

Visual

Release 2.4

Roadway Lighting Tool User's Guide

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Visual User's Guide

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Should you have any questions concerning this Agreement or the Programs, or the Documentation, please contact Acuity Lighting Group, Inc. by calling (800) 279-8043.

System Requirements

Visual has been programmed for a Microsoft Windows 95/98/ME/XP/2000/NT 4.0 environment. The minimum system requirements to successfully run the application are listed below:

- Microsoft Windows 95/98/ME/NT/2000/XP
- Pentium Processor, 200 MHz minimum
- 25-105 MB Hard Drive space for install depending on installation component choices
- 64 MB RAM minimum, 128 MB RAM or more recommended
- 800x600xSmall Fonts minimum screen resolution, 1024x768xSmall Fonts recommended

Installation, Registration and Technical Support

Installation

1. Download the setup program from <http://www.VisualLightingSoftware.com>. Make sure to save the setup program to your hard drive. Run the setup by double-clicking the setup file.
-or-
Insert the Visual CD into your CD-ROM Drive. The Visual CD Browser will appear. Select INSTALL VISUAL.
2. The Visual Installation program will begin running. Follow the instructions that appear on your screen.
3. Visit <http://www.VisualLightingSoftware.com> to check for program news and updates.

Registration

It is important that we keep all users informed of updates for Visual. To register as a Visual user, please create an account on the Visual website: <http://www.VisualLightingSoftware.com>

Technical Support

For technical support questions, please visit the Support section of the Visual website or contact the Visual Support Center via email or telephone:

- Internet: <http://www.VisualLightingSoftware.com>
- Email: support@VisualLightingSoftware.com
- Phone: 1-800-279-8043, Monday – Friday 8 AM – 5 PM EST

Document Conventions

Numerous instructions and references appear throughout this guide. The following conventions are designed to make it quick and easy to find and understand information.

- Menu names and items are printed in small caps type. For Example: "Select ARC from the CONSTRUCT MENU."
- Form and Dialog Box names as well as major interface elements are printed in bold type. For Example: The **Options Form** will appear."
- Terms that are defined in the glossary appear in Italics. For Example: "Visual will calculate the *illuminance* level."
- References to keyboard keys appear in 8 point all caps type. For example: "Press the TAB key on the keyboard to change the working plane."
- Input that must be typed into a text or list box in this guide is printed in bold type. For example: "Enter **2.5** into the Workplane Height Text Box."
- Filenames that are referred to are in 10 point all caps type. For example: "Save the file as FOOTBALLFIELD.VSL."

Scope, Features and Limitations

Scope

The Visual Roadway Lighting Tool is designed to speed the process of designing roadway lighting systems based on IESNA RP-8 or CIE 2000 standards. The Roadway Lighting Tool provides a step-by-step interface for calculating luminaire spacing, luminance, illuminance, veiling luminance, small target visibility, longitudinal uniformity and threshold increment. Roadway designs can be imported into the Visual Professional Edition for additional design and analysis capabilities.

Features

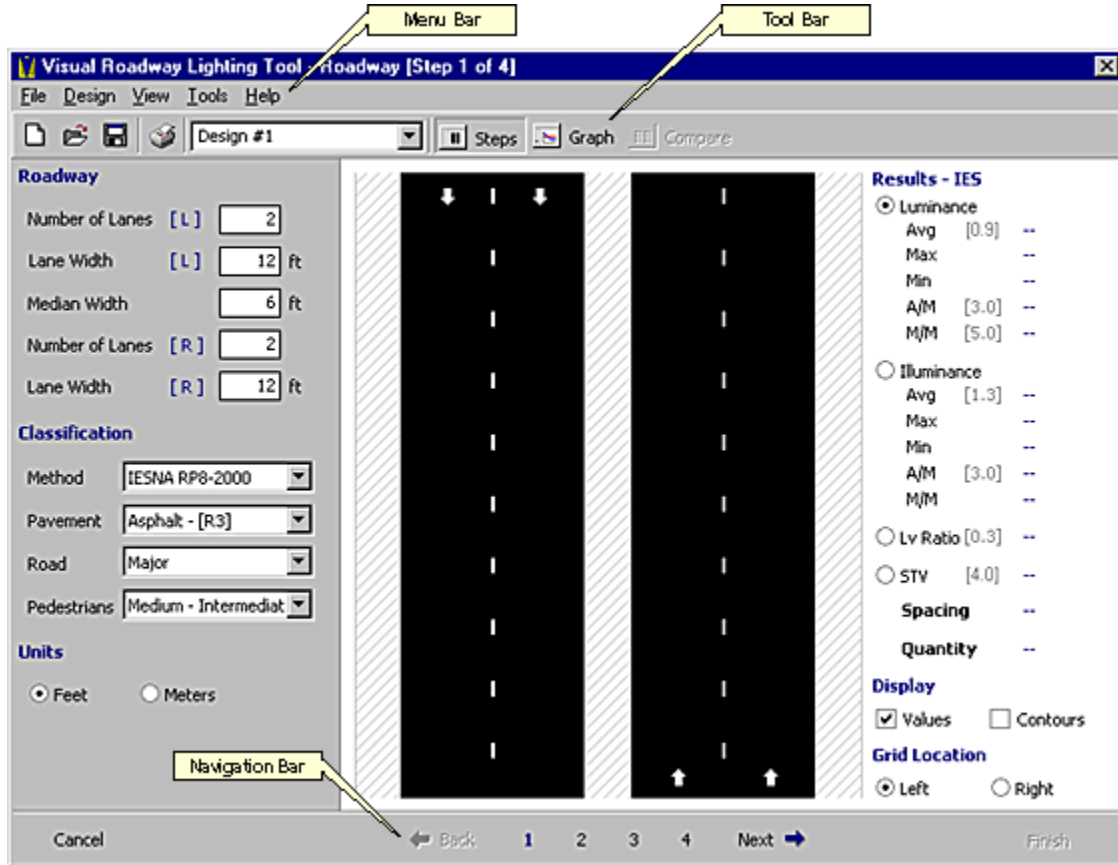
- Run as a standalone program or from within the Visual Professional Edition.
- Design using either the IESNA RP-8 or CIE-2000 calculation method.
- Independently define the number and width of the left and right lanes, and optionally specify a median.
- Create and use multiple luminaires. Luminaires can be independently placed on the left, median and right sides of the roadway.
- Calculate using built-in IESNA and CIE recommendations, or specify individual criteria.
- Real-time calculations provide instantaneous feedback throughout the design process.
- Graph system performance versus luminaire cycle spacing.
- Design and compare multiple roadway designs.
- Print formatted professional output.

Limitations

- Restricted to uniform straight sections of roadway.
- Calculates only one side of the roadway at a time (per RP-8 and CIE 2000).
- Does not perform calculations for sidewalks.

Chapter 1 - Understanding The Interface

The Visual Roadway Lighting Tool is presented in enhanced wizard format. The interface includes a standard wizard-style navigation bar as well as a menu bar and a toolbar that provide additional functionality.



The Menu Bar

The menu bar provides access to the extended functionality of the design tool. Functions such as file management, changing tool settings and obtaining Help are accessed through the menu bar.

The Toolbar

The toolbar provides quick access to commonly used commands. It also provides a dropdown list for switching between multiple designs.

The Navigation Bar

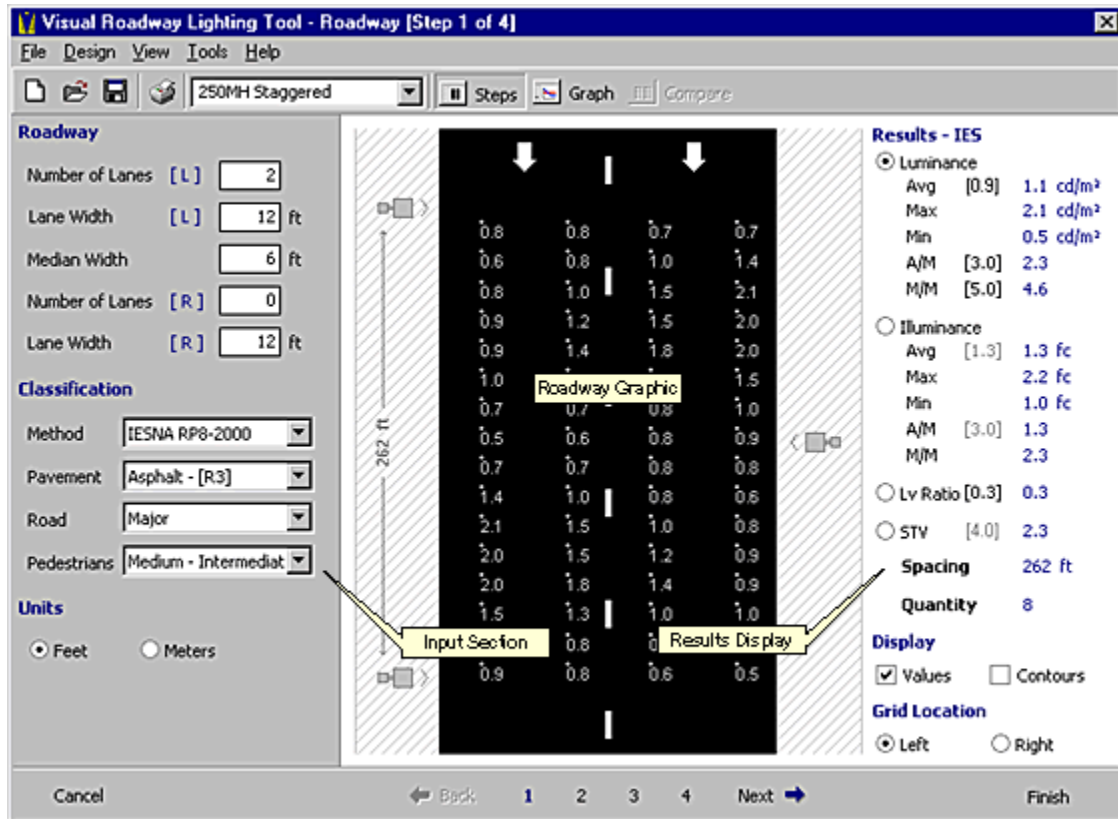
The Navigation Bar provides wizard style navigation using the familiar Back, Next, Cancel and Finish buttons. The Navigation Bar also includes buttons for each step to facilitate design modification.

*Note: The Cancel and Finish buttons are not available when the Roadway Lighting Tool is run as a standalone program.

Chapter 2 - Using the Roadway Lighting Tool

2.1 The Steps View

The Steps view is where roadway lighting designs are created. Each step will display a section for data input, a roadway graphic and the calculated results.



Input Section

Each step in the Roadway Lighting Tool includes a section for data input on the left side of the screen. Data input is provided via textbox, option selection, checkbox selection or a drop-down list. Certain fields may restrict input data to appropriate values. For example, the number of lanes for a roadway can only be a positive whole number such as **2** -- a fractional number such as **2.5** is not permitted.

Roadway Image

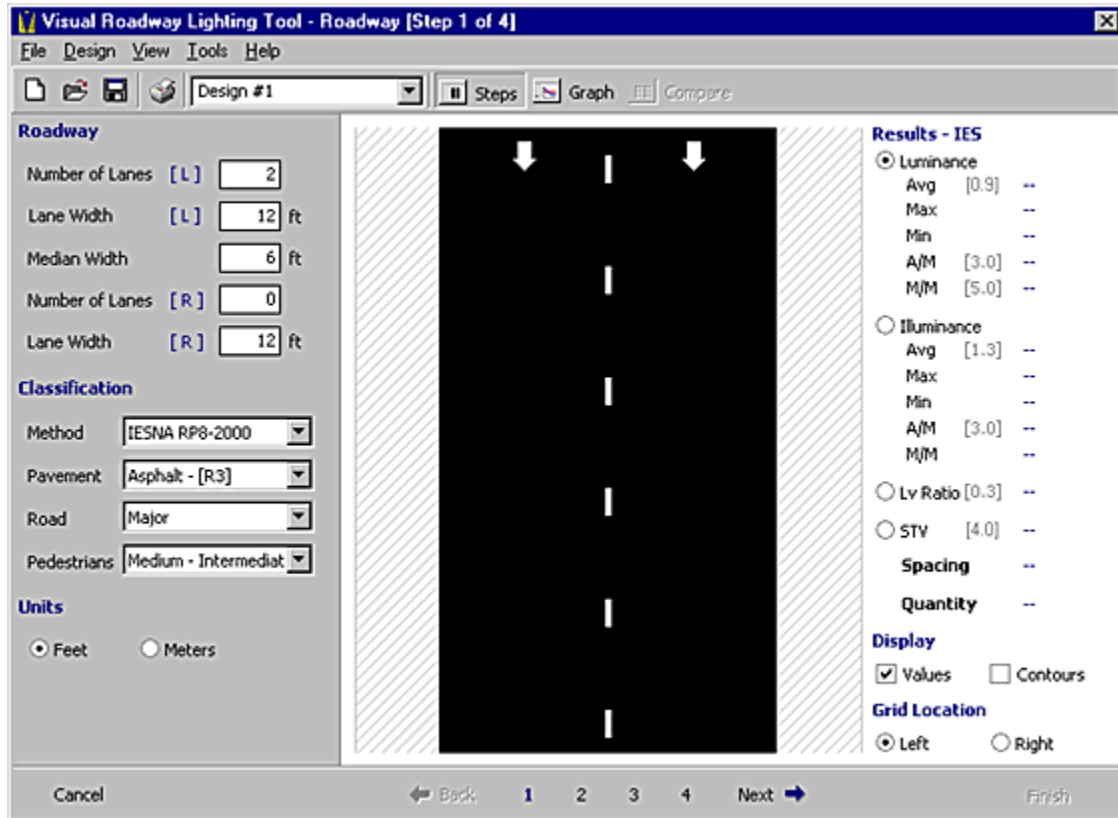
The roadway graphic located in the center of the screen provides a visual representation of the roadway geometry, luminaire locations and calculation values. The roadway image is automatically updated each time a design parameter is changed.

Results Display

The results section is located on the right side of each step. This section provides immediate numerical feedback as well as controlling some display and calculation options. The results section is automatically updated each time a design parameter is changed.

2.1.1 Step 1 – Roadway Information

Step 1 consists of the definition of the roadway and selection of a calculation method (IESNA RP8 or CIE) and classification. Proper roadway classification is necessary for obtaining the correct IESNA or CIE design recommendations in Step 4. Each input field is described below.



Roadway

The Roadway section controls the physical geometry of the roadway.

Number of Lanes

The number of lanes can be independently defined for the left and right side of the roadway. To design a one-way roadway with traffic moving in the same direction, enter 0 for the number of right lanes, as shown in the graphic above.

Lane Width

The lane width can be independently defined for the left and right side of the roadway. The lane width applies to each lane on the associated side of the roadway.

Median Width

A median width greater than 0 designates a divided roadway. To design a two-way roadway with no median, enter a median width of 0.

Classification

The Classification section controls the design method to be used and any parameters required by the selected method

Method

Roadway designs can be created using either the IESNA RP8-2000 or CIE 2000 methods. Selection of a calculation method will change associated options throughout the tool.

Pavement

Pavement reflectances based on IESNA RP8-2000 and CIE 2000 are provided for concrete and asphalt roadways. Both use a similar R1 to R4 classification. A complete description of pavement reflectance is in the Glossary.

Road

The IESNA RP8-2000 roadway classifications are based on roadway traffic volume, location, and intended usage. The CIE 2000 roadway classifications are similar to the IESNA classifications but also include pedestrian activity. A complete description of roadway classification is in the Glossary.

Pedestrians

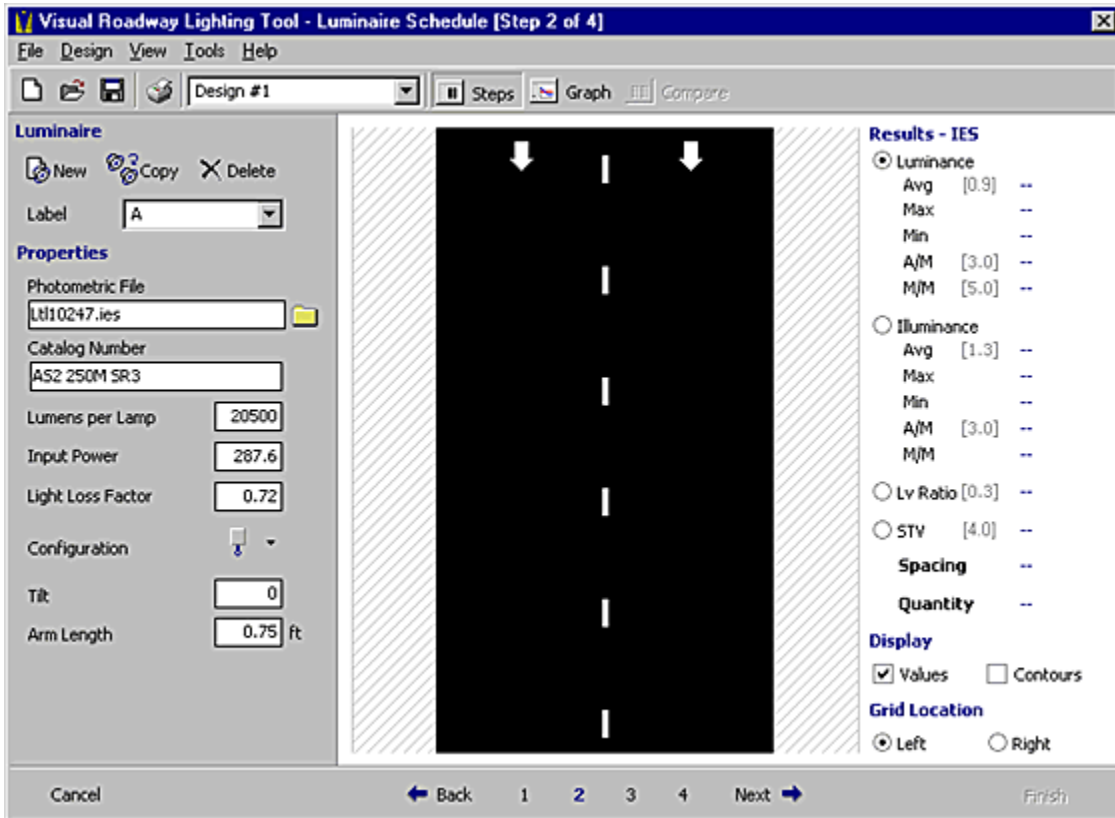
Pedestrian Conflict classifications are defined by the IESNA only, and are used to describe nightly pedestrian activity. A complete description of pedestrian conflict is in the Glossary.

Units

The choice of units applies to all physical dimensions. The units of illuminance are specified in Step 4.

2.1.2 Step 2 – Luminaire Schedule

Step 2 consists of defining the luminaires that will be used in the roadway design. If the Roadway Lighting Tool is being run from within the Visual Professional Edition, any luminaires that are in the Professional Edition's luminaire schedule will be imported into the Roadway Lighting Tool.



Luminaire

The Luminaire section provides functionality for managing the luminaire schedule.

New



Click the New button to create a new luminaire and begin the process of defining the luminaire properties. The luminaire label will automatically default to the next available character in the alphabet.

Copy



Select Copy to create a copy of the current luminaire. The luminaire label will automatically default to the next available character in the alphabet.

Delete



Select Delete to remove the current luminaire from the schedule.

Label

The label field has a dual function. Selecting a luminaire from the drop-down list makes it the current luminaire and loads its properties for editing. Typing into the field modifies the label of the current luminaire.

Properties

The Properties section allows for modification of the currently selected luminaire (as shown in the Label field in the Luminaire section).

Photometric File



Click the file folder button to the right of the Photometric File field to display the Luminaire Selection dialog. See section 2.5 Selecting a Photometric File for more information. After file has been selected, the remaining fields will be filled with the new information.

Catalog Number

The Catalog Number will default to the information provided in the selected luminaire file. For an IESNA formatted luminaire file, this information is retrieved from the line with keyword [LUMCAT].

Lumens Per Lamp

The Lumens Per Lamp will default to the rated lamp lumens from the selected luminaire file. Changing the value in this field will re-rate the luminaire and affect the calculations.

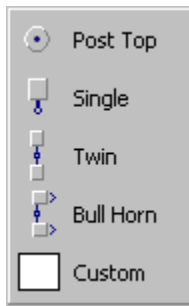
Input Power

The Input Power will default to the information provided in the selected luminaire file. This field is for reporting purposes only and has no effect on the calculations.

Light Loss Factor

The Light Loss Factor field defaults to a value of 1.0. This will result in calculation values based on initial lumen values. To calculate maintained values, an appropriate light loss factor must be entered here.

Configuration



The luminaire configuration defaults to single luminaire on a pole. Other options include a post-top, a twin configuration, a bull-horn configuration and a custom configuration. Additionally, complex luminaire configurations can be created in the Visual Professional Edition and imported into the Roadway Lighting Tool.

The bull-horn configuration consists of two luminaires on a pole with each luminaire oriented in the same direction.

The custom configuration is typically used for high-mast luminaires. The specified number of fixtures will be arranged circularly around the pole.

Tilt

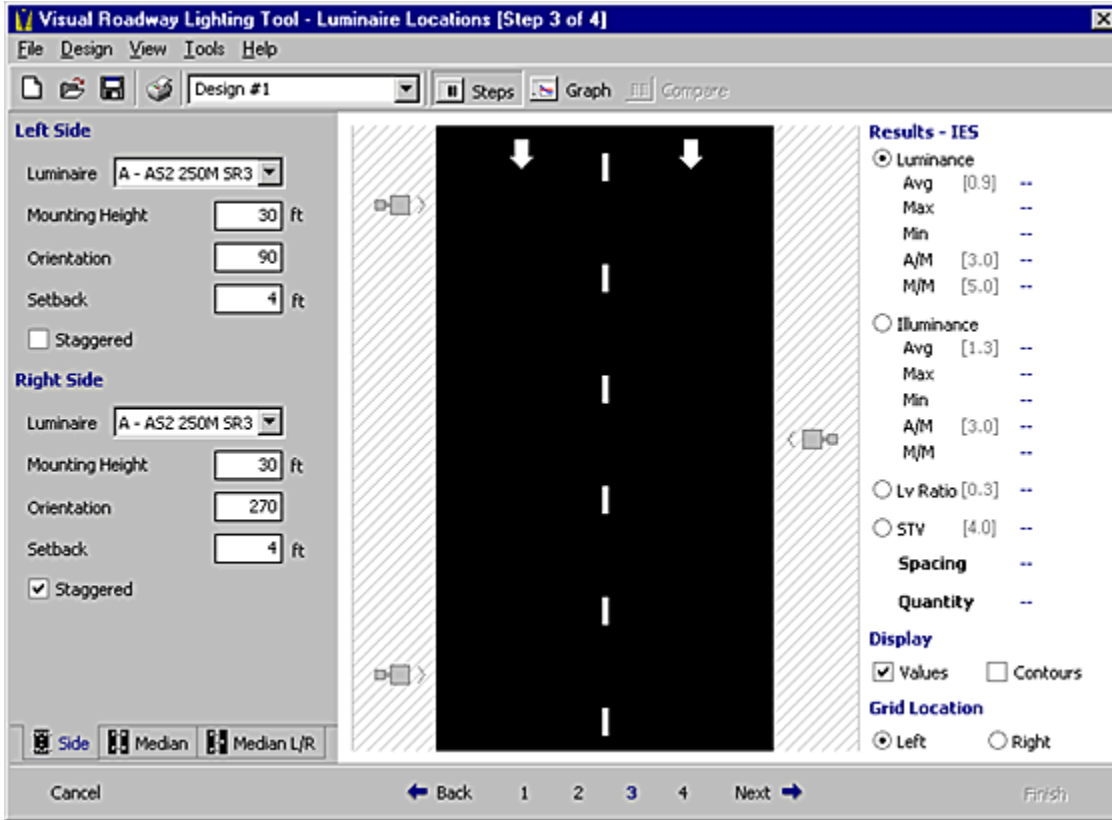
The Tilt field specifies the vertical tilt of each individual luminaire in the current configuration. Tilt is measured from horizontal with positive tilt "upward".

Arm Length

The Arm Length field specifies the length of the luminaire support arm(s). It defaults to 0.75 feet (9 inches) for the single and twin configurations. A single post-top configuration defaults to zero arm length. The bull-horn and custom configurations default to an arm length of 1.5 feet.

2.1.3 Step 3 – Luminaire Locations

Step 3 consists of placing luminaires in the desired locations. The Roadway Lighting Tool allows a different luminaire type to be placed in each location.



Position Tabs



The position tabs at the bottom of the screen provide access to the five locations supported by the Roadway Lighting Tool. The Side tab allows luminaires to be placed on the left and right shoulders of the road. The Median tab allows luminaire placement in the middle of the median (no setback). The Median L/R tab allows luminaires to be placed on the left and/or right side of the median.

Location Sections

Each location section provides fields for specifying and positioning luminaires.

Luminaire

Select a luminaire from the drop-down list to place it in the corresponding location.

Mounting Height

The mounting height specifies the vertical distance from the roadway surface to the center of the luminous area of the luminaire. The luminous area is typically the bottom of the luminaire housing. Note that this is not always equivalent to the pole height.

Orientation

The orientation specifies the orientation of luminaire configuration with respect to the road. An orientation of 0 degrees corresponds to North (up on the screen), 90 degrees to East, 180 to South and 270 degree to West.

Setback

The setback defines the distance from the edge of the roadway to the pole location of a luminaire configuration.

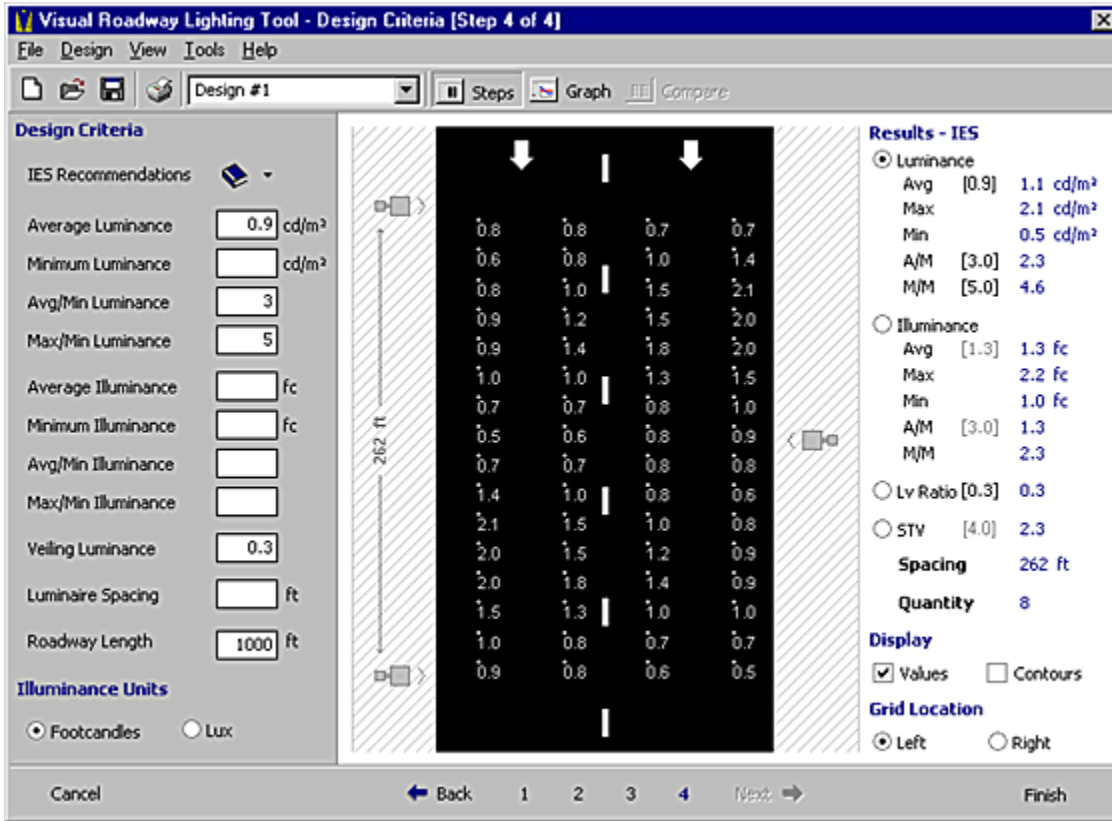
Note: Luminaires placed in the Median location are always centered in the median and thus have no Setback field. The Median Left and Right locations may be used if a specific setback is desired.

Staggered

The staggered checkbox causes the luminaires in the associated location to be offset by half a cycle spacing.

2.1.4 Step 4 – Design Criteria

Step 4 consists of specifying criteria for design optimization. The Roadway Lighting Tool will determine the greatest spacing that satisfies all of the specified criteria. In cases where it is not possible to meet all of the specified criteria, a message will be displayed indicating which criteria could not be met.



Design Criteria

The Design Criteria section provides fields for specifying the design goals for the lighting system.

IES/CIE Recommendations

Selecting an IES or CIE Recommendation will enter the appropriate lighting recommendations into the design criteria fields. The recommendations are based on the information specified in the Classification section of Step 1.

IESNA RP8-2000 provides recommendations for luminance and illuminance, while CIE 2000 provides recommendations only for luminance.

Note: Changing the Classifications in Step 1 will **not** update the design criteria. The IES Recommendations must be reselected to update the values.

Luminance

A design based on luminance criteria is recommended for roadways with a majority of vehicle traffic such as a freeway, expressway, or major roadway.

Illuminance

A design based on illuminance criteria is recommend for the analysis of areas with high levels of pedestrian traffic, intersections and high mast lighting.

Veiling Luminance [Lv] – IESNA RP8 Only

The Veiling Luminance Ratio design criterion will only appear when the IESNA RP8-200 calculation method is selected in Step 1. See the Glossary for an explanation of Veiling Luminance Ratio.

Threshold Increment [Ti] – CIE 2000 Only

The Threshold Increment design criterion will only appear when the CIE calculation method is selected in Step 1. See the Glossary for an explanation of Threshold Increment.

Luminaire Spacing

A roadway design at a particular spacing can be quickly analyzed by entering a value in this field. All other design criteria will be ignored when the luminaire spacing has been specified.

Roadway Length

The roadway length can be specified to determine the total number of luminaires required for the design. Specifying a roadway length has no effect on the calculations.

Illuminance Units

The choice of units applies to illuminance only. Luminance is always reported in cd/m^2 .

2.1.5 The Results Display

The Results display, located on the right side of each step of the Roadway Lighting Tool, provides immediate evaluation of design modifications on any step in the tool.

Target criteria values appear in brackets to the right of certain metrics. Each criterion that is specified in Step 4 will appear in black. Each calculated result is compared to its target value (if any) and is displayed in red if it does not satisfy the criterion. If no target value is specified, but an IESNA or CIE recommendation exists for a particular criterion, the recommended value will appear in gray. The gray recommended values are for informational purposes only -- no comparison is performed.

Results - IES

Luminance

Avg	[0.9]	0.8 cd/m ²
Max		1.9 cd/m ²
Min		0.3 cd/m ²
A/M	[3.0]	2.5
M/M	[5.0]	5.9

Illuminance

Avg	[1.3]	1.0 fc
Max		2.2 fc
Min		0.5 fc
A/M	[3.0]	1.9
M/M		4.4

Lv Ratio [0.3] 0.4

STV [4.0] 3.6

Spacing 350 ft

Quantity 6

Display

Values Contours

Grid Location

Left Right

Results

The Results section reports the lighting system performance. The particular statistics that are displayed in the Results section can be chosen in the Options dialog. Certain items have a round option control to their immediate left. Clicking the option control displays the corresponding calculation grid in the roadway graphic.

Luminance

The luminance lighting metrics provide an analysis of the light reflected off of the pavement in the direction of the driver. The luminance lighting metrics indicate how bright the roadway surface appears. Maximum to Minimum and Average to Minimum luminance ratios are used when the IESNA calculation method is selected in Step 1, while Minimum to Maximum and Minimum to Average luminance ratios are used when the CIE calculation method is selected.

Illuminance

The illuminance lighting metrics provide an analysis of the amount of light incident on the roadway surface due to the lighting design. Maximum to Minimum and Average to Minimum illuminance ratios are used when the IESNA calculation method is selected in Step 1, while Minimum to Maximum and Minimum to Average illuminance ratios are used when the CIE calculation method is selected.

Veiling Luminance Ratio [Lv Ratio] – IESNA RP8 Only

The veiling luminance ratio provides an evaluation of the disability glare from a roadway lighting design. This metric will only appear in the Results section when the IESNA calculation method is selected in Step 1.

Small Target Visibility [STV] – IESNA RP8 Only

Small target visibility provides an evaluation of the visibility of an array of targets on the roadway. STV will only appear in the Results section when the IESNA calculation method is selected in Step 1.

Threshold Increment [Ti] – CIE 2000 Only

Threshold increment is a measure of the loss of visibility due to disability glare from the luminaires of the roadway design. This metric will only appear in the Results section when the CIE calculation method is selected in Step 1.

Longitudinal Uniformity [UI] – CIE 2000 Only

Longitudinal uniformity is the calculated ratio of the lowest luminance to the highest luminance along a line parallel to the length of the roadway. Longitudinal uniformity will only appear in the Results section when the CIE calculation method is selected in Step 1.

Spacing

The spacing is the typical spacing for one luminaire cycle. It applies to all luminaire locations (left, right, median, etc...).

Quantity

This result only appears if a value is entered for the **Roadway Length** in Step 4. This number is the total quantity of luminaires at all locations required for the specified roadway length.

*Note: The number of luminaires required per the left side, right side and median locations appears on the summary page of the printed documentation.

Display

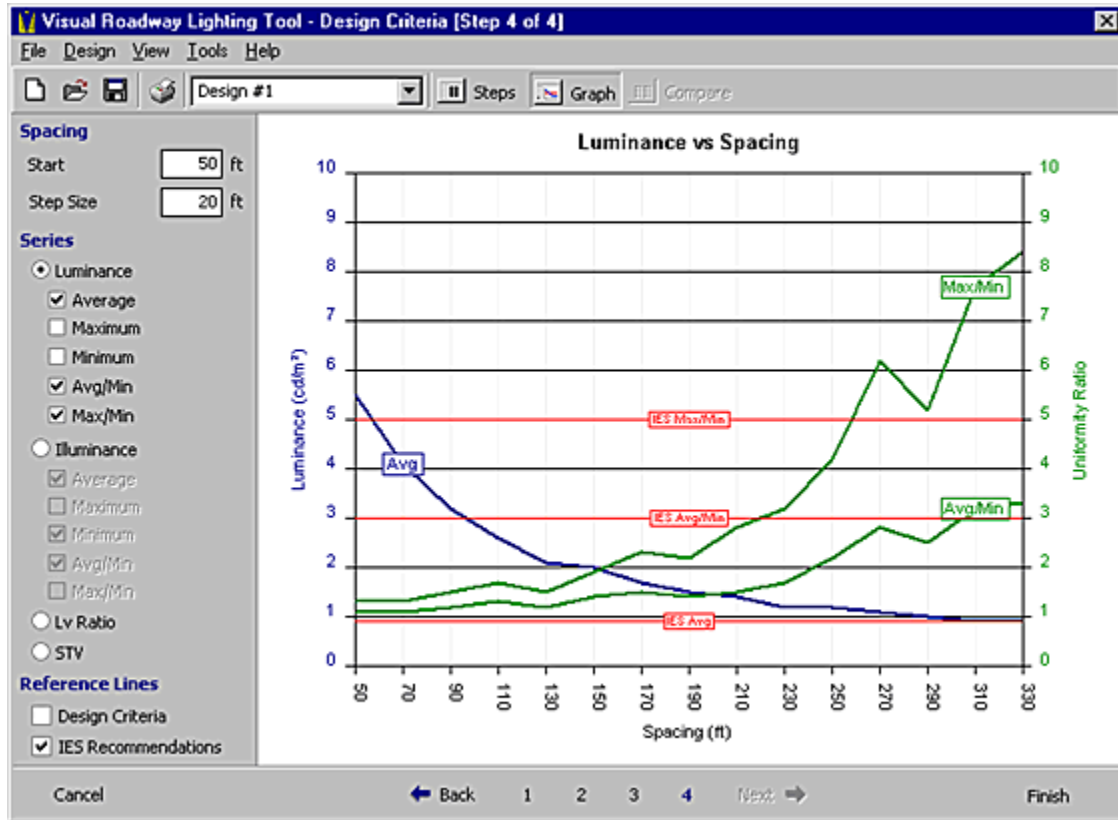
The Display section controls the display of point values and iso-contour lines in the roadway graphic.

Grid Location

The Grid Location section specifies on which side of the roadway the calculations are to be performed. As most roadway metrics are sensitive to the position of the observer, the grid location can be an important factor.

2.2 The Graph View

The graph view displays lighting system performance as a function of spacing. The screen consists of a section specifying the graph parameters on the right with the graph itself occupying the remainder of the screen.



Spacing

The Spacing section controls the horizontal axis. The lighting system will be evaluated at each spacing value on the horizontal axis. A total of 15 spacing values will be evaluated.

Start

This field specifies the initial system spacing to be analyzed.

Note: "0" is not a valid spacing. If a "0" is entered in this field, the graph will not be drawn.

Step Size

The Step Size field contains the spacing increment to apply between each iteration.

Series

The Series section controls the vertical axis (or axes). Click the round option control next to the series titles to graph that series.

Luminance

Values for average, minimum, and maximum luminance are plotted in blue. These will always be plotted against the left axis. Values for average/minimum and maximum/minimum luminance ratio are plotted in green. The axis will appear on the right, or on the left if average, minimum, or maximum is not selected.

CIE 2000 only: A series for Longitudinal Uniformity (UI) will also be available on the green axis.

Illuminance

The illuminance series behave in the same fashion as the luminance series, see above.

Veiling Luminance Ratio [Lv] – IESNA RP8 Only

The Veiling Luminance Ratio option only appears when the IESNA RP8-2000 calculation method is selected in Step 1.

Small Target Visibility [STV] – IESNA RP8 Only

The Small Target Visibility option only appears when the IESNA RP8-2000 calculation method is selected in Step 1.

Threshold Increment [Ti] – CIE 2000 Only

The Threshold Increment option only appears when the CIE 2000 calculation method is selected in Step 1.

Reference Lines

The Reference Lines section controls the display of reference lines. Reference lines are drawn across the graph at particular threshold values, to aid in the evaluation of the lighting system.

Design Criteria

These lines will be drawn in magenta for each series that has a design criteria value specified on Step 4.

IES/CIE Recommendations

These lines will be drawn in red for each series that has an associated IES/CIE recommended value.

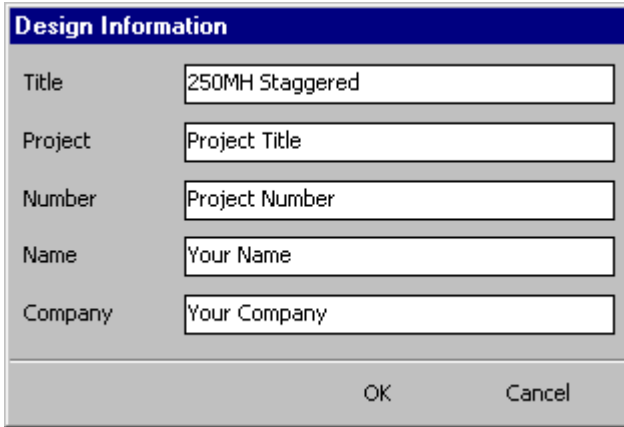
2.3 The Compare View

The compare view provides a side-by-side comparison of the currently loaded designs. Three designs are visible at a time -- if more designs are loaded, a horizontal scroll bar will appear at the bottom of the screen.

250MH Staggered		250MH Opposite		250MH One side	
IESNA RP8-2000		IESNA RP8-2000		IESNA RP8-2000	
Luminance					
Average	1.1 cd/m ²	Average	1.4 cd/m ²	Average	1.3 cd/m ²
Maximum	2.1 cd/m ²	Maximum	2.9 cd/m ²	Maximum	2.5 cd/m ²
Minimum	0.5 cd/m ²	Minimum	0.6 cd/m ²	Minimum	0.5 cd/m ²
Avg/Min	2.3	Avg/Min	2.4	Avg/Min	2.5
Max/Min	4.6	Max/Min	5.0	Max/Min	4.9
Illuminance					
Average	1.3 fc	Average	1.6 fc	Average	1.5 fc
Maximum	2.2 fc	Maximum	3.2 fc	Maximum	2.4 fc
Minimum	1.0 fc	Minimum	0.5 fc	Minimum	1.0 fc
Avg/Min	1.3	Avg/Min	3.3	Avg/Min	1.5
Max/Min	2.3	Max/Min	6.5	Max/Min	2.4
Lv Ratio	0.3	Lv Ratio	0.3	Lv Ratio	0.2
STV	2.3	STV	6.4	STV	2.3
Spacing	262 ft	Spacing	209 ft	Spacing	115 ft
Length	1000 ft	Length	1000 ft	Length	1000 ft
Quantity	8	Quantity	10	Quantity	9

2.4 Design Information

The Design Information screen is accessed by selecting **Information...** from the Design menu. The information entered on this screen will be printed in the design summary, see Chapter 3.



Design Information	
Title	250MH Staggered
Project	Project Title
Number	Project Number
Name	Your Name
Company	Your Company
OK Cancel	

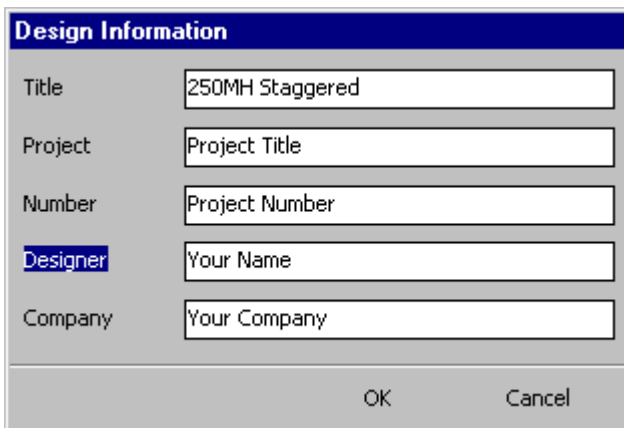
Title

Changes to the Title field will be reflected in the dropdown list on the main toolbar.

Note: You can also change the title of a design by typing the new title directly into the list field on the main toolbar.

Design Information Fields

The remaining fields on the screen can be renamed as desired. Click on the field caption and enter a new value. In the example below, the "Name" field has been changed to "Designer".

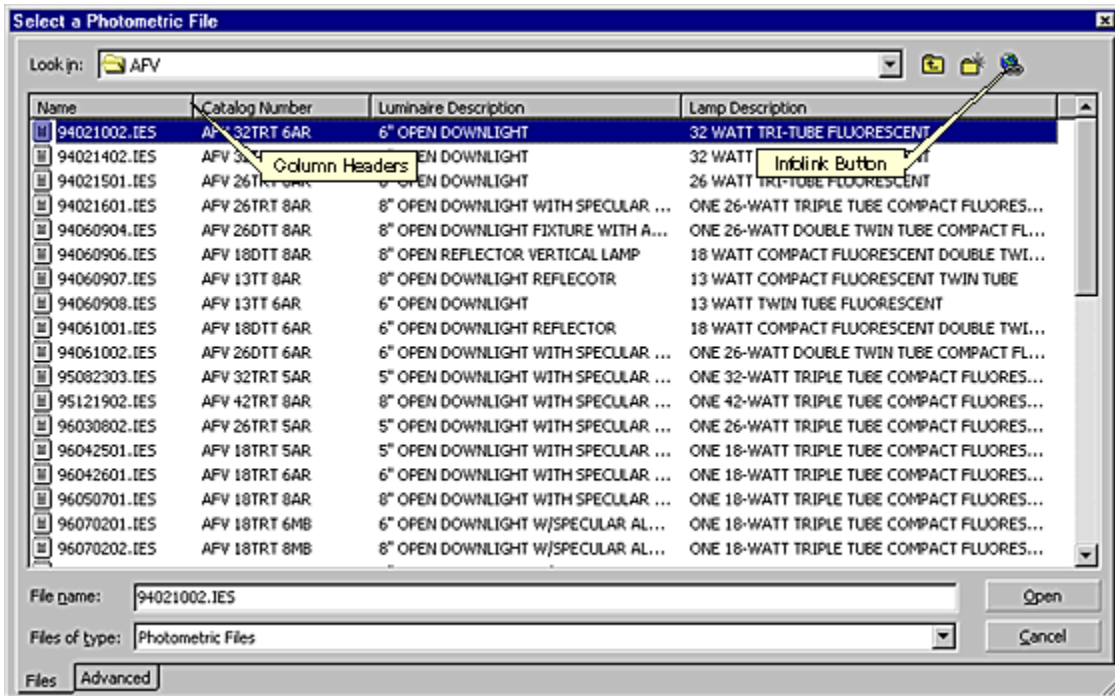


Design Information	
Title	250MH Staggered
Project	Project Title
Number	Project Number
Designer	Your Name
Company	Your Company
OK Cancel	

2.5 Selecting a Photometric File

It will often be necessary to select a photometric file for use with a luminaire. This is accomplished via the **Photometric File Dialog**. Much of the operation of the **Photometric File Dialog** is similar to standard Windows file dialogs. Additional functionality specific to photometric data has been added to aid in finding a specific luminaire.

2.5.1 The Files Tab



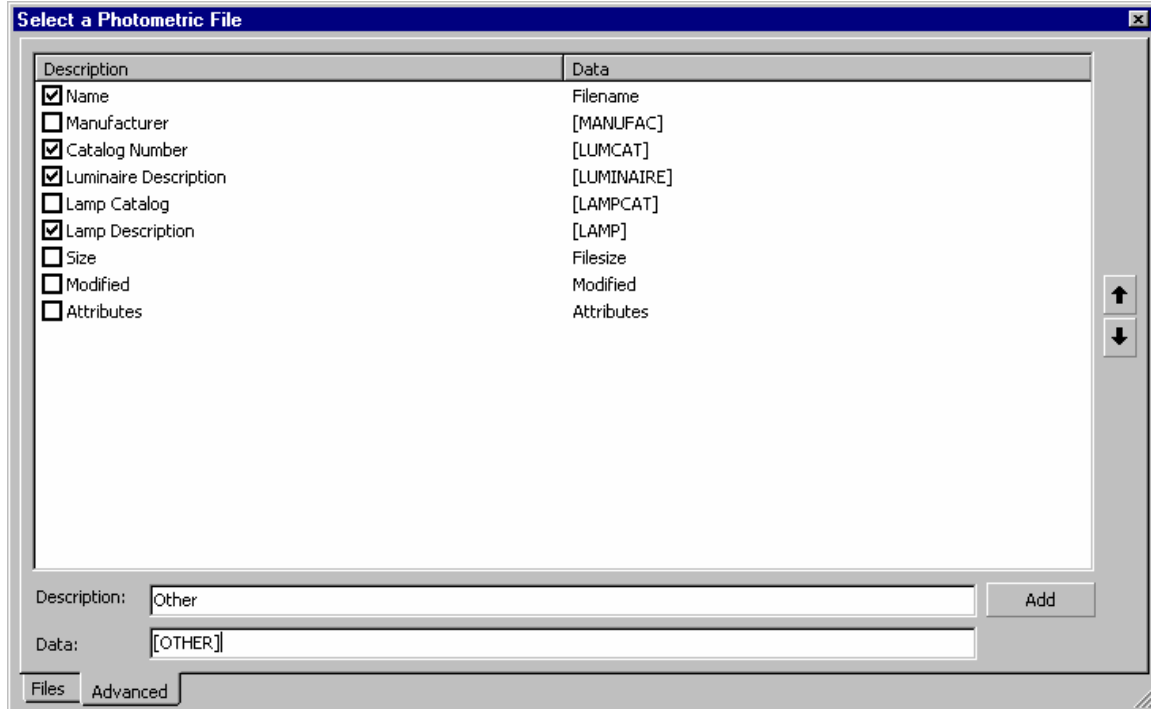
The dialog will by default list any files with an IES, LDT, CIB, TMS, or CB1 extension. Files with other extensions may be seen by either selecting "All Files" from the FILES OF TYPE: list; or by typing *.*??? (where .??? is the desired extension) into the FILE NAME: field and pressing ENTER. Visual can read any photometric file that is formatted in accordance with the IESNA LM-63, EULUMDAT, or CIBSE-TM14 specifications.

Each file in the selected directory that matches the desired file type is opened and its header is read. The header data is displayed underneath the corresponding Column Header. The file list may be sorted by clicking on any of the Column Headers. Clicking on the same Column Header reverses the order of the sorted list. Some photometric files may not contain certain header information, in which case the corresponding Column entry will be blank. This does not imply that the photometric file is invalid, only that there is no header data to display.

Some photometric files may contain an infolink, which points to a web page containing information particular to that file. If a file containing an infolink is selected from the file list, the Infolink button will be activated. Clicking this button will launch the default web browser and direct it to the appropriate web page.

2.5.2 The Advanced Tab

Column Headers may be turned on or off, repositioned, or customized by clicking on the Advanced tab in the bottom-left corner of the dialog. A list of Column Headers and their associated header data will be displayed.



To turn a column on or off, check or uncheck the box next to the desired Column Header name.

To reposition a column, click on the Column Header name to select it. Then use the arrow buttons on the right of the dialog to move the column through the list. The Name column header that corresponds to the filename can not be turned off or repositioned (it will always be the first column).

To add a custom column, enter the name of the Column Header in the Description: field. Then enter the header data to search for into the Data: field. It is important that this matches exactly with the header field in the photometric file. Finally, click the Add button. A new entry will be added to the column list.

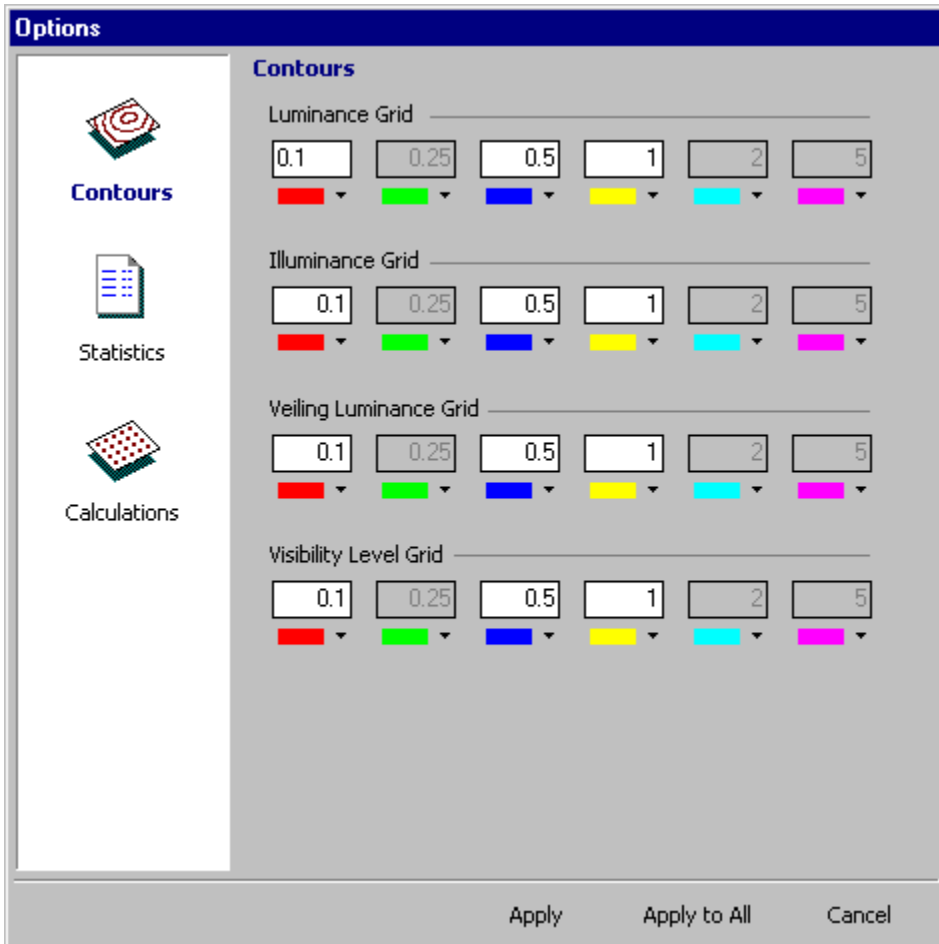
To delete a custom column, click the desired Column Header name to select it, then press the DELETE key. Only column headers that have been added using the Add button may be deleted.

2.6 The Options Screen

The Options screen is accessed by selecting **Options...** from the Tools menu. The Options Screen controls various display and program settings. There are three buttons at the bottom of the Options screen: **Apply** applies settings to the currently active design, **Apply to All** applies settings to all designs in the project, and **Cancel** exits the Options screen without applying any changes.

Note: To save settings as the default for new roadway designs, select **Save As Default** from the File menu.

2.6.1 Contours



The contours options category controls the parameters for the iso-contour lines that are displayed on the roadway graphic. Click the button directly underneath a text field to activate or deactivate an iso-contour. Clicking the arrow next to the activation button displays a color palette. If an iso-contour is active, the value in the text field may be modified.

2.6.2 Statistics

Options

Statistics

Contours

Statistics

Calculations

Display

Decimal Places

Luminance Grid 0.0

Average Luminance 0.0

Maximum Luminance 0.0

Minimum Luminance 0.0

Avg/Min Luminance 0.0

Max/Min Luminance 0.0

Illuminance Grid 0.0

Average Illuminance 0.0

Maximum Illuminance 0.0

Minimum Illuminance 0.0

Avg/Min Illuminance 0.0

Max/Min Illuminance 0.0

Veiling Luminance (Lv) 0.0

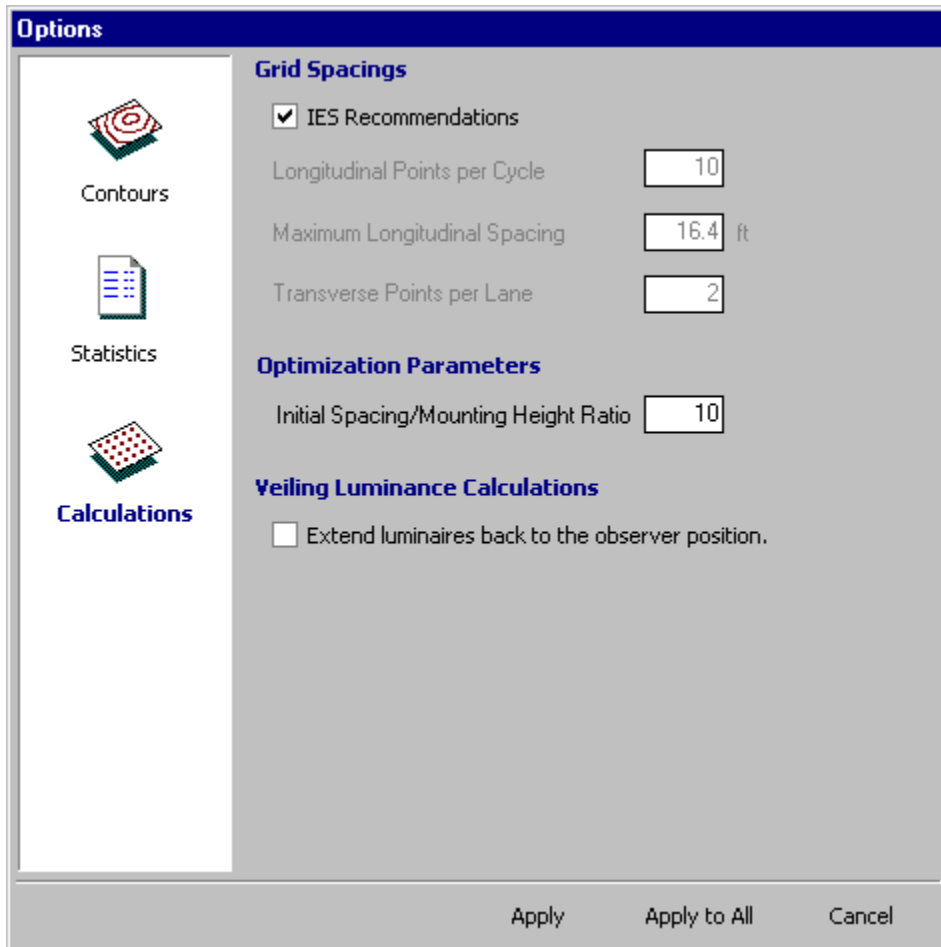
Small Target Visibility (STV) 0.0

Spacing 0

Apply Apply to All Cancel

The Statistics options category controls the display of the calculated metrics. Items with a checkbox beside them can be added or removed from the Results Display and the printed output. Items without a checkbox control the calculation grids displayed on the Roadway Graphic.

2.6.3 Calculations



The Calculations options section controls parameters used during calculations. Each subsection is described below.

Grid Spacings

Both the IESNA and CIE explicitly specify the spacing and location of the calculation grids used in compliant roadway lighting calculations. The Roadway Lighting Tool will use the recommended parameters if the **IES/CIE Recommendations** checkbox is checked.

Alternative calculation grid parameters may be specified by clearing the **IES/CIE Recommendations** checkbox and entering the desired values into the subsequent fields.

For the following descriptions, a row of calculation points is defined to be a uniformly spaced line of points parallel to the direction of travel of the roadway.

The **Longitudinal Points per Cycle** field specifies the minimum number of points that will be placed in each row of calculation points in the calculated luminaire cycle.

The **Maximum Longitudinal Spacing** field specifies the maximum distance between consecutive points along a row of calculation points. Note that this may result in more points being placed than are specified in the Longitudinal Points per Cycle field.

The **Transverse Points per Lane** field specifies the number of rows of calculation points that will be placed in each lane of the roadway. The rows will be uniformly spaced and centered in each lane.

Optimization Parameters

The initial spacing used by the optimization routine is calculated by multiplying the average mounting height of all luminaires by the value in the **Initial Spacing/Mounting Height Ratio** field. Calculations may converge more quickly if the initial spacing is close to the final optimized spacing.

Veiling Luminance Calculations

The **Extend luminaires back to the observer position** checkbox allows the Roadway Lighting Tool to implement an upcoming modification to the IESNA RP-8 veiling luminance calculation.

Chapter 3 - Printing

The Print screen is accessed by selecting **Print...** from the File menu or by clicking the Print button on the toolbar. Depending on which View (Steps, Graph or Compare) is active, different print options will be displayed. The graphic below illustrates the options when printing from the Steps View.

Print - 250MH Staggered

Printer

Printer: ▾

Copies: Properties...

Design Information

Title:

Project:

Number:

Name:

Company:

Print Pages

Design Summary Veiling Luminance Grid

Luminance Grid Visibility Level Grid

Illuminance Grid Graph

Print Cancel

Printer

The Printer section provides a drop-down list containing all the installed printers. Clicking the **Properties...** button launches a printer properties window for the currently selected printer. Note that the printer properties window is provided by the installed printer drivers, not by the Visual Roadway Tool.

Design Information

The Design Information Section is only available when printing from the Steps or Graph Views. Its behavior is exactly the same as that of the Design Information screen, described in Section 2.4.

Print Pages

The Print Pages section will have various options depending on the current View. Each of the printed pages is described in the following sections.

3.1 Design Summary

Visual Roadway Lighting Tool - 250MH Staggered
7/3/2003

Design Information

Project Number	Project Title
Name	Project Number
Company	Your Name
	Your Company

Roadway Information

Number Left Lanes	2
Left Lane Width	12 ft
Median Width	0 ft
Number Right Lanes	0
Right Lane Width	12 ft
Calculation Method	IES RP8-2000
Pavement Reflectance	Asphalt - R3
Roadway Classification	Major
Pedestrian Confid	Low

Luminaire Information

Left Side		Right Side	
Label	A	Label	A
Catalog Number	AS2 250MSR3	Catalog Number	AS2 250MSR3
Photometric File	LH10247.ies	Photometric File	LH10247.ies
Lamp Lumens	20500	Lamp Lumens	20500
Light Loss Factor	0.72	Light Loss Factor	0.72
Input Power	287.6 W	Input Power	287.6 W
Tilt	0°	Tilt	0°
Arm Length	0.75 ft	Arm Length	0.75 ft
Mounting Height	30 ft	Mounting Height	30 ft
Setback	4 ft	Setback	4 ft
Quantity	4	Quantity	4

Calculation Results - Left Side

Luminance		Illuminance			
Average	1.1 cd/m²	Average	1.3 fc	Lv Ratio	0.3
Max	2.1 cd/m²	Max	2.2 fc	STV	2.3
Min	0.5 cd/m²	Min	1.0 fc	Spacing	262 ft
Max/Min	4.6	Max/Min	2.3	Length	1000 ft
Avg/Min	2.3	Avg/Min	1.3	Quantity	8

The diagram illustrates a roadway layout with two lanes, each 12 feet wide. The spacing between the lanes is 262 feet. Luminaire positions are shown on both sides of the roadway, with arrows indicating the direction of light distribution. The diagram also shows the mounting height and setback of the luminaires.

Calculations are based on procedures established by the governing standards body or standard industry practice. Visual computes output performance based on input data as provided by, and which is the sole responsibility of, the user. The Acuity Lighting Group, Inc. cannot be held responsible for the variations in actual situations which can effect calculated output.

www.VisualLightingSoftware.com
Users guide.RWT

The Design Summary is a one page summary consisting of design information, roadway geometry and classification, all applicable luminaire information and the calculated results.

The Design summary may be printed from all three Views (Steps, Graph or Compare). If it is selected in the Compare view, one summary page for each design will be printed.

3.2 Calculation Grid

Visual Roadway Lighting Tool - 250MH Staggered
7/3/2003

Luminance

0.8	0.8	0.7	0.7
0.6	0.8	1.0	1.4
0.8	1.0	1.5	2.1
0.9	1.2	1.5	2.0
0.9	1.4	1.8	2.0
1.0	1.0	1.3	1.5
0.7	0.7	0.8	1.0
0.5	0.6	0.8	0.9
0.7	0.7	0.8	0.8
1.4	1.0	0.8	0.8
2.1	1.5	1.0	0.8
2.0	1.5	1.2	0.9
2.0	1.8	1.4	0.9
1.5	1.3	1.0	1.0
1.0	0.8	0.7	0.7
0.9	0.8	0.6	0.5

Grid Statistics

Average	1.1	cd/m ²
Max	2.1	cd/m ²
Min	0.5	cd/m ²
Max/Min	4.6	
Avg/Min	2.3	

Grid Properties

Number of Rows	16
Row Spacing	16.38 ft
Number of Columns	4
Column Spacing	6 ft

Illuminance

2.2	2.0	1.4	1.0
1.2	1.2	1.2	1.4
1.1	1.2	1.1	1.3
1.0	1.2	1.2	1.0
1.0	1.2	1.2	1.0
1.3	1.1	1.2	1.1
1.4	1.2	1.2	1.2
1.0	1.4	2.0	2.2
1.0	1.4	2.0	2.2
1.4	1.2	1.2	1.2
1.3	1.1	1.2	1.1
1.0	1.2	1.2	1.0
1.0	1.2	1.2	1.0
1.1	1.2	1.1	1.3
1.2	1.2	1.2	1.4
2.2	2.0	1.4	1.0

Grid Statistics

Average	1.3	fc
Max	2.2	fc
Min	1.0	fc
Max/Min	2.3	
Avg/Min	1.3	

Grid Properties

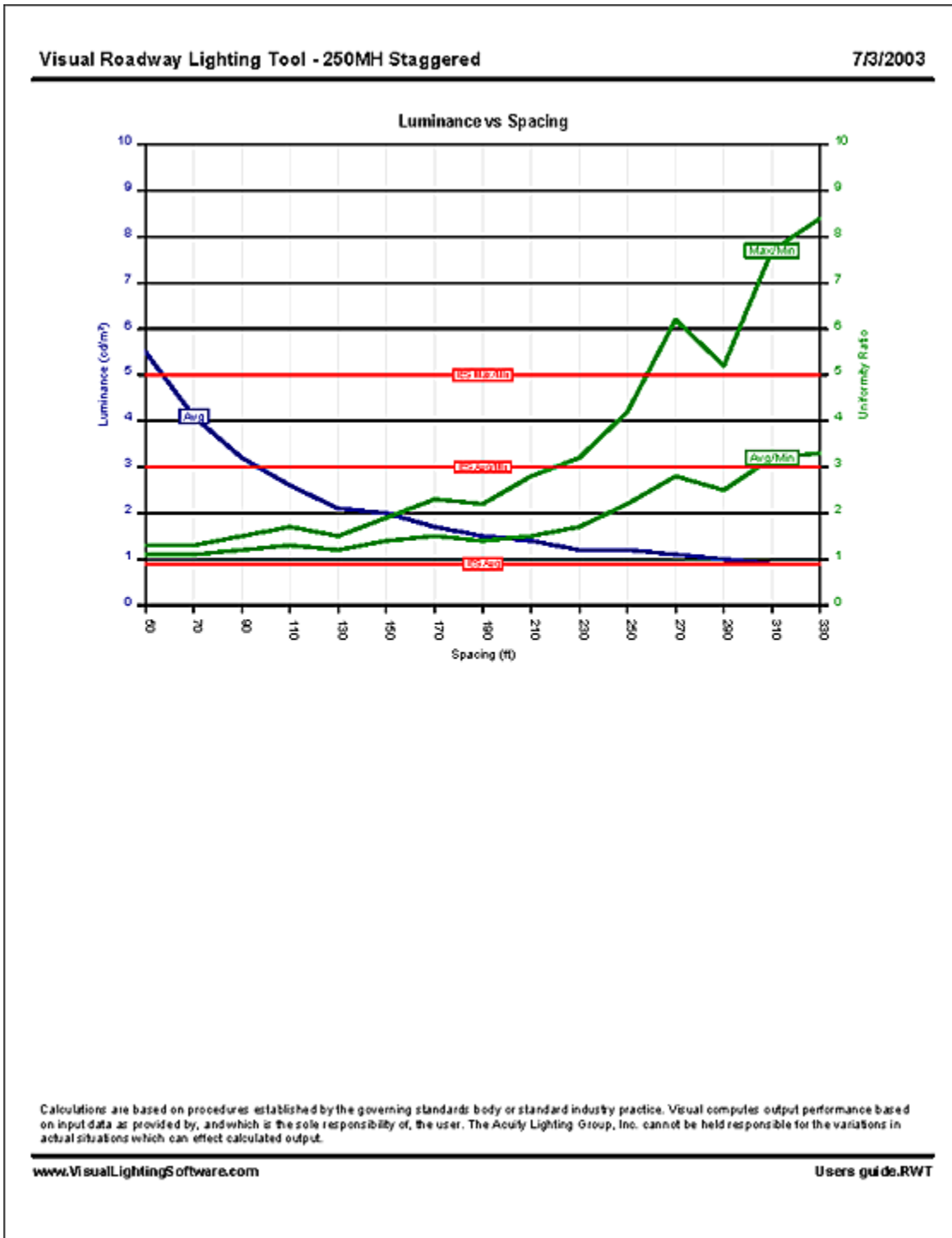
Number of Rows	16
Row Spacing	16.38 ft
Number of Columns	4
Column Spacing	6 ft

Calculations are based on procedures established by the governing standards body or standard industry practice. Visual computes output performance based on input data as provided by, and which is the sole responsibility of, the user. The Acuity Lighting Group, Inc. cannot be held responsible for the variations in actual situations which can effect calculated output.

www.VisualLightingSoftware.com
Users guide.RWT

Each calculation grid used in the roadway calculations can be printed from the Steps View. Select the desired grid(s) on the Print Pages section of the Print screen.

3.3 Graph



The graph page may be printed from either the Steps View or the Graph View.

3.4 Comparison

Visual Roadway Lighting Tool - Comparison				7/7/2003			
250MH Staggered		250MH Opposite		250MH One side			
IESNA RP8-2000		IESNA RP8-2000		IESNA RP8-2000			
Luminance		Luminance		Luminance			
Average	1.1 cd/m ²	Average	1.4 cd/m ²	Average	1.3 cd/m ²		
Maximum	2.1 cd/m ²	Maximum	2.9 cd/m ²	Maximum	2.5 cd/m ²		
Minimum	0.5 cd/m ²	Minimum	0.6 cd/m ²	Minimum	0.5 cd/m ²		
Avg/Min	2.3	Avg/Min	2.4	Avg/Min	2.5		
Max/Min	4.6	Max/Min	5.0	Max/Min	4.9		
Illuminance		Illuminance		Illuminance			
Average	1.3 fc	Average	1.6 fc	Average	1.5 fc		
Maximum	2.2 fc	Maximum	3.2 fc	Maximum	2.4 fc		
Minimum	1.0 fc	Minimum	0.5 fc	Minimum	1.0 fc		
Avg/Min	1.3	Avg/Min	3.3	Avg/Min	1.5		
Max/Min	2.3	Max/Min	6.5	Max/Min	2.4		
Lv Ratio	0.3	Lv Ratio	0.3	Lv Ratio	0.2		
STV	2.3	STV	6.4	STV	2.3		
Spacing	262 ft	Spacing	209 ft	Spacing	115 ft		
Length	1000 ft	Length	1000 ft	Length	1000 ft		
Quantity	8	Quantity	10	Quantity	9		

Calculations are based on procedures established by the governing standards body or standard industry practice. Visual computes output performance based on input data as provided by, and which is the sole responsibility of, the user. The Acuity Lighting Group, Inc. cannot be held responsible for the variations in actual situations which can effect calculated output.

www.VisualLightingSoftware.com Users guide.RWT

The Comparison page can only be printed from the Compare View. Up to six designs will be printed per page.

File Menu Commands

Contents

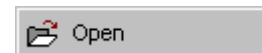
- NEW
- OPEN
- SAVE
- SAVE AS...
- SAVE AS DEFAULT
- IMPORT...
- PRINT...
- EXIT

New



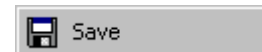
The New command begins a new Roadway Lighting Tool project. All existing designs will be cleared and the Roadway Lighting Tool will be loaded with the default settings. Note that this is not the same as adding a new design to the current project (see the New command under the Design menu).

Open



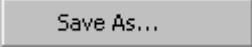
The Open command loads an existing Roadway Lighting Tool project file (*.RWT) from a disk. The current project will be replaced with the file contents. See the Import command under the File Menu for additional options.

Save




The Save command saves the current Roadway Lighting Tool project to a disk file (*.RWT). If the project has an associated filename, the Save command saves directly to that file with no dialog. If the current project does not have an associated filename (ie, has never been saved to a file), the Save command behaves in the same manner as the Save As... command.

Save As...

A rectangular button with a light gray background and a thin border, containing the text "Save As..." in a standard sans-serif font.

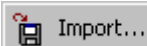
The Save As... command displays the **File Selection dialog** so that a filename can be specified for the current Roadway Lighting Tool project. Clicking the Save button on the File Selection Dialog saves the project to the specified disk file.

Save As Default

A rectangular button with a light gray background and a thin border, containing the text "Save As Default" in a standard sans-serif font.

The Save As Default command saves the current Roadway Lighting Tool project as the default project. The default project will be loaded each time a new Roadway Lighting Tool project is started.

Import...

A rectangular button with a light gray background and a thin border. On the left is a small icon of a document with a red 'X' over it, and to its right is the text "Import..." in a standard sans-serif font.

The Import... command loads a saved Roadway Lighting Tool project file into the current project. Each design in the saved project will be added to the current project. This command is useful for performing comparisons between multiple saved Roadway Lighting Tool projects.

Print...

A rectangular button with a light gray background and a thin border. On the left is a small icon of a printer, and to its right is the text "Print..." in a standard sans-serif font.

The Print... command displays the **Print Screen**. See Chapter 3 - Printing for more information.

Exit

A rectangular button with a light gray background and a thin border, containing the text "Exit" in a standard sans-serif font.

The Exit command closes the Roadway Lighting Tool. A prompt to save changes will appear if the current project has been modified but not saved to disk.

Design Menu Commands

Contents

- NEW
- COPY
- DELETE
- INFORMATION...

New

A rectangular button with a light gray background and a thin border, containing the text "New" in a dark gray font.

The New command adds a new roadway lighting design to the current project and makes it the active design. The new design is created using the settings in the default project (see Save As Default in the File menu).

Copy

A rectangular button with a light gray background and a thin border, containing the text "Copy" in a dark gray font.


The Copy command creates a duplicate of the currently active design, adds it to the project and makes it the active design. If the original design has a title, the new design title will be the original design title followed by "(copy)".

Delete

A rectangular button with a light gray background and a thin border, containing the text "Delete" in a dark gray font.

The Delete command removes the currently active design from the project. No prompt is given to save changes, and the command is irreversible. If there is only one design in a project and the Delete command is selected, the design will be removed and a new default design will be added, so that there is always one design in the project.

Information...

A rectangular button with a light gray background and a thin border. On the left side, there is a small icon of a document with a blue arrow pointing to it. To the right of the icon, the text "Information..." is displayed in a dark gray font.

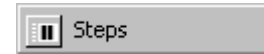
The Information... command displays the **Design Information Screen**. See Section 2.4 Design Information for more information.

View Menu Commands

Contents

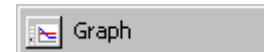
- STEPS
- GRAPH
- COMPARE

Steps



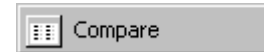
The Steps command switches the Roadway Lighting Tool to the Steps View. See Section 2.1 The Steps View for more information.

Graph



The Graph command switches the Roadway Lighting Tool to the Graph View. See Section 2.2 The Graph View for more information.

Compare



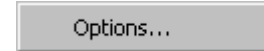
The Compare command switches the Roadway Lighting Tool to the Compare View. See Section 2.3 The Compare View for more information.

Tools Commands

Contents

- OPTIONS...

Options...



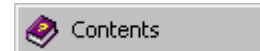
The Options... command displays the **Options Screen**. See Section 2.6 The Options Screen for more information.

Help Commands

Contents

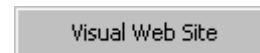
- CONTENTS
- VISUAL WEB SITE
- TECHNICAL SUPPORT
- DEACTIVATE
- ABOUT ROADWAY

Contents



The Contents command displays the Help file for the Roadway Lighting Tool.

Visual Web Site



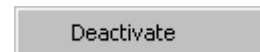
The Visual Web Site command displays the Visual website, www.Visuallightingsoftware.com, in the default web browser. The Visual website provides support, FAQs, account information and much more.

Technical Support



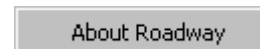
The Technical Support command displays a web page providing information on obtaining technical support.

Deactivate



The Deactivate command initiates the Software Deactivation process. This command is only active if the Software Activation process has been completed. Software Deactivation frees the current license number for use on another computer.

About Roadway



The About Roadway command displays a screen providing version and activation information.

Glossary

Discomfort Glare

Glare that produces discomfort to the observer but that may not necessarily hinder visual performance.

Footcandle

A unit of illuminance equal to one lumen per square foot. 1 fc = 10.76 lux.

Glare

The sensation produced by a luminance within the visual field that is significantly greater than the luminance to which the eyes are adapted. Glare results in discomfort or loss of visibility.

Illuminance

Illuminance is the density of light incident on a surface due to the lighting system.

Lighting Classification

The CIE specifies lighting recommendations based on a lighting classification system that ranges from M1 to M5. These lighting classifications are dependent on the function of the roadway, density of traffic, traffic complexity, separation of traffic, and the existence of traffic lights. They also consider motorist, motor and pedal cyclists, and pedestrians.

Classification	Description
M1 M2 M3	High speed roads with separate carriageways, free of crossing at grade and with complete access control; motorways; express roads. Traffic density and complexity of road layout: High Medium Low
M1 M2	High speed roads, dual carriageway roads. Traffic control and separation of different types of road user: Poor Good
M2 M3	Important urban traffic routes, radial roads, distinct distributor roads. Traffic control and separation of different types of road users: Poor Good
M4 M5	Connecting less important roads, local distributor roads, residential major access roads. Roads which provide direct access to property and lead to connecting roads. Traffic control and separation of different types of road user: Poor Good

Refer to CIE 115-1995 for further information.

Light Loss Factor [LLF]

A multiplier used in lighting calculations to represent the effects to the lighting system after a period of time and under certain conditions. This factor can be a combination of dirt accumulation, lamp lumen depreciation, ballast factors, maintenance procedures and equipment variations.

Longitudinal Uniformity [UL]

Longitudinal uniformity is the ratio of the minimum to the maximum luminance along a line parallel to the length of the roadway. This calculation is performed with the observer positioned in line with the calculation points. The purpose of the longitudinal uniformity metric is to prevent a pronounced repetitive pattern of high and low luminances on the roadway.

Luminance

Luminance is the density of light leaving a surface in a particular direction. For roadway lighting calculations, luminance is the amount of light reflected from the pavement in the direction of the driver.

Lux

A unit of illuminance equal to one lumen per square meter. 1 lux = 0.093 fc.

Pavement Reflectance

Pavement reflectance characteristics for a roadway surface are specified using a classification system ranging from R1 to R4, as defined by the IESNA and CIE. The calculation of roadway luminance and small target visibility (STV) depends on the reflective properties of the roadway.

Classification	Surface	Description
R1	Concrete	A mostly diffuse concrete surface.
R2	Asphalt	A combination diffuse and specular surface. This is not commonly used in North America.
R3	Asphalt	A slightly specular surface. This is typical for most asphalt highways in North America.
R4	Asphalt	A mostly specular surface with a smooth texture.

Refer to IESNA RP8-2000 for further information.

Pedestrian Conflict Area

Pedestrian conflict areas are based upon the level of pedestrian traffic. Three classifications of pedestrian activity are defined by the IESNA in RP8-2000.

Classification	Description
Low	Areas with a low volume of nightly pedestrian activity. This is typical of neighborhoods and other low residential developments. A volume of up to 10 pedestrians per hour.
Medium	Areas with higher level of nightly pedestrian activity. This is typical for office areas, apartments, shopping areas, industrial locations, and streets that support transit lines. A volume of 10 to 100 pedestrians per hour.
High	Areas with a significant level of nightly pedestrian traffic on sidewalks and intersections. This is typical of commercial areas, theaters, sports complex, and transit terminals. A volume of over 100 pedestrians per hour.

Refer to IESNA RP8-2000 for further information.

Roadway Classification

Roadway Classifications are based on the level of vehicular traffic and intended function of the roadway. The roadway classifications are defined in the IESNA RP8-2000.

Classification	Description
Freeway A	A divided major roadway with full control of access. A roadway with high traffic volumes and a greater visual complexity. This is typically a roadway in a major metropolitan area or near the center of a city.
Freeway B	All other divided roadways with full control of access.
Expressway	A divided major roadway for through traffic and partial access control at the intersection of major roadways.
Major	The section of the roadway that supports the through-traffic flow. These sections are referred to as the thoroughfares that connect primary traffic generation and roadways leaving the city.
Collector	Roadways that support the traffic between the major and local streets. These roadways are primarily used for traffic movements within residential, commercial and industrial areas. Collectors are not meant to handle long thoroughfare.
Local	These roadways are primarily used to support access to residential, commercial and industrial property. Local streets are a majority of the total roadway system, but only carry a small portion of the traffic.

Refer to IESNA RP8-2000 for further information.

Small Target Visibility [STV]

Small Target Visibility provides an evaluation of the visibility of an array of targets on the roadway. This calculated value is based upon the luminance of the targets, the luminance of the background, the adaptation level of the adjacent environment and the disability glare.

Threshold Increment [Ti]

Threshold Increment is a measure of the loss of visibility due to disability glare from the luminaires of the roadway design. This value represents a percentage increase in the luminance difference required to make a target visible in the presence of glare compared to when the target is barely visible in the absence of glare.

Veiling Luminance [Lv]

Veiling luminance is the effect produced by bright sources or objects in the visual field that causes decreased visibility and visual performance. The veiling luminance calculation is performed with the observer looking in a downward direction of view of one degree as defined in IESNA RP8-2000.

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