FINAL

2008

City and County
San Francisco Hazard Mitigation Plan

DECEMBER 2008

source: FEMA, San Francisco Chronicle, and the Associated Press.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Tables

Appendices

TABLE OF CONTENTS

Acronyms/Abbreviations

2005 HMP	2005 Multi-Jurisdictional Local Government Hazard Mitigation Plan: City and County of San Francisco Annex
2008 HMP	2008 San Francisco Hazard Mitigation Plan
ABAG	Association of Bay Area Governments
CAL FIRE	California Department of Forestry and Fire Protection
CAP	Citywide Action Plan
CBRNE	chemical, biological, radiological, and nuclear, explosive
Census	United States Census Bureau
CFR	Code of Federal Regulations
CGS	California Geological Survey
CIP	Capital Improvement Program
DBI	Department of Building Inspection
DEM	Department of Emergency Management
DMA 2000	Disaster Mitigation Act of 2000
DPW	Department of Public Works
DSOD	California Division of Safety of Dams
EHS	extremely hazardous substance
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ERP	Emergency Response Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance (grant program)
FY	fiscal year
GIS	Geographic Information System
GP	General Plan
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
M	magnitude
MM	modified Mercalli
MOT	Marine Oil Terminals

mph	miles per hour
MUNI	San Francisco Municipal Railway
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NRC	National Response Center
OES	California Governor's Office of Emergency Services
PDM	pre-disaster mitigation
PGA	peak ground acceleration
POC	Point of Contact
RFC	repetitive flood claims
RL	Repetitive Loss
SFGIS	San Francisco Enterprise GIS
SFHA	Special Flood Hazard Area
SFPUC	San Francisco Public Utilities Commission
SOMA	South of Market
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
STAPLEE	social, technical, administrative, political, legal, economic, and environmental
UMB	unreinforced masonry building
URS	URS Corporation
USC	United States Code
USGS	United States Geological Survey
WMD	Weapon of Mass Destruction

The City and County of San Francisco (the City) has developed this Hazard Mitigation Plan (hereinafter referred to as the 2008 HMP) to assess risks posed by natural and human-caused hazards and to develop a mitigation strategy for reducing the City's risks. The City has prepared the 2008 HMP in accordance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). The Department of Emergency Management (DEM), Division of Emergency Services, has coordinated the preparation of the 2008 HMP in cooperation with other city agencies and departments. The 2008 HMP replaces the HMP prepared by the City in 2005.

This section provides a brief introduction to hazard mitigation planning, Local Mitigation Plan requirements, Federal Emergency Management Agency (FEMA) mitigation grants, and a description of the 2008 HMP.

1.1 HAZARD MITIGATION PLANNING

Hazard mitigation, as defined in Title 44 Code of Federal Regulations (CFR), Subpart M, Section 206.401, is "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." In California, the Governor's Office of Emergency Services (OES) has expanded this definition to include human-caused hazards. As such, hazard mitigation is any work done to minimize the impacts of any type of hazard event before it occurs. It aims to reduce losses from future disasters. Hazard mitigation is a process in which hazards are identified and profiled, people and facilities at risk are analyzed, and mitigation actions are developed. The implementation of the mitigation actions, which include long-term strategies that may involve planning, policy changes, programs, projects, and other activities, is the end result of this process.

1.2 LOCAL PLANNING REQUIREMENTS

In recent years, local hazard mitigation planning has been driven by a new federal law, known as the Disaster Mitigation Act of 2000 (DMA 2000). On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act) (Title 42 of the United States Code [USC] Section 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. This new section also provided the legal basis for the Federal Emergency Management Agency's (FEMA's) mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002 (FEMA 2002) (44 CFR Part 201). The planning requirements, including plan update requirements, are identified in their appropriate sections throughout this plan.

In addition to meeting the Local Mitigation Plan requirements of the DMA 2000, this plan also addresses the Local Flood Mitigation Plan requirements of the Flood Mitigation Assistance (FMA) grant program. The FMA grant program was created pursuant to Section 1366 of the National Flood Insurance Act of 1968 (42 USC 4104c) as amended by the National Flood Insurance Reform Act of 1994 (Public Law 103-325) and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (Public Law 108-264). The goal of the FMA grant program

is to reduce or eliminate flood insurance claims under the National Flood Insurance Program (NFIP). Particular emphasis for this program is placed on mitigating Repetitive Loss (RL) properties.

The new Local Plan Update FEMA crosswalk, which documents compliance with 44 CFR for both the Local Mitigation Plan and the Flood Mitigation Plan requirements, is provided in Appendix A.

1.3 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

Currently, five FEMA grant programs provide funding to local entities that have a FEMA-approved Local Mitigation Plan that meet the Flood Mitigation Plan requirements. Two of the grant programs are authorized under the Stafford Act and DMA 2000, and the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act.

1.3.1 Stafford Act Grant Programs

Hazard Mitigation Grant Program (HMGP): The HMGP provides grants to state, local, and tribal entities to implement long-term hazard mitigation measures after declaration of a major disaster. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem (for example, elevation of a home to reduce the risk of flood damage rather than buying sandbags and pumps to fight the flood). Also, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. Under the program, the Federal government may provide a state or tribe with up to 20 percent of the total disaster grants awarded by FEMA; and may provide up to 75 percent of the cost of projects approved under the program.

Pre-Disaster Mitigation (PDM) Program: The PDM Program provides funds to state, local, and tribal entities for hazard mitigation planning and the implementation of mitigation projects before a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, the potential savings of a PDM project must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In fiscal year (FY) 2008, Congress appropriated $100M for PDM grants. The Federal government provides up to 75 percent of the cost of projects approved under the program.

1.3.2 National Flood Insurance Act Grant Programs

Flood Mitigation Assistance (FMA) Grant Program: As noted above, the goal of the FMA Grant Program is to reduce or eliminate flood insurance claims under the NFIP. This program places particular emphasis on mitigating RL properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of

grants: Planning, Project, and Technical Assistance. Project grants, which use the majority of the program's total funding, are awarded to local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. In FY 2008, FMA funding totaled $30 million. The cost-share for this grant is 75 percent federal/25 percent nonfederal. However, a cost-share of 90 percent federal/10 percent nonfederal is available in certain situations to mitigate severe repetitive loss (SRL) properties.

Repetitive Flood Claims (RFC) Program: The RFC Program provides funding to reduce or eliminate the long-term risk of flood damage to residential and non-residential structures insured under the NFIP. Structures considered for mitigation must have had one or more claim payments for flood damages. In FY 2008, Congress appropriated $10 million for the implementation of this program. All RFC grants are eligible for up to100 percent federal assistance.

Severe Repetitive Loss (SRL) Program: The SRL Program provides funding to reduce or eliminate the long-term risk of flood damage to residential structures insured under the NFIP. Structures considered for mitigation must have had at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claim payments exceeds $20,000; or for which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any 10-year period. Congress has authorized up to $40 million per year from FY 2005–FY 2009. The cost-share for this grant is 75 percent federal/25 percent nonfederal. However, a cost-share of 90 percent federal/10 percent nonfederal is available to mitigate SRL properties when the state or tribal plan addresses ways to mitigate SRL properties.

1.4 HAZARD MITIGATION PLAN DESCRIPTION

The remainder of this 2008 HMP consists of the sections and appendices described below.

1.4.1 Section 2: Prerequisites

Section 2 addresses the prerequisites of plan adoption.

1.4.2 Section 3: Community Description

Section 3 provides a general history and background of San Francisco, including historical trends for population and the demographic and economic conditions that have shaped the area. A location figure of San Francisco and the Bay Area is provided in Appendix C.

1.4.3 Section 4: Planning Process

Section 4 describes the plan update process, including changes made to the 2005 Multi-Jurisdictional Local Government Hazard Mitigation Plan for the San Francisco Bay Area: City and County of San Francisco Annex (hereafter referred to as the 2005 HMP). This section identifies members of the Hazard Mitigation Planning Team (Planning Team), the meetings held as part of the planning process (Appendix D), and the URS Corporation consultants (hereafter referred to as the consultants). This section also documents public outreach activities (attached as

Appendix E) and the review and incorporation of relevant plans, reports, and other appropriate information.

1.4.4 Section 5: Hazard Analysis

Section 5 describes the process through which the Planning Team identified, screened, and selected the hazards to be profiled in the 2008 HMP. The hazard analysis includes the nature, history, location, extent, and probability of future events for each hazard. Extra detail is given to the flood hazard profile to meet the FMA planning requirements. Historical and location hazard figures are provided in Appendix C.

1.4.5 Section 6: Vulnerability Analysis

Section 6 identifies potentially vulnerable assets — people, residential, nonresidential, and mixed use building structures, critical and non-critical facilities, major utilities, and transportation systems — in the County limits of San Francisco. For this version of the plan, City-owned assets located outside of the County limits were not included. This data was compiled by assessing the potential impacts from each hazard using Geographic Information System (GIS) data. The resulting information identifies the full range of hazards that San Francisco could face and the potential social impacts, damages, and economic losses.

1.4.6 Section 7: Capability Assessment

Section 7 identifies and evaluates human and technical, financial, and legal and regulatory resources available for hazard mitigation within San Francisco. In addition, this section lists current, ongoing, and completed mitigation projects and programs within the City.

1.4.7 Section 8: Mitigation Strategy

The mitigation strategy (Section 8) provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Planning Team reviewed and revised the 2005 HMP's mitigation goals and potential actions to create a list of over two-dozen new mitigation projects. Through an evaluation and prioritization process described in this chapter, the Planning Team selected high-priority projects to be included in the implementation strategy.

1.4.8 Section 9: Plan Maintenance

Section 9 describes the formal plan maintenance process to ensure that the 2008 HMP remains an active and applicable document. The process includes monitoring, evaluating, and updating the 2008 HMP (Appendix G); implementation through existing planning mechanisms; and continued public involvement.

1.4.9 Section 10: References

Section 10 lists the reference materials used to prepare the 2008 HMP.

1.4.10 Appendix A

Appendix A provides the FEMA crosswalk, which documents compliance with 44 CFR for both the Local Mitigation Plan requirements and the Flood Mitigation Plan requirements.

1.4.11 Appendix B

Appendix B provides the Adoption Resolution.

1.4.12 Appendix C

Appendix C includes the figures that identify known hazard areas, previous hazard occurrences, population density, building stock, critical and non-critical facilities, major utilities, and transportation systems.

1.4.13 Appendix D

Appendix D contains the Planning Team meeting information for meetings #1, #2, and #3.

1.4.14 Appendix E

Appendix E provides public outreach information, including information posted on DEM's website and the Disaster Preparedness Coordinators' Meeting presentation.

1.4.15 Appendix F

Appendix F lists the name and neighborhood of each public asset included in the vulnerability analysis.

1.4.16 Appendix G

Appendix G provides the plan maintenance documents.

1.4.17 Appendix H

Appendix H provides an electronic version of the 2008 HMP on a CD.

2.1 ADOPTION BY LOCAL GOVERNING BODY AND SUPPORTING DOCUMENTATION

The requirements for the adoption of this HMP by the participating local governing body, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PREREQUISITES

Adoption by the Local Governing Body

Requirement §201.6(c)(5): [The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

Element

- Has the local governing body adopted the new or updated plan?
- Is supporting documentation, such as a resolution, included?

Source: FEMA 2008.

The City and County of San Francisco meets the requirements of Section 409 of the Stafford Act and Section 322 of the DMA 2000.

The Board of Supervisors of the City and County of San Francisco adopted the 2008 HMP by resolution on December 9, 2008. Mayor Gavin Newsom approved the foregoing resolution on December 16, 2008. A scanned copy of the resolution is included in Appendix B, Adoption Resolution.

This section describes the location, geography, and history; demographics; and land use development trends of the City and County of San Francisco (hereafter referred to as the City or San Francisco).

3.1 LOCATION, GEOGRAPHY, AND HISTORY

San Francisco is located on the coast of Northern California. It forms the northern tip of a peninsula lying between the San Francisco Bay and the Pacific Ocean and is bordered by the Pacific Ocean to the west, the San Francisco Bay to the north and east, and by San Mateo County to the south. San Francisco is approximately 350 miles northwest of Los Angeles and approximately 300 miles south of the California-Oregon border. The City occupies approximately 47 square miles. . Elevations in San Francisco range from sea level at the Pacific Ocean to over 927 feet at the top of Mount Davidson, near the center of San Francisco.

San Francisco's climate is temperate and Mediterranean, characterized by moist mild winters and dry summers. The varied topography and marine surroundings provide for a spectrum of microclimates within the county borders. Fog is common in San Francisco, particularly in the western areas. Temperatures usually range between 40 and 70 degrees Fahrenheit.

The region around San Francisco Bay (hereafter referred to as the Bay) was first inhabited by indigenous peoples between 10,000 and 20,000 years ago by indigenous peoples now known as the Ohlone, though at the time, no single unified group by such a name existed. Rather, about 40 culturally distinct groups of native hunter-gathers lived throughout the area. The group that lived in what is today San Francisco was the Yelamu, many of which became involved with the Spanish Mission of San Francisco de Asis in the late 1700s.

In 1769, Spanish explorers on an expedition led by Jose Francisco Ortega discovered the mouth of the San Francisco Bay, now known as the Golden Gate. In 1776, a Spanish expedition led by Juan Bautista de Anza reached what is today the open space area known as the Presidio. In that same year, Spanish explorers established the Mission of San Francisco de Asis (also known as the Mission Dolores).

Following the Mexican War of Independence, between 1810 and 1821, Mexico, which at the time included San Francisco and much of the southwestern United States, gained independence from Spain. In 1846, Mexico and the United States became engaged in the Mexican-American War, which resulted in the United States taking control, from Mexico, of a portion of California that included San Francisco. At the time, present-day San Francisco was known as Yerba Buena, but was renamed San Francisco by the Chief Magistrate in 1846.

In 1848, gold was discovered in California, precipitating a mass migration of Americans westward. The development of institutions after this migration contributed to the California Legislature establishing counties in California, including San Francisco in 1850. The San Francisco County government was established on April 1, 1850, and City of San Francisco was incorporated on April 15, 1850. The Consolidation Act of 1856 mandated the combination of the City and County into the single geographic and political unit that exists today.

3.2 GOVERNMENT

Under the 1996 Charter, the San Francisco government consists of two equal branches, the legislative branch and the executive branch. The legislative branch consists of an 11-member Board of Supervisors. Each member is elected by a majority vote of residents of the district he or she represents. Because San Francisco is both a city and county, the Board of Supervisors also serves as a city council. The Board of Supervisors is headed by a President of the Board, who appoints members of Board committees.

The executive branch of San Francisco consists of the Mayor of San Francisco, who serves as the chief executive officer and official representative of the City and County, as well as various commissions and departments. The Mayor has responsibility for general administration and oversight of all departments and governmental units in San Francisco. The Mayor also frequently appoints members to City commissions, though the Board of Supervisors sometimes plays a role in such appointments.

3.3 ECONOMY

San Francisco is both a worldwide tourist destination and a global finance center. Over 30 international financial institutions and some of the largest banks in the United States are based in San Francisco. In 2007, San Francisco's tourism industry generated $8.2 billion and attracted 2.3 million visitors. The 9-county San Francisco Bay Area (hereafter referred to as the Bay Area) thrives on international trading and shipping. The Port of Oakland is one of the largest ports on the West Coast, and in combination with three airports and eight other ports in the area, the Bay Area handles nearly 30 percent of West Coast trade. The San Francisco International Airport, the ninth largest in the United States and the fourteenth largest in the world, contributes significantly to trade, shipping, and tourism in the Bay Area.

South of San Francisco, Silicon Valley, which is located in the Bay Area's Santa Clara County, serves as a national and international center for the high-technology industry. San Francisco's economy has become increasingly linked to that of Silicon Valley. Closely connected to the high-technology sector, medical science and medical technology also play an important part in the economy of San Francisco and the Bay Area. Nearly one-third of total worldwide biotechnology workers are employed in San Francisco and the Bay Area. San Francisco's Mission Bay area has become a center for high-technology medical sciences and is the site of a major new biomedical research campus of the University of California, San Francisco. The headquarters of the California Institute for Regenerative Medicine, an agency funding stem cell research, is also located in Mission Bay.

3.4 DEMOGRAPHICS

According to the United States Census Bureau (Census), San Francisco's population in 2000 was 776,733. According to the 2000 Census, 1 percent of San Franciscans were under 5 years of age, 85.5 percent were18 years old or over, and 13.7 percent were 65 years old or over. The median age in San Francisco in 2000 was 36.5 years.

The 2000 Census recorded San Francisco's racial composition as follows: 49.7 percent White; 7.8 percent Black or African American; 0.4 percent American Indian and Alaska Native; 30.8

percent Asian, 0.5 percent Native Hawaiian and Other Pacific Islander, 6.5 percent some other race; 4.3 percent two or more races; and 14.1 percent Hispanic or Latino.

The 2000 Census found the San Francisco's labor force to consist of 448,669 individuals. San Francisco's unemployment rate in 2000 was 3.0 percent. The Census reported the median income in San Francisco in 1999 to be $63,545 and the 1999 per capita income to be $34,556. About 7.8 percent of San Francisco families and 11.3 percent of individuals were reported to be living below the poverty level in 2000.

Social Compact, a not-for-profit corporation promoting investment in low-income communities, worked with San Francisco to prepare a market and demographic analysis of its 12 neighborhoods. According to Social Compact's extrapolations, San Francisco's 2007 population was 846,515. Social Compact found the median income in San Francisco in 2007 to be $93,771. The City believes that these numbers more accurately reflect San Francisco's population than 2007 Census population estimates and therefore the Social Compact population estimations are used in this 2008 HMP.

This section describes the original planning efforts; details how the plan was updated and who was involved in this process; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop the 2008 HMP. Additional information regarding the Planning Team meetings and public outreach efforts is discussed below and provided in more detail in Appendix D, Planning Team Meetings, and Appendix E, Outreach Information.

The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PLANNING PROCESS

Documentation of the Planning Process
Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the new or updated plan provide a narrative description of the process followed to prepare the plan?
- Does the new or updated plan indicate who was involved in the current planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan indicate that an opportunity was given for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan indicate for each section whether or not it was revised as part of the update process?

Source: FEMA 2008.

4.1 INITIAL PLANNING PROCESS, 2004–2005

As noted previously, the initial basis for this plan was the base plan of 2005 HMP. The base plan was prepared by the Association of Bay Area Governments (ABAG). Plan development occurred over a 9-month period, from June 2004–April 2005. To kick off the planning process, ABAG held a series of forums across the Bay Area. At the San Francisco forum, held on June 1, 2004, policy, planning, building, public works, and emergency management staff were invited to learn about DMA 2000, the multi-jurisdictional plan and annexes, a GIS-based hazard identification and risk assessment, and the mitigation projects to include in a community annex.

Over the next 4 months, ABAG staff reviewed existing technical reports and studies as a basis for the hazard assessment, exposure, and vulnerability portion. ABAG staff also prepared 53 online GIS hazard maps. Next, ABAG drafted goals, policies, and 50 mitigation projects (based on existing HMGP projects) and presented this information to ABAG's Regional Planning Committee in September 2004. In addition, ABAG drafted an outline of mitigation strategies and circulated the strategies to all participating local government agencies for comment.

ABAG distributed the Draft Local HMP at the ABAG General Assembly conference on "Taming Natural Disasters" on October 6, 2004. Between October and November 2004, ABAG presented the draft plan at several existing Bay Area workshops and forums. Comments received from the general public, participating jurisdictions, the OES, and FEMA were incorporated into the draft plan by late January 2005. ABAG's Executive Board adopted the base plan of the 2005 HMP on March 17, 2005. The San Francisco Board of Supervisors adopted the 2005 HMP on April 12, 2005, and Mayor Gavin Newsom approved the adoption resolution on April 15, 2005.

4.2 PLAN UPDATE PROCESS, 2008

As required by DMA 2000, a local HMP must be updated every 5 years or when substantial changes are made to the plan. In mid-2007, DEM decided that the plan warranted an update, as DEM determined that additional hazards and mitigation projects needed to be addressed in the plan. As such, DEM invited several City departments and agencies as well as the San Francisco Community Agencies Responding to Disaster to participate as Planning Team members for the 2008 HMP update. All Planning Team members that contributed to this plan update process are listed in Table 4-1.

Table 4-1 Hazard Mitigation Planning Team

Name	Department or Agency	Key Input
Lt. Babe Franey	DEM	Point of Contact
Laura Adleman	DEM	Public outreach
Cynthia Chono	DPW	Hazard selection
David Copeland	SFPUC	Mitigation projects
Herb Dang	SFPUC	City assets, stormwater ponding information, GIS
Lucas Eckroad	DEM	Planning team coordination, DEM website
Gary Hoy	DPW	DPW assets and projects
Matt Hansen	Risk Management Program	Replacement values for assets, mitigation projects
Jonas Ionin	Planning	Public assets, GIS, mitigation projects
Raymond Lui	DBI	Public assets
John Rodgers	SFPUC	City assets, UMBs, GIS
Sidonie Sansom	Port	Port assets and projects
Brian Strong	DPW	DPW assets and projects

Table 4-1 Hazard Mitigation Planning Team

Name	Department or Agency	Key Input
Jack Sylvan	Economic & Workforce Development	Mitigation projects
Vernon Takasuka	DBI	Public assets, UMBs, GIS
Adam Van de Water	Capital Planning Program	City assets, mitigation projects
Linda Yeung	Office of City Administrator	NFIP, mitigation projects

DBI = Department of Building Inspection, DPW = Department of Public Works, SFPUC = San Francisco Public Utilities Commission
UMB = unreinforced masonry building

On April 21, 2008, DEM held the first Planning Team meeting to begin the plan update process. As shown in Appendix D, Planning Team Meetings, the consultants and DEM familiarized the Planning Team with the DMA 2000, the plan update process, the plan outline, and the plan schedule. The Planning Team also assessed a matrix of hazards addressed in other City plans, including 1996 General Plan, 2005 HMP, and 2008 Emergency Response Plan (ERP), as well as state and Presidentially declared disasters within San Francisco. Using this information, the Planning Team developed a preliminary list of hazards to be profiled in the new plan. In addition, the Planning Team reviewed a list of assets included in the 2005 HMP and determined additional assets to be addressed in the 2008 HMP.

At the end of the meeting, the consultants and DEM handed out copies of the 2005 HMP and asked the Planning Team to review the plan and provide feedback to the consultants and DEM about what they would like to see included in the updated version of the plan.

As such, on May 1, the consultants emailed the Planning Team with the finalized list of hazards to be profiled, assets to be analyzed, and a synopsis of the recommended changes to be made to the plan. A summary of these plan update findings is shown in Table 4-2.

Table 4-2 Summary of Initial Update Findings

2005 HMP	Actions Needed to be Taken
Adoption Annex	• Rename as “Prerequisites” section. • Adopt the 2008 HMP by the Board of Supervisors, with approval from the Mayor.
Introduction	• Rename as “Community Description” section. • Update demographic information. • Include history, government, and economy information.
Planning Process	• Create a Planning Team. • Determine hazards to be profiled and assets to be analyzed. • Develop a public outreach strategy. • Incorporate other existing City plans and reports into 2008 HMP. • Document entire plan update process.

Table 4-2 Summary of Initial Update Findings

2005 HMP	Actions Needed to be Taken
Hazard and Risk Assessment	• Rename as "Hazards Analysis" and "Vulnerability Analysis" sections. • Update hazards and assets, per discussion at Planning Team meeting #1 and subsequent emails. • Update hazards profiled in the 2005 HMP. Utilize various hazard data sources to determine recent historical events, new hazard areas, and new subhazards. • Update the asset lists to include critical facilities, non-critical facilities, major utilities, and transportation systems. • Conduct vulnerability analysis, using updated asset and hazard information, interpret analysis, and discuss new findings. • Meet with the Planning Team to discuss vulnerability analysis findings. • Remap hazard areas and asset locations in GIS.
Mitigation Activities and Priorities	• Rename as "Mitigation Strategy" section. • Develop a "Capability Assessment" section. • Review and document all local legal and regulatory, administrative and technical, and financial resources available for hazard mitigation. • Meet with the Planning Team to determine if the 2005 HMP goals are still relevant. • Revise the list of mitigation actions in the 2005 HMP. • Develop a comprehensive list of new mitigation actions from various City agencies and departments. • Develop a new mitigation action evaluation/prioritization process. • Determine the implementation strategy for selected mitigation actions.
Plan Monitoring, Evaluation, and Updating Process	• Rename as "Plan Maintenance" section. • Create a DEM and Planning Team monitoring and evaluation process. • Create a 5-year update process. • Create a public input process.

During the second meeting held on June 25, the consultants and DEM presented the Planning Team with the draft hazard and asset figures, the draft asset list, and the draft vulnerability analysis (Appendix D, Planning Team Meetings). The Planning Team commented on progress made-to date, such as critical and non-critical assets listed in the plan. At the end of the meeting, the consultants distributed information about the mitigation strategy, including previously funded mitigation projects and FEMA mitigation project criteria. Each Planning Team member was asked to submit mitigation project ideas to the consultants on behalf of their department or agency prior to the third Planning Team meeting.

On July 14, a third Planning Team meeting was held to develop the mitigation strategy. As shown in Appendix D, Planning Team Meetings, the Planning Team reviewed and revised a list of potential mitigation projects submitted by various departments and agencies and the consultants. The Planning Team reviewed different evaluation criteria, such as cost-benefit, local champion, and funding availability to develop a list of high-priority projects. The Planning Team determined that all high-priority projects would be listed in the implementation strategy. After this meeting, departments with high-priority projects submitted detailed project information, including a project timeline, details of project funding, and details of project administration, to the consultants to include in the implementation strategy.

On August 7, the consultants led a presentation about the 2008 HMP update at the City's Disaster Preparedness Coordinators' Meeting. Per the Mayor's Executive Directive 06-01, issued May 10, 2006, the Disaster Preparedness Coordinators are a group of senior department and agency staff who are responsible for coordinating emergency preparedness activities within their respective departments. Specifically, this group is tasked with the implementation of the City's All-Hazard Strategic Plan and meets monthly to review ongoing emergency preparedness efforts, assess progress, and plans next steps in the implementation process. Besides City staff, DEM invited emergency management staff from neighboring Marin, Alameda, and San Mateo counties to attend the meeting and comment on progress made-to-date.

In mid-August, the Planning Team reviewed and commented on the Administrative Draft Plan. The consultants addressed and incorporated these comments into the next draft plan, the Public Draft Plan. As noted in Section 4.4, DEM posted the Public Draft HMP on its website for a 30-day public comment period. Subsequently, DEM sent the Public Draft Plan to the OES and FEMA for a courtesy review.

4.3 PUBLIC OUTREACH

Shortly after the planning process began, the consultants and DEM developed a 2008 HMP public outreach strategy. The two-pronged strategy focused on efforts made during the planning phase and efforts made during the drafting phase. For the first half of the strategy, DEM sought public input regarding the hazards to be profiled in the 2008 HMP. The 2005 HMP addressed eight natural hazards; the 2008 HMP addresses an additional six natural hazards (reservoir failure, coastal flooding, stormwater ponding, heat, landslides, and wind) and four human-caused hazards (hazardous material, Weapon of Mass Destruction [WMD], energy supply, and terrorism). The DEM posted several of the new hazard maps on its website for public review and comment as the plan was developed (Appendix E, Outreach Information). DEM did not receive any public comments regarding the types of hazards to be addressed in the plan or the hazard figures developed for the plan.

For the second half of the public outreach strategy, DEM sought input on the Public Draft Plan. As such, DEM posted the Public Draft Plan on its website for public comment from September 5 to October 5 (Appendix E, Outreach Information).

4.4 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the planning process, the consultants reviewed and incorporated information from existing plans, studies, and reports into the 2008 HMP. The state and City plans integrated into this document are listed below. A complete list of the sources consulted is provided in Section 10.

San Francisco Emergency Response Plan (2008): The Hazards identified in the ERP provided a basis for the hazards selected for the 2008 HMP.

San Francisco General Plan, Community Safety Element (1997): The hazards identified in the 1997 Community Safety Element provided hazard profile information for seismic hazards (ground shaking and ground failure) and inundation hazards (tsunami and flooding).

San Francisco General Plan, Area Plans (1989–2008): The land use and development trends identified in the Area Plans provided guidance for development trends identified in the 2008 HMP's vulnerability analysis.

SFPUC Stormwater Management Plan (2003–2004): The Stormwater Management Plan provided hazard information for the 2008 HMP's stormwater ponding hazard profile.

San Francisco Building Codes: These codes regulate new construction and major remodels/additions; they were used to develop the capability assessment.

State of California Multi-Hazard Mitigation Plan (2007): This plan, prepared by OES, was consulted to ensure that the hazard profiles and mitigation strategy in the 2008 HMP are consistent with state hazard profiles and the state's mitigation strategy..

California Department of Conservation, Division of Mines and Geology, Seismic Hazard Zone Report for the City and County of San Francisco (2000): This report provided information about the seismic hazard zone maps and the potential for ground shaking, liquefaction, and landslides in San Francisco.

A hazard analysis includes the identification and screening of each hazard and subsequently the profiling of each hazard. Hazard identification is the process of recognizing the natural and human-caused events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of significant size and destructive power. Human-caused hazards result from human activity and include technological hazards and terrorism. Technological hazards are generally accidental or result from events with unintended consequences (for example, an accidental hazardous materials release). Terrorism is defined as the calculated use of violence (or threat of violence) to attain goals that are political, religious, or ideological in nature. Even though a particular hazard may not have occurred in recent history in the study area, all hazards that may potentially affect the study area are considered; the hazards that are unlikely to occur or for which the risk of damage is accepted as being very low, are eliminated from consideration.

Hazard profiling is accomplished by describing hazards in terms of their nature, history, location, extent, and probability. Hazards are identified through the collection of historical and anecdotal information, review of existing plans and studies, and preparation of hazard maps of the study area. Hazard maps are used to determine the geographic extent of the hazards and define the approximate boundaries of the areas at risk.

5.1 HAZARD IDENTIFICATION AND SCREENING

The requirements for hazard identification, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Identifying Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

Element

- Does the new or updated plan include a description of all of the types of all natural hazards that affect the jurisdiction?

Source: FEMA 2008.

For the first step of the hazard analysis, the Planning Team developed a list of all types of natural and human-caused hazards, including the hazards identified in the City's 2005 HMP, General Plan, and ERP. Next, as shown in Table 5-1, the Planning Team evaluated and screened this comprehensive list of potential hazards based on a range of factors, including prior occurrence (Presidentially-declared and state-declared emergencies and disasters that have occurred in the Bay Area over the past 20 years), perception of the relative risk presented by each hazard, and the ability to mitigate each hazard.

Table 5-1 Identification and Screening of Hazards

Hazard Type	Subhazard	State Proclamation	Presidential Declaration	Identified in ERP, General Plan, 2005 HMP	Hazard to be Profiled in 2008 HMP*
Avalanche					No
Civil Unrest		Unknown (1966)		ERP	No
Coastal Erosion					No
Dam Failure					Yes, as a Reservoir Failure
Drought		Unknown (2008)		2005 HMP	Yes
Energy Emergency/Power Disruption		GP-2001 (2001)		ERP	Yes
Expansive Soil					No
Flood		GP-96-01 (1996) Unknown (1958)	1203-DR (1998) 1046-DR (1995) (1958)	General Plan, 2005 HMP	Yes
Hailstorm					No
Hazardous Material Event				General Plan, ERP	Yes, as a Human-Caused Hazard
Heat					Yes
Hurricane					Yes
Infectious Disease				ERP	No
Land Subsidence					No
Landslide				General Plan, 2005 HMP	Yes
Oil Spill		Unknown (2007)		ERP	Yes, as a Hazardous Material Event

Table 5-1 Identification and Screening of Hazards

Hazard Type	Subhazard	State Proclamation	Presidential Declaration	Identified in ERP, General Plan, 2005 HMP	Hazard to be Profiled in 2008 HMP*
Seismic	Ground Shaking		845-DR (1989)	General Plan, ERP, 2005 HMP	Yes
	Liquefaction		845-DR (1989)	General Plan, ERP, 2005 HMP	Yes
	Lateral Spread		845-DR (1989)		Yes, as part of a Earthquake-Induced Landslide
	Earthquake-Induced Landslide			General Plan, ERP, 2005 HMP	Yes
Reservoir Failure				General Plan, ERP	Yes, as a Other Hazard
Snow					No
Transportation Disruption				ERP	No
Terrorism/WMDs				ERP	Yes, as a Human-Caused Hazard
Tornado					No
Urban Conflagration				General Plan, ERP	Yes, as a Other Hazard
Volcano					No
Tsunami				General Plan, ERP, 2005 HMP	Yes, as a Seismic Hazard
Wildfire				ERP, 2005 HMP	Yes
Wind		GP-96-01 (1996)	1203-DR (1998)	General Plan	Yes

ERP = Emergency Response Plan,, HMP = Hazard Mitigation Plan, WMD = Weapon of Mass Destruction.

Presidential declared disaster since 1988 are indicated by disaster number.

* A description, including nature, history, location, extent, and probability, of each hazard selected to be profiled in the 2008 HMP is provided in Section 5.2.

The Planning Team determined that the following hazard groups pose the greatest threat to San Francisco:

Seismic hazards

- Ground shaking
- Ground failure (landslide and liquefaction)
- Tsunami

Weather-related hazards

- Drought
- Flood (coastal and stormwater ponding)
- Heat
- Landslide
- Wildfire
- Wind

Other hazards

- Reservoir failure
- Urban conflagration
- Human-caused (hazardous material, WMD, energy supply, and terrorism)

The remaining hazards excluded through the screening process were considered to pose a lower threat to life and property in San Francisco due to the low likelihood of occurrence or the low probability that life and property would be significantly affected. Should the risk from these hazards increase in the future, the 2008 HMP can be updated to incorporate vulnerability analyses for these hazards.

Section 5.2 provides a detailed description of each hazard that affects San Francisco.

5.2 HAZARD PROFILE

The requirements for hazard profiles, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Profiling Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Element

- Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?
- Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?
- Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?
- Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?

Source: FEMA 2008.

The specific hazards selected by the Planning Team for profiling have been examined in a methodical manner based on the following factors:

- Nature
- History
- Location
- Extent and probability of future events

The hazards profiled for San Francisco are presented in the rest of Section 5.3 in the following order: seismic hazards, weather-related hazards, and other hazards. The order of presentation does not signify the level of importance or risk.

5.2.1 Seismic Hazards

For this 2008 HMP update, seismic hazard profiles are provided for ground shaking and ground failure.

5.2.1.1 Ground Shaking

Nature

An earthquake is generally a result of displacement along a geologic fault resulting in the release of accumulated strain. The effects of large earthquakes can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and, after just a few seconds, can cause significant damage and extensive casualties. The most common effect of earthquakes is ground

motion, or the shaking of the ground during an earthquake. Ground shaking is caused by seismic waves traveling in the earth's interior or along the earth's surface.

The severity of an earthquake can be expressed in terms of intensity. Intensity is based on the effects and damage and observed effects on people to the natural and built environment. It varies from place to place, depending on the location with respect to the earthquake fault rupture. The intensity generally increases with the amount of energy released, which is proportional to the size of the earthquake, and decreases with distance from the causative fault.

The scale most often used to measure intensity is the Modified Mercalli (MM) intensity scale. As shown in Table 5-2, the MM intensity scale consists of 12 increasing levels that range from imperceptible to catastrophic destruction. With the advent of modern instrumentation, ground shaking intensity can be quantitatively measured. It is measured in terms of acceleration, velocity, or displacement. Peak ground acceleration (PGA) is a common ground motion parameter used by engineers. It measures the earthquake's intensity by quantifying how hard the earth shakes in a given location. PGA is measured in units of the gravitational rate of acceleration (1 g = 980 centimeters/second^2). Magnitude (M) is the measure of the earthquake's size and is often based on the amplitude of the earthquake waves recorded on instruments. The first magnitude scale was the Richter local magnitude scale. The magnitude scale used by seismologists is the moment magnitude (M) scale. Table 5-2 shows an approximate correlation between M, MM intensity, GPA in g's, and the perceived shaking.

Table 5-2 Magnitude/Intensity/Ground-Shaking Comparisons

Magnitude (M)	MM Intensity	PGA (% *g*)	Perceived Shaking
0–4.3	I	<0.17	Not Felt
	II-III	0.17–1.4	Weak
4.3–4.8	IV	1.4-–3.9	Light
	V	3.9–9.2	Moderate
4.8–6.2	VI	9.2–18	Strong
	VII	18–34	Very Strong
6.2–7.3	VIII	34–65	Severe
	IX	65–124	Violent
	X	124+	Very Violent
7.3–8.9	XI		
	XII		

Source: USGS 2004.

History

Historically, the San Andreas fault system is the most active fault system in the state; this fault system is capable of generating very strong earthquakes of M 7.0 or greater. The last major earthquake on the northern portion of the fault occurred in 1906. Known as the Great San Francisco earthquake, the event lasted 45 to 60 seconds and was in the range of M 7.7 to 8.2. As shown on Figure C-4 (Appendix C, Figures) the San Andreas fault and other regional faults, including the Hayward fault, have generated 326 recorded M 4.0 or greater earthquakes since 1800. Of these recorded earthquakes, three earthquakes (1838, 1906, and 1989) registered at a M 7.0 or greater.

Location

San Francisco is exposed to seismic hazards from numerous known faults and potentially unmapped or undiscovered faults. Most of the major faults in the Bay Area are strike-slip faults, where the rupture plane is oriented generally vertically and the ground on one side of the fault slips horizontally relative to the other. The Bay Area also has several thrust or reverse faults, where ground moves upward and over adjacent ground. As noted earlier, the most active strike-slip faults in the region are the San Andreas fault, which has ten different fault segments; and the Hayward fault, which has three fault segments, including the Rodgers Creek fault. No known active faults are present within the San Francisco County limits. Table 5-3 lists the major regional faults and their locations and lengths

Table 5-3 Major Known Faults in the San Francisco Bay Area

Fault Source	Location	Total Length (miles)
San Andreas	Coastal California	621
Hayward/Rodgers Creek	Alameda, Contra Costa, Marin, and Sonoma counties	27/19
Calaveras	Alameda, Contra Costa counties	37
Concord/Green Valley	Alameda, Contra Costa, Solano, Santa Clara counties	6/ 11
Greenville Fault	Alameda, Contra Costa, Santa Clara counties	58
San Gregorio	Marin, Monterey, San Mateo, Santa Cruz counties	54
Mt. Diablo Thrust	Contra Costa County	8

Source: USGS 2003.

Extent and Probability of Future Events

As noted earlier, the severity or extent of an earthquake can be expressed in terms of the MM intensity. Figures C-5 and C-6 (Appendix C, Figures) show the shaking intensity areas for a M 7.9 earthquake on the northern segment of the San Andreas Fault (such an event would be similar to the 1906 earthquake) and a M 6.9 earthquake on the northern segment of the Hayward Fault. Figure C-5 shows that all of San Francisco is susceptible to very strong to severe shaking. Figure C-6 shows areas subject to very strong shaking include the Lake Merced area, Treasure Island, and the Marina District, North Waterfront, Financial District North, Financial District South, SOMA, Mission Bay, South Beach, Potrero Hill, Bayview District, and Hunters Point neighborhoods. San Francisco will likely experience a significant earthquake from one of the known major faults. In 2003, the Working Group on California Earthquake Probabilities determined that a 62 percent chance exists that a major earthquake (M equal to or greater than 6.7) will strike the nine-county Bay Area region over a 30-year period (2002–2031) along one of the seven fault systems identified in the study. The results of this study are shown in Table 5-4.

Table 5-4 Probabilities of One or More Major Earthquakes in the San Francisco Bay Region

Source Fault	Probability
Bay Area Region	0.62
San Andreas	0.21
Hayward/Rodgers Creek	0.27
Calaveras	0.11
Concord/Green Valley	0.04
San Gregorio	0.10
Greenville	0.03
Mt. Diablo Thrust	0.03

Source: USGS 2003.

Note: Major earthquakes are equal to or greater than M 6.7.

5.2.1.2 Ground Failure

Liquefaction

Nature

Liquefaction occurs when earthquake waves pass through a saturated granular soil layer, distort its granular structure, and cause some of its pore spaces to collapse. The collapse of the granular structure increases pore space water pressure, and decreases the soil's shear strength, causing ground rupture, sand boils, ground subsidence, and lateral displacement of the ground.

History

The United States Geological Survey (USGS) has mapped liquefaction occurrences in San Francisco for the earthquakes occurring in the following years: 1838, 1852, 1865, 1868, 1906, 1954, and 1989. Detailed liquefaction maps for the 1906 earthquake show very high liquefaction-susceptible areas along the ocean front, bay front, Treasure Island, and the South of Market (SOMA), Downtown, and South Financial District neighborhoods. Detailed liquefaction maps for the 1989 earthquake show the same areas as those affected by the 1906 earthquake and in addition show the Marina District. The Marina District experienced little liquefaction in 1906 because much of the area was still part of the Bay (i.e., it had not yet been filled).

Location

As shown on Figure C-7 (Appendix C, Figures), the California Geological Survey (CGS) has mapped areas of liquefaction potential, as required by the Seismic Hazard Mapping Act of 1990. Liquefiable soils in San Francisco are generally found in filled areas along the bay front, former bay inlets, and sandy low-lying areas along the ocean front. Areas subject to liquefaction include the Lake Merced area, Treasure Island, and the Marina District, North Waterfront, Financial

District North, Financial District South, SOMA, Mission Bay, South Beach, Potrero Hill, Bayview District, and Hunters Point neighborhoods.

Extent and Probability of Future Events

As noted previously, liquefaction can cause ground rupture, sand boils, ground subsidence, and lateral and vertical displacement of the ground. In the 1989 Loma Prieta earthquake, liquefaction in the Marina District caused vertical settlement, lateral displacement of buildings, buckling of sidewalks, cracking of asphalt pavement, and breaking of water pipes and gas lines. Over 70 sand boils were reported in garages and backyards, with some sand boils reaching nearly 4-feet deep.

Because San Francisco includes areas where ground conditions are prone to liquefaction, the City will likely experience liquefaction during the next major earthquake. As noted earlier, scientists have determined that a 62 percent chance exists that a major earthquake will strike along one of the seven regional fault systems over a 30-year period (2002–2031).

Earthquake-Induced Landslide

Nature

Landslide is a general term for the dislodgment and fall of a mass of soil or rocks along a sloped surface or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, lateral spreads, and slump-earth flows. Earthquake-induced landslides occur as a result of ground shaking. The most common earthquake-induced landslides include shallow rock falls, disrupted rock slides, and disrupted slides of earth and debris.

History

USGS records show that localized damage in the San Francisco Bay Area due to earthquake-induced landslides has been recorded since 1838 for at least 20 earthquakes. The 1906 earthquake generated more than 10,000 landslides throughout the region, killing 11 people and causing substantial damage to buildings and infrastructure. The most significant landslides caused by the 1989 earthquake were located in the Santa Cruz Mountains. However, landslides from this event were reported in San Francisco and as far north as Marin County.

Location

According to CGS, steep slopes on hills and cliffs and intermediate slopes with previous landslide deposits are highly susceptible to landsliding. Also, weak saturated soils that are bordered by steep or unsupported embankments or slopes are prone to lateral spreading, which is a type of landslide. The Seismic Hazard Zone Map in Figure C-8 (Appendix C, Figures) shows areas susceptible to earthquake-induced landslide; these areas include the hills and cliffs of the Outer Richmond, Sea Cliff, Presidio, Lake Shore, Bayview Heights, Midtown Terrace, Twin Peaks, Claredon Heights, Golden Gate Heights, Forest Hills, Diamond Heights, Eureka Valley/Dolores Heights, and Noe Valley neighborhoods.

Extent and Probability of Future Events

The extent of an earthquake-induced landslide is unknown, as it depends on the landslide characteristics and materials and on the settings in which the landslide occurs. As noted above, shallow rock falls, disrupted rock slides, and disrupted slides of earth and debris are the most abundant types of earthquake-induced landslides; earth flows, debris flows, and avalanches of rock, earth, or debris typically transport material the farthest.

USGS studies show that earthquakes as small as M 4.0 may dislodge landslides from susceptible slopes, and larger earthquakes can generate tens of thousands of landslides within the near epicentral zone. Therefore, San Francisco is likely to experience an earthquake-induced landslide from a major earthquake event, which has a 62 percent chance of occurring along one of the regional faults over a 30-year period (2002–2031).

5.2.1.3 Tsunami

Nature

A tsunami is a series of waves generated in a body of water by an impulsive disturbance along the seafloor that vertically displaces the water. Subduction zone earthquakes at plate boundaries often cause tsunamis. However, tsunamis can be generated by submarine landslides, submarine volcanic eruptions, and the collapses of volcanic edifices.

A single tsunami may involve a series of waves, known as a train, of varying heights. In open water, tsunamis exhibit long wave periods (up to several hours) and wavelengths that can extend up to several hundred miles, unlike typical wind-generated swells on the ocean, which might have a period of about 10 seconds and a wavelength of 300 feet.

The actual height of a tsunami wave in open water is generally only 1 to 3 feet and is often practically unnoticeable to people on ships. The energy of a tsunami passes through the entire water column to the seabed. Tsunami waves may travel across the ocean at speeds up to 700 miles per hour. As the wave approaches land, the sea shallows and the wave no longer travels as quickly, so the wave begins to “pile up” as the wave-front becomes steeper and taller, and less distance occurs between crests. Therefore, the wave can increase to a height of 90 feet or more as it approaches the coastline and compresses.

Tsunamis not only affect beaches that are open to the ocean, but also bay mouths, tidal flats, and the shores of large coastal rivers. Tsunami waves can also diffract around land masses. Since tsunamis are not symmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. However, tsunamis do propagate outward from their source, so coasts in the shadow of affected land masses are usually fairly safe.

History

Since 1850, 51 tsunamis have been recorded or observed in the Bay. Nine of these tsunamis originated in Alaska and were caused by an earthquake, earthquake and landslide, or volcano and earthquake. Only one tsunami has been recorded as originating along the central California Coast: a 4-inch wave run-up was recorded at the Presidio gauge station shortly after the 1906

earthquake. The earthquake caused the downdropping of the seafloor north of Lake Merced between overlapping segments of the San Andreas fault, spawning a tsunami.

Location

A tsunami run-up map is shown in Figure C-9 (Appendix C, Figures). The map was developed using the June 2007 SF Modeling of Tsunami Effects at Marine Oil Terminals (MOT) in San Francisco Bay study, by Jose Borrero, Lori Dengler, Burak Uslu and Costas Synolakis, for a worst-case scenario tsunami run-up along the bay side of the San Francisco Bay. The worst-case scenario for this model is the Alaska Peninsula rupture of the Alaska-Aleutians subduction zone. Interpolates on the bay side are between the 14.45-foot run-up at Fort Point and the 5.91-foot run-up at the Potrero District.

Figure C-10 (Appendix C, Figures) shows tsunami inundation map prepared by the OES. This map illustrates coastal land areas that could become submerged in a tsunami. The area of land subject to inundation is a factor of: distance of shoreline from the tsunami generating event; magnitude; duration and period of waves; run-up elevations; tidal level at time of occurrence; location along shore and direction of shore in respect to propagated waves; and topography of the seabed.

Extent and Probability of Future Events

The MOT study estimates that a 100-year return period tsunami wave run-up elevation at the Golden Gate Bridge would be 8.2 feet (National Geodetic Vertical Datum), but this wave run-up would dissipate as it moved eastward into the Bay. By the time it reached the eastern shoreline of the Bay (at Alameda), it would be half as high.

Because the majority of the region's faults are strike-slip faults, a tsunami is not expected to be a major threat as a result of a regional earthquake. The primary tsunami threat along the central California coast is from distant earthquakes along subduction zones elsewhere in the Pacific basin, including Alaska. Since 1877, Alaska earthquakes have produced tsunami run-ups in the Bay Area nine times or on average, every 28 years. Historically, the run-ups from these events have been only a few inches.

5.2.2 Weather-Related Hazards

For this 2008 HMP update, weather related hazard profiles have been developed for drought, flood, heat, landslide, wildfire, and wind.

5.2.2.1 Drought

Nature

Drought is a prolonged period of dryness in which precipitation is less than expected or needed in a given geographic location or climate over an extended period of time. For much of human history, drought and its devastations have been seen as an unpredictable, unavoidable calamity. However, that viewpoint is giving way to the recognition that climatic fluctuations occur everywhere, and that periods of low precipitation are a normal, recurrent feature of climate.

Drought is commonly referenced in terms of its effects on crops, and the direct environmental effects (such as crop loss or failure, livestock death or decreased production, Wildfire, impaired productivity of forest land, damage to fish habitat, loss of wetlands, and air quality effects) to social effects (from economic and physical hardship and increased stress on residents of a drought-stricken area). In San Francisco, the primary impact of drought would be reduced availability of water for residential and commercial use.

Drought can be a meteorological phenomenon, resulting from abnormally low precipitation or an institutional phenomenon, resulting from poor management of water supply and reserves—an imbalance in supply and demand—and is often due to a combination of these factors. Understanding drought as a recurring feature of climate is a first step toward creating management practices that effectively mitigate its effects.

History

Drought is a cyclic part of the climate of California, occurring in both summer and winter, with an average recurrence interval between 4 and 10 years. Short-term, annual events are more frequent, whereas the less frequent long-term events have ranged from 2 to 4 years in length. San Francisco County has never been declared a Presidential disaster area as a result of drought. However, statewide droughts have been declared for 1976–1977, 1987–1992, and 2008.

Location

According to the California Multi-Hazard Mitigation Plan, droughts in excess of 3 years are rare in Northern California, including San Francisco. When drought exists in the region, it affects all of San Francisco.

Extent and Probability of Future Events

Drought is difficult to measure, due to its diverse geographical and temporal nature and its operation on many scales. Despite that difficulty, various indices for measuring and characterizing drought can be useful. The Palmer Drought Indices (Palmer Z Index, Palmer Drought Index, and Palmer Hydrological Drought Index) and the Standardized Precipitation Index are most commonly used. Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration), and loss (runoff) to determine drought. The Standardized Precipitation Index considers precipitation alone, comparing the probability of a region receiving a given amount of precipitation (based on historical levels) in a given time period with precipitation actually recorded. All three Palmer drought indices show that as of June 2008, San Francisco has moderate drought (-1.99 to -1.25) to no drought (-1.24 to +0.99) conditions, and Standardized Precipitation Index shows near normal (-0.50 to + 0.50) precipitation conditions for June. It is unknown how long current drought conditions will persist. However, based on previous events, Northern California, including San Francisco, can expect to experience a drought every 4 – 10 years.

5.2.2.2 Flood

San Francisco has no natural surface flooding sources, such as streams and rivers, which pose a flood hazard within the City. Therefore, flood hazards in San Francisco are limited to coastal

flooding resulting from high onshore winds and high tides; and flooding that occurs when stormwater exceeds the capacity of the City's drainage systems.

Coastal Flood

Nature

Flooding is the accumulation of water where usually none occurs or the overflow of excess water from a stream, river, lake, reservoir, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods. Floods are natural events that are considered hazards only when people and property are affected.

Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.
- Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed.

Floods also cause economic losses through closure of businesses and government facilities, disrupt communications, disrupt the provision of utilities, such as water and sewer service, result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

Coastal flooding in San Francisco is generally caused by wave run-up. Pacific Ocean storms in the months of November through February in conjunction with high tides and strong winds can cause significant wave run-up. Beef this up a bit – mention both inundation and wave action; and the fact that waves can damage waterfront structures. Move some details up from the extent section.

History

The National Climatic Data Center (NCDC) query results show that San Francisco has experienced 12 flood events since 1996. With the exception of one flood in May 1996, all of the other reported floods occurred during the months of December, January, and February.

Location

FEMA has conducted an approximate analysis of flooding in the Bay and prepared a preliminary Flood Insurance Rate Map (FIRM), dated September 2007, that shows the extent of flooding in San Francisco, including Treasure Island. The preliminary FIRM shows the Special Flood Hazard Areas (SFHAs), which are those areas subject to inundation during a flood having a 1 percent chance of occurrence in any given year (also referred to as the 100-year flood). The SFHAs for San Francisco are based on the effects of Pacific Ocean storms that occur in conjunction with high tides and strong winds that can cause significant wave run-up. As shown on Figure C-11 (Appendix C, Figures), the 1 percent annual chance flood is likely to cause

shallow flooding (with wave heights of less than 3 feet) along Crissy Field in the Marina District, the inlets of Mission Bay, Potrero Hill, Hunters Point, and the Bayview District neighborhoods as well as in the northwestern and western waterfront parts of Treasure Island.

The preliminary FIRM shows the San Francisco Bay is subject to the additional hazards associated with wave action (identified on the FIRM as Zone V). The preliminary FIRM shows that the entire shoreline of the Bay within San Francisco is subject to this hazard. Additionally, the Pacific Ocean shoreline is subject to this hazard, although the FIRM shows that the areas at risk are limited to beaches and shoreline cliffs.

Extent and Probability of Future Events

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as stream-flow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in a given year.

The following factors contribute to the frequency and severity of coastal flooding:

- Astronomical tides
- Storm surge, which is the rise in water from wind stress and low atmospheric pressure
- Waves
- Peak still-water elevation

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a probability of occurrence of 1 percent in any given year, also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of FIRMs prepared by FEMA. These maps are used to support the NFIP. The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as SFHAs and are the basis for flood insurance and floodplain management requirements. The FIRMs also show floodplain boundaries for the 500-year flood, which is the flood having a 0.2 percent chance of occurrence in any given year. As noted above, the preliminary FIRM shows the SFHAs for bay front areas that are subject to shallow (3 feet or less) flooding and possibly additional flooding due to significant wave attack. Based on previous occurrences, San Francisco can expect to experience coastal flooding due to a severe storm event every 7-8 years, during a strong El Niño.

Stormwater Ponding

Nature

For purposes of this plan, stormwater refers to water that collects on the ground surface or is carried in the stormwater system when it rains. In events where the amount of runoff is too great for the system, or if the stormwater system is disrupted by vegetation or other debris that blocks inlets or pipes, excess water remains on the surface. This water may “pond” in low-lying areas, often in street intersections; or enters nearby structures. Stormwater ponding, also known as localized flooding, not only creates flood problems, but also creates a pollution problem, as

stormwater can pick up debris, chemicals, dirt, and other pollutants from the impervious surfaces.

History

In San Francisco, stormwater ponding occurs as a result of heavy rainfall. As noted above, the NCDC shows that localized flooding has occurred 12 times over the past 10 years.

Location

FEMA generally does not show areas of localized flooding on FIRMs; and the September 2007 FIRM for San Francisco does not show areas of localized flooding in the City. However, as shown on Figure C-12 (Appendix C, Figures), the DPW has created a stormwater ponding map that shows areas susceptible to stormwater ponding. Areas of potential flooding include the ocean-front areas of the Lakeshore, Outer Parkside, and Outer Sunset neighborhoods; and portions of the Lake District, Mission Bay, North Waterfront, Inner Mission, Bayview District, Bernal Heights, and Mission Terrace neighborhoods.

Extent and Probability of Future Events

In San Francisco, stormwater ponding is generally only a few inches in depth, but ponding to depths of up to 4 feet can occur. Historical occurrences indicate that San Francisco can expect to experience a heavy precipitation event almost every winter; therefore, occurrences of stormwater ponding are likely to occur annually.

5.2.2.3 Heat

Nature

According to the National Weather Service, extreme heat occurs when the temperature reaches extremely high levels or when the combination of heat and humidity causes the air to become oppressive and stifling. Generally, extreme heat is considered to be 10 degrees above the normal temperature over an extended period of time. However, extreme heat can manifest itself in several ways:

- A spell of sweltering humidity, which reaches levels commonly associated with moist tropical regions. Stress on the body can be exacerbated when atmospheric conditions cause pollutants to be trapped near the ground.
- An excessively dry condition, in which strong winds and blowing dust can worsen the situation.
- A rise in the heat index, the body's perception of the "apparent" temperature based on both the air's real temperature and the amount of moisture present in the air. Humidity and mugginess makes the temperature seem higher than it is. In high humidity, an 85 degree day may be perceived as 95 degrees.

During heat or extreme heat, local National Weather Service offices can issue heat-related messages as conditions warrant, including:

- **Excessive Heat Outlook**: when the potential exists for an excessive heat event in the next 3 to 7 days. An outlook is used to indicate that a heat event may develop. It is intended to provide information to those who need considerable lead time to prepare for the event, such as public utilities, emergency management personnel, and public health officials.

- **Excessive Heat Watch**: when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so. Relevant plans include established individual community excessive heat event mitigation plans.

- **Excessive Heat Warning/Advisory**: when an excessive heat event is expected in the next 36 hours. These warnings are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurrence. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

History

The Golden Gate Weather Service reports record maximum daily temperatures in excess of 90 degrees only 125 times between 1875–2002. Ten of these days reached maximum temperatures in excess of 100 degrees. According to a NCDC query for storm events, on June 14, 2000, a 103-degree heat wave resulted in reports of 102 heat-related illnesses and nine deaths in San Francisco.

Location

When an excessive heat event occurs, it affects all of San Francisco.

Extent and Probability of Future Events

In San Francisco, heat or extreme heat is generated when a massive warm high-pressure ridge inhibits the normal onshore breezes, resulting in temperatures into the high 80s, 90s, and possibly into the 100s. Based on previous occurrences, San Francisco can expect to experience temperatures in excess of 90 degrees about 1 day every year, generally between the months of May and October.

5.2.2.4 Landslide

Nature

As noted above, landslide is a general term for the dislodgment and fall of a mass of soil or rocks along a sloped surface or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. Landslides may involve a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also

occur due to indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Non-earthquake-induced landslides, the focus of this section, often occur as a result of intense or prolonged precipitation that can saturate slopes and cause failures.

History

Non-earthquake-induced landslides in San Francisco generally occur during or after prolonged periods of winter rainstorms. Several landslides occurred during El Niño in the winter of 1998. Between February 2 and February 26, 1998, landslides and minor debris flows were reported on the steep slopes of Mount Sutro and Mount Davidson, and in the Twin Peaks, Diamond Heights, Potrero Hill, and Seacliff neighborhoods. The landslides caused an estimated $4.1 million in damages to several residential properties and the Olympic Golf course. Nine years later, on February 28, 2007, a 75-foot-wide mass of Telegraph Hill slid down a granite and sandstone slope above Broadway Street. Approximately 120 people from a 45-unit condominium were evacuated until the property owner stabilized the hillside.

Location

As noted in Section 5.3.1.2, steep slopes on hills and cliffs are the areas most susceptible to landsliding in San Francisco. CGS has not prepared maps for San Francisco that identify hazards associated with non-earthquake induced landslides. However, the areas that are subject to landslides during earthquakes are also subject to landslides under other conditions. Consequently, the earthquake-induced landslide map (Figure C-8, Appendix C, Figures) is also used to show steep-sloped areas in which landslides may occur under other conditions. These areas include the Outer Richmond, Sea Cliff, Lake Shore, Bayview Heights, Midtown Terrace, Twin Peaks, Claredon Heights, Golden Gate Heights, Forest Hills, Diamond Heights, Eureka Valley/Dolores Heights, and Noe Valley neighborhoods and the Presidio.

Extent and Probability of Future Events

The USGS reports that landslides in San Francisco are typically narrower than 1,500 feet. Landslides are likely to occur during winter storm events that produce heavy and/or prolonged rainfall. Based on previous occurrences, San Francisco can expect to experience a landslide every 7 -10 years, particularly during winters in which a strong El Niño increases the frequency and intensity of Pacific storms.

5.2.2.5 Wildfire

Nature

A wildfire is an uncontrolled fire spreading through vegetative fuels. Wildfires can be caused by human activities (such as arson or campfires) or by natural events (such as lightning). Wildfires often occur in forests or other areas with ample vegetation. In areas where structures and other human development meets or intermingles with wildland or vegetative fuels (referred to as the "wildland urban interface"), wildfires can cause significant property damage and present extreme threats to public health and safety.

The following three factors contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas.

- **Topography:** As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops may mark the end of wildfire spread, as fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or will burn with greater intensity; and nonnative plants may be more susceptible to burning than native species. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The risk of fire increases significantly during periods of prolonged drought, as the moisture content of both living and dead plant matter decreases; or when a disease or infestation has caused widespread damage. The fuel's continuity, both horizontally and vertically, is also an important factor.
- **Weather:** The most variable factor affecting the behavior of wildfires is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. By contrast, cooling and higher humidity often signal reduced wildfire occurrence and easier containment.

Even small fires can threaten lives and resources and destroy improved properties. If not promptly controlled, wildfires may grow into an emergency or disaster.

The indirect effects of wildlfires can be catastrophic. Besides stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as described above.

History

The California Department of Forestry and Fire Protection (CAL FIRE) has no record of any wildfire in San Francisco.

Location

CAL FIRE has developed a fuel ranking assessment methodology that assigns ranks (moderate, high, and very high) based on expected fire behavior for unique combinations of topography and vegetative fuels under a given severe weather condition (including wind speed, humidity, and temperature). As shown on Figure C-13 (Appendix C, Figures), high and very high wildfire hazards include San Francisco's large parks and open spaces, and Yerba Buena Island.

Extent and Probability of Future Events

The CAL FIRE Fuel Rank model shown on Figure C-13 (Appendix C, Figures) displays the extent (moderate, high, and very high) of wildfire hazards in San Francisco. In general, the

susceptibility for high and very high wildfires dramatically increases in the late summer and early autumn as vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. Common causes of wildfires include arson and negligence. However, as noted above, a recorded wildfire has not occurred in San Francisco. Therefore, the probability of a future wildfire event is unknown.

5.2.2.6 Wind

Nature

Winds are horizontal flows of air that blow from areas of high pressure to areas of low pressure. Wind strength depends on the difference between the high- and low-pressure systems and the distance between them. A steep pressure gradient results from a large pressure difference or short distance between these systems and causes high winds. High winds are defined as those that last longer than 1 hour at greater than 39 miles per hour (mph) or for any length of time at greater than 57 mph.

History

In San Francisco, high winds associated with cyclonic systems and their cold fronts occur in the winter, generally between the months of November through March. The NCDC has recorded over two dozen winter wind storm events in San Francisco since 1982. The greatest number of events occurred in 1995, in which high wind events were recorded on January 4, January 9, March 10, and December 9.

Location

All of San Francisco is subject to strong southeasterly winds associated with powerful winter cold fronts.

Extent and Probability of Future Events

The NCDC climatic wind data for San Francisco shows peak gusts of 44–74 mph (1930-1996). Historically, the greatest peak gust wind velocities occurred during the months of February (PGU of 69 mph) and December (PGU of 74 mph). Based on previous events, San Francisco can expect to experience at least one winter windstorm annually.

5.2.3 Other Hazards

Other hazards described in this 2008 HMP include for reservoir failure, urban conflagration, and human-caused hazards.

5.2.3.1 Reservoir Failure

Nature

A reservoir failure is the structural collapse of a dam or other structural element, such as the wall of a tank, that releases the water stored in the reservoir. A reservoir failure may occur due to the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. The sudden release of water has the potential to cause dangerous flooding conditions,

resulting in human casualties, economic loss, and environmental damage. This type of disaster is dangerous because it can occur rapidly, providing little warning and evacuation time for people living downstream or below a reservoir. If reservoirs are located on streams, the flows resulting from reservoir failure generally are much larger than the capacity of downstream channels and can therefore lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water, flooding over the channel banks, and the impact of the debris carried by the flow.

History

The SFPUC-owned Calaveras Dam, which is located in Alameda County, failed during construction in 1918. A landslide damaged the upstream shell of the dam and destroyed the dam's outlet tower.

Location

Figure C-14 (Appendix C, Figures) shows the location of 15 reservoirs located in the San Francisco County limits. Four reservoirs have above-ground sides and are considered to be dam faces, which are regulated by the California Department of Water Resources, Division of Safety of Dams (DSOD). State-sized dams are more than 25 feet in height and hold back more than 15 acre-feet of water or are more than 6 feet in height and hold more than 50 acre-feet of water. The state-sized dams within the San Francisco County limits are listed in Table 5-5.

Table 5-5 State-Regulated Dams within the San Francisco County Limits

Reservoir Name	Dam Name	Year Constructed	Type+	Capacity (acre-feet)	Reservoir (acre-feet)
Sutro Reservoir	Sutro Reservoir	1952	Earth	96	6
Sunset Reservoir	Sunset North Basin	1938	Earth	275	12
	Sunset South Basin	1960	Earth	268	12
Twin Peaks Reservoir	Stanford Heights	1928	Earth	37	2
University Mound	University Mound North	1885	Earth	182	10
	University Mound South	1937	Earth	250	11

Source: California Division of Safety of Dams 2008.

Extent and Probability of Future Events

As shown on Figure C-19 (Appendix C, Figures), dam inundation maps have been prepared by the DSOD for the Sutro, Sunset, and University Mound reservoirs only. However, the maps are most likely outdated, as they were prepared in the 1970s, and do not take into account subsequent construction activities that might change water flow patterns. As such, the extent of potential flood inundation in San Francisco is unknown.

The probability of a reservoir failure is unknown. To reduce the likelihood of any reservoir failure due to a seismic event, the SFPUC implemented a $3.6 billion Capital Improvement Program (CIP) in 2002, which is described in Section 6.

5.2.3.2 Urban Conflagration

Nature

An urban conflagration is a fire that occurs in the built environment and spreads to numerous structures. If not contained, an urban conflagration may expand uncontrollably beyond its original source area to engulf adjoining regions. A conflagration can have many causes, including:

- Criminal acts (arson, illegal explosive devices, acts of terrorism, or civil unrest)
- Residential accidents (improper use of electrical and heating appliances, improper storage or handling of flammables, faulty connections, grease fires, misuse of matches and lighters, or improper disposal of charcoal and wood ashes)
- Industrial accidents (hazardous material incidents, explosions, and transportation accidents)
- Acts of nature (lightning strike, ignitions following a large earthquake)

Wind, extremely dry weather conditions, explosions, and a dense environment of structures built with combustible materials can also contribute to an urban conflagration.

History

Records from the San Francisco Fire Department Museum, dating back to the mid-1800s, show that San Francisco was devastated by six major fires during the California Gold Rush.

However, the greatest fire in San Francisco to date occurred as a result of an earthquake. On the morning of April 18, 1906, the Great San Francisco earthquake shook the region and within 2 hours of the event, 52 fires had ignited within San Francisco. The fires quickly spread throughout the City, as the firefighters had no water supply. Within three days, the earthquake and fire had taken the lives of approximately 2,000 people and destroyed over 28,000 buildings.

San Francisco's most recent large urban conflagration event occurred as a result of the Loma Prieta earthquake on October 17, 1989. Gas pipe and main ruptures ignited 27 fires within San Francisco, including a major blaze in the Marina District that claimed the lives of 5 people.

According to the most recent San Francisco Fire Department Annual Report, the Fire Department responded to 3,748 fire-specific incidents from July 1, 2004, to June 30, 2005. The Arson Task Force initiated 64 arrests for incendiary fires.

Location

Figure C-15 (Appendix C) shows urban conflagration hazard areas for all areas of the City for which parcel data was available. This model takes into account building construction material, land use, and structural age. For construction material, wood frame structures were assumed to be more vulnerable to conflagration than other structure types. Similarly, commercial and industrial land uses were calculated as a higher urban conflagration risk. Finally, older structures were assumed to have a high conflagration risk as they pre-date modern fire codes. As such,

areas at greatest risk to urban conflagration include areas with the North Waterfront, South Beach, Mission Bay, Potrero Hill, Hunters Point, Van Ness/Civic Center, Downtown/Tenderloin, and Hayes Valley neighborhoods.

Extent and Probability of Future Events

The urban conflagration model shown on Figure C-15 (Appendix C, Figures) displays the extent (non/no data, very low, low, moderate, high, very high, and extreme) of urban conflagration hazards in San Francisco.

As noted above, the San Francisco Fire Department responds to approximately 10 single-alarm fires every day. Larger fires (two-alarm or larger) occur, on average, only 5-6 times annually.

5.2.3.3 Human-Caused Hazards

Hazardous Material

Nature

Hazardous materials include hundreds of substances that pose a significant risk to humans. These substances may be highly toxic, reactive, corrosive, flammable, radioactive, or infectious.

Hazardous material releases can occur from any of the following:

- Fixed facilities (such as refineries, chemical plants, storage facilities, manufacturing facilities, warehouses, wastewater treatment plants, swimming pools, dry cleaners, automotive sales/repair, and gas stations)
- Highway and rail transportation (such as tanker trucks and railcars transporting hazardous materials)
- Maritime transportation (including transportation of petroleum products by barges and ocean-going tankers and spills associated with petroleum terminals)
- Air transportation (such as cargo packages)
- Pipeline transportation (petroleum products, natural gas, and other chemicals)

Unless exempted, facilities that use, manufacture, or store hazardous materials in the United States fall under the regulatory requirements of the Emergency Planning and Community Right to Know Act (EPCRA) of 1986, enacted as Title III of the Federal Superfund Amendments and Reauthorization Act (42 USC 11001–11050 [1988]). Under EPCRA regulations, hazardous materials that pose the greatest risk for causing catastrophic emergencies are identified as Extremely Hazardous Substances (EHSs). The EPA identifies these chemicals in the List of Lists–Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112 of the Clean Air Act. Releases of EHSs can occur during transport and from fixed facilities. Transportation-related releases are generally more troublesome because they can occur anywhere, including close to human populations, critical facilities, or sensitive environmental areas. Transportation-related EHS releases are also more difficult to mitigate due to the variability of locations and distance from response resources.

In addition to accidental human-caused hazardous material events, natural hazards may cause the release of hazardous materials and complicate response activities. The impact of earthquakes on

fixed facilities may be particularly serious due to the impairment or failure of the physical integrity of containment facilities. The threat of any hazardous material event during and immediately after an earthquake may be magnified due to restricted access, reduced fire suppression and spill containment, and even complete cut-off of response personnel and equipment. Also, the risk of terrorism involving hazardous materials is considered a major threat due to the location of hazardous material facilities and transport routes throughout communities and the frequently limited antiterrorism security at these facilities.

History

The Web-based query system of the National Response Center (NRC), which serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States, shows that since 1998, 70 vessel-related oil spills (bilge oil, gasoline, hydraulic oil, jet fuel, and diesel oil) have been reported in the San Francisco County jurisdictional area of the Bay. Common causes of incidents included operator error and equipment failure.

The largest oil spill event in most recent history occurred on November 7, 2007, when a container ship struck a pier bumper at the western span of the Bay Bridge, causing 58,000 gallons of bunker fuel to be released into the water. Oiled and dead wildlife and oil slicks and oil globs were reported around the Bay and the Pacific coastline.

The NRC's Web-based query system also shows that since 1998, two transportation accidents that resulted in petroleum spills were reported in the City. The query system did not show any reported hazardous material transport incidents along the Bay Bridge or the Golden Gate Bridge. However, on April 29, 2007, a gasoline tanker carrying 8,600 gallons of unleaded gasoline hit a guard rail and burned, causing the MacArthur Maze overpass to the Bay Bridge in Oakland to collapse.

Location

In San Francisco, a hazardous materials event is most likely to occur within the City's industrial area, and along land and water transportation corridors. Trucks and vessels that use these transportation corridors commonly carry a variety of hazardous materials, including gasoline, other petroleum products, and other chemicals known to cause human health problems.

Extent and Probability of Future Events

Comprehensive information on the probability and magnitude of a hazardous material event along the transportation corridors is not available. Wide variations among the characteristics of hazardous material sources and among the materials themselves make such an evaluation difficult. However, based on previous occurrences, San Francisco can expect, on average, a hazardous material event every 4 years due to a truck accident and 7 times a year due to a large vessel accident as a result of equipment failure or operator error.

Weapon of Mass Destruction

Nature

A WMD is a weapon that can kill a large number of humans and/or cause significant damage to the built or natural environment. WMDs include nuclear, biological, chemical, radiological, and explosive (CBRNE) weapons.

History

San Francisco has no history of WMD attacks. Information on potential threat elements and activity is not available.

Location

The Regional Terrorism Threat Assessment Center, a counter-terrorism, law-enforcement-oriented intelligence fusion center, suggests that the top target sectors for a CBRNE attack include banking and financing, commercial, defense industrial base, emergency services, energy, government facilities, postal and shipping, transportation, and water. As such, areas at higher risk include San Francisco Bay, state and federal highways, public transportation, and the Financial District South, South of Market, Downtown/Tenderloin, and Van Ness/Civic Center neighborhoods, and areas surrounding access to the Golden Gate bridge

Extent and Probability of Future Events

The extent and probability of a future WMD attack is unknown. However, due to tourism, iconic features, sports stadiums, large sports stadiums, etc., San Francisco has a higher risk than other smaller urban areas.

Energy Supply

Nature

Energy supply includes electrical power; natural gas; and finished petroleum products used for transportation, manufacturing, residential, and commercial purposes. It potentially encompasses the extraction, transmission, generation, distribution, and storage of fuels. Energy supply can become disrupted in several ways:

- **Intentional**: planned disruptions are scheduled, such as for maintenance; unscheduled disruptions are generally done on the spot; demand-side management disruptions are done as part of an agreement during periods of peak system loads; load shedding disruptions are done when the system is under extreme stress due to heavy demand or the failure of energy facilities.
- **Unintentional**: outages which are unplanned. These outages include an accident by the utility company, malfunction or equipment failure, reduced capability, vandalism or terrorism, weather, excessive operation, or overload of the system.

History

Along with the rest of California, San Francisco experienced electric power supply shortages during early 2001. On January 17, the California Independent System Operator declared a Stage 3 Emergency three times between January and March 2001, as PG&E dropped firm loads of 500 megawatts in Northern California. The Independent System Operator implemented rolling blackouts, which were hour-long outages that rotated among customers in hopes of avoiding a total power failure.

Location

All of San Francisco is susceptible to an intentional or unintentional energy supply disruption.

Extent and Probability of Future Events

San Francisco is susceptible to energy supply disruptions that can occur as rolling blackouts (where power is temporarily lost) and brownouts (where the voltage level is below the normal minimum level specified for the system) due to extreme heat and blackouts (where power is completely lost) due to high winds.

According to the California Multi-Hazard Mitigation Plan, the State has taken measures to mitigate market manipulation, reduce distribution bottlenecks, and implement emergency technology and energy conservation programs. Therefore, it is most likely that San Francisco will experience an energy supply disruption due to a severe weather event, such as extreme heat or high winds. Based on previous occurrences, the City can expect a loss of power due to during severe winter storms (strong El Niños) every 7–8 years or a severe heat wave (100 degrees and above) every 12 years.

Terrorism

Nature

Terrorism can be defined as violence against noncombatants (civilians) to achieve political or ideological objectives through fear. Most definitions of terrorism include only those acts that are intended to create fear or terror, are perpetrated for an ideological goal, deliberately target or discount the safety and livelihood of noncombatants (civilians), or are unlawful acts violence and of unconventional and psychological warfare. The variations of a possible terrorist attack are many. Incidents with the greatest impact are those involving WMDs, including CBRNE weapons.

History

San Francisco has experienced incidents that could be classified as terrorism, including incidents involving explosive devices. However, San Francisco has never experienced an incident involving a biological, chemical, radiological, or nuclear weapon.

Location

The Department of Homeland Security's National Planning Scenario identifies the possible terrorist strikes it views as most plausible. Places at risk include cities that have economic and symbolic value, places with hazardous facilities, and areas where large groups of people

congregate, such as an office building or sports arena. As such, places at risk in San Francisco may include high rises in the Financial District, commercial sports facilities, and the Golden Gate and Bay bridges.

Extent and Probability of Future Events

The extent and probability of a future terrorist attack is unknown.

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage. A vulnerability analysis consists of the following six steps: asset inventory, methodology, data limitations, exposure analysis, summary of impacts, and land use and development trends.

6.1 ASSET INVENTORY

Assets within San Francisco that may be affected by hazard events include the City's population, general building stock, critical and non-critical facilities, major utilities, and transportation infrastructure. A complete list of assets, including type, name, and neighborhood location, is located in Appendix F, Asset Information.

6.1.1 Population and Building Stock

Population data for San Francisco was obtained from the 2000 Census, which was collected at the level of the census block, and Social Compact. San Francisco's total population for 2000 was 776,733 and was estimated to be 864,515 for 2007 (Table 6-1). Population density throughout San Francisco is shown on Figure C-16 (Appendix C, Figures).

Table 6-1 Estimated 2007 Population and Building Inventory

Population	Building Inventory by Area (Square Miles)			Building Inventory by Count
Estimated 2007 Census	Residential Buildings	Non-Residential Buildings	Mixed Residential/Commercial Buildings	Exempt Unreinforced Masonry Buildings
864,515	16.67	5.73	0.63	20

Sources: U.S. Census Bureau 2000a, 2000b; SocialCompact.org 2008; SFGIS 2008.

The square miles of the San Francisco building inventory were estimated from the Municipal Code Zoning Maps as shown in Table 6-1 and on Figure C-17 (Appendix C, Figures). A total of 16.67 square miles of residential buildings were considered in this analysis, including single-family and multifamily dwellings. A total of 5.73 square miles of non-residential buildings were also analyzed, including industry, retail trade, wholesale trade, personal and repair services, professional and technical services, banks, medical offices, religious centers, entertainment and recreational facilities, theaters, and parking facilities. Also, 0.63 square miles of property zoned mixed residential and commercial buildings were included in this analysis.

In addition to general building stock, this 2008 HMP also inventoried exempt UMBs, which include buildings retrofitted between May 21, 1973, and February 15, 1993, residential building units with fewer than five dwelling units, and buildings exempt due to the 1937 School Field Act. These buildings are shown on Figure C-18 (Appendix C, Figures).

The 2008 HMP does not address RL properties, which are properties that have experienced more than one flood insurance claim under the NFIP. San Francisco is not yet a member of the NFIP, and therefore, does not have any RL properties.

6.1.2 Facilities Located Outside of County Limits

The City owns and operates a number of facilities located outside of the County limits. However, for this version of the plan, the Planning Team decided not to include these facilities in the analysis. As shown on Figure C-19 (Appendix C, Figures), these facilities include the San Francisco International Airport, County Jail #5–San Bruno Complex, wastewater treatment plants, and the series of tunnels, pipelines, power stations, and dams that constitute the Hetch Hetchy system. These facilities are located outside of the County limits and therefore are not included in the vulnerability analysis.

6.1.3 Critical Facilities

A critical facility is defined as a public or private facility that provides essential products and services to the general public, including important public safety, emergency response, and disaster recovery functions. For this 2008 HMP, critical facilities include only those facilities owned by the City, with the exception of some educational facilities that are owned and operated by the San Francisco Unified School District or the State of California. The critical facilities included in this plan were obtained from San Francisco Enterprise GIS (SFGIS) and are listed in Table 6-2 and on Figures C-20 through C-24 (Appendix C, Figures).

Table 6-2 Critical Facilities Inventory

Subcategory	Type*	Number	Total Dollar Amount
Government	City Hall	1	N/A
	Department or Agency	31	N/A
	Hall of Justice	1	N/A
	Jail and Juvenile Hall	4	$45,500,000 (1 facility)
	Animal Shelter	1	N/A
Emergency Services	Emergency Operations Center	1	N/A
	Fire Department	53	N/A
	Police Department	12	N/A
Education	San Francisco Unified School District	145	$1,272,651,835
	City College of San Francisco	2	N/A
	San Francisco State University	2	N/A
	University of California San Francisco	5	N/A
Care	Clinic	6	N/A
	Health Center*	8	N/A
	Hospital	2	N/A
	Senior Service Center	1	N/A
Convention Center	Civic Auditorium	1	N/A
	Moscone Center	1	$713,514,071

Sources: SFGIS 2008; Risk Management Program 2008.
***** To avoid double-counting facilities, health centers located within the City's hospitals are not listed independently as health centers.
N/A = insured value or replacement cost information does not exist.

6.1.4 Non-Critical Facilities

Non-critical facilities include facilities that are not essential to public safety, emergency response, and disaster recovery functions. However, they are public spaces in which large number of people gather and congregate. Non-critical facilities obtained from the SFGIS and included in this 2008 HMP are owned and operated by the City, with the exception of large commercial sports facilities. Non-critical facilities are shown in Table 6-3 and on Figure C-25 through C-27 (Appendix C, Figures).

Table 6-3 Non-Critical Facilities Inventory

Subcategory	Type	Number	Total Dollar Amount
Library	Public Library	26	N/A
	Law Library	3	N/A
Museum and Performing Arts	Academy of Sciences	5	N/A
	Asian Arts Commission	1	N/A
	Fine Arts Museum	3	N/A
	San Francisco Museum of Modern Art	1	N/A
	War Memorial and Performing Arts Center	3	N/A
Parks and Recreation	Commercial Sports Facility	2	N/A
	Mini Park	13	N/A
	Park	72	$8,310,896 (1 park)
	Playground/Sports Facility	60	$19,265,880 (1 facility)
	Recreation Center	12	$132,094,195 (Yerba Buena Gardens)
	Zoo	1	N/A

Sources: SFGIS 2008; Risk Management Program 2008.
N/A = insured value or replacement cost information does not exist.

6.1.5 Major Utilities Infrastructure

Major utilities provide essential products and services to the general public, such as water, power, and communication services. Major utilities owned and operated by the City include communication, emergency water, and clean water and wastewater facilities. Data for these facilities, obtained through the SFGIS, is shown in Table 6-4 and on Figures C-28 through C-30 (Appendix C, Figures).

Table 6-4 Major Utilities Infrastructure

Subcategory	Type*	Number	Total Dollar Amount
Communication	Central Communication	3	N/A
	Data Center	1	N/A
	Dispatcher	1	N/A
	National Warning Center	1	N/A
Emergency Water	Pump Station	2	N/A
	Reservoir	1	N/A
	Tank	2	N/A
Clean Water and Wastewater*	Chlorine Station	4	$743,076 (4 facilities)
	Hydro-Pneumatic Station	7	N/A
	Pump Station	32	$22,196,305 (6 facilities)
	Reservoir	15	N/A
	Tank	3	N/A
	Treatment Building	1	N/A
	Wastewater Plant	3	N/A

Sources: SFGIS 2008; Risk Management Program 2008.
***** To avoid double-counting facilities, maintenance facilities located in the same building as stations are not listed independently.

6.1.6 Transportation Systems Infrastructure

City-owned transportation systems include the facilities operated by the San Francisco Municipal Railway (MUNI), the Port of San Francisco, and the parking garages operated by the Department of Parking and Traffic. The mapped MUNI facilities do not include the fleet's diesel or electric buses. However, the Transbay Terminal, which is utilized by MUNI, is included. Facility information was obtained from SFGIS and are listed in Table 6-5 and on Figures C-31 through C-33 (Appendix C, Figures)

Table 6-5 Transportation Systems Infrastructure

Subcategory	Type	Number	Total Dollar Amount
San Francisco Municipal Railway (MUNI)	Central Control	1	N/A
	Rectifier Station	1	N/A
	Substation	8	$4,606,499
	Transfer Station	15	$124,624,380
	Yard	8	$48,620,592
	Transbay Terminal	1	N/A
	Cable Car	4.91 miles	N/A
	Streetcar	35.48 miles	N/A

Table 6-5 Transportation Systems Infrastructure

Subcategory	Type	Number	Total Dollar Amount
Port	Ferry Building	1	N/A
	Harbor	1	N/A
	Facility	15	$95,260,500
	Marine	24	N/A
	Pier (including Pier buildings)	82	$460,240,577
	Land	41	N/A
	Terminal	1	N/A
Parking	Parking Structure	13	$227,350,000

Sources: SFGIS 2008; Risk Management Program 2008.
N/A = insured value or replacement cost information does not exist.

6.2 METHODOLOGY

A conservative exposure-level analysis was conducted to assess the risks associated with the identified hazards. This analysis is a simplified assessment of the potential effects of the hazards on values at risk without consideration of the probability or level of damage.

Using Census block level information, a spatial proportion was used to determine the percentage of the population located where hazards are likely to occur.

Using the City's Municipal Code Zoning Maps, a spatial proportion was used to determine the square miles of each type of combined use district (residential, non-residential, mixed residential/commercial) located where hazards are likely to occur.

Using data from the San Francisco SFGIS, the geocoded locations of critical and non-critical facilities and major utilities and transportation systems infrastructure were compared to locations where hazards are likely to occur. If any portion of the assets fell within a hazard area, it was counted as impacted. A spatial proportion was also used to determine the amount of linear assets, such as highways, within a hazard area. The exposure analysis for linear assets was measured in miles.

The City's Risk Management Program provided replacement values or insurance coverage value for approximately 10 percent of City-owned facilities. To date, several of the City-owned facilities are self-insured and do not have a replacement value or insurance coverage value.

For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). The aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

6.3 DATA LIMITATIONS

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and critical and non-critical facilities and infrastructure to the identified hazards. It was beyond the scope of this 2008 HMP update to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the HMP.

6.4 EXPOSURE ANALYSIS

The requirements for identifying structures and estimating potential losses, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 RECOMMENDATIONS: RISK ASSESSMENT

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA 2008.

DMA 2000 RECOMMENDATIONS: RISK ASSESSMENT

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan reflect changes in development in loss estimates?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA 2008.

The results of the exposure analysis for San Francisco's loss estimations are summarized in Tables 6-6 through 6-20, Table 6-22, and in the discussion following the tables.

Table 6-6 Potential Hazard Exposure Analysis Overview – Estimated Population and Building Inventory

				Population	Building Inventory by Area (Square Miles)			Building Inventory by Count
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**Estimated 2007 Census**	**Residential Buildings**	**Non-Residential Buildings**	**Mixed Residential/Commercial Buildings**	**Exempt UMBs**
Seismic	Ground Shaking	San Andreas	Severe	840,416	16.28	5.45	0.63	20
			Very Strong	24,099	0.391	0.27	0.00	0
		Hayward	Very Strong	97,365	1.48	4.06	0.25	7
			Strong	731,572	14.46	1.62	0.38	13
			Moderate	35,578	0.74	0.05	0.01	0
	Ground Failure	Liquefaction	Liquefiable Soil	92,822	1.01	3.18	0.27	2
		Landslide	Earthquake-Induced Landslide Zone	9,569	0.45	0.06	0.00	0
	Tsunami	Coastal	Inundation Area	9,626	0.22	0.01	0.00	0
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	150	0.08	0.00	0.09	0
		Stormwater	Ponding Area	3,721	0.06	0.13	0.01	0
	Wildland Fire	-----	Very High	1,077	0.04	0.00	0.00	0
			High	14,132	0.46	0.07	0.00	0
			Moderate	831,335	15.91	4.80	0.57	19
Other Hazards*	Reservoir Failure	-----	Inundation Area	30,258	0.74	0.05	0.00	0
	Urban Conflagration	-----	Extreme	5,333	0	0.66	0.03	0
			Very High	38,796	0.59	2.50	0.05	0
			High	60,716	0.93	1.67	0.23	14

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-7 Potential Hazard Exposure Analysis Overview – Critical Facilities: Government

				City Hall		Department or Agency		Hall of Justice		Jail		Animal Shelter	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	1	N/A	29	N/A	1	N/A	1	$45,500,000	1	N/A
			Very Strong	0	N/A	2	N/A	0	N/A	3	$0	0	N/A
		Hayward	Very Strong	0	N/A	8	N/A	0	N/A	2	0	0	N/A
			Strong	1	N/A	23	N/A	0	N/A	2	$45,500,000	1	N/A
			Moderate	0	N/A	0	N/A	1	N/A	0	0	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	0	N/A	17	N/A	1	N/A	2	0	1	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	N/A	0	0	0	N/A
	Tsunami	Coastal	Inundation Zone	0	N/A	0	N/A	0	N/A	0	0	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	1	N/A	0	N/A	0	0	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	N/A	0	0	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	N/A	0	0	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	0	0	N/A
			Moderate	1	N/A	26	N/A	1	N/A	3	$45,500,000	1	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	N/A	0	0	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	0	0	N/A
			Very High	0	N/A	0	N/A	0	N/A	0	0	0	N/A
			High	0	N/A	2	N/A	0	N/A	0	0	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A + Insured value or replacement cost information does not exist.

Table 6-8 Potential Hazard Exposure Analysis Overview – Critical Facilities: Emergency Services

				Emergency Operations Center		Fire Department		Police Department	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	1	N/A	51	N/A	12	N/A
			Very Strong	0	N/A	2	N/A	0	N/A
		Hayward	Very Strong	0	N/A	15	N/A	4	N/A
			Strong	1	N/A	35	N/A	8	N/A
			Moderate	0	N/A	4	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	0	N/A	13	N/A	3	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A
			Moderate	1	N/A	49	N/A	12	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	1	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	4	N/A	0	N/A
			High	0	N/A	5	N/A	1	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-9 Potential Hazard Exposure Analysis Overview – Critical Facilities: Education

				San Francisco Unified School District		San Francisco City College		San Francisco State University		University of California San Francisco	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	143	$1,267,943,014	2	N/A	2	N/A	5	N/A
			Very Strong	2	$4,708,821	0	N/A	0	N/A	0	N/A
		Hayward	Very Strong	17	$103,254,715	1	N/A	1	N/A	1	N/A
			Strong	124	$1,442,007,488	1	N/A	1	N/A	3	N/A
			Moderate	4	$27,389,632	0	N/A	0	N/A	1	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	10	$155,221,750	0	N/A	1	N/A	1	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	0	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	0	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	0	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	0	0	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	0	0	0	N/A	0	N/A	0	N/A
			High	141	$1,265,039,506	0	N/A	0	N/A	0	N/A
			Moderate	2	$5,187,758	2	N/A	2	N/A	5	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	2	$10,236,215	0	N/A	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	1	N/A	0	N/A	0	N/A	0	N/A
			High	2	$8,096,517	0	N/A	.0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-10 Potential Hazard Exposure Analysis Overview – Critical Facilities: Care

				Clinic		Health Center		Hospital		Senior Service Center	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	6	N/A	8	N/A	2	N/A	1	N/A
			Very Strong	0	N/A	0	N/A	0	N/A	0	N/A
		Hayward	Very Strong	0	N/A	2	N/A	0	N/A	0	N/A
			Strong	6	N/A	6	N/A	2	N/A	1	N/A
			Moderate	0	N/A	0	N/A	0	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	1	N/A	2	N/A	0	N/A	1	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	N/A
			Moderate	6	N/A	8	N/A	2	N/A	1	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-11 Potential Hazard Exposure Analysis Overview – Critical Facilities: Convention Center

				Civic Auditorium		Moscone Center	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	1	N/A	1	713,514,071
			Very Strong	0	N/A	0	0
		Hayward	Very Strong	0	N/A	1	713,514,071
			Strong	1	N/A	0	0
			Moderate	0	N/A	0	0
	Ground Failure	Liquefaction	Liquefiable Soil	0	N/A	1	713,514,071
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	0
	Tsunami	Coastal	Inundation Area	0	N/A	0	0
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	0
		Stormwater	Ponding Area	0	N/A	0	0
	Wildfire	-----	Very High	0	N/A	0	0
			High	0	N/A	0	0
			Moderate	1	N/A	1	713,514,071
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	0
	Urban Conflagration	-----	Extreme	0	N/A	0	0
			Very High	0	N/A	0	0
			High	0	N/A	0	0

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-12 Potential Hazard Exposure Analysis Overview – Non-Critical Facilities: Library

				Public Library		Law Library	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	25	N/A	3	N/A
			Very Strong	1	N/A	0	N/A
		Hayward	Very Strong	0	N/A	1	N/A
			Strong	22	N/A	2	N/A
			Moderate	4	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	4	N/A	1	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A
			High	0	N/A	0	N/A
			Moderate	25	N/A	3	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A
			Very High	1	N/A	0	N/A
			High	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-13 Potential Hazard Exposure Analysis Overview – Non-Critical Facilities: Museum and Performing Arts

				Academy of Sciences		Asian Arts Commission		Fine Art Museum		Museum of Modern Art		War Memorial and Performing Arts Center	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	4	N/A	1	N/A	2	N/A	1	N/A	3	N/A
			Very Strong	0	N/A	0	N/A	1	N/A	0	N/A	0	N/A
		Hayward	Very Strong	0	N/A	0	N/A	0	N/A	1	N/A	0	N/A
			Strong	4	N/A	1	N/A	2	N/A	0	N/A	3	N/A
			Moderate	0	N/A	0	N/A	1	N/A	0	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	0	N/A	0	N/A	1	N/A	1	N/A	0	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	4	N/A	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
			Moderate	1	N/A	1	N/A	3	N/A	1	N/A	3	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-14A Potential Hazard Exposure Analysis Overview – Non-Critical Facilities: Recreation and Park

				Commercial Sports Facility		Mini Park		Park		Playground/Sports Facility	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	2	N/A	12	N/A	67	$8,310,896	58	$19,265,880
			Very Strong	0	N/A	1	N/A	5	N/A	2	N/A
		Hayward	Very Strong	2	N/A	1	N/A	19	0	8	$19,265,880
			Strong	0	N/A	11	N/A	48	$8,310,896	52	N/A
			Moderate	0	N/A	1	N/A	5	0		N/A
	Ground Failure	Liquefaction	Liquefiable Soil	1	N/A	1	N/A	7	0	8	$19,265,880
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	4	0	2	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	0	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	1	0	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	0	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	1	0	1	N/A
			High	0	N/A	0	N/A	6	0	0	N/A
			Moderate	1	N/A	13	N/A	60	$8,310,896	59	$19,265,880
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	0	1	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	1	N/A	1	N/A	0	N/A
			High	0	N/A	3	N/A	1	N/A	1	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-14B Potential Hazard Exposure Analysis Overview – Non-Critical Facilities: Recreation and Park

				Recreation Center		Zoo	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	13	$132,094,195	1	N/A
			Very Strong	0	$0	0	N/A
		Hayward	Very Strong	2	$132,094,195	0	N/A
			Strong	11	0	1	N/A
			Moderate	0	0	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	2	$132,094,195	0	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	0	0	N/A
	Tsunami	Coastal	Inundation Area	0	0	1	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	0	0	N/A
		Stormwater	Ponding Area	0	0	0	N/A
	Wildfire	-----	Very High	1	0	0	N/A
			High	0	0	0	N/A
			Moderate	11	$132,094,195	1	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	0	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A
			Very High	2	N/A	0	N/A
			High	1	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-15 Potential Hazard Exposure Analysis Overview – Major Infrastructure: Communication

				Central Communication		Data Center		Dispatcher		National Warning Center	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	3	N/A	1	N/A	1	N/A	1	N/A
			Very Strong	0	N/A	0	N/A	0	N/A	0	N/A
		Hayward	Very Strong	1	N/A	1	N/A	0	N/A	0	N/A
			Strong	1	N/A	0	N/A	1	N/A	1	N/A
			Moderate	1	N/A	0	N/A	0	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	1	N/A	1	N/A	0	N/A	0	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	1	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	N/A
			Moderate	3	N/A	1	N/A	1	N/A	1	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-16 Potential Hazard Exposure Analysis Overview – Major Infrastructure: Emergency Water

				Pump Station		Reservoir		Tank	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	2	N/A	1	N/A	2	N/A
			Very Strong	0	N/A	0	N/A	0	N/A
		Hayward	Very Strong	2	N/A	0	N/A	0	N/A
			Strong	0	N/A	0	N/A	1	N/A
			Moderate	0	N/A	1	N/A	1	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	1	N/A	0	N/A	0	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	1	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A
			Moderate	2	N/A	1	N/A	2	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	1	N/A
			High	0	N/A	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-17A Potential Hazard Exposure Analysis Overview – Major Infrastructure: Clean Water and Wastewater

				Chlorine Station		Hydro-Pneumatic Station		Pump Station		Reservoir	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	4	$743,076	7	N/A	32	$22,196,305	2	N/A
			Very Strong	0	$0	0	N/A	0	$0	13	N/A
		Hayward	Very Strong	0	0	0	N/A	14	$228,581	1	N/A
			Strong	4	$743,076	6	N/A	17	$21,967,724	13	N/A
			Moderate	0	0	1	N/A	1	0	1	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	0	0	0	N/A	13	$228,581	0	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	0	0	N/A	0	0	0	N/A
	Tsunami	Coastal	Inundation Area	0	0	0	N/A	3	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	0	0	N/A	0	0	0	N/A
		Stormwater	Ponding Area	0	0	0	N/A	0	0	0	N/A
	Wildfire	-----	Very High	0	0	0	N/A	0	0	0	N/A
			High	0	0	0	N/A	0	0	0	N/A
			Moderate	4	$743,076	7	N/A	32	$22,196,305	15	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	0	0	N/A	4	$2,337,604	2	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	0	N/A	0	N/A
			High	0	N/A	1	N/A	2	$228,581	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-17B Potential Hazard Exposure Analysis Overview – Major Infrastructure: Clean Water and Wastewater

				Tank		Treatment Building		Wastewater Plant	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	3	N/A	1	N/A	3	N/A
			Very Strong	0	N/A	0	N/A	0	N/A
		Hayward	Very Strong	2	N/A	1	N/A	2	N/A
			Strong	1	N/A	0	N/A	1	N/A
			Moderate	0	N/A	0	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	2	N/A	1	N/A	2	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	N/A
			High	1	N/A	0	N/A	0	N/A
			Moderate	2	N/A	1	N/A	3	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	0	N/A
			High	0	N/A	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-18A Potential Hazard Exposure Analysis Overview – Transportation Systems Infrastructure: MUNI

				Central Control		Rectifier Station		Substation		Transfer Station	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	1	N/A	1	N/A	8	$4,606,499	15	$124,624,380
			Very Strong	0	N/A	0	N/A	0	$0	0	$0
		Hayward	Very Strong	0	N/A	0	N/A	1	0	7	0
			Strong	1	N/A	1	N/A	6	$4,606,499	8	$124,624,380
			Moderate	0	N/A	0	N/A	1	0	0	0
	Ground Failure	Liquefaction	Liquefiable Soil	0	N/A	0	N/A	2	$4,606,499	8	$43,056,004
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	0	0	0
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	0	0	0
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	N/A	0	N/A	0	0	0	0
		Stormwater	Ponding Area	0	N/A	0	N/A	0	0	0	0
	Wildfire	-----	Very High	0	N/A	0	N/A	0	0	0	0
			High	0	N/A	0	N/A	0	0	0	0
			Moderate	1	N/A	1	N/A	8	$4,606,499	14	$124,624,380
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	1	N/A	1	0	0	0
	Urban Conflagration	-----	Extreme	.0	N/A	0	N/A	1	$4,606,499	0	0
			Very High	0	N/A	0	N/A	0	0	0	0
			High	0	N/A	0	N/A	0	0	0	0

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-18B Potential Hazard Exposure Analysis Overview – Transportation Systems Infrastructure: MUNI

				Yard		Transbay Terminal		Cable Car		Streetcar	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**Miles of Line**	**Value ($)**	**Miles of Line**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	8	$48,620,592	1	N/A	3.77	N/A	34.77	N/A
			Very Strong	0	0	0	N/A	1.13	N/A	0.71	N/A
		Hayward	Very Strong	3	$24,960,367	1	N/A	1.48	N/A	10.5	N/A
			Strong	5	$23,660,225	0	N/A	3.43	N/A	23.88	N/A
			Moderate	0	0	0	N/A	0	N/A	1.1	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	3	$24,960,367	1	N/A	1	N/A	10.28	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	0	0	N/A	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	0	0	N/A	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	0	0	N/A	0	N/A	0	N/A
		Stormwater	Ponding Area	0	0	0	N/A	.09	N/A	.48	N/A
	Wildfire	-----	Very High	0	0	0	N/A	0	N/A	0	N/A
			High	0	0	0	N/A	0	N/A	.28	N/A
			Moderate	6	$46,767,976	1	N/A	4.68	N/A	33.44	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	0	0	N/A	0	N/A	1.53	N/A
	Urban Conflagration	-----	Extreme	0	0	0	N/A	0	N/A	0	N/A
			Very High	0	0	0	N/A	0	N/A	0	N/A
			High	0	0	0	N/A	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-19A Potential Hazard Exposure Analysis Overview – Transportation Systems Infrastructure: Port of San Francisco

				Ferry Building		Harbor		Facility		Marine	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	1	N/A	1	N/A	15	$95,260,500	24	N/A
			Very Strong	0	N/A	0	N/A	0	$0	0	N/A
		Hayward	Very Strong	1	N/A	1	N/A	15	$95,260,500	24	N/A
			Strong	0	N/A	0	N/A	0	0	0	N/A
			Moderate	0	N/A	0	N/A	0	0	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	1	N/A	0	N/A	12	$7,949,225	0	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	N/A	0	N/A	0	0	0	N/A
	Tsunami	Coastal	Inundation Area	0	N/A	0	N/A	0	0	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	1	N/A	1	N/A	15	$95,260,500	24	N/A
		Stormwater	Ponding Area	0	N/A	0	N/A	0	0	0	N/A
	Wildfire	-----	Very High	0	N/A	0	N/A	0	0	0	N/A
			High	0	N/A	0	N/A	0	0	0	N/A
			Moderate	1	N/A	0	N/A	12	$87,311,275	0	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	N/A	0	N/A	0	0	0	N/A
	Urban Conflagration	-----	Extreme	0	N/A	0	N/A	0	N/A	0	N/A
			Very High	0	N/A	0	N/A	0	N/A	24	N/A
			High	0	N/A	0	N/A	7	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-19B Potential Hazard Exposure Analysis Overview – Transportation Systems Infrastructure: Port of San Francisco

				Pier (including Pier buildings)		Land		Terminal	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**	**No.**	**Value ($)**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	82	$460,240,577	41	N/A	1	N/A
			Very Strong	0	$0	0	N/A	0	N/A
		Hayward	Very Strong	82	$460,240,577	41	N/A	1	N/A
			Strong	0	0	0	N/A	0	N/A
			Moderate	0	0	0	N/A	0	N/A
	Ground Failure	Liquefaction	Liquefiable Soil	33	$180,016,147	34	N/A	1	N/A
		Landslide	Earthquake-Induced Landslide Zone	0	0	0	N/A	0	N/A
	Tsunami	Coastal	Inundation Area	0	0	0	N/A	0	N/A
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	82	$460,240,577	41	N/A	1	N/A
		Stormwater	Ponding Area	0	0	7	N/A	0	N/A
	Wildfire	-----	Very High	0	0	0	N/A	0	N/A
			High	0	0	0	N/A	0	N/A
			Moderate	38	$243,288,026	37	N/A	1	N/A
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	0	0	N/A	0	N/A
	Urban Conflagration	-----	Extreme	0	0	0	N/A	0	N/A
			Very High	42	173,623,168	0	N/A	0	N/A
			High	29	257,946,807	0	N/A	0	N/A

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.
N/A = Insured value or replacement cost information does not exist.

Table 6-20 Potential Hazard Exposure Analysis Overview – Transportation Systems Infrastructure: Parking

				Parking Structure	
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**No.**	**Value ($)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	13	$277,350,000
			Very Strong	0	$0
		Hayward	Very Strong	4	$90,000,000
			Strong	9	$137,350,000
			Moderate	0	0
	Ground Failure	Liquefaction	Liquefiable Soil	6	$88,850,000
		Landslide	Earthquake-Induced Landslide Zone	0	0
	Tsunami	Coastal	Inundation Area	0	0
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0	0
		Stormwater	Ponding Area	0	0
	Wildfire	-----	Very High	0	0
			High	0	0
			Moderate	12	$188,850,000
Other Hazards*	Reservoir Failure	-----	Inundation Area	0	0
	Urban Conflagration	-----	Extreme	0	0
			Very High	0	0
			High	0	0

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.

6.5 SUMMARY OF IMPACTS

The requirements for an overview of the vulnerability analysis, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA 2008.

6.5.1 Seismic Hazards

6.5.1.1 Ground Shaking

Nearly 100 percent of the City's population, building stock, critical and non-critical facilities, major utilities, and transportation systems are located within severe shaking intensity hazard areas for a M 7.9 earthquake along the northern segment of the San Andreas fault. This includes an estimated 840,416 people, 16.28 square miles of residential buildings, 5.73 square miles of non-residential buildings, and 0.62 miles of mixed residential/commercial buildings. In addition, it accounts for 270 critical facilities, 193 non-critical facilities, 74 major utilities, and 212 transportation systems. The remaining population, building stock, critical and non-critical facilities, major utilities, and transportation systems are located within very strong shaking intensity hazard areas.

Over 70 percent of the City's non-residential buildings and transportation systems are located in very strong shaking intensity hazard areas for a M 6.9 Hayward fault earthquake. However, less than 15 percent of the City's population and building stock are located in this hazard area. In fact, the majority (75 percent and above) of the City's population, residential building stock, and critical and non-critical facilities are located in strong shaking intensity hazard areas. Less than 10 percent of the population and all assets considered for this analysis are located in moderate shaking intensity hazard areas.

6.5.1.2 Ground Failure

An estimated 92,822 (11 percent) people are located within a liquefaction hazard area of the Seismic Hazard Zone Map. This includes 0.06 square miles (6 percent) of residential building stock, 3.18 square miles (55 percent) of non-residential building stock, 0.27 square miles (43 percent) of mixed residential/commercial building stock, 54 (20 percent) critical facilities, 26 (13 percent) non-critical facilities, 21 (28 percent) major utilities, and 101 (48 percent) transportation systems.

Only 1 percent (9,569 people) of the City's population is located within a landslide hazard area of the Seismic Hazard Zone Map. This includes 0.45 square miles (3 percent) of residential building stock, 0.06 square miles (1 percent) of non-residential building stock, 6 (3 percent) non-critical facilities, and 2 (3 percent) major utilities.

6.5.1.3 Tsunami

An estimated 9,626 (less than 1 percent) people are located in a coastal tsunami hazard area, as defined by the OES. This includes 0.22 square miles (1 percent) of residential building stock, and 0.01 square miles (less than 1 percent) of non-residential building stock, 1 non-critical facility and 3 major utilities.

6.5.2 Weather-Related Hazards

6.5.2.1 Drought

A quantitative analysis for a drought was not prepared for this version of the plan. The City's entire population and assets are at risk to a drought.

6.5.2.2 Flood

Only 150 people are located within the SFHA of the preliminary FIRM. Only 1 critical facility, 1 non-critical facility, and less than 0.08 square miles of residential building stock and 0.09 square miles of mixed residential/commercial building stock are located in this hazard zone. There are no major utilities and no non-residential buildings located in the SFHA. All Port facilities considered in this analysis are located in/above the SFHA.

An estimated 3,721 (less than 1 percent) people are located in a stormwater ponding hazard area, as defined by the DPW. This includes 0.06 square miles (less than 1 percent) of residential building stock, 0.13 square miles (2 percent) of non-residential building stock, 0.01 square miles (2 percent) of mixed residential/commercial building stock, 1 (1 percent) major utilities, and 7 (3 percent) transportation systems.

6.5.2.3 Heat

A quantitative analysis for a heat event was not prepared for this version of the plan. However, the City's entire population and assets are at risk to heat and extreme heat.

6.5.2.4 Landslide

As noted in Section 6.6.1.2, only 1 percent (9,569 people) of the City's population is located within a landslide hazard area of the Seismic Hazard Zone Map. This includes 0.45 square miles (3 percent) of residential building stock, 0.06 square miles (1 percent) of non-residential building stock, 6 (3 percent) non-critical facilities, and 2 (3 percent) major utilities.

6.5.2.5 Wildfire

The CAL FIRE Fuel Rank model shows that over 95 percent (831,335) of the City's population, residential building stock (15.91 square miles), mixed residential/commercial building stock (4.8 square miles), critical (262) and non-critical (182) facilities, and major utilities (75) are located

in a moderate wildfire hazard area. Approximately 85 percent (4.8 square miles) of the non-residential building stock and 60 percent (132) of the transportation systems are located within this hazard area. In addition, there are a few assets that do not fall within the minimum requirements for a moderate ranking, and therefore, are not furthered considered in this exposure analysis.

Less than 15,000 (less than 1 percent) people, 0.04 (less than 1 percent) square miles of residential building stock, 2 (less than 1 percent) critical facilities, 6 (3 percent) non-critical facilities, and 1 major utility are located in a high wildfire hazard area.

Only 1,077 people, including 7 non-critical facilities are located in a very high wildfire hazard area.

6.5.2.6 Wind

A quantitative analysis for a wind event was not prepared for this version of the plan. However, the City's entire population and assets are at risk to wind and high wind.

6.5.3 Other Hazards

6.5.3.1 Reservoir Failure

Dam inundation maps prepared by the DSOD for the Sutro, Sunset, and University Mound reservoirs show that 30,258 (3 percent) of the City's population is at risk to dam failure. In addition, 0.74 square miles (4 percent) of the residential building stock, 0.05 square miles (1 percent) of the non-residential building stock, 3 critical facilities (1 percent), 1 non-critical facility (less than 1 percent), 6 major utilities (8 percent), and 2 transportation systems (1 percent) are located in this hazard area.

6.5.3.2 Urban Conflagration

Less than 1 percent of the City's population (5,333) is located in an extreme urban conflagration area. This includes 0.66 square miles (11 percent) of non-residential building stock and 0.03 square miles (5 percent) of mixed residential/commercial building stock. There is only 1 transportation system located in this hazard area.

Approximately 4 percent of the City's population (38,796) is located in an very high urban conflagration hazard area. This includes 0.59 square miles (6 percent) of residential building stock, 2.50 square miles (40 percent) of non-residential building stock, and 0.05 square miles (8 percent) of mix residential/commercial building stock is located in this hazard area. In addition, there are 5 critical facilities and 5 non-critical facilities, 1 major utility, and 66 transportation systems infrastructure located in this very high urban conflagration hazard area.

Approximately 7 percent of the City's population (60,716) is located in an high urban conflagration hazard area. This includes 0.93 square miles (6 percent) of residential building stock, 1.67 square miles (30 percent) of non-residential building stock, and 0.23 square miles (35 percent) of mix residential/commercial building stock is located in this hazard area. Additionally, there are 6 critical facilities and 6 non-critical facilities, 3 major utilities, and 36 transportation systems infrastructure located in this high urban conflagration hazard area.

6.5.3.3 Human-Caused Hazards

A quantitative analysis for human-caused hazards was not prepared for this version of the plan. As noted in Section 5.3.3.3, the City's population and assets located within the industrial area and land and water transportation corridors are most vulnerable to a hazardous material event. The City's population and assets located within the banking and financing, commercial, defense industrial base, emergency services, energy, government facilities, postal and shipping, transportation, and water sectors are most vulnerable to a WMD event. Areas of economic and symbolic value, places with hazardous facilities, and areas where large groups of people are congregated are most vulnerable to a terrorism attack. Finally, the City's entire population and assets are vulnerable to an energy supply event.

6.6 LAND USE AND DEVELOPMENT TRENDS

The requirements for an overall vulnerability summary and impact summary, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 RECOMMENDATIONS: RISK ASSESSMENT

Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Element

- Does the new or updated plan discuss land uses and development trends?

Source: FEMA 2008.

6.6.1 Land Use

San Francisco serves as the center of the Bay Area. The City's planning nexus consists of the San Francisco Planning Commission and the San Francisco Planning Department. San Francisco's City Charter states that it is the function of the Planning Commission to adopt and maintain a comprehensive, long-term general plan for the future improvement and development of San Francisco.

San Francisco maintains a General Plan, which was last amended in June 1996, and a zoning ordinance (Planning Code), which was last amended in March 2008. San Francisco's Citywide Policy Planning Program maintains the General Plan. The General Plan contains the following ten elements: Air Quality, Arts, Commerce and Industry, Community Facilities, Community Safety, Environmental Protection, Housing, Recreation and Open Space, Transportation, and Urban Design. Currently, the Planning Department is preparing a Preservation Element and a Community Safety Element for adoption into the General Plan. Also, updates to the Housing Element and the Recreation and Open Space Element are under way.

Currently, the Planning Department is updating and clarifying policies set forth in the General Plan through its Citywide Action Plan (CAP). The CAP, first released in 2006, identifies a number of planning-related challenges facing San Francisco and initiatives to address those challenges. In brief, the five challenges addressed in the CAP are to increase the supply and affordability of housing; to build housing where existing services, amenities, and transit lines are

located; to preserve production, distribution, and repair services and land uses within the City; to give priority to travel modes that make the most efficient use of street space, such as transit, bicycling, and walking; and to recognize the need for attractive, walkable streets that serve as civic spaces.

Within the CAP, the Planning Department has identified five initiatives, all based on the General Plan, to address the challenges it identifies. The first initiative is to develop programs that encourage the development of affordable housing Citywide. The second initiative consists of plans for the development of new residential neighborhoods just south of San Francisco's downtown office core. The Planning Department is also planning to implement policy initiatives to support and encourage higher-density mixed-use, primarily residential in-fill development in certain transit-rich areas; to determine essential lands for industrial use and new permanent controls to preserve those industrial lands; and to identify existing industrial lands that can be converted new uses, primarily housing. The CAP also includes new approaches to parking policies in San Francisco, with an emphasis on creating more flexible parking policies.

In addition to the CAP, the Planning Department has a number of programs under way. The Better Neighborhoods Program is currently developing specific plans for three San Francisco neighborhoods: Balboa Park, the Central Waterfront, and the Market and Octavia area. The Better Neighborhoods Program seeks community involvement to improve these neighborhoods and address the specific challenges each neighborhood faces. The Planning Department's Eastern Neighborhoods Program seeks to address the changes that have been occurring in the area in recent years through community planning efforts and the development of permanent zoning controls.

6.6.2 Development Trends

The General Plan also contains Area Plans that serve as guides to future development for specific areas. The General Plan contains Area Plans for the following locations: Bayview, Hunters Point, Central Waterfront, Chinatown, Civic Center, Downtown, Market and Octavia, Northeastern Waterfront, SOMA, Rincon Hill, Van Ness Avenue, and the Western Shoreline.

In conjunction with the City government, the San Francisco Redevelopment Agency (the Redevelopment Agency) implements redevelopment projects, particularly in the General Plan's Area Plans, as designated by the San Francisco Board of Supervisors, and provides local funding for new affordable housing throughout the City. The Redevelopment Agency was incorporated in 1948 for the purpose of improving the environment of San Francisco and creating better urban living conditions through the removal of urban blight. Under California Law, the Redevelopment Agency is legally separate from the City government, but exists solely to perform certain functions exclusively for the City government and by authorization of the City government.

The San Francisco Redevelopment Agency, in conjunction with the Planning Department, has completed a redevelopment plan for the Transbay Terminal and its surroundings. The Planning Department has adopted policies and zoning to support the redevelopment plan, which envisions a mixed-use commercial and residential neighborhood in San Francisco's downtown surrounding a newly rebuilt Transbay Transit Center with enhanced bus and rail service, including the future extension of high-speed rail.

Table 6-21 and Figure C-34 (Appendix C, Figures) show the target neighborhoods in San Francisco's Redevelopment Areas, as identified by the San Francisco Redevelopment Agency.

Table 6-21 Areas of Future Development – San Francisco's Redevelopment Areas

	Location	
Proposed Project	**Realtor Neighborhood**	**Neighborhood Area (Square Miles)**
Transbay	Financial District South	0.55
Mid-Market	South of Market (SOMA)	0.63
South of Market Expansion		
Bay View Hunters Point	Bayview District	2.05
	Hunters Point	1.69

Source: San Francisco Redevelopment Authority 2003.
N/A = Insured value or replacement cost information does not exist.

The results of an exposure analysis of these neighborhoods, and therefore the proposed projects, are show in Table 6-22.

Table 6-22 Potential Hazard Exposure Analysis Overview – San Francisco's Redevelopment Areas

				Financial District South	**South of Market (SOMA)**	**Bayview District**	**Hunters Points**
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**Area (Sq. Miles)**	**Area (Sq. Miles)**	**Area (Sq. Miles)**	**Area (Sq. Miles)**
Seismic Hazards	Ground Shaking	San Andreas	Severe	0.55	0.63	2.02	1.69
			Very Strong	0.00	0.00	0.03	0.00
		Hayward	Very Strong	0.55	0.39	1.99	1.39
			Strong	0.00	0.24	0.06	0.29
			Moderate	0.00	0.00	0.00	0.00
	Ground Failure	Liquefaction	Liquefiable Soil	0.42	0.53	1.11	1.13
		Landslide	Earthquake-Induced Landslide Zone	0.00	0.00	0.02	0.04
	Tsunami	Coastal	Inundation Area	0.00	0.00	0.00	0.00
Weather-Related Hazards*	Flood	Coastal	100-Year Flood Zone	0.00	0.00	.05	0.06
		Stormwater	Ponding Area	0.01	0.03	0.05	0.00
	Wildfire	-----	Very High	0.00	0.00	0.00	0.00
			High	0.00	0.00	0.01	0.11
			Moderate	0.49	0.58	1.99	1.44

Table 6-22 Potential Hazard Exposure Analysis Overview – San Francisco's Redevelopment Areas

				Financial District South	South of Market (SOMA)	Bayview District	Hunters Points
Hazard Group	**Hazard Category**	**Hazard Subcategory**	**Hazard Area**	**Area (Sq. Miles)**	**Area (Sq. Miles)**	**Area (Sq. Miles)**	**Area (Sq. Miles)**
Other Hazards*	Reservoir Failure	-----	Inundation Area	0.00	0.00	0.07	0.00
	Urban Conflagration	-----	Extreme	0.01	0.00	0.25	0.03
			Very High	0.00	0.03	0.22	0.23
			High	0.05	0.02	0.64	0.08

*Drought, heat, landslide, wind, and human-caused hazards are not included in this analysis. Drought, heat, and wind affect San Francisco equally. The best available landslide data are the same data used to create earthquake-induced landslides and, therefore, the data reported for earthquake-induced landslides are the same for weather-related landslides. The potential exposure of human-caused hazards is unknown and, therefore, cannot be included in this analysis.

A capability assessment is not required by the DMA 2000, but is requested by the OES. A capability assessment identifies and evaluates the human and technical, financial, and legal and regulatory resources available for hazard mitigation within a community. As such, the following capability assessment identifies the human and technical, financial, and legal and regulatory mitigation resources available to San Francisco. This capability assessment also describes the current, ongoing, and recently completed mitigation projects by the City.

The recommendations for a capability assessment, as requested by the OES, are described below.

DMA 2000 RECOMMENDATIONS: LOCAL CAPABILITY ASSESSMENT

Local Capability Assessment

Requirement §201.4(c)(3)(ii): – Of the Federal Register Interim Final Rule 44 CFR Parts 201 and 206 states, "[The State mitigation strategy shall include] a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.

Element

- Does the new or updated plan provide a description of the human and technical resources available within this jurisdiction to engage in a mitigation planning process and to develop a local hazard mitigation plan?
- Does the new or updated plan list local mitigation financial resources and funding sources (such as taxes, fees, assessments or fines) which promote mitigation within the reporting jurisdiction?
- Does the new or updated plan list local ordinances which affect or promote disaster mitigation, preparedness, response, or recovery within the reporting jurisdiction?
- Does the new or updated plan describe the details of in-progress, ongoing, or completed mitigation projects and programs within the reporting jurisdiction?

Source: FEMA 2008.

7.1 HUMAN AND TECHNICAL RESOURCES

Table 7-1 describes the City government's human and technical resources that are available to engage in mitigation planning, including overseeing mitigation projects and the implementation of this plan. The staff/personnel resources, responsible department or agency, and principal activities related to hazard mitigation for each department or agency are described in Table 7-1.

Table 7-1 Local Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s) or engineer(s) with knowledge of land development, land management practices, and human-caused and natural hazards	Planning Department	Develops and maintains the General Plan, including the Community Safety Element. Develops area plans based on the General Plan, to provide more specific guidance for the development of the various neighborhood areas. Reviews of private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and Planning Code changes. Applies the approved plans, policies, Planning Code, and other regulations to proposed land use.
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Department of Building Inspection Department of Public Works General Services Agency	The Department of Building Inspection oversees the effective, efficient, fair, and safe enforcement of the San Francisco Building, Housing, Plumbing, Electrical, Mechanical, and Disability Access Codes. The Department of Public Works promotes the undergrounding of overhead utilities; and provides architectural, civil, structural, and mechanical engineering services, including project and construction management. The General Services Agency oversees the maintenance, operations, and management of City-owned buildings and infrastructure, technology and telephony services, design and construction of department's capital improvements, and Citywide risk management.

Table 7-1 Local Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Floodplain Manager	Not Applicable. San Francisco is currently not a member of the National Flood Insurance Program (NFIP). The City government is in the process of joining the NFIP, and once it does, the Floodplain Manager will be the City Administrator	Once San Francisco joins the NFIP, the Floodplain Manager will be responsible for enforcing the Floodplain Damage Prevention Ordinance.
Personnel skilled in GIS and/or HAZUS-MH	Department of Telecommunications and Information Services, Enterprise Geographic Information Systems (SFGIS)	Provides high-quality spatial data to City departments and the public and offers essential mapping services to citizens through SFgov.org.
Emergency managers and analysts	Department of Emergency Management (DEM), Division of Emergency Services	Maintains the Emergency Response Plan for San Francisco. In addition, in partnership with the nine Bay Area counties and the cities of Oakland and San Jose, it helps coordinate regional emergency response planning. Coordinates local response and relief activities within the Emergency Operation Center, and works closely with its regional, state, and federal partners to provide information and coordinate assistance. Highlights the importance of disaster preparedness through public education efforts. Facilitates meetings of the San Francisco Disaster Council.
Finance	Department-specific Mayor's Office of Public Finance	Manages grants. Utilizes three principal types of municipal debt obligations to finance long-term capital projects and the acquisition of select equipment.
Public Information Officers (PIO)	Department-specific	The Division of Emergency Services highlights the importance of disaster preparedness through its public education efforts. Its award-winning website, www.72hours.org, helps San Franciscans plan for emergencies such as earthquakes, fires, severe storms, and power outages. The website is available in English, Spanish, and Chinese.

7.2 FINANCIAL RESOURCES

Table 7-2 describes the local and federal resources that may be available to the City to promote hazard mitigation, including mitigation projects identified in the 2008 HMP implementation strategy. The type and subtype of the financial resource, administrator, purpose, and availability and the amount for each financial resource are discussed in Table 7-2.

Table 7-2 Local and Federal Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount/Availability
Local	General Fund	Department-specific	Program operations and specific projects.	Variable.
	General Obligation (GO) Bonds	Mayor's Office of Public Finance	GO Bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to San Francisco residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	The Board of Supervisors will hold a minimum of two public hearings prior to placing a GO bond measure on the ballot. Prior to any issuance of any new money or refunding general obligation bonds, the Board of Supervisors will approve, by majority vote, a resolution authorizing such issuance. All new money GO bonds issued by the City will be approved by two-thirds of the voters voting in the election. Outstanding general obligation bonded indebtedness cannot exceed 3 percent of the Assessed Valuation of taxable property within County's jurisdictional area.
	Lease Revenue Bonds	Mayor's Office of Public Finance	Lease revenue bonds are appropriately used to finance capital projects that (1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts, etc.), (2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs, or (3) finance the acquisition and installation of equipment for the City's general governmental purposes.	The Board of Supervisors will hold a minimum of one public hearing to place the lease revenue bond measure on the ballot. Subsequent to successful passage and prior to any issuance of new money or refunding lease revenue bonds, the Board of Supervisors will approve, by majority vote, a resolution authorizing such issuance. All new money lease revenue bonds will be approved by 50 percent plus one of the voters voting in the election. No statutory restriction exists on the amount of Lease Revenue Bonds that can be outstanding at any given time.

Table 7-2 Local and Federal Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount/Availability
Local	Certificates of Participation (COPs)	Mayor's Office of Public Finance	Used for acquisition of existing facilities and/or construction of new facilities that result, on a present value basis, in immediate or future savings in payments currently made or to be made by the City's general fund. For example, COPs may be used to provide funds to execute a lease purchase option for a facility whereby future savings accrue, on a net present value basis, to the general fund during the period for which the COPs and the obviated lease would be outstanding.	COPs may consist of lease financing agreements between the City and a for-profit lessor. All issuances of COPs shall be authorized by resolution of the Board of Supervisors by majority vote and then validated by the Superior Court of San Francisco. COPs are not subject to voter approval, but are subject to Validation.
	Public-Private Partnerships	Various Departments, City Administrator	Includes the use of professionals and professional associations, generally for the research and development of guidance, recommendations, etc., such as the CAPPS program.	Project-specific.
Federal	Hazard Mitigation Grant Program (HMGP)	Federal Emergency Management Agency (FEMA)	Support pre- and post-disaster mitigation plans and projects.	Available to California communities after a Presidentially declared disaster has occurred in California. Grant award based on specific projects as they are identified.
	Pre-Disaster Mitigation (PDM) grant program	FEMA	Support pre-disaster mitigation plans and projects.	Available on an annual basis, nationally competitive grant. Grant award based on specific projects as they are identified (no more than $3M federal share for projects).
	Flood Mitigation Assistance (FMA) grant program	FEMA	Mitigate repetitively flooded structures and infrastructure.	Available on an annual basis, distributed to California communities by the Office of Emergency Services (OES). Grant award based on specific projects as they are identified.
	Assistance to Firefighters Grant (AFG) Program	FEMA/USFA (U.S. Fire Administration)	Provide equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Available to fire departments and nonaffiliated emergency medical services. Grant award based on specific projects as they are identified.

Table 7-2 Local and Federal Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount/Availability
Federal	Community Block Grant Program Entitlement Communities Grants	US HUD (U.S. Department of Housing and Urban Development)	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Available to entitled cities, including San Francisco. Grant award based on specific projects as they are identified.
	Community Action for a Renewed Environment (CARE)	U.S. Environmental Protection Agency (EPA)	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local environment. Through CARE, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	Competitive grant program. Grant award based on specific projects as they are identified.
	Clean Water State Revolving Fund (CWSRF)	EPA	The CWSRF is a loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	CWSRF programs provided more than $5 billion annually to fund water quality protection projects for wastewater treatment, non-point source pollution control, and watershed and estuary management. For fiscal year (FY) 2008, the EPA has awarded $66.4 M toward drinking water funds for the State of California to distribute to California communities.
	Public Health Emergency Preparedness (PHEP) Cooperative Agreement.	Department of Health and Human Services' (HHS's) Centers for Disease Control and Prevention (CDC)	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Competitive grant program. Grant award based on specific projects as they are identified.

Table 7-2 Local and Federal Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount/Availability
Federal	Homeland Security Preparedness Technical Assistance Program (HSPTAP)	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Technical assistance services developed and delivered to state and local homeland security personnel. Grant award based on specific projects as they are identified.

7.3 LEGAL AND REGULATORY RESOURCES

Table 7-3 describes the legal and regulatory capabilities that affect or promote hazard mitigation, preparedness, response, and recovery in San Francisco. Legal and regulatory capabilities include San Francisco's plans and policies. The name, description, hazards identified, area of emergency management addressed, and effect on development in hazardous areas for each legal or regulatory capability are discussed in Table 7-3.

Table 7-3 Local Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Plans	City and County of San Francisco, General Plan: Community Safety Element (1997)	Describes various methods of reducing hazards including improvements in coordination among City programs, and more specific policies, such as assuring that new construction meets current structural and life safety standards and building codes consider soil conditions, assessing the risks of hazardous structures (e.g., small wood-framed residential buildings), considering geological hazard information when planning for new development, and identifying and replacing critical lifelines in high risk areas.	Seismic, Landslide, Tsunami, Flood, and Reservoir Failure	Mitigation & Preparedness	Yes
	City and County of San Francisco, Emergency Response Plan (2008)	Describes at a high level what the City's actions will be during a response to an emergency. Forthcoming annexes to this plan will describe in more detail the actions required of City's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and City's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Seismic (including secondary hazards), Civil Unrest, Energy Emergency/Power Shortage, Infectious Disease, Oil Spill, Transportation Disruption, Terrorism/Weapons of Mass Destruction, and Wildfire	Response	No

Table 7-3 Local Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Plans (cont)	San Francisco Public Utilities Commission, Stormwater Management Plan (SWMP) (2004)	Describes measures that the City will take to minimize stormwater pollution. The SWMP is required by the National Pollutant Discharge Elimination System Phase II regulations, which became effective in March 2003.	Stormwater	Mitigation & Preparedness	Yes
Policies	City and County of San Francisco, Executive Directive 08-07	Legislation will address seismic safety issues around "soft-story" buildings. The Directive and legislation will expedite development of retrofit guidelines for soft-story, wood-framed buildings and the processing and review of permits for seismic retrofit upgrades of these buildings.	Seismic	Mitigation	No
	City and County of San Francisco, Unreinforced Masonry Building (UMB) Ordinance No. 225-92	Requires all owners of UMBs to retain a licensed civil structural engineer or architect to file a Building Inventory Form with the Department of Building Inspection (DBI) to identify the "hazard class" of a particular UMB building. The ordinance also requires all owners of UMBs to seismically upgrade buildings by February 15, 2006.	Seismic	Mitigation	Yes
	California Seismic Hazards Mapping Act of 1990: Public Resources Code, Chapter 7.8, Sections 2690–2699.6	Directs the Department of Conservation, California Geological Survey to identify and map areas prone to liquefaction, earthquake-induced landslides, and amplified ground shaking. Cities and counties are then required to use the Seismic Hazard Zone Maps in their land use planning and building permit processes.	Seismic	Mitigation	Yes

Table 7-3 Local Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Policies (cont)	City and County of San Francisco, Building Code 2007 Edition	The purpose of this code is to establish the minimum requirements to safeguard the public health, safety, and general welfare through structural strength, means of egress facilities, stability, access to persons with disabilities, sanitation, adequate lighting and ventilation and energy conservation, and safety to life and property from fire and other hazards attributed to the built environment; to regulate and control the demolition of all buildings and structures, and the quarrying, grading, excavation, and filling of land; and to provide safety to fire fighters and emergency responders during emergency operations. Chapter 7 – Fire-Resistance Rated Construction Chapter 9 – Fire-Protection Systems Chapter 13 – Resource Conservation (Energy Efficiency) Chapter 16 – Structural Design Chapter 16B – Earthquake Hazard Reduction in Unreinforced Masonry Bearing Wall Buildings Chapter 16C – Seismic Strengthening Provisions for Unreinforced Masonry Bearing Wall Buildings Chapter 16D – Parapets and Appendages	Seismic, Fire, Energy	Mitigation, Preparedness, and Response	Yes
	City and County of San Francisco, Housing Code 2007 Edition	The purpose of this code is to provide for the maintenance of the minimum requirements for the protection of life, limb, health, property, safety, and welfare of the general public and the owners and occupants of residential buildings in San Francisco. Specific chapters of the code that address hazards include: Chapter 6 – Structural Requirements Chapter 9 – Fire Protection Chapter 12 – Residential Energy Conservation Chapter 13 – Residential Water Conservation	Seismic, Fire, Energy, Drought	Mitigation, Preparedness, and Response	Yes

Table 7-3 Local Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Policies (cont)	City and County of San Francisco, Municipal Code 2001 Fire Code (referred to as the 2007 San Francisco Fire Code)	Regulates and governs the safeguarding of life and property from fire and explosions hazards arising from the storage, handling, and use of hazardous substances, materials, and devices, and from conditions hazardous to life or property in the occupancy of buildings and premises as herein provided; and to provide for the issuance of permits, inspections, and other Fire Department services, and the assessment and collection of fees for those permits, inspections, and services.	Fire	Preparedness	No
	High-Rise Sprinkler Ordinance	All non-residential buildings 75 feet and higher are required to have sprinklers by an ordinance passed 11/15/93, excluding apartment and condominium buildings.	Fire	Property Prevention	No
	City and County of San Francisco, Municipal Health Code (2008)	Article 21 Hazardous Materials provides information on the location, type, and health risks of hazardous materials used, stored, or disposed of in the City to firefighters, health officials, planners, elected officials, and residents. Article 22 Risk Management implements the program for prevention of accidental releases.	Hazardous Materials	Preparedness & Response	No

7.4 MITIGATION PROJECTS AND PROGRAMS

Table 7-4 describes current, ongoing, and completed large-scale mitigation projects and programs implemented by San Francisco. For this capability assessment, current projects are those that are being implemented now and in the near term, and ongoing projects are those that have been implemented and continue to be implemented over an extended period of time (+10 years). Because San Francisco has implemented numerous mitigation projects and programs, only mitigation projects and programs for its critical facilities, major utilities/transportation systems, and residential buildings are addressed. The type of facility/utility/transportation system/building mitigated, a description, and a timeframe for each project and program are identified below.

Table 7-4 Local Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status	Critical Facilities, Major Utilities/Transportation Systems, Private Buildings	Description	Year(s)
Current	Critical Facilities	San Francisco General Hospital (SFGH) Seismic Retrofit In 2000, the San Francisco Department of Public Health (SFDPH) commissioned a seismic evaluation study, which concluded that the Main Hospital building at SFGH has significant seismic deficiencies and that it may not be capable of providing health care services to the public after a major seismic event. The SFGH Main Building was categorized as Structural Performance Category 1 (SPC-1). Buildings categorized as SPC-1 pose a significant risk of partial or total collapse and a danger to the public. In 2001 the San Francisco Health Commission adopted Resolution 1-01 supporting the construction of a new general acute care hospital by 2013.	To be completed by 2013
	Major Utilities & Transportation Systems	See Ongoing Projects and Programs, Port of San Francisco Capital Plan See Ongoing Projects and Programs, San Francisco Public Utilities Commission (SFPUC) Capital Improvement Program.	

Table 7-4 Local Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status	Critical Facilities, Major Utilities/Transportation Systems, Private Buildings	Description	Year(s)
Current (cont)	Private Buildings	Soft-Story Building Seismic Retrofit Program San Francisco Mayor Gavin Newsom announced new legislation on July 8, 2008, to expedite the review of retrofit permits sought by owners and waive of fees associated with the permits. Pacific Engineering Earthquake Research Center (PEER) Tall Buildings Initiative Develop a framework for seismic design of tall buildings, summarized in a final guidelines document containing principles and specific criteria for tall building seismic design. The document is intended to support ongoing guidelines and code-writing activities of collaborating organizations, as well as being a stand-alone reference for designers of high-rise buildings.	Soft-Story Building Retrofit Program – Introduced in July 2008 PEER Tall Buildings Initiative – Started in 2007
Ongoing	Critical Facilities	San Francisco Unified School District (SFUSD) Capital Improvements Substantial capital improvements to the system are ongoing at schools throughout San Francisco, including addressing modernization needs at 30 school sites and since 2006 including 64 projects at 59 additional sites, for a total of 89 of its 195 building sites. San Francisco Fire Commission Resolution 07-6 The Fire Commission and Department have requested that the City fund capital improvements to the existing fire stations and other facilities. The majority of department's facilities were built in the early-mid 1900s, and many have not had routine maintenance or needed replacement, renewal, renovation, or upgrade over the years.	SFUSD Capital Improvements – Ongoing since 2003 SF Fire Commission Resolution – fiscal year (FY) 2007– FY 2008, otherwise ongoing

Table 7-4 Local Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status	Critical Facilities, Major Utilities/Transportation Systems, Private Buildings	Description	Year(s)
Ongoing (cont)	Major Utilities & Transportation Systems	Port of San Francisco (Port) Capital Plan Port estimates it will take approximately $300M for substructure and seismic work to upgrade Port facilities. The Port has seismically upgraded several facilities along the central and northern waterfront, including Pier 48, AT&T Park, Ferry Building and Ferry Plaza, Pier 1, Pier 1.5-3-5, Pier 45, Aquarium by the Bay, and Pier 27/29. SFPUC Capital Improvement Program (CIP) In May 2002, the SFPUC adopted a $2.9 billion CIP to rebuild and retrofit the regional water system to improve system reliability, especially to ensure seismic safety. The list of the 94 projects, including several seismic safety projects and flood and stormwater protection projects, can be viewed at http://sfwater.org/ProjectList.cfm/MC_ID/21/MSC_ID/360/MTO_ID/525/Page/1/Type/1u SFPUC Stormwater Management Demonstration Projects A 1,200-square-foot green roof was constructed atop the Summit Pump Station in central San Francisco, as part of an upgrade of the pump station facility. The impetus for the green roof was primarily aesthetic, because the facility roof is visible from the surrounding hills, and also hydrologic, to provide low-impact stormwater management, also called Low Impact Development (LID).	Port of San Francisco Capital Plan – various facilities seismically upgraded since 1989 SFPUC CIP – Ongoing since 2002 SFPUC Demonstration Projects – Ongoing since 2007

Table 7-4 Local Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status	Critical Facilities, Major Utilities/Transportation Systems, Private Buildings	Description	Year(s)
Ongoing (cont)	Private Buildings	Parapet Program Requires private property owners to reinforce older parapets and roofline appendages to reduce the risk of damage from earthquakes. Community Action Plan for Seismic Safety (CAPSS) Project Initiated by the Department of Building Inspection in 2000 to evaluate seismic risk in San Francisco and to conduct public meetings to obtain input on proposed hazard mitigation approaches for reducing these risks, including expediting completion of the soft-story component of the CAPSS initiative, including the development of retrofit guidelines for soft-story, wood-framed buildings. Unreinforced Masonry Building (UMB) Retrofit Program Provides $350M in bonds to retrofit privately owned UMBs. The program is administered by the Department of Building Inspection and is designed to minimize the displacement of residents and commercial tenants after a disaster.	Parapet Program – Ongoing since 1969 CAPSS Project – Ongoing since 2000 UMB Retrofit Program – Ongoing since 1992

Table 7-4 Local Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status	Critical Facilities, Major Utilities/Transportation Systems, Private Buildings	Description	Year(s)
Completed	Critical Facilities	Seismic Retrofit of San Francisco City Hall After the Loma Prieta earthquake in 1989, structural engineers determined that City Hall was seismically unsafe. The City completed a $293 million upgrade and seismic retrofit in 1998. The resurrected City Hall was officially reopened on January 5, 1999. To isolate it from the shock of the next "big one," engineers installed 530 Lead-Rubber Isolators that act like huge shock absorbers, making City Hall the world's largest base-isolated building.	Seismic Retrofit of SF City Hall – Completed in 1999
	Major Utilities & Transportation Systems	See Ongoing Projects and Programs, Port of San Francisco Capital Plan See Ongoing Projects and Programs, SFPUC Capital Improvement Program	
	Private Buildings	San Francisco Housing Authority (SFHA) HOPE VI Revitalization Project Severely distressed public housing mid- and high-rises, including Hayes Valley North and South, Bernal Dwellings, Plaza East, North Beach Place, and Valencia Garden, were demolished and rebuilt to current San Francisco building codes for seismic and fire safety. Unreinforced Masonry Building Survey The Landmarks Preservation Advisory Board conducted a survey of UMB construction in San Francisco from 1850–1940. The survey prioritizes the UMBs into three groupings of buildings, with Priority 1 resources rated as the highest.	SFHA HOPE VI Revitalization Project – Completed in 2006 UMB Survey – Completed and Adopted in 1991

This section outlines the four-step process for preparing a mitigation strategy: developing mitigation goals, identifying mitigation actions, evaluating and prioritizing mitigation actions, and designing an implementation strategy.

8.1 DEVELOPING MITIGATION GOALS

The requirements for developing local hazard mitigation goals, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY

Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Element

- Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?

Source: FEMA 2008.

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide vision. As shown in Table 8-1, the Planning Team developed five goals, including one multi-hazard goal; one preparedness, response, and recovery goal; and one goal to address each of the three hazard groups identified in this plan.

Table 8-1 Mitigation Goals

Goal Number	Goal Description
1	Promote disaster-resistant development.
2	Build and support local capacity to enable the City government and the greater San Francisco community to prepare for, respond to, and recover from disasters.
3	Reduce the possibility of damages and losses due to seismic hazards, including ground shaking, ground failure, and tsunami.
4	Reduce the possibility of damages and losses due to weather-related hazards, including drought, flood, heat, landslide, wildfire, and wind.
5	Reduce the possibility of damages and losses due to other hazards, including reservoir failure, urban conflagration, and human-caused hazards.

8.2 IDENTIFYING MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?
- Does the mitigation strategy identify actions related to the participation in and continued compliance with the NFIP?

Source: FEMA 2008.

During the second Planning Team meeting on June 25, 2008, the Planning Team reviewed a draft of the vulnerability analysis and hazard maps as a basis for developing potential mitigation actions. In addition, the Planning Team reviewed the 2 mitigation actions selected in the 2005 HMP (one mitigation action, the seismic retrofit of the Port of San Francisco Agriculture Building, has already been implemented). Using this information, the Planning Team members were asked to develop new and additional potential mitigation actions. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

As listed in Table 8-2, the Planning Team developed 33 potential mitigation actions. For each mitigation action, the following information is listed: type of mitigation project; hazard(s) addressed; type of development affected by action; and the source of the mitigation project idea.

Table 8-2 Potential Mitigation Actions

Goal	Action #	Action Description	Mitigation Type	Hazard(s) Addressed*	Existing or New Development	Project Idea Source
Promote disaster-resistant development.	1.A	Create a coordinated voluntary and mandatory GIS-based pre-application review for new construction and major remodels in hazard areas, such as liquefaction, lateral spread, landslide, or SFHA zones.	Property Protection	Seismic, Flood, Landslide	New & Existing	HMP Planning Team
	1.B	Integrate the ERP and 2008 HMP into the General Plan's Community Safety Element update process.	Prevention & Property Protection	All	New & Existing	HMP Planning Team
Build and support local capacity to enable the City government and the greater San Francisco community to prepare for, respond to, and recover from disasters.	2.A	Retrofit major utilities or mitigate land (e.g., slope stabilization, vegetation management) around the major utilities so that they can function before, during, and after a disaster.	Prevention	Seismic, Flood, Landslide, Wildfire	Existing	URS
	2.B	Inventory and develop replacement values for all City-owned facilities to help the City better understand the values of assets at risk.	Property Protection	All	Existing	Risk Management Division
	2.C	Replace and/or seismically retrofit the AWSS infrastructure to ensure that emergency water is available during a disaster.	Structural Project	Seismic	Existing	Capital Planning Program
	2.D	Seismically retrofit or replace City-owned bridges and other critical street structures that are categorized as structurally deficient by Caltrans and are necessary for first responders to use during an emergency.	Structural Project	Seismic	Existing	Capital Planning Program
	2.E	Structurally and non-structurally retrofit the future San Francisco Data Center to ensure that City's emergency communication functions are operable during and after a disaster.	Structural Project	Seismic	Existing	Capital Planning Program
	2.F	Carry out exercises and interdepartmental meetings to ensure that all City plans related to emergency management are integrated and cohesive.	Emergency Services	All	N/A	HMP Planning Team

Table 8-2 Potential Mitigation Actions

Goal	Action #	Action Description	Mitigation Type	Hazard(s) Addressed*	Existing or New Development	Project Idea Source
Reduce the possibility of damages and losses due to seismic hazards, including ground shaking, ground failure, and tsunami.*	3.A	Develop a Soft-Story Seismic Retrofit program that provides funding to seismically retrofit soft-story buildings throughout San Francisco.	Property Protection, Structural Project	Seismic	Existing	Planning Department
	3.B	Implement industry guidelines and building codes developed by the PEER Tall Building Initiative.	Structural Project	Seismic	New & Existing	HMP Planning Team
	3.C	Participate in the Tsunami Ready Program. This new program, sponsored by the National Weather Service, is designed to provide communities with incentives to reduce tsunami risks.	Public Education & Awareness	Seismic (Tsunami)	N/A	NOAA
	3.D	Seismically upgrade the Port's facilities identified in the Port's Capital Plan.	Structural Project	Seismic	Existing	2005 HMP
	3.E	Structurally and non-structurally brace the areas of the Veterans Building, including Herbst Theatre and the Green Room, that are most at risk to severe damage during a seismic event.	Property Protection, Structural Project	Seismic	Existing	Capital Planning Program
	3.F	Structurally and non-structurally brace SFUSD facilities as identified in its Capital Improvements Plan.	Property Protection, Structural Project	Seismic	Existing	HMP Planning Team
	3.G	Implement geotechnical stabilization measures to protect the Treasure Island from seismic hazards.	Structural Projects	Seismic	New & Existing	TIDA
	3.H	Seismically upgrade Treasure Island Causeway, which is a critical lifeline access to the island, and to protect the utility corridor that runs under the causeway.	Structural Project	Seismic	Existing	TIDA
	3.I	Seismically retrofit or upgrade Recreation and Parks Department facilities identified as potential shelters.	Structural Project	Seismic	Existing	Parks & Recreation Department

Table 8-2 Potential Mitigation Actions

Goal	Action #	Action Description	Mitigation Type	Hazard(s) Addressed*	Existing or New Development	Project Idea Source
Reduce the possibility of damages and losses due to weather-related hazards, including drought, flood, heat, landslide, wildfire, and wind.	4.A	Upon joining the NFIP, implement the floodplain management ordinance for existing and new development in the SFHA (identify structures/parcels located in the SFHA, incorporate elevation requirements into the development of a permitting process for new or substantially improved properties, and prepare of Elevation Certificates when necessary).	Property Protection	Flood	New & Existing	Port of San Francisco, City Administrator
	4.B	Implement landscape-based stormwater management techniques in San Francisco, including Low Impact Development (LID) projects such as vegetated swales and infiltration basins that can recharge groundwater reserves.	Public Education & Awareness, Natural Resource Protection	Flood (Stormwater)	Existing	SFPUC Stormwater Management Demonstration Projects
	4.C	Implement a grant-funded program for the Voluntary Fire Sprinkler Retrofit program.	Property Protection	Urban Conflagration	Existing	HMP Planning Team
	4.D	Stabilize cliffs susceptible to sliding and failure through bolts, soft netting, and vegetation stabilization methods.	Prevention, Property Protection	Landslide	New & Existing	USGS
	4.E	Develop and implement beach-nourishment projects for San Francisco beaches affected by beach erosion caused by strong El Niños.	Natural Resource Protection	Flood/Wind	Existing	DPW
	4.F	Develop and implement a stormwater systems upgrade to better accommodate stormwater and reduce stormwater ponding and localized flooding.	Prevention	Flood (Stormwater)	Existing	PUC
	4.G	Develop a drought contingency plan to provide an effective and systematic means of assessing drought conditions, develop mitigation actions and programs to reduce risks in advance of drought, and develop response options that minimize hardships during drought.	Prevention, Natural Resource Protection	Drought	N/A	Navajo Nation Drought Contingency Plan

Table 8-2 Potential Mitigation Actions

Goal	Action #	Action Description	Mitigation Type	Hazard(s) Addressed*	Existing or New Development	Project Idea Source
Reduce the possibility of damages and losses due to weather-related hazards, including drought, floods, heat, landslide, wildfire, and wind. (cont.)	4.H	Carry-out hydrology/hydraulic studies to determine the feasibility of the proposed perimeter flood protection for Treasure Island.	Property Protection	Flood	New and Existing	TIDA
	4.I	Build ring levees around the drainage pump houses (localized flood control projects) to specifically protect the pumps, which are critical elements in the island's flood control system. This element of construction is separate from the larger flood control project on the island.	Property Protection	Flood	Existing	TIDA
	4.J	Implement a fuel reduction program, such as the collection and disposal of dead fuel, within parks and open spaces.	Prevention, Natural Resource Protection	Wildfire	New and Existing	URS
Reduce the possibility of damages and losses due to other hazards, including dam and reservoir failure, urban conflagration, and human-caused hazards.	5.A	Develop a public outreach and awareness program about heat and human health. Ideas include media announcements, buddy system, heat line, increased emergency medical staff, home visits to the elderly, cooling stations, outreach visits to the homeless, etc.	Public Education & Awareness	Heat	N/A	URS
	5.B	Examine and mitigate City-owned ramps, streets, and bridges that have been identified as being too narrow or having too many tight turns to ensure the safe transportation of truck loads.	Prevention	Hazardous Material Event	Existing	URS
	5.C	Provide an annual training glass and exercise for the Pacific Coast Federation of Fishermen's Associations (San Francisco fishing fleet) to be trained/retrained in boom deployment and oil cleanup.	Natural Resource Protection	Oil Spill	Existing	CA Assembly, Natural Resources Committee
	5.D	Implement recommended Buffer Zone Protection measures for pre-designated critical facilities and infrastructure.	Prevention	WMD/Terrorism	Existing	Northeast States Emergency Consortium

Table 8-2 Potential Mitigation Actions

Goal	Action #	Action Description	Mitigation Type	Hazard(s) Addressed*	Existing or New Development	Project Idea Source
Reduce the possibility of damages and losses due to other hazards, including dam and reservoir failure, urban conflagration, and human-caused hazards.	5.E	Create a cool roofs grant or incentive program for property owners that meet or exceed the EPA Energy Star Cool Roof Standards. The standards are intended to reduce the urban heat island effect or the warming caused in cities when heat is absorbed by pavement and other dark surfaces.	Prevention	Energy Emergency	Existing and New	EPA
	5.F	Secure funding for small-scale projects of the larger $4.3 billion retrofit of the Hetch Hetchy system.	Structural Project	Seismic, Reservoir Failure	Existing	SFPUC

* "Seismic" as listed in the "Hazard(s) Addressed" category of this table refers to both ground shaking and ground failure (earthquake-induced landslide, liquefaction, and/or lateral spread), unless otherwise noted.

8.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The requirements for the evaluation and prioritization of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered? (For example, does it identify the responsible department, existing and potential resources, and timeframe?)
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?

Source: FEMA 2008.

After a list of potential mitigation actions had been developed, the Planning Team evaluated and prioritized each of the mitigation actions to determine which actions would be included in the implementation strategy. To complete this task, the Planning Team reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (shown in Table 8-3) to consider the opportunities and constraints of implementing each particular mitigation action.

Table 8-3 Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support

Table 8-3 Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, state, and federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, state, and federal laws

Next, the Planning Team developed their own evaluation criteria, including the following:

1. Current or potential support from the Mayor and/or Board of Supervisors
2. Local City department or agency champion
3. Ability to be implemented during the 5-year lifespan of this version of the 2008 HMP
4. Ability to reduce expected future damages and losses (cost-benefit)
5. Value added to resiliency (of the City and its citizens)
6. "Low-lying fruit" projects (projects that are easy to develop, fund, implement, and close out)

As shown in Table 8-4, the Planning Team rated the mitigation actions against the criteria. Next, they determined that the mitigation actions the met the most criteria would be ranked as "high priority" mitigation actions.

Table 8-4 "High Priority" Mitigation Action Selection Process

Action #	Action Description	Criterion #	High Priority
1.A	Create a coordinated voluntary and mandatory GIS-based pre-application review for new construction and major remodels in hazard areas, such as liquefaction, lateral spread, landslide, or SFHA zones.	2, 3, 4	✓
1.B	Integrate the ERP and 2008 HMP into the General Plan's Community Safety Element update process.	2	
2.A	Retrofit major utilities or mitigate land (e.g., slope stabilization, vegetation management) around the major utilities so that they can function before, during, and after a disaster.	2, 3	
2.B	Inventory and develop replacement values for all City-owned facilities to help the City better understand the values of assets at risk.	2, 3, 6	✓
2.C	Replace and/or seismically retrofit the AWSS infrastructure to ensure that emergency water is available during a disaster.	1, 2, 4, 5	✓

Table 8-4 "High Priority" Mitigation Action Selection Process

Action #	Action Description	Criterion #	High Priority
2.D	Seismically retrofit or replace City-owned bridges and other critical street structures that are categorized as structurally deficient by Caltrans and are necessary for first responders to use during an emergency.	1, 2, 4, 5	✓
2.E	Structurally and non-structurally retrofit the future San Francisco Data Center to ensure that City's emergency communication functions are operable during and after a disaster.	2, 3	
2.F	Carry out exercises and interdepartmental meetings to ensure that all City plans related to emergency management are integrated and cohesive.	2	
3.A	Develop a Soft-Story Seismic Retrofit program that provides funding to seismically retrofit soft-story buildings throughout San Francisco.	1, 2, 3, 4, 5	✓
3.B	Implement industry guidelines and building codes developed by the PEER Tall Building Initiative.	2, 4, 6	✓
3.C	Participate in the Tsunami Ready Program. This new program, sponsored by the National Weather Service, is designed to provide communities with incentives to reduce tsunami risks.	4	
3.D	Seismically upgrade the Port's facilities identified in the Port's Capital Plan.	2, 4	
3.E	Structurally and non-structurally brace the areas of the Veterans Building, including Herbst Theatre and the Green Room, that are most at risk to severe damage during a seismic event.	2, 4	
3.F	Structurally and non-structurally brace SFUSD facilities as identified in its Capital Improvements Plan.	4, 5	
3.G	Implement geotechnical stabilization measures to protect the Treasure island from seismic hazards.	3, 4	
3.H	Seismically upgrade Treasure Island Causeway, which is a critical lifeline access to the island, and to protect the utility corridor that runs under the causeway.	2, 4, 5	✓
3.I	Seismically retrofit or upgrade Recreation and Parks Department facilities identified as potential shelters.	1, 2, 3, 4, 5	✓
4.A	Upon joining the NFIP, implement the floodplain management ordinance for existing and new development in the SFHA (identify structures/parcels located in the SFHA, incorporate elevation requirements into the development of a permitting process for new or substantially improved properties, and prepare of Elevation Certificates when necessary).	1, 2, 3, 4	✓
4.B	Implement landscape-based stormwater management techniques in San Francisco, including Low Impact Development (LID) projects such as vegetated swales and infiltration basins that can recharge groundwater reserves.	3, 6	
4.C	Implement a grant-funded program for the Voluntary Fire Sprinkler Retrofit program.	2, 5	
4.D	Stabilize cliffs susceptible to sliding and failure through bolts, soft netting, and vegetation stabilization methods.	2, 3, 4, 5	✓
4.E	Develop and implement beach-nourishment projects for San Francisco beaches affected by beach erosion caused by strong El Niños.	2, 3, 4, 6	✓
4.F	Develop and implement a stormwater systems upgrade to better accommodate stormwater and reduce stormwater ponding and localized flooding.	2, 3, 4, 5	✓

Table 8-4 "High Priority" Mitigation Action Selection Process

Action #	Action Description	Criterion #	High Priority
4.G	Develop a drought contingency plan to provide an effective and systematic means of assessing drought conditions, develop mitigation actions and programs to reduce risks in advance of drought, and develop response options that minimize hardships during drought.	3	
4.H	Carry-out hydrology/hydraulic studies to determine the feasibility of the proposed perimeter flood protection for Treasure Island.	2, 3	
4.I	Build ring levees around the drainage pump houses (localized flood control projects) to specifically protect the pumps, which are critical elements in the island's flood control system. This element of construction is separate from the larger flood control project on the island.	2, 3, 4	✓
4.J	Implement a fuel reduction program, such as the collection and disposal of dead fuel, within parks and open spaces.	2	
5.A	Develop a public outreach and awareness program about heat and human health. Ideas include media announcements, buddy system, heat line, increased emergency medical staff, home visits to the elderly, cooling stations, outreach visits to the homeless, etc.	2, 5, 6	✓
5.B	Examine and mitigate City-owned ramps, streets, and bridges that have been identified as being too narrow or having too many tight turns to ensure the safe transportation of truck loads.	4	
5.C	Provide an annual training glass and exercise for the Pacific Coast Federation of Fishermen's Associations (San Francisco fishing fleet) to be trained/retrained in boom deployment and oil cleanup.	1, 3, 4, 5	✓
5.D	Implement recommended Buffer Zone Protection measures for pre-designated critical facilities and infrastructure.	2, 3, 6	✓
5.E	Create a cool roofs grant or incentive program for property owners that meet or exceed the EPA Energy Star Cool Roof Standards. The standards are intended to reduce the urban heat island effect or the warming caused in cities when heat is absorbed by pavement and other dark surfaces.	3	
5.F	Secure funding for small-scale projects of the larger $4.3 billion retrofit of the Hetch Hetchy system.	2, 4	

8.4 DESIGNING AN IMPLEMENTATION STRATEGY

Table 8-5 shows the implementation strategy, which includes all high-priority mitigation actions that, pending funding availability, the City intends to implement during the 5-year lifespan of this version of the plan. Listed with each mitigation action is administering department or agency, estimated timeframe to complete project, potential funding source, and estimated project cost.

Table 8-5 Implementation Strategy Matrix

Action Number	Description	Administering Department	Estimated Project Timeframe	Potential Funding Source	Estimated Cost
1.A	Create a coordinated voluntary and mandatory GIS-based pre-application review for new construction and major remodels in hazard areas, such as liquefaction, lateral spread, landslide, or SFHA zones.	Planning Department or DBI	1-2 years	HMGP or PDM, General Fund	$500,000
2.B	Inventory and develop replacement values for all City-owned facilities to help the City better understand the values of assets at risk.	Risk Management Division	1-3 years	HMGP or PDM, General Fund	$200,000
2.C	Replace and/or seismically retrofit the AWSS infrastructure to ensure that emergency water is available during a disaster.	Fire Department	1-3 years	HMGP or PDM, Lease-Revenue Bonds	$80,000, 000 (entire systems project, smaller projects can be funded and implemented)
2.D	Seismically retrofit or replace City-owned bridges and other critical street structures that are categorized as structurally deficient by Caltrans and are necessary for first responders to use during an emergency.	DPW	3 years	HMGP or PDM, Lease-Revenue Bonds	Unknown
3.A	Develop a Soft-Story Seismic Retrofit program that provides funding to seismically retrofit soft-story buildings throughout San Francisco.	Planning Department or DBI	Ongoing	HMGP or PDM	$3,000,000
3.B	Implement industry guidelines and building codes developed by the PEER Tall Building Initiative.	DBI	1-2 years	HMGP or PDM	$500,000
3.H	Seismically upgrade Treasure Island Causeway, which is a critical lifeline access to the island, and to protect the utility corridor that runs under the causeway.	TIDA	12 months	HMGP or PDM	$5,000,000
3.I	Seismically retrofit or upgrade Recreation and Parks Department facilities identified as potential shelters.	Recreation and Parks Department	1-3 years	HMGP or PDM	$3,000,000
4.A	Upon joining the NFIP, implement the floodplain management ordinance for existing and new development in the SFHA (identify structures/parcels located in the SFHA, incorporate elevation requirements into the development of a permitting process for new or	City Administrator	Ongoing	General Fund	N/A

Table 8-5 Implementation Strategy Matrix

Action Number	Description	Administering Department	Estimated Project Timeframe	Potential Funding Source	Estimated Cost
	substantially improved properties, and prepare of Elevation Certificates when necessary).				
4.D	Stabilize cliffs susceptible to sliding and failure through bolts, soft netting, and vegetation stabilization methods.	DPW	1-3 years	HMGP or PDM	$3,000,000
4.E	Develop and implement beach-nourishment projects for San Francisco beaches affected by beach erosion caused by strong El Niños.	DPW	1-3 years	HMGP or PDM	$3,000,000
4.F	Develop and implement a stormwater systems upgrade to better accommodate stormwater and reduce stormwater ponding and localized flooding.	DPW	1-5 years	CWSRF	Unknown
4.I	Build ring levees around the drainage pump houses (localized flood control projects) to specifically protect the pumps, which are critical elements in the island's flood control system. This element of construction is separate from the larger flood control project on the island.	TIDA	1 year	HMGP or PDM	$4,000,000
5.A	Develop a public outreach and awareness program about heat and human health. Ideas include media announcements, buddy system, heat line, increased emergency medical staff, home visits to the elderly, cooling stations, outreach visits to the homeless, etc.	Human Services Agency	Initial development 1 year, then ongoing	PHEP	$1,500,000
5.C	Provide an annual training glass and exercise for the Pacific Coast Federation of Fishermen's Associations (San Francisco fishing fleet) to be trained/retrained in boom deployment and oil cleanup.	DEM	Annually	HSPTAP	$100,000/annually
5.D	Implement recommended Buffer Zone Protection measures for pre-designated critical facilities and infrastructure.	DEM	3-5 years	HSPTAP	Unknown

This section describes a formal plan maintenance process to ensure that the 2008 HMP remains an active and applicable document. It includes an explanation of how the City's DEM and Planning Team intend to organize their efforts to ensure that improvements and revisions to the 2008 HMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail below:

- Monitoring, evaluating, and updating the HMP
- Implementation through existing planning mechanisms
- Continued public involvement

9.1 MONITORING, EVALUATING, AND UPDATING THE PLAN

The requirements for monitoring, evaluating, and updating the 2008 HMP, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PLAN MAINTENANCE PROCESS

Monitoring, Evaluating and Updating the Plan

Requirement §201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Element

- Does the new or updated plan describe the method and schedule for monitoring the plan? (For example, does it identify the party responsible for monitoring and include a schedule for reports, site visits, phone calls, and meetings?)
- Does the new or updated plan describe the method and schedule for evaluating the plan? (For example, does it identify the party responsible for evaluating the plan and include the criteria used to evaluate the plan?)
- Does the new or updated plan describe the method and schedule for updating the plan within the five-year cycle?

Source: FEMA 2008.

The 2008 HMP was prepared as a collaborative effort among DEM, the Planning Team, and the consultants. To maintain momentum and build on previous hazard mitigation planning efforts and successes, DEM will make use of the Planning Team to monitor, evaluate, and update the 2008 HMP. The current Planning Team Point of Contact (POC), which is from DEM, will continue to serve as the POC and will coordinate all local efforts to monitor, evaluate, and update this document.

Every 12 months from plan adoption, the Planning Team POC will email each member of the Planning Team an Annual Review Questionnaire to complete. As shown in Appendix G, Plan Maintenance Documents, the Annual Review Questionnaire will include an evaluation of the following: planning process, hazard analysis, vulnerability analysis, capability assessment, and mitigation strategy. The Planning Team POC will collect all completed questionnaires and determine if the 2008 HMP needs to be updated to address new or more threatening hazards, new technical reports or findings, and new or better-defined mitigation projects. The Planning Team POC will summarize these findings and email them out to the Planning Team. If the Planning Team POC believes that the 2008 HMP needs to be updated based on the findings, then the

Planning Team POC will request that the Planning Team members attend an HMP update Planning Team meeting.

In addition, the implementation strategy will be monitored and updated through the use of the Mitigation Project Progress Report. During each annual review, each department or agency currently administering a mitigation project will submit a progress report to the Planning Team POC to review and evaluate. As shown in Appendix G, Plan Maintenance Documents, the report will discuss the current status of the mitigation project, including any changes made to the project, identify implementation problems, and describe appropriate strategies to overcome them. After considering the findings of the submitted progress reports, the Planning Team POC may request that the implementing department or agency meet to discuss project conditions.

In addition to the Annual Review Questionnaire, Mitigation Project Progress Report, and any annual meetings, the Planning Team will meet to update the 2008 HMP every 5 years. To ensure that this update occurs, in the fourth year following plan adoption, the Planning Team will undertake the following activities:

- Thoroughly analyze and update the risk of natural and human-made hazards in San Francisco
- Complete a new Annual Review Questionnaire and review previous questionnaires
- Provide a detailed review and revision of the mitigation strategy
- Prepare a new implementation strategy
- Prepare a new draft HMP and submit it to the Board of Supervisors for adoption
- Submit an updated HMP to the OES and FEMA for approval

9.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PLANNING PROCESS

Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Element

- Does the new or updated plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan?
- Does the new or updated plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?

Source: FEMA 2008.

After the adoption of the 2008 HMP, the Planning Team will ensure that elements of the 2008 HMP are incorporated into other existing planning mechanisms. The processes for incorporating the 2008 HMP into various planning documents will occur as (1) other plans are updated and (2) new plans are developed.

Therefore, various members of the Planning Team will undertake the following activities:

Planning Team members from DEM will ensure that as other emergency management plans are being developed or updated, hazards and risk addressed in these plans are consistent with those identified and profiled in the 2008 HMP.

Planning Team members from the Planning Department will ensure that hazards addressed in the Community Safety Element update of the General Plan are consistent with those profiled in the 2008 HMP. In addition, during the Safety Element update process, the Planning Team members for the Planning Department will ensure that the goals identified in the mitigation strategy are addressed as "objectives" and the mitigation actions developed in the implementation strategy are addressed as "policies" in the Community Safety Element.

Planning Team members from the SFPUC will ensure that during the Stormwater Management Plan's update for Treasure Island, Mission Bay, and Hunters Point stormwater hazards profile and exposure analysis from the 2008 SF HMP is incorporated into the plan.

Planning Team members from the SFPUC will work to integrate SFPUC-related mitigation actions in the implementation strategy into the agency's Capitol Improvement Program as the program is updated.

9.3 CONTINUED PUBLIC INVOLVEMENT

The requirements for continued public involvement, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PLANNING PROCESS

Continued Public Involvement

Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

Element

- Does the new or updated plan explain how continued public participation will be obtained? (For example, will there be public notices, an ongoing mitigation plan committee, or annual review meetings with stakeholders?)

Source: FEMA 2008.

The DEM and Planning Team are dedicated to involving the public directly in the continual reshaping and updating the City's HMP. A downloadable copy of the 2008 HMP will be available on DEM's website. Also, any proposed changes or updates will be posted on the "News and Alerts" link on DEM's website. DEM's website will also contain an e-mail address and phone number to which people can direct their comments or concerns.

During the 2008 HMP update, DEM did not receive any public comments regarding the hazards, figures, or plan posted to the DEM website. As such, the Planning Team is committed to identify additional opportunities to raise community awareness about the 2008 HMP and the hazards that affect San Francisco. As such, the DEM will work organizers of local emergency preparedness and response special events, including events sponsored by the San Francisco Neighborhood Emergency Response Team and the American Red Cross Bay Area Chapter, to distribute fliers and handouts about the 2008 HMP, hazards that affect the City, and current and future mitigation projects.

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Appendix A
FEMA Crosswalk

Single Jurisdiction & Multi-Jurisdiction, Local Hazard Mitigation Plan (LHMP), LHMP Review and Approval Status

Single/Lead Jurisdiction:	**Title of LHMP Plan:**	**Date of Plan:**
City and County of San Francisco	2008 San Francisco Hazard Mitigation Plan	August 2008

Local Point of Contact: Lt. Babe Franey	**Address:** Department of Emergency Management Division of Emergency Services 1011 Turk Street San Francisco, CA 94102
Title: Sheriff's Representative	
Agency: Department of Emergency Management	
Phone Number: 415.503.2089	**E-Mail:** babe.franey@sfgov.org

State Reviewer:	**Title:**	**Date:**
Date Received at State OES		
Date Forwarded to FEMA for review/approval		

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region IX		
Plan Not Approved		
Plan Approved		
Date Approved		

List single jurisdiction or, If MJP, list Participating Jurisdictions, including the "Lead Jurisdiction":	**NFIP Status***			
	Y	**N**	**N/A**	**CRS Class**
1. City and County of San Francisco		X		
2.. [ATTACH PAGE(S) WITH ADDITIONAL JURISDICTIONS]				

*** Notes:** **Y = Participating** **N = Not Participating** **N/A = Not Mapped**

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a **"Needs Improvement"** score.

Prerequisite(s) (Check Applicable Box)	**NOT MET**	**MET**
1. Adoption by the Local Governing Body: §201.6(c)(5) **OR**		
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) **AND**		
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		

Planning Process	**N**	**S**
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		

Risk Assessment	**N**	**S**
5. Identifying Hazards: §201.6(c)(2)(i)		
6. Profiling Hazards: §201.6(c)(2)(i)		
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		
8. Assessing Vulnerability: Addressing Repetitive Loss Properties. §201.6(c)(2)(ii)		
9. Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(B)		
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)		
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)		
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		

*States that have additional requirements can add them in the appropriate sections of the *Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

SCORING SYSTEM

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	**N**	**S**
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		
15. Identification and Analysis of Mitigation Actions: NFIP Compliance. §201.6(c)(3)(ii)		
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		

Plan Maintenance Process	**N**	**S**
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		
.20 Continued Public Involvement: §201.6(c)(4)(iii)		

Additional State Requirements*	**N**	**S**
Local Capabilities Assessment §201.4(c)(ii) and §201.6(c)(1) [This section is reviewed and scored by OES.]		

LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED	
See Reviewer's Comments	
PLAN APPROVED	

PREREQUISITE(S)

1. Adoption by the Local Governing Body

Requirement §201.6(c)(5): *[The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Has the local governing body adopted **new or updated** plan?	No, this is a draft plan.			
B. Is supporting documentation, such as a resolution, included?	No, this is a draft plan.			
		SUMMARY SCORE		

2. Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan indicate the specific jurisdictions represented in the plan?	N/A	Not applicable	N/A	N/A
B. For each jurisdiction, has the local governing body adopted the **new or updated** plan?	N/A	Not applicable	N/A	N/A
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?	N/A	Not applicable	N/A	N/A
		SUMMARY SCORE	N/A	N/A

3. Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process … Statewide plans will not be accepted as multi-jurisdictional plans.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan describe **how** each jurisdiction participated in the plan's development?	N/A	Not applicable	N/A	N/A
		SUMMARY SCORE	N/A	N/A

PLANNING PROCESS: ***§****201.6(b): An open public involvement process is essential to the development of an effective plan.*

4. Documentation of the Planning Process

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process* ***shall*** *include:*
(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): *[The plan* ***shall*** *document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the plan provide a narrative description of the process followed to prepare the **new or updated** plan?	Section 4.3			
B. Does the **new or updated** plan indicate who was involved in the **current** planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)	Table 4-1			
C. Does the **new or updated** plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	Section 4.4, Appendix E			
D. **Does the new or updated plan indicate that** an opportunity **was given** for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?	Section 4.3			
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	Section 4.5			
F. Does the updated plan document how the planning team reviewed and analyzed each section of the plan?	Section 4.3, Table 4-2			
G. Does the updated plan indicate for each section whether or not it was revised as part of the update process?	Section 4.3, Table 4-2			
		SUMMARY SCORE		

Local Capabilities Assessment (State OES Requested Information)

Requirement §201.4(c)(3)(ii): *– Of the Federal Register Interim Final Rule 44 CFR Parts 201 and 206 states, "[The* ***State*** *mitigation strategy* ***shall*** *include] a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.*

The following elements should be covered as they provide information that assists the State to meet the required planning element in the State's mitigation plan. More importantly, providing this information benefits the local community in their planning efforts. A "Needs Improvement" score will not preclude either plan from being recommended for approval by OES or approved by FEMA.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE			
			LHMP		FMA	
			N	S	N	S
A. Does the plan provide a description of the human and technical resources available within this jurisdiction to engage in a mitigation planning process and to develop a local hazard mitigation plan?	Section 7.1, Table 7-1					
B. Does the plan list local mitigation financial resources and funding sources (such as taxes, fees, assessments or fines) which affect or promote mitigation within the reporting jurisdiction?	Section 7.2, Table 7-2					
C. Does the plan list local ordinances which affect or promote disaster mitigation, preparedness, response or recovery within the reporting jurisdiction?	Section 7.3, Table 7-3					
D. Does the plan describe the details of in-progress, ongoing or completed mitigation projects and programs within the reporting jurisdiction?	Section 7.4, Table 7-4					
		STATE OES SUMMARY SCORE				

RISK ASSESSMENT: *§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

5. Identifying Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment **shall** include a] description of the type … of all natural hazards that can affect the jurisdiction.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include **a description** of the types of **all natural hazards** that affect the jurisdiction?	Table 5-1			
		SUMMARY SCORE		

6. Profiling Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment **shall** include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the risk assessment identify the **location** (i.e., geographic area affected) of each natural hazard addressed in the **new or updated** plan?	**Seismic hazards** (ground shaking 5.3.1.1, ground failure 5.3.1.2, tsunami, 5.3.1.3) **Weather-related hazards** (drought 5.3.2.1, flood 5.3.2.2, heat 5.3.2.3, landslide 5.3.2.4, wildfire 5.3.2.5, wind 5.3.2.6) **Other hazards** (reservoir failure 5.3.3.1, urban conflagration 5.3.3.2, and human caused 5.3.3.2)			
B. Does the risk assessment identify the **extent** (i.e., magnitude or severity) of each hazard addressed in the **new or updated** plan?	**Seismic hazards** (ground shaking 5.3.1.1, ground failure 5.3.1.2, tsunami, 5.3.1.3) **Weather-related**			

	hazards (drought 5.3.2.1, flood 5.3.2.2, heat 5.3.2.3, landslide 5.3.2.4, wildfire 5.3.2.5, wind 5.3.2.6) **Other hazards** (reservoir failure 5.3.3.1, urban conflagration 5.3.3.2, and human caused 5.3.3.2)			
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the **new or updated** plan?	**Seismic hazards** (ground shaking 5.3.1.1, ground failure 5.3.1.2, tsunami, 5.3.1.3) **Weather-related hazards** (drought 5.3.2.1, flood 5.3.2.2, heat 5.3.2.3, landslide 5.3.2.4, wildfire 5.3.2.5, wind 5.3.2.6) **Other hazards** (reservoir failure 5.3.3.1, urban conflagration 5.3.3.2, and human caused 5.3.3.2)			
D. Does the plan include the **probability of future events** (i.e., chance of occurrence) for each hazard addressed in the **new or updated** plan?	**Seismic hazards** (ground shaking 5.3.1.1, ground failure 5.3.1.2, tsunami, 5.3.1.3) **Weather-related hazards** (drought 5.3.2.1, flood 5.3.2.2, heat 5.3.2.3, landslide 5.3.2.4, wildfire 5.3.2.5, wind 5.3.2.6) **Other hazards** (reservoir failure 5.3.3.1, urban conflagration 5.3.3.2, and human caused 5.3.3.2)			
			SUMMARY SCORE	

7. Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): *[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Tables 6-6 through 6-20, Sections 6.5.1 – 6.5.3			
B. Does the **new or updated** plan address the **impact** of each hazard on the jurisdiction?	Tables 6-6 through 6-20, Sections 6.5.1 – 6.5.3			
		SUMMARY SCORE		

8. Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): *[The risk assessment] **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of *repetitive loss properties* located in the identified hazard areas?	N/A, San Francisco is not a member of the NFIP	***Note: This requirement becomes effective for local plans approved after October 1, 2008, for any jurisdiction with NFIP repetitive loss properties.***		
B. Does the new or updated plan estimate the potential dollar losses to *repetitive loss properties*?	N/A, San Francisco is not a member of the NFIP	***Note: This requirement becomes effective for local plans approved after October 1, 2008, for any jurisdiction with NFIP repetitive loss properties.***		
C. Does the new or updated plan describe land uses and development trends within *repetitive loss areas*?	N/A, San Francisco is not a member of the NFIP	***Note: This requirement becomes effective for local plans approved after October 1, 2008, for any jurisdiction with NFIP repetitive loss properties.***		
D. Does the new or updated plan include a map of the known flood hazards, repetitive loss areas, areas not mapped on the FIRM that have flooded in the past, and surface flooding identified in existing studies?	Figure C-11 Coastal Flooding Figure C-12 Stormwater Ponding	***Note: This requirement becomes effective for local plans approved after October 1, 2008, for any jurisdiction with NFIP repetitive loss properties.***		

SUMMARY SCORE		

9. Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): *The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area … .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **existing** buildings, infrastructure, and critical facilities located in the identified hazard areas?	Tables 6-6 through 6-20	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the identified hazard areas?	No	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

10. Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): *[The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate … .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan estimate **potential dollar losses** to vulnerable structures?	Tables 6-6 through 6-20	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the new or updated plan reflect changes in development in loss estimates?	Table 6-22	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
C. Does the **new or updated** plan describe the **methodology** used to prepare the estimate?	Section 6.3	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

11. Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): *[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe land uses and development trends?	Section 6.6	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

12. Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): *For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?	N/A	Not applicable.	N/A	N/A
		SUMMARY SCORE	N/A	N/A

MITIGATION STRATEGY: *§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

13. Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy **shall** include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include a description of mitigation **goals** to reduce or avoid long-term vulnerabilities to the identified hazards?	Section 8.1, Table 8-1			
		SUMMARY SCORE		

14. Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): *[The mitigation strategy **shall** include a] section that identifies and analyzes a comprehensive range of specific mitigation*

actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?	Section 8.2, Table 8-2			
B Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?	Section 8.2, Table 8-2			
C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?	Section 8.2, Table 8-2			
		SUMMARY SCORE		

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement: §201.6(c)(3)(ii): *[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the mitigation strategy identify actions related to participation in and continued compliance with the NFIP?	N/A, San Francisco is currently not a member of the NFIP. However, mitigation action 4.A addresses joining the NFIP.	***Note: This requirement becomes effective for all plans approved after October 1, 2008.***		
		SUMMARY SCORE		

16. Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): *[The mitigation strategy section **shall** include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization **shall** include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S

A. Does the **new or updated** mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)	Section 8.3, Table 8-3			
B. Does the **new or updated** mitigation strategy address how the actions will be **implemented and administered**? (For example, does **the action plan** identify the responsible department, existing and potential resources, and timeframe?)	Section 8.4, Table 8-4			
C. Does the **new or updated** prioritization process include an emphasis on the use of a **cost-benefit review** to maximize benefits?	Section 8.3, Table 8-3 (and following text)			
		SUMMARY SCORE		

17. Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include identifiable **action items** for each jurisdiction requesting FEMA approval of the plan?	N/A	Not applicable	N/A	N/A
		SUMMARY SCORE	N/A	N/A

PLAN MAINTENANCE PROCESS

Monitoring, Evaluating, and Updating the Plan

Requirement §201.6(c)(4)(i): *[The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe the method and schedule for **monitoring** the plan? (For example, does it identify the party responsible (department and title) for monitoring and include a schedule for reports, site visits, phone calls, and meetings?)	Section 9.1, Appendix G			
B. Does the **new or updated** plan describe the method and schedule for **evaluating** the plan? (For example, does it	Section 9.1, Appendix G			

identify the party responsible (department and title) for evaluating the plan and include the criteria used to evaluate the plan?)				
C. Does the **new or updated** plan describe the method and schedule for **updating** the plan within the five-year cycle?	Section 9.1			
		SUMMARY SCORE		

Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan?	Section 9.2			
B. Does the **new or updated** plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?	Section 9.2			
		SUMMARY SCORE		

Continued Public Involvement

Requirement §201.6(c)(4)(iii): *[The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

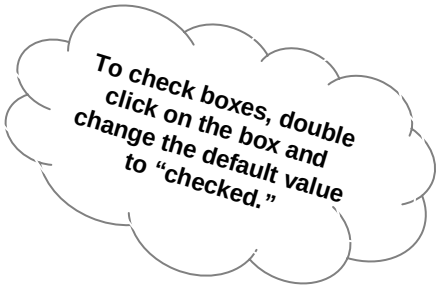
Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Section 9.3			
		SUMMARY SCORE		

Matrix A: Profiling Hazards

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that their plan addresses each natural hazard that can affect the jurisdiction. **Completing the matrix is not required**.

*Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each **applicable** hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Location		B. Extent		C. Previous Occurrences		D. Probability of Future Events	
	Yes	N	S	N	S	N	S	N	S
Avalanche	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dam Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐	☐	☐	☐	☐
Expansive Soils	☐	☐	☐	☐	☐	☐	☐	☐	☐
Extreme Heat	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flood	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hailstorm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐	☐	☐	☐	☐
Land Subsidence	☐	☐	☐	☐	☐	☐	☐	☐	☐
Landslide	☐	☐	☐	☐	☐	☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tornado	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tsunami	☐	☐	☐	☐	☐	☐	☐	☐	☐
Volcano	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐	☐	☐	☐	☐
Windstorm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐



Legend:
§201.6(c)(2)(i) Profiling Hazards
A. Does the risk assessment identify the location (i.e., geographic area affected) of each hazard addressed in the plan?
B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the plan?
C. Does the plan provide information on previous occurrences of each natural hazard addressed in the plan?
D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the plan?

Matrix B: Assessing Vulnerability

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that their plan addresses each requirement. **Completing the matrix is not required**.

*Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each **applicable** hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Note: Receiving an N in the shaded columns will not preclude the plan from passing.

To check boxes, double click on the box and change the default value to "checked."

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	§201.6(c)(2)(ii) Assessing Vulnerability: Overview					§201.6(c)(2)(ii) Assessing Vulnerability: Identifying Structures				§201.6(c)(2)(ii) Assessing Vulnerability: Estimating Potential Losses					
		A. Overall Summary Description of Vulnerability		B. Hazard Impact			A. Types and Number of Existing Structures in Hazard Area (Estimate)		B. Types and Number of Future Structures in Hazard Area (Estimate)		A. Loss Estimate		B. Methodology			
	Yes	N	S	N	S		N	S	N	S	N	S	N	S		
Avalanche	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Coastal Erosion	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Coastal Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Dam Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Drought	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Earthquake	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Expansive Soils	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Extreme Heat	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Flood	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Hailstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Hurricane	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Land Subsidence	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Landslide	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Severe Winter Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Tornado	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Tsunami	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Volcano	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Wildfire	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Windstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐		

Legend:

§201.6(c)(2)(ii) Assessing Vulnerability: Overview

A. Does the plan include an overall summary description of the jurisdiction's vulnerability to each hazard?

B. Does the plan address the impact of each hazard on the jurisdiction?

§201.6(c)(2)(ii)(A) Assessing Vulnerability: Identifying Structures

A. Does the plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?

B. Does the plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

§201.6(c)(2)(ii)(B) Assessing Vulnerability: Estimating Potential Losses

A. Does the plan estimate potential dollar losses to vulnerable structures?

B. Does the plan describe the methodology used to prepare the estimate?

Matrix C: Identification and Analysis of Mitigation Actions

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure consideration of a range of actions for each hazard. **Completing the matrix is not required.**

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Comprehensive Range of Actions and Projects	
	Yes	N	S
Avalanche	☐	☐	☐
Coastal Erosion	☐	☐	☐
Coastal Storm	☐	☐	☐
Dam Failure	☐	☐	☐
Drought	☐	☐	☐
Earthquake	☐	☐	☐
Expansive Soils	☐	☐	☐
Extreme Heat	☐	☐	☐
Flood	☐	☐	☐
Hailstorm	☐	☐	☐
Hurricane	☐	☐	☐
Land Subsidence	☐	☐	☐
Landslide	☐	☐	☐
Severe Winter Storm	☐	☐	☐
Tornado	☐	☐	☐
Tsunami	☐	☐	☐
Volcano	☐	☐	☐
Wildfire	☐	☐	☐
Windstorm	☐	☐	☐
Other _____	☐	☐	☐
Other _____	☐	☐	☐
Other _____	☐	☐	☐

To check boxes, double click on the box and change the default value to "checked."

Legend:
§201.6(c)(3)(ii) Identification and Analysis of Mitigation Actions
A. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

Appendix B
Adoption Resolution

FILE NO. 081405 RESOLUTION NO. 517-08

[2008 Hazard Mitigation Plan.]

Resolution adopting the 2008 City and County of San Francisco Hazard Mitigation Plan.

WHEREAS, The City and County of San Francisco ("the City") recognizes the threat that natural and human-caused hazards pose to people and property within its community; and,

WHEREAS, Undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and,

WHEREAS, The federal government defines "hazard mitigation" as "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards", and the California Governor's Office of Emergency Services ("OES") has expanded that definition to include human-caused hazards; and,

WHEREAS, The Federal Emergency Management Agency ("FEMA") requires local governments to adopt a Local Hazard Mitigation Plan as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs, and requires local governments to update their Hazard Mitigation Plans every 5 years; and,

WHEREAS, In 2005, the City adopted a Hazard Mitigation Plan prepared by the Association of Bay Area Governments, and,

WHEREAS, The Department of Emergency Management, in cooperation with other City departments, prepared a 2008 City and County of San Francisco Hazard Mitigation Plan ("2008 Hazard Mitigation Plan") that contains comprehensive, city-wide hazard identification, including the probability of particular risks, as well as a risk assessment and an impact analysis; and,

WHEREAS, The 2008 Hazard Mitigation Plan includes the following components: Prerequisites, Community Description, Planning Process, Hazard Analysis, Vulnerability Analysis, Capability Assessment, Mitigation Strategy, Plan Maintenance, and References, and,

WHEREAS, the City fully participated in the FEMA-prescribed mitigation planning process to prepare the 2008 Hazard Mitigation Plan; and

WHEREAS, The OES and FEMA officials have pre-approved the 2008 Hazard Mitigation Plan, contingent upon official adoption of the Plan by the City; now, therefore, be it

RESOLVED, That the City and County of San Francisco adopts the 2008 City and County of San Francisco Hazard Mitigation Plan as an official plan of the City; and, be it

FURTHER RESOLVED, That the Executive Director of the Department of Emergency Management shall submit this Resolution to the FEMA, Region IX officials to enable the Plan's final approval.

City and County of San Francisco

Tails

Resolution

City Hall
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4689

File Number: 081405 **Date Passed:**

Resolution adopting the 2008 City and County of San Francisco Hazard Mitigation Plan.

December 9, 2008 Board of Supervisors — ADOPTED

Ayes: 11 - Alioto-Pier, Campos, Chu, Daly, Dufty, Elsbernd, Maxwell, McGoldrick, Mirkarimi, Peskin, Sandoval

File No. 081405

I hereby certify that the foregoing Resolution was ADOPTED on December 9, 2008 by the Board of Supervisors of the City and County of San Francisco.

Angela Calvillo
Clerk of the Board

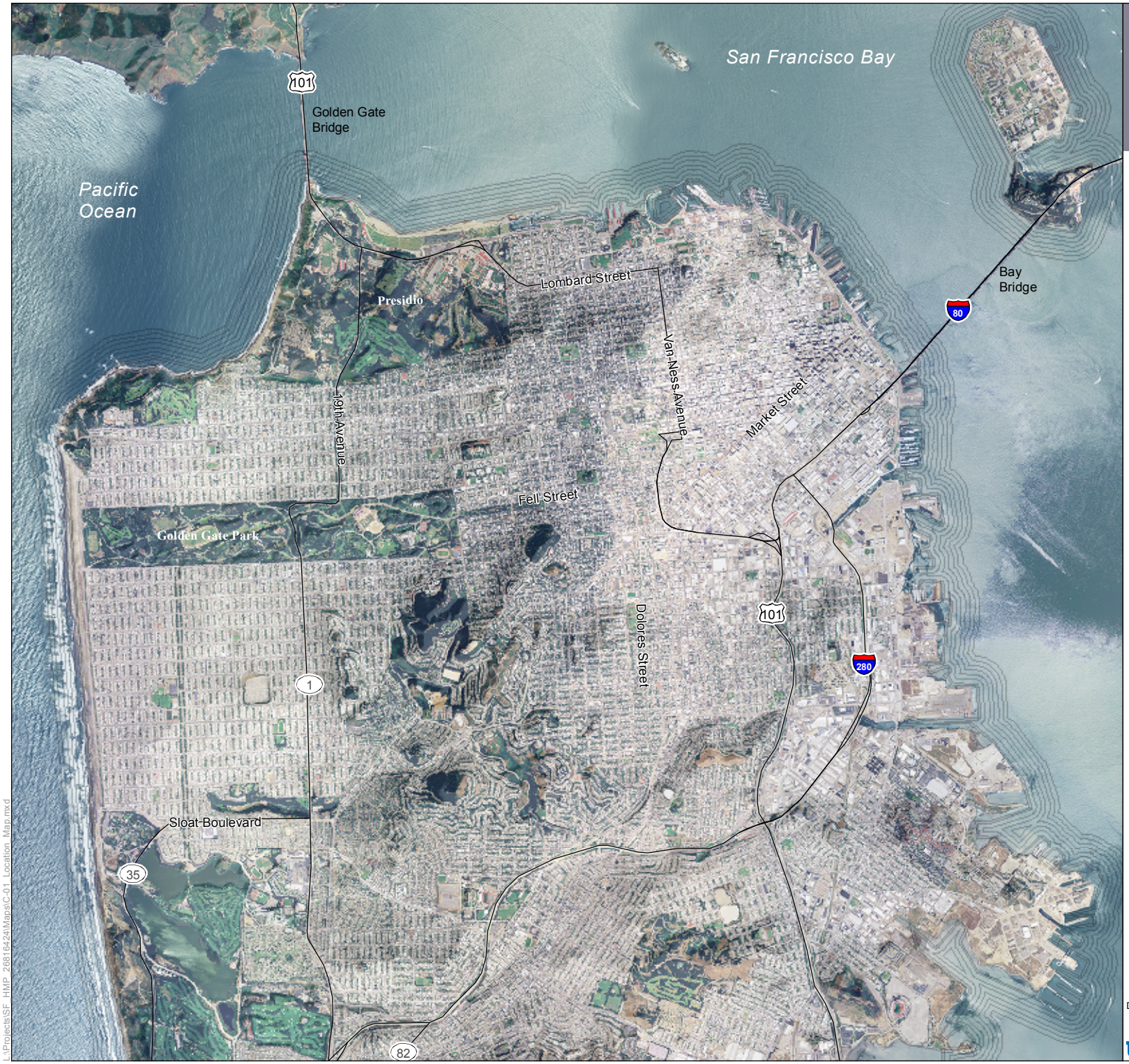
12/16/2008
Date Approved

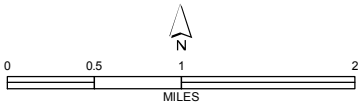
Mayor Gavin Newsom

Appendix C
Figures

San Francisco Hazard Mitigation Plan

Location Map





Data source: NAIP, 2005

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C-1
September 2008

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San Francisco Hazard Mitigation Plan

Land Use

Zoning

- Commercial
- Industrial
- Mixed Residential/ Commercial
- Public
- Residential

This figure shows a simplified version of the Zoning Maps of San Francisco. The following Use Districts included in this figure are Commercial Districts, Neighborhood Commercial Districts, Industrial Districts, Mixed Use Districts, Residential Districts, and Public Use Districts.

N

0 0.5 1 2

MILES

Data Source: NAIP Aug 2005; SFGIS Data Library, June 2008

URS

C-2

September 2008

L:\Projects\SF HMP 26816424\Maps\C-02 Land Use.mxd

San Francisco Hazard Mitigation Plan

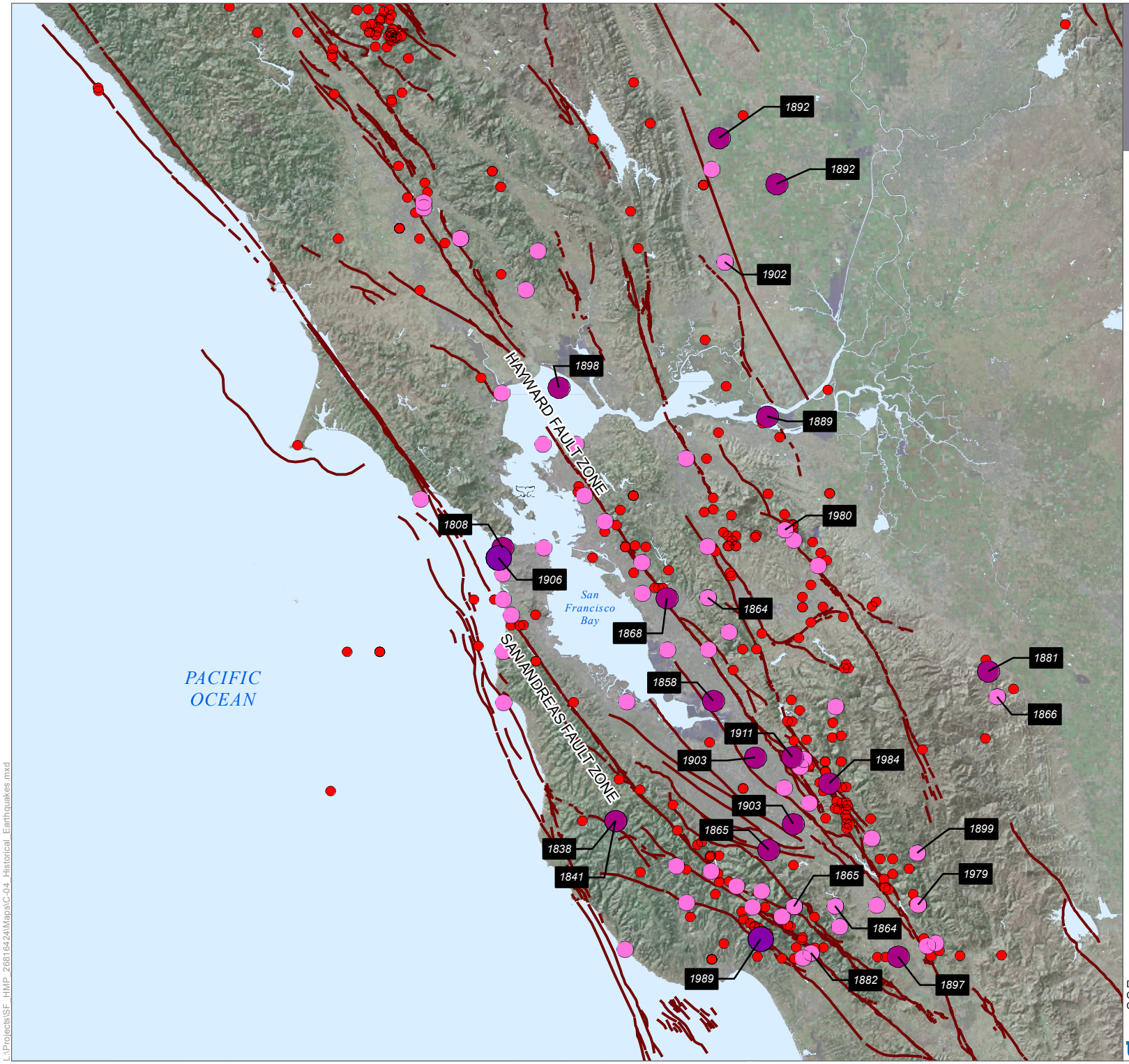
Realtor Neighborhoods

Data Source: NAIP Aug 2005; SFGIS Data Library, June 2008

URS

C-3
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-03_Neighborhoods.mxd



San Francisco Hazard Mitigation Plan

Historic Earthquakes

Historic Epicenters (1800-2007)

Richter Magnitude Greater than 4.0

(dates provided for events greater than 6.0)

- 4.0 - 5.0
- 5.1 - 6.0
- 6.1 - 7.0
- 7.1 - 8.0
- Fault

This figure shows historic earthquake epicenter locations. URS Seismic group developed a historic database using information from the Decade of North American Geology Catalog, The Northern California Seismic Network, California Geological Survey, University of California Berkeley, USGS NEIC, Historical locations from Stover and Coffman, and various other sources.

N

0 5 10 20

Miles

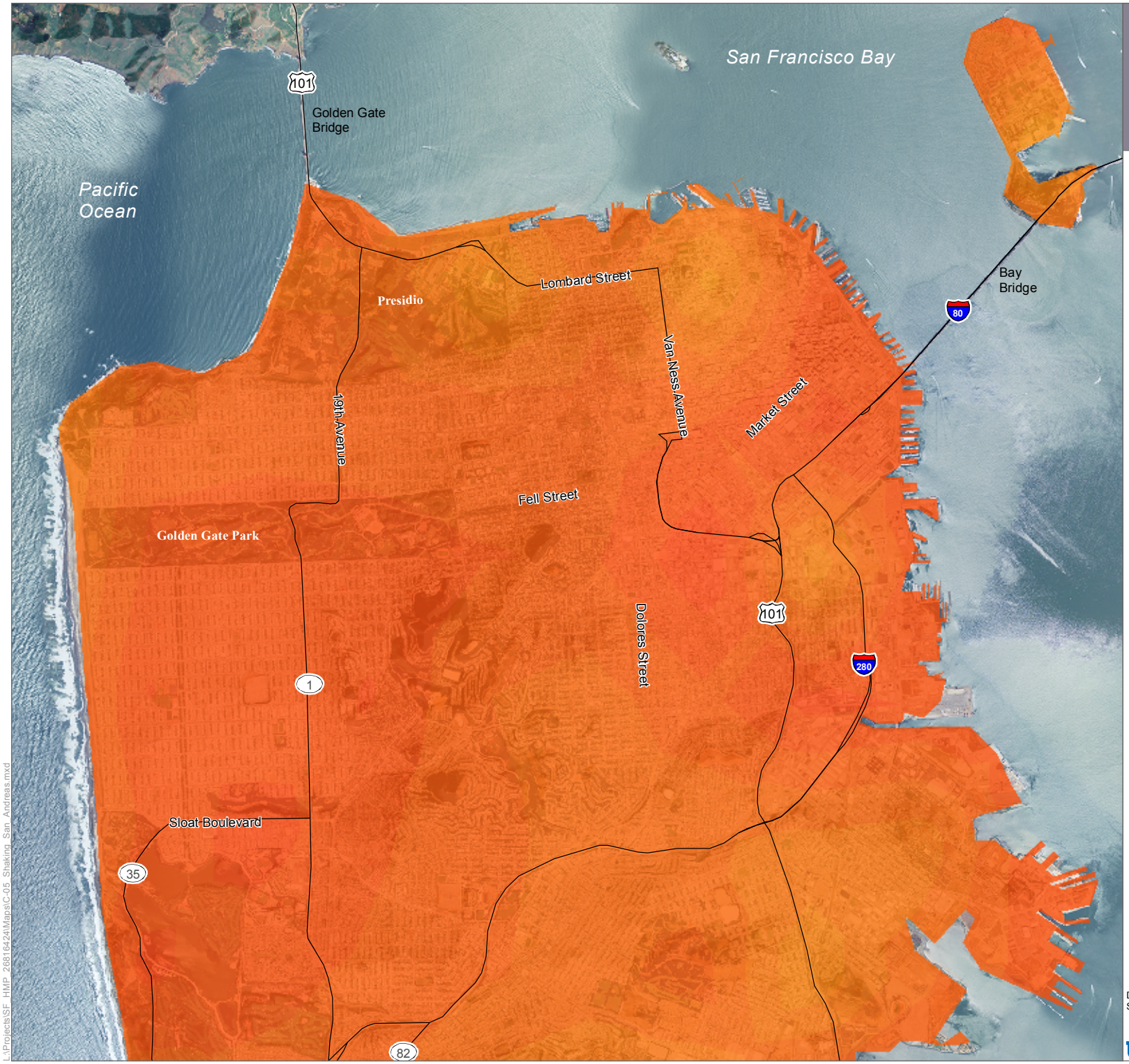
Data source: NAIP, Aug 2005; CGS, 2005; Historical Seismicity Catalog: URS Seismic Hazards Group

URS

L:\Projects\SF_HMP_26816424\Maps\C-04_Historical_Earthquakes.mxd

San Francisco Hazard Mitigation Plan

Shaking Intensity Areas, Magnitude 7.9 Earthquake San Andreas Fault

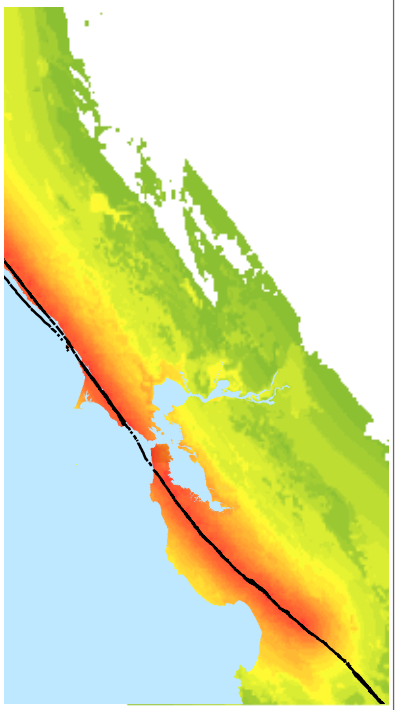


Shaking Intensity

Modified Mercalli Intensity

Light Moderate Strong Violent Very Violent

San Andreas fault zone



N

0 0.5 1 2

Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-5
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-05_Shaking_San_Andreas.mxd

San Francisco Hazard Mitigation Plan

Shaking Intensity Areas, Magnitude 6.9 Earthquake Hayward Fault

San Francisco Bay

Pacific Ocean

Golden Gate Bridge

Bay Bridge

Presidio

Golden Gate Park

Lombard Street

19th Avenue

Van Ness Avenue

Market Street

Fell Street

Dolores Street

Sloat Boulevard

101

80

280

1

35

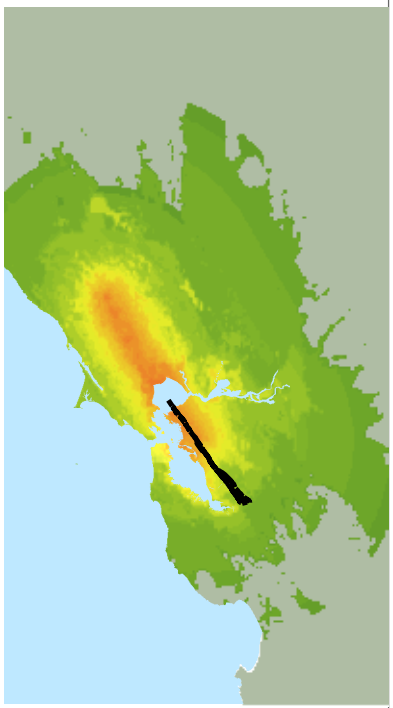
82

Shaking Intensity

Modified Mercalli Intensity

Light | Moderate | Strong | Violent | Very Violent

Hayward fault zone



N

0 0.5 1 2

MILES

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-6
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-06_Shaking_Hayward.mxd

San Francisco Hazard Mitigation Plan

Soil Liquefaction Hazard Area

Liquefaction Hazard

Liquefaction hazard area

The figure shows Liquefaction Zones determined by the Department of Conservation, California Geologic Survey (CGS). Liquefaction is the transformation of a confined layer of sandy or silty water-saturated material into a liquid -like state because of earthquake shaking.

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005; City of SF; CGS, 2000

URS

L:\Projects\SF HMP 26816424\Maps\C-07 Liquefaction.mxd

San Francisco Hazard Mitigation Plan

Earthquake-Induced Landslide Hazard Area

Landslide Hazard

Landslide Hazard Area

The figure shows earthquake-induced Landslide Zones determined by the Department of Conservation, California Geologic Survey (CGS). A landslide is a movement of a mass of soil down a steep slope when the soil loses strength and can no longer support the weight of overlying soil or rocks. Landslides vary in size and rate of movement.

N

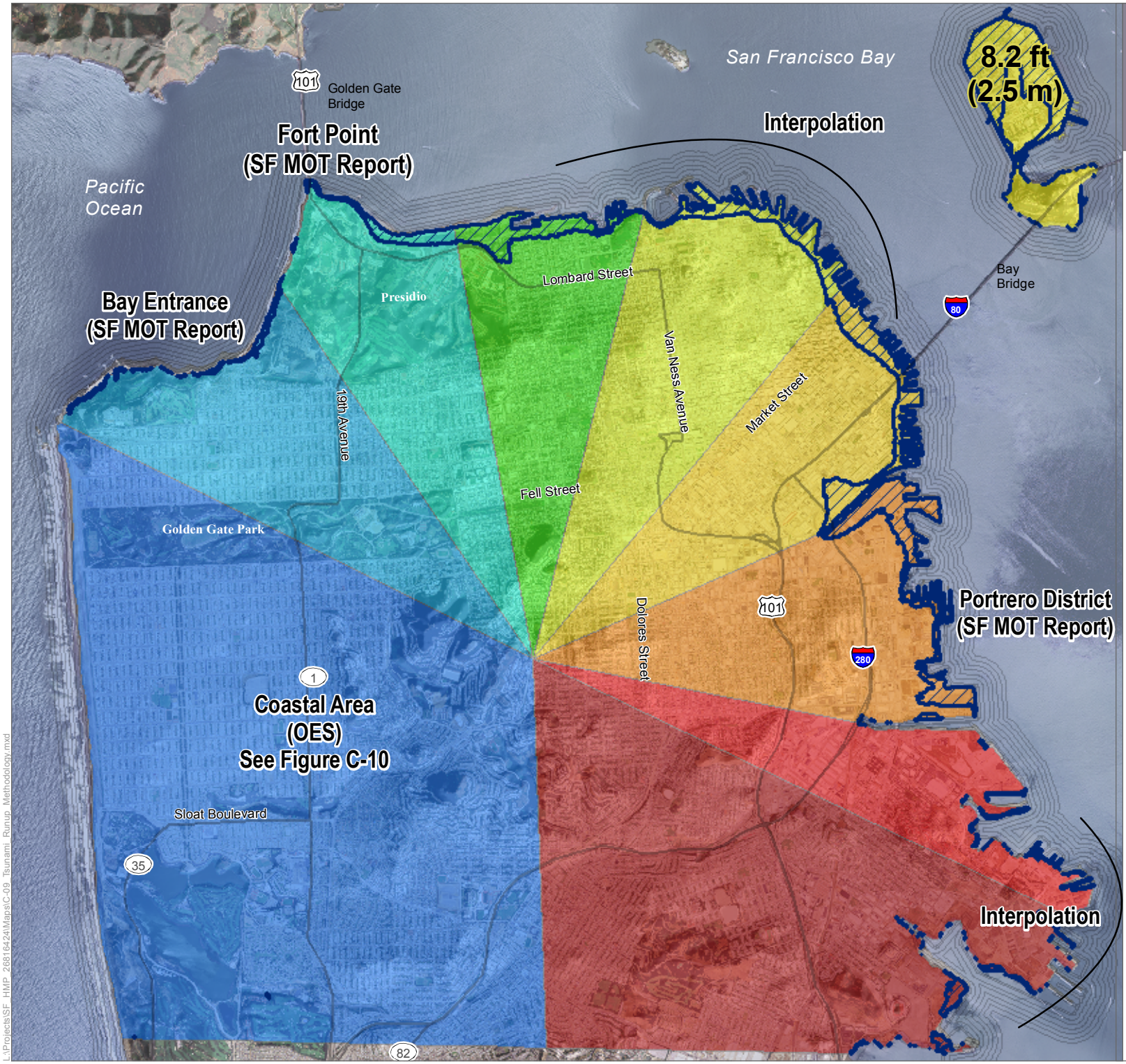
0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005; CGS, 2000

URS

L:\Projects\SF_HMP_26816424\Maps\C-08_Landslides.mxd



San Francisco Hazard Mitigation Plan

Tsunami Run-up Heights

Tsunami Hazard

Tsunami Run-Up Heights

This figure was developed using the June 2007 SF Modeling of Tsunami Effects at Marine Oil Terminals in San Francisco Bay study (SF MOT Report) for a worst case scenario tsunami run-up along the coastal side and bay side of the San Francisco Bay. The worst case scenario for this model is the Alaska Peninsula rupture of the Alaska-Aleutians subduction zone). Interpolates on the bay side are between 14.45 ft. run-up at Fort Point and 5.91 ft. run-up at Potrero District.

N

0 0.5 1 2

MILES

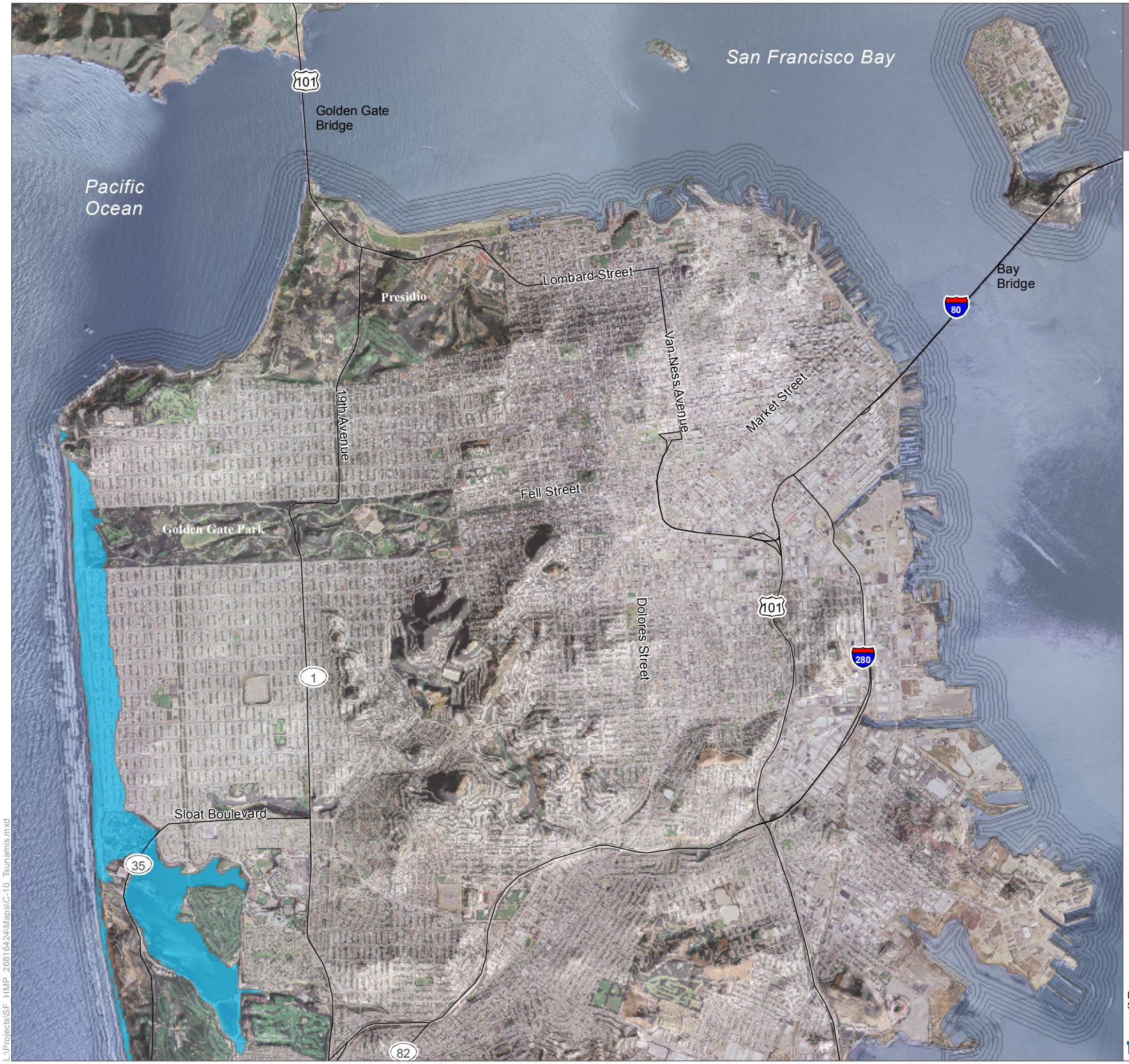
Data Source: NAIP, Aug 2005;
SF MOT Report June 2006; URS 2008

URS

L:\Projects\SF_HMP_26816424\Maps\C-09_Tsunami_Runup_Methodology.mxd

San Francisco Hazard Mitigation Plan

Tsunami Inundation Hazard Area



Tsunami Hazard

Tsunami Inundation

This figure, prepared by the CA OES, shows coastal land areas that could become submerged in a tsunami event. The area of land subject to inundation is a factor of: distance of shoreline from the tsunami-generating source, magnitude (primarily related to earthquake source), duration and periods of the waves, runup elevations (i.e. height above sea level likely to be flooded), tide level at time of occurrence, location along shore and direction of shore with respect to propagated waves, and topography of the seabed in the vicinity (bathymetry).

N

0 0.5 1 2

MILES

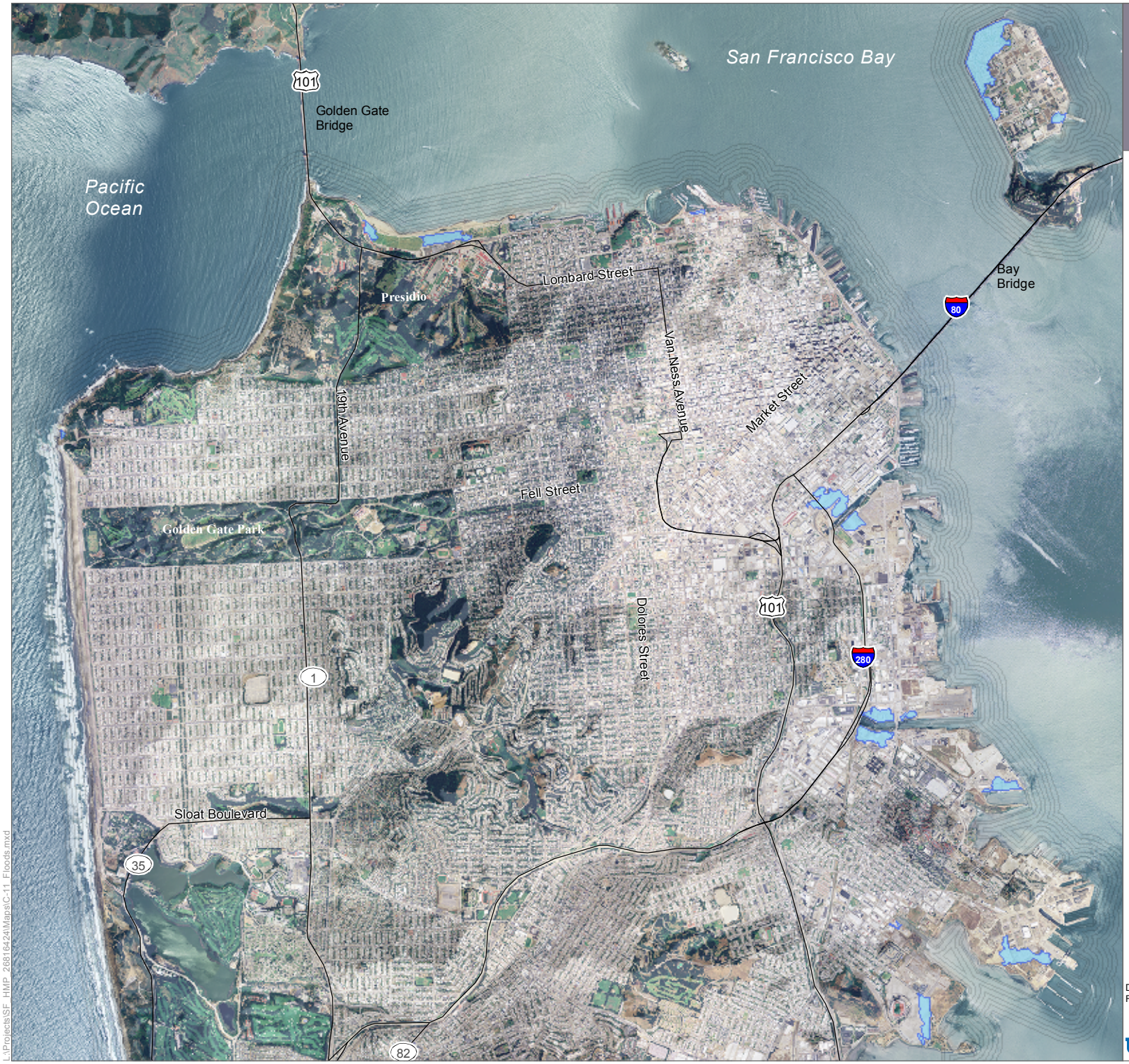
Data Source: NAIP, Aug 2005
State OES 2001; URS 2008

URS

L:\Projects\SF HMP 26816424\Maps\C-10 Tsunamis.mxd

San Francisco Hazard Mitigation Plan

Coastal Flood Hazard



Flood Hazard

100-Year Flood Zone

This figure shows the 2007 preliminary FIRM for the County of San Francisco. This FIRM shows areas at risk from a flood having a 1 percent chance of occurrence in any given year (also known as the 100-year flood). Flood zones on the maps are shown as Zone A (areas of coastal flooding with no wave hazard; or waves less than three feet in height) or Zone V (coastal high hazard areas with wave hazard).

N

0 0.5 1 2

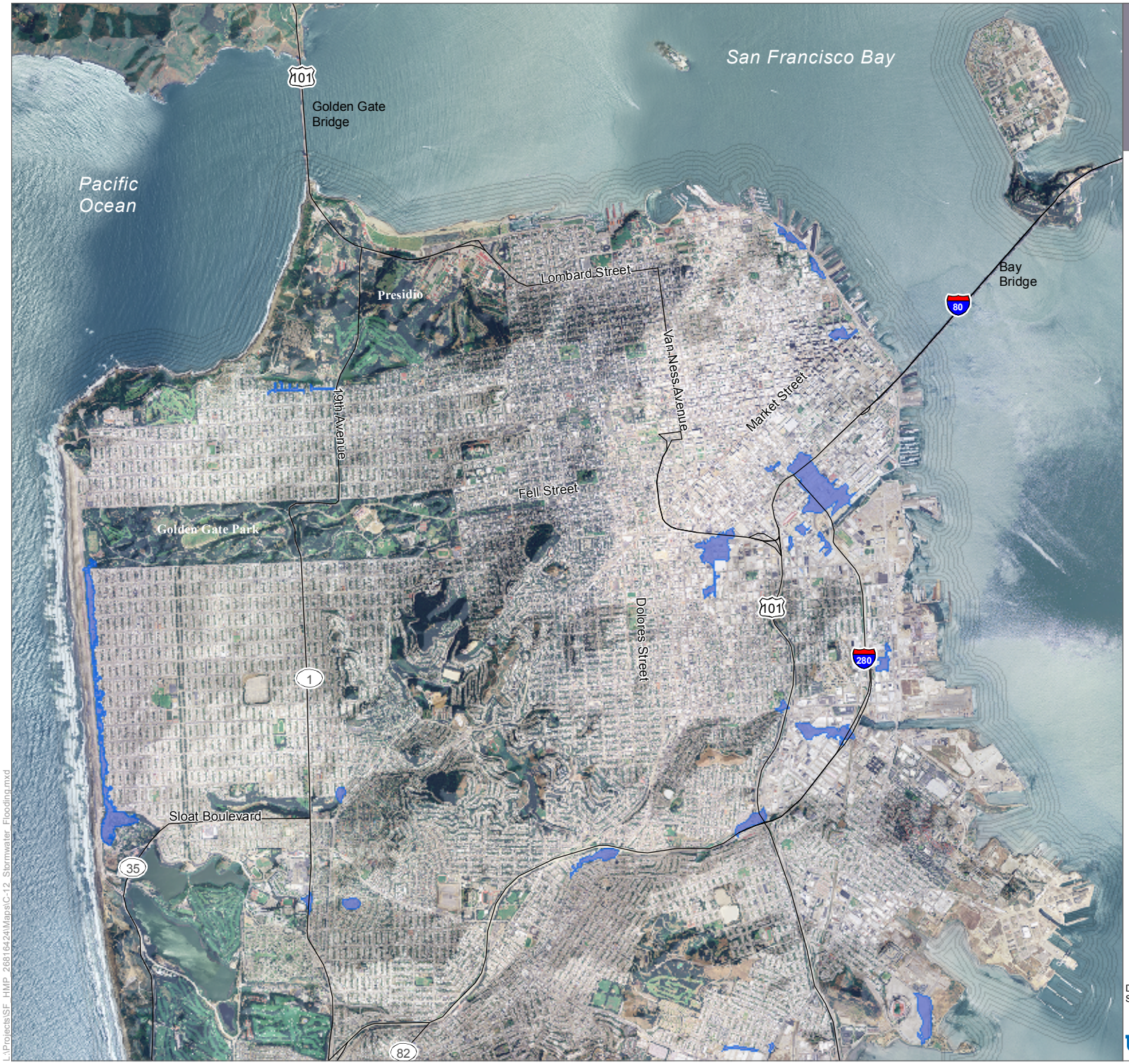
MILES

Data Source: NAIP, Aug 2005
FEMA - Preliminary FIRM, 2008

URS

C-11
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-11_Floods.mxd



San Francisco Hazard Mitigation Plan

Stormwater Ponding Hazard Area

Stormwater Ponding Hazard

Stormwater Ponding Area

This figure shows areas that, under extreme storm conditions, have the potential to experience widespread shallow or localized deep ponding in the roadway because of roadway surface ponding or other open channel flow obstructions.

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005
SF DPW, 2008

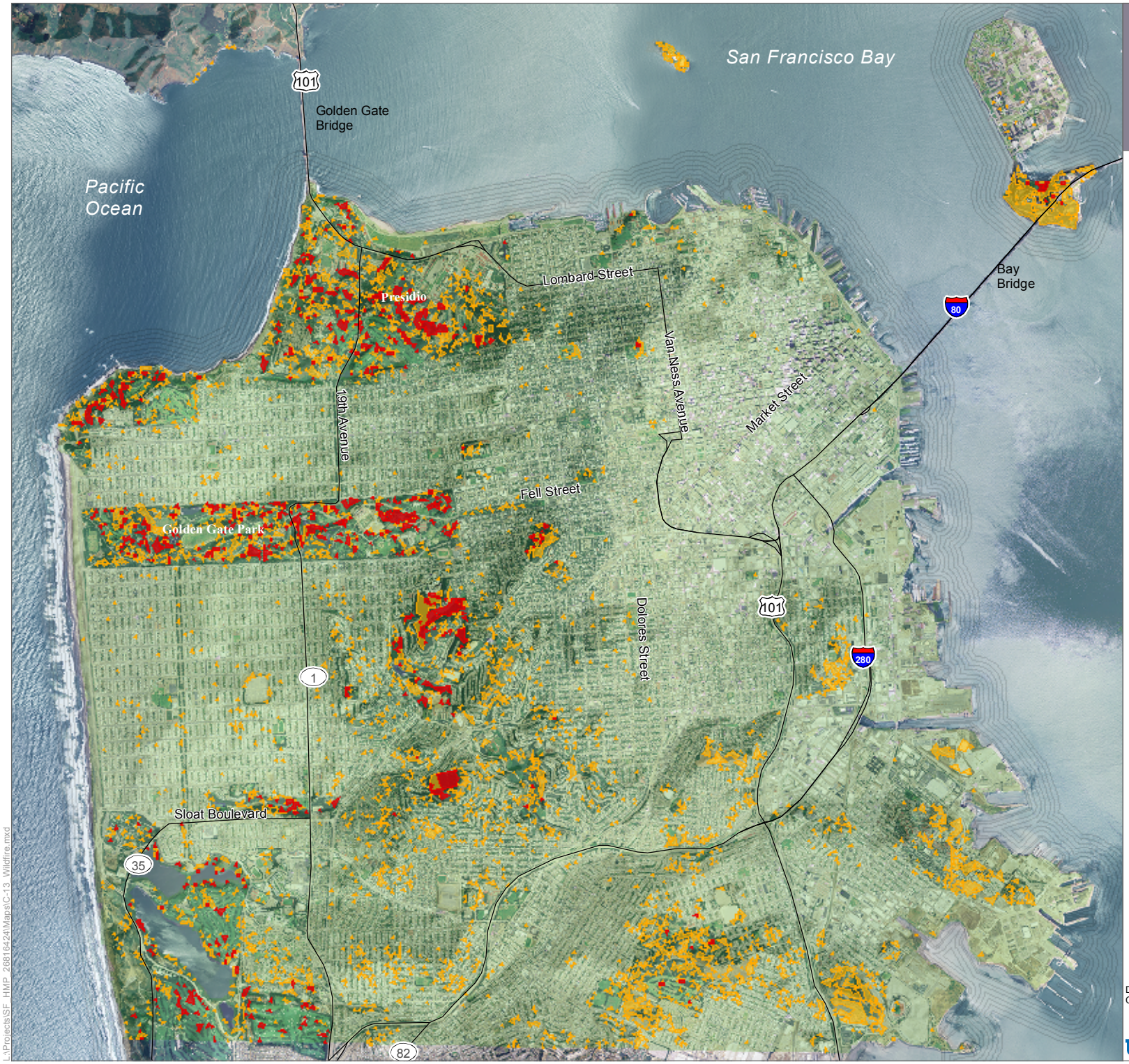
URS

C-12
September 2008

L:\Projects\SF HMP 26816424\Maps\C-12 Stormwater Flooding.mxd

San Francisco Hazard Mitigation Plan

Wildfire Hazard Area



Wildfire Hazard

- Very high
- High
- Moderate

The California Department of Forestry fuel ranking methodology assigns ranks based on expected fire behavior for unique combinations of topography and vegetative fuels under a given severe weather condition (wind speed, humidity, and temperature). The procedure makes an initial assessment of rank based on an assigned fuel model and slope, then raises ranks based on the amount of ladder and/or crown fuel present to arrive at a final fuel rank.

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005
CDF FRAP Data, 2005

URS

L:\Projects\SF_HMP_26816424\Maps\C-13_Wildfire.mxd

San Francisco Hazard Mitigation Plan

Reservoir Inundation Hazard Area

Reservoir Inundation Hazard

- Reservoir Location
- Reservoir Inundation Hazard Area

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005;
SFPUC UWMP December, 2005; CA OES

URS

C-14
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-14_Reservoir_Inundation.mxd

San Francisco Hazard Mitigation Plan

Urban Conflagration Hazard Area

Urban Conflagration Hazard

Hazard

- None/No data
- Very low
- Low
- Moderate
- High
- Very high
- Extreme

This figure shows urban conflagration hazard areas for all areas of the city for which parcel data was available. The analysis combined building construction material, land use, and structural age. For construction material wood frame structures are assumed to be more vulnerable to conflagration than other construction types. Similarly Commercial and Industrial land use are calculated as a higher conflagration risk. Stuctural age was taken into account as older buildings were built to different fire code standards.

N

0 0.5 1 2

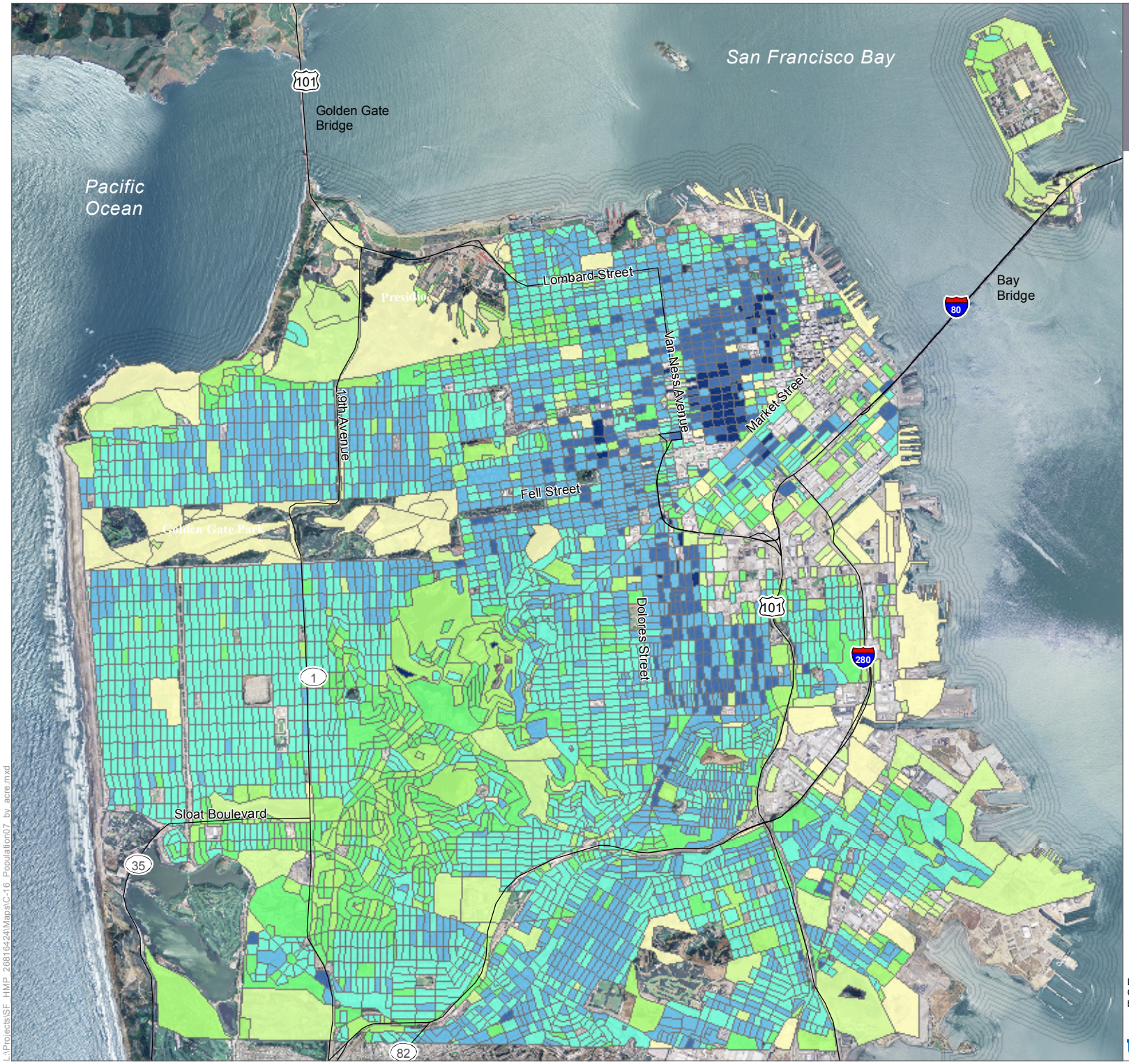
MILES

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-15
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-15_Urban_conflagration.mxd



San Francisco Hazard Mitigation Plan

Estimated 2007 Population Density

Population Density (per acre)

- 0 - 1
- 2 - 5
- 6 - 15
- 16 - 25
- 26 - 50
- 51 - 100
- 101 - 200
- 201 - 550

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005;
Census 2000; SF DrillDown Report
by Social Compact.org, March 2008

URS

L:\Projects\SF HMP 26816424\Maps\C-16 Population07 by acre.mxd

San Francisco Hazard Mitigation Plan

Buliding Stock

Building Stock

- Non-Residential
- Mixed Residential/ Commercial
- Residential

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005;
SFGIS Data Library, June 2008

URS

C-17
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-17_Building_Stock.mxd

San Francisco Hazard Mitigation Plan

Exempt Unreinforced Masonry Buildings

Exempt Unreinforced Masonry Building

This figure shows UMBs exempt because they were: 1. retrofitted between May 21, 1973 and February 15, 1993; 2. residential building units with less than five dwelling units; and 3. buildings exempt due to the 1937 School Field Act.

N

0 0.5 1 2

MILES

Data Source: NAIP, Aug 2005;
City of San Francisco, Department of Building Inspection, May 2008

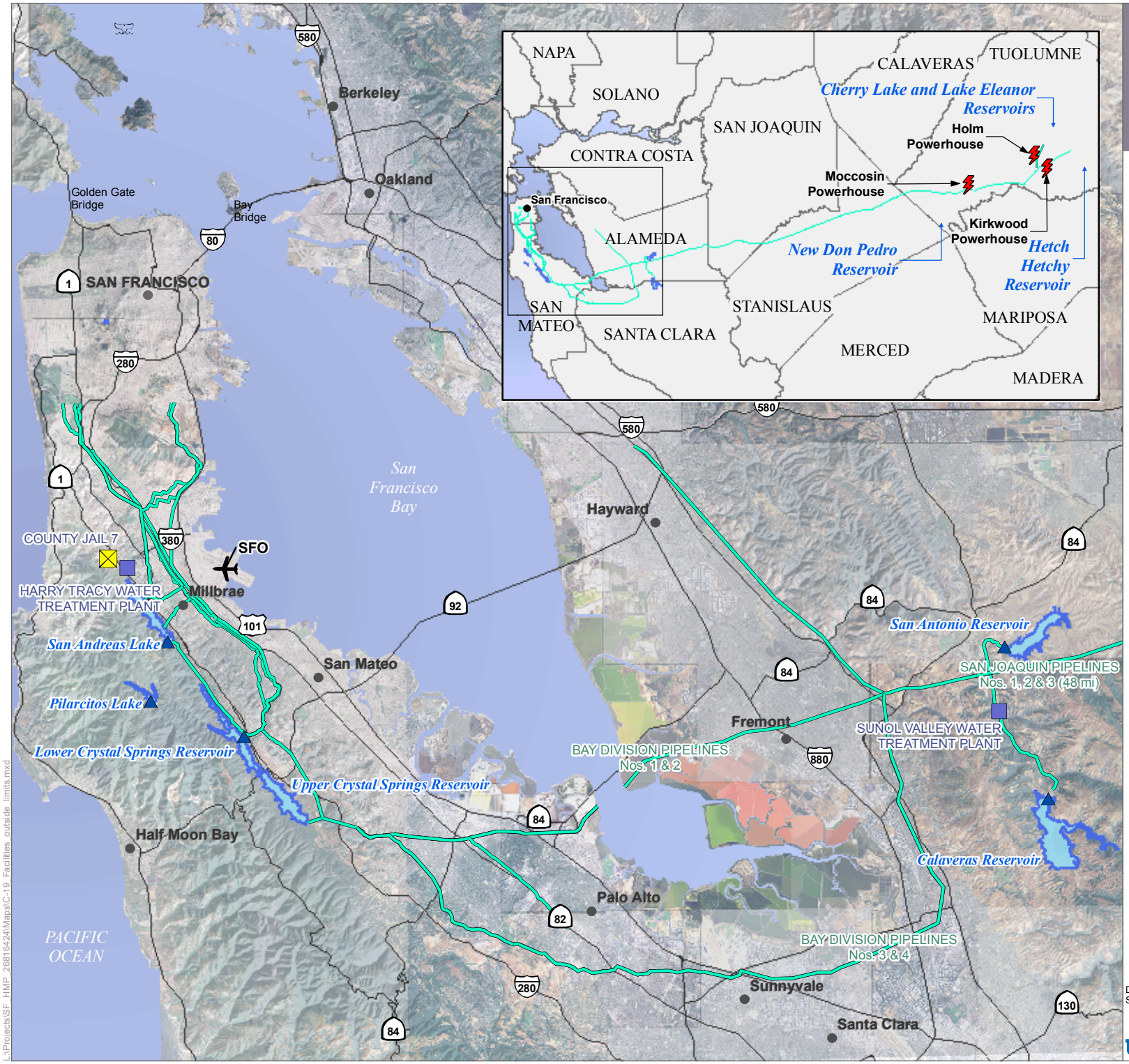
URS

C-18
September 2008

L:\Projects\SF_HMP_26816424\Maps\C-18_Exempt_UMBs.mxd

San Francisco Hazard Mitigation Plan

San Francisco Facilities and Infrastrucure Located Outside of County Limits



Data source: NAIP, Aug 2005;
SFPUC UWMP December, 2005

URS

L:\Projects\SF_HMP_26816424\Maps\C-19_Facilities_outside_limits.mxd

San Francisco Hazard Mitigation Plan

Critical Facilities: Government

- City Hall
- Department or Agency Building
- Hall of Justice
- Jail
- Animal Shelter

N

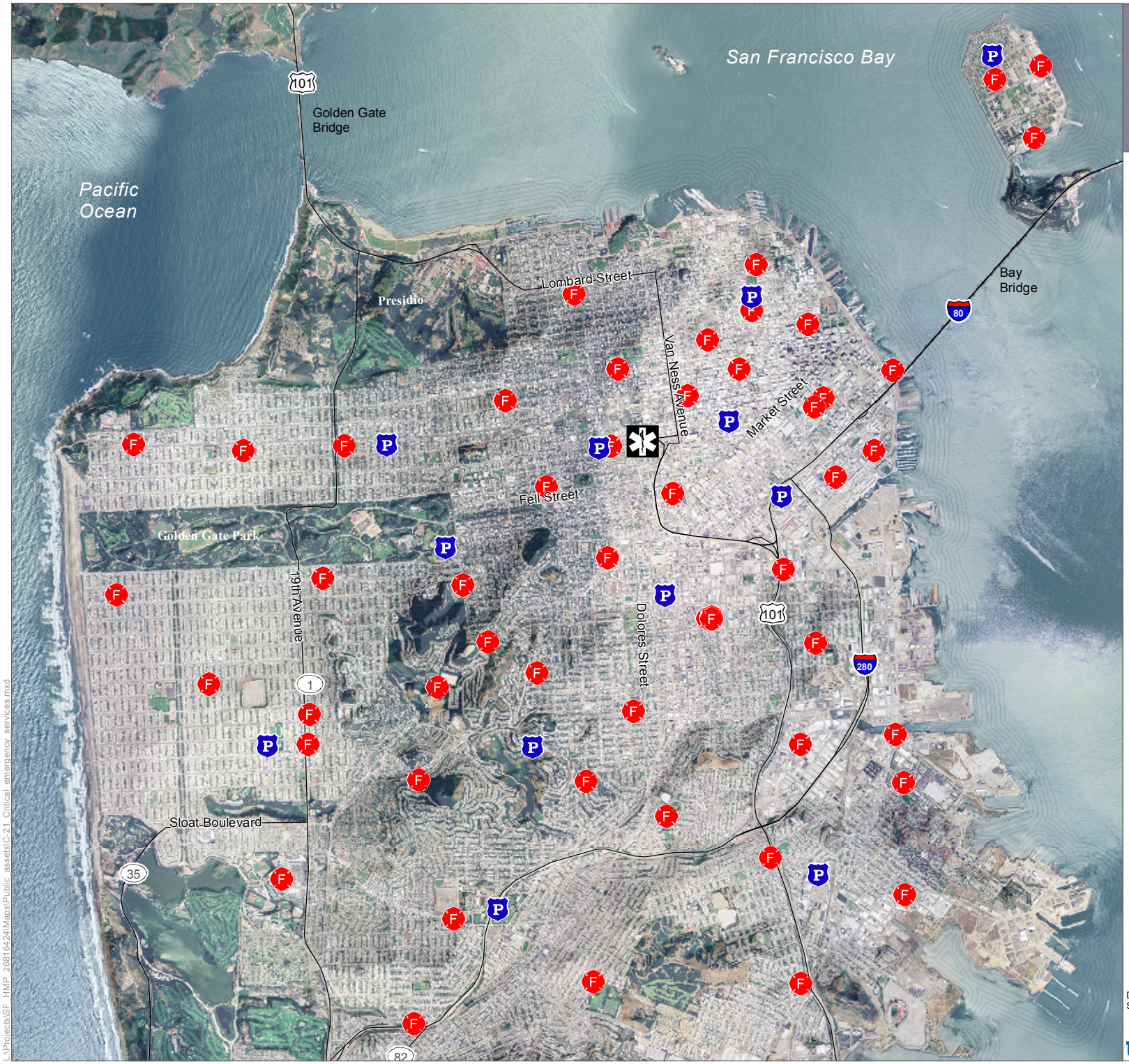
0 0.5 1 2
Miles

Source: NAIP, Aug 2005;
SFGIS Data Library, June 2008; URS

URS

C-20
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public_assets\C-20_Critical_government.mxd



San Francisco Hazard Mitigation Plan

Critical Facilities: Emergency Service

- Emergency Operations Center
- Fire Department
- Police Department

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-21
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public_assets\C-21_Critical_emergency_services.mxd

San Francisco Hazard Mitigation Plan

Critical Facilities: Education

- SF Unified School District (SFUSD)
- City College of San Francisco
- San Francisco State University
- University of California San Francisco

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-22
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public assets\C-22 Critical education.mxd

San Francisco Hazard Mitigation Plan

Critical Facilities: Community Health Network Facilities

- Clinic
- Health Center
- Hospital
- Senior Service Center

N

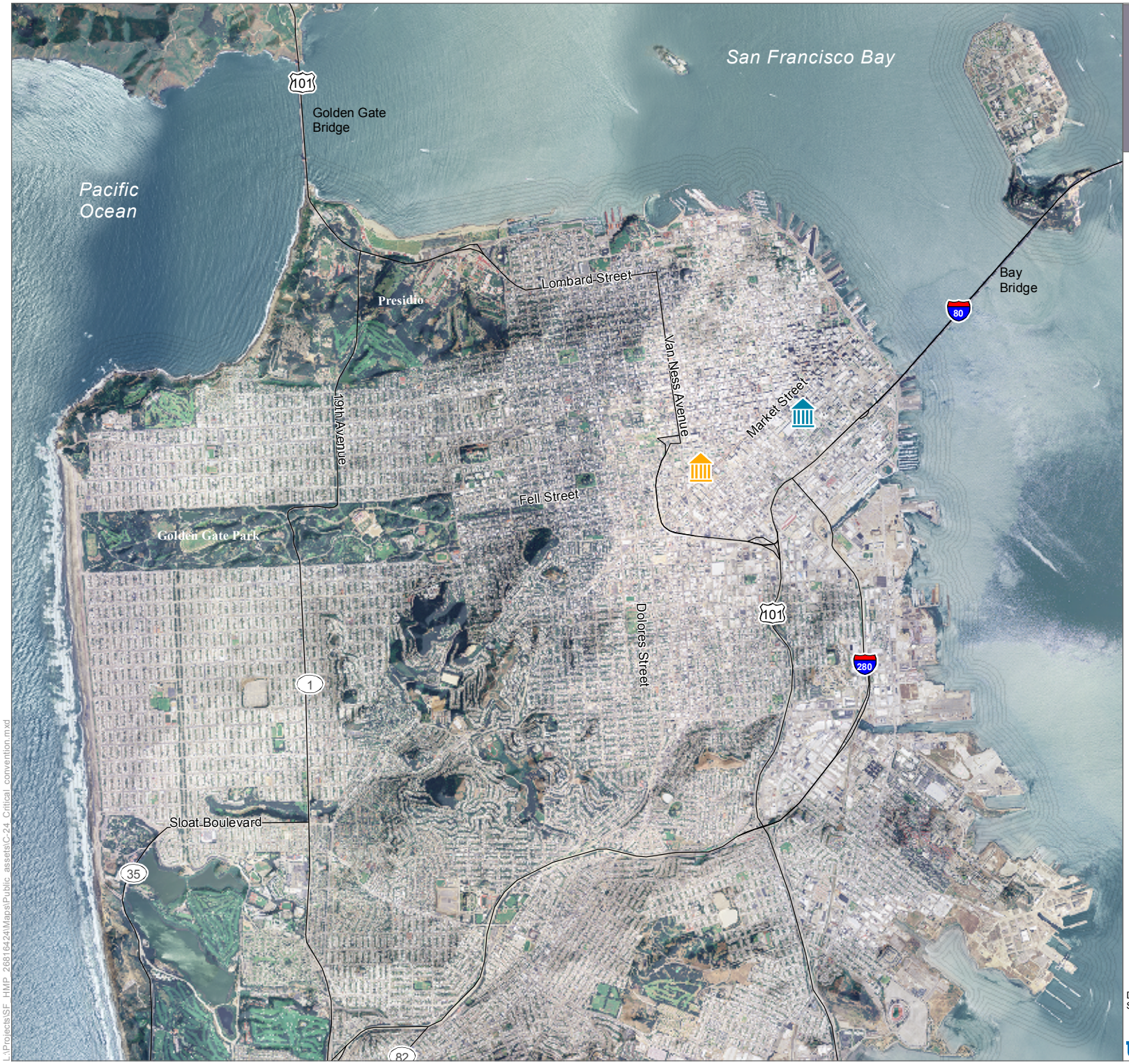
0 0.5 1 2
Miles

Data Source: Source: NAIP Aug 2005; SFGIS Data Library, June 2008; DPH

URS

C-23
September 2008

L:\Projects\SF HMP 26816424\Maps\Public assets\C-23 Critical care.mxd



San Francisco Hazard Mitigation Plan

Non-Critical Facilities: Convention Center

Civic Auditorium

Moscone Center

N

0 0.5 1 2

Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-24
September 2008

L:\Projects\SF HMP 26816424\Maps\Public assets\C-24 Critical convention.mxd

San Francisco Hazard Mitigation Plan

Non-Critical Facilities: Library

Law Library

Public Library

N

0 0.5 1 2

Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008; URS

URS

C-25
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public_assets\C-25_Noncritical_libraries.mxd

San Francisco Hazard Mitigation Plan

Non-Critical Facilities: Museums and Performing Arts

- Academy of Sciences
- Asian Arts Commission
- Fine Arts Museums
- Museum of Modern Art
- War Memorial and Performing Arts Center

N

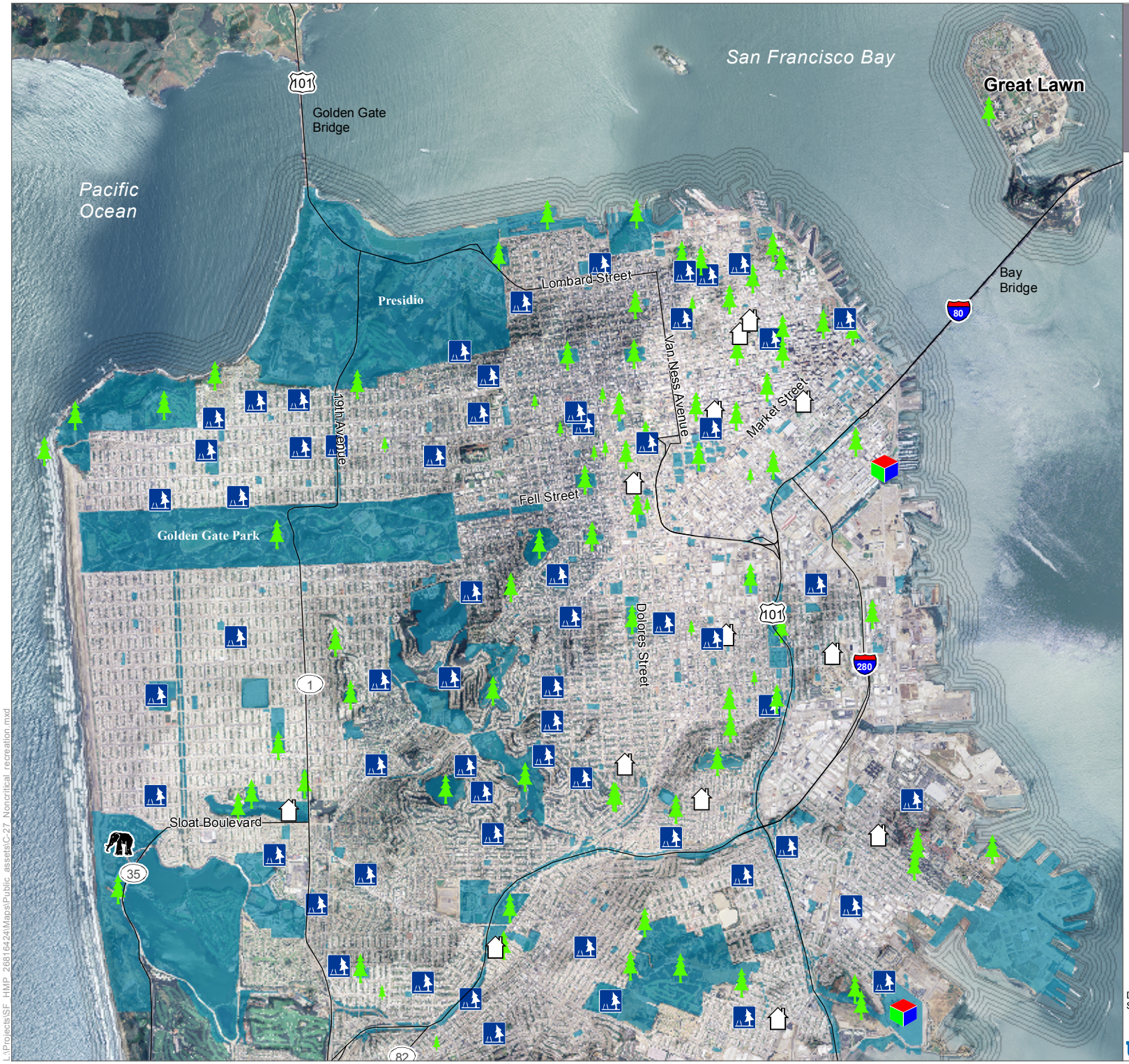
0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-26
September 2008

L:\Projects\SF HMP 26816424\Maps\Public assets\C-26 Noncritical museums arts.mxd



San Francisco Hazard Mitigation Plan

Non-Critical Facilities: Parks and Recreation

- Commercial Sports Facility
- Mini Park
- Park
- Playground/Sports Facility
- Recreation Center
- Zoo
- Public Space

N

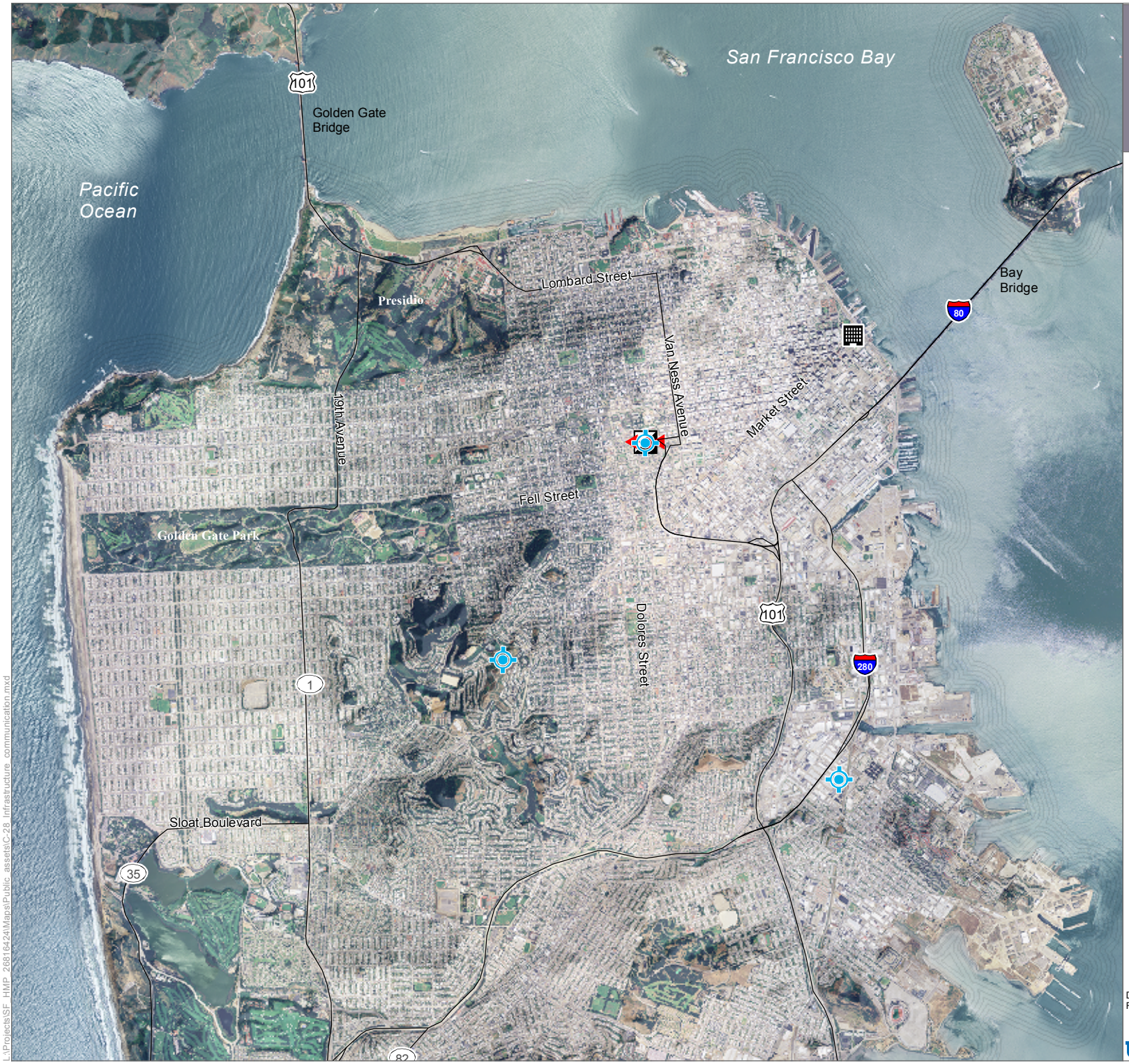
0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-27
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public_assets\C-27_Noncritical_recreation.mxd



San Francisco Hazard Mitigation Plan

Major Utilities Infrastructure: Communication

- Central Communication
- Data Center
- Dispatcher
- National Warning System

This figure includes the major emergency communication infrastructure of the departments of Emergency Management, Fire, Police, and Telecommunications and Information Services

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005; FCC, March 2008

URS

C-28
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public assets\C-28 Infrastructure communication.mxd

San Francisco Hazard Mitigation Plan

Major Utilities Infrastructure: Emergency Water

AWSS Facilities

- PS — Pump Station
- Reservoir
- Tank

This figure shows the reservoirs, tanks, and pump stations for San Francisco's Auxiliary Water Supply System (AWSS). It does not include the mains and hydrants for San Francisco's fire protection emergency water supply system.

N

0 0.5 1 2

Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008; URS

URS

L:\Projects\SF HMP 26816424\Maps\Public assets\C-29 Infrastructure emergency water.mxd

San Francisco Hazard Mitigation Plan

Major Utilities Infrastructure: Clean Water and Wastewater

SFPUC Facilities

- Chlorine Station
- Hydro-Pneumatic Station
- PS — Pump Station
- Reservoir
- Tank
- Treatment Building
- WTP — Wastewater Plant

This figure shows the reservoirs, tanks, pump stations, treatment buildings, and pump, chlorine, and hydro-pneumatic stations managed by the San Francisco Public Utilities Commission (SFPUC). It does not include the tunnels and pipelines for the City's clean water supply system or the PUC maintenance, facility, and administration buildings. The PUC administration buildings are identified in Figure C-20.

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008; URS

URS

L:\Projects\SF_HMP_26816424\Maps\Public_assets\C-30_Infrastructure_SFPUC_water.mxd

San Francisco Hazard Mitigation Plan

Transportation Systems Infrastructure: San Francisco Municipal Railway

Muni Facilities

- Central Control
- Rectifier Station
- Substation
- Transfer Station
- Yard
- Terminal
- Cable Car
- Streetcar

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005; URS; Bureau of Transportation Statistics, 2004

URS

C-31
September 2008

L:\Projects\SF HMP 26816424\Maps\Public assets\C-31 Infrastructure SF MUNI.mxd

San Francisco Hazard Mitigation Plan

Transportation Systems Infrastructure: Port of San Francisco

- Ferry Building
- Harbor
- Facility
- Marine
- Pier
- Land
- Terminal

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

URS

C-32
September 2008

L:\Projects\SF_HMP_26816424\Maps\Public assets\C-32_Infrastructure_port.mxd

San Francisco Hazard Mitigation Plan

Transportation Systems Infrastructure: Parking

P Parking Structure

N

0 0.5 1 2
Miles

Data Source: NAIP Aug 2005;
SFGIS Data Library, June 2008

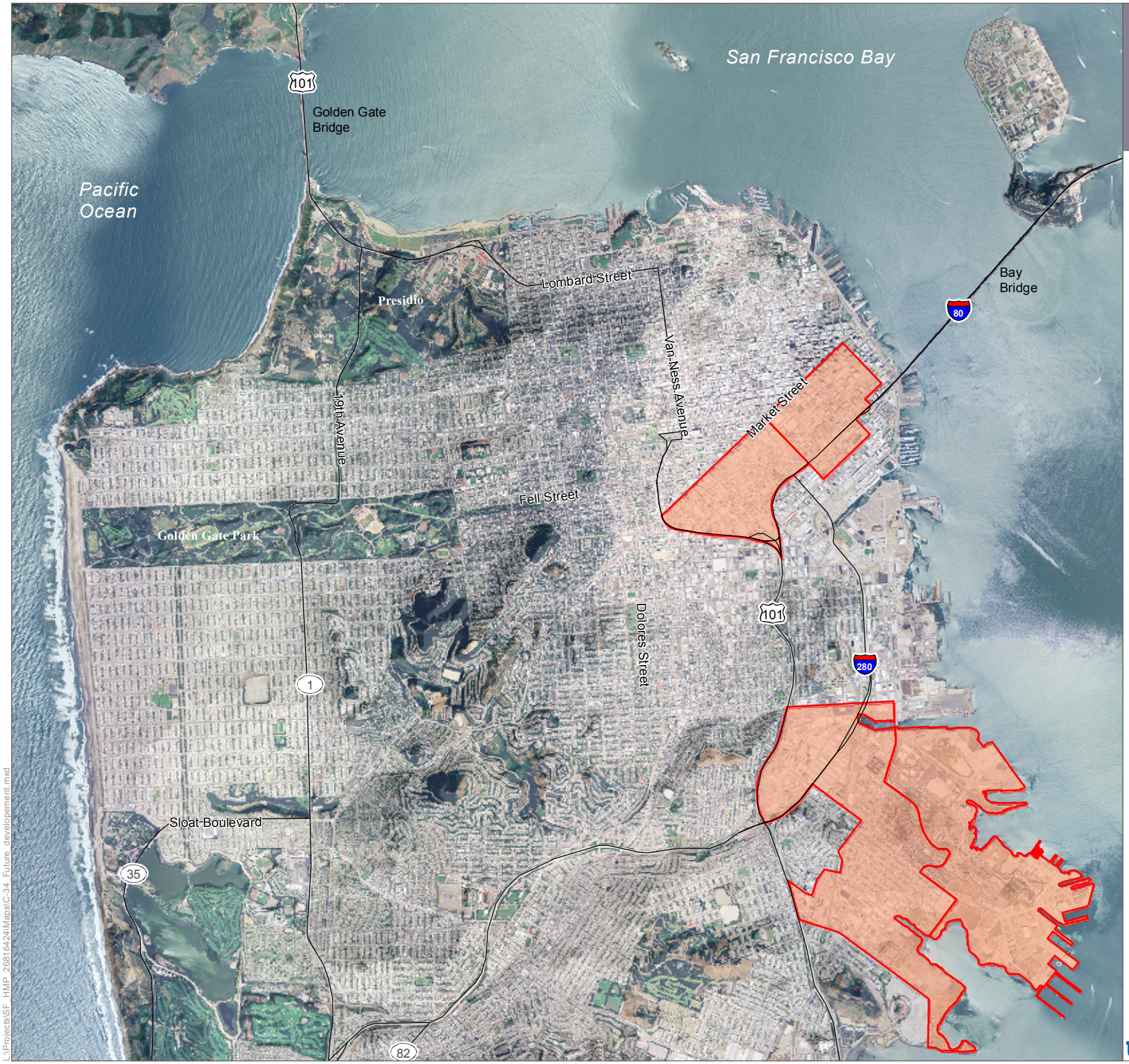
URS

C-33
September 2008

L:\Projects\SF HMP 26816424\Maps\Public assets\C-33 Infrastructure parking.mxd

San Francisco Hazard Mitigation Plan

Areas of Future Development- San Francisco's Redevelopement Areas



Proposed Project Areas (by neighborhood)

N

0 0.5 1 2

Miles

Data source: NAIP, 2005
SFGIS Data Library, June 2008

URS

C-34
September 2008

L:\Projects\SF HMP 26816424\Maps\C-34 Future developement.mxd

Appendix D
Planning Team Meetings

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #1
APRIL 22, 2008

AGENDA

9:00-9:15	**Introductions** San Francisco Department of Emergency Management Hazard Mitigation Planning Team URS Corporation
9:15-9:45	**Pre-Disaster Mitigation Planning** Why Mitigation Planning? Disaster Management Act of 2000* Types of Funding & Eligible Projects*
9:45-10:15	**Plan Development** FEMA "Crosswalk"* Plan Outline* Schedule*
10:15-10:45	**Exercise & Homework** Hazard Identification & Screening* EFMUTS List
10:45-11:00	**Questions & Answers**

*** Additional handout**

CITY AND COUNTY OF SAN FRANCISCO LOCAL HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #1
APRIL 22, 2008

LOCAL HAZARD MITIGATION PLAN OUTLINE

Section 1 Introduction

- Hazard Mitigation Planning
- Planning Requirements
- Grant Programs Associated with Mitigation Plan Requirements
- Hazard Mitigation Plan Description

Section 2 Prerequisites

- Adoption Documentation

Section 3 Community Description

- Location, Geography, and History
- Demographics
- Land Use and Development Trends

Section 4 Planning Process

- Overview of Planning Process
- Planning Team
- Public Involvement
- Incorporation of Existing Plans and Other Relevant Information

Section 5 Hazard Profiles

- Overview
- Hazard Identification and Screening
- Hazard Profiles

Section 6 Vulnerability Analysis

- Overview
- Asset Inventory
- Methodology / Data Limitations
- Exposure Analysis

Section 7 Capability Assessment

- Human and Technical Resources
- Financial Resources
- Legal and Regulatory Resources
- Current, Ongoing, and Completed Mitigation Projects

Section 8 Mitigation Strategy

Potential Mitigation Goals and Actions

Prioritization Process

Implementation Strategy

Section 9 Plan Maintenance

Monitoring, Evaluating, and Updating the Hazard Mitigation Plan

Implementation Through Existing Planning Mechanisms

Continued Public Involvement

Section 10 References

Appendices

A FEMA "Crosswalk"

B Adoption Resolution

C Figures

D Planning Team Meeting Handouts

E Public Outreach

F CCSF Asset Information

G Plan Maintenance Documents

H Electronic Files

DISASTER MITIGATION ACT OF 2000

Hazard mitigation, as defined in Title 44 of the Code of Federal Regulations (CFR), Subpart M, Section 206.401, is "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." In California, the Governor's Office of Emergency Services, has expanded this definition to also include human-caused hazards. As such, hazard mitigation is any work done to minimize the impacts of any type of hazard event before it occurs. It aims to reduce losses from future disasters. Hazard mitigation is a process in which hazards are identified and profiled, people and facilities at risk are analyzed, and mitigation actions are developed. The implementation of the mitigation actions, which include long-term strategies that may include planning, policy changes, programs, projects, and other activities, is the end result of this process.

In recent years, local hazard mitigation planning has been driven by a new Federal law. On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. In addition, it provided the legal basis for the Federal Emergency Management Agency's (FEMA) mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the *Federal Register* on February 26, 2002 (FEMA 2002a), 44 CFR Part 201. The FEMA crosswalk documents compliance with 44 CFR.

CITY AND COUNTY OF SAN FRANCISCO LOCAL HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #1
APRIL 22, 2008

SCHEDULE

Action	**Dates**
Review the City's existing HMP	February 18 – March 31
Assist DEM with the establishment of a Planning Team composed of representatives from key city departments	Week of March 16
Planning Team Meeting No.1 • Introduction to hazard mitigation planning and the DMA 2000 • Identify and select hazards • Confirm City assets	Week of April 20
Planning Team Meeting #2 • Draft Risk Assessment • Draft figures	Week of June 22
Planning Team Meeting #3 • Capability Assessment • Mitigation Strategy • Implementation Strategy	Week of July 13
• Plan Maintenance • Administrative Draft HMP	Week of August 3
Concurrent Preliminary Draft for OES and FEMA "courtesy" review and 30-day Public Comment period	Week of August 17 – September 17
Final Draft • Incorporate / address any public comment, OES / FEMA comments • Prepare Final Draft for adoption by resolution	Week of September 21

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #1
APRIL 22, 2008

CRITICAL FACILITIES, MAJOR UTILITIES, AND TRANSPORTATION SYSTEMS LIST

Essential Facilities	Government
	Emergency Response
	Educational
	Gathering Places
	Care
Major Utilities	Reservoirs
	Power
	Communication
	Water
	Wastewater
Transportation Systems	State and Federal Highways
	Bridges
	MUNI and BART

EXAMPLES OF ELIGIBLE MITIGATION PROJECTS

Alaska	Seismic Retrofit for Kodiak Middle School	$938,663
Arkansas	Greenwood Schools Westwood Safe Room	$1,172,485
Arkansas	ADEM Technical Assistance Grant	$150,000
California	University of California San Francisco Medical Center Nonstructural Seismic	$3,000,000
California	City of Napa / Queen of the Valley Structural Mitigation	$2,656,370
Colorado	City of Colorado Springs Wildfire Mitigation Project	$150,168
Colorado	Cottonwood Creek Channel Improvements and Bank Stabilization Project	$3,000,000
Georgia	Fayette County Residential Acquisition Project	$161,836
Missouri	Power & Light Overhead Electric to Underground	$1,709,991
North Carolina	Acquisition and Demolition of 80 unit apartment complex	$2,441,556
Tennessee	2006 MLGW Sheahan Water Plant Seismic Retrofit Project	$2,023,950
Utah	Ogden City Fire Station Retrofit and Reconstruction Project	$374,254
Utah	JVWTP Filter Gallery & Chemical Control Buildings Seismic Retrofit	$1,639,500

GRANT FUNDING

Currently five FEMA grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State or Local Mitigation Plan and to local entities that have a FEMA-approved Local Mitigation Plan with a flood annex or a stand-alone Flood Mitigation Plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act.

Stafford Act Grant Programs

The following grant programs require a State, Tribe, or local entity to have a FEMA-approved State or Local Mitigation Plan.

Hazard Mitigation Grant Program (HMGP): HMGP provides grants to States, Tribes, and local entities to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. The program may provide a State or Tribe with up to 20 percent of the total disaster grants awarded by FEMA. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

Pre-Disaster Mitigation (PDM) Program: PDM provides funds to State, Tribes, and local entities, including universities, for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In Fiscal Year (FY) 2007, PDM program funding totaled $100 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

National Flood Insurance Act Grant Programs

The following grant programs require a local entity to have a FEMA-approved State or Local Mitigation Plan with a flood annex or a stand-alone Flood Mitigation Plan.

Flood Mitigation Assistance (FMA) Grant Program: As noted above, the goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating RL properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants, including Planning, Project, and Technical Assistance. Project grants, which use the majority of the program's total funding, are awarded to States, Tribes, and local entities to apply mitigation measures reduce flood losses to properties insured under the NFIP. In FY 2007, FMA

funding totaled $31 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate severe repetitive loss (SRL) properties is available in certain situations.

Repetitive Flood Claims (RFC) Program: The RFC program provides funding to reduce or eliminate the long-term risk of flood damage to residential and nonresidential structures insured under the NFIP. Structures considered for mitigation must have had one or more claim payments for flood damages. In FY 2007, Congress appropriated $10 million for the implementation of this program. All RFC grants are eligible for up to 100 percent Federal assistance.

Severe Repetitive Loss (SRL) Program: The SRL program provides funding to reduce or eliminate the long-term risk of flood damage to residential structures insured under the NFIP. Structures considered for mitigation must have at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claims payments exceeds $20,000; or for which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any 10-year period. Congress has authorized up to $40 million per year from FY 2005 – FY 2009. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate SRL properties is available when the State or Tribal plan addresses ways to mitigate SRL properties.

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #1
APRIL 22, 2008

HAZARD IDENTIFICATION AND SCREENING

Hazard Type	Sub-Hazard	State Proclamation	Federal Proclamation	Identified in ERP, General Plan (GP), 2005 HMP Annex	Should be Profiled in HMP?
Avalanche					
Civil Unrest		(1966)		ERP	
Coastal Erosion					
Dam Failure					
Drought				2005 HMP	
Energy Emergency / Power Disruption		GP 2001 (2001)		ERP	
Expansive Soil					
Extreme Heat					
Hailstorm					
Hurricane					
Infectious Disease				ERP	
Land Subsidence					
Oil Spill		(2007)		ERP	
Seismic	Ground Shaking		845-DR (1989)	GP, ERP, 2005 HMP	
	Liquefaction		845-DR (1989)	GP, ERP, 2005 HMP	
	Earthquake-Induced Landslide			GP, ERP, 2005 HMP	
	Tsunami			GP, ERP, 2005 HMP	
	Urban Conflagration			GP, ERP	
	Hazardous Material Release			GP, ERP	
	Reservoir Failure			GP, ERP	
Transportation Disruption				ERP	
Terrorism				ERP	
Tornado					
Volcano					
Wildland Fire				ERP, 2005 HMP	
Winter Storm	Flood (Coastal)	GP-96-01 (1996) (1958)	1203-DR (1998) DR-1046 (1995) (1958)	GP, 2005 HMP	
	Wind	GP-96-01 (1996)		GP	
	Landslide			GP, 2005 HMP	
	Snow				

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #1
APRIL 22, 2008

MEETING MINUTES

9:00-9:15 Introductions

- 11 attendees, including two members of the consulting team (URS)
- Departments/agencies represented included DEM, DBI, WWE, Planning, DPW, and PUC

9:15-9:45 Pre-Disaster Mitigation Planning

- URS provided an overview of the Disaster Mitigation Act of 2000, FEMA grants associated with Local Hazard Mitigation Plan requirements, and examples of eligible mitigation projects

9:45-10:15 Plan Development

- URS and the Planning Team reviewed the draft FEMA requirements, known as the "crosswalk", for the Local Hazard Mitigation Plan.
- URS provided an overview of the plan outline and the draft schedule developed to complete the plan by October 2008.
- Planning Team confirmed that a second Planning Team meeting would occur during the week of June 22 and a third Planning Team meeting would occur during the week of July 13 or July 20.

10:15-10:45 Exercise & Homework

- Hazards:
  - Planning Team completed the Hazard Identification and Screening worksheet and verified the following hazards to be profiled in the Local Hazard Mitigation Plan: erosion and land movement; earthquake ground shaking, liquefaction, landslide, tsunami, urban conflagration, hazardous materials release, and reservoir failure; winter storm flood (coastal and stormwater), wind, and landslide; wildland fire; and oil spill.
  - In addition, the Planning Team also considered transportation disruption.
  - URS will work with FEMA and DEM to best determine how group/list the hazards to be profiled.
- Assets
  - Planning Team identified Unreinforced Masonry Buildings (UMB) and Soft-Story buildings to include in asset list. URS GIS to collect building inventory from appropriate City personnel.
  - Planning Team discussed how to identify and determine "essential facilities" or "key infrastructure" or "continuity of operations" facilities to be included in plan. URS will review SF ERP and General Plan to help determine appropriate language to use.

10:45-11:00 Next Steps / Outstanding Issues

- Confirm dates for Planning Team meetings 2 and 3
- URS to determine hazards to be profiled / grouped based on Planning Team meeting 1 input and discussions with FEMA and DEM. URS to distribute hazards to Planning Team for review.
- URS to determine assets to include as "critical" or "key" and distribute to Planning Team for review.

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #2
CITY HALL, ROOM 348
JUNE 25, 2008

AGENDA

9:00-9:15	**Re-Introductions**
	Hazard Mitigation Planning Team
	URS Corporation
9:15-9:30	**Project Status**
	Plan Update and Plan Requirements
	Completed Tasks and Remaining Tasks*
9:30-10:30	**Risk Assessment**
	Screened Hazards
	Hazard Figures*
	Population, Building Stock, and Public Assets*
	Asset Figures*
10:30-10:45	**Mitigation Projects**
	FEMA Mitigation Project Requirements*
	Previously Funded Mitigation Projects*
	SF HMP Project Ideas*
10:45-11:00	**Questions & Answers**

*** Additional handout**

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #2
CITY HALL, ROOM 348
JUNE 25, 2008

LOCAL HAZARD MITIGATION PLAN OUTLINE

(Plan components completed to date are italicized)

Section 1 Introduction

Hazard Mitigation Planning

Planning Requirements

Grant Programs Associated with Mitigation Plan Requirements

Hazard Mitigation Plan Description

Section 2 Prerequisites

Adoption Documentation

Section 3 Community Description

Location, Geography, and History

Demographics

Land Use and Development Trends

Section 4 Planning Process

Overview of Planning Process

Planning Team

Public Involvement

Incorporation of Existing Plans and Other Relevant Information

Section 5 Hazard Profiles

Overview

Hazard Identification and Screening

Hazard Profiles

Section 6 Vulnerability Analysis

Overview

Asset Inventory

Methodology / Data Limitations

Exposure Analysis

Section 7 Capability Assessment

Human and Technical Resources

Financial Resources

Legal and Regulatory Resources

Current, Ongoing, and Completed Mitigation Projects

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #2
CITY HALL, ROOM 348
JUNE 25, 2008

FEMA MITIGATION PROJECT REQUIREMENTS

Determining Eligibility – Questions That Need a "Yes" Answer

1. Does the project conform to the SF HMP and CA HMP?
2. Does your project provide a beneficial impact on the disaster area?
3. Does your application meet the environmental requirements
4. Does your project solve a problem independently?
5. Is your project cost-effective?

Eligible Activities:

1. Voluntary acquisition of real property for conversion to open space in perpetuity
2. Relocation of public or private structures
3. Elevation of existing public or private structures to avoid coastal or riverine flooding
4. Structural retrofitting and non-structural retrofitting (e.g., storm shutters, bracing systems)
5. Beach nourishment activities
6. Dry flood proofing of non-residential structures
7. Construction of safe rooms for public and private structures
8. Hydrologic and hydraulic studies / analyses, engineering studies, and drainage studies for the purpose of project design and feasibility determined as part of a project subapplication
9. Vegetation management for natural dune restoration, wildfire, or snow avalanche
10. Protective measures for utilities (e.g., electric and gas), water and sanitary sewer systems and/or other infrastructure (e.g., roads and bridges)
11. Storm water management projects (e.g., culverts and retention basins) to reduce or eliminate long-term risk from flood hazards
12. Localized flood control projects, such as certain ring levee and floodwall systems that are designed specifically to protect critical facilities and that do not constitute a section of a larger flood control system
13. Post-disaster building code related activities that support building code officials during the reconstruction process

Ineligible Activities:

1. Flood studies or flood mapping
2. Mapping activities that are not park of a risk assessment
3. Risk assessments, technical assistance, studies, or workshops not resulting in a FEMA-approved hazard mitigation plan
4. Information dissemination activities exceeding 10 percent of the total cost of the planning subapplication
5. A subapplication that requires ground disturbing activities that would initiate the environmental or historic preservation review and compliance process
6. Warning and alert notification systems
7. studies that do not yield in a project
8. Projects that solely address operations or maintenance of existing structures, facilities, and infrastructure (e.g., dredging, debris removal)
9. Water quality infrastructure projects
10. Any phase or part of a project that is dependent on another project
11. Major flood control projects

Ranking Factors:

1. Frequency and severity of hazard
2. Project related to recent disaster in your community / region / state
3. The percent of the population benefiting
4. Whether the project protects critical facilities
5. Does the project elevate or acquire a Severe Repetitive Loss or Repetitive Loss Property (FMA grant only)
6. Does the community participate in mitigation, such as the Firewise Community Program, adoption and enforcement of certain building codes, Community Rating Class system

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #2
CITY HALL, ROOM 348
JUNE 25, 2008

PREVIOUSLY FUNDED MITIGATION PROJECTS

Alaska	Seismic Retrofit for Kodiak Middle School	$938,663
California	**University of California San Francisco Medical Center Nonstructural Seismic**	**$3,000,000**
California	**University of California San Francisco Medical Center Seismic Saw-Cut Project**	**$3,000,000**
California	**SFPUC Hayward Fault Mitigation Project**	**$2,999,109**
California	City of Huntington Beach Ca. Civic Center Seismic Retrofit	$3,000,000
California	Cucamonga Valley Water District, Reservoir Site 1C, Seismic Mitigation Project	$109,497
California	Santa Clara County - Old Santa Cruz Hwy Infrastructure Protection Project	$1,338,655
Colorado	City of Colorado Springs Wildfire Mitigation Project	$150,168
Colorado	City of Grand Junction Ranchman's Ditch Capacity Improvement Project	$3,000,000
Colorado	Cottonwood Creek Channel Improvements and Bank Stabilization Project	$3,000,000
Georgia	Fayette County Residential Acquisition Project	$161,836
Missouri	Power & Light Overhead Electric to Underground	$1,709,991
Missouri	Jemerson Creek Road Bank Stabilization	$ 45,671
North Carolina	Acquisition and Demolition of 112 unit apartment complex - Charlotte, NC	$3,000,000
Tennessee	2006 MLGW Sheahan Water Plant Seismic Retrofit Project	$2,023,950
Utah	Ogden City Fire Station Retrofit and Reconstruction Project	$374,254
Utah	JVWTP Filter Gallery & Chemical Control Buildings Seismic Retrofit	$1,639,500
Washington	Old Stilly Flood Drainage Gate	$122,500
Washington	City of Kalama Downtown Flood Prevention Project	$255,000

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #2
JUNE 25, 2008

MEETING MINUTES

9:00-9:15 Re-Introductions

- Seven attendees, including three members of the consulting team (URS).
- Departments/agencies represented included the Capital Planning Program, Planning, DPW, and PUC.

9:15-9:30 Project Status

- URS reviewed the plan outline and highlighted progress made to date, including GIS asset and hazard mapping.
- URS noted upcoming deadlines, including Planning Team Meeting #3 and the release of the first draft.

9:30-10:30 Risk Assessment

- URS reviewed the hazards that had been chosen during the first Planning Team Meeting and refined over email correspondence with the DEM Project Manager and Planning Team. Hazards included in this version of the plan include: seismic hazards (ground shaking, ground failure, tsunami); weather-related hazards (drought, flood, heat, landslide, wildland fire, and wind); and other hazards (dam and reservoir failure, urban conflagration, and human caused, such as hazardous material, WMD, energy supply, and terrorism).
- The URS GIS analysts provided an overview of the asset and hazard figures created to date. Based on the feedback from the Planning Team, URS will:
    - Include a legend text box for each figure describing the data used to create the figure and also noting any data limitations.
    - Increase the regional area of the historic earthquake map and add occurrence dates to earthquakes larger than M 5.0.
    - Recreate urban conflagration figure to reflect house structure type.
    - Change conventions centers from non-critical to critical.
    - Change the 2007 Estimated Population figure to Population Density (2007).
    - Recreate Public Transportation Figure to reflect MUNI only and in addition include: central control, rectifier station, substation, transfer station, yards, and Transbay Terminal.
    - Create AWSS facilities figure only.
    - Merge all PUC facilities (clean water and wastewater) into one figure and include: wastewater plants, treatment buildings, tanks, reservoirs, pump stations, hydro-pneumatic stations, and chlorine stations.

- Recreate communications figure to include essential City and County of San Francisco communication facilities only, including: central communication, data center, dispatcher, and National Warning System.
- Include extension buildings for SF Community College, SFSU, and UCSF.

10:30-11:00 Mitigation Projects

- URS reviewed FEMA project requirements with the Planning Team, including conformity with the CA HMP and SF HMP, beneficial impacts, environmental requirements, stand-alone requirements, and cost efficiency requirements.
- URS and the Planning Team reviewed previously PDM-funded requirements, including the seismic retrofit of SF General Hospital.
- URS asked the Planning Team to develop mitigation project ideas and email the URS Project Manager with the ideas by July 11.

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #3
CITY HALL, ROOM 348
JULY 14, 2008

AGENDA

9:00-9:15	**Re-Introductions**
	Hazard Mitigation Planning Team
	URS Corporation
9:15-9:30	**Project Status**
	Meeting #2 Minutes*
	Assets and Figures*
	Completed Tasks and Remaining Tasks*
9:30-10:15	**Capability Assessment**
	Human and Technical Resources*
	Financial Resources*
	Legal and Regulatory Resources*
	Current and Ongoing Mitigation Projects*
10:15-11:00	**Mitigation Strategy**
	Goals and Potential Mitigation Projects*
	Prioritization Process*
	Implementation Strategy*
11:00	**Next Steps**
	Planning Team Draft, week of August 3
	Disaster Preparedness Coordinators Meeting, August 7
	Concurrent Preliminary Draft for OES/FEMA Review and Public Comment, week of August 17 – September 17

*** Additional handout**

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #3
CITY HALL, ROOM 348
JULY 14, 2008

LOCAL HAZARD MITIGATION PLAN OUTLINE

(Plan components completed or near completion are italicized)

Section 1 Introduction

Hazard Mitigation Planning

Planning Requirements

Grant Programs Associated with Mitigation Plan Requirements

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Hazard Identification and Screening

Hazard Profiles

Section 6 Vulnerability Analysis

Overview

Asset Inventory

Methodology / Data Limitations

Exposure Analysis

Section 7 Capability Assessment

Human and Technical Resources

Financial Resources

Legal and Regulatory Resources

Current, Ongoing, and Completed Mitigation Projects

Section 8 Mitigation Strategy

Potential Mitigation Goals and Actions

Prioritization Process

Implementation Strategy

Section 9 Plan Maintenance

Monitoring, Evaluating, and Updating the Hazard Mitigation Plan

Implementation Through Existing Planning Mechanisms

Continued Public Involvement

Section 10 References

Appendices

A FEMA "Crosswalk"

B Adoption Resolution

C Figures

D *Planning Team Meeting Handouts*

E Public Outreach

F CCSF Asset Information

G Plan Maintenance Documents

H Electronic Files

C-1 Location
C-2 Land Use
C-3 Realtors Neighborhoods
C-4 Historical Earthquakes
C-5 Shaking: San Andreas
C-6 Shaking: Hayward
C-7 Liquefaction Hazard Area
C-8 Landslide Hazard Area
C-9 Tsunami Hazard Area
C-10 Tsunami MOT
C-11 Flood Hazard Area
C-12 Stormwater Hazard Area
C-13 Wildland Fire Hazard Area
C-14 Reservoir Failure Hazard Area
C-15 Urban Conflagration Hazard Area
C-16 Population Density (2007)
C-17 Residential and Commercial Building Stock
C-18 Exempt Unreinforced Masonry Buildings
C-19 Facilities Located Outside of County Limits
C-20 Critical Facilities: Government
C-21 Critical Facilities: Emergency Services
C-22 Critical Facilities: Education
C-23 Critical Facilities: Care
C-24 Critical Facilities: Convention Centers
C-25 Non-Critical Facilities: Libraries
C-26 Non-Critical Facilities: Museums and Performing Arts
C-27 Non-Critical Facilities: Recreation and Parks
C-28 Major Utilities Infrastructure: Communication
C-29 Major Utilities Infrastructure: (AWSS) Emergency Water
C-30 Major Utilities Infrastructure: (SFPUC) Clean Water and Wastewater
C-31 Transportation Systems Infrastructure: San Francisco Municipal Railway (MUNI)
C-32 Transportation Systems Infrastructure: Port of San Francisco

CITY AND COUNTY OF SAN FRANCISCO HAZARD MITIGATION PLAN
PLANNING TEAM MEETING #3
JULY 14, 2008

MEETING MINUTES

9:00-9:15 Introductions

- 4 attendees, including DEM, DBI, PUC, and Planning.

9:15-9:30 Project Status

- Reviewed Meeting #2 minutes, including changes made to assets and figures

9:30-9:45 Capability Assessment

- Reviewed draft capability assessment, including potential local funding mechanisms.

9:45-11:00 Mitigation Strategy

- Reviewed and commented on potential mitigation projects. Redefined potential projects to be more in line with current and ongoing projects.
- Reviewed STAPLEE criteria and developed additional criteria including:
    - Current or potential support from the Mayor and/or Board of Supervisors
    - Local CCSF department or agency champion
    - Ability to be implemented during the 5-year lifespan of this version of the HMP
    - Reduce expected future damages and losses (cost-benefit)
    - Value added to resiliency (of the CCSF and its citizens)
    - "Low-lying fruit" projects (projects that are easy to develop, fund, implement, and close-out).
- Determined that all projects meeting the above requirements would be considered high priority projects and included in the Implementation Strategy. Initially have selected 12 mitigation projects to be included in the implementation strategy.
- DEM/URS will email Planning Team to review potential mitigation actions list as well as implementation strategy.
- All additional project ideas must be submitted to DEM/URS by July 21.

Appendix E
Outreach Information


SFGov: Department of Emergency Management: Division of Emergency Services - Windows Internet Explorer
http://www.sfgov.org/site/oes_index.asp
SFGov: Department of Emergency Management: ...
sfgov
SFgov | Residents | Business | Government | Visitors | Online Services
Help
Search
Department of Emergency Management
LISTEN
TEXT ONLY
PRINT
Within the Department of Emergency Management, the Division of Emergency Services works closely with emergency responders, community partners and residents to engage in comprehensive disaster planning for the City and County of San Francisco.
News and Alerts
NEW - August 4, 2008
The 2008 San Francisco Hazard Mitigation Plan is currently being updated. View the plan's draft seismic maps here.
NEW - July 7, 2008
Property Owners Earthquake Safety Information - ABAG
NEW - June 12, 2008
Bay RICS Brochure
- Copy of the Bay Area's Regional Interoperable Communication System Brochure.
- Highlights of Current Activities at the Department of Emergency Management.
April 16, 2008 - Emergency Plans Update
An update of the City's Emergency Plan is now available. Download a PDF of the City's Emergency Response Plan.
March 17, 2008 - January 4, 2008 Storm
The Event Summary Report for the storm of January 4, 2008 was published on March 14, 2008. Download a PDF of the January 4th Storm Event Summary Report.
March 13, 2008 - Cosco Busan Oil Spill
The final After-Action Report for the M/V Cosco Busan Oil Spill was published on March
EXPLORE
Home
About Us
Events Calendar
Emergency Plans
Job Opportunities
Contact Us
HOW DO I?
...get involved?
...prepare an emergency plan?
....prepare for the next storm? (PDF)
RELATED LINKS
Division of Emergency Communications
72hours.org
AlertSF
Internet | Protected Mode: On
100%
SFGov: Department ...
4:53 PM


SFGov: Department of Emergency Management: Division of Emergency Services - Windows Internet Explorer
http://www.sfgov.org/site/oes_index.asp
File Edit View Favorites Tools Help
SFGov: Department of Emergency Management: ...
sfgov
SFgov | Residents | Business | Government | Visitors | Online Services
Help
Search
Department of Emergency Management
LISTEN TEXT ONLY PRINT
Within the Department of Emergency Management, the Division of Emergency Services works closely with emergency responders, community partners and residents to engage in comprehensive disaster planning for the City and County of San Francisco.
News and Alerts
NEW - January 5th, 2009
On October 21st, the City conducted the first ever City wide earthquake drill called ShakeUp SF. This Fact Sheet highlights the many people who participated as well as some examples as to what they did.
October 21, 2008
San Francisco's own earthquake quiz gives residents and visitors a fun, interactive opportunity to test their knowledge of what to do if an earthquake strikes while driving, sleeping, on Muni, at the beach or at work.
Cosco Buson 1 year anniversary
Please take a look at the City's After Action Report or the Fact Sheet to read what steps the City has taken to prevent, mitigate, and respond to another such incident.
September 5, 2008
The City and County of San Francisco has just completed a draft of the City's Hazard Mitigation Plan for public comment. View the plan's draft seismic maps here.
August 22, 2008
What's Your
Are You Ready? Take this quick survey to find out your Readiness
EXPLORE
Home
About Us
Events Calendar
Emergency Plans
Job Opportunities
Contact Us
HOW DO I?
...get involved?
...prepare an emergency plan?
....prepare for the next storm? (PDF)
RELATED LINKS
Division of Emergency Communications
72hours.org
Internet | Protected Mode: Off
100%
courtesy - Goog...
SFGov: Departm...
San Francisco B...
Message - Wind...
Re: final produc...
Re: final produc...
Message - Wind...
3:05 PM

Appendix F
Asset Information

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Care	Clinic	Balboa Teen Health Center	Mission Terrace
Care	Clinic	Cole Street Clinic	Haight Ashbury
Care	Clinic	Housing and Urban Health Clinic	Downtown/Tenderloin
Care	Clinic	Larkin Street Clinic	Downtown/Tenderloin
Care	Clinic	Tom Waddell Clinic	Van Ness/Civic Center
Care	Clinic	YGC Clinic	Midtown Terrace
Care	Health Center	Castro - Mission Health Center	Eureka Valley/Dolores Heights
Care	Health Center	Chinatown Public Health Center	Nob Hill
Care	Health Center	Maxine Hall Health Center	Western Addition
Care	Health Center	Ocean Park Health Center	Central Sunset
Care	Health Center	Potrero Hill Health Center	Potrero Hill
Care	Health Center	Silver Avenue Health Center	Portola
Care	Health Center	Southeast Health Center	Bayview District
Care	Health Center	Std Clinic On 7th Street Station	South of Market
Care	Hospital	Laguna Honda - Main Hospital-#1 (Admin A-G)	Midtown Terrace
Care	Hospital	S.F. General Hospital Bldg 01	Inner Mission
Care	Senior Service Center	Curry Senior Service Center	Downtown/Tenderloin
Convention Center	Civic Auditorium	Bill Graham Civic Auditorium	Van Ness/Civic Center
Convention Center	Moscone Center	Moscone Center	Financial District South
Education	SF Community College District (SFCCD)	City College	Sunnyside
Education	SFCCD	City College – Extension	Silver Terrace
Education	SF Unified School District (SFUSD)	A.P. Giannini Jr. High School	Outer Parkside
Education	SFUSD	Abraham Lincoln Sr. High School	Parkside
Education	SFUSD	Abraham Lincoln Sr. High School (Annex)	Parkside
Education	SFUSD	Alamo Park Sr. High School	Alamo Square
Education	SFUSD	Alamo School (Elementary)	Central Richmond

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Education	SFUSD	Alice Fong Yu Alternative Elementary School	Inner Sunset
Education	SFUSD	Alvarado School (Elementary)	Noe Valley
Education	SFUSD	Aptos Jr. High School	Mount Davidson Manor
Education	SFUSD	Argonne Nursery	Central Richmond
Education	SFUSD	Argonne School (Elementary)	Central Richmond
Education	SFUSD	Balboa Sr. High School	Mission Terrace
Education	SFUSD	Benjamin Franklin Jr. High School	Western Addition
Education	SFUSD	Bessie Carmichael Elementary	South of Market
Education	SFUSD	Bessie L. Smith Child Care Center	Hayes Valley
Education	SFUSD	Bret Harte School (Elementary)	Bayview Heights
Education	SFUSD	Bryant School (Elementary)	Inner Mission
Education	SFUSD	Buena Vista Alternative Elementary School	Noe Valley
Education	SFUSD	Cabrillo School (Elementary)	Central Richmond
Education	SFUSD	Candlestick Cove Child Care Center	Visitacion Valley
Education	SFUSD	Central Administrative Offices	Van Ness/Civic Center
Education	SFUSD	Cesar Chavez Elementary School	Inner Mission
Education	SFUSD	Chinese Education Center	Financial District North
Education	SFUSD	Claire Lilienthal (3-8) Alternative School	Marina
Education	SFUSD	Claire Lilienthal (K-2) Alternative School	Presidio Heights
Education	SFUSD	Claire Lilienthal K - 8 School	Pacific Heights
Education	SFUSD	Clarendon Alternative Elementary School	Forest Knolls
Education	SFUSD	Cleveland School (Elementary)	Excelsior
Education	SFUSD	Commodore Sloat School (Elementary)	Balboa Terrace
Education	SFUSD	Daniel Webster School (Elementary)	Potrero Hill
Education	SFUSD	Downtown Sr. High School	Inner Mission
Education	SFUSD	Dr. Charles R. Drew School (Elementary)	Bayview District
Education	SFUSD	Dr. William Cobb School (Elementary)	Lower Pacific Heights
Education	SFUSD	E.R. Taylor School (Elementary)	Portola

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Education	SFUSD	Edison School (Elementary)	Noe Valley
Education	SFUSD	El Dorado School (Elem)	Visitacion Valley
Education	SFUSD	Enola D. Maxwell Middle School	Potrero Hill
Education	SFUSD	Everett Junior High School	Eureka Valley/Dolores Heights
Education	SFUSD	F.S. Key Annex Child Care Center	Outer Sunset
Education	SFUSD	Facilities Management Offices	Bayview District
Education	SFUSD	Fairmount School (Elem.)	Glen Park
Education	SFUSD	Filipino Education Center	Financial District South
Education	SFUSD	Florence Martin Child Care Center	Haight Ashbury
Education	SFUSD	Francis Scott Key School (Elementary)	Outer Sunset
Education	SFUSD	Francisco Middle School	North Beach
Education	SFUSD	Frank Mccoppin School and Child Care Center	Inner Richmond
Education	SFUSD	Galileo Academy of Science & Technology	Russian Hill
Education	SFUSD	Garfield School (Elementary)	Telegraph Hill
Education	SFUSD	Geary Child Care Center	Jordan Park/Laurel Heights
Education	SFUSD	George Peabody School (Elementary)	Inner Richmond
Education	SFUSD	George R. Moscone Elementary School	Inner Mission
Education	SFUSD	George Washington Carver Elementary	Bayview District
Education	SFUSD	George Washington Sr. High School	Central Richmond
Education	SFUSD	Glen Park School (Elementary)	Sunnyside
Education	SFUSD	Gloria R. Davis Middle School	Bayview District
Education	SFUSD	Golden Gate School (Elementary)	Western Addition
Education	SFUSD	Gordon J. Lau CDC	Nob Hill
Education	SFUSD	Gordon J. Lau Elementary School	Nob Hill
Education	SFUSD	Grattan School (Elementary)	Parnassus/Ashbury Heights
Education	SFUSD	Guadalupe School (Elementary)	Crocker Amazon
Education	SFUSD	Harvey Milk Children Center	Van Ness/Civic Center
Education	SFUSD	Harvey Milk Civil Rights Academy	Eureka Valley/Dolores Heights

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Education	SFUSD	Herbert Hoover Jr. High School	Forest Hill
Education	SFUSD	Hillcrest School (Elementary)	Portola
Education	SFUSD	Horace Mann Jr. High School	Inner Mission
Education	SFUSD	Ida Wells High School	Alamo Square
Education	SFUSD	Independence High School	Outer Sunset
Education	SFUSD	International Studies Academy	Potrero Hill
Education	SFUSD	James Denman Jr. High School	Mission Terrace
Education	SFUSD	James Lick Jr. High School	Noe Valley
Education	SFUSD	Japanese Bilingual - Bicultural Program -West	Outer Parkside
Education	SFUSD	Jean Parker School (Elementary)	North Beach
Education	SFUSD	Jefferson Nursery	Central Sunset
Education	SFUSD	Jefferson School (Elementary)	Inner Sunset
Education	SFUSD	John McLaren Child Care Center	Visitacion Valley
Education	SFUSD	John Muir School (Elementary)	Hayes Valley
Education	SFUSD	John O'Connell Alternative High School	Inner Mission
Education	SFUSD	John Swett Alternative Elementary School	Van Ness/Civic Center
Education	SFUSD	John Yehall Chin Elementary School	Telegraph Hill
Education	SFUSD	Junipero Serra School (Elementary)	Bernal Heights South
Education	SFUSD	Lafayette School (Elem.)	Outer Richmond
Education	SFUSD	Laguna Golden Gate Child Care Center, Pre-K School	Western Addition
Education	SFUSD	Laguna Honda School	Inner Sunset
Education	SFUSD	Lakeshore School (Elementary)	Lake Shore
Education	SFUSD	Lakeside School	Lake Shore
Education	SFUSD	Las Americas Children's Center	Inner Mission
Education	SFUSD	Lawton School (Elementary)	Central Sunset
Education	SFUSD	Leonard R. Flynn Elementary School	Bernal Heights North
Education	SFUSD	Longfellow School (Elementary)	Crocker Amazon
Education	SFUSD	Louise Lombard Special School	Stonestown

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Education	SFUSD	Lowell High School	Lake Shore
Education	SFUSD	Luther Burbank Jr. High School	Excelsior
Education	SFUSD	Malcolm X Academy	Hunters Point
Education	SFUSD	Marina Jr. High School	Marina
Education	SFUSD	Marshall School (Elementary)	Inner Mission
Education	SFUSD	Martin Luther King Jr. High School	Portola
Education	SFUSD	Mcateer High School	Diamond Heights
Education	SFUSD	McKinley School (Elementary)	Corona Heights
Education	SFUSD	Miraloma School (Elementary)	Miraloma Park
Education	SFUSD	Mission Education Center	Inner Mission
Education	SFUSD	Mission Nursery	Inner Mission
Education	SFUSD	Mission Senior High School	Mission Dolores
Education	SFUSD	Monroe School (Elementary)	Excelsior
Education	SFUSD	New Tradition Alternative School (Elem.)	North Panhandle
Education	SFUSD	Newcomer High School	Pacific Heights
Education	SFUSD	Ortega School (Elementary)	Ingleside Heights
Education	SFUSD	Paul Revere School (Elementary)	Bernal Heights South
Education	SFUSD	Paul Revere School Annex	Bernal Heights South
Education	SFUSD	Phillip and Sala Burton Academic High School	Visitacion Valley
Education	SFUSD	Potrero Nursery	Potrero Hill
Education	SFUSD	Presidio Jr. High School	Central Richmond
Education	SFUSD	R.L. Stevenson School (Elementary)	Parkside
Education	SFUSD	Raul Wallenberg High School	Anza Vista
Education	SFUSD	Redding School (Elementary)	Downtown/Tenderloin
Education	SFUSD	Richmond Community Center	Central Richmond
Education	SFUSD	Richmond Recreation Center	Central Richmond
Education	SFUSD	Rooftop Alternative 5-8 School	Twin Peaks
Education	SFUSD	Rooftop Alternative K-4 School	Twin Peaks

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Education	SFUSD	Roosevelt Middle High School	Jordan Park/Laurel Heights
Education	SFUSD	Rosa Parks Elementary School	Western Addition
Education	SFUSD	S.F. Community School	Excelsior
Education	SFUSD	San Miguel Child Care Center	Mission Terrace
Education	SFUSD	Sanchez School (Elementary)	Eureka Valley/Dolores Heights
Education	SFUSD	Sarah B. Cooper Child Development Center	Russian Hill
Education	SFUSD	School of The Arts	Diamond Heights
Education	SFUSD	Sheridan School (Elementary)	Oceanview
Education	SFUSD	Sherman School (Elementary)	Pacific Heights
Education	SFUSD	Spring Valley School (Elementary)	Nob Hill
Education	SFUSD	Starr King School (Elementary)	Potrero Hill
Education	SFUSD	Sunnyside School (Elementary)	Sunnyside
Education	SFUSD	Sunset Elementary School	Outer Parkside
Education	SFUSD	Sunshine Small High School	Inner Mission
Education	SFUSD	Sutro School (Elementary)	Inner Richmond
Education	SFUSD	Tenderloin Community School	Van Ness/Civic Center
Education	SFUSD	Theresa S Mahler CDC	Eureka Valley/Dolores Heights
Education	SFUSD	Thurgood Marshall Academic High School	Silver Terrace
Education	SFUSD	Treasure Island Elementary School	Treasure Island
Education	SFUSD	Twenty-First Century Academy	Silver Terrace
Education	SFUSD	Ulloa School (Elementary)	Outer Parkside
Education	SFUSD	Visitacion Valley Jr. High School	Visitacion Valley
Education	SFUSD	Visitacion Valley School (Elementary)	Visitacion Valley
Education	SFUSD	West Portal School (Elementary)	West Portal
Education	SFUSD	William De Avila School (Elementary)	Buena Vista Park
Education	SFUSD	Yerba Buena Cultural College Center	Cow Hollow
Education	SFUSD	Yerba Buena School Yard	Cow Hollow
Education	SFUSD	Yick Woo School (Elementary)	Russian Hill

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Education	San Francisco State University (SFSU)	SF State University	Stonestown
Education	SFSU	SFSU – Extension	Downtown/Tenderloin
Education	University of California at San Francisco (UCSF)	UCSF	Inner Sunset
Education	UCSF	UCSF Laurel Heights Campus	Presidio Heights
Education	UCSF	UCSF Mission Bay Campus	Mission Bay
Education	UCSF	UCSF Mount Zion Medical Center	Lower Pacific Heights
Education	UCSF	UCSF Veteran's Affairs Medical Center	Outer Richmond
Emergency Services	Emergency Operations Center	Emergency Operations Center (EOC)	Western Addition
Emergency Services	Fire Department	Arson Task Force	Financial District South
Emergency Services	Fire Department	Bureau of Equipment	Hunters Point
Emergency Services	Fire Department	Fire Chief's Residence	Downtown/Tenderloin
Emergency Services	Fire Department	Fire Dept Drill Tower	Inner Mission
Emergency Services	Fire Department	Fire Dept Hqtrs/Salt Water Pumping Station #1	South Beach
Emergency Services	Fire Department	Fire Division of Training	Inner Mission
Emergency Services	Fire Department	Fire Station #1	Financial District South
Emergency Services	Fire Department	Fire Station #1	Stonestown
Emergency Services	Fire Department	Fire Station #10	Jordan Park/Laurel Heights
Emergency Services	Fire Department	Fire Station #11	Noe Valley
Emergency Services	Fire Department	Fire Station #12	Parnassus/Ashbury Heights
Emergency Services	Fire Department	Fire Station #13	Financial District North
Emergency Services	Fire Department	Fire Station #14	Central Richmond
Emergency Services	Fire Department	Fire Station #15	Westwood Park
Emergency Services	Fire Department	Fire Station #16	Cow Hollow
Emergency Services	Fire Department	Fire Station #17	Bayview District
Emergency Services	Fire Department	Fire Station #18	Parkside
Emergency Services	Fire Department	Fire Station #2	Hunters Point

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Emergency Services	Fire Department	Fire Station #2	Nob Hill
Emergency Services	Fire Department	Fire Station #20	Midtown Terrace
Emergency Services	Fire Department	Fire Station #21	North Panhandle
Emergency Services	Fire Department	Fire Station #22	Inner Sunset
Emergency Services	Fire Department	Fire Station #23	Outer Sunset
Emergency Services	Fire Department	Fire Station #24	Noe Valley
Emergency Services	Fire Department	Fire Station #26	Glen Park
Emergency Services	Fire Department	Fire Station #28	Telegraph Hill
Emergency Services	Fire Department	Fire Station #29	Mission Bay
Emergency Services	Fire Department	Fire Station #3	Downtown/Tenderloin
Emergency Services	Fire Department	Fire Station #31	Inner Richmond
Emergency Services	Fire Department	Fire Station #32	Bernal Heights South
Emergency Services	Fire Department	Fire Station #33	Oceanview
Emergency Services	Fire Department	Fire Station #34	Outer Richmond
Emergency Services	Fire Department	Fire Station #35/Fire Boat Headquarters	South Beach
Emergency Services	Fire Department	Fire Station #36	Van Ness/Civic Center
Emergency Services	Fire Department	Fire Station #37	Potrero Hill
Emergency Services	Fire Department	Fire Station #38	Pacific Heights
Emergency Services	Fire Department	Fire Station #39	Miraloma Park
Emergency Services	Fire Department	Fire Station #40	Inner Parkside
Emergency Services	Fire Department	Fire Station #41	Nob Hill
Emergency Services	Fire Department	Fire Station #42	Portola
Emergency Services	Fire Department	Fire Station #43	Excelsior
Emergency Services	Fire Department	Fire Station #44	Visitacion Valley
Emergency Services	Fire Department	Fire Station #48	Treasure Island
Emergency Services	Fire Department	Fire Station #5	Western Addition
Emergency Services	Fire Department	Fire Station #6	Duboce Triangle
Emergency Services	Fire Department	Fire Station #7 - Division 3 Headquarters	Inner Mission

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Emergency Services	Fire Department	Fire Station #8	Mission Bay
Emergency Services	Fire Department	Fire Station #9	Bayview District
Emergency Services	Fire Department	Palo Alto Avenue	Midtown Terrace
Emergency Services	Fire Department	San Francisco Neighbors Resource	Inner Parkside
Emergency Services	Fire Department	Fire Training Center	Treasure Island
Emergency Services	Fire Department	Station 48	Treasure Island
Emergency Services	Police Department	Bayview Police Station	Silver Terrace
Emergency Services	Police Department	Central Police Station	North Beach
Emergency Services	Police Department	Ingleside Police Station	Sunnyside
Emergency Services	Police Department	Mission Police Station	Mission Dolores
Emergency Services	Police Department	Northern Police Station	Western Addition
Emergency Services	Police Department	Park Police Station	Golden Gate Park
Emergency Services	Police Department	Police Academy	Diamond Heights
Emergency Services	Police Department	Richmond Police Station	Inner Richmond
Emergency Services	Police Department	Motorcycle Training Center	Treasure Island
Emergency Services	Police Department	Southern Police Station	Mission Bay
Emergency Services	Police Department	Taraval Police Station	Parkside
Emergency Services	Police Department	Tenderloin Task Force Police Station	Downtown/Tenderloin
Government	Animal Shelter	Animal Care and Control	Inner Mission
Government	City Hall	City Hall	Van Ness/Civic Center
Government	Department and Agency	Administration Building	Treasure Island
Government	Department and Agency	Civil Grand Jury	Van Ness/Civic Center
Government	Department and Agency	Convention Facilities Department	Van Ness/Civic Center
Government	Department and Agency	Department of Aging and Adult Services, Reproduction & Mail Services	South of Market
Government	Department and Agency	Department of Building Inspection and Planning and Information Center	South of Market
Government	Department and Agency	Department of Children, Youth, and Their Families,	Van Ness/Civic Center

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
		Veterans Affairs, Department of Public Health	
Government	Department and Agency	Department of Emergency Management	Western Addition
Government	Department and Agency	Department of Emergency Management	Western Addition
Government	Department and Agency	Department of Human Services	South of Market
Government	Department and Agency	Department of Public Works	Treasure Island
Government	Department and Agency	Department of The Environment	Van Ness/Civic Center
Government	Department and Agency	Express to Success Employment Centers	South of Market
Government	Department and Agency	Express to Success Employment Centers	Van Ness/Civic Center
Government	Department and Agency	Office of The Public Defender	Mission Bay
Government	Department and Agency	San Francisco Public Utilities Commission (SFPUC)	Treasure Island
Government	Department and Agency	Recreation and Parks Department	Golden Gate Park
Government	Department and Agency	San Francisco Arts Commission, Department of Emergency Management	Van Ness/Civic Center
Government	Department and Agency	San Francisco County Transportation Authority	Van Ness/Civic Center
Government	Department and Agency	San Francisco Ethics Commission	Van Ness/Civic Center
Government	Department and Agency	San Francisco Housing Authority	Downtown/Tenderloin
Government	Department and Agency	San Francisco Planning Department	South of Market
Government	Department and Agency	San Francisco Unified School District	Van Ness/Civic Center
Government	Department and Agency	San Francisco Youth Commission	Van Ness/Civic Center
Government	Department and Agency	San Francisco MTA	Van Ness/Civic Center
Government	Department and Agency	SFPUC Administration Building	Bayview District
Government	Department and Agency	SFPUC Administration Building	Golden Gate Park
Government	Department and Agency	SFPUC Administration Building	Van Ness/Civic Center
Government	Department and Agency	SFPUC/Clean Water Administration Building	Downtown/Tenderloin
Government	Department and Agency	Southeast Community Facility Commission	Silver Terrace
Government	Department and Agency	Transbay Joint Powers Authority	South Beach
Government	Department and Agency	Treasure Island Development Authority	Treasure Island
Government	Hall of Justice	County Jail 1 - Hall of Justice	Mission Bay

Table F-1 Critical Facilities

Category	Type	Facility Name	Neighborhood
Government	Jail	County Jail 8	Mission Bay
Government	Jail	Juvenile Justice Center	Midtown Terrace
Government	Jail	S.F. General Hospital Jail	Inner Mission
Government	Jail	Treasure Island Jail	Treasure Island

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Libraries	Law Library	Law Library - Civic Center (Main Library)	Van Ness/Civic Center
Libraries	Law Library	Law Library - Courthouse Reference Room	Downtown/Tenderloin
Libraries	Law Library	Law Library - Financial District Branch	Financial District South
Libraries	Public Library	Anna E. Waden Library (Bayview)	Bayview District
Libraries	Public Library	Anza Library	Outer Richmond
Libraries	Public Library	Bernal Heights Library	Bernal Heights South
Libraries	Public Library	Chinatown Branch Library	Nob Hill
Libraries	Public Library	Eureka Valley Branch Library	Eureka Valley/Dolores Heights
Libraries	Public Library	Excelsior Library	Mission Terrace
Libraries	Public Library	Golden Gate Valley Library	Pacific Heights
Libraries	Public Library	Library Support Services	South of Market
Libraries	Public Library	Main Library	Van Ness/Civic Center
Libraries	Public Library	Marina Branch Library	Marina
Libraries	Public Library	Merced Branch Library	Lakeside
Libraries	Public Library	Mission Bay Branch	Mission Bay
Libraries	Public Library	Mission Branch Library	Inner Mission
Libraries	Public Library	Noe Valley Branch Library	Noe Valley
Libraries	Public Library	North Beach Branch Library	North Beach
Libraries	Public Library	Ocean View Branch Library	Ingleside Heights
Libraries	Public Library	Ortega Branch Library	Outer Parkside
Libraries	Public Library	Park Branch Library	Haight Ashbury
Libraries	Public Library	Parkside Branch Library	Parkside
Libraries	Public Library	Potrero Library	Potrero Hill
Libraries	Public Library	Presidio Branch Library	Pacific Heights
Libraries	Public Library	Richmond Branch Library	Inner Richmond
Libraries	Public Library	Sunset Branch Library	Inner Sunset

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Libraries	Public Library	Visitacion Valley Branch Library	Visitacion Valley
Libraries	Public Library	West Portal Branch Library	West Portal
Libraries	Public Library	Western Addition Branch Library	Lower Pacific Heights
Museums & Performing Arts	Academy of Sciences	Cowell Hall	Golden Gate Park
Museums & Performing Arts (Museum & Arts)	Academy of Sciences	Bird Hall	Golden Gate Park
Museum & Arts	Academy of Sciences	Mcbean-Peterson Hall	Golden Gate Park
Museum & Arts	Academy of Sciences	Ocean Hall	Golden Gate Park
Museum & Arts	Academy of Sciences	Wattis Hall	Golden Gate Park
Museum & Arts	Asian Arts Commission	Asian Art Museum	Van Ness/Civic Center
Museum & Arts	Fine Arts Museums	M.H. De Young Memorial Museum	Golden Gate Park
Museum & Arts	Fine Arts Museums	Palace of Legion of Honor	Outer Richmond
Museum & Arts	Fine Arts Museums	Palace of Fine Arts	Presidio
Museum & Arts	San Francisco Museum of Modern Art (SFMOMA)	SFMOMA	Financial District South
Museum & Arts	War Memorial & Performing Arts Cent	Davies Symph Hall/Zellerbach Hall	Van Ness/Civic Center
Museum & Arts	War Memorial & Performing Arts Cent	War Memorial Opera House	Van Ness/Civic Center
Museum & Arts	War Memorial & Performing Arts Cent	War Memorial Veteran’s Bldg	Van Ness/Civic Center
Parks & Recreation	Commercial Sports Facility	AT&T Park	South Beach
Parks & Recreation	Commercial Sports Facility	Candlestick Park	Bayview Heights
Parks & Recreation	Mini Park	Alioto Mini Park	Inner Mission
Parks & Recreation	Mini Park	Arguello Mini Park	Inner Richmond
Parks & Recreation	Mini Park	Mini Park (24th & York)	Inner Mission
Parks & Recreation	Mini Park	Mini Park (1129 Howard)	South of Market

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Parks & Recreation	Mini Park	Mini Park (Bright & Randolph)	Ingleside Heights
Parks & Recreation	Mini Park	Mini Park (Bush & Baker)	Lower Pacific Heights
Parks & Recreation	Mini Park	Mini Park (Fillmore Street)	Western Addition
Parks & Recreation	Mini Park	Mini Park (Hyde & Vallejo)	Russian Hill
Parks & Recreation	Mini Park	Mini Park (Lessing & Liebig)	Outer Mission
Parks & Recreation	Mini Park	Mini Park (O'Farrell & Beideman)	Western Addition
Parks & Recreation	Mini Park	Mini Park (Page & Laguna)	Hayes Valley
Parks & Recreation	Mini Park	Mini Park (Steiner & Golden Gate)	Western Addition
Parks & Recreation	Mini Park	Mini Park (Sutter & Fillmore)	Lower Pacific Heights
Parks & Recreation	Park	Adam Rogers Park	Bayview District
Parks & Recreation	Park	Alamo Square	Alamo Square
Parks & Recreation	Park	Allyne Park	Pacific Heights
Parks & Recreation	Park	Alta Plaza	Pacific Heights
Parks & Recreation	Park	Aquatic Park	Marina
Parks & Recreation	Park	Balboa Park	Sunnyside
Parks & Recreation	Park	Bay View Park	Bayview Heights
Parks & Recreation	Park	Bayview Hill Park/Open Space	Bayview Heights
Parks & Recreation	Park	Bernal Heights Park	Bernal Heights North
Parks & Recreation	Park	Brooks Park	Ingleside Heights
Parks & Recreation	Park	Buchanan Street Mall	Western Addition
Parks & Recreation	Park	Buena Vista Park	Buena Vista Park
Parks & Recreation	Park	Carl Larsen Park	Parkside
Parks & Recreation	Park	Collins P. Huntington Park	Nob Hill
Parks & Recreation	Park	Duboce Park	Hayes Valley
Parks & Recreation	Park	Embarcadero Plaza	Financial District North
Parks & Recreation	Park	Esprit Park	Potrero Hill
Parks & Recreation	Park	Fairmount Plaza	Glen Park
Parks & Recreation	Park	Fairmount Plaza Extension	Glen Park

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Parks & Recreation	Park	Father Alfred E. Boeddeker Park	Downtown/Tenderloin
Parks & Recreation	Park	Fay Park	Russian Hill
Parks & Recreation	Park	Fort Funston Remainder	Lake Shore
Parks & Recreation	Park	Franklin Square	Inner Mission
Parks & Recreation	Park	Garfield Square	Inner Mission
Parks & Recreation	Park	Geneva Ave (Remainder At Delano)	Mission Terrace
Parks & Recreation	Park	Glen Park	Diamond Heights
Parks & Recreation	Park	Golden Gate Park	Golden Gate Park
Parks & Recreation	Park	Golden Gateway Plaza/Public Park	Financial District North
Parks & Recreation	Park	Grand View Park	Golden Gate Heights
Parks & Recreation	Park	Great Lawn	Treasure Island
Parks & Recreation	Park	Hilltop Park	Bayview District
Parks & Recreation	Park	Holly Park	Bernal Heights South
Parks & Recreation	Park	Hunters Point Park Lands	Bayview District
Parks & Recreation	Park	Ina Coolbrith Park	Russian Hill
Parks & Recreation	Park	Japanese Peace Plaza and Pagoda	Lower Pacific Heights
Parks & Recreation	Park	Jas D. Phelan Recreation Beach	Sea Cliff
Parks & Recreation	Park	Jefferson Square	Western Addition
Parks & Recreation	Park	John Macaulay Park	Downtown/Tenderloin
Parks & Recreation	Park	John McLaren Park	Visitacion Valley
Parks & Recreation	Park	John McLaren Park Parcel (Alberta St)	Visitacion Valley
Parks & Recreation	Park	John McLaren Park Parcel (Dublin St)	Excelsior
Parks & Recreation	Park	John McLaren Park Parcel (La Grande Ave)	Excelsior
Parks & Recreation	Park	Joseph L. Alioto Performing Arts Piazza (Civic Center Plaza)	Van Ness/Civic Center
Parks & Recreation	Park	Koshland Park	Hayes Valley
Parks & Recreation	Park	Lafayette Park	Pacific Heights
Parks & Recreation	Park	Lincoln Park	Outer Richmond

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Parks & Recreation	Park	Marina Green	Marina
Parks & Recreation	Park	Mccoppin Square & Clubhouse	Parkside
Parks & Recreation	Park	Mckinley Square	Potrero Hill
Parks & Recreation	Park	Mission Dolores Park	Mission Dolores
Parks & Recreation	Park	Mountain Lake Park	Lake
Parks & Recreation	Park	Mt Davidson Park	Sherwood Forest
Parks & Recreation	Park	Mt Olympus (Upper Terrace)	Parnassus/Ashbury Heights
Parks & Recreation	Park	Palace Park	Presidio
Parks & Recreation	Park	Parkside Square	Parkside
Parks & Recreation	Park	Pinelake Park	Pine Lake Park
Parks & Recreation	Park	Pioneer Park/Telegraph Hill	Telegraph Hill
Parks & Recreation	Park	Point Lobos Shoreline Development	Outer Richmond
Parks & Recreation	Park	Portsmouth Square	Financial District North
Parks & Recreation	Park	Potrero del Sol (Knudsen Dairy Site)	Inner Mission
Parks & Recreation	Park	Precita Park	Bernal Heights North
Parks & Recreation	Park	Russian Hill Park	Russian Hill
Parks & Recreation	Park	Seal Rocks	Outer Richmond
Parks & Recreation	Park	Shoreline Park	Hunters Point
Parks & Recreation	Park	South Market Park	South of Market
Parks & Recreation	Park	South Park	Financial District South
Parks & Recreation	Park	St Mary’s Square	Financial District North
Parks & Recreation	Park	Sunset Heights Park	Golden Gate Heights
Parks & Recreation	Park	Telegraph Hill Park	Telegraph Hill
Parks & Recreation	Park	Union Square	Downtown/Tenderloin
Parks & Recreation	Park	View Protection (Rec/Park)	Twin Peaks
Parks & Recreation	Park	Washington Square	North Beach
Parks & Recreation	Playground/Sports Facility	Alice Chalmers Playground	Crocker Amazon
Parks & Recreation	Playground/Sports Facility	Alice Marble Tennis Courts	Russian Hill

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Parks & Recreation	Playground/Sports Facility	Angelo J. Rossi Playground	Lone Mountain
Parks & Recreation	Playground/Sports Facility	Aptos Playground	Mount Davidson Manor
Parks & Recreation	Playground/Sports Facility	Argonne Playground	Central Richmond
Parks & Recreation	Playground/Sports Facility	Bayview Playground	Bayview District
Parks & Recreation	Playground/Sports Facility	Cabrillo Playground	Outer Richmond
Parks & Recreation	Playground/Sports Facility	Cayuga Playground	Outer Mission
Parks & Recreation	Playground/Sports Facility	Chinese Playground	Financial District North
Parks & Recreation	Playground/Sports Facility	Corona Heights Playground	Corona Heights
Parks & Recreation	Playground/Sports Facility	Cow Hollow Playground	Cow Hollow
Parks & Recreation	Playground/Sports Facility	Crocker Amazon Playground	Excelsior
Parks & Recreation	Playground/Sports Facility	Douglas Playground	Noe Valley
Parks & Recreation	Playground/Sports Facility	Dupont Tennis Courts	Central Richmond
Parks & Recreation	Playground/Sports Facility	Eucalyptus Park (Rolph-Nicole Playground)	Lake Shore
Parks & Recreation	Playground/Sports Facility	Eureka Valley Playground	Eureka Valley/Dolores Heights
Parks & Recreation	Playground/Sports Facility	Excelsior Playground	Excelsior
Parks & Recreation	Playground/Sports Facility	Folsom Playground	Inner Mission
Parks & Recreation	Playground/Sports Facility	Fulton Playground	Central Richmond
Parks & Recreation	Playground/Sports Facility	George Christopher Playground	Diamond Heights
Parks & Recreation	Playground/Sports Facility	Gilman Playground	Bayview Heights
Parks & Recreation	Playground/Sports Facility	Grattan Playground	Parnassus/Ashbury Heights
Parks & Recreation	Playground/Sports Facility	Hamilton Playground	Lower Pacific Heights
Parks & Recreation	Playground/Sports Facility	Helen Wills Playground	Nob Hill
Parks & Recreation	Playground/Sports Facility	Jackson Playground	Potrero Hill
Parks & Recreation	Playground/Sports Facility	James Rolph Jr. Playground	Inner Mission
Parks & Recreation	Playground/Sports Facility	John P. Murphy Playground	Forest Hill
Parks & Recreation	Playground/Sports Facility	Julius Kahn Playground	Presidio
Parks & Recreation	Playground/Sports Facility	Junipero Serra Playground	Lakeside
Parks & Recreation	Playground/Sports Facility	Justin Herman Plaza	Financial District North

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Parks & Recreation	Playground/Sports Facility	Laurel Hill Playground	Jordan Park/Laurel Heights
Parks & Recreation	Playground/Sports Facility	Margaret S Hayward Playground	Western Addition
Parks & Recreation	Playground/Sports Facility	Merced Heights Playground	Ingleside Heights
Parks & Recreation	Playground/Sports Facility	Michelangelo Playground	Russian Hill
Parks & Recreation	Playground/Sports Facility	Midtown Terrace Playground	Midtown Terrace
Parks & Recreation	Playground/Sports Facility	Miraloma Playground	Miraloma Park
Parks & Recreation	Playground/Sports Facility	Mission Playground	Mission Dolores
Parks & Recreation	Playground/Sports Facility	Moscone Playground	Marina
Parks & Recreation	Playground/Sports Facility	Noe Valley Tennis Courts	Noe Valley
Parks & Recreation	Playground/Sports Facility	North Beach Playground	North Beach
Parks & Recreation	Playground/Sports Facility	Ocean View Playground	Oceanview
Parks & Recreation	Playground/Sports Facility	Portola Playground	Portola
Parks & Recreation	Playground/Sports Facility	Presidio Heights Playground	Presidio Heights
Parks & Recreation	Playground/Sports Facility	Presidio Parkway	Central Richmond
Parks & Recreation	Playground/Sports Facility	Raymond Kimbell Playground	Western Addition
Parks & Recreation	Playground/Sports Facility	Richmond Playground	Lake
Parks & Recreation	Playground/Sports Facility	Rochambeau Playground	Lake
Parks & Recreation	Playground/Sports Facility	Silver Terrace Playground	Silver Terrace
Parks & Recreation	Playground/Sports Facility	South Sunset Playground	Outer Parkside
Parks & Recreation	Playground/Sports Facility	St Mary’s Playground	Bernal Heights South
Parks & Recreation	Playground/Sports Facility	Stanford Heights Playground	Miraloma Park
Parks & Recreation	Playground/Sports Facility	Sunnyside Playground	Sunnyside
Parks & Recreation	Playground/Sports Facility	Sunset Playground	Central Sunset
Parks & Recreation	Playground/Sports Facility	Swimming Pool	Central Richmond
Parks & Recreation	Playground/Sports Facility	Tenderloin Pre-School Playground	Downtown/Tenderloin
Parks & Recreation	Playground/Sports Facility	Visitacion Valley Playground	Visitacion Valley
Parks & Recreation	Playground/Sports Facility	Walter Haas Playground	Glen Park
Parks & Recreation	Playground/Sports Facility	West Portal Playground	West Portal

Table F-2 Non-critical Facilities

Category	Type	Facility Name	Neighborhood
Parks & Recreation	Playground/Sports Facility	West Sunset Playground	Outer Parkside
Parks & Recreation	Playground/Sports Facility	Youngblood-Coleman Playground	Hunters Point
Parks & Recreation	Recreation Center	Bernal Heights Recreation Center	Bernal Heights South
Parks & Recreation	Recreation Center	Chinese Recreation Center	Nob Hill
Parks & Recreation	Recreation Center	Hayes Valley Community Center	Hayes Valley
Parks & Recreation	Recreation Center	Joseph Lee Recreation Center	Bayview District
Parks & Recreation	Recreation Center	Mission Center	Inner Mission
Parks & Recreation	Recreation Center	Potrero Hill Recreation Center	Potrero Hill
Parks & Recreation	Recreation Center	Sigmund Stern Recreation Grove	Pine Lake Park
Parks & Recreation	Recreation Center	Tenderloin Recreation Center	Downtown/Tenderloin
Parks & Recreation	Recreation Center	Upper Noe Rec Center	Noe Valley
Parks & Recreation	Recreation Center	Visitation Valley Community Center	Visitacion Valley
Parks & Recreation	Recreation Center	Woh Hei Yuen Recreation Center	Nob Hill
Parks & Recreation	Recreation Center	Yerba Buena Gardens	Financial District South
Parks & Recreation	Recreation Center	Youth & Teen Arts Building	Outer Mission
Parks & Recreation	Zoo	San Francisco Zoo	Lake Shore

Table F-3 Major Utilities Infrastructure

Category	Type	Facility Name	Neighborhood
AWSS	Pump Station	Salt Water Pumping Station #1	South Beach
AWSS	Pump Station	Salt Water Pumping Station #2 (At Fort Mason)	Marina
AWSS	Reservoir	Twin Peaks Reservoir (AWSS)	Clarendon Heights
AWSS	Tank	Ashbury Street Tank & Tank House	Corona Heights
AWSS	Tank	Jones St Tank & Tank House	Nob Hill
Communication	Central Communication	Central Communications Center (Fire)	Western Addition
Communication	Central Communication	Central Radio Station	Twin Peaks
Communication	Central Communication	Public Safety Wire Communications	Bayview District
Communication	Data Center	Data Center	Financial District North
Communication	Dispatcher	Dispatcher	Western Addition
Communication	National Warning System	National Warning System	Western Addition
SFPUC	Chlorine Station	Merced Manor Chlorine Station	Merced Manor
SFPUC	Chlorine Station	College Hill Chlorine Station	Bernal Heights South
SFPUC	Chlorine Station	UCSF Chlorine Station	Portola
SFPUC	Chlorine Station	Lombard Chlorine Station	Van Ness/Civic Center
SFPUC	Hydro-Pneumatic Station	Palo Alto Ave. Hydro-Pneumatic Station	Clarendon Heights
SFPUC	Hydro-Pneumatic Station	Vista Francisco Hydro-Pneumatic Station	Twin Peaks
SFPUC	Hydro-Pneumatic Station	Aqua Vista Hydro-Pneumatic Station	Midtown Terrace
SFPUC	Hydro-Pneumatic Station	Bernal Heights Hydro-Pneumatic Station	Bernal Heights South
SFPUC	Hydro-Pneumatic Station	Forest Hill Hydro-Pneumatic Station	Forest Hill
SFPUC	Hydro-Pneumatic Station	Lincoln Park Hydro-Pneumatic Station	Outer Richmond
SFPUC	Hydro-Pneumatic Station	Forest Knolls Hydro-Pneumatic Station	Forest Knolls
SFPUC	Pump Station	4th St. North Pump Station	Mission Bay
SFPUC	Pump Station	Army St. Circle Pump Station	Noe Valley
SFPUC	Pump Station	Central Pump Station	Merced Manor
SFPUC	Pump Station	Channel St. Pump Station	Mission Bay

Table F-3 Major Utilities Infrastructure

Category	Type	Facility Name	Neighborhood
SFPUC	Pump Station	College Hill Station	Glen Park
SFPUC	Pump Station	Crestline Pump House	Midtown Terrace
SFPUC	Pump Station	Drumm St. Pump Station	Financial District North
SFPUC	Pump Station	Fitzgerald Pump Station	Bayview District
SFPUC	Pump Station	Fulton St. Pump Station	Outer Richmond
SFPUC	Pump Station	Geary St. Pump Station	Anza Vista
SFPUC	Pump Station	Griffith St. Pump Station	Bayview Heights
SFPUC	Pump Station	Hunters Point Pump Station	Hunters Point
SFPUC	Pump Station	Lakeshore Pump Station	Lake Shore
SFPUC	Pump Station	Marina Pump Station	Marina
SFPUC	Pump Station	Mariposa St. Pump Station	Potrero Hill
SFPUC	Pump Station	Munich St. Pump Station	Excelsior
SFPUC	Pump Station	Northshore Pump Station	Financial District North
SFPUC	Pump Station	Pinelake Pump Station	Pine Lake Park
SFPUC	Pump Station	Pump St./Staffed/Lake Merced	Visitacion Valley
SFPUC	Pump Station	Pump St/Unstaffed/Alemany	Portola
SFPUC	Pump Station	Pump St/Unstaffed/Bay Bridge	South Beach
SFPUC	Pump Station	Pump St/Unstaffed/Central	Merced Manor
SFPUC	Pump Station	Pump St/Unstaffed/McLaren Park	Portola
SFPUC	Pump Station	Summit Pump Station	Van Ness/Civic Center
SFPUC	Pump Station	Newcomb Pump Station	Bayview District
SFPUC	Pump Station	SE #1 & 2 Water Pump Station	Bayview District
SFPUC	Pump Station	Pump Station 062	Silver Terrace
SFPUC	Pump Station	Sea Cliff #1 Pump Station	Sea Cliff
SFPUC	Pump Station	Sea Cliff Pump Station #2	Sea Cliff
SFPUC	Pump Station	Vicente Pump Station	Outer Parkside
SFPUC	Pump Station	Westside Pump Station	Outer Parkside
SFPUC	Pump Station	Yosemite St Pump Station	Bayview District

Table F-3 Major Utilities Infrastructure

Category	Type	Facility Name	Neighborhood
SFPUC	Reservoir	Laguna Honda Reservoir	Forest Hill
SFPUC	Reservoir	McLaren - Wilde Ave. Reservoir	Visitacion Valley
SFPUC	Reservoir	University Mound Reservoir	Portola
SFPUC	Reservoir	College Hill Reservoir	Bernal Heights South
SFPUC	Reservoir	Francisco St. Reservoir	Russian Hill
SFPUC	Reservoir	Hunters Point Reservoir	Bayview District
SFPUC	Reservoir	Lombard Reservoir	Russian Hill
SFPUC	Reservoir	Merced Manor Reservoir	Merced Manor
SFPUC	Reservoir	Potrero Heights Reservoir	Potrero Hill
SFPUC	Reservoir	Stanford Heights (Twin Peaks) Reservoir	Miraloma Park
SFPUC	Reservoir	Sunset Reservoir	Central Sunset
SFPUC	Reservoir	Sutro Reservoir	Forest Knolls
SFPUC	Reservoir	Balboa Reservoir	Westwood Park
SFPUC	Reservoir	Summit Reservoir	Midtown Terrace
SFPUC	Reservoir	Sunset Reservoir	Parkside
SFPUC	Tank	Forest Hill Tank	Forest Hill
SFPUC	Tank	Sludge Tank – 750	Bayview District
SFPUC	Tank	Primary Sludge Tank-610	Bayview District
SFPUC	Treatment Building	Pre-Treatment Bldg 011	Bayview District
SFPUC	Wastewater Plant	Southeast Treatment Plant	Bayview District
SFPUC	Wastewater Plant	North Point Wet Weather Facility	North Waterfront
SFPUC	Wastewater Plant	Oceanside Treatment Plant	Lake Shore

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Parking	Parking Garage	16th and Hoff Street Garage	Inner Mission
Parking	Parking Garage	Civic Center Plaza Garage	Van Ness/Civic Center
Parking	Parking Garage	Golden Gateway	Financial District North
Parking	Parking Garage	Japan Center Garages	Western Addition
Parking	Parking Garage	Lombard Street Garage	Cow Hollow
Parking	Parking Garage	Mission-Bartlett	Inner Mission
Parking	Parking Garage	Moscone Center	Financial District South
Parking	Parking Garage	North Beach	North Beach
Parking	Parking Garage	Performing Arts	Van Ness/Civic Center
Parking	Parking Garage	Polk Bush	Downtown/Tenderloin
Parking	Parking Garage	SF General Hospital	Inner Mission
Parking	Parking Garage	St. Mary's Square	Financial District North
Parking	Parking Garage	Vallejo Street	North Beach
Port	Ferry Building	Ferry Building	Financial District North
Port	Harbor	Yacht Harbor	Marina
Port	Facility	Agriculture Building	South Beach
Port	Facility	Chez Laura Enterprises	North Waterfront
Port	Facility	Coast Marine	North Waterfront
Port	Facility	Cory (& Rest of Bldg.)	North Waterfront
Port	Facility	F. Alioto Fish	North Waterfront
Port	Facility	Fish Alley	North Waterfront
Port	Facility	Fisherman's Grotto	North Waterfront
Port	Facility	Frank's Fisherman Supply	North Waterfront
Port	Facility	Gelard's Gift Shop	North Waterfront
Port	Facility	M. Alioto Seafood L9122	North Waterfront
Port	Facility	Martell Ins. 11463	North Waterfront

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Port	Facility	Maskell Marine Services L8992	North Waterfront
Port	Facility	Pompei Enterprises	North Waterfront
Port	Facility	United Shellfish L9173	North Waterfront
Port	Facility	United Shellfish L9174	North Waterfront
Port	Marine	Southwest Marine #101	Potrero Hill
Port	Marine	Southwest Marine #102	Potrero Hill
Port	Marine	Southwest Marine #103	Potrero Hill
Port	Marine	Southwest Marine #104	Potrero Hill
Port	Marine	Southwest Marine #105	Potrero Hill
Port	Marine	Southwest Marine #108	Potrero Hill
Port	Marine	Southwest Marine #109	Potrero Hill
Port	Marine	Southwest Marine #110	Potrero Hill
Port	Marine	Southwest Marine #111	Potrero Hill
Port	Marine	Southwest Marine #119	Potrero Hill
Port	Marine	Southwest Marine #120	Potrero Hill
Port	Marine	Southwest Marine #127	Potrero Hill
Port	Marine	Southwest Marine #141	Potrero Hill
Port	Marine	Southwest Marine #19	Potrero Hill
Port	Marine	Southwest Marine #21	Potrero Hill
Port	Marine	Southwest Marine #22	Potrero Hill
Port	Marine	Southwest Marine #30	Potrero Hill
Port	Marine	Southwest Marine #36	Potrero Hill
Port	Marine	Southwest Marine #38	Potrero Hill
Port	Marine	Southwest Marine #49	Potrero Hill
Port	Marine	Southwest Marine #50	Potrero Hill
Port	Marine	Southwest Marine #58	Potrero Hill
Port	Marine	Southwest Marine #68	Potrero Hill
Port	Marine	Southwest Marine 41	Potrero Hill

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Port	Pier	H & H (Pier 62)	Mission Bay
Port	Pier	Pier 1 Bulkhead	Financial District North
Port	Pier	Pier 1 Shed	Financial District North
Port	Pier	Pier 1.5	Financial District North
Port	Pier	Pier 15 Bulkhead	North Waterfront
Port	Pier	Pier 15 Shed	North Waterfront
Port	Pier	Pier 17 Shed	North Waterfront
Port	Pier	Pier 19	North Waterfront
Port	Pier	Pier 19 Shed	North Waterfront
Port	Pier	Pier 22.5	South Beach
Port	Pier	Pier 23 Shed	North Waterfront
Port	Pier	Pier 27	North Waterfront
Port	Pier	Pier 27 (Pier 29 Annex)	North Waterfront
Port	Pier	Pier 27 Office Building	North Waterfront
Port	Pier	Pier 27 Shed	North Waterfront
Port	Pier	Pier 28	South Beach
Port	Pier	Pier 28-Between #52 & #54 Bldgs.	South Beach
Port	Pier	Pier 28-Boondocks	South Beach
Port	Pier	Pier 29 Shed	North Waterfront
Port	Pier	Pier 29/Pier 39 Bulkhead	North Waterfront
Port	Pier	Pier 3	Financial District North
Port	Pier	Pier 33	North Waterfront
Port	Pier	Pier 35	North Waterfront
Port	Pier	Pier 35 Bulkhead #1	North Waterfront
Port	Pier	Pier 35 Bulkhead #2	North Waterfront
Port	Pier	Pier 36 Main Building	South Beach
Port	Pier	Pier 36 Shed	South Beach
Port	Pier	Pier 38 Bulkhead	South Beach

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Port	Pier	Pier 38 Shed	South Beach
Port	Pier	Pier 40 Shed	South Beach
Port	Pier	Pier 41	North Waterfront
Port	Pier	Pier 43	North Waterfront
Port	Pier	Pier 43.5	North Waterfront
Port	Pier	Pier 45a	North Waterfront
Port	Pier	Pier 45b	North Waterfront
Port	Pier	Pier 45c	North Waterfront
Port	Pier	Pier 45d	North Waterfront
Port	Pier	Pier 46b	South Beach
Port	Pier	Pier 48 Between A and B	Mission Bay
Port	Pier	Pier 48 Shed A	Mission Bay
Port	Pier	Pier 48 Shed B	Mission Bay
Port	Pier	Pier 5	Financial District North
Port	Pier	Pier 50 Administration Bldg.	Mission Bay
Port	Pier	Pier 50 Shed A	Mission Bay
Port	Pier	Pier 50 Shed B	Mission Bay
Port	Pier	Pier 50 Shed D	Mission Bay
Port	Pier	Pier 54 Bldg. 1	Mission Bay
Port	Pier	Pier 54 Bldg. 2	Mission Bay
Port	Pier	Pier 54 Bldg. 3	Mission Bay
Port	Pier	Pier 54 Bldg. 4	Mission Bay
Port	Pier	Pier 70 #1	Potrero Hill
Port	Pier	Pier 70 #10	Potrero Hill
Port	Pier	Pier 70 #11	Potrero Hill
Port	Pier	Pier 70 #12	Potrero Hill
Port	Pier	Pier 70 #13	Potrero Hill
Port	Pier	Pier 70 #2	Potrero Hill

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Port	Pier	Pier 70 #3	Potrero Hill
Port	Pier	Pier 70 #4	Potrero Hill
Port	Pier	Pier 70 #5	Potrero Hill
Port	Pier	Pier 70 #6	Potrero Hill
Port	Pier	Pier 70 #7	Potrero Hill
Port	Pier	Pier 70 #8	Potrero Hill
Port	Pier	Pier 70 #9	Potrero Hill
Port	Pier	Pier 70	Potrero Hill
Port	Pier	Pier 70 Office Bldg.	Potrero Hill
Port	Pier	Pier 80	Potrero Hill
Port	Pier	Pier 80 Administration Bldg.	Potrero Hill
Port	Pier	Pier 80 Gear & Maintenance Bldg.	Potrero Hill
Port	Pier	Pier 80 Terminal (Restaurant)	Potrero Hill
Port	Pier	Pier 80 Terminal 1	Potrero Hill
Port	Pier	Pier 80 Terminal 2	Potrero Hill
Port	Pier	Pier 80 Terminal 3	Potrero Hill
Port	Pier	Pier 80 Terminal- Service Bldg.	Potrero Hill
Port	Pier	Pier 80 Terminal Shed A	Potrero Hill
Port	Pier	Pier 80 Terminal Shed D	Potrero Hill
Port	Pier	Pier 9 Bulkhead #1	North Waterfront
Port	Pier	Pier 9 Bulkhead #2	North Waterfront
Port	Pier	Pier 9 Shed	North Waterfront
Port	Pier	Pier 96 Administration Bldg.	Hunters Point
Port	Pier	Pier 96-Crane Maintenance Area	Hunters Point
Port	Pier	Pier 96-Gatehouse	Hunters Point
Port	Pier	Pier 96-Light Freight Station	Hunters Point
Port	Land	Land	Bayview District
Port	Land	Land	Bayview District

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Port	Land	Land	Bayview District
Port	Land	Land	Bayview District
Port	Land	Land	Financial District North
Port	Land	Land	Financial District North
Port	Land	Land	Financial District South
Port	Land	Land	Hunters Point
Port	Land	Land	Mission Bay
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
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Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
Port	Land	Land	North Waterfront
Port	Land	Land	North Waterfront
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Land	Land	Potrero Hill
Port	Terminal	Lash Terminal Facility	Bayview District
San Francisco Municipal Railway (MUNI)	Central Control	Central Control	West Portal
MUNI	Rectifier Station	Rectifier Station	Midtown Terrace
MUNI	Substation	Bryant Substation	Inner Mission
MUNI	Substation	Carl Substation	Parnassus/Ashbury Heights
MUNI	Substation	Fillmore Substation	Lower Pacific Heights
MUNI	Substation	MUNI Railway Substation, Judah	Central Sunset
MUNI	Substation	MUNI Railway Taraval Substation	Outer Parkside
MUNI	Substation	Substation-Outer Mission	Ingleside Heights
MUNI	Substation	Substation-Station J	Financial District North
MUNI	Substation	Substation-Station N	Inner Sunset
MUNI	Transfer Station	Balboa Park/BART	Mission Terrace
MUNI	Transfer Station	Brannan and The Embarcadero	South Beach
MUNI	Transfer Station	Castro	Duboce Triangle
MUNI	Transfer Station	Church	Duboce Triangle

Table F-4 Transportation Systems Infrastructure

Category	Type	Facility Name	Neighborhood
MUNI	Transfer Station	Civic Center/BART	Van Ness/Civic Center
MUNI	Transfer Station	Embarcadero/BART	Financial District North
MUNI	Transfer Station	Folsom and The Embarcadero	South Beach
MUNI	Transfer Station	Forest Hill	Midtown Terrace
MUNI	Transfer Station	Fourth St. and King/Caltrain	Mission Bay
MUNI	Transfer Station	Montgomery/BART	Financial District North
MUNI	Transfer Station	Powell/BART	Downtown/Tenderloin
MUNI	Transfer Station	Second St. and King/Ballpark	South Beach
MUNI	Transfer Station	St. Francis Circle	Saint Francis Wood
MUNI	Transfer Station	Van Ness	Van Ness/Civic Center
MUNI	Transfer Station	West Portal	West Portal
MUNI	Yard	Cable Car Barn	Nob Hill
MUNI	Yard	David Pharr Restoration Facility	Duboce Triangle
MUNI	Yard	Geneva Division Complex (Includes Curtis Green, Geneva Division, Geneva Upper Yard)	Mission Terrace
MUNI	Yard	Kirkland Division	North Waterfront
MUNI	Yard	Metro East Light Rail Complex	Potrero Hill
MUNI	Yard	Potrero Division	Inner Mission
MUNI	Yard	Presidio Division	Lower Pacific Heights
MUNI	Yard	Woods Yard Park	Potrero Hill
MUNI	Terminal	Transbay Terminal	Financial District South

Appendix G

Plan Maintenance Documents

Annual Review Questionnaire				
Project Title	**Questions**	**Yes**	**No**	**Comments**
PLANNING PROCESS	Have any internal or external organizations and agencies been invaluable to the planning process or to the mitigation action?			
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?			
	Has the Planning Team undertaken any public outreach activities regarding the HMP or a mitigation project?			
HAZARD ANALYSIS	Has the natural and/or human-caused disaster occurred in this reporting period?			
	Have any natural and/or human-caused hazards not been addressed in this HMP and should they be?			
	Are additional maps or new hazard studies available? If so, what are they and what have they revealed?			
VULNERABILITY ANALYSIS	Do any new critical facilities or infrastructure need to be added to the asset lists?			
	Have any changes in development trends occurred that could create additional risks?			
CAPABILITY ASSESSMENT	Are any different or additional resources (financial, technical, and human now available for mitigation planning?			
MITIGATION STRATEGY	Should new mitigation actions be added to the Implementation Strategy?			
	Are the mitigation actions listed in a community's Mitigation Action Plan appropriate foe available resources?			

Mitigation Project Progress Report			
Progress Report Period From (date):		**To (date):**	
Project Title:			
Project ID:			
Description of Project:			
Implementing Agency:			
Supporting Agencies:			
Contact Name:			
Contact E-mail:			
Contact Number:			
Grant/Finance Administrator:			
Total Project Cost:			
Anticipated Cost Overun/Underun:			
Date of Project Approval:			
Project Start Date:			
Anticipated Completion Date:			
Summary of Progress of Project for this Reporting Period			
1. What was accomplished during this reporting period?			
2. What obstacles, problems, or delays did the project encounter, if any?			
3. How were the problems resolved?			

Appendix H
Electronic Document