

UPDATE ON SEISMIC HAZARD RATINGS OF CITY-OWNED BUILDINGS

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HAZUS

- HAZUS is a nationally-applicable methodology developed by FEMA to estimate potential losses from earthquakes, hurricanes, and floods
 - Input: Soil maps, ground shaking maps, building inventory maps, building structural data, building occupancy data, building economic data
 - Output: **Estimated** economic impact, building damage, and casualties
- It is a relative risk model, and **helps** prioritize mitigation efforts, emergency preparedness, and response and recovery planning

MITIGATION

- Prioritize seismic retrofits of existing facilities
- Support development of local hazard mitigation plans
- Support development of hazard-resistant building codes & land use planning activities

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HAZUS

City-owned Portfolio

Hazus Analysis: High-Priority Buildings

SHR

SHR

SHR

Bond Programs

Other Sources

B.O.R.P Program

ANALYSIS

CAPITAL
PROGRAMS

HAZUS PROJECTED BUILDING DAMAGE (2017)

	Hayward M6.9	San Andreas M6.5	San Andreas M7.2	San Andreas M7.9
Green-tagged	195	183	127	75
Yellow-tagged	32	44	89	74
Red-tagged	12	12	23	90
Total Buildings	239	239	239	239

HAZUS

PROJECTED ECONOMIC IMPACT (LOSSES IN 2017)

<i>\$ in millions</i>	Hayward M6.9	San Andreas M6.5	San Andreas M7.2	San Andreas M7.9
Structural Damage	107.2	133.4	212.3	353.1
Non-Structural Damage	398.3	545.4	859.7	1,489.3
Total Building Damage	505.5	678.8	1,072.0	1,842.4
Content Damage	130.1	426.7	523.6	714.3
Operational Losses; Rent, Relocation & Lost Income	154.8	191.9	314.7	527.2
Total Economic Impact	790.4	1,297.3	1,910.3	3,083.8

SEISMIC EVALUATION CRITERIA

- *ASCE 41-13: Seismic Evaluation and Retrofit of Existing Buildings*
 - *BSE-1E: 20% probability of exceedance in 50 years (225 year return period)*
 - *BSE-2E: 5% probability of exceedance in 50 years (975 year return period)*
- *SHR Evaluations*
 - *10% probability of exceedance in 50 years (475 year return period)*



SEISMIC HAZARD RATING

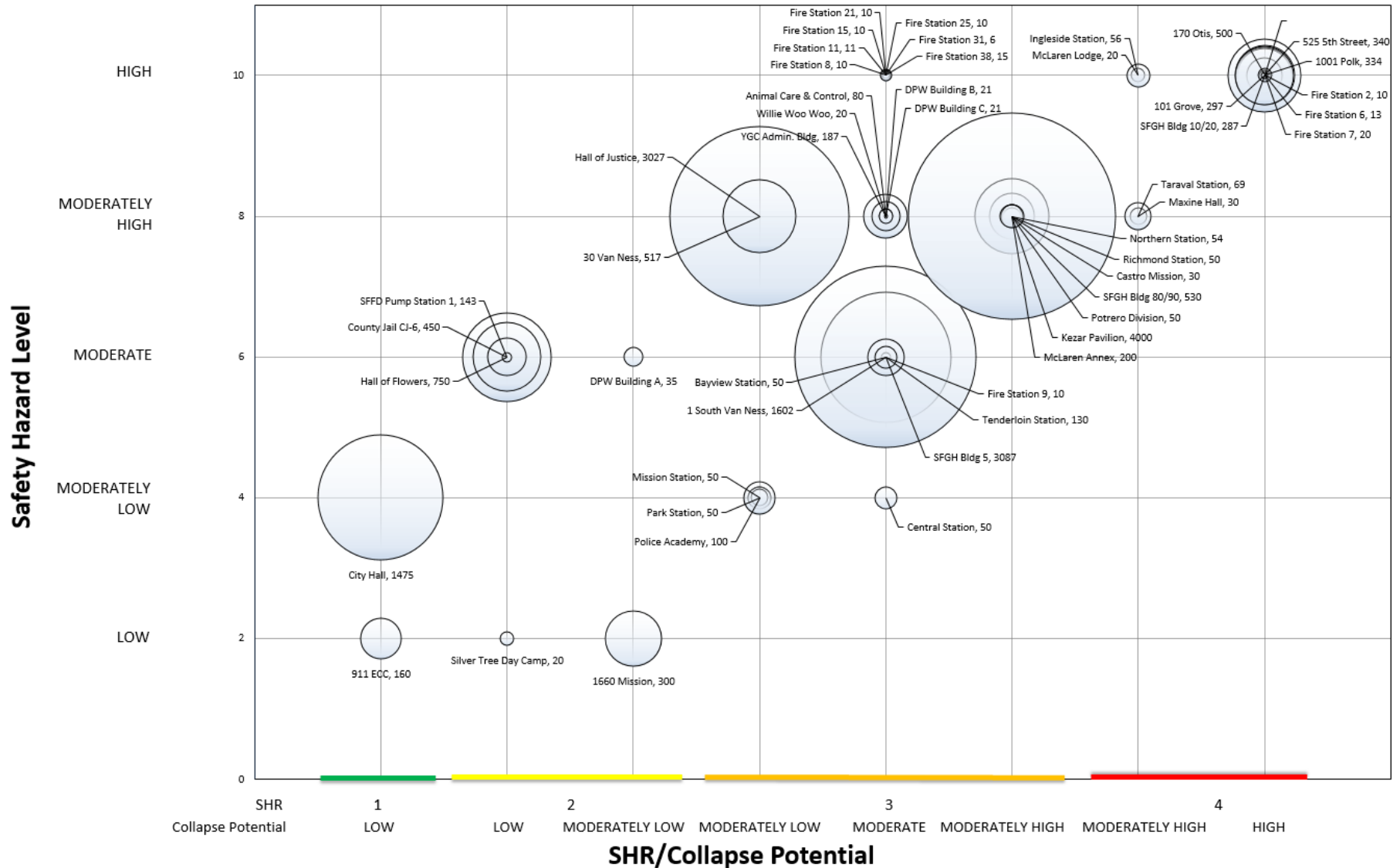
ASCE 41 Structural Performance Level at BSE-1N	SHR	SHR Description
Immediate Occupancy (I.O.)	1	Negligible damage (very good performance). Minimal to no disruption to the building's function. Damage is so minor or negligible, that repair is not necessary.
Damage Control		Minor damage (good performance). Some structural or nonstructural damage and/or falling hazards may occur, but these would pose minimal life safety hazards to occupants. The damage can be repaired while the building is occupied and with minimum disruption to functions. Buildings and structures with this rating represent an acceptable level of earthquake safety, and funds need not be spent to improve their seismic resistance to gain greater life safety.
Life Safety (L.S.)	2	Moderate damage (fair performance). Structural and nonstructural damage and/or falling hazards are anticipated which would pose low life hazards to occupants. The damage can be repaired while the building is occupied. Buildings and structures with this rating will be given a low priority for expenditures to improve seismic performance and/or falling hazards to the "good performance" level.
Limited Safety	3	Major damage (poor performance). Structural and nonstructural damage are anticipated which would pose appreciable life hazards to occupants. The building has to be vacated during repairs, or possibly cannot be repaired due to the extent and/or economic considerations. Buildings and structures with this rating will be given a high priority for expenditures to improve seismic performance and/or falling hazards to the "good performance" level, or would be considered for other abatement programs such as reduction of occupancy.
Collapse Prevention (C.P.)		
	4	Partial/total collapse (very poor performance). Extensive structural and nonstructural damage, potential structural collapse and/or falling hazards are anticipated which would pose high life safety hazards to occupants. There is a high likelihood that damage repairs would not be feasible. Buildings and structures with this rating will be given the highest priority for expenditures to improve seismic performance and/or falling hazards to the "good performance" level, or would be considered for other abatement programs such as reduction of occupancy or vacation.

COMPLETED SHR'S FOR OVER 50 BUILDINGS

- Animal Care and Control
- Fire
- Public Health
- Police
- Public Works
- Real Estate
- Recreation and Parks



SHR FOR SELECTED CITY-OWNED BUILDINGS



PRIORITY SEISMIC RISK FACILITIES & THE CAPITAL PLAN

Buildings	SHR	Mitigation Plan
SFGH Building 10/20	4	Planned – Relocate staff
101 Grove	4	Planned – Relocate staff
Maxine Hall	4	Planned – Retrofit
170 Otis	4	Planned – Relocate staff
Fire Stations 2, 6, 7, 40	4	ESER Priority
Ingleside, Taraval PD Stations	4	ESER Priority
McLaren Lodge	4	TBD
260 Golden Gate, 525 5 th Street, 1001 Polk	4	Newly assessed, TBD

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RISKS OF NONSTRUCTURAL EARTHQUAKE DAMAGE

- Completed pilot project to determine nonstructural performance
 - Maxine Hall Health Center
 - Mission Police Station
- ASCE 41-17: Seismic Evaluation and Retrofit of Existing Buildings
- FEMA E-74: Reducing the Risks of Nonstructural Earthquake Damage



Photo from FEMA E-74

RISKS OF NONSTRUCTURAL EARTHQUAKE DAMAGE

- Nonstructural Components
 - Architectural
 - Mechanical and Electrical Equipment
 - Furnishings and Interior Equipment
- Mitigation to Reduce Recovery Costs and Downtime



Photo from FEMA E-74

QUESTIONS



Photo from oshpd.ca.gov