Avoiding Application Pitfalls
Observations from the FY 2018 National Technical Review Cycle
Agenda

▸ Presentation – 1 hour
▸ Questions – 1 hour
Agenda

▸ Common Pitfalls
▸ Best Practices
▸ Questions and Answers

▸ Acquisition/Elevation
▸ Flood Risk Reduction
▸ Slope Stabilization
▸ Wind Retrofit
▸ Generator
▸ Safe Room
▸ Seismic
▸ Wildfire
Common Pitfalls – All Project Types
Common Pitfalls

- Unclear Scope of Work
- Inconsistencies within application sections
- Inconsistencies between application and Benefit-Cost Analysis (BCA)
Common Pitfalls: Cost-Effectiveness

- Incomplete or Unsupported Documentation
- Recurrence Intervals (RIs)
  - RIs are not equal to the time between two events
- Historical/Professional Expected Damages
  - Unsupported estimated damages
  - User analysis duration
  - Does not consider residual risk (after mitigation)
Acquisition/Elevation Projects
Acquisition/Elevation: Pre-Calculated Benefits Common Pitfalls

Not in Special Flood Hazard Area (SFHA)

Property parcel boundaries identified as overlapping with SFHA

But structure is not in SFHA
## Acquisition: Common Pitfalls

Unsupported Fair Market Value (FMV)

<table>
<thead>
<tr>
<th>Data Quality</th>
<th>Form of Supporting Documentation for FMV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best</td>
<td>• Recent appraisal</td>
</tr>
<tr>
<td>Good</td>
<td>• Older appraisal + % market adjustment</td>
</tr>
<tr>
<td></td>
<td>• Property tax card + % market adjustment</td>
</tr>
<tr>
<td>Ok</td>
<td>• Average based on homes acquired in area</td>
</tr>
<tr>
<td></td>
<td>previously</td>
</tr>
<tr>
<td>Low</td>
<td>• Building replacement value</td>
</tr>
</tbody>
</table>
Acquisition/Elevation: Flood Module Common Pitfalls

Incorrect first floor elevation (FFE) based on building diagram type

### FFE Guidance Table

<table>
<thead>
<tr>
<th>Building Diagram</th>
<th>Lowest Finished Floor Description</th>
<th>A-Zone FFE location</th>
<th>V-Zone FFE location</th>
<th>Residential Building Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Bottom Floor</td>
<td>C2.a</td>
<td></td>
<td>One or two (or more) story without a basement</td>
</tr>
<tr>
<td>1B</td>
<td>Bottom Floor</td>
<td>C2.a</td>
<td></td>
<td>One or two (or more) story without a basement</td>
</tr>
<tr>
<td>2</td>
<td>Next Higher Floor</td>
<td>C2.b</td>
<td></td>
<td>One or two (or more) story with a basement</td>
</tr>
</tbody>
</table>

**Diagram 1A**

- All slab-on-grade single- and multiple-floor buildings (other than split-level) and high-rise buildings, either detached or row type (e.g., townhouses); with or without attached garage.
- Distinguishing Feature - The bottom floor is at or above ground level (grade) on at least one side.

**Diagram 2**

- All single- and multiple-floor buildings with basement (other than split-level) and high-rise buildings with basement, either detached or row type (e.g., townhouses); with or without attached garage.
- Distinguishing Feature - The bottom floor (basement or underground garage) is below ground level (grade) on all sides.

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**Column a**: Top of bottom floor (including basement, crawlspace, or enclosure floor)
- 188.00 feet
- 188.00 meters

**Column b**: Top of the next higher floor
- 196.30 feet
- 196.30 meters

**Column c**: Bottom of the lowest horizontal structural member (V Zones only)
- 185.30 feet
- 185.30 meters

**Column d**: Attached garage (top of slab)
- 185.00 feet
- 185.00 meters

**Column e**: Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)
- 188.70 feet
- 188.70 meters

**Column f**: Lowest adjacent (finished) grade next to building (LAG)
- 185.00 feet
- 185.00 meters

**Column g**: Higthest adjacent (finished) grade next to building (HAG)
- 196.40 feet
- 196.40 meters

**Column h**: Lowest adjacent grade at lowest elevation of deck or stairs, including structural support
- 189.10 feet
- 189.10 meters
Acquisition/Elevation: Best Practices

▸ Flood Module – Includes Flood Insurance Study (FIS) profile with structure location clearly marked

▸ Historical Damages – Provides claims data for historic damages
Flood Risk Reduction Projects
Flood Risk Reduction: Riverine Common Pitfalls

- Project does not address upstream and downstream impacts
- Hydrologic and Hydraulic study (H&H) results are based on a study that includes improvements other than the proposed project
- Not including flood elevation for each RI in project area
- Not providing elevation data for each structure
Flood Risk Reduction: Coastal Common Pitfalls

Does not clearly demonstrate how project will prevent flooding or damage to structures

- Tie-in to local topography will not prevent flooding
- Unclear whether structures will be protected by project. Structures are affected by flooding from a different source, or floodwaters can enter from a different direction
- Backwater or ponding issues are not addressed
Flood Risk Reduction: Cost-Effectiveness Common Pitfalls

- Incorrect Analysis Duration
- Incorrect methods are used to determine recurrence intervals
- Regional estimates are used rather than best available, site-specific data
- Missing residual risk (after mitigation)
Flood Risk Reduction: Best Practices

- RI from reputable source: FIS reports, FEMA models, USGS historic streamflow calculations, NOAA Atlas 14
  - Identify nearest coastal transect to project site
- Best available data used
- Provide stage-frequency documentation at project site from H&H modeling or other statistical calculations
Slope Stabilization Projects
Slope Stabilization: Common Pitfalls

- Application does not specify what will be protected
- If structures are not acquired, scope of work must address how they will be protected

Cost-Effectiveness

- Imminent failure
  - Lack of documentation showing that slope will fail in ≤5 years
- Incorrect methods to determine RIs
  - Analysis duration
  - RI < project useful life
- Residual risk
  - No basis for after-mitigation damages
Slope Stabilization: Best Practices

Application

- Scope of work proposes to acquire structures at risk of imminent failure

Cost-Effectiveness

- Documentation for estimated days loss of function
- After-mitigation damages demonstrate residual risk
Wind Retrofit Projects
Wind Retrofit: Common Pitfalls

- Does not state whether building can resist current code level design wind speeds
- Does not address all known building vulnerabilities
Wind Retrofit: Common Pitfalls – Cost-Effectiveness

Does not include documentation for building properties before or after mitigation

<table>
<thead>
<tr>
<th>Building Properties</th>
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</thead>
<tbody>
<tr>
<td>Select Type of Construction</td>
</tr>
<tr>
<td>Select Building Type</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Properties Before Mitigation</th>
<th>Properties After Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window Area *</td>
<td>Window Area *</td>
</tr>
<tr>
<td>Roof Cover Type *</td>
<td>Roof Cover Type *</td>
</tr>
<tr>
<td>Wind Debris *</td>
<td>Wind Debris *</td>
</tr>
<tr>
<td>Shutters *</td>
<td>Shutters *</td>
</tr>
<tr>
<td>Roof Deck Attachment III (Metal) *</td>
<td>Roof Deck Attachment III (Metal) *</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>SPM</td>
<td>BUR</td>
</tr>
<tr>
<td>Residential/Commercial Mix</td>
<td>Residential/Commercial Mix</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Standard</td>
<td>Standard</td>
</tr>
</tbody>
</table>

FEMA
Wind Retrofit: Best Practices

- Includes evaluation that addresses all vulnerabilities and demonstrates structure’s ability to endure design wind speed
- Properly select wind exposure category
  - FEMA only uses Wind Exposure Categories B and C
  - If building is in Wind Exposure Category D, use Wind Exposure Category C

Exposure B:  
Exposure C:
Generator Projects
Generator: Common Pitfalls

- Proposed load is non-critical load
- Residential-type generator
- Upgrade to the electrical system that is not necessary for the generator to function
- Project is not accepted by local code
- Purpose is to meet current building code
Generator: Common Pitfalls – Cost-Effectiveness

- Incorrect service type for loss of function
- Includes previous damages/outages that will not be mitigated by proposed scope of work
- Does not account for residual risk after mitigation measure is implemented
Generator: Best Practices

- Identified fuel tank capacity
- Documented project useful life
- Documented occurrences of loss of function, such as:
  - Letter from utility detailing power outages
  - Narrative indicating historical power losses (e.g., news articles)
  - Historical documentation of damage events
Safe Room Projects
Safe Room: Common Pitfalls

- Safe room occupancy vs. number of possible protected occupants
- Lacks documentation for meeting requirements of ICC-500 and FEMA P-361
Safe Room: Common Pitfalls – Cost-Effectiveness

- Entered the number of occupants instead of the occupant percentage
- Cannot have more than 100% of the occupants in a safe room
Safe Room: Best Practices

▸ Provide documentation that safe room will be designed to ICC-500 and FEMA P-361

▸ Provide a map indicating:
  • Population protected
  • Maximum travel distance
  • Type of surrounding structures

▸ Peer review statement
Seismic Projects
Seismic: Common Pitfalls

- Unsupported soil type
- Benefits from both monthly cost of living and loss of rental income
- Inappropriate design level (pre-code, low code, medium code, high code)

<table>
<thead>
<tr>
<th></th>
<th>Morning (8AM-12PM)</th>
<th>Afternoon (12PM-5PM)</th>
<th>Evening (5PM-9PM)</th>
<th>Night (9PM-8AM)</th>
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</thead>
<tbody>
<tr>
<td>Monday</td>
<td>10</td>
<td>10</td>
<td>25</td>
<td>30</td>
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<tr>
<td>Tuesday</td>
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<tr>
<td>Saturday</td>
<td>15</td>
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<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Sunday</td>
<td>20</td>
<td>20</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

- Incorrect average number of occupants
Seismic: Best Practices

<table>
<thead>
<tr>
<th>Data Quality</th>
<th>Form of Supporting Documentation for Retrofit Sketches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best</td>
<td>• Engineered retrofit drawings. Final “for construction&quot; drawings not required</td>
</tr>
<tr>
<td>Acceptable</td>
<td>• Sample drawings of retrofits from similar projects</td>
</tr>
<tr>
<td></td>
<td>• Sketches of retrofit options under consideration</td>
</tr>
<tr>
<td></td>
<td>• Industry accepted standard details</td>
</tr>
</tbody>
</table>

- Approved projects almost always include involvement from a registered Professional Engineer
- Explicitly references codes/standards being applied
- As-built/record drawings provided whenever possible to describe structure
Wildfire Projects
Wildfire: Common Pitfalls

- Incorrect use of mitigation measures
  - Ignition-resistant construction must be paired with defensible space measures
- Unclear vulnerability and location of properties within project area
Wildfire: Common Pitfalls – Cost-Effectiveness

- Incorrect selection of mitigation measures
- Unsupported fire suppression costs and/or timber value
- Environmental benefits
Wildfire: Best Practices

The scope of work should clearly explain the mitigation measures and wildfire risk reduction.

<table>
<thead>
<tr>
<th>Data Quality</th>
<th>Type of Maps</th>
</tr>
</thead>
</table>
| Best         | - Aerial maps with clearly defined boundaries of mitigation activities and the associated benefited properties  
               - Clearly shows the wildfire risk rating of the area, the wildland-urban interface, and the location of recent nearby wildfires |
| Ok           | - Map highlighting general project area without indicating boundaries of mitigation activities or wildfire risk rating |
Best Practices – All Project Types
Best Practices

- All inputs into Benefit-Cost Analysis Tool are supported
  - Pre-mitigation damages
  - After-mitigation damages
  - User analysis duration
  - Any non-default Inputs
- For BCA 6.0, use comment box to identify where documentation is in application
- Narratives and checklists are helpful to check work and ensure data are accurately conveyed
## Best Practices: Documentation

<table>
<thead>
<tr>
<th>Data Quality</th>
<th>Building Replacement Value</th>
<th>First Floor Elevation</th>
<th>Loss of Function</th>
</tr>
</thead>
</table>
| **Best**     | • Cost estimate from a contractor  
• Standard cost reference guide | • Elevation Certificate | • Official statement/accounting table showing annual operating budgets or venue 
• Official statement outlining service area/populations |
| **Good**     | • Statement of BRV from an insurance company | • Lidar elevation | • Maps showing service area with estimate of population based on the number of houses |
| **Ok**       | • Tax records | • Ground surface elevation and offset | • Statement in the scope of work indicating operating budgets, service areas/population, or description of services |
Questions?