LOSS AVOIDANCE ASSESSMENT

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Senior Planner, ARCADIS
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AGENDA

- Loss Avoidance Assessment 101
- Substantiating Mitigation in Florida
- System and Strategy
  - Flood
  - Wind
- Recommendations
DECLARED DISASTERS
SINCE 2011
Mitigation

Reducing the loss of life and property by lessening the impact of disasters

Recovery
Putting a community back together after a disaster

Response
Saving life and property during and immediately after a disaster

Preparedness
Getting people and equipment ready to quickly and effectively respond to a disaster before it happens

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What is Loss Avoidance?

**EXPECTED DAMAGE WITHOUT MITIGATION**

– DAMAGE EXPERIENCED WITH MITIGATION

– COST OF MITIGATION

**LOSS AVOIDANCE**

06/29/2012
Where on this spectrum does public sentiment and the will to make political expenditures lie?
There is a surge in support for mitigation

When the potential costs of inaction are clear

And

Post-disaster

We need a bridge to action
The State must “document the system and strategy by which the State will conduct an assessment of the completed mitigation actions and include a record of the effectiveness (actual cost avoidance) of each mitigation action.”

**Requirement §201.5(b)(2)(iv)**
Record-keeping was inadequate

The methodology was primitive

High data and technical demands ($$$?)

Low project utility
FLORIDA’S OBJECTIVES

Simplification
Automation
Replication
Defensibility
Ease of Implementation
Long-term Tracking of Results
SUBSTANTIATING MITIGATION IN FLORIDA

www.floridadisaster.org/mitigation

- Loss Avoidance Assessments (LAA)
- Loss Avoidance Assessment System and Strategy
- Calculators and Tools for Flood and Wind Mitigation Projects
- Economic Impact Analysis
- 2012 FSU Studio Report: “Getting to Drier Ground” - Flood mitigation projects lessons learned
- Flood in the Statewide Building Code
LAA Resources and Tools

- System and Strategy (User Guides and Methodologies)
- Two separate calculators for flood
  - Building Modification projects
  - Drainage projects (modeling required)
- Wind mitigation project LAA calculator
- Historical losses calculator
SYSTEM AND STRATEGY STRUCTURE

A. System and Strategy Overview
B. Project Record Keeping and Data Needs
C. Event Data Collection and Processing
D. Loss Avoidance Calculator User Guide
E. Technical Details

Include:
- Checklists
- Forms

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THE BUILDING MODIFICATIONS CALCULATOR

To assess projects where you modify the structure being mitigated, as opposed to its environment.
### PROJECT DATA

<table>
<thead>
<tr>
<th>Project Code</th>
<th>1234</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Type</td>
<td>Acquisition</td>
</tr>
<tr>
<td>Project Descriptor</td>
<td>Ned's Home</td>
</tr>
<tr>
<td>Building Type</td>
<td>Residential</td>
</tr>
<tr>
<td>Building Use</td>
<td>Single Family Dwelling</td>
</tr>
<tr>
<td>Stories</td>
<td>1 Story</td>
</tr>
<tr>
<td>Basement</td>
<td>N</td>
</tr>
<tr>
<td>Address</td>
<td>1767 Hermitage Blvd.</td>
</tr>
<tr>
<td>Latitude</td>
<td></td>
</tr>
<tr>
<td>Longitude</td>
<td></td>
</tr>
<tr>
<td>Building SF</td>
<td>1200</td>
</tr>
<tr>
<td>Pre-Mitigation FFE</td>
<td>0</td>
</tr>
<tr>
<td>Project Completion Year</td>
<td>2001</td>
</tr>
<tr>
<td>Total Project Cost</td>
<td>$65,000.00</td>
</tr>
<tr>
<td>Federal Grant</td>
<td>$65,000.00</td>
</tr>
<tr>
<td>State Match</td>
<td></td>
</tr>
<tr>
<td>Local Match</td>
<td></td>
</tr>
<tr>
<td>Total Yearly Costs</td>
<td>$</td>
</tr>
<tr>
<td>Maintenance Expenses</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Other costs/losses (annual maintenance, lost tax revenue, etc.) not shown here.

**Required**

**Recommended**
Because older project files can exist in varying levels of completeness...

- Some fields are not required, but add to the robustness of the output
- Data can be gathered in a variety of ways
- Simply keep track of where data was gathered from
- For example:
  - Elevation data?
  - Building data?
  - Project Cost?
  - Yearly or other costs?
**FEMA’s Preferred Flood Elevation Sources**

<table>
<thead>
<tr>
<th>Preferred Source</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Water Marks</td>
<td></td>
</tr>
<tr>
<td>Stream Discharge Gage in Flooding Source</td>
<td></td>
</tr>
<tr>
<td>Stream Stage Gage in Flooding Source</td>
<td></td>
</tr>
<tr>
<td>Stream Discharge Gage in Same Watershed</td>
<td></td>
</tr>
<tr>
<td>Stream Discharge Gage in Watershed with Similar Characteristics, Affected by Same Storm Event, and in Close Proximity</td>
<td></td>
</tr>
<tr>
<td>Precipitation Gage in Same Watershed</td>
<td></td>
</tr>
<tr>
<td>Precipitation Gage in Watershed Affected by Same Storm Event and in Close Proximity</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Inadequate Data</td>
<td></td>
</tr>
</tbody>
</table>

Added to this list, Florida uses Project Performance Call Sheets to obtain event and project performance data from local resources.
### Nominal Expected and Actual Losses

#### Nominal Expected Disaster Losses Mitigation PRESENT for 1234

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Flood Depth</th>
<th>Building Losses</th>
<th>Contents Losses</th>
<th>Displacement</th>
<th>Total Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 Flood</td>
<td>0</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>2004 Flood</td>
<td>0</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>2005 Flood</td>
<td>0</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

#### Nominal Expected Losses Mitigation ABSENT for 1234

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Flood Depth</th>
<th>Building Losses</th>
<th>Contents Losses</th>
<th>Displacement</th>
<th>Total Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 Flood</td>
<td>3</td>
<td>$30,912.00</td>
<td>$19,872.00</td>
<td>$9,821.67</td>
<td>$60,605.67</td>
</tr>
<tr>
<td>2004 Flood</td>
<td>4</td>
<td>$36,000.00</td>
<td>$22,800.00</td>
<td>$12,133.33</td>
<td>$70,933.33</td>
</tr>
<tr>
<td>2005 Flood</td>
<td>0</td>
<td>$22,032.00</td>
<td>$7,344.00</td>
<td>$</td>
<td>$29,376.00</td>
</tr>
</tbody>
</table>

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### Project Information

<table>
<thead>
<tr>
<th>Project Code</th>
<th>RFC-PJ-04-FL-2007-001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Type</td>
<td>Acquisition</td>
</tr>
<tr>
<td>Project Descriptor</td>
<td>Middleburg Acquisition</td>
</tr>
<tr>
<td>Address</td>
<td>4060 Lightning Lane</td>
</tr>
<tr>
<td>Latitude</td>
<td>30.005906</td>
</tr>
<tr>
<td>Longitude</td>
<td>-81.850894</td>
</tr>
<tr>
<td>Project Completion Year</td>
<td>2010</td>
</tr>
<tr>
<td>Completed Project Cost</td>
<td>$253,336.00</td>
</tr>
</tbody>
</table>

### Event Information for Project Site

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Name</th>
<th>Flood Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>TS Debby</td>
<td>2</td>
</tr>
</tbody>
</table>

### Results

**Net Losses Avoided Using GDP Deflator to Normalize Costs**

<table>
<thead>
<tr>
<th>Real Losses Avoided through 2012</th>
<th>$57,519.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Present Value</td>
<td>-$201,224.14</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>22.23%</td>
</tr>
</tbody>
</table>

**Net Losses Avoided Using Reverse Discount Rate to Normalize Costs**

<table>
<thead>
<tr>
<th>Real Losses Avoided through 2012</th>
<th>$57,519.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Present Value</td>
<td>-$206,852.42</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>21.76%</td>
</tr>
</tbody>
</table>

**Net Losses Avoided Using the Relative Share of GDP**

<table>
<thead>
<tr>
<th>Real Losses Avoided through 2012</th>
<th>$57,519.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Present Value</td>
<td>-$211,504.92</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>21.76%</td>
</tr>
</tbody>
</table>

### Comments

FFE rounded for calculator. / Due to uncertainty in call sheet, flood depth based on precipitation and other project flooding - FMA2007-003 / Project site within damage swath of TS Fay (1785) and North Florida Flood Event (1831), but was incomplete at the time. As such, losses avoided not calculated for those events.
ASSUMPTIONS

- A building damage of 50 percent or more would result in demolition (default value specified in FEMA’s BCA Riverine Flood-Full Data Module).

- Depth damage functions don’t take velocity or sediment deposits into consideration. This translates to conservative measurements.

- Only financial losses are considered – e.g., direct damage costs, displacement.
DRAINAGE V. BUILDING MODIFICATION

- The structure does not change in a drainage project, the flood hazard changes.
- The flood hazard does not change in a building modification project, the structure changes.
Multiple Structure LAA Calculator

- Can be used for drainage or local flood protection of any kind
- Single event analysis
- Can be used for one to many structures
- Pre-mitigation event data must be determined through modeling or run-off calculations
- The calculator interprets the results
Components

- Calculator – project data and results processing (one event at a time)
- Access Database – import into Hazus
- User Guide

- Hazus
  - FEMA Free Software
  - ArcGIS Add-on

- Study region (create your own)
PROJECT DATA

- Structure details (SF, Material, Building type, Roof details)
- Pre and post-mitigation attributes
  - Opening protection
  - Secondary water barriers
  - Roof deck attachment
  - Continuous load path
  - Tie-downs
- Project cost information
- *Calculator determines Mapping Schemes for Hazus import*
Hurrevac Data Import, straight through Hazus

Two ways to assess post-mitigation performance:
- Hazus pre-mitigation analysis
- OR
- Field assessment

Calculator collects the data and formats it for import into Hazus and re-import into calculator for calculations

Hazus 2.1, haven’t checked it with other versions
1. Enter basic project data
2. Enter structure attributes
3. Enter project scope data

*Calculator combines the information and puts it into a format for Hazus import*

4. Paste the data into the pre-set up Access database and import into Hazus
(Hazus Steps)

5. Follow User Guide to modify Hazus Mapping Schemes

6. Define Hurricane Scenario as a specific historical event or import Hurrevac (The system provides Guidance)

7. Run Hazus analysis

8. Paste results into calculator

Results are provided as a specific probability of a structure experiencing a certain category of damage pre- and post-mitigation. The calculator converts these “qualitative” results into dollars.
**HISTORICAL LOSSES CALCULATOR**

- Useful for special projects or projects with other hazards
- Use historical losses to interpolate and project potential losses for the magnitude of event being studied
- Relies on event probability
- The only calculator to identify loss of service costs
- Based on methods used with FEMA’s BCA Toolkit, but the two tools do not supplant one another
Recommendations
1. **Maintain Electronic Project Data**

2. **Gather Event Data Quickly and Systematically**
PROJECT DATA

- Data storage options
  - Spreadsheets
  - Calculators will store the data
  - Database
  - GIS files
- Retain project applications and BCA, especially
- Retain project final inspection report
- Integrate data retention into regular project management activities
EVENT DATA

- Collect during preliminary damage assessment process
- Develop partnerships to gather high water marks, record project performance information, take photos
- Develop SOPs and assign responsibilities
- Integrate event data collection into other post-event processes
GET A PLAN!
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QUESTIONS?
Thank You!