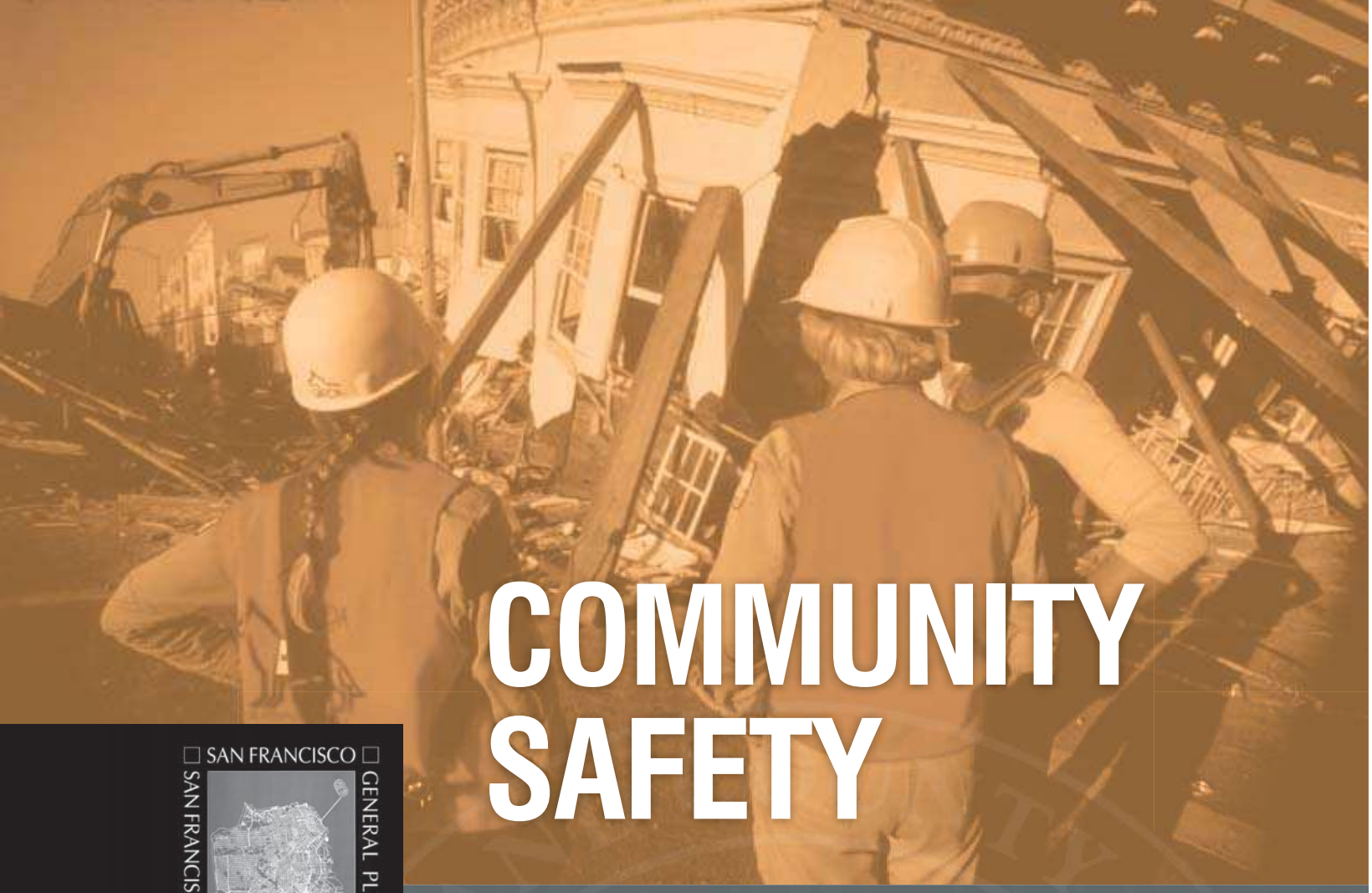


SAN FRANCISCO GENERAL PLAN

COMMUNITY SAFETY

AN ELEMENT OF THE GENERAL PLAN
OF THE CITY AND COUNTY OF SAN FRANCISCO

OCTOBER 2012 | SAN FRANCISCO PLANNING DEPARTMENT

SAN FRANCISCO
PLANNING DEPARTMENT

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I. Summary of Objectives & Policies

OBJECTIVE 1

REDUCE STRUCTURAL AND NON-STRUCTURAL HAZARDS TO LIFE SAFETY AND MINIMIZE PROPERTY DAMAGE RESULTING FROM FUTURE DISASTERS.

POLICY 1.1

Continue to support and monitor research about the nature of seismic hazards in the Bay Area, including research on earthquake prediction, warning systems and ground movement measuring devices, and about earthquake resistant construction and the improved performance of structures.

POLICY 1.2

Research and maintain information about emerging hazards such as terrorism threats and communication failures.

POLICY 1.3

Assure that new construction meets current structural and life safety standards.

POLICY 1.4

Use best practices to review and amend at regular intervals all relevant public codes to incorporate the most current knowledge of structural engineering regarding existing buildings.

POLICY 1.5

Support development and amendments to buildings code requirements that meet City seismic performance goals.

POLICY 1.6

Consider site soils conditions when reviewing projects in areas subject to liquefaction or slope instability.

POLICY 1.7

Consider information about geologic hazards whenever City decisions are made that will influence land use, building density, building configurations or infrastructure are made.

POLICY 1.8

Direct City actions to reduce its contributions towards climate change, and mitigate future releases of greenhouse gasses.

POLICY 1.9

Mitigate and assess the risk of flooding in San Francisco by incorporating the Flood Insurance Rate Map for San Francisco and related programs from this map to mitigate against flood risks.

POLICY 1.10

Examine the risk of flooding due to climate change-related effects, such as storm surges, changes in precipitation patterns, and sea level rise as well as adaptation actions that will reduce population, built environment, and ecosystem vulnerability due to these threats.

POLICY 1.11

Continue to promote green stormwater management techniques.

POLICY 1.12

Ensure that new development on Treasure Island, Yerba Buena Island and Hunters Point Shipyard are resistant to natural disasters.

POLICY 1.13

Reduce the risks presented by the City's most vulnerable structures, particularly privately owned buildings and provide assistance to reduce those risks.

POLICY 1.14

Reduce the earthquake and fire risks posed by older small wood-frame residential buildings.

POLICY 1.15

Abate structural and non-structural hazards in City-owned structures.

POLICY 1.16

Preserve, consistent with life safety considerations, the architectural character of buildings and structures important to the unique visual image of San Francisco, and increase the likelihood that architecturally and historically valuable structures will survive future earthquakes.

POLICY 1.17

Create a database of vulnerable buildings, seismic evaluations, and seismic retrofits to track progress, record inventories, and evaluate and report on retrofit data.

POLICY 1.18

Identify and replace vulnerable infrastructure and critical service lifelines in high-risk areas.

POLICY 1.19

Mitigate against damage to City systems and infrastructure through awareness of threats posed by new forms of hazards such as terrorism and communication failures.

POLICY 1.20

Increase communication capabilities in preparation for all phases of a disaster, and ensure communication abilities extend to hard-to-reach areas and special populations.

POLICY 1.21

Ensure plans are in place to support populations most at risk during breaks in lifelines.

POLICY 1.22

Reduce hazards from gas fired appliances and gas lines.

POLICY 1.23

Enforce state and local codes that regulate the use, storage and transportation of hazardous materials in order to prevent, contain and effectively respond to accidental releases.

POLICY 1.24

Educate public about hazardous materials procedures, including transport, storage and disposal.

POLICY 1.25

Prepare for medical emergencies and pandemics.

POLICY 1.26

Monitor emerging industries like bioscience, and ensure that state and local codes manage risks effectively.

OBJECTIVE 2

BE PREPARED FOR THE ONSET OF DISASTER BY PROVIDING PUBLIC EDUCATION AND TRAINING ABOUT EARTHQUAKES AND OTHER NATURAL AND MAN-MADE DISASTERS, BY READYING THE CITY'S INFRASTRUCTURE, AND BY ENSURING THE NECESSARY COORDINATION IS IN PLACE FOR A READY RESPONSE.

POLICY 2.1

Promote greater public awareness of disaster risks, personal and business risk reduction, and personal and neighborhood emergency response - a "culture of preparedness."

POLICY 2.2

Encourage businesses and homeowners to evaluate their earthquake risks.

POLICY 2.3

Provide on-going disaster preparedness and hazard awareness training to all City employees and other responding agencies.

POLICY 2.4

Bolster the Department of Emergency Management's role as the City's provider of emergency planning and communication, and prioritize its actions to meet the needs of San Francisco.

POLICY 2.5

Maintain a comprehensive, current Emergency Response Plan, in compliance with applicable state and federal regulations, to guide the response to disasters.

POLICY 2.6

Create a consolidated website linking all of the City's disaster-related information for the general public.

POLICY 2.7

Continue to expand the City's fire department prevention and firefighting capability with sufficient personnel and training.

POLICY 2.8

Ensure potable water is available in an emergency.

POLICY 2.9

Develop agreements with private facilities to ensure immediate supply needs can be met.

POLICY 2.10

Maintain the San Francisco Disaster Debris Management Plan.

POLICY 2.11

Ensure the City's designated system of emergency access routes is coordinated with regional activities for both emergency operations and evacuation.

POLICY 2.12

Utilize the City's and the region's bus and rail transit network to facilitate response and recovery during and after a disaster.

POLICY 2.13

Continue coordination with water transit agencies, ferries and private boat operators to facilitate water transportation as emergency transport.

POLICY 2.14

Support the Emergency Operations Center, and continue maintenance of alternative operations centers in the case of an emergency.

POLICY 2.15

Utilize advancing technology to enhance communication capabilities in preparation for all phases of a disaster, particularly in the high-contact period immediately following a disaster.

POLICY 2.16

Plan to address security issues that may arise post-disaster, and balance these issues with the other demands that will be placed on public safety personnel as emergency response providers.

POLICY 2.17

Ensure the City's plan for medical response is coordinated with its privately owned hospitals.

POLICY 2.18

Ensure all Response Plans are coordinated with the Disaster Council.

POLICY 2.19

Seek funding for preparedness projects.

POLICY 2.20

Enhance communications with nearby jurisdictions.

POLICY 2.21

Develop and maintain mutual aid agreements with local, regional and state governments as well as other relevant agencies.

POLICY 2.22

Develop partnerships with private businesses, public service organizations and local nonprofits to meet disaster-time needs.

OBJECTIVE 3

ESTABLISH STRATEGIES TO ADDRESS THE IMMEDIATE EFFECTS OF A DISASTER.

POLICY 3.1

After an emergency, follow the mandates of the Emergency Response Plan and Citywide Earthquake Response Plan.

POLICY 3.2

Follow the National Incident Management System (NIMS) Procedures in declared emergency scenarios.

POLICY 3.3

Have plans to accept, organize and utilize convergence workers.

POLICY 3.4

Have vendors and contractors available to respond immediately after a disaster.

POLICY 3.5

Develop strategies for cooperating with the media.

POLICY 3.6

Support the ability to shelter-in-place for residents.

POLICY 3.7

Develop a system to convey personalized information during and immediately after a disaster.

POLICY 3.8

Establish centers to facilitate permits for repairs.

POLICY 3.9

Work collaboratively with nonprofit partners to assist vulnerable populations during and immediately after a disaster and to ensure resumption of social services directly after a disaster.

POLICY 3.10

Support the efforts of the Controller's Office to ensure service continuation and financing of post-disaster.

POLICY 3.11

Ensure historic resources are protected in the aftermath of a disaster.

POLICY 3.12

Address hazardous material and other spills by requiring appropriate cleanup by property owners per local, state, and federal environmental laws.

OBJECTIVE 4

ASSURE THE SOUND, EQUITABLE AND EXPEDIENT RECONSTRUCTION OF SAN FRANCISCO FOLLOWING A MAJOR DISASTER.

POLICY 4.1

Before an emergency occurs, establish an interdepartmental working group to develop an advance recovery framework that will guide long-term recovery, manage reconstruction activities, and coordinate rebuilding activity.

POLICY 4.2

As a part of the advance recovery framework, develop and adopt a repair and reconstruction ordinance, to facilitate the repair and reconstruction of buildings.

POLICY 4.3

As a part of the advance recovery framework, coordinate the realignment of government post-disaster, so City employee's skills can be used effectively towards recovery and reconstruction efforts.

POLICY 4.4

Update the advance recovery framework on a regular basis.

POLICY 4.5

Develop and maintain public support for the advance recovery framework to ensure its eventual implementation.

POLICY 4.6

Post-disaster, build upon the advance recovery framework to create a recovery and reconstruction plan to direct the City's reconstruction activities, manage the long-term recovery period, and coordinate rebuilding activity.

POLICY 4.7

Ensure the recovery and reconstruction plan is comprehensive and consistent with already established City programs and policies.

POLICY 4.8

Where necessary, use public authority to expedite repair, reconstruction and rebuilding.

POLICY 4.9

Engage the community in the reconstruction planning process.

POLICY 4.10

View recovery as a partnership with neighborhoods.

POLICY 4.11

Promote partnerships with non-governmental agencies, including public/private partnerships, to ensure support is ready to step in after a disaster.

POLICY 4.12

Rebuild after a major disaster consistent with established General Plan objectives and policies.

POLICY 4.13

Support existing policies to create and maintain affordable housing choices.

POLICY 4.14

Utilize emergency exemptions for rebuild projects with limited or no environmental impacts.

POLICY 4.15

Utilize green building practices in rebuilding.

POLICY 4.16

Ensure design character and quality is paramount in consideration of all rebuilding projects.

POLICY 4.17

Provide adequate interim accommodation for residents and businesses displaced by a major disaster in ways that maintain neighborhood ties and cultural continuity to the extent possible.

POLICY 4.18

Repair damaged neighborhoods in a manner that facilitates resident return and maintains neighborhood community quality.

POLICY 4.19

Consider homelessness in the wake of disaster.

POLICY 4.20

Ensure sufficient workforce housing during reconstruction.

POLICY 4.21

Have an economic recovery plan in place before the disaster strikes.

POLICY 4.22

Explore expansion of the City's disaster relief programs.

POLICY 4.23

Ensure effective use of public emergency funds and expenditures, and recovery of those expenditures.

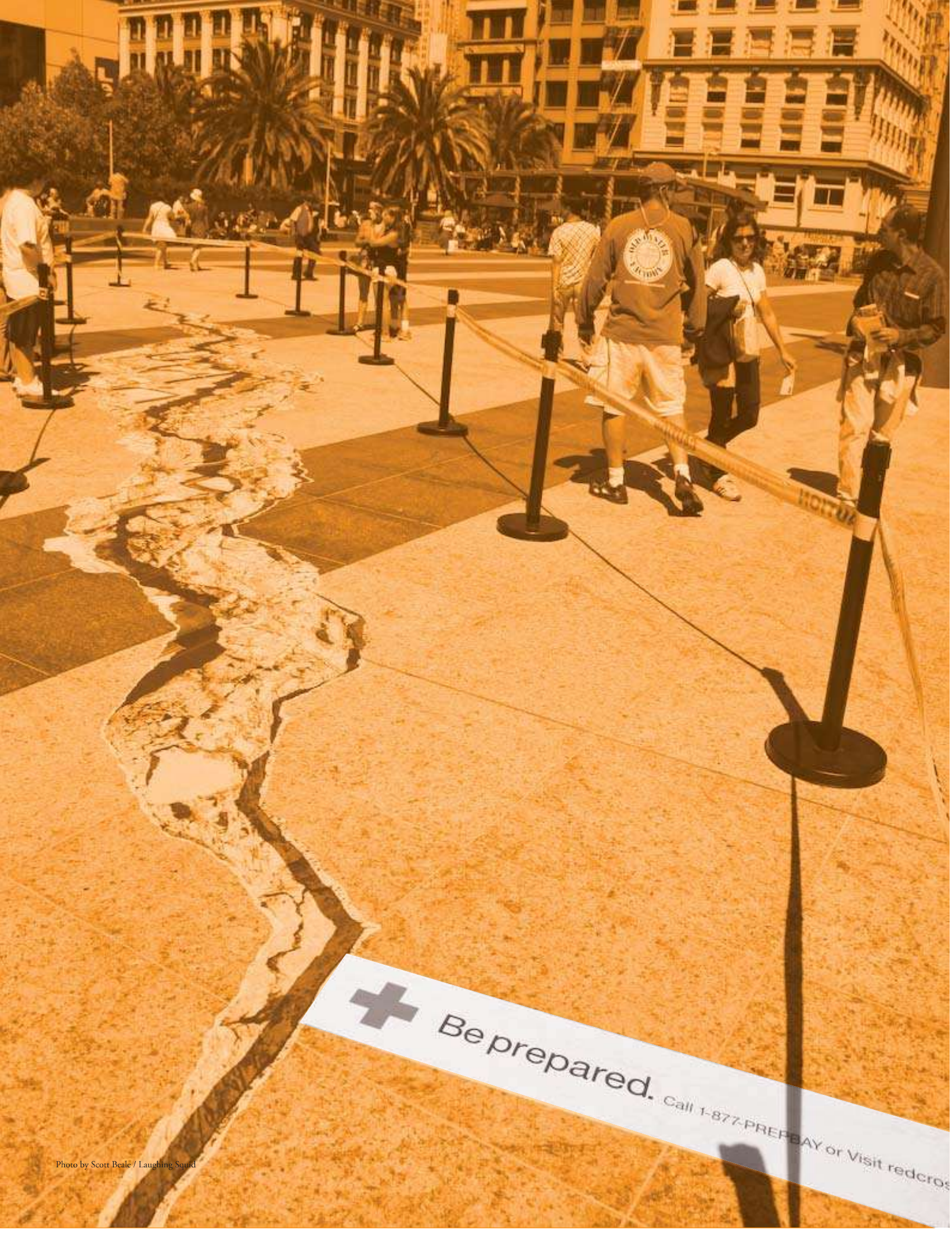


Photo by Scott Beale / Laughing Squid

II. Introduction

The purpose of the Community Safety Element is to facilitate community resilience and reduce future loss of life, injuries, property loss, environmental damage, and social and economic disruption from natural or technological disasters. There are several assumptions behind this Element:

- Creating a greater public awareness of the hazards and risks that face San Francisco will result in an informed commitment by public agencies, private organizations and individuals to prepare for future disasters.
- Development and implementation of programs to increase safety and economic resilience, mitigate risk, increase preparedness and respond to emergencies are the responsibility of many different agencies. Cooperation among City and County agencies, Bay Area Communities, federal and state agencies, community-based organizations, and the private sector is essential for these programs to be effective.
- New policies and programs must be developed and funding vehicles identified that will minimize risks from natural hazards and expedite the recovery process.
- Existing hazardous structures have the greatest potential for loss of life, extended economic interruption and other serious impacts as a result of an earthquake. The City should continue to explore ways to reduce these risks.

The Community Safety Element focuses on seismic hazards, because the greatest risks to life and property in San Francisco result directly from the ground shaking, ground failure, and other impacts associated with large earthquakes. Other hazards common in other California communities, such as ground failure, inundation, landslides, hazardous materials releases and fire, are most likely to occur in San Francisco in association with an earthquake, and are addressed in that capacity. Additionally, other hazards, particularly man-made hazards, pose threats to the City's health and welfare, and must be considered here in terms of hazard mitigation, preparedness, response and recovery.

The Community Safety Element establishes policies to guide the City's actions in preparation for, response to, and recovery from a major disaster. Implementation of the Community Safety Element is carried out through a number of City plans and programs, as described below-most specifically the City's Hazard Mitigation Plan and the programs developed under the Resilient San Francisco Initiative (ResilientSF) – as well as by the agencies and entities referenced in relevant policies.

Relationship to Other Plans and Programs

While the Community Safety Element also establishes policies to guide the longer-term recovery and rebuilding of the City, a more detailed plan will be needed to coordinate the specific efforts of the City, its residents, and its economy in recovery and rebuilding following a major disaster. Therefore, this Element calls for a recovery framework to be developed prior to any disaster, to set the stage for a recovery and rebuilding plan to be developed after a disaster. This eventual recovery and rebuilding plan will make clear the community's vision for how our City – its physical infrastructure, transportation systems, and neighborhoods – will be rebuilt in the case of a major disaster or catastrophe.

Plans

The Community Safety Element, and its related components described above, contains broader policies to reduce impacts, occurring over a longer time frame, that will need to be carried out by the Planning Commission and other City agencies. The City also maintains several policy documents and response plans that provide more immediate direction to specific agencies in the case of disaster. These include:

CCSF Emergency Response Plan

The City's Emergency Response Plan is maintained and updated by the Department of Emergency Management. The Emergency Response Plan implements many of the emergency response policies of this Community Safety Element.

The Emergency Response Plan provides for a coordinated response to disaster by describing specific responses to be undertaken by the emergency response agencies, and other supporting City departments. The Emergency Response Plan is divided into three parts. Part 1 provides an overview of the emergency management system at the policy and operations levels, and is intended to educate the City's agencies about emergency operations in San Francisco. Part 2 (under development at the time of drafting) consists of detailed and restricted information that will be used by Emergency Command Center personnel in response actions; and is intended for internal and authorized emergency management staff. Part 3 (under development at the time of drafting) is a set of functional and hazard-specific annexes that provide additional detailed response, resource and recovery information on specific areas of response, such as Care and Shelter, Evacuation and Volunteer Management. Examples of hazard-specific annexes are Earthquake, Oil Spill and National Security Emergency.

CCSF Hazard Mitigation Plan

Another related plan is the Hazard Mitigation Plan, required by federal law as a condition of receiving hazard mitigation grants after a declared disaster. By law, a Hazard Mitigation Plan must describe the type, location, and extent of all natural hazards that can affect the jurisdiction; describe the jurisdiction's vulnerability to these hazards; include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses; and, contain a plan maintenance process. The Hazard Mitigation Plan serves as one of the Implementation Programs of the Community Safety Element, and contains programs that implement its policies. The Board of Supervisors regularly adopts updates to the San Francisco Hazard Mitigation Plan.

Citywide Earthquake Response Plan

The Citywide Earthquake Response Plan is designed to support the Emergency Response Plan (ERP), by providing considerations for a response to a major earthquake in the Bay Area that has a significant effect on the City of San Francisco. While the EOP focuses on preparedness and mitigation, this Response Plan is primarily focused on response and short-term recovery operations. The Response Plan provides direct response strategies for all of the City's agencies in various functions that must be performed in the wake of a major earthquake. Also, for a comprehensive analysis of the potential impact of a range of earthquake magnitudes on the City, and their cumulative effects on our population and built environment, see Appendix A: Hazard Analysis of the Catastrophic Earthquake Response Plan.

Regional Emergency Coordination Plan

The San Francisco Department of Emergency Management is the lead agency to develop a Regional Emergency Coordination Plan (RECP), which is focused on the responsibilities and procedures between California's Emer-

gency Management Agency (CalEMA) and the counties. The plan is designed to enhance coordination in governance, fire response, law enforcement, and industry across municipalities in the region; and will facilitate the flow of mutual aid. The RECP is intended to reflect existing plans and interagency agreements, and to address any gaps or inconsistencies between the existing plans. The RECP entails a Baseline Plan and nine subsidiary elements, including the Transportation Coordination and Recovery Plan (TCRP).

San Francisco All-Hazards Strategic Plan

The San Francisco All-Hazards Strategic Plan contains a five-year vision and strategy for the City's disaster management program and is intended to enhance the City's ability to deter, prevent, respond to, and recover from acts of terrorism and natural and human-caused disasters. The Strategic Plan is designed to serve as a long-term guide that is able to direct both short- and long-term planning and preparedness efforts of City and non-governmental agencies to accomplish a single emergency management and homeland security vision and mission. This plan uses the Department of Homeland Security Target Capabilities List to identify a desired end state of the City's emergency management and homeland security capabilities, and provides objectives and performance metrics to twenty strategic goals for enhancing the City's resilience identified by senior leadership and major stakeholders. The Strategic Plan is designed to assist citywide senior leadership in directing programmatic efforts, accomplishing results, ensuring accountability, and properly allocating limited resources through the duration of the plan.

State of California Seismic Hazards Mapping Act

In 1990, the California Legislature enacted the Seismic Hazards Mapping Act (SHMA). As a result, the Department of Conservation, California Geological Survey (CGS) (formerly known as the California Division of Mines and Geology) published a report entitled "Seismic Hazard Zone Report for the City and County of San Francisco, California" in 2000 and the Seismic Hazard Zones map for the City and County of San Francisco in 2001. The Seismic Hazard Zones (SHZ) map is included in this Element, and shows the areas with potential liquefaction and earthquake-induced landslides.

The City must take the information contained in the maps into account when preparing the Community Safety Element, or when adopting or revising land use ordinances. When development projects are proposed within the SHZs, the project sponsor is required to conduct a site investigation and prepare a seismic hazard report assessing the nature and severity of the hazard, and suggesting appropriate geotechnical measures and structural design features. When approving any project in a SHZ, the City will use the information and recommendations included in the report to achieve a reasonable protection of public safety.

Programs

The City of San Francisco has developed several local programs to address hazard mitigation, reduce losses, and deal with post-disaster reconstruction issues. The programs outlined below are not an exhaustive list, but rather meet the current needs at the time the Element was adopted. Additional programs may be developed.

Building Occupancy Resumption Program (BORP)

The usual building inspection and posting program, instituted after a damaging earthquake, is organized to allow volunteer inspectors to post buildings that need to be reviewed by qualified structural engineers before they can be reoccupied. The BORP, coordinated by the Department of Building Inspection, is an emergency inspection program designed to facilitate rapid decisions regarding reoccupancy by eliminating the step by volunteer inspectors. The program provides pre-certification for private emergency inspection by qualified Structural Engineers who are retained by the building owner to evaluate and post buildings on behalf of the City. Building owners must request participation in this program prior to an earthquake, or other disaster, sponsor a pre-earthquake evaluation of their building, and meet the program requirements for setting specific criteria for posting. This program allows knowledgeable, pre-approved engineers to inspect and definitively post a building immediately without the need for another level of inspection. The City does not charge a fee for participation in this program.

Community Action Plan for Seismic Safety (CAPSS) and the Earthquake Safety Implementation Program (ESIP)

The Community Action Plan for Seismic Safety (CAPSS) was a ten-year project and study contracted with the Applied Technology Council (ATC) to understand the seismic vulnerability of San Francisco's privately owned buildings. The follow-up to CAPSS is the Earthquake Safety Implementation Program (ESIP), a program intended to implement the recommendations of the CAPSS study. CAPSS and ESIP are based on five objectives: that residents will be able to stay in their own homes following a disaster, that residents will quickly have access to important privately-run community services, that no building will collapse catastrophically, that businesses and the economy will quickly return to functionality, and that the City's sense of place will be preserved. These objectives are supported by seventeen recommendations.

The CAPSS project was divided into three phases: Its first phase involved preliminary evaluations of seismic risks and public meetings to gain input on ways to reduce that risk. The second phase of CAPSS included several components: a vulnerability assessment identifying the City's most at-risk private buildings, which led to the development of a section on earthquake safety for soft-story buildings; the formulation of requirements for the evaluation of, and subsequent repair or demolition of, buildings that are significantly damaged by earthquakes; and an implementation plan to carry out the seventeen recommendations laid out by the program. This last component carries on the work of CAPSS as ESIP.

Community Engagement

The Department of Emergency Management Community Engagement team partners with and works to support the efforts of the government, private sector, and non-profit-, faith-based, and community-based organizations that have a role in San Francisco's resilience. The goal of this program is to enhance the community's capacity to participate in the City's rapid and effective recovery.

The Community Engagement team promotes personal and organizational preparedness among partners by providing all-hazards education, multi-media, promotional campaigns, toolkits and guidance for organizational continuity, planning, and exercises to help ensure that plans can be effectively carried out in the case of a disaster. During an emergency, the Community Engagement team integrates the efforts, resources, and on the ground awareness of private sector partners into emergency operations through the use of communication technologies and by including representatives from those sectors at the Community Branch of the Emergency Operations. *Coordinated Assistance Network*

The Bay Area Coordinated Assistance Network (Bay Area CAN) is a collaborative group of nonprofit, community-based, faith-based, and government agencies working together to strengthen the region's disaster response and recovery systems. The primary purpose is to coordinate and utilize a shared client and resource information database that shares complete client data among members to enhance services to clients after a disaster. Bay Area CAN uses information and referral systems such as 2-1-1 to help organizations to effectively match the needs of disaster clients with available resources. The core agencies involved in Bay Area CAN are American Red Cross Bay Area, The Salvation Army, United Way of the Bay Area, HELPLINK / 211, The Volunteer Center, SF VOAD, Catholic Charities CYO, SF CARD, SF Dept. of Emergency Management, and San Francisco Human Services Agency

Give2SF

Established under Sec. 10.100-100 of the San Francisco Administrative Code, Give2SF is an on-line donations program created in 2011 to provide an opportunity for individuals or organizations to make on-line as well as mail-in donations to a group of City programs, including the San Francisco Disaster Recovery Fund. These funds can only be used to replace, repair and rebuild essential buildings, roadway systems, transportation, water services and other critical infrastructure damaged in an emergency such as an earthquake. These funds will help San Francisco rebound so services can be delivered, commerce can continue, and residents can get to schools, hospitals and their jobs as soon as possible after a disaster. Following a declaration of disaster, the Mayor can direct the administrator of Give2SF to remove links to the other five programs and disable those funds so that the only donation option is the San Francisco Disaster Fund .

Lifelines Council

In 2009, the City and County of San Francisco convened a Lifelines Council under the Citywide Post-Disaster Resilience and Recovery Initiative with a purpose and scope focused on post-disaster reconstruction and recovery (*http://sfgsa.org/lifelinescouncil/*). The Lifelines Council seeks to:

- Develop and improve collaboration in the City and across the region.
- Understand inter-system dependencies to enhance planning, restoration and reconstruction.
- Share information about recovery plans, projects and priorities.
- Establish coordination processes for lifeline restoration and recovery following a major disaster event.

Membership consists of executive officers and senior-level operational deputies of City and County of San Francisco agencies, and other local and regional providers of transportation, water, power, communications, and other essential services.

Neighborhood Emergency Response Team (NERT) and NERT Medical Reserve Corps (NERT MRC)

The Neighborhood Emergency Response Team Training Program was developed by the San Francisco Fire Department after the residential response to the 1989 earthquake. The program provides hands-on training in disaster skills and emergency response to various engaged groups, such as individual residents, neighborhood groups, response staff for the medical and hospitality sectors, and members of partnership agencies, and prepares them to be members of a team to respond to personal emergencies or as an adjunct to the SFFD response. The training prepares volunteers for all phases of emergency - preparedness, mitigation, response and recovery.

The San Francisco Fire Department makes the 20-hour NERT training available for people who live or work in San Francisco at no cost. The classes are taught by first responders of the San Francisco Fire Department. NERT also makes available continuing training opportunities for NERT graduates.

The SFFD also coordinates San Francisco's Medical Reserve Corps (NERT MRC), a volunteer organization of EMTs, Paramedics, first responders, fire service volunteers, medical professionals, students and retirees of these disciplines, and community members to serve San Franciscans with non-clinical needs by establishing local teams of medical, health and other volunteers to strengthen the public health infrastructure, improve emergency preparedness, and provide logistical support to professional responders.

Neighborhood Empowerment Network (www.empowersf.org)

The "Neighborhood Empowerment Network"is a colaition of residents, neighborhood and merchant organizations, nonprofits, academic and faith-based instiutions, foundations and government agencies whose mission is to empower residents and their communities with the capacity and resources to build strong communities. The NEN accomplishes this by leveraging the assets of Network members to build programs, tools and technical resources that neighborhood stakeholders can leverage as they create safe, clean, healthy, inclusive and economically resilient communities *(empowersf.org)*.

Resilient San Francisco Initiative (Resilient SF)

The Resilient San Francisco Initiative (ResilientSF) advances San Francisco's overall resilience by providing a framework, and road map, that coordinates plans, programs, resources and relationships that increase the capacity of individuals, organizations and communities to collectively solve problems and capture opportunities. Organizatinally hosted by the City Adminstrator, the Department of Emergency Management and the Controller's Office, ResilientSF acts as a comprehensive planning platform, residing in the Department of Emergency Management, which tracks and coordinates plans and programs cross-sector to ensure the City's overall ability to both respond rapidly to a disaster as well as achieve an accelerated recovery. ResilientSF accomplishes its goals by leveraging existing capacity programs, such as the Lifelines Council, CAPSS/ESIP, the Capital Planning Program, and NEN, as well as developing a suite of initiatives to advance the overarching mission. ResilientSF incorporates the work of the 2009 Citywide Post-Disaster Resilience and Recovery Initiative.

San Francisco Community Agencies Responding to Disasters (SFCARD)

SFCARD works with human service agencies serving vulnerable populations in San Francisco to ensure business continuity after a disaster. They provide extensive disaster preparedness training to support the capacity of local agencies and the vulnerable populations that they serve. In partnership with HELPLINK and the Volunteer Center, SFCARD is working a creating a Disaster Database to assist Health and Human Service agencies before, during, and after a disaster.

San Francisco Coordinated Assistance Network (SF CAN)

SF CAN is a collaborative group of nonprofit and faith-based agencies working together to strengthen San Francisco's disaster response and recovery systems. The primary purpose is to coordinate and utilize a shared client and resource information database that shares client data among members to enhance services to clients after a disaster. In addition, the collaboration works to create joint response and recovery plans that are integrated into the City's overall response plan and enhance existing community collaboration efforts. The core agencies involved in CAN are American Red Cross Bay Area, The Salvation Army, United Way of the Bay Area, HELPLINK / 211, The Volunteer Center, VOAD, Catholic Charities CYO, SF CARD, SF Dept. of Emergency Management, and San Francisco Human Services Agency.

San Francisco Urban Planning and Research Association – "Resilient City" Initiative (SPUR)

In 2006, earthquake professionals and policymakers in San Francisco joined forces in an initiative to identify and prioritize policies and actions that are needed to help ensure that San Francisco can rebound quickly from a major earthquake. Their efforts resulted in four major policy papers (to date) summarized in the "The Resilient City," policy paper adopted by the Board of the San Francisco Planning and Urban Research Association in 2008 (*http://www.spur.org/policy/the-resilient-city*). The document provides a vision for a resilient San Francisco as having:

> *"chosen to invest the time, energy, and political and economic capital to become a city that can rebound quickly from a natural disaster. It became a city that established performance objectives for buildings and for lifelines — those systems such as power, gas and water services, as well as communications and transportation systems. Enough homes have been retrofitted so that the vast majority of San Franciscans are able to shelter in place. A 'Lifelines Council' with influence over the preparation of critical services has ensured that the city's water, gas, electricity and sewer services are strong enough to be back in use within days. Seismic Silver and Seismic Gold buildings, defined by a new voluntary rating system, perform so well that they quickly become a model for all new housing in the region. The entire city is back on its feet within four months."*

SF Ready

A collaboration between the Chamber of Commerce, Department of Emergency Management and numerous concerned businesses. SF Ready produces roundtables every other month, free to the public, on topics of business emergency preparedness and business continuity.

Soft Story Wood-Frame Seismic Hazard Reduction Program

"Soft-story" buildings are wood-frame buildings with open fronts, usually large openings on the ground floor such as multiple garage doors or large storefront windows. Because of the lack of lateral in the first story, these buildings are at high risk for partial or total collapse in an earthquake. Particularly hazardous are corner buildings, where two sides of the building exhibit open fronts. DBI expects to require mandatory strengthening of soft-story wood-frame residential buildings of three or more stories and 5 or more residential units built before 1978. Other soft story buildings are expected to be subject to mandatory retrofit in following phases.

There are also several civic organizations and resources addressing the issue of seismic mitigation, preparation and recovery:

Unreinforced Masonry Building Program

An unreinforced masonry bearing wall building (UMB) is a building or structure having at least one unreinforced masonry (typically brick) bearing wall. UMBs have a strong likelihood of structural failure in the event of earthquakes, either by the collapse of walls or the entire building.

TARGET STATES OF RECOVERY FOR SAN FRANCISCO'S BUILDINGS AND INFRASTRUCTURE

INFRASTRUCTURE CLUSTER FACILITIES	Event occurs	Phase 1 Hours			Phase 2 Days		Phase 3 Months		
		4	24	72	30	60	4	36	36+
CRITICAL RESPONSE FACILITIES AND SUPPORT SYSTEMS									
Hospitals								X	
Police and fire stations			X						
Emergency Operations Center									
Related utilities						X			
Roads and ports for emergency				X					
CalTrain for emergency traffic					X				
Airport for emergency traffic				X					
EMERGENCY HOUSING AND SUPPORT SYSTEMS									
95% residence shelter-in-place								X	
Emergency responder housing				X					
Public shelters							X		
90% related utilities								X	
90% roads, port facilities and public transit							X		
90% Muni and BART capacity						X			
HOUSING AND NEIGBORHOOD INFRASTRUCTURE									
Essential city service facilities							X		
Schools							X		
Medical provider offices								X	
90% reighborhood retail services									X
95% of all utilities								X	
90% roads and highways						X			
90% transit						X			
90% railroads							X		
Airport for commercial traffic					X				
95% transit							X		
COMMUNITY RECOVERY									
All residences repaired, replaced or relocated									X
95% neighboorhood retail businesses open								X	
50% offices and workplaces open									X
Non-emergency city service facilities								X	
All businesses open									X
100% utilities									X
100% roads and highways									X
100% travel									X

Source: SPUR analysis

TARGET STATES OF RECOVERY

Performance measure	Description of usability after expected event	BUILDINGS	LIFELINES
	Category A: Safe and operational		
	Category B: Safe and usable during repairs	100% restored in 4 hours	
	Category C: Safe and usable after moderate repairs	100% restored in 4 months	
X	Expected current status		

San Francisco Urban Planning and Research Association – "Resilient City" Initiative (SPUR), 2008

In 1992, the Unreinforced Masonry Building Seismic Hazard Reduction Program and Ordinance required the retrofit of unreinforced masonry buildings (UMBs), to address their record of poor performance in earthquakes. The Department of Building Inspection is charged with oversight and enforcement of the program. As of February 2006, all UMB's were required to be in full compliance with the Ordinance. As of January 2007, all but approximately 270 of these buildings had been retrofit. The remaining upgrades should be carried out to complete the requirements of this program.

The Seismic Safety Retrofit Bond and Loan Program, also known as the UMB Loan Program, was authorized by San Francisco voters in 1992, authorizing $350 million in bonds for loans to owners of UMBs. As this program was intended to support the UMB Ordinance, it is largely completed. Approximately $3.5 million in market-rate funds remain, though additional bonds could be issued to restore funding. The program is administered by the Mayor's Office of Housing and a Loan Committee established by the Board of Supervisors.

Vial of Life

This program targets seniors and people with disabilities and provides a mechanism for first responders to gain life-saving information about these individuals when responding to an emergency at the individual's residence. Important medical information is recorded on a single form and inserted into a vial that is then placed in the individual's refrigerator. Magnets and window decals are provided along with the form and vial so that responders know to look in the refrigerator upon arriving on scene. This program is distributed in partnership with the SFFD and San Francisco State University Community Involvement Program, among other programs that work with the target population.

72hours.org

72hours.org is a public service campaign providing information to residents on how to prepare for emergencies such as earthquakes, fires, severe storms, power outages and acts of terrorism. The program includes a series of public service announcements and an emergency preparedness website developed and maintained by the Department of Emergency Management. The website offers step-by-step instructions on how to make a family emergency plan, build a disaster kit, and get training before a disaster occurs.

Natural Hazards in San Francisco

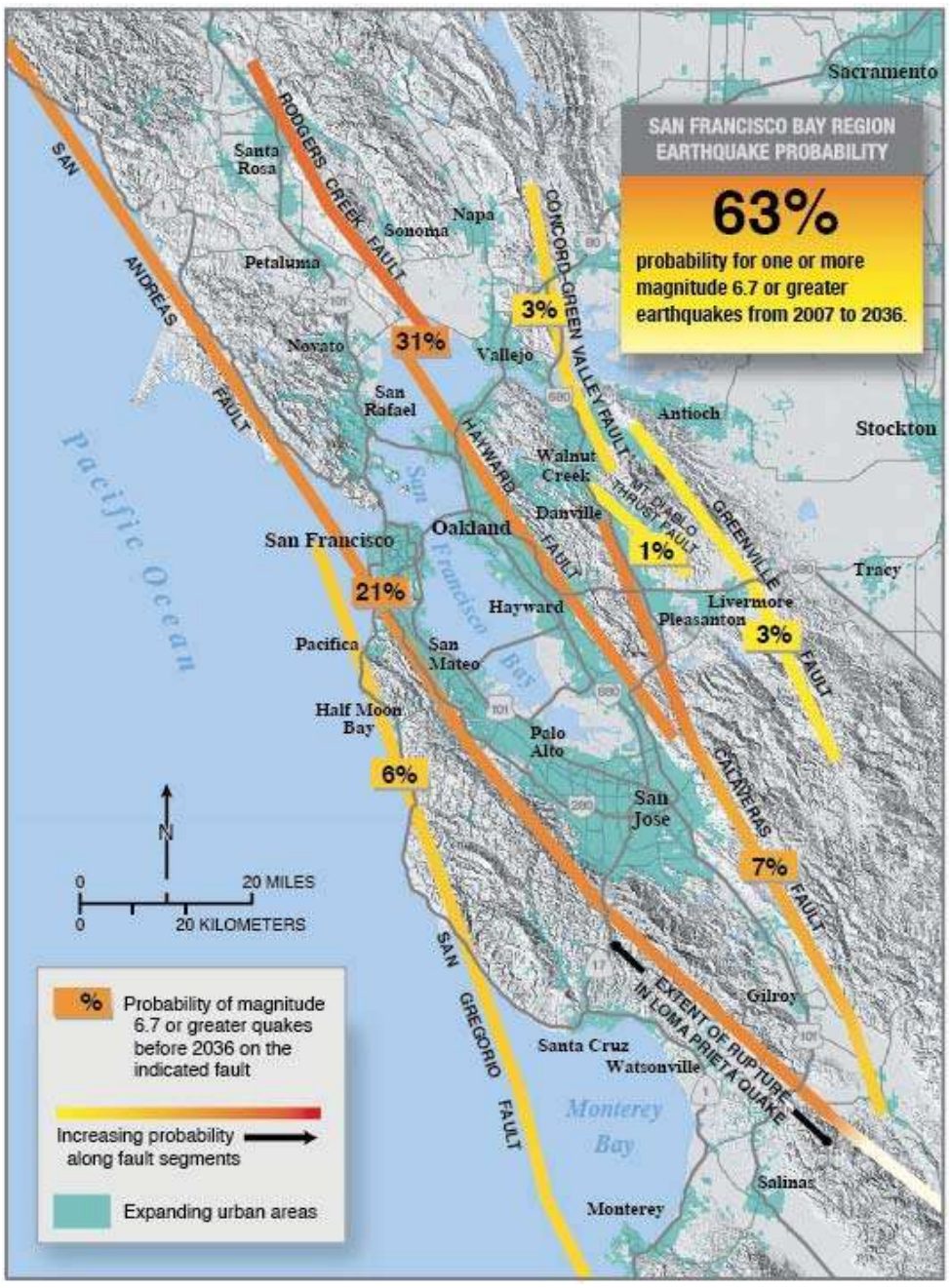
The greatest risks to life and property in San Francisco result directly from the ground shaking and ground failure associated with large earthquakes. Many of the other hazards San Francisco faces, such as urban fires, transportation disruption, communication or technical failures, and ground failure are often associated with an earthquake. Other, less common, natural hazards include flooding due to a tsunami, seiche or reservoir failure, which may occur as a result of an earthquake. Another risk category consists of disasters due to human activity, such as environmental disasters such from the release of hazardous materials, including oil spills, socially motivated catastrophes from civil disturbances and terrorism, and might even include large-scale road accidents, incidents on commercial aircraft or other large scale mechanical failure.

The section immediately following contains a brief review of the City's earthquake vulnerability and the risks associated with earthquakes: ground shaking and ground failures such as settlement, liquefaction and landslides. The subsequent section discusses inundation hazards such as tsunami and flooding. Human-caused disasters, such as terrorist activity, transportation disruptions or collisions, building collapses, and hazardous material spills or explosions are not discussed at length in this section, However, the mitigation, preparedness and response policies contained later in this Element apply to these kinds of disasters as well.

The City's Emergency Response Plan will provide more detail on disaster threats faced by the City of San Francisco. The recently adopted San Francisco Hazard Mitigation Plan will provide further analyses of these hazards, and as include specific hazard mitigation plans and programs to address them.

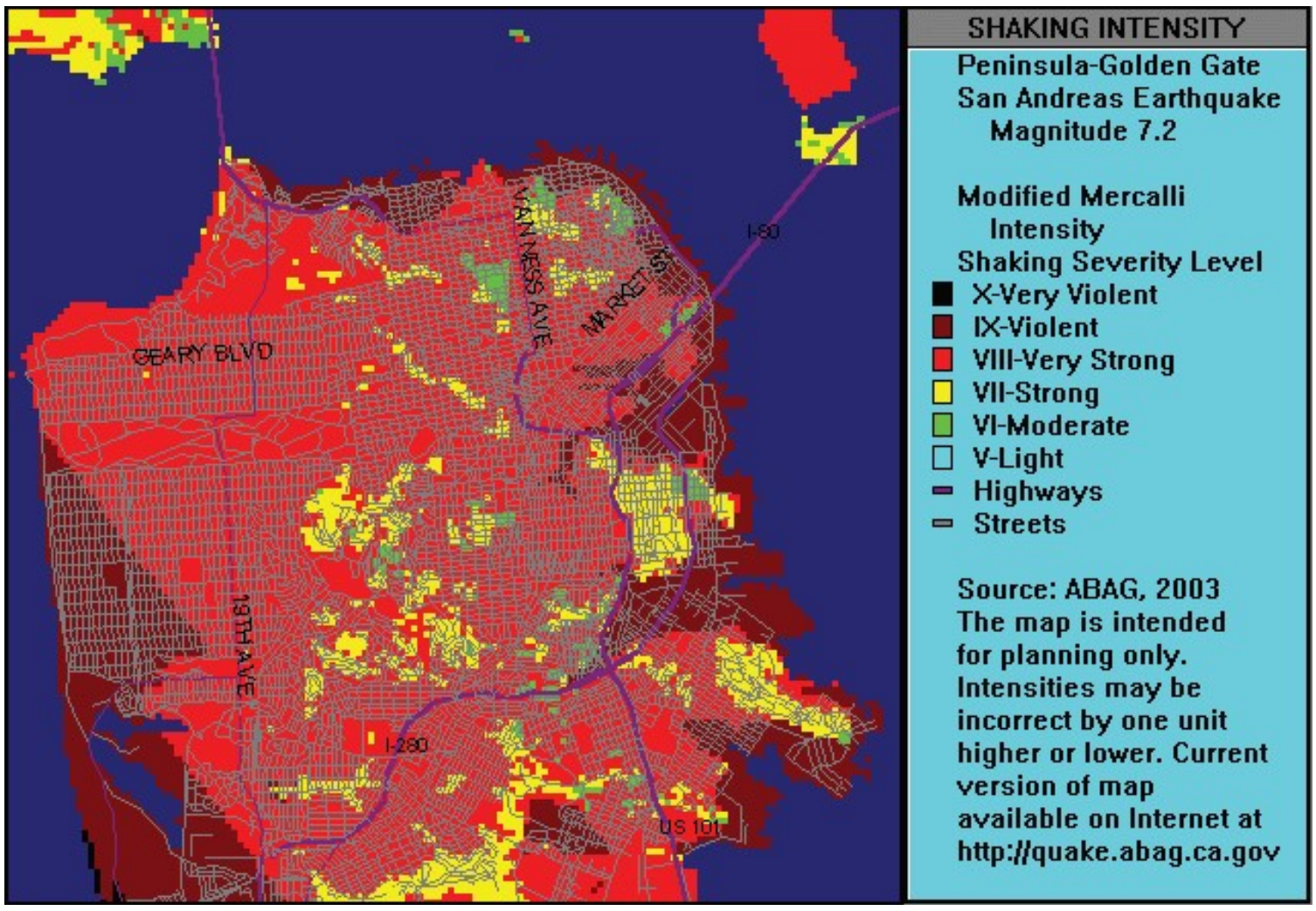
Earthquakes

Earthquakes have always occurred in the San Francisco area and will continue to occur in the future. There is a historical record of damaging earthquakes dating as far back as 1808 and trenching and other geological studies have identified earthquake events over many hundreds of years. Although few magnitude 6 or greater earthquakes occurred between 1906 and the late 1970s, many scientists believe that higher frequency of earthquakes since 1979 may represent a return to the higher rates of activity recorded before 1906.



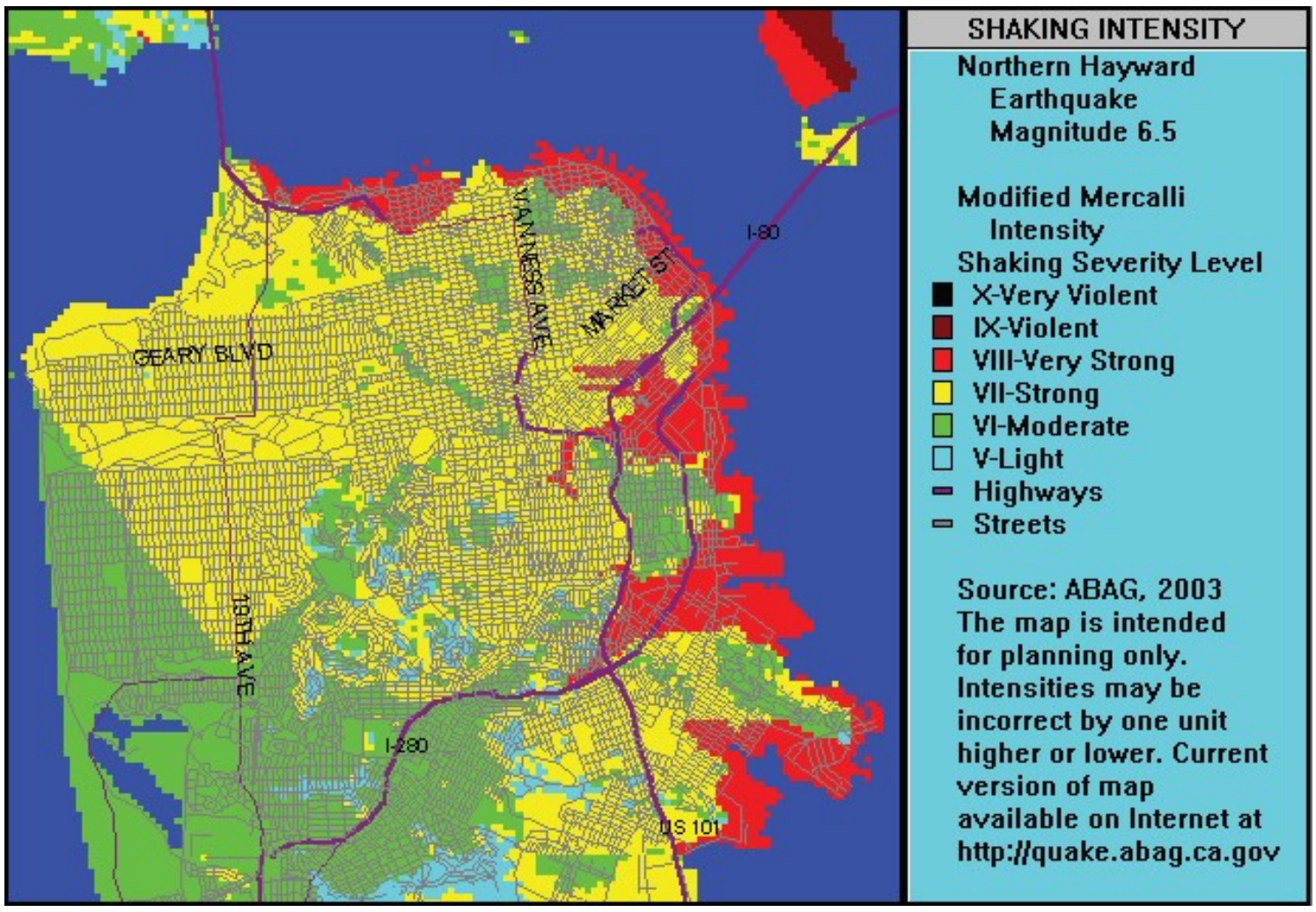
Bay Area Earthquake Faults
USGS 2007

MAP 01



Ground Shaking Intensity
Magnitude 7.2 Earthquake on the San Andreas Fault

MAP 02



Ground Shaking Intensity
Magnitude 6.5 Earthquake on the Hayward Fault

MAP 03

The great 1906 earthquake and the fire that it caused resulted in about 3,000 deaths. The worst building damage occurred on "made land": artificially filled areas created on former marshes, streams and bay. Wood-frame buildings in the South of Market area and brick buildings downtown were especially heavily damaged. Large ground displacements in the filled ground along the Bay damaged utilities. Damage to the gas generating and distribution system resulted in explosions and exacerbated the spread of fire. Breaks in the underground water pipes resulted in a loss of fire fighting capability. More than 28,000 buildings within a four square mile area were destroyed over a period of three days. About 100,000 people were left homeless. Refugee camps in parks and other open spaces continued for many months. A 1908 estimate of private property damage in the fire zone was $1 billion. Some of the municipal bonds that financed the rebuilding of public facilities were not paid off until the 1980s.

The October 17, 1989 Loma Prieta earthquake occurred on the San Andreas fault about 60 miles (100 km) southeast of San Francisco. Sixty-two people were killed, including eleven in San Francisco. Forty-two of these fatalities occurred because of failures of bridges and freeways. Most of the remaining deaths resulted from the collapse of buildings in Santa Cruz and San Francisco. The total damage to private and public facilities throughout the region is estimated at more than $6 billion. Again, the damage was not evenly distributed through the City. Much of the severe damage occurred in the same areas that suffered in 1906 and those areas built on unengineered artificial fill in the Marina and South of Market districts. Many buildings severely damaged by the earthquake had structural weaknesses known to make them vulnerable to earthquake damage. They included "soft story" wood-framed buildings (with large openings and inadequate strength at the ground story) and unreinforced masonry buildings. Fire ignited in the Marina District did not spread beyond the immediate region, owing to efforts of San Francisco firefighters and benign wind conditions. About 130 buildings in San Francisco, containing more than 1,000 housing units, were destroyed or irreparably damaged. Many more could not be occupied for an extended length of time while repairs were carried out. Additional residents were displaced temporarily by a lack of utilities. The Red Cross provided overnight shelter for about 2,000 people on the night of the earthquake.

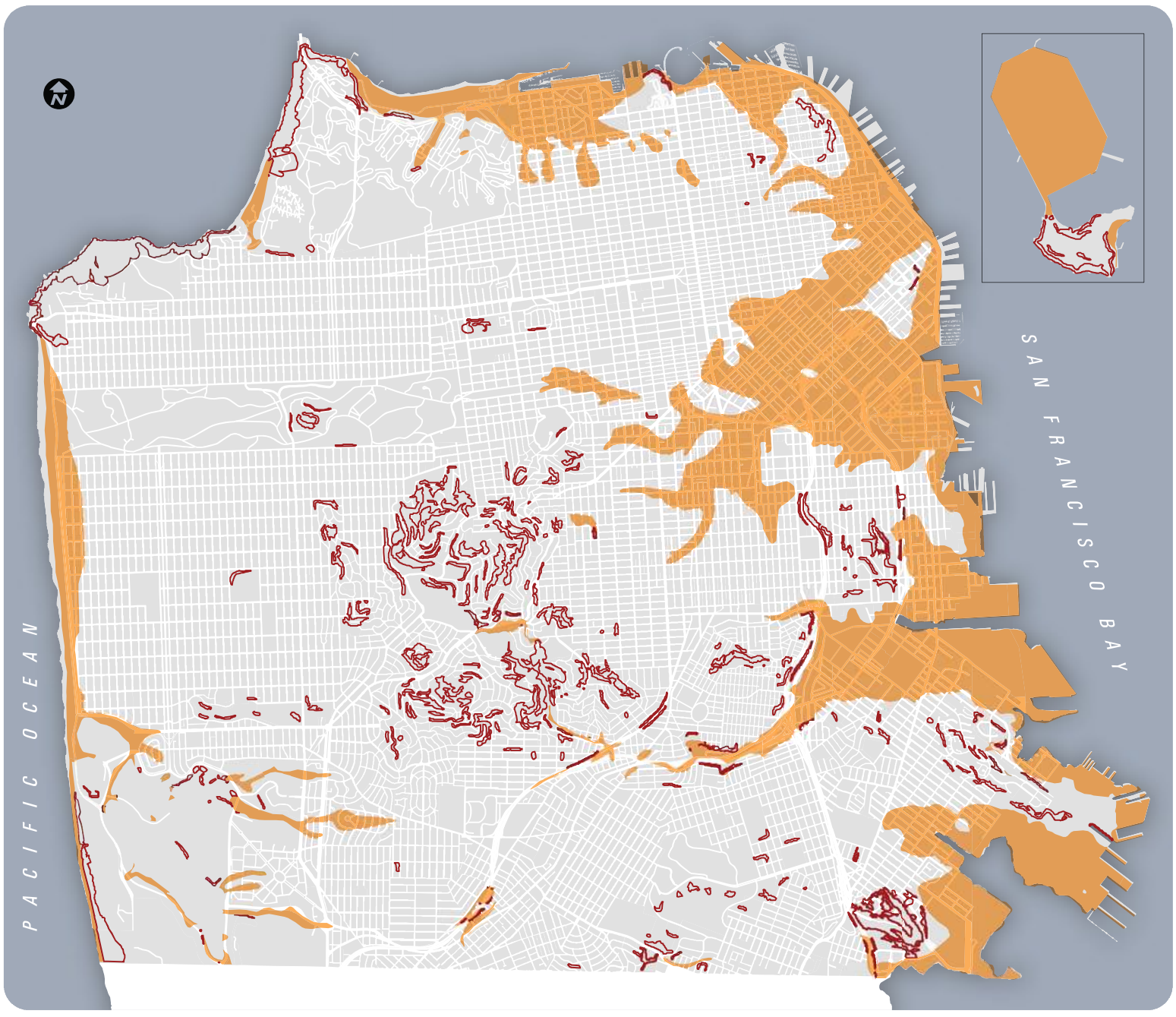
After the October 1989 Loma Prieta Earthquake, the National Earthquake Prediction Evaluation Council formed a Working Group of earthquake scientists to assess the probabilities of large earthquakes in the Bay Area. The Working Group's most recent assessment in 2008 concluded that there is a 67% likelihood of one or more major earthquakes (magnitude 6.7 or greater and capable of resulting in substantial damage) occurring in the Bay Area in the next 30 years (*http://earthquake.usgs.gov/regional/nca/ucerf/*). This means that a major quake is twice as likely to occur as it is not to occur. Most of our existing structures and infrastructure, and most of the new buildings and public works now contemplated, will probably be in place when the expected earthquake happens.

San Francisco Geology and Seismicity

The San Andreas fault system is a complex network of faults that extends throughout the Bay area. (See Map 1.) While no known active faults exist in San Francisco, major earthquakes occurring on the faults surrounding the City have resulted in substantial damage within the City. Similar damaging earthquakes in the future are inevitable.

Some of these faults are found beneath or close to the most heavily populated parts of the Bay Area. As a result, earthquakes on these faults could be much more damaging than the Loma Prieta earthquake, even if the magnitude is smaller. The Northridge earthquake of 1994 and the Kobe earthquake of 1995 illustrate how destructive earthquakes very close to urban areas can be. The Northridge earthquake, with a magnitude of 6.8 resulted in about 60 deaths and severe or total damage to about 3,000 buildings. The Kobe earthquake had a magnitude of 6.8 and resulted in more than 5,000 deaths and the loss of about 60,000 buildings, including those destroyed by fire.

The location and movement of earthquake faults do not explain all of the earthquake risk. Even in locations that are relatively far from faults, soils can intensify ground shaking, or the ground may settle or slide. The parts of San Francisco that experienced the greatest damage in 1989 were not those closest to Loma Prieta, but those with soils that magnified ground shaking or liquefied. These were the same areas that experienced damage in 1906, though the epicenter of the 1906 earthquake was in a different direction.



Seismic Hazard Zones
San Francisco, 2012

0 Miles 1

MAP 04

Liquifaction Zone

Landslide Zone

The hills along the central spine of the San Francisco peninsula are composed of rock and soils that are less likely to magnify ground shaking, although they are sometimes vulnerable to landsliding during an earthquake. The soils most vulnerable during an earthquake are in low-lying and filled land along the Bay, in low-lying valleys and old creek beds, and to some extent, along the ocean. Those soils, as well as those at steep hillsides, are at the most serious risk during earthquakes from ground shaking and ground failure such as earthquake liquefaction and landslides.

Ground Shaking

Most earthquake damage comes from ground shaking. Ground shaking occurs in all earthquakes. All of the Bay area and much of California are subject to some level of ground shaking hazard. The impacts of ground shaking will be quite widespread. The severity of ground shaking varies considerably over the impacted region depending on the size of the earthquake, the distance from the epicenter of the earthquake, the nature of the soil at the site, and the nature of the geologic material between the site and the fault. It is likely that the intensities of ground shaking will vary considerably throughout the City during any given earthquake, and that the pattern of ground shaking will be fairly consistent, reflecting the underlying soils. In general, sites with stronger soils will experience shaking of less intensity than those in low-lying areas and along the Bay, with Bay mud or other weaker soils. Some sites, particularly those with poor soils, will experience strong ground shaking in most earthquakes.

Ground Failure, Liquefaction and Landslides

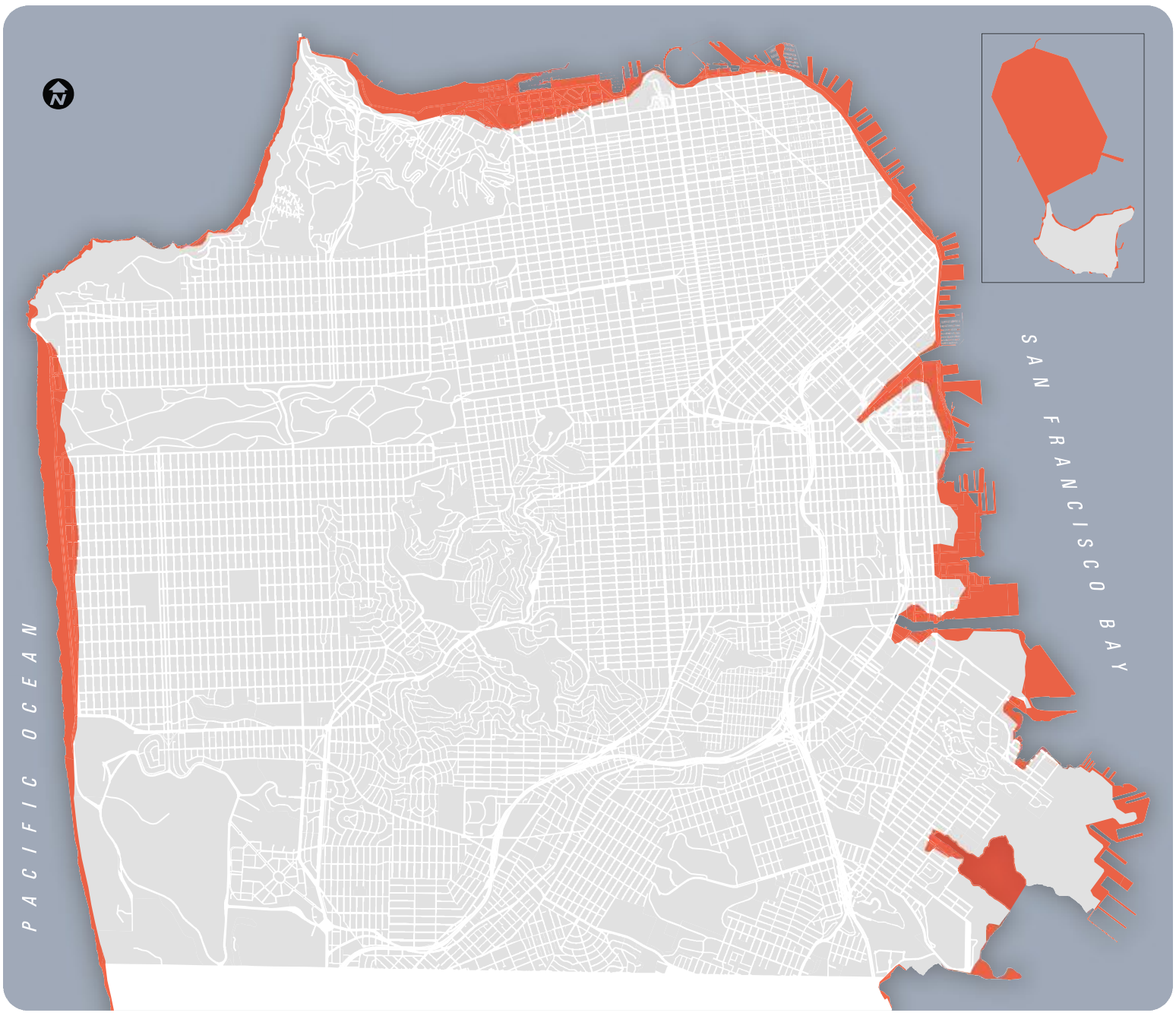
"Ground failure" means that the soil is weakened so that it no longer supports its own weight or the weight of structures. Ground failure can happen without earthquakes. For example, landsliding is a natural geological process. It is also likely to occur suddenly and catastrophically during earthquakes. The major types of ground failure associated with earthquakes are liquefaction, landslides, and lateral spreading.

Liquefaction is the transformation of a confined layer of sandy water-saturated material into a liquid-like state because of earthquake shaking. When soil liquefies during an earthquake, structures no longer supported by the soil can tilt, settle or break apart. Underground utilities can be substantially damaged. Localities most susceptible to liquefaction are underlain by loose, water-saturated, granular sediment within 40 feet of ground surface, a condition which is widespread in San Francisco. This susceptibility is exacerbated by the high risk of ground shaking from nearby active faults. The combination of these factors constitutes a significant seismic hazard in the City and County of San Francisco.

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. They can occur slowly over time or suddenly. Areas susceptible to landslides are those where masses of soils are weakly supported because of natural erosion, changes in ground water or surface water patterns, or human activities such as undercutting. Landslides can be triggered by heavy rains, as occurred during the high wind and rainstorms of the winter of 1995-1996 and in early 1997. Earthquakes will trigger landslides in susceptible areas, as occurred in the Santa Cruz Mountains during the 1989 Loma Prieta earthquake. A large earthquake in San Francisco may cause movement of active slides and could trigger new slides similar to those that have already occurred under normal conditions.

The California Geological Survey (CGS) has prepared maps of areas of liquefaction potential, as required by the Seismic Hazard Mapping Act of 1990. The map and evaluation report summarizing seismic hazard zone findings for potentially liquefiable soils show that liquefaction zones exist south of Market Street, in the Mission District, and at Hunters Point; in areas of artificial fill along the waterfront, especially the Marina District and at Treasure Island; and along the beaches facing the ocean. Liquefiable soils are also generally found in filled areas along the Bay front and former Bay inlets, and in sandy low-lying areas along the ocean front and around Lake Merced. The analysis also demonstrates the locations of steep slopes and cliffs that are most susceptible to landsliding. These earthquake-induced landslide hazard zones make up about 3 percent of the land in San Francisco.

This Seismic Hazard Zone Map, shown as Map 4, illustrates the areas with liquefaction potential and those subject to earthquake induced landslides. This map must be used by the City when adopting land use plans and in its permitting processes. Development proposals within the Seismic Hazard Zones shown on the official maps must include a



Tsunami Hazard Zones
San Francisco, 2012

0 Miles 1

MAP 05

Tsunami Hazard Zone

geotechnical investigation and must contain design and construction features that will mitigate the liquefaction hazard. The City's Department of Building Inspection uses these guidelines during independent building review of proposed projects.

Inundation Hazards

Tsunami

Tsunamis are large waves in the ocean generated by earthquakes, coastal or submarine landslides, or volcanoes. Damaging tsunamis are not common on the California coast. Most California tsunami are associated with distant earthquakes (most likely those in Alaska or South America, and recently in Japan), not with local earthquakes. Devastating tsunamis have not occurred in historic times in the Bay area. Because of the lack of reliable information about the kind of tsunami runups that have occurred in the prehistoric past, there is considerable uncertainty over the extent of tsunami runup that could occur. There is ongoing research into the potential tsunami run-up in California. Map 5 shows areas where tsunamis are thought to be possible.

Flooding

The National Flood Insurance Program (NFIP), which designates flood-prone areas, has recently completed mapping communities along the San Francisco Bay, including San Francisco. Areas currently designated as prone to surface flooding in San Francisco on the new floodplain maps are in portions of Mission Bay, Treasure Island, Hunters Point Shipyard and Candlestick Point, as well a significant portions of the Port. Designation as a federal flood hazard zones could necessitate the adoption of a Flood Plan Management Ordinance, which would restrict uses that could be dangerous due to water or erosion, require that uses be protected against flood damage when constructed, and require floodplain management by development in floodplain areas.

Reservoir Failure

Dams and reservoirs which hold large volumes of water represent a potential hazard due to failure caused by ground shaking. The San Francisco Water Department owns above ground reservoirs and tanks within San Francisco. The San Francisco Water Department monitors its facilities and submits periodic reports to the California Department of Water Resources, Division of Safety of Dams (DOSD), which regulates large dams.

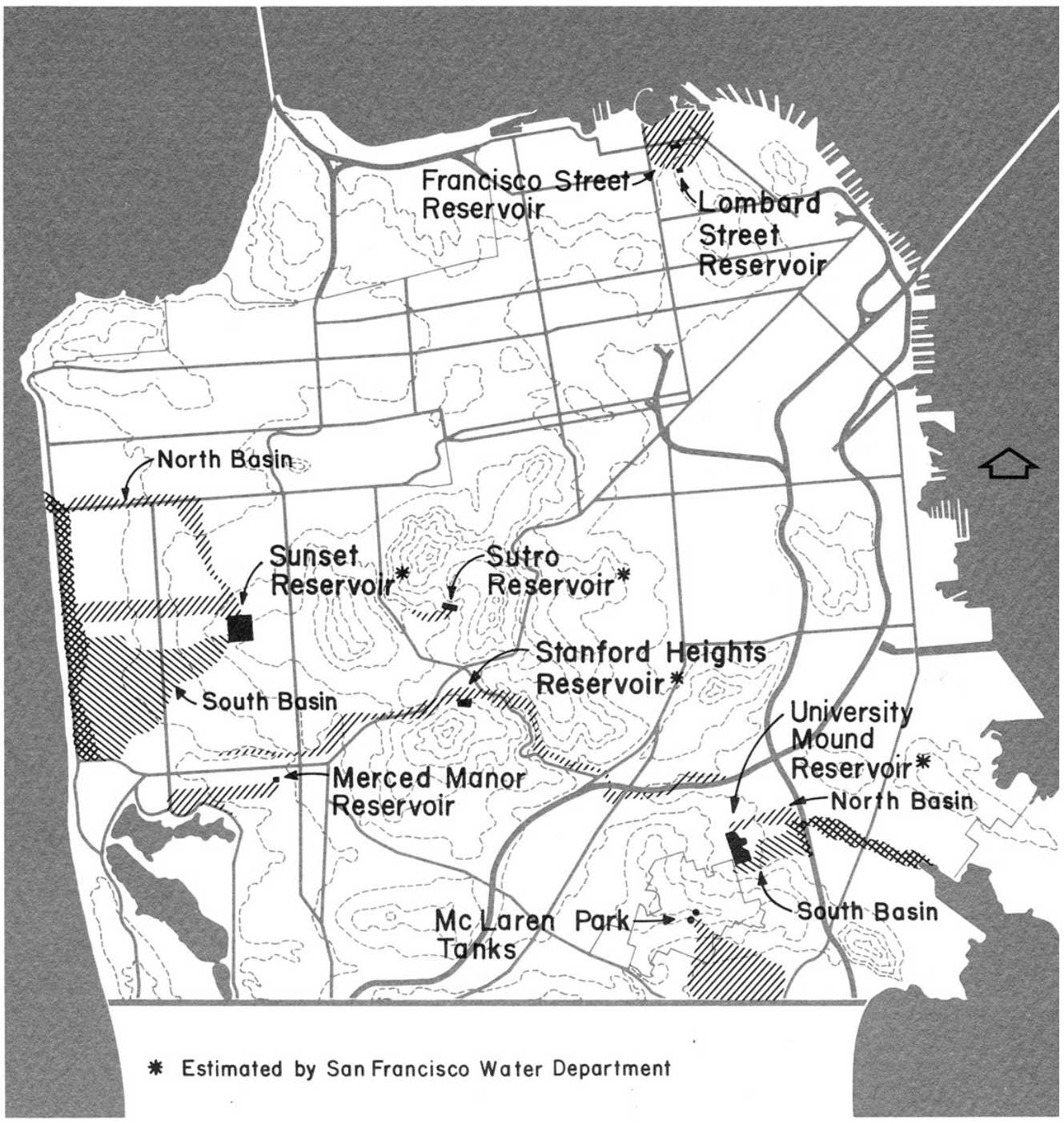
Sea Level Rise

Using multiple emissions scenarios, best available projections for California and the Bay Area currently assume 12-18 inches of sea level rise by 2050 and 21-55 inches of sea level rise by 2100, given current carbon emissions trends (see, for example, BCDC's sea level rise maps at *http://www.bcdc.ca.gov/planning/climate_change/index_map.shtml*). These projections are likely to change over time as climate science progresses. Perhaps the most obvious and widespread consequence of sea level rise is inundation and flooding of land. Sea level rise will not only cause permanent land inundation, it will increase and expand the 100-year floodplain. Thus, the number of residents at risk would increase during storm events. Land composed of bayfront fill is at risk for inundation because of low elevation and subsidence over time due to compaction from buildings and soil desiccation. Additionally, sea walls located along the Embarcadero and along the Great Highway may be at risk for overtopping and inundation.

Impacts of Future Earthquakes

The most immediate impacts from earthquakes are deaths and serious injuries, the extent of which depends on the number of people in the area at the time, and the types of structures that they occupy. Risk is related to more than distance from the earthquake; nevertheless, about 1.26 million people live within 10 km of the likely epicenter of a magnitude 7 earthquake on the Northern segment of the Hayward fault. This is about 10 times the number of people at a similar distance from the epicenter of the Loma Prieta earthquake.

Since the 1906 earthquake, San Francisco has made strides in ways to reduce impacts of earthquakes and other disasters. Improvements in building and fire codes, modern



Potential Inundation Areas Due to Reservoir Failure

MAP 06

construction techniques, and retrofits reduced vulnerability. However, the City's population has more than doubled, and the value of its buildings has increased significantly; these increases in population and appreciated building values result in heightened risk.

Most deaths and injuries will result from the failure of buildings and other structures. The number of casualties will be influenced by the time of day of the earthquake. At night more people are in relatively safe small wood-frame structures. During the day more people could be in more hazardous and higher occupancy buildings, on vulnerable bridges and freeways, or on streets subject to falling debris. In recent large earthquakes, buildings designed and constructed with current engineering techniques generally performed well. This means that they did not collapse or pose an unreasonable threat to the lives of occupants, although they may have suffered structural damage that is difficult, expensive or even impossible to repair.

The 1974 Community Safety Element specifically examined unreinforced masonry buildings (UMBs) because of their record of poor performance in earthquakes. Eight deaths during the Loma Prieta earthquake resulted from UMBs. In the Loma Prieta earthquake about 13% of all San Francisco UMBs were damaged to the extent that occupancy was limited, while about 2% of other San Francisco buildings were damaged. To date, most of the City's unreinforced masonry buildings have been upgraded via the 1992 UMB Ordinance. However, other hazardous building types remain. Most of San Francisco's private, noncommercial buildings are wood, and are highly susceptible to post-earthquake fire conflagration. Concrete frame structures with unreinforced masonry infill panels are also a concern, as they are prone to collapse during earthquakes. Non-ductile concrete structures often fail in large earthquakes. "Soft-story" buildings, wood-frame buildings with open fronts or other extensive wall openings are also at high risk for partial or total collapse.

A major earthquake will result in substantial damage to utility systems. It is likely that fires will break out, larger and in greater number than can be controlled by available professional fire fighters. There may be releases of hazardous materials.

In addition to these physical impacts, there will be social and economic impacts. Lost housing will result in the need for both temporary, short-term shelter and for permanent housing to replace that which is completely destroyed. People with limited English language facility or limited mobility may be at increased risk. Many businesses will be seriously disrupted. Valuable historic buildings will be lost.

The Earthquake Response Plan Enhancement, a part of the Emergency Response Plan contains an analysis of the potential impact of several possible scenarios of earthquakes on the City of San Francisco. The mid-range scenario viewed by the analysis looked at magnitude 7.1 to 7.2 earthquakes on the Peninsula-Golden Gate segment of the San Andreas Fault. The analysis showed that under this scenario, injuries requiring basic or significant medical aid could range from 5,300 to 8,700, and life threatening casualties or deaths could encompass anywhere from 350 to 650 depending on the time of day and day of the week. The greatest numbers of casualties are likely to occur during the daytime, when the commuting population nearly doubles the total population, and in areas where the working population is greatest. In terms of building damage, as much as 25% of the City's private residential buildings could be effectively destroyed under a mid-range scenario quake, from either the earthquake itself or from post-earthquake fires; and up to 23% percent of the City's stock of commercial and industrial buildings could be similarly destroyed by earthquake or related fires. In terms of social impacts and displacement, nearly 92,000 households, about 28% of the total, will require new housing, and over 56,000 people, 7 percent of San Francisco's total population, would need short-term shelter, with need greatest among the elderly and disabled populations.



Photo by California Watch

III. Overall Objectives & Policies

One of the Priority Policies of the City's General Plan, with which all City actions are required to be consistent, is that the City achieves the greatest possible preparedness to protect against injury, loss of life, and economic impacts in an earthquake. The policies of the Community Safety Element are intended to direct all City actions to achieve this goal in the face of earthquakes and other natural and technological disasters, to reduce the social, cultural and economic dislocations of disasters, and to assist and encourage the rapid recovery from disaster should one occur. The Community Safety Element also sets forth the responsibilities of the many City departments who will need to implement these policies.

Objectives and Policies to advance this goal are classified into four general categories. They are:

1. Mitigation. Hazard mitigation policies and programs are intended to diminish long-term impacts to an appropriate level. Hazard mitigation activities, effectively carried out, reduce the need for response and recovery from disasters because they will reduce the amount of physical damage suffered.

2. Preparedness. Preparedness anticipates the effects of a disaster and takes appropriate countermeasures in advance, such as issuing warnings, stockpiling supplies, or establishing evacuation routes. Preparedness programs educate and organize people to respond appropriately to disasters.

3. Response. Response actions are those taken during an event and its immediate aftermath. Response programs are generally focused on those agencies with responsibility for providing emergency and other services to the public when a disaster occurs. The focus of response activities is saving lives and preventing injury, and reducing immediate property damage.

4. Recovery and Reconstruction. Recovery encompasses the steps necessary to bring a community back to life – fundamentals such as housing, business resumption, lifeline restoration, and provision of day-to-day services—as well as having the capacity to rebuild effectively in the post-disaster period. Reconstruction happens over the long term after a major disaster. Both recovery and reconstruction require that key decisions be made about short-term and long-term rebuilding, including the provision of housing for those displaced, resumption of services to homes and businesses, and the resumption of economic and government functions.

Communication is an important aspect of all of these steps. Knowledge about natural disasters is continually growing, and in order to deal with disasters effectively, it is critical that the public, City agencies, and decision-makers be well informed. It is also important that information about events and activities in the City be available to other government agencies and researchers. The general public needs to know how they can prepare for disaster. The City needs to facilitate contact with the community and among its various organizations and departments to be an effective responder. All stages need improved and enhanced coordination. Improved coordination among City programs, and others working to reduce the risks of disasters will result in more effective preparedness, response and recovery efforts. Coordination with outside agencies including regional, state and federal organizations will expand the City's network of support and the speed with which it responds in the case of a San Francisco disaster.

1. MITIGATION

OBJECTIVE 1

REDUCE STRUCTURAL AND NON-STRUCTURAL HAZARDS TO LIFE SAFETY AND MINIMIZE PROPERTY DAMAGE RESULTING FROM FUTURE DISASTERS.

Most earthquake-related deaths and injuries will result from the failure of buildings and other structures as a result of shaking or ground failure. Damage to structures results in substantial economic losses and severe social, cultural and economic dislocations. In addition to the characteristics of the earthquake and of the site, a structure's performance will depend on structural type, materials, design, and quality of construction and maintenance. The hazards posed by buildings and other structures can be reduced by assuring that all structures achieve performance that meet acceptable safety levels, by learning more about the risks posed by vulnerable structures and developing plans to reduce those risks, and by including a consideration of natural hazards in all land use, infrastructure, and public capital improvement planning.

POLICY 1.1

Continue to support and monitor research about the nature of seismic hazards in the Bay Area, including research on earthquake prediction, warning systems and ground movement measuring devices, and about earthquake resistant construction and the improved performance of structures.

Knowledge about geologic risks in the Bay Area is substantial, but always evolving. The City needs to keep informed, through the professional contacts of its staff, and through State and federal agencies like CalEMA and the United States Geological Survey, about advances in the field. New information will be shared with the public and decision-makers.

Similarly, new techniques are continually developing in the seismic design of structures, and new data is emerging about the actual seismic performance of previously retrofitted buildings. The risks of damage to life and property can be reduced by these improved engineering practices. The City should continue to support the institutions, professional organizations and individuals who carry out research in structural safety. Special attention should also be paid to support and seek out research that identifies innovative and low-cost retrofit concepts. Once the City sets new acceptable safety levels, this research should support the engineering requirements to meet safety levels.

POLICY 1.2

Research and maintain information about emerging hazards such as terrorism threats and communication failures.

Partially due to the recent events of September 11th, the South Indian Ocean Tsunamis, Hurricane Katrina, and the Christchurch New Zealand and Easter Japan earthquakes, this field of disaster research is growing in both scope and recognition. While research into disasters focused primarily on natural disasters, sticking close to the areas of science and environmental management, newer research strains extend into terrorism and cyber-failures, biological and chemical emergencies and other community-wide crises beyond natural hazards. They also encompass research components such as organizational response to disasters, the social ramifications of hazards and disasters, particularly the effects of large-scale terrorist attacks. The City's emergency management departments should keep abreast of evolutions in this field of research, particularly as new threats emerge and as new methods of mitigating those are developed. DEM should also continue its work with the San Francisco Citizen Corps Council, modeled after the national Citizen Corps program established after the

September 11th terrorist attacks, which aim to elevate the level of networking, emergency training and outreach to the public.

Regulations for New Development

The State of California requires the use of the California Building Code, based on the model International Building Code (IBC) prepared by the International Code Council (ICC). The International Building Code, prepared by the International Code Council, became effective as the model building code for San Francisco on January 1, 2008. Buildings built to current code provisions are expected to resist damage from minor earthquakes, experience some non-structural damage from moderate earthquakes, and incur non-structural and some structural damage (but not collapse) in major earthquakes (Specially-regulated buildings such as hospitals are designed for better performance). The Code is continually updated as knowledge grows about how structures respond to earthquakes. Recent earthquakes in Northridge and Kobe have demonstrated that buildings that incorporate current engineering knowledge about earthquakes generally perform well in earthquakes.

Local governments are permitted to impose more restrictive standards than those in the State codes when this can be justified by local conditions such as seismicity, topography (for example hilly terrain), or climate. San Francisco adopts the California Building Code with modifications which concern the resistance to ground-shaking and hillside construction, as well as some long-standing local provisions. The San Francisco Building Code is adopted by the Board of Supervisors and implemented by the Department of Building Inspection (DBI), which reviews building plans and inspects buildings under construction to ensure that the approved plans and codes are followed.

POLICY 1.3

Assure that new construction meets current structural and life safety standards.

The Department of Building Inspection and the Fire Department have ongoing responsibility for reviewing plans for proposed buildings and inspecting buildings under construction to ensure that they are built as shown on the approved plans and in accordance with applicable codes. This includes ongoing training for plan checkers and inspectors and the involvement of professional structural and civil engineers with expertise in seismic engineering.

The engineering of complex or unusual structures requires more than the routine application of set rules. It often involves creativity and judgment in solving new design problems. Because there can be considerable independent judgment required, the involvement of more than one design professional can often shed new light on structural issues, or uncover overlooked problems.

POLICY 1.4

Use best practices to review and amend at regular intervals all relevant public codes to incorporate the most current knowledge of structural engineering regarding existing buildings.

The State of California mandates the local adoption of the California Building Code, which is adopted from the International Building Code. Buildings built to these provisions are expected to resist damage from minor earthquakes, experience some non-structural damage from moderate earthquakes, and suffer some structural damage, but not collapse; from major earthquakes (specially-regulated buildings such as hospitals are designed for better performance.) The Code is updated triennially, with a provision for additional amendments as knowledge grows about how structures respond to earthquakes. Local governments may impose more restrictive standards than those in the State code. San Francisco adopts the State code with modifications that concern the resistance to ground-shaking and hillside construction, as well as other local equivalencies. San Francisco has adopted the 2010 California Building Code with local amendments.

Chapter 34 of the San Francisco Building Code includes long-standing local provisions that supplement those of the state and model codes with regard to required upgrades of existing structures. These provisions have been updated and modified to be in coordination with the current California Building Code. In addition, the City should consider provisions that explicitly endorse or adopt consensus standards for the seismic evaluation and retrofit of existing buildings. State amendments to the model code (for DSA-regulated structures) and related model code provisions (such as those in the International Existing Building Code) provide examples to follow.

Even with this new building code, however, the local code may, in time, lag behind technology advances. For example, recent advances in elevator safety make it possible for occupants to use elevators for escape and for firefighters

to use them to ascend to fight fires, which could be critical for taller buildings. Recognizing that San Francisco is at high risk to fires due to seismic issues, the Fire Department has developed local code amendments that would make elevators in new high-rises more resistant to fire, smoke and water. The City should continue this practice of proactively reviewing and updating codes to incorporate the latest knowledge and standards of safety and seismic design.

POLICY 1.5

Support development and amendments to buildings code requirements that meet City seismic performance goals.

The design and construction methods used in buildings are critical to community safety. Current seismic codes ensure that new buildings are earthquake- and fire-resistant, and protect people inside buildings by preventing collapse and allowing for safe evacuation. However, current code requirements do not necessarily limit damage to a structure, or ensure its function post-earthquake. A number of factors support the idea that new and retrofitted buildings in San Francisco should be built for better seismic performance than the default level provided by the current building code, or give options for quantifiably improved seismic performance, and that the seismic performance expectations of the current code should be made explicit. Among U.S cities in areas of very high seismic hazard, San Francisco is unique because of its geography, urbanization, and reliance on public transportation. Damage to new buildings and developments can have magnified impacts that affect adjacent structures and the city's lifelines. Seismic improvements can often be provided with measures that increase building costs by no more than a few percent, if at all.

The Bay Area is fortunate to be home to many of the country's foremost experts in the structural and earthquake engineering professions. These professional should be encouraged to design buildings to tiered, "enhanced" levels of seismic performance that are performance-based, and developers to finance these enhanced levels, by offering incentives such as priority processing. (Similar to a LEED certification for sustainable design.) Eventually the City should consider ways to formalize such "enhanced" design levels and use them as a basis for evaluating seismic risk.

POLICY 1.6

Consider site soils conditions when reviewing projects in areas subject to liquefaction or slope instability.

Building codes consider soil conditions only at a very general scale. But soils conditions vary enormously throughout the City. Different soils conditions can result in very different earthquake impacts and can result in damage at other times - for example landslides. Because of the importance of soil conditions, the California Seismic Hazards Mapping Act requires that a geotechnical investigation and geotechnical report be prepared for new or renovated buildings that are constructed in Seismic Hazard Zones.

Pursuant to this act, the Department of Building Inspection requires geotechnical reports prepared by a licensed geologist and geotechnical engineer for projects in areas with susceptibility to ground failure, including liquefaction and landslides. DBI requires that foundations and structural systems be designed that are more likely to survive these hazards. DBI has procedures in codes and bulletins for requesting additional review of proposed projects the Department believes present difficult or unusual issues in areas with the potential for ground failure.

POLICY 1.7

Consider information about geologic hazards whenever City decisions are made that will influence land use, building density, building configurations or infrastructure are made.

Land use decisions should be made with hazards in mind. The Planning Commission and other City decision-makers shall be aware of and consider geologic hazards when making decisions that will affect the types and structures that will exist in the future, including potential and existing structures, land uses and their associated densities, transportation and other infrastructure. Area plans, changes to the General Plan and amendments to the Planning Code should take into consideration the hazards resulting from geologic conditions, and the effects they may have on the safety of future development, while balancing these with other community welfare concerns, ranging from safety to community health to economic security to quality of life.
In order to protect City building, building codes and

technical knowledge must be as up to date as possible as new engineering expertise is gained. Keeping abreast of such information and technologies should be a priority for the City.

POLICY 1.8

Direct City actions to reduce its contributions towards climate change, and mitigate future releases of greenhouse gasses.

The significance of global warming, and its impact on disasters, has been clarified in recent years. Science correlates climate change with an increase in the frequency of natural disasters, and in economic losses from these disasters. Results of global warming include increasing runoff from urban storms, springtime floods from swollen rivers and rising sea levels.

Recent studies show that more than two-thirds of the measured climate change in the past 50 years has been human-induced, and human actions can also stem this tide. New urban systems to handle storm runoff, flood control structures will be needed. Continuation of the PUC's upgrade of the City sewer system is one facet of preparation, but also critical are more imaginative solutions, like capturing storm waters for irrigation, increasing urban forestry activities and other green uses.

Ways to mitigate against pending damage from climate change include installation of infrastructure systems that reuse resources, generate clean energy, and provide alternatives to automobile transportation; and implementation of policies that promote energy efficiency, renewable energy, and recycling. San Francisco's 2004 Climate Action Plan set a 2012 goal for greenhouse gas emissions, with a program for recommended emissions reduction actions. It presents next steps required over the near term to implement the Plan, including developing a process to support City departments and private entities to integrate climate protection into their standard operating procedures, to be led by SF Environment. Recent proposals for a local carbon tax, solar rebate and loan programs, grease recycling initiative, and a landmark green building ordinance are an outgrowth of this effort. The recently created San Francisco Carbon Fund also provides a city-based carbon offset program to funds local green activities.

POLICY 1.9

Mitigate and assess the risk of flooding in San Francisco by incorporating the Flood Insurance Rate Map for San Francisco and related programs from this map to mitigate against flood risks.

The National Flood Insurance Program (NFIP), managed by the Federal Emergency Management Agency (FEMA), provides for flood insurance for communities that adopt floodplain management programs to mitigate flood losses and damages. FEMA uses the Flood Insurance Rate Map (FIRM) to identify areas with 1% annual chance of flooding, and uses this as the basis for insurance rating.

FEMA approved San Francisco's application for participation in the NFIP in April 2010, and subsequently the City has amended the 2008 Floodplain Management Ordinance in order to meet the requirements of NFIP. The established flood damage reduction program provides homeowners and other property owners the opportunity to purchase federally subsidized flood insurance at affordable rates. FEMA issued a preliminary FIRM for San Francisco in 2007, and its final map has since been adopted (*http://www.sfgov.org/floodplain*).

The Floodplain Management Ordinance requires first floor of structures in flood zones to be constructed above the floodplain or to be flood-proofed with variances for exceptional circumstances. The map, as proposed, would designate portions of waterfront piers, Mission Bay, Bayview Hunters Point, Hunters Point Shipyard, Candlestick Point, and Treasure Island in coastal flood hazard zones, which may have implications for development plans and insurance requirements in those areas.

To mitigate against potential risks, the City should continue to pursue NFIP participation and use the information provided by FEMA to engage in additional floodplain improvements to at-risk areas. The City should continue to implement ordinance requirements for new construction, address flood hazards in the plans for refuse projects, and pursue substantial improvements for potential flood areas.

POLICY 1.10

Examine the risk of flooding due to climate change-related effects, such as storm surges, changes in precipitation patterns, and sea level rise as well as adaptation actions that will reduce population, built environment, and ecosystem vulnerability due to these threats.

Despite best efforts to reduce greenhouse gas emissions and mitigate against future climate change, current CO2 levels are already causing changes in weather patterns, more extreme weather events, and an increase in sea levels. Even if greenhouse gas emissions were halted today, the long half life of many greenhouse gasses and the change in global ocean temperatures mean that we will be experiencing consequences of increased CO2 in our atmosphere for centuries.

Climate risks and the associated flooding due to storm surges, increased precipitation, and sea level rise have the potential to greatly increase permanently inundated land as well as expand and alter the current 100-year floodplain, making many more residents and structures vulnerable to flooding than current conditions. The City should review scientific emissions and sea level rise projections to become fully aware of risks to safety due to flooding, as well as support the institutions, professional organizations and individuals who carry out climate research.

These risks should be taken into account when making land use decisions, bearing in mind that the future landform, as well as perceptions of acceptable risk may change in the future. These risks should also be incorporated into appropriate city documents, such as the Planning and Zoning Codes, and the Planning Commission should be fully apprised of these risks as they conduct reviews.

The City should also review best practices, case studies, and current technology to mitigate these potentially harmful effects and adapt to future conditions that will reduce loss of life and loss of built structures and infrastructure. Adaptation actions should be considered for feasibility and incorporated into seismic upgrades and routine maintenance if possible. Special projects should also be considered based on cost, feasibility, and consequences.

POLICY 1.11

Continue to promote green stormwater management techniques.

As an urbanized area, San Francisco has an abundance of impervious surface. Buildings, streets, parking lots and other paved surfaces prevent the absorption of rainfall, so low lying areas of the City are particularly susceptible to flooding in heavy rains. In addition, urban storm water runoff can be highly polluted, and pollutants that go down street storm drains can have negative impacts on the sewer and storm system, contributing to system overflows. Natural systems can often be an effective supplement, helping to absorb the overflow and filter out pollutants from that runoff.

Building and site development should include natural systems wherever possible. Natural vegetation, landscaped swales and gardens included in site designs can reduce, filter or slow stormwater runoff. "Green streets" that include pervious concrete, planters and landscaped strips adjacent to sidewalks can assist the City's sewer discharge capabilities. Green roofs incorporated into buildings provide another method of absorption. Similarly, sustainable construction techniques can be used to mitigate against the effects of future disasters. Green building technologies now allow for buildings that can provide their own power and filter their own water from run-off. This helps reduce two problems associated with disasters, the need for power and the need for potable water.

POLICY 1.12

Ensure that new development on Treasure Island, Yerba Buena Island and Hunters Point Shipyard are resistant to natural disasters.

Landfill areas are at a high risk of liquefaction during an earthquake. Current plans for the development of approximately 6,000 new homes on Treasure and Yerba Buena Islands do recognize this risk, and require the seismic stabilization of the islands' perimeter.

In addition to soil stabilization, redevelopment plans should ensure new development is designed and constructed to ensure performance equivalent to that of similar structures built on firm ground.

Programs for Existing Building Stock and Infrastructure

Most of San Francisco's buildings predate modern seismic design and construction practice. Some older buildings, such as conventional wood frame houses, may not pose

extreme risk to life safety in earthquakes, but even those expected to survive an earthquake are likely to sustain much more physical damage than their modern counterparts. Local and state legislation already addresses certain classes of hazardous and essential structures, such as UMBs and hospitals, but significant risks remain. Earthquake risk reduction requires an enhanced understanding of the current building stock, followed by focused efforts to address critical conditions in public and private buildings. The CAPSS program has undertaken both this enhanced understanding as well as laid out a 30-year plan for implementation of the CAPSS recommendations for private buildings. In addition to existing buildings, programs should be implemented to prepare existing infrastructure for a large scale disaster.

POLICY 1.13

Reduce the risks presented by the City's most vulnerable structures, particularly privately owned buildings and provide assistance to reduce those risks.

A significant earthquake could impact more than 25,000 buildings in the City, making them unsafe to occupy. This level of damage would impact where people live, gather, and work. The loss of the numerous facilities where people address their day-to-day needs would severely impact residents' abilities to stay in or return to their homes.

At particular risk are non-ductile concrete frame buildings, which perform poorly in earthquakes, with notable collapses having occurred in the 1971 San Fernando, 1985 Mexico City, and 1994 Northridge events. Buildings of these types exist in San Francisco but have not been inventoried. Non-ductile concrete frame buildings were constructed as factories, warehouses, or office buildings in the densest parts of the City until the San Francisco Building Code was changed in 1976 to require ductility. ABAG estimated that more than 30% of the commercial building stock and more than 50% of the industrial building stock is concrete, with an unknown but large number of these being non-ductile concrete. Standards for the evaluation and retrofit of non-ductile concrete buildings exist, but the engineering is more complicated and the retrofit is generally more disruptive and expensive than it is for other vulnerable structure types.

Also at risk are pre-cast concrete tilt-up buildings built before 1973, which have performed poorly in the 1971 San Fernando, 1989 Loma Prieta, and 1994 Northridge earthquakes. There are believed to be relatively few of these buildings in San Francisco, and many are used as warehouses with few occupants, but they have not been carefully inventoried. Such an inventory of vulnerable structures would assist in prioritizing where the City should direct resources.

A comprehensive approach is needed to address all at-risk buildings in the City. While San Francisco has numerous programs in place to bring public buildings into seismic compliance, addressing privately owned buildings is a political, legislative and financial challenge. To assist private property owners in retrofitting these and other challenging building types, the City should explore the development of a standard list of recommendations for retrofits, and dissemination of retrofit information. Furthermore the City should explore and develop tools to provide financial assistance for their retrofit. Particular groups to support include homeowners, commercial property owners, business owners and small institutions. And as many of these older buildings are often converted to new uses such as offices or residential units, the City should also encourage retrofits with conversions.

POLICY 1.14

Reduce the earthquake and fire risks posed by older small wood-frame residential buildings.

San Francisco's current programs for UMB and soft-story wood-frame buildings only apply to larger scale and commercial structures. Individual homes or buildings under 5 units are not required to be seismically strengthened, and therefore exist at varying levels of risk. Some individual homeowners make upgrades to their buildings voluntarily, but that number could be substantially increased with more programs designed to encourage homeowners to make safety improvements. "Soft-story" buildings, in which the ground story has much less rigidity and/or strength than the rest of the structure, pose significant hazards. Often the soft story is the result of multiple garage door openings or "tuckunder" parking. Soft-story collapses resulted in deaths in both the 1989 Loma Prieta and 1994 Northridge earthquakes.

These deficiencies can be fixed relatively easily and inexpensively, substantially reducing life safety hazards and the likelihood that the building will sustain substantial damage in an earthquake. There are currently no requirements to undertake this work, although many owners do so voluntarily. Insurance companies sometimes encourage

or require upgrade as a condition of providing insurance. The State of California requires sellers of homes built before 1960 to disclose the existence of a series of common weaknesses, including lack of foundation bolts and water heater bracing, and to provide a copy of the state publication, The Homeowners Guide to Earthquake Safety. This law does not require sellers to fix these deficiencies. The City of Berkeley has a program which rebates a portion of the City's real estate transfer tax, if the money is applied to the mitigation of seismic hazards. This program has funded over 1700 retrofits since it began in 1993. The City of San Leandro has published guidelines, and provides technical assistance to encourage owners of small wood-frame homes to reduce their seismic risks.

The City should adopt incentives and regulations to encourage relatively simple retrofit approaches that increase the structural stability and safety of smaller wood frame residential buildings, as well as consider a phased mandate for retrofits over a 30-year timeframe. The City's Soft Story Wood-Frame Seismic Hazard Reduction Program establishes an inventory of buildings with five or more units and notifies their owners of their risk. Future phases of the program should examine mandatory strengthening of larger soft story buildings. However, this strengthening may be financially difficult for homeowners , and they may not be aware of potential funding sources. The City should develop a funding "menu" with information about potential sources from loans to Mello Roos districts, to assist building owners in making upgrades.

POLICY 1.15

Abate structural and non-structural hazards in City-owned structures.

Both technical and financial resources are needed to repair and retrofit City-owned structures. The City shall utilize its capabilities to assess hazards and to create and implement bond and other funding opportunity and to carry out retrofit projects. A number of City buildings have already been structurally upgraded utilizing bond financing, including parts of the Laguna Honda Hospital and General Hospital complexes.

There are other important City-owned buildings that present seismic risks, but for which funding for retrofit or replacement have not yet been secured. Among the most critical are the remaining buildings of the Laguna Honda Hospital and General Hospital complexes and the Hall of Justice, all of which are vulnerable to severe earthquake damage. These proj¬ects should be prioritized for future bond measures.

The City's Capital Planning Committee acts as the policy body advising San Francisco's capital-planning process. Recognizing that certain kinds of public buildings are critical to the community's functioning, the Capital Planning Committee should work to establish a clear prioritization for these projects, develop an implementation program for their upgrade including funding sources (such as bond measures), and establish a timeline for the improvements.

POLICY 1.16

Preserve, consistent with life safety considerations, the architectural character of buildings and structures important to the unique visual image of San Francisco, and increase the likelihood that architecturally and historically valuable structures will survive future earthquakes.

Older buildings are among those most vulnerable to destruction or heavy damage from a large earthquake. They may not have the more recent engineering features that make buildings more resistant to ground shaking, and many of them are located in areas near the Bay and the historic Bay inlets that were among the earliest parts of the City to be settled, and have the softest soil. They are also likely to have ornate façade structures that, in the event of an earthquake, can detach and threaten people on the street. The part of the City most vulnerable to fire, the dense downtown area, also contains many historic structures. A major earthquake could result in an irreplaceable loss of the historic fabric of San Francisco. The City needs to achieve the related goals of increasing life safety and preserving these buildings for future generations by increasing their ability to withstand earthquake forces.

When new programs are being considered to abate hazards posed by existing buildings and structures, the likely impacts of those programs on historic buildings must be thoroughly investigated. The resulting programs should encourage the retrofit of historic buildings in ways that preserve their architectural design character while increasing life safety. When development concessions, transfers of development rights or City funds are granted to promote preservation of historic buildings, there should be reasonable measures taken to increase the building's chances of surviving future earthquakes.

POLICY 1.17

Create a database of vulnerable buildings, seismic evaluations, and seismic retrofits to track progress, record inventories, and evaluate and report on retrofit data.

By maintaining a database of seismic retrofit data, the City has the ability to allow progress of mitigation activities and meet measurable goals, as well as learn valuable information about retrofit and vulnerability patterns, and develop unique solutions to problematic retrofit patterns. The City can use this data and analysis as feedback on how well certain programs are working as a base for evaluation and improvement. Regular reporting of the data can also inform the general public about specific, realistic risks and triumphs on the city's seismic status.

Lifelines

San Francisco's lifelines are part of regional systems that extend well beyond the City's boundaries. They include city services such as water, sewer and power provision, communication networks such as phone, radio, television and Internet, and transportation infrastructure. State and private agencies operate some of the regional lifelines. Caltrans operates most of the regional transportation network, which is vulnerable to earthquake damage resulting in significant impacts on San Francisco.

Disruption is inevitable in the event of a disaster. Many areas may be without power, at least temporarily, during some portion of the first 72 hours or longer. Natural gas systems will probably experience breaks in major transmission lines and innumerable breaks in the local and individual systems, particularly in areas of poor soils. Telephone communications will be hampered by overloading resulting from many calls being placed and from phones knocked off hooks. Cellular networks may be overwhelmed, and depending on locations of damage, radio and Internet capabilities may be limited. Damage to the City operated water system may result in many areas being dependent on tanker trucks to provide water. Sewage collection systems and sewage treatment facilities on poorer soils near the Bay are likely to suffer damage, resulting in the discharge of raw sewage into the Bay. Impacts to transportation systems will definitely include power outages, disabled traffic lights, and closed roads and bridges; and may also extend to transit networks including BART, bus and rail. However, with planning and mitigation, the extent of these disruptions can be minimized.

POLICY 1.18

Identify and replace vulnerable infrastructure and critical service lifelines in high-risk areas.

In the case of a disaster, two of the most critical networks will be the City's water system and its sewer and sanitation lines. Upgrades are already underway: The Water Department and the Department of Public Works have ongoing programs to replace vulnerable water mains and sewers and to improve performance of the systems during earthquakes by including system segmentation, safety shut-off systems and redundant back-up systems or other methods of reducing damage and providing alternative sources of service. The San Francisco Public Utilities Commission is undertaking a Water System Improvement Program to strengthen the Hetch Hetchy water transmission system against earthquake damage, with completion anticipated by 2015. A connecting pipeline is currently under construction to connect the region's major water supply systems of the Hetch Hetchy, managed by the SFPUC, and the reservoirs in Calaveras, Amador and Alpine counties managed by the East Bay Municipal Utility District (EBMUD), which will enable water to be distributed from one Bay Area system to another in the case of failure. However, aging infrastructure in the City's sewer and sanitation system is a concern – beyond ailing pipes, the City's tunnels, pump stations and treatment plants need upgrades and repairs. The SF Sewer System Master Plan project currently underway at the PUC will eventually provide a detailed roadmap for these major improvements, and provide a plan for funding these improvements.

Other upgrades underway include Pacific Gas and Electric's seismic program replacing vulnerable gas lines, and Caltrans' bridge and highway retrofit programs. BART is in the midst of a system wide seismic upgrade project; the City should lobby for continued seismic retrofit and disaster-resistance measures on our regional transportation systems such as Caltrans and AC Transit. More upgrades are needed to PG&E's electric system to reduce the risk of service disruption to customers, including transmission improvements, replacement of vulnerable transformers, circuit breakers, and other at-risk components of the electric system. The City should require a specific plan detailing these improvements, and a timeline for their implementation.

POLICY 1.19

Mitigate against damage to City systems and infrastructure through awareness of threats posed by new forms of hazards such as terrorism and communication failures.

While San Francisco does maintain some risk of terrorism, it is more likely at risk of deliberate acts intended to impact its service and communication networks. Often the objective of such acts is not destruction or death, but disturbance - a visible impact to the City's public services, economies, and social networks; and its sources can include vandals, mentally disturbed individuals, domestic terrorist groups, disgruntled residents, and past or present City employees. Critical facilities include the City's communication systems including its fiber-optic data network, and network data, its physical infrastructure such as its water and power systems, important public facilities upgrades to enhance security, through physical security measures, cyber protection measures, and tight security procedures and policies should be made as technology and practices improve. Redundant networks will help ensure that incidental failures to not have grave impacts.

One such network is the Mayor's Emergency Telephone System (METS), which provides communication to key agencies and individuals in a disaster, linking City departments, fire and police stations with citywide call boxes in the case of an emergency. The METS telephone system is also connected to the State of California's satellite telephone system for direct communication with the Governor's Office of Emergency Services in Sacramento, as well as the emergency operations centers of surrounding counties. Another network is the 800 MHz trunked radio system that links the City's public safety departments and first responders including police and fire, which will help to avoid the kinds of communications failures that occurred during New York's September 11th tragedy.

POLICY 1.20

Increase communication capabilities in preparation for all phases of a disaster, and ensure communication abilities extend to hard-to-reach areas and special populations.

Strong communication systems are critical to a City's functioning in a hazard scenario. Communication will be necessary in the response phase immediately following a disaster, and continued conveyance of recovery efforts and their progress is an important aspect of the reconstruction period. The City should have redundant networks in place to communicate at all levels- to internal staff and emergency response personnel, to convey public information, to ensure communication with special needs populations such as the hearing impaired or non-English speakers.

In addition, existing neighborhood organizations can develop local models that serve the same purpose. Development of a neighborhood communications plan can allow community members to keep in touch with – and keep track of – their neighbors, particularly the elderly or disabled that may be most in need of support during a time of emergency. Elements of this plan could include phone trees, text message trains, and the establishment of physical block captains to perform door-to-door checks if necessary.

POLICY 1.21

Ensure plans are in place to support populations most at risk during breaks in lifelines.

As events have repeatedly shown, from the Loma Prieta earthquake in 1989 to Hurricane Katrina in 2005, the most vulnerable populations become even more vulner¬able when their lives and communities are disrupted by disas¬ters. Gaps in transit service can drastically impact immobile populations such as the elderly, poor and medically fragile, especially in terms of their access to medical care. Loss of electrical power can also be a problem for homebound, medically dependent individuals. Programs to notify officials, especially power providers, of these individual locations should be developed so that patients who may be unable to help themselves during a power outage or any other emergency can get necessary support, including continuing medical care for chronic conditions and delivery of prescription refills.

Several programs already exist among City agencies and partners that provide support to vulnerable population planning, including the Care and Shelter Workgroup led by DEM and the Human Services Agency, the Disability Disaster Preparedness Committee led by the Mayor's Office on Disability, and preparedness work performed by SFCARD. City agencies involved in disaster planning and serving vulnerable populations also participate in efforts to coordinate service providers to enable them to continue

critical operations post-disaster, such as performing wellness check-ins on dependent clients. The In Home Supportive Services program of the Human Services Agency has 20,000+ clients who receive their services, and social workers assigned to the program have plans in place to do a post-disaster check on those consumers who are identified as being at highest risk in a disaster. DEM supports SF Paratransit, the paratransit broker for SFMTA, on emergency planning to ensure transportation services continue post-disaster for people with mobility disabilities, and coordinate primary feeding organizations that do both congregate feeding and home delivered meals to ensure that they have the capacity to maintain services post-disaster. Other service providers should be encouraged to engage in planning efforts to adopt similar policies and practices.

Hazardous Materials

Earthquake-initiated hazardous materials releases (EIHRs) are a high risk for industrialized, densely populated urban areas. San Francisco's industrial and research areas store and manufacture limited quantities of hazardous materials; and adjacent uses in close proximity means that more and more people live and work near facilities that may process or store hazardous materials. An earthquake can be the trigger for concurrent hazmat releases within a small area, and earthquake aftershocks can make hazmat releases more difficult to stabilize, causing follow-up releases. A study of hazmat releases during the Northridge earthquake found that almost 20% of industrial facilities in the area discharged potentially damaging chemicals. Efforts to minimize risk of EIHRs and related accidents are critical aspect of everyday mitigation activities.

POLICY 1.22

Reduce hazards from gas fired appliances and gas lines.

A large earthquake is likely to result in fires at a time when the water systems may be disrupted and personnel needed to fight fires may be overtaxed. One of the sources of ignition will be gas leaks from appliances. As a result of its experience in the Northridge earthquake, Los Angeles now requires installation of seismic gas shut-off valves in new buildings, in renovations over $10,000 and on transfer of ownership. The City may also encourage or require, as done in Los Angeles, the installation of shut-off valves in certain limited building types which are activated only by a major seismic shaking.

POLICY 1.23

Enforce state and local codes that regulate the use, storage and transportation of hazardous materials in order to prevent, contain and effectively respond to accidental releases.

Homes, businesses and other facilities contain many materials that, if not properly handled, can result in risks to life, health, or the environment. During a disaster, especially an earthquake, such materials could be accidentally released. The materials that generally pose the greatest hazard during a disaster are those that can, in the form of gas, spread and affect large numbers of people; those that are highly flammable or explosive; and those that are highly toxic or are strong irritants. Large earthquakes lead to release of hazardous materials while reducing the ability of emergency personnel to respond. The continued requirement of business and facility emergency plans and local inspections as part of the City's permitting process for hazardous material storage is critical to reducing an overload on public emergency response resources during a major earthquake.

POLICY 1.24

Educate public about hazardous materials procedures, including transport, storage and disposal.

Hazardous materials include chemical, physical and biological agents. Accidents such as toxic releases from facilities and vehicles, fires and explosions caused by chemical releases, and oil spills in the Bay are not uncommon. FEMA has estimated that an average of 60,000 accidents involving chemicals occur in this country every year, and cause over 200 deaths and many injuries.

Several of the City's agencies provide businesses and residents with information about disposal of hazardous materials. The City's Fire Department is responsible for administering local safety regulations for business operating with hazardous materials, and is the first responder to chemical and hazardous spill accidents, and risk/hazard assessments, capability assessments, and detailed response planning. The San Francisco Department of Public Health (DPH) enforces State and San Francisco environmental health laws, including hazardous materials storage, issues hazardous materials use permits; investigates illicit discharge and disposal of hazardous materials. The SFPUC provides residents and businesses with information (through ads and website resources) on how to properly dispose of hazardous materials including waste oils such as motor oil.

POLICY 1.25

Prepare for medical emergencies and pandemics.

Emerging infectious diseases can pose as much of a natural disaster as other types. Many residents may become ill, leaving as much as one-third of the entire workforce at home, affecting local businesses because of absence and affecting the general public through its ripple effects. The impact to the City's economy, as well as its health, may be great.

San Francisco agencies are closely monitoring avian influenza and preparing for a pandemic in our region. The San Francisco City Department Avian/Pandemic Influenza Task Force coordinates planning for the City's response to a pandemic, and continuity of operations in its wake. The Health Department has completed a pandemic flu plan and has preparations in place to coordinate with local health providers to meet the needs of special populations, and the general public. They have developed health advisories for diagnosing, reporting, and treating patients, and the health department's disease control team has been trained to evaluate suspect cases.

Public information will be critical in the case of a pandemic. The City should ensure the public is kept well informed through the Joint Information Center. The City should also ensure systems are in place to ensure continuity of services as much as possible, following plans for emergency actions if necessary because of staff absence. The City should continue to maintain necessary emergency supplies, such as antiviral medication and protective equipment, and plans to deal with a possibly overwhelming need for emergency care and beds. While local hospitals have surge capacity plans to deal with patient overflows, things may become difficult in the case of a pandemic, as medical staff may also be sick and unavailable. The City should also reach out to neighborhoods to educate them about possibilities, to enable them to develop localized plans for identifying the ill if the City's resources become inundated, and for assisting with sick individuals if hospital bed space is limited.

POLICY 1.26

Monitor emerging industries like bioscience, and ensure that state and local codes manage risks effectively.

The City of San Francisco has made it a goal to encourage bioscience industry in the City because of its economic development potential. The University of California San Francisco (UCSF) is a generator of life science and bioscience companies, and has made the Bay Area a center for the industry, and the number of companies located in San Francisco is expected to continue to grow.

Many bioscience firms contain laboratories which handle biological materials, which may generate radioactive or otherwise hazardous materials and waste. Because of this, bioscience and biotechnology facilities are governed by a strict set of federal and state regulations. Bioscience firms in San Francisco are subject to regulation by the San Francisco Department of Public Health, and are required to generate Hazardous Materials Business Plans including storage and secondary containment policies; Emergency Response Plans; and training plans to educate staff about handling and disposal. Currently, state and federal regulations seem to be sufficient to govern bioscience activities, as no local jurisdiction in the state has yet adopted health and safety controls beyond those requirements.

One particular point about the bioscience industry is that it is likely to change over time with advances in research; thus functions of the firms located in San Francisco may shift in the future. And as noted previously, state and national-level codes may lag behind technology advances. As bioscience grows, the City should monitor the industry to ensure its current safety regulations continue to be applicable to bioscience facilities. In addition, the City should encourage performance-based design and engineering technologies at a high level of performance to protect the safety of critical bioengineering research projects, particularly if facilities have the potential to be of interest with regards to bioterrorism.

2. EMERGENCY PREPAREDNESS

OBJECTIVE 2

BE PREPARED FOR THE ONSET OF DISASTER BY PROVIDING PUBLIC EDUCATION AND TRAINING ABOUT EARTHQUAKES AND OTHER NATURAL AND MAN-MADE DISASTERS, BY READYING THE CITY'S INFRASTRUCTURE, AND BY ENSURING THE NECESSARY COORDINATION IS IN PLACE FOR A READY RESPONSE.

The City must be prepared to respond quickly and effectively in the case of a disaster. In order to meet the fundamental needs of its citizens after a disaster, the City must have plans in place. Response activities must be prepared in advance, and the coordination necessary to execute them must be in place for rapid realization.

In addition to readying its own agencies and departments, the City must ensure its residents are aware and prepared for the possibility of disaster. State and local emergency response offices advise people to be prepared to be self-sufficient for 72 hours after a large earthquake. Achieving preparedness is even more critical for vulnerable populations, including the elderly and the disabled, and those in geographical areas and building types that are more vulnerable to earthquake damage.

Emergency Awareness and Training

POLICY 2.1

Promote greater public awareness of disaster risks, personal and business risk reduction, and personal and neighborhood emergency response - a "culture of preparedness."

People and organizations that are well informed about possible disasters can take private and effective measures to reduce their vulnerability. They can also increase their effectiveness in responding after a disaster and helping others when public agencies are overwhelmed. Several of the City's agencies, including the Department of Emergency Management, the Fire Department, the Police Department, the Department of Public Works, and the Department of Building Inspection provide information to the general public on what to do in a disaster. The City's 72hours.org campaign has been successful in raising public awareness about personal steps to take in advance of an emergency. The Department of Building Inspection maintains a list of earthquake information, including information about PG&E, in its public reception and on its website.

Information accessibility can, however, be increased beyond these sources, especially in order to reach populations who may not be familiar with the City system nor are frequent visitors to City buildings. Materials should be placed in everyday materials like newspapers, alternative venues such as social clubs, community facilities or service agencies, and distributed via mobile sources at gatherings such as fairs and festivals in the City. Information distributed should be available in large print and on audio cassette for the visually impaired, as well as in a variety of non-English languages.

POLICY 2.2

Encourage businesses and homeowners to evaluate their earthquake risks.

Many businesses and residents hold a misguided perception that federal and state sources will provide financial assistance after a disaster. But the federal aid provided in a declared disaster does not protect individual homeowners. And when a major disaster hits an entire area, local governments are often unable to step up as well, being strapped simply to provide the funds necessary to repair major public infrastructure and buildings.

The most important thing the City can do is encourage residents and businesses to evaluate their own risk and the repercussions they might face from earthquake damage. Whether through a formal risk assessment, which businesses may undertake through a qualified consultant, or simply through a personal assessment that evaluates the potential for earthquake damage, property owners should consider the full range of methods of decreasing their risk, and pursue the strategy that works best for them. This risk should also be clearly communicated to tenants and upon sale of the building, and be made part of public City records.

Earthquake insurance can also provide mitigation, although it may not be for everyone. Residents of San Francisco should be made aware that standard homeowner and tenant insurance policies do not cover losses that result from earthquakes or other natural disasters, as most policies exclude "acts of God". Instead, California homeowners are entitled to purchase earthquake coverage at the time they purchase standard homeowner policy and every other year thereafter. Yet because the insurance is so costly, few do – a report issued at the drafting of this Element found that only 11 to 12 percent of recent insurance packages included earthquake coverage. The City should work with the state's insurance commissioner to encourage purchase by increasing information about and access to, earthquake insurance. Locally, there are other strategies the City government can pursue to support the purchase of earthquake insurance, such as or providing tax incentives or supporting interest rate reductions on mortgages where earthquake insurance is purchased. Tenants should also focus on getting "renters insurance," which does cover losses due to natural disaster, and businesses should focus on getting "business interruption insurance."

POLICY 2.3

Provide on-going disaster preparedness and hazard awareness training to all City employees and other responding agencies.

Under state law, all public employees are designated Disaster Service Workers. At any time during a catastrophic event, which places life or property in jeopardy, City employees could be assigned to any disaster service activity that promotes the protection of public health and safety. The Department of Emergency Management and the Department of Human Resources have been working together to develop and implement a comprehensive Disaster Service Worker Program. DEM recently conducted an optional introductory one-hour Disaster Service Worker training. The City should continue this training program and expand it to mandatory programs, so that all service workers can be trained in potential categories of risk. The City should also continue to hold multi-agency drills on a regular basis to test and refine emergency plans.

In addition to responding to the emergency, one of the post-disaster tasks of City agencies will be the resumption of normal public services as quickly as possible. City workers will be more effective emergency responders, will be able to provide necessary public service, and will be better equipped to aid in the recovery if they are not, themselves, victims of the disaster.

POLICY 2.4

Bolster the Department of Emergency Management's role as the City's provider of emergency planning and communication, and prioritize its actions to meet the needs of San Francisco.

The Department of Emergency Management has responsibility for developing the City's Emergency Response Plan, annexes, and other emergency plan elements; supporting the coordination of the response and recovery agencies; providing emergency training opportunities; conducting and advising on functional and discussion-based exercises, coordinating activities with regional, State and federal agencies; and maintaining the Emergency Operations Center. This agency must be maintained at an appropriate level, with sufficient personnel and resources to carry out these tasks.

The agency also manages Homeland Security Grants disbursed by the federal government. In recent years San Francisco has been the recipient of a significant amount of homeland security funds, most of which were targeted for urban centers. In the future, DEM should work with the state to improve its homeland security spending, to ensure that grant money can be effectively utilized and will not revert back to the federal government.

POLICY 2.5

Maintain a comprehensive, current Emergency Response Plan, in compliance with applicable state and federal regulations, to guide the response to disasters.

The Emergency Response Plan (ERP), formerly the Emergency Operations Plan, ensures that the roles of City Agencies and others are well defined. The ERP utilizes an all-hazards approach to emergency planning, and therefore encompasses all natural and man-made hazards applicable to San Francisco. The ERP was most recently updated in December 2009. The ERP addresses the roles and responsibilities of City agencies and personnel during an all-hazards emergency response. Specifically, the ERP identifies and describes City interaction with regional, State, and Federal entities, the role of the San Francisco Emergency Operations Center (EOC), and the coordination that occurs between the EOC and City agencies. The ERP has several annexes based on hazards and local emergency support functions that provide further guidance on those aspects of emergency management. Periodic functional and discussion-based exercises based on the directives of this Emergency Response Plan should be implemented within the framework of the Department of Emergency Management's Master Improvement Plan to test plans and identify gaps in emergency management practices.

POLICY 2.6

Create a consolidated website linking all of the City's disaster-related information for the general public.

Just as the responsibilities for different disaster planning programs and actions is distributed among many agencies and departments within the City, the related information about those programs and operations is dispersed. Much information is housed within the agencies responsible for their development, and it can be difficult for the layperson to secure all the information that exists.

The City should utilize technology to redress this issue – a simple solution would be to bring together all of the varied information that exists into one website. This site should contain links to hazard maps of geologic hazards and soil conditions; to the City's adopted emergency response plans and other related plans and documents; links to programs such as BORP and NERT; to programs for property owners, incentives and other action items; and to information about emergency services and locations. It should map relevant public information such as drinking areas, evacuation routes, emergency transport pick-up locations and locations of Public Information Centers to be set up in an emergency.

Water and Supplies

POLICY 2.7

Continue to expand the City's fire department prevention and firefighting capability with sufficient personnel and training.

Post-earthquake fires are part of the earthquake risk San Francisco faces. Huge numbers of structures were lost in the 1906 earthquake, not due to the quake itself, but because of the spreading fires that were difficult to battle in the aftermath of the quake. Fires continue to be a great threat, particularly in densely developed areas.

The supplemental water supply systems including the Auxiliary Water Supply System, the Portable Water Supply System, cisterns, Bay water suction devices, and fire boats have been extended and strengthened since the Loma Prieta earthquake. Staffing and equipment needs of the Fire Department must also be foreseen in advance, and met. The City also needs to improve water supply systems to cover those neighborhoods not served by the Auxiliary Water Supply.

POLICY 2.8

Ensure potable water is available in an emergency.

In February 2005, the SFPUC completed an extensive Emergency Drinking Water Plan, and recent updates ensure that the region/state's water resources would be available to San Francisco if/when needed.

The plan sets forth procedures for immediate provision of critical drinking water to the City if regional and/or local water service is disrupted. The Plan locates emergency water distribution sites, and sets forth priority routes for the delivery of emergency drinking water. Beyond the primary assets used by the SFPUC to deliver water to San Francisco on a daily basis and the programs used to support those assets, the SFPUC has many alternative means to delivery water should those primary assets become partially or totally unavailable in an emergency. The SFPUC has other resources that include portable assets to move water to areas where it is needed, including water trucks, water bagging machines and portable manifolds for drinking water hydrants. In addition, the SFPUC has plans in place for mutual assistance to ensure that the region/state's water resources would be available to San Francisco if/when needed.

If San Francisco's in-city reservoirs fail, or if the water shortage is prolonged, the City has other local water sources, such as East Bay and Peninsula Reservoirs and Lake Merced. The Water System Improvement Project (WSIP) will repair, replace, and seismically upgrade the system's deteriorating pipelines, tunnels, reservoirs, pump stations, storage tanks, and dams. The program is funded by a bond measure that was approved by San Francisco voters in November 2002 and includes more than 80 projects throughout the service area – from San Francisco to the Central Valley – to be completed by midyear 2016.

POLICY 2.9

Develop agreements with private facilities to ensure immediate supply needs can be met.

Supplies that may be critical and in short supply after a disaster include food, water, medical supplies. Hospitals and service providers may also have difficulty in obtaining replacement equipment and medication. The City should coordinate agreements with private facilities such as hospitals and warehouses to ensure that reasonable quantities of these necessities can be made available to the City and its residents in case of a disaster. The City should also maintain its up-to-date list of rental agreements, for use of temporary supplies and facilities should they be necessary.

POLICY 2.10

Maintain the San Francisco Disaster Debris Management Plan

The City's Emergency Response Plan includes a response strategy, and identifies post disaster debris management as a function of Emergency Response Function 3: Public Works and Engineering. The Post Disaster Debris Management Plan establishes a strategy for removal and disposal of disaster debris. However, having much of this plan mapped out in advance will speed up its execution. Designating appropriate temporary and permanent disposal sites as part of this plan will be critical for long-term land-use planning.

Post-disaster, the Plan aims to incorporate existing waste ordinances, diverting as much waste as possible from landfills though reuse and recycling. All vegetative debris should be composted; metals can be recycled; other wastes should be separated and reused or recycled wherever possible. Disaster recycling programs seeks to follow the City's recycling program already in place, so as not to require new permits or other legal permission to be developed. The City should develop clear guidelines to direct businesses and residents as they deal with their own debris and trash removal after the disaster.

Evacuation and Access Routes

POLICY 2.11

Ensure the City's designated system of emergency access routes is coordinated with regional activities for both emergency operations and evacuation.

After a large earthquake or other disaster, it is likely that many streets will be impassible. This will make fire fighting and other emergency response actions more difficult, hinder the movement of residents, and interfere with debris removal and other short-term recovery activities. In order to support post disaster transportation movement, the Department of Public Works has developed priority routes for opening during an emergency or disaster. These routes include routes which connect fire and police stations, hospitals, and other critical facilities; routes to emergency drinking water distribution sites and City shelters; and routes to staging areas for Disaster Service work around the City. These routes enable the necessary clearance width for emergency vehicles and support trucks, and have been prioritized for debris clearance immediately following a disaster.

The City should ensure that the regional sequence of clearance activities is coordinated to connect with these priority routes, and that the route openings are well timed to synch with the opening of bridges and regional highways. This coordination can be directed using information from the Transportation Management Center (TMC) staffed by Caltrans, the California Highway Patrol and the MTC, and specifically from its Emergency Resource Center (ERC) which was created for procedural disaster management.

POLICY 2.12

Utilize the City's and the region's bus and rail transit network to facilitate response and recovery during and after a disaster.

Dependence on cars will not work well in a state of emergency. San Francisco's vehicular network is limited by bridges and freeways with little redundancy. Damage caused by the event to roadway networks, security considerations and traffic control may restrict private automobile use for months after the event. And transit is a necessary part of the Bay Area's movement. According to the 2000 US Census, 12% of San Francisco households did not own a vehicle, which, based on recent estimates (771,121 residents as of 2006), translates to well over 90,000 residents that rely on the transit system for their travel needs. Many San Francisco workers living outside of the City rely on transit to get to their jobs, making regional transit a pivotal part of our local economy. The transit network will be a critical component of response during a disaster.

Transit should be used in emergency situations to move emergency workers to sites, to deliver equipment, and for communications. Evacuation plans should incorporate public transportation to efficiently evacuate residents who do not have access to cars, and include clear methods to convey information about evacuation possibilities in advance and at the time of disaster. Immediately following a disaster, the City should utilize its transit network to restore the City's mobility – to help bring significant numbers of evacuees back to their neighborhoods, to move daily workers to jobs, and to resume day-to-day life, as soon as possible. Coordinated transit, ferry and bus services can be used to provide long-range links across counties. Temporary transportation improvements such as limited stop buses, bus-only routes and the addition of HOV lanes may help relieve overtaxed freeway segments. And clear conveyance of route information and service maps can help connect riders to services.

The Bay Area region, under the leadership of a task force that included the CalEMA, Caltrans, the Metropolitan Transportation Commission (MTC) and Bay Area transportation agencies, has developed a Trans Response Plan (TRP). This TRP, adopted in 1997, sets out a framework for a coordinated, multimodal and timely response by Bay Area transportation providers to a major earthquake or other significant emergency in the region. The resulting procedures are tested on an annual basis through tabletop and functional exercises. The procedures have also been integrated into individual operator emergency plans so that the regional response can be automatically invoked, if needed.

San Francisco, in cooperation with MTC, also has plans that address immediate emergency transportation needs, and the day-to-day transportation routes that will need to be reinstated in order for the region's activities to resume. The Transportation Coordination and Recovery Plan (TCRP) focuses on 'emergency transportation' - evacuations and the movement of emergency workers. The Regional Transportation Emergency Management Plan (RTEMP) addresses the movement needs of the general public following a major disaster. Together, the two plans are expected to result in a single, unified program for direction of the region's transportation resources.

POLICY 2.13

Continue coordination with water transit agencies, ferries and private boat operators to facilitate water transportation as emergency transport.

Water transit has the potential to provide vital transportation support in response to a natural or man-made disaster. Ferries can play a particular role in moving people and goods after a disaster because of their flexibility and size. Smaller commercial boats can supplement the role of ferries in evacuating civilians, and can also provide transit to emergency personnel and equipment in reaching disaster sites.

For disaster relief to be successful, vessels must be quickly deployed where most needed, and the response needs to be coordinated with land transit providers to get evacuees to/from the shoreline. The Trans Response Plan (TRP) includes a Regional Maritime Contingency Plan, which aims to establish this coordination through its guidelines and procedures for utilizing the Bay's water transit system in the recovery phase of a major disaster.

The Water Emergency Transit Authority (WETA), which replaced the Water Transit Authority in 2007, published their Emergency Water Transportation System Management Plan in June 2009, which lays out emergency response and communication procedures in the case of an emergency. WETA also has plans to add seven new routes through its Ferry Implementation and Operations Plan (WTA, July 2003), and will add a number of new boats and terminals. The increase in capacity gained by these new improvements would allow the Bay Areas ferries to carry over 20,000 trips per hour during a response to disaster, which is almost the evacuation capacity provided during the Loma Prieta by ferries. The City should support these plans, and should ensure coordination is in place so these new boats and facilities can be added to the existing fleet

designated by the Ferry Implementation and Operations Plan. While WETA has plans to slowly transition existing public transportation ferry services within the Bay Area region to WETA, the City should coordinate with private operators not yet transitioned to WETA, with the aim of establishing emergency aid agreements for the boats as well as the operators in the case of need.

Internal Coordination

The City agencies with lead roles during the response phase of a natural disaster, a catastrophic hazardous waste incident, a large-scale crime or terrorist attack, are the same agencies that have a day-to-day responsibility for responding to fires, accidents, crimes or other emergencies: the Fire Department, the Department of Public Health, the Police Department, the Department of Public Works, and others to a lesser extent and as needed. However, in a major disaster, the needs for assistance are greater than the resources of the usual responders; in fact this could be said to be the definition of a disaster. During and after a major disaster, additional organizations, including City agencies, other public safety agencies, and private organizations, will be called into service. Therefore, a significantly heightened level of coordination, and different type of organization, is necessary. The Department of Emergency Management is responsible for this coordination. The recently updated Emergency Response Plan provides the blueprint for coordination among city responders, other governmental agencies, non-governmental agencies involved in response (such as the American Red Cross), and the public during a major disaster of any kind.

POLICY 2.14

Support the Emergency Operations Center, and continue maintenance of alternative operations centers in the case of an emergency.

The City completed an Emergency Operations Center (EOC) in 1999 to serve as a secure well-equipped location for centralized communications and direction. This center houses the Department of Emergency Management, including its Division of Emergency Communication; and consolidates 911 calls and Fire, Police and Medical Dispatch. It is managed by the Department of Emergency Management. However, emergency centers may be destroyed or rendered inaccessible in a major catastrophe. The City should prepare for this possibility in advance, by ensuring duplication of information and systems in multiple locations, by identifying alternative sites for temporary EOCs, and by establishing a mobile command center with the necessary technology and information infrastructure for flexible operations.

POLICY 2.15

Utilize advancing technology to enhance communication capabilities in preparation for all phases of a disaster, particularly in the high-contact period immediately following a disaster.

Reducing the impacts of natural and technological hazards requires extraordinary cooperation and coordination among City departments, and between departments and other governments and non-government agencies. During the immediate response period, the City will need to determine the extent and location of damage, marshal resources for response, provide information to the public, and provide critically needed services to the affected populations. The Division of Emergency Communications of DEM maintains responsibility for coordinating communication among emergency responders, private partners and citizens in San Francisco to ensure an effective and successful emergency operations system. Reporting to DEM, and assisting in preparation of departmental emergency response plans, are key staff of each department.

The City currently uses technologies such as geographic information systems and global positioning to allow wide access to everyday information, and is extending these net¬works to enhance disaster communication. The City has adopted the use of EOC information management software to increase the speed and efficiency of its operations as well as provide a method to track critical documentation and should continue to fund the licensing of this software to ensure that efficiency in critical events. San Francisco has developed an emergency text-message alerting system, AlertSF, which delivers disaster notifications to registered users, and allows users to access neighborhood specific in¬formation. It has reestablished the old World War II sirens to provide alerts to residents, and is further upgrading the system to broadcast voice instructions for responding to an emergency.

The City has established a 311 Customer Service Center, where callers will get assistance from an agent 24 hours a day, seven days a week, and will provide real-time instructions during an actual emergency.

Continuing advances in technology and information systems will enable information to be more widely, quickly, and reliably accessible. Under the direction of CalEMA, the City should keep abreast of these advances and utilize them to bolster the existing local information network. DT and DEC should explore opportunities to use technology to keep San Franciscans informed during an emergency, using the full potential of the Internet as a primary communications medium. The City should ensure redundant networks exist to communicate at all levels- to internal staff and emergency response personnel, to convey public information, to ensure communication with special needs populations such as the hearing impaired or non-English speakers.

The City should also continue to implement solutions for interoperable communications to ensure that communication is possible among departments in a disaster. San Francisco's police, fire and most other City depart-ments are on the same 800 MHz radio system, and other agencies such as the City's Municipal Railway and the California Highway Patrol are expecting to switch to the same system in near-future funding cycles. In the interim, the City should make sure that those agencies not on the same system are able to patch in during a disaster event.

Historically, public safety agencies throughout the Bay Area have used a varied network of radio frequencies and equipment, making direct intercom¬munication difficult. The Bay Area continues to focus on improving interoperable communications across disparate agencies. In 2011, the region formed the Bay Area Regional Communications System Authority (BayRICS) to oversee initiatives and projects that improve communications capabilities. BayRICS consists of representatives from San Francisco, as well as Alameda County, Contra Costa County, Marin County, Sonoma County, San Mateo County, Santa Clara County, and Cities of Oakland, San Jose, and several cities throughout the Bay Area. The region is promoting the build out of standards-based, regional communications systems, including BayWEB, a 700MHz Broadband System dedicated for Public Safety. This system will allow public safety agencies across the region to better share information and data, independent of which jurisdiction they are responding in. The City should continue to support this effort.

POLICY 2.16

Plan to address security issues that may arise post-disaster, and balance these issues with the other demands that will be placed on public safety personnel as emergency response providers.

Community violence, including looting and rioting, have recently surfaced as forces to contend with in the aftermath of disaster. Desperate situations, such as being without food, or being stranded with no expectation of rescue, can occur in the face of disaster, and such desperation can lead to rash or risky personal actions. However, many disaster researchers regard looting as rare in disasters in developed societies. Experts state that perceptions of widespread community violence, which occurred most recently in Hurricane Katrina, are often based on misinformation, and cite human tendency to misread crowds as more malevolent than they really are.

Whether violent activities such as looting do actually occur, fear of these activities is definite. Past disasters have shown people may be unwilling to evacuate because they fear the loss of their property. The City should make efforts to manage fears of looting or other criminal activity through a visible police presence across the City and assure residents their property will be protected by police officers who will remain in the City after the evacuation. The City should also maintain the ability to dispatch special mobile forces if needed to maintain peace post-disaster.

Police will be needed to deal with issues beyond looting, such as search-and-rescue activities, directing traffic or dealing with other emergency duties. Police response must be coordinated so that it can respond to both social and physical needs in the face of disaster. Law enforcement agencies, including the San Francisco Police Department and the Sheriff's Department, District Attorney's Office, agency forces such as San Francisco Municipal Railway Police Department, and institutional agencies such as the San Francisco Community College District Police Department, should work to ensure better organization among agencies, so that their magnitude can be leveraged towards the many services that will be required. The City should also maintain relationships with State and federal level peacekeepers that may be needed in an emergency, such as the Coast Guard and National Guard. Finally, security forces should establish communication with Disaster Ser-

vice Workers to mobilize civilians if necessary to support their efforts.

POLICY 2.17

Ensure the City's plan for medical response is coordinated with its privately owned hospitals.

The Department of Public Health is the City's lead health response agency in the event of a natural disaster or terrorist attack that led to a major health emergency. They should continue efforts to coordinate with Bay Area private hospitals, community based clinics and CBO's in the Bay Area.

POLICY 2.18

Ensure all Response Plans are coordinated with the Disaster Council.

The San Francisco Disaster Council is the City's central body for emergency planning, and has been accredited by the California Emergency Council. The Disaster Council is codified by the San Francisco Administrative Code, Chapter 7, and is chaired by the Mayor and composed of the Director of Emergency Services, key department heads and City officials, three members of the Board of Supervisors, and representatives of private organizations having official emergency responsibilities. The Council reviews the efforts of the Emergency Response Planning task force, and recommends emergency actions such as mutual aid plans and agreements and such ordinances and resolutions and rules and regulations for adoption by the Board of Supervisors.

In order to coordinate the actions of the various agencies throughout the City, the Disaster Council should serve as a central repository for all mitigation, preparedness, and response and recovery activities. The Disaster Council, through its contact with the State Emergency Council and the several local disaster councils within this metropolitan area, can ensure that the work of the City is coordinated with those of the surrounding region. All actions recommended this Safety Element, and developed in other efforts or documents, should be brought forth to the Disaster Council for their review and approval.

POLICY 2.19

Seek funding for preparedness projects.

A significant amount of preparedness funding exists at the state and federal level. Several recent state propositions provide funding for specific disaster mitigation projects. The Disaster Preparedness and Flood Prevention Bond Act funds storm water flood management projects throughout California. The Strategic Growth Plan education proposal authorizes state dollars for seismic safety improvements to schools and education facilities. In addition, the Department of Homeland Security has lately been a large source of funding for preparedness and mitigation projects.

Since so much of the available funding is disbursed beyond the local level, access to these funds requires coordination for project proposals. As noted above, the Department of Emergency Management is responsible for coordination of preparedness funds. Securing these grant dollars, and effective utilization of them, should remain a priority in coming years. The City should explore the creation of a grant officer specifically tasked with coordinating with state and federal grant offices, as well as designate internal coordinators to work with each individual City department as they navigate applications and grant requirements.

External Coordination

Being prepared to address the impacts of natural and technological hazards requires extraordinary cooperation and coordination beyond the City itself. San Francisco is dependent on regional systems for transportation, evacuation, supply of goods and other necessities. In order to be effective in meeting needs, the City will need to have strong working relationships with regional and local governments and agencies.

It is also important to remember that while local governments bear the responsibility of being the first responders to any emergency or disaster, our interaction with our state and federal partners is critical to the safety of our citizens and to rapid recovery from a major disaster. Like any independent municipality, San Francisco depends on these partners for pre-planning, emergency response, and post-disaster recovery.

POLICY 2.20

Enhance communications with nearby jurisdictions.

Local Emergency Planning Committees (LEPCs) are regional entities set up to enhance coordination among adjacent municipalities. LEPCs are comprised of representatives from local government, the fire service, law enforcement, the local community, and industry; and are intended to facilitate the coordination and flow of mutual aid. CalEMA Coastal Regional Branch-Mutual Aid Region 2 is the LEPC for the San Francisco Bay Area and nearby counties.

The City of San Francisco acted as the lead agency to develop a Regional Emergency Coordination Plan (RECP) to help the Coastal Region CalEMA address gaps in regional emergency plans. The plan details how the communities which make up our LECP will work together on evacuation, housing and transportation of displaced residents. It also outlines how medical professionals will interact and how to cope with threats to the water supply, among other issues. The City should continue to utilize this plan as a basis for emergency operations issues that transcend City boundaries, such as emergency transportation, evacuation and the movement of emergency workers.

POLICY 2.21

Develop and maintain mutual aid agreements with local, regional and state governments as well as other relevant agencies.

Many state and local governments and private nonprofit organizations enter into mutual aid agreements to provide emergency assistance to each other in the event of disasters or other crises. The California Master Mutual Aid Agreement has been adopted by San Francisco, as well as most cities and counties in the state. This agreement creates a formal structure for giving and receiving assistance in emergency situations. The City should expand its network of mutual aid beyond local governments to include relevant agencies such as transit providers, utilities, volunteer agencies and professional organizations for groups like health workers and emergency managers. Numerous agencies and businesses may have resources – facilities, trained staff, transportation or equipment – that can be valuable in emergencies. The City should pursue Memorandums of Understanding or other contracts with any local agencies or businesses that can be identified as resources, including the Unified School District. Discipline-specific mutual aid agreements, such as those for public works, engineering, Emergency Managers Mutual Aid, or public information, may also be useful.

POLICY 2.22

Develop partnerships with private businesses, public service organizations and local nonprofits to meet disaster-time needs.

The City should continue to seek opportunities to partner with private sector businesses and organizations where possible. For example, drug stores can be used to distribute medical supplies and pharmaceuticals during emergencies, medical institutions and university health centers can be set up to provide medical treatment such as inoculations in the event of a chemical or biological emergency; sundry stores can provide educational materials to customers, such as essential items for disaster kits; hospitality sector can serve an important role in housing Disaster Service Workers; and other private businesses can help with critical donations.

Private and community-based organizations can assist with recovery activities, and in the dissemination of disaster information. The American Red Cross and the Salvation Army can be supportive partners in providing emergency shelter, food, clothing, and physical and mental health support. The City's relationships with these agencies and organizations should be mutually supportive. Local services, particularly in lower-income areas, such as food banks, senior centers, child care centers, may be ill-prepared to cope with disaster. The City should assist in developing support networks for these organizations, providing them with employee response training, assisting them in securing insurance coverage and helping to develop contingency plans for their operations' continuance post-disaster.

3. RESPONSE

OBJECTIVE 3

ESTABLISH STRATEGIES TO ADDRESS THE IMMEDIATE EFFECTS OF A DISASTER.

The first days after a major earthquake or other large disaster make up the response phase. Immediate response will focus on saving life and property damaged by the disaster. The City of San Francisco has a network of emergency response strategies in place which have been discussed above. The City's Emergency Response Plan is the primary source which will direct the City's response in the case of a disaster, and describes specific responses to be undertaken by the emergency response agencies and other supporting City departments toward the recovery process, such as emergency building assessment and repairs, debris removal, and meeting the immediate needs of federal and state agencies for information. The City of San Francisco is also leading a Bay Area-wide planning effort to create a disaster plan for the nine county Bay Area plus Santa Cruz, which will detail how the counties will work together to respond to a disaster, including evacuation, housing and transportation.

Relief activities to provide aid for the population left in its wake will follow response activities. These include securing food and shelter for victims, and stabilization of day-to-day conditions for the area's remaining residents. Economic welfare, social networks, and emotional well being are as critical as the City's physical infrastructure to the City's long-term recovery.

POLICY 3.1

After an emergency, follow the mandates of the Emergency Response Plan and Citywide Earthquake Response Plan

The Emergency Response Plan directs the City's actions after a disaster, assigning responsibility to agencies and departments. Many of the immediate actions needed to begin the recovery process, such as debris removal, emergency building assessment and repairs, and meeting the immediate needs of federal and state agencies for information, are described in the Emergency Response Plan. The Citywide Earthquake Response Plan supports this plan by providing response actions for the incident of an earthquake. Both plans should be used to guide all responsibilities and activities in the case of a disaster.

POLICY 3.2

Follow the National Incident Management System (NIMS) Procedures in declared emergency scenarios.

A major disaster will entail assistance from far beyond San Francisco's borders, involving the assistance of other Bay Area jurisdictions, the state of California and even the federal government. To coordinate this assistance, the federal government has developed a national approach to incident management, called the NIMS, to act as the common language and procedural guide bridging different entities. NIMS was developed so responders from different jurisdictions and disciplines could talk to each other in a common language, and work together better to respond to natural disasters and emergencies, including acts of terrorism. NIMS uses a systems approach to integrate the best of existing processes and methods into a unified national framework for incident management. Its concepts and practices cover incident management; standard command and management structures; and emphasis on preparedness, mutual aid and resource management.

The City's various agencies, particularly those who are its first responders, are already familiar with the NIMS system, and utilizing its framework in the development of emergency response and other plans. The City should continue this practice, and ensure it is kept up-to-date with current NIMS practices. New approaches that will improve effectiveness are likely to result in refinement of the NIMS