

# Seismic Rehabilitation Grant Program

2022 Application Training Session  
January 13, 2022

Gloria Zacharias, Business Oregon

Leanna Heiman, Oregon Department of Education

Cale Ash, Heejae Yang, Josh Sizemore & Sarah Bergquist  
Degenkolb Engineers

Ken Goettel, Goettel & Associates

# Agenda

Welcome, Agenda & Housekeeping

Gloria Zacharias

Technical Assistance Program

Leanna Heiman

OR SRGP: Background

Gloria Zacharias

Grant Application: Engineering Report

Degenkolb

Grant Application: Benefit-Cost Analysis

Ken Goettel

Other Business

Gloria Zacharias

# Housekeeping

- Please remain on Mute
- Questions at the end of each section (about every 15 slides)
- Send questions via chat
  - Please include slide number(s) associated with the question if possible

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# Technical Assistance Program's Seismic Assessment Grant

Leanna Heiman, TAP Administrator

# TAP Grant Specifics

## Grant Types:

1. Facilities Assessment
  2. Long-Range Facility Planning
  3. Seismic Assessment
  4. Environmental Hazard Assessment
- All 197 School Districts are eligible
  - Charters schools need their sponsoring district to apply
  - Application Period is every year, January 15 – February 15
  - Awards announced by March 15

# TAP Grant Eligibility & Specifics

- Seismic Assessment Grant is \$25,000
- TAP awards cost-reimbursable grants
  - Districts submit a final report and invoices for approval
- Same grant type every 4 years
  - For 2022, districts that received a Seismic grant in 2018 are eligible
- Grant period is 24 months, January 1 (Year of Award) to December 31 (Following Year)
- Pre-Award Costs are allowable back to July 1 (Previous Year)
- TAP grants can only be used for assessments

# Application Criteria

1. District has not conducted an assessment for the SRGP.
2. District's Mapped Spectral Acceleration for 1-second period ( $S_s$ ) is greater than 0.6 as determined by USGS
3. At least 50% of buildings that district wants to assess are listed as "High" or "Very High" for collapse potential according to DOGAMI's RVS data
4. District's enrollment is under 2,500 students
5. District has 25% or more of Students in Poverty
6. District has updated its facilities information to ODE's Buildings Collection by February 15



# Reporting Requirements

- Oregon Administrative Rule (OAR) 581-027-0045
- Certified by a Structural Engineer licensed in the State of Oregon
  - Districts are instructed to check ***Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) Registrant List***
- ASCE 41-17 checklists
- Schematics illustrating rehabilitation tasks
- Cost estimate with contingencies built in

# Straight from the TAP

- **Award Results by Application Period**  
posted by mid-late March

<https://www.oregon.gov/ode/schools-and-districts/grants/Pages/Technical-Assistance-Program.aspx>

**Email:** [Leanna.Heiman@ode.oregon.gov](mailto:Leanna.Heiman@ode.oregon.gov)



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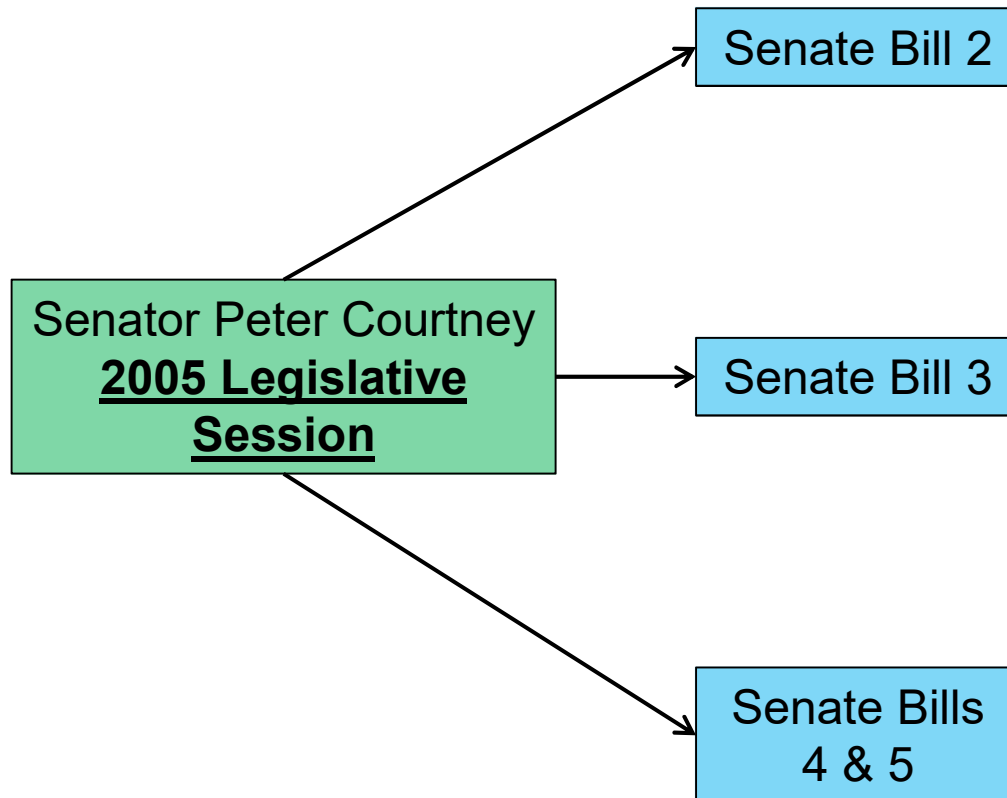
Gloria Zacharias

# Background

*Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.*

The maximum award for the seismic program is \$2.5m per building.

# Background



Requires DOGAMI to complete a statewide seismic needs assessment.

**Completed June 2007**

Provided OEM with authority to develop and implement the SRGP and establish a grant committee

Authorized the issuance of Article XI-N and XI-M bonds which provide funding for implementing the ballot measures for the seismic rehab. of school and EOCs

# Who Can Apply?

Eligible facilities include:

- ☐ Schools

- ☐ Public K-12 school districts, community colleges, or education service districts

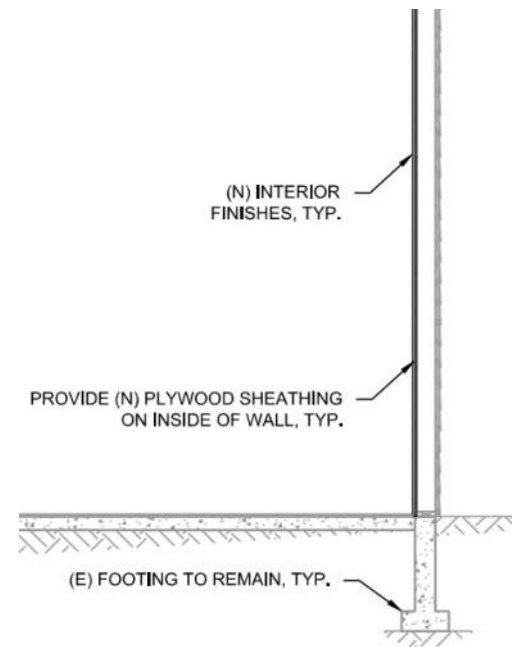
- ☐ Emergency Services Facilities

- ☐ Emphasis on first responder buildings
- ☐ Hospital buildings with acute inpatient care, fire stations, police stations, sheriff's office, 9-1-1 centers, Emergency Operations Centers (EOCs), etc.

# Eligible Activities

**Eligible** activities include:

- ❑ Structural improvements including non-structural
- ❑ Architecture and Engineering
- ❑ Project management



# Ineligible Activities

**Ineligible** activities include:

- ☐ Demolition/rebuild or new construction proposals
- ☐ Solely non-structural projects

Buildings with a mix of eligible and ineligible uses can be considered if an entity pays for the ineligible portion of the project. Eligible projects can apply for as much as \$2.5 million through the SRGP.



# Questions?

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# Oregon Seismic Rehabilitation Grant Program

## Engineering Report Requirements

Cale Ash, Heejae Yang, Josh Sizemore & Sarah Bergquist

# Engineering Report Requirements

- Introduction
- Application Procedure
- Application Evaluation
- Closing Remarks

# Engineering Report

- Primary means to communicate seismic evaluations results, retrofit concepts, and associated costs.
- Audience consists of the advisory board in addition to engineers.
- Good news: no major changes in technical requirements

# Performance Objectives

## Goal:

Schools and Emergency Response Facilities are designated as *Risk Category III* and *Risk Category IV* buildings, depending on building use, as defined by ASCE 7 and IBC and retrofitted to the corresponding Basic Performance Objective for Existing Buildings (BPOE).

### *Risk Category III:*

School buildings, other than areas intended to be used as emergency shelters, shall be categorized as Risk Category III.

### *Risk Category IV:*

Emergency service buildings and school areas that are intended to be used as emergency shelters shall be categorized as Risk Category IV.

# ASCE 41-17

**Table 2-1. Basic Performance Objective for Existing Buildings (BPOE)**

Risk Category	BSE-1E	BSE-2E
I and II	Life Safety Structural Performance	Collapse Prevention Structural Performance
	Life Safety Nonstructural Performance (3-C)	Hazards Reduced Nonstructural Performance <sup>a</sup> (5-D)
III	Damage Control Structural Performance	Limited Safety Structural Performance
	Position Retention Nonstructural Performance (2-B)	Hazards Reduced Nonstructural Performance <sup>a</sup> (4-D)
IV	Immediate Occupancy Structural Performance	Life Safety Structural Performance
	Position Retention Nonstructural Performance (1-B)	Hazards Reduced Nonstructural Performance <sup>a</sup> (3-D)

<sup>a</sup> Compliance with ASCE 7 provisions for new construction is deemed to comply.

**BSE-1E:** Basic Safety Earthquake-1 for use with the Basic Performance Objective for Existing Buildings, taken as a seismic hazard with a 20% probability of exceedance in 50 years, but not greater than the BSE-1N, at a site.

**BSE-2E:** Basic Safety Earthquake-2 for use with the Basic Performance Objective for Existing Buildings, taken as a seismic hazard with a 5% probability of exceedance in 50 years, but not greater than the BSE-2N, at a site.

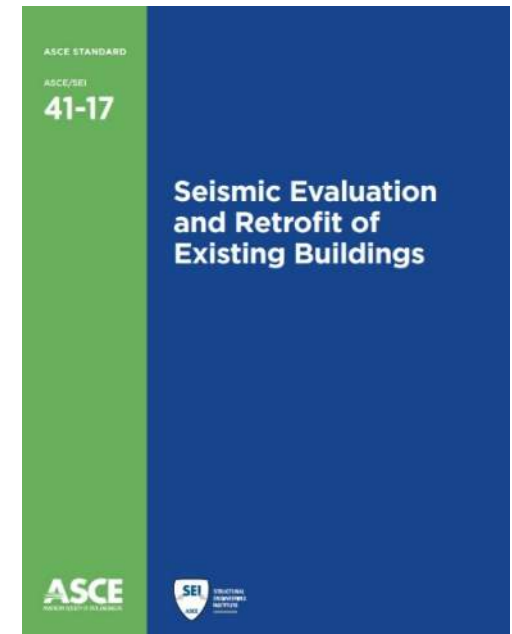
**2.3.1.1 Immediate Occupancy Structural Performance Level (S-1).** Structural Performance Level S-1, Immediate Occupancy, is defined as the postearthquake damage state in which a structure remains safe to occupy and essentially retains its preearthquake strength and stiffness. A structure in compliance with the acceptance criteria of this standard for Immediate Occupancy is expected to achieve this postearthquake state.

**2.3.1.3 Life Safety Structural Performance Level (S-3).** Structural Performance Level S-3, Life Safety, is defined as the post-earthquake damage state in which a structure has damaged components but retains a margin of safety against the onset of partial or total collapse. A structure in compliance with the acceptance criteria specified in this standard for this Structural Performance Level is expected to achieve this state.

**2.3.1.5 Collapse Prevention Structural Performance Level (S-5).** Structural Performance Level S-5, Collapse Prevention, is defined as the postearthquake damage state in which a structure has damaged components and continues to support gravity loads but retains no margin against collapse. A structure in compliance with the acceptance criteria specified in this standard for this Structural Performance Level is expected to achieve this state.

# Resources

- *ASCE Seismic Evaluation and Retrofit of Existing Buildings (ASCE 41-17)*
- Seismic Rehabilitation Grant Program (SRGP) website:
  - <http://www.orinfrastructure.org/Infrastructure-Programs/Seismic-Rehab/>
- Program Coordinator: Gloria Zacharias
- Consulting Team through Gloria





# SRGP Website

Additional resources:

**business oregon** Home About Us Programs Reports, Publications, and Plans Newsroom

Seismic Rehabilitation Grant Program

## Seismic Rehabilitation Grant Program

The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities. Click below to learn more about eligibility.

**Now Accepting Applications**

A new application round begins December 1, 2021, and closes February 28, 2022, at 5:00 pm. There will be \$55 million for school projects and \$25 million for emergency service projects. The maximum award for the seismic program is \$2.5 million per building. We encourage all school retrofits to be designed as Risk Category IV building. However, at a minimum, school projects must design the retrofit as Risk Category III building unless the project is for a shelter which then must be designed as Risk Category IV building. All emergency service building projects must design the retrofit as Risk Category IV building in order to be eligible for a grant. Our goal is to announce awards by the end of May 2022.

Please email Gloria Zacharias or call (503) 986-0132 if you have any questions or need further information.

**Contact**  
Gloria Zacharias  
Seismic Program & Policy Coordinator  
503-986-0132

**Subscribe for our email updates**

### Additional Resources

**Authority**  
ORS 782  
OAR 123-051

**Application and Guides**  
Applications accepted until 5 pm, Feb. 28, 2022

- Application Guidance Packet
- Steps for Successful Application
- Common Errors to Avoid
- User Guide
- User Guide Appendices
- Benefit Cost Analysis Worksheet
- What is BCA?
- Engineering Reporting Guidance
- ASCE 41-17 Implementation Guidance
- SRGP Application

**The Projects**

### Who is Eligible?

### What Activities are Eligible?

### What is the Application Process?

SRGP requires that school facilities be retrofitted to risk category III and emergency services to risk category IV standards as defined by the ASCE.

- Risk Category III** means that the building has enhanced safety structural performance level between life safety and immediate occupancy structural performance level.
- Risk Category IV** means that the building has immediate occupancy structural performance level and that not only will the building remain standing after an earthquake (BSE-1E) but emergency services will be able to continue to operate and provide services.

November 30, 2021

**business oregon**  
Seismic Rehabilitation Grant Program Applications  
Guidance for Engineering Reports

November 30, 2021

# Engineering Report Requirements

- Introduction
- Application Procedure
- Application Evaluation
- Closing Remarks

# Application Procedure

A complete application includes:

- ☐ Seismic Rehabilitation Grant Program Application
- ☐ Preliminary Engineering Report or Assessment
- ☐ Cost estimate
- ☐ Benefit-cost analysis (BCA) – *Later session*
- ☐ Photos of the buildings proposed for rehabilitation
- ☐ RVS Seismic Needs Assessment

# Application Procedure

A complete application includes:

- ☐ Seismic Rehabilitation Grant Program Application
- ☐ Preliminary Engineering Report or Assessment
- ☐ Cost estimate
- ☐ Benefit-cost analysis (BCA) – *Later session*
- ☐ Photos of the buildings proposed for rehabilitation
- ☐ RVS Seismic Needs Assessment

# Preliminary engineering report

Evaluation of existing building  
to identify deficiencies



Preliminary retrofit concept that  
addresses deficiencies



Cost estimate for retrofit  
concepts

*Per ASCE 41-17 Tier 1 or  
Tier 2 evaluation procedure*

*Provide schematic drawings  
and list of retrofit concepts  
(includes both structural and  
non-structural)*

*Cost estimate must include all  
parts of retrofit concept*

# Mandatory Information

1. Engineering Report Cover Page
2. Project Summary Page
3. Engineering Report Checklist

Applications that do not include the above information will not be eligible for funding under the Seismic Rehabilitation Grant Program.

# Engineering Report Cover Page

Include the following information on the cover page:

- District name, school name and school address
- Engineering firm name, address and telephone number
- Names of engineer(s) who prepared the report and e-mail address(es) for communications during review of the application

# Project Summary Page

**Project Summary Template (Mandatory):**

Project Summary Information						
Building Part	Building Part Name	Included in Retrofit	Year Built	Building Type***	Nonstructural Retrofits Included in Scope Y/N***	Previous Seismic Retrofit Y/N*** (Year if Yes)
A	Library	Y	1955	W2	Y	N
B	Classrooms	Y	1955	W2	Y	N
C	Music Room	N	2005			N
D	Gym	N	1999			N
E	Classrooms	Y	1939	W2	Y	Y (1989)

\*\*\* Entries required **ONLY** for building parts included in proposed seismic retrofit

Nonstructural deficiencies posing life safety risk **MUST** be included in the scope of work and budget.

Seismic fragility inputs for existing buildings with previous seismic retrofits **MUST** be adjusted to reflect previous seismic retrofit measures completed for a building part.

Total Retrofit Cost	\$1,456,789
Retrofit Square Feet	15,678
Retrofit Cost per Square Foot	\$92.92
Is the campus within a tsunami, FEMA flood zone, landslide/slope instability, liquefaction potential or other high hazard area?	<b>If so, provide documentation (e.g. the Oregon Statewide Hazards Viewer by DOGAMI).</b>



# Engineering Report Checklist

Engineering Report Checklist		
<input type="checkbox"/>	Engineering Report Cover Page	
<input type="checkbox"/>	Project Summary Page	Page
<input type="checkbox"/>	Building Parts Identification	Page
<input type="checkbox"/>	Statement of the Performance Objective	Page
<input type="checkbox"/>	Summary of Deficiencies	Page
<input type="checkbox"/>	Structural Seismic Deficiencies	Page
<input type="checkbox"/>	Nonstructural Seismic Deficiencies	Page
<input type="checkbox"/>	Summary of Mitigation/Retrofit	Page
<input type="checkbox"/>	Structural Mitigation/Retrofit	Page
<input type="checkbox"/>	Nonstructural Mitigation/Retrofit	Page
<input type="checkbox"/>	Summary Construction Cost Estimate	Page
<input type="checkbox"/>	Direct Cost	Page
<input type="checkbox"/>	Indirect Soft Cost	Page
<input type="checkbox"/>	Certification Statement by Engineer	Page
<input type="checkbox"/>	ASCE 41-17 Tier 1 Checklist	Page
<input type="checkbox"/>	Basic Configuration Checklist	Page
<input type="checkbox"/>	Building System Structural Checklist	Page
<input type="checkbox"/>	Nonstructural Checklist	Page
<input type="checkbox"/>	Retrofit Drawings & Sketches	Page
<input type="checkbox"/>	DOGAMI or Geotechnical Report	Page
<input type="checkbox"/>	Itemized Construction Cost Estimate	Page

# Performance Objectives (RC III)

SRGP required performance objectives differ for RC III and RC IV structures.

- ☐ RC III Structures
  - ☐ School buildings (other than areas which may be used as emergency shelter)
- ☐ RC III Structural Performance Objectives
  - ☐ **BSE-1E:** not explicitly evaluated (ASCE 41-17 Table 2-2 footnote a); therefore, IO Structural Checklists are not required.
  - ☐ **BSE-2E:** Tier 1 checklists shall be based on the *Collapse Prevention Performance Level* (S-5), except that checklist statements using Quick Check procedures of Section 4.4.3 shall be based on  $M_s$  factors taken as the average of the values for Life Safety and Collapse Prevention (ASCE 41-17 table 2-2 footnote c)
- ☐ RC III Non-Structural Performance Objectives
  - ☐ **BSE-1E:** Position Retention (N-B)
  - ☐ **BSE-2E:** Hazards Reduced (N-D)
  - ☐ A single Tier 1 Nonstructural checklist is completed for the combinations of Performance Levels and Seismicity Levels.

**Table 2-2. Scope of Assessment Required for Tier 1 and Tier 2 with the Basic Performance Objective for Existing Buildings (BPOE)**

Risk Category	Tier 1 and 2 <sup>a</sup>	
	BSE-1E	BSE-2E
I and II	Not evaluated	Collapse Prevention Structural Performance
	Life Safety Nonstructural Performance (3-C)	Hazards Reduced Nonstructural Performance <sup>b</sup> (5-D)
III	Not evaluated	Limited Safety Structural Performance <sup>c</sup>
	Position Retention Nonstructural Performance (2-B)	Hazards Reduced Nonstructural Performance <sup>b</sup> (4-D)
IV	Immediate Occupancy Structural Performance	Life Safety Structural Performance <sup>d</sup>
	Position Retention Nonstructural Performance (1-B)	Hazards Reduced Nonstructural Performance <sup>b</sup> (3-D)

<sup>a</sup> For Tier 1 and 2 assessments of Risk Categories I–III, Structural Performance for the BSE-1E is not explicitly evaluated.

<sup>b</sup> Compliance with ASCE 7 provisions for new construction is deemed to comply.

<sup>c</sup> For Risk Category III, the Tier 1 screening checklists shall be based on the Collapse Prevention Performance Level (S-5), except that checklist statements using the Quick Check procedures of Section 4.4.3 shall be based on  $M_s$  factors taken as the average of the values for Life Safety and Collapse Prevention.

<sup>d</sup> For Risk Category IV, the Tier 1 screening checklists shall be based on the Collapse Prevention Performance Level (S-5), except that checklist statements using the Quick Check procedures of Section 4.4.3 shall be based on  $M_s$  factors for Life Safety.

# Performance Objectives (RC IV)

SRGP required performance objectives differ for RC III and RC IV structures.

- ❑ RC IV Structures
  - ❑ Emergency service buildings and School areas that may be used as emergency shelter
- ❑ RC IV Structural Performance Objectives
  - ❑ **BSE-1E:** Tier 1 checklists shall be based on the *Immediate Occupancy Performance Level (S-1)*; therefore, IO Structural Checklists are required.
  - ❑ **BSE-2E:** Tier 1 checklists shall be based on the *Collapse Prevention Performance Level (S-5)*, except that checklist statements using Quick Check procedures of Section 4.4.3 shall be based on  $M_s$  factors taken for Life Safety (ASCE 41-17 table 2-2 footnote d)
- ❑ RC IV Non-Structural Performance Objectives
  - ❑ **BSE-1E:** Position Retention (N-B)
  - ❑ **BSE-2E:** Hazards Reduced (N-D)
  - ❑ A single Tier 1 Nonstructural checklist is completed for the combinations of Performance Levels and Seismicity Levels.

**Table 2-2. Scope of Assessment Required for Tier 1 and Tier 2 with the Basic Performance Objective for Existing Buildings (BPOE)**

Risk Category	Tier 1 and 2 <sup>a</sup>	
	BSE-1E	BSE-2E
I and II	Not evaluated	Collapse Prevention Structural Performance
	Life Safety Nonstructural Performance (3-C)	Hazards Reduced Nonstructural Performance <sup>b</sup> (5-D)
III	Not evaluated	Limited Safety Structural Performance <sup>c</sup>
	Position Retention Nonstructural Performance (2-B)	Hazards Reduced Nonstructural Performance <sup>b</sup> (4-D)
IV	Immediate Occupancy Structural Performance	Life Safety Structural Performance <sup>d</sup>
	Position Retention Nonstructural Performance (1-B)	Hazards Reduced Nonstructural Performance <sup>b</sup> (3-D)

<sup>a</sup> For Tier 1 and 2 assessments of Risk Categories I–III, Structural Performance for the BSE-1E is not explicitly evaluated.

<sup>b</sup> Compliance with ASCE 7 provisions for new construction is deemed to comply.

<sup>c</sup> For Risk Category III, the Tier 1 screening checklists shall be based on the Collapse Prevention Performance Level (S-5), except that checklist statements using the Quick Check procedures of Section 4.4.3 shall be based on  $M_s$  factors taken as the average of the values for Life Safety and Collapse Prevention.

<sup>d</sup> For Risk Category IV, the Tier 1 screening checklists shall be based on the Collapse Prevention Performance Level (S-5), except that checklist statements using the Quick Check procedures of Section 4.4.3 shall be based on  $M_s$  factors for Life Safety.

# ASCE 41 - Tier 3 Procedure

- ASCE 41-17 limits the use of Tier 1 & 2 procedure
- Notable Limitations:
  - Precast Concrete Frames
  - URMs

Only at S-1 (IO) structural performance level, Moderate or High Seismicity

Table 3-4. Limitations on the Use of the Tier 1 and Tier 2 Procedures

Common Building Type <sup>a</sup>	Number of Stories <sup>b</sup> beyond which the Tier 3 Systematic Procedures Are Required							
	Level of Seismicity							
	Very Low		Low		Moderate		High	
	S-5	S-1	S-5	S-1	S-5	S-1	S-5	S-1
<b>Wood Frames</b>								
Light (W1)	NL	NL	NL	4	4	4	4	4
Multistory, multiunit residential (W1a)	NL	NL	NL	6	6	6	6	4
Commercial and industrial (W2)	NL	NL	NL	6	6	6	6	4
<b>Steel Moment Frames</b>								
Rigid diaphragm (S1)	NL	NL	NL	12	12	8	8	6
Flexible diaphragm (S1a)	NL	NL	NL	12	12	8	8	6
<b>Steel Braced Frames</b>								
Rigid diaphragm (S2)	NL	NL	NL	8	8	8	8	6
Flexible diaphragm (S2a)	NL	NL	NL	8	8	8	8	6
<b>Metal Building Frames (S3)</b>								
Dual Systems with Backup Steel Moment Frames (S4)	NL	NL	NL	12	12	8	8	6
<b>Steel Frames with Infill Masonry Shear Walls</b>								
Rigid diaphragm (S5)	NL	NL	NL	12	12	8	8	4
Flexible diaphragm (S5a)	NL	NL	NL	12	12	8	8	4
<b>Steel Plate Shear Wall (S6)</b>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>
<b>Cold-Formed Steel Light-Frame Construction</b>								
Shear wall system (CFS1)	NL	NL	NL	6	6	6	6	4
Strap-braced wall system (CFS2)	NL	NL	NL	6	6	6	6	4
<b>Concrete Moment Frames (C1)</b>								
<b>Concrete Shear Walls</b>								
Rigid diaphragm (C2)	NL	NL	NL	12	12	8	8	6
Flexible diaphragm (C2a)	NL	NL	NL	12	12	8	8	6
<b>Concrete Frame with Infill Masonry Shear Walls</b>								
Rigid diaphragm (C3)	NL	NL	NL	12	12	8	8	4
Flexible diaphragm (C3a)	NL	NL	NL	12	12	8	8	4
<b>Precast or Tilt-Up Concrete Shear Walls</b>								
Flexible diaphragm (PC1)	NL	NL	3	2	2	2	2	2
Rigid diaphragm (PC1a)	NL	NL	3	2	2	2	2	2
<b>Precast Concrete Frames</b>								
With shear walls (PC2)	NL	NL	NL	6	6	NP	4	NP
Without shear walls (PC2a)	NL	NL	NL	6	6	NP	4	NP
<b>Reinforced Masonry Bearing Walls</b>								
Flexible diaphragm (RM1)	NL	NL	NL	8	8	8	8	6
Rigid diaphragm (RM2)	NL	NL	NL	8	8	8	8	6
<b>Unreinforced Masonry Bearing Walls</b>								
Flexible diaphragm (URM)	NL	NL	6	4	6	NP	4	NP
Rigid diaphragm (URMa)	NL	NL	6	4	6	NP	4	NP
<b>Seismic Isolation or Passive Dissipation</b>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>	NP <sup>c</sup>

Note: The Tier 3 systematic procedures are required for buildings with more than the number of stories listed herein.

<sup>a</sup> Common building types are defined in Section 3.2.1.

<sup>b</sup> Number of stories shall be considered as the number of stories above lowest adjacent grade.

NL = No Limit (No limit on the number of stories).

NP = Not Permitted (Tier 3 systematic procedures are required).

<sup>c</sup> No deficiency-based procedures exist for these building types. If they do not meet the Benchmark Building requirements, Tier 3 systematic procedures are required.

# Tier 3

- Tier 3 is not required for the SRGP application.
- Applicants should anticipate that Tier 3 will be required if the project is funded and moves forward with the retrofit.
- Retrofit concept and cost estimate should account for any additional retrofit scope required due to Tier 3 procedure.

# Under-Reinforced RM

- ASCE41 A.3.2.4.2
- URM checklists required for under-reinforced RM buildings.

*A.3.2.4.2 REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in.; And All Vertical Bars Extend to The top of The Walls. If the walls do not have sufficient reinforcing steel, they have limited capacity in resisting seismic forces. The wall also behaves in a nonductile manner for inelastic forces.*

Nondestructive methods should be used to locate reinforcement, and selective demolition should be used if necessary to determine the size and spacing of the reinforcing. If it cannot be verified that the wall is reinforced in accordance with the minimum requirements, then the wall should be assumed to be unreinforced and the procedures for unreinforced masonry (URM) should be followed.

# Geological Hazards

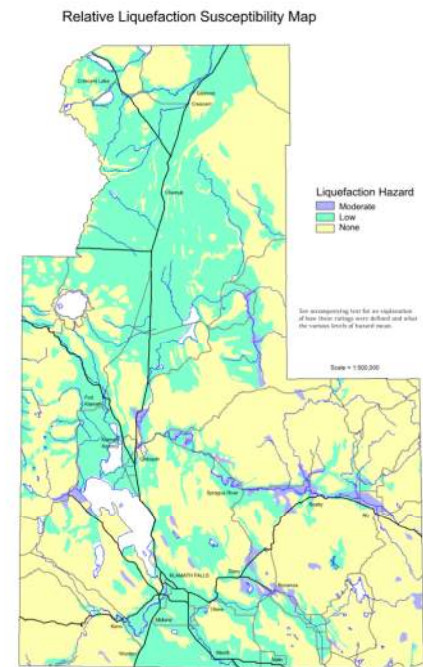
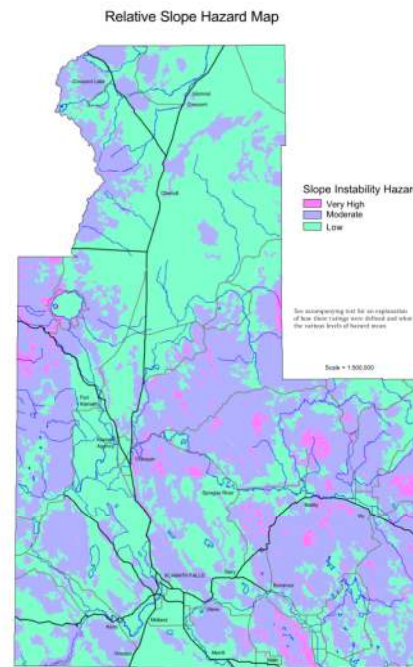
- DOGAMI or a Geotechnical report must be used to identify geological site hazards, including tsunami, FEMA flood zone, landslide/slope instability, and liquefaction.
- If checked unknown(Tier 1) and no engineering judgement is provided, then they should be treated as deficiencies and retrofit concepts & costs should be provided.

## Geologic Site Hazards

C	NC	N/A	U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)
C	NC	N/A	U	SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)
C	NC	N/A	U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)

# Geological Hazards

- Geotechnical Report
- DOGAMI Resources:
  - Interpretive Map Series
- USGS Resources
- PNSN Resources
- Others?





# Adjacent Buildings

- If ADJACENT BUILDINGS statement listed under Building System-General of Basic Configuration Checklist is marked noncompliant and seismic jointing is provided as a corresponding mitigation plan, the following details shall be included in the retrofit scope and cost estimates:
  - New gravity load path if the retrofit jointing interrupts an existing horizontal load path to shared vertical gravity elements and requires new vertical elements.
  - New lateral load path if the jointing interrupts an existing diaphragm load path to shared vertical lateral elements and potentially requires new vertical elements, strengthening of existing lateral systems, including both vertical and diaphragm components.
  - Any required mitigation resulting from the jointing shall be included in the retrofit scope, even if the mitigation is to occur on the side of the joint that is not a part of the scope building/area. If a seismic joint is proposed as a retrofit scope, but no detailed mitigation plans are included in the engineering report, then the engineering report will be considered missing a critical retrofit scope.

# Cost Estimate

Cost estimates should always provide as much detail as possible and clearly demonstrate how each proposed scope of work item is included.

The cost estimate should include the following:

- ☐ Project and construction management
- ☐ A/E Design Fees
- ☐ Asbestos abatement (if needed)
- ☐ Testing
- ☐ Permitting
- ☐ Construction and labor
- ☐ Relocation and/or temporary space
- ☐ Contingencies for all budget categories

# Application Procedure

A complete application includes:

- ☐ Preliminary engineering report or assessment
- ☐ Cost estimate
- ☐ Benefit-cost analysis (BCA) – Later session
- ☐ Photos of the buildings proposed for rehabilitation
- ☐ RVS Seismic Needs Assessment

# Photos of the Buildings

Photos are required for each building part included in the proposed seismic retrofit.



*Site map and building part key.*



*Building part A entrance*

# RVS Assessment

RVS reports completed in 2006 can be downloaded online at: <https://www.oregongeology.org/rvs/reports.htm>

Verify the database identified building type matches the structural system

- ☐ Confirm the presence of structural irregularities per the 3<sup>rd</sup> edition of the RVS handbook including:
  - ☐ Severe vertical
  - ☐ Moderate vertical
  - ☐ Plan (horizontal)
- ☐ The 2006 RVS values may include incorrect building types
  - ☐ Revise if significant errors found
- ☐ RVS 3<sup>rd</sup> Edition Level 1 is OK for use.

Seismicity Zone: High										
FEMA 154 Rapid Visual Screening Score Card										
	Type	Basic Score	Vert Irreg	Plan Irreg	Pre-Code	Post-Bench	Soil C	Soil D	Soil E	RVS Score
Primary	C2	2.8	-1	-0.5	0	0	-0.4	0	0	0.9
Secondary	RM1	2.8	-1	-0.5	0	0	-0.4	0	0	0.9
Tertiary		0	0	0	0	0	0	0	0	0

Floyd Light Middle School	
Final RVS Score	
Final Type	Final Score
C2	0.9
FEMA-154 Collapse Potential	
High (>10%)	

# Questions?

# Engineering Report Requirements

- Introduction
- Application Procedure
- Application Evaluation
- Closing Remarks

# Evaluation of Applications

Applications are evaluated as a whole by the grant committee and ranked based on:

- ☐ BCA score
- ☐ Project Readiness – based on staff, resources, and project management planning
- ☐ Scope of work
- ☐ Financial feasibility to enhance the project outcome
- ☐ Match between proposed project and other community-wide mitigation and preparedness efforts
- ☐ Building importance within the community it serves



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- ☐ BCA score
- ☐ Project Readiness – based on staff, resources, and project management planning
- ☒ Scope of work
- ☐ Financial feasibility to enhance the project outcome.
- ☐ Match between proposed project and other community-wide mitigation and preparedness efforts.
- ☐ Building importance within the community it serves.

# Scope of Work – What do we look for?

- ☐ Do the engineers have a preliminary understanding of the building?
- ☐ Are all the identified deficiencies addressed in the retrofit concept?
- ☐ Are all items in the retrofit concept addressed in the cost estimate?
- ☐ Does the cost estimate seem reasonable for the scope of work indicated?
- ☐ Are superfluous items included in the cost estimate?

# What do we look for?

- ☐ Do the engineers have a preliminary understanding of the building?
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- ☐ Are superfluous items included in the cost estimate?

# What do we look for?

☐ Do the engineers have a preliminary understanding of the building?

- ➡ Have the engineers made a site visit to examine existing conditions?
- ➡ Have the engineers filled out the Tier 1 checklists?
- ➡ Are checklists filled out with everything marked as “unknown”?



# What do we look for?

- ❑ Do the engineers have a preliminary understanding of the building?

## Structural Seismic Deficiencies

#	Deficiency/unknown	Description
1	Load Path	There does not appear to be sufficient blocking to tie the roof diaphragm to shear walls.
2	Shear Stress Check	Let in braced timber frame walls have an estimated shear stress of 420plf. This is less than the target value of 100plf. Therefore walls fail the shear stress check.
3	Openings	There are walls which have openings greater than 80% of the length which are insufficiently tied to adjacent construction.
4	Roof Chord Continuity	There do not appear to be sufficient tension chord elements
5	Diagonally sheathed and unblocked diaphragms	The gymnasium diaphragms have spans greater than 40ft. Further analysis should deem this roof acceptable.
6	Wood Sill Bolts	There was no information available regarding sill bolt spacing.

# What do we look for?

- ☐ Do the engineers have a preliminary understanding of the building?
- ☒ Are all the identified deficiencies addressed in the retrofit concept?
- ☐ Are all items in the retrofit concept addressed in the cost estimate?
- ☐ Does the cost estimate seem reasonable for the scope of work indicated?
- ☐ Are superfluous items included in the cost estimate?

# What do we look for?

- ❑ Are all the identified deficiencies addressed in the retrofit concept?

ASCE 41-13 Tier 1 Checklist Deficiency	Retrofit	
	Scope	Cost
ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4 percent of the height of the shorter building. This statement shall not apply to the following building types: W1, W1A, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	Develop seismic gap between gymnasium building and classroom building (see SSK-001)	<i>Dollar amount Or Line item in cost estimate</i>
STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.1)	Install plywood sheathing on gymnasium roof (see SSK-002).	<i>Dollar amount Or Line item in cost estimate</i>

**\*\* This includes non-structural deficiencies!\*\***

# What do we look for?

- ☐ Do the engineers have a preliminary understanding of the building?
- ☐ Are all the identified deficiencies addressed in the retrofit concept?
- ☒ Are all items in the retrofit concept addressed in the cost estimate?
- ☐ Does the cost estimate seem reasonable for the scope of work indicated?
- ☐ Are superfluous items included in the cost estimate?



# What do we look for?

- ❑ Are all items in the retrofit concept addressed in the cost estimate?

<b>work task # 4</b>			
cut & remove roofing & insulation	470	lf	
weather protect	470	lf	2.50 1,175
haul & disposal	940	sf	0.50 470
install strapping	1	sum	235.00 235
roof insulation	470	lf	8.00 3,760
roofing	940	sf	3.00 2,820
protect / clean-up / misc. support / ladders	940	sf	10.00 9,400
Sub-total	470	lf	6.00 2,820
	45,920	sf	0.45 /sf \$20,680
<b>work task # 5 - dtl SK03</b>			
remove 2' ceiling	490	lf	
add new 2 x blocking	490	lf	2.75 1,348
A35 clips @ 12" oc top & bottom	490	lf	6.25 3,063
remove / reinstall cabinets / shelving	980	ea	1.50 1,470
cut access holes for new sill ab @ 48" oc	123	lf	35.00 4,288
drill @ epoxy ab @ 48" oc	123	ea	20.00 2,460
patch holes	123	ea	35.00 4,305
finish to match	123	ea	30.00 3,690
reinstall ceiling	490	lf	3.50 1,715
cleanup / protect existing	490	lf	5.00 2,450
Sub-total	490	lf	10.00 4,900
	45,920	sf	0.65 /sf \$29,689

*Costs clearly broken down by scope of work task*

# What do we look for?

- ☐ Do the engineers have a preliminary understanding of the building?
- ☐ Are all the identified deficiencies addressed in the retrofit concept?
- ☐ Are all items in the retrofit concept addressed in the cost estimate?
- ☒ Does the cost estimate seem reasonable for the scope of work indicated?
- ☐ Are superfluous items included in the cost estimate?

# What do we look for?

- ☐ Does the cost estimate seem reasonable for the scope of work indicated?

If cost estimate is too low ...

Districts may not be able to fund the project themselves when it goes forward

# What do we look for?

- ☐ Do the engineers have a preliminary understanding of the building?
- ☐ Are all the identified deficiencies addressed in the retrofit concept?
- ☐ Are all items in the retrofit concept addressed in the cost estimate?
- ☐ Does the cost estimate seem reasonable for the scope of work indicated?
- ☒ Are superfluous items included in the cost estimate?

# What do we look for?

- ☐ Are superfluous items included in the cost estimate?

***Only items associated with seismic retrofit should be in the cost estimate! Do not include:***



# Questions?

# Engineering Report Requirements

- Introduction
- Application Procedure
- Application Evaluation
- Closing Remarks

# Common issues – Evaluation

- ❑ Failure to clearly identify which deficiencies applied to which building part
- ❑ Non-structural deficiencies not evaluated
- ❑ Too many items marked as “unknown” within Tier 1 checklists and not addressed as potential deficiencies
- ❑ Previous retrofit work not mentioned
- ❑ Omission of Tier 1 checklists from the report
  - ❑ Multiple Tier checklists may be required for a given building part, because of horizontal and vertical combinations of multiple LFRS types
- ❑ Performance not checked at BSE-1E and 2E levels or improper Ms factors used



# Common issues – Scope

- ☐ Identified deficiencies within Tier 1 checklist not clearly addressed in retrofit scope of work (structural and non-structural)
- ☐ Omission of retrofits for identified nonstructural seismic deficiencies
- ☐ Failure to clearly identify which building parts were included in proposed retrofit
- ☐ Some scope of work omitted due to cost or complexity

# Common issues – Cost Estimate

- ☐ Incomplete or does not clearly address full scope of work identified within the report
- ☐ Large lump sum estimates not broken down by item or scope of work task
- ☐ Includes items not associated with seismic retrofit
- ☐ Cost estimate/sq. ft. is low for scope of work

# What is a successful application?

- ☐ Engineering report has clear statements of major deficiencies and scope of work
- ☐ Identify if building is more vulnerable than a typical building of this type and age
- ☐ Major deficiencies addressed within cost estimate so that enough grant money is requested
- ☐ School district is able to have enough resources from grant and local funding to complete rehabilitation

# Feedback Memos

- Degenkolb Engineers will provide feedback on engineering reports with technical or scope concerns.
- These memos:
  - Will identify the omitted or incomplete items that may have resulted in the applications being scored lower than others
  - Will provide recommendations on addressing the noted issues and on improving the clarity of the report in order to assist delivering a more successful application.

**Degenkolb Engineers**  
400 University Street, Suite 1200  
Seattle, WA 98101  
Phone: 206.262.9240  
Fax: 206.262.9240

**Memorandum**

To: [Redacted] Job: Oregon Science Rehabilitation Grant  
From: Cale Ash Job Number: 201616015.00  
Subject: Engineering Report & Cost Estimate Feedback

**Report:**  
This memo is intended to summarize our evaluation of the engineering report included with the seismic rehabilitation grant application for Pilar Rock School District - Pilar Rock Elementary. This memo also contains suggestions for improvements to the report to be included with the application for the future submission.

One of the critical evaluation criteria for a successful application is based on the clearly defined and complete scope of work. Per Oregon SRGP website, a successful application shall include an engineering report and cost estimate that must be detailed and describe both the identified building deficiencies and the corresponding improvements. This should correlate directly to the preliminary engineering report. If the seismic rehabilitation work is part of a larger building improvement project, that should be identified as well. There are other resources available at the OR SRGP website related to report guidance and steps for a successful application. ([Click for Successful Application and Engineering Reporting Guidelines](#)) In addition to the online resources, there will be an in-person training workshop in Portland on June 20, 2018.

Degenkolb, working in cooperation with Gertel & Associates as consultants to OR SRGP, reviewed the engineering report and cost estimate with the focus on the following criteria:

- The engineering report contains complete and appropriate ASCE 41-13 Tier 1 checklist.
  - L/S/O Basic Configuration Checklist
  - L/S/O Safety Structural Checklist
  - Nonstructural Checklist
- The engineering report clearly identifies seismic deficiencies and corresponding retrofit measures and lists all of them in the narrative.
  - All identified structural deficiencies are addressed in the scope of work.
  - All identified nonstructural deficiencies are addressed in the scope of work.

**Sign:** Cale Ash, Hui Jue Yang, Josh Sizemore  
**Copies to:** [Redacted]

Any engineering report questions regarding this memo should be directed to Cale Ash or Hui Jue Yang at Degenkolb Engineers. Cale and Hui Jue may be reached via email at [cale@degenkolb.com](mailto:cale@degenkolb.com) and [huijue@degenkolb.com](mailto:huijue@degenkolb.com), respectively, or by phone at 206.262.9240.

**Sign:** Cale Ash, Hui Jue Yang, Josh Sizemore  
**Copies to:** [Redacted]

# Summary Letter

- Once the project is completed, EOR is to provide a summary letter to SGRP stating the following:
  - The retrofitted building meets the building performance objective as required by SGRP
  - The building is constructed in compliance with all applicable local and state codes, statutes, and regulations.

# Final Remarks

- Read all guidance on SRGP website
- Use Engineering Report Checklist
- Contact SRGP for questions



## Contact

Gloria Zacharias

Seismic Program & Policy  
Coordinator

503-986-0132

## Application and Guides

Applications accepted until 5 pm,  
Feb. 28, 2022

- Application Guidance Packet
- Steps for Successful Application
- Common Errors to Avoid
- User Guide
- User Guide Appendices
- Benefit Cost Analysis Worksheet
- What is BCA?
- Engineering Reporting Guidance
- ASCE 41-17 Implementation Guidance
- SRGP Application

## 3. Engineering Report Checklist

Include the checklist below, with all the boxes checked indicating that all required information is provided in the report, on the third page of the engineering report. The table below is an editable Word Table that can be copied and pasted into the engineering report.

Engineering Report Checklist		
<input type="checkbox"/>	Engineering Report Cover Page	
<input type="checkbox"/>	Project Summary Page	Page
<input type="checkbox"/>	Building Parts Identification	Page
<input type="checkbox"/>	Statement of the Performance Objective	Page
<input type="checkbox"/>	Summary of Deficiencies	Page
<input type="checkbox"/>	Structural Seismic Deficiencies	Page
<input type="checkbox"/>	Nonstructural Seismic Deficiencies	Page
<input type="checkbox"/>	Summary of Mitigation/Retrofit	Page
<input type="checkbox"/>	Structural Mitigation/Retrofit	Page
<input type="checkbox"/>	Nonstructural Mitigation/Retrofit	Page
<input type="checkbox"/>	Summary Construction Cost Estimate	Page
<input type="checkbox"/>	Direct Cost	Page
<input type="checkbox"/>	Indirect Soft Cost	Page
<input type="checkbox"/>	Certification Statement by Engineer	Page
<input type="checkbox"/>	ASCE 41-17 Tier 1 Checklist	Page
<input type="checkbox"/>	Basic Configuration Checklist	Page
<input type="checkbox"/>	Building System Structural Checklist	Page
<input type="checkbox"/>	Nonstructural Checklist	Page
<input type="checkbox"/>	Retrofit Drawings & Sketches	Page
<input type="checkbox"/>	DOGAMI or Geotechnical Report	Page
<input type="checkbox"/>	Itemized Construction Cost Estimate	Page

# Questions?

# Agenda

Welcome, Agenda & Housekeeping

Gloria Zacharias

Technical Assistance Program

Leanna Heiman

OR SRGP: Background

Gloria Zacharias

Grant Application: Engineering Report

Degenkolb

**Grant Application: Benefit-Cost Analysis**

**Ken Goettel**

Other Business

Gloria Zacharias



# Oregon Seismic Rehabilitation Grant Program Workshop Benefit-Cost Analysis

Introductory Guidance  
January 13, 2022

# What is Benefit-Cost Analysis?

- Benefit-cost analysis compares the net present value of the estimated reduction in average annual damages, losses and monetized casualties to the cost of a seismic retrofit.

# What is the BCR?

- The benefit-cost ratio is the net present value of the reduction in damages, losses and casualties divided by the cost of the retrofit.
- The net present value takes into account the time value of money by using a “discount” rate for future damages and losses.

# SRGP Grant Eligibility

- A seismic retrofit with a BCR  $< 1.0$  may be funded by the SRGP.
- However, the probability of grant award is likely lower than that for retrofits with a higher BCR.
- The SRGP program takes into account other factors including level of life safety risk and geographic diversity.



# Hazard + Exposure = Risk

## HAZARD

Frequency  
and Severity  
of Hazard Events

+

## EXPOSURE

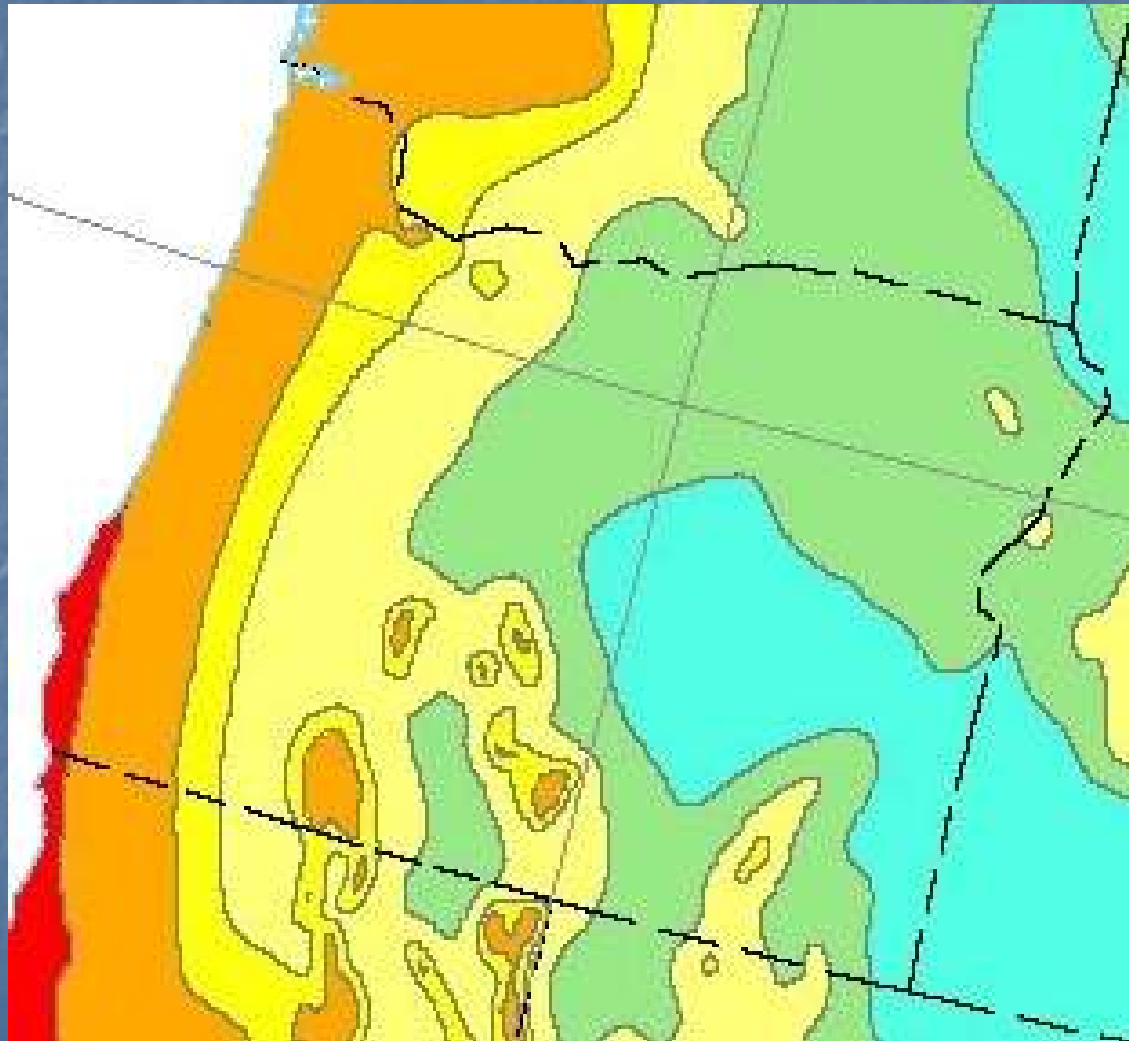
Value and  
Vulnerability of  
Inventory

=

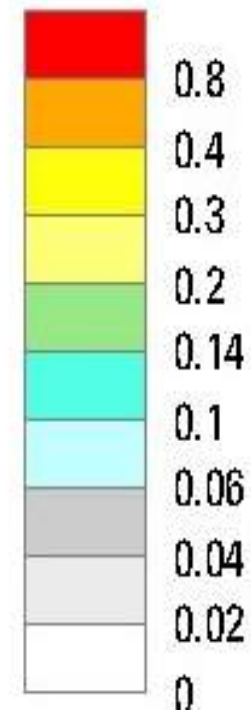
## RISK

Threat to the  
Community:  
People, Buildings  
and Infrastructure

# USGS 2014 PGA 2% in 50 Years



**Peak acceleration, expressed as  
a fraction of standard gravity (g)**



# The BCR Depends on Several Factors

- The level of seismic hazard which depends on location and Site Class
- The vulnerability (fragility) of the building
- The cost of the seismic retrofit, and
- Several economic factors for the building.

# Building Economic Factors

- Building replacement value,
- Historical value,
- Contents replacement value,
- Occupancy, and
- Annual operating budget, which is a proxy for the value of services



# BCR Trends

**Given two identical buildings, with identical retrofit schemes and identical economic parameters in different locations, the building in the higher seismic location will always have a higher benefit-cost ratio.**

# However...

A building in a high seismic hazard area may have a low BCR if:

- The seismic vulnerabilities are minor,
- The retrofit cost/SF is high,
- The building and contents replacement values are low, and
- The 24/7365 average occupancy is low.

# Conversely...

A building in a low seismic hazard area may have a relatively high BCR if:

- The seismic vulnerabilities are profound,
- The retrofit cost/SF is relatively low,
- The building and contents replacement values are high, and
- The 24/7365 average occupancy is high.

# Fatal Errors to Avoid

The BCA Tool has many default (standard) values built to the software.

User can change any or all of these values.

However, clear justification of the basis for changing default values **MUST** be provided.



# BCA and Grant Guidance

**There are nine (9) available guidance documents:**

- **Application Guidance Package,**
- **Key Steps for Successful Applications,**
- **Common Errors to Avoid,**
- **User's Guide (Benefit-Cost Analysis),**
- **User's Guide Appendices (Technical Information)**

# BCA and Grant Guidance

## Continued...

- Memo: What is Benefit-Cost Analysis?
- PowerPoint presentations from this workshop:
  - Engineering Issues, and
  - Benefit-Cost Issues.

# SUGGESTIONS

- Thoroughly review ALL of the guidance documentation.
- Failure to heed the above guidance may be **fatal** to your grant application.
- Complete the engineering evaluations, the application and the BCA as early as possible.
- If in doubt about anything ask questions and get clarifications well before the grant application deadline.

**QUESTIONS?**



# Agenda

Welcome, Agenda & Housekeeping

Gloria Zacharias

Technical Assistance Program

Leanna Heiman

OR SRGP: Background

Gloria Zacharias

Grant Application: Engineering Report

Degenkolb

Grant Application: Benefit-Cost Analysis

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