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

Symposium on Resilient Design for Buildings, Communities, & Cities

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Center for the Built Environment

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Resilience Planning in San Francisco

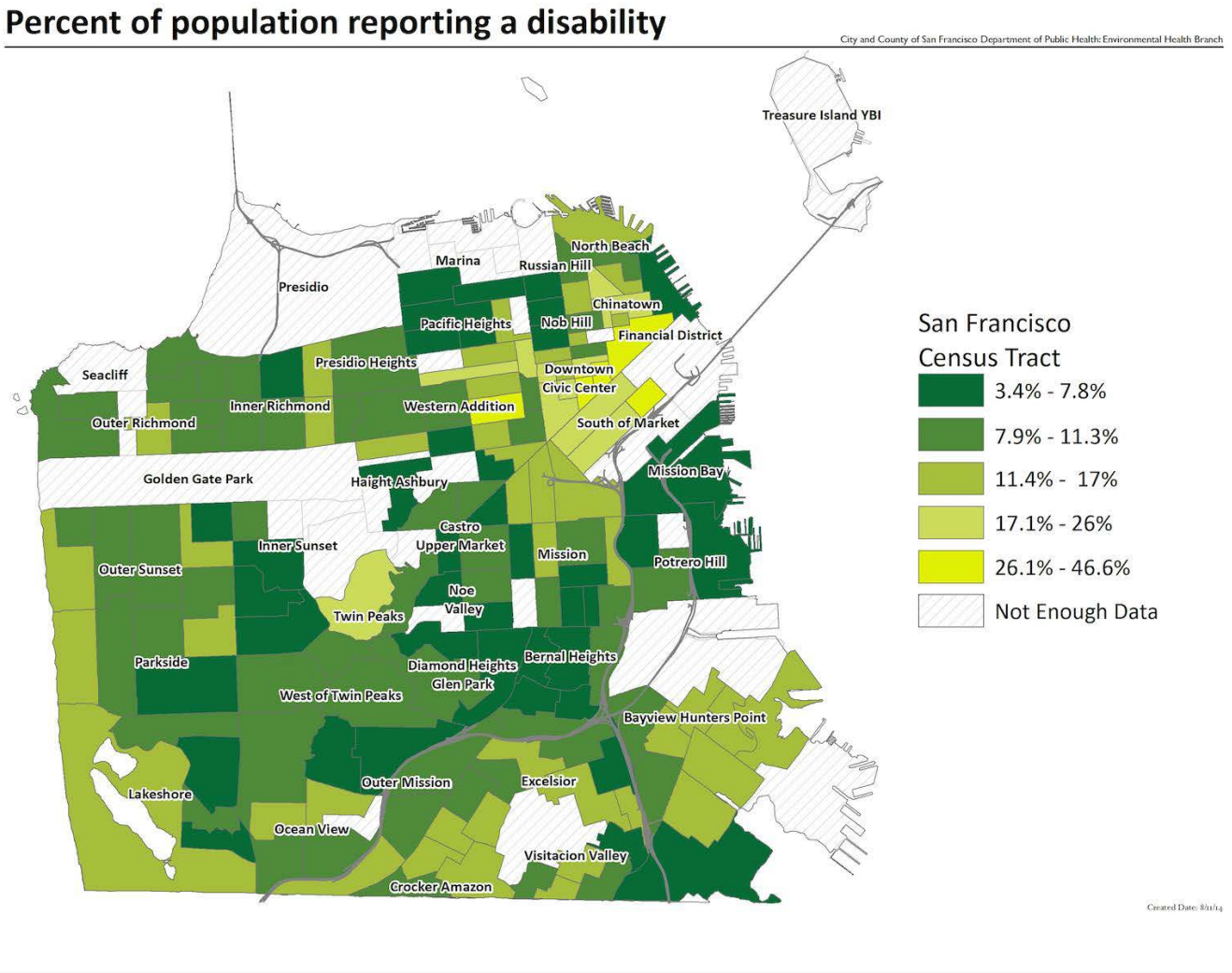
- Developed policies and infrastructure to mitigate and recover from disasters
- Expanded definition of resilience:
  - Responding to disasters
  - Systemic crises like economic downturns, poverty, and housing shortages
  - Slow-moving disasters such as climate changes and sea level rise.

Critical Challenges

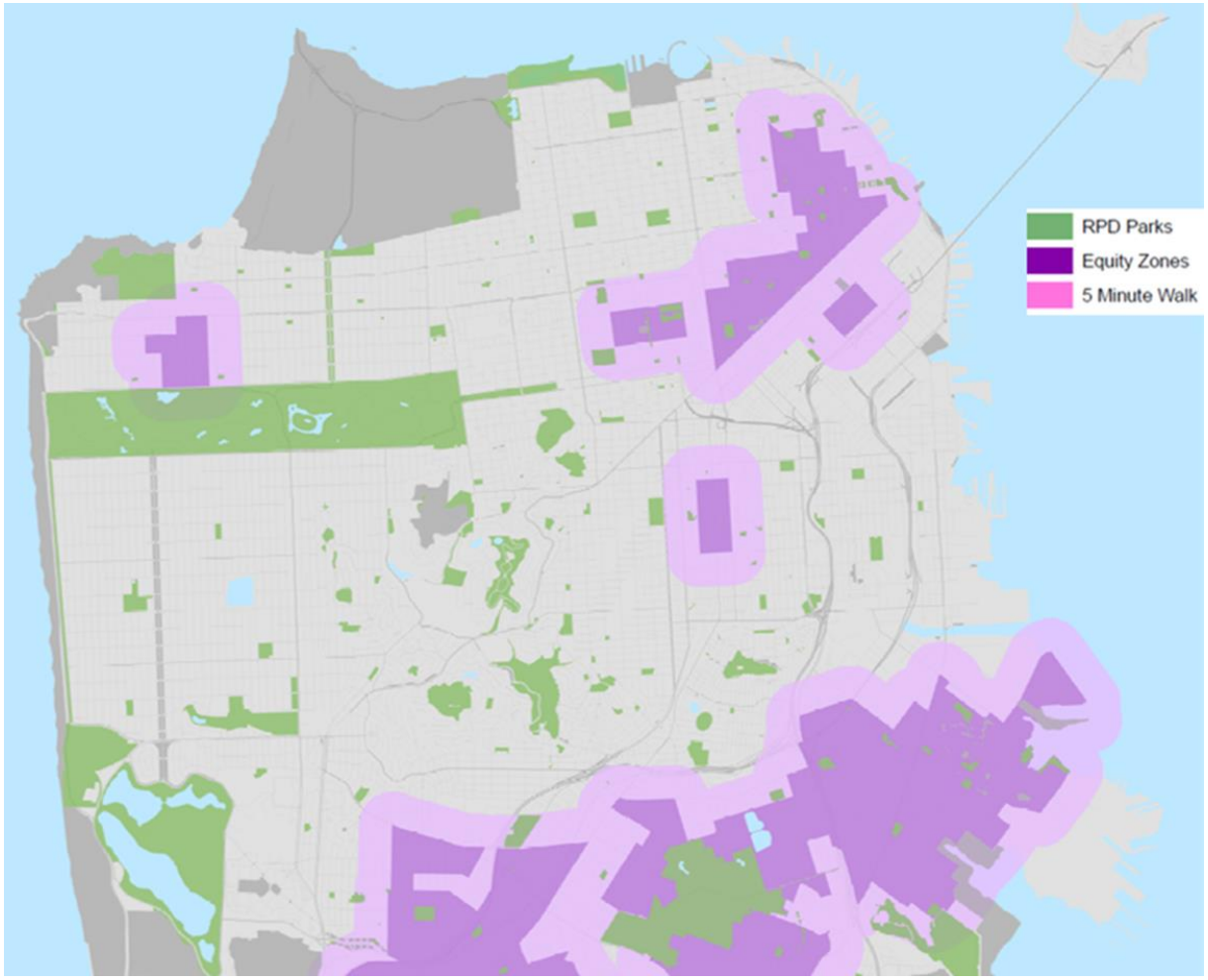
- Creating a sense of urgency
- Long-term planning and implementation in a political environment
- Issues of equity, displacement, housing, demographics, and population growth
- Building code focus on life-safety rather than recovery
- Encouraging the private sector to address resiliency
- Lack of funding for mitigation

Neighborhood Population Risk Factors

- Neighborhoods with risk factors require additional resources for disaster response.
- Place increased outreach and capacity building emphasis.



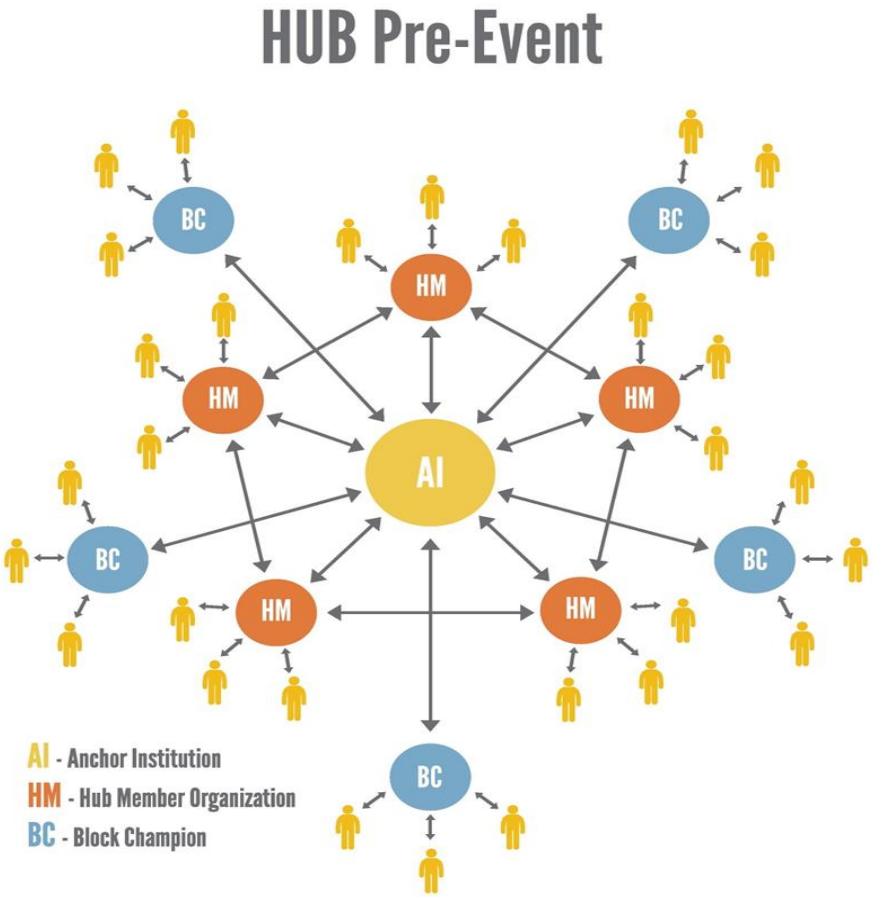
Park Department – Access To Services



- Analysis compares several population measures to the City as a whole.
- Allows targeted investments in communities of need.

Community-Based Resilience

- Effective disaster response cannot be driven by government alone.
- Community-based partners expand government's reach.
- Organize local institutions to activate once disaster strikes.
- Developing a community leadership academy



Neighborhood Assets and Leadership Development

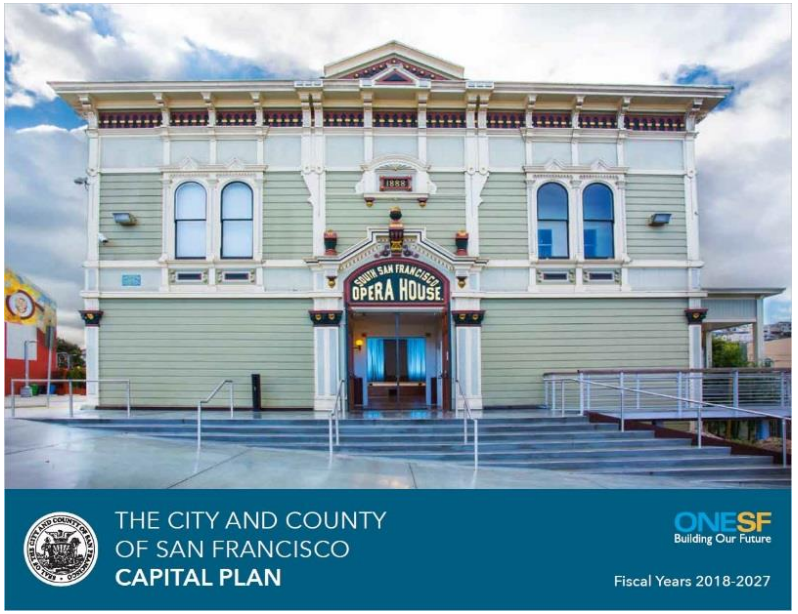
Build capacity for local leadership in the event of a disaster.

Capital Plan – City-Owned Infrastructure

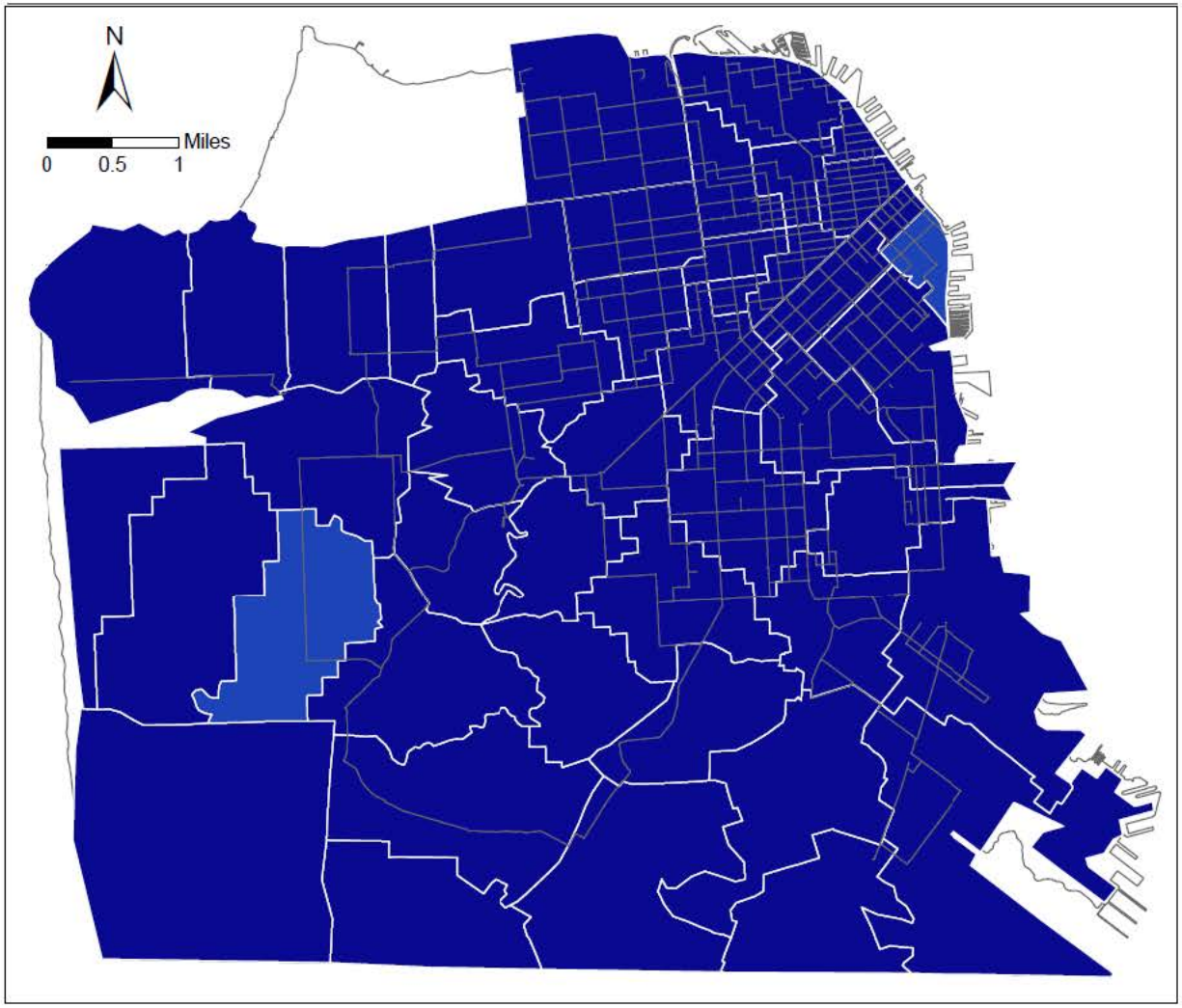
- Constrained 10-year Plan of Finance
  - Created in 2006 to coordinate and prioritize infrastructure investments.
  - Current plan proposes to spend $35 billion through 2027.

- Accomplishments
  - Over $10 billion approved since 2006
  - $3.5 billion GO bonds since 2008

- Upcoming and Ongoing Projects
  - Emergency Firefighting Water System
  - Seawall Fortification
  - Sewer System Improvement Project
  - Hall of Justice



Major Project
Emergency Firefighting Water System



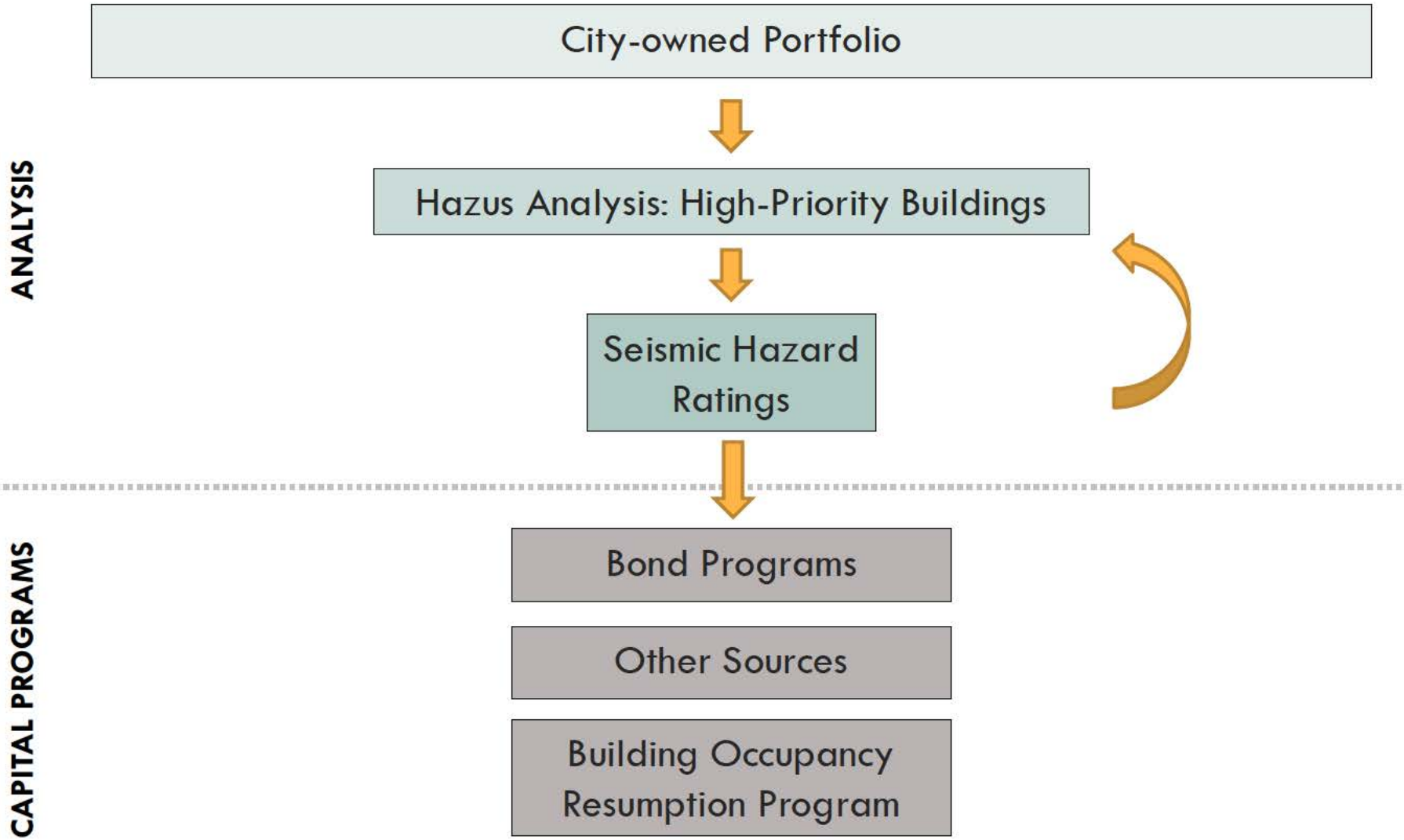
- Ability to meet full water demand in an earthquake.

Citywide reliability
After future projects
96%

Major Project
Seawall Fortification Project

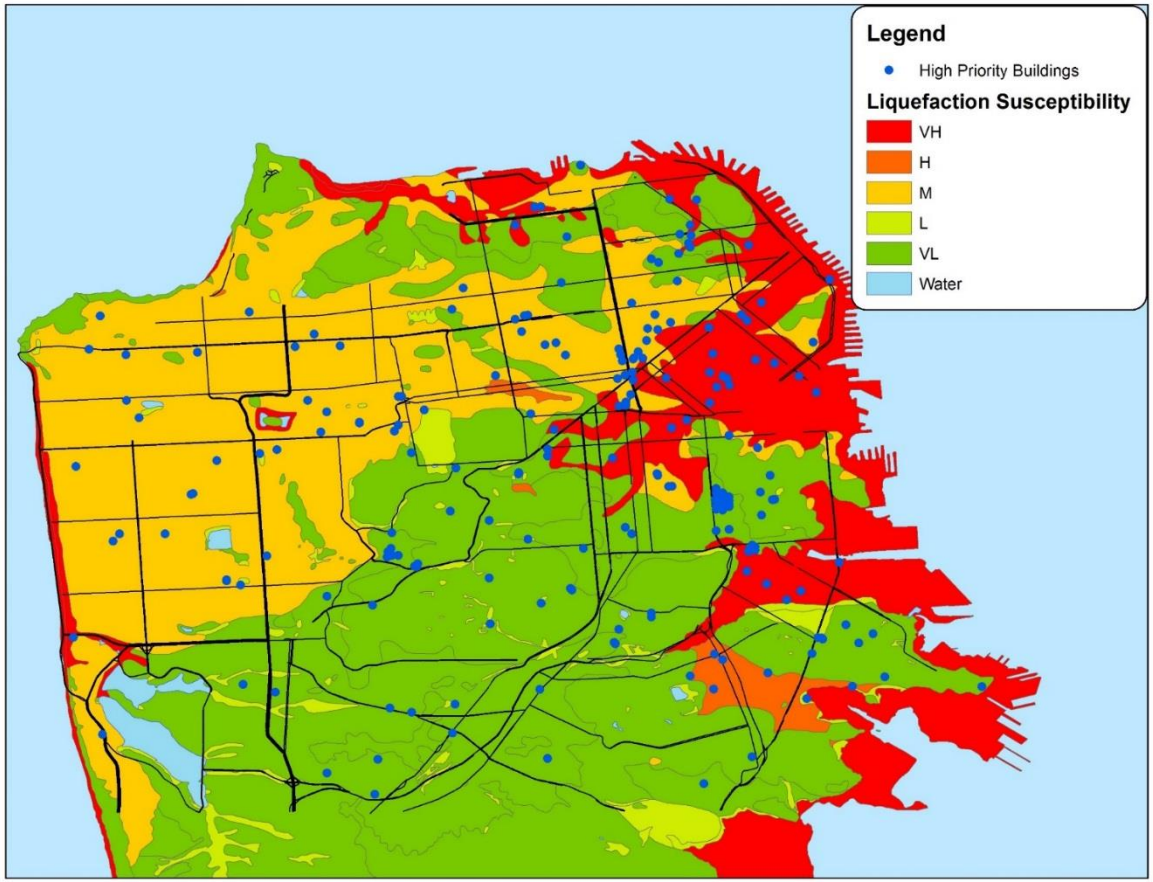
- San Francisco's Great Seawall was built in 1878 and runs three miles along waterfront.
- It supports business and infrastructure on the waterfront and protects the City against flooding.
- The Seawall is vulnerable to earthquakes and must be strengthened.
- The estimated cost to fully replace is $2-5 billion.

Facility Risk Analysis

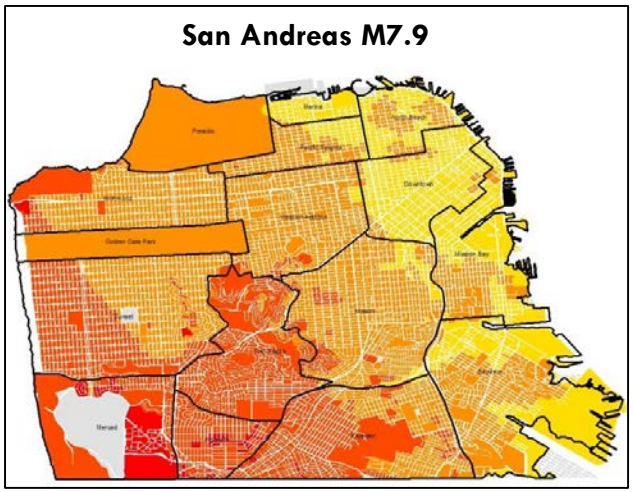


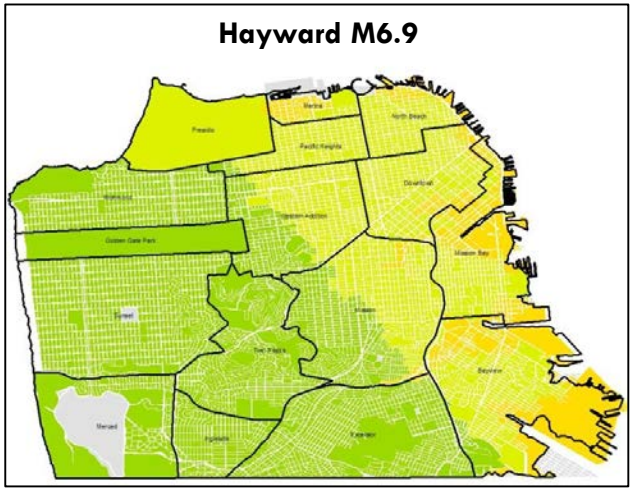
HAZUS – Where Are The Risks?

Liquefaction



Ground Shaking





Resilience in San Francisco Capital Plan – HAZUS

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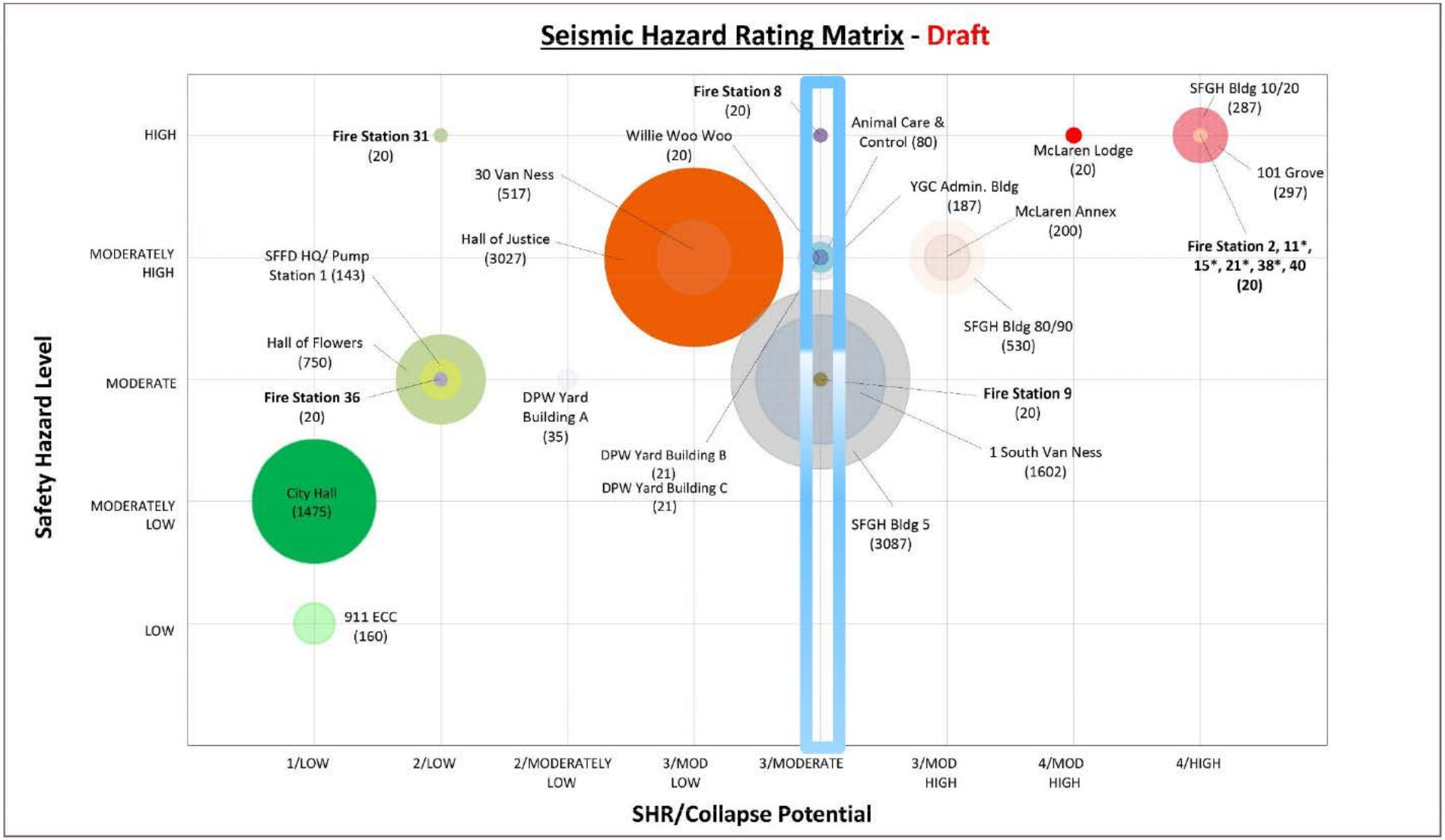
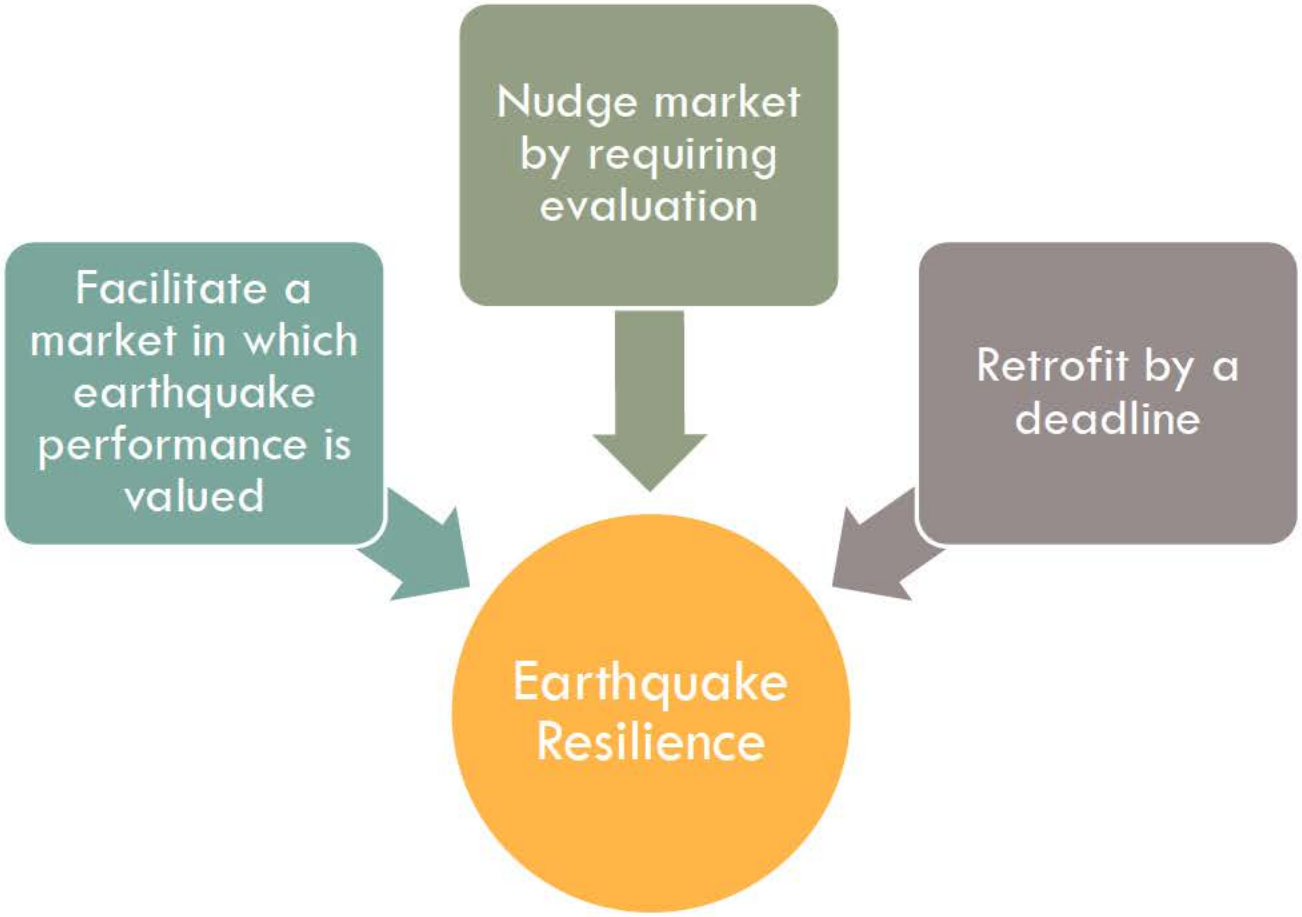
Project Economic Impact for 239 City Facilities

$ in millions	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 Hazard Ratings of City Buildings

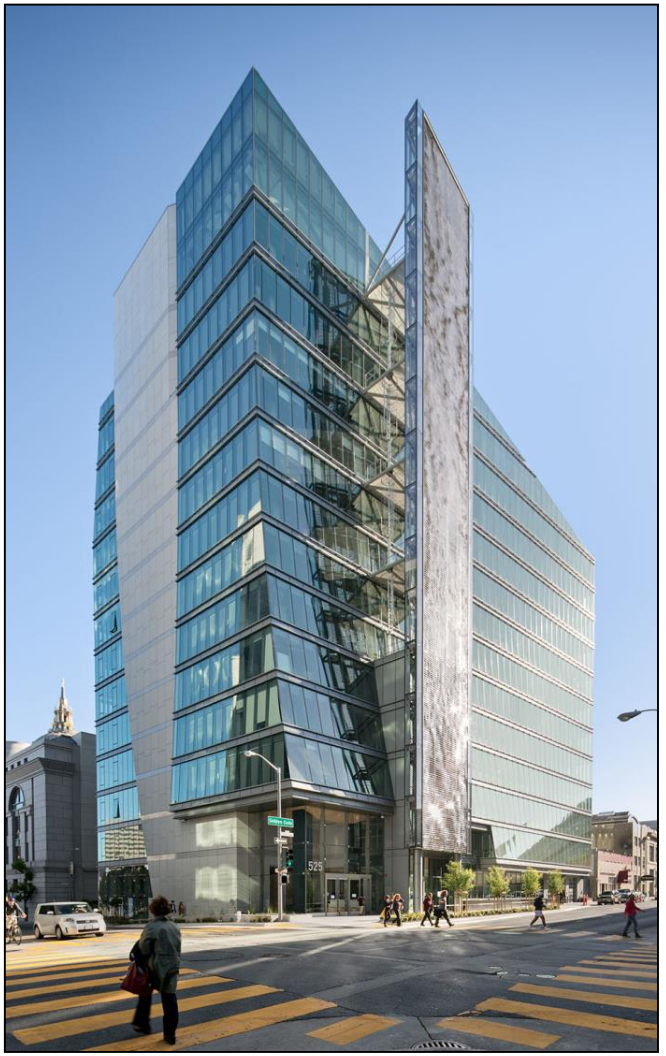


Encouraging The Private Sector

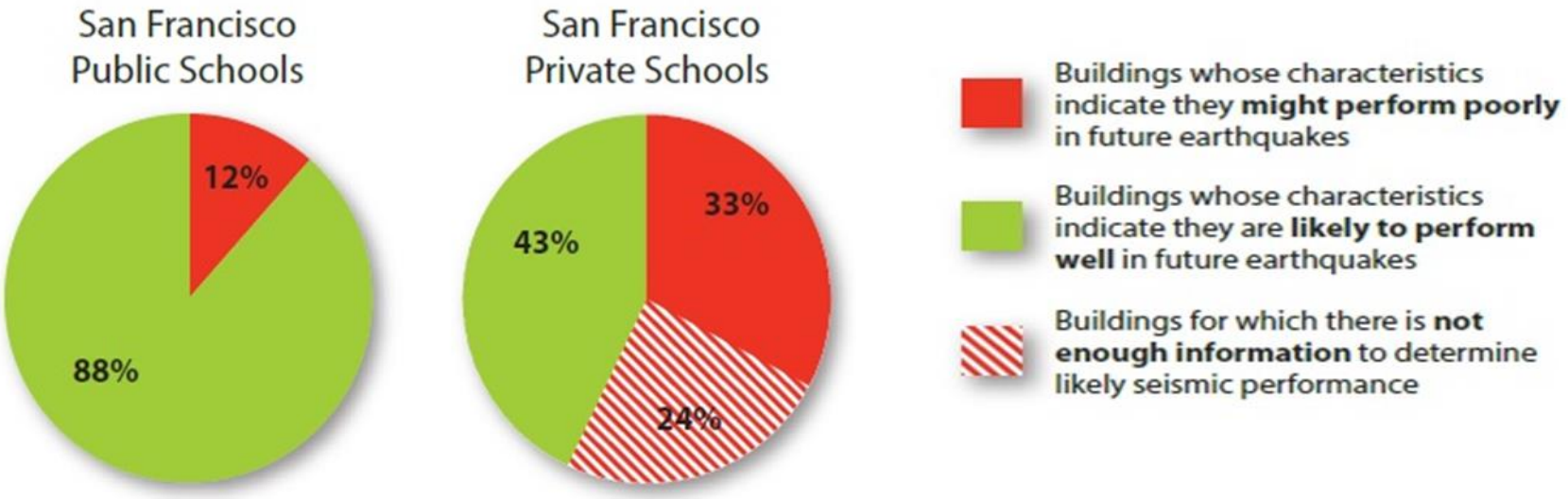


Facilitate Changes in the Private Sector

- Leading by example
- Major commitments include:
  - LEED standards to reduce energy consumption
  - Developed Sea Level Rise Guidance for City infrastructure
  - Exploring Solar + Storage to capture solar energy
  - Zero Net Energy in municipal construction

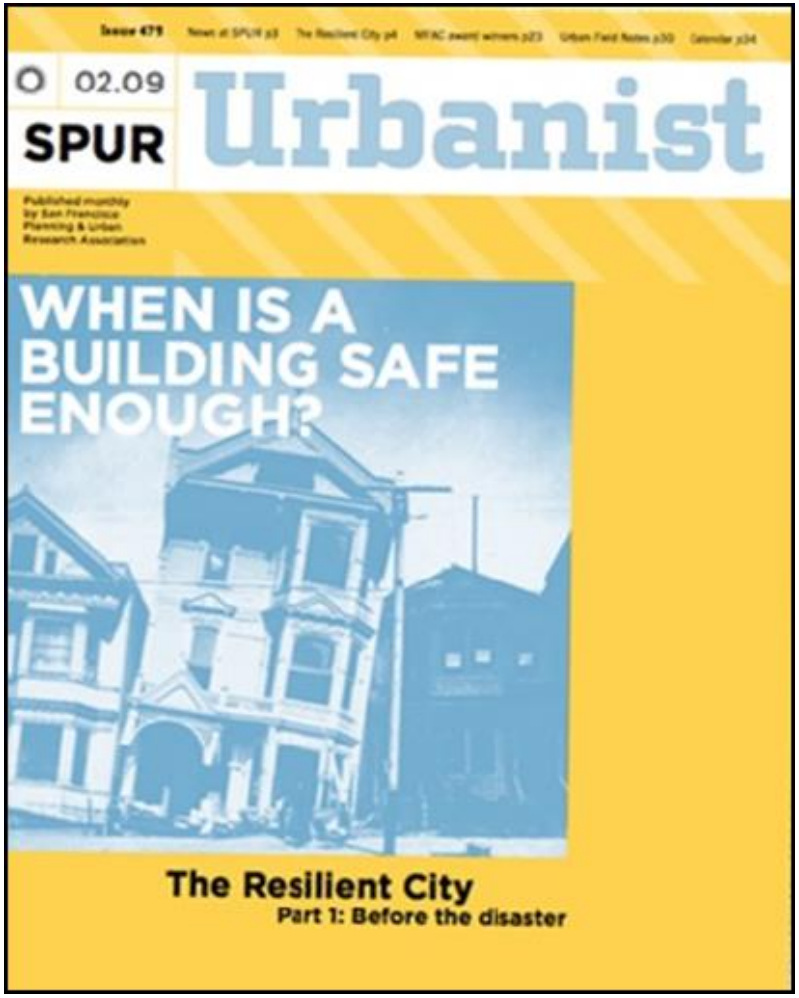


Nudge Behavior By Requiring Evaluations



- Private schools were required to complete an evaluation of seismic vulnerability.
- Schools are not required to retrofit based on the evaluation.

Enacting Regulation



- Performance standards for new buildings.
- Mandatory soft-story building retrofits.
- Façade maintenance ordinance.
- EQ effects on retail businesses

Questions & Comments

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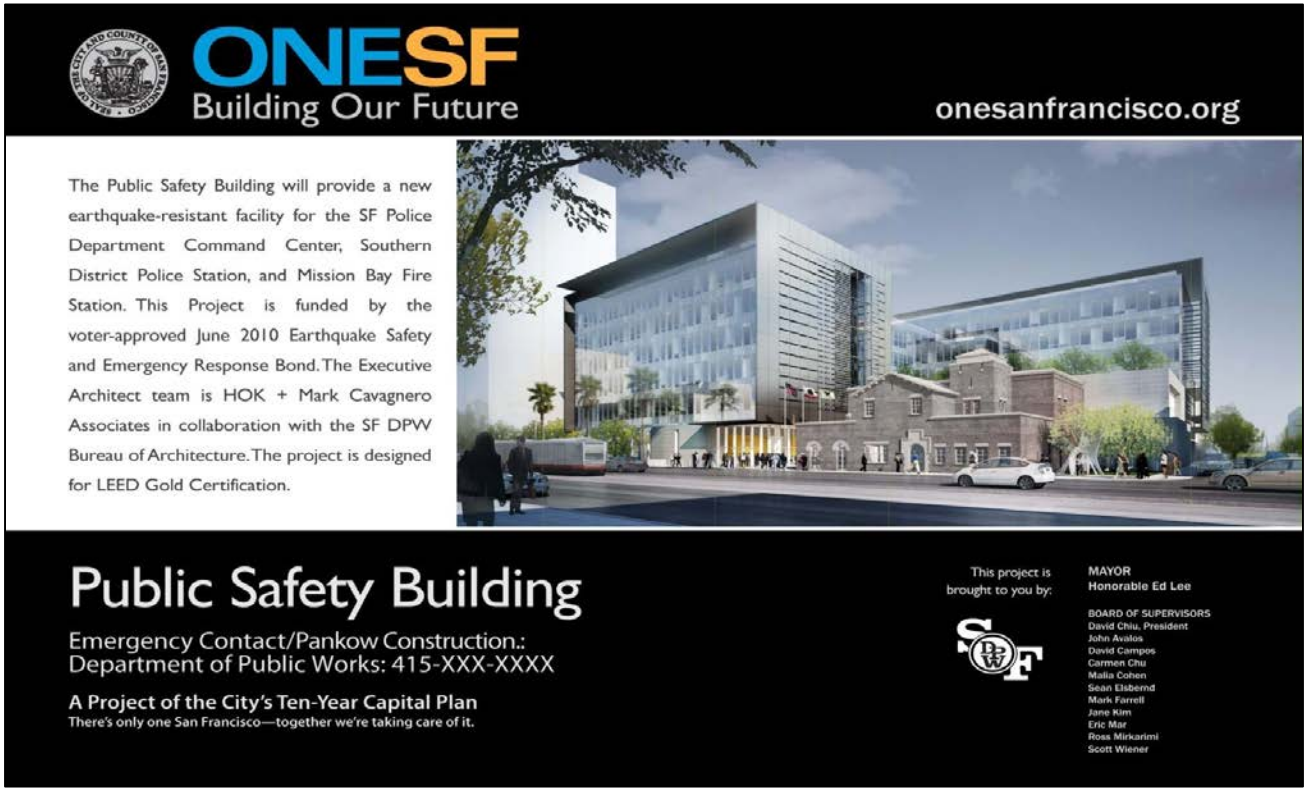
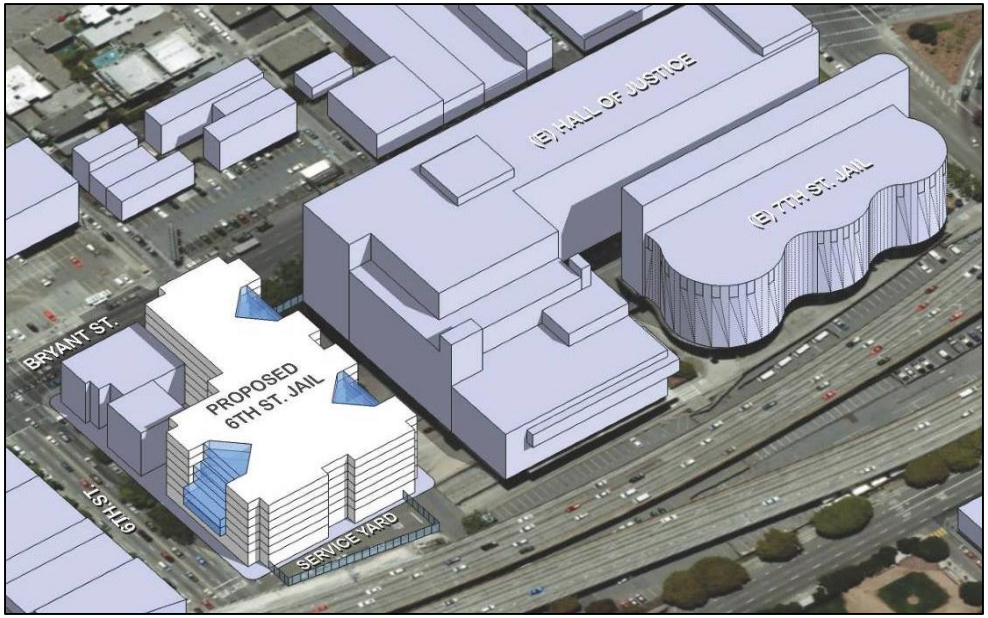


Seismic Hazard Rating Categories

SHR	Description
SHR-1	**Minor damage** (good performance). Some structural or nonstructural damage and/or falling hazards may occur, but these would pose minimal life hazards to occupants. The damage can be repaired while the building is occupied and with minimum disruptions to functions.
SHR-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.
SHR-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.
SHR-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 hazards to occupants. There is a good likelihood that damage repairs would not be feasible.

San Francisco Infrastructure Illustration—Hall of Justice



Contains critical criminal justice facilities including: ***Criminal Courts; 900-bed Jail; SF Police Department HQ, Southern Station, Traffic Division, & Crime Lab; District Attorney, Adult Probation, Medical Examiner***

- 608,000 ft² Building constructed in 1958
- 2007 Study showed it needs to be <u>twice</u> as big to meet current needs & standards
- Cost is $1.5 billion over 15-years

- San Francisco focus on Resilience...older and new programs...
- Challenges to Resilience slide
- 10-yr Capital Plan--invested over $10b in city infrastructure -- AWSS + Cisterns --WSIP + SSIP --Hospital + HOJ (PSB, OCME, Crime Lab, etc) + Vets Lots of work remains...including SeaWall...multiple issue of EQ and SLR
- Private Side--
- Soft Story Legislation
- Performance Standards for bldgs (tall, residential, etc) Community Based Preparedness (NEN) GIS Tools

Neighborhood Empowerment Network

- Why it's important
  - Neighborhoods are diverse and needs are not identical
  - Government must be nimble in its approach to tailor services for unique populations
  - Developing leaders at the neighborhood level allows the City to expand its reach post-disaster
  - Community-based partners possess unique resources that the City cannot provide

RESILIENCY & CAPITAL PLANNING INITIATIVES:

Seismic Capital Programs – Auxiliary Water Supply System

Backup Fire Hydrant System Built Largely Pre-1913