

Interactive Highway Safety Design Model (IHSDM)

Crash Prediction Module (CPM) User's Manual

Developed for
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1. Introduction

The Crash Prediction Module estimates the frequency and severity of crashes on a highway using geometric design and traffic characteristics. This helps users evaluate an existing highway, compare the relative safety performance of design alternatives, and assess the safety cost-effectiveness of design decisions.

The Crash Prediction Module (PRM) User's Manual is a reference for the mechanics of using the CPM software graphical user interface.

For background information on the Crash Prediction Module, refer to the Crash Prediction Module (CPM) Engineer's Manual .

1.1 Crash Prediction Module Stand-Alone Graphical User Interface

This is the initial window for the CPM when called directly from the command line (i.e., the stand-alone version). The **Crash Prediction Module** frame includes the following menu items: File, Edit, View and Help. The **Crash Prediction Module** frame includes the following toolbar buttons: Change Project, Change Analysis, Edit Highway Data, Edit User Properties, Edit User Defaults, View Current Analysis Report, View Analysis Report Index and Search Master Index. The **Crash Prediction Module** frame includes the following tabs: Project/Analysis, Attributes and Evaluation. The **Crash Prediction Module** frame includes the following statusbar fields: Progress Bar and Progress Bar Text.

1.1.1 Menu Items

The Crash Prediction Module Frame includes the following menu items:

- **File** - This menu includes menu items to change the current project and/or analysis, import data and exit CPM. The **File** menu includes the following menu items: Change Current Project, Change Current Analysis, Run CPM, Import Highway Data and Exit CPM.
 - **Change Current Project** - This menu item brings up a dialog to change the current project. From this dialog, you can edit project attributes. For additional information, see Project, Analysis and Master Highway Operations in the Running IHSDM Software Manual.
 - **Change Current Analysis** - This menu item brings up a dialog to change the current analysis. From this dialog, you can edit analysis attributes and change the master highway associated with the analysis. For additional information, see Project, Analysis and Master Highway Operations in the Running IHSDM Software Manual.
 - **Run CPM** - This menu item starts the CPM analysis for the master highway and analysis attributes.
 - **Import Highway Data** - This menu item invokes the Data Import Utility to import a file such as a highway file. The **Import Highway Data** menu includes the following menu items: IHSDM Highway Data and TWOPAS Input Data.
 - **IHSDM Highway Data** - This menu item imports either IHSDM CSV or LandXML highway data files.
 - **TWOPAS Input Data** - This menu item imports TWOPAS input data.
 - **Exit CPM** - This menu item saves the data in the window and then exits the Crash Prediction Module.

- **Edit** - This menu includes menu items to edit highway datasets, edit user properties and to complete an IHSDM program report. The **Edit** menu includes the following menu items: Edit/View Highway Data, Edit Intersections, Manage Highway Datasets, Edit User Properties, Edit Defaults and Problem Report/Change Request.
 - **Edit/View Highway Data** - This menu includes menu items to edit either the current or selected highway dataset. For additional information, see Editing Highway Elements. The **Edit/View Highway Data** menu includes the following menu items: Select Master Highway, Select from Available Highways, Create Highway Data and Clone Highway Data.
 - **Select Master Highway** - This menu item brings up a new window to edit the master highway associated with the current analysis.
 - **Select from Available Highways** - This menu item brings up a dialog to select a highway dataset by name and then launches the edit/view highway data editor with the selected highway.
 - **Create Highway Data** - This menu item brings up a dialog to create a new highway dataset name and then launches the edit/view highway data editor.
 - **Clone Highway Data** - This menu item brings up a dialog to select a highway dataset by name and creates a new name for the cloned highway dataset.
 - **Edit Intersections** - This menu item invokes the intersection data editor dialog to allow intersection data associated with this highway dataset to be edited. For additional information, see IHSDM Intersection Model.
 - **Manage Highway Datasets** - This menu item launches the highway dataset list manager. The current analysis must be closed to perform this operation. Highway dataset list management operations include renaming and deleting highway datasets.
 - **Edit User Properties** - This menu item brings up a dialog to edit the IHSDM user properties. For additional information, see User Properties in the User Properties and Defaults Manual.
 - **Edit Defaults** - This menu item brings up a dialog to edit the default values to the IHSDM modules.
 - **Problem Report/Change Request** - This menu contains menu items to create a new PR/CR or edit an existing PR/CR. The **Problem Report/Change Request** menu includes the following menu items: Create New PR/CR, Edit Existing PR/CR and List Existing PR/CR .
 - **Create New PR/CR** - This menu item brings up a dialog to complete a new IHSDM problem report/change request. For additional information, see Creating an IHSDM Problem Report/Change Request.
 - **Edit Existing PR/CR** - This menu item brings up a file chooser dialog to select a file. If selected, the file will be read as an IHSDM problem report/change request and displayed. For additional information, see Creating an IHSDM Problem Report/Change Request.
 - **List Existing PR/CR** - This menu item brings up browser with a listing of the current PR/CR issues at the development website. For additional information, see Creating an IHSDM Problem Report/Change Request.

- **View** - This menu includes menu items to display and clear the analysis log and analysis report. The **View** menu includes the following menu items: View Analysis Log, Start a New Analysis Report, View Current Analysis Report, View Analysis Report Index, Clear Analysis Log, Clear Analysis Report and Open Saved Graph.
 - **View Analysis Log** - This menu item launches the user's specified text editor with the current analysis log.
 - **Start a New Analysis Report** - This menu item causes a new analysis report file to be started.
 - **View Current Analysis Report** - This menu item launches the user's specified analysis report display tool with the current analysis report.
 - **View Analysis Report Index** - This menu item launches the user's specified HTML browser to display an index of analysis reports available within the current analysis.
 - **Clear Analysis Log** - This menu item clears (erases) the current analysis log.
 - **Clear Analysis Report** - This menu item clears (erases) the current analysis report.
 - **Open Saved Graph** - This menu item invokes a dialog to open and display a previously saved graph. The graph file may be created from a DCM, CPM, DVM or TAM analysis.
- **Help** - This menu includes menu items to display various help documents and the module's about box. The **Help** menu includes the following menu items: IHSDM User's Manual, CPM User's Manual, CPM Engineer's Manual, User Documentation Summary, Master Index, Search Master Index and About CPM.
 - **IHSDM User's Manual** - This menu item launches the HTML browser to display the IHSDM User's Manual.
 - **CPM User's Manual** - This menu item launches the HTML browser and display the CPM User's Manual.
 - **CPM Engineer's Manual** - This menu item launches the HTML browser and display the CPM Engineer's Manual.
 - **User Documentation Summary** - This menu item launches the HTML browser to display the **User Documentation Summary**. The summary contain links to all the user documentation.
 - **Master Index** - This menu item launches the HTML browser to display the **IHSDM Documentation Master Index**.
 - **Search Master Index** - This menu item launches a dialog to allow a keyword search of the **IHSDM Documentation Master Index**.
 - **About CPM** - This menu item displays the CPM 'about box' dialog which contain information about the release and runtime environment.

1.1.2 Toolbar

The Crash Prediction Module Frame includes the toolbar buttons listed below.

Change Project - This button item brings up a dialog to change the current project. From this dialog, you can edit project attributes. For additional information, see Project, Analysis and Master Highway Operations in the Running IHSDM Software Manual.

Change Analysis - This button brings up a dialog to change the current analysis. From this dialog, you can edit analysis attributes and change the master highway associated with the analysis. For additional information, see Project, Analysis and Master Highway Operations in the Running IHSDM Software Manual.

Edit Highway Data - This toolbar button starts the Edit/View Highway Data editor for the master highway. For additional information, see Editing Highway Elements.

Edit User Properties - This toolbar button brings up a dialog to edit the IHSDM user properties. For additional information, see User Properties in the User Properties and Defaults Manual.

Edit User Defaults - This button brings up a dialog to edit the default values to the IHSDM modules.

View Current Analysis Report - This toolbar button item launches the user's specified analysis report display tool with the current analysis report.

View Analysis Report Index - This button launches the user's specified HTML browser to display an index of analysis reports available within the current analysis.

- This button launches the user's HTML browser to display the CPM Engineer's Manual.

- This button invokes the HTML browser to display the CPM User's Manual.

Search Master Index - This toolbar button launches a dialog that support searching the master documentation index.

- This button runs the CPM analysis.

- This button saves all CPM analysis data and exits the CPM program.

1.1.3 Tabs

The Crash Prediction Module Frame includes the tabs described in the following sections.

1.1.3.1 Project/Analysis Tab

This tab contains the project/analysis identification, the current highway identification, and processing bounds.

Figure 1 Project/Analysis Tab

The **Project/Analysis** tab includes the following widgets: Project Name, Project Comment, Project Unit System, Analysis Name, Analysis Comment, Analysis E Max, Default Normal Cross Slope, Analysis Year, Highway Name, Chain, Comment, Edit/View Highway Data, Start Station and End Station.

- **Project Name** - Widget type: text field (read-only). The value of this item is the name of the project.

- **Project Comment** - Widget type: text field (read-only). This is an optional comment about the project.
- **Project Unit System** - Widget type: combo box (read-only). This item specifies the unit system used for the entry and display of all values associated with the project. This unit system is used to control all outputs as well as the unit system assumed for imported datasets if no unit system is explicitly specified in the imported file. The enumeration values are:
 - **user default** (user default unit system),
 - **Metric** (Metric unit system) and
 - **English** (English (Imperial) unit system).
- **Analysis Name** - Widget type: text field (read-only). This is the name of the analysis. The name of the analysis is unique within a project. If the user does not specify a name, the system will create one.
- **Analysis Comment** - Widget type: text field (read-only). This is an optional comment about the analysis.
- **Analysis E Max** - Widget type: combo box (read-only). Unit of measure: percent. The value of this item is the maximum superelevation, as a percentage, for this analysis. The enumeration values are: **4, 6, 8, 10** and **12**. The unit of measure for this item is percent.
- **Default Normal Cross Slope** - Widget type: text field (read-only). Unit of measure: percent. The value of this item is the default normal cross slope, as a percentage, for this analysis. Once a highway dataset is imported, normal cross slope elements can be defined to vary the value along the alignment. The unit of measure for this item is percent.
- **Analysis Year** - Widget type: text field (read-only). Unit of measure: YEAR. The value of this item is the year of the analysis. It is used to compute the average daily traffic volume (ADT).
- **Highway Name** - Widget type: text field (read-only). The value of this item is the name of the master highway associated with the analysis.
- **Chain** - Widget type: text field (read-only). The value of this item is an optional chain name for the alignment associated with the highway dataset.
- **Comment** - Widget type: text field (read-only). The value of this item is an optional comment for the highway dataset.
- **Edit/View Highway Data** - Widget type: button. This button starts the edit/view highway data editor for the master highway. For additional information, see Editing Highway Elements.
- **Start Station** - Widget type: text field. Unit of measure: STATION. The value of this item is the effective starting station of this highway dataset for purposes of this analysis.
- **End Station** - Widget type: text field. Unit of measure: STATION. The value of this item is the effective end station of this highway dataset for purposes of this analysis.

1.1.3.2 Attributes Tab

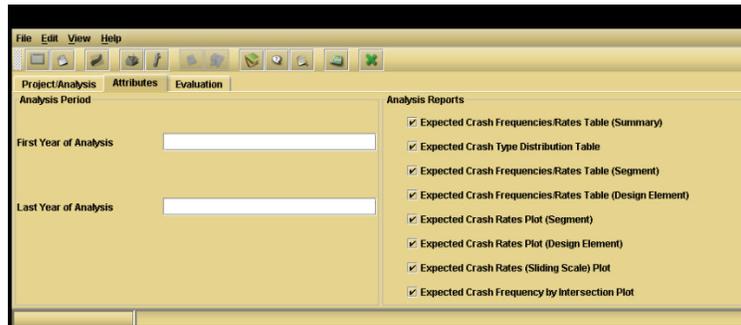


Figure 2 Attributes Tab

The **Attributes** tab includes the following widgets: First Year of Analysis, Last Year of Analysis, Expected Crash Frequencies/Rates Table (Summary), Expected Crash Type Distribution Table, Expected Crash Frequencies/Rates Table (Segment), Expected Crash Frequencies/Rates Table (Design Element), Expected Crash Rates Plot (Segment), Expected Crash Rates Plot (Design Element), Expected Crash Rates (Sliding Scale) Plot and Expected Crash Frequency by Intersection Plot.

- **First Year of Analysis** - Widget type: text field. Unit of measure: YEAR. This item is the first year of the crash prediction analysis. When a new analysis is created, the value of this item is initialized to next year.
- **Last Year of Analysis** - Widget type: text field. Unit of measure: YEAR. This item is the last year of the crash prediction analysis. When a new analysis is created, the value of this item is initialized using the value of the *First Year of Analysis* and the value of the CPM user default value for *Number of Years*.
- **Expected Crash Frequencies/Rates Table (Summary)** - Widget type: check box. This item will enable/disable the *Expected Crash Frequencies and Rates Summary Table* in the analysis report.
- **Expected Crash Type Distribution Table** - Widget type: check box. This item will enable/disable the *Expected Crash Type Distribution Table* in the analysis report.
- **Expected Crash Frequencies/Rates Table (Segment)** - Widget type: check box. This item will enable/disable the *Expected Crash Frequencies and Rates by Segments Table* in the analysis report.
- **Expected Crash Frequencies/Rates Table (Design Element)** - Widget type: check box. This item will enable/disable the *Expected Crash Frequencies and Rates by Design Element Table* in the analysis report.
- **Expected Crash Rates Plot (Segment)** - Widget type: check box. This item will enable/disable the *Expected Crash Rates by Segment Plot* in the analysis report.
- **Expected Crash Rates Plot (Design Element)** - Widget type: check box. This item will enable/disable the *Expected Crash Rates Plot by Horizontal Design Element* in the analysis report.
- **Expected Crash Rates (Sliding Scale) Plot** - Widget type: check box. This item will enable/disable the *Expected Crash Rates* (with a sliding scale) plot in the analysis report.

- **Expected Crash Frequency by Intersection Plot** - Widget type: check box. This item will enable/disable the *Expected Crash Rates Plot* in the analysis report.

1.1.3.3 Evaluation Tab

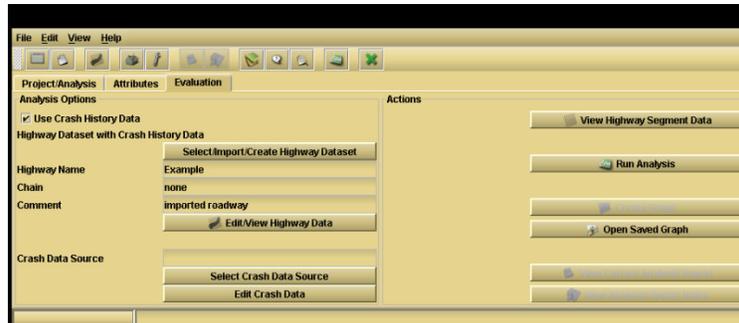


Figure 3 Evaluation Tab

The **Evaluation** tab includes the following widgets: Use Crash History Data, Select/Import/Create Highway Dataset, Highway Name, Chain, Comment, Edit/View Highway Data, Crash Data Source, Select Crash Data Source, Edit Crash Data, View Highway Segment Data, Run Analysis, Create Graph, Open Saved Graph, View Current Analysis Report and View Analysis Report Index.

- **Use Crash History Data** - Widget type: check box. This checkbox enables/disables the use crash history data and the Empirical Bayes analysis in the crash prediction. If no crash history data is available, the value of this item is ignored.
- **Select/Import/Create Highway Dataset** - Widget type: button. This button invokes a dialog that provides a way of changing the CPM highway dataset with crash history data. If the **Use Crash History Data** check box is disabled, this button is ignored. For additional information, see Editing Highway Elements.
- **Highway Name** - Widget type: text field (read-only). This is the name of the CPM highway dataset with crash history data.
- **Chain** - Widget type: text field (read-only). The value of this item is an optional chain name for the alignment associated with the CPM base highway dataset w/crash data.
- **Comment** - Widget type: text field (read-only). The value of this item is an optional comment for the CPM base highway dataset with crash history data.
- **Edit/View Highway Data** - Widget type: button. This button starts the edit/view highway data editor for the CPM highway dataset with crash history data. If the **Use Crash History Data** check box is disabled, this button is ignored. For additional information, see Editing Highway Elements.
- **Crash Data Source** - Widget type: text field (read-only). This item is the source of the crash history data used in the CPM analysis.
- **Select Crash Data Source** - Widget type: button. This button starts the *Select Crash Data Source* wizard. If the **Use Crash History Data** check box is disabled, this button is ignored. For additional information, see Selecting Crash History Data in the Crash Prediction Module (CPM) User's Manual.
- **Edit Crash Data** - Widget type: button. This button starts a dialog to edit the current crash history data. If no crash history data source has yet been selected, the button starts the

Select Crash Data Source wizard. If the **Use Crash History Data** check box is disabled, this button is ignored. For additional information, see *Editing Crash History Data* in the *Crash Prediction Module (CPM) User's Manual*.

- **View Highway Segment Data** - Widget type: button. This button starts the HTML browser to display the highway segment data. For additional information, see *Editing Highway Elements*.
- **Run Analysis** - Widget type: button. This button starts the CPM analysis for the specified analysis data.
- **Create Graph** - Widget type: button. This button starts a dialog that allows the user to create and display a graph of the results of the CPM analysis. If the crash prediction analysis has not yet been run, this button is ignored. For additional information, see *Editing Highway Elements*.
- **Open Saved Graph** - Widget type: button. This button invokes a dialog to open and display a previously saved graph.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.

1.1.4 Status Bar

The Crash Prediction Module Frame includes the statusbar fields listed below.

Progress Bar - This progress bar displays the progress of the current processing.

Progress Bar Text - This text field bar displays the current processing status message.

2. Other Topics

2.1 Using Crash History Data

2.1.1 Selecting Crash History Data

Crash history data can be selected from three sources:

- **Create a New Crash History Dataset** to extract crash data from a highway definition, or enter new crash data. The new crash history dataset is saved to an XML-formatted file.
- **Read an Existing Crash History Dataset** to obtain crash data from a previously saved XML-formatted crash history dataset. After the file is read, the user may optionally edit the data.
- **Use Crash History from a Highway Definition** with crash history. The user has the option to edit the data.

A wizard-based dialog is used to specify the source of crash history data. This wizard allows the data to be edited. Once the data is finalized, the user has the option to use this new data to replace a crash data element in a highway definition. **Note: the user can limit crash data used within an analysis based on a range of years.**

2.1.1.1 Graphical User Interface

This wizard panel selects the source of the crash history data. The **Select/Edit Crash History Data** frame includes the following wizard panels: Data Source Selection, New File Attributes, Existing File Attributes, Data Edit, Highway Data Replacement and Data Range Selection/Data Save.

Wizard Panels

The Select/Edit Crash History Data Frame includes the wizard panels described in the following sections.

Data Source Selection Panel

Three sources of crash history data are currently supported. This panel is used to select the source of the crash data to be used by the analysis:

- **Create a New Crash History Dataset** to extract crash data from the highway dataset, or enter new crash data. The new crash history dataset is saved to an XML-formatted file.
- **Read an Existing Crash History Dataset** to obtain crash data from a previously saved XML-formatted crash history dataset. After the file is read, you may optionally edit the data.
- **Use Crash History from the Highway Dataset** with crash history. The user has the option to edit the data.

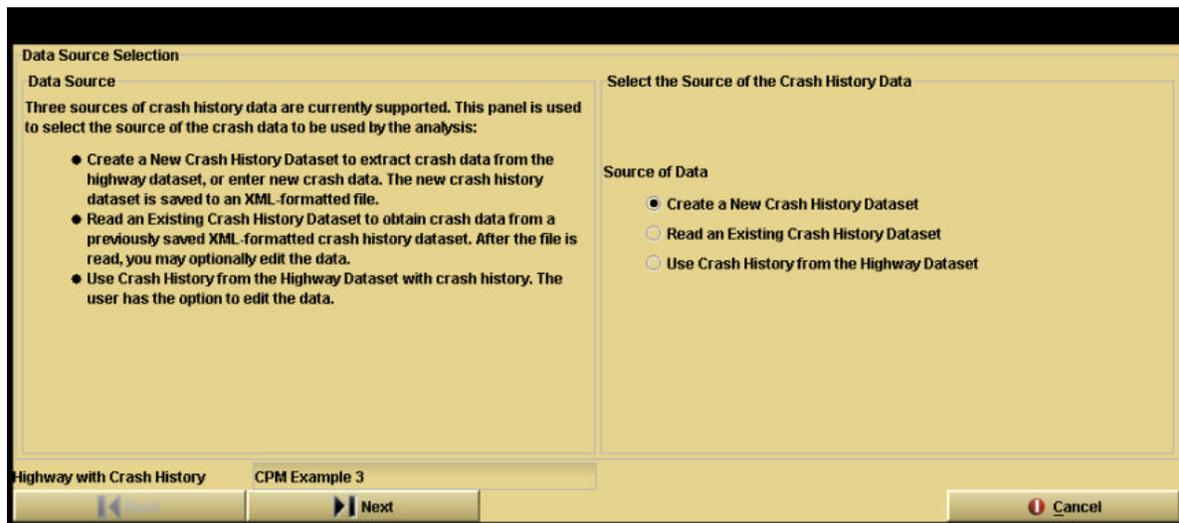


Figure 4 Data Source Selection Panel

The **Data Source Selection** wizard panel includes the following widgets: Source of Data.

- **Source of Data** - Widget type: radio button. This item specifies the source of the crash history data. The enumeration values are:
- **Create a New Crash History Dataset** (create a new crash history dataset to be save to a file),
- **Read an Existing Crash History Dataset** (read an existing crash history dataset from a file) and

- **Use Crash History from the Highway Dataset** (use the crash history data associated with the 'Highway Dataset with Crash History Data').

New File Attributes Panel

This panel is only displayed when the source of data was specified as a **New** file. This panel is used to specify a **name** and optional comment for the new dataset. You may enter or browse for a file name for the crash history data. If no file name is entered, the system creates the file name from the dataset name. The file is created in the user directory (i.e., *c:\f2\ihsdm_home\users\ihsdm_admin*). .br .br Enable the **Include Data from Highway Dataset** check box to use any crash data in the highway dataset to initialize the dataset. .br .br Press the **Next** button to proceed to the list box containing the crash history data.

Figure 5 New File Attributes Panel

The **New File Attributes** wizard panel includes the following widgets: Dataset Name, Dataset Comment, Dataset File Name and Include Data from Highway Dataset.

- **Dataset Name** - Widget type: text field. The value of this item is the name of the new crash history dataset. A name must be defined when creating a new dataset. The browse button may be used to select a new file using a file chooser.
- **Dataset Comment** - Widget type: text field. The value of this item is a descriptive comment about the crash history dataset.
- **Dataset File Name** - Widget type: text field (w/button). The value of this item is the full name and path of the file used to store the crash history dataset. If no file name is specified, a name is constructed from the dataset name.
- **Include Data from Highway Dataset** - Widget type: check box. The value of this item is used to specify whether any existing crash data from the associated highway dataset are to be merged into this crash history data.

Existing File Attributes Panel

This panel is only displayed when the source of data was specified as an **Existing** file. This panel is used to specify the dataset **file name** or use the browse button to select the input dataset file. The dataset name and comment is obtained from the dataset. .br .br Enable the **Include Data from Highway Dataset** check box to merge any crash data in the highway dataset with the data imported from the named dataset. .br .br Press the **Next** button to proceed to the list box

containing the crash history data.

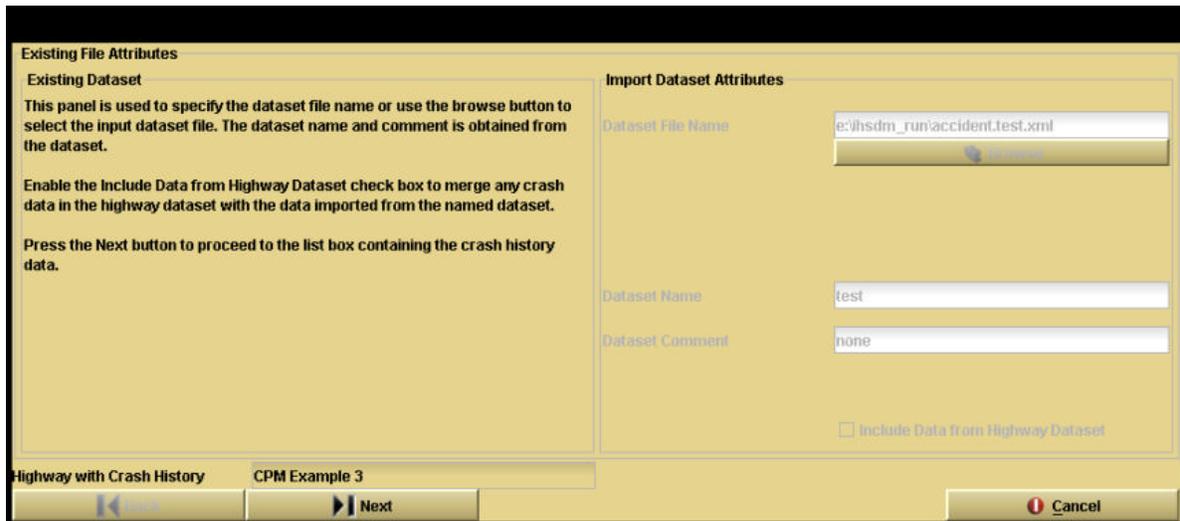


Figure 6 Existing File Attributes Panel

The **Existing File Attributes** wizard panel includes the following widgets: Dataset File Name, Dataset Name, Dataset Comment and Include Data from Highway Dataset.

- **Dataset File Name** - Widget type: text field (w/button). The value of this item is the full name and path of the file used to store the crash history dataset.
- **Dataset Name** - Widget type: text field. The value of this item is the name of the existing crash history dataset. The name can be changed after the dataset is defined. The browse button may be used to select an existing file using a file chooser.
- **Dataset Comment** - Widget type: text field. The value of this item is a descriptive comment about the crash history dataset.
- **Include Data from Highway Dataset** - Widget type: check box. The value of this item is used to specify whether any existing crash data from the associated highway dataset are to be merged into this crash history data.

Data Edit Panel

This panel is used to edit the crash history data. The panel also has buttons to support the export and import of CSV formatted crash data.

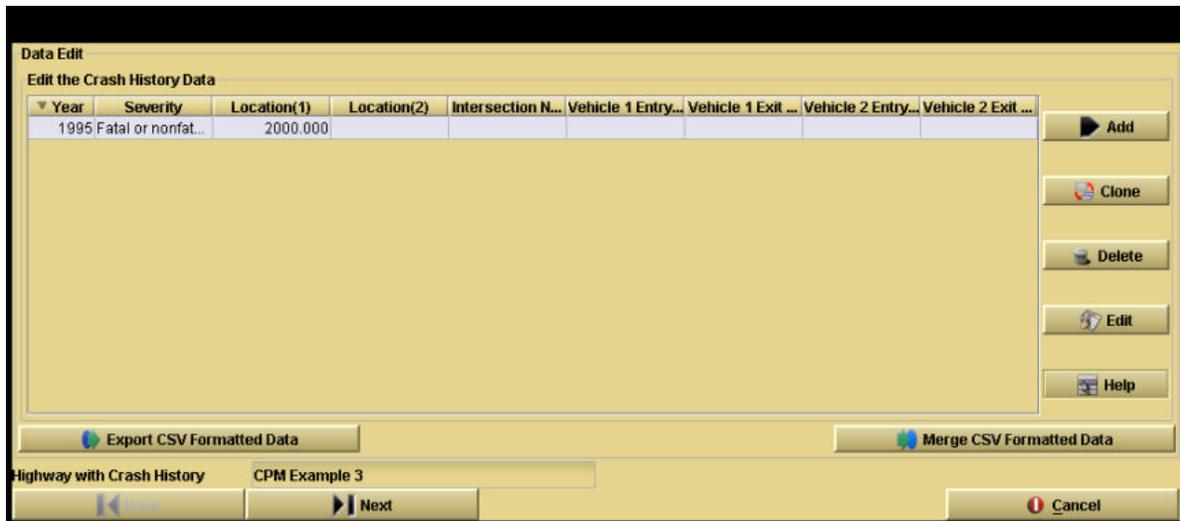


Figure 7 Data Edit Panel

The **Data Edit** wizard panel includes the following widgets: Crash History Data, Export CSV Formatted Data and Merge CSV Formatted Data.

- **Crash History Data** List Box - Widget type: list box. This element is the basic crash history data record. It defines attributes of a single historical crash event. The **Crash History Data** list box includes the following items: Year, Severity, Location(1), Location(2), Intersection Name, Vehicle 1 Entry Leg, Vehicle 1 Exit Leg, Vehicle 2 Entry Leg and Vehicle 2 Exit Leg.
 - **Year** Item - Unit of measure: YEAR. This is the year associated with the date of the crash. Note that the day and month are not required.
 - **Severity** Item - The value of this item is the severity level of the crash. The enumeration values are:
 - **Fatal or nonfatal injury** (crash resulted in an injury or fatality) and
 - **Property damage only** (crash only resulted in property damage).
 - **Location(1)** Item - Unit of measure: STATION. The value of this item is the location (station) of the crash, or the start station of a range of locations.
 - **Location(2)** Item - Unit of measure: STATION. The value of this item is the end location (station) of a range for the location of the crash. No value needs to be specified for this item.
 - **Intersection Name** Item - The value of this item is the name of the intersection associated with the crash. The enumeration values are: (**none**).
 - **Vehicle 1 Entry Leg** Item - The value of this item is the name of the leg on which vehicle 1 entered the intersection. The enumeration values are: (**none**).
 - **Vehicle 1 Exit Leg** Item - The value of this item is the name of the leg on which vehicle 1 was intending to exit the intersection. The enumeration values are: (**none**).
 - **Vehicle 2 Entry Leg** Item - The value of this item is the name of the leg on which vehicle 2 entered the intersection. The enumeration values are: (**none**).

- **Vehicle 2 Exit Leg Item** - The value of this item is the name of the leg on which vehicle 2 was intending to exit the intersection. The enumeration values are: (**none**).
- **Export CSV Formatted Data** - Widget type: button. This button launches a file chooser to select an output crash data file. Once the file is selected, the current crash data is exported to the file in a CSV format. CSV is a **secondary** data format for crash data, XML is the **primary** data format for crash data.
- **Merge CSV Formatted Data** - Widget type: button. This button launches a file chooser to select an input CSV formatted crash data file. Once the file is selected, the data in the file is read and appended to the current crash data. CSV is a **secondary** data format for crash data, XML is the **primary** data format for crash data.

Highway Data Replacement Panel

This panel is only displayed when the source of data was specified as either a **New** or an **Existing** file. This panel is used to specify whether the crash history data should replace the crash history elements in the *Highway Dataset with Crash History*:

- Select **Do not modify Highway dataset** to leave the highway dataset crash data untouched.
- Select **Replace Highway dataset** to completely replace the highway dataset crash data with this new data.

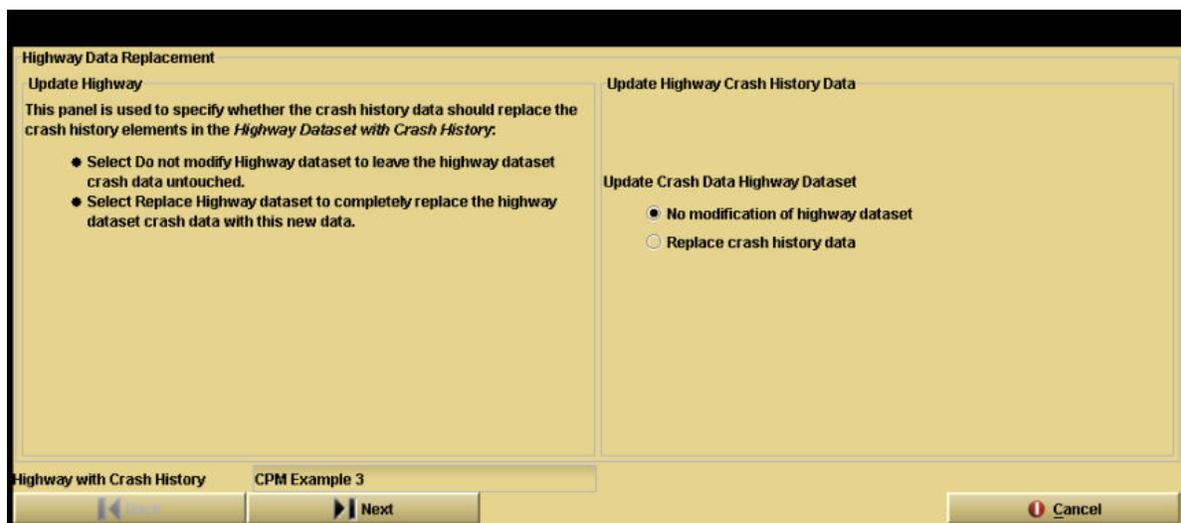


Figure 8 Highway Data Replacement Panel

The **Highway Data Replacement** wizard panel includes the following widgets: Update Crash Data Highway Dataset.

- **Update Crash Data Highway Dataset** - Widget type: radio button. The value of this item is used to specify whether the crash history data is used to replace the crash data elements in the associated highway dataset. The enumeration values are:
 - **No modification of highway dataset** (do not modify any existing highway dataset's crash history data) and
 - **Replace crash history data** (completely replace any highway crash history data with this data).

Data Range Selection/Data Save Panel

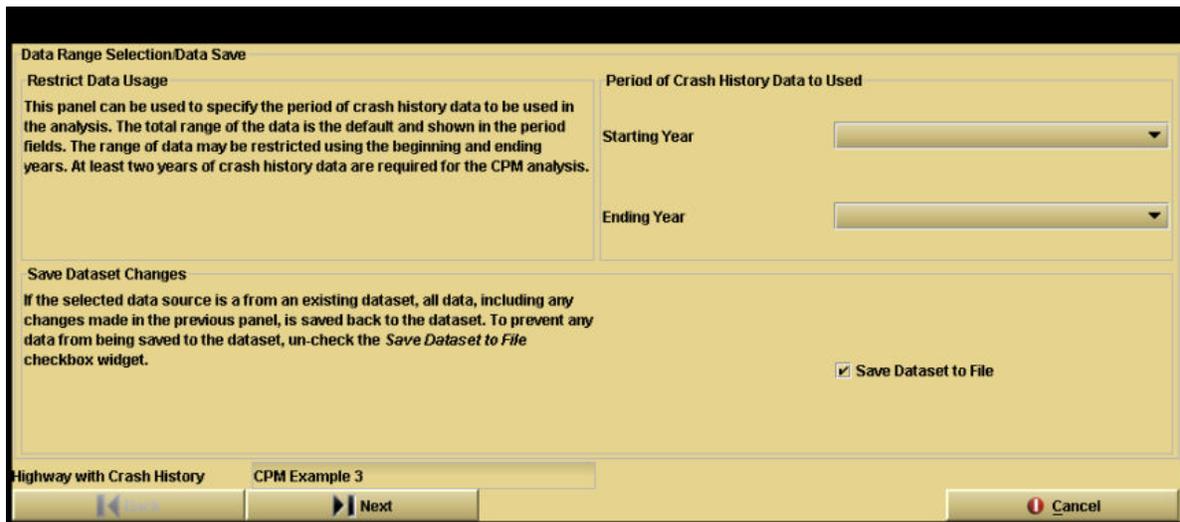


Figure 9 Data Range Selection/Data Save Panel

The **Data Range Selection/Data Save** wizard panel includes the following widgets: Starting Year, Ending Year and Save Dataset to File.

- **Starting Year** - Widget type: combo box. Unit of measure: YEAR. This item specifies the first year of the crash history data to be used in the analysis. The item is initially set to the lower bound of the crash data.
- **Ending Year** - Widget type: combo box. Unit of measure: YEAR. This item specifies the last year of the crash history data to be used in the analysis. The item is initially set to the upper bound of the crash data.
- **Save Dataset to File** - Widget type: check box. This item is a flag that specifies whether the current data, potentially changed, should be written to the external (XML) file associated with the dataset. If the item is enabled (checked), the dataset is stored in the external file. If the item is disabled (unchecked), the dataset is not stored in the external file, changes made to the dataset is lost at the end of the process.

2.1.2 Editing Crash History Data

2.1.2.1 Graphical User Interface



Figure 10 Edit the Crash History Data Dialog

This dialog allows the current crash history data to be edited. The **Edit the Crash History Data** dialog includes the following widgets: Crash History Data, Dataset Name,

Dataset Comment, Dataset File Name, Starting Year, Ending Year, Save and Cancel.

Widgets

- **Crash History Data** List Box - Widget type: list box. This element is the basic crash history data record. It defines attributes of a single historical crash event. The **Crash History Data** list box includes the following items: Year, Severity, Location(1), Location(2), Intersection Name, Vehicle 1 Entry Leg, Vehicle 1 Exit Leg, Vehicle 2 Entry Leg and Vehicle 2 Exit Leg.
 - **Year** Item - Unit of measure: YEAR. This is the year associated with the date of the crash. Note that the day and month are not required.
 - **Severity** Item - The value of this item is the severity level of the crash. The enumeration values are:
- **Fatal or nonfatal injury** (crash resulted in an injury or fatality) and
- **Property damage only** (crash only resulted in property damage).
 - **Location(1)** Item - Unit of measure: STATION. The value of this item is the location (station) of the crash, or the start station of a range of locations.
 - **Location(2)** Item - Unit of measure: STATION. The value of this item is the end location (station) of a range for the location of the crash. No value needs to be specified for this item.
 - **Intersection Name** Item - The value of this item is the name of the intersection associated with the crash. The enumeration values are: **(none)**.
 - **Vehicle 1 Entry Leg** Item - The value of this item is the name of the leg on which vehicle 1 entered the intersection. The enumeration values are: **(none)**.
 - **Vehicle 1 Exit Leg** Item - The value of this item is the name of the leg on which vehicle 1 was intending to exit the intersection. The enumeration values are: **(none)**.
 - **Vehicle 2 Entry Leg** Item - The value of this item is the name of the leg on which vehicle 2 entered the intersection. The enumeration values are: **(none)**.
 - **Vehicle 2 Exit Leg** Item - The value of this item is the name of the leg on which vehicle 2 was intending to exit the intersection. The enumeration values are: **(none)**.
- **Dataset Name** - Widget type: text field. The value of this item is the name of the existing crash history dataset. The name can be changed after the dataset is defined. The browse button may be used to select an existing file using a file chooser.
- **Dataset Comment** - Widget type: text field. The value of this item is a descriptive comment about the crash history dataset.
- **Dataset File Name** - Widget type: text field (read-only). The value of this item is the full name and path of the file used to store the crash history dataset.
- **Starting Year** - Widget type: combo box. Unit of measure: YEAR. This item specifies the first year of the crash history data to be used in the analysis. The item is initially set to the lower bound of the crash data.
- **Ending Year** - Widget type: combo box. Unit of measure: YEAR. This item specifies the last year of the crash history data to be used in the analysis. The item is initially set to the upper bound of the crash data.

- **Save** - Widget type: button. This button saves the crash history data and any changes made to it and closes the dialog.
- **Cancel** - Widget type: button. This button discards any changes to the crash history data and closes the dialog.

2.1.3 External File Format

Crash history data is maintained in an external file using the standard IHSDM XML data format. In the future, file filtering capabilities may be developed to allow data exchanging with the crash history data formats.

2.2 Input Data

This section describes the input data for the accident prediction algorithm. It also describes the methods used to supply data to the algorithm.

2.2.1 Overview of Input Data

In addition to the IHSDM system-level input categories, projects and analyses, the input data to the accident prediction algorithm consists of the following sub-categories within an analysis, Analysis Limits, Analysis Period (dates), Source of Accident History Data (if available), Period for Which Accident History Data is Available (dates), and Geometric Design/Traffic Control/Traffic Volume Data. Each of these input data categories is described in this section.

2.2.1.1 Analysis Limits

The analysis limits are the beginning and ending stations for the portion of the project to be evaluated. Analysis limits provide the capability to analyze only a portion of a project selected from a geometric design/traffic control/traffic volume data file that includes the entire project.

The analysis limits are set by the user in the same manner as the Policy Review Module (PRM) and Design Consistency Module (DCM).

2.2.1.2 Analysis Period

The analysis period is specified by the first and last year of the time period for which safety performance is to be predicted. The analysis period is usually (but not necessarily) a period in the future. The algorithm works with entire calendar years and does not provide predictions for partial year periods. All years should be specified with 4 digits.

2.2.1.3 Source of Accident History Data

The user must identify whether site-specific accident history data is available and, if so, from what source the data is available. Possible sources of accident history data include files in IHSDM format and manual data entry. Only accident history data for the actual site being analyzed is permitted; accident history data for a "similar" site is not appropriate.

2.2.1.4 Period for Which Accident History Data is Available

If accident history data is available, the user must specify the time period (beginning and ending years) for which accident history data is to be used. As with the analysis period, only full calendar years should be included in accident history data. The period for which accident history data is to be used must not overlap the analysis period (see above). If such an overlap is detected, the following message is displayed:

- **Warning:** Historical data specified overlaps with the specified analysis period. Please revise accident history or analysis period, or both.

The accident history data should be used only if at least two years of site-specific accident history data for the project being evaluated are available. If two years of historical data are not available the following message is provided notifying the user:

- Only one year of historical crash data was specified. At least two years of historical data are required in order to be used in the analysis. The historical data provided will be omitted from the analysis. Continue with analysis?

2.2.1.5 Geometric Design/Traffic Control/Traffic Volume Data

The geometric design/traffic control/traffic volume data needed for the accident prediction algorithm is stored in a single IHSDM highway file and edited/viewed through the edit/view highway data editor.

2.3 Editing Accident Data

2.4 Crash Prediction Module Properties

IHSDM properties are used to control the runtime behavior of the system. To view the "Crash Prediction Module properties, refer to the Properties Document.

2.5 Projects, Analyses and Master Highways

For detailed information on projects, analyses and highways, see Running IHSDM Software Manual.

3. IHSDM Documentation

IHSDM documentation is organized in a series of manuals oriented to specific user types and information needs. User types include first-time users, regular users, and system administrators. Information needs include: installing and configuring IHSDM, the mechanics of using the various features of the software, engineering insights to ensure appropriate use of the software and interpretation of outputs, and administering and maintaining the software installation.

The structure of the series of manuals is illustrated in the User Documentation Map. The manuals are listed and described below by the users and information needs they support:

- Manuals for First-Time Users: These manuals are oriented to assist new users in installing and configuring IHSDM and running it for the first time. Manuals include:
 - Getting Started Guide - An overview of the installation and use of IHSDM. This Guide should be sufficient for stand-alone installations. For client-server installations, the more detailed IHSDM Installation Manual will be needed.
 - Installation Manual - A detailed reference to the installation and configuration of IHSDM.
 - Running IHSDM Software Manual - An overview of the basic operations in running the IHSDM software. The intent is to provide new users the information they need to run IHSDM for the first time.
- User's Manuals: These Manuals are intended as references that regular users can consult when issues arise about the mechanics of using the IHSDM graphical user interface. Manuals include:
 - IHSDM User's Manual - A reference for using the primary IHSDM graphical user interface. Other User's Manuals provide additional details on specific components of the IHSDM graphical user interface:

- Policy Review Module (PRM) User's Manual - A reference for using the (stand-alone) Policy Review Module software graphical user interface.
- Crash Prediction Module (CPM) User's Manual - A reference for using the (stand-alone) Crash Prediction Module software graphical user interface.
- Design Consistency Module (DCM) User's Manual - A reference for using the (stand-alone) Design Consistency Module software graphical user interface.
- Intersection Review Module (IRM) User's Manual - A reference for using the (stand-alone) Intersection Review Module software graphical user interface.
- Traffic Analysis Module (TAM) User's Manual - A reference for using the (stand-alone) Traffic Analysis Module software graphical user interface.
- Using the IHSDM Graphical User Interface - A reference for the operation of the individual components of the graphical user interface.
- User Properties and Defaults Manual - A reference for editing IHSDM system properties, user properties, and user default values.
- Frequently Asked Questions - A list of frequently asked questions related to the IHSDM software.
- IHSDM Troubleshooting Guide - A reference for troubleshooting IHSDM software problems.
- Documentation of IHSDM Data: These documents provide detailed descriptions of all IHSDM data elements and references for importing and editing data.
 - IHSDM Highway Model - A reference for the IHSDM highway model, including descriptions of the data elements comprising the model.
 - LandXML Support - A reference for IHSDM support for the LandXML data standard.
 - Editing Highway Elements - A reference for using the Edit/View Highway Elements graphical user interface.
 - GEOPAK-TO-IHSDM Application Programmer's Interface (API) User's Manual - A reference for using the Application Program Interface (API) to export data from GEOPAK into a format that IHSDM can import.
- Engineer's Manual: The intent of these Manuals is to provide the engineering information necessary to make appropriate use of IHSDM evaluation capabilities and interpretation of results. Manuals include:
 - Policy Review Module (PRM) Engineer's Manual - A reference for the engineering issues of using the Policy Review Module.
 - Crash Prediction Module (CPM) Engineer's Manual - A reference for the engineering issues of using the Crash Prediction Module.
 - Design Consistency Module (DCM) Engineer's Manual - A reference for the engineering issues of using the Design Consistency Module.
 - Intersection Review Module (IRM) Engineer's Manual - A reference for the engineering issues of using the Intersection Review Module.
 - **Intersection Policy Review Sub-Manual** - Describes the procedures for checking an intersection design element against relevant policy, including

references to the section of the AASHTO policy that contains the information used to develop the module and check the design. **(The Intersection Policy Review Sub-Manual is not available in the current release of IHSDM.)**

- Intersection Diagnostic Review Engineer's Sub-manual - Describes in detail the concerns that the diagnostic review component considers and the models used to evaluate those concerns.
- Traffic Analysis Module (TAM) Engineer's Manual - A reference for the engineering issues of using the Traffic Analysis Module.
- Manuals for System Administrators: These Manuals provide system administrators the information they need to maintain IHSDM installations.
 - System Administrator's Manual - A reference for using the IHSDM Administration Tool software graphical user interface. This manual also discusses customizing variable components of IHSDM, including analysis report templates, data dictionaries, and policy files.
 - PRM/IRM Policy Table Maintenance - A reference for editing design policy tables used in the Policy Review Module and Intersection Review Module.

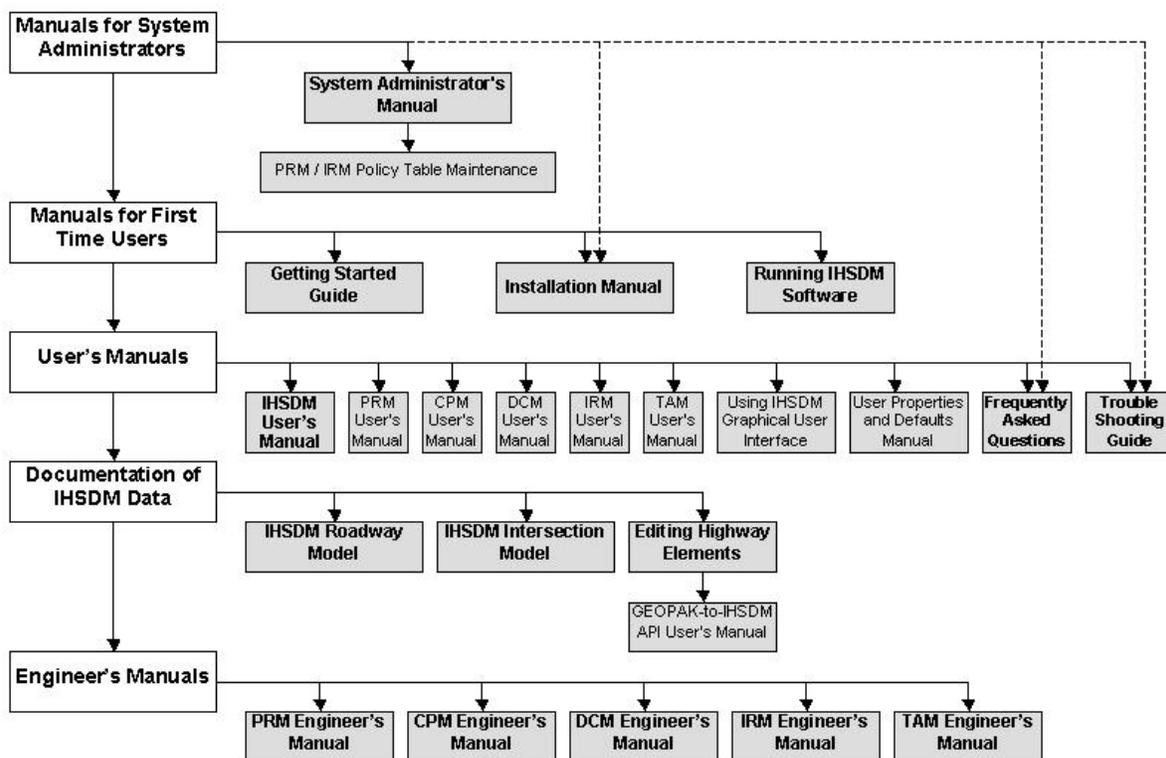


Figure 11 User Documentation Map

4. Troubleshooting

For updated information on troubleshooting problems in the IHSDM, refer to the Troubleshooting Guide.

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