



City and County of SAN FRANCISCO LIFELINES COUNCIL



Edwin Lee, Mayor
Amy Brown, Acting City Administrator

Thursday, November 17, 2011
2:00 PM - 4:00 PM
San Francisco City Hall, Room 305

Lifelines are the systems and facilities that provide services vital to the function of an industrialized society and important to the emergency response and recovery after a natural disaster. These systems and facilities include communication, electric power, liquid fuel, natural gas, transportation (airports, highways, ports, rail and transit), water, and wastewater.
- American Society of Civil Engineering Technical Council on Lifeline Earthquake Engineering (TCLEE), 2009

CO-CHAIRS

Amy Brown
City and County of San Francisco
Acting City Administrator
General Services Agency

Chris Poland
Chair, NEHRP ACEHR
Co-Chair, SPUR Resilient Cities Initiative
Chairman, Degenkolb Engineers

REPRESENTED AGENCIES

ABAG
Comcast
Degenkolb Engineers
Kircher & Associates Consulting
Engineering
Laurie Johnson Consulting
Metropolitan Transportation Commission
Office of the City Administrator
PG&E

San Francisco Capital Planning Program
San Francisco Department of Emergency
Management
San Francisco Department of Public
Works
San Francisco Department of Technology
San Francisco Fire Department
San Francisco General Services Agency
Real Estate Division

San Francisco Municipal Transportation
Authority
San Francisco Public Utilities
Commission
San Francisco Risk Management Division
SPUR
Verizon Wireless

MEETING #7 NOTES

1) Welcome and Introductions *Amy Brown and Chris Poland, Co-Chairs*

Opening remarks by Lifelines Council Co-Chairs, Amy Brown and Chris Poland.

2) Initiating the Lifelines Interdependency Study *Laurie Johnson, Ph.D., AICP, Principal, Laurie Johnson Consulting | Research*

Dr. Laurie Johnson, consultant to the City and County of San Francisco on recovery and lifelines interdependency issues, gave the group an overview and progress report of the Lifelines Interdependency Study. The study, initiated in 2011, is one of the 4 key objectives of the Lifelines Council: to understand inter-system dependencies to enhance planning efforts for restoration and coordination of reconstruction;

The Lifelines Council kicked off the interdependency study with a presentation at the April 2011 meeting that looked at existing research and examined the current experiences of lifeline operators in terms of their interdependencies. Then, a subset of the Lifelines Council met in July to discuss the interdependency study design. A working session was then held at the August 2011 meeting of the Lifelines Council to discuss the study design, including scenario

parameters, the analysis approach, goals and outcomes of the analysis, and community expectations.

Outcomes of August 2011 Discussion Groups

The discussion groups had a preference for using a maximum credible earthquake scenario (M7.9 on the San Andreas fault), and the 2006 EERI study, “When the *Big One* Strikes Again: Estimated Losses Due to a Repeat of the 1906 San Francisco Earthquake,” provides building and casualty losses estimated for such an event. Discussion groups also recommended that details of damage are not necessary for a successful study, and that identification of weak points, choke points, and limitations on service restoration will be sufficient and less binding. Operators whose lifeline systems extend outside of San Francisco also asked to have the regional nature of their restoration priorities acknowledged, although that may fall outside of the Lifelines Council purview. The full feedback from the August 2011 meeting is available on the Lifelines Council website, <http://www.sfgsa.org/lifelinescouncil>.

Discussants also recommended that the goals of the lifelines interdependency be to obtain a workable understanding of existing interdependencies by developing a comprehensive scenario of lifeline system impacts and restoration issues following a major disaster. Using this information, the Lifelines Council can then develop an action agenda for operators and a work program for the City to help:

- Identify asset restoration priorities that will guide the post-event restoration of lifelines in San Francisco;
- Identify the consequences of existing conditions that cause choke-points, and major mitigation actions that can be taken to ensure that these systems continue to function (including considerations for funding and legislative/regulatory issues); and
- Develop a set of collective performance expectations of lifeline systems.

Study Methodology

Dr. Johnson presented the proposed study basics and methodology to the Council which is modeled after a hybrid a lifelines interdependency study conducted in Vancouver (Chang et al.) and in Southern California (Porter et al 2011). The methodology relies upon a questionnaire for lifeline operators to complete by quantitatively describing damage; restoration assumptions, timelines, and metrics; and issues of interdependencies both upstream (factors lifeline depends on) and downstream (customers and dependents).

Dr. Johnson reported that a draft interdependency questionnaire and discussion guide have been developed and two pilot studies, with PG&E and Caltrans, are currently in progress. Following these two pilots, the guide will be revised based upon feedback and then, over the first half of 2012, a series of panels for various infrastructure sectors will be asked to participant in discussions to complete the questionnaire. The results of interdependency study will be presented to the full Council later in 2012 for further discussion and identification of priority issues and next steps.

3) Study Scenario: 2006 EERI study “When the Big One Strikes Again: Estimated Losses due to a Repeat of the 1906 San Francisco Earthquake”

***Charles Kircher, Ph.D, P.E.,
Principal, Kircher & Associates***

Dr. Johnson introduce Dr. Kircher, stating that he was invited to present the 2006 EERI scenario study of the estimated losses due to a repeat of the 1906 San Francisco earthquake which will serve as the basis for the Lifelines Council's interdependency study. In 2006, Dr. Kircher led a multi-disciplinary team of geologists, engineers, and other professionals who analyzed the ground motions from the 1906 earthquake, developed a current building inventory and population for 19 counties in Northern California, and estimated potential building and casualty losses from such a scenario event. His presentation to the Lifelines Council is available on the Lifelines Council website, <http://www.sfgsa.org/lifelinescouncil>.

The study examined the ground shaking of the 1906 earthquake across Northern California and two versions of potential ground motions developed by the U.S. Geological Survey to assess the future likely effects of a similarly sized, and similarly located earthquake on the San Andreas fault. The study used the nationally-available HAZUSTM disaster loss modeling software to estimate building damage and human impacts. In San Francisco, detailed building data from the CAPSS project were included in the analysis. Additional information was obtained from ABAG and the Structural Engineers Association of Northern California. The loss model was first calibrated by using ground motion dating from the 1989 Loma Prieta earthquake, to successfully generate building and casualty losses similar to those actually experienced in 1989 (with adjustments for population growth since that time).

The study found that most of the \$120 billion in economic losses estimated for the 19-county region following a M7.9 earthquake were caused by damage to the non-structural systems of buildings. The study also found that a relatively small percentage of fatalities were caused by severe building damage or collapses. Both of these results are due to the effectiveness of modern seismic codes that focus on life safety, which help prevent building collapse but can still result in substantial damage to building systems. The highest fatality estimates occurred in San Francisco and San Mateo counties, where portions of the building stock predate the latest seismic codes and recommendations. In all, the study found that less than 5 percent of the region's building inventory was responsible for more than 50 percent of the estimated fatalities. Given its close proximity to the San Andreas Fault and dense pattern of development, San Francisco County incurred over 30% of the total losses estimated for the 19-county region in such a scenario.

Given the region's historic vulnerability to fires following earthquakes, the study also included an assessment of fire susceptibility. The study found that areas with strong shaking and older, denser development patterns were most vulnerable to fire ignitions. This included San Francisco and San Mateo counties. Because of the limitations of lifeline modeling in HAZUS, the 2006 study focused on geographically identifying different transportation and utility lifelines systems (highways, railways, airports, potable water, wastewater, power, etc.) and areas of potential system failure in such a scenario.

In summarizing up lessons from the 2006 study, Dr. Kircher drew parallels between the San Francisco Bay Area and Kobe, Japan, which was devastated by an earthquake in 1995. He compared the population density and geographical configuration of the two regions and noted that estimates for damage and casualties in the Bay Area following a M7.9 earthquake on the San Andreas fault are very similar to the fatalities and economic losses actually experienced in Kobe in 1995. Dr. Kircher highlighted several risk reduction mechanisms, including increased redundancy of critical infrastructure and mitigation of potential failures, which could substantially reduce potential losses from such a scenario. Dr. Kircher also said that the results,

maps, and geographic information system data files from the study could potentially be made available for the Lifelines Council's interdependency study.

Detailed study results, numbers, and visuals can be found in the PDF of the presentation.

4) Insights from Capital Planning for Lifeline Mitigation (Presentation)

**Brian Strong, Director,
SF Capital Planning Program**

Co-chair Amy Brown introduced the San Francisco Capital Planning Program as a model program that brings together the City's general funded agencies that have capital infrastructure to identify the most critical needs for improvement and plan for their efficient financing, using funding mechanisms such as public financing and public-private partnerships.

Brian Strong, Director of Capital Planning, gave the group an overview of the program from its inception six years ago, and highlighted the progress made in improving critical but deteriorating City assets. The Capital Planning Program presentation to the Lifelines Council is available on the Lifelines Council website, <http://www.sfgsa.org/lifelinescouncil>.

The San Francisco Capital Plan was developed in 2006 to provide a long-term plan for safety and accessibility improvements to City assets.. The Capital Plan gives a comprehensive list of City and County services and assets provided by San Francisco to the public, including both those that receive general funding, and those that do not. The majority of current projects in the Capital Plan are infrastructure improvement efforts. The Capital Plan is updated every two years.

Mr. Strong explained that while enterprise committees control the financing of their enterprise departments, such as the San Francisco Public Utilities Commission, the finances of general fund departments, such as Fire and Police Departments, is controlled by the Board of Supervisors. The general fund departments depend largely upon the proceeds of the sale of General Obligation (GO) Bonds, which add a percentage to the property taxes to fund infrastructure improvements. GO Bonds require a 2/3rds voter approval to pass. In 2010, the voters approved the Earthquake Safety and Emergency Response (ESER) Phase I bond, with Phase II scheduled for 2013 and Phase III for 2021; each has to meet 2/3rds voter approval. The Capital Planning Program has been able to adhere to a policy commitment to only issue new bonds when old bonds are retired and not raise the city's bond-indebtedness levels.

Mr. Strong reported that the Capital Planning Program has helped the City to leverage public funding with public and private partners to finance important structural improvements. For example, the new Academy of Sciences building was funded by a combination of GO bond funds and private donations, and serves as an excellent example of a functional public-private partnership. Improvements to the Moscone convention centers were made possible in part due to a self-imposed hotel tax by the Hotels Council. The City continues to explore creative financing tools to make many more improvements possible and other examples are provided in the presentation.

Mr. Strong also reported that San Francisco was able to successfully leverage its wide-ranging Capital Plan, containing numerous shovel-ready projects, when the federal government released the American Recovery and Reinvestment funds in 2009. He noted that national

investment in infrastructure is radically below what it should be relative to the development and population expansion of the country, so a comprehensive list of necessary improvements can be a useful tool to put pressure on the federal government to make infrastructure improvement a priority. Mr. Strong also pointed out that many infrastructure improvement projects are seen as job generators by the voters, and in the current economic climate this can make bonds more passable.

Q&A

Q: The funded seismic safety improvement projects in the Capital Plan are roughly \$2.8 billion. What is the breakdown of that sum?

A: The projects include ESER Phase I, the Hall of Justice relocation, continued improvements to hospital buildings, the Veterans Building, and many others.

Q: What does the ESER Phase II bond entail?

A: Phase II of ESER will include improvements to many fire and police stations, including seismic and health and safety mitigations; improvements to the Traffic Division, Crime Lab, and Medical Examiner's Office of the Hall of Justice; and a portion of the Auxiliary Water Supply System (AWSS) prioritized based on a current study.

Q: How will performance standards for infrastructure improvements be evaluated?

A: Current performance standards exist only for building structures based on review of building plans (the Seismic Hazard Rating and Building Occupancy Resumption Programs). The study of the AWSS will identify performance standards and priority needs for that lifeline.

Q: What are some of the regulations around issuing debt in San Francisco?

A: By the Administrative Code, the city can issue debt up to 3% of all the property value of San Francisco, and is currently at 0.9%. There is flexibility in issuing Certificates of Participation and Revenue Bonds, especially if they can be leveraged with federal dollars.

The full details, figures and visuals of the Capital Plan Program can be found in the PDF of the presentation.

5) Other Issues and Announcements

As Chair of the National Earthquake Hazard Reduction Program, Chris Poland briefed Lifelines Council members on PPD-8 National Preparedness, a public policy directive calling for the strengthening of national resilience. The first two deliverables of the directive – Implementation Priorities and the National Preparedness System Description – are now published (<http://www.fema.gov/prepared/ppd8.shtm>), and the DHS office of Critical Infrastructure is now beginning to take an active role in lifeline restoration planning as it relates to resiliency and setting national lifeline performance standards. He recommended that local lifeline planning groups, such as the San Francisco Lifelines Council, should continue to identify system issues and gaps in order to leverage this federal effort.

6) Adjourn

Meetings will continue on a quarterly basis.