

SMART CHOICES: UNDERSTANDING THE COST OF DEVELOPMENT

USER'S GUIDE FOR MARC'S COST OF DEVELOPMENT TOOL [MARC_CODT.XLS]

PREPARED FOR:



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HAMMER, SILER, GEORGE ASSOCIATES
1638 Pennsylvania Street
Denver, Colorado 80203

and

GOULD EVANS GOODMAN ASSOCIATES
4041 Mill Street
Kansas City, Missouri 64111

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**SMART CHOICES: UNDERSTANDING THE COST OF DEVELOPMENT
COST OF DEVELOPMENT TOOL
(MARC_CODT.XLS)**

INTRODUCTION

The Mid-America Regional Council (MARC) initiated the *Creating Quality Places* program to foster the development of quality places and enhance the quality of life throughout the Kansas City region. MARC, through this program, is working to engage the regional community in a dialogue about how the design and function of land development impacts community character, mobility and fiscal responsibility.

The current *Cost of Development Study* is the third in a series of studies by MARC to further the *Creating Quality Places* program. This study analyzes private sector development costs associated with “conventional” land development, typified by suburban-style development, and “alternative” or traditional land development patterns based on the *Creating Quality Places* principles. Private development costs most sensitive to the pattern of development were studied using a case study approach applied to six prospective development projects in the Kansas City region. Estimated differences in development costs demonstrated reductions in such costs by employing the *Creating Quality Places* principles. As such, savings afforded by application of these principles represent additional profit margins for developers or opportunities to lower the sales prices of units.

A description of the case study approach, the “conventional” and “alternative” planning concepts for the six sites, and results of the analysis are contained in *SMART CHOICES: Understanding the Cost of Development, An Element of Creating Quality Places*, published by MARC in December, 2001. Electronic versions of that report can be downloaded from MARC's Website (<http://www.marc.org/Community/codreport.pdf>), and printed copies are available from MARC.

A second objective of the *Cost of Development Study* was to develop a planning model for application by local government officials and the real estate development community to explore the development cost implications of *Creating Quality Principles* for other projects under consideration. This document is a companion to the report cited above, presenting an overview and user's guide for MARC's Cost of Development Tool, a spreadsheet based program. Copies of the program can also be downloaded from MARC's Website (http://www.marc.org/Community/marc_codt.xls).

COST OF DEVELOPMENT STUDY

An objective of the *Cost of Development* study was to estimate the differential development costs associated with current land development practices and those reflecting the *Quality Places* principles. MARC and the consultant team worked with a committee of local government and private stakeholders to identify six development projects as case studies for this study. These projects are generally located in rapidly growing areas of the Kansas City region, and typify the opportunities to incorporate the *Quality Places* principles into new developments. The six sites are listed below and shown on the accompanying map:

1. Arbor Park—a 364-acre site in Lee's Summit, Missouri.

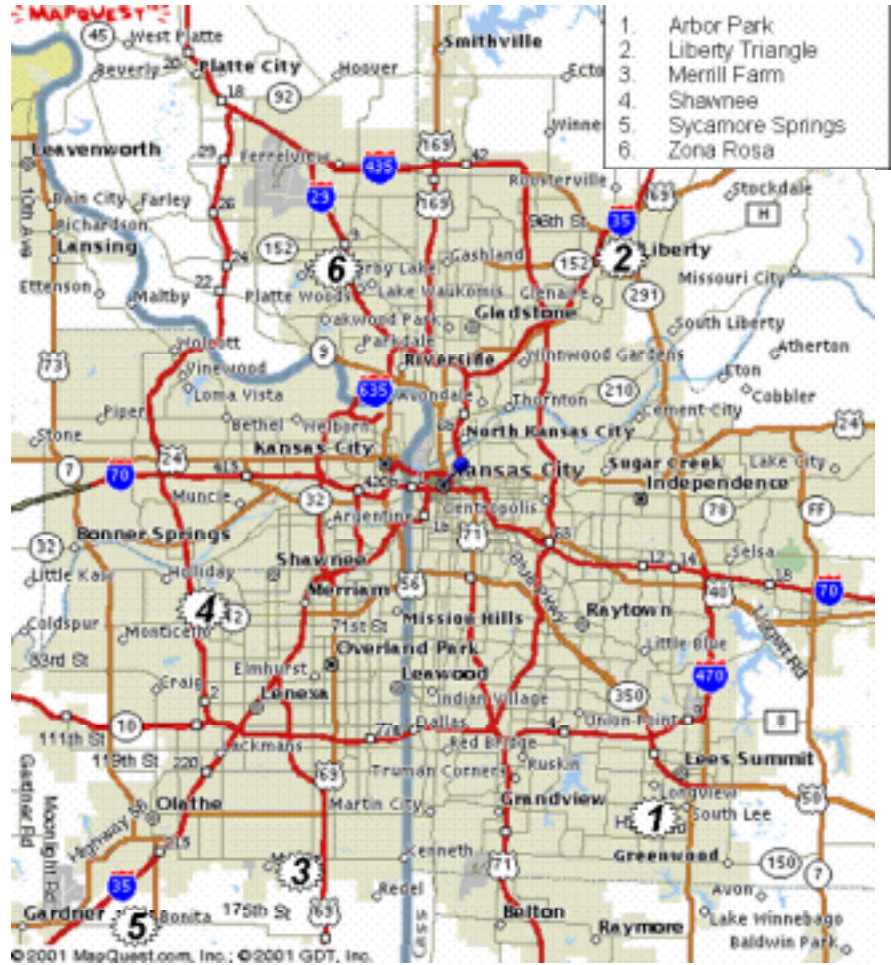
2. Liberty Triangle—a 68-acre commercial and residential site in Liberty, Missouri.

3. Merrill Farm—a 300-acre tract just south of Overland Park, in Johnson County, Kansas.

4. Shawnee—a 450-acre site at the intersection of I-435 and Shawnee Mission Parkway in Shawnee, Kansas.

5. Sycamore Springs—a 300-acre tract of farmland in Johnson County, Kansas.

6. Zona Rosa—a 70-acre site on the northwest corner of the intersection of Barry Road and I-29 in Kansas City, Missouri.



Conventional and alternative concept designs were developed for each site based on its topography, existing nearby land uses, and input from local planning officials and real estate developers concerning the feasibility of implementation. Two sites, Shawnee and the Liberty Triangle, are prototype sites for MARC's related study on transit supportive development. For information on that project see MARC's report *Transit Supportive Development: Prototypes for Metropolitan Kansas City*, also available from MARC or its website.

The quantitative analysis estimated the infrastructure development costs for the two concepts for each project. Since the case studies provide the basis for the generic, replicable cost of development tool, the analysis was limited to parameters, such as density and infrastructure specifications, that are expected to vary due to underlying differences in the two concepts. Site-specific variables such as lot grading and other topography-related costs, off-site utilities, land acquisition and redevelopment costs were not considered. Furthermore, public sector costs were not addressed as reviews conducted with local planning and public works staffs indicated little if any difference in the public service costs associated with the two concepts.

COST OF DEVELOPMENT TOOL OVERVIEW

The case studies demonstrated the comparative development costs of implementing the *Creating Quality Places* principles. Those case studies also provide a basis for generalizing those results in the form of an analysis tool that can be applied to projects under consideration elsewhere in the Kansas City metropolitan area. Developing the MARC Cost of Development Tool (MARC_CODT) entailed six basic steps:

- Outlining its underlying logical structure.
- Determining the input variables required and outputs to be produced.
- Calibrating the quantitative relationships to be imbedded in the MARC_CODT.
- Selecting the software environment and completing the programming.
- Testing the MARC_CODT using data from the six case studies.
- Preparing this User's Guide describing the functioning and use of the MARC_CODT.

The companion report, *SMART CHOICES: Understanding the Cost of Development, An Element of Creating Quality Places*, discusses the first five of those steps. The remainder of this report briefly reviews the logical structure of the MARC_CODT and provides a guide to its use.

Logical Structure

Data availability, the level of analysis supported by the development concepts and other issues addressed during the study dictated a logical structure for the MARC_CODT in which acres of land use, by type, the density of development and infrastructure design criteria are the principal inputs used to estimate development costs differences associated with alternative development patterns. These inputs are combined with coefficients derived from the case studies to estimate infrastructure development costs. Outputs include overall estimated infrastructure development costs and average costs on a *per unit* basis (dwelling unit for residential and square footage for nonresidential).

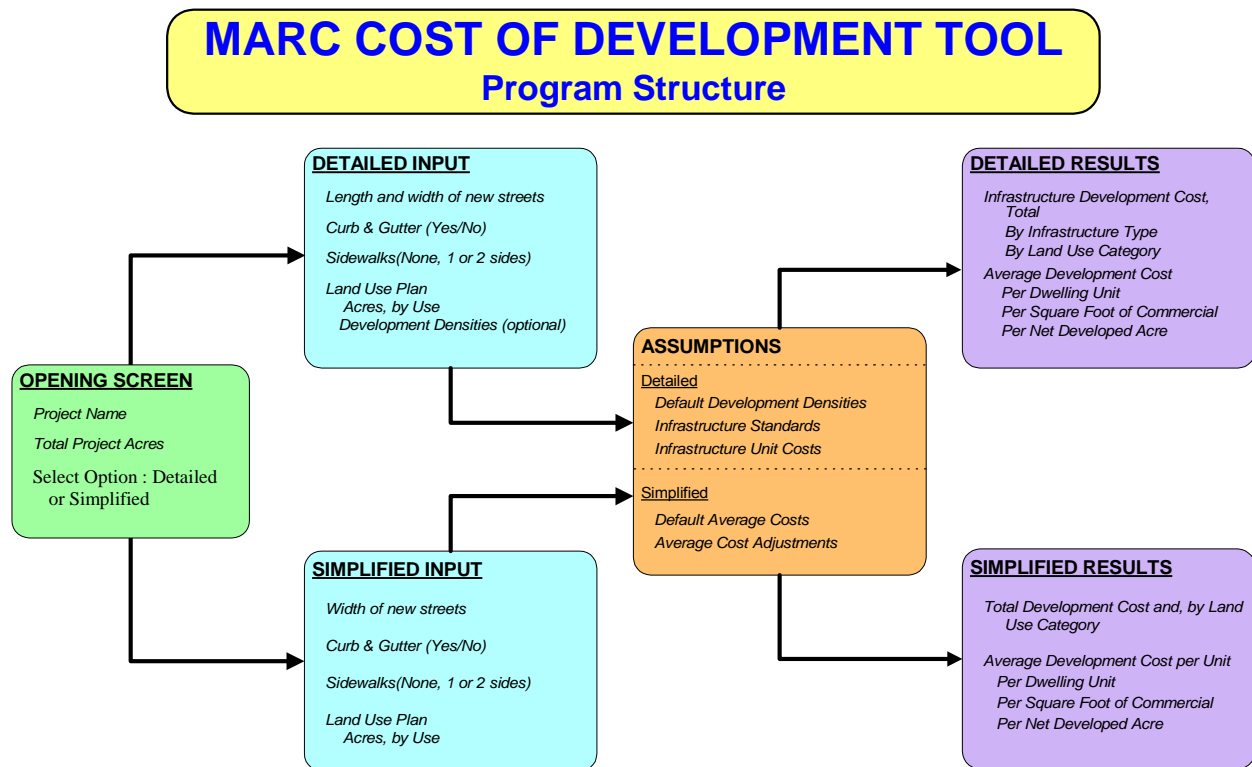
A decision to focus the *Cost of Development Study* on the cost implications for individual, smaller scale projects, rather than regional scale or "urban sprawl" development patterns, allowed several simplifying assumptions to be made. First, public sector revenues and costs are not included in the analysis. Second, off-site development costs would not vary significantly and therefore, could also be excluded from the analysis. Finally, raw land acquisition costs are ignored because it is assumed that the test of options will be applied to a given site that is already under control by the proponent.

The process of developing and analyzing the conventional and alternative development concepts for the six case studies revealed that two variants of the CODT were needed. A *detailed* approach, akin to that employed for the case studies, requires a substantial level of detail regarding the planned development concepts. Not every user would be at that stage and that some users may want to perform a quick test, at a more general level, before deciding to proceed with more detailed planning. This called for a *simplified* approach for application with limited

input at a relatively abstract level. Rather than calculating the costs, the *simplified* approach uses default per unit costs for each land use that were derived from the case studies. However, both approaches should follow a consistent logical structure.

Figure 1 below illustrates the logical structure for the MARC_CODT in a flow chart format. Each box represents a separate program module and the heavy lines and arrows indicate the flow of information (data, intermediate computations, and so forth) from entry through to the results. As shown, the program structure and flow of the *simplified* and *detailed* approaches parallel one another, varying only with respect to the level of detail.

Figure 1



Software Environment

MARC_CODT operates in a computerized spreadsheet programming format, specifically Microsoft Excel ®. Excel was chosen based on the ease of programming, its wide acceptance and large installed user base in both the public and private sectors, its suitability to quantitative analysis, and flexibility in formatting outputs. For more advanced users, Excel programs are also relatively “transparent” with respect to their structure and operations, underlying mathematical relationships, use of constants and logical formulas, and ease of modification. Finally, Excel offers a straightforward, simple user interface.

MARC_CODT was created using the Office XP version of Microsoft Excel. However, it has been saved in a format compatible with the following versions of Excel: 5.0/95, 1997, 2000 and 2002. Some formatting options available with Office XP may be lost if one of these earlier

versions of Excel is used, for example, the use of colors on the worksheet tabs, but the underlying functionality and integrity of the program is unaffected.

Target Audience and Base Knowledge Requirements

MARC_CODT was specifically developed for use by local government planning staffs and members of the real estate development community in the Kansas City region. At the same time, the program may be of interest to a wider audience interested in issues related to the relationships between land use, development patterns, real estate development economics, urban form, and public sector fiscal conditions.

Given the likely audience and subject matter involved, development of MARC_CODT and preparation of this user's guide are predicated on the assumption that users will have a basic understanding of PC operations, Excel, and Excel terminology and features. For example, users are assumed to have the Excel application installed on their PC or network, to be able to start the Excel application program and locate and open a specific file, e.g., MARC_CODT.XLS, using either the Menu Bar or Standard Toolbar. Thus, instructions for such tasks are not provided in this guide.

A basic understanding of planning and development terminology and concepts is assumed. The user's guide does not address issues such as compatible land use mixes, planning densities, infrastructure design specifications, or site suitability for development, although these and other factors are important determinants of the reasonableness of a development concept envisioned for a particular site. Some constraints are incorporated into MARC_CODT to preclude unreasonable concepts, and by extension, unreasonable and unreliable results. However, the responsibility for formulating reasonable concepts remains with you, the user. The remainder of this user's guide will adopt the protocol of referring to users using the simple pronoun "you."

MARC_CODT.XLS Master File

MARC_CODT consists of a single Excel workbook. A master, "READ-ONLY" version of the program is saved with the filename, MARC_CODT.XLS. (The program is available to be downloaded from MARC's Website, http://www.marc.org/Community/marc_codt.xls.) The READ-ONLY file status is password protected, preventing its being overridden. The protected status insures that a clean, error-free version of the model always remains available to you.

Every time you open the master file, for instance, to begin a new analysis, a message box will appear advising you of the file's protected status. You are provided the option to cancel the file open operation or to open the file as a READ-ONLY (see Figure 2 on the following page.) Choose the READ-ONLY option to continue. The master file will then open. However, the file remains READ-ONLY. A reminder of this appears in the top line of the visible window (see Figure 3 on the following page.) The READ-ONLY status does not prevent you from entering data for project studies or from making changes to the program itself. However, if you wish to save your work, you must assign the modified file a new file name. The modified file will not be READ-ONLY and the message box will not appear when you open that new file.

Figure 2

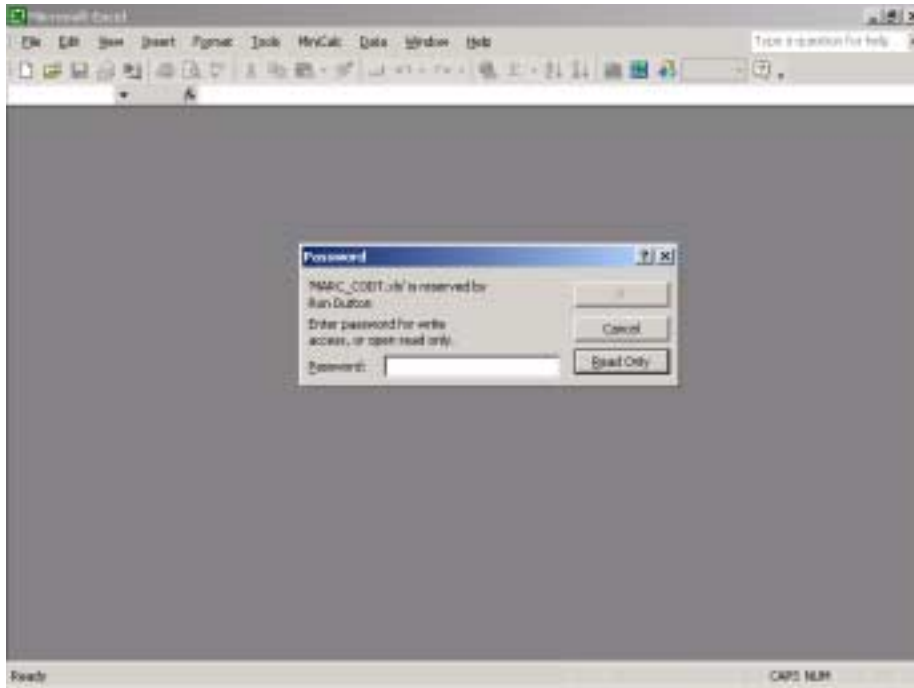
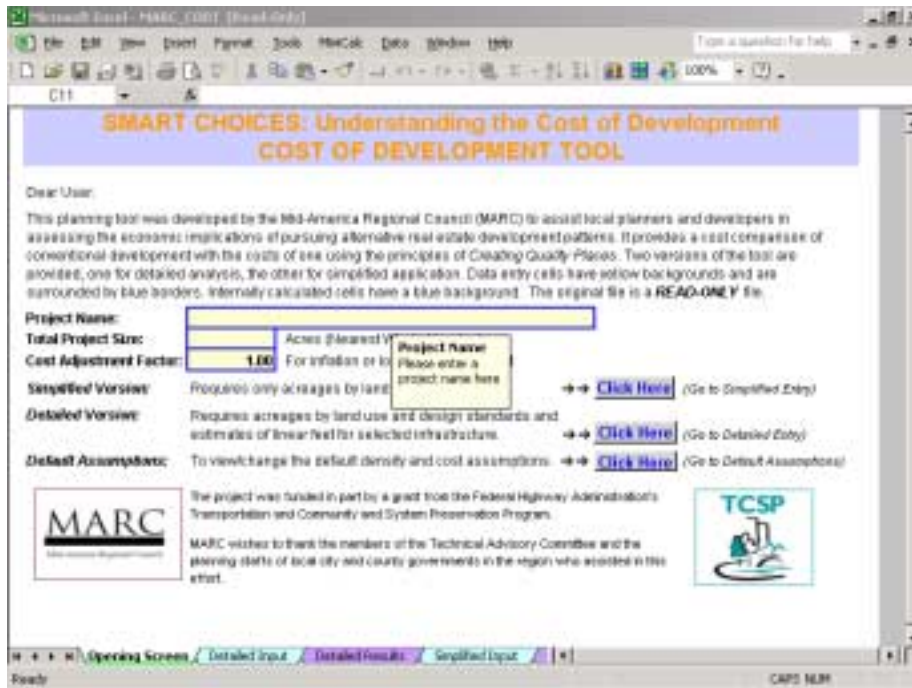


Figure 2 shows the message box that appears when you first try to open the MARC_CODT.XLS master file. The file is READ-ONLY to prevent accidental over-writing of the file or saving changes that destroy the underlying formulas and linkages.

When you get this message, Click the “Read Only” button to continue.

Figure 3

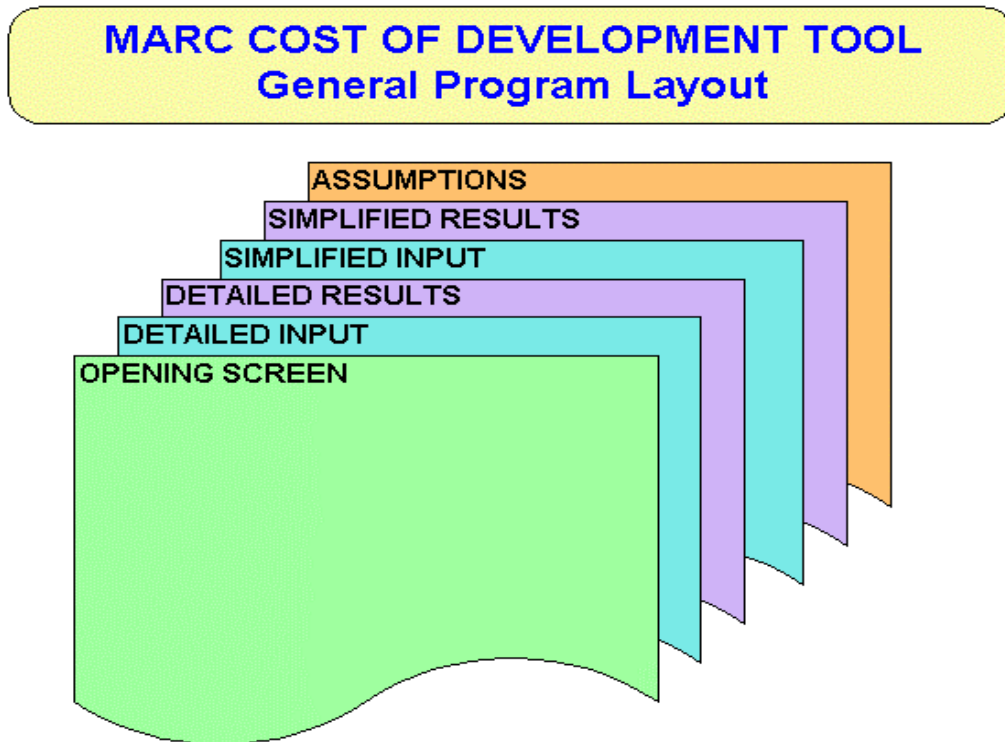


After you Click on the “Read Only” button, the master file will open. However, the file remains READ-ONLY, as is shown on the top line in the Excel window – see Figure 3. To save any project specific data or changes to the program itself, you must use the Save As command and assign the program a new file name. The new file will not be READ-ONLY.

MARC_CODT Workbook Structure

Each of the six program modules shown in Figure 1 above is on a separate tabbed worksheet within the MARC_CODT workbook. Separating the modules onto individual worksheets promotes ease of use by segregating project inputs from the underlying assumptions and outputs and provides formatting flexibility for both on-screen and printed versions of the program tables. A schematic representation of the MARC_CODT model layout, including the names of the six worksheets, is shown below. The worksheet names and their functions are self-explanatory. Note that the worksheet names appear on tabs near the bottom of the actual Excel screen.

Figure 4



Navigating the Worksheets

Navigating around the MARC_CODT program is relatively easy. Excel's basic navigation modes remain enabled. You can use a GOTO command and select from the available locations, or you can use the mouse to left-click on the desired tab at the bottom of the page, then navigate to the desired cell using your mouse or the arrow keys on the keyboard. An easier means to navigate the MARC_CODT is by using the grey-shaded navigation buttons like those appearing to the left. Clicking on those buttons will jump you to a pre-specified cell on the designated worksheet, from where you can resume navigation around the spreadsheet using the mouse or keyboard arrows.

[Click Here](#)

[Click Here to Return to Detailed Input](#)

Several other Excel formatting features are used to aid in navigating around the worksheets and focusing in on the results. First, colors and borders around cells are

used to highlight different functions in the program. Data entry cells are designated by yellow background fills, bordered by a bold, blue line. Cells with a white background contain labels and borders that establish a basic structure for the respective tables. Blue-shaded cells contain formulas, logical functions, and links to other cells. These cells represent various program “outputs.” Typically you would not modify or make any data entries in these cells. A series of basic grey-shaded cells define the outer boundaries of the tables and unused cells within the tables. Thus, they primarily serve a formatting function.

Cell level “protection” is enabled on the individual worksheets. Enabling this feature along with the use of individual cell formats limits cursor movements to selected cells on each worksheet. Thus, entering data in a particular cell and hitting the Enter key will result in the cursor jumping to the next data entry, navigation button or other specified cell. This feature hides the underlying formulas, cell references and other cell entries to be hidden from normal view.

User Note: Passwords are not assigned to the protected cells. You may turn “protection” off, thereby gaining full access to any cell and allowing formulas to be seen. However, if you overwrite a formula with a value, the formula will be lost and you may have to restart with a clean copy of MARC_CODT to have the appropriate linkages and references.

Printing

Print areas have been defined for each worksheet in the MARC_CODT program. The defined print areas and corresponding print setup specifications are set to print each worksheet on a single 8.5” x 11” page using portrait mode. Printing can be initiated using the normal toolbar or menu options. Grey-shaded “print” buttons, similar to the navigation buttons, appear on the two results worksheets and the assumptions worksheet. Clicking these print buttons will print that specific page. Use the print command sequence on Excel’s main menu to print the entire MARC_CODT workbook at one time, checking the “Entire Workbook” option under the Print What heading.

Each printed page will contain a three-part footer at the bottom of the page. The footer will identify the current file name, the date printed, and the worksheet page. This feature is useful in organizing and tracking multiple analyses that may be performed using this program.

Input Variables and Data Entry

MARC_CODT requires a discrete set of inputs for each of the two development concepts in order to estimate the differential in infrastructure development cost. The required inputs characterize the concepts in terms of size (net developed acres), land use mix and infrastructure development standards and also serve other functions. Those functions are to:

1. Create labels on screen and on printed reports to identify the project.
2. Specify criteria for use as lookup references in formulas.
3. Establish land use acreage control totals to help validate data entry.
4. Provide data for use in equations internal to the model.

The two variants of the model differ in the level of input detail supported with respect to development density and infrastructure. Default values, consistent with the appropriate development concepts, are established for many of these inputs and appear in the corresponding cells when MARC_CODT is opened. Labels reminding you about the default values appear in cells immediately to the right of the corresponding data entry cells. Key input variables for the two model variants, and the corresponding data formats, are summarized in the following table.

Input Variable	Data Format	Simplified Approach	Detailed Approach
Project name	Text	•	•
Total project area (gross acres)	Numeric	•	•
Cost Adjustment Factor	Numeric	•	•
Internal street widths	Specify Option	•	•
Is curb and gutter required?	Yes/No	•	•
Are sidewalks required?	Specify Option	•	•
Are sewers and water required	Yes/No		•
Estimated length of infrastructure	Numeric		•
Acres of land use, by category	Numeric	•	•
Development density, by land use	Numeric		•

As shown, four data formats are used in the model:

- *Text* refers simply to any alphanumeric entry. The entry is not constrained; however, the display of lengthy entries on-screen and on printed pages may be truncated by the size of the data entry cell.
- *Numeric* indicates entry of a numeric value equal to or greater than zero. Generally the entry must fall within a specified range and be appropriately formatted. If you wish to alter the default densities in the detailed version, a small message box appears on the screen providing guidance regarding the range limits and format when the cursor is placed in such cells. Enter a value within the limits of the range, following the format shown or described in the box. Entering a value that is not within the limits will trigger a message to that affect and you will be given an opportunity to enter a new value.
- *Specify Option* indicates variables for which a defined list of values exists. When the cursor is placed in one of these cells, a small down arrow appears in a grey box next to the cell. Clicking on the arrow produces a drop-down list in a white box listing the allowable entries. Clicking on one of the entries will place that value in the cell and move the cursor to the next cell. Alternatively, you may enter one of the values directly then hit the Enter key or click on another cell. Entering a value that is not on the list will trigger a message to that affect and you will be given an opportunity to enter another value.
- *Yes/No* is a simple constrained either/or choice. The options appear using a drop-down list.

As discussed above, data input is facilitated by the use of Excel's cell protection feature. When the navigation buttons are used to move to a new worksheet, the cursor will automatically be placed in the unprotected cell nearest the upper, left side of the worksheet. From there you can

jump to another cell using the mouse, or the cursor will move to the next cell each time the Enter key is depressed. This feature is particularly useful when you want to accept the default values, or are modifying a previously saved file and want to jump over a cell without changing the current entry. When data entry on an input page is complete, click on a navigation button to jump to the results or assumptions pages or return to the opening page.

Model Outputs and Results

Input data are combined with other data and mathematical relationships imbedded in the model to derive the comparative costs estimates for the conventional and alternative development scenarios. Outputs derived by the model are summarized below.

Output Variable	Simplified Approach	Detailed Approach
Development Summary (Dwelling units and SF)	•	•
Estimated Infrastructure Development Cost		
By infrastructure type		•
Total	•	•
Average per Acre	•	•
Per dwelling unit and SF	•	•

The estimated average infrastructure development cost per acre, per dwelling unit, and per square foot of nonresidential development are the key outputs. These costs represent the average costs that developers carry forward into the overall construction costs of the product. As such, savings afforded by the *Creating Quality Places* principles represent additional profit potential for the developer or the opportunity to lower the sales prices of units.

An evaluation of the case study results suggests that the detailed approach should be used if a project is suspected to have an unusually high development cost, e.g., due to topography, floodplains, or other unique circumstances. And although the model is set up to compare the conventional and alternative concepts for a given site plan, it can be equally effective in calculating costs for any given development within the range of parameters in the model.

The two results worksheets are formatted such that the results appear at the top of each worksheet and appear on-screen when a navigation button is used to jump to the results worksheets. Summaries of the inputs are carried forward to the results page from the input worksheets and appear below the results. Thus, when a results page is printed, using either the “print” button appearing on these pages or the standard menu or toolbar commands, both the results and the corresponding inputs are printed.

A STEP-BY-STEP GUIDE

Building upon the information provided above regarding the structure and general operating parameters of MARC_CODT, you can now begin to use the program. The remainder of this user’s guide provides a step-by-step tour and guide through the MARC_CODT program. Copies of screen images from the operating program are relied on heavily to describe the

organization and functioning of a particular worksheet and MARC_CODT in general. You are encouraged to have a copy of the program operating as you proceed through this guide.

Several font protocols are used in the step-by-step guide.

- When a specific program module/worksheet is referenced, the name of the worksheet will appear in bold, Arial font, for example, **Opening Screen**.
- Directions to “*Click*” on a cell or navigation button will appear in italics and indicate a single click using the left mouse button. *Double-clicks* using the left button are not needed but can be used to edit a cell entry in cells requiring numeric data. Right-clicks are not necessary during normal operation of MARC_CODT.
- Data entry directions are generically stated as “Enter/Select a value for” This terminology indicates use of either direct manual entry or selection of an available option using the mouse and a *Click*. Using/depressing the **Enter** key to complete manual data entry is assumed and is not explicitly repeated at the end of the data entry instructions.
- Finally, where text that appears on-screen is cited directly, that text appears in simple, nonbolded Arial font, for example, (Default is 28).

Opening MARC_CODT

Locate and open your copy of the MARC_CODT master version on your computer. As described above (see Figure 2), a message dialogue box will appear on screen reminding you that the file is protected and that you can only open it as a READ-ONLY file. *Click* on the **Read-Only** button. If you receive a warning message that the workbook contains “macros,” see the related question and answer on page 28.

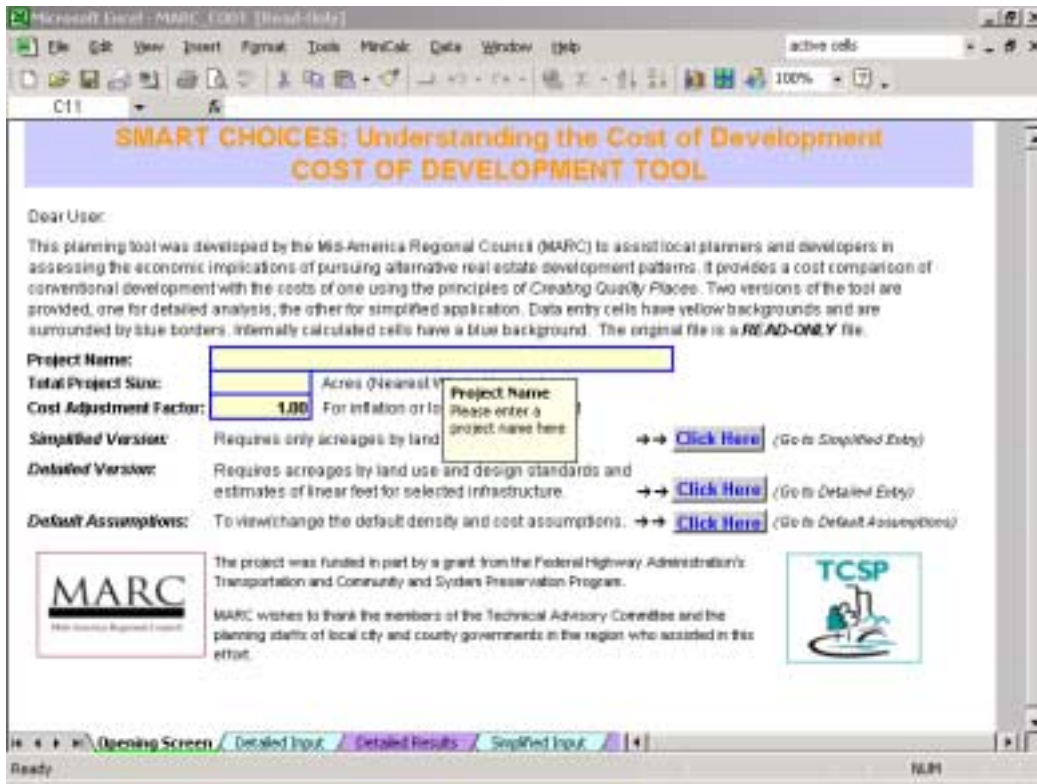
When the program loads and opens, the **Opening Screen** appears – see Figure 5 below.

Note: To save the file you must assign it a different file name. Once you do so, the program will open to the worksheet page where the cursor was located when you last saved it. You can return to the **Opening Screen** using one of the navigation buttons provided in the program.

Opening Screen Worksheet

Function: The **Opening Screen** presents a brief introduction to the program, identifies MARC and the Federal Highway Administration’s Transportation and Community and Systems Preservation Program as the sponsors and contains data entry cells and navigation buttons. Recall that such cells have yellow backgrounds and are bordered by a bold, blue line. The border around the active cell changes to yellow. When the MARC_CODT program is opened, the active cell allows input of a project name.

Figure 5



Data Inputs: The **Opening Screen** contains three data entry cells. Those cells, their function and corresponding data types, and associated message/dialogue boxes are described below.


Project Name: Enter a project name for the specific project being analyzed in the current application of the MARC_CODT. This cell accepts data in *text* format. A message box prompts you to supply a name appears when this is the active cell. The Project Name is carried forward, appearing in the main heading at the top of the input and results worksheets. Entry length is unconstrained; however, only the first 28 characters appear on the other worksheets.

Total Project Size: Enter a value for the total gross acreage of the project being analyzed. This cell accepts data in *numeric* format. A message box prompts you to enter the acreage when this is the active cell. The entered value carries forward to the input and results pages. Entries must be between 5 and 500 acres, inclusive. The entered value serves as a control total for the land use allocations, prompting error messages on both the input and results pages if the acreage allocations by use do not sum to the control total (this subject is discussed further in the sections on the **Detailed Input** and **Detailed Results** pages below.) Because this value serves as a control total, it is suggested that entered values be integers.

Cost Adjustment Factor: Enter a value to adjust all internal cost assumptions by a constant percentage. The adjustments can reflect either general inflation or differences in

local market costs. This cell accepts *numeric* data, entered in decimal format. A message box prompts you to enter a value when this is the active cell. Entries must be between 1.00 and 2.00, inclusive. Entered values are used to inflate the default, base year 2001, cost coefficients contained in the **Assumptions** worksheet. For example, an entry of 1.15 would represent a 15 percent adjustment for inflation over the 2001 base, local market cost adjustments, or a combination of both factors.

Note: One-time cost adjustments for local market conditions can also be entered by changing the default cost coefficients on the **Assumptions** worksheet, reserving the cost adjustment cell for past or future inflation.

Navigation Buttons: Three navigation buttons, like the one shown to the right,  are located on right hand side of the Opening Screen. When data entry is completed, a *Click* on one of these buttons will shift the cursor to a designated cell on the indicated worksheet. The top button shifts to the **Simplified Input** worksheet, the middle button to the **Detailed Input** and the bottom button to the **Assumptions** worksheet.

For the purposes of this step-by-step guide, the **Detailed Input** worksheet will be discussed next.

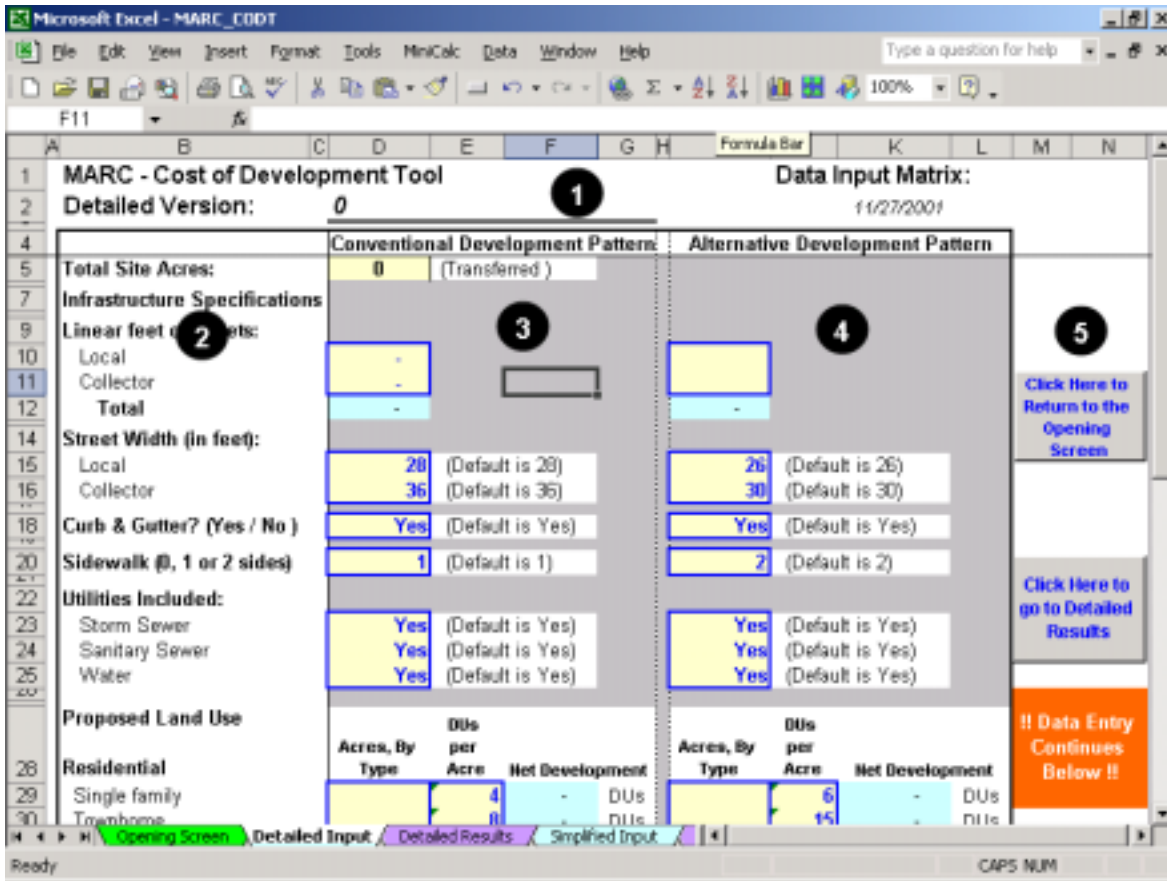
Detailed Input Worksheet

Function: The **Detailed Input** worksheet centralizes the data inputs needed to analyze development costs for projects for which preliminary concept plans and layouts are available. The worksheet contains numerous data entry cells, navigation buttons and several informational messages. When a navigation button is used to access the **Detailed Input** worksheet, the cell intended for entry of the linear feet of local streets for the “conventional” plan is the designated active cell. Figure 7 on the following page shows a version of the **Detailed Input** worksheet. *Note: the numbered black circles and diamonds are not part of the worksheet, but were added here to help describe how to use this worksheet.*

The general layout of the **Detailed Input** worksheet consists of five regions. The first region spans the entire top width of the screen and contains the title the MARC Cost of Development Tool, identifies the worksheet and model variant, a line where the Project Name would appear, the date of the analysis and column headings for the “Conventional” and “Alternative” development concepts. In the example shown, a project name was not entered so a bold “0” appears. This part of the worksheet remains visible as you scroll down the worksheet to enter or review previously entered data.

The remaining four regions are vertically aligned across the page. Beginning on the left, the second region contains row labels for data entry, informational and calculated cells in the two adjacent regions to the right. Those two regions contain data for the “Conventional” (region 3) and “Alternative” (region 4) development concepts, respectively. The side-by-side layout allows easy comparison of the differences between the two concepts and the column headings in region 1 remind you to enter data in the regions for the appropriate concept. The last region, region 5, contains several informational entries and two navigation buttons.

Figure 6



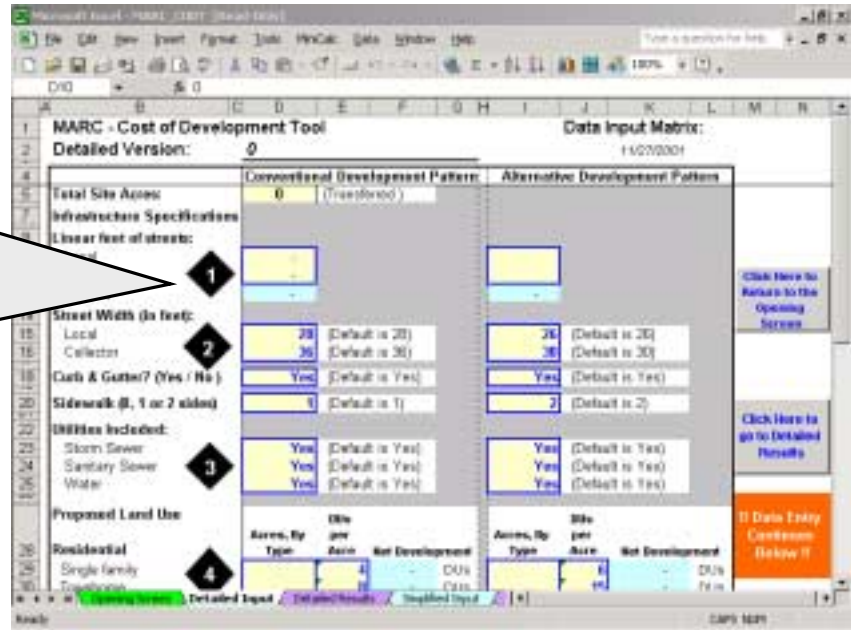
Data Inputs: The **Detailed Input** worksheet contains numerous data entry cells. Those cells, their function and corresponding data types, and associated message/dialogue boxes are described below.

Total Site Acres: This value is transferred from the **Opening Screen**. It serves as a reminder of the total acres of land that should be allocated to various land use categories elsewhere on the worksheet. It also acts as a control total, triggering an error message if the totals are not equivalent.

Linear Feet of Streets: Enter the estimated total linear feet of streets, using approximate centerline measurements, associated with each development concept for the specific project being analyzed in the current application of MARC_CODT. Two cells are provided for each development concept (see the area identified as section 1 on Figure 7 on the following page). The top cell in each column is for local streets; the lower cell is for collector streets within the boundaries of the project. These cells accept *numeric* data in general format, i.e., no commas required. Entries are not constrained. The program sums the two entries for each concept.

Figure 7

Data entry cells on the Detailed Input worksheet are organized by sections (topics) and columns (development concepts). Street lengths are entered in section 1; street widths and associated features in section 2, utilities in section 3 and land use in section 4.



Street Width (in feet): Enter/Select values reflecting the street development standards for interior streets with the project. These widths are back to back (include curb and gutter), but exclude sidewalk requirements. Two data entry cells are provided for each development concept, one to specify widths for the local streets, the other for collectors. Entries for these cells are in the *Specify Option* format and are constrained to values on a drop-down list. The drop-down list is activated when you *Click* in the cell and then *Click* on the small down arrow that appears adjacent to the cell.

Figure 8

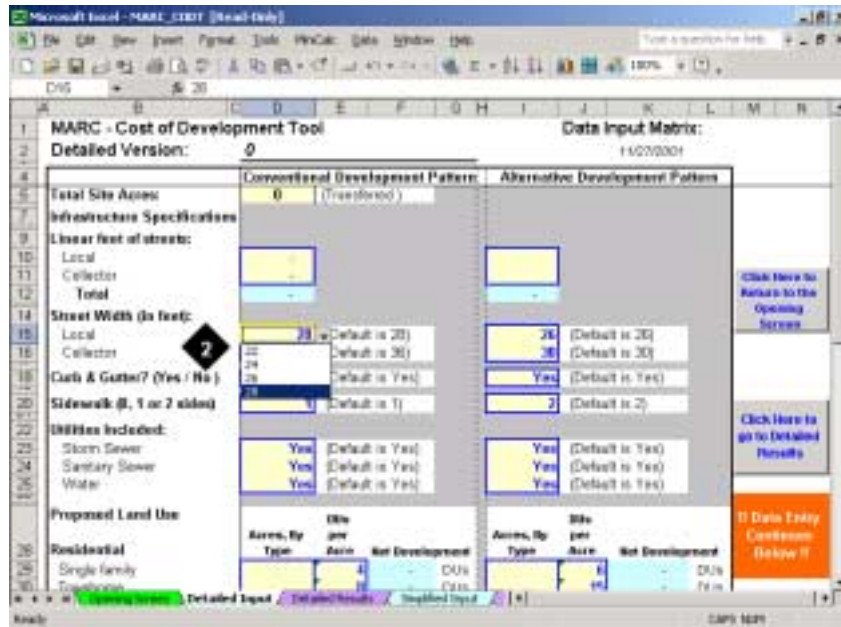


Figure 8 shows an example of a drop-down list. In the example, four options are listed for local street widths – 22, 24, 26 and 28 feet. When a drop-down list appears, the default value is highlighted. You can change the selection using the arrow keys or mouse. When the desired option is highlighted, Click or depress the **Enter** key.

The default choices for the various infrastructure types are also indicated in the adjacent text.

Curb & Gutter: Enter/Select whether curbs and gutters are required for each development concept. These cells are provided in the area identified as section 2 on Figure 7. These cells are in the *Specify Option* format, with “Yes” and “No” the available options on the drop-down list. Selecting “Yes” includes the appropriate costs, based on the total linear feet of streets identified in section 1.

Sidewalks: Enter/Select whether sidewalks are required for each development concept. These cells are provided in the area identified as section 2 on Figure 7. These cells are in the *Specify Option* format, with “0”, “1” and “2” the available options on the drop-down list. Selecting either “1” or “2” includes the appropriate costs, calculated on the basis of the total linear feet of streets in section 1.

Utilities Included – Storm Sewer/Sanitary Sewer/Water: A series of three data entry cells located in section 3 on Figure 7 are used to enter/select which centralized utility systems, storm sewer, sanitary sewer and water, are to be provided under each development concept. These cells are in the *Specify Option* format, with “Yes” and “No” the available options on the drop-down list. Selecting “Yes” includes the appropriate costs, based on the total linear feet of streets identified in section 1.

Proposed Land Use – Residential and Nonresidential, By Category: Enter values for the net developed acres, by land use category, and if you wish to override the defaults, the corresponding planning densities in these clusters of cells in section 4 (see Figure 9 on the following page.) All of the cells accept *numeric* data. There are five data entry clusters for each development concept. Three of those are for entering acreages, under the headings of “Acres by Type” and two are for entering development densities. Land use categories included in MARC_CODT include:

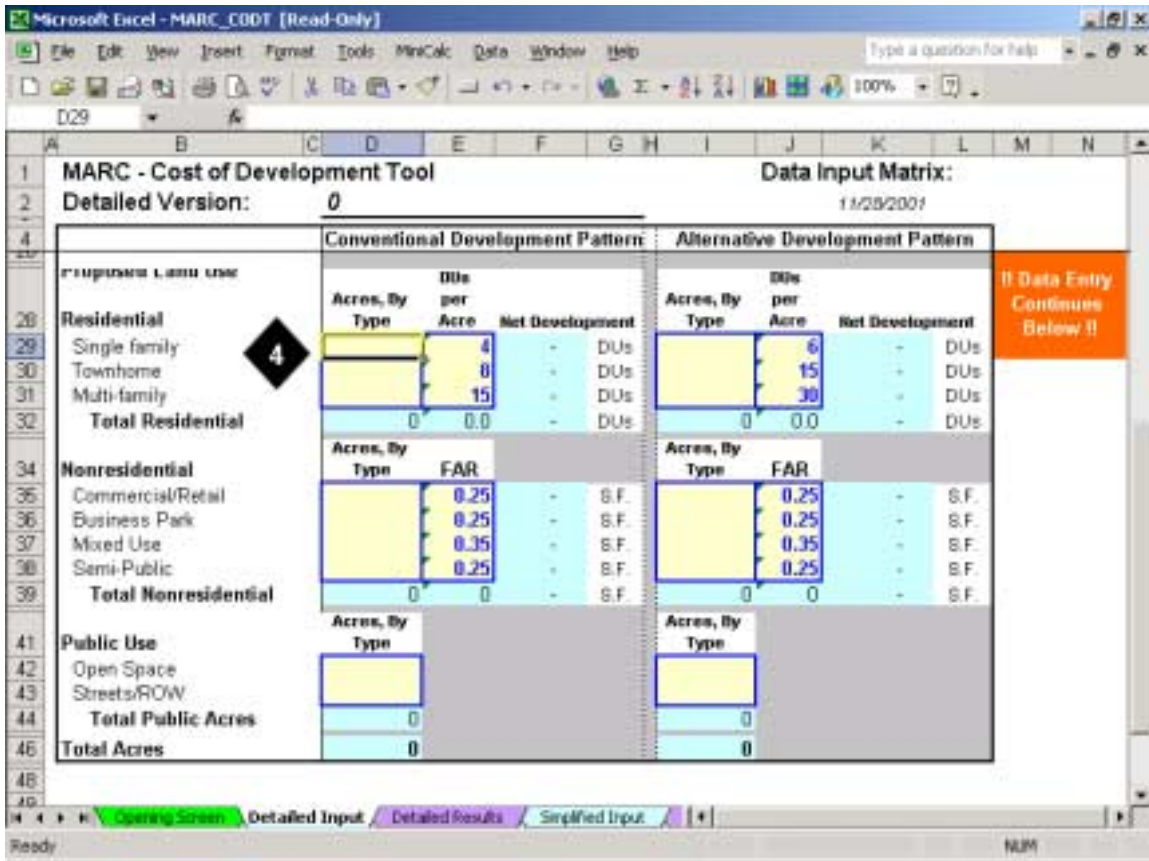
<u>Residential</u>	<u>Nonresidential</u>	<u>Public Use</u>
Single family	Commercial/Retail	Open Space
Townhomes	Business Park	Streets/Right of Way
Multifamily	Mixed Use	
	Semi-Public	

The headings for the development densities are “DUs per Acre” for residential uses and “FAR” for nonresidential uses. Development densities do not apply for the public uses. The MARC_CODT contains default residential densities consistent with the underlying development concepts, for example, 4 DUs per acre for single family residential under the conventional concept.

The residential development densities can be changed by entering a value into the appropriate cells; however, the densities are constrained within specific ranges for each category and concept. Message boxes indicating the ranges appear below the active cell. Entering a value that is not within the defined range will trigger another message indicating an error and you will be given a chance to reenter a valid value.

Note: if you override the default densities and save the file, you cannot automatically restore the built-in references to the **Assumptions** worksheet, but you can recreate the links if you are familiar with Excel programming. If the default densities are inappropriate to your jurisdiction, another option is to alter the defaults in the **Assumptions** worksheet. How you do this is described later in the section on the **Assumptions** worksheet.

Figure 9



Note: Care should be exercised when entering land use data to insure that the sum of the entered values in section 4 exactly equals the gross developable acres entered on the **Opening Screen**. Because MARC_CODT derives development costs estimates on a per developable acre basis, inconsistency in accounting for the total developed acres will invalidate the results. To help avoid such problems, MARC-CODT contains several error trapping formulas that will display a message alerting you to the problem as long as the entered acreages do not sum to the total gross acres. The alerts appear on both the input and output pages. The location of the message alert on the **Detailed Input** is highlighted in Figure 11 on the following page. (The arrows and boxes are added for emphasis and don't appear on the actual program.)

Figure 10

The screenshot shows a spreadsheet titled "MARC - Cost of Development Tool" with a "Data Input Matrix" for "Detailed Version: 0" dated "11/29/2007". The matrix is divided into three main sections: Residential, Nonresidential, and Public Use. Each section has columns for "Conventional Development Pattern" and "Alternative Development Pattern".

Proposed Land Use	Conventional Development Pattern				Alternative Development Pattern			
	Acres, by Type	Units per Acre	Net Development	DUs	Acres, by Type	Units per Acre	Net Development	DUs
Residential								
Single family	7.5	4	10	DUs	4	8	24	DUs
Townhome		8		DUs		15		DUs
Multi-family		15		DUs		30		DUs
Total Residential	7.5	4.0	10	DUs	4	0.0	24	DUs
Nonresidential								
Commercial/retail		0.25		SF		0.25		SF
Business Park		0.25		SF		0.25		SF
Mixed Use		0.25		SF		0.25		SF
Semi Public		0.25		SF		0.25		SF
Total Nonresidential	0	0		SF	0	0		SF
Public Use								
Open Space								
Streets/ROW								
Total Public Acres								
Total Acres	7.5				4			

Red arrows point to error messages in the Public Use section: "Total Acres Don't Match, Check Entries". A black diamond with the number "4" is next to the "Single family" row. An orange box on the right says "Data Entry Conflicts Below".

A message alerting you to a problem in entering the land use acreages appears adjacent to the data entry locations for the public use categories.

Navigation Buttons: Two navigation buttons, similar to the one shown here, are located on right hand side of the **Detailed Input** worksheet. When data entry is completed, a *Click* on one of these buttons will return the cursor to the **Opening Screen**, the other shifts you to the **Detailed Results** worksheet. A “print” navigation button is not included on this worksheet because a summary of the inputs and results can be printed together from the **Detailed Results** worksheet.

Click Here to Return to Detailed Input

Detailed Results Worksheet

Function: The **Detailed Results** worksheet combines the infrastructure specifications and land use data, with cost information in the **Assumptions** worksheet to estimate the development costs for the two design concepts. The results of these computations are shown in cells with blue background fills – see Figure 11 on the following page. No data entry occurs on this worksheet.

The general layout of the **Detailed Results** worksheet consists of four sections. Like the **Detailed Input** worksheet, the first section spans the entire top width of the screen and contains the title the MARC Cost of Development Tool, identifies the worksheet and model variant, a line where the Project Name would appear, the date of the analysis and column headings for the “Conventional” and “Alternative” development concepts. In the example shown, no Project Name was entered so a bold “0” appears. This part of the worksheet remains visible as you scroll down the worksheet to enter or review previously entered data.

The second section is just below the first and presents the streets and utility infrastructure development costs, by infrastructure type. The total costs are also shown. Estimates for the two design concepts appear side-by-side.

Figure 11

Estimated Infrastructure Development Cost		Conventional Development Pattern		Alternative Development Pattern	
Streets	\$ -			\$ -	
Sidewalk	\$ -			\$ -	
Utilities					
Sanitary	\$ -			\$ -	
Storm	\$ -			\$ -	
Water	\$ -			\$ -	
Total Cost	\$ -			\$ -	

Development Costs	Conventional Development Pattern			Alternative Development Pattern		
	Cost	Unit Cost		Cost	Unit Cost	
Land Use						
Single-family	\$ -	\$ -	per DU	\$ -	\$ -	per DU
Townhome	\$ -	\$ -	per DU	\$ -	\$ -	per DU
Multifamily	\$ -	\$ -	per DU	\$ -	\$ -	per DU
Commercial/Retail	\$ -	\$ -	per S.F.	\$ -	\$ -	per S.F.
Business Park	\$ -	\$ -	per S.F.	\$ -	\$ -	per S.F.
Mixed Use	\$ -	\$ -	per S.F.	\$ -	\$ -	per S.F.
Semi-Public	\$ -	\$ -	per S.F.	\$ -	\$ -	per S.F.
Average Cost per Developed Acre	\$ -		per acre	\$ -		per acre

Summary of Inputs	Conventional Development Pattern	Alternative Development Pattern
Total Site Acres:	0 (Transferred)	

The third section assigns the development cost to the various private and semi-public land use categories, derives the average unit costs and reports the average development cost per developed acre.

The comparative development costs per unit is the key indicator of the effective impact of implementing the Creating Quality Places principles on the development economics.

The fourth section of the **Detailed Results** worksheet summarizes the inputs from the Detailed Input worksheet. It appears below the development cost estimates. When this page is printed, both the input and results appear on a single page.

Navigation Buttons: Three navigation buttons, similar to the one shown here, are located on right hand side of the **Detailed Results**. Two of them are designed to transfer you to another worksheet, specifically the Detailed Input and Opening Screen worksheets. A *Click* on the third button will print this worksheet.

Click Here to Return to Detailed Input

Figure 12

The screenshot shows the MARC - Cost of Development Tool interface. The main window is titled 'MARC - Cost of Development Tool' and contains a 'Results Table'. The table is divided into three main sections: 'Development Costs', 'Conventional Development Patterns', and 'Alternative Development Patterns'. The 'Development Costs' section includes rows for 'Utilities' (Gas, Sewer, Water), 'Development Costs', and 'Land Use' (Single-family, Townhome, Multi-family, Commercial/Retail, Business Park, Mixed Use, Semi-Public). The 'Conventional Development Patterns' and 'Alternative Development Patterns' sections each have columns for 'Cost' and 'Unit Cost'. Below the table, there are rows for 'Average Cost per Acre' and 'Total Acres Built Match, Check Entries'. Red arrows point to error messages in these rows. Navigation buttons like 'Click here to Return to the Opening Screen' and 'Click here to return to Detailed Input' are visible on the right side.

Due to the potential implications on the estimated development costs, several messages alerting you to problems with the land use data entry appear on the **Detailed Results** worksheet. The locations where such messages appear are just below the average development costs per acre (as shown on Figure 12) and again at the bottom of the data input summary (not shown). If these messages appear, use the navigation button to return to **Detailed Input** to rectify the problem. Data entry is not permitted on

the **Detailed Results** worksheet.

After you have reviewed and printed the results you may return to the **Opening Screen** to enter data for another project, quit the program without saving the results (using the normal Excel procedures), or save the file with a suitable filename. If you decide to save the file for future use or modification, print the **Detailed Results** worksheet again after you complete the save operation so that the correct filename appears on the bottom of the printed page.

This completes the directions for using the *detailed* approach. The next section describes the implementation of the simplified approach in MARC_CODT and provides instructions on using that approach. As indicated at the outset of this user's guide, that approach is appropriate for use when no preliminary designs are available or you want to do a quick test of the implications of the *Creating Quality Place* principles for a site in a more generic manner. The user instructions for the simplified approach are relatively succinct because the individual worksheet functions, data entry protocols and navigation buttons in the simplified variant of the program are the same as in the **Detailed Input** and **Detailed Results** worksheets.

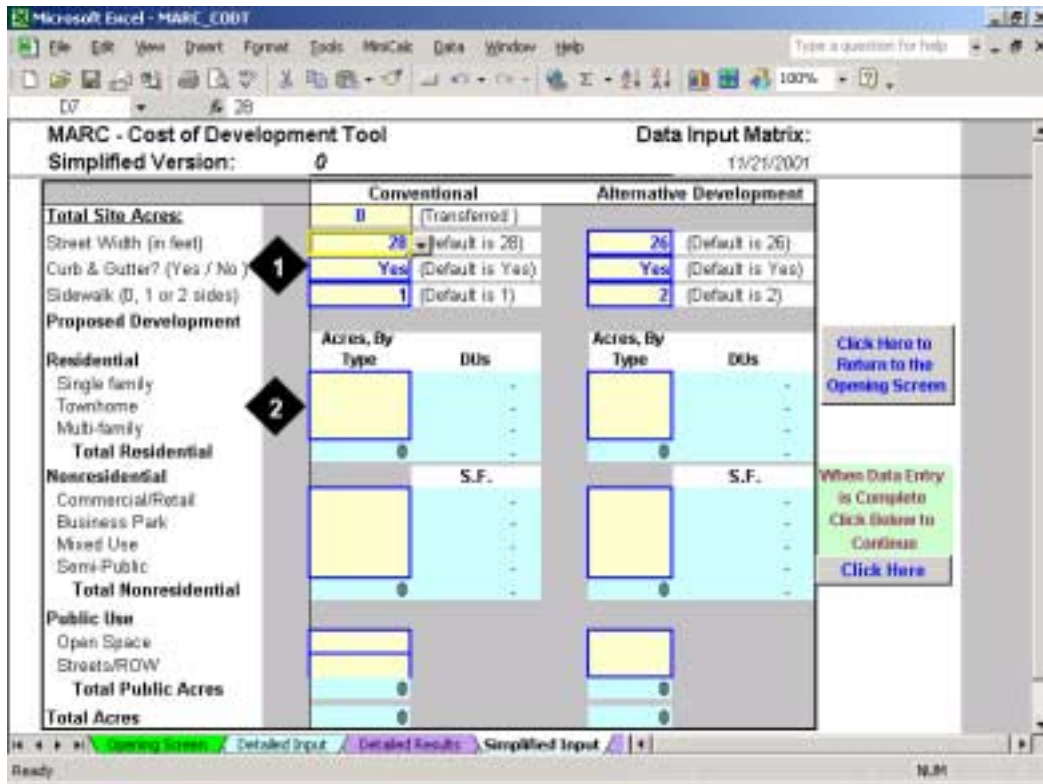
Simplified Input Worksheet

Function: The **Simplified Input** worksheet centralizes the data inputs to analyze development costs for projects for which preliminary concept plans or layouts are not available. The worksheet contains data entry cells, navigation buttons and informational messages. When accessed using a navigation button, the cell entering the street width for the “conventional” plan is the designated active cell in **Simplified Input**. Figure 13 on the following page shows a version of the worksheet. *Note: the numbered black diamonds were added to help describe how to use this worksheet but are not part of the actual worksheet.*

The general layout of the **Simplified Input** worksheet consists of four areas. The first region contains the title the MARC Cost of Development Tool, identifies the worksheet and model variant, a line where the Project Name would appear, the date of the analysis and column headings for the “Conventional” and “Alternative” development concepts. It spans the entire width of the screen. In the example shown, no Project Name was entered so a bold “0” appears. This part of the worksheet remains visible as you scroll down the worksheet to enter or review previously entered data.

The remaining areas are vertically aligned across the page, paralleling the layout of the **Detailed Input** worksheet. Beginning on the left, these regions contain row labels for cells in the two adjacent regions to the right, data entry cells for the “Conventional” and “Alternative” development concepts and an area for informational entries and navigation buttons.

Figure 13



Data Inputs: The **Simplified Input** worksheet contains numerous data entry cells. Those cells are clustered in two areas, shown in Figure 13. Their function and corresponding data types, and associated message/dialogue boxes are described below. A major difference between the two approaches results from the lack of information regarding the type and linear feet of streets and infrastructure to support the simplified approach. Thus, the user options are more limited.

Total Site Acres: This value is transferred from the **Opening Screen**. It serves as a reminder of the total acres of land to be allocated to various land use categories and acts as a control total, triggering an error message if the totals are not equivalent.

Street Width (in feet): Enter/Select values reflecting the street development standards for all interior streets with the project. These widths include curbs and gutters but exclude sidewalk requirements. A single data entry cell is provided for each development concept as all streets are assumed to be the same width within any given project, as was the case in the case studies. Entries are in the *Specify Option* format and are constrained to values on a drop-down list. The drop-down list activates when you *Click* in the cell and then *Click* on the small down arrow that appears adjacent to the cell.

Curb & Gutter: Enter/Select whether curbs and gutters are required. These cells are provided in the area identified as section 1 on Figure 13. Entries are in the *Specify Option* format, with “Yes” and “No” the available options. Selecting “Yes” includes the appropriate costs, based on the total linear feet of streets identified in section 1.

Sidewalks: Enter/Select whether sidewalks are required for each development concept. These cells are provided in the area identified as section 2 on Figure 13. These cells are in the *Specify Option* format, with “0”, “1” and “2” the available options. Selecting “1” or “2” includes the appropriate costs, calculated using a percentage adjustment mechanism.

Note: Another difference between the simplified and detail approaches is the lack of options to specify which utilities are included. By default, the simplified approach assumes that storm sewer, sanitary sewer, and a centralized water system are all provided.

Proposed Land Use – Residential and Nonresidential, By Category: Enter values for the net developed acres, by land use category, in these clusters of cells in section 2 (see Figure 13 on the preceding page.) All of the cells accept *numeric* data. Like the **Detailed Input** worksheet, there are three data entry clusters for each development concept. The land use categories for the simplified approach are the same as those in the detailed approach.

Note: Care should be exercised when entering land use data to insure that the sum of the entered values in section 3 equals exactly the gross developable acres entered on the **Opening Screen**. To help avoid inconsistencies in data entry, MARC_CODT contains error-trapping formulas that will display a message alerting you to a problem as long as the entered acreages do not sum to the total gross acres. The alerts appear on both the **Simplified Input** and **Simplified Output** worksheets.

Navigation Buttons: Two navigation buttons, similar to the one shown here, are located on right hand side of the **Simplified Input** worksheet. When data entry is completed, a *Click* on one of these buttons will return the cursor to the **Opening Screen**, the other shifts you to the **Simplified Results** worksheet.

Click Here
to Return
to Detailed
Input

A “print” button is not included on this worksheet because a summary of the inputs and results can be printed together from the **Simplified Results** worksheet.

Simplified Results Worksheet

Function: The **Simplified Results** worksheet combines the infrastructure specifications and land use data, with cost information in the **Assumptions** worksheet to estimate the

development costs for the two design concepts. The simplified approach's foundation is a series of average costs per unit derived from the calculated development costs for five of the case studies. The results of these computations are shown in cells with blue background fills – see Figure 14 below. No data entry occurs on this worksheet.

The general layout of the **Simplified Results** worksheet consists of three sections. Like the other worksheets, the first section spans the entire top width of the screen and contains the title the MARC Cost of Development Tool, a line for the Project Name, and other information to identify the analysis being done.

Figure 14

The screenshot displays the 'MARC - Cost of Development Tool' interface. The main window title is 'MARC - Cost of Development Tool' and the subtitle is 'Results Table: Simplified Version: 0'. The date is 11/21/2001. The interface is divided into three main sections:

Section 1: Estimated Infrastructure Development Costs

Land Use	Conventional Development Pattern		Alternative Development Pattern	
	Total Cost	Unit Cost	Total Cost	Unit Cost
Single-family	\$ -	\$ - per DU	\$ -	\$ - per DU
Townhome	\$ -	\$ - per DU	\$ -	\$ - per DU
Multi-family	\$ -	\$ - per DU	\$ -	\$ - per DU
Commercial/Retail	\$ -	\$ - per S.F.	\$ -	\$ - per S.F.
Business Park	\$ -	\$ - per S.F.	\$ -	\$ - per S.F.
Mixed Use	\$ -	\$ - per S.F.	\$ -	\$ - per S.F.
Semi-Public	\$ -	\$ - per S.F.	\$ -	\$ - per S.F.
Average Cost per Developed Acre	\$ -	\$ - per acre	\$ -	\$ - per acre

Section 2: Proposed Development

	Conventional Development Pattern	Alternative Development Pattern
Total Site Acres:	0 (Transferred)	25 (Default is 25)
Street Width (in feet)	28 (Default is 28)	25 (Default is 25)
Curb & Gutter? (Yes / No)	Yes (Default is Yes)	Yes (Default is Yes)
Sidewalk (0, 1 or 2 sides)	1 (Default is 1)	2 (Default is 2)

Section 3: Residential Development Summary

	Acres, By Type	DUs per Acre	Net Development
Residential	0	0	0

The interface also includes navigation buttons on the right: 'Click Here to Return to the Opening Screen', 'Click here to return to Simplified Input', and 'Click here to Print this page'. At the bottom, there are tabs for 'Detailed Results', 'Simplified Input', 'Simplified Results', and 'Accounting'.

The second section is just below the first and presents estimated development costs. The total costs, average costs per developed acres, allocated costs by land use category, and average unit costs are detailed. Cost estimates for the two design concepts appear side-by-side. The third section is located at the bottom of the page, below the cost estimates, and summarizes the data inputs for that specific project. When this page is printed, both the input and results appear on a single page.

As described earlier, the simplified approach relies on a series of default average costs to estimate the project development costs. This is in contrast to the detailed approach, which builds up a cost estimate from the infrastructure requirements. The default cost factors included in MARC_CODT are presented in Table 3 on the following page.

TABLE 3. DEFAULT AVERAGE PER UNIT INFRASTRUCTURE DEVELOPMENT COSTS

Land Use	Conventional Development		Alternative Development	
Single family	\$ 8,866	per DU	\$ 6,027	per DU
Townhome	\$ 4,433	per DU	\$ 2,411	per DU
Multi-family	\$ 2,722	per DU	\$ 1,708	per DU
Commercial/Retail	\$ 3.38	per S.F.	\$ 3.17	per S.F.
Business Park	\$ 2.96	per S.F.	\$ -	per S.F.
Mixed Use	\$ -	per S.F.	\$ 2.62	per S.F.
Semi-Public	\$ 2.96	per S.F.	\$ 3.50	per S.F.

The MARC_CODT model does not simply use the default costs but adjusts them to reflect the specific infrastructure parameters chosen. The adjustment process enhances the model's sensitivity to changes in infrastructure standards that may vary across the region or by developer. The default values and the adjustment factors are contained in the **Assumptions** worksheet. That worksheet is the subject of the next section of this user's guide documents.

Navigation Buttons: Three navigation buttons, similar to the one shown here, are located on right hand side of the **Simplified Results**. Two of them are designed to transfer you to another worksheet, specifically the **Simplified Input** and **Opening Screen** worksheets. A *Click* on the third button prints this worksheet.



After you have printed and reviewed the results you may return to the **Opening Screen** to enter data for another project, quit the program without saving the results (using the normal Excel procedures), or save the file with a suitable filename. If you decide to save the file for future review or medication, it is suggested that you print the **Simplified Results** worksheet again after you complete the save operation so that the correct filename appears on the bottom of the printed page. This completes the directions for using the simplified variant of MARC_CODT.

Assumptions Worksheet

Function: The model's last module contains the cost coefficients and other parameters used in combination with the input assumptions to generate the development cost estimates. Most of these parameters can be overridden, allowing you to customize this program to your jurisdiction's specific preferences or infrastructure cost experience.

The general layout of the **Assumptions** worksheet consists of four areas. The first spans the width of the screen and contains the title MARC Cost of Development Tool and the worksheet name. This title remains visible as you scroll down the worksheet to enter or review the default development density and cost parameters – see Figures 15 and 16 on the following pages.

The second section of the worksheet contains the default development densities for the two development concepts. Residential densities are higher for the alternative concept. Nonresidential densities are unchanged, but in general, the alternative concepts involve shifting acres from the commercial/retail and business park categories to the mixed-use category.

Because mixed use occurs at a higher FAR, this effectively yields a net increase in nonresidential development or a densification of development that allows more open space to be developed.

Figure 15

The screenshot shows the 'KEY ASSUMPTIONS' and 'INFRASTRUCTURE COST ASSUMPTIONS' sections of the spreadsheet. The 'KEY ASSUMPTIONS' section includes 'DEVELOPMENT DENSITIES' with columns for 'CONVENTIONAL' and 'ALTERNATIVE' standards, and rows for 'LAND USE' (Single family, Townhome, Multi-family) and 'FAR' (0.25, 0.25, 0.35, 0.25). The 'INFRASTRUCTURE COST ASSUMPTIONS' section includes 'STREETS' with rows for 'Width (incl. curb and gutter)' (22, 24, 26, 28, 30, 36) and 'Cost per linear foot' (\$ 94.00, \$ 103.00, \$ 112.00, \$ 120.00, \$ 130.00, \$ 150.00). It also includes 'Curb and Gutter' with a cost of \$ 16.00.

Default infrastructure development costs are contained in the third section of this worksheet. These costs are per linear foot and are expressed in year 2001 dollars. Only a single set of infrastructure costs are presented. These costs do not vary between the concepts, but do vary based on the standards selected, e.g., street widths. From top to bottom within the column, costs are presented for streets, curb and gutter and sidewalks.

Figure 16

The screenshot shows the 'INFRASTRUCTURE COST ASSUMPTIONS' and 'DEFAULT COSTS FOR SIMPLIFIED VERSION' sections. The 'INFRASTRUCTURE COST ASSUMPTIONS' section includes 'Curb and Gutter' (\$ 16.00), 'SIDEWALKS' (Width (feet) 4, \$ 0.00), and 'UTILITIES' (Storm Sewer \$ 25.00, Sanitary Sewer \$ 20.00, Water \$ 35.00). The 'DEFAULT COSTS FOR SIMPLIFIED VERSION' section includes a table comparing 'Conventional Dev.' and 'Alternative Dev.' costs per unit for various land uses.

	Conventional Dev.	Alternative Dev.
Single family	\$ 7,903 per DU	\$ 5,736 per DU
Townhome	\$ 3,951 per DU	\$ 2,294 per DU
Multi-family	\$ 2,722 per DU	\$ 1,708 per DU
Commercial/Retail	\$3.07 per S.F.	\$3.47 per S.F.
Business Park	\$3.07 per S.F.	\$3.47 per S.F.
Mixed Use	\$2.19 per S.F.	\$2.45 per S.F.
Semi-Public	\$3.07 per S.F.	\$3.47 per S.F.
Base Cost	235.20	207.20
Adj. Cost	\$ 224.00	\$ 224.00
Adj. Percent	95.2%	98.6%

The **Assumptions** worksheet's fourth section presents the default per unit development costs used in the simplified variant. This section also contains the mechanism used to adjust the default costs in response to variations in infrastructure standards. This section of the worksheet is password protected to avoid accidental overwriting of data and formulas.

Data Inputs: The **Assumptions** worksheet contains default development density and costs parameters. These values can be changed, for example, to customize the model to your specific jurisdiction's zoning and development standards. Doing so would eliminate the need to reenter such data repetitively. It also preserves the cell reference links that are in the **Detailed Input** worksheet that are otherwise overwritten when changes in development densities are made on that page. If construction costs in your jurisdiction are markedly higher or lower than the defaults, you can enter different costs here and continue to use the **Cost Adjustment Factor** for addressing the impacts of inflation.

Note: If you do customize the **Assumptions** worksheet, you may wish to create a new READ-ONLY master file. See the Excel help utility if you are unfamiliar with how to do this.

As in other parts of MARC_CODT, the data entry cells appear with a yellow background and bold, blue border. To enter new data, move the cursor to the appropriate cell and enter the desired value. Note that the cells for entering the residential development densities have the same range constraints as those described in the **Detailed Input** worksheet.

Note: The default per unit development costs and cost adjustment mechanism used in the *simplified* variant is password protected to prevent accidental modification.

Navigation Buttons: Two navigation buttons, similar to the one shown here, are located on right hand side of the **Assumptions** worksheet. When data entry is completed, a *Click* on one of these buttons will return the cursor to the **Opening Screen**, the other prints this worksheet.

Click Here
to Return
to Detailed
Input

ANSWERS TO OTHER QUESTIONS THAT MAY ARISE

Why can't I see the formulas and cell references in the various cells?

These entries have been hidden from normal view and the cell protection features enabled to reduce the possibility of accidentally overwriting the formulas and references

How do I eliminate the "Total Acres Don't Match, Check Entries" message on the input and results worksheets?

These messages appear when the sum of the developed acres by land use categories entered on the input worksheets does not exactly equal the total gross acres entered on the **Opening Screen**. To clear these messages, double check all of the entries. To reduce the likelihood of errors, it is suggested that you round acreage figures to the nearest whole or tenths of an acre.

Why can't I get the cursor to highlight all of the cells on the worksheets?

Most of the cells containing labels and shading have been "locked" to prevent access. The advantage of this comes about when the cell protection feature is enabled. When this occurs, the cursor will only highlight cells that are intended for data entry. Furthermore, when you complete data entry in a particular cell and hit the **Enter** ↵ key, the cursor will automatically jump to the next cell.

This feature notwithstanding, If you have problems seeing the entire worksheet, you can use your mouse to grab one of the slide bars and move the image up, down, left or right to see the areas of interest.

The normal column and row headings aren't visible. Can I make them re-appear on my versions of the MARC_CODT spreadsheet?

The column and row headings have been "turned off" in the normal view to allow more of the MARC_CODT worksheets to be visible on the screen. Furthermore, there is little need for these reference points once the programming was completed and navigation around the program provided for by the use of locked and protected cells, worksheet protect and navigation buttons.

These headings can be "turned on" by going to Tools → Options → View, unchecking the box for Row & Column headers under the Windows Options, then clicking on *OK*.

The images on my screen show more or less of the worksheets than appear in the user's guide. Why don't I see the same amount of the worksheet?

The differences in what is visible on the screen do not affect the functioning of MARC_CODT. There are several possible reasons for such differences. The three most likely are that you are using a different size monitor, have Excel set up to show more or fewer toolbars at the top and bottom of the screen, or have the zoom/magnification level set differently. The screen captures in the user's guide are from a 17" monitor, have only the main menu and standard tool bar enabled and have the magnification level set at 100%.

When I try to open MARC_CODT, rather than the message about a READ-ONLY file, I get an Excel warning message that the workbook contains macros and may contain viruses. What should I do?

This message is triggered by the security settings on the version of Excel you are using. These settings are intended to reduce the risks of a computer virus being attached to a macro. The message you see varies depending on those settings. One gives you an option to continue and either disable or enable macros, the other simply alerts you that the security settings won't allow the file to be opened unless you lower the security settings. If you choose to open the file but disable the macros, the navigation and print buttons will not work.

Care has been taken to insure that the MARC_CODT master file is virus free. Thus, the first step is to make sure you are using a copy of the READ-ONLY master file. Then choose "Enable Macros" in the message box, if given the option. At that point you should receive the message about the file being READ-ONLY. If you don't get that message and the file is not one that you created, hit the cancel button. Then make sure that you have a virus protection program installed and operating with updated virus signatures and repeat the process. If you receive the more severe warning about macros, you will not be able to open the file unless you lower the security setting from High to either Medium or Low. Consult the Excel help utility on how to do this. **And again, make sure that you have a virus protection program installed and operating.** After this is done, you should be able to open the program.

Care has been taken to make the MARC_CODT master file virus free. However, neither Hammer, Siler, George Associates nor the Mid-America Regional Council make any warranties that the MARC_CODT program is virus-free. Users are responsible for maintaining and operating a virus protection program to avoid damages caused by virus. Hammer, Siler, George Associates and the Mid-America Regional Council are not responsible for any damages associated with this program.