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Seismic Rehabilitation Grant Program Applications

Common Errors to Avoid in Grant Applications

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Common Errors To Avoid

Many applications for previous rounds of the Seismic Rehabilitation Grant Program (SRG) contained one or more significant errors that required revisions to the application, the engineering study, the proposed retrofit scope of work, the cost estimate and/or the benefit-cost analysis.

To help make the SRGP process more efficient for OBDD staff, applicants and applicant's engineering consultants, the following suggestions summarize common errors and how to avoid these.

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This memo summarizes common errors in the BCA data inputs that were made in the previous applications. Applicants should ensure that they are careful to avoid all of these errors in their SRGP applications.

1. **For Facilities with Buildings or Building Parts with Different Dates Built and/or Different Structural Systems, the Building Parts Must be Considered Separately in the Benefit- Cost Analysis.**

   This is true even if the OR BCA Tool Database incorrectly lists an entire facility as one building part (Part A). If a district's engineering study indicates that there are more distinct building parts than listed in the database, applicants must add more building parts on the Main Page of the OR BCA Tool.

   Example:

Is the Building in the Oregon BCA Tool Database: Yes or No?					Yes
How Many Structurally Different Building Parts Are There?				User-Defined: 4	Database: 1
Unique Building ID Number	Building Part Square Footage	Percent of Total SF	Percent of Occupancy	Percent of Budget	Building Part Being Retrofitted?
Clac_Sch08A	14,500	30.24%	38.00%	42.00%	Yes
Clac_Sch08B	9,000	18.77%	23.00%	20.00%	No
Clac_Sch08C	13,330	27.80%	32.00%	26.00%	Yes
Clac_Sch08D	11,123	23.20%	7.00%	12.00%	No
Totals:	47,953	100.00%	100.00%	100.00%	

In the above hypothetical example, the database listed the entire school as Part A. However, the District's engineering report identified four building parts built at different times and/or with different structural systems. By entering "4" in the User-Defined cell shown above, the OR BCA Tool opens four rows for building data input.

In this example, a BCA using only one building part (Part A) would be incorrect for several reasons:

- The seismic vulnerability varies for each of the four building parts because they have different dates built and/or different structural systems
- In this example, only building Parts A and C are included in the proposed retrofit. This means that there are no benefits attributable to building Parts B and D because no retrofits are being done.
- Even though building Parts B and D are not included in the retrofit, the occupancy data and annual operating budget for the school (which are entered on separate pages in the OR BCA Tool) are for the entire school and the correct percentages of occupancy and annual operating budget must be allocated to each building part. This can be done in two ways:
    - Use the default allocation pro-rata with building part square footages, or
    - Enter facility specific estimates for each building part in the Percent of Occupancy and Percent of Annual Operating Budget columns.
    - **NOTE:** the "budget" on this page is the Annual Operating Budget for the facility–**not** the cost of the proposed seismic retrofit.
- However, the detailed building data on the separate pages in the OR BCA Tool for each building part need be entered only for Building Parts A and C–the only parts that are included in the proposed retrofit.
- A BCA for a facility can be done correctly in only one building part **if and only if** the entire facility is built at one time[1] with one structural system. For example, a school built at one time with a classroom wing and a multipurpose room with different structural systems, must be done in two building parts: one for the classroom wing and one for the multipurpose room.
- [1] There is some flexibility regarding a single date of construction. If two parts of a building were built several years apart, but with the same structural system and within the same code period (such as Pre-Code or Low-Code), then it is permissible to consider the two parts as one building, if both parts are being retrofitted.
- **Note:** the same concepts apply to fire stations and other emergency response facilities. For example, an apparatus bay is likely to have a different structural system than office or living space in a fire station and thus these parts must generally be considered separately.

2. Clearly Identify Which Building Parts are Building Parts A, B, C, etc.

A common error in engineering reports was the failure to clearly identify which building parts–such as 1954 classroom wing or 1983 apparatus bay–correspond to Building Parts (A, B, C, etc.). The best way to identify building parts is by a drawing, sketch of photograph

clearly identifying the building parts by year built, name (or function) **and** by corresponding Building Parts (A,B,C, etc). For example, the 1954 Gymnasium is Building Part C. This clear identification is **essential** for application reviewers to evaluate the credibility of BCA data entries for specific building parts.

A related error, which may arise in part because of confusion re: identification of building parts, is that the square footages for building parts as stated in the engineering reports and/or the application and those entered on the Main Page of the OR BCA Tool were sometimes inconsistent. The building square footage entries on the Main Page **must** match the stated square footages in the engineering report and in the application.

3. **The Proposed Scope of Work Must Be Clearly Defined**

Many applications failed to clearly identify the proposed scope of work, with omission of key information. Essential information includes:

- Clearly identify which buildings or building parts are included and which proposed retrofit measures are for which buildings or building parts.
- An explicit statement that the proposed retrofit is designed to meet the Life Safety or Immediate Occupancy criteria. **These criteria include both structural and nonstructural measures.**
- An explicit statement that the nonstructural mitigation measures necessary to meet the Life Safety or Immediate Occupancy criteria are included **and** a narrative clearly describing the specific nonstructural measures that are included in the proposed retrofit.
- Drawings or sketches showing clearly the locations in buildings or building parts where each major structural retrofit measure is proposed.

4. **Detailed Retrofit Cost Estimate**

The cost estimate for the proposed seismic retrofit must be detailed and as accurate as possible. Acceptable formats include output from engineering cost estimating software or engineer's opinion of probable costs, with itemization for each retrofit measure. A credible cost estimate will include:

- Quantities and unit costs for the major elements of structural mitigation measures,
- Lump sum estimates only for clearly defined relatively low cost elements.
- Itemized line items for the "soft costs"–that is, costs other than physical construction elements–including costs such as: architectural and engineering design fees, permitting, inspection, insurance, mobilization costs, general conditions, contingencies, construction management, grant management, etc.
- Identification of "relocation" costs if building occupants and contents must be moved out during construction.
- Itemized cost estimates for nonstructural mitigation measures.
- Any other costs necessary to complete the retrofit

Note: rough estimates are **not** acceptable as cost estimates. For example, an estimate of $400,000 for seismic retrofit of a gymnasium roof is not acceptable because it does not

specify the specific construction elements with quantities and units costs. Similarly, cost estimate categories such as "Other" or "Miscellaneous" are not acceptable because they lack specificity.

Provide a narrative explanation for any cost items that are unusual, hard to understand, or that may raise questions from reviewers.

5. **Previous Seismic Retrofits**

   The Seismic Rehabilitation Grant Program application asks for the "Date of Most Recent Major Remodel."

   If a building or building part for which retrofit measures are proposed has had any previous structural or nonstructural seismic retrofit measures completed–whether part of a "major remodel" or separately–the engineering report supporting your seismic retrofit project **must** contain a narrative clearly documenting the seismic retrofit measures already completed for such buildings or building parts.

   Previous seismic retrofits may have significant impacts on the BCA and ignoring previous retrofits will yield inaccurate, unacceptable BCA results, unless the previous retrofits are accounted for in the before mitigation seismic fragility curves on the Building Part Pages in the OR BCA Tool.

   A building which has had previous partial retrofits will have less seismic vulnerability than the original building. Thus, the before mitigation seismic fragility curve inputs need to be adjusted to reflect this lower vulnerability.

6. **Omission of Recommended Seismic Retrofit Measures**

   In some cases, retrofit measures recommended for a building or building part are **not** included in the proposed seismic retrofit.

   If so, the recommended retrofit measure(s) that is/are omitted **must** be described, along with an explanation of the reason(s) for the omission. One example that applied to several retrofits for schools in the 2014 applications was that increasing the capacity of a roof diaphragm to transfer seismic loads by adding plywood sheathing was not included in the proposed seismic retrofit because a roof covering replacement had been recently completed without including this seismic retrofit. That is, it was deemed not-economically feasible to re-do the recently replaced roof covering.

   Note: omitting retrofit measures that are necessary to meet the life safety or immediate occupancy criteria is likely to disqualify your project for a SRGP grant, because the retrofit won't meet the SRGP criteria.

   However, omitting suggested retrofit measures that are not necessary to meet the life safety or immediate occupancy criteria will not disqualify your project, if clearly documented as being not necessary.

7. **Occupancy Data**

There were several common errors in entering occupancy data, including:

- Mismatches between the number of employees shown on the Occupancy Page and the number shown on the Budget Page. Applicants are encouraged to check all data inputs for reasonableness and **consistency**.
- For retrofits for only one building or building part, such as a gymnasium, some applicants assigned 100% of the occupancy to the gymnasium, but entered occupancy data on the Occupancy Page for the entire school. This is a major error that grossly overestimates the occupancy for the gymnasium and thus overestimates the life safety benefits. This error can be avoided in two ways:
    - Enter occupancy data for the entire facility on the Occupancy Page and allocate the facility occupancy to each building part on the Main Page—this is the preferred method.
    - Alternatively, 100% of the occupancy can be allocated to one building part on the Main Page, but **if and only if** the entered data on the Occupancy Page is only for the one building part **and if** only one building part is included in the retrofit. This approach is mathematically correct, but is not recommended because it is less straightforward and more prone to confusion and/or data entry errors.
- Several applicants (mostly for schools) entered very large number of visitors in schools for up to two hours per day. For occupancy data (and all other BCA data inputs), applicants should provide a narrative with justification for data entries that may appear questionable or outside the bounds of credibility.
- Many applicants made errors in entering occupancy for long duration events such as book fairs, other fund raising events, blood drives, or other events with durations of many hours or more than one day. For example, a book fair might last for 8 hours with a total of 600 visitors. This does not mean that the average occupancy is 600 people for 8 hours. Rather, the average occupancy should be calculated in two parts: based on the average number of staff/volunteers running the event and the average duration that typical visitor spends at the events. For example: if the average staffing is 10 volunteers for the entire duration and the average visitor spends about one hour at the event, then the average occupancy is calculated as follows:
    - Volunteers staffing the event: 10 people for the entire duration
    - Visitors: 600 people for 1 hour over an 8 hour event corresponds to 75 visitors on average: 600 divided by 8.
    - Thus the average occupancy for this event is **85** people (10 plus 75), not 600 (the total number of visitors) or 610 (the total number of visitors and staff).
    - The average time that a visitor spends at such long duration events is rarely known exactly, but good faith reasonable estimates are OK.

8. **Budget Data (Annual Operating Budget for the Facility)**

There were several common errors or omissions in entering the data inputs for Annual Operating Budget:

- Many applicants left one or more categories blank, which underestimates the Annual Operating Budget for the facility. This error results in an underestimate of the benefits of avoided loss of services provided by the facility, because the Annual Operating Budget is used as a proxy for the value of services provided to the community.
- Many fire districts underestimated the value of services by not included the value of volunteer staff. For evaluating the value of services–that is, the Annual Operating Budget–volunteer staff may be assigned the same value as paid staff. For example, if volunteers provide the same number of hours of serviced as 5 paid staff, the value of volunteers can be entered as equivalent to the cost of 5 paid staff.
- School districts may also include the value of volunteers if they perform services equivalent to those of teacher's aides or other paid staff.
- For buildings that are also district headquarters, some applicants double counted the headquarters staff, by entering data in the Headquarters section of the Budget Page in the OR BCA Tool **and** counting a percentage of these costs for the facility being retrofitted. Such double counting is not acceptable.
- Most data entries for the Annual Operating Budget are readily available from the latest calendar year or fiscal year budget document, but some may not be.
    - For budget categories that may not be specified in the budget document, or that vary from year to year–such as capital goods–a reasonable estimate and/or a multi-year average value may be entered. A brief narrative justifying such entries improves credibility.
    - Similarly, the percentage of the annual operating budget for a district headquarters building that is allocated to the facility being retrofitted must be estimated by applicants. A simple way to do this is use the percentage district staff of students in the facility being retrofitted.

9. Building Part Data (Only for Building Parts Included in Proposed Retrofit)

The Building Part Pages in the OR BCA Tool contain numerous data entries that directly affect the BCA results. Thus, these are very important data entries and the input data must be credible.

Users can enter building-specific values for any of the data entries on any of the green shaded cells in Column C. For credibility, the engineering report must provide a brief narrative documenting/justifying each user-entered value, with summaries entered in the Data Documentation Table on each Building Part page in the OR BCA Tool.

User-entered data on the Building Part Pages:

- **Latitude and Longitude.** There may be some errors in the latitude/longitude data in the OR BCA Tool Database. If so, users may enter the correct latitude/longitude for a given campus.
- **Soil Type.** The soil type may be changed if there is geotechnical data for the campus site or other justification.

- **Building Structural Data.** The building structural type, number of stories and year built should be edit to correct any errors in the OR BCA Tool Database.
- **RVS Data.** The OR BCA Tool allows user inputs to edit four of the RVS inputs: Vertical Irregularity, Plan Irregularity, Pre-Code and Post-Benchmark, if any of these inputs are incorrect based on the engineering analysis of a given building or building part. The 2019 OR BCA Tool also allows input of a Severe Vertical Irregularity—this designation was not included in the RVS scores in the database, but was added in FEMA's 2015 RVS update (3rd Edition).
- **Building Square Footage.** The value on this page is read from the user—entry on the Main Page. Corrections must be made on the Main Page.
- Building Replacement Value ($/SF) and Contents Value (% of Building Value). These inputs can be edited to reflect building-specific values.
    - Users may: a) use the default values built into the OR BCA Tool for **both** Building Value and Contents Value, or b) enter building-specific values for **both** Building Value and Contents Value.
    - However, users may not enter a higher than default value for Building Value or Contents value and then use the default value for the other value. Many users entered a higher than default value for the Building Value but used the default value for Contents Value that was much higher than the stated value in the application—this combination of inputs is **not** acceptable.
- **Displacement Costs ($/SF/Month) and One Time ($/SF).** Users may enter building-specific values, with documentation/justification.
- **Average Annual Occupancy and Annual Operating Budget.**These values are read from the user-entries on the Main Page. Corrections must be made on the Main Page.
- **Seismic Fragility Curves.** Engineers with thorough understanding of seismic fragility curves may edit these data inputs with documentation/justification in the engineering report.
    - Some applicants replaced the fragility curves in the OR BCA Tool with the verbatim HAZUS fragility curves. This is acceptable if the engineer believes that such inputs reflect the building-specific characteristics.
    - However, in many cases, the default values calculated by the algorithms in the OR BCA Tool will yield higher benefits than the verbatim HAZUS fragility curves, because the default values are adjusted to reflect the time-history of seismic provisions in building codes effective in Oregon.
    - For example, the Pre-Code time period in Oregon extends much later than in most states, because Oregon was considered to be nearly as-seismic until the 1970s and Oregon adopted is first statewide building code only in 1974.