CAPSS
Earthquake Safety Implementation Program

THE CITY AND COUNTY OF SAN FRANCISCO | WORKPLAN 2012–2042

DRAFT SEPTEMBER 13, 2011

Community Action Plan for Seismic Safety

CAPSS Earthquake Safety Implementation Program

WORKPLAN 2012–2042

Draft **September 13, 2011**

Prepared for

Amy Brown, City Administrator &

Earthquake Safety Implementation Committee

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Start-Up Phase A (2012–2015)

Implementation Phase B (2015–2020)

Implementation Phase C (2020–2042)

Now 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042

REV. 9/13/2011

Recommended Action **Mandatory Evaluation** **Mandatory Retrofit**

Introduction

Time is of the essence in preparing for earthquakes in San Francisco. A significant Bay Area earthquake—two to three times as strong as the 1989 Loma Prieta earthquake—is likely to occur within the next thirty years. And after that earthquake, another earthquake will be looming on the horizon. San Francisco will suffer terribly from these coming earthquakes, primarily due to the collapse or extensive damage to many buildings that were built before building codes contained modern earthquake design requirements. The suffering will not be limited to loss of life and injuries, but to dramatic losses of affordable housing, character-defining buildings, business, tourism, and much more. Demographics will shift. Resources will run out. Public confidence in government will be shaken, as San Franciscans question why the codes and standards necessary to protect their homes and their community were not in place. In even a moderate earthquake, San Francisco will be terribly impacted. These impacts have been confirmed by the extensive studies performed under the Community Action Plan for Seismic Safety (CAPSS) program.

This Earthquake Safety Implementation Program Workplan outlines a **30-year program**, based on the extensive CAPSS analysis and community supported recommendations that will reduce San Francisco's most significant earthquake impacts. Because of the likelihood of an earthquake in the near future, the plan begins with a major effort to address our most severe problem, the likely failure of many of San Francisco's larger soft-story apartment buildings. Many other plan elements are also scheduled to start soon so that results can be achieved in time to reduce likely earthquake impacts. Of course, not all work can be done at once. Some program elements will take decades to accomplish due to limited private and public funding or because preliminary technical work must precede implementation. The implementation of this plan requires a major commitment by the San Francisco city government. The affected community of San Francisco, including building and business owners, residents, business and community leaders, has already expressed their commitment to earthquake safety through the CAPSS process and is ready to proceed.

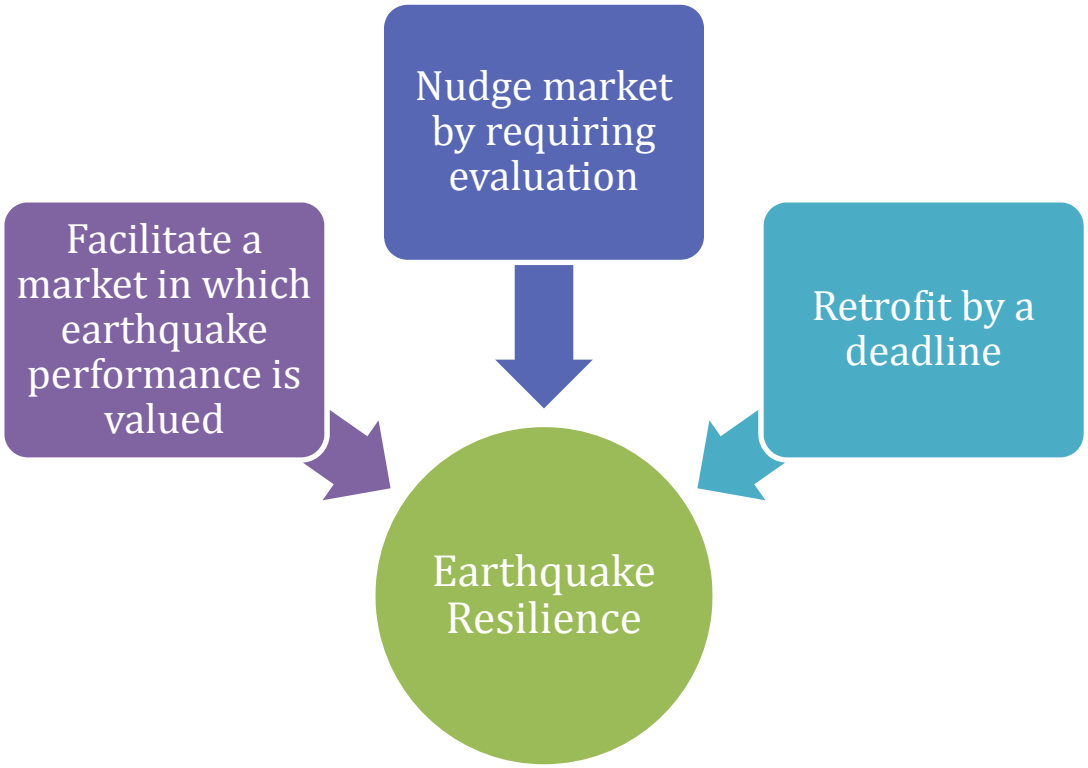
The **Community Action Plan for Seismic Safety that forms the basis of this Workplan** was unanimously endorsed in December 2010 by an advisory group of over sixty representative stakeholders, community leaders, professional experts, and City officials. The CAPSS program was developed over a ten-year period, resulting in agreement upon acceptable earthquake impacts for San Francisco and, through dozens of meetings and workshops, development of a plan to achieve those resilience goals. The work of the CAPSS program was supported by the work of many other community and professional organizations, and the CAPSS recommendations coordinate with the proposed goals and policies of the *Resilient City* initiative, a multi-year study program by San Francisco Planning and Urban Research Association's (SPUR); the Planning Department's *Draft Community Safety Element;* and the City's *Hazard Mitigation Plan*.

This Workplan directly incorporates the goals and recommendations of the CAPSS report leading to a resilient San Francisco having greatly reduced earthquake impacts over a thirty-year period. The proposed time frames for the accomplishment of the various program elements are based on the CAPSS recommendations, slightly adjusted based upon written and other responses received in response to the CAPSS Implementation Priority Worksheets, and based on a review of important implementation factors. Much of the technical work to implement Workplan tasks has been done or is currently underway, reducing startup times and allowing much work to be done without delay.

San Francisco is but one of many cities seriously at risk by future earthquakes. We cannot wait years for others to propose and adopt model programs for cities to achieve earthquake resilience, but we must continue our leadership in planning for earthquakes by developing our own plans to limit earthquake impacts, to assure a coordinated local response, and to facilitate a rapid recovery.

Implementation of this plan will greatly assist in making San Francisco a more resilient city.

The CAPSS Three-Step Approach to Earthquake Resilience



What is San Francisco's Community Action Plan for Seismic Safety?

- CAPSS is a community plan, developed by an advisory committee of over 50 persons.
- CAPSS studied and quantified future earthquake impacts on San Francisco so that mitigation measures could be crafted to reduce significant impacts and to greatly increase City resilience.
- Four realistic scenario earthquakes were used to understand future impacts, focusing on "expected earthquakes" that are likely to occur during the lifetime of the City's existing buildings.
- CAPSS began as a result of action by the Building Inspection Commission in July 1998. Its work was paused from 2003 to 2007. After resumption, its final report was presented in December 2010.
- The CAPSS study cost approximately $1 million, funded by the Department of Building Inspection and the California Strong Motion Instrumentation Program (SMIP).
- Project technical and report work was primarily done by Applied Technology Council (ATC), a non-profit agency, with assistance from professional organizations including the Structural Engineers Association of Northern California.
- Project managed by Department of Building Inspection staff.
- CAPSS reports are available at http://www.sfcapss.org/.
- The scope of the CAPSS study was limited to San Francisco buildings under the jurisdiction of the Department of Building Inspection. Not included in the study were infrastructure and lifeline elements, public schools, hospitals, and buildings under federal and state jurisdiction.
- Buildings owned and leased by the City and County of San Francisco are separately considered.

What are CAPSS' Long-term Objectives?

Support City policies, including the objectives articulated in the 1986 Proposition M Priority Policies, the General Plan and the Community Safety Element.

Assure that after expected earthquakes:

- Residents will be able to stay in their own homes,
- Residents will quickly have access to important privately-run community services,
- No buildings will collapse catastrophically,
- Businesses and the economy will quickly return to functionality, and
- The City's *sense of place* will be preserved.

For details, see ATC 52-2 Report, *Community Action Plan for Seismic Safety,* Chapter 3, Objectives.

What is Resilience?

San Francisco's earthquake resilience is based on preparation and self-reliance in the three main phases of earthquake activity:

- **Before the earthquake**, to reduce impacts to allow our community to quickly restore function;
- **In response to the earthquake**, to perform essential emergency functions and to allow our neighbors and businesses to stay in the City and, insofar as possible, to stay in their own homes; and
- **During the recovery**, to assist our neighbors and to assure certainty in planning and building regulations to bolster public confidence and to speed reinvestment and community restoration.

Everything is Coming Together Right Now!

This is the right time for this seismic safety program. Most of the technical elements necessary to achieve a resilient city are coming together right now, and we are able to take advantage of recent dramatic advances in structural engineering, geological understanding, building materials, construction techniques, and hazard analysis tools. Much of this work has been done through the structural engineering community, through FEMA, and through other national agencies; some of this work is the result of efforts by Bay Area organizations such as San Francisco Planning and Urban Research Association, the Association of Bay Area Governments, the Earthquake Engineering Research Institute, the Pacific Earthquake Engineering Research Center, and through this CAPSS program.

Equally important has been a high level of public participation in the ongoing discussion about acceptable building performance. Through the SPUR *Resilient City* work and in other activities, the minimum code-mandated building performance levels have been analyzed and new building performance expectations have been recommended, performance that is suitable for San Francisco's specific needs. The concepts of community resilience and Shelter-in-Place drive these revised performance objectives. There is a high level of excitement among the entire community of people involved in earthquake hazard mitigation and seismic design, and San Francisco is the leader in the application of these many breakthroughs.

Summary of Workplan Organization, Priorities and Schedule

Workplan Tasks are Separated into Three Phases

Phase A: Start-up 2012–2015

Phase B: Implementation 2015–2020

Phase C: Implementation 2020–2042

Individual Tasks are Categorized

Education/Information

Education and information will increase overall preparedness and the number of seismic retrofits voluntarily conducted by owners of one- and two-family dwellings. It may, perhaps, encourage voluntary retrofit of other vulnerable buildings.

Evaluation

Evaluation allows building owners and users to make informed decisions about building performance, rental desirability, and use. Evaluation may encourage voluntary retrofit work. Evaluation against clear standards is a necessary precursor to all mandatory retrofit activities.

Building Upgrades

Seismically vulnerable buildings may be voluntarily retrofitted when owners conclude that it is valuable to protect their own interest or the broader community welfare. The experience of building retrofit in San Francisco and in other California communities is that few building owners will evaluate or retrofit their buildings until required to do so.

Post-Earthquake Response and Recovery

City earthquake recovery will be speeded by having certainty in post-earthquake repair and retrofit standards.

Strategies and Incentives

Seismic retrofit and other resilience activities require that the City make every effort to develop incentives and policies supporting this work.

Study and Technical Development

Much of the work supporting San Francisco resilience requires preliminary study and development of policy and technical standards. Much requires research into best practices and development of new retrofit analysis, design and construction technologies.

Programs and Operations

Each task requires committed program and interagency support and public involvement.

Phase A: Start-Up 2012–2015

Overview

Many program tasks are already underway; others are scheduled to begin in this early phase.

1. Education/Information

a. Initiate public information programs about building hazards and performance. Begin in 2012.

b. Provide information and assistance about renter's insurance. Begin in 2012.

c. Provide home-owner education, demonstration projects, and support to encourage voluntary seismic upgrades of one- and two-family dwellings. Begin 2013.

d. Institute training programs for contractors in seismic upgrade requirements and techniques. Program from 2014 to 2020.

2. Building Evaluation

a. Mandatory evaluation upon sale or by deadline of wood frame residential buildings with three or more dwelling units. Program from 2014 to 2019.

b. Building façade evaluation and maintenance for large, older buildings. Program development in process. Adopt ordinance in 2013.

3. Mandatory Building Upgrades

a. Mandatory evaluation and retrofit of soft-story wood frame residential buildings with three or more stories and five or more dwelling units. Program from 2012 to 2024.

b. Mandatory evaluation and retrofit of concrete tilt-up and similar buildings. Program from 2013 to 2020.

4. Post-Earthquake Response and Recovery

a. Complete development of Shelter-in-Place policies and procedures. Adopt policies and begin implementation planning. In progress, complete by 2015.

b. Develop and implement concept of Neighborhood Support Centers, including local empowerment to address immediate and urgent post-earthquake needs and to support Shelter-in-Place policies. Begin in 2013, complete by 2016.

c. Complete development of repair and retrofit standards for one- and two-unit buildings, three-plus unit buildings, and concrete buildings. Develop and adopt policies and procedures. In progress, complete in 2012.

d. Complete disproportionate damage trigger. Adopt code change and procedures. In progress, complete in 2012.

e. Revise Planning Code "Act of God" provisions to exempt earthquake damage unless minimum retrofit has been accomplished. Begin 2013, adopt in 2015.

f. Complete update of post-earthquake inspection (ATC-20) policy and procedure updates. In progress, complete in 2014.

g. Develop chimney repair/reconstruction guidelines. Adopt procedures. Begin in 2013, adopt in 2014.

h. Implement program for data collection of performance of retrofitted buildings to evaluate effectiveness of retrofit measures. Begin in 2014, complete in 2018.

5. Strategies and Incentives

a. Continue to develop funding sources to assist private property owners to pay for seismic upgrades. In progress.

b. Investigate Planning Code and other possible City agency incentives for seismic upgrades. Begin 2012.

c. Actively seek Federal and State support for CAPSS ResilientSF implementation activities. Begin 2012.

d. Offer "Ombudsman" or "Citizen Assistance" services to provide technical, permitting and other assistance. Begin 2013.

6. Study, Technical and Policy Development

a. Review and recommend updates to the current Draft Community Safety Element to assure conformance with CAPSS and related recommendations. In progress, complete and adopt in 2012.

b. Complete development of technical guidelines, standard plans and program to support voluntary seismic upgrade of one- and two-family dwellings. In progress, complete in 2013.

c. Complete development of evaluation criteria and standards for older concrete buildings and other "most hazardous to life" buildings. In progress, complete in 2015.

d. Continue development of innovative and potentially cost-saving seismic retrofit solutions (garage door bracing, seismic dampers, etc.) In progress.

e. Further review effects of earthquake retrofits on economically disadvantaged San Franciscans for incorporation in policies. Begin in 2012, report in 2015.

f. Assess scope of issues related to Private K-12 school building performance and begin policy discussion and development. Begin in 2012, complete in 2014.

g. Assess scope of issues related to critical retail stores, suppliers, medical service providers and others. Begin in 2013, complete in 2016.

h. Continue development of evaluation and retrofit standards for all building types that conform to desired performance goals. In progress, complete in 2025.

i. Study fire-related earthquake resilience topics, including possible gas-shut off valve uses, availability of water for post-earthquake fire suppression, access to building water shut off valves to limit water damage, and survey ignition sources. Begin 2013.

7. Programs and Operations

a. Develop CAPSS Earthquake Safety Implementation Program office and staffing. In progress.

b. Develop "Implementation by Task" model for CAPSS Earthquake Safety Implementation Program. In progress.

c. Coordinate with City database systems, both existing and under development, to allow tracking by all persons of building upgrades, performance, and other elements. Begin 2012, complete 2015.

d. Develop CAPSS Earthquake Safety Implementation Program evaluation program. Begin 2012.

Phase A Task Details

Task A.1.a. Provide general public information program about building hazards and performance

Schedule

- Initiate program in 2012

General Comments

- Much work currently underway
- Public already has much partial information, much is not correct
- Many different informational messages are current being provided. Need to have a consistent overall message, to which detailed messages can be linked
- Need to develop overall program identity and related materials
- Communications must be through a wide variety of media

Costs and Other Impacts

- Major impacts. Informed public can help drive policy and performance standards

Technical Issues

- None

Necessary Preliminary Work

- Need to define overall messages and goals.

Legislative Action Required

- None

Lead Agency

- ResilientSF team

Supporting City Agencies

- Department of Building Inspection
- Department of Emergency Management

External Involvement

- CAPSS ESIP advisory group

Implementation Cost

- May be best done under outside contract
- Communications programs may have expenses for program development, printing, etc.

Task A.1.b. Provide information and assistance about renter's insurance and business interruption insurance

Schedule

- Begin in 2012, complete program in 2014

General Comments

- Insurance can greatly mitigate impacts on tenants and businesses
- Business applications may include rental housing providers
- Public has little accurate information about insurance availability
- Both public and private insurance agencies are eager to assist
- Communications must be through a wide variety of media
- Program requires support to answer questions, provide direction and updates

Costs and Other Impacts

- Renter's insurance is low cost
- Business interruption insurance is moderate cost

Technical Issues

- Need to translate insurance issues and impacts into easily understood, cost-benefit analyses

Necessary Preliminary Work

- Research into available insurance types and costs

Legislative Action Required

- None

Lead Agency

- To be determined

Supporting City Agencies

- Board of Supervisors
- City Risk Management Office

External Involvement

- California Earthquake Authority
- Private insurance companies
- Tenant and business groups
- CAPSS ESIP advisory group

Implementation Cost

- Modest staff costs for task development and oversight
- May be best done under outside contract
- Modest costs for information preparation and dissemination

Task A.1.c. Provide homeowner education, demonstrations, and support for voluntary seismic upgrades of 1–2 family dwellings based on standard plans being developed

Schedule

- Begin in 2013, complete in 2030

General Comments

- One- and two-family upgrades are critical to overall resilience and to meeting Shelter-in-Place goals
- Many homeowners are asking for direction and technical assistance
- Retrofits elements should conform to future mandatory seismic retrofit standards so that further upgrades would not be required
- Demonstration projects have big impacts and can engage communities through action-by-example of community leaders
- Support for these voluntary upgrades is necessary, including design, permitting, and construction.
- This voluntary program could be part of a Seismic Rating System (gold, silver, etc. or other system.)

Costs and Other Impacts

- Retrofits would be voluntary by property owners until other mandatory standards are in effect
- Costs would be low to moderate
- Costs could be greatly reduced to take advantage of many easily achievable seismic solutions
- Tool-lending library and other coordinated programs can help reduce costs

Technical Issues

- None

Necessary Preliminary Work

- Standard detail sheets and related materials have not yet been completed (in process)

Legislative Action Required

- Administrative Bulletin and related approval actions by DBI required for elements of this program.

Lead Agency

- Program development: ResilientSF team
- Program Implementation: Department of Building Inspection

Supporting City Agencies

- SFGovTV and other City outreach programs

External Involvement

- Neighborhood associations
- SEAONC
- AIA
- CAPSS ESIP advisory group

Implementation Cost

- Substantial costs for demonstration and project staffing and operation. This is proposed to be primarily a public/private partnership program.
- May be best done under outside contract

Task A.1.d. Institute training programs for contractors in seismic upgrade requirements and techniques. Program from 2014 to 2020

Schedule

- Program from 2014 to 2020

General Comments

- Will be extremely valuable in educating public and contractors
- Not a mandated program, but supplementary if contractors wish to attend
- Should give a certificate or "title" to attendees

Costs and Other Impacts

- No cost to users
- Minor costs to contractors for training
- Excellent way for contractors to assure clients that they are in touch with City requirements

Technical Issues

- None

Necessary Preliminary Work

- Must follow development of standard plan sets

Legislative Action Required

- None

Lead Agency

- ResilientSF team

Supporting City Agencies

- Department of Building Inspection

External Involvement

- Contractor groups and associations
- CAPSS ESIP advisory group
- ABAG as part of ongoing general contractor training

Implementation Cost

- May be best done under outside contract
- Minor costs for seminar space, trainers, materials.

Task A.2.a. Mandatory evaluation of wood frame residential buildings with three or more dwelling units upon sale and with a fixed deadline

Schedule

- Begin in 2014, complete by 2019.

General Comments

- Evaluation of these building should be reflect goals adopted in the Community Safety Element
- This is part of the recommended CAPSS three-step approach (Educate, evaluate, retrofit)
- This applies the ATC 71-1 evaluation methodology for structural evaluation
- Mandatory evaluation should include certain non-structural elements
- Buildings not evaluated at time of sale to be done by 2019

Costs and Other Impacts

- Cost for building evaluation are low to moderate (estimated $100 per dwelling unit)

Technical Issues

- None

Necessary Preliminary Work

- Performance goals and evaluation standards must be developed

Legislative Action Required

- Action by the Board of Supervisors to adopt mandatory requirements.
- Adoption of implementation procedures by the Department of Building Inspection

Lead Agency

- Program development: ResilientSF team

Supporting City Agencies

- Department of Building Inspection

External Involvement

- SEAONC
- San Francisco real estate community
- CAPSS ESIP advisory group

Implementation Cost

- Minor program development costs

Task A.2.b. Building façade evaluation and maintenance

Schedule

- In process, adopt in 2013

General Comments

- This is general building maintenance, not specifically earthquake related
- Façade failures have resulted in pieces of building cladding and ornamentation falling onto sidewalks, endangering pedestrians and others
- In even a minor earthquake, extensive faced failure is likely to result in deaths and injuries to persons on sidewalk and streets
- Façade maintenance and repair is the logical step to follow San Francisco's highly successful 20-year parapet reinforcement program, now completed.
- Façade program should be limited to older and larger buildings that have facades that are at risk of failure primarily due to age-related corrosion of fasteners
- Building owners typically do not inspect or repair until some façade elements fail and fall to the ground, and then repairs are often limited to the failed elements
- Other major cities have similar programs

Costs and Other Impacts

- Inspection costs and maintenance costs will be substantial.

Technical Issues

- Standard inspection protocols and procedures can be adapted to meet San Francisco needs

Necessary Preliminary Work

- Work is underway to evaluate and modify standards and procedures, and to develop local policies
- Will require extensive meetings and development with BOMA and other building owners

Legislative Action Required

- Board of Supervisors adoption of inspection requirements
- Adoption of implementation procedures by the Department of Building Inspection

Lead Agency

- Program development: ResilientSF team
- Implementation: Department of Building Inspection

Supporting City Agencies

- Department of Public Works
- Planning Department

External Involvement

- BOMA
- SEAONC
- CAPSS ESIP advisory group

Implementation Cost

- Moderate program development costs
- May be best done under outside contract

Task A.3.a. Mandatory evaluation and retrofit of 3+ story, 5+ unit soft-story wood frame residential buildings

Schedule

- Begin immediately, complete by 2024, phased in four categories based on geological hazard and use.

General Comments

- Impact study, overall analysis, professional review, and community input have been completed (see CAPSS report ATC 52-3 and 52-3A, Earthquake Safety for Soft-Story Buildings, 2009).
- Detailed implementation program has been developed by Mayor's Soft Story Task Force (see CAPSS report ATC 52-2, A Community Action Plan for Seismic Safety, Chapter 4, Table 3.)
- Legislation based on the recommendation of the Mayor's Soft Story Task Force has been prepared.
- This has been determined to be one of San Francisco's highest resilience priorities. Damage to these larger buildings will cause some of the City's most significant earthquake impacts due to many expected collapses and red-tags.
- The anticipated damage will lead to moderate loss of life, many injuries, and will severely impact the City's supply of affordable housing, small businesses, historic resources, neighborhoods, and many other elements.
- Estimated number of buildings to require retrofit is 2 800 of a total building population of about 4 400.

Costs and Other Impacts

- Retrofit costs expected to range from $10 000 to $20 000 per dwelling unit (see ATC-52A, Appendix 5, Cost Estimates for Retrofits)
- Retrofits limited to the soft-story (typically the ground level).
- Commercial spaces on the soft-story floor typically do not need to be vacated for this work.
- Disability access work in ground floor commercial spaces where retrofit occurs will be required.
- Many building owners will seek financial assistance.

Technical Issues

- Applied Technology Council (ATC), supported by FEMA, is now completing development of a new engineering analysis and retrofit design program, ATC 71-1, for soft-story buildings using San Francisco as a model. This tool is expected to be available for use upon the effective date of this ordinance.
- The new Applied Technology Council program will allow rapid and inexpensive preliminary screening to determine hazardous level of buildings.
- Hardware manufacturers and contractors are now developing reduced-cost solutions.
- New technical concepts allow use of a variety of retrofit solutions, reducing costs.

Necessary Preliminary Work

- Completion of current ATC 71-1 work
- Adjustment of ATC 71-1 to meet San Francisco needs, incorporating building performance goals and target earthquake.

Legislative Action Required

- Adoption of ordinance by the Board Of Supervisors (prepared)
- Preparation and adoption of an Administrative Bulletin by Department of Building Inspection

Lead Agency

- Program development: ResilientSF team
- Program implementation: Department of Building Inspection

Supporting City Agencies

- Planning Department, for approvals
- Mayor's Office of Housing, for financing and other assistance
- Assessor/Recorder's Office, for data and information about incentives
- Rent Stabilization Board

External Involvement

- San Francisco Apartment Owners Association
- Other building owner and management groups
- Contractors and building materials suppliers
- SEAONC (Structural Engineers Association of Northern California)
- ATC (Applied Technology Council), currently developing program technical framework
- FEMA (Federal Emergency Management Agency)
- CAPSS ESIP advisory group

Implementation Cost

- Some minor program development costs and staff costs.
- Most program operating costs will be covered by permit fees and related fees.

Task A.3.b. Mandatory evaluation and retrofit of older concrete tilt-up and similar buildings

Schedule

- Begin 2013, complete 2020, phased based on geological hazard area and other hazard classification.

General Comments

- CAPSS report concludes these are a significant hazard with moderate impacts.
- There are limited number of these buildings in San Francisco (estimate 200–300)
- Damage to these buildings will often result in collapse of one or more walls and portions of roof.
- These are primarily commercial/warehouse/manufacturing buildings.
- Loss of these buildings will have significant impacts due to loss of critical goods and impacts on jobs and other commercial services, and significant damage to San Francisco's dwindling PDR (production, distribution and repair) sector.
- Buildings of this type have strong and stiff concrete walls with flexible roof diaphragms, many with insufficient connections between walls and roof.

Costs and Other Impacts

- Retrofit work is straightforward, typically limited in scope to the junction of walls to roof area.
- It is typically easy to access building areas for retrofit.
- Retrofit costs are low to moderate.
- Commercial spaces typically do not need to be vacated for this work.
- Retrofit work will trigger disability access work.

Technical Issues

- National standards have been developed for this type of retrofit work
- No comprehensive inventory of this style of building exists for San Francisco

Prior work necessary

- Complete current work underway by CAPSS ResilientSF program staff to adapt national standards to San Francisco building stock.
- Generally survey building stock to more closely determine the scope of the problem.
- Develop criteria for phased implementation.
- Prepare legislation
- Determine how to contact building owners based on building database information

Legislative Action Required

- Adoption of retrofit ordinance by the Board of Supervisors

Lead Agency

- Program development: ResilientSF team
- Program implementation: Department of Building Inspection.

Supporting City Agencies

- Assessor/Recorder's office for database
- Other City agencies to assist in contacting building owners

External Involvement

- SEAONC (Structural Engineers Association of Northern California)
- BOMA (Building Owners and Managers Association)
- CAPSS ESIP advisory group

Implementation Cost

- Significant program development and staff costs
- May be best done under outside contract
- Most implementation and enforcement costs covered by permit fees and related fees.

Task A.4.a. Complete development of Shelter-in-Place policies and procedures, adopt policies and begin implementation

Schedule

- In progress. Draft policy by November, 2011. Complete City adoption and policies by 2014.

General Comments

- Currently underway as a SPUR Resilient City project.
- CAPSS ESIP staff are team leader for Shelter-in-Place Task 2, defining shelter-in-place, setting standards, proposing implementation methods.

Costs and Other Impacts

- Minor cost impacts before earthquake to prepare minimum equipment for emergency period
- After earthquake, possible minor costs to residents to provide minimum shelter improvements

Technical Issues

- None

Necessary Preliminary Work

- Completion of SPUR work

Legislative Action Required

- Adoption of Shelter-in-Place post-earthquake performance standards for residential buildings in Community Safety Element by Planning Commission and Board of Supervisors
- May require revision of post-earthquake inspection references in the Building Code

Lead Agency

- Development: ResilientSF team
- Implementation: Department of Building Inspection

Supporting City Agencies

- Planning Department
- Department of Emergency Management

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- Current work is being paid by grant from California Department of Geological Survey
- Some minor costs for reprinting placards and inspection materials

Task A.4.b. Develop and implement concept of Neighborhood Response and Support Centers, including local empowerment to address immediate and urgent post-earthquake problems and to support Shelter-in-Place policies

Schedule

- Begin in 2013

General Comments

- This concept is supported by SPUR Resilient City efforts, CAPSS report recommendation, and other plans
- Requires very small, local focus (support center within a few blocks of each home, areas of size similar to election precincts)
- Physical needs are limited to stored materials, supplies, and equipment.
- Detailed requirements for Neighborhood Support Centers are addressed in the Shelter-in-Place proposals
- Includes neighbor-to-neighbor and other peer and community-based seismic education programs.

Costs and Other Impacts

- No cost to users or building owners

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- Adoption as an item in Community Safety Element, Hazard Mitigation Plan, or other plan.

Lead Agency

- Department of Emergency Management

Supporting City Agencies

- ResilientSF team
- Fire Department
- Department of Building Inspection

External Involvement

- Building owner and tenant groups
- Neighborhood Associations
- CAPSS ESIP advisory group

Implementation Cost

- Minimum start-up cost without an equipped Neighborhood Response center.
- A modest center set-up cost is estimated to be about $25 000.

Task A.4.c. Complete development of repair and retrofit standards for one- and two-unit buildings, three-plus unit buildings, and concrete buildings

Schedule

- In progress. Complete in 2012.

General Comments

- Currently under development based on CAPSS report recommendations
- Requires minor Building Code changes and adoption of three Administrative Bulletins
- These clear standards will greatly speed recovery
- Insurance and other building repair claims will be more readily resolved
- Disproportionate damage triggers will allow the worst buildings to be indentified and retrofitted in small earthquakes

Costs and Other Impacts

- No pre-earthquake costs
- Post-earthquake costs vary based on level of damage
- Costs are limited due to new "component repair" criterion that addresses repair or retrofit of specific components rather than entire buildings.

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- Adoption of code revisions by Board of Supervisors
- Approval of Administrative Bulletins by Building Inspection Commission and its Code Advisory Committee and subcommittees

Lead Agency

- Development: ResilientSF team
- Implementation: Department of Building Inspection

Supporting City Agencies

- Department of Public Works

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- Minor pre-earthquake implementation costs, such as reprinting inspection materials

Task A.4.d. Complete disproportionate damage triggers and adopt code change and procedures

Schedule

- In progress, complete in 2012

General Comments

- General part of post earthquake repair and retrofit standards
- Significant damage in a very minor earthquake triggers retrofit
- Will identify the very worst buildings before a major earthquake
- Few buildings will be impacted

Costs and Other Impacts

- A few moderately damaged buildings will be required to expend significant funds for retrofit.

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- Board of Supervisors adoption of code provisions
- Building Inspection Commission adoption of related Administrative Bulletins regarding post earthquake repair and retrofit.

Lead Agency

- Development: ResilientSF team
- Implementation: Department of Building Inspection

Supporting City Agencies

- Department of Public Works (for City buildings)

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- Minor costs for program development
- Implementation costs to be by permit fees

Task A.4.e. Revise Planning Code "Act of God" provisions to exempt earthquake damage unless minimum retrofit has been accomplished

Schedule

- Begin in 2013, adopt in 2014, effective 2020

General Comments

- Current Planning Code "Act of God" building replacement provisions provide disincentive for owners of residential buildings to retrofit
- Proposed Planning Code change would allow rebuilding nonconforming structure only if retrofit work had been done before the earthquake
- Retrofits should be equivalent to future mandatory seismic retrofit standards so that further upgrades would not be required
- Becomes effective only after 2020 to allow time for property owners to retrofit. Current provisions in place until 2020.
- After 2020, if retrofit work has been done, nonconforming structure may be replaced in kind.

Costs and Other Impacts

- Retrofits would be voluntary by property owners until other mandatory standards in effect.
- Costs could be high, similar to general seismic retrofits.
- High benefits to property owners for retrofitting.
- This is not limited to wood framed buildings but could apply to any construction type

Technical Issues

- None

Necessary Preliminary Work

- Standards for seismic retrofit have not yet been developed for all building types

Legislative Action Required

- Board of Supervisors and Planning Commission amendment to Planning Code

Lead Agency

- Planning Department

Supporting City Agencies

- Department of Building Inspection

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- Planning Department costs for code update and public meetings.

Task A.4.f. Complete update of post-earthquake inspection (ATC-20) policy and procedure updates

Schedule

- In progress, complete in 2014.

General Comments

- Currently ATC-20 does not incorporate local goals and procedures
- ATC 20 is being revised, considering San Francisco recommendations

Costs and Other Impacts

- Clarifications will greatly assist businesses, residents and others regarding post-earthquake postings and uses of posted buildings

Technical Issues

- None

Necessary Preliminary Work

- Adoption of Community Safety Element which will help inform local ATC-20 posting goals

Legislative Action Required

- Building Inspection Commission adopt Administrative Bulletin

Lead Agency

- Program development: Department of Building Inspection/ResilientSF team
- Program implementation: Department of Building Inspection

Supporting City Agencies

- Planning Department, regarding goals in Community Safety Element
- Department of Public Works
- Department of Emergency Management

External Involvement

- Building owner and tenant groups
- SEAONC and other technical groups
- ATC, original contractor for ATC-20 development
- SPUR as part of Resilient City project
- CAPSS ESIP advisory group

Implementation Cost

- Costs for printing forms and training materials

Task A.4.g. Develop chimney repair/reconstruction guidelines, adopt procedures

Schedule

- Begin in 2013, adopt in 2014.

General Comments

- Includes repair of earthquake-caused and other chimney damage
- Need to coordinate with other fireplace and chimney requirements in SFBC Sections 13C and 3111

Costs and Other Impacts

- Chimney upgrade to factory-made chimney is moderate cost
- Chimney repair to original appearance, with brick facing, is possibly expensive

Technical Issues

- None

Necessary Preliminary Work

- Complete review of chimney repair ordinances of other cities and in the International Existing Building Code and other references

Legislative Action Required

- Possible Board of Supervisors and Building Inspection Commission approval of ordinance
- Building Inspection Commission approval of Administrative Bulletin

Lead Agency

- Program development: ResilientSF team
- Program implementation: Department of Building Inspection.

Supporting City Agencies

- Planning Department

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- None

Task A.4.h. Develop and implement program for data collection of performance of retrofitted buildings to evaluate effectiveness of retrofit measures

Schedule

- Begin in 2014, complete by 2015.

General Comments

- Currently little way of determining if building retrofit goals have been successful
- Particularly need to understand earthquake performance of retrofitted soft-story buildings and brick buildings.
- Valuable adjustments of technical requirements can be made from data analysis following a minor to moderate earthquake.
- New accelerometer instrumentation is extremely small and inexpensive to install.

Costs and Other Impacts

- Very low cost to building owners
- State and other agencies may assist in program costs and set-up

Technical Issues

- Need to coordinate with California Geological Survey

Necessary Preliminary Work

- Need to research methods, equipment, standards, data collection and processing

Legislative Action Required

- Possible Building Inspection Commission adoption of instrumentation requirements as part of existing Administrative Bulletin AB-094
- Possible Board of Supervisors and Building Inspection Commission action to revise SFBC Section 1604 regarding Earthquake recording instrumentation

Lead Agency

- Program development: ResilientSF team
- Program implementation: Department of Building Inspection.

Supporting City Agencies

- Department of Public Works for City buildings

External Involvement

- Building owner groups
- CAPSS ESIP advisory group
- California Department of Geological Survey

Implementation Cost

- Minor costs for staff time
- May be best done under outside contract

Task A.5.a. Continue to develop funding sources to assist private property owners to pay for seismic upgrades

Schedule

- In progress

General Comments

- Some funding mechanisms seen as critical to implementing mandates
- Funding can be through the private sector (banks, other lenders) or through public financing
- Avoid funding problems of UMB fund program

Costs and Other Impacts

- Supportive funding could greatly increase acceptance of mandatory programs
- Funding the availability should be considered for voluntary seismic improvements, including nonstructural measures.
- Complications related to funding must be limited
- Funding needs are not just for soft story buildings but for buildings any construction type

Technical Issues

- Unknown

Necessary Preliminary Work

- Unknown

Legislative Action Required

- Unknown

Lead Agency

- Mayor's office

Supporting City Agencies

- Office of the City Controller
- ResilientSF team

External Involvement

- Building owner groups
- Financial institutions
- CAPSS ESIP advisory group

Implementation Cost

- Minor staffing costs
- Some consulting attorney costs

Task A.5.b. Investigate Planning Code and other possible City agency incentives for seismic upgrades

Schedule

- Begin in 2012

General Comments

- Few incentives currently exist for seismic retrofit
- Many potential incentives for retrofit have been suggested, including:
    - Allowing additional dwelling units,
    - Changing parking requirements,
    - Expanding Transfer Development Rights to residential buildings,
    - Approving Mills Act requests to redirect property taxes for retrofit/maintenance of qualifying older buildings, and
    - Condo conversion bonus if retrofitted
- All incentives are highly complex and require much discussion among interested parties

Costs and Other Impacts

- Almost every incentive has a cost to the City, some financial, some other impacts

Technical Issues

- Many issues to be considered for each proposed incentive

Necessary Preliminary Work

- None

Legislative Action Required

- Planning Commission, Board of Supervisors and other agencies will likely be required to approve any such incentives

Lead Agency

- Planning Department, or
- Appointed Task Force

Supporting City Agencies

- Department of Building Inspection
- ResilientSF team
- City Attorney

External Involvement

- Building owner and tenant groups
- Neighborhood associations
- CAPSS ESIP advisory group

Implementation Cost

- Moderate costs for Planning program work

Task A.5.c. Actively seek Federal and State support for CAPSS ESIP and related ResilientSF Implementation activities

Schedule

- Begin 2012.

General Comments

- Funds are available if actively sought
- City is seen as a national leader in earthquake resilience and attracts interest from FEMA and other agencies

Costs and Other Impacts

- Could have positive cash benefits to City

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- Unknown

Lead Agency

- To be determined

Supporting City Agencies

- Department of Emergency Management
- ResilientSF team

External Involvement

- CAPSS ESIP advisory group

Implementation Cost

- Costs for staff to explore and apply for funding

Task A.5.d. Offer "Ombudsman" services to provide technical, permitting and other assistance

Schedule

- Begin in 2013

General Comments

- City system of permits, approvals, requirements, etc. are highly complex.
- Most building owners need some assistance navigating the City programs.
- This has been called a Citizen Assistance program.
- Almost everyone believes this is essential!

Costs and Other Impacts

- Will reduce costs and time spent on process to property owners.

Technical Issues

- None

Necessary Preliminary Work

- Develop programs to be assisted

Legislative Action Required

- No legislative action

Lead Agency

- Department of Building Inspection or ResilientSF team

Supporting City Agencies

- Permitting, licensing and other City agencies
- Mayor's Office of Neighborhood Services
- Small Business Commission

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- Costs for staffing one or more positions
- Some minor printing and related information costs

Task A.6.a. Review and recommend updates to the current Draft Community Safety Element to assure conformance with CAPSS and related recommendations

Schedule

- In process.

General Comments

- Work is underway to review
- Review work must be done prior to environmental review of this General Plan element
- Goal is to allow public and policymaker review and adoption of policies upon which CAPSS ESIP and other implementation work may be based.
- San Francisco Hazard Mitigation Plan goals and SPUR resiliency goals, adopted as part of CAPSS recommendations, to be included in review.
- Current draft Community Safety Element is in effect as an interim guide

Costs and Other Impacts

- No direct costs
- Policies, including building performance goals, which become incorporated into the adopted Community Safety Element will drive the scope and cost of many implementation programs.

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- Complete on-going review for concordance between policies recommended by various agencies and organizations

Lead Agency

- Planning Department

Supporting City Agencies

- Department of Emergency Management
- CAPSS Implementation program

External Involvement

- SPUR
- CAPSS ESIP advisory group

Implementation Cost

- Minor staff costs for task oversight
- Planning Department environmental review staff costs

Task A.6.b. Complete development of technical guidelines, standard plans and program to support voluntary seismic upgrade of one- and two-family dwellings

Schedule

- In progress, complete in 2013.

General Comments

- This is a San Francisco version of the generally accepted "Plan Set A" from ABAG/SEAONC/ICC and other agencies
- Will include water heater bracing details
- Provides both structural and nonstructural details and recommendations
- Provides for varying "point scores" for different retrofit work
- Plan sheets can be used as permitting documents
- Addresses the high demand from property owners for details about retrofit work

Costs and Other Impacts

- Will significantly reduce owner expenses by providing clear instructions and limiting unnecessary work

Technical Issues

- Must be reviewed and approved by various organizations and agencies

Necessary Preliminary Work

- None

Legislative Action Required

- Perhaps adopt Administrative Bulletin by Department of Building Inspection

Lead Agency

- Program development: ResilientSF team
- Program Implementation: Department of Building Inspection

Supporting City Agencies

- CAPSS ESIP advisory group

External Involvement

- SEAONC/AIA
- ABAG
- Contractor groups

Implementation Cost

- Costs for staff preparation, graphic development, printing
- May be best done under outside contract

Task A.6.c. Complete development of evaluation criteria and standards for older concrete buildings and other "most hazardous to life" buildings

Schedule

- In progress, complete in 2015.

General Comments

- Probably "collapse prevention" rather than higher levels of performance
- This engineering evaluation criterion is a necessary precursor for later mandatory upgrades
- This is difficult as there are many building types
- Prerequisite to mandatory evaluation beginning in 2015

Costs and Other Impacts

- Evaluation development is minor costs
- Actual building engineering evaluation is moderately expensive

Technical Issues

- Need clear evaluation criteria such as performance goals

Necessary Preliminary Work

- Completion of SF survey analysis work
- Completion of EERI Concrete Coalition recommendations

Legislative Action Required

- None

Lead Agency

- ResilientSF team

Supporting City Agencies

- Department of Building Inspection

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- May be best done under outside contract

Task A.6.d. Continue development of innovative and potentially cost-saving seismic retrofit solutions (garage door bracing, seismic dampers, etc.)

Schedule

- In progress.

General Comments

- Technology transfer from labs and universities is difficult and must be pushed.

Many cost saving, high impact solutions appear to be available.

- Testing is difficult and costly, so focus on tested products with high probability of utility
- This is not typically a City responsibility, but no one else does it.

Costs and Other Impacts

- Major possible cost savings when retrofitting

Technical Issues

- Many technical concerns to be addressed

Necessary Preliminary Work

- Literature searches

Legislative Action Required

- None

Lead Agency

- ResilientSF team

Supporting City Agencies

- Department of Building Inspection

External Involvement

- CAPSS ESIP advisory group

Implementation Cost

- May be best done under outside contract

Task A.6.e Further review effects of earthquake retrofits on economically disadvantaged San Franciscans for incorporation in policies

Schedule

- Begin in 2012, Report in 2015

General Comments

- Much work was done under CAPSS to review vulnerabilities by economic, demographic and other categories
- Overall seismic safety program should pay particular attention to special populations and persons who might be disproportionately affected by either earthquakes or retrofit costs.
- Retrofit programs should preserve San Francisco's cultural and economic diversity

Costs and Other Impacts

- Financial and programmatic sensitivity is goal

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- None

Lead Agency

- ResilientSF team

Supporting City Agencies

- Planning Department

External Involvement

- CAPSS ESIP advisory group

Implementation Cost

- Minor staff costs for task oversight
- May be best done under outside contract

Task A.6.f. Assess scope of issues related to Private K-12 school building performance and begin policy discussion and development

Schedule

- Begin in 2012, complete in 2014.

General Comments

- Public perceptions of intended private school performance are generally incorrect–believe that private schools meet public school safety standards. They do not.
- San Francisco has a large number of private school attendees.
- This is a potentially major issue with parents and children attending private schools.

Costs and Other Impacts

- Analysis costs can be quite high
- This task, for policy development, may motivate some analysis and retrofit.

Technical Issues

- None

Necessary Preliminary Work

- None

Legislative Action Required

- Possible action by Board of Supervisors to adopt policy.

Lead Agency

- ResilientSF team

Supporting City Agencies

- Unknown

External Involvement

- Private school administration and parent groups
- California Seismic Safety Commission
- SEAONC/AIA
- CAPSS ESIP advisory group

Implementation Cost

- Minor staff costs for task oversight
- May be best done under outside contract

Task A.6.g. Assess scope of issues related to critical retail stores, suppliers and service providers

Schedule

- Begin in 2013, complete 2016

General Comments

- Much work is already underway by other agencies (SF Card and others) to evaluate these facilities
- Goal is to allow continued operation of important private-sector suppliers and service-providers including medical clinics, dialysis centers and similar medical service centers, and medical suppliers.
- Non-structural improvements appear to be key to allowing continuous operation
- Currently there is no known list or categorization of these businesses or service providers

Costs and Other Impacts

- Non-structural improvements are low-cost, high-impact
- Structural improvements to allow continuous occupancy may be high-cost

Technical Issues

- None

Necessary Preliminary Work

- Review work of many other agencies
- Establish affiliation with groups currently engaged in this work

Legislative Action Required

- None

Lead Agency

- To be determined

Supporting City Agencies

- Department of Emergency Management
- Planning Department
- Small Business Commission
- CAPSS ESIP advisory group

Implementation Cost

- Minor staff costs for task oversight
- May be best done under outside contract

Task A.6.h. Continue development of evaluation and retrofit standards for various building types/uses to assure that they conform to desired performance goals

Schedule

- In progress, complete in 2025.

General Comments

- This is a complicated program, involving many policy and engineering issues

Costs and Other Impacts

- Higher performance goals will likely not increase costs of building evaluations
- Higher performance goals will increase retrofit costs

Technical Issues

- Many to be addressed as program develops.

Necessary Preliminary Work

- Develop performance goals for various building types and uses

Legislative Action Required

- Board of Supervisors will adopt performance goals
- Board of Supervisors and Building Inspection Commission must adopt code changes or Administrative Bulletins reflecting desired standards if different from current requirements.

Lead Agency

- ResilientSF team.

Supporting City Agencies

- Department of Building Inspection
- Planning Department
- Many other City agencies

External Involvement

- Building owner and tenant groups
- Professional organizations
- CAPSS ESIP advisory group

Implementation Cost

- Minor staff costs for task oversight
- May be best done under outside contract

Task A.6.i. Study fire-related earthquake resilience topics, including possible gas shut-off valve application, availability of water for post-earthquake fire suppression, access to building water shut-off valves to limit water damage, and survey ignition sources

Schedule

- Begin in 2013.

General Comments

- Fire issues require specialized knowledge
- Great public interest in post-earthquake fire issues
- CAPSS report extensively studied post-earthquake fire scenarios

Costs and Other Impacts

- Many financial impacts of post-earthquake fire.
- Some mitigation measures may be moderately costly.

Technical Issues

- Unknown

Necessary Preliminary Work

- None

Legislative Action Required

- Board of Supervisory may need to enact follow-up legislation

Lead Agency

- Fire Department

Supporting City Agencies

- Department of Building Inspection

External Involvement

- Building owner and tenant groups
- CAPSS ESIP advisory group

Implementation Cost

- Staff costs
- Possible contract study costs

Phase B: Implementation 2015–2020

Overview

1. Education/Information

a. Focus outreach to critical retail stores, suppliers, and medical and other critical service providers regarding nonstructural and moderate cost structural upgrades. Begin in 2015, complete by 2020.

b. Develop a focused non-structural upgrade program for businesses. Begin in 2015, complete by 2025.

2. Evaluation

a. Mandatory evaluation of older non-ductile concrete residential buildings. Begin in2015, complete by 2025.

b. Train design professionals (engineers and architects) on seismic evaluation and retrofit programs. Begin in 2015.

c. Mandatory evaluation of all other wood frame residential buildings upon sale. Begin in 2016.

d. Mandatory evaluation of all 5+ dwelling unit residential buildings and hotels/motels. Begin in 2017, complete by 2025.

3. Mandatory Building Upgrades

a. Mandatory evaluation and retrofit of Private K-12 schools to public-school standard. Begin in 2014, complete by 2024.

b. Mandatory evaluation and retrofit of Soft-Story buildings–three or more stories, three or more dwelling units. Begin in 2016, complete by 2026.

4. Post-Earthquake Response and Recovery

a. Develop earthquake inspection and posting procedures for special use buildings such as community service facilities, landmark and other historic buildings, private schools and similar uses. Begin in 2015, complete by 2020.

b. Develop post-earthquake repair and retrofit standards for building types not previously addressed, including steel frame buildings and unreinforced masonry buildings. Begin in 2017, complete by 2025.

5. Strategies and Incentives

a. Develop links to distribute materials and provide special retrofit incentives from building material suppliers and other companies that regularly come into contact with building owners and managers. Begin in 2015.

6. Study and Technical Development

a. Convene code development workgroup to update codes for new buildings to reflect desired performance goals and acceptable levels of confidence in meeting those goals. Begin in 2015.

b. Study assisted living facilities and similar special purpose facilities to assure that desired building performance standards are in place. Propose improvement programs as necessary. Begin in 2016, complete by 2020.

c. Review of ground failure mitigation measures, such as area-wide soil remediation in liquefaction zones, to evaluate potential for reducing vulnerabilities in high geological hazard areas. Begin in 2016.

Phase B Task Details

Task B.3.a. Mandatory evaluation and retrofit of private K-12 schools to public school standard

Schedule

- Begin in 2014, complete by 2024.

General Comments

- K-12 private schools are not required to meet the stringent safety requirements of public schools unless they are new buildings or have been extensively remodeled. Many private schools are of older, potentially unsafe construction.
- Public expectation of seismic performance of schools does not reflect the reality of safety of many private schools.
- San Francisco has the highest percentage of children attending private schools in the state of California.
- Collapse or extensive damage to even a few schools could result in many deaths or injuries to children.

Costs and Other Impacts

- Costs for engineering evaluations, design and retrofit construction can be very high.
- Financing retrofits will be difficult.
- Scheduling work around school schedules is difficult. Much retrofit work can be done in phases.

Technical Issues

- None

Prior work necessary

- Completion of information and analysis program for private schools (Element A.6.f)
- Formation of a group of interested persons to coordinate program development.

Legislative Action Required

- Adoption of ordinance by the Board of Supervisors

Lead Agency

- ResilientSF team for program development.
- Department of Building Inspection for program implementation.

Supporting City Agencies

- Planning Department

External Involvement

- CAPSS ESIP advisory group
- School administration and parent groups
- Technical experts

Implementation Cost

- Some minor program development costs and staff costs.
- May be best done under outside contract

Task B.3.b. Mandatory evaluation and retrofit of soft-story buildings with three or more stories and three or more dwelling units

Schedule

- Begin in 2016, complete by 2026.

General Comments

- Damage to these moderate-size residential buildings will cause significant earthquake impacts. The anticipated damage could severely impact the City's supply of housing and affect many other City elements. Estimated total number of buildings is 6 000+.
- Base on criteria similar to 5+ unit buildings

Costs and Other Impacts

- Retrofit costs expected to range from $10 000 to $20 000 per dwelling unit.
- Retrofits limited to the soft-story (typically the ground level).
- Commercial spaces in a soft story typically do not need to be vacated for this work
- Commercial spaces in areas of retrofit work may be required to be upgraded for disability access.

Technical Issues

- A new analysis and retrofit design tool, ATC-71-1, is being developed.
- This tool is expected to be available for use upon the effective date of this ordinance.

Prior work necessary

- Completion of current ATC 71-1 work
- Evaluation of issues related to soft-story 5+ unit buildings

Legislative Action Required

- Adoption of ordinance by the Board Of Supervisors

Lead Agency

- ResilientSF team for program development.
- Department of Building Inspection for program implementation.

Supporting City Agencies

- Planning Department

External Involvement

- San Francisco Apartment Owners Association
- Other building owner groups
- CAPSS ESIP advisory group

Implementation Cost

- Some minor program development costs and staff costs.
- Most implementation costs covered by permit fees and related fees.

Phase C: Implementation 2020–2042

Overview

1. Evaluation

a. Mandatory evaluation on sale or by deadline for all building types not otherwise covered. Begin 2020, complete by 2030.

b. Evaluate buildings retrofitted before 1994 or meeting non-conforming performance standards. Begin 2020, complete by 2030.

2. Mandatory Building Upgrades

a. Mandatory retrofit of older non-ductile concrete residential buildings. From 2020 through 2032.

b. Mandatory evaluation and retrofit of nonstructural, possibly structural, elements to critical stores, suppliers, and service providers. Begin in 2020.

c. Mandatory evaluation and retrofit of larger (over 300 occupants) assembly buildings. Begin 2025, complete 2037.

d. Mandatory evaluation and retrofit of pre-1994 welded steel moment frame buildings. Begin 2030, complete 2042.

e. Mandatory evaluation and retrofit of other building types found to be collapse hazards or otherwise not meeting established performance goals. Begin 2030, complete 2040.

Other program tasks for future consideration

- Retrofit of private buildings designated for use as emergency shelters. (SPUR Resilient City recommendation)
- Analysis and retrofit of private colleges and universities
- Broadening of retrofit triggers in the building code (SPUR Resilient City recommendation)
- Retrofit of buildings at time of conversion to condominiums
- Develop seismic rating and building posting systems to make seismic performance more transparent. (SPUR Resilient City recommendation)

Related Issues

Disability Access

The Attorney General of the state of California has issued a formal opinion that confirms that buildings undergoing seismic retrofit (structural repair) must be provided with disability access where such access is otherwise required by the codes.

Disability Access to Commercial Spaces and Buildings

Disability access improvements are required when structural repairs are made within the commercial and public use spaces of buildings. These access provisions are detailed in the California Building Code and the Americans with Disabilities Act and its guidelines. Disability access typically requires access to the area of work, an accessible primary entrance and primary path of travel to the area of work, and the sanitary facilities, drinking fountains, signs and public telephones serving this area. Other elements, such as parking and storage, may also be triggered.

When work within a commercial space is under a disability access threshold, currently $132,536, and when an unreasonable hardship has been approved by the Department of Building Inspection, disability access work may be limited to 20% of the cost of the structural repairs. Where the structural repair costs exceeds the threshold, all provisions of disability access must be met or alternatives must be approved by the Access Appeals Commission, through the California Historical Building Code, or through other legitimate means. Alternatives or exceptions to provision of disability access are not commonly approved.

Disability Access to Residential Units and Public Spaces within Residential Buildings

Disability access improvements are typically not required when structural repairs or alterations are made within older privately funded residential buildings. If areas of these residential buildings serve the public, such as rental offices or public dining areas, disability access to such areas may be required.

In all cases when building alterations, additions, or structural repairs are made it is essential that a person with knowledge of State and federal disability access regulations be consulted. Failure to provide required disability access can result in substantial liabilities, and access improvements can be difficult to make after other work has been completed.

Permits and Inspections

Permits and inspections are required for most construction work. The Department of Building Inspection along with other plan review and permitting agencies, typically the Planning Department, Fire Department and Department of Public Works, will be challenged to provide timely and efficient services for these extensive programs to succeed. New ombudsman services could substantially ease the permit process.

Financing for Seismic Improvements

The costs of seismic improvements to buildings range from quite low to very high, based on the type of work to be done, the performance standards to be met, and many other factors. Examples of low-cost, high-impact seismic improvements are nonstructural improvements such as securing water heaters, bolting chillers and other commercial equipment to prevent damage, or structural improvements such as installing anchor bolts or providing post-to-beam connectors in homes. Soft story building improvements typically are in the middle range of costs of seismic retrofits. High-cost seismic upgrades include retrofits of older concrete buildings.

In most cases, building owners and other responsible parties will be looking for financing to help subsidize the cost of implementing seismic mitigation activities. The need for a closer review of financing options is addressed

in this Workplan.

Enforcement of Current Regulations and Programs

Increased diligence in enforcement of variety of current City regulations can enhance earthquake safety and the overall resilience of San Francisco.

- Completion of the Unreinforced Masonry Building (UMB) upgrade program. Many unreinforced buildings our past the time allowed for seismic retrofit and are now pending enforcement and abatement action.
- Enforcement of water heater bracing requirements. While many water heaters are braced, few such bracing installations meet minimum structural standards.
- Enforcement of requirements for bracing nonstructural elements. The requirements in Chapter 16 of the Building Code apply to newly installed equipment and systems (such as HVAC units. suspended ceilings) and also apply to replacement equipment.
- Careful application of the nonstructural provisions of buildings in Occupancy Category III and IV, which require that large assembly occupancies, schools, essential facilities, and other uses be designed such that equipment can withstand significantly greater lateral loads then in standard occupancies.
- Verification that Special Inspection meets or exceeds minimum code requirements. Most of the lateral force-resisting structural elements in new, remodeled, and retrofitted buildings are inspected under Special Inspection provisions rather than by City inspection staff.
- Continued active involvement in development of standards and codes and adoption of local amendments to reflect the adopted building performance goals in the Community Safety Element and in other documents, as part of the Department of Building Inspection's Class A membership in the International Code Council and other organizations.
- Proactive provision of information regarding currently allowed fee waivers to permit applicants. Currently, permit applicants must make a specific request to have the waivers applied when undertaking seismic retrofits.
- Proactively inform the public of the transfer tax benefits related to seismic improvements.
- Proactively inform the public of the property tax reassessment exclusions when seismic retrofits are undertaken.

This Workplan recommends that City agencies responsible for the enforcement of the above regulations be tasked to report on enforcement of the regulations and, if found to be in need of improvement, to propose programs to increase effectiveness.

CAPSS Earthquake Safety Implementation Program (ESIP)

Program Operational Summary

The new CAPSS Earthquake Safety Implementation Program operates under the City Administrator. The urgency and scope of this program requires that an organization be developed with sufficient capacity to both manage the overall program and to develop some specific programs. A further staff responsibility will be to see that the tasks are properly implemented. It is anticipated that much of the work to achieve the goals of the ESIP program will be done with assistance of outside consultants, in public/private partnerships in association with other governmental agencies, or other organizations.

This program is an aggressive and technically challenging project. Some recommendations of to assure successful implementation of this earthquake safety program:

- Provide sufficient City resources for implementation
- Engage the most skilled and committed staff available
- Assure a high level of commitment from the many involved City agencies.
- Begin many tasks immediately, with little startup delay, due to immediacy and scope of hazards
- Engage many agencies and organizations in public/private cooperative tasks
- Consider this Implementation Plan to be only a piece of overall earthquake safety programs. Many other tasks related to earthquake safety are underway by Department of Emergency Management, other City agencies, and private organizations.
- Maintain flexibility as new or expanded issues arise
- Recognize that most tasks are significant projects and many have many smaller pieces that are not detailed.

Staffing

Following a review of the work necessary to achieve the goals of this program in its startup phase, the following minimum full-time staffing is recommended. This staffing level is based on the premise that much of the actual technical and program development work will be done by others under contract, such as was done by the Applied Technology Council (ATC) for earlier CAPSS projects.

- One full-time Program Manager
- One full-time person with policy development and writing skills, such as a planner
- One clerical support person
- One Public Information Officer/"Ombudsman" for information and coordination with permitting agencies

This staff will be supported by:

- Cooperating City agencies and programs
- Professional organizations and associations
- Interns and other links to educational institutions
- Volunteers, including CAPSS participants
- Not-for-profit partners, including SPUR, ABAG, EERI, SEAONC, PEER
- Consultants (paid)
- Cooperating industry/technical/business organizations

Funding

Costs

- ESIP staffing $_____/year
- Office space $ _____/year
- Related support costs $ _____/year
- Media and related production costs $ _____/year
- Consultant services (minimum) $100,000/year

Possible funding sources

- Strong Motion Instrumentation Fund
- FEMA and related federal sources
- Private foundations and related programs
- Others

Overall Strategy

The overall CAPSS Earthquake Safety Implementation Program should maintain a focus on public policy issues, not technical issues, as the drivers for decisions regarding implementation and strategies. The resolution of technical matters should follow the determination of the public policy needs.

The broad scope of the program requires that the work be broken into small, discrete, measurable tasks. These tasks allow the work to be done in many organizational ways, such as under contract, by other nonprofit organizations, by other City agencies in partnership with CAPSS ESIP staff, or in other forms. See Attachment A for Task Management strategy.

Physical Facilities Needed

This program is not best conducted as an everyday office activity. Because of the extensive community involvement, volunteerism, public education and outreach, and other partnership and cooperative activities, the program office needs are more for a large “campaign headquarters” style office. A large, informal office space is needed that has room for worktables and a few open workstations, seminars, collaborative work, reference materials and library, displays and demonstrations. Such office space need not be fancy or modern, well furnished or finished. What is required is a large, flexible, well lit space. The ideal office space would have a large ancillary workshop space for demonstration projects, testing, and development of equipment and models.

Measurement

The CAPSS Earthquake Safety Implementation Program will require data and measurement to allow analysis of the program to assure success. Program development should include quantitative public policy analysis as a key component.

Glossary of Acronyms and Abbreviations

ABAG	Association of Bay Area Governments
AIA	American Institute of Architects
ASCE	American Society of Civil Engineers
ATC	Applied Technology Council
BOMA	Building Owners and Managers Association
BORP	Building Occupancy Resumption Program
CAPSS	Community Action Plan for Seismic Safety
DEM	Department of Emergency Management
EERI	Earthquake Engineering Research Institute
ESIP	Earthquake Safety Implementation Program
FEMA	Federal Emergency Management Agency
PEER	Pacific Earthquake Engineering Research Institute
SEAONC	Structural Engineers Association of Northern California
SMIP	California Strong Motion Instrumentation Program
SPUR	San Francisco Planning and Urban Research Association
UMB	Unreinforced Masonry Building Program

Attachments

Attachment A—Task Management Strategy

Attachment B—Implementation Worksheet Responses

Attachment C—CAPSS summary report, ATC 52-2 *A Community Action Plan for Seismic Safety*

Attachment A—Task Management Strategy

Organization of Individual Task Workplans should include a written project description:

- Goal statement that "shapes" the project
- Scope of Task and project overview
- Overall task management concept, including proposed team
- Related City agency anticipated participation
- How this task integrates with other City ResilientSF and other earthquake work underway
- Specific intended outcomes
- Documentation proposed for task
- Schedule–overall and subtasks
- Costs and resource requirements
    - Funds
    - Staffing
    - Technical needs such as information, data, survey, analysis, research, testing, document review, etc.
    - How to assure task continues over long time
- Constraints, risks and possible support and opposition
- Special Issues
    - How does the task link to sustainability agenda?
- Communications plan
- Information management plan, including storage and access
- Permitting and other administrative requirement plan
- Evaluation of success
    - Develop clear, measurable objectives and metrics
    - Develop or assemble baseline data
    - Assign Review team
    - Measurement and quality control during all phases of task implementation
    - Progress reporting
    - Instrumentation, monitoring and postearthquake data analysis program
    - Focus on lessons learned
- Reporting
    - Regular quarterly, annual and others.
    - Share lessons
- Submittal and approval of Task Workplan to overall CAPSS ResilientSF panel

Attachment B—Implementation Worksheet Responses

Implementation Priority Worksheet Responses

In April, CAPSS Implementation Worksheets were emailed to approximately 140 persons (see sample worksheet that follows). The worksheets were structured to allow reviewers to share their thoughts and comments about implementation priorities for the 48 major tasks that had been recommended in the CAPSS program.

Fourteen completed worksheets were returned and one set of abbreviated written comments was received. A few persons chose to call and discuss the CAPSS implementation program. This response, though limited, provided some insight into priorities and approaches to be taken.

The responses generally supported proceeding with the priorities in the CAPSS report. That approach has been adopted in this Workplan, which closely follows the CAPPS report ATC 52-2, *Community Action Plan for Seismic Safety,* Table 5, Recommended timeframe for applying the three-step approach to key categories of buildings.

A few of the responses expressed concerns about financings, political will, or questioning the necessity of performing seismic improvements.

Generally the implementation worksheets provided the following information:

- There is general support for this program
- Most elements are given either moderate or high-priority. There are few low priority tasks.
- Soft-story building upgrade is generally seen as a top priority
- Despite variations in priorities, most respondents believe that many tasks should begin early in the program
- Cost and financing are important issues, but do not rise to become overriding issues.
- Many other groups and organizations are actively doing pieces of the CAPSS RESILIENTSF tasks.
- Many respondents suggested expanding the scope of the NERT program (SF Fire Department's Neighborhood Emergency Response Training) or use similar groups to assist with implementation of many tasks.

CAPSS — Community Action Plan for Seismic Safety

Implementation Priority Worksheets — Please Return by Thursday, July 7th

June 29, 2011

Dear Friends,

We urgently need your help at this critical stage of the CAPSS program implementation. Please help us develop the long-range **CAPSS Implementation Workplan** by providing your suggestions about implementation priorities and related timeframes on the attached **Worksheets**.

Each Worksheet contains notes related to implementation of each of the recommendations contained in the CAPSS report. These notes present new information and ideas that were not part of the previous CAPSS reports. The notes are not objective analyses, but represent the opinions of CAPSS staff about issues that may impact actual implementation. More information about many tasks is available in the CAPSS reports and in the *Technical Documentation* sections.

We are interested in your comments as well, and have provided a place for comments in the Worksheets.

Implementing all of the CAPSS Recommendations will take decades. On the worksheets, a thirty year period has been divided into five-year increments, with CAPSS implementation work to be apportioned in these five-year increments based on policy decisions about priorities, resources available, and other factors. Some tasks, such as public education and outreach programs, may continue for decades or even over the entire program. Feel free to propose implementation timeframes that extend beyond a single five-year time period or beyond thirty years.

This is a long and complex document, so we suggest that you dedicate at least one full hour to reading the materials and responding with priorities for each of the CAPSS tasks.

While we value the opinions and comments of all interested persons, we are particularly interested in the opinions of persons who have been active CAPSS program participants and who will be most directly impacted by this implementation work. **Your responses will help create the draft CAPSS Implementation Workplan that will be discussed at the July 13th CAPSS meeting to be held at 1660 Mission Street, room 2001, from 11:00 AM to 1:00 PM.**

Many thanks for your help in this difficult but important CAPSS task and for your continued assistance in making San Francisco a resilient city.

Laurence Kornfield

Laurence.Kornfield@sfgov.org
CAPSS Earthquake Safety Implementation Program

CAPSS Implementation Priority Worksheets

Instructions

1. Save a copy of this Microsoft Word document on your computer. You will need a copy of Microsoft Word to complete the form. Please save your work frequently to avoid data loss.
2. Throughout the document, you will notice areas marked "**Response Form**". Please add your responses there, as they are the only editable parts of this document.
3. On this page, we request that you provide updated contact information for our records.
4. On Worksheet pages, in response to each of the 17 CAPSS recommendations and their subtasks, please complete the forms as follows:
    a. **Priority** — Using the list box, indicate how important this task is to the overall earthquake preparedness of San Francisco. The default choice is "Medium"—click on it to choose another priority.
    b. **Timeline** — Using as many of the checkboxes as desired, indicate the rough timeframe during which the task should take place. (If you wish to be more precise, or to specify a longer timeframe, indicate this in the comments.)
    c. **Comments** — Using the text box, type in your comments and observations about the task and our analysis of its implementation. Click in the top-left area of the text box to edit it. Do not be concerned if your comments are lengthier than the table permits; it will automatically resize itself.
5. On the final page, you may enter additional comments on any topic.
6. Submit this form via an e-mail attachment to Laurence.Kornfield@sfgov.org with the subject line "CAPSS Worksheet Submission".
7. Deadline for submittal is July 7, 2011. Later submittals will be reviewed, but may not be part of the initial Workplan Implementation program now under development.
8. If you have problems reading, filling out or submitting this document, please call us for assistance: cellular (415) 307-6707 or CAPSS office (415) 554-4925.
9. Alternatively, you can print out this entire document, mark your thoughts in pen or pencil, and mail or deliver to Laurence Kornfield at the CAPSS Program office, City Hall, Room 034, 1 Dr. Carlton B. Goodlett Place, San Francisco, CA 94012.

Your Contact Information	
First Name	
Last Name	
Title	
Affiliation	
E-mail Address	
Phone Number	
Address	

<First Name>	<Last Name>	<Title>	<Affiliation>
Thomas	Anderson	Owner	Anderson Niswander Construction Inc.
Catherine	Bauman	none	self
Tim	Carrico		
Sigmund	Freeman	Structural Engineer	WJE Associates
Carla	Johnson	Access Compliance and Emergency Planner	Mayor's office on Disability
Stephen	King	Owner	Landlord
Mike	Martinet	Emergency Planning Manager	Controller's Office
George	Orbelian	Owner of 640 Mason Street, San Francisco, CA 94108, U.S.A.	
Kenneth	Paige		CAPSS, Paige Glass Co./Paige Properties
John	Paxton	Real Estate Consultant	John Paxton, Real Estate Advisory Services
Jeanne	Perkins	Hazards-Mitigation-Recovery Consultant	Jeanne Perkins Consulting
Bill	Quan		
Laura	Samant	Consultant	
Armand	Silva	Dr.	at large

CAPSS Implementation Priority Worksheets

Recommendation 1: Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and retrofit of those that are vulnerable to earthquake damage. **A Mayoral task force has proposed an ordinance to require evaluation and retrofit of these buildings. The Board of Supervisors should enact it.**	
General comments	The CAPSS report shows these buildings will have an extremely high impact on the City, and evaluation and retrofit early in the overall seismic safety campaign is generally agreed to be an important step toward City resilience. Reinforcement work is limited to the ground level. The Soft Story Task Force recommended that all evaluations and retrofits be done over a seven-year period. The City must decide to what standard (collapse prevention, shelter-in-place, or other) the buildings should be evaluated and retrofitted.
Are public funds required?	Yes. Some public funds are required for program development and implementation operations.
Are private funds required?	Yes. Building owners will need to pay for evaluation (low to moderate cost) and retrofit (typically $10 000 to $20 000 per dwelling unit). Providing funding to assist building owners' evaluation and retrofit is a major issue.
Is technical knowledge and information available to implement this action?	Almost. A program is now being developed specifically for evaluation/retrofit of this building type. This ATC 71-1 program is expected to be completed later in 2011. There are other acceptable existing technical standards for evaluation/retrofit that could be applied.
Political will	There appears to be general support by policymakers, particularly if this is incorporated into an overall, long range earthquake safety program. Financing and various special issues must be addressed to gain full support.
Known or expected opposition	Some building owners do not wish to pay for seismic evaluations or upgrades. Tenants are concerned about pass-through costs.
Is there public/staff interest and expertise in this subject?	Yes. Great public and staff interest in seeing this accomplished, and much expertise available.
What resources/staff could implement this?	Additional staff, likely in the Department of Building Inspection, will be needed to set up the program and related information management systems, to provide notices and information, and to manage the program. Program development will require other City staff or expert consultants to write some technical details and to manage.
Is legislation required?	Yes. Likely requires an amendment to San Francisco Building Code and budget approval for staff.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 26–27 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 1

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	0	0	0	0	0	Most important task of all. This will set the battlefield. All else flows from this.
Catherine	Bauman	High	1	0	0	0	0	0	High impact!
Tim	Carrico	High	1	1	0	0	0	0	I think there should be a minimum of five, and possibly seven years, to complete this first phase. The knowledge and infrastructure that will be developed on these properties will make it much easier to predict the time and financing needed for future groups of wood-frame buildings, but this first phase will probably get going more slowly.
Sigmund	Freeman	Medium-high	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	1	0	0	0	(Add comments here.) With the collapse of the housing market, it will be at least 10 years before most property owners recover from this recession/depression. The sooner the gov't forces this on property owners, the more the taxpayers will be asked to subsidize this project. A great many of this type of bldg has withstood 2 large earthquakes. Many, many more have withstood the 1989 earthquake and several smaller quakes with little or no damage. This is definitely not the right time for such a huge gov't imposed project.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.) This specific action is part of a very complex recovery equation. Is the ultimate goal to save lives or to save lives and keep the property habitable after an earthquake? If the job is to save lives and keep buildings habitable, then we must also consider the related utility infrastructure issues. If a building is habitable, but unliveable for a lack of utilities, the additional retrofit expense may be a for nought. Clearly there is no easy answer to this issue. \
George	Orbelian	High	1	0	0	0	0	0	Resiliency bank. Credit cards secured by real estate. Credit unions. Interest bearing opportunities for savers/investors.
Kenneth	Paige	Medium	1	0	0	0	0	0	This is a great solution in an ideal world-but the supervisors will not have the political will to enact it.
John	Paxton	Medium	0	0	0	0	0	0	Per additional comments.]
Jeanne	Perkins	Medium-high	1	1	0	0	0	0	I am convinced that housing is an area where local governments need to take the initiative. For major corporations or utilities, they are large enough that, on their own, they can make "rational" decisions on when or if it is appropriate to retrofit.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	Top priority. If a compromise on financing is not available in the short term, mandatory evaluation in the short term and longer deadlines for retrofit should be sought.
Armand	Silva	Medium	0	0	0	0	0	0	Should start this immediatley. Any delay will postpone the effort until the deadline. Various incentives should be part of the program. Funds should be found to jump-start the effort. A previous thought included a well advertised competition to assist first-starters with partial funding and professional discounts; with filming of typical retrofitting procedures.

CAPSS Implementation Priority Worksheets

Recommendation 2: Inform the public of risks and ways to reduce risk. **a. Explain the need for and process to evaluate building seismic performance, including structural and fire hazards, and building elements that affect usability.**	
General comments	Public information concerning earthquake risks and impacts is a critical, major CAPSS goal and the first of the three-step CAPSS seismic resilience strategy. An informed public is needed to support earthquake hazard mitigation activities.
Are public funds required?	Yes. Some limited funds are required for development, production and distribution of information.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes. CAPSS and many other seismic hazard studies can provide the needed information. Effective communication strategies need to be developed and implemented. San Francisco Dept. of Emergency Management and other agencies are actively developing communication strategies.
Political will	Expected general support for these informational and educational programs.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	Great public interest; there is substantial staff interest and expertise.
What resources/staff could implement this?	Some City staff might be available through related San Francisco programs. Much of this work might best be done by consultants to the City.
Is legislation required?	No, except for budget approval for staff/consultants, video and other production resources.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 28 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(a)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	0	0	0	0	0	Of highest importance. Until the battlefield is set nothing else matters. A lot of this has been done-the USGS publication of a few years ago for instance.
Catherine	Bauman	High	1	0	0	0	0	0	Easy & responsible.
Tim	Carrico	Medium-high	1	0	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	1	0	0	0	(Add comments here.) SEE RESPONSE FOR RECOMMENDATION 1
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.) I can recommend research done by Dr. Denis Mileti on how to effectively communicate the issues to the public. Also, Anna-Marie Jones of CARD has some expertise in this area.
George	Orbelian	High	1	0	0	0	0	0	Property ID. Seismic conditions by address.
Kenneth	Paige	Medium	1	0	0	0	0	0	This would be an excellent and realistic start.
John	Paxton	High	1	0	0	0	0	0	[Per additional comments.]
Jeanne	Perkins	Medium	1	1	1	1	1	1	See comments for 2(b).
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	1	0	0	0	0	This would be an important accompaniment to rec 1 and rec 4, but I don't recommend launching this until around the time rec 1 and 4 are launched. There needs to be a strong education component as part of any new programs about exactly what people need to do, how to do it, and why. The more targeted these are in subject and audience, the more effective they will be. Building owners, tenants, and prospective buyers needs a thorough understanding of what an evaluation of earthquake risk means. Building owners need a thorough understanding of how to get an evaluation of their building. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Various education materials should be distributed, probably through the Supervisors. Presentations by professionals at all the districts with aggressive advertisements.

CAPSS Implementation Priority Worksheets

Recommendation 2: Inform the public of risks and ways to reduce risk. **b. Offer courses aimed at single-family homeowners about how to conduct small scale seismic retrofits.**	
General comments	This is of high importance in order to meet the City's overall shelter-in-place and related resiliency goals. Demonstration projects for one- and two-family dwelling unit seismic upgrades can be done in various City neighborhoods, filmed for later viewing.
Are public funds required?	Yes, some funds for printing and related materials. Some costs for demonstration materials. Funds required for media production.
Are private funds required?	Possibly some funds required for the demonstration work done on private residences. No private money required for training.
Is technical knowledge and information available to implement this action?	Yes. Standard plan sheets and related materials are now being developed. Need some effort for staff to complete.
Political will	Expected general support for educational programs.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	There is a high level of public interest in retrofit of one-and-two family homes. Great staff interest.
What resources/staff could implement this?	Limited staff are available who can do both technical and education/public interest presentations. Many private resources (volunteer architects, engineers, contractors) are likely available to support this.
Is legislation required?	No. Some budget approval may be needed.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 28 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(b)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	Believe public intersest in DIY is over rated. Great in theory but falls apart in practice.
Catherine	Bauman	High	1	0	0	0	0	0	Easy, effective.
Tim	Carrico	Medium	0	1	0	0	0	0	I am not really sure what the objective is here. Is it to provide information for "do it yourself" retrofits or to ease homeowner's anxiety about what is required to have someone else do the work? In either event, I don't think this should get too much priority until the soft-story program is well underway and we see if new knowledge and insights are developed that will make the work on the 1 & 2 unit buildings more efficient.
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	High	0	0	0	0	0	0	The City of Oakland has put together some crude but effective handouts. Bill Schock did the same in San Leandro. Start with information packets which can be downloaded or handed out. Expand to workshops demonstrations and video. Accept on a policy basis the standard specifications for minor seismic retrofit in lieu of custom drawn plans for one or two family dwellings. Have mandatory start work conference with building inspector before work begins.
Stephen	King	Medium-high	1	0	0	0	0	0	(Add comments here.) NERT is a good group to assist in getting the word out.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Get manufacturers like Simpson to sponsor programs/projects through their retail network.
Kenneth	Paige	Medium	1	0	0	0	0	0	Great idea!
John	Paxton	High	1	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	1	1	1	1	It is important to have a public education program in part to say that you have made a "good faith" effort at explaining the purpose of any mandated city program. One way to do this is to promote the types of things that the CITY has done re: seismic safety - and then say that property owners need to do the same (such as bragging about city hall, etc.) However, at some point, some basic retroffiting will need to be mandated.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	There is a lot of uncertainty right now about what homeowners should do to make their homes safe and resilient. Homeowners need materials to find out whether they should retrofit their home and, if they need to, how to retrofit their home and whether they need to engage design/construction professionals and who. Right now, if a homeowner calls an engineer, that engineer is good at telling them what to do if they want to retrofit, but there is no good answer about whether they need to retrofit. Pamphlets, plan sets, videos, courses would all be very valuable. These would take some time to put together as the technical community would need to agree on what the best guidance is for homeowners in terms of when they need to retrofit. This is linked with rec 12a. (Add comments here.)
Armand	Silva	Medium	0	1	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 2: Inform the public of risks and ways to reduce risk. **c. Educate installers, building owners, and others about proper ways to brace water heaters.**	
General comments	Some CAPSS participants believe this is of high importance. This is easily achievable and inexpensive. Water heater bracing is currently required by various codes, but is rarely done correctly due to lack of available clear technical standards and little inspection/oversight. Water heater bracing both reduces fire risk and allows retention of drinking water in the heater tank.
Are public funds required?	Possibly some small amount of funds required to print information.
Are private funds required?	Yes. Some private funds (very little) will be required for the bracing work to be done on private residences.
Is technical knowledge and information available to implement this action?	Yes. Clear and simple technical information is readily available.
Political will	Expected general support.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	Some public and staff interest.
What resources/staff could implement this?	Standards can be collected and educational materials developed by existing staff or under contract. Some additional DBI- Plumbing Division staff time will likely be required to implement this.
Is legislation required?	No. Some budget approval may be needed to hire additional inspection staff at Department of Building Inspection if required.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 28–29 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(c)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	1	0	0	Another DIY effort-probably few takers.
Catherine	Bauman	High	1	0	0	0	0	0	Easy, effective.
Tim	Carrico	High	1	0	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	0	0	0	0	0	Education is basic. Strapping is already required for water heater replacements and when the property is sold. Hw big of a problem is this really?
Stephen	King	Medium	1	0	0	0	0	0	(Add comments here.)
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Should be combined with other simple "non-structural" projects.
Kenneth	Paige	Medium	1	0	0	0	0	0	Water heater bracing is already required by insurance carriers.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	0	0	0	0	0	This is "low hanging fruit" if it has not yet been done - but the folks I have talked to say that this is pretty much an "old" problem. It would be simple enough to talk to some water heater installers.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	1	0	0	0	0	Simple and low cost to implement technically, but requires DBI to take on minor additional duties. Moderate effectiveness at reducing fire risk. A good thing to do, but less important than many other recommendations, and requires . (Add comments here.)
Armand	Silva	Medium	1	1	0	0	0	0	Need better inspections and follow through. My recent experience is that some of the attachments are not very robust and results of buyers inspections are not communicated to condo managers.

CAPSS Implementation Priority Worksheets

Recommendation 2: Inform the public of risks and ways to reduce risk. **d. Educate residents about simple and cost-effective ways to make their homes safer and habitable following earthquakes by reducing falling hazards.**	
General comments	Reducing falling hazards and other nonstructural hazards will help meet shelter-in-place and resiliency goals. Nonstructural and falling hazards are easily mitigated, with potential high benefits and low costs.
Are public funds required?	Yes. Some funds required to develop and print information and conduct educational campaign.
Are private funds required?	Yes. Some (limited) funds required for the actual work to be done on private residences.
Is technical knowledge and information available to implement this action?	Yes. Material is available but must be collected and organized.
Political will	Expected general support.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	Limited public or staff interest at this time.
What resources/staff could implement this?	City staff not currently available. This might best be done under contract.
Is legislation required?	No. Budget approval could be necessary for staffing or contract work.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 28–29 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(d)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	Easy, effective.
Tim	Carrico	Medium-high	1	0	0	0	0	0	This is a good idea. Literature good be developed that landlords could give to new and existing tenants about how to attach shelves, etc in their apartments in safe and non-destructive ways. This would require some research with property owners/managers to see if they would cooperate in telling people to put holes in their walls . . .
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	This is an on-going effort. It will never be done
Stephen	King	Medium-high	1	0	0	0	0	0	(Add comments here.) NERT is a good group to assist in getting the word out.
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	This is a great way to bring the community together-the program should connect people and districts-tie into NERT, neighborhood watch programs, Laurence's idea for community response centers in containers.
Kenneth	Paige	Medium	1	0	0	0	0	0	Great! And make your garage kits available.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	0	0	0	0	0	More low-hanging fruit!
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Low	0	0	0	0	0	0	This is simple and easy to do, but it is likely that education programs on this topic would have limited effectiveness at improving life safety and no effect on overall City resiliency. Falling hazards in homes are pretty low impact. Industrial/commercial falling hazards are more significant. (Add comments here.)
Armand	Silva	Medium	1	1	0	0	0	0	(Add comments here.)

Recommendation 2: Inform the public of risks and ways to reduce risk. **e. Develop a program in coordination with other City agencies to work with small businesses and important community service providers on measures they can take to reduce vulnerability to earthquakes.**	
General comments	This task actually contains two important elements: small business continuity and community service provider continuity.
Are public funds required?	Yes. Substantial staffing or consultant costs to develop and implement these programs.
Are private funds required?	Not for program development; implementation costs for businesses and community service provides could vary widely.
Is technical knowledge and information available to implement this action?	Yes, information is available for small business hazard reduction. No, information is not available for community service providers. Need to better understand the vulnerability of the buildings and types of services provided and affected by these uses.
Political will	Unknown.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	Some interest regarding small business; little current public or staff involvement in earthquake resilience for community service facilities.
What resources/staff could implement this?	City staff not currently available. This might best be done under contract.
Is legislation required?	No. Budget approval could be necessary for staffing or contract work.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 28–29 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(e)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	0	0	0	0	0	The literature for these types of programs could reflect that the recommendations for the target group is just one part of a broader program that involves practically everyone in the City so that no group feels like they are being singled out to spend time and money.
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	Work with exisiting networks. SF CARD already provides organizational disaster preparedness and resiliience for non-profits. Piggy back with a grant or other funding and the proper expertise to train the non-profit service providers. As for the businesses, work with neighborhood merchant groups through the Office on Small Business.
Stephen	King	Medium	0	0	1	0	0	0	(Add comments here.) Economic climate is putting small businesses at the edge of failure. Do not burden them until economy improves.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Businesses key to survival/economic recovery should be identified and coalitions created to develop reliable response.
Kenneth	Paige	Medium	0	0	0	0	0	0	No-too much talk-not enough action. Other city agencies are too busy with their own concerns.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-high	1	1	1	1	1	1	The City EMA business liason used to work at the Fritz Institute - and they were active with service providers. When I did the project with small businesses, we did a focus group and they recommended a "tip of the week" - saying they tend to listen to radio on their way to work - otherwise they are too busy to read anything. This may be best done through a collaborative project with local radio stations. I don't know if KQED would be game, but that seemed to be a popular one for east bay folks to listen to.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	1	0	0	0	0	This is linked to rec 6. This is very important for community resiliency, and the education component of this task is the most affordable and achievable part (more than, say, bond measures to support retrofits or relocation, etc. or mandates to require retrofits that hurt businesses or desperately needed community organizations). This activity should include education materials -- what can these groups do to improve their resiliency -- and then assistance to do the easy things (like evaluate their buildings, relocate if feasible, make plans to operate at another location if their site is damaged at an earthquake, etc. etc.). (Add comments here.)
Armand	Silva	Medium	1	1	0	0	0	0	Provide awards.

CAPSS Implementation Priority Worksheets

Recommendation 2: Inform the public of risks and ways to reduce risk. **f. Encourage building materials stores, insurance companies and utility companies to supplement education campaigns.**	
General comments	This may best be covered through one of the City's related resilience programs.
Are public funds required?	Yes. Minimal funds required to print information.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes. Information can be compiled as needed from existing sources.
Political will	Unknown.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	Limited public or staff interest expressed to date.
What resources/staff could implement this?	Availability of City staff through associated programs unknown. This might best be done under contract.
Is legislation required?	No. Budget approval could be necessary for staffing or contract work.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 28–29 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(f)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	Need a PR firm to get this rolling.
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	0	0	0	0	0	State Farm has an insert in every property and auto insurance premium notice called "News and Notes" and I imagine most other insurance companies do the same.
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	0	0	0	0	0	Local businesses like Cole Hardware already provide valuable information to their consumers in their newsletters. Thisis one of the benefits of working with local businesses because they have a much larger investment in the community than just corporations
Stephen	King	Medium	0	1	0	0	0	0	(Add comments here.)
Mike	Martinet	Medium-high	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Education is key.
Kenneth	Paige	Medium	1	0	0	0	0	0	Yes! Great. Cheap solution. But keep it simple.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Low	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	Social scientists say that education programs are most effective when they come from multiple sources, all saying the same thing. (However, personally I don't trust education materials from building stores that are trying to sell me things.) After the City has developed its own education materials, it could ask others to help distribute them, or to make their own education materials consistent. Relatively minor effort. Could leverage City efforts. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	They should be encouraged to do this but don't know how.

Recommendation 2: Inform the public of risks and ways to reduce risk. **g. Revise post-earthquake building inspection protocols and train inspectors and owners to identify buildings that can be occupied safely despite damage and loss of utilities.**	
General comments	High importance in achieving City Shelter-in-Place goals for occupancy following an earthquake. A Shelter-in-Place Task Force is currently working on this project, including City employees and many other representatives.
Are public funds required?	Yes. Some limited funds required to prepare forms and training materials.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Not at this time – this material is currently under development. The technical and related materials needed to adopt revisions to ATC-20 and develop related programs can only be prepared at the conclusion of the work now underway.
Political will	Anticipated support.
Known or expected opposition	Some possible opposition to City revisions to the standard ATC-20 inspection and tagging requirements.
Is there public/staff interest and expertise in this subject?	Great public interest, some staff interest.
What resources/staff could implement this?	Limited staff time is available for development of post-earthquake housing standards (revisions of ATC-20) and related training materials. This might best be accomplished as contract work.
Is legislation required?	Yes. Minor revisions to Building Code. Budget approval could be necessary for contract work.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 28–29 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(g)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	ATC territory-ATC training materials.
Catherine	Bauman	Medium	0	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	This is basic. Prepare policies now for the earthquake that can strike anytime. Incorporate into training efforts that are just now being revived
Stephen	King	Medium	1	0	0	0	0	0	(Add comments here.)) NERT is a good group to assist in getting the word out.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	Medium-high	1	1	0	0	0	0	Primary focus should concentrate on most vulnerable seismic conditions.
Kenneth	Paige	Medium	1	0	0	0	0	0	These people [inspectors] could provide a temporary occucpancy permit.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	This builds on the work SPUR is leading and is high priority. The City also needs to anticipate public messaging after an earthquake to the public. Residents need to understand the concept of shelter-in place, and believe that they are safe. The media needs to help. The technical issues will take some time to be worked out. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 2: Inform the public of risks and ways to reduce risk. **h. Train preservation engineers and architects knowledgeable about San Francisco's historic resources in post-earthquake safety tagging.**	
General comments	Development of post-earthquake policies for review and preservation of historic resources is a priority for many people.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Generally, yes. Some additional survey and database development work may be needed.
Political will	Unknown.
Known or expected opposition	Possible opposition to any increase in "historic resource" regulations.
Is there public/staff interest and expertise in this subject?	High interest on the part of preservation advocates and many others; high interest by some City staff persons.
What resources/staff could implement this?	City staff not currently available for this work. This could be part of future work plans, or could be addressed by non-City groups with limited City staff participation.
Is legislation required?	Possibly. May require minor revisions to the Building Code regarding post-earthquake inspection procedures.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 28 & 30 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 2(h)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	Yes-character of the city vital.
Catherine	Bauman	Medium	0	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	0	1	0	0	0	0	I do not understand what the issue is here. How and why would a "historic" building be evaluated for post-earthquake safety and use any differently than any other building? It seems to me the issue is limited to more restrictive regulations for demolishing or altering damaged buildings which would come into importance later in the process.
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	CALBO offers training annualy through education week. Architects and engineers are qualified for the SAP credentialling. CAL EMA oversees the State program for both the SAP and for mutual aid. The architects and engineers would have to be deputized by DBI for offical placarding)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Low	0	0	0	0	0	0	(Add comments here.) We should be able to hire this expertise when needed and get them paid for by FEMA. Our limited resources can be better used elsewhere at this time.
George	Orbelian	Medium-high	1	1	0	0	0	0	Anticipate hazards based on seismic conditions and construction.
Kenneth	Paige	Medium	0	0	0	0	0	0	I think I would enlist existing trained engineers and architects for temporary tags and recommendations. Too much power otherwise.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	0	0	0	0	0	Historic properties are key to the "feel" of San Francisco. I think that this is a great idea.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-low	0	0	0	0	0	0	Preserving the City's historic character is important, but the City has a strong culture of preservation already. This could be a good candidate for non-City groups, coordinating with the City, to explore this issue further. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 3: Adopt updated code standards. **The City should adopt code standards for seismic evaluation and retrofit of all common building types in San Francisco.**	
General comments	Updated technical standards for building evaluation and retrofit are required to implement any programs where current standards are determined to be insufficient. Standards should reflect agreed-upon San Francisco building performance goals. While most building types can be evaluated and retrofitted using current codes and standards, those may not reflect "shelter-in-place" or other desired performance goals. This may be a necessary action item before beginning to implement building evaluation and upgrade programs.
Are public funds required?	Yes, funds will be required for staffing and/or contract work.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Partially. Much of the needed information is available, although some building analysis and upgrade methodologies are currently under development, such as for wood-frame soft-story and concrete buildings.
Political will	Expected support.
Known or expected opposition	None known. Owners of some buildings may object to revised codes/standards if performance expectations are enhanced.
Is there public/staff interest and expertise in this subject?	Yes. There is great interest and expertise among both City staff and the public.
What resources/staff could implement this?	City staff not currently available for this work. Much of the general preliminary work is being done or may be done by other agencies/organizations. Formatting for local use will require staff time.
Is legislation required?	Yes. Ultimately, revised codes or standards must be adopted by ordinance. Non-mandatory technical standards may not require legislation.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 31–32 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 3

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	0	0	0	0	0	Big issue-needs to be done-ATC?
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	0	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	1	0	0	0	(Add comments here.) With the collapse of the housing market, it will be at least 10 years before most property owners recover from this recession/depression. The sooner the gov't forces this on property owners, the more the taxpayers will be asked to subsidize this project. A great many of this type of bldg has withstood 2 large earthquakes. Many, many more have withstood the 1989 earthquake and several smaller quakes with little or no damage. This is definitely not the right time for such a huge gov't imposed project.
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	We should also address key infrastructure elements like Muni, underground, tunnels, retaining walls, stairs, utilities, etc..
Kenneth	Paige	Medium	1	0	0	0	0	0	Totally necessary.
John	Paxton	High	1	0	0	0	0	0	[Per additional comments.]
Jeanne	Perkins	Medium-high	1	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	This is a complex one -- the City will need to develop/adapt evaluation procedures on a high priority basis. Regarding adopting new retrofit standards, this issue is very important to many people, but my personal take is that this could cause delays to other programs if we have this as a precursor to retrofit programs. I definitely think the City should be proactive about adopting new and innovative code standards as they become available, and accepting innovative engineering approaches that may use a different approach than existing codes. However, I believe that current codes for new buildings and retrofits are significant improvements over what was used decades ago, and are okay. The City is not in the business of code development, and relies on professional organizations to develop code standards it can use. Perhaps the most important thing the City can do is make sure that knowledgeable and progressive engineers help the City update its codes by serving on relevant commissions and committees. (Add comments here.)
Armand	Silva	Medium	0	1	0	0	0	0	The codes must be simplified for lay people.

CAPSS Implementation Priority Worksheets

Recommendation 4: Require all buildings to be evaluated for seismic risk. **Building owners should evaluate the seismic performance of their buildings upon sale relative to Department of Building Inspection (DBI) standards or, if no sale occurs, by a deadline established based on the building use and structural type. The result would be shared with tenants and prospective buyers and tenants, and be made a part of public City records.**	
General comments	This is one of the key steps of the CAPSS three-step strategy. Timeframes for evaluation within various building categories under the proposed CAPSS evaluation program advances from "evaluation upon sale" to "evaluation by a deadline" over a 25-year period.
Are public funds required?	Yes, some funds are required to develop and monitor building evaluation programs and to maintain data.
Are private funds required?	Yes, evaluation of buildings will be a moderate expense, with costs varying widely based on building size, type and age.
Is technical knowledge and information available to implement this action?	Not at this time, but work is actively underway by outside groups to develop or modify building screening and evaluation tools, including simplified evaluation tools that will provide desired information at reduced cost for some building types.
Political will	Unknown.
Known or expected opposition	Yes. Opposition expected by building owners who may be required to pay for and disclose building evaluations. Possible opposition from others related to impacts on real estate transfers, property values and other elements.
Is there public/staff interest and expertise in this subject?	Yes. Great public interest. Some City staff interest/expertise.
What resources/staff could implement this?	City staff not currently available to develop and implement evaluation programs. The development might be best done under contract, with implementation by City agencies.
Is legislation required?	Yes, mandatory evaluations and staffing budget would require legislative approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 33–34 and pages 63-65 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 4

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	0	0	0	0	0	Keep pressure on owners. Owners to take responsibility.
Catherine	Bauman	Medium-high	0	1	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	0	0	0	0	0	0	At this point, I am opposed to an "evaluation upon sale" requirement except for building categories whose time frames for evaluation and retrofit have already been triggered. The private real estate market will quickly incorporate strategies for when to evaluate or not evaluate particular types of buildings once the concept of impending retrofit requirements becomes common knowledge. I am particularly concerned about requiring early evaluation of concrete buildings before sufficient knowledge and standards of retrofit are established. Our society often overreacts to perceived safety or toxic threats early on and then becoming more realistic and practical once the hysterial dies down. Two examples are the reactions to asbestos and lead based paint in buildings; a lot of private and public resources were wasted in the initial reactions to those problems.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	High	0	1	0	0	0	0	Start this project ASAP but expect it will take four years to implement first deadline. City owned or City leased buildings need to be included in this ordinance
Stephen	King	Low	0	0	0	1	0	0	(Add comments here.) With the collapse of the housing market, it will be at least 10 years before most property owners recover from this recession/depression. The sooner the gov't forces this on property owners, the more the taxpayers will be asked to subsidize this project. A great many of this type of bldg has withstood 2 large earthquakes. Many, many more have withstood the 1989 earthquake and several smaller quakes with little or no damage. This is definitely not the right time for such a huge gov't imposed project.
Mike	Martinet	Medium	1	0	0	0	0	0	(Add comments here.)Might not ever happen, but could we consider posting buildings with placards denoting seizmic hazard risk like the health department posts restaurant cleanliness grades?
George	Orbelian	High	1	0	0	0	0	0	Evaluation of seismic risk should be based 100% on seismic conditions with most vulnerable areas dealt with first.
Kenneth	Paige	Medium	0	0	1	0	0	0	Let's start with required assessment due on sale-and then see how it goes.
John	Paxton	High	1	0	0	0	0	0	[Per additional comments.]
Jeanne	Perkins	Medium	1	1	1	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	1	0	0	0	0	I think this a high priority but challenging task. It is high priority because it has the potential to change the broader culture surrounding earthquake risk, and is likely to more feasible than mandating many retrofits (while still being politically challenging to make law). By inserting information in the market place, this activity would encourage retrofits over the long-term and make decisions more transparent. However, there is currently no evaluation or rating scheme appropriate that the City can adopt/use. This is an area of active research by a number of organizations, including FEMA and SEAONC. I guess that it would be perhaps five years before the City could enact a comprehensive program of evaluations, although it may be possible to require wood frame buildings to be evaluated before then. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	This is an excellent idea but difficult to implement.

CAPSS Implementation Priority Worksheets

Recommendation 5: Require retrofits of vulnerable buildings. **Owners of vulnerable buildings should seismically retrofit their building for structural, fire, usability and falling hazards by specific deadlines, varying by building category.**	
General comments	This is the 3rd step of the CAPSS three-step strategy. After evaluation, vulnerable buildings would be seismically retrofitted over a 30-year period. See Table 5 (printed on the next page) from the CAPSS Report. Note that this is supplementary to Recommendation 1, which separately addresses required retrofit of 5+ unit, 3+ story wood-framed buildings.
Are public funds required?	Yes. Substantial funds would be required to develop and operate this program over this long period.
Are private funds required?	Yes. This would be a major cost to property owners. Providing funding mechanisms to assist owners pay retrofit costs is a major issue.
Is technical knowledge and information available to implement this action?	No. Knowledge for all building types will be developed over the coming years, as building timeframes become effective. Significant effort will be required to meet these technical development needs.
Political will	Unknown.
Known or expected opposition	Yes. Opposition expected from some affected property owners, and possible some tenants who are concerned about costs being passed on to them.
Is there public/staff interest and expertise in this subject?	Yes. Great public interest and expertise.
What resources/staff could implement this?	City staff not currently available to develop or operate this program. This will likely require consultant involvement and cooperation with outside groups such as the Structural Engineer Association.
Is legislation required?	Yes. Mandatory response requirements and budget to support the program would require legislative approval.
For additional information see below and *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 35–36 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 5

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

Table 5 Recommended Timeframe* for Applying the Three-Step Strategy to Key Categories of Buildings

Building Categories	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Wood-frame residential buildings with three or more stories and five or more units**						
Concrete tilt-up buildings						
Residential buildings with three and four units						
Private K-12 schools and private universities						
Assisted living facilities						
Concrete residential buildings built before 1980						
Other types of residential buildings with more than five units						
Hotels and motels serving tourists						
Critical retail stores and suppliers						
Single family homes and two unit residences						
Concrete non-residential buildings built before 1980						
Houses of worship						
Preschools and daycare centers						
Buildings used by large audiences						
Historic buildings						
Large buildings with welded steel moment frames built before 1994						
Early retrofitted buildings						
All other building types						

*The mandatory evaluation or retrofit program would begin at the start of the period and be completed by the end of the period.

**See Table 3 for the detailed schedule proposed in the draft ordinance developed by the Mayoral Task Force.

Color key***:

Step 1: Facilitate a market in which earthquake performance is valued	
Step 2a: Nudge market by requiring evaluation upon sale	
Step 2b: Nudge market by requiring evaluation by a deadline	
Step 3: Implementation period to require retrofit by a deadline	

*** Note: all previous steps remain in effect after advancing to a higher step.

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	Medium-high	0	1	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	0	1	1	1	1	1	(Add comments here.)
Sigmund	Freeman	Low	0	0	0	1	0	0	(Add comments here.)
Carla	Johnson	High	0	1	0	0	0	0	Like my comment for Recommendation 4, work on this project needs to start ASAP but implementation will be phased, first effective date 2016. City owned or leased residential buildings need to be prioritized and listed in the table and included in this time frame. Much of our most affordable housing that is serving our most vulnerable residents due to poverty or disability live in the SRO's under the master leases and the Housing authority in other instances. We should retrofit them early in the timetable. The residents are the ones most likely to be injured killed or displaced.
Stephen	King	Medium	0	0	0	1	0	0	(Add comments here.) With the collapse of the housing market, it will be at least 10 years before most property owners recover from this recession/depression. The sooner the gov't forces this on property owners, the more the taxpayers will be asked to subsidize this project. A great many of this type of bldg has withstood 2 large earthquakes. Many, many more have withstood the 1989 earthquake and several smaller quakes with little or no damage. This is definitely not the right time for such a huge gov't imposed project.
Mike	Martinet	Medium	0	0	0	0	0	1	(Add comments here.) Mother nature may take care of this before we can get significant compliance, except from those forward thinking building owners who want to survive with their real estate portfolios intact. We could put our efforts into parts of the CAPPS program where we would get a better return on our efforts given the perceived high costs involved with retrofitting.
George	Orbelian	High	1	0	0	0	0	0	Greatest seismic risk should have earliest deadlines to resolve most vulnerable/life threatening conditions. Let geologic conditions drive schedule; most vulnerable seismic areas = priority.
Kenneth	Paige	Medium	0	0	1	0	0	0	Large buildings with welded steel moment frames built before 1994: way too slow.
John	Paxton	High	1	0	0	0	0	0	[Per additional comments.]
Jeanne	Perkins	Medium	0	1	1	1	1	1	This is the ultimate solution. The timing and phasing of the work is critical, as you know.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	1	1	1	1	1	The most significant way to make San Francisco resilient to earthquakes is to improve the building stock, and mandating retrofits is the fastest/most effective way to do this. However, due the expensive and politically challenging nature of this, the City may want to spread the timeframe to longer than the thirty years recommended by CAPSS. It is important to note that it is likely that a major earthquake will strike the City sooner than thirty years, and that the City will only be partway through its mandatory retrofit program when an earthquake strikes. I think I would put pre-1980 concrete buildings higher on the priority list, since they are a potential major threat to life. They are, however, very costly to retrofit. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Good summary table.

Recommendation 6: Assist community service organizations to reach earthquake resilience. **The City should provide technical and financial assistance for important nonprofit organizations, medical clinics, daycare centers and similar organizations to seismically retrofit their buildings or relocate to better buildings.**	
General comments	Community service providers' continuity of service is an important part of overall city resilience. This action, in conjunction with item 2(e) above, could provide large benefits at low cost, for example by informing the public about non-structural mitigation options (e.g. equipment and supplies being restrained against falling). (Note that *structural* retrofits of housing and community service providers' facilities are addressed in Recommendation 5 above.)
Are public funds required?	Yes. Funds needed for some staffing required for program development. Some public funds could provide for effective demonstration projects.
Are private funds required?	Yes. Limited private funds required to address operational issues.
Is technical knowledge and information available to implement this action?	Yes. Readily available.
Political will	Expected.
Known or expected opposition	None known or anticipated.
Is there public/staff interest and expertise in this subject?	Little focused interest in this topic has been expressed by staff or public.
What resources/staff could implement this?	Some City staff may be available through related programs. Development of this material could be part of contract work.
Is legislation required?	No. However, staffing may require budget approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 37–38 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 6

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	Such buildings probably not owned by the target groups-leased?
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	1	0	0	(Add comments here.)
Sigmund	Freeman	Medium	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	1	0	0	(Add comments here.) No more Gov't spending on projects when SF is drowning in debt!!
Mike	Martinet	Medium-high	1	1	1	1	1	1	(Add comments here.) This could be enforced through the City's contracting and service provider agreements. Just as any private sector business that protects its critical parts supply chain by requiring its vendors to have business continuity plans in place, the City could require its partners and vendors to have continuity plans. The City could provide training, but each agency/vendor would have to create their own plans and certify them to the City.
George	Orbelian	Medium-high	1	1	0	0	0	0	Most vulnerable locations should be priority.
Kenneth	Paige	Medium	1	0	0	0	0	0	What about private schools and churches?
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	It is really tough to get this group to prioritize earthquake issues when they are dealing with no money and so much need right now.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	1	0	0	0	0	Related to rec 2e. Very important because many businesses and organizations are critical to the City's resilience, but may be very vulnerable and have limited ability to improve their resilience on their own. The City should help with education programs (rec 2e) and with staff assistance to develop resilience plans and implement them. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 7: Establish clear responsibility within City government for preparing for and reducing risk from earthquakes. **The City should identify a single official in the Chief Administrative Officer's Office to be responsible for achieving earthquake resilience through mitigation, response and recovery.**	
General comments	This is essential to the implementation of CAPSS recommendations. At this time, the overall responsibilities related to CAPSS program implementation have been assigned to the City Administrator. After the development and adoption of the CAPSS work plan, some responsibilities may be distributed to other designated agencies.
Are public funds required?	Yes. Staffing, support, work space, etc. all require funding support.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Yes.
Known or expected opposition	None known.
Is there public/staff interest and expertise in this subject?	Great interest and appropriate staff expertise.
What resources/staff could implement this?	Additional staff may be required in the future, including "Seismic Safety Ombudsmen" as recommended in CAPSS report.
Is legislation required?	No, however staffing and program costs may require budget approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 39 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 7

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	0	0	0	0	0	How about a czar-like Robert Moses (NYC), Haussmann (Paris), Olmstead (various public parks).
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	0	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium-high	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) There are already emergence response teams in position.
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.) Resiliency will remain a dream without someone driving the program and the process. This would also put the City in position for an accelerated recovery because there would be knowledgable staff in place to manage the recovery process and provide professional expertise to the political leadership in time of crisis.
George	Orbelian	High	1	0	0	0	0	0	This could also be accomplished by various departments in the City embracing a plan/strategy that connects to state of California preparation/response standards-could also have a board of experts (ABAG, SPUR, SEONC, ATC, etc.).
Kenneth	Paige	Medium	1	0	0	0	0	0	I nominate Laurence!
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	1	1	1	1	1	While a "leader" is critical, a culture of mitigation and preparedness MUST be embedded in all departments and city activities. When I worked with San Jose and Oakland to prepare their long-term recovery plans, we involved dozens of folks - and made it clear that the responsibility for planning for shortening long-term recovery was ALL of their responsibilities.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	(Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Agree.

CAPSS Implementation Priority Worksheets

Recommendation 8: Adopt improved post-earthquake repair standards. **The City should enact updated post-earthquake repair and retrofit standards developed by CAPSS and expand this approach to other building types.**	
General comments	This was a critical component of the CAPSS report. Most necessary work has been done to proceed with final development and adoption. While basic post-earthquake repair/retrofit standards are in current codes, most experts agree that existing standards are difficult to apply and do not reflect desired policy related to building performance.
Are public funds required?	No.
Are private funds required?	No. (After an earthquake, private funds will, of course, be required to execute repairs and retrofits.)
Is technical knowledge and information available to implement this action?	Yes, although some building types require further technical development. Some of the elements of this program have been detailed in the CAPSS report and will be relatively easy to implement. Other elements require substantial analysis and preparation.
Political will	Unknown.
Known or expected opposition	None known or expected.
Is there public/staff interest and expertise in this subject?	Great interest and expertise in the technical/professional engineering community. Limited staff interest or expertise.
What resources/staff could implement this?	City staff has limited time; some of the remaining work may be best done under contract.
Is legislation required?	Yes. Some code revisions required.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 40 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 8

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	0	0	0	0	ATC?
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	High	1	0	0	0	0	0	(Add comments here.)
Sigmund	Freeman	High	1	0	0	0	0	0	This was the primary reason for originally establishing the CAPSS program. If we do not have a process established before the next damaging earthquake, we are going to be in big trouble with FEMA and insurance companies.
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Medium	0	0	0	0	0	1	(Add comments here.) With the collapse of the housing market, it will be at least 10 years before most property owners recover from this recession/depression. The sooner the gov't forces this on property owners, the more the taxpayers will be asked to subsidize this project. A great many of this type of bldg has withstood 2 large earthquakes. Many, many more have withstood the 1989 earthquake and several smaller quakes with little or no damage. This is definitely not the right time for such a huge gov't imposed project.
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	Medium-high	1	1	0	0	0	0	The expected repair protocol should be addressed at evaluation of seismic vulnerability and construction resiliency.
Kenneth	Paige	Medium	1	0	0	0	0	0	Of course!
John	Paxton	High	1	0	0	0	0	0	[Per additional comments.]
Jeanne	Perkins	High	1	0	0	0	0	0	Private and public standards need to be the same to collect FEMA funds for retrofit, not just repair, of damaged buildings.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	This is relatively easy to accomplish and should be done immediately. It may require an outside contract to expand the approach developed by CAPSS to additional building types. That can happen independently from the approach being adopted. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 9: Offer incentives for retrofit of buildings. **a. Amend the Planning Code and other City statutes and regulations to offer incentives to building owners who voluntarily conduct seismic retrofits, to allow changes to their buildings that would increase their value.**	
General comments	Some CAPSS participants believe that additional incentives for retrofits are important adjuncts to current permit incentives and possible financial assistance. Incentives might be such as density bonuses or parking waivers. These are difficult and highly complex issues that would require involvement and approval by multiple agencies.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Generally yes, although compilation of materials and analysis of possible incentives could require more research.
Political will	Unknown.
Known or expected opposition	Unknown. Significant opposition is possible if Planning or other Code changes are proposed. Building owners are very interested in incentives that might offset the burdens of seismic upgrade costs.
Is there public/staff interest and expertise in this subject?	Great public and staff interest in mitigation incentives.
What resources/staff could implement this?	Little City staff not available at this time. This could be done under future City department work plans or under contract.
Is legislation required?	Yes. Most incentives would require changes to codes or regulations.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 41 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(a)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	Incentives OK but owners must take responsibility-prevailing sense of entitlement to be overcome.
Catherine	Bauman	Medium-high	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	0	0	0	0	This concept is great, butI really can't think of any real incentives that could be reasonably implemented. "Waiving parking requirements" only applies when adding additional housing units and that usually has far more discouraging problems than parking, mainly requirements such as "1 hour fire rate the entire building." If a way could be found to add one or more additional units to existing buildings without triggering code upgrades to the entire building, then that would be a terrific incentive and would tie in exrtremely well with the seismic program since just about all units that could be added would be on the ground floor where the seismic work is being done.
Sigmund	Freeman	Medium-high	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	1	0	0	(Add comments here.) With the collapse of the housing market, it will be at least 10 years before most property owners recover from this recession/depression. The sooner the gov't forces this on property owners, the more the taxpayers will be asked to subsidize this project. A great many of this type of bldg has withstood 2 large earthquakes. Many, many more have withstood the 1989 earthquake and several smaller quakes with little or no damage. This is definitely not the right time for such a huge gov't imposed project.
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Add garages, basements, rooms, improve foundations, yards, stairs, etc.. Improve property value & create jobs.
Kenneth	Paige	Medium	1	0	0	0	0	0	Great-if you could actually make this happen. Not likely.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	0	0	0	0	If you could snag some state or federal grant funds, this is the perfect type of project that could be applicable for more than just San Francisco.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	1	0	0	0	0	The first step is to study this and engage the Planning Dept, which has not been a major participant in earthquake mitigation planning so far. These incentives have the most potential to encourage voluntary retrofits because some of them offer real value to building owners because they would increase the value of their buildings. These are appealing because they have no financial cost to the City. However, the politics of the incentives are likely to be very tricky -- some or all of them may be totally infeasible. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	See previous comments on incentives. (Recommendation 1: "Should start this immediatley. Any delay will postpone the effort until the deadline. Various incentives should be part of the program. Funds should be found to jump-start the effort. A previous thought included a well advertised competition to assist first-starters with partial funding and professional discounts; with filming of typical retrofitting procedures.")

CAPSS Implementation Priority Worksheets

Recommendation 9: Offer incentives for retrofit of buildings. **b. Allow owners to pass through the full costs of voluntary seismic retrofits that meet Department of Building Inspection (DBI) code standards.**	
General comments	This is a highly complex and socially sensitive recommendation.
Are public funds required?	No.
Are private funds required?	Unknown -this could affect private funding issues related to voluntary retrofits.
Is technical knowledge and information available to implement this action?	Yes, although most of the issues are non-technical.
Political will	Unknown.
Known or expected opposition	This is likely to be opposed by many tenants and housing advocacy organizations based on impacts of increased rent from pass-through of seismic retrofit costs.
Is there public/staff interest and expertise in this subject?	Great public and staff interest in this and other mitigation incentives.
What resources/staff could implement this?	City staff not currently available, although this could become part of future City department work-plans.
Is legislation required?	Yes.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41–42 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(b)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Low	1	1	1	0	0	0	Owners must take on some of the burden-responsibility of ownership.
Catherine	Bauman	Medium	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	High	1	0	0	0	0	0	This is critical if you really want any meaningful amount of voluntary work to be done. This is true even though most owners would not do the pass throughs; somehow the right to do it is psychologically very helpful in making these kind of decisions.
Sigmund	Freeman	Medium	0	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Low	0	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) If the City were to abolish Gov't forced Owner subsidized housing, this wouldn't be an issue.
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Market rents will drive the amount of passthroughs. Retrofit buildings could be required to provide tenants with "renters' insurance" policies-adding value & economic resiliency to the community.
Kenneth	Paige	Medium	1	0	0	0	0	0	If you cannot pass through-then you cannot mandate.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Low	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	High	1	1	1	1	1	1	The SF Rent Board already has financial hardship guldelines that allows qualified tenants to defer or not pay for passthroughs. Perhaps, the guidelines need to to tweak to take into account the possible huge costs from retrofitting. Also, perhaps a certain percentage of the rent controlled units in a building that has undergone retrofitting can be deregulated from rent control for a certain length of time. The above comments apply to both voluntary and non-voluntary retrofits.(Add comments here.)
Laura	Samant	Medium-high	0	0	0	0	0	0	Many building owners see this as of symbolic importance, although it is unlikely to change the status quo too much. I think that it is important for the City to show building owners that it is investigating this issue, as a matter of good faith. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Sounds impossible.

CAPSS Implementation Priority Worksheets

Recommendation 9: Offer incentives for retrofit of buildings. **c. Maintain fee waivers and expedited review for voluntary seismic retrofits of vulnerable wood-frame residential buildings.**	
General comments	A program of plan review fee waivers and expedited review has been in place for the past few years, with few projects taking advantage of these incentives. Expect more owners to do so as mandatory retrofit program deadlines approach.
Are public funds required?	Yes, there are City costs resulting from fee waiver programs that require services without payment.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Yes, legislation is already in place.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Yes.
What resources/staff could implement this?	City staff already assigned.
Is legislation required?	No additional legislation anticipated.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41–42 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(c)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	Current system is good.
Catherine	Bauman	Medium	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	0	0	0	0	0	I think this sounds better to politicians and city officials than it does to property owners. In any event, it is better than the alternative, but the amount of money saved is so small relative to the overall project cost that, like you say above, it will probably only be a motivator during the brief period that it is expiring.
Sigmund	Freeman	Medium-high	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium-low	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Does this mean that non-voluntary seismic retrofits will be overcharged and slowed down?
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Should be geology driven-seismic SWAT teams for structural and non structural work.
Kenneth	Paige	Medium	1	0	0	0	0	0	Absolutely!
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-high	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	These incentives are not particularly effective at motivating retrofits, but offer a token of appreciation to building owners who voluntarily retrofit and should be continued. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	See previous comments on incentives. (Recommendation 1: "Should start this immediatley. Any delay will postpone the effort until the deadline. Various incentives should be part of the program. Funds should be found to jump-start the effort. A previous thought included a well advertised competition to assist first-starters with partial funding and professional discounts; with filming of typical retrofitting procedures.")

CAPSS Implementation Priority Worksheets

Recommendation 9: Offer incentive for retrofit of buildings. **d. Adopt a policy that assures that those who voluntary retrofit to appropriate standards would not be required to do more work for 15 years, even if standards change.**	
General comments	San Francisco Ordinance #54-10, which currently provides the authority for incentives for seismic strengthening of soft-story wood-frame buildings, already includes this policy in Section 1, item 9.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes. Completed.
Political will	Yes. Completed.
Known or expected opposition	No.
Is there public/staff interest and expertise in this subject?	Yes. All parties will want to be assured that any future retrofit standards, whether voluntary or mandatory, would not change within 15 years or other designated timeframe.
What resources/staff could implement this?	Staff are available to provide assistance in this and related topics.
Is legislation required?	No further legislation required.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41–42 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(d)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	0	0	0	0	0	Good carrot-hits the owners' perception that do it now is better.
Catherine	Bauman	Medium	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	0	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	0	0	0	0	0	If this has already been accomplished, why is it listed?----------
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) It is not the Gov't's job to force law-abiding property owners to spend their life savings or borrow against their property to make questionable improvements dictated by political power brokers.
Mike	Martinet	Medium	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	All incentives to improve seismic resiliency should be considered-especially those that also add property value, space, functionality.
Kenneth	Paige	Medium	1	0	0	0	0	0	(Add comments here.)
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-high	1	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	0	0	0	0	0	This should cover all building types that retrofit to an accepted code, not just wood frame buildings. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Good.

Recommendation 9: Offer incentive for retrofit of buildings. **e. Publicize how to use the recently passed transfer tax rebate for seismic safety upgrades.**	
General comments	Possibly an important incentive when considered as part of a comprehensive incentive package.
Are public funds required?	Unknown.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Unknown.
Political will	Yes. Legislation has been passed.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Little public awareness; great staff interest as this has been shown in other cities to be an effective seismic upgrade incentive strategy.
What resources/staff could implement this?	Unknown.
Is legislation required?	Yes. Already done.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41–42 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(e)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	This is roundabout way of getting the public to pay for owner's responsibilities.
Catherine	Bauman	Medium	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	1	1	0	0	(Add comments here.)
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) (Add comments here.) It is not the Gov't's job to force law-abiding property owners to spend their life savings or borrow against their property to make questionable improvements dictated by political power brokers.
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	One element of the funding solution.
Kenneth	Paige	Medium	0	0	0	0	0	0	Why transfer rebate? I don't understand this one.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-high	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	0	0	0	0	0	Easy. But also likely to be of modest value, because the dollar amounts are pretty low. The process to take advantage of this incentive should be clarified (when, how), and the standard of retrofit that applies also needs to be clarified. Does strapping a water heater count? Berkeley initially had problems because they did not have standards for the work that qualified for rebates and have no knowledge about whether some of the work done in the early years of their program actually improved seismic resilience. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 9: Offer incentive for retrofit of buildings. **f. Publicize and facilitate the process for building owners to make sure that seismic retrofit work is exempted from property reassessments.**	
General comments	Publicizing incentives may encourage property owners to undertake seismic retrofit work.
Are public funds required?	Some persons may consider this exemption from property tax reassessment to be a use of public funds.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Yes, this is current law.
Known or expected opposition	No.
Is there public/staff interest and expertise in this subject?	Unknown.
What resources/staff could implement this?	Unknown.
Is legislation required?	No. Law already in effect.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41–42 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(f)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	1	0	0	(Add comments here.)
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Medium	1	0	0	0	0	0	(Add comments here.)
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.) Many of these related recommendations should be part of a comprehensive package of incentives/regulations.
George	Orbelian	High	1	0	0	0	0	0	This is public/private partnership. If seismic work is not completed then public funds will be used anyway.
Kenneth	Paige	Medium	1	0	0	0	0	0	Easy solution.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-high	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	I think this is already pretty routine in SF. It would be good to have a simple pamphlet that explains all city incentives from all departments, and how and when to take advantage of them and what they cover. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Yes.

CAPSS Implementation Priority Worksheets

Recommendation 9: Offer incentive for retrofit of buildings. **g. Change the Planning Code to prevent owners of buildings demolished after an earthquake from rebuilding to prior nonconforming conditions, unless the building was seismically retrofitted before the earthquake.**	
General comments	This could provide both an incentive to retrofit and address some post-earthquake rebuilding issues. This is one of three current major post-earthquake regulations that may shape reconstructed housing (the other two will exempt reconstructed housing from rent control and from condominium conversion regulations).
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Great public and some staff interest.
What resources/staff could implement this?	Some limited Planning Department and other City staff time would be required to prepare revision to Planning Code.
Is legislation required?	Yes. Requires revision to the Planning Code.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41 & 43 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(g)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Low	0	0	0	0	0	0	I think this is a very bad idea at the present time because if a major earthquake occurs sooner rather than later and very many multifamily buildings had to be demolished, it would greatly decrease the number of rental units in some neighborhoods and change the character of those neighborhoods. A lot of people don't seem to realize how drastically some of our most popular and beautiful neighborhoods have been downzoned and how much less of the lot can be covered with a building.
Sigmund	Freeman	Medium	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Medium	0	0	0	0	0	1	(Add comments here.)
Mike	Martinet	High	1	0	0	0	0	0	(Add comments here.)See previous commment
George	Orbelian	High	1	0	0	0	0	0	Any building demolished after an earthquake should be rebuilt to a standard that would survive a future event utilizing state of the art engineering/construction at the time.
Kenneth	Paige	Medium	1	0	0	0	0	0	Great idea-but unlikely to pass.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	0	0	0	0	0	This seems like a really clever idea.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	This policy should be rationalized, but I am not sure that this is a major disincentive for retrofit. I have heard some concern expressed that this could reduce the number of units that could be rebuilt after an earthquake, which would go against other policy to keep the City family friendly, etc. Berkeley has some problems that its neighborhoods had been downzoned in the 70's, which means that if large concrete residential buildings need to be demolished after future earthquakes, the City will lose a lot of housing that it cannot replace. This may fit under reco very planning efforts that the City currently has underway. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Should discuss this.

Recommendation 9: Offer incentive for retrofit of buildings. **h. Review, extend and document as appropriate historical resources both within designated historic districts, and individually, and conduct earthquake vulnerability assessments.**	
General comments	Many San Franciscans believe that maintaining the City's historic resource buildings is critical to resiliency, particularly in preserving the City's "sense of place" in attracting tourists and businesses. This is a precursor to Recommendation 2(h) regarding post-earthquake historic building actions. This Recommendation is in conjunction with Recommendation 4, evaluation.
Are public funds required?	Yes, funds could be required for survey and other historic resources review staff or contract work.
Are private funds required?	Possibly, for individual building vulnerability and other assessments.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	Some possible opposition to expanding City focus on "historic resources".
Is there public/staff interest and expertise in this subject?	Yes. Expected significant support among historic preservation advocates. Substantial staff expertise in various departments.
What resources/staff could implement this?	Unknown.
Is legislation required?	Possibly. Official designation of historic resources requires legislative action. Mandating "vulnerability assessments" or evaluations would require legislation.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41 & 43 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(h)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	Maintain the city character-very important.
Catherine	Bauman	Medium-high	0	1	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	0	0	0	0	0	0	Again, I don't really understand what this means . . . It is already pretty difficult to get a demolition permit. I think it would be more important to not allow assembly of multiple lots where multiple buildings had to be demolished. One of our most important architectural inheritances is the fabric of multiple 'small' buildings on adjacent lots built and owned by different people so they all develop some individuality. Large, centrally managed buildings don't allow this fabric to develop.
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) (Add comments here.) It is not the Gov't's job to force law-abiding property owners to spend their life savings or borrow against their property to make questionable improvements dictated by political power brokers.
Mike	Martinet	Medium	0	0	0	0	0	0	(Add comments here.)Don't really understand this one.
George	Orbelian	High	1	1	1	0	0	0	Geology should drive this schedule. Vulnerable construction in vulnerable seismic areas should be priority.
Kenneth	Paige	Medium	1	0	0	0	0	0	(Add comments here.)
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	1	0	0	0	This has two parts: identifying historic resources and evaluating their earthquake vulnerability. (Why is this under the incentives rec? I guess it probably started as some sort of historic retrofit incentive, and then got edited through successive rounds of receiving comments… Existing historic incentives are problematic and unlikely to have wide appeal.) The Planning Department is working to inventory historic properties City wide. "Evaluations" in this rec could mean developing protocols that identify unique aspects of evaluation relevant to historic buildings, or mandating evaluations, or identifying common seismic weaknesses in historic buildings and using existing City data about historic buildings to try to state the vulnerability of the City's historical resources overall, identify the most vulnerable building types… This is important to resiliency, but of lesser importance in my opinion than housing and community organizations. Thus the medium. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Turn this over to appropriate group(s).

Recommendation 9: Offer incentive for retrofit of buildings. **i. Provide need-based loans for qualified retrofits.**	
General comments	Providing some funding mechanism for private building retrofits appears to be a necessary element of a San Francisco earthquake hazard mitigation program.
Are public funds required?	Possibly, depending on funding strategies adopted.
Are private funds required?	Unknown.
Is technical knowledge and information available to implement this action?	No. Additional review of possible funding sources and mechanism is required.
Political will	Apparently yes, loan or other funding programs are seen as necessary.
Known or expected opposition	Some opposition to any funding program is anticipated, but great support of funding programs is expected by building owners.
Is there public/staff interest and expertise in this subject?	Strong interest on the part of all parties.
What resources/staff could implement this?	Some staff is currently available in various City agencies.
Is legislation required?	Yes, most funding programs would require legislation; bond measures would require 2/3rds voter approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41 & 44 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(i)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Low	1	1	0	0	0	0	Building owners getting into my pocket!
Catherine	Bauman	Medium	0	1	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) (Add comments here.) It is not the Gov't's job to force law-abiding property owners to spend their life savings or borrow against their property to make questionable improvements dictated by political power brokers.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.) Could we get FEMA Hazard mitigation funds to supplement a combination of other public and private funds to leverage the funding?
George	Orbelian	High	1	1	0	0	0	0	Resiliency bank. Real estate secured credit cards. Credit unions. Investments (2% to 4%) interest bearing instruments that are secure and outperform other institutional savings returns. "Invest in your community."
Kenneth	Paige	Medium	0	0	0	0	0	0	Unlikely.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	1	0	0	0	(Add comments here.)
Bill	Quan	High	1	1	1	1	1	1	Please eliminate obstacles that prevented the old UMB loan program from being used. Perhaps, requirements for the use of the loan can be lessened if it is only a partial loan. That is, the retrofit is funded by both a city loan and property owner's funds. This should apply to both voluntary and non-voluntary retrofits.(Add comments here.)
Laura	Samant	High	0	0	0	0	0	0	This is a broad rec. A financing scheme is high priority for any mandatory retrofit. The nature and scope of that program will need to be negotiated. Any loan programs should seek to learn lessons from the UMB loan program, which is widely believed to have been ineffective for private building owners. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

Recommendation 9: Offer incentive for retrofit of buildings. **j. Advocate for federal and state incentives.**	
General comments	In conjunction with Recommendation 9(i), incentives could be based on local, state, or federal programs.
Are public funds required?	No, federal & state incentives would not likely require local funds.
Are private funds required?	Not likely.
Is technical knowledge and information available to implement this action?	Unknown.
Political will	Expected.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Significant interest by all parties in federal and state incentives.
What resources/staff could implement this?	Some limited city staff is available for this work.
Is legislation required?	Not likely to require local legislation.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 41 & 44 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 9(j)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	A 5-10 year depreciation schedule would be a great incentive for investment properties. It is currently 27.5 years for residential and 40 years for commercial buildings, which is a disincentive to investment in my opinion.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) (Add comments here.) It is not the Gov't's job to force law-abiding property owners to spend their life savings or borrow against their property to make questionable improvements dictated by political power brokers.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.) Could we get FEMA Hazard mitigation funds to supplement a combination of other public and private funds to leverage the funding?
George	Orbelian	Medium-high	1	1	1	1	0	0	Adhere to state and federal guidelines except where 1) we can improve upon them and, 2) where our conditions dictate our own unique approach.
Kenneth	Paige	Medium	0	0	0	0	0	0	I think the City needs to have all programs in place before going to state and feds. Let's do our homework first.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-low	0	0	0	0	0	0	Sure, advocate for specific changes that impact the City, like a change to the Mello-Roos laws. Mainly, the City should focus on what the City can do. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Yes, need to explore all possibilities; set up a small commitee to do this.

CAPSS Implementation Priority Worksheets

Recommendation 10: Require automatic gas shut-off valves on select buildings. **The City should require owners of certain vulnerable buildings and buildings in Fire Department designated Post-Earthquake High Fire Hazard Areas to install automatic gas shutoff valves.**	
General comments	Automatic seismic gas shut-off valves have been the subject of extensive research and debate. A city-wide use would have high social consequences (loss of heat, hot water, and cooling for extended periods with grave impacts on vulnerable populations.) Localized use of automatic gas shut-off valves in specific, highly vulnerable buildings or areas may have some benefits in reducing the number of post-earthquake fires.
Are public funds required?	No.
Are private funds required?	Yes. Modest cost of installation of automatic gas shut-off valves and related permit fees.
Is technical knowledge and information available to implement this action?	Technical information about valves is available, however additional review is required to determine if this is an appropriate strategy and to designate buildings or building types to be fitted with valves.
Political will	Unknown.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Great public interest but limited expertise.
What resources/staff could implement this?	City staff not currently available. Could possibly be part of contract work.
Is legislation required?	Yes, legislation would be required to mandate installation of automatic gas shut-off valves.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 45 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 10

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	0	0	0	0	In light of expected ignitions this needs a solution, polarizing subject.
Catherine	Bauman	Medium-high	0	0	1	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	I think the negative social consequences are overstated and can be dealt with by training and information.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) (Add comments here.) It is not the Gov't's job to force law-abiding property owners to spend their life savings or borrow against their property to make questionable improvements dictated by political power brokers. Any mandated action should be completely paid for by the people who support this idea.
Mike	Martinet	Medium	0	0	0	0	0	0	(Add comments here.) This is an all or none proposition to me. One unprotected meter could endanger a wide area.
George	Orbelian	High	1	0	0	0	0	0	Geologic conditions should drive this schedule. Greatest seismic risk/construction vulnerability should be priority.
Kenneth	Paige	Medium	0	0	0	0	0	0	Required already by insurance underwriters.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	1	0	0	0	0	I would definitely limit the number and type of buildings for this - and it will take a few years to figure out how to best do this.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	1	0	0	0	0	There are very strong opinions on both sides of this issue, but it is clear that fire risk is a major threat for the City. The first step should be to study this issue more by examining what other communities are doing - many other cities already require automatic gas shutoff valves. Also to further examine the downsides of these valves, and seek to develop a policy that focuses only on those buildings where there would be maximum benefit and minimum social impacts. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Very important issue, should pursue.

CAPSS Implementation Priority Worksheets

Recommendation 11: Track evaluations and retrofits in a database system. **The City should include information relating to seismic evaluations and retrofits in DBI's updated database system to allow tracking progress of mitigation activities, recording inventories, evaluation reports and retrofit information.**	
General comments	Determining the success and weaknesses of the earthquake hazard mitigation program requires modern data collection and reporting capabilities. A state-of-the-art permit and data collection and tracking system is currently being developed through Department of Building Inspection (DBI) and other agencies.
Are public funds required?	Yes. Already authorized.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Yes. Systems have already been approved.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Great interest by both public and staff.
What resources/staff could implement this?	Some collaboration with CAPSS and other hazard mitigation staff will assist system developers in providing specific fields and features allowing data capture, tracking and reporting of seismic program data.
Is legislation required?	No. Authorization and funding already in place.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 46 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 11

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium-high	1	0	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.)
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.) Very important to know how far along the process we are at any point. Important to prove to the Feds that we are serious and making good use of whatever funding we might be able to get.
George	Orbelian	High	1	0	0	0	0	0	Interate DBI with ABAG seismic address information.
Kenneth	Paige	Medium	1	0	0	0	0	0	Good idea.
John	Paxton	High	1	0	0	0	0	0	[Per additional comments.]
Jeanne	Perkins	High	1	1	1	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	It is important to make sure that DBI designs it new system in a way that anticipates future mitigation needs, and is flexible. This is an opportunity that should not be missed. It should not be high cost. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	This is a "must".

CAPSS Implementation Priority Worksheets

Recommendation 12: Provide technical assistance for building retrofits. **a. Develop standard plan sets for retrofits of typical San Francisco buildings.**	
General comments	Retrofit of many one- or two-family dwellings is necessary to meet City shelter-in-place and other resilience goals. To implementation Recommendations 2(b), retrofit training, 2(c) water heater bracing, and 2(d), nonstructural improvements, a standard plan set would be of great help. This plan set is currently under development. Key challenge is communication of technical information to general public.
Are public funds required?	Some funds required for final graphic development, printing and distribution of plans and related materials.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes. Almost all technical information is available, but communication strategy for this material is still being developed. Final details are being developed for such details as garage-door reinforcement and water heater bracing.
Political will	Yes.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Great public and staff interest.
What resources/staff could implement this?	Yes. The current project is being done by City staff in cooperation with volunteer structural engineers and others.
Is legislation required?	No.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 47 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 12(a)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	0	0	0	0	0	0	Would not be broadly applicable. We already have IEBC-needs updating which is in progress. [N.B. no timeline indicated.]
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	0	0	0	0	I am not convinced at this point that "many one or two-family dwellings" will need to be retrofitted. Probably over 80% of the one story, house-over-garage buildings are mid-block and the front longitudinal walls directly abut the neighbors walls. This is also true of a smaller but still significant percentage of the two unit buildings.
Sigmund	Freeman	Medium-high	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	My comments are siilar to an earlier recommendation. have specialized expertise inspectors. Have a mandatory start work conference to go through site specifc variables. Engage engineering students as interns on an annual basis)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Smart phone based, internet based/YouTube, SFGOVTV program, SFGOV website based.
Kenneth	Paige	Medium	1	0	0	0	0	0	Make it wasy and immediately intuitive and understandable. Do this now.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	0	0	0	0	0	This is particularly important for homes.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	One and two unit wood frame building owners in SF are really wondering what to do with their buildings, and there is no clear information available to them currently. Standard plan sets are important, and they should be embedded in public information that explains WHEN and building should be retrofit (how to make the decision -- homeowners can't trust engineers that would profit from their decision to retrofit), whether they can do any of the work themselves, and what they should be asking professionals to do. Standard plan sets will reduce costs, but it also needs to be clear when standard plan sets do not apply. This is linked to rec 2b. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Good idea.

CAPSS Implementation Priority Worksheets

Recommendation 12: Provide technical assistance for building retrofits **b. Provide training for engineers and other licensed professionals in conducting building seismic evaluations.**	
General comments	This professional training in building evaluation for architects and engineers is an essential follow-up to the ATC 71-1 soft story program currently under development (see Recommendation 1 above) as well as a part of Recommendations 3 & 4.
Are public funds required?	No, except for limited funds for training materials and demonstration projects. Funds required for staff time to prepare and execute training and development of video and other media materials.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	No. Currently being developed.
Political will	Yes, expected.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Great public and professional interest.
What resources/staff could implement this?	City staff not currently available for training. This could be done through professional organizations.
Is legislation required?	No, except that staff and some demonstration project materials may require budget approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 47 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 12(b)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium-high	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	0	0	0	0	0	Work with the professional organizations. consider making it a mandatory part of maintaing license or part of continuing education units)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	1	1	0	0	0	This should be part of all trades'/design/engineers'/architects'/planners'/etc. continuing education. New job opportunities "workersnow.org".
Kenneth	Paige	Medium	1	0	0	0	0	0	Have Pat do this-as a pro bono service to the city.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-high	1	1	0	0	0	0	It seems like someone else should take the lead on this one.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	0	0	0	0	0	This should accompany a mandatory retrofit program. Things will work better if the City makes sure engineers and contractors understand new codes and new requirements. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Good.

Recommendation 12: Provide technical assistance for building retrofits **c. Provide information on retrofit costs and effective technical approaches based on experience as the program progresses.**	
General comments	Similar to Recommendation 12(b), basic seismic upgrade demonstrations focusing on costs and related impacts for owners, contractors, city staff and others will be valuable in implementing seismic evaluation and upgrade programs. Owner education and cost calculations are essential parts of this.
Are public funds required?	No, except for limited funds for training materials, demonstration projects and staff time to prepare and execute training and development of video and other media materials.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	No. Currently being developed
Political will	Yes.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Great public interest.
What resources/staff could implement this?	City staff not currently available.
Is legislation required?	No, except that some staff and demonstration project materials may require budget approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 47 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 12(c)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Low	0	0	0	0	0	0	I don't think this item is needed. The relevant concepts are covered in other worksheets and the City is not going to have that great a handle on day to day costs since the City is not involved in the negotiations and contracts between contractors and private owners. Based on past experience with the UMB program, the costs paid by non-profit owners, which other City departments might have access to, will be wildly inflated above the costs paid by legitimate business owners.
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Engineering/construction seismic SWAT teams, structural/non-structural earthquake preparedness supplies, Red Cross.
Kenneth	Paige	Medium	0	0	0	0	0	0	Costs are up to the owner. Don't get involved.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	0	0	0	0	Again, perhaps some other organization can take the lead ont this one.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	1	0	0	0	0	This would be good to monitor for City purposes, so it can understand the impacts of any mandatory programs before it imposes more. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

Recommendation 12: Provide technical assistance for building retrofits **d. Provide training for design professionals and contractors in conducting seismic retrofits.**	
General comments	Similar to Recommendations 12(a) and 12(b), actual seismic retrofit training programs will likely be based on demonstration projects made available through videos and other media.
Are public funds required?	No, except for limited funds for training materials, demonstration projects and staff time to prepare and execute training and development of video and other media materials.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	No, currently being developed.
Political will	Yes.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Great public interest.
What resources/staff could implement this?	City staff not currently available.
Is legislation required?	No, except that staff costs and some demonstration projects may require budget approval.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 47 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 12(d)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	Work with the professional organizations. Make the training a required part of continuing education units----------
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Web based programs with technical assistance. Simpson programs. Garage door retrofit programs.
Kenneth	Paige	Medium	0	0	0	0	0	0	Have City College or SF State offer this course-not the City.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	(Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 12: Provide technical assistance for building retrofits **e. Develop additional building code standards, as needed, to reduce hazards and improve post earthquake building usability, including bracing of mechanical and other heavy equipment and shelves, elevator functionality, etc.**	
General comments	Substantial benefits in City resilience can possibly be accrued at low costs through non-structural hazard mitigation programs (bracing equipment, etc). Lessons learned from recent earthquakes in Chile and other places show this to be both important and relatively easy to achieve.
Are public funds required?	No, although implementing programs for bracing equipment and related measures for public buildings will be a public expense.
Are private funds required?	No, although implementing programs for bracing equipment and related non-structural measures for private buildings will be a private building expense.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Moderate public and staff interest.
What resources/staff could implement this?	No staff currently available to implement this – possibly could be best done as contract work.
Is legislation required?	No, except possible budget approval for public building nonstructural retrofit implementation.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 47 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 12(e)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	0	0	0	What happens to refrigerators in a major earthquake and what have been the implications for resilience?
Sigmund	Freeman	Medium	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium-low	1	0	0	0	0	0	(Engage the building Standards commission. Lobby at the State level..)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Seismic SWAT teams. Structural/non-structural.
Kenneth	Paige	Medium	1	0	0	0	0	0	Yes-but keep it simple.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	Can this be done with the support of Service Groups?
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	(Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 12: Provide technical assistance for building retrofits **f. Conduct inventories of structural types and building uses of concern.**	
General comments	Information is needed to understand the seismic hazards posed by a variety of less-common building types and uses. General inventories are needed of concrete tilt-up buildings, concrete-and-steel buildings with masonry infill, pre-1994 steel moment frame buildings and others. Also needed is information about day care centers, preschools, private schools, social service and medical service providers, and others. This data will indicate how to proceed with hazard mitigation and resilience programs.
Are public funds required?	Yes, Funds are required for staffing or consulting contracts to collect, compile, and analyze data.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Moderate interest by public and staff.
What resources/staff could implement this?	City staff not currently available. These activities may be done under contract.
Is legislation required?	No, except funding for possible inventory programs.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 47–49 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 12(f)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	0	0	0	0	Non-ductile concrete apartment buildings & schools a priority.
Catherine	Bauman	High	1	0	0	0	0	0	1st step for other steps.
Tim	Carrico	Medium-high	1	1	0	0	0	0	Needs to be done . . .
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Should be geology driven. Seismic/construction vulnerability.
Kenneth	Paige	Medium	1	0	0	0	0	0	Necessary.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-low	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	1	1	0	0	0	0	This will help the City better understand the scope of its risk, and needed programs to improve resiliency, as well as who might be affected by future mandatory retrofit programs. Like the wood frame soft-story inventory, this might be partly doable with volunteers from professional organizations, at low cost to the City. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Agree.

CAPSS Implementation Priority Worksheets

Recommendation 13: Enact a façade ordinance. **An ordinance should require periodic inspection of façades, parapets and decorative features fixed to building exteriors, and require repair of materials found to be falling hazards.**	
General comments	Older SF buildings are reaching an age where exterior building elements, such as building facings and facades may be suffering from corrosion, fractures and general deterioration. This may result in an increasing number of serious falling hazards. Earthquakes will cause many façade failures. Many other cities have such façade inspections and maintenance requirements.
Are public funds required?	No.
Are private funds required?	Private funds will be required for inspection and necessary maintenance/repair.
Is technical knowledge and information available to implement this action?	Yes, model ordinances are available from other cities.
Political will	Unknown.
Known or expected opposition	Some opposition from building owners is anticipated based on costs of evaluation.
Is there public/staff interest and expertise in this subject?	Some public and staff interest.
What resources/staff could implement this?	City staff not currently available. Compiling model façade ordinances is a 2011 intern project, but additional staff or consultant time will be required to prepare and present an ordinance.
Is legislation required?	Yes. An ordinance amending the San Francisco Building Code would be required.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 50 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 13

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	If owners can't afford this, they can't afford to own.
Tim	Carrico	Medium	0	1	1	0	0	0	Should come into effect after a suitable 'rest and recovery' period once mandatory retrofits have had been completed.
Sigmund	Freeman	Medium-high	1	0	0	0	0	0	THIS IS AN IMPORTANT ISSUE. As it is, many facades eventually get upgraded when they have problems with leaks and maintenance. However, it is expensive and some owners would not want to be obligated to full compliance with an ordinance. This would be somewhat similar to the parapet ordinance of some years ago, but much more expensive. Needs to be phased in very carefully. If cities like New York and Chicago can do it, we should be able to.
Carla	Johnson	Medium	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	0	1	0	0	0	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Should also include brick veneer on steel frame.
Kenneth	Paige	Medium	1	0	0	0	0	0	How often is periodic? Every 10 years?!
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	Falling facades do pose risks to life, during earthquakes and even outside of earthquakes. San Francisco would be following in the footsteps of other large cities with such an ordinance. However, in terms of earthquake resilience, I believe other recommendations would have a much greater impact. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Important.

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction **a. Plan data collection programs to follow the next damaging earthquake, focused on learning about issues of policy importance to San Francisco.**	
General comments	Learning lessons about building performance from earthquakes, even small or moderate events, could provide valuable lessons to assist in developing effective hazard mitigation and recovery programs.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes, although further consideration of appropriate data collection is necessary.
Political will	None anticipated.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Little public or staff interest in this topic has been expressed.
What resources/staff could implement this?	City staff not currently available. Project might best be done in conjunction with other agencies and professional organizations, but will require some City staff coordination.
Is legislation required?	Likely not, but may require revisions to SF Building Code regarding post-earthquake inspection protocols.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 51 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(a)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	EERI.
Catherine	Bauman	High	1	0	0	0	0	0	Why not?
Tim	Carrico	Medium	0	1	1	1	0	0	(Add comments here.)
Sigmund	Freeman	Medium-low	0	0	0	1	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	1	0	0	0	0	(Add comments here.)
George	Orbelian	Medium	0	1	1	1	0	0	Ongoing data acquisition to support improvements in building codes and public policy.
Kenneth	Paige	Medium	1	0	0	0	0	0	Good idea as a matter of course.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-low	1	1	1	0	0	0	The interesting issue here is that NSF and others seem to have pulled out most public support for research on long-term recovery from past earthquakes, which is truly needed. If you folks know how to get corporations to get interested in taking up the slack, that would be great.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-low	0	0	0	0	0	0	This could be done in coordination with universities and research organizations. They could be asked to do the heavy-lifting work, defining what information would need to be collected to provide good information about issues of interest to the City. This would require coordination with various City departments, so staff interest would be critical. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction **b. Support efforts to test and research innovative and low-cost retrofit concepts, such as bracing garage doors and adding ductility and energy absorption to brittle or weak building elements.**	
General comments	Building retrofit alternatives and creative seismic upgrade strategies show promise in achieving cost savings while adding to overall City resilience. The City's patented garage door reinforcement mechanism and related project is one example of such alternative retrofit possibilities.
Are public funds required?	Limited funding required for materials/supplies.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	No. This item focuses on developing new technical solutions to current problems.
Political will	Unknown.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Some public and staff interest. This requires very specialized interests and expertise.
What resources/staff could implement this?	City staff not currently available, although some work is being done by 2011 CAPSS interns. Much could be done by professional organizations, other non-City groups, or under the aegis of another non-profit group.
Is legislation required?	No.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 51 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(b)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	Good idea but hard to get traction.
Catherine	Bauman	High	1	0	0	0	0	0	Low-cost seems good.
Tim	Carrico	Medium	1	1	1	0	0	0	Possibly some sort of prizes could be awarded to inventors and designers who come up with creative ideas that get accepted as code-approved solutions . . .
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	Always do the simple and inexpensive fixes first.
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Ther should be design competitions for these ideas. Simpson should sponsor and put winning ideas into production. Seismic SWAT teams should use these solutions.
Kenneth	Paige	Medium	1	0	0	0	0	0	Enough already! Just market these products now.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	1	0	0	0	The key here is to support efforts of others - not try to solve this problem using city staff (except as volunteers). Is there a way to get Mary Comerio and her students interested in some of these issues?
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium	0	0	0	0	0	0	The City should encourage testing of innovative approaches for retrofit, particularly low-cost approaches. It seems like this would need to be led by groups outside the City, with the City providing support and access. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Yes there is much that can be done; maybe set up a special subcommitee to develop this.

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction **c. Support innovation needed to modernize and improve evaluation and retrofit standards.**	
General comments	Similar to the current ATC 71-1, which is developing alternate structural analysis and retrofit methodologies, this item seeks to maintain contact with state-of-the-art engineering advancements, and to validate and incorporate into codes and regulations new analysis, design and construction ideas. . Involvement by San Francisco in such programs helps direct development of technology to meet the needs of strengthening our specific building types.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Much future research and cooperation is underway within the engineering and construction communities to identify and develop new ideas and promising practices.
Political will	Unknown.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Extensive public and professional interest and enthusiasm.
What resources/staff could implement this?	City staff not currently available. This could be achieved through collaboration with local professional organizations, but would require some City efforts through staff or contract work.
Is legislation required?	Not likely unless future code changes are proposed.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 51 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(c)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	Medium	1	0	0	0	0	0	Why not?
Tim	Carrico	Medium	1	1	1	0	0	0	Great idea.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Drive this program with geology. Base schedule on seismic vulnerability.
Kenneth	Paige	Medium	1	0	0	0	0	0	Good idea.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	1	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	0	0	0	0	0	The City clearly benefits from improved retrofit and evaluation standards that make retrofits better or more efficient. Again, this needs to be led by others, but the City can help by expressing needs (this helped get FEMA funding for ATC 71-1), participating on technical review committees, and clearly expressing what works and doesn't in San Francisco. Depends strongly on staff interest. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Important follow-up work. Maybe we need a new advisory group????

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction **d. Reexamine the expected performance of previously retrofitted buildings.**	
General comments	Thousands of buildings in SF have been retrofitted over the past 40 years, triggered by building enlargement or additions, changes in use, required parapet or unreinforced masonry upgrades, voluntary improvements, and other reasons. A general review of these past retrofits could determine whether they meet current expectations for public safety and city resilience.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	No opposition to the research of previously retrofitted buildings, but substantial opposition expected if any further work might be suggested.
Is there public/staff interest and expertise in this subject?	Moderate public and staff interest.
What resources/staff could implement this?	City staff not currently available. This might best be accomplished through contract work.
Is legislation required?	No, unless standards are proposed for modification.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 51 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(d)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	Medium	0	1	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	0	0	0	I think it is important to inform owners if a technique used in the retrofit of their building has subsequently proven to be inadequate resulting in unexpected damage.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	1	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Drive this program with geology. Base schedule on seismic vulnerability.
Kenneth	Paige	Medium	0	0	0	0	0	0	Bad idea. Move forward not backwards.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	1	0	0	0	In the east Bay, we determined that much retrofit work had been done without permits. Thus, you might want to work with the ASHI folks to identify homes that have had work done - and then go into them while ownership is being changed.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Low	0	0	0	0	0	0	We know that some early retrofits were not great, however, it is politically difficult to encourage or require buildings to re-retrofit. I think that these buildings are better dealt with by removing their exclusion for retrofit requirements when damaged after an earthquake (as discussed but not solved in rec 8 report). Studying and identifying bad retrofits may be interesting, but I think we should focus on the many other risks that we are more likely to solve. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction. **e. Study the hazard from masonry chimneys in San Francisco, and recommend necessary mitigation measures**	
General comments	Masonry chimneys have been clearly identified as posing structural hazards, but the extent of life-safety hazard and resilience impacts posed by these chimneys in SF is unknown and may require future study. Post-earthquake repair/retrofit of chimneys is covered under Recommendation 8.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	None expected.
Is there public/staff interest and expertise in this subject?	Little interest expressed among public or staff.
What resources/staff could implement this?	City staff not currently available for this study.
Is legislation required?	Legislation only required if revision of codes related to chimneys are proposed.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 51–52 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(e)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Low	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	Medium	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	0	0	0	0	I realize there is not a lot of life-safety hazard data compiled, but my anecdotal data regarding the three chimney failures I am familiar with is this: Two brick chimneys landed on sidewalks in the Haight Ashbury that are frequently used by pedestrians. The third chimney crashed through the roof of a top floor flat in the Marina and landed on the tenant's bed. No one was hurt in any of these incidents, but each of them could have been fatal at a different moment of the same day.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	1	0	0	0	0	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	This could be a great seismic SWAT team side business for chimney sweeps, roofers and masonry contractors. Reducing the number of chimneys falling through roofs would also be of interest to insurance companies.
Kenneth	Paige	Medium	0	0	0	0	0	0	This is a detail-not a major project. Do the important stuff first.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	Talk to Steve Kieffer in Livermore. I think he told me once than only 5% of the chimneys that fell in Northridge fell toward the home. (He worked for the City of LA at the time of Northridge.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	1	0	0	0	0	Easy - codes for retrofits exist. Chimney retrofits should be encouraged. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction. **f. Support installation of instruments to measure building movement in earthquakes.**	
General comments	Expanding and better coordinating earthquake recording systems could have great benefits in determining the necessary scope of detailed post-earthquake evaluation of buildings, resulting in cost savings for building owners. This recommended increased scope of earthquake instrumentation also may lead to better understanding of future earthquake risks, to developing better earthquake evaluation systems for buildings, in developing earthquake warning programs, and for other technical programs.
Are public funds required?	Yes. Some limited public funding may be required to support "strong motion instrumentation" hardware installation, monitoring, and data collection and analysis.
Are private funds required?	Yes. Some limited cost to private property owners who participate in instrumentation programs.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Some public interest has been express in this.
What resources/staff could implement this?	City staff not currently available; state of California Department of Geology staff may take lead role in this, but City staff or contractor should be available to colaborate.
Is legislation required?	Not unless additional instrumentation is required.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 51–52 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(f)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Low	1	1	1	0	0	0	(Add comments here.)
Catherine	Bauman	Medium	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	1	0	0	This sounds like the perfect grant program for City-State-Federal government collaboration with university research programs . . .
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	0	1	0	0	0	(Add comments here.)
George	Orbelian	Medium-high	1	1	1	0	0	0	This idea could also be used for early warning systems.
Kenneth	Paige	Medium	0	0	0	0	0	0	In an ideal world-this would be great. But there is no money for this-so stick to the basics.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-low	0	0	0	0	0	0	The City should collaborate with state or federal or research groups that want to improve instrumentation, but I personally think it would be better to spend the City's limited resources and staff time on other issues that have a more direct link to resiliency. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	This is a great idea, probably can get some interest from federal agencies, such as NSF, DOE to fund academic reasearch programs.

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote Development and implementation of effective ideas on earthquake risk reduction. **g. Study the feasibility of administrative measures to mitigate ground failures that affect multiple properties and cannot be completed by a single building owner.**	
General comments	Liquefaction and lateral spreading will affect some SF areas containing multiple buildings. These earthquake effects are very hard to mitigate on a site-by-site basis. Mitigation of larger areas containing multiple buildings may be a feasible hazard mitigation strategy.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Some additional research and technical development is necessary. See Recommendation 14(h).
Political will	Unknown.
Known or expected opposition	Ground improvement strategies are expensive and may be opposed by affected property owners.
Is there public/staff interest and expertise in this subject?	Moderate public interest.
What resources/staff could implement this?	City staff not currently available; outside professional groups may take lead role in this.
Is legislation required?	No.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 51–52 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(g)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Low	1	1	1	0	0	0	(Add comments here.)
Catherine	Bauman	Medium	1	0	0	0	0	0	It's got to be expensive.
Tim	Carrico	Medium	1	1	1	1	0	0	What is an "adminstrative measure" that would mitigate ground failures that wouldn't require public and/or private funding? Based on the text provided in g & h, I don't fully understand this. It would seem that the actual mitigation, not to mention the foundational research, would require a lot of public and/or private funding.
Sigmund	Freeman	Medium-low	0	0	0	1	0	0	(Add comments here.)
Carla	Johnson	Medium	0	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	0	1	0	0	0	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Get soil stabilization contractors and material suppliers involved in this program. Seismically challenged geologic areas could have this done and the work paid for through property tax revenues.
Kenneth	Paige	Medium	0	0	0	0	0	0	Nonsense-I just completed my own anti-liquefaction epoxy injection by Gordon + Graf. Everyone should do their own.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-low	1	1	1	1	0	0	This is a tricky one.
Bill	Quan	High	1	1	1	1	1	1	Also, determine whether it would be adequate to only retrofit every other vulnerable building on a block; evaluate similar strategies to reduce costs by not having to retrofit evey vulnerable building on a block.(Add comments here.)
Laura	Samant	Low	0	0	0	0	0	0	Liquefaction is a conundrum, but I think these solutions are too far off to be worth the City's effort now.(Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 14: Promote Development and implementation of effective ideas on earthquake risk reduction. **h. Periodically review remediation technology and provide guidance to owners in potential liquefaction and lateral spreading zones when techniques become feasible.**	
General comments	Mitigation strategies are now being developed and utilized for liquefaction and lateral spreading that affects multiple buildings. This keeps tabs on such state-of-the-art developments.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	No. This study supports item 14(g).
Political will	Unknown.
Known or expected opposition	Ground improvement strategies are expensive and may be opposed by affected property owners.
Is there public/staff interest and expertise in this subject?	Moderate public interest.
What resources/staff could implement this?	City staff not currently available; outside professional groups may take lead role in this.
Is legislation required?	No.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 51–52 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 14(h)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	0	0	0	0	0	0	[No response provided; page missing.]
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	0	0	0	See 'g' above. I can't see how public funding wouldn't be required to study this concept.
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium	0	1	0	1	0	1	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	Information should be web based and available to all. Once owners know they are liable to inform tenants, which will affect property values/rents.
Kenneth	Paige	Medium	1	0	0	0	0	0	It's feasible now.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	0	0	0	0	THe liquefaction report has some background material. Utilities should be interested in helping to support this - but I don't know if they will.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Low	0	0	0	0	0	0	Liquefaction is a conundrum, but I think these solutions are too far off to be worth the City's effort now.(Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 15: Evaluate measures to reduce post-earthquake fires. **a. Improve water supply systems to cover those neighborhoods not served by the Auxiliary Water Supply System.**	
General comments	Requires separate consideration by a group focused on fire issues – perhaps an adjunct Workplan to be developed in conjunction with SFFD.
Are public funds required?	Unknown.
Are private funds required?	Unknown.
Is technical knowledge and information available to implement this action?	Unknown.
Political will	Unknown.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Unknown.
What resources/staff could implement this?	Unknown.
Is legislation required?	Unknown.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 53–54 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 15(a)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	1	0	0	0	Gas shut off. AFCI breakers (arc fault suppression) as 50% of all ignitions is electrical arcing. The technology is available-change out load centers at time of sale.
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	(Add comments here.)
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium-high	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Medium-high	1	0	0	0	0	0	(Add comments here.)
Mike	Martinet	Medium	0	0	1	0	0	0	(Add comments here.)
George	Orbelian	High	1	1	0	0	0	0	NERT?
Kenneth	Paige	Medium	0	0	0	0	0	0	I need more information to comment.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	1	0	0	0	0	0	Fire is a real risk after earthquakes. The City needs to address it. An appropriate group should be convened to make long-term decisions about have adequate redundant water systems in every neighborhood. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Definetly need this.

CAPSS Implementation Priority Worksheets

Recommendation 15: Evaluate measures to reduce post-earthquake fires. **b. Expand the training and scope of Neighborhood Emergency Response Teams (NERT) to include fire suppression, fire reporting, assisting vulnerable residents, and assisting with neighborhood recovery.**	
General comments	Some increased mechanism for neighborhood/community involvement in all phases of earthquake-hazard mitigation, response, and recovery- would greatly move toward SF resilience. This could be through NERT or other programs. Any NERT component could also be part of an adjunct Workplan to be developed in conjunction with SFFD.
Are public funds required?	Unknown.
Are private funds required?	Unknown.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	High public and staff interest.
What resources/staff could implement this?	Staff available through multiple city programs.
Is legislation required?	Probably not.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 53–54 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 15(b)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	0	0	0	0	CERT/NERT provide all important hand-to-hand early response.
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	1	0	0	0	NERT people could also be trained to turn gas meters back on, check for indications of gas leaks, and re-light pilot lights where necessary.
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Medium-high	1	0	0	0	0	0	(Add comments here.)
Mike	Martinet	High	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	(Add comments here.)
Kenneth	Paige	Medium	1	0	0	0	0	0	Excellent!
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	1	1	0	0	This is a good mechanism to preach mitigation to residents.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	1	0	0	0	0	This has a lot of potential, but would also require a lot of work, to develop appropriate training protocols and change the entire current NERT system. This would require SFFD, or another instution, to believe in this issue and provide good leadership. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	The NERT program can be improved, let's discuss this.

CAPSS Implementation Priority Worksheets

Recommendation 15: Evaluate measures to reduce post-earthquake fires. **c. Increase accessibility of water shutoff valves on building fire sprinkler systems to control water loss from damaged sprinkler systems.**	
General comments	Requires separate consideration by a group focused on fire issues – perhaps an adjunct Workplan to be developed in conjunction with SFFD.
Are public funds required?	Unknown.
Are private funds required?	Unknown.
Is technical knowledge and information available to implement this action?	Unknown.
Political will	Unknown.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Unknown.
What resources/staff could implement this?	Unknown.
Is legislation required?	Unknown.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 53–54 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 15(c)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	0	0	0	0	0	0	[No response provided; page missing.]
Catherine	Bauman	Medium-high	0	1	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	1	0	0	0	0	Excellent idea . . .
Sigmund	Freeman	Medium	0	1	0	0	0	0	(Add comments here.)
Carla	Johnson	Medium-low	0	0	0	0	0	0	Potentially problematic. there have been fires in SF due to sprinkler main shut off)
Stephen	King	Medium-high	1	0	0	0	0	0	(Add comments here.)
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Also have seismic SWAT teams versed in additional sprinkler line strappingto minimize sprinkler line breakage/leakage.
Kenneth	Paige	Medium	0	0	0	0	0	0	Great idea-I have no idea where my own are.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	0	0	0	0	0	0	(Add comments here.)
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Low	0	0	0	0	0	0	I know very little about this issue. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

Recommendation 15: Evaluate measures to reduce post-earthquake fires. **d. Study potential post-earthquake ignition risks and evaluate measures to reduce them.**	
General comments	Requires separate consideration by a group focused on fire issues – perhaps an adjunct Workplan to be developed in conjunction with SFFD.
Are public funds required?	Unknown.
Are private funds required?	Unknown.
Is technical knowledge and information available to implement this action?	Unknown.
Political will	Unknown.
Known or expected opposition	Unknown.
Is there public/staff interest and expertise in this subject?	Unknown.
What resources/staff could implement this?	Unknown.
Is legislation required?	Unknown.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) pages 53–54 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 15(d)

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	High	1	1	0	0	0	0	Electrical & gas ignitions-needs in depth study. Important.
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium-high	1	1	0	0	0	0	Another excellent idea . . .
Sigmund	Freeman	Medium-low	0	0	0	1	0	0	(Add comments here.)
Carla	Johnson	Medium	1	0	0	0	0	0	SFFD should take on a leadership role on this kind of project)
Stephen	King	Medium	1	0	0	0	0	0	(Add comments here.) As long as the proposals are voluntary.
Mike	Martinet	Medium	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	NERT? Fire extinguishers/mitigation equipment.
Kenneth	Paige	Medium	0	0	0	0	0	0	Good idea. Fire department coordination essential to a complete plan.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium-low	0	0	0	0	0	0	As near as I know, this work was done with a review by the Seismic Safety COmmission after Northridge - showing that the ignitions tended to be electical, not gas.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-low	0	0	0	0	0	0	This is a research question: are ignition risks in SF different from those observed in recent earthquakes with good data? It's an interesting question, and could drive policy about how to reduce post-eq fire risk, but it's a lot to bite off. This feels like it should be led by a research organization/university, not the City. We have enough fire issues that we already understand - let's focus on those first. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

CAPSS Implementation Priority Worksheets

Recommendation 16: Address the hazards from damage to building systems, appliances and equipment and non-structural building elements. **DBI should initiate a comprehensive program to encourage, and in some instances, require measures to reduce these hazards.**	
General comments	Reduction of damage to building contents, equipment and non-structural elements shows great potential in helping meet city resiliency goals. This item coordinates with Recommendations 2(d), 4, 5, 12(e), and others.
Are public funds required?	No.
Are private funds required?	Yes, for bracing equipment to prevent falling and to mitigate other non-structural hazards.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	Some opposition expected from persons who might be asked to undertake mandated mitigation work.
Is there public/staff interest and expertise in this subject?	Moderate public interest.
What resources/staff could implement this?	City staff not currently available – this might best be done as part of contract work.
Is legislation required?	Possibly, depending on proposals to mandate hazard remediation.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 55 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 16

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Low	1	1	0	0	0	0	(Add comments here.)
Catherine	Bauman	High	0	0	0	0	0	0	(Add comments here.)
Tim	Carrico	Medium	1	0	0	0	0	0	I'd hate to be in Costco or Lowes when the Big One hits . . .
Sigmund	Freeman	Medium-low	0	0	1	0	0	0	(Add comments here.)
Carla	Johnson	Medium-low	0	1	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Not the government's job.
Mike	Martinet	Medium-high	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	High	1	0	0	0	0	0	Seismic SWAT teams. Schedule geology driven. Secure water/sprinkler pipes to minimize breakage & flooding.
Kenneth	Paige	Medium	0	0	0	0	0	0	Primary a question of education-like strapping water heaters.
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	Medium	1	1	0	0	0	0	Again, getting other groups involved such as Habitat for Humanity, whatever Christmas in April is currently called, etc.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	Medium-high	0	1	0	0	0	0	Non-structural risk reduction for industrial and retail can have big bang for buck, especially for moderate earthquakes. Program would need to be better defined. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	Sounds good.

CAPSS Implementation Priority Worksheets

Recommendation 17: Periodically assess progress and implementation of these recommendations.	
General comments	This is necessary to determine if goals for San Francisco resilience goals are being met.
Are public funds required?	No.
Are private funds required?	No.
Is technical knowledge and information available to implement this action?	Yes.
Political will	Unknown.
Known or expected opposition	None.
Is there public/staff interest and expertise in this subject?	Great public interest.
What resources/staff could implement this?	Limited staff available at this time.
Is legislation required?	Yes. Requirements for program evaluation and reporting should be part of any legislatively mandated programs.
For additional information see *A Community Action Plan for Seismic Safety* (ATC 52-2) page 56 (available at http://sfcapss.org/PDFs/CAPSS_522.pdf)	

Response Form for Recommendation 17

Priority (click to select one)	**Timeline** (choose as many as are applicable)					
	Now–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040
Medium	☐	☐	☐	☐	☐	☐

Comments

(Add comments here.)

<First Name>	<Last Name>	<Priority>	<Now-2015>	<2016–2020>	<2021–2025>	<2026–2030>	<2031–2035>	<2036–2040>	<Comments>
Thomas	Anderson	Medium	1	1	1	0	0	0	(Add comments here.)
Catherine	Bauman	High	1	0	0	0	0	0	(Add comments here.)
Tim	Carrico	High	1	1	1	0	0	0	I think it is very important for programs like this to have a CAPSS-like committee continually reviewing the effectiveness of the new regulations and recommending tweaks to both ordinances and administrative regulations.
Sigmund	Freeman	Medium-low	0	0	0	1	0	0	(Add comments here.)
Carla	Johnson	High	1	0	0	0	0	0	(Add comments here.)
Stephen	King	Low	0	0	0	0	0	1	(Add comments here.) Most of these proposals are not the Government's (ergo Taxpayers') responsibility. This assault on private property rights will cause great economic hardship for the average property owner.
Mike	Martinet	Medium-high	1	1	1	1	1	1	(Add comments here.)
George	Orbelian	Medium-high	1	1	1	1	1	1	Ongoing knowledge & education.
Kenneth	Paige	Medium	0	0	0	0	0	0	Of course!
John	Paxton	Medium	0	0	0	0	0	0	(Add comments here.)
Jeanne	Perkins	High	1	1	1	1	1	1	Accountability and tracking is the best way to make sure that ineffective programs are dropped - and promising ones are speeded up through additional resources.
Bill	Quan	Medium	0	0	0	0	0	0	(Add comments here.)
Laura	Samant	High	0	1	0	0	0	0	This should be outsourced to a consultant. (Add comments here.)
Armand	Silva	Medium	0	0	0	0	0	0	(Add comments here.)

Additional Response Form

Additional Comments (on any topic)

(Add comments here.)

<First Name>	<Last Name>	<Additional Comments>
Thomas	Anderson	Pervasive sense of entitlement in our society prevents owners & citizens from taking responsibility. This is a major obstacle to any of the measures suggested in this study.
Catherine	Bauman	(Add comments here.)
Tim	Carrico	(Add comments here.)
Sigmund	Freeman	I have a difficult time with questionaires like this.
Carla	Johnson	last years bond measure to seismically retrofit a portion of the Mayor's Office on Housing portfolio needs to be revived. It came very near to passing. this portfolio represents some of the City's most dangerous housing stock due to age, construction type, and location on liquifaction zones. The residents are some of the most vulnerable due to poverty or disability. The bond should also be expanded to cover the buildings which the City leases. HIGH PRIORITY with Now timeframe. PS. Next time a form like this is developed, format in 12 point font. It was almost impossible to read.
Stephen	King	(Add comments here.)
Mike	Martinet	(Add comments here.)
George	Orbelian	Veterans.
Kenneth	Paige	We need to move faster. This should be part of the mayoral race dialogue, CAPSS should be a part of any candidate's vision for the City. What happened to the gold/sliver star system?? Voluntary-easy?
John	Paxton	You have asked for my opinions on how I would prioritize the items in the CAPSS reports. Here is my view of the world: (1) The most important thing is to start the evaluation of buildings, and to make that information available to the public. The timing for evaluations should correspond to the pecking order in Table 5 in ATC 52-2. That is, wood-frame residential buildings, with 5+ units should happen immediately. With evaluations and public disclosure, "market driven" retrofits will start to occur. (2) I believe that substantial funding sources will not be available in the foreseeable future. I am scared to death that we will be hobbled into inaction if we tie retrofits to the availability of funding. Funding must be on its own independent track; the obligation of owners of private property to make safety-related, seismic retrofits must not be dependent on the availability of potential financing. (3) Mandatory retroflts are very important, but I believe that this will not occur - because City leaders will tie it to the availability of money. (4) Certain ministerial actions are essential, to support the efforts mentioned above. For example, ATC 71-1 needs to be completed; and evaluation standards and post-earthquake repair standards need to be adopted. [Transcribed from letter dated 2011/07/07.]
Jeanne	Perkins	(Add comments here.)
Bill	Quan	(Add comments here.)
Laura	Samant	I didn't include time frames for many of my replies -- it's hard. It is hard to rate any of the items as less than medium. (Add comments here.)
Armand	Silva	Very ambitious program, maybe too broad, hope we can ahow quick progress and keep it going. Good luck!

Attachment C—CAPSS summary report

ATC 52-2 *A Community Action Plan for Seismic Safety*

ATC 52-2

Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco

A Community Action Plan for Seismic Safety

Applied Technology Council

Prepared for
San Francisco Department of Building Inspection
under the Community Action Plan for Seismic Safety (CAPSS) Project

Community Action Plan for Seismic Safety (CAPSS) Project

The Community Action Plan for Seismic Safety (CAPSS) project of the San Francisco Department of Building Inspection (DBI) was created to provide DBI and other City agencies and policymakers with a plan of action or policy road map to reduce earthquake risks in existing, privately-owned buildings that are regulated by the Department, and also to develop repair and rebuilding guidelines that will expedite recovery after an earthquake. Risk reduction activities will only be implemented and will only succeed if they make sense financially, culturally and politically, and are based on technically sound information. CAPSS engaged community leaders, earth scientists, social scientists, economists, tenants, building owners, and engineers to find out which mitigation approaches make sense in all of these ways and could, therefore, be good public policy.

The CAPSS project was carried out by the Applied Technology Council (ATC), a nonprofit organization founded to develop and promote state-of-the-art, user-friendly engineering resources and applications to mitigate the effects of natural and other hazards on the built environment. Early phases of the CAPSS project, which commenced in 2000, involved planning and conducting an initial earthquake impacts study. The final phase of work, which is described and documented in the report series, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco*, began in April of 2008 and was completed at the end of 2010.

This CAPSS Report, designated by the Applied Technology Council as the ATC-52-2 Report, recommends policies to reduce earthquake risk in privately owned buildings of all types. Several other CAPSS reports are also available in the series, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco*:

- *Potential Earthquake Impacts* (ATC-52-1 Report), which focuses on estimating impacts to the City's privately owned buildings in future earthquakes, and the companion *Technical Documentation* volume (ATC-52-1A Report), which contains descriptions of the technical analyses that were conducted to produce the earthquake impacts;
- *Earthquake Safety for Soft-Story Buildings* (ATC-52-3 Report), which describes the risk of one vulnerable building type and recommends policies to reduce that risk, and the companion *Documentation Appendices* volume (ATC-52-3A Report), which details the technical methods and data used to develop the policy recommendations and related analyses; and
- *Post-earthquake Repair and Retrofit Requirements* (ATC-52-4 Report), which recommends clarifications as to how owners should repair and strengthen their damaged buildings after an earthquake.

Many public and private organizations are working actively to improve the City's earthquake resilience. The CAPSS project participants cooperated with these organizations and considered these efforts while developing the materials in this report. Three ongoing projects outside of CAPSS but directly related to this effort are:

- *The Safety Element.* The City's Planning Department is currently revising the Safety Element of the General Plan, which lays out broad earthquake risk policies for the City.
- *The SPUR Resilient City Initiative*. San Francisco Planning and Urban Research (SPUR) published recommendations in February 2009 for how San Francisco can reduce impacts from major earthquakes. SPUR is currently developing recommendations on Emergency Response and Post-Earthquake Recovery.
- *Resilient SF.* San Francisco City government is leading a unique, internationally recognized, citywide initiative that encompasses the City's All Hazards Strategic Plan and seeks to use comprehensive advanced planning to accelerate post-disaster recovery. This work is coordinated by San Francisco's General Services Agency (GSA), the Department of Emergency Management (DEM) and Office of the Controller in collaboration with the Harvard Kennedy School of Government.

Cover photo credit: Courtesy of Anderson Niswander Construction

ATC-52-2

Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco

A Community Action Plan for Seismic Safety

Prepared for the

DEPARTMENT OF BUILDING INSPECTION (DBI)
CITY AND COUNTY OF SAN FRANCISCO
under the Community Action Plan for Seismic Safety (CAPSS) Project

Prepared by the

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PREFACE

Today, more than 5 years after the category 3 hurricane Katrina hit New Orleans, several thousand people still live in temporary housing and an estimated 25% of the city's population has not returned. The catastrophe of cascading consequences that Katrina wrought was devastating, even more so because the high storm surge and levee collapse accompanying the hurricane had been anticipated. In fact, the event, as played out, closely mirrored one of three Federal Emergency Management Agency (FEMA) "worst case" scenarios – that is, one of the three most catastrophic disasters expected to occur in the United States.

A major earthquake striking the San Francisco Bay Area was another of those three FEMA scenarios. Most Bay Area residents acknowledge the U. S. Geological Survey forecast that a major earthquake (magnitude 6.7+) is nearly twice as likely as not to strike the region in the next 30 years. Unlike hurricanes, most earthquakes strike without warning. However, while many people could and should have been evacuated in the several day warning window that New Orleans had, nothing could have been done to strengthen the levees in that time frame. The same is true in the Bay Area – even if the next earthquake was accurately predicted with a week's warning, the tens of thousands of seismically vulnerable buildings throughout the region would still be severely damaged or collapse. The resulting recovery would likely take years and potentially result in many residents leaving the region and many businesses closing permanently.

The purpose of the Community Action Plan for Seismic Safety (CAPSS) is to recommend specific actions that will reduce death, injury and damage in San Francisco from future earthquakes, thus allowing the City to quickly return to its pre-earthquake vitality. CAPSS has previously produced a series of unique reports, documenting the impacts that future earthquakes will likely have on San Francisco. The CAPSS project culminates with this call to action, which sets forth a series of recommended steps which the City can take to dramatically reduce the impacts of future earthquakes.

A study, however, never saved a life or prevented property damage – studies are only effective when their results and recommendations stimulate actions that mitigate the effects and consequences of future disasters. The CAPSS project team, together with the volunteer public advisory committee that represents tenants, landlords, small business owners, and other concerned citizens, have spent years investigating these issues and alternatives. They unanimously approve these recommendations. We know what to do, and how to do it. City government must now take action.

Will San Francisco be like New Orleans, aware of looming catastrophe but taking no action to prevent it? Or does San Francisco have the political will and courage to invest in its future, by retrofitting the many known seismically vulnerable building

types? Such investment will cost building owners in the short term, but will reap many benefits in the long-term both for the owners and the community at large when strengthened buildings continue to function as safe homes and sources of continued revenue in the aftermath of a major earthquake.

Inaction is inexcusable in light of the City's known vulnerability and the fact that most of these risks are avoidable. City government, especially the Mayor and the Board of Supervisors, are the linchpin for causing the essential evaluations and retrofits to take place to assure that, after the next big earthquake, San Francisco can recover quickly and maintain both its economic and cultural vibrancy.

Mary Lou Zoback
Advisory Committee Co-Chair

John Paxton
Advisory Committee Co-Chair

MAYOR'S EXECUTIVE DIRECTIVE

On December 22, 2010, the Honorable Gavin Newsom, Mayor of San Francisco, issued Executive Order 10-02, Earthquake Safety Implementation Committee (ESIC), which directed the City Administrator to oversee the process of outreaching to interested parties around the City to building a broad coalition of supporters to implement the Community Action Plan for Seismic Safety (CAPSS) recommendations. The Executive Directive is provided verbatim on the following pages.

Office of the Mayor
City & County of San Francisco

Gavin Newsom

Executive Directive 10-02
Earthquake Safety Implementation Committee (ESIC)

December 22, 2010

ABOUT CAPSS
The Community Action Plan for Seismic Safety (CAPSS), run by the Department of Building Inspection, is a 9-year, $1 million effort to catalogue the specific seismic risks San Francisco faces as a result of damage to privately-owned property from future earthquakes, and suggestions on how to best mitigate this loss of life and property damage. The project ends on December 31, 2010, and CAPSS has completed reports describing the scope of vulnerability faced by San Francisco, and recommendations as to what steps the City can take to mitigate these risks.

THE CONSEQUENCES
USGS scientists have forecast 63% likelihood of one or more M6.7 or larger earthquakes striking the Bay Area in the next 30 years. Using GPS to measure strain accumulating along the San Andreas fault, scientists report that enough strain has re-accumulated along the Peninsula segment of the San Andreas already to produce a M7.2 earthquake. This event, which seismologists call the "expected" earthquake, would lead to an estimated 300 fatalities, 7,000 injuries requiring medical attention, 27,000 buildings being condemned, 2,700 additional buildings destroyed by fire, 85,000 housing units lost, and up to $30 billion in property damage.

All told, after shaking and fire, almost a fifth of the City's buildings would be uninhabitable or destroyed, including an estimated 11 million square feet that will burn. More detailed tables on casualties and building damage are attached to this Directive as Appendix A.

THE SOLUTIONS
The CAPSS reports present a very grim picture. But they also suggest policies and programs to mitigate as much damage and loss of life as possible. It all begins with requiring owners to evaluate the seismic performance of their buildings at the next sale or by a time-certain deadline. This citywide evaluation would be paired with updated code standards for all common building types in San Francisco, which would be mandatory by different deadlines for different specific retrofits.

CAPSS proposes a set of 17 recommendations to get buildings evaluated and retrofitted. A full outline of recommendations is attached to this Directive as Appendix B. Taken together, CAPSS's suggested policies will save lives and prevent billions of dollars in property damage. CAPSS details prioritized timetables for much of this seismic upgrading, a chart of which is attached as Appendix C.

NEXT STEPS
The scientific research is complete: San Francisco faces grave consequences when the next big earthquake hits. CAPSS provides us with actions we need to take to mitigate this damage. The next phase of the CAPSS program must include:

1) Raising the public's awareness of the consequences of future earthquakes and what we can do to prevent the resulting loss of life and property damage
2) Building a broad base of political will to enact government programs and mandates to get this work accomplished
3) Locating resources to assist with the retrofit of private structures

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Over the next several decades, billions of dollars must be spent on retrofitting privately owned buildings if we hope to prevent hundreds of deaths, thousands of injuries, and tens of billions of dollars of damage. Some of this money will come from private citizens paying to retrofit their own property. But some funding must be made available through government financing, either in the form of GO Bonds, special assessments, or some other instrument.

San Francisco needs a comprehensive program that links disparate interests together for a common cause. When the ground shakes and buildings fall, the damage and displacement of residents impacts the whole City. Loss of housing, tent camps, economic devastation, fires – these afflictions don't discriminate between neighborhoods or blocks.

Earthquake prevention requires citywide effort to achieve citywide benefit. In order to successfully educate the public on what must be done, the City must outreach to neighborhood councils, building owners, tenant associations, commercial builders, and dozens of other groups. Only with a citywide approach like this can we win support for the comprehensive interventions necessary to reduce the risks that San Francisco faces. Awareness breeds urgency. Urgency paves the way for solutions. The next phase of CAPSS must be widespread awareness, and knowledge of the relative risks posed by each building.

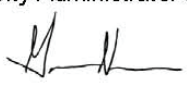
Directive Establishing ESIC Under the City Administrator

To that end, I am directing the City Administrator to oversee the process of outreaching to interested parties around the City to build a broad coalition of supporters to implement the CAPSS recommendations. The City Administration is currently tasked with post-disaster planning, coordination and recovery, and ESIC aligns with this existing responsibility. We have scientifically supported conclusions about how the next earthquake will impact San Francisco. We now need to implement.

This Directive establishes the Earthquake Safety Implementation Committee (ESIC), with the main objective being timely implementation of the 17 policy recommendations included in the CAPSS Task 4 report.

- Coordinating with DBI to create implementation plans and timelines for CAPSS's recommendations and tasking other departments with implementation assignments;
- Performing community outreach to build political support for a comprehensive, long-term earthquake mitigation strategy;
- Clarifying, through stakeholder meetings and further research, the costs associated with the CAPSS recommendations;
- Devising a variety of financial instruments to subsidize for the cost of implementing seismic mitigation activities on private property, through both the legislative process and public-private partnerships with the financial and mortgage sectors; and
- Building consensus around timelines for inspection and retrofit, taking into account CAPSS's recommended time frames and community feedback on feasibility and desire to perform the work.

The City Administrator should work closely with the following entities or their designees: the Controller, the Office of Public Finance, the Director of DBI, the President of the Building Inspection Commission, the Fire Chief, and the Director of the Department of Emergency Management. All other City departments and agencies are directed to cooperate with the City Administrator's requests for information, participation, and action pertaining to ESIC.



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Appendix A.
Casualty & Damage Estimates

Table 12 Estimated Injuries and Deaths in Four Scenario Earthquakes

Earthquake Scenario	Casualties			
	Severity 1: Injuries Needing First Aid	Severity 2: Injuries Needing Hospitalization	Severity 3: Life Threatening Injuries	Severity 4: Death
Hayward Fault, Magnitude 6.9	1,500 to 2,300	330 to 510	40 to 60	70 to 120
San Andreas Fault, Magnitude 6.5	1,800 to 3,600	390 to 740	40 to 60	80 to 120
San Andreas Fault, Magnitude 7.2	3,200 to 5,600	760 to 1,300	90 to 150	170 to 300
San Andreas Fault, Magnitude 7.9	6,500 to 10,600	1,800 to 3,000	220 to 450	420 to 880

Table 6 Estimated Damage States of Buildings Due to Shaking and Ground Failure in a Magnitude 7.2 Earthquake on the San Andreas Fault, by Building Use

Building Occupancy	Number of Buildings in Various States of Damage			
	Usable, Light Damage	Usable, Moderate Damage	Repairable, Cannot be Occupied	Not Repairable
Single-Family Houses	45,000	54,000	11,000	1,700
Two-Unit Residences	8,200	7,400	3,200	290
Three-or-More-Unit Residences	7,200	7,500	7,200	1,100
Other Residences	300	400	80	40
Commercial Buildings	1,600	2,400	630	290
Industrial Buildings	750	820	320	210
Other	330	280	60	30
Total	63,000	73,000	23,000	3,600

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Appendix B.
Community Action Plan for Seismic Safety – Recommended Actions to Reduce Earthquake Risk

1. Require evaluation of all wood frame residential buildings of three or more stories and five or more units, and retrofits of those that are vulnerable to earthquake damage. A Mayoral task force has drafted an ordinance to require retrofit of these buildings. The Board of Supervisors should pass it.

2. Inform the public of risks and ways to reduce risk. The City should conduct focused education and outreach campaigns aimed at building owners, tenants, realtors and others to improve their understanding of earthquake risk and measures to manage the risk, and to facilitate a market for retrofitting.

3. Adopt updated code standards. The City should adopt code standards for seismic evaluation and retrofit of all common building types in San Francisco.

4. Require all buildings to be evaluated for seismic risk. Owners of all buildings should evaluate the seismic performance of their buildings upon sale relative to DBI standards or, if no sale occurs, by a deadline established based on the building use and structural type. The results would be shared with tenants and prospective buyers and tenants, and be made a part of public City records.

5. Require retrofits of vulnerable buildings. Owners of vulnerable buildings should seismically retrofit their building for structural, fire, usability and falling hazards by specific deadlines, varying by building category.

6. Assist community service groups to reach earthquake resilience. The City should provide technical and financial assistance for important non-profits, medical clinics, daycare centers and similar groups to seismically retrofit their buildings or relocate to better buildings.

7. Establish clear responsibility for preparing for and reducing risk from earthquakes. The City should identify a single official in the Chief Administrator's Office, to be responsible for achieving earthquake resilience through mitigation, response and recovery.

8. Adopt improved post-earthquake repair standards. The City should enact updated post-earthquake repair and retrofit standards developed by CAPSS and expand this approach to other building types.

9. Offer incentives for retrofit of buildings. The City should enact a range of meaningful programs to help building owners afford retrofits.

10. Require gas shut-off valves on select buildings. The City should require owners of certain vulnerable buildings and buildings in Fire Department designated Post-Earthquake High Fire Hazard Areas to install automatic gas shutoff valves.

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11. Track evaluations and retrofits in a database system. The City should include information relating to seismic evaluations and retrofits in DBI's updated database system to allow tracking progress of mitigation activities and recording inventories, evaluation reports and retrofit information.

12. Provide technical assistance for building retrofits. The City should help residents and building professionals to evaluate and seismically retrofit buildings efficiently and in accordance with City codes.

13. Enact a façade ordinance, requiring periodic inspection of façades, parapets and decorative features fixed to building exteriors, and require repair of materials found to be falling hazards.

14. Promote development and implementation of effective ideas on earthquake risk reduction. The City should encourage efforts to improve knowledge relevant to San Francisco about building structural performance and effective ways to reduce earthquake risk.

15. Evaluate measures to reduce post-earthquake fires. Multiple City Departments should work together to evaluate and implement measures to reduce fire ignitions and spread, and improve fire suppression capacity following earthquakes.

16. Address the hazards from damage to furnishings, appliances and equipment and non-structural building elements. DBI should initiate a comprehensive program to encourage, and in some instances, require measures to reduce these hazards.

17. Periodically assess progress and implementation of these recommendations.

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18. Appendix C.
Proposed Timeframes for Seismic Retrofits

Table 5 **Recommended Timeframe* for Applying the Three-Step Strategy to Key Categories of Buildings**

Building Categories	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Wood-frame residential buildings with three or more stories and five or more units**						
Concrete tilt-up buildings						
Residential buildings with three and four units						
Private K-12 schools and private universities						
Assisted living facilities						
Concrete residential buildings built before 1980						
Other types of residential buildings with more than five units						
Hotels and motels serving tourists						
Critical retail stores and suppliers						
Single family homes and two unit residences						
Concrete non-residential buildings built before 1980						
Houses of worship						
Preschools and daycare centers						
Buildings used by large audiences						
Historic buildings						
Large buildings with welded steel moment frames built before 1994						
Early retrofitted buildings						
All other building types						

*The mandatory evaluation or retrofit program would begin at the start of the period and be completed by the end of the period.

**See Table 3 for the detailed schedule proposed in the draft ordinance developed by the Mayoral Task Force.

Color key***:

Step 1: Facilitate a market in which earthquake performance is valued	
Step 2a: Nudge market by requiring evaluation upon sale	
Step 2b: Nudge market by requiring evaluation by a deadline	
Step 3: Implementation period to require retrofit by a deadline	

*** Note: all previous steps remain in effect after advancing to a higher step.

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REPORT SUMMARY

Earthquakes are in San Francisco's future. The consequences of those future earthquakes could be very different—worse or better—depending on the policy choices and actions City agencies and building owners take now.

The Community Action Plan for Seismic Safety (CAPSS) project studied four probable earthquakes that could strike the City and found that future earthquakes would damage many thousands of buildings to the point where they cannot be occupied. They would devastate the City's housing stock, and could have long-term implications on the City's affordability to middle- and low-income residents, who would be displaced for years. Hundreds of people could be killed and thousands could be injured. The City would lose irreplaceable historic buildings and rent-controlled apartments. The price tag of the earthquake damage would be many billion dollars. Property owners, the majority of whom do not carry earthquake insurance, would bear the brunt of these economic losses, but residential tenants and businesses would suffer as well. Many more details appear in a companion report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Potential Earthquake Impacts* (ATC, 2010a).

Demolition in the Marina District after the 1989 Loam Prieta earthquake. Photo credit: Courtesy of Earthquake Engineering Research Institute Mitigation Center, Oakland, California.

Much of the damage from future earthquakes is preventable. This report recommends measures building owners and the City can take to reduce risk to privately owned buildings[1]. It identifies steps to protect important community resources that currently face high risk from future earthquakes—affordable housing, private schools, and medical clinics, to name a few. Reducing the negative consequences of future earthquakes benefits all San Franciscans: building owners, businesses, residential tenants, and the City government. This report, recognizing the challenges building owners face to finance seismic retrofits, recommends that the City take steps to assist and empower most building owners to make improvements on their own schedule, prior to enacting mandates. Taking action before an earthquake strikes is far less costly than repairing damage after an earthquake, both in terms of the dollars required and the social impacts associated with housing losses, business closures, and damaged property.

This report proposes the following long-term objectives to guide mitigation actions and priorities:

After expected earthquakes:

1. Residents will be able to stay in their own homes;
2. Residents will quickly have access to important privately-run community services;
3. No building will collapse catastrophically;
4. Businesses and the economy will quickly return to functionality; and
5. The City's *sense of place* will be preserved.

This report identifies seventeen important actions that San Francisco's City government leaders should take now to reduce the consequences of future earthquakes. These recommendations were developed with advice from an advisory committee of a diverse group of San Francisco residents. The committee met over thirty times over two and a half years to guide the project.

Recommendation 1: Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and retrofit of those that are vulnerable to earthquake damage.

The moderate-sized 1989 Loma Prieta earthquake showed how vulnerable these buildings are to earthquakes. A Mayoral task force has proposed an ordinance to require evaluation and retrofit of these buildings. The Board of Supervisors should enact it.

Recommendation 2: Inform the public of risks and ways to reduce risk.

The City should conduct focused education and outreach campaigns aimed at building owners, tenants, realtors and others to improve their understanding of earthquake risk and measures to manage the risk, and to facilitate a market for retrofitting. On their own, education programs motivate only a limited number of people to take action. However, they are an essential part of making other risk reduction programs work.

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[1] It does not consider the risk to publicly owned buildings or infrastructure, though these risks are considerable. These risks are being addressed by other City programs.

A seismic retrofit in progress. Photo credit: Courtesy of Anderson Niswander Construction.

Recommendation 3: Adopt updated code standards for seismic evaluation and retrofit of all common buildings.

As the City moves forward with programs to encourage and require more retrofits of vulnerable buildings, it is critical for the San Francisco Department of Building Inspection (DBI) to adopt updated code standards applicable to all of the City's common building types that reflect both the City's earthquake resilience objectives and technical advances in structural engineering. It must be clear to building owners what building seismic performance is acceptable to the City, and what requirements of future mandates would be.

Recommendation 4: Require all buildings to be evaluated for seismic risk.

Building owners should evaluate the seismic performance of their buildings, upon sale, relative to standards adopted by the City. If no sale occurs, they should evaluate their buildings by a deadline established based on the building use and structural type. The result would be shared with tenants and prospective buyers and tenants, and be made a part of public City records. This information allows prospective buyers and tenants to consider seismic issues when making decisions about purchasing or renting space. It provides information needed to incorporate seismic issues in market

pricing of real estate. It would also provide owners with the information needed to decide whether to seismically retrofit vulnerable buildings.

Recommendation 5: Require retrofits of vulnerable buildings.

Owners of vulnerable buildings should be required to seismically retrofit their buildings for structural and fire hazards and building elements that affect usability, by specific deadlines, varying in time by building category. It is likely that most owners will not retrofit their buildings unless they are required to do so. Ultimately, to improve San Francisco's earthquake resilience, the City will need to require owners of vulnerable buildings to retrofit. Establishing deadlines for mandatory retrofits will show that the City recognizes the importance of this issue, allows the market to consider seismic safety in its pricing, and provides certainty for owners of vulnerable buildings to plan for the future.

Recommendation 6: Assist community service organizations to reach earthquake resilience.

The City should provide technical and financial assistance to important non-profit organizations, medical clinics, and similar organizations that meet the basic needs of many San Franciscans to seismically retrofit their buildings or relocate to better buildings. After an earthquake, vulnerable residents will need services from these groups more than ever. Many of these organizations occupy rented space and are not in control of building issues such as seismic safety concerns.

Recommendation 7: Establish clear responsibility within City government for preparing for and reducing risk from earthquakes.

The City should identify a single official within the Chief Administrative Officer's Office to be responsible for achieving earthquake resilience through mitigation, response and recovery. Implementing earthquake mitigation measures needs to become an ongoing concern of the City, with standing equal to other programs.

Recommendation 8: Adopt improved post-earthquake repair standards.

The City should enact the updated post-earthquake repair and retrofit standards developed by CAPSS and should expand this approach to other building types. In a companion report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Postearthquake Repair and Retrofit Requirements* (ATC, 2010c), CAPSS has clarified the technical requirements for post-earthquake building repair, to improve existing City policy and to improve the way this process builds the City's resilience over time.

Recommendation 9: Offer incentives for retrofit of buildings.

The City should enact a range of meaningful programs to help building owners afford retrofits. Owners ultimately are responsible for the earthquake performance of their buildings: they have the most to gain from improved performance, and the most to lose because of damage and liability. However, the City has an overriding interest in reducing the amount of damage that occurs to privately-owned buildings in future earthquakes. Therefore, it makes sense for the City to invest in encouraging building owners to make their buildings safer.

Recommendation 10: Require gas shut-off valves on select buildings.

The City should require owners of a limited number of vulnerable buildings and buildings in Fire Department designated Post-Earthquake High Fire Hazard Areas to

install automatic gas shutoff valves. In past earthquakes, gas leaks have played a significant role in fueling post-earthquake fires. Automatic gas shutoff valves, either triggered by shaking or excess flow, can play a role in reducing this fire risk.

Recommendation 11: Track evaluations and retrofits in a database system.

The City should include information relating to seismic evaluations and retrofits in DBI's updated database system to allow tracking progress of mitigation activities and recording inventories, evaluation reports and retrofit information.

Recommendation 12: Provide technical assistance for building retrofits.

The City should help residents and building professionals to evaluate and seismically retrofit buildings efficiently and in accordance with City codes. Training programs and other technical assistance can help make retrofitting easier and contribute to high-quality work.

Recommendation 13: Enact a façade ordinance.

An ordinance should require periodic inspection of façades, parapets and decorative features fixed to building exteriors, and require repair of materials found to be falling hazards. Parts of building façades can fall off and kill passers-by during earthquakes or at any time.

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction.

The City should encourage efforts to improve knowledge relevant to San Francisco about building performance and effective ways to reduce earthquake risk. Knowledge about earthquake risk reduction is developing rapidly from ongoing research, retrofitting experience, and studies following large, damaging earthquakes.

Recommendation 15: Evaluate measures to reduce post-earthquake fires.

Multiple City departments should work together to evaluate and implement measures to reduce fire ignitions and spread, and improve fire suppression capacity following earthquakes. Fires triggered by earthquakes pose a serious risk that transcends City departments.

Recommendation 16: Address the hazards from damage to building systems, appliances, equipment and non-structural building elements.

Damage to building systems, such as fallen ceilings and fixtures, broken pipes, and overturned equipment, cause serious problems in every earthquake, including deaths, greatly increased economic losses, and making buildings unusable. DBI should initiate a comprehensive program to encourage, and in some instances, require measures to reduce these hazards.

Recommendation 17: Periodically assess progress and implementation of these recommendations.

The preceding sixteen recommendations in this report call for significant new policies and programs to improve the earthquake resilience of San Francisco's building stock. The City should commission an assessment at least every five years to review progress and the consequences of the resulting program and to make recommendations for improving seismic programs.

This plan is a call to action to invest in the City's future. San Francisco will always have earthquakes in its future, but with foresight and effort, the consequences of

those earthquakes can be reduced so that the City can rebound quickly and maintain its unique character. San Francisco's leaders must act now. Improving San Francisco's earthquake resilience will take persistent effort and government intervention over several decades. However, as the recommended measures are implemented, the San Francisco community will weather earthquakes with fewer casualties and less damage, be able to more rapidly recover economically, and preserve for future generations the exciting, dynamic, culturally diverse, historic and livable city residents enjoy today. In a word, San Francisco would become more resilient.

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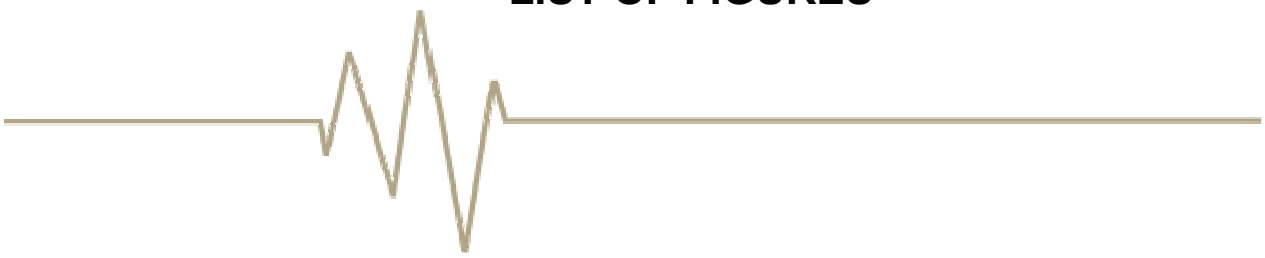

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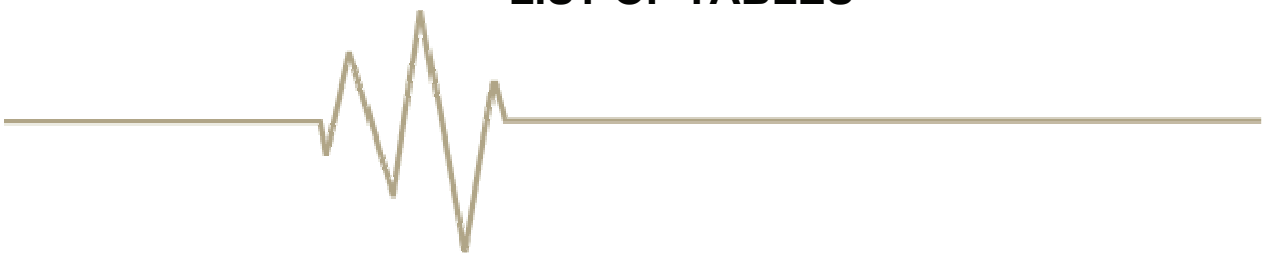

CHAPTER 1: INTRODUCTION

San Francisco faces a daunting earthquake threat given its proximity to active faults, buildings that are older than those in other Western cities, steep hillsides, areas with poor soils prone to liquefaction and amplification of shaking, and dense, wooden buildings with a susceptibility to fire. However, there are many things that can be done to minimize the consequences of future earthquakes and make San Francisco more earthquake resilient. Actions taken to improve buildings before earthquakes strike will reduce damage and casualties, speed recovery, lessen economic losses from business interruption, reduce housing and jobs losses, and protect community values and the unique character of the City. San Franciscans need to understand the risk from earthquakes and the steps they can take to improve the situation.

This report identifies measures that could be taken before earthquakes strike to reduce damage to privately-owned buildings. It recommends a comprehensive, long-term mitigation program to lead the City toward earthquake resilience and identifies steps needed to carry out the program. The program begins with building public awareness among specific groups of San Franciscans and builds over time to stronger measures to make the City's building stock more robust.

Earthquake risk creates a dilemma for building owners. Most owners understand that intense earthquakes would damage their buildings, and that the cost to repair their buildings and the income lost, while the building is repaired or replaced, can amount to significant losses. They also sense that they bear a duty to others who could be harmed by damage to their buildings and the ensuing disruption, but they are faced with uncertainty. The lack of community standards about the appropriate actions to take leads to misleading and inconsistent opinions about what needs to be done. Acting now appears to leave them open to requirements adopted later. If they retrofit their building now, will it comply with code requirements put in place in a few years? Will they need to re-do the work? Some owners, especially homeowners, have tried to improve their buildings without advice from qualified design professionals, but the lack of standards often leads them to overspend or carryout projects that might be ineffective. This report calls for measures to provide owners with the information and standards that would help them decide on the right course of action. It recommends giving owners of some types of vulnerable buildings about 20 years to voluntarily to protect their own interests before the City requires them to take action.

The course of action, however, cannot be only voluntary because too much is at stake. Therefore, this report recommends setting mandatory deadlines for buildings to be retrofitted. The report reiterates an earlier recommendation for a mandatory retrofit program addressing wood-frame buildings with five or more residential units and three or more stories[1]. A task force created by the Mayor drafted an ordinance to

[1] See companion CAPSS report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Earthquake Safety for Soft-Story Buildings* (ATC, 2009a).

implement this recommendation. Improving San Francisco's earthquake resilience will take persistent effort and government intervention over several decades. As the recommended measures are implemented, however, the San Francisco community would weather earthquakes with fewer casualties and less damage, be able to recover more rapidly and more economically, and preserve for future generations the exciting, dynamic, culturally diverse, historic and livable city residents enjoy today. In a word, San Francisco would become more resilient.

The recommended mitigation program is presented in the following chapters:

- Chapter 2 summarizes the likely impacts of future earthquakes in San Francisco as it exists today. These impacts are described in detail in the companion CAPSS report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Potential Earthquake Impacts* (ATC, 2010a).
- Chapter 3 recommends objectives to guide the City's mitigation activities.
- Chapter 4 recommends actions building owners and the City should take, and explains why these actions make sense for the City.
- Chapter 5 presents a worksheet so the City can prepare a plan of action for the next few years, 2011 to 2015, to launch the recommendations in this report.

This plan is a call to action to invest in the City's future. San Francisco will always have earthquakes in its future, but with the proper foresight and effort, those earthquakes do not need to be unmitigated disasters.

CHAPTER 2: SAN FRANCISCO'S EARTHQUAKE RISK

Future large earthquakes will have severe consequences to San Francisco if the City does not act to improve the seismic performance of its older buildings. These consequences are discussed exhaustively in a companion CAPSS report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Potential Earthquake Impacts* (ATC, 2010a), and they include deaths and injuries; damaged and destroyed buildings; loss of housing, particularly affordable and rent-controlled units; economic losses; job losses; businesses closures; reductions in City revenues at a time of increasing need; loss of historic resources; and increased difficulties for low and middle income residents.

Knowing the risk the City faces today is important because it defines the starting point for reducing those risks. The San Francisco community can compare where its risk is today with where it would like it to be, and identify the risks that are least acceptable. San Francisco can learn from New Orleans, where the risk of hurricane flooding was well known, but the importance of acting on that knowledge became widely accepted only after Hurricane Katrina struck.

This chapter briefly reviews selected impacts of four possible earthquakes that could strike the City, highlighting impacts that point towards mitigation priorities and steps the City could take to become more resilient. The earthquakes studied are magnitude 6.5, 7.2 and 7.9 earthquakes on the San Andreas fault at the City's western coast, and a magnitude 6.9 earthquake on the Hayward fault across the Bay. The CAPSS project analyzed the damage these earthquakes and fires ignited by the shaking could cause, and the impacts of that damage on various aspects of San Francisco. Selected findings are discussed below[2]. These findings are estimates, not predictions, and any number of circumstances could cause impacts after future earthquakes to be much lower or higher.

Loss of Life

Buildings damaged by earthquakes can kill people. Some loss of life may be unavoidable in large earthquakes, but measures can reduce the danger. In fact, San Francisco already has taken many steps to reduce casualties in earthquakes by enforcing building design and construction standards and requiring seismic retrofits of unreinforced masonry buildings and bracing of parapets. San Francisco can expect fewer casualties after a large earthquake than seen in less developed countries, but deaths are still expected and significant risk remains.

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[2] Detailed loss estimates are available in the report *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Potential Earthquake Impacts* (ATC, 2010a). A discussion of the technical methods behind the estimates appears in the companion CAPSS report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Potential Earthquake Impacts: Technical Documentation* (ATC, 2010b).

The study of four scenario earthquakes found the following[3]:

- Depending on the magnitude, location and time of day of an earthquake, deaths could range from 70 to nearly 1,000, and injuries requiring medical care could number from 1,900 to more than 14,000.
- Casualties could be much higher than these estimates if even one large, densely occupied office or apartment building collapses. There are some large, multi-story concrete buildings in the City built before 1980 that have the potential to collapse catastrophically and kill many people.

Specific types of buildings are most likely to cause casualties in future earthquakes. As shown in Figure 1, stiff and brittle concrete buildings built before the 1980's have the highest potential to cause casualties. Falling items, such as heavy shelves, plaster ceilings, or exterior veneer, even in buildings that are structurally robust, also can cause casualties. For example, studies following the 1999 Kocaeli earthquake near Istanbul found that nearly half of the casualties were caused by falling hazards[4]. Casualties caused by such damage are included in these estimates but are not reported separately.

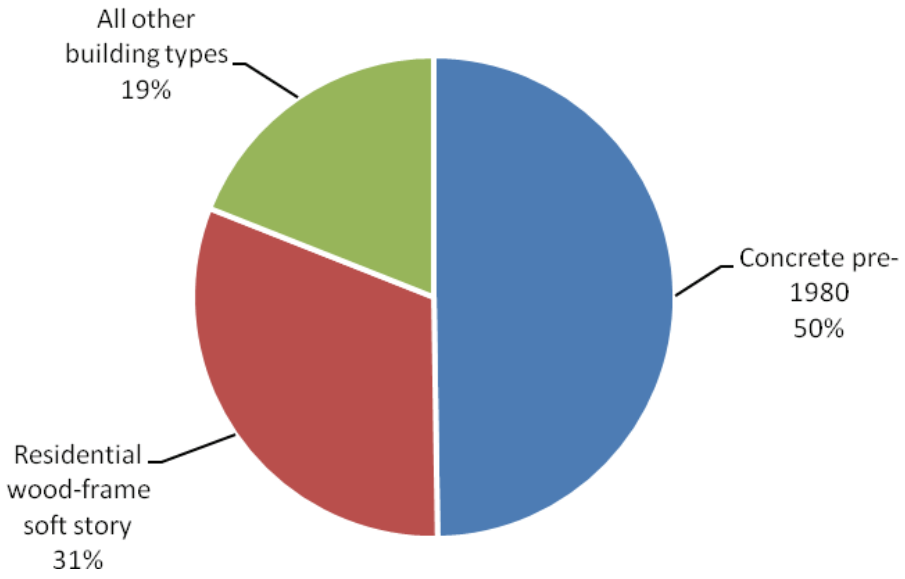


Figure 1 Estimated percent of deaths caused by various structure types in a Magnitude 7.2 San Andreas fault scenario, averaged over different times of day.

[3] These estimates only include casualties caused by building damage. They do not include casualties caused by infrastructure damage (e.g., collapse of overpasses) or casualties due to fires sparked by the earthquake.

[4] Petal, 2004.

Implications for Risk Mitigation Activities:

- Structural improvements to concrete buildings built before 1980 and residential wood-frame soft-story buildings would do the most to reduce expected casualties in future earthquakes.
- Casualties could be further reduced by making sure falling hazards are properly secured so that they do not fall on occupants during shaking. This is a relatively simple, low-cost effort.

Loss of Housing and Displaced Residents

Housing, which is a critical part of San Francisco's recovery from future earthquakes, will be hard hit. Damage will threaten the availability and affordability of housing and displace residents for years. The loss study found the following damage to housing after a magnitude 7.2 scenario earthquake on the San Andreas fault:

- 85,000 of the City's 330,000 housing units would not be safe to occupy due to damage caused by shaking. This is more than a quarter of the City's housing units.
- 11,000 of those damaged housing units would need to be demolished. It is likely that many of the lost units would be rent-controlled apartments, which, due to state law, could not be replaced by apartments covered by rent control.
- Fires that follow the earthquake could destroy more than 5,800 additional housing units.

Rebuilding is a slow process. After the Loma Prieta and Northridge earthquakes, both of which were much smaller in size than the earthquakes studied by this project, it took an average of two to three years before most heavily damaged residences were repaired or replaced. San Francisco can expect it will take much longer for its damaged and destroyed housing units to be usable after larger earthquakes.

Housing loss due to shaking damage is linked to particular types of structures. Figure 2 shows the types of structures responsible for unusable housing units after a Magnitude 7.2 San Andreas scenario earthquake.

Implications for Risk Mitigation Activities:

- Wood-frame residences with three or more units account for about two-thirds of the housing units that would not be usable after a Magnitude 7.2 San Andreas scenario earthquake. These structures are vulnerable largely because of weak or "soft-story" conditions. Retrofitting these types of structures would have a significant impact to improve post-earthquake housing availability. These retrofits are relatively straightforward and are less expensive than retrofits to other types of structures.
- Rebuilding after an earthquake will take a long time. There are steps City agencies and building owners can take prior to an earthquake to facilitate rapid and efficient repair and rebuilding, but reducing the amount of expected damage is the most effective way to speed post-earthquake recovery.

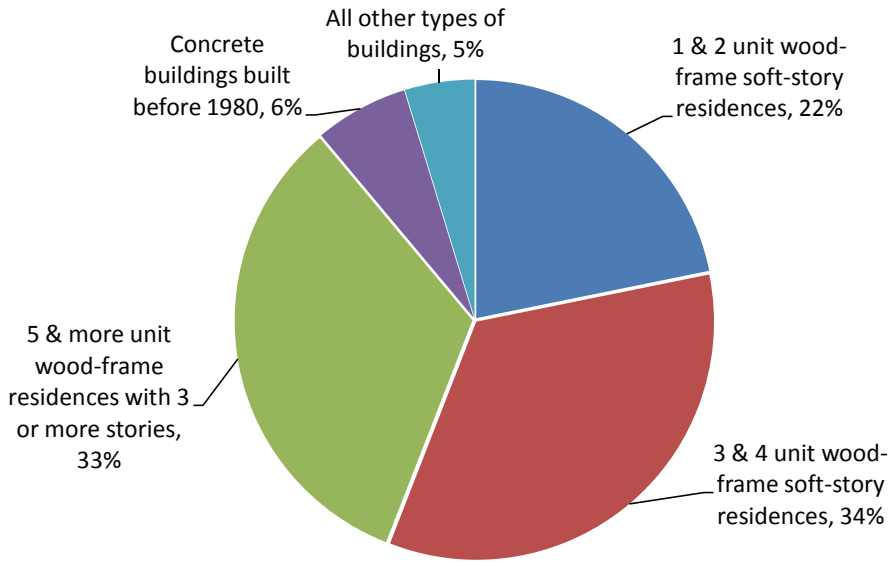


Figure 2 The estimated share of housing units that could not be occupied, by structural types, for a Magnitude 7.2 San Andreas scenario earthquake.

Economic and Business Impacts

The damage from earthquake shaking and fires sparked by the earthquake will be costly to households and businesses. Home and business owners will face an immediate need for funds to pay for repairs or to relocate. Businesses will fail and jobs will be lost. CAPSS found the following expected impacts:

- Damage to buildings due to shaking and fire could be valued at $17 to $54 billion[5], depending on which earthquake scenario occurs. These losses can be compared to the annual City budget of approximately $5 billion.
- Additional types of losses (such as damage to building contents and inventory, lost business income, lost wages, and relocation expenses) could add another $5 to $15 billion in losses, again varying by scenario earthquake.
- On top of the previously stated losses, reduced spending by businesses and workers could shrink the City's economy by more than two percent after a Magnitude 7.2 scenario earthquake, equivalent to or greater than the impacts of a recession.

In addition, a number of commercial and industrial buildings would be damaged. After the Magnitude 7.2 San Andreas fault scenario, it is estimated that more than 900 commercial buildings and 200 industrial buildings, out of a total of about 7,000 such buildings in the City, would not be safe for occupancy.

All of these impacts will affect the City's economy, businesses and jobs. The economy relies greatly on tourism and knowledge-based businesses. Many of the businesses and residents in San Francisco today do not need to be located here but

[5] All dollar figures are in 2009 dollars.

have chosen to be in San Francisco because of its urban amenities and attractiveness to creative workers. If those attractions change after an earthquake, these businesses could relocate and residents could move. The success of the City's tourism industry is directly linked to people wanting to visit San Francisco. Tourism will plummet after a major earthquake, and how quickly it rebounds is closely linked to how extensive the damage is and how quickly and how well the City as a whole recovers and rebuilds.

Damage to a Hotel in Nevada after an earthquake. Photo credit: Karl Steinbrugge, Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

San Francisco is privileged to have many small and local businesses; firms with 25 or fewer employees make up over 90 percent of the City's businesses. These face the highest failure risk after an earthquake. These businesses often have limited capital, depend entirely on revenues from one or few locations, carry limited insurance, and face difficulties repairing facilities, replacing damaged equipment and inventory, and weathering an economic downturn. Maintaining neighborhood business operations and speeding recovery are key to avoiding blighted neighborhoods. Vacant storefronts mean that both property values and neighborhood livability decline.

Certain businesses are critical to helping the City recover quickly and it is desirable to have them operational as soon as possible. San Franciscans need pharmacies, grocery stores, and similar retail establishments that provide the items required for daily living. Many of these important businesses may be located in weak buildings that would not be usable after a large earthquake.

Implications of Business And Economic Losses For Risk Mitigation Activities

- The cost of building damage and the economic ripple effects of this damage are daunting. The longer it takes to repair and rebuild the City, the more these losses will increase. Retrofitting buildings and reducing post-earthquake fire risk before

an earthquake would reduce these costs and keep the City's economy on stronger footing.

- Small and local businesses are particularly vulnerable to post-earthquake impacts. These businesses might be tenants in buildings with a limited ability to address seismic safety concerns and they may rely on nearby residents as customers. There are steps the City can take to minimize earthquake impacts to small and local businesses.
- There are particular retailers, such as large grocery stores and pharmacies, that are critical to the City's residents following earthquakes. The City has a particular interest in making sure these retailers can serve the community quickly after a disaster.

Impacts on Building Owners

Building owners stand to lose the most. Almost every building would be damaged by an intense earthquake to a degree that varies by building weaknesses, ground conditions, proximity to the fault and whether there are fires. Building owners bear the costs of repairs, as well as other costs, such as costs to relocate while damage is being repaired. Commercial owners lose income from rents. Existing lenders continue to expect payments. Owners' ability to repair their buildings depends on their ability to continue making payments on existing debt and to fund repairs from savings, liquidating other assets, or borrowing additional sums. Those without sufficient assets and with limited income might not qualify for additional loans. In contrast, retrofitting before earthquakes allows owners the opportunity to plan and finance measures to protect their assets and improve the chances that they will be able to afford repairs and recover quickly after future earthquakes.

Private building owners cannot rely on outside sources of funds to help them recover. FEMA's Individual and Households Program would cover some of the cost of minor repairs and temporary housing, but does not offer funds to cover the magnitude of costs that will face San Franciscans. Fewer than ten percent of San Franciscan homeowners carry earthquake insurance. The cost of insurance premiums is high relative to the coverage offered. Many argue that it is better to invest in retrofitting to reduce losses than to spend similar sums over time for insurance.

Implications for Mitigation Activities

- Owners should know the risks they face and measures they can take to manage the risks so they can make informed decisions;
- Building owners, by failing to address earthquake and fire risks, allow damage that jeopardizes adjoining buildings and entire neighborhoods.

Impacts on Vulnerable City Residents

Some privately-owned buildings that serve the City's most vulnerable populations may not be safe during or usable after future earthquakes. The following types of important services are often located in privately-owned buildings:

- Private schools—Kindergarten through grade 12 and colleges;
- Preschools and childcare centers;
- Assisted living facilities for the elderly or disabled;

- Medical offices and clinics, dialysis centers, medical suppliers;
- Nonprofits that serve vulnerable populations (e.g., meal delivery and public kitchens); and
- Single room occupancy hotels in older buildings.

: *A heavy ceiling panel that fell in a private school in the 1987 Whittier Narrows earthquake in southern California. Photo credit: Earthquake Engineering Research Institute Mitigation Center, Oakland, California.*

The buildings that house these services are no better than the general building stock and would suffer similar degrees of damage, if not more, in earthquakes. Many community serving organizations rent space in older buildings where rents are lower and near the population they serve. Some of these buildings might be unsafe. Extensive damage will interrupt critical support for those dependent on the services these organizations provide. Community service organizations have little leverage to cause owners to retrofit weak buildings.

Implications for Risk Mitigation Activities

- Organizations serving the City's most vulnerable residents may be located in buildings that will not be safe during or usable after future earthquakes. The City's elderly, disabled, children and poor will need the services these organizations provide in the aftermath of an earthquake. It makes sense for the City to help these organizations to become more resilient.

Loss of Community Character or "Sense of Place"

San Francisco's character could be defined in many ways, but surely it is partly captured by the distinctive flavor of the neighborhoods and the diversity of the City's residents. A major earthquake would affect both.

Earthquake damage and damage from fires sparked by earthquake shaking could destroy many buildings that define San Francisco's look and feel, including historic buildings. Demolished buildings would be replaced with buildings having modern construction materials that would look and function differently. Many of them would be larger, taking advantage of current height and density limits.

Earthquake damage to housing would have big impacts on the City's lowest income residents, senior citizens, people with fixed incomes and those with disabilities. Due to a variety of factors—including, but not limited to, few vacancies, expensive repairs, and loss of rent-controlled units—rents for apartments are likely to increase after an earthquake. Combined with short and medium term impacts on the City's businesses and job market, this could drive demographic changes that reduce San Francisco's socioeconomic diversity.

Implications for Risk Mitigation Activities

- Architecturally attractive private buildings, including historic buildings and districts, are at risk from earthquake and fire, and programs to limit building damage and earthquake-triggered fires would protect these irreplaceable resources.
- Risk reduction measures targeted at housing for low, middle and fixed income households would help keep San Francisco's population diverse.

Loss of City Government Revenue

Damage to privately owned buildings affects the City government's bottom line. An earthquake would reduce revenue at a time when increased funds would be needed because City-owned facilities would need repair and residents would need assistance to recover from the earthquake. The City can expect short and medium term declines in property tax, business tax, hotel room tax, sales tax, and other income sources. Federal funds will cover a fraction of the City government's rebuilding and recovery expenses, but none of its lost income.

Implications for Risk Mitigation Activities

- Limiting damage to privately owned buildings and the ensuing financial impacts would improve post-earthquake government revenues from property, sales and hotel taxes.

Conclusion

The analysis of four possible earthquakes to strike the City makes it clear that, as it is today, the City should expect a lot of damage from future earthquakes. As described above, wide ranging consequences will flow from that damage, causing recovery challenges for all residents, especially building owners. San Francisco will recover, but it could be forever changed by losing residents and businesses that relocate rather than wait for the City to recover. Taking steps to mitigate earthquake damage before the next earthquake strikes can avoid many of these consequences. In the following chapters, this report recommends a comprehensive program for the City to improve its earthquake resiliency.

CHAPTER 3: OBJECTIVES

Earthquakes are in San Francisco's future. The consequences of those future earthquakes could be very different—worse or better—depending on the policy choices and actions City agencies and building owners take now. It is up to San Franciscans to join in an informed and open process to decide what level and types of consequences they are willing to accept. San Franciscans should consider three fundamental questions: How many casualties are acceptable? How much damage and disruption are acceptable from shaking and fires sparked by that shaking? How quickly should the City return to a "new normal" after earthquakes? The citizens committee that advised the preparation of this study concluded that the expected casualties are too many, the damage and destruction too great, and the time to recover too long. Many of the attributes of the City that San Franciscans value are at risk. San Francisco, its neighborhoods and people, would be changed in regrettable ways by a large earthquake. This need not be the case.

Objectives are needed to guide the efforts to improve earthquake safety and post-disaster resiliency in San Francisco. This chapter recommends mitigation objectives, and the following chapters provide recommendations to meet the objectives.

Objectives are important because they shape the policies the City needs to pursue. The objectives indicate priorities for which categories of buildings should be evaluated first, and how quickly weak buildings should be strengthened. They guide development of the standards used for identifying unacceptably weak buildings and the measures needed to strengthen those buildings to achieve the desired performance. The objectives justify incentives that help building owners take actions that benefit the wider community.

This report proposes the following long-term objectives to guide mitigation actions and priorities:

After expected earthquakes[6]

1. Residents will be able to stay in their own homes.
2. Residents will quickly have access to important privately-run community services .

[6] The damage the City experiences in future earthquakes depends to a large extent on the intensity of earthquake shaking. Shaking intensity depends on a number of factors including the location of the fault where an earthquake occurs, magnitude of the earthquake, the manner that the fault rupture propagates, and the character of the ground underlying the City. The recommendations in this report are based on the intensity of shaking used by the building code for the design of new buildings. In its Resilient City report (SPUR, 2009), San Francisco Planning and Urban Research (SPUR) called this the "expected earthquake" because shaking of this intensity is likely to occur during the lifetime of the City's existing buildings.

3. No building will collapse catastrophically.
4. Businesses and the economy will quickly return to functionality.
5. The City's *sense of place* will be preserved.

These objectives are not new to the City. They respond to existing policies provided in the San Francisco General Plan. For over two decades, the City has clearly stated that earthquake safety, housing, neighborhood character and neighborhood-serving businesses are priorities (see sidebar on facing page for a discussion of how the objectives link to existing City policy). Additionally, the proposed objectives in this report also build on San Francisco Planning and Urban Research (SPUR) recommendations (see sidebar on page 14 for a discussion of how the objectives in this CAPSS report relate to proposed SPUR recommendations).

Meeting these objectives will require many San Franciscans to improve their buildings so that they experience less damage from earthquake shaking and resulting fires. It will require City government to develop new programs and rethink existing ones. There are many ways to structure objectives. This report proposes general objectives in terms of visualizing hopes for how the City will look after future large earthquakes. These objectives are long-term and ideal, and when pursued would result in a more earthquake-resilient San Francisco.

Looking at each of the proposed CAPSS objectives in more detail provides insights into why each is important:

1. Residents will be able to stay in their own homes.

Keeping San Franciscans in San Francisco after an earthquake is critical to the City's recovery. Residents will help revive their neighborhoods and the City's economy. It makes sense for owners to invest in, and the City government to encourage, making the existing housing stock robust, rather than coping with a major homelessness crisis, providing long-term temporary housing, and rebuilding a large part of the City's housing after an earthquake. Retrofitting residential buildings known to be vulnerable would save lives and money, and speed recovery.

2. Residents will quickly have access to important privately-run community services.

San Franciscans depend on numerous private entities for essential aspects of their daily lives. These entities range from non-profits that provide housing, food and care to disabled, elderly or low-income residents, to medical clinics and suppliers, to grocery stores and pharmacies, to daycare centers, schools and assisted living facilities. Residents need these services to be operational shortly after an earthquake. Many of the buildings that house these services need to be strengthened so they can withstand future earthquakes.

3. No building will collapse catastrophically.

Today, many buildings in the City used as residences and offices every day have the potential for dramatic and lethal collapses. These buildings can and must be made safer.

EXISTING CITY POLICY

The City articulates objectives in its General Plan, shaped by the 1986 Proposition M that established eight Priority Policies for the protection, preservation and enhancement of the economic, social, cultural and esthetic values that establish the desirable quality and unique character of the city. The objectives and priorities proposed in this report respond to five of these Priority Policies:

- That existing neighborhood-serving retail uses be preserved and enhanced and future opportunities for resident employment in and ownership of such businesses enhanced;
- That existing housing and neighborhood character be conserved and protected in order to preserve the cultural and economic diversity of our neighborhoods;
- That the City's supply of affordable housing be preserved and enhanced;
- That the City achieves the greatest possible preparedness to protect against injury and the loss of life in an earthquake; and
- That landmarks and historic buildings be preserved.

The Community Safety Element, an integral part of the General Plan, provides additional City policies. The City is currently updating the Community Safety Element. The 2007 draft Community Safety Element recognizes that existing hazardous structures have the greatest potential for loss of life and other serious impacts resulting from an earthquake and that the City should continue to explore ways to reduce this risk. It calls for more detailed plans.

The goals of the pending revisions to the Community Safety Element mirror those of this report. They call for protecting against injury and loss of life; reducing social, cultural and economic dislocations; and encouraging rapid recovery. Some of the many relevant objectives and policies in the Community Safety Element draft appear below:

Objective 1: Reduce Structural and Non-Structural Hazards to Life Safety and Minimize Property Damage Resulting from Future Disasters.

Policy 1.9—Complete remaining upgrades of the Unreinforced Masonry Building Seismic Hazard Reduction Program and the Parapet Safety Program.

Policy 1.10—Assess the risks presented by other types of concrete structures and reduce the risks to the extent possible.

Policy 1.11—Reduce the earthquake and fire risks posed by older small wood-frame residential buildings through easily accomplished hazard mitigation measures.

Policy 1.12—Explore incentives for private homeowners to upgrade their buildings.

Policy 1.14—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.

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 2.2—Encourage businesses and homeowners to evaluate their earthquake risks.

Objective 4. Assure the Sound, Equitable and Expedient Reconstruction of San Francisco Following a Major Disaster.

Policy 4.7—Develop and adopt a Repair and Reconstruction Ordinance, to facilitate the repair and reconstruction of buildings.

SAN FRANCISCO PLANNING AND URBAN RESEARCH (SPUR) RECOMMENDATIONS

In its Resilient City report (SPUR, 2009), SPUR recommended recovery targets for the City after an earthquake. SPUR's intent is for the City to require those improvements needed to assure a quick recovery—or the functional level needed for each phase of recovery. SPUR defined three phases of disaster response and recovery.

Phase 1, from one to seven days, is the period of initial emergency response and staging for reconstruction. Within this timeframe, SPUR proposes these recovery targets:

- Within 24 hours, hotels designated to house emergency response workers are safe and useable, shelters are open, and all occupied households are inspected by their occupants. Fewer than five percent of all dwelling units should be unsafe to occupy. Residents can shelter in place in superficially damaged buildings, even if utility services are not functioning.
- Within 72 hours, the initial recovery and reconstruction efforts will be focused on repairing residences and schools to a usable condition.

Phase 2, from 30 to 60 days, is the timeframe when housing is restored and ongoing social needs are met. Within this timeframe, SPUR proposes these recovery targets:

- Within 30 days, ninety percent of the neighborhood businesses are open and serving the workforce.
- Reconstruction efforts will be focused on repairing residences, schools and medical provider offices to a usable condition.

Phase 3, covering several years, is when long-term reconstruction is completed. Within this timeframe, SPUR proposes these recovery targets:

- All displaced households return home or are permanently relocated.
- Within four months, ninety-five percent of the community retail services are reopened.
- Within four months, fifty-percent of offices and workplaces are reopened.
- Within three years all business operations are restored to pre-earthquake levels.

SPUR also estimated the expected current status for selected uses following an expected earthquake. The target recovery times and current status applicable to private buildings are summarized in the following table.

Target States of Recovery for San Francisco's Buildings

Facilities	Phase 1 (Hours)			Phase 2 (Days)		Phase 3 (Months)		
	4	24	72	30	60	4	36	36+
95 percent of residents shelter in place							■	
Emergency Responder Housing			■					
Public Shelters						■		
Schools						■		
Medical provider offices							■	
90 percent of neighborhood retail businesses open								■
All residences repaired or relocated								■
95 percent of neighborhood retail businesses open								■
50 percent of offices and workplaces open								■
All businesses open								■

Legend

Desired Status	
Expected current status	■

Source: Adapted from SPUR, 2009.

4. **Businesses and the economy will quickly return to functionality.**

   The City's recovery depends on a functional economy. Particular businesses are especially vulnerable to earthquake impacts, such as small, local businesses and visitor serving businesses. If recovery is slow, many businesses would fail and others, such as knowledge-based businesses, could easily relocate to other communities. Retrofit of vulnerable buildings would help assure businesses stay afloat and in San Francisco after an earthquake.

5. **The City's *sense of place* will be preserved.**

   Keeping San Francisco diverse and maintaining its architectural character is important to preserving the City's soul. Retrofitting vulnerable buildings would prevent future earthquake damage from making the City unaffordable to low and middle income residents and maintain the cultural and architectural character of the neighborhoods. Many of the City's older historic buildings and cultural resources need to be preserved and protected.

The objectives and recommendations in this report are focused in a number of ways:

- This report was developed through a project of the Department of Building Inspection (DBI); therefore, its objectives and recommendations primarily focus on issues that are central to DBI's mission. Earthquakes, however, do not respect departmental boundaries. Therefore, this report also includes recommendations relevant to other City agencies.
- This report focuses on mitigation: steps taken before earthquakes strike to reduce their impacts. It does not focus on emergency response or preparedness planning, nor does it focus on post-earthquake recovery planning, which are all essential ingredients for achieving resilience. The lines among all these activities, however, are indistinct; recommendations in this report may contribute to other aspects of earthquake planning.
- This report focuses on reducing damage to privately owned buildings and the consequences that flow from that damage. It does not cover government buildings or infrastructure (roads, bridges, and water, sewer, gas, and electric utility systems), although the earthquake resilience of both is of major importance to the City.

The objectives recommended in this report cannot be achieved by the Department of Building Inspection acting alone, nor is requiring owners to strengthen weak buildings sufficient to achieve them. Achieving the recommended objectives requires actions by other City agencies and private partners joining in a long-term, comprehensive effort. The objectives build on and should be integrated within the policy fabric of the City as expressed in ordinances, the General Plan and its Community Safety Element, and through the policies carried out by the Planning Commission, Historic Building Commission, Fire Department, Rent Stabilization and Arbitration Board, and other bodies responsible for the stewardship and management of the resources at risk.

The objectives proposed in this report are ambitious. Reaching them will take decades of sustained effort. It will require using many approaches to tackle the City's risk. It will be an investment in the City's future, a recognition that the City does not want to pass all of the responsibility for earthquakes onto future generations. In the following chapters, this report recommends a long-term and comprehensive program of activities.

CHAPTER 4: RECOMMENDED ACTIONS: THE COMPREHENSIVE PROGRAM

San Franciscans have a choice: either absorb dramatic losses from future earthquakes and endure the painful and protracted recovery that follows, or undertake measures to reduce the losses and impacts from those earthquakes. Reaching the objectives proposed in the previous chapter will take thirty years of sustained effort by the City, its departments and residents. This chapter recommends the specific actions needed to pursue those objectives, in a comprehensive and phased effort.

Informed decision-making forms the basis of the comprehensive recommended program that follows. All San Franciscans, homeowners, business owners, tenants and officials, need to understand how earthquakes will affect them, and know measures they can take to reduce these impacts. Everyone should be empowered to make risk reduction decisions in their best interests, but not everyone will do so. Therefore, the recommended strategy proceeds through a series of activities, at first encouraging improvements to buildings, and later requiring such improvements to buildings when the larger community welfare is threatened.

This chapter is organized into three sections:

- **A Three-Step Strategy to Better Buildings**

  This section provides a discussion of the overall recommended three-step strategy the City should use to reach its earthquake mitigation objectives over the next thirty years. It begins with facilitating a market in which earthquake performance is valued. Next, building owners would be required to evaluate the seismic vulnerability of their buildings and share the findings with tenants and prospective buyers and tenants. Last, vulnerable buildings would be required to be retrofitted by set deadlines, which vary by category of building.

- **Specific Recommended Actions**

  This section recommends seventeen specific actions the City should take to carry out the three-step strategy to reduce earthquake risk. Together, these actions combine to form a comprehensive approach that addresses the recommended objectives. Many of the recommended actions contribute to meeting several or all of the objectives.

- **Building Categories and Retrofit Deadlines**

  This section recommends a scheme to categorize and prioritize the City's buildings based on both building structure type and use. It presents a recommended schedule for mandatory seismic retrofit of each vulnerable building category.

A Three-Step Strategy to Better Buildings

The recommendations in this report aim to use market forces and other mechanisms to drive actions to reduce earthquake risks. Public awareness and understanding is essential. Knowledge provides the information needed to give earthquake performance a financial value. Owners and occupants of buildings are empowered to make decisions in their own best interests when they know about the earthquake risk of the buildings they live in or use, understand how the risk affects them, and know what they can do about it. They can address earthquake vulnerability when buying, leasing, financing, insuring, repairing or renovating buildings. Currently, few owners or tenants have any knowledge about how the buildings they own or use are likely to perform in earthquakes, which may contribute to inaction. Misconceptions, both over and underestimating risk, abound.

Market forces have been working well to improve San Francisco's commercial building stock. Lenders and insurers for commercial buildings routinely require an analysis of the expected earthquake performance of a building before they will lend or insure. They generally require that expected building damage be less than 20 percent of the building replacement cost. The result is that the City's commercial building stock has undergone many upgrades over the years and is expected to fare significantly better than the City's housing stock in future earthquakes. Lenders and insurers generally do not have the same requirements for residential buildings and, for a variety of reasons, these industries are unlikely to enact such requirements anytime soon. Therefore, it makes sense for the City to step in and help build a market for seismically robust housing.

The goal of the strategy recommended by this report is to increase the number of seismic retrofits voluntarily conducted by owners of the most vulnerable buildings. As more retrofits are conducted, retrofitting techniques will improve, engineering and construction work will grow more efficient and less costly, and the community as a whole will begin to benefit from seismic remediation by building owners. However, experience with the unreinforced masonry law in San Francisco and other California communities indicates that many owners will not evaluate or retrofit their buildings until required to do so. Deadlines requiring evaluations and retrofitting of weak buildings are needed to give market forces a push, even though it may be appropriate to set some of these deadlines decades in the future. Requirements and deadlines show that earthquake risk is an issue the City government takes seriously; in contrast, a purely voluntary program suggests that this issue is not viewed as important. Deadlines for required action, based on the City's priorities and the capacity of the government and private sectors to do the work, are needed.

The City has a strong interest in making sure owners make informed decisions about their buildings and strengthen those that are most vulnerable. Unsafe and damage prone buildings threaten the safety of City residents, the viability of neighborhoods, the long-term affordability of the City's housing, the socio-economic diversity of the City, and the larger City economy. Individual building failures weaken the fabric of the entire community and can be economically ruinous for the owner, tenants and neighbors. Damaged buildings are prone to fire ignitions that could spread for blocks or consume entire neighborhoods. The cumulative impact of individual failures is devastating; conversely, the cumulative impact of individual retrofits will protect attributes that San Franciscans value.

This report recommends a three-step strategy to engage market forces to encourage structural retrofits, enact measures to reduce fire damage, and promote measures to reduce risk from falling hazards and non-structural elements. The strategy follows the following steps:

Step 1. Facilitate a market in which earthquake performance is valued;

Step 2. Nudge the market by requiring evaluation upon sale, or by a deadline; and

Step 3. Require retrofitting by a deadline.

By applying this three-step program in a phased manner, San Francisco would help buildings owners address their risk and take actions that benefit the broader community. Not all building categories need to pass through each phase. For example, the effort to strengthen weak unreinforced masonry buildings began with Step 3, in recognition of their lethal risk.

Each of the steps is described below:

- **Step 1: Facilitate a market in which earthquake performance is valued**

  Initially, the City would take steps to encourage building owners to have their buildings evaluated and retrofitted, if vulnerable. This involves the following types of activities:

  - Conducting focused education and outreach campaigns that present specific steps that particular types of building owners, tenants, business owners, construction professionals, and others can take to reduce earthquake impacts. Knowing how to reduce risk is a necessary first step to action (see Recommendation 2).
  - Adopting updated code standards for seismic evaluation and retrofit of all common building types in San Francisco. As the City moves forward with programs to encourage and require more retrofits of vulnerable buildings, it is critical for the Department of Building Inspection to adopt updated code standards that reflect both the City's earthquake resilience objectives and technical advances in structural engineering. It must be clear to building owners what building seismic performance is acceptable to the City, and what requirements of future mandates will be (see Recommendation 3).
  - Offering meaningful incentives to building owners who retrofit voluntarily. Owners ultimately are responsible for the earthquake performance of their buildings: they have the most to gain from improved performance, and the most to lose because of damage and liability. However, the City has a strong interest in reducing the amount of damage that occurs to privately-owned buildings in future earthquakes. Therefore, it makes sense for the City to incentivize building owners to make their buildings safer (see Recommendation 9).
  - Providing technical assistance to help residents and building professionals to evaluate and seismically retrofit buildings efficiently and in accordance with City codes. Technical assistance can range from developing standard plan sets to organizing technical training sessions (see Recommendation 12).

Many of these activities will require the Department of Building Inspection to work with other departments and private partners. During all stages, existing requirements to evaluate and retrofit buildings when expanding, changing use or repairing damage would remain in place.

- **Step 2: Nudge the market by requiring evaluation upon sale or by deadline**

  The second step (Recommendation 4) would require owners to complete an engineering evaluation, prior to selling buildings, that compares a building to the performance standards that DBI has adopted for each type of building. The findings of these evaluations would be shared with tenants and prospective buyers and tenants, and be made a part of public City records. The evaluations would identify structural weaknesses, fire ignition and spread risks, falling hazards that affect safety, vulnerable building elements that affect whether a building could be used after an earthquake, and ground failure hazards. These standards would specify whether it is likely that the occupants would be safe and be able to shelter-in-place following the expected earthquake. The evaluation should clearly identify buildings with dramatic weaknesses, or "killer buildings". A potential buyer could then decide on the building's value and, if it is purchased, whether to retrofit it or not. Buyers and sellers would negotiate sales prices and financing based in part on the findings of the seismic evaluations. The City would supplement this phase by requiring that certain categories of buildings, such as those that are infrequently sold, condominiums with multiple owners, and owners of many buildings, such as a university or institutional investor, to complete evaluations according to a schedule. This should include requiring larger buildings to participate in the City's Building Occupancy Resumption Program (BORP). BORP is a City program that allows building owners to engage an engineer before an earthquake to inspect their building for damage after an earthquake in order to expedite reoccupancy after an earthquake.

A seismic retrofit in progress. Photo credit: Anderson Niswander Construction.

- **Step 3: Require retrofitting by a deadline**

  The third, and last, step would require retrofitting vulnerable buildings by a deadline. This is the approach used to address unreinforced masonry buildings during the 1990's. This step ensures that owners of vulnerable buildings that threaten the broader community's welfare ultimately improve those buildings. Deadlines for mandatory retrofits show that the City believes this issue is serious, allows the market to consider seismic safety in its pricing, and provides certainty for owners of vulnerable buildings to plan for the future. The requirements of the earlier phases would remain in effect. This step is proposed in Recommendation 5.

This report recommends that the City apply the three-step strategy to key categories of buildings in the City in a phased manner, which is discussed further later in the report.

Recommended Actions

This section presents specific recommended policies to reduce San Francisco's earthquake risk. The seventeen key recommendations listed on the next two pages are needed to reduce vulnerability from earthquake shaking, falling hazards, ground failure and post-earthquake fire. Some of the recommended actions directly tackle the sources of risk; others are needed to sustain the City's mitigation efforts over the next few decades. Each of the seventeen recommendations is described in more detail in the pages that follow, including a discussion of why it is a good choice for San Francisco.

The recommendations are categorized by mitigation objective in Table 1, and by steps and other factors in the three-step recommended strategy in Table 2.

Recommended Actions to Reduce Earthquake Risk	Additional details
1. **Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and retrofit of those that are vulnerable to earthquake damage.** A Mayoral task force has proposed an ordinance to require evaluation and retrofit of these buildings. The Board of Supervisors should enact it.	page 26
2. **Inform the public of risks and ways to reduce risk.** The City should conduct focused education and outreach campaigns aimed at building owners, tenants, realtors and others to improve their understanding of earthquake risk and measures to manage the risk, and to facilitate a market for retrofitting.	page 28
3. **Adopt updated code standards.** The City should adopt code standards for seismic evaluation and retrofit of all common building types in San Francisco.	page 31
4. **Require all buildings to be evaluated for seismic risk.** Building owners should evaluate the seismic performance of their buildings upon sale relative to DBI standards or, if no sale occurs, by a deadline established based on the building use and structural type. The results would be shared with tenants and prospective buyers and tenants, and be made a part of public City records.	page 33
5. **Require retrofits of vulnerable buildings.** Owners of vulnerable buildings should seismically retrofit their building for structural and fire hazards and building elements that affect usability, by specific deadlines, varying by building category.	page 35
6. **Assist community service organizations to reach earthquake resilience.** The City should provide technical and financial assistance for important non-profit organizations, medical clinics, daycare centers and similar groups to seismically retrofit their buildings or relocate to better buildings.	page 37
7. **Establish clear responsibility within City government for preparing for and reducing risk from earthquakes.** The City should identify a single official in the Chief Administrator's Office to be responsible for achieving earthquake resilience through mitigation, response and recovery.	page 39
8. **Adopt improved post-earthquake repair standards.** The City should enact updated post-earthquake repair and retrofit standards developed by CAPSS and expand this approach to other building types.	page 40

Recommended Actions to Reduce Earthquake Risk	Additional details
9. **Offer incentives for retrofit of buildings.** The City should enact a range of meaningful programs to help building owners afford retrofits.	page 41
10. **Require gas shut-off valves on select buildings.** The City should require owners of certain vulnerable buildings and buildings in Fire Department designated Post-Earthquake High Fire Hazard Areas to install automatic gas shutoff valves.	page 45
11. **Track evaluations and retrofits in a database system.** The City should include information relating to seismic evaluations and retrofits in DBI's updated database system to allow tracking progress of mitigation activities and recording inventories, evaluation reports and retrofit information.	page 46
12. **Provide technical assistance for building retrofits.** The City should help residents and building professionals to evaluate and seismically retrofit buildings efficiently and in accordance with City codes.	page 47
13. **Enact a façade ordinance.** An ordinance should require periodic inspection of façades, parapets and decorative features fixed to building exteriors, and require repair of materials found to be falling hazards.	page 50
14. **Promote development and implementation of effective ideas on earthquake risk reduction.** The City should encourage efforts to improve knowledge relevant to San Francisco about building performance and effective ways to reduce earthquake risk.	page 51
15. **Evaluate measures to reduce post-earthquake fires.** Multiple City Departments should work together to evaluate and implement measures to reduce fire ignitions and spread, and improve fire suppression capacity following earthquakes.	page 53
16. **Address the hazards from damage to building systems, appliances, equipment and non-structural building elements.** DBI should initiate a comprehensive program to encourage, and in some instances, require measures to reduce these hazards.	page 55
17. **Periodically assess progress and implementation of these recommendations.**	page 56

Table 1 Recommended Actions Categorized By Mitigation Objective

Recommended Mitigation Actions	Objective				
	(1)	(2)	(3)	(4)	(5)
1. Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and retrofit of those that are vulnerable to earthquake damage.	X	X	X	X	X
2. Inform the public of risks and ways to reduce risk.	X	X	X	X	X
3. Adopt updated code standards.	X	X	X	X	X
4. Require all buildings to be evaluated for seismic risk.	X	X	X	X	X
5. Require retrofits of vulnerable buildings.	X	X	X	X	X
6. Assist community service organizations to reach earthquake resilience.		X		X	
7. Establish clear responsibility within City government for preparing for and reducing risk from earthquakes.	X	X	X	X	X
8. Adopt improved post-earthquake repair standards.	X	X	X	X	X
9. Offer incentives for retrofit of buildings.	X	X	X	X	X
10. Require gas shut-off valves on select buildings.	X	X		X	X
11. Track evaluations and retrofits in a database system.	X	X	X	X	X
12. Provide technical assistance for building retrofits.	X	X	X	X	X
13. Enact a façade ordinance.				X	X
14. Promote development and implementation of effective ideas on earthquake risk reduction.	X	X	X	X	X
15. Evaluate measures to reduce post-earthquake fires.	X	X		X	X
16. Address the hazards from damage to building systems, appliances, equipment and non-structural building elements.	X	X		X	
17. Periodically assess progress and implementation of these recommendations.	X	X	X	X	X

Mitigation objectives:

(1) Residents will be able to stay in their own homes
(2) Residents will quickly have access to important privately-run community services
(3) No building will collapse catastrophically
(4) Businesses and the economy will quickly return to functionality
(5) The City's sense of place will be preserved

Table 2 Recommended Mitigation Actions Categorized by Three-Step Strategy

Recommended Mitigation Actions	Step 1	Step 2	Step 3	Other
	Facilitate market for earthquake performance	Evaluation upon sale or by deadline	Retrofit by deadline	
1. Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and retrofit of those that are vulnerable to earthquake damage.		X	X	
2. Inform the public of risks and ways to reduce risk.	X			
3. Adopt updated code standards.	X	X	X	
4. Require all buildings to be evaluated for seismic risk.		X		
5. Require retrofits of vulnerable buildings.			X	
6. Assist community service organizations to reach earthquake resilience.				X
7. Establish clear responsibility within City government for preparing for and reducing risk from earthquakes.				X
8. Adopt improved post-earthquake repair standards.				X
9. Offer incentives for retrofit of buildings.	X			
10. Require gas shut-off valves on select buildings.				X
11. Track evaluations and retrofits in a database system.	X	X	X	
12. Provide technical assistance for building retrofits.	X	X	X	
13. Enact a façade ordinance.				X
14. Promote development and implementation of effective ideas on earthquake risk reduction.				X
15. Evaluate measures to reduce post-earthquake fires.				X
16. Address the hazards from damage to building systems, appliances, equipment and non-structural building elements.	X	X	X	
17. Periodically assess progress and implementation of these recommendations.				X

Recommendation 1: Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and retrofit of those that are vulnerable to earthquake damage. A Mayoral task force has proposed an ordinance to require evaluation and retrofit of these buildings. The Board of Supervisors should enact it.

San Francisco has about 4,400 wood-frame residential buildings with three or more stories and five or more units. Many of these buildings have a soft-story condition at the ground level, due to garage doors, store windows, or other conditions, that make these buildings extremely prone to damage in earthquakes. The 1989 Loma Prieta earthquake, a moderate sized and distant event, caused heavy damage to this building type.

A retrofit of a soft-story residence. Photo credit: Anderson Niswander Construction.

In a companion CAPSS report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco Earthquake Safety for Soft-Story* Buildings (ATC, 2009a), CAPSS analysis found that in likely, larger earthquakes these buildings would suffer a large amount of damage. Analysis of a sample of 2,800 of the worst of these buildings in a possible magnitude 7.2 San Andreas fault earthquake scenario found the following:

- Between 40 percent and 85 percent of these buildings would be red-tagged after post- earthquake inspection, meaning they would be posted with a red UNSAFE placard and could not be occupied. These red-tagged buildings contain from 12,000 to 25,000 residential units whose occupants would be displaced during the years required for repair.
- A quarter of these buildings could collapse (300 to 850 buildings), endangering ground floor occupants and causing permanent loss of rent-controlled housing and attractive, older buildings.

The project analyzed the effectiveness and costs of seismic retrofits for these buildings:

- Seismic retrofits would reduce the damage significantly. After retrofit, less than one percent of these buildings would collapse.
- Retrofits would likely cost between $60,000 to $130,000 per building. Residents of upper floors could remain in these buildings while the retrofits take place.

In early 2010, Mayor Newsom convened a task force of City officials and community stakeholders to develop a program to require mandatory retrofits of vulnerable wood-frame buildings with three or more stories and five or more residential units. This task force drafted an ordinance that is ready for the Board of Supervisors. The ordinance defines all aspects of the program, including code standards and timelines (see Table 3). Building owners would be required to, first, evaluate their buildings and then to retrofit them, if found vulnerable, within three to seven years. The Board of Supervisors should pass this ordinance.

Table 3 Proposed Implementation Schedule for Proposed Evaluation and Retrofit Program for Wood-frame Soft-Story Buildings with Three of More Stories and Five or More Residential Units (in years[a])

Compliance Tier[b]	Submission of Inventory and Analysis Form to DBI	Submittal of Permit Application with Plans for Seismic Strengthening	Completion of Work and Issuance of Certificate of Final Completion[c]
I	1	2	3
II	1	2	4
III	2	4	6
IV	2	5	7

[a] All time periods are in years measured from the date the ordinance becomes operative.

[b] The compliance tiers are the following:
Tier I: buildings containing a Group A, E, R-3.1 or R-4 occupancy on the soft-story level and buildings that are in a mapped liquefaction zone that is not covered under Tier IV.
Tier II: buildings containing 15 or more dwelling units, except for buildings that fall within the definition of another tier.
Tier III: all buildings not falling within the definition of another tier.
Tier IV: buildings located in lateral spreading areas as delineated in designated maps.

[c] Time limits and extensions are explained further in the draft ordinance. All work is to be completed by 2020, as recommended in California Health & Safety Code Section 19160(l).

Source: Draft Soft-Story Retrofit Building Code Ordinance, date 9/16/2010

Recommendation 2: Inform the public of risks and ways to reduce risk. The City should conduct focused education and outreach campaigns aimed at building owners, tenants, realtors and others to improve their understanding of earthquake risk and measures to manage the risk, and to facilitate a market for retrofitting.

The first step in the three-step strategy (see previous section) is to create a deeper understanding of earthquake risk and risk reduction measures, which will underpin a market for retrofitting. San Francisco residents, businesses and building owners need to know specifically what risks they face and what to do to reduce those risks. On their own, education programs motivate only a limited number of people to take action. However, they are an essential part of making other risk reduction programs work. When used in tandem with other programs aimed at reducing risk, education programs can lead to significant action.

Education and outreach campaigns need to be targeted at specific audiences and focused on particular building categories and topics to be effective. Programs should present specific steps that particular types of building owners, tenants, business owners, construction professionals, and others can take to reduce earthquake impacts. San Franciscans need to understand earthquake risk in personal terms. These campaigns need to be long-lasting and the messages frequent, and from multiple sources.

City departments can do some of this, and can get the ball rolling, but it is critical to coordinate with partners in the public and private sectors. Fire and earthquake insurance companies, utilities, contractors, and building materials stores could be particularly effective partners that also would benefit from better community understanding of these issues.

CAPSS recommends the following specific education and outreach programs for San Francisco:

a. Explain the need for and process to evaluate building seismic performance, including structural and fire hazards, and building elements that affect usability.

This report recommends requiring building owners to evaluate the seismic performance of their building upon sale or a scheduled deadline (Recommendation 4). Building owners and others that would be involved in this process (realtors, etc.) need to know what they need to do, and how to do it properly. They should also understand why evaluations are important and the goals behind requiring them.

b. Offer courses aimed at single-family homeowners about how to conduct small scale seismic retrofits.

Some single-family homes can improve their seismic safety through relatively simple and affordable steps. The City should develop a course for residents teaching them simple things they can do to upgrade their homes, as well as clarifying when they need to seek professional help.

c. Educate installers, building owners, and others about proper ways to brace water heaters.

Toppled water heaters have fueled earthquake-triggered fire in past earthquakes. State law and the City's building code currently require water heaters be strapped securely whenever they are replaced, or when buildings in the City are sold. However, it appears that many water heaters in San Francisco are strapped improperly, meaning they could still fall and fuel fires during an earthquake. A program to make sure water heater installers, building owners and others know the proper, safe ways to secure water heaters could make a big difference with small cost.

d. Educate residents about simple and cost-effective ways to make their homes safer and habitable following earthquakes by reducing falling hazards.

Damage to building systems, such as ceilings and fixtures, broken pipes, and upset equipment, cause serious problems in every earthquake, including deaths, increased economic losses, and making building space unusable. It is often simple and inexpensive to reduce the risk of casualties and damage from these hazards. The City should conduct an education campaign informing residents about specific steps they should take, and include details such as types of hardware to purchase and how to install it.

e. Develop a program in coordination with other City agencies to work with small businesses and important community service providers on measures they can take to reduce vulnerability to earthquakes.

Small businesses and important community services, such as non-profit organizations that serve the daily needs of the City's most vulnerable residents, are important to the City's recovery from future earthquakes. By reducing risk and planning in advance, these organizations can greatly improve their ability to stay afloat and continue to function after an earthquake. The City should encourage and help organizations to develop mitigation and recovery plans.

f. Encourage building materials stores, insurance companies and utility companies to supplement education campaigns.

Building materials stores, insurance companies and utility companies regularly contact building owners and managers, and could provide San Francisco specific information about reducing earthquake vulnerability and actions to take after earthquakes. These companies have a direct interest in reducing earthquake damage and post-earthquake fire, and should advise building owners accordingly. Multiple, consistent education messages from a variety of public and private entities are far more likely to lead to action than isolated messages only from government agencies.

g. Revise post-earthquake building inspection protocols and train inspectors and owners to identify buildings that can be occupied safely despite damage and loss of utilities.

After an earthquake, it benefits everyone to allow as many residents and businesses to remain in their buildings as possible, while ensuring safety during aftershocks. Displacing residents and businesses makes recovery more difficult. Inspectors who conduct post-earthquake safety tagging should be trained in

post-earthquake occupancy concerns particular to San Francisco. Many buildings will be inspected and evaluated by their occupants, which means that public information campaigns about this issue immediately after an earthquake will play an important role.

h. Train preservation engineers and architects knowledgeable about San Francisco's historic resources in post-earthquake safety tagging.

San Francisco's building stock is unique and beautiful. To ensure that it is protected, the City should make sure that engineers and architects are knowledgeable about preservation issues that are involved in post-earthquake building safety evaluations and tagging. The tagging process occurs immediately after an earthquake and influences repair and demolition decisions. Historic resource issues must be considered in these decisions. The City should conduct outreach to the preservation community to make sure that they are involved in this process.

Recommendation 3: Adopt updated code standards. The City should adopt code standards for seismic evaluation and retrofit of all common building types in San Francisco.

The Department of Building Inspection (DBI) should adopt building code standards to be used as a basis for determining vulnerability and seismic retrofitting requirements. As the City moves forward with programs to encourage and require more retrofits of vulnerable buildings, it is critical for DBI to adopt updated code standards that reflect both the City's earthquake resilience objectives and technical advances in structural engineering.

The City should define what performance it expects during earthquakes for all existing and new buildings, considering post-earthquake usability and safety. Retrofit standards should reflect these performance goals. Retrofit standards should relate to both a building's structure type and how it is used, because building use is a key factor in determining what level of damage in earthquakes is deemed acceptable by society. DBI should seek to adopt retrofit standards that take a practical, optimal approach. The standards should optimize performance improvements while minimizing intrusion into occupied spaces and the cost of retrofits. For some types of buildings, achieving "shelter-in-place" performance, or even reparability, might be unacceptably expensive or intrusive, making lower performance expectations reasonable.

During this process, the Department should develop a clear understanding of the performance expected from new buildings constructed to the current building code, and consider whether improvements are necessary. Superior performance is needed from new construction for the City to achieve its resilience objectives for housing and businesses.

The City also should define standards and procedures for engineering evaluations of seismic performance for all building types common in San Francisco**.** Recommendation 4 in this report recommends requiring building owners to evaluate the seismic vulnerability of their building upon sale or by a scheduled deadline. Before this can happen, DBI needs to adopt clear guidelines and technical standards for professionals to use for evaluations of structures of different types and for communicating the findings in meaningful and objective terms. For common building types, it would be ideal if inspectors could use a simple checklist approach that requires a minimum of complex calculations. DBI should also work to identify a scheme, such as a building rating scheme, to explain the findings of the structural evaluations to non-technical building owners and users in meaningful ways that can help them make decisions about buying, renting or retrofitting [7]. The information provided should be clear that buildings with identified vulnerabilities might perform better than buildings that have not yet been evaluated.

[7] As an example, the Structural Engineers Association of Northern California (SEAONC) is developing a scheme to assign stars to buildings, rating three characteristics: safety, repair cost, and time to reoccupy. After evaluation, buildings would be assigned from zero to five stars, indicating good or bad seismic characteristics (CAPSS, 2010). Another example is a proposed rating system for detached, single-family, wood-frame dwellings, developed for the City of Los Angeles (ATC, 2007), that assigns A, B, C, and D ratings that indicate expected losses should the design level earthquake occur. Other schemes may be available, as well.

CAPSS recommends the following general performance objectives for San Francisco code standards:

- Retrofit standards should result in most residential buildings being safe for use after earthquakes and during aftershocks (this performance level is generally referred to as "shelter-in-place"). Utilities (e.g., water, sewer, and power systems) may not be functional, which would influence whether occupants choose to remain in these buildings. San Francisco Planning and Urban Research (SPUR) has proposed a goal that 95 percent of San Franciscans should be able to shelter-in-place following a large, "expected" earthquake.
- Retrofit standards for buildings that cannot reasonably meet the shelter-in-place standard should result in buildings that can be repaired. Reparability protects San Francisco's communities, sense-of-place, historic resources and affordable housing.
- Retrofit standards for building types that cannot reasonably meet either the shelter-in-place or reparability standards, as a minimum, must prevent collapse and danger to occupants.

Regardless of the structural performance standard, all retrofit standards should also include measures to address the following issues: building elements such as stairs and elevators that affect the usability of buildings; other hazards that affect safety and occupiability, such as overhead piping, and equipment and furnishings; and fire ignition sources and conditions that could contribute to fire spread. Standards should require large buildings to address ground failure risks when undergoing retrofits; typically, addressing this risk for smaller buildings is prohibitively expensive.

DBI should specify benchmark code dates for all significant building structure types. Buildings constructed or retrofitted after these benchmark dates would be presumed to have adequate earthquake resistance to meet the City's performance objectives. For buildings constructed or retrofitted to earlier codes, standards designated by DBI would set the basic retrofit standard. Currently, DBI has one benchmark code date for all structure types—May 21, 1973—although it is clear that some building types constructed or retrofitted after that date have serious seismic vulnerabilities.

DBI should amend the building code to improve it as new information and standards become available. In particular, DBI should seek standards that reflect advances in structural engineering approaches and consider building flexibility in addition to strength. Some performance-based national standards are now referenced in building codes and are widely used here and abroad, such as ASCE 31 for evaluations (ASCE, 2003) and ASCE 41 for retrofits (ASCE, 2007). These standards have known limitations at this time, but should become increasingly practical for use in coming years. These "next generation" code standards potentially allow more effective retrofits at lower costs.

Recommendation 4: Require all buildings to be evaluated for seismic risk. Building owners should evaluate the seismic performance of their buildings upon sale relative to DBI standards or, if no sale occurs, by a deadline established based on the building use and structural type. The result would be shared with tenants and prospective buyers and tenants, and be made a part of public City records.

This is the second step in the three-step strategy. People who own and use buildings in San Francisco should know whether their building is likely to be safe during future earthquakes, and repairable and/or usable after those earthquakes. This information allows prospective buyers and users to consider seismic issues when making decisions about purchasing or renting space. It provides information needed to incorporate seismic issues in market pricing of real estate. It would also provide owners with the information needed to decide whether to seismically retrofit vulnerable buildings.

This requirement should be enacted only after DBI has adopted updated code standards for seismic evaluation and retrofits (Recommendation 3). The information provided should be objective and measured against the established standards. Building owners who choose to voluntarily retrofit to DBI standards after discovering, through an evaluation, that their building has seismic vulnerabilities, should be exempted from retrofit mandates for a period of 15 years.

Findings of the evaluation should be shared with existing tenants and prospective buyers and tenants and be available in public records. The findings should be included in the Report of Residential Building Record (3R report for residential buildings) provided to the buyer prior to the sale or exchange of any residential building older than one year. This evaluation should be conducted by licensed design professionals (engineers and architects), along with other inspections typically conducted by licensed personnel at the time of sale.

Evaluation results should be presented in a way that make it clear that evaluated buildings are not regarded as more vulnerable than buildings that have not yet been evaluated. Buildings not yet evaluated are potentially hazardous.

The evaluations should cover many aspects of building seismic risk, in addition to assessing whether a building's structure meets the adopted DBI retrofit standards:

- Evaluations should identify buildings with weaknesses that could lead to collapse and life loss.
- Evaluations should explicitly examine building materials for deterioration due to water intrusion or pest infestation and weakness in the attachment of cladding and decorative elements.
- Geotechnical evaluations should be conducted for large buildings located in areas designated as having a high potential for liquefaction-induced ground failure.
- Evaluations should identify fire ignition and spread risks, such as whether water heaters are properly secured; whether electrical wiring, gas piping, appliances and meters are properly installed; the presence of unauthorized perforations in firewalls; and whether a building is located in an area prone to conflagration

(defining these areas, designated as Post-Earthquake Fire Hazard Area, is discussed in Recommendation 10).

- Evaluations should identify issues that affect post-earthquake usability and safety. There are various "non-structural" aspects of buildings that affect the safety, usability and reparability of buildings. Damaged partition walls, equipment, furnishings, elevators and utilities can hurt people, ignite fires, or prevent occupancy and business resumption.

Deadlines for evaluations should be established for building types that sell rarely, or those divided into multiple parcels that sell at different times (e.g., condominiums), with priority given to buildings that may be unsafe. Owners of portfolios of many buildings, such as a university or institutional investor, could submit a program to DBI showing how their entire building stock will be addressed, reflecting their internal priorities and facility management needs, and be allowed flexibility within the City's deadlines by building type. Recommended building categories and associated deadlines appear in the next section, *Building Categories and Retrofit Deadlines*.

As part of this process, larger buildings could be required to participate in the Building Occupancy Resumption Program (BORP). BORP is a City program that allows building owners to engage an engineer before an earthquake to inspect their building for damage to expedite reoccupancy after an earthquake.

Recommendation 5: Require retrofits of vulnerable buildings. Owners of vulnerable buildings should seismically retrofit their building for structural, fire, usability and falling hazards by specific deadlines, varying by building category.

San Francisco is a City prone to earthquakes with an old and vulnerable stock of buildings. As discussed in other recommendations, the City needs to offer strong education and incentive programs and require seismic evaluations of buildings. All of these steps will encourage building owners to seismically retrofit voluntarily. However, it is likely that most owners will not retrofit their buildings unless they are required to do so. Ultimately, the City will need to require owners of vulnerable buildings to retrofit to improve San Francisco's earthquake resilience. This is the third, and last, step in the three-step strategy (see previous section), and was the approach used to address unreinforced masonry buildings during the 1990's.

A retrofitted multi-story, soft story building. Photo credit: William Godden, Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

Deadlines for mandatory retrofits show that the City recognizes the importance of this issue, allows the market to consider seismic safety in its pricing, and provides certainty for owners of vulnerable buildings to plan for the future. The City should define a number of building categories, based on building use and structural system, and set a series of staggered deadlines for requiring retrofits. Some of these deadlines should be soon; others should be decades away. Deadlines should be assigned to various building categories based on building risk, importance to community resilience, and feasibility and cost of retrofits. Again, owners of many buildings, such as a university or institutional investor, could submit a program to DBI showing how their entire building stock will be addressed, reflecting their

internal priorities and facility management needs, and be allowed flexibility within the City's deadlines by building type.

Recommended building categories and associated deadlines appear in the following section, *Building Categories and Deadlines*. Retrofits should address structural damage, fire risk, falling hazards, usability concerns and, for larger buildings, geotechnical concerns that were identified in evaluations (Recommendation 4).

Recommendation 6: Assist community service organizations to reach earthquake resilience. The City should provide technical and financial assistance for important non-profit organizations, medical clinics, daycare centers and similar organizations to seismically retrofit their buildings or relocate to better buildings.

San Francisco is fortunate to have many organizations that serve the daily needs of the City's most vulnerable residents—its poor, elderly, children, disabled, and non-native English speakers. After an earthquake, vulnerable residents will need services from these organizations more than ever. Many of these organizations occupy rented space and are not in control of building maintenance issues or seismic safety concerns. The City departments that work with these organizations should develop a program to assist them, technically and financially, to evaluate the seismic safety of the buildings they use and to retrofit vulnerable buildings or relocate to better buildings.

: *People standing in line for food and water after the 1994 southern California Northridge earthquake. Photo credit: Robert Eplett, Courtesy of Earthquake Engineering Research Institute Mitigation Center, Oakland, California.*

The City should provide special assistance to the following types of organizations:

- **Non-profit organizations providing important services to vulnerable populations**

  These providers serve the homeless, persons confined to their homes due to health or disabilities, persons with medical issues, the poor and others. Many City agencies use these organizations to deliver services. Tens of thousands of San Franciscans rely on these organizations for services that keep them alive.

- **Preschools and daycare centers**

  Children in preschool and daycare centers should be safe in earthquakes, just as their older siblings are in public schools. Moreover, parents rely on these facilities to care for their children while they work. San Francisco's recovery following earthquakes depends on people returning to work.

- **Clinics and facilities providing urgent and critical medical services**

  Neighborhood urgent care and psychological clinics, dialysis centers, medical suppliers, and hospital facilities not regulated by the State of California[8] provide critical services to San Franciscans. These services would be needed to treat the thousands of injuries that do not require hospitalization immediately after earthquakes, and in the days, weeks and months that follow.

- **Places of worship**

  Churches, temples, mosques and other religious buildings have large occupancies during services. Many provide critical services to the broader community. These buildings often have earthquake vulnerabilities due to their size, configuration, age and falling hazards. During earthquakes they pose serious threats to the safety of occupants, and the resulting damage would limit their ability to provide services to the community.

[8] A state law referred to as Senate Bill (SB) 1953 requires owners of acute care hospitals to evaluate their facilities and meet specified deadlines to retrofit or replace vulnerable facilities.

Recommendation 7: Establish clear responsibility within City government for preparing for and reducing risk from earthquakes. The City should identify a single official in the Chief Administrative Officer's Office to be responsible for achieving earthquake resilience through mitigation, response and recovery.

Implementing earthquake mitigation measures needs to become an ongoing concern of the City with standing equal to other programs. The earthquake programs within the City need to be institutionalized and responsibility for implementation clarified so that the long-term effort required will not wane as people retire and other issues emerge. It should be the responsibility of one high level official within the Chief Administrative Officer's office who has the authority to work with many departments and is accountable for achieving progress.

The official would monitor progress in carrying out the recommendations in this report within the responsible City agencies and would make public quarterly reports to the Disaster Council. Ideally, this function would be established in the City Charter.

Overseeing the interrelated yet autonomous departments responsible for earthquake mitigation, retrofit incentives, preparedness, response and recovery at the highest administrative level is necessary and the responsibilities should be explicitly described. The measures needed to improve the earthquake performance of the City are physical, involving private and government buildings and utilities, preparation of people and organizations, and many departments, commissions and boards (including the Departments of Building Inspection, Planning, Emergency Management, Public Works and Fire, and functions such as facilities management and capital planning). The office should seek appointment of a Mayoral task force to investigate a number of the recommended actions and to focus agencies on reducing and managing earthquake risk.

An early activity of this position should be to work with the staff revising the Community Safety Element in the General Plan to ensure that the recommendations of this report are incorporated.

The official should work with an advisory committee, which would meet periodically to review progress implementing the recommendations in this report and to advise on ways to improve the program. The preparation of the recommendations in this report benefited from an active and dedicated advisory committee. The insights and concerns of representatives of various interests and neighborhood groups provide valuable perspective and improve accountability for performance and progress.

This office would also support private sector efforts by providing on City staff an ombudsperson to help owners navigate through City requirements and programs relating to retrofitting. Navigating City requirements can be challenging. A dedicated staff person could help building owners and construction and design professionals meet all requirements relating to seismic safety and take advantage of all incentive programs. This ombudsperson office should have employees knowledgeable about programs and requirements across the many City departments that address these issues. An ombudsperson who reaches out to owners, provides training and instructions, and helps shepherd projects through the entire process could facilitate widespread retrofitting. The ombudsperson should understand both economic and technical issues and be supported administratively and not conflicted with other responsibilities.

Recommendation 8: Adopt improved post-earthquake repair standards. The City should enact updated post-earthquake repair and retrofit standards developed by CAPSS and expand this approach to other building types.

After an earthquake, some damaged buildings can be repaired to their pre-earthquake condition. Other damaged buildings need to incorporate seismic retrofits into their repairs, to ensure that they suffer less damage in future earthquakes. The City's current policy regarding which buildings need to retrofit, and which can only repair, needs improvement, as evidenced by problems experienced after the 1989 Loma Prieta earthquake. The City needs to have a post-earthquake repair and retrofit policy to receive certain types of post-disaster funding from the Federal Emergency Management Agency.

In a companion report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Postearthquake Repair and Retrofit Requirements* (ATC, 2010c), CAPSS has developed detailed, clarified technical recommendations to improve this policy and the way this process builds the City's resilience over time. The City should adopt these revised provisions.

The CAPSS recommendations cover 95 percent of the City's buildings. DBI should use this work as a model to develop detailed improvements for additional structure types identified in the CAPSS report.

A damaged building in the Marina District after the 1989 Loma Prieta earthquake. Photo credit: Courtesy of Earthquake Engineering Research Institute Mitigation Center, Oakland, California..

Recommendation 9: Offer incentives for retrofit of buildings. The City should enact a range of meaningful programs to help building owners afford retrofits.

Owners ultimately are responsible for the earthquake performance of their buildings: they have the most to gain from improved performance, and the most to lose because of damage and liability. Building owners benefit by retrofitting before earthquakes strike, but the upfront costs are significant and conflict with other expenditure priorities. While retrofitting results in a safer, more reliable building with its value better protected from earthquake damage, often there is no more useable space or operating efficiency achieved, and improved seismic safety may not be reflected in market values or rental incomes. However, the City has a strong interest in reducing the amount of damage that occurs to privately-owned buildings in future earthquakes. Less damage means a quicker and less costly recovery for the entire City, as well as reduced social dislocation. The consequences of cumulative damage to privately-owned buildings for neighborhoods, local businesses, historic character, and post-earthquake housing availability and affordability make private damage a public concern. Therefore, it makes sense for the City to invest in encouraging building owners to make their buildings safer.

It is imperative that agencies develop and offer meaningful incentives in the near future. Incentives are an important component of Step 1 of the three-step strategy (see previous section) to encourage owners to retrofit. While incentives will not lead to most buildings owners retrofitting their buildings, they could make the difference for some owners who are already inclined to retrofit and will combine with other programs to lead to more action. They also send a positive signal to building owners that the City does not expect them to solve this problem on their own.

Different incentives are meaningful for different owners, so the City should offer a variety of approaches. Incentives that would encourage and facilitate retrofitting in San Francisco are the following:

a. Amend the Planning Code and other City statutes and regulations to offer incentives to building owners who voluntarily conduct seismic retrofits, to allow changes to their buildings that would increase their value.

The City has the ability to offer a number of non-financial incentives that provide real value to building owners. These include allowing additional units or uses (density bonuses), encroachment into setbacks, increased floor/area ratios, relaxation of parking requirements, change in height limits, transfer of development rights, priority in the condominium conversion lottery, and others. These issues would allow building owners to make changes to their building to increase their value or income. While not costing the City anything in terms of dollars, these planning and zoning issues impact other values and can inspire strong feelings among City residents. The City should engage relevant departments, City residents and building owners to discuss which potential incentives provide meaningful motivation to building owners to retrofit, and whether their social costs outweigh the long-term social benefits that come from improved seismic performance. Existing policies protect values important to the City, such as housing affordability and density of uses. However, these values are threatened by inevitable earthquake damage far more than by changes made during retrofits. Incentives for earthquake retrofits would protect these values long-term, not erode them.

b. Allow owners to pass through the full costs of voluntary seismic retrofits that meet DBI code standards.

Rental housing is likely to bear the brunt of damage in future earthquakes, leading to long-term displacement of renters and permanent loss of affordable housing. Tenants benefit greatly from seismic retrofits that reduce these impacts and improve safety. The Board of Supervisors should change the rent ordinance to allow owners to pass through the full cost of retrofit measures undertaken voluntarily in accordance with the code standard. Procedures should protect tenants who would suffer undue hardships by spreading smaller rent increases over a longer period. Currently, building owners can only pass through 50 percent of the costs of voluntary retrofits for most buildings, but they can pass through all costs for mandated retrofits.

c. Maintain fee waivers and expedited review for voluntary seismic retrofits of vulnerable wood-frame residential buildings.

In 2009, San Francisco began offering expedited plan review and plan review fee waivers for owners who decide to retrofit vulnerable wood-frame residential buildings. Damage to wood-frame buildings will be responsible for most of the housing units that cannot be occupied after future large earthquakes. It makes sense to continue this modest program to encourage building owners to invest their own resources to retrofit these vulnerable buildings.

d. Adopt a policy that assures that those who voluntarily retrofit to appropriate standards would not be required to do more work for 15 years, even if standards change.

Owners who undertake retrofitting to the City's standards want some assurance that the City will not require additional retrofit measures as codes change and knowledge of earthquake performance advances. The City has a current policy that applies to both retrofitted unreinforced masonry buildings and wood-frame soft-story buildings, which should be extended to all types of buildings. Providing a 15-year period in which further retrofits would not be required would encourage owners to retrofit rather than wait, and assure lenders that additional funds would not be needed.

e. Publicize how to use the recently passed transfer tax rebate for seismic safety upgrades.

San Francisco voters passed Proposition N in November 2008. This allows up to a 1/3rd rebate of transfer tax upon sale to owners who invest in seismic retrofit measures. Few residents know about this rebate or how to use it. The City should publicize how to use this existing incentive.

f. Publicize and facilitate the process for building owners to make sure that seismic retrofit work is exempted from property reassessments.

This incentive has been state law for twenty years, but many owners do not know about it or how to apply for this credit when properties are reassessed after renovations. The City should clarify the process to ensure that seismic work is not considered in property reassessments after upgrades.

g. Change the Planning Code to prevent owners of buildings demolished after an earthquake from rebuilding to prior nonconforming conditions, unless the building was seismically retrofitted before the earthquake.

Currently, if a building is demolished following an earthquake, the owner can rebuild incorporating nonconforming conditions that existed in the building previously at that site (e.g., area, height, number of units, parking). This policy should be changed so that building owners have an incentive to retrofit.

San Francisco homes damaged in the 1906 earthquake. Photo credit: Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

h. Review, extend and document, as appropriate, historical resources both within designated historic districts, and individually, and conduct earthquake vulnerability assessments.

Owners of officially listed historical resources who invest in rehabilitation projects can qualify for federal income tax incentives. Because earthquakes threaten the preservation of irreplaceable historic resources, the City should encourage vulnerability assessments and measures to improve the earthquake performance of historical resources. The City also should seek funds to screen identified historical resources, and significant and contributory buildings located within designated historic districts, for earthquake vulnerability, and then work with building owners to encourage retrofitting. The term "Historical Resources" is defined by the California Environmental Quality Act and interpreted locally by the Planning Department.

i. Provide need-based loans for qualified retrofits.

Many owners lack the assets or cash flow to qualify for commercial loans to finance retrofitting. The City could help by offering conventional or deferred loans. The City could raise funds through the sale of a general obligation bond to lend funds needed to retrofit buildings that would be paid back on a schedule or when the building is sold or refinanced. This was the approach used to support retrofits of unreinforced masonry buildings. However, many people believe that loan program was ineffective due to the conditions owners needed to meet to use the funds. New loan programs should be designed with fewer restrictions so they provide true assistance to building owners. The City recently investigated creating a Mello-Roos "opt-in" district to provide funds for retrofit that would be repaid through property tax over a period of years. At the current time, this strategy is infeasible because mortgage lenders and mortgage investment agencies such as Freddie Mac and Fannie Mae believe these programs increase the risk of their debt securities. This approach may become a useful option in the future.

j. Advocate for federal and state incentives.

The City could advocate for federal and state incentives such as tax credits and depreciation schedules to reduce owners' costs and lessen federal and state costs following earthquakes and a retrofit loan insurance program to protect existing mortgages. The state also could require condominium associations to develop provisions for either repairing earthquake damage or for retrofitting vulnerabilities. Amendments to the federal Robert T. Stafford Disaster Relief and Emergency Assistance Act could provide resources to help the City carry out the recommendations in this report.

Recommendation 10: Require gas shut-off valves on select buildings. The City should require owners of certain vulnerable buildings and buildings in Fire Department designated Post-Earthquake High Fire Hazard Areas to install automatic gas shutoff valves.

In past earthquakes, gas leaks have played a significant role in fueling post-earthquake fires. Gas appliances can break away from connections and building damage can sever gas lines. San Francisco is a densely packed City with mostly wood frame, flammable buildings, making post-earthquake fire risk a serious concern.

Automatic gas shutoff valves, either triggered by shaking or excess flow, can play a role in reducing this fire risk. A limited number of buildings that are found through seismic evaluation to be particularly vulnerable should be required to install automatic gas shutoff valves. In addition, the Fire Department, working with DBI, should identify locations where fire risk is particularly high and where shut off valves would be required. These areas would be called Post-Earthquake High Fire Hazard Areas.

While gas shutoff valves reduce fire risk, they increase some social risks because it can take a long time to get all gas lines restarted after an earthquake. If shutoff valves were installed on all buildings, many residents in buildings with little damage could be left without heat, hot water, or cooking facilities for an extended period after an earthquake. This could be deadly to the City's large elderly and disabled populations, which is why this report only recommends shutoff valves for buildings most at risk of fueling fires. Requirements for shut off valves should be coordinated with social service agencies so that the needs of vulnerable persons are addressed.

Burned rubble in the Marina District after the 1989 Loma Prieta earthquake. Photo credit: Courtesy of Earthquake Engineering Research Institute Mitigation Center, Oakland, California.

Recommendation 11: Track evaluations and retrofits in a database system. The City should include information relating to seismic evaluations and retrofits in DBI's updated database system to allow tracking progress of mitigation activities, recording inventories, evaluation reports and retrofit information.

DBI's current database system does not include trackable information about seismic retrofits or vulnerability and cannot aggregate and manipulate information for evaluation and tracking citywide progress of mitigation programs.

DBI is in the process of installing an updated database system. This system should include a range of information to support earthquake risk reduction programs, such as the following:

- Information about building use;
- Whether and when buildings have undergone seismic retrofits, and to what standard a building was retrofitted;
- Building structural type and characteristics that affect vulnerability; and
- The findings of building seismic evaluations.

A seismic retrofit on the University of California, Berkeley, campus. Photo credit: William Godden, Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

Recommendation 12: Provide technical assistance for building retrofits. The City should help residents and building professionals to evaluate and seismically retrofit buildings efficiently and in accordance with City codes.

Training programs and other technical assistance can help make retrofitting easier and contribute to high-quality work. The following types of technical assistance activities would encourage retrofitting:

a. Develop standard plan sets for retrofits of typical San Francisco buildings.

Many of San Francisco's buildings are similar in design and construction. This means that similar seismic retrofit solutions should work for a number of buildings. DBI should develop standard plans sets for seismic retrofits of common and simple building types. Buildings that are similar to those in the plan set could use these plans for retrofit. Plan sets reduce design costs for retrofits and have been in use in the East Bay for cripple wall buildings (a building type that is not common in San Francisco) for several years.

b. Provide training for engineers and other licensed professionals in conducting building seismic evaluations.

The City should offer hands-on technical training for how to conduct building seismic evaluations (Recommendation 4). This type of training would help make sure that evaluations are competent.

c. Provide information on retrofit costs and effective technical approaches based on experience as the program progresses.

The City should monitor lessons learned when owners undertake retrofits, including effective retrofit design, construction techniques, costs, and innovative use of technology. The City can share these lessons with building owners, design professionals and contractors to help retrofit programs grow increasingly effective and efficient over time.

d. Provide training for design professionals and contractors in conducting seismic retrofits.

The City should provide training in how to conduct seismic retrofitting, particularly in how to use updated technical standards. This training could include an overview of innovative products and technologies developed for seismic retrofits. The City could post a list of those who have completed this training on its website, which would help consumers.

e. Develop additional building code standards, as needed, to reduce hazards and improve post-earthquake building usability, including bracing of mechanical and other heavy equipment and shelves, and elevator functionality.

Safety and post-earthquake usability are affected by the performance of contents, appliances, equipment, elevator functionality, functionality of HVAC (heating ventilation, and air conditioning) and utility systems, and other building elements not directly associated with a building's structural system. These elements can pose safety hazards during earthquakes, play a big role in whether

buildings can be used after an earthquake, and affect the scope of economic losses. The building code already includes some standards; however, DBI should develop additional technical standards for reducing the hazard from objects and systems not covered. These standards would be applied either as requirements or would guide voluntary efforts.

A store damaged in the 1989 Loma Prieta earthquake with damage that will delay occupancy. Photo credit: James Blacklock, Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

f. Conduct inventories of structural types and building uses of concern.

There are structure types in the City that are known to pose risks to the safety of residents, and building uses of special importance. However, the City has no inventory of exactly where these building are or how many there are. DBI should lead an effort to get a good inventory of the highest risk structure types and buildings with selected important uses in the City so programs to address the risk of these buildings can move forward.

Inventories are needed for the following types of structures:

- Concrete tilt up buildings;
- Concrete frame buildings constructed prior to 1980;
- Concrete and steel frame buildings with unreinforced masonry infill walls;
- Early retrofitted buildings; and
- Large welded steel moment frame buildings built before 1994.

Lists of owners responsible for buildings with the following uses are needed:

- Assisted living facilities;
- Social service providers;
- Daycare centers and preschools;
- Medical service providers;
- Critical retail services (e.g., grocery stores, pharmacies);
- Private schools and colleges; and
- Large institutions with control over many buildings.

Recommendation 13: Enact a façade ordinance. An ordinance should require periodic inspection of façades, parapets and decorative features fixed to building exteriors, and require repair of materials found to be falling hazards.

Parts of building façades can fall off and kill passers-by during earthquakes or at any time. Many cities have passed laws requiring regular inspection of façades and other building elements that could fall, and requiring maintenance of deficient conditions. San Francisco should have such an ordinance. San Francisco enacted measures in the 1970's to brace parapets and to prevent exterior building elements from falling on the sidewalks or adjacent buildings. These measures should be extended to address building façades and cladding vulnerable to falling, as many aging buildings have increased hazards due to corrosion and general deterioration.

Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction. The City should encourage efforts to improve knowledge about building performance and effective ways to reduce earthquake risk that are relevant to San Francisco.

Knowledge about earthquake risk reduction is developing rapidly from ongoing research, retrofitting experience, and studies following large, damaging earthquakes. The City should keep abreast of new developments in structural, geotechnical and social science topics to make sure issues important to San Francisco are addressed and applied in San Francisco. As evidence that the City can influence research, the CAPSS project's work on wood-frame soft-story buildings has already resulted in a national effort in the technical community to define better standards and methods for retrofits of this type of structure.

The following activities would provide information helpful to San Francisco:

a. Plan data collection programs to follow the next damaging earthquake, focused on learning about issues of policy importance to San Francisco.

The City should plan now to make sure that important lessons relevant to San Francisco are learned from the next earthquake to strike the City or other communities with similar conditions. Earthquake damage is ephemeral, disappearing as residents repair and rebuild. Data collection programs, beyond standard post-earthquake building inspections, should be planned in advance. This will help the City be better prepared for the inevitable earthquakes that follow.

b. Support efforts to test and research innovative and low-cost retrofit concepts, such as bracing garage doors and adding ductility and energy absorption to brittle or weak building elements.

DBI should work with universities, companies and individuals developing innovative and potentially low-cost solutions for seismic retrofits. Encouraging such innovators to conduct demonstration projects, or to conduct seminars in San Francisco, can help move these technologies closer to reality and channel them in directions that make sense for San Francisco.

c. Support innovation needed to modernize and improve evaluation and retrofit standards.

Current building codes generally rely on analysis methods that are decades old. More modern methods, such as those developed for Performance Based Design, are increasingly becoming viable approaches for retrofits and building codes. DBI should work with the research community to help translate improved analysis methods into practical code standards that could be adopted by the City.

d. Reexamine the expected performance of previously retrofitted buildings.

San Francisco has pioneered efforts to improve the earthquake performance of its building stock. In the 1970's, the City required building owners to brace parapets and decorative elements, and began requiring retrofitting of vulnerable buildings when they were enlarged or renovated to change their use. In the 1990's, the City began its program to retrofit most unreinforced masonry

buildings. Since then, knowledge about retrofitting has changed in significant ways and some of the early retrofits might not provide the performance the owners and tenants expect, or that the City desires. The City should conduct a careful analysis of previous retrofits, especially the use of thin-wall steel tube braced frames. The City should report whether additional retrofits are needed to protect public safety and improve the City's resilience.

e. Study the hazard from masonry chimneys in San Francisco, and recommend necessary mitigation measures.

Masonry chimneys, mostly on small dwellings, often are unreinforced and prone to falling dangerously. San Francisco's fire chief was killed when a chimney fell during the 1906 earthquake. Unreinforced chimneys are not allowed by code and some cities encourage their removal. The extent of risk to San Franciscans needs further analysis and should be addressed when buildings are evaluated and retrofitted.

f. Support installation of instruments to measure building movement in earthquakes.

Records of building movements during earthquakes provide information that is useful when evaluating the extent of damage a building has experienced and its level of post-earthquake safety. The recordings also provide evidence to better understand how buildings respond when subjected to strong shaking.

g. Study the feasibility of administrative measures to mitigate against ground failures that affect multiple properties and cannot be completed by a single building owner.

Liquefaction and lateral spreading ground failures generally involve more than a single parcel, making it difficult for a single owner to address the hazard. Administrative arrangements, such as opt-in districts (geologic hazard abatement districts) can be used to fund and execute projects involving several owners, government agencies and utilities. Administrative measures will be needed when remediation technology (see recommendation below) advances to become useful.

h. Periodically review remediation technology and provide guidance to owners in potential liquefaction and lateral spreading zones when techniques become feasible.

Current research into soil remediation measures suitable for built-up areas shows some promise, but is not yet ready for widespread commercial application. The City should monitor progress periodically and consider administrative ways to use the technology when appropriate.

Recommendation 15: Evaluate measures to reduce post-earthquake fires. Multiple City Departments should work together to evaluate and implement measures to reduce fire ignitions and spread, and improve fire suppression capacity following earthquakes.

Fires triggered by earthquakes pose a serious risk. Strong efforts by multiple City departments are needed to reduce the number of ignitions that occur after future earthquakes and to limit fire spread to adjacent buildings. Issues that affect ignitions, fire spread, and fire suppression are the responsibility of a number of City departments, private owners, and entities outside of City control (e.g., Pacific Gas and Electric company and property insurers). The most sensible ways to manage post-earthquake fire risk should be determined through dialogue between all of these groups. Each of these groups should share what they know with other groups, to help everyone make good decisions for San Francisco.

Views of fires and displaced residents from the Presidio after the 1906 earthquake Photo credit: Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

A diverse group of City Departments and others should evaluate and consider implementing the following actions:

a. Improve water supply systems to cover those neighborhoods not served by the Auxiliary Water Supply System.

The Auxiliary Water Supply System provides a redundant water system for fighting fires after earthquakes and at other times, and incorporates many earthquake resistant features in its design. However, this system covers only the

northern and eastern City neighborhoods, those that were developed in the early part of the last century when the system was constructed. The City needs adequate, reliable water sources to fight post-earthquake fires in all neighborhoods. There are a number of options to improve the water supply in neighborhoods not served by the Auxiliary System, including expanding the City's Portable Water Supply System, which can be deployed wherever needed. This important issue needs to be addressed as soon as possible.

a. Expand the training and scope of Neighborhood Emergency Response Teams (NERT) to include fire suppression, fire reporting, assisting vulnerable residents, and assisting with neighborhood recovery.

The San Francisco Fire Department runs training programs for Neighborhood Emergency Response Teams (NERT) and has trained thousands of residents to help their neighborhoods after an emergency. NERT volunteers could be trained to help in new ways, including basic fire suppression, fire reporting, relighting pilot lights, and helping neighbors who are dependent on functioning utilities and others for the delivery of food, water, oxygen, medicine and health services. The City should examine how to take maximum advantage of the enthusiasm of NERT teams to help the City to respond to and recover from major earthquakes.

b. Increase accessibility of water shutoff valves on building fire sprinkler systems to control water loss from damaged sprinkler systems.

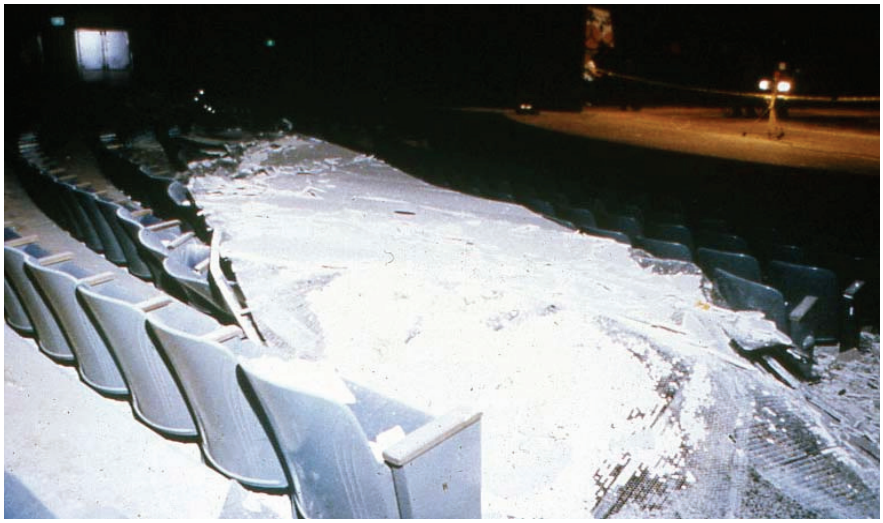
Damaged water sprinkler systems broken by earthquake shaking can contribute to loss of water needed to fight fires from the municipal water system, as well as seriously damage buildings by water inundation. The City should investigate whether making shutoff valves for these systems more accessible is a cost effective way to improve post-earthquake water availability and limit non-structural damage.

c. Study potential post-earthquake ignition risks and evaluate measures to reduce them.

There are a number of mechanisms that may reduce fire ignitions in earthquakes that warrant further investigation. These include using modern arc fault circuit interrupters to avoid electrical fires, using flexible connections for gas-fired appliances, and addressing the high pressure gas lines inside buildings. The City should convene a group to look at these and other ignition risks and recommend further action.

Recommendation 16: Address the hazards from damage to building systems, appliances and equipment and non-structural building elements. DBI should initiate a comprehensive program to encourage, and in some instances, require measures to reduce these hazards.

Damage to building systems, such as fallen ceilings and fixtures, broken pipes, and overturned equipment, cause serious problems in every earthquake, including deaths, greatly increased economic losses, and making buildings unusable. Building communications, electrical, plumbing and HVAC systems, elements such as stairs and elevators, furnishings, appliances and equipment, and retail inventories can be more valuable than the building structures. These elements greatly affect whether buildings can be used following earthquakes, the magnitude of losses, and the safety of inhabitants. Measures to reduce damage to these elements generally are not difficult, are affordable, and are readily achievable.



A heavy plaster ceiling that collapsed during the 1989 Loma Prieta earthquake. Photo credit: Consortium of Universities for Research in Earthquake Engineering, Courtesy of the National Information Service for Earthquake Engineering, University of California, Berkeley.

DBI should initiate a comprehensive program to encourage, and in some instances, require measures to reduce these hazards. It should include education and outreach activities focused on these issues (see Recommendation 2d) and development of relevant code standards (see Recommendation 12e). DBI should consider ways to improve enforcement of water heater installation standards.

This report recommends that falling hazards and other non-structural concerns be identified as part of mandatory evaluations (Recommendation 4) and be addressed prior to, or as part of, mandatory retrofits (Recommendation 5). For some building categories, the City might find that falling hazards and other non-structural concerns should be addressed before mandatory retrofit deadlines. For example, this report proposes that many building categories not be mandated to retrofit for more than two decades. In these cases, the City could require buildings to comply with non-structural standards by an earlier date.

Recommendation 17: Periodically assess progress and implementation of these recommendations.

The preceding sixteen recommendations in this report call for significant new policies and programs to improve the earthquake resilience of San Francisco's building stock. The City should commission an independent assessment at least every five years to review progress and consequences of the resulting program and to make recommendations for improving its effectiveness. The recommendations in this report are interrelated, and will be most effective if implemented as a complete program, instead of piece by piece. The assessment should look at what actions have been taken by the City and highlight important steps that may have been neglected. The assessment should also recommend adjustments based on lessons learned. Although these recommendations have been carefully selected, some of them may not work as intended when implemented. It is imperative that they be reviewed periodically to measure their effectiveness in reaching the City's objectives and to recommend changes to make them work better.

Building Categories and Retrofit Deadlines

Categories of Buildings

The City should divide the building stock into "categories," or groups of buildings defined by a building's use, its type of structural system, or both. This way of grouping buildings allows priorities to be set based on both the importance of buildings to the community and public safety. All buildings in a category would be moved through the three-step strategy—information, evaluation, and retrofit—as appropriate. The sequence in which building categories would be addressed would be assigned based on how important the type of building is to San Francisco's resilience (e.g., two important uses are rental housing and private schools) or the threat the building type poses for injuries and deaths (e.g., structural categories with known life safety risks include unreinforced masonry bearing wall buildings, concrete tilt-up buildings, and concrete frame buildings constructed before 1980).

Many buildings would be included in two categories, one because of their use and another because of the type of structure. The category with the first deadline would take precedence, but the retrofit standards should be the same. For example, if there is an assisted living facility located in a large concrete building constructed before 1980, the owner would be required to evaluate the building because it houses an assisted living facility, not because it is an older concrete building. When the program advances to the category of older concrete buildings, the seismic upgrade of this building would have been already completed.

The City could choose to prioritize within each category so that buildings with greater numbers of occupants, more important uses, located on weak soils, or with greater vulnerability, or a combination of these attributes, could be addressed first. These characteristics could be identified when an inventory of buildings in the category is prepared.

This report recommends twenty categories of buildings based on use, structure type or both. Each category is described below. Table 4 summarizes the categories and how they are comprised of both uses and building types.

The building categories are:

- **Wood-frame residential buildings with three or more stories and five or more units**

  There are about 4,400 buildings of this type, many with a soft-story condition at the ground level. A soft-story is significantly weaker or more flexible than the stories above it. The weakness at the ground level usually comes from large openings in perimeter walls, due to garage doors or store windows, and/or few interior partition walls. During strong earthquake shaking, the ground level walls cannot support the stiff and heavy mass of the stories above them as they move back and forth. The ground level walls could shift sideways until the building collapses, crushing the ground floor. This building type is expected to be responsible for about one-third of housing units that cannot be occupied after future earthquakes. Retrofits of this type of structure are relatively straightforward and inexpensive, compared to other structure types. The risk of this type of building and the benefits associated with retrofits are explored in detail in the companion CAPSS report *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Earthquake Safety for Soft-Story*

Buildings (ATC, 2009a). In response to this report, the Mayor formed a task force to create a program and to draft legislation to implement the report's recommendations (see Recommendation 1).

Table 4 Building Categories Summary

Building Category	Estimated Number of Buildings
Categories Based only on Structural Systems	
Concrete tilt-up buildings	200
Large buildings with welded steel moment frames built before 1994	Unknown
Early retrofitted buildings	Unknown
Categories Based on Structural System and Use	
Wood-frame residential buildings with three or more stories and five or more units	4,400
Concrete residential buildings built before 1980	Unknown
Other types of residential buildings with five or more units	Unknown
Concrete non-residential buildings built before 1980	Unknown
Categories Based Only on Building Use	
Residential buildings with three and four units	More than 6,000
Single-family homes and two-unit residences	112,000 single family, 20,000 two unit
Providers of important services to vulnerable populations	Unknown
Preschools and daycare centers	Unknown
Clinics and facilities providing medical services	Unknown
Private kindergarten through grade 12 (K-12) schools and private colleges	About 100 private K-12 schools, more than 20 private colleges and universities
Assisted Living facilities	Unknown
Houses of worship	Unknown
Hotels and motels	About 240
Critical retail stores and suppliers	About 30 large grocery stores and 100 pharmacies
Buildings used by large audiences	Unknown
Historic buildings, significant and contributory buildings in historic districts, and other resources that may be historic	Unknown

Sources: *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Potential Earthquake Im*pacts (ATC, 2010a), Housing Inspection Services.

- **Residential buildings with three and four units**

  There are an estimated 6,000 wood-frame residential buildings with three to four units. Many of these have a soft-story at the ground level. There also are a small number of unreinforced masonry buildings that were exempt from the earlier mandatory retrofit program, and a number of vulnerable buildings of various other structural types. These buildings are expected to be responsible for about one-third of residential units that cannot be occupied after a large earthquake (in addition to the third associated with larger wood-frame buildings, discussed above). A mandatory program addressing these buildings should begin as soon as progress on seismic upgrades to the five unit buildings progresses to the point that the program can be expanded, about five years from the present.

A reinforced concrete column undergoing retrofit. Photo credit: L. Thomas Tobin.

- **Concrete residential buildings built before 1980**

  Older reinforced concrete buildings are a serious risk for extensive damage and dramatic and deadly collapses during earthquakes. Such collapses have been responsible for many of the casualties in earthquakes around the world. There are older reinforced concrete buildings in San Francisco being used as apartment

buildings and residential hotels. Thousands of people live in these buildings and many would be killed or displaced by damage. Retrofit of these buildings is expensive, but is important due to the risks they pose to the City. It may make sense to retrofit these buildings to a "collapse prevention" standard, recognizing that, even after retrofit, many of them may not be habitable or repairable after an earthquake.

- **Other types of residential buildings with five or more units**

  This category includes all large residential buildings not constructed from wood or concrete that are found to be vulnerable through evaluation. This category includes diverse and vulnerable buildings, such as reinforced masonry and steel frame buildings with masonry infill walls. Mostly, these buildings are multi-unit; many of them have historic features. Many of these buildings provide housing for low income tenants and will be difficult to replace. It may be appropriate to retrofit some of these buildings to a "collapse prevention" standard.

- **Single family homes and two unit residences**

  This is by far the most common type of building in San Francisco, with an estimated 112,000 single-family homes and almost 20,000 two-unit residential buildings. Many of these buildings are vulnerable to earthquakes because of garages at the ground level, creating a weak or soft-story condition, as well as significant non-structural hazards that may prevent buildings from being occupied after earthquakes. There are a small number of unreinforced masonry buildings of this size that were exempted from the earlier mandatory program. DBI should develop prescriptive standards for typical buildings that would improve the likelihood that residents could shelter in place.

- **Providers of important services to vulnerable populations**

  These providers serve the homeless, persons with limited mobility, persons with significant medical and psychological issues, the poor and others. Many City agencies use these organizations to deliver services. Tens of thousands of San Franciscans rely on these organizations for services that keep them alive.

- **Preschools and daycare centers**

  Children in preschool and daycare centers should be as safe in earthquakes as are their older siblings in public schools. Parents rely on these facilities to care for their children while they work and to provide a satisfactory level of safety. San Francisco's recovery following earthquakes depends on people returning to work.

- **Clinics and facilities providing medical services**

  Neighborhood urgent care and other medical services, dialysis centers, medical suppliers, and hospital facilities not regulated by the State of California[9] provide critical services to San Franciscans. These services would be needed to treat the thousands of injuries that do not require hospitalization immediately after earthquakes, and in the days, weeks and months that follow.

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[9] State law gives the Office of Statewide Health Planning and Development authority over the design and construction of acute care hospital and skilled nursing facilities.

- **Private K-12 schools and private colleges**

  Most people assume that school buildings are safe, but most private schools are probably no safer than the general building stock. Many of San Francisco's private school buildings were constructed when building standards were much less stringent than today. Nearly one third of school children—more than 23,000—attend private schools in San Francisco, the highest rate in the entire state[10]. The City must ensure that all of San Francisco's children and other students attend school in buildings that meet standards equivalent to the standards for public schools[11].

- **Assisted Living facilities**

  The City's elderly and other disabled persons should be in facilities that are expected to be safe and functional after future earthquakes. Relocation after an earthquake would be hardest on these residents. The City must provide assistance to those facilities serving low-income residents.

- **Houses of worship**

  Churches, temples, mosques and other religious buildings have large occupancies during services, and often in times of emergency. Many provide critical services to the broader community. These buildings often have earthquake vulnerabilities due to their size, configuration, age and falling hazards. During earthquakes they pose serious threats to the safety of occupants, and the resulting damage would limit their ability to provide services to the community. Many of the most vulnerable houses of worship have limited resources, warranting long lead times before mandates to allow for planning.

- **Concrete non-residential buildings built before 1980**

  Like concrete residential buildings, older reinforced concrete buildings used for other purposes can experience dramatic and deadly collapses during earthquakes. Such collapses are responsible for many of the casualties in earthquakes around the world. There are many older reinforced concrete buildings in San Francisco being used as office buildings and warehouses. Thousands of people use these buildings daily. Retrofit of these buildings may be expensive, but is important due to the risks they pose to the City. It may make sense to retrofit these buildings to a "collapse prevention" standard, recognizing that, even after retrofit, many of them may not be repairable after an earthquake.

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[10] California Department of Education, 2009.

[11] The CAPSS project did not consider public schools, which serve about 55,000 students in San Francisco. Public schools built to state standards are among the most earthquake resistant buildings in California. However, like other buildings, some were constructed to older standards and some of the buildings constructed before the state standards were adopted in 1933 were retrofitted, but do not provide the performance expected from modern school buildings. In 2002, the Department of Conservation, Division of the State Architect, developed a list of public school buildings, *Seismic Safety Inventory of California Public Schools* (Department of General Services, 2002), to identify non wood-frame school buildings built before July 1, 1978 that should be evaluated because of their age and building type. There are 72 buildings belonging to the San Francisco Unified School District on this list.

- **Hotels and motels**

  Hotels and motels of all structural types must be safe during future earthquakes and readily reoccupiable. Hotels play a key role during post-earthquake recovery by housing emergency workers, including those brought to the City to restore utilities. They also provide potential temporary housing for displaced residents. Moreover, because tourism is a key part of the City's economy, improving the performance of visitor-serving buildings is critical for the City's earthquake recovery.

- **Critical retail stores and suppliers**

  Certain businesses are critical to helping the City recover quickly and it is desirable to have them operational as soon as possible. San Franciscans need pharmacies, grocery stores, and similar retail establishments that provide the items required for daily living. Some of these important businesses may be located in weak buildings that would not be usable after a large earthquake. Many of these businesses may rent the space they use, and retrofit timelines should allow time to renegotiate leases as part of this process.

- **Buildings used by large audiences**

  Theaters and other buildings that are used to gather many people need to be safe, considering hazards due to occupants due to damage to the building and falling hazards. Although many of these buildings are occupied only a few hours each week, when they are occupied there is the chance of a large number of casualties. A reasonable threshold for the size of buildings in this category is an occupant load of 300 persons.

- **Historic buildings, significant and contributory buildings in historic districts, and other resources that may be historic**

  Historic resource buildings should be repairable after future earthquakes so the City may maintain its heritage. This could include many older masonry buildings previously upgraded to standards only intended to reduce casualties, but not to assure reparability.

- **Concrete tilt-up buildings**

  These buildings have heavy precast concrete panels that are raised in place to form the building walls. If the walls are not adequately connected to each other and to the roof, they can separate when shaken by an earthquake, causing the roof and wall sections to collapse on the occupants and contents of the building. This structure type is often used for industrial purposes, but also may be used for grocery stores or other commercial purposes. There are an estimated 200 of these in San Francisco. These buildings are relatively simple and inexpensive to retrofit, compared to other structure types, and a number of communities have enacted retrofit programs for this type of building. Standards for retrofitting are readily available for adoption into the San Francisco Building Code.

- **Large buildings with welded steel moment frames built before 1994.**

  Many office buildings and workplaces were constructed with welded steel moment frames with details that were found vulnerable in the 1994 Northridge earthquake in southern California. Welding procedures and connection details were changed in 1994 to improve the performance of buildings built since then.

The connections used before 1994 can be damaged, resulting in buildings that cannot be used and might have to be razed. These large buildings should be retrofitted to reduce the chance of damage and increase the likelihood that the businesses they house will not be displaced and the buildings can be repaired and reoccupied quickly.

- **Early retrofitted buildings**

  Some retrofits conducted decades ago may be inadequate to meet public policy goals. These include early retrofits with thin-wall steel tube braced frames, those meeting very low standards, and those with partial retrofits not meeting an adopted standard. In these early retrofits, tube walls may be too thin, allowing buckling to occur, welded connections might be inadequate, or there may be other vulnerabilities.

- **All other buildings**

  There are other categories of vulnerable buildings and important building uses not included in this list. Buildings with mixed structural systems and parking structures are examples. The City should add additional categories as the need arises as part of the regular evaluation of mitigation programs (Recommendation 17).

Recommended Retrofit Deadlines for Building Categories

This report recommends that San Francisco's buildings go through a three-step strategy over thirty years to improve their seismic resilience—information, evaluation, and retrofit. The recommended timeframe for action for the key categories of buildings is depicted in Table 5.

The first step, providing information and incentives to inform and assist owners, should begin immediately for all building types and continue indefinitely (Recommendations 2, 3, 9, 11 and 12).

The second step (Recommendation 4), requiring evaluation upon sale, should begin for all building types within five years. The five-year timeframe allows the City time to adopt evaluation criteria and procedures and improved retrofit standards before the mandatory evaluations commence. However, after five years the City should establish deadlines and begin requiring evaluations.

The third and final step, mandatory retrofits, should begin immediately for wood-frame buildings with three or more stories and five or more residential units and concrete tilt-up buildings, and should conclude for all building categories in thirty years. This report recommends the City enact mandatory retrofit requirements for the following building categories in the following timeframe:

Ongoing

- Continue to strictly enforce retrofitting buildings as part of significant repairs, alterations, expansions, changes of use, and repair of damage above specified thresholds; and
- Enact retrofitting as a condition to converting multi-unit residential buildings to condominiums.

Begin to require retrofitting immediately and complete within ten years

- Wood-frame residential buildings with three or more stories and five or more units; and
- Concrete tilt-up buildings.

Begin to require retrofitting in five years and complete within fifteen years

- Residential buildings with three and four units;
- Private K-12 schools and private colleges; and
- Assisted Living facilities.

Begin to require retrofitting in ten years and complete within twenty years

- Concrete residential buildings built before 1980;
- Other types of residential buildings with five or more units;
- Hotels and motels ; and
- Critical retail stores and suppliers.

Begin to require retrofitting in twenty years and complete within thirty years

- Single family homes and two unit residences;
- Concrete non-residential buildings built before 1980;
- Houses of worship;
- Preschools and daycare centers;
- Buildings used by large audiences;
- Historic buildings, significant and contributory buildings in historic districts, and other resources that may be historic;
- Large buildings with welded steel moment frames built before 1994; and
- Early retrofitted buildings.

Other Categories

The following use-based building categories are very important to San Francisco's earthquake resilience. However, many of these organizations are nonprofit entities that do not own the buildings they occupy. This report recommends that the City assist these groups to evaluate and retrofit buildings where possible, or relocate, if necessary (Recommendation 6). However, buildings used for these purposes would trigger mandatory retrofit if they also fall under one of the other categories, such as a concrete building built before 1980.

Other categories:

- Non-profit organizations providing important services to vulnerable populations; and
- Clinics and facilities providing medical services.

Table 5 Recommended Timeframe* for Applying the Three-Step Strategy to Key Categories of Buildings

Building Categories	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Wood-frame residential buildings with three or more stories and five or more units**						
Concrete tilt-up buildings						
Residential buildings with three and four units						
Private K-12 schools and private universities						
Assisted living facilities						
Concrete residential buildings built before 1980						
Other types of residential buildings with more than five units						
Hotels and motels serving tourists						
Critical retail stores and suppliers						
Single family homes and two unit residences						
Concrete non-residential buildings built before 1980						
Houses of worship						
Preschools and daycare centers						
Buildings used by large audiences						
Historic buildings						
Large buildings with welded steel moment frames built before 1994						
Early retrofitted buildings						
All other building types						

*The mandatory evaluation or retrofit program would begin at the start of the period and be completed by the end of the period.

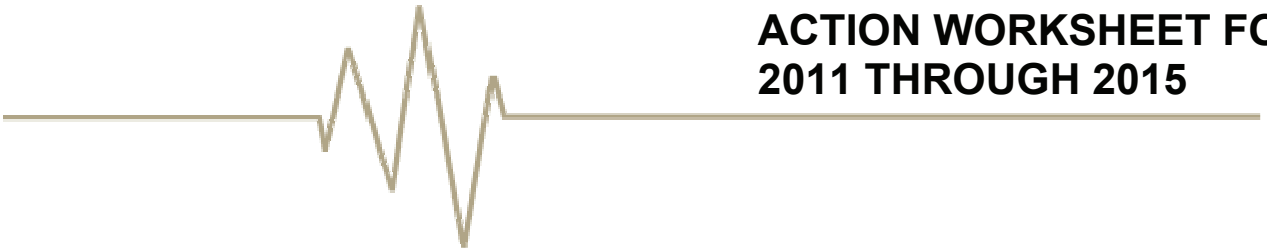
**See Table 3 for the detailed schedule proposed in the draft ordinance developed by the Mayoral Task Force.

Color key*:**

Step 1: Facilitate a market in which earthquake performance is valued	
Step 2a: Nudge market by requiring evaluation upon sale	
Step 2b: Nudge market by requiring evaluation by a deadline	
Step 3: Implementation period to require retrofit by a deadline	

*** Note: all previous steps remain in effect after advancing to a higher step.

CHAPTER 5: GETTING STARTED: AN ACTION WORKSHEET FOR 2011 THROUGH 2015



This chapter outlines the actions needed to begin to implement the recommendations in this report over the next five years. It is intended to be used as a worksheet to plan detailed steps. Before completion of this period, the City should evaluate its progress, change the program based on what is learned and prepare a new action plan.

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
Getting Started				
Design a program with designated staff to carry out a sustained Existing Building Hazard Mitigation Program.				
Implementing the Recommended Actions				
Recommendation 1: Require evaluation of all wood-frame residential buildings of three or more stories and five or more units, and follow-up retrofit of those that are vulnerable to earthquake damage.				
• Contact known owners of the 4,400 buildings having five or more residential units and three or more stories to inform them of their potential vulnerability and the proposed mandatory program.				
• Adopt newly developed retrofit standards for large wood-frame soft-story residences, as revised by DBI.				
○ Draft				
○ Review				
○ Approve				
○ Adopt and implement				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Adopt procedures for evaluating this category of building, including report contents, forms, preparer qualifications, and a scheme to explain results to non-technical stakeholders.				
○ Draft				
○ Technical Review				
○ Community stakeholder review				
○ Approve				
• Submit ordinance to Board of Supervisors for approval.				
• Implement program				
Recommendation 2: Inform the public of risks and ways to reduce risk.				
• Develop a cross-departmental earthquake resilience education team.				
• Prioritize education and outreach activities to support other ongoing earthquake risk mitigation initiatives.				
a. Explain the need for and process to evaluate building seismic performance, including structural, fire, and non-structural hazards.				
• Work with organizations that represent building owners, Real Estate brokers and agents, property managers and residential tenants to design an effective outreach program.				
b. Offer courses aimed at single-family homeowners about how to conduct small scale seismic retrofits.				
• Develop materials that show typical retrofit details appropriate for residences in San Francisco, in non-technical language intended for homeowners.				
• Develop a strategy to distribute these materials and use them in training courses.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
c. Educate installers, building owners, and others about proper ways to brace water heaters.				
• Develop clear, non-technical information sheets with illustrations showing correct and incorrect ways to secure water heaters. One version should be aimed at installers. Another should be appropriate for building owners and realtors.				
• Develop a strategy to distribute these materials to all relevant parties when water heaters are installed or inspected.				
d. Educate residents about simple and cost-effective ways to make their homes safer and habitable following earthquakes by reducing non-structural hazards.				
• Develop materials aimed at residents that show, in simple and visual terms, steps they can take to reduce hazards in their home. Materials should be written for a non-technical, non-“handy” audience and should be explicit about hardware and tools required.				
• Develop a scheme to distribute these materials to residents.				
e. Develop a program in coordination with other City agencies to work with small businesses and important community service providers on measures they can take to reduce vulnerability to earthquakes.				
• Create a multi-departmental team to address earthquake risk issues relating to social service groups, small businesses, and vulnerable populations.				
• Work with groups such as the Red Cross and Collaborating Agencies Responding to Disaster (CARD) to develop a program to help social service groups with earthquake hazard mitigation.				
f. Encourage building materials stores, insurance companies and utility companies to supplement education campaigns.				
• Develop relationships with relevant private businesses to coordinate on communication and outreach programs.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Encourage private businesses to distribute City developed education materials, and to create their own complementary materials.				
g. Revise post-earthquake building inspection protocols and train inspectors and owners to identify buildings that can be occupied safely despite damage and loss of utilities.				
• Review and revise post-earthquake safety tagging procedures to make sure they reflect San Francisco's occupancy goals.				
• Create materials to train post-earthquake safety tagging inspectors in updated procedures.				
• Prepare video to show mutual aid inspectors at time of earthquake response.				
• Organize and hold training sessions.				
h. Train preservation engineers and architects knowledgeable about San Francisco's historic resources in post-earthquake safety tagging.				
• Develop post-earthquake standards for historic resources.				
• Reach out to the historic preservation community to encourage qualified people to participate in post-earthquake safety tagging training sessions.				
Recommendation 3: Adopt updated code standards.				
• Apply City adopted performance standards for existing and new buildings based on building structural system and use.				
• Amend the Building Code based on existing prescriptive standards for concrete tilt up buildings, as revised by DBI.				
○ Draft				
○ Review				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
○ Approve				
○ Adopt				
• Identify benchmark code dates. Buildings constructed in compliance with these benchmark codes would be deemed to have adequate seismic performance.				
○ Review				
○ Approve				
○ Amend Building Code				
• Develop standards to reduce fire ignition sources when buildings are retrofitted. These would be included in retrofits for all building types.				
• Incorporate standards to reduce falling hazards and other non-structural risks in retrofits of all building types (see Recommendation 12e).				
• Develop standards to address ground failure issues when larger buildings are retrofit.				
• Revise and adapt existing standards for additional types of building structural systems and uses, in consultation with professional associations such as the Structural Engineers Association of Northern California (SEAONC).				
• Encourage the Port of San Francisco and other jurisdictional entities to adopt the updated code standards in their jurisdictions.				
Recommendation 4: Require all buildings to be evaluated for seismic risk.				
• Adopt procedures for evaluating buildings including report contents, forms, preparer qualifications, and a scheme to explain results to non-technical stakeholders.				
○ Draft				
○ Technical Review				
○ Community stakeholder review				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
○ Approve				
• Adopt an ordinance requiring the seller of any building in San Francisco to have a building earthquake performance evaluation completed by a qualified design professional and to disclose the results to potential buyers and to provide the results to DBI as part of the public record.				
○ Draft				
○ Review				
○ Approve				
Recommendation 5: Require retrofits of vulnerable buildings.				
• Adopt an ordinance requiring owners of wood-frame buildings with three or more residential units to evaluate their buildings for earthquake vulnerability and to retrofit them, if found vulnerable, in conformity with the San Francisco Building Code. Owners of buildings with three or more stories and five or more residential units should comply by 12/31/17 (see Recommendation 1). Owners of buildings with three and four units should comply by 12/31/20.				
• Adopt an ordinance requiring owners of concrete tilt-up buildings built before 1980 to evaluate their building for earthquake vulnerability, and to retrofit those buildings that are found vulnerable.				
○ Prepare an inventory of concrete tilt-up buildings constructed before the bench mark code.				
• Amend the San Francisco Building Code to require all buildings to meet the *existing building earthquake standard* by December 31, 2039, with staggered deadlines for particular categories of buildings.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
Recommendation 6: Assist community service organizations to reach earthquake resilience.				
• Plan with a multi-departmental group (see Recommendation 2e) a program to assist social service groups to evaluate the vulnerability of their facilities and plan appropriate action.				
• Conduct outreach to social service groups about the program and need for earthquake evaluations.				
Recommendation 7. Establish clear responsibility within City government for preparing for and reducing risk from earthquakes.				
• Assign this responsibility for earthquake mitigation and recovery planning to one official and make it a permanent part of San Francisco's City structure.				
• Designate a single high-level official within the Chief Administrative Officer's Office to have responsibility for implementing a comprehensive Citywide coordinated effort to reduce the risk from earthquakes through mitigation.				
• Work to get CAPSS recommendations incorporated into the Community Safety Element of the General Plan.				
• Convene a Citizen's Advisory Committee to regularly advise on mitigation programs.				
• Establish an ombudsperson to assist building owners will all aspects of seismic retrofits.				
Recommendation 8: Adopt improved post-earthquake repair standards				
• Amend the San Francisco Building Code to incorporate the CAPSS recommendations for post-earthquake repair and retrofit.				
○ Draft amendments				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
○ Review				
○ Approve				
○ Amend Building Code				
• Support development of repair/retrofit guidance materials for the other building types recommended by CAPSS in companion report, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco, Post-Earthquake Repair and Retrofit Requirements*.				
○ Draft guidance				
○ Review				
○ Approve				
Recommendation 9: Offer incentives for retrofit of buildings.				
a. Amend the Planning Code and other City statutes and regulations to offer incentives to building owners who voluntarily conduct seismic retrofits to allow changes to their buildings that would increase their value.				
• Work with building owners and tenant organizations to identify meaningful and feasible incentives.				
• Amend the Planning and other codes to codify the incentives.				
b. Allow owners to pass-through the full costs of voluntary seismic retrofits that meet DBI code standards.				
• Convene a group of tenants, building owners and other stakeholders to discuss this issue.				
c. Maintain plan review fee waivers and expedited review for voluntary seismic retrofits of vulnerable wood-frame residential buildings.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
d. Adopt a policy that assures that those who voluntarily retrofit to appropriate standards would not be required to do further retrofit work for 15 years, even if standards change.				
• Draft policy				
• Review				
• Approve				
e. Publicize how to use the recently passed transfer tax rebate for seismic safety upgrades.				
• Work with the Assessor's Office to determine best procedures to use this incentive.				
• Develop a flyer explaining how to use this incentive and make it widely available.				
f. Publicize and facilitate the process for building owners to assure that seismic retrofit work is exempted from property reassessments.				
• Work with the Assessor's Office to determine best procedures to use this incentive.				
• Develop a flyer explaining how to use this incentive (possibly combine with flyer in Recommendation 9d) and make it widely available.				
g. Change the Planning Code to prevent owners of buildings demolished after an earthquake from rebuilding to prior nonconforming conditions, unless the building was seismically retrofitted before the earthquake.				
• Review the consequences of changing this policy (e.g., could neighborhood density be significantly reduced in some areas due to downzoning?).				
• Develop changes to the Planning Code.				
h. Review, extend and document as appropriate historical resources and conduct earthquake vulnerability assessments.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Develop a program to take maximum advantage of federal tax incentives to encourage retrofits of buildings identified as historical or contributing to historical districts.				
• Evaluate the earthquake vulnerability of all buildings and districts designated as historical under local, state and federal programs, recommend measures to enhance the post-earthquake reparability of these facilities and work with owners to implement these measures.				
i. Provide need-based loans for qualified retrofits.				
• Convene a group of representatives from relevant City departments and community stakeholders to review funding options for retrofits of private buildings, including loans, grants, opt-in assessment districts, and other possibilities, and to recommend best options.				
j. Advocate for federal and state incentives.				
• Encourage City officials to communicate with federal and state officials about the need for tax incentives to encourage seismic retrofitting and retrofit loan insurance.				
• Encourage City officials to communicate with state officials to communicate about state-level incentives for retrofitting, such as requiring homeowner and condominium associations to include in facility plans provisions for either repairing earthquake damage or for retrofitting vulnerabilities.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
Recommendation 10: Require gas shut-off valves on select buildings.				
• Create DBI and Fire Department team to identify neighborhoods highly vulnerable to post-earthquake fire spread due to building vulnerability and density, geological conditions and building combustibility, and presence of potential ignition sources. These areas will be called Post-Earthquake High Fire Hazard Areas.				
• Develop guidlines for the use of automatic gas shutoff valves, indicating types of valves for various building types and gas line configurations, in coordination with Pacific Gas and Electric (PG&E).				
• Develop an ordinance requiring buildings to install automatic gas shutoff valves prior to seismic retrofit if they are found by evaluation to be vulnerable (Recommendation 4), or if they are located in a Post-Earthquake High Fire Hazard Area.				
○ Draft policy				
○ Review				
○ Approve				
Recommendation 11: Track evaluations and retrofits in a database system.				
• Define database needs for earthquake mitigation programs, including data fields, and required search and analysis capabilities.				
• Work with team developing new database system to ensure mitigation database needs are incorporated.				
Recommendation 12: Provide technical assistance for building retrofits.				
a. Develop standard plan sets for retrofits of typical San Francisco buildings.				
b. Provide training for engineers and other licensed professionals in conducting building seismic evaluations.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Develop and conduct training sessions explaining how to conduct earthquake vulnerability evaluations, after evaluation protocols are developed (Recommendation 3). Explain evaluation requirements (Recommendation 4).				
c. Provide information on retrofit costs and effective technical approaches based on experience as the program progresses.				
• Develop a program to track retrofit lessons, including costs and effective techniques.				
• Develop a method to share these lessons with building owners.				
d. Provide training for design professionals and contractors in conducting seismic retrofits.				
• Develop programs, in coordination with outside groups, to train engineers to use newly adopted code standards for retrofits (Recommendation 3).				
e. Develop additional standards, as needed, to reduce non-structural hazards and improve post-earthquake building usability, including bracing of mechanical and other heavy equipment and shelves, and elevator functionality.				
• Develop code standards to reduce falling hazards and improve post-earthquake building functionality.				
○ Draft				
○ Review				
○ Approve				
f. Conduct inventories of structural types and building uses of concern.				
• Identify concrete tilt-up buildings.				
• Identify three and four unit residential buildings.				
• Identify K-12 private schools and private universities.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Identify assisted living facilities.				
• Identify and screen buildings designated historic or contributing to historic districts.				
• Identify critical stores and suppliers.				
• Identify concrete residential buildings built before 1980.				
• Identify providers of important services to vulnerable residents.				
• Identify preschools and day care centers.				
• Identify clinics and facilities providing urgent and critical medical services.				
Recommendation 13: Enact a façade ordinance				
• Draft				
• Review				
• Approve				
Recommendation 14: Promote development and implementation of effective ideas on earthquake risk reduction.				
a. Plan data collection programs to follow the next damaging earthquake, focused on learning about issues of policy importance to San Francisco.				
• Work with universities and professional organizations to identify the most useful data to collect after future earthquakes and how it could be collected most efficiently and with the largest public benefit.				
b. Support efforts to test and research innovative and low-cost retrofit concepts, such as bracing garage doors and adding ductility and energy absorption to brittle or weak building elements.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Invite speakers on innovative retrofit concepts to share their work with San Francisco audiences.				
• Work to support innovations relevant to San Francisco by providing advice and sharing data, as appropriate.				
c. Support innovation needed to modernize and improve evaluation and retrofit standards.				
• Communicate with professional organizations and others working to improve technical standards to make sure their work is practical for application in San Francisco.				
d. Reexamine the expected performance of previously retrofitted buildings.				
• Work with professional organizations to identify the expected performance of older retrofits.				
e. Study the hazard from masonry chimneys in San Francisco, and recommend necessary mitigation measures.				
• Review and adapt existing standards used in other communities for retrofit and repair of masonry chimneys.				
• Consider building code changes relating to masonry chimneys.				
f. Support installation of instruments to measure building movement in earthquakes.				
• Work with researchers to identify building types in San Francisco where seismic instruments would produce the most useful information.				
• Work with researchers and state and federal government institutions to get seismic instruments installed in a range of San Francisco building types.				
g. Study the feasibility of administrative measures to mitigate against ground failures that affect multiple properties and cannot be completed by a single building owner.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
• Convene a study group to examine administrative approaches to remediating liquefaction and lateral spreading risks, including reviewing what other communities are doing worldwide.				
h. Periodically review soil remediation technology and provide guidance to owners in potential liquefaction and lateral spreading zones when techniques become feasible.				
• Convene a study group to examine this issue and report to City officials.				
Recommendation 15: Evaluate measures to reduce post-earthquake fires.				
a. Improve water supply systems to cover those neighborhoods not served by the Auxiliary Water Supply System.				
• Develop a multi-departmental task force to review the need for expanding post-earthquake water for fire fighting and to evaluate options to do so.				
• Pursue the recommended strategy of the task force.				
b. Expand the training and scope of Neighborhood Emergency Response Teams (NERT) to include fire suppression, fire reporting, assisting vulnerable residents, and assisting with neighborhood recovery.				
• Encourage the Fire Department to work with NERT volunteers to examine whether those volunteers could do additional activities, including learning ways other communities are using NERT teams.				
c. Increase accessibility of water shutoff valves on building fire sprinkler systems to control building damage and water loss from damaged sprinkler systems.				
• Review the effectiveness of this strategy. If found to be effective, draft change in sprinkler system requirements.				

Action Required	Responsible Entities	Begin Date	End Date	Resources Required
d. Study potential post-earthquake ignition risks and evaluate measures to reduce them.				
• Convene a group to study ignition sources and possible ways to manage them.				
Recommendation 16: Address the hazards from damage to building systems, appliances, equipment and non-structural building elements.				
• Evaluate whether deadlines for mandatory remediation of non-structural safety and occupancy risks should precede deadlines for mandatory retrofits, which include such measures.				
• Consider ways to improve enforcement of water heater installation standards.				
Recommendation 17: Periodically assess progress and implementation of these recommendations.				
• Review the progress and accomplishments of the Existing Building Hazard Mitigation Program, new information regarding earthquake hazard and building vulnerability, and recommend how to improve San Francisco's earthquake resilience.				

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APPLIED TECHNOLOGY COUNCIL: AN OVERVIEW

The Applied Technology Council (ATC) is a nonprofit corporation founded to protect life and property through the advancement of science and engineering technology. With a focus on seismic engineering, and a growing involvement in wind and coastal engineering, ATC's mission is to develop state-of-the-art, user-friendly resources and engineering applications to mitigate the effects of natural and other hazards on the built environment.

ATC fulfills a unique role in funded information transfer by developing nonproprietary consensus opinions on structural engineering issues. ATC also identifies and encourages needed research and disseminates its technological developments through guidelines and manuals, seminars, workshops, forums, and electronic media, including its web site (www.ATCouncil.org) and other emerging technologies.

Key Publications

Since its inception in the early 1970s, the Applied Technology Council has developed numerous, highly respected, award-winning, technical reports that have dramatically influenced structural engineering practice. Of the more than 100 major publications offered by ATC and its Joint Venture partners, the following have had exceptional influence on earthquake engineering practice:

ATC-3-06, *Tentative Provisions for the Development of Seismic Regulations for Buildings*, funded by the National Science Foundation (NSF) and the National Bureau of Standards and completed in 1978, provides the technical basis for seismic provisions in the current *International Building Code* and other model U. S. seismic codes.

ATC-14, *Evaluating the Seismic Resistance of Existing Buildings*, funded by NSF and completed in 1987, provides the technical basis for the current American Society of Civil Engineers (ASCE) Standard 31, *Seismic Evaluation of Existing Buildings* (the national standard for seismic evaluation of buildings).

ATC-20, *Procedures for Postearthquake Safety Evaluation of Buildings*, funded by the California Office of Emergency Services and the California Office of Statewide Health Planning and Development, is the *de facto* national standard for determining if buildings can be safely occupied after damaging earthquakes. The document has been used to evaluate tens of thousands of buildings since its introduction two weeks before the 1989 Loma Prieta earthquake in Northern California.

ATC-40, *Seismic Evaluation and Retrofit of Concrete Buildings,* funded by the California Seismic Safety Commission and completed in 1996, won the Western States Seismic Policy Council' s "Overall Excellence and New Technology Award" in 1997.

FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Existing Buildings,* funded by the Federal Emergency Management Agency (FEMA) and completed in 1997 under the ATC-33 Project, provides the technical basis for the current American Society of Civil Engineers (ASCE) Standard 41, *Seismic Rehabilitation of Existing Buildings* (the national standard for seismic rehabilitation of buildings).

FEMA 306, *Evaluation of Earthquake-Damaged Concrete and Masonry Wall Buildings, Basic Procedures Manual*, **FEMA 307,** *Evaluation of Earthquake-Damaged Concrete and Masonry Wall Buildings, Technical Resources*, and **FEMA 308**, *The Repair of Earthquake Damaged Concrete and Masonry Wall Buildings*, funded by FEMA and completed in 1998 under the ATC-43 Project, provide nationally applicable consensus guidelines for the evaluation and repair of concrete and masonry wall buildings damaged by earthquakes.

FEMA 352, *Recommended Post-earthquake Evaluation and Repair Criteria for Welded Steel Moment-Frame Buildings,* funded by FEMA and developed by the SAC Joint Venture, a partnership of the Structural Engineers Association of California, the Applied Technology Council, and California Universities for Research in Earthquake Engineering, provides nationally applicable consensus guidelines for the evaluation and repair of welded steel moment frame buildings damaged by earthquakes.

FEMA P646, *Guidelines for Design of Structures for Vertical Evacuation from Tsunamis*, funded by FEMA and completed in 2008 under the ATC-64 Project, provides state-of-the-art guidance for designing, locating and sizing structures to resist the effects of tsunamis and thereby provide safe evacuation refuge in affected coastal areas.

Organization

With offices in California, Delaware, and Virginia, ATC's corporate personnel include an executive director, senior-level project managers and administrators, and technical and administrative support staff. The organization is guided by a distinguished Board of Directors comprised of representatives appointed by the American Society of Civil Engineers, the National Council of Structural Engineers Associations, the Structural Engineers Association of California, the Structural Engineers Association of New York, the Western Council of Structural Engineers Associations, and four at-large representatives.

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