

Interactive Highway Safety Design Model (IHSDM)

IHSDM Intersection Model

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Table of Contents

1. Introduction	1
2. Editing Intersections	5
2.1 Widgets	6
2.2 Adding a New Intersection	6
2.2.1 Wizard Panels	7
2.2.1.1 Begin New Intersection Specification Panel	7
2.2.1.2 Specify an Intersecting Highway dataset Panel	8
2.2.1.3 Intersection Data Panel	9
2.3 Editing an Intersection	10
2.3.1 Widgets	11
3. Editing an Intersection Leg	13
3.1 Tabs	13
3.1.1 General Tab	13
3.1.2 Traffic Attributes Tab	14
3.1.3 Corner Tab	16
3.2 Widgets	18
4. Editing a Leg Turn	18
4.1 Widgets	19
Index	21

List of Figures

Figure 1 Four-Legged Intersection - Basic Layout	1
Figure 2 Three-Legged Intersection - Layout A	2
Figure 3 Three-Legged Intersection - Layout B	2
Figure 4 Three-Legged Intersection - Layout C	3
Figure 5 Four-Legged Intersection - Offset Tee	4
Figure 6 Select an intersection to edit Frame	5
Figure 7 Begin New Intersection Specification Panel	7
Figure 8 Specify an Intersecting Highway dataset Panel	8
Figure 9 Intersection Data Panel	9
Figure 10 Edit Intersection Data Frame	11
Figure 11 General Tab	13
Figure 12 Traffic Attributes Tab	15
Figure 13 Corner Tab	17
Figure 14 Add/Edit Leg Turn Element Dialog	19

1. Introduction

This document explains the intersection model used within IHSDM and how to specify intersection data in the graphical user interface. Within IHSDM, an intersection is used to represent the connection of two or more distinct alignments. Each alignment is defined by a distinct set of highway data elements. One of the alignments (i.e., set of highway data elements) is a reference alignment and is referred to as the **base highway**. Within IHSDM, the **master highway** (i.e., the set of highway data elements associated with the current analysis) is the default base highway. When editing other highway element sets, the highway being edited is considered the base highway.

Each approach to and/or departure from the intersection is referred to as a leg. Legs are numbered consecutively in a clockwise direction. The first leg to the left, when facing increasing stations on the base highway, is leg 1. Refer to Figure 1, *Four-Legged Intersection - Basic Layout* through Figure 5, *Four-Legged Intersection - Offset Tee* for the layout of some typical intersections.

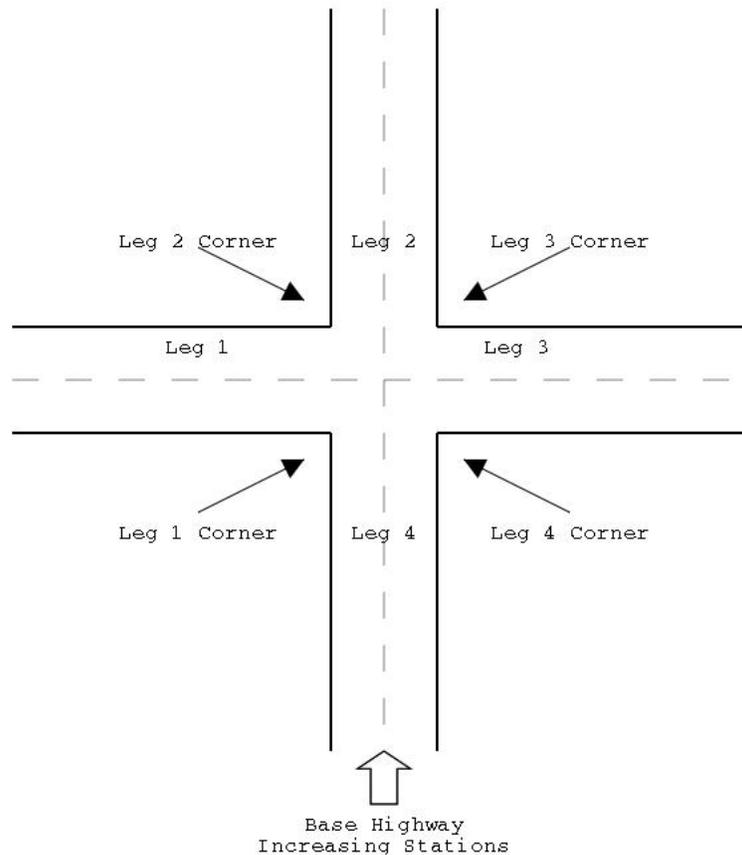


Figure 1 Four-Legged Intersection - Basic Layout

Figure 1, *Four-Legged Intersection - Basic Layout* shows the layout of a typical four-legged intersection. The base highway is shown vertically, with stations increasing in an upward direction. The intersection has four corners.

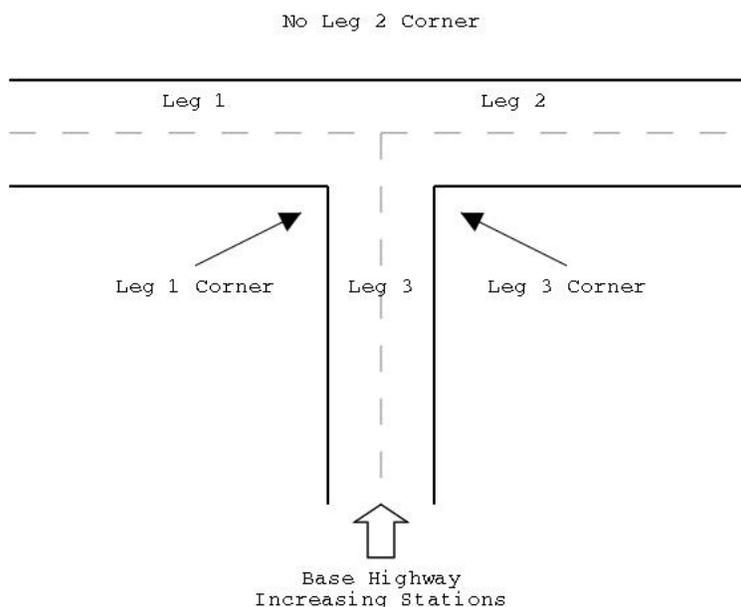


Figure 2 Three-Legged Intersection - Layout A

Figure 2, *Three-Legged Intersection - Layout A* shows the layout of a three-legged intersection in which the base highway ends at the intersecting highway. The base highway is shown vertically, with stations increasing in an upward direction. The intersection has two corners.

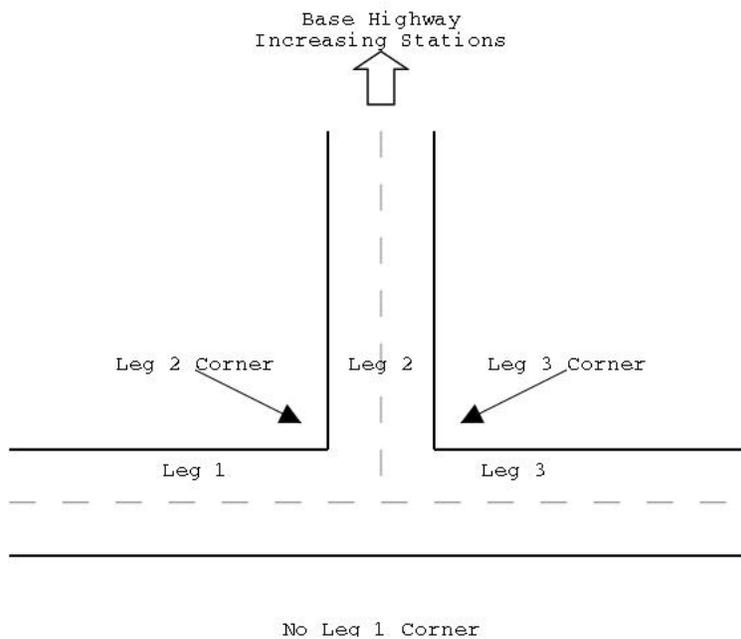


Figure 3 Three-Legged Intersection - Layout B

Figure 3, *Three-Legged Intersection - Layout B* shows the layout of a three-legged intersection in which the base highway begins at the intersecting highway. The base highway is shown

vertically, with stations increasing in an upward direction. The intersection has two corners.

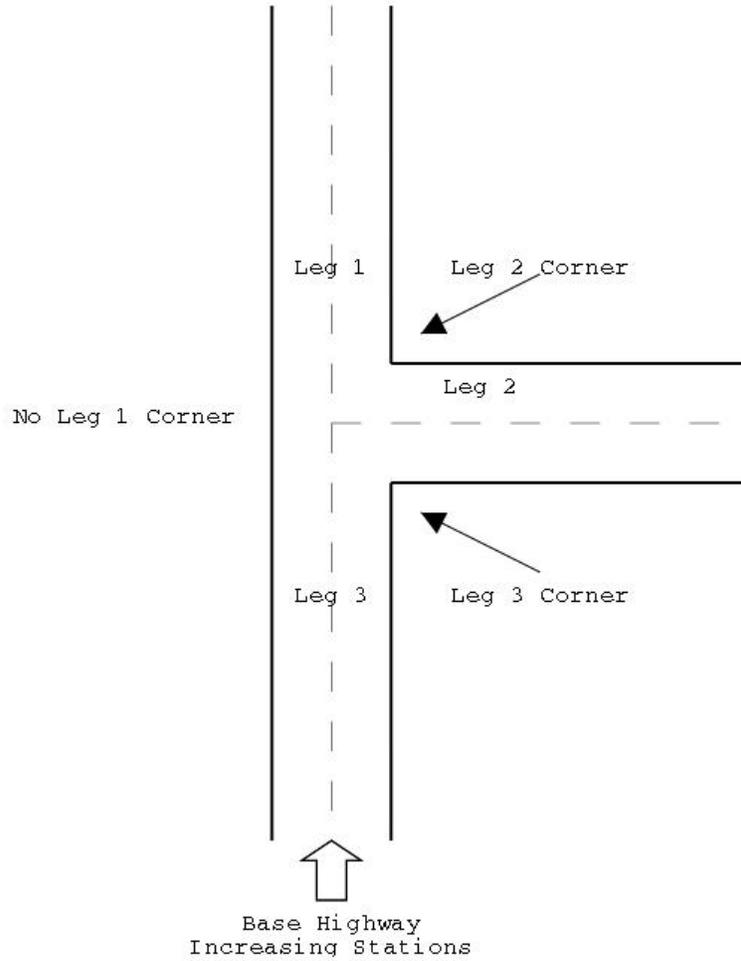


Figure 4 Three-Legged Intersection - Layout C

Figure 4, *Three-Legged Intersection - Layout C* shows the layout of a three-legged intersection in which the base highway is intersected by a single, non-through, highway. The base highway is shown vertically, with stations increasing in an upward direction. The intersection has two corners.

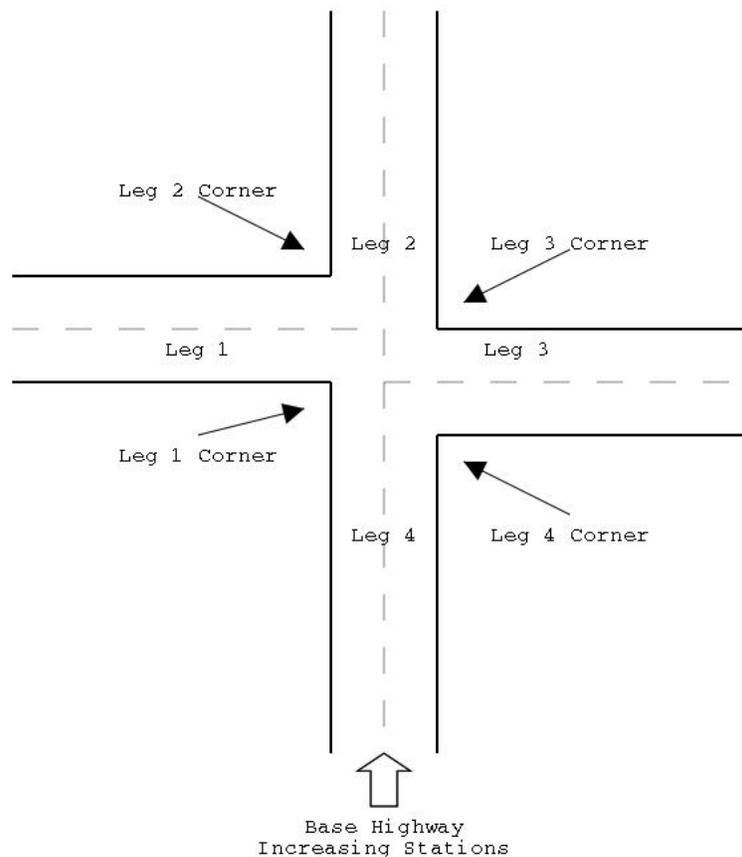


Figure 5 Four-Legged Intersection - Offset Tee

Figure 5, *Four-Legged Intersection - Offset Tee* shows the layout of a four-legged intersection in which the base highway is intersected by two, non-through, highways. The base highway is shown vertically, with stations increasing in an upward direction. The intersection has four corners.

The IHSDM intersection model describes the points of intersections of the legs and a number of attributes for both the intersection and the individual legs. The categories of intersection attributes include:

- A **base station** that specifies the location of the intersection on the base highway
- A user defined **name**
- An optional user **comment**
- The **number of legs**
- The **construction type**, that is, whether the intersection:
 - exists and will undergo minor improvements,
 - exists and will be improved, or
 - will be constructed as part of the project.
- An intersection **traffic control**. The model supports the following intersection traffic control type specifications: stop-controlled, signalized, all-way stop controlled, yield

controlled, and uncontrolled. For signalized intersections, the basic signal cycle length and whether the signal flashes at night are intersection attributes.

Each intersection leg has a number of attributes:

- A **leg number**, relative to the base highway, that is calculated by the system.
- A **leg name**, assigned by the system from the highway name and the relative heading of outgoing traffic.
- A **base station** that specifies the point of intersection of the leg on the base highway. This is normally the base station of the intersection. For one non-base highway legs of an offset tee intersection, the value of this attribute will **not** be the intersection base station.
- An intersecting **highway name** and **station**
- A **relative heading**. This value is computed by the system
- A number of traffic attributes, including
 - A leg **traffic control type**. This is specified only for legs that are part of an intersection that is stop or yield controlled.
 - A **leg traffic control position**
 - Any **turn restriction**
 - A highway **classification**, that is, whether the approach highway is primary or secondary.
 - A **channelization type**.
 - **Traffic turn data** for each possible maneuver, including
 - The **turn speed**
 - Percentage of incoming traffic that makes the maneuver and the percentage that are trucks
 - The percentage of the signal cycle length that allows the maneuver (only for signalized intersections)
- A **curb type**.
- A **corner type**. Three categories of corners are defined: simple curve, simple curve with taper and compound curve.

2. Editing Intersections

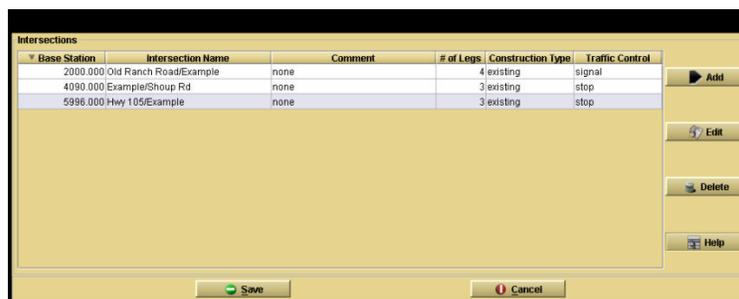


Figure 6 Select an intersection to edit Frame

This dialog is used to add, edit or delete intersections associated with a base highway dataset. To add a new intersection, press the list box *Add* button. To edit the data for an existing intersection,

selected the intersection and press the list box *Edit* button. To delete all data for an existing intersection, selected the intersection and press the list box *Delete* button. For additional information, see IHSDM Intersection Model. The **Select an intersection to edit** frame includes the following widgets: Intersection, Save and Cancel.

2.1 Widgets

- **Intersection** List Box - Widget type: list box. This element specifies all of the data to describe a single intersection. The **Intersection** list box includes the following items: Base Station, Intersection Name, Comment, Number of Legs, Construction Type and Traffic Control.
 - **Base Station** Item - Unit of measure: STATION. This is the station on the base highway dataset associated with the intersection.
 - **Intersection Name** Item - This item is a unique identification for the intersection. If no name is specified by the user, a name will be created by the system from the names of the intersection highway datasets.
 - **Comment** Item - This item is an optional user comment associated with the intersection
 - **Number of Legs** Item - Unit of measure: INT. This item is number of legs to be specified for the intersection.
 - **Construction Type** Item - This item specifies the intersection construction type. The item specifies whether the intersection: (1) exists and will undergo minor improvement, (2) exists and will undergo major improvements, or (3) will be constructed as part of the project. The enumeration values are:
 - **existing** (intersection exists, no major improvements planned),
 - **improvement** (intersection exists, major improvements planned) and
 - **new** (intersection does not yet exist).
 - **Traffic Control** Item - This item specifies the traffic control for the intersection. For *stop* and *yield* controlled intersections, control for each approach is specified as a leg attribute. The enumeration values are:
 - **stop** (stop-controlled intersection, e.g. some legs are stop controlled, some legs are uncontrolled),
 - **signal** (signalized intersection, e.g. all legs are signal controlled),
 - **all-way stop** (all-way stop controlled intersection, e.g. all legs are stop controlled),
 - **yield** (yield controlled intersection, e.g. some legs are yield controlled, some legs are uncontrolled) and
 - **none** (uncontrolled intersection, e.g. all legs are uncontrolled).
- **Save** - This button closes the element add/edit dialog and saves any changes or additions.
- **Cancel** - This button closes the element add/edit dialog and discards any changes or additions.

2.2 Adding a New Intersection

This wizard dialog is used to specify the data for a new intersection. For additional information, see IHSDM Intersection Model. The **Specify a new intersection** dialog includes the following wizard panels: Begin New Intersection Specification, Specify an Intersecting Highway dataset and Intersection Data.

2.2.1 Wizard Panels

The Specify a new intersection Dialog includes the wizard panels described in the following sections.

2.2.1.1 Begin New Intersection Specification Panel

Figure 7 Begin New Intersection Specification Panel

The **Begin New Intersection Specification** wizard panel includes the following widgets: Base Highway Name, Base Station, Number of Legs, Intersection Name, Comment, Construction Type, Traffic Control, Cycle Length and Signal Flashes at Night.

- **Base Highway Name** - Widget type: text field. This item is the name of the associated base highway.
- **Base Station** - Widget type: text field. Unit of measure: STATION. This is the station on the base highway dataset associated with the intersection.
- **Number of Legs** - Widget type: text field. Unit of measure: INT. This item is number of legs to be specified for the intersection.
- **Intersection Name** - Widget type: text field. This item is a unique identification for the intersection. If no name is specified by the user, a name will be created by the system from the names of the intersection highway datasets.
- **Comment** - Widget type: text field. This item is an optional user comment associated with the intersection
- **Construction Type** - Widget type: combo box. This item specifies the intersection construction type. The item specifies whether the intersection: (1) exists and will undergo minor improvement, (2) exists and will undergo major improvements, or (3) will be

constructed as part of the project. The enumeration values are:

- **existing** (intersection exists, no major improvements planned),
- **improvement** (intersection exists, major improvements planned) and
- **new** (intersection does not yet exist).
- **Traffic Control** - Widget type: combo box. This item specifies the traffic control for the intersection. For *stop* and *yield* controlled intersections, control for each approach is specified as a leg attribute. The enumeration values are:
 - **stop** (stop-controlled intersection, e.g. some legs are stop controlled, some legs are uncontrolled),
 - **signal** (signalized intersection, e.g. all legs are signal controlled),
 - **all-way stop** (all-way stop controlled intersection, e.g. all legs are stop controlled),
 - **yield** (yield controlled intersection, e.g. some legs are yield controlled, some legs are uncontrolled) and
 - **none** (uncontrolled intersection, e.g. all legs are uncontrolled).
- **Cycle Length** - Widget type: text field. Unit of measure: seconds. This item is the length of the traffic control signal cycle. The cycle length should be specified as the worst case (shortest length) as measured at the peak traffic time of day. This item is only applicable to signalized intersections. No value needs to be specified for this item. The unit of measure for this item is seconds.
- **Signal Flashes at Night** - Widget type: check box. This item specified whether the signal at this intersection flashes at night. If the intersection is not signalized, the value of this item is ignored. If the value of this item is enabled, *Flash at Night* item is enabled on each intersection leg.

2.2.1.2 Specify an Intersecting Highway dataset Panel

Specify an Intersecting Highway dataset

Please specify an intersecting highway dataset and the point of intersection with the base highway dataset. This wizard panel will be repeated until the highway and point of intersection has been collected for all legs. A highway that was recently deleted from this base highway dataset's intersections will not be listed under Intersecting Highway Datasets until the deletion has been saved and the user reopens the Intersection Editor.

Intersecting Highway Dataset: (none)

Station at Point of Intersection:

Intersecting Highway Datasets
Intersecting Highway Datasets

Figure 8 Specify an Intersecting Highway dataset Panel

The **Specify an Intersecting Highway dataset** wizard panel includes the following widgets: Intersecting Highway Dataset, Import/Create/Clone Highway Data, Station at Point of Intersection and Reset List.

- **Intersecting Highway Dataset** - Widget type: combo box. This item is the name of the intersection highway dataset. The enumeration values are: (**none**).
- **Import/Create/Clone Highway Data** - This button displays a menu with items to import, create or clone a highway dataset. This highway dataset can be selected as the intersecting highway dataset. When clicked, this button provides the following menu items:
 - **IHSDM Highway Data** - This menu item imports either IHSDM CSV or LandXML highway data files.
 - **Create** - This menu item starts a dialog that creates a new (empty) highway dataset.
 - **Clone** - This menu item starts a dialog that clones an existing highway dataset.
- **Station at Point of Intersection** - Widget type: text field. Unit of measure: STATION. This item is the station on the intersecting highway dataset at the point of intersection with the base highway dataset.
- **Reset List** - Widget type: button. This button will reset the list of intersecting highway datasets.

2.2.1.3 Intersection Data Panel

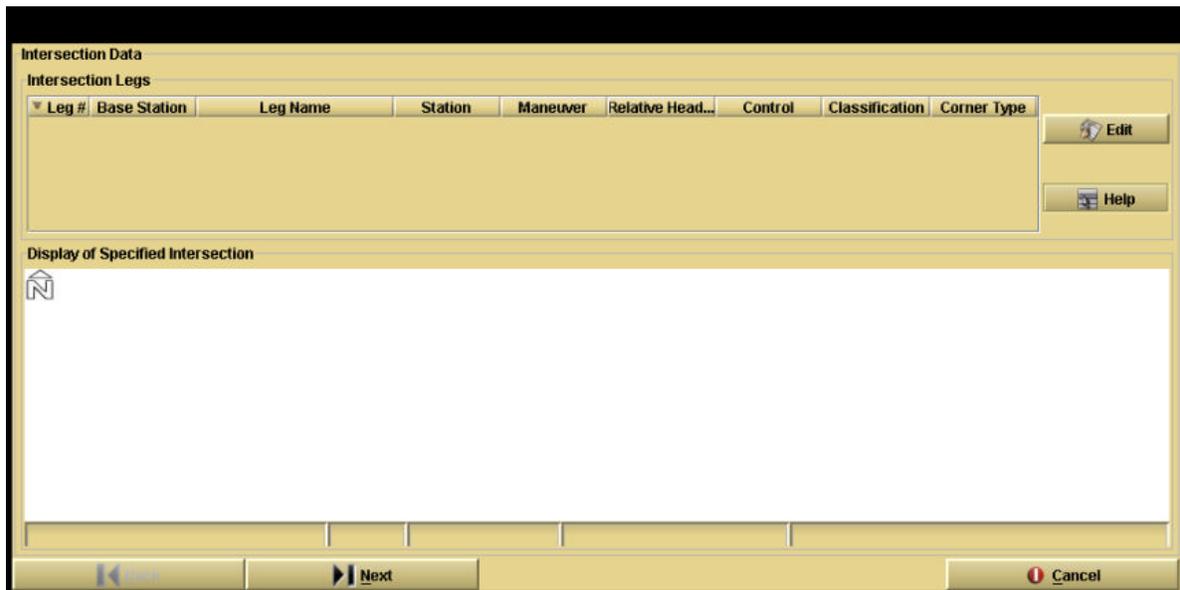


Figure 9 Intersection Data Panel

The **Intersection Data** wizard panel includes the following widgets: Intersection Legs.

- **Intersection Leg List Box** - Widget type: list box. This item specifies all of the data to describe a single intersection leg. The **Intersection Leg** list box includes the following items: Leg #, Base Station, Leg Name, Intersecting Station, Maneuver, Relative Heading, Approach Traffic Control, Classification and Corner Type.
 - **Leg # Item** - Unit of measure: INT. The leg number is the leg position relative to the intersection base alignment. The numbering begins with the first leg to the left, when facing increasing stations on the base alignment. The numbering increases in a

clockwise rotation. The value of this item is assigned by the system.

- **Base Station** Item - Unit of measure: STATION. Base highway station at the point of intersection.
- **Leg Name** Item - The value of this item is assigned by the system from the highway name and relative heading of outgoing traffic.
- **Intersecting Station** Item - Unit of measure: STATION. The station the center of the intersection.
- **Maneuver** Item - . The enumeration values are:
 - **left** (left-turn maneuver),
 - **fore** (forward (no-turn) maneuver),
 - **right** (right-turn maneuver) and
 - **back** (U-turn maneuver).
- **Relative Heading** Item - Unit of measure: degrees. The relative heading of this leg relative to the base highway. The unit of measure for this item is degrees.
- **Approach Traffic Control** Item - This item specifies the traffic control for traffic approaching the intersection on this leg. The value of this item is directly related to the intersection **Traffic Control** item. When the intersection traffic control is *all-way stop*, *signal* or *none*, the value of this item is the same (and can not be changed). When the intersection traffic control is *stop*, the value of this item should be *none* for the approach legs on a major highway and *stop* for the approach legs on a minor highway. Likewise, when the intersection traffic control is *yield*, the value of this item should be *none* for the approach legs on a major highway and *yield* for the approach legs on a minor highway. The enumeration values are:
 - **signal** (approach is control by a signal),
 - **none** (approach is uncontrolled),
 - **stop** (approach is stop-controlled) and
 - **yield** (approach is yield-controlled).
- **Classification** Item - . The enumeration values are:
 - **minor** (approach is a minor highway) and
 - **major** (approach is a major highway).
- **Corner Type** Item - . The enumeration values are: **simple curve**, **simple curve w/taper**, **compound curve** and **none**.

2.3 Editing an Intersection

Figure 10 Edit Intersection Data Frame

For additional information, see IHSDM Intersection Model. The **Edit Intersection Data** frame includes the following widgets: Base Highway Name, Intersection Name, Comment, Construction Type, Traffic Control, Cycle Length, Signal Flashes at Night, Intersection Legs, Save and Cancel.

2.3.1 Widgets

- **Base Highway Name** - Widget type: text field. This item is the name of the associated base highway.
- **Intersection Name** - Widget type: text field. This item is a unique identification for the intersection. If no name is specified by the user, a name will be created by the system from the names of the intersection highway datasets.
- **Comment** - Widget type: text field. This item is an optional user comment associated with the intersection
- **Construction Type** - Widget type: combo box. This item specifies the intersection construction type. The item specifies whether the intersection: (1) exists and will undergo minor improvement, (2) exists and will undergo major improvements, or (3) will be constructed as part of the project. The enumeration values are:
 - **existing** (intersection exists, no major improvements planned),
 - **improvement** (intersection exists, major improvements planned) and
 - **new** (intersection does not yet exist).
- **Traffic Control** - Widget type: combo box. This item specifies the traffic control for the intersection. For *stop* and *yield* controlled intersections, control for each approach is specified as a leg attribute. The enumeration values are:
 - **stop** (stop-controlled intersection, e.g. some legs are stop controlled, some legs are uncontrolled),
 - **signal** (signalized intersection, e.g. all legs are signal controlled),
 - **all-way stop** (all-way stop controlled intersection, e.g. all legs are stop controlled),
 - **yield** (yield controlled intersection, e.g. some legs are yield controlled, some legs are uncontrolled) and

- **none** (uncontrolled intersection, e.g. all legs are uncontrolled).
- **Cycle Length** - Widget type: text field. Unit of measure: seconds. This item is the length of the traffic control signal cycle. The cycle length should be specified as the worst case (shortest length) as measured at the peak traffic time of day. This item is only applicable to signalized intersections. No value needs to be specified for this item. The unit of measure for this item is seconds.
- **Signal Flashes at Night** - Widget type: check box. This item specified whether the signal at this intersection flashes at night. If the intersection is not signalized, the value of this item is ignored. If the value of this item is is enabled, *Flash at Night* item is enabled on each intersection leg.
- **Intersection Leg List Box** - Widget type: list box. This item specifies all of the data to describe a single intersection leg. The **Intersection Leg** list box includes the following items: Leg #, Base Station, Leg Name, Intersecting Station, Maneuver, Relative Heading, Approach Traffic Control, Classification and Corner Type.
 - **Leg #** Item - Unit of measure: INT. The leg number is the leg position relative to the intersection base alignment. The numbering begins with the first leg to the left, when facing increasing stations on the base alignment. The numbering increases in a clockwise rotation. The value of this item is assigned by the system.
 - **Base Station** Item - Unit of measure: STATION. Base highway station at the point of intersection.
 - **Leg Name** Item - The value of this item is assigned by the system from the highway name and relative heading of outgoing traffic.
 - **Intersecting Station** Item - Unit of measure: STATION. The station the center of the intersection.
 - **Maneuver** Item - . The enumeration values are:
 - **left** (left-turn maneuver),
 - **fore** (forward (no-turn) maneuver),
 - **right** (right-turn maneuver) and
 - **back** (U-turn maneuver).
 - **Relative Heading** Item - Unit of measure: degrees. The relative heading of this leg relative to the base highway. The unit of measure for this item is degrees.
 - **Approach Traffic Control** Item - This item specifies the traffic control for traffic approaching the intersection on this leg. The value of this item is directly related to the intersection **Traffic Control** item. When the intersection traffic control is *all-way stop*, *signal* or *none*, the value of this item is the same (and can not be changed). When the intersection traffic control is *stop*, the value of this item should be *none* for the approach legs on a major highway and *stop* for the approach legs on a minor highway. Likewise, when the intersection traffic control is *yield*, the value of this item should be *none* for the approach legs on a major highway and *yield* for the approach legs on a minor highway. The enumeration values are:
 - **signal** (approach is control by a signal),

- **none** (approach is uncontrolled),
- **stop** (approach is stop-controlled) and
- **yield** (approach is yield-controlled).
 - **Classification** Item - . The enumeration values are:
- **minor** (approach is a minor highway) and
- **major** (approach is a major highway).
 - **Corner Type** Item - . The enumeration values are: **simple curve**, **simple curve w/taper**, **compound curve** and **none**.
- **Save** - This button closes the element add/edit dialog and saves any changes or additions.
- **Cancel** - This button closes the element add/edit dialog and discards any changes or additions.

3. Editing an Intersection Leg

For additional information, see IHSDM Intersection Model. The **Edit Intersection Leg Data** dialog includes the following tabs: General, Traffic Attributes and Corner. The **Edit Intersection Leg Data** dialog includes the following widgets: Leg #, Leg Name, Save, Help and Cancel.

3.1 Tabs

The Edit Intersection Leg Data Dialog includes the tabs described in the following sections.

3.1.1 General Tab

Figure 11 General Tab

The **General** tab includes the following widgets: Base Highway Name, Base Station, Intersecting Highway Name, Intersecting Station, Reset Relative Heading, Relative Heading, Maneuver and Intersection Sight Distance Data.

- **Base Highway Name** - Widget type: text field. .
- **Base Station** - Widget type: text field. Unit of measure: STATION. Base highway station at the point of intersection.
- **Intersecting Highway Name** - Widget type: text field. .
- **Intersecting Station** - Widget type: text field. Unit of measure: STATION. The station the center of the intersection.

- **Reset Relative Heading** - Widget type: button. This button will open a dialog to reset the relative heading for this leg.
- **Relative Heading** - Widget type: text field. Unit of measure: degrees. The relative heading of this leg relative to the base highway. The unit of measure for this item is degrees.
- **Maneuver** - Widget type: combo box (read-only). . The enumeration values are:
 - **left** (left-turn maneuver),
 - **fore** (forward (no-turn) maneuver),
 - **right** (right-turn maneuver) and
 - **back** (U-turn maneuver).
- **Intersection Sight Distance Data** List Box - Widget type: list box. The **Intersection Sight Distance Data** list box includes the following items: Case and Clear.
 - **Case** Item - This item is the ISD intersection control/maneuver case. The enumeration values are:
 - **I** (AASHTO 1990/1994 ISD Case I, uncontrolled),
 - **II** (AASHTO 1990/1994 ISD Case II, yield control for minor road),
 - **III** (AASHTO 1990/1994 ISD Case III, stop control for minor road, all sub-cases),
 - **III-A** (AASHTO 1990/1994 ISD Case III-A, stop control for minor road, crossing maneuver),
 - **III-B** (AASHTO 1990/1994 ISD Case III-B, stop control for minor road, turning left),
 - **III-C** (AASHTO 1990/1994 ISD Case III-C, stop control for minor road, turning right),
 - **IV** (AASHTO 1990/1994 ISD Case IV, signalized),
 - **V** (AASHTO 1994 ISD Case V, stopped vehicle turning left from major road) and
 - **CPM** (Crash Prediction Module, Quadrant ISD).
 - **Clear** Item - The value of this item defines the status of the intersection sight distance for this leg/case pair. The enumeration values are:
 - **yes** (ISD for the case is clear of obstructions) and
 - **no** (ISD for the case is restricted).

3.1.2 Traffic Attributes Tab

The screenshot shows a software window titled 'Traffic Attributes Tab'. It has a yellow background and contains several sections:

- General** tab is selected, showing fields for 'Leg #', 'Leg Name', 'Approach Traffic Control' (set to 'signal'), 'Classification' (set to 'minor'), 'Traffic Control Position' (set to 'side'), 'Flash at Night' (set to 'yellow'), 'Turn Restriction' (set to 'none'), 'Stop Line Offset (m)' (set to '0.00'), and 'Channelization' (set to 'none'). There is a checked box for 'Right Turn on Red Allowed'.
- Corner** tab is also visible.
- Traffic Turn Data** section contains a table with columns: 'Relative Headin...', 'Maneuver', 'Destination', 'Turn Speed (km/h)', 'Turning (%)', 'Trucks Turning (%)', and 'Cycle Length (%)'. The table is currently empty.
- Buttons for 'Save', 'Help', and 'Cancel' are located at the bottom of the window.

Figure 12 Traffic Attributes Tab

The **Traffic Attributes** tab includes the following widgets: Approach Traffic Control, Traffic Control Position, Turn Restriction, Stop Line Offset, Classification, Flash at Night, Right Turn on Red Allowed and Channelization.

- **Approach Traffic Control** - Widget type: combo box. This item specifies the traffic control for traffic approaching the intersection on this leg. The value of this item is directly related to the intersection **Traffic Control** item. When the intersection traffic control is *all-way stop*, *signal* or *none*, the value of this item is the same (and can not be changed). When the intersection traffic control is *stop*, the value of this item should be *none* for the approach legs on a major highway and *stop* for the approach legs on a minor highway. Likewise, when the intersection traffic control is *yield*, the value of this item should be *none* for the approach legs on a major highway and *yield* for the approach legs on a minor highway. The enumeration values are:
 - **signal** (approach is control by a signal),
 - **none** (approach is uncontrolled),
 - **stop** (approach is stop-controlled) and
 - **yield** (approach is yield-controlled).
- **Traffic Control Position** - Widget type: combo box. This item specifies the position of the traffic control, if any. The item is used to calculate to sight distance to control. The enumeration values are:
 - **side** (traffic control is at the side of the highway) and
 - **overhead** (traffic control is over the the highway).
- **Turn Restriction** - Widget type: combo box. This item specifies the type of turn restriction associated with the leg. The enumeration values are:
 - **none** (no restrictions, all turns allowed),
 - **no left turn** (no left-turn allowed),
 - **no right turn** (no right-turn allowed),
 - **no turn** (no turns allowed) and
 - **no U-turn** (no U-turn allowed).
- **Stop Line Offset** - Widget type: text field. Unit of measure: meters (feet). This item is the offset of the effective or actual stop-line from the edge of the traveled way width of crossing lanes. The edge of the traveled way width is the maximum from crossing legs (incoming on the left, outgoing on the right) and is calculated to include the effects of leg skew. The unit of measure for this item is meters (feet).
- **Classification** - Widget type: combo box. . The enumeration values are:
 - **minor** (approach is a minor highway) and
 - **major** (approach is a major highway).
- **Flash at Night** - Widget type: combo box. This item specified the color the signal at flash for an approach to this leg. If the intersection is not signalized, the value of this item is ignored. If the intersection *Signal Flashes at Night* is not enabled, the value of this item is ignored. The enumeration values are:

- **yellow** (signal flashes yellow to approaching traffic) and
- **red** (signal flashes red to approaching traffic).
- **Right Turn on Red Allowed** - Widget type: check box. This item specifies whether a right turn on red is allowed from an approach on this leg. The value of item is ignored if the intersection is not signalized, if right turns are restricted or no right turn maneuver is available.
- **Channelization** - Widget type: combo box. This item specified the type of channelization treatment of the leg. Channelization is the regulation of conflicting traffic movements into defined paths by traffic islands or pavement markings. The enumeration values are:
 - **none** (leg in not channelized),
 - **pavement marking** (leg is channelized with pavement markings) and
 - **traffic island** (leg is channelized with a traffic island).
- **Leg Turn Element List Box** - Widget type: list box. The **Leg Turn Element** list box includes the following items: Relative Heading, Relative Leg #, Maneuver, Destination, Destination ID, Turn Speed, Percent Turning, Percent Trucks Turning and Percent Cycle Length.
 - **Relative Heading** Item - Unit of measure: degrees. The relative heading this maneuver relative to the incoming leg. The unit of measure for this item is degrees.
 - **Relative Leg #** Item - The relative leg number of destination leg.
 - **Maneuver** Item - The the maneuver type.
 - **Destination** Item - The destination of the maneuver.
 - **Destination ID** Item - The destination of the maneuver.
 - **Turn Speed** Item - Unit of measure: kilometers/hour (miles/hour). This item is the turn speed speed for turning vehicles. The turning speed is the maximum safe speed that can be maintained while turning through an intersection. The unit of measure for this item is kilometers/hour (miles/hour).
 - **Percent Turning** Item - Unit of measure: percent. This item is the percentage of peak volume that will turn the specified direction. The unit of measure for this item is percent.
 - **Percent Trucks Turning** Item - Unit of measure: percent. This item is the percentage of turning traffic that are trucks. No value needs to be specified for this item. The unit of measure for this item is percent.
 - **Percent Cycle Length** Item - Unit of measure: percent. The percent of the signal cycle length that permits a maneuver to this destination leg. The value of this item is ignored if the intersection is not signalized. No value needs to be specified for this item. The unit of measure for this item is percent.

3.1.3 Corner Tab

The screenshot shows a software window titled 'Corner Tab'. At the top, there are fields for 'Leg #' and 'Leg Name'. Below this, there are tabs for 'General', 'Traffic Attributes', and 'Corner', with 'Corner' being the active tab. The 'Curb Type' is a dropdown menu set to 'mountable'. Below it is a 'Corner Destination' text field. 'Turn Angle (deg)' is a text field. 'Corner Type' is a dropdown menu set to 'simple curve'. 'Turn Design Speed (km/h)' is a text field set to '10'. To the right, 'Radius (m)' is a text field set to '5.00'. Below these are two sections: 'Simple Curve w/Taper Corner' and 'Compound Curves Corner'. Each section has a table of input fields for offsets and radii. At the bottom, there are 'Save' and 'Cancel' buttons, and a 'Help' button.

Figure 13 Corner Tab

The **Corner** tab includes the following widgets: Curb Type, Corner Destination, Turn Angle, Corner Type, Turn Design Speed, Radius, Start Taper Offset, Start Taper, Radius, End Taper, End Taper Offset, Start Curve Offset, Start Radius, Middle Radius, End Radius and End Curve Offset.

- **Curb Type** - Widget type: combo box. This item specifies the type of curb. The enumeration values are:
 - **mountable** (curb is mountable),
 - **continuous barrier** (curb is a continuous barrier),
 - **intermittent barrier** (curb is an intermittent barrier) and
 - **none** (no curb existing for this corner).
- **Corner Destination** - Widget type: text field (read-only). The leg which the corner ajoins.
- **Turn Angle** - Widget type: text field (read-only). Unit of measure: degrees. The angle of turn for the corner. The unit of measure for this item is degrees.
- **Corner Type** - Widget type: combo box. . The enumeration values are: **simple curve**, **simple curve w/taper**, **compound curve** and **none**.
- **Turn Design Speed** - Widget type: text field (read-only). Unit of measure: kilometers/hour (miles/hour). This item is the design speed for turning vehicles. The turning design speed is the maximum safe speed that can be maintained while turning through an intersection. The unit of measure for this item is kilometers/hour (miles/hour).
- **Radius** - Widget type: text field. Unit of measure: meters (feet). This item is the radius of the simple curve corner. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **Start Taper Offset** - Widget type: text field. Unit of measure: meters (feet). This item is the offset of the start taper. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **Start Taper** - Widget type: text field. Unit of measure: TAPER. This item is the start taper ratio. No value needs to be specified for this item.
- **Radius** - Widget type: text field. Unit of measure: meters (feet). This item is the radius of the simple curve with taper corner. No value needs to be specified for this item. The unit of measure for this item is meters (feet).

- **End Taper** - Widget type: text field. Unit of measure: TAPER. This item is the end taper ratio. No value needs to be specified for this item.
- **End Taper Offset** - Widget type: text field. Unit of measure: meters (feet). This item is the offset of the end taper. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **Start Curve Offset** - Widget type: text field. Unit of measure: meters (feet). This item is the offset of the start (first) corner curve. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **Start Radius** - Widget type: text field. Unit of measure: meters (feet). This item is the radius of the start (first) corner curve. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **Middle Radius** - Widget type: text field. Unit of measure: meters (feet). This item is the radius of the middle (second) corner curve. Choice of curve radii is related to design speed, maximum superelevation rates, and friction. Longer curve radii result in flatter curves, while shorter radii result in sharper curves. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **End Radius** - Widget type: text field. Unit of measure: meters (feet). This item is the radius of the end (third) corner curve. No value needs to be specified for this item. The unit of measure for this item is meters (feet).
- **End Curve Offset** - Widget type: text field. Unit of measure: meters (feet). This item is the offset of the end (third) corner curve. No value needs to be specified for this item. The unit of measure for this item is meters (feet).

3.2 Widgets

- **Leg #** - Widget type: text field (read-only). Unit of measure: INT. The leg number is the leg position relative to the intersection base alignment. The numbering begins with the first leg to the left, when facing increasing stations on the base alignment. The numbering increases in a clockwise rotation. The value of this item is assigned by the system.
- **Leg Name** - Widget type: text field (read-only). The value of this item is assigned by the system from the highway name and relative heading of outgoing traffic.
- **Save** - Widget type: button. This button closes the element add/edit dialog and saves any changes or additions.
- **Help** - Widget type: button. This button will start your browser to display help for this dialog.
- **Cancel** - Widget type: button. This button closes the element add/edit dialog and discards any changes or additions.

4. Editing a Leg Turn

Figure 14 Add/Edit Leg Turn Element Dialog

.br Item summary for the **Leg Turn Element** element: .br .br **Relative Heading** - The relative heading this maneuver relative to the incoming leg. The unit of measure for this item is degrees. .br .br **Relative Leg #** - The relative leg number of destination leg. .br .br **Maneuver** - The maneuver type. .br .br **Destination** - The destination of the maneuver. .br .br **Destination ID** - The destination of the maneuver. .br .br **Turn Speed** - This item is the turn speed speed for turning vehicles. The turning speed is the maximum safe speed that can be maintained while turning through an intersection. The unit of measure for this item is kilometers/hour (miles/hour). .br .br **Percent Turning** - This item is the percentage of peak volume that will turn the specified direction. The unit of measure for this item is percent. .br .br **Percent Trucks Turning** - This item is the percentage of turning traffic that are trucks. No value needs to be specified for this item. The unit of measure for this item is percent. .br .br **Percent Cycle Length** - The percent of the signal cycle length that permits a maneuver to this destination leg. The value of this item is ignored if the intersection is not signalized. No value needs to be specified for this item. The unit of measure for this item is percent. .br .br The **Add/Edit Leg Turn Element** dialog includes the following widgets: Relative Heading, Maneuver, Destination, Turn Speed, Percent Turning, Percent Trucks Turning, Percent Cycle Length, Help Items, Save and Cancel.

4.1 Widgets

- **Relative Heading** - Widget type: text field. Unit of measure: degrees. The relative heading this maneuver relative to the incoming leg. The unit of measure for this item is degrees.
- **Maneuver** - Widget type: text field. The the maneuver type.
- **Destination** - Widget type: text field. The destination of the maneuver.
- **Turn Speed** - Widget type: combo box. Unit of measure: kilometers/hour (miles/hour). This item is the turn speed speed for turning vehicles. The turning speed is the maximum safe speed that can be maintained while turning through an intersection. The unit of measure for this item is kilometers/hour (miles/hour).
- **Percent Turning** - Widget type: text field. Unit of measure: percent. This item is the percentage of peak volume that will turn the specified direction. The unit of measure for this item is percent.

- **Percent Trucks Turning** - Widget type: text field. Unit of measure: percent. This item is the percentage of turning traffic that are trucks. No value needs to be specified for this item. The unit of measure for this item is percent.
- **Percent Cycle Length** - Widget type: text field. Unit of measure: percent. The percent of the signal cycle length that permits a maneuver to this destination leg. The value of this item is ignored if the intersection is not signalized. No value needs to be specified for this item. The unit of measure for this item is percent.
- **Help Items** - When clicked, this button provides the following menu items:
 - **Item Summary** - Display a dialog with a summary of the items in this element.
- **Save** - This button closes the element add/edit dialog and saves any changes or additions.
- **Cancel** - This button closes the element add/edit dialog and discards any changes or additions.

Index

A

Approach Traffic Control
item, 10, 12

B

Base Station
item, 6, 10, 12

C

Case
item, 14

Classification
item, 10, 13

Clear
item, 14

Clone
menu, 9

Comment
item, 6

Construction Type
item, 6

Corner
tab, 17

Corner Type
item, 10, 13

Create
menu, 9

D

Destination
item, 16

Destination ID
item, 16

G

General
tab, 13

I

IHSDM Highway Data
menu, 9

Intersecting Station
item, 10, 12

Intersection

list box, 6

Intersection Leg
list box, 9, 12

Intersection Name
item, 6

Intersection Sight Distance Data
list box, 14

item

Approach Traffic Control, 10, 12

Base Station, 6, 10, 12

Case, 14

Classification, 10, 13

Clear, 14

Comment, 6

Construction Type, 6

Corner Type, 10, 13

Destination, 16

Destination ID, 16

Intersecting Station, 10, 12

Intersection Name, 6

Leg #, 9, 12

Leg Name, 10, 12

Maneuver, 10, 12, 16

Number of Legs, 6

Percent Cycle Length, 16

Percent Trucks Turning, 16

Percent Turning, 16

Relative Heading, 10, 12, 16

Relative Leg #, 16

Traffic Control, 6

Turn Speed, 16

Item Summary
menu, 20

L

Leg #
item, 9, 12

Leg Name
item, 10, 12

Leg Turn Element
list box, 16

list box
Intersection, 6

Intersection Leg, 9, 12
Intersection Sight Distance Data, 14
Leg Turn Element, 16

M

Maneuver
item, 10, 12, 16

menu

Clone, 9
Create, 9
IHSDM Highway Data, 9
Item Summary, 20

N

Number of Legs
item, 6

P

Percent Cycle Length
item, 16

Percent Trucks Turning
item, 16

Percent Turning
item, 16

R

Relative Heading
item, 10, 12, 16

Relative Leg #
item, 16

T

tab

Corner, 17
General, 13
Traffic Attributes, 15

Traffic Attributes
tab, 15

Traffic Control
item, 6

Turn Speed
item, 16