



There's only one San Francisco. Let's take care of it.

CCSF HAZUS Analysis

Office of the City Administrator
Capital Planning Program

From 2011-2013, the Capital Planning Program, in collaboration with the Dept. of Public Works, Real Estate Dept., Dept. of Building Inspection, Dept. of Emergency Management, Risk Management, and Controller's Office, conducted a seismic review study on high priority General Fund facilities. The results help prioritize seismic improvements to reduce post-disaster recovery costs for the City.

HAZUS BENEFITS

- **Improves capital planning**
 - Identify where further seismic analysis is needed
 - Prioritize capital projects
- **Guides important emergency response planning decisions**
 - Inform emergency response actions plans
 - Increase ability to track changes in vulnerability over time
- **Provides loss estimates for grant applications**
 - Pre-disaster mitigation
 - Post-disaster recovery

CCSF STUDY DETAILS

- **Analyzed 214 high-priority, General Fund buildings**
 - Prioritized emergency response and vulnerable buildings
 - Highest priority buildings are primary department operation centers (DOCs), emergency shelter locations, and emergency response centers
- **Modeled four earthquake scenarios and estimated the impact on each building**
- **Significant driving factors include building design level, building occupancy, building exposure value, and liquefaction potential**

RESULTS

ECONOMIC IMPACT

ALL LOSSES IN \$ MILLION	Hayward M6.9	San Andreas M6.5	San Andreas M7.2	San Andreas M7.9
Structural Damage	85.2	111.4	183.0	313.3
Non-Structural Damage	306.8	440.6	727.9	1,324.7
Total Building Damage	392.0	552.0	911.0	1,638.0
Content Damage	80.9	217.9	295.1	447.6
Operational Losses; Rent, Relocation & Lost Income	94.3	119.8	197.5	318.3
Total Economic Impact	567.1	889.6	1,403.6	2,403.9

BUILDING DAMAGE

	Hayward M6.9	San Andreas M6.5	San Andreas M7.2	San Andreas M7.9
Mean building damage (% of building value)	8%	11%	19%	33%

Occupancy Tagging (Number of Buildings in Each Category):

# Green Tagged	179	167	123	69
# Yellow Tagged	24	36	73	67
# Red Tagged	11	11	18	78
Total # Buildings	214	214	214	214

Collapse Probabilities (Number of Buildings in Each Category):

<5%	210	210	198	142
5 – 10%	4	4	16	61
10 – 15%	0	0	0	11
Total # Buildings	214	214	214	214

CASUALTIES

ALL CASUALTIES AT PEAK OCCUPANCY	Hayward M6.9	San Andreas M6.5	San Andreas M7.2	San Andreas M7.9
Total # Casualties	550	1060	1700	3110

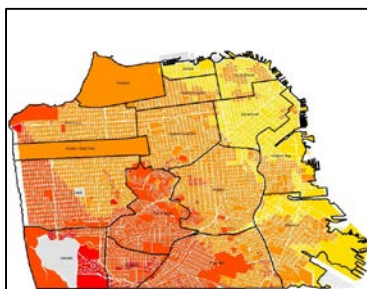
Total # Casualties (Number of Buildings in Each Category)

None Expected	151	130	102	64
10 or Fewer	48	66	88	107
11 to 25	11	11	11	22
26 to 50	3	3	4	9
51 to 100	0	0	4	3
101 or More	1	4	5	9

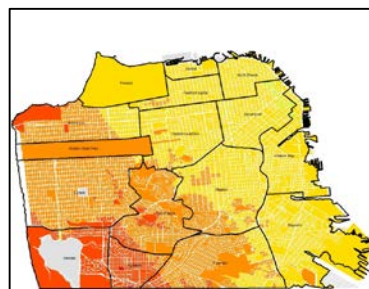
Results continue on next page →

EARTHQUAKE SCENARIOS (with USGS 30 year probability)

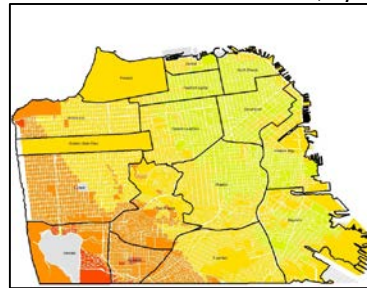
San Andreas M7.9 (3.8%)



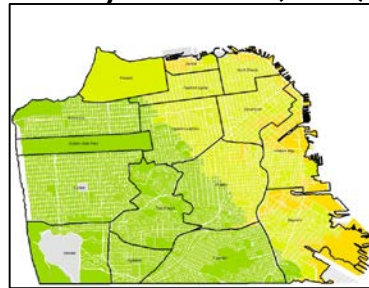
San Andreas M7.2 (0.6%)



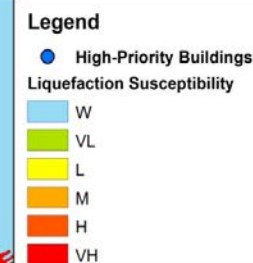
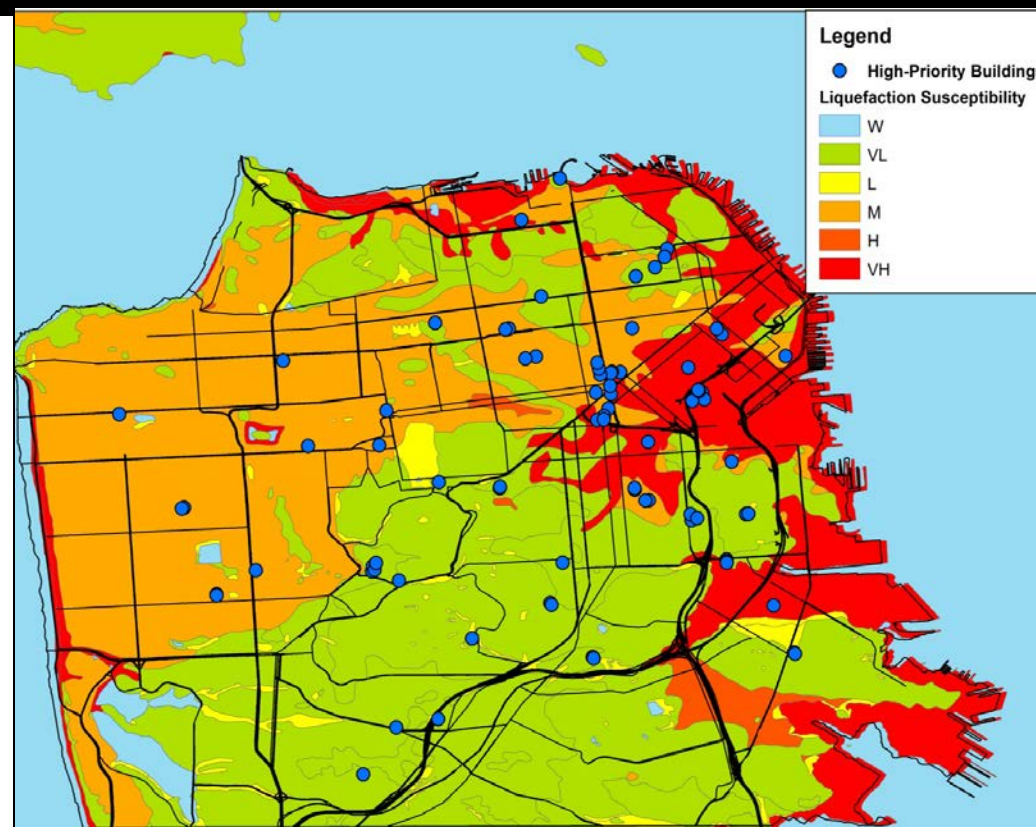
San Andreas M6.5 (N/A)



Hayward M6.9 (9.9%)



LIQUEFACTION SUSCEPTIBILITY



RESULTS (CONTINUED)

HIGH IMPACT BUILDINGS High impact buildings are those that were identified as having significant financial impact to the city or a high number of casualties in specific earthquake scenarios. Below are the results for the greatest magnitude earthquake scenario.

San Andreas M7.9					
Economic Impact >\$50M	Operational Losses >\$5M	Red-Tagged >70% Damage	Probability of Collapse >10%	Casualties >100	Casualty Rate >10%
ADM	ADM	ADM	ADM	ADM	ADM
1 South Van Ness	1 South Van Ness	Animal Care and Control Facility	Animal Care and Control Facility	Bill Graham Civic Auditorium	Animal Care and Control Facility
Hall of Justice	Hall of Justice	Produce Building-South	Produce Building-South	Hall of Justice	Produce Building-South
Moscone West	Moscone Center (South)	Produce Market-North Building L	ART	Moscone Center (South)	Produce Market-North Building L
DPH	Moscone North	Produce Market-North Building N	African American Art and Culture Center	Moscone North	Produce Market-North Building N
SFGH - Building 100	Moscone West	Produce Market-Pub Dock 1 middle	DPH	Moscone West	Produce Market-Pub Dock 2 middle
SFGH - Building 5 (Main Hospital)	DPH	Produce Market-Pub Dock 2 middle	Tom Waddell Clinic	FAM	Produce Market-Pub Dock 3a middle
SFGH - Building 80	Laguna Honda Main Hospital (H Wing)	Produce Market-Pub Dock 3a middle	DPW	de Young Museum	Produce Market-South Building K
FAM	SFGH - Building 100	Produce Market-South Building K	DPW - Carport 1-D	REC	Produce Market-South Building M
de Young Museum	SFGH - Building 5 (Main Hospital)	Produce Market-South Building M	DPW - Carport 4-G,H,J	Kezar Pavilion	ART
WAR	SFGH - Building 80	ART	Power House	SCI	African American Art and Culture Center
Davies Symphony Hall	SFGH - Building 9	African American Art and Culture Center	FIR	Academy of Sciences	DPH
War Memorial Opera House	SFGH - Building 90	DPH	Fire Chiefs Residence	WAR	Health Center Three (Silver Ave)
War Memorial Veterans Building (Pre-upgr)	SFGH - Mental Health Building	DPH Central Office (101 Grove)	Fire Station #8	War Memorial Veterans Building (Pre-upgr)	Maxine Hall Health Center
	HSA	Maxine Hall Health Center	SFFD Equipment Unit Headquarters		SFGH - Building 10 (COR.10-1B)
	170 Otis	Tom Waddell Clinic	REC		SFGH - Building 1A
	WAR	DPW	Corp. Yard (Paint/Carpenter Shop)		SFGH - Building 1B
	War Memorial Veterans Building (Pre-upgr)	DPW - Carport 1-D			SFGH - Building 1C
		DPW - Carport 4-G,H,J			SFGH - Building 20 (COR. 20-10)
		Power House			SFGH - Building 30 (COR. 30-40)
		FIR			SFGH - Building 4
		Fire Chiefs Residence			SFGH - Building 40 (COR. 40-9)
		Fire Station #23			Tom Waddell Clinic
		Fire Station #25			FIR
		Fire Station #34			Ashbury Street Tank & Tank House
		Fire Station #6			Fire Chiefs Residence
		Fire Station #8			Fire Station #16
		Pump Station #2 (Fort Mason)			Fire Station #23
		SFFD Equipment Unit Headquarters			Fire Station #24
		POL			Fire Station #25
		Park Police Station			Fire Station #39
		REC			Fire Station #44
		Corp. Yard (Paint/Carpenter Shop)			Fire Station #8
		Corp. Yard (Warehouse)			Pump Station #2 (Fort Mason)
		Kezar Pavilion			SFFD Equipment Unit Headquarters
		Park Senior Center			POL
		WAR			Park Police Station
		War Memorial Veterans Building (Pre-upgr)			Richmond Police Station
					REC
					Corp. Yard (Paint/Carpenter Shop)
					Corp. Yard (Warehouse)
					Kezar Pavilion
					Park Senior Center