employer distributes information about the MPN, at the time of hire, at the time of your report of injury or at the time you transfer into the MPN.

For any questions relating to the MPN, Compensability, Benefits, Continuity of Care Plan or Transfer of Care
Plan please contact your supervisor or your Claims Case Manager.

To report a workers' compensation injury or illness, please immediately contact your employer or the Claims
Case Manager at the above listed telephone number.

Liberty Mutual Group MPN
Form B - Employee Notification Confirmation

In order to confirm that you have received appropriate notification regarding the Liberty Mutual Group Medical Provider Network (MPN) please complete and sign the attached form. This form **must** be returned to your employer at the time you first receive employee notification information about the MPN. This may occur at the time of your employer's MPN presentation, at the time of hire, at the time of your report of injury or at the time you transfer into the MPN.

(Employee Signature) (Date)

(Print Employee Full Name)

(Name of Employer)

Any person who makes or causes to be made any knowingly false, or fraudulent material statement or material representation for the purposes of obtaining or denying workers' compensation benefits or payments is guilty of a felony.

Con el fin de confirmar que usted ha recibido la notificación adecuada acerca de la Red de Profesionales de Servicios Medicos del Grupo Liberty Mutual (MPN) (Liberty Mutual Group Medical Provider Network (MPN)) por favor Ilene y firme la forma adjunta. Esta forma **debe** ser entregada a su empleador al momento en que reciba inforrnacion de la notificación para empleados acerca de la MPN. Esto puede ocurrir al momento de la presentación de la MPN de su empleador, al momento de la contratación, al momento de su reporte de lesión o al momento de su traslado a la MPN.

(Firma del empleado) (Fecha)

(Nombre firma completo)

(Nombre del empleador)

Cualquicr persona que hace o provoca conscientemente cualquier declaratión o representatión material falsa o fraudulenta para propósitos de obtener o de negar 10s beneficios de compensación o pagos de los trabajadores es culpable de un delito grave.

Fax Completed Form to 949-349-9900.

SECTION 013502

COMMUNITY AND STUDENT WORKFORCE PROJECT AGREEMENT (CSWPA)

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements governing CSWPA.

B. Appendix A: Community and Student Workforce Project Agreement

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 012973: Schedule of Values Procedures.

C. Section 012976: Progress Payment Procedures.

D. Section 013229: Project Forms.

1.03 COMMUNITY AND STUDENT WORKFORE PROJECT AGREEMENT (CSWPA)

A. The CSWPA applies to this Project that is being funded by the District's Measure Q bond program.

B. The Contractor (as defined in the CSWPA, which includes subcontractors of whatever tier) shall comply with the CSWPA attached hereto.

C. Letter of Assent

1. The Contractor and all entities or persons covered by the CSWPA shall execute and deliver to the District an original of the Letter of Assent (Attachment A of the CSWPA) prior to commencing any work. Any entity or person covered by the CSWPA that fails to execute and provide the Letter of Assent shall not be allowed to work on the Project or allowed onto the Project site. Any delays resulting from providing the Letter of Assent as required shall be the responsibility of the Contractor.

D. Certified Payroll

1. The Contractor and all subcontractors (of any tier) shall submit, at least monthly, electronic certified payroll records directly to the District's Labor Compliance Consultant. The submission to the District's Labor Compliance Consultant shall include the Modified Certified Payroll Form, included in Section 013229 Project Forms.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

A. Refer to Appendix A of this section for a copy of the CSWPA.

END OF SECTION 013502

013502 - CSWPA

APPENDIX A

RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT
COMMUNITY AND STUDENT WORKFORCE PROJECT AGREEMENT
FOR CONSTRUCTION AND MAJOR REHABILITATION
FUNDED BY MEASURE Q

Effective Date: _____

RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT
COMMUNITY AND STUDENT WORKFORCE PROJECT AGREEMENT
FOR CONSTRUCTION AND MAJOR REHABILITATION
FUNDED BY MEASURE Q

This Community and Student Workforce Project Agreement (hereinafter, "CSWPA") is entered into by and between the Rancho Santiago Community College District, its successors or assigns, (hereinafter "District") and the Los Angeles/Orange Counties Building and Construction Trades Council (hereinafter "Council"), affiliated with the Building and Construction Trades Department ("AFL/CIO") and the signatory Craft Councils and Unions signing this CSWPA, (hereinafter, together with the Council, collectively, the "Union" or Unions"). The District, Council and Unions are herein collectively referred to as the "Parties" and individually as a "Party."

ARTICLE 1
RECITALS

WHEREAS, the District undertakes and anticipates undertaking large expenditures of Measure Q Funds for the demolition, construction, alteration, repair and maintenance of District properties; and

WHEREAS, the District desires of assuring the completion of the construction projects and the related facilities in a professional, confident, and economical manner, without undue delay or work stoppage; and

WHEREAS, the successful completion of the District's Measure Q Projects is of the utmost importance to the general public and the District; and

WHEREAS, the Parties have pledged their full good faith and trust to work towards a mutually satisfactory completion of the Measure Q Projects; and

WHEREAS large numbers of workers of various skills will be required in the performance of the construction work on the Measure Q Projects, including workers affiliated with and/or represented by the Unions; and

WHEREAS, it is recognized that on construction projects with multiple Contractors and bargaining units on the job site, at the same time over an extended period of time, the potential for work disruption is substantial without an overriding commitment to maintain continuity of work; and

WHEREAS, the Parties agree that by establishing and stabilizing wages, hours and working conditions for the workers employed on Measure Q Projects, a satisfactory, continuous and harmonious relationship will exist among labor and management that will lead to the efficient and economical completion of said Measure Q Projects; and

WHEREAS, the Parties believe that this CSWPA provides the District with the opportunity to establish a partnership with the local construction labor community respecting the District's Measure Q Projects, the benefits of which are expected to be: project cost containment,

the efficient and economical completion of projects to secure optimum productivity, a boost to the economy by generating local construction jobs and related jobs, partnering with responsible companies and contractors, and providing for the peaceful settlement of labor disputes and grievances without work interruptions such as strikes, slowdowns or lockouts, thereby promoting the public interest in assuring the timely and economical completion of projects contracted under the CSWPA; and

WHEREAS, the Parties believe it is desirable that this CSWPA apply to contracts for capital improvement work respecting Measure Q Projects awarded after the Effective Date in Section 2.2, and are paid for, in whole or in part, with Measure Q Funds (hereinafter, "Covered Contracts");

WHEREAS, it is understood by the Parties to this CSWPA that if this CSWPA is acceptable to the District, it will become the policy of the District for the Project Work to be contracted exclusively to Contractors who agree to execute and be bound by the terms of this CSWPA, directly or through the Letter of Assent ("Attachment A"), and to require each of its Subcontractors, of whatever tier, to become bound. The District shall include, directly or by incorporation by reference, the requirements of this CSWPA in the advertisement of and/or specifications for each and every contract for Project Work to be awarded by the District; and

WHEREAS, it is further understood that the District shall actively administer and enforce the obligations of this CSWPA to ensure that the benefits envisioned from it flow to all signatory Parties, the Contractors and craft persons working under it, and the ratepayers, residents and students of the District. The District shall, therefore, designate a "Project Labor Coordinator," either from its own staff or an independent contractor acting on behalf of the District, to monitor compliance with this CSWPA; assist, as the authorized representative of the District, in the development and implementation of the programs referenced herein, all of which are critical to fulfilling the intent and purposes of the Parties and this CSWPA; and to otherwise implement and administer the CSWPA.

NOW, THEREFORE, IT IS AGREED BETWEEN AND AMONG THE PARTIES AS FOLLOWS:

The above Recitals are a part of the terms of the CSWPA and are incorporated herein by reference.

ARTICLE 2
DEFINITIONS

Capitalized terms utilized in this CSWPA which are not otherwise defined herein shall have the meanings ascribed to said terms below. To the extent of any conflict between the definition of a term in this Article and the meaning ascribed to said term in the Recital paragraphs hereof, the definition of said term in this Article shall prevail.

Section 2.1 The term "Apprentice" as used in this CSWPA shall mean those employees registered and participating in Joint Labor/Management Apprenticeship Programs approved by the California Apprenticeship Council and the Department of Industrial Relations of the State of California.

Section 2.2 The term "Contractor" as used in this CSWPA includes any Contractor to whom the District awards a construction contract for Project Work, and also to Subcontractors of whatever tier utilized by such Contractors for Project Work. The term "Contractor" includes any individual, firm, partnership, or corporation, or combination thereof, including joint ventures, which as an independent Contractor has entered into a contract with the District with respect to the Project Work, or with another Contractor as a Subcontractor for Project Work.

Section 2.3 "Covered Contract" means a contract (and related subcontracts) for capital improvement work respecting a Measure Q Project awarded during the term of this CSWPA, as listed on Appendix A, and is paid for, in whole or in part, with Measure Q Funds.

Section 2.4 "Covered Project or Project Work" means a Project that is the subject of a Covered Contract.

Section 2.5 "District Residents" for purposes of this Agreement are defined as those residents living within the zip codes within the jurisdictional boundary of the District, as well as any veterans of the U.S. Armed Forces, apprentices currently enrolled and participating in their Joint Labor Management Apprenticeship Committee classroom training through the District or graduates of the District's construction Joint Labor Management Apprenticeship Committees, regardless of their residence.

Section 2.6 The term "Joint Labor/Management Apprenticeship Program" as used in this CSWPA means a joint Union and Contractor administered apprenticeship program certified by the Division of Apprenticeship Standards, Department of Industrial Relations of the State of California.

Section 2.7 The term "Responsible Contractor" as used in this CSWPA shall be defined as one that has a record of complying with federal, state and local government requirements for the determination of workplace wages, hours and conditions, including prevailing wages, apprenticeship, safety, workers' compensation, and Contractor licensing.

Section 2.8 The term "Schedule A Agreements" as used in this CSWPA means the local Master Labor Agreements of the signatory Unions having jurisdiction over the Project Work and which have signed this Agreement.

Section 2.9 "Signatory Contractors" as used in this CSWPA means contractors independently obligated to one or more collective bargaining agreements with the Unions.

Section 2.10 The term "Small Business Enterprise" as used in this CSWPA shall be defined in the same manner as a small business enterprise under California state guidelines and has its primary place of business in Orange County.

Section 2.11 The term "Subscription Agreement" means the contract between a Contractor and a Union's Labor/Management Trust Fund(s) that allows the Contractor to make the appropriate fringe benefit contributions in accordance with the terms of Schedule A Agreements.

Section 2.12 "Union" or "Unions" means any labor organization signatory to this CSWPA acting in their own behalf and on behalf of their respective affiliates and member organizations whose names are subscribed hereto and who have, through their officers, executed this Agreement.

ARTICLE 3
INTENT AND PURPOSE

Section 3.1 Background. The District's construction and major rehabilitation projects funded by Measure Q will affect school buildings and offices that are owned, leased or controlled by the District. The goal is to provide construction and major rehabilitation of the District's facilities so as to provide sufficient facilities and technologies to properly educate the students. The District, therefore, wishing to utilize the most modern, efficient and effective procedures for construction, including assurances of a sufficient supply of skilled craft persons, and the elimination of disruptions or interference with Project Work, adopts this CSWPA in the best interests of the students, parents, District staff, and the taxpayers of the District to meet the District's goal that the Project Work be completed on time and within budget.

Section 3.2 Identification and Retention of Skilled Labor and Employment of District Residents. The vast amount of school construction, substantial rehabilitation, and capital improvement work scheduled to be performed pursuant to Measure Q will require large numbers of craft personnel and other supporting workers. It is therefore the explicit understanding and intention of the Parties to this CSWPA to use the opportunities provided by the extensive amount of work to be covered by this CSWPA to identify and promote, through cooperative efforts, programs and procedures (which may include, for example, employment of District's students enrolled in District's approved Apprenticeship Programs, to assist persons for entrance into formal apprenticeship programs, or outreach programs to the community describing opportunities available as a result of the CSWPA), the interest and involvement of District residents and students in the construction industry, such as assisting residents in entering the construction trades, and through utilization of District's Apprenticeship Programs, providing training opportunities for those residents and students wishing to pursue a career in construction. Further, with assistance of the Project Labor Coordinator, the District, the Contractors, the Unions and their affiliated regional and national organizations, will work jointly to promptly develop and implement procedures for the identification of craft needs, the scheduling of work to facilitate the utilization of available craft workers, and the securing of services of craft workers in sufficient numbers to meet the high demands of the Project Work to be undertaken.

Section 3.3 Encouragement of Small Business Enterprise. The Project Work will provide many opportunities for Small Business Enterprises to participate as Contractors or suppliers, and the Parties therefore agree that they will cooperate with all efforts of the District, the Project Labor Coordinator, and other organizations retained by the District for this purpose, to encourage and assist the participation of Small Business Enterprises in Project Work. Specifically, all Parties understand that the District has established and quantified goals which place a strong emphasis on the utilization of local small businesses on the Project. Each Party agrees that it shall employ demonstrable efforts to encourage utilization in an effort to achieve such goals. This may include, for example, participation in outreach programs, education and assistance to businesses not familiar with working on projects of this scope, and the encouragement of local residents to participate in Project Work through programs and

procedures jointly developed to prepare and encourage such local residents for apprenticeship programs and formal employment on the Project Work through the referral programs sponsored and/or supported by the Parties to this CSWPA. Further, the Parties shall ensure that the provisions of this CSWPA do not inadvertently establish impediments to participation of such Small Business Enterprises and residents of the District.

Section 3.4 Project Cooperation. The Parties recognize that the construction to take place under this CSWPA involves unique and special circumstances which dictate the need for the Parties to develop specific procedures to promote high quality, rapid and uninterrupted construction methods and practices. The smooth operation and successful and timely completion of the work is vitally important to the District and the students of the District. The Parties therefore agree that maximum cooperation among all Parties involved is required; and that with construction work of this magnitude, with multiple Contractors and crafts performing work on multiple sites over an extended period of time, it is essential that all Parties work in a spirit of harmony and cooperation, and with an overriding commitment to maintain the continuity of Project Work.

Section 3.5 Peaceful Resolution of All Disputes. In recognition of the special needs of the Project and to maintain a spirit of harmony, labor-management, peace and stability during the term of this CSWPA, the Parties agree to establish effective and binding methods for the settlement of all misunderstandings, disputes and grievances; and in recognition of such methods and procedures, the Unions agree not to engage in any strike, slowdowns or interruptions or disruption of Project Work, and the Contractors agree not to engage in any lockout.

Section 3.6 Binding CSWPA on Parties and Inclusion of District Residents and Businesses. By executing this CSWPA, the District, Council, Unions and Contractors agree to be bound by each and all of the provisions of this CSWPA, and pledge that they will work together to adopt, develop and implement processes and procedures which are inclusive of the residents and businesses of the District.

ARTICLE 4
SCOPE OF THE AGREEMENT

Section 4.1 General. This CSWPA shall apply to all construction, rehabilitation and capital improvement work as described in Section 4.2 of this Article, performed by those Contractor(s) of whatever tier, where such work is funded in whole or in part by Measure Q Funds. Notwithstanding the foregoing: (i) each Covered Contract shall be awarded in accordance with the applicable provisions of California's Public Contract Code, (ii) the District has the absolute right to award Covered Contracts to the lowest responsible and responsive bidder, and (iii) the District has the absolute right to combine, consolidate or cancel contract(s) or portions of contract(s) for work on Measure Q Projects.

Section 4.2 Specific. The Covered Projects are defined and limited to:

(a) All construction, major rehabilitation and renovation work related to the Projects described in Appendix A are covered by the terms and conditions of this CSWPA.

(b) It is understood by the Parties that the District may at any time, and at its sole discretion, determine to build segments of the Project under this CSWPA which were not currently proposed, or to modify or not to build any one or more particular segments proposed to be covered.

Section 4.3 Exclusions. Items specifically excluded from the Scope of this CSWPA include the following:

(a) The CSWPA shall be limited to Covered Work, undertaken pursuant to Covered Contracts which are awarded by the District on or after the Effective Date, and is not intended to, and shall not govern, any construction contracts entered into prior to the Effective Date of this CSWPA, or after the expiration or termination of the CSWPA.

(b) This CSWPA is not intended to, and shall not affect or govern the award of contracts by the District, which are outside the approved scope of a Covered Project. Determination by the District respecting the intended scope of a Covered Project shall be final and binding on all Parties; and

(c) Work of non-manual employees, including but not limited to: superintendents, supervisors, staff engineers, quality control and quality assurance personnel except as to those covered by a Schedule A agreement, time keepers, mail carriers, clerks, office workers, messengers, guards, safety personnel, emergency medical and first aid technicians, and other professional, engineering, administrative, supervisory and management employees; and

(d) Equipment and machinery owned or controlled and operated by the District; and

(e) All off-site manufacture and handling of materials, equipment or machinery; provided, however, that lay down or storage areas for equipment or material and manufacturing (prefabrication) sites, dedicated solely to the Project, and the movement of materials or goods between locations on a Project site are within the scope of this CSWPA; and

(f) All employees of the District, Project Labor Coordinator, design teams (including, but not limited to architects, engineers and master planners), or any other consultants for the District (including, but not limited to, project managers and construction managers and their employees where not engaged in Project Work) and their sub-consultants, and other employees of professional service organizations, not performing manual labor within the scope of this CSWPA; provided, however, that it is understood and agreed that Building/Construction Inspector and Field Soils and Material Testers (Inspectors) are a covered craft under the CSWPA (This inclusion applies to the scope of work defined in the State of California Wage Determination for said craft). Every Inspector performing under the Wage classification of Building/Construction Inspector and Filed Soils Material Testers under a professional services agreement of a construction contract shall be bound to all applicable requirements of the CSWPA). Covered Work as defined by this Agreement shall be performed pursuant to the terms and conditions of this Agreement regardless of the manner in which the work was awarded. Nothing in this section will be construed to include Department of State Architects-certified inspectors employed by the District as included under the scope of this CSWPA; and

(g) Any work performed on or near or leading to or into a site of work covered by this CSWPA and undertaken by state, county, city or other governmental bodies, or their contractors; or by public utilities, or their contractors, and/or by the District or its contractors (for work for which is not within the scope of this CSWPA); and

(h) Off-site maintenance of leased equipment and on-site supervision of such work; and

(i) Warranty and service work;

(j) Non-construction support services contracted by the District, Project Labor Coordinator, or Contractor in connection with this Project; and

(k) Laboratory work for testing.

Section 4.4 Awarding of Contracts.

(a) The District has the absolute right to award contracts or subcontracts on this Project to any Contractor notwithstanding the existence or non-existence of any agreements between such Contractor and any Union Parties, provided only that such Contractor is willing, ready and able to execute and comply with this CSWPA should such Contractor be awarded work covered by this CSWPA.

(b) It is agreed that all Contractors and Subcontractors of whatever tier, who have been awarded contracts for Covered Work by this CSWPA, shall be required to accept and be bound by the terms and conditions of this CSWPA, and shall evidence their acceptance by the execution of the Letter of Assent as set forth in Attachment A hereto, prior to the commencement of work. At the time that any Contractor enters into a subcontract with any subcontractor of any tier providing for the performance on the construction contract, the Contractor shall provide a copy of this Agreement to said subcontractor and shall require the subcontractor, as a part of accepting the award of a construction subcontract, to agree in writing in the form of a Letter of Assent to be bound by each and every provision of this Agreement prior to the commencement of work on the Project. No Contractor or Subcontractor shall commence Project Work without first providing a Letter of Assent as executed by it to the Project Labor Coordinator and to the Council forty-eight (48) hours before the commencement of Project Work, or within forty-eight (48) hours after the award of Project Work to that Contractor (or Subcontractor), whichever occurs later.

(c) The District agrees that to the extent permitted by law and consistent with the economy and efficiency of construction and operation, it will use its best efforts to purchase materials, equipment and supplies which will not create labor strife. Under all circumstances, however, the District shall retain the absolute right to select the lowest responsive and responsible bidder for the award of contracts on all Covered Projects.

Section 4.5 Coverage Exception. The Parties agree and understand that this CSWPA shall not apply to any work that would otherwise be covered Project Work except when a governmental agency or granting authority partially or fully funding such work determines that it will not fund if such Project Work is covered by this CSWPA; or a law regulation, proposition or

measure prohibits such coverage or the use by the District, or for its benefit, of particular funds if such coverage exists. The District agrees that it will make every effort to establish the enforcement of this CSWPA with any governmental agency or granting authority.

Section 4.6 Schedule A's.

(a) The provisions of this CSWPA, including the Schedule A's, (which are the local Master Labor Agreements of the signatory Unions having jurisdiction over the work on the Project, as such may be changed from time-to-time consistent with Section 21.3, and which are incorporated herein by reference) shall apply to the work covered by this CSWPA, notwithstanding the provisions of any other local, area and/or national agreement which may conflict with or differ from the terms of this CSWPA. However, such does not apply to work performed under the National Cooling Tower Agreement, the National Stack Agreement, the National Transit Division Agreement (NTD), work within the jurisdiction of the International Union of Elevator Constructors, and all instrument calibration and loop checking work performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians except that Articles dealing with Work Stoppages and Lock-Outs, Work Assignments and Jurisdictional Disputes, and Settlement of Grievances and Disputes shall apply to such work. It is specifically agreed that no later agreement shall be deemed to have precedence over this Agreement unless signed by all Parties signatory hereto who are then currently employed or represented at the Project. Where a subject covered by the provisions of this CSWPA is also covered by a Schedule A, the provisions of this CSWPA shall apply. Where a subject is covered by a provision of a Schedule A and not covered by this CSWPA, the provisions of the Schedule A shall prevail. Any dispute as to the applicable source between this CSWPA and any Schedule A for determining the wages, hours of working conditions of employees on this Project shall be resolved under the procedures established in Article 11.

(b) It is understood that this CSWPA, together with the referenced Schedule A's, constitutes a self-contained, stand-alone agreement and by virtue of having become bound to this CSWPA, the Contractor will not be obligated to sign any other local, area or national collective bargaining agreement as a condition of performing work within the scope of this CSWPA (provided, however, that the Contractor may be required to sign an uniformly applied non-discriminatory Participation or Subscription Agreement at the request of the trustees or administrator of a trust fund established pursuant to Section 302 of the Labor Management Relations Act, and to which such Contractor may be bound to make contributions under this CSWPA, provided that such Participation or Subscription Agreement does not purport to bind the Contractor beyond the terms and conditions of this CSWPA and/or expand its obligation to make contributions pursuant thereto). It shall be the responsibility of the prime Contractor to have each of its Subcontractors sign the documents with the appropriate Union prior to the Subcontractor beginning Project Work.

Section 4.7 The Parties agree that this CSWPA will be made available to, and will fully apply to, any successful bidder for Project Work, without regard to whether that successful bidder performs work at other sites on either a union or non-union basis. This CSWPA shall not apply to any work of any Contractor other than that on Project Work specifically covered by this CSWPA.

Section 4.8 Binding Signatories Only. This CSWPA and Letter of Assent shall only be binding on the signatory Parties hereto, and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such party.

Section 4.9 Other District Work. This CSWPA shall be limited to the construction work within the Scope of this CSWPA including, specifically, site preparation and related demolition work, and new construction and major rehabilitation work for new or existing facilities referenced in Section 4.2 above. Nothing contained herein shall be interpreted to prohibit, restrict, or interfere with the performance of any other operation, work or function not covered by this CSWPA, which may be performed by District employees or contracted for by the District for its own account, on its property or in and around a Project site.

Section 4.10 Separate Liability. It is understood that the liability of the Contractor(s) and the liability of the separate Unions under this CSWPA shall be several and not joint. The Unions agree that this CSWPA does not have the effect of creating any joint employment status between or among the District or Project Labor Coordinator and/or any Contractor.

Section 4.11 Completed Project Work. As areas of Covered Work are accepted by the District, this CSWPA shall have no further force or effect on such items or areas except where the Contractor is directed by the District or its representatives to engage in repairs, modification, check-out and/or warranties functions required by its contract(s) with the District.

ARTICLE 5
UNION RECOGNITION AND EMPLOYMENT

Section 5.1 Recognition. The Contractor recognizes the Unions as the exclusive bargaining representative for the employees engaged in Project Work. Such recognition does not extend beyond the period when the employee is engaged in Project Work.

Section 5.2 Contractor Selection of Employees. The Contractor shall have the right to determine the competency of all employees, the number of employees required, the duties of such employees within their craft jurisdiction, and shall have the sole responsibility for selecting employees to be laid off, consistent with Section 5.6 and 6.3, below. The Contractor shall also have the right to reject any applicant referred by a Union for any reason, subject to any reporting time requirements of the applicable Schedule A; provided, however, that such right is exercised in good faith and not for the purpose of avoiding the Contractor's commitment to employ qualified workers through the procedures endorsed in this CSWPA.

Section 5.3 Referral Procedures.

(a) For signatory Unions having a job referral system contained in a Schedule A, the Contractor agrees to comply with such system and it shall be used exclusively by such Contractor, except as modified by this CSWPA. Such job referral system will be operated in a nondiscriminatory manner and in full compliance with federal, state, and local laws and regulations which require equal employment opportunities and non-discrimination. All of the foregoing hiring procedures, including related practices affecting apprenticeship, shall be operated so as to consider the goals of the District to encourage employment of District residents

and utilization of Small Business Enterprises on the Project, and to facilitate the ability of all Contractors to meet their employment needs.

(b) The local Unions will exert their best efforts to recruit and refer sufficient numbers of skilled craft workers to fulfill the labor requirements of the Contractor, including specific employment obligations to which the Contractor may be legally and/or contractually obligated; and to refer apprentices as requested to develop a larger, skilled workforce. The Unions will work with the Project Labor Coordinator and others designated by the District, to identify and refer competent craft persons as needed for Project Work, and to identify individuals, particularly residents of the District, for entrance into apprenticeship programs, or to participation in other identified programs and procedures to assist individuals in qualifying and becoming eligible for such apprenticeship programs, all maintained to increase the available supply of skilled craft personnel for Project Work and future construction work to be undertaken by the District.

(c) The Union shall not knowingly refer an employee currently employed by a Contractor on Project Work to any other Contractor.

Section 5.4 Non-Discrimination in Referral, Employment, and Contracting. The Unions and Contractors agree that they will not discriminate against any employee or applicant for employment on the basis of race, color, religion, gender, national origin, age, union status, sex, sexual orientation, marital status, political affiliation, or membership in a labor organization, or disability. Further, it is recognized that the District has certain policies, programs, and goals for the utilization of Small Business Enterprises. The Parties shall jointly endeavor to assure that these commitments are fully met, and that any provisions of this CSWPA which may appear to interfere with a Small Business Enterprises successfully bidding for work within the scope of this CSWPA shall be carefully reviewed, and adjustments made as may be appropriate and agreed upon among the Parties, to ensure full compliance with the spirit and letter of the District's policies and commitment to its goals for the significant utilization of Small Business Enterprises as direct contractors or suppliers on Covered Work.

Section 5.5 Employment of District Residents.

(a) In order to encourage the utilization of graduates of the District's Joint Apprenticeship and Training Committee programs, apprentices currently enrolled and participating in their Joint Labor Management Apprenticeship Committee classroom training through the District and veterans of the U.S. Armed Forces, those individuals will be considered residents within the meaning of this section regardless of their place of residence. In recognition of the District's mission to serve the District and its residents, the Unions and Contractors agree that, to the extent allowed by law, and as long as they possess the requisite skills and qualifications, District Residents shall be first referred for Project Work, including journeyperson, apprentice, or other positions which may be established under a Schedule A and covered by the applicable prevailing wage for utilization on Project Work.

It is the Parties goal that sixty-six percent (66%) of the positions for Project Work for a particular Contractor (including the Contractor's "core employees") by craft, have been filled with residents of Orange County and fifty percent (50%) of the positions should be District Residents. To

facilitate the dispatch of local residents all Contractors will be required to utilize the Craft Employee Request Form for Covered Projects, a sample of which is attached as Attachment B.

(b) Only if:

(1) sixty-six percent (66%) of the positions for any one Contractor, by individual craft, are filled by residents of Orange County and fifty percent (50%) of the positions are filled by District Residents; or

(2) such individuals are not available, may others be referred to Contractor for Project Work.

(c) The Project Labor Coordinator shall work with the Unions and Contractors in the administration of this local residency goal. The Unions shall, upon request of the Project Labor Coordinator, provide their response(s) to the Craft Request Form submitted to them by the Contractors. The Unions will also respond in writing, if requested, if they, or any of them, are unable to fill the dispatch request. As part of this process, and in order to facilitate the contract administration procedures, as well as appropriate benefit fund coverage, all Contractors shall require their "core work force" and any other persons employed other than through the Union referral process, to register with the appropriate hiring hall, if any, prior to their first day of employment at a project site.

(d) Notwithstanding the transfer or portability provisions of the Schedule A agreements, Contractors which are directly signatory to a Schedule A agreement shall comply with subsection (a) second paragraph in transferring and employing workers on Project Work.

Section 5.6 Core Employees. Except as otherwise provided in separate collective bargaining agreement(s) to which the Contractor is signatory,

(a) Contractors, including Subcontractors, may employ, as needed, first, a member of his core workforce, then an employee through a referral from the appropriate Union hiring hall, then a second core employee, then a second employee through the referral system, and so on until a maximum of five (5) core employees are employed. Once a maximum of five (5) core employees are employed, all further employees shall be employed pursuant to the dispatch provisions of this Article. It is agreed that of the five (5) core employees at least fifty percent (50%) be District Residents and sixty-six percent (66%) reside within the County and meet the requirements of subsection (b).

(b) The core work force is comprised of those employees:

(1) whose names appeared on the Contractor's active payroll for at least thirty (30) of the last one-hundred eighty (180) working days before award of the Project Work to the Contractor; and

(2) who possess any license required by state or federal law for the Project Work to be performed; and

(3) who have the ability to safely perform the basic functions of the applicable trade; and

(4) who are residents of the District or County on the effective date of this CSWPA, or have been residents of the District or County for one-hundred eighty (180) days prior to the award of Project Work to the Contractor.

(c) If there are any questions regarding a core employee's eligibility under this provision, the Project Labor Coordinator, at the Council's request, shall obtain appropriate proof of such from the Contractor. For proof of employment eligibility, quarterly tax records or payroll records normally maintained by the Contractor (or officially recognized substitutes) shall be utilized; and for residency, adequate proof thereof through driver's license, voter registration, postal address, or other official acknowledgements.

(d) The provisions of this section 5.6 shall only apply to employees working for employers not signatory to a Schedule A at the time of their transfer to work covered under this Agreement and is not intended to limit the transfer provisions of the Schedule A Agreements of any of the Unions signatory hereto.

Section 5.7 Time for Referral. If any Union's registration and referral system does not fulfill the requirements for specific classifications of covered employees requested by any Contractor within forty-eight (48) hours (excluding Saturdays, Sundays and holidays), that Contractor may use employment sources other than the Union registration and referral services, and may employ applicants meeting such standards from any other available source. The Contractor shall promptly inform the Union of any applicants hired from other sources, and such applicants shall register with the appropriate hiring hall, if any, within twenty-four (24) hours after being hired.

Section 5.8 Lack of Referral Procedure. If a signatory local Union does not have a job referral system as set forth in Section 5.3 above, the Contractors shall give the union equal opportunity to refer applicants. The Contractors shall notify the Union of employees so hired, as set forth in Section 5.7.

Section 5.9 Union Membership. No employee covered by this CSWPA shall be required to join any Union as a condition of being employed, or remaining employed, for the completion of Project Work; provided, however, that any employee who is a member of the referring Union at the time of referral shall maintain that membership in good standing while employed under this CSWPA. All employees shall, however, be required to comply with the union security provisions of the applicable Schedule A for the period during which they are performing on-site Project Work to the extent, as permitted by law, of rendering payment of an amount equal to the applicable monthly window and working dues.

Section 5.10 Individual Seniority. Except as provided in Article 6, Section 6.3, individual seniority shall not be recognized or applied to employees working on the Project: provided, however, that group and/or classification seniority in a Union's Schedule A as of the Effective Date of this CSWPA shall be recognized for purposes of layoffs.

Section 5.11 Foremen. The selection and number of craft foremen and/or general foremen shall be the responsibility of the Contractor. All foremen shall take orders exclusively from the designated Contractor representatives. Craft foremen shall be designated as working foreman at the request of the Contractors.

ARTICLE 6
UNION ACCESS AND STEWARDS

Section 6.1 Access to Project Sites. Authorized representatives of the Union shall have access to Project Work, provided that they do not interfere with the work of employees and further provided that such representatives fully comply with posted visitor, security and safety rules.

Section 6.2 Stewards.

(a) Each signatory local Union shall have the right to dispatch a working journeyperson as a steward for each shift, and shall notify the Contractor in writing of the identity of the designated steward or stewards prior to the assumption of such person's duties as steward. Such designated steward or stewards shall not exercise any supervisory functions. There will be no non-working stewards. Stewards will receive the regular rate of pay for their respective crafts.

(b) In addition to his/her work as an employee, the steward should have the right to receive, but not to solicit, complaints or grievances and to discuss and assist in the adjustment of the same with the employee's appropriate supervisor. Each steward should be concerned only with the employees of the steward's Contractor and, if applicable, Subcontractor(s), and not with the employees of any other Contractor. The Contractor will not discriminate against the steward in the proper performance of his/her union duties.

(c) When a Contractor has multiple, non-contiguous work locations at one site, the Contractor may request and the Union shall appoint such additional working stewards as the Contractor requests to provide independent coverage of one or more such locations. In such cases, a steward may not service more than one work location without the approval of the Contractor.

(d) The stewards shall not have the right to determine when overtime shall be worked or who shall work overtime.

Section 6.3 Steward Layoff/Discharge. The Contractor agrees to notify the appropriate Union twenty-four (24) hours before the layoff of a steward, except in the case of disciplinary discharge for just cause. If the steward is protected against such layoff by the provisions of the applicable Schedule A, such provisions shall be recognized when the steward possesses the necessary qualifications to perform the remaining work. In any case in which the steward is discharged or disciplined for just cause, the appropriate Union will be notified immediately by the Contractor, and such discharge or discipline shall not become final (subject to any later filed grievance) until twenty-four (24) hours after such notice have been given.

Section 6.4 Employees on Non-Project Work. On work where the personnel of the District may be working in close proximity to the construction activities covered by this CSWPA, the Union agrees that the Union representatives, stewards, and individual workers will not interfere with the District personnel, or with personnel employed by any other employer not a party to this CSWPA.

ARTICLE 7
WAGES AND BENEFITS

Section 7.1 Wages. All employees covered by this CSWPA shall be classified in accordance with work performed and paid the hourly wage rates for those classifications in compliance with the applicable prevailing wage rate determination established pursuant to the California Labor Code by the Department of Industrial Relations. If a prevailing rate increases under state law, the Contractor shall pay that rate in accordance with the California Labor Code. If the prevailing wage laws are repealed during the term of this CSWPA, the Contractor shall pay the wage rates established under the Schedule A's, except as otherwise provided in this CSWPA. Notwithstanding Section 4.6 (a), Signatory Contractor to one or more of the Schedule A Agreements are required to pay all of the wages set forth in such Agreements.

Section 7.2 Benefits.

(a) Contractors shall pay contributions for all employees to the established employee benefit funds in the amounts designated in the appropriate Schedule A; and make all employee - authorized deductions in the amounts designated in the appropriate Schedule A: provided, however, that the Contractor and Unions agree that only such bona fide employee benefits as accrue to the direct benefit of the employees (such as pension and annuity, health and welfare, vacation, apprenticeship, and training funds) shall be included in this requirement and required to be paid by the Contractor on the Project; and provided further, however, that such contributions shall not exceed the contribution amounts set forth in the applicable prevailing wage determination. Notwithstanding Section 4.6 (a), Signatory Contractor to one or more of the Schedule A Agreements are required to make all contributions set forth in those Schedule A Agreements without reference to the forgoing.

(b) Benefits designated in the Schedule A will be paid on all employees dispatched by the Union.

(c) Where applicable, the Contractor adopts and agrees to be bound by the written terms of the applicable, legally established, trust agreement(s) specifying the detailed basis on which payments are to be made into, and benefits paid out of, such trust funds for its employees. The Contractor authorizes the Parties to such trust funds to appoint trustees and successors' trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor.

(d) Each Contractor and Subcontractor is required to certify to the Project Labor Coordinator that it has paid all benefit contributions due and owing to the appropriate Trust(s) or fringe benefit programs prior to the receipt of its final payment and/or retention. Further, upon timely notification by a Union to the Project Labor Coordinator, the Project Labor Coordinator

shall work with any Contractor or Subcontractor who is delinquent in payments to assure that proper benefit contributions are made, to the extent of requesting the District or the prime Contractor to withhold payments otherwise due such Contractor, until such contributions have been made or otherwise guaranteed.

Section 7.3 Wage Premiums. Wage premiums, including but not limited to pay based on height of work, shift premiums, hazard pay, scaffold pay and special skills shall not be applicable to work under this CSWPA, except to the extent provided for in any applicable prevailing wage determination.

Section 7.4 Compliance with Prevailing Wage Laws. The Parties agree that the Project Labor Coordinator shall monitor the compliance by all Contractors and Subcontractors with all applicable federal and state prevailing wage laws and regulations, and that such monitoring shall include Contractors engaged in what would otherwise be Project Work but for the exceptions to CSWPA coverage in Section 4.2. All complaints regarding possible prevailing wage violations shall be referred to the Project Labor Coordinator for processing, investigation and resolution, and if not resolved within thirty (30) calendar days, may be referred by any party to the State Labor Commissioner.

ARTICLE 8
WORK STOPPAGES AND LOCKOUTS

Section 8.1 No Work Stoppages or Disruptive Activity. The Council and the Unions signatory hereto agree that neither they, and each of them, nor their respective officers, or agents or representatives, shall incite or encourage, condone or participate in any strike, walk-out, slowdown, picketing, observation of picket lines or other activity of any nature or kind whatsoever, for any cause or dispute whatsoever with respect to or any way related to Project Work, or which interferes with or otherwise disrupts, Project Work, or with respect to or related to the District or Contractors or Subcontractors, including, but not limited to, economic strikes, unfair labor practice strikes, safety strikes, sympathy strikes and jurisdictional strikes whether or not the underlying dispute is arbitrable. Any such actions by the Council, or Unions, or their members, agents, representatives or the employees they represent shall constitute a material violation of this CSWPA. The Council and the Union shall take all steps necessary to obtain compliance with this Article.

Section 8.2 Employee Violations. The Contractor may discharge any employee violating Section 8.1 above and any such employee will not be eligible for rehire under this CSWPA.

Section 8.3 Standing to Enforce. The District, the Project Labor Coordinator, or any Contractor affected by an alleged violation of Section 8.1 shall have standing and the right to enforce the obligations established therein.

Section 8.4 Expiration of Schedule A's. If the Schedule A Agreement, or any local, regional, and other applicable collective bargaining agreements expire during the term of the Project, the Union(s) agree that there shall be no work disruption of any kind as described in Section 7.1 above as a result of the expiration of any such agreement(s) having application on this Project and/or failure of the involved Parties to that agreement to reach a new contract.

Terms and conditions of employment established and set at the time of bid shall remain established and set. Otherwise to the extent that such agreement does expire and the Parties to that underlying agreement have failed to reach concurrence on a new contract, work will continue on the Project on one of the following two (2) options, both of which will be offered by the Unions involved to the Contractors affected:

(a) Each of the Unions with a contract expiring must offer to its Signatory Contractors to continue working on the Project under interim agreements that retain all the terms of the expiring contract, except that the Unions involved in such expiring contract may each propose wage rates and employer contribution rates to employee benefit funds under the prior contract different from what those wage rates and employer contributions rates were under the expiring contracts. The terms of the Union's interim agreement offered to Signatory Contractors will be no less favorable than the terms offered by the Union to any other employer or group of employers covering the same type of construction work in Orange County.

(b) Each of the Unions with a contract expiring must offer to continue working on the Project under all the terms of the expiring contract, including the wage rates and employer contribution rates to the employee benefit funds, if a Signatory Contractor affected by that expiring contract agrees to the following retroactive provisions: if a new, local, regional or other applicable labor agreement for the industry having application at the Project is ratified and signed during the term of this Agreement and if such new labor agreement provides for retroactive wage increases, then each affected Signatory Contractor shall pay to its employees who performed work covered by this Agreement at the Project during the hiatus between the effective dates of such expired and new labor agreements, an amount equal to any such retroactive wage increase established by such new labor agreement, retroactive to whatever date is provided by the new labor agreement for such increase to go into effect, for each employee's hours worked on the Project during the retroactive period. All Parties agree that such affected Signatory Contractors shall be solely responsible for any retroactive payment to its employees.

(c) Some Signatory Contractors may elect to continue to work on the Project under the terms of the interim agreement option offered under paragraph (a) above and other Signatory Contractors may elect to continue to work on the Project under the retroactivity option offered under paragraph (b) above. To decide between the two options, Signatory Contractors will be given one week after the particular labor agreement has expired or one week after the Union has personally delivered to the Signatory Contractors in writing its specific offer of terms of the interim agreement pursuant to paragraph (a) above, whichever is the later date. If the Signatory Contractor fails to timely select one of the two options, the Signatory Contractor shall be deemed to have selected option (b).

Section 8.5 No Lock-Outs. Contractors shall not cause, incite, encourage, condone or participate in any lock-out of employees with respect to Project Work during the term of this CSWPA. The term "lock-out" refers only to a Contractor's exclusion of employees in order to secure collective bargaining advantage, and does not refer to the discharge, termination or layoff of employees by the Contractor for any reason in the exercise of rights pursuant to any provision of this CSWPA, or any other agreement, nor does "lock-out" include the District's decision to stop, suspend or discontinue any Project Work or any portion thereof for any reason.

Section 8.6 Best Efforts To End Violations.

(a) If a Contractor contends that there is any violation of Section 9.3 or the provisions of Section 21.3, it shall notify, in writing, the Council of the involved Union(s) and the Project Labor Coordinator. The Council and the leadership of the involved Union(s) will immediately instruct, order and use their best efforts to cause the cessation of any violation of the relevant Article.

(b) If the Union contends that any Contractor has violated this Article, it will notify that the Contractor and the Project Labor Coordinator, setting forth the facts which the Union contends violate the CSWPA, at least twenty-four (24) hours prior to invoking the procedures of Section 8.7. The Project Labor Coordinator shall promptly order the involved Contractor(s) to cease any violation of the Article.

Section 8.7 Expedited Enforcement Procedures. Any party, including the District, which is an intended beneficiary of this Article, or the Project Labor Coordinator, may institute the following procedures, in lieu of or in addition to any other action at law or equity, when a breach of Section 8.1 or 8.5, above, or Section 9.3, or Section 21.3, is alleged.

(a) The party invoking this procedure shall notify Walt Daugherty, who has been selected by the negotiating Parties, and whom the Parties agree shall be the permanent arbitrator under this procedure. If the permanent arbitrator is unavailable at any time, the party invoking this procedure shall notify one of the alternates selected by the Parties, in that order on an alternating basis. Notice to the arbitrator shall be by the most expeditious means available, with notices to the Parties alleged to be in violation, and to the Council if it is a Union alleged to be in violation. For purposes of this Article, written notice may be given by telegram, facsimile, hand delivery or overnight mail and will be deemed effective upon receipt.

(b) Upon receipt of said notice, the arbitrator named above or his/her alternate shall sit and hold a hearing within twenty-four (24) hours if it is contended that the violation still exists, but not sooner than twenty-four (24) hours after notice has been dispatched to the Council of the involved Union(s) and/or Contractor as required by Section 8.6, above.

(c) The arbitrator shall notify the Parties of the place and time chosen for this hearing. Said hearing shall be completed in one session, which, with appropriate recesses at the arbitrator's discretion, shall not exceed twenty four (24) hours unless otherwise agreed upon by all Parties. A failure of any Party or Parties to attend said hearings shall not delay the hearing of evidence or the issuance of any award by the arbitrator.

(d) The sole issue at the hearing shall be whether or not a violation of Sections 8.1 or 8.5, above, of Section 9.3, or Section 21.3, has in fact occurred. The arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages. The Award shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without an opinion. If any party desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the Award. The arbitrator may order cessation of the violation of the Article and other appropriate relief, and such Award shall be served on all Parties by hand or registered mail upon issuance.

(e) Such Award shall be final and binding on all Parties and may be enforced by any court of competent jurisdiction upon the filing of this CSWPA and all other relevant documents referred to herein above in the following manner. Written notice of the filing of such enforcement proceedings shall be given to the other party. In any judicial proceeding to obtain a temporary order enforcing the arbitrator's Award as issued under Section 8.7(d) of this Article, all Parties waive the right to a hearing and agree that such proceedings may be ex parte. Such agreement does not waive any Party's right to participate in a hearing for a final order of enforcement. The court's order or orders enforcing the arbitrator's award shall be served on all Parties by hand or by delivery to their address as shown on this CSWPA (for a Union), as shown in their business contract for work under this CSWPA (for a Contractor) and to the representing Union (for an employee), by certified mail by the Party or Parties first alleging the violation.

(f) Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance hereto are hereby waived by the Parties to whom they accrue.

(g) The fees and expenses of the arbitrator shall be equally divided between the party or Parties initiating this procedure and the respondent Party or Parties.

ARTICLE 9
WORK ASSIGNMENTS AND JURISDICTIONAL DISPUTES

Section 9.1 Assignment of Work. The assignment of work will be solely the responsibility of the Contractor performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") currently in effect, or any successor plan.

Section 9.2 The Plan. All jurisdictional disputes between or among Building and Construction Trades Unions and Contractors, shall be settled and adjusted according to the Plan, or any other plan or method of procedures that may be adopted in the future by the Building and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractors and Union.

(a) For the convenience of the parties, and in recognition of the expense of travel between Southern California and Washington D.C., at the request of any party to a jurisdictional dispute under this Agreement an Arbitrator shall be chosen by the procedures specified in Article V, Section 5, of the Plan from a list composed of John Kagel, Thomas Angelo, Robert Hirsh, and Thomas Pagan, and the Arbitrator's hearing on the dispute shall be held at the offices of the Council. All other procedures shall be as specified in the Plan.

Section 9.3 No Work Disruption Over Jurisdiction. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, disruption, or slowdown of any nature, and the Contractor's assignments shall be adhered to until the dispute is resolved. Individuals violating this section shall he subject to immediate discharge.

Section 9.4 Pre-job Conference. In order to avoid jurisdictional disputes, it is required that a pre-job conference be held prior to the start of work by the Contractor for the Covered Project covered by this CSWPA. The Subcontractors and Owner Operators will be advised in

advance of such conferences and may participate if they wish. The purpose of the conference will be to, among other things, determine craft and manpower needs, schedule of work for the Contract and Project Work rules/owner rules. As provided in Article 16, each Contractor will conduct a pre-job conference with the appropriate affected Union(s) prior to commencing work. The Council and the Project Labor Coordinator shall be advised in advance of all such conferences and may participate if they wish.

ARTICLE 10
MANAGEMENT RIGHTS

Section 10.1 Contractor and District Rights. The Contractors and the District have the sole and exclusive right and authority to oversee and manage construction operations on Project Work without any limitations unless expressly limited by a specific provision of this CSWPA. In addition to the following and other rights of the Contractors enumerated in this CSWPA, the Contractors expressly reserve their management rights and all the rights conferred upon them by law. The Contractor's rights include, but are not limited to, the right to:

(a) Plan, direct and control operations of all work; and

(b) Hire, promote, transfer and layoff their own employees, respectively, as deemed appropriate to satisfy work and/or skill requirements; and

(c) Promulgate and require all employees to observe reasonable job rules and security and safety regulations; and

(d) Discharge, suspend or discipline their own employees for just cause; and

(e) Utilize, in accordance with District approval, any work methods, procedures or techniques, and select, use and install any types or kinds of materials, apparatus or equipment, regardless of source of manufacture or construction; assign and schedule work at their discretion; and

(f) Assign overtime, determine when it will be worked and the number and identity of employees engaged in such work, subject to such provisions in the applicable Schedule A(s) requiring such assignments be equalized or otherwise made in a nondiscriminatory manner.

Section 10.2 Specific District Rights. In addition to the following and other rights of the District enumerated in this CSWPA, the District expressly reserves its management rights and all the rights conferred on it by law and contract. The District's rights (and those of the Project Labor Coordinator on its behalf) include but are not limited to the right to:

(a) Inspect any construction site or facility to ensure that the Contractor follows the applicable safety and other work requirements; and

(b) Require Contractors to establish a different work week or shift schedule for particular employees as required to meet the operational needs of the Project Work at a particular location or in order to accommodate the instructional programs at various Project sites where school may be in session during periods of construction activity; and

(c) At its sole option, terminate, delay and/or suspend any and all portions of the Covered Work at any time; prohibit some or all work on certain days or during certain hours of the day to accommodate the ongoing operations of the District's educational facilities and/or to mitigate the effect of ongoing Project Work on businesses and residents in the neighborhood of the Project site; and/or require such other operational or schedule changes it deems necessary, in its sole judgment, to effectively maintain its primary mission and remain a good neighbor to those in the area of its facilities. (In order to permit the Contractors and Unions to make appropriate scheduling plans, the District will provide the Project Labor Coordinator, and the affected Contractor(s) and Union(s) with reasonable notice of any changes it requires pursuant to this section); and

(d) Approve any work methods, procedures and techniques used by Contractors whether or not these methods, procedures or techniques are part of industry practices or customs; and

(e) Investigate and process complaints, through its Project Labor Coordinator, in the matter set forth in Articles 10 and 12.

Section 10.3 Use of Materials. There should be no limitations or restrictions by Union upon a Contractor's choice of materials or design, nor, regardless of source or location, upon the full use and utilization, of equipment, machinery, packaging, precast, prefabricated, prefinished, or preassembled materials, tools or other labor saving devices, subject to the application of the California Public Contract and Labor Codes. Generally, the onsite installation or application of such items shall be performed by the craft having jurisdiction over such work.

Section 10.4 Special Equipment, Warranties and Guaranties.

(a) It is recognized that certain equipment of a highly technical and specialized nature may be installed at Project Work sites. The nature of the equipment, together with the requirements for manufacturer's warranties, may dictate that it be prefabricated, pre-piped and/or pre-wired and that it be installed under the supervision and direction of the District's and/or manufacturer's personnel. The Unions agree that such equipment is to be installed without incident. The use of this provision requires written approval by District. The District will provide the result to the Council.

(b) The Parties recognize that the Contractor will initiate from time to time the use of new technology, equipment, machinery, tools, and other labor-savings devices and methods of performing Project Work. The Unions agree that they will not restrict the implementation of such devices or work methods The Unions will accept and will not refuse to handle, install or work with any standardized and/or catalogue parts, assemblies, accessories, prefabricated items, preassembled items, partially assembled items, or materials whatever their source of manufacture or construction.

(c) If any disagreement between the Contractor and the Unions concerning the methods of implementation or installation of any equipment, device or item, or method of work, arises, or whether a particular part or pre-assembled item is a standardized or catalog part or item, the work will proceed as directed by the Contractor and the Parties shall immediately

consult over the matter. If the disagreement is not resolved, the affected Union(s) shall have the right to proceed through the procedures set forth in Article 11.

Section 10.5 No Less Favorable Treatment. The Parties expressly agree that Project Work will not receive less favorable treatment than that on any other project which the Unions, Contractors and employees work.

ARTICLE 11
SETTLEMENT OF GRIEVANCES AND DISPUTES

Section 11.1 Cooperation and Harmony on Site.

(a) This CSWPA is intended to establish and foster continued close cooperation between management and labor. The Council shall assign a representative to this Project for the purpose of assisting the local Unions, and working with the Project Labor Coordinator, together with the Contractors, to complete the construction of the Project Work economically, efficiently, continuously and without any interruption, delays or work stoppages.

(b) The Project Labor Coordinator, the Contractors, Unions, and employees collectively and individually, realize the importance to all Parties of maintaining continuous and uninterrupted performance of Project Work, and agree to resolve disputes in accordance with the grievance provisions set forth in this Article or, as appropriate, those of Article 8 or 10.

(c) The Project Labor Coordinator shall observe the processing of grievances under this Article and Articles 8 and 9, including the scheduling and arrangements of facilities for meetings, selection of the arbitrator from the agreed-upon panel to hear the case, and any other administrative matters necessary to facilitate the timely resolution of any dispute; provided, however, it is the responsibility of the principal Parties to any pending grievance to insure the time limits and deadlines are met.

Section 11.2 Processing Grievances. Any questions arising out of and during the term of this CSWPA involving its interpretation and application, but not jurisdictional disputes or alleged violations of Section 8.1, 8.4 and 8.5 and similar provisions, shall be considered a grievance and subject to resolution under the following procedures. Questions between or among parties arising out of or involving the interpretation of a provision in a Schedule A Agreement, which is not provided for in this CSWPA, shall be resolved under the grievance procedure provided in that Schedule A Agreement.

Step 1. (a) Employee Grievances. When any employee subject to the provisions of this CSWPA feels aggrieved by an alleged violation of this CSWPA, the employee shall, through his local Union business representative or job steward, within ten (10) working days after the occurrence of the violation, give notice to the work site representative of the involved Contractor stating the provision(s) alleged to have been violated. A grievance should be considered null and void if notice of the grievance is not given within the ten (10) day period. A business representative of the local Union or the job steward and the work site representative of the involved Contractor shall meet and endeavor to adjust the matter within ten (10) working days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party may, within ten (10) working days thereafter, pursue Step 2 of this grievance

procedure provided the grievance is reduced to writing, setting forth the relevant information, including a short description thereof, the date on which the alleged violation occurred, and the provision(s) of the applicable agreement alleged to have been violated.

Grievances and disputes settled at Step 1 shall be non-precedential except as to the Parties directly involved.

(b) Union or Contractor Grievances. Should the Union(s) or any Contractor have a dispute with the other Party(ies) and, if after conferring within ten (10) working days after the disputing party knew or should have known of the facts or occurrence giving rise to the dispute, a settlement is not reached within five (5) working days, the dispute shall be reduced to writing and processed to Step 2 in the same manner as outlined in Step 1(a) above for the adjustment of an employee complaint.

Step 2. The business manager of the involved local Union or his designee, together with the site representative of the involved Contractor, and the labor relations representative of the Project Labor Coordinator shall meet within seven (7) working days of the referral of the dispute to this second step to arrive at a satisfactory settlement thereof. If the Parties fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within seven (7) calendar days after the initial meeting at Step 2.

Step 3.

(a) If the grievance shall have been submitted but not resolved under Step 2, either the Union or Contractor party may request in writing to the Project Labor Coordinator (with copy(ies) to the other Party(ies)) within seven (7) calendar days after the initial Step 2 meeting, that the grievance be submitted to an arbitrator selected from the agreed-upon list below, on a rotational basis in the order listed. Those arbitrators are: (1) Michael Prihar; (2) Robert Steinberg; (3) Mike Rappaport; (4) Louis Zigman; (5) Walt Daugherty; and (6) Fred Horowitz. The decision of the arbitrator shall be final and binding on all Parties and the fee and expenses of such arbitrations shall be borne equally by the involved Contractor(s) and the involved Union(s).

(b) Failure of the grieving party to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the Parties involved at the particular step where the extension is agreed upon. The arbitrator shall have the authority to make decisions only on issues presented and shall not have the authority to change, amend, add to or detract from any of the provisions of this CSWPA.

Section 11.3 Limit on Use of Procedures. Procedures contained in this Article shall not be applicable to any alleged violation of Article 8 or 9.3, with a single exception that any employee discharged for violation of Section 8.2, or Article 9.3, may resort to the procedures of this Article to determine only if he/she was, in fact, engaged in that violation.

Section 11.4 Notice. The Project Labor Coordinator (and the District, in the case of any grievance regarding the Scope of this CSWPA), shall be notified by the involved Contractor of all actions at Steps 2 and 3, and further, the Project Labor Coordinator shall, upon its own request, be permitted to participate fully as a party in all proceedings at such steps.

ARTICLE 12
REGULATORY COMPLIANCE

Section 12.1 Compliance with All Laws. The Council and all Unions, Contractors, Subcontractors and their employees shall comply with all applicable federal and state laws, ordinances and regulations including, but not limited to, those relating to safety and health, employment and applications for employment. All employees shall comply with the safety regulations established by the District, the Project Labor Coordinator or the Contractor. Employees must promptly report any injuries or accidents to a supervisor.

Section 12.2 Monitoring Compliance. The Parties agree that the District shall require, and that the Project Labor Coordinator and Council shall monitor, compliance by all Contractors and Subcontractors with all federal and state laws and regulations that, from time to time may apply to Project Work. It shall be the responsibility of both the Council and the Project Labor Coordinator (on behalf of the District) to investigate or monitor compliance with these various laws and regulations. The Council may recommend to the Project Labor Coordinator and/or the District procedures to encourage and enforce compliance with these laws and regulations.

Section 12.3 Prevailing Wage Compliance. The Council or Union shall refer all complaints regarding any potential prevailing wage violation to the Project Labor Coordinator, who on its own, or with the assistance of the District's Labor Compliance Program, shall process, investigate and resolve such complaints, consistent with Section 7.4. The Council or Union, as appropriate, shall be advised in a timely manner with regard to the facts and resolution, if any, of any complaint. It is understood that this Section does not restrict any individual rights as established under the State Labor Code, including the rights of an individual to file a complaint with the State Labor Commissioner or to file a grievance for such violation, under this CSWPA.

Section 12.4 Violations of Law. Based upon a finding of violation by the District of a federal and state law, and upon notice to the Contractor that it or its Subcontractors is in such violation, the District, in the absence of the Contractor or Subcontractor remedying such violation, shall take such action as it is permitted by law or contract to encourage the Contractor to come into compliance, including, but not limited to, assessing fines and penalties and/or removing the offending Contractor from Project Work.

ARTICLE 13
SAFETY AND PROTECTION OF PERSON AND PROPERTY

Section 13.1 Safety.

(a) It shall be the responsibility of each Contractor to ensure safe working conditions and employee compliance with all applicable safety laws and regulations and any safety rules contained herein or established by the District, the Project Labor Coordinator or the Contractor. It is understood that employees have an individual obligation to use diligent care to perform their work in a safe manner and to protect themselves and the property of the Contractor and the District.

(b) Employees shall be bound by the safety, security and visitor rules established by the Contractor, the Project Labor Coordinator and/or the District. These rules will be published

and posted. An employee's failure to satisfy his/her obligations under this Section will subject him/her to discipline, up to and including discharge.

(c) The Project Labor Coordinator may, at the request of the District, establish and implement, after negotiation with the Union, reasonable substance abuse testing procedures and regulations, which may include pre-hire, reasonable cause, random and post-accident testing to the extent permitted by federal and state law. Should the Project Labor Coordinator approve an established program to which signatory Union(s) are currently a party, it shall become the project-wide substance abuse testing program, after consultation with the Unions. Until there is such a project-wide substance abuse testing procedure negotiated and/or otherwise adopted by the Project Labor Coordinator, the Parties agree that the Labor/Management Memorandum of Understanding ("MOU") on Drug Abuse Prevention and Detection negotiated with the various General Contractors Association and the Basic Trades Unions (titled Memorandum of Understanding testing policy for drug abuse; International Union of Operating Engineers Local Union 12; revised June 2009 as shown in Attachment C) shall be utilized under this CSWPA.

Section 13.2 Inspection. The inspection of shipments of equipment, machinery, and construction materials of every kind shall be performed at the discretion of the Contractor by individuals of its choice.

ARTICLE 14
TRAVEL AND SUBSISTENCE

Section 14.1 Travel expenses, travel time, subsistence allowances and/or zone rates and parking reimbursements shall not be applicable to work under this CSWPA, except to the extent provided for in any applicable prevailing wage determination. Parking for employees covered by this CSWPA shall be provided by the Contractor(s) according to the provision of the Schedule A(s) existing on the Effective Date of this CSWPA, and upon presentation of proof of any expense incurred.

ARTICLE 15
APPRENTICES

Section 15.1 Importance of Training. The Parties recognize the successful construction apprenticeship programs maintained by the District and to the greatest extent allowed by law agree to employ apprentices from these programs on Project Work. The Parties further recognize the need to maintain continuing support of the programs designed to develop adequate numbers of competent workers in the construction industry, the obligation to capitalize on the availability of the local work force in the area served by the District, and the opportunities to provide continuing work under the construction program funded by Measure Q. To these ends, and consistent with any laws or regulations, the Parties will facilitate, encourage, and assist local residents to commence and progress in Joint Labor/Management Apprenticeship Programs in the construction industry leading to participation in such Apprenticeship Programs. The District, the Project Labor Coordinator, other District consultants, the Contractors and the Council and Unions, will work cooperatively to identify, or establish and maintain, effective programs and procedures for persons interested in entering the construction industry and which will help prepare them for the entry into Apprenticeship Programs. Apprentices, if utilized, must be enrolled in a Joint Labor/Management Apprenticeship Program.

Section 15.2 Use of Apprentices.

(a) The Unions agree to cooperate with the Contractor in furnishing apprentices as requested up to the maximum percentage. The apprentice ratio for each craft shall be in compliance, at a minimum, with the applicable provisions of the Labor Code relating to utilization of apprentices. The District, unless otherwise required by law, shall encourage such utilization, and, both as to apprentices and the overall supply of experienced workers, the Project Labor Coordinator will work with the Council, Union(s), District's Apprenticeship Programs and other, Apprenticeship Programs and Contractors to assure appropriate and maximum utilization of apprentices and the continuing availability of both apprentices and journey persons.

(b) The Parties agree that all Contractors will comply with all applicable laws and regulations in the request for dispatch and employment of apprentices.

(c) The Parties agree that apprentices will not be dispatched to Contractors working under this CSWPA unless there is a journeymen or other Contractor employee working on the Project where the apprentice is to be employed who is qualified to assist and oversee the apprentice's progress through the program in which he is participating.

Section 15.3 Joint Subcommittee on Training and Apprenticeship. To carry out the intent and purposes of this Article, a subcommittee of the Labor Management Committee established pursuant to Article 17 shall be established, jointly chaired by a designee of the District and a designee of the Council, to oversee the identification and/or effective development of procedures and programs leading to the full utilization of District's Apprenticeship Programs, and to work with representatives of each apprenticeship committee and representatives of the District's Apprenticeship Programs to establish appropriate criteria for recognition by Joint Labor Management Apprenticeship Programs of the educational and work experience possessed by District students and graduates toward qualifying for entry or advanced level in the Joint Labor Management Apprenticeship Programs. The Joint Subcommittee will cooperate with and assist the District to facilitate students' entrance into the Joint Labor Management Apprenticeship Programs. The Subcommittee will meet as necessary at the call of the joint chairs to promptly facilitate its purposes in an expeditious manner as soon as this CSWPA becomes effective. In addition to the joint chairs, the membership of the committee will consist of at least three representatives of the signatory local Unions and three representatives of Contractors signatory to this CSWPA and experienced in overseeing and participating in Apprenticeship Programs.

ARTICLE 16
PRE-JOB CONFERENCE

Section 16.1 Work Assignments. Consistent with Section 9.4, all work assignments should be disclosed by the Contractor at a pre-job conference held in accordance with industry practice. The Contractor shall notify the Project Labor Coordinator at least two weeks before starting work under this CSWPA, and the Project Labor Coordinator shall coordinate the scheduling of a pre-job conference with the Council, the Contractor(s) and the affected Union(s). Should there be any formal jurisdictional dispute raised under Article 9, the Project Labor Coordinator shall be promptly notified. At the pre-job conference, the Project Labor Coordinator shall review the District's employment and contracting programs and goals with the participants.

The Council and Union(s) failure to participate in the pre-job conference may be considered by the District as a breach of the Agreement.

ARTICLE 17
LABOR/MANAGEMENT AND COOPERATION

Section 17.1 Joint Committee. The Parties to this CSWPA shall establish a six (6) person Joint Administrative Committee (JAC). This JAC shall be comprised of three (3) representatives selected by the Project Labor Coordinator and three (3) representatives selected by the Council. The purpose of the Committee shall be to promote harmonious and stable labor management relations on this Project, to ensure effective and constructive communication between labor and management Parties, to advance the proficiency of work in the industry, and evaluate and ensure an adequate supply of skilled labor for all Project Work. Representatives of the District may participate upon its request. Any JAC member wishing to call a meeting of the JAC shall contact the Project Labor Coordinator who shall schedule a meeting of the JAC if the Project Labor Coordinator believes such a meeting would be beneficial for the Parties or Contractors.

Section 17.2 Functions of Joint Committee. The Committee shall meet on a schedule to be determined by the Committee or at the call of the joint chairs, to discuss the administration of the CSWPA, the progress of the Project, general labor management problems that may arise, and any other matters consistent with this CSWPA. Substantive grievances or disputes arising under Articles 8, 9, or 11 shall not be reviewed or discussed by this Committee, but shall be processed pursuant to the provisions of the appropriate Article.

The Project Labor Coordinator shall be responsible for the scheduling of the meetings, the preparation of the agenda topics for the meetings, with input from the Unions, the Contractors, and the District. Notice of the date, time and place of meetings, shall be given to the Committee members at least three (3) days prior to the meeting. The District should be notified of the meetings and invited to send a representative(s) to participate.

The Project Labor Coordinator shall prepare quarterly reports on apprentice utilization and the training and employment of District residents, and a schedule of Project work and estimated number of craft workers needed. The Committee, or an appropriate subcommittee, may review such reports and make any recommendations for improvement, if necessary, including increasing the availability of skilled trades, and the employment of local residents or other individuals who should be assisted with appropriate training to qualify for apprenticeship programs.

Section 17.3 Subcommittees. The Committee may form subcommittees to consider and advise the full Committee with regard to safety and health issues affecting the Project and other similar issues affecting the overall Project, including any workers compensation program initiated under this CSWPA.

ARTICLE 18
SAVINGS AND SEPARABILITY

Section 18.1 Savings Clause. It is not the intention of the District, the Project Labor Coordinator, Contractor or the Union Parties to violate any laws governing the subject matter of this CSWPA. The Parties hereto agree that in the event any provision of this CSWPA is finally held or determined to be illegal or void as being in contravention of any applicable law or regulation, the remainder of the CSWPA shall remain in full force and effect unless the part or parts so found to be void are wholly inseparable from the remaining portions of this CSWPA. Further, the Parties agree that if and when any provision(s) of this CSWPA is finally held or determined to be illegal or void by a court of competent jurisdiction, the Parties will promptly enter into negotiations concerning the substantive effect of such decision for the purposes of achieving conformity with the requirements of any applicable laws and the intent of the Parties hereto. If the legality of this CSWPA is challenged and any form of injunctive relief is granted by any court, suspending temporarily or permanently the implementation of this CSWPA, then the Parties agree that all Project Work that would otherwise be covered by this CSWPA should be continued to be bid and constructed without application of this CSWPA so that there is no delay or interference with the ongoing planning, bidding and construction of any Project Work.

Section 18.2 Effect of Injunctions or Other Court Orders. The Parties recognize the right of the District to withdraw, at its absolute discretion, the utilization of the CSWPA as part of any bid specification should a Court of competent jurisdiction issue any order, or any applicable statute which results, temporarily or permanently in delay of the bidding, awarding and/or construction on the Project.

ARTICLE 19
WAIVER

Section 19.1 Waiver. A waiver of or a failure to assert any provisions of this CSWPA by any or all of the Parties hereto shall not constitute a waiver of such provision for the future. Any such waiver shall not constitute a modification of the CSWPA or change in the terms and conditions of the CSWPA and shall not relieve, excuse or release any of the Parties from any of their rights, duties or obligations hereunder.

ARTICLE 20
AMENDMENTS

Section 20.1 The provisions of this CSWPA can be renegotiated, supplemented, rescinded or otherwise altered only by mutual agreement in writing, hereafter signed by the Parties.

ARTICLE 21
DURATION OF THE CSWPA

Section 21.1 Duration. This CSWPA shall be effective _____, 2014 for purposes of Project Work funded under Measure Q and advertised for bid ninety (90) days thereafter ("Effective Date") and shall remain in effect for three (3) years after the Effective Date or three (3) years from the first award of the Covered Project or Covered Contract whichever is

later (provided, however, it shall continue in effect for all work awarded prior to such termination date until the completion of such Project Work). The CSWPA will automatically renew for another three (3) year term unless either party provides written notice of its intent to terminate sent no earlier than ninety (90) days or later than sixty (60) days prior to the Termination Date or Successor Termination Date. The District shall determine the Termination Date(s) within its sole and exclusive discretion and Termination Date(s) will not be subject to challenge. The District will provide the Termination Date to the Council within three (3) months of the first award of a Covered Project or Covered Contract. It is agreed that all notices shall be provided to the District at:

Raul Rodriguez, Ph.D.
Chancellor
Rancho Santiago Community College District
2323 North Broadway, Suite 410
Santa Ana, California 92706-1640

Notices to the Council, on behalf of the Council and the Local Unions, will be provided to:

Ron Miller
Executive Secretary
Los Angeles/Orange Counties Building and Construction Trades Council
1626 Beverly Blvd.
Los Angeles, California 90026

The Parties agreed to discuss extensions and/or modifications of the CSWPA based on the District's determination as to whether the CSWPA achieved its intent and goal.

Section 21.2 Turnover and Final Acceptance of Completed Work.

(a) Construction of any phase, portion, section, or segment of Project Work shall be deemed complete when such phase, portion, section or segment has been turned over to the District by the Contractor and the District has accepted such phase, portion, section, or segment. As areas and systems of the Project are inspected and construction-tested and/or approved and accepted by the District or third parties with the approval of the District, the CSWPA shall have no further force or effect on such items or areas, except when the Contractor is directed by the District to engage and repairs or modifications required by its contract(s) with the District.

(b) Notice of each final acceptance received by the Contractor will be provided to the Council with the description of what portion, segment, etc. has been accepted. Final acceptance may be subject to a "punch" list, and in such case, the CSWPA will continue to apply to each such item on the list until it is completed to the satisfaction of the District and Notice of Acceptance is given by the District or its representative to the Contractor.

Section 21.3 Continuation of Schedule A's. Schedule A's incorporated as part of this CSWPA shall continue in full force and effect, as previously stated, until the Contractor and Union Parties to the collective bargaining agreement(s), which are the basis for such Schedule A's, notify the Project Labor Coordinator of the mutually agreed upon changes in such agreements and their effective date(s).

The Parties agree to recognize and implement all applicable changes on their effective dates, except as otherwise provided by this CSWPA; provided, however, that any such provisions negotiated in said collective bargaining agreements will not apply to work covered by this CSWPA if such provisions are less favorable to the Contractor under the CSWPA than those uniformly required of Contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied if it may be construed to apply exclusively or predominately to work covered by this CSWPA. Any disagreement between the Parties over the incorporation into a Schedule A of any such provision agreed upon in a negotiation of the local collective bargaining agreement which is the basis for a Schedule A shall be resolved under the procedures established in Article 11.

Section 21.4 Final Termination. Final termination of all obligations, rights, and liabilities, and disagreements shall occur upon receipt by the Council of a Notice from the District saying that no work remains within the scope of the CSWPA.

ARTICLE 22
WORK OPPORTUNITIES PROGRAM

Section 22.1 Work Opportunity Programs. The Parties to this CSWPA support the development of increased numbers of skilled construction workers from among residents of the District and Orange County to meet the labor needs of covered projects specifically and the requirements of the local construction industry generally. Towards that end the Parties agree to cooperate respecting the establishment of a work opportunities program for District residents, the primary goals of which shall be to maximize (1) construction work opportunities for County and District residents, and (2) business opportunities for traditionally underrepresented members of the community, minority and women-owned business, and disabled veteran-owned businesses in the construction industry, the latter goal being consistent with the Government Code requirement that public agencies promote and encourage the use of these organization on public projects. In furtherance of the foregoing, the Unions specifically agree to:

(a) Encourage the referral and utilization, to the extent permitted by law and hiring hall practices, of qualified District residents as journeymen, and apprentices on Covered Projects and entrance into such qualified apprenticeship and training programs as may be operated by signatory Unions; and

(b) Work cooperatively with the District, the Project Labor Coordinator, and other District consultants to identify, or establish and maintain, effective programs, events and procedures for persons interested in entering the construction industry; and

(c) Participate in District based job fairs, career days and outreach events; and

(d) Provide speakers to speak at District programs and Academies as requested; and

(e) Assist District residents in contacting the Apprenticeship Training Committee for the crafts and trades they are interested in. The Unions shall assist District residents who are seeking Union jobs on the Project and Union membership in assessing their work experience and giving them credit for provable past experience in their relevant craft or trade, including

experience gained working for non-union Contractors. The Unions shall put on their rolls qualified bona fide District residents for work on this Project; and

(f) Allow tours of their JACs as requested; and

(g) Provide a contact information list for all Union representatives and Joint Apprenticeship Committee representatives; and

(h) Support local events and programs designed to recruit and develop adequate numbers of competent workers in the construction industry.

ARTICLE 23
HELMETS TO HARDHATS

Section 23.1 Veterans Entry into Building and Construction Trades. The Parties recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the services of the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program to serve as a resource for preliminary orientation, assessment and construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the Parties.

Section 23.2 Integrated Database. The Unions and Contractors agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Covered Project and of apprenticeship and employment opportunities for this Covered Project.

In witness whereof the Parties have caused this Community and Student Workforce Project Agreement for Rancho Santiago Community College District Construction and Major Rehabilitation Funded by Measure Q to be executed as of the date and year below stated.

Dated: 6/10/2014

RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

By: _____
[Insert Name and Title]

Dated: 6/6/14

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION TRADES COUNCIL

By: _____
Executive Secretary

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION TRADES COUNCIL'S AFFILIATED CRAFT LOCAL UNIONS/COUNCILS:

(Asbestos) Heat & Frost Local #5

Bricklayers & Allied Trades #4

Boilermakers Local #92

I.B.E.W. Local #441

Elevator Constructors Local #18

Operating Engineers Local #12

Operating Engineers Local #12

Operating Engineers Local #12

Gunite Workers #345

Iron Workers Local #416

Iron Workers Local #433

Laborers District Council

Painters District Council & Allied Trades #36

Laborers Local #652

U.A. Steamfitters #250

U.A. Landscape & Irrigation Local #345

U.A. Plumbers & Fitters Local #582

U.A. Sprinkler Fitters Local #709

Plasterers Tenders #1414

Cement Masons #500

Plasterers #200

Roofers & Waterproofers #220

Sheet Metal Workers Local #105

Teamsters Local #952

Tile Layers Local #18

SouthWest Regional Council of Carpenters

APPENDIX A
MEASURE Q PROJECTS

1. Central Chiller Plant - $40.1 million
2. Johnson Center Renovation - $10 million
3. New Science (STEM) Center - $40 million
4. New Health Science Center - $30.3 million

ATTACHMENT A - LETTER OF ASSENT

To be signed by all Contractors awarded work covered by the Community and Student Workforce Project Agreement prior to commencing work.

[CONTRACTOR'S LETTERHEAD]

DATE

Project Labor Coordinator
Address
Address
Address

Attention: _____

Re: Rancho Santiago Community College District Community and Student Workforce Project Labor Agreement

Dear Sir:

This is to confirm [Name of Company] agrees to be party to and bound by the Rancho Santiago Community College District Community and Student Workforce Project Agreement - for School Construction Major Rehabilitation Funded by Measure Q effective _____, as such Agreement may from time to time be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the Agreement undertaken by this Company on the Project pursuant to [Contract No. _____ and Name of Project/School], and this Company shall require all of its subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical Letter of Assent prior to their commencement of work.

Sincerely,

[Name of Construction Company]

By:
[Name and Title of Authorized Executive]

[Copies of this Letter must be submitted to the Project Labor Coordinator and to the Council consistent with Article 4, Section 4.4(b)]

ATTACHMENT B - CSWPA CRAFT REQUEST FORM

TO THE CONTRACTOR: Please complete and fax this form to the applicable union to request craft workers that fulfill all hiring requirements for this project. A duplicate fax request is to be sent to the Project Labor Coordinator. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax Transmission Verification Reports and keep copies for your records.

The Rancho Santiago Community College District (District) Community and Student Workforce Project Agreement sets the goal that 66% of all of the labor and craft positions shall be from workers residing in the County of Orange and 50% of the positions are filled by residents of the District's service area which covers the following zip codes:

92602	92606	92610	92612	92614	92618 92620	92626	92627	92660
92675	92676	92679 92688	92701	92703	92704	92705	92706	92707
92707	92708	92780	92782	92802	92805 92806	92807	92808	92840
92843	92861	92862	92865	92866	92867	92868	92869	92883 92887

TO THE UNION: Please complete the "Union Use Only" section on the next page and fax this form back to the requesting Contractor. Be sure to retain a copy of this form for your records and send a copy to Project Labor Coordinator.

CONTRACTOR USE ONLY

To: Union Local # _____ **Fax#** (___) _____ **Date:** _____

Cc: Project Labor Coordinator

From: Company: _____ Issued By: _____

Contact Phone: (___) _____ Contact Fax: (___) _____

PLEASE PROVIDE ME WITH THE FOLLOWING UNION CRAFT WORKERS.

Craft Classification (i.e., plumber, painter, etc.)	Journeyman or Apprentice	Local Resident	Number of workers needed	Report Date	Report Time
TOTAL WORKERS REQUESTED = _____					

Please have worker(s) report to the following work address indicated below:

Project Name: _____ Site: _____ Address: _____

Report to: _____ On-site Tel: _____ On-site Fax: _____

Comment or Special Instructions: _____

UNION USE ONLY

Date dispatch request rec'd:
Dispatch received by:
Classification of worker requested:
Classification of worker dispatched:

WORKER REFERRED

Name:			
Date worker was dispatched:			
Is the worker referred a:		(check all that apply)	
District (zip code) resident	(See zip code list above)	Yes _____	No _____
Veteran		Yes _____	No _____
Graduate of District's JATC	(Carp, Elect & O.E., only)	Yes _____	No _____
Current District JATC apprentice	(Carp, Elect & O.E., only)	Yes _____	No _____
Orange County resident		Yes _____	No _____
Regular dispatch from out of work list		Yes _____	No _____

[This form is not intended to replace a Local Union's Dispatch or Referral Form normally given to the employee when being dispatched to the jobsite.]

ATTACHMENT C

DRUG TESTING LANGUAGE

MEMORANDUM OF UNDERSTANDING

TESTING POLICY FOR DRUG ABUSE

Revised June 2009

International Union of Operating Engineers Local Union No. 12

-INTRODUCTION-

At the June 1991 General Membership Meeting, the members in attendance acknowledged the need of some form of drug testing that would keep the jobsite safe while at the same time protect each member's individual rights under the constitution.

When signatory contractors were not being allowed to bid on projects because they had no official drug testing policy, it became obvious that we were going to have to develop a test to remedy that problem. We feel that within the confines of this addendum the best and fairest for all has been accomplished.

This Memorandum of Understanding is actually an addendum to Local 12's Master Labor Agreement. All the provisions in this shall be adhered to and enforced by Local 12. No member shall be subjected to any provision outside of this memorandum. If any employer asks a member to test for substance abuse and asks for any procedures outside of what is outlined here or in the Side Letter of Understanding on page 11 - that employer is in violation of the Master Labor Agreement and you are not required to comply.

Substance abuse has become a national problem. While jobsite safety has always been a priority in Local 12, it is not the intent of this policy to subject any member to a test that all members on a project are not subjected to.

You, as a member working under these conditions have rights as well as obligations. If you have any questions please contact this office or your business representative.

Sincerely,

Wm. C. Waggoner, Business Manager &
General Vice President

This Memorandum of Understanding shall be considered as an addendum to the Master Labor Agreement currently in effect between the parties. It shall be effective as of the date it is signed and shall thereafter run concurrently with the Master Labor Agreement.

The parties recognize the problems which drug abuse has created in the construction industry and the need to develop drug abuse prevention programs. Accordingly, the parties agree that in order to enhance the safety of the workplace and to maintain a drug free work environment, individual Employers may require applicants or employees to undergo drug testing. The parties agree that if a testing program is implemented by an individual Employer, the following items have been agreed upon by the Labor and Management and will apply.

1. It is understood that the use, possession, transfer or sale of illegal drugs, narcotics, or other unlawful substances is absolutely prohibited while employees are on the Employer's job premises or while working on any jobsite in connection with work performed under the Master Labor Agreement.

2. No Employer may implement a drug testing program which does not conform in all respects to the provisions of this Agreement.

3. No Employer may implement drug testing at any jobsite unless written notice is

given to the Union setting forth the location of the jobsite, a description of the project under construction, and the name and telephone number of the Project Supervisor. Said notice shall be addressed to the International Union of Operating Engineers, 150 East Corson Street, Pasadena, California 91103. Said notice shall be delivered in person or by registered mail before the implementation of drug testing. Failure to give such notice shall make any drug testing engaged in by the Employer a violation of the Master Labor Agreement, and the Employer may not implement any form of drug testing at such jobsite for the following six months.

4. An Employer who elects to implement drug testing pursuant to this Agreement shall require all employees on the project to be tested. With respect to individuals who become employed on the project subsequent to the proper implementation of a valid drug testing program, such test shall be administered upon the commencement of employment on the project, whether by referral from a Union Dispatch Office, transfer from another project, or another method. Individuals who were employed on the project prior to the proper implementation of a valid drug testing program may only be subjected to testing for the reasons set forth in paragraph 5(f)(1) through 5(f)(3) of this Agreement. Refusal to undergo such testing shall be considered sufficient grounds to deny employment on the project.

5. The following procedure shall apply to all drug testing:

a. The Employer may request urine samples only. The applicant or employee shall not be observed when the urine specimen is given. An applicant or employee, at his or her sole option, shall, upon request, receive a blood test in lieu of a urine test. No employee of the Employer shall draw blood from a bargaining unit employee, touch or handle urine specimens, or in any way become involved in the chain of custody of urine or blood specimens. A Union Business Representative, subject to the approval of the individual applicant or employee, shall be permitted to accompany the applicant or employee to the collection facility to observe the collection, bottling, and sealing of the specimen.

b. The testing shall be done by a laboratory approved by the Substance Abuse & Mental Health Services Administration (SAMHSA), which is chosen by the Employer and the Union.

c. An initial test shall be performed using the Enzyme Multiplies Immunoassay Technique (EMIT). In the event a question or positive result arises from the initial test, a confirmation test must be utilized before action can be taken against the applicant or employee. The confirmation test will be by Gas Chromatography/Mass Spectrometry (GC/MS). Cutoff levels for both the initial test and confirmation test will be those established by the SAMHSA. Should these

SAMHSA levels be changed during the course of this agreement or new testing procedures are approved, then these new regulations will be deemed as part of this existing agreement. Confirmed positive samples will be retained by the testing laboratory in secured long-term frozen storage for a minimum of one year. Handling and transportation of each sample must be documented through strict chain of custody procedures.

d. In the event of a confirmed positive test result the applicant or employee may request, within forty-eight (48) hours, a sample of his/her specimen from the testing laboratory for purposes of a second test to be performed at a second laboratory, designated by the Union and approved by SAMHSA. The retest must be performed within ten (10) days of the request. Chain of custody for this sample shall be maintained by the Employer between the original testing laboratory and the Union's designated laboratory. Retesting shall be performed at the applicant's or employee's expense. In the event of conflicting test results the Employer may require a third test.

e. If, as a result of the above testing procedure, it is determined that an applicant or employee has tested positive, this shall be considered sufficient grounds to deny the applicant or employee his/her employment on the project.

f. No individual who tests negative for drugs pursuant to the above procedure and becomes employed on the project shall

again be subjected to drug testing with the following exceptions:

1. Employees who are involved in industrial accidents resulting in damage to plant, property or equipment or injury to him/herself or others may be tested pursuant to the procedures stated hereinabove.

2. The Employer may test employees following thirty (30) days advance written notice to the employee(s) to be tested and to the Union. Notice to the Union shall be as set forth in Paragraph 3 above and such testing shall be pursuant to the procedures stated hereinabove.

3. The Employer may test an employee where the Employer has reasonable cause to believe that the employee is impaired from performing his/her job. Reasonable cause shall be defined as being aberrant or unusual behavior, the type of which is a recognized and accepted symptom of impairment (i.e., slurred speech, unusual lack of muscular coordination, etc.). Such behavior must be actually observed by at least two persons, one of whom shall be a supervisor who has been trained to recognize the symptoms of drug abuse or impairment and the other of whom shall be the job steward. If the job steward is unavailable or there is no job steward on the project the other person shall be a member of the Operating Engineers bargaining unit. Testing shall be pursuant to the procedures stated hereinabove. Employees who are tested pursuant to the exceptions set forth in this paragraph and who test positive will be

removed from the Employer's payroll.

a. Applicants or employees who do not test positive shall be paid for all time lost while undergoing drug testing. Payment shall be at the applicable wage and benefit rates set forth in the Master Labor Agreement. Applicants who have been dispatched from the Union and who are not put to work pending the results of a test will be paid waiting time until such time as they are put to work. It is understood that an applicant must pass the test as a condition of employment. Applicants who are put to work pending the results of a test will be considered probationary employees.

6. The Employers will be allowed to conduct periodic jobsite drug testing on construction projects under the following conditions:

a. The entire jobsite must be tested, including any employee or subcontractor's employee who worked on that project three (3) working days before or after the date of the test;

b. Jobsite testing cannot commence sooner than thirty (30) days after start of the work on the project;

c. Prior to start of periodic testing, a Business Representative will be allowed to conduct an educational period on company time to explain periodic jobsite testing program to affected employees;

d. Testing shall be conducted by a SAMHSA certified laboratory, pursuant to the provisions set forth in Paragraph 5 hereinabove.

e. Only two periodic tests may be performed in a twelve month period.

7. It is understood that the unsafe use of prescribed medication, or where the use of prescribed medication impairs the employee's ability to perform work, is a basis for the Employer to remove the employee from the jobsite.

8. Any grievance or dispute which may arise out of the application of this Agreement shall be subject to the grievance and arbitration procedures set forth in the applicable Master Labor Agreement.

9. The establishment or operation of this Agreement shall not curtail any right of any employee found in any law, rule or regulation. Should any part of this Agreement be found unlawful by a court of competent jurisdiction of a public agency having jurisdiction over the parties, the remaining portions of the Agreement shall be unaffected and the parties shall enter negotiations to replace the affected provision.

10. Present employees, if tested positive, shall have the prerogative for rehabilitation program at the employee's expense. When such program has been successfully completed the Employer shall not discriminate in any way against the employee. If

work for which the employee is qualified exists he/she shall be reinstated.

11. The Employer agrees that results of urine and blood tests performed hereunder will be considered medical records held confidential to the extent permitted or required by law. Such records shall not be released to any persons or entities other than designated Employer representatives and the Union. Such release to the Union shall only be allowed upon the signing of a written release and the information contained therein shall not be used to discourage the employment of the individual applicant or employee on any subsequent occasion.

12. The Employer shall indemnify and hold the Union harmless against any and all claims, demands, suits, or liabilities that may arise out of the application of this Agreement and/or any program permitted hereunder.

13. Employees who seek voluntary assistance for substance abuse may not be disciplined for seeking such assistance. Requests from employees for such assistance shall remain confidential and shall not be revealed to other employees or management personnel without the employee's consent. Employees enrolled in substance abuse programs will be subject to all Employer rules, regulations and job performance standards with the understanding that an employee enrolled in such a program is receiving treatment for an illness.

14. The parties agree to develop and implement a drug abuse prevention and testing program for all apprentices entering the industry.

15. This Memorandum of Understanding shall constitute the only Agreement in effect between the parties concerning drug abuse, prevention and testing. Any modifications thereto must be accomplished pursuant to collective bargaining negotiations between the parties.

DRUG ABUSE PREVENTION AND DETECTION
APPENDIX A - CUTOFF LEVELS

DRUG	SCREENING METHOD	SCREENING LEVEL**	CONFIRMATION METHOD	CONFIRMATION LEVEL
Amphetamines	EMIT	1000 ng/ml*	GC/MS	500 ng/ml*
Barbiturates	EMIT	300 ng/ml	GC/MS	200 ng/ml
Benzodiazepines	EMIT	300 ng/ml	GC/MS	300 ng/ml
Cocaine	EMIT	300 ng/ml*	GC/MS	150 ng/ml*
Methadone	EMIT	300 ng/ml	GC/MS	100 ng/ml
Methaqualone	EMIT	300 ng/ml	GC/MS	300 ng/ml
Opiates	EMIT	2000 ng/ml*	GC/MS	2000 ng/ml*
PCP (Phencyclidine)	EMIT	25 ng/ml*	GC/MS	25 ng/ml*
THC (Marijuana)	EMIT	50 ng/ml*	GC/MS	15 ng/ml*
Propoxyphene	EMIT	300 ng/ml	GC/MS	100 ng/ml

* *SAMHSA specified threshold*

** *A sample reported positive contains the indicated drug at or above the cutoff level for that drug. A negative sample either contains no drug or contains a drug below the cutoff level.*

EMIT - Enzyme Immunoassay

GC/MS - Gas Chromatography/Mass Spectrometry

SIDE LETTER
OF
UNDERSTANDING

In regard to the Memorandum of Understanding on Drug Abuse Prevention and Detection agreed to by the parties, it is agreed that if, as a condition of contract award or due to Federal, State or Governmental Agency requirements, an individual Employer is required to abide by or implement more stringent requirements than set forth in the Memorandum of Understanding, the individual Employer will notify the Union in writing of those requirements. The Union reserves the right, upon receiving notification, to require the individual Employer to meet to negotiate any changes.

Agreed to this 18th day of June, 1991.

ASSOCIATED GENERAL CONTRACTORS OF CALIFORNIA, INC.

INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL UNION NO. 12

Wm. C. Waggoner
Business Manager

Mickey J. Adams
President

Ronald J. Sikorski
Vice President

SIDE LETTER
OF
AGREEMENT
TESTING POLICY
FOR DRUG ABUSE

It is hereby agreed between the parties hereto that an Employer who has otherwise properly implemented drug testing, as set forth in the Testing Policy for Drug Abuse, shall have the right to offer an applicant or employee a "quick" drug screening test. This "quick" screen test shall consist either of the "ICUP" urine screen or similar test or an oral screen test. The applicant or employee shall have the absolute right to select either of the two "quick" screen tests, or to reject both and request a full drug test.

An applicant or employee who selects one of the "quick" screen tests, and who passes the test, shall be put to work immediately. An applicant or employee who fails the "quick" screen test, or who rejects the "quick" screen tests, shall be tested pursuant to the procedures set forth in the Testing Policy for Drug Abuse. The sample used for the "quick" screen test shall be discarded immediately upon conclusion of the test. An applicant or employee shall not be deprived of any rights granted to them by the Testing Policy for Drug Abuse as a result of any occurrence related to the "quick" screen test.

Agreed to this 5th day of November, 2004.

ASSOCIATED GENERAL CONTRACTORS OF CALIFORNIA, INC.

INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL UNION NO. 12

Wm. C. Waggoner
Business Manager

Mickey J. Adams
President

Ronald J. Sikorski
Vice President

SECTION 013529

HEALTH, SAFETY, AND ENVIRONMENTAL REQUIREMENTS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Summary of safety requirements and procedures that are to be followed in addition to the Contractor's IIPP, and Federal, State and local requirements.

1.02 RELATED DOCUMENTS AND SECTIONS

A. Drawings, specifications, and provisions of Construction Contract, including General, Special and Supplementary Conditions and other General Requirements.

B. Owner Controlled Insurance Program (OCIP) Manual.

C. Contractors Mold Mitigation Plan.

D. Division 1 Sections.

1.03 DEFINITIONS

A. Incident: An unplanned, undesirable event, which disrupts or may disrupt work activity, regardless if injury and/or property damage occurred.

B. Pre Task Planner: Also known as a Job or Task Hazard Analysis (JHA/THA). A task-driven pre-planning document used to ensure every task receives proper safety assessment and planning. This document is required to be completed by each individual directly responsible for supervising workers (foreman) on a daily basis and, when conditions or elements of the task change. The immediate supervisor is required to review the task plan for completion and accuracy and discuss deficiencies with the crew directly on a daily basis.

1.04 SUBMITTALS

A. Contractor Safety Representative: Qualifications, proof of certifications, and resume shall be submitted to District Representative for approval prior to any onsite construction activity.

B. Alternate Contractor Safety Representative: Qualifications, proof of certifications and resume shall be submitted to District Representative for approval at least 48 hours in advance when the Contractor Safety Representative will not be present on the project.

C. A site-specific Project Health, Safety & Environmental Plan (PHSEP), compliant with ANSI Z10, shall be prepared by the Contractor and submitted to District Representative for its review and acknowledgement prior to issuance of the Notice to Proceed.

1.05 REQUIREMENTS

A. The requirements set forth in this Section are complementary to, and do not supersede the requirements of the General Conditions or Facilities Lease Agreement or other provisions of the Contract Documents pertaining to safety. In the event of a conflict between or among provisions relating to safety or protection, the provision that requires the greater degree and higher level of action, care, caution or protection shall govern. Contractors and subs of any tier shall comply with all.

B. The District Representative may bring to the attention of the Contractor any potentially unsafe acts or conditions in the field regarding the safety of personnel on the site. The Contractor shall be responsible for verifying the compliance with all local, state, and federal workplace safety guidelines. In no case shall this right to notify the Contractor absolve the Contractor of its responsibility for monitoring safety conditions. Such notification shall not imply that anyone other than the Contractor has assumed any responsibility for field safety operations.

C. An individual having responsibility for construction activities on the project site must have, at minimum, a Safety Trained Supervisor (STS) designation. This individual shall be considered the Contractor Safety Representative. The Contractor Safety Representative may perform other onsite duties in addition to the Contractor Safety Representative responsibilities. This individual shall be assigned to the Site full time, regardless of worker headcount, including off- hours and weekend work. The Contractor shall submit qualifications, proof of certification and resume of Contractor Safety Representative to District Representative for approval prior to any onsite construction activity.

D. An alternate Contractor Safety Representative meeting the same minimum qualifications as the full-time Contractor Safety Representative shall be present when the Contractor Safety Representative is not present. The Contractor shall notify the District Representative at least 48 hours in advance when the Contractor Safety Representative will not be present on the project. This notification shall include the name of the alternate Contractor Safety Representative and required qualifications (see 1.4C). The Contractor shall submit the qualifications and required documentation for the alternate Contractor Safety Representative to the District Representative at least 48 hours in advance for verification and approval.

E. In addition to the requirements of this specification, the Contractor and Installation Subcontractors of all tiers shall meet the minimum occupational safety and health qualifications required by California Government Code Section 4420 (applicable to projects involving use of wrap-up insurance), including the following: (1) the Contractor has not been cited for any serious or willful violations of Part 1 (commencing with Section 6300) of Division 5 of the Labor Code during the past five-year period; (2) the Contractor's (as of the Bid Closing Deadline) and Installation Subcontractor's (as of the OCIP enrollment date) current "Experience Modification Rate" (based on the most recent determination of the Contractor's or Installation Subcontractor's California Intrastate EMR used for evaluation of contractors in the State of California) is less than or equal to 1.24; (3) the Contractor's current Total Recordable Incidence Rate is not greater than the injury and illness rates published by the Bureau of Labor & Statistics per the Contractor 's industrial classification(s) as defined by the North American Industry Classification Systems (NAICS). (Contractors exempt from OSHA requirements for recordkeeping and reporting, or where no TRIR data is available, will be deemed to have met the requirement); and (4) the Contractor has instituted an injury prevention program pursuant to Section 3201.5 or 6401.7 of the California Labor Code.

F. The Contractor has sole responsibility, on a twenty-four (24) hour Day, seven (7) Day week basis, for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work. No actions, inspections or approvals by District, College, District Representative or other acting on behalf of District shall diminish such Contractor responsibility.

G. A site-specific "Project Health, Safety & Environmental Plan (PHSEP)", compliant with ANSI Z10, shall be prepared by the Contractor and submitted to District Representative for its review and acknowledgement prior to issuance of the Notice to Proceed. The Contractor must hold an interactive safety planning meeting with all known sub-trade contractors (separate from production or other meeting) to coordinate safe work among all trades associated with the project. Sub trades contractors must be provided this site-specific PHSEP and these General Requirements to ensure all trade contractors are completely familiar with the HSE requirements on this project prior to mobilization. The PHSEP must include, at a minimum and without limitation, a project-specific "Emergency Response Action Plan" in accordance with Applicable Laws and all applicable requirements of the District and Contract Documents. District Representative shall have the right, but not the obligation to request that Contractor make such corrections or changes deemed appropriate by District Representative and Contractor shall comply with such requests. Contractor shall remain solely responsible for the adequacy and completeness of the Project Safety Plan notwithstanding such review, acknowledgement or corrections by District Representative.

H. All Contractors are responsible for maintaining all postings required by Applicable Laws and the Contract Documents, such as, but not limited to, the CAL-OSHA poster, the CAL-OSHA 300 & 301 logs, Cal-OSHA Forklift rules, First Aid Register (CPS-0425), incident reports (CPS-0420), equipment inspection records, and health and safety training records for workers.

I. Contractor shall immediately inform the District Representative of any safety or health inspections or other actions by CAL-OSHA, EPA or other Governmental Authorities.

J. Incidents involving serious injuries, illnesses or any Incident (minor or serious) involving a third party or a member of the general public, or onsite workers/staff shall be immediately reported by the Contractor to the District Representative. Contractor must secure the scene of the incident immediately and remove personnel from the area.

K. Incidents involving potential exposure to Hazardous Substances, including, without limitation, releases or spills, shall be reported immediately by the Contractor to the District Representative.

L. A report (Form CPS-0420) for all Incidents shall be forwarded to the District Representative within twenty-four (24) hours of the occurrence of the Incident followed by an in depth incident investigation.

M. Contractor and Subcontractors are required to prepare daily task specific safety plans (Form CPS-0440). The work crew will halt work activity without a proper pre-task plan until proper pre-planning has taken place.

N. Copies of Weekly Safety Meeting Reports signed by Contractor, and in a form acceptable to District Representative, shall be submitted by the Contractor to the District Representative within twenty-four (24) hours of each safety meeting.

O. Contractors shall complete the Monthly Project Safety Performance Summary (CPS-0430) for each month in which they conduct work on the project. Contractor shall submit these reports to the District Representative by the tenth (10th) day of the month for the preceding month.

P. Contractor Safety Representative must conduct a proper project site-specific orientation for all workers and sub-trade workers reporting to the jobsite prior to accessing the work site. Proper orientation shall include the following:

a. A thorough review of the safety requirements with the workers assigned to the project site and Project Health, Safety and Environmental Plan (PHSEP).

b. Contractor collects signed Sign-Off from workers which must be maintained on site for duration of project and submitted to District Representative for archival upon project completion.

c. Assure all workers receive proper Safety stickers for their hard hats.

d. A pre-assigned drug screening is required of all Contractors and Subcontractors.

Q. Contractor is required to confirm OCIP enrollment of prior to onsite subcontractor work activity.

1.06 TRAINING / COMMUNICATION REQUESTS

A. The Contractor shall certify that all operators of mobile equipment such as forklifts, cranes, boom lifts, buses, etc., have been trained and/or certified on the proper operation of the equipment. Copies of proof of training or certification shall be maintained on the Site by the Contractor and forwarded to the College Project Manager upon request. Proof of training or certification of mobile crane operators must be provided for each specific crane (type & rating) they are assigned to operate. All operators shall be in compliance with NCCC.

B. All Contractor and Subcontractor's workers are required to complete a project-specific health and safety orientation, conducted by the General Contractor Project Manager, and to participate in weekly safety training sessions. Signed copies of the orientation sign-in sheets/reports and weekly safety meetings, shall be made available to the District Representative upon request. The Contractor shall verify all subcontractors have been properly enrolled into the District's OCIP prior to beginning work on site.

C. Contractor confirms OCIP enrollment of subcontractors represented by attendees.

D. The Contractor must establish a prompt and effective method of providing health and safety communications such as safety alerts, bulletins, regulatory updates, etc. to all workers Contractor on the Project Site.

1.07 BASIC HEALTH, SAFETY, AND ENVIRONMENTAL REQUIREMENTS

A. Without limitation to any other requirements of Applicable Laws or the Contract Documents, Contractor and Subcontractors shall comply with the following basic safety rules:

a. Hard hats, (ANSI Z89.1 or equivalent), shall be worn at all times when in the construction environment; this includes welders when using welding hoods.

b. Shirts with at least four (4) inch sleeves shall be worn at all times. Tank tops are prohibited.

c. Hard-toe footwear, (ANSI Z41.1 or equivalent), shall be worn by all employees when in the construction environment or in areas where there is a danger of foot injuries due to falling objects, rolling objects, objects piercing the sole or when employee's feet are exposed to electrical hazards.

d. Safety glasses with rigid side shields, (ANSI Z87.1 or equivalent), shall be worn at all times when in the construction environment, shop, or any time when eye hazards exist. This includes under welding hoods and employees with prescription eye wear. Safety goggles may be worn over non-safety prescription eyewear. Contractors are encouraged to provide "Reader" style safety glasses for personnel requiring magnification for reading purposes.

e. When worn alone, face shields do not protect employees from impact hazards. Face shields must be worn in conjunction with safety glasses when grinding, chipping, jack hammering, and power sawing, or conducting other tasks that involve serious face/eye hazards.

f. Gloves must be worn at all times when handling materials, or using tools that have the potential to injure hands. This includes clothing or gloves, appropriate for the hazard present, shall be worn when hands are exposed to absorption of harmful substances, cuts, abrasions, punctures, biological hazards, chemical burns, thermal burns or harmful temperature extremes. Gloves appropriate for the hazards must be readily available to workers on the work site.

g. Protective chainsaw chaps shall be worn at all times when operating a chain saw.

h. The Contractor and Subcontractors shall comply with a 100% Fall Protection Policy. The use of harnesses and lanyards for fall protection is a last resort. Where possible, passive methods of fall protection are to be utilized (guard rails, safety nets, scissor lifts, etc.). Engineering controls to eliminate the fall hazard are a first priority. 100% fall protection must be used anytime workers are exposed to any unprotected elevation of six (6) feet or more (whether moving or stationary). Additionally, 100% fall protection is required at any height when there is a hazard below the worker that may cause injury (exposed rebar, piping, stakes, etc.). This includes but is not limited to trenches, wall openings, holes, scaffolds, ladders, landing areas and aerial bucket lifts. Strict adherence to this policy is mandatory on all projects and by all trades and requires detailed PRE-PLANNING by supervision and site safety personnel. Failure to comply with this policy may result in a work stop order or dismissal from the project site.

i. Where tools, equipment and/or materials are piled higher than the top edge of the toe-boards, paneling or screening shall be erected from the walking/working surface to the mid-rail or top- rail to protect employees working below from falling objects.

j. Radios, iPods, mp3 players, or other audio/visual devices including earphones or headphones shall be prohibited on the jobsite.

k. Cell phones and 2-way radios must never be used while operating motorized vehicle or construction equipment, unless included in the pre-task plan for the subject activity and required for the safe performance of that activity.

l. All equipment on the Site shall be used in accordance with safety requirements of Applicable Laws, as well as manufacturer's instructions and guidelines. Equipment shall not be altered in any way to adapt it for a use or task for which the manufacturer does not intend it without specific written approval by the manufacturer of the equipment

approving of such adaptations or alterations under the specific circumstances of such use or task. Signed approval from the manufacturer must be maintained at the jobsite for the duration of its use.

m. All hand-held power tools must be equipped with constant pressure switches that will automatically shut off power when the pressure (worker's hand) is removed. Hand-held power tools with On/Off or lock-on switches are not allowed. All hand held tools must have a grounding prong or be identified by UL laboratory as double insulated.

n. Ground Fault Circuit Interrupter (GFCI) protection is required on all power tools/equipment and must be connected directly to the electrical outlet or drop. The option of assured grounding (quarterly equipment inspections) is not permitted. All contractors and subcontractors are required to inspect all power tools and temporary portable electrical cords prior to each use.

o. Portable ladders (extension, straight, step) should be equipped with a tie-off rope. The top of all straight and extension ladders shall be tied to a substantial anchor point before use; a second worker must hold the ladder until ladder tie-off is secured. If a worker's feet are on or above the fourth rung of a step ladder, the ladder must be tied to a substantial anchor or held by another worker. Note: the 100% 6-foot tie off requirement applies to ladders and requires PRE-PLANNING by the contractor and site Contractor Safety Representative.

p. Reflective ANSI/ISEA 107 Class-II safety vests must be worn by all personnel at all times when working on any RSCCD construction project. ANSI/ISEA 107 Class-III safety vests are required for all personnel working near motorized vehicles or motorized construction equipment. Tasks requiring a Class-III vest include flaggers, operators, riggers, survey crews, supervision, etc. ANSI/ISEA 107, Class III high-visibility reflective safety vests shall be worn for maximum visibility.

q. All crane and/or aerial lifts require a written plan. Lifts exceeding 85% capacity are prohibited. Larger crane and/or aerial lift equipment must be upgraded when exceeding 85% capacity. All outriggers on mobile cranes must be fully extended and fully deployed when the crane is used to lift or support a load. If, due to configuration or physical location, all outriggers cannot be fully deployed calculations must be made from the "on-rubber" section of the load chart. Lifts require College Project Manager's written acknowledgement. All rigging plans must follow manufacturer's load capacity badge affixed to all rigging. Unmarked rigging or job built rigging must have written approval and must be signed by a California registered Professional Engineer (P.E.).

r. All temporary power cords must be rated for hard or extra hard duty and must have a third grounding prong intact.

1.08 CERTIFICATION, INSPECTION, AND PERMITS

A. Some Governmental Authorities require permits for specific activities such as; excavations, heavy lifts, asbestos/lead abatement, air permits, water permits, hazardous waste generation, etc. Unless the College Project Manager specifically directs otherwise, the Contractor will be responsible to secure and comply with these permits.

B. A third party certified Competent Person shall make a thorough inspection, no less frequently than annually, of all cranes and powered hoisting equipment and more often where reasonable or necessary under the circumstances. Cranes assembled on Site shall receive such inspection prior to being put into service. Documentation of all crane inspections shall be provided to the Contractor and must be maintained on Site by the Contractor. Anti Two-Block devices, that automatically disengages and crane hoist/boom functions when the hook or block approaches the jib or boom tip, are required on all cranes.

C. All scaffolding must be inspected and tagged by a Competent Person prior to initial use, before each work shift and after any event that could affect its structural integrity. The inspection must be signed, documented and maintained on site for the entire duration the scaffold is erected. Untagged, uninspected or red-tagged scaffolds shall not be used. No employees are allowed to work on a scaffold during erecting, dismantling or while being modified.

1.09 HAZARD COMMUNICATION PROGRAM

A. The Contractor shall prepare a written Hazard Communication Program included in the PHSEP. Documentation of Contractor employee Hazard Communication training must be demonstrated by the Contractor to the District Representative prior to commencement of mobilization at the Site.

B. Any potential Hazardous Substance brought onto the Site is required to be accompanied by a Material Safety Data Sheet (MSDS). Additionally, the contractor will notify the site safety personnel when a new substance is introduced into the jobsite for approval and safe storage and use recommendations. Copies of the MSDS's shall be posted or located in accordance with Applicable Laws and District Requirements. They must be made available to employees at the jobsite upon request.

C. Small quantities of liquids typically used for construction that might be considered Hazardous Substances, such as gasoline, diesel fuels and any solvents, may be brought onto the Site, but shall be stored in a properly labeled safety container with a flame arrestor and self-closing lid. Large quantities of such Hazardous Substances shall not be brought onto the Site without the specific advance written approval of the College Project Manager, which approval may be granted or withheld at the sole discretion of College Project Manager. Contractor shall remain solely responsible for the handling, storage and use of such Hazardous Substances notwithstanding such approval by College Project Manager.

D. All containers brought onto the site must be labeled as to their contents per Cal/OSHA regulations and guidelines.

E. No chemical or material creating noxious or toxic fumes shall be used on the Site without prior approval by College Project Manager, which approval may be granted or withheld at the sole discretion of College Project Manager. Contractor shall remain solely responsible for the handling, storage and use of such chemicals or materials notwithstanding such approval by College Project Manager.

1.10 RESPIRATORY PROTECTION

A. Contractor and each Subcontractor employing persons who will be using respirators shall prepare and abide by a written Respiratory Protection Program for protection of employees who will be wearing a respirator. A copy of such program shall be provided to the College Project Manager prior to performance of any Work requiring use of a respirator. Such programs shall comply with Applicable Laws and must include the following:

a. Workplace hazard assessment

b. Proper respirator selection based on hazard assessment

c. Proper respirator training and the required fit test procedures

d. Proper respirator cleaning, sanitizing, inspection and maintenance

e. Cartridge change out schedule (if applicable)

f. Respirator user's medical clearance

g. Authorized user fit-test verification

1.11 INCIDENT INVESTIGATION REQUIREMENTS

A. The Contractor shall perform thorough, in-depth investigations and evaluations of all Incidents. A formal Incident investigation shall be conducted whenever any Incident occurs, including, without limitation, both non-injury Incidents and Incidents involving first-aid. Additionally, near miss accidents and/or incidents must be reported and undergo the same in-depth investigation, root cause analysis and lessons learned process.

B. When an Incident occurs, provide the best assistance possible to those who may need it and to ensure the safety of others that may be affected or acting as emergency responders.

C. Securing of the Incident scene is important to ensure a good Incident investigation. Conditions at the location of the Incident shall not be disturbed and material or equipment (unless necessary to

prevent further injury or loss) shall not be moved until an investigation of the Incident is completed. No work or construction activities shall commence at the incident scene until the investigation has been completed.

D. Photographs of the incident scene should accompany the investigation report and include several overview photos of the incident scene and numerous detailed up-close shots from all directions and angles. These photographs will be used for lessons learned and future employee training to prevent a repeat injury/illness.

E. All Incident investigations shall be documented using the Incident Investigation Report. All such reports should be completely filled out and should be completed and submitted within 24 hours to the District Representative and OCIP Safety Representative.

F. Recommendations and lessons learned to prevent recurrence of the Incident should be documented and communicated to all employees of Contractor and Subcontractors via safety meetings and on-the-job training.

G. For post-accident and reasonable cause for all incidents, drug screening shall be required.

1.12 RELEASES AND EMPLOYEE EXPOSURES INVOLVING HAZARDOUS CHEMICALS

A. All Incidents involving exposure to or releases of potentially Hazardous Substances must be reported in writing to the College Project Manager immediately. It is important to report all such exposures and releases even though it may be considered minor and even though no adverse health effects or symptoms are apparent at the time.

1.13 IMMINENT DANGER SITUATIONS

A. The Contractor shall report to the College Project Manager immediately any situation that poses a risk of the occurrence of an Incident. College Project Manager will have the right, but not the obligation, to immediately suspend the affected Work. Neither the College Project Manager's decision to exercise or not to exercise the option to suspend Work shall give rise to any duty or obligation on the part of the College Project Manager, College or District. Work may resume only after the circumstances giving rise to the safety concern have been corrected. Examples of circumstances that may be covered by this Paragraph 1.13 include, but are not limited to, the following:

a. Falls from elevations

b. Excavations not properly sloped or shored

c. Electrocution hazards

d. Work activities posing injury hazards to the general public

e. Operation of vehicles, machinery or heavy equipment in an unsafe manner

f. Work commencing without approved Pre-Task Plan

g. Hazardous material release or spill

1.14 SAFETY ADHERENCE POLICY

A. Action Level One: If the College Project Manager observes that the Contractor has failed to comply with safety requirements applicable to the Work, the College Project Manager will have the right, but not the obligation, to issue a "Warning Letter for Safety Non-Compliance" and/or a written "Notice of Safety Non-Compliance" to the Contractor. College Project Manager will have the further right, but not the obligation, to send either letter to the Contractor's reputed executive in charge, such as its President or Operations Manager, and to Contractor's Sureties.

B. Action Level Two: If an observed non-compliance with safety requirements is not corrected by Action Level One, or if the Contractor repeatedly fails to comply with the safety requirements applicable to the Project, the College Project Manager shall have the right, but not the obligation, to issue a "Written Notice of Temporary Job Suspension" to the Contractor and its Sureties. The Contractor may not resume Work until the College Project Manager and the Contractor's

reputed executive in charge, such as its President or Operations Manager, have met and the Contractor has demonstrated that it is prepared and able to take specific and adequate corrective actions. Actions that the College Project Manager may, in the exercise of its sole discretion, requirements of the Contractor include, but are not limited to, the following:

a. Removal of certain Contractor or Sub-Contractor personnel from the project Site and/or campus.

b. Alteration of the Contractor's or Subcontractor's job procedures.

c. The Contractor shall not resume Work until proposed corrective actions are reviewed with the College Project Manager and the College Project Manager has approved the Work proceeding. The Contractor will document the meeting results in the form of meeting minutes, a copy of which will be provided to the College Project Manager and maintained at the Site.

C. Action Level Three: If Action Levels One and Two do not result in the Contractor's performance being brought into compliance with applicable safety requirements, then other actions, including, without limitation, contract termination may result. A Contractor whose contract is terminated in accordance with this procedure may be declared ineligible to bid or participate in future District or College projects.

D. Nothing stated above or in the Safety Adherence Policy shall be interpreted as creating or implying any obligation on the part of the College Project Manager or District to issue any notices, whether formal or informal, to the Contractor in the event of an Incident or of circumstances involving the risk of an Incident. Contractor shall comply with notices issued to Contractor, whether or not in the forms suggested above. Nothing stated above shall be interpreted as limiting any of District's rights or remedies to the exercise of procedures set forth above or in the Safety Adherence Policy.

1.15 AIR TESTING EQUIPMENT

A. A confined space includes locations such as utility holes, cable vaults, pits, tanks, shafts, wall openings or other similar spaces where a potential for a flammable, toxic, or oxygen deficient atmosphere may exist.

B. Air testing equipment shall be UL or MET classified for use in Class I, Division 1, Groups A, B, C & D Division 1 hazardous locations as defined by the National Electrical Code.

C. Air testing equipment must be calibrated before each use, tested, used and repaired in accordance with the manufacturer's manual and instructions. Manufacturer's specifications and requirements must be maintained at the jobsite for verification purposes.

D. Prior to use, employees must be trained on the use, limitations and alarm modes of each air-testing device that they may use. This training is specific to the device being used and is not transferable to other types of devices or other manufacturer's devices.

E. Air testing equipment must be fully functional and checked prior to use per Cal-OSHA requirements and the manufacturer's user manual.

F. Employees must immediately leave a work area whenever an equipment alarm sounds due to:

a. Low or high oxygen level (acceptable range is 19.5% to 23.0 % oxygen)

b. Combustible gas detected above 10% lower explosive limit (LEL)

c. Set point for a toxic gas level is reached (e.g., 10 ppm hydrogen sulfide)

d. Sensor failure or low battery alarm

G. Testing and monitoring equipment must be carried with the employee or placed immediately adjacent to the work area and set to operate in a continuous monitor mode. Note, some spaces will require multiple air sampling units and air samples will need to be taken at different depths as determined by the competent person on site.

1.16 BURNING

A. An approved fire extinguisher (not less than 2A:10BC) and/or other fire protection equipment as required by code or regulations are to be provided by the Contractor.

B. When air monitoring is required, the Lower Explosive Limit must be non-detectable (0% LEL), prior to any type of burning, welding, or hot work being conducted by the Contractor.

C. Air monitoring will be required around or near any areas that may pose a potential fire or explosion threat from flammable or combustible vapors, for example.

1.17 HOT WORK

A. Hot work includes the following activities: grinding, cutting, welding, brazing or soldering, heating, hot air welding or other operations that generate heat, flames, arcs, sparks or other sources of ignition.

B. Prior to performing hot work the Contractor shall evaluate the following: type of hot work to be performed, site preparation, atmospheric conditions, use of appropriate personal protective equipment, and firefighting equipment. The Contractor shall implement 100% spark containment during hot work operations.

C. Site preparation should include a survey for the following: combustible/flammable materials; hazards posed by radiated or conductive heat sources; flammable, corrosive, or toxic residues; equipment linings; appropriate lock/tag out / block out application; potential ignition sources; adjacent contractor activities, and housekeeping.

D. The Contractor shall also evaluate the work area for the potential consequences of thermal conduction. Thermal conduction is the transfer of heat that could cause ignition by/through an object heated by the hot work operation.

E. Fire watch will be in place for work that may cause any potential ignition source that cannot be monitored by the creator of the ignition source. In many cases, multiple fire watch may be required to safely protect the jobsite from potential ignition sources.

F. Fire watch hot work must be stopped 1-hour before the end of the work day to verify there are no potential sources of ignition.

G. Fire extinguisher must be within a 10- foot clear path.

H. All workers must take measures to reduce the risk from combustible materials, flammable/combustible liquids and gases. Particular attention must be paid to polystyrene packing, textiles, and furniture with foam padding.

1.18 COMPRESSED GAS CYLINDERS

A. All cylinders must be stored and transported in an upright and secured position at all times. Cart mounted cylinders shall not to be gathered together in the same location when not in use.

B. Oxygen and fuel gas cylinders must be separated at least 20 ft., or a 5 foot high non- combustible barrier with a ½ hour fire rating when in storage, and placed away from potential sources of ignition or unintentional contact that may rupture or knock the tanks over. This includes cylinders that are considered to be empty.

C. Cylinders must have valve protection caps installed when in storage or when being transported.

D. Cylinders must be labeled as to the nature of their contents per NFPA requirements and the OSHA Hazard Communication Standard.

E. Back flow prevention devices shall be connected to the gages while cylinders are in use.

1.19 CONCRETE AND MASONRY CONSTRUCTION

A. The Contractor must not place loads on any concrete structure until concrete has reached a compressive strength predetermined by the structural engineer of record.

B. The Contractor must guard all protruding reinforcing steel to eliminate impalement hazards. Guarding shall be accomplished using one of the three approved Cal/OSHA methods (2X4 wooded troughs, 14 gauge steel troughs, or manufactured protective covers).

C. The Contractor must not remove any forms or shoring until a determination has been made by the testing lab and structural engineer that the concrete has gained sufficient strength to support its own weight and that of any superimposed loads.

D. The Contractor shall guard impalement hazards presented by vertical conduit, anchor bolts, small diameter pipe, etc. These items present impalement hazards similar to that of vertical reinforcing steel, but are not explicitly addressed in Cal/OSHA Standards.

E. Impalement hazard mitigation is the responsibility of the controlling, creating, exposing and correcting contractors.

1.20 CONFINED SPACE ENTRY

A. The Contractor must abide by the applicable OSHA standards for all confined space entry operations on RSCCD facilities, and furnish all appropriate permits, personnel, equipment, support and rescue plans.

B. The Contractor personnel must be trained in the hazards of confined space work, including operating and rescue procedures, the use of respiratory equipment, and instructions as to the hazards they may encounter.

C. The Contractor shall develop a written, understandable confined space operating and rescue procedure, which must be made available to all affected employees.

D. Always test before every entry, if space is vacated retest each time before re-entry when all workers are out of the area. Continuous monitoring is always recommended as a best practice during confined space operations.

E. Contractor is required to provide all necessary entry-rescue equipment required for all entries into confined spaces (tripod, full body harness and lifeline or equivalent, respirator, etc.) as required by the applicable Standard. Wrist straps may be used in designated areas instead of a full body harness. Contractor must demonstrate the effectiveness of the rescue equipment by conducting a drill prior to entry to assure proper operation of equipment and training of rescue personnel.

F. Prior to entry into a confined space, Contractor shall ensure all lines, which may convey flammable, injurious, or incapacitating substances into the space are disconnected, blinded, or blocked off by other positive means in accordance with Cal-OSHA regulations.

G. Prior to entry into confined space, the Contractor shall test the air with an appropriate device or method for: 1) Oxygen content, 2) Flammable gases and vapors, and 3) Potential toxic air contaminants. A written record shall be made and kept at the work site for the duration of the work.

H. The confined space shall be emptied, flushed, or otherwise purged of flammable or injurious substances to the extent feasible. Contractor is required to provide proper ventilation equipment, which is intrinsically safe and adequate for the space being ventilated.

I. Whenever an atmosphere free of dangerous air contamination and/or oxygen deficiency cannot be ensured, Contractor shall provide approved respiratory equipment to affected employees, who are involved in a comprehensive respiratory protection program in accordance with applicable OSHA standards.

J. Where a standby employee is required, the standby employee must have a valid certificate in first aid and CPR training from the American Red Cross, or equivalent training verified by documentary evidence.

K. Visual contact or two-way radio communication, which is intrinsically safe, must be available at all times. Contractor shall provide radios with extra charged batteries (2 per radio).

L. Contractor must establish a means of communication with outside Emergency Services.

1.21 CONNECTIONS TO UTILITIES

A. No temporary service connections can be made to electrical, water, air or steam utilities by the Contractor without the approval of the District.

B. The Contractor shall verify all utility connections, temporary or permanent, prior to energizing or putting into service any device, piping or system to avoid potential electrocution or other stored energy hazard. Facilities personnel must verify work prior to initial start-up.

1.22 ELEVATING WORK PLATFORMS

A. An elevating work platform is a device designed to elevate a platform in a substantially vertical axis.

B. Only authorized and trained personnel shall operate an elevating work platform.

C. Boom basket and platform load limits specified by the manufacturer shall not be exceeded.

D. Workers shall not exit the lift when elevated or, sit/climb on the edge of the basket or platform or use planks, ladders or other devices to gain greater height.

E. Workers shall not work off elevated work platforms or aerial devices when exposed to high winds.

F. The platform guardrail shall be 42 inches high, plus or minus 3 inches, with a mid-rail at the half-height point. Where the guardrail is less than 39 inches high, an approved personal fall protection system shall be used.

G. The platform shall never be used as a personal elevator or in place of a crane or forklift to hoist materials. Employees shall never stand on or lean over guardrails under any circumstances. Such behavior may exceed the horizontal loading capacity of the lift and cause the lift to fall over or become unstable.

H. Powered elevating work platforms shall have both upper and lower control devices. Controls shall be plainly marked as to their function and guarded to prevent accidental operation.

I. An emergency stopping device shall be provided at the upper controls of elevating work platforms.

J. Ladders or other objects shall not be placed on top of units to gain greater height.

K. Operators must not be in the cab when traveling through doorways.

1.23 AERIAL DEVICES

A. An aerial device is any vehicle-mounted or self-propelled device, telescoping extensible or articulating, or both, which is primarily designed to position personnel.

B. Tying off to an adjacent pole, structure, or equipment while working from an aerial device is not permitted and workers shall not exit the lift when elevated.

C. Lift controls shall be tested in accordance with the manufacturer's recommendations or instructions prior to use to determine that such controls are in safe working condition.

D. Aerial baskets or platforms shall not be supported by adjacent structures when workers are on the platform or in the baskets while in an elevated position.

E. An employee, while in an elevated aerial device shall be secured to the basket or tub through the use of a full body harness and lanyard for the purposes of fall restraint.

F. Only authorized and trained personnel shall operate an aerial device.

1.24 EMERGENCY ACTION/EVACUATION PLAN

A. When an emergency occurs, it may be necessary for the Contractor to evacuate the area. This alert will be accomplished through site radio or verbal notification.

B. Leave the site by the nearest exit.

C. Move away from the area and report to the designated assembly point.

D. Each Contractor shall develop a written job-specific emergency action plan that shall take into account probable and possible emergency situations. A copy of the Plan shall be at the jobsite, and available for review upon request. At minimum, the plan shall contain:

a. Project site map

b. Notification list

c. Notification procedures

d. Evacuation procedures

e. Evacuation route

f. Location of treatment facilities

g. No one is to leave until they are directed by management

E. This information will be incorporated into the required PHSEP described in section 1.5.4 of this document and included into the Contractor Project orientation to all Contractor workers.

1.25 EXCAVATIONS

A. Contractor shall obtain an activity permit for excavations 5' deep or deeper, from Cal/OSHA. A copy of the permit shall be present at the job site.

B. Entry is not permitted when water intrusion is discovered in the trench under any circumstances.

C. Trenching or excavating activities must be conducted under the supervision of a competent person.

D. The Contractor's materials for the protection of personnel (i.e., bracing, shoring, shielding, and trench boxes) must be in good condition and of proper dimensions/materials. The manufacturer's tabulated data and capacity must be maintained at the jobsite for verification purposes.

E. Excavations must be inspected at least daily by the “competent person” per Cal/OSHA regulations.

F. The Contractor’s “competent person” must determine the soil classification (Type A, B, or C) to determine the appropriate type of protective system required for the excavation.

G. Excavated soils, materials or equipment are to be kept at least two feet from the edge of the excavation.

H. Contractor must provide appropriate barricades to protect people from falling into the trench (lighted barricades must be provided at night).

I. Ladders or other means of egress must be provided by the Contractor for access and spaced within 25 feet of any worker inside the excavation.

J. Walkways are to be provided over any excavation or trench that employees may need to cross. Walkway must have handrails, mid rails, and toe boards.

K. Where pedestrian traffic must be accommodated over excavations, suitable non-skid plates or other suitable material capable of withstanding at least twice the maximum intended load must be provided to serve as a pedestrian walkway for safe passage.

L. The edges of the runway shall be tapered to minimize trip hazards. In the alternative, the approach shall be tapered with a suitable and durable material or set into the surface to minimize trip hazards.

M. Rescue equipment must be provided by the Contractor (full body harness and lifeline, breathing apparatus, basket stretcher, etc.) when hazardous atmospheric conditions are expected to exist.

N. Contractor must follow all regulations as outlined in the Contract Documents, and all Federal and State OSHA regulations pertaining to trenching and excavating activities.

O. An excavation permit may be required by the District Representative at any point in the project when hazards justify use. This is an additional permit to the Cal-OSHA required annual permit.

1.26 FALL PROTECTION

A. The competent person must be trained and understand the fall hazard in their work area. The competent person is to be aware of the correct procedures for erecting, maintaining and disassembly and inspection of fall protection systems. The competent person is to be responsible to train each contractor worker in the safe use of the complete fall protection system including:

a. Guard rail systems

b. Identification of potential fall hazards

c. Personal fall arrest systems

d. Type of personal fall protection systems

e. Positioning devices

f. Limitations of mechanical equipment during operations

g. Proper use of particular fall protective system

h. Use of overhead protection

i. Selection of personal fall protection systems

j. How to inspect fall protection equipment

k. Corrective procedures for handling and storing of materials and equipment

l. The role of workers in fall protection plans

B. Any misuse of fall protection equipment or system components (i.e. removal of guardrails, hole covers, or guide wires) or any observed work rules, orders, or practices is grounds for immediate dismissal from the project.

C. A safety monitor as means of fall protection is prohibited.

D. Where a fall hazard of six (6) feet or more exists, Contractors and Subcontractors shall comply with a 100% Fall Protection Policy. All contractors must provide documentation that fall management training has been provided to all workers exposed to fall hazards Fall protection must be used any time employees are working (whether moving or stationary) at an unprotected elevation of six (6) feet or more. The Contractor shall review design documents and identify potential fall exposures during construction and maintenance operations and design mitigation measures to either eliminate or protect against the hazard.

E. Contractors are required to provide training for any worker who might be exposed to a fall hazard prior to the exposure or upon hiring. This training, at a minimum, must cover the scope of work, exposures workers may encounter and the controls that will be implemented and enforced, and the proper use of the fall arrest system. The General Contractor must certify and document that all workers, including subcontractor workers, have completed fall management training.

F. Training must include an explanation of the company's fall protection policies and safe work practices with general instructions and precautions; specific instruction where required; hazard identification and correction; selection and proper use of protective devices; and inspection and maintenance of equipment. Instruction should also include correct procedures for inspecting, erecting, disassembling, and maintaining fall protection systems used; and the employee's role in fall safety monitoring.

G. Methods of fall protection include:

a. Guardrails and toe boards

b. Covers for floor opening, pits, trap-door, and temporary floor openings

c. Personal fall arrest, personal fall restraint and positioning devices

d. Safety net scaffold platforms

e. Roof Warning Lines

H. If guardrails, handrails or some other fall elimination device is missing, modified, in disrepair and/or not installed, the workers must use 100% fall protection and report the condition immediately to the Contractor.

I. The only allowable personal fall arrest system is a full body harness equipped with suspension trauma straps. Body belts shall not be used for fall protection or fall restraint.

J. All personal fall arrest, personal fall restraint and positioning device systems shall be labeled as meeting the requirements contained in ANSI A10.14.

K. Lifelines, anchorages and all connectors shall be capable of supporting a minimum dead weight of 5,000 pounds.

L. Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds.

M. Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per Contractor worker or an anchorage system designed and inspected by a CA Registered Professional Engineer.

N. The use of non-locking snap hooks is prohibited.

O. Lanyards are to be connected to the harness D-ring and not to the harness webbing.

P. Lanyards are NOT to be tied back to them unless designed by the manufacturer to do so.

Q. Lanyards are NOT to be connected in a series; free fall must be limited to <6 feet. If the lanyard is not long enough, use retractable lifeline.

R. Worker free fall must be limited to a 6-foot maximum fall distance.

S. All workers must be equipped with suspension trauma straps.

1.27 POSITIONING DEVICE SYSTEMS

A. Positioning devices shall be rigged such that an employee cannot free fall more than 2-feet.

B. Positioning device systems shall be inspected prior to each use.

C. Anchorage points for positioning device systems shall be capable of supporting two times the intended load or 3,000 pounds, whichever is greater.

1.28 PERSONAL FALL RESTRAINT

A. Anchorage points used for fall restraint shall be capable of supporting 3,000 pounds. Where practicable the anchor end of the lanyard shall be secured at a level not lower than the employee's waist, limiting the fall distance to a maximum of 6-feet. Under no circumstances shall the free fall exceed 6-feet.

B. Restraint protection shall be rigged to allow the movement of employees only as far as the sides of the working level or working area. Restraints should never permit worker's body to reach beyond the guard railing.

1.29 FIRE PROTECTION AND PREVENTION

A. The Contractor must develop a fire protection program to be followed throughout all phases of construction. This program shall be included into the Project Health, Safety & Environmental Plan (PHSEP).

B. Firefighting equipment must be conspicuously located or conspicuously marked.

C. A fire extinguisher, rated not less than 2A:10BC shall be provided for each 3,000 square feet of floor area and fraction thereof. Where the floor area is less than 3,000 square feet at least one fire extinguisher is required.

D. Travel distance from any point of the protected are to the nearest fire extinguisher shall not exceed 75-feet.

E. In multi-story buildings, at least two fire extinguishers shall be provided on each floor and located adjacent to the stairway.

F. A fire extinguisher, rated not less than 2A10B, shall be provided within 50-feet of wherever more than 5 gallons of flammable or combustible liquids are stored.

G. Portable fire extinguishers shall be fully charged, inspected monthly and serviced annually.

H. Storage of more than 25 gallons of flammable liquids shall be in a NFPA approved storage cabinet. Not more than 120 gallons of Class I, II, or IIIA liquids may be stored in a storage cabinet.

I. A fire extinguisher, rated not less than 20-B, shall be located outside of, but not more than 10 feet from the door opening of storage rooms containing flammable or combustible liquids or materials.

J. A portable fire extinguisher rated at least 2A:10BC shall be kept near operations where fuel gas cylinders/bottles are being used.

K. Portable fire extinguisher shall be readily available for use where temporary heating devices are used.

L. Fire extinguishers are best located at the exits to all buildings, the stair landing to each floor, on all welding, cutting and motorized equipment. Additionally, extinguishers will be placed at the same level where hot work is being performed.

M. All fire extinguishers must have valid inspection tag, tamper-proof seal, and a pressure gauge reading full.

1.30 FLAMMABLES AND COMBUSTIBLES

A. "No Smoking" signs must be posted around storage areas.

B. Tobacco products are not permitted on the project and will not be tolerated. Any worker caught smoking will be immediately removed from the project with no advanced notice.

C. Contractor is required to supply extinguisher, fire blankets, and other sufficient fire protection devices for the immediate work area where flammable and combustible material is stored or used. All fire extinguishers must be provided by the Contractor and rated at a minimum of 2A, 20BC.

D. Fire extinguishers shall be checked to verify that they are fully charged prior to service or shift when hot work operations are expected or in progress.

E. All Contractor supplied flammable liquids must be stored in approved safety containers. All containers must be properly labeled and stored when not in use. Additionally, flammable storage cabinets must be grounded and bonded to prevent ignition from static electricity. Plastic flammable/combustible liquid containers of any type are NOT permitted on the jobsite at any time for any reason.

F. Storage in excess of 25 gallons of flammable liquids or 60 gallons of combustible liquids shall be within cabinets constructed to the requirements of NFPA 30.

G. All flammable and combustible material outside storage areas must be at least 20-feet from any building and potential source of ignition.

1.31 FLAMMABLES AND COMBUSTIBLES FOR ROOF WORK

A. No more than a one-day supply of flammables may be placed on the roof during working hours. The Contractor must remove all flammable materials from the roof at the end of each workday.

B. At least two extinguishers must be provided if flammable materials are present.

C. All Contractor supplied flammable and combustible materials must be kept away from sparks, heaters, and any other heat source.

D. Only metal safety cans are permitted for flammable and combustible liquid storage. Storage cans must be leak proof, have self-closing lid, flame arrestor, and be approved for flammable liquid storage.

1.32 HEAVY EQUIPMENT/MATERIAL HANDLING AND EARTHMOVING EQUIPMENT

A. Equipment shall be maintained in good working order. All vital parts such as motors, chassis, blades, blade holders, tracks, drives, hydraulic and pneumatic mechanisms, and transmissions must be inspected each day.

B. Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.

C. All vehicles, or combination of vehicles, shall have brake lights in operable condition.

D. All vehicles shall be equipped with an adequate audible warning device (horn) at the operator's station.

E. All vehicles must have a back-up alarm audible for a distance of 200-feet.

F. All vehicles with cabs shall be equipped with windshields and powered wipers.

G. Vehicles operating in areas or conditions that causes fogging or frosting of windshields shall be equipped with operable defogging or defrosting devices.

H. Cracked or broken windshields shall be promptly replaced.

I. Seat belts and anchorages shall be installed in all haulage, earth moving, and UTV material handling heavy equipment.

J. The Contractor shall ensure employee use of seat belts on motor vehicles (including golf carts if equipped).

K. Trucks with dump bodies shall be equipped with positive means of support, permanently attached, to prevent accidental lowering of the body while maintenance or inspection work is being done.

L. Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device that will prevent accidental starting or tripping of the mechanism.

M. Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.

N. All rubber-tired motor vehicle equipment shall be equipped with fenders.

O. All vehicles in use shall be checked at the beginning of each shift for defects in: Service brakes, trailer brake connections, parking brake system, emergency stopping system (brakes) tires, horn, steering mechanism, seat belts, operating controls, safety devices, lights, reflectors, windshield wipers, defrosters, and fire extinguishers.

P. Before starting a job, the operator shall be given instructions regarding the work to be done.

Q. Before starting the motor the operator shall check to make sure that all operating controls are in the neutral position.

R. Before starting the equipment, the operator shall walk entirely around the equipment to make sure no other personnel or material will be struck by the equipment.

S. Contractor shall ensure that operators of heavy equipment wear appropriate hearing protection devices.

T. At no time shall a piece of equipment be left unattended while the motor is running, especially if the machine is on an inclined surface or on loose material.

U. Machines shall be operated at speeds and in a manner consistent with conditions on the particular job.

V. No employee other than the operator shall ride on equipment.

W. During refueling operations equipment motors shall be turned off. Smoking is prohibited during refueling.

X. If possible, equipment shall be driven entirely off the roadway at night.

Y. Unattended equipment must be left in a secure area not accessible to students and rendered inoperable by anyone other than the Contractor.

Z. Spotters/flaggers with appropriate safety vest must be used when equipment is backing and/or the equipment operator's view is obstructed whether moving forward or backward.

AA. All vehicles shall be equipped with an ABC type fire extinguisher.

BB. Equipment must be shut off when being lubricated, refueled or adjusted. Maintenance of equipment shall be conducted only in designated areas. Any piece of equipment that is in need of repairs i.e. leaking fuel, oil, hydraulic lines etc., shall be immediately taken out of service until repaired. Any spill i.e. fuel, motor oil, hydraulic oil etc., shall be immediately cleaned-up and the incident reported to District Representative before the end of the workday.

1.33 HOUSEKEEPING

A. All areas used by the public will be maintained free from grease, standing water, debris, equipment, materials, projections, tools, or other items. Substance or conditions that may constitute a slipping, tripping, or other hazard must be eliminated.

B. All construction materials must be stored in an orderly manner.

C. All exits and access ways must be kept unobstructed.

D. All work areas must be continuously cleaned and kept free of debris.

E. Metal containers with covers must be provided for disposal of oily and paint soaked rags.

F. Maintain all exits.

G. Emergency exits must be available. Panic hardware, where provided, must remain unobstructed.

H. Walkways and sidewalks must be kept free of construction materials, debris, dirt, tools and extension cords, welding leads and other trip hazards. These hazards must be suspended across walkways and sidewalks at a height greater than 7 ½ feet.

I. All wood is to be de-nailed immediately after each use.

J. All access ways stairs, passages, and walkways, including scaffolds, must be kept clear and clean at all times.

K. Where steel plates are used to bridge excavations or other similar type construction activities in walkways or sidewalks, the leading edges of the steel plates must be feathered with temporary asphalt or other suitable materials to prevent trip hazards.

1.34 LADDERS – STRAIGHT LADDERS, EXTENSION LADDERS AND STEPLADDERS

A. Where a fall hazard of six (6) feet or more exists, Contractors and Subcontractors shall comply with a 100% Fall Protection Policy. Fall protection must be used any time employees are working (whether moving or stationary) at an unprotected elevation of six (6) feet or more.

B. Portable ladders should be equipped with a tie-off rope.

C. Broken or defective ladders must be immediately removed from service.

D. Employees must maintain 3-point contact while ascending or descending ladders (2-feet and 1-hand or 1-foot and 2-hands).

E. Job-made ladders are not allowed on the jobsite.

F. All types of ladders must be inspected at least daily for:

a. The entire ladder for cracks, splits, splinters, and decay.

b. Protruding nails and loose rivets.

c. Loose, bent or broken braces, tie rods, guide irons, locks, pulleys and strand hooks.

d. Broken, worn or defective spurs and pads.

1.35 STRAIGHT AND EXTENSION LADDERS

A. Portable ladder feet shall be placed on a substantial base.

B. Straight and extension ladders must be tied off or secured to prevent displacement before use; a second employee must hold the ladder until the ladder is secured.

C. Metal ladders must not be used near energized equipment.

D. No more than one employee is allowed on a ladder.

E. Ladders are not to be used for skids, braces, workbenches, or any other purpose other than climbing.

F. All straight and extension ladders must be equipped with nonskid safety feet.

G. Ladders must extend no less than 36 inches above the landing.

H. Extension ladders shall have positive stops to ensure safe overlap of the sections. Overlap requirements are:

a. Ladders up to 32 feet long use a three-foot overlap.

b. Ladders from 32 to 36 feet use a four-foot overlap.

c. Ladders from 36 to 48 feet use a five-foot overlap.

d. Ladders over 48 feet use a six-foot overlap.

I. Ladders shall be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is about one-quarter of the working length of the ladder.

1.36 STEP LADDERS

A. Where a fall hazard of six (6) feet or more exists, Contractors and Subcontractors shall comply with a 100% Fall Protection Policy. Fall protection must be used any time employees are working (whether moving or stationary) at an unprotected elevation of six (6) feet or more, and any time that workers are in an area where there could occur a fall from a surface that is not protected by handrails, guardrails, or some other approved fall elimination device.

B. Step ladder legs must be fully open and the spreader set in the open and locked position.

C. Do not climb, stand or sit on the top two rungs.

D. Do not lean a step ladder against a wall in the unopened position.

E. Always ascend and descend facing the ladder.

F. Do not exceed the designated weight capacity (worker and materials).

1.37 LOCKOUT AND TAGOUT

A. The Contractor must have a written Lock-out/Tag-out/Block-out program that meets or exceeds the Cal/OSHA standards.

B. Equipment or systems shall be completely de-energized before beginning the Lock-out/Tag-out procedure and subsequent cleaning, servicing, or adjusting operations.

C. Moveable parts shall be mechanically blocked or locked out prior to cleaning, servicing, or adjusting operations.

D. Equipment that has lockable controls or that is readily adaptable to lockable controls shall be locked out or positively sealed in the “off” position.

E. Accident prevention signs or tags shall be placed on the controls of equipment, machines, and prime movers during repair work.

F. Contractor's employee must affix their own locks and tags.

G. Locks and/or tags must be removed at the end of the job by the originator. Never remove another person's tag or lock to operate a switch, valve, or device.

H. When work must be done on energized systems or, the potential exists for an arc flash to occur, full compliance with NFPA 70E is mandatory.

1.38 LOCATING UNDERGROUND UTILITIES BEFORE TRENCHING OR EXCAVATING

I. Contractor will use full, below grade investigation techniques, meeting standard clearance methodologies including any or all of the following:

a. Ground penetrating radar,

b. Electro-magnetic utility locating, and

c. Deep search metal detection.

J. The Contractor must locate buried utilities before digging.

K. Prior to excavation all known owners of underground facilities in the area shall be notified by calling the regional One Call Notification System. The Contractor shall check the entire job site for visual signs of substructures. This includes such items as manhole covers, water meter boxes, ditch lines, pavement patches, previous location marks, pole risers, and the obvious absence of overhead utilities.

L. The Contractor shall further check the entire site by "sweeping" back and forth with a pipe locator to verify both known substructures and to pick up any unknown substructures.

M. The Contractor shall be responsible for locating the surface trace of detectable subsurface utilities prior to the start of excavation.

N. The Contractor must expose substructure by hand after locations are determined.

O. The Contractor shall be careful that no holes or cuts are knocked into the substructure by scraping or hammering.

P. The Contractor shall be aware of the possibility of joint use of ditch for power, telephone, gas, etc.

1.39 MOTOR VEHICLES

A. All Contractor employees driving job site motor vehicles shall have a valid driver's license for the state in which the employee resides and for the class vehicle driven.

B. Drivers of vehicles over 26,000 pounds GVW are required by Federal and State Departments of Transportation regulations to possess a Commercial Driver's License (CDL).

C. Drivers of motor vehicles shall obey all street distance and highway speed and traffic laws.

D. All drivers of Contractor vehicles shall check the mechanical condition of their vehicles at least daily.

E. Drivers are required to observe the "right of way" rule. Even if you think you have the right of way, don't insist on having it if another driver tries to take it.

F. Drive defensively.

G. Drivers of Contractor vehicles shall keep a distance of at least one vehicle length for each 10 miles of speed between your vehicle and the one in front.

H. Employees driving and riding in Contractor vehicles must wear seat belts.

I. Block, chock, or angle vehicle wheels when parking on inclines.

J. All passengers on motor vehicles must be seated and within the confines of the vehicle.

K. The site speed limit is 5 mph. Obey all traffic signs.

L. All vehicles must be shut off when unoccupied.

M. Pedestrians have the right of way.

N. Parking shall be in specified areas only. Do not block entrances and do not park in reserved spaces.

O. The Contractor is responsible for the stability of any material being hauled.

P. The Contractor and Subcontractor employees are not allowed to ride in the open bed of a pickup truck.

Q. All vehicles shall be equipped with a fire extinguisher.

1.40 OVERHEAD UTILITIES

A. A job briefing will take place with all workers to outline work around utility lines, outlining the procedures while working around the utilities lines. If Contractor moves location of work this is to be done again.

B. The Contractor will identify all overhead utilities prior to the start of any work and notify utility company and District Representative where conflicts to executing the work exist.

C. Proper distances must be maintained from all overhead power lines with the use of a signal person.

D. Spotters will be used when work must be performed in the area.

1.41 SCAFFOLDS

A. All scaffolds must be inspected and tagged to identify that they meet the requirements for use by a Competent Person prior to initial use, before each work shift, and after any event that could affect the structural integrity or safety of the scaffold. Scaffolds that are not tagged shall not be used.

B. Handrails, mid rails and toe boards are required on all scaffolds over six (6) feet high. If the guardrail system is incomplete or missing, personal fall protection is required. Note: scaffolds can be designed with engineered anchor points for fall protection. This requirement needs to be incorporated into the scaffold design prior to assembly.

C. A ladder for access must be provided.

D. Wheels must be locked on rolling scaffolds before use.

E. Riding of manually propelled scaffolds is not permitted.

F. All connections, including casters on rolling scaffolds shall be pinned with approved device(s) and according to manufacturer's specifications.

G. Tower scaffold must be secured to the building or structure or otherwise secured.

H. The Contractor must keep the platform load within the safe platform working load limit.

I. Scaffolds must be erected level on a firm base. When the scaffold is resting on earth or other such material, the uprights shall rest on and be secured to the equivalent of a 2-inch by 10-inch by 10-inch wood base. This can be accomplished by nailing the mudsills to the base plates.

J. Suspended scaffolds must have adequate anchorage points and occupants with a full body harness, lifeline and deceleration device that must be attached to a separate anchorage point prior to stepping out onto any suspended scaffold.

K. Scaffold planks must be laid tight and secured to prevent movement. Planks must overlap between 6 and 12 inches over the scaffold supports.

L. Only OSHA Approved scaffolding planks shall be used.

M. Mobile scaffolds are required to have outriggers attached and in use while workers are using the scaffold. A “Qualified” scaffold erector as defined by OSHA regulations must erect all scaffolding.

1.42 STEEL ERECTION

A. Where a fall hazard of six (6) feet or more exists, Contractors and Subcontractors shall comply with a 100% Fall Protection Policy.

B. The Contractor must provide coordination between steel fabricator and/or erector to ensure proper attention and detail is given for fall protection systems to be implemented to comply with the policy above.

C. No building, structure, or part thereof, or any temporary support shall be loaded in excess of its designed capacity.

D. Trusses and beams shall be braced laterally and progressively during construction to prevent buckling or overturning.

E. During placing of structural members, the load shall not be released from the hoisting line until the members are secured with not less than two bolts drawn up wrench tight.

F. Where skeleton steel is being erected, a tightly planked and substantial floor shall be maintained with two stories or 30 feet, whichever is less, below and directly under that portion of each tier of beams on which any work is being performed.

G. When connecting beams at the periphery or interior of a building or structure where the fall distance is greater than six (6) feet, employees shall be tied-off by approved fall protection devices.

H. When performing work other than connecting, employees shall be protected by approved fall protection devices, where the fall distance is greater than six (6) feet.

I. Open web steel joists shall not be placed on any structural steel framework unless such framework is safely bolted or welded.

J. Containers shall be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.

K. When bolts or drift pins are being knocked out, means shall be provided to keep them from falling.

L. Impact wrenches shall be provided with a locking device for retaining the socket.

M. Connections of equipment used in plumbing-up shall be properly secured.

N. Turnbuckles shall be secured to prevent unwinding while under stress.

O. Plumbing-up guys shall be removed only under the supervision of a competent person.

P. Employees working above grade or any surface and exposed to protruding reinforcing steel or other similar projections shall be protected against the hazard of impalement by the use of guardrails, or approved fall protection systems, or protective covers.

Q. Exposed edges of all temporary planked or temporary metal decked floors at the periphery of the building, or at interior openings, such as stairways and elevator shafts shall be protected by a single 3/8-inch minimum diameter wire rope located between 42 and 45 inches above design finish floor height. Mid rail protection shall be installed at the completion of the installation of decking.

R. Stairs complete with railings should be installed as early as possible in order to allow access to upper levels. Pan type stair steps will be filled temporarily with lumber or other suitable material before employee use.

1.43 WARNING SIGNS

A. Construction safety signage shall be maintained in good condition throughout the entire project and state appropriate warnings of hazards for workers, visitors, members of the general public and campus students and faculty. Signage must be properly secured at all times and replaced when damaged, faded, or removed. Situations or areas where signage is required include; entry and exit gates to project, access points where construction traffic is prohibited, personal protective equipment requirements for entry to project, and other signage that may be reasonable and necessary to alert people to recognized hazards or elements of the project site.

B. The Contractor shall post and maintain site access and warning signage, including emergency contact information, competent persons on-site, traffic control signage, site safety requirements for

entering the site and other signage that may be necessary to notify workers, the public, or others of potential hazards.

C. Obey all warning signs and barricades.

D. All Contractors installed warning signs, signals and barricades must be removed when the hazard no longer exists.

1.44 WORK ZONE TRAFFIC CONTROL

A. The Contractor shall establish work area protection zones necessary to protect employees and the public when work is performed in areas where pedestrians or vehicles have access. Traffic control shall be established in compliance with the U.S. Department of Transportation, Part VI, Manual on Uniform Traffic Control Devices (MUTCD), State and local traffic control regulations, and the WATCH handbook.

B. All personnel who work on or near active highways, roads, or parking lots must wear reflective safety vests. ANSI/ISEA 107, Class III high-visibility vests shall be worn for maximum visibility.

C. Vests are also required for work that places personnel near motor vehicles and equipment, such as for flaggers, riggers, survey crews, etc.

D. The Contractor shall establish Work Area Protection in consideration of the location of the worksite, pedestrian and traffic conditions, and the time of day (daylight or dark).

E. The Contractor shall ensure adequate protection to passing vehicles on a roadway by providing a flagger when barricades, signs and signals may be insufficient.

F. When placing or removing Work Area Protection the Contractor shall:

a. Be consistently alert to traffic conditions.

b. Face oncoming traffic.

c. Wear proper personal protection (e.g. traffic warning vest, hard hat, eye protection).

d. Place the initial warning sign (e.g., Construction Ahead) first, and remove it last.

G. Work sites must be made safe for pedestrians by using:

a. Fencing or other barricades.

b. Cones and signs.

c. Pedestrian crossings (designated and painted).

H. All night work requires adequate illumination to light the work area and warn public vehicular traffic.

I. The Contractor shall ensure adequate protection to passing vehicles on a roadway by providing a flagger when barricades, signs and signals may be insufficient.

1.45 FLAGGING OPERATIONS

A. Flaggers shall be trained in the proper fundamentals of flagging (signaling) traffic before being assigned as flaggers.

B. The flagger must be protected and the motorist forewarned by use of advance warning signs and cones.

C. Use cones before the flaggers position to mark the traffic lane.

D. The use of high visibility Class III orange vests shall be required for all flagging operations.

E. During the hours of darkness the flaggers shall be outfitted with a reflectorized garment, and the flagger's position shall be illuminated.

F. To Stop Traffic - The flagger shall face traffic and hold the stop paddle in a vertical position at arm length.

G. When It Is Safe For Traffic To Proceed - The flagger shall stand parallel to the traffic movement, and with the slow paddle held in a vertical position at arm's length.

H. Flags shall be a minimum of 18" x 18" in size, and orange in color.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 013529

SECTION 014100

CEQA EIR MITIGATION MEASURES

PART 1 – GENERAL

1.01 SECTION INCLUDES:

A. This Section specifies administrative and procedural requirements governing California Environmental Quality Act (CEQA) Environmental Impact Report (EIR) Mitigation Measures.

1.02 RELATED SECTIONS:

A. Facilities Lease Agreement.

B. Facilities Site Agreement.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 EIR Mitigation Measure (MM) Requirements for Contractor:

A. MM 4.4.3: During construction, the Contractor shall comply with the requirements of the State General Construction Activity National Pollutant Discharge Elimination System (NPDES) Permit. The construction site shall be inspected in compliance with permit requirements. A copy of the SWPPP shall be kept at the project site and available for Regional Water Quality Control Board (RWQCB) review.

B. MM 4.5.5: Contractor shall comply with the District's Construction Area Traffic Management Plan. Contractor shall keep all haul routes free of debris including, but not limited to, gravel and dirt.

C. MM 4.6.1: Contractor shall comply with South Coast Air Quality Management District (SCAQMD) Rules 402 and 403 to assist in reducing short-term air pollutant emissions. Rule 402 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. Applicable dust suppression techniques from Rule 403 are summarized below.

1. Apply nontoxic chemical soil stabilizers according to manufacturers' specifications to all inactive construction areas (previously graded areas inactive for 10 days or more).

2. Water active sites at least twice daily. Locations where grading is to occur shall be thoroughly watered prior to earthmoving.

3. Cover or maintain at least two feet of freeboard (vertical space between the top of the load and top of the trailer) on all trucks hauling dirt, sand, soil, or other loose materials in accordance with the requirements of California Vehicle Code (CVC) Section 23114.

4. Reduce traffic speeds on all unpaved roads to 15 mph or less.

D. MM 4.6.2: Contractor shall follow dust suppression measures required by SCAQMD CEQA Air Quality Handbook during construction. Contractor shall be responsible for the implementation of the following dust suppression measures:

1. Revegetate disturbed areas as quickly as possible.

2. Suspend excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph.

3. Sweep streets once per day if visible soil materials are carried to adjacent streets (water sweepers with reclaimed water are recommended).

4. Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash trucks and any equipment leaving the site each trip.

5. Pave all on-site roads as soon as feasible. Periodically water or chemically stabilize dirt roads.

6. Minimize the area disturbed by clearing, grading, earthmoving, or excavation operations at all times.

E. MM 4.6.3: Contractor shall utilize construction equipment with low-emission factors and high-energy efficiency. All construction equipment shall be tuned and maintained in accordance with the manufacturer's specifications.

F. MM 4.6.4: Contractor shall time the construction activities to not interfere with peak-hour traffic and minimize obstruction of through-traffic lanes adjacent to the site. If necessary, a flagperson shall be retained to maintain safety adjacent to existing roadways. Contractor shall also support and encourage ridesharing and transit incentives for the construction crew.

G. MM 4.6.5: Contractor shall be responsible for compliance with SCAQMD Rule 1113 regarding the use of architectural coatings.

H. MM 4.7.1: Construction will be limited to the hours of 7:00 a.m. to 5:00 p.m., 8:00 p.m., Monday through Saturday, in accordance with Rancho Santiago Community College District (RSCCD) standards. No construction activities, including starting or warming up construction equipment, are permitted outside of these hours, or on Sundays and federal holidays. The following measures shall also be implemented to reduce potential construction noise impacts on nearby sensitive receptors:

1. During all site excavation and grading, Contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

2. Contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

3. Contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

END OF SECTION 014100

SECTION 014523

TESTING AND INSPECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Testing and inspection services to meet requirements of California Building Standards Code, Title 24, California Code of Regulations.

B. Tests of materials are required by a DSA certified Testing Agency as set forth in Section 4-335 of the California Building Standards Commission's California Administration

C. Appendix A: DSA Form 103, Structural Testing & Inspections.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 013113: Project Coordination.

C. Section 013213: Construction Schedule.

D. Section 013300: Submittal Procedures.

E. Section 015000: Construction Facilities and Temporary Controls.

F. Section 017329: Cutting and Patching.

G. Section 017836: Warranty Procedures.

1.03 COORDINATION OF TESTS AND INSPECTIONS

A. Contractor shall establish a protocol for requesting inspections and special inspections to avoid delaying the progress of the work. Contractor shall review General Conditions or Construction Services Agreement for additional requirements.

1.04 TESTING COSTS

A. District Representative will pay special inspections and testing identified in the Statement of Structural Tests and Special Inspections (DSA FORM 103) except Contractor shall reimburse the District Representative for retesting costs caused by failure of materials to pass initial tests. Contractor shall arrange and pay for all other testing that are specified in other specification sections.

1. Reimbursement of Inspection Costs: The Contractor shall reimburse to the District Representative all or any part, as the District Representative may deem just and proper, of the actual excessive inspection costs incurred by the District Representative due to any or all of the following:

i. Contractor's failure to complete the Work within the Contract Time stated in the Agreement, and any previously authorized extensions thereof.

ii. Claims between separate contractors

iii. Covering of any of the Work before the required inspections of tests are performed.

iv. Extra inspections required for Contractor's correction of defective Work.

v. Overtime costs for acceleration of Work done for Contractor's convenience.

1.07 CONTRACTOR-FURNISHED ASSISTANCE

A. When requested, Contractor shall furnish access, facilities, and labor assistance as necessary for duties to be performed at the site by Test Laboratory, and Inspector, including ladders, hoisting, temporary lighting, water, and like services.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 SCHEDULES FOR TESTING

A. Establishing Schedule:

1. By advance discussion with the testing laboratory selected by the District Representative, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide required time within the construction schedule.

B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate such changes of schedule with the testing laboratory as required.

C. Adherence to Schedule: When the testing laboratory is ready to test according to the determined schedules, but is prevented from testing or taking specimens due to incompleteness of the work, extra charges for testing attributable to the delay may be back-charged to the Contractor and may be deducted by the District Representative from the contract sum.

3.02 REQUESTING TESTING

A. Contractor shall request testing and inspection through the Project Inspector. Contractor shall provide Project Inspector a minimum of twenty-four (24) hour notice prior to Project Inspector inspections being required and a minimum of forty-eight (48) hour notice prior to special testing and inspections being required.

3.03 TESTS

A. District Representative will select and provide an independent DSA certified testing agency (Testing Agency) to conduct tests, sampling, and testing of materials. Selection of material to be tested shall be by the Testing Agency and not by Contractor.

B. The Contractor shall not incorporate into the work any material shipped from the source of supply prior to having satisfactorily passed the required testing and inspection, or prior to the receipt of notice from Project Inspector that the testing and inspection is not required.

C. District Representative will select, and directly reimburse, the Testing Agency for costs of all DSA required tests and inspections; however, the District Representative may be reimbursed by Contractor for such costs as specified or noted in related sections of the Contract Documents.

D. The independent Testing Agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

E. The Testing Agency shall not perform any duties of Contractor.

F. Contractor shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

3.04 TEST REPORTS

A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of

special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

3.05 VERIFICATION OF TEST REPORTS

A. Each Testing Agency shall submit to the Division of the State Architect a verified report covering all tests required to be performed by that Testing Agency during the progress of the Work, in accordance with DSA PR 13-01.

3.06 INSPECTION BY DISTRICT REPRESENTATIVE

A. District Representative, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. Contractor shall, at all times, maintain proper facilities and provide safe access for such inspection.

B. District Representative shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to District Representative. If Contractor does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, District Representative may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.

C. Contractor is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.07 PROJECT INSPECTOR

A. A Project Inspector shall be employed by District Representative in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA certified inspectors may be employed and assigned to the Work by District Representative in accordance with the requirements of California Building Standards Commission's, California Administrative Code with their duties as specifically defined in Section 4-333, 4-342, and in DSA IR A-8.

B. Inspection of Work shall not relieve Contractor from any obligation to fulfill all terms and conditions of the Contract Documents.

C. Contractor shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.08 TESTS AND INSPECTIONS

A. The following tests and inspections do not limit inspection of the Work but are required by DSA, other agencies, or are required in related Sections of the Contract Documents.

1. Excavations, Foundations and Retaining Walls - CBC, Chapter 18A:

a. Inspection:

i.	Inspection of Driven Pile Installation	1810A.4.12
ii.	Inspection of Caissons	1810A.4.12

2. Concrete - CBC, Chapter 19A:

a. Materials:

i.	Test of Materials	1903A.1 – ACI 318
ii.	Portland Cement Tests	1913A.1 – ASTM C 150

	iii.	Concrete Aggregate	1903A.6 – ACI 318
	iv.	Shotcrete Aggregate	1910A.3
	v.	Reinforcing Bars	1913A.2
	vi.	Prestressing Steel & Anchorage	1913A.3
	vii.	Structural Steel, Steel Pipe or Tubing	ACI 318
	viii.	Admixtures	1904A.1
b.	Quality:		
	i.	Proportions of Concrete	ACI 318
	ii.	Mixing and Placing	ACI 318
	iii.	Concrete Testing	ACI 318
	iv.	Test of Shotcrete	1910A.5;1910A.10; 1913A.5
	v.	Composite Construction Cores	1913A.4
	vi.	Gypsum Concrete Strength Tests	1913A.6
c.	Inspection:		
	i.	Project Site Inspection	ACI 318
	ii.	Batch Plant or Weigh-master Inspection	1705A.3.2
	iii.	Pre-stressed Concrete Inspection	1705A.3.4
	iv.	Shotcrete Inspection	1705A.18
	v.	Reinforcing Bar Welding Inspection	1705A.2.2.5
3.	Lightweight Metal - CBC, Chapter 22A:		
a.	Materials:		
	i.	Alloys	2210A.1
	ii.	Identification	2210A.1
b.	Inspection:		
	i.	Welding	2212A.2.3
4.	Masonry - CBC, Chapter 21A:		
a.	Materials:		
	i.	Masonry Units	2103A.1,2,3,4,5,6,7,8
	ii.	Portland Cement	2103A.11.1; 2103A.11.2
	iii.	Mortar & Grout Aggregates	2103A.13.3
	iv.	Reinforcing Bars	2103A.14
b.	Quality:		
	i.	Portland Cement Tests	2105A.2.2
	ii.	Mortar & Grout Tests	2105A.2.2.1.4
	iii.	Masonry Prism Tests	2105A.2.2.2; 2105A.3
	iv.	Masonry Core Tests	2105A.4
	v.	Reinforcing Bars	2103A.14

c.	Inspection:		
	i.	Reinforced Masonry	1705A.4
	ii.	Reinforcing Bar Welding Inspection	1705A.2.2.1.2
5.	Steel - CBC, Chapters 17A & 22A:		
a.	Materials:		
	i.	Structural Steel	2205A.1
	ii.	Material Identification	2203.A.1
b.	Inspection and Tests:		
	i.	Test of Structural Steel	1705A.2.2
	ii.	Tests of High Strength Bolts,	1705A.2.1; 2213A.1
	iii.	Tests of End Welded Studs	2213A.2
	iv.	Shop Fabrication Inspection	1704A.2.5
	v.	Welding Inspection	1705A.2.2.5
	vi.	High Strength Bolt Inspection	1705A.2.1
	vii.	Steel Joist Load Tests	1705A.2.2.3
	viii.	Spray applied fire resistance materials	1705A.13
6.	Wood - CBC, Chapter 23:		
a.	Materials:		
	i.	Lumber and Plywood Grading	2303.1
	ii.	Glue - Laminated Members	2303.1.3
b.	Inspection:		
	iii.	Glue - Laminated Fabrication	2303.1.3 – ASTM D 3737
	iv.	Timber Connectors	2304.9
	v.	Manufactured Trusses	2303.4
7.	Exterior Wall Coverings - CBC, Chapter 14, 25:		
a.	Materials:		
	i.	Portland Cement Plaster	2512
b.	Inspection:		
	ii.	Veneer Inspection	1410
8.	Clay or Concrete Roof Tile – CBC Chapter 15:		
a.	Materials:		
	i.	Clay or concrete tile	1507.3
	ii.	Inspection	1512

END OF SECTION 014523

APPENDIX A – DSA FORM 103 TESTING & INSPECTIONS

Refer to the following document

SECTION 014524

ENVIRONMENTAL IMPORT/EXPORT MATERIALS TESTING

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies the requirements for the sampling, testing, transportation and certification of imported fill materials or exported fill materials from RSCCD Sites.

B. This Section defines:

1. Contractor requirements for use of existing, imported or generated materials on RSCCD Sites.

2. Contractor requirements for stockpiling materials for use on school sites.

3. Contractor requirements for exporting materials from a school site including transportation.

4. Testing requirements for all materials imported, exported, stockpiled or generated for use on the school site.

5. Testing and reporting requirements.

6. Contractor submittal requirements.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 011100: Summary of Work.

C. Section 013113: Project Coordination.

D. Section 013213: Construction Schedule.

E. Section 013229: Project Forms

F. Section 013300: Submittal Procedures.

G. Section 312000: Earthwork.

1.03 OBJECTIVES

A. Ensure that fill materials imported to RSCCD Sites are free of known and expected environmental contaminants for students, staff, and visitors.

B. Ensure that materials exported from RSCCD Sites comply with California Code of Regulations (CCR) Title 22 requirements.

C. Ensure that representative data be collected so that analytical determinations can be made in regards to the first two objectives.

1.04 SUBMITTALS

A. Contractor shall submit to District Representative for transmittal to RSCCD Environmental Consultant:

1. Written notification in the form of a memo or e-mail from the Contractor to the District Representative is required prior to the importing/exporting of soils from a school or borrow site. All hauling contracts must specify the use of "clean" trucks. Clean trucks shall be clean of any and all visible contamination or deleterious materials.

2. Written documentation confirming that the trucks traveled directly from the source location to the recipient location with no detours or stops at other locations and that short loads were not augmented by other materials that were not tested as part of the final import/export activities. It is the Contractor's responsibility to document that no other trips or short load augmentation occurred and submit the documentation within seven (7)

calendar days of the completion of the import/export activities. All import/export transportation activities shall be conducted in accordance with all applicable (local, State, Federal) rules and regulations.

3. The District's third party Environmental Consultant shall have the required tests performed and report results noting if the tested material passed or failed and shall furnish copies to the District Representative, Project Inspector (PI), Architect, Contractor and/or others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer or professional geologist and the material was tested in accordance with applicable provisions of the Contract Documents, DSA, and CCR Title 22.

4. Certification, in the form of haul tickets or completed waste manifests, documenting the volume/weight and recipient of all import/export materials and activities. This documentation shall be coordinated through the District Representative and RSCCD Environmental Consultant. Contractor shall provide, track, and maintain a log of all imported and exported materials.

5. Specific Import Requirements:

   a. Within forty-five (45) calendar days of receipt of Notice to Proceed, the contractor shall submit a spreadsheet listing all required import material types including but not limited to backfill soil, sand, gravel, and crushed aggregate base **(NO Crushed Miscellaneous Base (CMB) shall be allowed for use on RSCCD projects)**. The list shall include estimated volumes/weights required by each subcontractor and the intended borrow site locations each contractor intends to procure material from.

   b. Prior to the import of material, the Contractor must provide a "Request for Import Material Testing" form a minimum of four (4) weeks prior to needing material on site. The "Request for Import Material Testing" form can be found in Specification Section 013229.

   c. For import to the school project site, haul tickets shall be utilized, and shall contain the following minimum information:

      1) Date(s) of haul activity.

      2) Address of source site.

      3) Address of recipient.

      4) Load volume/weight.

      5) Day of departure from source.

      6) Day of arrival at recipient site.

      7) Signature of recipient or recipient's agent.

      8) It is the Contractor's responsibility to confirm that no other trips or short-load augmentation occurred and submit documentation to the District Representative.

6. Specific Export Requirements:

   a. Prior to the export of material from the site, the Contractor must provide a "Request for Export Material Testing" form a minimum of four (4) weeks prior to the scheduled material export date.

   b. All export material must be shipped to the location identified on the "Request for Export Material Testing" form.

   c. Contractor is responsible for finding an acceptable receiving site or facility including facilities permitted to receive exports deemed unusable or environmentally impacted/contaminated. The contractor shall obtain the receiving

site's test requirements and the district shall test to these requirements prior to loading or hauling of material.

d. Contractor shall provide to the District, the receiving facilities' acceptance criteria and test requirements so that the District's Environmental Consultant can have the requisite testing performed based on requirements of the site or facility.

e. The District's Environmental Consultant shall confirm that the proposed waste classification for any proposed export material is appropriate. For materials deemed unacceptable for export except to a permitted facility, or for those materials sent electively by Contractor to a permitted facility, the Contractor shall provide to the District's Environmental Consultant information on the necessary waste manifest documentation no later than 30 calendar days from the date of material/waste hauling from the site.

f. Contractor shall provide a waste acceptance letter to the District from the designated disposal facility prior to any export from the District's site.

g. Contractor must provide the appropriate waste manifest(s) and provide a copy, signed by the receiving site. A copy of the executed manifest shall be provided to the District Representative.

h. Materials identified as hazardous wastes will need the site US EPA waste generator identification number and hazardous waste manifests prepared with requisite information on generator and receiving facility.

1.05 APPROVALS

A. Import or export of soil, granular base, geotechnical grading or filling materials at RSCCD sites will occur only with prior approval of the District through the District Representative.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Imported:

1. Soils: Soils proposed for import shall be tested pursuant to the requirements as outlined in Part 3 of this Section.

2. Gravels/CAB: Clean gravel, consisting of native rock from a commercial source, shall be tested pursuant to the requirements of this Section.

3. Sands: Clean sand from a commercial source shall be tested pursuant to the requirements of this Section. Contractor shall provide written documentation, which identifies the source, volume/weight and proposed transport date(s) of the material for review.

4. Miscellaneous Material: No crushed miscellaneous material (CMB) containing crushed concrete, asphalt, construction debris, recycled, or other potential deleterious materials may be utilized or imported to a RSCCD project site for use as fill or grading material.

B. Exported/Site Generated:

1. Soils: Soils proposed for export shall be tested pursuant to the requirements of the intended receiving facility's acceptance criteria. (Note: Once soils or other materials for export have been tested, they cannot be disturbed or reused for any purpose without prior approval by District Representative.

2. Gravels/Sands: Gravels, sands, or other natural rock materials shall not be exported from a RSCCD project site without prior testing. An exception to this provision is gravel adhering to concrete or asphalt pavement. In this instance and in consultation with the RSCCD Environmental Consultant, the Contractor may be allowed the disposal of said materials and construction debris without sampling and analytical testing required under this Section.

3. Miscellaneous Material. No miscellaneous material or other similar materials shall be exported from a RSCCD project site without prior evaluation, testing, and approval of the

RSCCD Environmental Consultant. No crushed miscellaneous material containing concrete, asphalt, construction debris, or other potential deleterious materials that is generated onsite may be used as fill or grading material for any RSCCD project site. Crushed asphalt shall be segregated and stockpiled separately. The onsite use of crushing equipment is not permitted.

PART 3 – EXECUTION

3.01 GRADING/EXCAVATION

A. If the Contractor encounters an area(s) with discolored, stained, and/or odorous soils or any other evidence of contamination during excavation/grading work, Contractor must immediately notify the District Representative, cease work at the aforementioned area(s), and secure the area(s) with fencing, tape, stakes or other suitable means to prevent entry by personnel or equipment. Upon notification, the District Representative will immediately notify the RSCCD Environmental Consultant, which will initiate a construction response to address the area(s) of concern, in accordance with pertinent regulatory requirements.

3.02 SAMPLING AND TESTING

A. All import/export material testing will be performed by a testing laboratory selected by District's Environmental Consultant. Contractor must coordinate with the District per Item 1.04, of this Section, to request testing.

B. All fill/grading material must be tested at the site of origin. Import/export testing and certification process shall include the steps listed below. OWNER retains the right to refuse any fill material proposed for use at any RSCCD site.

1. Stockpile all materials for sampling (standard stockpile or backhoe pothole stockpile). Crushed fill materials generated by Contractor at a RSCCD site must be segregated by material type (e.g., separate stockpiles for concrete, asphalt, etc. – not to be tested).

2. Provide completed Request for Import/Export Fill Material Testing form, per Item 1.04.A.1.

C. Import/export fill materials shall be stockpiled by Contractor (or the export site) and will be deemed acceptable for import/export or reuse only when it has been tested and proven clean to the satisfaction of the District's Environmental Consultant.

D. Import/export fill material may be deemed defective for use by the RSCCD Environmental Consultant at a RSCCD site should any of the following compounds or chemicals exceed the prescribed volumes:

1. TPH are present at concentrations exceeding 100 milligrams per kilogram (mg/kg) for gasoline and/or 1,000 mg/kg for oil/diesel and long-chain hydrocarbons.

2. Solvents and other VOCs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.

3. PCBs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.

4. SVOCs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.

5. OCPs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.

6. OPPs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.

7. Chlorinated herbicides are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.

8. California Code of Regulations Title 22 (CAM 17) Metals at concentrations exceeding human health risk levels for unrestricted land use or typical background levels expected in California and/or hazardous waste characterization criteria whichever is lower.

9. Hexavalent chromium is present at concentrations exceeding 17 mg/kg or failing hazardous waste STLC leachate criteria.

E. All export/import material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations. For the purpose of this specification, "contaminated" shall mean any soil or geotechnical material with constituent concentrations, which would require disposal at a permitted facility (i.e., California hazardous or RCRA hazardous). District Representative must be notified at least five days prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of District Representative.

F. Specification test results and RSCCD Environmental Consultant approvals shall be valid for a period of 90 days from the date of the subject testing. Previously approved materials shall not be utilized or disposed offsite after the 90-day limit without prior review and approval by the District's Environmental Consultant.

G. Soils with concentrations above Section 014524 - 3.02.D screening levels may, upon prior approval by the RSCCD Environmental Consultant, be reused at other RSCCD sites if supported by a site-specific human health risk assessment at the receiving school.

3.03 TRANSPORTATION

A. Details of the samples and testing must be submitted to and approved by RSCCD Environmental Consultant before the materials from which the samples were collected undergo transportation.

B. Haul Routes and Regulations/Restrictions: Contractor must comply with requirements of project environmental disclosure documents (i.e., CEQA EIR) and authorities having jurisdiction over the project area and the proposed activities (e.g. Regional Water Quality Control Board, Orange County Health Care Agency, DTSC, etc.).

3.04 COSTS

A. District will incur the costs of testing both mined (quarry) and borrow sites up to and including 4 locations within a distance of 70 miles of project location. The costs for the need to test more than 4 sites shall be incurred by the Contractor.

B. Contractor shall pay all fees associated with loading, hauling and disposal of exported soil and aggregates. Should contaminated soil be encountered, the district shall pay the fee difference if the soil is determined to be treated as a hazardous material.

C. Contractor shall pay all fees for loading, hauling, disposal and/or processing of contaminated and/or hazardous fill materials identified in the contract documents.

END OF SECTION 014524

SECTION 014533.10
STRUCTURAL TESTING AND SPECIAL INSPECTIONS

PART 1 GENERAL

1.1 INTENT AND CONDITIONS

A. Intent:
   1. For compliance with the California Building Code, the Owner shall employ and pay for a special inspector (or inspectors) as required by Chapter 17 of the International Building Code.
   2. Duties and responsibilities of the special inspector(s) shall be as outlined in Chapter 17 of the International Building Code and as herein specified.
   3. Define and coordinate structural tests and special inspection services.
   4. Define and coordinate conventional testing and inspection services.
   5. Testing and Inspection services are intended to assist in determining probable compliance of the work with requirements specified. These services do not relieve the Contractor of responsibility for compliance with the requirements of the Contract Documents.

B. Conditions:
   1. If inspection of fabricator's work is required, the Owner's representative may require testing and inspection of the work at the plant, before shipment. Owner, Architect and Structural Engineer of Record (SER) reserve the right to reject material not complying with Contract Documents.
   2. Perform testing and inspection in accordance with industry standard used as reference for specific material or procedure unless other criteria are specified. In the absence of a referenced standard, accomplish tests in accordance with generally accepted industry standards.
   3. Failure to detect defective work or materials shall in no way prevent later rejection if defective work or materials are discovered.

1.2 RELATED REQUIREMENTS

A. Refer to individual technical specification sections for additional qualifications, inspections, tests, frequency and standards required.

1.3 DEFINITIONS

A. Testing: Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.

B. Inspection: Evaluation of systems, primarily requiring observation and judgment.
   1. Continuous Inspection: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
   2. Periodic Inspection: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

C. Structural Tests and Special Inspections: Structural Tests and Special Inspection Services herein include items required by Chapter 17 of the International Building Code as adopted by the current California Building Code, and other items which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure.

D. Conventional Testing and Inspections: Conventional Testing and Inspection Services herein describe those items not specially required by Code but may be considered essential to the proper performance of the building systems.

E. Architect of Record: The prime consultant in charge of overall design and coordination of the Project.

F. Structural Engineer of Record (SER): The Licensed Engineer in responsible charge of the structural design for the Project.

G. Licensed Structural Engineer: A professional engineer with education and experience in the design of structures similar to this Project and licensed in the State of California.

H. Testing Agency (TA):
   1. Testing Agency: Approved independent testing agency acceptable to the Owner, Architect, SER and as noted below:
      a. Authorized to operate in the State of California and experienced with the requirements and testing methods specified in the Contract Documents.
      b. Meeting applicable requirements of references stated in paragraph 1.4.
      c. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.

I. Special Inspector (SI): A properly qualified individual or firm performing special inspections.

J. The categories of special inspector are:
   1. Special Inspector - Technical I, II and III: Usually an employee of a testing agency:
      a. Technical I (Sections 316329) - Technician shall be under the direct supervision of a licensed civil/geotechnical engineer regularly engaged in this type of work. Work shall be performed in a qualified geotechnical/testing laboratory.
      b. Technical I (Sections 033000)
         1) ACI Certified Concrete Field Testing Technician – Grade/Level I.
         2) ACI Certified Concrete Strength Testing Technician.
         3) ACI Certified Concrete Laboratory Testing Technician – Grade/Level 1.
         4) ACI Certified Associate Concrete Construction Inspector.
         5) Inspector shall be employed by a testing laboratory, experienced in the type of work being performed, and under the direct supervision of a licensed civil/structural engineer.
      c. Technical I (Section 042000) - Technician shall be under the direct supervision of a licensed civil/structural engineer regularly engaged in testing and inspection of this type of work. The licensed engineer shall review and approve all inspection reports.
      d. Technical I (Section 051200) - Non-destructive Testing Technician SNT-TC-1A Level I, and/or AWS Certified Associate Weld Inspector (CAWI).
      e. Technical I (Section 078100) - Shall be familiar with the interpretation and use of ASTM E605, and have prior field experience in testing and inspection of spray-applied fireproofing. Shall be supervised by an engineer licensed to practice in the state where the work is performed.
      f. Technical I (Section 078400) - Shall be familiar with the interpretation and use of ASTM E2174, and have prior field experience in testing and inspection of penetration firestopping. Shall be supervised by an engineer licensed to practice in the state where the work is performed.
      g. Technical I (Section 078443) - Shall be familiar with the interpretation and use of ASTM E2393, and have prior field experience in testing and inspection of fire-resistant joint systems. Shall be supervised by an engineer licensed to practice in the state where the work is performed.
      h. Technical II (Section 316329) - Technician with a minimum of 2 years' experience, or a graduate engineer, and is an employee of a qualified and approved geotechnical/technical laboratory, under the direct supervision of a licensed civil/geotechnical engineer regularly engaged in this type of work.
      i. Technical II (Sections 033000)
         1) ACI Certified Concrete Field Testing Technician – Grade/Level I.
         2) ACI Certified Concrete Strength Testing Technician.
         3) ACI Certified Concrete Laboratory Testing Technician – Grade/Level 1.
         4) ACI Certified Associate Concrete Construction Inspector.
         5) Inspector with a minimum of 3 years' experience, or a graduate engineer, and is employed by a testing laboratory experienced in the type of work being performed, under the direct supervision of a licensed civil/structural engineer.
      j. Technical II (Structural Note Sheet S0.02 for Post-Installed Anchors)
         1) ACI-CRSI Certified Adhesive Anchor Installer or equivalent educational training approved by the SER.
         2) ACI Certified Associate Concrete Construction Inspector.

3) Inspector with a minimum of 3 years' experience, or a graduate engineer, and is employed by a testing laboratory experienced in the type of work being performed, under the direct supervision of a licensed civil/structural engineer.

k. Technical II (Section 042000) - Graduate civil/structural engineer, with experience in this type of work. Supervised by a licensed civil/structural engineer. The licensed engineer shall review and approve all inspection reports.

l. Technical II (Section 051200) - Non-destructive Testing Technician ASNT TC-1A Level II, (NDE Technician II), AWS/CAWI, with minimum 3 years' experience, or an AWS/CWI.

m. Technical III (Section 316329) - A civil/geotechnical engineer regularly engaged in this type of work with a minimum of 4 years' experience, licensed in the state in which the project is located, and is an employee of a qualified and approved geotechnical/testing laboratory. This licensed engineer shall review and approve all final field reports.

n. Technical III (Section 033000) - A civil/structural engineer regularly engaged in this type of work, with a minimum of 4 years' experience and licensed in the state in which the project is located and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.

o. Technical III (Section 051200) - ASNT Level III with a minimum of 10 years' experience or an AWS/CWI with a minimum of 10 years' experience.

2. Special Inspector - Structural I and II: Usually an employee of the Structural Engineer of Record.

a. Structural I (Sections 316329, 017325, 033000, 042000, 051200) - Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a licensed civil/structural engineer.

b. Structural II (Sections 316329, 033000, 042000, 051200) - Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.

K. Building Official: The Officer or duly authorized representative charged with the administration and enforcement of the California Building Code.

1.4 REFERENCES

A. ANSI/ASTM E329 – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

B. ASTM E543 – Standard Practice for Agencies Performing Non-destructive Testing.

C. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

D. ASTM C1093 – Standard Practice for the Accreditation of Testing Agencies for Unit Masonry.

E. ANSI/ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

F. California Building Code.

G. International Building Code.

H. See technical specification sections for specific references.

1.5 RESPONSIBILITIES/AUTHORITY

A. Structural Tests and Special Inspections:

1. Special Inspector:

a. Attend all pre-installation meetings to review scope of structural tests and special inspections.

b. Test and/or inspect the work assigned for conformance with the building department approved plans, specifications, and applicable material and workmanship provisions of the code. Perform testing and inspection in a timely manner to avoid delay of work.

c. Bring nonconforming items to the immediate attention of the Contractor for correction, then, if uncorrected after a reasonable period of time, to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.
d. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons in accordance with the Structural Testing and Special Inspection Schedule.
e. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the code.
f. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.

2. Architect:
   a. Coordinate the flow of reports and related information to expedite resolution of construction issues.
   b. Attend pertinent pre-installation meetings to review scope of structural testing and special inspection.
   c. Complete and sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction. Provide a completed copy of the schedule to all signed parties including Building Official.
3. Structural Engineer of Record:
   a. Identify items requiring structural testing and special inspection including special cases.
   b. Define "type" of special inspector required for "description" of work indicated on the Structural Testing and Special Inspection Schedule.
   c. Attend pertinent pre-installation meetings to review scope of structural testing and special inspection.
   d. Complete and sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
   e. Review reports issued by all special inspectors.
   f. If engaged as a special inspector, provide structural testing and special inspection services as noted in Article 1.5.A.1.
4. Testing Agency:
   a. When engaged as a special inspector, provide structural testing and special inspection services as noted in Item 1.5.A.1.
   b. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
   c. Attend pertinent pre-installation meetings to review scope of structural testing and special inspection.
5. Contractor:
   a. Arrange and attend all pre-installation meetings to review scope of structural testing and special inspection. Include the Building Official, Owner, Architect, SER, Testing Agency and other parties concerned.
   b. Post or make available the Structural Testing and Special Inspection Schedule within project site office. Provide timely notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
   c. Provide special inspector access to the approved plans and specifications at the project site.
   d. Review all reports issued by special inspectors.
   e. Retain at the project site all reports submitted by the special inspectors for review by the building official upon request.
   f. Correct in a timely manner, deficiencies identified in inspection and/or testing reports.
   g. Provide safe access to the work requiring inspection and/or testing.
   h. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
   i. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
   j. Verification of conformance of work within specified tolerances is solely the responsibility of the Contractor.
6. Fabricator:

a. Submit a Certificate of Compliance to the Building Official, Special Inspector, and Structural Engineer of Record stating the work was performed in accordance with the Contract Documents.
b. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.

7. Building Official:
   a. Review all special inspector qualifications.
   b. Review all fabricators who perform work in their shop, which requires special inspection.
   c. Accept and sign completed Structural Testing and Special Inspection Schedule.
   d. Review reports and recommendations submitted by special inspector.
   e. Review the "final signed reports" submitted by special inspector. These documents must be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.
   f. Determine work, which, in the Building Officials opinion, involves unusual hazards or conditions.
8. Owner:
   a. Provide and pay cost of structural testing and special inspection services.
   b. Provide special inspector with Contract Documents and accepted shop drawings.
   c. Provide special inspectors and testing agencies with full access to the site at all times.
   d. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.

B. Inspections by Building Official: provide timely notice for inspections performed by the building official, as required by IBC Chapter 17, the California Building Code, and local ordinance.

1.6 INSPECTION NOTICES

A. Contractor: Provide minimum of 24 hours notice for all items requiring testing or inspection. Do not place items requiring testing and inspection services prior to or during placement until testing and inspection services are available. Do not enclose or obscure items requiring testing and inspection services after placement until testing and inspection services are performed.

1.7 REPORTS

A. Testing agency and/or special inspectors shall submit a report in accordance with the Structural Testing and Special Inspection Schedule and shall conduct and interpret tests and inspections and state in each report whether; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in work, (3) record work required and performed, to correct deficiencies.

B. Submit reports for structural testing and special inspection, in timely manner to the Contractor, Building Official, SER, and Architect.
   1. Submit reports for ongoing work, to provide the information noted below:
      a. Date issued.
      b. Project title and number.
      c. Firm name and address.
      d. Name and signature of tester or inspector.
      e. Date and time of sampling.
      f. Date of test or inspection.
      g. Identification of product and specification section.
      h. Location in project, including elevations, grid location and detail.
      i. Type of test or inspections.
      j. Results of tests or inspections and interpretation of same.
      k. Observations regarding compliance with Contract Documents or deviations therefrom.
   2. Submit final signed report stating that, to the best of the special inspector’s knowledge, the work requiring testing and/or inspection conformed to the Contract Documents.

1.8 FREQUENCY OF TESTING AND INSPECTION

A. For detailed requirements see individual technical specification sections, and Part 3 of this section.

1.9 PROTECTION AND REPAIR

A. Upon completion of testing, sample-taking, or inspection, repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/Engineer of Record. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

1.10 TESTS TO DEMONSTRATE QUALIFICATION

A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect or SER may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.

B. The Architect or SER reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SCOPE OF STRUCTURAL TESTING AND SPECIAL INSPECTION

A. Refer to individual specification articles and DSA approved DSA103 for scope of structural testing and special inspection.

3.2 STRUCTURAL TESTING AND SPECIAL INSPECTION PROGRAM SUMMARY

A. The parties involved shall complete and sign the Structural Testing and Special Inspection Schedule. The completed schedule is an element of the Contract Documents and after permit issuance, becomes part of the building department approved plans and specifications. The completed schedule shall include the following:
   1. Specific listing of items requiring inspection and testing.
   2. Associated specification section which defines applicable standards by which to judge conformance with approved plans and specifications in accordance with IBC Chapter 17 as adopted by the California Building Code. The specification section should also include the degree or basis of inspection and testing; i.e., intermittent/will-call or full-time/continuous.
   3. Frequency of reporting, i.e., intermittent, weekly, monthly, per floor, etc.
   4. Parties responsible for performing inspection and testing work.
   5. Required acknowledgments by each designated party.

B. See attached "Structural Testing and Special Inspection Schedule".

END OF SECTION

Structural Testing and Special Inspection Schedule.

Project Name:
Project No.:
Location:

Permit No.:_____(1)

STRUCTURAL TESTING AND SPECIAL INSPECTION				
Section Reference (2)	**Description (3)**	**Type of Inspector (4)**	**Report Frequency (5)**	**Assigned Firm (6)**
310000.3.19	Earthwork	Tech II	Daily	
316316.3.9	Augered Cast-In-Place Piles – Observations	Tech II	Daily	
316316.3.9	Augered Cast-In-Place Piles – Load Testing	Tech III	Weekly	
316223.3.5	Driven Piles – Observations	Tech II	Daily	
316223.3.5	Driven Piles – Load Testing	Tech III	Weekly	
316329.3.6	Drilled Piers	Tech II	Daily	
316623.3.9	Short Aggregate Piers	Tech II	Daily	
017325.3.20	Seismic Restraint Requirements for Nonstructural Components	Struc 1	per Inspection	
031100.3.8	Concrete Formwork	Tech II	Weekly	
032000.3.2	Concrete Reinforcement	Struc I	Daily	
033000.3.18.C	Cast-In-Place Concrete Concrete Mix Verification	Tech I	Weekly	
033000.3.18.D	Cast-In-Place Concrete Material Sampling & Testing	Tech I	Daily	
033000.3.18.E	Cast-In-Place Concrete Concrete Placement	Tech I	Weekly	
033000.3.18.F	Cast-In-Place Concrete Protection & Curing	Tech II	Weekly	
033000.3.18.G	Cast-In-Place Concrete Embedded Items	Tech II	Weekly	
033800.3.8.B	Post-Tensioned Concrete Tendon Placement	Struc I	Weekly	
033800.3.8.C 033000.3.8.D	Post-Tensioned Concrete Tensioning Logs & Supplemental Testing	Tech II	Weekly	
Structural Note Sheet **[S001][S002] [S003]**	Post-Installed Anchors – Installation Conformance & Proof Load Testing	Tech II	Weekly	
042000.3.15.E	Unit Masonry Material Testing	Tech II	Weekly	
042000.3.15.F	Unit Masonry Preparation & Placement	Tech II	Weekly	
042000.3.15.G	Unit Masonry Reinforcement	Struc I	Weekly	
042000.3.15.H 042000.3.15.I	Unit Masonry Grouting	Tech II	Weekly	
051200.3.5.C	Structural Steel High Strength Bolting	Tech II	Weekly	
051200.3.5.D	Structural Steel Welding	Tech I / Tech II	Bi-Weekly	

051200.3.5.E	Structural Steel Headed Shear Studs	Tech I	Weekly	
051200.3.5.F	Structural Steel Mechanical Fasteners	Tech I	Bi-Weekly	
051200.3.5.G	Structural Steel General Configuration	Struc I	Bi-Weekly	
078100.3.6	Spray-Applied Fire Resistive Materials	Tech I	Weekly	
078400.3.6	Firestopping	Tech I	Weekly	
078443.3.4	Fire-Resistant Joint Systems	Tech I	Weekly	

Notes: This schedule to be filled out and included in the project specification. Information unavailable at that time to be filled out when applying for a building permit.

(1) Permit No. to be provided by the Building Official.
(2) Reference to specific technical scope section in program.
(3) Use descriptions per IBC Chapter 17, as adopted by California Building Code.
(4) Special Inspector – Technical, Special Inspector – Structural.
(5) Weekly, monthly, per test/inspection, per floor, etc.
(6) Firm contracted to perform services.

ACKNOWLEDGEMENTS

Each appropriate representative shall sign below:

Owner:	Firm:	Date:
Contractor:	Firm:	Date:
Architect:	Firm:	Date:
SER:	Firm:	Date:
SI-S:	Firm:	Date:
TA:	Firm:	Date:
SI-T:	Firm:	Date:
TA:	Firm:	Date:
SI-T:	Firm:	Date:
F:	Firm:	Date:
F:	Firm:	Date:

* The individual names of all prospective special inspectors and the work they intend to observe shall be identified. (Use reverse side of form if more room is needed.).

LEGEND:
SER = Structural Engineer of Record
SI-S = Special Inspector – Structural
TA = Testing Agency
SI-T = Special Inspector – Technical
F = Fabricator.

Accepted for the Building Department By_____
Date._____

SECTION 015000

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities, construction facilities and controls to be provided, maintained, relocated, and removed by Contractor.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 011100: Summary of Work.

C. Section 012973: Schedule of Values Procedures.

D. Section 013213: Construction Schedule.

E. Section 014523: Testing and Inspection.

F. Section 015723: Storm Water Pollution Prevention Plan.

G. Section 017419: Construction and Demolition Waste Management.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 QUALITY ASSURANCE

A. Contractor shall comply with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building Code requirements.

2. Division of State Architect.

3. Health and safety regulations.

4. Utility company regulations.

5. Police, fire department and rescue squad requirements.

6. Environmental protection regulations.

B. Contractor shall arrange for the inspection and testing of each temporary utility prior to use. Obtain required certifications and permits and transmit to District Representative.

C. Contractor provided facilities are to be in place and available for Project Inspector use and occupancy within fourteen (14) calendar days following the date of issue of the Notice to Proceed and shall remain in place and available for District Representative use and occupancy until Substantial Completion of the Project or an earlier date if agreed upon by the District Representative.

D. Contractor shall provide site layout to District Representative for District review and approval prior to installation.

3.02 TEMPORARY UTILITIES

A. Contractor shall submit to District Representative reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

B. Contractor shall coordinate with the appropriate utility company to install temporary services. Where the utility company provides only partial service, Contractor shall provide and install the remainder with matching compatible materials and equipment.

C. Temporary Water:

1. Contractor shall furnish, install and pay for all necessary permits, inspections, move ins/out, temporary water lines, connections and fees, extensions and distribution, metering devices and use charges, deliveries/pick-ups, rentals, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other miscellaneous items for the temporary water system, and upon Substantial Completion of the Work, removal of all such temporary water system devices and appurtenances.

2. Contractor shall provide and maintain temporary water service, including water distribution piping and outlet devices of the size and required flow rates in order to provide service to all areas of the Project site.

3. District will pay for all water usage. Contactor shall assist the District in obtaining a separate meter for the water source.

4. Contractor shall at their expense and without limitation, remove, extend and/or relocate temporary water systems as rapidly as required in order to provide for progress of the Work.

D. Temporary Electric:

1. Contractor shall furnish, install, maintain and pay for all necessary permits, inspections, temporary wiring, metering devices, move ins/outs, connections and fees, service, extension and distribution, deliveries/pickups, rentals, storage, transportation, taxes, labor, insurance, bonds, materials, equipment and all other required miscellaneous items for the temporary electric systems and upon Substantial Completion of Work, removal of all such temporary electric systems and appurtenances.

2. Contractor shall furnish, install, maintain, extend and distribute temporary electric area distribution boxes, so located that individual trades can obtain adequate power and artificial lighting, at all points required for the Work, for inspection and for safety.

3. Contractor shall provide temporary electric for construction, temporary facilities, and connections for construction equipment requiring power or lighting, at all points required for the Work, for inspection and safety.

4. Contractor shall provide adequate task lighting and safe exit(s) inside building(s), as per Cal/OSHA guidelines, for safety and security.

5. Contractor shall ensure welding equipment is supplied by electrical generators.

6. Contractor shall at their expense and without limitation remove, extend and/or relocate temporary electric systems as rapidly as required in order to provide for progress of the Work.

7. Contractor to provide temporary power plan indicating source and power pole locations, for District review.

E. Temporary Gas:

1. Contractor shall furnish, install, maintain and pay for all necessary permits, inspections, metering devices and use charges, move ins/out, extension and distribution, deliveries/pickups, rentals, storage, transportation, equipment and piping, rentals, taxes, labor, material, insurance, bonds, and all other required miscellaneous items for the temporary gas systems necessary to perform the Work, and upon Substantial Completion of the Work, removal of all such temporary gas system devices and appurtenances.

2. Contractor shall at their expense and without limitation remove, extend and/or relocate temporary gas systems as rapidly as required in order to provide for progress of the Work.

F. Temporary Heating, Ventilation and Air Conditioning:

1. Contractor shall furnish, install, maintain, and pay for all necessary permits, inspections, move ins/out, extensions and distribution, connections and fees, use charges, metering devices and use charges, equipment, rentals, deliveries/pickups, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other required miscellaneous items for temporary heat and ventilation needed for proper installation of the Work and to protect materials and finishes from damage due to weather. Upon Substantial Completion of the Work, Contractor shall remove all such temporary heating and ventilating system devices and appurtenances.

2. Contractor shall provide, maintain and pay for all temporary ventilation of enclosed Work areas to cure materials, disperse humidity, remove fumes, and to prevent accumulation of dust, irritants, or gases.

3. District Representative will not accept utilization of the permanent HVAC system for temporary HVAC until Substantial Completion.

4. Contractor shall maintain manufacturer required levels of room and/or space temperature, humidity and ventilation necessary to install products, materials and/or systems of the Work.

5. Contractor shall at their expense and without limitation, remove, extend and/or relocate temporary heating and ventilating systems as rapidly as required in order to provide for progress of the Work.

G. Temporary Telephone and Data:

1. Contractor shall furnish, install, maintain and pay for all necessary permits, inspections, move ins/outs, extensions and distribution, devices, connections and fees, use charges, rentals, deliveries/pickups, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other required miscellaneous items for temporary phone, data service and distribution to Project site temporary offices as required by this Section and Section 3.03.

2. Contractor shall at their expense and without limitation, remove, extend and/or relocate temporary phone service and distribution as rapidly as required in order to provide for progress of the Work.

3. Upon Substantial Completion of the Work, Contractor shall remove all such temporary phone service, distribution, devices and appurtenances.

3.03 CONTRACTOR PROVIDED FACILITIES

A. Contractor shall provide temporary offices, utilities, storage units, fencing, barricades, chutes, elevators, hoists, scaffolds, railings and other facilities or services as required. Contractor shall be responsible for providing/supplying, installing and maintaining all items indicated under this specification Section 01 50 00.

B. Temporary Offices:

1. In addition to Project site temporary office facilities Contractor provides for use of Contractor, Contractor shall provide and maintain a minimum of one 12’x60’ trailer new (or as approved by District Representative) construction trailer on the Project site for sole use by District for the duration of the Work. Construction trailer shall be accessible by District Representative and/or Project Inspector on a 7 day a week 24-hour basis. Contractor shall provide the necessary materials and labor to provide the trailer with disable access on request by the District Representative. Trailer shall include, at a minimum, the following:

a. Conference room with a table and adequate seating for twelve;

b. One restroom;

c. An open work area with dividing partitions as required by District Representative and

d. Two enclosed, separate offices with windows and lockable doors.

2. Trailer shall be furnished with two exterior entrance doors. Each door shall be furnished with both a dead bolt and cylinder lock with six keys. Exterior doors and windows shall be provided with exterior mounted burglar bars. Windows shall be provided with operable window shades. Security of trailer and contents is a continuous obligation of Contractor and shall be equipped with monitored security system.

3. Trailer shall have ample headroom, 8-foot minimum, and shall be lighted, heated, ventilated, and air-conditioned.

4. The separate offices shall each be approximately 120 square feet in size and shall be furnished with a minimum of four 120 volt single phase convenience outlets with one telephone jack and one data/LAN outlet. The conference room shall be approximately 360 square feet in size and shall be furnished with a minimum of six single phase convenience outlets with one telephone jack and one data/LAN outlet.

5. Contractor shall coordinate floor plan and location of electrical, telephone, data outlets with District Representative prior to ordering and delivering the trailer.

6. Contractor will provide furnishings in the following quantities, to be set in rooms and position as directed by District Representative upon delivery:

a. **(2)** rolling mid-back task chairs, with arms, WorkPro or equal. (Similar to Office Depot #130313)

b. **(2)** double pedestal metal desks, 29”H by 72”W by 36”D, HON or equal. (Similar to Office Depot #571899)

c. **(2)** metal bookcases, three shelf, 41”H by 34”W by 12”D inches, HON or equal (Similar to Office Depot #388961)

d. **(4)** folding tables, molded plastic top, 29”H by 8’W by 30”D, (Similar to Office Depot #774511)

e. **(12)** padded meeting chairs, Global or equal. (Similar to Office Depot #662302)

f. **(1)** five (5) shelf storage/supply cabinet of approximately 72”H by 36”W by 24”D, furnished with locking doors, HON or equal. (Similar to Office Depot #989772)

g. Provide and install **(1)** large white board in conference room, 48” by 72” (Similar to Office Depot #691976)

7. Contractor shall provide phone, data transmission lines, related appurtenances, services, and equipment for use by District Representative as specified below:

a. Provide LAN and broadband connectivity in all offices and work area.

b. Provide one dedicated fax line

c. Provide business class data service with minimum 5 Mbps upload and download with wireless access point for services.

C. Contractor shall be responsible for maintaining all transmission lines, equipment and related devices. If equipment and/or transmission equipment becomes inoperable and downtime exceeds two days, Contractor shall replace and/or provide equivalent interim equipment.

D. Furniture, equipment, and related ancillary devices shall remain property of Contractor. Contractor shall remove such property upon Substantial Completion of Work or as otherwise determined in writing by District Representative.

F. At Contractor's expense and without limitation remove and/or relocate temporary office(s) and related facilities as rapidly as required in order to provide for progress of the Work.

G. Electronic/office equipment to be new at the commencement of the project.

H. Contractor shall remove waste bin trash from District Representative's trailer, vacuum District Representative's trailer floors and/or mop District Representative's trailer floors once per week. Provide trailer with bathroom paper goods, soap, broom, mop, door mats, etc.

I. Temporary Storage Units:

1. Contractor shall provide secure and waterproof storage units for the temporary storage of furniture, equipment and other items requiring protection.

2. Contractor shall be responsible for delivery charges and will install the storage unit in an appropriate area.

3. Contractor shall remove the storage unit from the Project site when the storage unit is no longer required for the Work or upon Substantial Completion of the Work.

4. Contractor shall at their expense and without limitation remove and/ or relocate storage units as rapidly as required in order to provide for progress of the Work.

J. Temporary Sanitary Facilities:

1. Contractor shall provide portable chemical toilet facilities, hand wash facilities, and trash receptacles. Quantity of units shall be based on total number of workers and shall be in accordance with Cal/OSHA standards and in compliance with SWPPP.

2. Portable chemical toilet facilities, hand wash facilities, and trash receptacles shall be maintained with adequate supplies and in a clean and sanitary condition and shall be removed from the Project site upon Substantial Completion of the Work. Contractor shall maintain District Representative trailer restroom clean and operational at all times.

3. Contractor employees shall not use school toilet facilities.

4. At Contractor's expense and without limitation remove and/or relocate portable chemical toilet facilities as rapidly as required in order to provide for progress of the Work.

5. Contractor will contain their breaks and lunch periods to the areas designated by District Representative or any public area outside the Project site. Contractor shall provide a suitable container within the break/lunch area for the placement of trash. Areas used for break/lunch must be maintained clean and orderly. Once finish flooring has been installed in a particular area, no food or beverages will be permitted in that area.

K. Temporary Security Fence/Barricade:

1. Contractor shall install temporary Project site security barricade(s) as indicated on Drawings or as required for safety and as specified herein. New or used material may be furnished. Security of Project site and contents is a continuous obligation of Contractor.

2. Unless otherwise indicated or specified, security fence shall be constructed of 6-foot high chain link fencing with 6-foot high green screen. Post spacing shall not exceed ten feet on center. Posts shall be of following nominal pipe dimensions: terminal, corner, and gatepost 2 ½-inches, line posts 2-inch. Chain link fence shall be not less than #13 gauge, 2-inch mesh, and in one width. Posts, fence and accessories shall be as follows:

a. Posts shall be set in the earth a depth of 30-inch with soil firmly compacted around post, unless required otherwise in writing by District Representative.

b. Green screen shall be attached to fence mesh on the construction side of the fence and steel tension wires at 18-inch centers with a minimum of #14 gauge tie wire. Green screen shall be maintained and all rips, tears, missing sections shall be corrected upon notification by District Representative.

c. Gates shall be fabricated of steel pipe with welded corners, and bracing as required. Fence and fabric to be attached to frame at 12-inch on center. Provide all gate hardware of a strength and quality to perform satisfactorily until barricade is removed upon Substantial Completion of the Work. Each gate shall have a chain and combo padlock. At Substantial Completion of the Work, remove barricade from Project site, backfill and compact fence footing holes. Existing surface paving that is cut into or removed shall be patched and sealed to match surrounding areas.

d. At Contractor's expense and without limitation remove or relocate fencing, fabric and barricades or other security and protection facilities as rapidly as required in order to provide for progress of the Work.

L. Other Temporary Enclosures and Barricades:

1. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.

2. Provide protective barriers around trees, plants and other improvements designated to remain.

3. Temporary partitions shall be installed at all openings where additions connect to existing buildings, and where to protect areas, spaces, property, personnel, students and faculty and to separate and control dust, debris, noise, access, sight, fire areas, safety and security. Temporary partitions shall be as designated on the Drawings or as specified by Architect. At Contractor's expense and without limitation remove and/or relocate enclosures, barriers and temporary partitions as rapidly as required in order to provide for progress of the Work.

4. Since the Work of this Project may be immediately adjacent to existing occupied structures and vehicular and pedestrian right of ways, Contractor shall, in accordance with applicable safety standards, provide temporary facilities, additional barricades, protection and care to protect existing structures, occupants, property, pedestrians and vehicular traffic. Contractor is responsible for any damage, which may occur to the property and occupants of the property of District Representative or adjacent private or public properties which in any way results from the acts or neglect of Contractor.

5. Contractor shall be responsible for cleaning up all areas adjacent to the construction site which have been affected by the construction; and for restoring them to at least their original condition- including landscaping; planting of trees, sod, and shrubs damaged by construction; and raking and disposal of debris such as roofing shingles, paper, nails, glass sheet metal, bricks, and waste concrete. Construction debris shall be removed and properly disposed of. Culverts and drainage ditches with sediment from the construction area shall be cleared routinely to maintain proper drainage and re-cleaned prior to completion of the contract.

6. Contractor shall ensure sediment does not block storm drains. Contractor shall be responsible for cleaning storm drains blocked due to erosion or sediment from the work area.

7. Contractor shall provide temporary shade for all break areas as required by Cal/OSHA's Heat Safety Regulations.

M. Temporary Storage Yards:

1. Contractor shall fence and maintain storage yards in an orderly manner.

2. Provide storage units for materials that cannot be stored outside.

3. At Contractor's expense and without limitation remove and/or relocate storage yards and units as rapidly as required in order to provide for progress of the Work.

N. Temporary De-watering Facilities and Drainage:

1. Contractor shall be responsible for, but not limited to, de-watering of excavations, trenches and below grade areas of buildings, structures, the Project site and related areas.

O. Temporary Protection Facilities Installation:

1. Contractor shall not change over from using temporary facilities and controls to permanent facilities, except as permitted by District Representative

2. Until permanent fire protection needs are supplied and approved by authorities having jurisdiction, Contractor shall provide, install and maintain temporary fire protection facilities of the types needed in order to adequately protect against fire loss. Contractor shall adequately supervise welding operations, combustion type temporary heating and similar sources of fire ignition.

3. Contractor shall provide, install and maintain substantial temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Where materials, tools and equipment are stored within the Work area, Contractor shall provide secure lock up to protect against vandalism, theft and similar violations of security. District Representative accepts no financial responsibility for loss, damage, vandalism or theft.

4. Contractor operations shall not block, hinder, impede or otherwise inhibit the use of required exits and/or emergency exits to the public way, except as approved by District Representative. CONTACTOR shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for firefighting equipment and/or personnel.

P. Temporary Security and Safety Measures:

1. During performance of the Work in existing facilities and/or on a Project Site occupied by students, Contractor shall provide, install and maintain substantial temporary barriers and/or partitions separating all Work areas from areas occupied by students, faculty and/or administrative staff.

2. During performance of the Work, Contractor shall provide an employee meeting the requirements of Education Code Section 45125.2.(2) to continually supervise and monitor all employees of Contractor and Subcontractor. For the purposes of this Section, Contractor employee shall be someone whom the Department of Justice has ascertained has not been convicted of a violent or serious felony as listed in Penal Code Section 667.5(c) and/or Penal Code Section 1192.7(c). To comply with this Section, Contractor shall have his employee submit his or her fingerprints to the Department of Justice pursuant to Education Code Section 45125.1(a).

3. Penal Code Sections 290 and 290.4 commonly known as “Megan’s Law”, require, among other things, individuals convicted of sexually oriented crimes, to register with the chief of police where the convicted individual resides or with a county sheriff or other law enforcement officials. Contractor shall check its own employees and require each Subcontractor to check its employees and report to Contractor if any such employees are registered sex offenders. Contractor shall check monthly during the life of the Contract to ascertain this information and report same to District Representative. Before starting the Work, and monthly thereafter during the life of Contract, Contractor shall notify District Representative in writing if any of its employees and/or if any Subcontractor’s employees is a registered sex offender. If so, the DISTRICT may elect and request to have such individuals removed from project and replaced.

4. Contractor shall employ and maintain sufficient security and safety measures to effectively prevent vandalism, vagrancy, theft, arson, and all other such negative impacts to the Work. Any impacts to the progress of the Work of Contractor, District Representative, or District Representative’s forces, due to loss from inadequate security, will be the responsibility of Contractor.

Q. Temporary Access Roads and Staging Areas:

1. Due to the limited amount of on and off Project site space for the parking of staff, students, and campus visitor vehicles there will be no parking of Contractor vehicles in areas designated for campus use only. Contractor shall provide legal access to and maintain Contractor designated areas for the legal parking, loading, off-loading and delivery of all vehicles associated with the Work. Contractor shall be solely responsible for providing and maintaining these requirements whether on or off the Project site. Contractor shall provide and maintain ample on-site parking spaces designated for the exclusive use of District Representative. Contractor shall erect signs as required by District Representative each of these spaces and prevent all unauthorized vehicles from parking in the District Representative-reserved spaces.

2. Temporary access roads are to be installed and maintained by Contractor to all areas of the Project site.

3. Contractor will be permitted to utilize existing facility campus roads as designated by District Representative. Contractor shall only utilize those entrances and exits as designated by District Representative and Contractor shall observe all traffic regulations of District Representative.

4 Contractor shall maintain roads and walkways in a clean condition including removal of debris and/or other deleterious material on a daily basis.

3.04 PROJECT SIGNAGE

A. No signs shall be displayed without approval of District Representative. At Contractor's expense and without limitation remove and/or relocate Project signage and related facilities as rapidly as required in order to provide for progress of the Work.

B. Contractor shall remove any approved signage at Substantial Completion of the Work.

C. Contractor shall employ appropriate means to remove all graffiti from buildings, equipment, fences and all other temporary and/or permanent improvements on the Project site within twenty-four (24) hours from the date of report or forty-eight (48) hours of each occurrence.

D. Contractor shall provide and install signage to provide directional identification, safety, and contact information to construction personnel and visitors as follows and as reviewed by District Representative.

1. For construction traffic control/flow at entrances/exits, and as designated by District Representative.

2. To direct visitors.

3. For construction parking.

4. To direct deliveries.

5. For Warning Signs as required.

6. For trailer identification and Project site address.

7. For "No Smoking" safe work site at designated locations.

8. Emergency contact information and phone number of Contractor.

9. Emergency contact information and phone number of local police, fire, and emergency personnel.

10. For Labor Compliance Program (LCP) as required by the DIR (Prevailing wage rates and Notice of LCP).

11. Employee benefits payments paid to trust funds are required under the Facilities Lease Agreement.

3.05 TRENCHES

A. All open trenches for installation of utility lines (water, gas, electrical and similar utilities) and open pits shall be barricaded at all times in a legal manner, as required by Cal/OSHA and determined by Contractor. Trenches shall be backfilled and patch-paved within twenty-four (24) hours after approval of installation by authorities having jurisdiction or shall have "trench plates" installed. Required access to buildings shall be provided and maintained. Contractor shall comply with all applicable statutes, codes and regulations regarding trenching and trenching operations.

3.06 DUST CONTROL

A. Contractor is responsible for dust control on and off the Project site. When Work operations produce dust the Project site and/or streets shall be sprinkled with water to minimize the generation of dust. Contractor shall clean all soils and debris from construction vehicles and cover both earth and debris loads prior to leaving the Project site. Contractor shall, on a daily basis, clean all streets and/or public improvements within the right of way of any and all debris, dirt, mud and/or other materials attributable to operations of Contractor.

3.07 WASH OUT

A. Contractor shall provide and maintain wash out boxes of sufficient size and strength to provide for concrete mixer wash out. Contractor shall locate and relocate both the wash out boxes and wash out areas in order to accommodate the progression of the Work. Contractor shall legally dispose of the contents of the wash out boxes and area on an as needed basis or as required by District Representative.

3.08 WASTE DISPOSAL

A. Contractor shall provide and maintain trash bins on the Project site and in compliance with SWPPP requirements. Trash bins shall be serviced on an as needed basis and Contractor is responsible for the transportation of and the legal disposal of all contents.

3.09 ADVERSE WEATHER CONDITIONS

A. Should warnings of adverse weather conditions such as heavy rain and/or high winds be forecasted, Contractor shall provide every practical precaution to prevent damage to the Work, Project site and adjacent property. Contractor precautions shall include, but not be limited to, enclosing all openings, removing and/or securing loose materials, tools, equipment and scaffolding.

B. Contractor shall provide and maintain drainage away from buildings and structures.

C. Contractor shall implement all required storm water mitigation measures as required under related Sections.

3.10 DAILY AND MONTHLY REPORTS

A.. By the end of each workday, Contractor shall submit to District Representative and Project Inspector a daily construction report denoting the daily manpower counts and a brief description/location of the workday activities. Manpower shall be broken down by trade classification such as foreman, journeyman or apprentice. The report shall also note the date, day of the week, weather conditions, deliveries, equipment on the Project site whether active and/or idle, visitors, inspections, accidents and unusual events, meetings, stoppages, losses, delays, shortages, strikes, orders and requests of governing agencies, Construction Change Directive, Immediate Change Directive, and/or Change Orders received and implemented, services disconnected and/or connected, equipment start up or tests and partial use and/or occupancies. Contractor shall also include on the daily construction report the above information for all Subcontractors at whatever tier.

END OF SECTION 015000

SECTION 015723
TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of Storm Water Pollution Prevention Plan (SWPPP) measures as per plans, specifications and the project SWPPP document for the purpose of preventing the discharge of pollutants from the construction site.

B. Compliance with local, state, and federal regulations.

1.2 REFERENCES

A. California Storm Water Best Management Practice Handbook for Construction Activity (BMP Handbook)

B. Construction General Permit (CGP) Order No. 2009-009-DWQ

1.3 SUBMITTAL REQUIREMENTS

A. Product Data: Provide product catalog cut sheets of all temporary and permanent equipment and specialty items that will be provided to comply with the SWPPP, including items necessary for storage, disposal and recycling.

B. Shop Drawings: Provide site plan indicating construction staging, storage, refuse areas and vehicular routing and parking areas.

PART 2 PRODUCTS

2.1 MATERIALS

A. Use materials of a class, grade and type needed to meet the performance described in the BMP Handbook and project SWPPP document.

PART 3 EXECUTION

3.1 QUALIFIED SWPPP DEVELOPER (QSD)

A. The owner shall designate a Qualified SWPPP Developer (QSD) having registrations, certifications and appropriate experience as defined by the State of California Construction General Permit (CGP) Order No. 2009-009-DWQ to perform the following:

1. Prepare, certify and amend as required the project SWPPP document.
2. Assist the owner in obtaining permit coverage prior to the commencement of construction activity through filing of Permit Registration Document (PRDs) on the Storm Water Multiple Application and Report Tracking System (SMARTS).
3. Assist the owner in filing the Notice of Termination (NOT) when construction is complete and final stabilization has been reached.

3.2 QUALIFIED SWPPP PRACTITIONER (QSP)

A. The owner shall designate a Qualified SWPPP Practitioner (QSP) having registrations, certifications and appropriate experience as defined by the State of California Construction General Permit (CGP) Order No. 2009-009-DWQ to perform the following:

1. Conduct storm water and non-storm water visual inspections of Best Management Practice's (BMP) and prepare documentation as prescribed by the CGP according to the risk level and project type.
2. Identifying BMP failures or shortcomings and provide an action plan to correct the deficiencies.

3. Conduct discharge monitoring as prescribed by the CGP for pH, turbidity, and non-visible pollutant monitoring, according to the project risk level and project type.
4. Develop a Rain Event Action Plan (REAP) for Risk Level 2 and 3 projects for qualifying rain events.
5. Conduct pre-storm event visual inspections for qualifying rain events.
6. Implement a Construction Site Monitoring Program (CSMP).
7. Track weather forecasts from the National Oceanic and Atmospheric Administration (NOAA) in accordance with Permit requirements.
8. Complete applicable monitoring, sampling, and inspection logs, forms and documents for filing to the Storm Water Multiple Application and Report Tracking System (SMARTS).
9. Report Numeric Action Level (NAL) exceedances to SMARTS for Risk Level 2 and 3 projects.
10. Provide assistance to the owner with annual reporting requirements.

3.3 PERFORMANCE BY CONTRACTOR

A. General

1. Keep the original SWPPP document in a readily accessible location at the construction site from the commencement of construction activity until submission of the Notice of Termination (NOT) for storm water discharges associated with construction activity. Contractors with day to day operation control over SWPPP implementation shall have the original SWPPP document available at a central location, on-site, for the use of all operators and those identified as having responsibility under the SWPPP.
2. Review the SWPPP. Ensure that all key personnel understand the requirements of the SWPPP.
3. Provide to the QSD, names of all key subcontractors involved in earthwork/land disturbing activities.

B. Good Site Management "Housekeeping"

1. For projects designated as Risk Level 1 and above, implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, the contractor shall implement the following good housekeeping measures:
   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).
   c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
   d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
   e. Implement Best Management Practices to prevent the off-site tracking of loose construction and landscape materials.
2. For projects designated as Risk Level 1 and above, implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:
   a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.
   b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.
   c. Clean or replace sanitation facilities and inspect them regularly for leaks and spills.
   d. Cover waste disposal containers at the end of every business day and during a rain event.
   e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.
   f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.
   g. Implement procedures that effectively address hazardous and non-hazardous spills.

1) Equipment and materials for cleanup of spills shall be available on site. Spills and leaks shall be cleaned up immediately and disposed of properly.
2) Appropriate spill response personnel shall be assigned and trained.
3) Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. For projects designated as Risk Level 1 and above, implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:
   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.
   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate Best Management Practices.
   c. Clean leaks immediately and dispose of leaked materials properly.
4. For projects designated as Risk Level 1 and above, implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:
   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.
   b. Contain all fertilizers and other landscape materials when they are not actively being used.
   c. Discontinue the application of any erodible landscape material within two days before a forecasted rain event or during periods of precipitation.
   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.
   e. Stack erodible landscape material on pallets and cover or store such materials when not being used or applied.
5. Maintain an inventory of materials in association with the Material Safety Data Sheet (MSDS) per OSHA requirements. Provide to QSP upon request.
6. For projects designated as Risk Level 1 and above, implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.
7. For projects designated as Risk Level 2 or 3, implement the Rain Event Action Plan (REAP) as directed by the QSP.
8. For projects designated as Risk Level 1 and above, begin implementing repairs or changes to BMPs within 72 hours of identification as directed by the QSP and complete the changes as soon as possible.

C. Non-Storm Water Management

1. For projects designated as Risk Level 1 and above, implement measures to control all non-storm water discharges during construction.
2. For projects designated as Risk Level 1 and above, wash vehicles in such a manner as to prevent non-storm water discharges.
3. For projects designated as Risk Level 1 and above, clean streets in such a manner as to prevent unauthorized non-storm water discharges.

D. Erosion Control

1. For projects designated as Risk Level 1 and above, implement effective wind erosion control.
2. For projects designated as Risk Level 1 and above, provide effective soil cover for inactive areas and all finished slopes, open space, utility backfill, and completed lots.
3. For projects designated as Risk Level 1 and above, limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. For projects designated as Risk Level 1 and above, establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. For projects designated as Risk Level 1 and above, on sites where sediment basins are to be used, at minimum, install and maintain sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.
3. For projects designated as Risk Level 2 or 3, implement appropriate erosion control Best Management Practices (runoff control and soil stabilization) in conjunction with sediment control Best Management Practices for areas under active construction. Active areas of construction are areas undergoing land surface disturbances.
4. For projects designated as Risk Level 2 or 3, install linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths in accordance with Table 1.

Table 1 – Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet Flow Length Not to Exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

5. For projects designated as Risk Level 2 or 3, ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.
6. For projects designated as Risk Level 2 or 3, ensure that all storm drain inlets and perimeter controls, runoff control Best Management Practices, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.
7. For projects designated as Risk Level 2 or 3, inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, remove any sediment or other construction activity related materials that are deposited on the roads (by vacuuming or sweeping).

F. Run-on and Run-off Controls

1. For projects designated as Risk Level 1 and above, effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from offsite shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

END OF SECTION

SECTION 016210
PRODUCT OPTIONS AND SUBSTITUTION REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Procedures, requirements and limitations for considering substitutions.
   2. Criteria for selecting product options and substitutions.

1.2 DEFINITIONS

A. "Product" means material, equipment, assembly, system, manufacturer, brand, trade name, element, item or similar as applicable.
   1. Provide new products free from defects and deficiencies unless otherwise noted.
   2. Provide components and accessories necessary for a complete system by same manufacturer unless otherwise specified.

B. Terms such as “approved substitute”, "equal to", "accepted by", "approved by", or other synonymous terms mean that acceptance of proposed product is subject to approval by Architect after submittal requirements are met. Architect’s decision is final and binding.

C. Available Manufacturers: See below.

D. Except where "no substitutions", "same as existing" or "match existing" are noted, term "or approved substitute" is implied throughout, subject to prior approval conditions specified including where the term "Available Manufacturers" is included.

1.3 SUBMITTALS

A. Submit requests for substitution in writing to Architect at least 10 calendar days prior to bid date and hour. Requests received after this time will not be considered.

B. Clearly define and describe proposed substitute product including following items:
   1. Fully completed Section 016211 - Substitution Request Form.
   2. Manufacturer's printed information supporting claim that proposed product meets specified requirements. Provide following as applicable:
      a. Literature Specifications Drawings Cut Sheets Performance data List of reference projects of similar size, value and complexity Model numbers Other information necessary to completely describe item.
   3. Provide a point by point comparison between key features of specified Basis of Design item and proposed substitution.
   4. Provide submitted materials marked with Article and Paragraph references from Specification using highlighter, marker and flags on pages to facilitate review and show that substitution meets specified requirements.
   5. Provide a letter indicating requestor has reviewed Contract Documents and examined site (if needed) and that proposed substitution meets specified requirements.

C. Accepted substitutions will be published in writing. No information or indication of acceptance will be provided by means other than written Addendum during bidding or Architect’s written construction administration document following bidding. Refer to “Limitations on Substitutions after Bids or During Construction" in this Section.

D. Bid and construct according to Contract Documents unless approval of substitution is provided in writing.

E. Architect is not obligated to state reasons for rejecting substitution.

1.4 LIMITATIONS ON SUBSTITUTIONS AFTER BIDS OR DURING CONSTRUCTION

A. Intent is to limit unnecessary substitutions after bids. Changes will not be allowed to accepted list of products, except when specified or accepted product subsequently is determined as not meeting requirements of Contract Documents or product becomes unavailable, and then only under following conditions:

1. Orders were placed in timely manner as required after list of materials is accepted. No excuse or proposed substitution will be considered for products due to unavailability unless proof is submitted that firm orders were placed in a timely manner.
2. Reason for unavailability is beyond control of Contractor: prolonged strikes or lockouts which will delay Project to an extent unacceptable to Owner, bankruptcy, discontinuance of a product, delays or Acts of God or other similar reasons.
3. Request for substitution is submitted in writing within 10 days after date Contractor becomes aware product does not comply with specifications or has become unavailable, accompanied by supporting evidence.
4. No extra cost to Owner.
5. Substitution does not compromise design intent or quality required.
6. Substitute product is acceptable to Owner and Architect.
7. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
8. Requested substitution does not require revisions to Contract Documents.
9. Requested substitution is consistent with the Contract Documents and will produce intended and indicated results.
10. Substitution request is fully documented and properly submitted.
11. Requested substitution will not adversely affect Contractor's Construction Schedule.
12. Requested substitution has received necessary approvals of authorities having jurisdiction.
13. Requested substitution is compatible with other portions of Work.
14. Requested substitution has been coordinated with other portions of Work.
15. Requested substitution provides specified warranty.
16. If requested substitution involves more than one trade, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to installers involved.

B. All substitutions that result in changes to or affecting the Structural, Access or Fire & Life Safety portions of the project shall be submitted to DSA for review and approval as required per CBC 2013 Part 1 Section 4-338.

PART 2 MATERIALS

2.1 PRODUCTS

A. Architect and Owner reserve right to accept or reject proposed product. Should a proposed product be unable to meet requirements to satisfaction of Architect, product shall not be used. No additional compensation will be allowed for required Work resulting from use of product accepted by Addendum.

B. Use only one brand, manufacturer, source or type for like products unless otherwise approved or specified. Contractor is obligated to do so unless otherwise approved in writing.

C. Provide pricing based on products listed in Contract Documents. Contract award is based on use of specified products or substitutions approved prior to bidding or pricing.

1. By execution of Contract, Contractor agrees and understands Work will be accomplished with products specified or accepted by substitution.

D. Basis of Design Products:

1. Reference to "Basis of Design" and a named specific product or manufacturer is intended to establish criteria for use of that product and manufacturer based on that products published information whether or not those criteria are explicitly stated in Specifications.

2. Criteria may establish higher performance requirement than specified reference or performance standards. Such reference is intended to establish minimum level of quality, standard of design, function, appearance, type, strength, durability, construction, efficiency, sound level, finish, appearance, availability, service and similar characteristics determined necessary for Project.
3. Specification criteria including basis of design products are considered as a whole.
4. Other products or manufacturers listed meet features, performance, appearance and other criteria established by that product or manufacturer even if product must be customized to meet those criteria.
5. When other products are listed in a Section those products may be used if they meet entire specification criteria including criteria implied by product listed as basis of design. Meeting some requirements but not meeting criteria established by basis of design product does not qualify as meeting specified requirements.
6. Products or manufacturers accepted for substitution will be acceptable provided they fully comply with requirements and match basic and essential criteria of product used for basis of specification or design, including level of fabrication quality, as determined by Architect.

E. Reference Standards for Products:
1. When references to Federal Specification, ASTM Standard, American National Standards Institute (ANSI) or similar association standards are listed for product quality, provide an acceptable affidavit certifying that proposed substitution for this Project meets with same standard.
2. Submit supporting test data to substantiate compliance.

F. Substitute products shall:
1. Be available in same range of colors, textures, dimensions, gauges, types, and finishes as specified product.
2. Be equal to specified item in strength, durability, efficiency, serviceability, ease and cost of maintenance.
3. Be compatible with building design.
4. Not necessitate design modifications.
5. Not impose additional work or require changes in work of Prime Contractor, or other Subcontractor, vendor, or materials supplier.
6. Not add cost to Owner.
7. Be similar in essential fabrication features.

G. Contractor, supplier or manufacturer providing accepted substitute product shall bear cost of required modifications to spaces, services, utilities and other features as result of accepting substitute products, including but not limited to:
1. Larger capacity mechanical or electrical service, devices or utilities resulting from acceptance of product for bidding purposes.
2. Modification to pipes, conduits, ducts, and controls for conveying, distributing, and controlling those services or utilities.
3. Modification to insulation, wrappings, coatings, or other integral features of lines or items conveying those lines.

H. Timely Placement of Product Orders: Place product orders in a timely manner, within ten days after acceptance of submitted list of materials.

2.2 LABELS, NAMEPLATES AND TRADEMARKS

A. Provide permanent nameplate on each item of service-connected or power-operated equipment. Locate nameplate on easily accessible surface.
1. Nameplate shall indicate manufacturer, model number, serial number, capacity, speed, electrical characteristics and similar essential operating data.

B. UL fire rating labels and other labels which must be visible after installation shall be located on inconspicuous surfaces.
1. Other labels and trademarks shall be located on concealed surfaces or shall be removable without damaging surfaces.
2. Do not permanently attach or imprint labels or trademarks on surfaces which will be exposed to view in occupied spaces.

C. Do not paint, deface or conceal required nameplates or labels.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 016211
SUBSTITUTION REQUEST FORM

To: **Hammel, Green and Abrahamson, Inc.**
1918 Main St. Third Floor
Santa Monica, California 90405
Attention: Tom Elander

Project: **Rancho Santiago Community College District**
Santa Ana College Science Center

HGA Comm. No.: 3584-001-00 **Date Received:**_____

Specification Section Number and paragraph:_____

Drawing and details affected:_____

Proposed Substitution:_____

Manufacturer:_____

Product (model, pattern, etc.):_____

WHY IS SUBSTITUTION BEING SUBMITTED? (Select one of the following):

- ☐ Pre-Bid Substitution (Prior Approval) Bid Date:
- ☐ Specified product is not available. Explain.
- ☐ Cost savings to Owner. Indicate comparative cost analysis.
- ☐ Other: Explain.

EFFECTS OF PROPOSED SUBSTITUTION: Answer the following questions and attach explanations.

Does substitution affect dimensions indicated on Drawings?
☐NO ☐YES, explain:

Does substitution affect Work of other Sections?
☐NO ☐YES, explain:

Does substitution require modifications to design, changes to Drawings, or revisions to specifications to be incorporated into the Project?
☐NO ☐YES, explain:

Attach list of at least 3 projects where proposed substitution has been used within past 12 months; include name, address, and telephone number of Owner and Architect.

CONTRACTOR'S / BIDDER'S REPRESENTATION

Undersigned accepts responsibility for coordination of proposed substitution and accepts all additional costs resulting from the incorporation of proposed substitution into the Project per Section 016210.

SUBMITTED BY:

_____

_____

Fax No: _____

For Architect's use:

- ☐ Accepted ☐ Not Accepted
- ☐ No Action Required
- ☐ Submission: Incomplete
- ☐ Too Late

Reviewed by/date:_____

Comments:_____

Subcontractor's signature and date:_____

Contractor's signature and date:_____

SECTION 016400
OWNER FURNISHED PRODUCTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. On-Site transport and installation of Owner furnished equipment, noted “OFCI” (Owner Furnished and Contractor Installed), on Drawings and Schedules.
   2. Rough-in and Coordination of Other Equipment, noted "OFOI” (Owner Furnished and Owner Installed), "OFVI" (Owner Furnished and Vendor Installed).

B. Related Sections:
   1. Section 011100 - Summary of Work.
   2. Divisions 21, 22, 23, 26, 27, and 28 - Connection to building services ("OFCI" equipment).

C. Related Work:
   1. Furnishing of equipment, transport to Owner's storage, inspection, unloading, unpacking, storage, testing and adjustments.
   2. Disconnections, removal, refurbishment, and transport of existing equipment to installation locations.
   3. Instructions and shop drawings for installation, assembly and connection of both new and existing equipment.
   4. Connection of equipment to mechanical and electrical building services ("OFOI" and "OFVI" equipment).
   5. Testing and adjustments.

PART 2 PRODUCTS

2.1 CONTRACTOR-FURNISHED MATERIALS

A. Provide labor, tools, devices and methods required for assembly and installation of equipment.

2.2 OWNER FURNISHED EQUIPMENT

A. Equipment will be delivered to Owner's storage by party having title or custody.
   1. In addition to items themselves, installation and assembly instructions, shop drawings, templates, accessories will be delivered to Contractor in order that Contractor may proceed with work of installing.

B. Delivery of equipment, installation instructions, shop drawings, templates, and accessories will be in accordance with schedules as established by Owner.

PART 3 EXECUTION

3.1 INSTALLATION OF NEW OWNER FURNISHED EQUIPMENT

A. For installation of new equipment furnished by Owner and installed by Contractor, Owner will deliver equipment to Project, uncrate or unpack, assemble, clean and otherwise make equipment ready for installation and connection.
   1. Owner will deliver equipment to particular room in which it is to be installed and Contractor will set in place and make final connections.
   2. Owner will assume responsibility for damage found during unpacking and for damage which may occur in moving equipment, and will assume responsibility for caring for accessories or other loose items.
   3. Owner will remove debris from unpacking, uncrating or assembly work. Final connections shall be made by Subcontractor for particular trades involved.
   4. Owner's Responsibilities:

a. Arrange for and deliver necessary shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
b. Deliver supplier's bill of materials to Contractor.
c. Arrange and pay for delivery to site in accordance with Progress Schedule.
d. Inspect deliveries jointly with Contractor.
e. Submit claims for transportation damage.
f. Arrange for replacement of damaged, defective, or missing items.
g. Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

B. Refer to Equipment Schedule as indicated on drawings.

3.2 INSTALLATION BY CONTRACTOR

A. Contractor Installation: Work consists of transporting equipment to installation locations, setting in place, building in, leveling and attachment to building construction.
   1. Cleaning: After installation and prior to acceptance of installation by Owner, clean surfaces, wash and polish as appropriate.

B. Leave ready for connection to mechanical and electrical building services, and for testing and adjustments by vendor or Owner; Contractor has option to be present during testing
   1. Contractor's Responsibilities:
      a. Designate submittals and delivery date for each Product in the Progress Schedule.
      b. Review shop drawings, product data, samples, and other submittals. Submit to Architect with notification of discrepancies or problems anticipated in use of product.
      c. Receive and unload products at site.
      d. Inspect deliveries jointly with Owner, record shortages, damaged or defective items.
      e. Handle products at site, including uncrating and storage.
      f. Protect products from damage and from exposure to elements.
      g. Assemble, install, connect, adjust and finish products.
      h. Provide installation inspections required by public authorities.
      i. Repair or replace items damaged by Contractor.

C. Owner and Vendor Installation: Verify service and installation requirements with responsible party and furnish rough-ins, supporting construction and other requirements to enable responsible party to properly install equipment.

END OF SECTION

SECTION 017123

FIELD ENGINEERING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Layout of the work.

B. Verification of work.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 011100: Summary of Work.

C. Section 013113: Project Coordination.

D. Section 013213: Construction Schedule.

E. Section 013300: Submittal Procedures.

F. Section 017700: Contract Closeout.

1.03 SURVEY CONTROLS

A. Vertical and horizontal control shall use same benchmark used in the preparation of topographic survey. When Work consists of both on-site and off-site and benchmarks differ, an equation shall be indicated on Drawings.

1.04 LAYOUT OF WORK

A. All work related to staking shall be by a Land Surveyor or Civil engineer registered with the State of California to perform land surveying and employed by Contractor.

B. Before commencement of Work, Land Surveyor shall locate all reference points and benchmarks to be used for vertical and horizontal control.

C. Land Surveyor shall lay out entire Work, set grades, lines, levels, control points, elevations, grids and positions.

1.05 VERIFICATION OF WORK

A. All curb and gutter, sidewalks, pavers, ramps, concrete flatwork, and asphalt will be subject to line and grade certification. This task shall be performed by a licensed Land Surveyor in the State of California, employed by the Contractor, and shall certify that:

1. The forms for all curb and gutter, sidewalks, pavers, ramps, concrete flatwork, and asphalt are within conformance of the Contract Documents and that no rates of grade are in excess of the rates of grade shown on the approved precise grading plan. These certifications shall be signed by the Land Surveyor and submitted to the District Representative, Architect, and Project Inspector forty-eight (48) hours prior to concrete pour or product placement.

2. The as-built conditions for all curb and gutter, sidewalks, pavers, ramps, concrete flatwork, and asphalt are within conformance of the Contract Documents and that no rates of grade are in excess of the rates of grade shown on the approved precise grading plan. These certifications shall be signed by the Land Surveyor and submitted and approved by the District prior to the finalization of the project.

B. All of the above certifications shall be performed at the contractor's expense and the District reserves the right to use an outside consultant to verify any work that the Project Inspector deems necessary in order to ensure compliance with the above specifications.

1.06 SUBMITTALS

A. Land Surveyor: Shall submit name, address and license number to District Representative, including any changes as they occur.

B. Field notes: Upon request by District Representative, submit copies of cut sheets, coordinate plots, data collector printouts, marked-up construction staking plans and other documentation as available to verify accuracy of field engineering work during and at completion of project. Submittals to District Representative must be signed and sealed by Surveyor and counter-signed by Contractor

C. Statement of Compliance: Contractor shall submit a statement of certification signed and sealed by Land Surveyor, counter-signed by Contractor indicating compliance with grades and alignment of construction plans at rough grade, fine grade, and top of rock stages. Project Inspector shall review survey submittals for each stage of construction prior to proceeding with Work.

D. Upon Substantial Completion, Contractor shall obtain and pay for reproducible survey drawings (or "As Built").

E. Completed record drawings shall be signed and certified as correct and within specified tolerances by licensed Land Surveyor. Original AutoCAD file and two (2) signed hardcopies shall be submitted to District Representative.

1.07 RECORD DOCUMENTS

A. Maintain complete and accurate log of all control and survey documentation as work progresses.

B. Record, by coordinates, all utilities onsite with top of pipe elevations, at major grade and alignment changes, rim, grate or top of curb and flow line elevations of all drainage structures and sewer manholes.

C. Indicate reference and control points on record drawings. The basis of elevation shall be one of the established benchmarks.

D. Upon Substantial Completion, obtain and pay for reproducible plans and provide to District Representative. Clearly indicate all differences between original drawings and completed work within specified tolerances. In addition, provide AutoCAD files of each survey performed for District records.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PREPARATION

A. Pre-mark areas of excavation in accordance with the requirements of "Dig-Alert". Request locators two (2) days before commencing excavation.

B. Before commencing Work, establish all horizontal and vertical reference points used in Contract Documents according to existing field conditions.

C. Preserve established reference lines and benchmarks.

D. Differentiate school and city datum as applicable.

E. Relocate bench marks that may interfere with Work.

F. Reset and re-establish reference marks damaged or lost during construction.

3.02 SURVEY REQUIREMENTS GENERAL

A. Establish a minimum of two permanent horizontal and vertical control points on Project site, remote from construction area, referenced to data established by control points.

B. Indicate reference points, relative to benchmark elevation, on record drawings.

C. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.

D. Calculate and layout proposed finished elevations and intermediate controls, as required, to provide smooth transitions between spot elevations indicated on Drawings.

E. Provide stakes and elevations for grading, fill, and topsoil placement.

F. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or asphaltic concrete (AC) surfaces at key locations such as beginning-of-curve (BC), end-of-curve (EC), grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

G. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.

H. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.

I. Submit a certification signed by the Land Surveyor confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

J. Mark boundaries for rights-of-way dedications and easements for utilities prior to making location of buildings and utilities.

K. Layout all lines, elevations, and measurements needed for construction or installation of buildings, grading, paving utilities according to the following:

1. Identify site boundary, property lines.
2. Provide working benchmarks.
3. Set stakes for Bottom of Excavated Plane (B.E.P.).
4. Set gridlines, radii, working points etcetera, for foundation.
5. Set and verify building pad elevations.
6. Set finish floor elevations.
7. Stake location and elevations for exterior ramps and stairs.
8. Set gridlines, radii, working points, etc, for all floors of multi-story buildings.
9. Set storm drain and sanitary sewer inverts and other utilities as needed at 5-foot off-set from building lines.

10. For new facilities, establish permanent onsite Benchmark with 2-inch diameter brass disk. Location of Benchmark to be determined by District Representative.

3.03 SURVEY REQUIREMENTS FOR GRADING

A. Provide grade stakes and elevations as follows:

1. Removal limits (cut lines).

2. Rough grade staking: 60-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.

3. Fine grade for top of dirt: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.

4. Verify fine grade for top of rock: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.

5. Finish grade marks on all buildings, structures and at pertinent locations.

6. Finish grades and offsets for all concrete work, flatwork, sidewalks, pavers, curbs and gutters, asphalt, utilities, landscape areas, and structures.

7. Provide controls and baselines for playground striping.

8. Offsite improvements: set grades and provide grade sheets as required by local authorities.

B. Provide a minimum of two permanent horizontal and vertical control points onsite, remote from building area, referenced to data established by survey control points.

3.04 SURVEY REQUIREMENTS FOR UTILITIES

A. Locate "wet" utility lines and provide vertical control proportionate to slope of line as required for accurate construction. "Dry" utilities shall have adequate horizontal and vertical control layout supplied by others.

B. Prior to back-filling trench, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished surfaces at key locations (such as Back of Curbs, grade breaks, corners or angle points) in sufficient number to demonstrate Work complies with intent of Contract Documents.

C. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.

1. Set grades for vaults one inch higher than adjacent surrounding design grades, unless noted otherwise.

D. Leave all trenches open until required inspection is completed.

3.05 SURVEY REQUIREMENTS FOR STRUCTURES

A. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within building pad perimeter adequate to control both over excavation and re-compaction and final sub-grade elevation of building pad.

B. Submit a certification signed by Land Surveyor confirming elevations and locations of improvements are in conformance with Contract Documents. Statement shall include survey notes for finish floor and building pad, showing actual measured elevations on completed sub-grade, recorded to nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

END OF SECTION 017123

SECTION 017325
SEISMIC RESTRAINT REQUIREMENTS FOR NONSTRUCTURAL COMPONENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide seismic restraint of nonstructural components to withstand seismic forces and seismic deformations without displacing or overturning. For designated nonstructural components, provide installations capable of providing post-earthquake functionality.

B. Work in this section includes furnishing and installing complete seismic restraint systems. Work in this section may also include the seismic restraint design and/or equipment/product certifications to be submitted for review by the registered design professional.

1.2 SCOPE

A. The architectural, medical equipment, mechanical, electrical, and plumbing components and systems identified in the attached Responsibility Matrix shall be designed and constructed for seismic demands.

1.3 DEFINITIONS

A. Professional Engineer - A professional engineer is one who is legally qualified to practice in the jurisdiction where the Project is located, who is experienced in providing engineering services of the kind indicated, and is registered with the state where the Project is located.

B. Seismic Forces: Forces acting in any direction on a nonstructural component and related system due to the action of an earthquake as defined in the Building Codes currently in effect where the Project is located.

C. Seismic Deformations: Drifts, deflections and seismic relative displacements determined in accordance with the applicable seismic requirements of the Building Codes currently in effect where the Project is located.

D. Restraint/Bracing: Bracing or anchorage used to limit movement under seismic forces. Cables or rigid elements (strut, pipe, angles, etc) used to resist forces by uniaxial tension or compression. The term “bracing” may also be used to describe design to resist lateral forces through the use of wall or frame elements.

E. Support: Elements used to support the weight (gravity load) of an item. Where the support is located at a seismic brace, the element may also resist tension/compression reactions from the restraint system.

F. Anchorage: Connection to structure typically through the use of welding, bolts, screws, post-installed anchors or other fasteners selected to meet the Building Codes currently in effect where the Project is located.

G. Designated Seismic System: Those architectural, electrical and mechanical systems and their components that require seismic design in accordance with ASCE 7 and for which the component importance factor, Ip, is 1.5 according to ASCE 7 or listed as 1.5 in Section 017325.1.2.

H. Inspection Body: Organization or individual accredited to ISO 17020 and regularly engaged in factory inspection services for seismic restraint of non-structural components and equipment.

I. Special Inspector: An IAS accredited IBC special inspection agency or qualified professional engineer who demonstrates competence, to the satisfaction of the building official (or Authority Having Jurisdiction [AHJ]), for inspection of the designated seismic systems. The owner or the registered design professional in responsible charge acting as the owner’s agent shall employ one or more special inspectors to provide periodic inspections during installation of designated seismic systems.

J. AHJ: Authority Having Jurisdiction – The governmental agency or sub-agency that regulates the construction process. This may be a local building department, state agency, federal entity or other body or bodies having statutory authority.

K. OSHPD: California Office of Statewide Health, Planning and Development.

L. ICC-ES: International Code Council Evaluation Service.

M. IAS: International Accreditation Service, Inc.

N. IBC: International Building Code.

O. VISCMA: Vibration Isolation and Seismic Control Manufacturers Association.

P. ASCE: Minimum Design Loads for Buildings and Other Structures.

1.4 RELATED SECTIONS

A. Coordinate and comply with the requirements of the following:

1. Section 014533.10 – Structural Testing and Special Inspection
2. Section 054000 – Cold-Formed Metal Framing
3. Section 055000 – Metal Fabrications
4. Section 084400 – Aluminum Curtain Walls, Windows and Entrances
5. Section 088000 – Glazing
6. Section 092216 – Non-Structural Metal Framing
7. Section 095100 – Acoustical Ceilings
8. Section 102226.10 – Vertical Folding Wall System
9. Section 220548 – Vibration and Seismic Controls for Plumbing Piping and Equipment
10. Section 230548 – Vibration and Seismic Controls for HVAC

1.5 APPLICABLE PUBLICATIONS

A. The most recent edition of publications listed below (including amendments, addenda revisions, supplements and errata) form a part of this specification to the extent referenced unless otherwise noted. The publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):

1. 355.2 Qualification for Post-Installed Mechanical Anchors in Concrete and Commentary.
2. 318 Appendix D Anchoring to Concrete.

C. American Institute of Steel Construction (AISC): Load and Resistance Factor Design American Society of Civil Engineers Minimum Design Loads for Building and Other Structures.

D. American Society for Testing and Materials (ASTM):

1. A/36/A36M Standard Specification for Carbon Structural Steel.
2. A/53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. A307 Standard Specification for Carbon Steel Bolts and Studs; 600,000 PSI Tensile Strength.
4. A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
5. A325M Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric).
6. A490 Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
7. A490M Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
8. A500/A500m Standard Specification for Cold-Form Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. A501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
10. A615/A615M Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
11. A992/A992M Standard Specification for Steel for Structural Shapes for Use in Building Framing.

12. A996/A996M Standard Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement.
13. E488-96 Standard Test Method for Strength of Anchors in Concrete and Masonry Elements.
14. E580 Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

E. American National Standards Institute (ANSI) and Rack Manufacturers' Institute (RMI): Specification For The Design, Testing and Utilization of Industrial Steel Storage Racks (ANSI MH16.1).

F. American Welding Society (AWS):
1. AWS D1.1 Structural Welding Steel
2. AWS D1.3 Structural Welding Sheet Steel

G. International Code Council Evaluation Service (ICC-ES): Index of Reports can be found at http://www.icc-es.org/reports/index.cfm

H. National Fire Protection Association: Installation of Sprinkler Systems (NFPA-13)

I. OSHPD Code Application Notice 2-1708A.5 – Certification of Equipment and Nonstructural Components

J. Americal Society of Mechanical Engineers (ASME)
1. Standard B31 Standards for Pressure Piping.

1.6 REGULATORY REQUIREMENTS

A. Comply with the International Building Code (IBC) latest adopted Edition by the jurisdiction where the Project is located and applicable local and/or statewide adopted amendments.

B. Special Seismic Certification – Provide certification in accordance with IBC, Chapter 17 and ASCE 7 Chapter 13 requirements for designated seismic systems as indicated on the Responsibility Matrix.

1.7 PROJECT SEISMIC DESIGN CRITERIA

A. Seismic Design Category – See General Structural Notes Sheet S0.01.

A. Seismic Design Force – Calculation of seismic design force shall be based on the requirements of Chapter 13 of ASCE 7 with the following seismic design parameters
1. See General Structural Notes Sheet S0.01 for building seismic design criteria and parameters.
2. Component importance factor (I_p) = 1.0 or 1.5 as indicated in the Responsibility Matrix or as required by ASCE 7 Section 13.1.3.
3. Component amplification factor (a_p) and component modification factor (R_p) shall be determined in accordance with ASCE 7 Tables 13.5-1 and 13.6-1

B. Seismic Relative Displacement – Design shall accommodate the following inter-story drift in addition to thermal movement that may be present.

Δ1-2 = inter-story drift between floors 1 and 2 = 1"
Δ2-3 = inter-story drift between floors 2 and 3 = 1"
Δ3-Roof = inter-story drift between floors 2 and 3 = 1.25"

1.8 SUBMITTALS

A. Shop Drawings: Submit seismic restraint shop drawings in accordance Section 013300:
1. Incorporate seismic restraint layouts, details, erection drawings, fastener details, anchorage details, materials and member sizes into the specific component shop drawings in accordance with the individual specification article. Where the individual specification article does not require the shop drawings to be submitted, provide standalone seismic restraint shop drawings.

2. Seismic restraint shop drawings shall be prepared or their preparation shall be overseen by a Professional Engineer, licensed in the state where the Project is located and is experienced in designing seismic restraints for nonstructural components as required by the authority having jurisdiction.
3. The use of proprietary restraint systems with a certificate of compliance verified and listed by an IAS accredited inspection body is acceptable.

B. Calculations: Submit signed engineering calculations concurrently with shop drawings:
1. Seismic restraint calculations shall be prepared and signed by a Professional Engineer, licensed in the state where the Project is located, indicating structural integrity of members, anchors, fasteners and connections to building structure in accordance with specified criteria and the applicable building codes.

C. Special Seismic Certification of Mechanical and Electrical Equipment and Distribution Systems:
1. Each manufacturer of designated seismic system components shall provide a certificate of compliance indicating that the component and its mounting system or anchorage have been tested and/or analyzed in accordance with ASCE 7 to withstand required seismic loads and maintain operability.

1.9 QUALITY ASSURANCE

A. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings and other structural data.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services in the area of seismic restraint of nonstructural components and systems.

C. Special Seismic Certification of Mechanical and Electrical Equipment and Distribution Systems:
1. Each manufacturer of designated seismic system components shall provide a certificate of compliance indicating that the component and its mounting system or anchorage have been tested or analyzed in accordance with ASCE 7 to withstand required seismic loads and maintain operability. Depending on the contents or functionality of the designated seismic system as defined in ASCE 7, certification shall be provided by an actual test on a shake table with three-dimensional shock tests, an analytical method using dynamic characteristics and forces and/or experience data based upon nationally recognized procedures acceptable to the authority having jurisdiction. Certificate must be verified by an IAS accredited inspection body or other independent inspection entity acceptable to the Authority Having Jurisdiction. Components shall be labeled with an identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an accredited agency that indicates that the representative sample of the product or material and its testing have been evaluated and listed by an accredited inspection body agency.
2. If a particular component has no manufacturer available that has been evaluated and listed by an accredited inspection body agency, then qualification must be by analysis performed be a professional engineer registered in the jurisdiction where the Project is located. Professional engineer must be approved by the authority having jurisdiction and experienced in providing engineering services of the kind indicated. Analysis must include an evaluation of stress and deflection developed through the entire load path from the center of applied seismic load to the equipment anchorage. Analysis must consider dynamic characteristics and the response spectrum required by code.
3. Special Seismic Certification for distribution systems such as piping and ductwork shall include a stress analysis of the pipe/duct, supports, bracing and anchors. The stress analysis shall include gravity and seismic demands and shall include an analytical assessment of connections and consideration of movement of points of attachment. The effects of in-line devices, where present, shall be considered in the analysis. Conformance with NFPA 13 2010 will satisfy Special Seismic Certification requirements for fire protection piping.

D. Coordination:
1. Do not install seismic restraints until seismic restraint submittals have been reviewed and accepted by the entity/entities identified on the Responsibility Matrix.

2. Verify that multiple systems installed in the same vicinity can be installed without conflict.
3. Verify tolerances between installed items to confirm that unbraced components will not come into contact with restrained equipment or structural members during an earthquake. When contact is possible, provide seismic restraint or provide justification to the satisfaction of the registered design professional in responsible charge of the project that contact will not cause unacceptable damage to the components in contact, their supports, finishes or other elements that are contacted.

PART 2 - GENERAL

2.1 STEEL

A. Structural steel: ASTM A36, A36M, A992.

B. Structural tubing: ASTM A500, Grade B.

C. Steel pipe: ASTM A53/A53M, Grade B.

D. Bolts and nuts: ASTM, A307, A325, A325M, A490, A490M, ASTM A563.

E. Lag bolts and screws: ASME B18.2.1 (ASME B18.2.3.8M), ASTM A563.

F. Powder driven anchors: NES NER-272.

G. Nails: ASTM F1667.

2.2 LIGHT GAGE NON-LOAD BEARING METAL FRAMING

A. Metal studs: A653 Grade 33, ASTM A1011 Grade 33, ASTM A446 Grade A or D, or ASTM A570.

B. Tie wires: ASTM A641/A641M.

C. Screws for fastening to cold-formed metal framing: ANSI B18.6.4.

2.3 WELDING

A. Welding filler metal: AWS A5.1.

2.4 POST-INSTALLED ANCHORS

A. Expansion or sleeve anchors: Pre-qualified for use in seismic applications per ASTM E488.

B. Adhesive anchors: Pre-qualified for use in seismic applications per ASTM E488.

2.5 SEISMIC RESTRAINT CABLES

A. Prestretched galvanized carbon steel cable 7x19 strand core, ASCE-19, ASTM A-1023 1A, ASTM A-603 or stainless steel.

2.6 CHANNEL STRUT AND FITTINGS

A. Strut: ASTM A 1011SS Gr 33 or ASTM A 653 Gr 33.
Fittings: ASTM A 575, A 576, A36 or A 635.

PART 3 - EXECUTION

3.1 CONSTRUCTION, GENERAL

A. For items identified in the Responsibility Matrix furnish and install supports, braces, connections, hardware and anchoring devices to withstand code-required seismic forces and seismic deformations without shifting or overturning. For components with Ip = 1.5, in addition to providing code-required seismic forces and deformations, provide installations capable of providing post-earthquake functionality.

B. Construct seismic restraints and anchorages that do not inhibit thermal expansion and contraction of distribution systems. Utilize ASME Standard B31 when utilizing common supports for both thermal and seismic loading.

C. Maintain fire ratings of assemblies as specified elsewhere or on the drawings in addition to compliance with the criteria set forth below.

3.2 NONSTRUCTURAL EXTERIOR WALL COMPONENTS

A. Nonstructural exterior wall framing
   1. Design framing to resist out-of-plane seismic design force, movement due to temperature changes and relative vertical movement between floors.
   2. Design framing to accommodate code-required inter-story drift without damage that compromises the exterior wall water, moisture and thermal barriers.
   3. Design framing with sufficient out-of-plane stiffness to prevent damage to cladding or veneer when subjected to code-required out-of-plane forces.

B. Veneer
   1. Fasten veneer to substrate to accommodate out-of-plane seismic design force and deformation of supporting framing.
   2. Anchored veneer shall be detailed to prevent moisture penetration from weather that could corrode anchors.

C. Nonstructural prefabricated panels
   1. Design prefabricated panels and connections capable of resisting in-plane and out-of-plane forces and story drift deformations in accordance with ASCE 7.

D. Glazing
   1. Design glazing to resist out-of-plane seismic design force.
   2. Design glazing to accommodate relative displacement to resist fallout as set forth in ASCE 7 Section 13.5.9.1 and not less than 0.5".
   3. Drift limit for glass components shall be determined in accordance with AAMA 501.6 or by engineering analysis.
   4. In lieu of calculations, compliance with design criteria may be established by testing in accordance with AAMA 501.4.

3.3 INTERIOR PARTITIONS

A. Heavy partitions (masonry, glass block, etc.):
   1. Design wall and connections to resist out-of-plane seismic design force.
   2. Provide connection detail between the building structure and heavy partition to accommodate seismic relative displacement between partition and structure.
   3. Maintain fire rating at connections in rated construction.

B. Light partitions (metal stud or wood stud):
   1. Design partitions to resist out-of-plane seismic design force. Design force shall be based on the weight of the partition framing, finishes, soffits, connected casework or equipment, and ceilings for which it provides bracing. Out-of-plane design force shall not be less than 5 psf.
   2. Design partitions to accommodate inter-story drift.
   3. Fasten veneer to partition framing to resist code required forces and deformation of studs.
   4. Where partition does not extend to the structure, the partition height does not exceed 9 feet, the linear weight of the partition does not exceed the product of 10 pounds times the height in feet of the partition and the partition horizontal load does not exceed 5 psf, lateral bracing to the building structural is not required. For all other conditions, provide supplemental bracing or framing to resist out-of-plane seismic design force. Such bracing or framing shall be independent of splayed wire ceiling bracing. Design wall bracing or framing for compatibility with ceiling deflection requirements, fire ratings and architectural treatments.
   5. Design support and bracing to resist seismic design force in any direction.
   6. When attaching items to interior partition walls, install backing plates or blocking as required to deliver load to primary wall framing members. Do not anchor to gypsum wallboard, plaster or other wall finish that has not been engineered to resist imposed loads.

3.4 CEILING

A. Suspended acoustic tile ceilings:
   1. Design and install ceiling in accordance with ASTM E580.
   2. For Seismic Design Categories D, E and F, provide bracing at regular intervals to resist code design forces and limit vertical and lateral movement.
   3. Suspended ceilings with areas less than or equal to 144 square feet and that are surrounded by walls or soffits that are laterally braced to the structure above are exempt from seismic design requirements.
   4. Where ceilings are unbraced or splayed wire bracing is used to resist seismic forces and limit lateral deflections, provide 1 inch clearance around all penetrations through the ceiling sprinkler drops. If flexible sprinkler drops are used and have been certified to accommodate 1 inch of movement, the 1 inch clearance requirement may be waived.
   5. Provide independent support of lighting fixtures, diffusers, cable trays, electrical conduit and other ceiling appurtenances.
   6. The ceiling system weight for determining seismic forces shall be taken as not less than 4 psf.

B. Ceilings directly fastened to structural framing or furred with materials that are directly applied to structural framing
   1. Fasten ceiling to framing to resist the vertical seismic design forces and the weight of the ceiling and all connected light fixtures, sprinklers, HVAC appurtenances.

3.5 PARAPETS, ROOF SCREEN WALLS, APPENDAGES, CANOPIES, MARQUEES, SIGNS, CHIMNEYS, AND STACKS

A. Exterior appendages
   1. Design component and connections to resist out-of-plane seismic design force and code wind force.
   2. Design and provide supplementary framing and/or backing as required to support and anchor to structural framing.
   3. Provide details that do not compromise water, moisture and thermal barriers.

3.6 STAIRWAYS

A. Stairs (including treads, risers, landings and enclosures)
   1. Design components and connections to resist seismic design force Design stairs to accommodate inter-story drift. Acceptable means shall include isolating the stair from experiencing internal stresses due to inter-story drift or provide substantiating evidence to demonstrate that stair can accommodate inter-story drift.
   2. Design and provide supplementary framing as required to support and anchor to structural framing.
   3. Design components and connections to maintain fire rating when subjected to seismic design forces and deformations.

3.7 EQUIPMENT SUPPORT SYSTEMS

A. Suspended architectural and medical equipment and systems
   1. Design support and bracing to resist seismic design force in any direction.
   2. Provide flexible connection between equipment and interconnected components (piping, med gas, electrical wiring, etc).
   3. As an alternate to project-specific design of seismic bracing, use of proprietary restraint systems with a certificate of compliance verified and listed by an accredited inspection body is acceptable. Use of a certified product does not preclude the requirement for shop drawings.

3.8 FREESTANDING WALLS OR FENCES

A. Freestanding walls and fences:
   1. Design wall/fence and foundation capable of resisting out-of-plane seismic design force and code wind forces including out-of-plane forces.

3.9 MECHANICAL AND PLUMBING COMPONENTS

A. Floor and base-mounted mechanical equipment (boilers, furnaces, pumps, chillers, manufacturing, process machinery, etc.), vibration isolated equipment and associated system vibration and seismic controls for connections.

1. Design equipment anchorage to resist seismic design force in any direction.
2. Design vibration and seismic controls for equipment to include base and isolator requirements.
3. Provide flexible connection between equipment and interconnected piping.
4. Where equipment is mounted on vibration isolators and restraints, use isolators and restraints designed for amplified code forces per ASCE 7 and with demonstrated ability to resist required forces including gravity, operational and seismic forces.
5. Provide supplemental steel or concrete base as required for mounting equipment on isolators. Where equipment is not designed to be point loaded, provide base capable of transferring gravity and seismic demands from equipment to isolator base plate anchorage.
6. Where concrete floor thickness is less than required for expansion anchor installation per ICC-ESR, install through bolt in lieu of expansion anchor. Where timber/wood floor or other substrate is inadequate for installation of lag bolts, screws or other mechanical fasteners, furnish and install supplemental framing or blocking to transfer loads to structural elements.

B. Suspended mechanical equipment

1. Design support and bracing to resist seismic design force in any direction.
2. Provide flexible connection between equipment and interconnected piping.
3. Brace equipment hung from spring mounts using cable or other bracing that will not transmit vibration to the structure.
   As an alternate to project-specific design of seismic bracing, use of proprietary restraint systems with a certificate of compliance verified and listed by an accredited inspection body is acceptable. Use of a certified product does not preclude the requirement for shop drawings.

C. Wall-mounted mechanical equipment

1. Design support and bracing to resist seismic design force in any direction.
2. Install backing plates or blocking as required to deliver load to primary wall framing members. Do not anchor to gypsum wallboard, plaster or other wall finish that has not been engineered to resist imposed loads.

D. Piping

1. Provide seismic bracing for piping as required by Section 1.2.
2. Provide supports, braces and anchors to resist gravity and seismic design forces.
3. Design piping and piping risers to accommodate inter-story drift.
4. Provide flexible connections between floor-mounted equipment and suspended piping; between unbraced piping and restrained suspended items; as required for thermal movement; at building separations and seismic joints; and wherever relative differential movements could damage pipe in an earthquake.
5. Brace resiliently-supported pipe with cable bracing or alternate means designed to prevent transmission of vibrations and noise to structure.
6. Brace every run (5’ or more in length) with two transverse and one longitudinal bracing locations. For pipes and connections constructed of ductile materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections) provide transverse bracing at not more than 40 feet on center and longitudinal bracing at spacing not more than 80 feet on center. For pipes and their connections constructed of non-ductile materials (cast iron, no-hub pipe and plastic or non-UL listed grooved coupling pipe), provide transverse bracing at not more than 20 feet on center and longitudinal bracing at spacing not more than 40 feet on center. Alternatively, explicitly design piping and connections to resist gravity and seismic forces and seismic deformations.
7. Provide lateral restraint for risers at not more than 30 feet on center or as required for horizontal runs, whichever is less.
8. Where piping is explicitly exempt from seismic bracing requirements, provide flexible connections between piping and connected equipment, including in-line devices such as VAV boxes and reheat coils.

9. Where piping is explicitly exempt from seismic bracing requirements, install piping such that swinging of the pipes will not cause damaging impact with adjacent components, finishes or structural framing. This will be considered satisfied if there is horizontal clear distance of at least 2/3 the hanger length between subject components. If swinging of exempted piping can cause damaging contact with adjacent components, finishes or structural framing, add swing restraints as required to eliminate contact.
10. As an alternate to project-specific design of seismic bracing, use of proprietary restraint systems with a certificate of compliance verified and listed by an accredited inspection body is acceptable. Use of a certified product does not preclude the requirement for shop drawings.
11. Re-use of existing hangers: Where pipes are being installed in existing facilities, the re-use of existing hangers at locations of seismic bracing will be judged on a case-by-case basis by the registered project design professional. Unless otherwise shown on the drawings, it shall be assumed that all hangers supporting new piping and located at a seismic brace will be installed new.

E. Ductwork
1. Provide seismic bracing for ducts with cross sectional area greater than 6 square feet (independent of the duct contents) and for ducts containing hazardous materials.
2. Provide supports, braces and anchors to resist gravity and seismic design forces.
3. Design ducts and duct risers to accommodate inter-story drift.
4. Provide independent support for in-line devices weighing more than 20 pounds. Provide independent support and bracing for all in-line devices weighing more than 75 pounds. Unbraced piping attached to braced in-line equipment shall be provided with adequate flexibility to accommodate differential displacements.
5. Appurtenances such as dampers, louvers and diffusers shall be positively attached to the ductwork with mechanical fasteners.
6. Duct supports shall be designed to resist not less than 150% of the weight of the duct. For seismic design categories D, E and F, ducts weighing over 10 plf shall not be hung using power driven fasteners.
7. As an alternate to project-specific design of seismic bracing, use of proprietary restraint systems with a certificate of compliance verified and listed by an IAS accredited inspection body or otherwise accepted by the Authority Having Jurisdiction is acceptable. Use of a certified product does not preclude the requirement for shop drawings.

F. Tanks
1. Design tank anchorage to resist seismic design force.
2. Design tank legs or supporting structure to resist seismic design force.
3. Provide flexible connections between tank and interconnected piping.

G. Fire suppression equipment and piping
1. See requirements for suspended piping.
2. See requirements for floor-mounted and wall-mounted equipment.
3. Satisfy requirements of NFPA 13 and the force and displacement requirements of ASCE 7. All components shall be UL listed.
4. Provide end of line restraint as required by NFPA 13.

3.10 ELECTRICAL EQUIPMENT

A. Electrical equipment
1. Design equipment to resist seismic design force in any direction.
2. Batteries on racks shall be provided with acid resistant and corrosion resistant wrap-around restraints or shall be otherwise prevented from movement within battery rack. Racks shall be designed to resist seismic design force.
3. Electrical cabinet design shall comply with the applicable National Electrical Manufacturers Association (NEMA) standards.
4. Supports shall be designed to accommodate the seismic relative displacement between points of support.
5. Where equipment is mounted on vibration isolators and restraints, use isolators and restraints designed for amplified code forces and with demonstrated ability to resist required forces including gravity, operational and seismic forces.

B. Conduit, cable tray, bus duct, raceways, bundled cabling
   1. Provide supports and anchoring so that, upon application of seismic forces and deformations, conduit/cable tray/bus duct/raceway/bundled cabling will not displace sufficiently to cause damage to wires, connections, adjacent or connecting equipment, building members or finishes.
   2. Provide seismic bracing of conduit/cable tray/bus duct/raceway/bundled cabling to resist gravity and seismic design forces.
   3. Provide gravity support for conduit/cable tray/bus duct/raceway/bundled cabling that is independent of suspended ceiling framing.
   4. Design conduit/cable tray/bus duct/raceway/bundled cabling to accommodate inter-story drift.
   5. As an alternate to project-specific design of seismic bracing, use of proprietary restraint systems with a certificate of compliance verified and listed by an accredited inspection body is acceptable. Use of a certified product does not preclude the requirement for shop drawings.
   6. Provide flexible connections wherever relative differential movement could damage conduit/cable tray/bus duct/raceway/bundled cabling in an earthquake.

C. Light fixtures
   1. Design fixture connections to resist seismic design force.
   2. For lights in suspended ceilings:
      a. For lights weighing 56 pounds or less, provide positive mechanical connection between fixtures and ceiling framing to resist seismic design force and gravity load. Provide 2 independent wires at diagonally opposite corners connected to structural framing. For lights weighing more than 56 pounds, provide independent support and bracing.
   3. For lights in light framed ceilings and walls:
      a. For lights weighing 56 pounds or less, provide positive mechanical connection between the fixture and the ceiling/wall framing capable of resisting required gravity and seismic demands. Provide ceiling and wall framing capable of delivering demands from the light fixture to the structure.
   4. For pendant mounted fixtures:
      a. Verify that fixture will not displace in such a manner as to hit adjacent lighting and/or architectural elements or other suspended items. Connection to the structure shall allow a 360 degree range of motion. If pendant fixture could come in contact another item when swinging in a 45 degree arc from vertical in any direction, provide bracing to limit movement and avoid interaction. Design load shall be 1.4 times the operating weight acting down with a simultaneous horizontal load of 1.4 times the operating weight.

D. Communication systems including alarm systems
   1. See requirements for electrical equipment and conduit, cable tray, bus duct, raceways, bundled cabling.

3.11 TRANSPORTATION COMPONENTS

A. Elevator and escalators
   1. Design for conformance with seismic requirements of ASME A17.1.
   2. Design to resist seismic design force specified herein. The more stringent design force shall govern.
   3. Elevator/escalator equipment and controller supports and attachments shall be designed to resist seismic design force.
   4. Elevators travelling with a speed of 150 ft/min or greater shall be provided with a seismic switch in accordance with ASCE 7.
   5. Provide retainer plate at the top and bottom of the car and counterweight.

3.12 STORAGE RACKS AND SHELVING

A. Light duty storage racks and shelving
   1. Provide restraint to resist seismic design force in any direction.
   2. Where restraint is provided by anchorage to a wall, verify that wall has adequate strength to resist anchor demands. Install backing plates or blocking as required to deliver load to primary wall framing members. Do not anchor directly to gypsum wallboard, plaster or other wall finish that has not been engineered to resist imposed loads.

3.13 TELEVISIONS, MONITORS

A. Design support and bracing for wall-mounted and suspended televisions/monitors to resist seismic design force in any direction.

B. Where restraint is provided by anchorage to a wall, verify that was has adequate strength to resist anchor demands. Install backing plates or blocking as required to deliver load to primary wall framing members. Do not anchor directly to gypsum wallboard, plaster or other wall finish that has not been engineered to resist imposed loads.

C. Use mounting brackets certified for resistance to seismic loads.

3.14 DESKTOP COMPUTERS

A. Provide straps, high friction pads, snubbers or other mechanisms as required to resist seismic design forces.

B. All connections shall be readily demountable and shall not damage computer housing.

3.15 COMPUTER AND COMMUNICATIONS RACKS, CABINETS AND BOARDS

A. Design equipment anchorage to resist seismic design force in any direction

B. Where cable tray is connected to the top of racks or cabinets, design seismic restraint to include the tributary weight of the cable tray and components.

C. Interconnect adjacent cabinets to cause them to respond together when resisting lateral forces.

D. Where equipment is supported on raised access flooring, provide bracing and anchorage to the supporting floor below.

3.16 KITCHEN EQUIPMENT

A. Design equipment anchorage to resist seismic design force in any direction.

B. Connections shall enable the equipment to be readily disengaged to enable the equipment to be relocated for cleaning.

C. Provide flexible connections between connected piping and kitchen equipment. If kitchen equipment is restrained with removable “tethers,” provide sufficient flexibility in connections to accommodate full range of movement associated with tether.

3.17 DEMOUNTABLE PARTITIONS

A. Use system engineered for use in regions of seismicity. Anchor to structure to resist seismic design force in any direction.

3.18 SHELF- AND COUNTER-MOUNTED CONTENTS

A. Provide straps, mechanical barriers, high friction pads, snubbers or other mechanisms as required to resist seismic design forces.

B. All connections shall be readily demountable and shall not damage or permanently alter contents.

C. Restraints shall not prevent items from being added to or removed from shelf or counter.

3.19 FIELD QUALITY CONTROL

A. Owner will engage qualified special inspectors in accordance with Section 014533.

1. Qualifications: The minimum category of special inspector required to perform services outlined below are noted by qualifications in parentheses. The definitions of the categories of special inspector are included in Section 014533.

B. Coordinate with independent testing and inspecting agency engaged by the Owner to perform field quality control inspection and testing.

1. Provide necessary scaffolding or temporary platforms required by testing agency in order to perform their work. Such scaffolding or platforms shall comply with safety regulations and shall be acceptable to testing agency.

C. Testing agency shall provide a quality assurance plan as required by ASCE 7, Appendix 11A for installation of the following components and systems per IBC Chapter 17. Confirm the installation of the following complies with details indicated on the Contract Documents and approved shop drawings. A minimum of 3 special inspections shall be performed (pre-construction, mid-construction, and final inspection):
   1. Architectural (Structural 1):
      a. Visually inspect the erection, fastening and anchorage of exterior cladding, veneer and nonbearing walls installed greater than 30 feet in height above grade or a walking surface and/or exterior cladding or veneer weighing more than 5 psf.
      b. Visually inspect the erection of glass in glazed curtain walls and glazed storefronts for glass installed greater than 30 feet in height above grade or a walking surface.
      c. Visually inspect the erection, fastening and anchorage of interior veneer and nonbearing walls installed greater than 30 feet in height above grade or a walking surface, interior veneer weighing more than 5 psf and/or interior nonbearing walls weighing more than 15 psf.
      d. Visually inspect the erection of glass in interior glazed partitions installed greater than 30 feet in height above grade or a walking surface.
      e. Visually inspect the erection and anchorage of suspended ceiling systems. Verify member type and size, verify that bracing elements such as splayed wires and compression struts are installed as detailed; test anchorage to structure.
      f. Visually inspect the installation and anchorage of steel storage racks greater or equal to 8 feet in height. Verify connections and anchorages of the racks to structure. Spot check the connection of horizontal beams to uprights verifying fastener tightness.
      g. Visually inspect the installation and anchorage of access floors. Verify connections and anchorages of access floor framing to structure. Verify connection of access floor framing to support posts. Inspect and proof load test installation of post-installed anchors.
   2. Mechanical, Electrical and Plumbing (Structural 1):
      a. Visually inspect installation and anchorage of heating, ventilating and air-conditioning (HVAC) ductwork containing hazardous materials or smoke control.
      b. Visually inspect installation and anchorage of piping systems and mechanical units containing flammable, combustible or highly toxic materials.
      c. Visually inspect anchorage of electrical equipment used for emergency or standby power systems.
      d. Visually inspect anchorage of all other electrical equipment.
      e. Visually inspect installation and anchorage of vibration-isolated systems and associated seismic restraints where indicated on the construction documents or submittals. All restraints require a nominal clearance of 0.25” or less between the equipment support frame and restraint.

D. Special Seismic Certifications (Structural 1):
   1. Verify that the label, anchorage or mounting conforms to the certificate of compliance for designated seismic systems defined in Section 017325.1.2 and 1.3.

E. Post-Installed Anchorage Inspection and Testing (Technician II):
   1. Refer to individual specification sections and/or structural drawings identified in Section 014533 for special inspection and proof load testing of post-installed anchors.

F. Correct deficiencies in work which inspections and test reports have indicated to be not in compliance with requirements when directed in writing by Architect or Owner.

END OF SECTION

SECTION 017329

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section specifies procedural requirements for cutting and patching.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 012973: Schedule of Values Procedures.

C. Section 013113: Project Coordination.

D. Section 013119: Project Meetings.

E. Section 013213: Construction Schedule.

F. Section 013300: Submittal Procedures.

G. Section 017123: Field Engineering.

H. Section 017836: Warranty Procedures.

1.03 SUBMITTALS

A. The word "cutting" as used in the Contract Documents includes, but is not limited to, cutting, drilling, chopping, and other similar operations and the word "patching" includes, but is not limited to, patching, rebuilding, reinforcing, repairing, refurbishing, restoring, replacing, or other similar operations.

B. Cutting and Patching Proposal: Contractor shall submit a work plan describing procedures well in advance of the time cutting and patching will be performed if the Contract Documents requires approval of these procedures before proceeding. Include the following information, as applicable, in the work plan:

1. Describe the extent of cutting and patching required. Denote how it will be performed and indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance or other significant visual elements.

3. List products to be used and firms or entities that will perform this Work.

4. Indicate dates when cutting and patching will be performed.

5. Utilities: List utilities that cutting and patching operations will disturb or affect. List utilities to be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.

7. Review by Architect and DSA prior to proceeding with cutting and patching does not waive Architect right to later require complete removal and replacement of defective Work.

1.04 QUALITY ASSURANCE

A. Requirements for structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval from Architect and DSA of the cutting and patching work plan before cutting and patching the following structural elements:

a. Foundation construction.

b. Bearing and retaining walls.

c. Structural concrete.

d. Structural steel.

e. Lintels.

f. Timber and primary wood framing.

g. Structural decking.

h. Stair systems.

i. Miscellaneous structural metals.

j. Exterior curtain-wall construction.

k. Equipment supports.

l. Piping, ductwork, vessels, and equipment.

m. Any other structural systems not listed above.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain review of the cutting and patching work plan before cutting and patching the following operating elements or safety related systems:

a. Primary operational systems and equipment.

b. Air or smoke barriers.

c. Water, moisture, or vapor barriers.

d. Membranes and flashings.

e. Fire protection systems.

f. Noise and vibration control elements and systems.

g. Control systems.

h. Communication and/or data systems.

i. Conveying systems.

j. Electrical wiring systems.

k. Any other operating systems not listed above.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the opinion of Architect, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1.05 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

1. Before proceeding, meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

A. Temporary support: Provide adequate temporary support of existing improvements or Work to be cut.

B. Protection: Protect existing improvements and Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of existing improvements or Work that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Where the Work requires sandblasting of existing surfaces in order to receive new materials secured by cementitious, adhesive or chemical bond, completely remove existing finishes, stains, oil, grease, bitumen, mastic and adhesives or other substances deleterious to the new bonding or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

3.03 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay. Carefully remove existing Work to be salvaged and/or reinstalled. Protect and store for reuse into the Work. Verify compatibility and suitability of existing substrates before starting the Work.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill. Saw cut reinforcing bars and paint ends per approved submittal except where bonded into new concrete or masonry.

4. Comply with requirements of applicable Sections of Divisions 31, 32, and 33 where cutting and patching requires excavating, backfill, and recompaction.

5. Woodwork: Cut and or remove to a panel or joint line.

6. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and seal watertight.

7. Glass: Remove cracked, broken, or damaged glass and clean rebates and stops of setting materials.

8. Plaster: Cut back to sound plaster on straight lines, and back bevel edges of remaining plaster. Trim existing lath and prepare for new lath.

9. Gypsum: Cut back on straight lines to undamaged surfaces with at least two opposite cut edges centered on supports.

10. Acoustical ceilings: Remove hanger wires and related appurtenances where ceilings are not scheduled to be installed.

11. Tile: Cut back to sound tile and backing on joint lines.

12. Flooring: Completely remove flooring and clean backing of prior adhesive.

13. Curb, gutters, and flat work: Saw cut joint to nearest joint.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with required tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation. Verify conditions of existing substrates prior to executing Work.

2. Restore exposed finishes of patched areas and extend finish restoration into retaining adjoining construction in a manner that will eliminate all evidence of patching and refinishing.

3. Non-Structural Concrete Flatwork: Finish placed concrete to match existing unless noted otherwise. Concrete shall have a compressive strength of 2,500 psi where installed to repair and match existing improvements, unless noted otherwise.

4. Metal Fabrications: Items to remain exposed shall have their edges cut and ground smooth and rounded.

5. Sheet Metal: Replace removed or damaged sheet metal items for new Work.

6. Glass: Install matching glass and re-seal exterior window assemblies.

7. Lath and Plaster: Install new lath materials to match existing and fasten to supports at 6-inch centers. Provide a 6-inch lap where new lath adjoins existing lath. Fasten new lath as required for new Work. Restore paper backings as required. Apply a bonding agent on cut edges of existing plaster. Apply three coat plaster of the type, thickness, finish, texture, and color to match existing.

8. Gypsum: Fasten cut edges of wallboard. Install patches with at least two opposite edges centered on supports and secure at 6-inch centers. Tape and finish joints and fastener heads. Patching shall be non-apparent when painted or finished.

9. Acoustical Ceilings: Comply with the requirements for new Work specified in related sections of the Contract Documents.

10. Resilient Flooring: Completely remove flooring and prepare substrate for new material.

11. Painting: Prepare areas to be patched, patch and paint as specified under related sections of the Contract Documents.

3.04 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged coverings to their original condition.

END OF SECTION 017329

SECTION 017419

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Preparation and implementation, including reporting and documentation, of a Waste Management Plan for reusing, recycling, salvage or disposal of non-hazardous waste materials generated during demolition and new construction (Construction and Demolition (C&D) Waste), to foster material recovery and re-use and to minimize disposal in landfills.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 013229: Project Forms.

C. Section 013300: Submittal Procedures.

D. Section 015000: Construction Facilities and Temporary Controls.

1.03 REFERENCES

A. California Integrated Waste Management Act (IWMA) of 1989 (AB 939).

B. California Code of Regulations Title 14, Section 18700 et seq.

C. California Green Building Standards Code, Part 11 of Title 24.

1.04 SYSTEM DESCRIPTION

A. Collection and separation of all C&D waste materials generated on-site, reuse or recycling on-site, transportation to approved recyclers or reuse organizations, or transportation to legally designated landfills, for the purpose of recycling salvaging and reusing a minimum of 75% of the C&D waste generated.

1.05 SUBMITTALS

A. Per Section 01 32 29, Contractor to provide a C&D Waste Management Plan within fifteen (15) calendar days after the Notice to Proceed and prior to any waste removal. Submit the following to the District Representative for review and approval:

1. Materials to be recycled, reused, or salvaged, either onsite or offsite.

2. Estimates of C&D waste quantity (in tons) by type of material. (If waste is measured by volume, give factors for conversion to weight in tons.)

3. Procedures for recycling and reuse program.

4. Permit or license and location of Project waste-disposal areas.

5. Site plan for placement of waste containers.

B. Per Section 01 32 29, Contractor to provide a C&D Waste Management Monthly Progress Report, summarizing waste generated by Project and submitted monthly with Application for Payment. Include:

1. Firm(s) accepting the recovered or waste materials.

2. Type and location of accepting facilities (landfill, recovery facility, used materials yard, etcetera). If materials are reused or recycled on the Project site, location should be designated as “on-site reuse and recycling”.

3. Type of materials and net weight (tons) of each.

4. Value of the materials or disposal fee paid.

5. Attach weigh bills and other documentation confirming amount and disposal location of waste materials.

C. C&D Waste Management Final Compliance Report: Final update of Waste Management Plan to provide summary of total waste generated by Project.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 IMPLEMENTATION

A. Implement approved Waste Management Plan including collecting, segregating, storing, transporting and documenting each type of waste material generated, recycled or reused, or disposed in landfills.

B. Designate an on-site person to be responsible for instructing workers and overseeing the sorting and recording of waste/recyclable materials.

C. Include waste management and recycling in worker orientation and as an agenda item for regular Project meetings.

D. Recyclable and waste bin areas shall be limited to areas approved on the Waste Management Plan. Keep recycling and waste bins neat and clearly marked to avoid contamination of materials.

END OF SECTION 017419

SECTION 017700

CONTRACT CLOSEOUT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for Contract Closeout, including but not limited to, the following:

1. Inspection procedures.
2. Project record documents submittal.
3. Operation and maintenance manual submittal.
4. Owner orientation and instruction.
5. Final cleaning.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 012976: Progress Payment Procedures.

C. Section 013213: Construction Schedule.

D. Section 013229: Project Forms.

E. Section 013300: Submittal Procedures.

F. Section 014525: Testing, Adjusting, and Balancing of HVAC.

G. Section 015000: Construction Facilities and Temporary Controls.

H. Section 017419: Construction Demolition and Waste Management.

I. Section 017836: Warranties.

J. Section 019113: General Commissioning Requirements

1.03 REQUIREMENTS FOR PREPARATORY FINAL INSPECTION

A. All contract work completed.

B. Remove temporary facilities from the Project site.

C. Thoroughly clean the Buildings and Project site.

D. All mechanical equipment shall operate quietly and free from vibrations. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration in the occupied areas of the buildings. Provide additional brackets, bracing, or other methods to prevent objectionable noise or vibration. All systems shall operate without humming, surging, or rapid cycling.

E. Properly mount all operation instructions for equipment and post as specified in their respective Sections.

F. Job Record specifications and prints “as builts” shall be completed, signed, and submitted to the District Representative as specified in respective Specification Sections.

G. Submit to the District Representative, the material and equipment maintenance instructions, as specified in the body of the Specification Sections.

H. Submit to the District Representative, all warranties, guarantees, and bonds, as specified in the body of the Specification Sections.

I. When requested, submit certificates indicating payment of all debts and Claims arising from the Work.

J. Deliver all tools which are a permanent part of equipment installed in the Work to the District Representative.

K. Deliver all keys (construction and permanent), properly identified, to the District Representative.

L. Deliver all extra stock items, as directed by the District Representative, to a location within the District.

M. Contractor determined the Work has been completed. All life safety items are completed and in working order.

N. Electrical circuits scheduled in panels and disconnect switches labeled.

O. Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.

P. Work cleaned, free of stains, scratches, marks, dirt, superfluous labels, and other foreign matter, replacement of damaged and broken material.

Q. Finished and decorative work shall have marks, dirt and superfluous labels removed.

R. Final cleanup complete.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 SUBSTANTIAL COMPLETION

A. Inspection Procedures: After all requirements preparatory to the final inspection have been completed, as herein specified in the Specification Sections, the Contractor will notify the District Representative, Architect, and Project Inspector to perform the final inspection.

1. If after inspection of the Work, District Representative does not consider the Work complete, District Representative will notify Contractor.

2. If after inspection, District Representative considers the Work complete, Architect shall prepare a Punch List of items to be corrected.

B. Re-inspection Procedures: Project Inspector, District Representative, Contractor and Architect will inspect the Work upon notice the Work, including final inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to District Representative.

1. Upon completion of inspection, District Representative will recommend Final Completion. If the Work is incomplete, District Representative will advise Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Final Completion.

2. If necessary, re-inspection will be repeated, but may be assessed against Contractor if Owner is subject to additional professional service and or additional costs of inspection.

3.02 PROJECT RECORD DOCUMENT SUBMITTAL

A. General: Do not use project record documents for construction purposes. Protect record documents from deterioration and loss. Provide access to record documents for Architect, Project Inspector, and District Representative reference during normal working hours. Project record document shall be updated on a daily basis prior to work being concealed. Prior to submitting each application for payment, secure Project Inspector approval of project record documents.

B. Record Drawings: Maintain a clean, undamaged set of prints of Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies from the Work as originally shown. Mark the Drawing that is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location

on the Drawings. Provide detailed and accurate field dimensions for concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work. Date and number entries in the same format as submitted. Call attention to entry by a "cloud" around the affected areas.

2. Mark new information important to Owner but was not shown on Drawings or Shop Drawings.

3. Utility location and depth below finished grade and above ceilings and attic spaces shall be fully dimensioned and indicated on record drawings. Dimensions shall be measured from building lines or permanent landmarks and shall be triangulated to those features.

4. Note related Change Order or Construction Directive numbers where applicable. RFI submissions shall be referenced on each affected sheet, Drawing and Shop Drawing.

5. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

6. Prior to Contract Completion of the Work, review of the project record drawings by Architect; prepare a final set of project record drawings and submit to Architect.

C. Record Specifications: Maintain one (1) complete copy of the Specifications, including Addenda. Include with the Specifications two copies of other written Contract Documents, such as Change Orders or Construction Directives issued during construction.

1. Mark these record documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.

2. Give particular attention to substitutions and selection of options and information on concealed Work that cannot otherwise be readily discerned later by direct observation.

3. Note related record document information with Product Data.

4. Prior to Contract Completion of the Work, submit record Specifications to Architect for Owner records.

D. Record Product Data: Maintain one (1) copy of each Product Data submittal. Note related Change Orders and Construction Directives and mark-up of record drawings and Specifications.

1. Mark these documents to illustrate significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the Project site and from the manufacturer's installation instructions and recommendations.

2. Provide detailed and accurate information regarding concealed products and portions of Work that cannot otherwise be readily discerned later by direct observation.

3. Prior to Contract Completion, submit complete set of record Product Data to Architect for Owner records.

E. Record Samples: Immediately prior to Substantial Completion, Contractor shall meet with Architect and District Representative at the Project site to determine which Samples are to be transmitted to Owner for record purposes. Comply with District Representative instructions regarding delivery to Owner storage area.

F. Miscellaneous Records: Refer to other Specification sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Prior to the date of Contract Completion, complete and compile miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to Architect for Owner records.

G. Maintenance Manuals: Shall be submitted and approved by the Architect prior to Commissioning and startup of the corresponding system/product. Organize operation and maintenance data into suitable three (3) sets of manageable size. Bind properly, indexed data in individual, heavy-duty, three-inch 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Provide a table of contents in front

and all items shall be indexed with tabs. Each manual shall also contain a list of subcontractors, with their scope of work, addresses, phone numbers, email, and the names of persons to contact in cases of emergency. Identifying labels shall provide names of manufactures, their addresses, ratings, and capacities of equipment and machinery. Submit to Architect for Owner records. Include the following types of information.

1. Table of Contents (in each binder)
2. Emergency instructions.
3. Spare parts list.
4. Copies of warranties.
5. Wiring diagrams.
6. Recommended "turn-around" cycles.
7. Inspection procedures.
8. Shop Drawings and Product Data.
9. Fixture lamping schedule.
10. Note which items also have video training.

H. Verified Reports: Construction progress of the Work shall be reported to DSA via a duly verified report as per Title 24, Part 1, Sections 4-336 and 4-343.c of the California Building Standards Commission's, California Administrative Code.

I. Provide one (1) electronic version of all documents listed above on one (1) flash drive to the District Representative.

3.03 OPERATION AND MAINTENANCE:

A. Operation and Maintenance Instructions: Prior to Substantial Completion, arrange for each installer of equipment that requires regular operation and maintenance to meet with designated Owner personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Spare parts and materials.
3. Tools.
4. Lubricants.
5. Fuels.
6. Identification systems.
7. Control sequences.
8. Hazards.
9. Cleaning.
10. Warranties and bonds.
11. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.

5. Safety procedures.

6. Economy and efficiency adjustments.

7. Effective energy utilization.

C. Notice of Termination: Contractor shall submit a Notice of Termination (NOT) to the District for District issuance to the local Regional Water Quality Control Board (RWQCB). Provide a copy of NOT to District Representative.

3.04 FINAL CLEANING

A. General: The Contractor shall be solely responsible for all cleaning operations during the Project.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for a certificate of Substantial Completion.

a. Remove labels that are not permanent labels.

b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

c. Clean exposed exterior and interior hard-surfaced finished to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

e. Clean the Project site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

f. Complete the final filter change replacing all HVAC filters.

END OF SECTION 017700

SECTION 017836

WARRANTY PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This Section includes procedural requirements for warranties, including manufacturers and installer's standard warranties on products and special product warranties.

1.02 RELATED SECTIONS

A. Facilities Lease Agreement.

B. Section 013229: Project Forms

C. Section 017329: Cutting and Patching.

D. Division 2 through Division 33.

1.03 SUBMITTALS

A. Form of Submittal: In accordance with the Facilities Lease Agreement, compile two (2) copies of each required final warranty properly executed by Contractor, or by Contractor and Subcontractor, installer, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Specifications and provide a table of contents.

B. Bind warranties and bonds in heavy-duty, commercial-quality, durable three ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11 paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the item or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.

2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title and/or name, and name of Contractor.

3. When warranted Work requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

C. Provide one (1) electronic version of all documents listed above on one (1) flash drive to the District Representative.

D. Provide a Warranty Guarantee Form on the District's form provided in Section 01 32 29 as part of the Closeout documentation.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION (Not applicable)

END OF SECTION 017836

SECTION 018113
SUSTAINABLE DESIGN REQUIREMENTS - LEED FOR NEW CONSTRUCTION AND MAJOR RENOVATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED[**-Certified**] [**Silver**] [**Gold**] [**Platinum**] certification based on USGBC's "LEED 2009 for New Construction & Major Renovations." (See attached certification planning spreadsheet).). Achievement of any particular pre-requisite, credit, group of credits or achievement of any certification level is not guaranteed because there are many factors, actions and decisions outside the control of design and construction team that can affect achievement of the certification.

1. Contractor and subcontractors must prepare written plans for fulfillment of LEED credits. See attached LEED Certification Planning Spreadsheet.
2. Other LEED prerequisites and credits needed to obtain LEED certification depend on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits should be considered when evaluating substitution requests and comparable product requests.
3. Some LEED requirements depend on actions that are not Work of this Contract.
4. A copy of the “LEED NC 2009 Certification Planning Matrix” is attached at the end of this Section for information only.

B. Assist Owner and Owner’s Agent for LEED with providing documentation, completing LEED templates so project can be submitted for LEED 2009 for New Construction & Major Renovations certification.

C. Prepare required documentation and submittals described in this Section, throughout the Contract Documents and as documented in the LEED 2009 for New Construction & Major Renovations reference guide and online submittal portal.

D. This Section governs entirety of Construction Documents and Work of this Contract must conform to requirements of this Section whether or not this Section is referenced by other Sections in Construction Documents.

E. Conform to the requirements of the Living Build Challenge 2.1 for avoiding materials listed on the Red List, except as included in Construction Documents.

1.2 LEED PREREQUISITES

A. Prerequisite SS 1, Construction Activity Pollution Prevention: Requires an erosion and sedimentation control plan complying with certain EPA recommendations or local requirements if more stringent.

B. Prerequisite SS 2, Environmental Site Assessment: Requires that a Phase I Environmental Site Assessment to determine if there is site contamination, and if suspected, conduct a Phase II Environmental Site Assessment.

C. Prerequisite WE 1, Water Use Reduction: Requires increased water efficiencies within buildings employing strategies to reduce water usage by 20 percent from baseline buildings.

D. Prerequisite WE 2, Minimize Potable Water Use for Medical Equipment Cooling: Requires all medical equipment will not be using potable water for cooling, except for emergency backup systems.

E. Prerequisite EA 1, Fundamental Commissioning of the Building Energy Systems: Requires that commissioning be performed to verify that the building’s energy related systems are installed, calibrated and perform according to the owner’s project requirements (OPR), basis of design , and construction documents.

F. Prerequisite EA 2, Minimum Energy Performance: Requires compliance with the mandatory provisions and the prescriptive requirements or performance requirements of ASHRAE/IESNA Standard

90.1-2007 (with errata but without amendments). It affects the selection of materials that make up the building envelope, mechanical and electrical systems.

G. Prerequisite EA 3, Fundamental Refrigerant Management: Requires Zero use of CFC-based refrigerants in new base building HVAC&R systems. Complete a comprehensive CFC phase-out conversion prior to project completion if existing base building HVAC equipment, containing CFCs, is reused.

H. Prerequisite MR 1, Storage & Collection of Recyclables: Requires the provision of a dedicated area for the collection and storage of non-hazardous materials for recycling.

I. Prerequisite MR2, PBT Source Reduction – Mercury: Requires to reduce mercury-containing products and devices and mercury discharge through product substitution, capture and recycling.

J. Prerequisite EQ 1, Minimum IAQ Performance: Requires compliance with Sections 4 through 7 in ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality. Naturally ventilated buildings shall comply with ASHRAE 62.1-2004, paragraph 5.1.

K. Prerequisite EQ 2, Environmental Tobacco Smoke (ETS) Control: Requires that smoking be prohibited within the building and that designated outside smoking areas be located at least 50 feet away from entries, outdoor-air intakes, bus stops, qualifying places of respite, operate windows and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building .

1.3 DEFINITIONS

A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

B. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

C. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.

1.5 ACTION SUBMITTALS

A. This Contract includes administrative submittal requirements under each Section for LEED information required to demonstrate compliance with LEED pre-requisites and credits. This Contract includes providing completed USGBC LEED letter template online and hardcopy documentation for credits assigned to Contractor for the construction phase. Cooperate with others assigned to submit letter templates and provide information or documents needed to complete those templates.

B. General: Provide LEED submittals required by Specification Sections. This contract includes providing LEED submittals required by LEED online and LEED 2009 for New Construction & Major Renovations Reference Guide whether or not specified in individual Specification Sections.

C. Provide documentation required for LEED certification in addition to submittals required for normal construction approvals.

D. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project, excluding mechanical, electrical, and plumbing components, and specialty items such as elevators and equipment. Include statement indicating total cost for wood-based materials used for Project.

E. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.

F. LEED Documentation Submittals:

1. Credit EA 5: Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over [**time**] [**a period of time of not less than one year of postconstruction occupancy**].
2. Credit MR 2: Comply with Section 017419 "Construction Waste Management and Disposal."
3. Credit MR 3: Receipts for salvaged and refurbished materials used for Project, indicating sources and costs for salvaged and refurbished materials.
4. Credit MR 4: Product data and certification letter from product manufacturers indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating material cost for each product having recycled content.
5. Credit MR 5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
6. Credit MR 7: Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
7. Credit IEQ 3.1:
   a. Construction indoor-air-quality management plan.
   b. Product data for temporary filtration media.
   c. Product data for filtration media used during occupancy.
   d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
8. Credit IEQ 3.2:
   a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
   b. Product data for filtration media used during flush-out and during occupancy.
   c. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.
9. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used.
10. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used.
11. Credit IEQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For LEED coordinator.

B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
   1. Furniture.
   2. Plumbing.
   3. Mechanical.
   4. Electrical.
   5. Specialty items such as elevators and equipment.
   6. Wood-based construction materials.

C. LEED Action Plan and Progress Reports: Provide action plan and status reports of LEED credit compliance for each pre-requisite and credit as agreed at commencement of Work and at least monthly thereafter. Prior to sub-contracting, provide a report showing compliance with each LEED credit targeted. In addition, submit regular reports comparing actual construction and purchasing activities with pre-requisites and credits shown on spreadsheet for provided by Architect:
   1. Credit MR 2: Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
   2. Credit MR 3: List of proposed salvaged, refurbished, and reused materials. Identify each material that will be salvaged, refurbished, or reused, including its source, cost, and replacement cost if the item was to be purchased new.
   3. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
   4. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
   5. Credit MR 7: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
   6. Credit IEQ 3.1: Construction indoor-air-quality management plan.

D. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
   1. Credit MR 2: Waste reduction progress reports complying with Section 017419 "Construction Waste Management and Disposal."
   2. Credit MR 3: Salvaged, refurbished, and reused materials.
   3. Credit MR 4: Recycled content.
   4. Credit MR 5: Regional materials.
   5. Credit MR 7: Certified wood products.

1.7 QUALITY ASSURANCE

A. Construction Team LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator. Construction team LEED coordinator for the site will coordinate with and cooperate with Project LEED Administrator.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.2 MATERIALS COST INFORMATION

A. Construction Materials Cost Data
   1. Provide a Construction Materials Cost Data Report summarizing total cost of all construction materials used.
   2. Breakdown the materials cost by Specification Division.
   3. Provide cost for individual materials with detail needed to show compliance with applicable MR credits.

4. Provide Construction Materials Cost Data Report at end of construction.

2.3 SALVAGED, REFURBISHED, OR REUSED MATERIALS

A. Credit MR 3: Not less than [**5**] [**10**] percent of building materials (by cost) shall be salvaged, refurbished, or reused materials. The following materials may be salvaged, refurbished, or reused materials:

1. <Insert list of materials>.

2.4 RECYCLED CONTENT OF MATERIALS

A. Credit MR 4: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of [**10**] [**20**] percent of cost of materials used for Project.

1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
2. Do not include [**furniture,**]plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

2.5 REGIONAL MATERIALS

A. Credit MR 5: Not less than [**10**] [**20**] percent of building materials (by cost) shall be regional materials.

2.6 CERTIFIED WOOD

A. Credit MR 7: Not less than 50 percent (by cost) of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
   a. Rough carpentry.
   b. Miscellaneous carpentry.
   c. Heavy timber construction.
   d. Wood decking.
   e. Metal-plate-connected wood trusses.
   f. Structural glued-laminated timber.
   g. Finish carpentry.
   h. Architectural woodwork.
   i. Wood paneling.
   j. Wood veneer wall covering.
   k. Wood flooring.
   l. Wood lockers.
   m. Wood cabinets.
   n. Furniture.

2.7 LOW-EMITTING MATERIALS

A. Credit IEQ 4.1: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Metal-to-Metal Adhesives: 30 g/L.
3. Adhesives for Porous Materials (Except Wood): 50 g/L.
4. Subfloor Adhesives: 50 g/L.
5. Plastic Foam Adhesives: 50 g/L.
6. Carpet Adhesives: 50 g/L.
7. Carpet Pad Adhesives: 50 g/L.
8. VCT and Asphalt Tile Adhesives: 50 g/L.

9. Cove Base Adhesives: 50 g/L.
10. Gypsum Board and Panel Adhesives: 50 g/L.
11. Rubber Floor Adhesives: 60 g/L.
12. Ceramic Tile Adhesives: 65 g/L.
13. Multipurpose Construction Adhesives: 70 g/L.
14. Fiberglass Adhesives: 80 g/L.
15. Contact Adhesive: 80 g/L.
16. Structural Glazing Adhesives: 100 g/L.
17. Wood Flooring Adhesive: 100 g/L.
18. Structural Wood Member Adhesive: 140 g/L.
19. Single-Ply Roof Membrane Adhesive: 250 g/L.
20. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine-covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
21. Top and Trim Adhesive: 250 g/L.
22. Plastic Cement Welding Compounds: 250 g/L.
23. ABS Welding Compounds: 325 g/L.
24. CPVC Welding Compounds: 490 g/L.
25. PVC Welding Compounds: 510 g/L.
26. Adhesive Primer for Plastic: 550 g/L.
27. Sheet-Applied Rubber Lining Adhesive: 850 g/L.
28. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight.
29. Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight.
30. Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight.
31. Other Adhesives: 250 g/L.
32. Architectural Sealants: 250 g/L.
33. Nonmembrane Roof Sealants: 300 g/L.
34. Single-Ply Roof Membrane Sealants: 450 g/L.
35. Other Sealants: 420 g/L.
36. Sealant Primers for Nonporous Substrates: 250 g/L.
37. Sealant Primers for Porous Substrates: 775 g/L.
38. Modified Bituminous Sealant Primers: 500 g/L.
39. Other Sealant Primers: 750 g/L.

B. Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    1. Flat Paints and Coatings: VOC not more than 50 g/L.
    2. Nonflat Paints and Coatings: VOC not more than 150 g/L.
    3. Dry-Fog Coatings: VOC not more than 400 g/L.
    4. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
    5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
    6. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
    7. Pretreatment Wash Primers: VOC not more than 420 g/L.
    8. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
    9. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
    10. Floor Coatings: VOC not more than 100 g/L.
    11. Shellacs, Clear: VOC not more than 730 g/L.
    12. Shellacs, Pigmented: VOC not more than 550 g/L.
    13. Stains: VOC not more than 250 g/L.

C. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.

PART 3 EXECUTION

3.1 [REFRIGERANT] [AND] [CLEAN-AGENT FIRE-EXTINGUISHING-AGENT] REMOVAL

A. Prerequisite EA 3: Remove CFC-based refrigerants from existing HVAC&R equipment indicated to remain and replace with refrigerants that are not CFC based. Replace or adjust existing equipment to accommodate new refrigerant as described in HVAC Sections.

B. Credit EA 4: Remove clean-agent fire-extinguishing agents that contain HCFCs or halons and replace with agent that does not contain HCFCs or halons. See Section 212200 "Clean-Agent Fire-Extinguishing Systems" for additional requirements.

3.2 MEASUREMENT AND VERIFICATION

A. Credit EA 5: Implement measurement and verification plan consistent with [**Option B: Energy Conservation Measure Isolation**] [**Option D: Calibrated Simulation, Savings Estimation Method 2**] in the EVO's "International Performance Measurement and Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction," and as further defined by the following:

1. <Insert measurement and verification plan design team submitted for credit>.

B. If not already in place, install metering equipment to measure energy usage. Monitor, record, and trend log measurements.

C. Evaluate energy performance and efficiency by comparing actual to predicted performance.

D. Measurement and verification period shall cover at least one year of postconstruction occupancy.

3.3 CONSTRUCTION WASTE MANAGEMENT

A. Credit MR 2: Comply with Section 017419 "Construction Waste Management and Disposal."

3.4 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. Credit IEQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."

1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 015000 "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
2. Replace all air filters immediately prior to occupancy.

B. Credit IEQ 3.2:[Comply with one of the following requirements:]

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
   a. <Insert operating requirements>.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate determined in Prerequisite IEQ 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.
   a. <Insert operating requirements>.
3. Air-Quality Testing:
   a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "Green Building Design and Construction Reference Guide."
   b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

1) Formaldehyde: 27 ppb.
2) Particulates (PM10): 50 micrograms/cu. m.
3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.

d. Air-sample testing shall be conducted as follows:
   1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
   2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
   3) Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
   4) Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION

LEED NC 2009

Santa Ana - Science Center
Santa Ana, California

Updated for 95% CD

PRELIMINARY TOTAL POINTS	**61**	**6**	**43**
PREREQUISITES	***8 req'd***	**met**	
CERTIFIED	***40-49***	**YES**	
SILVER	***50-59***	**YES**	
GOLD	***60-79***	**YES**	
PLATINUM	***80+***	**need 19**	

Building Area	67,780
Site Area	113,140
Building Footprint	23,750
Vegetated Open Space	28,975
Parking Stalls on Site	46
FTE Occupants	36
Visitors / Students (at Peak)	670

	LEED 2009 Credit	Points	Point Status: Targeted	Point Status: Investigation & Verification Req'd	Point Status: Not Targeted	Compliance Requirements	Responsibility for Compliance / Documentation	Notes & Resources
SS	**SUSTAINABLE SITES**	**26**	**22**	**0**	**4**			
PR 1	Construction Activity Pollution Prevention	X	X			Erosion control plan per typical regulatory standards	Civil / Contractor Implementation & Documentation	Per E&S sheets in civil docs and SWPP regulations.
1	Site Selection	1	1			Do not develop on farmland, flood plain, habitat, wetland or water, or park lands	Civil	Previously developed, meets requirements.
2	Development Density & Community Connectivity	5	5			Identify residential area & 10 human services available within a 1/2 mile radius of project site.	Architect	Residential and services available.
3	Brownfield Redevelopment (Asbestos Abatement by alternate compliance)	1	1			Describe site contamination and remediation steps taken. (Testing and removal reports per recognized standards for asbestos abatement.)	Owner / Haz Mat Consultant	Assumes asbestos abatement required in existing buildings based on age of construction.
4.1	Public Transportation Access	6	6			Show pedestrian travel distances of 1/2 mile to rail transit or 1/4 mile to 2 bus routes/stops.	Architect	Several bus routes/stops on campus
4.2	Bicycle Storage and Showers	1			1	Provide secure bike storage for 5% of occupants and shower facilities for 0.5% of occupants.		No showers in building. Would require 40 bike racks.
4.3	Low Emitting & Fuel Efficient Vehicles	3	3			Support and encourage efficient vehicle use by providing vehicles, providing preferred parking for vehicles, or providing alternate fuel stations.	Owner / Civil / Architect	Requires 3 preferred stalls (closest to building), signed for LEV vehicles. Owner to verify implementation.
4.4	Parking Capacity	2	2			Limit parking to minimum local zoning requirements and provide preferred parking for carpools, or add no parking to the site.	Owner / Civil / Architect	Requires 3 preferred stalls (closest to building), signed for carpool vehicles. Owner to verify implementation.
5.1	Protect or Restore Habitat	1			1	Limit site disturbance on greenfield sites, or protect/restore 50% of site area on previously developed sites.		NA
5.2	Maximize Open Space	1	1			Provide vegetative open space for 20%-25% of site area, depending on local zoning codes.	Civil / Landscape	Site is compliant. Need to verify zoning code for open space.
6.1	Storm Water Quantity Control	1	1			Reduce run-off quantity by reducing impervious surfaces or increasing on-site infiltration. Calculations for compliance depend on existing site conditions and other site specific factors.	Civil	Large infiltration structure should yield compliance.
6.2	Storm Water Quality Control	1	1			Capture and treat run-off from 90% of average annual rainfall.	Civil	Large infiltration structure should yield compliance.
7.1	Heat Island Non-Roof	1			1	Provide shade, reflectance or open grid system for 50% of hardscape, or place 50% of parking under cover.		NA - site paving is mostly asphalt
7.2	Heat Island Roof	1	1			Use highly reflective roofing material for 75% of roof area, or green roof for 50% of roof area.	Architect	Compliance via combination of white TPO and reflectance coated BUR roofing.
8	Light Pollution Reduction	1			1	Provide lighting controls on interior building lighting during night hours. Reduce and control exterior lighting to comply with ASHRAE 90.1-2007 standards.	Electrical / Civil	Likely not possible given walkways around site
WE	**WATER EFFICIENCY**	**10**	**5**	**0**	**5**			
PR1	Water Use Reduction - 20% reduction	X	X			Reduce potable water use by 20% from a calculated baseline.	Plumbing	Low flow fixtures comply
1.1	Water Efficient Landscaping - Reduce by 50%	2	2			Reduce potable water use for landscape irrigation by 50% from a baseline calculation.	Landscape	Drip irrigation and efficient controller spec'd.
1.2	Water Efficient Landscaping - Reduce to zero	2			2	Reduce potable water use for landscape irrigation to zero or use no irrigation.		NA
2	Innovative Wastewater Technologies	2			2	Reduce wastewater use by 50%, or treat 50% on site.		NA
3	Water Use Reduction - 30% reduction	2	2			Reduce potable water use from a calculated baseline.	Plumbing	Use of 0.125 gpf urinal required, plus metering faucets should make 35% achievable.
	Water Use Reduction - 35% reduction	1	1					
	Water Use Reduction - 40% reduction	1			1			
EA	**ENERGY AND ATMOSPHERE**	**35**	**8**	**4**	**23**			
PR1	Fundamental Commissioning	X	X			Contract with qualified commissioning agent for basic scope of commissioning services.	Mechanical / Comm Agent	Comm agent can be from design firm or owner but not a project team member. Owner to verify implementation.
PR2	Minimum Energy Performance - 10% / 5%	X	X			Improve building energy performance by 10% over ASHRAE 90.1-2007 energy standard.	Mechanical / Electrical	New building will comply. Existing central plant will impact.
PR3	Fundamental Refrigerant Management	X	X			No CFC refrigerants used in building HVAC&R equipment. Phase out plan for existing CFC equipment in existing buildings.	Mechanical / Kitchen	New equipment will comply. Need to verify CP chillers compliance.
1.1	Optimize Energy Performance - 12%(new) / 8%(reno)	1	1			Improve building energy performance beyond the baseline ASHRAE 90.1-2007 energy standard.	Mechanical / Electrical / Energy Consultant	Assumes not much efficiency possible due to difficulty modeling a lab building. Amount of exhaust and make-up air will be a burden.
	14% / 10%	1	1					
	16% / 12%	1	1					
	18% / 14%	1	1					
	20%+	15		1	14			
2	On-Site Renewable Energy - 1%+ of energy	7			7	Produce on-site energy to offset a percentage of total yearly energy use. On-site energy sources include solar, wind, geothermal, hydro, biomass.	Owners / Mechanical / Electrical / Architect	Solar-ready requirements met. Installation of PV panels would earn credit.
3	Enhanced Commissioning	2	2			Contract with qualified commissioning agent for extensive scope of commissioning services.	Owner / Comm Agent	Comm agent can not be from design firm, but may be owner personnel. Enhanced tasks to be included in Cx contract. Owner to verify implementation.
4	Enhanced Refrigerant Management	2	2			Use refrigerants in HVAC&R equipment that minimize contribution to ozone depletion & global warming. Likely HFC type refrigerants. Or use no refrigerants.	Mechanical / Kitchen	New equipment will comply. New CP chillers should comply. Need info on CP refrigerant type and charge.
5	Measurement and Verification	3		3		Provide a plan for ongoing monitoring and potential correction of building energy consumption while in operation.	Owners / Mechanical / Electrical	Will be designed for possible implementation. Verify implementation plan w/ Owner.
6	Green Power - 35% of yearly power for 2 yrs	2			2	Purchase electricity from renewable sources for 35% of total electrical use per year for a 2 year period. Can be satisfied by the purchase of renewable energy certificates for 35% x 2 yr equivalent.	Owner / Electrical	To be deferred to end of project if points are needed. Can be purchased via REC's. Approx. $7,500. Currently not pursued.

LEED NC 2009

Updated for 95% CD

Santa Ana - Science Center
Santa Ana, California

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MR	**MATERIALS AND RESOURCES**	**14**	**7**	**0**	**7**			
PR 1	Storage and Collection of Recyclables	X	X			Provide recycling for paper, cardboard, glass, plastic, and metal.	Owner / Architect	Owners policy for verification.
1.1	Building Reuse - Maintain	1			1	Provide portion of building to remain existing.	Architect / Structural / Owner	NA
1.2	Maintain 75% of structure & shell	1			1			
1.3	Maintain 95% of structure & shell	1			1			
1.4	Maintain 50% of interior non-structural elements	1			1			
2.1	Construction Waste Management -	1	1			Divert construction and demolition debris from landfill disposal or incineration	Contractor / Architect	Most areas have waste haulers that will sort and track recyclables. Contractor to provide plan for compliance. 75% should be achievable.
2.2	75%	1	1					
3.1	Materials Reuse - 5% of materials by cost	1			1	Use salvaged, refurbished, or reused materials for 5%/10% of total project materials, by cost. Materials can be purchased from salvage or refurbished or reused from on-site.	Contractor / Architect	Typically difficult to find applicable materials.
3.2	10%	1			1			
4.1	Recycled Content - 10% of materials by cost	1	1			Use materials with high recycled content such that those materials constitute 10%/20% of total project materials, by cost.	Contractor / Architect	Steel materials, gyp, carpet, countertop, tile, cores, sound batt insulation, agg & fly ash in concrete & precast materials apply. 20% should be achievable in a new construction.
4.2	20%	1	1					
5.1	Regional Materials - 10% extracted, processed, and manuf locally	1	1			Use materials that originate and are manufactured within 500 miles of the project site such that those materials constitute 10%/20% of total project materials, by cost.	Contractor / Architect	All portions of concrete mix, except possibly portland cement, can apply. Some exterior materials. 20% typically achievable in new construction.
5.2	20%	1	1					
6	Rapidly Renewables - 2.5% of materials by cost	1			1	Use materials produced from rapidly renewable sources such that those materials constitute 2.5% of total project materials, by cost.	Contractor / Architect	Bamboo, cork, cotton insulation, agrifiber, wheatboard 8 strawboard casework & panels, linoleum, wool carpet are available. Would require specific targeting.
7	Certified Wood - 50% of all wood materials	1	1			Use wood produced from FSC certified sources such that those materials constitute 50% of total wood products used on the project, by cost.	Contractor / Architect	Nearly all types of wood products can be spec'd as FSC certified. Should be achievable at minimal impact.
EQ	**INDOOR ENVIRONMENTAL QUALITY**	**15**	**14**	**0**	**1**			
PR1	Minimum IAQ Performance	X	X			Design project to comply with ASHRAE 62.1-2004 ventilation standard	Mechanical	Commercial buildings typically meet this standard.
PR2	Environmental Tobacco Smoke Control	X	X			Designate facility as non-smoking and locate exterior smoking areas 25' from entries.	Owner	Need Owners policy, and requires site signage. Owner to verify implementation.
1	Outdoor Air Delivery Monitoring	1	1			Install monitoring systems to ensure ventilation requirements are being met. Outdoor air measuring stations and CO2 monitoring for densely occupied spaces.	Mechanical	Can be designed for compliance. All classrooms and labs will need additional CO2 sensor in the room.
2	Increased Ventilation	1	1			Increase outdoor air ventilation to improve indoor air quality. Several methods to achievement.	Mechanical	Should be accomplished within current design given high levels of exhaust and makeup. Engineering calcs required to verify.
3.1	Construction IAQ Plan - During Construction	1	1			Implement a construction indoor air quality plan per recognized standards, protect on-site materials, install MERV 8 filters in any permanent HVAC equipment used during construction	Contractor / Architect / Mechanical	Typical contractor procedures.
3.2	Construction IAQ Plan - Before Occupancy	1	1			Implement a construction indoor air quality plan for building flush out before occupancy, per LEED standards.	Contractor / Architect / Mechanical	Can affect construction schedule and occupancy planning. Would require +/-2 weeks of 100% OA flushout. Will be pursued.
4.1	Low-Emitting Materials - Adhesives and Sealants	1	1			All products used inside the building envelope to comply with the recognized standards for low VOC content.	Contractor / Architect	Spec'd for compliance, per setion 018113. Verified per contractor submittals.
4.2	Low-Emitting Materials - Paints & Coatings	1	1			All products used inside the building envelope to comply with the recognized standards for low VOC content.	Contractor / Architect	Spec'd for compliance, per setion 018113. Verified per contractor submittals.
4.3	Low-Emitting Materials - Flooring Systems	1	1			Flooring products shall comply with "FloorScore" standard, carpet to be Green Label Plus certified. All flooring adhesive to be low VOC.	Contractor / Architect	Spec'd for compliance, per setion 018113. Verified per contractor submittals.
4.4	Low-Emitting Materials - Composite Wood & Agrifiber	1	1			All products used inside the building envelope shall contain no added urea-formaldehyde.	Contractor / Architect	Spec'd for compliance, per setion 018113. Verified per contractor submittals.
5	Indoor Chemical & Pollutant Source Control	1	1			Minimize pollutants in building environment by employing entry mats, enclosing and ventilating hazardous chemical spaces, and installing MERV 14 filtration in HVAC equipment.	Architect / Mechanical	Requires recessed mats at entries, or roll out mats. Labs with chemical use may need to be verified for ventilation requirements.
6.1	Controllability of Systems - Lighting	1	1			Provide individual lighting control for 90% of building occupants, and adequate control in multi-occupant spaces.	Electrical / Owner	Requires undercounter task lighting at workstations and in offices. Multi-occ spaces comply.
6.2	Controllability of Systems - Thermal Comfort	1	1			Provide individual comfort control for 50% of building occupants, and adequate shared control for all multi-occupant spaces.	Mechanical	Current system should comply given classroom control design. Engineering calcs required to verify.
7.1	Thermal Comfort - Design	1	1			Design HVAC systems to meet ASHRAE 55-2004 standards for thermal comfort.	Mechanical	Commercial buildings typically meet this standard.
7.2	Thermal Comfort - Verification	1	1			Implement a thermal comfort survey of building users at 6 to 18 months after occupancy, and plan for corrective action at a 20% dissatisfied response.	Owner	Post Occupant survey requirements and template taken from Center for the Built Environment website. Owner to verify implementation.
8.1	Daylight (75% of occupied spaces)	1			1	Design the building such that 75% of occupied spaces receive adequate daylight, as calculated or tested per LEED ref guide.	Architect	Smaller windows and deep classrooms will make compliant difficult. Calc to be tested at DD.
8.2	Views (90% of occupied spaces)	1	1			Design the building such that 90% of occupied spaces have views to the outside, as calculated or tested per LEED ref guide.	Architect	Most rooms have windows and are compliant. Prelim calcs show compliance.

LEED NC 2009

Updated for 95% CD

Santa Ana - Science Center
Santa Ana, California

PRELIMINARY TOTAL POINTS	**61**	**6**	**43**	
PREREQUISITES	***8 req'd***	**met**		
CERTIFIED	***40-49***	**YES**		
SILVER	***50-59***	**YES**		
GOLD	***60-79***	**YES**		
PLATINUM	***80+***	**need 19**		

Building Area	67,780
Site Area	113,140
Building Footprint	23,750
Vegetated Open Space	28,975
Parking Stalls on Site	46
FTE Occupants	36
Visitors / Students (at Peak)	670

ID	LEED 2009 Credit	Points	Point Status: Targeted	Point Status: Investigation & Verification Req'd	Point Status: Not Targeted	Compliance Requirements	Responsibility for Compliance / Documentation	Notes & Resources
ID	**INNOVATION AND DESIGN PROCESS**	**6**	**4**	**2**	**0**			
1.1	Exemplary Performance: SS/MR credits	1	1			Per applicable credit from above	Per applicable credit from above	Typically in new construction one of these SS/ MR credits is achievable
1.2	Exemplary Performance: SS/MR credits	1	1			Per applicable credit from above	Per applicable credit from above	Typically in new construction one of these SS/ MR credits is achievable
1.3	Green Education Program	1		1		Implement a green education plan to include 2 of 3 aspects : signage program highlighting sustainable building features, case study or manual transmitted to USGBC, outreach program/building tours.	Owner / Architect	To be investigated with Owner. May have past experience on other projects.
1.4	Green Cleaning Program	1		1		Implement housekeeping policy per LEED EBOM requirements.	Mechanical	To be investigated with Owner. May have past experience on other projects.
1.5	Low mercury lamps	1	1			For all florescent and metal halide light fixtures, install low mercury content type bulbs, per LEED EBOM credit requirements.	Owner / Electrical	All LED lighting will achieve this credit.
2	LEED Accredited Professional	1	1			LEED accredited professional on project team	Owner / Architect	
RP	**REGIONAL PRIORITY (92706)**	**4**	**1**	**0**	**3**			
1.1	SSc5.1 - Open Space	1	1			Per applicable credit from above	Per applicable credit from above	
1.2	WEc2 - Wastewater	1			1			
1.3	WEc3 - Water Use Reduction 40%	1			1			
1.4	EAc2 - Renewables	1			1			
1.5	MRc2.2 - Building Reuse							
1.6	EQc8.1 - Daylight							
	TOTAL POINTS	**110**	**61**	**6**	**43**			

*** This matrix is to be used only as a planning tool. Achievement of LEED certification at any level, or compliance with particular pre-requisites and credits depends on many factors, decisions and variables outside the control of the design team and are not specifically guaranteed.**

SECTION 019113
GENERAL COMMISSIONING REQUIREMENTS

Part 1 - GENERAL

1.01 SUMMARY

A. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the Owner's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contact documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations & Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the Owner's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the technical sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.

C. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division Specification Sections, apply to this Section.

B. Owner's Project Requirements and Basis of Design Documentation.

C. Related Divisions and sections include the following:

1. Division 1 – General Requirements
2. Division 3 - Concrete
3. Division 7 – Thermal and Moisture Protection
4. Division 8 – Openings
5. Division 10 – Specialties
6. Division 11 – Equipment
7. Division 21 – Fire Suppression
8. Division 22 - Plumbing
9. Division 23 – Heating, Ventilating and Air Conditioning (HVAC)
10. Division 26 – Electrical
11. Division 27 - Communications
12. Division 28 – Electronic Safety and Security
13. Section 32 84 00 – Irrigation Systems

1.03 DEFINITIONS

A. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the contract documents.

B. Basis of Design (BoD) document: A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

C. Building Envelope: All parts for the exterior shell of a building that provide insulation and air and water resistance such as roofing, windows, doors, flashing, exterior water proofing, ground contact water proofing, etc.

D. Building Envelope Commissioning: A systematic process of ensuring that all building envelope systems perform interactively according to the Designer's Basis of Design (BOD) and Owner's Project Requirements (OPR).

E. Commissioning Plan: An overall plan developed by the CxA that provides the structure, schedule and coordination for the commissioning process.

F. Commissioning Observation: An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Deficiency or Commissioning Issue)

G. Commissioning Process: A quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated and maintained to meet the Owner's Project Requirements.

1. Commissioning shall:
2. Verify that the applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations and industry accepted standards and they receive adequate operational checkout by installing contractors.
3. Verify and document proper performance of equipment and systems.
4. Verify O&M documentation is complete.
5. Verify that Owner's operations and maintenance personnel are adequately trained.

H. Construction Checklist: A form used by the contractor to verify that appropriate components are on-site, ready for installation, correctly installed and functional. Also see prefunctional and functional checklists.

I. Control System: A component of environmental, HVAC, security and fire systems for reporting, monitoring and issuing of commands.

J. CxA: Commissioning Authority. The entity identified by the Owner who leads, plans, and schedules and coordinates the commissioning team to implement the commissioning process.

K. Deficiency or Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components.

L. Factory Testing: Testing of equipment on-site or at the factory by factory personnel with or without owner's representative present.

M. Functional Performance Testing (FPT): Generally refers to testing of a complete system and demonstrates control of equipment and the interaction of equipment or systems. Performed by the contractor and witnessed by the CxA.

N. Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

O. Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

P. Master Issues Log: A formal and ongoing record of problems or concerns and their resolution that have been raised by members of the commissioning team during the course of the commissioning process. Maintained by the CxA.

Q. Owner's Project Requirements (OPR): A collection of documents that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

R. Owner: Project Owner or designated representative.

S. Pre-functional Checklists (PFC): Refers to checklists prepared by the CxA and provided to the contractor to document the complete installation of equipment or systems. Pre-functional checklists are completed by the contractors prior to start-up.

T. Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

U. Sampling: Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

V. Seasonal Performance Tests: Functional Tests that are deferred until the system(s) will experience conditions closer to their design conditions.

W. Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

X. Site Observation Reports (SO): Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.

Y. Start-up: The initial starting or activating of dynamic equipment.

Z. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

AA. TAB: A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.

BB. Training Plan: A written document that details the expectations, schedule and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users and occupants.

CC. Trending: The monitoring by a building management system or other electronic data gathering equipment and analyzing of the data gathered over a period of time to verify proper equipment or systems sequence of operations.

DD. Verification: The process by which specific documents, components, equipment, assemblies, systems and interfaces among systems are confirmed to comply with the criteria described in the contract documents. Verification testing is performed by the contractor and witnessed by the CxA.

EE. Warranty Phase Commissioning: Commissioning efforts executed after a project has been completed and accepted by the Owner. Warranty Phase Commissioning includes

follow-up on verification of seasonal system performance, assistance in identifying warranty issues and enforcing warranty provisions of the construction contract.

FF. Warranty Visit: A commissioning meeting and site review where all outstanding warranty issues and deferred testing is reviewed and discussed.

1.04 COMMISSIONING TEAM

A. Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Construction Managers, General Contractor, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.

B. The members of the commissioning team consist of the contracted commissioning agent (CxA), the owner's representative/construction manager (PM/CM), the general contractor (GC), the general contractor's commissioning coordinator (CMG), the architect and design engineers (AE), the mechanical contractor (MC), the electrical contractor (EC), the controls contractor (CC), the testing and balancing contractor (TAB), the facility operating staff and any other installing subcontractors, suppliers of equipment or specialists. The contracted CxA is hired by the owner directly. The CxA directs and coordinates the project commissioning activities and the reports to the owner. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

C. The prime contractor shall in addition to their representative also appoint a representative from each subcontractor involved in commissioned systems including mechanical, electrical, controls, test and balance and plumbing.

D. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Construction Project Manager (CM). Thus, the procedures outlined in this specification must be executed within the following limitations:

1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the District (South Orange County Community College District) and the Contractor.
2. Commissioning Issues identified by the Commissioning Agent will be delivered to the Construction Manager and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
3. In the event that any Commissioning Issues and suggested resolutions are deemed by the Construction Manager to require either an official interpretation of the construction documents or require a modification of the contract documents, the Construction Manager will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the Construction Manager of any issues that they deem to constitute a potential contract change prior to acting on these issues.
5. Authority for resolution or modification of design and construction issues rests solely with the Construction Manager, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.05 OWNER'S RESPONSIBILITIES

A. Participate in resolution of issues that may occur as a result of the commissioning process.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:

1. Coordination meetings.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Testing meetings.
4. Demonstration of operation of systems, subsystems, and equipment.

1.06 CONTRACTOR'S AND SUBCONTACTOR'S RESPONSIBILITIES

A. Provide utility services required for the commissioning process.

B. Contractor is responsible for construction means, methods, job safety, or management function related to commissioning on the job site.

C. Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

1. Attend a commissioning kick-off/scoping meeting and other necessary meetings scheduled by the CxA to facilitate the Cx process.
2. Participate in construction-phase commissioning meetings including controls coordination meeting to review and resolve any issues with the sequence of operations.
3. Provide detailed start-up procedures.
4. Participate in maintenance orientation and inspection.
5. Participate in operation and maintenance training sessions.
6. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
7. Perform quality control of all work and certify it is complete prior to request for inspection.
8. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

D. The GC will be required to maintain a commissioning schedule that is updated periodically during the commissioning process and is presented and discussed at the commissioning meetings.

E. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

1. Participate in construction-phase coordination meetings.
2. Participate in maintenance orientation and inspection.
3. Complete pre-functional checklists for all equipment. Submit completed forms with start-up reports immediately after start up. The CxA may request further documentation necessary for the commissioning process.
4. Participate in procedures meeting for testing.
5. Participate in final review at acceptance meeting.
6. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
7. Provide a copy of the O&M manual submittals of commissioned equipment, through normal channels, to the CxA for review and approval. O&Ms are required to be submitted and approved at least one month prior to training.
8. Provide information to the CxA for developing construction-phase commissioning plan.

9. Participate in training sessions for operation and maintenance personnel.
10. Verify that all systems function correctly by testing each mode of operation, alarm and system function.
11. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified.
12. Perform quality control of all work and certify it is complete prior to request for inspection.
13. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.
14. Provide updated Project Record Documents or Shop Drawings to the CxA.

1.07 MECHANICAL CONTRACTOR'S RESPONSIBILITIES

A. Responsibilities listed in Section 1.06 above.
B. Completely install and thoroughly inspect, startup, test, adjust, balance, and document all systems and equipment.
C. Assist CxA in verification and performance testing. Assistance will generally include the following:

1. Review CxA provided prefunctional and functional performance test documents and provide written comments.
2. Demonstrate system operation.
3. Manipulate systems and equipment to facilitate testing.
4. Provide specialized instrumentation necessary for verification and performance testing.

D. Perform seasonal testing, at the direction of the CxA, to prove functional performance of the HVAC and controls in the opposite season.
E. Schedule and perform duct air leakage testing as specified in the technical specification sections with CxA as witness.
F. Provide flushing plans, disinfection reports and water treatment reports to the CxA for review.
G. Participate in pre-TAB meeting and jobsite inspections to verify TAB readiness.
H. Provide draft completed TAB report to CxA for review. CxA will identify up to 20% of TAB report for TAB contractor to demonstrate compliance to the completed TAB report.
I. Provide a copy of the O&M manual submittals of commissioned equipment, through normal channels, to the CxA for review and approval. O&Ms are required to be submitted and approved at least one month prior to training.

1.08 CONTROLS CONTRACTOR'S RESPONSIBILITIES

A. Responsibilities listed in Section 1.06 above.
B. Completely install and thoroughly inspect, startup, test, adjust, balance, and document all systems and equipment.
C. Assist CxA in verification and performance testing. Assistance will generally include the following:

1. Establish trend logs of system operation as specified herein.
2. Demonstrate system operation.
3. Manipulate systems and equipment to facilitate testing.
4. Provide specialized instrumentation necessary for verification and performance testing.
5. Manipulate control systems to facilitate verification and performance testing.
6. Provide trend reports of all points designated by the CxA for 1 week following successful performance testing at 15 minute maximum intervals.

D. Software Optimization Assistance: Provide a Control technician to work at the direction of Commissioning Authority for software optimization assistance for a minimum of 80 hrs. Refer to Part 3 for a description of the software optimization.

E. Sequences of Operation and Control Logic Submittals: The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the Specifications. They shall include:

1. An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
2. All interactions and interlocks with other systems.
3. Detailed delineation of control between any packaged controls and the Building Automation System (BAS), listing what points the BAS monitors only and what BAS points are control points and are adjustable.
4. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).
5. Start-up sequences.
6. Warm-up mode sequences.
7. Normal operating mode sequences.
8. Unoccupied mode sequences.
9. Shutdown sequences.
10. Capacity control sequences and equipment staging.
11. Temperature and pressure control: setbacks, setups, resets, etc.
12. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
13. Effects of power or equipment failure with all standby component functions.
14. Sequences for all alarms and emergency shut downs.
15. Seasonal operational differences and recommendations.
16. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
17. Schedules.
18. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered
19. Provide documentation of all site specific programming as well as programming manual to CxA for review. Logic shall include all line code, function block templates with associated logic, graphical logic diagrams, etc. as applicable to the control system

F. Control Drawings Submittal

1. The control drawings shall have a key to all abbreviations.
2. The control drawings shall contain graphic schematic depictions of the systems and each component.
3. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
4. Provide a full points list with at least the following included for each point:

    a. Controlled system
    b. Point abbreviation
    c. Point description DB temp, airflow, etc
    d. Display unit

e. Control point or Setpoint: Point that controls equipment and can have its setpoint changed (OSA, SAT, etc.).
f. Monitoring point: Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.
g. Intermediate point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).
h. Calculated point: “Virtual” point generated from calculations of other point values.

G. The Controls Contractor shall keep the CxA informed of all changes to this list during programming and setup.
H. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.
I. Controls point to point checkout will require documentation of specific set up and calibration parameters for each point and controller such as measured value versus displayed value at various ranges, stroke and range adjustments, adjusted and actual trip points of switches, alarm thresholds, etc. A simple binary indication that a point-to-point checkout has been accomplished is not acceptable to document the point checkout.
J. Assist and cooperate with the TAB contractor in the following manner:

1. Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).
2. For a given area, have all required prefunctional checklists, calibrations, start-up and selected functional tests of the system completed and approved by the CxA prior to TAB.
3. Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.

K. The Controls Contractor shall expand on the prefunctional and functional testing plans to incorporate a comprehensive checkout of the control system.
L. Provide a signed and dated certification to the CxA and CM/CMG upon completion of the checkout of each controlled device, equipment and system prior to functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.
M. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).
N. Provide building automation systems controls trend reports as requested by the CxA as part of functional testing.
O. Warranty Period

1. Execute seasonal or deferred functional performance testing, witnessed by the CxA, according to these specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.09 ELECTRICAL CONTRACTOR’S RESPONSIBILITIES

A. Responsibilities listed in Section 1.06 above.
B. Construction and Acceptance Phases

1. Contractors shall provide normal cut sheets and shop drawing submittals to the CxA of commissioned equipment.

2. Provide additional requested documentation, prior to normal O&M manual submittals, to the CxA for development of start-up and functional testing procedures.

    a. Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any Owner-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up, and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CxA.
    b. The CxA may request further documentation necessary for the commissioning process.
    c. This data request may be made prior to normal submittals.

3. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the Specifications, control drawings or equipment documentation are not sufficient for writing detailed testing procedures.
4. Provide assistance to the CxA in preparation of the specific functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
5. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists from the CxA. Submit manufacturer's detailed start-up procedures and the full start-up plan and procedures and other requested equipment documentation to CxA for review.
6. During the start-up and initial checkout process, execute and document the electrical-related portions of the prefunctional checklists provided by the CxA for all commissioned equipment.
7. Perform and clearly document all completed start-up and system operational checkout procedures, providing a copy to the CxA.
8. Address current A/E punch list and Cx Issues Log items before performing functional performance testing.
9. Provide skilled technicians to execute starting of systems and equipment and to assist in the functional performance tests. Ensure that they are available and present during the agreed-upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem solving.
10. Correct deficiencies (differences between specified and observed performance) as interpreted by the CxA, CMG and A/E and retest the equipment.
11. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
12. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (include deferred testing).
13. Provide training of the Owner's operating personnel as specified.
14. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

1.10 EQUIPMENT SUPPLIER'S RESPONSIBILITIES

A. The equipment suppliers shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

    1. Assist in equipment testing per agreements with Subcontractors.

2. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
3. Review test procedures for equipment installed by factory representatives.
4. Attend commissioning kickoff meetings and additional meetings as necessary.
5. Contracted to General or Subcontractor.

1.11 ARCHITECT AND DESIGN ENGINEER'S RESPONSIBILITIES

A. Responsible for developing the construction contract documents and clarifying the design intent during the construction phase of the project.
B. Provides the Basis of Design document.
C. Performs construction observation.
D. Contracted directly to OWNER.

1.12 CxA's RESPONSIBILITIES

A. Organize and lead the commissioning team.
B. Prepare a Commissioning Plan. Collaborate with design team, owner, contractor and subcontractors to develop test procedures. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.
C. Work with the Contractor to schedule commissioning activities. The Contractor shall integrate all commissioning activities into the master construction schedule. All parties will address scheduling issues in a timely manner in order to expedite the commissioning process.
D. Review and comment on submittals for compliance with the approved project documents and identify any potential conflicts.
E. Conduct commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five (5) workdays of the commissioning meeting.
F. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for permanent power; operation and maintenance data submittals; operation and maintenance training sessions; TAB Work; and Project completion.
G. Develop an enhanced start-up and initial systems checkout plan with contractors.
H. Periodically observe and inspect construction and report progress and deficiencies. In addition to compliance with the Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.
I. Prepare Project-specific pre-functional checklists and functional test procedures checklists.
J. Witness HVAC piping pressure testing and flushing, ductwork pressure testing and final cleaning and major systems start-up.
K. Witness and document functional performance testing.
L. Compile test data, inspection reports, and certificates and include them in the Systems Manual and Commissioning Report.
M. Review and comment on operation and maintenance documentation for compliance with the Contract Documents and adequacy for Owner training.
N. Review Contractor's operation and maintenance training program.
O. Prepare commissioning status reports.
P. Assemble the final commissioning documentation, including the Commissioning Report and Systems Manual including applicable Project Record Documents.

1.13 COMMISSIONING DOCUMENTATION

A. Commissioning Plan: A document, prepared by CxA, that outlines the process, schedule, allocation of resources, and documentation requirements of the commissioning effort, and shall include, but is not limited to the following:

1. Description of the organization, layout, and content of commissioning documentation to be provided along with identification of responsible parties.
2. Identification of systems and equipment to be commissioned.
3. Description of the level of commissioning for each system
4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training, including required training materials.
9. Provide a schedule for key commissioning activities with specific dates coordinated with overall construction schedule.
10. Define the process for completing prefunctional and startup checklists for systems, subsystems, and list of specific equipment requiring these checklists.
11. Include Step-by-step procedures for Functional testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.

B. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will review Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.

C. Start-Up Reports: Contractor/Manufacture created forms that document that factory start-up procedures have been followed for all equipment and systems to be commissioned. Provided by sub-contractors and included as part of the Cx Plan.

D. Functional Performance Testing: CxA shall develop functional performance test procedures for all equipment and systems to be commissioned with input from installing contractors.

E. Site Visit Reports: CxA shall record test data, observations, and measurements on site visit forms. Photographs and other means appropriate for the application shall be included with data.

F. Test and Inspection Reports: CxA shall compile relevant test and inspection reports and test and inspection certificates and include them in Systems Manual and Commissioning Report.

G. Commissioning Schedule: CxA shall review and provide input to the master project and construction schedules for commissioning activities. Contractor shall incorporate all commissioning activities into the construction schedule.

H. Cx Issues Log: CxA shall prepare and maintain an issues log that describes installation, and performance issues that are at variance with the Contract Documents. CxA will identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.

1. Creating a Cx Issues Log Entry:

a. Identify the issue with a unique numeric identifier by which the issue may be tracked.
b. Assign a descriptive title of the issue.
c. Identify issue date and author

d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
e. Identify system, subsystem, and equipment to which the issue applies.
f. Identify location of system, subsystem, and equipment.
g. Include information that may be helpful in diagnosing or evaluating the issue.
h. Note recommended corrective action.
i. Identify commissioning team member responsible for corrective action.
j. Identify persons responding to the issue.

2. Documenting Issue Resolution:

a. Log date issue is closed; issue may be closed and unresolved.
b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
c. Identify changes to the Contract Documents that may require action, if any.
d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
e. Identify person(s) who corrected or resolved the issue.
f. Identify person(s) documenting the issue resolution.

I. Commissioning Report: CxA shall document results of the commissioning process including performance of systems, subsystems, equipment and issues. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the Owner's Design Intent and Contract Documents. The commissioning report shall include, but is not limited to, the following:

1. Discussion of performance of commissioned systems including any variance from the design intent and the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
2. Test plans and reports.
3. Submittal Review Comments
4. Cx Issues log.
5. Completed prefunctional and functional test checklists.
6. Completed start-up reports
7. Listing of off-season test(s) not performed and a schedule for their completion.
8. Training Records
9. Trend Report Analysis

J. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:

1. Owner's Project Requirements
2. Basis of Design or Design Narrative
3. As-built system narratives, schematics, and list of installed equipment.
4. Operation and maintenance data.
5. Re-commissioning forms and schedule for each Cx system.

1.14 SUBMITTALS

A. Commissioning Plan: CxA shall submit a draft commissioning plan. Deliver one copy to Contractor and one to Owner. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final commissioning plan.

B. Prefunctional Checklists: CxA shall submit sample checklists and forms to Contractor and subcontractors for review and comment.

C. Construction Checklists for Enclosure Commissioning: CxA shall submit sample Construction Checklists to Contractor for review. Contractor will complete the Construction Checklists prior to requesting CxA witnessing of Contractor provided tests.

D. Start-Up Forms: Contractor shall submit start up forms to be used during construction for all equipment and systems to be commissioned for CMG and CxA Review.

E. Functional Test Plan: CxA shall submit draft Functional Test Plan for comment by the installing contractors. The final Functional Test Plan will be submitted and used for functional testing.

F. Site Observation Reports: CxA shall submit site visit reports within two days of the site visit documenting areas observed and any deficiencies noted.

G. Final Commissioning Report: CxA shall submit the draft commissioning report. One copy, with review comments, will be returned to the CxA for preparation of final submittal. The final report submittal must address previous review comments.

H. The CxA will provide appropriate contractors with a specific request for the type of submittal documentation the CxA requires facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum the request will include the manufacturer and model number, the manufacturer printed installation and detailed start-up procedures, sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details. In addition, the factory checkout sheets or field technicians shall be submitted for review.

I. The CxA will review submittals related to the commissioned equipment and systems for conformance with the contract documents as it relates to commissioning process, to the performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of performance procedures. The CxA will notify the Owner/CM of items missing or areas that are not in conformance with contract documents and which require resubmission.

J. BAS Trend Reports: The controls subcontractor shall submit 1 week of trend reports with the control system in “auto” without alarms after functional performance testing to demonstrate stability and proper control sequences. Trended points and time intervals to be determined by the CxA.

K. Test and Inspection Reports: Contractor shall submit test and inspection reports and start-up reports for review by the CxA. This includes, but is not limited to, controls calibration report, point to point report and checkout reports.

1.15 QUALITY ASSURANCE

A. Training Instructor Qualifications: Factory-authorized service representatives experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration:

1. Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.
2. All test equipment required to perform start-up and initial checkout and required performance testing shall be provided by the contractor for the equipment being tested.
3. The following minimum requirements apply if not noted in the specifications: temperature sensors and digital thermometers shall carry a current certified calibration to an accuracy of .5 degrees F and resolution of +/- .1 degree F; pressure sensors shall have an accuracy of +/- 2% of the value range being measured and have been calibrated within the last year. All equipment shall be

calibrated per the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.

C. TAB Verification: TAB contractor shall use same equipment used to perform testing, adjusting and balancing for demonstrating up to 20% of the TAB report for CxA verification. Calibration certificates will be reviewed for each piece of test equipment.

1.16 COORDINATION

A. Scheduling: The Contractor shall work with the Commissioning Agent and the CMG to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the CM to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction schedule as directed by the CM.

B. Coordinating Meetings: CxA shall conduct coordination meetings with the commissioning team as needed to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

C. Pretesting Meetings: CxA shall conduct pretest meetings with the commissioning team to review startup reports, coordinate controls sequence of operations, review pretest inspection results, review testing and balancing procedures, review testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

D. Testing Coordination: CxA shall coordinate with the Owner and Contractor to plan the sequence of testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Contractor shall schedule times for tests, inspections, obtaining samples, and similar activities.

Part 2 - PRODUCTS

2.01 INSTRUMENTATION AND TEST EQUIPMENT

A. Instrumentation required to verify readings and test system and equipment performance shall be provided by Contractor and made available to Commissioning Authority. Generally, no testing equipment will be required beyond that required to perform Contractors work under these Contract Documents. All equipment used for testing and calibration shall be NIST/NBS traceable and calibrated within the preceding 1 year period. Certificates of calibration shall be submitted to CxA for review.

2.02 TAB & Cx OPERATORS TERMINAL AND SOFTWARE

A. Contractor shall provide a portable operators terminal or hand held device and all software required to facilitate TAB and calibration and functional testing to TAB contractor. This device shall support all functions and allow querying and editing of all parameters required for proper calibration and start up, viewing real time point information, set up and view trends, view program logic, etc..

B. BAS Temporary Graphical User Interfaces for Commissioning: Provide fully featured graphical user interfaces in all major mechanical rooms to facilitate Cx. Interfaces to eventually be relocated may be used. Contractor shall secure hardware from damage and theft as applicable. CxA shall be provided required hardware and software access.

1. BAS shall ensure that all real time point information for HVAC zones, including those that include multiple controllers (such as tracking zones) can be accessed by provided tools within the zone through one communication port in that zone.

2. The system shall be capable of recording and storing historical trend data at the time of functional testing for use in evaluating performance of the system.

Part 3 - EXECUTION

3.01 COMMISSIONED SYSTEMS

System	Equipment	Note
HVAC	Air Handling Units	5
	Packaged Gas Air Conditioning Unit	5
	Heating Hot Water Pumps	5
	Hot Water Boilers	5
	Exhaust Fans	5
	Variable Refrigerant Flow Split Systems	4
	Variable Frequency Drives	5
	Ductwork – Leakage Testing	3
	Variable Air Volume Boxes	3
	Fan Powered Boxes	5
	Lab Supply and Exhaust Valves	3
	Fume Hood Exhaust Valves	3
	Test and Balance Report	3
	Factory Controls	5
	Lab Supply and Exhaust Air Controls	5
	Stand Alone Controls	3
Building Enclosure	Foundations/Slabs	3
	Wall Systems	3
	Roof Systems	3
Plumbing	Domestic Hot Water Heaters	5
	Domestic Hot Water Recirculation Pump & Controls	5
	Temperature Mixing Valves	5
	Domestic Water Pumps and Controls	5
	Sanitary Sewerage Pumps & Controls	5
	Plumbing Fixtures	3
	Emergency Plumbing Fixtures	5
	Lab Air Systems – Compressed and Vacuum	3
	Compressed Air Equipment & Controls	5
	Vacuum Equipment & Controls	5
	Processed Water	5

System	Equipment	Note
Electrical	Sweep and Schedule Lighting Controls	3
	Daylighting Controls	3
	Dimming Controls and Occupancy Sensors	3
	Uninterruptible Power Supplies	5
	Power Distribution	1
Communications	Integrated Audio-Video	4
	Clocks	5
Electronic Safety and Security	Video Surveillance	4
	Access Control	4
	Fire and Smoke Alarm	3
	Fire Suppression	3
Energy Management	Controllers	5
	I/O Settings	5
	Graphical User Interface	5
	Programming / Schedules / Set Points	5
Landscaping Systems	Irrigation Control System	5
	Irrigation Zones	3

Level 1 The CxA will periodically observe and inspect the installation of building systems and may review project documentation to verify operational requirements meet the design intent.

Level 2 The CxA will perform Level 1 activities and inspect, test or operate portions of the system to verify operational requirements are met. These activities may be performed independently of the contractor.

Level 3 The CxA will perform Level 2 activities and will witness contractor performance testing of up to 20% of the system to prove operational requirements are met. The test sections shall be chosen at random by the CxA to ensure uniformity of system. Failure of any test section shall require retesting of that section and an additional test section equivalent in scope.

Level 4 The CxA will perform Level 2 activities and will witness contractor performance testing of up to 50% of the system to prove operational requirements are met. The test sections shall be chosen at random by the CxA to ensure uniformity of system. Failure of any test section shall require retesting of that section and an additional test section equivalent in scope.

Level 5 The CxA will perform Level 2 activities and will witness contractor performance testing of up to 100% of the system to prove operational requirements are met. Failure of any test section shall require retesting of that section.

3.02 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

A. The following procedures apply to all equipment and systems to be commissioned.

B. Prefunctional Checklists are developed by the CxA and completed by the appropriate installing contractors for all major equipment and systems being commissioned before functional testing can begin. The checklist captures equipment nameplate and characteristics data, location & service areas, and confirms the as-built status of the equipment or system. These checklists also ensure that the systems are complete and operational, so that the functional performance testing can be scheduled. The Contractor and vendors shall execute factory startup and provide the CxA with a copy of the signed and dated completed start-up checklists which will be submitted with the Prefunctional checklists.

C. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.

D. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.

    1. The full startup plan shall at a minimum consist of the following items:

        a. The Pre-Functional Checklists.
        b. The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
        c. The manufacturer's normally used field checkout sheets.

E. The Commissioning Agent will review/approve the full start-up plan.

F. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.

G. Execution of Prefunctional Checklists and Startup.

    1. 2 weeks prior to start-up, sub-contractors and vendors schedule startup and checkout with the CM, CMG, and CxA. The performance of the startup and checkout shall be directed and executed by the CMG.
    2. The contractor shall maintain a master copy of signed checklists.
    3. The installing contractors shall update the checklists as work is completed. Only individuals that have direct knowledge and witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off.
    4. The CxA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are repetitive multiple units, (in which case a sampling strategy may be used as approved by the Owner).
    5. The CxA will periodically review the checklists for completeness and report on progress at the Cx meetings.

H. BAS (and other similar control systems) Startup Testing, Adjusting, and Calibration

    1. Work and/or systems installed under this Division shall be fully functioning prior to Demonstration and Acceptance Phase. Contractor shall start, test, adjust, and calibrate all work and/or systems under this Contract, as described below:

        a. Inspect the installation of all devices. Review the manufacturer’s installation instructions and validate that the device is installed in accordance.

b. Verify proper electrical voltages and amperages, and verify that all circuits are free from faults.
c. Verify integrity/safety of all electrical connections.
d. Coordinate with TAB subcontractor to obtain and CxA to fine tune control settings that are determined from balancing and testing procedures. Record the following control settings as obtained from TAB contractor, and note any TAB deficiencies in the BAS, Pre-functional checklists and initiate an associated Action Item:

    1 Optimum duct static pressure setpoints for VAV air handling units.
    2 Minimum outside air damper settings for air handling units.
    3 Optimum differential pressure setpoints for variable speed pumping systems.
    4 Calibration parameters for flow control devices such as VAV boxes and flow measuring stations.
    5 BAS contractor shall provide hand held device as a minimum to the TAB and CxA to facilitate calibration. Connection for any given device shall local to it (i.e: at the VAV box or at the thermostat). HHD or portable operator's terminal shall allow querying and editing of parameters required for proper calibration and start up.

e. Test, calibrate, and set all digital and analog sensing, and actuating devices. Calibrate each instrumentation device by making a comparison between the BAS display and the reading at the device, using an instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +/-0.5% accurate, test equipment shall be +/-0.25% accurate over same range). Record the measured value and displayed value for each device in the BAS Pre-functional Report.
f. Check and set zero and span adjustments for all transducers and transmitters.
g. For dampers and valves:

    1 Check for adequate installation including free travel throughout range and adequate seal
    2 Where loops are sequenced, check for proper control without overlap

h. For actuators:

    1 Check to insure that device seals tightly when the appropriate signal is applied to the operator.
    2 Check for appropriate fail position, and that the stroke and range is as required at operating pressures/conditions.
    3 For sequenced electronic actuators, calibrate per manufacturer's instructions to required ranges.

i. Check each digital control point by making a comparison between the control command at the controller and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the OI display. Record the results for each device in the BAS Pre-functional checklists.
j. For outputs to reset other manufacturers devices (VSDs) and feedback from them, calibrate ranges to establish proper parameters. Coordinate with representative of the respective manufacturer and obtain their approval of the installation.

k. Verify proper sequences by using the approved checklists to record results and submit with BAS Pre-functional checklists. Verify proper sequence and operation of all specified functions. There is inherent duplication between the functional performance testing of the Testing Contractor, and the thorough checking testing of the sequences by the BAS. Generally the sequence checkouts indicated as the responsibility of the Testing Contractor under functional testing, must first be tested by the BAS under prefunctional testing.

l. Verify proper systems operation under emergency power. Cooperate and coordinate with Testing Contractor and CxA for comprehensive building power outage tests.

m. Verify all safety devices trip at appropriate conditions. Adjust setpoints accordingly.

n. Verify that all alarm thresholds for all analog devices are entered. Request direction from Owner as to alarm threshold parameters

o. Tune all control loops to obtain the fastest stable response without hunting, offset or overshoot. Record tuning parameters and response test results for each control loop in the BAS Prefunctional Report. Except from a startup, maximum allowable variance from set point for controlled variables under normal load fluctuations shall be as follows. Within 2 minutes of any upset (for which the system has the capability to respond to) in the control loop, tolerances shall be maintained (exceptions noted):

1 Duct air temperature: ±1°F.
2 Space Temperature: ±2°F
3 Chilled Water: ±1°F
4 Hot water temperature: ±2°F.
5 Duct pressure: ± 0.25” w.g.
6 Water pressure: ±1 psid
7 Duct or space Humidity: ±5%
8 Air flow control: ±5% of setpoint velocity. For min OA flow loops being reset from CO2, response to upset max time is one hour
9 Space Pressurization (on active control systems): ±0.02” wg with no door or window movements

p. For interface and DDC control panels:

1 Ensure devices are properly installed with adequate clearance for maintenance and clearly labeled in accordance with the record drawings
2 Ensure terminations are safe, secure and labeled in accordance with the record drawings
3 Check power supplies for proper voltage ranges and loading.
4 Ensure wiring and tubing are run in a neat and workman-like manner, either bound or enclosed in trough.
5 Check for adequate signal strength on communication networks.
6 Check for stand-alone performance of controllers by disconnecting the controller from the LAN. Verify the event is enunciated at OIs. Verify that the controlling LAN reconfigures as specified in the event of a LAN disconnection.
7 Ensure that controller memory and control network through-put are adequate to support the extensive trending requirements. Reconfigure the system to provide a reliable and robust system as necessary.
8 Ensure all outputs and devices fail to their proper positions/states.

9 Ensure buffered and/ or volatile information is held through power outage.

10 With all system and communications operating normally, sample and record update/enunciation times for critical alarms fed from the panel to the OI.

11 Check for adequate grounding of all DDC panels and devices.

q. For Operator Interfaces:

1 Verify all elements on the graphics are functional and properly bound to physical devices and/or virtual points and that hot links or page jumps are functional and logical.

2 Output all specified system reports for review and approval.

3 Verify the alarm printing and logging is functional and per requirements

4 Verify trend archiving to disk and provide a sample to the CxA for review.

5 Verify paging/dial out alarm enunciation is functional.

6 Verify functionality of remote OIs and that a robust connection can be established consistently.

7 Verify that required third party software applications required with the bid are installed and functional.

8 Start up and check out control air compressors and air drying and filtering systems in accordance with the appropriate section and manufacturer's instructions.

9 Verify proper interface with fire alarm system.

r. Submit Start-Up Test Report. Report shall be completed, submitted and approved prior to functional testing.

I. Sensor and Actuator Calibration. All field-installed temperature, relative humidity, CO, CO2, refrigerant, O2, and/or pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated. Verify that all locations are appropriate and away from causes of erratic operation. Submit to the CxA through the CM the calibration methods and results. All test instruments shall have had a current certified calibration record. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated. Contractor to field verify all installed sensors.

1. Sensor Calibration Methods

a. All Sensors: Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable, are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within specifications of each other for temperature and for pressure. Tolerances for critical applications may be tighter.

b. Sensors without Transmitters: Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.

c. Sensors with Transmitters: Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.

2. Valve and Damper Stroke Setup and Check BAS Readout: For all valve and damper actuator positions checked, verify the actual position against the BAS

readout. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, repair or replace actuator.

3. Closure for heating coil valves (NO): Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position are as specified. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. Restore setpoints to normal.
4. Closure for cooling coil valves (NC): Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position are as specified. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. Restore setpoints to normal.

J. Loop Tuning

1. For all control loops, contractor shall tune the loops to ensure the fastest stable response without hunting, offset or overshoot within tolerances specified above. Contractor shall introduce upsets to the load when possible to affect response. Otherwise, setpoints can be changed to affect the response.
2. Generally tune loops during periods of high gain.
3. Document all parameters either by capturing text, short interval trends, or screen shots of trend graph documenting the final response.

K. Valve Stroke Setup and Check

1. For all valve and actuator positions checked, verify the actual position against the OI readout.
2. Set pumps or fans to normal operating mode. Command valve or damper closed, verify that device is closed and adjust output zero signal as required. Command device open, verify position is full open and adjust output signal as required. Command valve to a few intermediate positions. If actual valve position doesn't reasonably correspond, adjust spring tension, replace actuator or add pilot positioner (for pneumatics).

L. Coil Valve Leak Check

1. Verify proper close off of the valves. Ensure the valve seats properly by simulating the maximum anticipated pressure difference across the circuit. Calibrate air temperature sensors on each side of coil to be within 0.5°F of each other. Via the OI, command the valve to close. Energize fans. After 5 minutes observe air temperature difference across coil. If a temperature difference is indicated, and the piping surface temperature entering the coil is within 3°F of the water supply temp, leakage is probably occurring. If it appears that it is occurring, close the isolation valves to the coil to ensure the conditions change. If they do, this validates the valve is not closing. Remedy the condition by adjusting the stroke and range, increasing the actuator size/torque, replacing the seat or replacing the valve as applicable.

M. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

1. The Contractor shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.

2. The Commissioning Agent will review the report and submit comments to the CM. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the CM and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the CM and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the CM.
3. The Contractor shall be responsible for resolution of deficiencies as directed the CM.

3.03 TEST AND BALANCE VERIFICATION

A. Objective & Scope: The objective of TAB verification is to verify that air and water testing and balancing has been completed and all issues have been resolved prior to functional performance testing. A TAB report is required to be submitted to the CxA for review prior to scheduling verification. The CxA and the TAB contractor will meet on-site to discuss the report and walk the building to verify 20% of the total amount tested using a random sample, utilizing the same equipment that was used to perform the test and balance. Any portions that fail the testing require an additional test. Acceptable results include those that are within specified tolerance of the design values (5-10%). If more than 20% fail the testing, the report is rejected and additional balancing must be completed and a revised report submitted before this portion of functional testing is considered complete.

3.04 DDC SYSTEM TRENDING FOR COMMISSIONING

A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.
B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers – Critical, Priority, and Maintenance.

1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
2. Priority level alarms are to be printed to a printer which is connected to the Operator’s Work Station located within the engineer’s office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from the operator or maintenance personnel within a normal work shift, and not immediate action.
3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer’s office.

C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.
D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included

with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but be not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing – Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the CxA. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the CM, prior to the execution of Systems Functional Performance Testing.
2. Dynamic plotting – The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The points to be trended are identified in the Functional Test Checklist by equipment or system.

E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission shall be recorded and resubmitted to the CM and Commissioning Agent.

1. Point-to-Point checkout documentation;
2. Sensor field calibration documentation including system name, sensor/point name, measured value, DDC value, and Correction Factor.
3. A sensor calibration table listing the referencing the location of procedures to following in the O&M manuals, and the frequency at which calibration should be performed for all sensors, separated by system, subsystem, and type. The calibration requirements shall be submitted both in the O&M manuals and separately in a standalone document containing all sensors for inclusion in the commissioning documentation. The following table is a sample that can be used as a template for submission.

Sensor	Calibration Frequency	O&M Calibration Procedure Reference
Discharge air temperature	Once a year	Volume I Section D.3.aa
Discharge static pressure	Every 6 months	Volume II Section A.1.c

4. Loop tuning documentation and constants for each loop of the building systems. The documentation shall be submitted in outline or table separated by system, control type (e.g. heating valve temperature control); proportional, integral and derivative constants, interval (and bias if used) for each loop. The following table is a sample that can be used as a template for submission.

AIR HANDLING UNIT AHU-1				
Control Reference	Proportional Constant	Integral Constant	Derivative Constant	Interval
Heating Valve Output	1000	20	10	2 sec.

3.05 FUNCTIONAL PERFORMANCE TESTING

A. Objectives and Scope. The objective of functional performance testing is to demonstrate that each system is operating according to the Contract Documents. Each system will be tested to verify that the system response is as designed. Commissioned systems will be checked for conformance to the design sequences of operation and stable control. Proper system responses to such conditions as power failure, out of limit condition, equipment failure, etc. shall also be tested.

B. Development of Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. The test procedures are written by the CxA based upon the final operational sequences from available project documentation. The CxA shall develop specific test procedures and forms to verify and document proper operation of each system. Prior to execution, the CxA shall provide a copy of the test procedures to the Contractor who shall review the tests for feasibility, safety, equipment and warranty protection. The test procedure checklists developed by the CxA shall include the following information:

1. System and equipment or component name(s).
2. Equipment location and ID number.
3. Date.
4. Project name.
5. Participating parties.
6. Reference to the specification section describing the test requirements, if applicable.
7. Identification of control points
8. Identification of specific control points to be trended as part of the testing
9. A summary of the specific sequence of operations.
10. Prerequisites for the test.
11. Special cautions, alarm limits, etc.
12. Specific step-by-step procedures to execute the test.
13. Acceptance criteria of proper performance with a Yes / No/NA check box.
14. A section for comments.

C. Test Methods.

1. Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.

a. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.

b. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

c. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

d. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 C (54 F), when the outside air temperature is above 12 C (54 F), temporarily change the lockout setpoint to be 2 C (4 F) above the current outside air temperature.

e. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.

D. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.

E. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The sampling rate is specified in Section 3.01. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.

F. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

G. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the CM regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and CM. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.

H. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the CMG before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance Testing will proceed from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.

I. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

3.06 Common Elements For All Systems

A. Have the required submitted documentation convenient to testing area. Validate that all required documentation has been submitted and is per the contract requirements (very cursory review). CxA shall review the content of the documentation and validate that it is per contract documents

B. CxA shall review the startup documentation at the start of functional performance testing. Review the startup tests and checklist documentation. CxA shall validate that startup is acceptably executed and complete. CxA shall ensure that any items indicated as outstanding in the checklists is entered as an Action Item and enter one if it is not. The checklists and start up tests/measurements shall be spot checked at the beginning of FPT to ensure accuracy. CxA shall complete a test that indicates he has reviewed the prefunctional checklists and finds them acceptable and note any outstanding items

C. CxA shall check for and as applicable direct Contractor to demonstrate that access is sufficient to perform required maintenance.

D. CxA shall validate that all prerequisite work is complete and confirm via a test record that he feels it is.

E. Specifically check labeling and ensure conformance to contract requirements.

F. Check proof indication, alarming on failure and restart/acknowledgement as applicable.

G. CxA shall observe operating conditions encountered at the start of FPT. CxA shall examine for normal functionality and record parameters as a test.

H. All dynamic systems powered by electricity shall be tested to simulate a power outage to ensure proper sequencing. Those on emergency power or uninterruptible power shall be tested on all sources.

I. CxA shall inspect the installation and compare it to contract requirements. Record the inspection as a test.

J. Capacities and adjusted and balanced conditions as applicable will generally be checked.

K. Verify all sequence modes and sequences of operation. CxA must initiate all modes and may not refer to or rely on a prefunctional test done by the BAS. Some examples of generic modes that apply to most systems include:

1. Off Mode
2. Failed Mode: Proof, safeties, power outage etc. See below for crash testing.
3. Start Sequence in various modes
4. Stop sequences in various modes

L. All adjusted, balanced, controlled systems shall be assessed to determine the optimal setting for the system as applicable. The optimal settings should be determined to establish reliable, efficient, safe and stable operation. CxA is responsible for placing systems in optimal condition for occupancy and not simply relying on initial design estimated settings.

M. Dynamic Graphics: The graphic for all components, systems, and areas sampled and required to be represented by a graphic shall be checked for adequacy and accuracy.

Furthermore, when setpoints are required to be adjustable, verify that they can be adjusted directly from the graphic screen.

N. All interfaces between two systems or equipment of different manufacturers must be checked for accuracy and functionality.

O. CxA shall to the extent possible, load the heating and cooling systems during initial FPT to check the capacity of the building central systems and initially optimize system settings. This will typically be done using the preheat system to false load the cooling system. This test will incorporate varying the load to check central systems response.

P. "Crash Testing": CxA shall analyze systems to identify possible conditions where functionality may be compromised. CxA shall design non-destructive tests that will demonstrate either the automated response to the conditions or so that team can identify the best method for responding or fixing the condition. All tests and finding shall be documented.

Q. Building Enclosure Systems Functional Performance Tests

1. Participants shall include CxA, GC and water-proofing subcontractors.
2. Sample 20%; failure 0%.
3. CxA shall review construction checklists and perform site inspections during installation to verify completeness per construction documents.
4. The CxA may witness testing performed by contractor and will review all test reports.
5. Foundation: Upon completion of the under-slab vapor retarder installation the contractor will perform a field inspection to ensure that the installation was performed in accordance with manufacturer's instructions, construction documents, ASTM E1745-11 and ASTM E1643-11. CxA will observe and inspect the installation of the under-slab vapor retarders.
6. Walls:
   a. Upon completion of the wall insulation installation and prior to installation of interior wall sheathing, e.g. gypsum board, the contractor will field verify to ensure that the insulation installation was performed in accordance with the construction documents.
   b. The contractor will notify CxA to perform a site observation to review installed wall insulation installation.
7. Windows and Wall Systems:
   a. Upon completion of exterior windows and wall systems and prior to installation of insulation and wall sheathing the contractor will perform a field water spray test. A test plan will be provided by the CxA indicating tests locations. The approved test plan will outline up to 20% of the exterior windows and wall systems to be tested.
   b. Field water spray testing will be performed in accordance with AAMA 501.2. This test uses a hand held spray assemble employing a Type B2 #6.030 nozzle, pressure gauge, control valve and a ¾" garden hose apply water to the windows at 30 psi. Direct the water at joints and perpendicular to the face of the window frame. Slowly move the nozzle back and forth above the window joints at a distance of 1'-0" for a period of five minutes for each 5'-0" of joint. At the same time have an observer on the inside of the building to check for water leakage. The contractor will be responsible to repair any identified leaks and retest repaired joints.
   c. The contractor will coordinate spray testing schedule in advance with the CxA allowing adequate time for the CxA to witness field water spray testing.
8. Doors : The contractor will perform visual inspections of all exterior doors with weatherstripping. The contractor will be responsible to adjust doors for proper

operation and weather seal. CxA will inspect, test or operate a random sampling of exterior doors to verify proper seal.

9. Roof:

    a. Upon completion of the roof systems and prior to installation of interior ceiling systems the contractor will perform a roof flood test. A test plan will be provided by the CxA indicating tests locations. The structural engineer will review the roof flood test plan and approve prior to any roof flood testing. The approved test plan will outline up to 20% of the roof area to be tested.
    b. Roof flood testing will be performed in accordance with ASTM D 5957.
    c. The contractor will coordinate roof flood testing schedule in advance with the CxA allowing adequate time for the CxA to witness roof flood testing.

R. Domestic and Lab Water Systems Functional Performance Tests

1. Participants shall include CxA, PC
2. Sample 100% of equipment and 50% of fixtures; failure 10%
3. CxA shall review prefunctional checklists, chlorination report and any factory start-up reports to verify prefunctional testing is completed.
4. Contractor to demonstrate settings and sequences of water heaters, circulation and booster pumps, temperature mixing valves and controls, reverse osmosis and water softener systems.
5. Domestic hot water will be tested by the CxA by measuring the hot water temperature at all fixtures along with the time it takes to reach that temperature.
6. Plumbing fixtures will be checked for proper operation and water saving features.
7. Equipment alarm outputs to the BAS will be checked for proper communication.

S. Lab Vacuum and Compressed Air Systems Functional Performance Test

1. Participants shall include CxA, PC
2. Sample: 100% of equipment and controls and 20% of lab fixtures. Failure: 10%
3. CxA shall review prefunctional test checklists, factory start-up reports, pipe pressure and cleaning reports to verify system readiness.
4. Contractor to demonstrate vacuum and pressure settings and alarms including BAS interface.
5. Lab vacuum and compressed air outlets will be checked for proper air pressure and vacuum.

T. HVAC System Pumps Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS (where pumps are automatically controlled).
2. Sample 100%
3. CxA shall review prefunctional checklists, start-up reports, and TAB report for pumps and variable frequency drives as applicable.
4. CxA shall check that construction strainers have been removed to validate that the system is clean.
5. Pumps shall be manually started individually. Pressure differential, KW (or slip on the motor), and flow shall be checked at shut-off, wide open, and balanced (or controlled) condition. Generally the reading from the instrumentation provided with the pump (thermometers and pressure gages and flow meters as applicable) will be acceptable if used to validate an action as opposed to checking balancing. Listen to pump to ensure no excessive noise or vibration
6. For pumps designed with automatic starting of back up pump on primary pump failure:

    a. Enable automatic controls.
    b. Start primary pump.

c. Throw disconnect switch of primary pump, and validate that standby is energized. Perform this test on all pumps.
d. Change lead and retest.

7. Check proof indication and alarm. Generally affect failure by turning off electrical feed at each available dedicated location (i.e.: breaker feeding drive or starter (when dedicated), throwing disconnect on starter or drive and/or turning HOA to off, and disconnecting local motor disconnect (coordinate with drive manufacturer where applicable particularly when reconnecting).
8. For staged pumping systems:
   a. Vary load by opening and closing valves to affect a stage up and stage down.
   b. Fail pumps throughout the process to ensure staging logic responds correctly.
   c. Ensure minimum run and off times of stages. Consider criticality of the system.
   d. Change pump priority and perform the same process with another priority.
9. For multiple pump systems, affect or observe a normal rotation of lead or priority sequence.
10. Simulate peak and minimum operating pressure conditions on the systems and check stroke and ranges on valves to ensure adequate close off and ranging.
11. For variable speed pumps:
    a. Manipulate control valves to change flow conditions (increase and decrease) and observe control response.
    b. Ensure stable control response to step change in flow conditions in both directions.
    c. Check for the applicable acceleration and deceleration of the pumps.
    d. Spot check for critical frequencies by manually ramping pump speed from min. to max. to ensure stable operation of pumps and record/defeat any critical frequencies.
    e. Record representative part load output from the drive (using VFD read out).
    f. Check calibration of control input. Check drive bypass operation if applicable.
    g. Specifically check for status indication at minimum pump speed and ensure reliability of status signal
12. Simulate power outage and ensure orderly and automatic restart.

U. Heating Hot Water System Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 100%, max failure limit 10%
3. CxA shall review prefunctional checklists, start-up check-lists and TAB reports.
4. Verify automatic start/stop of boiler.
5. Start heating system and manipulate control devices to obtain maximum heating call. Measure temperatures and pressures to determine capacity.
6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for primary pump, isolation valves, lead/lag and staging modes and proper operations within a mode.
7. Verify setpoints are properly programmed and
8. Check calibration of control devices and for stable control response and component performance including heating water coils, humidifiers, economizer cycles, etc. Ensure proper coordination of control loops and that no fighting or energy wastes result

9. Check for free and adequate flow of condensate.
10. Seasonal test may be required depending on time of year completion.

V. Variable Refrigerant System & Split Systems Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 20%, max failure limit 10%
3. CxA shall review start-up check-lists and TAB reports.
4. Verify automatic start/stop of fan and open/close of outdoor air damper as applicable.
5. Start heating and cooling system, manipulate control device to obtain maximum cooling and heating. Measure temperatures and pressures to determine capacity.
6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
7. Check calibration of control devices and for stable control response.
8. Check for free and adequate flow of AC condensate.
9. Simulate power outage and ensure automatic and orderly restart.

W. Miscellaneous Terminal Unit (split systems) Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 100%, max failure limit 10%
3. CxA shall review prefunctional checklists, start-up check-lists and TAB reports.
4. Verify automatic start/stop of fan and open/close of outdoor air damper as applicable.
5. Start heating and cooling system, manipulate control device to obtain maximum cooling and heating. Measure temperatures and pressures to determine capacity.
6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
7. Check calibration of control devices and for stable control response.
8. Check for free and adequate flow of AC condensate as applicable.
9. Simulate power outage and ensure automatic and orderly restart.

X. Air Handling Unit Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 100%, max failure limit 0%
3. CxA shall review prefunctional checklists, start-up check-lists and TAB reports.
4. Verify automatic start/stop of fan and open/close of outdoor air damper.
5. Start heating and cooling system, manipulate control device to obtain maximum cooling and heating. Measure temperatures and pressures to determine capacity.
6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
7. Check calibration of control devices and for stable control response and component performance including chilled water coils, hot water coils, steam coils, humidifiers, economizer cycles, etc. Ensure proper coordination of control loops and that no fighting or energy wastes result
8. Check for free and adequate flow of AC condensate.
9. Spot check valve close off under peak pressure conditions that the valve will try to close.
10. For variable speed fans:

a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
b. Manually ramp fan speed from min. to max. to ensure stable operation of fans.
c. Record representative part load output from the drive.
d. Check calibration of control inputs.
e. Check drive bypass operation if applicable.

11. For fans with inlet vanes:

a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
b. Manually modulate vanes from min. to max. to ensure stable operation of fans.
c. Record representative part load power draw on the motor.
d. Check calibration of control input.

12. Ensure minimum required ventilation rates are maintained across the full range of control where applicable.
13. Test all interfaces with the fire alarm system and all smoke control sequences.
14. Verify interlocks with exhaust fans where applicable.
15. Test proof alarming where applicable.
16. Test operation of applicable safeties including freeze stats, high and low static devices, smoke detection, etc. Check AH component status in each event.
17. Check system status and operation in the Off, Unoccupied, and Occupied Mode of operation. Validate proper start up and shut down sequences.
18. Simulate power outage, operation under emergency power where applicable, and ensure automatic and orderly restart.
19. Where systems are headered and/or sequenced, vary loading to affect stage up and stage down. Adjust parameters to affect smooth staging. Validate that header pressure is not compromised in the event of a failure of one of the units.
20. 20. Check temperature sensor coordination by isolating or stopping coils and heat wheels with air flowing.

Y. Fan/Air System Functional Performance Test.

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 100%
3. CxA shall review prefunctional check-lists, start-up reports and TAB reports.
4. Verify start/stop control sequences.
5. Check the capacity of the fan at maximum conditions.
6. Cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
7. For variable speed fans:

a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
b. Manually ramp fan speed from min. to max. to ensure stable operation of fans. Record representative part load output from the drive.
c. Check calibration of control input.
d. Check drive bypass operation if applicable.

8. For fans with inlet vanes:

a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
b. Manually modulate vanes from min. to max. to ensure stable operation of fans. Record representative part load power draw on the motor.
c. Check calibration of control input.

9. Verify interlocks with exhaust fans where applicable.
10. Test all interfaces with the fire alarm system and all smoke control sequences.
11. Test proof alarming where applicable. Simulate failures of fans and ensure proper start-up of back up fans. Check status indication at minimum fan speed to ensure reliable and repeatable condition.
12. Test operation of applicable safeties including freeze stats, high and low static devices, smoke detection, etc.
13. Check system status and operation in the Off, Unoccupied, and Occupied Mode of operation. Validate proper start up and shut down sequences.
14. Simulate power outage, operation under emergency power where applicable, and ensure automatic and orderly restart.
15. Where systems are headered and/or sequenced, vary loading to affect stage up and stage down. Adjust parameters to affect smooth staging. Validate that header pressure is not compromised in the event of a failure of one of the units.

Z. HVAC VAV/SAV/GEV/FEV Air Terminal Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 20%, max failure limit 10%
3. CxA shall review start-up check-lists and TAB reports.
4. Check the calibration of zone temperature sensors.
5. Set boxes for both minimum and maximum flow (typically by setting the space temperature setpoint up and down) and check the calibration of the flow settings
6. Check the stability of the zone temperature control loop for the damper and any associated heating devices by changing the space setpoints and observing the response.
7. Cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
8. Determine the optimal settings for the control parameters
9. Simulate and test the unoccupied and emergency mode response of the box where applicable
10. Check the capacity of the heating device where applicable.

AA. Building Automation System Functional Performance Test

1. Participants shall include CxA, MC, and BAS.
2. Controls system sampling will typically correspond to the sampling rate of a system or piece of equipment. These sampling rates are indicated in Section 3.01 for the respective item.
3. Contractor shall operate the equipment and subsystems through all specified modes of control and sequences of operation including full and part load conditions, and emergency conditions.
4. Verify that equipment operates in accordance with design intent and approved control diagrams. This shall include checking the operation of dampers, valves, smoke detectors; high and low limit controls, of a sample of 25% of components with a maximum failure limit of 10%.
5. Analog Input Sensors: (at a sample of 50% of the inputs on the sampled devices (see above for device samples) with a maximum failure rate of 10%) Spot check analog input sensors (space temperature sensors, outside, return, and mixed air temperature sensors, discharge air temperature sensors, chilled water and hot

water temperature sensors, and humidity sensors, air and water differential pressure sensors, airflow monitoring stations, etc.) for acceptable accuracy (which is generally as specified for the device).

6. Valves, Dampers and Actuators: (at a sample of 50% of the inputs on the sampled devices (see above for device samples) with a maximum failure rate of 10%) Ensure that valves and dampers and their actuators close off or seal against the maximum pressure differential. Ensure that the actuators stroke throughout the correct range and that the positioners are set correctly where applicable.
7. Analyze trends of control system points for a minimum of a one week period prior to and throughout the Acceptance period. Trends shall be analyzed to identify any control problems, lack of capacity, control loops fighting or unstable, etc.
8. Spot (at a sample of 50% of the inputs on the sampled devices (see above for device samples) with a maximum failure rate of 10%) check the operation of all automatic switches (pressure switches, current switches, flow switches, etc.) to ensure that they are adjusted to proper make and break settings.
9. Verify the stand alone functionality of the controllers. Generally disconnect LAN communication wiring and ensure that the controller functions properly and that the loss of communication is acknowledged by the interface. Restore communications and ensure an orderly restoration to normal control.
10. Verify that the EMS interface, EMS software, graphics and functions are in accordance with design intent and approved control diagrams.
    a. Validate intuitive interface and graphic linking.
    b. Validate all graphics are done and accurate.
    c. Validate that all graphics contain required information.
    d. Validate that all security passwords and access to system information has been set up correctly.
    e. Validate that point naming convention is consistent and per Owner requirements.
11. Check dial in communications and pager functions where applicable to ensure functionality.

BB. Lighting Fixtures And Lighting Controls/277/120V Functional Performance Test

1. General: Provide the services of a factory trained manufacturer's representative to assist the contractor in the installation and start up service of the lighting control system and train Owner's maintenance personnel as specified below. Representative will confirm the proper installation and operation of all system components.
2. Train Owner's maintenance personnel on the operation and programming of the lighting control system. Seven days of training will be provided for up to 50 users.
3. Start-up checklists: Perform the following final checks before startup:
    a. Ensure all labeling is affixed and accurate
    b. Ensure all terminations are tight.
    c. Check sensor placement is adequate for required duty.
    d. Ensure adequate access is provided to all panels and that documentation of that panel is provided in it.
    e. Ensure all circuits for the loads are energized and ready for testing.
4. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
    a. Test, calibrate, and set all digital and analog sensing, and actuating devices. Calibrate each instrumentation device by making a comparison between the graphic display and the reading at the device, using an

instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +/-0.5% accurate, test equipment shall be +/-0.25% accurate over same range). Record the measured value and displayed value for each device in the Start Up Report.

b. Check each digital control point by making a comparison between the control command at the control panel and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the OI display. Record the results for each device in the Start-Up Report.
c. Check loads on all breakers to ensure that the breaker is properly sized.
d. Enter all schedules per occupant's direction.

5. For Operator Interfaces:

a. Verify all elements on the graphics are functional and properly bound to physical devices and/or virtual points and that hot links or page jumps are functional and logical.
b. Output all specified reports for review and approval.
c. Verify the alarm printing and logging is functional and per requirements
d. Validate all interfaces with other systems on a point by point basis

6. Daylighting and Dimming Controls:

a. Participants shall include CxA, EC and trained manufacturer's representative.
b. Sample 50%
c. CxA shall review prefunctional check-lists and start-up reports.
d. Verify daylighting and dimming control sequences and setpoints for photocells for required footcandle levels at desk level.
e. Check proper sequence for low voltage switch modes and proper operation within a mode.

7. Occupancy Sensor

a. Participants shall include CxA, EC and trained manufacturer's representative.
b. Sample 50%
c. CxA shall review prefunctional check-lists and start-up reports.
d. Verify that the area occupancy can be monitored
e. Verify that the sensor can be overridden when sensor problems occur.
f. Verify that the area lights turn on when occupied and off when unoccupied for fifteen minutes.

CC. Power Distribution System Functional Performance Test

1. Participants shall include CxA and EC.
2. General: Provide the services of a NETA certified testing contractor to assist the contractor in equipment and power distribution system start-up and prefunctional testing. Representative will confirm the proper installation and operation of all system components.
3. Start-up checklists: Perform the following final checks before startup:

a. Ensure all labeling is affixed and accurate
b. Ensure all terminations are tight.
c. Inspect for physical, electrical and mechanical condition of equipment and cabinet - no damage evident.
d. Equipment installed agrees with shop drawings and specifications

4. Ensure adequate access is provided to all panels and that documentation of that panel is provided in it.
5. Ensure all circuits for the loads are energized and ready for testing.
6. Perform Test Procedures in accordance with technical specifications and provide Test Reports for CxA review.
7. Simulate a utility outage and verify that all equipment being served by the emergency power system functions properly through the sequence of operations without interruptions or alarms.

DD. Uninterruptible Power Supplies Functional Performance Test

1. Participants shall include CxA and EC.
2. Sample 100%
3. Upon completion of the emergency power system, factory start-up and contractor pretesting, the CxA will witness a contractor test to verify complete system power loss and verify proper power provision of critical systems. The test will not be scheduled until all other systems dependent on emergency power have been tested and approved.
4. The contractor shall demonstrate the power management system to the CxA.
5. The contractor is to provide NETA certified third party testing of the power distribution system and provide the CxA with a certified test report. CxA will review contractor provided as-builts for proper identification and labeling of all equipment, piping and devices.

EE. Data and Communication Systems Functional Performance Test

1. Audio/Visual Systems

    a. Participants shall include CxA, EC and A/V Subcontractor
    b. Sample 50%
    c. Witness the testing of audio integrated with the video.
    d. Verify sound matches voices on the video.
    e. Witness the contractor testing the audio from the microphones.
    f. Verify audio levels within the audio mixing equipment.
    g. Verify audible audio levels within the room.
    h. Verify contractor is performing the test in full operation of the audio visual system.
    i. Verify the contractor is testing the handheld microphones, the lapel microphones, and the stationary microphones independently and simultaneously to ensure no feedback is present in the system during this operation.

FF. Security System Functional Performance Test

1. Participants shall include CxA, EC, and Security subcontractor.
2. Sample 50%, max failure limit 10%
3. CxA shall review prefunctional checklists and start-up reports.
4. Verify cable and system component installation complies with the specifications and drawings.
5. Verify correct panel and door hardware power supplies and batteries are connected and operational.
6. Verify operation at the doors and gates is per the specification.
7. Verify alarms for forced, held open, and closed functions are operational.
8. Verify camera field of view meets owner’s requirements.
9. Verify camera recording and video storage meets specifications.

GG. Fire Alarm Equipment / Fire Alarm/Detection System Functional Performance Test

1. General: General: Provide the services of a qualified fire alarm specialist to supervise the installation, make adjustments, and perform tests on the fire alarm system and train Owner's maintenance personnel.
2. Start-up checklists: Perform the following final checks before startup:
    a. Ensure all labeling is affixed and accurate
    b. Ensure all terminations are tight.
    c. Ensure adequate access is provided to all panels and that documentation of that panel is provided in it.
    d. Review that all fire alarm devices as shown on the construction drawings and shop drawings are installed.
    e. Review height and locations of pull stations and visual alarms to comply with ADA.
    f. Review that smoke and duct detectors are installed according to NFPA 72E and NFPA 90A.
    g. Check that fire alarm system control panel is clear with no trouble or ground faults.
    h. Sprinkler flow and tamper switches have been adjusted.
    i. Check wire supervision on all devices.
3. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
    a. Check location of all sensors and switches to ensure conformance with requirements.
    b. Cause activation of all device, assure alarms are initiated and resulting response is per the requirements.
    c. Verify interfaces with all other inter-related systems or equipment including FMS, sound systems, security systems, HVAC systems, vertical delivery systems, etc. on a point by point basis for all points
    d. Validate all output devices (speakers and strobes) meet the code criteria (96 dBa at 10’ and 117 candela at peak)
    e. Activate high temperature detectors in the elevator machine room. Verify all sequences including elevator shunt off, elevator recall including alternate floors when main floor is in alarm.
    f. Activate all sprinkler flow switches. Validate that appropriate zone enunciates and alarms sound.
    g. Verify audio aspects of the system function as required. Verify paging messages can be heard throughout the building.
    h. For enunciator panels, validate correct graphic and correct identification of all zones. Test the action and interlocks of all override switches as appropriate
4. For Operator Interfaces:
    a. Verify all elements on the graphics are functional and properly bound to physical devices and/or virtual points and that hot links or page jumps are functional and logical.
    b. Output all specified reports for review and approval.
    c. Verify the alarm printing and logging is functional and per requirements
    d. Validate all interfaces with other systems on a point by point basis
5. Training: Train Owner's maintenance personnel on procedures and schedules related to start up and shutdown, troubleshooting, servicing, and preventative maintenance as specified in technical specification sections.

HH. Landscape Irrigation Functional Performance Test

1. Participants shall include CxA and Landscape Contractor.

2. Sample: All irrigation controllers, 20% (of zones coverage test using thermographic camera for bubblers), max failure limit 0%.
3. Check irrigation controller schedule and zone settings and record to verify conformance with approved schedules and settings.
4. CxA shall review as-built drawings, pressure test documentation for drip emitters and inline drip tubing and confirm valves have been adjusted, heads aligned and coverage has been adjusted for each zone.

3.07 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the CM and the CMG for review and approval. The Contractor shall include the filled out forms with the O&M manual data.

B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the CM/CMG on Commissioning Field Reports and/or the Commissioning Master Issues Log.

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the CM.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:

    a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent will submit a Commissioning Field Report to the CM. The Commissioning Agent will also note items of noncompliance and the Contractor’s response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the CM and the Commissioning Agent.
    b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.

5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:

    a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor’s response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.

b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the CM.
c. The Commissioning Agent will document the resolution process.
d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.

C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the CM. In such case, the Contractor shall provide the CM with the following:

1. Within one week of notification from the CM, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the CM within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The CM shall determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the CM. The Commissioning Agent will evaluate each test and report to the CM using a standard form. The CM will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

3.08 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, Contractor, and subcontractors. Perform the following:

1. Review installed systems, subsystems, and equipment.
2. Review instructor qualifications.
3. Review instructional methods and procedures.
4. Review training module outlines and contents to ensure it meets the specific maintenance personnel requirements.

5. Review course materials (including operation and maintenance manuals).
6. Inspect and discuss locations and other facilities required for instruction.
7. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
8. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable

B. Training of Owner Personnel

1. Provide the CxA with training agendas and schedule at least two weeks before the planned training.
2. Provide designated Owner personnel with comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.
3. Training shall start with classroom sessions, if necessary, followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including start-up, shutdown, fire/smoke alarm, power failure, etc.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
    a. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
    b. Include a review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shutdown, seasonal changeover and any emergency procedures.
    c. Discuss relevant health and safety issues and concerns.
    d. Discuss warranties and guarantees.
    e. Cover common troubleshooting problems and solutions.
    f. Explain information included in the O&M manuals and the location of all plans and manuals in the facility.
    g. Discuss any peculiarities of equipment installation or operation.
    h. Classroom sessions shall include the use of overhead projections, slides, video and audio taped material as might be appropriate.
8. Hands-on training shall include start-up, operation in all modes possible, including manual, shutdown and any emergency procedures and maintenance of all pieces of equipment.
9. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.

C. BAS Demonstration and Orientation

1. The intent of the demonstration and orientation is to provide the Owner, Testing Contractor, and Commissioning Authority with a reasonable level of assurance

that the system is complete and ready for functional performance testing, and to provide an initial orientation to the system configuration, set-up, features, and commissioning related procedures.

2. Demonstrate the operation of a sampling of the BAS hardware, software, and all related components and systems to the satisfaction of the CxA. Schedule the demonstration with the Owner's representative 2 weeks in advance. Demonstration shall not be scheduled until all hardware and software submittals, and the Pre-functional Test Reports are approved. If in the judgment of the CxA the Work fails to be demonstrated to be complete and ready for functional testing, so as to require additional site visits by the CxA for re-demonstration, Contractor shall reimburse Owner for all costs of subsequent CxA site visits for demonstration.
3. The Contractor shall supply all personnel and equipment for the demonstration, including, but not limited to, instruments, ladders, etc. Contractor supplied personnel shall be competent with and knowledgeable of all project-specific hardware, software, and the HVAC systems. All documentation and submittals shall be at the job site.
4. The system shall be demonstrated following the same procedures used in the Pre-functional Test. Demonstration shall include, but not necessarily be limited to, the following:

    a. Demonstrate that all required software is installed on workstations. Demonstrate that all graphic screens, alarms, trends, and reports are installed as submitted and approved.
    b. Demonstrate that a sampling of points specified and shown can be interrogated and/or commanded (as applicable) from all workstations, as specified.
    c. Demonstrate that remote dial-up communication abilities (as applicable) are in accordance with contract requirements.
    d. Demonstrate correct calibration and calibration procedure for a sampling of input/output devices selected by the Owner and CxA.
    e. Demonstrate that all DDC and other software programs exist at respective field panels. The Direct Digital Control (DDC) programming and point database shall be as submitted and approved.
    f. Demonstrate that all DDC programs accomplish the specified sequences of operation.
    g. Demonstrate that the panels automatically recover from power failures, as specified.
    h. Demonstrate that the stand-alone operation of panels meets the requirements of these Specifications. Demonstrate that the panels' response to LAN communication failures meets the requirements of these Specifications.

5. Include a maximum of 16 hours (2 work days) of control technician time for Demonstration in project price. Additional time required for repeating demonstration of control system because of initial failure shall be provided at no cost to the Owner.
6. Failure of any of the above items shall be noted as part of the functional testing, and failed items shall be corrected to conform to contract requirements.
7. BAS Demonstration shall be completed prior to functional performance testing and Substantial Completion.

3.09 Performance Period

A. Upon successful completion of functional acceptance tests, a performance period of 15 consecutive calendar days shall commence on first day following the last acceptance test. This period shall be completed prior to final acceptance of the project. In event of

failure to meet standard of performance during any initiated performance period, it is not required that one 15-calendar day period expire in order for another performance period to begin.

B. If equipment or system operate and demonstrate continuing compliance with specified requirements for period of 15 consecutive calendar days from commencement date of performance period, it shall be deemed to have met the standard of performance.

C. Equipment will not be accepted by the Owner and final payment will not be made by the Owner until acceptable performance is met.

D. Contractor shall provide Commissioning Authority with trend logs of the system performance for the control variables and set point in each control process in 15-minute time intervals.

E. Systems shall be first tested as independent building systems followed by tests of systems tied into Owner's systems. Types of Owner's systems include, but are not limited to, central plant heating and cooling; off-site security / alarm monitoring; and campus automated controls systems.

F. Upon Contractor's completion of the requirements of the commissioning plan and the successful completion of the performance period, and receipt of the required documentation, the Commissioning Authority shall provide the Owner with a statement of acceptable performance.

G. Operational Test: Prior to the start of functional performance testing, the system shall operate properly for two weeks without malfunction, without alarm caused by control action or device failure, and with smooth and stable control of systems and equipment in conformance with these specifications. At the end of the two weeks, contractor shall forward the trend logs to the CxA for review. CxA shall determine if the system is ready for functional performance testing and document any problems requiring contractor attention.

1. If the systems are not ready for functional performance testing, Contractor shall correct problems and provide notification to the Owner's representative that all problems have been corrected. The Acceptance Period shall be restarted at a mutually scheduled time for an additional one week period. This process shall be repeated until Commissioning Authority issues notice that the BAS is ready for functional performance testing.
2. During the Operational Test, the contractor shall maintain a hard copy log of all alarms generated by the FMS. For each alarm received, contractor shall diagnose the cause of the alarm, and shall list on the log for each alarm, the diagnosed cause of the alarm, and the corrective action taken. If in the contractor's opinion, the cause of the alarm is not the responsibility of the contractor, contractor shall immediately notify the Owner's representative.
3. During the Acceptance Phase, the contractor shall maintain all controller network and workstation hardware and software in a state that will allow remote access by CxA to Trend Logs as specified below.

H. Trend Logs

1. Trend logs are databases of ASCII characters (usually numbers) representing a historical record of the systems operation. Contractor shall establish and store these trend logs.
2. Trend logs shall be set up for all control system points on an average of 15 minute intervals or change of value thresholds as approved by CxA. BAS contractor must design panel and network loading to accommodate this trending without adversely impacting the control system functionality.
3. CxA will analyze trend logs of the system operating parameters to evaluate normal system functionality. Contractor shall establish these trends, ensure they are being stored properly, and forward the data in electronic format to the CxA.
4. Data shall include a single row of field headings and the data thereafter shall be contiguous. Each record shall include a date and time field. Recorded

parameters for a given piece of equipment or component shall be trended at the same intervals and be presented in a maximum of two separate two dimensional formats with time being the vertical axis and field name being the horizontal axis.. Data shall be forwarded in one of the following formats.

a. Microsoft ACCESS Database (.mdb)
b. Microsoft EXCEL Spreadsheet (.xls)
c. Comma Separated Value (.csv or .txt) preferably with quotes delimiting text fields and # delimiting date/time fields

5. If sample times are trended as COV or change of value, when output to the trending file, the latest recorded value shall be listed with any given time increment record. If the system does not have the capability to fill the archive with the latest value, the parameter shall be recorded based on the interval common to the unit.
6. Contractor shall provide the CxA with required passwords, phone numbers, etc. to allow the CxA access to the trend log data and allow downloading to a remote location. Contractor shall also provide step-by-step written instructions for accessing the data.

3.10 DEFERRED TESTING

A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the project completion level, required occupancy condition or other deficiency, execution of checklists and performance testing may be delayed upon approval of the CxA. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.

B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity through the Owner/CM. Tests will be executed, documented by the CxA and deficiencies should be corrected by the appropriate contractor/ subcontractors with the CxA witnessing. Any final adjustments to the O&M manuals and as-built drawings due to the testing shall be made by the contractor.

3.11 Warranty Review

A. During the first year of the system and buildings' operation, it is important to assure that the performance of the facility is maintained, particular before the warranty period expires. At 22 months into a 24 month warranty period, operation of system and components is reviewed by the Owner, Contractor, and the CxA to identify any items that must be repaired or replaced under warranty. CxA will also interview building operating personnel to identify any outstanding warranty failures and any persistent equipment failures that should be handled within the warranty period. This review is based on warranty items and continued performance with Owner's project Requirements. The CxA will document the results and forwards recommendations to Owner and Contractor for resolution.

END OF SECTION 019113

SECTION 022623
ASBESTOS ABATEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work under this section includes the furnishing all labor, equipment and materials necessary to remove asbestos-containing materials from the old maintenance compound (J Buildings) prior to the demolition of these buildings by others. All work shall be performed in accordance with applicable federal, state, and local requirements and statutes. The work will be performed by persons knowledgeable, qualified, trained, and experienced in the removal, treatment, handling, transportation, and disposal of asbestos-containing material.

1.2 SCOPE OF WORK

A. General Requirements: Work of this section includes but is not limited to the following:

1. Obtaining all notifications and permits required to perform the work.
2. Developing a detailed asbestos removal work plan, including: work sequence; work area isolations; decommissioning HVAC and Electrical systems within each affected building; installing a temporary power system with ground-fault interruption/protection to be used in the removal areas; removal methods; and transport/disposal procedures. This work shall be coordinated with the lead-related abatement work plan in Section 02 26 26.
3. Removing and legally disposing of the identified asbestos-containing materials, and asbestos-contaminated materials, to allow demolition of the buildings by others.
4. Removing and legally disposing of all asbestos-containing materials (ACM) and asbestos contaminated materials disturbed by the project and removed from the project site.
5. Thoroughly cleaning the area of work and obtaining final visual inspection approval from the District's Representative. Clearance air monitoring performed by Phase Contrast Microscopy (PCM) (NIOSH Method 7400) will be performed for negative pressure enclosures.
6. The Contractor shall retain a third party asbestos consulting firm to perform an exposure assessment and perform exposure monitoring. The third party consulting firm shall perform monitoring for a minimum of two days while asbestos-related demolition is being performed.
7. The Contractor shall perform employee exposure monitoring as required by Cal OSHA during the project.

B. The Contractor shall remove, transport, and properly dispose the following material associated with the buildings of the Old Maintenance Compound. The buildings were identified in the survey as J-A, J-B and J-C. The estimated quantities shall be field verified:

1. The flashing cement used to seal roof curbs, penetrations and seams on the roofs of the three buildings is estimated to be 300 sq. ft. in quantity.
2. 9” green floor tile/mastic in several rooms of Building J-A (see Asbestos survey). The estimated quantity is 1,350 sq. ft.
3. The off-white sheet flooring in the entrance and restrooms of Building J-A. The estimated quantity is 100 sq. ft.
4. The green chalk boards in Building J-A are assumed to be transite. These boards are also lead-containing components. The estimated quantity is quantity is 120 sq. ft.

1.3 REQUIRED LICENSURE

A. Contractor shall be licensed by the State of California, Contractors State License Board and be registered to perform asbestos related work with the Division of Occupational Safety and Health, Department of Industrial Relations. At a minimum, Contractor shall hold the following license classifications:

1. ASB -Asbestos Certification Supplement

B. Transportation of Friable and Non-Friable Asbestos-Containing Materials: Contractor shall itself be, or have a subcontractor that is, a registered hazardous waste transporter with the State of California, Department of Toxic Substances Control.

1.4 APPLICABLE DOCUMENTS AND REGULATIONS

A. It is the responsibility of the Contractor to know the current regulations controlling work and to perform all related work in accordance with such regulations that provide for worker and public safety against asbestos exposure.

B. The publications listed below form a part of this specification to the extent referenced. The current issue of each document shall govern. Where conflict among requirements or with these Specifications exists, the more stringent requirements shall apply.

C. CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1910	Occupational Safety and Health Standards for General Industry
29 CFR 1910.1200	Hazard Communication
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.145	Specifications for Accident Prevention Signs and Tags
29 CFR 1910.1020	Access to Employee Medical Records
29 CFR Part 1926	Occupational Safety & health for Construction
29 CFR 1926.1101	Construction Standards for Asbestos, Tremolite, Anthophylite and Actinolite

D. U.S. ENVIRONMENTAL PROTECTION AGENCEY (EPA)

40 CFR 61 Sub A & B	General Provisions
40 CFR 61 Sub M	National Emissions Standard for Hazardous Air Pollutants (NESHAP)
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 763	Sub G Worker Protection Rule
40 CFR 763	Asbestos Hazard Emergency Response Act (AHERA)

E. U.S. DEPARTMENT OF TRANSPORTATION (DOT)

49 CFR 171 & 172	Transportation of Hazardous Waste

F. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (1989) Methods of Fire Test for Flame Resistant Textiles and Films

G. UNDERWRITERS LABORATORIES (UL)

UL 586 (1990) High-Efficiency Particulate Air Filter Units

H. CALIFORNIA CODE OF REGULATIONS (CCR)

Title 8 5208	General Industry Safety Orders -Asbestos
Title 8 Article 2.5	Registration -Asbestos Related Work
Title 8 5194	Hazard Communication
Title 81529	Construction Industry Safety Orders -Asbestos
Title 22 Div. 4 Cpt. 30	Hazardous Waste Handling

I. CALIFORNIA LABOR CODE

Section 6501.5-6505.5

J. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

Rule 1403 Asbestos Emissions from Demolition/Renovation Activities

1.5 NOTIFICATIONS AND PERMITS

A. Contractor shall make all required written notifications or applications to regulatory agencies including the following:

1. South Coast Air Quality Management District SCAQMD Notification shall be in accordance with Rule 1403.

2. California Division of Occupational Safety and Health

B. Notification shall be in accordance with Section 341.9 of Title 8 of the California Code of Regulations

1.6 SUPERVISOR/COMPETENT PERSON, FOREPERSON, AND WORKERS

A. The Contractor shall have an Asbestos Supervisor/Competent Person present at all times while asbestos-related work on this Contract is in progress.

B. The Asbestos Supervisor/Competent Person shall have successfully completed a five (5) day EPA-approved Asbestos Abatement Contractor/Supervisor training course, and be thoroughly familiar and experienced with asbestos removal and related work, and shall be familiar with and enforce the use of all safety procedures and equipment. He/she shall be knowledgeable of all EPA, OSHA, and NIOSH requirements and guidelines.

C. In addition to the Asbestos Supervisor/Competent Person, the Contractor shall furnish one (1) or more forepersons who have successfully completed a five (5) day EPA-approved Asbestos Abatement Contractor/Supervisor training course, and who are familiar and experienced with asbestos abatement and its related work, safety procedures, and equipment.

D. It shall be a requirement of this Contract that the Contractor's Asbestos Supervisor/Competent Person and one or more of the foremen be onsite at all times while work is in progress. A foreman will be required to conduct inspections of the work practices, and enclosure condition inside the work area at least three (3) times during each work shift.

E. All workers shall, at a minimum have successfully completed a four (4) day EPA approved Asbestos Abatement Worker training course.

1.7 SUBMITTALS

A. Within 10 working days of receiving the notice to proceed, submit to the District representative the following documents:

1. Copies of the written notification to the following regulatory agencies:

a. SCAQMD Rule 1403

b. California Division of Occupational Safety and Health

2. Copies of waste haulers Hazardous Waste Transporter Registration and Environmental Protection Agency Acknowledgment of Notification of Hazardous Waste Activity.

3. Identification of the landfill to be used for the disposal of the asbestos-containing waste generated at the project site and the landfill disposal and packaging requirements.

4. A written asbestos abatement work plan identifying work sequence, abatement duration, dust control measures, work area preparation, personal protection equipment to be utilized, asbestos-containing materials removal procedures, asbestos-containing/contaminated debris cleanup and disposal procedures, and waste handling, storage, and disposal procedures.

5. Manufacturer's certification that HEPA vacuums, differential pressure air filtration devices and other local exhaust ventilation equipment conform to ANSI Z9.2-79.

6. Current SCAQMD registration of all HEPA vacuums, differential pressure air filtration devices.

7. Manufacturer’s product data and material safety data sheet(s) for all chemical products to be used on the site.

8. Identification of the project's Asbestos Supervisor/Competent Person who meets the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529 and is experienced in administration and supervision of asbestos abatement projects, including work practices, protective measures for building and personnel, disposal procedures, etc.

9. Documentation that the Contractor's employees performing asbestos removal, disposal, and air sampling operations have received training which meets the criteria of the Federal EPA Model Accreditation Plan (40 CFR Part 763, Subpart E, Appendix C).

    a. Training certification shall be provided prior to the start of work involving asbestos abatement, for all of the Contractor's workers, forepersons, and Asbestos Supervisors/Competent Persons. Training shall meet the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529 and the criteria of the Federal EPA Model Accreditation Plan (40 CFR Part 763, Subpart E, Appendix C). Training shall be provided prior to the time of job assignment and, at least, annually.

10. Documentation from a physician that employees or agents who may be exposed to airborne asbestos fibers in excess of the Permissible Exposure Limit have received medical monitoring to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. Contractor shall be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g. high temperatures, humidity, and chemical contaminants) that may impact on the employee's ability to perform work activities. Medical monitoring shall be performed in accordance with the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529.

11. Documentation of respirator fit-testing for Contractor employees and agents who must enter the work area. This fit-testing shall be in accordance with qualitative procedures as required by OSHA regulations or be quantitative in nature.

12. Documented NIOSH approvals for respiratory protective devices utilized on site, including manufacturer's certification of HEPA filtration capabilities for cartridges and filters.

B. Upon completion of all asbestos abatement activities, submit to the District's Representative, documentation that includes, without limitation, the following:

1. Work area entry/exit logbook. The logbook must record the name, affiliation, time in, and time out for each entry into the work site.

2. Material Safety Data Sheets (MSDS) for solvents, encapsulants, wetting agents and replacement materials, as necessary.

3. OSHA required personal air monitoring results.

4. Accident/ incident reports where injury or damage has occurred on or to the District's property.

5. Hazardous waste manifests, non-hazardous waste data forms, trip tickets and disposal receipts for asbestos waste materials removed from the work area within 72 hours of transport. Send the information to:

Rancho Santiago Community College District
Facility Planning, District Construction and Support Services
2323 N. Broadway, Suite 112, Santa Ana, CA 92706
Attention: _____, Facilities Project Manager

1.8 NOTICES AND POSTINGS

A. Post in the decontamination unit, a list containing the names, addresses, and telephone numbers of the Contractor, District's Representative, Project Environmental Manager, and emergency contact numbers.

B. Additional postings shall include:

1. Visitor entry and exit log.

2. Employee daily sign in/out log.

3. Work area entry and exit procedures.

4. Emergency procedures.

C. One copy of the Cal-OSHA regulations.

D. Posted Warnings and Notices: The following regulations, warnings, and notices shall be posted at the work site in accordance with 29 CFR Part 1926.1101 and 8 CCR Part 1529.

1. Warning Signs and Labels: Warning signs shall be provided at building entrances and approaches to asbestos abatement areas. Signs shall be located at a sufficient distance from the asbestos control areas that will allow personnel to read the sign and take the necessary protective actions required before entering the asbestos control area.

2. Post at least two (2) safety warning signs, in English and Spanish, which follow the "Sample Format Warning Sign" shown below:

Sample Format Warning Sign Minimum Size -24" x 36" Material -Aluminum or Fiberglass
Script:

DANGER

ASBESTOS CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING AREA REQUIRED IN THIS AREA

Color -Black Letters on Red Background

1.9 WORK AREA SECURITY

A. The asbestos work control area shall be restricted only to authorized personnel, including Contractor, Contractor's employees, District's Representative(s), and state, and local inspectors.

B. Entry into the asbestos work control area by unauthorized individuals shall be reported immediately to the District's Representative.

C. Contractor shall be responsible for Project site security during asbestos-related demolition operations in order to protect work efforts and equipment.

1.10 WORK SEQUENCE

A. Work Sequence: The following is the work sequence for the project:

1. The three buildings will be vacant; therefore, there are no restrictions on how the work is completed. Lead-related removal work identified in Section 02080 may be performed in conjunction with the asbestos-related work.

1.11 PERSONAL PROTECTION AND SAFETY

A. The Contractor alone shall be responsible for the safety, efficiency, and adequacy of his/her appliances, methods, and for any damages which may result from his/her operations, improper construction practices, or maintenance. He shall erect and properly maintain at all times as required by the conditions and progress of the work, proper safeguards for the protection of workmen and the public and shall post warning signs around the job site.

B. Respiratory protection requirements:

1. All respiratory protection programs shall be established in accordance with the respiratory protection requirements of 29 CFR Part 1910.134, 8 CCR Part 5144, 29 CFR Part 1910.1001, and 29 CFR Part 1926.1101. Copies of these regulations are included herein by reference and shall be considered as a requirement of these Specifications.

2. All respirators used shall be selected from those approved by NIOSH for use in atmospheres containing asbestos fibers.

3. Work activities associated with the removal of non-friable asbestos-containing materials (i.e., floor tile and roofing material) shall be conducted in a minimum of half-face air purifying respirators

with P-100 filters.

4. Respirators shall be quantitatively fit-tested a minimum of every 12 months. Either the standard Irritant Smoke Protocol or the Isoamyl Acetate Protocol may be used.

C. Provide workers and authorized visitors with sufficient sets of protective full body impervious protective clothing. Such clothing shall consist of full body coveralls and headgear. Provide eye protection and hard hats as required by applicable safety regulations. Reusable type protective clothing and footwear shall be left in the equipment room until the end of the asbestos abatement work, at which time such items shall be disposed of as asbestos waste, or shall be thoroughly cleaned of all asbestos or asbestos-containing material. Disposable type protective clothing, headgear, and footwear may be provided.

D. Provide and post, in the equipment room and the clean room, the decontamination and work procedures to be followed by workers and authorized visitors as described in these Specifications.

E. Provide and post, in the equipment room and the clean room, the decontamination and work procedures to be followed by workers and authorized visitors as described in these Specifications.

F. Worker Protection Procedures:

1. Each worker and authorized visitor shall, upon entering the job site remove street clothes in the clean room and put on a respirator and clean protective clothing before entering the equipment room or the work area.

2. All workers and authorized visitors shall, each time they leave the work area; remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except respirators; still wearing the respirator proceed to the showers, clean the outside of the respirator with soap and water while showering; remove the respirator; thoroughly shampoo and wash themselves.

3. Following showering and drying off, each worker and authorized visitor shall proceed directly to the clean room and dress in clean clothes at the end of each day's work, or before eating, smoking, or drinking. Before reentering the work area from the clean room each worker and authorized visitor shall put on a clean respirator and shall dress in clean protective clothing.

4. Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, the footwear will either be disposed of as contaminated waste, or will be bagged and sealed for use at another abatement project.

5. Workers removing waste containers from the equipment decontamination enclosure shall enter the holding area from outside wearing a respirator and dressed in clean disposable coveralls. No worker shall use this system as a means to leave or enter the washroom or the work area.

6. Workers shall not eat, drink, smoke, or chew gum or tobacco while in the work area.

7. Workers shall be fully protected with respirators and protective clothing from the time of first disturbance of asbestos-containing or contaminated materials prior to commencing actual asbestos abatement and until final cleanup is completed.

G. If evacuation of the work area is required by contaminated personnel due to an emergency, all work efforts shall stop, and all forces shall be directed at minimizing the area contamination, cleanup operations, and first-aid procedures. These activities shall be noted in the daily logbook.

H. During work activities requiring decontamination procedures, the Contractor shall provide a means of communication for the workers inside the work area without requiring personnel to enter or leave the work area. The method of communication shall be a two-way radio, localized wire-connected telephone, or similar system. This communication system shall remain intact until the final isolation plastic is removed. Then all equipment shall be wiped down; HEPA vacuumed or disposed of as asbestos- contaminated material.

I. Adequate shower facilities shall be provided by the Contractor. An employee leaving the work area shall follow all decontamination procedures necessary or as described herein.

PART 2 – PRODUCTS

2.0 MATERIALS

A. Handling and Storage:

1. Deliver all materials to the project in the original package(s), container(s), or bundle(s) bearing the name of the manufacturer, brand name and the model number.

2. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.

3. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be disposed of in accordance with the applicable regulations.

B. Plastic (Polyethylene) Sheeting: Provide 6-mil thickness or greater polyethylene sheeting as specified in sizes to minimize the frequency of joints. Fire retardant polyethylene sheeting is required.

C. Tape: Provide two inch or wider duct tape capable of sealing joints of adjacent sheets of polyethylene and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials. Duct tape shall be capable of adhering under both dry and wet conditions, including use of amended water.

D. Spray Cement: Provide aerosol based spray adhesive specifically formulated to stick tenaciously to sheet polyethylene.

E. Surfactant: Provide a 50 percent polyoxyethylene ether and 50 percent polyoxyethylene ester, or equivalent and mix with water to provide a concentration of one-ounce surfactant to 5 gallons of water.

F. Impermeable Containers: Provide impermeable containers suitable to receive and retain any asbestos-containing or contaminated materials until disposal at Disposal Site labeled in accordance with OSHA Regulation 29 CFR 1910.1101, DOT 49 CFR 171-177, Title 8 CCR and SBACPD. Containers must be both air and watertight and must be resistant to damage and rupture. Plastic bags shall be a minimum of 6-mil thick.

G. Warning Labels and Signs: Provide warning labels and signs as required by OSHA Regulation 29 CFR Part 1910.1101, Title 8 CCR Part 1529 and SBAPCD Rule 1001.

H. Other Materials: Provide all other materials, such as lumber, nails and hardware, which may be required to construct and dismantle the decontamination area and the barriers that isolate the work area.

I. Solvents used for the removal of resilient flooring mastics shall be low-odor.

2.2 TOOLS AND EQUIPMENT

A. Provide all tools and equipment necessary to perform the required asbestos removal/abatement.

B. Air Filtration Equipment: High Efficiency Particulate Air (HEPA) filtration systems shall be equipped with filtration equipment in compliance with ANSI Z9-2-79, local exhaust ventilation. No air movement system or air filtering equipment shall discharge unfiltered air outside the work area. A pressure differential system shall be established in the work area continuously (24 hours per day) from the start of the work in the area until the area has been decontaminated and certified as such by the required testing. The system shall produce a minimum of four filtered air changes per hour in the work area and maintains a pressure differential of 0.020-inches water gauge between the inside and outside of the work area. All filtered, exhausted air shall be discharged outside the building away from any building air-intake devices (unless stated otherwise).

C. Manometer: A continuous recording monitor shall measure and record the difference in air pressure between that inside the work area from that outside the work area. The recording system shall be accurate to the nearest 0.001-inches of water pressure differential and be equipped with an alarm that sounds if the difference becomes less than 0.020-inches water gauge.

PART 3 – EXECUTION

3.0 ASBESTOS REMOVAL PREPARATION PROCEDURES

A. General Work Area Preparation: Contractor shall perform the following general work area preparation procedures prior to commencement of any abatement activities:

1. Danger signs meeting the specifications of 29 CFR Part 1926.1101 and 8 CCR 1529 shall be posted at any location and approaches to locations where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the work area to permit an employee to read the sign and take the necessary protective measures to reduce or avoid exposure. Additional signs may need to be posted following construction of workplace enclosure barriers. The signs shall be in accordance with Article 1.09.0.2 of this Section.

2. Asbestos handlers shall don personnel protective equipment as required in Article 2.02 of this Section.

3. Contractor shall shut down and lock out electric power to work areas, where necessary, to provide a safe work environment. Contractor shall provide temporary power source and equipment, including ground faulting, in compliance with all applicable electrical code requirements and Cal-OSHA requirements for temporary electrical systems. The Contractor shall utilize a licensed electrician to perform all electrical power shut down and temporary power installation. All electrical equipment used during the removal of asbestos-containing materials shall be connected to a Ground Fault Interrupted (GFI) circuit.

4. Heating, ventilating, and air-conditioning (HVAC) system components that supply, return, or that pass through the work area shall be shut down and locked out.

5. The Contractor shall isolate the various asbestos removal work areas from areas where no asbestos related work is required. Windows, doorways, corridor entrances, drains, ducts, grilles, grates, diffusers, and other openings will be considered "critical barriers" and sealed with two layers of polyethylene sheeting and duct tape.

6. Emergency and fire exits from the work areas shall be maintained and adequately marked. Alternative exits shall be established that are satisfactory to the District and local fire regulations.

7. Contractor shall construct and maintain at least one three-stage decontamination unit. This decontamination unit shall be constructed in accordance with the requirements set forth in Article 3.02 of this Section. The asbestos worker wash/decontamination station may be used as the lead worker wash/decontamination station.

B. Resilient Flooring Removal Preparation: In addition to the requirements of Article 3.01A above, the following preparation procedures shall be used in areas where asbestos-containing resilient flooring and mastic will be removed:

1. Wall surfaces are not required to be covered, however, the walls shall not be allowed to be contaminated with asbestos-containing mastic residue. Walls must be covered for sheet flooring removal.

2. Install worker decontamination unit described in Article 3.02 or as agreed upon with the Project Environmental Manager.

3. A pressure differential system shall be established that produces a minimum of four filtered air changes per hour in the work area and maintains a pressure differential of 0.02-inch water gauge between the inside and outside of the work area. The pressure differential system shall not be exhausted into occupied areas of the building.

C. Chalk Board Removal: The boards are assumed to be cement asbestos (transite). Prior to removing the chalk boards, restrict access to each room with a chalk board and activate a HEPA-filtered vacuum or small negative air machine to control fiber migration. Carefully disconnect each board from the wall supports. Wrap each panel in two layers of plastic sheeting and seal the seams with duct tape. Apply OHSA labels to each panel and wet wipe each package before take it directly from the work area to the waste container.

D. Flashing Cement Removal: In addition to the requirements of Article 3.01A, the following preparation procedures shall be used where non-friable asbestos-containing roofing materials will be removed:

1. Isolate the asbestos removal work area below the roof with "DANGER ASBESTOS HAZARD" warning ribbon.
2. Prior to starting work on the roof, clear and remove trash from the base of the exterior walls (ground level) extending 15 feet out from the walls. If bushes are present, these shall be covered with
3. Place a drop cloth consisting of one layer of 6-mil polyethylene sheeting at the base of the exterior walls and extend the drop cloth 15 feet out from the walls.
4. Seal rooftop penetrations, skylights, ventilator equipment, and all other openings with two layers of 6-mil polyethylene sheeting.

3.2 WORKER DECONTAMINATION ENCLOSURE SYSTEMS

A. At least one worker decontamination enclosure system shall be provided on the site that is easily accessible from each of the asbestos removal work areas. The asbestos worker decontamination enclosure system may also be used for the lead worker decontamination system.

B. Worker decontamination enclosure systems constructed at the worksite shall utilize 6-mil Opaque black or white polyethylene sheeting or other acceptable materials for privacy.

C. The worker decontamination enclosure system shall consist of at least a clean room, a wash station, and an equipment room, each separated from the other by curtained doorways.

D. Entry to and exit from all decontamination enclosure system chambers shall be through curtained doorways consisting of two sheets of overlapping polyethylene sheeting. One sheet shall be secured at the top and left side, the other sheet at the top and right side. Both sheets shall have weights attached to the bottom to ensure that they hang straight and maintain a seal over the doorway when not in use. Doorway designs, providing equivalent protection and acceptable to the District, may be utilized.

E. Pathways into (from clean to contaminated) and out of (contaminated to clean) the work area shall be clearly designated.

F. The clean room shall be sized to adequately accommodate the work crew. The clean room shall also provide shelves for storing respirators and a location for posting notices.

G. The wash station shall have water and soap for washing away asbestos contamination. The wash station shall have a drain pan to collect wastewater.

H. The equipment room shall be used to disrobe for washing at the wash station. A drum lined with a labeled 6-mil polyethylene bag for collection of disposable clothing shall be located in this room.

3.3 EMERGENCY EXITS

A. Emergency exits shall be established and clearly marked with duct tape arrows or other effective designations to permit easy identification and location by the workers from anywhere within the work area. Emergency exits shall be secured to prevent access from uncontaminated areas and still permit emergency exiting. Emergency exits shall be properly sealed with 6-mil polyethylene sheeting that can be cut to permit egress, if needed. These exits may be the worker decontamination enclosure, the waste pass-out airlock, and/or other alternative exits satisfactory and in compliance with local fire regulations. Where emergency exits are sealed, an instrument capable of cutting the polyethylene barrier shall be installed on both sides of the barrier, to allow for immediate exit from the work area in the event of an emergency.

3.4 MAINTENANCE OF WORKPLACE BARRIERS

A. Following completion of the construction of polyethylene barriers and decontamination system enclosures, adequate settling time shall be required to ensure that barriers will remain intact and secured to walls and fixtures before beginning actual abatement activities.

B. Workplace barriers shall be visually inspected at the beginning of each work period or shift by the Supervisor/Competent Person.

C. Damage and defects in the enclosure system shall be repaired immediately upon discovery. This information shall also be noted in the Contractor's daily log.

D. At any time during the abatement activities after barriers have been erected, if visible material is observed

outside of the work area or if damage occurs to barriers, work shall immediately stop, repairs made to barriers, and debris/residue cleaned up using appropriate HEPA-vacuuming and wet-mopping procedures. This information shall also be noted in the Contractor's daily log.

3.5 COMMENCEMENT OF WORK SHALL NOT OCCUR UNTIL

A. Enclosure systems have been constructed and tested.

B. At least one three-stage decontamination unit with wash station is operational. This decontamination unit can be the same as the lead-related demolition decontamination unit.

C. Pressure differential systems are functioning adequately.

D. Pre-abatement submissions, notifications, and permits have been provided and are satisfactory to the District's Representative.

E. Equipment for abatement, cleanup, and disposal are available.

F. Worker training, medical examination, and respirator fit testing (and certification) is completed or applicable, current documentation of this information is provided.

G. This information shall also be provided for new workers on the first day they arrive at the work site.

H. Glove bags have been smoke tested.

I. Contractor receives permission from the District to commence asbestos-related demolition work.

3.6 WORKPLACE ENTRY AND EXIT PROCEDURES

A. General: The following procedures shall be followed prior to entrance into any regulated asbestos work area:

1. Personnel who enter the work area shall sign the entry log upon entry and exit.

2. Personnel, before entering the work area, shall read and be familiar with posted regulations, personal protection requirements (including workplace entry and exit procedures), and emergency procedures.

3. Personnel shall wear appropriate respiratory protection and disposable coveralls, head covering, and foot covering. Hardhats, eye protection, and gloves shall also be utilized, as required. Clean respirator filter cartridges and protective clothing shall be provided and utilized by each person for each separate entry into the work area.

4. Personnel wearing designated personal protective equipment shall proceed to the work area.

5. To exit the work area, personnel shall proceed to the equipment room where they shall remove protective equipment, except respirators, and deposit disposable clothing into appropriately labeled containers for disposal.

6. Clothing or footwear worn into a regulated work area will not be permitted out of the regulated work area.

7. Reusable, contaminated footwear shall be stored in the equipment room when not in use in the work area. Upon completion of abatement, it shall be disposed of as asbestos-contaminated waste. (Rubber boots may be decontaminated at the completion of the abatement for reuse).

B. Roofing Material Removal Work Area and Exit Procedures:

1. Asbestos handlers involved in roofing material removal procedures shall wear two disposable spunbound suits, including gloves, hood and footwear, and appropriate respiratory protective equipment. Hard hats, eye protection, and gloves shall also be utilized as required. Clean respirators and protective clothing shall be provided and utilized by each person for each separate entry into the work area.

2. The double layer personal protective equipment shall be used throughout the procedure if a decontamination unit with a shower room is not contiguous to the work area. Upon exiting the work area and entering the change room, the worker shall HEPA vacuum and wet clean the outer suit and dispose of it as asbestos-contaminated waste. Workers shall then proceed to an operational three-stage decontamination unit to remove and dispose of the second suit, shower,

and change into street clothes.

3.7 ASBESTOS-CONTAINING MATERIAL REMOVAL PROCEDURES

A. General

1. Work area shall be cleaned and isolated in accordance with the procedures set forth in Article 3.01 of this Section.

2. Waste containers for floor tile and mastic and roofing material shall be sealed when full. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental opening and leakage by tying the tops of bags in an overhand knot or by taping in gooseneck fashion. Bags shall not be sealed with wire or cord.

B. Resilient Floor Tile/Mastic Removal Procedures:

1. Asbestos-containing floor tile/mastic shall be sprayed with amended water, or chemical remover using spray equipment capable of providing a low-pressure application. Solvent vapors shall be exhausted in a manner that does not create a fire hazard, health hazard or nuisance, and complies with applicable SCAQMD regulations.

2. Wetted asbestos resilient floor tile/mastic shall be removed using methods to minimize the breakup of the material. The resilient flooring shall not be rendered friable during the removal. Waste materials shall be packed in 6-mil plastic bags as it is removed and placed in labeled containers for transport. Material shall not be allowed to dry out prior to insertion into the container.

3. Mastic shall be removed using solvent and rags. The mastic residue and rags shall be placed into properly labeled waste containers.

4. Cleanup shall proceed in accordance with Article 3.08 -Cleanup Procedures.

5. After the work area surfaces have been rendered free of visible residues, a thin coat of an approved encapsulating agent shall be applied to seal in nonvisible residue.

6. Dispose of all asbestos containing/contaminated waste in accordance with Article 3.10 -Disposal Procedures.

3.8 CLEANUP PROCEDURES

A. General

1. Visible accumulations of ACM and asbestos-contaminated debris shall be removed and containerized utilizing nonmetallic tools (squeegees, shovels, and the like). Surfaces in the work area shall then be wet cleaned. Equipment used in the work area shall be included in the cleanup, and shall be removed from work areas via the decontamination enclosure system or waste load-out, at appropriate times in the cleaning sequence.

3. None of the procedures described in this Article relieve the Contractor of the responsibility to meet the final clearance criteria as established by this Section.

B. Resilient Flooring and Mastic Removal Cleanup Procedures:

1. The windows, doors, and HVAC vents shall remain sealed, and any HEPA filtered pressure differential systems, waste load-out, and decontamination enclosure systems shall remain in service.

2. The work area and other contaminated areas shall be cleaned utilizing HEPA filtered vacuum equipment and wet-wiping techniques. After completion of the cleaning operation, a complete visual inspection of the work shall be conducted with the District to ensure that the work area is free of visible asbestos debris. A final check shall be made for asbestos debris, and further cleaning will be conducted as necessary. The District shall be notified 24 hours in advance of the requirement for a visual inspection.

3. Upon completion of the cleaning operation, Contractor shall notify the District that the negative pressure enclosure work areas are ready for review and clearance air monitoring. The negative pressure enclosure areas shall be cleaned until they pass the Clearance Air Monitoring Standard.

The District will require up to one 8-hour shift to complete clearance air monitoring following successful completion of the visual inspection.

4. Upon notification from the District that the negative pressure enclosure work area have passed the standard for clearance air monitoring, the Contractor shall remove remaining polyethylene sheeting, isolation and/or critical barriers, decontamination unit, dismantle negative air pressure devices, and remove asbestos warning signs/ribbon.

3.9 CLEARANCE AIR MONITORING

A. The following clearance air monitoring procedures will be used in negative pressure enclosure work areas.

1 After completion of cleanup operations, Contractor shall notify the District that the work areas are ready for clearance air monitoring. Notification shall be a minimum of 24 hours prior to the need for clearance air monitoring. Final clearance air monitoring shall be conducted only after the procedures set forth in Article 3.08 of this Section have been completed, the area has been satisfactorily cleaned and encapsulated, and the abatement area has been thoroughly dried.

2 The District shall conduct post-abatement clearance testing by collecting and analyzing air samples using Phase Contrast Microscopy using NIOSH Method 7400.

3 Clearance of a work area shall be achieved when each sample indicates airborne fiber concentrations are less than or equal to 0.01 fiber/CC.

4 Abatement areas not achieving clearance shall be re-cleaned using procedures set forth in Article 3.08 of this Section, and retested until clearance is achieved. The cost of additional samples, consultant air monitoring fees, and labor for re-cleaning the work areas that fail final air clearances shall be paid for by the Contractor.

3.10 DISPOSAL PROCEDURES

A. As the work progresses, to prevent exceeding available storage capacity on site, sealed and labeled containers of asbestos-containing waste shall be removed and transported to the prearranged disposal location.

B. Unless other arrangements are made satisfactory to the District, bagged or wrapped material shall be removed from the work areas and placed in a Contractor-supplied dumpster a minimum of every day. The dumpster shall be marked with asbestos warning signs and be locked at all times when not in use. When a dumpster is full, it shall be removed from District property by the end of the next business day.

C. Disposal shall occur at an authorized site, in accordance with regulatory requirements of NESHAPs and applicable state and local guidelines and regulations, including the California State Department of Health Services, Toxic Substances Control Division.

D. Uniform hazardous waste manifests, non-hazardous waste date forms, dump receipts; trip tickets, transportation manifests, or other documentation of disposal shall be delivered to the District Representative for their records.

3.11 OSHA PERSONNEL AIR MONITORING

A. Air monitoring required by OSHA for asbestos exposure determination is work of the contractor. The contractor is responsible for providing daily OSHA compliance monitoring as per 8 CCR 1529 and 29 CFR 1926.1101.

1. At minimum, Contractor shall conduct representative (25% of crew) breathing zone personal air monitoring of its employees twice each shift and repeated daily.

2. Monitoring shall be conducted by a qualified air professional experienced and knowledgeable about the methods of air monitoring and in accordance with 8 CCR 1529 and CFR 1926.1101.

3. Monitoring results and appropriate laboratory analysis work shall be submitted to the District within twenty-four (24) hours of the monitoring work.

3.12 ALTERNATE PROCEDURES

A. The procedures described in this Section shall be utilized at all times.

B. If specified procedures cannot be utilized, a request shall be made in writing to the District providing details of the problem encountered and proposed alternatives.

C. Alternative procedures shall provide equivalent or greater protection than the procedures that they replace.

D. Alternative procedure shall be approved in writing by the District prior to implementation.

END OF SECTION

SECTION 022624

LEAD PAINT OR LEAD CONTAINING COMPONENTS ABATEMENT

PART 1-- GENERAL

1.1 DESCRIPTION

A. These specifications have been designed in favor of Rancho Santiago Community College District for the removal or management of all surfaces containing lead or lead based paint that will be impacted during the demolition of Building J the Old Maintenance Compound at the Santa Ana College Campus. These specifications shall apply to all areas constructed before January 1, 1993. According to Title 17, Code of Regulations, Division 1, Chapter 8, §35043, all painted surfaces that have not been tested by a State Certified Lead Inspector I Assessor are presumed lead-based paint.

1.2 SCOPE OF WORK:

A. The preparation of work under this contract covers materials that contain lead and/or lead based paint, including but not limited to wall pipe racks, roof vents, ceramic tile walls, tack boards and chalk boards.

B. The Contractor shall provide all labor, materials, equipment, services, testing, supervision and incidentals necessary to perform work of lead paint abatement/stabilization under this contract in accordance with the following specifications. After preparation, the areas disturbed shall be cleaned and tested in accordance with the procedures outlined below.

C. All surfaces that are only prepped and not abated during site preparation shall be primed or encapsulated using any latex paint or primer on each type of surface or substrate that has been disturbed (wood, metal, stucco, etc.) prior to demolition. All components that tested positive for the presence of lead at or above the HUD action level and any similar untested components should be considered lead-laden. Any work activities on these components must be performed in an abatement/containment environment as required by Cal/OSHA Construction and Safety Orders, Lead Section *1532.1*. Any component that is below the HUD action level but still contains lead requires personal exposure level (PEL) testing be performed to determine the workers skill or certification required to perform the activity if an outside contractor will do the work.

D. Refer to lead based paint inspection reports for each site to determine whether lead based paint is present at penetration or attachment locations.

Building J-A Abatement –

Exterior
a) Remove roof 3 vent pipes

Interior Room J1 Area 3
a) Remove 1 sink

Room J1 Area 4 Men's RR
a) Remove approximately 250 square feet of ceramic wall tile

Room J1 Area 5
a) Remove chalk board
b) Remove tack board

Room J1 Area 8
a) Remove tack board

Room J1 Area 9
a) Remove tack board

Room J1 Area 11
a) Remove tack board

Room J1 Area 15
a) Remove tack board Room

J1 Area 16
a) Remove chalk board
b) Remove tack board

Building J-B Abatement –

Exterior
a) Remove 1 roof vent pipe
b) Remove 1 orange support bracket

1.3 REQUIRED LICENSURE

A. All workers who perform the lead paint abatement and *I* or stabilization (including clean up) described herein shall be State Certified Workers with current State issued "certificates" and have prior training in lead abatement as required by Title 17, CCR, Division 1 Chapter 8, §35009 & §35001as well as other required training including safe and proper use of equipment.

B. Contractor is to have a State Certified Lead Supervisor with a current State issued "certificate" referenced above by Title 17 CCR, as part of his staff during the lead paint abatement/stabilization. The State Certified Lead Supervisor will be designated the "competent person". A "competent person" is a DPH "certified supervisor" who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions who has authorization to take prompt corrective measures to eliminate them.

C. A minimum of one RRP certified worker shall be on job site at all times. The RRP certified worker is responsible to train the other DPH Certified Workers, worker lead safe practices as taught in the RRP class.

1.4 SUBMITTALS

A. Within 10 working days of receiving the notice to proceed, submit to the RSCCD representative the following documents:

1. Copies of current lead in blood, medical release to use respirator, respirator fit test and proof of DPH certification for each worker as well as respirator fit test documentation.
2. Proof of delivery of DPH form 8551 to DPH (Department of Health Services) five days prior to commencement of abatement activities as required by Title 17, CCR, Div 1, Chapt.8.
3. Proof of delivery of Cal/OSHA notification of lead related work as required as of January 25, 2002 in Title 8, Construction Safety Orders, Chapter 4, Subchapter 4, Article 4, Section 1532.1.
4 A copy of his current California Department of Health Services "Supervisor Certificate" or California Department of Health Services photo identification card prior to commencement of work.
5 A detail summary of the techniques used to comply with these regulations.
6. Information regarding proposed Certified waste hauler and landfill facility for disposal of waste materials, including EPA number and a copy of the transportation manifest

1.5 PERSONAL PROTECTION:

A. The contractor shall insure that its employees are protected in accordance with all applicable Federal, State and Local standards, in particular, those set forth in the OSHA regulations governing occupational health and

environmental controls in Subpart D of Title 29 CFR (Code of Federal Regulations) Section 1926.62 containing employee protection requirements for construction workers exposed to lead.

B. All lead paint abatement workers shall have received lead paint medical screening and will have been physician certified to work while wearing a respirator along with all other regulations as required by CCR, (California Code of Regulations) Title 8, Section 1532.1.

C. All persons when, present at the work site, shall wear disposable protective suits with attached hoods and shoe coverings designed for lead abatement. All personnel entering the lead control area shall wear rubber or latex gloves beneath their work gloves. Gloves are to be taped to the suit sleeves with duct tape.

D. Contractor shall provide gloves, eye protection, disposable protective suits and other recommended safety equipment for use by all workers.

E. All persons entering the work area are to wear a minimum of a half faced air-purifying respirator equipped with HEPA cartridges for protection from airborne lead particles.

F. Personal sampling is to be done using an air sampling pump to determine overall exposure in each work area and to monitor PEL (permissible exposure limits) for workers.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Handling and Storage:

1. Deliver all materials to the project in the original package(s), container(s), or bundle(s) bearing the name of the manufacturer, brand name and the model number.
2. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.
3. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be disposed of in accordance with the applicable regulations.

B. Plastic (Polyethylene) Sheeting: Provide 6-mil thickness or greater polyethylene sheeting as specified in sizes to minimize the frequency of joints. Fire retardant polyethylene sheeting is required.

C. Tape: Provide two inch or wider duct tape capable of sealing joints of adjacent sheets of polyethylene and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials. Duct tape shall be capable of adhering under both dry and wet conditions, including use of amended water.

D. Spray Cement: Provide aerosol based spray adhesive specifically formulated to stick tenaciously to sheet polyethylene.

E. Impermeable Containers: Provide impermeable containers suitable to receive and retain any asbestos-containing or contaminated materials until disposal at Disposal Site labeled in accordance with OSHA Regulation 29 CFR 1910.1101, DOT 49 CFR 171-177, Title 8 CCR and SBACPD. Containers must be both air and watertight and must be resistant to damage and rupture. Plastic bags shall be a minimum of 6-mil thick.

F. Other Materials: Provide all other materials, such as lumber, nails and hardware, which may be required to construct and dismantle the decontamination area and the barriers that isolate the work area.

2.2 TOOLS AND EQUIPMENT

A. Provide all tools and equipment necessary to perform the required asbestos removal/abatement.

PART 3 – EXECUTION

3.1. WORK AREA PREPARATION:

A. One decontamination unit will be required at each lead control area.

1. Cover the floor where the decontamination unit will be placed with 2-layers of 6-mil polyethylene (poly) prior to setting up of unit.

2. Provide single entry and exit to each work area.

3. Provide a 1-stage decontamination unit with a wash station. This area must be constructed of 6-mil "poly" sheeting and PVC piping at a minimum.

4. Each decontamination area shall contain a minimum of a HEPA vacuum, wash station (soapy water and rinse water or pre-moistened towelets) and dressing area. All disposable clothing, wash supplies and discarded equipment is to be placed directly into 6 mil plastic bags and then stored in locked 55-gallon metal drums as per specifications under Clean Up of Work Area.

B. Lead Control Area Isolation Procedures:

1. Post signs and barrier tape in compliance with Cal/OSHA, Title 8, CCR Section 1532.1. Barrier tape shall be at a minimum of 25 feet around all lead abatement areas. Contractor shall insure that the signs required are at least 20 inches by 14 inches and states the date and place of the lead abatement project. The sign must include the phrase "CAUTION LEAD HAZARD. KEEP OUT" in bold lettering at least 2 inches high. Signs to be in English and Spanish.

2. Install suitable ground protection to prevent rupturing of plastic sheeting by ladders, scaffolding, nails, falling debris, etc. Install a minimum of two layers of 6-mil poly sheeting to base of building with duct tape or other anchoring system so that no gaps exist between the base of the building and the plastic sheeting. Poly sheeting is to extend a minimum of 10 feet from the farthest exterior portion of the area or building being disturbed. Seal overlapping sections of plastic with duct tape to provide a leak proof surface. Weight the ends of plastic sheeting to prevent blowing from the wind and breezes. All edges of the plastic sheeting shall be elevated to create a trough and prevent runoff of excess water and debris. Cover all plants and shrubs within 15 feet of the perimeter of the building with one layer plastic sheeting.

3. In the event of rain, all work on the exterior of any structure shall be suspended or shall not begin until such time that weather conditions change more favorably.

4. In the event of strong winds that create a condition whereby containment of airborne lead dust and or debris become infeasible, work shall be suspended or shall not begin on the exterior of the structure until notified by project monitor.

5. The decision to suspend work due to wind or rain will be made by the project monitor or a District Representative.

3.2 CONTROL OF ACCESS:

A. Each work area to be secured with barrier warning tape at least 25 feet from the work location and posted as a lead abatement project and potential hazard site.

B. A person may not enter the work area unless that person is authorized to do so by the "competent person" or project monitor.

C. Contractor to post caution signs and barrier tape in each work area containing lead based paint before removing or encapsulating lead paint.

D. Contractor shall keep the signs posted and barrier tape intact during abatement and clean up as described in this specification.

E. Contractor shall insure that the signs required are at least 20 inches by 14 inches and states the date and place of the lead abatement project. The sign must include the phrase "CAUTION LEAD HAZARD, KEEP OUT" in bold lettering at least 2 inches high along with DO NOT ENTER WORK AREA, AUTHORIZED PERSONNEL ONLY, NO EATING, DRINKING, OR SMOKING IN THIS AREA in at least 1-inch-high lettering. The signs are to be in English and Spanish.

3.3 METHODS OF ABATEMENT/STABILIZATION:

A Removal of wall and floor tiles is to be performed by striking with hammers and chisels or mechanical means (jack hammers / chipping hammers).

B Floor sinks and water basins shall be unbolted and removed after all plumbing connections have been severed.

C Remove roof vent pipes with pry-bars and chisels.

D Remove tack boards and chalk boards by unscrewing and prying as required.

E Unbolt orange support post from side of building.

F. Housekeeping: Throughout the abatement process the work areas will be kept free from a buildup of removed components or paint chip debris. On an ongoing basis, all components shall be wrapped or placed in two layers of 6-mil plastic sheeting or bags. Loose paint chip dust and debris shall be collected with HEPA vacuums and / or wet wiping and placed in six mil plastic bags and sealed with duct tape.

3.4 CLEAN UP OF WORK AREA:

A. Preliminary clean up shall be performed by certified-trained workers as follows:

1. After the abatement / preparation work has been completed, or at the end of the work day, remove all debris and provide the interim clean-up as described below:
2. Deposit all lead waste, including sealing tape, plastic sheeting, mop heads, sponges, filters and disposable clothing etc. in double plastic bags, of at least 6 mils thick. Bags are then to be deposited and stored in locked 55-gallon metal drums labeled "DANGER LEAD HAZARD" and secured on site.
3. Vacuum clean all surfaces in the work area including woodwork, metal work, walls, windows, window wells, polyethylene, steps etc. with a HEPA vacuum.
4. After vacuum cleaning, using phosphate free or detergent wash all polyethylene coverings that are to be reused in the work area with at least 1-ounce of 5 percent phosphate free solution (or similar lead

removal product) to each gallon of water.

5. After polyethylene washing has dried, vacuum clean polyethylene, with a HEPA vacuum until no visible residue remains.
6. Final clean up to be performed prior to wipe testing when abatement/preparation work is finished.

3.5 FINAL CLEANUP:

A. Procedures:

1 After removal of all plastic sheeting, except critical barriers, final cleaning can proceed. Begin with a thorough HEPA vacuuming of all surfaces starting at the ceilings, proceeding down the walls to the floor. The floors shall be vacuumed by starting from the farthest corners of the entrance of the work areas. HEPA vacuuming is to be performed as described in the previous section before and after detergent wash as shown below.

2 Wet wipe and mop the same surfaces with a 5 percent solution of Phosphate Free Lead cleansing detergent and allow the surfaces to dry.

3 Thoroughly HEPA vacuum and wet wipe tools and other equipment before removing from work area. Any power tools that cannot be completely de-contaminated shall be placed in pre-labeled plastic bags and sealed with duct tape before removing from work area.

4 Hand tools such as, scrappers, broad knives, etc., shall be cleaned by wet wiping prior to removal from the work area.

5 All personnel will follow strict decontamination procedures, including use of soap and shower facilities to wash hands, face and body as well as respirators before exiting shower.

3.6 WASTE DISPOSAL

A. The contractor shall be responsible for determining whether any of the waste materials are hazardous waste. This includes not only solid waste, but also wastewater generated from interim and final clean up. All test results are to be submitted to a representative of the District prior to the disposal of lead containing debris.

B. The contractor shall remove, within 10 days, all lead waste materials from the site after final completion of lead abatement and preparation in compliance with applicable waste requirements.

C. The contractor shall transport and dispose of lead waste in a legal manner as described in 22CCR, chapter 12 (beginning with section 66262.10).

D. All lead containing components removed for disposal shall be burrito wrapped in six mil plastic or double bagged in six-mil plastic bags and sealed with duct tape prior to being placed in roll off container

3.7 TESTING:

A. Prior to commencement of site abatement and preparation Project Monitor will take baseline samples to establish existing lead dust levels.

B. At time of final clearance, the Project Monitor shall conduct wipe tests at and around abatement and preparation work areas.

C. The Project Monitor shall submit the test results to the District and the Contractor indicating that lead dust levels are at or below baseline levels.

D. If wipe test exceeds baseline levels, contractor is to re-clean areas using the above criteria and new wipe tests shall be taken until at which time the test does pass. Cost associated with retesting will be billed to the District and deducted from abatement contractor at $125 per return visit and $50 per sample retaken.

3.8 PEL MONITORING:

A. Personal air monitoring shall be performed at one or more sites to determine the PEL and worker qualifications for performing similar tasks at each location.

B. Employees involved in personal exposure monitoring to determine worker protection and certification requirements will be required to have:

1. Recent medical release to wear a respirator
2. Biological Testing (blood draw within last 6 months)
3. Recent respirator fit test
4. Dress out in protective clothing including gloves, shoe covers, eye protection, head cover and HEPA equipped respirator as outlined in Section 1.5.

C. Worker is to wear a personal air-monitoring pump equipped with a 37mm cassette for testing lead content in air. The air flow rate is to be set between 2 and 4 liters of air per minute and be worn for eight hours while performing abatement / remediation tasks.

D. Air sample(s) to be collected by Project Monitor and sent to state accredited laboratory for analysis.

3.9 SITE SPECIFIC LEAD LOCATIONS:

A. Not every component on the building was tested, therefore any similar component to those identified as lead containing are to be assumed to also contain lead based paint unless otherwise noted. All lead laden components must be worked on in an abatement / containment environment.

END OF SECTION

SECTION 024100
DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Protection of public properties/utilities and existing adjacent private structures/features.
   2. Disconnection of utility services to building.
   3. Demolition of buildings and surface features indicated.
   4. Removal of demolition material from site.

B. Related Sections:
   1. Section 315000 - Excavation Support and Protection.
   2. Section 312000 - Earthwork.
   3. Section 312300 - Excavation and Fill.
   4. Section 333000 – Sanitary Sewerage Utilities.

1.2 CONDITION AND ACCEPTANCE OF PREMISES

A. Accept premises as existing. Accept buildings to be demolished upon execution of Contract with Owner. No damage or loss shall relieve Contractor from obligation to complete work under this Contract.

B. Where the work of removals, demolition, cutting and similar work involves possible hazardous substances or harmful physical agents, such as asbestos fibers, exercise extreme care to avoid damage and preserve safety of personnel. Notify Owner before making removals or cutting such material so that tests of such substances may be taken in order to ascertain whether asbestos fibers exist. Accomplish removal or cutting work involving such material by competent and qualified personnel as contracted and approved by Owner, including barriers to isolate area. Owner will pay for hazardous material removal and disposal, unless the hazardous substance or harmful physical agents have been generated or caused to be on Project by Contractor.

1.3 PROTECTION AND SAFETY

A. Execute work in a manner to prevent injury or damage to public or private property. Prevent damage from falling debris or other cause. Do not interfere with use of adjacent buildings or free, safe passage to and from same.

B. Furnish temporary sidewalks, barricades, covers and other temporary structures necessary for proper and safe conduct of work, or as required by law. Remove without additional compensation.

C. Protect trees, whenever possible, from damage. Repair injuries to bark, trunk and branches of trees by dressing, cutting and painting by skilled specialist. When so directed by Architect/Engineer (A/E), remove trees which have been injured; additional compensation will be provided by Change Order to Contract.

D. Do not drop material from great height, but lower by appropriate demolition equipment or by enclosed duct chutes. Where multi-story buildings are being demolished, enclosed chutes shall include control gates to govern flow of materials into receiving trucks. Sprinkle during demolition operations to allay dust.

E. Take precautions to prevent movement or settlement of adjacent structures, streets, walks, and similar work; provide and place adequate bracing, shoring or supports. Be responsible for complete safety of nearby buildings and assume liability for damage, movement, settlement or similar injury resulting from operations or work under contract. If safety of nearby buildings or other work appears endangered, stop work and take corrective or preventative measures to eliminate possibilities of damage, injury, settlement or movement. Conform to instructions from Municipality regarding safety, additional precautions, additional bracing or shoring and similar protective measures. Support provisions shall be adequate and be carried to lower levels or grade as required to insure complete safety and prevent settlement.

F. Provide warning lights and other lighting as required to permit safe pedestrian traffic.

G. Exercise prudent operation with heavy equipment to prevent damage when working adjacent to existing buildings. Govern operations accordingly.

H. Permanently seal abandoned water wells located within the parcels being demolished. Sealing shall be as specified in Section MHD 218 of "The Water Construction Code and Amendments to Regulations Relating to the Licensing of Water Well Contractors" as adopted by the Minnesota State Board of Health, April 11, 1984.

I. Use planking or other approved methods to protect sidewalks adjacent to property from damage due to demolition operations, including trucks and equipment. Repair damage to walks with equal or better materials by licensed concrete contractor.

1.4 PERMITS AND REGULATIONS

A. Review and comply with national, state and local standards and regulations including, but not limited to, pollution control standards.

B. Apply and pay for permits necessary to perform work.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Use appropriate equipment to obtain results expected, considering safety and expeditious methods and operations.

B. Use of explosives is not permitted.

PART 3 EXECUTION

3.1 RODENT AND PEST EXTERMINATION

A. Rodent and pest extermination to premises and existing structure or building shall be under the control of a Contractor or subcontractor licensed by the State or Municipal Health Department or Environmental Agency having jurisdiction.

B. Proper and safe use of rodenticide shall be in accordance with manufacturer's latest printed directions and with State or Municipal laws, ordinances and regulations. During and after rodent and pest control has begun, safeguard building from unlawful entrance until certificate from the State or Municipality Health Department has certified that rodents and pest nuisances have been exterminated within structures and premises.

C. Properly dispose of dead rodents, pest nuisance, bait, poison and similar items before demolition or wrecking operations begin.

3.2 EXISTING UTILITIES AND UNDERGROUND FEATURES

A. Contact municipal authorities and utility companies with jurisdiction in the area. Have utility companies verify and locate utility lines within the construction limits prior to initiating work.

B. Seal off openings which extend beyond building or property lines with 12-inch concrete block and mortar. Seal vertical shafts, tunnel openings and cave openings within property in same manner.

C. Plug building sewers and cap other utility lines. Contact utility companies for approved methods of plugging and capping utility lines.

D. Do not start demolition until services have been cut off, sealed, capped, removed or otherwise made inoperative by Contractor or applicable Utility Company representative. Protect seals, caps, stubs or similar services to remain.

3.3 DEMOLITION

A. Remove exterior walls and foundation walls to a level of 4 feet below grade of adjoining ground. At areas of proposed buildings or paved surfaces, remove walls and floors completely. Do not disturb or undermine adjacent private property or street right-of-way. Remove common walls supporting public sidewalks or private improvements down to sidewalk or private property grade. Do not permit wall or part thereof to fall outwardly onto public sidewalks or streets.

1. Demolish, fill with sand and seal vaults, areas, coal-holes, tunnels, trap doors or other openings located in public right-of-way adjacent to and having served the buildings being demolished. Owners of public or private utility systems still in use in vaults, areaways, coal-holes, tunnels, trapdoors or other openings will be responsible for moving or protecting same. This does not include utility vaults currently maintained by utility companies in the adjacent right-of-way area.

B. Remove on-grade slabs and those slabs up to 3 feet below grade. Treat slabs that are more than 3 feet below grade as basement slabs; they shall remain if not under new building or paved surfaces; however, break such slabs into distinct pieces which cover no more than 1 square yard apiece.

C. Remove other building walls, including interior foundation walls, partition walls, columns, piers, beams or other projections, to level of basement floor.

D. Remove driveways, sidewalks, garage slabs, entrances, private pools, patios, porch slabs, steps, retaining walls, clothes poles and bases, fences, signs, railings, bituminous surfacing and miscellaneous concrete within construction limits. This does not apply to sidewalks, driveways or signs within street rights-of-way except where specifically noted.

E. Remove underground gasoline, oil tanks and appurtenances by State approved contractor, in accordance with state guidelines and regulations.

F. Remove from basements pipes, furnaces, boilers, miscellaneous fixtures, wood, furniture, rubbish and other debris.

G. Remove supporting pads for storage tanks, fences, tanks and walls.

H. Perform other incidental and collateral work necessary to fully complete removal of building or buildings as specified.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. As it accumulates, remove from site debris, rubbish, and other materials resulting from demolition operations. Storage or sale of removed materials will not be permitted at site.

B. Dispose of demolished materials off site at a permitted disposal facility, at no cost to Owner.

END OF SECTION

SECTION 024116
STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes demolition and removal of the following:

1. Buildings and structures**.**
2. Site improvements including site utilities.
3. Protecting existing trees, shrubs, groundcovers, plants, and grass to remain.
4. Protecting existing utilities, ac paving, concrete paving, curb and gutters, and site lights to remain.
5. Removing existing trees, shrubs, groundcovers, plants, and grass.
6. Removing existing, curbs, gates, fences, trash cans, area drains, valves, and fire hydrants.
7. Clearing and grubbing.
8. Stripping and stockpiling topsoil.
9. Removing above- and below-grade site improvements.
10. Disconnecting and capping or sealing site utilities.
11. Temporary erosion and sedimentation control measures.

B. See Division 23 Sections for demolishing or relocating site mechanical items.

C. See Division 26 Sections for demolishing or relocating site electrical items.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

1.3 MATERIALS OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 SUBMITTALS (Not Applicable)

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

C. Predemolition Conference: Schedule conference with Owner.

1.6 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of Work.

B. Owner assumes no responsibility for buildings and structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
2. Before building demolition, Owner will remove the following items:

a. Owner to verify if any items need to be removed before construction commences.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

F. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

G. Utility Locator Service: Notify utility locator service to identify utilities for area where Project is located before site clearing.

H. Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place.

1.7 COORDINATION

A. Arrange demolition schedule so as not to interfere with on-site operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of building and site demolition required.

B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Inventory and record the condition of items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Architect.

3.2 PREPARATION

A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

B. Existing Utilities: Refer to Division 23 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping mechanical or electrical utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

D. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Protect and maintain benchmarks and survey control points from disturbance during construction.

F. Locate and clearly flag trees and vegetation to remain or to be relocated.

G. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.4 TREE PROTECTION

A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.5 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during demolition and reinstalled in their original locations after demolition operations are complete.

C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

    a. Provide at least 72 hours notice to Owner if shutdown of service is required during changeover.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 1 Section "Temporary Facilities and Controls."

1. Protect existing site improvements, appurtenances, and landscaping to remain.
2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
3. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
4. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

3.6 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings, structures, and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
2. Maintain adequate ventilation when using cutting torches.
3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: Perform surveys as the Work progresses to detect hazards that may result from building demolition activities.

C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.7 MECHANICAL DEMOLITION

A. Remove buildings, structures, and site improvements intact when permitted by authorities having jurisdiction.

B. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on next lower level.

C. Remove debris from elevated portions by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

   1. Remove structural framing members and lower to ground by method suitable to minimize ground impact or dust generation.

D. Concrete: Cut concrete full depth at junctures with construction indicated to remain.

E. Masonry: Cut masonry cleanly at junctures with construction indicated to remain.

F. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished at junctures with construction indicated to remain, then break up and remove.

G. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

   1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

H. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.8 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

   1. Arrange with Owner to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
   3. Owner will allow utility interruptions during off hours and/or on the weekends. Verify with Owner prior to commencing.

3.9 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

B. Place fill material in horizontal layers not exceeding a loose depth of eight inches, and compact each layer to a density equal to adjacent original ground.

3.10 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.11 EXPLOSIVE DEMOLITION

A. Explosives: Use of explosives is not permitted.

3.12 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Section "Earthwork."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.13 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.14 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.15 REPAIRS

A. General: Promptly repair damage to adjacent construction caused by building demolition operations.

B. Where repairs to existing surfaces are required, patch to restore surface to original or better condition.

C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.16 RECYCLING DEMOLISHED MATERIALS

A. General: Separate recyclable demolished materials from other demolished materials to the maximum extent possible. Separate recyclable materials by type.

1. Provide containers or other storage method approved by Architect for controlling recyclable materials until they are removed from Project site.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Transport recyclable materials off Owner's property and legally dispose of them.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling building demolition materials shall accrue to Owner.

3.17 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled**,** reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.18 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 024116

SECTION 031500
CONCRETE ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete accessories and related materials for cast-in-place concrete.
   2. Coordinate Work in this Section with requirements of Section 031100 and 033000.

B. Related Sections:
   1. Section 014533.10 - Structural Testing and Special Inspections.
   2. Section 032000 - Concrete Reinforcing.
   3. Section 033000 - Cast-in-Place Concrete.
   4. Section 079000 - Joint Protection.

1.2 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Product Data: Manufacturer's specifications, technical data including performance, construction and fabrication information.

C. Certificates: Provide a letter stating each product specified in this Section has been evaluated and found compatible with other sections.

PART 2 PRODUCTS

2.1 UNDERSLAB VAPOR BARRIERS

A. (UVB-3) Under-Slab Vapor Barrier: ASTM E 1745, Class A. Permeance of less than 0.01 perms before and after mandatory conditioning tests per ASTM E 1745, Sections 7.1.1 – 7.1.5.
   1. Minimum Thickness, ACI 302: 15-mil
   2. Maximum Water Vapor Permeance, ASTM E 154: 0.01 perms
   3. Minimum Tensile Strength, ASTM E 154: 45 lbf/in.
   4. Puncture Resistance, ASTM D 1709: 2200 grams
   5. Manufacturers and Products:
      a. Epro Services: Ecoshield E15
      b. Raven Industries: VaporBlock VBLP15.
      c. Reef Industries: Griffolyn 15 Mil Green.
      d. Stego Industries: Stego Wrap 15 mil.
      e. Viper: VaporCheck II 15 mil.
      f. W.R. Meadows: Perminator 15 mil.

B. Vapor Barrier Accessories:
   1. Seam Tape: By same Manufacturer as vapor barrier, minimum width 4 inches.
      a. Water Vapor Transmission: Less than 0.3 perms per ASTM F 1249 or ASTM E 96.
   2. Pipe Boots:
      a. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.
   3. Perimeter/edge seal:
      a. Stego Crete Claw by Stego Industries LLC, or comparable product by approved Manufacturers.
      b. Stego Term Bar by Stego Industries LLC, or comparable product by approved Manufacturers.
      c. StegoTack Tape (double sided) by Stego Industries LLC, or comparable product by approved Manufacturers.

2.2 EXPANSION JOINT FILLERS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, pre-molded asphalt-saturated cellulosic fiber.

B. Expansion Joint Fillers (Backing for Sealant): Flexible, compressible, closed-cell polyethylene foam, not less than 10 psi compression deflection.

2.3 WATERSTOPS

A. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Volclay Waterstop-RX; Colloid Environmental Technologies Co.
      b. Conseal CS-231; Concrete Sealants Inc.
      c. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
      d. Hydrotite; Greenstreak.
      e. Superstop; Progress Unlimited Inc.

B. Flexible Rubber Waterstops: Corps of Engineers CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Flat, dumbbell with center bulb.

C. Flexible PVC Waterstops: Corps of Engineers CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Ribbed, spit-flange with center bulb.

D. Chemically-Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
   1. Earth Shield TPE-Rubber by JP Specialties, Inc..
   2. PetroStop TPE-R by Vinylex Corp..
   3. 600 Series TPE-R by WESTEC Barrier Technologies, Inc..

E. Provide factory fabricated waterstop intersections, leaving only straight butt joint splices for the field.

2.4 INSERTS

A. Dovetail Anchor Slots: Fabricate from not less than 22 gauge galvanized steel with one inch wide back by one inch deep with 5/8 inch throat. Nail holes 4 inch o.c.
   1. Provide complete with fibrous, waterproof slot sealer or removable foam slot filler.
   2. Acceptable Manufacturers and Products:
      a. Gateway Beehive Slot.
      b. Heckman Building Products No. 100.

B. Continuous Concrete Inserts: 12 gauge minimum cold-formed galvanized or painted steel, “U” section to support 2000 pound minimum allowable point load.
   1. Acceptable Manufacturers:
      a. Cooper B-Line
      b. Unistrut

C. Wedge Type Shelf Angle Inserts: Malleable iron castings with wedge shaped holding faces to receive 5/8 inch askew head bolt.
   1. Do not use inserts complete with askew head bolts, flat washers, nuts and horseshoe shims.
   2. Acceptable Manufacturers:
      a. Dayton Superior.
      b. Gateway Building Products.

D. Expansion Sleeves: Where reinforcing extends from concrete mass to support adjacent slab, with provisions for expansion required, provide metal sleeve at each bar to permit movement.
   1. Provide at stoops and elsewhere as indicated.

E. Reglets: Form reglets in concrete exposed to weather (for membranes, flashing and similar items),with removable forms (inserts). Form reglets, wedge-shaped to preserve sharp edges of concrete with twice material thickness, but not less than 3/8 inch
   1. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
   2. Do not use metal reglets, except where specifically approved.
   3. For concealed reglets use 24-gauge galvanized metal flashing reglet #307.
   4. Acceptable Manufacturers:
      a. Hohmann-Barnard.
      b. Gateway Building Products.
      c. Heckman Building Products.

F. Dowel Caps: Plastic material of size recommended for rod diameter.

G. Cast-Metal Stair Nosing: Cast iron with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both.
   1. Fabricate units in lengths necessary to accurately fit openings or conditions.
   2. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
   3. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

H. Refer to Section 055000 for embeds and other fabricated items for insertion into concrete.

2.5 FLOOR AND SLAB TREATMENTS

A. Aggregate for Slip-Resistant Finish: Aluminum oxide abrasive grits, or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide, factory-graded, rustproof and non-glazing, unaffected by freezing, moisture and cleaning materials.
   1. Acceptable Manufacturers and Products:
      a. Frictex by Sonneborn Building Products.
      b. Toxgrip by Toch-Carboline.
      c. Grip It by L&M Construction Chemicals.
      d. Nonslip by Euclid Chemical.

B. Pigmented Mineral-Aggregate Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground, nonfading mineral oxides interground with cement.
   1. Colors: Match Architect's samples.
   2. Acceptable Manufacturers and Products:
      a. Quartz Tuff; Dayton Superior Corporation.
      b. Surflex; Euclid Chemical Co.
      c. Maximent; Master Builders, Inc.
      d. Quartzplate; L&M Construction Chemicals, Inc.
      e. Quartz Floor Hardener; SpecChem, LLC

2.6 CURING AND SEALING MATERIALS

A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed below.

B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
   1. Spray-Film; ChemMasters.
   2. Sure Film; Dayton Superior Corporation.
   3. Eucobar; Euclid Chemical Co.
   4. E-Con; L&M Construction Chemicals, Inc.
   5. SpecFilm ; SpecChem, LLC

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. (CS-2) Clear, Non-yellowing, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A, minimum 30 percent total solids. Comply with ACI 301, only for floors to remain bare or where surface treatments are compatible. Apply in accordance with manufacturer's recommendations. For floors to remain bare such as mechanical or utility rooms thoroughly clean surface and apply additional roller application just prior to project completion.
   1. Polyseal WB; ChemMasters.
   2. Vocomp-30; W. R. Meadows, Inc.
   3. Cure and Seal WB 30; SpecChem, LLC

2.7 BEARING PADS

A. Non-Slip Plastic Bearing Pads: High-density plastic bearing pads with one rough surface for placement against hardened concrete and one smooth surface to be placed against adjacent bearing pad to create a slide bearing or one-sided for support of precast concrete
   1. Minimum pad thickness: 1/4 inch.
   2. Acceptable Manufacturers and Products:
      a. Korolath of New England: NS (Non-Slip) Plastic Bearing Strips
      b. Dayton Superior: P-82 Bearing Strips

PART 3 EXECUTION

3.1 INSTALLATION

A. Install concrete accessories and related materials as specified in Section 031100 - Concrete Formwork, Section 032000 - Concrete Reinforcement and Section 033000 - Cast-in-Place Concrete.

END OF SECTION

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

B. Normal Weight Concrete: Concrete having a density of approximately 150 pcf made with gravel or crushed stone aggregates.

C. Shore: A temporary support designed to support formwork, fresh concrete, and construction loads from above for recently built structures that have not developed full design strength.

D. Strength Test: The average of the compressive strengths of two or more cylinders made from the same sample of concrete and tested at 28 days or at the specified test age.

E. Structural Lightweight Concrete: Structural concrete made with lightweight aggregate; the equilibrium density, as calculated by ASTM C 567, usually is in the range of 90 to 115 pcf with a minimum compressive strength of 2500 psi.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture stamped and signed by a Civil or Structural licensed in the State of California. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
2. Include historical strength test records if design mixture is based on field experience.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installers.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.

9. Vapor retarders.
10. Semirigid joint filler.
11. Joint-filler strips.
12. Repair materials.

D. Material Test Reports: For the following, from a qualified Testing Agency, indicating compliance with requirements:
   1. Aggregates.

E. ICC ES Evaluation Reports: For evidence of Building Code compliance:
   1. Mechanical splices and connectors for reinforcing steel.

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Architect

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5. Sections 1 through 5 and Section 7, "Lightweight Concrete."
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Engage a qualified independent Testing Agency to perform material evaluation tests and to design concrete mixtures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Dowel Bar Sleeves: Circular PVC sleeve, sealed one end, dowel bar embedment plus 1 inch in length, and 1/16 inch annular space inside diameter.

C. Deformed Bar Anchors: ASTM A 496, deformed steel wire; AWS D1.1/D1.1M, Type C.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

E. Mechanical Splices and Connectors: Comply with ACI 318 and ACI 439.3, Type I and Type II.

1. Furnish splicing and connector system with current ICC ES Evaluation Report.

2.4 CONCRETE MATERIALS

A. Regional Materials: Provide concrete that has been manufactured within 500 miles of Project site from aggregates and/or cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I or Type II. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F or C.

C. Normal-Weight Aggregates: ASTM C 33, Class 1N coarse aggregate, well-graded. Provide aggregates from a single source.

1. Maximum Coarse Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C 330, expanded shale, presize before firing, 3/4-inch nominal maximum aggregate size.

E. Water: ASTM C 94/C 94M.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A, 15 mil. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand, at least 3 inches thick; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.7 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.

B. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.

2.8 LIQUID FLOOR TREATMENTS

A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.9 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Reglets: Fabricate reglets in concrete to receive flashing from other trades of not less than 0.022-inch thick galvanized-steel sheet. See Division 07 Section “Sheet Metal Flashing and Trim”. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Use a qualified independent Testing Agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 25 percent maximum. If Fly ash is greater than 15% by weight, the mix design shall be proportioned per ACI 318 Section 5.3.

C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete, unless otherwise indicated on Drawings.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Granular Course: Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint or use PVC dowel bar sleeve.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, or built-up or membrane roofing.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
    a. Specified overall values (SOV) of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values (MLV) of flatness, F(F) 17; and of levelness, F(L) 15.
    b. Specified overall values (SOV) of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values (MLV) of flatness, F(F) 24; and of levelness, F(L) 17; for surfaces to receive thin-set flooring.
3. For floor installations 10,000 sq. ft. or less in total project area, finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (90 percent compliance) in accordance to ACI 117 Section 4.8.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aluminum granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

G. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer.

2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three

hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.12 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply liquid to concrete sooner than that recommended by manufacturer.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
4. Repair technique shall be tested on a mockup or surface to be concealed later, before repairing surfaces exposed to view, for approval by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to

reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified Testing Agency to perform field tests and inspections and prepare test reports.

B. Inspections: Verify and inspect concrete Work as shown on Drawings.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. of concrete, or for each 2000 sq. ft of surface area of slabs or walls thereof of each concrete mixture placed each day. Additional samples for 7-day tests shall be taken for each type of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure two sets of two standard cylinder plus one spare standard cylinder specimens for each composite sample.

b. To verify concrete strength for removal of shoring and reshoring in multistory construction, cast and field cure sets of two standard cylinder specimens for each composite sample. Number of field cured sets to be determined by Contractor.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
   a. If 28-day compressive-strength test falls below satisfactory levels, strength test the spare cylinder at age determined by the Contractor and average with the strength of the 28-day specimens. The average strength of the three cylinders shall be considered one compressive-strength test.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete Testing Agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing Agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to within 24 hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 040516
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mortar and masonry grout for unit masonry.
   2. Testing of mortar and masonry grout.
   3. Admixtures for mortar and masonry grout.

B. Related Sections:
   1. Section 040520 - Masonry Accessories.
   2. Section 042000 - Unit Masonry.

1.2 REFERENCES

A. IMIAC (International Masonry Industry All-Weather Council) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

B. IMIAC (International Masonry Industry All-Weather Council) - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

1.3 SUBMITTALS

A. Submit manufacturer's recommendations and product data in accordance with Section 013300.

B. Submittals shall be in accordance with Section 013300 and be prepared by an approved testing laboratory.

C. Mortar Submittals:
   1. Submit mix designs for each type of mortar to be used and state building components in which each will be used. Indicate whether proportion or property specification of ASTM C270 is used on each mix design.
   2. Submit Reference Test data as specified by ASTM C270.
   3. Submit Reference Test data indicating minimum bond strength of 20 psi when tested in accordance with ASTM E518 or 100 psi when tested in accordance with ASTM C1072.

D. Submit mix designs for each type of masonry grout to be used and state building components in which each will be used. Use proportion specification of ASTM C476 as minimum criterion and design for minimum compressive strength of 3000 psi when tested in accordance with ASTM C1019. Submit Reference Test data.

E. Prior to installing unit masonry using colored mortar, construct sample wall panels to verify selections made under sample submittals and to demonstrate aesthetic effects of materials and execution.

1.4 QUALITY ASSURANCE

A. Testing of Mortar and Masonry Grout shall be by approved testing laboratory as specified in Section 014500.

B. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate. Choose mortar ingredients that will not produce effloresence.

1.5 TESTING

A. Use representative samples of mortar and masonry grout materials and proportions to be utilized in construction.

B. Mortar Tests:

1. Perform tests of mortar and mortar materials to ensure conformance with requirements stated herein.
2. Flexural Bond Strength Test: ASTM E518 or ASTM C1072.
3. Mortar Composition and Properties: Test and evaluate per ASTM C780. For compressive strength tests, provide 3 inch by 6 inch mortar cylinders.
4. Water Retention Tests: ASTM C91, Article 20.

C. Masonry Grout Tests:
1. Sampling and testing of masonry grout shall be in accordance with ASTM C1019.
2. Masonry units used to create molds for samples shall be same type of units used in construction. Wood blocks shall be at base of sample and permeable liner shall be used at sides of sample to prevent bond with masonry units. Molds and sample shall remain undisturbed for 48 hours prior to transporting samples to laboratory. Sample size shall be 3 1/2 inches square by 7 inches high.

D. If mortar tests do not indicate conformance with requirements stated herein, re-establish and resubmit for further testing. Pay costs for required retesting.

E. Payment of Reference Tests (tests performed prior to construction): By Contractor.

F. Payment of Construction Progress Tests (tests performed during construction): By Owner.

1.6 PRODUCT HANDLING

A. Storage: Store mortar materials off ground, under cover, and in dry location.

PART 2 PRODUCTS

2.1 MORTAR MATERIALS

A. Portland Cement: ASTM C150, Type I, non-staining without air-entrainment and of natural color.

B. Masonry Cement: Masonry cement not allowed.

C. Aggregates for Mortar: ASTM C144.

D. Aggregates for Masonry Grout: ASTM C404.

E. Hydrated Lime: ASTM C207 Type S, without air-entrainment.

F. Premix Mortar: Commercially prepared premix of low alkali Portland cement, hydrated lime, and aggregates; ASTM C387; mortar Type M, S, N.
1. Optional Mortar Cement (in lieu of Portland Cement and Lime); Lafarge Mortar Cement Complying with Uniform Building Code for Mortar Cement. Use at Contractor's option.

G. Water: Potable.

2.2 ADMIXTURES

A. Mortar Color: Premeasured, non-fading, concentrated mineral oxide pigment, appropriate for addition to Portland cement/lime mortar mix.
1. Provide in color as selected from manufacturer’s standard range.
2. Manufacturers:
a. Tamms Industries,
b. Solomon Grind-Chem Service,
c. Euclid’s Super Concentrated Mortar Color,
d. DCS Color and Supply,
e. Prism Pigments.

B. Chemical Resisting Mortar:
1. Manufacturers:
a. Atlas Minerals and Chemicals,
b. Ceilcote Company,
c. Ameron Corrosion Control Division.

C. Water-Repellent Admixture: Dry-Block integral water-repellent admixture.
   1. Manufacturers:
      a. Grace Masonry Products.

D. Latex Additive: Brock-White latex liquid or Duraweld.
   1. (Use for mortar at stone sills, and wall caps.)

2.3 MORTAR MIXES

A. Mortar for Non-Load Bearing Interior Walls and Partitions: ASTM C270, type as scheduled using Proportion specification.

B. Mortar for Structural Unit Masonry (indicated on structural drawings): ASTM C270, type as scheduled using Property specification.

C. Pointing Mortar: ASTM C270. Type as scheduled using proportion specification.

D. Stain Resistant Pointing Mortar: ASTM C270. Type as scheduled using proportion specification.

2.4 MASONRY GROUT MIXES

A. For use in filling bond beams, concrete unit masonry cells with reinforcing bars, and other cells or cavities as indicated. Comply with ASTM C476.

B. Use coarse grout in grout spaces 2 inches or more in least horizontal dimension, unless otherwise indicated.

C. Use fine grout in grout spaces less than 2 inches in least horizontal dimension, unless otherwise indicated.

D. Add sufficient water to produce mix of suitable consistency for placing without segregation. Slump range: 8 inches to 11 inches.

E. Use fine aggregate size No. 2 for fine grout and coarse aggregate size No. 8 for coarse grout in accordance with ASTM C404.

PART 3 EXECUTION

3.1 MIXING MORTAR

A. Mortar Ingredients: Thoroughly mix in accordance with ASTM C270 in quantities needed for immediate use.

B. Mortar Admixtures: Add in accordance with manufacturer's recommendations. Ensure uniformity of mix and colorations.
   1. Consult with and follow manufacturer's directions on: Use, quantity and mixing of admixtures; various conditions affecting mixing and pouring; mix designs and procedures. Show proposed admixtures on mix designs and do not use unless shown.

C. Ensure that sand is uniformly damp immediately before mixing.

D. Do not use anti-freeze compounds to lower freezing point of the mortar. Do not use calcium chloride in the mortar.

E. Use mortar within 2 hours of mixing at temperatures over 80 degrees F and 2-1/2 hours at temperatures under 50 degrees F.

F. If water is lost by evaporation, retemper mortar only within 2 hours of mixing. Do not retemper mortar after 2 hours of mixing.

3.2 MORTAR TYPE SCHEDULES

A. Exterior Cavity Wall: Type S mortar in masonry back-up wall with Type N mortar in face brick veneer.

B. Interior Bearing Walls: Type S mortar.

C. Masonry Below Grade: Type S mortar.

D. Interior Non-Load Bearing Walls: Type N mortar.

E. Glass Unit Masonry: Type N mortar with Type O pointing mortar.

3.3 MORTAR COLOR SCHEDULES

A. Mortar Color: Color as selected.

3.4 MIXING MASONRY GROUT

A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for Fine or Coarse grout.

B. Add admixtures in accordance with manufactures instructions. Mix thoroughly.

C. Do not use anti-freeze compounds to lower the freezing point of the grout. Do not use calcium chloride in the grout.

3.5 CONSTRUCTION PROGRESS TESTING

A. Mortar Testing. Provide two 3 inch by 6 inch mortar cylinders as described in Article 1.5 on first 10,000 masonry units laid or first 2 weeks work whichever occurs first. Thereafter if tests are acceptable, provide 2 test cylinders for each 50,000 masonry units or every 4 weeks, whichever occurs first.

B. Masonry Grout Testing. For every 15 cubic yards of masonry grout placed, or for each days work when less than 15 cubic yards is placed, provide 3 samples. Test 1 sample at 7 days of age for projecting probable 28 day strength and 2 samples at 28 days for acceptance of average as required for evaluation and acceptance per ACI 318.

END OF SECTION

SECTION 040520
MASONRY ANCHORAGE, REINFORCING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Masonry reinforcing

B. Related Sections:
   1. Section 040516 - Masonry Mortaring and Grouting.
   2. Section 042000 - Unit Masonry: Installation of masonry anchorage, reinforcing and accessories.
   3. Section 072100 - Thermal Insulation: Cavity wall insulation.

1.2 SUBMITTALS

A. Submit in accordance with Section 013300

B. Product Data:
   1. Submit product literature for each masonry accessory.

C. Shop Drawings:
   1. List and mark bars showing quantities, sizes, lengths, locations, bending details and ASTM designations.
   2. Show locations, type and quantities of bolsters, spacers, chairs, support bars and other accessories.
   3. Show bar locations from face of walls.

PART 2 PRODUCTS

2.1 MASONRY REINFORCEMENT

A. Deformed Reinforcing Bars for Wall Reinforcing: Steel Reinforcing Bars at Concrete Unit Masonry; ASTM A615, Grade 60, or comply with Section 032000.

2.2 MASONRY ANCHORS AND TIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Heckman Building Products.
   2. Dur-O-Wal Incorporated.
   3. Hohmann and Barnard Incorporated.
   4. AA Wire Products Co.

B. (HORIZ REINF-1) Horizontal Reinforcing at Concrete Unit Masonry: Continuous Wire Joint Reinforcing with 9 gage side rods and crossrods.
   1. Use hot dipped galvanized wire ASTM A 153, Class B-2 (1.5 oz. PSF) for exterior masonry walls.
   2. Use mill galvanized wire ASTM A641. Class 1 (0.40 minimum zinc coating) for interior masonry walls.
   3. Use prefabricated corners and tees at wall intersections.
   4. Acceptable Manufacturers:
      a. Dur-O-Wal: Truss-type D/A 310.
      b. Comparable product of other specified manufacturers.

C. (HORIZ REINF-2) Horizontal Reinforcing at Concrete Unit Masonry: Continuous Wire Joint Reinforcing with 9 gage side rods and crossrods.
   1. Use hot dipped galvanized wire ASTM A153, Class B-2 (1.5 oz. PSF) for exterior masonry walls and interior walls at moisture areas.

2. Use mill galvanized wire ASTM A641. Class 1 (0.40 minimum zinc coating) for interior masonry walls.
3. Use prefabricated corners and tees at wall intersections.
4. Acceptable Manufacturers:
   a. Dur-O-Wal: Ladder-type D/A 320.
   b. Comparable product of other specified manufacturers.

D. Steel Wire Rods at Masonry Joints: ASTM A82. Use galvanized wire at exterior masonry walls.
1. Use mill galvanized wire Class 3 (0.8 oz. minimum zinc coating) for exterior masonry walls.

2.3 JOINT FILLER MATERIALS

A. (MA-1) Control Joint Filler: Open-cell polyethylene foam.
1. Products and Manufacturers:
   a. Ethafoam by Sealed Air.
   b. Expansion Joint Filler by BASF.

B. (MA-2) Deflection Material: Flexible semi-closed urethane or closed cell neoprene, gray unless otherwise selected by Architect.
1. Product and Manufacturer: Will-Seal by Williams Products, or equal.
2. For Fire-rated partitions: Refer to Section 078443 Fire-Resistive Joint Systems.

C. (MA-3) Column Wrap: ASTM D 1056, Grade 2B1, closed cell foam, 1/4 inch thick.

D. (MA-4) Control Joint bond Breaker: 6 mil thick polyethylene film.

2.4 MASONRY CLEANER

A. Type and Manufacturer: Sure Klean masonry cleaner by PROSOCO Incorporated. Use masonry cleaner to clean exposed masonry work. Type of cleaner as recommended by manufacturer for each type of masonry material.

B. Other Acceptable Manufacturers:
1. L&M Chemicals,
2. Diedrich Technologies, Inc., Oak Creek, WI.
3. American Building Restoration Products, Inc., Franklin, WI.

PART 3 EXECUTION

3.1 REINFORCEMENT LOCATION AND SPACING

A. Reinforcement: Locate and space as indicated on drawings. If not indicated provide joint reinforcing as follows:
1. 16 inches o.c. vertical dimensions, continuous full length of wall.
2. At bed joint at top course of wall or partition, continuous full length of wall.
3. In first and second courses below and above each wall opening, extending at least 3 feet beyond opening jamb, in addition to continuous reinforcing noted under #1 above.
4. At foundation walls with earth both sides, provide only at top 2 courses.
5. Do not carry through control or expansion joints.
6. At composite walls, without cavity, provide extended type reinforcing; full width (less one inch each side) of block and brick wythes.
7. Provide ties at 16 inches on center each way. Thoroughly embed wall ties for face brick.
8. Refer to structural drawings for locations of steel reinforcing bars.
9. Refer to Structural Drawings for location of rebar positioners at interior 16 inch concrete masonry units.

END OF SECTION

SECTION 042000
UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Burnished concrete masonry units
3. Installation of reinforcing bars and deformed bar anchors in unit masonry.
4. Installation of anchor bolts and other embedments in unit masonry
5. Installation of masonry anchorage, reinforcing and accessories specified in Section 040520.

B. Related Sections:

1. Section 033000 - Cast-In-Place Concrete.
2. Section 040516 - Masonry Mortaring and Grouting.
3. Section 040520 - Masonry Anchorage, Reinforcing and Accessories.
4. Section 051200 - Structural Steel: Items to be built in masonry work.
5. Section 055000 - Metal Fabrications: Items to be built in masonry work.
6. Section 072100 - Thermal Insulation: For cavity spaces.
7. Section 076210 – Sheet Metal Flashing and Trim: Reglets to be built in masonry work.
8. Section 079000 - Joint Protection: Sealants for expansion and contraction joints.

1.2 REFERENCES

A. ANSI A41.1 - Building Code Requirements for Masonry.

B. ACI 530.1/ASCE 6 - Specifications for Masonry Structures.

1.3 SUBMITTALS

A. Product Data and Test Reports: Submit manufacturer's recommendations, product data and test reports in accordance with this section and Section 013300.

B. Shop Drawings: Submit in accordance with Section 013300 for stone trim in form of cutting and setting drawings showing sizes, profiles, and location of each stone trim unit required.

C. Samples: Submit samples of each type of unit masonry for color selection and appearance acceptance.

1. Burnished concrete unit masonry.

1.4 QUALITY ASSURANCE

A. Reference Standards: Comply with requirements of listed standards unless indicated otherwise herein.

B. Fire-Rated Masonry: Wherever fire-resistance classification is shown or scheduled for unit masonry construction, comply with requirements for materials and installation established by governing authorities for construction shown.

C. Test Data: Provide evidence and test data confirming that concrete block conform to standards stated herein.

D. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or uniform blend within ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

E. Job Mock-Up: Prior to installation of masonry work, erect sample wall panel mock-up using materials, bond and joint tooling required for final work.

1. Build mock-up at site, where directed, of full thickness and approximately 4 feet by 4 feet, indicating proposed range of color, texture and workmanship to be expected in completed work.

2. Architect's acceptance of visual qualities of mock-up before start of masonry work. Provide separate mock-up panel for each type of exposed unit masonry work.
3. Where masonry is to match existing, erect panels parallel to existing surface.
4. Mock-up to show following assemblies as part of masonry construction.
    a. Back-up wall, ties, insulation, vapor retarder
    b. Building corner
    c. Sealant joints
    d. Window opening with vapor retarder terminations shown.

1.5 TESTING

A. Testing of Concrete Masonry Units:
    1. Tentative Acceptance: For tentative acceptance of blocks provide tests and reports on minimum of 5 units, from current stock, to provide proof of ability to conform to ASTM Standards. Texture, dimension, tolerance, appearance and test reports will be basis for tentative acceptance of supplier of blocks.

B. Prism Testing:
    1. F'm-1500 psi unless noted otherwise on drawings.
    2. Compressive strength of masonry assembly (f'm) may be determined by one of the following methods:
        a. Provide compressive strength of masonry units to achieve required F'm per CBC Table 2105.2.2.1.2 for Type 'M' or 'S' mortars.
        b. Prism testing per CBC 2105.2.2.2 and ASTM C1314.
            1) Prior to construction, notify Architect in writing of method to be used.
            2) When prism testing is used to determine F'm, construct and test not less than 3 prisms prior to construction for each strength specified.

C. Mortar strength test in accordance with ASTM C780.

1.6 MASONRY TO STEEL STUD TIE TESTING

A. Owner will retain and pay for ITL (Independent Testing Laboratory) to perform pull out testing on masonry anchors attached to steel studs.

B. Type of testing equipment shall be hydraulic or other testing apparatus as determined by ITL.

C. Provide ITL with description of materials and installation procedures and methods.

D. Perform field testing (use approximately 150 lbs per tie) on selected area of 20 square feet of installed masonry anchors at start of anchor installation. Test area shall represent same materials and methods utilized for remainder of project.

E. If required by testing results, adjust materials or methods to obtain secure masonry anchor attachment.

F. After adjustment, if necessary, masonry anchor testing on remainder of project shall be accomplished on indiscriminate basis as determined by ITL, testing one anchor out of approximately 150 installed anchors.

G. Exact testing program, pattern and procedure to be used will be established by ITL with change of test procedure and additional testing as determined by ITL.

1.7 APPEARANCE OF CONCRETE MASONRY UNITS

A. Appearance Requirements: Concrete masonry units shall be light in color, with uniform fine texture, free of face smears.
    1. Do not use broken units. Chipped or other defective units will not be acceptable for use where exposed. Not over 5 percent of units will be permitted to have chips and chips shall not exceed 3/8 inch.
    2. Exposed concrete masonry unit walls shall have units uniform in size, texture and color.
    3. Architect reserves the right to reject unit masonry manufacturer if, in Architect's opinion, unit quality, color or texture is unacceptable with design intent.
    4. Appearance requirements may be waived by Architect for concealed units.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off ground, under cover, and in dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in air-dried condition.

C. Store cementitious materials off ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 48 inches down both sides and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 48 inches down face next to unconstructed wythe and hold cover in place.
3. Maintain protective boards at exposed external corners which may be damaged by construction activities. Provide such protection without damaging completed work.
4. Protect sills, ledges and projections from droppings of mortar.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

1.10 PROTECTION

A. Provide temporary bracing during erection of concrete block work. Maintain in place until building structure provides permanent bracing.

B. Heat materials and provide temporary protection of completed portions of masonry work. Comply with governing codes and with "Construction and Protection Recommendations for Cold Weather Masonry Construction" of Technical Notes on Brick and Tile Construction by Brick Institute of America (BIA). Extend covering at least 2 feet down both sides of walls and hold securely in place.

C. Prevent mortar or soil from staining face of masonry to be left exposed or painted. Remove immediately mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

D. Protect sills, ledges and projections from droppings of mortar.

PART 2 PRODUCTS

2.1 CONCRETE UNIT MASONRY

A. Concrete Blocks: Modular size, load bearing, ASTM C90.
   1. (CMU-1) Normal weight Class 1: C33 Aggregate. Unless concrete block is indicated as "light weight block", provide normal weight concrete block.
      a. Size:
         1) Nominal, as indicated.

B. Provide shapes indicated and as follows:
   1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
   2. Provide square-edged units for outside corners, unless indicated as bullnose.

C. Curing: Kiln and air cured under cover until age of blocks is at least 45 days. Autoclave cured type block may be used.

2.2 DECORATIVE CONCRETE MASONRY UNITS

A. (CMU-11) and (CMU-12) Ground Faced (Burnished) Concrete Masonry Units: ASTM C90, normal weight units (minimum 125 pcf), moisture controlled curing, with manufacturer's standard dissipating block protection.
   1. Load Bearing Unit Shapes: All units (excluding lintel, cap and sill block units) to be Plain Double Corner; Single Open End, ("A" shaped); or Double Open End, ("H" shaped) units.
   2. Type: Provide special shapes where indicated on the Drawings
   3. Sizes:
      a. (CMU-11): Nominal 4" x 8" x 16" at all Site walls and Generator Enclosure wall.
      b. (CMU-12): Nominal 4" x 12" x 16" at Greenhouse foundation wall.
   4. Colors: Refer to Material Identification Codes.
   5. Acceptable manufacturer:
      a. ORCO Block Co.
      b. Or District approved equal.

PART 3 EXECUTION

3.1 PREPARATION

A. Ensure items built-in by other trades for this work are properly located and sized. Fill in solidly with masonry around built-in items. Fill space between hollow metal frames and masonry solidly with mortar.

B. Establish lines, levels and coursing. Protect from disturbances.

C. Rake out mortar in preparation for application of sealants, where required.

3.2 CONCRETE BLOCK WORKMANSHIP AND INSTALLATION

A. Place masonry in accordance with lines and levels indicated on Drawings. Lay from exposed side, plumb, level and true to modular dimensions.

B. Fully bond external and internal corners.

C. Install joint reinforcing, anchors and ties in full mortar surround and where necessary fill voids in blocks to provide full bed to completely imbed items.

D. Keep concrete block dry, under cover and lay only clean, dry undamaged units. Do not lay units with moisture content over 40 percent.

E. Lay hollow concrete masonry units with full mortar coverage on vertical face shells. Bed webs in mortar in starting course.

F. Lay solid masonry units with completely filled bed and head joint, except at expansion and control joints. Butter ends with sufficient mortar to fill head joints and shove into place.

1. Do not slush head joints.
2. Bevel rear of bed joint at cavity to exclude mortar from protruding into cavity.

G. Isolate masonry partitions from vertical structural framing members with control joint, with mortar raked back 3/4 inch install backer rod and sealany.

H. Do not shift or tap masonry after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.

I. Ensure masonry courses are of uniform height. Make vertical and horizontal joints equal and of uniform thickness. in full bed of mortar, properly jointed with other work.

J. Remove excess mortar and projections. Take care to prevent breaking masonry corners. Do not let mortar fall into cavity air space, clean out promptly.

K. Perform job site cutting of masonry with proper power tools to provide straight and true, unchipped edges.

L. Lay exposed concrete block in running bond with vertical joint in each course centered on units in course above and below.

M. Where piping and conduit run in masonry, work with other trades to coordinate work. Cut out center bridges in block to create voids for pipes or conduit. Where pipes or conduit exit from wall, drill neat holes to provide neat unpatched walls.

N. Build inner wythe ahead of outer wythe to receive insulation or vapor retarder adhesive.

O. Strike flush and then tool to dense sealed surface mortar joints that will be covered by earth.

P. Tool exposed joints slightly concave to dense smooth surface without overlaps from horizontal to vertical joints. Tool exposed mortar when thumbprint hard. Joints behind ceramic tile shall be flush. Rake out mortar in preparation for application of sealants, where required.

3.3 TOLERANCES

A. Maximum variation from masonry unit to adjacent masonry unit: 1/16 inch.

B. Maximum variation from vertical and horizontal building lines: 1/4 inch in 10 feet.

C. Maximum variation from cross sectional thickness of cavity and composite walls: Plus or minus 1/4 inch.

D. Maintain flush face on exposed masonry surfaces.

E. Lay concrete block to receive thinset ceramic tile plumb, with flush mortar joints and with maximum surface variation of 1/8 inch in 10 feet.

3.4 REINFORCEMENT AND ANCHORAGES

A. Place masonry reinforcing as shown on Drawings and in accordance with Section 040523 - Masonry Accessories.

B. Reinforce walls, except masonry veneer, with continuous horizontal joint reinforcing and masonry ties. Fully embed longitudinal side rods in mortar for entire length with minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations.

C. Anchor single wythe masonry veneer to concrete back-up with dovetail anchors. Provide additional anchors within 1 foot of openings.

D. Fully reinforce corners and intersections.

E. Lap masonry reinforcing splices minimum 6 inches.

3.5 COREFILL AND GROUT

A. Place corefill concrete at intervals not to exceed 5 feet of wall height during construction of walls, unless cleanouts are provided in which case 8 foot lifts may be used.

B. Rod or vibrate corefill to insure complete filling of cells.

C. Allow at least 15 minutes between successive pour lifts to permit settlement.

D. Stop intermediate pours at least 1-1/2 inch below mortar joint.

E. Exercise care during filling of cells to insure reinforcement is properly positioned. Tie vertical bars to joint reinforcing at 32 inch centers to maintain their proper location.

F. Use care to prevent mortar droppings from accumulating at base of cells. Provide temporary clean out openings, if necessary, at base of cells in order to remove droppings prior to placement of corefill concrete.

3.6 BOND BEAMS AND LINTELS

A. Provide reinforced concrete block lintels over openings where indicated on drawings.

B. Construct lintels and bond beams using concrete and reinforcing steel specified to PCA recommendations. Maintain minimum 6 inch bearing on each side of openings. Erect on full even beds of mortar with minimum one course filled-core hollow units under lintels and beams.

C. For lintels, use reinforcing bars of full lengths only.

D. Place and consolidate concrete without disturbing reinforcing. Construct lintels on plank, adequately supported, joints equally spaced. Do not support lintels with hollow metal door frames. Fill spaces around built-in items solid with masonry and mortar unless otherwise indicated. Clean out spaces prior to pouring concrete fill.

E. Allow lintels to reach 90 percent design strength or 28 days before removing temporary supports. Remove units that show evidence of cracking.

3.7 JOINT FILLERS AND DEFLECTION MATERIAL

A. Install fillers in accordance with manufacturer's printed instructions. Compressible fillers shall be of joint size.

B. Set units at proper depth or position in joint to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units. Recess exposed edges or faces or compressible fillers slightly behind adjoining surfaces so that compressed units will not protrude from joint.

3.8 THROUGH-WALL FLASHING AND WEEP SYSTEMS

A. Place through wall flashings in accordance with manufacturer's recommendations.

B. Install flashing as block is laid and protect from damage. Lap ends and seal, with laps in direction of moisture flow.

1. Adhesive apply and anchor flashing in place to prevent moisture from penetrating behind or under flashing.
2. At flashing horizontal terminations, construct end dams 1 block course in height with joints lapped and sealed.

C. Install rope wicks over flashing, cut flush with mortar face and leave end of wicks visible to insure drainage. Install at head joint location, at bottom of cavity walls, and at lintels and relieving angles. Secure at 45 degree angle to back-up.

D. Install cavity drainage mat at locations where flashing and weeps are required.

E. Install block vents in accordance with manufacturer's written instructions. Install at head joint locations, at bottom of cavity walls, and at lintels and relieving angles.

3.9 CONTROL JOINTS AND CONSTRUCTION JOINTS

A. Provide control joints in block work as indicated and where shown on Drawings, or if not shown, locate at 40 feet maximum for horizontal run of wall.

B. Do not continue horizontal masonry reinforcing across joints. End reinforcing approximately one inch either side of joints.

C. Form joints in block work, straight and true.

D. Keyed Control Joint in Bond Beams: At continuous bond beams, provide keyed control joint at construction joints.

1. Extend rebar beyond joint minimum of 18 inches.
2. Use 2X wood block drilled to allow rebar to pass through wood block.
3. Set block inside of bond beam and coat with form release agent.
4. Secure block in place before pouring bond beam.

3.10 BUILT-IN WORK

A. As work progresses, build-in items as indicated and required, including, hollow metal frames, window frames, steel angle lintels, nailing strips, anchor bolts, plates, sleeves, hangers, supports, and other items supplied by other trades. Wherever bolts, brackets and similar anchor items are cast-in masonry, fill voids in masonry with mortar to adequately anchor and transmit loads.

B. Build-in items plumb and true to lines and levels.

C. Bed anchors of hollow metal frames in mortar joints. Fill masonry cores at jambs with grout for full projection of frame anchors.

D. Do not build-in organic materials which will be subjected to rot or deterioration.

3.11 CUTTING AND FITTING

A. Cut and fit concrete block for chases, pipes, conduit, sleeves, and grounds. Cooperate with other sections of work to ensure correct size, shape and location. Provide not less than 8 inches of masonry between chase or recess and jamb of openings. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges.

B. Obtain Architect's review prior to cutting or fitting any area not indicated on drawings, or which may impair appearance or strength of masonry work.

3.12 PARTITIONS

A. General: Carry masonry partitions up to structure above, unless otherwise noted.

B. Openings Through Walls: Except as otherwise indicated, where piping, conduit or similar features pass through walls, carefully fill spaces to block sound. Fill voids to permit movement and deflection. Fill solid around obstructions and voids to form effective closures.

C. Joint to Structure Above: Provide joint between masonry and over-structure and pack voids solidly with deflection material. Filling of voids shall permit movement and deflection. Fill solid around obstructions and voids to form effective closure.

D. Sand Filled Cores: Where indicated, fill cores in masonry wall solid with sand, full height of wall. Sand as specified in Section 040516 – Masonry Grouting.

3.13 FIELD QUALITY CONTROL - LEVEL 1 NONESSENTIAL FACILITIES

A. Testing and Inspection: Owner will engage qualified special inspectors in accordance with Section 014533.

1. Qualifications: The minimum category of special inspector required to perform services outlined below are noted by qualifications in parentheses. The definitions of the categories of special inspector are included in Section 014533.

B. Coordinate with independent testing and inspecting agency engaged by the Owner to perform field quality control inspection and testing.
   1. Provide necessary scaffolding or temporary platforms required by testing agency in order to perform their work. Such scaffolding or platforms shall comply with safety regulations and shall be acceptable to testing agency.

C. Inspection of masonry is required during preparation of masonry wall prisms, sampling and placing of masonry units, placement of structural reinforcement, cleanout of grout space immediately prior to closing of elements and during all grouting operations.

D. "Continuous" Inspection of Masonry: Inspections noted below as being continuous shall be performed uninterrupted each day while the specific task is being performed.
   1. Continuous inspection shall be provided for 100% of shear walls, masonry beams and masonry columns.

E. "Periodic" inspection of masonry: Inspection items noted below as being periodic shall be performed at least once per 1,000 square feet of surface but not less than once per week.

F. Samples and Tests for Special Inspections: (Technical II)
   1. Construction Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof, but not less than one set for the project.
      a. One set shall consist of testing three samples.
   2. Masonry Unit Tests – Perform in accordance with CBC Chapter 21.
      a. For each type of unit provided, verify units conform to strength, absorption, and unit weight requirements of ASTM C 55 or ASTM C 90 when tested in accordance with ASTM C 140.
      b. Provide units which match accepted samples as to texture and general character. Appearance will be an element considered for conformance. Contractor must arrange for tests and for delivery to laboratory.
   3. Masonry Prism Tests – Perform in accordance with CBC Chapter 21.
      a. For each type of construction provided, verify compressive strength of masonry equals or exceeds specified f'_m when tested in accordance with ASTM C 1314.
      b. Preparation, storage, handling of prism tests. (Contractor will provide labor and materials to construct all prism tests.)
   4. Mortar Tests for Unit Masonry Complying with ASTM C270 Proportion Specifications:
      a. For each mix provided, test mortar for initial consistency and board life, mortar aggregate ratio, and mortar air content in accordance with ASTM C 780.
   5. Mortar Tests for Unit Masonry Complying with ASTM C270 Property Specifications:
      a. For each mix provided, test mortar for initial consistency and board life, mortar air content and compressive strength in accordance with ASTM C 780.
   6. Flexural Bond Strength Testing:
      a. For each type of construction provided at the following applications, test mortar for flexural bond strength in accordance with ASTM E 518 or ASTM C 1072.
         1) Below grade masonry basement walls or retaining walls in contact with earth.
         2) Exposed exterior, above grade, load-bearing and non-load-bearing walls, and parapet walls.
   7. Grout Testing for each mix provided:
      a. Test grout for temperature in accordance with ASTM C 1064.
      b. Test grout for slump in accordance with ASTM C 143.
      c. Test grout for strength in accordance with ASTM C 1019. For each 50 cu yds placed or each day's work, whichever is less, make 3 grout samples and test one sample at 7 days and remaining 2 at 28 days.

G. Masonry Preparation and Placement (Technical II)
   1. Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.
   2. Condition of Units: On a periodic basis, verify that masonry units are clean, sound and dry.
   3. Proportions of site prepared mortar: On a periodic basis, verify proportions of prepared mortar are consistent with previously submitted materials.

4. Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.
5. Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.
6. On a periodic basis, verify hot and cold weather procedures are followed.
7. On a periodic basis, verify wall cavities are protected against entry of precipitation.

H. Masonry Reinforcement (Structural I)
1. Vertical Reinforcement: On a periodic basis, inspect placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls and positioning of steel.
2. Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement (HJR) steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls and alignment.
3. Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size.
4. Dowels and Anchors: On a periodic basis, inspect the installation of masonry anchor bolts, joist anchors, inserts, straps and dowels.

I. Prior to Masonry Grouting and Capping (Technical II)
1. Grout Spaces: On a periodic basis, verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting.
2. Reinforcement: On a periodic basis, verify placement of reinforcement and connectors remains consistent with Contract Documents.
3. Site Prepared Grout: On a periodic basis, verify proportions of site prepared grout are consistent with previously submitted materials.

J. During Grout Placement (Technical II)
1. Grouting:
a. Continuously observe proper grouting technique including consolidation to approved height of grout space, cleanouts, rebar positioning, reconsolidation and vibration.
b. Grout Specimens: Observe 100% of preparation of all required grout specimens, mortar specimens, and/or prisms to be tested.
2. Dry Packing: On a periodic basis, verify proper application of dry packing.

3.14 FIELD QUALITY CONTROL - LEVEL 2 ESSENTIAL FACILITIES

A. Testing and Inspection: Owner will engage qualified special inspectors in accordance with Section 014533.
1. Qualifications: The minimum category of special inspector required to perform services outlined below are noted by qualifications in parentheses. The definitions of the categories of special inspector are included in Section 014533.

B. Coordinate with independent testing and inspecting agency engaged by the Owner to perform field quality control inspection and testing.
1. Provide necessary scaffolding or temporary platforms required by testing agency in order to perform their work. Such scaffolding or platforms shall comply with safety regulations and shall be acceptable to testing agency.

C. Inspection of masonry is required during preparation of masonry wall prisms, sampling and placing of masonry units, placement of structural reinforcement, cleanout of grout space immediately prior to closing of elements and during all grouting operations.

D. "Continuous" Inspection of Masonry: Inspections noted below as being continuous shall be performed uninterrupted each day while the specific task is being performed.
1. Continuous inspection shall be provided for 100% of shear walls, masonry beams and masonry columns.

E. "Periodic" inspection of masonry: Inspection items noted below as being periodic shall be performed at least once per 1,000 square feet of surface but not less than once per week.

F. Samples and Tests for Special Inspections: (Technical II)
   1. Construction Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof, but not less than one set for the project.
      a. One set shall consist of testing three samples.
   2. Masonry Unit Tests – Perform in accordance with CBC Chapter 21.
      a. For each type of unit provided, verify units conform to strength, absorption, and unit weight requirements of ASTM C 55 or ASTM C 90 when tested in accordance with ASTM C 140.
      b. Provide units which match accepted samples as to texture and general character. Appearance will be an element considered for conformance. Contractor must arrange for tests and for delivery to laboratory.
   3. Masonry Prism Tests – Perform in accordance with CBC Chapter 21.
      a. For each type of construction provided, verify compressive strength of masonry equals or exceeds specified f'_m when tested in accordance with ASTM C 1314.
      b. Preparation, storage, handling of prism tests. (Contractor will provide labor and materials to construct all prism tests.)
   4. Mortar Tests for Unit Masonry Complying with ASTM C270 Proportion Specifications:
      a. For each mix provided, test mortar for initial consistency and board life, mortar aggregate ratio, and mortar air content in accordance with ASTM C 780.
   5. Mortar Tests for Unit Masonry Complying with ASTM C270 Property Specifications:
      a. For each mix provided, test mortar for initial consistency and board life, mortar air content and compressive strength in accordance with ASTM C 780.
   6. Flexural Bond Strength Testing:
      a. For each type of construction provided at the following applications, test mortar for flexural bond strength in accordance with ASTM E 518 or ASTM C 1072.
         1) Below grade masonry basement walls or retaining walls in contact with earth.
         2) Exposed exterior, above grade, load-bearing and non-load-bearing walls, and parapet walls.
   7. Grout Testing for each mix provided:
      a. Test grout for temperature in accordance with ASTM C 1064.
      b. Test grout for slump in accordance with ASTM C 143.
      c. Test grout for strength in accordance with ASTM C 1019. For each 50 cu yds placed or each day's work, whichever is less, make 3 grout samples and test one sample at 7 days and remaining 2 at 28 days.

G. Masonry Preparation and Placement (Technical II)
   1. Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.
   2. Condition of Units: On a periodic basis, verify that masonry units are clean, sound and dry.
   3. Proportions of site prepared mortar: On a periodic basis, verify proportions of prepared mortar are consistent with previously submitted materials.
   4. Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.
   5. Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.
   6. On a continuous basis, verify hot and cold weather procedures are followed.
   7. On a continuous basis, verify wall cavities are protected against entry of precipitation.

H. Masonry Reinforcement (Structural I)
   1. Vertical Reinforcement: On a continuous basis inspect placement and alignment of all vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls and positioning of steel.
   2. Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement (HJR) steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls and alignment.
   3. Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size.
   4. Dowels and Anchors: On a continuous basis inspect the installation of masonry anchor bolts, joist anchors, inserts, straps and dowels.

I. Prior to Masonry Grouting and Capping (Technical II)

1. Grout Spaces: On a continuous basis, verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting
2. Reinforcement: On a periodic basis, verify placement of reinforcement and connectors remains consistent with Contract Documents.
3. Site Prepared Grout: On a periodic basis, verify proportions of site prepared grout are consistent with previously submitted materials.

J. During Grout Placement (Technical II)
   1. Grouting:
      a. Continuously observe proper grouting technique including consolidation to approved height of grout space, cleanouts, rebar positioning, reconsolidation and vibration.
      b. Grout Specimens: Observe 100% of preparation of all required grout specimens, mortar specimens, and/or prisms to be tested.
   2. Dry Packing: On a periodic basis, verify proper application of dry packing.

3.15 CLEANING

A. Wipe off excess mortar as work progress. Dry brush at end of each days work. Remove excess mortar and smears upon completion of masonry work.

B. Point or replace defective mortar. Match adjacent work.

C. After mortar is thoroughly set and cured, clean exposed surfaces with masonry cleaner in accordance with cleaner manufacturer's printed instructions. Use non-metallic tools in cleaning operations.

END OF SECTION

SECTION 051200
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Grout.

B. Related Sections:
   1. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
   5. Identify members and connections of the seismic-load-resisting system.
   6. Indicate locations and dimensions of protected zones.
   7. Identify demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
   1. Power source (constant current or constant voltage).
   2. Electrode manufacturer and trade name, for demand critical welds.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Welding certificates.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Non-shrink grout.

E. Source quality-control reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
5. AWS D1.1/D1.1M.
6. AWS D1.8/D1.8M.

E. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's Testing Agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
   1. W-Shapes: 60 percent.
   2. Channels, Angles, M, S-Shapes: 60 percent.
   3. Plates and Bars: 25 percent.
   4. Cold-Formed Hollow Structural Sections: 25 percent.
   5. Steel Pipe: 25 percent.
   6. All Other Steel Materials: 25 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M-, S-Shapes: ASTM A 36/A 36M.

D. Plates and Bars: ASTM A 36/A 36M, typical; ASTM A 572/A 572M, Grade 50, when used in SLRS connection.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Finish: Black except where indicated to be galvanized.

G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. Shear Connectors: ASTM A 108, Grades 1010 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

C. Headed Anchor Rods: ASTM F 1554, Grade 36, typical; ASTM F 1554, Grade 55, weldable, when used in SLRS; straight.
   1. Nuts: ASTM A 563 heavy-hex carbon steel.
   2. Plate Washers: ASTM A 36/A 36M carbon steel.
   3. Washers: ASTM F 436, Type 1, hardened carbon steel.
   4. Finish: Plain.

D. Threaded Rods: ASTM A 36/A 36M unless otherwise noted on structural drawings.
   1. Nuts: ASTM A 563 heavy-hex carbon steel.
   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
   3. Finish: Plain.

E. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

F. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

G. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers", including 2004 Addenda.

B. Primer: SSPC-Paint 25, Type II, zinc oxide, alkyd, linseed oil primer.

C. Galvanizing Repair Paint: ASTM A 780.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened unless noted otherwise on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted with slip-critical connections.
   4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
   1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened unless noted otherwise on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent Testing Agency to inspect field welds and high-strength bolted connections and prepare test reports.

B. Inspections: Verify and inspect structural steel Work as shown on Drawings.

C. Bolted Connections: Bolted connections will be tested and inspected according to RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at Testing Agency's option:
   a. Liquid Penetrant Inspection: ASTM E 165.
   b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   c. Ultrasonic Inspection: ASTM E 164.

E. SLRS Connections: Test and inspect SLRS connection elements as shown on Drawings in accordance to AISC 341, AWS D1.1/D1.1M and AWS D1.8/D1.8M.

F. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Testing Agency, where warranted, may select a reasonable number of additional studs to be subjected to the bend tests.

G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

SECTION 053100
STEEL DECKING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Roof deck.
   2. Noncomposite form deck.

B. Related Requirements:
   1. Division 03 Section "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
   2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For steel deck.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
   1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ASC Profiles, Inc.; a Blue Scope Steel company.
   2. Nucor Corp.; Vulcraft Group.
   3. Verco Manufacturing Co.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
   1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
   2. Deck Profile: As indicated.
   3. Profile Depth: As indicated.
   4. Design Uncoated-Steel Thickness: As indicated.
   5. Span Condition: Simple span.
   6. Side Laps: Interlocking seam.

2.3 NONCOMPOSITE FORM DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ASC Profiles, Inc.; a Blue Scope Steel company.
   2. Nucor Corp.; Vulcraft Group.
   3. Verco Manufacturing Co.
   4. Or approved equal.

B. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
   1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
   2. Profile Depth: 1-1/2 inches .
   3. Design Uncoated-Steel Thickness: As indicated.
   4. Span Condition: Simple span.
   5. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi , not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi , of same material and finish as deck, and of thickness and profile indicated or as recommended by SDI Publication No. 31 for overhang and slab depth.

F. Galvanizing Repair Paint: ASTM A 780 or SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members with screws as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals indicated and as follows:

1. Mechanically clinch or button punch.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches , with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members with screws as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals indicated and as follows:

1. Mechanically clinch or button punch.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:

1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 054000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Exterior non-load-bearing wall framing.

B. Related Sections include the following:
   1. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Testing Agency.

B. Welding certificates.

C. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Steel sheet.
   2. Expansion anchors.
   3. Power-actuated anchors.
   4. Mechanical fasteners.
   5. Vertical deflection clips.
   6. Miscellaneous accessories.

D. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

C. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: (ST230H)As indicated on DSA Approved Drawings.
   2. Coating: G60 (Z180)

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: 50 (340), Class 1 or 2.
   2. Coating: G90 (Z275).

2.2 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths and flange widths indicated, punched, with stiffened flanges.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths and flange widths indicated, unpunched, with unstiffened flanges.

C. Vertical Deflection Clips: As indicated on DSA Approved Drawings.

2.3 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Anchor clips.
   5. End clips.
   6. Foundation clips.
   7. Hole reinforcing plates.
   8. Backer plates.

2.4 ANCHORS, CLIPS, AND FASTENERS

A. Anchor Bolts: As indicated on DSA Approved Drawings..

B. Expansion Anchors: As indicated on DSA Approved Drawings.

C. Power-Actuated Anchors: As indicated on DSA Approved Drawings.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

2.6 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding or screw fastening as indicated on DSA Approved Drawings. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to DSA Approved Drawings, with screw penetrating joined members by not less than three exposed screw threads.
   4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to DSA Approved Drawings.

B. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding or screw fastening. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to DSA Approved Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

1. Connect vertical deflection clips to bypassing studs and anchor to building structure.

D. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

E. Install horizontal bridging in wall studs, spaced in rows indicated on DSA Approved Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

3.4 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified Testing Agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 055000
METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Miscellaneous and ornamental metal, except structural steel framing as specified in Section 051200 and defined as structural steel in AISC "Code of Standard Practice".
   2. Supports, anchorage and accessories for miscellaneous metal and ornamental metal work.
   3. Shop prime paint on ferrous metal.
   4. Shop prime for (Section 099600) high performance coating, where indicated.
   5. Pre-engineered metal stair system as follows:
      a. Engineering of metal stair system including handrails and connections to building structure.
      b. Steel pan type stairs and landings, with integral handrails and balusters, plates, angles, hangers, struts and welds for securing to building structure.
   6. Steel handrails and guardrails.
   7. Galvanized metal gratings and supports.
   8. Steel framing, supports and mounting plates at overhead doors.
   9. Ladders.
   10. Bollards.
   11. Sliding metal gate.
   12. Metal fin.

B. Related Sections:
   1. Section 017325 - Seismic Restraint Requirements for Nonstructural Components
   2. Section 033000 – Cast-In-Place Concrete.
   3. Section 042000 - Unit Masonry.
   4. Section 051200 - Structural Steel Framing.
   5. Section 089100 - Louvers.
   6. Section 099000 – Painting: Finish painting.
   7. Section 099600 - High Performance Coatings: Coating of Architecturally Exposed metal fabrication steel (AES).

1.2 REFERENCES

A. AWS D1.1 - Structural Welding Code.

B. SSPC PS7.01 - Steel Structures Painting Council.

C. Specification for Design of Cold-Formed Steel Structural Members by American Iron and Steel Institute.

D. ANSI A14.3 Safety Code for Fixed Ladders.

1.3 STAIR SYSTEM DESCRIPTION

A. General: Provide complete stair and landing systems including stringers, landing framing, treads, landings, connections and other components necessary for the support and installation of stairs and landings, comply with NAAMM requirements for Service Class Stairs.

B. Structural Performance of Stairs: Provide metal stairs capable of withstanding following structural loads without exceeding allowable design working stress of materials involved, including anchors and connections. Apply each load to produce maximum stress in each component of metal stairs.
   1. Treads and Platforms of Metal Stairs: Capable of withstanding uniform live load of 100 lb/sq ft or concentrated load of 300 lb/sq ft on area of 4 sq. in., whichever produces greater stress.
   2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.

3. Design and construct stair components and connections capable of withstanding seismic forces in any direction and capable of accommodating seismic relative displacements. Refer to Section 017325 for seismic design, loading and deflection criteria.
4. Egress stair components and connections as defined in the life safety plan or as indicated in the Section 017325 Responsibility Matrix shall be designed as a “Designated Seismic Systems”
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

C. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
      b. Concentrated load of 200 lbf (0.89 kN) applied at any point and in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Intermediate Rails, Balusters and Panel Fillers Not Serving as Top Rails:
      a. Concentrated load of 50 lbf (0.22 kN) applied normal to the plane of the rail or panel on an area not to exceed 1 sq. ft. (0.093 sq. m).
      b. Infill load and other loads need not be assumed to act concurrently.

1.4 SUBMITTALS

A. Comply with Section 013300.

B. Shop Drawings: Indicate dimensions, description of materials and finishes; include plans, elevations, sections, and details of railings and their connections and reactions to building structure. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections, and installation procedures, including specific requirements indicated.
   1. Indicate design criteria and reactions to structure.
   2. Construction details, sizes of metal sections, thickness of metals, profiles, attachments, dimensions and field joints, method of support from structure, and finishes.
   3. Work to be built-in or provided by other Sections.
   4. Welding: Indicate welded connections, both shop and field, using standard AWS welding symbols. Indicate net weld lengths.
   5. Provide shop drawings signed and sealed by qualified professional engineer responsible for their preparation licensed in State where project is located.

C. Calculations: Structural design shall be performed by a Professional Engineer, licensed in the state where Project is located, indicating structural integrity of members, anchors, fasteners and connections to building structure, in accordance with specified criteria. Submit signed engineering calculations concurrently with the shop drawings to Architect/Engineer upon request.
   1. Engineering Responsibility: Calculations shall be reviewed for stated design assumptions, general compliance to specified requirements, and forces imposed on structure. The accuracy of the design calculations shall be the sole responsibility of the Contractor’s Professional Engineer.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

1.5 QUALITY ASSURANCE

A. Applicable Standards: AISC "Specifications for Design of Cold-Formed Steel Structural Members" and AWS "Structural Welding Code".

B. Qualification for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

C. Field Measurements: Take field measurements prior to fabrication to insure proper fitting of work.

D. Shop Assembly: Preassemble metal items in shop to greatest extent possible, so as to minimize field splicing and assembly. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

E. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.

F. Professional Engineer Qualifications: Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of handrails and railing systems that are similar to those indicated for this Project in material, design, and extent of work.

1.6 HANDLING AND STORAGE

A. Load, unload, handle and store work in manner that will not bend, deform or otherwise damage metal. Store so metal and shop coats will not be subject to weather or moisture, store off ground and provide covering for metal in storage.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metal Surfaces: For fabrication of miscellaneous metal work items which will be exposed to view, use only materials which are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names and roughness. Select steel for exposed work to provide best possible appearance.

B. Steel Plates, Shapes and Bars: ASTM A36.

C. Steel Tubing: ASTM A501 or ASTM A500.

D. Steel Pipe: ASTM A53, Type S, Grade A, standard weight and extra-strong as required, galvanized and plain.

E. Galvanized Sheet Metal: ASTM A526 or A527, G-90 coating designation with both sides of metal prime painted.

F. Galvanizing: ASTM A123, hot dip galvanizing, thickness Grade 55 unless otherwise indicated.

1. Galvanize exterior steel fabrications, steel at exterior wall locations, and where steel is exposed to weather.

G. Fasteners: As indicated and recommended by manufacturer. Provide zinc- coated fasteners for exterior use or where built into exterior walls.

1. Provide stainless steel fasteners where indicated and where dissimilar metals are connected. Where dissimilar metals are connected, provide neoprene spacer or washer for isolation.

H. Stainless Steel: ASTM A167, Type 304 with #4 finish. Passivate exterior stainless steel.

I. Metal Primer Paint: Provide comparable primer recommended by finish coat manufacturer which is lead and chromate free, Low VOC complying with VOC guidelines.

1. Primer for Metal to Receive High Performance Coatings (HPC): See Section 099600 for products to be applied by this Section.
2. Primer to Receive Fire Protection Treatment: See applicable Division 7 Section for primer to be applied by this Section.
3. Primers for Painting: See Section 099000 for primers to be applied by this Section.

2.2 FABRICATION

A. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to radius of 1/32 inch, unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

B. Weld corners and seams continuously and in accordance with AWS. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

C. Form exposed connections with hairline joints which are flush and smooth, using concealed fasteners wherever possible.

D. Fabricate and space anchoring devices to provide adequate support. Cut, reinforce, drill and tap metal work to receive finish hardware and similar items.

E. Shop Painting: Remove scale, rust and other deleterious materials before shop coat of paint is applied. Apply shop coat of metal primer to fabricated metal items in accordance with manufacturer's printed instructions, with full coverage of joints, corners and edges.

F. Primer: High Performance Coating: At high performance painting use SSPC-6, complying with Section 099600.

1. Apply shop primer after surface preparation in compliance with primer manufacturer's instructions at a rate to provide uniform dry film thickness of 1.5 mils, maintain minimum coverage at joints, corners, edges and exposed surfaces.

2.3 HANDRAILS AND RAILINGS

A. (RAIL) and (MET RAIL-1) Types and Handrail Sizes: Refer to Material Identification Codes.

B. Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railing or use welding connectors.

1. Galvanize exterior handrails and railings.

C. Weld corners and seams continuously and in accordance with recommendations of AWS. Grind exposed welds smooth and flush, to match and blend with adjoining surface. Discoloration of finished surfaces is not acceptable.

D. Form exposed connections with flush, smooth, hairline joints, using concealed fasteners. Provide for anchorage to supporting structure. Fabricate and space anchoring devices as indicated and required for adequate support.

E. Provide brackets, flanges, and anchors for railing posts and for handrail supports. Provide inserts and sleeves for anchorage to concrete or masonry work.

F. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.

G. Provide wall returns at ends of wall-mounted handrails, except where otherwise indicated.

H. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings.

2.4 STAIR FABRICATION

A. (MET FAB-1): Shop fabricated steel stair, steel pan concrete filled.

B. General:

1. Verify dimensions on site prior to shop fabrication.
2. Fit and shop assemble sections in largest practical sizes, easily handled through building openings.
3. Accurately form and fit components and connections. Grind exposed edges and welds smooth and flush.
4. Accurately form components required for proper anchorage of stairs and landings, and integral railings to each other and to building structure.

5. Thoroughly clean surfaces of rust, scale, grease, and foreign matter prior to galvanizing or prime painting. Allow to dry thoroughly before applying priming material.

C. Fabrication of Stairs and Landings:
   1. Fabricate stairs with closed risers and treads of pan construction.
   2. Form treads and risers from sheet stock.
   3. Properly secure tread pans to stringers with clip angles welded in place.
   4. Form stringers of rolled steel channels or steel plate sections, as required to meet performance requirements. Weld fascia plates of minimum 14 gage thick sheet stock across channel toes, where applicable.
   5. Form landings of sheet stock. Reinforce underside of landings with angles, tees as required.
      a. Fabricate stairs, landings and component connections to support live loads of minimum 100 lb./sq.ft. with deflection of stairs and landings not exceeding 1/360 of span when underside is to be finished with gypsum board and 1/240 of span when underside is not being finished.

D. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with minimum 28-day compressive strength of 3000 psi, unless higher strengths are indicated.

E. Fabrication of Handrails and Guardrails:
   1. Handrails: Handrails shall have an outside diameter of 1-1/2".
   2. Inside handrails shall be continuous and shall sweep around smoothly at landings.
   3. Outside handrails shall be mounted on wall brackets as required to meet performance requirements and shall have extensions at top and bottom of stair runs as indicated on the Drawings and required by accessibility standards.
   4. Intermediate Guard Configuration: Intermediate guard shall be configured as indicated on drawings.
      a. Provide railing system consisting of 1-1/2 inch round sloping strands following each stair run and 1-1/2 inch round top rails that continuously sweep around at each corner.
   5. At top floor of stair system and at each floor landing (except lower level) provide 3'-6" high guard rails.
   6. Continue handrail and intermediate guard system down to the lower level where concrete stairs are indicated.

2.5 METAL SUPPORT ASSEMBLY

A. (MSA) Metal Support Assembly Manufacturer and Type:
   1. Unistrut Corporation:
      a. Unistrut Metal Framing.
      b. UMS Boom Supports
   2. Cooper B-Line Strut Systems,
   3. Hilti USA:
      a. Hilti Strut Framing.
      b. Hilti Medical Equipment Supports.
   4. Or District approved equal.
   5. Propriety equipment supports systems to be approved by the Architect.

B. (MSA-1) Individual Metal Support Assembly: Metal support assembly designed to provide support for individual piece of equipment,
   1. Provide support assembly for individual pieces of equipment as shown on the architectural reflected ceiling plan.
   2. Verify loading, deflection criteria and tolerance requirements with equipment supplier. See structural drawings for special loading requirements.
   3. Design and construct assembly, including anchorage, to withstand seismic forces in any direction. Refer to Section 017325 for seismic loading criteria and restraint requirements.
   4. Provide lateral diagonal bracing, orthogonal in two directions to prevent assembly from racking due to seismic forces.
   5. Verify bolting plate assembly requirements with equipment supplier.
   6. located and spaced as indicated on Drawings or as required by the equipment supplier.

2.6 METAL GRATINGS

A. (GRT-1) Galvanized Metal Gratings: Borden Metal Products Type B size 5 pressure locked steel gratings with 1-1/4 inch by 1/8 inch bearing bars at 1-3/16 inch centers and 3/4 inch by 1/8 inch cross bars at 4 inch centers, galvanized finish in accordance with ASTM A123.

2.7 METAL GRILLES

A. (GRL-1) Aluminum ceiling grille.

B. (GRL-2) Aluminum wall grille.

2.8 METAL LADDERS

A. (MET FAB-2) Interior Steel Ladder:

1. Comply with ANSI A14.3, unless otherwise indicated.
2. Height as indicated on Drawings.
3. Siderails: Continuous, 3/8 by 2-1/2 inch steel flat bars, with eased edges. Space siderails 16 inches apart, unless otherwise indicated.
4. Rungs: 3/4 inch diameter steel bars at 12 inches on center.
5. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
6. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
7. Support each ladder at top and bottom, and not more than 60 inches o.c. with welded or bolted steel brackets.
8. Prime with zinc-rich primer.

2.9 BOLLARDS

A. (MET FAB-8) Removable Bollards: Trafficguard Model TL 1004 R, or District approved equal, as indicated on Drawings and consisting of the following components:

1. 5 inch dia. pipe.
2. Exposed pipe above footing: 36” high.
3. Concrete footing per manufacturer’s written instructions with sleeve for pipe in concrete footing.
4. Tamper proof lock provided for securing cover when bollard removed.

B. (MET FAB-9) Bollards Imbedded in Concrete: Trafficguard Model RFP 4560 R, or District approved equal. Hot-dipped galvanized steel pipe, 5 inch dia., concrete filled, crowned cap, prime paint finish only the exposed top 3'-6".

1. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
2. Fill bollards solidly with concrete, mounding top surface to shed water.

2.10 SLIDING METAL GATE

A. (GATE-1) Sliding Metal Gate: Ameristar PassPort II Classic Industrial Roll Gate System as manufactured by Ameristar Fence Products, Inc., Tulsa, OK, (888) 333-3422, www.ameristarfence.com

1. Steel material for roll gate components (i.e. pickets, rails, diagonals and uprights), shall be commercial steel with a minimum yield strength of 45,000 psi.
2. Ornamental picket material shall be 1” square x 14 Ga. Tubing. Picket spacing shall be 4-3/4”. Material for toprails, uprights and diagonals rails shall be 2” square x 12 Ga. Material for the bottom rail shall be 2” x 4” x 11 Ga. Posts shall be a minimum of 4” square x 11 Ga.
3. Pickets/pales, rails, uprights and posts shall be precut to specified lengths. Diagonals shall be precut to specified lengths and angles. Frame materials shall be joined by welding. Pickets/pales shall be face welded to roll gate frame.

4. The manufactured roll gates and bolt-on panels (if applicable) shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pre-treatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils. The color shall be selected by the Architect from manufacturer's standard colors.

2.11 METAL FIN

A. (FIN-1) Metal Fin: Extruded aluminum fin, 12' x 3" x 3/8", finish: Light Gray (powder coat).
   1. Profile, Attachment Method, and Fasteners: As indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which miscellaneous metal items are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Provide setting drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

C. Perform cutting, drilling and fitting required for installation of miscellaneous metal items. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.

D. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch up shop paint coat. Do not weld, cut or abrade surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

F. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 2 mils.

G. Install metal gratings and supports according to reviewed shop drawings and manufacturer instructions.

3.3 METAL SUPPORT ASSEMBLY

A. Examination
   1. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
      a. Do not proceed until unsatisfactory conditions have been corrected.
   2. Take field measurements; report interferences with structural framing, mechanical systems, or other obstructions to Architect.

B. Installation

1. Install equipment support systems and accessories in accordance with reviewed shop drawings and manufacturer's printed instructions.
   a. Install before extensive electrical, mechanical, ceiling framing or room finish work.
2. Provide anchorage devices and fasteners for securing equipment support systems to in-place construction.
3. Attach to structure by means of imbedded concrete inserts, through bolts or by direct attachment to structural framing. If expansion anchors are used to anchor metal framing to support structure locate in such manner that anchor bolt is loaded in shear.
4. Set system accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.

3.4 METAL STAIR ERECTION

A. Erect stairs square, level, plumb and free from distortion or defects detrimental to appearance and performance.

B. Provide necessary anchors, plates, angles, hangers and struts as required for connecting stairs to the structure.

C. Ensure alignment with adjacent construction. Coordinate with related work to ensure no interruption in installation.

D. Perform necessary cutting and altering for installation of work of other sections. Do not perform any other additional cutting without review of Architect.

E. Field bolt and weld to match standard of shop bolting and welding. Hide bolts and screws whenever possible. Where not hidden, use flush countersunk fastenings, unless indicated otherwise. Make mechanically fastened joints flush hairline butted. Grind welds smooth and flush.

F. Touch up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide minimum 2-mil dry film thickness.

3.5 HANDRAILS AND RAILINGS

A. Provide anchorage devices and fasteners for securing handrails and railings to in-place construction.

B. Adjust railing prior to securing in-place to ensure proper matching at butting joints and correct alignment. Secure posts and rail ends to building construction.

C. Anchor steel pipe rails in concrete by means of galvanized pipe sleeves set and anchored into concrete. Provide steel plate closure secured to bottom of sleeve and of width and length not less than one inch greater than sleeve. After post is inserted into sleeve, fill sleeve solid with quick-setting hydraulic cement.

D. Anchor rail ends to supporting structure with flanges welded to rail ends and bolted to supporting members in accordance with reviewed shop drawings. Secure handrails to walls with wall brackets and end fittings.

3.6 SLIDING METAL GATE INSTALLATION

A. Gateposts shall be set in accordance with the spacing’s shown in the construction plans. The “Earthwork” and “Concrete” sections of this specification shall govern post base material requirements. 6” wheels shall be bolted to the gate (between the wheel plates welded near the ends of the gate bottom rail). The gate shall be set upright with the V-grooved wheels positioned over the pre-installed steel V-track that traverses the gate opening. Roller guides shall be affixed to the gateposts at a height even with the gate toprail to hold the gate in a vertical position. Gate stops shall be welded to the end of the gate or track so gate cannot pass rollers in either direction.

END OF SECTION

SECTION 061000
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concealed wood blocking and nailers.
   2. Concealed sheathing.
   3. Preservative treatment.
   4. Fire-retardant treatment.
   5. Anchors nails, bolts, and screws.

B. Related Sections:
   1. Section 064000 - Architectural Woodwork.
   2. Section 075410 – TPO Membrane Roofing.
   3. Section 079000 – Joint Protection.

1.2 DEFINITIONS

A. The following definitions apply to this section as they pertain to rough carpentry items.
   1. Rough Carpentry: Carpentry work not specified in other Sections and not used as exposed work.

1.3 DESCRIPTION

A. Concealed wood blocking, sheathing, anchors, fasteners, adhesives, and related items, including accessories furnished and installed as specified herein.

1.4 SUBMITTALS

A. Product Data: Submit for carpentry in accordance with Section 013300, Submittals.
   1. Submit for sheathing, air infiltration barrier, vapor retarders, tapes, sealants, and miscellaneous products specified.

B. Certification:
   1. Submit letter certifying that lumber is kiln-dried to 15 - 19 percent moisture content, well seasoned, grade marked, trade marked and free from warp.
   2. Submit letter from treatment plant certifying that chemicals and process used and net amount of salts retained are in conformance with specified standards
   3. Submit letter certifying that fire-retardant treatment materials comply with requirements herein stated and local authorities having jurisdiction and that treatment will not bleed through finished surfaces.

1.5 QUALITY ASSURANCE

A. Lumber Standard:
   1. Comply with U.S. Dept. of Commerce Product Standard PS 20, including moisture content and actual sizes related to indicated nominal sizes.
   2. Comply with Standard Grading Rules No. 16 for West Coast Lumber.
   3. Comply with American Softwood Lumber Standard and with application grading rules of inspection agencies certified by American Lumber Standard Committee's (ALSC) Board of Review.
   4. Comply with lumber producer's inspection agency grading rules certified as conforming to "National Grading Rules for Dimension Lumber" established under Section 10 of PS 20 and local code standard.

B. Plywood Standard: Comply with U. S. Product Standard PS 1-74/ANSI A199.1; and Grades and Specifications, Performance-Rated Panels and Specifications by APA – The Engineered Wood Association local code standard. Each construction and industrial panel shall bear APA trademark and appropriate identification.

C. Provide Forest Stewardship Council (FSC) Certified Wood Products: Subject to compliance with specified requirements, acceptable manufacturers and products are listed at: www.fscus.org/certified companies

1.6 DELIVERY, STORAGE AND HANDLING

A. Inspect wood materials for conformance to specified grades, species, and treatment at time of delivery to Project site.
   1. Reject and return unsatisfactory wood materials.

B. Provide facilities for handling and storage of materials to prevent damage to edges, ends and surfaces.

C. Keep carpentry materials dry.
   1. Store lumber and plywood in stacks with provision for air circulation within stacks.
   2. Protect bottom of stacks against contact with damp surfaces. Protect exposed materials against weather.
   3. Stack materials minimum 12 inches off ground, or if on concrete slab-on-grade, minimum 1-1/2 inches, fully protected from weather.
   4. Provide for air circulation within and around stacks and under temporary coverings.

D. Place spacers between each bundle of pressure treated materials treated with waterborne chemicals to provide air circulation.

1.7 PROJECT CONDITIONS

A. Environmental Impact: Products containing following materials will not be permitted:
   1. Urea Formaldehyde.
   2. Chromium in wood pressure treatment products.
   3. Arsenic.

1.8 COORDINATION

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit, show location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.
   1. Coordinate work directly with other subcontractors as necessary to insure proper fitting, joining or to clearances of other work. Obtain templates as required to insure proper fitting.

PART 2 PRODUCTS

2.1 LUMBER

A. (WD BLKG-1) Miscellaneous Lumber: Lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members.
   1. Moisture content of 19 percent maximum for lumber items not specified to have wood preservative treatment.
   2. Grade: No. 3 or standard grade.

2.2 WOOD SHEATHING

A. Provide materials that do not contain added urea formaldehyde.

B. (WD SHTG-1) Concealed Sheathing: APA, C-D touch-sanded plugged. Exposure 1, 3/4 inch, square edge, fire-resistive treated Douglas Fir.

C. (WD SHTG-3) Concealed Sheathing: APA EXT, Rated Structural 1, touch sanded, Exposure 1, 23/32 or 3/4 inch depending on availability, square edge, moisture treated, Douglas Fir.

D. (WD SHTG-9) Exposed Sheathing for Paint: APA, one or both sides exposed in finish work. Exposure 1, Veneer Grade B, APA A-B Group 1, exposure 2, 3/4 inch, square edge fire-resistive treated, Douglas Fir.

2.3 AIR INFILTRATION BARRIER

A. (AB-1) Air Barrier: Air retarder complying with ASTM E1667; made from polyolefins; either cross laminated films, woven strands, or spun bonded fibers; coated or uncoated; with or without perforations to transmit water vapor but not liquid water.
   1. Minimum Thickness: 3 mils, minimum water vapor transmission, 10 perms when tested in accordance with ASTM E96, Procedure A, Maximum flame spread, 25 per ASTM E84.
   2. Product:
      a. Tyvek Commercial Building Wrap with weatherization systems with contractor's tape by DuPont, or District approved equal for use in connection with wood sheathing.
         1) Staples: Corrosion-resistant type.

2.4 ASPHALT-SATURATED FELTS

A. (AF-1) No.15 Asphalt-Saturated Felt: ASTM D226 Type I (11.5 to 12.5 lbs.), non-perforated.

2.5 PRESERVATIVE TREATMENT

A. Ammoniacal, or amine, copper quat ACQ: AWPA C22-92.

B. (PPT-1) Extent of Treatment:
   1. Wood nailers and blocking in contact with cementitious materials.
   2. Plywood at parapets

C. Coat cut surfaces after treatment with brush coat of same preservative treatment. Allow preservative to dry prior to placing members.

2.6 FIRE-RETARDANT TREATMENT

A. (FRT-1) Fire Retardant Treatment: Pressure impregnation with fire-retardant chemicals.

B. Manufacturers:
   1. Dricon by Arch Wood Products,
   2. Pyro-Guard by Hoover Treated Wood Products,

C. Lumber and Plywood Treatment:
   1. Each piece to bear:
      a. UL FR-S rating (flame spread and smoke developed less than 25),
      b. Complying with extended 30-minute tunnel test, ASTM E84 or UL 723
      c. Meet interior Type A requirements in AWPA Standard C-20 for lumber and C-27 for plywood.
      d. And shall be registered for use as a wood preservative by the U.S. Environmental Protection Agency.
   2. Treatment to provide protection against:
      a. Termites,
      b. Fungal decay
   3. Treatment to be free of:
      a. Hologens
      b. Sulfates,
      c. Ammonium phosphate,
      d. Formaldehyde.

D. After treatment: Material shall be dried to an average moisture content of 15 percent or less for plywood and 19 percent or less for other lumber.

E. Complete fabrication prior to treatment to minimize cutting and jointing after treatment.

1. Coat surfaces cut after treatment with heavy brush coat of same fire-retardant chemical.

F. Do not use twisted, warped, bowed or otherwise damaged or defective pieces.

G. Extent of Treatment: Wood materials as part of fire-rated assemblies shall be fire retardant treated, and as indicated, with (FRT-1).

2.7 ROUGH HARDWARE, FASTENERS AND ANCHORAGE DEVICES

A. Extent: Provide rough hardware required, including nails, screws, bolts, lag screws, cinch anchors, toggle bolts, shot anchors and similar items.

B. General: Provide proper size and type for use intended and for materials to be fastened.
   1. Install adequate hardware to insure substantial and positive anchorage.
   2. Use galvanized for exterior locations and high humidity locations and treated wood, plain finish for other interior locations.
   3. Fasteners, hangers and bearing plates used on or in connection with treated wood shall comply with IBC 2304.9.

C. Nails: Conform to materials standards established under FS FF-N-105.
   1. At exterior work, use galvanized steel nails.
   2. Refer to IBC Nailing Schedule for quality and size.

2.8 TAPES, SEALANTS AND MISCELLANEOUS

A. Adhesive: As recommended by manufacturer of product to be applied for surface material to give permanent adhesion, with material remaining flat to back surface. Comply with local code standards.
   1. Comply with APA AFG-01 for adhesive for use with type of construction panel indicated.
   2. Exterior: Phenolic resin waterproof glue.
   3. Interior: Water-resistant casein and other adhesives suited for particular use.

B. Expansion Material: Dow Chemical Ethafoam. Use where expansion joint material is indicated and not installed under other sections.

C. Concealed Sealants: Polyisobutylene sealant
   1. Tremco's Curtainwall Sealer.

D. Soft Gasket or Urethane Insulation:
   1. Product: Ester 72PP from American Convertors; flexible semi- closed cell urethane.
      a. Distributor: Brock-White Company, Minneapolis, Minnesota.
   2. Provide 1/2 inch thicker than joint where foam tape, foam gasket and urethane insulation is indicated and not provided under other sections.
   3. Location: At gaps between framing and other materials.

E. Expanded Closed-Cell Filler (ECCF-1):
   1. Product: Everlastic NN-1, 1040 Series from Williams Products, Inc.; flexible closed-cell sponge rubber, with blend of neoprene, EPDM, and SBR.
      a. Compression/Defection at 25 percent deflection: 2 to 5 pounds per square inch.
      b. Elongation: 150 percent.
      c. Ultimate tensile strength: 75 pounds per square inch.
      d. Distributor: Brock-White Company, Minneapolis, Minnesota.
   2. Field cut to thickness, width, and length where foam tape, foam gasket and urethane insulation is indicated and not provided under other sections.
   3. Location:
      a. Expansion joint filler in masonry and concrete.
      b. Filler support sealant in traffic bearing joints.
      c. Gaps between open web joists or beams and gypsum board surfaces.

F. Sill Sealer Gaskets:
   1. Glass-fiber resilient insulation, fabricated in strip form for use as a sill sealer.
   2. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 EXECUTION

3.1 FURRING, STRIPPING, GROUNDS AND BACKING

A. Install plumb, level, true and square. Anchor substantially for permanent installation. Set and shim to straight edge so finish wall is true and straight.

B. Provide grounds and backing as shown or required. Blocking as required or shown on drawings for plumbing fixtures, brackets, drapery rods, window and door frames, built-in furniture and other woodwork, both interior and exterior.

C. Allow for finishes and shim out to form level surfaces. Verify ground sizes and locations before installation.

3.2 INSTALLATION OF SHEATHING

A. Install plywood in accordance with Plywood Construction Guide by APA – The Engineered Wood Association.

B. Place roof and wall sheathing with end joints staggered. Secure sheets over firm bearing.

1. Maintain minimum 1/16 inch and maximum 1/8 inch spacing between joints on walls. Place perpendicular to framing members.

C. Comply with roofing manufacturer's requirements for sheathing attachments.

3.3 AIR INFILTRATION BARRIER

A. Cover sheathing with air infiltration barrier.

1. Apply air infiltration barrier to comply with manufacturer’s written instructions. Apply to cover upstanding flashing with 4-inch overlap.
2. Apply asphalt-saturated organic felt horizontally with 2-inch overlap and 6 inch end lap; fasten to sheathing with galvanized staples or roofing nails.

3.4 FACTORY WOOD TREATMENT

A. Shop pressure treat and deliver to site ready for installation, wood materials requiring UL fire rating or pressure impregnated preservatives.

B. Provide UL approved identification on fire resistant treated materials.

1. Deliver fire retardant treated materials cut to required sizes so as to eliminate necessity of field cutting.

C. Ensure exposed materials requiring stain or paint finish do not exceed 15 percent moisture content before applying wood preservative treatment.

3.5 SITE TREATMENT OF WOOD MATERIALS

A. Apply preservative treatment in accordance with manufacturer's printed instructions.

B. Brush apply 2 coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

D. Ensure exposed materials requiring stain or paint finish do not exceed 15 percent moisture content before applying wood preservative treatment.

END OF SECTION

SECTION 064000
ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SUMMARY

Section Includes: Custom-fabricated architectural woodwork, wood, laminate, solid surface, custom fabricated items, countertops, hardware and accessories, requirements for fabrication and Installation.

A. Related Sections:
   1. Section 013300 – Submittal Procedures.
   2. Section 081400 - Wood Doors: Provide wood veneers for wood doors.
   3. Section 099000 - Painting: Field-finishing of woodwork.
   4. Division 22 - Plumbing and Division 26 - Electrical sections for coordination with cabinetwork.

1.2 COORDINATION

A. Coordinate work directly with Work of other Sections as necessary to ensure proper fitting, joining or required clearances of other work.
   1. Exchange and coordinate shop drawings and templates.
   2. Coordinate fabrication schedule.
   3. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

1.3 ACTION SUBMITTALS

A. Submit in accordance with Section 013300 - Submittal Procedures.

B. Product Data: For each material, system, fabricated item, accessory and finishes.

C. Shop Drawings: Indicate dimensions, descriptions of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, including specific requirements where indicated.
   1. Indicate materials, wood species, component profiles, fastening, jointing, details, finishes and accessories.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   3. Indicate special requirements for field assembly and installation, including field connection locations, required clearances and tolerances.
   4. Indicate provisions for attachment of architectural woodwork and other components performed by others in the field.
   5. Indicate locations of plumbing and electrical service field conditions.

D. Samples: Material and finishes.
   1. (PLAM) Plastic Laminates. 12 by 12 inch with one edge treatment or profile as specified.
   2. (SSF) Solid Surfacing: Solid Surface Fabrication Samples: Submit samples demonstrating chemical welding of two pieces at abutted condition and a separate sample for corner condition. 12 by 12 inch with one edge treatment or profile as specified.
   3. Accessories and Hardware: Submit samples of hardware, accessories, and components of wood fabrications and casework.
   4. Cabinetwork Unit Samples: Units may be used as part of work if approved.
      a. Base cabinet with door, drawer, countertop and hardware.
      b. Wall-hung upper cabinet with door and shelf.

E. Site Conditions Reports: Relative humidity and temperature readings taken before, during and after installation. Include readings taken in areas where woodwork is stored on site prior to installation.

1.4 INFORMATION SUBMITTALS

A. Qualification Data: For Fabricator and Installer.

B. Product Certificates: For each type of product.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 LEED SUBMITTALS

A. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.
   1. For each composite-wood product used, documentation indicating that the bonding agent contains no urea formaldehyde.
   2. For each adhesive used, documentation indicating that the adhesive contains no urea formaldehyde.

B. Product Data for Credit IEQ 4.4: For composite wood products and fabrication adhesives, documentation indicating that products contain no urea formaldehyde.

C. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
   1. Include statement indicating cost for each product having recycled content.

D. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
   1. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
   2. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

E. Certificates for Credit MR 6 or MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
   1. Include statement indicating costs for each certified wood product.
   2. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.6 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications:
   1. Fabricator Qualifications: A well-established and experienced fabricator, acceptable to Owner and Architect, employing skilled workers to custom-fabricate millwork, casework and other architectural woodwork similar to that required for this Project, whose Work meets or exceeds quality requirements of specified AWS Grade, and whose completed Work has a record of successful in-service performance.
   2. Installer Qualifications: A well-established installer with experience installing millwork, casework, finish carpentry work, and other custom-fabricated woodwork similar to that required for this Project, whose Work meets or exceeds quality requirements of specified AWS Grade, and whose completed Work has a record of successful in-service performance.
   3. Architect reserves the right to reject woodwork fabricator if it is Architect's opinion that previous performance by fabricator has been unsatisfactory, or if any of the following will not result in required quality within time required for completion:
      a. Shop capacity.
      b. Experience of workers.
      c. Equipment or supply of material.
      d. Previous performance by manufacturer has been unsatisfactory.

B. Welding Qualifications: Qualify procedures and personnel in accordance with American Welding Society's AWS D1 "Structural Welding Code."

C. Mockups: Construct mockups, using same materials to be used for permanent construction, to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution of final Work. Provide the following mockups as described below and as directed by Architect.

1. General:
   a. Submit mockup shop drawings to Architect.
   b. Mockup will serve as Architects review of aesthetic effects and workmanship.
   c. Final selection of materials, system components, configuration, design and other performance and appearance criteria are subject to modification based on review of submittals and mockups.
   d. Obtain Architect's approval of mockups before starting permanent work, fabrication, or permanent construction. Allow 10 days for initial review and each re-review of mockups.
   e. Maintain and protect undisturbed approved mockups throughout construction to serve as a standard for judging completed Work.
   f. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 SITE CONDITIONS

A. Delivery, Handling and Storage: Protect woodwork items from damage, dust and dirt. Do not deliver, receive, store or install woodwork materials until storage and installation areas are conditioned in accordance with requirements and recommendations of AWS.

B. Environmental Requirements: Use permanent HVAC system or provide temporary systems and controls to establish and maintain site conditions complying with specified requirements.

1. Do not deliver, receive, store or install architectural woodwork until building is enclosed, wet work is complete, and temporary or permanent HVAC systems are operating in areas where woodwork is stored and installed and are maintaining temperature and relative humidity at occupancy levels and within the following ranges during the remainder of the construction phase:
   a. Temperature Range: Between 60 and 90 deg F.
   b. Relative Humidity Range: Between 25 and 55 percent.
2. Fluctuation of Temperature and Relative Humidity Levels:
   a. Do not exceed 15 percent fluctuation over any portion of a 7-day period and not to exceed 25 percent fluctuation over any portion of a 28-day period.
   b. Maintain operation and control of heating, cooling, humidity, ventilation, temporary barriers and similar facilities continuously on a 24-hour basis to avoid rapidly fluctuating ambient levels.
3. Site Conditions Report: Monitor temperature and relative humidity in areas where woodwork is stored and installed at Project site. Record temperature and relative humidity prior to delivery, throughout storage period and installation, and after installation until time of Substantial Completion. Report recorded values in accordance with Submittals requirements.

C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standards: Provide custom-fabricated architectural woodwork, casework and fabricated items in accordance Architectural Woodwork Standards, Adopted and Published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturer's Association of Canada and Woodwork Institute - Current Edition (AWS) except where more stringent requirements are shown or specified.

2.2 WOOD MATERIALS

A. Provide FSC-Certified wood materials for architectural woodwork, produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
   1. Provide FSC Certified materials for wood materials (WD), core materials, plywood, cabinet work and other concealed wood materials.
   2. Submit chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

B. Provide specified wood materials and other materials recommended by woodwork fabricator, and in compliance with specified AWS Grade.
   1. Wood Moisture Content: 5 to 10 percent.
   2. Provide wood products made with binder containing no urea formaldehyde,
   3. Dimensions: As shown.
   4. Sheathing Thickness: provide specified thickness or AWS thickness required by AWS standards whichever is greater.
   5. Fire-Retardant-Treated Materials: Where fire-retardant-treated materials are indicated, use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

C. Wood Materials:
   1. MDF Board: Medium-Density Fiberboard, ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
      a. Class B or Class A Flame Spread Rating: Vesta FR by Sierra Pine, or District approved equal.
   2. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
   3. Hardboard: AHA A135.4.
   4. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
   5. Softwood Plywood: DOC PS 1, exterior.
   6. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
   7. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

2.3 WOODWORK FOR TRANSPARENT FINISH

A. Source Limitations for Wood Materials with Transparent Finish: The intent of this requirement is to ensure matching of wood species and finishes by providing solid wood and wood veneers of like species from a single source with resources to provide materials of consistent quality in appearance and physical properties, and by shop-finishing woodwork in single shop using one process for each finish type.
   1. Engage a qualified woodworking firm to assume undivided responsibility for production of wood-veneer-faced cabinets.
   2. Engage a qualified woodworking firm to assume undivided responsibility for finishing all WD-1 woodwork.
   3. Supply wood veneer facing materials for wood doors.

B. Minimum Quality Standard: Comply with *Architectural Woodwork Standards* (AWS) Premium Grade for architectural woodwork with transparent finish.

C. (WD-1) Hardwood Type for Transparent Finish:
   1. Species: Hickory.
   2. Cut:
      a. Veneer: quarter-sliced.
      b. Solid: quarter-sawn.

D. Transparent Finish: Shop-applied, AWS Premium Grade, System 5 Conversion Varnish.
   1. Pre-finish woodwork at shop, defer only final touchup, cleaning, and polishing until after installation.
   2. Finish all surfaces, faces and edges of architectural woodwork.
      a. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork.
   3. Sheen: Matching Architect's sample.

2.4 PLASTIC-LAMINATE-FACED CABINETS

A. Minimum Quality Standard: Unless otherwise indicated, comply with the *Architectural Woodwork Standards* (AWS) for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
   1. Cabinets: Custom Grade.
   2. Countertops: Premium Grade.
   3. Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Plastic-Laminate-Faced Cabinets:
   1. (PLAM) Basis of Design: Refer to Material Identification List.
   2. Type of Construction: Frameless.
   3. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
   4. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
   5. Exposed Horizontal and Vertical Surfaces: Grade HGS.
   6. Exposed Edges: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
   7. Semi-Exposed Surfaces (Other than Drawer Bodies): Thermoset Decorative Panels consisting of particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
      a. Medium-Density Fiberboard: ANSI A208.2, Grade 130 made with binder containing no urea formaldehyde.
      b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
   8. Semi-Exposed Backs of Panels: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
   9. Concealed Backs of Panels: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
   10. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
      a. Join subfronts, backs, and sides with glued dovetail joints.
      b. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
      c. Drawer Bottoms: Thermoset decorative panels.

2.5 SOLID SURFACE FABRICATIONS

A. Products and Manufacturers:
   1. Corian by E.I. DuPont de Nemours & Company
   2. Avonite by Avonite, Inc.
   3. Formica Solid Surfacing by Formica
   4. Renaissance, Gibraltar and Earthstone by Wilsonart

5. LG Hi-Macs by LG Solid Source, L.L.C.

B. Solid Surface Fabrications: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
   1. (SSF) Basis of Design: Refer to Material Identification Codes
   2. Performance Requirements:
      a. Flame Spread less than 25. Flammability Class I fire rating.
      b. Rockwell hardness ('M' scale) minimum of 55 per ASTM D785.
      c. Impact strength (IZOD) minimum of 22 ft -lbs/in per ASTM D256.

C. (SSF) Solid Surface Countertops: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
   1. (SSF) Basis of Design: Refer to Material Identification Codes.
   2. Integral Sinks: Install integral sink bowls in countertops in the shop.
      a. Basis of Design: Corian Model No. 810 by DuPont.
   3. Configuration and Fabrication:
      a. Fabricate tops in one piece with shop-applied eased edges unless otherwise indicated.
      b. Configurations: As shown.
      c. Backsplash: Standard single length solid surface pieces; longest length possible to minimize joints. Where indicated provide countertop with coved backsplash.
      d. Inside Corners: Fabricate countertops with square inside corners.
      e. Sinks: Install integral sink bowls in countertops in the shop.

D. Adhesives and Sealants: Comply with manufacturer's written instructions for adhesives, sealers, fabrication, and sealing. Do not use adhesives that contain urea formaldehyde.
   1. Sealant: Silicone sealant as recommended by panel manufacturer for application to substrate.
   2. VOC Limits for Installation Adhesives and Glues, and for Primers and Sealers: Use installation adhesives with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 COUNTERTOPS

A. Minimum Quality Standard: Comply with the *Architectural Woodwork Standards* (AWS) Premium Grade for architectural countertops on base cabinets, wall-mounted countertops and shelves.

B. PLAM Countertops:
   1. (PLAM) Basis of Design: Basis of Design: Refer to Material Identification Codes.
   2. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS ; post forming grade (0.039" thick) High Pressure laminate counter top.
   3. Edge Treatment: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
   4. Backsplash: As shown on Drawings.
   5. Core Board for Countertops: 1-inch thick, medium-density fiberboard made from 100% recycled fiber meeting ANSI 208.2 standards, ASTM D1037 2, Grade2-M-2 and HUD 24 emission standards (formaldehyde free).
      a. Medex MD Exterior by Medex Corporation
      b. AllGreen PR MDF by CanFibre Group Ltd
   6. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

C. Solid Surface Countertops: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
   1. (SSF) Basis of Design: Refer to Material Identification Codes.
   2. Integral Sinks: Install integral sink bowls in countertops in the shop.
      a. Basis of Design: Corian Model No. 810 by DuPont.
   3. Configuration and Fabrication:
      a. Fabricate tops in one piece with shop-applied eased edges unless otherwise indicated.
      b. Configurations: As shown.
      c. Backsplash: Standard single length solid surface pieces; longest length possible to minimize joints. Where indicated provide countertop with coved backsplash.
      d. Inside Corners: Fabricate countertops with square inside corners.

e. Sinks: Install integral sink bowls in countertops in the shop.

4. Adhesives and Sealants: Comply with manufacturer's written instructions for adhesives, sealers, fabrication, and sealing. Do not use adhesives that contain urea formaldehyde.
   a. Sealant: Silicone sealant as recommended by panel manufacturer for application to substrate.
   b. VOC Limits for Installation Adhesives and Glues, and for Primers and Sealers: Use installation adhesives with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 WALL-MOUNTED SHELVES

A. Brackets for Wall-Mounted Countertops and Shelves:
   1. Provide mounting brackets as shown on Drawings, in size and weight capacity required for use.
      a. Provide custom fabricated steel supports in compliance with Section 055000 - Metal Fabrications.
      b. Coordinate with Sections 054000, 055000, 061000, 092216 and other applicable Sections for concealed backing, support and anchoring of woodwork as shown on Drawings.
   2. Steel Supports for Lavatory and Workstations: Provide in sizes and shapes as shown on Drawings, shop-primed for field finish.
      a. Steel Tubing: ASTM A501 or ASTM A500.
      b. Steel Bar: ASTM A36.

B. (BKT-1) Countertop Brackets: 5mm thick steel bar with 3/4 inch steel strut, holds 1000 lb. per pair, finish in epoxy coated finish in color as indicated or selected.
   1. Basis of Design: KV 208 550 Ultimate L-Bracket Series.

C. (BKT-2) Work Station Brackets: 1/8 inch steel; 1-1/2 inch forms with multiple 1/4 inch mounting holes per side; reversible; color as chosen by Architect from manufacturer's standard colors.
   1. Sizes: As required by application.
   2. Capacity: 1,000 pounds minimum.

2.8 CABINET HARDWARE AND ACCESSORIES

A. Hinges: BHMA A 156.9. Provide 3 per leaf over 48 inches high, 2 per leaf elsewhere. .
   1. (HDWR-H1) Fixed pin, five knuckle, dull chrome, 2-3/4-inch, fastened with 4 screws each let into faces, no edge fastening allowed.
      a. Stanley HT1592, Removable button tip five knuckle hinge for overlay doors.
      b. Grass 950.
      c. Or District approved equal.
   2. (HDWR-H2): Grass Nexis, concealed, all-metal hinges, 110 degree opening (unless otherwise noted) self-closing, 3-way adjustable.
      a. Quiet Soft-Cushion Closers: Nexis G-Force Soft Closer.
      b. Or District approved equal.

B. Door and Drawer Pulls: BHMA A156.9, B02011, back-mounted type pulls.
   1. (HDWR-P1): Häfele 112.83.00, Stainless Steel Colored.

C. Catches: [Magnetic catches, BHMA A156.9, B03141] [Push-in magnetic catches, BHMA A156.9, B03131].
   1. Magnetic Pressure Catches: Häfele 245.80.320, prefinished steel, black.
   2. Metal Strike: Häfele 245.63.988,
   3. Or District approved equals.

D. Drawer Slides: BHMA A156.9, cold rolled steel, zinc plated with positive stop and full extension. Rolling steel balls, nylon rollers meeting or exceeding the following requirements, unless otherwise indicated:
   1. (HDWR-S1): Minimum 75 lb. load rating, for use at drawers 16-inches wide or less.
   2. (HDWR-S2): Minimum 100 lb. load rating, for use at drawers 24-inches wide or less.
   3. (HDWR-S3): Minimum 150 lb. load rating, for use at drawers greater than 24-inches wide, at deep drawers, and drawers with file folder racks.

4. Full Extension Drawer Slides: Side-mount, ball bearing type; epoxy coated; not less than 100 lb load rated; color to match cabinet interior.
    a. Accuride EW3832.
    b. Blum 430EW.
    c. Hettich W5632.
    d. Blum#430 with positive in-stop. Nylon ball bearing rollers.
    e. Or District approved equal.
5. Over-Travel Extension File Drawer Slides: Side-mount, ball bearing type; epoxy coated; not less than 150 lb load rated; color to match cabinet interior.
    a. Accuride 4034.
    b. K&V 8505.
    c. Hettich 558.
    d. Or District approved equal.

E. Door and Drawer Silencers: BHMA A156.16, L03011.

F. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

G. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
1. (HDWR-SS1) Shelf Supports: Knape & Vogt 346 NP.
2. Or District approved equal.

H. Door and Drawer Locks: BHMA A156.11; E07121 door locks and E07041 drawer locks.
1. Cylinder Lock: Disc tumbler, master-keyed, dull chrome finish by CCL Security Products #0737 and #0738.
    a. Review final keying sequences with Owner.
    b. Provide at hinged doors and drawers, where indicated.
    c. Other Acceptable Manufacturers: Timberline, National, Häfele, CompX National, or District approved equal..
2. Cabinet Keypad Device: BHMA A156.9, B03141.
    a. C9602 Spring Latch Cabinet Lock by Simplex Access Controls, 2941 Indiana Ave., Winston Salem, N.C. 27105, Tel: (919) 725-1331, or District approved equal..
3. Electronic Locks: Keypad-operated, battery-powered, programmable electronic lock with motorized deadbolt.
    a. Product and Manufacturer: DK-ATV by Digilok, or District approved equal.
    b. Configuration:
        1) Mounting: Fully-recessed.
        2) Finish: brushed nickel.
        3) Pull: No integral pull. Refer to cabinet hardware.

I. Cable Passage Grommets: Provide cord grommets in diameter shown, and in color as selected by Architect.
1. (GROM-1) Plastic Grommet Liner and Cap: SG Series or EDP Series by Doug Mockett, or District approved equal..
2. (GROM-2) Aluminum Grommet, No Cap: MG Series by Doug Mockett, or District approved equal..

J. Miscellaneous Cabinetwork Accessories:
1. Under-Counter Trash: Rev-A-Shelf, double 50 Qt containers.
2. Fully Recessed Monitor Mounts: 4 inch keyboard drawer, large flat panel 18 inch by 18 inch tinted tempered viewport, height adjust with 30 degree tilt. Provide fully recessed kits for standard monitors as provided by Nova, Closet Masters.
3. Pencil Drawer: Molded, chemical resistant, high-density polyethylene with in-stop and out-stop features. Compartment type drawer body and slides in White or Stone Grey color.
4. Charting Dividers: 1/4 inch Acrylite GP by Cyro, color as selected by Architect.
5. Cabinet Shelf TV Bracket: Cabinet mounted steel slide-out and pivot Model #421.96.118 shelf bracket by Häfele in color, Brown.
6. Column Legs: Steel legs with mounting plate 3-1/2 inch diameter by 27-3/4 inch high
    a. Model #J010-3 by Johnson Industries.
7. Table Leg: Stainless-steel bar-height legs, 43 inches high, with adjustable foot.
    a. Hamburg Legs series by Camar.

8. Pull-Out Keyboard Tray: fully adjustable and storable work surface support panel, color as selected to match work surface.
    a. Haworth #AKPT-3-TR-J.
    b. Haworth #AKP-19.
9. Cabinet Drawer File Insert:
    a. HON 2-Step Hangrail System (to convert file cabinets to hanging files), 4 frames per pack, by Mercury Office Supply, Saint Paul, MN (or local office supply).
    b. Pandaflex 1700 Series File Rail by Grass America.

2.9 AUXILIARY MATERIALS AND COMPONENTS

A. Installation Accessories: Provide assembly hardware as shown on Drawings, or as recommended by Fabricator and approved by Architect.
    1. Mechanical Fasteners and Anchors: Use material, type, size and finish required for each substrate for secure anchorage and as recommended by architectural woodwork fabricator and installer.
        a. Provide concealed anchors unless otherwise indicated.
        b. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
        c. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.
    2. Adhesives: Do not use adhesives that contain urea formaldehyde. VOC Limits for Installation Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
        a. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, or rubber 1/16 inch or less in thickness to any surface): 250 g/L.
        b. Wood Glues: 30 g/L..
        c. Multipurpose Construction Adhesives: 70 g/L.
        d. Contact Adhesive: 80 g/L.

B. (GL-1T) Tempered Float Glass for Cabinets: 1/4-inch thick, ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3; with exposed edges seamed before tempering.

C. (FABRIC) Acoustically-Transparent Scrim: Fire-resistant, open weave cotton scrim with protective Scotchgard type coating, seamed edges, mounted taught.
    1. Products and Manufacturers: Refer to Material Identification Codes.

D. Upholstery Padding: High-resilient, high-density, fire-resistant foam as recommended by woodwork Fabricator.

2.10 FABRICATION

A. General: Fabricate Work of this Section using materials, methods and quality control procedures recommended by AWS, and in accordance with reviewed Shop Drawings.
    1. Complete fabrication in shop, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site.
    2. Join and assemble work to provide durable, strong, rigid units that will not warp or rack, including during shipping and installation.
    3. Disassemble components only as necessary for shipment and installation. Allow for easy handling and passage through building openings.
    4. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
    5. Woodwork in Spaces without Humidification Control: Fabricate Work as necessary to protect installed Work from moisture and damage due to movement and dimensional changes associated with fluctuating temperature and relative humidity levels during construction and after Substantial Completion.

B. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

C. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

D. Metal Framing and Supports:
   1. Welded Connections: Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
   2. Non-Welded Connections: Fabricate for interconnection of members by means of mechanical fasteners and fittings unless otherwise indicated.

E. Shop Finishing: Pre-finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
   1. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
   2. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces. Concealed surfaces of plastic-laminate-clad paneling do not require backpriming when surfaced with plastic laminate.
   3. Primer Application on Steel Framing: Apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examination and Acceptance of Conditions: Before proceeding with installation, take field measurements, examine substrates and verify temperature and relative humidity and other conditions.
   1. Verify that mechanical and electrical items affecting this section are properly placed, complete, and have been inspected by Architect prior to commencement of installation.
   2. Proceed with installation only after unsatisfactory conditions have been corrected and after building temperature and relative humidity are within specified range. Proceeding with the Work indicates acceptance of surfaces and site conditions.

B. Material Moisture Content and Environmental Requirements: Install products at the time and under conditions that will ensure the best possible results and maintain conditions until Substantial Completion.
   1. Comply with recommendations of Architectural Woodwork Standards.
   2. Conditioning: Before installation, condition wood materials and cabinets in accordance with specified site condition requirements.
      a. Do not install unconditioned woodwork.
      b. Reject materials that are wet, moisture damaged or mold damaged.

C. Substrate: Before proceeding with installation, examine substrate to receive work for compliance with requirements for installation tolerances and other conditions affecting performance. Installer must approve substrate prior to installation.

D. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product.
   1. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.
   2. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   3. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.2 INSTALLATION

A. General: Install architectural woodwork in accordance with Architectural Woodwork Standards (AWS) and in accordance with reviewed shop drawings and manufacturer instructions.
   1. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
   2. Install free from hammer or tool marks, open joints or slivers or other defects detrimental to appearance or performance.
   3. Set plumb, level, square and true to dimensions shown and required. Allow for finishes and proper clearances where necessary. Use concealed shims where required for alignment.
   4. Tolerances: Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining work with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
   5. Scribe and cut to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
   6. Coordinate with materials and systems in or adjacent to woodwork and provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.
   7. Shop-Fabricated Work: Before installing, examine shop-fabricated work for completion. Assemble shop fabricated work and complete fabrication at Project site to the extent that it was not completed in the shop. Backprime unfinished surfaces that are concealed when installed.
   8. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

B. Anchorage: Adequately anchor, fasten and support members to form secure, substantial and accurate work and to hold required dimensions and prevent twist.
   1. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
   2. Provide blocking, attachment plates, anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work.
   3. Provide anchorage type required to allow movement of wood due to changes in relative humidity without permanent damage to the wood and other components.

C. Joints: Fit exposed connections together to form hairline joints. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect as determined by Architect.
   1. Provide joints to accommodate expansion of woodwork due to changes in relative humidity.

D. Wood Fabrications: Install woodwork assemblies in accordance with approved shop drawings.

E. Solid Surfacing: Install solid surfacing in accordance with reviewed shop drawings and manufacturer's instructions.

F. Cabinetwork Installation: Install cabinets to comply with same AWS Grade as item was fabricated.
   1. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
   2. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork. For shop finished items use filler matching finish of items being installed.
   3. Countertops: Anchor securely to base units and other support systems as indicated.

G. Wall-Mounted Shelving and Work-Surfaces: Install standards, brackets and other supports according to manufacturer's written instructions. Fasten to framing members, wood sheathing, wood blocking or metal backing, or use toggle bolts or hollow wall anchors.

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
   1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

2. Refer to Section 099000 - Painting for final finishing of installed architectural woodwork not indicated to be shop finished, and for related brackets and other Work exposed to view.

3.3 INSTALLED WORK

A. Damaged or Non-Compliant Woodwork: Remove and replace materials that are damaged or do not comply with requirements.
   1. Damaged woodwork may be repaired or refinished if resulting repair work complies with requirements and shows no evidence of repair or refinishing.
   2. Remove and replace woodwork materials that are wet, moisture damaged, or mold damaged.
   3. Replace, at no additional cost to Owner, materials that are damaged or that cannot be cleaned to satisfaction of Owner.

B. Adjusting: Adjust movable components of assembly to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range, and without binding or damaging assembly components. Lubricate hardware and moving parts. Adjust joinery for uniform appearance.

C. Cleaning: Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.
   1. Clean interior finish carpentry on exposed and semi-exposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.
   2. Clean cabinetwork, counters, shelves, hardware, fittings and fixtures.

D. Protection: Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
   1. Comply with specified requirements for temperature and relative humidity.
   2. Protect installed products from damage from weather, moisture, dust, dirt and other causes during construction.

E. Demonstration and Training: Instruct Owner's personnel to operate, adjust and maintain operable components of woodwork assemblies.

END OF SECTION

SECTION 066400
FIBERGLASS REINFORCED PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Fiberglass-reinforced plastic panels and accessories (FRP-1).

1.2 SUBMITTALS

A. LEED Submittals:
   1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content and chemical components.

B. Product Data: For each type of fiberglass-reinforced panel indicated,
   1. Include installation instructions, construction details, weights, individual components, profiles and finishes.
   2. Maintenance Manual.

C. Samples: Submit in accordance with Section 013300.
   1. Two 8 inch by 10 inch samples of each type of panel, 10 inch length of each type of trim and molding, fastener.

D. Shop Drawings: Indicate and dimension locations of joints, fastener attachments.
   1. Show fabrication and installation details not shown on product data.
   2. Show profiles, thicknesses, joints, tolerances and anchorage details.
   3. Show connections to wall mounted items: cutouts for grilles.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed fiber glass-reinforced panel installations similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated as documented according to ASTM E548.

C. Fire-Test Response Characteristics: Provide fiber glass-reinforced panels with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another independent testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Flame Spread: 25 or less.
   2. Smoke Developed: 450 or less.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:
   1. Package sheets on skids or pallets for shipment to project site.
   2. Deliver adhesive in sealed containers with labels legible and intact.

B. Storage of Materials:
   1. Store sheets in dry place at project site for at least 48 hours prior to installation.

C. Handling:
   1. When moving more than single sheet, place sheets face-to-face and back-to-back.
   2. Protect surface during cutting and working by application of temporary, strippable coating or by other means recommended by panel manufacturer.
   3. Remove foreign matter from face of panel by use of soft bristle brush, avoiding abrasive action.

1.5 PROJECT CONDITIONS

A. During installation and for not less than 48 hours before, maintain ambient temperature and relative humidity within limits required by type of adhesive used.

B. Allow no containers of adhesive to be opened until potential sources of flame or spark have been shut down or extinguished and until warnings against their ignition during adhesive application have been posted.

C. Provide ventilation to disperse fumes during application of solvent-based adhesive.

D. Field Measurements: Where fiber glass-reinforced panels are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

A. Coordinate layout and installation of fiber glass-reinforced panels and attachment system components with other construction, including partition assemblies.

PART 2 PRODUCTS

2.1 FIBERGLASS-REINFORCED PLASTIC PANELS

A. (FRP-1) Fiberglass-Reinforced Panels: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

1. Fire-Rating per ASTM E 84: Class A.
2. Nominal Thickness: 0.09 inch.
3. Panel Finish: [Smooth] [Embossed (Pebble Texture)]
4. Color: White [As selected by Architect from manufacturer's full range].
5. Products and Manufacturers:
   a. Glasbord with Surfaseal by Crane Composites.
   b. Structoglas by Crane Composites.
   c. Marlite FRP by Marlite.
   d. Fiber-Lite by Nudo Products, Inc..

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard two-piece, snap-on vinyl extrusions designed to cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

B. Adhesive: As recommended by panel manufacturer for application to substrate.

1. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Sealant: Single-component, mildew-resistant silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079000 - Joint Protection.

1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Exposed Fasteners: Non-corrosive nylon drive rivets as recommended by panel manufacturer.

E. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Examine back-up surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with adjoining surface.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Preparation for Adhesive Application:
   1. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
   2. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
   3. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels and so that trimmed panels at corners are not less than 12 inches wide, or as shown on Drawings.
   1. Mark plumb lines on substrate at trim accessory and panel joint locations for accurate installation.
   2. Locate trim accessories and panel joints to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

A. Install fiberglass-reinforced paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.
   1. Drill oversized fastener holes in panels and center fasteners in holes.
   2. Apply sealant to fastener holes before installing fasteners.

D. Install trim accessories with adhesive and nails.

E. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

F. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

G. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

H. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

3.4 CLEANING

A. Remove adhesive or excessive sealant from face using solvent or cleaner recommended by panel manufacturer.

END OF SECTION

SECTION 071326
SELF-ADHERING SHEET WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Self -adhering modified bituminous sheet waterproofing system (WP-6), including protection course and drainage sheets, for horizontal applications and vertical below-grade applications.

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete.
   2. Section 072100 - Thermal Insulation: Foundation wall insulation.
   3. Section 072670 - Moisture Barrier.
   4. Section 079000 - Joint Protection.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's instructions for surface conditioner compatibility, elastic flashing, joint cover sheet, and joint and crack sealants, with temperature range for application of waterproofing membrane.

B. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

D. Samples: Provide sample of waterproof membrane materials.
   1. 12-by-12-inch square of waterproofing and flashing sheet.

E. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

F. LEED Submittals:
   1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.

B. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

C. Remove and replace materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

C. Weather: Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.6 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.

1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch in width.
2. Warranty Period: Five years.

B. Special Installer's Warranty: Written waterproofing Installer's warranty, signed by Installer, covering Work of this Section, for warranty period of two years.

PART 2 PRODUCTS

2.1 WATERPROOFING SYSTEM

A. Provide complete waterproofing system in accordance with waterproofing Manufacturer’s written recommendations and requirements for warranty.

B. Source Limitations: Provide waterproofing system components from single source from single manufacturer. Provide accessory products including drainage panel and protection course from sources as recommended in writing by waterproofing manufacturer.

C. Material Compatibility: Waterproofing materials shall be compatible with one another and with adjacent work under conditions of service and application required, and as demonstrated by waterproofing manufacturer based on testing and field experience.

D. Performance Requirements: Installed waterproofing system shall withstand thermally induced movement and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Waterproofing system shall remain watertight.

2.2 MODIFIED BITUMINOUS SHEET MEMBRANE WATERPROOFING

A. (WP-6) Modified Bituminous Sheet Membrane: 60-mil (1.5 mm) thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil-thic polyethylene-film reinforcement, with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Products and Manufacturers:
   a. Bituthane 4000 by Grace Construction Products with Bituthene Deck Prep.
   b. CCW Miradri 860/861 by Carlisle Coatings and Waterproofing.
   c. Blueskin WP 200 by Henry Company.
   d. 650 Membrane by Polyguard Products, Inc..
   e. Sealtight MEL-ROL by W. R. Meadows.
   f. Or District approved equal.
2. Physical Properties:

a. Membrane Tensile Strength; ASTM D 412, Die C, modified: 250 psi minimum.
b. Ultimate Elongation; ASTM D 412, Die C, modified: 300 percent minimum.
c. Low-Temperature Flexibility; ASTM D 1970, at minus 20 deg F: Pass.
d. Crack Cycling; ASTM C 836, after 100 cycles of 1/8-inch movement: Unaffected.
e. Puncture Resistance; ASTM E 154: 40 lbf minimum.
f. Water Absorption; ASTM D 570, after 48-hour immersion at 70 deg F: 0.2 percent weight-gain maximum.
g. Water Vapor Permeance; ASTM E 96, Water Method: 0.05 perms maximum.
h. Hydrostatic-Head Resistance; ASTM D 5385: 200 feet, minimum.

B. Concealed Strip Flashing: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
   1. Furnish liquid-type auxiliary materials complying with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne or VOC compliant solvent borne primer recommended for substrate by manufacturer of sheet waterproofing material.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

F. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

G. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

2.4 PROTECTION COURSE

A. Protection Course: Perimeter insulation (INSUL-1), refer to Section 072100 - Thermal Insulation.

2.5 MOLDED-SHEET DRAINAGE SYSTEM

A. Preformed Geocomposite Drainage Sheet System (for Horizontal Applications): Composite subsurface drainage sheet consisting of a high impact studded polystyrene drainage core; covered on one side with a nonwoven, needle-punched polypropylene filter fabric; and on the other side with a high backing film.
   1. Product and Manufacturer:
      a. Hydroduct 660 by Grace Construction Products.
      b. Or District approved equal.

2.6 INSULATION

A. Foundation Wall Insulation: Comply with Section 072100 - Thermal Insulation for (INSUL-1).

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
   1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.

2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
   1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

F. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall joints with overlapping sheet strips.
   1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
   1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
      a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D6135.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
   1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

E. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.

F. Termination Bars: Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detailing tape.
   1. Install termination bar 2” below finish grade, coordinate with precast exterior finish transition locations.
   2. Apply compatible sealant at top edge of termination bar. Refer to section 079000 - Joint Protection.

G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.

H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.

I. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 PROTECTION COURSE, DRAINAGE PANELS AND INSULATION INSTALLATION

A. Protection Course: Install protection course with butted joints before installing drainage panels.

B. Drainage Panel: Place and secure molded-sheet drainage panels according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Ensure that drainage channels are aligned and free of obstructions. Protect installed molded-sheet drainage panels during subsequent construction.

C. Foundation Wall Insulation: Install insulation over drainage panels in compliance with Section 072100 - Thermal Insulation.

3.5 PROTECTION AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 071416
COLD FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cold, fluid-applied membrane waterproofing system (WP-7), including protection course and drainage panels, for vertical below-grade applications.

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete.
   2. Section 072100 - Thermal Insulation: Foundation wall insulation.
   3. Section 072670 - Moisture Barrier.
   4. Section 079000 - Joint Protection.

1.2 SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
   2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
   3. Material safety data sheets for all products and accessories of waterproofing system.
   4. Submit manufacturer's installation instructions for waterproofing system.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.

B. Pre-Installation Conference: Conduct conference at Project site, with all related parties, to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

C. Remove and replace materials that cannot be applied within their stated shelf life.

D. Protect product from freezing.

E. Protect stored materials from direct sunlight.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

C. Weather: Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.6 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.

1. Special Manufacturer's Warranty Period: Five (5) years.

B. Special Installer's Warranty: Written waterproofing Installer's warranty, signed by Installer, covering Work of this Section.

1. Special Installer's Warranty Period: Two (2) years.

PART 2 PRODUCTS

2.1 WATERPROOFING SYSTEMS

A. Provide complete waterproofing system in accordance with waterproofing Manufacturer’s written recommendations and requirements for warranty.

B. Source Limitations: Provide waterproofing system components from single source from single manufacturer. Provide accessory products including drainage panel and insulation from sources as recommended in writing by waterproofing manufacturer.

C. Material Compatibility: Waterproofing materials shall be compatible with one another and with adjacent work under conditions of service and application required, and as demonstrated by waterproofing manufacturer based on testing and field experience.

D. Performance Requirements: Installed waterproofing system shall withstand thermally induced movement and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Waterproofing system shall remain watertight.

2.2 COLD FLUID-APPLIED MEMBRANE WATERPROOFING

A. (WP-7) Spray-Applied Waterproofing System: Water-based, polymer-modified asphalt membrane, ASTM C 836, minimum cured membrane thickness of 60 mils, complying with VOC limits of authorities having jurisdiction; with substrate primer, reinforcing fabric, drainage panels, and other auxiliary components for complete waterproofing system.

1. Basis of Design: Barricoat-S by Carlisle Coatings and Waterproofing (CCW).
2. Or District approved equals: Subject to compliance with specified requirements and meeting or exceeding Basis of Design product features and performance.

B. System Components: Provide auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with fluid-applied waterproofing.

1. Substrate Patching Material: Low-viscosity, two-component, asphalt-modified coating.
2. Primer: Manufacturer's standard primer, sealer, or surface conditioner; waterborne or VOC-compliant solvent borne.
3. Roller-Grade Fluid-Applied Membrane Waterproofing: Roller-grade, water-based, polymer-modified asphalt waterproofing compatible with spray-grade waterproofing for detailing and reinforcing as recommended by manufacturer.
   a. Basis of Design: Barricoat-R by Carlisle Coatings and Waterproofing (CCW).
4. Transition Sheet Membrane: 60 mils thick self-adhering, rubberized-asphalt sheet waterproofing, provided by fluid-applied waterproofing manufacturer.
5. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric.
6. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

C. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 40 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per ft.
   1. Basis of Design: MiraDrain 6200 by Carlisle Coatings and Waterproofing (CCW).

D. Foundation Wall Insulation: Comply with Section 072100 - Thermal Insulation for (INSUL-1).

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
   1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
   2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Joint and Crack Treatment: Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
   1. Install transition membrane and center over treated construction and contraction joints and cracks in accordance with manufacturer’s recommendations.
   2. Install transition membrane according to manufacturer’s recommendations.

F. Encapsulate reinforcing fabric as follows: Coat substrate with approximately 30 wet mils of roller-grade waterproofing, lay fabric into wet surface, coat fabric with approximately 30 more wet mils of roller-grade waterproofing.

G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

H. Apply transition membrane or reinforcing fabric encapsulated in roller-grade waterproofing according to manufacturer’s instructions and drawings in the following areas:
   1. Cold joints
   2. Cracks
   3. Expansion joints
   4. Control joints
   5. Inside/outside corners and other change in plane
   6. Mechanical/electrical penetrations
   7. Transition to different substrate.

3.3 COLD FLUID-APPLIED WATERPROOFING APPLICATION

A. Allow materials used during surface preparation to cure fully before applying product.

B. Apply waterproofing according to manufacturer's written instructions and to recommendations in ASTM C 1471.
   1. Cured membrane thickness shall measure a minimum of 60-mils (1.5 mm).

C. Provide complete coverage without pinholes or voids for fully-adhered waterproofing. Apply greater thickness of fluid-applied waterproofing as necessary to provide continuous coating over rough surfaces and irregularities.

D. Allow fluid-applied waterproofing to dry completely before application of overburden, including drainage panels and rigid insulation.

E. Correct deficiencies in or remove waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

F. Place and secure molded-sheet drainage panels according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

G. Install rigid insulation with butted joints over drainage panels and waterproofing membrane, according to Section 072100 – Thermal Insulation.

3.4 PROTECTION AND CLEANING

A. Protect waterproofing from damage and wear during remainder of construction period.

B. Waterproofing and accessories are not designed for permanent exposure. Cover with drainage panels, rigid insulation, and backfill as soon as schedule allows. Exposure shall not exceed 30 days.

C. Avoid damaging waterproofing, drainage panels, and rigid insulation during backfill.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

E. After completion, remove masking materials and stains from exposed surfaces caused by waterproofing installation.

END OF SECTION

SECTION 071616
CRYSTALLINE WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Crystalline waterproofing.
   2. Clean and prepare surfaces to receive waterproofing.

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data recommended installation instructions, including surface conditioner compatibility and temperature range for application.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Firm specializing in installation of waterproofing products for not less than 3 years and is acceptable to waterproofing manufacturer.

B. As applicable, assign work closely associated with waterproofing, including waterproofing accessories, to installer of waterproofing, for undivided responsibility.

1.4 DELIVERY STORAGE AND ANDLING

A. Deliver materials to job site in sealed containers or bags.

B. Maintain crystalline products dry.

C. Protect with polyethylene or other waterproof covers. Store in dry, well-ventilated space, undercover and off ground.

1.5 PROJECT CONDITIONS

A. Substrate: Proceed with work of this section only after substrate construction and penetrating work have been completed.

B. Do not apply waterproofing to surfaces that are dry; contain dirt, grease or other substances that would inhibit product effectiveness.

1.6 WARRANTY

A. Warranty shall provide for making good, within period of 3 years, at no cost to Owner, failures of waterproofing to resist penetration of water except where such failures are result of structural failures of building.
   1. Hairline cracking due to temperature or shrinkage is not considered as structural failure.
   2. Repair and make good waterproofing compound membrane and pay for and repair or replace affected or damaged materials or surfaces at no cost to Owner.

PART 2 PRODUCTS

2.1 MATERIALS

A. Crystalline Waterproofing (WP-8): Liquid compound waterproofing system by Xypex Chemical Corporation consisting of the following without limitation to provide a complete waterproofing system including accessories, primers, surface preparation products required to apply functional waterproofing system.
   1. Primer: Slurry coat of Xypex Concentrate.

2. Top Coat: Slurry coat of Xypex Modified.
3. Patching Material: Xypex Patch-N-Plug for filling surface depressions, bugholes, wide cracks and other surface imperfections that would impede waterproofing application or performance.
4. Or District approved equals.

PART 3 EXECUTION

3.1 EXAMINATION

A. Ensure drains, sleeves and curbs and other penetrating components which pass through surfaces to receive waterproofing are properly and rigidly installed.

B. Ensure surfaces are free of cracks, depressions, waves, loose gravel, or projections that may be detrimental to proper application or performance of waterproofing system. Repair surfaces as required.

C. Clean surfaces of dust, dirt and other foreign matter detrimental to proper installation of waterproofing compound as recommended by compound manufacturer. Use recommended cleaner where required.

D. Ensure that surface have been properly wetted.

3.2 PREPARATION

A. Smooth concrete surface shall be lightly roughened or etched as recommended before application.

B. Concrete substrate shall be thoroughly wetted with water so that there is abundance of moisture in pores of concrete. Presence of water is imperative.

3.3 APPLICATION

A. Apply waterproofing in accordance with manufacturer's recommendations.

B. Temperature of waterproof membrane shall be within minimum and maximum range recommended by membrane product manufacturer.

C. Apply concentrate slurry over wall and floor surfaces with brush in accordance with manufacturer's recommendations.

D. Apply compound waterproofing at minimum rate of 6 square feet per pound.

E. Extend coating over areas to be waterproofed.

F. Moisture is required for generation of crystals within pores of concrete. During curing, keep treated compound areas damp for minimum of 48 hours following application.

G. Protect waterproofed areas as recommended by manufacturer.

END OF SECTION

SECTION 072100
THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Foundation wall insulation.
   2. Concealed building insulation.
   3. Exposed building insulation.

B. Related Sections:
   1. Section 042000 - Unit Masonry: Cavity wall masonry construction.
   2. Section 054000 - Cold-Formed Metal Framing: Steel stud wall framing.
   3. Section 072670 - Moisture Barriers.
   4. Section 075410 – TPO Membrane Roofing (Fully Adhered): Roof insulation.
   5. Section 078443 – Fire Resistant Joint Sealants.
   6. Section 084400 – Aluminum Curtain Walls, Windows and Entrances: Curtain wall insulation.
   7. Section 092900 - Gypsum Board: Acoustical insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E84.
   2. Combustion Characteristics: ASTM E136.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:
   1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
   3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. (INSUL-1) Rigid Insulation: ASTM C578; Type IV, 25 psi compressive strength, extruded cellular polystyrene type; for below grade application:
   1. Acceptable manufacturer and product:
      a. Dow Chemical: Styrofoam SE
      b. Owens Corning: Foamular 250

c. DiversiFoam Products: Certifoam
d. Pactiv Building Products: GreenGuard CM
e. Or District approved equal

B. (INSUL-2) Rigid Insulation: ASTM C578; Type IV, 25 psi compressive strength, extruded cellular polystyrene type; for above grade application:

1. Acceptable manufacturer and product:
   a. Dow Chemical: Cavitymate Plus
   b. Owens Corning: Foamular 250
   c. DiversiFoam Products: Certifoam
   d. Pactiv Building Products: GreenGuard CMX
   e. Or District approved equal

C. (INSUL-15) Polyisocyanurate Rigid Insulation: ASTM C1289, Type I, Class II; glass fiber reinforced polyisocyanurate insulation with aluminum foil facing on both faces; for cavity wall application.

1. Water Vapor Transmission as Permeance: Less than 0.03 in accordance with ASTM E96.
2. Compressive Strength: 25 psi.
3. Flame Spread Rating, ASTM E84: Not to exceed 25.
4. R Value: 6.5 per inch thickness in accordance with ASTM C518 (aged 190 day at 140 degrees)
5. Thickness: Maximum 4 inches in single layer.
6. Acceptable Manufacturer:
   a. Dow Chemical Company: Thermax Xarmor (ci) Exterior Insulation with aluminum foil or other tape recommended by manufacturer for taping perimeter and joints.
   b. Atlas roofing Corporation: Energy Shield Pro.
   c. Or District approved equal

D. (INSUL-20) Batt or Blanket Insulation: ASTM C665; Type I (blankets without membrane facing); consisting of fibers manufactured from glass; conforming to the following:

1. Nominal density of 1.0 lb/cu. ft., thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F
2. Fire Characteristics:
   a. ASTM E 84:
      1) Maximum flame-spread of 25
      2) Maximum smoke-developed indices of 50
   b. ASTM E 136: Passes.
3. Thickness: Same as stud depth or as indicated.
4. Width of Batts: Center to center dimension of metal studs and full face to face at other voids.
5. ASTM C665; Type I Class A.

E. (INSUL-21) Fiberglass Batt or Blanket Insulation with Foil Facing: ASTM C665; Type III Class B and C, foil-faced fiberglass batt insulation with integral vapor barrier; conforming to the following.

1. Fire Characteristics:
   a. ASTM E84:
      1) Maximum flame-spread of 25
      2) Smoke-developed indices of 50
2. Thickness: Same as stud depth or as indicated.
3. Width of Batts: Center to center dimension of metal studs and full face to face at other voids.

F. (INSUL-24) Unfaced Mineral-Fiber Blanket Insulation: ASTM C612, consisting of manufactured from slag or rock wool; and of the following density, type, thermal resistivity, and fiber color:

1. Fire Characteristics:
   a. ASTM E84:
      1) Maximum flame-spread of 15
      2) Maximum smoke-developed indices of 0
   b. ASTM E136: Passes.
2. Density: 2.5 pcf
3. Thickness: Same as stud depth or as indicated.
4. Width of Batts: Center to center dimension of metal studs and full face to face at other voids.

G. (INSUL-25) Curtain Wall Insulation: ASTM C665, Type III, Class A and rated noncombustible when tested in accordance with ASTM E136, rigid mineral fiber insulation with integral foil-faced vapor barrier conforming to following.

1. Density: 4 pcf.
2. Foil Facer:
   a. Flame spread: Class A
   b. Perm Rating: 0.02 perms per ASTM E96
3. Thickness: 3 inch, unless otherwise indicated.
4. R-Value: 12.6 at 3 inches.
5. Acceptable Manufacturers and Product:
   a. Thermafiber: Fiberspan-40.
   b. Or District approved equal

2.2 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
   1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
   2. Spindle: Copper-coated, low carbon steel, fully annealed, 0.105 inch (2.67 mm) in diameter, length to suit depth of insulation indicated.
   3. Manufacturers and Products:
      a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
      b. Eckel Industries of Canada Limited; Stic-Klip Type N Fasteners.
      c. Gemco; Spindle Type.
      d. Or District approved equal

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
   1. Manufacturers and Products:
      a. AGM Industries, Inc.; RC150.
      b. AGM Industries, Inc.; SC150.
      c. Gemco; Dome-Cap.
      d. Gemco; R-150.
      e. Gemco; S-150.
      f. Or District approved equal

C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.
   1. Manufacturers and Products:
      a. Gemco; Clutch Clip.
      b. Or District approved equal

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
   1. Manufacturers and Products:
      a. AGM Industries, Inc.; TACTOO Adhesive.
      b. Gemco; Tuff Bond Hanger Adhesive.
      c. Or District approved equal

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

F. Refer to Section 072600 - Vapor Retarders for installation of vapor retarder. Coordinate with 072600 for installation of insulation to insure protection of insulation and retarder.

3.2 INSTALLATION QUALITY

A. Install rigid insulation to maintain continuous and complete thermal protection for building spaces and elements.

B. Ensure surfaces which are to receive rigid insulation are clean, free of deleterious matter and are sufficiently level to allow proper installation of insulation.

C. Cut and trim insulation neatly to fit spaces. Butt edges and ends tight. Fit insulation tight against mechanical, electrical and other items which protrude through plane of insulation.

D. Use insulation free of broken or chipped edges.

3.3 PREPARATION

A. Clean substrates and substances harmful to insulation or vapor retarders, including removing projections capable of puncturing retarders or interfering with insulation attachment.

3.4 PERIMETER FOUNDATION WALL INSTALLATION

A. Secure insulation (INSUL-1) on perimeter foundation wall with adhesive using spot or bead method in accordance with insulation manufacturer's recommendations. Place insulation horizontally.
   1. Coordinate installation with waterproofing systems where applicable.

B. Stagger vertical joints of insulation, except free ends over line of control joints.

C. Lay out insulation so that ends overlap minimum 4 inches and maximum 6 inches over line of expansion contraction joints. Leave overlapping ends of insulation unbonded over line of these joints, allowing insulation to move freely with foundation walls.

3.5 CAVITY WALL INSTALLATION ON STEEL STUD BACKUP

A. Secure insulation (INSUL-15) within cavity walls in place over sheathing.
   1. Secure insulation with mechanical fasteners compatible with insulation and substrate. Coordinate compatibility with moisture barrier Section.
   2. Continuously tape perimeter edges and joints of insulation boards at back-up surfaces to maintain vapor retarder continuity.
   3. Place insulation horizontally.
   4. Press insulation firmly and uniformly against wall sheathing.
   5. Fit joints tightly together.
   6. Fill joints, including to adjacent materials, and brick ties or stone anchors protruding through insulation with silicone sealant.

B. Stagger vertical joints of insulation, except free ends over line of control joints.

C. Leave insulation unbonded over line of control joints.

D. Repair damaged foil surfaces of insulation with foil tape.

3.6 CURTAIN WALL INSULATION

A. Place (INSUL-25) curtain wall insulation within curtain wall system. Provided under Section 084400.

B. Tape joints with aluminum tape.

C. Coordinate installation with fire resistive joint systems specified under Section 078443.

3.7 BATT INSULATION INSTALLATION

A. Install batt and blanket insulation (INSUL-20) and (INSUL-24) in accordance with manufacturer's instructions.

B. Trim insulation neatly to fit spaces which are less than stud spacing.

C. Fit insulation tight within spaces and tight to and behind mechanical and electrical services within plane of insulation. Leave no gaps or voids.

3.8 BATT INSULATION INSTALLATION

A. Install batt and blanket insulation (INSUL-21) in accordance with manufacturer's instructions.

B. Fit insulation tight within spaces and tight to and behind mechanical and electrical services within plane of insulation. Leave no gaps or voids.

C. Tape joints to seal foil facing with foil tape.

3.9 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

C. Repair vapor retarders as recommended by manufacturer.

END OF SECTION

SECTION 072600
VAPOR RETARDERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall vapor retarders

B. Related Sections:
   1. Section 031500 – Concrete Accessories: Materials for underslab vapor retarders.
   2. Section 054000 – Cold Form Metal Framing.
   3. Division 7 Roofing Sections for vapor retarders used in conjunction with roof construction

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Manufacturer's installation instructions for placement, seaming and pipe boot installation

1.3 QUALITY ASSURANCE

A. Applicator: Company specializing in retarder type work with minimum 3 years experience in application of retarder.

PART 2 PRODUCTS

2.1 VAPOR RETARDERS

A. (VR-1) Polyethylene Vapor Retarder: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

2.2 AUXILIARY MATERIALS

A. Seam Tape at Vapor Retarders:
   1. Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
   2. Minimum: 2 inches wide.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify that sleeves, ties, and other penetrating components which pass through surfaces to receive retarder are rigidly installed.

3.2 PREPARATION

A. Clean substrates of substances harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.3 INSTALLATION FOR VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated.

1. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions.
   1. Seal butt joints and fastener penetrations with vapor-retarder tape.
   2. Locate all joints over framing members or other solid substrates.

C. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.

D. Seal end laps and terminations after each day's work with trowelled bead of mastic. Lap sides 2-1/2 inches minimum and ends 6 inches.

E. Seal ends and edges to each other and to adjoining surfaces with uniform fillet bead of sealant. Extend vapor retarder to perimeter of windows and door frames and other items interrupting plane of membrane.
   1. Imbed vapor retarder in sealant and tape edge to window or door frame.

F. Apply heavy pressure to membrane at top and bottom terminations with back of utility knife to assure positive adhesion at edge.
   1. Roll membrane firmly and completely, immediately after each sheet is applied.

G. Lap joints on sloped substrate in direction of drainage.

H. Work out air bubbles, wrinkles, and fishmouths. Firmly press sheet into place without stretching.

I. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

J. Metal deck at wall, cut vapor retarder to fit flutes of decking and imbed vapor retarder in sealant and tape edge to metal deck.

K. After installation protect membrane from damage.

L. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION

SECTION 072670
MOISTURE BARRIER

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
   1. Elastomeric wall membrane moisture barrier system

B. Related Sections
   1. Section 033000 - Cast-In-Place Concrete.
   2. Section 040520 – Masonry Anchorage, Reinforcing and Accessories: Through-wall flashing.
   3. Section 042000 - Unit Masonry.
   4. Section 054000 - Cold-Formed Metal Framing.
   5. Section 072100 - Thermal Insulation.
   6. Section 075113 - Built-Up Asphalt Roofing.

1.2 SYSTEM DESCRIPTION

A. (MB-1) Moisture Barrier: Self adhering rubberized laminated membrane including primers and required accessories.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's instructions for surface conditioner compatibility, primer, mastic, membrane, temperature range for application of barrier materials.

B. Compatibility: Verify compatibility of barrier materials with adjacent materials.

1.4 QUALITY ASSURANCE

A. Membrane Applicator: Company specializing in retarder type work with minimum 3 years experience in application of elastomeric membrane type moisture barrier.

B. Liquid Applied Membrane Applicator: Company specializing in liquid moisture and vapor barrier type work with minimum 3 years experience in application of liquid type moisture barrier.

C. Pre-Installation Conference:
   1. Prior to installation of barrier, conduct pre-installation conference at project site.
   2. Attendance: Contractor, job superintendent, subcontractors, supplier and manufacturer's technical representative.
   3. Agenda: Cover installation and coordination procedures, protective measures and related conditions.

1.5 PROJECT CONDITIONS

A. Do not apply barrier during inclement weather or when air temperature is below 40 degrees F., unless manufacturer's written application instructions indicate otherwise.

B. Do not apply barrier to damp, frozen, dirty, dusty, or surfaces unacceptable to manufacturer.

1.6 WARRANTY

A. Manufacturer and installer of moisture barrier shall provide a warranty which shall provide for making good, within period of 3 years, at no cost to Owner, failures of barrier to resist penetration of water, except where such failures are:
   1. Result of structural failures of building.
   2. Cracking of membrane due to temperature or shrinkage is not considered as structural failure.

B. Manufacturer and installer of moisture barrier shall repair and make good barrier membrane and pay for and repair or replace affected or damaged materials or surfaces at no cost to Owner.

1.7 COORDINATION

A. Coordinate installation of moisture barrier with other systems including interface conditions at window and door openings, and to other waterproofing systems.

B. Coordinate installation of system over moisture barrier to protect moisture barrier from UV exposure.

PART 2 PRODUCTS

2.1 SELF-ADHERING MOISTURE BARRIER SYSTEM

A. (MB-1) Product: 1mm (40-mils) thick laminated polyethylene and rubberized asphalt membrane sheet for application to exterior wall substrates.

1. Widths and lengths appropriate to application and as provided by manufacturer.

B. Primer: Use manufacturer's recommended solvent-based or water-based primers for concrete and concrete masonry substrates or glass-matt faced sheathing.

C. Cleaner: As recommended by membrane manufacturer to clean surfaces to be lapped.

D. Sealant and Mastics: As recommended by membrane manufacturer to seal seam at laps and end dams.

E. Flashing: As recommended by manufacturer for through-wall applications, detailing or transition sheets around openings, or between assemblies or systems.

F. Manufacturer:

1. Grace Construction Products: Perm-A-Barrier System.
2. Carlisle Coatings & Waterproofing: CCW-705 Self-adhering Vapor/Air Barrier System.
3. Protecto Wrap Company: PW 100/40 AVB.
4. W. R. Meadows: Sealtight Air-Shield.
5. Tremco: ExoAir 110/110LT.
6. Henry Blueskin SA.

G. Minimum Material properties:

1.	Membrane tensile strength (ASTM D412 (C))	400 psi
2.	Film tensile strength (ASTM D412 (C))	5000 psi
3.	Elongation (ASTM D412 (C))	200 percent
4.	Puncture Resistance (ASTM E154)	40 lbs
5.	Moisture Permeance (ASTM E 96)	0.05 perms
6.	Assembly Air Permeance maximum (ASTM E 2357)	0.04 cfm/sf

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that sleeves, ties, and other penetrating components that pass through surfaces to receive barrier are rigidly installed.

B. Verify that surfaces are free of cracks, depressions, waves or projections which may be detrimental to successful installation.

C. Ensure that exterior sheathing panels are stabilized with corners and edges fastened with appropriate screws.

D. Starting work of this Section means acceptance of substrate and site conditions.

3.2 PREPARATION

A. Seal cracks and joints with recommended material and sealant. Clean surfaces of foreign matter detrimental to installation of retarder.

B. Apply surface conditioner (primer) at rate as recommended by manufacturer.

3.3 DETAIL WORK

A. Transition and Through-Wall Flashing Membranes:
   1. Where directed by manufacturer's written instructions, apply before or after application of membrane to create a shingle effect and maintain continuity of the air barrier assembly from top to bottom of structure.
   2. Apply to beams, columns, joints, openings, and penetrations as indicated in detail drawings, overlapping edge seams minimum 2 inches and end laps minimum 4 inches.
   3. Use transition membranes to tie into opening frames, spandrel panels, floor intersections and changes in substrates.
   4. Apply in accordance with manufacturer's instructions, positioning, lapping, sealing and protecting as required.

3.4 INSTALLATION OF SHEET MEMBRANE

A. Install membrane barrier in accordance with manufacturer's instructions.

B. Seal end laps and terminations after each day's work with trowelled bead of mastic. Lap sides 2-1/2 inches minimum and ends 6 inches. Stagger end laps.

C. Apply heavy pressure to membrane at top and bottom terminations to assure positive adhesion at edge. Roll membrane firmly and completely, immediately after each sheet is applied.

D. Lap joints on sloped substrate in direction of drainage.

E. Work out air bubbles, wrinkles, and fishmouths. Firmly press sheet into place without stretching.

F. Seal ends and edges to each other and to adjoining surfaces with uniform fillet bead of sealant.

G. At wall penetrations carry moisture barrier on to penetrating element and seal to element.

H. At openings:
   1. Wrap moisture barrier into openings at windows and doors.
   2. Place separate piece of moisture barrier in each corner per manufacturers instructions
   3. Start at sill and wrap 12 inch wide strip of moisture barrier into opening and lap over moisture barrier on face of sheathing.
   4. Wrap both jambs similar to sill and overlap with sill.
   5. Wrap head and overlap with jambs.

I. Reinforce membrane over joints if required to maintain, whether barrier joints are static or moving.

J. At overhead applications, or on substrates such as OSB, back-nail membrane within 2 inches of edge seam; lap successive membrane minimum 2 inches, covering nail heads.

K. At terminations of vertical surfaces, turn membrane up into reglet, under counter flashing, or secure with termination bar.

L. Patch misaligned, or inadequately lapped seams, punctures or other damage with patch of moisture barrier membrane lapped 6 inches over edges of damaged area. Seal edges of patch with mastic.

3.5 PROTECTION

A. After installation, protect membrane from damage.
   1. Cover membrane barrier to avoid damage. If air and vapor barrier system cannot be permanently covered within 30 days after installation, provide temporary UV protection and contact manufacturer.

END OF SECTION

SECTION 074213
METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preformed and prefinished metal wall panel systems with related flashing, and accessory components.

B. Related Sections:
   1. Section 051200 - Structural Steel Framing: Structural steel framing and supports.
   2. Section 054000 - Cold-Formed Metal Framing.
   3. Section 076210 - Sheet Metal Flashing and Trim: Other flashing and sheet metal.
   4. Section 079000 - Joint Protection: Other sealants.

1.2 SYSTEM DESCRIPTIONS

A. (MP-2) System: Preformed and prefinished exposed fastener metal wall panel system of horizontal profile, non-perforated aluminum; site assembled; with sub- girt framing/anchorage assembly.

B. (MP-3) System: Preformed and prefinished concealed fastener aluminum wall panel system with caulked joints; site assembled.

1.3 PERFORMANCE

A. Manufactured wall metal panel systems to withstand code imposed design loads. Maximum allowable deflection of span: 1/180.

B. Systems to accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to seasonal temperature ranges. (Wind load - 30 psf single span.)

C. Systems to accommodate tolerances of structure.

D. Provide positive drainage to exterior for moisture entering or condensation occurring within panel systems.

E. Provide for "U" factor of 0.15.

F. Air Infiltration: Provide wall panel systems with air infiltration rate of not more than 0.06 cfm per sq. ft. of fixed wall area when tested in accordance with ASTM E283 at static air pressure differential of 1.57 psf.

G. Water Penetration: Provide panel systems with no water penetration as defined in test method when tested in accordance with ASTM E331 at inward static air pressure differential of not less than 6.24 psf and not more than 12.0 psf.

1.4 SUBMITTALS

A. Shop Drawings and Product Data: Submit in accordance with Section 013300.
   1. Indicate dimensions, panel layouts, construction details, methods of anchorage, methods of installation.

B. Samples: Submit manufacturer's standard color samples for selection in accordance with Section 013300.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage experienced installer who has completed metal wall panel projects similar in material, design, and extent to that indicated for this Project and with record of successful in-service performance.

B. Source Limitations: Obtain each type of metal wall panel system through one source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package wall panels for protection against transportation damage.

B. Handling: Exercise care in unloading, storing, and erecting wall panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather tight ventilated covering. Store metal wall panels so that they will not accumulate water. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.7 WARRANTY

A. Finish Warranty: Furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish on metal wall panels within warranty period.

1. Warranty period for factory-applied exterior finishes on wall panels shall be 20 years.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Basis of Design (MP-2): VB-36 Exposed Fastener Wall Panels, non-perforated aluminum, by Morin Corporation of Kingspan Group Company, 685 Middle Street, Bristol, Connecticut 06010-8416; (800) 640-9501; (www.morincorp.com).

1. Wall Panel Description:
   a. Panel Width: 36 inches.
   b. Profile: VB-36.
   c. Thickness: 1 inch.
2. Colors: Refer to Material Identification Codes.
3. Other Acceptable Manufacturers: Centria, or District approved equal.

B. Basis of Design (MP-3): SAF Series M-3000 (caulk joint) Aluminum Wall Panel System by SAF Metal Fabrication, Villa Rica, GA 30180, (770) 942-1207, or District approved equal.

1. Wall Panel Description:
   a. Profile: M-3000.
   b. Thickness: 1 inch.
2. Colors: Refer to Material Identification Codes.

2.2 SHEET MATERIALS

A. (MP-2) Aluminum:

1. Coil Stock meeting ASTM B209; Alloy and temper as required for forming operations.
2. Gauge: 0.032 inch.

B. (MP-3) Aluminum Sheet: 0.090” alloy 3003-H14 meeting ASTM B209.

2.3 ACCESSORIES

A. Wall panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturers’ approved standard details. Match material and finish of metal wall panels.

B. Sealants and Gaskets: Manufacturer's standard type suitable for use with installation of metal panel systems; ultraviolet and ozone resistant for exterior applications.

C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, galvanized in accordance with ANSI/ASTM A153 with 1.25 oz./sq.ft. coating; finish to match wall panels finishes when exposed.

D. Power Actuated Fasteners: Galvanized in accordance with ANSI/ASTM A153; with soft neoprene washers, caps of same color as wall panels when exposed.

E. Flashing and Trim:

1. Fabricate flashing and trim from same material as roof panels, minimum 0.018 inches thick. Finish to match metal wall panels.

F. Closure Strips: Provide closed cell closure strips, minimum 1 inch thick matching metal wall panels profiles.

G. Touch-up Paint: As recommended by panel manufacturers.

H. Bituminous Paint: Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.4 FABRICATION

A. Shop fabricate manufactured metal wall panels in accordance with reviewed shop drawings. Design and fabrication of panels shall comply with design criteria, and shall withstand movements and stresses of thermal expansion.

B. Metal wall panels shall be formed to lap with edges of adjacent panels which are then mechanically attached through panel to supports using fasteners with a neoprene washer. Fastener head shall match wall panel finish when exposed.

C. Internal and External Corners: Same material, thickness and finish as metal panels; profile to suit system, brake formed (shop cut and factory mitered) to required angles. Mitered internal corners, back braced with sheet stock, to maintain continuity of profile.

D. Expansion Joints: Same material and where exposed, finish as panels; manufacturers' standard brake formed type of profile to suit systems as detailed. Exposed fasteners same finish as panel system.

E. Trim, Closure Pieces, Caps, and Infills: Same material, thickness and where exposed, of same finish as sheet stock; brake formed to required profiles.

F. Fabrication of component profiles on site not permitted.

G. Condensation: Fabricate panels for control of condensation, including vapor inclusion of seals and provisions for breathing, venting, weeping and draining.

2.5 FINISH

A. Exposed Surfaces: Two coat process of Hylar or Kynar 500 factory finish, minimum 70 percent PVDF coating system, Class I, 0.7 dry mils thickness minimum.

1. Colors: Refer to Material Identification Codes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine structural framing supports and conditions under which metal panel systems work is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before panel installation.

3.2 INSTALLATION

A. Install manufactured metal wall panel systems on walls in accordance with manufacturer's instructions.

B. Protect panel surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Remove site cuttings from finish surfaces.

D. Permanently fasten panel system to structural supports; align, level, and plumb, within specified tolerances.

E. Locate panel joints over supports.

F. Provide expansion (control) joints where indicated.

G. Seal to prevent weather penetration. Maintain neat appearance.

H. Remove protective coverings and clean finished surfaces as recommended by panel manufacturer.

3.3 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch.

END OF SECTION

SECTION 074243
COMPOSITE PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preformed composite metal panels (MP-1) complete with accessory components.
   2. Flashing and sheet metal where indicated to match panels.

B. Related Sections:
   1. Section 074213 – Metal Wall Panels: (MP-2) and (MP-3).
   2. Section 084113 – Aluminum Entrances and Storefronts.
   3. Section 084400 – Aluminum Curtain Walls, Windows and Entrances.

1.2 DESCRIPTION

A. Aluminum alloy 4 mil thick composite panels with low density core. Metal panels, fascia and soffit.
   1. With extruded aluminum abutting surfaces using wet seal system for weather tightness.
   2. At expansion joints, with extruded aluminum dry set attachment system with perimeter extrusions, gaskets, sealants, concealed fasteners, and related trim for complete watertight system.
   3. Provide lap and panel joints, including integral reveal system as shown on drawings.
   4. Provide with weep holes at 16 inches on center maximum at soffit conditions and at horizontal reveals to allow for weeping condensation.

1.3 PERFORMANCE

A. System to accommodate movement of components without buckling, undue stress on fasteners, or other detrimental effects, when subject to seasonal temperature ranges.

1.4 SUBMITTALS

A. Shop Drawings and Product Data: Submit in accordance with Section 013300.
   1. Indicate dimensions, panel layout, construction details, method of anchorage, method of installation.

B. Samples: Submit color samples for selection in accordance with Section 013300.

1.5 QUALITY ASSURANCE

A. Structural Deflection: Deflection of perimeter framing members shall not exceed L/175 of span length or 1/4 inch whichever is less; or there shall be no permanent set in excess of 0.100 inch.

B. Panel system fabricator and attachment system shall be approved by the panel manufacturer.

1.6 WARRANTY

A. Panel manufacturer and fabricator shall warrant that panels (including finish) and system are free from defects in materials and workmanship for a period of 3 years.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. (MP-1) Basis of Design Manufacturer and Type: Alpolic aluminum composite aluminum faced wall panels by Mitsubishi Chemical America, Inc., ALPOLIC Composite Materials Division, 401 Volvo Parkway, Chesapeake, VA 23320; (800) 422-7270.

B. Other Acceptable Panel Manufacturers:

1. Alucobond by Alcan Composites USA, Inc. 208 West 5th. Street, Benton, KY 42025, (800) 626-3365.
2. Reynobond by Alcoa Architectural Products, 50 Industrial Boulevard, Eastman, Georgia 31023 USA; 800-841-7774.
3. Or District approved equal.

2.2 SHEET MATERIALS

A. Face Sheet Stock: ASTM B209; aluminum alloy suitable for finish.

2.3 MATERIALS

A. Panels: Minimum 0.20 gauge sheet stock; 4mm thickness, smooth finish aluminum sheet profile as indicated with low density extruded thermoplastic polyethylene core.

B. Concealed Fasteners: Manufacturer's standard type clips and fasteners to suit application; finish to match panel finish when exposed.

C. Flashing: Aluminum, same finish to match panels where exposed, secured with concealed fastening method.

D. Sealant: As recommended by manufacturer.

E. Touch-up Paint: As recommended by panel manufacturer.

2.4 FABRICATION

A. Shop fabricate preformed composite metal wall panels in accordance with reviewed shop drawings. Design and fabrication of panels shall comply with design criteria, and shall withstand movements and stresses of thermal expansion.
   1. Fabricate and assemble with structural silicone perimeter frame extrusion (standard black), with integral weather-stripping.
   2. Use wet set panel-attachment system.
   3. At expansion joints, with extruded aluminum dry set attachment system with perimeter extrusions, gaskets, sealants, concealed fasteners, and related trim for complete watertight system.
   4. Fabricate joints and corners from manufacturer’s standard detail sections at joints and bent corner conditions. Provide laminated, precision cut laminated double bent corners where shown.

B. Panel Profile: Lines, breaks and angles shall be sharp, true and surfaces free from warp or buckle.

C. Stiffeners shall be shop applied with structural silicone and mechanically fastened at ends to perimeter framing when required.

D. Shop fabricate system and assemble units ready for installation. Panel fabricator shall field measure as required to insure level, square and true to line, installation.

2.5 FINISH

A. Exposed Surfaces: Kynar or Hylar 5000 based 2-coat polyvinylidene floride (PVDF) resin, complying with AAMA 605.2.

B. Colors: Refer to Material Identification Codes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine support system and conditions under which metal panel system work is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install composite metal panel system in accordance with manufacturer's instructions.

B. Protect panel surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Remove site cuttings from finish surfaces.

D. Permanently fasten panel system to structure, align, level, and plumb, within specified tolerances.

E. Use concealed fasteners unless otherwise approved by Architect.

F. Joint Sealers: Install joint fillers, and sealants where indicated for a weatherproof performance of wet attached panel systems. Provide fillers and sealants as recommended by panel manufacturer, in compliance with Section 079000 – Joint Protection.

   1. Provide fasteners under sealant joints.

G. Prime surfaces as recommended by sealant manufacturer. Comply with Section 079200 – Joint Protection for sealant requirements.

3.3 TOLERANCES

A. Tolerances: Maximum deviation from vertical and horizontal alignment of erected panels shall not exceed 1/8 inch in 12 foot length of member, or 1/4 inch in total run in line.

B. Panel Bow: Maximum 0.8 percent of panel dimension in width and length.

3.4 CLEANING

A. Remove temporary protective coverings and strippable films. Upon completion of panel installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction.

END OF SECTION

SECTION 074244
COMPOSITE WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Composite panel wall cladding system (CPNL), including:
   1. Solid composite panels.
   2. Sub-framing.
   3. Exposed fasteners.

B. Related Sections
   1. Section 054000 - Cold-Formed Metal Framing.
   2. Section 072100 - Thermal Insulation.
   3. Section 072670 - Moisture Barrier.
   4. Section 074213 - Formed Metal Wall Panels.
   5. Section 076210 – Prefinished Sheet Metal Flashing and Trim.
   6. Section 092216 – Non-Structural Metal Framing.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM D 635 - Standard Test Method for Small Scale Burning.
   2. ASTM D 1929 - Standard Test Method for Ignition Temperature.
   3. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
   4. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
   5. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   6. ASTM E 119 - Standard Test Method for Fire Rated or Fire Resistive Construction.

B. National Fire Protection Association (NFPA):
   1. NFPA 268 - Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
   2. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheet on each product to be used including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation materials and components.
   4. Manufacturer’s installation instructions.
   5. Certified test results from independent testing laboratory substantiating specified performance characteristics and physical properties.

B. Shop Drawings: Provide shop drawings that show elevations and details for Work of this Section including but not limited to:
   1. Elevations showing mounting and fastener pattern and spacing with dimensions complying with manufacturer’s requirements.
   2. Panel layout consistent with design intent shown on Drawing Elevations.
   3. Field verified dimensions.
   4. Details of each condition including attachment and mounting details.
   5. Installation coordination affecting related and adjacent materials such as opening and terminations.
   6. Connections and reactions to structure.
   7. Panel joint spacing meeting manufacturer’s requirements.
   8. Thermal expansion and contraction allowances.

9. Drainage design that comply with manufacturer's requirements.
10. Provide certified drawings for anchor design and reactions to structure that comply with design criteria reactions to structure including seismic details certified by a Professional Engineer registered in the State of New Jersey. Coordinate with Section 018820.

C. Samples:
   1. Panels: Submit sample for each finish product specified, two samples a minimum of 36 inches by 12 inches, representing actual product, color, and patterns. Sample edges may vary from field panel edges.
   2. Fasteners: 4 each of fasteners in specified color.

D. Quality Assurance Submittals:
   1. Submit letter certifying compliance with qualification requirements in Quality Assurance article.
   2. Manufacturer's Field Reports: Manufacturer's field reports specified herein.
   3. Installer Certification: Upon request, submit names of projects of similar size and scope with contact information.

E. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Actual warranty documents.

F. Warranty: Submit sample of manufacturer and installer warranty.

1.4 QUALITY ASSURANCE

A. Performance Requirements: Provide panels that have been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

B. Panel Manufacturer Qualifications: Company specializing in exterior cladding systems with minimum of 5 years experience.
   1. Provide field service representation during fabrication and approving application method.
   2. Obtain cladding and fastening components from a single manufacturer.

C. Installer Qualifications: Installer shall be experienced in the installation of the specified products, and have completed installations similar in extent and design with a verifiable record of successful performance.
   1. Panel manufacturer shall review and approve qualifications of installer, verifying that installer meets manufacturer's requirements.

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in Manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in accordance with the Manufacturer's instructions in unopened packaging until ready for installation. Store materials in a covered area, away from water, on a flat, level surface with adequate support to prevent sagging according to manufacturer's instructions.

C. Protect materials during handling to prevent damage.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

B. Open boxes and remove components from packaging; stack flat with spacers between the pieces in their final environment for a minimum 3 to 4 days prior to installation.

C. Do not install cladding material under environmental conditions where it is likely to be immersed in water, or where the temperature is likely to exceed 120 degrees Fahrenheit for extended periods of time.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of composite panels and sub-framing systems that fail in materials or workmanship within specified warranty period.
   1. Failures including but not limited to the following:
      a. Deterioration resulting from U.V. and weather exposure,
      b. Structural failures including rupturing, cracking, or puncturing.
      c. Deterioration of materials beyond normal weathering.
   2. Provide warranty covering panel fabrication defects and loss of specified physical and performance properties, when panels are installed in accordance with manufacturer's requirements.
   3. Provide warranty covering cost of panel removal and installation of replacement panels.
   4. Warranty Period: 10 years.

PART 2 PRODUCTS

2.1 COMPOSITE PANEL SYSTEM

A. (CPNL-1) and (CPNL-3) Composite Panel System for Exterior Applications: Provide complete system including composite panels and extruded aluminum sub-framing.
   1. Basis of Design Products and Manufacturer:
      a. Panels:
         1) (CPNL-1): Trespa Meteon FR by Trespa North America.
            (a) Color: Carmine Red.
         2) (CPNL-3): Trespa Meteon Uni by Trespa North America.
            (a) Finish: Diffuse, Color: Mid Grey Satin
      b. Sub-Framing: Trespa TS110-285 - Exposed fastening on fixed depth aluminum sub-framing tested and meeting the performance requirements of NFPA 285.
   2. Other Products and Manufacturers: Subject to specified requirements, provide equivalent product as approved by District prior to Bid.

B. (CPNL-2) Composite Panel System for Interior Applications: Provide complete system including composite panels and extruded aluminum sub-framing.
   1. Basis of Design Product and Manufacturer:
      a. Panels: Trespa Virtuon by Trespa North America.
      b. Color: Elegant Oak.
      c. Sub-Framing: Trespa TS110-285 - Exposed fastening on fixed depth aluminum sub-framing tested and meeting the performance requirements of NFPA 285.
   2. Other Products and Manufacturers: Subject to specified requirements, provide equivalent product as approved by District prior to Bid.

C. Composite Panels: Solid phenolic panel composed of thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surfaces, under high pressure and high temperature; and as follows:
   1. Panel Properties:
      a. Thickness: 3/8 inch, minimum.
      b. Backing: Provide balance sheet on concealed face of panel.
      c. Core: Phenolic resin, type FR fire retardant, black color.
      d. Flatness: Maximum difference of 0.08 inch for 3 foot span.
      e. Finishes and Colors: Refer to Material Identification Codes.

D. Fasteners for Panels: Provide corrosion resistant stainless steel, Type 316, mechanical fasteners meeting panel manufacturer's requirements for fasteners to be used with metal mounting frame.
   1. Provide Powder coat finish matching panel color, as selected.

E. Sub-Framing and Accessories: Provide framing and accessories by panel Manufacturer or as approved by panel Manufacturer.
   1. Sub-Framing: Extruded aluminum sub-framing assembly as recommended by composite panel Manufacturer.
   2. Clips: As recommended by panel manufacturer and as required to meet performance requirements.
   3. Fasteners for Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.
   4. Ventilated Closure: Type recommended by panel Manufacturer, in color as selected by rchitect from standard color range.

2.2 FABRICATION

A. Fabricate panels, components and accessory items in accordance with manufacturer's recommendations, specified requirements and accepted submittals.

B. Fabricate panels to profile indicated. Prefabricate as much as practical in shop prior to shipping materials to site.

C. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation or alignment; do not proceed until unsatisfactory conditions are corrected.

C. Verify compatibility of different metallic surfaces in contact with each other to protect against electro-chemical corrosion.

D. Verify moisture barrier and each wall system component is properly installed and substrate wall assembly is ready for Work of this Section.

E. Commencement of Work of this Section means substrate wall conditions are acceptable and meet panel system manufacturer's warranty requirements. Refer to manufacturer's guide.

3.2 PREPARATION

A. Follow panel and mounting frame manufacturer's preparation requirements.

B. Metal Protection:
   1. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
   2. Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

C. Comply with manufacturer's instruction on tools and methods to use for cutting and drilling panels.

3.3 INSTALLATION

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, product carton instructions for installation, and accepted shop drawings. Install true, plumb, square and level.

B. Install panels and mounting and fastening system so panel is not deformed, stressed or damaged. Installer will be responsible for damage or deterioration resulting from improper installation for not following installation requirements of manufacturer and information resulting from mock-up and pre-installation meetings.

C. Install panels to maintain design criteria and performance requirements and in accordance with manufacturer's installation instructions, including maintaining open joints as specified.

1. Joints: Maintain 3/8 inch of free space for panel movement.
2. Coordinate exact sizes and dimensions with Drawings, field conditions and approved shop drawings.

D. Install fasteners using drivers provided by panel manufacturer which are pre-set to proper torque.

E. Install ventilated closure at perimeter of panel system, as shown.

3.4 CLEANING

A. After installation is complete remove protective coating on each panel and wipe panels following manufacturer's cleaning instructions.

B. Clean in accord with panel manufacturer's written instructions.

C. Remove construction debris from project site and legally dispose of debris.

3.5 PROTECTION

A. Protection: Protect installed surfaces from damage, dirt and debris during construction.

END OF SECTION

SECTION 075216
(SBS) MODIFIED BITUMEN ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. SBS modified bitumen roofing, including insulation.
      a. Built-in flashing at roof edges,
      b. Curbs and similar roofing around openings and obstructions.
      c. Vapor retarder at metal deck and concrete deck.
      d. Clean soiled work, including check up after completion to remove any drips or other work.
      e. Protection of work of others.
      f. Manufacturer's 15 year roofing, insulation and flashing warranty.

B. Related Sections:
   1. Section 061000 - Carpentry: Wood blocking.
   2. Section 075410 - TPO Membrane Roofing.
   3. Section 076210 - Prefinished Flashing and Sheet Metal.

1.2 DESCRIPTION

A. (MBIT-1): (SBS) Modified Bitumen Roofing: Metal and concrete roof decks with vapor retarder, thermal barrier at metal deck, 2 ply modified hot mopped roofing system with granule surfacing, polyisocyanurate insulation, including wood fiberboard insulation cover.

1.3 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300, indicating roof size, location and type of penetrations, perimeter and penetration details, roof insulation (including taper) make-up and layout.
   1. Submit copies of manufacturer’s information sheets for all products used.

B. Warranty: Submit 2 copies of warranty for Modified Bitumen Roofing and flashing. Install Modified Bitumen membranes as for manufacturer's 15-year warranty with similar terms and conditions as for Single Ply Membrane Roofing Warranties.

C. Certification: Letter certifying that roofer is licensed by roofing manufacturer.

D. Deviation to Details: If deviations to indicated details are desired, submit proposed detail changes not later than 5 days prior to bid date.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide primary products, including each type of roofing sheet (felt), bitumen and composition flashings, produced by single manufacturer. Provide secondary products only as recommended by manufacturer of primary products for use with roofing system specified.

B. Approved Applicator: Applicator shall have not less than 5 years of successful experience in installation of similar roofing systems and shall be certified in writing by manufacturer as a licensed or approved applicator.

C. Installer's Field Supervision: Maintain full-time installation supervisor/foreman on jobsite during times that roofing work is in progress. Supervisor shall have minimum of 5 years experience in roofing work similar to nature and scope to specified roofing.

D. Pre-Roofing Conference: Prior to installation of roofing and associated work, meet at project site with installer, roofing manufacturer, installers of related work, and other entities concerned with roofing performance. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours advance notice to participants prior to convening pre-roofing conference.

1. Review requirements (Contract Documents), submittals, status of coordinating work, availability of materials and installation facilities and establish preliminary demolition and installation schedule. Review requirements for inspections, testing, certifications, forecasted weather conditions, governing regulations, insurance requirements, proposed installation procedures and roofing warranty.
2. Record discussion including agreement or disagreement on matters of significance; furnish copy of recorded discussions to each participant. Discuss re-roofing system protection requirements for construction period extending beyond roofing installation. Discuss possible need for temporary roofing. If meeting ends with substantial disagreements, determine how disagreements will be resolved and set date for reconvened meeting.

E. Preapplication Roofing Conference: Approximately 2 weeks prior to scheduled commencement of built-up roofing installation and associated work, meet at project site with installer, installers of deck or substrate construction to receive roofing work, installers of roof-top units and other work in and around roofing which has precede or follow roofing work (including mechanical work), Prime Contractor, Architect, Owner, roofing systems manufacturer's representative, and other representatives directly concerned with performance of work. Record discussions of conference and decisions and agreements (or disagreements) reached, and furnish copy of record to each participant. Provide at least 72 hours advance notice to participants prior to convening pre-roofing conference. Review foreseeable methods and procedures related to roofing work; including but not necessarily limited to following:
   1. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by other trades.
   2. Review roofing system requirements (drawings, specifications and other contract documents).
   3. Review required submittals, both completed and yet to be completed.
   4. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   5. Review required inspection, testing, certifying and material usage accounting procedures.
   6. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing.

F. UL Listing: Provide built-up component materials which have been tested for application indicated and are listed by Underwriter's Laboratories, Inc. (UL) for Class A external fire exposure.
   1. Provide roof-covering materials bearing UL Classification Marking on bundle, package, or container indicating that materials have been produced under UL's Classification and follow-up service.
   2. Provide modified bitumen sheet roofing system that can be installed to comply with UL requirements for Fire Classified and Class 60 (Class 90) wind-uplift requirements.

G. FM Listing: Provide modified bitumen sheet roofing system and component materials that have been evaluated by Factory Mutual System for fire spread, wind uplift, and hail damage and that are listed in "Factory Mutual Approval Guide" for Class I construction.
   1. Roofing system shall comply with FM Class I-60 (I-90) for wind-uplift resistance.
   2. Provide roof-covering materials bearing FM approval marking on bundle, package, or container, indicating that material has been subjected to FM's examination and follow-up inspection service.

H. Roof insulation make-up and lay-out shall be approved and accepted by roofing system manufacturer.

I. Safety: Installer shall be responsible for safety policies and practices during installation of roofing system, including fire prevention. Provide required number of fire extinguishers on roof at all times.

1.5 PRODUCT HANDLING

A. Store materials off ground and keep under waterproof covering. Do not allow covering to be torn, displaced or damaged. Store rolls by stacking on end, with adequate platform and clearance to prevent penetration of moisture from grade. Handle with care to avoid damage and do not install felts or other materials that have been exposed to moisture. Discard felts that have been exposed to moisture.

B. If materials are stored on roof, do not exceed allowable live load of area, store on pallets elevated from roof surface and distributed across roof surface to reduce point loading. Do not double stack pallets. Cover from weather.

C. In cold weather (below 35 degrees F) store felts in warmed enclosure prior to installation. Provide sufficient heat to drive moisture from material.

D. Deliver roofing material in manufacturer's protective containers, unopened with labels intact and legible, and comply with manufacturer's instructions for storage and handling.

E. Make no deliveries to project until ready to install or approved storage provided.

F. Store materials on clean, raised platforms with weather protective covering, when stored outdoors. Coverings secured against wind.

G. Maintain manufacturer's temperature requirements for storage of materials.

H. Provide continuous protection of applied materials against wetting and moisture absorption.

I. Select and operate material handling equipment and store materials as not to damage existing construction, or new roofing system, and without overloading building structural system.

J. Handle and store materials in manner which will not damage material.

K. Heed manufacturer's cautions regarding safe handling, use and storage of materials.

1.6 PROJECT CONDITIONS

A. Proceed with installation of roofing only after substrate construction has been completed, and after penetrating components have been installed, so that membrane will not be penetrated or damaged by subsequent work.

B. Weather Condition Limitations: Proceed with roofing work only when weather conditions comply with manufacturers' recommendations and only when existing and forecasted weather conditions will permit unit of Work to be installed in accordance with manufacturers' recommendations and warranty requirements. Do not exceed temperature limitations recommended by roofing manufacturer.

1.7 WARRANTY

A. Standard Roofing Manufacturer's Warranty: Submit written warranty, signed by roofing system manufacturer agreeing to promptly repair leaks in roof membrane and base flashings resulting from defects in materials or workmanship for warranty period of 30 years.

PART 2 PRODUCTS

2.1 VAPOR RETARDER

A. Asphalt Fiberglass Felt: ASTM D2178, Type IV. 15 lb. base sheet felt with asphalt primer as specified herein.

2.2 THERMAL BARRIER (METAL DECK)

A. Dens-Deck UL rated 5/8 inch thick gypsum roof board by Georgia-Pacific.

B. Other acceptable Product: USG Securock roof boards.

2.3 INSULATION

A. Polyisocyanurate Foam Board Insulation: Rigid boards of minimum 2 lb/cu ft density polyisocyanurate based foam core, permanently bonded to roofing felt facer sheets. Provide in thickness indicated, with minimum aged K-value of 0.17. Taper as required, with slopes as indicated.

1. Meet FM 4450 and UL 1256.

B. Insulation Cover: Factory fabricated celluosic fiber insulation, minimum 1/2 inch thickness. Miter boards at direction changes.

2.4 MODIFIED BITUMEN ROOFING TYPE AND MANUFACTURER

A. Type and Manufacturer: Firestone SBS Modified Bitumen Roofing Membrane System with SBS FR finish by Firestone Building Products.

B. Other Acceptable Manufacturers:

1. Garland.
2. GAF.
3. U.S. Intec.
4. John Mansville.
5. Or District approved equal.

C. Finish: White colored mineral granule finish.

D. General: Manufacturer's requirements for twenty-year roofing and flashing for type of deck and other conditions shall be strictly adhered to, or as specified herein, whichever may be in excess of roof manufacturer's normal roof specifications as such additional requirements shall be provided. For all modified bitumen membrane materials, provide products of one manufacturer.

2.5 MODIFIED BITUMEN ROOFING AND FLASHING MATERIALS

A. Provide materials that conform to ASTM Standards where they apply as minimum requirements as well as equal to specified materials.

B. Base Sheet Felt: ASTM D4601.

C. Asphalt Primer: ASTM D41.

D. Asphalt Bitumen: ASTM D312, Type III.

E. Modified Asphalt Bitumen: Mixture of selected bitumen and SBS polymer as standard with roofing manufacturer.

F. Modified Bitumen Membranes: Styrene-butadiene-styrene smooth and FR modified bitumen roofing membranes for two ply system.

G. Membrane Flashing: Same as membrane material.

H. Pourable Sealer: As recommended by roofing manufacturer.

I. Termination Bar: 0.094 inch by 1.35 inch by 10 feet aluminum with integral caulk ledge.

J. Flashing Cement: As recommended by roofing manufacturer. Minimum standards FS SS-C-153, Type 1 or Type 2 as required.

K. Walkway Protection: Apply modified bitumen membrane to finished roofing system using standard mopping techniques.

L. Granular Surfacing Finish: White colored mineral granule finish.

2.6 FASTENERS

A. Base Flashing System: Galvanized 1-1/4 inch barbed galvanized roofing nails through one inch metal discs into wood members and one inch barbed galvanized roofing nails through one inch metal discs into vertical plywood blocking.

B. Insulation Fastener: Heavy duty threaded fasteners with 4-coat fluorocarbon polymer coating and drill point tip capable of penetrating 20 gauge steel, complying with SAE 1022, heat treated, with insulation plate.
   1. Length sufficient to penetrate deck minimum of 3/4 inches for steel and one inch for wood and concrete.
   2. Structural concrete decks shall be pre-drilled with 7/32 inch carbide drill bit to depth 1/2 inch deeper than the fastener engagement.

C. Scupper Flanges to Wood Blocking: 1-3/4 inch galvanized roofing nails.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. General: Perimeter wood blocking, insulation and sheet metal installation shall, as minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, June 1985.

B. Workmanship and Requirements: Conform to best practice and accomplish by using only skilled mechanics. Exercise special care at openings through roof and at roof edge. Spill no roofing materials on other building materials. Spilled materials on exposed surface will result in roofer repairing, resurfacing or replacing stained work. Install roofing in accordance with manufacturer's requirements. No part of roofing system and materials shall be left exposed to inclement weather during application or at end of working day.

C. General Responsibility: Perform no work in conflict with, contrary to, or below standards established by roofing or membrane materials manufacturer. After starting work, roofer is responsible for complete water integrity of membranes, checking work installed on roof and other membranes, and for properly applied membrane. Therefore roofer shall:
   1. Not apply membranes or other work under any conditions which are not proper and in best recommended practices, including surfaces or weather.
   2. Examine roof decks and other surfaces for suitability of surfaces and do not proceed until corrections have been made where necessary.
   3. Not install membranes or other materials that have been exposed to moisture; store membranes off ground and cover with waterproof membrane. Discard materials that have been exposed to moisture.
   4. Review drawings and specification requirements and establish control procedures to insure compliance.
   5. Exercise care to insure adequate quantities of materials are used.
   6. Provide continuous and competent supervisor, with authority to discard unsuitable materials or remove unsatisfactory workers.
   7. Supervise installation of and be responsible for seeing that drains, curbs and other work are properly set and roof is not damaged; make roof and flashing repairs as necessary.
   8. Resolve questionable installation work prior to proceeding.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at roof penetrations and terminations and match thicknesses of insulation required. Verify that wood nailer strips are located perpendicular to roof slope and are spaced according to requirements of roofing system manufacturer.

C. Do not proceed with installation until after minimum concrete curing period recommended by roofing system manufacturer.

D. Verify that flatness and fastening of metal roof decks comply with installation tolerances specified. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane.

3.3 PREPARATION

A. Surfaces: Properly prepare surfaces to provide and insure best installation. Decks and other surfaces shall be clean and dry. Sweep and clear areas thoroughly before starting work. Do not start work during threatening weather. Do not proceed over frosty or damp surfaces. Remove snow from decks and clean thoroughly before starting.

B. Deck Smoothness: Check deck for smoothness and for suitability to receive materials. Have corrections made to provide deck that meets project requirements and roofer's approval.

C. Protection: Cover side of building where materials are hoisted to prevent damage and bitumen spills.

D. Waterstop: Schedule and perform work to provide waterstop at end of daily work.

3.4 VAPOR RETARDER

A. Vapor retarder application:
   1. Prime concrete at rate of one gallon per 100 square feet.
   2. Install fiberglass felt in continuous shingle fashion
      a. Install direct to concrete.
      b. Install over thermal barrier insulation over metal deck.
   3. Maximum moisture content of felt at time of application shall be one percent of dry weight.
   4. Provide full, uniform mopping of asphalt for vapor barrier application.

B. Broom, or press, felt into hot bitumen providing tight, smooth application without wrinkles, buckles, kinks, or “fishmouths”.
   1. Carry vapor retarder minimum of 8 inches up vertical surfaces.

3.5 MODIFIED BITUMEN ROOFING

A. Base Sheet at Concrete Deck: Install base sheet at concrete decks with full mopping of hot steep asphalt in accordance with recommendations of NRCA - National Roofing Contractors Association. Lap base sheet minimum of 3 inches for side laps and 6 inches for end laps. Provide offset between the side and end laps of the base sheet and the roof membrane of 6 inches minimum in all cases.

3.6 ROOFING AND INSULATION

A. General: Use only dry, undamaged and properly mopped membranes. Complete roofing in one operation without phases. Lay plies "shingle fashion" at one time (no "combination" laying).

B. Use spot moppings of asphalt if required for application of each layer of insulation.

C. Maximum moisture content of insulation at time of application shall be 4 percent of dry weight.

D. Stagger joints of upper layer with joints of bottom layer and stagger short joints in each layer. Stagger joints a minimum of 25 percent of board dimension.

E. Lay with edges in moderate contact, but do not force into place.

F. Fill insulation joints wider than 1/4 inch with insulation cut to fit.

3.7 BITUMEN

A. Maximum bitumen temperature in heating equipment.
   1. Bitumen shall not be heated to minimum flashpoint.
   2. Minimum finished blowing temperature for asphalt shall not be exceeded for more than total of 4 hours for any asphalt batch, or portion thereof.
   3. Remove from project, bitumen heated above these limits.

B. Temperatures at time and point of application:
   1. Bitumens shall be within 25 degrees F of their equiviscous temperature when applied in roof system.
   2. Bitumens not meeting this criterion shall be reheated or allowed to cool, as required.

C. Rate of bitumen application:
   1. Insulation: 25 lbs. per 100 square feet.
   2. Interply moppings for membrane, and over insulation: 25 lbs. per 100 square feet of asphalt, with tolerance of -15 percent and +15 percent.

D. Modified Bitumen Membrane: Hot mop membrane beginning at low point of slope and position square with roof edge. Side laps shall be perpendicular to roof edge. Completely unroll membrane and align. Remove roll wrapping tape before mopping membrane.
   1. Hot mop membrane base sheet to recovery board and lap sheet a minimum of 3 inches for side laps and 6 inches for end laps. Maintain a 6 inch minimum offset between the side and end laps of base sheet.
   2. Hot Mop face of roll and previously installed membrane's top surface at seaming area. Trowel seam area if slight puddling occurs so minimum 1 inch of flow is observed.

E. Repair of Modified Bitumen Membrane: Cut and lay membrane flat at wrinkle or fishmouth so as not to create hump or void and repair with section of membrane. Provide minimum 4 inch extension around cut or puncture in all directions. Round corners of patching material.

F. Drains: Keep drains free of bitumen and other materials so strainer can be removed. Set flashing plies, flashing clamp and drain in plastic cement for at least 2 feet around drain. Use plastic cement only if acceptable to membrane manufacturer.

G. Obstructions and Roof Penetrations: Perform and install work around openings with plastic cement, including drains, vents and similar items. Double felt flash flanges into roofing. At pipes, conduits and similar round items (without flanges) which penetrate roof, install plastic flashing sealed to obstruction and carried out onto roof at least 8 inches, built into roofing.

H. Cutoffs: Do not install permanent cutoffs except at edges and curbs, unless specifically required by manufacturer. Install temporary water cutoffs each time work is suspended (daily) and remove prior to proceeding with work. Extend membrane minimum 2 feet and apply continuous layer of roofing cement onto substrate and membrane edge. Firmly embed roof membrane into roof cement and provide continuous pressure over length of cut-off.

I. Membrane Type Walkways: Provide walkway protection membrane at locations shown or required by membrane manufacturer, using membranes of size shown or, if sizes not shown, using membranes of manufacturer's standard size..

J. Granulated Surface Finish: When torching granulated modified bitumen sheet areas such as end laps, base flashing, and patches that have granules on receiving surface, embed granules in underlying sheet.
   1. Embed granules with a hot trowel by heating surface and troweling-in granules until uniform black surface coated with compound is achieved in lap area.
   2. Any area of sheet not protected with granule surface should be dressed with additional loose granules or patched with additional piece of granule surfaced modified.

3.8 FLASHING

A. Vertical Surfaces, Modified Bitumen Membranes: At intersections of horizontal surfaces to walls, curbs, penetrations and similar vertical surfaces with cant, carry felts of membrane up cant, cut off evenly 8 inches above roof membrane and torch apply. Flashing shall extend minimum of 6 inches onto field membrane. Cut membrane with hook blade knives.

B. Metal Roof Edge Cover: Carry roofing membrane to top of wood cant and up and over and heat properly and flop (mop and flop method) into place. Seam membrane portion extending onto field surface to field membrane. Use membranes of size which will not allow cooling of bitumen before being flopped into place.

C. Miscellaneous: Install flashing membranes, including at parapets, curbs, vertical surfaces and flashing at roof edges as recommended by manufacturer for ten-year warranty, or as specified above, whichever is most rigid requirement.

3.9 WALKWAY PAD INSTALLATION

A. Installation of Walkway Pads:

1. Where modified bitumen pads are indicated, install pads in full bed of bitumen, leaving minimum of one inch between pads for drainage.

3.10 INSPECTIONS AND SERVICE

A. Project Completion: Just prior to acceptance of entire project, roofing Installer shall inspect entire roof, remove debris, nails, wire, and cut metal. Remove drips or bitumen.

B. Restoration: Installer shall repair or replace (as required) deteriorated or defective work found at time of final inspection. Installer shall repair damages to roofing which occurred subsequent to roofing installation and prior to final inspection. Repair or replace roofing and associated work to condition free of damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 075400
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanically anchored thermoplastic single ply membrane roofing.
   2. Flashing, adhesive, in-seam sealant, splicing cement, lap sealant, mastic, sealer and wood nailers, in connection with thermoplastic sheet roofing.
   3. Thermal barrier.
   4. Thermal roof insulation and vapor retarder.
   5. Manufacturer's standard 20-year warranty.
   6. Protection of roofing.

B. Related Sections:
   1. Section 076210 - Prefinished Flashing and Sheet Metal.
   2. Section 061000 - Carpentry: Wood curbs and nailers.
   3. Section 077233 – Prefabricated Roof Curbs.
   4. Section 079000 - Joint Sealers: Other sealants.
   5. Section 072100 - Building Insulation: Other insulation.

1.2 REFERENCES

A. American Society for Testing Materials (ASTM).

B. Factory Mutual Engineering Corporation (FM) Class 1 Fire Resistance and I-60/90 Wind Uplift Specifications and Loss Prevention Bulletins (1-28, 1-29S, 1-49).

C. Underwriters Laboratories Inc. (UL).

D. Warnock Hersey International.

E. North American Insulation Manufacturers Association (NAIMA).

F. Single Ply Roofing Institute (SPRI): Wind Design Guide for Mechanically Fastened Roofing Systems.

1.3 SYSTEM DESCRIPTION

A. (TPO-1): Mechanically anchored thermoplastic single ply membrane over flat insulation (R-25) with thermal barrier and vapor retarder on metal decking.

1.4 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300, indicating roof size, location and type of penetrations, perimeter and penetration details, roof insulation make-up and layout that have been accepted by authorized manufacturer's representative.

B. Testing: Submit 2 copies of fastener test results.

C. Compliance: Submit compliance from insulation manufacturer that insulation furnished conforms to specified product.

D. Warranty: Submit 2 copies of manufacturer's warranty for thermoplastic sheet single ply roofing.

E. Deviation to Details: If deviations to indicated details are desired, submit proposed detail changes not later than 10 days prior to bid date.

F. Installation Instructions: Submit two copies of Manufacturer’s installation instructions in accordance with Section 013300.

1.5 QUALITY ASSURANCE

A. Manufacturer: Manufacturer shall assure qualifications of installer and suitability and compatibility of system.
   1. Prime Manufacturer: History of successful installations minimum ten years old.

B. Approved Applicator: Applicator shall have not less than 3 years of successful experience in installation of similar roofing systems and shall be certified in writing by manufacturer as a licensed or approved applicator.

C. Inspections for Warranted Roofs: Conducted by technical employee of manufacturer, not sales representative, unless sales representative is factory authorized inspector.

D. Pre-Roofing Conference: Prior to installation of roofing and associated work, meet at project site with installer, roofing manufacturer, installers of related work, and other entities concerned with roofing performance. Record discussions and agreements and furnish copy to each participant.
   1. Provide at least 72 hours advance notice to participants prior to convening pre-roofing conference.

E. FM Listing: Sheet membrane, base flashings and component materials shall comply with FM 4450 and FM 4470 and are listed in FM's "Approval Guide" for Class 1 or non-combustible construction as applicable.

F. Compatibility: All roofing components shall be compatible.

G. Wind Uplift: Secure roofing to comply with Factory Mutual FM-I-90 requirements.

1.6 PRODUCT HANDLING

A. Deliver thermoplastic sheet single ply roofing material in manufacturer's protective containers, and comply with manufacturer's instructions for storage and handling.

1.7 PROJECT/SITE CONDITIONS

A. Proceed with installation of mechanically attached thermoplastic sheet single ply roofing only after substrate construction has been completed, and after penetrating components have been installed, so that membrane will not be penetrated or damaged by subsequent work.

B. Weather Conditions: Proceed with mechanically attached thermoplastic sheet single ply roofing work only when weather conditions comply with manufacturer's recommendations, and will permit materials to be applied and cured in accordance with those recommendations. Do not exceed temperature limitations recommended by roofing manufacturer.

1.8 WARRANTY

A. Completed mechanically attached thermoplastic sheet single ply roofing installation shall be warranted by sheet roofing manufacturer, in accordance with manufacturer's standard warranty, for period of 20 years.

PART 2 PRODUCTS

2.1 VAPOR RETARDER

A. Fully adhered membrane similar to V-Force Self Adhering Air and Vapor Retarder, or District approve equal: 32 mil thick unreinforced membrane with a permeability rating of 0.05 perms (ASTM E-96), compatible with adhesive. Provide vapor retarder required by membrane manufacturer consistent with system warranty so that all components are from a single manufacturer and each component of roof system is included in warranty.
   1. Primer and Adhesive: Follow manufacturer's written instruction for application of primer and vapor retarder on approved substrates. VOC: less than 100 g/l.
   2. Select Primer capable of withstanding moisture exposure.

2.2 THERMAL BARRIER

A. Type and Manufacturer: 5/8 inch UL rated Dens-Deck gypsum roof board by Georgia-Pacific, or District approve equal.

2.3 ROOF INSULATION

A. Polyisocyanurate Foam Board: Closed cell polyisocyanurate foam core with laminated black glass reinforced mat facer complying with ASTM C 1289.
   1. Density: 2.0 pcf per ASTM D1622
   2. Compressive Strength: 25 psi minimum per ASTM D1621 Procedure A
   3. Meets FM 4450 and UL 1256.
   4. Moisture Vapor Transmission: 1.0 perms maximum.
   5. Thickness: Provide thickness and slope as indicated. Provide minimum of 3 inches.
   6. R-Value: 5.6 design stabilized R-value according to RIC/TIMA Bulletin No. 101.

B. Factory taper insulation to provide smooth incline of slopes as shown on drawings. (Factory miter valleys and corners.)

C. Multiple Layers: Furnish in not less than 2 layers.

D. Insulation Fasteners: Refer to Membrane Fasteners specified herein.

2.4 MECHANICALLY ANCHORED THERMOPLASTIC SINGLE PLY MEMBRANE ROOFING

A. Mechanically anchored Ultra Ply 60 mil thick thermoplastic alloy with polyester reinforced weft, thermoplastic sheet roofing system, UltraPly by Firestone Building Products.

B. Other Manufacturers: Johns Mansville, Carlisle, or District approve equal.

C. Sheet Membrane: Minimum 0.060 inch thick compounded thermoplastic membrane, largest sheet size possible as determined by membrane manufacturer.

D. Flashing: Minimum 0.045 inch thick. Provide longest pieces of flashing practicable.

E. Miscellaneous Accessories: Bonding adhesive, pourable sealers, splicing cement, lap sealant, water cut-off mastic, and preformed cone and vent sheet flashing and inside and outside corner sheet flashing, T-joint covers, seam caulk, tape, termination reglets and other accessories: As recommended by membrane roofing manufacturer.

F. Kraft Paper: Heavy duty type. Provide 12 inch wide strips under splices over polystyrene insulation to protect insulation from splicing materials.

G. Compressible Tube Joint Filler: Armstrong Armaflex.

H. Nailers, Blocking: No. 2 or better dimensional lumber, pressure-treated for rot resistance as specified in Section 061000 - Carpentry.
   1. Provide drilled at 6 inch on center, or pre-drilled rubber fastening strip for membrane nailer strip as recommended by manufacturer.

I. Walkway Protection: Sized membrane pads, adhered to roof membrane.
   1. Compatible adhesive.

2.5 MEMBRANE FASTENERS

A. Fasteners (Mechanical Fastening): Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance requirements of FM 4470, and as recommended by roofing manufacturer.
   1. Insulation Plates: Corrosion-resistant type plates as specified above.

B. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
   1. Batten Layout Category: Follow category securement requirements as recommended by manufacturer for intended use.

C. Membrane Nailer to Wood: Coated screws of sufficient length to penetrate minimum one inch into wood or masonry substrate. Install screws using manufacture's approved screw guns.

D. Metal Termination Bars: Manufacturer's standard aluminum bars, approximately 1 inch wide, roll formed and prepunched.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate and conditions under which elastic sheet roofing work is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Verify that penetrations, expansion joints, and blocking are in place and secured and that roof drains are properly clamped into position.

3.2 ROOFING CUT-OFFS

A. Coordinate installation so that each area is made watertight at the end of each work period. Provide water cut-offs by extending the membrane beyond the insulation and securely setting the edge of the membrane into 6 inch wide band of plastic roofing cement and placing weight on the adhered edge to prevent displacement.

1. Remove cut-offs prior to the start of the next work period by cutting of the membrane section in contact with the plastic roofing cement and disposing of it.

3.3 SUBSTRATE PREPARATION

A. Comply with sheet membrane manufacturer's instructions for preparation of substrate to receive thermoplastic sheet roofing.

1. Clean substrate of dust, debris and other substances detrimental to thermoplastic sheet roofing work.
2. Install slip sheet if recommended by membrane manufacturer.

3.4 THERMAL BARRIER

A. Lay thermal barrier without adhesive perpendicular to roof deck direction with end joints occurring over crests of steel deck and staggered 2 feet in adjacent rows.

1. Neatly cut and fit around penetrations and projections.
2. Install only as much thermal barrier as can be covered same day with vapor retarder, insulation and membrane.

3.5 VAPOR RETARDER

A. Install vapor retarder using approved primer on all substrates, in a single layer, shingle fashion from low to high, with all laps 2 -1/2 inches minimum and end laps staggered, each sheet.

1. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive approved by FMG's Approval Guide.

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

3.6 ROOF INSULATION

A. Install and secure roof insulation to roof deck in accordance with manufacturer=s requirements. Stagger joints between layers, minimum of 2 layers. Insulation joints shall be 1/4 inch or less in width.

1. Neatly cut and fit insulation around roof penetrations and projections. Install only dry insulation and only as much insulation as can be covered same day with membrane.
2. Install tapered insulation around roof drains to provide proper slope for drainage.

B. Recovery Board: Place immediately under roofing membrane with joints staggered from insulation below.

1. Secure insulation boards with fasteners and insulation plates to roof deck:

C. Steel Decking: Minimum 1/2 inch fastener penetration through the deck using minimum of 16 fasteners per 4 foot by 8 foot board and with additional fasteners at perimeter and corners as required by FM-I-90.
   1. Test fasteners for pull-out resistance as specified.

3.7 WOOD NAILERS

A. Wood nailer height shall match total thickness height of insulation being used and shall be installed with 1/8 inch gap between each length of wood nailer.
   1. Fasten wood nailers to deck or wall at maximum 16 inch on center in manner to resist force of 200 pounds per foot in any direction.
   2. Where nailers are required to be flush at point of contact with roofing membrane, taper wood nailers.

3.8 MECHANICALLY FASTENED SHEET ROOFING INSTALLATION

A. Install thermoplastic sheet single ply membrane roofing to exclude water in accordance with manufacturer's printed instructions.
   1. Install Kraft paper under splices over polystyrene insulation.
   2. Field weld or Join seams of thermoplastic sheet roofing material by thoroughly solvent washing, brush applied primer, if required, and brush applied solvent.
   3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

B. Loosely lay sheet membrane over roof insulation and allow membrane to relax before fastening or splicing.
   1. Apply adjoining sheets by lapping edges a minimum of 3 inches and splicing. Thoroughly seal laps, including use of lap seal as final application. Stagger end laps.
   2. Apply roofing sheet with side laps shingled with slope of roof deck.
   3. Mechanically fasten membrane at terminations, to nailers and around penetrations using membrane fasteners. Install membrane at wood or masonry with screw gun.
   4. At in-seam attachment, secure one edge of sheet using fastening plates or battens centered within the membrane seam and mechanically fasten sheet to roof deck. Field-weld or join seams as specified.
   5. Test lap edges with probe to verify seam weld continuity. Apply seam caulk to seal cut edges of sheet membrane.

C. Complete splice between flashing and sheet roofing before bonding flashing to vertical surface. Adhesively apply flashing and nail at top of flashing.
   1. Flash penetrations passing through sheet membrane and field-formed inside and outside corners as recommended by manufacturer.
   2. Install flashing where indicated, extend vertically minimum of 8 inches.
   3. Clean seam areas, overlap sheets, and firmly roll flashings into adhesive. Weld side and end laps to ensure a watertight seam installation.
   4. Test lap edges with probe as specified.
   5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

D. Roof Drains: Comply with membrane manufacturer's and drain manufacturer's recommended installation procedures.
   1. Spread sealant bed over deck drain flange at deck drains and securely seal roofing sheet in place with clamping ring.

E. Walkway Protection: Install paver units at locations shown and where required for access to roof mounted equipment. Place pavers carefully to avoid damage to membrane, laying over additional layer of roof membrane material.

3.9 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
   1. At end of construction period, or at time when remaining construction will in no way affect or endanger roofing, make final inspection of roofing and prepare written report to Owner, describing nature and extent of deterioration or damage found.
   2. Notify Architect 48 hours in advance of the date and time of inspection.

3.10 PROTECTION OF ROOFING

A. Upon completion of roofing (including associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. Maintain roof free of nails, screws, scrap and other foreign objects.

B. Repair or replace (as required) deteriorated or defective work found at time of final inspection to condition free of damage and deterioration at time of Substantial Completion and in accordance with requirements of specified warranty.

END OF SECTION

SECTION 076210
PREFINISHED SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Prefinished sheet metal flashing, roof edge, coping, expansion and contraction joint covers, parapet wall covers.
   2. Counter flashings for roof hatches and roof mounted mechanical equipment/services.
   3. Membrane flashing liner under metal flashing and sheet metal.
   4. Shop fabricated interior and exterior corners for roof edge flashing, copings, base flashing, and counterflashing, where applicable.
   5. Sealant concealed within sheet metal.

B. Related Sections:
   1. Section 061000 - Rough Carpentry: Wood blocking, nailers, grounds.
   2. Section 079000 - Joint Protection: Exposed sealants.

1.2 REFERENCES

A. "Architectural Sheet Metal Manual" standard industry details by SMACNA.

1.3 PERFORMANCE REQUIREMENTS

A. Install sheet metal and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking and fastener disengagement.

B. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300.
   1. Clearly detail shaping, jointing, length of sections, fastening, and installation details.

B. Samples: Submit in accordance with Section 013300 indicating metal finish.

C. Warranty: Submit 2 copies of manufacturer's written warranty.

1.5 QUALITY ASSURANCE

A. High performance roof edge system shall be certified by the manufacturer and/or fabricator to comply with ANSI/SPRI Standard ES-1.

1.6 PROJECT/SITE CONDITIONS

A. Exercise care when working on or about roof surfaces to avoid damaging or puncturing membrane or flexible flashings.

B. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

1.7 WARRANTY

A. Special Finish Warranty: Submit manufacturer's 20 year written warranty covering failure of the factory-applied exterior finish on sheet metal and agreeing to repair finish or replace sheet metal that evidences finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

PART 2 PRODUCTS

2.1 MATERIALS

A. Type and Manufacturer (SMF-1): Ryerson ColorKlad precoated galvanized metal, ASTM A525 G-90 shop coated with Kynar fluoropolymer coating in color as selected by Architect from manufacturers standard.

B. Type and Manufacturer (SMF-2): Ryerson ColorKlad pre-finished aluminum flashing, ASTM B 209 alloy, shop coated with Kynar fluoropolymer coating in color as selected by Architect.

C. Other Acceptable Sheet Metal Manufacturers: Peterson Aluminum Pac-Clad, Firestone Metal Products Una-Clad, Berridge Manufacturing, Dura Clad, or District approved equal.

D. Anchorage: Nails and screws of hot dip zinc coated steel. Use screws where exposed anchorage is required. Screws minimum 1-1/2 inch long with neoprene washer under screw head. Exposed surfaces with finish to match color of sheet metal.

E. Concealed Sealant: Tremco curtain wall sealant.

F. Membrane Flashing:

1. (MEMB FLASH-1): Cold-applied self-adhering membrane of rubberized asphalt integrally bonded to polyethylene sheeting, Ice and Water Shield by Grace Construction Product.
   a. Other Acceptable Manufacturers:
      1) Polyken Technologies Polyken 640 Ice-O-Late.
      2) Carlisle Coatings & Waterproofings WIP 300HT.
2. (MEMB FLASH-2) EPDM Rubber Sheet Membrane Flashing: ASTM D 6134, Type I, 60-mil-thick flexible sheet, unreinforced, formed from EPDM.
   a. Manufacturers:
      1) Carlisle Coatings & Waterproofing Inc..
      2) Firestone Building Products.
      3) Johns Manville.
      4) Versico.
3. Accessories: Furnish auxiliary materials including sheet flashing and bonding adhesive, recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

2.2 FABRICATION

A. Factory fabricate metal flashing and sheet metal in accordance with reviewed shop drawings and standard industry details by SMACNA in "Architectural Sheet Metal Manual."

1. Provide interior and exterior corners, where applicable to site conditions.

B. Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate and conditions under which flashing and sheet metal work is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sheet metal work in accordance with reviewed shop drawings and Architectural Sheet Metal Manual with sharp clean breaks.

B. Lower edge of flashing, counter flashing and exposed metal edges shall be turned back into hemmed edge.

C. Flashing shall be securely fastened and water and weatherproof. Neatly install with sharp clean breaks. Metal work at roof shall meet roofer's requirements and approval.

D. Butt and locked joint in metal work shall be watertight. Joints shall be lapped in direction of flow.

E. Provide lead wedges where required to hold metal firmly in place.

F. Install work with proper allowance for expansion and contraction from thermal changes.

G. Prior to starting work, nailers and blocking shall be true to size and line and securely anchored. Do not proceed until corrections are made so straight, level, plumb and properly sized work results.

H. Carefully form flashings, including at masonry, to conform to material dimensions as shown and according to field dimensions as verified.

I. Join lengths of gutters and downspouts with formed seams sealed watertight. Flash and seal gutters to downspouts. Slope gutters to downspout.

3.3 LOCATION OF JOINTS IN METAL

A. Center roof edge cover joints on other building features, symmetrical on facade, with joints not to exceed 10 feet o.c., as directed by Architect.

B. Joints in other metal work may be placed where convenient to metal lengths, not to exceed 10 feet lengths.

C. Cut metal for installations to maintain uniform 1/4 inch joint.

3.4 TYPES OF METAL END JOINTS

A. Flush, butt type with backplate for expansion at: Roof edge covers and expansion joint covers.

B. Cover strip over joint, with single lock seam: Typical curb covers.

C. Lapped joints at: Counter flashing, reglets, and similar cover type metal.

3.5 CONSTRUCTION OF END JOINTS

A. Butt Joints with Backplate for Expansion: Provide backplates same gauge and metal as flashing, 6 inch wide (2-7/8 inch each side of joint) conforming to exact shape of back of metal and full profile of metal after forming (except hems).

1. At both ends of each length of flashing metal, provide not less than 3 bent clips riveted near end, to receive backplate. Backplates are to slip under bent clips and shall form tight contact with flashing or cover metal.
2. In installation, butter bed of sealant on backplate and slide section of metal onto backplate, such that backplate fits into clips to hold metal tight and in perfect alignment. Repeat until metal has been set. At joints, install screws with neoprene washers through backplate without fastening to metal flashing length. (Notch out ends of flashing metal to accommodate screw heads and to eliminate obstructions for metal expansion.) Provide screw with neoprene washer at center of each length of roof metal flashing. Provide keepers or cleats to keep metal in place.

B. Locked Cover Strips: Cover strip shall have same profile as flashing and be formed with single lock seam to metal each side of joint. Locked seam joints shall have about 3/4 inch seam lock, with flashing spaced about 3/8 inch and shall permit movement at each joint.

C. Lapped Joints: Lap 3 inches in direction of water flow. At counterflashings, lock bottom edges together.

D. Sealant: Apply concealed sealant in accordance with requirements of Section 079000 - Joint Sealers.

E. At corners, inside or outside type, provide neat corner sections built-up in shop; with soldered joints and follow profile of adjacent metal. No nails permitted at exposed surfaces of exposed roof metal, only screws shall be used. Set roof edges in cooperation with roofer. Form angles to lesser degrees than required to insure snug fit after installation.

3.6 MEMBRANE FLASHING

A. Install membrane flashing as liner directly under sheet metal. Install membrane in accordance with manufacturer's directions to maintain watertight integrity of flashing materials and installation. Lengths shall be as long as possible by rolls of material. Lap ends minimum 2 inches, seal entire lap with adhesive and clean free of residue.

3.7 COUNTERFLASHING AND CURB FLASHING

A. Install metal counterflashing after membrane flashing is installed. Secure with screws through neoprene washers and locate not to exceed 18 inches o.c. Lap joints and lock lower edges together.

B. Install counterflashing to provide watertight closure over top of roofing flashing. Corners at curbs shall be sealed watertight. Height of counterflashing above membrane as indicated, with counterflashing carried down 45 degrees cant strip to about 1/2 inch above roof insulation. Bottom edge shall be hemmed (turned back) to eliminate sharp edges.

C. Counter-flash mechanical and electrical items projecting through membrane roofing.

3.8 CLEANING

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

END OF SECTION

SECTION 077233
PREFABRICATED ROOF CURBS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Prefabricated roof curbs.

B. Related Sections:
   1. Section 053100 - Steel Decking.
   2. Section 075216 – (SBS) Modified Bitumen Roofing.
   3. Section 075400 – Thermoplastic Membrane Roofing.
   4. Section 076210 - Sheet Metal Flashing and Trim: Flashing roof hatches to roof system.
   5. Section 099000 - Painting: Field painting.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.

1.3 QUALITY ASSURANCE

A. Standards: Comply with the following:
   1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
   2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Roof Curbs and Equipment Supports:
      a. AES Industries, Inc.
      b. Curbs Plus, Inc.
      c. LM Curbs.
      d. Pate Co.(The).
      e. Roof Products & Systems Corp.
      f. ThyCurb, Inc.

2.2 ROOF CURBS

A. General (PRC-1): Provide roof curbs capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

B. Fabrication: Unless otherwise required for strength, fabricate units from minimum 0.0747-inch thick, structural-quality, hot-dip galvanized or aluminum-zinc alloy-coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.
   1. Provide preservative-treated wood nailers at tops of curbs and formed flange at perimeter bottom for mounting to roof.
   2. Provide manufacturer's standard rigid or semirigid insulation where indicated.
   3. Provide reinforced sides when length is greater than 3 feet.
   4. Provide formed cants and base profile coordinated with roof insulation thickness.
   5. Fabricate units to minimum height of 8 inches above roof membrane, unless otherwise indicated.
   6. Sloping Roofs: Where slope of roof deck exceeds 1/4 inch per foot, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that roof curb installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

3.2 INSTALLATION

A. Install roof curbs in accordance with manufacturer's recommendations.

B. Coordinate with installation of roofing system and related flashings. Provide weather tight installation.

C. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

END OF SECTION

SECTION 078100
APPLIED FIREPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparation of substrates.
   2. Wet-mix sprayed fireproofing.
   3. Test data, literature and samples.
   4. Patching and repairs.
   5. Protection and cleaning.

B. Related Sections:
   1. Section 051200 - Structural Steel Framing.
   2. Section 053100 - Steel Decking.
   3. Section 078400 - Firestopping.
   4. Section 078443 – Fire-Resistant Joint Systems.
   5. Section 092900 - Gypsum Board.

1.2 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's specifications including certification from materials manufacturer required to show material compliance with Contract Documents.
   1. Submit U. S. Department of Labor Material Safety Data Sheets (MSDS) for hazardous materials used during Work of this Section.

A. Shop Drawings: Framing plans, schedules, or both, indicating the following:
   1. Extent of fireproofing for each construction and fire-resistance rating.
   2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
   3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
   4. Treatment of fireproofing after application.

B. Samples: Submit to Architect for review.
   1. Submit samples of cured fireproofing material, size 3-1/2 inch by 4-1/2 inch, in accordance with Section 013300.

C. Manufacturer's Certificates:
   1. Certification from manufacturer, stating that proposed material is free of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite and asbestos contaminated vermiculite.
   2. Certification by manufacturers that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
   3. Fireproofing Product Certificates: Provide certificates from fireproofing manufacturer, for each fireproofing product required, indicating that:
      a. Steel to receive sprayed fireproofing should be unprimed; however, if it is primed, sprayed fireproofing manufacturer certify primers applied to steel in shop or field are compatible with sprayed-on fireproofing and will not impair its performance under fire exposure for applications indicated, as provided by ASTM E119 test. Include test and other data as evidence. Coordinate with structural steel Sections.
      b. Each fireproofing product complies with specified product requirements and is suitable for use indicated.
      c. Sprayed fireproofing has been completed in accordance with requirements to provide necessary fire resistance ratings. Provide Ratings Certificate.
   4. Manufacturer Letter: Verifying that the UL Designs selected for the project are not load restricted.

D. Test Data: Submit laboratory test results for sprayed fireproofing for following, upon request.
   1. Corrosion Resistance per Military Specification MIL-E-5272C and ASTM E937.
   2. Deflection per ASTM E759.
   3. Bond Impact per ASTM E760.
   4. Compressive Strength per ASTM E761.
   5. Bond Strength per ASTM E736.
   6. Air Erosion per ASTM E859.
   7. Surface Burning Characteristics per ASTM E84.
   8. Indentation Hardness per ASTM C569.
   9. Dry Density per ASTM E605.
   10. Definition of Cementitious Materials - UL.

E. Laboratory Test Reports and Engineering Studies: Submit in accordance with ASTM E119, indicating fire endurance as required to satisfy codes or other requirements. Extracts of classified listings of such tests performed by Underwriters Laboratories, Inc. (ULI) of Northbrook, Illinois, or Underwriters Laboratories of Canada (ULC) of Scarborough, Ontario, Canada, are acceptable.
   1. Test results from independent testing laboratory indicating compliance of sprayed-on fireproofing products with performance requirements indicated, including asbestos content where applicable. Density requirements should be tested in accordance with the Displacement method per AWCI Tech Manual 12-A, 5.4.5.
   2. Test results of in-place performance as required under Part 3 of this Section for field quality control.

1.3 QUALITY ASSURANCES

A. Single Source Responsibility: Obtain wet-mix sprayed-on fireproofing materials (SFRM) from single manufacturer for each different product required.

B. Fireproofing Installer: Licensed, qualified, experienced and approved by manufacturer to apply fireproofing materials as specified. Applicator to have been in continuous business for not less than the past 5 years. Applicator shall provide, in writing, names of previous projects, comparable in type and size, successfully completed on time.

C. Testing Agency:
   1. Testing Laboratory Qualifications: Independent testing laboratory shall demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E-699, that has experience and capability to conduct satisfactorily testing indicated without delaying progress of the Work.
   2. Perform inspection and testing to ensure that applied thickness and density meets fire rating requirements, and verify that installation meets reviewed test reports. Initial inspection and testing shall be paid for by Owner.

D. Assemblies: Restrained and Unrestrained Assemblies Criteria for floor/ceiling and roof/ceiling assembly ratings shall comply with ANSI/UL 263. Provide fire resistance ratings for use in unrestrained conditions unless otherwise indicated.

E. Performance Criteria:
   1. Sprayed Fireproofing: Test by Underwriters' Laboratories in accordance with ASTM E119. Protect structural steel members except those encased in concrete with adequate fireproofing thickness and densities to provide fire resistance ratings as indicated.
   2. Apply materials in accordance with ASTM E84.
   3. Dry Density: Measure field density in accordance with ASTM E605 and displacement method per AWCI Tech Manual 12-A, 5.4.5. Minimum average density as listed in UL Fire Resistance Directory, ICBO Evaluation Report as required by authority having jurisdiction.
   4. Deflection: Material shall not crack, spall or delaminate from surface to which it is applied when tested in accordance with ASTM E759.
   5. Bond Impact: Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from surface to which it is applied.
   6. Bond Strength: Fireproofing, when tested in accordance with ASTM E736, shall have minimum average bond strength of 200 psf.

7. Air Erosion: Maximum allowable weight loss of fireproofing material of 0.005 gpm/ft^2 when tested in accordance with ASTM E859.
8. Compressive Strength: Fireproofing shall not deform more than 10 percent when subjected to compressive forces of 6.9 psf when tested in accordance with ASTM E761.
9. Corrosion Resistance: Test steel with applied fireproofing in accordance with ASTM E937; no corrosion of steel.
10. Abrasion Resistance: No more abrasion or removal than 22 cm^3 from fireproofing substrate when tested in accordance with test methods developed by city of San Francisco, Bureau of Building Inspection, and required by U.S. Navy (NAVFAC).
11. Impact Penetration: No loss of more than 6 cm^3 of fireproofing material when subjected to impact penetration tests in accordance with test methods developed by City of San Francisco, Bureau of Building Inspection, and required by U.S. Navy (NAVFAC).
12. Surface Burning Characteristics ASTM E84:
    a. Flame Spread: 0.
    b. Smoke Development: 0.
13. Resistance to Mold: Formulate fireproofing materials (SFRM) at time of manufacturing with mold inhibitor. Test fireproofing material in accordance with ASTM G21. Material shall show resistance to mold growth when inoculated with aspergillus niger and mixed spore cultures (Tappi T487-M54 and ASTM G21).

F. Codes and Regulations:
1. Supplement this specification by applicable requirements of Building Code and authorities having jurisdiction. Refer conflicts and discrepancies between Contract Documents and ordinances to Architect's attention.

G. Reference Standards:
1. American Society for Testing and Materials (ASTM):
    a. ASTM E84 Surface Burning Characteristics of Building Materials.
    b. ASTM E119 Fire Tests of Building Construction and Materials.
    c. ASTM E605 Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members.
    d. ASTM E736 Cohesion/Adhesion of Sprayed Fire-Resistive Material Applied to Structural Members.
    e. ASTM E759 Effect of Deflection of Sprayed Fire-Resistive Material Applied to Structural Members.
    f. ASTM E760 Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
    g. ASTM E761 Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
    h. ASTM E859 Air Erosion of Sprayed Fire-Resistive Material Applied to Structural Members.
2. Federal Specification (FS)
    a. SS-S-111B Sound Controlling Materials (Trowel and Spray Applications).
3. Military Specification (MIL)
    a. MIL-E-5272C Humidity Test, Procedure III.
4. California Building Code Standard (CBC)
    a. Thickness, Density Determination and Cohesion/Adhesion For Spray-Applied Fire-Resistive Fireproofing.
5. Underwriters' Laboratories, Inc. (UL).
    a. Building Materials Directory.
6. Occupational, Safety and Health Act (OSHA).

H. Mock-Up:
1. Apply typical sample section of not less than 10 square feet to representative substrate on site for review and to establish requirements of fire ratings and finish texture. Comply with project requirements as to thickness, density of application, and fire rating.
2. Examine installation within 24 hours of application to determine variance due to shrinkage, temperature, and humidity. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary.
    a. Provide 2 bond strength tests in accordance with ASTM E736.
    b. Provide 2 dry density tests in accordance with ASTM E605.

c. Mock-up may not remain as part of work.

1.4 DELIVERY, STORAGE AND HANDLING

A. Package materials in sturdy moisture-proof packages and deliver to project properly marked and labeled to show manufacturer's name, brand and certification of compliance with requirements for fire hazard, fire resistance classification, date of manufacture and shelf life.

B. Keep material dry until ready for use, off ground under cover and away from sweating walls and other damp surfaces. Discard bags that have been exposed to water or moisture. Use material before its expiration date.

1.5 PROJECT CONDITIONS

A. Ensure structure and surface to which sprayed fireproofing is applied, is not enclosed and is open to view until application is reviewed.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply spray fireproofing when temperature of substance material and surrounding air are below manufacturer's application recommendations.

1.7 PROTECTION

A. Provide ventilation in areas to receive fireproofing during and 24 hours after application, to maintain non-toxic, unpolluted safe work area.

B. Protect adjacent surfaces and equipment from damage by overspray fall-out, and dusting. Mask adjacent work as required.

C. Provide temporary enclosure to prevent spray from contaminating air.

D. Close off and seal duct work in areas where fireproofing is applied.

E. Protect applied sprayed fireproofing from damage.

1.8 SEQUENCING AND COORDINATION

A. Sequence and coordinate application of sprayed-on fireproofing with other related work specified in other Sections to comply with following requirements:

1. Provide temporary enclosures to prevent deterioration of sprayed-on fireproofing for interior applications due to exposure to unfavorable environmental conditions.
2. Avoid unnecessary exposure of sprayed-on fireproofing to abrasion and other damage likely to occur during construction operations subsequent to its application.
3. Do not apply fireproofing to metal roof decking substrates until application of roofing system has been completed; prohibit roof traffic during application and drying of fireproofing.
4. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, tested, and corrections made to defective fireproofing.

1.9 WARRANTY

A. Manufacturer and installer of applied fireproofing shall provide warranty stating applied fireproofing will remain free from cracks, checking, dusting, flaking, spalling, separation and blistering for minimum period of 2 years. Completely remove and reapply cracked fireproofing to satisfaction of Owner at no additional cost.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND PRODUCTS

A. Sprayed-on Fire-resistant Coating: Cementitious fireproofing, Wet-mix setting based type as defined by Underwriters Laboratories and free from asbestos, actinolite, amosite, anthophyllite, chrysotile and tremolite. No mineral fiber fireproofing allowed.

1. Cementitious Wet Mix Admixtures: Materials (with and without aggregate) which, when mixed in accordance with accompanying instructions forms a slurry or mortar providing properties necessary for conveyance and application to building structures.
2. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    a. Steel members are to be considered unrestrained unless specifically noted otherwise.
    b. UL design listings must state that the loading was determined by Allowable Stress Design Method or Load and Resistance Factor Design Method. UL design listings requiring a load restriction factor are not allowed.
3. VOC Content: Products shall comply with VOC

2.2 MATERIALS

A. (FP-1): Provide standard density material meeting or exceeding 15 pounds per cubic foot per ASTM E605, no fungal growth per ASTM G21. For concealed locations and in plenum ceilings and above suspended ceilings.

1. Monokote MK-6 by Grace Construction Products.
2. Pyrolite 15 by Carboline Fireproof Products Division.
3. Cafco-300 by Isolotek.
4. Southwest Fireproofing Type 5GP by AD Fire Protection Systems.

B. (FP-2): Provide medium density material meeting or exceeding 22 pounds per cubic foot per ASTM E605, no fungal growth per ASTM G21 and also containing 50 percent cement content by weight minimum. For exterior concealed areas, exposed locations on columns, beams, and roof deck in mechanical and electrical rooms, penthouses, data rooms, elevator rooms and shafts, non-ducted air shafts, equipment rooms, and other service type rooms and where indicated.

1. Grace Construction Products, Monokote Z-106.
2. Pyrolite 22 by Carboline Co., Fireproofing Products Division.
3. Carboline Co., Fireproofing Products Div.; Pyrocrete 239.
4. Isolatek International Corp.; Cafco 400.
5. Pyrok-MD by Pyrok, Inc.
6. Southwest Fireproofing Type 5MD by AD Fire Protection Systems.

C. (FP-3): Provide high density material meeting or exceeding 40 pounds per cubic foot per ASTM E605, no fungal growth per ASTM G21 and also containing 50 percent cement content by weight minimum. For exterior locations, new and existing canopy structure, including columns, high impact resistance locations, high humidity areas, including swimming pool areas, and where indicated.

1. Grace Construction Products, Monokote Z-146.
2. Fendolite M-II by Isolotek.
3. Pyrocrete 40 by Carboline Co., Fireproofing Products Division.
4. Pyrok, Inc.; Pyrok-HD.
5. Southwest Fireproofing Type 1XR by AD Fire Protection Systems.

2.3 MATERIALS

A. Sprayed-on Fire-resistant Coating: Wet-mix setting based type as defined by Underwriters Laboratories and free from asbestos, actinolite, amosite, anthophyllite, chrysotile and tremolite.

1. Wet Mix Admixtures: Materials (with and without aggregate) which, when mixed in accordance with accompanying instructions forms a slurry or mortar providing properties necessary for conveyance and application to building structures.

B. Water: Potable, fresh and free from organic and mineral impurities which would affect set of sprayed fireproofing materials.

2.4 AUXILIARY FIREPROOFING MATERIALS

A. Auxiliary Fireproofing Materials: Provide type compatible with sprayed-on fireproofing products and substrate that are approved for use indicated by manufacturer of sprayed-on fireproofing, and are approved by nationally recognized testing laboratories or other testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance rated designs indicated.

B. Substrate Primers: Type approved by manufacturer of sprayed-on fireproofing for substrate and for conditions of exposure indicated.

C. Adhesive for Bonding Fireproofing: Type recommended by manufacturer of sprayed-on fireproofing manufacturer.

2.5 MIXING

A. Perform mixing and preparation of materials at project using mechanical equipment, in accordance with manufacturer's printed directions to achieve performance criteria specified herein.

PART 3 EXECUTION

3.1 AREA PREPARATION

A. Provide necessary measures for protection of workers and public, as required under regulation of U.S. Occupational Safety and Health Act (OSHA), and applicable local ordinances, and code regulations.

B. Provide protection for workmen applying fireproofing and for other workers who are in vicinity of application of mixing operations. Provide necessary measures for protection of general public and for prevention of air pollution as required. Enclose exterior openings at areas where spray application will be in progress.

C. Provide masking, drop cloths, or other satisfactory covering for materials which are not to receive fireproofing to prevent damage from contamination from overspray or fallout of materials.

3.2 EXAMINATION

A. Examine surfaces to which this work is to be attached or applied and notify Architect if conditions exist which are detrimental to proper and expeditious installation of work. Starting of work shall imply acceptance of substrate for adhesion and performance of work as specified. Substrate is in satisfactory condition if it complies with following :

1. Substrate complies with requirements of section in which substrate and related work is specified and is free of oil, grease, rolling compounds, incomplete primers, loose mill scale, dirt or other foreign substances capable of impairing bond of fireproofing with substrate under conditions of normal use or fire exposure.
2. Objects which will penetrate fireproofing, including clips, hangers, support sleeves and similar items have been securely attached to substrates.
3. Substrates are not obstructed by ducts, piping, equipment and other suspended construction that could interfere with application of fireproofing and until it has dried.

B. Cooperate with coordination and scheduling of work of this section with work of other sections so not to delay job progress.

C. Clips, hangers, supports, sleeves and other attachments to fireproofing bases, as covered under other sections of specifications, are to be placed by other trades prior to application of fireproofing material, where these materials can be anticipated in advance.

D. Ducts, piping or conduit or other suspended equipment that could interfere with uniform application of fireproofing material are to be positioned after application of sprayed fireproofing, unless fireproofing applicator agrees to their installation prior to fireproofing.

E. Prior to application of fireproofing material, ascertain that steel is acceptable to receive fireproofing. Steel shall be free of oil, grease, loose mill scale, or other substance that may impair proper adhesion.

3.3 SURFACE PREPARATION

A. Clean surface to receive sprayed fireproofing to remove mill scale, dirt, grime, oil, grease, dust, loose rust, rolling compounds, incompatible primers and other foreign material which will impair satisfactory bonding of fireproofing to substrate.

B. Cover other work which might be damaged by fallout or overspray of fireproofing materials during application. Provide temporary enclosure as may be required to confine operations, protect environment, and to ensure adequate ambient conditions for temperature and ventilation.

C. Notify Contractor of surface condition which cannot be corrected by normal cleaning methods and requires correction of conditions prior to application of sprayed fireproofing.

3.4 APPLICATION

A. Commencement of application of fireproofing shall be deemed as acceptance by applicator of suitability of surface to receive work and acceptance of responsibility for failure of bond between fireproofing and substrate.

B. Apply spray fireproofing using manufacturer's authorized installer in accordance with manufacturer's directions and instructions and in conformance with city and state codes, regulations and requirements having jurisdiction. Qualified manufacturer's representative shall be present for initial application to guide and assist applicator's personnel.

C. Sprayed Fireproofing: Apply to areas and surfaces which are scheduled to be fireproofed and to proper thicknesses to achieve fireproofing hours.

1. Control thickness of fireproofing by utilizing workable depth gauge to assure that minimum thickness has been applied.

D. Ventilation: Make provisions to properly dry fireproofing after application. In enclosed areas lacking natural ventilation, provide mechanical air circulation and ventilation.

E. Equipment, Mixing and Application: In accordance with manufacturer's written specification and application instructions. Mechanically control material and water ratio on project site.

F. Qualified Personnel: Provide to supervise application.

G. Bonding Adhesive: Apply to underside of steel roof deck units which do not have concrete topping and where required by appropriate UL Design. Bonding adhesive is optional in other conditions unless recommended by manufacturer of sprayed fire protection material (SFRM). Apply bonding adhesives in accordance with manufacturer's written application instructions.

H. Do not install fireproofing prior to completion of concrete work on steel pan stairs. Apply to underside of roof deck assemblies only after roofing system is complete and roof traffic has ceased.

I. Cracking: No cracking of fireproofing material allowed per UL requirements. Repair cracks at no additional cost to Owner by removing existing fireproofing and reapplying

3.5 PATCHING, REPAIRING, CLEANING AND PROTECTION

A. Perform patching and repairing of sprayed fireproofing, due to cutting by other trades, by fireproofing applicator. Work shall be paid for by trades that performed cutting, as directed and at no additional cost.

1. Coordinate installation of fireproofing with other work in order to minimize need for other trades to cut or remove fireproofing. As other trades successively complete installations of their work, maintain protection of structure's fireproofing by patching areas which have been removed or damaged prior to concealment of fireproofing by other work.

B. After completion of fireproofing work, remove equipment and clean walls, floors, equipment, pipes and conduit of over sprayed fireproofing materials.

C. Cleaning: Immediately upon completion of sprayed operations in each containable area, remove over-spray and fall-out materials from surfaces of other work and clean exposed surfaces to remove evidence of soiling.

D. Cure exposed wet-mix fireproofing materials in compliance with fireproofing manufacturer's recommendations to prevent premature drying.

E. Protect fireproofing according to advice of fireproofing manufacturer and installer from damage resulting from construction operations or other causes so that fireproofing will be without damage or deterioration at time of Substantial Completion.

3.6 FIELD QUALITY CONTROL

A. Testing and Inspection: Owner will engage qualified special inspectors in accordance with Section 014533.
   1. Qualifications: The minimum category of special inspector required to perform services outlined below are noted by qualifications in parentheses. The definitions of the categories of special inspector are included in Section 014533.

B. Contractor and sub-contractor for this Section shall cooperate with testing agency in furnishing samples for testing, and other testing agency procedures.
   1. Should tested fireproofing fail to meet performance criteria, remove fireproofing, reinstall and retest at no additional cost to Owner.
   2. Correct unacceptable work and pay for further testing required to prove acceptability of installation.
   3. Patch test areas as required to re-establish fireproofing integrity.

C. Testing agency shall be familiar with the requirements and testing methods required by applicable code sections and with approved UL assembly requirements.

D. Spray Applied Fireproofing: (Technical I)
   1. Procedures and Preparation: Verify substrates to receive fireproofing are prepared in accordance with manufacturer's instructions and are free of materials that may prevent adequate adhesion. Inspect batching to comply with manufacturer's requirements for first 3,000 SF applied. Select areas to be tested in accordance with IBC Section 1704.10.5.1 and 1704.10.5.2 and test per ASTM E 736. Bond strength shall not be less than 150 pounds per square foot when tested in accordance with the field test method of ASTM E 736.
   2. Thickness: Test thickness of applied fireproofing per frequencies per applicable code requirements. Test 25% of gross applied area on the structural frame, columns and beams of each building story in accordance with ASTM E 605. Take not less than four measurements for each 1000 square feet of sprayed area on each floor or part thereof per ASTM E 605 for beams and joists (other than structural frame members).
   3. Density: Test density per ASTM E 605 on 1 column, 1 beam and 1 deck or slab for each 10,000 SF (or fraction thereof), of floor or roof area, or from each level if the area is smaller than 10,000 SF.

END OF SECTION

SECTION 078400
FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Firestop joint sealant and backing, including intumescent elastomeric compounds and sealants.
   2. Rigid boards, forms, wraps and accessories.
   3. Fiber packing and fiber fill.
   4. Wool fiber insulation and fire-safing insulation.
   5. Other firestopping as indicated.

B. Related Requirements:
   1. Section 078100 - Applied Fireproofing.
   2. Section 078443 - Fire-resistant Joint Sealants.
   3. Section 079000 - Joint Protection: Other sealants.
   4. Section 084400 – Aluminum Curtain Walls, Windows and Entrances: Edge of floor firestopping.
   5. Section 092900 – Gypsum Board: Acoustical sealants.
   6. Divisions 13 and 14 - Firestopping of penetrations caused by special construction services is specified in Section 078400.
   7. Division 21 – Fire Suppression: Firestopping of penetrations caused by fire suppression services.
   8. Division 22 – Plumbing: Firestopping of penetrations caused by plumbing services.
   9. Division 23 – Heating, Ventilating and Air Conditioning: Firestopping of penetrations caused by mechanical services.
   10. Division 26 - Electrical: Firestopping of penetrations caused by electrical services.
   11. Division 27 – Communications: Firestopping of penetrations caused by communications services.
   12. Division 28 – Electronic Safety and Security: Firestopping of penetrations caused by safety and security services.

1.2 REFERENCES

A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops".

B. Test Requirements: UL 1479, “Fire Tests of Through-Penetration Firestops”.

C. Test Requirements: UL 2079, “Tests for Fire Resistance of Building Joint Systems”.

D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
   1. UL Fire Resistance Directory:
      a. Firestop Devices (XHJI).
      b. Fire Resistance Ratings (BXRH).
      c. Through-Penetration Firestop Systems (XHEZ).
      d. Fill, Voids, or Cavity Material (XHHW).
      e. Forming Materials (XHKU).
      f. Joint Systems (XHBN).
      g. Perimeter Fire Containment Systems (XHDG).
   2. Alternate Systems: “Omega Point Laboratories Directory” (updated annually).

E. Test Requirements: ASTM E 1966, “Standard Test Method for Fire Resistive Joint Systems”.

F. Test Requirements: ASTM E 2307, “Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus”.

G. Inspection Requirements: ASTM E 2174, “Standard Practice for On-site Inspection of Installed Fire Stops”.

H. ASTM E 84, “Standard Test Method for Surface Burning Characteristics of Building Materials”.

I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

J. All major building codes: ICBO, SBCCI, BOCA, IBC and Building Code of the City of New York.

K. NFPA 101 - Life Safety Code.

L. NFPA 70 - National Electric Code.

1.3 DEFINITIONS

A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.

B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.

C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gases, and smoke.

D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.

E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, and structural floors or roof decks; and gaps between adjacent sections of structural floors and at wall tops between top of wall and ceiling.

F. System: Specific products and applications, classified and numbered by Underwriters Laboratories Inc., to close specific barrier penetrations.

G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other Sections and may or may not be required.

H. Manufacturer's Engineering Judgment: Firestopping systems derived from other U.L. Systems/Designs or other tests, and acceptable to code enforcing authorities.

1.4 SYSTEM DESCRIPTION

A. Fire Rated Construction Design Requirements: Maintain barrier fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

B. Through-Penetration Fire Stopping Schedule: Assembly designs are specified generally under UL system categories by penetrating item. Manufacturers' product applications must have specific UL system designations. The schedules on the following page indicate which Series of UL Classified Through Penetration Fire Stopping (TPFS) assemblies are acceptable for this Project based on barrier type, construction and penetrant type. The TPFS Series listed are generic in nature; ex: Series C-AJ-2000 includes all designs from 2001 through 2999 from all manufacturers; note that each manufacturer has its own number for tested assemblies. Select appropriate TPFS assemblies for each condition encountered.

C. Refer to Schedule at the end of this section.

1.5 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data for each material including the following.

1. Composition and limitations.

2. Manufacturer's installation instructions.
3. Furnish sleeve size schedule indicating size of penetrating item, insulation thickness (where applicable), and minimum annular space requirements.

B. Proposed UL System Drawings - Special Installation Drawings: Prior to starting installation of firestopping, firestopping manufacturer and installer shall review specific conditions applicable for Project, and identify each condition for firestopping and prepare individual U.L. Designs or manufacturers engineering judgements identification numbers, and installation drawings for each condition.
   1. Submit 3 Special Installation Drawings for each condition, 1 set for Owner, 1 set for Architect's File Copy, and 1 set for Building Official.
   2. Submit other information as may be requested by Building Official.

C. Submit installer qualifications for each person installing firestopping systems.

1.6 QUALITY ASSURANCE

A. Engage experienced Installer certified, licensed, or otherwise qualified by the firestopping manufacturer with the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

B. The work is to be installed by a contractor with at least one of the following qualifications:
   1. FM 4991 Approved Contractor
   2. UL Approved Contractor
   3. Hilti Accredited Fire Stop Specialty Contractor

C. Firm with not less than 3 years' experience with fire stop installation.

D. Successfully completed not less than 3 comparable scale projects using similar systems.

E. Single Source Responsibility for Materials: Obtain firestopping materials from one manufacturer for entire project.
   1. This does not restrict Contractor from subcontracting installation of firestopping to multiple subcontracts, but does require all installers do use the same manufacturer throughout the Project and be licensed by that manufacturer for the installation of firestopping.

F. Field Samples: First two applications for each firestopping condition will be reviewed by Owner's Representative and the Architect, and Firestop manufacturer's direct representative (i.e., Fire Protection Specialist, Field Engineer, etc. not authorized distributor representative) and when accepted by the local Building Official shall become a standard of performance for remaining Work.
   1. Correct areas, modify method of application/installation, or adjust as directed by local code official to comply with specified requirements.
   2. Maintain field samples accessible to serve as a standard of quality for this Section.

G. Fire-Test Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those of this specification Section:
   1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, ITS, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
   2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
      a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
      b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
         1) UL in "Fire Resistance Directory."
         2) ITS in "Directory of Listed Products."

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle to prevent damage, staining and disfigurement in original, new, and unopened packages and containers bearing manufacturer's name and label identifying contents. Do not freeze.

B. Where limited shelf life of product is noted by date on container or packing list, take note and do not use out of date material.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Store firestopping materials out of weather, in cool, dry place, out of direct sunlight, at temperatures below 90 degrees F, not less than 40 degrees F and as recommended by manufacturer.

1.9 PROJECT CONDITIONS

A. Environmental Requirements: Comply with fireproofing material manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of fireproofing.

B. Ventilation Requirements: Comply with fireproofing material manufacturer's recommendations during and after installation of fireproofing by natural or mechanical means.

C. Sleeves: Unless otherwise called for, sleeves passing through walls, slabs, beams, bridging, columns, shall be minimum of 1/2 inch greater in inside diameter than external diameter of pipe passing through sleeves, or insulation diameter. Verify sleeve size required with manufacturer of firestopping used. Pipe insulation shall be continuous through sleeves. Space between sleeve and pipe or duct and annular opening space shall be provided with a firestop system. Notify Contractor immediately of deviation from above sleeving requirements.

D. Fire Dampers: Place Firestopping of annular spaces around fire dampers before installation of damper's anchoring flanges. Prior to the installation of any firestop system, verify with fire damper manufacturer the addition of a firestop product will not adversely affect the fire-rating or performance of fire damper.

1.10 SEQUENCING

A. Sequence and coordinate application of firestopping with other related work specified in other Sections to comply with the following requirements:

1. Provide temporary enclosures to prevent deterioration of firestopping for interior applications due to exposure to unfavorable environmental conditions.
2. Do not install enclosing or concealing construction until after firestopping has been applied, inspected, tested, and corrections have been made to any defective firestopping.

1.11 SYSTEM DESIGN

A. Design of firestopping described by this Section is responsibility of Contractor. Individual through-penetration systems, construction-gap firestopping, through-penetration smoke-stopping, and construction-gap smoke-stopping will be selected by Contractor to meet requirements of Contract Documents and governing codes. Actual selection of individual designs or systems is responsibility of Contractor, and 'Single Source Responsibility for Materials' is required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers and products (FSTOP): Products listed in UL Fire Resistance Directory for UL System involved, that are manufactured by one of the following:

1. 3M Fire Protection Products.
2. Hilti, Inc.

3. Rectorseal Company
4. Specified Technologies Inc.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-/rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

C. Mold Resistance: Provide firestopping system sealant with mold and mildew resistance rating of 0 as determined by ASTM G21.

2.3 FILL MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E 814, UL 2079, ASTM E 1966, or ASTM E 2307 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and F-rating for each construction assembly.

B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls

C. Post-install firestop devices for use with noncombustible and combustible pipes (closed and open systems) and conduit penetrating concrete floors.,

D. Re-penetrable cable management device for floor or wall applications

E. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

F. Firestop Collars: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

G. Firestop Boards: Ready-to-use firestop board designed for large opening with cable trays and multiple penetrations Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

H. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds,

I. Outlet and switch box protection: Ready-to-use intumescent insert to provide protection to outlet and switch boxes in fire rated assemblies

J. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

K. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

L. Pillows/Bags/Blocks: Reusable heat-expanding pillows/bags/blocks designed to seal medium to large size openings. Ideal for re-penetration or new penetrations.

M. Firestop Plug: Ready-to-use intumescent and reusable plug for small openings.

N. Two Component Polyurethane Foams: Multicomponent, polyurethane based liquid elastomers that, when mixed, expand and cure in place to produce a nonshrinking foam

O. Firestop Joint Spray: A sprayable firestop mastic for construction joints where maximum movement is required

P. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
   2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

Q. Wiring devices: Hilti CP 653 Speed Sleeve or Ez-Path Fire Rated Pathway by Specified Technologies, Inc.
   1. Fire-rated wiring devices containing intumescent material that allows cable to pass through device F Rating: Equal to rating of barrier in which device is installed.
   2. Capable of allowing a 0 to 100-percent visual fill of cables.
   3. Sufficient size to accommodate quantity and size of electrical wires and data cables required.
   4. Provide with steel wall plates allowing for single or multiple devices to be ganged together.
   5. Firestop device to provide an L-Rating of 10 CFM/sq. ft. or less OR ≤ 1 CFM/device when empty, partially full or completely full (0% visual fill, 50% visual full and 100% visual full).
      a. Smoke Barrier Assemblies: wiring devices to provide L-Ratings of a maximum of 5 CFM/sq. ft. or as required by Local Building Codes".

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.
4. Do not allow caulks containing solvents to come in direct contact with plastic pipe.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 INSTALLATION

A. Use methods and materials indicated in firestopping systems shown in Referenced Standards.

B. Install penetration seal materials in accordance with instructions in UL Building Materials Directory and in accordance with manufacturer's printed instructions.

C. Install sealant, including forming, packing and other accessory materials to fill opening around services penetrating floors and walls to provide firestops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs.
1. Use masking tape to protect finished substrates and products adjacent to sealant materials.
2. Apply sealant as specified under Section 079000 - Joint Protection.
3. Forming to be left in place until foam is cured, or as recommended by Firestop Manufacturer.

D. At sleeved pipes or other sleeved penetration, firestop annular space between sleeve and its contained pipe or duct with resilient firestopping sealant system to permit movement of pipe or duct without damage to firestopping sealant.

E. Seal holes and voids made by penetrations to ensure effective fire and smoke barrier.

F. Patch penetrations caused by cutting or presence of unused or abandoned openings or boxes using materials compatible with barrier construction and with fire rating equal to or greater than barrier rating.

G. For plumbing sleeves, construct time rated walls after placement of penetrating materials if possible, and to fit rated construction materials tightly to or directly upon material of penetration.

H. Large Openings: Close unused portions of large openings (annular spaces) made for later installation of pipes and ducts with solid fill equal to barrier rating or with applicable firestopping sealant system.

1. Where both horizontal dimensions exceed 4 inches in structural floor openings, firestop annular spaces with concrete, or other rated assembly. Provide dowels and reinforcement, within such fill, equal to that specified for slab.
2. In rated concrete or masonry wall openings where both height and width exceed thickness of rated materials, firestop annular spaces with masonry or other solid fill.
3. Use fiber fill, solid fill or fiber packing to make up remainder of barrier thickness where required width of firestopping sealant system is less than barrier.

I. Install firestopping materials capable of supporting same loading as floor at floor openings more than four inches in width without penetrating item and subject to traffic or loading.

J. Install firestopping at least equal to barrier fire rating in and around penetrations of floor structures, exterior walls and interior walls noted as time rated fire barriers or smoke barriers.

K. Unused or abandoned openings or boxes or penetrations caused by cutting shall be patched with materials compatible with barrier construction and with fire rating equal to or greater than barrier fire-rating.

L. Use firestopping sealant systems at narrow spaces and at spaces with dimensions less than barrier thickness.

M. Fill void spaces completely with firestopping material.

N. Protect materials from damage on surfaces subject to traffic. Provide firestopping in floors flush with top of slab, sleeve or housekeeping pad.

3.5 IDENTIFICATION

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

Warning – Fire-stop System
DO NOT DISTURB
Notify Building Management of Any Damage

Manufacturer's System No. _____
UL System No: _____
Contractor: _____
Date Installed: _____
Manufacturer: _____

3.6 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
   1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.

B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

D. Manufacturer's Field Services: Firestopping manufacturer's technical representative (not Authorized Distributor representative) shall provide the following field services during application.
   1. Perform a pre-installation examination and acceptance of substrate and voids scheduled for firestopping. Issue report.
   2. Be present at initial start-up for each process. Confirm application techniques. Issue report.
   3. Issue a summary report at completion of installation indicating manufacturer's acceptance of installed system and compliance with UL Design requirements.

3.7 ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

3.8 SCHEDULE

THROUGH-PENETRATION UL CLASSIFICATION SYSTEM

	Fire Stopping Systems	**UL Classification System**		
		Construction Penetrated	Type Of Construction	System Identification
1	No Penetrating Items:	F, W, C	A, B, J, K, L	0001-0999
2	Metallic Pipes, Conduit or Tubing:	F, W, C	A, B, J, K, L	1001-1999
3	Nonmetallic Pipe, Conduit or Tubing:	F, W, C	A, B, J, K, L	2001-2999
4	Electric Cables:	F, W, C	A, B, J, K, L	3001-3999
5	Cable, Trays with Electric Cables:	F, W, C	A, B, J, K, L	4001-4999
6	Insulated Pipes:	F, W, C	A, B, J, K, L	5001-5999
7	Electrical Bussduct Penetrations:	F, W, C	A, B, J, K, L	6001-6999
8	Mechanical Ductwork Penetrations:	F, W, C	A, B, J, K, L	7001-7999
9	Multiple Penetrations Through Common Openings:	F, W, C	A, B, J, K, L	8000-8999

Construction Penetration

F	Floor penetration
W	Wall penetration
C	Either Wall or Floor Penetration

Type of Construction

A-	Concrete floors equal to or less than 5-inches thick
B-	Concrete floors greater than 5-inches thick
J-	Concrete or masonry walls equal to or less than 8-inches thick
K-	Concrete of masonry walls greater than 8-inches thick
L-	Framed walls

JOINT UL CLASSIFICATION SYSTEM

Fire-Resistant Joint Systems	**UL Classification System**

		Joint System	Movement Capability	Joint Width range
1	Floor-to-Floor	FF	S/D	0000-4999
2	Wall-to-Wall	WW	S/D	0000-4999
3	Floor-to-Wall:	FW	S/D	0000-4999
4	Head-to-Wall:	HW	S/D	0000-4999
5	Wall-to-Wall as Corner Guards	CG	S/D	0000-4999
6	Bottom of Wall	BW	S/D	0000-4999

Movement Capability

S-	No movement (Static)
D-	Allows movement (Dynamic)

Joint Width

0000-0999	Less than or equal to 2 inches
1000-1999	Greater than 2 inches and less than or equal to 6 inches
2000-2999	Greater than 6 inches and less than or equal to 12 inches
3000-3999	Greater than 12 inches and less than or equal to 24 inches
4000-4999	Greater than 24 inches

END OF SECTION

SECTION 078443
FIRE-RESISTANT JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fire-resistant joint systems for the following:
   1. Head-of-wall joints.
   2. Joints at cold formed exterior wall framing and floor slab.
   3. Joints between perimeter edge of fire-resistance-rated floor assemblies and back of non-fire-resistance-rated, exterior, glazed aluminum curtain walls.

B. Related Sections:
   1. Section 072100 - Thermal Insulation: Perimeter fire-containment systems if not specified in this Section.
   2. Section 078400 - Firestopping: Through-Penetration Firestop Systems for systems installed in openings in walls and floors with and without penetrating items.
   3. Section 079000 -Joint Protection: Non-fire-resistant joint sealants.
   4. Section 078100 – Applied Fireproofing.
   5. Section 084400 – Aluminum Curtain Walls, Windows and Entrances.

1.2 PERFORMANCE REQUIREMENTS

A. General: For joints in the following constructions, provide fire-resistant joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistant joint systems are installed:
   1. Fire-resistance-rated load-bearing walls, including partitions[**,** with fire-protection-rated openings].
   2. Fire-resistance-rated non-load-bearing walls, including partitions[**,** with fire-protection-rated openings].
   3. Exterior curtain-wall assemblies and fire-resistance-rated floor assemblies.
   4. Exterior stud wall assemblies and fire-resistance-rated floor assemblies.

B. Fire Resistance of Joint Systems: Assembly ratings (and movement capabilities) indicated, but with assembly ratings not less than that equaling or exceeding fire-resistance rating of constructions in which joints are located, as determined by UL 2079.
   1. (Load-bearing capabilities as determined by evaluation during the time test.)

C. Fire Resistance of Perimeter Fire-Containment Systems: Integrity and insulation ratings indicated as determined by UL 2079.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each fire-resistant joint system, show each kind of construction condition in which joints are installed and relationships to adjoining construction. Include fire-resistant joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistant joint system configuration for construction and penetrating items.

C. (Product Certificates: For each type of fire-resistant joint system, signed by product manufacturer.)

D. Qualification Data: For Installer.

E. (Compatibility and Adhesion Test Reports: From fire-resistant joint system manufacturer indicating the following:

1. Materials forming joint substrates have been tested for compatibility and adhesion with fill materials.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.)

F. Evaluation Reports: Evidence of fire-resistant joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.

G. (Research/Evaluation Reports: For each type of fire-resistant joint system.)

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire-resistant joint systems for each kind of joint and construction condition indicated through one source from a single manufacturer.

B. Preconstruction Compatibility and Adhesion Testing: Submit to fire-resistant joint system manufacturers, for testing indicated below, samples of materials that will contact or affect fill materials.

1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of fill materials to joint substrates.
   a. Perform tests under environmental conditions replicating those that will exist during installation.
2. Submit no fewer than nine pieces of each type of material, including joint substrates, forming materials, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain fire-resistant joint system manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

C. Fire-Test-Response Characteristics: Provide fire-resistant joint systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistant joint systems acceptable to authorities having jurisdiction.
2. Fire-resistant joint systems are identical to those tested per ICBO ES AC30 and are qualified for types of joints and joint movement capabilities indicated in a current Evaluation Report by the ICBO Evaluation Service.
3. (Fire-resistant joint systems are identical to those tested per UL 2079 [and ICBO ES AC30 and are qualified for joint movement capabilities indicated in a current ICBO Evaluation Report by the ICBO Evaluation Service].[Perimeter fire-containment systems are identical to those tested per UL 2079.] Provide rated systems complying with the following requirements:
   a. Fire-resistant joint system products bear classification marking of qualified testing and inspecting agency.
   b. Fire-resistant joint systems correspond to those indicated by referencing system designations listed by the following:
      1) UL in its "Fire Resistance Directory."
      2) <**Insert name of a qualified testing and inspecting agency.**>)

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistant joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for fire-resistant joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistant joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistant joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistant joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistant joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistant joint systems.

C. (Notify Owner's inspecting agency at least 7 days in advance of fire-resistant joint system installations; confirm dates and times on days preceding each series of installations.)

D. (Do not cover up fire-resistant joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Basis-of-Design Products: The design for each fire-resistant joint system is based on products named in Part 2 articles. Subject to compliance with requirements, provide either the named products or comparable products by one of the following:
   a. Fire-resistant joint systems:
      1) 3M Fire Protection Products Systems,Inc.
      2) Specified Technologies, Inc.
      3) A/D Fire Protection Systems Inc.
      4) Hilti, Inc.
      5) RectorSeal Corporation (The)
      6) United States Gypsum Company.
   b. Perimeter Fire-Containment Systems:
      1) Specified Technologies Inc.
      2) United States Gypsum Company.

2.2 FIRE-RESISTANT JOINT SYSTEMS, GENERAL

A. Compatibility: Provide fire-resistant joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistant joint system manufacturer based on testing and field experience.

B. Accessories: Provide components of fire-resistant joint systems, including forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistant joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

2.3 FIRE-RESISTANT JOINT SYSTEMS

A. Where UL-classified fire-resistant joint systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.

B. (FRJS-1) Head-of-Wall, Fire-resistant joint system at interior partitions:

1. Basis-of-Design UL-Classified Product: UL HW-D joint type or similar systems from Intertek to be selected based on actual conditions and subject to approval through submittals. Provide engineering judgment acceptable to Architect and authority having jurisdiction for head of wall conditions where a tested system is not available for the actual conditions.
2. Assembly Rating: 1 hour or 2 hour to be consistent with wall ratings shown on Drawings.
3. Nominal Joint Width: As shown.
4. Movement Capabilities: Class II, 18.75 percent movement in compression and extension.

2.4 PERIMETER FIRE-CONTAINMENT SYSTEMS

A. Where UL-classified perimeter fire-containment systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHDG.

B. (FRJS-2) Perimeter Fire-Containment System at Curtain Walls
1. Basis-of-Design System: Provide CW-D type listed by UL or CEJ type listed by Intertek for joint conditions. Provide engineering judgment acceptable to Architect and authority having jurisdiction if a tested, listed system is not available.
2. Assembly Rating: 1 hour or 2 hour to be consistent with assembly ratings shown on Drawings.
3. Joint Width: As shown.
4. Movement Capability: Joint system capable of withstanding total horizontal movement of 25 percent compression and elongation and a total vertical shear movement of 12.5 percent.

C. (FRJS-3) Perimeter Fire-Containment System at Exterior Stud Walls
1. Basis-of-Design System: Provide CW-S type listed by UL or CEJ type listed by Intertek for joint conditions. Provide engineering judgment acceptable to Architect and authority having jurisdiction if a tested, listed system is not available.
2. Assembly Rating: 1 hour or 2 hour to be consistent with assembly ratings shown on Drawings.
3. Joint Width: As shown.
4. Movement Capability: Joint system capable of withstanding total horizontal movement of 25 percent compression and elongation and a total vertical shear movement of 12.5 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistant joint systems to comply with fire-resistant joint system manufacturer's written instructions and the following requirements:
1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistant joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistant joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistant joint system materials.
1. Remove tape as soon as possible without disturbing fire-resistant joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistant joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistant joint system manufacturer's written installation instructions for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistant joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistant joint systems and to prepare inspection reports.

1. Inspecting agency will state in each report whether inspected fire-resistant joint systems comply with or deviate from requirements.

B. Proceed with enclosing fire-resistant joint systems with other construction only after inspection reports are issued and inspecting agency has approved installed fire-resistant joint systems.

C. If deficiencies are found, repair or replace fire-resistant joint systems so they comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistant joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistant joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistant joint systems immediately and install new materials to produce fire-resistant joint systems complying with specified requirements.

END OF SECTION

SECTION 078700
SMOKE CONTAINMENT SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Smoke containment system and related accessories (SMOK-1).
   2. Accessories, including, reinforced polyimide plastic film smoke containment curtain, control station, sheet metal container, rewind switch, cove bases and accessories as required for complete operational installation.

B. Installed but not Furnished:
   1. Electrical: Electrical components for electrical power connections.

C. Related Sections:
   1. Section 079000 - Joint Protection: Sealant at inside and outside perimeter of auxiliary rails, cove bases and container.
   2. Section 092216 - Non-Structural Metal Framing: Metal backing in housing mounting area.
   3. Section 099000 - Painting: Field painting.
   4. Section 142423 - Hydraulic Elevators.
   5. Mechanical: Service supply and source hookup to equipment.
   6. Electrical: Service supply and source hookup to equipment, smoke detector with auxiliary contact and emergency power supply, box and wire for termination of smoke detector system, tie in to 110 VAC power, box and wire for rewind switch.

1.2 REFERENCES

A. NFPA 70 - National Electric Code.

B. NFPA 105 - Installation of Smoke-Control Door Assemblies, 1998 Edition.

C. NFPA 258 - Standard Test Method for Measuring the Smoke Generated by Solid Materials.

D. California Building Code.

1.3 SUBMITTALS

A. Shop Drawings: Submit shop drawings in accordance with Section 013300.
   1. Provide in large scale detail, drawings of fabricated housing showing construction methods, type and gage of metal, hardware and fittings, with plan, front elevation, and minimum of 1 cross-section. Show service connections, characteristics, and wiring diagrams for control systems.

B. Product Data and Test Reports: Submit in accordance with Section 013300.
   1. Submit manufacturer's installation recommendations, product data and test reports for each proposed containment system based on UL and local code standards design indicated. Include data verifying that material and procedures provide smoke containment for time ratings required.

C. Samples: Submit finish samples in accordance with Section 013300.

D. Operation and Maintenance Data: Submit operation and maintenance data in accordance with Section 017700.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Store smoke containment materials out of weather, in cool, dry place, out of direct sunlight, at temperatures below 90 degrees F, not less than 40 degrees F and as recommended by manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturers: Companies specializing in manufacture of smoke containment systems with minimum 3 years experience.

B. Maximum Air Leakage Rate: Less than 1 cfm per square foot at 0.3 IN. Wg. Pressure at 400 degrees F.

C. Maximum Temperature Necessitating Replacement: Smoke containment system must be replaced after exposure to temperatures exceeding 200 degrees F.

D. Release Mechanism: Capable of deploying smoke containment system in less than 10 seconds and complying with UL Standard No.508.

E. Connect system to auxiliary contact circuit of the smoke detector complying with UL Standard No. 228 equipped with an auxiliary power supply or an approved central smoke detection alarm system.

F. System shall be listed and labeled by an independent testing laboratory meeting requirements of ICBO Evaluation Service.

G. Manufacture system under a quality control program meeting the requirements of the ICBO ES Acceptance Criteria for Quality Control Manuals.

H. Post each smoke containment unit with a sign warning occupants not to exit through the smoke barrier.

I. System Assemblies: Manufacturers of system, including components by others, shall assume complete responsibility of final assembled system.

J. Pre-Installation Meeting:

1. Schedule and convene a pre-installation meeting prior to commencement of field operations with representatives of the following in attendance: Owner, Architect, General Contractor, smoke containment system sub-contractor, painting sub-contractor, and electrical sub-contractor.
2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

1.6 REGULATORY REQUIREMENTS

A. Comply with ICBO Evaluation Service Acceptance Criteria for smoke containment systems used with fire-resistive elevator hoistway doors and frames Subject No. AC77, September 1992.

B. Electrical Wiring and Components, Self-contained Refrigeration Systems: Conform to Underwriters' Laboratories Standards.

C. Smoke Containment System will be cycle tested by the Owner on a semi-annual basis or as required by appropriate governing agency by activating the smoke detector, observing the deployment of curtain, rewinding unit by activating rewind switch, and closing container door.

1. Fill in service card and retain a permanent record of cycle tests.
2. Backup battery (in control box) will be tested semi-annually and replaced every three years.
3. Contact Manufacturer for repainting of system or components.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle to prevent damage, staining and disfigurement in original, new, and unopened packages and containers bearing manufacturer's name and label identifying contents. Do not freeze.

B. Where limited shelf life of product is noted by date on container or packing list, take note and do not use out of date material.

C. Coordinate size of access and route to place of installation.

1.8 COORDINATION

A. Coordinate work with other trades, including Section 14210- Electric Traction Elevators and 092900-Gypsum Board Systems, for installation and Mechanical and Electrical trades as required.

B. Maximum Size of Smoke Containment System: Maximum width 4 feet inside door frame. Maximum mounting height 9 feet.

1.9 PERFORMANCE

A. The smoke containment system shall meet or exceed the following standards:
   1. Reinforced Film:
      a. ASTM E84: Surface Burning Characteristic producing a flame-spread index less than 25 and a smoke-development rating less than 50.
      b. ASTM D543: Resistance of Plastics to Chemical Reagents maintaining its physical properties after exposure to Hydrochloric Acid at pH 1, Sodium Hydroxide at pH 10, Kerosene and Paint Thinner when tested in accordance with ASTM D882 Tensile Properties of Thin Plastic Sheeting.
      c. ASTM D1183: Resistance of Adhesives to Cyclic Laboratory Aging Conditions maintaining its physical properties after exposure to accelerated aging.
      d. ASTM D1276: Peel resistance of Adhesives maintaining a bond between the yarn and the film at least 2 pounds per inch.
   2. Polyimide Film:
      a. UL 736B: Polymeric Materials - Long Term Property Evaluations maintaining its physical properties after exposure to accelerated aging.
   3. Smoke Containment System:
      a. UL 1784: Air Leakage Tests of Door Assemblies maintaining an air leakage rating of less than 1 cfm per square foot of opening when tested under both positive and negative pressure at both ambient and elevated (400 degrees F/204 degrees C) temperatures at a differential air pressure 0.3 inches water column.
      b. ICBO ES AC77: Cycle Testing as described therein demonstrating no fatigue after completing 100 cycles. The system must continue to function without impairment.
      c. Expansion: Expansion characteristics of less than 6 inches when tested under both positive and negative pressure at both ambient and elevated (400 degrees F/204 degrees C) temperatures at a differential air pressure 0.3 inches water column.
      d. Opening Force: Less than 15 pounds per foot to disengage the system applied perpendicular to the plane of the film at the boundary.

1.10 TESTING

A. Smoke Containment System: Before smoke containment systems are placed into use, perform acceptance tests as required and recommended by code and governing authorities. Review test results with Owner and submit record copy.

1.11 WARRANTY

A. Provide two year manufacturer's warranty in accordance with Section 017836.

PART 2 PRODUCTS

2.1 TYPE AND MANUFACTURER

A. Type and Manufacturer (SMOK-1): Smoke Guard Model 400 smoke containment system by Smoke Guard Inc., 287 Maple Grove, Boise, Idaho 83704 http://www.smokeguard.com

2.2 MATERIALS

A. Containment Film: 2 mil thick transparent polyimide plastic film reinforced at 0.24 inches each way with 200 denier nomen yarn. Attach flexible multi-pole magnetic strips of energized ferrite in a nitrile rubber binder exerting a minimum force of 1.4 MGOe to each longitudinal edge of film and attach magnets to the film using continuous bead of low modulus silicone sealant.

B. Synthetic Elastomer: Attach two 1/8 inch wide strips of 0.002 inch thick synthetic elastomer with two stage laminating adhesive to the attaching face of the flexible magnets.

C. Metal Container: Provide with a primed metal hinged door.

D. Control Box: 12" x 8" x 5" NEMA one junction box.

E. Rewind Motor: NFPA 70, 90v DC.

F. Screen Rewind Switch: Include switch to rewind screen into housing.

G. Metal Cove Bases or Auxiliary Rails: As recommended by system manufacturer. Provide where required for installation as indicated.

2.3 FABRICATION

A. Form edges smooth. Fabricate sheet material for surfaces, of straight lengths in one continuous sheet.

B. Manufacture curtain of one piece sized as recommended by manufacturer.

C. Provide system to support vertical test load of 50 lbs. without visible deflection of unit or damage to supports.

D. Provide anchor components for installation of system to building construction.

E. Form box surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

F. Back paint components where contact is made with building finishes to prevent electrolysis.

G. Shop assemble system components and package complete with anchors and fittings.

2.4 SERVICES ACCESSORIES AND CONNECTIONS

A. Provide internal wiring including electrical devices; wiring controls; and switches. Provide final connections at junction box terminations for smoke detector auxiliary contact and rewind switch.

B. Mount control box within 2'-0" of the gangable 4 by 6 deep junction box and disconnect provided by electrical.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of unit to balance widths at ceiling. Comply with reflected ceiling plans for location and installation of system.

3.3 INSPECTION

A. Verify ventilation outlets, service connections, and supports are correct and in scheduled locations.

B. Beginning of installation means acceptance of existing conditions.

3.4 INSTALLATION

A. Install smoke containment systems in accordance with reviewed shop drawings, manufacturer's recommendations, to produce finished system true to lines and levels and in accordance with CAC Title 24 where applicable.

B. Shop assemble system components and package complete with anchors and fittings.

C. Use anchoring devices for materials encountered and usage expected.

D. Install items in accordance with manufacturers' instructions.

E. Support ceiling mounted system directly from the structure above with hanger wires or cables capable of supporting 4 times weight of system. Special details are necessary for this condition at ceiling grid.

F. Sequence installation and erection to ensure mechanical and electrical connections are achieved in orderly and expeditious manner.

G. Cut, fit and patch where necessary. Coordinate work with others.

H. Install true, plumb and level, securely and rigidly anchored to substrate.

3.5 ADJUSTING AND CLEANING

A. Clean and adjust equipment and apparatus to ensure proper working order and conditions.

B. Adjust and lubricate operating parts for proper operation.

C. Remove masking or protective covering from stainless steel and other finished surfaces. Wash and clean equipment.

3.6 DEMONSTRATION AND TESTING

A. Test equipment prior to demonstration.

B. Ensure equipment, including specified accessories, is operational.

C. At completion of work, provide qualified and trained personnel to demonstrate operation of each item of equipment and instruct Owner in operating procedures and maintenance.

D. Submit operation and maintenance data prior to demonstration. Schedule demonstration minimum 2 weeks in advance.

E. Demonstrate equipment to familiarize Owner on planned operation and maintenance, including periodic preventative maintenance measures required. Include explanation of service requirements and simple on-site service procedures, as well as information concerning name, address, and telephone number of qualified local source of service.

F. Individual performing demonstration shall be fully knowledgeable of operating and service aspects of equipment.

G. Provide written report of demonstration to Architect outlining equipment demonstrated and malfunctions of deficiencies noted. Identify individuals present at demonstration.

END OF SECTION

SECTION 079000
JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior and interior sealants.
   2. Foam gasket seals.

B. Related Sections:
   1. Section 033000 – Cast-in-Place Concrete: Sealant in conjunction with exterior horizontal concrete joints.
   2. Section 042000 – Unit Masonry.
   3. Section 074243 – Composite Wall Panels: Sealant at joints.
   4. Section 076210 - Sheet Metal Flashing and Trim: Sealant concealed within sheet metal.
   5. Section 078400 – Firestopping.
   6. Section 078443 – Fire-Resistant Joint Sealants.
   7. Section 084114 – Aluminum Interior Doors and Frames.
   8. Section 084126 – All-Glass entrances.
   9. Section 084400 – Aluminum Curtain Walls, Windows and Entrances: Sealant at modified entrance system.
   10. Section 088000 - Glazing: Glazing sealant.
   11. Section 092900 - Gypsum Board: Acoustical sealant at gypsum board systems.
   12. Section 093000 - Tiling: Sealant in tile work.

1.2 SUBMITTALS

A. Comply with Section 013300, unless otherwise indicated.

B. Product Data: Manufacturer's specifications and technical data including performance, construction and fabrication.
   1. Manufacturer's installation instructions for specific substrates on surface preparation and application for each type of sealant specified.
   2. Indicate joint dimensions and description of sealant.

C. Color Samples: 2 sets of manufacturer's full color range for each type of sealant specified.

D. Quality Control: Comply with Section 014500.
   1. Statement of qualification for manufacturers and installers.
   2. Statement of compliance for compatibility of sealant with adjacent materials and coatings.
   3. Field Quality Control submittals as specified in Part 3 of this Section.
      a. Field adhesion tests.
      b. Manufacturer's Field Services: For sizing of foam gasket seals and compressible seals.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with record of successful in-service performance.

B. Provide materials for exterior envelope from a single manufacturer.

C. Compatibility: Verify compatibility of silicone sealant with materials in contact with sealant.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi component materials.

B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.5 PROJECT CONDITIONS

A. Weather Conditions: Do not proceed with installation of sealant under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
   1. Proceed with work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.
   2. Wherever joint width is affected by ambient temperature variation, apply elastomeric sealant only when temperatures are in lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.

B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

D. Compatibility and Adhesion Testing: Ascertain sealant compatibility and adhesion with adjacent materials using laboratory testing procedures.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

A. 1-Part Polyurethane Sealants: Polyurethane based one part elastomeric sealant, complying with FS- TT-S-00230C, Type II Class A, with elongation and compression of not less than 25 percent. ASTM C920, Type S, Class 25, Grade NS.
   1. Acceptable Manufacturers and Products:
      a. Sika Chemical Corporation: Sikaflex-1a.
      b. BASF Building Systems: Masterseal NP-1.
      c. Tremco Incorporated: Dymonic.
      d. Pecora Corporation: Dynatrol I.
      e. Tremco Incorporated: Vulkem 116.

B. 2-Part Polyurethane Sealant for Horizontal Applications: Self-leveling polyurethane based 2 part elastomeric sealant, complying with FS-TT-S-00227E, Type I, Class A, with shore A hardness of not less than 30 and elongation and compression of not less than 25 percent. ASTM C920, Type M, Class 25, Grade P.
   1. Acceptable Manufacturers and Products:
      a. Tremco Incorporated: THC900.
      b. BASF Building Systems: MasterSeal SL-1 or 2.
      c. Pecora Corporation: Urexpan NR-200.

C. Low-Modulus Silicone Rubber Sealant: Silicone rubber based, one part neutral cure elastomeric sealant with plus 50 percent to minus 50 percent movement complying with FS-TT-S-001543, Class A, and recommended by manufacturer for joints.
   1. Acceptable Manufacturers and Products:
      a. General Electric: Silpruf SCS 2000.
      b. Dow Corning Corporation: 795 Building Sealant.
      c. BASF Building Systems: Sonolastic Omniseal or OmniPlus.
      d. Pecora Corporation: 864 Silicone.
      e. Tremco Construction Division: Spectrem 1, 2, and 3.

D. Ultra Low-Modulus Silicone Rubber Sealant: Silicone rubber based, one part neutral cure elastomeric sealant with plus 100 percent to minus 50 percent movement complying with FS-TT-S-001543, Class A.
   1. Acceptable Manufacturers and Products:
      a. Dow Corning Corporation: 790 Building Sealant.

b. Precora Corporation: 890 Silicone
c. Tremco Construction Division: Spectrem 1.

E. Mildew-Resistant Silicone Rubber Sealant: Silicone rubber based, one part mildew resistance sealant with integral fungicide complying with FS-TT-S-001543A, Class A. Specifically recommended by manufacturer for interior joints in wet areas around plumbing fixtures and ceramic tile.

1. Acceptable Manufacturers and Product:
   a. General Electric: Sanitary 1700 Sealant.
   b. Dow Corning Corporation: Silicone 786 mildew resistant.
   c. Tremco Construction Division: Tremsil 600.

F. Acrylic Sealants: General purpose, paintable acrylic-emulsion sealant. Caulk with approximately 12- 1/2 percent elongation complying with ASTM C834.

1. Acceptable Manufacturers and Products:
   a. Tremco Incorporated: Acrylic Latex 834.
   b. BASF Building Systems: Sonolac.
   c. Pecora Corporation: AC-20.

G. Colors: Colors as selected by Architect from manufacturer's standard colors. Acceptance of sealant will depend on range of standard colors available for selection.

2.2 FOAM GASKET SEAL

A. Joint Design: Joint manufacturer shall review layout, configuration, and anticipated movement and establish the specific model number and size of Foam Gasket Sealant for this application.

B. (FGS-1) Foam Gasket Seal: Pre-compressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in pre-compressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

1. Acceptable Manufacturers and Products:
   a. Dayton Superior Specialty Chemicals; Polytite Standard.
   b. EMSEAL Joint Systems, Ltd.; Emseal 25V.
   c. Sandell Manufacturing Co., Inc.; Polyseal.
   d. Schul International, Inc.; Sealtite.
   e. Willseal USA, LLC; Willseal.

C. Splice Adhesive for Foam Gasket Seal: One part urethane wet sealant as recommended by gasket seal manufacturer.

2.3 JOINT SEALANT BACKING

A. Joint Sealant Backer Rod Manufacturers:

1. Denver Foam, Backer Rod Manufacturing, Inc.
2. Sonneborn Sonolastic, BASF Building Systems.
3. Construction Foam Products, Nomaco Inc..

B. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

C. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Provide Type C closed-cell backings at horizontal applications and at acoustically-rated assemblies.
2. Use of Type O open-cell backing is acceptable only as approved by Architect for joints meeting the following conditions:
   a. Closed-cell backing cannot accommodate joint movement;
   b. Joint is not exposed to moisture;

c. Joint is not horizontal;
d. Joint is not in an acoustically-rated assembly.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 ACCESSORIES

A. Joint Primer: Non-staining type recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive type recommended by sealant manufacturer; compatible with joint forming materials.

C. Bond Breaker: ASTM C962, pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine joint surfaces, backing, and anchorage of units forming sealant rabbet, and conditions under which sealant work is to be performed. Do not proceed with sealant work until unsatisfactory conditions have been corrected.

3.2 JOINT SURFACE PREPARATION

A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant.

B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant application.

C. Roughen joint surfaces on vitreous coated and similar non-porous materials, wherever sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or steel wool to produce dull sheen.

D. Ensure that joint forming materials are compatible with sealant.

E. Examine joint dimensions and size materials to achieve required width/depth ratios. Use joint filler to achieve required joint depths, to allow sealants to perform properly.

3.3 SEALANT APPLICATION

A. Apply sealant in accordance with manufacturer's printed instructions. Perform work in accordance with ASTM C1193.

B. Prime joint surfaces. Do not allow primer to spill or migrate onto adjoining surfaces.

C. Install sealant backer rod for liquid elastomeric sealant, except where recommended to be omitted by sealant manufacturer for application shown.

D. Install bond breaker tape wherever required by manufacturer's recommendations to ensure that elastomeric sealant will perform properly.

E. Employ only proven installation techniques, which will ensure that sealant will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides.

1. Except as otherwise indicated, fill sealant rabbet to slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between horizontal surface and vertical surface, fill joint to form slight cove, so that joint will not trap moisture and dirt.

F. Install sealant to depth as shown or, if not shown, as recommended by sealant manufacturer but within following general limitations, measured at center (thin) section of bead:

1. For sidewalks, pavements and similar joints sealed with elastomeric sealant and subject to traffic and other abrasion and indention exposures, fill joints to depth equal to 75 percent of joint width, but not more than 5/8 inch deep nor less than 3/8 inch deep.
2. For normal moving joints sealed with elastomeric sealant, but not subject to traffic, fill joint to depth equal to 50 percent of joint width, but not more than 1/2 inch deep nor less than 1/4 inch deep.

G. Interior joints not subject to movement, these are:
1. Gypsum board to masonry joints.
2. Gypsum board to hollow metal joints.
3. Gypsum board to concrete joints.

H. Do not allow sealant or compounds to overflow or flow onto adjoining surfaces, or to migrate into voids of adjoining surfaces including rough texture surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either primer/sealer or sealant.

I. Remove excess and spillage of sealant promptly as work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.

3.4 FOAM GASKET SEAL INSTALLATION

A. Comply with manufacturer's recommendations except where more stringent requirements are specified, or except where manufacturer's technical representative directs otherwise.

B. Clean, prepare, and size joints to comply with manufacturer's recommendations. Remove loose materials and other foreign matter which might impair adhesion of sealant.
1. Size material to obtain compression of 25 percent of uncompressed dimension.

C. Remove foam gasket from protective wrapping.

D. Expose self-adhesive side and secure against joint face.

E. Horizontal Joints: Proceed sequentially in one direction with scarfed ends pushed well past one another.

F. Vertical Joints: Start at bottom and proceed up wall.

G. Do not stretch material during installation.

3.5 FIELD QUALITY CONTROL

A. Sealant Adhesion Field Test: Comply with following.
1. Weathering Sealant Adhesion: After liquid-applied sealant is fully cured, perform sealant adhesion test according to sealant manufacturer's recommendations.

3.6 PROTECTION AND CLEANING

A. Protect joint sealers during and after curing period from contact with contaminating operations or other causes so that they are without deterioration or damage at time of Substantial Completion.
1. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

B. Clean off excess sealant or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.7 SCHEDULE

A. Provide sealant where indicated (SLNT) or as required to achieve a weather-tight assembly.

B. The following schedule is not intended to be all inclusive.
   1. Exterior Joints at Unit Masonry to Unit Masonry: Ultra low modulus silicone sealant.
   2. Exterior Joints at Unit Masonry to Curtain Wall or Window System: Ultra low modulus silicone sealant.
   3. Interior Joints at Unit Masonry to Unit Masonry: Low modulus silicone sealant.
   4. Joints subject to Pedestrian or Vehicle Traffic: Use 2 part, self leveling polyurethane sealant.
   5. Interior Joints Subject to Movement: One part polyurethane sealant.
   6. Interior Joints NOT Subject to Movement: Acrylic sealant.
   7. Interior Joints in Ceramic Tile Walls and Floors, and around Equipment and Plumbing Fixtures: Mildew resistant silicone rubber sealant.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pressed steel hollow metal doors and frames.
   2. Fire-rated hollow metal doors and frames.
   3. Hollow metal window-walls, glazed openings, and other hollow metal frames for glass.
   4. Rough bucks, frame reinforcing, door reinforcing, door insulation, closure panels, clip angles and anchorage.
   5. Factory prime paint finish.

B. Related Sections:
   1. Section 083100 - Access Doors and Panels.
   2. Section 087100 – Door Hardware: Finish hardware, weather-stripping and sound-stripping.
   3. Section 088000 - Glazing: Glass and glazing.
   4. Section 089100 - Louvers.
   5. Section 099000 – Painting: Finish painting.

1.2 REFERENCES

A. A250.8-2003 - Recommended Specifications - Standard Steel Doors and Frames, Steel Door Institute, unless herein specified.

B. Underwriters' Laboratories Inc. (UL) UL63, Factory Mutual (FM), or Warnock Hersey as applicable to fire rated hollow metal assemblies and acceptable to authorities having jurisdiction.

C. NFPA No. 80 - Fire Doors and Windows.

D. ANSI/BHMA A115 - Specification for Door and Frame Preparation for Hardware.

E. ANSI/BHMA A156.7-2009 - Template Hinge Dimensions.

1.3 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300. Indicate general construction, configurations, jointing methods, reinforcements, and location of hardware and cutouts for glass and louvers.

1.4 QUALITY ASSURANCE

A. Applicable Standards: Specifications and standards of SDF 100-83.

B. Installer Qualification: Experience with installation of similar materials.

C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E152-81AE02 " Methods of Fire Tests of Door Assemblies" by nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.
   1. Oversize Fire-Rated Door Assemblies: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, provide certificate or label from approved independent testing and inspection agency, indicating that door and frame assembly conforms to requirements of design, materials and construction as established by individual listings for tested assemblies.
   2. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450 degrees F maximum in 30 minutes of fire exposure.

1.5 PRODUCT HANDLING

A. Deliver hollow metal doors in manufacturer's protective covering. Handle hollow metal with care to prevent damage.

B. Door Storage: Store doors in upright position, under cover. Place doors on at least 4 inch wood sills or on floors in manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. If corrugated wrapper on door becomes wet, or moisture appears, remove wrapping immediately. Provide 1/4 inch space between doors to promote air circulation.

C. Frame Storage: Store frames under cover on 4 inch wood sills on floors in manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. Store assembled frames in vertical position, 5 units maximum in stack. Provide 1/4 inch space between frames to promote air circulation.

PART 2 PRODUCTS

2.1 HOLLOW METAL

A. Acceptable Manufacturers: Trussbilt, Mesker, Pioneer, Steelcraft, Curries, Ceco, North Central Supply, Precision Metals, Republic, Kewanee, Security Metal Products.

B. Cold Rolled Steel Sheets: Cold formed, prime quality pickled, annealed stretcher level steel, free from scale, pitting or other surface defects, complying with ASTM A366.

C. Galvanized Steel Sheets: ASTM A526 or A527, G60 zinc coating. Use galvanized steel sheets for exterior hollow metal doors, door frames and door louvers.

D. Minimum gages of hollow metal are specified below. Provide heavier gage if required by details or specific condition. Entire frame and sidelight shall be of same gage.

1. 16 gage: Interior door frames, and glazed opening frames.
2. 16 gage: Labeled frames (or heavier if required by label).
3. 18 gage: Interior doors (or heavier if required by label).
4. 14 gage: Exterior door frames, window-wall and window frames, transom and sidelight frames.
5. 16 gage: Exterior doors.
6. 20 gage: Trim members.

2.2 RELATED MATERIALS

A. Steel Reinforcing: ASTM A36.

B. Door Bumpers or Silencers: GJ-64.

2.3 HOLLOW METAL FRAMES

A. General: Provide frames as full profile welded unless otherwise indicated. Where necessary, alternate details will be considered provided design intent is maintained. Consider and provide for erection methods.

B. Typical Reinforcing: Provide minimum hinge reinforcement 3/16 inch by 1-1/2 inch by 9 inch and lock strike reinforcement 3/16 inch by 1-1/2 inch by 4 inch long. Provide similar reinforcement for hardware items as required to adequately withstand stresses, minimum 12 gage, including channel reinforcement for door closers and closer arms, door holders and similar items. Provide reinforcement and clearances for concealed in-head bar closers and for mortise locks.

C. Cover Plates: For hinge and strike plate cutouts, provide fully enclosed pressed steel cover boxes spot welded to frames behind mortises.

D. Hardware: Mortise, reinforce, drill and tap for mortise hardware, except drilling and tapping for surface door closers, door closer brackets and adjusters shall be done in field.

E. Anchorage: Provide standard and special anchorage items as required. Provide 12 gage angle clips at bottom of frames with punched holes for securing frames to floor, except where frames are secured entirely by rough bucks. Provide formed steel channel spreader at bottom of frames, removable without damaging frame. At masonry, provide anchors (about 2 inch by 10 inch) approximately 24 inches on center.

F. Silencers: Provide specified silencers, except where stop does not occur and at smoke gasketed openings, 3 per jamb at single door and one for each door at double doors.

G. Extensions: Reinforce transom bars or mullions as necessary to provide rigid installation. Where required (as at multiple openings) to stabilize large frames, provide frame or mullion extensions to anchor to structure above, proper size to fit within overhead construction. Provide angle clips to fasten to structure.

H. Mullions: Provide mullions, continuously reinforced, straight and without twist, of tubular design. For removable mullions provide fastenings of non-ferrous bolts at bottom, with sleeves at head of frame for mullion to clip over.

I. Clearances: Provide and be responsible for proper clearances at metal frames, including for weatherstripping, soundstripping and smoke gasketing. Glass clearance shall be thickness of glass plus clearance each side (1/8 inch minimum exterior - 1/16 inch minimum interior), adjust for installation, glass thickness to allow for glazing and sealant. Where sealed double glazing is indicated, provide rebates minimum of 3/4 inch and provide 1/4 inch clearance at glass edges. Where units fit around concrete blocks (blocks built into frames) obtain actual dimensions of blocks being used to establish minimum clearances.

J. Terminated Stops: Terminate stops **6 inches <Insert dimension>** above finish floor with a [**45**] [**90**]-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

K. Stops: Set with countersunk or Jackson head screws.

L. Labeled Frames: Construct in accordance with requirements for labeled work. Attach proper U.L. label, Warnok Hersey. "B" labeled frames shall be 1-1/2 hour construction.

M. Joinings: At frames with equal width jambs and head, neatly miter on face (except locations as at transom bars and at frames with large head members). Cope and butt stops. Weld length of entire joint, including face and flat intersections. Grind smooth, at other frames, provide same mitered joint wherever possible (at intersection of jamb-head or jamb-sill) and at other locations butt metal neatly and fully welded. All joints to be tight, neatly ground, puttied, and sanded smooth before priming.

N. Workmanship: Fabricate so no grind marks, hollow or other out-of-plane areas are visible. At joints of intermediate members (as mullions and transom bars), provide tight joining, neatly accomplished without holes, burned out spots, weld build up or other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints.

O. Finish: Clean frames by degreasing process and apply thorough coating of baked-on primer, covering inside as well as outside surfaces. At galvanized frames, coat welds and other disrupted surface with zinc-rich paint containing not less than 90 percent zinc dust by weight.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 HOLLOW METAL DOORS

A. Provide to design indicated including: Flush panel doors, flush panel with cut-out as indicated, stile and rail type, stile and rail with door louver. Use galvanized steel at exterior doors.

B. Flush Doors: Reinforce, stiffen and sound deaden. Provide cut-outs for glass and louvers with stops as shown. Provide flush steel closure at top of exterior and interior doors and at bottom of exterior doors with drain holes in bottom closure. Provide seamless edge. Following door construction types are acceptable.
   1. Exterior Doors (and Interior Reinforced Doors): Reinforced with 20 gage steel stiffeners vertically 6 inches o.c. full height and width, spot welded 5 inches o.c. to both face sheets. Stiffeners welded together top and bottom. Insulate with 2-1/2 lb density mineral wool insulation.
   2. Honeycomb Core Interior Doors (Typical): Impregnated Kraft honeycomb core completely filling inside of center panel and permanently laminated to inside face sheets.
   3. Door Construction: Manufacturer's standard honeycomb, polyurethane foamed in place, unitized steel grid, vertical steel stiffeners, or rigid mineral fiber core with internal sound deadener on inside of face sheets where appropriate in accordance with SDI standards.

C. Stile and Rail Doors: Construct with equivalent reinforcing. Reinforce intersections of stiles and rails at stile type doors, to form rigid unit capable of withstanding severe abuse without racking or sagging.

D. Labeled Doors: Insulate as required by Underwriters Laboratories. Build in special hardware and provide astragals as indicated. At one hour and at 1-1/2 hour doors at enclosures, maximum transmitted temperature end point shall not exceed 450 degrees F above ambient at end of 30 minutes of fire exposure specified in NFPA 252 and UL10 ABC as applicable.

E. Seamless Vertical Edges: Construct doors with smooth flush surfaces, without visible joints or seams on exposed faces or stile edges. Interior and exterior door edge seams shall be full welded, except if polyurethane core is used for exterior, these doors shall have edges filled with body putty and ground smooth.

F. Exterior Hollow Metal Door Louvers: Fabricate louver units of 16-gage galvanized steel sheets with stationary, weatherproof Z-shaped blades and U-shaped frames, not less than 1-3/8 inch thick. Space louver blades not more than 1-1/2 inch on center. Assemble units by welding. Provide insect screen on interior side of frame, consisting of 14 by 18 wire mesh in rigid, formed metal frame.
   1. Interior Hollow Metal Door Louvers: Fabricate of 20-gage cold-rolled steel sheets with stationary sightproof inverted V-shaped blades and U-shaped frames. Space louver blades not more than 3 inches on center. Assemble units by welding.

G. Typical Reinforcement: Provide as required for hardware items. For lock reinforcement, provide manufacturer's standard reinforcement. Provide 12 gage reinforcement for escutcheons or roses. centering clips to hold lock case in alignment. For door checks, provide 3/16 inch channel type reinforcements, 3-1/2 inch deep by 14 inches long, or as required. Hinge reinforcement minimum 7 gage by 1-1/2 inch by 9 inch bar. Weld reinforcing to door. Reinforce doors for surface items such as surface and semi-concealed closers, brackets, surface holders and door stops. Drilling and tapping installation of these surface items shall be done in field by hardware installer.

H. Special Reinforcing: At exterior doors, reinforce inside of door on hinge side with high frequency hinge preparation. Weld to door.

I. Hardware: Mortise, reinforce, drill and tap for hardware furnished under Section 087100 – Door Hardware, except drilling and tapping for surface door closers, door closer brackets and adjusters shall be done in field. Obtain templates from hardware supplier.

J. Finish: Provide prime coat finish on doors. Thoroughly clean off rust, grease and other impurities. Grind welds smooth, no marks shall show. Apply metallic filler as required to fill cracks and joints and to level any weld areas or similar imperfections. Sand filler coat smooth.

2.6 HOLLOW METAL PANELS

A. Same materials and constructed and finished in same way as specified for hollow metal doors.

2.7 FASTENINGS

A. Provide fastenings, anchors and clips as required to secure hollow metal work in place. Provide Jackson head screws, or flatter. Dimple metal work to receive screw heads. Set stops and other non-structural fastenings with #6 Jackson head self-tapping screws.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting structure and conditions under which hollow metal is to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install hollow metal in accordance with reviewed shop drawings and manufacturer's printed instructions. Securely fasten and anchor work in place without twists, warps, bulges or other unsatisfactory or defacing workmanship. Set hollow metal plumb, level, square to proper elevations, true to line and eye. Set clips and other anchors with Ramset "shot" anchors or drill in anchors as approved. Units and trim shall be fastened tightly together, with neat, uniform and tight joints.

B. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
   1. In masonry construction, building-in of anchors is specified in Section 042000 - Unit Masonry. At in-place concrete or masonry construction, set frames and secure in place with masonry anchorage devices with bolt heads neatly filled with metallic putty, ground smooth and primed.
   2. At acoustic rated metal stud and gypsum board partitions, install insulation within frames.
   3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   4. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
   5. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
      a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
      b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
      c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
      d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Place fire-rated frames in accordance with NFPA Standard #80.

D. Door Installation: Fit hollow metal doors accurately in their respective frames, within following clearances: Jambs and head 3/32 inch, meeting edges pair of doors 1/8 inch, sill where no threshold or carpet 1/4 inch above finished floor, sill at threshold 3/4 inch maximum above finished floor, sill at carpet 1/4 inch above carpet. Place fire-rated doors with clearances as specified in NFPA Standard #80.

3.3 ADJUSTING AND CLEANING

A. Prime Coat Touch-Up: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 081400
WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Prefinished solid core flush wood doors:
      a. Fire-rated flush wood doors.
      b. Non-rated flush wood doors.
   2. Shop priming of field-painted doors.
   3. Factory finishing flush wood doors.

B. Related Sections:
   1. Section 064000 - Architectural Woodwork: Wood veneer and facing.
   2. Section 081113 - Hollow Metal Doors and Frames.
   3. Section 081423 - Vinyl-Acrylic-Clad Wood Doors
   4. Section 087100 - Door Hardware.
   5. Section 088000 - Glazing: Glass and glazing for doors.
   6. Section 099000 - Painting: Painted finish.

1.2 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
   1. Indicate hardware locations
   2. Indicate locations of cut-outs for glass and louvers.
   3. Indicate thickness of veneers.
   4. Indicate requirements for veneer matching.
   5. Indicate doors to be factory finished and finish requirements.

C. Samples: Submit samples of wood veneer and factory finishing as follows:
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
   2. For each wood species and transparent finish, provide set of 3 samples showing typical range of color and grain to be expected in finished work.

D. Certification: Submit certification that doors and frames comply with NFPA 252 or UL-10.

1.3 QUALITY ASSURANCE

A. Comply with requirements of referenced standard and manufacturer's written instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting
   1. Stack wood doors as recommended by door manufacturer.
   2. Use opaque plastic sheeting for natural finished doors.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings

1.5 PROJECT CONDITIONS

A. Delivery, Handling and Storage: Protect wood doors from damage, dust and dirt. Do not deliver, receive, store or install wood doors until storage and installation areas are conditioned in accordance with requirements and recommendations of AWS.

B. Environmental Requirements:

1. Do not deliver, receive, store or install architectural woodwork until building is enclosed, wet work is complete, and temporary or permanent HVAC systems are operating in areas where woodwork is stored and installed and are maintaining temperature and relative humidity at occupancy levels and within the following ranges during the remainder of the construction phase:
   a. Temperature Range: Between 60 and 90 deg F.
   b. Relative Humidity Range: Between 25 and 55 percent.
2. Monitor, Record and Report: Monitor temperature and relative humidity in areas where woodwork is stored and installed at Project site. Record temperature and relative humidity prior to delivery, throughout storage period and installation, and after installation until time of Substantial Completion. Report recorded values in accordance with Submittals requirements.

1.6 WARRANTY

A. Special Warranty: Signed by Manufacturer, Installer, and Contractor, in which Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 or UL-10C.

1. Provide gasket as required by door manufacturer in compliance with UL-10C, Category A.
2. Oversize, Fire-Rated Wood Doors: For door assemblies exceeding sizes of tested assemblies, provide oversize fire door label or certificate of inspection, from a testing and inspecting agency acceptable to authorities having jurisdiction, stating that doors comply with requirements of design, materials, and construction.
3. Fire-Rated Wood Door and Frame Assembles: Provide wood doors and frames which are identical in materials and construction to units tested in door and frame assemblies in accordance ASTM E152 and which are labeled and listed for ratings indicated by UL or other testing and inspection agency acceptable to authorities having jurisdiction.

B. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450 degrees F maximum in 30 minutes of fire exposure.

2.2 WOOD DOORS, GENERAL

A. Quality Standards: Provide wood doors fabricated and installed in accordance with specified Grade classification of the *Architectural Woodwork Standards, Adopted and Published jointly by Architectural Woodwork Institute, Architectural Woodwork Manufacturer's Association of Canada and Woodwork Institute - Current Edition* (AWS)

1. Comply with AWS Premium Grade, except where more stringent requirements are indicated in the Contract Documents.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

C. Manufacturers:
   1. VT Industries
   2. Eggers Industries
   3. Marshfield Door Systems
   4. Algoma Group

D. WDMA I.S.1-A Performance Grade: Heavy Duty.

E. Structural-Composite-Lumber-Core Doors:
   1. Structural Composite Lumber: WDMA I.S.10.
      a. Screw Withdrawal, Face: 700 lbf.
      b. Screw Withdrawal, Edge: 400 lbf.

F. Mineral-Core Doors: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   1. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated.

G. Construction: Five plies.

H. Adhesives: Type I per WDMA TM-6, waterproof.

2.3 DOOR FACING AND FINISHES

A. Shop-Finished Doors: Provide finished doors which have been final finished in shop prior to shipping.
   1. Seal faces, all four edges, edges of cutouts, and mortises with first coat of finish.

B. Wood-Veneer Faced Doors with Transparent Finish: Premium Grade AA.
   1. Wood Species and Finish: Hickory, quartersawn, clear coat.
      a. Matching (WD-1), as specified in Section 064000 - Architectural Woodwork.
   2. Thickness: 1/50 inch thick before final sanding.
   3. Veneer Matching:
      a. Match between Veneer Leaves: Book match.
      b. Assembly of Veneer Leaves on Door Faces: Balance match.
      c. Pair and Set Match: Provide for doors hung in same opening.
      d. Room Match: Match door faces within each separate room or area of building.
      e. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Section 064000 - Architectural Woodwork.
      f. Exposed Vertical and Top Edges: Same species as faces.
   4. Transparent Finish: Shop-applied, AWS Premium Grade, System 5 Conversion Varnish.
      a. Pre-finish woodwork at shop, defer only final touchup, cleaning, and polishing until after installation.
      b. Finish all surfaces, faces and edges of architectural woodwork.
         1) Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork.
      c. Sheen: Matching Architect's sample.

C. Closed-Grain Hardwood Faced Doors with Opaque Painted Finish:
   1. Wood Species and Finish: Natural birch or poplar.
   2. Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099000 - Painting.

2.4 ACCESSORIES

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
   1. Facing and Crossband Adhesive: Type 1 waterproof.
   2. Door Construction: Type 2.

B. Vision Frames:

1. Non-rated doors: Flush wood frames, hardwood to match facing.
2. 20 minute fire rated doors: Flush wood frames, hardwood to match facing
3. Fire-rated doors: UL approved wood veneer stop system.
4. Glass: Refer to Section 088000 for glass types.

C. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours or less.

1. Metal and Finish: hot-dip galvanized steel, 0.40 inch thick, factory primed for paint finish.

2.5 FABRICATION

A. Fabricate wood doors in accordance with requirements of specified AWS Grade.

B. Fabricate Work of this Section using materials, methods and quality control procedures necessary for installed units to withstand dimensional changes that can be expected resulting from temperature and humidity variations at project location when interior spaces do not have humidity control. Seal each surface to help mitigate dimensional change resulting from temperature and humidity variations.

C. Fabricate and label fire-rated doors in accordance with requirements of Underwriters' Laboratories (UL), UL-10C, Category A Positive Pressure, with intumescent required for compliance contained within the door (concealed) and requiring no additional installation of intumescent products.

D. Fabricate doors with hardware blocking as follows:

1. Provide head and sill rails on all doors.
2. Provide adequate blocking for doors specified with concealed overhead stops and surface mounted closers.
3. Provide lock-block at fire-rated, mineral core doors at latch side only.
4. Provide cross blocking only when exit devices are specified for door.
5. Provide hook block for pivots, or when floor bolts are specified under Section 087100 - Door Hardware.

E. Provide doors with minimum 1-1/4 inch thick edge strips, of wood species to match face veneers except as required for UL rating.

F. Make cut-outs and provide stops for glass and louvers. Seal cut-outs prior to installation of moldings.

1. For full light doors: Provide cut out from flush wood door, with vertical grain direction.

G. Bevel strike edge of single acting doors 1/8 inch in 2 inches. Radius strike edge of double-acting swing doors 2-1/8 inches.

H. Prepare doors to receive hardware. Refer to Section 087100 – Door Hardware and NFPA 80 for hardware requirements including UL-10C.

1. Factory pre-machine doors for all mortised hardware, including pilot holes for hinge screws and lock fronts.
2. Prefit and bevel to net opening size less approximately 3/16 inch in width and provide 1/4 inch clearance above finished floor, unless otherwise indicated on drawings.
3. Slightly ease vertical edges.

I. Fire Rated Pair of Doors; greater than 20 minute: If astragal is required, to comply with fire rated labeling requirements for pairs of fire rated doors, provide door manufacturer's standard tested astragal.

1. Shop apply astragals.
2. Shop apply matching veneer wrap to conceal metal astragal at wood faced doors.
3. Install concealed intumescent seals per UL-10C where required by code.

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099000 - Painting.

B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing." Seal edges of cutouts and mortises with first coat of finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with installation, examine openings to receive wood doors and other conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Material Moisture Content and Environmental Requirements: Comply with recommendations of AWS Woodwork Standards.
      a. Do not install woodwork that has not been conditioned to average prevailing humidity conditions in installation areas.
   3. Reject doors with defects.
   4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions. Architectural woodwork Installer shall approve substrate prior to installation.

3.2 INSTALLATION

A. Hardware: For installation, refer to Section 087100 - Door Hardware.

B. Installation Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
   1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
   2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
   1. Clearances: Provide 1/8 inchat heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
   2. Comply with NFPA 80 for fire-rated doors.
   3. Factory-Finished, Job-Fitted Doors: Restore finish before installation if fitting or machining is required at Project site.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Acoustically-Rated Wood Doors:
   1. Undercut of door shall be 3/8-inch maximum for doors to be equipped with automatic door bottoms (sound seals).
   2. Contractor shall adjust all sound seals for positive light-proof seal to adjacent jambs, head and sill conditions.
   3. Rough framed openings in drywall partitions for hollow metal frames scheduled to be fitted with acoustical seals but not having an STC rating shall be fabricated from back-to-back 18-gauge studs, or double 2x wood studs.
   4. Tightly caulk openings between steel frame and adjoining partition with clear silicone sealant.
   5. Apply clear silicone sealant to all jamb and head seals prior to application of seals to frame.

F. Ensure that smoke and sound gaskets are in-place before prefinished door installation.

3.3 INSTALLED WORK

A. Damaged or Non-Compliant Work: Remove and replace materials that are damaged or do not comply with requirements.

1. Damaged finish may be repaired or refinished if resulting repair work complies with requirements and shows no evidence of repair or refinishing.

B. Adjusting: Adjust movable components to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range, and without binding or damaging assembly components.
   1. Lubricate hardware and moving parts in accordance with Manufacturer's written instructions.
   2. Operation: Rehang or replace doors that do not swing or operate freely.

C. Cleaning: Clean and maintain installed work as frequently as necessary through the remainder of the construction period.

D. Protection: Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
   1. At clear finished doors, do not partially cover door surfaces with paper, cardboard, or other opaque covering that will create uneven aging of wood veneer.

E. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 083100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Access panels and accessories.

B. Related Sections:
   1. Section 033000 – Cast-In-Place Concrete
   2. Section 092216 – Supports for Gypsum Board.
   3. Section 092900 - Gypsum Board.
   4. Section 099000 – Painting: Field painting.

1.2 SUBMITTALS

A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

B. Shop Drawings: Submit for each item of work in accordance with Section 013300 showing location and size of proposed access panels.

C. Schedule: Provide complete access panel schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

1.3 QUALITY ASSURANCE

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. NFPA 252 for vertical access doors.
   2. ASTM E119 or UL 263 for horizontal access doors and frames.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver and protect as required during handling to preclude damage. Replace damaged units.

1.5 COORDINATION

A. Provide panels as part of this Contract needed to access concealed equipment and controls whether shown on drawings or not.

B. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

C. Provide one universal keyway for all access door and/or panel types. Contractor to coordinate between trades, where applicable.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Milcor Inc.
   2. Nystrom Building Products
   3. Bilco
   4. Babcock-Davis
   5. Karp Associates Inc.

6. J.L. Industries
7. Cesco Access Products
8. Williams Brothers Corporation of America

2.2 ACCESS PANELS

A. (AP-1) Non-rated, flush metal access panel.
   1. Milcor: Style DW Metal Access Door flush panel for gypsum board (and veneer plaster).
   2. Milcor: Style K flush panel for plaster,
   3. Milcor: Style M for unit masonry,
   4. Accessories: Cylinder lock.
   5. Factory Finish: Prime coat.

B. (AP-2) Fire-rated, recessed metal access panel for gypsum panel infill, complying with UL, and self-closing door.
   1. Milcor: Style URF recessed panel for gypsum board (and veneer plaster).
   2. Provide fire-rated access doors, B label at fire rated walls or ceilings.
   3. Accessories: Cylinder lock.
   4. Factory Finish: Prime coat.

C. (AP-3) Non-rated, recessed metal access panel for gypsum panel infill.
   1. Milcor: Style DWR recessed panel for gypsum board (and veneer plaster).
   2. Accessories: Cylinder lock.
   3. Factory Finish: Prime coat.

2.3 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from one sheet of stock, free of joints.

C. Provide steel anchor plates and anchor components for installation of building finishes.

D. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

E. Back paint components where contact is made with building finishes to prevent electrolysis.

F. Hot dip galvanized ferrous metal anchors and fastening devices.

G. Shop assemble components and package complete with anchors and fittings.

PART 3 EXECUTION

3.1 PREPARATION

A. Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates and rough-in measurements as required.

B. Before starting work notify Architect in writing of conflicts detrimental to installation or operation of units.

C. Verify with Architect location of access panels.

D. Advise installers of other work about specific requirements relating to access panel and floor door installation, including sizes of openings to receive access panel or access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access panels and frames, and floor doors and frames.

B. Install plumb, square and level, securely fastened, properly anchored and ready for full, complete operation and use.

C. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

D. Install access doors with trimless frames and floor doors flush with adjacent finish surfaces or recessed to receive finish material.

E. Adjust and lubricate operating parts for proper operation.

3.3 ACCESS PANEL SCHEDULE

A. General: The following are general recommendations for selecting access panel types and sizes, unless noted otherwise or as indicated on the drawings. Access panels typically are located for access to mechanical equipment and controls, located above hard ceilings (gypsum board) or walls of differing construction and finishes. Confirm access panel type, size and location with the Architect.

B. Type:

1. (AP-1): Typical non-rated hard ceilings and walls.
2. (AP-3): Lobbies, reception rooms, conference rooms, lecture halls.

C. Size by access requirement:

1. 12 inch by 12 inch: Hand access.
2. 18 inch by 18 inch: Arm access.
3. 24 inch by 24 inch: Arm and head access.
4. 30 inch by 24 inch: Head and torso access.
5. 36 inch by 36 inch: Ladder access.

D. Ceiling or wall access panels required to access a mechanical access panel (MAP), (AP) should be slightly larger than the (MAP) and centered on the panel.

END OF SECTION

SECTION 083324
OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire rated overhead coiling doors, electric operated.
   2. Electrical wiring from disconnect to control station and door operator.

B. Related Sections:
   1. Section 051200 - Structural Steel: Support framing.
   2. Section 055000 - Metal Fabrications: Steel framing and supports at overhead doors.
   3. Section 061000 – Rough Carpentry: Support framing.
   4. Section 087100 – Door Hardware: Cylinder core and keys.
   5. Section 099000 - Painting.
   6. Division 26 - Electrical: Conduit from disconnect to control station and door operator.

1.2 SYSTEM DESCRIPTION

A. Coiling Doors:
   1. (CD-1) Electric motor operated unit with manual override in case of power failure. Fire rated doors with fusible link activated with automatically governed closing speed.

1.3 SUBMITTALS

A. Shop Drawings and Product Data: Submit in accordance with Section 013300. Indicate pertinent dimensioning, general construction, component connections and details, anchorage methods, hardware location, and installation details.

B. Submit samples of door finish in accordance with Section 013300.

C. Submit wiring diagrams for electric operated overhead coiling doors.

1.4 QUALITY ASSURANCE

A. Furnish each overhead coiling door as complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

B. Wind Loading: Design and reinforce overhead coiling doors to withstand 20 lb. per sq ft (85 mph) wind loading pressure unless otherwise indicated.

C. Fire Door Assemblies: Provide fire door assemblies which comply with NFPA No. 80 and have been fire tested, rated and labeled in accordance with ASTM E152. Provide each door with metal UL label as evidence of rating, with label indicating rating in hours of duration of exposure to fire and letter designation of location for which assembly is designed.

D. Automatic Closing: Provide automatic closing device and governor, operating when activated by magnetic release wired to fire alarm system. Construct governor unit to be inoperative during normal door operations. Design release mechanism for easy resetting.

E. Fabricate unit to permit manual lifting of curtain for emergency exit after automatic closing, with curtain returning to closed position when released.

F. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for no less than 20,000 cycles.

G. Installer Qualifications: Engage experienced installer who is authorized representative of overhead coiling door manufacturer for both installation and maintenance of units required for this Project.

1.5 DELIVERY OF MATERIALS

A. Deliver doors in manufacturer's packaging complete with installation instructions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer and Type:

1. Door Type (CD-1): Auto-Test Model # FDO-A fire-rated, motor operated, automatic resetting, steel rolling service door by Cookson Company.

B. Other Acceptable Manufacturers: Cornell Iron Works, Wayne-Dalton, Lawrence, Apton, J.G. Wilson, Atlas Roll-Lite, Ceco/Windsor Door, Mahon Door, Overhead Door.

2.2 MATERIALS

A. Curtain: Minimum 22 gage galvanized steel, ASTM A526, galvanized with minimum 1.25 oz/sq ft coating in accordance with ASTM A525; ends of slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement; bottom fitted with angles to provide reinforcement and positive contact with floor when curtain is closed; labeled, in accordance with requirements indicated on drawings.

1. Slats: 2 inches wide by required length; slat profile No. 10.

B. Curtain Guides: Formed steel angles of required sizes and configurations.

C. Roller Shaft (counterbalance): Steel pipe and helical steel spring system capable of producing sufficient torque to assure easy operation of curtain from any position; adjustable spring tension.

D. Housing: Galvanized steel; internally reinforced to maintain rigidity and form.

E. Weatherstripping: Water and rot proof, resilient type; located along jamb edges, bottom of curtain, and within housing.

F. Hardware: Cylinder lock operable from both sides of openings. Master keyed cylinder specified under Section 087100 – Door Hardware. Remote key switch with key masterkeyed to building keying system.

G. Magnetic Release: Provide magnetic release device. Device will be wired and connected to building fire alarm system by Electrical Subcontractor. Provide time delay between release of door and before alarm system activation.

2.3 ELECTRIC OPERATOR

A. Electric Operator: UL approved in accordance with ANSI/UL 325; side mounted; volt as required by electrical service, single (three) phase, 60 hertz supply to electric motor as recommended by coiling door manufacturer; adjustable friction clutch, double shoe brake system actuated by independent full line voltage solenoid controlled by motor starter; fully enclosed positive gear driven limit switch; fully enclosed magnetic cross line reversing starter.

B. Control Station: Standard 3 button (open-close-stop) control, for each operator; 24 volt circuit; surface mounted.

C. Safety Devices: Located at bottom of doors, full width; electromechanical type; wired to reverse door upon striking object; neoprene covered to provide weather seal.

2.4 FINISH

A. Galvanized steel with factory precoated powder coat with finish color coat in standard color as selected by Architect.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install overhead coiling doors, with electric operators and controls, in accordance with reviewed shop drawings and manufacturer's instructions. Coordinate installation with electrical service and adjacent construction.

B. Fit, align, and adjust door assemblies level and plumb; provide smooth operation.

C. After completing installation, including work by other trades, lubricate, test, and adjust door to operate easily, free from warp, twist, or distortion.

D. Test door closing when activated by smoke-detector (fire-release system). Reset door-closing mechanism after successful test.

E. Train Owner's maintenance personnel on procedures and schedules related to door operation, servicing, preventive maintenance, and procedures for resetting closing devices after activation.

END OF SECTION

SECTION 084113
ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aluminum exterior entrance doors and frames (AFS).
   2. Aluminum storefront and window-wall framing system.
   3. Anchors, brackets, reinforcement and attachments.
   4. Sealant at aluminum entrances and storefronts.
   5. Field Testing

B. Related Sections:
   1. Section 079000 - Joint Protection: Other sealants.
   2. Section 084114 – Aluminum Interior Doors and Frames.
   3. Section 084400 – Aluminum Curtain Walls, Windows and Entrances.
   4. Section 087100 – Door Hardware.
   5. Section 088000 - Glazing.

1.2 DESCRIPTION

A. Low-rise aluminum thermally broken exterior entrance doors and framing and storefront framing systems designed to accept 1 inch glazing material.
   1. Thermally Improved: Internally reinforced to resist wind loading. Front glazed.
   2. Profile (AFS-2): 2-1/4 inches by 6 inches.

1.3 SYSTEM PERFORMANCES

A. General: Provide exterior entrance and storefront assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
   1. Thermal Movement: Allow for expansion and contraction resulting from ambient temperature range of 120 degrees F.
   2. Thermally Broken Construction: Provide systems that isolates aluminum exposed to exterior from aluminum exposed to interior with material of low thermal conductance.
   3. Wind Loading: Provide capacity to withstand wind loading shown on Structural Drawings.

B. Transmission Characteristics of Framing: Comply with requirements indicated below for transmission characteristics and test methods.
   1. Air Infiltration: Air infiltration of not more than 0.06 CFM per square at 6.24 psf of fixed area unless ASTM E283, applicable AAMA methods or manufacturers data requires a higher pressure.
      a. Limit air infiltration to 0.10 cu. ft/min/lineal foot of sash crack for operating sash.
   2. Water Leakage: No uncontrolled water penetration per ASTM E331 and AAMA 503 at pressure differential of 12.00 psf.
   3. Thermal Resistance of Wall System (Excluding Vision Glass Areas): U-value of 0.65 BTU/sq ft. per AAMA 1503.1.
   4. Condensation: Achieve not less than 60 CRF per AAMA 1503 so condensation is not formed on interior frame and interior window surfaces at following conditions unless project humidity conditions and specific location conditions are more severe per ASHRAE Handbook of Fundamentals, Weather Data and Design Conditions.
      a. Interior Air Temperature: 75 degrees F.
      b. Interior Humidity: 30 percent.
      c. Exterior Air Temperature: 0 degrees F.
      d. Wind Speed: 15 miles per hour unless other indicated.

C. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below for transmission characteristics and test methods.
   1. Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E283 at pressure differential of 1.567 psf.
   2. Thermal Transmittance: U-value of not more than 0.93 Btu per AAMA 1503.
   3. Condensation Resistance: Not less than 48 CRF per AAMA 1503.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of aluminum entrances and storefronts required for project.
   1. Include test reports certifying that products have been tested and comply with performance requirements.

B. Shop Drawings: Submit shop drawings in accordance with Section 013300 for fabrication and installation of aluminum entrances and storefronts.
   1. Include elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.

C. Samples: Submit samples of each type and color of aluminum finish in accordance with Section 013300.
   1. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing limits of such variations.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage experienced installer who has completed installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum entrance and storefront components in manufacturer's original protective packaging.

B. Store aluminum components in clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in manner to permit circulation of air.
   1. Stack framing components in manner that will prevent bending and avoid significant or permanent damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Type and Manufacturer: Arcadia TC670 Series heavy duty medium style aluminum doors and frames and storefront framing system by Arcadia Inc.

B. Other Manufacturers: Contingent on meeting or exceed specified requirements: Kawneer Company, Oldcastle/VistaWall Architectural Products, Tubelite Incorporated, EFCO Incorporated, Wausau Metals, or District approved equal.

2.2 MATERIALS AND ACCESSORIES

A. Exterior Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B221 for extrusions, ASTM B209 for sheet/plate.
   1. Aluminum Doors: Heavy duty with 4 inch stiles and top rails and 6-1/2 inch bottom rails with continuous steel reinforcing at each hinge stile. Weld four corners of door and provide with continuous steel rods at top and bottom rails fixed to stile with plated and lock nuts.

B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
   1. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal.
   2. Provide Phillips flat-head machine screws for exposed fasteners.

C. Concealed Flashing: Dead-soft stainless steel, 26 gauge minimum, or extruded aluminum, 0.062 inch minimum, of alloy and type selected by manufacturer for compatibility with other components.

D. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A386.

E. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A386.

F. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30 mil thickness per coat.

G. Compression Weatherstripping: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D2000 or molded PVC gaskets complying with ASTM D2287.

H. Sliding Weatherstripping: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric of aluminum strip backing, complying with AAMA 701.2.

I. Accessories: Closures, reinforcement and anchorage as indicated and recommended by entrance manufacturer. Provide concealed reinforcement for hardware. Continuous reinforcing steel channels 3/16 inch thickness with zinc-chromate coating. Provide steel plate reinforcement for closer attachment.

J. Sealant and Backer Rod: As specified in Section 079200 - Joint Protection.

2.3 FABRICATION

A. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
   1. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
   2. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces.
      a. For hardware, perform these operations prior to application of finishes.

B. Welding: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish.

C. Reinforcing: Install reinforcing as necessary for performance requirements.

D. Dissimilar Metals: Separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.

E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

F. Fasteners: Conceal fasteners wherever possible.

G. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
   1. Provide EPDM/vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
   2. At interior vestibule doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

2.4 STOREFRONT FRAMING SYSTEM

A. General: Provide inside-outside matched resilient flush-glazed system with provisions for glass replacement. Shop-fabricate and pre-assemble frame components where possible.

B. Thermal-Break Construction: Fabricate aluminum storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members, in manner which eliminates direct metal-to-metal contact.
   1. Provide manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.

C. Sealant Back Stop Containment: At perimeter, provide not less than 1-1/2 inch continuous flush metal to permit sealant back-stop containment.

2.5 STILE-AND-RAIL TYPE ALUMINUM DOORS

A. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option.

B. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of door stiles and rails.
   1. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

2.6 ALUMINUM DOOR FRAMES

A. Fabricate tubular and channel frame assemblies, as indicated, with either welded or mechanical joints in accordance with manufacturer's standards, reinforced as necessary to support required loads.

2.7 FINISHES

A. Exposed Aluminum Surfaces:
   1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat thermocured system of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, complying with AAMA 2605, (similar to Hylar 5000 or Kynar 500).
      a. Colors: Refer to Material Identification List.

B. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A653 to 2.0 oz/sq ft.

C. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Field Measurement: Wherever possible, take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work.

B. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay work.

3.3 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of aluminum entrances and storefronts.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels.
   1. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

C. Construction Tolerances: Install aluminum entrance and storefront to comply with following tolerances:
   1. Variation from Plane: Do not exceed 1/8 inch in 12 feet of length or 1/4 inch in any total length.
   2. Offset from Alignment: Maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch.
   3. Diagonal Measurements: Maximum difference in diagonal measurements shall not exceed 1/8 inch.
   4. Offset at Corners: Maximum out-of-plane offset of framing at corners shall not exceed 1/32 inch.

D. Drill and tap frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements.
   1. Use concealed fasteners wherever possible.

E. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weather tight construction.
   1. Comply with requirements of Section 079000 - Joint Protection for sealants, fillers, and gaskets.

F. Install perimeter sealant and backing in accordance with Section 079000 - Joint Protection.

3.4 FIELD TESTING

A. Field test installed glazed aluminum curtain wall unit in accordance with AAMA 503 (pressure chamber with water spray apparatus), except that reduction of performance criteria for field testing is not allowed. Testing must be performed at the specified pressure.

B. Perform air infiltration testing in accordance with applicable AAMA field method except reduction of performance criteria for field testing is not allowed.

C. Perform not less than two tests in accordance with AAMA perform testing until test results from two tests are satisfactory.

D. Include in test area adjacent wall materials so seal between window framing and rough opening is included in test.

E. Perform testing by approved independent testing laboratory acceptable to Architect.

3.5 ADJUST AND CLEAN

A. Adjust operating hardware to function properly, without binding, and to prevent tight fit at contact points and weatherstripping.

B. Clean completed system, inside and out, promptly after erection and installation of glass and sealants.
   1. Remove excess glazing and joint sealants, dirt, and other substances from aluminum surfaces.

C. Institute protective measures and other precautions required to assure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 084114
ALUMINUM INTERIOR DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior aluminum framing system (AFS).
   2. Interior aluminum doors
   3. Anchors, brackets, reinforcement and attachments.

B. Related Sections:
   1. Section 079000 – Joint Protection.
   2. Section 084113 - Aluminum Entrances and Storefronts.
   3. Section 084400 – Aluminum Curtain Walls, Windows and Entrances.
   4. Section 087100 – Door Hardware.
   5. Section 088000 - Glazing.

1.2 SYSTEM DESCRIPTION

A. (AFS-1) Low-rise non-thermally improved doors and framing systems design to accept 1/4 inch glazing material, including aluminum frame glass doors.
   1. Non-thermal broken system, center glazed.
   2. Profile: 2 inches by 4-1/2 inches.

B. (AFS-1A) Low-rise non-thermally improved doors and framing systems design to accept 1 inch glazing material, including aluminum frame glass doors.
   1. Non-thermal broken system, center glazed.
   2. Profile: 2 inches by 4-1/2 inches.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of interior aluminum doors and frames required for project.
   1. Include test reports certifying that products have been tested and comply with performance requirements.

B. Shop Drawings: Submit shop drawings in accordance with Section 013300 for fabrication and installation of aluminum doors and frames.
   1. Include elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.

C. Samples: Submit samples of each type and color of aluminum finish in accordance with Section 013300.
   1. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing limits of such variations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage experienced installer who has completed installations of aluminum doors and frames similar in design and extent to those required for project and whose work has resulted in construction with record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum door and frame components in manufacturer's original protective packaging.

B. Store aluminum components in clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in manner to permit circulation of air.

1. Stack framing components in manner that will prevent bending and avoid significant or permanent damage.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Aluminum Framing System:
   1. Type and Manufacturer: Arcadia AR450 Series by Arcadia Inc.
   2. Other Acceptable Manufacturers: Kawneer Company, Tubelite Incorporated, or District approved equal.

B. Aluminum Swinging Door:
   1. Type and Manufacturer: Arcadia Medium Stile by Arcadia Inc.
   2. Other Acceptable Manufacturers: Kawneer Company, Tubelite Incorporated, or District approved equal.

2.2 MATERIALS AND ACCESSORIES

A. Interior Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B221 for extrusions, ASTM B209 for sheet/plate.

B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
   1. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal.
   2. Provide Phillips flat-head machine screws for exposed fasteners.

C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A386.

D. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A386.

E. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.

2.3 FABRICATION

A. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
   1. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
   2. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

B. Welding: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish.

C. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.

D. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

E. Fasteners: Conceal fasteners wherever possible.

2.4 ALUMINUM FRAMING

A. Extruded aluminum alloy; ASTM B221, complete with integral weather-stripping, extruded aluminum security type snap-in glass stops for sidelights and transom lights, of profile to suit frame section.

2.5 STILE-AND-RAIL TYPE ALUMINUM DOORS

A. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option.

B. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of door stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

2.6 ALUMINUM DOOR FRAMES

A. Fabricate tubular and channel frame assemblies, as indicated, with either welded or mechanical joints in accordance with manufacturer's standards, reinforced as necessary to support required loads.

2.7 FINISHES

A. Exposed Aluminum Surfaces:
   1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat thermocured system of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, complying with AAMA 2605, (similar to Hylar 5000 or Kynar 500).
      a. Colors: Refer to Material Identification List.

B. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A653 to 2.0 oz/sq ft.

C. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of door and frame systems.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Field Measurement: Wherever possible, take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work.
   1. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay work.

3.3 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of aluminum doors and frames.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

C. Construction Tolerances: Install aluminum doors and frames to comply with following tolerances:
   1. Variation from Plane: Do not exceed 1/8 inch in 12 feet of length or 1/4 inch in any total length.
   2. Offset from Alignment: Maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch.
   3. Diagonal Measurements: Maximum difference in diagonal measurements shall not exceed 1/8 inch.
   4. Offset at Corners: Maximum out-of-plane offset of framing at corners shall not exceed 1/32 inch.

D. Drill and tap frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements.
   1. Use concealed fasteners wherever possible.

3.4 ADJUST AND CLEAN

A. Adjust operating hardware to function properly, without binding, and to prevent tight fit at contact points.

B. Clean completed system, inside and out, promptly after erection and installation of glass and sealants.
   1. Remove excess glazing and joint sealants, dirt, and other substances from aluminum surfaces.

C. Institute protective measures and other precautions required to assure that aluminum doors and frames will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 084400
ALUMINUM AND FIRE-RATED STEEL CURTAIN WALLS, WINDOWS AND ENTRANCES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aluminum tube frame system, curtain walls, window-walls and windows.
   2. Aluminum entrance doors and frames.
   3. Fire-rated steel curtain wall systems.
   4. Glass and glazing, and insulated metal infill panels.
   5. Anchors, brackets, reinforcements and attachments.
   6. Sealant at aluminum curtain walls, windows and entrances.
   7. Field testing of glazed aluminum curtain walls.

B. Related Sections:
   1. Section 051200 - Structural Steel Framing.
   2. Section 055000 - Metal Fabrications: Fabricated metal framed opening.
   3. Section 061000 - Rough Carpentry: Framed blocking. (Wood perimeter shims.)
   4. Section 079000 - Joint Protection: Other sealants and back-up materials.
   5. Section 084113 - Aluminum Entrances and Storefronts.
   6. Section 087100 – Door Hardware: Entrance door hardware.
   7. Section 088000 - Glazing: Other glass and glazing.

1.2 SYSTEM DESCRIPTION

A. High-rise aluminum thermally broken curtain wall framing system and entrance framing systems designed to accept 1 inch glazing material.
   1. (CW-1) and (CW-2): Pre-fabricated, field assembled, pressure wall.

B. Fire-rated steel curtain wall and entrance framing designed to accept 1-5/8” glazing material:
   1. (CW-3): Steel fire-rated glazed curtain wall system, outside glazed pressure plate, cover cap format.

1.3 REFERENCES

A. Aluminum Design Manual 2000.

B. Aluminum Standards and Data 2000.

C. AAMA MCWM-1

D. AAMA/NWWDA 101/I.S.2 97(Revised 12/99) Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

E. AAMA 503 - Field Check of Water Penetration through Installed Exterior Windows, Curtain Walls, and Doors by Uniform Pressure Difference.

F. ANSI A58.1/ASCE 7-10 - Minimum Design Loads for Buildings and Other Structures.

G. AAMA 2605 Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels.

H. International Building Code.

I. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

J. The Aluminum Association – “Specification for Aluminum Structures”.

1.4 SYSTEM PERFORMANCE - STRUCTURAL

A. Design Loads: Design and construct curtainwall system, including anchorages, to withstand dead loads of curtainwall system and wind loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with requirements of authorities having jurisdiction or ANSI/ASCE 7-10, whichever are more stringent.

1. Wind Load Provisions of ANSI/ASCE 7-10 as shown on Structural Drawings.

B. Deflection of building cladding members in a direction normal to plane of wall when subjected to design windloads or concentrated maintenance loads shall be limited to following:

1. Spans up to 13 feet-6 inches: limit deflection to L/175.
2. Spans greater than 13 feet-6 inches: limit deflection to L/240 plus 1/4 inch.
3. Cantilevered members: limit deflection to lesser of 2L/175 or 3/4 inch.
4. No permanent deformation in excess of 0.2 percent of its span.
5. The deflection of any member (such as vertical jambs) shall not impair the function of or damage any joint seals as warranted by the manufacturer.

C. The deflection of building cladding members in a direction parallel to the plane of the wall shall not exceed an amount which will reduce the glass bite below 75 percent of design dimension, and member shall have a minimum 1/8 inch clearance between itself and edge of fixed panel, glass or fixed part immediately below.

D. Structural Support Movement: System to accommodate anticipated interstory differential live load vertical movement of 5/16 inch (downward) in addition to anticipated thermal movement.

E. Sidesway Movement: System to accommodate anticipated interstory differential drift of H/400 in any horizontal direction.

1.5 SYSTEM PERFORMANCE – THERMAL AND INFILTRATION

A. Thermal Movement: System to provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F without causing detrimental effects to system or components.

B. Thermally Broken Construction: Provide systems that isolates aluminum exposed to exterior from aluminum exposed to interior with material of low thermal conductance.

C. Transmission Characteristics of Framing: Comply with requirements indicated below for transmission characteristics and test methods.

1. Air Infiltration: Air infiltration of not more than 0.06 CFM per square foot of fixed area at 6.24 psf unless ASTM E283, applicable AAMA or manufacturer's data methods require a higher pressure.
   a. Limit air infiltration to 0.10 cu. ft/min/lineal foot of sash crack for operating sash.
2. Water Leakage: No uncontrolled water penetration per ASTM E331 and AAMA 503 at pressure differential of 15.00 psf.
3. Thermal Resistance of Wall System (Excluding Vision Glass Areas): U-value of 0.65 BTU/sq ft. per AAMA 1503.1.
4. Condensation: Achieve not less than 71 CRF per AAMA 1503 so condensation is not formed on interior frame and interior window surfaces at following conditions unless project humidity conditions and specific location conditions are more severe per ASHRAE Handbook of Fundamentals, Weather Data and Design Conditions.
   a. Interior Air Temperature: 75 degrees F.
   b. Interior Humidity: 30 percent.
   c. Exterior Air Temperature: 0 degrees F.
   d. Wind Speed: 15 miles per hour unless other indicated.

D. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below for transmission characteristics and test methods.

1. Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E283 at pressure differential of 1.567 psf.
2. Thermal Transmittance: U-value of not more than 0.93 Btu per AAMA 1503.
3. Condensation Resistance: Not less than 48 CRF per AAMA 1503.

E. Sound Attenuation Through-Wall System (Exterior to Interior): STC 30.

F. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

G. Maintain continuous air and vapor barrier throughout assembly primarily in line with (inside) pane of glass and heal bead of glazing sealant. (Position thermal insulation on exterior surface of air and vapor retarder).

H. Not Permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening, or fracturing of attachments or components of system.

1.6 SUBMITTALS

A. Shop Drawings: By system manufacturer shall include the following:
   1. Plans, elevations, and sections.
   2. System and component dimensions.
   3. Details of components within assembly.
   4. Framed opening requirements and tolerances.
   5. Fasteners and attachments clearly indicating reactions to supporting elements and assumed eccentricities.
   6. Glass and infills.
   7. Anticipated deflection under load.
   8. Affected related work.
   9. Expansion and contraction joint locations and details.
   10. Drainage details and flow diagrams.
   11. Field welding.
   12. Show design criteria on shop drawings and certify by qualified professional engineer. Only submit calculation upon request.

B. Product Data: Submit product data for each product specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
   1. Submit substantiating test results of previous testing meeting performance criteria, and other supportive data.

C. Samples: Submit samples illustrating prefinished aluminum surface, specified glass and insulated infill panels, including glazing edge and corner, and glazing materials.

D. Certifications:
   1. Manufacturer certificate signed by manufacturer certifying compliance with requirements of Quality Assurance article.
   2. Installer certificates signed by manufacturer certifying that installer complies with requirements of Quality Assurance article.
   3. Professional Engineer certificate signed by manufacturer certifying that Professional Engineer complies with requirements of Quality Assurance article.

E. Calculations: Structural design shall be performed by a Professional Engineer, licensed in the state where Project is located, indicating structural integrity of members, anchors, fasteners and connections to building structure, in accordance with specified criteria.
   1. Signed engineering calculations shall be submitted to the Architect/Engineer only upon request.
   2. Engineering Responsibility: Calculations shall be reviewed for stated design assumptions, general compliance to specified requirements, and forces imposed on structure. The accuracy of the design calculations shall be the sole responsibility of the Contractor's Professional Engineer.

1.7 QUALITY ASSURANCE

A. System Manufacturer Qualifications: Company specializing in aluminum curtain wall systems with minimum of 5 years experience.

B. Installer Qualifications: Engage an installer with a minimum of 5 years experience to assume engineering responsibility and perform work of this Section who has specialized in installing glazed aluminum curtain wall systems that are similar to those indicated for this Project in material, design, and extent.
   1. Curtain wall manufacturer shall review and approve qualifications of installer, indicating manufacturer's verification that installer meets minimum requirements.

C. Professional Engineer Qualifications: A professional engineer, who is legally qualified to practice in the state where the project is located, with a minimum of 10 years experience in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of glazed aluminum curtain wall systems that are similar to those indicated for this Project in material, design, and extent.

D. Testing Agency: Contract with an independent testing agency to field-test installed curtain walls for compliance with specified performance criteria for air and water infiltration.
   1. Independent testing agency shall conduct tests and re-tests.
   2. Architect will determine which curtain wall units will be tested. Test area shall include perimeter sealant joint and corner or other unique features.
   3. Assist with testing procedures and otherwise cooperate with testing agency and be present to observe
   4. Failed curtain wall installations shall be removed, re-installed and re-tested until they pass.
   5. Re-testing and associated costs shall be paid for by Contractor.
   6. For each failed curtain wall test, an additional curtain wall unit shall be tested at Contractor's expense.
   7. Publish report of system modification made to allow system to pass test including specific actions to be taken by installer to help assure consistent quality control during installation of entire system on Project.

E. One Installer for Total System: Company authorized by system manufacturer.

F. Mock-Ups: Provide mock-ups of curtain wall system in accordance with Contract Documents to be field-tested for air and water infiltration.
   1. Mock-Up Pre-Installation Conference: Before beginning curtain wall mock-up construction and installation, conduct pre-installation conference at Project site with curtain wall system manufacturer, installer, Architect, Owner and other interested parties to review procedures, schedules, and coordination of curtain wall installation with other elements of Work.
      a. Provide system sample for pre-installation meeting.
   2. Architect will observe complete installation of curtain wall mock-up.
   3. During construction of mock-up to be tested and during duration of onsite testing, the following individuals shall be present:
      a. General Contractor's project manager
      b. System fabricator's project manager
      c. Installer's job superintendent that will actually be onsite supervising installation.
      d. At least one installation laborer for each trade that will actually install systems on Project to perform mock-up construction and be present to make adjustments to mock-ups.
      e. Owner's representative
      f. Representative of Architect.
   4. Mock-up shall including intermediate mullion, sill muntin, vision glass light, and insulated infill panel.
   5. Coordinate with Work of other sections to include adjacent assemblies required to be included in mock-up and in accordance with Section 014339.
   6. Mock-ups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   7. Mock-ups to demonstrate component assembly including integral glazing materials, weep drainage system, attachments, and anchors
   8. Mock-ups will pass field tests as specified herein and must be accepted by Architect prior to installation of remaining curtainwall and prior to payment for curtainwall materials.
   9. Accepted mock-up may remain as part of final work.

10. Pre-Installation Conference: After mock-ups testing is complete and testing agency has published its report, and prior to commencing installation of the remaining portions of the curtainwall system, convene a meeting to instruct installers and others that will oversee installation of systems regarding specific requirements resulting from testing that must be incorporated during installation.

G. Welding: Qualify procedures and personnel according to AWS D1.2, “Structural Welding Code – Aluminum”.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver and handle system components to prevent damage to finished surfaces.

B. Store and protect system components in accordance with manufacturer's recommendations.

C. Provide wrapping or strippable coating to protect prefinished aluminum surfaces. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.9 WARRANTY

A. Provide manufacturer's warranty for 10 years on materials and 5 years on installation and workmanship.

B. Warranty: Cover complete system for failure to meet specified requirements, including ability to exclude exterior moisture from interior.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer and Type: Aluminum curtain wall and entrance framing by Arcadia, Inc.

B. Other Acceptable Manufacturers:

1. Kawneer Company, Oldcastle/VistaWall Architectural Products, Wausau Window and Wall Systems, or District approved equal.

2.2 TYPES

A. Curtain Wall and Entrance Framing:

1. (CW-1): Arcadia Model No. T500 (OPG2900), 2-1/2” x 7”.
2. (CW-2): Arcadia Model No. T500 (OPG6000), 2-1/4” x 6”.

B. Entrance Doors: Arcadia thermal barrier, heavy duty doors.

2.3 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 611.
3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

C. Primer: FS TT-P-31; for shop application and field touch-up.

D. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641; TT-P-645.

E. Fasteners Exposed to Weather: 300 Series stainless steel, type and size recommended by curtain wall manufacturer with exposed portions matching finish curtain wall system.

F. Concealed Fasteners: ASTM A449, SAE Grade 5 carbon steel with cadmium and yellow chromate finish, type and size recommended by curtain wall manufacturer.

G. Setting Blocks: Black EPDM 85±5 durometer, Shore-A per ASTM D 2000.

2.4 FABRICATED COMPONENTS

A. Frames: Extruded aluminum profile; thermally broken with interior tubular section insulated from exterior pressure plate; matching stops and pressure plate of sufficient size and strength to provide bite on glass and infill panels; drilled drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.

B. Reinforced Mullion: Profile of extruded aluminum cladding with internal reinforcement of steel shaped structural section.

C. Infill Panel: Custom insulated aluminum panels.

D. Closure Panel: 0.0625 inch thick aluminum, size and profile as indicated.

E. Column Covers: 0.125 inch thick aluminum; full contact pressure bonded to internal stiffeners ensuring flat strong surface.

F. Flashing: Aluminum same finish as for curtain wall aluminum section where exposed; secured with concealed fastening method.

G. Fire Stop: Provide FRJS per Section 078443.

2.5 GLASS AND GLAZING

A. Glass and Glazing Materials: As specified in Section 088000 - Glazing.

2.6 SEALANT

A. Sealant and Backing Rod: As specified in Section 079000 - Joint Protection.

2.7 FABRICATION

A. Form aluminum shapes before finishing.

B. Fabricate curtain wall components allowing minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.

C. Rigidly fit and secure joints and corners with screw and spline (internal reinforcement). Make joints and connections flush, hairline and weatherproof.

D. Develop drainage holes with moisture pattern to exterior.

E. Prepare components to receive anchor devices. Fabricate anchorage items.

F. Arrange fasteners, attachments, and jointing to ensure concealment from view.

G. Reinforce sections as necessary for hardware and loads.

H. Reinforce interior horizontal as necessary for head rail to receive drapery track bracket and attachments.

I. Reinforce framing members and attachments for window washing platform imposed loads.

J. Complete fabrication and assembly at shop to minimize field cutting, splicing, fastening, sealing and similar work. Disassemble only to extent required for delivery and installation. Install operating sash in factory.

K. Aluminum Finishes: Prepare surface for finishing in accordance with recommendations of aluminum producer and finisher. Finish components of assembly simultaneously so as to attain complete uniformity of color.

1. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

2.8 FIRE-RATED GLAZED STEEL CURTAIN WALL

A. (CW-3) Fire-Rated Curtain Wall and Entrance Framing:
   1. Frame System: Fireframes® Curtainwall Series fire-rated steel frame system as supplied by Technical Glass Products (800-426-0279) fax (800-451-9857) e-mail sales@fireglass.com web site http://www.fireglass.com.
   2. Entrance Doors: Fireframes thermal barrier, heavy duty doors.

B. System Description:
   1. Steel fire-rated glazed curtain wall system, outside glazed pressure plate, cover cap format, designed to accept 1-5/8" glazing material.
   2. Frame Size: 2-3/8' x 8".
   3. Water Drainage:
      a. System is vertically weeped. No joint plugs or weep holes at horizontal mullions. Horizontal gaskets are notched and received by vertical gaskets.

C. Steel Curtainwall Framing System 60 min.
   1. Frame: profiled steel tubing permanently joined with steel bolts.
   2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant
   3. Fasteners: Type recommended by manufacturer
   4. Glazing Gaskets, Compounds and tapes: Glaze Pilkington Pyrostop glass with approved EPDM glazing gaskets and closed cell PVC tape, or pure silicone sealant.
   5. Steel Pressure Plates: Formed stainless steel pressure plate with dimensions recommended by manufacturer to securely hold glazing material in place.
   6. Cover Caps: Formed extruded aluminum.

D. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).

E. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   2. Cold-Rolled Sheet and Strip: ASTM A 611.
   3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

F. Brackets and Reinforcements: Manufacturer's standard high-strength materials with nonstaining, nonferrous shims for aligning system components.

G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   2. Reinforce members as required to receive fastener threads.

H. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

I. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

J. Exposed Fasteners: Use fasteners fabricated from Type 304 or Type 316 stainless steel.

K. Fire Rated Glazing: Refer to Section 088000 – Glazing.

L. Glazing Gaskets:
   1. Glazing gaskets for interior or exterior applications: ASTM C 864 (extruded EPDM rubber that provides for silicone adhesion) or ASTM C1115 Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories (extruded silicone).

M. Intumescent Tape: As supplied by frame manufacturer.

N. Setting Blocks: 1/4” Calcium silicate.

O. Perimeter Anchors: Steel or 316 Stainless steel when exposed.

P. Flashings: As recommended by manufacturer; same material and finish as cover caps.

Q. Silicone Sealant: One-Part Low Modulus, neutral cure High Movement-Capable Sealant: Type S; Grade NS; Class 25 with additional movement capability of 100 percent in extension and 50 percent in compression (total 150 percent); Use (Exposure) NT; Uses (Substrates) M, G, A, and O as applicable. (Use-O joint substrates include: Metal factory-coated with a high-performance coating; galvanized steel; ceramic tile.)

1. Available Products:
   a. Dow Corning 790, 795 - Dow Corning Corp.
   b. Momentive
   c. Tremco

R. Intumescent Caulk: Single component, latex-based, intumescent caulk designed to stop passage of fire, smoke, and fumes through fire-rated separations; permanently flexible after cure; will not support mold growth; flame spread/smoke developed 10/10.

1. Available Products:
   a. 3M CP-25 WP+.

S. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following nominal density and thermal resistivity:

1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Fiber Color: Regular color, unless otherwise indicated.

T. Fabrication - General:

1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
2. Accurately fit and secure joints and corners. Make joints flush and weatherproof.
3. Prepare components to receive anchor devices.
4. Provide physical and thermal isolation of glazing from framing members.
5. Provide internal guttering to drain water from joints and condensation occurring within glazing pocket.
6. Fabricate anchors.
7. Arrange fasteners and attachments to be concealed from view.

2.9 FINISHES

A. Exposed Aluminum Surfaces:

1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat thermocured system of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, complying with AAMA 2605, (similar to Hylar 5000 or Kynar 500).
   a. Colors: Refer to Material Identification List.

B. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A653 to 2.0 oz/sq ft.

C. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Coordinate dimensions, tolerances, and method of attachment with other work.

3.3 INSTALLATION

A. Install curtain wall, window-wall, window and entrance system in accordance with reviewed shop drawings and manufacturer's instructions.

B. Install fire-rated curtain wall and entrance framing by a specialty contractor with appropriate experience qualifications; and in strict accordance with the approved shop drawings. Employ experienced mechanics familiar with this type of specialized work.

C. Use method of attachment to structure permitting sufficient adjustment to accommodate construction tolerances and irregularities.

D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

E. Anchorage: Provide alignment attachments and shims required to permanently fasten system to building structure as indicated on Shop Drawings.

1. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

G. Install components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

H. Do not cut, trim, weld or braze component parts during erection in manner which would damage finish, decrease strength, or result in visual imperfection or failure in performance. Return component parts which require alteration to shop prefabrication, if possible, or for replacement with new parts.

I. Provide thermal isolation where components penetrate insulation.

J. Coordinate installation of fire stop insulation at each floor slab edge.

K. Coordinate attachment and seal of air and vapor retarder materials. Install sill flashings.

L. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

M. Install glass and glazing in accordance with Section 088000 - Glazing.

N. Install perimeter sealant and backing materials in accordance with Section 079000 - Joint Protection.

O. Install firestopping with securely anchored metal flanges to prevent dislocation.

3.4 TOLERANCES

A. Variation from Plane: 0.06 inches every 3 feet maximum or 0.25 inches per 100 feet, whichever is less.

B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.5 FIELD TESTING

A. Field test installed glazed aluminum curtain wall unit in accordance with AAMA 503 (pressure chamber with water spray apparatus), except that reduction of performance criteria for field testing is not allowed. Testing must be performed at the specified pressure.

B. Perform air infiltration testing in accordance with applicable AAMA field method except reduction of performance criteria for field testing is not allowed.

C. Perform not less than two tests in accordance with AAMA perform testing until test results from two tests are satisfactory.

D. Include in test area adjacent wall materials so seal between window framing and rough opening is included in test.

E. Perform testing by approved independent testing laboratory acceptable to Architect.

3.6 CLEANING

A. Remove protective material from prefinished aluminum surfaces.

B. Wash down exposed surfaces using solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 084426
STRUCTURAL GLASS CURTAIN WALLS

PART 1: GENERAL

1.1 SUMMARY

A. Section Includes: Structural glass, glazing and connections for fully structural glass wall suspended system (CW).

B. Related Sections:
   1. Section 079000 - Sealants: Sealants for glazing
   2. Section 084229 - Automatic Entrance Doors
   3. Section 088000 - Glass and Glazing

1.2 QUALITY ASSURANCE

A. Manufacturer Single Source: Provide entire system from a single manufacturer capable of providing system design, glass, glazing and accessories.

B. Installer Qualifications: Installer acceptable to system manufacturer.

C. Installer is responsible for supplying and erecting complete structural glazing system, coordinating and maintaining tolerances between structure and glazing system with individual suppliers and manufacturers, and installation of glazing system. Where safety glass is indicated or required by authorities having jurisdiction, provide type of products which comply with ANSI Z97.1 and testing requirements of 16 CFR, Part 1201 for category II materials.

1.3 SYSTEM DESCRIPTION

A. Structural Glass Wall (CW-4) Design Requirements:
   1. Design Wind Load: ANSI/ASCE 7-10 as shown on Structural Drawings.
   2. Snow Load: (If applicable.)
   3. Seismic Zone:
   4. Live load deflection of supporting structure if any.

B. Structural Glass Glazing System:
   1. Fittings are designed to give flush appearance to outward surface of glazing system.
   2. Design of system fittings is sole responsibility of manufacturer.
   3. Spring plate members are designed to prevent high stress concentration at hole positions and must cope with:
      a. Negative and positive wind loading
      b. Seismic loads
      c. Thermal movement
      d. Construction tolerances
      e. Live load and dead load movements
   4. Movement diaphragms of stainless steel and durable flexible discs must be incorporated in connections to accommodate oversize holes in spring plate members which allow for thermal movement and glass manufacturing tolerances.
   5. System shall provide for unitized pre-fixing of all items to glass prior to erection.

1.4 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Calculations: Submit calculations, only if requested, showing structural glazing systems performance and compliance with specified loads certified by licensed Professional Engineer registered in State of Project.

C. Shop Drawings:

1. Indicate materials, methods, system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; anticipated deflection under load; affected related work; expansion and contraction joint locations and details; drainage details and flow diagrams; and field work.
2. Coordination with other trades
3. Bear signed approval of glazing system manufacturer and glazing system installer
4. Certified by a qualified licensed Professional Engineer in State of Project.

D. Product Data: Material description and installation instructions for tapes, compounds, gaskets and other materials.

E. Samples:
1. Glass and Glazing: 12 inch by 12 inch sample of glass and glazing required for project.
2. Sealant or Gasket: 12 inches long.
3. Spring Plate: Complete with glass, bolt and accessories.

F. Quality Assurance Compliance:
1. Letters from manufacturer authorized representative and from project installer stating that they are in compliance with requirements of Contract Documents.
2. Letter signed by representative of manufacturer with company's authorization stating that installer is acceptable and qualified to install system.

G. Test Reports:
1. Test reports from an independent laboratory certifying that fully suspended structural glazing system proposed for use has been tested.
2. System tested must be similar in type of materials and design shown on drawings, utilizing counter sunk bolted attachments through glass.
3. Tested system must be equivalent in glass type and panel configuration as that shown on contract drawings.
4. If existing test reports are submitted, those tests shall have been carried out to loads at least equal to or greater than those called required for this project. If test reports are not available, system shall be tested. Cost for testing will be paid by glass system manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a temperature at 40 degrees F minimum during glazing installation unless manufacturer of glazing material specifically agrees to application at lower temperature.

1.6 WARRANTIES

A. Manufacturer Warranty: Provide manufacturer, twelve year warranty for design and materials provided. Provide written requirements for notification of manufacturer and terms for maintaining warranty provisions. Do not contradict requirements of Contract Documents.
1. Written warranties against nickel sulfide inclusions in lieu of heat soaking will not be accepted.

B. Installer Warranty: Warrant installation for a period of five years for installation and repairs of failures. Provide written requirements for notification of installer and terms for maintaining warranty provisions.

C. Warranties submitted under this Section shall not deprive Owner of other rights or remedies that Owner may have under other provisions of Contract Documents and laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by Contractor under requirements of Contract Documents.

PART 2: PRODUCTS

2.1 MATERIALS

A. Structural Glass Wall System (CW-4): The Pilkington PLANAR system distributed by: W&W Glass Systems, Inc. 300 Airport Executive Park, Suite 302, Nanuet, NY 10954 Telephone: 1-800-452-7925 Fax: 914-425-6156.
1. Other Acceptable Manufacturers: Litewall/Ekert Glass by Apex Architectural Metals, Inc.

B. Glass: Fully tempered and heat soaked. Thickness and make up of face plates and stabilizing fins to be determined by manufacturer in accordance with specifications and drawings. Average rollerwave distortion certified not to exceed 0.05 mm.
   1. Monolithic Glass: Horizontally tempered eliminating tong marks.
   2. Tempered Glass: Heat soak tested to convert nickel sulfide inclusions from alpha phase to beta phase so that glass will fracture in test.
      a. Probability of Failure: Not greater than 1 in 54,000 sq.ft. of tempered glass by statistical analysis of test data.
   3. Grind edges flat with a frosted appearance unless otherwise indicated.
   4. Fabricate tempered glass so edgework, holes and notches are completed prior to tempering and comply with the following tolerances:
      a. Dimensional Panel Size Tolerance: 1 mm from theoretical dimension required.
      b. Squareness: Within 3 mm.
      c. Bow Allowance: 0.1%.
      d. Position Variation of Holes: 1mm from a single datum point.
   5. Prestress glass around holes to a level which is compatible with design and use of fittings. Check by differential surface refractometer on stress level.

C. Fittings: Stainless steel Grade 316.
   1. Type: As shown.
   2. Stresses induced in glass by fittings will be compatible with strength of glass and meet or exceed performance requirements herein.
   3. Finish: Stainless steel No. 3.
   4. Spring plates: As shown.
      a. Spring plates shall provide a tolerance capability which will cope with full range of movements described below.
      b. Thermal Movements: Components movement resulting from differential coefficients of thermal expansion shall withstand noiselessly thermal movements without buckling, distortion, cracking, failure of joint seals or excess stress on glass or fixing assemblies.
      c. Deflection of edge beams due to loading applied after erection of cladding to magnitude specified.
      d. Maximum side sway of structure due to wind load to magnitude specified or seismic movement to degree specified.
      e. Deflection due to self weight of Planar system. Inward and outward movements due to design wind loads specified.
   5. Countersunk Planar bolts will be bright machine finished, socket head bolt diameter 1-1/8" with hexagonal shank, stainless steel Type 303. No exterior plates, caps, disks or buttons will be permitted.
   6. Bushings will be Nylatron Polyamide.
   7. Gaskets will be fully vulcanized fiber, neoprene or precured silicone.

D. Sealant: See Section 079000.

PART 3: EXECUTION

3.1 EXAMINATION

A. Inspect each unit of glass immediately before installation.

B. Glass which has significant impact damage at edges, scratches or abrasion of faces, or any other evidence of damage shall not be installed.

C. Verify dimensions of in-place and subsequent construction.

D. Follow FGMA recommended inspection procedures.

E. Do not begin work until unsatisfactory conditions have been corrected.

F. Beginning of Installation constitutes acceptance of related construction as suitable.

3.2 PREPARATION

A. Pre-Installation Meeting:
   1. Meet at project site with representatives of glass and glazing materials manufacturers, architectural exposed structural steel fabricator and erector, sealant manufacturer, glazing installer, Architect's representative and Owner's representative.
   2. Review glazing procedure and schedule, including method of delivering and handling glass, and installing glazing materials. The chemical compatibility of all glazing materials and framing sealants with each other and with like materials used in glass fabrication shall be established.

B. Clean laitance, dust, dirt and other substances from glazing connectors receiving glazing materials which could impair installation.

C. Remove protective coatings which may adversely affect sealants adhesion. Comply with manufacturer's instructions for final wiping of surfaces immediately before application of primer and glazing sealants. Wipe metal surfaces with recommended solvents.

3.3 INSTALLATION

A. Install in accordance with manufacturer's requirements and approved shop drawings.

B. Seal plate to plate joints of glass with silicone sealant. See Section 079000.

C. Bolt Torque: Torque bolts to torques specified on shop drawings using calibrated tool. Lock torqued bolts into position to prevent backoff. Reset calibrations regularly to ensure accurate torquing.

D. Sealants: Prime surfaces to receive glazing sealants where required, in accordance with manufacturer's recommendations, using recommended primers.

E. Locate setting blocks, if required by drawings, at quarter points of sill, but no closer than 6 inches to corners of glass. Use blocks of proper sizes to support glass in accordance with manufacturer's recommendations.

F. Provide spacers to separate glass from spring plates.

G. Set glass in a manner which produces greatest possible degree of uniformity in appearance. Face all glass, which has dissimilar faces, with matching faces in same direction.

H. Use masking tape or other suitable protection to limit coverage of glazing materials to surfaces intended for sealants.

I. Tool exposed surfaces of glazing materials.

J. Clean excess sealant from glass and support members immediately after application, using solvents or cleaners recommended by manufacturers.

3.4 CURING, PROTECTION, AND CLEANING

A. Cure sealants in accordance with manufacturer's instructions to attain maximum durability and adhesion to glass.

B. Clean surfaces after installation.

C. Final cleaning and protection after installation is responsibility of others.

END OF SECTION

SECTION 087100
DOOR HARDWARE

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Door hardware.

B. Thresholds, weather seals and smoke seals.

C. Electrified door hardware.

D. Scope of Work in this Section: Provide door hardware necessary to complete work. Hardware items not specifically specified or identified are to be provided of type and quality suitable to the service required and comparable to other hardware, and at no additional cost to Owner.

1.2 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Provide templates to:

1. Section 08 11 13 for door and frame preparation.
2. Section 08 14 00 for door preparation.
3. Section 08 44 13 for door and frame preparation.
4. Section 32 31 13 for gate and frame preparation.
5. Section 32 31 19 for gate and frame preparation.

1.3 RELATED WORK

A. Division 3-Concrete – Core Drilling for Stop Anchors

A. Section 08 11 13-Hollow Metal Doors and Frames.

B. Section 08 14 00-Wood Doors.

C. Section 08 41 13-Aluminum Entrances and Storefronts.

D. Section 09 90 00-Painting

E. Division 26-Electrical

F. Section 28 13 00-Access Control.

G. Section 32 31 13-Chain Link Fences and Gates.

H. Section 32 31 19-Decorative Metal Fences and Gates.

1.4 REFERENCES

A. Steel Door Institute (SDI) standards as specified.

A. Architectural Woodwork Institute (AWI) as specified.

B. California Building Code (CBC) 2010.

C. California Referenced Standards Code (CRSC).

D. Americans with Disabilities Act (ADA) of 1990 criteria as specified.

E. Underwriters Laboratories Inc. standards as specified.

F. National Fire Protection (NFPA) standards as specified.

1.5 QUALITY ASSURANCE

A. Hardware Supplier: Provide hardware from company specializing in supplying institutional door hardware with five years' experience and approved by specified hardware manufacturers as a factory direct supplier.

A. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) or equivalent to prepare submittal required by this section.

1.6 REGULATORY REQUIREMENTS

A. Conform to CBC "Means of Egress" requirements.

A. Conform to UL10C requirements applicable to positive pressure fire rated doors and frames. Provide all necessary hardware for complete fire labeled opening including ball-bearing hinges, latching hardware, non-flaming fluid closers, smoke seals and intumescent hot seals.

B. Conform to CRSC Standard 12-7-4 requirements applicable to fire rated doors and frames.

C. Conform to applicable requirements of the Americans with Disabilities Act of 1990 regarding accessibility requirements for door and entrance hardware.

D. Conform to applicable requirements of California Building Code regarding exiting and accessibility requirements for door and entrance hardware.

E. All hardware shall meet the requirements of CBC Sections 11B-404.2.4.4, 11B-404.2.9, 11B-404.2.8.1, 11B-404.2.7 and 11B-309.4.

1.7 SUBMITTALS

A. Submit schedule and product data under provisions of Section 01 30 00.

A. Provide five (5) copies of vertical format hardware schedule showing each application including door index, headings, hardware sets, door number and location, door and frame size and material, door and hardware handing, degrees of opening, quantity required, part numbers and finish of each item.

1. Projects with multiple buildings and/or multiple floor levels must be submitted so each building and/or floor level is not mixed with another starting with Building A, 1st floor etc.
2. Architect's review of such schedule does not relieve the Contractor of providing hardware required for the work, whether or not such hardware was inadvertently omitted from this Section.

B. Accompanying the schedules, provide two (2) manufacturer's brochures of each item scheduled, indicating function, finish, dimensions, and related features. No hardware schedule will be accepted for review without submission of such brochure package.

C. Submit manufacturer's certificate of warranty with submittal; otherwise material will be rejected.

D. When alternate manufacturers are proposed by contractor, provide two (2) brochures of proposed items two weeks prior of bid date.

E. Submit only manufacturers specified as approved or alternate.

F. Provide samples indicating hardware design and finish when required by Architect.

1.8 COORDINATION

A. Coordinate work of this Section with other directly affected Sections involving manufacturers of any internal reinforcement for door hardware.

A. In particular, coordinate door preparation in accordance with applicable regulatory and trade standards specified.

B. Review details and conditions prior to ordering hardware. When a door hand is changed during construction, coordinate and change hardware as necessary at no cost to the Owner.

C. Pre-installation training: Provide on-site training by hardware factory personnel on the proper installation, wiring, and programming of the locks, panic hardware, and door closers prior to any such hardware's installation. Provide Schlage AD-Series training to COD facility staff, the project's door hardware installers, and the project's security system installers.

1.9 OPERATIONS AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 1.

A. Include data on operating hardware. Lubrication requirements and inspection procedures related to preventive maintenance.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 1.

A. Store and protect products under provisions of Division 1.

B. Package hardware items individually; label and identify packages with door opening code to match hardware schedule.

1.11 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

A. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.12 WARRANTY

A. Provide two year guarantee against defects on hardware, including electrical components, five years warranty for cylindrical locks, mortise locks and exit devices and ten year warranty for surface, floor concealed closers and continuous hinges.

A. Submit guarantee on form provided in Documents.

B. Submit manufacturer's certificate of warranty with submittal, otherwise material will be rejected.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

Item	Manufacturer	Approved Alternates
Hinges:	(IVE)-Ives	Stanley, Bommer, Hager, McKinney
Continuous Hinges:	(MAR)-Markar	McKinney, Pemko, Select, Stanley, ABH Manufacturing
Pivots:	(RIX)-Rixson	Ives, McKinney
Push/Pull Plates:	(IVE)-Ives	Trimco, Rockwood
Anti-Vandal Pulls:	(IVE)-Ives	Rockwood, Trimco
Offset Pulls:	(IVE)-Ives	Rockwood, Trimco
Metal Door Flush Bolts:	(IVE)-Ives	Door Controls International, Rockwood
Wood Door Flush Bolts:	(DCI)-Door Controls	Rockwood
Locks and Latchsets:	(SCH)-Schlage	Best (45H), Corbin-Russwin (ML2000), Sargent (8200), Yale (8800)
Cylinders:	(MED)-Medico	CAMPUS STANDARD
Strike Monitors:	(SDC)-Secure Door Controls	Securitron,
Lock Guards:	(D-J)-Don-Jo	Ives, Rockwood
Exit Devices:	(VON)-Von Duprin	Precision Hardware (Apex), Sargent (19-43-80)
Coordinators:	(DCI) - Door Controls	Rockwood
Surface Closers:	(LCN)-LCN	Norton (7500), Sargent (351), Stanley (D4550/D4551)
Overhead (OH) Concealed Closers:	(RIX) - Rixson	Dorma
Floor Stops:	(IVE)-Ives	Rockwood, Trimco
Floor Holder/Stops:	(ROC)-Rockwood	Trimco, Ives
Overhead Stops:	(RIX)-Rixson	Glynn-Johnson, ABH
Kick & Mop Plates:	(TRM)-Trimco	Rockwood, Tice
Adhesive Seals with 3M Tape:	(ZER)-Zero	Or Equal
Door Sweeps	(ZER)-Zero	Pemko, National Guard Products
Automatic Door Bottoms:	(ZER)-Zero	No Known Equal
Rated Overlapping Astragals	(PEM)-Pemko	Reese, or Equal
Thresholds:	(PEM)-Pemko	Zero, National Guard Products
Coat Hooks:	(ROC)-Rockwood	or Equal
Silencers:	(TRM)-Trimco	Ives, Rockwood
Alarm Contacts:	(INT)-Interlogix	or Equal
Knox Boxes:	(KNX) - Knox	No Known Equal
Elec. Power Transfer for TGP	(SEC)-Securitron	or Equal

2.2 HINGES & PIVOTS

A. Unless noted otherwise, provide steel hinges, with finish as shown in schedule. Provide non-ferrous hinges at exterior doors.

B. Where pivots are specified in the hardware sets for hollow metal doors, omit the pivots and provide Markar (or approved equal) continuous hinge: FM-300-MB x CHS-1. At doors with electrified pivots, provide Markar (or approved equal) electric power transfer CE8D-ETAP option.

C. Provide hinges in accordance with following schedule:
   1. Doors up to 4 feet high: 2 hinges.
   2. Doors 4 feet to 7 feet 5 inches high: 3 hinges minimum.

3. Doors greater than 7 feet 5 inches high: 4 hinges.
4. Doors up to 3 feet wide, standard weight: 4-1/2" x 4-1/2" hinges.
5. Doors 3'6" wide to under 4'0" wide, standard weight: 5" x 4-1/2".
6. Doors 4'0" wide, heavy weight: 5" x 4-1/2".
7. Provide heavy-weight hinges where specified.
8. At doors weighing 150 lbs. or more, furnish 5" high hinges.
9. At doors in aluminum frames: standard weight 4-1/2" x 4-1/2" hinges, or continuous hinges as scheduled.

D. Unless otherwise noted or required, provide full mortise three-knuckle hinges, with non-rising loose pins and concealed ball bearings.

E. Provide set screw (NRP) type at key lockable outswing doors to prevent pin removal when door is in closed position.

F. Where necessary to maintain door clearance at jamb trim, frame conditions, door reveals and similar conditions, provide wide throw hinges as approved by the Architect.

G. Continuous Hinges
   1. To be barrel-type of 14 gauge 304 stainless steel, 14 gauge 1012 cold-rolled steel or 6063-T5 aluminum material with 0.25" diameter stainless steel Teflon-coated pin. Gear types are prohibited. Provide with "medical bearings" to reduce noise and accumulation of dust.
   2. Hinge guard models to be furnished with Adjusta-screw fasteners.
   3. Provide with self-lubricating fiber-reinforced polymer bearings ("MB" option) for noise-free operation and resistance to dust and dirt accumulation.

H. Provide with welded end pins.

I. Where necessary to maintain door clearance at jamb trim, frame conditions, door reveals and similar conditions, provide wide throw hinges as approved by the Architect. Provide wide throw hinges as required for doors swinging 180° into a room to avoid conflict between the door closer cover and the wall or frame.

J. Provide with factory cut-outs for mortise hardware that must penetrate the hinge (e.g. concealed auto door bottoms, concealed power transfer, etc.) where they occur.

K. Provide mortar guard frame box by hinge manufacturer for electric hinges where not provided by frame manufacturer.

2.3 KEYING

A. Keying to be tied into the campus MEDECO M3 grand mastered keyway system. Contractor to coordinate with campus Locksmith to determine keying requirements and keyway.

A. Manufacturer will provide Master keyed cores to be installed by district after installing of hardware is complete and just prior to Owner occupancy.

B. Contractor to coordinate the order from the manufacture with a Letter of Authorization from the District and have the supplier send sub assembled, bitted cores with specified keyway and uncut keys along with cut key directly to the authorized campus personnel. Installation is to be coordinated with the Contractor and District Project Manager.

C. Each master keyed core comes with two keys and two additional keys per core for a total of four cut keys.

D. Construction Keying: Contractor to provide temporary keyed alike cores

E. Provide cylinder collars and spacers to match key cylinder finish for each locking device. Provide collar and spacers to ensure a tight, secure fit of the key cylinder to the locking device with no gaps or spaces.

2.4 LOCKSETS, LATCHSET AND STRIKES

A. Unless noted otherwise in schedule, locksets, latchsets, cylinders and component parts shall be the products of single manufacturer.

B. Provide strikes at locks with curved lip strike of sufficient length to protect trim and jamb. Each strike will include wrought strike box (similar to Tice Industries No. 1502). At outswing doors with overlapping astragals installed on the pull side, provide a flat strike with 7/8" lip-to-center dimension.

C. Mortise Locks:

D. Lock Body shall include quick reversibility mechanism without removing lock body cover.

E. Provide cast or forged levers only. Roses, where specified, shall be wrought. Escutcheons, where specified, shall be cast or forged.

F. Unless noted otherwise, provide 2-3/4 inch backset.

G. Lock Throw: Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

H. Auto Flush Bolts: Minimum ½" throw latch bolts, fully automatic extending into top strike and dust proof strike at sill. Provide longer rods as necessary for doors exceeding 7'0" in height. Where auto flush bolts are specified as top bolts only with bottom fire bolt at wood pairs rated above 20-minutes, provide bottom auto flush bolt and dust proof strike (DCI 82 or approved equal) in lieu of specified bottom fire bolt. Provide type of auto flush bolt required by door material (metal or wood), regardless of type specified.

2.5 PANIC EXIT DEVICES

A. Where specified, provide panic exit device with required UL labels. Where panic device is required on fire rated doors, provide UL label with supplementary marking on door and hardware indicating compliant fire exit hardware.

B. Provide modern push-pad type, reversible exit devices. Provide exit device manufacturer's shims as required to clear glass lite frames.

C. Push-pad shall be mounted at a height of not less than 30 inches (762mm) nor more than 44 inches (1118mm) above floor. The unlatching force shall not exceed 15 pounds (66.72N) when applied in the direction of travel per CBC 11B-404.2.9.

D. Exit Devices shall comply with CRSC Standard 12-10-3 and CBC 1008.1.9.

E. Provide exit devices levers of design to match lock levers.

2.6 DOOR CLOSERS

A. Surface mounted closers to be full rack and pinion type with cast shell.
   1. Provide drop brackets, mortise shoes, and long arms as required.
   2. Provide non-handed door closers with multi-sized springs, with separate adjustable valves for latch, sweep speed, and backcheck.
   3. Template and adjust closers per manufacturer's recommendations and to meet accessibility requirements. When used in conjunction with an overhead stop, provide special templates and brackets as required.
   4. Where regular arm closers are specified at doors that must swing past 120°, revise closer to LCN 4040T-Series (top jamb) x 4040TJ-18 plate and provide minimum 4-1/2" wide hinges.
   5. Where used in conjunction with an overhead stop, provide special template, special arms, back plates, and other items as needed to allow the closer to be installed without conflicting with the overhead stop.

2.7 MAGNETIC HOLDERS

A. Provide magnetic holders with tri-volts coils only.

B. Provide assemblies consisting of an armature contact plate with adjustable mounting pivot.

C. Use extensions as necessary to align door at parallel with wall.

2.8 PROTECTIVE PLATES AND EDGE GUARDS

A. Provide stainless steel kick or armor plates as scheduled, 18 gauge, 10 inches high, 2 inches less than door width on single doors, 1 inch less than door width on pair, 40 inches high on armor plates, with all edges beveled. Where armor plates are specified at rated doors, provide with U.L. listing.

B. Provide stainless steel mop plates as scheduled, 18 gauge, 4 inches high, 1 inch less than door width, with all edges beveled.

C. Mortise edge guards:

D. Maximum height to bottom of mortise lock armor front; at doors without mortise locks, provide same height edge guard as doors with mortise locks.
   1. Provide with cut-outs for mortised door hardware.
   2. Provide in mortise configuration.
   3. Provide with bevel to match door bevel.
   4. Provide for exact door thickness.
   5. Provide with countersunk fasteners in edge of door only; door face legs shall have no exposed fasteners.

E. Forward edge guards to wood door manufacturer for factory-installation.

F. Mortise edge guards installed at leading edge of door unless specified otherwise.

2.9 PUSH/PULL PLATES

A. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation; through-bolted for matched pairs, but not for single units.

2.10 STOPS

A. Provide a floor or wall stop at every door.

B. Provide carpet risers for floor stops where required.

C. Where specified floor or wall stop would present a pedestrian hazard or cannot be used, furnish Rixson model overhead concealed stop.

D. Template overhead stops for maximum available swing.

2.11 SILENCERS

A. Provide silencers at hollow metal or wood door frames that are without seals in quantities as follows:
   1. Single Doors: 3 silencers
   1. Pairs: 4 silencers

2.12 SEALS

A. Provide seals complete with retainers, fasteners and trim.

B. Provide UL listed seals at rated openings.

C. Provide UL listed intumescent hot seal at fire rated wood doors when doors are not being furnish with intumescent hot seal.

D. Unless noted otherwise, furnish fastener-applied silicone or neoprene seals at door jamb and head conditions. Use of vinyl seal prohibited.

E. Where flat bar head seals are specified to accommodate hardware mounted to the underside of the frame stop, furnish factory-cut as required for frame stops narrower than the standard seal width.

F. Where specified, furnish solid neoprene seals complying with MilSpec R6855, Class II, Grade 40.

G. Where concealed automatic door bottoms are specified, provide a type compatible with the construction and rating of the door, regardless of the type specified.

H. At doors in aluminum frames, omit seals. Seals will be provided by aluminum frame section.

I. Where adhesive frame seals are scheduled, provide only type with genuine 3M adhesive tape for superior adhesion.

J. Provide automatic door bottoms with the below features:
   1. Provide integral permanent magnets to assist in even dropping of the door bottom.
   2. Door edge mounting plates that allow the automatic door bottom to be removed for service or replacement without de-mounting the door from the frame.

K. Where frame seals, astragals, or door bottoms are not specified at exterior hollow metal doors, provide weather seals as below:
   1. Outswing door frame seals: Pemko 2891AS x CSK SCREWS.
   2. Inswing door frame seals: Pemko 332CS.
   3. Meeting stile astragals for pairs with panic hardware: Pemko 351C x 351CP.
   4. Overlapping astragals for pairs with locksets and auto flush bolts: Pemko 357SS x CSK TORX SCREWS x SPECIAL HOLE PATTERN TO AVOID CONFLICT WITH LOCK AND AUTO FLUSH BOLTS.
   5. Door bottoms: Pemko 315CN.

2.13 THRESHOLDS

A. General: Except as otherwise indicated furnish standard metal threshold unit of type, size and profile as shown or scheduled. Where required by fire code, furnish appropriate model thresholds at openings where combustible floor material extends through the door opening. Provide threshold as indicated in details. Provide ¼-20 stainless steel fasteners with combo anchors.

B. Thresholds must comply with the requirements of ADA and ANSI-117.1 and CBC section 11B-404.2.5.

C. Provide thresholds with aluminum composite filler where so specified for increased strength.

2.14 FINISHES

A. Finishes are identified in Schedule at end of this Section.

B. Where finish not shown, match finish of lockset.

C. Where finish is noted in the hardware schedule as “TBD”, request finish selection from the Architect and provide the selected finish.

D. Provide fasteners matching in finish, base material and color.

E. Provide anti-microbial lifetime coating where specified on lever handles, panic bars, hospital latch pulls, door pulls and push/pull plates.

2.15 FASTENERS

A. Fasteners: Provide hardware manufacture to conform to publish templates, generally prepared for machine screws installation.

B. Install hardware with manufacturer supplied screws for each item.

C. Provide screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

D. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners.

E. Provide ¼-20 stainless steel machine screws and combo anchors for all thresholds.

2.16 COAT HOOKS

A. Omit coat hooks where specified at doors with half or full glass lites.

B. Where coat hooks are specified at accessible rooms, provide two coat hooks per door, installed at normal height and at ADA prescribed height.

2.17 ELECTRICAL DRAWINGS

A. Provide custom point-to-point wiring diagram for each electric hardware application.

B. Provide custom electric hardware elevation riser diagram for each hardware application.

PART 3 - EXECUTION

3.0 INSPECTION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings, instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

3.1 INSTALLATION

A. A QUALIFIED MECHANIC skilled in the application of institutional grade builder’s hardware shall install hardware.

B. Install hardware in accordance with manufacturer's instructions and requirements of SDI, ANSI/NFPA 80, AWI, and BHMA. Select applicable standard based on door function, type and regulatory criteria.

C. Install hardware in accordance with NFPA 80 in fire labeled doors.

D. Where door is designated as receiving new hardware, package and label hardware by type and function, and deliver to Owner.

E. Predrill pilot holes in wood for screws. Drill and tap for surface mounted hardware on metal. Set hinge leaf snug and flat in mortises, turn screws to flat seat [do not drive].

F. Mount surface closers on side of door away from corridor, inside rooms or in stairs. Install regular or parallel rigid arm closers as required.

G. Provide adequate backing in stud partitions for the attachment of all respective finish hardware.

H. Floor mounted door stops are to be installed at maximum of four inches from the face of the wall or partition.

I. Install thresholds in full bed of sealant at front and side edges.

3.2 INSTALL HARDWARE USING TEMPLATES PROVIDED BY HARDWARE ITEM MANUFACTURER

A. Prior to finishing door, fit hardware to door, utilizing fasteners and templates as specified.

B. Remove hardware, carefully label and store. Where door exists and is designated to receive new finish, remove existing hardware.

C. Re-install after door finish is complete

3.3 UNLESS NOTED OTHERWISE OR SHOWN ON DRAWINGS, MOUNT HARDWARE IN ACCORDANCE WITH THE FOLLOWING CRITERIA:

A. Latchset and Lockset handle: 38 inches above finish floor. Verify manufacturer's template with door design.

B. Glass locks: 40 inches above finish floor to center line. Verify manufacturer's template with door design.

C. Auxiliary Locks: 40 inches to center line.

D. Panic Devices: 40 inches above floor; at storefront doors, aligned with center muntin on adjacent window wall. Verify manufacturer's template with door design.

E. Push and Pull Plates: 44 inches to center line.

F. Door Pulls: 40 inches above finish floor to center line.

3.4 ADJUST CLOSER OPERATING EFFORT CONFORM TO CALIFORNIA BUILDING CODE SECTION 1133B.2.5

A. Exterior and Interior Doors: 5.0 pounds force.

B. Fire Rated Doors: Verify with AHJ (Authority Having Jurisdiction) not to exceed 15.0 pounds force.

3.5 ADJUST CLOSER DELAY AND OPERATING SPEEDS TO COMPLY WITH REQUIREMENTSOF CALIFORNIA BUILDING CODE AND THE AMERICANS WITH DISABILITIES ACT ARCHITECTURAL GUIDELINES, ARTICLE 4.13.10

A. The sweep period of the door closers shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Closer Certification: Provide written certification, signed by door closer representative, stating closers were inspected and installed in accordance with specified opening force and delay requirements.

3.6 CLEAN AND ADJUST

A. At completion, all hardware shall be left clean and free from disfigurement. Contractor shall make a final adjustment to all door closers and other items of hardware. Where hardware is found defective, repair, replace, or otherwise correct as directed.

B. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Adjust hardware so that moving parts operate freely, without bind, or excessive play. Hardware shall be free of paint, corrosion, or damage of any kind.

3.7 POST-INSTALLATION INSPECTION

A. Provide written certification, signed by the hardware manufacturer representative, stating the locks, panics, and door closers were inspected and installed in accordance with specified operational requirements.

DOOR HARDWARE SCHEDULE

HW-1
Men's, Women's
Each Door to Have: (HMD x HMF) NR

1	Continuous Hinges	FM-300-WEP	630	MAR
1	Utility Lock	L9060L-06A	630	SCH
2	Mortise Cylinder	LFIC-32	626	MED
2	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4041-DEL- TB	SRIx689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Mop Plate	KM050 4" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Threshold	STONE BY OTHERS.		

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-1A
Conference
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1	630	IVE
1	Passage Latch	L9010S-06A	630	SCH
1	Closer	4041-DEL- TB	SRIx689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-1B
Conference
Each Door to Have: (AL/GL x ALF) NR

1	Continuous Hinge	SL24HD	***	SEL
2	Door Pulls	1161.SOLID FULL HEIIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
1	OHC Closer	PH91-H	689	RIX
1	Floor Stop	RM850	630	ROC

FRAME SEALS BY ALUM FRAME MANUFACTURER

HW-2
Restroom
Each Door to Have: (HMD x HMF) Rated

1	Continuous Hinge	FM-300-WEP	630	MAR
1	Keyed Privacy Lock	L9486L-06A xL583-375 x L583-363	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4041-DEL- TB	SRIx689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Mop Plate	KM050 4" x 1" LDW B4E-HVY CTSK	630	TRM
1	Wall Stop	RM860	630	ROC
2	Coat Hooks	796 @ 48" and 60" MOUNTING HEIGHT	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Threshold	STONE BY OTHERS.		

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-3
Interior Office, Division Office
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1	630	IVE
1	Office Lock	L9456L-06A x L583-363	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
2	Coat Hooks	796 @ 48" and 60" MOUNTING HEIGHT	630	ROC

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-3A
Interior Office, Work Room, Lab Prep Room
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1	630	IVE
1	Office Lock	9456L-06A x L583-363	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Armor Plate	KA064 34" x 2" LDW B4E-HVY CTSK	630	TRM
1	Overhead Stop & Hold	2-SERIES	630	RIX
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-3B
Interior Office
Each Dbl. Acting Gate: (WD) NR

1	Set of Spring Pivot	7122	626	BOM

HW-3C
Interior Office
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1	630	IVE
1	Office Lock	L9456L-06A x L583-363	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Overhead Stop & Hold	2-SERIES	630	RIX
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Coat Hook	796	630	ROC

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-3D
Prep Room
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1	630	IVE
1	Classroom Lock	L9070L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Armor Plate	KA064 34” x 2” LDW B4E-HVY CTSK	630	TRM
1	Overhead Stop & Hold	2-SERIES	630	RIX
1	Set Seal	332CR HEAD & JAMBS	AL	PEM

HW-5
Janitor Storage, Room, Electrical
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1 x NRP	630	IVE
1	Utility Lock	L9060L-06A	630	SCH
2	Mortise Cylinder	LFIC-32	626	MED
2	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-H-EDA-MC TB SRI	x689	LCN
1	Kick Plate	KO064 10” x 2” LDW B4E-HVY CTSK	630	TRM
1	Overhead Stop & Hold	2-SERIES	630	RIX
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-5A
Waste,
Each Door to Have: (WD x HMF) NR

4	Hinges	3CB1 x NRP	630	IVE
1	Storeroom Lock	L9080L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-REG- MC TB	SRIx689	LCN
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-5B
Chemical Storage
Each Door to Have: (WD x HMF) Rated

4	Hinges	3CB1HW x NRP	630	IVE
1	Storeroom Lock	L9080L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-REG- MC TB	689	LCN
1	Kick Plate	KO064 10” x 2” LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-5C
Storage
Each Door to Have: (WD x HMF, HMD x HMF) NR

4	Hinges	3CB1	630	IVE
1	Storeroom Lock	L9080L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Kick Plate	KO064 10” x 2” LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-5D
BDF
Each Door to Have: (HMD x HMF) NR

4	Hinges	3CB1HW x NRP	630	IVE
1	Storeroom Lock	L9080L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP -SCUSH-MC TB SRIx	689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-5E
Centralized Prep & Storage
Each Dutch Door to Have: (WD x HMF) NR

Top Leaf:

2	Hinges	3CB1 x NRP	630	IVE
1	Dutch Door Bolt	3920-4	626	TRM
1	Overhead Stop & Hold	2-SERIES	630	RIX
1	Set Seal	332CR HEAD & JAMBS	AL	PEM

Bottom Leaf:

2	Hinges	3CB1 x NRP	630	IVE
1	Utility Lock	L9060L-06A	630	SCH
2	Mortise Cylinders	LFIC-32	626	MED
2	Permanent Cores	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Armor Plate	KA064 34" x 2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-7
Stair Exit
Each [MHO] Door to Have: (WD x HMF) 45 Min.

1	Continuous Hinges	FM-300- WEP	630	MAR
1	Fire Panic Device	AX-98L-BE-F-PA x 996L-06.	630	VON
1	Closer	4040XP-MC PULL SIDE - TB	SRIx689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Magnetic Holder	998-TRI VOLTAGE x EXT. AS REQUIRED	689	RIX
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Threshold	AS PER DETAIL		

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
FOR SMOKE DETECTORS, CONDUIT AND WIRING, SEE DIVISION 28

HW-7A
Main Electrical Room
Each Door to Have: (WD x HMF) 45 Min.

1	Continuous Hinges	FM-300-HT-RADBP	630	MAR
1	Fire Panic Device	AX-98LNL-F-PA x 996L-06	630	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED1 Closer
	4040XP-SCUSH-MC TB	SRIx689	LCN	
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-12
Electrical Closet
Each Pair to Have: (HMD x HMF) NR

8	Hinges	3CB1 x NRP	630	IVE
2	Manual Flush Bolt	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Storeroom Lock	L9080L-06A 7/8" LTC STRIKE	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Set Seals	*488_-S x 3M x MITRED	TBD	ZER
1	Astragal	357SP x CSK x TB SPECIAL HOLE PATTERN TO AVOID LOCK CASE	600	PEM
2	Overhead Stop & Hold	2-SERIES	630	RIX

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

HW-12A
Cadaver Room
Each Door to Have: (HMD x HMF) NR

1	Cont. Hinge Guard	HG-305- WEP-AS-RADBP	630	MAR
1	Utility Lock	L9060L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Edge Guard	EG-308-AS CUT: HARDWARE	630	MAR
1	Closer	4040XP-EDA-H MC TB	689	LCN
1	Armor Plate	KA064 34" x WIDTH TO SNUG TO EDGE GUARD B4E-HVY CTSK	630	TRM
1	Set Seals	*488_-S x 3M x MITRED	TBD	ZER
1	Automatic Door Bottom	350XA-Z49-PULL	TBD	ZER
1	Floor Stop	RM850 @ ACTIVE LEAF	630	ROC

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
COORDINATE FIELD PAINTING OF Z49 END PLATES BY DIV. 9

HW-13
Generator
Each Barn Door to Have: (STL x STL) NR

1	Box Track	NO. 25 –LENGTH AS REQUIRED	PWD	C-I
2	Hangers	25-TBS	ZIN	C-I
1	Welding Kit	25-x 374	600	C-I
20	Side Wall Brackets	25G x 1 GALV.	GAL	C-I
2	End Blinds	25G x 2 GALV	GAL	C-I
1	Bottom Derlin Guide	CRC-P375 x DOOR WIDTH		C-I
1	Floor Guide Track	CRC-75 –LENGTH AS REQUIRED		C-I
1	Bow Handle	191	GAL	C-I
1	Flush Pull	470P1	600	C-1
1	Bumper Shoe and Stop	102-P136	600	C-I
1	H D Hasp	182-00030ZC	ZIN	C-I
1	Padlock	TYPE AS REQUIRED	630	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED

HW-18
Welding
Each Gate to Have: (TS x TS) NR

2	Weldable Gate Hinges	i-8513 x Blank for Welding	600	BRO
1	Dbl. Cyl. Storeroom Lock	L9082L-06A	630	SCH
2	Mortise Cylinder	LFIC-32	626	MED
2	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	S.S Closer	STA 8916 ARP x FMC x SNB1 x Back plate as required	630	DOR
1	Gate Mounting Box	K-BXMOR1-DBL CYLINDER	600	KEE
1	Weldable Strike Box	K-BXSTR	600	KEE
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

BALANCE OF HARDWARE BY GATE FABRICATOR. GATE FABRICATOR SHALL PROVIDE THE CONDUIT AND WIRING BY DIVISION 26.

HW-19
NOT USED

HW-20
Exit Gate

		Each Door to Have: (TS x TS)	NR.	
2	Weldable Gate Hinge	i-8513 x BLANK FOR WELDING	600	BRO
1	Panic Device	CD98XP-NL-OP-PA-AX	630	VON
1	Mortise Cylinder	LFIC-32 (FOR DOGGING)	626	MED
1	Rim Cylinder	LFIC-32 (FOR DEVICE)	626	MED
2	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Anti Vandal Pull	1097HA-FC	630	TRM
1	S. S Closer	STA 8916 ARP x FMC x SNB1	630	DOR
1	Aluminum Back Plate	CUSTOM FOR PARALLEL ARM CLOSER FOR NARROW TOP RAIL x SS FASTENER	600	TICE
1	Closer Arm Angle Bracket	CUSTOM ALUMINUM (SIMILAR TO DORMA FTHD BRACKET) x SS SCREWS TO FIT 1" TALL FRAME HEAD	600	TICE
1	Gate Mounting Box	CUSTOM FOR PANIC HARDWARE	600	TICE
1	Gate Strike Bracket	CUSTOM TO ALLOW STRIKE TO MOUNT	600	TICE
1	Lockable Cane Bolt	525-P21-CANE BOLT w/LOCKABLE 524SP W/TWO SLEEVES-ZINC-LOCK IN OPEN POSITION		C-I
1	Padlock	TYPE AS REQUIRED	630	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED

BALANCE OF HARDWARE, INCLUDING 10-INCH HIGH BOTTOM RAIL BY GATE FABRICATOR.
SUBMIT DIMENSIONED SKETCH OF CUSTOM HINGE WITH GATE AND FRAME FOR ARCHITECT'S REVIEW AND APPROVAL.
SUBMIT DIMENSIONED GATE ELEVATION WITH DETAILS SHOWING ALL HARDWARE ITEMS.

HW-20A
Ext. from Science Learning Center
Each Door to Have: (AL/GLD x ALF)

			NR	
1	Cont. Hinge	SL24HD	***	SEL
1	Panic Device	98NL-OP-PAx LESS PULL	630	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Door Pull	1161.SOLID FULL HEIGHT 5” BACKSET MOUNTING TYPE “N”	630	TRM
1	OHC Closer	PH91-N	689	RIX
1	Floor Stop	1214CK x 1268CK	626	TRI
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
1	Door Sweeps	477_	TBD	ZER

FRAME SEAL BY ALUMINUM STOREFRONT SECTION.CONDUIT AND WIRING BY DIVISION 26.

SH-1
Exit Corridor
Each [CR, REX, DPS, ADO] Pair to Have: (TGP-STL/GL x STL) RATED

6	Weldable Pivot	907662 BY TGP DOOR AND FRAME SECTION		TGP
2	Electric Power Transfers	EPTL BY TGP DOOR AND FRAME SECTION	689	SEC
1	Electric Panic Devices	QEL-RX -LD3547A -EO-F-PA-CON 24 VDC BY TGP DOOR AND FRAME SECTION	630	VON
1	Electric Panic Device	QEL-RX- LD3547NL-OP-F-PA-CON. - 24 VDC BY TGP DOOR AND FRAME SECTION	630	VON
2	Wire Harness	BY TGP DOOR AND FRAME SECTION	----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161.SOLID FULL HEIIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
2	Auto. Door Operators	SEE SPECIFICATION SECTION 08 71 13	689	
2	Floor Stops	1214CK x 1268CK	626	TRM
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
2	Automatic Door Bottoms	420APKL BY TGP DOOR AND FRAME SECTIONAL		PEM
1	Power Supply	PS902-2RS-4RL		VON
2	Alarm Contacts	1076D BY TGP DOOR AND FRAME SECTION	TBD	INT
1	Set Astragal & Seals	BY TGP DOOR AND FRAME SECTION		
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

MOUNTING BRACKETS AND REINFORCEMENT PLATES FOR AUTOMATIC DOOR OPERATORS BY TGP DOOR AND FRAME SECTION.
AUTOMATIC DOOR OPERATOR, ACTIVATION SENSOR AND SAFETY SENSORS BY SECTION 08 71 13. CONTINUOUS WIDTH ENCLOSURE HOUSING FOR AUTOMATIC DOOR OPERATOR BY SECTION 08 71 13. NO REACTIVATION SENSORS AT THESE DOORS.
3-INCH DIAMETER CORE DRILL FOR FLOOR STOP ANCHOR BY DIVISION 3; SET ANCHOR FLUSH IN CONCRETE.
CARD READER, LOW VOLTAGE POWER, AND FIRE ALARM CONNECTION BY DIVISION 28. CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation: **A**

- Alarm contact monitors door open/closed status. Use of card reader, timer control, use of inside push plate switch, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panics are normally powered (unlocked).
- In an emergency, the panics may be locked by signal from a central security point.
- Doors normally opened manually with operators acting as manual door closers.
- Push plate switches available for automatic operation. Inside push plate switch is always available. Outside push plate switch is always available during "open" hours; after hours, outside push plate switch is inactive unless card reader is first used.
- 3-position switch used to turn off auto door operators.

SH-1A
Exit Corridor
Each [CRDPS, ADO] Pair to Have: (TGP-STL/GL x STL) RATED

6	Weldable Pivot	907662 BY TGP DOOR AND FRAME SECTION		TGP
2	Electric Power Transfers	EPTL BY TGP DOOR AND FRAME SECTION	689	SEC
1	Electric Panic Device	QEL-RX-LD 3547A -F-PA- CON. 24 VDC BY TGP DOOR AND FRAME SECTION	630	VON
1	Electric Panic Device	QEL-RX-LD LD3547A-NL-OP-F-PA-CON. BY TGP DOOR AND FRAME SECTION 24 VDC	630	VON
2	Wire Harness		----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161.SOLID FULL HEIIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
2	Auto. Door Operators	SEE SPECIFICATION SECTION 08 71 13	689	
2	Floor Stops	1214CK x 1268CK	626	TRM
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
2	Automatic Door Bottoms	420APKL BY TGP DOOR AND FRAME SECTIONAL		PEM
1	Power Supply	PS902-2RS-4RL		VON
2	Alarm Contacts	1076D BY TGP DOOR AND FRAME SECTION	TBD	INT
1	Set Astragal & Seals	BY TGP DOOR AND FRAME SECTION		
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

AUTOMATIC DOOR OPERATOR, ACTIVATION SENSOR AND SAFETY SENSORS BY SECTION 08 71 13. CONTINUOUS WIDTH ENCLOSURE HOUSING FOR AUTOMATIC DOOR OPERATOR BY SECTION 08 71 13. NO REACTIVATION SENSORS AT THESE DOORS.
3-INCH DIAMETER CORE DRILL FOR FLOOR STOP ANCHOR BY DIVISION 3; SET ANCHOR FLUSH IN CONCRETE.
CARD READER, LOW VOLTAGE POWER, AND FIRE ALARM CONNECTION BY DIVISION 28. CONDUIT AND WIRING BY DIVISION 26.
CONTINUOUS WIDTH ENCLOSURE HOUSING FOR AUTOMATIC DOOR OPERATOR BY SECTION 08 71 13.

Theory of Operation**: A**

- Alarm contact monitors door open/closed status. Use of card reader, timer control, use of inside push plate switch, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panics are normally powered (unlocked).
- In an emergency, the panics may be locked by signal from a central security point.
- Doors normally opened manually with operators acting as manual door closers.
- Push plate switches available for automatic operation. Inside push plate switch is always available. Outside push plate switch is always available during "open" hours; after hours, outside push plate switch is inactive unless card reader is first used.
- 3-position switch used to turn off auto door operators.

SH-1A.1
Exit Corridor
Each [CR, DPS, ADO] Pair to Have: (AL/GL x AL) NR

2	Cont. Hinges	SL24HD –VD-EPT	***	SEL
2	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Device	QEL-RX- LD3547EO-PA- CON.	630	VON
1	Electric Panic Device	QEL-RX- LD3547A- NL-OP-PA-CON.	630	VON
2	Wire Harness		----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161.SOLID FULL HEIIGHT 5” BACKSET MOUNTING TYPE “N”	630	TRM
2	Auto. Door Operators	SEE SPECIFICATION SECTION 08 71 13	689	
2	Overhead Stops	1-SERIESWITH LS OPTION	630	RIX
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
1	Power Supply	PS902-2RS-4RL		VON
2	Door Sweeps	477_	TBD	ZER
2	Alarm Contacts	1076D BYSECURITY	TBD	INT
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

FRAME SEAL & MEETING STILE ASTRAGAL BY ALUMINUM STOREFRONT SECTION.
AUTOMATIC DOOR OPERATOR, ACTIVATION SENSOR AND SAFETY SENSORS BY SECTION 08 71 13.
CARD READER, LOW VOLTAGE POWER BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
CONTINUOUS WIDTH ENCLOSURE HOUSING FOR AUTOMATIC DOOR OPERATOR BY SECTION 08 71 13.

Theory of Operation: **A**

- Alarm contact monitors door open/closed status. Use of card reader, timer control, use of inside push plate switch, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panics are normally powered (unlocked).
- In an emergency, the panics may be locked by signal from a central security point.
- Doors normally opened manually with operators acting as manual door closers.
- Push plate switches available for automatic operation. Inside push plate switch is always available. Outside push plate switch is always available during “open” hours; after hours, outside push plate switch is inactive unless card reader is first used.
- 3-position switch used to turn off auto door operators.

SH-1B
Exit Corridor
Each [CR, EPH, DPS] Pair to Have: (TGP-STL/GL x STL) RATED

6	Weldable Pivot	907662 BY DOOR AND FRAME SECTION		TGP
2	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Device	QEL-LD LD3547A-EO-F -PA- CON. 24VDC	630	VON
1	Electric Panic Device	QEL LD LD3547A NL-F-OP-PA-CON.	630	VON
2	Wire Harness		----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161.SOLID FULL HEIIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
2	Surface Closer	TS9315T, PUSH SIDE MTD 110 DEGREE	689	DOM
2	Floor Stops	1214CK x 1268CK	626	TRM
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
2	Automatic Door Bottoms	420APKL BY TGP DOOR AND FRAME SECTION	AL	PEM
1	Power Supply	PS902-2RS		VON
1	Set Astragal & Seals	BY TGP DOOR AND FRAME SECTION		
2	Alarm Contacts	1076D BY TGP DOOR AND FRAME SECTION	TBD	INT
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

FRAME SEAL & MEETING STILE ASTRAGAL BY CARD READER, LOW VOLTAGE POWER BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
CONTINUOUS WIDTH ENCLOSURE HOUSING FOR AUTOMATIC DOOR OPERATOR
3-INCH DIAMETER CORE DRILL FOR FLOOR STOP ANCHOR BY DIVISION 3; SET ANCHOR FLUSH IN CONCRETE.

SH-1C
Exit Corridor
Each [CR, REX, DPS] Pair to Have: (TGP-STL/GL x STL)

			RATED	
2	Cont. Hinges	SL24HD –VD-EPT	***	SEL
2	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Devices	QEL-RX -LD9847EO-F-PA-CON.	630	VON
1	Electric Panic Device	QEL-RX-LD9847NL-OP-F-PA-CON.	630	VON
2	Wire Harness		----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161.SOLID FULL HEIIGHT 5” BACKSET MOUNTING TYPE “N”	630	TRM
2	OH Concealed Closers	91N	689	RIX
2	Floor Stops	1214CK x 1268CK	626	TRM
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
2	Door Sweeps	477_	TBD	ZER
1	Power Supply	PS902-2RS-4RL		VON
2	Alarm Contacts	1076D BY SECURITY	TBD	INT
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Set Astragal	351C x 351CS	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Set Meeting Stile Astragal	351C x 351CS	AL	PEM

AUTOMATIC DOOR OPERATOR, ACTIVATION SENSOR AND SAFETY SENSORS BY SECTION 08 71 13. CONTINUOUS WIDTH ENCLOSURE HOUSING FOR AUTOMATIC DOOR OPERATOR BY SECTION 08 71 13. NO REACTIVATION SENSORS AT THESE DOORS.
3-INCH DIAMETER CORE DRILL FOR FLOOR STOP ANCHOR BY DIVISION 3; SET ANCHOR FLUSH IN CONCRETE.
CARD READER, LOW VOLTAGE POWER, AND FIRE ALARM CONNECTION BY DIVISION 28. CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation: **A1**

- Alarm contact monitors door open/closed status. Use of card reader, timer control, use of inside push plate switch, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panics are normally powered (unlocked).
- In an emergency, the panics may be locked by signal from a central security point.
- Doors self-closed by manual door closers.

SH-2
Physics Lab,
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-P-MC TB	689	LCN
1	“Z” Bracket	870SPB	600	ZER
1	Kick Plate	KO064 10” x 2” LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC1
	Automatic Door Bottom	369A-Z49-PULL	TBD	ZER
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	151A x MS & ES	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

LOW VOLTAGE POWER AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
PROVIDE CLOSER THRU-BOLT FINISH TO MATCH DOOR FINISH.
COORDINATE FIELD PAINTING OF Z49 END PLATES BY DIV. 9

SH-2.1
Division Office
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP REG--MC TB	689	LCN
1	Kick Plate	KO064 10” x 2” LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Automatic Door Bottom	369A-Z49-PULL	TBD	ZER
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	151A x MS & ES	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

LOW VOLTAGE POWER AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
PROVIDE CLOSER THRU-BOLT FINISH TO MATCH DOOR FINISH.
COORDINATE FIELD PAINTING OF Z49 END PLATES BY DIV. 9

SH-2A
IDF, Mechanical Room
Each [CR, REX, DPS] Door to Have: (HMD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	AS PER DETAIL		
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
COORDINATE FIELD PAINTING OF Z49 END PLATES BY DIV. 9
CARD READER, REX-SENSOR, LOW VOLTAGE POWER AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside push pad (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside push pad.
- Door may be opened from outside by means of card reader or mechanical key (emergency override).

SH-2A.1
BDF
Each [CR, REX, DPS] Door to Have: (HMD x HMF) Labeled

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Overhead Concealed Stop	2 Series	630	RIX
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	AS PER DETAIL		
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

COORDINATE FIELD PAINTING OF Z49 END PLATES BY DIV. 9
CARD READER, REX-SENSOR, LOW VOLTAGE POWER AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside push pad (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside push pad.
- Door may be opened from outside by means of card reader or mechanical key (emergency override).

SH-2B
Computer Lab, Geology/Physical Science Lab & Lecture
Each [CR, DPS, EB, I/L] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plate	KO064 10" x2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the electric lock may be locked by signal from a EB Button located inside the Classroom.

AT DOOR 212B, 213B ADD THE FOLLOWING:

1	Auto. Door Bottom	369AA x Z49	AL	ZER
1	Threshold	151A x MS & ES	AL	PEM

SH-2B.1
Reception, Open Office, Storage, Offices, Classroom
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer (Inswing)	4040XP-REG-MC TB	689	LCN
1	Closer (Outswing)	4040XP-EDA-MC TB	689	LCN
1	Kick Plate	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Overhead Concealed Stop	2 Series @ DOOR 116A	630	RIX
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Automatic Door Bottom	369A-Z49-PULL	TBD	ZER
1	Threshold	151A x MS & ES	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the electric lock may be locked by signal from a EB Button located inside the Classroom.

SH-2B.2
Reception, Open Office, Storage, Offices, Waste
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-REG-MC TB	689	LCN
1	Kick Plate	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
2	Coat Hooks	796 (@ 48" & 60" A.F.F.)	630	ROC
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.

SH-2B.3
Geology/Earth Science Lab
Each [CR, REX, DPS, EB] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plate	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Auto. Door Bottom	369AA x Z49	AL	ZER
1	Threshold	151A x MS & ES	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
CARD READER, LOW VOLTAGE POWER AND EMERGENCY
BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.

SH-2C
General Biology Lab
Each [CR, I/L, REX, DPS] Door to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP-	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
1	Electrified Lock	L9092LEU-RX- 06A x CON-24VDC 7/8" LTC STK	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Wire Harness		----	VON
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plates	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
I/S ELECTRIC LOCK ACTIVATED BY NEAR BY CARD READER AS INDICATED IN DOOR SCHEDULE
NOTE: * INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom

SH-2C.1
Instrument
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP-	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
1	Electrified Lock	L9092LEU-RX- 06A x CON-24VDC 7/8" LTC STK	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Wire Harness		----	VON
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plates	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

LOW VOLTAGE POWER AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
NOTE: * INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.

SH-2D
Chemistry Prep & Storage
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092 LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Armor Plate	KA064 34" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
CARD READERLOW VOLTAGE POWER AND EMERGENCY,
BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside lever (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, or mechanical key (emergency override).
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom

SH-3
Open Office
Each [DPS] Door to Have: (HMD x HMF) NR

4	Hinges	3CB1HW x NRP	630	IVE
1	Utility Lock	L9060L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Edge Guard	EG-308-AS CUT: HARDWARE	630	MAR
1	Closer	4040XP-REG-H MC TB	689	LCN
1	Kick Plate	KO064 10” x 2” LDW B4E-HVY CTSK	630	TRM
1	Set Seals	*488_-S x 3M x MITRED	TBD	ZER
1	Floor Stop	RM850	630	ROC
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

SH-4
Exit Corridor
Each RR, REX, DPS] Pair to Have: (AL/GLD x ALF) NR

REQUIRES WIDE STILE DOOR WITH 7" HIGH TOP RAIL

2	Cont. Hinges	SL24HD –VD-EPT	***	SEL
2	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Device	AX-RX-QEL-LD9847-EO-PA- CON.	630	VON
1	Electric Panic Device	AX-RX-QEL-LD9847-NL-OP-PA-CON.	630	VON
2	Wire Harness		----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161.SOLID FULL HEIIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
2	Overhead Concealed Closers	PH91N	689	RIX
2	Floor Stops	1214CK x 1268CK	626	TRM
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
2	Door Sweeps	477_	TBD	ZER
1	Power Supply	PS902-2RS		VON
2	Alarm Contacts	1076D BY SECURITY	TBD	INT
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

3-INCH DIAMETER CORE DRILL FOR FLOOR STOP ANCHOR BY DIVISION 3; SET ANCHOR FLUSH IN CONCRETE. MOUNT FLOOR STOP AT LEFT HAND REVERSE LEAF CLOSE TO WALL TO AVOID TRIPPING HAZARD.
FRAME SEAL & MEETING STILE ASTRAGAL BY ALUMINUM STOREFRONT SECTION.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation: **B**

- Alarm contact monitors door open/closed status. Use of timer control switch or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panics are normally powered (unlocked).
- In an emergency, the panics may be locked by signal from a central security point.
- Doors normally closed manually overhead concealed closers.
- Push plate switches available for automatic operation. Inside push plate switch is always available. Outside push plate switch is always available during "open" hours; after hours, outside push plate switch is inactive unless card reader is first used.
- 3-position switch used to turn off auto door operators.

SH-5
Mechanical
Each [CR, REX, DPS] Door to Have: (HMD x HMF) NR

7	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Set Auto Flush Bolt	842	626	DCI
1	Dust Proof Strike	82	626	DCI
1	Coordinator	600-SERIES	600	DCI
1	Electrified Lock	L9092LEU-RX 06A x CON-24VDC 7/8" LTC STK	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Closers	4040XP -SCUSH-MC TB SRI	x689	LCN
1	Set Seals	2891_S CSK SCREWS	TBD	PEM
1	Astragal	357SP x CSK x TB SPECIAL HOLE PATTERN TO AVOID LOCK CASE	600	PEM
2	Door Sweeps	477_	TBD	ZER
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D BY SECURITY	TBD	INT

CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
PROVIDE CLOSER THRU-BOLT FINISH TO MATCH DOOR FINISH.
.
Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside push pad (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside push pad.
- Door may be opened from outside by means of card reader or mechanical key (emergency override).

SH-5A
Machine Room, Electrical Closet
Each [DPS] Door to Have: (HMD x HMF) Labeled

4	Hinges	3CB1HW x NRP	630	IVE
1	Storeroom Lock	L9080L-06A	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closers	4040XP -SCUSH-MC TB SRI	x689	LCN
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	1076D BY SECURITY	TBD	INT

WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
PROVIDE CLOSER THRU-BOLT FINISH TO MATCH DOOR FINISH.

SH-6
Ext. from Science Learning Center
Each [CR, DPS, EA] Door to Have: (AL/GLD x ALF) NR

1	Cont. Hinge	SL24HD —VD-EPT	***	SEL
1	Panic Device	AX-QEL-XP98NL-OP-PA x LESS PULL	630	VON
1	Rim Cylinder	LFIC-32	626	MED
2	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Door Pull	1161.SOLID FULL HEIGHT 5” BACKSET MOUNTING TYPE “N”	630	TRM
1	OHC Closer	PH91-N	689	RIX
1	Floor Stop	1214CK x 1268CK	626	TRI
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
1	Door Sweeps	477_	TBD	ZER
1	Power Supply	PS902-2RS		VON
1	Alarm Contacts	1076D BY SECURITY	TBD	INT
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

3-INCH DIAMETER CORE DRILL FOR FLOOR STOP ANCHOR BY DIVISION 3; SET ANCHOR FLUSH IN CONCRETE.
FRAME SEAL BY ALUMINUM STOREFRONT SECTION.CONDUIT AND WIRING BY DIVISION 26.
CARD READER, DPS, AND EMERGENCY ALARM HORN BY DIVISION 28

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar but the Exit Alarm [EA] will sound.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- In an emergency, the panics may be locked by signal from a central security point.

SH-7
Geology/Physical Science Lab & Lecture
Each [EH, REX I/L] Pair Un-Equal Leaf to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP-	630	MAR
1	Cont. Hinge	FM-300-WEP	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
1	Electrified Lock	L9092LEU-RX- 06A x CON-24VDC 7/8" LTC STK	630	SCH
2	Manual Flush Bolts	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Wire Harness		----	VON
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB @ ACTIVE LEAF SRI	x689	LCN
2	Kick Plates	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
2	Floor Stops	RM850	630	ROC
1	Astragal	355CS	AL	PEM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
2	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
I/L ELECTRIC LOCK ACTIVATED BY NEAR BY CARD READER AS INDICATED IN DOOR SCHEDULE
NOTE: * INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panic is normally unlocked.
- In an emergency, the electric lock may be locked by signal from a EB Button located inside the Classroom.

AT DOOR 212A ADD THE FOLLOWING:

2	Auto. Door Bottoms	369AA x Z49	AL	ZER
1	Threshold	151A x MS & ES	AL	PEM

SH-7A
Science Learning Center
Each [CR, REX, DPS, EB] Door to Have: (WD x HMF) 45 Min.

1	Elec. Transfer Hinge	FM-300- WEP-CTP	630	MAR
1	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Device	AX-RX-9875L-F x E996L-PA-CON.	630	VON
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP SCUSH-MC TB	SRIx689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
1	Alarm Contacts	1076D BY SECURITY	TBD	INT

CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
NOTES: * INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OFADHESIVE TAPE IS FULLY ENGAGED.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panic is normally unlocked.
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.

SH-7B
Physics Prep & Storage, Organic Chemistry Lab, Centralized Prep & Storage
Each [CR, REX, DPS, EB] Pair Un-Equal Leaf to Have: (WD- x HMF)

			NR.	
1	Elec. Cont. Hinge	FM-300-WEP –CTP	630	MAR
1	Cont. Hinge	FM-300-WEP	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
2	Manual Flush Bolts	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Electrified Lock	L9092LEU-RX- 06A x CON-24VDC 7/8" LTC STK	630	SCH
1	Wire Harness		----	VON
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-REG-MC TB @ ACTIVE LEAF X ST-1630	689	LCN
2	Armor Plates	KA064 34" x 1" LDW B4E-HVY CTSK-X UL ENGRAVED	630	TRM
1	Overhead Stop	1ADJ-SERIES @ ACTIVE LEAF	630	RIX
1	Floor Stop	RM850 @ INACTIVE LEAF	630	ROC
1	Astragal	355CS*	AL	PEM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
2	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
* INSTALL ON PUSH SIDE INACTIVE LEAF.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside push pad (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader or mechanical key (emergency override).

SH-7C
Geology/Physical Science Lab & Lecture
Each [CR, REX, DPS] Pair Un-Equal Leaf to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP	630	MAR
1	Cont. Hinge	FM-300-WEP	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
2	Manual Flush Bolts	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Electric Panic Device	AX-QEL-RX-9875L x E996L-PA-CON. 24 VDC	630	VON
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB @ ACTIVE LEAF	689	LCN
2	Armor Plates	KA064 34” x 1” LDW B4E-HVY CTSK- x UL ENGRAVED	630	TRM
2	Floor Stops	RM850	630	ROC
1	Astragal	355CS	AL	PEM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
2	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
** INSTALL ON PUSH SIDE INACTIVE LEAF.

SH-7C.1
Geology Earth Science Lab
Each [EH, REX I/L, EB, DPS] Pair Un-Equal Leaf to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP-RADBP -CUT FOR HARDWARE	630	MAR
1	Cont. Hinge	FM-300-WEP- RADBP -CUT FOR HARDWARE	630	MAR
2	Manual Flush Bolts	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Electric Power Transfer	EPT-10 x CON	689	VON
1	Electric Panic Device	AX-RX-9875L x E996L x CON x 24VDC-PA	630	VON
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB @ ACTIVE LEAF	SRIx689	LCN
2	Kick Plates	KO064 10” x 1” LDW B4E-HVY CTSK	630	TRM
2	Floor Stops	RM850	630	ROC
1	Astragal	355CS	AL	PEM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
2	Auto. Door Bottoms	369AA x Z49	AL	ZER
1	Threshold	151A x MS & ES	AL	PEM
2	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
I/L ELECTRIC LOCK ACTIVATED BY NEAR BY CARD READER AS INDICATED IN DOOR SCHEDULE

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panic is normally unlocked.
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.

SH-7D
General Biology Lab
Each [CR, or EH, REX, DPS] Pair Un-Equal Leaf to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP	630	MAR
1	Cont. Hinge	FM-300-WEP	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
2	Manual Flush Bolts	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Electric Panic Device	AX- RX-9875L x E996L x 24VDC x -PA-CON	630	VON
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB @ ACTIVE LEAF	689	LCN
2	Armor Plates	KA064 34” x 1” LDW B4E-HVY CTSK-	630	TRM
1	Overhead Stop	1ADJ-SERIES @ ACTIVE LEAF	630	RIX
1	Floor Stop	RM850 @ INACTIVE LEAF	630	ROC
1	Astragal	355CS	AL	PEM
1	Set Adhesive Seal	*488_-S x 3M TAPE x MITRED	TBD	ZER
2	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

CARD READER, LOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
NOTES: * INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF THE ADHESIVE TAPE IS FULLY ENGAGED.

SH-7E
Physics Lab
Each [CR, RX, DPS] Pair Un-Equal Leaf to Have: (WD x HMF) NR.

1	Elec. Cont. Hinge	FM-300-WEP -CTP	630	MAR
1	Cont. Hinge	FM-300-WEP	630	MAR
1	Electric Power Transfer	EPT-10 x CON	689	VON
1	Manual Flush Bolts	FB358 (TOP BOLT ONLY)	626	IVE
1	Electrified Lock	L9092LEU-RX- 06A x CON -24VDC 7/8" LTC STK	630	SCH
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB @ ACTIVE LEAF	689	LCN
2	Kick Plates	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
2	Floor Stops	RM850	630	ROC
1	Astragal	355CS	AL	PEM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
2	Auto. Door Bottoms	369AA x Z49	AL	ZER
1	Threshold	151A x MS & ES	AL	PEM
2	Alarm Contacts	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

CARD READERLOW VOLTAGE POWER AND EMERGENCY BUTTON AND WIRING BY DIVISION 28. CONDUIT AND WIRING BY DIVISION 26.

SH-8
Emergency Electrical
Each [CR, EPH, REX, DPS] Door to Have: (HMD x HMF) NR

3	Hinges	3CB1HW x NRP	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Panic Device	AX-RX-QEL-98NL-OP-PA x LESS PULL x CON 24 VDC	630	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Anti-Vandal Pull	VR910NL	630	VON
1	Closer	4040XP- -SCUSH-MC TB	SRIx689	LCN
1	Door Sweep	477_	TBD	ZER
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
1	Set Seals	2891_S CSK SCREWS	TBD	PEM
1	Alarm Contact	1076D BY SECURITY	TBD	INT
1	Power Supply	PS902-2RS		VON

INSTALL CLOSER ARM ON FRAME SEAL; DO NOT CUT SEAL
PROVIDE CLOSER THRU-BOLT FINISH TO MATCH DOOR FINISH.
CARD READER AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).

SH-9
Large Classroom
Each [CR, REX, DPS, EB], I/L WITH_ Door to Have: (WD x HMF) 45 Min.

1	Continuous Hinge	FM-300-HT-CTP	630	MAR
1	Electric Power Transfers	EPT-10 x CON FOR REACTIVATION SENSOR/PH	689	VON
1	Electric Panic Device	AX-RX- -9875L -F x E996-PA-CON.	630	VON
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	689	LCN
1	Kick Plates	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Auto. Door Bottom	369AA x Z49	AL	ZER
1	Threshold	151A x MS & ES	AL	PEM
1	Alarm Contact	1076D BY SECURITY	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

CONDUIT AND WIRING BY DIVISION 26.
CARD READER, EMERGENCY BUTTON AND WIRING BY DIVISION 28.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panic is normally unlocked.
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.

SH-9A
Large Classroom
Each [I/L WITH _, DPS, EB] Door to Have: (WD x HMF) 45 Min.

1	Continuous Hinge	FM-300-HT-CTP	630	MAR
1	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Device	AX-RX- 9875L- -F x E996L-PA-CON.	630	VON
1	Wire Harness		----	VON
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-EDA-MC TB	SRIx689	LCN
1	Kick Plates	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	RM850	630	ROC
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Alarm Contact	1076D	TBD	GES
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

I/S ELECTRIC PANIC ACTIVATED BY NEAR BY CARD READER AS INDICATED IN DOOR SCHEDULE
I/L, EMERGENCY BUTTON, AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader, timer control, or use of inside panic bar (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- During classroom hours, electric panic is normally unlocked.
- In an emergency, the panic may be locked by signal from a EB Button located inside the Classroom.
- Door to interlock [I/L] to another door in the same classroom.

SH-11B
Engineering Lab
Each [EPH, I/L. REX, DPS] Pair to Have: (WD x HMF) NR

2	Continuous Hinges	FM-300-WEP- RADP-CTP	630	MAR
2	Electric Power Transfers	EPT-10 x CON	689	VON
1	Electric Panic Device	AX-RX-QEL-WDC-9847EO-LBR-PA -CON.	630	VON
1	Electric Panic Device	AX-QEL-RX-WDC-9847L-LBR-PA-CON x 996L	630	VON
2	Wire Harnesses		----	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Closers	4040XP-EDA-MC TB SRIx	689	LCN
2	Kick Plates	KO064 10” x 1” LDW B4E-HVY CTSK	630	TRM
2	Floor Stops	RM850	630	ROC
2	Automatic Door Bottoms	369A-Z49-PULL	TBD	ZER
1	Threshold	151A x MS & ES	AL	PEM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Power Supply	PS902-2RS-4RL		VON
1	Set Astragal	351C x 351CS	AL	PEM
2	Alarm Contacts	1076D BY SECURITY	TBD	INT

* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.
CARD READER, LOW VOLTAGE POWER, EMERGENCY BUTTON AND WIRING BY DIVISION 28.
FURNISH WOOD DOOR BRAND DOES NOT REQUIRED METAL EDGES.
I/S ELECTRIC LOCK ACTIVATED BY NEAR BY CARD READER AS INDICATED IN DOOR SCHEDULE CONDUIT AND WIRING BY DIVISION 26.

SH-12
Engineering Prep & Storage
Each [CR, REX, DPS] Door to Have: (WD x HMF) NR

3	Hinges	3CB1HW	630	IVE
1	Transfer Hinge	3CB1HW x TW8 x EXTENDED LEADS TO HEAD	630	IVE
1	Wire Harness		----	SCH
1	Electrified Lock	L9092LEU-RX x CON 06A-24VDC	630	SCH
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Mortise Cylinder	TYPE AS REQUIRED	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-18TJ x ST1630 MC TB	SRIx689	LCN
1	Armor Plate	KA064 34" x 2" LDW B4E-HVY CTSK	630	TRM
1	OHC Stop	2-SERIES	630	RIX
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	AS PER DETAIL		
1	Alarm Contact	1076D BY SECURITY DIVISION 28	TBD	INT

CARD READER, LOW VOLTAGE POWER, EMERGENCY BUTTON AND WIRING BY DIVISION 28.CONDUIT AND WIRING BY DIVISION 26.

Theory of Operation:

- Alarm contact monitors door open/closed status. Use of card reader or use of inside le (REX) shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside lever.
- Door may be opened from outside by means of card reader or mechanical key (emergency override).

SH-13
Main Electrical Room
Each [DPS] Door to Have: (HMD x HMF) 45 Min.

1	Continuous Hinges	FM-300-HT-RADBP	630	MAR
1	Fire Panic Device	AX-98L-NL-F-PA x 996L-06	630	VON
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Closer	4040XP-SCUSH-MC TB	SRIx689	LCN
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Threshold	AS PER DETAIL		
1	Alarm Contact	1076D BY SECURITY DIVISION 28	TBD	INT

CONDUIT AND WIRING BY DIVISION 26.

SH-14
Electrical Closet
Each [DPS] Pair to Have: (HMD x HMF) NR

8	Hinges	3CB1 x NRP	630	IVE
2	Manual Flush Bolt	FB358	626	IVE
1	Dust Proof Strike	DP2	626	IVE
1	Storeroom Lock	L9080L-06A 7/8" LTC STRIKE	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Set Seal	332CR HEAD & JAMBS	AL	PEM
1	Astragal	357SP x CSK x TB SPECIAL HOLE PATTERN TO AVOID LOCK CASE	600	PEM
2	Overhead Stop & Hold	2-SERIES	630	RIX
2	Alarm Contacts	1076D BY SECURITY DIVISION 28	TBD	INT

CONDUIT AND WIRING BY DIVISION 26.
* INSTALL SEALS TIGHT TO FRAME CORNERS. INSTALL WITH EXTRA CARE THAT ALL OF ADHESIVE TAPE IS FULLY ENGAGED.

SH-15
Reception
Each[CR, EPH, DPS] Door to Have: (AL/GL x AL) NR

1	Cont. Hinge	SL24HD —VD-EPT	***	SEL
1	Panic Device	AX-QEL-XP98NL-OP-PA x LESS PULL	630	VON
1	Rim Cylinder	LFIC-32	626	MED
2	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Door Pull	1161.SOLID FULL HEIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
1	OHC Closer	PH91-N	689	RIX
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
1	Power Supply	PS902-2RS		VON
1	Alarm Contacts	1076D BY SECURITY	TBD	INT
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX

FRAME SEAL BY ALUMINUM STOREFRONT SECTION.CONDUIT AND WIRING BY DIVISION 26.
CARD READER, DPS, AND EMERGENCY ALARM HORN BY DIVISION 28

Theory of Operation:
- Alarm contact monitors door open/closed status. Use of card reader, timer control, shunts alarm contact for legal opening. Door prop past time allowed by security system triggers alarm.
- Free egress available at all times by use of the inside panic bar but the Exit Alarm [EA] will sound.
- Door may be opened from outside by means of card reader, timer unlock, or mechanical key (emergency override).
- In an emergency, the panics may be locked by signal from a central security point.

SH-18
Stair to Roof
Each [DPS] Gate to Have: (TS x TS) NR

2	Weldable Gate Hinges	i-8513 x Blank for Welding	600	BRO
1	Storeroom Lock	L9080L-06A*	630	SCH
1	Mortise Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	S.S Closer	STA 8916 ARP x FMC x SNB1 x Backplate as required**	630	DOR
1	Gate Mounting Box	K-BXMOR1	600	KEE
1	Weldable Strike Box	K-BXSTR	600	KEE
1	Wiring Diagram	CUSTOM POINT-TO-POINT	---	XXX
1	Riser Diagram	CUSTOM ELECTRIC HARDWARE ELEVATION	---	XXX
1	Alarm Contact	SURFACE MTD (BY DIVISION 28)	TBD	GES

BALANCE OF HARDWARE BY GATE FABRICATOR.
GATE FABRICATOR SHALL PROVIDE THE CONDUIT AND WIRING BY DIVISION 26.
*MOUNT CYLINDER & CARD READER ON STAIR SIDE
** INSTALL CLOSER ARM ON FRAME SEAL; DO NOT CUT SEAL.

SH-19

Greenhouse
Each [CR, EPH, DPS] Pair to Have: (AL/GD x ALF) NR

REQUIRES WIDE STILE DOOR WITH 7" HIGH TOP RAIL

2	Cont. Hinges	SL24HD –VD-EPT	***	SEL
2	Electric Power Transfers	EPT-10 x CON	689	VON
1	RX-Panic Device	AX-RX-LD9849EO-PA -CON.	630	VON
1	Electric Panic Device	AX-EL-RX-LD-9849NL-OP-PA-CON.	630	VON
2	Wire Harness		----	VON
1	Rim Cylinder	LFIC-32 (DEVICE)	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
2	Door Pulls	1161 SOLID FULL HEIGHT 5" BACKSET MOUNTING TYPE "N"	630	TRM
2	Closers	4040XP-EDA-MC-TB	SRIx689	NOR
2	Floor Stops	1214CK x 1268CK	626	TRI
1	Threshold	AS PER DETAILS x MS & ES	AL	PEM
2	Door Sweeps	477_	TBD	ZER
1	Threshold	AS PER DETAIL		
1	Power Supply	PS902-2RS		VON
2	Alarm Contacts	1076D BY SECURITY DIVISION 28	TBD	INT

CARD READER, LOW VOLTAGE POWER, EMERGENCY BUTTON AND WIRING BY DIVISION 28.CONDUIT AND WIRING BY DIVISION 26.
FRAME SEAL & MEETING STILE ASTRAGAL BY ALUMINUM STOREFRONT SECTION.

SH-20
Greenhouse Exit Door
Each [CR, DPS, REX] Door to Have: (HMD x HMF) NR.

1	Continuous Elec. Hinges	FM-300-WEP- -CTP	630	MAR
1	Electric Power Transfers	EPT-10 x CON	689	VON
1	RX Panic Device	AX-WP-RX-98NL-OP -PA-CON. LESS PULL	630	VON
1	Electric Strike	9600-24VDC	630	HES
1	Smart Pac	III		HES
1	Rim Cylinder	LFIC-32	626	MED
1	Permanent Core	MEDECO CORE TO MATCH OWNER STD.	626	MED
1	Anti Vandal Pull	1097HA-FC-SP	630	TRM
1	Closer	4040XP-EDA-MC-TB	SRIx689	NOR
1	Floor Stop	1209HA	630	TRM
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
3	Silencers	1229A	GRY	TRM

CARD READER, LOW VOLTAGE POWER, AND WIRING BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.

THRESHOLDS
Reference “Threshold Notes and Details” Sheet A080

B1	STONE	BY OTHERS		
B2	STONE	BY OTHERS		
C	CARPET TO VINYL	EV2322_ x CAULKING	TBD	PEM
D	CARPET TO TILE	EV2325_ x CAULKING	TBD	PEM
E	CARPET TO CARPET	EV232_ x CAULKING	TBD	PEM
F	CONCRETE TO SAME	158A x MS&ES	TBD	PEM
G	SADDLE @EXTERIOR	276A x MS&ES	TBD	PEM
H	OFFSET SADDLE @ EXT	2727A x MS&ES x MITERED ENDS	TBD	PEM
I	RFT/RSF/VCT TO SAME	151A x MS&ES	TBD	PEM

MISCELLANEOUS

MISC-1

Knox Box

2	Knox Boxes	4400-RMK x ALUMINUMIZATION x ANTI-TAMPER SWITCH	AL	KNX

LOCATE KNOX BOXES AS DIRECTED BY THE ARCHITECT.
CONDUIT BY DIVISION 26
WIRING BY DIVISION 28

END OF SECTION

SECTION 087113
AUTOMATIC SWING DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of automatic door operators:
   1. Exterior and interior, automatic swing door operators, low energy, with concealed-in-head, or visible mounting per architectural details.
   2. Automatic door operators shall be configured for doors as follows:
      a. Simultaneous pairs, inswing or out swing.
      b. Single doors, inswing or outswing

B. Related Sections:
   1. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
   2. Division 26 Sections for electrical connections including conduit and wiring for automatic door operators.

1.3 REFERENCES

General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

A. Underwriters Laboratories (UL):
   1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
   2. UL 228 – Standard for Automatic Closing Devices. *NOTE: Variance from local authority having jurisdiction required to allow automatic door operators to remain powered during a fire event to maintain stair pressurization.*

B. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
   1. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.

C. American Society for Testing and Materials (ASTM):
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

D. American Association of Automatic Door Manufacturers (AAADM):

E. National Fire Protection Association (NFPA):
   1. NFPA 101 – Life Safety Code.
   2. NFPA 70 – National Electric Code.

F. International Conference of Building Officials (ICBO):
   1. CBC: California Building Code (permit edition)

G. California Department of Forestry and Fire Protection, Office of the State Fire Marshall.

H. International Standards Organization (ISO):
   1. ISO 9001 - Standard for Manufacturing Quality Management Systems

I. National Association of Architectural Metal Manufacturers (NAAMM):
   1. Metal Finishes Manual for Architectural and Metal Products.

J. American Architectural Manufacturers Association (AAMA):
   1. AAMA 607.1 - Clear Anodic Finishes for Architectural Aluminum.
   2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

1.4 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

1.5 PERFORMANCE REQUIREMENTS

A. Provide automatic door operators capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Operating Range: Minus 30 deg F (29 deg C) to 130 deg F (54 deg C).

C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) applied at 1” (25 mm) form the latch edge of the door.

D. Door Energy: The kinetic energy of a door in motion shall not exceed 1.25 lbs-ft (1.69 Nm).

E. Closing Time:
   1. Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer.
   2. Doors shall be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

1.6 SUBMITTALS

A. Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.

C. Color Samples for selection of factory-applied color finishes.

D. Closeout Submittals: Provide the following with project close-out documents.
   1. Owner’s Manual.
   2. Warranties.

1.7 QUALITY ASSURANCE

A. Supplier and Installer Qualifications: Manufacturer's authorized representative who is trained for installation and maintenance of units required for this Project.

Authorized Dealers	
Brand	Dealer
Besam	Besam - Southern California Contact: Erik Huber ASSA ABLOY Entrance Systems 1520 S. Sinclair Street

Authorized Dealers	
Brand	Dealer
	Anaheim, CA 92806 Phone: (714) 922-9925 Fax: (800) 285-8825
Horton	Capitol Door Service Contact: Doug Cutts 8733 Monroe Court Rancho Cucamonga, CA 91730 Phone: (909) 484-3401 Fax: (909) 484-3650

B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001 and with company certificate issued by AAADM.

C. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
   1. ANSI A156.19.
   2. NFPA 101.
   3. UL 228 Listed (Fire Door Operator).
      a. Variance from local authority having jurisdiction required to allow automatic door operators to remain powered during a fire event to maintain stair pressurization.
   4. UL 325 Listed.
   5. ICBO (UBC Standard 10-1).
   6. California State Fire Marshall (CSFM) Listed.

D. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.

E. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

F. Power Operated Door Standard: ANSI/BHMA A156.19.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

1.8 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

1.9 COORDINATION

A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators, safety sensors, activation switches, and control switches to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, and remote activation devices.

C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation.
   1. Provide electrical interface control capability for card reader or keypad operation of automatic door operators on doors with electric locking.
   2. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

1.10 WARRANTY

A. Automatic door operators shall be free of defects in material and workmanship for a period of two (2) years from the date of substantial completion.

B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 AUTOMATIC DOOR OPERATORS

A. Manufacturers: Besam SW200i / SW200ig or Horton 4100LE/4900LE / 4100-IG

Dr #	087100 HW #	Mounting Type	Activation Means	Safety Sensors	Remarks
100B	SH-1A.1	SURFACE-PUSH ARM	Pedastal mounted WIKK Ingress'r @ exterior Wall mounted WIKK Ingress'r @ interior	Re-activation Sensor	Continuous width enclosure housing for automatic door operator Emergency power, CR
100A	SH-1A	SURFACE-PUSH ARM	Pedastal mounted WIKK Ingress'r @ exterior Wall mounted WIKK Ingress'r @ interior	Re-activation Sensor	Continuous width enclosure housing for automatic door operator Emergency power, CR
100-1A	SH-1	SURFACE-PUSH ARM	Pedastal mounted WIKK Ingress'r @ exterior Wall mounted WIKK Ingress'r @ interior	Re-activation Sensor	Continuous width enclosure housing for automatic door operator Emergency power, CR
105A	SH-1A.1	SURFACE-PUSH ARM	Pedastal mounted WIKK Ingress'r @ exterior, CR Pedestral mounted WIKK Ingress'r @ interior	Re-activation Sensor	Continuous width enclosure housing for automatic door operator Emergency power

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Headers: 6063-T6.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Sheet and Plate: ASTM B 209.

B. Sealants and Joint Fillers: Refer to Division 7 Section "Interior Joint Sealants".

2.3 COMPONENTS

A. Operator Enclosure for Surface-Mounted and Overhead Concealed Units: Enclosure shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the enclosure. Access to the operator and electronic control box shall be provided by a full-length removable cover. Removable cover shall be secured to prevent unauthorized access.

B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors. Provide units with arm assemblies to mount on non-public side of each opening, inside rooms, and inside stairs. Center-pivoted overhead concealed units shall include “power arm” that will serve as the direct drive top pivot.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

D. Mounting Plates: Provide custom aluminum mounting plates by Tice Industries (Portland, OR) to secure operators to walls and fill any gaps behind the operator enclosure.

E. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

F. Provide full-width enclosures in size as directed by Architect. Provide surface closer enclosures to match automatic door operator enclosures where so indicated in Section 087100 “Door Hardware”.

2.4 SWINGING DOOR OPERATORS

A. Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operators: Self-contained unit.
   1. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
   2. Mounting: Concealed-in-ground at glass doors, surface mounted at hollow metal doors.
   3. Features:
      a. Adjustable opening and closing speeds.
      b. Adjustable opening and closing force.
      c. Adjustable back-check.
      d. Adjustable hold-open time between 0 and 30 seconds.
      e. Reverse on obstruction.
      f. Variable rate open/closed speed control.
      g. Closed loop speed control with active braking and acceleration.
      h. Variable obstruction recycle time delay.
      i. Power close feature at stair discharge doors to ensure door closes and latches against stairwell air pressure.
      j. When operators are provided in pairs, adjustable features are independently adjustable for each operator. Provide for independent opening.

C. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.

D. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.

E. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 20 amps for doors with operators in pairs, 15 amps for single doors.

F. Locate in-ground operator control boxes outside of operator enclosure in protected access panel in location as directed by the Architect, with wire run no greater than 50 feet from operator.

2.5 ELECTRICAL CONTROLS

A. Safety Search Circuitry: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time

the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.

B. Control Switch: Automatic door operators shall be equipped with a Camden CM-170/3 three position key switch to control the operation of the door. Control switch shall provide three modes of operation: On, Off, and Hold-Open. Provide key switch located on enclosure or frame jamb as directed by the Architect.

C. Safety Sensing at Doors with Knowing Switch Activation: Provide BEA SuperScan II at push side of each door equipped with an automatic door operator, both sides at doors with power close feature. Push side sensor to sense when a person is in the doorway and signal the automatic door operator to re-activate until the doorway is clear. Sensors on both sides cancel the power close feature (where occurs) when a person is detected approaching the door. Provide BEA BodyGuard (with BodyMount as required) at pull-side frame face.

D. Provide with Power-Close Feature. Operator to remain functional during a fire event.

2.6 ACTIVATION DEVICES

A. Push Plate Switches: Provide MS Sedco Stainless Steel 59-P, or equal with DPDT @ each side of opening at restroom doors except omit at sides where card reader serves as activation switch.

B. Activation for Low Energy Doors with knowing activation devices:

1. Vertical Actuation Bars: Provide customized Wikk Ingress'R x Satin Stainless Steel activation devices where noted on architectural floor plans, integrated into custom Wikk stainless steel bollards per Architect's design. Provide with double pole double throw (DPDT) switch at doors that also have card reader access so that switch use will simultaneously signal the operator and the security system (request-to-exit).

2.7 FINISHES

A. Provide operator enclosure and mounting plate in custom anodized finish to match door and frame finish.

B. Provide arm assembly in custom powdercoated finish to match door and frame assembly.

PART 3 - EXECUTION

3.1 INSPECTION

Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.

B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, arms and linkages level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.

D. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants" to provide weather tight installation.

3.3 FIELD QUALITY CONTROL

Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

Adjust door operators, controls, and hardware for smooth and safe operation, for weather-tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.

3.5 CLEANING AND PROTECTION

Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

END OF SECTION

SECTION 088000
GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Monolithic vision glass.
      a. Laminated glass.
   2. Insulated vision glass.
      a. Insulated laminated glass
      b. Insulated spandrel glass.
      c. Insulated laminated spandrel glass.
   3. Fire-rated glazing
   4. Accessories, glazing and setting materials.

B. Related Sections:
   1. Section 017325 - Seismic Restraint Requirements for Nonstructural Components
   2. Section 079000 – Joint Protection.
   3. Section 084113 – Aluminum Entrances and Storefronts: Glass stops and glazing gaskets.
   4. Section 084114 – Aluminum Interior Doors and Frames: Glass stops and glazing gaskets.
   5. Section 084400 – Aluminum Curtain Walls, Windows and Entrances: Glass and glazing in curtain wall, window and entrance system.
   6. Section 102813 – Toilet Accessories: Metal-framed mirror units.

1.2 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. Deterioration of Coated Glass: Defects developed from normal use attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

D. Deterioration of Laminated Glass: Defects developed from normal use attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

E. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
    a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
    b. Specified Design Seismic Loads: Determine design seismic loads applicable to Project, required by ASCE 7 and Section 017325
    c. Specified Design Snow Loads: As indicated, but not less than snow loads applicable to Project, required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7, "Snow Loads."
    d. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
        1) Load Duration: 60 seconds or less.
    e. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
        1) For monolithic-glass lites heat treated to resist wind loads.
        2) For insulating glass.
        3) For laminated-glass lites.
    f. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
    g. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

C. Seismic Movements: Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet relative displacement requirements to resist fallout as indicated in Section 017325 in accordance with ASCE 7, Section 13.5.9.

D. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F, material surfaces.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- wide interspace.
4. Center-of-Glass U-Values: NFRC 100 methodology using LBL WINDOW 6.3 computer program, expressed as Btu/ square foot x h x degree F.
5. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL WINDOW 6.3 computer program.
6. Solar Optical Properties: NFRC 300

1.4 APPLICABLE STANDARDS

A. Safety Glazing: Conform to Safety Standard for Architectural Glazing Materials (CPSC 16 CFR 1201). Tempered glass and wire glass shall conform to requirements of ANSI Z97.1, with permanent label in accordance with statutes.

B. ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation *(replaces ASTM E773, E774 CBA, CAN / CGSB 12.8)*Flat Glass: ASTM C 1036, Flat Glass. Flat Glass Marketing Association (FGMA) Glazing Manual.

C. Fire-Resistance-Rated Wire Glass: Provide wire glass products that are identical to those tested per ASTM E163 (UL 9) and are labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

D. Heat Treated Flat Glass: ASTM C 1048, Heat Treated Flat Glass.

E. Laminated Glass: ASTM C 1172 – Standard Specification for Laminated Architectural Flat Glass; Comply with applicable quality requirements for cut sizes of flat laminated glass consisting of two or more lites of glass bonded with interlayer material for use in building glazing.

1.5 SUBMITTALS

A. Product Data: Provide for structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

B. Shop Drawings:
   1. Review curtain wall and window shop drawings and submit acceptance of details as suitable for proposed glass products.

C. Calculations: Structural design shall be performed by a Professional Engineer, licensed in the state where Project is located. Signed engineering calculations shall be submitted to Architect/Engineer
   1. Structural design calculations are required per IBC Section 2403, for glass not supported on 4 sides, including glass supports and framing, indicating structural integrity of glass size, glass support members, anchors, fasteners and connections to building, in accordance with specified criteria.
   2. Structural design calculations for seismic design forces and relative displacements are required for glass in glazed curtain walls, glazed storefronts and glazed partitions in accordance with Section 017325.
   3. Engineering Responsibility: Calculations shall be reviewed for stated design assumptions, general compliance to specified requirements, and forces imposed on glass structure. The accuracy of the design calculations shall be the sole responsibility of the Contractor's Professional Engineer.

D. Samples: Submit samples of sandblasted/frosted, spandrel, decorative and wire glass, and glazing sealant, for color selection and appearance acceptance.

E. Insulating Glass Certification: Submit data verifying compliance with IGCC, Class A level.

F. Compatibility Certification: After testing and review, certify compatibility of materials in contact and in close proximity to glazing sealant materials.

G. Wind Pressure and Thermal Stress Analysis: Submit thermal stress analysis of glass where thermal stress may occur.

H. LEED Submittal:
   1. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
   1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
   2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

C. Single Source Responsibility: Provide materials obtained from one source for each type of insulating glass and glazing product indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252

E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:

1. Insulating Glass Certification Council.

H. Mockups: Before glazing, build mockups for each glass product indicated below to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the combination with curtain wall mockup requirements.
2. Build mockups with the glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting fabrication.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed.

1.7 PRODUCT HANDLING

A. Deliver and store glass and glazing in manufacturer's protective covering. Handle glass and glazing with care to prevent damage.

1.8 PROJECT/SITE CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 GLASS WARRANTY

A. Warranty for Insulating Units: Warranty sealed insulating glass units for minimum period of ten (10) years, with manufacturer's replacement guarantee, covering as minimum: Defective or failure of seal; material vision obstruction as result of dust collection or film formation between panels or other similar failure and the following specific conditions:

1. Reflective glass whose reflective coating cracks, peels or discolors shall be replaced at no charge (material only) for minimum ten (10) year period beginning on date of Substantial Completion.
2. In addition to replacement of insulated units, provide removal and reinstallation of new units without cost to Owner during first five (5) years of guarantee.

B. Spandrel Glass Warranty: Spandrel glass whose opacifier delaminates, cracks, peels, wrinkles, discolors, or stains shall be replaced at no charge (material only) for minimum five (5) year period beginning on date of Substantial Completion.

C. Laminated Glass Warranty: Laminated glass that delaminates shall be replaced at no charge (material only) for minimum 5 years beginning on date of Substantial Completion.

D. Glazing installer shall coordinate glass and glazing installation with framing systems, and install glass and glazing in accordance with manufacturer's instructions, so that guarantee is maintained.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers for Glass Substrate:
   1. AFG Industries.
   2. ACH Float Glass Operations (Versalux)
   3. Guardian Industries.
   4. Pilkington.
   5. PPG Industries Glass Group.

B. Acceptable Fabricators for Insulated Glass Units:
   1. Any manufacturer/fabricator with "CBA" classification.

C. Acceptable Fabricators for Metallic Coated Units:
   1. Viracon Incorporated.
   2. Tempglass Eastern.
   3. PPG Industries Glass Group.

2.2 SINGLE GLASS

A. (GL-1) Clear Float Glass: 1/4 inch thickness; comply with ASTM C1036, Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

B. (GL-1T) Clear Tempered Glass: 1/4 inch thickness; comply with ASTM C1036, Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), and further processed to comply with ASTM C1048, Kind FT (fully tempered).

2.3 MONOLITHIC BACK PAINTED GLASS

A. (GL-6) Back Painted Glass: LI BP Straight White (Lustre Finish) by GlassPro, 1/4 inch thickness.

B. (GL-7) Back Painted Glass: LI BP Yellow by GlassPro, 1/4 inch thickness

C. (GL-7T) Back Painted Tempered Glass: LI BP Yellow by GlassPro, 1/4 inch thickness

D. (GL-8) Back Painted Glass: LI BP True Fog White (Starphire) by GlassPro, 1/4 inch thickness.

2.4 LAMINATED MONOLITHIC GLASS

A. (GL-15) Laminated, Tempered Clear Glass: LI Super Red (Tempered) by GlassPro, 9/16 inch thick laminated, tempered glass. Edges ground smooth for exposed conditions.

2.5 INSULATING GLASS

A. (GL-21) Clear Low-E Insulated Glass Unit: One inch thick unit constructed of 1/4 inch clear heat strengthened exterior light, 1/2 inch air space using fabricators black warm edge spacer, and 1/4 inch clear heat strengthened interior. High performance low-emissivity coating on No. 2 surface and argon gas in cavities. Glass thickness and thickness of individual glass plies are minimum. One or both plies heat strengthened where required for wind pressure or thermal stress.
   1. Visible transmittance: 59 percent.
   2. Exterior reflectance: 27 percent.
   3. Shading coefficient: 0.43
   4. Nighttime Winter U-value: 0.30 BTU/hour/square foot maximum.
   5. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
   6. SHGC: 0.37
   7. LSG: 1.59
   8. Acceptable products:
      a. Viracon: Solarscreen 2000, VRE 1-65.
      b. Comparable product of other specified manufacturers.

B. (GL-21L) Clear Laminated Low-E Insulated Glass Unit: 1-1/16 inch thick laminated, insulated, low-e coated glass unit constructed of 1/4 inch clear heat strengthened exterior light, 1/2 inch air space using fabricators black warm edge spacer, and 2 layers of 1/8 inch clear heat strengthened inboard light laminated with 0.060 inch clear PVB inner layer. High performance low-emissivity coating on No. 2 surface and argon gas in cavities. Glass thickness and thickness of individual glass plies are minimum.

1. Visible transmittance: 59 percent.
2. Exterior reflectance: 27 percent.
3. Shading coefficient: 0.43
4. Nighttime Winter U-value: 0.30 BTU/hour/square foot maximum.
5. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
6. SHGC: 0.37
7. LSG: 1.59
8. Acceptable products:
    a. Viracon: Solarscreen 2000, VRE 1-65.
    b. Comparable product of other specified manufacturers.

C. (GL-21T) Clear Tempered Low-E Insulated Glass Unit: One inch thick unit constructed of 1/4 inch clear tempered exterior light, 1/2 inch air space using fabricators black warm edge spacer, and 1/4 inch clear tempered interior. High performance low-emissivity coating on No. 2 surface and argon gas in cavities. Glass thickness and thickness of individual glass plies are minimum. One or both plies heat strengthened where required for wind pressure or thermal stress.

1. Visible transmittance: 59 percent.
2. Exterior reflectance: 27 percent.
3. Shading coefficient: 0.43
4. Nighttime Winter U-value: 0.30 BTU/hour/square foot maximum.
5. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
6. SHGC: 0.37
7. LSG: 1.59
8. Acceptable products:
    a. Viracon: Solarscreen 2000, VRE 1-65, tempered.
    b. Comparable product of other specified manufacturers.

D. (GL-23) Clear Insulated Coated Silkscreen, Low-E Insulated Glass Unit: One inch thick unit constructed of 1/4 inch clear heat strengthened exterior light with No. 5065 on No. 2 (V933 – Warm Gray Viraspan #2), 1/2 inch air space using fabricators black warm edge spacer, and 1/4 inch clear heat strengthened interior. High performance low-emissivity coating on No. 2 surface and argon gas in cavities. Glass thickness and thickness of individual glass plies are minimum. One or both plies heat strengthened where required for wind pressure or thermal stress.

1. Visible transmittance: 39 percent.
2. Exterior reflectance: 27 percent.
3. Shading coefficient: 0.31
4. Nighttime Winter U-value: 0.30 BTU/hour/square foot maximum.
5. Nighttime Summer U-value: 0.27 BTU/hour/square foot maximum.
6. SHGC: 0.27
7. LSG: 1.44
8. Acceptable products:
    a. Viracon: Solarscreen 2000, VRE 1-65 screened.
    b. Comparable product of other specified manufacturers.

F. (GL-23L) Clear Laminated Insulated Coated Silkscreen, Low-E Insulated Glass Unit: 1-1/16 inch thick laminated, insulated, low-e coated glass unit constructed of 1/4 inch clear heat strengthened exterior light with No. 5065 on No. 2 (V933 – Warm Gray Viraspan #2), 1/2 inch air space using fabricators black warm edge spacer, and 2 layers of 1/8 inch clear heat strengthened inboard light laminated with 0.060 inch clear PVB inner layer. High performance low-emissivity coating on No. 2 surface and argon gas in cavities. Glass thickness and thickness of individual glass plies are minimum. One or both plies heat strengthened where required for wind pressure or thermal stress.

1. Visible transmittance: 39 percent.
2. Exterior reflectance: 27 percent.
3. Shading coefficient: 0.31
4. Nighttime Winter U-value: 0.30 BTU/hour/square foot maximum.
5. Nighttime Summer U-value: 0.27 BTU/hour/square foot maximum.
6. SHGC: 0.27
7. LSG: 1.44
8. Acceptable products:
    a. Viracon: Solarscreen 2000, VRE 1-65 screened.
    b. Comparable product of other specified manufacturers.

G. (GL-24T) Clear Tempered Low-E Insulated Glass Unit: 5/8 inch thick unit constructed of 5/16 inch clear tempered exterior light, 1/2 inch air space using fabricators black warm edge spacer, and 5/16 inch clear tempered interior. High performance low-emissivity coating on No. 2 surface and argon gas in cavities. Glass thickness and thickness of individual glass plies are minimum. One or both plies heat strengthened where required for wind pressure or thermal stress.

1. Acceptable products:
    a. International Green House, clear tempered Low-E insulated.
    b. Comparable product of other specified manufacturers.

2.6 SPANDREL GLASS

A. (GL-41) Insulated Tinted Spandrel Glass Units: One inch thick tinted insulated glass unit, 1/4 inch tinted outboard light with Viraspan V908 #2, 1/2 inch air space using fabricators warm edge spacer, 1/4 inch clear VE-48 #4 inboard light (ceramic coating on the fourth surface).

1. Nighttime Winter U-value: 0.31 BTU/hour/square foot maximum.
2. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
3. Product:
    a. Viracon: Solarscreen VE 1-48 tinted, glass, with ceramic frit.

B. (GL-41L) Insulated Laminated Tinted Spandrel Glass Units: 1-1/16 inch thick laminated tinted insulated glass unit, 1/4 inch tinted outboard light with Viraspan V908 #2, 1/2 inch air space using fabricators warm edge spacer, 2 layers of 1/8 inch clear VE-48 #4 inboard light laminated with 0.060 inch clear PVB inner layer (ceramic coating on the fourth surface).

1. Nighttime Winter U-value: 0.31 BTU/hour/square foot maximum.
2. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
3. Product:
    a. Viracon: Solarscreen VE 1-48 tinted, glass, with ceramic frit.

C. (GL-41T) Insulated Tinted Tempered Spandrel Glass Units: One inch thick tinted tempered insulated glass unit, 1/4 inch tinted tempered outboard light with Viraspan V908 #2, 1/2 inch air space using fabricators warm edge spacer, 1/4 inch clear tempered VE-48 #4 inboard light (ceramic coating on the fourth surface).

1. Nighttime Winter U-value: 0.31 BTU/hour/square foot maximum.
2. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
3. Product:
    a. Viracon: Solarscreen VE 1-48 tinted, glass, with ceramic frit.

D. (GL-41TL) Insulated Laminated Tinted Tempered Spandrel Glass Units: 1-1/16 inch thick laminated tinted tempered insulated glass unit, 1/4 inch tinted tempered outboard light with Viraspan V908 #2, 1/2 inch air space using fabricators warm edge spacer, 2 layers of 1/8 inch clear tempered VE-48 #4 inboard light laminated with 0.060 inch clear PVB inner layer (ceramic coating on the fourth surface).

1. Nighttime Winter U-value: 0.31 BTU/hour/square foot maximum.
2. Nighttime Summer U-value: 0.29 BTU/hour/square foot maximum.
3. Product:
   a. Viracon: Solarscreen VE 1-48 tinted, glass, with ceramic frit.

2.7 FIRE-RATED GLAZING

A. (GL-62) Laminated Ceramic Glazing: Proprietary product in the form of two lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft.; and as follows:
   1. Fire-Protection Rating: 45 min. rated, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
   2. Polished on both surfaces, transparent.
   3. Product: Subject to compliance with requirements, provide "FireLite Plus" manufactured by Nippon Electric Glass Co., Ltd. and distributed by Technical Glass Products.
   4. Other Acceptable Manufacturer: Vetrotech Saint-Gobain.

B. (GL-63) Laminated Glass with Intumescent Interlayers: Proprietary product in the form of multiple lites of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass laminated with intumescent interlayers to produce a laminated lite of 1-5/8-inch nominal thickness; and as follows:
   1. Fire-Protection Rating: 60 min. rated, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
   2. Product: Subject to compliance with requirements, provide "Pilkington Pyrostop 60-361" distributed by Technical Glass Products.
   3. Other Acceptable Manufacturer: Vitrotech Saint-Gobain, or District approved equal.

2.8 ACCESSORIES

A. Framing for Butt Glazing: Aluminum or stainless steel angles as indicated. Anchor to ceiling and floor substrates with appropriate fasteners in locations as indicated.

B. Setting Blocks: 100% silicone with a durameter hardness of 85±5, chemically compatible with glazing sealant or compound, length as recommended by glass manufacturer.

C. Spacers and Shims: 100% silicone with a durameter hardness of 85±5, chemically compatible with glazing sealant or compound, length as recommended by glass manufacturer.

D. Glazing Tape: Butyl or silicone preshimmed tape similar to Tremco 440 Tape.

2.9 EXTERIOR GLAZING

A. Glazing gaskets, sealant backers within glazing pockets, and continuous glass spacer pads at structural silicone shall be black heat cured silicone rubber conforming to ASTM C1115-00, Type C. Norton V2100 Thermalbond Tape is acceptable as a glass spacer pad when used in conjunction with structural silicone.

B. Gaskets for dry glazed system shall be silicone, EPDM, neoprene or Santoprene. Sponge gaskets shall be extruded black neoprene with hardness of 40 +/- 5 durometer Shore A and conforming to ASTM C 509-00. Design sponge gaskets to provide 20% to 35% compression. Dense gaskets shall be black extrusions with Shore A hardness of 75 +/- 5 for hollow profiles and 60 +/- 5 for solid profiles, and conforming to ASTM C1115-00, Type C or to ASTM C 864-99. Injection mold corners of gaskets where compatible with installation procedures.

C. Structural Glazing System:
   1. Sealant: GE Ultraglaze SSG 4000 by General Electric or 795 by Dow Corning. Verify compatibility of sealant with secondary seal of dual seal insulating glass system.
   2. Maximum design stress on Structural Silicone Sealant shall not exceed 20 ps

2.10 INTERIOR GLAZING

A. Type and Manufacturer: Mono one-part acrylic-terpolymer sealant or Proglaze silicone sealant by Tremco, color as selected from manufacturers standard colors.

B. Other Acceptable Manufacturers: General Electric, DAP, PTI, Pecora.

C. Fire-Rated Glazing System: As recommended by fire-rated glass manufacturer.

D. Butt Glazing System: Tremco silicone structural "butt" glazing system, color as selected from manufacturer's standard range.

2.11 FABRICATION

A. Heat-Treated Float Glass: ASTM C 1048. Fabricate using horizontal roller heating process only. Roll wave distortion parallel to bottom edge of glass as installed. Deviation from flatness at any peak (peak to valley deviation): shall not exceed 0.003 inches in the center of a lite and shall not exceed 0.008 inches within 10.5 inches of the leading or trailing edge.

B. Insulating Glass Units:
   1. Fabricate using both primary and secondary seals and as otherwise required to comply with the IGCC CBA classification.
   2. Fabricate using glass from the same manufacturer throughout the Project.
   3. Seal Construction: Dual seal design with primary seal of PIB and Silicone Secondary Seal, unless specifically indicated otherwise.

A. Edge Finishing: Fabricate finished edges to produce smooth, polished edges without chips, scratches, or warps.
   1. Non-Exposed Finished Edge, Typical: Flat polished.
   2. Butt-Glazed Lites: Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
   3. Exposed Edges: Grind smooth and polish exposed glass edges and corners, unless noted otherwise.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Verify glazing channels are free of burrs, irregularities, and debris.
   2. Verify glass is free of edge damage or face imperfections.
   3. Inspect door and frames to determine that frames, sash, and stops are set true and straight. Sash rabbets and stops shall be clean and dry at time of glazing.
   4. Do not proceed until unsatisfactory conditions have been corrected.

B. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Provide glass manufacturer's recommended edge clearances when sizing glass.

B. Remove protective coatings from surfaces to be glazed.

C. Clean glass and glazing surfaces to remove dust, oil, and contaminants, and wipe dry.

D. Verify measurements of sash and openings at Project.
   1. Dimensions shown or indicated are given only as a guide for estimating purposes, and actual size shall be determined by measurement of the actual openings. Accurately cut glass to fit openings with proper clearances and setting block height.

E. Coordinate with and check Shop Drawings furnished by other suppliers of Work affecting this Section to avoid field installation problems.

F. Before glazing metal sash, remove oil, lacquer, or other material to which the compound will not readily adhere or which will tend to delaminate from metal and cause a leak through the glazing seal.

3.3 INSTALLATION

A. Comply with glass fabricators recommendations.

B. Except where curtain wall, window, entrance or glass manufacturer recommends otherwise, comply with Flat Glass Marketing Association (FGMA) Sealant Manual and FGMA Glazing Manual.

C. Glaze insulated units as recommended by glass and frame manufacturers.

D. Do not apply glazing materials at temperatures below manufacturer's recommendations or to damp or frosted surfaces. Apply glazing material according to the manufacturer's instructions using proper primers as required.

E. Set glass using neoprene setting blocks and spacers to insure proper edge clearance and uniform beads of compound. Clearances shall conform to FGMA Glazing Manual requirements. Center glass in glazing rabbets.

1. Butt glazing requirements: Apply mildew resistant silicone sealant to flush depth of joint as indicated by sealant manufacturer.

F. Check openings to confirm proper clearance at perimeters and between glass and stops.

1. Clean surfaces of rabbet (including stops) and surface of glass which will come into contact with sealant. Use solvents and methods which insure clean, dry surfaces without film or foreign material when sealant is placed.

G. Remove and replace glazing beads carefully to avoid marking or defacing any portion of frame, sash, or fastenings.

1. Set glass in full bed of glazing tape or sealant. Clean glazing material after stops are installed. Clean excess compound, etc. from glass after setting in conformance with glass manufacturer's recommendations.
2. If recommended prime surfaces prior to glazing.

H. Set glass with reams (waves) running horizontally. Set glass with factory attached labels in place.

I. Setting Blocks: Place setting blocks at locations recommended by glass manufacturer, generally between 1/4 points and 6 inches from corner, except at glazed doors.

1. At glazed doors, provide one block at sill, located 3 inches up from edge of glass at hinge side; one block at hinge side jamb, located 3 inches up from lower edge of glass; one block at head, located 3 inches from edge of glass at latch side of door; and, one block at jamb at lock side of door, located 3 inches down from edge of glass at top corner.
2. Use blocks of length required to properly support glass. Offset approximately 1 inch from shims.

J. Glass Installation in Steel (Hollow Metal) Frames:

1. Glaze frames using pre-shimmed tape on both sides. Firmly glaze in place with joints sealed, free of rattles.
2. Set glass on setting blocks with a full bed of sealant or glazing tape.

K. Glass Installation in Aluminum Frames:

1. Glaze aluminum frames using preformed EPDM elastomeric glazing extrusion separately or in combination with sealant and pre-shimmed glazing tape in compliance with aluminum frame supplier's recommendations.
2. Set glass on setting blocks as recommended by manufacturer.
3. Apply tape and/or sealant to produce uniform sight line even with frame.
4. Set glass in gaskets with corners sealed.

L. Glazing Sealant: Along entire bottom edge of light, and up at least 6 inches at each jamb, gun in continuous full bed of sealant to fill voids.

1. Fill entire space, full width of pane, full depth of glass, with sufficient sealant to form heel along inside face and edge of glass.
2. At other edges (top and sides) gun in continuous heel bead of sealant along edges of glass perimeter to set stop against and into, acting as fill between glass and stop.
3. Immediately after setting glass, at entire perimeter of glass, gun in sealant between stop and glass so space above spacer is completely filled, without voids.

4. Place sealant flush with daylight edge of stops, with slight watershed at exterior. Provide straight, smooth surface meeting at opening corners with sharp intersection.
5. Leave no sealant on exposed surfaces of stops and glass.

M. Apply structural sealant carefully in uniform thickness pushing bead ahead of nozzle and making sure that entire cavity is filled. Air pockets or voids along edges are not acceptable.

1. Tool joint immediately after application.
2. Tool neatly, forcing sealant into contact with joint sides, eliminating internal voids and insuring good substrate contact.
3. Do not tool with soap or detergent solutions.
4. Install silicone structural butt glazing system in accordance with manufacturer's printed instructions.

3.4 CLEANING

A. Remove surplus materials.

B. Final cleaning of glass by Contractor.

END OF SECTION

SECTION 089100
LOUVERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Shop fabricated louvers and frames.
   2. Head and sill flashing to adjacent work.
   3. Bird screening.
   4. Attachment hardware.

B. Related Sections:
   1. Division 23 - Mechanical: Attachment of ducting and blanking out unused louver area.
   2. Section 055000 - Metal Fabrications: Steel support framing.
   3. Section 099000 - Painting: Finish painting.

1.2 REFERENCES

A. SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures.

1.3 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300. Clearly indicate, in large scale, profile of frame and installation details, relation to adjacent construction, flashing, blade configuration, connections to duct work, bird screens, and percentage of free air opening.

B. Samples: Submit samples of metal wall louver finish in accordance with Section 013300.

1.4 QUALITY ASSURANCE

A. General: Design and fabricate exterior wall louvers in accordance with AMCA Standard 500 and comply with AMCA Certified Ratings Program.

B. Free Area, Exterior Wall Louvers: Not less than 40 percent free area.

C. Water Penetration, Exterior Wall Louvers: Zero water penetration at 700 FPM through louver free area.

D. Air Pressure Drop, Exterior Wall Louvers: Not more than 0.10 inch of Water Gauge at 1000 FPM through louver free area.

E. SMACNA Standard: Comply with SMACNA Architectural Sheet Metal Manual recommendations for fabrication, construction details, and installation procedures.

1.5 PROTECTION

A. Protect louvers and finishes from damage during delivery and installation.

B. Protect adjacent surfaces, finishes and materials from damage during installation of louvers.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer and Type: Type K609 extruded aluminum louvers by Airolite Company.

B. Other Acceptable Manufacturers: A. C. P., Inc., Airline Products, Airstream Products, Construction Specialties, Industrial Louvers, Louvers and Dampers, Cesco Products, Ruskin Manufacturing, Arrow United Industries, Commercial Air Products, Dowco, American Warming and Ventilating, or District approve equal.

2.2 MATERIALS

A. Aluminum: Extruded, ASTM B221, alloy and strength as required for intended use.

2.3 FABRICATION

A. Aluminum Louvers (LVR-1): Extruded, 4 inch deep, minimum 0.081 inch thick with reinforcing bosses, integral water stop fastened with stainless steel screws to extruded aluminum channel shape frame minimum 0.081 inch thick to provide rigid and square self supporting unit with fixed blades at 45 degree slope, with free area as specified.

B. Bird Screen: 0.063 inch diameter aluminum wire 1/2 inch interwoven square mesh in aluminum frame.

C. Accessories: Recessed mullions, sill extensions, flashings, wall anchors, structural supplementary sub-framing.

2.4 FINISHES

A. Aluminum: Hylar 5000 or Kynar 500 PVDF fluorocarbon coating, minimum 70 percent PVDF.

B. Colors: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.1 PREPARATION

A. Take site dimensions affecting this work.

B. Ensure openings affecting this work are properly prepared and that flashings are correctly located to divert moisture to exterior.

3.2 INSTALLATION

A. Install louvers in openings properly aligned and level.

B. Secure louvers rigid with semi-concealed fasteners of noncorrosive metals to suit materials as being encountered.

C. Coordinate installation method with application of wall system and mechanical work.

D. Set and tie in to flashings to ensure diversion of moisture to exterior.

E. Install bird screens fixed to interior.

3.3 CLEANING

A. Periodically clean exposed surfaces of louvers, which are not protected by temporary covering, to remove fingerprints and soil during construction period; do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and mild soap or detergent not harmful to finishes. Rinse thoroughly and dry surface.

END OF SECTION

SECTION 092216
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Non-load-bearing metal framing systems for interior assemblies, including:
      a. Interior partitions.
      b. Interior suspended ceiling and soffit systems.
      c. Shaft wall systems.

B. Related Sections:
   1. Section 017325 - Seismic Restraint Requirements for Nonstructural Components
   2. Section 054000 - Cold-Formed Metal Framing: For exterior steel stud framing assemblies and for interior framing members carrying a lateral (transverse) load exceeding 10 lbs/ft^2, a superimposed vertical load exceeding 100 lbs/ft , or a superimposed vertical load exceeding 200 lbs; and members exceeding maximum heights, spans or spacing for non-structural framing as indicated in ASTM C 754 Tables 1-7.
   3. Section 055000 - Metal Fabrications.
   4. Section 079000 - Joint Protection.
   5. Section 092400 - Cement Plastering.
   6. Section 092523 – Lime Based Plastering.

1.2 SUBMITTALS

A. Product Data: Submit required product data and documentation in accordance with Section 013300:
   1. Submit statement indicating that metal stud manufacturer has reviewed Project documents and that framing supplied conforms to specified requirements.
   2. Evaluation Reports: ICC-ES reports for metal studs and tracks, indicating compliance with specified requirements and building code in effect.

B. EQ Stud Submittals: Comply with the following if submitting EQ studs.
   1. Submit statement indicating that metal stud manufacturer has reviewed Project documents and that framing supplied conforms to specified requirements.
   2. Submit list of completed projects of similar project type and similar wall loading where specific product recommended has been used.
   3. Submit material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   4. Evaluation Reports: ICC-ES reports for metal studs and tracks, indicating compliance with specified requirements and building code in effect.

C. Shop Drawings: Submit in accordance with Section 013300, indicating light gauge framing system. Indicate by plan and elevation, stud framing (spacing, sizes, thicknesses and types), openings, bracing and blocking, fastening and anchorage, strapping, bridging, connection details and reinforcement.

D. Seismic Design Calculations: Structural design shall be performed by a Professional Engineer, licensed in the state where Project is located, indicating structural integrity of members, anchors, fasteners and connections to building structure, in accordance with specified seismic design criteria in Section 017325. Submit signed engineering calculations concurrently with the shop drawings to Architect/Engineer upon request.
   1. Engineering Responsibility: Calculations shall be reviewed for stated design assumptions, general compliance to specified requirements, and forces imposed on structure. The accuracy of the design calculations shall be the sole responsibility of the Contractor's Professional Engineer

E. LEED Submittals: Submit required product data and documentation in accordance with Section 018113 - Sustainable Design Requirements and Section 013300 - Submittal Procedures:
   1. Product Data for LEED MRc 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with applicable reference standards unless otherwise indicated.

B. Pre-Installation Conference: Convene a pre-installation meeting at the beginning of the project to review acoustically-rated construction requirements and to coordinate penetrations.
   1. Architect, Contractor, Owner's representative and each trade that may need to penetrate acoustically rated construction or will be involved in construction of acoustically rated partitions and related systems must attend.
   2. Review layouts and routing for potential penetrating items, discuss reducing or eliminating penetrating items by considering alternate routing, review construction requirements, details and specifications for acoustically rated construction.
   3. A follow-up meeting should be scheduled as needed.
   4. This meeting can occur in conjunction with a regular construction progress meeting.
   5. Publish meeting minutes highlighting topics discussed, actions items and decision made.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing metal framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Shaft Wall Assemblies: Provide stud shaft wall system designed and tested by manufacturer to withstand lateral loading (air pressure) of 10 lbs per sq ft for maximum wall height required, and with deflection limited to 1/240 of partition height. (Refer to Section 092900 - Gypsum Board for shaft wall construction).

D. Seismic Design Requirements: Design all metal framing systems to withstand out-of-plane seismic design forces and to accommodate seismic relative displacements in accordance with Section 017325. Seismic design forces shall be based on the weight of the partition framing, finishes, soffits, connected casework or equipment, and ceilings for which it provides bracing. Out-of-plane seismic design force shall not be less than 5 psf.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
   1. Provide framing type, weight, grade and finish of materials in accordance with Manufacturer's recommendations, except where otherwise required by governing regulations and applicable standards.
   2. Provide clips, fasteners, ties, reinforcing, flat strap and backing plates, stiffeners, shoes, tracks, hangers, brackets, anchors, accessories, and trim as recommended by Manufacturer for application indicated.
   3. Steel Sheet Components: ASTM C 645, fabricated of steel meeting requirements of ASTM A1003.
   4. Protective Coating (Minimum): ASTM A653, G40 hot-dip galvanized zinc coating or coating with G40 equivalent corrosion resistance.
   5. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. (MET STUD-1) Metal Studs and Runners: ASTM C645, and meeting or exceeding flexural strength, allowable bending moment, and screw pull-out of a standard 33 mil thick stud.

C. (MET STUD-2) Shaft Wall Metal Studs: ASTM C645, steel C-H, C-T or I studs hot-dipped galvanized.

D. Double-Runners: ASTM C645 slip-type head joint; inside runner with 2-inch-deep flanges, and outer runner sized to friction fit inside runner.

E. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

F. Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

G. Furring and Bracing Members: Provide members with protective galvanized coating, in depths as indicated.
   1. (MET FURG-1) Hat-Shaped, Rigid Furring Channels: ASTM C645; with minimum base-metal thickness of 0.033 inch
   2. (MET FURG-2) Z-Shaped Furring: With slotted or nonslotted web; with minimum base-metal thickness of 0.027 inch.
   3. (MET FURG-3) Cold-Rolled Steel Channels: Channel bridging, furring channels, carrying channels, steel channel stiffeners and braces; with minimum base-metal thickness of 0.054 inch.
   4. (MET FURG-4) Resilient Furring Channels: Asymmetrical steel sheet members, with face attached to single flange by a slotted leg (web), designed to reduce sound transmission.
   5. (MET FURG-5) Foam furring channel (U shaped) (thermal studs): 33 mil (0.0346 inch) thick galvanized metal 1/2-inch legs used to reduce thermal transmission.

H. Galvanized Flat Strap and Backing Plate at Interior Stud Walls: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thicknesses:
      a. Typical: 0.054 inch.
      b. For Heavy Equipment and Grab Bar Locations: 0.068 inch.
   2. Where Wood Backing and Blocking is Indicated: Refer to Section 061000 for wood requirements. Provide fire-resistant treatment.

2.3 SUSPENSION SYSTEMS

A. Components, General: Comply with ASTM C754 for conditions indicated.

B. Furring Channels: As specified above.

C. Tie Wire: ASTM A641, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.

D. Hanger Attachment Anchors in Concrete: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488 by a qualified independent testing agency.
   1. Cast-in-place anchor, designed for attachment to concrete forms.
   2. Postinstalled, chemical anchor.
   3. Postinstalled, expansion anchor.

E. Wire Hangers: ASTM A641, Class 1 zinc coating, soft temper, 0.162 inch diameter.

F. Rod Hangers: ASTM A510, mild carbon steel; ASTM A153, hot-dip galvanized; 0.25 inch diameter.

G. Manufactured Suspension Grid System for Ceilings and Soffits: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Products and Manufacturers:
      a. Drywall Grid Systems by Armstrong World Industries, Inc.;
      b. Drywall Grid Systems by Chicago Metallic Corporation;

c. Drywall Suspension System by USG Corporation.

2.4 AUXILIARY COMPONENTS

A. Fasteners: Galvanized steel fasteners of type, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates; and of length suitable for adequate penetration of substrate

B. Asphalt Protection Strips: Strip of 15 lb. asphalt saturated felt at intersection of partitions and masonry walls.

C. Isolation Strip: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

D. Acoustic Sealant: In accordance with Section 092900 - Gypsum Board.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
   1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:
   1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
   2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standards: ASTM C 754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
   2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Install bracing at terminations in assemblies.

C. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

D. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from plane formed by faces of adjacent framing.

3.4 FRAMING INSTALLATION

A. Framing Installation, General:
   1. Partition Heights: Extend partition stud system through suspended ceilings to structural support above, except where indicated to terminate at ceiling.
      a. Provide additional bracing for partitions extending above ceiling where indicated.
      b. Continue framing around ducts penetrating partitions above ceiling.
   2. Coordinate erection of studs with installation of service utilities. Align stud web openings. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work which is to be placed in or behind partition framing. Allow such items to be installed after framing is complete.
   3. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned joints to attain lateral support and avoid axial loading.
   4. Reinforce stud partitions and provide additional metal studs as indicated and required for installation of wall cabinets, wall mounted equipment, wall mounted mechanical and electrical fixtures, accessories, shelves and shelf standards. Provide thick steel plate to span minimum of 3 studs for installation of mirrors, toilet accessories or grab bars.
   5. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   6. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

B. Runners and Tracks: Secure runner tracks to floor and ceiling construction, and to structure above ceilings as recommended by manufacturer, with fastener spacing not to exceed 24 inches o.c.
   1. Runner Tracks: Provide continuous track sized to match studs. Align runner tracks accurately to partition layout at both floor and ceiling. Provide fasteners at corners and ends of runner tracks.
   2. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   3. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
   4. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

C. Metal Studs: Install studs vertically at 16 inches o.c., unless otherwise indicated, and not more than 2 inches from abutting construction, each side of openings, and at corners.
   1. Install metal studs in floor and ceiling runner tracks. Secure studs to runners. Anchor light gauge screw-type partition studs to runner tracks by screwing opposite flanges top and bottom, except screw end studs to both tracks at both flanges.
   2. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
   3. Provide additional studs at exterior corners and 2 inches from inside corners, terminations of partitions, and both sides of control joints.
   4. Where partitions abut other construction, provide vertical runner track securely attached to construction.
   5. Use full length studs between runner tracks.
   6. Stud Splicing: Not permitted.

D. Door Openings:
   1. Frame door openings with vertical studs attached to each jamb of door frame.
   2. Provide additional studs 2 inches from jamb studs.
   3. Frame head of door with horizontal section of runner track attached to jamb studs and provide vertical studs cut to fit between head and ceiling tracks and attach to tracks.
   4. Fit runners under and above openings, secure intermediate studs at spacing of wall studs. Brace stud framing system and make rigid.

E. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

F. Wall Furring Installation:
   1. Erect wall furring directly attached to concrete block and concrete walls.
   2. Erect furring channels horizontally or vertically as indicated. Secure in place on alternate channel flanges at maximum 24 inches on center.
   3. Space furring channels maximum 24 inches on center, not more than 4 inches from floor and ceiling lines or abutting walls.
   4. Erect freestanding metal stud framing by means of adjustable furring brackets in accordance with manufacturer's directions.
   5. Splicing Members: Lap furring members 8 inches and runner channels 12 inches and wire-tie near each end of lap.

3.5 SHAFT WALL INSTALLATION

A. Shaft Wall Installation, General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
   1. Anchor components to comply with ratings and performance requirements, and with governing regulations.
   2. Isolate shaft system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
   3. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

B. Supplementary Framing: Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

C. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

D. Sprayed Fire-Resistive Materials: Coordinate gypsum board shaft system work with sprayed-on fireproofing of structure, so that both remain complete and undamaged. Patch or replace sprayed-on fireproofing removed or damaged during installation of shaft framing system.

3.6 SUSPENSION SYSTEM INSTALLATION

A. Suspended Assemblies, General: ASTM C 754.
   1. Install ceiling framing independent of walls, columns, and above ceiling work.
   2. Do not bridge building expansion joints with support system.
   3. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member transversely between parallel members.

B. Hangers: Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   1. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
      a. Space hanger wires 48 inches o.c. along carrying channels and within 6 inches of ends of channel run. Anchor hanger wires to supporting structure. Do not attach hangers to metal deck tabs.

2. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
3. Coordinate location of hangers with other work.
    a. Do not attach hangers to steel roof deck.
    b. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
    c. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
    d. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Carrying Channels: Position channels at proper height and level, and secure with hanger wires.
1. Space main carrying channels at maximum 48 inches on center, not more than 6 inches from perimeter walls.
2. Lap splices minimum 12 inches and secure together 2 inches from each end of splice. Provide clearance between channels and abutting walls or partitions.

D. Furring Channels: Comply with Gypsum Association GA-203.
1. Place furring channels perpendicular to carrying channels at 16 inches on center not more than 6 inches from perimeter walls.
2. Lap splices minimum 8 inches and secure together one inch from each end of splice.
3. Provide clearance between furring and abutting walls or partitions. Secure furring to carrying channels with clips.
4. Frame both sides of joints with furring and other supports.
5. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Lateral Bracing: Laterally brace entire suspension system where required. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

3.7 GRID SUSPENSION SYSTEM INSTALLATION

A. Suspension Grid Systems: Install in accordance with Manufacturer's instructions.
1. Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces.
2. Install main beams and cross tees at the on center spacing required for ceiling loading, and location of in-ceiling services.
3. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
4. Provide additional bracing as required by code.

B. Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces.

C. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

END OF SECTION

SECTION 092400
PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stucco-Portland cement plaster, (PLAS-12) vertical and (PLAS-13) horizontal.
   2. Metal lath, furring and accessories.

B. Related Sections:
   1. Section 054000 – Cold-Formed Metal Framing: Gypsum sheathing.
   2. Section 079000 - Joint Protection.

1.2 SYSTEM DESCRIPTIONS

A. (PLAS-12): Exterior vertical stucco-Portland cement plaster, 3/4" thick, on metal lath.
   1. Color: To be selected by Architect.

B. (PLAS-13): Exterior horizontal stucco-Portland cement plaster soffit, 3/4" thick, direct-applied to gypsum sheathing.
   1. Color: To be selected by Architect.

1.3 REFERENCES

A. ASTM C933: Standard Specification for Welded Wire Lath

B. ASTM A641: Specification for Zinc–Coated (Galvanized) Carbon Steel Wire

1.4 SUBMITTALS

A. Samples: Submit sample of cement plaster finish. Obtain sample acceptance before job site sample application.

B. Job Site Sample Areas: Make sample application of cement plaster work. Obtain acceptance of field sample before any additional application.

C. Accepted surface finish of sample establishes minimum standard of quality and workmanship of cement plaster work on job.

1.5 PRODUCT HANDLING

A. Except for sand and water, deliver materials to job site in sealed containers or bags. Store materials in dry, well-ventilated space, under cover and off ground.

1.6 ENVIRONMENTAL CONDITIONS

A. Provide sufficient heat and ventilation in areas where work of this Section is being performed, so as to allow cement plaster to properly cure. Take precautionary measures necessary to ensure that excessive temperature changes do not occur. Moist cure to prevent rapid dry-out.

PART 2 PRODUCTS

2.1 BASECOAT MATERIALS

A. Portland Cement: ASTM C150.

B. Hydrated Lime: ASTM C206, Type S.

C. Aggregate: ASTM C144 - basecoat gradation as follows:
   1. Aggregate: Colored, natural sand, marble dust or granite screenings graded as follows:

Sieve Size	Percent Passing

No. 4	100
No. 8	0 to 90
No. 16	60 to 90
No. 30	35 to 70
No. 50	10 to 30
No. 100	5

a. Not more than 50 percent shall be retained between 2 consecutive sieves nor more than 25 percent between No. 50 and No. 100 sieves.

D. Water: Potable.

E. Admixture: Acryl 60 by Thoro System Products.

F. Bonding Agent: ASTM C932, type recommended for satisfactorily bonding cement plaster to substrate. Plaster Weld by Larsen Products, Acryl 60 by Thoro System Products, Everbond by L & M Construction Chemicals or TK-225 by T.K. Products.

G. Glass Fibers: 1/2 inch chopped glass fiber strands, alkali resistant; Owens-Corning Cem-FIL.

2.2 FINISHING PLASTER MATERIALS

A. Premixed Finishing Coat: 100 percent acrylic finish with integral color by Dryvit Systems, Parex Insul/Crete, Senergy Incorporated, STO Industries, Thoro System Products, or District approved equal.

1. Custom colors as selected by Architect.

B. Water: Potable.

C. Admixture: Acryl 60.

2.3 METAL ACCESSORIES

A. Corner Beads, Casing Beads and Base Screeds: Zinc alloy accessories of longest possible lengths; sized and profiled to suit application. Casing beads: Milcor #66, or equivalent Keene, or District approved equal.

1. Soffit Drip: Extruded aluminum, profile as shown, continuous drip trim.

B. Expansion (Control) Joints: Back to back casing beads of longest possible lengths. Control joints and expansion joints: 2 Milcor #66 casing beads.

C. Plaster Trim:

1. (PLTR-1): Stockton Aluminum Plaster Channel Screed, PCS, 3/4" wide, or District approved equal.
2. (PLTR-2): Stockton Aluminum Drip Screed, Vented, DS, 7/8 inch, or District approved equal.

D. Anchorages: Nails, staples, or other metal supports, of type and size to suit application and to rigidly secure metal accessories in place.

E. Corner Reinforcing: Corner Aid galvanized reinforcing by Stockton Wire Products.

F. Metal Lath: Galvanized self-furring lath 3.4 lbs per square yard. Comply with FS QQ-L-101C and ASTM C847.

G. Metal Lath Alternate: Grid shaped, self-furred, welded wire lath, formed from cold rolled rectangular longitudinal wires with coated thickness dimensions of 0.0330 inch (0.83 mm) by 0.075 inch (1.90 mm), and round cross wires having a coated diameter of 0.056 inch (1.42 mm), resistance welded at the intersections. Galvanized coating complying with ASTM A641. Minimum nominal weight 1.95 pounds per square yard (1.05 kg/m²).

1. Structa Wire Products Mega Lath or District approved equal.

2.4 METAL LATH (ACCESSORIES)

A. (AF-1) No.15 Asphalt-Saturated Felt: ASTM D226 Type I (11.5 to 12.5 lbs.), non-perforated.

2.5 CEMENT PLASTER MIXES

A. Apply minimum 3/4 inch thick (measured from face of lath). Mix and proportion cement plaster, parts by volume, as follows:
   1. Scratch Coat: One Portland Cement, 3/4 lime, 2-1/2 - 4 aggregate, one admixture to 3 water.
   2. Brown Coat: One Portland Cement, 3/4 lime, 3-5 aggregate, one admixture to 3 water, 2 percent glass fibers.
   3. Premixed Finishing Coat: In accordance with manufacturer's recommendations.
   4. Mixing Liquid: One part admixture to 3 parts water.

B. Mix only as much plaster as can be used in one hour.

C. Mix materials dry, to uniform color and consistency, before adding water.

D. Protect mixes from frost, dust and evaporation.

E. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces which are to receive cement plaster and accessories, and conditions under which work is to be performed. Do not proceed with cement plaster work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prior to application ensure mechanical and electrical services behind surfaces to receive cement plaster have been tested and approved.

B. Clean concrete and concrete block surfaces of dust, laitance, efflorescence, loose particles, grease or other foreign matter. Thoroughly wet surfaces before using acid solutions, solvents or detergents to perform cleaning. Thoroughly wash surfaces with clean water immediately following their use. Ensure mortar joints are flush. Do not use acid solutions without approval of Architect.

C. Roughen smooth concrete surfaces so as to allow adequate adhesion. Use method acceptable to Architect.

D. Apply bonding agent on concrete and concrete block surfaces which are to receive cement plaster. Apply in accordance with manufacturer's recommendations, ensuring complete coverage.

E. Ensure metal lath has been properly installed and rigidly secured.

F. Wet concrete and concrete block surfaces to reduce excessive suction.

G. Place metal accessories true to lines and levels.

H. Control Joints: Panel size shall be limited to 144 square feet for walls and 100 square feet for ceilings. Panels shall be kept as square as possible and not exceed a ratio of 2-1/2 to 1. The distance between shall not exceed 18 lineal feet.

3.3 LATHING

A. Install metal lath where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards.

3.4 PLASTERING

A. Apply cement plaster using 3 coat system.

B. Apply scratch and brown coats minimum thickness of 3/8 inch each coat. Apply with sufficient pressure to form good bond with masonry and to force through and completely imbed metal lath. Horizontally scratch first coat.

C. Maintain surface flatness, with maximum variation of 1/8 inch in 10 feet for plumb and level tolerances.

D. Construct control joints so that panel size shall be limited to 144 square feet for walls and 100 square feet for ceilings. Panels shall be kept as square as possible and not exceed a ratio of 2-1/2 to 1. The distance between shall not exceed 18 lineal feet.

E. Moist cure basecoat.

F. Apply finish coat in accordance with manufacturer's instructions. Apply finish continuously in one operation to entire area maintaining "wet" edge so that completed finish is free of scaffold lines and other imperfections due to application methods.

G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

END OF SECTION

SECTION 092523
LIME BASED PLASTERING

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Lime Based Plastering.

B. Related Requirements:
   1. Section 092400 – Portland Cement Plastering: Plaster scratch coat substrate.

1.2 DEFINITIONS

A. Control Joint: A joint that accommodates movement of shrinkage and curing per ASTM 1063-08.

B. Expansion Joint: A joint that accommodates movement beyond shrinking and curing per ASTM 1063-08.

1.3 REFERENCES

A. ASTM International (ASTM):
   1. B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
   2. C109 - Standard Test Method for Compressive Strength of Cube test Specimens.
   3. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   4. C177 - Standard Test Method for Thermal Transmission Properties
   5. C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
   6. C926 - Standard Specification for Application of Portland Cement Based Plaster.
   7. C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
   8. C979 - Standard Specification for Pigments for Integrally Colored Concrete.
   9. C1506 - Standard Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters.
   10. C1498 – Test Method for Hygroscopic Sorption Isotherms of Building Materials
   11. D2794 – Standard Test Method for Impact Resistance of Organic Coatings
   12. D6904 - Standard Practice for Resistance to Wind-Driven Rain for Exterior Coatings Applied on Masonry.
   13. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   14. E96 - Standard Test Methods for Water Vapor Transmission of Materials.
   15. E136 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace.
   16. E2178 – Standard Test Method for Air Permeance of Building Materials
   17. G154 - Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

1.4 DESIGN REQUIREMENTS

A. Control Joints:
   1. Design and location of control joints shall be determined by the project design professional in accordance with ASTM 1063 and indicated on the contract drawings. Cut the lath to the control joint accessory so lath is discontinuous at or beneath the accessory. As a minimum, control joints shall be located at the following locations:
      a. Wall areas no to exceed 144 sq. ft.
      b. Length to width ratios of wall area not to exceed 2.5:1
      c. Maximum spacing of control joints shall not exceed 18 lineal feet in any direction.
      d. Corners of openings.
      e. At through wall penetrations – i.e. above and below doors or windows.
      f. Provide minimum 3/8 inch wide joint where the system abuts windows, doors and other through wall penetrations.

g. Provide appropriate accessories at terminations.
h. Avoid the use of channel reveal accessories which can interfere with proper stress relief.

B. Expansion Joints:
1. Design and location of expansion joints shall be determined by the project design professional and indicated on the contract documents. As a minimum expansion joints are required at the following locations:
a. Where expansion joints occur in the substrate system.
b. Where building expansion joints occur.
c. At floor lines.
d. Where it abuts dissimilar materials.
e. Where the substrate changes.
f. Where significant structural movement occurs such as changes in roofline, building shape or structural system.

1.5 SUBMITTALS

A. Product Data: Manufacturer's descriptive data, mixing procedures, application instructions, and precautions and limitations in product use.

B. Shop Drawings: Show locations and installation of expansion joints including plans, elevations sections details of components, and attachments to other work.

C. Samples for Verification: For each type of finish coat indicated; Provide 7 x 9 inch sample showing texture and color prepared on rigid backing.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 20 years experience in manufacture of specified products.

B. Applicator Qualifications:
1. Minimum 5 years documented experience in work of this Section.
2. Successful completion of minimum of 3 projects of similar scope and complexity within past 2 years.
3. Employ applicators experienced in exterior plaster applications and familiar with specified products.

C. Mock-up:
1. Apply finish system to minimum 16 square feet of actual substrate.
2. Show color and surface texture.
3. Locate where directed by Architect.
4. Approved mockup may remain as part of the Work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials under cover, dry, and protected from temperature extremes and contamination.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not apply finishes at temperatures below 40 degrees F or above 95 degrees F.
2. Ambient temperatures below 40 degrees F: Provide temporary sheet coverings and supplemental heat to prevent freezing of finish.
3. Protect applied finishes from direct sun, winds above 5 MPH, dust, dirt, frost, and precipitation for 48 hours after application. Provide screening for surfaces by use of small-sized mesh, tarps, or plastic sheeting.
4. Do not apply finishes during heavy or extended rain or to saturated or frozen surfaces.

1.9 WARRANTY

A. Provide manufacturer's 20 year performance warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. (PLAS-11) and (PLAS-14) Basis of Design Products: Subject to compliance with requirements, provide Thermocromex, or District approved equal, provided by Southwest Progressive Enterprise; contact info: 800-780-7731, info@thermocromex.com, www.thermocromex.com.

2.2 MATERIALS

A. Limestone High Performance Cladding:
   1. Type: Limestone high performance cladding based on natural hydraulic lime.
   2. Characteristics:
      a. Granulometry: 0.8 to 4.0 mm, tested to ASTM C136.
      b. Compressive strength: 650 PSI average, tested to ASTM C109 at 28 days, 1500 PSI at full cure.
      c. Air Permeance: 0.002 at 75 Pa, tested to ASTM E2178
      d. Flexural strength: 2.0 to 2.5 N/sq mm, tested to ASTM C348 at 28 days.
      e. Water retention: 94 percent plus or minus 2 percent, tested to ASTM C1506 on paste.
      f. Water vapor transmission rate: 84 PERMS, tested to ASTM E96/E96M Wet Cup Method
      g. Wind driven rain resistance: Passed, tested to ASTM D6904 (78 percent better than the standard for weight gain).
      h. Salt fog exposure: No significant change after 300 hours, tested to ASTM B117.
      i. Sorption Isotherm: Average absorption value at 90%RH is 1.36%, tested to ASTM C1498
      j. Impact Resistance: Passed 140 Inch-Pound Impact, tested to ASTM D2794
      k. Accelerated weathering; tested to ASTM G154:
         1) Visual color change: None, after 2000 hours.
         2) 60 degree gloss change: 3 gloss units after 2000 hours.
         3) Blistering: None after 2000 hours.
         4) Chalking: None after 2000 hours.
         5) Checking: None after 2000 hours.
         6) Cracking: None after 2000 hours.
         7) Other: None after 2000 hours.
      l. Thermal conductivity: 1.02 square meters K/W, tested to ASTM C177.
      m. Modulus of Elasticity: 7584 MPa, tested to ASTM C469.
      n. Flame spread/smoke developed: Class A, tested to ASTM E84.
      o. 1) Flame spread/smoke over OSB Substrate: Class A, tested to ASTM E84.
      p. 2) Flame spread/smoke over Lath/Scratch Substrate: Class A, tested to ASTM E84.
      q. 3) Flame spread/smoke over Cementitious Substrate: Class A, tested to ASTM E84.
      r. If applied over a 1 hour approved fire resistant wall assembly Thermocromex being a non-combustible product per ASTM E136 will not affect in any way that 1 hour fire rated wall assembly.
      s. Volatile organic compound (VOC) content: 0

2.3 MIXES

A. Mix materials in accordance with manufacturer's instructions using mechanical mixing equipment.

B. Add water to premixed bagged material at rate of 1-1/4 to 1-1/2 gallons per bag until desired consistency is achieved. Use same amount of water per bag for subsequent batches.

C. Add coloring admixture in accordance with manufacturer's instructions; color to match approved samples.

D. Continue mixing for 6 to 7 minutes total.

E. Clean mixer thoroughly at end of each work day, when work is suspended for an extended period, and when changing colors.

F. Discard mixes not used within 60 minutes after mixing.

G. Source Quality Control:
   1. Perform slump and weight density test on first batch daily and whenever equipment is not in use for more than 30 minutes using materials discharged directly from mixer before application on wall.
   2. Record results of each batch using form provided by manufacturer.
   3. Record location of each batch number on copy of exterior building elevations.
   4. Ensure consistent compliance with manufacturer's slump and weight density requirements.
   5. Discard batches not complying with slump and density weight requirements and adjust subsequent mixes as required.
   6. If batches fail to meet required slump and weight requirements, remove applied finishes back to last verifiable point at no additional cost to Owner.
   7. Owner or Architect may request additional testing at any time during mixing.

2.4 ACCESSORIES

A. Coloring Admixture: ASTM C979, Colors:
   1. (PLAS-11A): Tandour Finish, Integrated Color: #P75.
   2. (PLAS-11B): Tandour Finish, Integrated Color: #LM-17931.
   3. (PLAS-14A): Tandour Finish, Integrated Color: #P75.
   4. (PLAS-14B): Tandour Finish, Integrated Color: #LM017931.

B. Bonding Agent: ASTM C932; Weld-Crete by Larsen Products Corp., or District approved equal (if required).

C. Water: Clean and potable.

D. Lath:
   1. Mega Lath by Structa Wire, or District approved equal, in compliance with ASTM C847-10a
   2. Diamond mesh that is self-furred, galvanized steel at a minimum 3.4 lb/yd^2 in compliance with ASTM C847-10a.
   3. Welded wire lath that is self-furred, galvanized steel at minimum 1.95lb/yd^2 in compliance with ASTM C933-1.

PART 3 - EXECUTION

3.1 PREPARATION

A. Portland Cement Plaster Base Coat Substrates:
   1. Ensure Portland cement plaster base coat conforms to ASTM C926, minimum 1/2 inch thickness, pre-blended only.
   2. Achieve the levelness and appearance of a brown coat.
   3. Allow new plaster to cure per specific manufacturer's instructions.

B. Dampen surfaces when required to prevent excess suction due to porosity of substrate or climatic conditions. Lightly wet surfaces but do not saturate.

C. Enhanced Crack Resistance:
   1. After Moist Curing, allow Stucco Base to air dry for 24 hours before applying the leveling and reinforcing coat.
   2. Using a stainless steel trowel, apply the acrylic modified basecoat over the substrate at thickness of 1/16 – 3/32 inch.
   3. Fully embed the fiberglass reinforcing mesh into the wet modified acrylic basecoat including diagonal strips at corners of openings and trowel smooth. If 4.5 ounce fiberglass mesh is used, seams are overlapped 2½ inches

3.2 APPLICATION

A. Apply finish in accordance with manufacturer's instructions.

B. Dampen surfaces when required to prevent excess suction due to porosity of substrate or climatic conditions. Lightly wet surfaces but do not saturate.

C. Apply finish to minimum 3/8 inch thickness. When overall thickness exceeds 3/4 inch, apply in two coats. Do not exceed 1-1/2 inch overall thickness. Measure depth using depth gage or equivalent; ensure consistent thickness.

D. Apply finish to Tandour finish.

E. Finish surfaces true to plane, plumb and with neat, sharp corners and intersections.

F. Work in panels to nearest natural break formed by intersections, corners, trim, and accessories.

G. Not Acceptable: Lines caused by variations in application or finishing techniques, cold joints, and other surface defects visible when viewed from a distance of 10 feet.

H. Debri netting is required when winds are 5 MPH and above.

I. Cure applied finishes with light water mist 3 to 4 times daily for 2 to 3 days after application. Prevent uneven and excessive evaporation from surfaces.

J. Surface tolerance: Maximum 1/8 inch in 10 feet variation from surface flatness.

K. Provide minimum 4 inch clearance above earth grade, at grade for hardscape. Provide increased clearance in freeze/thaw climate zones.

L. Commence the installation of Thermocromex after completion of all floor, roof construction and other construction that imposes dead loads on the walls to prevent excessive deflection and potential cracking. Sequence interior work such as drywall installation prior to Thermocromex installation to prevent stud distortion and potential cracking.

3.3 FIELD QUALITY CONTROL

A. If current project is applicator's first application of specified product, manufacturer of finish to provide on-site applicator training for minimum of one day, including review of manufacturer's application instructions, equipment, application procedures, and curing.

3.4 ADJUSTING

A. Repair or replace damaged, discolored, and defective finishes.

B. Match patched areas to adjacent surfaces.

3.5 CLEANING

A. Remove finish from adjacent and underlying surfaces before it sets.

END OF SECTION

SECTION 092900
GYPSUM BOARD

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior gypsum board.

B. Gypsum board shaft wall panels.

C. Tile backing panels.

1.2 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.3 PREINSTALLATION MEETINGS

A. Pre-Installation Conference: Convene a pre-installation meeting at the beginning of the project to review acoustically rated construction requirements and to coordinate penetrations. Architect, Contractor, Owner's representative and each trade that may need to penetrate acoustically rated construction or will be involved in construction of acoustically rated partitions and related systems must attend. Review layouts and routing for potential penetrating items, discuss reducing or eliminating penetrating items by considering alternate routing, review construction requirements, details and specifications for acoustically rated construction. A follow-up meeting should be scheduled as needed. This meeting can occur in conjunction with a regular construction progress meeting. Publish meeting minutes highlighting topics discussed, actions items and decision made.

1.4 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's recommended installation requirements for gypsum board products and accessories, including control joint placement location at walls and ceilings.

1.5 QUALITY ASSURANCE

A. Keep copy of GA 216 and Levels of Gypsum Board Finish in field office for duration of project.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

1. Cold Weather Protection: When ambient outdoor temperatures are below 55 degrees F maintain continuous, uniform, comfortable building working temperatures of not less than 55 degrees F for minimum period of 48 hours prior to, during and following application of gypsum board and joint treatment materials or bonding of adhesives.
2. Ventilation: Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Shaft Wall Performance Requirements: Provide gypsum board shaft wall system design and tested by manufacturer to withstand lateral loading (air pressure) of 10 lbs per sq ft for maximum wall height required, and with deflection limited to 1/240.
   1. Refer to Section 092216 – Gypsum Board Supports for shaft wall studs.

D. Acoustic Rated Construction: Meet requirements of GA-600 design manual and referenced acoustic rated system.

2.2 GYPSUM BOARD, GENERAL

A. Provide gypsum board materials in accordance with recommendations of GA 216.

B. Provide gypsum board materials not containing asbestos.

C. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Gypsum
   2. CertainTeed Corp.
   3. Continental Building Products.
   4. G-P Gypsum Corp..
   5. National Gypsum Company.
   6. PABCO Gypsum.
   7. United States Gypsum Co.
   8. Or District approved equal.

B. (GYP BD-1) Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

C. (GYP BD-2) Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
   1. Products: Subject to compliance with requirements, provide the following:
      a. CertainTeed Corp.; M2Tech Type X Gypsum Board.
      b. G-P Gypsum Corp.; ToughRock Mold-Guard Fireguard X.
      c. National Gypsum Company; Gold Bond Brand XP Fire-Shield Gypsum Board.
      d. United States Gypsum Co.; SHEETROCK Brand Mold Tough Firecode Gypsum Panel.
      e. Or District approved equal.
   2. Core: 5/8 inch, Type X.
   3. Long Edges: Tapered.
   4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. (GYP BD-11) Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; CertainTeed Type C.
      b. G-P Gypsum Corp.; Fireguard C.
      c. National Gypsum Company; Gold Bond Brand Fire-Shield C.
      d. United States Gypsum Co.; Firecode C Core.
      e. Or District approved equal.
   2. Thickness: 1/2 inch.
   3. Long Edges: Tapered.

B. (GYP BD-14) Gypsum Board, Type C, Moisture-Resistant: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability with moisture-resistant core and surfaces, and with manufacturer's standard edges.
   1. Thickness: 1/2 inch.

C. (GYP BD-21) Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; M2Tech Shaftliner Type X.
      b. National Gypsum Company; GoldBond Brand Fire-Shield Shaftliner XP.
      c. United States Gypsum Co.; SHEETROCK Brand Mold Tough Gypsum Liner Panels.
      d. Or District approved equal.
   2. Thickness: 1 inch.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. (GYP BD-26) Fire-Rated Acoustically Enhanced Gypsum Board: ASTM C 1396/C 1396M. Multi-layer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core for STC 55 assembly.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. National Gypsum Company; Gold Bond Brand Soundbreak XP 5/8” Gypsum Board.
      b. PABCO Gypsum; QuietRock ES.
      c. Supress Products, LLC.; Supress SED5848.
      d. Or District approved equal.
   2. Sealant: Provide manufacturer’s recommended sound-engineered sealant at all panel edges, joints and seams.
   3. Core: 5/8 inch, Type X.
   4. Long Edges: Tapered.

E. (GYP BD-35) Abuse and Mold Resistant Gypsum Board: ASTM C 1629/C 1629M.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; AirRenew Extreme Abuse Gypsum Board.
      b. National Gypsum Company; Gold Bond Brand Hi-Abuse XP Gypsum Board.
      c. Or District approved equal.
   2. Core: 5/8 inch, Type X.
   3. Surface Abrasion: Meets or exceeds Level 3 requirements.
   4. Surface Indentation: Meets or exceeds Level 1 requirements.
   5. Single-Drop Soft-Body Impact: Meets or exceeds Level 2 requirements.
   6. Long Edges: Tapered.
   7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

F. (GYP BD-36) Impact and Mold Resistant Gypsum Board: ASTM C 1629/C 1629M.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.: AirRenew Extreme Impact Resistant Gypsum Board.
      b. National Gypsum Company; Gold Bond Brand Hi-Impact XP Gypsum Board.
      c. Or District approved equal.
   2. Core: 5/8 inch, Type X.
   3. Surface Abrasion: Meets or exceeds Level 3 requirements.

4. Surface Indentation: Meets or exceeds Level 1 requirements.
5. Single-Drop Soft-Body Impact: Meets or exceeds Level 3 requirements.
6. Hard-Body Impact: Meets or exceeds Level 3 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TILE BACKING PANELS

A. (GYP BD-25) Fire-Rated, Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; GlasRoc Diamondback Tile Backer.
      b. G-P Gypsum Corp.; DensShield Fireguard Type X Tile Backer.
      c. National Gypsum Company; eXP Tile Backer Fire-Shield Type X.
      d. United States Gypsum Company; Durock Glass-Mat Tile Backerboard Type X.
      e. Or District approved equal.
   2. Core: 5/8 inch, Type X.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
   2. Shapes:
      a. Cornerbead.
         1) Basis-of-Design: USG Sheetrock® Brand; Dur-A-Bead® Corner Bead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
         1) Basis-of-Design: USG Sheetrock® Brand; 200-A “J” Metal Trim.
      c. L-Bead: L-shaped; exposed long flange receives joint compound.
         1) Basis-of-Design: USG Sheetrock® Brand; 200-B “L” Metal Trim.
      d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
         1) Basis-of-Design: USG Sheetrock® Brand; 401/402 “J-Stop” Metal Trim.
      e. (GYP TRIM-1) Expansion (control) joint.
         1) Basis-of-Design: Clark Dietrich Building Systems; #093 Zinc Control Joint.
      f. Curved-Edge Cornerbead: With notched or flexible flanges.
      g. Or District approved equals.

B. (GYP TRIM) and (WRT) Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
   1. Acceptable Manufacturers:
      a. Gordon Incorporated.
      b. Fry Reglet.
      c. Or District approved equal.
   2. Profiles: Refer to Material Identification Codes and as shown on Drawings.
   3. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
   4. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
   3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:
1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. (INSUL-40) Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

F. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

2.9 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products:
   a. Hilti Incorporated; CP 506 Acoustical Sealant.
   b. Pecora Corporation; AC-20 FTR.
   c. United States Gypsum Co.; SHEETROCK Acoustical sealant.

B. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
1. Products:
   a. Ohio Sealants, Inc. Pro-Series SC-170 Rubber Base Sound Sealant.
   b. Pecora Corp. BA-98.
   c. Tremco, Inc. Tremco Acoustical Sealant.

C. Provide moldable putty type products acceptable to meet or exceed STC rating at service boxes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840, and located not over 30 feet on center without perimeter relief, and with perimeter relief maximum spacing is 50 feet, regardless if control joints are indicated on drawings or not. Prior to commencing gypsum board work, verify location of control joints with Architect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.
6. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 SHAFT WALL INSTALLATION

A. Anchor and fasten materials and components to comply with ratings and performance requirements, and to comply with governing regulations.

B. Coordinate gypsum board shaft system work with sprayed-on fireproofing of structure, so that both remain complete and undamaged. Patch or replace sprayed-on fireproofing removed or damaged during installation of shaft system.

C. Seal perimeter of each section of gypsum board shaft work where it abuts other work. Install second bead of acoustical sealant in location and manner which will prevent dislocation by air pressure differential between shaft and external spaces. Seal joints and penetrations in work; comply with manufacturer's instructions.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
5. Level 5: Where indicated on Drawings.

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 093000
TILING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glazed floor tile, wall tile and trim shapes.
   2. Latex-Portland cement mortar and grout.
   3. Transition thresholds in door openings and ceramic washroom accessories.
   4. Waterproofing membrane system for tile applications.
   5. Sealant and backer materials in tile work.

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete: Concrete subfloors.
   2. Section 079000 - Joint Protection: Other sealants.
   3. Section 102813 - Toilet Accessories.

1.2 REFERENCES

A. ANSI A108.5 - Ceramic Tile Installed in Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.

B. ANSI A108.10 - Installation of Grout in Tile Work.

C. ANSI A118.4 - Latex-Portland Cement Mortar.

D. ANSI A137.I - Specifications for Ceramic Tile.

E. Tile Council of North America - Handbook for Ceramic Tile Installation.

F. MMSA - Materials and Methods Standards Association.

1.3 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300. Indicate tile patterns and locations; width and locations of control, isolation, contraction and expansion joints in tile surfaces.

B. Samples: Submit in accordance with Section 013300, for color selection and appearance acceptance.

1.4 QUALITY ASSURANCE

A. Standards: Comply with applicable reference standards unless otherwise indicated.

B. Manufacturing Standards: Provide tile to comply with Standard Grade Requirements of ANSI A137.1.

C. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

D. Installer Qualifications: Engage experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with record of successful in-service performance.

1.5 PRODUCT HANDLING

A. Deliver, store and handle tile, mortar, and grout materials with care to avoid damage.

1.6 ENVIRONMENTAL CONDITIONS

A. Provide sufficient heat and ventilation in areas where work of this section is being performed, so as to allow ceramic tile to properly set. Take precautionary measures necessary to ensure that excessive temperature changes do not occur.

1.7 EXTRA MATERIALS

A. Replacement Materials: Upon completion of work deliver extra tile to Owner for total of one percent of tile used of same size and color for use in future repair and maintenance work.

PART 2 PRODUCTS

2.1 TILE MATERIALS

A. Ceramic Tile: Standard Grade complying with ANSI A137.1, and CBC 11B-302.1.
   1. (CTF) Ceramic Floor Tile: All-purpose edge porcelain type units with manufacturer's standard back-mounting.
      a. Refer to Material Identification Codes.
   2. (CTW) Glazed Wall Tile: Cushion edge units with matte glaze finish.
      a. Refer to Material Identification Codes.

2.2 CERAMIC TILE ACCESSORIES

A. Trim and Special Shapes: Rounded external corners and trim shapes at head, jamb and sills of openings.
   1. Wainscot cap.
   2. Surface-bullnose.
   3. Bullnose cap.

B. (CTB) Ceramic Base: Sanitary cove units, sizes, and materials, refer to Material Identification Codes.

C. (CTA) Ceramic Tile Accessories: Schluter metal trims, refer to Material Identification Codes.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

B. (THS-2) Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.
   1. Description: as selected by Architect.

2.4 MORTAR MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
   1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
      a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

A. (GR-1) Cement Grout materials:
   1. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated.
      a. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

B. Acceptable Cement Grouts Manufacturers:
   1. Bonsal, W. R., Company.
   2. Bostik Inc.
   3. Custom Building Products.
   4. DAP, Inc.
   5. LATICRETE International Inc.
   6. MAPEI Corporation.
   7. TEC Specialty Products Inc.

8. Or District approved equal.

C. Grout Sealer: Provide grout sealer compatible with grout materials as recommended by grout manufacturer.

2.6 WATERPROOFING AND CRACK ISOLATION

A. Fluid-Applied Waterproofing System: Provide continuous and seamless waterproofing and crack isolation system, including premixed or single-component self-curing liquid-latex rubber or elastomeric-polymer membrane; ANSI A118.10 and ANSI 118.12; ASTM C627 Extra Heavy Service rating; IAPMO-approved as shower pan liner; and recommended by the manufacturer for the application indicated.
   1. Products and Manufacturers:
      a. Redgard Waterproofing and Crack Prevention Membrane by Custom Building Products
      b. Hydro Ban by Laticrete International, Inc..
      c. Mapelastic AquaDefense by Mapei Corporation.
      d. Or District approved equal.
   2. Pre-treat control joints and cracks in accordance with membrane manufacturer's instructions.
   3. Provide reinforcement and accessories as recommended by manufacturer for complete system.

2.7 MISCELLANEOUS MATERIALS

A. Tile and Grout Sealer: MicroGuard AD708 Hard Tile Clear Treatment by Adsil Corp., or District approved equal.

B. Wall and Tub Sealant: Silicone sealant, FS TT-S-001543A, mildew resistant type.
   1. Color to match adjacent grout.

C. Horizontal Joint Sealant: One-part, non-sag, urethane conforming to FS TT-S-00230C, Type II, Class A.
   1. Color to match adjacent grout.

D. Joint Filler or Bond Breaker (under sealant): As specified in Section 079000 - Joint Protection.

2.8 MIXING

A. Mix and proportion cementitious materials for site made leveling coats, mortar beds and bond coats and grout as recommended by Handbook for Ceramic Tile Installation.

B. Mix and proportion premix setting bed bond coat and grout materials in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

B. Prior to installing tile work, ensure that surfaces are level, with maximum surface variation of 1/8 inch in 10 feet and sloped to drains.

C. Prior to installing tile work, coordinate with other trades layout of expansion joints in tile work to ensure expansion joints in substrate and tile work line up.

3.2 PREPARATION

A. Prepare surfaces to receive tile as recommended by mortar or adhesive manufacturer.
   1. Roughen surfaces that are glossy or which have loose surface material by sanding or scarifying.
   2. Remove surface material that is not compatible with adhesive.

3. Use primer when recommended by adhesive manufacturer.
4. Clean thoroughly to remove oil, dirt and dust.
5. Embed reinforcing in setting bed where indicated.

3.3 TILE INSTALLATION

A. Install tile work in accordance with applicable parts of ANSI A108 and manufacturer's printed instructions. Comply with TCNA installation methods as applicable to installation conditions.
   1. Achieve 100 percent bond in tile work. Back butter units 8 inch by 8 inch and larger.

B. Extend tile work into recesses and under equipment and fixtures, to form complete covering without interruptions. Terminate work neatly at obstructions, edges and corners without disruption of pattern or joint alignment.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish or built-in items for straight, aligned joints.
   1. Fit tile closely to electrical outlets, piping and fixtures so that plates, collars or covers overlap tile.

D. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated, or if not indicated, at spacings and locations recommended in TCNA Handbook for Ceramic Tile Installation, and approved by Architect.

E. Thoroughly waterproof entire wall behind plumbing fixtures and recessed tile accessories at shower and wet locations such as floor drains, kitchen, cart wash areas, emergency shower areas.

F. Jointing Pattern: Unless otherwise shown, lay ceramic tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields both directions in each space or on each wall area.
   1. Adjust to minimize tile cutting. Provide uniform joint width.

G. Apply tile and grout sealer as recommended by sealer, tile and grout material manufacturers.

3.4 MEMBRANE WATERPROOFING

A. Preparation: Concrete surfaces to be waterproofed shall be clean and free from loose scale, mortar and structural cracks.

B. Surface preparation and temperature limitations shall be as recommended by membrane manufacturer. Pre-treat substrate cracks and joints as recommended.

C. Spray apply membrane waterproofing according to manufacturer instructions, in 2 coat application, with combined dry coat thickness of 0.030 inch (0.8 mm).

D. Apply two separate layers. Apply first layer to cover base floor substrate below mortar bed continuous from drain and covering entire wall surface to ceiling on each wall. Second layer is applied over the mortar bed and is continuous overlapping into drain and extending 2 feet above water line onto vertical wall surface.

E. Install at each drain and behind tile at each wet location. Extend waterproofing onto entire wall surface up to ceiling. Include ceiling if recommended by TCA and GA guides.

3.5 EXPANSION JOINTS, SEALANT AND BACKER

A. Expansion and Control Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated.
   1. If not indicated, locate joints at periphery of tile installation, around restraining surfaces, over joints in substrate, and where materials change in substrate, and in field of installation - at minimum 24 feet in each direction, unless otherwise indicated.
   2. Spacing of joints shall be in locations recommended in TCNA Handbook for Ceramic Tile Installation EJ171 and as approved by Architect.

B. Sand or grind tile edges at expansion joints as required to obtain bond. Apply primer to tile edges as recommended by sealant manufacturer.
   1. Joint over substrate joint shall not be narrower than joint in substrate.

C. Sealant Installation: Install sealant as recommended by manufacturer at showers and tubs.
   1. Install sealant over backing material at expansion joints in accordance with installation methods and procedures specified in Section 079000 - Joint Protection.
   2. Install sealant at joint between tub and tile.
   3. Install sealant at corners of tile to tile at bath and shower recesses.

3.6 FIELD QUALITY CONTROL

A. Upon completion of membrane waterproofing work and prior to tile installation, plug drain or dam areas and fill with water. After 24 hours, inspect for leakage. Make necessary adjustments to stop leakage and re-test until watertight.

3.7 ADJUST AND CLEAN

A. Clean grout and setting materials from face of tile while materials are workable. Leave tile face clean and free of foreign matter.

B. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but not sooner than 10 days after installation.

C. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

D. Protect installed tile work with non-staining Kraft paper over 3/4” thick plywood or OSB protection board as called for in the TCNA Handbook for Ceramic Tile Installation to prevent damage and wear during construction period.

END OF SECTION

SECTION 095100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustical panel ceilings and exposed suspension system.

B. Related Sections:
   1. Section 017325 - Seismic Restraint Requirements for Nonstructural Components
   2. Section 098433 – Sound-Absorbing Wall Units.
   3. Division 21 – Fire Suppression: Sprinkler heads.
   4. Division 23 – Heating, Ventilating and Air Conditioning: Air diffusers.
   5. Division 26 – Electrical: Lighting fixtures.
   6. Division 27 – Communications: Fixtures.

1.2 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.3 DESCRIPTION

A. Acoustical Ceilings: Acoustical panel ceilings are described with suspension system for each type of ACT listed in the Material Identification Codes and as described in PART 2.

1.4 REFERENCES

A. UL - Underwriter's Laboratories Incorporated.

B. 2006 IBC 803.9.1.1 - Installation of Suspended Acoustical Ceiling Systems.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.

C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
   1. Ceiling suspension members.
   2. Method of attaching hangers to building structure.
   3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
   4. Minimum Drawing Scale: 1/8 inch equals 1 foot.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Acoustical Panel: Set of manufacturers standard size samples of each type, color, pattern, and texture.

2. Exposed Suspension System Members, Moldings, and Trim: Set of 12 inch long samples of each type, finish, and color.

E. Evaluation Reports per ICC-ES: For each seismically qualified acoustical tile ceiling suspensions system used in lieu of the industry standard design.

1.6 QUALITY ASSURANCE

A. Ceilings and Interior Systems Construction Association (CISCA): Acoustical Ceilings, Use and Practice.

B. Installer's Qualifications: Firm experienced in application or installation of systems similar in complexity to those required for this Project, including specific requirements indicated.

1. Acceptable to or licensed by manufacturer.

C. Rated Assemblies: Where acoustical ceilings are components of assemblies indicated for fire-resistance rating, provide acoustical units and suspension systems bearing UL classification marking for applicable UL design number listed in UL "Fire Resistance Index". Where required by applicable UL design, provide protection materials for fixtures and ducts.

1. Protect mechanical openings in acoustical tile ceilings as per UL outlet protection systems A or B as approved by UL. Provide mineral wool batt insulation and gypsum board where required.

D. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components and partition system.

E. Source Limitations for Ceiling Units and Suspension Systems: Obtain each acoustical ceiling panel and suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying Work.

1.7 PRODUCT HANDLING

A. Deliver acoustical ceiling materials in manufacturer's protective packaging. Store and handle materials with care to avoid damage.

1.8 ENVIRONMENTAL CONDITIONS

A. Do not install acoustical ceiling panels until building is enclosed, sufficient heat is provided, dust generating activities have terminated and all overhead mechanical, electrical and telecommunications work is completed, tested and approved.

1. Install ceiling tile after carpeting and other interior materials that off-gas have been preconditioned and odors and VOC fumes have dissipated.

B. Permit wet work to dry prior to commencement of installation.

C. Maintain uniform temperatures of minimum 60 degrees F and humidity as recommended by acoustical ceiling manufacturer prior to, during and after installation.

1.9 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.10 EXTRA MATERIALS

A. Provide extra one percent of each type of acoustical ceiling unit to Owner for replacement.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Design Requirements: Design and construction ceiling system, including attachments to structure, to withstand seismic forces in any direction. Refer to Section 017325 for seismic force criteria and restraint requirements.

B. Seismic Standard: Provide acoustical panel ceilings designed and constructed in accordance with the following industry or seismic certification standard:
   1. ASTM E580: “Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions,” Section 5 – Seismic Design Category D, E & F.
   2. Seismically qualified in accordance with the International Code Council – Evaluation Services – AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components, acceptable to the authority having jurisdiction and approved by the Structural Engineer of Record.

2.2 PRODUCTS AND MANUFACTURERS

A. Basis-of-Design Product and Manufacturers: Subject to compliance with requirements, provide specified product or a comparable product by one of the following:
   1. Armstrong World Industries, Inc.
   2. USG Interiors, Inc.
   3. Ecophon CertainTeed, Inc.
   4. Chicago Metallic Corporation.
   5. Or District approved eqaul.

2.3 SUSPENSION SYSTEM

A. Exposed Type, ASTM C635: Intermediate duty, double web, cold rolled, hot dipped galvanized steel tees and wall moldings, steel cap with baked on painted polyester finish.
   1. Exposed Suspension System: System with main runners and cross tees, exposed surfaces with white enamel finish to match lay-in panels.
   2. Products:
      a. Armstrong Suprafine 9/16 inch grid
      b. Armstrong Prelude 15/16 inch grid

B. Suspension System Supports:
   1. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

C. Accessories: Stabilizer bars, furring clips, splices, edge moldings and hold down clips. Provide as required to complete and complement suspended ceiling grid system.
   1. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
   2. Edge Moldings and Trim: Metal of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated.
      a. Provide moldings with exposed flange of the same width as exposed runner.
   3. Touch-up Paint: Manufacturer’s touch-up paint for field cut tegular or other reveal edge tiles.

D. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

E. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

F. Seismic Separation Joints: For ceiling areas exceeding 2,500 sqft in accordance with ASTM E580.

G. Armstrong, AXIOM Classic Trim: Sizes and profiles as indicated on Drawings.

2.4 ACOUSTICAL CEILING SYSTEMS

A. (ACT) Acoustical Lay-in-Panels, Grids, and Ceiling Type: Refer to Material identification Codes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with ductwork or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
   4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
   6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Tolerances: Erect ceiling system level within 1/8 inch in 12'-0" in any direction.

G. Install fire rated ceiling systems which are components of fire-rated assemblies in accordance with applicable UL "Fire Resistance Index" design numbers.

H. Form expansion joints as detailed on drawings. Form to accommodate plus or minus one inch movement and maintain visual closure.

3.4 ACOUSTICAL PANEL INSTALLATION

A. Fit acoustic lay-in panels in place, free from damaged edges or other defects detrimental to appearance and function. Lay directional patterned tile one way with pattern parallel to shortest room axis.
   1. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
   2. Field recess units with tegular or reveal edge at border or ceiling edge.
   3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

B. Install lay-in panels level, in uniform plane and free from twist, warp and dents with straight joints, edges in alignment, and edges and corners flush.

3.5 ADJUST AND CLEAN

A. Adjust sags or twists that develop in ceiling systems and replace part which is damaged or faulty.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
   1. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 096500
RESILIENT FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sheet vinyl flooring.
   2. Resilient flooring accessories.
   3. Cleaning and waxing of resilient flooring.
   4. Transition Edge Strips

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete: Finish floor slab and moisture treatment.

1.2 SUBMITTALS

A. Shop Drawings: Submit layout drawings on sheet flooring showing seam locations, pattern direction, and type of edge treatment used in accordance with Section 013300.

B. Slab Moisture Content and Calcium Chloride Test Results: Submit to Architect.

C. Samples: Submit samples of tile and sheet flooring in accordance with Section 013300.

D. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices for each type of resilient flooring.

1.3 QUALITY ASSURANCE

A. Provide each type of resilient flooring produced by single manufacturer, single run.

B. Applicator Qualifications: Installation of resilient flooring shall be by manufacturer's approved applicator.

C. Job Mock-Up: Make sample installation of rubber base on project surfaces as directed by Architect. Obtain acceptance of sample field installation and accomplish work to equal or exceed standard established by accepted sample.

1.4 PRODUCT HANDLING

A. Deliver resilient flooring materials in manufacturer's protective packaging. Store and handle flooring with care to prevent damage.

1.5 PROJECT CONDITIONS

A. Maintain temperature in areas of installation as recommended by resilient flooring manufacturer.

1.6 EXTRA MATERIAL

A. Replacement Materials: Deliver not less than one percent of total project quantity of each type, size and color of material to Owner for replacement materials.

B. Clearly identify each container as replacement materials.

PART 2 PRODUCTS

2.1 FLOOR COVERING MATERIALS

A. Slip Resistance of Flooring Materials: Provide materials with 0.6 coefficient of friction or greater when tested in accordance with ASTM 2047.

B. Sheet Vinyl Flooring: ASTM F1913, Type as indicated by product selected.
   1. (RSF)Type, color and pattern: Refer to Material Identification Codes.

C. Colors and Patterns: Provide tile units with uniformly distributed color and pattern throughout thickness of tile.

2.2 RESILIENT FLOORING ACCESSORIES

A. (RB) Rubber Base: ASTM F1861, Type as indicated by product selected, 4 inch height, 1/8 inch thickness, 120 foot coil lengths. Provide standard top-set cove base, except provide straight base at carpet.

1. Type and Color: Refer to Material Identification Codes.

B. Transition Edge Strips: Vinyl reducer strips in thickness to match adjacent resilient flooring material. Provide at edges of resilient flooring wherever edge is exposed.

1. (TRS) Color: Refer to Material Identification Codes. Sheet Cove Cap or Zero Edge Reducing Strip and Fillet Strip: Plastic cap or reducing strip and fillet strip as recommended by manufacturer for integral or flash cove base.

2.3 FILLERS/ADHESIVES/SEALERS

A. Sub-Floor Filler: White premix latex, mix with water to produce cementitious paste.

B. Primers and Adhesives: Water-resistant stabilized type as recommended by resilient flooring manufacturer for specific material.

C. Flooring Adhesives: Adhesive recommended and approved by flooring manufacturer, zero VOC, tested by the adhesive manufacturer for use with the specified flooring product; Submit approval documentation by both flooring manufacturer and adhesive manufacturer as compatible with substrate, flooring, project conditions, use, expected traffic, equipment loads and surface conditions including alkalinity, moisture emission levels, slab relative humidity, and other factors that may affect flooring and adhesive performance.

D. Adhesive and Sealant VOC Limits: According to South Coast Air Quality Management District Rule 1168 and GS-36 for aerosols. VOC Limits: As tested using U.S. EPA Reference Test Method 24 and as defined by South Coast Air Quality Management District Rules: SCAQMD Rule 1168, Adhesive and Sealant Applications

E. Polish: Type recommended by resilient flooring material manufacturer for material type and location.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which resilient flooring is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 SITE AND SUBSTRATE CONDITIONS

A. Ensure floor surfaces are smooth and flat with maximum variation of 1/8 inch in 10 feet.

B. Ensure concrete floors are dry and meet moisture conditions required by flooring and adhesive manufacturer's and exhibit negative alkalinity, carbonization or dusting. Also ensure substrate meets requirements of adhesive and flooring manufacturer's requirements. Remove curing agents and other surface residue that may negatively affect adhesion or flooring installation and performance.

C. Floor Substrate Criteria:

1. Moisture vapor emissions do not exceed 75 percent RH when tested in accordance with ASTM F2170 unless otherwise required by finished flooring and adhesive manufacturer.
2. Moisture in concrete slab conditions up to 3lb. per 1,000 sq. ft. per 24 hours when tested with a prepackaged calcium chloride crystal kit performed in accordance with ASTM F1869 unless otherwise required by finished flooring and adhesive manufacturer.

3. Concrete slab alkalinity conditions up to a pH of 6-9 when tested in accordance with ASTM F710 with in-situ monitoring, unless otherwise required by finished flooring and adhesive manufacturer.
4. Maintain testing records and submit along with warranties for Project Record Documents.

D. Maintain minimum 70 degrees F air temperature at flooring installation area for 3 days prior to, during, and for 24 hours after installation.

E. Store flooring materials in area of application. Allow 3 days for material to reach equal temperature as area.

3.3 LEVELING

A. Preparation: Prepare substrate surfaces to receive resilient flooring as recommended by adhesive manufacturer and resilient flooring manufacturer.
1. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with subfloor filler.
2. Clean floor and apply, trowel and float filler to leave smooth, flat hard surface. Prohibit traffic until filler is cured.

3.4 INSTALLATION - FLOORING

A. Clean substrate. Spread adhesive evenly in quantity recommended by manufacturer to ensure adhesion over entire area of installation. Spread only enough adhesive to permit installation of flooring before initial set.

B. Set flooring in place; press with heavy roller to ensure full adhesion. Tightly adhere flooring to substrate without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

C. Install sheet flooring to minimum of 1/3 full material width and with sheet parallel to length of room unless otherwise indicated. Lay sheet flooring to provide as few seams as possible. Double cut sheet and continuously heat seal or heat weld seams in vinyl sheet flooring to provide seamless installation. Match seam edges for color shading and pattern.

D. Terminate resilient flooring at centerline of door openings where adjacent floor finish is dissimilar.

E. Scribe flooring to walls, columns, cabinets, floor outlets and other appurtenances to produce tight joints. Cut flooring neatly to and around fixtures.

F. Butt flooring tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions and to produce joints, laid tight, even, and straight. Extend flooring into toe spaces, door reveals, and into closets and similar openings.

G. Install flooring on covers for telephone and electrical ducts, in pan type floor access covers, and other such items as occur within finished floor areas. Maintain overall continuity of color and pattern with pieces installed in these covers.

H. Continue flooring through areas to receive moveable type partitions without interrupting floor pattern.

I. Install feature strips and floor markings where indicated. Fit joints tightly.

3.5 INSTALLATION - ACCESSORIES

A. Apply wall base to walls, columns, pilasters, cabinetwork and other permanent fixtures in rooms or areas where base is required. Coped inside corners; install preformed outside corners. Tightly bond base to backing and fit joints tight and vertical.

B. Install base on solid backing. Adhere tightly to wall and floor surfaces throughout length of each piece, with continuous contact at horizontal and vertical surfaces. Scribe and fit to door frames and other obstructions.

C. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edge strips at unprotected edges of flooring and at door jambs between rooms with different color or pattern of flooring.

D. Adhere accessories over each entire surface and fit accurately and securely.

3.6 PROTECTION

A. Prohibit traffic from floor finish for 48 hours after installation. Protect flooring from damage by use of protective covering.

3.7 CLEAN-UP

A. Remove excess adhesive or other surface blemishes from floor, base and wall surfaces without damage, and as recommended by flooring manufacturer.

3.8 FINISHING

A. After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories. Apply sealer, wax and buff, with type of sealer, wax, number of coats and buffing procedures as recommended by flooring manufacturer for new flooring installation. Seal and wax floor and base surfaces in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 096623
EPOXY-RESIN TERRAZZO FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparation of concrete substrate for epoxy thinset flooring.
   2. Epoxy terrazzo flooring (TER-3) and (TER-4), border and base with divider strips.
   3. Curing, grinding and sealing.
   4. Precast epoxy terrazzo stair treads (TER-5).

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete: Preparation of concrete slab.

1.2 DESCRIPTION

A. Epoxy Terrazzo (TER-3) and (TER-4): 3/8 inch minimum terrazzo topping bonded to concrete base slab.

B. Precast Epoxy Terrazzo Stair Treads (TER-5): 2 inch thick precast terrazzo stair treads.

1.3 REFERENCES

A. Terrazzo Technical Data, National Terrazzo and Mosaic Association, Inc. (NTMA).

1.4 SUBMITTALS

A. Submit shop drawings in accordance with Section 013300. Indicate divider strip layouts and details of abutting items.

B. Samples: Submit 2 samples of each color or chip mixture variation of terrazzo required for this project.

C. Maintenance Instructions: Submit 2 copies of written instructions for recommended periodic maintenance of each type of terrazzo.

1.5 QUALITY ASSURANCE

A. Epoxy-Resin Terrazzo Flooring shall comply with 2013 CBC 11B-302.1.

B. NTMA Standards: Comply with specified provisions and recommendations of National Terrazzo and Mosaic Association, (NTMA).

C. Installer's Qualifications: Installer of epoxy terrazzo shall be approved by manufacturer of epoxy terrazzo matrix and member of N.T.M.A. (National Terrazzo and Mosaic Association).

D. Source Limitations: Obtain primary terrazzo materials through one source from single manufacturer. Obtain each color, grade, type, and variety of aggregate from one source with resources to provide materials of consistent quality in appearance and physical properties.

E. Mockups: Install mockup of 100 sq ft of typical flooring for each color and pattern, to demonstrate aesthetic effects and qualities of materials, joint conditions and execution. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Meeting: Conduct a preinstallation meeting to coordinated joint details and substrate conditions. Schedule this meeting well in advance of installation so submittals can include information resulting from this meeting. Attendees should include trades involved in related construction especially substrate conditions. Publish minutes of this meeting and instruct all workers regarding actions required.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.

PART 2 PRODUCTS

2.1 EPOXY TERRAZZO MATCHING MATERIALS

A. Type and Manufacturer (TER-3) and (TER-4): Thin-Set Epoxy Terrazzo #1100 decorative flooring system by General Polymers/Sherwin-Williams.
   1. Refer to Material Identification Codes.

B. Other Acceptable Manufacturers:
   1. Dex-O-Tex/Crossfield Products.
   2. Key Resin Company.
   3. Terroxy Resin Systems.
   4. Hi-Tek Polymers, Inc.
   5. Or District approved equal.

C. Divider Strips (FDS-1): “T” type, angle type, zinc.
   1. Expansion Type: Neoprene filled, 1/8 inch exposed thickness.

D. Primer: As recommended by manufacturer for intended use.

E. Sealer: Water based acrylic-urethane sealers as recommended by manufacturer.
   1. VOC less than 50 g/L.

2.2 PROPORTIONING

A. Topping: Provide chips and variation of chips to match Architect sample.

2.3 PRECAST EPOXY TERRAZZO

A. Precast Epoxy Terrazzo Manufacturers:
   1. Precast Terrazzo Enterprises, Inc.
   2. Romoco Precast Terrazzo.
   3. Wausau Tile Inc.
   4. Or District approved equal.

B. Precast Terrazzo Stair Treads (TER-5): Minimum 2-inches thick, epoxy terrazzo stair treads. Comply with manufacturer's written instructions for fabricating precast units in sizes and profiles indicated. Reinforce units as required by stair tread sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges to 1/8-inch radius.
   1. Color, Pattern, and Finish: Red (custom mixture TBD by Architect), black epoxy abrasives.

PART 3 EXECUTION

3.1 WORKMANSHIP

A. Install terrazzo after concrete substrate has been cured for 28 days minimum.

B. Install divider strips straight and level to existing pattern.

C. Produce terrazzo finish surface to match existing, with minimum of 70 percent marble chips exposed.

3.2 PREPARATION

A. Examine surfaces which are to receive terrazzo and accessories, and conditions under which terrazzo work is to be performed. Do not proceed with terrazzo work until unsatisfactory conditions have been corrected.

B. Clean concrete slab free from foreign matter.

C. Prior to installing terrazzo, ensure that surfaces are level, with maximum surface variation of 1/8 inch in 8 feet.

D. Mask and provide other protection required to prevent staining or other marks or damage to other materials. Verify dimensions prior to starting work.

E. Prepare surfaces to receive terrazzo as recommended by mortar or adhesive manufacturer. Roughen surfaces which are glossy or which have loose surface material by sanding or scarifying. Remove surface material that is not compatible with adhesive. Use primer when recommended by adhesive manufacturer. Clean thoroughly to remove oil, dirt and dust.

F. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
   1. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

G. Moisture Testing:
   1. Test for moisture by anhydrous calcium chloride method according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
   2. Test for moisture by relative humidity probe and digital meter method according to ASTM F 2170. Proceed with installation only after substrates have a maximum relative-humidity-measurement reading of 70 to 75 percent in 24 hours.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

B. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."

C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; noncumulative.

D. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.

E. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

F. Divider and Control-Joint Strips:
   1. Locate divider strips in locations indicated. Spacing of divider strips should be 12 ft. maximum.
   2. Install control-joint strips back to back directly above concrete-slab control joints in locations indicated.
   3. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.

3.4 FLOORS

A. Thinset Terrazzo: 1/4 inch to 3/8 inch minimum terrazzo topping bonded to concrete base slab.

3.5 BASE AND BORDER

A. Vertical Base: 1/4 inch or 3/8 inch minimum topping on underbed bonded to wall.

B. Border: Form border with division strip.

3.6 FINISH

A. Finish terrazzo to NTMA standards and as selected by Architect.

B. Grind terrazzo surfaces with power disc machine, sequence with course and fine grit, wet method.

C. Apply grout mix (to match mortar) over ground surface to fill honeycomb exposed during grinding.

D. Remove grouting coat by grinding using fine grit abrasive.

E. Hand grind base and cove similarly.

F. Dust shall not be permitted to coat surfaces. Remove grinding mud from site immediately. Finish terrazzo to eliminate grinding dust and to protect other building features.

G. Scrub and clean surfaces immediately following last grinding, rinse and neutralize. Apply minimum of 2 coats of sealer to terrazzo surfaces per manufacturers written instructions.

3.7 PRECAST TERRAZZO INSTALLATION

A. Install precast terrazzo stair treads using method recommended in writing by NTMA and manufacturer unless otherwise indicated.

B. Do not install units that are chipped, cracked, discolored, or improperly finished.

3.8 CLEANING AND PROTECTION

A. Protect terrazzo from damage and stains during construction. Place suitable non-staining coverings over terrazzo and keep in place until final cleaning.

B. Near end of project, re-scrub, clean, and resurface damaged areas if necessary. Terrazzo shall be undamaged, clean and in like-new condition.

END OF SECTION

SECTION 096800
CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Carpet, adhesive and accessories.

B. Related Sections:
   1. Section 096500 - Resilient Flooring.
   2. Section 096813 – Carpet Tile.

1.2 SUBMITTALS

A. Shop Drawings: Submit layout drawings showing seam locations, pattern direction, type of edge treatment, and type of adhesive used in accordance with Section 013300.

B. Slab Moisture Content and Calcium Chloride Test Results: Submit to Architect.

C. Samples: Submit samples in accordance with Section 013300, for color, texture and pattern selection, and appearance acceptance.
   1. Submit two 12 inch by 18 inch samples of carpet.
   2. Label samples to indicate manufacturer's name, supplier's name, job location, composition, construction quality, face weight, backing weight, total weight and pile height. Provide carpet samples to Architect in full color range, including custom colors, if required, to match sample submitted and selected by Architect.

D. Order Copies: Provide copy of order to manufacturer of carpet and copy of mill order to Architect prior to carpet being fabricated or woven.

E. Maintenance Manuals: Furnish Owner with 3 printed copies of carpet manufacturer's recommendations for care, cleaning, maintenance and repair.

1.3 QUALITY ASSURANCE

A. Approved Installer: Installation of carpeting and accessories shall be by manufacturer's approved installer specializing in carpet installation with not less than 2 years of experience in installation of carpeting similar to that required for this project.

B. Flame/Smoke Resistance Standards: Where ratings are indicated for carpet installations, provide materials complying with ratings as indicated for following test standards:
   1. Tunnel Test: Test for surface burning characteristics, with ratings for flame spread, fuel contribution, and smoke density; ASTM E84, UL 723, or NFPA No. 255.
   2. Pill Test: Test for flammability, ASTM D2859, or DOC FF-1-70.
   3. Floor Radiant Panel Test: Test for burning under varying radiant energy levels; ASTM E648, with minimum average radiant flux ratings not less than following:
      a. FRPT Rating: 0.22 watts/sq. cm.
   4. Smoke Density Test: Test in radiant heat chamber, with and without flame, for density of smoke generated; ASTM E662, or NFPA No. 258, also known as NBS Smoke Density Chamber Test.

C. Low VOC Compliance:
   1. Carpet: Carpet and Rug Institute (CRI) Indoor Air Quality label.
   2. Adhesive: Low VOC type.

D. Single Source Responsibility: Provide material produced by single manufacturer for each carpet type.

1.4 DELIVERY AND PROTECTION

A. Deliver carpet to job site in original mill wrappings with each roll having mill registered numbers attached and accessible for identification. Protect from damage, dirt, stains, and moisture.

1.5 PROJECT CONDITIONS

A. Do not commence with carpet installation until painting and finishing work is complete and ceilings and overhead work are tested, approved and completed.

B. Maintain room temperature at minimum 60 degrees F and relative humidity at approximately that at which area is to be maintained for at least 24 hours prior to installation.

C. Provide sufficient lighting.

1.6 EXTRA MATERIALS

A. Limit production overrun to amount necessary to insure complete installation without extra seams. Package, identify and deliver usable scrap and overage (carpet over 3 sq. ft.) to Owner for use.

B. Provide minimum of 2 percent of each type and color of carpet.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer and Type:
   1. Tandus.
   2. Bigelow Commercial Carpets.
   3. Lee's Carpet.
   4. Milliken Contract Carpets.
   5. Patcraft and Designweave.
   6. Collins and Aikman.
   7. Patrick Carpet Mills.
   8. Mannington Commercial.
   9. J & J Industries.
   10. Masland Carpets
   11. Or District approved equal.

2.2 MATERIALS

A. (CPT) Carpet:
   1. Manufacturer and other information, including types, patterns and colors:
      a. Refer to Material Identification Codes.

B. Flooring Adhesives: Adhesive recommended and approved by flooring manufacturer, zero VOC, tested by the adhesive manufacturer for use with the specified flooring product; Submit approval documentation by both flooring manufacturer and adhesive manufacturer as compatible with substrate, flooring, project conditions, use, expected traffic, equipment loads and surface conditions including alkalinity, moisture emission levels, slab relative humidity, and other factors that may affect flooring and adhesive performance.

C. Adhesive and Sealant VOC Limits: According to South Coast Air Quality Management District Rule 1168 and GS-36 for aerosols. VOC Limits: As tested using U.S. EPA Reference Test Method 24 and as defined by South Coast Air Quality Management District Rules: SCAQMD Rule 1168, Adhesive and Sealant Applications.

D. Miscellaneous Materials: Seaming cement, seaming tape, primer, and adhesives as recommended by carpet manufacturer.
   1. Cementitious Self-Leveling Underlayment: Floorstone quick-setting underlayment by Tamms Industries, Inc.

E. Resilient Stair Nosing: Ribbed rubber square nose, 3/16 inch with 1-1/4 inch vertical face and 1-1/2 inch horizontal face, by Roppe or similar as selected by Architect.

F. (TRS) Transition Edge Strips: Refer to Material Identification List for type and color selected.
   1. Vinyl tee edge cover with extruded aluminum carpet edge guard stripping, color as selected from manufacturer's standard colors, with concealed teeth to grip carpet from below.

2. Vinyl reducer strips in thickness to match adjacent resilient flooring material. Provide at edges of resilient flooring wherever edge is exposed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate and conditions under which carpeting is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 PREPARATION OF SURFACES

A. Clean floors of dust, dirt, solvents, oil, grease, paint, plaster and other substances detrimental to proper performance of adhesive and carpet. Allow floors to thoroughly dry. Installation indicates acceptance of floor condition.

B. Ensure concrete floors are dry and meet moisture conditions required by flooring and adhesive manufacturer's and exhibit negative alkalinity, carbonization or dusting. Also ensure substrate meets requirements of adhesive and flooring manufacturer's requirements. Remove curing agents and other surface residue that may negatively affect adhesion or flooring installation and performance..

C. Floor Substrate Criteria:
   1. Moisture vapor emissions do not exceed 75 percent RH when tested in accordance with ASTM F2170 unless otherwise required by finished flooring and adhesive manufacturer.
   2. Moisture in concrete slab conditions up to 3lb. per 1,000 sq. ft. per 24 hours when tested with a prepackaged calcium chloride crystal kit performed in accordance with ASTM F1869 unless otherwise required by finished flooring and adhesive manufacturer.
   3. Concrete slab alkalinity conditions up to a pH of 6-9 when tested in accordance with ASTM F710 with in-situ monitoring, unless otherwise required by finished flooring and adhesive manufacturer.
   4. Maintain testing records and submit along with warranties for Project Record Documents.

D. Maintain minimum 70 degrees F air temperature at flooring installation area for 3 days prior to, during, and for 24 hours after installation.

E. Use approved cementitious filler to patch cracks, small holes and for leveling.
   1. Level uneven areas using floor patching material in accordance with manufacturer's printed instructions.

F. Where carpets of different pile height meet, apply Floorstone feathering under lower pile height carpet at seam tapering away from seam minimum of 18 inches to provide even surface where carpets meet.

3.3 INSTALLATION

A. Lay out rolls of carpet full for Architect's approval.

B. Check matching of carpet before cutting and ensure there is no visible variation between dye lots.

C. Cut carpet, where required, in manner to allow proper seam and pattern match. Ensure cuts are straight and true and unfrayed.
   1. Provide cut-outs as required for removable access devices in substrate.

D. Where possible and practical, locate seams in areas of least amount of traffic.

E. Join seams in recommended manner so as not to detract from appearance of carpet installation and decrease its life expectancy. Ensure seams are straight, not overlapped or peaked and free of gaps.
   1. Place seams in direction indicated, and as accepted on shop drawings.

F. Apply adhesive for glue-down installation in accordance with carpet manufacturer's instructions. Apply with notched trowel. Roll carpet with 150 lb roller to insure contact with adhesive.

G. Vacuum clean substrate. Spread adhesive in quantity recommended by manufacturer, after primer application, to ensure proper adhesion over full area of installation. Apply only enough adhesive to permit proper adhesion of carpet before initial set.

H. Install carpet with seams taped or sewn, or taped-and-sewn, using permanent type construction that is of sufficient strength for stretching and wear without failure during life of carpet. Apply seaming cement to edges without being in evidence on face of carpet. Maintain straight seams, running true with lines of building.

I. Stretch, adjust and trim carpet in accordance with recognized installation practices. Secure edges in manner indicated, and as recommended by carpet manufacturer.

J. Lay carpet on floors with run of pile in same direction of anticipated traffic. Lay carpet on stairs with run of pile in opposite direction of anticipated traffic to avoid peaking of backing at nosing.

K. Do not change run of pile in one room or from one room to next where continuous through wall opening.

L. Extend carpet under open-bottomed and raised-bottom obstructions. Extend carpet into closets and alcoves of rooms indicated to be carpeted, unless other floor finish is indicated for such spaces. Extend carpet under movable furniture and equipment unless otherwise shown.

M. Cut and fit carpet neatly around projections through floor and to walls and other vertical surfaces.

N. Fit carpet snugly to walls or other vertical surfaces where no base is scheduled, leaving no gaps.
   1. Provide base trim at exposed edges of coved carpet base.

O. Lay entire carpet installation tight and flat to subfloor, well fastened at edges and presenting uniform pleasing appearance. Ensure monolithic color, pattern and texture match within one area.

P. Install edging strips where carpet terminates at other floor coverings except where another device, such as expansion joint cover system or threshold is indicated with integral binder bar. Use full length pieces only. Butt tight to vertical surfaces. Where splicing cannot be avoided, butt ends tight and flush.

Q. Remove debris, sorting pieces to be saved from scraps to be disposed of.

R. Do not place heavy objects such as furniture on carpeted surfaces for minimum of 24 hours or until adhesive is set.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing carpet:
   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
   2. Remove yarns that protrude from carpet surface.
   3. Vacuum carpet using commercial machine with face-beater element.
   4. Remove spots and replace carpet where spots cannot be removed.

B. Protect installed carpet to comply with CRI Carpet Installation Standards, Section 20, "Protecting Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

END OF SECTION

SECTION 096813
TILE CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Carpet tiles, adhesive and accessories.

B. Related Sections:

1. Section 033000 - Cast-in-Place Concrete: Finish troweling of concrete floor slabs.
2. Section 087100 – Door Hardware: Thresholds for door openings.
3. Section 096500 - Resilient Flooring.
4. Section 096800 - Carpeting.

1.2 SUBMITTALS

A. Product data for each type of carpet tile material and installation accessory specified. Submit manufacturer's printed data on physical characteristics, durability, fade resistance, and fire-test-response characteristics. Submit method of installation of each type of substrate.

B. Shop drawings showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tile.

C. Samples in manufacturer's standard sizes, showing full range of color, texture, and pattern variations expected. Prepare samples from same material to be used for work. Label each sample with manufacturer's name, material type, color, pattern, and designation indicated on Drawings and carpet tile schedule.

1. Full-size sample of each type of carpet tile required.
2. 12-inch samples of each type of exposed edge stripping and accessory item.

D. Maintenance data for carpet tile to include in operation and maintenance manual. Include following:

1. Methods for maintaining carpet tile, including manufacturer's recommended frequency for maintaining carpet tile.
2. Precautions for cleaning materials and methods that could be detrimental to finishes and performances. Including cleaning and stain-removal products and procedures.

1.3 MOCKUP

A. Contractor is to include mock-ups of a minimum of (8) production carpet tiles for each tile and pattern installation method specified; final approval from the Architect and Owner is required prior to proceeding with carpet installation.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage experienced Installer who is certified by Floor Covering Installation Board (FCIB) or who can demonstrate compliance with FCIB certification program requirements.

B. Single-Source Responsibility: Obtain each type of carpet tile from one source and by single manufacturer.

C. Fire-Test-Response Characteristics: Provide carpet tiles with following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify carpet tile with appropriate markings of applicable testing and inspecting agency.

1. Surface Flammability: Passes CPSC 16 CFR, Part 1630.
2. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E648.
3. Flame Spread: 25 or less per ASTM E84.
4. Smoke Developed: 450 or less per ASTM E84.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI Carpet Installation Standard, Section 5: "Storage and Handling."

B. Deliver materials to Project site in original wrappings and containers, labeled with identification of manufacturer, brand name, and lot number.

C. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.

1.6 PROJECT CONDITIONS

A. Comply with CRI Carpet Installation Standard, Section 7: "Site Conditions."

B. Space Enclosures and Environmental Limitations: Do not install carpet tile until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

C. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft/24 hours when tested by calcium chloride moisture test in compliance with CRI Carpet Installation Standard, 9.3, with subfloor temperature not less than 55 degrees F.

D. Subfloor Alkalinity Conditions: Testing the pH at the surface of a concrete slab must be conducted in accordance with ASTM F 710-05, not to exceed 9 pH.

1. The test site or building must be at the same temperature and humidity expected during normal use. These conditions are required to be maintained 48 hrs prior to, and during testing.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

1. Carpet Tile: Before installation begins, furnish quantity of full-size units equal to 5 percent of amount installed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Tandus/Desso
2. Bigelow Commercial Carpets
3. Milliken Contract Carpets.
4. Patcraft and Designweave.
5. Mannington Commercial.
6. J & J Industries.
7. Masland Carpets
8. Interface
9. Shaw

2.2 CARPET TILE

A. (CPT) Carpet Tile:

1. Manufacturer and other information, including types, patterns, and colors:
   a. Refer to Material Identification Codes.

2.3 ACCESSORIES

A. Concrete-Slab Primer: Non-staining type as recommended by carpet tile manufacturer.

B. Trowelable Underlayments and Patching Compounds: As recommended by carpet tile manufacturer.

C. Adhesive: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet tile as recommended by carpet tile manufacturer.

D. (TRS) Transition Edge Strips: Refer to Material Identification Codes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet tile. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that subfloors and conditions are satisfactory for carpet tile installation and comply with requirements specified in this Section and those of carpet tile manufacturer.

3.2 PREPARATION

A. Comply with carpet tile manufacturer's installation recommendations to prepare substrates indicated to receive carpet tile installation.

B. Level subfloor within 1/4 inch in 10 feet noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.

1. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by carpet tile manufacturer.

C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

D. Broom or vacuum clean subfloors to be covered with carpet tile. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.

E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by carpet tile manufacturer.

3.3 INSTALLATION

A. Comply with CRI Carpet Installation Standard, Section 18: "Modular Carpet."

B. Where demountable partitions or other items are indicated for installation on top of finished carpet tile floor, install carpet tile before installation of these items.

C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

1. Provide cut-outs as required for removable access devices in substrate; and provide inserts for covers.

D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstruction, removable flanges, alcoves, and similar openings.

E. Install borders parallel to walls.

3.4 CLEANING

A. Perform following operations immediately after completing installation:

1. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove protruding yarns from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

3.5 PROTECTION

A. Comply with CRI Carpet Installation Standard, Section 20: “Protecting Indoor Installations.”

B. Provide final protection and maintain conditions, in manner acceptable to manufacturer and Installer, that ensure carpet tile is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 097200
WALL COVERINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vinyl wall covering (VWC)

B. Related Sections:
   1. Section 092900 - Gypsum Board: Substrate prep.
   2. Section 099000 - Painting: Substrate prep and priming of surfaces to receive wall covering.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

A. LEED Submittals:
   1. Certificates for Credit MR 7: Chain-of-custody certificates indicating that wood-veneer wall coverings comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
   2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
   3. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   4. Product Data for Credit IEQ 4.2: For paints and coatings, documentation including printed statement of VOC content.
   5. Laboratory Test Reports for Credit IEQ 4.4: For wall-covering systems and adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Shop Drawings: Show location and extent of each wall-covering type.
   1. Indicate pattern placement, seams and termination points.

C. Samples: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inches long.
   1. Wall-Covering Sample: From same production run to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.

D. Product Schedule: For wall coverings. Use same designations indicated on Drawings.

E. Qualification Data: For qualified testing agency.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.

G. Maintenance Data: For wall coverings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications: Firm with not less than 5 years experiences in installation of systems similar in complexity to those required for this Project, including specific requirements indicated.
   1. Acceptable to or licensed by manufacturer.
   2. Successfully completed not less than 5 comparable scale projects using this system.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.
   1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.

B. Storage and Protection: Comply with manufacturer's recommendations.
   1. Store in a cool, dry place out of direct sunlight.
   2. Protect from damage by the elements and construction procedures.
   3. Store at temperature above 40 degrees F.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Wall-Covering Materials: For each type, full-size units equal to 5 percent of amount installed.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Low-Emitting Materials: Wall-covering system shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Surface-Burning Characteristics: As follows, per ASTM E 84:
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Fire-Growth Contribution: Textile wall coverings tested according to NFPA 265 and complying with Method A test protocol in IBC 2000, Section 803.5.1.

2.2 VINYL WALL COVERING

A. (VWC-1) Vinyl Wall Covering, General: For each wall covering type, provide mildew-resistant wall covering in rolls from the same production run or dye lot.
   1. Manufacturer, Colors and Patterns: Refer to Material Identification Codes.

2.3 ACCESSORIES

A. Adhesive: Mildew-resistant, non-staining, strippable adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.
   1. Adhesive shall have a VOC content of 50 g/L or less.
   2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Primer/Sealer: Mildew resistant, complying with requirements in Section 099000 - Painting and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

C. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Schedule installation of wall covering at appropriate time during progress of work to prevent damage during construction and movement of materials.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

C. Fill seams, joints, nicks, gouges and other minor imperfections of substrate wall surfaces with latex block filler. Sand smooth flush with surface.
   1. Follow with prime coat of sealer recommended by wall covering manufacturer.

D. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
   1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
   2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   3. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   4. Gypsum Board Substrate:
      a. Tape and sand gypsum board assemblies in accordance with Section 092900 – Gypsum Board to achieve smooth and flat substrate for cork wall covering.
      b. Prime gypsum board surfaces receiving wall covering as recommended by manufacturer.
   5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

E. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.

F. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

G. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL-COVERING INSTALLATION

A. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated except where more stringent requirements apply.

B. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.

C. Install strips in same order as cut from roll.

1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.

D. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

E. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner.

F. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

G. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

3.4 CLEANING

A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION

SECTION 098413
FIXED SOUND -ABSORPTIVE PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustical wall panels.
   2. Acoustical sonic baffles.

B. Related Sections:
   1. Section 095100 - Acoustical Ceilings.

1.2 SUBMITTALS

A. Shop Drawings: Submit shop drawings of acoustical panel suspension system and layout in accordance with Section 013300.

B. Samples: Submit samples of acoustical panels and suspension systems in accordance with Section 013300.

1.3 QUALITY ASSURANCE

A. Approved Installer: Installation of acoustical wall panels shall be by manufacturer's approved installer.

B. Fire Performance Characteristics: Provide acoustical panels with surface-burning characteristics as indicated, which have been determined by testing in accordance with ASTM E84.

C. Mock-ups: Before installing acoustical wall panels, build mock-ups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
   1. Obtain Architect’s approval of mock-ups before starting acoustical wall panel fabrication.
   2. Maintain mock-ups during construction in an undisturbed condition as standard for judging completed Work.
   3. Approved mock-ups may become part of completed Work if undisturbed at time of Substantial Completion.

1.4 PRODUCT HANDLING

A. Deliver acoustical panel materials in manufacturer's protective packaging. Store and handle materials with care to prevent damage.

1.5 PROJECT CONDITIONS

A. Environmental Requirements: Maintain temperature and humidity in area of installation as recommended by acoustical unit manufacturer.

B. Coordination: Coordinate acoustical panel work with Mechanical and Electrical work, for proper and timely installation of work.

1.6 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage and identified with appropriate labels:
   1. Fabric Finish: Maintenance stock of fabric finish used in identical dye lot, amount equal to 2 percent of total yardage required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Decoustics Limited
   2. PSI-Panel Solutions,
   3. Conwed Incorporated,
   4. Sound Concepts,
   5. Golterman and Sabo,
   6. Acoustics Associates.
   7. Armstrong Soundsoak Panels
   8. USG Interiors
   9. Or District approved equal.

2.2 MATERIALS

A. Core: Constructed of not less than 6 lb/cu ft density semi rigid fiberglass core,
   1. Provide boards free of surface defects and face sanded to uniform thickness which will not vary by more than 0.010 inches.
   2. Boards shall not vary from determined sizes by more than 0.020 inches vertically, horizontally, and corner to corner.

B. Edges: Harden board edges using modified polyester resin. Cured resin shall achieve Barcol hardness of 34.
   a. Edge penetration of fiberglass panel shall not be less than 0.1875 inches in depth.

C. Fabric Covering: Manufacture fabric of fire retardant polyester yarn. After market treatments are not acceptable.
   1. (FABRIC): Refer to Material Identification Codes.

D. Suspension System:
   1. Manufacturer's standard concealed mechanical panel clips factory-attached to back of panels and concealed wall-clips attached to wall surface.

2.3 ACOUSTICAL WALL PANELS

A. Acoustical Wall Panels (AWP-2), (AWP-3), (AWP-4) and (AWP-5): Decoustics Type HIR panels by Decoustics Limited, fabric wrapped rigid tackable panel with resin-hardened edges.
   1. Core: Fiberglass.
   2. Thickness: 1-1/8 inch.
   3. Size: As indicated.
   4. Edge: Square.
   5. Finish:
      a. (FABRIC) Types and Colors: Refer to Material Identification Codes.

2.4 ACOUSTICAL SONIC BAFFLES

A. (ASB-1) Acoustical Sonic Baffles: SONEX Rondo Baffles by Pinta Acoustic, Inc., Minneapolis, MN (800) 662-0032, www.pinta-acoustic.com
   1. Manufactured from Pinta's willtec foam.
   2. Diameter: 6 inch.
   3. Lengths: as indicated on Drawings.
   4. Integral Custom Colors: Refer to Material Identification Codes.
   5. Installation: hung vertically using 1/16 inch cable or lightweight chain.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate surfaces and conditions under which acoustical wall panel work is to be performed. not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install acoustical sonic baffles in accordance with reviewed shop drawings and manufacturer's printed instructions.

B. Install acoustical wall panels and accessories in accordance with reviewed shop drawings and manufacturer's printed instructions.

C. Install fabric-wrapped panels vertical and plumb; true in line; and with fabric installed square to grain. Match and level fabric pattern and grain.
   1. Cut boards to sizes required by field dimension

D. Edges: Fill and sand edges as required to ensure straightness and sharp profile.
   1. Soft edge treatment is not acceptable

E. Provide for shimming and adjustments as required to maintain consistent alignment of joints and of finished panel faces.

F. Coordinate installation of panel suspension system with work of other trades. Secure supports to structure as recommended by system manufacturer.

3.3 CLEANING

A. Clean panels with fabric facing, upon completion of installation, to remove dust and other foreign materials from facing, using dry brush or vacuum or both.

B. Clean panels with vinyl facing, upon completion of installation, to remove dust and other foreign materials from facing, using warm water and clean sponge, wipe dry.

END OF SECTION

SECTION 099000
PAINTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Painting and finishing of new materials.
   2. Preparation of surfaces for painting and finishing.
   3. Repainting and refinishing of existing surfaces as indicated and as specified in Section 017329 - Cutting and Patching.
      a. Preparation of existing surfaces for repainting and refinishing.
   4. Smoke and fire partitions stenciling, and pipe painting.

B. Related Sections:
   1. Section 092400 – Portland Cement Plastering: Cement plaster color coat.
   2. Section 092523 – Lime Based Plastering: Lime plaster color coat.
   3. Section 099600 – High Performance Coatings.

1.2 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.
   1. Material List: Provide inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing and applying each coating material proposed for use.
   3. Certification by manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. Samples: Submit paint and transparent finish samples in accordance with Section 013300, for color selection and finish acceptance.
   1. Paint Colors, Surface Treatments and Finishes: As selected by Architect. Submit three 8 inch by 10 inch samples to be reviewed for color and sheen. Architect reserves right to select color or finish from any manufacturer, herein specified, as necessary to achieve desired color or finish.

C. Schedule: For acceptance, submit 3 copies of complete schedule showing each product by number and brand name proposed to be used at each surface and location. Generally follow specified outline and list number of coats.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat paint produced by same manufacturer as finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

C. Applicator Qualifications: Engage experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with record of successful in-service performance.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation and instructions for mixing or reducing.

B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 45 degrees F in well ventilated area. Restrict storage to paint materials and related equipment.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion. Comply with health and fire regulations.

1.5 PROJECT CONDITIONS

A. Environmental Requirements: Comply with manufacturer's recommendations as to environmental conditions under which painting and finishing can be applied. Do not apply finish in areas where dust is being generated.

B. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete and Concrete Block: 12 percent.
   3. Interior Wood: 15 percent.

C. Ensure surface temperature and surrounding air temperature is above 40 degrees F before applying finishes. Minimum application temperature for latex paints for interior work shall be 45 degrees F and 50 degrees F for exterior work. Minimum application temperature for transparent finish shall be 65 degrees F, or surface and air temperature shall be 5 degrees above dew point.

D. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45 degrees F for 24 hours before, during and 48 hours after application of finishes.

E. Provide minimum 25 foot candles of lighting on surfaces to be finished.

1.6 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
   1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:
      a. Interior, Paint: 1 gal. of each color applied.
      b. Exterior, Paint: 1 gal. of each color applied.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. National Manufacturers:
   1. Sherwin-Williams
   2. Glidden Professional/Devoe Coatings
   3. Benjamin Moore
   4. Mythic Paint
   5. PPG Paints
   6. Valspar

B. Regional Manufacturers:
   1. Frazee
   2. Kelly Moore
   3. Vista Paint

2.2 MATERIALS

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
    a. Products specified are by Sherwin-Williams (S-W), unless otherwise indicated, similar quality products of acceptable manufacturers may be furnished.
    b. Refer to Painting and Finishing Schedule at end of this Section.
        1) Colors (PT): Paint Systems indicated in Schedule in Part 3
            (a) Refer to Schedule of Finishes for manufacturer and color selection.

C. Sheen: When one of following terms is used to denote specific sheen for coating listed, following index shall apply:
    1. Flat: Less than 15 units based on 85 degrees of sheen.
    2. Eggshell: 5 to 20 units based on 60 degrees of sheen.
    3. Satin/Low Lustre: 15 to 35 units based on 60 degrees of sheen.
    4. Semi-gloss: 30 to 65 units based on 60 degrees of sheen.
    5. Gloss: Above 65 units based on 60 degrees of sheen.

D. Paint Types and Colors: Refer to Material Identification Codes.

2.3 MIXING AND TINTING

A. Deliver paints ready-mixed to job site.

B. Job mixing and job tinting is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive paint and transparent finishes for conditions that would adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work. Do not proceed with surface preparation or coating application until conditions are suitable.

3.2 PREPARATION OF SURFACES

A. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as specified, for each particular substrate condition.
    1. Remove mildew, by scrubbing with solution of detergent, bleach and warm water. Rinse with clean water and allow surface to dry completely.
    2. Remove surface contamination from aluminum surfaces requiring paint finish by steam, high pressure water or solvent washing. Apply etching primer or acid etch. Apply paint immediately if acid etching.
    3. Remove contamination from copper surfaces requiring paint finish by steam, high pressure water or solvent washing. Apply vinyl etch primer or acid etch. Apply paint immediately if acid etching.
    4. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of anticipated problems in using specified coating systems with substrate primed by others.

B. Remove hardware, hardware accessories, plates, lighting fixtures, and similar items in-place and not to be finish painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items by workmen skilled in trades involved.

C. Clean surfaces to be painted before applying paint or surface treatment. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program cleaning and painting so that dust and other contaminants from cleaning process will not fall in wet, newly painted surfaces.

1. Remove dirt, oil, grease and sand if necessary to provide adhesion key, when asphalt, creosote or bituminous surfaces require paint finish. Apply compatible sealer or primer.
2. Remove dirt, grease and oil from canvas and cotton insulated coverings.

D. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block and cement plaster to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint.
   1. Remove contamination, acid etch and rinse new concrete floors with clear water. Ensure required acid alkali balance is achieved. Allow to thoroughly dry. Repeat procedure if necessary to achieve a medium sandpaper-like profile.
   2. Remove dirt, loose mortar, scale, powder and other foreign matter from concrete and concrete block surfaces which are to be painted or to receive clear seal. Remove oil and grease with solution of trisodium phosphate, rinse well and allow to thoroughly dry.
   3. Remove stains from concrete and concrete block surfaces caused by weathering of corroding metals with solution of sodium metasilicate after being thoroughly wetted with water. Allow to thoroughly dry.

E. Gypsum Wallboard: Remove contamination from gypsum wallboard surfaces and prime to show defects, if any. Paint after defects have been remedied.

F. Plaster Surfaces: Fill hairline cracks, small holes and imperfections on plaster surfaces with patching plaster. Smooth off to match adjacent surfaces. Wash and neutralize high alkali surfaces where they occur.

G. Galvanized Surfaces: Clean free of oil and surface contaminates with acceptable non-petroleum based solvent.

H. Ferrous Metals: Clean non-galvanized, ferrous surfaces that have not been shop-coated of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning, complying with Steel Structures Painting Council (SSPC)-SP3.
   1. Touch-up shop-applied prime coats which have damaged or bare areas. Wire-brush, solvent-clean, and touch-up with same primer as shop coat.
   2. Clean unprimed steel surfaces by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime surfaces to indicate defects, if any. Paint after defects have been remedied.
   3. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. (Prime steel including shop primed steels.)

I. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off.
   1. Prime or seal wood required to be job painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood.
   2. When transparent finish is required, back-prime with one coat of same material as used for surface.
   3. Seal tops, bottoms and cut-outs of wood doors with coat of surface finish immediately upon delivery to job for field painted doors only.
   4. Scrape and clean small, dry, seasoned knots and apply thin coat of white shellac or other recommended knot sealer, before application of priming coat.
   5. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
   6. Remove dust, grit and foreign matter from exterior wood siding which is to receive paint finish. Seal knots, pitch streak and sappy sections. Fill nail holes with exterior caulking compound after prime coat has been applied.
   7. Prior to finishing glue laminated beams, wash down surfaces with solvent and remove grease and dirt.

J. Existing Surfaces to be Repainted or Refinished: Wash surfaces to remove grease, oil, soil or other matter which will interfere with proper bond of new materials. Scrape and wire brush loose or flaking paint. Fill cracks, voids or other defects.

3.3 MATERIALS PREPARATION

A. Mix and prepare painting materials and transparent finish materials in accordance with manufacturer's directions.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in clean condition, free of foreign materials and residue.

C. Stir materials before application to produce mixture of uniform density, and as required during application of materials. Do not stir any film that may form on surface into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

A. Do not apply to wet or damp surfaces.
   1. Wait at least 30 days before applying to new concrete or masonry.
      a. Test concrete for moisture content to verify manufacturer’s surface moisture requirements are met.
      b. Follow manufacturer’s procedures to apply appropriate coatings prior to 30 days.
   2. Wait until wood is fully dry after rain, fog or dew.
      a. Test wood for moisture content to verify manufacturer’s surface moisture requirements are met.

B. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
   1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
   2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
   4. Apply each coat at proper consistency.
      a. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
   5. Each coat of paint shall be slightly darker than preceding coat unless otherwise approved by Architect.
   6. Provide finish coats which are compatible with prime paints used.

C. Do not apply succeeding coats until previous coat has completely dried. Sand between each enamel or varnish coat application with fine sandpaper, or rub surfaces with pumice stone where required to produce even, smooth surface in accordance with coating manufacturer's directions.
   1. Allow each coat of finish to dry before following coat is applied, unless directed otherwise by manufacturer.

D. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive film thickness equivalent to that of flat surfaces.

E. Finish doors on tops, bottoms, and side edges same as exterior faces, unless otherwise indicated.

F. Film Thickness: Apply materials in accordance to paint manufacturer’s recommendations and spreading rates to provide total dry film thickness as recommended.
   1. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated
   2. Use precision instruments designed for measuring and evaluation wet and dry films of paints and coatings.
   3. Results measuring less than recommended thickness will require additional material application.

a. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.

4. Use of poor hiding colors may require application of additional coats in order to achieve proper coverage and hiding.

G. Apply first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

H. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of undercoat.

I. Prime Coats: Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure finish coat with no burn-through or other defects due to insufficient sealing.

J. Stipple Enamel Finish: Roll and redistribute paint to even and fine texture. Leave no evidence of rolling such as laps, irregularities in texture, skid marks, or other surface imperfections.

K. Transparent Finish: On exposed portions, use multiple coats to produce glass-smooth surface film continuity of even luster. Provide finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.

L. Repainting of Existing Surfaces: Where repainting of existing surfaces is required, repaint wall and ceiling surfaces in their entirety, patch or spot painting is not acceptable.

M. Paint surfaces behind movable equipment or furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only.

N. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.5 MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to mechanical and electrical documents with respect to field painting and finishing requirements. Painting of mechanical and electrical work is not required in pipe chases, tunnels, and mechanical rooms with unpainted walls.

B. Remove grilles, covers and access panels for mechanical and electrical systems from location and paint separately.

C. Finish paint primed equipment to color selected.

D. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with prefinished coating, or where they are not in finished space or room.

E. Paint interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers before installation of equipment with 1 coat of flat black paint, to limit of sight line. Paint dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels.

F. Paint exposed piping, insulated piping and conduit occurring in finished areas. Color and texture to match adjacent surfaces.

G. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.

3.6 CLEANING

A. As work proceeds and upon completion, promptly remove paint where spilled, splashed or spattered. Touch up and restore damaged or defaced painted areas.

B. During progress of work keep premises free from unnecessary accumulation of tools, equipment, surplus materials and debris. Remove at end of each workday.

C. Upon completion of work clean window glass and other paint-spattered surfaces and leave premises neat and clean, to satisfaction of Architect.

3.7 PROTECTION

A. Adequately cover or otherwise protect finished work of other trades and other surfaces from paint and damage. Repair damage as result of inadequate or unsuitable protection as acceptable to Architect.
   1. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

B. Place cotton waste, cloths and material which may constitute fire hazard in closed metal containers and remove daily from site.

C. Remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. These items shall be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove permanent lacquer finish.

D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.8 EXTERIOR PAINTING AND FINISHING SCHEDULE

A. Non-Ferrous Metal Surfaces (Galvanized, Aluminum):
   1. Surfaces Included:
      a. Galvanized sheet metal (flashing).
      b. Steel lintels, lintel plates, relieving angles.
      c. Hollow metal doors and frames, and window-walls.
      d. Metal handrails, guardrails, ladders.
      e. Metal gratings.
      f. Metal roof hatches
      g. Aluminum.
   2. Waterborne System, Low-VOC: Waterborne Acrylic Gloss Enamel over Waterborne Metal Primer.
      a. Primer: 1 coat S-W DTM Acrylic Primer, B66W1.
      b. Finish:
         1) 2 coats S-W DTM Acrylic Coating Semi-Gloss, B66-200 Series.
         2) 2 coats S-W DTM Acrylic Coating Gloss, B66-100 Series.

B. Ferrous Metal Surfaces (Steel, Iron):
   1. Surfaces Included:
      a. Steel lintels, lintel plates, relieving angles.
      b. Roof ventilators, roof vents.
      c. Metal roof stacks.
      d. Exterior ferrous metal.
   2. Waterborne System, Low-VOC: Waterborne Acrylic Gloss Enamel over Waterborne Metal Primer.
      a. Primer: 1 coat S-W DTM Acrylic Primer, B66W1.
      b. Finish:
         1) 2 coats S-W DTM Acrylic Coating Semi-Gloss, B66-200 Series.
         2) 2 coats S-W DTM Acrylic Coating Gloss, B66-100 Series.

C. Wood Surfaces for Painted Finish:
   1. Surfaces Included:
      a. Wood overhead doors.
      b. Wood doors for paint finish.
      c. Plywood fascia.
      d. Redwood boards and framing.
      e. Windows, trim, siding, posts, fences, rough sawn lumber.

2. Waterborne System, Low-VOC: 100 percent Acrylic Latex Finishes over 100 percent Acrylic Latex Primer.
    a. Primer: 1 coat S-W Exterior Latex Wood Primer, B42W8041.
    b. Finish:
        1) 2 coats S-W Zero VOC Acrylic Semi-Gloss, B66-650 Series.
        2) 2 coats S-W Zero VOC Acrylic Gloss, B66-600 Series.

D. Wood Surfaces for Stained, Opaque Finish:
1. Surfaces Included:
    a. Horizontal and vertical siding.
    b. Clapboard, Hardboard.
    c. T-1-11 Siding.
    d. Shakes, shingles, beams, posts.
    e. Fences, rough sawn lumber.
2. Water-Based System, Low VOC: Acrylic Solid Color Stain over Acrylic Stain Blocking Primer.
    a. Primer: 1 coat S-W Woodscapes Solid Color Acrylic Stain, A15 Series.
    b. Finish: 1 coat S-W Woodscapes Solid Color Acrylic Stain, A15 Series.

E. Wood Surfaces for Stained, Semi-Transparent Finish:
1. Surfaces Included:
    a. Horizontal and vertical siding.
    b. Clapboard, T-1-11 Siding.
    c. Shakes, shingles, beams, posts.
    d. Fences, rough sawn lumber.
    e. Decking, floors, porches, patios, furniture.
2. Water Based System, Low VOC: Penetrating, Water-Repellent Acrylic Semi-Transparent Stain.
    a. Finish: 1 coat S-W Deckscapes Acrylic Semi-Transparent Stain, A15T15.

F. Wood Surfaces for Transparent Finish:
1. Surfaces Included:
    a. Horizontal and vertical siding.
    b. Wood doors for transparent finish.
    c. Redwood boards and framing.
    d. Other wood for transparent finish.
2. Water Based System, Low VOC: Penetrating, Water-Repellent Acrylic Semi-Transparent Stain.
    a. Finish: 1 coat S-W Deckscapes Acrylic Semi-Transparent Stain, A15T15.

G. Concrete, Precast and Cast-In-Place:
1. Surfaces Included: Walls, beams, columns, posts, ceilings, soffits.
2. Water Based System, Low VOC: 100 percent Acrylic Latex Finish over 100 percent Acrylic Latex Primer.
    a. Primer: 1 coat S-W Loxon Concrete and Masonry Primer, A24W8300.
    b. Finish: 2 coats S-W 0 VOC Acrylic Gloss, B66-600 Series.

H. Portland Cement Plaster (Stucco):
1. Surfaces Included: Walls, columns, ceilings, soffits.
2. Water Based System, Low VOC: 100 percent Acrylic Latex Finish over 100 percent Acrylic Latex Primer.
    a. Primer: 1 coat S-W Loxon Concrete and Masonry Primer, A24W8300.
    b. Finish: 2 coats S-W 0 VOC Acrylic Gloss, B66-600 Series.

I. Concrete Block Masonry (CMU):
1. Surfaces Included: Walls, beams, columns.
2. Water Based System, Low VOC: 100 percent Acrylic Latex Finish over 100 percent Acrylic Latex Primer.
    a. Primer: 1 coat SW Heavy Duty Block Filler, B42W46.
    b. Finish: 2 coats S-W 0 VOC Acrylic Gloss, B66-600 Series.

J. Cast-In-Place Concrete, Precast Concrete, Cement Plaster (Stucco) and Concrete Masonry (CMU) Surfaces, Waterproofing System:

1. Waterproofing Elastomeric System: Waterproofing Acrylic Elastomeric Coating over Heavy Duty Acrylic Block Filler.
    a. Primer for Concrete and Stucco: 1 coat S-W Loxon Concrete and Masonry Primer, A24W300.
    b. Block Filler for CMU: 1 coat S-W Loxon Block Surfacer, A24W200.
    c. Finish:
        1) 1-2 coats S-W Conflex, A5-400 Series (all substrates).
        2) 1-2 coats S-W Conflex Textured High Build Fine, A5-800 Series.
        3) 1-2 coats S-W Conflex Textured High Build Medium, A5-800 Series.
        4) 1-2 coats S-W Conflex Textured High Build Coarse, A5-800 Series.

3.9 INTERIOR PAINTING AND FINISHING SCHEDULE (INTERIOR)

A. Cast-In-Place Concrete, Precast Concrete and Portland Cement Plaster (Stucco):
    1. Surfaces Included: Walls, beams, columns, posts, ceilings.
    2. Water-Based System: Premium Quality Acrylic Latex Finish-not less than 39 percent solids over Acrylic Primer/Sealer.
        a. Primers: S-W Loxon Concrete and Masonry Primer, A24W8300.
        b. Finishes:
            1) 2 coats S-W Harmony Interior Latex Flat, B5 Series.
            2) 2 coats S-W Harmony Interior Latex Eg-Shel, B9 Series.
            3) 2 coats S-W Harmony Interior Latex Semi-Gloss, B10 Series.
    3. Waterborne Zero-VOC, Low-Odor System: Zero-VOC, Low-Odor Acrylic Finish over Zero-VOC, Low-Odor Acrylic Primer.
        a. VOC Requirement: Not more than 50 grams VOC's per liter, not less than 35 percent solids, ammonia free coating.
        b. Primer: 1 coat S-W ProMar 200 Zero-VOC Interior Latex Primer, B28W2600.
        c. Finish:
            1) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Flat, B30-2600 Series.
            2) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Eg-Shel, B20-2600 Series.
            3) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Semi-Gloss, B31-2600 Series.

B. Concrete Masonry Units (CMU) Surfaces:
    1. Surfaces Included: Walls.
    2. Water-Based System: Premium Quality Acrylic Latex Finish, not less than 39 percent volume solids, over Heavy Duty Acrylic Block Filler.
        a. Block Filler: 1 coat S-W PrepRite Block Filler, B25W25.
        b. Finish:
            1) 2 coats S-W Harmony Interior Latex Flat, B5 Series.
            2) 2 coats S-W Harmony Interior Latex Eg-Shel, B9 Series.
            3) 2 coats S-W Harmony Interior Latex Semi-Gloss, B10 Series.
    3. Waterborne Zero-VOC, Low-Odor System: Zero-VOC, Low-Odor Acrylic Finish over Latex Block Filler,
        a. VOC Requirement: Not less than 35 percent solids, ammonia free coating.
        b. Block Filler: 1 coat S-W Preprite Block Filler, B25W25.
        c. Finish:
            1) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Flat, B30-2600 Series..
            2) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Eg-Shel, B20-2600 Series.
            3) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Semi-Gloss, B31-2600 Series..

C. Ferrous and Non-Ferrous Metal Surfaces:
    1. Surfaces Included:
        a. Hollow metal doors and frames.
        b. Sound control door assemblies (SCDA).
        c. Steel stairs, ladders and railings.
        d. Pre-painted surfaces.
        e. Prime painted hardware.
        f. Fire extinguisher cabinet trim.
        g. Radiator, convector and other heating unit covers.
        h. Uninsulated piping and ductwork.

i. Metal access panels.
j. Metal louvers and grilles.
k. Electric panels (over factory finish).
l. Fire horns.
m. Metal supports for counters, benches and shelves.
n. Exposed and miscellaneous metals.
o. Other exposed to view interior ferrous metals not factory finished.

2. Waterborne System: Waterborne 100% Acrylic Gloss Enamel over Waterborne Metal Primer.
   a. Primer (Touch-up if pre-primed): 1 coat S-W Pro-Cryl Universal Primer, B66-310 Series.
   b. Finish:
      1) 2 coats S-W 0 VOC Acrylic Satin, B66-660 Series
      2) 2 coats S-W 0 VOC Acrylic Semi-Gloss, B66-650 Series.
      3) 2 coats S-W 0 VOC Acrylic Gloss, B66-600 Series.
3. Waterborne Zero-VOC, Low-Odor System: Zero-VOC, Low-Odor Acrylic over Waterborne Metal Primer; not less than 35 percent solids, ammonia free coating.
   a. VOC Requirement: Not more than 50 grams VOC's per liter,
   b. Primer: 1 coat S-W DTM Acrylic Primer, B66W1.
   c. Finish:
      1) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Semi-Gloss, B31-2600 Series.
      2) 2 coats S-W Zero-VOC Acrylic Gloss, B66-600 Series.

D. Gypsum Wallboard, Gypsum Plaster and Gypsum Veneer Plaster Surfaces:
1. Surfaces Included:
   a. Gypsum wallboard, including over skim coat of joint compound.
   b. Apply additional coat of primer under deep tone finish paint.
   c. Veneer plaster.
2. Sheens, General: Unless noted otherwise on Room Finish Schedule.
   a. Walls: Eggshell
   b. Ceilings and Soffits: Flat
   c. Walls where indicated on Room Finish Schedule: Semi-gloss.
3. Water-Based System: Premium Quality Interior Latex Finish not less than 39 percent volume solids over Premium Quality Latex Primer/Sealer.
   a. Primer: 1 coat S-W Harmony Interior Primer, B11-900 Series.
   b. Finish:
      1) 2 coats S-W Harmony Interior Latex Flat, B5 Series.
      2) 2 coats S-W Harmony Interior Latex Eg-Shel, B9 Series.
      3) 2 coats S-W Harmony Interior Latex Semi-Gloss, B10 Series.
4. Waterborne Zero-VOC, Low-Odor System: Zero-VOC, Low-Odor Acrylic Finish over Zero-VOC, Low-Odor Acrylic Primer - not more than 50 grams VOCs per liter, not less than 35 percent solids, ammonia free coating.
   a. Primer: 1 coat S-W ProMar 200 Zero-VOC Interior Latex Primer, B28W2600 Series.
   b. Finish:
      1) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Flat, B30-2600 Series.
      2) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Eg-Shel, B20-2600 Series.
      3) 2 coats S-W ProMar 200 Zero-VOC Interior Latex Semi-Gloss, B31-2600 Series.
5. Wall Surfaces Under Vinyl Wall Coverings: (Primer/Sealer)
   a. Primer: 1 coat S-W Pre-Wallcovering Primer, B28W8980.
6. Waterborne Polyurethane System: Low VOC, not more than 150 grams VOC's per liter, and complying with LEED Standards.
   a. Primer:
      1) 1 coat S-W Pro-Cryl Universal Primer, B66-310 Series.
      2) 1 coat Master Coating Technologies/Scuffmaster "Primemaster" Primer/Sealer.
   b. Finish:
      1) 1 coat Waterbased Acrolon 100, B65-700 Series.
      2) 1 coats Master Coating Technologies/Scuffmaster "ScrubTough". For light colors.
      3) 2 coats Master Coating Technologies/Scuffmaster "ScrubTough". For dark and bright colors.

E. Plaster Surfaces:
1. Surfaces Included:

a. Plaster, apply additional coat of primer under deep tone finish paint.
b. Walls, ceilings, soffits.

2. Water-Based System: Premium Quality Acrylic Latex Finish, not less than 39 percent volume solids, over Premium Quality Acrylic Latex Primer/Sealer for cured plaster.
   a. Primer:
      1) 1 coat S-W Harmony Interior Primer, B11-900 Series for cured plaster, only.
      2) 1 coat S-W Loxon Concrete and Masonry Primer, A24W8300, for fresh plaster.
   b. Finish:
      1) 2 coats S-W Harmony Interior Latex Flat, B5 Series.
      2) 2 coats S-W Harmony Interior Latex Eg-Shel, B9 Series.
      3) 2 coats S-W Harmony Interior Latex Semi-Gloss, B10 Series.
3. Waterborne Zero VOC, Low Odor System: (Zero VOC, Low Odor Acrylic Finish over Zero VOC, Low Odor Acrylic Primer - not more than 50 grams VOC's per liter, not less than 35 percent solids, ammonia free coating)
   a. Primer: 1 coat S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 Series for cured plaster.
   b. Finish:
      1) 2 coats S-W ProMar 200 Zero VOC Interior Latex Flat, B30-2600 Series.
      2) 2 coats S-W ProMar 200 Zero VOC Interior Latex Eg-Shel, B20-2600 Series..
      3) 2 coats S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 Series.
4. Waterborne Polyurethane System: Low VOC, not more than 150 grams VOC's per liter, and complying with LEED Standards.
   a. Primer:
      1) 1 coat S-W Pro-Cryl Universal Primer, B66-310 Series.
      2) 1 coat Master Coating Technologies/Scuffmaster "Primemaster" Primer/Sealer.
   b. Finish:
      1) 1 coat Waterbased Acrolon 100, B65-700 Series.
      2) 1 coats Master Coating Technologies/Scuffmaster "ScrubTough". For light colors.
      3) 2 coats Master Coating Technologies/Scuffmaster "ScrubTough". For dark and bright colors.

F. Wood Surfaces for Painted Finish:
   1. Surfaces Included:
      a. Hardwood rails and benches, except where pre-finish is indicated.
      b. Millwork, except where pre-finish is indicated.
      c. Wood doors and frames, except where pre-finish is indicated.
      d. Plywood shelving.
      e. Other wood for paint finish.
      f. Concealed surfaces of wood items to be back-primed.
   2. Water-Based System: Premium Quality 100% Acrylic Finish over Acrylic Latex Wood Undercoater.
      a. Primer: 1 coat S-W Premium Interior Wall and Wood Primer, B28W8111.
      b. Finish:
         1) 2 coats S-W 0 VOC Acrylic Semi-Gloss, B66-650 Series.
         2) 2 coats S-W 0 VOC Acrylic Gloss, B66-600 Series.
   3. Waterborne Zero-VOC, Low-Odor System: Zero-VOC, Low-Odor Acrylic Finish over Acrylic Latex Wood Primer - not more than 50 grams VOC's per liter, not less than 35 percent solids, ammonia free coating.
      a. Primer: 1 coat S-W Premium Wood Primer, B28W8111.
      b. Finish: 2 coats S-W ProMar 200 Zero-VOC Interior Latex Eg-Shel, B20-2600 Series.

G. Wood Floors for Painted Finish:
   1. Surfaces Included: Wood floors and decks, pedestrian traffic only.
   2. Water-Based System: Acrylic Low Sheen Enamel over Acrylic Low Sheen Enamel.
      a. Primer: 1 coat S-W ArmorSeal Tread Plex, B90W111.
      b. Finish: 1 coat S-W ArmorSeal Tread Plex, B90W111.

H. Wood Surfaces for Stained and Varnished Transparent Finish:
   1. Surfaces Included:
      a. Hardwood handrails and guardrails, except where paint or prefinish is indicated.

b. Wood doors and frames, except where paint or prefinish is indicated.
c. Laminated wood benches.
d. Drawer sides and drawer surfaces concealed in closing position.
e. Cabinet interiors.
f. Concealed surfaces of wood items to be back-primed with varnish.
g. Plywood shelving.
h. Other wood for stain and varnish (transparent) finish.

2. Waterborne System: Waterborne Acrylic Finishes over Alkyd Penetrating Stain
   a. Transparent Stain: 1 coat S-W Minwax 250 Interior Stains.
   b. Finish: 2 coats S-W Woodclassics Waterborne Varnish, A68 Series.

I. Wood Floors for Stained and Varnished Transparent Finish:

1. Surfaces Included: Wood floors and decks, pedestrian traffic only.
2. Polyurethane Varnish over Penetrating Stain
   a. Transparent Stain: 1 coat S-W Minwax 250 Interior Stains.
   b. Sealer: 1 coat ICI/Woodpride Polyurethane Gloss Finish #1908, reduced 8:1 with mineral spirits.
   c. Finish:
      1) 2 coats ICI/Woodpride Gloss Polyurethane Varnish #1908.
      2) 2 coats ICI/Woodpride Satin Polyurethane Varnish #1902.

3.10 SPECIAL SURFACES

A. Metal Ceilings:

1. Coordinate with Division 05 for shop-applied primer.
2. Surfaces Included:
   a. Bar joist, decking and supports.
   b. Galvanized ductwork.
   c. Other overhead metal surfaces.
3. Dry Fall Spray-Applied Waterborne Systems: Waterborne Dryfall over Waterborne Metal Primer
   a. Primer (touch-up if pre-primed): 1 coat 1 coat S-W Pro-Cryl Universal Primer, B66-310 Series.
   b. Finish: 1 coat S-W Waterborne Acrylic Dry Fall, B42W2.

B. Non-Metal Ceilings and Soffits:

1. Surfaces Included:
   a. Gypsum board assemblies.
   b. Plaster assemblies.
   c. Spray fireproofing (SFRM)
   d. Acoustical tile ceilings.
2. Dry Fall Spray-Applied Waterborne System: Waterborne Dryfall over Waterborne Metal Primer.
   a. Primer (touch up if pre-primed): 1 coat S-W Pro-Cryl Universal Primer, B66-310 Series.
   b. Finish: 1 coat S-W Waterborne Acrylic Dry Fall, B42W2.

C. Insulation-Wrapped Piping and Equipment:

1. Surfaces Included: Piping, ducts, tanks, and equipment.
2. Waterborne System: Premium Quality Acrylic Latex finish over -Acrylic Primer.
   a. Primer: 1 coat S-W Moisture Vapor Barrier Primer, B72W1.
   b. Finish: 2 coats S-W ProMar 200 Zero-VOC Interior Latex Eg-Shel, B20-2600 Series.

D. Black Enamel Finish:

1. Surfaces Included: Duct throats for visible distance but not less than approximately 24 inches behind supply or return air grilles, registers, louvers.
   a. Wood blocking exposed at reveals.
2. Water-Based Systems, Low-VOC: Acrylic Latex Finish.
   a. Finish: 1 coat S-W ProMar 400 Latex Flat Black, B30W400 Series.

3.11 REPAINTING OF EXISTING SURFACES

A. Existing Surfaces: Existing surfaces where indicated to be repainted.
   1. Latex System: 2 coats paint type as listed above.

3.12 REPAINTING OF EXISTING SURFACES

A. Existing Surfaces:
   1. Surfaces Included:
      a. Existing surfaces where indicated to be repainted.
      b. Existing metal lockers (casework) (metal toilet compartments) where indicated to be repainted.
   2. Low-VOC Latex System:
      a. Primer/Finish: 2 coats paint similar to type listed above.
   3. Electrostatic System:
      a. Primer/Finish: 2 coats electrostatic paint finish.

3.13 SMOKE AND FIRE PARTITIONS

A. Stenciling: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions to be stenciled with the appropriate Hour-rating/Minute rating, i.e., "SMOKE and/or FIRE (1 HR /2 HR) – Protect All Openings," etc. as indicated on the Life Safety Plan, above ceilings on both sides of walls in letters not less than 3 inches high and 3/8 inch wide stroke. Refer to IBC Article 703 for additional information.
   1. Stenciling shall be located above every door and no more than fifteen feet on center.
   2. Stencil every change in direction of rated walls.
   3. Indicate the end of a rated wall with a 2-inch vertical red line with an arrow pointing to the direction of the rated wall.

B. Lead Walls: Stencil above the ceiling, both sides of walls lined with lead with the height of the lead and the density, i.e., "7 FOOT A.F.F./4 LB. LEAD".

C. MRI RF Shielded Walls: Stencil above ceilings, both sides of walls: “RF Shielded Wall”.

D. Latex Primer/Finish System: Provide red semi-gloss paint. S-W 0 VOC Acrylic Semi-Gloss, B66-650 Series.

3.14 PIPE PAINTING

A. Painting Colors: Matching Sherwin Williams colors listed below
   1. High and Low Pressure Steam: Safety Yellow
   2. High and Low Pressure Condensate Return Line and Tank: Brass
   3. High and Low Pressure Boiler Feed Water: Mill Ivory
   4. High and Low Pressure Exhaust Breaching: Silver
   5. Vacuum: Pure White
   6. Oxygen: Rain Forest
   7. Medical Air: Modelar Tan
   8. Lab Air: Pallet Tan
   9. Nitrous Oxide: Blue Print
   10. 20 lb. Air for Pneumatic controlled Equipment and 80 lb., Air for Pneumatic Controlled Equipment, and Compressed Air: Turbine Blue.
   11. Nitrogen: Graphite
   12. Gas: Safety Orange
   13. Oil: Black
   14. Domestic Water: Circuit Breaker
   15. 120 Degree Hot Soft Water: Polymer Blue
   16. Soft water and Polished Soft Water: Hydro Blue
   17. Non Potable Water: Toggle Teal
   18. Chilled Water Closed Loop & Pumps: Safety Blue.
   19. Condenser Water & Pumps: Dewpoint
   20. Radiation Closed Loop & Pump: Solar Yellow
   21. Reheat Closed Loop & Pump: Junction Yellow

22. Fire Sprinkler Lines: Safety Red
23. A.C. Freon Lines: Plumb
24. Electrical Conduits: Structural Grey.

END OF SECTION

SECTION 099600
HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Coating and finishing of Architecturally Exposed Metal Fabrication Steel (AES) materials with high performance coatings (HPC), except as specified.
   2. Preparation of surfaces for high performance coating and finishing.

B. Related Sections:
   1. Section 051200 – Structural Steel Framing: Shop priming for High Performance Coatings.
   2. Section 055000 - Metal Fabrications: Shop priming for High Performance Coatings.
   3. Section 099000 – Painting.

1.2 MOCK-UP

A. Job Site Sample Areas: Make sample application on project surfaces to extent of 1 system on 1 unit of 1 area as directed by Architect.
   1. Obtain acceptance of sample field application before making additional applications.
      a. Accomplish work to equal or exceed standards established by approved samples.
      b. Protect and maintain approved field samples through completion of project.
   2. High Performance Coating Sample Area: One small area of architecturally exposed steel (AES) of project will be selected by Architect to represent typical job surface and condition for application of high performance coating.
      a. Apply coating in this area in accordance with reviewed color schedule and as specified.
      b. After sample area is accepted, this area will be used for comparison in evaluation of other high performance coating applications.

1.3 SUBMITTALS

A. Samples: Submit coating finish samples in accordance with Section 013300, for color selection and finish acceptance.
   1. Architect reserves right to select color or finish from manufacturer specified, as necessary, to achieve desired color or finish.
      a. Mix coating to match chips, where necessary.
   2. Schedule: For acceptance, submit 3 copies of complete schedule showing each product by brand name proposed to be used at each surface and location.
      a. Generally follow specified outline and list number of coats.
      b. Submit within 30 days after award of contract.

B. Product Data: Include primers for each coating system specified.
   1. Material List: Provide inclusive list of required coating materials.
      a. Indicate each material and cross-reference specific coating, finish system, and application.
      b. Identify each material by manufacturer's catalog number and general classification.
   2. Manufacturer’s Information: Provide manufacturer’s technical information, including label analysis and instructions for handling, storing and applying each coating material proposed for use.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat coating produced by same manufacturer as finish coats.

B. Compatibility: Provide materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer of coating system based on testing and field experience.

C. Provide protection during removal of existing rust, coatings, or other films from steel. Surface preparation of steel by sanding, scraping or other means may create dust or particles containing lead or other hazardous substances.
   1. Protect roofing membrane as required, coordinate with membrane manufacturer.

D. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of total systems for various substrates.
   1. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

E. Approved Applicator: Applicator shall have not less than 3 years of successful experience in installation of similar coating systems and shall be certified in writing as manufacturer's licensed or approved applicator.

F. Sheen Types:
   1. Manufacturer's standard sheen for specified product.
      a. Flat: Less than 5 units based on 60 degrees.
      b. Eggshell: 5 to 20 units based on 60 degrees.
      c. Satin/Low Luster: 15 to 35 units based on 60 degrees.
      d. Semi-gloss: 30 to 65 units based on 60 degrees.
      e. Gloss: Above 65 units based on 60 degrees.

G. Owner reserves the right to have testing agency test materials used as often as deemed necessary during period when coatings are being applied to ensure that product materials being used comply with specified requirements.

1.5 MAINTENANCE MATERIALS

A. Leave on premises, where directed by Architect, not less than one unopened gallon of each color used.

B. Tightly seal containers and clearly label for identification.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver coating materials in sealed original labeled containers, bearing manufacturer's name, type of coating, brand name, color designation and instructions for mixing or reducing.

B. Provide adequate storage facilities. Store coating materials at minimum ambient temperature of 45 degrees F. in well ventilated area. Restrict storage to coating materials and related equipment.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion. Comply with health and fire regulations.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Comply with manufacturer's recommendations for environmental conditions under which coating and finishing can be applied.
   1. Do not apply finish in areas where dust is being generated.

B. Measure moisture content of surfaces using electronic moisture meter.
   1. Do not apply finishes unless moisture contents of surfaces are below manufacturer's maximums.

C. Ensure surface temperature or surrounding air temperature is between 50 degrees F. and 90 degrees F. before applying finishes.
   1. Minimum application temperature for exterior work is 50 degrees F.

D. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45 degrees F. for 24 hours before, during and 48 hours after application of finishes.

E. Provide minimum 25 foot candles of lighting on surfaces to be finished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. (HPC-1) High Performance Coatings Manufacturers:
   1. ICI/Dulux,
   2. Pittsburg Paints,
   3. Tnemec Company, Inc.,
   4. AkzoNobel Devow Performance Coatings
   5. Or approved substitute; submit for approval.

B. Materials: Coating or finish materials selected for each type of surface shall be product of single manufacturer.

C. Colors: As selected by Architect.

2.2 MIXING AND TINTING

A. Deliver coatings and enamel ready-mixed to job site. Accomplish job mixing and job tinting only when acceptable. Use tinting colors recommended by manufacturer for specific type of finish.

2.3 MATERIALS

A. Refer to attached high performance coating and finishing schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive high performance coatings for conditions that would adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work.
   1. Do not proceed with surface preparation or coating application until conditions are suitable.

3.2 PREPARATION OF SURFACES

A. Perform preparation and cleaning procedures in accordance with coating manufacturer's instructions and as specified, for each particular substrate condition.
   1. Remove mildew, by scrubbing with solution of detergent, bleach and warm water.
      a. Rinse with clean water and allow surface to dry completely.
   2. Remove surface contamination from aluminum surfaces requiring finish by steam, high pressure water or solvent washing.
      a. Apply etching primer or acid etch.
      b. Apply coating immediately if acid etching.
   3. Provide barrier coats over incompatible primers or remove and reprime as required.
      a. Notify Architect in writing of anticipated problems in using specified coating systems with substrate primed by others.

B. Finishes for steel labeled Architecturally Exposed Steel shall comply with these additional requirements: smooth exposed surface and edges, including welds, by grinding and fill depressions, voids and holes with weld material and/or auto body filler, sand smooth, prime and coat.

C. Clean surfaces to be coated before applying coating or surface treatment. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning.
   1. Program cleaning and coating so that dust and other contaminants from cleaning process will not fall in wet, newly coated surfaces.
      a. Apply compatible sealer or primer.

D. Equipment used for blast cleaning shall be of type that has proper oil and water filters and traps on compressors and/or tanks so that sandblasting material is not being re-contaminated by oil and water in the air blast.

E. Ferrous Metals: Clean non-galvanized, ferrous surfaces that have not been shop-coated of oil, grease, loose mill scale and other foreign substances by solvent or mechanical cleaning, complying with The Society for Protective Coatings (SSPC)-SP6.
   1. Touch-up shop-applied prime coats which have damaged or bare areas. Wire-brush, solvent clean, and touch-up with same primer as shop coat.
      a. Clean unprimed steel surfaces by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned.
      b. Prime surfaces to indicate defects. Coat after defects have been remedied.
      c. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous.
      d. Clean surfaces with solvent. Prime bare steel surfaces. (Prime steel including shop primed steels.)

3.3 MATERIALS PREPARATION

A. Mix and prepare coating materials in accordance with manufacturer's directions.

B. Store materials not in actual use in tightly covered containers.
   1. Maintain containers used in storage, mixing, and application of coating in clean condition, free of foreign materials and residue.

C. Stir materials before application to produce mixture of uniform density, and as required during application of materials.
   1. Do not stir film which may form on surface into material.
   2. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

A. Schedule Coatings: Apply first coat to surfaces that have been cleaned, pre-treated or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
   1. Number of coats and film thickness required is the same regardless of application method employed.

B. Apply high performance coating with brush, roller, spray, or other acceptable practice in accordance with manufacturer's directions.
   1. Use brushes best suited for type of material being applied. Use rollers of carpet, velvet back, or high pile sheep wool recommended by coating manufacturer for material and texture required.
      a. Apply each coat at proper consistency.
      b. Each coat shall be slightly darker than preceding coat unless otherwise approved by Architect.
      c. Provide finish coats which are compatible with prime coatings used.

C. Do not apply succeeding coats until previous coat has completely dried, unless directed otherwise by manufacturer.
   1. Sand between each enamel or varnish coat application with fine sandpaper, or rub surfaces with pumice stone where required to produce even, smooth surface in accordance with coating manufacturer's directions.

D. Apply additional coats when undercoats, or other conditions show through final coat, until coating film is of uniform finish, color and appearance.
   1. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive film thickness equivalent to that of flat surfaces.
      a. Apply each material at not less than manufacturer's recommended spreading rate, to provide total dry film thickness as recommended.
      b. Apply first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.

E. Allow sufficient time between successive coatings to permit proper drying.

1. Do not recoat until coat has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause lifting or loss of adhesion of undercoat.

F. Prime Coats: Recoat primed and sealed areas where there is evidence of suction spots or unsealed areas in first coat, to assure finish coat with no burn-through or other defects due to insufficient sealing.

G. Stipple Enamel Finish: Roll and redistribute coating to even and fine texture. Leave no evidence of rolling such as laps, irregularities in texture, skid marks, or other surface imperfections.

H. Brush Application: Brush-out and work brush coats onto surfaces in even film.
   1. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropeyness, or other surface imperfections will not be acceptable.
   2. Neatly draw glass and color break lines.

3.5 CLEANING

A. As work proceeds and upon completion, promptly remove coating where spilled, splashed or spattered.
   1. Touch up and restore damaged or defaced coated areas.

B. During progress of work keep premises free from unnecessary accumulation of tools, equipment, surplus materials and debris.
   1. Remove at end of each work day.

C. Upon completion of work clean coating-spattered surfaces and leave premises neat and clean, to satisfaction of Owner's Representative.

3.6 PROTECTION

A. Adequately cover or otherwise protect finished work of other trades and other surfaces from coating and damage.
   1. Repair damage as result of inadequate or unsuitable protection as acceptable to Owner's Representative.
      a. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being coated and in particular, surfaces within storage and preparation area.
      b. Place cotton waste, cloths and material which may constitute fire hazard in closed metal containers and remove daily from site.

B. Provide "Wet Paint" signs as required to protect newly coated finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of coating operations.

3.7 FIELD QUALITY CONTROL

A. Comply with these additional requirements; smooth exposed surface and edges at steel, including welds, by grinding and fill depressions, voids and holes with weld material and/or auto body filler, sand smooth, prime and coat as recommended by coating manufacturer. Apply by brush or spray to provide minimum dry film thickness of 2 mils or as recommended by coating manufacturer. Insure that coating film is complete and undamaged as approved by Owner's Representative.

3.8 EXTERIOR COATING SYSTEM FOR AES (AESS) MATERIALS

A. (HPC-1) System: Low VOC Waterborne Aliphatic Urethane Semi-Gloss Enamel over Polyamide Epoxy Primer:
   1. TNEMEC:
      a. Primer: 1 Coat Low VOC primer compatible with finish coats and recommended by manufacturer for intended application.
      b. Finish: 2 Coats Endura-Shield Aliphatic Acrylic Polyurethane Semi-Gloss 1081 Series.
   2. ICI/Dulux

a. Primer: 1 Coat Devoe Coatings Devran Polyamide Epoxy Primer.
b. Finish: 2 Coats Devoe Coatings Devthane Aliphatic Semi-Gloss Enamel.

3. Pittsburg Paints:
   a. Primer: 1 Coat Aquapon Polyamide-Epoxy Zinc Rich Primer.
   b. Finish: 2 Coats Pitthane High Build Semi-Gloss urethane Enamel.
4. Diamond Vogel Paints:
   a. Primer: 1 Coat Multi-E-Poxy 180 Epoxy Mastic.
   b. Finish: 2 Coats Multi-Thane 340 High Solids Acrylic Polyurethane Semi-Gloss.

END OF SECTION

SECTION 101100
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Markerboards.
   2. Tackboards.

B. Related Sections:
   1. Section 064000 - Architectural Woodwork: Tackboards in millwork.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Show location of panel joints.
   2. Show location of special-purpose graphics for visual display surfaces.
   3. Include sections of typical trim members.

C. Samples for Verification: For each type of visual display surface indicated and as follows:
   1. Visual Display Surface: Not less than 8-1/2 by 11 inches, mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
   2. Trim: 6-inch- long sections of each trim profile.
   3. Support System: 6-inch- long sections.
   4. Accessories: Full-size Sample of each type of accessory.

D. Maintenance Data: For visual display surfaces to include in maintenance manuals.

E. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative of motor-operated, sliding visual display unit manufacturer for installation and maintenance of units required for this Project.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display surfaces and are based on the specific system indicated. Refer to Section 016210 - Product Options and Substitution Requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Fire-Test-Response Characteristics: Provide fabrics with the surface-burning characteristics indicated, as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.4 PRODUCT HANDLING

A. Deliver factory-built visual display boards, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.

B. Store visual display units vertically with packing materials between each unit.

1.5 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Surfaces lose original writing and erasing qualities.
      b. Surfaces become slick or shiny.
      c. Surfaces exhibit crazing, cracking, or flaking.
   2. Warranty Period: 50 years.

PART 2 PRODUCTS

2.1 MARKERBOARDS

A. (MKBD-1) Description: 24 gauge Porcelain Enamel Steel Skin mounted on 7/16 inch MDF core with moisture barrier backing.
   1. Core: Medium density fiberboard
   2. Moisture Backing: 0.005 inch aluminum foil
   3. Finish panel: Low gloss.
   4. Color: White
   5. Size: 4 foot high unless noted otherwise, length as indicated.
   6. Trim: 1-1/4 inch exposed aluminum face, satin anodized finish
   7. Option: Marker tray, full length
   8. Attachment: Angle clips at 24 inches on center.
   9. Product: Claridge, Type A, Series 3 by Claridge Products.
      a. Other Acceptable Manufacturers:
         1) ADP Lemco Incorporated, or District approved equal.

2.2 TACKBOARDS

A. (TKBD-1) Plastic Impregnated Cork, Manufacturer: Krommenie Cork.
      a. Other Acceptable Manufacturers: Claridge Products, PolyVision, or District approved equal.
   2. Plastic Impregnated Cork: Seamless sheet, Krommenie type 1/4 inch thick bulletin board cork with washable vinyl finish, of ground natural cork compressed with resinous binder and integral color throughout entire thickness and laminated to burlap backing.
   3. Sizes and Colors: Refer to Material Identification Codes.

2.3 FABRICATION

A. Factory pressure laminate board surfaces to 1/2 inch gypsum board, or 1/2 inch particle board, 0.015 aluminum balance sheet.

B. Markerboards shall be fully backed with aluminum foil.

C. Factory assemble visual display boards in accordance with reviewed shop drawings.

D. Make joints only where total length exceeds maximum manufactured length (16 feet by 4 feet or 12 feet by 5 feet). Fabricate with minimum number of joints, balanced around center of board.

E. Provide mullion trim at joints between markerboard and tackboard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which visual display boards are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install visual display boards in accordance with reviewed shop drawings and manufacturer's printed instructions. Keep perimeter lines straight, plumb and level.

B. Provide grounds, clips, backing, brackets, anchors, trim and accessories. Use splines at joints to maintain surface alignment and smooth joints.

C. Set visual display boards plumb and level, and securely attach to adjacent construction. Join parts with neat, precision fit.

D. Clean units in accordance with manufacturer's instructions.

END OF SECTION

SECTION 101220
DISPLAY CASES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Display cases.
   2. Poster cases.

B. Related Sections:
   1. Section 061000 - Rough Carpentry: Wood blocking.
   2. Section 088000 - Glazing: Other glass and glazing.
   3. Section 092216 - Non-Structural Metal Framing.
   4. Division 16 – Electrical: Connections and requirements.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of display system.

B. Shop Drawings: Submit shop drawings and product data in accordance with Section 013300.
   1. Provide in large scale detail, drawings of fabricated display cases, showing construction methods, mounting and anchors, type and gage of metal, hardware and fittings, with plan, front elevation, and minimum of one cross-section.
   2. Show complicated parts of typical items in cutaway perspective. Show service connections, characteristics, and wiring diagrams for lighting systems.

C. Samples: Submit finish samples in accordance with Section 013300.

D. Certification: Submit certificate from manufacturer that materials provided for display system have met fire performance requirements.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage manufacturer-approved, locally based, experienced installer who regularly installs and services display cases similar in kind, quality and extent to that indicated for Project.

B. Fire Performance Characteristics of Fabrics: Provide fabrics which have been tested and certified as complying with BIFMA F-1 sponsored by Business and Institutional Furniture Manufacturer's Association.

C. Single Source Responsibility: Obtain each type of display case from single manufacturer, including accessories, and mounting and other installation components.

D. Inner Bonding Strength: Average inner bonding strength (IB) of 150 psi. IB is function of adhesives and pressure used in manufacturing fiberboard panel core and indicates ability of panel to remain whole under stress.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer's protective covering. Handle with care to prevent damage.

B. Unload and store products in accordance with manufacturer’s instructions.

C. Coordinate size of access and route to place of installation if required.

1.5 COORDINATION

A. Coordinate work directly with other trades. Provide and obtain necessary dimensions, templates, product lists, shop drawings, and similar data to insure proper clearances and anchorage of interrelated work.

1.6 PROJECT CONDITIONS

A. Securely factory assemble components to fullest extent possible.

B. Environmental Conditions: Do not install display cases until space is enclosed and weatherproof, wet-work in space is complete and nominally dry, installation of finishes including painting is complete, other units of work above ceiling are complete; and ambient temperature and humidity conditions will be continuously maintained at values near those indicated for final occupancy.

1.7 EXTRA MATERIALS

A. 2 quarts metal touch-up paint.

B. 5 extra panels and display cases components in each color.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Basis of Design Type and Manufacturer (DWS): Display Cases and Poster Cases as manufactured by Poblocki Sign Company, Milwaukee, WI (800) 776-7064, www.poblocki.com , or District approved equal.

2.2 MATERIALS

A. Aluminum Extrusions: Meeting ASTM B221, alloy 6063-T5.

B. Aluminum Panels: Meeting ASTM B209, minimum 0.090" thick.

C. Glass: ASTM C 1048, fully tempered, type I clear with minimum 1/4” thick.

D. Tackable Surface: 1/4” thick linoleum grade cork with burlap backing.

E. Finishing Hardware: Manufacturer's standard, except fixtures and outlets exposed within aluminum.

2.3 FABRICATION - GENERAL

A. Display Case Front:
   1. Description: 6063-T5 extruded aluminum alloy in accordance with ASTM B221; minimum 0.090 inch thick for window frame sill, and a minimum of 0.072 inch thick for all other members including frame, panels, and horizontal mullions. Aluminum extrusion mitered and assembled with concealed corner angles.
   2. Frame Depth: minimum 2 inches.
   3. Size: as indicated on drawings.
   4. Trim: as indicated on drawings.
   5. Glazing: Minimum 1/4 inch clear tempered glass in accordance with Section 088000.
   6. Door Profiles: Sliding aluminum channel with “H” bars on top and bottom equipped with ball bearing rollers and ground in finger pulls. Fully aluminum framed glass doors with a 2-1/2” top and bottom track required for all sliding doors over 66” tall.
      a. Fixed glass utilizing aluminum framed glass stops.
   7. Locks: All sliding doors to be equipped with flush mounted plunger locks keyed alike. All hinged doors to be equipped with flush mounted cam locks keyed alike.

B. Mounting:
   1. Recessed: Recess mount displays to wall structure through back plate or case sides.

C. Display Case Cabinet:
   1. Aluminum cabinet fully factory assembled with .090” aluminum walls. Background to be 3/4” AC plywood. No visible fasteners or knocked-down cases accepted.

D. Interior Cabinet Finish:
   1. Fabric over 1/4” natural cork at background with decorative plastic laminate at sides, top, and bottom. Finish and colors as selected by Architect from manufacturer’s standard options or as indicated drawings.

E. Illumination:
   1. Top mounted light fixture located within cabinet. High-output T-8 fluorescent lamps with dual 120 or 277 voltage ballasts and .063 aluminum baffle.

F. Shelving:
   1. Shelves: 1/4” thick clear Hz tempered glass with edges ground, polished, or swiped as required. Depth of shelves to be 2” less than total cabinet depth or as indicated on drawings.
   2. Standards: Surface mounted “T” type channel. Minimum standard KV83 up to KV 87.
   3. Brackets: KV 160 or Heavy-duty KV 187 with lever lock as required for depths over 12”.

G. Frame Finish:
   1. Aluminum with a polyurethane coating, with recommended film thickness of 3.3 mils wet – 1 mil dry (min.). Faces shall be smooth, free of scratches, blemishes or other imperfections.
      a. Color: As selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Verify that blocking and backings have been installed as required for anchorage.

C. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install display cases in accordance with reviewed shop drawings and manufacturer's printed instructions.

B. Provide permanent mounting accessories, including bolts, screws, sleeves, anchors and washers.

C. Touch-up scratches and abrasions. Adjust equipment to operate properly.

D. Replace finish or fabric which has been damaged in installation.

E. Insulate to prevent electrolysis between dissimilar metals.

F. Cut, fit and patch where necessary. Coordinate work with others.

3.3 ADJUSTING AND CLEANING

A. Clean and adjust display cases to ensure proper working order and conditions.

B. Remove masking or protective covering from stainless steel and other finished surfaces. Wash and clean equipment. Polish glass, plastic, hardware, and accessories, fixtures and fittings.

END OF SECTION

101400
INTERIOR AND EXTERIOR SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

A. Section includes:
   1. Work in this section includes furnishing and installation, complete in all respects, for interior and exterior signs, letters and/or graphics as required by the Contract Documents and Specifications.

1.3 SUBMITTALS

A. Samples – Submit the Following:
   1. Typical vinyl letter
   2. Typical individual letter and numeral in specified material and finish, as required.
   3. Sign Contractor shall submit three (3) sets of material samples indicating each designated color and surface finish.
      a. Metal: Submit color shade range on actual production selections.
      b. Plastics: Samples of plastic materials for the various applications in the finished state, and data describing the materials and finishes.
      c. Additional samples of typestyles, materials and finishes, as hereinafter specified.
      d. Prototypes, as required.

      Installed work shall match approved samples exactly, or work will not be accepted.

B. Shop Drawings
   1. Shop drawings shall establish the actual detail of all manufactured or fabricated items, indicate proper relation to existing work and incorporate changes of design or construction, as directed by Owner or Owner's representative to suit actual field conditions.
   2. Sign Contractor shall submit three (3) complete sets of Shop Drawings for approval prior to fabrication.
   3. Sign Contractor shall submit a prototypical full size letter and word spacing pattern for each sign type specified.
      a. Include Shop Drawings and project data items as hereinafter specified.

C. Job Conference
   1. Before start of installation, a conference between the Owner or Owner's representative, General Contractor, Sign Contractor and Graphic Designer shall be held to discuss the exact locations of the various signs and other details of installation, including any sign copy that has not been finalized.

PART 2 PRODUCTS

2.1 MATERIALS – BASIC

A. Aluminum: Extrusions and sheets of proper alloy and gauge to produce quality finish suitable for painted finish. Refer to design intent drawings for specified metal thickness/gauges.

B. Stainless Steel: Extrusions and sheets of proper alloy and gauge to produce quality finish.

C. Misc. Metals: Use new stock, free from defects impairing strength, durability or appearance. Paint as follows:

1. Shop prime coat: Zinc chromate primer by Matthews Paint.
2. Two coats: Satin acrylic polyurethane (20% gloss factor) by Matthews Paint

D. Plastics/Composite Materials: Use new stock free from defects.

E. Films: For die-cut letters, 3M's Scotchcal or Scotchlite (Reflective) series pressure-sensitive letters for application to first and second surfaces. For color digital sheeting, 3M's digital Scotchprint material with clear satin-finish UV-resistant protective over laminate. 3M product specifications and warranties for these products to be provided with shop drawings.

F. Adhesives: Type as recommended by the manufacturer for that particular use and project condition.
   1. Identify each type and use on Shop Drawings.
   2. Include data describing method of application.

G. Inks, Paints and Lacquers:
   1. Inks, paints and lacquers required for silk-screened, engraved or embossed surfaces shall be of type made for the surface material on which applied and recommended by manufacturer.
      a. Identify each type and use on Shop Drawings.
      b. Include data describing method of application
   2. Do not use products that will fade, discolor or delaminate as a result of exposure to ultraviolet light source or heat there from.
   3. Include as part of this work, prime coats and other surface pre-treatments, where recommended by the manufacturer, for inks, paints and lacquers
   4. Evenly apply paints without pinholes, scratches, peeling, application marks, etc.
   5. All paint, unless specified otherwise, shall be 2-stage Matthews Paint Acrylic Polyurethane with clear satin-finish clear coat, in colors specified on Design Intent Drawings as color No. P1, P2, P3 etc. or as otherwise specified by the Graphic Designer. All paints to include the addition of UV inhibitor.

H. Concrete: All concrete work (pre-cast or poured-in-place) to match standards, colors and textures established in the project's architectural and/or general contractors specifications.
   1. All exposed corners shall be eased.
   2. All exposed portions of footings to be cast smooth, level and free from broken edges.
   3. All concrete footings located in landscaped areas are to have compacted soil back fill around concrete to ensure sign stability.

I. Signage:
   1. The sign program consists of sign types, hereinafter referred to as "Type 1," "Type 2," etc. Each type is differentiated from the others by construction and/or size. See Design Intent Drawings for specific description of sign types.
   2. Color: All sign colors shall be specified in the Sign Schedule and/or Design Intent Drawings.
   3. Letterform: As indicated on the Design Intent Drawings.
   4. Letter Size: All letters shall be measured by capital letter height as specified on the Design Intent Drawings.
   5. All exposed hardware shall match adjacent surfaces unless specifically noted otherwise.
   6. Application of Letters: All letters shall be permanently affixed to sign or building surfaces in such a manner that all letter surfaces and edge areas are tightly and evenly adhered to the sign/building surface. Letters with creases or air pockets, or with folded, curled or loose edges or corners will not be accepted. Vinyl letters applied to first surface of sign panels for cabinets shall have a satin clear protective over coating as manufactured by Matthews Paint, product No. VOC Satin Clear 281-228SP.
   7. Excess adhesive, if any, shall be removed from sign and letter surfaces in such a manner, and with such a solvent, that neither anodized nor "Scotchcal" surfaces are scratched, discolored, glossed or de-glossed.
   8. Refer to Design Intent Drawings and Legend for the following information:
      a. Locations.
      b. Mounting and method of attachment.
      c. Size, type and materials.
      d. Designation of colors.
   9. Tactile Graphics: All signage shall conform to CBC Sections 11B-703 and 1143A.1. Tactile exit signage shall be provided per CBC 1011.4.

a. Character Type: Characters on signs shall be raised 1/32 inch (0.794 mm) minimum and shall be sans serif uppercase characters accompanied by Grade 2 Brail (see Note e below).
b. Character Size: Raised characters shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (51 mm) high.
c. Finish and Contrast: Contrast between characters, symbols and their background must be 70% minimum and have a non-glare finish. CBC 11B-703.5.1.
d. Proportions: Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10. CBC 11B-703.2.4.

All letters measured must be uppercase. After choosing a typestyle to test, begin by printing the letters I, X and O at 1 inch height. Place the template's 1:1 square over the X and O, whichever is narrower. If the character is not wider than 1 inch, nor narrower than the 3:5 rectangle to determine if the stroke of the I is too broad, and the 1:10 rectangle to see if it is too narrow. If all tests are passed, the typestyle is compliant with proportion code.

e. Braille: California Contracted Grade 2 Braille shall be used whenever Braille is required in other portions of these standards. Dots shall be spaced 1/10 inch (2.54 mm) on center in each cell, with 2/10 inch (5.08 mm) space between cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch (0.635 mm) above background. CBC Section 11B-703.3. Recommended Rounded or domed California Braille dots, each distinct and separate. Dots with straight sides and flat tops are not readable for many Braille users and are not acceptable.
f. Tactile exit signs: Tactile exit sign shall comply with CBC Section 1011.3 and 11B-703.3.
g. Symbol of Accessibility: The International symbol of accessibility shall be located at accessible building entries and at all transfer seating and wheelchair space locations.
h. Assistive Listening System: The International symbol of access for hearing loss shall be located at all Assistive Listening System locations.

10. Graphics:
    a. The following are applicable to all items unless otherwise noted:
        1) Letterforms: The project standard type font (Arial) shall be used for all signage unless noted otherwise, or as indicated on the Design Intent Drawings.
            (a) Submit for Approval: Complete alphabets, numbers and punctuation.
        2) Directional Arrows: As indicated on Design Intent Drawings (custom).
        3) Letter Size: As determined from Design Intent Drawings. (Note: written dimensions shall take precedence over scaled dimensions).
        4) Letter Spacing: Optical, but in accord with examples shown in Design Intent Drawings.
            (a) Submit for Approval: Templates or samples showing letter and word spacing for each letter size, in each letterform specified.
        5) Typography: Use all capital letters and/or capitals and lower case as indicated on the Design Intent Drawings. Position in accord with the grid specified for each sign.
11. Reproduction Processes:
    a. Cutting of letterforms shall be in accord with recommendations by the manufacturer of material specified to be cut.
        1) Perform cutting of vinyl graphics in such a manner that all edges and corners of the finished letterforms are true and clean. Letterforms with rounded positive or negative corners, nicked, cut or ragged edges, etc. will not be accepted.
        2) Silk-Screening: Execute from photo-screens prepared from typesetter's reproductions which shall be no smaller than 75% of actual size specified. Hand-cut screens will not be accepted.
            (a) Perform silk-screen printing in such a manner that all edges and corners of finished letterforms are true, sharp and clean. Letterforms with rounded positive or negative corners, edge build-up or bleeding will not be accepted.
            (b) All surfaces of silk-screened letterforms shall be without pinholes.
        3) Submit samples of each above-listed process in accord with the items indicated on the Design Intent Drawings. Include data describing materials and finishes.
12. Dimensional Metal Letters and Numbers:
    a. Fabricated or flat cut metal letters or numerals shall be of specified metal, typestyle, size, text and finish as indicated in the Design Intent Drawings.

1) Letters or numerals shall be precision cut from solid stock or fabricated from gauges as specified in the Design Intent Drawings. Edges shall be clean and sharp.
2) All letters shall be permanently affixed to surfaces with adhesives as recommended by the manufacturer for the particular usage and project conditions, and/or mechanically mounted as specified in the Design Intent Drawings.
3) Workmanship:
   (a) Letters and numerals shall be free from scale, pits, dents and/or other imperfections which would mar their appearance or durability.

13. Illuminated Signs:
    a. Illumination: Provide all necessary wiring, transformers and electrical equipment within or remote from sign including the required quantity of fluorescent lamps or LED units so that the surface intensity of all internally illuminated surfaces are uniform. All electrical components shall be UL listed. All electrical equipment, disconnect switches, conduit and wiring shall be concealed from normal view. Refer to Design Intent Drawings for methods of illumination.
    b. Power: Owner/General Contractor will provide electrical power to each sign location where required. Fabricator will perform all electrical work required for hook-up of signs.
14. Interior Signs:
    a. All interior sign types as reflected on the Design Intent Drawings shall be based on the Santa Ana College Campus Interior Signage Design Standards. All symbols and pictographs shall be selected from the SAC Standard Graphics. Copy applications will include vinyl, silkscreen or photopolymer unless otherwise noted on the Design Intent Drawings.
    b. Sign components shall consist of colors selected from SAC Interior Standard Colors. All symbols and copy shall be white, or as noted on Design Intent drawings.
    c. Symbol elements, Grade 2 Braille and tactile copy on interior signs shall be integrated in a composite one piece photo-etched photopolymer insert. All exterior locations shall use exterior grade materials for tactile signs. All Braille to be painted to match background color of sign on which it appears.
    d. All signs attached to walls shall be mounted based on SAC standard mounting/attachment methods. Use blind anchor studs as required for specific field conditions. A 1/8” thick black acrylic spacer panel shall be used per SAC standards. Refer to Design Intent Drawings for details.
    e. All signs mounted to glass sidelights are to be mounted per SAC standards, or as noted on Design Intent drawings.
    f. Signs with applied vinyl copy shall have a clear satin protective over coating as manufactured by Matthews Paint product No. VOC Satin Clear 281 228SP.
    g. All interior sign copy shall use the SAC standard Arial Regular type style as noted on Design Intent Drawings.

PART 3 EXECUTION

3.1 MATERIALS – BASIC:

A. Sign contractor shall provide structural engineering calculations and/or details for all cabinet framing and sign attachments/supports to building substrate or footings and /or coordinate concrete footing calculations/details if provided by others.

B. Sign materials shall be of durable rust-inhibited materials as specified on the Design Intent Drawings.

C. Ferrous and non-ferrous metals shall be separated with non-conductive gaskets to prevent electrolysis. In addition to gaskets, stainless steel fasteners shall be used to secure ferrous to non-ferrous materials.

D. All metals shall have proper prime coat prior to application of paint finish.

E. Paint colors shall be reviewed and accepted by Owner or Owner's representative prior to application to signs. Color coatings shall exactly match the colors specified on the accepted Shop Drawings and approved color submittals.

F. Formed metal, such as sign cabinets, panels and letterforms, shall be fabricated using full-weld construction. Metal sign cabinet faces adhered to exposed structural framing with foam tape and adhesives are not acceptable.

G. Sign panels mounted to support post shall be attached with blind anchor studs, VHB tape and silicone. Panels attached with foam tape and silicone only are not acceptable. Sign panels attached with visible screw on face of sign are not acceptable.

H. Sign contractor shall provide structural engineering calculations and/or details for all cabinet framing and sign attachments/supports to building substrate or footings and/or coordinate concrete footing calculations/details if provided by others.

I. Metal Cabinets:
   1. All exterior fabricated metal sign cabinet joints to have continuous weld ground out smooth. Seams/joints are to be sanded and filled to match finish of surrounding metal work.
   2. All angled metal corners shall be eased with 1/8-inch maximum radius.
   3. All fabricated metal cabinets shall utilize angle reinforcement as required to prevent oil canning.
   4. All exposed screws shall be counter sunk, flush with face of surrounding material and painted to match unless otherwise specified.
   5. All surfaces of signs with self-adhesive digital print graphics shall be painted prior to application of print.
   6. No sign company labels will be permitted on exposed surfaces of any sign in public view.
   7. Refer to Part 2 Products, 2.1 Materials, Section I, item number 13, for illuminated signs.
   8. Metal post with cantilevered sign panels:
      a. All cantilevered sign panels shall be secured to posts with structural framing that penetrates the post as reflected on Design Intent Drawings.

3.2 INSTALLATION

A. Install signs plumb, level and securely attached to the designated substrate. Sign Contractor shall be responsible for field verifying conditions at each sign location and to determine the proper method of attachment or embedment. Sign of various types shall be set at uniform heights, as indicated or directed, above the floor or other reference point.

B. Carefully space and accurately set letters in place, both vertically and horizontally, with overall inscription to conform to the Design Intent Drawing sand approved templates.

C. Blind anchor studs shall be mounted into holes not more than 3/16" in diameter to ensure a clean, uncluttered appearance. Use spacers for standoff installations if specified.

D. Signs with concrete footings located in landscaped areas shall have a compacted soil back fill around concrete to ensure sign stability.

E. Interior sign plaques mounted to glass sidelights shall use the SAC standard mounting method as noted in Design Intent Drawings.

3.3 ADJUST AND CLEAN:

A. Repair or remove and replace with new materials, all damaged units and units not complying with Contract Documents as approved by Owner or Owner's representative, at no additional cost to the Owner.

B. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect from damage until acceptance by the Owner or Owner's representative, at no additional cost to the owner. Remove all debris resulting from signage installation and leave site in a clean and orderly condition.

3.4 PROTECTION:

A. Protect the work in this section until substantial completion and acceptance of work by Owner or Owner's representative.

3.5 WARRANTY:

A. Sign contractor shall agree to bring all portions of the work to entire completion free of all defects in materials and workmanship for a minimum period of two (2) years from date of final acceptance of completed work by Owner or Owner's representative.

   The sign contractor also guarantees, within a reasonable time after receipt of written notice thereof, to make good any defects in materials and/or workmanship which may develop within the two year period, and to pay or cause to be paid for any damages to other work resulting there from.

B. The sign contractor shall include in all shop drawing submittals, all manufacturer's material/product warranties for vinyl film, digital print materials, paints and adhesives for all such products used in the fabrication/installation of signage/graphics.

C. A site review with the designated District representative is required prior to expiration of warranty as a condition to end installation warranty period.

3.6 PROJECT CLOSEOUT:

A. Upon completion of project, the Owner or Owner's representative and sign contractor shall walk the project site to review the installed signs for the purposes of preparing a punch list outlining items and conditions that need to be corrected prior to final acceptance of the work

END OF SECTION 101400

SECTION 102113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid surface partitions for toilet cubicles (T COMP-7).
   2. Urinal screens.
   3. Attachment hardware, accessories and anchorage.

B. Related Sections:
   1. Section 102813 - Toilet Accessories.

1.2 SUBMITTALS

A. Shop Drawings and Product Data: Submit in accordance with Section 013300.
   1. Clearly indicate partition layouts, size and swing of doors, elevations showing locations of hardware, anchorage and mounting details, panel construction, components hardware, finishes and all relevant dimensions.
   2. Submit manufacturer's descriptive literature and installation instructions.

B. Samples: Submit samples of partition finish on accordance with Section 013300.

1.3 WARRANTY

A. Guarantee solid surface partitions against defects in materials, breakage, corrosion or delamination for a period of ten years.

1.4 PRODUCT HANDLING

A. Deliver solid surface partitions and accessories in manufacturer's protective covering.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer and Type: BioPrism solid surface toilet compartments by Inpro Corp., telephone: 800-222-5556, www.Inprocorp.com

B. Other Acceptable Manufacturers: Columbia Partitions, General Partitions, Global Partitions, Hadrian Products, Scranton Products, or District approved equal.

2.2 TYPE

A. (T COMP-7) Provide floor mounted overhead-braced type toilet partitions.

B. Urinal Screens: Wall hung solid surface urinal screen.

2.3 MATERIALS AND COMPONENTS

A. BioPrism® Solid Surface with wood reinforced core:
   1. 1/4” thick BioPrism® Solid Surface panel which is a mineral filled, cast bio-based polyester/acrylic hybrid sheet manufactured in flat panels and bonded to a moisture resistant wood core. All doors, panels and screens shall be 1” finished thickness. All Pilasters shall have a 1” thickness. All material shall have a minimum Class A fire rating.
   2. Wood Core material shall be industrial grade 46 pound density moisture resistant particle board. All face sheet shall be bonded with a polyvinyl adhesive.

3. Edge material will be 1/4” thick solid surface bonded with methyl methacrylate adhesive matching in pigmentation to the face and edge material. All seam and glue lines will be inconspicuous.

B. Pilaster Shoes: 3 inch high, ASTM A167; Type 302/304, No. 4 polished finish; stainless steel.

C. Attachments, Screws, and Bolts: Stainless steel; tamper proof type; heavy duty extruded aluminum brackets.

D. Hardware:
1. Hinges: Chrome plated non-ferrous cast pivot hinges, gravity type, adjustable for door close positioning, nylon bearings.
2. Latch and Keeper: Manufacturer standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible.
3. Coat Hook: Manufacturer standard rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.

E. Hardware at accessible stalls:
1. Accessible Units: Provide units that comply with accessibility requirements of California Building Code.
2. Hinges: Chrome plated non-ferrous cast pivot hinges, nylon bearings, adjustable for door close positioning, self-closing type per CBC 11B-604.8.1.2.
3. Latch and Keeper: ADA paddle handle with concealed latch not requiring user to grasp or twist per CBC 11B-604.8.1.2, and with combination rubber-faced door strike and keeper designed for emergency access. Mount latch and keeper at 34 – 44 inches above finish floor per CBC 11B-404.2.7.
4. Door Bumper: Manufacturer standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Handles: Loop or U-shaped door handle on each side of door immediately below latch per CBC 11B-604.8.1.2 and at 34 – 44 inches above finish floor per CBC 11B-404.2.7.
6. Coat Hook: Manufacturer standard coat hook and rubber-tipped bumper on stall door, sized to prevent door from hitting compartment-mounted accessories, installed at maximum 48 inches above finish floor at each accessible stall, per CBC 11B-604.8.3.

2.4 FABRICATION

A. Fabricate partitions in accordance with reviewed shop drawings.

B. Doors and Panels: Machined with sharp corners removed.

C. Pilasters: One inch thick, pre-drilled for connections, of sizes required to suite cubicle widths and spacing.

D. Pre-notch and recess doors, panels and pilasters for hardware as required.

2.5 FINISHING

A. Texture and Color: Refer to Material Identification Codes.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine site conditions to which work is to be applied. Do not proceed with work until satisfactory conditions have been corrected.

B. Take site dimensions affecting this work.

C. Ensure correct spacing of plumbing fixtures.

D. Ensure correct location or built-in framing, anchorage, and bracing, where required.

3.2 INSTALLATION

A. Install partitions secure, plumb, level, and square.

B. Leave 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Provide for adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with stainless steel shoes.

E. Equip each door with hinges; one door latch, or at accessible stalls, one handicap use door latch and one door pull; and one coat hook and bumper.

F. Install door strike keeper with door bumper on each pilaster in alignment with door latch.

G. Accessible stalls:

1. Provide code compliant width of door per CBC 11B-604.8.1.2.
    a. Doors at front entry accessible stalls to have 32 inches minimum clear width when door open 90 degrees.
    b. Doors at side entry accessible stalls to have 34 inches minimum clear width when door open 90 degrees.
2. Accessible doors to provide 9 inches minimum clearance from bottom of door to finish floor (for footrests) per CBC 11B-604.8.1.2.
3. Equip each accessible door with hinges, one accessible door latch, one accessible door pull, and one accessible coat hook and bumper at 48 inches above finish floor.

H. Adjust and align hardware to uniform clearance at vertical edges of doors not exceeding 3/16 inch.

I. Adjust hinges to locate doors in partial open position when unlatched, except that out-swing doors shall return to closed position.

J. At handicap stalls provide code compliant width of door.

3.3 CLEANING

A. Field touch-up of scratches or defaced surface finish will not be permitted. Damaged, scratched or marred defective materials will be rejected, and shall be replaced with new materials.

B. Remove protective maskings. Clean surfaces free of oil and imperfections.

END OF SECTION

SECTION 102226.10
VERTICAL FOLDING WALL SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Work Included:
   1. Automatic vertical folding acoustical wall system (VWS-1), necessary hardware, seals, lifting machinery, and electrical controls.

B. Related Sections:
   1. Electrical: Site wiring and connections for main power, including disconnect switches at each motor location. Site wiring and connections for control, including installation of key switches.

1.2 SYSTEM DESCRIPTION

A. Automatic vertically folding acoustical operable wall shall be acoustical partitions that, when in down position (closed) are hard, rigid, flat, plumb walls, made of a grid of rectangular acoustical panels, and when are lifted (opened), fold upward (vertically) without use of any manual labor into pocket in ceiling. In the down (closed) position, wall shall be comprised of 2 vertical plans of acoustical panels, separated by acoustical air space.

B. Operable wall shall open and close in manner that all wall panels fold and unfold at exact same time, at exact same rate.

C. Drive System: Motor/shaft/drum assembly shall be offset from centerline of operable wall.

1.3 PERFORMANCE

A. Operable wall shall be opened and closed using spring return, three-position key switch. Turning key from “off” position shall cause wall to move in designated direction “up” or “down.” When hand pressure is removed, wall shall stop immediately. Operable wall shall stop in quick and positive fashion without coasting. As normal part of operation, it shall be possible to partially open (or close) wall, stop it and then reverse operation. There shall be two key switches per operable wall, on either side of axis of wall.

B. From fully open position, wall shall be able to go through its entire cycle of closing and/or opening without any manual intervention.

C. When operable wall is being lowered (closed), it shall come automatically to rest once it has reached fully down (closed) position.

D. When operable wall is being lifted (opened), it shall come automatically to rest once it has reached fully up (open) position.

E. Operable wall shall automatically and acoustically seal against floor without need for any manual intervention. Floor seals shall leave joint between floor and bottom acoustical panels of not more than 1-1/2 inch.

F. Operable wall shall automatically and acoustically seal against two end walls without need of any manual intervention. End seals shall act in such a way as not to come into contact with end walls while operable wall is in motion. End seals shall leave a joint between acoustical panels and end walls of no more than approximately one inch. Once wall reaches down position, end seals shall activate automatically. Key switch shall be held for duration of operation.

G. Operable wall shall automatically and acoustically seal against ceiling without any manual intervention. Top seals shall leave joint between top acoustical panels and ceiling of pocket of not more than 1-1/2 inch.

H. Operable wall shall open and close at constant nominal speed of 5 to 10 vertical feet per minute.

I. When operable wall is being lowered (closed), it shall stop if leading (bottom) edge comes into firm contact with any object between it and floor. Regular operation of wall shall resume once key switch has been released and direction of the wall has been reversed and obstruction removed.

J. Operable wall shall be visibly flat and rigid in down (closed) position.

K. There shall be no exposed hinges, brackets, screws, and no part of mechanical system shall be visible when operable wall is in down (closed) position.

L. Panel edges shall be right angled, with minimum radius not more than 1/16 inch.

M. Panels shall be rectangular, nominally of same size.

N. Joints between panels, vertical and horizontal, shall be no more than ½ inch wide.

O. Each acoustical panel shall be individually removable using only a screw driver. No special tools or equipment shall be required. Removal of single acoustical panel shall not affect, dislocate or cause removal of any adjacent panels or other acoustical panels.

P. Operable wall shall be mechanically operable with few of acoustical panels removed from one, or both, sides of operable wall.

Q. Operable wall shall not weigh more than 8 lbs. per square foot, not including the lifting equipment and architectural finish or other acoustical panels.

R. Completely functioning operable wall, tested in accordance and compliance with ASTM E90 shall achieve Laboratory Sound Transmission Class (STC) rating of not less than 50. Acoustical panels, when tested in accordance with the ASTM E90 protocol, shall achieve Laboratory Sound Transmission Class (STC) rating of not less than 54.

S. Operable wall shall be designed to have design life of at least 10,000 complete closed to opened to closed cycles.

1.4 QUALITY ASSURANCE

A. Work and materials specified herein shall be installed only by qualified installer of manufacturer, according to manufacturer's written instructions.

1.5 SUBMITTALS

A. Submit manufacturer's technical data for each type of operable wall specified herein.

B. Submit shop drawings showing complete layout of operable wall system based on field verified dimensions. Drawings shall include dimensional relationships to adjoining work. Include details indicating materials, finishes, tolerances, methods of attachment and electrical requirements.

C. Submit a 12 1nch by 12 inch sample of wall panel with specified finish.

D. Submit certified test reports evidencing compliance to acoustical STC requirements as specified.

1.6 SITE CONDITIONS

A. Floor underneath operable wall along its axis shall be flat to within ±1/4 inch over entire length of operable wall. Peak to valley undulation of ±1/4 inch shall not be closer together than 24 inch, and peak to valley undulation of ±1/8 inch shall not be closer than 12 inches.

B. Support steel above operable wall along its axis shall be parallel to floor within ±1/2 inch for entire length of operable wall. This includes loaded deflection. Beam shall also be paralleled to centerline of wall within ±1/8 inch left to right.

C. Fixed walls at either end of operable wall shall be within ±1/4 inch -0 from plumb vertical.

D. Fixed walls at either end of operable wall shall be flat to within +0, -1/4".

1.7 WARRANTY

A. Operable wall shall be warranted free of defective materials and workmanship for a period of two years or 5,000 cycles, from date of shipment, whichever occurs first.

B. Parts and labor required to maintain operable wall and part subject to normal wear and tear are not covered under the warranty and are Owner's responsibility.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Vertically Folding Walls (VWS-1), Basis of Design: Skyfold Classic 51 SKY-19125A as manufactured by Railtech Composites, Inc., Plattsburgh, New York (phone 514/457-4767), or District approved equal.

2.2 ACOUSTICAL MATERIALS

A. Acoustical panels shall be faced with steel that is compatible with fabric coverings.

B. Acoustical panels and sound insulation shall be made of non-combustible fire-treated materials.

C. Acoustical panels shall be fabricated to satisfy rigid criteria when operable wall is down (closed) and to ensure that there is no interface between panels when wall is in motion.

D. Acoustical panels shall be flat with no bowing, oil canning, warping, waviness or other surface deformation and discontinuity.

E. Acoustical panels shall have fabric finish: Refer to Material Identification Codes.

2.3 FOLDING MECHANISM

A. Hanging, folding and extension mechanism shall be made from structural grade aluminum extrusions and structural shapes.

B. Wear surfaces, such as bushings, spacers, pins, discs, bearings, sleeves shall be designed to function quietly and with minimum wear, over the 10,000 cycle design life of operable wall.

C. Hangers, which fasten lifting mechanism to support steel, shall be fabricated from stele and shall be welded or bolted to support steel.

2.4 LIFTING EQUIPMENT

A. Lifting equipment shall be sized so that it can open and close wall effectively over the 10,000 cycle design life of wall, at minimum design speed.

B. Lifting mechanism shall be designed to function smoothly, quietly and safely. Ball bearings shall be used instead of bushings.

C. Provide wire rope cable for every set of lifting mechanisms. This cable shall be of 6 x 31 construction aircraft cable and shall be made of galvanized steel or stainless steel. Diameter of cables shall be sized so that they are able to hold entire weight of wall with safety factor.

D. For the standard drive system, each wire rope cable shall wind and unwind on its own cable drum. Cable drums shall be grooved to acceptable single layer of cable and shall have a minimum pitch diameter of 20 times cable diameter. Length of drums shall be sufficient to accommodate 3 cable safety wraps. Cable drums shall be keyed to line shaft.

E. Line shaft, sized to deliver required torque with minimum deflection, shall support and rotate cable drums.

F. Pillow block bearings (for standard drive system), of appropriate size, shall support line shaft and be located immediately on either side of each cable drum.

G. For the standard drive system, line shaft shall be connected directly to power drive through properly sized, load rated couplings, keyed to line shaft.

H. Power drive shall be sized to deliver sufficient amount of torque to safely and effectively raise and lower the operable wall over its design life.

I. Lifting equipment shall use latest industry standards in thermal protection, overload protection, and quick acting fuses in order to ensure safety and reliability of system.

2.5 SAFETY EQUIPMENT

A. Operable wall shall employ an electromagnetic type of brake which shall activate firmly, without hesitation, when power is lost to system. This brake shall have minimum regarding torque rating equal to 200% of the power drive full load torque. Manual break release lever shall be supplied on motor.

B. Operable wall shall employ dynamic brake, distinct and separate from brake in paragraph 2.5.A in order to lower wall at controlled speed of no more than approximately 150% of the normal down speed in case of catastrophic failure in power train. Alternately, operable wall shall employ brake, distinct and separate from brake in paragraph 2.5.A in order to completely halt downward motion of wall in case of catastrophic failure in power train.

C. Operable wall shall employ electrical or other limit switches in order to stop wall at its up and down travel limits.

D. Operable wall shall employ over torque detector in order to sense jamb in system and to act as over travel limit in up direction should primary limit switch fail to act. This over torque sensor shall be mechanical, using motor's torque arm in its over torque detection.

E. Entire length of bottom edge of operable wall shall be equipped with a continuous pressure sensing strip which shall cut power to lifting equipment and shall activate brake outlined in paragraph 2.5.A, if sensing edge comes in firm contact with object before wall is in full down (closed) position. Power shall remain cut to lifting equipment until key switch has been released or direction of wall has been reversed and obstruction is removed.

2.6 FABRICATION

A. Factory assemble components, assemblies and systems into largest possible assemblies in order to minimize amount of assembly on site.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect relevant aspects of site such as evenness of floor, walls and structural steel, and ensure that these are within tolerances stated in Part 1 of this specification.

B. Confirm any deviations from these tolerances. Do not proceed until these conditions are corrected.

C. Carry out appropriate field measurements before manufacturing any components or assemblies.

3.2 INSTALLATION

A. Install operable walls in accordance with reviewed shop drawings and manufacturer's printed instructions.

3.3 ADJUSTING AND CLEANING

A. Adjust and fine tune operable walls to ensure that seals are operating and sealing properly and that walls are in correct and smooth operation.

B. Clean up any dirt, oil or grime that may have found its way onto acoustical panels. Leave wall in state of architectural cleanliness.

3.4 SPARE PARTS

A. Ensure that the correct number of spare parts that were requested are safety stored in secure areas designated by the Architect or Owner.

END OF SECTION

SECTION 102600
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall and corner guards, and accessories.

1.2 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300.

B. Samples: Submit samples for color selection and appearance acceptance.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver wall and corner guards in manufacturer's protective covering. Handle finished surfaces with care to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers for Vinyl/Alloy Products:
   1. InPro Corporation.
   2. Comparable products of the following manufacturers are acceptable:
      a. C/S Group: Acrovyn.
      b. Tepromark International Inc.: PVC.
      c. Pawling Corporation, Standard Products Division: Pro-Tek.
   3. Drawings and specifications are based on manufacturer's proprietary literature from Construction Specialties, unless otherwise indicated. Other manufacturers shall comply with minimum levels of material and detailing indicated.

B. Acceptable Manufacturers for Stainless Steel:
   1. Wilkinson Company.
   2. Comparable products of the following manufacturers are acceptable:
      a. MM Systems Corp.
      b. K.J.Miller Corp.
   3. Drawings and specifications are based on manufacturer's proprietary literature from Wilkinson Company, unless otherwise indicated. Other manufacturers shall comply with minimum levels of material and detailing indicated.

2.2 MATERIALS

A. Vinyl Alloy Material: Extruded, textured, chemical and stain resistant, high-impact, acrylic modified vinyl plastic, thickness as indicated.
   1. Fire performance characteristics when tested in conformance with U.L.273, ASTM E84, or NFPA 255:
      a. Flame spread: 25 or less.
      b. Smoke development: 450 or less.

2.3 STAINLESS STEEL CORNER GUARDS

A. Corner Guards:
   1. (WCG-4): Recessed for 90 degree angle corner; 16 gauge stainless steel with No. 4 satin finish having 1/8 inch radius corner.
   2. Size: 2 inch by 2 inch legs.
   3. Height: 4 feet up from top of base, unless otherwise indicated.

B. Manufacturer and Type:
   1. Recessed, stainless steel corner guards by Wilkinson Chutes.

2.4 WALL RAILS

A. Wall Rails:
   1. (WR-1): InPro 500 Wall Guard, 3 inches high, color: Pewter Gray 0107.
   2. Types, Sizes and Colors: Refer to Material Identification Codes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which wall surface protection components and wall protection systems will be installed.
   1. Complete finishing operations, including painting, before beginning installation of wall surface protection system materials.

B. Wall surfaces to receive impact-resistant wall covering materials shall be dry and free from dirt, grease, loose paint and scale.

C. Do not proceed with installations until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prior to installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Install wall and corner guards and accessories in accordance with reviewed shop drawings and manufacturer's printed instructions.

B. Install true, plumb and level, securely and rigidly anchored to substrate.

3.4 CLEANING

A. Immediately upon completion of installation, clean plastic covers and accessories using standard ammonia based household cleaning agent. Clean metal components in accordance with manufacturer's recommendations.

B. Remove excess adhesive using methods and materials recommended by manufacturer.

C. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

END OF SECTION

SECTION 102813
TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Toilet and bath accessories.
   2. Building accessories
   3. Warm-air dryers.

B. Related Sections:
   1. Section 092900 - Gypsum Board: Metal anchor reinforcement in walls.
   2. Section 093000 - Tiling: Ceramic tile bath and shower accessories.

1.2 SUBMITTALS

A. Submit in accordance with Section 013300

B. Product Data: Illustrate each accessory at large scale and show installation method.

C. Samples: Submit finish samples.

D. Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for project.

E. Setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.

F. Maintenance instructions, including replaceable parts and service recommendations.

1.3 QUALITY ASSURANCE

A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
   1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.
   2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.4 DELIVERY, STORAGE AND HANDLING

A. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.

B. Pack accessories individually in manner to protect accessory and its finish.

1.5 PROTECTION

A. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this section.

1.6 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 15 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:

B. Washroom Equipment

1. Bobrick Washroom Equipment Inc. (Basis of Design)
2. American Specialties Inc.
3. Bradley Corporation
4. GAMCO
5. Or District approved equal.

C. Warm-Air Dryers:

1. Bobrick Washroom Equipment, Inc. (Basis of Design)
2. Excel Dryer Corporation.
3. World Dryer.
4. Or District approved equal.

D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Toilet and Bath Accessory Schedule at the end of Part 3.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated. Adhesive: Epoxy type contact cement.

B. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, G60.

D. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication

F. Fasteners, Screws, and Bolts: Hot dip galvanized. Expansion Shields: Fiber, lead or rubber as recommended by accessory manufacturer for component and substrate. Provide exposed fasteners with finish to match accessories.

2.3 FINISHES

A. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

B. Chrome/Nickel Plating: Satin finish.

C. Stainless Steel: No. 4 satin finish.

D. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

2.4 FABRICATION

A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

E. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

F. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

G. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.1 PREPARATION

A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in. Provide templates and rough-in measurements as required.

B. Before starting work notify Architect in writing of conflicts detrimental to installation or operation of units.

C. Verify exact location of accessories with Architect. Verify blocking is in place prior to gypsum board installation.

D. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

3.2 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturer's printed instructions.

B. Install true, plumb and level, securely and rigidly anchored to substrate and sealed to protect structural elements of wall from moisture.

C. Use tamper proof (security) type fasteners.

3.3 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's recommendations after removing labels and protective coatings.

3.4 TOILET AND BATH ACCESSORY SCHEDULE

A. Building Accessories:
   1. (BA-2) Mop and Broom Holder with Shelf: Bobrick B-239 X 34 with shelf, 4 hooks and 3 mop/broom holders 34 inches long, or District approved equal.

B. Coat Hooks:
   1. (CH-1) Robe Hooks: Bobrick B-76717, satin finish, 1-5/8 inch projection, single hook, or District approved equal.
   2. (CH-2) Robe Hooks: Bobrick B-76727, satin finish, 1-7/8 inch projection, double hook, or District approved equal.

C. Grab Bars:
   1. (GB) Grab Bars: Bobrick Series 6806, 1-1/2 inch diameter with concealed mounting, with 1/8 inch thick stainless steel plate.
      a. Sizes and configurations as indicated.
      b. Use Bobrick Series 6806.99, for grab bars in showers or steam rooms.
      c. Or District approved equal.

D. Hand (Hair) Dryers – Electric:
   1. (HD-1) Electric Hand Dryers: Bobrick B-3725, recessed with 2” projection from wall, electric with automatic operation, stainless steel, 1000 watts, or District approved equal.

E. Mirrors:
   1. (MIR-1) Framed Mirrors: Bobrick B-290 Series, sizes as indicated, with Johnson Defender Film applied, or District approved equal.

F. Paper Towel Cabinets:
   1. (PTC-1) Combined Paper Towel Dispenser and Waste Receptacle: Bobrick B-3974, recessed compact unit, 12 gallon capacity, automatic, or District approved equal.
   2. (PTC-2) Paper Towel Dispensers: Bobrick B-29744, semi-recessed, automatic, roll paper towel dispenser, or District approved equal.

G. Soap Dispensers:
   1. (SDISP-1) Automatic Soap Dispensers: Bobrick B-2013, foam soap dispenser with “AA” batteries, sensor activated, surface mounted, or District approved equal.

H. Sanitary Napkin Cabinets:
   1. (SNC-1) Sanitary Napkin/Tampon Dispensers: Bobrick 37063, 25 cent operation, recessed mounted.

I. Sanitary Napkin Disposal Units:
   1. (SND-1) Sanitary Napkin Disposal Units: Bobrick 254, surface mounted.

J. Toilet Paper Holders:
   1. (TPH-4) Toilet Paper Holders: Bobrick B-2892, twin jumbo-roll toilet tissue dispenser, surface mounted. Or District approved equal.

K. Toilet Seat Covers:
   1. (TSC-2) Toilet Seat Covers: Bobrick 221, surface mounted, or District approved equal.

L. Utility Shelves:
   1. (US-3) Stainless Steel Shelf with Mop/Broom Holders and Rag Hooks: Bobrick B-239, 8 inch deep, surface mounted, or District approved equal.

M. Waste Receptacles:
   1. (WRC-1) Waste Receptacles: Bobrick B-2280, free standing, 13 gal open top, or District approved equal.
   2. (WRC-3) Waste Receptacles: Bobrick B-279, waste receptacle, surface mounted, or District approved equal.

END OF SECTION

SECTION 104400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire extinguisher cabinets.
   2. Fire extinguishers in cabinets and on wall brackets.
   3. Fire hose valve cabinets.

B. Related Sections:
   1. Section 099000 - Painting.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
   1. Fire Extinguishers: Include rating and classification.
   2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
   3. Show location of knockouts for hose valves.

B. Samples: Submit samples of cabinet finish for color selection, in accordance with Section 013300.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
   1. Provide fire extinguishers approved, listed, and labeled by FMG.

C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver fire fighting devices in manufacturer's protective packaging as required by project sequencing for installation. Fill and service extinguishers as required before installation.

B. Store and handle with care to prevent damage.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire hose valves indicated are accommodated.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure of hydrostatic test according to NFPA 10.
      b. Faulty operation of valves or release levers.
   2. Warranty Period: 5 years.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Manufacturers: Basis of design: The design for each fire extinguisher is based on the product named. Subject to compliance with the requirements in this Section, other manufacturer's listed may provide products.
   1. JL Industries / Activar, Inc.
   2. Larsen's Manufacturing
   3. Potter Roemer, Div. of Smith Industries, Inc.
   4. Kidde Fyrnetics.
   5. Nystrom Building Products.
   6. Or District approved equal.

B. Extinguishers
   1. Extinguisher (FE-4): 10 lb. Type ABC dry chemical.
      a. JL Industries, Cosmic 10E
   2. Extinguisher (FE-5): 22.5 pounds, Type "K", Wet Chemical; K class; potassium acetate based, low PH agent.
      a. JL Industries, Saturn 15

C. Extinguishers shall be charged and bear inspection tag with charge date.

2.2 FIRE EXTINGUISHER CABINETS

A. Manufacturers: Basis of design: The design for each fire extinguisher cabinet is based on the product named. Subject to compliance with the requirements in this Section, other manufacturer's listed may provide products.
   1. J L Industries: www.jlindustries.com / Activar, Inc.: www.activar.com
   2. Larsen Manufacturing Company: www.larsensmfg.com
   3. Potter Roemer, Div. of Smith Industries, Inc.: www.potterroemer.com
   4. Nystrom Building Products.
   5. Or District approved equal.

B. Fire Extinguisher Cabinets:
   1. Fire Extinguisher Cabinet (FEC-3): J L Industries Ambassador Series No. 2012-F-17.
      a. Description: Steel cabinet, semi-recessed 4 inch radius return trim with clear door, full glass door.
      b. Glass Type:
         1) Clear tempered glass.
      c. Latch:
         1) Magnetic catch.
      d. Finish:
         1) Baked enamel finish in color as selected by Architect.
      e. Extinguisher: FE-4.

2.3 FIRE HOSE AND VALVE CABINETS

A. Fire Valve Cabinet (FVC-1): Potter Roemer, Series No. 1811.
   1. Description: Steel cabinet, recessed, trimless and full glass door.
   2. Glass: Clear tempered safety glass.
   3. Latch:
      a. Magnetic catch with standard pull.
   4. Finish:
      1) Powder-coated finish in color as selected by Architect.
   5. Other Manufacturers:
      a. Larsen Manufacturing
      b. JL Industries / Activar, Inc.
      c. Nystrom Building Products.
      d. Or District approved equal.

2.4 FIRE EXTINGUISHER MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   1. Color: Black.
   2. Manufacturers:
      a. Larsen
      b. JL Industries / Activar, Inc..
      c. Potter Roemer
      d. Kidde Fyrnetics.
      e. Nystrom Building Products.
      f. Or District approved equal.

2.5 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- thick, cold-rolled steel sheet lined with minimum 5/8-inch- thick, fire-barrier material.
      a. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
   2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed.

C. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fire protection specialties and accessories according to reviewed shop drawings and manufacturer instructions.

B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
   1. Provide inside latch and lock for break-glass panels.
   2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

D. Install in locations and at mounting heights indicated or, if not indicated, at heights to comply with applicable regulations of governing authorities.

E. Prepare recesses in walls for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

3.3 INSTALLATION OF FIRE-RATED HOSE/VALVE CABINETS

A. Install cabinet with not more than 1/16-inch tolerance between pipe OD and knockout OD. Center pipe within knockout.

B. Seal through penetrations with firestopping sealant as specified in Division 7 Section "Through-Penetration Firestop Systems."

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 105626.13
MANUAL MOBILE STORAGE SHELVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pre-engineered, prefinished high density mobile storage system, consisting of moveable and stationary units, complete with tracks, full raised floor, ramp, operation handles, end panels and shelving system, with supports, standards, and accessories.
   2. Bolt setting grout.
   3. Manufacturer's 2 year warranty.

1.2 QUALITY ASSURANCE

A. Approved Installer: Installation of storage systems and accessories shall be by manufacturer's approved installer specializing in storage system installation with not less than 3 years of experience in installation of systems similar to that required for this project.

B. Manufacturer's Qualifications: Firm (material producer) with not less than 3 years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

1.3 DESIGN

A. Design: Performed in accordance with applicable codes and standards to safely support design loads without excessive deflections or stress.

B. Design Calculations: Performed and certified by Professional Structural Engineer registered in the State where project is located, experienced in steel design. These certified calculations shall be submitted to the Architect upon request. Calculations shall include storage system members and connections, and connections made from storage system to main structure.

C. Design Loads: Design of storage systems shall consider following loading parameters as well as applicable code loads:
   1. Uniform live load of 125 psf.
   2. Storage system dead loads. Loaded weight of Cine System: 11,936#.
   3. Concentrated live load of 1500#, placed on space 2-1/2 feet square, wherever this load placed upon otherwise unloaded floor would produce stresses greater than those caused by design uniform loads.

D. Deflections: Deflection design limits of storage system shall be as follows:
   1. Maximum shelving deflection under full loads shall not exceed 1/4 inch.
   2. Maximum floor system component deflection shall not exceed 1/240 of component span.
   3. Building Movement: Provide for one inch movement of foundation wall after installation of storage system.
   4. Obstructions: Design of supporting structure in the main and secondary aisles shall be such that any obstructions are minimal and do not inhibit pedestrian or cart traffic.

1.4 SUBMITTALS

A. Shop Drawings: Submit fabrication and installation drawings in accordance with Section 013300. Shop drawings shall be certified by Professional Engineer Registered in State where project is located, experienced in steel design.
   1. State storage system component manufacturer's name, sizes, types, quantities, locations, painting and accessories included.

B. Show connections required and include details and instructions as necessary for complete assembly and installation of storage system including assembly attachments to structure.

C. Samples: Submit samples for color and finish selection. Submit samples of laminate face panels for color selection and appearance acceptance.

1.5 DELIVERY, STORAGE AND HANDLING

A. Package, deliver, handle, store, install and erect at job site to avoid damage.

B. Deliver in timely manner for installation in proper sequence with work of other trades.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Type and Manufacturer: Quik-Lok™ four-post shelving manufactured by Aurora Storage Products, Inc.

B. Other Acceptable Manufacturers: Spacesaver Corporation, Magic Aisle #810 by Acme Visible Records, TAB Storage Systems Modular Mobile, or District approved equal.

2.2 MATERIALS

A. Sheet Steel: ASTM A446; stretcher leveled, prime grade furniture steel; 1.25 oz/sq ft galvanized coating (A366; stretcher or roller levelled prime grade furniture steel; E finish).

B. Steel Shapes: ASTM A36; galvanized.

C. Steel Rails: Minimum 1035 case hardened steel, one-piece.

D. Grout: Hydraulic type polymer cement.

E. Plywood: 3/4 inch, 5 ply, B-D exterior grade.

F. Plastic Laminate; NEMA LD3; 0.050 inch thick by Wilsonart; color as selected.

1. Laminate Backing Sheet: NEMA LD3; BK20 backing grade, undecorated plastic laminate.

2.3 GENERAL DESIGN

A. Storage System Requirements: Maximum overall height of system shall be 90 inches. Construct stationary units of same materials as moveable units so that shelving heights are consistent throughout system. Overhead raceway assemblies, anti-tips and other components mounted on top of shelving shall not project beyond 90 inch ceiling height.

B. Cine System shall cover overall area as indicated on drawings.

C. Manual operation shall provide for efficient movement of one or more ranges. Physical effort to start unit moving (each fully loaded 1600 lbs) moveable carriage shall not exceed 5 pounds.

D. System alignment: 1/2 inches maximum variation, measured between edges of end panels within each range in aisle positions.

E. Components shall exhibit no abnormal friction, abrasion, binding, or wear on or between contact surfaces and drifting or rolling of stopped carriages will not be acceptable.

2.4 FABRICATION

A. Rails: One-piece steel rail, 2-1/2 inches wide, 1-1/8 inches high, formed into tee section with wide base flange for lateral support and ability to anchor rails to subfloor.

B. Provide tongue and groove interlocking design rail connection joints to provide horizontal and vertical continuity between rail sections and to gradually transfer concentrated wheel point load to and from adjoining rail sections. Do not butt splice rail joints.

C. Level and grout rails locate and position properly, work grout under rail completely filling voids and trim up sides flush with rails.

1. Rail Levelness: 3/32 inch maximum variation from true level within module; 1/16 inch maximum variation between adjacent rails, perpendicular to rail direction; 1/32 inch maximum variation in 10 feet of rail length, along rail in system.

D. Recheck rails for integrity of position and levelness and anchor into original concrete using minimum one inch rawl plugs and 2 inch by #10 screws not to exceed 4 foot on center.

E. Grout: Hydraulic type polymer cement compound which, when mixed with water, will harden rapidly to produce permanent bolt setting anchor.
   1. Compound: Based on performance of test specimens at room temperature and in laboratory air. to following:
      a. Linear Movement: Exhibit slight expansion of not more than 0.002 inch per lineal inch on setting, it shall not shrink.
      b. Compression Strength: ASTM Standards tested on Balding-South-ward machine of 60,000 lbs. capacity - 2 inch cubes shall have following average compression strengths:
      c. Age: One hour -- 4,500 psi 28 hours -- 5,000 psi 7 days -- 8,000 psi.
   2. Content: Compound shall contain no Portland cement, ferrous metals or rust promoting agents.

F. Raised Floor and Ramp: Incorporate manufactured raised floor system between adjacent rails and at back of system at bays of moveable system. Finished elevation of raised floor: Flush with top of rails.

G. Provide continuous ramp at front of system not to extend past front of the carriages and having maximum slope of 9 degrees. Vertical transition from ramp edge to base floor shall be maximum of 1/8 inch.
   1. Construct raised floor panels of minimum 3/4 inch thick plywood as specified. Raised floor and ramp assembly shall support 400 pound concentrated load with maximum deflection of 3/8 inch, or as required to support fully loaded system.

H. Install leveling screws at raised floor and ramp on maximum 16 inch centers to level and support the floor. Anchor floor panels and ramp to base floor to prevent movement.

2.5 CARRIAGES

A. Unit welded construction capable of supporting minimum load of 1, 000 pounds per carriage foot without distortion.Carriage splices, where necessary, shall be tongue and groove tension bolted design to maintain proper alignment.

B. Construct carriage to provide 5/8 inch high shelf retaining flange on top of carriage full length of range to keep shelf storage units centered and aligned. Secure shelving unit upright to carriage frame with vibration proof fasteners of no less than size #12.

C. Load Wheels: Constructed of solid, case hardened steel, minimum 2-3/4 inches in diameter, precision ground and balanced.
   1. Bearings: Permanently sealed, lubricated and self-aligning of ball or roller design.

D. Provide minimum one inch neoprene bumpers between aisles for safety finger space and positive stop for moveable carriages.

E. Finish exposed carriage faces in smooth appearance without exposed holes or protruding bolts.

F. Provide in-rail (carriage mounted) or overhead (top shelf mounted) anti tip assembly per moveable carriage. Anchor entire system to stationary platforms and wall.

G. Finish paint carriages same color as shelving as selected by Architect.

2.6 FACE PANELS

A. Exposed Ends: High pressure plastic laminate, provide backer sheets as specified to prevent panel warping. Panel edges of plastic T-mold edging. Color or pattern as selected by Architect.

2.7 SHELVING EQUIPMENT

A. Design: 4-post, wedge locking design consisting of 3 basic parts, uprights, shelves, and shelf supports, assembled without nuts, bolts, studs, sway braces, gussets or clips. Punch shelves to accept center stops.
   1. Front and back flange of shelf shall be flush with outside face of post. Shelves shall be adjustable on 1-1/2 inch vertical centers.

B. Top and bottom closure shelves shall be solid sheet metal. Provide intermediate storage shelves of wire design capable of supporting cine film cans (50 pound capacity per shelf) or shelves appropriate for pharmaceutical materials where indicated.

C. 6 foot range lengths consist of two 36 inch wide shelving sections. 8 foot range lengths consist of two 30 inch wide and one 36 inch wide shelving sections.

D. Vertical shelf openings minimum 6 inches on center for 12 inch deep shelving and 9 inch on center for 8 inch deep shelving. 12 inch deep shelving sections shall be 12 usable wire shelves high plus solid canopy top dust covers and bottom shelves. 8 inch deep shelving sections shall be 8 usable wire shelves high plus solid canopy top dust covers and solid bottom shelves.

E. Shelving components shall exhibit no dents, oil-canning, buckling, or other surface irregularities.
   1. Steel gauges:
      a. Upright frames: 18 gauge.
      b. Shelf supports 36 inch (file): 14 gauge.
      c. Top and bottom shelves: 22 gauge.

F. Shelving finish abrasion resistance:ASTM D968, 25 liters per mil.

G. Shelving Components:Provide components free of burrs, sharp edges, projecting hardware and other defects which could present hazards to materials or personnel.

2.8 FINISH

A. Factory Finish: Solid and wire shelves and shelving system shall be finished with electrostatically applied powder coating system using epoxy-polyester hybrid powder paint in color as selected by Architect from manufacturer's standard colors. Apply to 1-1/2 mil thickness.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install storage system in accordance with reviewed shop drawings and manufacturer's instructions.

B. Coordinate with other trades involved where required for installation.

C. Install storage shelving system and accessories plumb and true, and securely anchor in-place.

END OF SECTION

SECTION 108000
OTHER SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Miscellaneous specialties and accessories.

1.2 SUBMITTALS

A. Shop Drawings: Submit for each item of work in accordance with Section 013300.

1.3 DELIVERY, STORAGE AND HANDLING

A. Do not deliver miscellaneous specialties to site until rooms in which they are to be installed are ready to receive them.

B. Pack miscellaneous specialties individually in manner to protect accessory and its finish. Replace damaged units.

PART 2 PRODUCTS

2.1 LOCK BOX

A. (LKB-1) Manufacturer and Type: Type 440R-RMK - recessed aluminum lock box by Knox Company, 846 Production Place, Newport Beach, CA 92663. (714) 650-2885. Fax (714) 650 - 6223.

1. Provide with recessed masonry mounting kit
2. Finish: Polyester powder coat finish.

B. Initial Procedure: Submit order with payment to: Fire Marshall. Knox Company will not accept direct orders.

C. Installation Procedure: Prior to installation, submit approved sketch to Fire Marshal's Office detailing placement of box. When Fire Marshall's approval has been made, installation may proceed.

D. After Installation: Prior to placing keys in box, again contact Fire Marshal's Office to have box closed. Box will be shipped open and Fire Department will have sole key.

2.2 EMERGENCY EVACUATION CHAIRS

A. (EVAC-1) Emergency Evacuation Chair: Stryker Evacuation Chair Model 6254, with storage cabinet Model 6254-002-000, as manufactured by Stryker, (800) 784-4336.

1. Provide and install evacuation chairs where indicated.

2.3 DEEP ROOT CEDAR RAISED BED

A. (CRB-1) Cedar Raised Bed as manufactured by Gardener's Supply Company (800) 427-3363, www.gardeners.com

1. Size: 4' x 8" x 15".
2. Parts Included: Cedar boards, aluminum raised bed corners, in-line raised bed connectors, corner caps, 3/4" stainless steel Phillips screws.
3. Assemble cedar raised bed in accordance with manufacturer's written instructions.

PART 3 EXECUTION

3.1 PREPARATION

A. Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates and rough-in measurements as required.

B. Before starting work notify Architect in writing of conflicts detrimental to installation or operation of units.

C. Verify with Architect exact location of accessories.

3.2 INSTALLATION

A. Install fixtures, accessories and items in accordance with reviewed shop drawings and manufacturer's printed instructions.

B. Install true, plumb and level, securely and rigidly anchored to substrate.

C. Adjust and lubricate operating parts for proper operation.

END OF SECTION

SECTION 115213
PROJECTION SCREENS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Recessed above ceiling automatic operated projection screens and accessories.

B. Related Sections:
   1. Electrical: Electrical service to screen operator and control switch.

1.2 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013300.

1.3 QUALITY ASSURANCE

A. UL-Listed Products: Provide projection screens that are UL-listed and bear re-examination markers of UL.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver projection screens in manufacturer's protective covering. Handle finished surfaces with care to prevent damage.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. (PS-1) Type and Manufacturer, Basis of Design: Da-Lite Senior Electrol automatic electric projection screens by Da-Lite.

B. Other Acceptable Manufacturers: Draper Screen, or District approved equal.

2.2 MATERIALS

A. Projection Screen: [X] feet high by [X] feet wide electrically operated 115V, 60Hz, 3.5 amp, flame-retardant and mildew-resistant screen surface, matte white with black masking borders.

B. Motor and Controls: 3 wire quick reversal motor ball bearing with automatic overload cut-out and interlocking gears, preset accessible limit switch to automatically stop screen in "up" and "down" position, with three position control switch.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install projection screens and accessories in accordance with reviewed shop drawings and manufacturer's printed instructions.

B. Install true, plumb and level, securely and rigidly anchored to substrate.

C. Adjust installed unit for smooth operation.

END OF SECTION

SECTION 115310
LABORATORY CASEWORK AND OTHER FURNISHINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wood Laboratory Casework and Tables

B. Metal Laboratory Casework and Tables

C. Cabinet Hardware

D. Zoology and Ornithology Specimen Cabinets

E. Map Storage File

F. Laboratory Work Surfaces

G. Downdraft Dissection Table with Hinged Cover

H. Shelving Assemblies

I. Cylinder Restraint Assembly

J. Overhead Service Carriers

K. Overhead Support Grid (Overhead Unistrut)

L. Pipe Drop Enclosure

M. Drying Rack

N. Accessories

O. Finish for Miscellaneous Wood Items

P. Metal Fabrications

Q. Stainless Steel Fabrications
   1. Work Surfaces
   2. Laboratory Sinks
   3. Scullery Sinks
   4. Canopy Hoods

R. Slotted Channel Framing (Strut)

S. Sealant

1.2 RELATED SECTIONS

A. Division 09 – Flooring (wall base)

B. Section 115313 – Fume Hoods and Other Air Containment Units

C. Section 115343 – Laboratory Service Fittings and Fixtures

D. Division 22 – Plumbing

E. Division 23 – Heating, Ventilated, and Air-Conditioning

F. Division 26 – Electrical

G. Division 27 - Communications

1.3 REFERENCES

A. Architectural Woodwork Institute (AWI), Woodwork Institute (WI), and Architectural Woodwork Manufacturers Association of Canada (AWMAC): Architectural Woodwork Standards (AWS), Edition 1, October 2009.

B. Builders Hardware Manufacturers Association: ANSI/BHMA A156.18-2006 American National Standard for Materials and Finishes, 2006.

C. California Code of Regulations: Title 17, Section 93120: Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.

D. Hardwood Plywood & Veneer Association: ANSI/HPVA HP-1-2004 Standard for Hardwood and Decorative Plywood, 2004.

E. National Hardwood Lumber Association: NHLA Rules for the Measurement & Inspection of Hardwood & Cypress, 2007.

F. Scientific Equipment and Furniture Association: SEFA 2-2010 SEFA Recommended Practices for the Installation of Scientific Laboratory Furniture and Equipment.

G. Scientific Equipment and Furniture Association: SEFA 3-2010 SEFA Recommended Practices for Work Surfaces.

H. Scientific Equipment and Furniture Association: SEFA 8-W-2010 Recommended Practices for Laboratory Grade Wood Casework.

I. Scientific Equipment and Furniture Association: SEFA 8-M-2010 Recommended Practices for Laboratory Grade Metal Casework.

J. Underwriters Laboratory: UL61010A-1 Electrical Equipment for Laboratory Use.

K. United States Green Building Council: USGBC, LEED Reference Guide for Green Building Design and Construction For the Design, Construction, and Major Renovations of Commercial and Institutional Buildings Including Core & Shell and K-12 School Projects 2009 Edition.

1.4 BID SUBMITTALS

A. Certification of Compliance: All bidders (including those listed in 2.01-A) must submit a compliance certification statement indicating that their bid includes products and installation which comply with every requirement of the project specifications and drawings (accounting for any RFI responses received during the bidding phase).

B. Certification of Qualifications: All bidders must submit a certification of compliance with the Qualifications requirements outlined below. List specific project experience as evidence of compliance.

C. Substitution Requests: All substitution requests for this scope of work in this section must be made during the bidding phase. No substitution requests will be considered post-bid.

1.5 SUBMITTALS

A. Refer to General Conditions and Division 1 “Submittal Procedures” for submittal requirements. In addition to these requirements, provide submittal requirements specified herein.

B. Submittal requirements:

1. Submittal shall be prepared individually for this specification section. Arrange product data, drawings and information for submission in a complete set for this specification section.
   a. Shop drawings and product data as applicable for required mockups may be submitted separately and should be expedited for submittal as soon as the contract is awarded.
2. Submittal shall contain complete data for all items of this specification section. Periodic or partial submittals of individual components within this specification section will be returned as incomplete and rejected.
3. Submittals shall be organized by specification sequence with section and paragraph number identified.
4. Equipment and components being proposed shall be clearly labeled with all options and accessories indicated and shall be for this specific project. All non-applicable items shall be deleted or struck.
5. Product data submittals provided in PDF format shall consist of fully collated PDF files allowing for collated printing from a single file.

6. Shop drawings shall meet the requirements of the Architectural Woorworking Standards (AWS), except in cases where stricter requirements are identified in this section.

C. Materials List/Product Data: Submit complete materials list, including catalogue data, of all materials, equipment, and products for work in this section.
   1. Product data shall not be duplicative or redundant with shop drawings. Do not include drawings in the product data submittal that are included in the shop drawings.

D. Shop Drawings: Submit complete shop fabrication and installation drawings, including plans, elevations, sections, details and schedules.
   1. Show relationship to adjoining materials and construction.
   2. Show seaming pattern layout of all joints in work surfaces.
   3. Shop Drawings shall be in the form of reproducible, PDF files, or photocopies, to scale, sheet size not to exceed 11 inches x 17 inches (A3).
   4. Shop drawing submittals provided in PDF format shall consist of fully collated files allowing for collated printing from a single file. Blueline prints are not acceptable.

E. Approved Substitution/Approved Equal: In addition to the items required in Division 1, all substitution requests shall include item-by-item comparison of the proposed substitution to this project specification. A copy of the project specification shall be submitted, with each item and subsection of the project specification marked as “Comply” or “Not Comply.” In any cases where “Not Comply” is indicated, an explanation of the relative advantages of the proposed design shall be provided.

F. LEED Submissions: Provide documentation and certification as required relative to the work of this section to support the project’s submission to the USGBC for the credits indicated below.

G. Submit detailed anchorage and attachment drawings and calculations provided by a licensed Structural Engineer complying with the Uniform Building Code Earthquake Regulations and the California Administrative Code, Title 24 Seismic Restraint requirements.

H. Samples: Accompanying Materials List, submit for Architect's approval two (2) samples of each type of specified finish and color range available for casework, laboratory work surfaces, painted steel fabrications, cabinet hardware, and shelving.

I. Certifications/ Test Data: Submit certifications and test data as required elsewhere in this section, including SEFA structural performance test reports, and finish performance test reports.

J. Operations/Maintenance Manuals: At project close-out, submit for Architect's review and Owner's use, complete operating and maintenance manuals that describe proper operating procedures, maintenance and replacement schedules, components parts list, and closest factory representative for components and service.

K. Warranty: Submit manufacturer’s warranty including any additional certifications as needed to meet the requirements specified.

1.6 MOCKUP

A. Provide and install products within this scope of work as part of the laboratory mockup, as indicated on the drawings.

B. Location of mockup must be approved by the Architect and the Owner from the following options:
   1. In final location as shown on drawings. Note that products installed may require correction and/or replacement relative to issues of non-compliance with the contract documents.
   2. In off-site location in the vicinity of the project, provided by the Owner.
   3. At location provided by the laboratory subcontractor, such as the factory.

C. Disposition of mockup:
   1. Mockup items may be incorporated into the final project subject to approval and/or corrections as identified in the mockup review.
   2. Mockup items will remain the property of the laboratory subcontractor.

D. The mockup will be reviewed and appropriate comments documented. The mockup – and the associated comments - will become a quality sample against which the remainder of the product installation will be compared.

E. Coordinate delivery, installation, and review of the mockup with the contractor. The mockup should be complete and reviewed prior to fabrication of the remainder of the project. To the extent that the subcontractor elects to fabricate the project prior to review and approval of the mockup, it is understood that this is “at risk” and items may require re-fabrication to address issues that arise from the mockup review.

1.7 PRODUCT HANDLING

A. Protection: Use all means necessary to protect work of this section before, during and after installation including installed work and materials of other trades.

B. Replacement: Any damaged work shall be replaced, repaired and restored to original condition to the approval of the Architect at no additional cost or inconvenience to the Owner.

1.8 ENVIRONMENTAL CONDITIONS

A. It is the responsibility of the general contractor or construction manager to provide appropriate environmental conditions within the laboratory spaces throughout the period of installation of wood and composite wood casework products until substantial completion of the project and turnover to the owner. The relative humidity standards as delineated by the Architectural Woodwork Standards should be followed.

1. Humidity must be controlled between 25% and 55% in all areas where laboratory casework is stored and/or installed.
2. The range of relative humidity change should not exceed 30 percentage points.

B. It is the responsibility of the laboratory furniture subcontractor to assess building environmental conditions prior to the delivery and installation of laboratory casework. Wood laboratory casework shall not, under any circumstances, be installed in spaces which do not comply with the requirements outlined above.

1.9 QUALIFICATIONS

A. Work in this section shall be manufactured by and installed by a company/companies having a minimum of eight years documented experience providing and installing products similar to those specified in laboratory applications; an established organization; and production facilities including all tools, equipment and special machinery necessary for specializing in the fabrication and installation of the type of products specified, with skilled personnel, factory trained workmen and an experienced engineering department. Each shall have the demonstrated knowledge, ability and the proven capability to produce the specified work of the required quality and the proven capacity to complete an installation of this size and type within the required time limits.

1.10 ENVIRONMENTAL COMPLIANCE

A. Composite Wood Products – Composite wood products shall comply with the California Code of Regulations: Title 17, Section 93120: Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.

1. The definition of composite wood products, as applied to this requirement, shall be those as defined in the regulation cited.
2. Comply with the limitations scheduled for enforcement at the time of sale and manufacturing, accounting for the grace periods allowed by the regulation.
3. Provide documentation, certification, and labelling as required by the regulation.

B. Certified Wood: All wood products used in the fabrication shall comply with the FSC’s (Forest Stewardship Council’s) Principles and Criteria as required to contribute towards USGBC LEED Credit MR7.

1. All lumber shall come from forestry sources that are certified under the Forestry Stewardship Council’s (FSC) Forest Management Certification program.
2. The casework manufacturer must have FSC Chain-of-Custody (COC) Certification.
3. Documentation:
   a. Provide manufacturer’s Chain of Custody Certification.

b. Provide documentation of the cost, volume, and weight of all wood products provided for this project, including any non-FSC wood products or components.
c. Provide documentation of the cost, volume, and weight of FSC wood products provided for this project.
d. In the case of assemblies where some components are FSC-certified and other components are not – provide separate cost, volume, and weight information for each assembly component.

C. Low-Emitting Materials – Composite Wood and Agrifiber Products: Composite wood and agrifiber products used in casework products shall contain no added urea-formaldehyde resins, as required to meet USGBC LEED Credit EQ4.4.
1. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
2. Provide certification as required.

D. Wood products as listed below shall contain recycled content to contribute towards achievement of the USGBC LEED Green Building Rating System MR Credits 4.1 and/or 4.2.
1. Recycled wood products:
a. Particleboard plywood cores.
2. The manufacturer shall submit documentation (i.e. “Source of Materials”, Invoices, Third Party Validation, etc.) for specified wood products purchased for this project providing recycled content.
a. Where assemblies contain both recycled and non-recycled wood products, provide documentation of the weight of recycled wood products relative to the total weight of each assembly.
b. Provide documentation of the cost of each component or assembly which contains recycled wood products. Provide percentages (by weight) and costs of post-consumer recycled material and pre-consumer recycled material within each component.

E. All steel used in the product fabrication shall comply with the recycled steel content requirements to contribute towards achievement of the USGBC LEED Green Building Rating System MR Credits 4.1 and/or 4.2.
1. All steel used in the fabrication of laboratory cabinets, fume hoods and modular laboratory systems shall have a minimum of 25%recycled steel content, as defined by ISO 14021-1999, calculated as follows:
2. (% of Post Consumer Recycled Steel Content by Weight) + 0.5 x (% of Pre-Consumer Recycled Content by Weight) >/= 20% (30%) (40%)
3. Documentation:
a. The manufacturer shall submit documentation (i.e. “Source of Materials”, Invoices, Third Party Validation, etc.) for steel purchased for this project providing recycled content.
b. Provide documentation of the cost of each component which contains recycled steel.
c. Provide percentages (by weight) and costs of post-consumer recycled material and pre-consumer recycled material within each component.

1.11 WARRANTY

A. All products will be warranted to be free from defects in materials and workmanship for a period of five years following substantial completion. The manufacturer/dealer/subcontractor shall repair or replace any products (or parts thereof) that are found to be defective. Replacement will include any parts, labor, shipping, and travel expenses involved. Warranty replacement work must be scheduled in coordination with the client’s academic/research schedule and may therefore require evening and/or weekend work.

B. Installation Warranty:
1. Provide unconditional 2-year installation warranty commencing on substantial completion in addition to the manufacturer warranty.
2. Provide a site review with the designated District representative prior to expiration of installation warranty as a condition to end installation warranty period.

PART 2 PRODUCTS

2.1 WOOD LABORATORY CASEWORK AND TABLES

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.

1. CiF Lab Solutions, 53 Courtland Avenue, Vaughan, Ontario, Canada L4K 3T2 Tel: 905 738-5821.
2. Kewaunee Scientific Corporation, P O Box 1842, Statesville, NC 28687 Tel: 704 873-7202.
3. Mott Manufacturing Ltd., 452 Hardy Road, P. O. Box 1120, Brantford, ON, Canada N3T 5T3 Tel: 519 752-7825.
4. Diversified Woodcrafts, Inc., 300 South Krueger Street, Suring, WI 54174 Tel: 920 842-2136.
5. Pacific Cabinets Inc., 2010 Front Street, Ferdinand, Idaho 83526 Tel: 208 962-5546.
6. Approved substitution/equal.

B. Quality Standards:

1. Wood casework shall comply with all requirements of AWS Custom Grade architectural cabinets, unless otherwise specified in this section.

C. Design Requirements:

1. Door and drawer design: Square edged full flush overlay design with eased edges. Applied panels may be required in areas such as sink cabinets and knee spaces with pencil drawers to complete the flush construction. Reveals shall be within the ranges indicated below; however, they shall be consistent across a given project.
   a. Reveal from top of door/drawer fronts to top of cabinet: 3/32 inch to 3/8 inch.
   b. Reveal from bottom of door/drawer fronts to bottom of cabinet bottom panel: Flush.
   c. Horizontal and vertical reveals between door and drawer fronts: 3/32 inch to 3/16 inch.
   d. Vertical reveal between side of door and drawer fronts and the side of the cabinet: one-half of the typical horizontal and vertical reveal.
2. Pulls on doors shall be mounted vertically and on drawers horizontally.
3. Grain Pattern:
   a. Vertical Matched Grain Pattern: Grain pattern on all exposed surfaces shall be vertical. Entire cabinet front must be cut from a single panel.
4. Toe Kicks/ Toe Spaces:
   a. All tall storage cabinets to have toe space to match base units.
   b. Provide toe spaces at all fully-exposed sides of cabinets, including locations such as the end of island benches, the end of peninsula benches, and outside-corner cabinets. Toe spaces shall run continuously through all items such as knee opening side panels and end panels.
5. Full-Flush Construction and Installation: All finished panels and surfaces shall be in the same plane as the front of cabinet doors/drawers to provide a true flush overlay appearance.
   a. Filler panels: Provide filler panels where casework units meet perpendicular walls to create a continuous appearance.
      1). Full-flush end-of-run filler panels are required at all conditions where the joint width is one inch or larger. At conditions where the joint width is less than one inch, filler panel should be flush with cabinet body.
   b. Flush panels: Provide fixed fully-edgebanded flush panels at sink cabinets, knee opening drawer units, filler panels, and elsewhere, so that all finished panels are in the same plane as cabinet doors and drawers to provide a true flush overlay appearance.
   c. Applied panels may be required in areas such as sink cabinets and knee spaces with pencil drawers to complete the flush construction.
   d. At outside corners, align side panel of cabinet with the face of the door of adjacent cabinet.
   e. At inside corners, mount filler panels flush with face of adjacent cabinet doors.
   f. At open cabinets (without doors), align face of cabinet with face of adjacent cabinet door. Adjust the depth of the cabinet and toe kick accordingly.
   g. Align other filler panels and applied panels with face of adjacent cabinet doors.
   h. Align face of end panels and knee-opening side panels with face of adjacent cabinet doors.
   i. Provide filler/ trim panels at locations where undercounter dishwashers or glasswashers are shown and the units provided do not completely fill the opening indicated.
   j. Filler panels shall follow the profile of toe kicks.
6. Extended Ends:

a. At end-of-run base cabinets, provide extended end to cabinet to create closure to the wall without the use of filler panels. Extended end shall be edgebanded on front and bottom edges. Back edge shall be scribed to the wall with a tight hairline joint. Field-applied panels do not meet this requirement.
b. At ends of island benches and peninsula benches, provide a paired set of base cabinets, each with an extended end, resulting in a single joint. These extended end panels shall be edgebanded on the front and bottom edges and shall meet at a hairline joint. Applied panels do not meet this requirement.

7. Flush interiors: Set cupboard bottom flush with front-end facers. Surface mounted bottoms and offsets caused by front face frames that interfere with ease of cleaning are not acceptable.
8. Widths of drawer bodies in knee opening rails shall not be less than 18 inches (457 mm). As noted above, applied panel shall be provided to complete the flush construction on either side of the drawer head.

D. Materials and Finishes:
1. Wood:
a. Definition of cabinet components by surface visibility:
1). Exposed Surfaces:
a). Surfaces exposed when doors and drawers are closed.
b). Surfaces visible when behind glass doors, including tops and bottoms of shelves.
c). All exterior surfaces of suspended casework.
d). Open units.
e). Bottoms of cabinets if 42 inches (1070 mm) or more above finished floor.
f). Tops of cabinets if less than 72 inches (1830 mm) above finished floor.
g). Front rail of web frames.
2). Semi-exposed surfaces:
a). Surfaces that are visible when solid (opaque) doors are open or drawers are extended, including backs of doors.
b). Tops of cabinets 72 inches (1830 mm) or more above finished floor when visible from an upper level.
3). Unexposed surfaces:
a). Surfaces not normally visible after installation with doors open and drawers extended.
b). Bottoms of cabinets less than 30 inches (750 mm) above finished floor.
c). Tops of cabinets over 78 inches (1980 mm) above finished floor and not visible from an upper level.
b. Wood Species and Veneer Cut: Provide materials that are selected and arranged for compatible grain and color. Do not use materials adjacent to one another that are noticeably dissimilar in color, grain, figure, or natural character markings.
c. Maple:
1). Lumber:
a). Exposed and semi-exposed: Plain sawn Maple, NHLA Grade FAS.
b). Unexposed: Select grade hardwood of a species suitable for the specified purpose.
c). All lumber shall be clean and free of defects; kiln and air dried to uniform moisture content of 6 percent.
2). Veneer:
a). Exposed: Plain sliced white select maple, grade A. Thickness: 1/50 inch (0.5 mm), minimum.
(1). Color and Matching:
(a). 100% sapwood, no heartwood allowed.
(b). Slight color streaks or marks.
(c). Slight color variation.
(d). No sharp contrast at veneer joints.
(2). Natural Characteristics:
(a). Small conspicuous burls: combined average not to exceed 4 per 10 square feet (1 m^2).
(b). Conspicuous burl size: 3/8 inch (9.5 mm), maximum.

(c). Conspicuous pin knots: combined average not to exceed 4 per 32 square feet (3 square meters). Maximum pin knot size – dark part: 1/8" (3.2mm). Maximum pin knot size – total: ¼" (6.4mm).
(d). Scattered sound repair knots, bark pockets: not allowed.
(e). Slight mineral streaks, worm tracks, cross bars and vine marks.
(3). Manufacturing Characteristics:
(a). Rough cut or ruptured grain is not allowed.
(b). Blended repaired tapering hairline Splits: two 1/16 inch (1.6 mm) x 6 inch (152 mm) on end panels only.
(4). Repairs: Small blending allowed.
(5). Flitch Width, Face Components: 5 inches minimum, except for outside components.

2. Plywood
   a. Typical, Unless Otherwise Noted: Hardwood Veneer Plywood
      1). Product shall be provided with hardwood face veneers as specified above.
      2). Plies:
         a). ¾ inch (19 mm): minimum 7-ply, including face veneers.
         b). 1 inch (25 mm): minimum 9-ply, including face veneer.
      3). Physical Properties:
         a). Screwholding: 355 lb at face.
         b). Average modulus of rupture: 7346 psi (50.65 N/mm^2).
   b. Drawer and Door Fronts: ANSI A208.1 M3 Grade Industrial Particleboard Core Plywood.
      1). Product shall be provided with hardwood face veneers as specified above.
      2). Plies:
         a). 3-ply, including face veneers.
      3). Minimum Physical Properties:
         a). Screwholding: 247 lbs at face, 225 pounds at edge.
         b). Average modulus of rupture: 2,393 lb/in2.
         c). Modulus of elasticity: 398,900 lb/in2.
         d). Hardness: 500 lbs.
   c. Drawer box back, front and sides: Finnish or Baltic Birch Plywood
3. Hardboard: Dry process S2S hardboard made from compressed exploded wood fibers.
4. Edgeband/Facer: 1/8" (3 mm) hardwood; species as described above.
5. Dowels: 8 mm, diameter, minimum, hardwood, laterally fluted with chamfered ends.
6. Glue: Type 2 or Type 3 water resistant glue with gluing done in clamps and jigs.
7. Finish for Wood Laboratory Components:
   a. All wood components shall be fully sanded on all surfaces including the underside of exposed components, glazed door element inside edges, penetrations for the attachment of drawer heads, screws attaching adjacent cabinets, cutouts at grilles, and all other such locations. The final installation shall present no rough, splintered, or unfinished surfaces at any visible, exposed, semi-exposed, or touchable locations. This does not apply to components of surfaces which will be fully concealed in the final installation.
   b. Finish processes (stains and finishes) shall be by means of compression spray or a UV roll coater, providing high-transfer efficiency low waste generation. Solvent applied coatings are not acceptable and will not be considered. Manufacturer shall supply documentation that waste generated during the finishing process, is a non-hazardous material, eliminating liquid waste disposal in landfills.
      1). Chemically Resistance Finish: Finish for all wood products shall be environmentally friendly, highly chemically resistant, water-borne, laboratory-grade finish that satisfies the requirements specified herein for chemical and durability resistance. A letter from a third-party validator, verifying independent test results, shall be submitted.
      2). Operator Protection: The application shall be convenient and easily mastered, in a custom spray booth. The finish process shall be cleanly contained and shall have no solvent odor, and shall be applied in an air-conditioned room.
      3). VOC Emissions: Water-borne finishes shall be sprayed and cured with a near zero (2.0 lbs. per gallon for 'clean finish') VOC (Volatile Organic Compounds) emissions.
      4). Offgasing: After all wood products have cooled from the curing ovens, the coating shall be firm and stable. No further emissions or "Offgasing/Decomposition" vapors shall occur at room temperature.

c. Manufacturer may uses either of the following finish systems:
   1). Customized, high-solids, cross-linked, ultraviolet light (UV)-cured coating developed for durability, including abrasion, chemical, impact, and scratch resistance, for flat-line applications. Coatings shall have little or no VOCs.
   2). Chemical-resistant modified acrylic urethane finish with built-in UV blocker, or equal, applied over permanent wood stain.
d. Stain Color:
   1). To be selected by Architect from manufacturer's full published color range.
e. Application:
   1). Finish application and sequence shall be as recommended and designed by the manufacturer for a high quality, laboratory-grade wood casework finish.
   2). Preparation: Sand exposed and semi-exposed surfaces smooth, free from dirt and defects.
   3). Stain application: Apply stain of color selected to all exposed and semi-exposed casework surfaces. Apply in a manner to achieve a match with the selected color sample upon completion of application of the finish.
   4). Finish application: Apply chemical resistant top finish to all stained surfaces. Apply to doors after any notching for hinges has been performed. Finished surfaces shall be even, water-clear and bright. Cloudy or muddy finishes carrying tinting pigments will not be acceptable.

8. Glass: Framed glass doors:
   a. 1/8 inch (3mm) to 7/32 inch (5.5 mm) nominal tempered glass.
   b. Without imperfections or marred surfaces.
   c. All glass should have etched safety information, readable from outside the cabinet.

E. Construction:

1. Base Cabinets:
   a. Assembly: Dowel and/or mortise-and-tenon joinery secured with countersunk screws and pressure-glued.
   b. Cabinet Top:
      1). L-shaped front rail of ¾" plywood: 1½ inches (38 mm) x 2¼ inches (57 mm); or horizontal front rail of 1 inch (25 mm) x 3 inches (76 mm) hardwood. Back rail: ¾" plywood or hardwood, 3-3/4" tall.
   c. Cabinet Bottom: ¾ inch (19 mm) thick plywood. Set flush and join to cabinet end panels. Front edge shall be edgebanded.
   d. Cabinets Ends/Sides, and Backs Exposed to View from the Outside: ¾ inch (19 mm) thick plywood.
      1). Side panels and end panels: edgeband front edge and bottom edge.
   e. Cabinet Backs, Exposed to View From the Inside at Open Units and Units with Glazed Doors: 1/4 inch (19 mm) thick veneer core plywood.
   f. Cabinet Back, Semi-Exposed and Unexposed:
      1). Removable hardboard, 1/4 inch (6 mm) thick.
      2). Sink base back shall be half-height construction to allow for plumbing and sink waste connection.
      3). Provide split back on drawer cabinets.
   g. Cabinet Base: 3¾ inches (95 mm) x ¾ inch (19 mm) front hardwood or veneer core plywood toe space rail, mounted between end panels, forming a 4 inch (102 mm) high x 2½ inch (63 mm) deep toe space, closed to cupboard bottom. Secure rails to cabinet end panels.
   h. Shelves: 1 inch (25 mm) thick full-depth, 9-ply hardwood plywood. Full-depth is defined as a shelf whose front edge is within ½ inch (13mm) of the face of the cabinet when the shelf is fully back in the cabinet.
      1). Front edge of shelves shall be edgebanded.
      2). Shelf Adjustment: All shelves shall be adjustable on 32 mm centers.
      3). Shelf Tolerance: Shelves shall fit into cabinets or into shelf supports with a tolerance of 1/16 inch per side maximum.
   i. Drawer construction:
      1). Drawer box back, front and sides shall be of ½ inch (13 mm), 9-ply Finnish or Baltic Birch veneer plywood, with eased top edge, finished with a Gloss Level 7 polyester acrylic finish. The top edges of the completed drawer bodies shall be very smooth to the touch

and shall not present any rough or splintered surfaces. Sides shall be full height with 1 inch (25 mm) clearance to frame opening. Drawers shall be a minimum of 18 inches front to back.

2). Acceptable drawer joinery options:
   a). Dowel: Glued under pressure; 32mm, minimum, dowel spacing to 4 inches (102 mm) high, 64 mm dowel spacing above 4 inches (102 mm).
   b). Multiple Dovetail: Tight fitting and glued.

3). Drawer bottom shall be Baltic Birch veneer plywood. Bottom shall be grooved into the 4 sided drawer box and sealed with hot melt glue process around entire drawer bottom perimeter.
   a). Drawers up to 24 inches wide: 3/8 inch (6mm) thick 7-ply Baltic Birch veneer plywood.
   b). Drawers greater than 24 inches wide: 1/2 inch (13 mm) thick 9-Ply Baltic Birch veneer plywood.

j. Door and Drawer Heads: shall be ¾ inch (19 mm) thick plywood with edgebanding. Edges shall be as specified previously in this section. Drawer heads shall be screwed to drawer box.

k. Flush Panels: As described in the Design Requirements section of this specification.

l. Front Horizontal intermediate Rail: ¾ inch (19 mm) x 1½ inches (38 mm) exposed hardwood rail shall be provided between doors and drawers. For all drawer units at benches where service fitting connections are not accessible via an adjacent knee opening filler or cabinet filler panel, drawer units to be provided with Keku fasteners (Keku fasteners not required at other locations). The drawer unit intermediate horizontal and vertical box frames must be removable. These components shall be assembled with Keku suspension fittings as manufactured by Häfele America Co. or approved so these members are easily removable at any time with no special tools to gain access to concealed piped services behind.

m. Intermediate Back Rail: 1½ inch (38 mm) x ¾ inch (19 mm) hardwood lumber to accept hardboard security panel between drawers.

n. Security Panels: Provide hardboard security panels, 1/8 inch (3 mm) thick, in frames when keyed-different locks are specified, or where individual padlock hasps are indicated. Inset security panel into frame on all four sides.

o. Where drawers are indicated to be removable and without ball bearing glides provide a drawer keel and a mating case channel, wherein weight loads are distributed over a three (3) point area. They shall be furnished one (1) pair on all drawers up to 24 inches wide, two (2) pairs on drawers over 24 inches wide. Drawer keels shall be 1-13/16 inches wide, chamfered to a 30 degree angle, allowing it to mate with the 3 inch wide case channel. Security panels, where required, shall be an integral part of this assembly. Removable horizontal intermediate rails and case channels shall be provided for all drawer units at benches where service fitting connections are not accessible via an adjacent knee opening filler or cabinet filler panel using components as described above. Provide a drawer stop mounted on top of the drawer back to prevent inadvertent drawer removal which can be manually released. Working parts of drawer stop to be made of corrosion resistant stainless steel and plastic. Plated metal stops subject to failure in a corrosive atmosphere are not acceptable.

2. Wall, upper and tall cases:
   a. Shall be manufactured with materials and joinery methods as specified for base units, unless otherwise indicated.
   b. Edgebanding:
      1). Wall cabinets side panels: Edgeband front and bottom edges. Wall cabinet end panels: Edgeband front, bottom, and top edges.
      2). Edgeband front, top, and bottom edges of tall cabinet side and end panels.
   c. Cabinet Interior Backs: 1/4 inch thick veneer core plywood, typical for all exposed, and semi-exposed interior backs.
   d. Hardwood plywood tops: 1 inch (25 mm) thick with front edge edgebanded.
   e. Wall and upper case hardwood plywood bottoms: 1 inch (25 mm) thick. Tall case hardwood plywood bottoms ¾ inch (19 mm) thick. Edgeband front edges.
   f. Bottom hardwood kick rail on tall cases: 3¾ inches (95 mm) x ¾ inch (19 mm) front hardwood or veneer core plywood toe space rail, mounted between end panels, forming a 4 inch (102

mm) high x 2½ inch (63 mm) deep toe space, closed to cupboard bottom. Secure rails to cabinet end panels.

g. Solid doors shall be the same construction as specified for base cabinets.

h. Framed-glazed doors: Hardwood construction, ¾ inch (19 mm) x 2¾ inch (70 mm) machined to accept glass. Ease all edges, interior and exterior, including those that frame the glazing. Provide extruded vinyl retaining molding on interior designed so glass can be replaced without tools

i. Shelves: 1 inch (25 mm) thick full depth, 9-ply hardwood plywood. Full-depth is defined as a shelf whose front edge is within ½ inch (13mm) of the face of the cabinet when the shelf is fully back in the cabinet.
   1). Front edge of shelves shall be edgebanded.
   2). Front edge of open shelves:
      a). Retainer Rail: Retainer rail as specified elsewhere in this section and detailed on drawings.
   3). Shelf adjustment:
      a). Wall units: All shelves shall be adjustable on 32 mm centers.
      b). General purpose tall units: One fixed shelf. All others shall be adjustable on 32 mm centers.
   4). For tall cabinets indicated with Dividers provide 3 equally spaced bent stainless steel ¼ inch rod dividers for each shelf and cabinet bottom positioned perpendicular to the long dimension of the shelves and bottom. Rod dividers to be 12 inch long x 2 ½ inches tall above surface, centered in the cabinet front to back, counter sunk into shelves, and bottom and secured with silicon sealant.

3. Wood-Framed Laboratory Tables
   a. Tops: Refer to Laboratory Furnishing drawings for worktop materials, described in the Laboratory Work Surfaces section of this specification.
   b. Vibration absorbing isolation: Provide a continuous wide bead of clear silicone sealant to the top of all supporting rails. Allow complete cure before attachment of the work surface.
   c. Electrical receptacles: Where indicated on the Laboratory Furnishings or Electrical drawings provide cutouts for electrical receptacles as work of this Section and coordinate with Division 26. Cord, plug, back boxes, electrical devices, faceplates, wiring, and junction boxes shall be provided under the work of Division 26
   d. Leveling Glide and Leg Shoe: Each leg other than those fitted with casters, shall have leveling glides and leg shoes.
      1). Leveling glides: (2 inch) (48 mm) diameter, two-piece pivot construction, steel housing, nonmarring, phenolic or translucent plastic insert, (1/2 inch) (12 mm) diameter, minimum (1 1/2 inch) (36 mm) long zinc plated stems. Each glide shall have a load bearing capacity of 150 lbs.
      2). Leg shoe: Black coved vinyl or rubber leg shoe, 2 inches (50 mm) in height.
   e. Casters: Where indicated on Laboratory Furnishing drawings, provide sets of 3 ½ inch (89 mm) diameter wheels with self-lubricating bearing, rated to carry 250 pounds (113 kg) minimum each. Each caster must swivel and have a locking brake at front wheels. Wheel shall be of molded polyurethane tread mechanically locked to a polyolefin core. Moveable tables to have all 4 swivel and locking casters.
   f. Rails: Not less than ¾ inch x 4-5/16 inch (19 x 110 mm) solid lumber with attached heavy duty steel corner braces, grooved and screwed into both rails at each corner. Groove rails for "Z" irons or drill for top attachment.
   g. Reinforcing cross rails: Hardwood lumber doweled and glue into front and back rails and pinned at intervals not more than 33 inches (838 mm) on center in tables without drawers.
   h. Legs: Not less than 2 inch x 2 inch (50 x 50 mm).
      1). Construction: Either of the following is acceptable:
         a). Made of one solid piece of lumber
         b). Made from two pieces of solid lumber glued together. Individual components shall be carefully selected for color match. The glue joint shall be on the diagonal of the leg, as seen in plan. All legs shall be oriented so that the diagonals converge to create an “X” in plan.
      2). Veneered lumber or wood of any type is not acceptable for leg components.
   i. Leg rails and spreader rail: Not less than 1¼ inch x 2½ inch (32 x 63 mm) hardwood lumber.

j. All exposed edges of legs and rails shall be eased, sanded smooth, and finished per the requirements for wood laboratory casework components.

4. Aprons and leg assemblies:
   a. Apron: Not less than ¾ inch (19 mm) x 4-5/16 inch (110 mm) hardwood.
   b. Legs: Not less than 2 inch (50 mm) x 2 inch (50 mm) hardwood.
   c. Leg rails: Not less than 1¼ inch (32 mm) x 2½ inch (63 mm) hardwood.
   d. All exposed edges of legs and aprons shall be eased, sanded smooth, and finished per requirements described above for wood laboratory casework components.
5. Fume Hood Cabinets:
   a. Purpose-designed wood cabinet with fixed panel above door to conceal cup sink and plumbing.
   b. Provide wood fume hood cabinets where adjacent cabinetry below a fume hood is wood.
6. Wood Casework Construction Performance:
   a. Base cabinets shall be constructed to support a uniformly distributed load of 200 lbs. minimum per square foot (1000 kg/m²) of cabinet top area (total maximum of 2000 lbs. (900 kg)), including working surface, without permanent distortion or interference with door and drawer operation.
   b. Base cabinets shall be constructed so that when supported on both back corners and one front corner; with a counterweight load of 350 pounds placed on the rear corner behind the supported front corner; and with a load of 200 pounds placed on the unsupported corner – there shall be no permanent damage after 24 hours of loading. Maximum allowable deflection shall not exceed 1/8 inch.
   c. Swinging doors mounted on base units shall support a 200 lb. (113 kg) load located at a test point 12 inches (305 mm) measured horizontally from hinge along the top edge of door through a swing of 160 degrees. Weight test shall allow nominal temporary deflection, but no permanent distortion. Door assembly shall be twist- resistant and rigid, and shall close in a flat plane against the cabinet to permit the door catch at top of door to function properly.
   d. Drawers shall be constructed so that they will support a 150 pound load hung on the drawer head centerline, with the drawer opened 13 inches (330mm), for five minutes. There shall be no interference with the normal operation of the drawer and the drawer head should remain tightly fastened to the drawer.
   e. Drawers shall be constructed so that a drawer that is removed and supported on four corners will support a 10 pound sand or shot bag dropped from a height of 24 inches (610mm) without damage.
   f. Drawers shall be constructed so that a drawer that is removed and supported at a 45 degree angle shall be capable of withstanding three impacts of a 2 inch (51mm) diameter, 12 inch (305mm) long steel rod (approximately 10 pounds in weight) released from 13 inches (330mm) from the front and back of the drawer. The drawer joinery shall remain intact and the drawer shall operate normally when placed back into the casework cabinet.
   g. Drawers mechanical suspension systems shall be designed and attached to that a drawer uniformly loaded with 75 pounds of sand or shot bags shall operate freely without binding over its full range for 50,000 cycles at a rate not exceeding 10 cycles per minute. The force required to open and close the loaded drawer for the purposes of this test shall not exceed 8 pounds.
   h. Shelves shall be designed and supported to that they can support a load of 40 pounds per square foot, up to a maximum of 200 pounds per shelf, for 24 hours with no more than 0.35 inches (9mm) of deflection maximum.

F. Hardware: As specified elsewhere in this Section.

G. Wood Finish Chemical Resistance Performance Requirements:
   1. Manufacturer shall submit wood finish chemical resistance performance test results. Testing to be performed by independent testing agency.
   2. Procedure: Place panel on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73º +/- 3ºF (23º +/- 2ºC) and 50 +/- 5% relative humidity or the currently accepted guideline set by ASTM. Test the panel for chemical resistance using forty-nine different chemical reagents by one of the following methods. For both methods, leave the reagents on the panel for a period of one hour. Wash off the panel with water, clean with detergent and naptha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73º +/- 3ºF (23º +/- 2ºC) and 50 +/- 5% relative humidity, or the currently accepted guideline set by ASTM.

a. Method A: Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.574cc) bottle and inverting the bottle on the surface of the panel.
b. Method B: Test non-volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24mm watch glass, concave side down.

3. Rating System: Evaluations shall use the following rating system:

Level 0	No detectable change.
Level 1	Slight change in color or gloss.
Level 2	Slight surface etching or severe staining.
Level 3	Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

4. Acceptance Level:
   a. Individual test results for the specified 49 reagents shall be within the Range for that reagent as specified on the table below.
   b. There shall be no more than four (4) Level 3 conditions.
5. Table of reagents:

Test No.	Chemical Reagent	Test Method	Range
1.	Acetate, Amyl	A	0-1
2.	Acetate, Ethyl	A	0-1
3.	Acetic Acid, 98%	B	0-1
4.	Acetone	A	0
5.	Acid Dichromate, 5%	B	0-1
6.	Alcohol, Butyl	A	0-1
7.	Alcohol, Ethyl	A	0
8.	Alcohol, Methyl	A	0-1
9.	Ammonium Hydroxide, 28%	B	0-2
10.	Benzene	A	0-1
11.	Carbon Tetrachloride	A	0-1
12.	Chloroform	A	0
13.	Chromic Acid, 60%	B	0-1
14.	Cresol	A	0-2
15.	Dichloroacetic Acid	A	0-3
16.	Dimethylformamide	A	0-2
17.	Dioxane	A	0-1
18.	Ethyl Ether	A	0-1
19.	Formaldehyde, 37%	A	0
20.	Formic Acid, 90%	B	0-1
21.	Furfural	A	0-1
22.	Gasoline	A	0
23.	Hydrofluoric Acid, 37%	B	0-2
24.	Hydrofluoric Acid, 48%	B	0-2
25.	Hydrogen Peroxide, 30%	B	0-1
26.	Iodine, Tincture of	B	0-2
27.	Methyl Ethyl Ketone	A	0
28.	Methylene Chloride	A	0-1
29.	Monochlorobenzene	A	0-1
30.	Naphthalene	A	0
31.	Nitric Acid, 20%	B	0
32.	Nitric Acid, 30%	B	0-2
33.	Nitric Acid, 70%	B	2-3
34.	Phenol, 90%	A	0-2
35.	Phosphoric Acid, 85%	B	0-1
36.	Silver Nitrate Saturated	B	0-1
37.	Sodium Hydroxide 10%	B	0-2
38.	Sodium Hydroxide 20%	B	0-2
39.	Sodium Hydroxide 40%	B	0-2
40.	Sodium Hydroxide Flake	B	0
41.	Sodium Sulfide Saturated	B	0
42.	Sulfuric Acid, 33%	B	0-1

Test No.	Chemical Reagent	Test Method	Range
43.	Sulfuric Acid, 77%	B	0-1
44.	Sulfuric Acid, 96%	B	1-3
45.	Sulfuric Acid 77% & Nitric Acid 70% equal parts	B	1-3
46.	Toluene	A	0
47.	Trichloroethylene	A	0
48.	Xylene	A	0
49.	Zinc Chloride, Saturated	B	0

2.2 METAL LABORATORY CASEWORK AND TABLES

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer. Corrosive and flammable liquid/solvent storage cabinets may also be provided by the manufacturers listed with their descriptions.

1. Laboratory Casework:
   a. Air Master Systems, 6480 Norton Center Drive, Muskegon, MI 49441 Tel 231 798-1111.
   b. Bedcolab Ltd, 2305 Francis Hughes Avenue, Laval, Quebec, Canada H7S 1H5 Tel 514 384-2820.
   c. CiF Lab Solutions, 53 Courtland Avenue, Vaughan, Ontario, Canada L4K 3T2 Tel: 905 738-5821.
   d. Jamestown Metal Products, Inc., 178 Blackstone Avenue, Jamestown, NY 14701 Tel: 716 665-5313.
   e. Kewaunee Scientific Corporation, P O Box 1842, Statesville, NC 28687 Tel: 704 873-7202.
   f. Mott Manufacturing Ltd., 452 Hardy Road, P. O. Box 1120, Brantford, ON, Canada N3T 5T3 Tel: 519 752-7825
   g. Approved substitution/equal.

B. Metal Laboratory Casework

1. Design Requirements:
   a. Door and drawer front design: Square edged inset metal construction with all front surfaces above the toe space in the same plane.
   b. Pulls on doors shall be mounted vertically and on drawers horizontally.
   c. All tall cases shall be provided with toe space to match base units.
   d. All cabinets shall be constructed and finished to be suitable for use as stand-alone units and to permit future rearrangement without the need for additional parts or finish.
   e. Widths of drawers in knee opening rails shall not be less than 24 inches (600 mm) or the width of the rail whichever is the lesser.
   f. Cabinets below fume hoods that conflict with ductwork, cup sinks, or waste connections shall be 19 inches deep to accommodate any obstructions.
2. Materials:
   a. Steel: Cold-rolled furniture stock sheet steel, prime grade, roller leveled.
      1). Steel shall be treated at the mill to be free of scale, ragged edges, deep scratches, or other injurious effects.
      2). All gauges indicated are to be U.S. standard.
   b. Glass: Framed glass doors:
      1). 1/8 inch (3mm) to 7/32 inch (5.5 mm) nominal tempered glass.
      2). Without imperfections or marred surfaces.
      3). All glass should have etched safety information, readable from outside the cabinet.
3. Base, Wall, Upper, and Tall Cabinets:
   a. General:
      1). Exterior corners: shall be spot and arc welded with heavy back up reinforcement at exterior corners. All face joints shall be arc welded and ground smooth to provide a continuous flat plane.
      2). All units shall have a cleanable smooth interior. Front and rear posts, reinforcing members or channel uprights shall be enclosed full heights on all cabinet openings.
      3). End Uprights shall be formed into not less than a channel formation at top, bottom, back and front.

4). The edge of the vertical uprights shall be formed to provide a strike for doors and drawers, and shall be perforated for the support of drawer channels, intermediate rails and hinge screws.
5). An upright filler shall be screwed in place in all cupboard units to close the back of the channel at front of the upright and to provide a smooth interior for the cupboard to facilitate cleaning.
6). The upright filler shall be perforated with shelf adjustment holes at no more than ½ inch (12.7 mm) centers.
7). The inside front of the upright shall be further reinforced with a full height 14 gauge (2.0 mm thick) hinge reinforcement angle.
8). Die Formed Gussets: shall be furnished in each bottom corner of base units to insure rigidity, and a 3/8 inch (10 mm) -16 leveling bolt, 3 inches (75 mm) long, shall engage a clinch nut in each gusset. Each leveling bolt and gusset shall be capable of supporting 500 lbs (225 kg). (Each unit shall support 2000 lbs. (900 kg) uniformly distributed on a work top.) Provide caps at all penetrations provided to access leveling devices.

b. Cabinet Base:
1). Case bottom and bottom rail shall be formed of one piece of metal except in corner units and shall have both sides and back formed up or down and shall be offset in front to provide a door and drawer recess rabbet.
2). Toe Space Rail: shall extend up and forward to engage bottom rail to form a smooth surfaced toe space, 3 inches (75 mm) deep and 4 inches (100 mm) high. Whenever the base is omitted for units to be set on building bases or separate metal bases, the toe space rail shall extend back 4½ inches (115 mm).

c. Cabinet Back, Unexposed: Cabinet back shall consist of a top and bottom rail, channel formed for maximum strength and welded to back and top flange of end uprights, with space between left open for access to plumbing lines. All units shall be provided with removable back panels.
1). Sink units shall be provided with fixed half-height backs to allow plumbing lines to enter and exit the cabinet through the open area.

d. Shelves: shall be full depth formed down ¾ inch (19 mm), back 7/8 inch (22 mm) and up ¼ inch (6 mm) at front and rear and formed down at ends ¾ inch (19 mm). Shelves over 36 inches (914 mm) in length shall be additionally reinforced by a flanged channel shaped member electro-welded to underside of shelf. Shelves shall be adjustable. Full-depth is defined as a shelf whose front edge is within ½ inch (13mm) of the face of the cabinet when the shelf is fully back in the cabinet.
1). Restraint: At open tall shelf units, provide retainer rail as specified elsewhere in this section and detailed on drawings.

e. Doors: shall be readily removable and hinges easily replaceable. Hinges shall be applied to the case and door with screws. Welding of hinges to either case or door will not be acceptable.

f. Door and Drawer Heads:
1). Metal, Flush Inset: shall be a two-piece sheet steel assembly of ¾ inch (19 mm) overall thickness to consist of an inner pan formed as an extension of the drawer body, an outer pan having a channel formation on all four sides, and the interior space filled with a non-organic sound deadening material at the time of assembly. Door Pans and Drawer Heads shall be painted inside and out prior to assembly.
a). All four corners of door and drawer heads shall be welded closed and ground smooth to eliminate exposure of raw edges and open gaps.
b). Glazed Hinged Door Contruction: Glazed swinging doors shall be 3/4” thick and consist of an inner and outer door pan welded to form a single unit. Outer door pan shall be 18 gauge steel, formed into a channel or flanged shape at all four sides. It shall be pierced and formed to create a 3” wide frame with a beveled edge around the glass opening in the center of the door. Inner door pan shall be 18 gauge steel, flanged at all four sides, pierced for a glass opening in center of the door, with 16 gauge hinge reinforcements welded in place. Glazing shall be held in place by a rubber or vinyl gasket around the entire edge of the glass. Outer door pan shall be prepared as necessary to accept attachment of pulls as specified elsewherein this section.

g. Drawer Construction:

1). Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and inner front. They shall be fully coved at interior bottom on all four sides for easy cleaning. Sides shall be full height with ½ inch (13 mm) clearance to frame opening. Drawers shall be a minimum of 18 inches front to back.
2). Drawer Suspension: Refer to Drawer Slides under Hardware section.
3). Drawer stops: shall be provided to insure smooth, quiet operation at point of contact with cabinet front.

h. Top Horizontal Rail: Provide on base cabinets such that rail shall interlock within the flange at top of end panels for strength. Reinforcements shall be provided at all front corners for additional welded strength between vertical and horizontal case members.
i. Intermediate Rails: Provide on base cabinets such that rails shall be provided between doors and drawers, but shall not be provided between drawers unless made necessary by locks in drawers. When required, intermediate rails shall be recessed behind doors and drawer fronts, and designed so that security panels may be added as required.
j. Intermediate Vertical Uprights: shall be furnished to enclose cupboards when used in a unit in combination with a half width bank of drawers. However, to allow storage of large or bulky objects, no upright of any type shall be used at the center of double door cupboard units.
k. Security Panels: Provide security panels in frames between drawers and cabinets within a cabinet where keyed different locks are indicated.
l. Knee Space Service Strip Cover Panels where specified, shall be 18 gauge (1.3 mm thick) steel, of the same finish as cabinets, and shall be furnished at open spaces under counter top where no cabinets occur. They shall be easily removable and shall cover piping from underside of top of service ledge to floor.
m. Provide filler panels where required between cabinets, at corner intersections of cabinets, between cabinets and walls and wherever else required for a complete finished installation. For tall cabinets, filler panels shall be provided for vertical face and top. For wall cabinets, filler panels shall be provided for vertical face, top and bottom. Filler panels shall follow the profile of toe kicks.

4. Metal-Framed Laboratory Tables
a. Tops: Refer to Laboratory Furnishing drawings for worktop materials, described in the Laboratory Work Surfaces section of this specification.
b. Vibration absorbing isolation: Provide a continuous wide bead of clear silicone sealant to the top of all supporting rails. Allow complete cure before attachment of the work surface.
c. Electrical receptacles: Where indicated on the Laboratory Furnishings or Electrical drawings provide cutouts for electrical receptacles as work of this Section and coordinate with Division 26. Cord, plug, back boxes, electrical devices, faceplates, wiring, and junction boxes shall be provided under the work of Division 26.
d. Leveling Glides and Leg Shoes:
1). Each leg other than those fitted with casters shall have leveling glides: (2 inch) (48 mm) diameter, two-piece pivot construction, steel housing, nonmarring, phenolic or translucent plastic insert, (1/2 inch) (12 mm) diameter, minimum (1 1/2 inch) (36 mm) long zinc plated stems. Each glide shall have a load bearing capacity of 150 lbs.
2). Each leg other than those fitted with casters and adjustable-height legs, shall have leg shoes: Black coved vinyl or rubber leg shoe, 2 inches (50 mm) in height.
e. Construction:
1). Table rails, legs, and spreader rails (where shown) shall be fully welded into a single-piece table frame structure. No mechanical joints between members are permitted.
f. Rails: Not less than 1½ inch x 4½ inch 16 gauge (38 x 114 x 1.6 mm) channel steel sections, reinforced as necessary for leg attachment.
g. Legs: Not less than 2 inch x 2 inch 16 gauge (50 x 50 x 1.6 mm) square tubular steel sections.
h. Where shown, leg rails and spreader rail: Not less than 1¼ inch x 2½ inch 16 gauge (32 x 63 x 1.6 mm) steel sections, reinforced as necessary for leg attachment.
i. Materials and Finish: Refer to Metal Fabrications specifications in this Section for material and finish requirements.
j. Low level shelf: If shown on Laboratory Furnishing drawings shall be of 20 gauge (1.0 mm thick) steel sheet with perimeters formed down ¾ inch (19 mm). Shelves over 36 inches wide shall be reinforced by a flanged channel shaped member electro-welded to underside of shelf.

5. Aprons and leg assemblies:

a. Apron: Not less than 1½ inch (38 mm) x 4 inch (114 mm) 16 gauge (x 1.6 mm thick) channel steel sections, reinforced as necessary for leg attachment.
b. Legs: Not less than 2 inch (50 mm) x 2 inch (50 mm) 16 gauge (x 1.6 mm thick) square tubular steel sections.
c. Leg rails: Not less than 1¼ inch (32 mm) x 2½ inch (63 mm) 16 gauge (x 1.6 mm thick) steel sections, reinforced as necessary for leg attachment. Each leg shall have a recessed leveling screw and a black, coved vinyl or rubber leg shoe, 2 inches (50 mm) in height.

6. Fume Hood Cabinets:
   a. Purpose-designed metal cabinet with fixed panel above door to conceal cup sink and plumbing.
   b. Provide metal fume hood cabinets where adjacent cabinetry below a fume hood is also metal.
7. Corrosives Storage Cabinets:
   a. Manufacturers:
      1). Manufacturers of metal laboratory casework.
      2). Justrite Manufacturing Company, 2454 Dempster St., Suite 300, Des Plaines, IL 60016 Tel: 800 798-9250.
      3). Approved substitution/equal.
   b. Purpose-designed lined metal cabinet.
   c. Lining: All interior surfaces of the cabinet shall be coated with a 100% seamless non-porous flame-coated thermoplastic liner. Liner shall be applied to all interior walls, ceiling, sump, door interiors, and shelving. Basis of design: Justrite Chemcor. No known equal.
      1). Shelf: Removable adjustable full-depth metal shelf coated with lining material. Full-depth is defined as a shelf whose front edge is within ½ inch (13mm) of the face of the cabinet when the shelf is fully back in the cabinet.
   d. Label: "CORROSIVES" in conspicuous silk-screened lettering. Stick-on decals are not acceptable. Size and style of lettering shall match the Flammable Liquid/Solvent Storage Cabinet label. Lettering shall be 2 ½ inches tall. Color of lettering shall be red. If cabinet color is red, lettering shall be yellow.
   e. Locks: Cabinet doors shall be lockable. Lock shall have not metal parts exposed within the lined interior.
   f. Venting:
      1). Cabinets below or adjacent to fume hoods: Provide and install 2 inch (50 mm) diameter schedule 40 PVC vent pipe and PVC fittings. Termination of vent pipe maybe one of the following:
         a). Extend vent pipe 4 inches (100 mm) above dished worktop, behind the baffle in the hood, as shown on the drawings. Provide hole through fume hood work surface above the corrosive storage cabinet to accommodate 2 inch (50 mm) diameter vent pipe. Seal gap around penetration with clear silicone sealant.
         b). Extend vent pipe up within the fume hood side wall and vent through the hood side wall liner behind the upper portion of the fume hood baffle.
      2). Cabinets not below or adjacent to fume hoods: Vent connection to exhaust duct system shall be by Division 23. Provide hole in back of cabinet to accept exhaust connection.
   g. Seismic Anchor: Provide seismic anchor for freestanding cabinets and cabinets located below fume hoods designated to be removable for access for persons with disabilities. Seismic anchors may be floor or wall attachments, but shall not attach to adjacent casework or work surfaces. Seismic anchors shall be accessible without removal of laboratory casework, furnishings, or equipment.
8. Flammable Liquid/Solvent Storage Cabinets:
   a. Manufacturers:
      1). Manufacturers of metal laboratory casework.
      2). Eagle Manufacturing Company, 2400 Charles St., Wellsburg, WV 26070 Tel: 304 737-3171.
      3). Justrite Manufacturing Company, 2454 Dempster St., Suite 300, Des Plaines, IL 60016 Tel: 800 798-9250.
      4). Approved substitution/equal.
   b. Purpose-designed double-walled metal cabinet for the storage of flammable, combustible and solvent liquids.
   c. Cabinet doors: Well-fitting, metal, self-closing and self-latching with fusible lead links and door sequencer.

d. Label: "FLAMMABLE - KEEP FIRE AWAY" in conspicuous silk-screened lettering. Stick-on decals are not acceptable. Size and style of lettering shall match that of the Corrosive Storage Cabinet label. “FLAMMABLE” lettering shall be 2 ½ inches tall. “KEEP FIRE AWAY” lettering shall be 2 inches tall. Color of lettering shall be red. If cabinet color is red, lettering shall be yellow.
e. Locks: Cabinet doors shall be lockable.
f. Floor pan: Provide a 2 inch (50 mm) deep liquid tight pan to cover the entire bottom of the cabinet to contain liquid leaks and spills.
g. Shelves: Provide heavy-duty full-depth metal shelves using pan-type construction to create a liquid-tight containment tray.
h. Casters: Provide cabinets with lockable casters where indicated on the Laboratory Furnishing drawings.
i. Standards:
   1). Comply with the requirements of OSHA and NFPA 30.
   2). Comply with the requirements of Uniform Fire Code and the International Fire Code with with UL 1275 and FM 6050 labels.
j. Flammable liquid/solvent storage (base) cabinets shall not be vented. Seal vent openings with bungs as provided by manufacturer.
k. Venting of tall cabinets:
   1). Remove both metal bungs from cabinet outlets and replace with flash arrestors provided by manufacturer. Connection with 2 inch (50 mm) black iron vent piping to the HVAC systems as shown on LF drawings shall be by Division 23.
   2). Vents from multiple cabinets shall not be manifolded prior to connection to the building system.
l. Electrical grounding:
   1). Provide each flammable liquid / solvent storage cabinet with an externally mounted grounding conductor screw terminal for up to #8 AWG conductor, mounted at the top of the cabinet.
   2). Connection from the equipment grounding bus at the lab branch circuit panel to the storage cabinet terminal shall be by Division 26.
m. Seismic Anchor: Provide seismic anchor for freestanding cabinets and cabinets located below fume hoods designated to be removable for access for persons with disabilities. Seismic anchors may be floor or wall attachments, but shall not attach to adjacent casework or work surfaces. Seismic anchors shall be accessible without removal of laboratory casework, furnishings, or equipment. Anchor attachment shall not void UL listing.

9. Metal Casework Construction Performance: Base cabinets shall be constructed to support a uniformly distributed load of 200 lbs. minimum per square foot (1000 kg/m²) of cabinet top area (total maximum of 2000 lbs. (900 kg)), including working surface without objectionable distortion or interference with door and drawer operation.
   a. Base cabinet corner gussets with leveling bolts shall support 500 lbs. (225 kg) per corner, at 1½ inch (38 mm) projection of the leveling bolt below the gusset.
   b. Each adjustable and fixed shelf 4 feet (1219 mm) or shorter in length shall support an evenly distributed load of 40 lbs. per square foot (200 kgf/m²) up to a maximum of 200 lbs. (90 kg), with nominal temporary deflection, but no permanent set.
   c. Drawer assemblies shall automatically maintain alignment in cabinet opening and shall not bind during opening or closing of the drawer so as to minimize glass breakage and damage to fragile parts.
   d. Swinging doors mounted on base units shall support a 250 lb. (113 kg) load located at a test point 14 inches (356 mm) measured horizontally from hinge along the top edge of door through a swing of 180 degrees. Weight test shall allow nominal temporary deflection, but no permanent distortion. Door assembly shall be twist- resistant and rigid, and shall close in a flat plane against the cabinet to permit the door catch at top of door to function properly.

C. Hardware: As specified elsewhere in this Section.

D. Metal Casework Color: As selected by the Architect from manufacturer's full color line and complying with finish requirements described below.

E. Metal Casework Finish Requirements:

1. Paint finish for steel laboratory products shall utilize a dry coating process with minimal waste generation. Liquid-applied coatings shall not be acceptable. Manufacturer shall supply documentation that waste generated during the painting process, is a solid, non-hazardous material.
   a. Pretreatment: Finish process shall incorporate a phosphate conversion coating during the pretreatment/cleaning operation.
   b. Operator Protection: The painting process shall be cleanly contained, have no solvent odor and be performed in an air-conditioned room.
   c. VOC (Volatile Organic Compounds) emissions shall not exceed 0.29 lbs per gallon (35 g/L).
   d. Offgasing: No further emissions or "Offgasing/Decomposition" vapors shall occur at room temperature from installed finished parts.
2. Preparation: After the units have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish to the metal and to aid in the prevention of corrosion. Physical and chemical cleaning of the metal shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a heated cleaner/phosphate solution and pretreated with iron phosphate spray followed by a neutral final seal prior to application of final finish. The strength of each solution shall be monitored by filtration to insure consistent quality. All treated parts shall be immediately dried in heated ovens and gradually cooled before application of the finish. Treated metal parts shall be clean and properly prepared to provide optimum adhesion of finish and resistance to corrosion.
3. Application: Electrostatically apply powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thicknesses:
   a. All surfaces, exterior or interior, exposed to view, shall receive sufficient powder coat to achieve an average 1.5 mil (38 µm) film thickness with a minimum 1.2 mil (30 µm) film thickness and shall have smooth satin luster.
   b. Backs of cabinets and other surfaces not exposed to view shall have sufficient powder coat to achieve an average 1.0 mil (25 µm) film thickness.
4. All drawer bodies to be finished in matching color or in a uniform neutral color.
5. Concealed interior parts shall receive corrosion-resistant treatment.
6. Finish must be UV stable.

F. Metal Finish Performance Requirements:
   1. Manufacturer shall submit metal finish performance testing results. Testing to be performed by independent testing agency.
   2. Chemical resistance:
      a. Test procedure: Place samples on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73+ 3F (23(+ 2(C) and 50+ 5% relative humidity, or the currently accepted guideline set by ASTM. Test the samples for chemical resistance using forty-nine different chemical reagents by one of the following methods. For both methods, leave the reagents on the sample for a period of one hour. Wash off the sample with water, clean with detergent and naptha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73± 3°F (23°± 2°C) and 50± 5% relative humidity, or the currently accepted guideline set by ASTM
         1). Method A: Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.574cc) bottle and inverting the bottle on the surface of the sample. The cotton ball shall remain in contact with the sample for the duration of the test.
         2). Method B: Test non-volatile chemicals by placing five drops of the reagent on the surface of the sample and covering with a 24mm watch glass, convex side down.
      b. Rating System: Evaluations shall use the following rating system:

Level 0	No detectable change.
Level 1	Slight change in color or gloss.
Level 2	Slight surface etching or severe staining.
Level 3	Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

      c. Acceptance Level:
         1). Individual test results for the specified 49 reagents shall be within the Range for that reagent as specified on the table below.
         2). There shall be no more than four (4) Level 3 conditions.

d. Table of reagents:

Test No.	Chemical Reagent	Test Method	Range
1.	Acetate, Amyl	A	0-1
2.	Acetate, Ethyl	A	0-2
3.	Acetic Acid, 98%	B	0-3
4.	Acetone	A	0-1
5.	Acid Dichromate, 5%	B	0-1
6.	Alcohol, Butyl	A	0-1
7.	Alcohol, Ethyl	A	0-1
8.	Alcohol, Methyl	A	0-1
9.	Ammonium Hydroxide, 28%	B	0
10.	Benzene	A	0-2
11.	Carbon Tetrachloride	A	0-1
12.	Chloroform	A	0-2
13.	Chromic Acid, 60%	B	0-2
14.	Cresol	A	0-2
15.	Dichloroacetic Acid	A	0-3
16.	Dimethylformamide	A	0-2
17.	Dioxane	A	0-2
18.	Ethyl Ether	A	0-1
19.	Formaldehyde, 37%	A	0-1
20.	Formic Acid, 90%	B	0-3
21.	Furfural	A	0-3
22.	Gasoline	A	0
23.	Hydrofluoric Acid, 37%	B	0-2
24.	Hydrofluoric Acid, 48%	B	0-3
25.	Hydrogen Peroxide, 30%	B	0-1
26.	Iodine, Tincture of	B	0-2
27.	Methyl Ethyl Ketone	A	0-2
28.	Methylene Chloride	A	0-2
29.	Monochlorobenzene	A	0-2
30.	Naphthalene	A	0-1
31.	Nitric Acid, 20%	B	0-1
32.	Nitric Acid, 30%	B	0-1
33.	Nitric Acid, 70%	B	0-3
34.	Phenol, 90%	A	0-2
35.	Phosphoric Acid, 85%	B	0-1
36.	Silver Nitrate Saturated	B	0
37.	Sodium Hydroxide 10%	B	0
38.	Sodium Hydroxide 20%	B	0
39.	Sodium Hydroxide 40%	B	0-1
40.	Sodium Hydroxide Flake	B	0
41.	Sodium Sulfide Saturated	B	0
42.	Sulfuric Acid, 33%	B	0
43.	Sulfuric Acid, 77%	B	0
44.	Sulfuric Acid, 96%	B	2-3
45.	Sulfuric Acid 77% & Nitric Acid 70% equal parts	B	1-3
46.	Toluene	A	0-1
47.	Trichloroethylene	A	0-1
48.	Xylene	A	0-1
49.	Zinc Chloride, Saturated	B	0

3. Hot Water Test
   a. Test Procedure: 190°F to 205°F (88°C to 96°C) hot water shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces (177.5 cc) per minute) on the finished surface, which shall be set at an angle of 45°, for a period of 5 minutes.
   b. Acceptance Level: After cooling and wiping dry, the finish shall show no visible effect from the hot water.
4. Paint Adhesion on Steel Test

a. Test Procedure: Test shall be based on ASTM D2197-86 “Standard Method of Test for Adhesion of Organic Coating.” Two sets of eleven parallel lines 1/16 inch (1.587 mm) apart shall be cut with a razor blade to intersect at right angles thus forming a grid to 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. Brush surface lightly with a soft brush for one minute. Examine under 100 fc (1076 lux) of illumination.
b. Acceptance Level: Ninety or more of the squares shall show finish intact.

5. Impact Test
   a. Test Procedure: Drop a 1 lb (0.4536 kg) ball (approximately 2 inch (50.8 mm) diameter from a distance of 12 inches (305 mm) onto a flat horizontal surface, coated to manufacturer’s standard manufacturing method.
   b. Acceptance Level: No visual evidence to the naked eye of cracks in the finish due to impact.
6. Paint Hardness on Steel Test
   a. Test Procedure: Paint film shall be tested with pencils of various hardnesses. Pencils shall have a wide, sharp edge. Pencils shall be pushed across surface in a chisel-like manner.
   b. Acceptance Level: Finish film shall not rupture from a sharpened 4H pencil.

G. Shop Casework

1. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
   a. Greene Manufacturing, Inc., 3985 South Fletcher Road, Chelsea, MI 48118 Tel: 800-396-4642. Manufacturer of Dura-Tech product range.
   b. Lista International Corporation, 106 Lowland Street, Holliston, MA 01746-2094 Tel: 800-722-3020.
   c. Approved substitution/equal.
2. Modular Shop Cabinets
   a. Basis of Design: Dura-Tech Modular Technical and Industrial Cabinets, or equivalent.
   b. Cabinet Requirements:
      1). Heavy duty load rated construction.
      2). All welded case and frame construction.
      3). Outer shell is constructed from 16 gauge furniture grade steel utilizing all welded construction.
      4). Bases are equipped standard with a 4” high recessed riser base including floor leveler glides.
      5). Full extension drawer glides rated for a minimum 125 lb up to 400 lb capacity.
      6). Drawer and door facings are full inner and outer headers securely welded together.
      7). All drawer components are formed from 18 gauge furniture grade steel.
      8). Door base cabinets feature an interior adjustable shelf.
      9). Cabinet shells are one piece side, back, and face frame.
      10). Wall cabinets feature all welded construction from 16 and 18 gauge steel and a full face frame with welded seams.
      11). 16 gauge interior shelves.
      12). Hardware:
         a). Provide satin finish stainless steel five-knuckle institutional grade hinges.
         b). Three-point cylinder locks as indicated on drawings and as specified elsewhere in this section.
         c). Pulls shall be stainless steel round “wire” as specified elsewhere in this section.
      13). Work surfaces as specified elsewhere in this section.

2.3 CABINET HARDWARE

A. General: Special cabinets, such as corrosives storage, flammable liquid and solvent storage, rock storage, map storage, museum storage, radioisotope storage, and narcotics lockers, may be provided with the manufacturer’s standard hardware.

1. All door and drawer pulls shall match, regardless of type of casework, except for:
   a. Polypropylene casework. Refer to the pull requirements as specified above.
   b. Flammable liquid/ solvent storage cabinets, which should use manufacturer’s standard latch handles as required to satisfy requirements of regulatory approvals.

2. All hardware shall be compliant with the ADA Standards for Accessible Design (28 CFR Part 36).

B. Drawer and Hinged Door Pulls:
   1. Drawer and door pulls shall attach to door or drawer with machine screws. Two (2) pulls shall be furnished on drawers wider than 28 inches (711 mm). Plastic pulls or other types subject to breakage are not acceptable.
   2. Type: Pulls shall be round "wire."
      a. Material and Finish:
         1). Stainless steel with finish as follows:
            a). BHMA 630 Satin (Previously US32D).
      b. Size:
         1). Length: 4 inches (100 mm) center to center of screw holes.
         2). Diameter: ¼ inch (6 mm).

C. Hinges:
   1. General: Hinges shall be attached to both door and case with three screws through each leaf. Provide two hinges for doors up to 48 inches (1219 mm) high; three hinges for doors over 48 inches (1219 mm) high.
   2. Type: Institutional with a five-knuckle bullet-type barrel. Characteristics:
      a. Height: 2½ inches (63 mm), nominal.
      b. Material: Stainless steel with stainless steel screws.
         1). Finish:
            a). BHMA 630 Satin (Previously US32D).
         2). Manufacturers:
            a). Rockford Process Control, Inc. 202 Seventh St., Rockford, IL 61104 Tel: 815 966-2000.
            b). Approved substitution/equal.

D. Shelf Hardware:
   1. Shelf Supports:
      a. Adjustable shelf supports: Adjustable clear plastic shelf support with lockdown clips.
   2. Manufacturers:
      a. Bainbridge Manufacturing, Inc., P. O. Box 487, 237 W 3rd, Waterville, WA 98858 Tel: 800 255-4702.
      b. The Engineered Products Company (Epco), P. O. Box 108, Flint, MI 48501 Tel: 313 767-2050.
      c. Knape & Vogt Manufacturing CO., 2700 Oak Industrial Dr. NE, Grand Rapids, MI 49505 Tel: 616 459-7620.
      d. Sugatsune America, Inc. 221 East Selandia Lane, Carson, CA 90746 Tel: 310 329-6373.
      e. Approved substitution/equal.

E. Catches:
   1. Roller Catches:
      a. Types and Materials: Roller catches shall be one of the following types. All-plastic or knuckle-type catches are not acceptable, except at corrosive storage cabinets.
         1). Tension ball catches consisting of a case with an adjustable-tension ball catch and a martching strike. Components shall be either stainless steel, chrome plated zinc alloy, or chrome-plated brass.
         2). Nylon roller housed in a steel case, which catches on a steel strike plate. Steel components shall be zinc finished.
         3). At metal casework base cupboard, catches may consist of a two-piece heavy-duty cam action positive catch positioned near the pivoting edge of door which provides a clean unobstructed opening. Main body of the catch shall be confined within an integral cabinet divider rail, while latching post shall be mounted on the hinge side of door.
         4). At corrosive storage cabinets, catches shall be non-metallic.
      b. Application: Provide roller catches at top of all cabinet doors without elbow catches.
      c. Manufacturers:
         1). The Engineered Products Company (Epco), P. O. Box 108, Flint, MI 48501 Tel: 313 767-2050.
         2). Sugatsune America, Inc. 221 East Selandia Lane, Carson, CA 90746 Tel: 310 329-6373.

3). Approved substitution/equal.

2. Elbow catches: Heavy-duty, adjustable, spring-type elbow catch and strike plate.
   a. Material: Brass or steel with bright chromium plated finish.
   b. Application: Elbow catches shall be used on left hand doors of locked double door cabinets, including tall cabinets.
      1). At tall cabinets, elbow catch shall latch to fixed center shelf. Latching devices using chains or strings are not acceptable.
   c. Manufacturers:
      1). The Engineered Products Company (Epco), P. O. Box 108, Flint, MI 48501 Tel: 313 767-2050.
      2). Approved substitution/equal.

F. Drawer slides:
   1. Typical: Ball bearing slides:
      a. Material:
         1). Clear, zinc-coated steel.
      b. Full extension, 100 lb/pr. (45 kg/pr.) capacity: Accuride 3832, Fulterer FR5000, or equal.
      c. File drawers and other drawers noted as having heavy duty slides shall be equipped with rail mounted with overtravel, 150 lb/pr. (68 kg/pr.) capacity: Accuride 4034, Fulterer 5755, or equal.
      d. Manufacturers:
         1). Accuride, 12311 Shoemaker Ave., Santa Fe Springs, CA 90670 Tel: 562 903-0200.
         2). Hettich America LLP, 6225 Shiloh Road, Alpharetta, Georgia 30005 Tel: 770 887-3733.
         3). Fulterer USA, 542 Townsend Ave., High Point, NC 27263 Tel: 800 395-4646.
         4). Waterloo Furniture Components Inc., 501 Manitou Dr., Kitchener, Ontario, Canada N2C 1L2 Tel: 519 748-5060.
         5). Approved substitution/equal.

G. Drawer Stops: All regular drawers shall be equipped with integral stops to prevent drawer head impact with cabinet body.

H. Door Stops: Provide door stops for any cabinet door, which will strike an obstruction when opened between 90° and 135°.
   1. Stop to be either:
      a. Sash chain, #30 zinc-plated steel.
         1). Terminations: Zinc chromate wire screw eyes. Open eye as required to attach stop with screws. Through-bolting not allowed.
      b. Coated cable.
         1). Seven-strand, 7-wire-per-strand, stainless steel cable with clear nylon coating.
         2). Wire diameter: 0.047 inches.
         3). Composite diameter with coating: 0.063 inches.
         4). Terminations: Number 10 stake eye on both ends. Attach to door/cabinet with screws. Through-bolting not allowed.
         5). McMaster Carr part number 30345T3 or equivalent.
   2. Engineer stop to length to allow door to open 1 ½ inch (40 mm) from obstruction.

I. Hanging File Suspension System: Hangers shall be fastened and secured to drawer construction and shall not be freestanding units set inside the drawer. Provide in all file drawers.
   1. Basis of Design: Blum Metafile Hanging File Frame Kit.
   2. Manufacturers:
      a. Julius Blum, Inc. 7733 Old Plank Rd., Stanley, NC 28164 Tel: 800 438-6788.
      b. Hettich America L. P., 6225 Shiloh Rd., Alparetta, GA 30005 Tel: 800 438-8424.
      c. Approved substitution/equal.

J. Label holders: Provide label holders, pinned in place. Stick-on holders not acceptable. Label holders shall be provided at all file drawers, and elsewhere as shown on drawings.
   1. Size:
      a. Minimum Size: 1 inch (25mm) x 2 inches (50mm)
      b. Maximum Size: 2 inches (50mm) x 3 ½ inches (90mm)
   2. Material and finish:

a. Steel with matt chrome finish.
3. Basis of Design Product:
a. 704ANO Label Holder by Knape & Voght, 2700 Oak Industrial Drive NE, Grand Rapids, MI 49505 Tel: 800 253-1561.
b. Approved substitution/equal.

K. Number Plates: Provide 5/8 inch (16 mm) x 1 ¼ inches (32 mm) aluminum number plates with black numbers, pinned in place. Stick-on holders not acceptable. Number plates shall be provided at all drawers where indicated on the plans. Number drawers sequentially in each laboratory as directed by Architect and Owner.

L. Locks:
1. General: Provide locks on all file cabinet drawers. Provide locks at other locations as indicated on the drawings.
2. Lock type: Deadbolt-type lock.
a. Disc-tumbler-type locks and/or cam-type locks will not be accepted.
b. Framed sliding door locks shall be plunger type.
c. Refer to Elbow Catches section, above, for requirements at two-swinging-door cabinets.
3. Testing requirements:
a. Locks shall comply with ANSI/BHMA standard E07121.
b. Lock shall be cycle tested per ANSI/BHMA A156.11 Grade 1.
4. Include spacers, adapters, fasteners, and strikes.
a. All locks shall strike into metal material. Striking directly into wood is not acceptable.
5. Barrel length shall be coordinated with specific conditions.
6. Finish: Locks shall have satin nickel or satin chrome finish.
7. Coordinate with Laboratory Furnishings plans.
8. Keying:
a. Key quantities: Provide two keys per lock. Provide four copies of any master/ grand master keys.
b. Key system:
1). Key system shall support a minimum of 2000 different keys.
2). Key system shall support up to three levels of master keys (grand-master keys, master keys, and sub-master keys) in addition to individual keys.
c. Key cylinder type:
1). Coordinate key type with owner.
d. Key schedule: Coordinate key schedule with Owner.
9. Key engraving:
a. Keys to be engraved with an identification number corresponding to the layout of unique keys on the project. All identical keys shall be engraved with the same number.
b. At laboratories with multiple, individually-locked drawers where number plates are indicated, engrave each key with number to match the number plate on each drawer.
10. Manufacturers:
a. Swinging Doors and Drawers:
1). Illinois Lock Company, 301 West Hintz Rd., Wheeling, IL 60090 Tel: 847 537-1800.
2). National Cabinet Lock, 200 Old Mill Rd., P. O. Box 200, Mauldin, South Carolina 29662 Tel: 864-297-6655.
3). Olympus Lock, Inc. 18424 Highway 99, Lynnwood, Washington 98037 Tel: 206 362-3290.
4). Approved substitution/equal.

M. Fixed Padlock Eye
1. Stainless-steel fixed padlock-eye and strike plate at cabinet locations as indicated on the drawings. Strike plate, or protection plate, shall be large enough to prevent padlock from damaging door or drawer front.
2. Rotating cam-type padlock hasps are not acceptable and shall not be provided.

N. Glides: Non-marring material, 1 inch (25 mm) diameter, minimum, with at least 5/8 (16 mm) vertical adjustment. Provide on movable tables, unless otherwise indicated.

O. Leveling devices: Provide each table leg with 3/8 inch (10 mm) minimum diameter leveling bolt and floor clip.

P. Leg shoes: Leg shoes shall be provided on all legs and table legs to conceal leveling devices, except for tables with casters. Shoes shall be 2 ½ (63 mm) inch high and of black rubber or pliable black vinyl material. Use of a leg shoe which does not conceal leveling device is not acceptable.

Q. Floor clips: Provide leg assemblies and fixed table legs with floor clips securely fastened to the floor after shimming.

R. Casters: Where indicated on Laboratory Furnishing drawings, provide sets of 3 ½ inch (89 mm) diameter wheels with self-lubricating bearing, rated to carry 250 pounds (113 kg) minimum each. Each caster must swivel and have a locking brake. Wheel shall be of molded polyurethane tread mechanically locked to a polyolefin core.

1. Material: Caster shall be heavy gauge cold rolled steel with bright zinc plating.

S. Support Struts and Service Ledging: Refer to specifications for slotted channel framing in this Section.

2.4 ZOOLOGY AND ORNITHOLOGY SPECIMEN CABINETS

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.

1. Lane Science Equipment Corporation, 225 West 34th Street, New York, NY 10122 Tel: 212 563 0663.
2. Viking Metal Cabinet Co., 5321 West 65th Street, Chicago, IL 60638 Tel: 800 776 7767.
3. Delta Design Ltd., P. O. Box 1733, Topeka KS 66601 Tel: 785 234-2244.
4. Approved substitution/equal.

B. Basis of Design: Lane Model 201 stackable zoology and ornithology specimen cabinet, or equal.

C. Size: 46 1/2 inches wide x 28 1/32 inches deep x 42 1/16 inches tall.

D. Cabinet: Single compartment with double wall construction, two lift off double-paneled doors with elastomeric door seals and fumigant compartments, and guides for a maximum of 9 high rim storage trays or 18 low rim storage trays.

E. Trays:

1. Where indicated, provide 9 high rim masonite/aluminum trays, model 201-T, 3 ½ inches high x 42 3/8 inches wide x 26 inches deep.
2. Where indicated, provide 9 high rim powder coated steel trays, model 201-T/S, 3 ½ inches high x 42 3/8 inches wide x 26 inches deep.

F. Provide seismic anchorage suitable for cabinets stacked in configuration shown.

2.5 MAP STORAGE FILE

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.

1. Mayline Company, Inc., 619 N. Commerce, P.O. Box 728, Sheboygan, WI 53082 Tel: 414 457-5537.
2. Thermo Fisher Scientific, 1316 18th Street, Two Rivers, WI 54241 Tel: 920 793-1121.
3. Viking Metal Cabinet Co., 5321 West 65th Street, Chicago, IL 60638 Tel: 800 776-7767.
4. Approved substitution/equal.

B. Basis of Design: Stackable, interlocking steel plan files with coated fabric dust covers in each drawer for storing maps up to 24 inches x 36 inches as follows:

1. Flush base: Mayline 7767-W, or equal.
2. Five drawer units: Mayline 7767-D, or equal.
3. Steel cap: Mayline 7767-U, or equal.

2.6 LABORATORY WORK SURFACES

A. Epoxy Resin:

1. Manufacturers: Products complying with this specification may be provided by the following manufacturers.
   a. Durcon Laboratory Tops, Inc., 206 Allison Drive, Taylor, TX 76574 Tel: 512-595-8000.

b. Epoxyn Products, 500 E. 16th Street, Mountain Home, AR 72653 Tel: 870 425-4321.
c. Kewaunee Scientific Corporation, P O Box 1842, Statesville, NC 28687 Tel: 704 873-7202.
d. Prime Industries, Inc., 2600 Warrenville Road, Suite 205, Downers Grove, IL 60515 Tel 630-725-9200
e. Approved substitution/equal.

2. Thickness:
   a. Typical work surface: 1 inch (25 mm).
   b. Fume hood work surfaces: Tops shall be 1¼ (32 mm) inches thick at outer edge, indented minimum ¼ inch (6 mm) to provide a raised rim around all exposed edges 1 inch (25 mm) wide, minimum, or as to allow for the fume hood sash. The front top edge of the raised rim and exposed vertical corners of the top shall be rounded or chamfered to a 1/8 inch (3 mm) radius. The juncture between the raised rim and the top surface shall be coved or chamfered to a ¼ inch (6 mm) radius.
   c. Curbs and Splashes: ¾ inch (19 mm).
3. Color:
   a. Black.
   b. Color sample to be approved by Architect before work is put in hand.
4. Description:
   a. Monolithic filled epoxy resin work surface consisting of a polymerized cast resin material oven-cured in molds.
   b. Drip Grooves: Provide under all work surface exposed edges, unless noted otherwise on the Laboratory Furnishing Drawings. Drip grooves shall be ½ inch (13 mm) from the front edge where the top overhangs 1 inch (25 mm) and ¼ inch (6 mm) from the edge where the edge overhangs ½ inch (13 mm).
   c. Edge profile: For all exposed upper edges and corners:
      1). Bevel eased: 1/8 inch (3 mm) machined bevel with blended radius corners.
   d. Marine edges: Where indicated on the Laboratory Furnishing Drawings, shall be 1 inch (25 mm) wide and ¼ inch (6 mm) high with chamfered or radiused transition to and be an integral part of the work surface.
   e. Sink Mounting:
      1). Drop-in Sink Cutouts: Cutouts shall be profiled to provide support for the sink, and to ensure that the rim of the installed sink is 1/8 inch (3 mm) below the surrounding work surface level or bottom of drain grooves, if present. The top edge of the cutout shall have 1/8 inch (3 mm) bevel. Ensure that there shall be no gaps between the installed sink rim and work surface.
   f. Curbs and Splashes:
      1). Height: 4 inches (100 mm), unless noted otherwise on Laboratory Furnishing Drawings.
      2). Bonded to the surface of the top to form a square joint.
   g. Provide all holes and cutouts as required for built-in equipment and mechanical and electrical service fixtures. Verify size of opening with actual size of equipment to be used prior to making openings. Form inside corners to a radius of not less than 1/8 inch (3 mm). After sawing, rout and file cutouts to ensure smooth, crack-free edges. Seal exposed edges after cutting with a waterproofing material recommended by the manufacturer.
   h. Provide full-length, one-piece tops and backsplashes wherever possible, and keep field joints to an absolute minimum.
5. Physical Properties:
   a. Chemical resistance:
      1). Organic solvents: A cotton ball, saturated with the test chemical, is placed in a one ounce bottle with a reservoir of liquid above the ball. The container is inverted on the test material surface for a period of 24 hours. Test temperature: 23°C ±2°C.
      2). Other test chemicals: Five drops (1/4 cc) of the test chemical are placed on the test material surface. The chemical is covered with a 1 inch diameter watch glass for a period of 24 hours. Test temperature: 23°C ±2°C.
      3). Evaluation: After 24 hours exposure, exposed areas are washed with water, then a detergent solution, finally with naphtha, then rinsed with distilled water, dried with a cloth, and rated as follows:

0	No effect	No detectable change in the material surface.

1	Excellent	Slight detectable change in color or gloss but no change in function or life of the surface.
2	Good	A clearly discernable change in color or gloss but no significant impairment of surface life or function.
3	Fair	Objectionable change in appearance due to discoloration or etch, possibly resulting in deterioration of function over an extended period of time.
4	Failure	Pitting, cratering, or erosion of the surface. Obvious and significant deterioration.

4). Test results:

Test chemical	Concentration	Black	Dark gray	Light gray	Beige
Chromic acid	40%	3	2	2	2
Hydrochloric acid	10%	0	0	0	0
Hydrochloric acid (conc.)	37%	0	0	0	0
Nitric acid	40%	0	0	0	0
Nitric acid (conc.)	70%	0	0	0	0
Sulfuric acid	60%	0	0	0	0
Sulfuric acid (conc.)	96%	4	4	4	4
Acetic acid	5%	0	0	0	0
Acetic acid (glacial)		0	0	0	0
Citric acid	1%	0	0	0	0
Oleic acid		0	0	0	0
Phenol solution	5%	0	0	0	0
Ammonium hydroxide	10%	0	0	0	0
Sodium carbonate sol.	20%	0	0	0	0
Sodium hydroxide sol.	60%	0	0	0	0
Sodium hypochlorite sol.	4%	0	0	0	0
Acetone		1	1	1	1
Benzene		1	1	1	1
Carbon tetrachloride		1	1	0	0
Diethyl ether		0	0	1	1
Dimethyl formamide		0	0	0	0
Ethyl acetate		0	1	1	0
Ethyl alcohol	95%	0	0	0	0
Ethylene dichloride		0	0	0	0
Heptane		0	0	1	0
Isooctane		0	0	0	0
Kerosene		0	0	0	0
Methyl alcohol		0	0	0	0
Toluene		0	0	0	0
Aniline		0	0	0	0
Mineral oil		0	0	0	0
Olive oil		0	0	0	0
Soap solution	1%	0	0	0	0
Transformer oil		0	0	0	0
Turpentine		0	0	0	0

b. Heat resistance:

1). High temperature test: A porcelain crucible is heated to a dull red color, placed on the test material, and allowed to cool to ambient temperature. Result: No observable surface deformation.

2). Flame test: A 3/8 inch (10 mm) Bunsen burner is adjusted to a quiet flame with a 1½ inch (38 mm) inner cone, overturned on the test material, and allowed to stay for 5 minutes. Result: no observable surface deformation.

c. Physical properties:

Compressive strength	ASTM D695	31,400 psi (216 MPa)
Tensile strength	ASTM D638	8,000 psi (55 MPa)
Flexural strength	ASTM D790	11,700 psi (81 MPa)
Rockwell hardness "M"	ASTM D785	105-110
Specific density	ASTM D792	122.4 lb/ft³ (1960 kg/m³)
Water absorption	ASTM D570	0.01%
Fire Resistance	ASTM D635	ATB (sec)=0
Heat deflection @ 264 psi (1.82 MPa)	ASTM D648	205°F (172°C)

B. Stainless Steel: Refer to Stainless Steel Fabrications section of this specification.

2.7 DOWNDRAFT DISSECTION TABLE WITH HINGED COVER

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
1. Mopec, 21750 Coolidge Highway, Oak Park, MI 48237 Tel: 800 362-8491.
2. Thermo Shandon, 171 Industry Drive, Pittsburgh, PA Tel: 800 547-7429.
3. Mortech Manufacturing Company, 45 La Porte St., Arcadia, CA Tel: 800 410-0100.
4. Jewett, 275 Aiken Rd., Asheville, NC 28804 Tel: 800 879-7767.
5. Approved substitution/equal.

B. Basis of Design: Mopec Model HB450-MOD (modified) as specified herein, or equal.

C. Description: Downdraft dissecting table for dissection of cadavers.

D. Product Characteristics:
1. All 14 gauge (2.0 mm) stainless steel construction, with a #4 satin finish. Sub-frame shall be 12 gauge (2.8 mm) stainless steel.
2. All inside and outside corners and edges rounded for easy cleaning. Heliarc welded seams and joints, ground and polished to a smooth finish.
3. Four 1-1/2 inch (38 mm), minimum, tubular legs with adequate cross support. Legs to be manual adjustable height with hand crank operation adjustable from a maximum of 30 inches above finish floor to a minimum of 36 inches above finished floor. Legs rest on 5 inch (125 mm) diameter casters with swivel locks and wheel brakes.
4. Stainless steel hinged hood, continuously welded, with corner reinforcing strap. Provide continuous stainless steel hinges. Provide latches to lock hood covers open below the table during use and to lock hood close when not in use.
5. Table shall drain toward one end. Drain outlet shall have PVC stop valve. Table shall have means of suspending a drain pail below the drain outlet and stop valve.
6. Work surface shall have perimeter perforations to a plenum below the table. The plenum shall be designed for even airflow and terminate in a single 6 inch (150 mm) diameter duct collar.
7. Clear, 6 inch (150 mm) diameter PVC hose shall be attached to plenum duct collar and shall be attached to exhaust system duct provided by Division 23.
   a. Hose shall be reinforced with white vinyl-covered spring steel wire helix.
   b. Hose shall be abrasion, moisture, corrosion, chemical, and weather-resistant.
   c. Hose wall shall be 0.05 inches (1.3 mm) thick.
   d. Hose shall be UL recognized for flame resistance to UL 94-VO.
   e. Provide metal hose clamp, Mopec "Q-F" or equal, with resilient seal. Provide chain through clamp handle to table leg to prevent loss of hose clamp.
8. Dimensions: 80 inches long x 30 inches wide x 36 inches high (2000 mm x 760 mm x 915 mm high) (to table top).

2.8 SHELVING ASSEMBLIES

A. High-Pressure Decorative (Plastic) Laminate Shelving:

1. Manufacturers/Facing material: Products complying with this specification may be provided by the following manufacturers.
   a. Nevamar Decorative Surfaces, One Nevamar Place, Hampton, SC 29924 Tel: 800 638-4380.
   b. Pionite Decorative Surfaces, One Pionite Road, P.O. Box 1014, Aubern, ME 04211 Tel: 800 746-6483.
   c. Wilsonart International, 2400 Wilson Place, P. O. Box 6110, Temple, TX 76503 Tel: 800 433-3222.
   d. Approved substitution (no known equal).
2. Approved Products:
   a. Nevamar ChemArmor.
   b. Pionite ChemGuard.
   c. Wilsonart ChemSurf
3. Color: To be selected by Architect.
4. Description:
   a. High-pressure decorative laminate, meeting or exceeding NEMA Standard LD3 2005 Grade HGP, HGL, or HGS requirements, consisting of a resin formulation applied over the decorative surface paper to achieve chemical resistance. The decorative paper shall be treated with melamine resin, and the core shall consist of kraft papers impregnated with phenolic resin. Sheets shall be bonded under high temperature and pressure. Product shall be developed for casework, work surface, and shelving surfaces in laboratories.
   b. Laminate shall be applied to top and bottom surfaces.
   c. Finish: Fine pebble-grained “crystal” texture or matte texture with slight sheen to minimize smudges and finger marks, and to provide optimum scratch resistance.
      1). Gloss: 15-16 +/- 3 gloss units.
   d. Physical Properties:
      1). Reference Standard: Plastic laminates shall meet or exceed ANSI/NEMA Specification LD3-2005 as specified herein.
      2). Minimum Thickness: 0.038 inches ± 0.005 inches (0.97 mm ± 0.13 mm).
      3). Cleanability: 10 cycles (NEMA LD3 test method 3.4).
      4). Boiling Water Resistance: No effect (NEMA LD3 test method 3.5).
      5). High Temperature Resistance: Slight effect (NEMA LD3 test method 3.6).
      6). Scratch Resistance: 4.5 Newtons (NEMA LD3 test method 3.7).
      7). Ball Impact Resistance: 60 inches (1524 mm) (NEMA LD3 test method 3.8).
      8). Radiant Heat Resistance: 200 sec (NEMA LD3 test method 3.10).
      9). Dimensional change:
      10). Machine direction: 0.50% (NEMA LD3 test method 3.11).
      11). Cross direction: 0.80% (NEMA LD3 test method 3.11).
      12). Wear resistance: 1,500 cycles, min. (black); 700 cycles, min. (other colors) (NEMA LD3 test method 3.13).
      13). Blister Resistance: 70 sec (NEMA LD3 test method 3.15).
      14). Stain Resistance Performance Test Results: The surface shall show essentially no effect on Black (Lab grade) plastic laminate when left in contact for 16 hours either when reagents were kept covered or allowed to evaporate.

0	No effect	No detectable change in the material surface.
1	Excellent	Slight detectable change in color or gloss but no change in function or life of the surface.
2	Good	A clearly discernable change in color or gloss but no significant impairment of surface life or function.
3	Fair	Objectionable change in appearance due to discoloration or etch, possibly resulting in deterioration of function over an extended period of time.
4	Failure	Pitting, cratering, or erosion of the surface. Obvious and significant deterioration.

Acids	Concentration	Rating
Acetic acid	All	0
Aqua regia		0
Chromic trioxide (Chromic acid cleaning solution)		1
Glacial acetic acid	99%	0
Hydrochloric acid	All	0
Hydrofluoric acid	48%	0
Formic acid	All	0
Nitric acid	All	3
Sulfuric acid	All	0
Perchloric acid (concentrated)		0
Phosphoric acid	All	0
Picric acid	1.2%	0
Tannic acid (saturated)		0
Uric acid (saturated)		0

Alkalis		
Ammonium hydroxide	All	0
Sodium hydroxide	All	3
Sodium sulfide	15%	0

Solvents		
Acetone		0
Amyl acetate		0
Amyl alcohol		0
Butyl alcohol		0
Carbon disulfide		0
Carbon tetrachloride		0
Chlorobenzene		0
Chloroform		0
Cresol		0
Dimethylformamide		0
Dioxane		0
EDTA		0
Ethyl acetate		0
Ethyl alcohol		0
Formaldehyde		0
Methanol		0
Methyl ethyl ketone		0
Methylene chloride		0
n-Hexane		0
Naphthalene		0
Phenol		0
Tetrahydrofuran		0
Toluene		0
Trichlorethane		0
Xylene		0

General Reagents		
Alconox (lab detergent)		0

General Reagents		
Aluminon		0
Ammonium phosphate		0
Aromatic ammonia		0
Benedicts solution		0
Calcium hypochlorite (concentrated)		0
Camphorated parachlorophenol		1
Cellosolve		0
Copper sulfate		0
Ethylene glycol		0
Eucalyptol		0
Formalin		0
Gasoline		0
Hydrogen peroxide	3%	0
Iodine		0
Karl Fisher Reagent		0
Kerosene		0
Lactated ringers		0
Lysol		0
Methyl methacrylate		0
Mineral Oil		0
Monsel's solution (Ferric subsulfate)		0
Naphtha		0
Petroleum jelly		0
Phosphate buffered saline (PBS)		0
Pine oil		0
Potassium permanganate		0
Povidone iodine		0
Procaine		0
Quaternary ammonia compounds		0
Silver nitrate		0
Sodium azide		0
Sodium chromate		0
Sodium hypochlorite	5%	0
Sodium thiocyanate		0
Sucrose	50%	0
Thymol & Alcohol		0
Tincture of Iodine		0
Tincture of Mercurochrome		0
Tincture of Merthiolate		0
Trisodium phosphate	30%	0
Urea		0
Vegetable oils		0
Water		0
Zephiran chloride		0
Zinc chloride		0
Zinc oxide ointment		0

Stains and Indicators		
Ag Eosin Bluish 5% in Alcohol		0
Bromothymol Blue		0
Cresol Red		0
Crystal Violet		0
Gentian Violet	1%	0
Gram Stains		0
Malachite Green		0
Methyl Orange		0
Methyl Red		0

Stains and Indicators	
Methylene Blue	0
Nigrosine	0
Safranin O	0
Sudan III	0
Thymol Blue	0
Wright's Blood Stain	0

5. Plastic laminate adhesive: High-pressure decorative laminate shall be bonded to core with thermosetting resorcinol or phenol-resorcinol adhesive, or as recommended by the manufacturer for the application, at temperature above 65°F (18.3°C) at a pressure no less than 15 pounds per square inch. Laminate core is not to exceed 10% moisture content and is to be laminated and cured in a controlled environment between 45% and 60% RH.
6. Core material: Hardwood Veneer Plywood.
   a. Description: A one step calibrated core +/- .5mm (to avoid voids) with type 1 waterproof nauf glue. Grade 2 face, and back of mill choice plywood veneer.
   b. Thickness/Plies:
      1). 1 inch (25 mm): minimum 9-ply.
   c. Physical Properties:
      1). Average modulus of rupture: 7346 psi (50.65 N/mm^2).
      2). Face Screw Holding Strength: 355 lbf (1579 N).
7. Edging:
   a. Unless otherwise indicated, all edges shall be edgebanded with 3 mm PVC edge banding set in hot melt adhesive. Adhesive shall have a minimum softening point of 150°F (65.6°C). Apply primer to substrate when recommended by adhesive manufacturer. Contact cement is not acceptable. Color of edgebanding to be selected by the Architect.
   b. Safety Edges:
      1). Types:
         a). Retainer Rail: ¼ inch (6 mm) diameter stainless steel retainer rail, as indicated on the drawings.
      2). Refer to the description of each system below for locations of each type.

B. Reagent Shelves with Fixed Tubular Supports.
   1. Shelving: High-Pressure Decorative Laminate shelving as specified above.
   2. Shelf supports shall be Type 304 stainless steel tubing, ASTM A312, 1 inch (25 mm) outside diameter, 0.133 inch (3.4 mm) wall thickness, with ¼ inch (6 mm) thick welded steel threaded inserts as shown on drawings.
   3. Fasteners shall be slotted, flat head, zinc screws with bolts as shown on drawings.
   4. Safety edging:
      a. Provide safety edging at all four edges of overall installation. Do not provide safety edging at intermediate butt joints.
      b. Retainer rail.
   5. Load capacity: System shall support a minimum of 25 pounds per square foot. Maximum deflection shall be 0.35 inches (9mm) under load.

C. Reagent Shelves on adjustable shelf standards with a steel tube support system.
   1. Shelving: High-Pressure Decorative Laminate shelving as specified above.
   2. Steel Frame Support System: Provide cold rolled steel tube vertical and horizontal support members with radiused edges. All members shall be welded together. Grind all welds smooth and polish to produce clean smooth appearance with no visual evidence of welds after paint is applied. All vertical members shall be one piece continuous from floor to underside of structure above or to top horizontal member as indicated on the drawings. Horizontal top and intermediate members shall be one piece between vertical members. Provide welded caps at all open ends of tube sections. Secure vertical members to floor slab, underside of benchtop, if indicated on the drawings, and to underside of structure above.
      a. Tube steel dimensions:
         1). 2 inches x 2 inches, 12 gauge (50 x 50 x 2.8 mm).
   3. Shelf standards:
      a. Steel tubes shall be punched to receive adjustable shelf brackets. Pattern shall match Knape & Vogt 85 ANO series uprights, length in accordance with drawings.

4. Shelf Brackets: 16 gauge (1.6 mm thick) bookend type, as detailed on drawings.
5. Safety edging:
   a. Front Edge:
      1). Retainer rail.
   b. Rear edge:
      1). Retainer rail.
6. Load capacity: System shall support a minimum of 35 pounds per square foot applied at all shelves simultaneously. Maximum deflection shall be 0.35 inches (9mm) under load.
7. Finish: Factory-finish steel tube support system, shelf standards, and brackets with epoxy powder coating. Color to be selected by the Architect.

D. Adjustable Wall Shelves:
1. Shelving: High-Pressure Decorative Laminate shelving as specified above.
2. Double Slot Shelf Standards:
   a. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
      1). Knape & Vogt Manufacturing Company, 2700 Oak Industrial Drive NE, Grand Rapids, MI 49505 Tel: 616 459-3311.
      2). Approved substitution.
   b. Basis of Design: Knape & Vogt 85 ANO series uprights, or equal. Length as indicated on the drawings.
3. Shelf Brackets: 16 gauge (1.6 mm) bookend type, as detailed on drawings.
4. Safety edging:
   a. Front Edge:
      1). Retainer rail.
5. Load capacity: System shall support a minimum of 35 pounds per square foot applied at all shelves simultaneously. Maximum deflection shall be 0.35 inches (9mm) under load.
6. Finish: Factory finish standards and brackets with epoxy powder coating. Color to be selected by the Architect.

E. Heavy Duty Wall Shelves:
1. Shelving: High-Pressure Decorative Laminate shelving as specified above. All shelves to be one piece continuous full length of assembly.
2. Heavy duty shelf standards: Slotted channel framing type. Refer to slotted channel framing specifications elsewhere in this Section.
3. Heavy duty shelf brackets:
   a. Shelf Brackets: Cold-formed steel, slotted channel framing type. Refer to slotted channel framing specifications elsewhere in this Section.
4. Other components, hardware, and fasteners, as required for a complete assembly and as indicated on the drawings.
5. Safety edging, provide at all four edges of each shelf or as indicated:
   a. Retainer rail.
6. Load capacity: System shall support a minimum of 50 pounds per square foot applied at all shelves simultaneously. Maximum deflection shall be 0.35 inches (9mm) under load.

F. Stainless Steel Shelving System
1. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
   a. InterMetro Industries Corporation, 651 North Washington St., Wilkes-Barre, PA 18705 Tel: 800 992-1776. Manufacturer of Metro product range.
   b. Eagle Group, 100 Industrial Blvd., Clayton, DE 19938 Tel: 302 653-3000.
   c. Nexel Industries Inc., March Equipment Inc., US Highway 206, Box 18, Flanders, NJ 07836 Tel: 973 584-4269.
   d. Approved substitution/equal.
2. Floor Mounted Stainless Steel Shelving Systems
   a. Basis of Design: Metro Super-Erecta stainless steel shelf system, floor mounted post supported, or equivalent.

b. Posts: floor mounted stainless steel posts, grooved at 1 inch (25 mm) increments and numbered at 2 inch (50 mm) increments for shelf adjustment, length as shown on drawings, Metro PS series or equal.
c. Shelves:
   1). Open Wire: stainless steel wire.
d. Provide diagonal bracing for lateral stability at freestanding applications.
e. Accessories:
   1). Foot Plate: stainless steel with adjustable leveling bolt, Metro No. 9993S or equal.
   2). Post Clamps: Zinc-plated, to join adjacent posts, Metro No. 9994Z or equal.
   3). Shelf Ledges:
      a). 1 inch (25 mm) high stainless steel wire, Metro No. LxxN-1S or equal, sized to match shelf.

2.9 CYLINDER RACKS AND RESTRAINT ASSEMBLIES

A. Cylinder Restraint Assembly:
   1. Framing channel, Fittings, Swivel Hangers, and End Caps: Slotted channel framing as specified elsewhere on this Section.
   2. Provide two swivel hangers per cylinder or dewar per wall bracket
   3. Sizing:
      a. Size typical units to accomodate standard-size laboratory gas cylinders.
      b. Where shown on drawings, size units to accomodate liquefied gas dewars.
   4. Chain: Provide restrainers of 5/16 inch diameter, Type 304 stainless steel welded chain fitted with stainless steel snap shackle with swivel clevis and split ring for each bracket; McMaster-Carr Supply Company, Suncor Marine & Industrial, Inc., or approved substitution.
   5. Cylinder restraint steel components shall be factory-finished to match the casework metal color as selected for the project.

2.10 OVERHEAD SERVICE CARRIERS

A. Materials:
   1. Support Framing: Slotted channel framing as specified elsewhere on this Section.
   2. Brake-formed metal: 16 gauge (1.6 mm) galvanized steel with epoxy powder-coated finish.

B. Fabrication: Fabricate and assemble components as detailed on the drawings.

C. Coordination: Carefully coordinate location of supports with the work of other Sections.

D. Finish: As specified for slotted channel framing. Color shall be selected by the Architect.

2.11 OVERHEAD SUPPORT GRID (OVERHEAD UNISTRUT)

A. Product Characteristics: Suspended channel grid, designed to support 200 lb. (0.89 kN) point load at any position and 50 lb./sq. ft. (0.73 kN/m) uniformly distributed load. All brackets, channels, etc. shall be provided for a complete installation.

B. Materials: Slotted channel framing as specified elsewhere on this Section.

C. Fabrication: Fabricate and assemble components as detailed on the drawings.

D. Coordination: Carefully coordinate location of supports with the work of other Sections.

2.12 PIPE DROP ENCLOSURE

A. Fabricate pipe drop enclosures from minimum 18 gauge (1.3 mm thick) cold rolled steel, per details shown on the Laboratory Furnishing drawings, except as noted.
   1. Pipe drop enclosures at the following locations shall be fabricated of 18 gauge, Type 304 stainless steel with a #4 finish:
      a. At scullery sinks.
      b. At stainless steel counters.

B. Seal all joints between dissimilar metals and at all panel seams with clear silicone sealant.

C. Materials and finish shall be as specified under Metals Fabrications in this Section.

2.13 DRYING RACK

A. Stainless Steel Drying Rack with White Polypropylene Pegs:

1. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
   a. Inter Dyne Systems, Inc., 676 Ellis Road, Norton Shores, MI 49441 Tel: 231 799-8760.
   b. Approved substitution (no known equal).
2. Basis of Design: Inter Dyne Systems “V” Victoria Series, modified as indicated on the drawings.
   a. Drying rack bodies shall be of one-piece design and of not less than 20 gauge (1.0 mm thick) Type 304 stainless steel with a No. 4 finish. The top shall have two 90-degree bends, and sides to have one 90 degree bend.
   b. Each rack shall have an integral full-width 20 gauge (1.0 mm thick), Type 304 stainless steel drip trough with stainless steel drain tube. Drip trough shall be continuously welded.
   c. The trough shall have a full-length, Type 304 stainless steel wire mesh screen insert. Screen insert shall be turned down on all four sides to provide a clean and finished appearance.
   d. Each rack front shall be dimensioned and punched with T-shaped holes to accommodate the peg arrangement shown on the drawings.
3. Pegs shall fit into the punched holes in the rack front. A T-shaped protrusion on the base of the pegs shall allow easy removal and replacement without the need for tools. The T-shaped holes shall be designed to fit the protrusion on support pegs for holding single or multiple utensil drip trays, drain shelves, funnel racks or pipette holders. Pegs shall be of injection-molded white polypropylene.
4. Provide wall hangers for each rack, designed to enable the removal and replacement of the entire rack for cleaning without the need for tools.
5. Provide stainless steel fixing screws of appropriate type for attachment to support structure.
6. Provide clear, tight-fitting hose to drain from drip trough drain tube into sink.
7. Provide finished stainless steel back panel when any portion of the back of drying rack is exposed.

2.14 ACCESSORIES

A. Utility Management Hook

1. Type 303 stainless steel hook with polished finish.
2. Size: 4 23/32 inch tall, 2 43/64 inch wide.
3. Load capacity: 22 pounds.
4. Basis of Design Model: McMaster-Carr Model No. 19075A12.
5. Manufacturer: McMaster Carr, P.O. Box 54960, Los Angeles, CA 90054-0960 Tel: (562) 692-5911, or approved equal.

B. Grilles

1. Air intake grilles: Perforated metal mesh in a metal frame.
2. Sizes: As shown on drawings.
3. Mesh Pattern: Mesh 1.
4. Color: Factory-applied light grey paint.
5. Basis of Design Model: Doug Mockett & Co., Inc. GT Series Grilles.
6. Manufacturer: Doug Mockett & Co., Inc. P.O. Box 3333, Manhattan Beach, CA 90266 Tel 800 523-1269 or approved equal.

2.15 FINISH FOR MISCELLANEOUS WOOD ITEMS

A. Applicability: This section applies to wood fabrications, including, but not limited to, wood laboratory tables and wood filler panels.

B. Finish:

1. Manufacturer may uses either of the following finish systems:
   a. Customized, high-solids, cross-linked, ultraviolet light (UV)-cured coating developed for durability, including abrasion, chemical, impact, and scratch resistance, for flat-line applications. Coatings shall have little or no VOCs. Chemical-resistant modified acrylic urethane finish with built-in UV blocker, or equal, applied over permanent wood stain.

2. Stain Color:
   a. To be selected by Architect from manufacturer's full published color range.
3. Application:
   a. Finish application and sequence shall be as recommended and designed by the manufacturer for a high quality, laboratory-grade wood casework finish.
   b. Preparation: Sand exposed surfaces smooth, free from dirt and defects.
   c. Stain application: Apply stain of color selected to all exposed casework surfaces. Apply in a manner to achieve a match with the selected color sample upon completion of application of the finish.
   d. Finish application: Apply top finish to all stained surfaces. Finished surfaces shall be even, water-clear and bright. Cloudy or muddy finishes carrying tinting pigments will not be acceptable.
   e. Stain Color:
      1). To be selected by Architect from manufacturer's full published color range.

C. Wood Finish Chemical Resistance Performance Requirements:
1. Manufacturer shall submit wood finish chemical resistance performance test results. Testing to be performed by independent testing agency.
2. Procedure: Place panel on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73º +/- 3ºF (23º +/- 2ºC) and 50 +/- 5% relative humidity or the currently accepted guideline set by ASTM. Test the panel for chemical resistance using forty-nine different chemical reagents by one of the following methods. For both methods, leave the reagents on the panel for a period of one hour. Wash off the panel with water, clean with detergent and naptha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73º +/- 3ºF (23º +/- 2ºC) and 50 +/- 5% relative humidity, or the currently accepted guideline set by ASTM.
   a. Method A: Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.574cc) bottle and inverting the bottle on the surface of the panel.
   b. Method B: Test non-volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24mm watch glass, concave side down.
3. Rating System: Evaluations shall use the following rating system:

Level 0	No detectable change.
Level 1	Slight change in color or gloss.
Level 2	Slight surface etching or severe staining.
Level 3	Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

4. Acceptance Level:
   a. Individual test results for the specified 49 reagents shall be within the Range for that reagent as specified on the table below.
   b. There shall be no more than four (4) Level 3 conditions.
5. Table of reagents:

Test No.	Chemical Reagent	Test Method	Range
1.	Acetate, Amyl	A	0-1
2.	Acetate, Ethyl	A	0-1
3.	Acetic Acid, 98%	B	0-1
4.	Acetone	A	0
5.	Acid Dichromate, 5%	B	0-1
6.	Alcohol, Butyl	A	0-1
7.	Alcohol, Ethyl	A	0
8.	Alcohol, Methyl	A	0-1
9.	Ammonium Hydroxide, 28%	B	0-2
10.	Benzene	A	0-1
11.	Carbon Tetrachloride	A	0-1
12.	Chloroform	A	0
13.	Chromic Acid, 60%	B	0-1
14.	Cresol	A	0-2
15.	Dichloroacetic Acid	A	0-3
16.	Dimethylformamide	A	0-2
17.	Dioxane	A	0-1
18.	Ethyl Ether	A	0-1

Test No.	Chemical Reagent	Test Method	Range
19.	Formaldehyde, 37%	A	0
20.	Formic Acid, 90%	B	0-1
21.	Furfural	A	0-1
22.	Gasoline	A	0
23.	Hydrofluoric Acid, 37%	B	0-2
24.	Hydrofluoric Acid, 48%	B	0-2
25.	Hydrogen Peroxide, 30%	B	0-1
26.	Iodine, Tincture of	B	0-2
27.	Methyl Ethyl Ketone	A	0
28.	Methylene Chloride	A	0-1
29.	Monochlorobenzene	A	0-1
30.	Naphthalene	A	0
31.	Nitric Acid, 20%	B	0
32.	Nitric Acid, 30%	B	0-2
33.	Nitric Acid, 70%	B	2-3
34.	Phenol, 90%	A	0-2
35.	Phosphoric Acid, 85%	B	0-1
36.	Silver Nitrate Saturated	B	0-1
37.	Sodium Hydroxide 10%	B	0-2
38.	Sodium Hydroxide 20%	B	0-2
39.	Sodium Hydroxide 40%	B	0-2
40.	Sodium Hydroxide Flake	B	0
41.	Sodium Sulfide Saturated	B	0
42.	Sulfuric Acid, 33%	B	0-1
43.	Sulfuric Acid, 77%	B	0-1
44.	Sulfuric Acid, 96%	B	1-3
45.	Sulfuric Acid 77% & Nitric Acid 70% equal parts	B	1-3
46.	Toluene	A	0
47.	Trichloroethylene	A	0
48.	Xylene	A	0
49.	Zinc Chloride, Saturated	B	0

2.16 METAL FABRICATIONS

A. Applicability: This section applies to metal fabrications, including, but not limited to, pipe drop enclosures, shelving support systems, metal-framed laboratory tables, cylinder racks, and other miscellaneous brake-formed and shop fabricated components and trim, such as required for overhead service carriers.

B. Materials:

1. Steel: Cold-rolled furniture stock sheet steel, prime grade, roller leveled.
   a. Steel shall be treated at the mill to be free of scale, ragged edges, deep scratches, or other injurious effects.
   b. All gauges indicated are to be U.S. standard.

C. Finish Requirements:

1. Paint finish for steel laboratory products shall utilize a dry coating process with minimal waste generation. Liquid-applied coatings shall not be acceptable. Manufacturer shall supply documentation that waste generated during the painting process, is a solid, non-hazardous material.
   a. Pretreatment: Finish process shall incorporate a phosphate conversion coating during the pretreatment/cleaning operation.
   b. Operator Protection: The painting process shall be cleanly contained, have no solvent odor and be performed in an air-conditioned room.
   c. VOC (Volatile Organic Compounds) emissions shall not exceed 0.29 lbs per gallon (35 g/L).
   d. Offgasing: No further emissions or “Offgasing/Decomposition” vapors shall occur at room temperature from installed finished parts.

2. Preparation: After the units have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish to the metal and to aid in the prevention of corrosion. Physical and chemical cleaning of the metal shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a heated cleaner/phosphate solution and pretreated with iron phosphate spray followed by a neutral final seal prior to application of final finish. The strength of each solution shall be monitored by filtration to insure consistent quality. All treated parts shall be immediately dried in heated ovens and gradually cooled before application of the finish. Treated metal parts shall be clean and properly prepared to provide optimum adhesion of finish and resistance to corrosion.
3. Application: Electrostatically apply powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thicknesses:
   a. All surfaces, exterior or interior, exposed to view, shall receive sufficient powder coat to achieve an average 1.5 mil (38 µm) film thickness with a minimum 1.2 mil (30 µm) film thickness and shall have smooth satin luster.
   b. Backs of cabinets and other surfaces not exposed to view shall have sufficient powder coat to achieve an average 1.0 mil (25 µm) film thickness.
4. All drawer bodies to be finished in matching color.
5. Concealed interior parts shall receive corrosion-resistant treatment.
6. Finish must be UV stable.
7. Color: As selected by the Architect.

D. Finish Performance Requirements:
1. Manufacturer shall submit metal finish performance testing results. Testing to be performed by independent testing agency.
2. Chemical Resistance:
   a. Test procedure: Place samples on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73+ 3F (23(+ 2(C) and 50+ 5% relative humidity, or the currently accepted guideline set by ASTM. Test the samples for chemical resistance using forty-nine different chemical reagents by one of the following methods. For both methods, leave the reagents on the sample for a period of one hour. Wash off the sample with water, clean with detergent and naptha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73± 3°F (23°± 2°C) and 50± 5% relative humidity, or the currently accepted guideline set by ASTM
      1). Method A: Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.574cc) bottle and inverting the bottle on the surface of the sample. The cotton ball shall remain in contact with the sample for the duration of the test.
      2). Method B: Test non-volatile chemicals by placing five drops of the reagent on the surface of the sample and covering with a 24mm watch glass, convex side down.
   b. Rating System: Evaluations shall use the following rating system:

Level 0	No detectable change.
Level 1	Slight change in color or gloss.
Level 2	Slight surface etching or severe staining.
Level 3	Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

   c. Acceptance Level:
      1). Individual test results for the specified 49 reagents shall be within the Range for that reagent as specified on the table below.
      2). There shall be no more than four (4) Level 3 conditions.
   d. Table of reagents:

Test No.	Chemical Reagent	Test Method	Range
1.	Acetate, Amyl	A	0-1
2.	Acetate, Ethyl	A	0-2
3.	Acetic Acid, 98%	B	0-3
4.	Acetone	A	0-1
5.	Acid Dichromate, 5%	B	0-1
6.	Alcohol, Butyl	A	0-1
7.	Alcohol, Ethyl	A	0-1
8.	Alcohol, Methyl	A	0-1

Test No.	Chemical Reagent	Test Method	Range
9.	Ammonium Hydroxide, 28%	B	0
10.	Benzene	A	0-2
11.	Carbon Tetrachloride	A	0-1
12.	Chloroform	A	0-2
13.	Chromic Acid, 60%	B	0-2
14.	Cresol	A	0-2
15.	Dichloroacetic Acid	A	0-3
16.	Dimethylformamide	A	0-2
17.	Dioxane	A	0-2
18.	Ethyl Ether	A	0-1
19.	Formaldehyde, 37%	A	0-1
20.	Formic Acid, 90%	B	0-3
21.	Furfural	A	0-3
22.	Gasoline	A	0
23.	Hydrofluoric Acid, 37%	B	0-2
24.	Hydrofluoric Acid, 48%	B	0-3
25.	Hydrogen Peroxide, 30%	B	0-1
26.	Iodine, Tincture of	B	0-2
27.	Methyl Ethyl Ketone	A	0-2
28.	Methylene Chloride	A	0-2
29.	Monochlorobenzene	A	0-2
30.	Naphthalene	A	0-1
31.	Nitric Acid, 20%	B	0-1
32.	Nitric Acid, 30%	B	0-1
33.	Nitric Acid, 70%	B	0-3
34.	Phenol, 90%	A	0-2
35.	Phosphoric Acid, 85%	B	0-1
36.	Silver Nitrate Saturated	B	0
37.	Sodium Hydroxide 10%	B	0
38.	Sodium Hydroxide 20%	B	0
39.	Sodium Hydroxide 40%	B	0-1
40.	Sodium Hydroxide Flake	B	0
41.	Sodium Sulfide Saturated	B	0
42.	Sulfuric Acid, 33%	B	0
43.	Sulfuric Acid, 77%	B	0
44.	Sulfuric Acid, 96%	B	2-3
45.	Sulfuric Acid 77% & Nitric Acid 70% equal parts	B	1-3
46.	Toluene	A	0-1
47.	Trichloroethylene	A	0-1
48.	Xylene	A	0-1
49.	Zinc Chloride, Saturated	B	0

3. Hot Water Test
   a. Test Procedure: 190°F to 205°F (88°C to 96°C) hot water shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces (177.5 cc) per minute) on the finished surface, which shall be set at an angle of 45°, for a period of 5 minutes.
   b. Acceptance Level: After cooling and wiping dry, the finish shall show no visible effect from the hot water.
4. Paint Adhesion on Steel Test
   a. Test Procedure: Test shall be based on ASTM D2197-86 “Standard Method of Test for Adhesion of Organic Coating.” Two sets of eleven parallel lines 1/16 inch (1.587 mm) apart shall be cut with a razor blade to intersect at right angles thus forming a grid to 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. Brush surface lightly with a soft brush for one minute. Examine under 100 fc (1076 lux) of illumination.
   b. Acceptance Level: Ninety or more of the squares shall show finish intact.
5. Impact Test

a. Test Procedure: Drop a 1 lb (0.4536 kg) ball (approximately 2 inch (50.8 mm) diameter from a distance of 12 inches (305 mm) onto a flat horizontal surface, coated to manufacturer's standard manufacturing method.
b. Acceptance Level: No visual evidence to the naked eye of cracks in the finish due to impact.

6. Paint Hardness on Steel Test
   a. Test Procedure: Paint film shall be tested with pencils of various hardnesses. Pencils shall have a wide, sharp edge. Pencils shall be pushed across surface in a chisel-like manner.
   b. Acceptance Level: Finish film shall not rupture from a sharpened 4H pencil.

2.17 STAINLESS STEEL FABRICATIONS

A. Applicability: This section applies to stainless steel fabrications, including, but not limited to, work surfaces, canopy hoods, drying racks, sinks and scullery sinks, stainless steel pipe drop enclosures, and other miscellaneous brake-formed and shop fabricated stainless steel components and trim as shown on the drawings.

B. Manufacturers:
   1. Inter Dyne Systems, Inc., 676 Ellis Road, Norton Shores, MI 49441 Tel: 231 799-8760.
   2. Kloppenberg & Co., 2627 West Oxford Avenue, Englewood, CO 80110 Tel: 303 761-1615.
   3. Approved substitution/equal.

C. Materials and Finishes:
   1. Unless otherwise noted stainless steel shall be Type 304 and shall be of gauge indicated on Laboratory Furnishing drawings or this specification.
   2. All fabrications shall have exposed surfaces ground and polished to a Number 4 satin finish.
   3. All stainless steel nuts, screws, bolts, and rivets, etc., shall be of the same type stainless as in the sheet material and shall have a tumbled finish closely resembling that of a Number 4 finish.
   4. All stainless steel welding material shall be of type similar to the sheet material or a richer quality. All welds shall be made without discoloration and shall be ground, polished, and passivated to blend harmoniously with a Number 4 satin finish. All joints in stainless steel tops and work surfaces shall be welded.

D. Work Surfaces:
   1. Thickness: 16 gauge (1.6 mm).
   2. Fabrication:
      a. Edges: Flanged down the same dimension as the adjacent non-stainless top, with 1 inch (25 mm) being a minimum and returned over a perimeter metal frame to simplify securing top material to cabinet or structural frame.
      b. Reinforcment: Under-surface shall be reinforced with full length 16 gauge (1.6 mm) structural metal channels as required to insure rigidity and prevent buckling, warping, or oil canning. Where bench-mounted fittings are indicated on the drawings, provide top reinforcement to allow for rigid, secure mounting of fittings.
      c. Undercoating: Underside of top shall have a heavy mastic agent coating providing sound deadening.
      d. Stainless steel sides and back-splashes, where indicated, shall be integrally welded to top and finish as indicated above. The back side of exposed backsplashes shall be finished to match front and sides.
      e. Provide all holes and cutouts as required for built-in equipment and mechanical and electrical service fixtures. Verify size of opening with actual size of equipment to be used prior to making openings. Form inside corners to a radius of not less than 1/8 inch (3 mm). After sawing, rout and file cutouts to ensure smooth, crack-free edges with no burrs.
   3. Tops with Sinks: Tops and sinks shall be integral, fabricated with a marine edge and shall be pitched to sink bowl for proper drainage. Marine edges shall be seamless die-formed.
   4. Flat Stainless Steel Work Surfaces: (Without marine edge or sink) shall have an integrally coved back splash and bull-nose at front of work surface.
   5. Joints: Fabricate work surfaces in the largest sections practical for delivery to the job site. All joints shall be field-welded, ground smooth, and polished on-site to create a continuous work surface.

E. Laboratory Sink: Integral one piece construction with stainless steel work surface.

1. Thickness: 18 gauge (1.3 mm thick), unless otherwise noted.
2. Construction: Sink units shall be designed and fabricated with sufficient reinforcement to prevent oil canning. All sink joints shall be butt-welded, ground smooth by the heliarc welding process. Inside radii shall be 1 inch (25 mm). Bottoms shall be pitched to the drain indent. No soldering will be permitted in connection with sink construction. Sink bowl dimensions given are inside dimensions. Underside shall have a heavy mastic agent coating providing sound deadening.

F. Scullery Sink: Stainless steel top with integral sink bowls in sizes as shown. The requirements for stainless steel tops and sinks described above shall govern in its entirety. Backsplash, marine edge and drain boards shall be provided as indicated in Laboratory Furnishings plans.
   1. Thickness: 14 gauge.
   2. Construction: Front, bottom and back of sink compartments shall be formed of one sheet of material with integral 1 ½ inch (40 mm) roll rim, extending full length at front and ends of compartments and drainboards. Compartment ends and partitions shall be electrically welded into place. Drainboards shall pitch from 2 inches at rolled rim and ends to 2 ½ inches (65 mm) below rim at compartments. Bottoms shall be pitched to the drain indent. Sink units shall be designed and fabricated with sufficient reinforcement to prevent oil canning. All sink joints shall be butt-welded, ground smooth by the heliarc welding process. Inside radii shall be 1 inch (25 mm). No soldering will be permitted in connection with sink construction. Sink bowl dimensions on drawings are inside dimensions. Underside shall have a heavy mastic agent coating providing sound deadening.
   3. Legs: Sinks shall be supported on stainless steel square tube legs with stainless steel leveling guides.
   4. Accessories: Provide Elkay LK-86-RT, or approved, waste fitting at each compartment of stainless steel construction with strainer, overflow and lever handle. Provide tailpiece compatible with laboratory waste piping system. Refer to Division 22 for piping requirements.
   5. Coordination: Coordinate scullery sink design with the requirements of any undercounter equipment (such as dishwashers and glassware washers), as shown on the Laboratory Furnishings drawings. Provide intermediate, end, and trim panels to enclose the undercounter portions of the scullery sink at equipment locations.

G. Canopy Hood: Provide stainless steel canopy with all hangers and miscellaneous hardware at locations and sizes as indicated on the Laboratory Furnishing drawings.
   1. Thickness: 18 gauge.
   2. Construction: Provide reinforcing necessary to prevent "oil canning" or deflection of panel between supports. All corners and joints shall be welded, ground smooth and free of all defects. Welded joints with visible burn marks will not be accepted.
   3. Accessories: Provide stainless steel hangers and miscellaneous support hardware as required for a complete installation.
   4. Provide dust- and vapor-proof light fixture with remote switch.
      a. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
         1). Canplas Industries Ltd., Barrie, Ontario, Canada L4M 4V3 Tel: 800 461-1771.
         2). Approved substitution/equal.
      b. Basis of Design: Canplas Canlet Series Vaporproof Lighting #6802-FCF-21-00-39.
      c. Construction/Features:
         1). Corrosion-resistant glass reinforced polyester thermoplastic fixture with brass screws and inserts and electrical box for ceiling mounting; U.L. listed for wet locations.
         2). Globe: Prismatic opal polycarbonate with no guard or reflector.
         3). Grounding screw.
         4). Hub-to-hub grounding via an internal bonding frame.
         5). External and internal gaskets for a water-tight seal.
      d. Ballast: Electronic, 120-volt.
      e. Lamp: 26 W compact fluorescent.
      f. Color: Stone Gray.
      g. Install in accordance with the requirements of Division 26.
   5. Provide exhaust duct transition piece for mechanical connection above the ceiling designed for 100 cfm/foot (557 m^3/h per meter) of hood length.

2.18 SLOTTED CHANNEL FRAMING

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
   1. Unistrut, 35660 Clinton Street, Wayne, MI 48184 Tel: 800 521-7730.
   2. Power Engineering Co. (Powerstrut), 420 Boston Turnpike, Shrewsbury, MA Tel: 800 274-1303.
   3. Kumar Industries (Nu-Strut), 4881 Chino Ave., Chino, CA 91710 Tel: (909) 591-0722.
   4. Cooper B-Line Inc. (B-Line), 509 West Monroe St., Highland, IL 62249 Tel: (618) 654-2184.
   5. Approved substitution/equal.

B. Materials: Channel and framing members shall be fabricated from steel conforming to the following requirements:
   1. Framing Members:
      a. Concealed Framing Members and Fittings: ASTM A570 GR 33.
      b. Exposed Framing Members and Fittings: ASTM A446 GR A with zinc coating conforming to ASTM A525.
      c. Stainless Steel Framing Members and Fittings: ASTM A240 (Type 304), where indicated.
   2. Fittings:
      a. Concealed Fittings: Fabricate from steel satisfying the requirements of ASTM A570 GR 33, and conform to the following ASTM specifications: A575, A576, A36, or A635. Nuts shall conform to ASTM A576 GR 1015 and screws shall conform to SAE J429 GR 2 and ASTM A307.
      b. Exposed Fittings: Fabricate from steel satisfying the requirements of ASTM A570 GR 33, and conform to the following ASTM specifications: A575, A576, A36, or A635. Nuts shall conform to ASTM A576 GR 1015 and screws shall conform to SAE J429 GR 2 and ASTM A307. Exposed fittings shall receive zinc coating conforming to ASTM A525.
      c. Stainless Steel Fittings and Hardware: Sintered Nuts shall be of ASTM B783 (Type 316N2-33) stainless steel and fittings shall be of ASTM A240 (Type 304) stainless steel. Stainless steel fittings and hardware shall be used with stainless steel framing members, or where indicated.
   3. Thickness: 12 gauge, unless noted otherwise.
   4. Size: 1 5/8 inch x 1 5/8 inch cross-section, unless noted otherwise.

C. Components:
   1. The following components shall be provided, unless otherwise noted:
      a. Framing Channel: 1 5/8 inch x 1 5/8 inch x 12 gauge: Unistrut P1000, Powerstrut PS 200, Kumar Industries N-200, B-Line Systems, Inc. B22, or equal.
      b. Suspended Framing Channel, 3 ¼ inch x 1 5/8 inch x 12 gauge: Unistrut P5000, Powerstrut PS 100, Kumar Industries N-150, B-Line Systems, Inc. B11, or equal.
      c. 90° Angle Fitting: 4 1/8 inch x 3½ inch x ¼ inch with two holes, each leg: Unistrut P1325, Powerstrut PS 607, Kumar Industries N-1123, B-Line Systems, Inc. B104, or equal.
      d. 135° Angle Fitting: 3 inch x 2 5/16 inch x ¼ inch with one hole, each leg: Unistrut P1546, Powerstrut PS 633-45°, Kumar Industries N-1425, B-Line Systems, Inc. B154, or equal.
      e. T-Shaped Flat Plate Fitting: 5 3/8 inch x 3½ inch x ¼ inch plate, T-shaped, with four holes: Unistrut P1031, Powerstrut PS 714, Kumar Industries N-1022, B-Line Systems, Inc. B133, or equal.
      f. Wing Shape Fitting, 9 5/32 inch x 3 7/8 inch ten holes, two holes in each wing section and two holes in each of three channel section sides: Unistrut P2347, Powerstrut PS 913, B-Line Systems, Inc. B273.
      g. Vertical Posts: 3¼ inch x 1 5/8 inch x 12 gauge, double channel section: Unistrut P1001, Powerstrut PS 200 2T3, Kumar Industries N-200-A, B-Line Systems, Inc. B22A, or equal.
      h. Horizontal Support Members: 1 5/8 inch x 1 5/8 inch x 12 gauge framing channel with 13/32 inch x 3 inch slotted holes, 4 inches on center: Unistrut P1000 SL, Powerstrut P 200 S, Kumar Industries N-200-SL, B-Line Systems, Inc. B22S, or equal.
      i. Slotted Hole Framing Channel, 1 5/8 inch x 1 5/8 inch x 12 gauge framing channel with 13/32 inch x 3 inch slotted holes, 4 inches on center: Unistrut P1000 SL, Powerstrut P 200 S, Kumar Industries N-200-SL, B-Line Systems, Inc. B22S.
      j. Slotted Framing Channel for installation in Chemical Fume Hoods, 1 5/8 inch x 13/16 inch x 16 gauge Type 316 stainless steel framing channel: Unistrut P4000 SS, Powerstrut PS 560 SS, Kumar Industries, B-Line Systems, Inc.

1). Attach channel to side of fume hood with 2 5/8 inch x 1 7/8 inch x 1/8 inch, 4 hole, stainless steel 90º fitting: Unistrut P6325 SS, Powerstrut, Kumar Industries, B-Line Systems, Inc.

k. Diagonal Brace Supports: Framing Channel, 1 5/8 inch x 1 5/8 inch x 12 gauge: Unistrut P1000, Powerstrut PS 200, Kumar Industries N-200, B-Line Systems, Inc. B22, or equa.

l. Closure Strip: 0.04 inches thick snap-in cover for framing channel: Unistrut P3184, Powerstrut PS 6152, Kumar Industries N-1920, B-Line Systems, Inc. B217-24, or equal. Provide closure strips over all exposed vertical post sections.

m. End Caps: 0.06 inches thick for framing channel: Unistrut P1280, Powerstrut PS 707, Kumar Industries N-2500, B-Line Systems, Inc. B205, or equal. Provide end caps for all exposed horizontal framing channels.

n. Ceiling Escutcheon: Provide 18 gauge steel, finished to match framing members, as indicated on the Laboratory Furnishing drawings, at ceiling penetrations.

o. Other components, hardware, and fasteners, as required for a complete assembly and as indicated on the drawings.

2. Service Struts and Ledging:
   a. 16 gauge, 13/16 inch x 1 5/8 inch cold-formed framing uprights: Unistrut P4000, Powerstrut PS 560, Kumar Industries N-400, B-Line Systems, Inc. B56, or equal. Uprights shall be provided at 48 inches, maximum, and fastened top and bottom by two adjustable U-shaped spreaders.
   b. U-shaped spreaders: 12 gauge by 1½ inch (45 mm) wide by length required, galvanized steel.
   c. Locations:
      1). Provide to support tops at pipe service chase space, support drain troughs, under fume hood superstructures, and other abnormal loads.
      2). Support struts with U-shaped spreaders shall be provided at 48 inches (1220 mm) on center below island and peninsula benches, as indicated on drawings. Support struts shall be provided along wall 48 inches (1220 mm) on center below island and peninsula benches. Struts will be used to support piped and electrical services installed under Divisions 22, 26, and 27. Provide all bolts, expansion sleeves, and fastening devices for a complete assembly. Pipe and conduit hangers shall be provided by Division 22, 26, and 27 installers.
3. Heavy Duty Wall Shelving:
   a. Shelf Standards: Framing channel, spaced equally, 36 inches on center, maximum. Secure to wall. Provide all bolts and fastening devices for a complete assembly.
   b. Brackets: Cold-formed framing channel brackets, as required for maximum cover of shelf depth:
      1). Shelves at least than 9 inches and less than 11 inches deep: Unistrut P1769, Powerstrut PS 732-8, B-Line Systems, Inc. B187, or equal. Secure to steel uprights and underside of shelf with removable bolt fasteners.
      2). Shelves at least than 11 inches and less than 13 inches deep: Unistrut P1771, Powerstrut PS 732-10, B-Line Systems, Inc. B541, or equal. Secure to steel uprights and underside of shelf with removable bolt fasteners.
      3). Shelves at least 13 inches and less than 15 inches deep: Unistrut P1773, Powerstrut PS 732-12, B-Line Systems, Inc. B289-12, or equal. Secure to steel uprights and underside of shelf with removable bolt fasteners.
      4). Shelves at least 15 inches and less than 17 inches deep: Unistrut P1775, Powerstrut PS 732-14, B-Line Systems, Inc. B289-14, or equal. Secure to steel uprights and underside of shelf with removable bolt fasteners.
      5). Shelves at least 17 inches and not exceeding 20 inches deep: Unistrut P1777, Powerstrut PS 732-16, B-Line Systems, Inc. B290, or equal. Secure to steel uprights and underside of shelf with removable bolt fasteners.
4. Cylinder and Dewar Restraint:
   a. Swivel Hanger: 1 ¾ inch long by 3/8 inch diameter link welded to threaded stud; provide two per cylinder: Unistrut M2350, Powerstrut PS205, Kumar N-2911, B-Line 446B.
5. Overhead Support Grid
   a. Exposed horizontal support members for user attachment, 3¼ inch x 1 5/8m inch x ¼ inch framing channel: Unistrut P5000, Powerstrut P 100, Kumar Industries N-150, B-Line Systems, Inc. B11.

6. Finish:
    a. Provide finish coating for all cold-formed framing components, except for stainless steel components.
    b. Concealed Framing Members and Fittings: Rust inhibiting acrylic enamel paint applied by electrostatic deposition, after cleaning and phosphating, and thoroughly baked. Finish shall withstand a minimum of 400 hours salt spray when tested in accordance with ASTM B117. Color: Green.
    c. Exposed Framing Members and Fittings: Factory applied epoxy powder coat. Color: To be selected by the Architect.

2.19 SEALANT

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers.
    1. Dow Corning Corporation, P.O. Box 994, Midland, MI 48686 Tel: 989 496-7881.
    2. General Electric Company, 260 Hudson River Rd., Waterford, NY 12188 Tel: 800 255-8886.
    3. Approved substitution/equal.

B. Basis of Design: Dow Corning 732 Multi-Purpose Sealant, GE Silicones RTV 100 Series, or equal.

C. Characteristics:
    1. Type: One-part silicone rubber, MIL-A-46106.
    2. Physical form: Non-slumping paste.
    3. Cure: Cures at room temperature on exposure to water vapor in the air.
    4. Authorizations:
        a. FDA Regulation No. 21 CFR 177.2600.
        b. USDA Rating P1.
        c. NSF Rating C2.
        d. UL 150 C Rating, File No. E40195(N).
    5. Properties:
        a. Tack Free Time: 45 minutes, maximum.
        b. Durometer, Shore A Hardness: 20, minimum.
        c. Tensile Strength: 220 pounds per square inch, minimum.
        d. Elongation: 350 percent, minimum.
        e. Extrusion Rate: 220 to 525 grams per minute.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Inspection:
    1. Prior to installation of the work of this Section, carefully inspect the installed work specified in other Sections and verify that all such work is complete to the point where this installation may properly commence.
    2. Verify that all work may be installed in complete accordance with the original design, reviewed submittals, and the manufacturer's recommendations.

B. Discrepancy: In the event of discrepancy, immediately notify the Architect.

3.2 INSTALLATION

A. Coordinate work with any Owner furnished and/or installed components indicated on drawings.

B. General: Assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining units to a tolerance of 1/16 inch (1.5 mm).

C. Cabinets:
    1. Install cabinets to create a plumb, level, true and straight installation.
    2. Installation of metal and stainless-steel casework fixed cabinets shall utilize the internal leveling devices. Do not use shims.

3. Installation of wood casework shall be performed using shims. Shimming shall be minimized as much as possible, yet be sufficient to achieve a level and plumb condition.
4. Installation shall maintain the required height of countertops. ADA-height countertops shall not exceed the heights off the finish floor as indicated.
5. Where floor conditions require shimming or leveling of more than ¾" at any point, do not install casework in those locations. Notify the contractor and design team that remedial measures will be required to bring the floors closer to a level situation.
6. Securely fasten wall units to solid supporting material, not plaster, lath, or wallboard. Anchor, adjust, and align wall cabinets as specified for base cabinets. Verify that all required backing and reinforcement necessary to support wall-mounted units is in place, secure, and accurately located.

D. Installation materials:
1. Installation of wood casework may involve the use of shims, spacers, cleats, straps and other such items of either metal or wood composition.
2. Installation of metal casework shall use spacers, cleats, and straps of galvanized steel, epoxy-coated steel, or stainless steel. No wood materials of any sort shall be part of the permanent installation of metal casework.

E. Laboratory Tops:
1. Scribe tops as necessary for close and accurate fit.
2. Field Joints: Factory-prepared and identical to factory joints, locate only where indicated on approved Shop Drawings. Field processing of top and edge surfaces is not acceptable, except as described by manufacturer in approved Submittal Data. Provide full length, one-piece tops and backsplashes wherever possible, and keep field joints to an absolute minimum.
3. Abut top and edge surface in one true plane, with internal supports placed to prevent any deflection. Joints in top units shall be flush and the narrowest for the respective materials of construction. Cement joint in accordance with the manufacturers' specifications.
4. All joints in stainless steel work surfaces shall be field-welded, ground smooth, and polished on-site to create a continuous work surface.

F. Sealant:
1. Caulk edges of tops, backsplashes and side splashes to adjacent wall or other vertical surface with silicone sealant.

3.3 DESTRUCTIVE TESTING

A. The Owner, Architect, and/or Contractor may, at their own cost, elect to perform destructive testing on casework cabinet components (such as fronts, sides, etc.) to confirm compliance with the requirements of this specification. The casework manufacturer/installer should account for the de-installation, repair, and reinstallation, or replacement of one cabinet that may be selected for destructive testing.

3.4 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as approved by the Architect at no additional cost to the Owner.

B. Clean finished units, touch up as required, and remove and refinish damaged or soiled areas.

C. Cover tops with kraft paper or polyethylene sheeting after installation and all other means necessary for protection against scratching, soiling, and deterioration during remainder of construction period. Remove protection prior to final cleaning.

D. Clean counter tops with diluted dishwashing liquid and water leaving tops free of all grease and streaks. Use no wax or oils.

END OF SECTION

SECTION 115313
FUME HOODS AND OTHER AIR CONTAINMENT UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Chemical Fume Hoods, including bench mounted hoods.

B. Fume Extractor Arms (Snorkels)

C. Canopy Hoods

1.2 RELATED SECTIONS

A. Section 019113: Commissioning

B. Section 115310: Laboratory Casework and Other Furnishings

C. Section 115343: Laboratory Service Fittings and Fixtures

D. Division 22: Plumbing

E. Division 23: HVAC

F. Division 26: Electrical

1.3 REFERENCES

A. Chemical fume hoods:
   1. ASHRAE 110, Method of Testing Performance of Fume Hoods.
   2. Conform to the recommended practices for laboratory fume hoods published by the Scientific Equipment and Furniture Association (SEFA) 1-2010.

1.4 DESCRIPTION

A. Provide equipment complete with accessories as described herein and shown on Laboratory Furnishings drawings.

B. Chemical fume hoods:
   1. Fume hoods with accessories shall be pre-piped and pre-wired. Pre-pipe service fittings to single point connection at 6 inches (150 mm) above top of hood or as otherwise shown.
      a. Refer to Section 115343 and details on Laboratory Furnishings drawings for service fittings.
      b. P-trap, waste piping and tailpiece extensions for cupsinks shall be furnished and installed by Division 22. Comply with Division 22 requirements for piping and installation requirements for respective pre-piped services.
      c. Pre-wire all electrical devices to junction box at top of hood. Comply with Division 26 requirements for electrical work.

1.5 SUBMITTALS

A. Refer to the General Conditions and Division 1 “Submittal Procedures” for submittal requirements. In addition to these requirements, provide submittal requirements specified herein.

B. Submittal requirements:
   1. Submittal shall be prepared individually for this specification section. Arrange product data, drawings and information for submission in a complete set for this specification section.
   2. Submittal shall contain complete data for all items of this specification section. Periodic or partial submittals of individual components within this specification section will be returned as incomplete and rejected.
   3. Submittals shall be organized by specification sequence with section and paragraph number identified.

4. Equipment and components being proposed shall be clearly labeled with all options and accessories indicated and shall be for this specific project. All non-applicable options, items and components shall be deleted or struck.

C. Materials List/Product Data: Submit complete materials list, including catalog data of all materials, equipment, and products for Work specified in this Section. Include chemical resistance finish performance test results for any products specified in this section.

D. Shop Drawings: Submit complete shop fabrication and installation drawings, including plans, elevations, sections, details and schedules. Show relationship to adjoining materials and construction. Shop Drawings shall be in the form of reproducibles or photocopies, not to exceed 11 inches x 17 inches (A3) in size. Blueline prints are not acceptable.

E. Submit detailed anchorage and attachment drawings and calculations provided by a licensed Structural Engineer complying with the Uniform Building Code Earthquake Regulations and the California Administrative Code, Title 24 Seismic Restraint requirements.

F. Samples: Submit two (2) samples of each type of specified finish and color range available.

G. Test Reports: Submit the following performance test reports.
   1. "As Manufactured" (AM) Fume Hood Testing in Manufacturing Facility: Provide certification that each type and size of fume hood has passed Flow Visualization and Face Velocity tests, and achieved an AM performance rating equal or better than 0.05 ppm with 4.0 Lpm tracer gas release rate when tested in accordance with ASHRAE 110-1995.
   2. Fume Hood Sound Level Certification: Provide certification of fume hood compliance with design criteria for maximum allowable noise within laboratories.
      a. At project design operating conditions for sash height and face velocity, test data of octave band analysis verifying hood is capable of a 50 NC or lower value when connected to a 50 NC (minimum) HVAC source. Measurements shall be taken 36 inches (915 mm) in front of open sash.
   3. Fume Hood Certification: Submit "As Installed" (AI) test report as described elsewhere in this section.

H. Operations/Maintenance Manuals: Submit under provisions of Division . Submit for Owner's use, complete operating and maintenance manuals that describe proper operating procedures, maintenance and replacement schedules, component parts list, and closest factory representative for components and service.

1.6 QUALIFICATIONS

A. Work in this Section shall be performed by a firm having a minimum eight years documented experience, and an established organization and production facilities including all tools, equipment and special machinery necessary for specializing in the fabrication and installation of the type of equipment required with skilled personnel, factory trained workmen and an experienced engineering department. Each shall have the demonstrated knowledge, ability and the proven capability to produce the specified equipment of the required quality and the proven capacity to complete an installation of this size and type within the required time limits.

1.7 COORDINATION

A. Work of this Section requires close coordination with Work of Divisions 22, 23 and 26 as well as Work specified in other Sections. Sequence all Work to ensure an orderly progress in the project without removal of previously installed Work and so as to prevent damage to finishes and products.

B. Coordinate, furnish, and install chemical fume hoods designed for variable air volume (VAV) or constant air volume (CAV) operation as indicated in the mechanical drawings. The designed exhaust airflow control method (VAV or CAV) shall be confirmed and coordinated prior to submission and shall be clearly indicated in the submittal product documentation.

1.8 SUBSTITUTIONS

A. Approved Substitution/Approved Equal: In addition to the items required in Division 1, all substitution requests shall include item-by-item comparison of the proposed substitution to this project

specification. A copy of the project specification shall be submitted, with each item and subsection of the project specification marked as “Comply” or “Not Comply.” In any cases where “Not Comply” is indicated, an explanation of the relative advantages of the proposed design shall be provided.

B. Substitution shall not affect dimensions shown on Drawings.

C. The Contractor shall pay for changes to the building design, including engineering design, detailing, utility and service requirements, and construction costs caused by the requested substitution.

D. Substitutions shall have no adverse effect on other trades, the construction schedule, or specified warranty requirements.

E. Maintenance and service parts shall be locally available for the proposed substitution.

1.9 WARRANTY

A. Refer to the General Conditions and Division 1 “Product Requirements” for warranty requirements. In addition to these requirements, all products will be warranted to be free from defects in materials and workmanship for a minimum period of two year following substantial completion. The manufacturer/ dealer/ subcontractor shall repair or replace any products (or parts thereof) that are found to be defective. Replacement will include any parts, labor, shipping, and travel expenses involved.

PART 2 PRODUCTS

2.1 ACCESSIBILITY FOR PERSONS WITH DISABILITIES

A. Where indicated on Laboratory Furnishings drawings, fume hoods shall be furnished and installed in a manner to make them accessible to persons with disabilities in accordance with the Americans with Disabilities Act and any state or local building code or regulation having jurisdiction. The height of the highest point of access to the work surface above finished floor shall not exceed 34 inches. Fittings for piped services and electrical receptacles and controls shall be of a design and in a location in order to be considered accessible.

2.2 CHEMICAL FUME HOODS

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be provided by a single manufacturer.
   1. Air Master Systems Corporation, 6480 Norton Center Drive, Muskegon, MI 49441 Tel: 231 798-1111.
   2. CiF Lab Solutions L.P., 53 Courtland Avenue, Vaughan, ON Canada L4K 3T2 Tel: 905 738-5821.
   3. Jamestown Metal Products, Inc., 178 Blackstone Avenue, Jamestown, NY 14701 Tel: 716 665-5313.
   4. Kewaunee Scientific Corporation, P O Box 1842, Statesville, NC 28687 Tel: 704 873-7202.
   5. Labconco Corporation, 8811 Prospect Avenue, Kansas City, MO 64132 Tel: 800 821-5525.
   6. Mott Manufacturing Limited, 452 Hardy Road, P. O. Box 1120, Brantford, ON, Canada N3T 5T3 Tel: 519 752-7825.
   7. Approved substitution/equal.

B. Underwriters Laboratory Listing: Fume hoods shall be UL subject 1805 classified. Label shall be attached to the face of each fume hood indicating classification to the UL 1805 standard for Laboratory Fume Hoods.

C. Materials: The following materials shall be provided, unless superseded by the requirements listed below for specific fume hood types.
   1. Steel:
      a. ASTM A366 mild steel, furniture stock, cold-rolled, pickled, double annealed, and free from rust, scale, scratches, buckles, ragged edges, and other defects.
      b. Minimum Thickness: 18 gauge (1.2 mm).
   2. Stainless Steel:
      a. Type 316, ASTM 240, with exposed surfaces ground and polished to a No. 4 finish.
      b. Minimum Thickness: 16 gauge (1.6 mm).

c. Welding: All stainless steel welding material shall be of similar type to sheet material. Welds shall be made without discoloration, ground, polished, and passivated to blend with a No. 4 finish.

3. Liner and Baffle:
   a. Typical: Glass-reinforced polyester panel, flame-retardant and self-extinguishing with smooth finish and white color. Flexural strength: 14,000 psi. Flame spread index of 0-25 when tested per UL 723 and ASTM E 84. Baffle shall be same material as liner. Liner thickness: 3/16 inch (4.76 mm); baffle thickness: ¼ inch (6.35 mm), minimum. Liner performance characteristics shall be as specified below.
4. Glass: 7/32 inch (5.56 mm) laminated safety glass. Glass shall not be etched with manufacturer's name, logo, or any other permanent markings, other than to identify the glass as safety glass. Light fixture lens may be tempered safety glass.
5. Sash guides: Extruded PVC.
6. Sash chain: ANSI #35 steel, single strand. Average tensile strength of 2,400 pounds; maximum working load of 480 pounds.
   a. Pulley assembly for sash chain: Finish bored steel drive sprockets and keyed drive, 1/2-inch (12.7 mm) diameter front connector shaft. Rear idler sprockets; double sealed ball bearings type, lubricated. All sprockets steel with zinc dichromate finish.
7. Sash belt: Two 1/2 inch wide stainless steel-reinforced polyurethane notched belts. Minimum tension cord strength of 840 N.
   a. Pulley assembly for sash belt: Cast aluminum sprocket mated to a steel shaft.
8. Sash pull: Steel with chemical resistant powder coating.
   a. Length: Full width of sash.
9. Gaskets: Provide PVC gasket at interior access panels to eliminate air leakage and retain liquids inside hood.
10. Fasteners:
    a. Exterior structural member attachments: Sheet metal screws, zinc plated.
    b. Interior fastening devices shall be concealed; exposed screws are not acceptable. (Screw head "caps" not acceptable).
    c. Exposed exterior fastening devices shall be corrosion-resistant, non-metallic material; exposed screws are not acceptable.

D. Construction:

1. Design: Fume hoods shall be designed for consistent and safe air flow through the hood face opening. Variations of face velocity shall not exceed ±20% of the average face velocity at any designated measuring point.
   a. Refer to the Laboratory Equipment Exhaust Schedule on the Laboratory Furnishings drawings for the design face velocity requirements for each type of fume hood.
2. Superstructure: Rigid, self-supporting assembly of double wall construction, maximum 4 7/8 inch (124 mm) thick. Wall shall consist of a sheet steel outer shell and a corrosion resistant inner liner, and shall house and conceal steel framing members, attaching brackets and remote operating service fixture mechanisms and services. Panels shall be attached to a full frame construction, minimum 14 gauge (2.0 mm) galvanized members. Panels and brackets attached to eliminate screw heads and metallic bracketry from hood interior.
3. Access Panel: Access to fixture valves and piping concealed in wall shall be through flush access panels on the inside liner walls, or through removable front posts. Panels shall be secured with PVC extruded gasket or tamperproof, epoxy coated, countersunk, flat head screws providing a tight fit. Hook and loop type attachments and panels held by gravity are not acceptable.
4. Downdraft bypass: Low resistant type, 18 gauge (1.27 mm) steel chamber; directional louvers are not acceptable. All bypass air shall enter top of bypass chamber and enter hood in a downflow direction. Chamber shall protect user from expelled particulate in the event of an adverse internal reaction.
5. Baffles: Baffles shall be fixed and non-adjustable.
6. Ceiling Closure Panels: Panel shall include simple-to-operate means of access to the hood lighting fixture without the use of tools. Finish shall match superstructure exterior. Closure panel shall conceal view of the sash when the sash is in the open position. Provide sash pocket if required to allow correct operation of the bypass.
   a. Provide 18 gauge steel paneled enclosure from top of hood to 2 inches above the ceiling.
7. Bypass Grille: Low-resistant type 18 gauge steel with upward directional louvers.

8. Trim and Side Panels: Provide matching steel trim and side panels, as required, to finish any openings around and between hoods. Finish shall match superstructure exterior.
9. Finished Back: Provide for any fume hood where back of hood is exposed to view. 18 gauge steel sheet. Finish shall match superstructure exterior.
10. Exhaust Duct Collar:
    a. Construction: Provide Type 316L stainless steel, minimum 18-gauge, duct collar with 1-½-inch (38 mm) to 2-inch (50 mm) extension above top of fume hood with butt joint termination suitable for welding. Duct collar design shall be bell-mouthed for round or contoured design for rectangular to provide lower static pressure drop and improved noise performance. Duct collar shall be integral to fume hood construction, factory-installed, and welded or permanently sealed airtight to hood.
    b. Configuration: For collar size and quantity, refer to Laboratory Equipment Exhaust Schedule on the Laboratory Furnishing drawings.
11. Exhaust Duct Transition Piece: Furnished by the fume hood manufacturer for installation by the mechanical contractor. Provide contoured Type 316L stainless steel, minimum 18-gauge, exhaust duct transition piece to connect to the fume hood exhaust duct collar and Laboratory exhaust duct system as shown on the Mechanical Drawings. Provide butt joint terminations suitable for welding. Note: Transition Piece is not required where hood exhaust duct collar has been provided per the Laboratory Equipment Exhaust Schedule.
12. Cup Sink:
    a. Oval with raised rim, material and color to match work surface, sizes in accordance with drawings. Comply with Section 115343 requirements.
    b. Raised Rim Height: ¼ inch (6.35 mm).
13. Piping shall be as specified in Division 22 for respective system.
14. Service Fittings: As shown on Laboratory Furnishings Drawings and specified in Section 115343, factory-installed and complete with all gaskets, grommets and sleeves. No additional holes in fume hood side posts shall be provided for services beyond those required by the construction documents.
15. Alarm: Coordinate cut out for fume hood alarm to be provided under Division 23. All cut outs for alarm shall be made in the factory; field cutting is not acceptable.
    a. Locate at 48 inches or below for all Accessible designated fume hoods.
16. Electrical:
    a. Pre-Wiring: All fume hood electrical devices shall be factory-installed and wired to a junction box located on top of the hood. Comply with Division 26 requirements for electrical work.
        1). Fume hood receptacles shall be wired such that no more than two duplex outlets and the hood lighting are wired through a single circuit.
    b. Receptacles: Flush mounted, 125V / 20A / 60Hz duplex type, single gang, NEMA 5-20R, 3-wire, grounding type receptacle, one or two per side, or as indicated on the Laboratory Furnishings Drawings, with brushed stainless steel cover plate. Each side of the fume hood shall have a GFCI receptacle with feed-through protection of any downstream receptacles.
17. Interior Hood Lighting:
    a. Lighting within the hood shall be provided by a UL approved, protected, vapor-proof, fluorescent light fixture with two lamps (32W T8, electronic ballast, rapid start) operated by an exterior switch with a stainless steel cover plate.
        1). Lamp size shall not exceed 48 inches; provide multiple light fixtures for hoods wider than 72 inches.
    b. Provide safety glass panel cemented and sealed to the hood roof.
    c. Light level: Average light level on the work surface shall be 80 foot-candles, minimum.
18. Safety label: Provide self-adhesive polyester label, as described on the Laboratory Furnishing drawings. Labels shall indicate safe operating conditions with respect to fume hood sash position. Labels solely indicating 100 fpm face velocity sash position are not acceptable.
    a. Manufacturer: Lab Safety Supply Inc., P.O. Box 1368, Janesville, WI 53547 Tel: 800 356-0783, Model No. 156.
    b. Approved custom made label.
    c. Approved equal.
19. Hood Finish: As specified elsewhere in this Section.
20. Exterior Color: As selected by Architect from manufacturer's full color line and complying with finish requirements.

E. Bench Mounted Chemical Fume Hoods:
   1. Style: General purpose.
      a. Subject to compliance with the requirements listed below, acceptable models include:
         1). Eliminator Series Fume Hoods by Air Master Systems Corporation.
         2). APEX-Air GP Series by CiF Lab Solutions L.P.
         3). Isolator Bench Fume Hood by Jamestown Metal Products, Inc.
         4). Supreme LV Fume Hood by Kewaunee Scientific Corporation.
         5). Protector XL Benchtop Laboratory Hood by Labconco Corporation.
         6). Pro Restricted Bypass Bench Fume Hood by Mott Manufacturing Limited.
   2. Exterior depth: 34 1/2 inches, maximum.
   3. Interior depth: 23 1/2 inches clear at 1 inch above the work surface, minimum.
   4. Design:
      a. Restricted bypass fume hoods for variable air volume or constant volume exhaust systems with airfoil. Bypass shall be sufficient in size to allow 25% flow with sash closed. Bypass must be achieved through low resistance opening at top of front lintel panel. Bypass shall be designed to provide a smooth down flow effect.
      b. Fume hoods shall be designed to operate safely at face velocities of 100 feet per minute (0.51 m/s) to 125 feet per minute (0.64 m/s).
   5. Work Surface: 1 ¼ inch (32 mm) dished epoxy resin, in compliance with Section 115310 requirements. Color: Black.
   6. Airfoil: The airfoil shall allow ample room for electrical hospital grade cords to fit beneath the airfoil. Sill must pivot forward to provide cord and trough access. Bottom horizontal foil shall provide nominal 1 inch (25.4 mm) bypass when sash is in the closed position. Bottom foil shall not be removable without use of special tools. Airfoil shall be steel with urethane or epoxy powder coating.
      a. Sill shall consist of a half-round bullnose on front edge. The air foil and sill shall be flush with the height of the work surface; airfoil sills that are not flush with the top plane of the work surface dish are not acceptable. A secondary containment trough shall be located in front of the work surface and extend below the airfoil sill.
      b. Seal joint between secondary containment trough and work surface with sealant to prevent liquid spills from entering joint opening.
   7. Fume hood sash (Vertical): Full-view, frameless type with clear, unobstructed, side-to-side view of fume hood interior and service fixture connections. Sash to have a 35 inch (890 mm), nominal, sight line.
      a. Sash Opening: Refer to the Laboratory Equipment Exhaust Schedule on the Laboratory Furnishings drawings for vertical access height clearance.
      b. Counter balance system: Single weight, counter balance system to prevent sash tilting and permit ease of operation at any point along full width pull. Maximum 7 pounds (3 kg) pull required to raise or lower sash throughout its full length of operating sash opening. Design system to hold sash at any position up to operation opening without creep and to prevent sash drop from any position in the event of suspension system failure.
      c. Sash Opening: Refer to the Laboratory Equipment Exhaust Schedule on the Laboratory Furnishings drawings for vertical access height clearance.
      d. Sash Stop (Upper and Lower): Designed to stop the sash at the Design Operating Condition and at full open Maximum Operating Condition (set-up position) as shown on the Exhaust Equipment Schedule, with manual override:
         1). Corrosion-resistant, spring-loaded lever handle integrated with sash track and fume hood side post.
         2). Stainless steel spring-loaded barrel-bolt integrated with sash pull and provided with angled stainless steel strike plate.
      e. Design sash counter-balance system to reset to Design Operating Condition, or 18 inches above work surface, when the upper sash stop is released

F. Finish Requirements
   1. Preparation:
      a. After the units have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish to the metal and to aid in the prevention of corrosion. Physical and chemical cleaning of the metal shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a

heated cleaner/phosphate solution and pretreated with iron phosphate spray followed by a neutral final seal prior to application of final finish. The strength of each solution shall be monitored by filtration to insure consistent quality.

b. All treated parts shall be immediately dried in heated ovens and gradually cooled before application of the finish. Treated metal parts shall be clean and properly prepared to provide optimum adhesion of finish and resistance to corrosion.

2. Application: Electrostatically apply powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thicknesses:
   a. All surfaces, exterior or interior, exposed to view, shall receive sufficient powder coat to achieve an average 1.5 mil (38 µm) film thickness with a minimum 1.2 mil (30 µm) film thickness and shall have smooth satin luster.
   b. Backs of cabinets and other surfaces not exposed to view shall have sufficient powder coat to achieve an average 1.0 mil (25 µm) film thickness.
   c. Concealed interior parts shall receive corrosion-resistant treatment.
   d. Stainless steel parts and surfaces shall not be powder coated.
3. Chemical Resistance Finish Performance Requirements:
   a. Test Procedure: Apply 10 drops (approximately 0.5 cubic centimeters) of each reagent identified to the surface of the finished test panels laid flat and level on a horizontal surface. Ambient temperature: 68°F to 72°F (20°C to 22°C). After one hour flush away chemicals with cold water and wash surface with detergent and warm water at 150°F (65.5°C) and with alcohol to remove surface stains. Examine surface under 100 foot-candles (1076 lux) of illumination.
   b. Evaluation Ratings: Change in surface finish and function shall be described by the following ratings:

0	No effect	No detectable change in the material surface.
1	Excellent	Slight detectable change in color or gloss but no change in function or life of the surface.
2	Good	A clearly discernable change in color or gloss but no significant impairment of surface life or function.
3	Fair	Objectionable change in appearance due to discoloration or etch, possibly resulting in deterioration of function over an extended period of time.
4	Failure	Pitting, cratering, or erosion of the surface. Damage to film and loss of adhesion and film protection. Obvious and significant deterioration.

4. Performance requirements: Test results for powder coat finish shall equal or exceed the following:

Reagent	% by weight	Rating
Acetic acid	50%	1
Acetic acid, glacial	98%	1
Acetone	50%	2
Ammonium hydroxide	25%	1
Amyl acetate		1
Benzene		1
Butyl alcohol		1
Carbon tetrachloride		1
Cresol		1
Dimethyl formamide		2
Dioxane		2
Ethyl alcohol		1
Ethyl acetate		2
Ethyl ether		1
Formaldehyde		1
Furfural		2
Gasoline		1
Glycerin		1

Reagent	% by weight	Rating
Hydrochloric acid	10%	1
Hydrochloric acid	20%	1
Hydrochloric acid	37%	1
Hydrofluoric acid	48%	2
Hydrogen peroxide	30%	1
Kerosene		2
Methyl alcohol		1
Methyl ethyl ketone		2
Monochlorobenzene		1
Naphthalene (dissolved in Toulene)		2
Nitric acid	10%	1
Nitric acid	30%	1
Phenol	85%	2
Phosphoric acid	25%	1
Phosphoric acid	75%	1
Potassium hydroxide	45%	1
Silver nitrate (10% aqueous solution)		1
Sodium carbonate, saturated		1
Sodium chloride, saturated		1
Sodium hydroxide	40%	1
Sodium hydroxide	50%	1
Sodium hypochlorite	5.25%	1
Sodium sulfide, saturated		1
Sulfuric acid	50%	1
Sulfuric acid	70%	1
Tincture of Iodine		2
Toulene		1
Trichloroethylene		2
Xylene		1
Zinc chloride, saturated		1

Note: Maximum concentration is to be understood unless a lower concentration is shown in the table.

a. Physical Tests:
   1). Abrasion: Finish shall have high abrasion resistance with maximum weight loss of 5.5 mg per 100 cycles as tested on a Taber Abrasion Tester No. E40101 with 1000 gm wheel pressure and Calibrase No. CS10 wheel.
   2). Hardness: Finish shall have surface hardness equivalent to 4H or 5H pencil lead.
   3). Humidity: Finish shall withstand 1000 hours exposure in saturated atmosphere at 100°F (38°C).
   4). Moisture: Finish shall withstand the following procedures with no visible effect:
      a). Boiling water flowing over 45 degree inclined surface for 5 minutes.
      b). 100 hours continuous contact with water-soaked cellulose sponge, maintained in a wet condition throughout test.
   5). Adhesion: Finish shall withstand the following test procedure with at least 95 squares maintaining their finish. Using a razor blade, score the finish surface of the test panel through to the substrate with a pattern of 100 squares, each 1/16 inch x 1/16 inch. Brush away loose particles with a soft brush.
   6). Salt spray: Finish shall withstand 200 hours exposure to salt spray test.

G. Fume Hood Liner Test: Polyresin
   1. Test No. 1: Spills and Splashes:
      a. Suspend a 42 inches (1067 mm) x 12 inches (305 mm) panel (42 inch (1067 mm) dimension horizontal) in a position to expose the surface to be tested in a vertical plane. Divide the panel vertically into 3/4 inch (19 mm) spaces.
      b. Using an eyedropper, apply five drops of each reagent as listed.
      c. Liquid reagents shall be applied at the top of the panel and permitted to flow down full panel height. (CAUTION! Flush away any reagent drops.)
   2. Test No. 2: Fumes and Gases:

a. Prepare a panel 24 inches (610 mm) x 12 inches (305 mm) by dividing panel into 2 inch (51 mm) squares. Using 100 ml beakers, place 25 ml (approximately 1/2 inch (13 mm) of reagent) into each beaker. Place beakers in position so that test panel may be placed over beaker tops in the proper sequence. Place panel over beakers. Note: Beaker pouring lip permits atmospheric oxygen to enter and participate in the reaction of the reagent fumes.
b. After a 24 hour time period has elapsed, remove panel, flush off with water, clean with naphtha and detergent, rinse and wipe dry. Evaluate.

3. Evaluating Ratings:

0	No effect	No detectable change in the material surface.
1	Excellent	Slight detectable change in color or gloss but no change in function or life of the surface.
2	Good	A clearly discernable change in color or gloss but no significant impairment of surface life or function.
3	Fair	Objectionable change in appearance due to discoloration or etch, possibly resulting in deterioration of function over an extended period of time.
4	Failure	Pitting, cratering, or erosion of the surface. Obvious and significant deterioration.

4. Performance: Test results shall equal or exceed the following:

Reagent	% by wt.	Spills	Fumes
Acetic acid, glacial		0	0
Acetone		0	0
Acid dichromate		1	1
Ammonium hydroxide	28%	0	0
Amyl acetate		0	0
Benzene		0	0
Butyl alcohol		0	0
Carbon tetrachloride		0	0
Chloroform		0	0
Chromic acid, saturated		3	0
Cresol		0	0
Dichloro acetic acid	93%	0	0
Dimethyl formamide		0	0
Dioxane		0	0
Ethyl acetate		0	0
Ethyl alcohol		0	0
Ethyl ether		0	0
Formaldehyde	37%	0	0
Formic Acid	88%	0	0
Furfural		2	0
Gasoline		0	0
Hydrochloric acid	48%	1	1
Hydrofluoric acid	37%	0	0
Hydrogen peroxide	30%	0	0
Methyl alcohol		0	0
Methyl ethyl ketone		0	0
Methylene chloride		0	0
Monochlorobenzene		0	0
Naphthalene		0	0
Nitric acid	20%	0	0
Nitric acid	30%	0	0
Nitric acid	70%	0	0
Phenol	85%	0	1
Phosphoric acid	85%	1	0
Silver Nitrate	10%	1	0
Sodium Hydroxide	10%	1	0
Sodium Hydroxide	20%	1	0
Sodium Hydroxide	40%	1	0

Reagent	% by wt.	Spills	Fumes
Sodium Hydroxide Flake		0	0
Sodium Sulfide, saturated		2	1
Sulfuric acid	33%	1	0
Sulfuric acid	77%	1	0
Sulfuric acid	93%	1	0
Sulfuric acid/Nitric acid, equal parts	77%/70%	0	1
Tincture of Iodine		0	2
Trichloroethylene		0	0
Toluene		0	0
Xylene		0	0
Zinc Chloride		0	0

Note: Maximum concentration is to be understood unless a lower concentration is shown in the table.

2.3 FUME EXTRACTOR ARMS (SNORKELS)

A. Manufacturers: Products complying with this specification may be provided by the following manufacturers. All products specified in this section shall be provided by a single manufacturer.
   1. Nederman Inc., 39115 West Warren Road, Westland, MI 48185 Tel: 800-575-0609.
   2. Alsident System represented by Laboratory Enterprises, 3122 Brinkerhoff Road, Kansas City, KS 66115 Tel: 913 621-7337.
   3. Movex Inc., 104 Commerce Drive, Suite C, Northampton, PA 18067 Tel: 610 440-0478.
   4. Approved substitution.

B. Models: Subject to compliance with the requirements listed below, acceptable models include:
   1. System 75 by Alsident System.
   2. ME 75 with external gas spring by Movex Inc.
   3. FX Extractor Arms by Nederman Inc.

C. Type: Ceiling mounted, self-supporting fume extractor arm.
   1. Extractor Arm Diameter:
      a. 3 inch diameter tubes.
   2. Extractor Arm Material:
      a. Anodized aluminum.
   3. Provide external gas spring assembly to support arm.
   4. Arm Length: Arms shall be of sufficient length to cover an 18 inch radius area at 48 inches above the finished floor.
      a. Assembly shall be positioned so that no component is lower than 90 inches above the finished floor.
   5. Swivel Assembly: Hi-grade cast aluminum with 360 degree rotation.
   6. Joints: Friction joints with ball bearings and O-ring.
      a. Provide external, corrosion-resistant adjustment knobs.
   7. Hood (metal): 10 inch diameter, powder-coated aluminum.
   8. Ceiling mounted stanchion/bracket for attachment to structure above.
   9. Escutcheon suitable to trim any ceiling penetrations.
   10. Final connection to the fume exhaust duct system under Division 23. Provide airflow per Equipment Exhaust Schedule.
   11. Dampers are not acceptable and shall not be provided.

2.4 CANOPY HOODS

A. Custom fabricated stainless steel canopy hoods: Refer to Section 115310, Stainless Steel Fabrications.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Prior to installation of the Work of this Section, carefully inspect the installed Work specified in other sections and verify that all such Work is complete to the point where this installation may properly commence.

B. Verify that all Work has been installed in complete accordance with the original design, received submittals, and the manufacturer's recommendations.

C. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

A. Work in this Section requires close coordination with Work specified in Division 22, Division 23 and Division 26, as well as installation by Owner of Owner furnished components. Coordinate all Work to ensure an orderly process in the Project, without removal of previously installed Work, and so as to prevent damage to finishes and products.

B. Coordinate location and alignment of fume hoods and cabinets for proper connection of all piping and duct work.

C. Install all equipment in accordance with applicable codes and regulations, accepted Shop Drawings, and as necessary for a complete operating system.

3.3 FIELD TESTING

A. Chemical Fume Hoods:

1. Fume hood field tests shall be performed by a qualified independent testing company on each hood.
2. All laboratory supply, general exhaust, and fume exhaust HVAC systems shall be operational during testing.
3. Test and certify each fume hood in accordance with ASHRAE Standard 110-1995 for Section 6.1 Flow Visualization, Section 6.2 Face Velocity Measurements, Section 6.3 Test Method for VAV Fume Hoods, Section 6.4 VAV Response Test, and Section 7 Tracer Gas Test Procedure testing requirements.
4. Flow Visualization: Fume hood shall provide complete containment of the smoke generated within the hood.
5. Face Velocity Measurements: Fume hoods shall be tested at the design operating condition sash opening height indicated in the Chemical Fume Hood Schedule.
    a. Fume hoods shall achieve the scheduled design operating condition average face velocity within ±5 fpm.
    b. Individual face velocity readings shall not vary by more than 20% of the mean between measurement grid locations.
6. Test Method for VAV Fume Hoods (Not Applicable to CAV Hoods): Perform this test to confirm VAV controls are properly calibrated. Average and individual face velocity reading should meet the performance criteria indicated for Section 6.2 Face Velocity Measurements above.
7. VAV Response Test (Not Applicable to CAV Hoods): Perform this test to verify VAV controls are responding accurately to the opening of the fume hood sash. The time it takes from the start of the sash movement until the face velocity stabilizes shall be less than 5 seconds.
8. Tracer Gas Test Procedure: Fume hoods shall achieve an As-Installed (AI) performance rating equal or better than 0.10 ppm with 4.0 Lpm tracer gas release rate.
9. Cross Drafts: Fume hood testing shall also include measuring and documenting the vertical and horizontal cross-drafts at the face of the hood. Cross-drafts shall not exceed half of the fume hood face velocity.
10. Balancing of the HVAC systems is in the scope of work of Division 23.

3.4 COMMISSIONING

A. Refer to Section 019113 for Commissioning.

3.5 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as approved by the Architect upon completion of installation.

B. Adjust all moving or operating part to function within their design parameters.

C. Clean equipment, touch up as required.

D. Protect all units before, during, and after installation. Damaged materials due to improper protection shall be cause for rejection.

END OF SECTION

SECTION 115343
LABORATORY SERVICE FITTINGS AND FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Laboratory service fittings, valves, and related components.

B. Laboratory emergency plumbing fixtures.

C. Laboratory sink units.

1.2 RELATED SECTIONS

A. Division 22: Plumbing

B. Division 23: Heating, Ventilated, and Air-Conditioning

C. Section 222000: Laboratory Plumbing

D. Division 26: Electrical

1.3 REFERENCES

A. Conform to SEFA 2-2010 Recommended Practices for Installation and SEFA 7-2010 Recommended Practices for Laboratory Fixtures as published by the Scientific Equipment and Furniture Association.

1.4 DESCRIPTION

A. Work includes but is not necessarily limited to furnishing to the project site for installation by Division 22, all laboratory fixtures, fittings, and emergency plumbing fixtures described herein and shown on the Laboratory Furnishings Drawings.

1.5 SUBMITTALS

A. Refer to General Conditions and Division 1 “Submittal Procedures” for submittal requirements. In addition to these requirements, provide submittal requirements specified herein.

B. Submittal requirements:

1. Submittal shall be prepared individually for this specification section. Arrange product data, drawings and information for submission in a complete set for this specification section.
2. Submittal shall contain complete data for all items of this specification section. Periodic or partial submittals of individual components within this specification section will be returned as incomplete and rejected.
3. Submittals shall be organized by specification sequence with section and paragraph number identified.
4. Equipment and components being proposed shall be clearly labeled with all options and accessories indicated and shall be for this specific project.

C. Materials List/Product Data: Submit complete materials list, including catalogue data, of all materials, equipment, and products for Work in this Section.

D. Shop Drawings: Submit complete shop fabrication and installation drawings, including plans, elevations, sections, details and schedules. Show relationship to adjoining materials and construction. Shop Drawings shall be in the form of reproducibles or photocopies, not to exceed 11inches x 17 inches (A3) in size. Blueline prints are not acceptable.

E. Approved Substitution/Approved Equal: In addition to the items required in Division 1, all substitution requests shall include item-by-item comparison of the proposed substitution to this project specification. A copy of the project specification shall be submitted, with each item and subsection of the project specification marked as “Comply” or “Not Comply.” In any cases where “Not Comply” is indicated, an explanation of the relative advantages of the proposed design shall be provided.

1. Substitution shall not affect dimensions shown on Drawings.

2. The Contractor shall pay for changes to the building design, including engineering design, detailing, utility and service requirements, and construction costs caused by the requested substitution.
3. Substitutions shall have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts shall be locally available for the proposed substitution.

F. Samples: Submit two (2) samples of each type of specified finish and color specified.

G. Certifications: As a condition of acceptance, submit certification stating that equipment is complete and ready for intended function.

H. Operations/Maintenance Manuals: Accompanying certification, submit for Architect's review and Owner's use, complete operating and maintenance manuals that describe proper operating procedures, maintenance and replacement schedules, components parts list, and closest factory representative for components and service.

1.6 PRODUCT HANDLING

A. Protection: Use all means necessary to protect work of this section before, during and after installation including installed work and materials of other trades.

B. Replacement: Any damaged work shall be replaced, repaired and restored to original condition to the approval of the Architect at no additional cost or inconvenience to the Owner.

1.7 QUALIFICATIONS

A. Work in this section shall be performed by a company having a minimum of eight years documented experience, and an established organization and production facilities including all tools, equipment and special machinery necessary for specializing in the fabrication and installation of the type of equipment required, with skilled personnel, factory trained workmen and an experienced engineering department. Each shall have the demonstrated knowledge, ability and the proven capability to produce the specified equipment of the required quality and the proven capacity to complete an installation of this size and type within the required time limits.

B. Work in this Section requires close coordination with Work in electrical and mechanical Sections. Coordinate all Work to assure an orderly progress in the Project, without removal of previously installed Work, and so as to prevent damage to finishes and products.

C. Review conditions of installation, procedures and coordination with related Work.

D. Carefully inspect the installed Work specified in other Sections and verify that all such Work is complete and ready for the installation of this Work to properly commence.

E. Verify that all Work may be installed in complete accordance with the original design, reviewed submittals and manufacturer's recommendations.

1.8 WARRANTY

A. All products will be warranted to be free from defects in materials and workmanship for a period of one year following substantial completion. The manufacturer/dealer/subcontractor shall repair or replace any products (or parts thereof) that are found to be defective. Replacement will include any parts, labor, shipping, and travel expenses involved. Warranty replacement work must be scheduled in coordination with the College’s academic schedule and may therefore require evening and/or weekend hours.

PART 2 PRODUCTS

2.1 GENERAL

A. All service fittings and emergency plumbing fixtures shall be specifically designed for laboratory use.

B. Service fittings, emergency fixtures, sinks, etc. specified in this Section shall be furnished and delivered to point of use for installation as specified in Division 22.

C. All service fittings shall be factory pre-assembled including the assembly of valves to turrets, mounting shanks to turrets, etc., and individually factory tested.

D. All laboratory service fittings shall be the product of one service fitting manufacturer to assure ease of replacement and maintenance.

E. All service valves, fittings, turrets, flange and accessories shall be forged brass with a minimum copper content of 85%.

F. Provide fittings as shown in laboratory fitting details for all laboratory equipment at locations shown on the Laboratory Furnishings drawings. See Service Fitting Schedule.

G. Assembly components and operating parts such as valve stems, renewable units, packing nuts, outlet nozzles and straight serrated hose ends shall be made from solid brass stock.

H. Replaceable seats, needle cones, valve disc screws and other accessories shall be Monel or stainless steel alloys especially selected for use intended.

I. Fittings shall be factory tested and shall be supplied with nipples, lock nuts, shanks, etc.

J. Serrated tip fittings shall be threaded with the hose end being tapered.

K. Turrets shall be brass drop forging of design indicated in details shown elsewhere in the Section and shall be one or two-way, as required, with 3/8 inch (9.525 mm) IPS female inlet thread for connections. Units shall be furnished with brass shanks, brass locknuts, and washers.

L. Fittings located on the same plane shall have their handles project the same distance from the plane of reference to present a uniform related appearance, regardless of valve type construction.

M. Flanges shall be brass forging of approved design with 3/8 inch (9.525 mm) IPS female inlet and outlet.

N. All goosenecks shall provide full thread for attachment of aerator or serrated hose ends.

O. Hot water/cold water gooseneck mixers and wall-mounted cold water goosenecks shall swivel. Swivel point shall be above valve body or at valve level if wall mounted. Swing joints shall have heavy Teflon type packings; "0" rings will not be permitted. Cold water goosenecks at cup sinks shall be rigid.

P. All fittings shall have plastic colored service index buttons as specified in this Section.

Q. Provide approved backflow preventers at hand held drench hoses. See details on Laboratory Furnishings drawings.

R. Provide durable 1inch x 3 inch (25 x 75 mm) sign “NONPOTABLE WATER, DO NOT DRINK” at each bench mounted industrial water fitting, see details on Laboratory Furnishings drawings.

S. Provide plug and socket (2-piece) quick connect service fittings for all compressed air (AIR60-100) fittings and processed chilled water supply and return fittings.

T. Fittings and fixtures designated to be accessible to persons with disabilities (ADA) with operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N), maximum.

2.2 LABORATORY SERVICE FITTINGS

A. Manufacturers:

1. Products, which comply with this specification section as judged and approved by the Architect, may be provided by the following manufacturers. All products specified in this section shall be provided by a single manufacturer.
   a. Water Saver Faucet Co., 701 West Erie Street, Chicago, IL 60610 Tel: (312) 666-5500.
   b. T&S Brass and Bronze Works, Inc., 2 Saddleback Cove, P. O. Box 1088, Travelers Rest, SC 29690 Tel: (800) 476-4103.
   c. Broen, Inc., 2820 Commerce Blvd., Birmingham, AL 35210 Tel: (800) 446-7326.
   d. Approved substitution/equal.

B. Cylindrical Pattern:

1. All service fittings shall have WaterSaver Standard turret style as the basis of design.

C. Handles:
   1. Faucets designated to be accessible to persons with disabilities (ADA): provide 4 inch "wrist-blade" handles with color coded screw-on index (identification) discs. Wrist-blade handles to be installed in the vertical position (off).
   2. Laboratory air and vacuum valves at workstations indicated to be accessible to persons with disabilities (ADA) and all laboratory gas valves: Provide ball valves fitted with lever-type handles and color coded screw-on index (identification) discs.
   3. Other fittings shall be fitted with four arm handles and color coded screw-on index discs or as indicated.

D. Finish: As described elsewhere in this section.

E. Water Valves:
   1. Water valves shall include a renewable unit containing all the working parts which are subject to wear, including stainless steel or monel seat, monel screw and heavy duty seat disk and Teflon packing.
   2. Volume control at deck mounted water faucets:
      a. Compression unit with integral adjustable volume control to regulate size of inlet port of valve.
   3. Volume control at fume hood water outlets: Serrated hose end shall have a 0.5 GPM removable flow restrictor insert to allow a perfect flow out of the outlet and eliminate any splashing or wide pattern spray.
   4. Goosenecks: Unit shall be capable of being readily converted from compression to self-closing, and vice versa, without disturbing faucet body and shall also be capable of being readily converted from water construction to needle valve or steam valve construction having outside packing gland without disturbing faucet body.
   5. Unit shall be sealed in valve body with special composition gasket. Metal-to-metal or ground joint type of sealing is not acceptable.
   6. Water fixtures shall be fully assembled and factory tested at 80 psi (0.55 MPa) water pressure.

F. Needle Valves: Fully assembled and factory tested at 225 psi (1.55 MPa) air pressure. Gas, air, vacuum and steam needle valve fittings shall have stainless steel replaceable floating cone that is precision ground and self-centering which shall seat against a stainless steel or monel renewable valve seat. Action of valve shall be slow compression for fine control under pressure up to 150 psi (1.03 MPa) and shall have subject-to-wear parts easily replaceable. Provide pressure regulators designed for use with the appropriate service at locations indicated on the Laboratory Furnishing drawings. Needle valves for natural (laboratory) gas service shall be certified for use with natural gas by the Canadian Standards Association under ANSI Z21.15-2009/CGA 9.1-2009. Needle valves in fume hoods shall be mounted on the front panel of the fume hood, with all components subject to wear accessible from the exterior face of the hood.

G. Laboratory Ball Valves: Suitable for laboratory gas, air and vacuum and be supplied fully assembled and factory tested at 125 psi (0.86 MPa) air pressure. Ball valves shall be of quarter-turn (closed to fully open) design, be fitted with lever handle requiring less than 5 lbf (22 N) force to operate, and shall have subject-to-wear parts easily replaceable. Ball valves for natural (laboratory) gas service shall be certified for use with natural gas by the Canadian Standards Association under ANSI Z21.15-2009/CGA 9.1-2009.

H. High Purity Water Valves: Suitable for purified water and provided with polypropylene liner. Valve stem and bonnet shall be brass.

I. Service Fitting Color Index:

Service Name	Disc Color	Letters	Letter Color
Lab Air	Orange	AIR	Black
Compressed Air	Orange	AIR60,90,100	White
Gas	Dark Blue	GAS	White
Vacuum	Yellow	VAC	Black
Industrial Cold Water	Dark Green	ICW	White
Industrial Hot Water	Red	IHW	White
High Purity Water	White	PW	Black
Deionized Water	White	DI	Black

2.3 LABORATORY EMERGENCY PLUMBING FIXTURES

A. Manufacturers:

1. Products, which comply with this specification section as judged and approved by the Architect, may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
   a. Water Saver Faucet Co., 701 West Erie Street, Chicago, IL 60610 Tel: 312 666-5500.
   b. Guardian Equipment, 1104N North Branch St., Chicago, IL 60642 Tel: 312 447-8100.
   c. Haws Corporation, 1455 Kleppe Lane, Sparks, NV 89431 Tel: 775 359-4712.
   d. Approved substitution/equal.

B. All emergency plumbing fixtures shall comply with requirements of ANSI Standard Z358.1-2009: American National Standard for Emergency Eyewash and Shower Equipment.

C. All emergency plumbing fixtures shall be accessible to persons with disabilities in compliance with the requirements of the federal Americans with Disabilities Act (ADA), ADA Accessibility Guidelines (ADAAG), and state accessibility regulations.

D. Barrier-free safety station with emergency shower actuation valve in stainless steel cabinet for recess mounting and wall-mounted eyewash with stainless steel skirt: Water Saver Model No. SSBF670-721, or equal, with the following characteristics or modifications.

1. Ceiling-mounted exposed showerhead. Nipple length shall be as required for a complete installation; verify finished ceiling height.
2. Exposed piping, showerhead, nipple, and escutcheon shall be chrome-plated brass with clear epoxy coating.
3. Safety shower actuating arm shall be stainless steel.
4. Showerhead shall have perforated stainless steel spreader.
5. Safety shower actuating arm shall be mounted in a flanged, recessed-mounted 18 gauge (1.3 mm) stainless steel cabinet with No. 4 finish.
6. Flag/paddle shall be epoxy-coated cast aluminum or stainless steel.
7. Eyewash heads shall be ABS plastic with float-off dust covers.
8. Stainless steel skirt shall have No. 4 finish.
9. Safety shower stay-open brass ball valve concealed behind stainless steel/access panel housing. Eyewash stay open brass ball valve concealed behind skirt.
10. Fixture shall be furnished with green plastic sign with graphic symbol for safety shower/eyewash.

E. Barrier-free safety station with swing-down eye/face wash, drain pan and emergency shower actuation valve in stainless steel cabinet for recessed mounting: Water Saver Model No. SSBF2150, or equal, with the following characteristics or modifications.

1. Ceiling-mounted exposed showerhead. Nipple length shall be as required for a complete installation; verify finished ceiling height.
2. Exposed piping, showerhead, nipple, and escutcheon shall be chrome-plated brass with clear epoxy coating.
3. Safety shower actuating arm shall be stainless steel.
4. Showerhead shall have perforated stainless steel spreader.
5. Eyewash heads shall be ABS plastic.
6. Eyewash flow shall be activated by swing-down actuation valve connected to eyewash piping.
7. Eyewash components and safety shower actuating arm shall be mounted in a flanged, recessed-mounted 18 gauge (1.3 mm) stainless steel cabinet with No. 4 finish. A stainless steel drain pan shall be integral with eyewash components and shall direct eyewash water to drain outlet in bottom of recessed mounting cabinet.
8. Stay-open brass ball valves concealed behind stainless steel/access panel housing.
9. Fixture shall be furnished with green plastic sign with graphic symbol for safety shower/eyewash.

F. Barrier-free eye wash, deck mounted, swing down “auto flow” style. Water Saver Model No. EWBF849.

1. Must be barrier free with supply arm angled downward so that spray heads are no more than 36 inches above finished floor in the down position.

2. Straight supply arm not meeting barrier free requirements is not acceptable and shall not be provided.
3. Coordinate configuration and location with other adjacent services.
4. Swing-down eye wash unit with dual gentle spray outlet heads and “AutoFlow” feature.
5. Heads shall be equipped with flip top dust cover that automatically releases with water pressure.
6. Furnish with inline backflow preventer at the inlet.
7. Strainer: Provide inline strainer to protect valve and spray heads.
8. Arm and elbow fitting shall be chrome-plated brass with clear epoxy coating.
9. Housing enclosure shall be stainless steel, Type 316.
10. Mounting shank.
11. Fixture shall be furnished with green plastic sign with graphic symbol for eyewash.

2.4 FINISHES

A. Service Fittings:
   1. Polished chrome finish with clear, acid-resistant coating:
      a. Chrome finish: All exposed surfaces shall be polished and buffed, then electroplated with one layer of nickel and one layer of chrome. Each layer of plating shall completely cover all visible areas. Total plating thickness shall be not less than 0.4 mil (10 µm).
      b. Clear epoxy coating: Following plating, clear epoxy coating shall be applied to all exposed surfaces and then baked to permit curing. Surfaces shall have a minimum coating thickness of 2 mils (50 µm).

B. Service Fittings at Fume Hoods:
   1. Preparation: Surfaces to be coated shall be polished or sandblasted to produce a uniform fine-grained surface and immersed in a phosphoric acid cleaning solution to remove thoroughly all oil, grease and other foreign substances.
   2. Epoxy finish: Following cleaning, coating material shall be electrostatically applied to all exposed surfaces. After application, coating shall be fully baked to permit curing. Coating material shall be free-flowing epoxy powder with particle size of 1.4 to 2.8 mils (35 to 70 µm). Surfaces shall have a minimum finished coating thickness of 2 mils (50 µm).
   3. Color:
      a. Fittings inside fume hoods shall have a colored finish color-coded to match the fitting service index color.

C. Performance requirements for coated finishes:
   1. Chemical resistance:
      a. Fume Test: Suspend coated samples in a container of at least 6 cu. foot (170 L) capacity, approximately 12 inches (300 mm) above open beakers, each containing 100 mL of 70% nitric acid, 94% sulfuric acid and 35% hydrochloric acid, respectively. After exposure to these fumes for 150 hours, the finish on the samples shall show no discoloration, disintegration or other effects.
      b. Direct Application Test: Subject coated samples to the direct action of the following reagents and solvents at a temperature of 25°C dropping from a burette at the rate of 60 drops per minute for ten minutes. Finish on samples shall not rupture, though slight discoloration or temporary softening is permissible.

Reagent	Concentration
Acetic Acid	98%
Acetone	
Ammonium Hydroxide	28%
Amyl Acetate	
Amyl Alcohol	
Benzene	
Butyl Alcohol	
Calcium Hypochlorite	
Carbon Disulfide	
Carbon Tetrachloride	
Chloroform	
Chromic Trioxide Acid	

Reagent	Concentration
Cresol	
Crude Oil	
Dioxane	
Distilled Water	
Ether	
Ethyl Acetate	
Ethyl Alcohol	
Ethyl Ether	
Formaldehyde	37%
Formic Acid	90%
Gasoline	
Glacial Acetic Acid	99.5%
Glycerine	
Hydrochloric Acid	38%
Hydrofluoric Acid	48%
Hydrogen Peroxide	5%
Isopropyl Alcohol	
Lactic Acid	10%
Kerosene	
Methanol	
Methyl Alcohol	
Methyl Ethyl Ketone	
Methylene Chloride	
Mineral Oil	
Monochlor Benzene	
N-Hexane	
Naphthalene	
Nitric Acid	70%
Perchloric Acid	70%
Phenol	
Phosphoric Acid	75%
Sea Water	
Silver Nitrate	30%
Sodium Bichromate	Saturated
Sodium Carbonate	10%
Sodium Chloride	20%
Sodium Hydroxide	50%
Sodium Hypochlorite	
Sodium Sulfide	
Sulfuric Acid	87%
Toluene	
Trichlorethylene	
Turpentine	
Urea	Saturated
Xylene	
Zinc Chloride	Saturated

2. Mar and abrasion resistance: Coating material shall have a pencil hardness of 2H – 4H with adhesion substantial enough to withstand both direct and reverse impacts of 160 inch-pounds (18 Nm). Coating shall have excellent mar resistance and be capable of withstanding scuffing, marring and other ordinary wear.
3. Repairability: Scratches and other localized surface damage shall be field-repairable.

2.5 LABORATORY SINKS

A. Epoxy Resin:
   1. Manufacturer: Manufacturer shall be the manufacturer of epoxy resin work surfaces specified in Section 115310.
   2. Laboratory Sinks:

a. Drop-in Type: Drop-in installation by Division 11 in epoxy resin work surface, sizes as indicated on drawings. Color to match work surface.
b. Comply with the requirements of Section 115310 for epoxy resin.
c. All exposed edges shall be radiused not less than 1/4 inch (6 mm).
d. Sink shall be set 1/8 inch (3 mm) below the level of the adjacent surface.
e. Provide epoxy resin sink outlet in color to match sink with strainer, stopper and open-end overflow, and install in sink with continuous bead of silicone sealant.
   1). At black epoxy resin sinks, outlet shall be black polypropylene.
   2). Where Garbage Disposers occur, provide outlet opening to match disposer's sink flange mounting assembly.
f. Provide tailpiece compatible with waste piping system for all sinks unless otherwise specified. Refer to Division 22 for piping requirements.

B. Epoxy resin, Polyolefin or Polypropylene Cup Sinks:
   1. Fume Hood Locations: Provide cup sinks at fume hoods as described in Section 115313.
   2. Provide strainer for all cup sinks.

C. Stainless steel:
   1. Laboratory Sinks:
      a. Refer to Section 115310, Stainless Steel Fabrications.
      b. Provide stainless steel strainer, outlet, standpipe overflow and stopper for all sinks unless otherwise specified.
      c. Provide tailpieces compatible with waste piping system for all sinks unless otherwise specified. Refer to Division 22 for piping requirements.
   2. Wall-Mounted Sinks:
      a. Manufacturers:
         1). Products, which comply with this specification section as judged and approved by the Architect, may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
            a). Just Manufacturing Company, 9233 King St., Franklin Park, IL 60131 Tel: 847 678-5150.
            b). Elkay, 2222 Camden Ct., Oak Brook, IL 60523 Tel: 630 574-8484.
            c). Approved substitution/equal.
      b. Hand Wash Sink: Just Model No. A-544-912, or equal.
         1). Material: Type 304 stainless steel with No. 4 finish.
         2). Material Thickness: 20 gauge (1.0 mm).
         3). Underside of sink shall be provided with sound deadening coating.
         4). Provide all necessary mounting hardware required for wall-mounted installation.
         5). Faucet hole punches to be coordinated with specified faucet.
      c. Provide stainless steel strainer and outlet for all sinks unless otherwise specified.
      d. Provide tailpieces compatible with waste piping system for all sinks unless otherwise specified. Refer to Division 22 for piping requirements.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Inspection:
   1. Prior to installation of fittings specified in Section 115343, carefully inspect the installed Work specified in other Sections and verify that all such Work is complete to the point where this installation may properly commence.
   2. Verify that all Work has been installed in complete accordance with the original design, approved submittals, and the manufacturer's recommendations.

B. Discrepancy:
   1. In the event of discrepancy, immediately notify the Architect.

3.2 PACKING AND DELIVERY

A. Deliver all fittings and fixtures to job site in recommended packaging, with each fitting individually packaged, marked, and scheduled for point of use.

B. Inventory fittings, at job site, verify that type and quantity are correct, and re-package until installed.

C. Store in clean, dry location.

3.3 INSTALLATION

A. Set internal volume control on all cup sink water fittings so water does not splash out of sink.

END OF SECTION

SECTION 115350
LABORATORY EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Laboratory Glassware Washer/Dryers: Base Cabinet Height

B. Laboratory Sterilizers (Autoclaves): Small

C. Procedure Lights (Exam Lights)

1.2 RELATED SECTIONS

A. General and Supplementary Conditions and Division 1

B. Division 23: Mechanical

C. Division 22: Plumbing

D. Division 26: Electrical

1.3 REFERENCES

A. Comply with requirements of general and supplementary conditions and Division 1 as part of this specification.

1.4 DESCRIPTION

A. Furnish and install all laboratory equipment with necessary components and accessories required to ensure a complete installation and ready for intended use as specified herein and shown on the Laboratory Furnishings Drawings.

B. Provide side panels to cover all exposed sides of cabinet-type equipment designed for under-counter installation.

C. Work of this section requires close coordination with work of Division 22, 23 and 26 as well as installation of Owner furnished components and work specified in other Sections. Sequence all work to assure an orderly progress in the project without removal of previously installed work and so as to prevent damage to finishes and products.

1.5 SUBMITTALS

A. Refer to General Conditions and Division 1 “Submittal Procedures” for submittal requirements. In addition to these requirements, provide submittal requirements specified herein.

B. Submittal requirements:

1. Submittal shall be prepared individually for this specification section. Arrange product data, drawings and information for submission in a complete set for this specification section.
2. Submittal shall contain complete data for all items of this specification section. Periodic or partial submittals of individual components within this specification section will be returned as incomplete and rejected.
3. Submittals shall be organized by specification sequence with section and paragraph number identified.
4. Equipment and components being proposed shall be clearly labeled with all options and accessories indicated and shall be for this specific project.

C. Shop Drawings: Submit complete shop fabrication and installation drawings, including plans, elevations, sections, details and schedules. Show relationship to adjoining materials and construction. Shop Drawings shall be in the form of reproducibles or photocopies, not to exceed 11 inches x 17 inches (A3) in size. Blueline prints are not acceptable.

D. Submit detailed anchorage and attachment drawings and calculations provided by a licensed Structural Engineer to show compliance with the applicable Building Code seismic restraint requirements.

E. Samples: Submit for Architect's approval two (2) samples of each type of specified finish and color range available.

F. Certifications: As a condition of acceptance, submit certification stating that equipment is complete and ready for intended function.

G. Operations/Maintenance Manuals: Accompanying certification, submit for Architect's review and Owner's use, complete operating and maintenance manuals that describe proper operating procedures, maintenance and replacement schedules, components parts list, and closest factory representative for components and service.

1.6 QUALIFICATIONS

A. Contractor for work in this section shall have an established organization and production facilities including all tools, equipment and special machinery necessary for specializing in the fabrication and installation of the type of equipment specified, with skilled personnel, factory trained workmen and an experienced engineering department. Each shall have the demonstrated knowledge, ability and the proven capability to produce the specified equipment of the required quality and the proven capacity to complete an installation of this size and type within the required time limits.

1.7 COORDINATION

A. Work of this Section requires close coordination with Work of Divisions 22, 23 and 26 and Work specified in other Sections. Sequence all Work to ensure an orderly progress in the project without removal of previously installed Work and so as to prevent damage to finishes and products.

1.8 SUBSTITUTIONS

A. Approved Substitution/Approved Equal: In addition to the items required in Division 1, all substitution requests shall include item-by-item comparison of the proposed substitution to this project specification. A copy of the project specification shall be submitted, with each item and subsection of the project specification marked as “Comply” or “Not Comply.” In any cases where “Not Comply” is indicated, an explanation of the relative advantages of the proposed design shall be provided.

B. Substitution shall not affect dimensions shown on Drawings.

C. The Contractor shall pay for changes to the building design, including engineering design, detailing, utility and service requirements, and construction costs caused by the requested substitution.

D. Substitutions shall have no adverse effect on other trades, the construction schedule, or specified warranty requirements.

E. Maintenance and service parts shall be locally available for the proposed substitution.

F. Regulatory: Specified products, materials, or systems for Project may include engineering or on file standards required by the Regulatory Agency. Contractor’s substitution of products, materials or systems may require additional engineering, testing, reviews, approvals, assurances, or other information for compliance with Regulatory Agency requirements or both. Contractor shall provide all Agency approvals or other additional information required and pay additional costs for required Architect’s services made necessary by the substitution at no increase in Contract Sum or schedule time, and as a part of substitution proposal

1.9 PRODUCT HANDLING

A. Protection: Use all means necessary to protect work of this section before, during and after installation including installed work and materials of other trades.

B. Replacement: Any damage as a result of this contractors work will be replaced, repaired and restored to original condition to the approval of the Architect at no additional cost or inconvenience to the Owner.

1.10 WARRANTY

A. Refer to the General Conditions and Division 1 “Product Requirements” for warranty requirements. In addition to these requirements, all products will be warranted to be free from defects in materials and workmanship for a minimum period of one year following substantial completion. The manufacturer/ dealer/ subcontractor shall repair or replace any products (or parts thereof) that are found to be defective. Replacement will include any parts, labor, shipping, and travel expenses involved.

B. Autoclave chambers shall be warranted to be free from defects in materials and workmanship for a minimum period of 15 years following substantial completion.

PART 2 PRODUCTS

2.1 LABORATORY GLASSWARE WASHER/DRYERS: BASE CABINET HEIGHT

A. Manufacturers/Models: Products, as listed below, which comply with this specification section as judged and approved by the Architect, may be provided by the following manufacturers, listed in alphabetical order:

1. Labconco Corporation, http://www.labconco.com.
   a. Model: Flaskscrubber
2. Lancer USA, http://www.lancer.com.
   a. Model: 815LX
3. Miele Professional, http://www.miele-pro.com.
   a. Model: G7883
4. Steelco, http://www.steelcospa.com.
   a. Model: Lab500SCL
5. Approved equal.

B. Description: Microprocessor-controlled laboratory glassware washer/dryer with purified water rinsing and with at least 9 automatic wash programs, capable of accepting optional inserts such as open baskets and spindles/injectors for open or injection cleaning of laboratory glassware on two rack levels.

C. Size:

1. Minimum Chamber Dimensions: 20½ inches wide x 18½ inches high x 20 inches deep.
2. Minimum Chamber Volume: 4.5 cubic feet.
3. Maximum Overall Dimensions: 24¼ inches wide x 34½ inches high x 27½ inches deep.

D. Door Configuration: Bottom-hinged, fold-down door with safety interlock.

E. Product Characteristics:

1. Construction:
   a. Insulated, fully cabinet-enclosed unit to allow for freestanding or under-counter installation. See Laboratory Furnishing drawings for location.
   b. Chamber and door:
      1). Walls and ceiling, type 304 or 316 stainless steel
      2). Floor and door, type 304 or 316 stainless steel.
   c. Exterior: Type 304 stainless steel.
2. Control System: Control panel with LCD display to indicate cycle times, temperature, and error messages.
3. Operation/ Performance:
   a. Dual pump system with separate pumps for circulation and draining.
   b. Rotating upper and lower wash arms.
   c. Circulation pump: rated at a minimum of 92 gpm.
   d. Minimum Heater rating: 2 kW.
   e. Wash water temperature: Unit shall be capable of attaining a wash temperature of 199°F (93°C).
   f. Final rinse temperature: Unit shall be capable of attaining a final purified water rinse temperature of 199°F (93°C).
   g. Easily-removable filter system to catch debris at bottom of the chamber.

h. Drying system: Unit can use any of the following drying systems:
   1). Gravity-convected drying via an electrical heating element.
   2). Drying via an electrical heating element with an internal chamber circulation fan.
   3). Non-filtered fan-driven drying system.
i. Detergents: Unit shall be capable of operating with both detergent and neutralizer. Dispensing shall either be manual or automatic.
j. Noise Level: Unit shall operate at a noise level not exceeding 70 dBA.

F. Utility Requirements:
1. Contractor to coordinate utility requirements with selected manufacturer's installation guide. The utility requirements below are intended to be able to accommodate any of the specified units.
2. Hot water: Minimum incoming temperature: 120°F (49°C). Maximum incoming temperature 158°F (70°C). Input pressure 25 to 120 psig.
3. Cold water: Input pressure 29 to 87 psig.
4. DI rinse water: Input pressure 29 to 60 psig.
5. Electric: 208 V, 60 Hz, single-Phase, 12-40 A. Provide washer with cord and plug to match electrical receptacle.
6. Drain: Connect to sink tailpiece, standpipe, or into adjacent floor sink. Refer to drawings for details. Maximum flow rates: 10.5 gpm.

G. Listing:
1. Unit shall carry an ETL mark signifying certification to UL Standard 3101-1/61010-1 or CAN/CSA C22.2 No. 1010.1.

H. Accessories required:
1. Drain water cool-down kit.
2. Provide an initial set of detergent and neutralizer chemicals, sufficient for a minimum of 50 washes, per unit.
3. Glassware accessories:
   a. Lower rack with a minimum of 19 spindles to provide for injection cleaning for narrow-neck glassware.
   b. Utensil basket(s) of approximately 512 cubic inch capacity with lid/cover(s).

2.2 LABORATORY STERILIZER (AUTOCLAVE): SMALL

A. Manufacturers: Products, which comply with this specification section as judged and approved by the Architect, may be provided by the following manufacturers. All products specified in this section shall be the provided by a single manufacturer.
1. Beta Star Life Science Equipment of R-V Industries, Inc., http://www.rvii.com.
2. Consolidated Sterilizer Systems, http://www.consteril.com.
3. Getinge USA, Inc., http://www.getingeusa.com.
4. Primus Sterilizer Co., Inc., http://www.primus-sterilizer.com.
5. Steris Corporation, http://www.steris.com.
6. Approved equal.

B. Description: Small size steam-jacketed sterilizer designed for use in Laboratory and industrial applications.

C. Chamber Size:
1. 20 inches x 20 inches x 38 inches (508 x 508 x 965 mm) nominal.

D. Door/Mounting Configuration:
1. Single door, cabinet enclosed unit.

E. Process Cycle Configuration:
1. Prevacuum: Prevacuum process shall be designed for fast, efficient sterilization of porous, heat- and moisture-stable materials, sterilization of liquids and media in borosilicate glass containers with vented closures, and decontamination of supplies after laboratory procedures. Prevacuum sterilizer shall be equipped with prevacuum, gravity, liquid, leak test and daily air removal test cycles.

F. Steam Source:
   1. Integral electric carbon steel steam generator supplied with industrial water.

G. Product Characteristics:
   1. Construction:
      a. Shell Assembly: Double wall, jacketed and insulated. Type 316L stainless steel welded sterilizer pressure vessel and type 304L or 316L stainless steel jacket. ASME rated at design operating pressure with allowance to relief valve setpoint - minimum 45 psig (310 kPa). Polished and passivated internal surfaces. Steam supply opening inside chamber to be shielded by a Type 316L stainless steel baffle. Chamber designed for positive sloped drainage with screen drain inlet to prevent debris for entering drain piping.
      b. Door Assembly: Vertical sliding door. Type 316L stainless steel, insulated with jacket. Door suspended by cable/pulley or chain/sprocket supports attached to counterweight or dual-spring assembly. Steam or compressed air activated recessed door gasket seal. Equipped with mechanical safety locking mechanism to prevent door opening when chamber pressure exceeds 2 psi (14 kPa). Provide door safety switch to prevent addition of steam to chamber unless door is closed and locked.
      c. Front Cabinet Panel: Type 304 or 316L stainless steel with No. 4 finish. Hinged or removable for full access to sterilizer piping and control systems.
      d. Side Panels: Sterilizer to be enclosed by Type 304 or 316L stainless steel removable side panels with No. 4 finish. Sterilizer sub-frame to be equipped with a synthetic rubber gasket to ensure tight fit between cabinet panels.
      e. Vacuum System: Water ejector to reduce chamber pressure during prevacuum and post-drying phases.
      f. Plumbing: All valves, fittings, and other plumbing components shall be non-proprietary. Custom manifolds or distribution systems shall not be installed. The piping system shall be designed such that all valve types used are from the same manufacturer for ease of maintenance. All utility piping connections shall terminate within the confines of the sterilizer and to be accessible from the front or access side of the unit. Provide ASME approved pressure relief valves rated for pressure vessels.
      g. Electrical: Electrical components such as switches, relays, and wiring systems shall be non-proprietary. Electrical design and installation shall conform to NEC requirements. Provide appropriate enclosure for components to protect against wet and moist environments.
      h. Floor Stand: Sterilizer to be equipped with a leveling height-adjustable floor stand manufactured of extruded aluminum structural members or welded stainless steel, or welded carbon steel with corrosion protective finish.
   2. Control System:
      a. General: The sterilizer control system shall monitor, control, display, and record all process parameters. The control system shall include a PLC controller, touch-screen operator interface control panel, printer, audible alert, and emergency manual off (EMO) safety switch.
      b. Programmable Logic Controller (PLC) Controller: Non-proprietary controller to display, monitor, and control all sterilizer operations and functions. Allen-Bradley® MicroLogix™ control system or equal.
      c. Touch Screen Operator Interface Control Panel: Color active matrix (TFT) touch sensitive color interface screen. Allen-Bradley® PanelViewPlus™ or equal. Provide one screen on each side of pass-through units.
      d. Printer: Alphanumeric ink-on-paper dot-matrix impact or permanent thermal paper printer with take-up spool.
      e. Programming: All programming to be stored in non-volatile memory to retain programming during a power outage. Provide help menus/screens for programming and troubleshooting alarm conditions. Provide security features to prevent inadvertent or unauthorized process changes. Provide user programmable time-of-day utility startup/shutdown schedules for energy savings.
      f. RS-232 or equivalent communication protocol for downloading cycle information.
      g. USB or compact flash memory card slot for memory backup/restore and downloading cycle information.

H. Utilities:
   1. Electric Steam Generator Unit:

a. Drain: 1½ inch (38 mm) ODT.
b. Generator drain: ½ inch (12.7 mm) ODT.
c. Electrical Controls: 120V, 60 Hz.
d. Electric Steam Generator: 480 V, 60 Hz, 3-phase.
e. Sterilizer feed water: Industrial cold water, 1 inch (25.4 mm) NPT, 30-50 psig (207-345 kPa) dynamic.
f. Compressed Air: ½ inch (38 mm) NPT, 80-100 psig (552-690 kPa).
g. Steam generator feed water: Industrial softened hot water, ½ inch (12.7 mm) NPT, 20-50 psig (138-345 kPa) dynamic.

I. Standards: Units shall conform to the applicable requirements of the following:
1. Underwriters Laboratories (UL).
2. International Plumbing Code.
3. NEC.
4. ASME Code, Section VIII, Division 1 for unfired pressure vessels.
5. ASME Code, Section I, Part PMB for power boilers.

J. Options Required:
1. Drain discharge cool down to limit discharge temperature into waste systems below 140°F.
2. Minimum 12-cycle capacity.
3. Seismic tie-down kit required to conform to local building codes.
4. Auto flush cycle for carbon steel steam generator with programmable timer/controls.
5. Power operated door.
6. Boiler Control and Safety Device (CSD-1) for secondary low water cut-off as required by local jurisdiction.

K. Accessories Required:
1. Rack and shelves.

2.3 PROCEDURE LIGHTS (EXAM LIGHTS)

A. Manufacturers: Products, which comply with this specification section as judged and approved by the Architect, may be provided by the following manufacturers.
1. Burton Medical Products, http://www.burtonmedical.com.
2. Approved equal.

B. Basis of Design: Aim 50
1. High-intensity of 45,000 lux (4181 fc) at 1 meter
2. 3100 K color temperature offers natural and true coloring
3. High CRI (Color Rendering Index) of 96
4. Uses three quartz halogen bulbs – each rated with a 2000-hour bulb life; bulbs wired in parallel for continuous operation
5. Compact 20" (51 cm) diameter lighthead
6. 360° limitless arm-and-mounting-system rotation around vertical axes
7. UL/IEC 60601-1, IEC 60601-1-2, EN/IEC 60601-2-41 and CAN/CSA C22.2 NO. 601.1, M90 certified
8. Required option: removable center sterilizable handle
9. Mounting:
a. Ceiling mounted
1). Single light head
2). Provide drop tube of a length so the lowest fixed part of the assembly is at 82 inches above the finished floor.
b. Seismic design (for ceiling-mounted fixtures)
10. Electric: Hard wired connection.
a. Single light head: 120V, 60Hz

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Inspection: Prior to installation of laboratory equipment, carefully inspect the installed work specified in other Sections and verify that all such work is complete to the point where this installation may properly commence.

B. Discrepancies: In the event of discrepancy, immediately notify the Architect.

3.2 EXAMINATION

A. Examine surfaces designated to receive work for conditions that would adversely affect the finished work. Repair or replace surfaces not meeting tolerances or quality requirements governing substrate construction prior to start of work.

B. Verify that surfaces, prepared openings, or support structures are ready to receive work.

C. Verify field measurements and opening dimensions are as instructed by manufacturer.

D. Inspect and verify that the required utilities are available, in proper locations, prior to equipment installation.

3.3 WORK REQUIRED OF OTHER SECTIONS PRIOR TO INSTALLATION

A. Install shutoff valves on service lines.

B. Install fused disconnect switches (with lockout in OFF position) in electric supply lines near the equipment.

C. Provide building service lines supplying specified pressures and flow rates.

D. Provide recommended feed water quality for carbon steel steam generators as follows: Total hardness as CaCO3-max 130 mg/l; Total alkalinity as CaCO3-max 180 mg/l; Total dissolved solids-max 250 mg/l; Total Silica-max 2.5 mg/l; pH-6.5 to 8.5.

E. Provide illumination of service area, with provision of convenience outlet for maintenance.

3.4 INSTALLATION

A. General:

1. Install all equipment per manufacturer's recommendations and reviewed submittals.
2. Properly align and position all equipment.

B. Connection to Building Systems: See Laboratory Plumbing and Electrical drawings and Divisions 22 & 23 and 26 for final connections.

3.5 START UP AND TESTING

A. Test, clean, and adjust equipment and apparatus installed to ensure performance meets specified requirements.

B. Operate each unit and test full range of cycles over a continuous period. Record test data.

C. Adjust and re-test any units not meeting requirements.

3.6 DEMONSTRATION AND INSTRUCTIONS

A. Engage services of factory-qualified instructor to instruct and train Owner's operating and maintenance personnel in operation, service, and maintenance of equipment.

B. Test equipment prior to demonstration. Ensure equipment, including specified accessories, is operational.

C. Provide demonstration of equipment operation and instruction of Owner's personnel.

D. Demonstrate operating capability of equipment and systems. Include control and safety features, and service and maintenance procedures.

3.7 CLEANING AND PROTECTION

A. All equipment shall be protected before, during and after installation. Damage to material due to improper protection shall be cause for rejection.

B. Packaging and debris and other waste resulting from installation of equipment will be removed.

C. Repair or remove and replace defective Work as directed by the Architect upon completion of installation.

D. Clean finished equipment, touch up as required and remove and refinish damaged or soiled areas.

E. Prior to final acceptance by the customer, equipment that has become damaged will be repaired or replaced according to the terms of the warranty and any external soiled surfaces will be cleaned.

END OF SECTION

SECTION 122113
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Operating louver blinds installed at windows frames.
   2. Manual operating hardware.

1.2 REFERENCES

A. NAAMM - National Association of Architectural Metal Manufacturers, Standard Designations for Mechanical Finishes.

1.3 DESCRIPTION

A. Horizontal metal slat louver blinds installed full height and width between jambs of window, manual control.

1.4 SUBMITTALS

A. Shop Drawings and Product Data: Submit in accordance with Section 013300. Indicate; at large scale, installation of blind, method of attachment, clearances and operation.

B. Samples: Submit in accordance with Section 013300. Provide two 12 inch blind slats in color and finish specified and one sample control specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage experienced Installer who has specialized in installing horizontal louver blinds similar to those required for this Project.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Flame-Resistance Ratings: Passes NFPA 701.

C. Single-Source Responsibility: Obtain horizontal louver blinds from one source of single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver blinds to site wrapped and crated in manner to prevent damage to components or marring of surfaces.

B. Store in clean, dry area, laid flat and blocked off ground to prevent sagging, twisting or warping.

1.7 PROJECT CONDITIONS

A. Field Measurements: Check openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in Work.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer and Type: Levelor Riviera by Levelor

B. Other Acceptable Manufacturers: Hunter Douglas, Bali Blinds, or District approved equal.

2.2 LOUVERED BLINDS

A. (WT-1) Louvered Blinds: 2 inch wide, spring tempered prefinished aluminum horizontal slats with mounting rails, controls, and accessories.

B. Manual Blind Controls: Braided polyester No.3 size lift cord with hook ring, tilting of slats by turning transparent wand by means of worm gear tilter.

C. Finish: Manufacturer's pre-treatment and baked enamel finish, color as selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine openings where horizontal louver blinds will be installed prior to beginning installation. Verify that critical dimensions are correct and surface conditions acceptable.

1. Complete finishing operations, including painting, before beginning installation.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide necessary measurements and templates to window manufacturer to insure clearance for blind installation.

B. Ensure cut-outs and preparatory work are correctly done.

C. Notify Architect in writing of discrepancies which would affect proper installation and operation of blind system. Install after discrepancies are corrected.

3.3 INSTALLATION

A. Install louvered blinds in accordance with reviewed shop drawings and manufacturer's printed instructions.

B. Position units level, plumb, and secure in place with flush countersunk mechanical fasteners.

C. Provide clearance between sash and blinds to permit unencumbered operation of sash hardware.

D. Adjust parts for smooth operation.

3.4 CLEANING

A. After completing installation, clean blind surfaces according to manufacturer's instructions.

B. Remove surplus materials, packaging, rubbish and debris resulting from installation. Leave areas where installation occurred neat, clean, and ready to use.

END OF SECTION

SECTION 122126
ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Shades at windows, where indicated.

B. Related Sections:

1. Section 061000 - Rough Carpentry: For wood blocking and grounds for mounting roller shades and accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

1. Motorized Shade Operators: Include operating instructions.

B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, fabric width and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.

1. Motorized Shade Operators: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.

C. Shade Material Samples for Verification: Not less than 3 inches square, with specified treatments applied. Mark face of material.

D. Product Certificates: For each type of roller shade, signed by product manufacturer.

E. Qualification Data: For Installer.

F. Product Test Reports: For each type of roller shade.

G. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:

1. Methods for maintaining roller shades and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Source Limitations: Obtain roller shades through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Product Standard: Provide roller shades complying with WCMA A 100.1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide either the specified products or comparable products by one of the following manufacturers:
   1. MechoShade Systems, Inc.,
   2. Draper Inc.,
   3. Hunter Douglas, Inc.,
   4. Lutron Electronics Co., Inc.,
   5. Nysan Solar Control Inc.
   6. Silent Gliss USA, Inc.
   7. Or District approved equal.

2.2 MANUALLY-OPERATED ROLLER SHADES

A. (WT-3) Manually-Operated Visually Transparent Shade: Manual roller shades, with continuous stainless-steel bead-chain operator and related heavy duty mounting systems, and accessories.
   1. Product and Manufacturer: “Mecho/5” by MechoShade Systems, Inc.
   2. Visually-Transparent Single-Fabric Shade: Extruded vinyl-coated polyester yarn consisting of approximately 79 percent reinforced vinyl and 21percent polyester core yarn; with straight bottom hem.
      a. Extra-Dense Linear Weave: "ThermoVeil 0900 Series" by MechoShade Systems, Inc.
         1) Openness Factor: 3 percent.
      b. Color and Pattern: Charcoal.

B. (WT-5) Manually-Operated Double-Roller Shade: Manual roller shades, with continuous stainless-steel bead-chain operator and related heavy duty mounting systems, and accessories.
   1. Product and Manufacturer: “Mecho/5 DoubleShades” by MechoShade Systems, Inc.
   2. Visually-Transparent Shade, Interior Face: Extruded vinyl-coated polyester yarn consisting of approximately 79 percent reinforced vinyl and 21percent polyester core yarn; with straight bottom hem.
      a. Extra-Dense Linear Weave: "ThermoVeil 0900 Series" by MechoShade Systems, Inc.
         1) Openness Factor: 3 percent.
      b. Color and Pattern: Dark Grey 0711.
   3. Blackout Shade, Exterior Face: Opaque shade, 0 percent openness factor; straight bottom hem.
      a. Blackout Shade with Opaque Acrylic Backing: “ThermoVeil Equinox 0100 Series” by MechoShade Systems, Inc.
      b. Material: 53 percent fiberglass, 45 percent acrylic, 2 percent polyester finish (PVC-free).

2.3 MOTOR-OPERATED ROLLER SHADES

A. (WT-4) Motor-Operated Double-Roller Blackout Shade: Motor-operated, blackout roller shades, and related heavy duty mounting systems and accessories.
   1. Product and Manufacturer: “Electro DoubleShades” by MechoShade Systems, Inc.
   2. Visually-Transparent Shade, Interior Face: Extruded vinyl-coated polyester yarn consisting of approximately 79 percent reinforced vinyl and 21percent polyester core yarn; with straight bottom hem.

a. Extra-Dense Linear Weave: "ThermoVeil 0900 Series" by MechoShade Systems, Inc.
   1) Openness Factor: 3 percent.
b. Color and Pattern: Dark Grey 0711.

3. Blackout Shade, Exterior Face: Opaque shade, 0 percent openness factor; straight bottom hem.
   a. Blackout Shade with Opaque Acrylic Backing: “ThermoVeil Equinox 0100 Series” by MechoShade Systems, Inc.
      1) Material: 53 percent fiberglass, 45 percent acrylic, 2 percent polyester finish (PVC-free).

2.4 SYSTEM COMPONENTS

A. Provide complete system with side angles, bottom bar, headbox, sponge liner, roller tube, controls, wiring, switches, fascia panel, and necessary accessories and fasteners.

B. Rollers: Electro-galvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with manufacturer's standard method for attaching shade material. Provide capacity for one roller shade band per roller, unless otherwise indicated.

C. Pocket with Ceiling Slot Opening: Six-sided box units for recessed installation; fabricated from formed-steel sheet, extruded aluminum, or wood; with a bottom consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing rollers, brackets, and operating hardware and operators within.

D. Bottom Bar: Steel or extruded aluminum, with metal capped ends. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.

E. Mounting: Recessed in ceiling pocket mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

F. Shade Operation: Manual, with continuous-loop bead-chain, clutch, and cord tensioner and bracket lift operator.
   1. Bead Chain: Stainless steel.
   2. Operating Function: Stop and hold shade at any position in ascending or descending travel.

2.5 ROLLER SHADE FABRICATION

A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.

B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials, with permanently lubricated moving parts.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings.

D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting roller, and operating hardware and for hardware position and shade mounting method indicated.

E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

2.6 MOTORIZED ROLLER SHADE OPERATORS

A. General: Provide factory-assembled motorized shade operation systems designed for lifting shades of type, size, weight, construction, use, and operation frequency indicated. Provide operation systems of size and capacity and with features, characteristics, and accessories suitable for Project conditions and recommended by shade manufacturer, complete with electric motors and factory-prewired motor controls, remote-control stations, remote-control devices, power disconnect switches, enclosures protecting controls and all operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with the building electrical system.

B. Comply with NFPA 70.

C. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

D. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection, brake, permanently lubricated bearings, and limit switches; sized by shade manufacturer to start and operate size and weight of shade considering service factor or considering Project's service conditions without exceeding nameplate ratings.

1. Service Factor: According to NEMA MG 1, unless otherwise indicated.
2. Motor Characteristics: Single phase, [**24**] [**110**] [**220**] V, 60 Hz.
3. Motor Mounting: Within manufacturer's standard roller enclosure.

E. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure for surface mounting. Provide the following devices for remote-control activation of shades:

1. Individual/Group Control Stations: Maintained-contact, three-position, rocker-style, wall switch-operated control station with open, close, and center off functions for individual and group control.

F. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop shade at fully raised and fully lowered positions.

G. Operating Function: Stop and hold shade at any position.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage factory-authorized service representative to train Owner maintenance personnel to adjust, operate, and maintain system.

END OF SECTION

SECTION 129300
SITE FURNISHINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all materials, labor, transportation, services and equipment specified including all footings, fittings and connections required to secure the product in place. Contractor's bid shall include all materials and services referenced in the Drawings and these Specifications, and shall be responsible for review and completion all these specification instructions herein.
2. Coordinate all trades that interface with the proper installation of the product.
3. Site Furnishing to include:
   a. Trash Receptacles.
   b. Recycle Receptacles
   c. Bicycle Racks

B. Related Sections:

1. Section 321400 - Unit Paving
2. Section 328400 - Irrigation Systems
3. Section 329000 - Planting
4. Section 329400 - Landscape Maintenance

C. Reference Standards:

1.2 SUBMITTALS

A. Submit all manufacturers' product specifications, product cuts, literature, and shop drawings for review.

B. Manufacturer's recommended installation procedures when approved will become the basis for accepting or rejecting actual installation procedure used on the job.

C. Product installed or furnished without prior approval may be rejected and the contractor shall be required to removed and replace such materials from the site at the Contractor's own expense.

D. Submittals shall include samples of the full range of colors and finishes available

1.3 QUALITY ASSURANCE

A. Certificates of compliance with all applicable ASTM and CBC standards shall be submitted on all products specified herein.

B. Manufacturers Literature: Manufacturer's specifications and detailed drawings shall be followed where the manufacturer of products used in this specifications.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Materials of this section shall be protected to maintain quality and physical requirement.

B. All products shall be stored on the job site and protected from rain, sun exposure, vandalism, etc. in the original containers.

C. Handle units carefully to avoid breakage and damage to finished surfaces.

1.5 WARRANTY AND GUARANTEES

A. Guarantee the entire construction for workmanship for a period of one (1) calendar year following the date of final acceptance of the work.

B. The guarantee statement shall be typed on the Contractor's letterhead. All guarantees shall be above and beyond the manufacturer's guarantee

PART 2 PRODUCTS

2.1 GENERAL

A. Materials shall conform to the following requirements and shall be free from defects and imperfections, unused and of recent manufacture. Where two (2) or more identical items are required, they shall be of the same manufacturer. Where product names, numbers, or models are indicated and the specified product has models discontinued, furnish the manufacturer's superseding product.

2.2 ITEMS:

A. Trash Receptacles- Refer to drawings.

B. Recycle Receptacles Refer to drawings.

C. Bicycle Racks – Refer to drawings.

PART 3 EXECUTION

3.1 GENERAL

A. Site furnishings to be installed per manufacturer's recommendations, unless otherwise noted per plan.

B. Exact location of all site furnishings to be determined in the field. Contractor to check and verify size and dimensions.

C. Coordinate installation of site furnishings including projections or appurtenances to avoid interference with utilities or other construction or difficulty in planting trees, shrubs, and groundcovers.

D. Contractor shall carefully verify all grades prior to installation to satisfy himself that he may safely proceed.

E. Physical Layout:

1. Contractor shall coordinate final locations with the College representative prior to installation. Contractor to move site furnishing into the location and make adjustment, as necessary, to the satisfaction of the College representative.
2. Contractor to repair all damage to exposed surfaces including blemishes and chips within 24-hours of installation. All repairs to finish matching adjacent work.
3. Contractor to make any repairs necessary to adjacent construction caused by installation of site furnishing without any additional cost to the owner.

F. All connections to be tightly secured or fastened per manufacturer's recommendations. Contractor to repair all constructions that is unstable or poorly secured at no cost to the College representative.

G. Contractor shall be responsible for compaction and grading necessary to install the site furnishing. In no instance shall the contractor impede or alter the natural drainage flow without written approval.

H. Work shall be set plumb level and true to line and shall present a neat and finished appearance. Include setting each item in its correct place, fastening it, connecting it, or incorporating it into other portions of the work, as each item may require; and testing and operating equipment to assure proper functioning.

3.2 INSTALLATION

A. Contractor shall maintain the site furnishing during for the duration of the maintenance period from any and all damages.

3.3 CLEANING

A. Clean up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site and any damage occurring to the work of others shall be repaired to original conditions.

END OF SECTION

SECTION 142423
HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Passenger and Hospital type elevator units.
   2. Guide hoistway rails and brackets, cylinder and plunger.
   3. Drilled hole and casing for cylinder, including concrete fill.
   4. Pit buffers.
   5. Motors, pumps, piping, controls and wiring up to main switch.
   6. Sill angles and pit ladders.
   7. Hoistway beam (if required).

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete: Machine Room floor.
   2. Section 096813 – Carpet Tile: Carpet tile flooring in elevators.
   3. Mechanical: Pit drainage.
   4. Electrical: Electrical power to machine room including main switch and breaker.

1.2 REGULATORY REQUIREMENTS

A. Conform to:
   1. ANSI A17.1 - American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks.
   2. ANSI A17.16 Supplement to Safety Code for Elevators and Escalators.
   3. National Electrical Code.
   4. ANSI A17.2 - American National Standard Practice for Inspection of Elevators, Escalators, and Moving Walks.
   5. Americans with Disability Act (ADA).

B. Welding: AWS D1.1.

1.3 DESCRIPTION

A. Work of this Section includes complete and operational systems for one individual (separated) direct plunger type hydraulic passenger elevator (elevators) with motor and pump at bottom and immediately adjacent to each hoistway as follows:

B. Elevator #1 and #2 Passenger:
   1. Net Capacity: 4000 lbs.
   2. Speed: 150 fpm.
   3. Platform Size: 6’-0” wide by 8’-3” deep.
   4. Travel: As indicated.
   5. No. of Openings: 1 front.
   6. No. of Stops: 5
   7. Entrance Openings Size: 4’-0” wide by 7’-0” high.
   8. Door Operation: Double leaf, side opening horizontal sliding.

C. Elevator Operation:
   1. Simple collective.
   2. Attendant operation (Independent operation) with key lock to remove car from normal hall button calls.
   3. Home landing shall be First floor.
   4. Manual keyed lockdown capability required for all interior and exterior elevators.

D. Fire Emergency Service:
   1. Elevator operation shall comply with requirements of Santa Ana, California.

2. Fire key shall be kept in suitable emergency box mounted adjacent to elevator.
3. If smoke or heat sensing devices are wired to elevator system to initiate foregoing operation, install three position key switch, third position to override automatic initiation by sensing device.

1.4 COORDINATION

A. Review Contract Documents for compatibility with products prior to submitting a price. If conflicts are discovered notify Architect in writing. Provide an allowance included in price and identify the allowance as a separate line item to be used for changes to structural, mechanical, electrical, or other systems required to accommodate Provider's equipment.

1.5 SUBMITTALS

A. Samples: Submit in accordance with Section 013300.
   1. Submit samples of finishes and materials required for cars, operating and signal system fixtures and finish of hoistway entrances and doors.

B. Shop Drawings and Product Data: Submit in accordance with Section 013300.
   1. Clearly indicate space requirements, general arrangement of elevator equipment, and material being supplied. Show connections, attachments, reinforcing, anchorage and location of exposed fastenings, and location and amount of loads and reactions to be carried on building structure.
   2. Submit descriptive brochures or detail drawings of landing buttons, hall fixtures, car position indicators and car operating panels, car interior and hoistway doors and frames for review.

C. Maintenance Manuals: Include operations and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and installer's maintenance personnel.

D. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.6 MAINTENANCE

A. Maintain entire elevator installation for 12 months after date of Substantial Completion of Work.

B. Include systematic examination, adjustment and lubrication of elevator equipment, repair or replace worn electrical and mechanical parts of elevator equipment using only genuine standard parts produced by manufacturer of equipment concerned.

C. Replace seals, packing, and valves to maintain required factor of safety.

D. Perform work without removing cars during peak traffic periods.

E. Provide 24 hour emergency call back service during maintenance period.

F. Ensure that competent personnel handle maintenance service. Maintain locally adequate stock of parts for replacement or emergency purposes and have qualified personnel available at such places to ensure fulfillment of this service without unreasonable loss of time.

1.7 MAINTENANCE PROPOSAL

A. Proposal for maintenance of installed elevator work for period of 3 years after termination of regular maintenance as required in preceding article.

B. Proposal shall include stipulated sum for above stated time period with premiums due annually.

C. Maintenance shall include requirements stated in preceding article.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Engage elevator manufacturer or experienced Installer approved by elevator manufacturer who has completed elevator installation similar in material, design, and extent to that indicated for this Project and with record of successful in-service performance.

1.9 DELIVERY AND STORAGE

A. Deliver items or materials to site after area in which they are to be installed is ready to receive them in their place of final installation.

B. Store materials in storage area allotted and in such manner as to prevent deterioration, damage, or loss of their essential properties.

C. Fully protect moveable and operating equipment from weather.

D. Wrap and crate factory finished materials in manner to protect their finishes.

1.10 POWER CHARACTERISTICS

A. Elevator Apparatus: Volt as indicated by Electrical, phase as required, 60 Hz alternating current.

B. Lighting: 120 volt, 60 Hz alternating current.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Hydraulic Elevators by Mitsubishi.
   1. Non-proprietary controllers by MCE Inc., http://mceinc.com , or District approved equal.
   2. Warranty: 2 years.

B. Other Acceptable Manufacturers: Otis Elevator Company, Schindler Group, ThyssenKrupp, or District approved equal.

2.2 MATERIALS

A. Rolled Steel Sections, Shapes, Rods: ANSI A17.1.

B. Sheet Steel: ASTM A446, G90 Coating designation, stretcher levelled commercial grade.

C. Stainless Steel: ASTM A167 Type 302/304, No. 4 finish. Run grain of belting in direction of longest dimension.

D. Aluminum: ASTM B221 extruded alloy; ASTM B209 sheet alloy 6063; enameling quality.

E. Plywood: PS 1, Western Softwood; (Douglas Fir) good one side, fire retardant treated per following requirements:
   1. Each piece to bear:
      a. UL FR-S rating (flame spread and smoke developed less than 25),
      b. Complying with extended 30-minute tunnel test, ASTM E84 or UL 723
      c. Meet interior Type A requirements in AWPA Standard C-27 for plywood.
      d. And shall be registered for use as a wood preservative by the U.S. Environmental Protection Agency.
   2. Treatment to provide protection against:
      a. Termites.
      b. Fungal decay.
   3. Treatment to be free of:
      a. Halogens.
      b. Sulfates.
      c. Ammonium phosphate.
      d. Formaldehyde.
   4. After treatment: Material shall be dried to an average moisture content of 15 percent or less for plywood and 19 percent or less for other lumber.
   5. Coat surfaces cut after treatment with heavy brush coat of same fire-retardant chemical
   6. Manufacturers:
      a. Dricon by Arch Wood Products.
      b. Pyro-Guard by Hoover Treated Wood Products.

F. Plastic Laminate: FS L-P-508; color, texture, pattern selected by Architect.

2.3 OPERATING EQUIPMENT

A. Motors, pumps, controllers, hydraulic fluid reservoir, cylinder, casing, plunger, piping, guide rails, buffers, buttons, wiring, indicators, and hardware and fittings to provide fully operational elevator.

B. Back-up power source: Provide with standby power source unless elevator is shown to be connected to emergency power generator.

C. Manual keyed lockdown capability required for all interior and exterior elevators.

2.4 FINISHES

A. Primer: Shop coat, (zinc dust/zinc oxide) alkyd.

B. Galvanizing: ASTM A526, G90 coating designation.

C. Enamel: Shop applied baked enamel of colors selected by Architect.

D. Corrosion Protection: Corrosive resistant paint and covering wrap as recommended by elevator manufacturer for specific soil conditions at site.

2.5 FABRICATION

A. Machine: A.C. type specifically designed for elevator service having motor, pump, tank valves and muffler mounted and aligned on steel bedplate.

B. Cylinder/Plunger: Machined polished steel tube having internal couplings where jointed, welded stop on bottom, sliding in high strength steel pipe cylinder having closed bottom and stuffing box with packing gland at top and necessary piping connections.

C. Car: Sheet steel enclosure with structural steel frame and bracing, 3/4 inch fire retardant treated plywood floor and wall cladding fastened with hidden mechanical fasteners. Power operated hollow steel doors with track, rollers and frame.

D. Car Finish: Color and finishes as selected by Architect from manufacturer's standard finishes. Provide cab with swing return front.

E. Hoistway Entrances: Baked enamel finish on steel.

2.6 FINISHING

A. Non-exposed to View Surfaces:
   1. Structural and Non-exposed Ferrous Metal Surfaces: Free surfaces of rust, oil or grease, clean with solvent, prime with 2 coats structural steel grade primer.
   2. Field Welds: Chip and clean away oxidation, flux or residue, wire brush clean, apply 2 coats of primer.
   3. Wood: One coat primer and 2 coats semi-gloss alkyd enamel.

B. Exposed to View Surfaces (in car, machine room and hoistway entrances).
   1. Stainless Steel: Type 302/304 No. 4 finish.
   2. Plastic Laminate: Wood grained or solid color furniture finish, 0.060 inch thick, pattern and color as selected from manufacturer's standard range.
   3. Baked Enamel: Clean, degrease zinc coated metal surface, one coat of zinc oxide primer sprayed and baked, 2 coats of semi-gloss enamel sprayed and baked, color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine work of other trades on which work of this Section depends. Report defects to Architect in writing which may affect Work of this trade or equipment operation.

B. Ensure that shafts and openings for moving equipment are plumb, level and in line and that pit is to proper depth, waterproofed and drained with necessary access doors, cylinder opening, ladder, guard.

C. Ensure that machine room is properly illuminated, heated and ventilated and equipment foundations correctly located complete with floor and access door.

D. Before fabrication, take necessary job site measurements and verify where work is governed by other trades. Check measurements of space for equipment and means of access for installation and operation. Obtain dimensions from site for preparation of shop drawings.

E. Ensure following preparatory work, provided under other Sections has been properly completed to receive elevator work:

1. Supply of electric feeder wires to terminals of elevator control panel, including fused main line switch or circuit breaker. Provision of hoistway outlets for car light, and for light in pit and outlets in machine room for light. Furnishing of electric power for testing and adjusting elevator equipment.
2. Provision of hoistway outlet for telephone.
3. Supply of power for emergency cab lighting and ventilation from power panel specified in Division 26 Electrical fed by building emergency circuits.
4. Machine room enclosed and protected from moisture, with lockable door.

F. Supply in ample time for installation, inserts, anchors, pipe sleeves, bearing plates, brackets, supports and bracing including setting templates and diagrams for placement.

3.2 INSTALLATION

A. Perform work with competent mechanics skilled in this work and under direct control and supervision of elevator manufacturer's experienced foreman.

B. Set hoistway entrances in alignment with car openings and true with plumb sill lines.

C. Install machinery, guides, controls, car and equipment and accessories in accordance with manufacturer's instructions, applicable codes, and standards to provide quiet, smoothly operating installation, free from sidesway, oscillation, or vibration.

D. Excavate for plunger and cylinder, set in place plumb and accurate and enclose with 3000 psi concrete.

E. Mount machine immediately adjacent to hoistway on concrete foundation provided under Section 033000 - Cast-in-Place Concrete. Isolate and dampen machine vibration with properly sized sound reducing anti-vibration pads.

F. Install and hookup piping between machine and cylinder.

G. Erect hoistway sills, headers and frames prior to erection of rough walls and doors; erect fascias and toe guards after rough walls finished.

H. Grout sills and hoistway entrance doors.

I. Provide stainless steel license holders in each elevator car to suit certificate issued. Design holder with nonvisible tamperproof fastenings.

J. Provide wall hooks and protective mats for walls of elevator car No. 2.

K. Locate hall buttons and indicators as detailed on Drawings.

3.3 CLEANING

A. Prior to final acceptance remove protection from finished or ornamental surfaces and clean and polish surfaces with due regard to type of material.

B. At completion of work of this Section, remove tools, equipment and surplus materials from site.

3.4 ADJUST AND BALANCE

A. Make necessary adjustments of equipment to ensure elevator operates smoothly and accurately.

3.5 PROTECTION

A. Locate and protect moveable equipment and controls in such way that they can only be operated by authorized persons.

3.6 INSPECTION

A. Obtain and pay for inspections and permits and make such tests as are required by regulations of authorities. Make tests in presence of Architect.

B. Final inspection shall be after elevator installation, hoisting enclosure and machine room are complete.

C. Inspect installation in accordance with ANSI A17.2.

D. Deliver test certificates and permits to Architect.

3.7 INSTRUCTION AND MAINTENANCE

A. Instruct Owner's personnel in proper use, operation and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for complete elevator maintenance program.

B. Make final check of each elevator operation, with Owner's personnel present and just prior to date of substantial completion. Determine that control systems and operating devices are functioning properly.

END OF SECTION