CHAPTER 6
BENEFIT-COST PROGRAM: LEVEL ONE ANALYSIS

Introduction

This chapter provides guidance on conducting a **LEVEL ONE (Minimum Data)** benefit-cost analysis; defines the data input terms; and provides hints on making reasonable estimates when exact data are not available. The **LEVEL ONE Data** entries **MUST** be completed whether or not a **LEVEL TWO** analysis is subsequently conducted.

See **Chapter 5, Benefit-Cost Program: Guidance**, for general guidance on benefit-cost analysis, including: the use of exact data vs. estimates, when to use **LEVEL ONE (Minimum Data)** vs. **LEVEL TWO (Detailed)** benefit-cost analysis, and other helpful hints.

See **Chapter 3, Program Basics**, and **Chapter 4, Tutorial**, for basic information on moving around within data entry screens, entering data, erasing mistakes, etc. See the Quattro Pro Manual for detailed technical information about the spreadsheet program.

Data Differences: Public, Commercial, & Residential Buildings

The Benefit-Cost Program can be used to evaluate hazard mitigation projects for a wide range of building uses, including public/nonprofit, commercial, residential, and mixed-use buildings.

Generally, the data requirements are similar for different building uses. However, any data entries which are not applicable to the building under evaluation may be left blank or zeros may be entered. For example, in a completely public/nonprofit or residential building, leave blank or enter zeros for any entries which pertain to business income.

There are six types of avoided damages and losses (i.e., benefits) which are considered in the program: building damages, contents damages, displacement costs, business income losses, rental income losses, and lost public/nonprofit services. In some circumstances it may not be necessary to consider all of these avoided damages and losses, even if they are applicable to the building under evaluation.

If benefit-cost analysis is being used **ONLY** to establish minimum eligibility for funding and **NOT** to prioritize projects, then once sufficient benefits are considered to exceed the project costs, it may not be necessary to consider additional benefits. For example, if the benefits of only avoiding building damage exceed costs, then it may not be necessary to consider any of the other damages and losses avoided.

If desired, data can be entered sequentially. For example, enter data applicable to building damages only, then review the benefit-cost ratio to see if it is greater than one. If so, then other data entries can be left blank. If not, then contents damage data, displacement costs, etc., can be entered sequentially until benefits exceed costs, i.e., the benefit-cost ratio is greater than one. In other words, it may not be necessary to consider some of the more complicated damages and losses, such as the value of government services lost if projects can be demonstrated to be cost-effective by avoiding only building and contents damages.

However, if benefit-cost ratios are used to prioritize among projects with benefit-cost ratios greater than one, then it is important to count fully all of the benefits applicable to each project.

Data Input: Color Codes

Each entry is color coded. See Cell Colors, page 3-11, or **Model** and **Color Codes** on the Benefit-Cost Program menu.

User data entries can be made only in **PINK, GREEN, BLUE** or **RED** blocks:

PINK BLOCK	**Information Only**: entries do not affect the numerical results;
GREEN BLOCK	**Data Input**: entries affect the numerical results;
BLUE BLOCK	**Override Default Values**: entries affect the numerical results;
RED BLOCK	**OMB Policy**: entries determined by OMB/FEMA policies and affect the numerical results.

Blocks colored **ORANGE, YELLOW,** and **PURPLE** and all other parts of the program are protected. User entries cannot be made in these blocks. To change information in **PURPLE blocks (Carry Over)** the original data entries in the **PINK** or **GREEN** blocks must be changed.

As you enter data, remember the color codes!

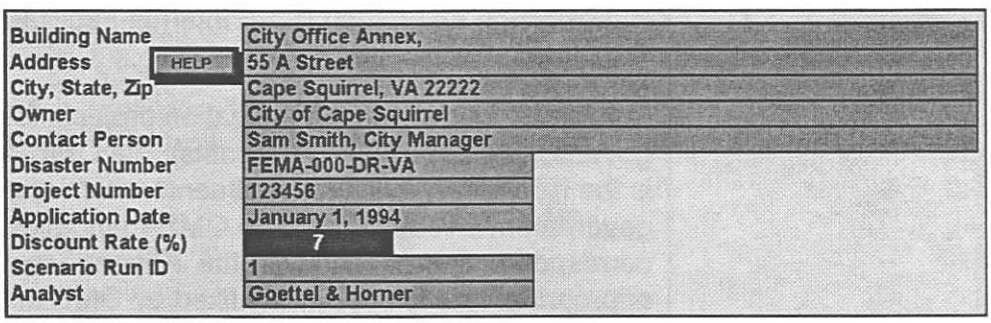
LEVEL ONE DATA

Introduction

To conduct a **LEVEL ONE (Minimum Data)** benefit-cost analysis, only the **LEVEL ONE Data** and the **Flood Hazard Data** must be entered. To conduct a **LEVEL TWO (Detailed)** benefit-cost analysis, additional building-specific data may be entered. See **Chapter 5, Benefit-Cost Program: Guidance**, for a discussion of the differences between **LEVEL ONE** and **LEVEL TWO** analyses. See **Chapter 8, Benefit-Cost Program: Level Two Analysis**, for a detailed review of conducting a **LEVEL TWO** analysis.

PROJECT INFORMATION

These data entries describe the building and hazard mitigation project under evaluation.



Building Name
Address
City, State, Zip

PINK Blocks (Information Only). These entries contain basic identifying information about the building being evaluated: **Building Name, Address, City, State and Zip Code**.

Help

When entering the address (or any combination of letters and numbers which begin with a number), remember to first type an apostrophe (') followed by the number and street name. See Chapter 3, page 3-13.

Owner

PINK Block (Information Only). The building's **Owner** may be an agency, a private party, etc. Building ownership may affect eligibility for hazard mitigation funding.

Contact Person

PINK Block (Information Only). The **Contact Person** is someone who could, if needed, provide additional information about the building to the analyst.

Disaster Number

PINK Block (Information Only). The **Disaster Number** is a unique number assigned by FEMA for each disaster.

Project Number

PINK Block (Information Only). The **Project Number** may be the DSR number assigned by FEMA or any other identifying number.

Application Date

PINK Block (Information Only). The **Application Date** is the date when the application was submitted to FEMA.

Discount Rate (%)

RED Block (OMB Policy). 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 Block**. After this rate is determined and entered **ONCE**, it can then be used for analysis of **ALL** hazard mitigation projects for this disaster.

The discount rate is determined by OMB Guidance and is NOT a user-defined parameter for FEMA-funded projects.

Scenario Run ID

PINK Block (Information Only). The **Scenario Run ID** provides a place to enter a Run Number or identifying name to distinguish this particular benefit-cost analysis from others. In some cases, multiple analyses of the same project may be run with different sets of input assumptions to explore the sensitivity of results to changes or uncertainties in input data.

Analyst

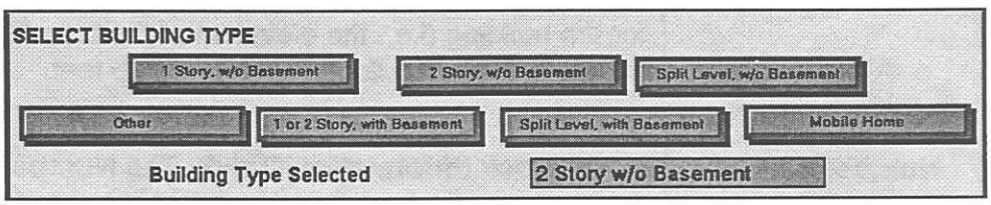
PINK Block (Information Only). The **Analyst** block identifies the person principally responsible for the benefit-cost analysis. The analyst's name is displayed automatically in small type on the bottom of each printed page and on the cover page of the printed report.

BUILDING DATA

BUILDING TYPE

The building's construction type is very important for the benefit-cost analysis because many of the numerical values in the program, including the amount of damage a particular building type is expected to sustain under different flood depths, depend on the building type.

GREEN Button (Data Input). Select the **Building Type** by clicking on the appropriate green and gray button which applies. This entry determines many of the default parameters. The selected building type appears in the purple cell labeled "Building Type Selected."



The building types on the **Select Building Type** buttons are the six Federal Insurance Administration (FIA) building types. If one of these six types is selected, default depth-damage functions are used by the program to estimate flood damages. To view the default depth-damage function for the building type selected, choose **Level Two Data | Building Depth-Damage Function** from the program menu, or see the Default Depth-Damage Function Table on page 8-4.

If the building under evaluation is not one of these FIA types, then a **LEVEL TWO** analysis of the building depth-damage function **MUST** be done. The closest type building type may be selected to provide a depth-damage function for reference, but a building-specific depth-damage function appropriate for the building **MUST** be entered. See

Chapter 8, Benefit-Cost Program: Level Two Analysis, page 8-2, for information about entering building-specific depth-damage functions. If **Other** is selected for building type, no default depth-damage functions can be provided for a **LEVEL ONE** analysis and a **LEVEL TWO** analysis **MUST** be conducted for the **Building Depth-Damage Function AND** for the **Contents Depth-Damage Function**.

BUILDING INFORMATION

This section contains entries for the **Zero Flood Depth Elevation** and three descriptive categories for the building.

Zero Flood Depth Elevation

GREEN Block (Data Input). The **Zero Flood Depth Elevation**, as defined by the Federal Insurance Administration, is the elevation in feet of the top of the finished flooring of the lowest finished floor.

The **Zero Flood Depth Elevation** of the building under evaluation is particularly important because it markedly affects the degree of flood risk for the building, and thus markedly affects the benefits of avoiding future flood damages.

Zero Flood Depth Elevations can be obtained from surveying data if available, or may be estimated from observed flood data. For example, if the flood was known to have had an elevation of 463 feet in a neighborhood and the flood depth in a building was 4.5 feet above the **Zero Flood Depth Elevation**, then the **Zero Flood Depth Elevation** for the building (i.e., the elevation of the top of the finished flooring of the lowest finished floor) must be 458.5 feet.

Number of Stories Above Grade

PINK Block (Information Only). The **Number of Stories Above Grade** may affect engineering judgment about the building's vulnerability to flood damage. Taller buildings will have lower percentages of flood damage at a given flood depth because only the lower story or stories will be directly affected by flood waters.

Construction Date

PINK Block (Information Only). The **Construction Date** is included to provide guidance about the building's vulnerability to flood damage because construction practices change with time. In the absence of more detailed information, knowing the construction date may help a knowledgeable engineer to make informed judgements about probable construction materials and details which may be relevant to a building's depth-damage function.