APPENDIX F

MANUAL FOR DIL SOFTWARE

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SECTION 1—INTRODUCTION

Application

The purpose of this software tool is to allow the user to derive a quantitative index of the *information load* imposed upon a motorist who is encountering an array of navigation-related signs. Drivers are frequently confronted with a multitude of information displays, which they must perceive, comprehend, and evaluate while they are simultaneously controlling their vehicles, monitoring other traffic, dealing with distractions, and navigating to a destination. Where drivers are confronted with more information than they can process, in consequence they may decelerate severely or drive unduly slowly, make late or erratic maneuvers, take an improper route alternative, ignore critical information, fail to monitor other traffic, or take their eyes off the road for extended periods. These effects of high information load may have safety and operational consequences.

Under NCHRP Project 3-50(2), a model of driver information load was developed that uses as input information about the roadway and signage and provides as output a quantitative index of the information load associated with each set of signs present on a section of roadway. "Driver information load" (DIL) refers to the level of demand placed on the driver in order to process and respond to the information presented in the time available. The information load imposed by a set of signs is determined not only by the characteristics of the signs themselves, but also the driver's task and the roadway context in which the signs are located. The model incorporates all of these factors in computing the index of driver information load. The current version of the model is specific to navigation-related signs (guide signs, service signs, recreational signs, etc.) on freeways and expressways.

The DIL software tool allows the user to assess the demand on the freeway driver imposed by an array of signs. The model output is provided in both tabular and graphic format, and shows the contributions of various component elements to the overall information load. The tool can be used to identify potential information overload problems and to compare alternatives for the design and placement of signs. However, it must be recognized that the model and the associated software tool deal specifically with the problem of driver information load, that is, the ability of the driver to safely process the amount of information in the time available. The model does not address the full process of designing an informational sign system, including consideration of motorist information needs, the accuracy or clarity of the message, the choice of wording or destinations, and so forth. Managing the information load is only one part of the process, and it is the part dealt with in a quantitative fashion by this tool.

Overview of the Driver Information Load Computational Model

The model is based on determining the driver information load associated with a particular sign array. The term "sign array" refers to a set of individual sign panels that are co-located with one another at a given point on the roadway, typically on the same sign mounting structure or assembly. For example, three individual sign panels mounted on an overhead mast would constitute a single sign array.

The general structure of the DIL model is shown in Figure 1. The model recognizes that a driver's ability to deal with the information in a sign array is a function of two broad sets of demands. One is termed the Information Search Demand (ISD); this is the demand imposed upon the driver by the effort of searching and processing the formal information sources (primarily signs) provided on the roadway. The other category is termed the Driving Task Demand (DTD); this is the attentional demand placed on the driver controlling and guiding the vehicle, monitoring the situation, making decisions and executing
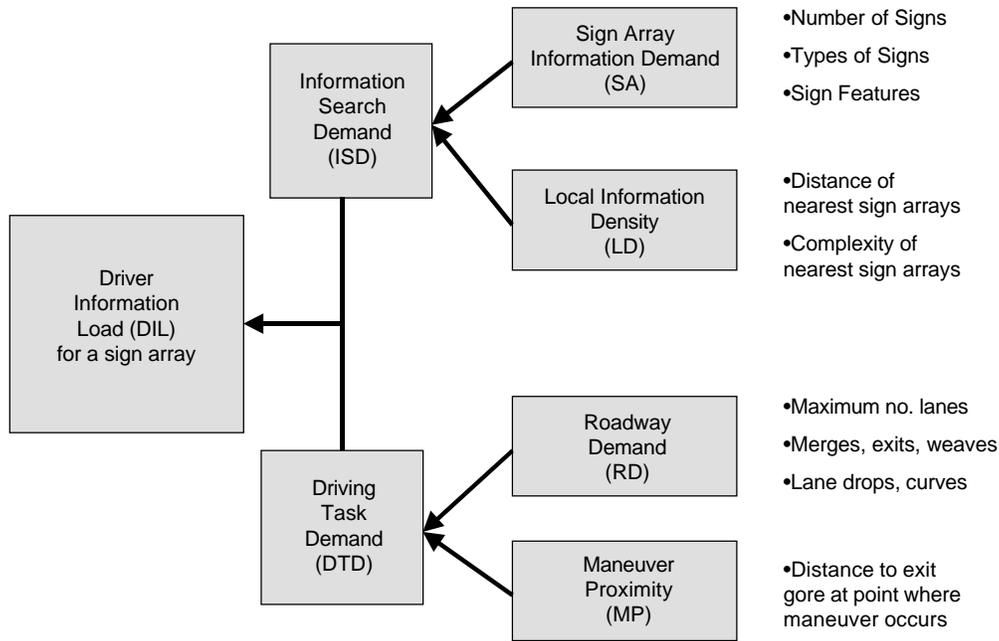
		•Number of Signs
Information Search Demand (ISD)	Sign Array Information Demand (SA)	•Types of Signs
		•Sign Features
	Local Information Density (LD)	•Distance of nearest sign arrays
Driver Information Load (DIL) for a sign array		•Complexity of nearest sign arrays
	Roadway Demand (RD)	•Maximum no. lanes
		•Merges, exits, weaves
Driving Task Demand (DTD)		•Lane drops, curves
	Maneuver Proximity (MP)	•Distance to exit gore at point where maneuver occurs

Figure 1.   Conceptual Model of Driver Information Load

maneuvers. DTD and ISD operate together to determine the overall driver information load (DIL) placed on the motorist who is confronting a particular sign array.

As Figure 1 illustrates, both ISD and DTD are in turn conceptualized as having two component factors. For ISD, one component is the demand imposed by the information within the particular sign array itself. The other component is the density of other sign information in the general area (how close and how complex are neighboring sign arrays). For DTD, one component is the geometric and operational complexity of the section of roadway leading up to a navigation maneuver point (exit or diversion point). The other component is the proximity to that choice point. Research supporting the development of the model found that drivers devoted more attention to DTD as they got progressively nearer to the point where they must make a navigation-related maneuver.

Figure 1 also shows the factors that go into the determination of each component of DIL. These are the inputs to the model that the user provides, and they are defined further below. Based on the user's input for these factors, the software tool provides estimates of each component of informational load (ISD and DTD and their subcomponents), and then computes the total information load confronting the motorist when dealing with the sign array (DIL).

The model is based on the use of roadway segments, where a segment ends at the point where a driver makes a navigational maneuver, such as an exit or a change into the appropriate lanes at a diversion point. This approach is necessary because the information load associated with a sign array is not the same for every driver. The worst case (therefore the one of interest) is where an unfamiliar driver must make a maneuver at an approaching choice point. Therefore the model assumes that the driver is making a maneuver at the choice point that defines the end of the road section. The road segment is defined as the section from the exit gore point at one end to an upstream point normally 11,000 feet from the gore. This distance is slightly over two miles, thus encompassing where the initial advance signing for an exit typically occurs. A particular sign array might be included in multiple segments defined by different exit points. Even though the sign array itself would be constant, the information load associated with dealing with the

sign may vary because of the changing road segment and proximity to the choice point. Therefore, the DIL computed for a sign array is specific to the assumption made about where the navigation maneuver takes place.

SECTION 2—SYSTEM REQUIREMENTS

The program files for this model were designed for IBM-compatible PCs. Hence, the computer must have Windows Operating System (Windows 95 or later). The computer also must have Microsoft Excel (Excel97 or later) installed on it.

The computer must have adequate hardware (e.g., memory, disk space, etc.) to be able to load and run Access Runtime and Excel application programs simultaneously. In general, 32 MB of memory and at least 4 MB of free hard disk space should be enough to run the program.

SECTION 3—INSTALLATION

The package can be installed on a PC by running the setup program from the DIL Installation CD. Insert the DIL Installation CD into your CD-ROM drive. Open the DIL Installation CD directory and run the "setup.exe" file.

> *Note: If you are prompted to install Microsoft Access 2000 Runtime files, follow the onscreen directions. You may be prompted to restart your computer several times during this process. After restarting, run the "setup.exe" file on the installation CD again to continue the installation process.*

The installation wizard window will appear to guide you through the rest of the installation. By default, setup will assume the following path for installation:

C:\Program Files\DIL New\

You may choose to install the program files in a folder other than the default folder. After choosing the install folder, click the large computer icon in the dialog box to continue installation.

The program will set up a shortcut on your "Programs" list. By default, it will be named "Driver Information Load Program." You may elect to change this name.

When installation is complete, the following two files should be present in the folder where the program was installed:

- DIL New.mdb
- DIL New.xls

It is essential that these two files reside in the same folder, otherwise the program will not be able to complete the Driver Information Load analysis.

SECTION 4—DRIVER INFORMATION LOAD PROGRAM OVERVIEW

Driver Information Load (DIL) is computed and output in three steps using this software package:

1. **Enter roadway segment information.** This includes segment length, roadway geo-
   metric information, number of sign arrays, and the site ID/name.

2. **Enter sign array data.** This includes entering information about each navigation-
   related sign array and individual signs within the arrays.

3. **Transfer data to spreadsheet.** Once all array and sign data have been entered, the data
   can be transferred from the Microsoft Access file to a Microsoft Excel spreadsheet that
   presents the DIL output. The output includes a graphic depiction of DIL at each array
   location. The output shows the level of contribution of each component element to the
   total DIL.

SECTION 5—GETTING STARTED

Open the DIL program by selecting it from the "Programs" menu (from the "Start" but-
ton). The first screen that appears is the **Main Menu**, as shown in Figure 2. You may
choose to perform one of the following operations:

- **Enter New Data:** Enter roadway and sign component data into the database.
- **Manage Data:** Transfer existing data to a spreadsheet for analysis.
- **View Report:** View and print reports for specific segments.
- **Exit Database:** Exit the database.

Select the appropriate menu option. When beginning data entry for a new roadway seg-
ment, select **Enter New Data**.

SECTION 6—ENTERING NEW DATA

Overview

It is recommended that all the required data be collected and organized before attempting
to enter it into the database. Roadway and sign data may be obtained from a variety of
sources such as field observations or measurements, computer inventories of signs and
roadway designs, sign design plans, etc. The model only deals with freeway sign arrays
that are relevant to navigation, such as guide signs and motorist information signs. Stand-
alone regulatory and warning signs (e.g., speed limit, added lane) are not relevant and
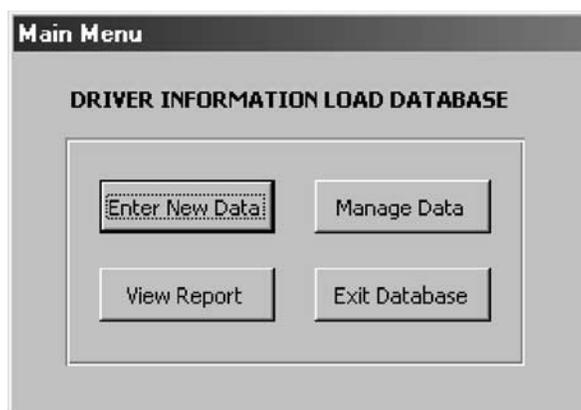should not be entered in the data.

Figure 2.   Main Menu

Data entry involves two major steps:

1. Enter information related to the roadway segment, which extends from the exit gore point to a point 11,000 feet upstream of the gore

2. Enter information related to the sign arrays and individual signs located within the roadway segment

After entering the roadway segment data, you will be prompted to enter data for the first sign array of the segment. After entering the data for the first sign array, you will be prompted to enter information about each sign panel within the array. When all sign panels are completed for the first array, you will be prompted to enter data for the second sign array. This procedure continues until all arrays and signs are entered. This data entry process is outlined in Figure 3. The data is then transferred to a Microsoft Excel spreadsheet where the output can be analyzed. The steps of data entry and analysis are described in detail in the following sections.

Note: See Appendix A for a glossary of terms used in this manual and in the DIL program.

Step 1: Enter Segment Info Data

A. To enter new data, click the "Enter New Data" from the Main Menu. The **Segment Info** form for entering roadway segment data, as shown in Figure 4, will appear.

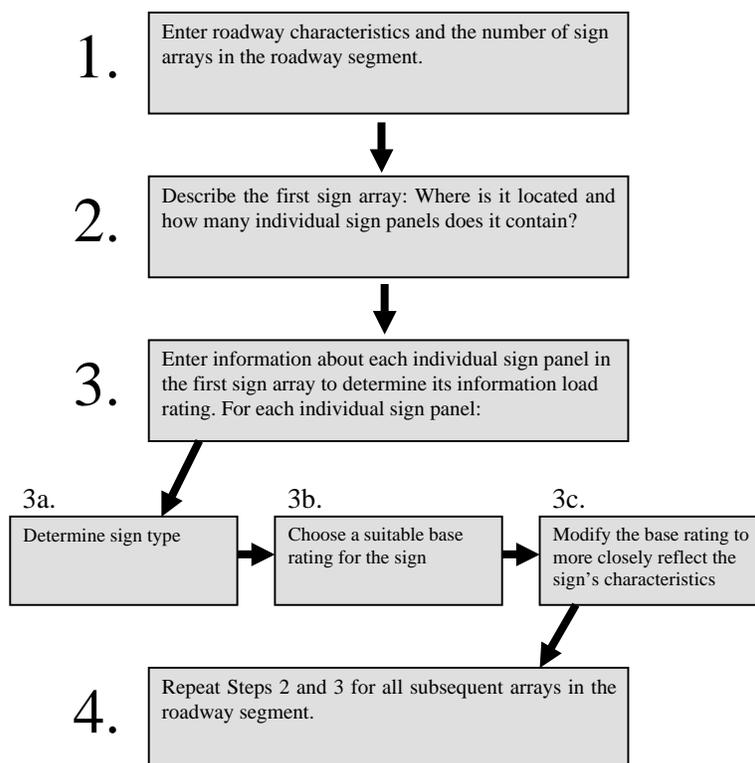B. In the **Segment Info** form, enter the following data in the appropriate input box:

1. Enter roadway characteristics and the number of sign arrays in the roadway segment.

2. Describe the first sign array: Where is it located and how many individual sign panels does it contain?

3. Enter information about each individual sign panel in the first sign array to determine its information load rating. For each individual sign panel:

3a. Determine sign type

3b. Choose a suitable base rating for the sign

3c. Modify the base rating to more closely reflect the sign's characteristics

4. Repeat Steps 2 and 3 for all subsequent arrays in the roadway segment.

Figure 3.   Flow Chart of Data Entry Procedures

Figure 4.   Road Segment Data Input Form

- A suitable name or identification number (ID) for the segment. This can be an alphanumeric entry.
- Length of roadway segment in feet, if less than 11,000 feet. A section extending 11,000 feet upstream of the gore point is the normal default, capturing normal advance signing for the exit and the area over which an approaching driver is most engaged in search and decision making. In some cases, a segment length less than 11,000 feet must be used if the roadway itself is not this long.
- Maximum number of through lanes in the roadway segment, excluding merges, exits, and weaving sections.
- Total number of merges, exits, and weaving areas in the segment.
- Number of lane-drops in the segment.
- Number of curves in the segment.
- Total number of sign arrays in the segment. Note that there may be multiple signs in a single sign array. Enter only the number of sign arrays here.

C. After entering all the relevant data on the **Segment Info** form, click the "Proceed to Sign Array Data button." Follow the steps to enter the sign array and individual sign rating data. A sequence of two forms will be used for this purpose.

Step 2: Enter Sign Array Data

Note: Be sure to enter all data accurately. Once data for a sign array have been entered, it cannot be deleted or edited. However, segment information (the data in) can be edited and additional sign arrays may be added after initial data entry is complete.

A. On the **Sign Array Subform**, which is shown in Figure 5, enter the following data in the appropriate input box:

- A suitable name or identification number (ID) for the sign array for which data is being entered.
- Distance (in feet) of the current sign array from the downstream end point of the segment.
- Number of individual signs in the sign array. It is important to enter this number correctly so that you will be presented with the correct number of entry forms.

The **Sign Array Subform** will display blank spaces under several DIL components at this time. These components will be computed and displayed once the individual sign information has been entered in the form that will follow.

B. After completing the **Sign Array Subform**, click the "Enter Individual Signs" button. A **Sign Lookup Table** form similar to the one displayed in Figure 6 will appear. Information related to individual signs is entered on this form. It should be noted that familiarity with the guide sign designations in the *Manual on Uniform Traffic Control Devices (MUTCD)* will be helpful in expediting data entry on this form. Specifically, the following information should be entered in the order shown below (Note that pressing the <Tab> key on the keyboard move to the next field in the form):

B-1) A suitable name or identification number (ID) for the sign. This entry can be alphanumeric. For reference, the form displays the name/ID of the sign array on which this sign is located and it cannot be overwritten on this form.

B-2) Next, assign the sign a type and category from the drop down list. This list is primarily based on the standard guide signs defined in the *MUTCD*. The sign type and category should be determined before beginning data entry. Based on the sign type and category selected, additional information appears on the form:

- The sign's corresponding *MUTCD* reference is cited in the box below it.
- Below the *MUTCD* reference is a table with the characteristics of the selected sign. The top row represents a typical complex sign of the selected sign type and the bottom row represents a typical uncomplicated sign of the selected sign type. The two rows have different sets of characteristics representing their varying levels of complexity. The complex ("upper") and simpler ("lower") versions of a sign type differ in terms of characteristics such as word length, number of destinations, and the presence of various features such as route markers or icons.

Figure 5.   Sign Array Information Form

Sign Lookup Table

PLEASE SELECT THE BASE SIGN TYPE AND CATEGORY THEN
THE CORRESPONDING SIGN ELEMENT DETAILS WILL BE DISPLAYED BELOW

Sign Array ID/Name 101   Sign Number or ID 115A
Sign Type and Category Advance Major Guide, Separate Exit
MUTCD Reference: Fig. 2E-13, Signs E1-1 and E1-5

Characteristics and Upper/Lower Bound Ratings for the Selected Sign

	Complexity	Rating	Word Length	# of Dest	# of Rte Markers	# of Icons	Lane Indicator	Direction
▶	Upper	26	Long	2	1	0	No	No
	Lower	20	Short	1	1	0	No	No

(Please use the values in the table displayed above as Guidance in selecting a suitable Base Rating value)

ENTER A SUITABLE BASE RATING FOR THE SELECTED SIGN   20

Rating Modifictaion Worksheet for Additional Sign Comoponents

	Sign Element	Adjustment	Check if Applicable	Add	or Subtract	Quantity	Net Adjustment
▶	Exit Number Panel (Single #)	8	☑	⊙	○	1	8
	Exit Number Panel (Multiple #)	10	☐				
	Destination	7	☑	⊙	○	1	7
	Route Marker	6	☑	⊙	○	1	6
	Cardinal Direction	4	☑	⊙	○	1	4
	Word Length (up/down 1 Level)	2	☑	○	⊙	2	-4
	Word Length (up/down 2 Levels)	4	☐				
	Word Length (up/down 3 Levels)	6	☐				
	Icon	3	☑	⊙	○	1	3
	Lane Drop	3	☐				
	Lane Arrow	2	☑	⊙	○	1	2

TOTAL MODIFICATION TO BASE RATING: 26

ADJUSTED SIGN RATING FOR DRIVER INFORMATION LOAD 46

COMPOSITE RATING FOR ALL SIGNS IN THIS ARRAY 46

NEXT SIGN

Figure 6.   Individual Sign Data Input Form with Base Rating and Modifications

B-3) The next step is to assign a base load rating for the sign. The upper and lower complexity rating values shown in the table should be used for reference. The characteristics of the sign should be compared to those displayed in the table. Engineering judgment should be used in deciding whether to use the higher complexity value, the lower complexity value, or a value in between these two values. A value outside the range of higher and lower values may also be selected if it is determined that the sign warrants it when compared to the selected sign category.

To simplify Step B-4, selecting one of the predetermined complexity ratings is recommended. If you decide that neither the upper nor lower sign complexity

characteristics reflect the subject sign, however, you may choose an intermediate value that reflects your personal judgment of the sign's complexity. Because the intermediate value deviates from the predetermined complexity levels, the Rating Modification Worksheet for Additional Sign Components in Step B-4 should not be completed. Upon deciding on an appropriate base rating, enter it in the input box provided. Scroll the form down to view the lower section of the form.

B-4) The final section of the **Sign Lookup Table** is the **Rating Modification Worksheet for Additional Sign Components**. This section allows you to enter information to modify the rating of the sign based on components that vary from the predefined components for the selected sign category. For example, there may be additional route markers or less text on the sign than is specified in the table of characteristics. To account for these variations, you may adjust the base rating that you selected for the sign. This is done using the worksheet below the base rating input box in the current form.

> *Note: If you do not want to use the rating adjustment worksheet, but rather just select an intermediate value between the upper and lower values based on analyst judgment, a sign rating value may be entered directly in the base rating box.*

You may add/subtract points to/from the specified base rating for the following sign components:

- Exit number panels for single or multiple exit numbers
- Number of destinations listed on the sign
- Number of route markers on the sign
- Cardinal direction (e.g., East, West, etc.) associated with routes
- Word length, i.e., length of text message on the sign
- Icons
- Lane drop
- Lane arrows depicted on sign

These items are listed in tabular format in the worksheet along with associated points that will be added or subtracted for each item selected. There is a selection box next to each item which can be checked or unchecked. Upon checking a box for a selected item, more input options will become available to the right of the checked box. This will allow you to choose whether you want to add or subtract a sign component as well as the quantity of that component that will be adjusted. For example, if the base rating for a sign type specifies 1 route marker but the actual sign has 3 route markers, you should select "Add" and fill in a quantity of 2. Quantity must be entered using the keyboard. After each modification, press <Enter> or <Tab> to calculate the modification. The total points to be added to or subtracted from the base rating will be displayed in the far right column, labeled "Net Adjustment." The total modification to the base rating is presented directly below the "Net Adjustment" column.

B-5) Two display boxes are present at the bottom of the **Sign Lookup Table** form. The top box displays the total adjusted rating for the current sign (the user-defined base rating plus or minus the total modification to the base rating). The other box displays the sum of sign ratings for all signs in the current sign array. Upon completing the entry for a given sign, click the "Next Sign" button at the

bottom of the form. The program will automatically determine if this is the last sign in the current array based on the number of signs entered in the **Sign Array Subform**. If this is not the last sign, then a blank **Sign Lookup Table** form will appear for entering data for the next sign. Otherwise, this form will close and the **Sign Array Subform** will reappear and will display the various computed components of Driver Information Load for the sign array, as shown in Figure 7 for the sample data.

Note that the **Sign Array Subform** now (as shown in) has a "Next Array" action button instead of the "Enter Individual Signs" button. Click the "Next Array" button to proceed. If this is not the last sign array in this segment, a blank **Sign Array Subform** will appear to enter data for the next array. Otherwise, this form will close and the **Segment Info** form will be displayed with a summary of all the sign arrays in the segment along with the roadway data. Figure 8 shows the **Segment Info** form with sample data.

Step 3: Transfer Data to the Spreadsheet

If all information has been entered correctly and you are prepared to view the DIL analysis output, you may transfer the data now (for instructions, skip to the second subheading: "If Data Entry is Complete and You are Ready to Transfer the Data and Begin Analysis"). If additional data is required, you may enter it now or exit the program and come back to it later. Remember that additional sign arrays may be added to a roadway segment, but existing sign arrays may not be deleted or edited. Whether you are ready to transfer data or not, the following paragraphs will give further instructions.

> *Note: If you have transferred roadway segment data previously, but have not renamed the "DIL New.xls" spreadsheet, please do so now. If you do not, the new output will overwrite this earlier spreadsheet.*

If You Would Like to Add Additional Data Before Beginning DIL Analysis

The data you have entered have been automatically saved to disk, so you can click the "Exit" button to close this form and return to the Main Menu. From the Main Menu, you may exit the program, manage data, or view summary reports. If you are not ready to finish data entry at this time, click "Exit Database" to close the DIL program.

When you are ready to complete data entry for the roadway segment, open the DIL program again and click "Enter New Data" from the Main Menu. This will bring up the same form that you used to enter the roadway data in Step 1. Enter the name of the seg-

Figure 7.   Sign Array Form After Entering Individual Sign Data

Figure 8.   Segment Summary After Entering Sign Array Data

ment exactly as you did during initial data entry. Re-enter the segment information. The information that you enter will overwrite the previous segment information. For number of sign arrays, however, enter the number of sign arrays that you would like to *add* to the segment, rather than the total number of sign arrays. Continue to enter all necessary information for the additional sign arrays as you did in Step 2. When the information for the additional sign arrays has been entered, you may exit to the Main Menu (your data will be automatically saved) or transfer the data to the spreadsheet. If you are not ready to transfer the data, click "Exit" and continue to the next paragraph for instructions on transferring data from the Main Menu. If you are ready to transfer data to the spreadsheet immediately, skip ahead to the next subheading.

To transfer data from the Main Menu, click "Manage Data." This will bring up the **Selection Form** seen in Figure 9. Select the name of the segment that you would like to transfer from the "Section ID/Name" drop down menu and click the "View/Transfer Data" button to bring up a **Segment Info** form similar to the one in which displays the information entered for the site. You are now ready to transfer the data. Continue to the next subheading for further instructions. If you wish to transfer the data to an Excel spreadsheet at this time, click the "Data to Spreadsheet>>" button. The data will be transferred to an Excel spreadsheet named "DIL New.xls" in the folder that you designated during installation.

If Data Entry is Complete and You are Ready to Transfer the Data and Begin Analysis

If you are ready to transfer the data to an Excel Spreadsheet, click the "Data to Spreadsheet>>" button on the **Segment Info** form to transfer all relevant data for the current

Figure 9.   Segment Selection Form

segment/site to a Microsoft Excel spreadsheet file named "**DIL New.xls**" in the folder
that you designated during installation (the default folder is "DIL New"). The Excel file
must not be open at the time of data transfer because data will not be transferred and an
error message will be displayed. Section 8 describes the Excel spreadsheet in detail.

SECTION 7—VIEW AND PRINT SIGN SUMMARY REPORTS

The program can generate two reports for each roadway segment. You can preview them
on the computer screen and print hard copies as well. One of the reports is a detailed
report of all the individual signs under all sign arrays associated with the segment. The
other report is a summary of all the sign arrays for the segment. Sample reports are pre-
sented in Figure 10 and Figure 11, respectively. Note that these sign summary reports are
not the final output of the DIL model. The full model output comes from the spreadsheet
analysis described in Section 8.

To view a report, click the "View Report" button on the DIL program's Main Menu. The
Report Selection Form, as shown in Figure 12, will appear. From the drop down menu,
select the segment for which the report is desired and then press the appropriate button
for the type of report desired. Select "Preview Sign Report" for a summary of sign rating
data for each array in the segment (see). Select "Preview Array Report" for a broader
overview of each array in the segment, along with its associated "Array Demand" and
"Maneuver Proximity" scores (see). The selected report will be displayed on the com-
puter screen. The program's Print menu can be used to print the report.

SECTION 8—DRIVER INFORMATION LOAD SPREADSHEET ANALYSIS

Spreadsheet Overview

This step provides the primary output of the DIL model. It provides, in both tabular and
graphic formats, the DIL associated with each sign array, and the contributions of the var-
ious components of DIL. This output can be manipulated in order to explore the effects of
making various changes to the sign system (e.g., alter a sign's content or relocate an array).

After a set of data for a roadway segment has been transferred to the spreadsheet (as
explained in Section 6, Step 3), you may open the spreadsheet to begin analysis.

First, open the file named "DIL New.xls". This file is in the directory or folder specified
at the time of program installation. If the default path was selected, then this file will be
in the "C:\Program Files\DIL New\" directory.

DIL Summary

Sign Rating Summary

Section ID: *I-95N -- I-695W Exit*

Sign Array ID 101 **Distance from Gore (ft)** 7588

SignID	Sign Type and Category	Base Rating	Modification	Sign Rating
115 B	Advance Major Guide, Separate Exit	26	4	30
115 A	Advance Major Guide, Separate Exit	20	26	46
		Sum of Sign Ratings for the Array:		76

Sign Array ID 102 **Distance from Gore (ft)** 5086

SignID	Sign Type and Category	Base Rating	Modification	Sign Rating
116	Advance Major Guide, Separate Exit	26	4	30
		Sum of Sign Ratings for the Array:		30

Sign Array ID 103 **Distance from Gore (ft)** 4113

SignID	Sign Type and Category	Base Rating	Modification	Sign Rating
117	Advance Minor Guide	6	3	9

Page: 1

Figure 10.   Sample Sign Rating Report

> **Warning! You must save the "DIL New.xls" file with a new, unique name.** *Every time new data is transferred to the spreadsheet, the "DIL New.xls" file is updated with the new data, overwriting any previously existing data in the file. A name that includes the segment ID is recommended.*

You do not need to perform any computations in the spreadsheet; the program has already computed the total Driver Information Load and its components for each sign array and created a chart plotting these values versus the distance of the sign array from the exit gore.

The Excel spreadsheet contains a number of worksheets listed as tabs along the bottom of the screen. Each worksheet is described in detail in the next section.

Worksheet Descriptions

The primary output of the Driver Information Load model is presented in tabular form in the "DIL" worksheet and in graphic form in the "DIL Components Chart" worksheet.

Figure 11.   Sample Array Summary Report

DIL

The worksheet titled "DIL" presents the DIL for each sign array in the roadway segment, as well as the contributions of the four factors in the model (e.g., sign array information demand, maneuver proximity, roadway demand, and local density). A sample worksheet is shown in Figure 13. The four rightmost columns are the components that contribute to the final DIL (second column). This worksheet may be formatted to your preference, but care must be taken not to unintentionally alter data or formulas. Data in the highlighted sections of the worksheet may be altered, but all other sections are protected and cannot

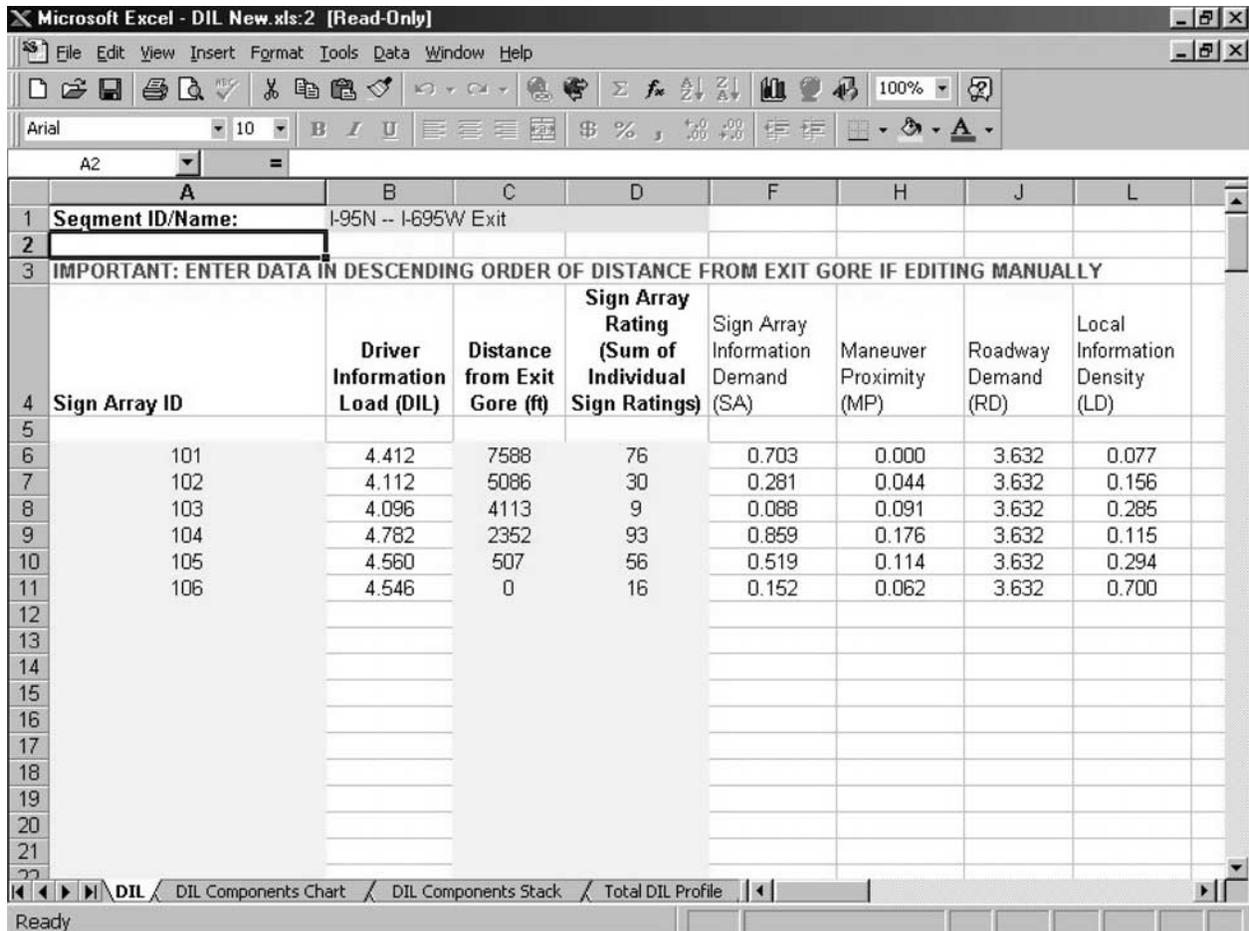*Figure 12.   Section and Report Selection Form*

Figure 13.   DIL Worksheet—Driver Information Load Computations

be changed. You may experiment with the effects of adding, removing, or altering arrays and view the resulting effect on DIL.

DIL Components Chart

This tab contains a graph of Driver Information Load (here referred to as Sign Array Information Demand) and its components plotted by distance (in feet) from the exit gore. A value is calculated at each point where an array is located. Roadway demand remains constant for each segment. This graph is linked to the "DIL" worksheet, so changes in the "DIL" worksheet will be reflected in the graph. The graph may be formatted for individual preferences, but care must be taken not to alter the source data. A sample chart is shown in Figure 14. Since Local Density (LD) shifts value at the point of each sign array, the chart shows the highest LD value at any point and the diamond symbol indicates the LD value for the sign array at that point. This chart provides a visualization tool that may be useful for considering alternate sign treatments.

DIL Components Stack

This tab contains a stacked bar chart that represents the individual contributions of each DIL component toward the total DIL for each sign array in the roadway segment. A sample chart is shown in Figure 15. The total height of each stack is the DIL of that array. Unlike the DIL Components Chart, the DIL Components Stack chart does not display rel-
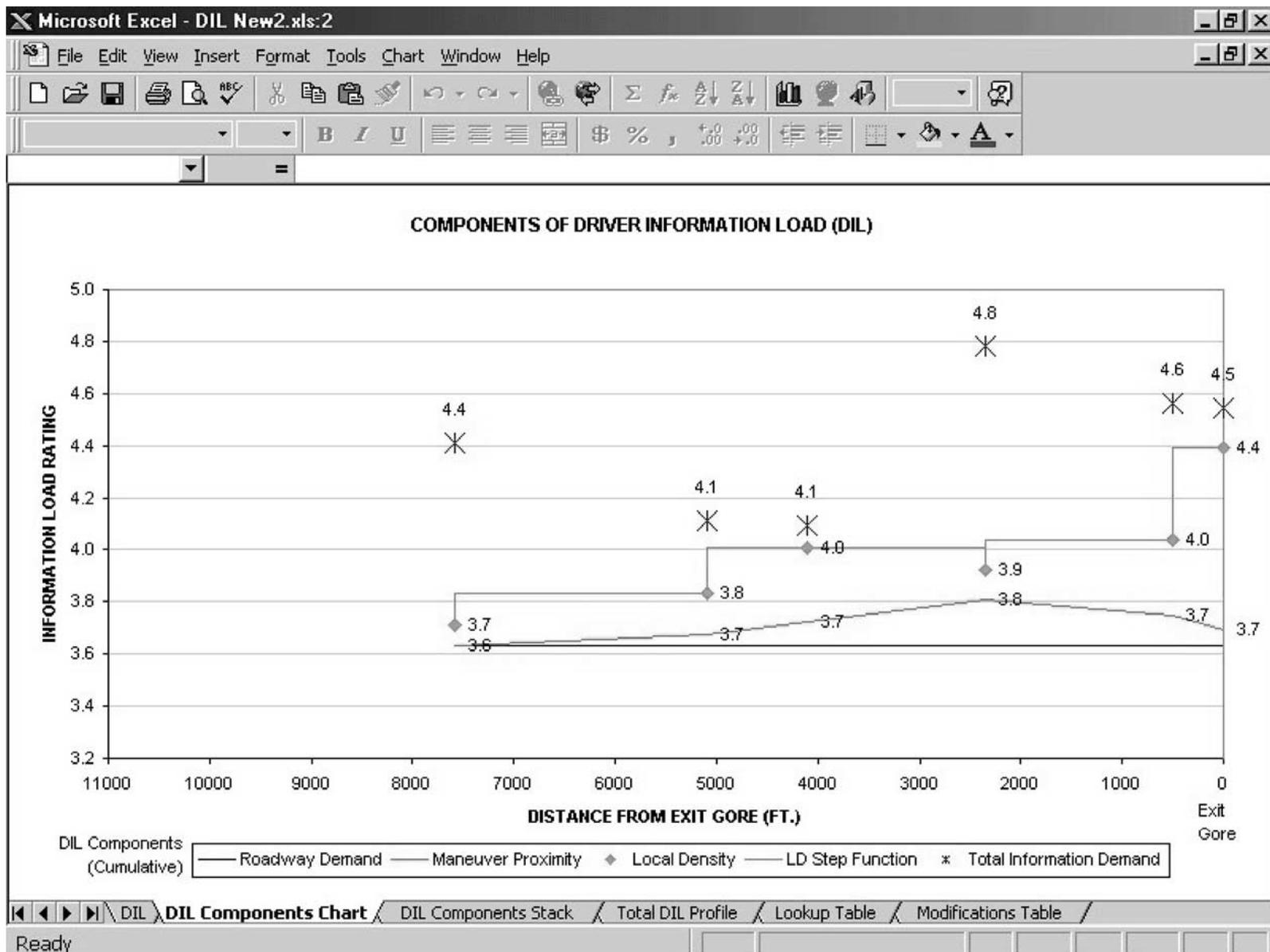
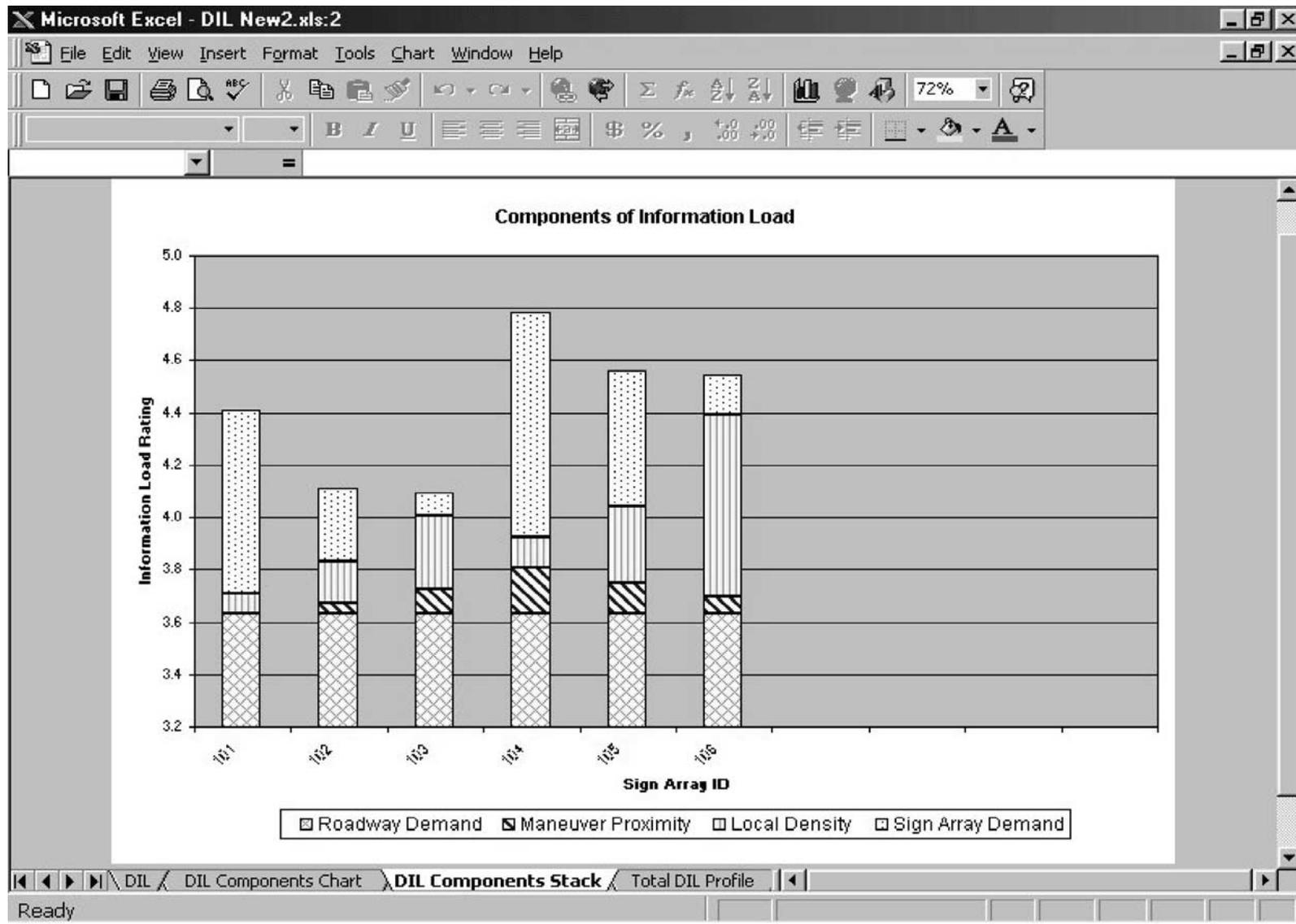*Figure 14. DIL Components Chart*

Figure 15.   DIL Components Stack

ative or actual distance from the exit gore. The chart area is formatted to display a maximum of ten sign arrays. If there are more than ten arrays in the roadway segment, you may format the Excel chart to fit the additional sign arrays.

Total DIL Profile

This tab is a simplified version of the "DIL Components Chart" described above. This graph displays the Driver Information Load value for each array, but not the individual components. In this graph, a straight line connects each array's DIL value.

Lookup Signs

This worksheet contains sign characteristics used in the **Sign Lookup Table** form during data entry. This worksheet may be used as a reference guide for information on the characteristics of various sign types.

Lookup Signs—Diff Format

The same information as in the "Lookup Signs" worksheet; formatted differently.

Lookup—Added Comps

This worksheet gives a number of sample sign types and the effects of hypothetical additions and subtractions from the standard sign components. This worksheet is particularly useful for reference when selecting a baseline sign rating between the two standard definitions.

GLOSSARY OF TERMS

Ordered According to the Form in Which Each Term Appears

Term	Definition
SEGMENT INFO	
Site	A roadway segment less than or equal to 11,000 feet from the exit gore point to the upstream end of the segment.
Site ID/Name	User-defined name/number used to identify the site
Maximum Number of Lanes	The maximum number of through lanes in a site, excluding exit, entrance, and weave lanes.
Number of Merges	The total number of locations where vehicles may enter the highway from another road, excluding weaving sections.
Number of Exits	The total number of locations where vehicles may exit the highway, excluding weaving sections.
Number of Weaves	The total number of weaving sections where the pattern of traffic entering and leaving at contiguous points of access results in vehicle paths crossing each other. Where a weaving section is present, DO NOT count the merge and exit individually.
Number of Lane Drops	The total number of through lanes which end (traffic must merge into other highway lanes) or become "exit only" lanes.
Number of Curves	The total number of discrete horizontal curves in the roadway segment.
Section Length (in feet)	The total length of a site measured from the exit gore point at one end to an upstream point normally 11,000 feet from the gore (the point where a driver makes a navigational maneuver, such as an exit or a change into the appropriate lanes at a diversion point).
Sign Array	A set of individual sign panels that are co-located with one another at a given point on the roadway, typically on the same sign mounting structure or assembly.
Number of Sign Arrays	The total number of sign arrays in a site.
SIGN ARRAY SUBFORM	
Sign Array ID	User-defined name/number used to identify the array.
Distance (ft) from Gore	Distance (in feet) of the current sign array from the downstream exit gore point where a driver will make a navigational maneuver such as an exit or a change into the appropriate lanes at a diversion point.
No. of signs	The total number of signs in an array.
Sum of Individual Sign Ratings	The additive sum of the ratings of each sign in an array.

Term	Definition
Array Demand	A value derived from the Sum of Individual Sign Ratings for each array. This value is a component of the Multiple Regression Formula for Driver Information Load.
Maneuver Proximity	A value determined by the array's proximity to the downstream end point of the roadway segment (the point where a driver must make a navigational maneuver). This value is a component of Driver Information Load.
Local Density (*not shown on Sign Array Subform*)	A value derived at each sign array by taking the mean of the array demand values for the array immediately preceding it and the array immediately after it. The mean value of the two signs is then divided by the distance between them. This value is a component of Driver Information Load.
Roadway Demand	A value derived from the complexity of the site's roadway geometry (e.g., merges, exits, curves, etc.) as entered in the "Segment Info" form. This value is a component of Driver Information Load.

SIGN LOOKUP TABLE

Sign	An individual panel in an array
Sign Array ID/Name	User-defined name/number used to identify the array. This ID was created on the previous form.
Sign Number of ID	User-defined name/number used to identify the individual sign
Sign Type and Category	Sign types according to the 2000 edition of the Manual on Uniform Traffic Control Devices (MUTCD). Refer to the MUTCD for detailed descriptions. Select the most appropriate sign type from the drop down menu.
MUTCD Reference	The location and/or figure reference for a particular sign in the MUTCD.
Complexity	Notes whether the specifications for a sign's components relate to the upper or lower boundary of complexity.
Rating	The base value associated with a sign's upper or lower bound.
Word Length	The average amount of text for all destinations on a sign. The 4 lengths to choose from are 'no word,' 'short word,' 'long word,' and 'very long word.' Value varies by increments of 2 according to amount of text on sign relative to the baseline amount. For example, if the baseline sign word length is 'short word' and the actual sign's word length is 'very long word,' the baseline word length must be increased by 2 increments. $2 \times 2 =$ total adjustment of +4. If the baseline word length is the same as the actual sign's word length, no adjustment is necessary.

Term	Definition
# of Dest	The total number of text destinations (e.g., road, town, etc.) on a sign.
# of Rte Markers	The total number of state or interstate route markers (a number within a shield).
# of Icons	The total number of meaningful pictures, images, or logos, often representing a point of interest.
Lane Indicator	The total number of downward-pointing arrows and/or text indicating which lane to use for a particular destination/exit.
Direction	The total number of direction indicators (text indicating the cardinal direction of a road's traffic flow).
Suitable Base Rating for the Selected Sign	A user-defined sign complexity rating based on the sign's characteristics and the upper/lower bounds established in the table above this item.
Exit Number Panel (Single #)	A small panel attached to a larger sign indicating an exit number or letter.
Exit Number Panel (Multiple #)	A small panel attached to a larger sign indicating multiple exits (often at the same interchange).
Destination	A text destination (e.g., road, town, etc.) on a sign.
Route Marker	A state or interstate route marker (a number within a shield).
Cardinal Direction	Text indicating the cardinal direction of a road's traffic flow.
Word Length (up/down 1 Level)	Increase or decrease length of baseline word by 1 increment. See "Word Length" above for more detail.
Word Length (up/down 2 Levels)	Increase or decrease length of baseline word by 2 increments. See "Word Length" above for more detail.
Word Length (up/down 3 Levels)	Increase or decrease length of baseline word by 3 increments. See "Word Length" above for more detail.
Icon	A meaningful picture, image, or logo, often representing a point of interest.
Lane Drop	A through lane which ends (traffic must merge into other highway lanes) or becomes an "exit only" lane.
Lane Arrow	A downward-pointing arrow and/or text indicating which lane to use for a particular destination/exit.
Total Modification to Base Rating	The net sum of all added and subtracted sign elements. This value will be applied to the user-defined base rating to generate the sign's Adjusted Rating for Driver Information Load.
Adjusted Sign Rating for Driver Information Load	See "Total Modification to Base Rating" above.
Composite Rating for All Signs in this Array	The sum of the "Adjusted Sign Rating for Driver Information Load" for all signs in the present array.