

III. RISK ASSESSMENT

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I. WHAT IS A RISK ASSESSMENT?

Risk assessment is the five step process of estimating or calculating the potential losses in terms of life, injuries, property damage and economic damage resulting from a natural hazard incident. To conduct this analysis, it is necessary to identify and understand the hazards that can impact the district and individual campuses; assess the vulnerability of the people, buildings and infrastructure; and estimate the potential losses. Each of these tasks, as it pertains to RSCCD is described below.

II. FEDERAL REQUIREMENTS FOR RISK ASSESSMENT

Recent federal regulations for hazard mitigation plans outlined in 44 CFR Part 201 include a requirement for risk assessment. This requirement is intended to provide information that will help communities identify and prioritize mitigation activities that will reduce losses from the identified hazards.

To simplify the Risk Assessment Process, we have broken it down into five simple steps. Below is a summary of the five steps.

Table 1: Federal Criteria for Risk Assessment

Section 322 Plan Requirement	How is this addressed in this plan?
Step 1: Identifying Hazards	Each section includes an inventory of the best available data sources that identify hazard areas. To the extent GIS and Hazus data are available, MMI Engineering developed maps identifying the location of the hazards impacting the district. They used Hazus for earthquake and flood. It is not available for any other hazards studied. The hazard maps are overlaid with RSCCD sites.
Step 2: Profiling Hazard Events	Each hazard section includes research and documentation on the geography, history of past hazard events, and the causes and characteristics of the hazard impact on RSCCD facilities.

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Section 322 Plan Requirement	How is this addressed in this plan?
Step 3: Assessing Vulnerability Identifying Assets	<p>Where data is available, the vulnerability assessment each hazard addressed provides information and an inventory on RSCCD facilities. RSCCD completed a contract with MMI Engineering for Vulnerability Assessment and mapping hazards for the Hazard Mitigation Plan. RSCCD provided their District's Insurance Property Evaluation Report to MMI Engineering to be used with the Hazus Advanced Engineering Building Module (AEBM) program. This will result in damage estimates of potential deaths, injuries and financial losses by building.</p>
Step 4: Risk Assessment (Assessing Vulnerability: Estimating Potential Losses)	<p>The Risk Assessment Section of this plan identifies key Critical Facilities, Dependent Care Facilities, High Occupancy Facilities and Community Critical Facilities. Vulnerability assessments have been completed for each hazard addressed in the plan and quantitative estimates were made for each hazard where data was available.</p>
Step 5: Assessing Vulnerability on Development Trends	<p>The Plan provides a description of development trends on the district's sites, future sites and buildings and their vulnerabilities, including geography and environment, as well as population and demographics.</p>

III. LOCAL MITIGATION PLANS

The local mitigation plan 201.6 is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

IV. RSCCD 5-STEP RISK ASSESSMENT PROCESS

A. STEP 1: HAZARD IDENTIFICATION

This is the description of the geographic extent, potential intensity and the probability of occurrence of a given hazard. Maps were used to display hazard identification data; this document includes numerous maps that show the geographic extent of the natural hazards. Maps specific to north and central Orange County and RSCCD sites are included throughout this plan. The district and its campuses can be impacted by earthquakes and secondary hazards triggered by earthquakes; floods/storms most often resulting from the Santa Ana River runoff; dam failure from the Prado Dam; high winds including the

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Santa Ana Winds; and one site has the potential for wildland interface fire. This plan discusses only natural hazards.

DEFINITIONS

Chronic Hazard

Substance or event, dangerous and damaging over a long period due to continuous or repeated exposures.

Catastrophic Hazard

Catastrophic hazards do not occur with the frequency of chronic hazards, but can have devastating impact on life, property, and the environment

RSCCD Hazard Mitigation Team collected data and compiled research for chronic hazards. Chronic hazards occur with some regularity and can be loosely predicted through historic evidence and scientific methods. Chronic hazards addressed in the plan include minor and moderate earthquakes, flood/storms, wildfires and high winds.

The district has the capability of having emergencies where the probability is low but the consequences are high. An example of this is a dam failure from Prado Dam. If following heavy rains that filled the dam and the dam construction failed (whether naturally or human-caused), over one million residents of Orange County would be impacted, have to be evacuated, and the damage could be catastrophic depending on the level of the dam and if residents had sufficient time to evacuate to higher ground. The threat of earthquake combined with fire or earthquake combined with Santa Ana Winds and fire are low probability but our highest consequence. These types of incidents happen rarely but because of the major consequences, mitigation efforts should be determined.

Catastrophic hazards do not occur with the frequency of chronic hazards, but can have devastating impact on life, property, and the environment. In Southern California, because of the geology and terrain, earthquake, flooding and wildfire have the same potential to be catastrophic as a chronic hazard.

Research was conducted referencing policies and procedures, located RSCCD information in historical documents, statistics, insurance reports, and interviewed long-time RSCCD employees. The resources and information cited in the mitigation plan provides a strong local perspective and helps identify strategies making RSCCD more disaster resistant. The Hazard Mitigation Team also identified current mitigation activities, resources and programs, and potential action items through research materials and Team meetings.

Each of the hazard-specific sections includes information on the history, hazard causes and characteristics, hazard assessment as well as goals and action items.

For the purpose of mitigation planning, RSCCD has determined five natural hazards that form the basis for the Hazard Mitigation Plan. Human-caused hazards are not included in this plan, however, it is recommended that in the second update of this plan, at the 10-year update that human-caused hazards

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be added. Most planning team members felt that they needed 10 years to complete the list of mitigation strategies listed in this plan and wouldn't be ready for human-caused hazards until then.

To research all hazards that could possibly impact the district, the Team reviewed the State of California and the Orange County Hazard Mitigation Plans. The Team utilized dozens of public and private websites and documents. A review of the district's disaster history was conducted using insurance files. Considerable time was spent reviewing Orange County's Hazus data and plan.

Hazus is a regional multi-hazard loss estimation model that was developed by FEMA and the National Institute of Building Sciences. The primary purpose of Hazus is to provide methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and simulate efforts to reduce risks and to prepare for emergency response and recovery. It cannot be emphasized enough that the Hazus loss estimates are exactly that, estimates. The study discussed throughout this plan was the Orange County Hazus Study dated April 23, 2009.

FEMA (2009), Orange County Essential Facilities Risk Assessment (OCEFRA) Project Report, Prepared by Map-IX Mainland/Dewberry & Davis, ABS Consulting and MMI Engineering for the Federal Emergency Management Agency, Mitigation Division, Region IX. Available for download from the FEMA library at: http://www.fema.gov/media-library-data/20130726-1719-25045-0604/ocefra_report_final_tagged.pdf

A list of RSCCD owned sites was compiled and reviewed by the Team. All sites are located within the cities of Santa Ana, Orange and Tustin. None of these cities had completed Local Hazard Mitigation Plans. The California Multi-Hazard Mitigation Plan and Orange County Hazard Mitigation Plan were reviewed. Maps from the plans, websites, publications and the Orange County Hazus studies were consulted.

History is one of the best indicators of future disasters. A study of past insurance claims in RSCCD include the following incidents:

01/01/2006	Santa Ana College	Weather/wind damage	Cost: Unknown
10/20/2007	Santa Ana College	Wind damage	Cost: \$81,210
11/25/2008	Santiago Canyon College	Rain caused flood and mud	Cost: \$51,777

On April 2, 2015, RSCCD held its Hazard Mitigation Kick-Off meeting. At the meeting the following list of hazards were considered. The Team reviewed each hazard and discussed whether they could impact RSCCD facilities. After an in-depth discussion, the Team came to a consensus on which hazards would be the basis for RSCCD Hazard Mitigation Plan.

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Table 2: List of Hazards Considered

Hazard	Natural or Human-Caused	Preliminary Disposition	To Be Researched for This Plan
Agricultural Pests	Natural	Not Applicable. RSCCD does not have any agriculture industry and would not warrant consideration of agricultural pest strategies.	No
Avalanche	Natural	Not Applicable. Avalanches are not possible given the location and geographical features of RSCCD.	No
Coastal Erosion	Natural	Not Applicable. There are no coastal sites in the district.	No
Coastal Storm	Natural	Yes - The Team agreed to add the concern for coastal storm with the flood hazard profile.	Yes - Combine with Flood/Storm
Dam Failure	Natural	Yes - The Team agreed the Prado Dam hazard warranted mitigation strategies. It was acknowledged that there was one incident of seepage, but the dam has been raised and holds more water. (Good news/bad news)	Yes
Earthquake	Natural	Yes – The Team agreed that in addition to the earthquake hazard, mitigation strategies for fires that occur as a result of earthquakes are needed. Earthquakes are especially dangerous to RSCCD area and facilities due to the possibility of liquefaction.	Yes
Epidemic/Pandemic	Human-Caused	The Team agreed this concern is addressed adequately through the Orange County’s public health efforts.	No
Extreme Heat	Natural	Not Applicable. Extreme heat is not a concern given the location and geographical features of OC.	No
Flood	Natural	The Team agreed to research flood in combination with storms and consider this hazard for mitigation strategies	Yes - Combine with Flood/Storm

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Hazard	Natural or Human-Caused	Preliminary Disposition	To Be Researched for This Plan
Hurricane	Natural	Not Applicable. Hurricanes are not a concern given the location and geographical features of RSCCD.	No
Land Subsidence	Natural	Not Applicable. The Team agreed that land subsidence is not a concern given the location and geographical features of RSCCD area.	No
Landslide and Mudslide	Natural	Not Applicable. The Team agreed that landslides and mudflow are not a concern given the location and geographical features of RSCCD area.	No
Santa Ana Winds	Natural	Yes – The Team was informed of the incidents that have occurred in Orange County and want this hazard studied.	Yes – Combine with Windstorm
Severe Winter Storms	Natural	Yes. Severe Winter Storms are a concern given the location and geographical features of RSCCD.	Yes - Combine with Flood/Storm
Terrorism	Human-Caused	Not a natural hazard. Add human-caused disasters in the first update of the plan scheduled for 2021.	No
Tornado	Natural	The Team acknowledged past incidents of high winds but they rarely reached tornado wind speeds (per the National Weather Service). The Team agreed to combine tornados with Windstorms.	Yes – Combine with Windstorm
Tsunami	Natural	Not Applicable. The district has no coastal sites.	No
Urban Fire	Natural or Human-Caused	Yes – The Team wanted this hazard researched and mitigation strategies developed.	Yes – Combine all Fire types
Volcano	Natural	Not Applicable. Volcano eruptions are not a concern given the location and geographical features of RSCCD.	No

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Hazard	Natural or Human-Caused	Preliminary Disposition	To Be Researched for This Plan
Waterspouts	Natural	Not applicable – The Team agreed this is a coastal problem.	No
Wildland/Urban Interface Fires	Natural	Yes – The Team wanted this hazard researched and mitigation strategies developed if any of the sites were threatened. This will be combined with Urban Fire.	Yes – Combine all Fire
Windstorm	Natural	Yes – Windstorm will consist of Santa Ana Winds & tornado.	Yes

The Project Manager and the Plan Writer facilitated an in depth discussion on this topic. The Team was certain that flood/storm and earthquake should be included. The discussions came about when the entire Team agreed that tornado-like events hit Orange County but they rarely reached the actual definition of a tornado. High winds including Santa Ana Winds caused the exact same type of threat and damage. The only difference was the warning systems. However, in Orange County both hazard warnings were received in the exact same manner. The National Weather Service often reminded Orange County Emergency Managers that the tornado-like events did not reach the National Weather Service definition of a tornado. However, tornado type events were possible so we wanted them included in the study. The Team agreed to combine these wind-related hazards (Santa Ana Winds and Tornado) into “Severe Weather/Windstorms”.

After considerable research and dialogue with Team members, they came to a consensus that the following natural hazards should be reviewed by MMI Engineering as a potential hazards to be studied.

Table 3: Initial List of Hazards For Review

1	Earthquake
2	Floods/Storms
3	Dam Failure
4	Fire (Urban and Urban/Wildland Interface Fire)
5	Windstorms/Severe Weather

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RSCCD hired MMI Engineering to conduct a Hazard Identification study to confirm which hazards should be studied. The following is the result of this study. It was learned that “All of the RSCCD’s buildings are located outside mapped areas of Fire Hazard Severity zones. The committee had thought that Santiago Canyon Community College in Orange would be in the Fire Severity Zone but is only borders the zone so this information was taken back to the Team at the June 11, 2015 meeting to discuss whether fire would be one of the hazards studied. With the drastic and long-term drought in California, the Team considered the plan should study drought instead of fire.

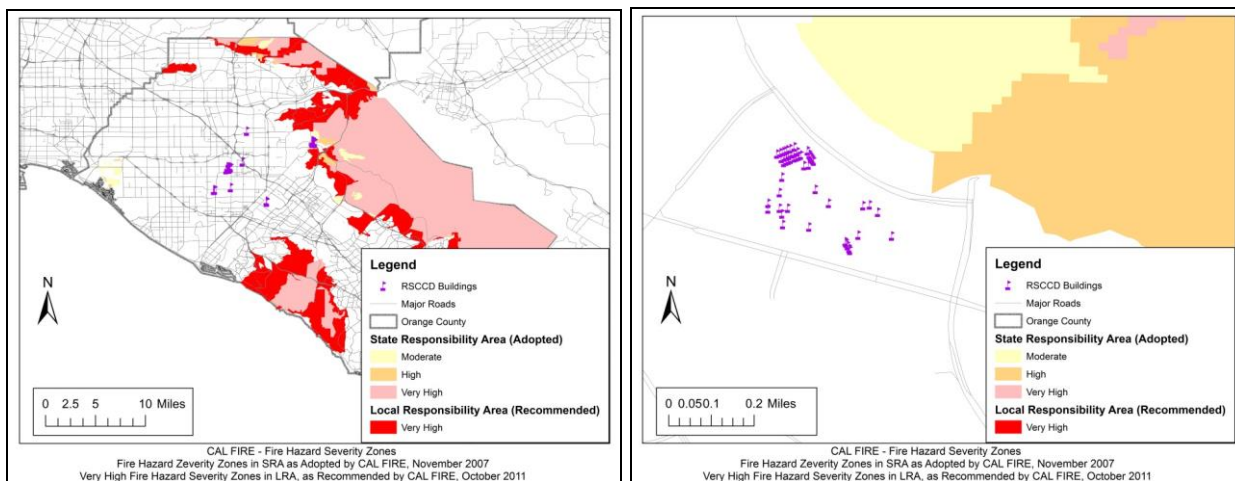
V. FIRE HAZARD SEVERITY ZONES

Fire hazard severity zones (FHSZs) throughout California have been mapped by the California Department of Forestry and Fire protection (CalFire), delineating areas of moderate, high and very high fire hazard severity within federal and state responsibility areas, and very high fire hazard severity within local responsibility areas. Per CalFire, uses for the FHSZ maps may include:

- Building construction standards on building permit
- Natural hazard disclosure at time of sale
- Defensible space clearance around buildings
- Property development standards such as road widths, water supply, address signs
- Considered in City and County general plans

Orange County’s FHSZ maps include the FHSZ map for State Responsibility Areas (*Adopted* 11/2007) and for Local Responsibility Areas (Draft 9/2007 and *Recommended* 11/2011). As shown in **Figure 1**, the RSCCD facilities are located outside all *Recommended* and *Adopted* fire hazard severity zones and Santiago Canyon College is located the closest to any of the mapped zones; a close-up view of Santiago Canyon College is provided in **Figure 1/right**.

Figure 1: CalFire Fire Hazard Severity Zones for O.C. and Santiago Canyon College



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Table 4: RSCCD Hazard Identification Summary by MMI Engineering

Rancho Santiago Community College District Hazard Mitigation Plan - Hazard Identification Summary

4/24/2015

		SITE	Centennial Education Center	Digital Media Center	District Office	Orange County Sheriff's Regional Training	Orange Education Center	Santa Ana College	Santiago Canyon College	
		Total # of Buildings	16	1	1	2	1	75	51	
Fire Hazards	Fire Hazard Severity Zones - Local Responsibility Area	Very High	All of the Rancho Santiago Community College District's buildings are located <i>outside</i> mapped areas of Fire Hazard Severity							
	Fire Hazard Severity Zones - State Responsibility Area	Very High								
		High								
		Moderate								
Flood Hazards	Special Flood Hazard Areas Subject to Inundation by the 1% Annual Chance (100-year) Flood	Zone A - no base flood elevations determined	0	0	0	0	0	0	0	
		Zone AE - base flood elevations determined	0	0	0	0	0	0	0	
		Zone AH - Flood depths of 1 - 3 feet (usually areas of ponding); base flood elevations determined	0	0	0	0	0	0	0	
		Zone AO - Flood depths of 1 - 3 feet (usually sheet flow on sloping terrain); average depths determined.	0	0	0	0	0	0	0	
	Other flood areas	Zone X (Shaded) - areas of 0.2% annual chance (500 yr) flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile.	0	1	0	0	0	0	0	0
		Zone X Protected by Levee - areas protected by levees from the 1% annual chance flood	0	0	1	0	1	75	0	
	Other Areas	Zone D - areas in which flood hazards are undetermined, but possible	16	0	0	0	0	0	0	
		Zone X (Unshaded) - areas determined to be outside the 0.2% annual chance (500-year) floodplain	0	0	0	2	0	0	51	

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Rancho Santiago Community College District Hazard Mitigation Plan - Hazard Identification Summary

4/24/2015

SITE		Centennial Education Center	Digital Media Center	District Office	Orange County Sheriff's Regional Training	Orange Education Center	Santa Ana College	Santiago Canyon College
Total # of Buildings		16	1	1	2	1	75	51
Earthquake Hazards	Seismic Hazard Zones: Zones of Required Investigation as mapped by the California Geological Survey <i>Liquefaction: Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.</i> <i>Earthquake-Induced Landslides : Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.</i>	16	1	1	2	0	75	0
	Alquist-Priolo Earthquake Fault Zone Inside mapped fault zone	All of the Rancho Santiago Community College District's buildings are located <i>outside</i> mapped Fault Zones						
	Location relative to Quaternary and Younger Faults as mapped by the California Geological Survey Fault Name of Closest Fault	Bolsa-Fairview Fault (Newport-Inglewood - Rose Canyon Fault Zone)	El Modeno Fault	Bolsa-Fairview Fault (Newport-Inglewood - Rose Canyon Fault Zone)	El Modeno Fault			
	Approximate distance to Fault (miles)	3.8	4.6	4.6	5.3	1.6	5.5	1.3

Table 5 (next page) is a summary of the MMI Engineering Hazard Identification Summary. It identifies the hazard and each RSCCD site that could be impacted by each hazard. It was distributed at the second meeting to help finalize which hazards would be studied. It includes recommendations from the Project Manager and Plan Writer to the Team on which hazards should be studied.

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Table 5: Summary of MMI Engineering Study

	Hazard	MMI Engineering Results	RSCCD Hazard Mitigation Committee Recommendation
1	Earthquake	<p>Located within Mapped Fault Zones: <u>All</u> RSCCD buildings are located <u>outside</u> mapped fault zones.</p> <p>Liquefaction Investigation Zone: -Centennial Education Center -Digital Media Center -District Office -OC Sheriff's Regional Training Academy -Santa Ana College</p> <p>Earthquake-Induced Landslides Investigation Zone: -Santiago Canyon College (Not in the zone; .25 miles from zone)</p>	Yes, study Earthquake because of earthquake and liquefaction threat to sites
2	Floods/ Storms	<p>Zone X: (shaded) /0.2% annual chance of flood or 500 year flood zone -Digital Media Center</p> <p>Zone X: Within 500 Year flood zone but protected from 100 year flood (1% annual chance of flood) by Levee -District Office -Orange Education Center -Santa Ana College</p> <p>Zone D: flood hazards are undetermined, but possible -Centennial Education Center</p> <p>Zone X (unshaded) areas outside the 0.2% annual chance of flood/500 year flood -OC Sheriff's Regional Training Center -Santiago Canyon College (SCC)</p>	Yes, 5 sites are exposed to potential flood hazards
3	Dam Failure	<p>In Inundation Zone: -Santa Ana College -Centennial Education Center -Digital Media CentE0072</p> <p>Borders Inundation Zone: -Orange Education Center -OC Sheriff Regional Training Academy -District Office</p>	Yes, study Dam Failure because several sites are in the inundation zones and other sites border the inundation zones. Study which dams other than Prado Dam may impact the RSCCD.
4	Fire	<p>Fire Hazard Severity Zone: All of the RSCCD buildings are located <u>outside</u> the mapped areas for Fire Hazard Severity Zone</p>	The Team discussed the Fire Threat at Meetings 1, 2 and 3. The final decision was not

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		-Santiago Canyon College borders the Fire Hazard Severity Zone	include fire but instead, include drought. .
5	Windstorms / Severe Weather	No data available	Yes, study Windstorms due to Orange County's Santa Ana Wind history of events.
6	Drought	The team decided to study drought, an ongoing problem in CA.	Study Drought because CA is in a "Drought State of Emergency"

The Hazard "Fire"

At the June 11, 2015 (second meeting), the Fire Hazard Severity Zone maps were presented. There was an intense discussion on the fire hazard. The MMI Engineering Hazard Identification Study was presented. It stated that "All buildings in the RSCCD are located outside the Fire Hazard Severity Zone." But it was also noted that one site, the Santiago Canyon Community College borders the Fire Hazard Severity Zone. The Hazard Mitigation Team voted on whether to study the hazard "fire." After reviewing the MMI Engineering study and the maps, the Team voted, NO, not to study the hazard "fire." It was suggested that in the 5-year review that fire should again be considered.

The Hazard "Drought"

It was brought to the attention of the Team that with the long term drought that California is experiencing, we may want to study the hazard, "drought." The Team held a discussion on "drought." Drought is being discussed every day in California newspapers, television news, etc. Families and businesses are being asked to cut their water usage. The district too is being asked to cut their water usage and having to work through how to best accomplish this. The Team voted, YES, study drought for this plan. They are worried that the drought will continue on for one or more years and that additional steps will be mandated to mitigate the drought. Drought is such a timely issue the Team voted to study drought as part of this Hazard Mitigation Plan.

Climate Change

In January the State OES provided assistance in developing a section on Climate Change. Climate Change was closely associated with Drought so it was combined into Drought and Climate Change. This plan will have to be enhanced in the 2021 update since not much actual data or maps done specifically for each jurisdiction were available.

B. STEP 2: PROFILING HAZARD EVENTS

Each hazard section includes research and documentation on the geography, history of past hazard events, and the causes and characteristics of the hazard impact on RSCCD facilities.

To profile the hazards both California and Orange County's Hazard Mitigation Plans were used. A history of California and Orange County disasters were reviewed. Major disasters have Presidential Declarations and are Federally Declared Disasters; moderate disasters have only State Declarations and a State of Emergency. When a local disaster does not require major resources it remains a local disaster. This plan reviewed both Federally Declared Disasters and States of Emergency.

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C. STEP 3: VULNERABILITY ASSESSMENT/INVENTORYING ASSETS

The District provided its Insurance Property Evaluation Report to contractor MMI Engineering who was hired to provide mapping overlays of district facilities with the hazards (earthquake and flood). MMI Engineering will use the Orange County Hazus study of 2009 to show how RSCCD facilities vulnerability to the hazards.

The resulting report from MMI Engineering used RSCCD insurance data to complete the Hazard Identification and Earthquake Risk Assessment. The report is entitled:

Rancho Santiago Community College District (RSCCD) Hazard Mitigation Plan
Hazard Identification and Earthquake Risk Assessment
MMI Engineering Project No. MMHB073, Memo MMHB073-TM-001, Rev. 0

HAZUS PROJECT OVERVIEW

In 2007, Orange County had an estimated population of 2,997,033 people, or about 8% of the total population of California (U.S. Census Bureau, 2007 estimate). The Hazus study is based on that data. The 2010 Orange County population increased to 3,010,232. The County includes 34 incorporated cities, as well as various unincorporated areas. Within Orange County, several emergency services providers manage a significant portion of service delivery; the Orange County Fire Authority (OCFA) provides fire-fighting and other services to 22 cities and the unincorporated areas, while the Orange County Sheriff's Department (OCSD) provides law enforcement services to 12 cities and the unincorporated areas. Remaining cities handle law enforcement and fire-fighting with their own city personnel. The three cities impacted have the following public safety services:

Table 6: RSCCD Facilities Public Safety Providers

City	Fire Service Provider	Law Enforcement Service Provider
Santa Ana	Orange County Fire Authority (OCFA)	Santa Ana Police Department
Orange	Orange City Fire Department	Orange City Police Department
Tustin	Orange County Fire Authority (OCFA)	Tustin Police Department

Because of this, the Team was expanded to include an OCFA member as of June 2, 2015.

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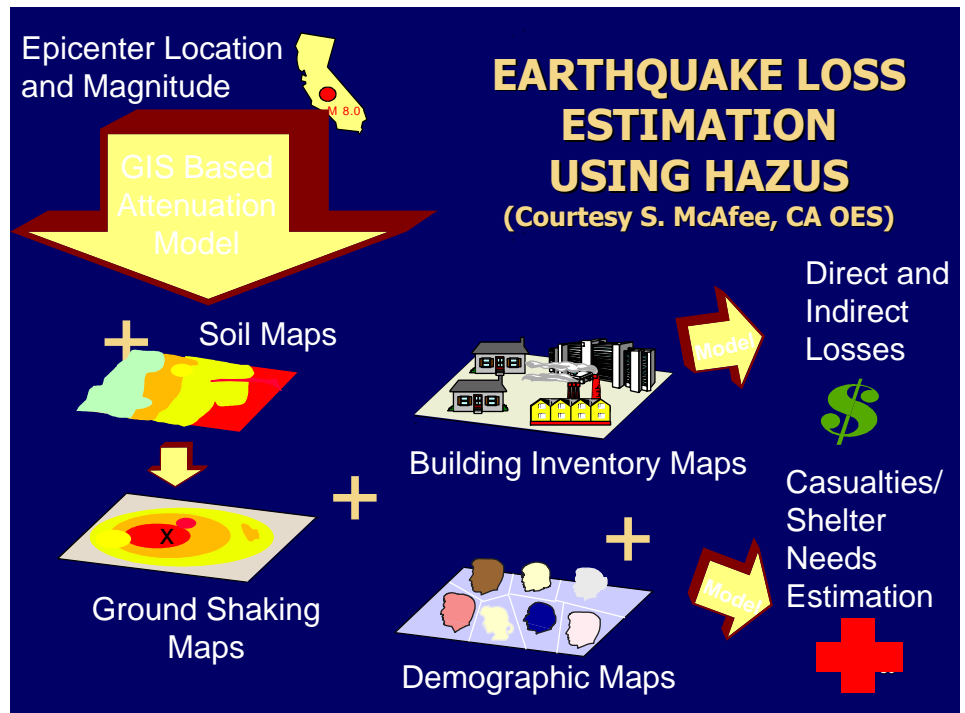
Seismic hazards are a significant issue for California in general, and for Orange County, in particular. In 2000, the California Division of Mines and Geology (now the California Geological Survey) used Hazus to develop statewide annualized earthquake loss estimates (CDMG, 2000). In 2001, FEMA similarly used Hazus to estimate national annualized earthquake losses (FEMA, 2001). This study was later updated using Hazus (FEMA, 2008). Both FEMA studies indicated that California suffered the bulk of the country's average annual losses (74% in 2001, and 66% in 2008), with Orange County suffering about 6.5% of the California loss and about 5% of the total national annualized earthquake loss in 2001. (Similar estimates for Orange County cannot be extracted from the 2008 results, because Orange County is grouped with Los Angeles County in the Los Angeles – Long Beach – Santa Ana metropolitan statistical area).

California is also subject to frequent and often destructive flooding. As noted in the State of California's Multi-Hazard Mitigation Plan (2004): "While ShakeMap earthquakes tend to cause more extensive and costly damage, floods are noted for their persistence and effect on numerous communities during a single event. Of the

72 federally declared disasters in the state occurring between 1950 and 2000, 50 percent have been flood related. Between 1992 and 2002, every county in California was declared a federal disaster area at least once due to a flooding event. The counties of Los Angeles, Orange, and San Bernardino were declared federal flood disaster areas five times.

Thus, understanding the potential impacts of earthquakes and floods on the district's facilities and the populace is an essential element of good hazard mitigation planning.

Hazus, developed for the Federal Emergency Management Agency (FEMA) by the National Institute of Building Sciences (NIBS), is a standardized, nationally applicable natural hazard loss estimation methodology implemented through PC-based geographic information system (GIS) software. First released as an earthquake loss estimation tool in 1997, the latest release of Hazus (currently released as Maintenance Release 3, or MR3) includes flood and hurricane wind modeling capability. Hazus MR3 also includes a new Comprehensive Data Management System (CDMS) for incorporating more accurate local data into the Hazus databases which will be used in the study. Its flood model also includes a streamlined process for incorporating DFIRM data, which will be exercised as part of this pilot study.



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Default data provided with the Hazus software allows a user to run a simplified or “Level 1” analysis without collecting additional data. In many cases, however, the quality of default national data delivered with the software is less than optimal; it may originate from agencies other than FEMA, or was collected for applications other than loss estimation. Accordingly, the accuracy of Hazus results can be greatly improved with the input of various “user supplied” data on either the hazard or the affected assets or both. Such an enhanced analysis is usually referred to as a “Level 2” analysis.

For the purposes of this RSCCD Hazard Mitigation Plan it utilized the Hazus information run by MMI Engineering using Hazus Advanced Engineering Building Module (AEBM).

Hazus produces estimates of damage to regional building stocks, lifelines and essential facilities, economic loss, and social impacts. Local, state and federal government officials use Hazus for mitigation, emergency response, and recovery planning. Default data built into Hazus MR3 includes regional building inventory databases representing building stock conditions in the year 2006, “proxied” from 2000 census data (e.g., square footage of residential structures is estimated from census data on housing unit counts) and commercially-available data on employment and businesses. These data are aggregated data, i.e., the database tabulates attributes such as the total building square footage and dollar exposure by census block (flood) or tract (earthquake), rather than on a building-by-building basis. For the Orange County pilot study, available parcel data was used to update this aggregate inventory data for selected residential occupancy types.

In contrast to the general building stock, Hazus estimates damage and functionality of essential facilities as well as transportation and utility lifelines, on a building or facility specific basis. In addition to developing enhanced regional building inventory data, the Orange County pilot study also generated significantly improved data sets for essential facilities, required for emergency response, community resilience and rapid recovery. Within Hazus, “Essential Facilities” include hospitals, fire stations, police stations, emergency operations centers (EOCs), and schools, including both grade schools and colleges and universities.

The Hazus Earthquake Module estimates damage state probabilities (i.e., the probability that a facility will be in each of five damage states; None, Slight, Moderate, Extensive, or Complete) and functionality (i.e., estimates of facility functionality, in percent, at Day 1, 3, 7, 10, 14, 30 and 90). Economic losses are not explicitly generated for essential facilities, but mean damage estimates were computed outside the Hazus program for this pilot study. In the Hazus Flood Module, essential facilities functionality and mean damage (in terms of percent of replacement cost) are computed directly.

As noted above, the OC Hazus was used to generate general building stock and essential facility loss estimates for six different natural hazard scenarios. Two of the scenarios were large scenario earthquakes selected by the Orange County Community Executive Team that was established as part of the project in preparation for the Orange County Hazard Mitigation Plan. The earthquakes chosen for analysis were a (1) M6.9 Newport-Inglewood Scenario Earthquake and a (2) M6.6 San Joaquin Hills Scenario Earthquake. Three scenarios involved major riverine flooding: (3) a 1% annual chance flood event (100-year flood), (4) a 1% annual chance flood event (100-year flood) with the assumed failure of the entire levee system, (5) and a 0.2% annual chance flood event (500-year flood).

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Results from the five scenario analyses will help government officers and administrators better understand where and how significant natural hazard risks exist throughout the county. This risk information should prove quite useful for developing effective disaster mitigation plans and designing emergency response exercises. The results can also be used in developing justifications for hazard mitigation grant funding requests to FEMA. And with a more updated county database and the Hazus tool, county and city officials will be able to model other natural disasters, obtaining much more accurate estimates of the potential effects for disaster mitigation planning.

This is a combination of hazard identification with an inventory of the existing (or planned) RSCCD property developments, populations and financial impact that may be exposed to the five identified hazards.

RSCCD provided their most recent Insurance Building Asset Values, types of buildings, square footage, construction type, number of floors, etc. to MMI Engineering to prepare damage cost estimates.

Hazus is available only for earthquake and flood. There will be damage cost estimates for earthquake and flood scenarios that are considered the most probable for Orange County, California

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Table 7: RSCCD Building Data Considered in the Risk Assessment

Site	Number of Buildings	Peak Daytime Occupancy (Number of People)	Building Area (Square Feet)	2015 Building Replacement Value (\$1,000)	2015 Content Replacement Value (\$1,000)
Centennial Education Center	15	1,809	49,263	8,008	1,352
Digital Media Center	1	283	28,184	6,877	3,049
District Office	1	399	61,002	14,744	1,895
Orange County Sheriff's Regional Training	2	305	52,455	13,547	2,121
Orange Education Center	1	1,600	84,404	17,609	0
Santa Ana College	76	14,925	599,107	136,298	30,010
Santiago Canyon College	50	9,513	406,026	103,223	25,323
TOTAL	146	28,834	1,280,441	300,306	63,750

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Table 8: Buildings not Included in the District's Space Inventory Report

Buildings Using Judgment-based Occupancy Estimates	Site & Building Number (2015 Insurance Appraisal Report)
SAC - Vending Building	Site 2 Building 17
SAC - Campus Vehicles Building	Site 2 Building 20
SAC - Office/Restroom Building	Site 2 Building 22
SAC - Weight Pavilion	Site 2 Building 24
SAC - Maintenance Storage Building	Site 2 Building 25
SAC - Mechanical Pool Building	Site 2 Building 26
SAC - PE Office Building	Site 2 Building 27
SAC - Office/Storage Building	Site 2 Building 28
SAC - Middle School (Business/Computer) Bldg	Site 2 Building 31
SAC - Pool Equipment Building	Site 2 Building 32
SCC – Childcare Building C	Site 6 Building 04
SCC - TV Studio Building	Site 6 Building 08
SCC - Boiler Building	Site 6 Building 09
SCC - Concession Stand	Site 6 Building 11
SCC - Grounds Building	Site 6 Building 12
SCC - Maintenance and Operation Building	Site 6 Building 15
OCSRT - Maintenance Office Building	Site 8 Building 02

D. STEP 4: RISK ASSESSMENT

The purpose of this task is to estimate the potential losses in a geographic area by assessing the damage likely to be sustained. This level of analysis involves estimating risk. The components in this plan of risk analysis are **Geographic Area**, **History**, **Probability of Occurrence** and **Potential Impact** to RSCCD

The District provided the Hazard Mitigation Team with their FUSION property insurance data. This data was combined with the 2009 Orange County Hazus study to determine potential dollar losses. Hazus data was only available on the hazards of earthquake and flood/storms.

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CRITICAL FACILITY DESCRIPTIONS

High-Risk Facilities

High Risk Facilities, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, freeway interchanges, bridges, and industrial plants that use or store explosives, toxic materials or petroleum products.

High-Occupancy Facilities

High Occupancy Facilities have the potential of resulting in a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multifamily residential complexes. RSCCD has seven facilities with a population of over 100 (faculty, students, and staff combined). These will be considered High Occupancy for the purpose of this plan.

Dependent-Care Facilities

Dependent-Care Facilities such as preschools and schools, rehabilitation centers, prisons, group care homes, and nursing homes, house populations with special evacuation considerations. All 15 sites are either schools or facilities that support the educational process.

Economic Facilities

Economic Facilities are those facilities that should remain operational to avoid severe economic impacts. These facilities include banks, archiving and vital record-keeping facilities, airports, and large industrial or commercial centers.

Critical Facilities

Critical Facilities are those parts of a community's infrastructure that must remain operational after a disaster. Community Colleges do not have hospitals, fire stations and police stations as cities do. They have district emergency operation centers (EOCs), Campus EOCs, Health Centers and information technology and communication centers.

These are facilities critical to emergency response and recovery activities such as life safety, property protection, environmental protection and damage assessment and reporting procedures.

Community Critical Facilities

The following facilities owned and/or operated by RSCCD have been identified by the Team as Community Critical Facilities. These facilities have been identified in Orange County Operational Area, County, Cities and/or District Emergency Plans as facilities necessary for community response and recovery. All RSCCD parking lots may be utilized as staging areas for police, fire and other emergency responders in times of disasters. In addition, the following sites have been identified as:

- Shelters – as stated in the District/American Red Cross Orange County Chapter Agreement
- Local Assistance Centers (LAC) – Orange County Operational Area and City Emergency Operation Plans
- Points of Dispensing (POD) for medications and supplies – Orange County Operational Area Plan and Orange County Health Care Agency Emergency Operations Plans
- Staging Areas – Orange County Operational Area and City Emergency Operations Plans

Rancho Santiago Community College District

RSCCD PRE-IDENTIFIED CRITICAL FACILITIES

These lists will help RSCCD prioritize its hazard mitigation strategies.

Table 9: HIGH OCCUPANCY SITES LISTED IN POPULATION ORDER

Identifier	Site Name	Total Student Population	Priority
2	Santa Ana College (SAC)	16,300	1
3	Santiago Canyon College (SCC)	8,200	2
4	Centennial Education Center (CEC)	2,000	3
5	Orange Education Center (OEC)	900	4
7	Orange County Sheriff's Regional Training Academy (OC SRTA)	200	5
8	Digital Media Center	283	6
1	District Operations Center	150	7

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Table 10: DEPENDENT CARE/CHILD CARE FACILITIES LISTED IN POPULATION ORDER

Identifier	Site Name	Child Population	Adult Staff Population	Priority
2	Santa Ana College (SAC) 1530 West 17 th Street Santa Ana	190	60	1
4	Centennial Education Center (CEC) 2900 West Edinger Santa Ana	75	20	3
3	Santiago Canyon College (SCC) 8045 East Chapman Avenue Orange	95	30	2
5	Orange Education Center (OEC) 1465 North Batavia Street Orange	Temporarily Closed	Closed	4
Local church; not owned by RSCCD	Santa Ana College Child Development Center East Campus 1510 North Parton Street Santa Ana	75	20	Not owned by RSCCD

Once the Orange Education Center Child Care site is reopened, the priority will have to be re-evaluated.

Once all child care facilities are reopened and operation there are expected to be over 900 children under the care of the district.

RSCCD CRITICAL FACILITIES

Critical Facilities are district and campus sites needed during emergencies. They include:

- Emergency Operations Centers (EOC) where sites will manage the response to the emergency
- IT and Communications centers because they are critical for communicating damage assessments and resource requests to the Orange County Operational Area (County EOC) during emergency incidents. These facilities are necessary to respond and recover from a disaster.
- Health Centers where first aid can be provided and first aid supplies are maintained
- Child Care Centers/Dependent Care sites

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Table 11: CRITICAL FACILITIES NEEDED FOR DISASTER REPONSE

Facility #	Facility Name	Address	Building/ Room #	Description
1	RSCCD District	2323 North Bristol Santa Ana	<ul style="list-style-type: none"> ▪ District EOC: Floor #1 Large Incident: Room 107 District Boardroom Small Incident: <li style="padding-left: 20px;">Chancellor's <li style="padding-left: 20px;">Conference Room ▪ IT: Floor #2 	Used to manage emergencies for <i>all</i> RSCCD facilities District Information Technology
2	Santa Ana College	1530 West 17th Street Santa Ana	<ul style="list-style-type: none"> ▪ Campus EOC: -Large Incident: A-214 Caesar Chavez Bldg. -Small Incident: X-101/ Campus Safety Office ▪ Student Health Center/ U-120 or #16 IT: A-117/Caesar Chavez Bldg. 	Used to manage emergencies at Santa Ana College <ul style="list-style-type: none"> ▪ Used to Manage medical incidents
3	Santiago Canyon College	8045 East Chapman Orange	<ul style="list-style-type: none"> ▪ Campus EOC: Building A/01 ▪ Health Care Center: Building T/03 ▪ IT: Building 18, room 107 	<ul style="list-style-type: none"> ▪ Used to manage emergencies at Santiago Canyon College ▪ Used to manage medical incidents
4	Centennial Education Center	2900 West Edinger Avenue Santa Ana	<ul style="list-style-type: none"> ▪ Campus EOC: Building A ▪ Large Incident: outside, back of Building E ▪ No Health Care Center 	<ul style="list-style-type: none"> ▪ Used to manage emergencies at Centennial Education Center
5	Orange Education Center	1465 North Batavia Street Orange	<ul style="list-style-type: none"> ▪ Campus EOC: Parking Lot ▪ No Health Care Center 	<ul style="list-style-type: none"> ▪ Used to manage emergencies at Orange Education Center
7	Orange County Sheriff's Regional Training Academy	15991 Armstrong Avenue Tustin, CA 92782	<ul style="list-style-type: none"> ▪ Campus EOC: Main Conference Rm ▪ No Health Care Center 	Used to manage emergencies at the OC Sheriff's Regional Training Academy
8	Digital Media Center	1300 South Bristol Street Santa Ana	<ul style="list-style-type: none"> ▪ Campus EOC: Second Floor Administration 	Used to manage emergencies at the Digital Media Center

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COMMUNITY CRITICAL FACILITIES NEEDED FOR THE COMMUNITY DURING A DISASTER

Community Critical Facilities are also utilized during emergencies by the community. They are outlined in Orange County Operational Area, County, and City emergency plans. These sites include:

- Public shelters
- Local Assistance Centers (LAC)
- Points of Dispensing (POD)
- Staging Areas

Table 12: COMMUNITY CRITICAL FACILITIES NEEDED FOR DISASTER RESPONSE

Identifier	Site Name	Shelters	LAC	POD	Staging Areas
1	RSCCD District				Yes
2	Santa Ana College	Yes Gym*	Possibly	Yes	Yes
3	Santiago Canyon College	Yes Gym*	Possibly	Yes	Yes
4	Centennial Education Center				Yes
5	Orange Education Center				Yes
7	Orange County Sheriff's Regional Training Academy				Yes
8	Digital Media Center				Yes

*RSCCD is not a primary shelter site. The district's facilities will only be used as public shelters, after available high schools in the area have been utilized.

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E. STEP 5: ASSESSING VULNERABILITY ON FUTURE DEVELOPMENTS

This task provides a general description of land uses and development trends for RSCCD properties so that mitigation options can be considered in land use planning and future land use decisions. This Plan provides an overview of the district facilities (see Section II for complete site list). Section II also includes the geography, history, demographics of students. Analyzing these components can help in identifying potential problem areas and can serve as a guide for incorporating the mitigation strategies contained in this plan into other RSCCD documents including future facility planning.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the Plan includes a section on hazard identification using data and information from District, City, County or State agencies and private sources.

Regardless of the data available for hazard assessments, there are numerous strategies RSCCD can take to reduce risk. Mitigation strategies can further reduce disruption to essential facilities, reduce the risk to human life, and alleviate damage to public property and infrastructure.

The Director of District Construction reviewed the Facilities Master Plan and reviewed the Hazus earthquake and flood facility studies. He utilized the data from these three studies and the two passed bond measures to come up with “RSCCD Development Trends” which is located in the Plan Maintenance section. This was one of the final sections of the plan to be completed.

VI. HAZARD MITIGATION BENEFIT-COST REVIEW

FEMA requires local governments to analyze the benefits and costs of a range of mitigation actions that can reduce the effects of each hazard within their community. Benefit-cost analysis is used in hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster related damages later. The analysis is based on calculating the frequency and severity of a hazard, avoided future damages and risk.

A hazard mitigation plan must demonstrate that a process was employed that emphasized a review of benefits and costs when prioritizing the mitigation actions. The benefit-cost review must be comprehensive to the extent that it can evaluate the monetary as well as the non-monetary benefits and costs associated with each action. The benefit-cost review should at least consider the following questions:

1. How many people will benefit from the action?
2. How large an area is impacted?
3. How are the facilities that benefit from the action (which is more beneficial to protect, the fire station or the administrative building)?
4. Environmentally, does it make sense to do this project for the overall community?

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For this plan, the Hazard Mitigation Planning Team used this data to help determine the appropriateness of each mitigation actions and idea. The Benefits: Losses Avoided - The one criterion that must be part of the evaluation and prioritization process. Priority - The planning team put together a list of actions that were acceptable and practical for addressing the problems identified in the risk assessment. They then needed a system to prioritize the action items for implementation. Action items were prioritized by numerical ranking; high, medium, or low designation. The evaluation and prioritization process helped the planning team weigh the pros and cons of different action alternatives. RSCCD used the FEMA Local Mitigation Planning Handbook from March 2013, worksheet 6.1 to facilitate this process.

VII. RANKING THE MITIGATION STRATEGIES

Ranking of Hazards by Damage Estimates

Once all research was presented to RSCCD Hazard Mitigation Team, the group agreed to rank the hazards. Hazus was used to study several hazards but was unavailable for others, so damage cost estimates could not be completed for all hazards. Since we do not have the same data for each hazard, the only system we could use to rank the hazards was for the Team to come to a consensus on which hazards posed the greatest potential impact to life, injury, and costs to RSCCD.

STAPLE/E PROCESS

The FEMA recommended STAPLE/E system was utilized by the Hazard Mitigation Team to determine the priority mitigation strategies. The FEMA worksheet 6.1 was used by the Team to rate each action item. STAPLE/E reviews the following criteria:

Social - Does the measure treat people fairly? (Different groups, different generations)

Technical - Will it work? (Does it solve the problem? Is it feasible?)

Administrative - Do you have the capacity to implement and manage project?

Political - Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?

Legal - Does your organization have the authority to implement? Is it legal? Are there liability implications? Is there property ownership issues such as co-owned properties?

Economic - Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

Environmental - Does it comply with environmental regulations?

Rankings for STAPLE/E:

Low 1-3 points (all low priority items were not included in the plan)

Medium 4-5 points

Medium/High 6 points

High 7-9 points

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The following data was used to help rank the district's mitigation strategies along with the team's extensive knowledge of facilities and experience.

- Table 4
- Table 5
- Table 6
- Table 7
- Table 8
- Table 9

The next few pages show layouts of the four most populated sites where the most of the Critical Facilities and Community Critical Facilities are located.

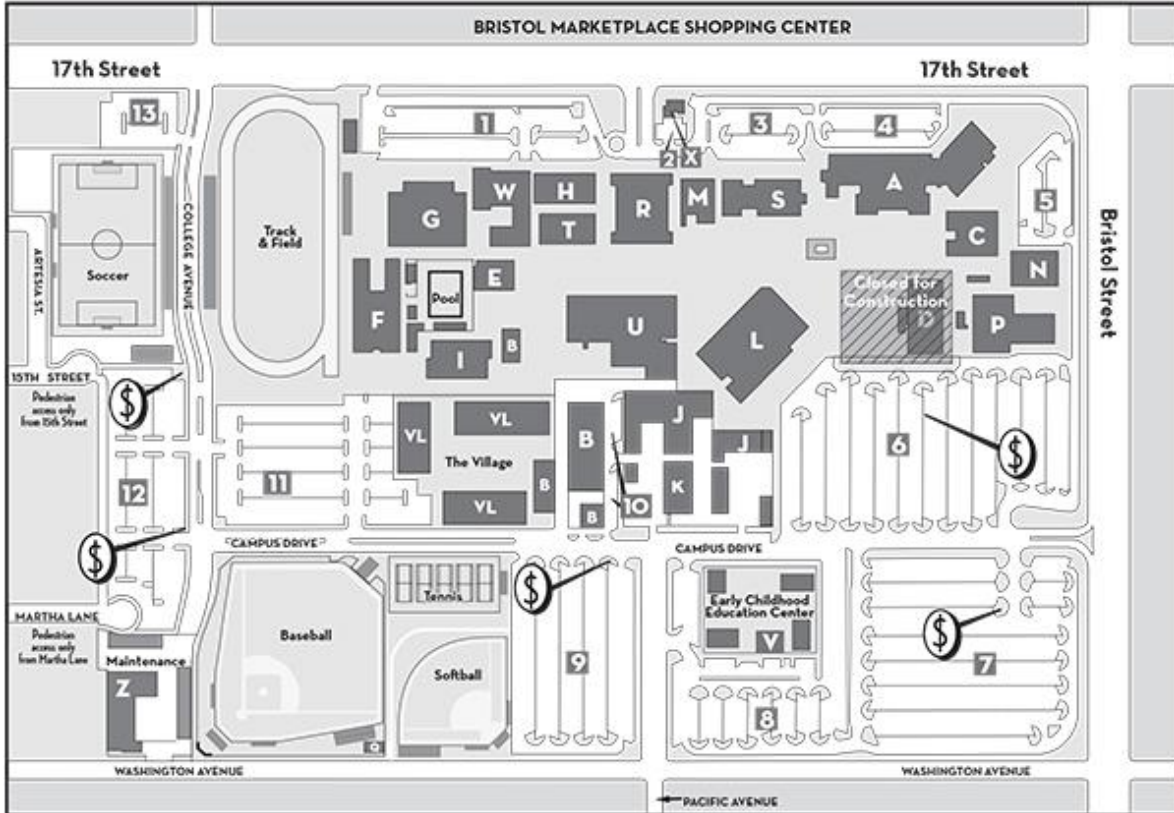
Rancho Santiago Community College District

Figure 2: RSCCD – DISTRICT OFFICE



Rancho Santiago Community College District

Figure 3: SANTA ANA COLLEGE



SAC FACILITIES

- | | |
|--|--|
| A Cesar Chavez Building / Business / Computer Lab | T Technical Arts |
| B Middle College High School | U Johnson Center / Student Business Office / Bookstore / Cafeteria / International Students Program |
| C Fine Arts / Art Gallery | V Early Childhood Education Center |
| D Dunlap Hall / Amphitheatre | VL The Village |
| E Fitness Center | W Exercise Science |
| F Locker Rooms | X Security / Safety |
| G Cook Gym | Z Maintenance |
| H Hammond Hall | |
| I Classroom Building | |
| J Auto Shop / Quick Center | |
| K Welding / Auto Diesel | |
| L Neally Library | |
| M Planetarium | |
| N Music Building | |
| P Phillips Hall Theatre | |
| R Russell Hall | |
| S Administration Building / Admissions / Counseling | |
-
- ### PARKING
- | | |
|---------------|------------------------------------|
| 1 | Staff Parking |
| 2 - 3 | Visitor Parking |
| 4 - 5 | Staff Parking |
| 6 - 13 | Student Parking (except as posted) |
| \$ | Permit Dispenser (\$2 for 8 hours) |

Rancho Santiago Community College District

Figure 4: SANTIAGO CANYON COLLEGE



Santiago Canyon College

8045 East Chapman Avenue
Orange, CA 92869
714-628-4900
www.sccollege.edu

A-LOWER LEVEL
Bookstore • Classrooms • Media Systems Office

A-UPPER LEVEL
Administration • Administrative Services
Associated Student Government • CAMP • Classrooms
Publications • Scholarships • Student Life & Leadership
Veterans • Writing Center

B-LOWER LEVEL
Classrooms • Faculty Offices

B-UPPER LEVEL
Classrooms

C-BUILDING
Child Development Center

D-FIRST FLOOR
Career Services • Classrooms • Counseling
Faculty Offices • Transfer Center

D-SECOND FLOOR
Academic Success Center • Classrooms
Faculty Offices

E-FIRST FLOOR
Admissions • CaWORKs • CARE • Cashier
Financial Aid • EO/PS • Disabled Students Program
Graduation Office • Photo ID
On-Campus Job Placement

E-SECOND FLOOR
Classrooms

E-THIRD FLOOR
Classrooms • Faculty Offices • Testing Center

G-FIRST FLOOR
GYM and Fitness Center

G-SECOND FLOOR
Aerobics • Swimming Pool • Exercise Science Offices

H-HUMANITIES BUILDING
Classrooms • Faculty Offices
Information Technology • Language Lab

L-LIBRARY

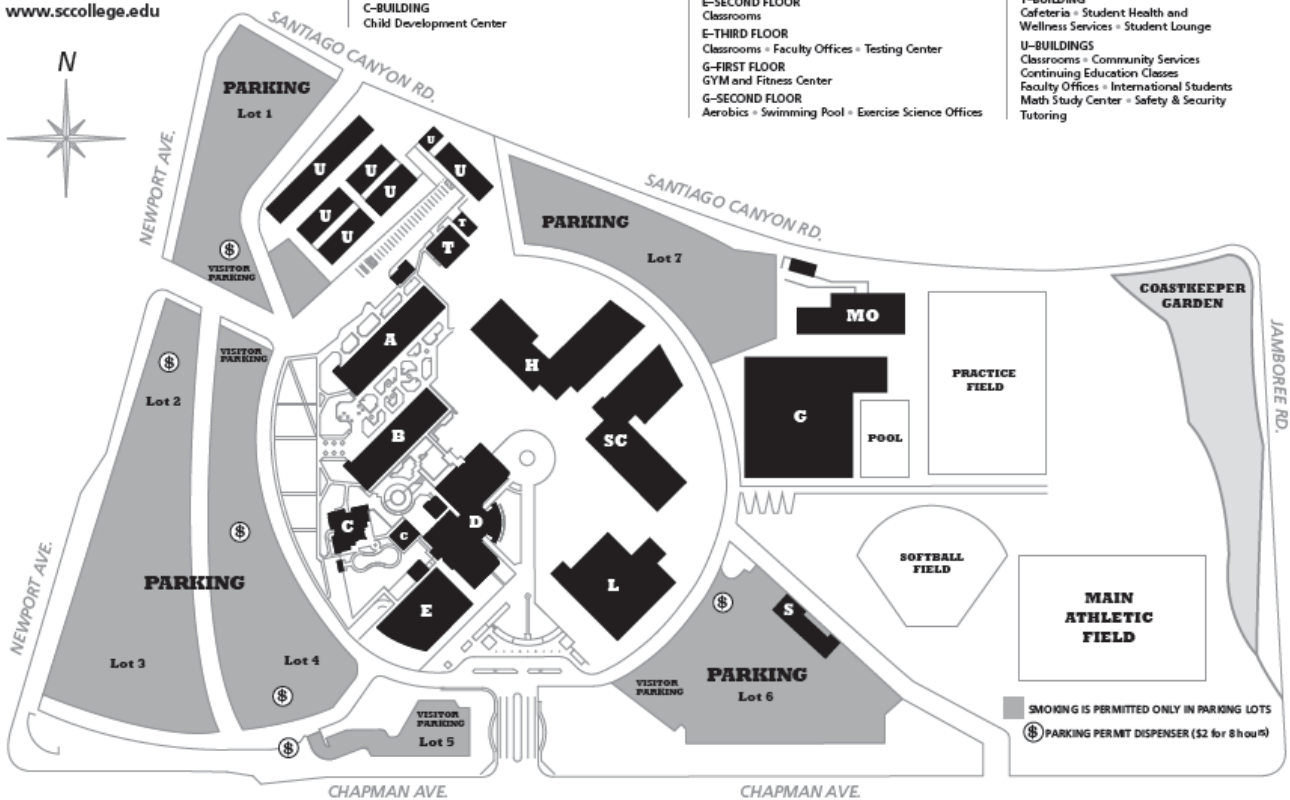
MO-MAINTENANCE & OPERATIONS

S-BUILDING
Continuing Education
Classes/Registration/Counseling

SC-SCIENCE CENTER
Classrooms • Faculty Offices • Science Labs

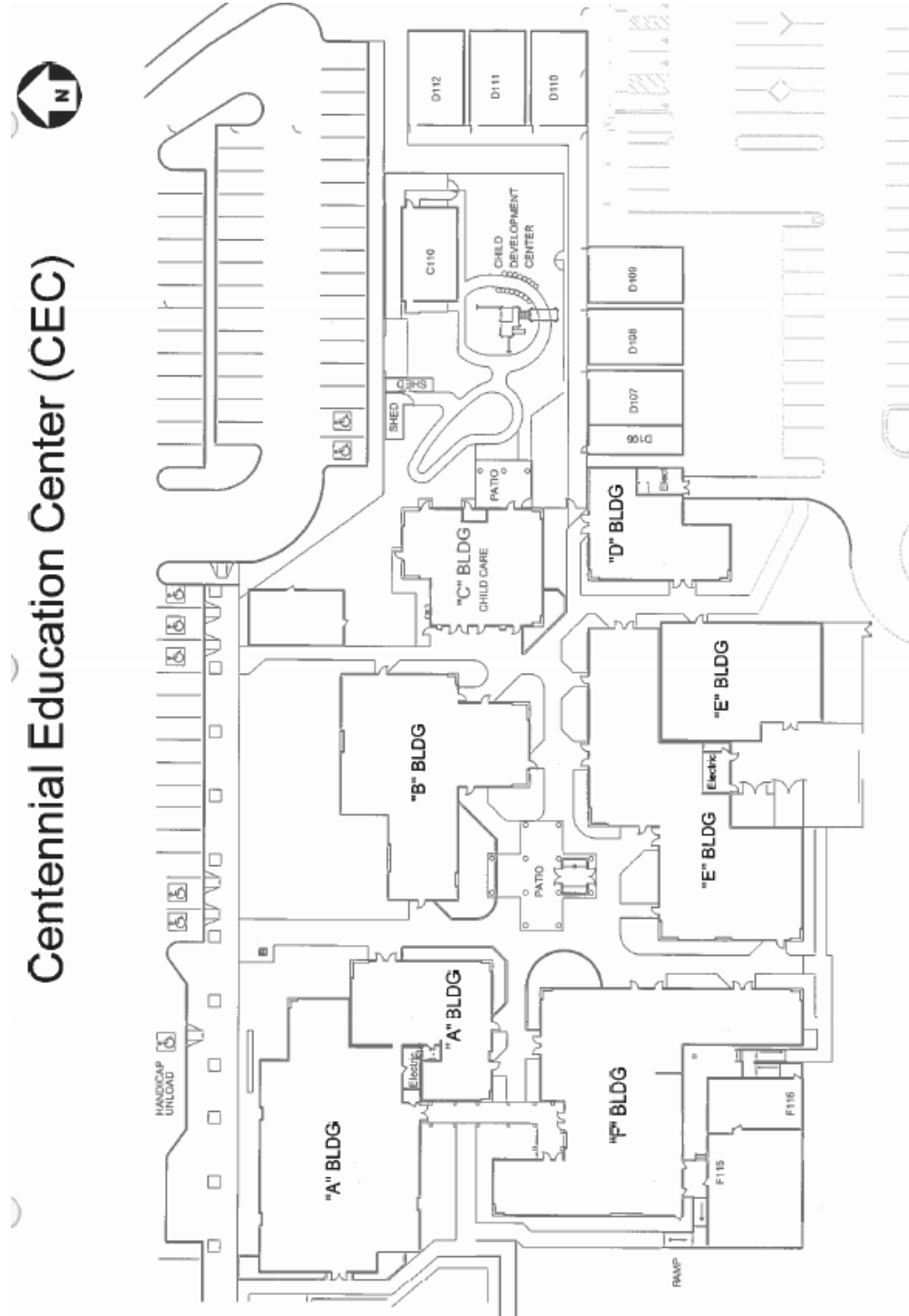
T-BUILDING
Cafeteria • Student Health and
Wellness Services • Student Lounge

U-BUILDINGS
Classrooms • Community Services
Continuing Education Classes
Faculty Offices • International Students
Math Study Center • Safety & Security
Tutoring



Rancho Santiago Community College District

Figure 5: Centennial Education Center Layout



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VIII. REPETITIVE LOSSES

After considerable research, assessing both RSCCD records and discussions with employees from facilities and finance, it was learned that RSCCD has never filed a State OES or FEMA claim on any of their properties up to this date. It is the Team's conclusion that there are no repetitive loss properties owned or operated by RSCCD.

RSCCD has filed three known insurance claims for floods and winds since 2000.

IX. SUMMARY

Natural hazard mitigation strategies can reduce the impacts of disasters on college campuses especially those considered critical facilities. Natural hazard mitigation for campuses includes developing relationships with City and County emergency management offices before disaster strikes and establishing mitigation strategies together. Collaboration among the cities, counties and school districts to create mitigation plans and actions can reduce the impacts of natural hazards.

This plan is an example of how a college district worked closely with the cities, the county and State of California to collaborate on mitigation strategies.

The following section IV. Hazards and Strategies details each of the five hazards addressed in this Hazard Mitigation Plan and their impact on RSCCD. Each hazard analysis will be followed by Mitigation Action Items for the hazard.

- IV – A Multi-Hazard Strategies for all hazards
- IV – B Earthquake
- IV – C Floods/Storms
- IV – D Dam Failure
- IV – E Drought/Climate Change
- IV – F Windstorms/Severe Weather