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

Symposium on Resilient Design for Buildings, Communities, & Cities
Brian Strong, Chief Resilience Officer, City & County of San Francisco Center for the Built Environment

May 3, 2017
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
Neighborhoods with risk factors require additional resources for disaster response.

Place increased outreach and capacity building emphasis.
- Analysis compares several population measures to the City as a whole.
- Allows targeted investments in communities of need.
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

City-owned Portfolio

Hazus Analysis: High-Priority Buildings

Seismic Hazard Ratings

Bond Programs

Other Sources

Building Occupancy Resumption Program
HAZUS – Where Are The Risks?

Liquefaction

Ground Shaking

Legend
- High Priority Buildings

Liquefaction Susceptibility
- VH
- H
- M
- L
- VL
- Water

San Andreas M7.9

Hayward M6.9
# Resilience in San Francisco Capital Plan – HAZUS

## Project Economic Impact for 239 City Facilities

<table>
<thead>
<tr>
<th>$ in millions</th>
<th>Hayward M6.9</th>
<th>San Andreas M6.5</th>
<th>San Andreas M7.2</th>
<th>San Andreas M7.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Damage</td>
<td>107.2</td>
<td>133.4</td>
<td>212.3</td>
<td>353.1</td>
</tr>
<tr>
<td>Non-Structural Damage</td>
<td>398.3</td>
<td>545.4</td>
<td>859.7</td>
<td>1,489.3</td>
</tr>
<tr>
<td><strong>Total Building Damage</strong></td>
<td><strong>505.5</strong></td>
<td><strong>678.8</strong></td>
<td><strong>1,072.0</strong></td>
<td><strong>1,842.4</strong></td>
</tr>
<tr>
<td>Content Damage</td>
<td>130.1</td>
<td>426.7</td>
<td>523.6</td>
<td>714.3</td>
</tr>
<tr>
<td>Operational Losses; Rent, Relocation &amp; Lost Income</td>
<td>154.8</td>
<td>191.9</td>
<td>314.7</td>
<td>527.2</td>
</tr>
<tr>
<td><strong>Total Economic Impact</strong></td>
<td><strong>790.4</strong></td>
<td><strong>1,297.3</strong></td>
<td><strong>1,910.3</strong></td>
<td><strong>3,083.8</strong></td>
</tr>
</tbody>
</table>
Seismic Hazard Ratings of City Buildings

Seismic Hazard Rating Matrix - Draft

- Fire Station 31 (20)
- 30 Van Ness (517)
- Hall of Justice (8027)
- Willie Woo Woo (20)
- Animal Care & Control (80)
- McLaren Lodge (20)
- YGC Admin. Bldg (187)
- McLaren Annex (200)
- Fire Station 2, 11*, 15*, 21*, 38*, 40* (287)
- 101 Grove (297)
- SFGH Bldg 80/90 (530)
- Fire Station 9 (20)
- 1 South Van Ness (1602)
- SFGH Bldg 5 (3087)

Safety Hazard Level:
- HIGH
- MODERATELY HIGH
- MODERATE
- MODERATELY LOW
- LOW

SHR/Collapse Potential:
- 1/LOW
- 2/LOW
- 2/MODERATELY LOW
- 3/MODERATE LOW
- 3/MODERATE
- 3/MODERATE HIGH
- 4/MODERATE HIGH
- 4/HIGH
Encouraging The Private Sector

- Facilitate a market in which earthquake performance is valued
- Nudge market by requiring evaluation
- Retrofit by a deadline

Earthquake Resilience
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
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

www.onesanfrancisco.org

The Public Safety Building will provide a new earthquake-resistant facility for the SF Police Department Command Center, Southern District Police Station, and Mission Bay Fire Station. This Project is funded by the voter-approved June 2010 Earthquake Safety and Emergency Response Bond. The Executive Architect team is HOK + Mark Cavagnero Associates in collaboration with the SF DPW Bureau of Architecture. The project is designed for LEED Gold Certification.

Public Safety Building
Emergency Contact/Pankow Construction:
Department of Public Works: 415-XXX-XXXX
A Project of the City’s Ten-Year Capital Plan
There’s only one San Francisco—together we’re taking care of it.
## Seismic Hazard Rating Categories

<table>
<thead>
<tr>
<th>SHR</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHR-1</td>
<td><strong>Minor damage</strong> (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.</td>
</tr>
<tr>
<td>SHR-2</td>
<td><strong>Moderate damage</strong> (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.</td>
</tr>
<tr>
<td>SHR-3</td>
<td><strong>Major damage</strong> (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.</td>
</tr>
<tr>
<td>SHR-4</td>
<td><strong>Partial/total collapse</strong> (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.</td>
</tr>
</tbody>
</table>
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 twice 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