Oregon Tech
Natural Hazard Mitigation Plan

Prepared by:

Oregon Tech NHMP Steering Committee
in collaboration with the University of Oregon
Office of Emergency Management and Continuity

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Oregon TECH

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[1] Left employment at Oregon Tech in summer 2011

Section 1:
Introduction

Plan Purpose 1
Mitigation Policy Background 1
Plan Development 2
How is the Plan Organized? 3

Plan Purpose

Natural hazard mitigation is defined as permanently reducing or alleviating the losses of life, property and injuries resulting from natural hazards through long and short-term strategies.

The mission of the Oregon Tech Natural Hazard Mitigation Plan is to create a disaster resilient Oregon Tech. Broadly there are three reasons to write a natural hazard mitigation plan:

- By identifying natural hazard issues now and mitigating them, the campus becomes better prepared and is impacted less when an event does occur.
- With a FEMA-approved natural hazard mitigation plan, the campus is eligible to receive FEMA mitigation grant funding.
- The plan forms the framework the campus can use to collectively deal with the natural hazard issues identified.

Mitigation Policy Background

The Disaster Mitigation Act of 2000 (DMA 2000) addressing mitigation planning and reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). These grant programs are only offered to entities with FEMA-approved and adopted natural hazard mitigation plans. PDM funds mitigation projects prior to a disaster event, and the HMGP provides mitigation funding after a federally declared natural disaster.

In the early 2000's FEMA also introduced the Disaster Resistant University (DRU) program. The DRU program funded university planning efforts to create disaster mitigation plans. The DRU program merged with the PDM program in 2006.

If a campus has a FEMA-approved natural hazard mitigation plan, it is eligible for both PDM and HMGP funding. These funding streams provide an opportunity for campuses to implement natural hazard mitigation projects such as seismically retrofitting high risk campus buildings,

implementing non-structural retrofits at university owned or operated child care facilities, or maintaining tree maintenance program to prevent trees from becoming hazards during wind or winter storms.

Plan Development

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center received a HMGP grant (DR-1733-HMGP-0010-P) to fund OUS schools' natural hazard mitigation planning processes. The planning effort for the OUS campuses was organized under OPDR's new Disaster Resilient University program area, which is based on FEMA's initial DRU program. Oregon Tech worked with OPDR in developing this natural hazard mitigation plan.

Oregon Tech took the lead to develop the first sections of the NHMP. OPDR provided the campus staff with print and web-based resources. Then, in 2011, due to staff changes Oregon Tech requested that OPDR and UO Emergency Management and Continuity (UOEMC) take a project management role to support the development of the NHMP.

The planning process was designed to: (1) result in a plan that is DMA 2000 compliant; (2) coordinate with the state of Oregon's Natural Hazard Mitigation Plan; (3) build a campus network that can play an active role in plan implementation, and (4) build upon the Disaster Resistant University initiative. The following is a summary of major activities included in the planning process.

Steering Committee

Oregon Tech convened a steering committee to oversee the NHMP development process. The steering committee had the following representatives:

- Andy Abbott, CIO and Emergency Management Coordinator
- Dr. Charlie Jones, Dean, Engineering, Technology & Management
- Christopher Bowman, Campus Safety Officer
- Ed Daniels, Director of Campus safety
- Edward Guy, Risk Management Director[1]
- Gwendolyn Raubolt, Director of Marketing
- James Lake, Facilities Services Maintenance Supervisor
- Mandi Clark, Director of Residential Life
- Michael Schell, Director of Athletics
- Sara Reuter, Director of Business Affairs
- Sherry Himelwright, Environmental Health and Safety Officer

[1] Left employment at Oregon Tech in summer 2011

Phase I: Getting Started

Steering Committee Meeting 1, 11/30/10

- Review the grant planning process and the role of the Steering Committee.
- Review the draft campus profile section of the plan.

Steering Committee Meeting 2, 2/15/11

- Review campus profile
- Discuss specific hazards relevant to OIT.

Phase II: Risk Assessment

Steering Committee Meeting 3, 5/25/11

- Risk Assessment Workshop

Steering Committee Meeting 4, 1/4/12

- Review existing drafts
- Risk Assessment review
- Preliminary action item discussion

Phase III: Developing a Mission, Goals and Action Items and Plan Implementation and Maintenance

Steering Committee Meeting 5, 3/22/12

- Determine NHMP Mission and Goals
- Review draft action item list
- Review draft implementation strategy
- Incorporate public comments
- Finalize the NHMP

Documentation of Steering Committee meetings provided in Appendix B.

How is the Plan Organized?

Section 1: Introduction

The Introduction briefly describes the mitigation planning efforts and the methodology used to develop the plan.

Section 2: Campus Profile

This section provides an overall description of the campus. The section includes a brief campus profile, discussion of the administrative structure, listing of existing plans and policies, and a summary of existing mitigation actions. This section allows readers to gain an understanding of the campus's sensitivities – those assets and characteristics that may be impacted by natural hazards, as well as the campus's resilience – the ability to manage risk and adapt to hazard event impacts.

Section 3: Risk Assessment

This section identifies and characterizes the natural hazards that might impact the campus and assesses the risk those natural hazards pose. The risk assessment forms the rationale for the mitigation strategies.

The following hazards are addressed in this portion of the plan: 1) Earthquake; 2) Wildfire; 3) Severe weather (windstorm and winter storm).

Section 4: Mission, Goals and Action Items

This section documents the plan mission, goals, and actions and also describes the components that guide implementation of the identified mitigation strategies. Actions are based on campus sensitivity and resilience factors and the hazard assessments in the Hazard Annexes.

Section 5: Plan Implementation and Maintenance

This section provides information on the implementation and maintenance of the plan. It describes the process for prioritizing projects, and includes a suggested list of tasks for updating the plan to be completed at the semi-annual and 5-year review meetings.

Resource Appendices

The resource appendices are designed to provide the users of the campus Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and provide them with potential resources to assist with plan implementation.

Appendix A: Action Item Forms

This appendix contains the detailed action item forms for each of the mitigation strategies identified in the plan.

Appendix B: Planning and Public Process

This appendix includes documentation of the public processes utilized to develop the plan. It includes invitation lists, agendas, sign-in sheets, and summaries of steering committee meetings as well as any other campus involvement methods.

Appendix C: Economic Analysis of Natural Hazards Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities. This appendix was developed by OPDR. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Appendix D: Resource Directory

This appendix lists state and federal resources and grant programs.

Section 2:
Campus Profile Assessment

Introduction 1
Geography and Climate 2
Population 5
University Research 6
Economic Generation 6
Administrative Structure 7
Built Environment 10
Existing Plan & Policies 13

Introduction

The Oregon Institute of Technology (Oregon Tech) located in Klamath Falls, Oregon, functions like a small community. It is a workplace and research facility for faculty and staff, a place of learning and home to students living in the Residence Halls, and a cultural hub for Klamath Falls and Klamath County.

Because Oregon Tech is responsible to the campus community and is an economic and cultural driver for the larger community, keeping the university open and functioning is necessary. Moreover, the university can be a significant resource for the local area during a disaster.

The following section describes the campus from a number of perspectives in order to help define and understand the campus's sensitivity and resilience to natural hazards. Sensitivity factors can be defined as those assets and characteristics that may be impacted by natural hazards, (e.g., infrastructure, economic factors, and historic and cultural resources). Resilience factors can be defined as the campus's ability to manage risk and adapt to hazard event impacts (e.g., administrative structure, campus missions and directives, and plans, policies, and programs). The information in this section represents a snapshot in time of the sensitivity and resilience factors at the time the plan was developed. The information documented below, along with the hazard assessments located in Section 3 – Risk Assessment, will be used as the rationale for the mitigation actions identified in Section 4 – Mission, Goals, and Action Items.

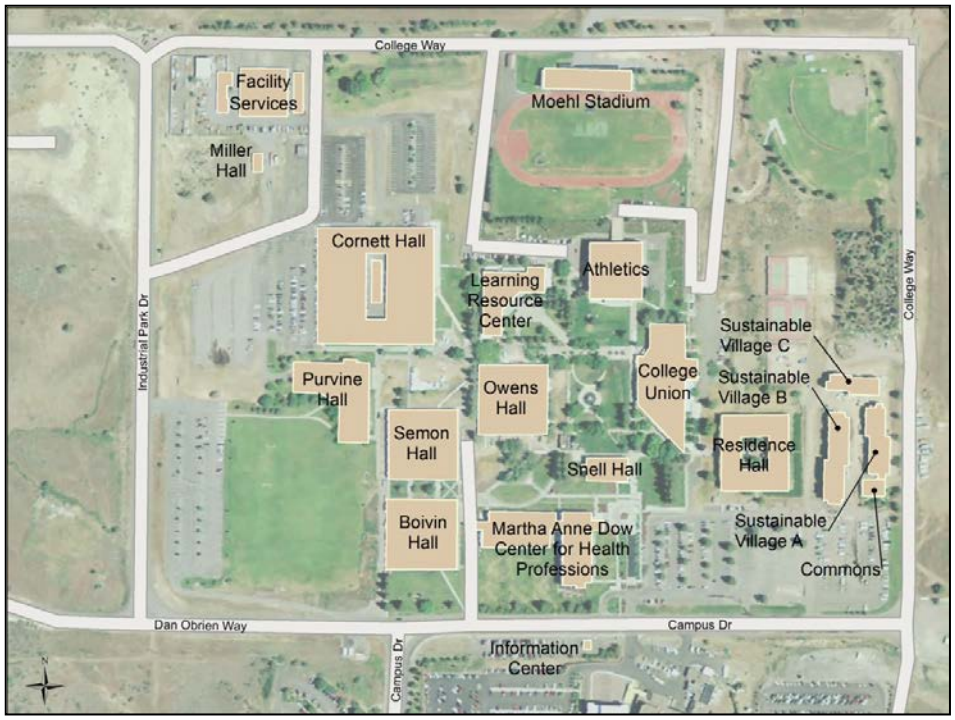
Geography and Climate

The Oregon Tech main campus is located in Klamath Falls which is the county seat of Klamath County, Oregon. The campus is comprised of approximately 312 acres, 90 of which are developed. Oregon Tech currently has six satellite campuses in addition to the Klamath Falls campus: four sites in Portland, Oregon, a site at Boeing in Seattle, Washington, and one in LaGrande, Oregon. During 2012, the four Portland campuses will be consolidated in a new facility in Wilsonville, Oregon.

Oregon Tech is located in the Klamath Basin, a portion of the foothills of the Cascade Mountain range and on the Klamath Graben Fault system, which is an area of high seismicity. The north edge of campus is bordered by a steeply sloped hill which has been classified as an area of liquefaction hazard. The east property boundary of campus parallels a minor geologic fault.

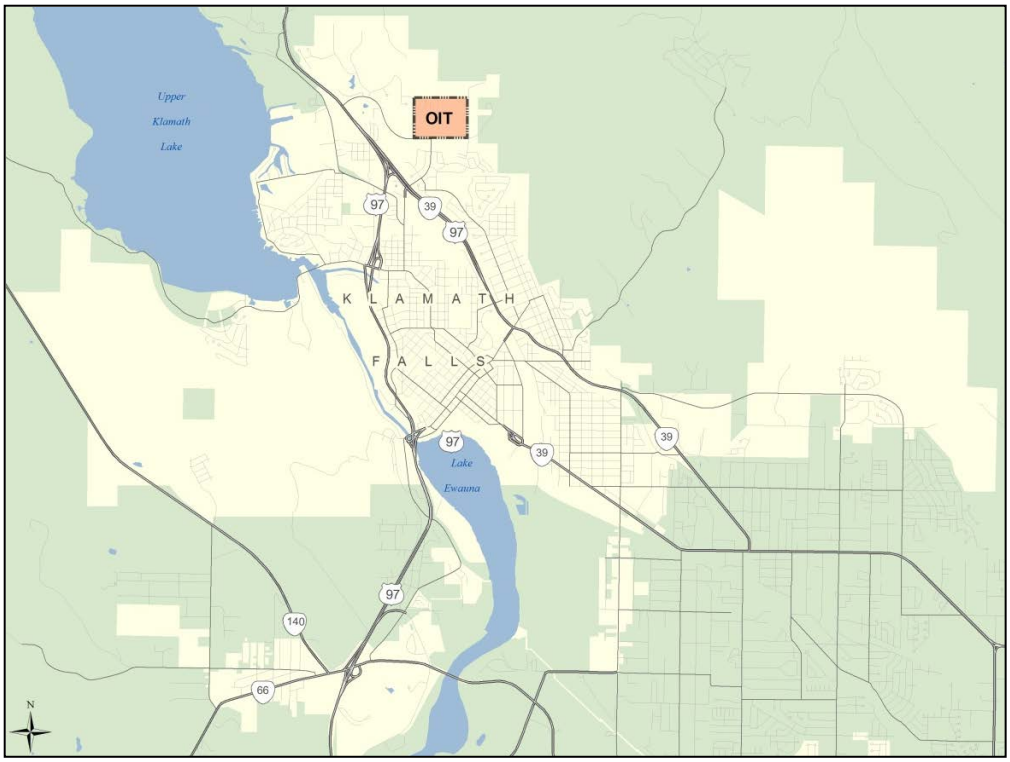
The primary access route to Oregon Tech is from the 97 Business Spur via Campus Drive. The vast majority of traffic to/from Oregon Tech travels this route. Campus Drive is a four lane street with two lanes of traffic in each direction. The two blocks immediately south of campus have a raised median separating the directions of travel. A secondary access point (Dan O'Brien Way), a two lane street, connects to the west with Route 97. The third access point (Bryant Williams Drive) is at the southeast corner of campus. This is a narrow street that winds through the medical complex surrounding the Sky Lakes Medical Center.

Figure 2.1: Campus Map, 2011



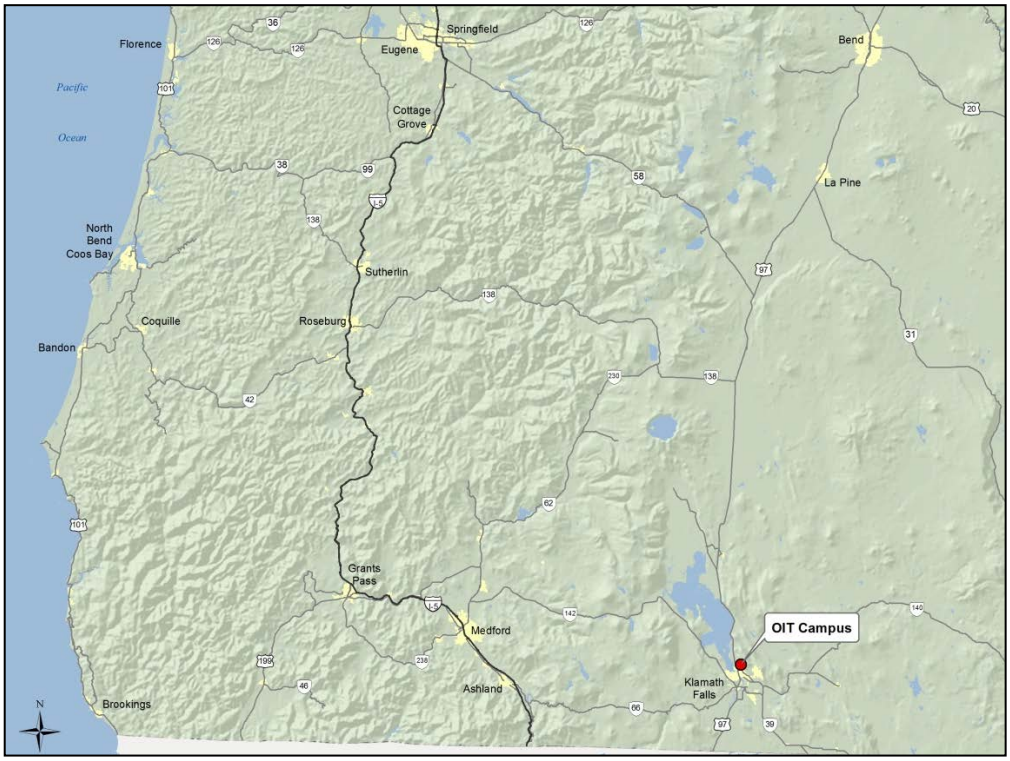
Source: University of Oregon Infographics Lab, Department of Geography, 2011

Figure 2.2: Local Map, 2011



Source: University of Oregon Infographics Lab, Department of Geography, 2011

Figure 2.3: Regional Map, 2011



Source: University of Oregon Infographics Lab, Department of Geography, 2011

Oregon Tech is located on the east slopes of the Cascade Mountain range. This area is classified as high desert. This designation is characterized by low levels of precipitation ranging between an average of 2.03 inches in January and 0.36 inches in July (See Table 2.1). High temperatures average between 85.7° and 39.5° Fahrenheit. Low temperatures average between 51.9° and 21.9° Fahrenheit (See Table 2.2).

Table 2.1 Klamath Falls Precipitation,

Monthly and Annual Averages (1971-2000)

Month	Klamath Falls
Jan	2.03
Feb	1.42
Mar	1.53
Apr	0.93
May	1.10
Jun	0.69
Jul	0.36
Aug	0.50
Sep	0.58
Oct	0.85
Nov	1.95
Dec	2.01
Annual	**13.95**

Source: Klamath County Natural Hazard Mitigation Plan 2010.

Table 2.2 Temperatures (deg F)

Monthly and Annual Average, Klamath Falls, 1971-2000

Month	Mean max	Mean min	Mean temp	Extreme max	Extreme min
Jan	39.9	21.9	30.9	58	-9
Feb	45.7	25.6	35.7	69	-10
Mar	51.8	28.8	40.3	73	4
Apr	59.3	32.3	45.8	87	15
May	68.2	39.1	53.7	98	22
Jun	77.1	45.8	61.5	100	28
Jul	85.7	51.9	68.8	102	30
Aug	85.2	50.4	67.8	104	32
Sep	77	43.6	60.3	100	20
Oct	64.6	34.9	49.8	88	11
Nov	47.4	27.7	37.6	71	1
Dec	39.5	22.1	30.8	59	-17
Annual	**61.8**	**35.3**	**48.6**	**104**	**-17**

Source: Klamath County Natural Hazard Mitigation Plan 2010.

Population

Any natural hazard mitigation activity for the university must take into account the size and distribution of the campus community. Given the nature of the university, the campus community is a dynamic body, composed of students, faculty, staff and visitors of all ages. Effective risk reduction must be tailored to its population, for there is no one-size-fits-all mitigation strategy. Because Oregon Tech is a teaching institution there is an opportunity to increase awareness and education regarding personal responsibility for risk reduction to natural hazards within the student body, while working with campus administration and departments to implement mitigation activities to safeguard the institution.

Students

In 2009, Oregon Tech's attendance at the Klamath Falls campus reached 2,440 students, with 2,331 undergraduate and 9 graduate students. The graduate students were enrolled in the MS Manufacturing Engineering Technology degree program. Enrollment of graduate students is projected to increase with the opening of additional graduate level degree programs.

32.6% of students (795) were local, coming from Klamath and Lake Counties. 49.7% of students (1213) were from other counties in Oregon, for a total of 81.3% resident students (2008). Only ten international students attended Oregon Tech, making up 0.4% of the student population. Non-resident students may not be aware of the natural hazards affecting the campus nor will they have a local support system therefore making them more dependent on the campus.

Students are divided by major into the two Colleges, College of Health, Arts and Sciences (HAS), and College of Engineering, Technology and Management (ETM). For Fall 2009, ETM enrolled 751 students in Engineering and 196 in Management, and HAS enrolled 970 students in Health and 523 in Arts & Sciences.

Faculty and Staff

Fall 2011 staffing levels for the Klamath Falls Campus include 130 faculty, approximately 59 adjunct faculty, 202 staff and 34 temporary staff, for a total of about 332 regular employees. Student workers are not included in these numbers. Faculty accounts for approximately 39% of 332 regular employees.

Visitors

Visitors are a significant component to the Oregon Tech community. Each year about 2,000 prospective students and their families visit the university. In addition, many people in the community and beyond come to athletic events held on the Oregon Tech campus. Basketball games in particular draw crowds up to 2000 spectators. The College Union (CU) is a major hub

of activity on campus. It is the venue for the Winter Wings Festival, Klamath Symphony concerts, and numerous other activities. The Residence Hall hosts a popular Haunted House on the weekend before Halloween. In 2010 the Haunted House had 2075 visitors and in 2011 there were 1671 visitors.

Overnight population

On campus housing is comprised of one traditional dormitory (Residence Hall) and three apartment style buildings (Sustainable Village). Maximum capacity for the Residence Hall and Village combined is 543. Fall 2011 4th week occupancy for both facilities was 510.

Approximately 80% of students live off campus. Since Klamath Falls is a relatively small community, most off campus residents have a 15 minute or less commute by car, and many students commute by bus, bicycle or walking.

University Research

The primary mission of Oregon Tech is instruction. As such, pure and/or applied research is not a focus for Oregon Tech. There are no spaces designated for research.

Oregon Renewable Energy Center (OREC) was established in 2001 to integrate renewable energy technologies into energy systems for practical use by businesses and consumers. OREC's primary location is on the Klamath Falls campus, and includes a laboratory facility for renewable energy projects.

For the fiscal year 2009-10, the School of Engineering, Technology and Management (ETM) had approximately $210,000 in research expenditures. Research funding information for Health, Arts and Sciences was unavailable at the time of writing this profile.

Economic Generation

In fiscal year 2010, Oregon Tech generated $14.7 million in economic activity in the county. During fiscal year 2010 the university conducted business with approximately 130 vendors spending over $1.7 million.

A disaster will have a major economic impact on the entire community. As noted in the Building a Disaster Resistant University Guide (FEMA 2003), "disasters regularly force universities and colleges to suspend their primary activity – the teaching of students. Such closures disrupt the continuity of instruction and limit the ability of the institution to deliver services that students expect." In addition to disrupting teaching, the economic backbone of the community would be compromised.

Administrative Structure

For mitigation to be truly successful, the entire campus must take steps to reduce risk to natural hazards. Ideally, every department or unit on campus would be involved in natural hazard mitigation. However, there are certain departments and units that must play a lead role in mitigation. These departments/units support the university infrastructure and facilities and keep the university safe and running efficiently.

Campus operations are divided into four main operational areas plus two other functional units. These are Finance and Administration, Academic Affairs, Development and Alumni Relations, and Student Affairs, plus Athletics and Institutional Research. Of these, most emergency response will come from divisions within Finance and Administration, with Marketing and Communications from the Development Department providing coordination of communication. Organizational Charts are included as an appendix.

Finance and Administration

Risk Management

Oregon Tech maintains a proactive approach to managing risk. The Risk Management Department acts in an advisory and facilitating capacity with regard to fire protection, loss control activities, safety and environmental health and emergency preparedness. The department promotes these priorities at Oregon Tech through consultative services including educational programs, emergency and non-emergency response services, inspections of physical assets and work practices, problem solving and development of appropriate policies and procedures.

Business Affairs

The areas of responsibility for Business Affairs include Accounting and Financial Reporting; Accounts Payable; Accounts Receivable (including student accounts and cashier); Grants and Contracts (post award administration); Payroll; Purchasing, Property Control and Vendor Relations; and Travel Reimbursement. While much of the role of the Business Affairs office will be recovering from a loss of function after a natural disaster, an effective recovery requires planning beforehand.

Facilities

Facilities maintains the infrastructure of the university, including power, water, sewer, and both structural and non-structural aspects of all buildings on campus. This infrastructure is critical to the continuity of university functions and services. Ensuring that the various components of these infrastructures are reinforced and supported in the event of a natural hazard is an important role for the facilities office.

Facilities staff maintains the campus grounds and will play a crucial role in debris management in the event of a wind storm or earthquake. Since the campus is located in a snow zone, clearing access roads and parking lots during and after winter storms is also an important responsibility.

Technology Services

The Information Technology Services (ITS) department is responsible for the development, implementation and operation of information technology systems and communications networks for Oregon Tech.

Phone and network lines are important services allowing people to communicate and share information. In the event of a natural disaster, these services will be necessary in a response effort.

Campus Security

The Campus Security department administers the university's security and parking programs. The department promotes security on the Oregon Tech campus through emergency and non-emergency response services, problem solving, and enforcement of appropriate laws, rules and regulations. The Campus Security department also provides service functions such as crime prevention and crime reporting programs.

Academic Affairs

As the chief academic officer for the university, the Provost provides leadership for matters that affect academic programs, research, and outreach involving faculty members, students, and staff members. The Provost oversees the quality of programs of instruction and research through collaborative work with vice presidents, academic deans, vice provosts, and numerous other units related to the university. Additionally, the Provost is responsible for overseeing academic and budgetary planning and priorities.

Academic Affairs supports the faculty and curriculum of Oregon Tech. Academic programs from the School of Health, Arts and Sciences and School of Engineering, Technology and Management are supervised by the Provost in collaboration with the dean of each school and the Faculty Senate.

The Provost helps ensure the quality of the faculty by providing leadership in matters related to faculty appointments and promotions, working conditions, and tenure. The Provost also works to ensure the quality of student learning by overseeing the curriculum and encouraging and coordinating initiatives in undergraduate education. The Provost also coordinates recruiting and admissions for undergraduate and graduate programs.

The Provost is accountable to the president of the university and, in his or her absence, acts on behalf of the president. As chief academic officer, the Provost serves as the spokesperson for academic matters at the university.

The academic programs are housed in either of two "schools". The Health Arts and Sciences (HAS) School provides programs and courses in the applied health sciences, the humanities, social sciences, communication, and mathematics, biology and the pre-professional programs.

The Engineering, Technology and Management School (ETM) In addition to its academic programs the School of ETM also includes the Oregon Renewable Energy Center with its Geo-Heat Center. These centers promote energy conservation and renewable energy use.

Development and Alumni Relations

Marketing and Communications

Marketing and Communications is responsible for developing and implementing integrated marketing and communications strategies designed to advance Oregon Tech's image and standing among wide-ranging target audiences.

This includes building and protecting the University's brand position and identity, providing consulting on marketing efforts undertaken by departments and programs, and managing university-wide publications and other internal and external communications processes.

Student Affairs

Housing and Residence Life

Housing and Residence Life strives to build an on-campus community that promotes academic success and fosters personal growth. The Residence Life program is designed to augment the formal experience of the classroom and laboratory, while providing opportunities for residents to meet others from diverse backgrounds and cultures, and to develop a sense of community within the Residence Halls.

Integrated Student Health Center (ISHC)

The mission of the ISHC is to assist students to realize their own goals of success in college by providing and safeguarding their physical and mental health and wellness. The Center aims to provide affordable, quality health care for all students, teach students how to be educated health care consumers, and promote prevention, wellness, and fitness.

Built Environment

Oregon Tech's current campus opened in 1964 and was comprised of Snell, Owens and Cornett Halls for classes and labs, a Facilities building and the Commons, which is the core of the current College Union. The campus is now composed of sixteen main buildings and five support buildings. According to the Oregon Tech Business Affairs Office, in 2011 the buildings have a total replacement value of $233,640,726 and the replacement value of the building contents is $33.2 million.

Campus buildings have several different construction systems. Older buildings such as Cornett, Owens, Snell, Facilities, Semon and Boivin and the PE Building have wood stud walls. Newer buildings such as Purvine and Dow are constructed with steel stud walls. The Village apartments are wood superstructure with wood stud walls. The College Union (CU) had multiple additions and renovations since 1964 and is a hybrid both steel and wood framing within a steel superstructure.

In 1993, two earthquakes caused major damage to the Learning Resource Center (LRC) and the CU. Both buildings were repaired and fortified afterward, although neither building is up to current seismic code. Two other buildings have received a seismic retrofit, Snell Hall in 2005, and Owens Hall in 2009.

All buildings constructed prior to 1980 are assumed to have some amount of asbestos. Post-1980 buildings include LRC (1982), Purvine (1986), Dow (2007, 2009), Integrated Student Health Center (1997) and the Village (2009).

Critical Facilities

Critical facilities are those facilities that house services that directly impact public health and safety and the most basic functioning of the campus. They play a significant role in reducing risk and recovering from damages from natural disasters.

Infrastructure

The university's infrastructure is composed of transportation and the following utilities – (water, power, data and communication lines, and storm water and wastewater services). These are detailed in a separate section below.

Campus/Building Security

Security is provided by Campus Security, whose business office is located in Cornett Hall. Keyed access to buildings is coordinated by Facilities, which is housed in the Facilities Building. Emergency backup in provided by City of Klamath Falls Police Department, Klamath County Sheriff Office and Oregon State Police.

Data Security

All main servers for systems other than Banner are located in a locked data center with video surveillance triggered to a motion detector that is recorded in another building. Data is archived to a disk and then tape storage system in another building. Selective data is also replicated to our Portland campus.

All Banner software, servers and data reside at OSU that hosts Banner for SOU, EOU, WOU, Oregon Tech and the Chancellor's Office. Banner data is archived near real time in La Grande at the EOU campus.

Historic Buildings and Cultural Sites

Since this campus was completely undeveloped land prior to Oregon Tech's development in the 1960's, there are no historic building or sites to note.

The Shaw Historical Library, founded in 1983 and located in the LRC, provides students, researchers, and the interested public with a place to learn about the people and history of the area encompassing south central and south eastern Oregon, northeastern California, and northwestern Nevada. The library holds approximately 3,000 books, as well as maps, art, manuscripts, photographs, and taped interviews. The library contains materials relating to American western migration and the history of the Klamath Basin. There are also significant collections on railroad, logging, agriculture of the Klamath Basin and Native American History

Buildings with Hazardous Materials

Several campus buildings contain notable quantities of hazardous materials. These include Boivin Hall, Cornett Hall, the Dow Center, the Physical Education building and Facilities Services.

Infrastructure

In addition to the built environment, the campus's infrastructure is important to understand when developing a mitigation strategy. Infrastructure refers to the basic facilities, services, and installations needed for the functioning of a campus. The university's infrastructure is composed of transportation and the following utilities – geothermal, power, water, data and communication lines, and storm water and wastewater services.

Geothermal

One of the unique features about Oregon Tech's Klamath Falls campus is its geothermal hot water resource. Oregon Tech has three operational hot water wells, which provide hot water, heating and sidewalk snow melting. In 2010, a low temperature power plant was brought on line, and now

provides approximately 8% of the power used on campus. A fourth well has been drilled and tested for anticipated use in a high temperature geothermal power plant.

Electricity

Most of the electrical needs of the Klamath Falls campus are provided by Pacific Power and Light (PPL). As noted above, Oregon Tech is taking steps toward energy independence by operating a low temperature geothermal power plant, and has an ongoing project for a high temperature power plant, scheduled to come on line as early as 2012. Geothermal power is projected to provide up to 70% of the electricity needs of the campus.

The Integrated Student Health Center building has a roof mounted solar array which generates electricity. The campus has an ideal location for developing a solar farm on the undeveloped hill north of campus, but any planning for such a project is in its earliest stages.

Heating/Cooling

Heating is provided by geothermal heat exchangers. Cooling is provided by electric powered units. Hot and chilled water are distributed throughout the campus via a system of tunnels, which are also used for data and communication cables.

Water

In addition to geothermal wells, Oregon Tech has two domestic wells to provide its water needs. The well water contains significant levels of arsenic and must be treated before uses such as drinking or cooking.

Sewer and Wastewater

The City of Klamath Falls provides the sewer and wastewater utility. All piping is located underground.

Data and Communication

Oregon Tech has a combined data and telecommunications center in the lower level of Snell Hall, a backup system in DOW hall and network closets in each building. Individual buildings are connected to Snell with fiber and copper in a star system. System cables are located in the utility tunnels and/or direct burial between buildings.

The data service is provided by NERO and has two redundant links to west of the Cascades. The first link follows Routes 97 and 58. A second system follows Route 140 to Medford. Cal-Ore provides data services to the Residence Halls. Charter also provides cable TV services on campus. Most of our servers are Microsoft based with a few UNIX and Linux units.

Oregon Tech has an AVAYA phone system including voice mail. Long distance is provided by AT&T with billing services at OSU as well as a system wide shared maintenance program. This system has a mixture of old style analog lines, proprietary digital lines and newer VoIP lines.

Existing Plan & Policies

Oregon Tech's existing plans and policies guide and influence growth. Plans and policies already in existence have support from the campus community. Many campus plans get updated regularly, and can adapt easily to changing conditions and needs.

The Oregon Tech Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the campus's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the campus's existing plans and policies. Linking existing plans and policies to the natural hazards mitigation plan helps identify what resources already exist that can be used to implement the action items identified in the plan. Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the campus's resources.

The following table documents the plans and policies already in place.

Table 2.3: Existing Plans and Policies, Oregon Tech

Name	Date of Last Revision	Author/ Owner	Description	Relation to Natural Hazard Mitigation
Campus Plan			The Campus Plan is a framework of patterns and policies defining the desired qualities and setting forth how those qualities will be preserved and expanded with new construction.	Ensure that new construction plans include nonstructural retrofitting to prevent the impact of natural hazards. Continue to meet and exceed building code standards. Plan should encourage fire-safe construction practices.
Oregon Tech 2017			The strategic plan for Oregon Tech addresses the following areas: quality and access to its academic programs; graduate programs; faculty engagement in applied research; long-term fiscal viability and a broad funding base; and sustainability.	
Emergency Response Plan	10/27/10	Risk Management	Establishes a basic guide for providing a response system to an emergency occurring at Oregon Tech.	
Sustainability Plan	10/10/08	Environmental Science Program	Establishes guidelines for sustainability on campus in the areas of campus operations, academics and community involvement.	Encourage implementation of mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and campus stability.
Campus Development Policy			Establishes guidelines for development of campus.	Include building standards that decrease building vulnerability.
Telecom Facilities Guidelines			Establishes placement and design of current and future telecom facilities on campus.	Promote hazard resistant utility and telecommunication construction and maintenance methods.
Transportation Plan			Establishes design of campus transportation system.	Identify safe evacuation routes in high-risk debris flow and critical areas. Identify and evaluate all critical campus transportation routes that could be used in the instance of a natural hazard.

Section 3:
Risk Assessment

Introduction and Methodology 1
What is a Risk Assessment? 2
Hazard Risk Assessments 3
Risk Assessment Methodology 3
Earthquake 5
Wildfire 11
Severe Weather: *Winter and Wind Storms* 15

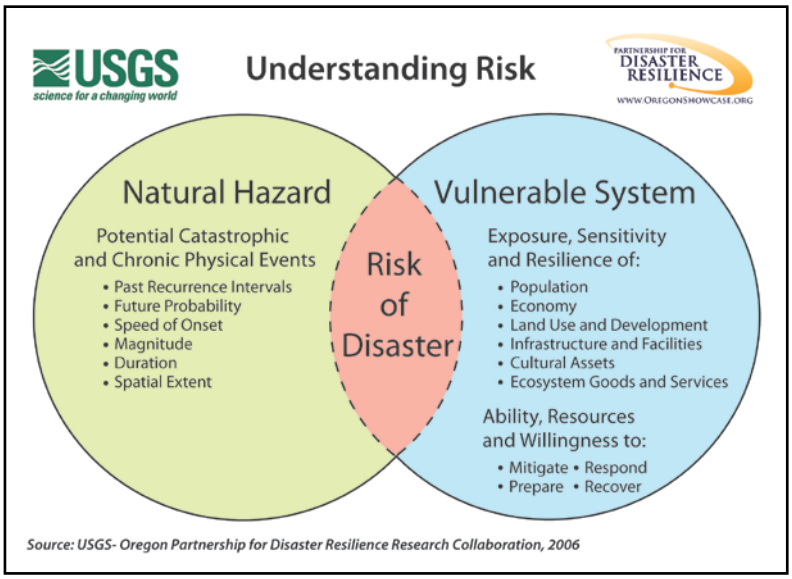
Introduction and Methodology

As described in the Campus Profile, Oregon Tech functions as a complex network of physical and social systems. Disaster events often highlight the fragility of some of these systems. By looking at campus risk from a holistic perspective, we can identify which campus resources (e.g. buildings, roads, utilities, social services, etc.) are vulnerable and/or sensitive in certain events. This knowledge can then be used to help develop strategies that strengthen the university, reduce losses and increase resiliency for both short- and long-term disaster risk.

The purpose of Section 3- Risk Assessment is to identify and characterize the natural hazards that could impact this university and assess the risk those natural hazards pose. A risk assessment provides a snapshot of the university's vulnerability relative to identified natural hazards. It becomes the factual basis for proposed activities that aim to mitigate damage to campus assets. By combining information from the natural hazard profile with an inventory of the existing campus characteristics, areas of vulnerability are exposed. The risk assessment process is characterized in Figure 3.1 below. From this information, "action items" or specific projects/activities are identified that will reduce potential losses and protect the integrity of the university.

This section identifies and profiles the location, extent, previous occurrences, and future probability of natural hazards that can impact the university.

Figure 3.1: Understanding Risk



What is a Risk Assessment?

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis.

Hazard Identification

The first phase, hazard identification, involves describing the causes and characteristics of each hazard, the history of that hazard on campus, the identification of the geographic extent of a hazard, its intensity, and its probability of future occurrence.

This level of assessment typically involves producing a map or maps. The outputs from this phase can also be used for planning, public awareness, and defining areas for further study.[1]

Vulnerability Assessment

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property, population exposed to a hazard and attempts to predict how different types of property, population groups and functions will be affected by the hazard. This step can assist in justifying property acquisition programs, policies concerning critical and public facilities and outreach programs to members of the campus community at risk.[2]

In short, this section analyzes the vulnerability of the university by identifying assets that could be exposed to a hazard. Critical facilities are of particular concern because they provide essential services that are necessary to protect life and fulfill important public safety, emergency response, and/or disaster recovery functions.

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[1] Burby, R. 1998. Cooperating with Nature. Washington, DC: Joseph Henry Press. Pg. 126.
[2] Burby, R. 1998. Cooperating with Nature. Washington DC: Joseph Henry Press. Pg. 133.

Risk Analysis

The third phase, risk analysis, involves estimating the damage, injuries, and costs likely to result from a natural hazard. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment, and (2) the likelihood or probability of the harm occurring.

An example of a product that can assist communities in completing the risk analysis phase is HAZUS, a risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage after a disaster occurs.

This three-phase approach to developing a risk assessment should be conducted sequentially because each phase builds upon data from prior phases. However, gathering data for a risk assessment need not occur sequentially.

Hazard Risk Assessments

The Oregon Tech Steering Committee reviewed the Risk Assessment for Klamath County and the City of Klamath Falls and also conducted a Hazard Risk Assessment to determine the relative risk incurred by Oregon Tech for a range of natural hazards.

Through this analysis the Steering Committee determined that, even though the County and City NHMP's include analysis of a longer list of hazards, based on the physical location of the campus in the community, the following hazards pose significant risk for Oregon Tech:

- Earthquake
- Severe Weather (Wind and Winter Storms)
- Wildfire

Each hazard addressed by the plan, the following information is provided:

- Hazard identification
- Vulnerability assessment
- Risk assessment
- Existing mitigation actions section

Risk Assessment Methodology

The Klamath County Natural Hazard Mitigation Plan (NHMP) was updated in 2011 and served as the primary source for the Oregon Tech Risk Assessment.

To facilitate connections with the Klamath County NHMP and the State of Oregon's NHMP, this plan uses the same rating scales as provided within Oregon Emergency Management's Hazard Analysis Methodology template, and are listed below. Probability estimates are based on the

frequency of previous events, and vulnerability estimates are based on potential impacts of the hazard.

Probability scores address the likelihood of a future major emergency or disaster within a specific period of time as follows:

- High = One incident likely within a 10-35 year period
- Moderate = One incident likely within a 35-75 year period
- Low = One incident likely within a 75-100 year period

Vulnerability scores address the percentage of population or region assets likely to be affected by a major emergency or disaster, as follows:

- High = More than 10% affected
- Moderate = 1-10% affected
- Low = Less than 1% affected

The probability and vulnerability scores in each hazard section were reviewed by the Oregon Tech Steering Committee members during the plan development process.

Table 3.1: Summary Risk Assessment

	Klamath County		City of Klamath Falls		Oregon Tech	
	Probability	**Vulnerability**	**Probability**	**Vulnerability**	**Probability**	**Vulnerability**
Earthquake	Moderate	High	Moderate	High	Moderate	Moderate
WildFire	High	High	High	High	Moderate	Moderate
Severe Weather	High	High	High	High	Moderate	Moderate

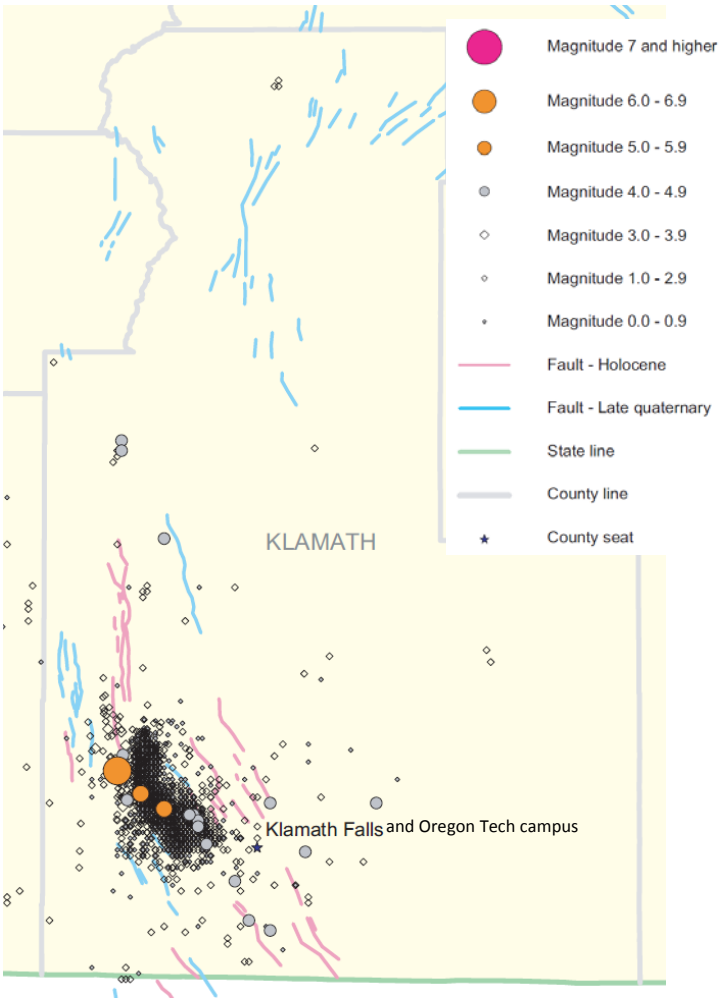
Earthquake

Hazard Identification

Location and Extent of the Hazard[3]

Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) the off-shore Cascadia Subduction Zone; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) shallow crustal events within the North American Plate. All have some tie to the subducting or diving of the dense, oceanic Juan de Fuca Plate under the lighter, continental North America Plate.

Figure 3.2: Klamath County Earthquake and Fault Map 1841-2002



When crustal faults slip, they can produce earthquakes with magnitudes (M) up to 7.0 and can cause extensive damage, which tends to be localized in the vicinity of the area of slippage.

Deep intraplate earthquakes occur at depths between 30 and 100 kilometers below the earth's surface. They occur in the subducting oceanic plate and can approach M7.5.

Subduction zone earthquakes pose the greatest hazard. They occur at the boundary between the descending oceanic Juan de Fuca Plate and the overriding North American Plate. This area of contact, which starts off the Oregon coast, is known as the Cascadia Subduction Zone (CSZ). The CSZ could produce a local earthquake up to 9.0 or greater.

Figure 3.2 shows the history of earthquakes and the location of known faults in Klamath County.[4]

[3] State of Oregon NHMP, Region 6: Central Oregon Regional Profile, 2009

[4] Klamath County NHMP, 2011

Central Oregon includes portions of five physiographic provinces (High Cascades, Blue Mountains, Basin and Range, High Lava Plains, and Deschutes-Columbia Plateau). Consequently, its geology and earthquake susceptibility varies considerably. Klamath County is considered to be a part of the "Basin and Range" area where earthquakes are also associated with extension (pulling apart of the crust).

Causes and Characteristics of the Hazard

The severity of an earthquake depends on several factors, including the distance from the earthquake source, the ability of soil and rock to conduct seismic energy and the degree (angle) and composition of slope materials. The specific hazards associated with an earthquake include the following:[5]

- Ground Shaking
- Ground Shaking Amplification
- Surface Faulting
- Earthquake-Induced Landslides
- Liquefaction

The Klamath County NHMP contains more detailed description of the causes and characteristics of earthquakes.

Hazard History

Most of the identified faults in the region with activity in the last 20,000 years are in Klamath County. Historically, the region has been shaken by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered outside the area (Table 4). All considered, there is good reason to believe that the most devastating future earthquakes would probably originate along shallow crustal faults in the region.

There have been several significant earthquakes that have been Klamath County: 1920 Crater Lake, and the 1993 Klamath County earthquakes (M5.9 and 6). The two earthquakes caused major damage to the Learning Resource Center (LRC) and the Campus Union. Both buildings were repaired and fortified afterward.

Table 3.2 Significant Earthquakes in Oregon[6]

Date	Location	Magnitude	Comments
4/2008	Newport, OR	5.0-5.4	Swarm of earthquakes occurred off the Central Oregon Coast
8/2004	Newport, OR	4.7	Small earthquake recorded northeast of Newport, no damages.
7/2004	Newport, OR	4.9	Earthquake recorded southwest of Newport, no damages
9/1993	Klamath Falls	5.9 to 6.0	Two earthquakes causing two deaths and extensive damage. $7.5 million in damage to homes, commercial, and government buildings. Crustal event (FEMA-1004-DR-OR)

[5] Klamath County NHMP, 2011
[6] Source: Klamath County NHMP, 2011

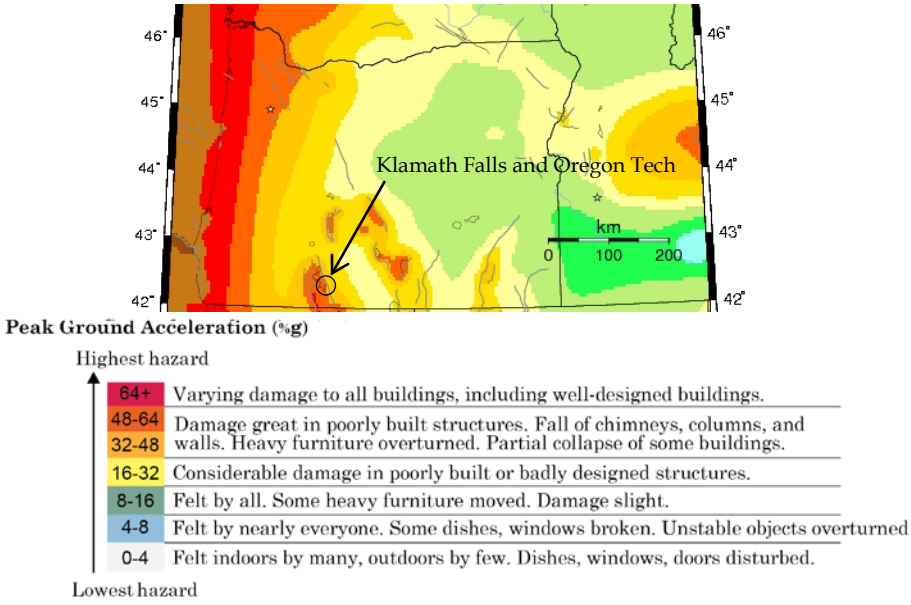
3/1993	Scotts Mills	5.6	$28 million in damage. Damage to homes, schools, businesses, state buildings (Salem). Crustal Event (FEMA-985-DR-OR)
11/1962	Portland	5.2 to 5.5	Damage to many homes (chimneys, windows, etc.). Crustal event
11/1873	Brookings area	7.3	Chimneys fell at Port Orford, Grants Pass, and Jacksonville. No aftershocks. Origin probably Gorda block of the Juan de Fuca plate. Intraplate event
1/1700	Offshore, CSZ	Approx. 9.0	Generated a tsunami that struck Oregon, Washington, and Japan; destroyed Native American villages along the coast

Sources: 1: Wong, Ivan and Bolt, Jacqueline, November 1995, A Look Back at Oregon's Earthquake History, 1841-1994, Oregon Geology, p.125-139. 2: The Pacific Northwest Seismograph Network, *Notable Pacific Northwest Earthquakes Since 1993*, www.pnsn.org/SEIS/EQ_Special/pnwtectonics.html, accessed July 30th, 2010. 3: Science Daily, "Unusual Earthquake Swarm Off Oregon Coast Puzzles Scientists," April 14, 2008, www.sciencedaily.com/releases/2008/04/080413184801.htm, accessed July 30th, 2010.

Probability of Future Occurrence

The image below depicts this hazard in terms of the intensity of ground shaking which has a 2% probability of being exceeded during a 50-year period. Depending on the epicenter of the earthquake, damage that campus could experience as a result of this hazard would be significant.

Figure 3.2: 2% 50-year earthquake Hazard



Source: United States Geological Survey. (2009). Earthquake Hazard Program: 2008 NSHM Figures. Retrieved from: http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/

Vulnerability Assessment

Oregon Tech is located in the Klamath Basin, a portion of the foothills of the Cascade Mountain range and on the Klamath Graben Fault system, which is an area of high seismicity. The north edge of campus is bordered by a steeply sloped hill which has been classified as an area of liquefaction hazard. The east property boundary of campus parallels a minor geologic fault.

Earthquakes will affect university buildings and building occupants as a result of seismic waves traveling through the ground. These waves result in vibrations that cause motion within the structural system of each building. If the design does not allow the structure to respond safely and predictably to this motion, failure can occur and produce harm to occupants and damage to the building. This motion will also cause building contents to shift; unsecured items such as bookshelves, computers, and file cabinets could move significantly and threaten life and safety. Many spaces on campus contain expensive, rare, or hazardous items that can be damaged or lead to secondary hazards during an earthquake. In addition to buildings, infrastructure and transportation systems are vulnerable to ground motion and consequently threaten the university's ability to operate.

The campus is composed of sixteen main buildings and five support buildings. Campus buildings have several different construction systems. Building age, construction type and material, and soils all contribute to overall risk of building damage or collapse during an earthquake.

- Older buildings, built between 1960 and 1980, such as Cornett, Owens, Snell, Facilities, Semon and Boivin and the PE Building have wood stud walls. The College Union (CU) had multiple additions and renovations since 1964 and is a hybrid both steel and wood framing within a steel superstructure.
    - Two buildings have received a seismic retrofit, Snell Hall in 2005, and Owens Hall in 2009.
    - Oregon Tech obtained eestimates for renovation projects on campus that included seismic retrofit, code upgrades, and deferred maintenance projects for several facilities: Cornet ($25M), Boivin for ($8M) and Semon for ($3M).
- Newer buildings such as Purvine and Dow are constructed with steel stud walls. The Village apartments are wood superstructure with wood stud walls. Post-1980 buildings include LRC (1982), Purvine (1986), Dow (2007, 2009), Integrated Student Health Center (1997) and the Village (2009).

Risk Analysis

Though the location, duration, and magnitude of any earthquake is impossible to predict, Oregon Tech can reasonably expect tens of thousands if not millions of dollars in damage from even an earthquake of moderate magnitude. The losses may be attributable to damaged buildings, loss of life, loss of equipment, or loss of research assets or other intellectual property.

According to the Oregon Tech Business Affairs Office, in 2011 the buildings have a total replacement value of $233,640,726 and the replacement value of the building contents is $33.2 million.

The Klamath County NHMP identified probability of and vulnerability to earthquakes for Klamath County and the City of Klamath Falls. During development of Oregon Tech's NHMP, the Steering Committee determined that the University experiences moderate probability (one incident likely within a 35-75 year period) and moderate vulnerability (1-10% of the population affected).

	Klamath County	City of Klamath Falls	Oregon Tech
Probability	Moderate	Moderate	Moderate
Vulnerability	High	High	Moderate

Hazard Mitigation Successes

- Two buildings have received a seismic retrofit, Snell Hall in 2005, and Owens Hall in 2009. The Owens Hall retrofit was completed using sustainability funds while the Snell Hall retrofit was completed using capital funds appropriate by the Oregon University System (OUS).
- Oregon Tech's Facilities Services conducts inspections, makes recommendations, and provides support for non-structural mitigation in campus buildings.

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Wildfire

Over the past decade, a number of wildfire specific hazard planning activities have been completed locally and regionally. The City of Klamath Falls (Fire Districts 1 & 4) has a Community Wildfire Protection Plan (CWPP) development process underway (in 2011/2012), as does Klamath County (plan update). The Klamath County CWPP was initially adopted in 2007 and includes reference to all locally adopted CWPPs in the county. For the purposes of this Hazard Mitigation Plan, the Klamath County CWPP will serve as primary guiding document for wildfire mitigation on the Oregon Tech campus and is incorporated herein by reference. Oregon Tech is within the jurisdiction of Fire District 1.

Hazard Identification[7]

Location and Extent of the Hazard

Fire is an essential part of Oregon's ecosystem, but it is also a serious threat to life and property, particularly within the state's wildland-urban interface. Wildfires occur in areas having large areas of flammable vegetation that require a suppression response.

Causes and Characteristics of the Hazard

Wildfire can be divided into three categories: interface, wildland, and firestorm.

- Interface Fires occur where wildland and developed areas come together with both vegetation and structural development combining to provide fuel.
- Wildland Fires main fuel source is natural vegetation. Often referred to as forest or rangeland fires, these fires occur in national forests and parks, private timberland, and on public and private rangeland. A wildland fire can become an interface fire if it encroaches on developed areas.
- Firestorms are events of such extreme intensity that effective suppression is virtually impossible. Firestorms often occur during dry, windy weather and generally burn until conditions change or the available fuel is consumed.

[7] Klamath County NHMP, 2011

Hazard History

Even though there is no history of direct impacts from wildfire on the Oregon Tech campus, wildfires have impacted Klamath County and the City of Klamath Falls. These events include:

- 2007 – A wildfire causes over $100,000 in property damage.
- 2006/2007 – A wildfire on Old Fort Road, burned to the east heading towards Swan Lake burning roughly 2,000 acres.
- August 1992 – Lone Pine Fire. 30,320 acres burned.
- June 1992 – Round Lake Fire, with 420 acres burned.

Probability of Future Occurrence

The natural ignition of forest fires is largely a function of weather and fuel; human-caused fires add another dimension to probability. Dry and diseased forests can be mapped accurately and some statement can be made about the probability of lightning strikes. Each forest is different and consequently has different probability/recurrence estimates.

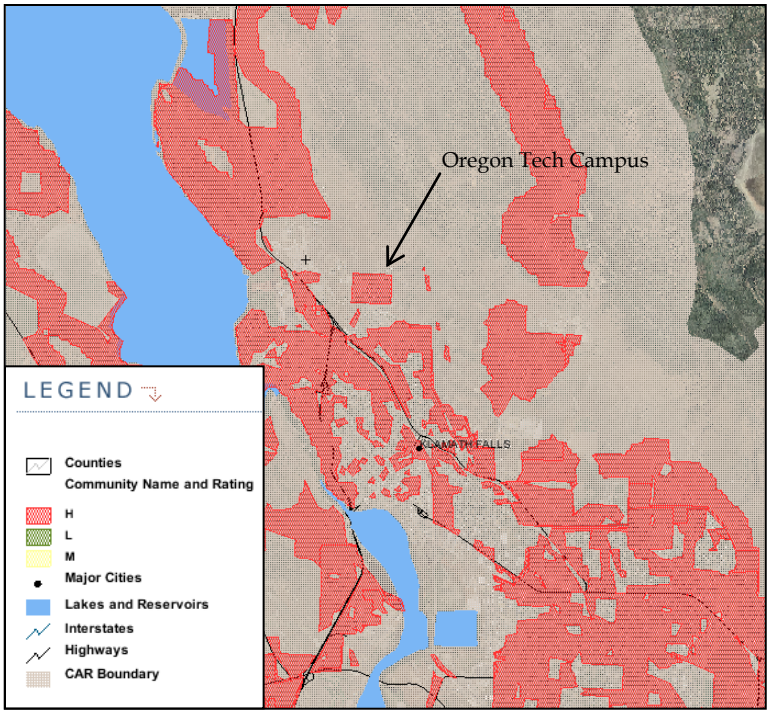
Vulnerability Assessment

Oregon Tech has some development within the Wildland-Urban Interface (WUI). Pressurized chlorine storage tanks are located on the hill that borders campus to the east. These tanks are enclosed in wooded structures with juniper trees nearby. Loss of these structures or the tanks due to fire could cut the water supply to campus. The campus' two geothermal power generation facilities are also located on the hill to the southeast and have juniper trees on one or more sides.

Additionally, significant wildlife locally or in the region has the potential to impact the campus community, indirectly. A wildfire of regional significance could restrict access to the Oregon Tech campus via Highways 39 and 97 and decreased air quality in the region due to smoke could negatively impact overall health and safety.

Figure 3.3 depicts the "community at risk" boundaries for the community surrounding Oregon Tech's campus.

Figure 3.3: Wildfire Hazard – "Community At Risk" Boundary



Source: Oregon State University, Oregon Hazards Explorer, http://www.oregonexplorer.info/hazards/. Notes: (1) "Community Name and Rating" shows geographic areas that meet the population density requirements of the National Fire Plan (1 dwelling per 40 acre or 28 persons per square mile, minimum of 4 dwellings/8 people, or basic infrastructure present,), (2) "Community At Risk (CAR) Boundary" shows the area within and surrounding populated jurisdictions that meet Oregon's definition for Community at Risk. The boundaries reflect areas within and surrounding jurisdictional populated areas that are considered part of the community.

Risk Analysis

The Klamath County NHMP identified probability of and vulnerability to wildfires for Klamath County and the City of Klamath Falls. Oregon Tech's Steering Committee used that information in assessing risk for the Oregon Tech campus and community and determined that the University experiences moderate probability (one incident likely within a 35-75 year period) and moderate vulnerability (1-10% of the population affected).

	Klamath County	City of Klamath Falls	Oregon Tech
Probability	High	High	Moderate
Vulnerability	High	High	Moderate

Hazard Mitigation Successes

- During the Simpson Fire in 2005, Oregon Tech served as the staging area and general basecamp for fire suppression operations of the US Forest Service. Oregon Tech provided security for the operations and the fire response Incident Command post was located inside one of Oregon Tech's facilities. By providing this support, Oregon Tech was able to build relationships with regional, state, and federal partners and can leverage such relationships to enhance mitigation and response on campus.

Severe Weather:
Winter and Wind Storms

Hazard Identification

Location, Extent, Causes and Characteristics of the Hazard

Winter storms affecting the Oregon Tech campus are characterized by a combination of heavy rains and high winds. Heavy rains can result in flooding, as well as debris slides and landslides. High winds commonly result in tree falls which primarily affect the electric power system, but which may also affect buildings and vehicles.

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect all of Klamath County, they are especially in developed areas with significant tree stands and major infrastructure, especially above ground utility lines. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities, and create tons of storm related debris.

The Klamath County NHMP contains more detailed description of the causes and characteristics of severe weather hazards.

Hazard History

The following list describes the history of winter storms in Klamath County and the City of Klamath Falls.

- 2011 – Strong wind storm topples a large pine tree on campus.
- 2008 – Heavy snow, followed by rain, caused structural damage to the roof of Owens Hall from the excess weight. This incident resulted in a 2 day closure of campus as engineers verified the safety of Owens Hall and other similarly designed structures. Snow removal costs for Klamath Falls exceeded $200,000.
- Winter 1998-99 - One of the snowiest winters in Oregon history (Snowfall at Crater Lake: 586 inches).
- Mar. 1994 - Heavy snow throughout the Cascade Mountains.
- Nov. 1993 - Heavy snow throughout the Cascade Mountains.
- Feb. 1986 - Heavy snow in and around the Deschutes Basin. Traffic accidents; broken power lines.
- Jan. 1969 - Heavy snow throughout state.
- Jan. 1950 - Record snowfalls caused property damage throughout state.
- Jan. 1916 - Two storms over the state produce heavy snowfall, especially in mountainous areas.

Probability of Future Occurrence

Winter storms and wind storm are considered chronic, seasonal hazards in Klamath County, occurring with some regularity and / or on an annual basis.

Vulnerability Assessment

Oregon Tech's campus vulnerability stems from unreinforced infrastructure and old or diseased trees.

- Tree limbs can fall during due to the weight of snow accumulation or from high wind speeds. Tree limbs falling on transportation routes, buildings, and other property can cause significant damage to both public and private assets.
- Trees can also fall when significant rain fall is followed or accompanied by strong winds. The rain will decrease the stability of the soil leaving the trees susceptible to the wind.

Risk Analysis

The Klamath County NHMP identified probability of and vulnerability to winter storms for Klamath County and the City of Klamath Falls. Oregon Tech's Steering Committee used that information in assessing risk for the Oregon Tech campus and community and determined that the University experiences moderate probability (one incident likely within a 35-75 year period) and moderate vulnerability (1-10% of the population affected).

	Klamath County	City of Klamath Falls	Oregon Tech
Probability	High	High	Moderate
Vulnerability	High	High	Moderate

Hazard Mitigation Successes

- Oregon Tech's Klamath Falls campus utilizes the geothermal hot water resource to not only provide hot water and heating, but also for sidewalk snow melting. This helps the campus maintain normal operations even during severe winter snow or ice.
- Oregon Tech has an Inclement Weather procedure that articulates communication protocol and response procedures for severe weather incidents. It was reviewed and revised extensively in 2008. The procedure is sent out annually to the campus community. It is implemented when there is concern that snow or ice may prevent safe use of sidewalks, parking lots and campus roads.
- **Back-up power**:
  The back-up generator for the Athletics facility was replaced in 2010 at a cost of $22, 000. This generator also serves the public safety communication infrastructure located on the roof of the

facility. The communication infrastructure has been hardened further with a battery back-up
Additionally, the Residence Hall and the College Union have generators to provide emergency power for egress lighting and fire / life safety systems in the building.

- Oregon Tech opened new residence facilities in 2009 called "Sustainable Village". The designs for all three buildings underwent additional engineering following the 2008 snow load damage to Owens Hall to ensure that the Sustainable Village facilities could withstand a similar incident.

Section 4:
Mission, Goals and Actions

Introduction

This section introduces the goal and action item framework for the Oregon Tech Natural Hazard Mitigation Plan (NHMP). The information provided in the Risk Assessment provides the basis and justification for the mission, goals and actions identified in this plan. The information in this section is based on the comparison of the information in *Section 2 – Campus Overview* and the information in *Section 3 – Risk Assessment*.

- **The mission statement** is a philosophical or value statement that answers the question "Why develop a plan?" In short, the mission states the purpose and defines the primary function of the university's NHMP. It is broad enough that it need not change unless the university environment changes.
- **Goals** are designed to drive actions and they are intended to represent the general end toward which the university effort is directed. Goals identify how the university intends to work toward mitigating risk from natural hazards. The goals are guiding principles for specific recommendations outlined in the actions.
- **Action Items** are detailed recommendations for activities that university departments, members of the campus community and others could engage in to reduce risk.

Mission

The mission of the Oregon Tech Natural Hazard Mitigation Plan is to create a disaster resilient Oregon Tech.

Goals

Goals have two purposes: to drive actions and to represent the general end toward which the university's effort is directed. Goals identify how the university intends to work toward mitigating risk from natural hazards. The goals are guiding principles for specific recommendations outlined in the actions. The goals put forward by this plan are:

Goal 1: Protect life and reduce injuries resulting from natural hazards.

Goal 2: Reduce risks posed by seismic, wildfire, and severe weather on campus.

Goal 3: Increase awareness and promote risk reduction activities through education and outreach.

Goal 4: Integrate risk reduction strategies into university plans, policies and practices.

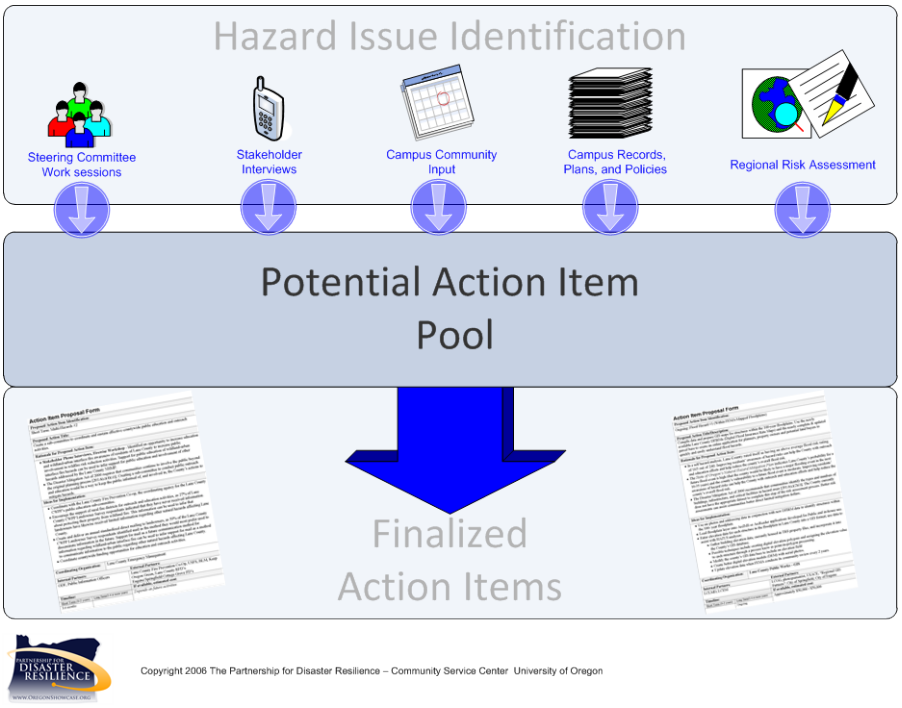
Goal 5: Reduce disruption of essential infrastructure and critical services on campus from natural hazards.

Goal 6: Minimize the impact of natural hazards while protecting and restoring the environment.

Action Items

The action items are detailed recommendations for activities that the university and its partners could engage in to reduce risk to natural hazards. The action items address the issues identified in the risk assessment and the values identified in the planning process. To facilitate implementation, each action item is described in a worksheet including information on alignment with plan goals and existing plans and policies, rationale, ideas for implementation, coordinating and partner organizations, timeline and status. The process for identifying potential sources of action items is shown in Figure 4.1 on the next page.

Figure 4.1 Action Item Identification Process



Action Item Worksheets

The action item worksheets can assist the university in packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A.

Alignment with Plan Goals

Each action item must be tied to a plan goal. The plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals following implementation.

Alignment with Existing Plans and Policies

Incorporating mitigation action items into existing plans and policies, such as strategic plans or campus master plans, will increase the likelihood that it will be implemented.

Rationale

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Each action item includes a summary of the critical issues that the item will address. Issues were identified from a number of sources, including participants of the planning process, noted deficiencies in campus capability, and the risk assessment. The rationale for proposed action items is based on the information documented in Section 2: Campus Profile and Section 3: Risk Assessment.

Ideas for Implementation

The ideas for implementation offer a transition from theory to practice. This component of the action items is dynamic, as some ideas may be not feasible and new ideas can be added during the plan maintenance process (for more information on how this plan will be implemented and evaluated, refer to Section 5: Maintenance and Implementation).

Coordinating Organization

The coordinating organization is the group on campus that is willing and able to organize resources, find appropriate funding, and oversee activity implementation, monitoring, and evaluation.

Internal Partners

Recommended by the project Steering Committee, internal partners are groups within the university that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External Partners

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations. The internal and external partner organizations listed are potential partners recommended by the project steering committee.

Timeline

Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. *Short-term action items* are activities that may be implemented with existing resources and authorities within one to two years. *Long-term action items* may require new or additional resources and/or authorities, and may take between two and five years to implement.

Status

As action items are implemented or new ones are created during the plan maintenance process, it is important to indicate the status of the action item—whether it is new, ongoing, or complete. Documenting the status of the action, whether completed, ongoing or new will make reviewing and updating mitigation plan easier during the plan's next update, and can be used as a benchmark for progress.

Action Items

These action items can be found in more detail in Appendix A.

MultiHazard

1. Acquire and site back-up generators for the Sustainable Village residence halls.
2. Partner with the City of Klamath Falls and Klamath County for coordinated emergency operations, mitigation, and response activities.
3. Conduct annual activities outreach that involve the Oregon Tech community.
4. Develop a Continuity of Operations Plan.
5. Review the Oregon Tech Emergency Operations Plan.
6. Enhance the training of senior leadership staff for emergency response.
7. Reinforce the Water Supply for campus.

Wildfire

8. Create and maintain defensible space around critical facilities in the Wildland-Urban interface.

Earthquake

9. Prioritize seismic retrofits of academic buildings.

Section 5:
Maintenance & Implementation

This section explains the process used to adopt, implement and maintain the plan. To ensure that the plan is responsive to the needs of the entire Oregon Tech community, many units must be involved in its maintenance and implementation. A clear structure will help coordinate these groups and ensure that the plan implemented.

Plan Adoption

The Oregon Tech Natural Hazard Mitigation Plan received FEMA pre-approval on date. The plan was adopted via letter of promulgation by the President of Oregon Tech on date. The plan received formal approval from FEMA on date.

Plan Implementation and Maintenance

This section details the formal plan implementation and maintenance process. Proper maintenance of the plan will ensure that it remains an active and relevant document and maximizes the efforts at Oregon Tech to reduce risks posed by natural hazards.

Implementation Structure

There are two important parts in Oregon Tech's efforts to implement and maintain this plan: the Steering Committee and the Plan Coordinator. The Steering Committee, the same group of administrative and auxiliary units that helped develop the plan, ensures that the plan is implemented and ultimately integrated into existing policies and programs at Oregon Tech. The Oregon Tech Emergency Management Advisory Committee will be the NHMP Steering Committee. The Plan Coordinator serves as day-to-day manager and staff to the Steering Committee providing essential coordination, communication, and technical oversight on plan maintenance and implementation. Ideally, the Plan Coordinator is the person that helped facilitate the plan creation.

Steering Committee

As the Steering Committee was responsible for plan development, it should be responsible for oversight and guidance the implementation of the mitigation plan. This committee is comprised of representatives from administrative units that have a defined role or responsibility for any element in the Oregon Tech NHMP.

The Steering Committee provides oversight and guidance on the plans, but ad hoc working groups can be responsible for carrying out the plan's

defined action items, plan updates and development, training and plan drills, and outreach activities.

Committee Responsibilities

The roles and responsibilities of the Steering Committee include:

- Providing oversight and periodic evaluation and update on the current Oregon Tech Natural Hazard Mitigation Plan in accordance with the prescribed maintenance schedule defined in the plan;
- Prioritizing and implementing plan action items;
- Developing and coordinating ad hoc and/or standing working groups as needed;
- Recommending funding for hazard risk reduction projects; and
- Serving as the campus evaluation committee for funding programs such as Pre-Disaster Mitigation Grant Program and the Hazard Mitigation Grant Program.

The Steering Committee will meet twice each year to perform its duties and will enlist the help of other Oregon Tech staff to serve on working groups to implement certain projects.

Members

The following units will comprise the Steering Committee:

- Information Services / Emergency Management
- Campus Safety
- Marketing
- Facilities Services
- Residential Life
- Athletics
- Business Affairs
- Environmental Health and Safety Officer
- Academic representative

Plan Coordinator

The mitigation actions proposed in the plan will not get implemented without campus-wide support and a person to coordinate and ensure their implementation. The Oregon Tech Plan Coordinator will be the office of Information Services / Emergency Management. The Plan Coordinator will complete the following tasks:

- Convene the Steering Committee meeting and coordinate dates, times, locations, agendas, and member notification;

- Document outcomes of Committee meetings;
- Serve as a communication conduit between the Steering Committee and key plan stakeholders;
- Identify emergency management related funding sources for natural hazard mitigation projects;
- Collaborate with other Disaster Resistant Universities to share best practices;
- Conduct outreach and awareness campaigns for students, staff and faculty;
- Document successes and lessons learned; and
- Develop of grant proposals for implementation of the plans actions items.

Implementation and Maintenance Meetings

The Steering Committee will be responsible for maintaining and updating the plan through a series of meetings outlined below:

- Annual meetings
- 3-Year Review Meetings

Semi-Annual Meetings

The Steering Committee will meet on a semi-annual basis. Possible agendas for these meetings include:

- Meeting 1:
  - Review existing action items to determine appropriateness for funding;
  - Identify issues that may not have been identified when the plan was developed;
  - Prioritize potential mitigation projects using the methodology described below;
  - Educate and train new Steering Committee members on the plan and mitigation in general; and
  - Assist in development of funding proposals for priority action items.
- Meeting 2:
  - Review existing and new risk assessment data
  - Discuss methods for continued public involvement; and

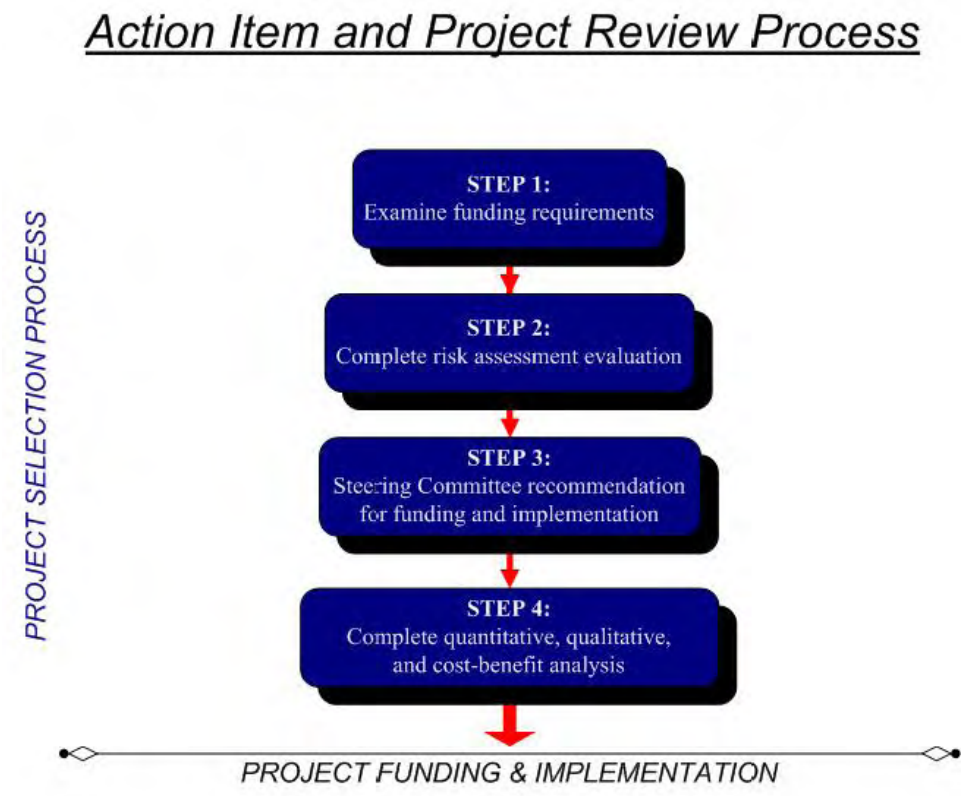
- Document successes and lessons learned during the year.

The Plan Coordinator will be responsible for documenting the outcome of the semi-annual meetings. The process the Steering Committee will use to prioritize mitigation projects is detailed in the section below.

Action Items Prioritization Process

The Disaster Mitigation Act of 2000 requires jurisdictions to identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Figure 5.1 illustrates the project development and prioritization process.

Figure 5.1 Project Prioritization Process



Step 1: Examine funding requirements

The first step in prioritizing the plan's action items is to determine which funding sources are available. Several funding sources may be appropriate for the Oregon Tech's proposed mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), Oregon Tech general funds, and private foundations, among others. Please see Appendix B for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the Steering Committee will examine upcoming funding streams'

requirements to determine which mitigation activities would be eligible. The Steering Committee may consult with the funding entity, Oregon Emergency Management, or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the semi-annual plan maintenance meetings.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is to examine whether or not the action is recommended based on the findings of the risk assessment. The Steering Committee will determine whether or not the plan's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and whether campus assets are at risk. The Steering Committee will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe / catastrophic damages.

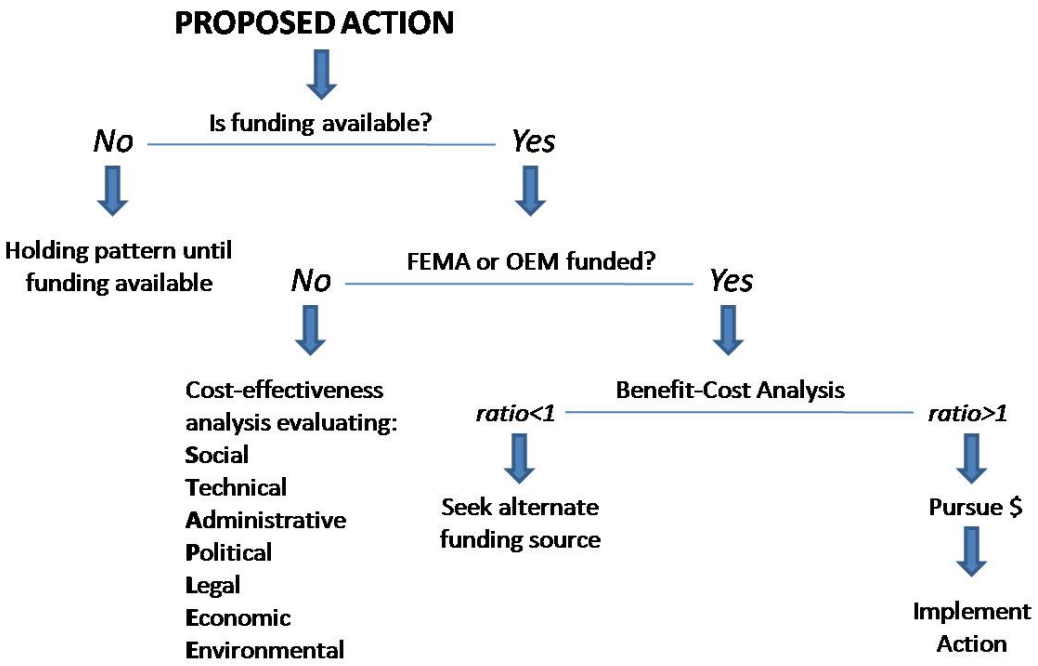
Step 3: Steering Committee recommendation

Based on the steps above, the Steering Committee will recommend which mitigation activities should be moved forward. If the Steering Committee decides to move forward with an action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. The Plan Coordinator will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

Step 4: Complete quantitative and qualitative assessment, and economic analysis

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 5.2 shows decision criteria for selecting the appropriate method of analysis.

Figure 5.2 Benefit Cost Decision Criteria



Source: Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon, 2006

If the activity will be funded through any Federal Emergency Management Agency (FEMA) funding sources, then the coordinating body must use a FEMA-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The coordinating body will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. The STAPLE/E technique has been tailored for use in natural hazard action item prioritization by the Partnership for Disaster Resilience at the University of Oregon's Community Service Center. See Appendix C for a description of the STAPLE/E evaluation methodology.

Five-Year Review of Plan

In accordance with the update schedule outlined in the Disaster Mitigation Act of 2000, this plan will need to be updated every five years. During the plan update, the following questions should be asked to determine what actions are necessary to update the plan. The Plan Coordinator will be responsible for assembling the Steering Committee to address the questions outlined below.

- Are the plan goals still applicable?
- Do the plan's priorities align with State priorities?
- Are there new departments, units, or partners that should be brought to the table?
- Are there new university, local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the university successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the university?
- Are the actions still appropriate given current resources?
- Have there been any changes in the university's footprint that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the university been affected by any disasters?

The questions above will help the Committee determine what components of the mitigation plan need updating. The Steering Committee will be responsible for updating any deficiencies found in the plan based on the questions above.

Continued Campus and Community Input

Oregon Tech is dedicated to involving the campus and community directly in the continual reshaping and updating of the NHMP. Therefore, portions of the plan are available on Oregon Tech's web-site allowing individuals or interested groups to view the plan and provide comments.

The success of the plan's implementation partially relies on the campus community's interest and willingness to become involved in natural hazard mitigation. Their willingness to become involved relies on the visibility and campus community's understanding of the issue before any behavioral change happens. There are action items directly related to public involvement have been included in the plan.

Additionally, Oregon Tech is represented on the Klamath County NHMP Steering Committee. Throughout implementation of the Oregon Tech NHMP and at the time of updates, Oregon Tech will connect with relevant external partners through the Klamath County NHMP Steering Committee.

For more information about public involvement in the plan and mitigation activities see the action item forms in Appendix A.

Appendix A: Action Item Forms

The action items are detailed recommendations for activities that the university and its partners could engage in to reduce risk to natural hazards. The action items address the issues identified in the risk assessment and the values identified in the planning process. To facilitate implementation, each action item is described in a worksheet including information on alignment with plan goals and existing plans and policies, rationale, ideas for implementation, coordinating and partner organizations, timeline and status.

Action Items

MultiHazard

1. Acquire and site back-up generators for the Sustainable Village residence halls.
2. Partner with the City of Klamath Falls and Klamath County for coordinated emergency operations, mitigation, and response activities.
3. Conduct annual activities outreach that involve the Oregon Tech community.
4. Develop a Continuity of Operations Plan.
5. Review the Oregon Tech Emergency Operations Plan.
6. Enhance the training of senior leadership staff for emergency response.
7. Reinforce the Water Supply for campus.

Wildfire

8. Create and maintain defensible space around critical facilities in the Wildland-Urban interface.

Earthquake

9. Prioritize seismic retrofits of academic buildings.

Action 1

Action:	**Hazard Addressed:**
Acquire and site back-up generators for the Sustainable Village residence halls	• Multi Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Reduce disruption of essential infrastructure and critical service on campus from natural hazards*

Rationale for Proposed Action Item:

Providing safe and secure housing is a critical service that Oregon Tech provides to students who live on campus. The existing Residence Hall is already supported by a back-up generator. Three (3) generators are needed, one for each building that is a part of the Sustainable Village.

Ideas for Implementation:

- Assess the generator capacity needed for each of the Sustainable Village buildings
- Designate portions of the Housing Reserve Fund for mitigation

Coordinating Organization:	Housing and Residence Life

Internal Partners:	**External Partners:**
Facilities Services	

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Reserve Fund; Grants; Donations	$175,000	☐ Short Term (0-2 years) x Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Andy Abbott
Action Item Status:	Holding, as other maintenance priorities are in process

Action 2

Action:	**Hazard Addressed:**
Partner with the City of Klamath Falls and Klamath County for coordinated emergency operations, mitigation, and response activities	• Multi Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
Part of the charge of the new Emergency Management Advisory Committee	• *Protect life and reduce injuries resulting from natural hazards* • *Reduce disruption of essential infrastructure and critical services on campus from natural hazards*

Rationale for Proposed Action Item:

Local first responders are the primary resource for campus related fire, medical, or police / law enforcement emergencies. Partnerships among these agencies can ensure that first responders are more familiar with campus to provide the highest level of service to student and Oregon Tech community members during an emergency. Partnerships can also be used as a basis for grant funding to support mitigation and response for Oregon Tech and other agencies.

Ideas for Implementation:

- Continue participation on the County's Type 3 Incident Management Team
- Attend monthly Klamath County Emergency Management meetings
- Invite Fire District No. 1 and KF City Police to campus EM meetings

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Facility Services; Public Safety, Emergency Management	City of Klamath Falls; Klamath County; Klamath County Fire District No1.

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	$0	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Andy Abbott
Action Item Status:	In Process

Action 3

Action:	**Hazard Addressed:**
Conduct annual activities outreach that involve the Oregon Tech community	• Multi-Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Increase risk awareness and promote risk reduction activities through education and outreach*

Rationale for Proposed Action Item:

Enhancing awareness about natural hazards and the corresponding mitigation or preparedness actions among Oregon Tech' students, faculty and staff will assist in creating a more resilient campus.

Ideas for Implementation:

- Provide information sessions about personal preparedness
- Conduct annual drills or exercises, e.g. fire drills
- Publish an article or add annually in campus newsletters and papers tailored for specific audiences on campus
- Distribute emergency preparedness, mitigation and response information during new student orientation.

Coordinating Organization:	Risk Management

Internal Partners:	**External Partners:**
Housing and Residence Life; Human Resources	Klamath County Emergency Management; City of Klamath Falls;

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	$1,000 year for handouts	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Andy Abbott
Action Item Status:	In Process

Action 4

Action:	**Hazard Addressed:**
Develop a Continuity of Operations Plan	• Multi Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Reduce disruption of essential infrastructure and critical services on campus from natural hazards.* • *Integrate risk reduction strategies into university plans, policies, and practices.*

Rationale for Proposed Action Item:

Natural disasters around the country have forced universities and colleges to close. Even smaller incidents can interrupt teaching, research, and campus life. To be resilient through an incident, Oregon Tech needs to have a plan in place to continue and resume after an incident. This can be accomplished through Business Continuity of Operations Plans (COOP). A COOP will also identify actions to make operations more resilient in the face of disruptions.

Ideas for Implementation:

- Catalogue critical functions for essential services
- Complete data backup protocols between the Klamath Falls Campus and the Wilsonville campus
- Have EMAC members complete IS-546 and IS-547

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Emergency Management Advisory Committee and the Finance and Administration Directors	

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	$0	X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Andy Abbott
Action Item Status:	On hold

Action 5

Action:	**Hazard Addressed:**
Review the Oregon Tech Emergency Operations Plan	• Multi Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Integrate risk reduction strategies into university plans, policies, and practices.*

Rationale for Proposed Action Item:

The current EOP is out of date and needs revisions as well as additions to be a useful document. It also has to be reviewed and updated yearly.

Ideas for Implementation:

- The emergency Management Advisory Committee will review the current document and make suggestions for changes that will be then reviewed by the Executive Staff
- The six campus members who attended L-363 will serve as the writing team
-

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**
Emergency Management Advisory Committee	Klamath County Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	$500 for print copies for the Executive Committee and select departments	X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Andy Abbott
Action Item Status:	Fall 2012 timeline

Action 6

Action:	**Hazard Addressed:**
Enhance the training of senior leadership staff for emergency response	• Multi Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Reduce disruption of essential infrastructure and critical service on campus from natural hazards*

Rationale for Proposed Action Item:

Senior Management needs to be fully aware of the relationships we have with Klamath County Emergency Management , Fire district No. 1 and the city of Klamath Falls Police Department as well as how all of us work within a FEMA framework,

Ideas for Implementation:

- ICS100, 200, 700 and 800 training for senior staff.
- Exercises
- Quarterly updates from the Emergency Management Advisory Committee
- Occasionall briefings by the Emergency Management Coordinator

Coordinating Organization:	Emergency Management

Internal Partners:	**External Partners:**

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	$0	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Andy Abbott
Action Item Status:	In Process

Action 7

Action:	**Hazard Addressed:**
Reinforce the Water Supply for campus	• Multi Hazard

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Reduce disruption of essential infrastructure and critical service on campus from natural hazards*

Rationale for Proposed Action Item:

To provide a dependable, safe and code compliant domestic water distribution system for a campus of 3,500 students, faculty and staff

Ideas for Implementation:

Currently reviewing design fee proposals that address the following:

- Well #1 – Address all code violations. Replace existing submersible pump and utilize existing frequency drive system. Analyze chlorination system and recommend any needed modifications. Upgrade DDC capabilities.
- Well #4 – Address all code violations. Replace water pump with high efficiency drive system. Analyze chlorination system and recommend my needed medications. Install DDC system. Analyze option of designating Well 4 for cooling tower make up water well for campus geothermal electrical power generation.
- Water Reservoir – Assess interior and exterior surfaces for deterioration. Specify means and methods for repair. Specify replacement finishes for interior and exterior surfaces. Design pressure transducer system for monitoring and control of water level through DDC system.
- Analyze water distribution system, system for Cross Connection & Backflow prevention and specify corrections for code compliance.
- Analyze Pressure Reduction Valves (PRV) to confirm functionality. Recommend modifications or additions to system.

Coordinating Organization:	Facilities Services

Internal Partners:	**External Partners:**
	OUS

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
OUS	unknown	X Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Jim Lake
Action Item Status:	Reviewing RFQ (#2012-05) engineering proposals for design phase.

Action 8

Action:	**Hazard Addressed:**
Create and maintain defensible space around critical facilities in the Wild land-Urban interface	• Wildfire

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
At this time there is no written memorandum of understanding with outside fire services	• *Reduce disruption of essential infrastructure and critical service on campus from natural hazards*

Rationale for Proposed Action Item:

Situation near the Wildland-Urban Interface (WUI), Oregon Tech is vulnerable to wildfires. In the past fires have had air quality impacts on the campus community. Additionally, several pieces of critical infrastructure a located in the WUI, the loss of which could reduce or eliminate water flow to campus.

Ideas for Implementation:

- Remove brush and trees located near well house. Coordinate removal with facilities services.
- Contact Fire Chief John Ketchum at Kino fire department to determine what types of resources are required for wild land urban interface.
  George Marlton to implement memorandum of understanding for wildlife urban interface use of resources on campus.

Coordinating Organization:	Facilities Services

Internal Partners:	**External Partners:**
Public Safety, Facilities Management	Local Fire Departments

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Facilities Services budget	$200	X Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Sherry Himelwright
Action Item Status:	Scheduled for late Fall 2012

Action 9

Action:	**Hazard Addressed:**
Prioritize seismic retrofits of academic buildings	• Earthquake

Alignment with Existing Plans/Policies:	**Alignment with Plan Goals:**
	• *Reduce disruption of essential infrastructure and critical service on campus from natural hazards*

Rationale for Proposed Action Item:

Teaching and providing students with a quality learning environment is a core mission of Oregon Tech. The primary academic buildings of Cornet Hall, Boivin Hall, and Semon Hall are the primary teaching facilities. Including structural seismic retrofit into any remodeling of these facilities will ensure that Oregon Tech can return to teaching more quickly after an earthquake

Ideas for Implementation:

Continue to prioritize these facilities within the OUS capital funding mechanism
Continue to prioritize these facilities within the Oregon Tech capital Construction List
Develop an appeal to donors and alumni around seismic resilience

Coordinating Organization:	Facilities Services

Internal Partners:	**External Partners:**
Risk Management	Oregon University System

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
In 2011, Oregon Tech submitted a 10-year capital request to the Oregon University System for funds to renovate these facilities	TBD	□Short Term (0-2 years) X Long Term (2-4+ years) □Ongoing

Form Submitted by:	Andy Abbot
Action Item Status:	On hold for lack of funding

Appendix B: Documentation

This appendix provides documentation of the planning process. Steering Committee meetings occurred over a two year period, and included:

Phase I: Getting Started

Steering Committee Meeting 1, 11/30/10*

- Review the grant planning process and the role of the Steering Committee.
- Review the draft campus profile section of the plan.

Steering Committee Meeting 2, 2/15/11

- Review campus profile
- Discuss specific hazards relevant to OIT.

Phase II: Risk Assessment

Steering Committee Meeting 3, 5/25/11

- Risk Assessment Workshop

Steering Committee Meeting 4, 1/4/12*

- Review existing drafts
- Risk Assessment review
- Preliminary action item discussion

Phase III: Mission, Goals and Action Items and Plan Implementation and Maintenance

Steering Committee Meeting 5, 3/22/11*

- Determine NHMP Mission and Goals
- Review draft action item list
- Review draft implementation strategy
- Incorporate public comments
- Finalize the NHMP

(indicates agenda or other documentation included in this appendix)*

Community Presentations

- 4/10/12, Faculty-Administrator meeting, presentation of draft plan*

Oregon Institute of Technology
Natural Hazard Mitigation Planning

Steering Committee
Work Session #1

November 30, 2010

1. **Introduction to Mitigation Planning**

2. **Steering Committee Role**

3. **Hazards the Plan will Address**

4. **Public Involvement Strategy**

5. **Campus Profile Review**

6. **Next Steps**

UNIVERSITY OF OREGON

Meeting: OIT Natural Hazard Mitigation Plan
Date: January 4, 2011
Time: 2:00 pm – 3:00pm
Location: Web Conference

AGENDA

1. **Welcome and Introductions** - *(10 minutes)*
    a. DRU Update
    b. Steering Committee Roles & Responsibilities
    c. NHMP Process Refresher
2. **Risk Assessment Overview** - *(30 minutes)*
    a. FEMA Requirements
    b. Exercise: Review Risk Assessment, County & City Assessment
3. **Campus Involvement** - *(10 minutes)*
    a. FEMA Requirements
    b. Tech News Daily & March Campus Meeting
4. **Homework and Next Steps** - *(10 minutes)*
    a. Homework
        i. Send in additional data for the Risk Assessment
        ii. Send in Success Stories
        iii. Brainstorm Action Items
    b. Next Meeting: Discussion of Action items, Mission & Goals, Implementation

Meeting: OIT Natural Hazard Mitigation Plan

Date: March 22, 2011

Time: 2:00 pm – 3:00pm

Location: Web Conference

AGENDA

1. **Welcome and Introductions**
    a. Review timeline
2. **Risk Assessment Review**
    a. Review updates for accuracy
3. **Mission and Goals**
    a. Review examples
    b. Develop mission and Goals for OIT
4. **Implementation**
    a. FEMA requirements
        i. Convener
        ii. Coordinating Body
    b. OIT Process
5. **Campus Involvement**
    a. Summary of outreach (Andy, OIT)
    b. Continued efforts
6. **Next Steps -**
    a. Update the NHMP (Emma, UO) for committee review
    b. NHMP Posted to web
    c. April meeting
    d. Final Meeting?

Mission & Goals

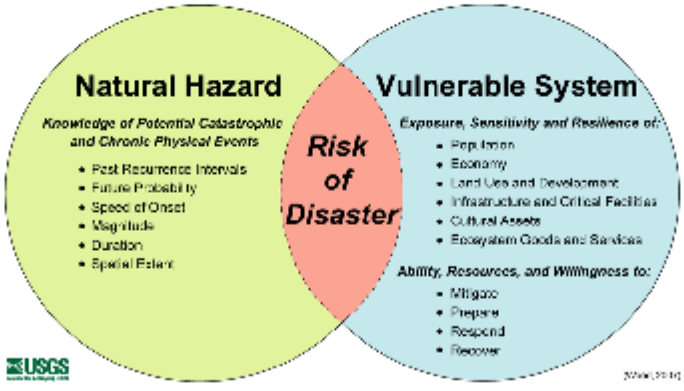
The Rule (*44 CFR Section 201.6*) states that your plan SHALL...

- Include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
- A statement that describes the purpose of the plan

Mission & Goals

- Mission
  - A statement that describes the **purpose** of the plan
  - Reflects a **realistic determination** of what the plan is, who it serves, what it does, and what it can accomplish
- Goals
  - Describe the outcomes to be produced
  - Goals **drive** actions

Mitigation Plan Actions



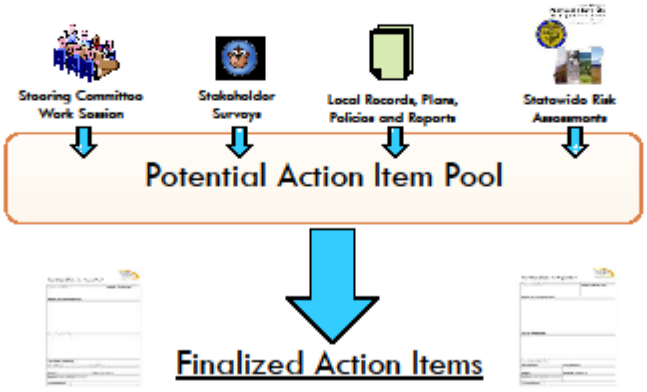
Mitigation Plan Actions

Your plan SHALL*...

- Identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard
- Identify actions and projects that reduce the effects of hazards on **new** buildings and infrastructure
- Identify actions and projects that reduce the effects of hazards on **existing** buildings and infrastructure?

*44 CFR, Section 201.6

Where Do Actions Come From?



Types of Mitigation Actions


Prevention


Emergency Services


Property Protection


Structural Projects


Public Education and Awareness


Natural Resource Protection

Implementation: Monitor, Evaluate, Update

Requirement §201.6(c)(4)(i):

[The plan maintenance process **shall** include a section describing the] method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

- Ongoing review
  - Sections v. entire NHMP
  - Catalogue successes as they happen
  - Connect with other processes

Implementation:
Monitor, Evaluate, Update

Coordinating Body

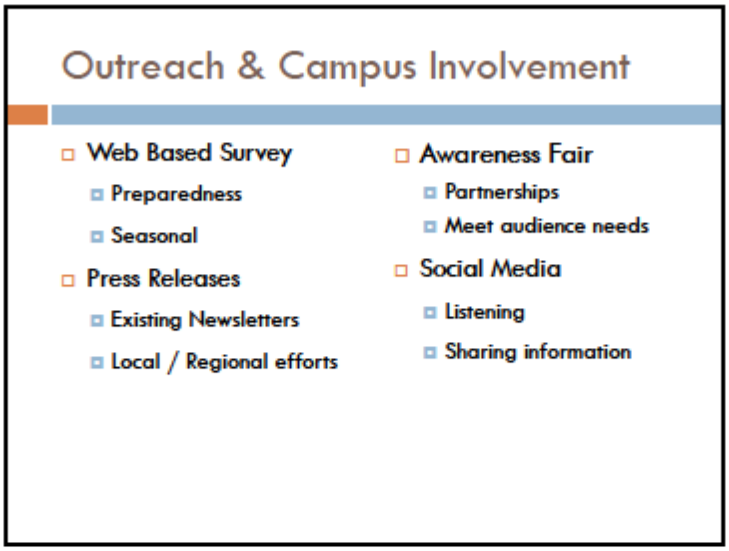
Convener

- Update
  - 5 year minimum
- Meetings
  - Semi-annual
  - Annual
- Ongoing review
  - Sections v. entire NHMP
  - Catalogue successes as they happen
  - Connect with other processes

Implementation Through Existing Plans

- The plan shall continue to describe how information in the mitigation plan will be **integrated into other planning mechanism**

- Opportunities:
  - Strategic Plan / Vision: OIT 2017
  - Capital or maintenance plans
  - Construction code


Outreach & Campus Involvement
Web Based Survey
Preparedness
Seasonal
Press Releases
Existing Newsletters
Local / Regional efforts
Awareness Fair
Partnerships
Meet audience needs
Social Media
Listening
Sharing information

3/22/12 Public Announcement in "Tech News", the Oregon Tech newsletter

NATURAL HAZARDS MITIGATION PLAN

Oregon Tech is developing a Natural Hazards Mitigation Plan (NHMP), and we want your input.

The NHMP will provide our community with goals, actions, and resources to reduce the effects of potential natural disasters. This type of planning and the resulting mitigation procedures can save lives, property and critical facilities. Developing an NHMP can help to reduce the costs of reconstruction and recovery, while increasing our potential to receive state and federal funding for said recovery.

In addition, the planning process increases cooperation and communication within the campus community and with our partners more broadly. This planning process includes representatives from multiple campus departments, and input from the entire campus community is needed.

If you have ideas for how to prepare for or mitigate the effects of a natural disaster, or are interested in Oregon Tech's planning process, or would like to view and comment on the draft version of the Oregon Tech NHMP, contact Andy Abbott at 541-885-1720 or andy.abbott@oit.edu. Additionally, the final draft of the plan will be posted on Oregon Tech's website for comments and will be on the agenda of the April Faculty/Administration public meeting.

Klamath County recently developed a county-specific component NHMP, and Oregon Tech's Plan draws on it as a source of current natural hazard information. You can find the County's plan at http://klamathcounty.org/depts/ems/HazardMitPlan.pdf

By creating an NHMP, Oregon Tech becomes eligible to apply for federal funding for natural hazard mitigation projects.

This update is supported by the Oregon Partnership for Disaster Resilience, utilizing funds from the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant Program.

4/10/12 Faculty Administrator Meeting Announcement

From: Adria Paschal
Sent: Thursday, April 05, 2012 4:33 PM
To: Faculty-List; Admin-List
Cc: Carl Agrifoglio; HelpDesk
Subject: Faculty Administrator Meeting

The next Faculty-Administrator meeting is scheduled for 2pm on Tuesday, April 10 in the Mt. Mazama Room of the College Union.

Here is the call in number and access code for those of you that are unable to participate in person:

Telephone number: 888-596-0363
Access code: 5789763 followed by the pound (#) sign

The bridge will dial out to the video units located in Mt. Mazama, OIT East Room 139, OIT West Room 243, and Dental Hygiene in the board room at 1:45pm.

Following is the agenda:

I. ANNOUNCEMENTS AND COMMUNICATIONS

- Oregon Tech Natural Hazard Mitigation Plan (Andy Abbott)

II. REPORTS

- Faculty Senate (Matt Schnackenberg)
- Administrative Council (Shelly Wilson)
- Academic Council (Brad Burda)
- Finance and Administration update (Mary Ann Zemke)

III. DISCUSSION & OTHER

IV. Q&A WITH PRESIDENT MAPLES

Appendix C:

Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the University of Oregon's Oregon Partnership for Disaster Resilience and it outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan,* (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigatio*n. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various

mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the there methods is outlined below:

Benefit/cost Analysis

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Conducting detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practicle. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of these methods is the STAPLE/E Approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a systematic fashion. This criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E Approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process".

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?

- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?

- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

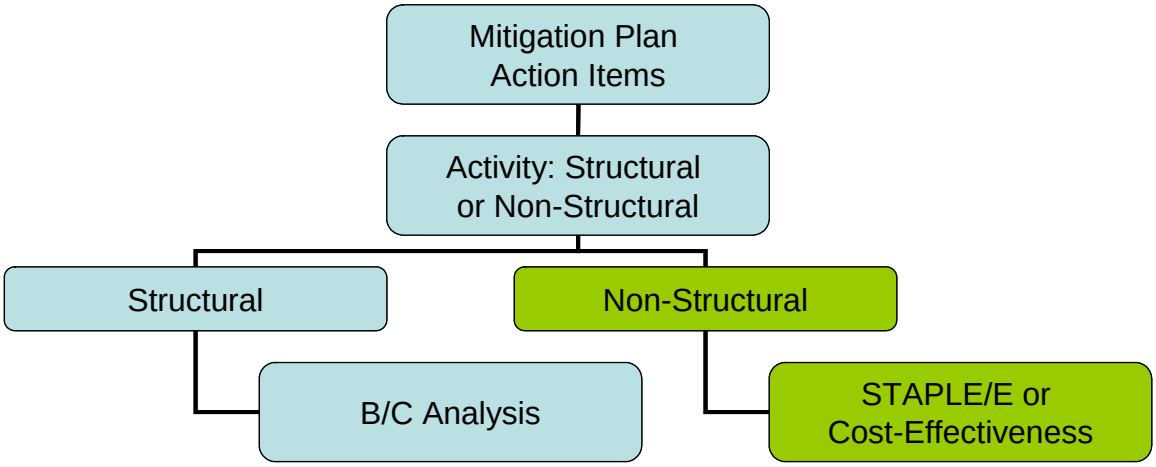
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed Benefit/Cost Analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure A.1: Economic Analysis Flowchart



Source: Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon, 2005

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost.*** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits.*** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical

durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- ***Consider costs and benefits to society and the environment.*** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate.*** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- ***Internal Rate of Return***. Using the *internal rate of return* method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

CUREe Kajima Project, *Methodologies For Evaluating The Socio-Economic Consequences Of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997.

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics Inc., 1996.

Federal Emergency Management Agency *Report on Costs and Benefits of Natural Hazard Mitigation.* Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in The City*

of Portland, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects* Volume V, Earthquakes, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olson Associates, Prepared for Oregon State Police, Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000).

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency Management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

Appendix D:
Resource Directory

Hazard Mitigation Programs

Post-Disaster Federal Programs

Hazard Mitigation Grant Program

- The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. http://www.fema.gov/government/grant/hmgp/

Physical Disaster Loan Program

- When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters. http://www.sba.gov/services/disasterassistance/index.html

Pre-Disaster Federal Programs

Pre-Disaster Mitigation Grant Program

- The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formulabased allocation of funds. http://www.fema.gov/government/grant/pdm/index.shtm

Flood Mitigation Assistance Program

- The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund costeffective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:
    - Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;
    - Encouraging long-term, comprehensive hazard mitigation planning;

- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
- Complementing other federal and state mitigation programs with similar, longterm mitigation goals.

http://www.fema.gov/government/grant/fma/index.shtm

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY10 Hazard Mitigation Assistance Unified Guidance, available at: http://www.fema.gov/library/viewRecord.do?id=3649

For Oregon Emergency Management grant guidance on Federal Hazard Mitigation Assistance, visit:
http://www.oregon.gov/OMD/OEM/plans_train/grant_info/hma.pdf
OEM contact: Dennis Sigrist, dsigrist@oem.state.or.us

State Programs

Community Development Block Grant Program

- Promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low and moderate income persons. Eligible Activities Most Relevant to Hazard Mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare.

http://www.hud.gov/offices/cpd/communitydevelopment/programs/

Oregon Watershed Enhancement Board

- While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately $20 million in funding annually.
  http://www.oweb.state.or.us/

Federal Mitigation Programs, Activities & Initiatives

Basic & Applied Research/Development

- National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation. Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology

(NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery.
http://www.nehrp.gov/

- Decision, Risk, and Management Science Program, National Science Foundation. Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES

Hazard ID and Mapping

- National Flood Insurance Program: Flood Mapping; FEMA. Flood insurance rate maps and flood plain management maps for all NFIP communities.
http://www.fema.gov/plan/prevent/fhm/index.shtm

- National Digital Orthophoto Program, DOI – USGS. Develops topographic quadrangles for use in mapping of flood and other hazards.
http://www.ndop.gov/

- Mapping Standards Support, DOI-USGS. Expertise in mapping and digital data standards to support the National Flood Insurance Program.
http://ncgmp.usgs.gov/ncgmpstandards/

- Soil Survey, USDA-NRCS. Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes.
http://soils.usda.gov/survey/

Project Support

- Community Development Block Grant Entitlement Communities Program, HUD. Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- in come persons.
http://www.hud.gov/offices/cpd/communitydevelopment/programs/entitlement/

- National Fire Plan (DOI – USDA) Provides technical, financial, and resource guidance and support for wildland fire management across the United States. Addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability.
http://www.nps.gov/fire/fire/fir_nationalfireplan.cfm

- Assistance to Firefighters Grant Program, FEMA. Grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (SAFER).
  http://www.fema.gov/firegrants/

- Emergency Watershed Protection Program, USDA-NRCS. Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.
  http://www.nrcs.usda.gov/programs/EWP/

- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.
  http://www.usda.gov/rus/

- Rural Development Assistance – Housing, USDA. Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.
  http://www.rurdev.usda.gov/rhs/

- Public Assistance Grant Program, FEMA. The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.
  http://www.fema.gov/government/grant/pa/index.shtm

- National Flood Insurance Program, FEMA. Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements.
  http://www.fema.gov/business/nfip/

- HOME Investments Partnerships Program, HUD. Grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons.
  http://www.hud.gov/offices/cpd/affordablehousing/programs/home/

- Disaster Recovery Initiative, HUD. Grants to fund gaps in available recovery assistance after disasters (including mitigation).
  http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/driquickfacts.cfm

- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs.

http://www.fema.gov/government/grant/empg/index.shtm#0

- Partners for Fish and Wildlife, DOI – FWS. Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. http://www.fws.gov/partners/

- North American Wetland Conservation Fund, DOI-FWS. Cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats. http://www.doi.gov/partnerships/wetlands.html

- Federal Land Transfer / Federal Land to Parks Program, DOI-NPS. Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space. http://www.nps.gov/ncrc/programs/flp/flp_questions.html

- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements. http://www.nrcs.usda.gov/Programs/WRP/

- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Reauthorized for FY2008-2011, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. http://www.fs.fed.us/srs/