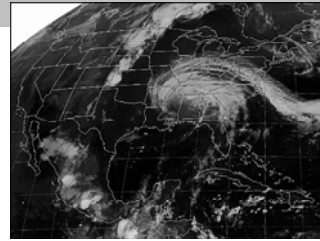


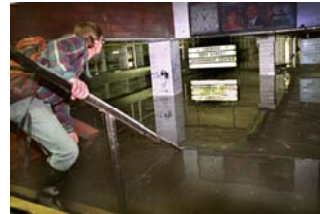
EXECUTIVE SUMMARY

MULTI-INSTITUTIONAL MULTI-HAZARD MITIGATION PLAN Boston, MA



PARTICIPATING INSTITUTIONS:

Emmanuel College
Massachusetts College of Art
Massachusetts College of Pharmacy & Health Sciences
Simmons College
Wentworth Institute of Technology
Wheelock College



Prepared for:



January, 2007

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Why a Disaster Mitigation Plan?

Across the United States, natural and manmade disasters have led to increasing levels of death, injury, property damage, and interruption of business, government and educational services. The Colleges of the Fenway, Inc. collectively recognize the consequences of disasters and the need to reduce their impacts. The Colleges of the Fenway (COF) is a non-profit consortium of six neighboring colleges in the Fenway area of Boston. Member institutions include: Emmanuel College, Massachusetts College of Art, Massachusetts College of Pharmacy & Health Sciences, Simmons College, Wentworth Institute of Technology and Wheelock College.

This *Multi-Institutional Multi-Hazard Mitigation Plan* (Plan) was prepared with input from students, faculty, and administrators from the six college campuses, as well as from the public, neighboring institutions and community groups. The plan was developed with the support of the Commonwealth of Massachusetts Emergency Management Agency (MEMA), The Department of Conservation and Recreation (DCR) and the Federal Emergency Management Agency (FEMA). The Plan will guide the colleges toward greater disaster resistance in harmony with the character and needs of the each campus and their surrounding community. Additionally, it will position the colleges for mitigation project grant eligibility. Planning is a prerequisite for funding under the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program and Flood Mitigation Assistance program, all available from FEMA through MEMA.

What is Mitigation?

Mitigation is defined as any *sustained action taken to reduce or eliminate the long term effects of disasters*. Simply stated, mitigation is loss reduction activities taken before or after disasters. While it is important to address the other three phases of emergency management: preparedness, response and recovery, the focus of this plan is on mitigation. It also addresses some aspects of disaster preparedness, response, and recovery, as these elements can enhance or hinder the eventual success of the plan itself. The plan will help to guide the campuses in making better future development decisions for new buildings, facilities, and utilities, as well as in the renovation of existing buildings. The Colleges of the Fenway Hazard Mitigation Plan identifies the hazards that may affect the colleges, and assesses the colleges' vulnerability to these hazards. Mitigation strategies have been developed and prioritized to address the vulnerabilities identified in the plan. The plan also includes an assessment of the colleges' existing capabilities to implement a hazard mitigation plan. It concludes with implementation and maintenance procedures.

Planning Process

The Colleges of the Fenway was the first consortium of schools to be awarded funding through the Federal Emergency Management Agency's Disaster Resistant University (DRU) program, a subset of the Pre-Disaster Mitigation Program. COF modeled its planning process on the *Building a Disaster-Resistant University* guide published in August 2003 by the Federal Emergency Management Agency. The process included:

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- Convening a Mitigation Advisory Committee (MAC) comprised of the pre-existing Colleges Emergency Preparedness Sub-Committee (CEPSC). The committee worked with a consultant throughout the process to develop the mitigation plan.
- Gathering and analyzing information on past and potential future impacts of hazards on the Colleges of the Fenway.
- Developing a capability assessment to determine the existing capabilities of the Colleges of the Fenway in administering a hazard mitigation program.
- Creating goals and mitigation strategies to address the risks and vulnerabilities identified in the planning process.
- Convening public forums to gather input from a broad group of stakeholders.

Hazard Identification and Risk Assessment

The purpose of the Hazard Identification and Risk Assessment (HIRA) is to:

- Identify and rank the hazards that could affect the Colleges of the Fenway area.
- Profile hazard events and determine what buildings and other assets are the most vulnerable to damage from these hazards
- Estimate losses and quantify potential risks to the Colleges of the Fenway

The identified hazards were ranked according to the probability that the hazard will affect the area and the potential impacts on the colleges when it does. Analysis of some hazards lent itself to quantitative methods while other hazards were analyzed using qualitative methods. The following table demonstrates the priority of the identified hazards and the type of analysis used in this plan.

| Hazard Type and Ranking | Planning Consideration Based on Hazard Level | Type of Analysis |
|--|---|------------------|
| 1. Flooding (41) | Significant | Quantitative |
| 2. Winter Storm (34) | Moderate | Qualitative |
| 3. Building Fire (29) | Moderate | Quantitative |
| 4. Wind (23) | Limited | Qualitative |
| 5. Hazardous Materials Incidents (21) | Limited | Qualitative |
| 6. Lightning (17) | Limited | Qualitative |
| 7. Terrorism/Human Threats (16) | Limited | Qualitative |
| 8. Earthquake (13) | Limited | Quantitative |

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Hazard indices and vulnerability assessments for flood and building fires were developed for the buildings on each of the six college campuses. The hazard indices evaluated the extent to which the buildings are at risk from the particular hazard. The vulnerability assessment estimated the potential impacts if a particular building were affected by a specific hazard. The hazard index and vulnerability assessments were then combined to create a mitigation priorities index for both flood and building fire hazards. The MAC used the mitigation priorities index for each hazard to guide the development of mitigation goals and strategies.

Flooding

Flooding was identified as the number one hazard for consideration in this plan. Nearly all of the campuses experience some form of flooding. Interestingly, no campus buildings are located in the FEMA mapped 100-year floodplain. While there has been some overland flooding, the majority of flood damage is due to urban storm drainage issues. Damages from flooding events as recently as 1996 and 1998 have caused multiple millions of dollars in damage to the COF institutions.

Winter Storms

Winter storms are a combination of heavy snowfall, high winds, ice, and extreme cold. The greater Boston area experiences cold winters on a regular basis. The mean annual snowfall in Boston is 45 inches. The most notable impact from winter storms are secondary impacts such as damage to power distribution networks, utilities, and roads or other points of access. As a practical matter, snow removal costs, necessary to avoid significant disruptions to operations have created the most significant problem associated with winter events. Severe winter storms have the potential to inhibit normal functions of the community. Power outages are typically caused when the weight of snow or ice forming on power lines pulls lines and breaks the poles. In the event of a winter storm, the colleges may have to shelter not only on-campus students but off-campus students and the staff may need to provide dining and other vital services to the sheltered. Should a college be forced to close due to severe weather the educational process would be impacted.

Building Fire

The two main fire risks for the Colleges of the Fenway are dormitory fires or chemical fires. Each campus has dormitories which are susceptible to fire from the kitchen, a lit candle, an electric space heater, etc. The science laboratories on the campuses store chemicals and flammable materials. Although, each college has implemented fire proof storage for these materials, a risk remains during use of the laboratory.

There have been no major fires reported by the Colleges of the Fenway. Most buildings on the six campuses have sprinklers installed throughout to prevent injury and property damage in the event of a building fire.

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Wind Events

Wind can be one of the most destructive forces of nature. The Massachusetts State Hazard Mitigation Plan states that forty destructive storms have affected the New England region since 1900. MAC members were unable to identify significant wind damage to COF institutions within recent history; however, potential vulnerabilities to wind damages were identified and addressed.

Hazardous Materials Incidences

Hazardous materials incidents can include explosive, flammable, combustible, corrosive, oxidizing, toxic, infectious, and radioactive materials that are involved in an accidental or intentional release causing danger to the general public. A hazard material spill or release may come from either fixed facilities or mobile containers. The Colleges of the Fenway are on major transportation corridors leading into and out of Boston. Trucks carrying hazardous materials are often delivering supplies to the Colleges and neighboring facilities and removing hazardous waste from the same facilities. Members of the MAC were not aware of historical occurrences of hazardous materials incidents.

Lightning

Communities in New England expect to receive thunder and lightning storms as part of the natural weather cycle. Many of the buildings on the Colleges of the Fenway campuses have antennas and electrical equipment on the rooftops that are vulnerable to lightning strikes. Lightning has struck the Activities and Administration Buildings on Wheelock's campus multiple times in the past causing power outages, but little direct damage. None of the other institutions reported damages from lightning strikes.

Terrorism/Human Threats

Terrorism is broadly defined as the use of force or violence against persons or property in violation of criminal law for purposes of intimidation, coercion, or ransom. Terrorists often use threats to create fear among the public, for a variety of reasons, and to get immediate publicity for their causes. Terrorism can strike communities of any size. The Colleges of the Fenway may be at risk of other types of human threat as well. Threats may occur due to objections to certain kinds of research, animal testing, or other activities in adjacent institutions on the campuses of the Colleges of the Fenway. Large athletic events or public venues have the potential to become a target for terrorist/civil disorder actions. There have been no historical events of terrorism at the Colleges of the Fenway. This plan analyzes frequency, intensity, and potential damage from terrorism in a general manner with regard to the Colleges of the Fenway. It also considers larger scale city-wide events that would impact the Colleges of the Fenway and neighboring institutions.

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Earthquake

An average of 5 earthquakes are felt each year in New England. The last major earthquake to affect Massachusetts was in 1755. The HAZUS Loss Estimation Model, developed for FEMA by the National Institute of Building Sciences as a tool to determine earthquake loss estimates, was run to determine probabilistic annualized losses to the Colleges of the Fenway area from earthquakes. The results of the model indicated that on an annualized basis, damages from earthquakes are relatively minimal due to the overall low probability of a damaging event. While earthquake risk is not to be discounted, identifying cost beneficial means of mitigation is very difficult.

Land Use and Development Trends

Most future development in the Longwood Medical and Academic Area (LMA) area will likely be in the form of removing older buildings to replace them with new structures and expanding or rehabilitating existing buildings. In general, it is anticipated that future development will lessen risk of damages. New construction will be built to modern codes, resulting in safer buildings, and infrastructure improvements associated with new construction will likely help to alleviate flooding and other development issues.

Capabilities Assessment

This plan assesses the current capacity of MASCO and the Colleges of the Fenway to implement a mitigation plan that addresses the effects of the identified hazards. Key points of the capabilities assessment that should inform the remainder of the mitigation planning process are:

- The Colleges of the Fenway, as members of Medical and Scientific Community Organization (MASCO), have access to the services of the Area Planning and Development Department.
- Each of the six member institutions have professional grant administrators on staff.
- An area-wide emergency management plan is currently in place for the Longwood Medical and Academic Area.
- Each of the six member institutions have an existing emergency preparedness/action plan constantly undergoing updates and revisions. The development of this mitigation plan will feed ideas and policies into the applicable emergency preparedness/action plans.

Mitigation Goals and Objectives

The findings of the HIRA and the capability assessment were used by the Mitigation Advisory Committee to understand the risks and vulnerabilities facing the colleges as well as their own capabilities available to address them. The committee developed long-term and general statements of goals, designed to address the identified vulnerabilities, then considered a full range of objectives and detailed mitigation strategies to meet these goals.

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| COF MITIGATION GOALS |
|---|
| Goal 1: Enhance institutional mitigation capabilities by leveraging the synergies and power of the Consortium to reduce losses |
| Goal 2: Ensure that future development and redevelopment is protected from known hazards by building mitigation projects/programs into capital improvement and infrastructure planning |
| Goal 3: Protect existing assets from identified hazards by implementing mitigation projects |
| Goal 4: Create safe and secure environment for students, faculty and staff |
| Goal 5: Protect business continuity |
| Goal 6: Enhance communications |
| Goal 7: Provide assistance to the greater community through Mutual Aid Agreements with LMA constituency |
| Goal 8: Share approaches with other organizations and institutions to promote mitigation in the LMA and beyond |

Prioritized mitigation strategies for the Colleges of the Fenway collectively, for implementation during the 5-year planning horizon included the following:

1. Develop an evacuation and sheltering plan to address the hazards identified in this mitigation plan
2. Develop a system for communicating with parents and students efficiently during and after disasters.
3. Petition FEMA to restudy and map the Muddy River Watershed to ensure that appropriate risk data is available for overland flooding.
4. Work with the larger LMA Emergency Preparedness Committee and MASCO's Emergency Preparedness Coordinator to become part of the City's emergency communications systems.
5. Develop a Geographic Information System to catalogue existing spatial and tabular data relating to past disaster locations and claims and potential future mitigation project locations.
6. Create an awareness program on natural and human-caused hazards for students, faculty, staff, and parents.
7. Continue to develop and improve business continuity plans for critical college business, financial and other key operations to allow them to resume activity within a predetermined time following a disaster.
8. Continue to participate as an active stakeholder in the Muddy River restoration efforts
9. Establish an annual storm sewer monitoring program in which the facilities maintenance staff inspect and report the conditions of the system to the MASCO Area Planning Department

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10. Continue to review feasibility of buying or renting a snow melter.
11. Continue to ensure that all new construction is built in accordance with applicable codes and standards.
12. Develop budget priorities and strategies that address vulnerabilities as identified this mitigation plan and seek annual funding to implement them.
13. Inventory all buildings and identify items such as hazardous materials containers, valuable artwork, laboratory research items and other valuable possessions that could be damaged if jostled by ground shaking.
14. Implement a program to inspect all rooftops/and exterior building surfaces on an annual basis to identify any deficiencies or areas with a high likelihood of damage during high wind or lightning events.
15. Identify all long term research initiatives ongoing at member institutions and develop a continuity of research plan based on its findings with member colleges where research is critical.

In addition to the collective strategies, each of the six member institutions identified specific mitigation strategies to be implemented on the individual campuses. These are detailed in section four of this plan.

Plan Maintenance

The long-term success of the Colleges of the Fenway Multi-Institutional Multi-Hazard Mitigation Plan depends first on the success in implementing the plan and, second, in establishing a process to ensure that the plan is monitored, evaluated, and updated on a periodic basis.

Responsibility for the overall implementation and maintenance of the mitigation plan rests primarily with the Mitigation Advisory Committee participants. The committee will meet at least quarterly and review the goals, objectives, and action items listed in the plan on a yearly basis. A more comprehensive review will be performed every two years to evaluate the content of the plan. Member colleges will provide COF with institutional-level updates to the Plan when necessary. Public feedback will be solicited during the annual review process.