**Scenario Damages After Mitigation** indicate the estimated damages which would result from a single flood of a particular depth at the building under evaluation after completion of the mitigation project. For example, the scenario damages for a 3-foot flood are the expected damages and losses **each time** a 3-foot flood occurs at a particular site. Scenario damages <u>DO NOT</u> depend on the probability of floods at that location.

**Scenario Damages Table**

| Flood Depth | Building Damages | Contents Damages | Displacement Costs | Business Losses | Rental Losses | Public/ Nonprofit | Total |
|---|---|---|---|---|---|---|---|
| -2 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| -1 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 1 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 2 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 3 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 4 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 5 | $3,750 | $1,688 | $1,909 | $250 | $477 | $5,171 | $13,245 |
| 6 | $6,750 | $3,038 | $3,550 | $450 | $888 | $9,308 | $23,983 |

The **Scenario Damages After Mitigation Table** contains scenario damages for each flood depth from -2 to 18 feet for six categories of **avoided** damages and losses: building damages, contents damages, displacement costs, business income losses, rental income losses, and lost public/nonprofit services. In addition, the total damages and losses are shown for each flood depth.

The information in this **Scenario Damages After Mitigation** table shows the total vulnerability of the building after mitigation to flood damage, how these damages are distributed among different categories of damages, and how these damages vary with flood depth. In the example table above, **Scenario Damages After Mitigation** are zero for flood depths through 4 feet, because the mitigation measure (elevation) is 100% effective in avoiding damages at these flood depths.

## EXPECTED ANNUAL DAMAGES AFTER MITIGATION   ($ per event)

**Expected Annual Damages After Mitigation** take into account the annual probabilities of floods of each depth. **Expected Annual Damages** are the **AVERAGE** damages per year expected over a long time period. "Expected annual" does not mean that these damages will occur every year.

**Expected Annual Damages After Mitigation** also take into account the effectiveness of the mitigation measure at each flood depth. For some mitigation projects such as relocation or buyout, the **Expected Annual Damages After Mitigation** will be zero. For other mitigation projects such as elevation or flood barriers, **Expected Annual Damages After Mitigation** will be lower than before mitigation but not zero.

For each flood depth, **Expected Annual Damages After Mitigation** are calculated by multiplying the **Scenario Damages** times the **Expected Annual Number of Floods** of each depth.

The **Expected Annual Damages After Mitigation** table (shown above) contains expected annual damages AFTER mitigation for each flood depth from -2 to 18 feet for six categories of **avoided** damages and losses: building damages, contents damages, displacement costs, business income losses, rental income losses, and lost public/nonprofit services. In addition, the total damages and losses AFTER mitigation are shown for each flood depth.

**Interpreting Damages After Mitigation**

The **Scenario Damages After Mitigation** and the **Expected Annual Damages After Mitigation** provide, **in combination**, a complete picture of the vulnerability of the building to flood damages after completing a mitigation project.

# BENEFITS

Benefits are damages and losses avoided because of the mitigation project. In other words, benefits are the difference in damages before and after the mitigation project. The **Expected Annual Benefits** of a mitigation project are the expected annual AVOIDED damages and losses. Thus, **Expected Annual Benefits** are the difference between **Expected Annual Damages Before Mitigation** and **Expected Annual Damages After Mitigation**.

# EXPECTED ANNUAL BENEFITS FROM MITIGATION    ($)

**Expected Annual Benefits Table**

| Flood Depth | Building Damages | Contents Damages | Displacement Costs | Business Losses | Rental Losses | Public/ Nonprofit | Total |
|---|---|---|---|---|---|---|---|
| -2 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| -1 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| 0 | $387 | $174 | $0 | $26 | $0 | $534 | $1,121 |
| 1 | $235 | $106 | $0 | $16 | $0 | $324 | $680 |
| 2 | $114 | $51 | $42 | $8 | $11 | $158 | $384 |
| 3 | $53 | $24 | $25 | $4 | $6 | $74 | $186 |
| 4 | $20 | $9 | $10 | $1 | $2 | $28 | $70 |
| 5 | $6 | $3 | $3 | $0 | $1 | $8 | $20 |

This table shows the **Expected Annual Benefits** arising from the specific mitigation project under evaluation.

The **Expected Annual Benefits Table** (shown above) contains expected annual benefits for each flood depth from -2 to 18 feet for six categories of **avoided** damages and losses: building damages avoided, contents damages avoided, displacement costs avoided, business income losses avoided, rental income losses avoided, and lost public/nonprofit services avoided. In addition, the total damages and losses avoided after mitigation are shown for each flood depth. The **Total Expected Annual Benefits** due to the mitigation project are the sum of the **Total Avoided Damages and Losses** over all of the flood depths.

## BENEFIT-COST RESULTS

This section of results has three subsections:
1.   **Reference Information From LEVEL ONE Data,**
2.   **Summary of Expected Annual Damages and Benefits,** and
3.   **Summary of Project Benefits and Project Costs.**

## REFERENCE INFORMATION FROM LEVEL ONE DATA

| | |
|---|---|
| Discount Rate (%) | 7 |
| Project Useful Life (years) | 20 |
| Present Value Coefficient | 10.59 |

**Discount Rate**

The **Discount Rate** entry is determined by OMB/FEMA policy and cannot be varied by the user on a project-by-project basis.

On October 29, 1992, OMB issued Circular A-94, Revised (Transmittal Memo No. 64), "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs."  In this Circular, OMB states that the appropriate discount rate varies depending on whether or not the investment (i.e., project) is an "internal Federal government investment."

For FEMA-funded hazard mitigation projects for state and local governments (or eligible nonprofits), the OMB-mandated discount rate is the rate applicable for investments which are **not** internal Federal government investments.  The OMB-mandated discount rate corresponds approximately to the 30-year Treasury bond rate, but the appropriate rate is specifically fixed by OMB annually.  Currently, the OMB-mandated discount rate is 7% (see Appendix C of Circular A-94).

For each disaster, an appropriate discount rate should be determined by FEMA, in accordance with the OMB guidance, and applied **uniformly** to all hazard mitigation projects being considered.  The discount rate determined for each disaster is entered in the **RED** box under **LEVEL ONE Data**.  After this rate is determined and entered **ONCE**, it can then be used for analysis of **ALL** hazard mitigation projects for this disaster.