Collision Information System

User Documentation

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Robohelp 7 → CIShelp.docx → MS-Word → CIShelp.pdf

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1. Introduction and Support

1.1. Introduction to the Collision Information System

The Collision Information System (CIS) is a web-based system, developed in 2008 to replace the mainframe-based Highway Accident System (HAS).

CIS contains data of collisions which occur on the British Columbia highway network, as defined by the Landmark Kilometre Inventory.

The collision data comes, via ICBC, from the MV6020 form - the BC Motor Vehicle Traffic Accident Police Investigation Report.

CIS provides facilities for querying, reporting, analysing and extracting collision data. CIS has an interactive map interface which can be used for query development and for displaying results.

1.2. History

The Highway Accident System (HAS.) was developed in 1988 and 1989 by Cypher Consulting for the Highway Safety Branch of the Ministry of Transportation and Highways, as a replacement for the Highway Safety Improvement System. The system has been used, maintained and enhanced continually since then. HAS runs on the IBM Mainframe, with a REXX / ISPF user-interface, and with analysis and reporting done by PL/I programs running in the batch MVS environment. A Visual Basic application called HASutil runs on user workstations to aid in uploading and downloading files, and performing some post-processing of HAS data and reports.

The Collision Information System (CIS) was developed by Vivid Solutions. The contract was awarded in February 2005. The first production release of CIS was version 1.1.1, released in August 2008.

1.3. Technical Overview

CIS uses J2EE architecture. All data is modeled and stored in a MoT Oracle database. The user works with the MoT-supported web browsers.. The non-spatial aspect of the GUI is implemented using Java Servlets employing the Struts Framework and Java Server Pages. Javabeans perform Oracle queries, and perform custom analysis. Reports are generated using Oracle Reports, and returned to the user in PDF and RTF formats. Output data is returned in CSV format for automatic opening in MS-Excel, and KML format for automatic opening in Google Earth. Map-based I/O is implemented using GeoServer and ESRI ArcIMS.

1.4. How to Get Access to CIS

First you need an IDIR account. IDIR is a BC government-wide authentication service, available to government employees and, in some cases, contractors. See Troubleshooting if you having problems obtaining or using an IDIR ID or password.

Next your IDIR ID must be added to the list of allowed CIS users. This is described under **CIS Authorization** on the CIS Launch Page.

Finally, you start CIS by opening your web browser, going to the CIS Launch Page and clicking on the **Launch CIS** link.

1.5. The CIS Launch Page

The CIS Launch Page is a web page on the MoT Intranet which contains system notices, and a link to start a user session of the Collision Information System.

To go to the CIS Launch Page, click Here.

(Note: this topic is designed to contain the only link to the launch page. All CIS Launch Page hot spots within this help system should jump to here.)

1.6. Basic Concepts

First, you should understand the Landmark Kilometre Inventory (LKI).

Collisions are located with LKI location codes: an LKI Segment number and a Km offset (sometimes called a KMmark). The LKI works with 2-decimal place (10 metre) accuracy, but collision location kms have only 1 decimal place. Hence CIS works with just one decimal place (100 metre accuracy). E.g. if a segment in the LKI has a length of 9.58 km, then in CIS that segment has length 9.6 km.

To get a report or data from CIS, you must first specify what collisions you are interested in. You do this by defining a *Query*, which is saved in a *Query Profile*. You then run the query, to create a *Collision Subset*. Once you have a Collision Subset, you can produce reports, do analysis, and extract data from that subset. Queries can be used to select collisions from a previously created collision subset, thus creating a subset of a subset.

Query Profiles are automatically saved for the duration of your CIS session, but are saved permanently if you explicitly save them. This means that you can re-run (and optionally modify) the query later, without having to respecify all the query criteria.

Collision Subsets are automatically saved for a month. After a month, a collision subset is automatically deleted, unless you extend its expiry date.

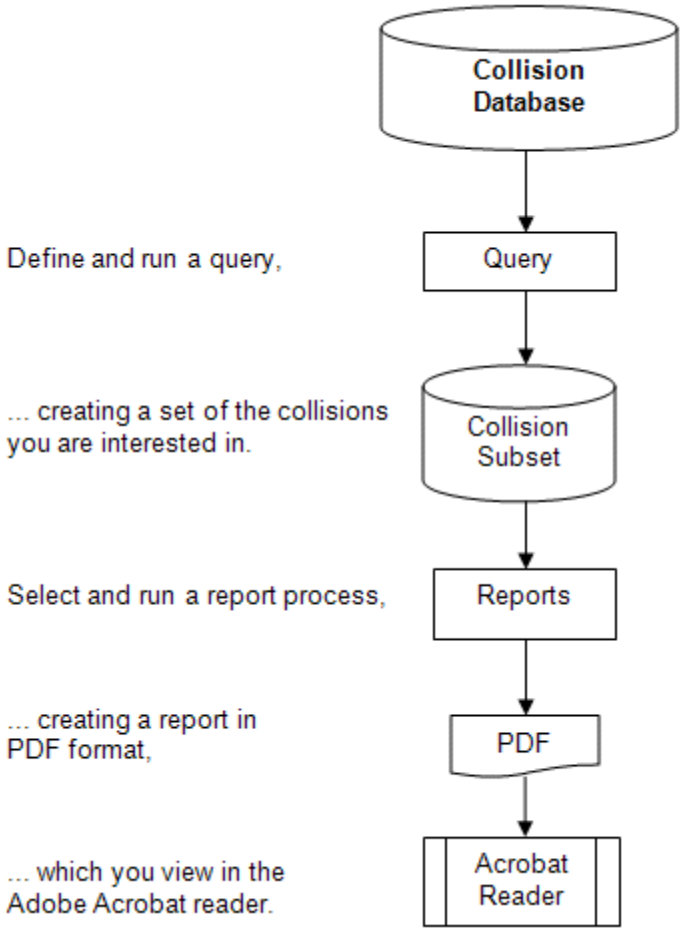
Once you have created one or more collision subsets, you can produce reports by either:

- selecting the subset first, then choosing a report, OR,
- selecting the report (or analysis), then choosing the input collision subset.

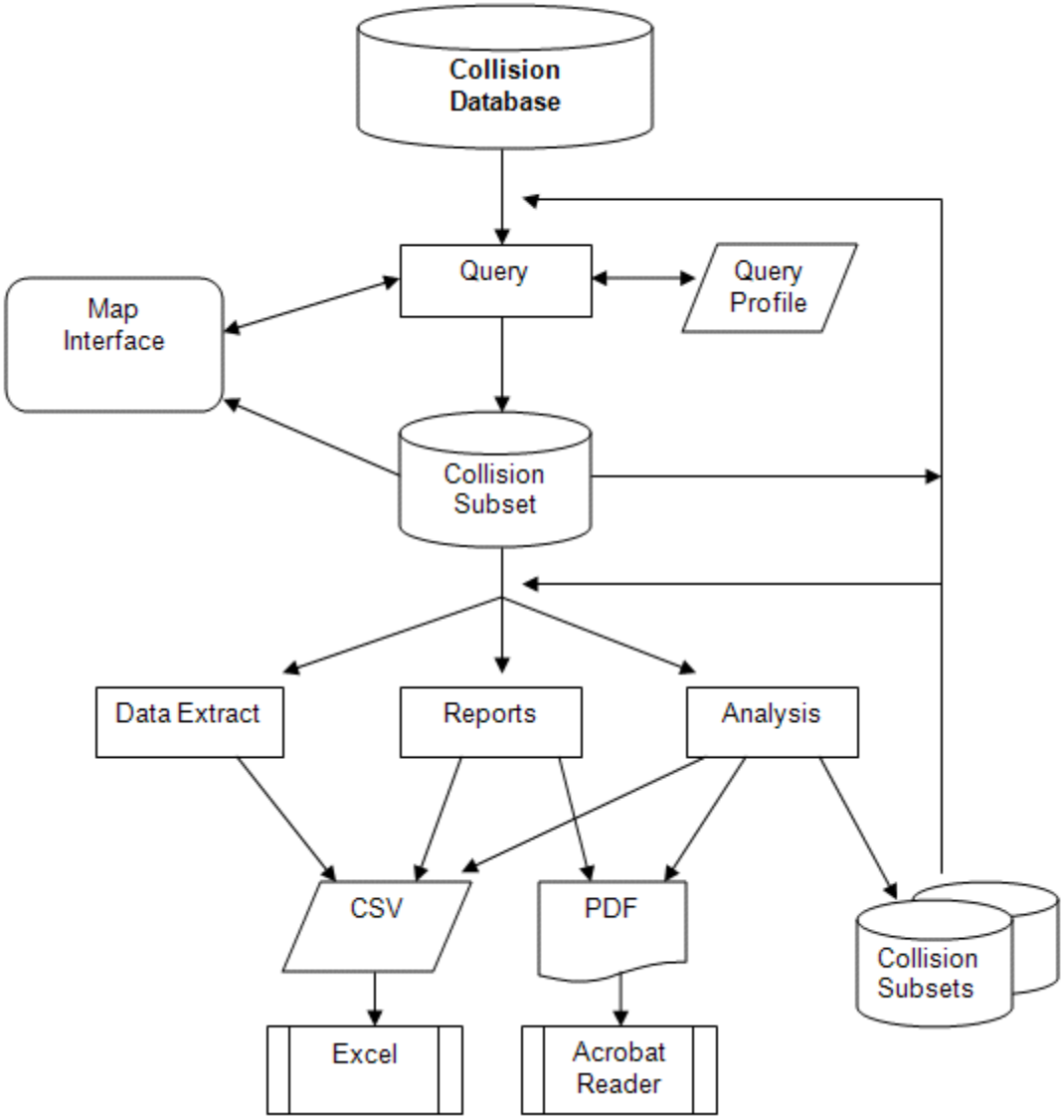
An *Analysis* process (e.g. Collision-Prone Locations) produces reports, but can also produce collision subsets (e.g. collisions AT Collision-Prone Locations) which are subsets of the input subset.

See the flowcharts in the following two topics.

1.7. Simple Flowchart – Creating a Report



1.8. Flowchart: Collision Data and Processes



1.9. Batch Processing

The processing for each user-initiated query, analysis and report is done as a Batch Job.

When a batch job starts, the **Batch Job Progress** screen CIS040 is displayed. You can wait for the job to finish, or you can go on to other work while the job is in progress. If you wait until the job finishes, the Job Details screen CIS060 will be automatically displayed. If you do not wait, you can come back later and check on the job progress on the **Existing Batch Jobs** screen CIS050. Screen CIS050 can be reached by selecting **Manage Batch Jobs** either from the Queries and Subsets menu, or from a link on the CIS home screen.

The job output can be downloaded or viewed by clicking on output icons on both the batch job management and details screens.

Note that a CSV icon *will not open* if Excel is already open in cell edit mode on your PC ! In this case you must get out of cell edit mode in Excel by selecting another cell, then click on the CSV file icon in CIS again.

A user may have only one batch job running at a time. If you have a batch job running, buttons such as **Run Query** and **Create Report** will be inactive (greyed out).

1.10. CIS Documentation

CIS Documentation Version Date: 2022-09-15

The Collision Information System Online documentation can be accessed from the **?** button at the top right of CIS screens. The Help system navigation pane features (Contents, Index & Search), unfortunately, do not work.

The PDF version of the documentation can be opened from the CIS Launch Page.

The version of the documentation accessed from the CIS help buttons is only updated with each complete system release. The version of the documentation accessed from outside the CIS application (from the CIS Launch Page, or as described below) may be more up-to-date.

The documentation is developed using RoboHelp 7 for Word, using MS-Word source documents.

The documentation is produced in 3 different formats. Unfortunately, various Microsoft Windows security restrictions cause problems with the two interactive Help formats, especially with the navigation pane features. Hence the PDF file is the most reliable and transportable way to access the documentation outside of the CIS application.

PDF

- open file:
  "P:\hq\eng\Safety - Highway Engineering\CIS\Documentation\CIShelp.pdf"
- also available from a link on the CIS Launch Page.

Microsoft HTML Help

- copy file:
  "P:\hq\eng\Safety - Highway Engineering\CIS\Documentation\CIShelp.chm"
  to a local drive on your computer.
- open file CIShelp.chm in Windows.
- Note 1: this does NOT WORK if CIShelp.chm is on a network drive.
- Note 2: works on a Local drive EXCEPT for the navigation pane SEARCH feature.

WebHelp

This is the format embedded in the CIS application.

You can create a local independent copy of the help system as follows. Using Internet Explorer it is fully functional, but does NOT work with Chrome, Firefox or Opera!

- copy folder:
  " P:\hq\eng\Safety - Highway Engineering\CIS\Documentation\RoboHelpProject\!SSL!\WebHelp"
  to a local drive.

- rename the local folder from "WebHelp" to "my_CIS_Help"
- in Internet Explorer, enter URL:
  file://localhost/C:/yourpath/my_CIS_Help/CISHelp.htm
- if prompted to allow blocked content, do NOT allow it. (Allowing blocked content blanks out the Navigation Pane!)

The RoboHelp project and source files are located on the MoT LAN at

P:\hq\eng\Safety - Highway Engineering\CIS\Documentation\RoboHelpProject

(where drive P is mapped to the MoTI public drive.)

Other CIS-related documentation may be found under folder:

P:\hq\eng\Safety - Highway Engineering\CIS\Documentation

Any suggestions, corrections etc. for the documentation should be addressed to the CIS Administrator, as posted on the CIS Launch Page.

1.11. Troubleshooting and Support

For problems with IDIR userids and passwords, phone the Workplace Technology Services help desk at 250-387-7000

For questions about how to accomplish a task in CIS, the first stop is the CIS Online documentation.

For CIS system problems, first check for relevant system notices and “Known Bugs” on the CIS Launch Page.

For all unresolved problems and questions, contact the CIS Administrator, as posted on the CIS Launch Page.

2. CIS User Interface

2.1. Screen CIS000 - Welcome

Description:

This welcome screen is the user's entry point to the Collision Information System. It contains links for accessing all the system functions. Many of the links are also available in the menu bar. For system administrators, additional administrative functions are visible.

In the Welcome box, there is a link back to the CIS Launch Page on the MoT web site. Go to the Launch Page for system notices, and for links to related systems.

Quick Introduction to CIS:

To obtain collision information from CIS, first define a query. The query may be saved. A saved query is called a Query Profile. Run the query. The result of a query is a Collision Subset. A Collision Subset is the set of all collisions which meet the criteria specified in the query. Collision Subsets are always saved. From the Collision Subset you can extract collision data, produce reports, or run analysis processes. Data and reports are downloaded directly to your workstation through your web browser.

An understanding of the Landmark Kilometre Inventory is recommended for CIS users.

Controls:

Subsets

Manage Available Subsets:	Go to "Available Subsets" screen CIS080, which displays a list of all your Collision Subsets, and other users' public Collision subsets.

Queries

New Query Profile:	Go to "Query Profile" screen CIS100, to define a new query.
Manage Query Profiles:	Go to "Available Query Profiles" screen CIS090, which displays all your *explicitly saved* Query Profiles.

Reports

LKI Report:	This is a link to the most recently generated complete Landmark Kilometre Inventory report. It lists all landmarks on all segments in the province. The report must already have been generated by the CIS administrator. If the report has not been generated, the message "**The LKI report has not been generated"** will be displayed. (Note that more selective lists of highways, segments and landmarks can be viewed using the […] buttons in From-To list portion of the Geographic Query / Segment Selection screen CIS110.)
Collision Details Report:	Go to "Collision Details Report" screen CIS610
Collision Summary Report:	Go to "Summary Report" screen CIS650
Histogram Report:	Go to "Histogram Report" screen CIS630
Collision Data Extract:	Go to "Collision Data Extract" screen CIS350

Volume Data Extract:	Go to “Volume Data Extract” screen CIS800, for extracting traffic volume data for specified segments.

Analysis

Collision-Prone Locations:	Go to Collision-Prone Locations screen CIS400
Collision-Prone Sections:	Go to Collision-Prone Sections screen CIS500
Specified Section Analysis:	Go to Specified Section Analysis screen CIS670
Collision Rate Table:	Go to Collision Rate Table screen CIS700
Collision Type Ratios:	Go to Collision Type Ratios screen CIS750

Recently Used Subsets

This box shows your most-recently used collision subsets. The subset names are links which will take you to screen CIS300, where you can work with the subset. The **Show More** link takes you to the "Available Subsets" screen CIS080, which displays a list of all your Collision Subsets, and other users’ public Collision subsets.

User Session Query Profiles

This box shows the query profiles you have created in the current session. The query names are links which will take you to screen CIS100, where you can work with the query. This list in this box includes “Saved Query Profiles”, and “Session Query Profiles”. (These two query types are defined in the screen CIS100 documentation.) This box is the only place where “Session Query Profiles” are listed.

Recently Saved Query Profiles

This box shows your recently (explicitly) saved query profiles. The query names are links which will take you to screen CIS100, where you can work with the query. The **Show More** link takes you to the "Available Query Profiles" screen CIS090, which displays all your *explicitly saved* Query Profiles.

2.2. Screen CIS040 - Batch Job Progress

Description:

This screen is shown whenever a user initiates a batch process. Collision Queries, Report Generation and Subset Analysis are examples of processes which are performed as batch jobs.

The screen will be automatically refreshed every 10 seconds until the batch job is complete, at which time screen CIS060 - Batch Job Details will be displayed.

Notes:

The Batch Process cannot be cancelled. It will continue even if the browser window is closed.

If you choose not to wait for the Batch Process to complete, you can close the browser window, and come back later to retrieve the results.

You can go to other CIS screens while a batch process is running, but you can not start another batch process. I.e. you can not have more than one batch process running at the same time.

To check on a batch process after leaving screen CIS140, select **Manage/Select Batch Jobs** from the **Queries & Subsets** menu. This will take you to screen CIS050.

2.3. Screen CIS050 - Existing Batch Jobs

Description:

To reach this screen, select **Manage/Select Batch Jobs** from the **Queries & Subsets** menu.

This screen displays a list of all existing Batch Jobs - those which have completed, and an "In Progress" job if there is one.

Actions:

Delete:

Click  at the left to delete a batch job including all its output.

A job cannot be deleted if it is in progress.

View Job Details:

Click on a Job ID to view job details (on screen CIS060)

View Job Output:

Click on an icon at the right (under the **Output** heading) to download and view a report, or to go to a CIS screen to view results.

See the description of the Batch Job Details screen CIS060 for a key to the output icons. (Output can also be retrieved from that screen.)

Notes:

A Batch Job is deleted automatically after one month, unless the expiry date is extended on the Batch Job Details screen.

If you are waiting for a job to complete, click the browser **Refresh** button periodically. (The job status on this screen is not updated automatically when the job completes.)

2.4. Screen CIS060 - Batch Job Details

Description:

This screen displays the details of a single Batch Job, and allows the job output to be retrieved or viewed.

The Expiry date indicates when the job will automatically be deleted. Click the EXTEND link to extend the expiry date by one month.

Output:

One or more of the following icons may be displayed to allow retrieval or viewing of the job results.

	Adobe PDF Format	Report viewable in Acrobat reader.
	RTF Format	Report in Rich Text Format file viewable in MS-Word.
	CSV Format	Data viewable in Excel and other applications.
	KML	Data viewable in Google Earth
	Collision Subset	Hyperlink to CIS300 – Subset Overview
	ETL Import	Hyperlink to appropriate ETL Management Screen (CIS850, CIS870, CIS880, CIS890) (For the CIS Administrator only.)
	XML	Data in XML format.

2.5. Screen CIS070 - Code Table Management

Description:

This screen displays a list of all the editable code tables contained within the CIS application. Code values in the within the selected code table are presented as editable fields on the screen.

Business Rules:

Not all code tables are considered editable. Codes used in logic processing within the code should not be changed as this will likely result in the need for a source code change in the application. The "editable" list should be configurable.

Field Descriptions:

Choose Code Table to Manage:	Select the code table to display
Code:	Code used on the MV6020 accident form.
Description:	Description of the code.
Effective Date:	Date this code came into use
Expiry Date:	Date this code was retired from use
Active Flag:	???

Controls:

Apply Changes:	Saves changes to the database.

2.6. Screen CIS080 - Available Subsets

Description:

This screen displays a list of all the available collision subsets: those created by the current user, plus those created by other users and marked as public. The user can delete a subset, or select it for viewing and analysis.

List Controls:

Display Public Subsets ON / OFF	Controls whether other users' public subsets are displayed. The black, non-underlined word (OFF in the example at left) indicates the current state. Click the blue underlined word (ON in the example) to flip the switch.
	The display order can be set using these buttons in the heading line. Click the "down" arrow-head to sort in ascending order, and the "up" arrow-head to sort in descending order. (Think of it as sorting in ascending order in the direction of the arrow-head.)

Field Descriptions:

	Delete the associated subset. (A user may not delete any other user's subsets.)
Subset Name:	Click on a name to go to the Subset Overview screen for working with the subset.
Description:	The user-supplied description. It can be modified on the Subset Overview screen.

Create Date:	Date the subset was created.
Created By:	User ID of the user that created the subset.
Valid?:	This will be set to No if an LKI update renders one or more collision locations invalid in this subset.
Public?	Indicates whether the subset is publicly available, i.e. accessible by other users.

2.7. Screen CIS090 - Available Query Profiles

Description:

This screen displays a list of all the user's saved query profiles. The user can delete a profile, copy a profile, or select it for viewing, changing and running.

Note that this screen does NOT include query profiles which were created in the current session but not explicitly saved. These query profiles are only available on the CIS Welcome screen. (Click the CIS link in the crumb-trail just below the menu bar on any CIS screen to get back to the Welcome screen.)

The query profiles are listed in reverse order of expiry date. Thus the most recently used profiles will be at the top of the list.

Field Descriptions:

	Delete the associated query.
	This will create a copy of the query profile, named "Copy of <old name>", then take you to the Query Profile screen, where you can make modifications as required.
Query Name:	Click on the query name to go to the Query Profile screen, where you can make modifications and/or run the query as required. Note that if you have made modifications to this query in the current session (without explicitly saving those changes), this link will take you to the updated version, *even if the name has changed.*
Description:	To change this description, click on the Query Name.
Create Date:	Date this query profile was saved.
Valid:	This will be set to **No** if an LKI update renders one or more locations or sections specfied in this query invalid.

2.8. Screen CIS100 - Query Profile

Description:

The Query Profile screen is the starting point for defining a new query, or viewing or modifying an existing query.

The criteria constituting a query are stored in a Q**uery Profile.** ("Query" and "Query Profile" are often used interchangeably.)

The three tabs on the query screens are: **Query Profile | Geographic Query | Collision Query**. Although "Query Profile" is the name on the first tab, the Query Profile in fact includes all the criteria specified on all three tabs.

How Queries are Saved:

There are two retention levels for query profiles:

Saved Query Profiles

- created by clicking on the **Save Query Profile** button.
- saved between sessions
- listed on the Available Query Profiles screen CIS090.

User Session Query Profiles

- automatically created or updated when moving between query profile screens.
- automatically deleted when a user session ends (beware: this includes session time-outs)
- these are NOT listed on the Available Query Profiles screen – the only place they are listed is in the **User Session Query Profiles** box on the CIS Welcome screen CIS000.

After changing a saved query profile, there will be both a Saved and a User Session copy of the query. The changes will only exist in the **User Session** copy. Click the **Save Query Profile** button to copy those changes into the **Saved** version. Whenever the query is selected from either a Saved Query Profile list or a User Session Query Profile list, it is the User Session version which will be displayed.

Query Profiles vs. Subsets:

A **query profile** is a stored *question*. A **collision subset** is the *answer*. You can name and save both. A collision subset may or may not have the same name as the query which produced it.

Field Descriptions:

Query Name:	Required. Enter a query name. Query names may contain spaces. Changing the query name field changes the name of the query; it does NOT create a new query.
Description:	Optional description.
Collision Period From / To:	Earliest and latest dates of collisions to select. Display format is yyyy-mm-dd. Note the following date entry conveniences: • if just the year (yyyy) is entered, "-01-01" is assumed for the **From** date, and "-12-31" is assumed for the **To** date. • if the year and month are entered (yyyy-mm), "-01" is assumed for the **From** date, and the last day of that month is assumed for the **To** date. • a complete date may be entered without dashes, i.e. in yyyymmdd format.
Query Datasource:	◉ **Entire CIS Database** – the default – the query is applied to the entire collision database. This is called a Primary query. ◉ **Existing Subset** – the query is applied to the specified (previously created) collision subset. This is called a Secondary query. In this case, the geographic query screens are disabled – the geographic query is fixed in the primary query.
Output Subset Name:	◉ **Use Query Name** – the output subset is given the query name. ◉ **Use Name:** - the specified name will be used.

Buttons:

Save Query Profile	Saves the query profile so that it will be available after the end of the current user session. See How Queries are Saved at near the top of this document.
	Creates a copy of the query profile, named "Copy of <old name>", and displays the copy.
	Opens a calendar pop-up to allow you to select a date.

Tabs:

Geographic Query	Go to "Geographic Query" screen CIS110. (Disabled if selecting from an existing collision subset.)

	For primary queries, you must go to this tab, even if to explicitly specifiy that you want to select from the whole highway network.
Collision Query	Go to "Collision Query" screen CIS200 You only need to go to this tab if you want to specify a restriction based upon non-geographic collision data, e.g. vehicle type.

2.9. Screen CIS110 - Geographic Query/Segment Selection

Description:

This screen consists of the Geographic Query main tab heading area, and the **Segment Selection** sub-tab. The screen allows you to select portions of the highway network by specifying highways or groups of highways, segment numbers and/or start and end points within segments. If the From-To List option is selected, the portions of the highway network to be queried can be specified on Query View of the Map Interface.

Field Descriptions:

See the documentation of the query control box, which at the top right of all the Collision Query and Geographic Query screens.

Include Devolved LKI Segments	*(Note: the devolved status of segments has not been recorded, so this feature is not yet functional.)* The LKI includes some segments which have been devolved – i.e. are no longer Provincial jurisdiction roads. These segments may stay in the LKI for five years or more after being devolved, to allow their collision history to remain accessible. If this checkbox is checked these segments will be included in the geographic query, otherwise they will not.
Include Nodes – ◉ **Once Only**	• If the geographic query results in intersecting highways, the collisions at Nodes (where LKI segments join) will be selected only the first time each Node is encountered in the search path. • This option is suitable if accurate total record counts are needed in any subsequent reports or analysis. • Note that the exclusion of 2nd and subsequent occurrence of a node will NOT result in a discontinuity in the search path at that point.
Include Nodes – ◉ **Multiple**	• If the geographic query results in intersecting highways, the collisions at Nodes (where LKI segments join) will be selected once for each highway. • This is suitable for Collision-Prone Location or Section analysis, so that the collisions a Node will be considered in the analysis of both highways. • WARNING: total accident counts for the subset produced will include Intersection Node accidents twice. (Conceivably more than twice, if several highways meet at a particular Node.)

◉ **None**	Select this option if you are using one or more of the other methods (tabs) to specify the geographic query, and you do not wish to limit by specified highways, groups of highways, or segments. If this option is selected, one or more of the other Geographic Query tabs must be used to specify the geographic part of the query.
◉ **Entire Highway Network**	Select this option if you want to select collisions from the entire province. (If you use any of the other Geographic Query query methods as well, it is more efficient to use the **None** option on this screen.)
◉ **Highway Groups**	Select this option if you want to limit the geographic query to one or more of the three groups: - All Numbered Highways (numbers and no letters) - All Lettered Highways (numbers and letters e.g. 1A) - All un-numbered Highway Segments An “un-numbered Highway Segment” is an LKI segment which is not on a numbered highway. These segments are given an internal highway number in the range 900 –

	999.
From-To List	Select this option if: • you want to use the Map Interface to select portions of the highway network, OR • you want to explicitily specify individual highways or segments, ranges of highways or segments, or sections using start and end locations. The fields of the From-To list are described under **From-To Specifications** below.

Buttons:

	Move this row UP in the From-To list.
	Move this row DOWN in the From-To list.
	Delete this row in the From-To list. (Following rows will move up.)
	Displays a selection list of Highways, Segments or LKI Landmarks. A Segment must be coded before the Km selection button is used. See help on screens CIS111,2,3 for details.
	Zoom to Map
	This is a disabled Zoom to Map icon. Click the Sync To Map button to enable it (assuming there is anything on the From-To row).
Clear List	Clear all the fields on all From-To list rows.
Add Rows	Adds 10 more blank entry lines to the From-To list.
Sync To Map	This will refresh the screen, ensuring that the map is up-to-date.

From-To Specifications:

Detailed or general extractions from the network may be specified. Selections specified in terms of entire highways may be made using the HIGHWAY fields, individual segments may be specified using the SEGMENT fields, and portions of segments may be specified using the KMMARK fields.

Each FROM-TO specification allows the definition of a start and an end point in the ordered list of all the highway segments in the province. (See Segment Search Sequence for details.)

The assumptions made when fields are left blank are defined below.

General Rules:

- if the Segment is entered, the Highway need not be entered, since the highway is implied by the Segment.
- if both the Segment and Highway are entered, the segment's Primary Highway must in fact be in the specified highway.
- if more than one FROM-TO specification is entered, they must not overlap.
- if more than one FROM-TO specification is entered they do not need to be in any particular order. The collisions in the generated subset will be in the order of the from-to specification.
- blank FROM-TO specifications may occur before non-blank ones.

FROM Rules:

- if the KMMARK is omitted, the beginning of the Highway or Segment specified is assumed.
- if the KMMARK field is entered, the Segment field must also be entered.
- if the Segment is entered but the KMMARK is omitted, the a FROM KMMARK of 0 is assumed. This will cause the inclusion of the segment's Begin Node
- to exclude the Begin Node of a segment, code 0.1 as the FROM KMMARK.
- entering the Highway and leaving the Segment and KMMARK blank is equivalent to entering the Highway and the first Segment of the highway.

TO Rules:

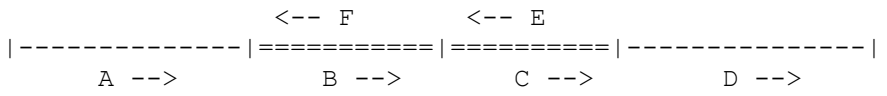
- the TO highway, segment and/or location must occur *after* the FROM location in the search sequence.
- if the TO specification is left blank, the end point is assumed to be the end of whatever is specified in the FROM specification, e.g. the end of the Highway (if only the FROM Highway is entered), or the end of the Segment (if the FROM Segment is entered).
- if the TO KMMARK is omitted, or coded in the range 999.0 to 999.9, the TO KMMARK is assumed to be the Segment length. This will cause the inclusion of the End Node of the segment .
- to exclude the End Node of a segment, code Segment Length minus 0.1 as the TO KMMARK.

Include Opposing

The INCLUDE OPPOSING checkbox allows single-direction segments opposite any of the segments specified in the From-To fields to be automatically included for collision selection.

Divided or 4-lane highways are likely to have a separate segment defined for each side of the highway, measured in the direction of travel. Within a highway, segments are ordered in the same order that you would drive them if you drove along the highway in the primary direction of measurement. Any opposite-direction segments occur after that, in the order you would encounter them if you drove back down the highway.

Consider the following highway X:



Segments A and D are 2-direction segments.

The others are 1-direction segments.

F and B are "Opposing Segments", as are C and E.

The six segments A to F would be ordered as: A B C D E F.

If you asked for the whole highway, you would get data from those segments, in that order.

You could specify the entire highway X in one of the following three ways:

- From Highway = X
- From Segment = A, To Segment = F
- From Segment = A, To Segment = D, INCLUDE OPPOSING.

Now suppose you wanted just segments A, B and F. Without the 'Include Opposing" feature, you would have to code two From-To specifications: 1: Segment A to Segment B, and 2: Segment F. Using the "Include Opposing" field you can do it on one line, as follows:

- From Segment = A, To Segment = B, INCLUDE OPPOSING

Kms may also be used with this feature. A km of 0.0 is translated to the length of the opposing segment. A km >= the primary segment length is translated to km 0.0 of the opposing segment. A mid-segment km is translated by subtracting it from the primary segment length. This means that if the opposing segment is a different length than the primary segment, the point on the opposing segment may not be exactly opposite the point on the primary segment.

If you wanted Segment A, and just up to Km 9 on Segment B, and from that point back to the beginning of Segment F, you would code:

- From Segment = A, To Segment = B, to KMmark = 9.0, INCLUDE OPPOSING

The starting point on Segment F would be calculated as the length of Segment B minus 9.

If you wanted the data of segments B and F, you could code either one, as the From Segment, and check INCLUDE OPPOSING. In the output collision subset produced, the data of the explicitly specified segment will come first, followed by data of the opposing segment.

Checking INCLUDE OPPOSING in any of the following situations is illegal:

- if Highway number(s) and no segments are coded - because specifying a highway number already includes segments in both directions on that highway.
- if a segment range is specified which already includes one or more opposing segments, e.g. if you coded From Segment = A, To Segment = E, INCLUDE OPPOSING.

FROM-TO Examples

	FROM			TO		
	HIGHWAY	SEGMENT	KMMARK	HIGHWAY	SEGMENT	KMMARK
1.	...	0920	5.0	...	0920	10.0
2.	1	0925	....	...	0950	....
3.	...	0925	....	...	0950	....
4.	3	....	....	6	....	....
5.	97A	....	....	...	....	....
6.	3	....	....	...	....	....
7.	3	....	....	...	....	....
8.	3	....	....	3	....	....
9.	1	....	....	2	....	....
10.	1	....	....	2	....	....
11.	97	1110	....	97	....	....
12.	97	1110	....	97	1125	....
13.	97	....	....	97A	1122	....
14.	97	....	....	...	....	....

Explanations:

1. - kilometre 5.0 through to kilometre 10.0 (inclusive) on segment 0920.
2. - all of segments 0925, 0935 and 0950. (These are 3 physically consecutive segments of Highway 1.)
3. - same as 2., except that it will not be verified that segment 0925 is in highway 1.
4. - all segments in highways 3, 4, 5 and 6.
5. - all segments in highway 97A
6. - all segments in highway 3, 3A, 3B, ...
7. - all segments in highway 3.
8. - same as example 7.
9. - all segments in highways 1, 1A, 1B,..., 2, 2A, 2B,...
10. -all segments in highways 1 and 2.
11. - segments in highway 97 starting at segment 1110
12. - segments 1110 up to 1125 in highway 97.
13. - all of highway 97 plus segment 1122 in 97A. (1122 is the first segment in 97A.)
14. - all segments of highway 97

2.10. Screen CIS111-2-3 - Highway-Segment-Km Selection

Screens CIS111, CIS112, CIS113 pop up when any of the  buttons are clicked in the From-To List section of screen CIS110.

On any of these screens, clicking the **Extract** button (at lower right) will produce a PDF report of the displayed list. So, for example, if you wanted a printable list of all the LKI segments in highway 1, go to the Geogrphic Query / Segment Selection screen, select From-To List, enter a 1 in the first Highway field, then click the button to the right of the first segment field. When the segment list displays, scroll to the bottom and click on the **Extract** button.

CIS111 - Highway Selection

A list of all highways is shown. Click on a highway number or name to have that highway number inserted in the adjacent Highway field in the From-To List.

CIS112 - Segment Selection

A list of LKI segments is shown, in Search Sequence order. Click on a segment number or description to have that segment number inserted in the adjacent Segment field in the From-To List.

If the preceding highway field in the From-To List on screen CIS110 is blank, all segments in the province are listed. If a highway is coded in the preceding highway field, only the segments of that highway are shown.

CIS113 - KmMark Selection

A Segment must be coded before a Km selection can be made. A list of all the LKI Landmarks in the segment is displayed. Click on a landmark's Km or Description to have that Km inserted into the adjacent Km field in the From-To List.

Note that you are not limited to coding Kms *at Landmarks* in the From-To List. Once you have selected a landmark, you may wish to adjust the selected Km. E.g. if you select an intersection for a From Km field, you may want to decrease the Km by 0.1 km to make sure you get all the collisions at or near the intersection.

2.11. Screen CIS130 - Geographic Query/Section Def. File

Description:

This screen consists of the Geographic Query main tab heading area, and the **Section Def. File** sub-tab.

This screen allows the user to specify the name of a Section Definitions File, which is a CSV file located on the user's Windows file system.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Field Descriptions:

Section Definition Filename	Enter a fully-specified windows file name. (Or use the Browse button to select a file.)
Sections May Overlap	Check this box to indicate whether any of the sections in the section definition file overlap. This affects how the section definitions are validated. To change this setting after a file has been uploaded, you must delete the uploaded copy of the file, then click the check-box, then re-upload the file.

Buttons:

Browse…	Opens a Windows file-find dialog to allow you to select a file.
Upload Now	Uploads and validates the SDF file.
Delete	This button appears instead of the Browse and Upload buttons if an SDF file is already loaded. To load a different SDF file instead, first use the Delete button to remove the currently loaded file. This will clear the file name, and restore the Browse and Upload buttons. (The Delete button does NOT delete the file from your Windows workstation.)

2.12. Screen CIS140 - Geographic Query/Admin Areas

Description:

This screen consists of the Geographic Query main tab heading area, and the **Admin Areas** sub-tab.

This screen allows you to select road sections by MoT Region, District and/or Contract Management Area.

See Query Control box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Field Descriptions:

Region Check Boxes	Click a Region checkbox to select or unselect an entire region.

District Check Boxes	Click a District checkbox to select or unselect an entire district.
Contract Area Check Boxes	Click an Area checkbox to select or unselect an individual contract management area.

2.13. Screen CIS150 - Geographic Query/Landmark Types

Description:

This screen consists of the Geographic Query main tab heading area, and the **Landmark Types** sub-tab.

This screen allows the user to restrict road sections searched to individual locations which are at LKI Landmarks of specified types.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Field Descriptions:

A Check Box for each LKI Landmark Type.	Check the boxes of the desired landmark types. Only collisions at these landmark types (as defined in the LKI) will be selected.

2.14. Screen CIS160 - Geographic Query/Highway Class

Description:

This screen consists of the Geographic Query main tab heading area, and the **Highway Class** sub-tab.

This screen allows the user to select road sections by Highway Classification.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Field Descriptions:

For each of the Highway Classification Categories, there is a check-box for each characteristic within that category.

Select the highway classifications from which you want collisions selected. Categories with no selections are ignored. I.e. checking none of the characteristics for a category is equivalent to checking all of them. For example if none of the characteristics under **Urban/Rural** are checked, there will be no Urban/Rural-based exclusions.

AND logic is used between categories. OR logic is used between characteristics within each category. For example, if you wanted all Expressways and Freeways which are Mountainous or Rolling, you would check those four boxes. this would exclude Arterial sections, and exclude Level sections

The **Select All** and **Clear All** buttons are simply a shortcut for checking or unchecking all the boxes in one category.

Query Algorithm Notes:

CIS uses the Highway Classification data of the LKI SegClass table, where each classification record has a date range. The Geographic part of the collision query includes only the highway sections which meet the specified classification criteria for more than half of the time period of the query date range.

So if a section of highway was Divided for the last 2 years of a 5 year collision query, that section would NOT be included, and so NO collisions AT ALL on that section would be selected. (Thus if you were hoping to get collisions in just the years when the section WAS divided, you will be disappointed!)

If a highway section was Divided for the last 3 years of a 5 year collision query, the section will be included, and you will get collisions on that section from the entire 5 years.

This behaviour is because at this stage you are defining the Geographic part of the query - the Search Path of start and end points of sections from which to select collisions. Individual collision dates are not considered at this stage.

(A possible enhancement to CIS would be to add a Highway Classification filter based upon the date of each collision.)

Note that you can get the Highway Classification by collision date for each collision in a collision subset, using the Collision Data Extract. You could then do your Highway Classification filter in Excel.

2.15. Screen CIS200 - Collision Query/Collision Info

Description:

This screen consists of the **Collision Query** main tab heading area, and the **Collision Info** sub-tab.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Field Descriptions

Collision Severity	Check one or more of the Fatal, Injury, and Property Damage Only boxes. E.g. to get only Fatal collisions, check Fatal and uncheck the other two. Injury collisions are non-fatal collisions which involved injuries.
Collisions at Obsolete Locations	An Obsolete Location is a location on a section of road which has been modified to such an extent that it should not be considered as "the same road", even though the LKI segment still exists. For example, after a curve has been straightened, locations on the curved piece of road which is no longer in use, are OBSOLETE. (Obsolete sections are identified in the LKI transformation table when an LKI is updated.)

2.16. Screen CIS210 - Collision Query/Dates

Description:

This screen consists of the **Collision Query** main tab heading area, and the **Dates** sub-tab. It is used to specify month, day-of-week and hour ranges to select collisions from within the outer time period specified on the Query Profile screen.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Field Descriptions:

Collision Month From, To	Collision selection will be limited to the specified month range. E.g. select July to August to get just summer collisions, or December to February to get winter collisions.
Collision Day (of Week) From, To	Collision selection will be limited to the specified day-of-week range. E.g. specify Saturday to Sunday to get weekend collisions only.
Collision Time From, To	Collision selection will be limited to the specified time range. Enter times in 24 hour format, e.g. From 16:30 To 17:45 for an afternoon rush. Midnight is 00:00. Times may span midnight, e.g. From 22:00 To 02:00 to get the two hours before and after midnight

If left blank, **From** fields default to the first, and **To** fields default to the last month/day/minute in the year/month/day.

All criteria specified in these fields are subject to the Collision Period limits.

2.17. Screen CIS220 - Collision Query/Data Fields

Description:

This screen consists of the **Collision Query** main tab heading area, and the **Data Fields** sub-tab. It is used to specify collision selection critera based upon the values in fields corresponding to MV6020 form fields.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

Usage:

- in the left pane, find the description of the data field you want to filter by.
- click on the field description.

- a selection pop-up window will be displayed, allowing you to either select code values, enter string values, or a numerical range.
- when you close the selection window, your selection criteria will be displayed in the right pane.
- click on a data field name in the right pane to change the selections for that field.

Vehicles

- each Vehicle-related field is listed just once (i.e. not separately for each vehicle)
- the Vehicle data selection pop-up window has options for specifying which vehicles, or combination of vehicles, the data value check is to be applied to.

Victims

- each Victim-related field is listed just once.
- the Victim data selection pop-up window has options for specifying which victims, or combination of victims, the data value check is to be applied to

Field Groups

- OR logic is always used between fields *within* a group.
- The logic used *between* field groups can be selected: AND or OR.
- By default, each field for which you define a filter is put into group A.
- Select field group letters to group fields as required.

Example 1: To select all collisions on steep curves::

1. Select **AND** for **Logic Between Field Groups** (this is the default)
2. Select **Road Curve,** then check the desired curve types.
3. Select **Road Gradient,** then check **Steep Grade.**
4. Set Field Groups as required to put the two data fields in different field groups (e.g. A and B)

Example 2: To select all collisions involving trucks on icy roads:

1. Select AND for **Logic Between Field Groups.**
2. Select **Road Surface Condition,** and select **Ice**.
3. Select **Vehicle – Type**.
4. Select the (default) option: “ANY of the Vehicles in the collision”.
5. Select the desired truck types in the **Data Values Available** pane. Use Ctrl-Click and Shift-Click to select multiple items in the list, in the standard Windows manner.
6. Click the [>] button to move the selections into the **Data Values Chosen** pane.
7. When happy with the **Data Values Chosen** list, click the Submit Selections Button
8. Change the Field Group letters as required to make Road Surface Condition group A, and Vehicle Type group B

Buttons:

	This button removes the data field and its selection criteria from the right pane.

2.18. Screen CIS230 - CM Collision Type

Description:

This screen is for specifying Counter-Measure Collision Types for collision selection.

See Query Control Box for the documentation of the query control box, (at top right) which is common to all the Collision Query and Geographic Query screens.

For a description of how the Counter-Measure collision types are defined, see Counter Measure Method

Field Descriptions:

1 Checkbox for each CM Collision Type.	Select the desired counter-measure collision types.

2.19. Screen CIS250 - Checkbox Code Chooser

Description:

This screen pops up as a separate window when a data field name is selected on the Collision Query / Data Fields screen. It is used for data fields which have a short (e.g. <= 20) list of defined codes. Each code and description is displayed as a checkbox.

The name of the selected field is displayed in the screen tab.

For Vehicle and Victim fields, options are displayed for specifying which vehicles or victims the data value criteria are to be applied to.

Field Descriptions:

Checkbox for each code	Check the box of the wanted code(s).

Buttons:

Submit Selections	Save the selections or values entered, and close the window.
Cancel	Close the window without saving selection changes.

2.20. Screen CIS251 - List Box Chooser

Description:

This screen pops up as a separate window when a data field name is selected on the Collision Query / Data Fields screen. It is used for data fields which have a long (e.g. > 20) list of defined codes. The codes and descriptions are displayed a scrollable list, and the user can move codes back and forth between the available and selected lists.

The name of the selected field is displayed in the screen tab.

For Vehicle and Victim fields, options are displayed for specifying which vehicles or victims the data value criteria are to be applied to.

Field Descriptions:

Data Values Available	• This list should contain the codes and descriptions of all the unchosen values for the data field. • Selected items in the list are displayed highlighted. • Clicking on a list item should select it, and unselect any other selected items. • Ctrl-Clicking on a list item should select it, leaving any other selections selected. • Shift-Clicking on a list item should select that item and select all the unselected items in between if that item and any previously selected items.
Data Values Chosen	• This list should contain the codes and descriptions of all the chosen values for the data field. • Item selection works the same as in the **Available** list. • Clicking on a list item should select it, and unselect any other selected items. • Ctrl-Clicking on a list item should select it, leaving any other selections selected. • Shift-Clicking on a list item should select that item and select all the unselected items in between that item and any previously selected items.

Buttons:

	Move selected code(s) from the Available to the Chosen list box.
	Move selected code(s) from the Chosen to the Available list box.
Submit Selections	Save the selections or values entered and close the window
Cancel	Close the window, without saving. .

2.21. Screen CIS252 - Discrete Values Chooser

Description:

This screen pops up as a separate window when a data field name is selected on the Collision Query / Data Fields screen. It is used for specifying text for selecting against text data fields.

Typically this is used for selecting one or a few collisions by Case number or police file number.

The name of the selected field is displayed in the screen tab.

Field Descriptions:

Multiple, unlabelled text boxes	Enter the strings (e.g. Case numbers) to be selected, one per text box. String comparisons are NOT case-dependent

Buttons:

Submit Selections	Save the selections or values entered, and close the window.
Cancel	Close the window without saving selection changes.

2.22. Screen CIS253 - Numeric Range Chooser

Description:

This screen pops up as a separate window when a data field name is selected on the Collision Query / Data Fields screen. This screen is for numeric data fields. It allows a range of integers to be specified.

The name of the selected field is displayed in the screen tab.

For Vehicle and Victim fields, options are displayed for specifying which vehicles or victims the data value criteria are to be applied to.

Field Descriptions:

Two text boxes: From and To	• Integers only, in the range looked up for the data field. • The first field is required. • The second field is optional. Leaving it blank is equivalent to entering the same value as in the first field. • If the second field is non-blank, it must be greater than or equal to the number in the first field.

Buttons

Submit Selections	Save the selections or values entered, and close the window.

Cancel	Close the window without saving selection changes.

2.23. Screen CIS300 - Subset Overview

Description:

At the top of this screen the high level information for a collision subset is displayed The subset name and description can be changed on this screen, the expiry date can be extended, and the subset can be made public or non-public. There is also a link to obtain a Collision Data Extract.

In the lower portion of the screen, the Search Path is displayed, and the Map Interface, which displays the collision locaions on an interactive map.

Field Descriptions:

Subset Name:	To change the subset name, change it in this field, and press Save Changes.
Collision Period:	The date range used for selecting the collisions for the subset.
Is Valid:	This will be set to No if an LKI update renders one or more collision locations invalid in this subset.
Create Date:	The date and time the subset was created.
Expiry Date:	The subset will be automatically deleted on this date. Click the EXTEND link to extend the expiry date.
Total Collisions:	Number of collisions in the subset.
Total Kms:	Length of all highway sections from which the collisions of this subset were selected. This length includes an extra 0.1 km for each separate section. (E.g. if kms 0.0 to 1.0 are selected, the length is 1.1 km.)
Description:	To change the description, change it in this field, then press Save Changes.
Created By:	User ID of the person who created the subset.
Publicly Available	Check this box and press Save Changes to allow other users to use this subset. Make sure the subset name is likely to be unique across all users before you make it public.

Buttons:

Save Changes	Save any changes made to fields on this screen.
	This button, on each search path element, will zoom the map to the search path element.

2.24. Screen CIS310 - Subset Analysis

Description:

This screen contains an annotated list of the reports and analysis processes which can be run on the selected subset. There is a link for each process which will take the user directly to the parameter screen for that process, with the current subset pre-selected.

2.25. Screen CIS330 - Subset History

Description:

This screen displays a detailed history of the subset. It includes the criteria and parameters used for the primary query, and any subsequent queries and processes.

The history includes the Search Path - a list of all the segments (or sub-segments), nodes and discontinuities traversed when searching for collisions in the primary query.

Note that the history is a chronological log of events, so the most up-to-date information is at the end of the history. For example, if the subset name or description was changed (on the Subset Overview screen), the original name and description remains at the top of the subset history. The change is logged as an event, in the appropriate place in the history. (The current name of the subset is displayed at the end of the crumb trail, above the **Subset History** tab.)

Following is a sample Subset History of a subset:

- created with a primary query, and named “testdays3”,
- reduced to Injury collisions only, and named “testdays3_2”
- renamed to HistoryExample

```
================================================================================
SUBSET NAME: testdays3
SUBSET DATE: 2010-10-28 11:51:23
TOTAL KMS: 13.9
TOTAL COLLISIONS: 92
--------------------------------------------------------------------------------
QUERY PROFILE - GEOGRAPHIC
--------------------------------------------------------------------------------
Query Name: testdays3
Description:
Query Type: PRI (Primary Query)
Collision Period From: 2007-01-01
Collision Period To: 2008-01-31
LKI Update Flag? N
Effective Date: 2010-10-28
Hwy Classification: 2002 - 2002 Classification Scheme (Classification Scheme defined in
2002)
Expiry Date: 2010-11-27

----- Segment Selection -----

Segment Selection Mode: FTL (From-To List)
Numbered? N
Lettered? N
Unnumbered? N
Devolved? N
Query Segment Node Selection: ONE (One Occurances of a Node)

HWY  SEG     KM - HWY  SEG     KM - INCL OPP
     0400       -      0410       - N

----- Section Definition File -----


----- MoT Admin Area -----


----- Landmark Type -----


----- Highway Class -----


--------------------------------------------------------------------------------
QUERY PROFILE - COLLISION
--------------------------------------------------------------------------------

----- Collision Info -----

Fatal? Y
Injured? : Y
Property Damage Only? Y
Query Obsolete Locations: OL (Obsolete Locations)
```

```
----- Dates -----

From Month:
To Month:
From Day:
To Day:
From Time: :
To Time: :

----- Data Fields -----

Logic Between Field Groups: And

----- CM Collision Type -----

--------------------------------------------------------------------------------
SEARCH PATH
--------------------------------------------------------------------------------
SEARCH PATH           START KM    END KM  # CLLSNS
Node 0400 - 0401                                0
Seg 0400                    .1       2.9        21
Node 0400 - 0410                                35
Seg 0410                    .1      10.7        36
Node 0410 - 0420                                 0
----

================================================================================
SUBSET NAME: testdays3_2
SUBSET DATE: 2010-10-29 14:49:48
TOTAL KMS: 13.9
TOTAL COLLISIONS: 38
Query Name: testdays3_2
Description:
Query Type: SEC (Secondary Query)
Collision Period From: 2007-01-01
Collision Period To: 2008-01-31

--------------------------------------------------------------------------------
QUERY PROFILE - COLLISION
--------------------------------------------------------------------------------

----- Collision Info -----

Fatal? N
Injured? : Y
Property Damage Only? N
Query Obsolete Locations: OL (Obsolete Locations)

----- Dates -----

From Month:
To Month:
From Day:
To Day:
From Time: :
To Time: :

----- Data Fields -----

Logic Between Field Groups: And

----- CM Collision Type -----

--------------------------------------------------------------------------------
SEARCH PATH
--------------------------------------------------------------------------------
SEARCH PATH           START KM    END KM  # CLLSNS
Node 0400 - 0401                                0
Seg 0400                    .1       2.9        13
Node 0400 - 0410                                12
```

```
Seg 0410                    .1      10.7        13
Node 0410 - 0420                                 0
----

--------------------------------------------------------------------------------
SUBSET MODIFIED
Updated: 2010-10-29 14:51
--------------------------------------------------------------------------------

SUBSET NAME: HistoryExample
DESCRIPTION: [EMPTY]
PUBLICLY AVAILABLE? N
```

2.26. Screen CIS350 - Collision Data Extract

Description:

This screen is used to extract collision data in CSV format. The user can select and order the data fields to be extracted, and specify whether code expansion is to be done. Data extract definitions (profiles) can be named, stored and recalled.

Field Descriptions:

Collision Extract Profile Name:	To create a new Extract Profile, enter a name into this field, then when the extract is defined, click the Save button.
Existing Profile:	If you want to re-run, (or modify then run) a previously saved Extract Profile, select it from the drop-down list, then press the Load button. (You see only the profiles which *you* have saved.) To delete a Data Extract Profile, select it, then click the Delete button.
Collision Subset:	Select the collision subset you want to extract the data from.
Headings:	Indicate whether you want a heading record in the Data Extract file, and if so, whether the headings are to be short or long (descriptive).
For Code Fields ☑ **Insert Descriptions.**	If this option is selected, code meanings will be looked up and inserted into the output file in addition to the codes.
Fields Available:	These are the fields available for inclusion in the Data Extract. The order of the fields in the list can be controlled with the Alphabetical Order / Natural Order options.
Fields Chosen:	These are the fields selected for inclusion in the Data Extract.

Buttons:

Save	Saves the currently displayed Collision Extract Profile, with the name provided to the left of the Save button.
Load	Loads (and displays) the Collision Extract Profile whose name is currently selected in the drop-down box to the left.
Delete	Deletes the Collision Extract Profile whose name is currently selected in the drop-down box to the left. This does not affect what is currently displayed.
>	Move the fields selected in the Fields Available pane to the Fields Chosen pane.
<	Move the fields selected in the Fields Chosen pane back to the Fields Available pane. (Note: the field is put at the END of the Fields Available list. Changing the sort order will refresh the list.)
Up	Move the selected fields up in the list in the Fields Chosen pane.

Dn	Move the selected fields down in list in the Fields Chosen pane.
Create Collision Extract	This will start the batch job for creating the collision extract.

Usage:

For each field you want in the Data Extract CSV file, click on the field in the **Fields Available** list, then click the [>] button to move it into the **Fields Chosen** list. Use the [<] button to move a field back. Multiple fields can be selected (using Shift-Click or Ctrl-Click in the standard Windows manner) and moved all at once.

Use the **Up** and **Dn** buttons to move selected fields in the **Fields Chosen** list up or down in the list. Data fields will go into the Data Extract file in the order they appear in the **Fields Chosen** list.

When you have finished selecting and ordering fields, name and save the Data Extract Profile (so you can re-use it without having to define it again), then press the **Create Collision Extract** button.

When the batch job is finished, download the CSV data file from the batch job screen.

Note that the subset history is not included in the extract. To capture the subset history, go to the Subset History tab for the subset, select all the text in the history field as in any Windows application, copy it to the Windows clipboard (press Ctrl-C), then insert it into another Windows application as desired.

Latitude and Longitude:

These values are generated by looking up the LKI location in the LKI geometry obtained from CHRIS. So if CHRIS does not contain an LKI segment, no latitude and longitude will be available for collisions on that segment.

2.27. Screen CIS400 - Collision-Prone Locations

Description:

This is the initial screen for specifying parameters and criteria for a Collision-Prone Locations Analysis.

For details on how Collision-Prone Location Analysis is done, see Collision Prone Locations.

Field Descriptions:

Input Collision Subset	Select the collision subset to be analysed.
Report Title	The title entered will appear in the heading in each report page.
Location Radius	A Location is defined by a Segment and KMMARK. The number of collisions attributed to a location includes the collisions back to and including KMMARK - R, and forward to and including KMMARK + R, where R is the specified Location Radius.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next tab by clicking on it, or by using the **Next** button.

2.28. Screen CIS405 - Potential Locations

Description:

On this screen, the user specifies which types of locations are to be considered as potential Collision-Prone Locations. There are two ways of typing a location: by the Landmark Type in the LKI Landmark table, and by the Location Type coded on each collision record. Note that collisions at the same place could be coded with multiple Location Types.

For details on how Collision-Prone Location Analysis is done, see Collision Prone Locations.

Field Descriptions:

At the Following Landmark Types	Select the Landmark Types of locations to be analysed.
At Least One Collision with Any of the Following Location Types	Select Location Types. If any collision at a location has any of the selected location types, the location will be analysed.

Notes:

If Landmark and/or Location types are specified, a location is considered as a potential Collision-Prone Location only if:

- at least one collision is found at the location proper, and the location is at one of the specified Landmark Types (according to the LKI Landmark Table), OR
- at least one collision is found (at the location) which has a Location Type (field 2 on the MV6020) equal to one of the specified Location Types.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.29. Screen CIS410 - Collision-Prone Location Criteria

Description:

On this screen the user specifies the main criteria for a location being "Collision-Prone".

For details on how Collision-Prone Location Analysis is done, see Collision Prone Locations.

Field Descriptions:

Location Attribute	Select an attribute, e.g. *Number of Collisions*
Comparator	Select a comparator, e.g. *Greater Than*
Critical Value	• If you want to specify the critical value explicitly (e.g. a number of collisions), select *Entered Value,* then enter the value in the following field. • If you want to use a calculated value (e.g. a Critical Collision Rate), select *Calculated Value.* The critical value appropriate to the selected Location Attribute will be calculated. • The Calculated Value option is only available for the Collision Rate location attributes.
Logic	If multiple criteria are specified, select AND or OR logic for combining them.

Rules:

- In the three criteria rows, criteria must be specified from top down. I.e. if only one row is used, it should be the top one. If only two rows are used, they should be the top two.
- If the 2nd or 3rd criteria rows are used, the preceding Logic field must be set to AND or OR.

Average Collision Rate File:	Specify the full Windows name of an Average Collision Rate file.
Level of Significance:	Select the level of significance value to be used in the Critical Collision Rate calculation.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.30. Screen CIS420 - CPL CM Collision Types

Description:

This screen is for specifying parameters for the Counter-Measure Method of identifying Collision-Prone Locations.

Field Descriptions:

A Location is Collision-Prone if...	Check this box to activate the parameters specified on this screen.
if the Location meets...	Select the logic for combining this method of identifying Locations with that of the previous tab/screen, i.e. to indicate whether both or one of the methods are sufficient to determine a location as Collision-Prone.
13 collision type checkboxes	Indicate the CM collision types to be tested for over-representation.
Average Collision Type Ratio File	Specify the full Windows file name of the Average Collision Type Ratio File to use. Click the Browse button to find the file in a Windows file-find dialog. If the Collision Type Ratios file you specify contains non-mutually-exclusive reference groups, the ratios of the first group into which each collision location falls will be used for that collision. Note: Average Collision Type Ratio files can be produced using the Collision Type Ratio Report .
Level of Significance:	The Level of Significance adjusts the CHI-squared(a) value. A HIGHER level of significance results in a lower CHI-squared(a), which means a collision-type proportion is more likely to be considered an over-representation, which means you will end up with MORE Collision-Prone locations.
Minimum Number of Collisions (any type):	Before an over-representation calculation is attempted for a collision type, there must be at least this minimum number of collisions of that type.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.31. Screen CIS430 - CPL Output

Description:

On this screen the user specifies what output the Collision-Prone Locations process is to produce, and, with the **Create...** button, starts the Collision-Prone Locations process.

Field Descriptions:

Formatted Report	Select this option to produce a printable report.
Output Format:	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.
Include Input Collision Subset Description	Includes information from the Subset History at the top of the report. Proper interpretation of the report may be impossible without this information.
CSV File	Select this option to produce the results in a CSV file, which can be opened in Excel.
Include Input Collision Subset Description	Includes information from the Subset History at the end of the CSV file. Proper interpretation of the data may be impossible without this information.
KML File	Select this option to produce the results in a KML file, which can be displayed in Google Earth.

Include Input Collision Subset Description	Includes information from the Subset History in the KML file. This can be displayed in Google Earth by selecting Summary Details in the Places pane.
OUTPUT SUBSET ...IN...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are IN collision-prone locations. The GROUP_ID field in the output subset associates each collision with its corresponding Collision-Prone Location (CPL) in the reports. This allows for further statistical analysis by CPL.
OUTPUT SUBSET ...NOT IN...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are NOT IN collision-prone locations. Such a subset can be useful for doing subsequent Collision-Prone Sections analysis without including locations which have already been identified as being collision-prone.

Buttons:

Create Collision-Prone Locations Report	Click this button to start the batch job for doing the Collision-Prone Locations analysis.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.32. Screen CIS500 - Collision-Prone Sections

Description:

This is the initial screen for specifying parameters and criteria for Collision-Prone Sections Analysis.

For details on how Collision-Prone Section Analysis is done, see Collision Prone Sections.

Field Descriptions:

Input Collision Subset	Select the collision subset to be analysed.
Report Title	The title entered will appear in the heading in each report page.
Section Length	Collisions in each highway section of this length are counted to determine if the section is collision-prone.
Report Worst Section	If this option is selected, each extended Collision-Prone Section report line will be followed by a line reporting the worst fixed-length section within the extended section. This applies to both the report and the CSV output.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next tab by clicking on it, or by using the **Next** button.

2.33. Screen CIS510 - Collision-Prone Section Criteria

Description:

On this screen the user specifies the main criteria for a section being "Collision-Prone".

For details on how Collision-Prone Section Analysis is done, see Collision Prone Locations.

Field Descriptions:

Attribute	Select an attribute of a section, e.g. *Number of Collisions*

Comparator	Select a comparison operator, e.g. *Greater Than*
Critical Value	If you want to specify the critical value explicitly (e.g. a number of collisions), select *Entered Value,* then enter the value in the following field. If you want to use a calculated value (e.g. a Critical Collision Rate), select *Calculated Value.* The critical value appropriate to the selected Attribute will be calculated. The Calculated Value option is only available for the Collision Rate attributes.
Logic	If multiple criteria are specified, select AND or OR logic for combining them.

Rules:

- In the three criteria rows, criteria must be specified from top down. I.e. if only one row is used, it should be the top one. If only two rows are used, they should be the top two.
- If the 2nd or 3rd criteria rows are used, the preceding Logic field must be set to AND or OR.

Average Collision Rate File:	Specify the full Windows name of an Average Collision Rate file. This file is used to look up average collision rates by Highway Classification, for use in calculating critical collision rates.
Level of Significance:	Select the level of significance value to be used in the Critical Collision Rate calculation.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.34. Screen CIS520 - CPS CM Collision Types

Description:

This screen is for specifying parameters for the Counter-Measure Method of identifying Collision-Prone Sections.

Field Descriptions:

☐ **A Section is Collision-Prone if...**	Check this box to activate the parameters specified on this screen.
And **if the Section meets...**	Select the logic for combining this method of identifying Sections with that of the previous tab/screen, i.e. to indicate whether both or one of the methods are sufficient to determine a section as Collision-Prone.
13 collision type checkboxes	Indicate the CM collision types to be tested for over-representation.
Average Collision Type Ratio File	Specify the full Windows file name of the Average Collision Type Ratio File to use. Click the Browse button to find the file in a Windows file-find dialog. If the Collision Type Ratios file you specify contains non-mutually-exclusive reference groups, the ratios of the first group into which each collision location falls will be used for that collision.
Level of Significance:	The Level of Significance adjusts the CHI-squared(a) value. A HIGHER level of significance results in a lower CHI-squared(a), which means a collision-type proportion is more likely to be considered an over-representation, which means you will end up with MORE Accident-Prone sections.
Minimum Number of Collisions (any type):	Before an over-representation calculation is attempted for a collision type, there must be at least this minimum number of collisions of that type.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.35. Screen CIS530 - CPS Output

Description:

On this screen the user specifies what output the Collision-Prone Sections process is to produce, and, with the **Create...** button, starts the Collision-Prone Sections process.

Field Descriptions:

Formatted Report	Select this option to produce a printable report.
Output Format:	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.
Include Input Collision Subset Description	Includes information from the Subset History at the top of the report. Proper interpretation of the report may be impossible without this information.
CSV File	Select this option to produce CSV file of the results.
Include Input Collision Subset Description	Includes information from the Subset History at the end of the CSV file. Proper interpretation of the data may be impossible without this information.
KML File	Select this option to produce the results in a KML file, which can be displayed in Google Earth.
Include Input Collision Subset Description	Includes information from the Subset History in the KML file. This can be displayed in Google Earth by selecting Summary Details in the Places pane.
OUTPUT SUBSET ...IN...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are IN collision-prone sections. The GROUP_ID field in the output subset associates each collision with its corresponding Collision-Prone Section (CPS) in the reports. This allows for further statistical analysis by CPS.
OUTPUT SUBSET ...NOT IN...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are NOT IN collision-prone sections. Such a subset can be useful for doing subsequent Collision-Prone Sections analysis without including sections which have already been identified as being collision-prone.

Buttons:

Create Collision-Prone Sections Report	Click this button to start the batch job for doing the Collision-Prone Sections analysis.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.36. Screen CIS610 - Collision Details Report

Description:

On this screen the user specifies the options for creating a Collision Details report, and, with the **Create Report** button, initiates the report creation.

The Details Report has one page per collision, with all available information listed, with all codes translated into English.

Field Descriptions:

Input Collision Subset	Select the subset containing the collisions to be reported on. Be aware of how many collisions there are in the subset - you get one page of output per collision!
Report Title	This will appear in the headings at the top of every page.
Include Victim Information	Check this box to get information on each person involved. (No names or other identifying information is included.)
Report Output Format	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.

Buttons:

Create Report	Click this button to start the batch job which will create the report.

2.37. Screen CIS630 - Histogram Report

Description:

Specify the Collision Histogram report options on this screen.

The Histogram report displays as a horizontal bar graph the number of Fatal, Injury and PDO collisions at specified intervals along all the highway sections in the search path of the input collision subset.

Field Descriptions:

Input Collision Subset	Select the (previously created) collision subset for creating the report.
Report Title	This will appear in the headings of each report page.
Km per Report Line:	Enter the highway section length to be represented by each histogram line. 0.1 is the minimum, since this is the accuracy to which colliions locations are coded.
Collisions per Character:	By default the horizontal bars of the histogram have a width equal to a typical character width for each collision. The histogram bars can be scaled to be shorter by increasing this number.

Tabs:

The Histogram Report screen tabs must be navigated sequentially. Either select the Output Selection tab, or press the **Next-->** button to proceed to the next step in creating the Histogram report.

2.38. Screen CIS635 - Histogram Output Selection

Description:

On this screen, specify the types of Histogram Report to be produced.

Use the **Create** button to start the report generation.

Field Descriptions:

Formatted Report	Select this option to get a ready-to-print report.
Output Format:	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.
CSV File	Select this option to get a CSV file, which you can load into Excel.

Include Histogram String of F, I and P Characters	In the CSV file, the histogram bars are character strings: F for Fatal, I for Injury and P for PDO collisions. The number of each type of collision are also included on each line, so the histogram string may not be required.
Include Discontinuity Indicator Records	These indicate where there is a discontinuity in the search path.
Inlclude Cumulative Totals	This selects columns of cumulative collision counts between discontinuities.
Include Input Collision Subset Description	This causes the subset history, including the search path, to be appended to the CSV file.

Buttons:

<- Back, Next->	These buttons are equivalent to using the tabs at the top of the screen.
Create Report	Click this button to start the batch job which will create the report.

2.39. Screen CIS650 - Collision Summary Report

Description:

The Summary Report can include a one-line summary for each collision, and can also include collision count summaries by Year and by Month.

On this screen the user specifies the input collision subset, and the title for the report..

Field Descriptions:

Input Collision Subset	Select the (previously created) collision subset for creating the report.
Report Title	This will appear in the headings of each report page.

Tabs:

The report screen tabs must be navigated sequentially. Either select the Output Selection tab, or press the **Next-->** button to proceed to the next step in creating the report.

2.40. Screen CIS655 - Summary Report Output Selection

Description:

On this screen the user specifies the content and format(s) of the Summary Report to be produced.

Field Descriptions:

Formatted Report	Select this option to get a ready-to-print report.
Output Format:	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.
CSV File	Select this option to get a CSV file, which you can load into Excel.

Options for both Formatted and CSV output:

Include the Input Collision Subset Description	This causes the subset history, including the search path, to be included.
Include One-Line Summary of each collision	Each line contains the most pertinent collision fields, with the codes translated into English.
Statistics by Month	For each month of each year in the input subset, the number of collisions; fatal, injury and PDO collisions; number of vehicles, and victim counts are reported.
Statistics by Year	As above, but just one line of counts for each year.

Buttons:

<- Back, Next->	These buttons are equivalent to using the tabs at the top of the screen.
Create Report	Click this button to start the batch job which will create the report.

2.41. Screen CIS670 - Specified Section Analysis

Description:

This is the initial screen for specifying parameters for Specified Section Analysis.

Field Descriptions:

Input Collision Subset	Select the collision subset to be analysed.
Report Title	This will appear at the top of the output CSV file.
Section Definition File	Enter the full Windows file name of the input CSV defining the sections to be analysed. See Section Definitions File for details. The Browse button may be used locate the file. **
Section Average Collision Rate File:	Specify the full Windows name of a “sections” Average Collision Rate file. This file is used to look up average collision rates by Highway Classification, for use in calculating critical collision rates for “section” calculations. The “section” calculation type is the default, but may be specified in the SDF file Loc/Sec field. **
Location Average Collision Rate File:	Specify the full Windows name of a “locations” Average Collision Rate file. This file is used to look up average collision rates by Highway Classification, for use in calculating critical collision rates for “location” calculations. The “location” calculation type may be requested using the SDF file Loc/Sec field. **
Level of Significance:	Select the level of significance value to be used in the Critical Collision Rate calculation.

** Note that if typing in file names (as opposed to using the Browse button), be sure to include the drive letter. If the drive letter is omitted, the screen will not respond at all to the Output Selection or Next buttons. No error messages will be produced. (This is due a difficulty in controlling Internet Explorer’s local file functions.)

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next tab by clicking on it, or by using the **Next** button.

2.42. Screen CIS675 - Specified Sections Analysis Output

Description:

On this screen the user specifies what output the Specified Section Analysis process is to produce, and, with the **Create Output...** button, starts the process.

Field Descriptions:

CSV File	Check this box to produce a CSV output file.
Include Input Collision Subset Description	Includes information from the Subset History at the end of the CSV file. Proper interpretation of the data may be impossible without this information.
OUTPUT SUBSET ...IN...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are IN the specified sections. The GROUP_ID field in the output subset associates each collision with its corresponding section in the Specified Section Analysis output CSV file. This allows for further statistical analysis by section. (See the description of the SDF file ID field.)
OUTPUT SUBSET ...NOT IN...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are NOT IN the specified sections.

Buttons:

Create Output	Click this button to start the batch job for doing the Specified Sections analysis.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Create** and **Back** buttons.

2.43. Screen CIS700 – Collision Rate Table Report

Description:

This is the initial screen for specifying parameters for generating a Collision Rate Table Report.

The Collision Rate Table has columns for user-specified Highway Classification Sets, and rows for user-specified traffic volume ranges. Each cell of the table contains collision rates and (optionally) other statistics. The statistics in each cell are calculated using collision data from sections of highway with a Highway Classification and traffic volume in the ranges defined for that cell.

Field Descriptions:

Input Collision Subset	Select the collision subset to be analysed.
Report Title	Enter a title to appear at the top of the output reports.
Calculation Type	From the drop-down, select one of the four Rate Table calculation types. This selection determines which of the following fields are displayed.
Urban Section Length:	This field appears only if the **Sections: lengths as specified** calculation type is selected. Sections with an Urban Highway Classification will be broken into sections of the specified length for the purposes of rate table calculations.
Non-Urban Section Length:	This field appears only if the **Sections: lengths as specified** calculation type is selected. Sections with a non-Urban Highway Classification will be broken into sections of the specified length for the purposes of rate table calculations.
Landmark Types:	This field appears only if the **Locations: at landmarks...** calculation type is selected. A scrollable list of LKI landmark types is displayed. Select one or more landmark types using standard Windows Click, Ctrl-Click and Shift-Click mouse

	actions.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next tab by clicking on it, or by using the **Next** button.

2.44. Screen CIS710 – Cell Contents

Description:

Each Rate Table cell always contains a Weighted Average Collision Rate. Additional optional cell information may be selected using the check-boxes on this screen.

Field Descriptions:

☑ Check boxes as required to add information to each Rate Table cell. For details, see optional cell information.

Average Collision Rate File:	Specify the full Windows name of an Average Collision Rate file.
Level of Significance:	Select the level of significance value to be used in the Critical Collision Rate calculation.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Create** and **Back** buttons.

2.45. Screen CIS720 – Hwy Classification Sets

Description:

This screen allows Highway Classification Sets to be defined, one for each column of the Rate Table.

The Highway Classification Sets are created or modified using the Highway Classification Set Construction screen CIS725, which is invoked by the  buttons.

The checkboxes allow you to indicate which highway classification sets are actually used for the Rate Table.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Create** and **Back** buttons.

2.46. Screen CIS730 – Traffic Volume Ranges

Description:

This screen allows you enter Traffic Volume ranges: one range for each row of the the Rate Table.

Enter ADT values: Average Daily Traffic.

Ranges may overlap.

Leave the Minimum blank to get the previous Maximum + 1

Leave the Maximum blank to get all above the Minimum.

E.g. the following two volume range tables are equivalent:

Minimum	Maximum		Minumum	Maximum
1	10000		1	10000
	20000		10001	20000
	30000		20001	30000
1			1	9999999

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Create** and **Back** buttons.

2.47. Screen CIS740 – Rate Table Output

Description:

On this screen, specify the types of Rate Table output to be produced.

Use the **Create...** button to start the process.

Field Descriptions:

Formatted Report	Select this option to get the Rate Table report.
Output Format:	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.
Include the Input Collision Subset Description	This causes the subset history, including the search path, to be included.
Class-Rate Report	This is a separate report, which contains one line of statistics for each section or location identified during the Rate Table analysis.
Sort Order	Select the desired sort order for the Class-Rate report.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Create** and **Back** buttons.

2.48. Screen CIS750 – Collision Type Ratio Report

Description:

This program calculates Counter-Measure Method Average Collision Type Ratios, broken down by Location/Section, reference group, and counter-measure collision type. The results are written to a report, and optionally to CSV files,

which are used for the Counter-Measure Method of determining Collision-Prone Locations and Collision_Prone Sections.

The program can also produce output collision subsets, of collisions which are in any Location reference group, and collisions which are not in any Location reference group but are in any Section reference group.

Field Descriptions:

Input Collision Subset	Select the collision subset to be analysed.
Report Title	Enter a title to appear at the top of the output report.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on the tab, or by using the **Next** and **Back** buttons.

2.49. Screen CIS760 – Location Reference Groups

Description:

On this screen, select and/or define the Location Reference Groups for the Collision Type Ratios report. A Location Reference Group is defined by a Highway Classification Set, and a list of Landmark Types. For a collision location to be in a particular Location Reference Group, the location must be at one of the listed landmark types, and the Highway Classification at that location must be in the specified Highway Classification Set.

Field Descriptions:

☑ **Use**	Only the checked reference group definitions will be used. Unchecked ones will be ignored..
Group Name	The reference group will be labelled with this name on the report.
Hwy Classification Set	The Highway Classification Set is displayed, but cannot be edited directly on this screen. Click the … button to the left to construct or modify the highway classification set (on screen CIS725).
Landmark Types	The list of of Landmark Types for this reference group is displayed, but cannot be edited directly on this screen. Click the … button to the left to construct or modify the Landmark Type list.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on the tab, or by using the **Next** and **Back** buttons.

2.50. Screen CIS770 – Section Reference Groups

Description:

On this screen, select and/or define the Section Reference Groups for the Collision Type Ratios report. A Section Reference Group is defined by a Highway Classification Set.

Field Descriptions:

☑ **Use**	Only the checked reference group definitions will be used. Unchecked ones will be ignored..
Group Name	The reference group will be labelled with this name on the report.
Hwy Classification Set	The Highway Classification Set is displayed, but cannot be edited directly on this screen. Click the  button to the left to construct or modify the highway classification set (on screen CIS725).

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on the tab, or by using the **Next** and **Back** buttons.

2.51. Screen CIS780 – Collision Type Ratios Output

Description:

On this screen the user specifies what output the Collision-Type Ratios process is to produce, and, with the **Create...** button, starts the Collision Type Ratios process.

Field Descriptions:

Formatted Report	Select this option to produce a printable report.
Output Format:	PDF is the default, suitable for viewing or printing. RTF (Rich Text Format) is suitable for opening, or inserting into MS-Word.
☑ **Include Input Collision Subset Description**	Includes information from the Subset History at the top of the report. Proper interpretation of the report may be impossible without this information.
☑ **Location Ratios CSV File**	Select this option to produce a CSV file of Location Ratios (which can be used as input for the Collision-Prone Locations process).
☑ **Section Ratios CSV File**	Select this option to produce a CSV file of Section Ratios (which can be used as input for the Collision-Prone Sections process).
OUTPUT SUBSET LOCATION..	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are IN one or more Location Reference Groups. (The GROUP_ID field in the output subset is NOT set, because each collision could be in multiple reference groups.)
OUTPUT SUBSET ...SECTION...	Check this box, and enter a subset name to produce a collision subset containing all the collisions which are NOT IN any Location reference groups, but are in one or more Section reference groups. (The GROUP_ID field in the output subset is NOT set, because each collision could be in multiple reference groups.)

Buttons:

Create Collision-Type Ratio Output	Click this button to start the batch job for doing the Collision-Type Ratio analysis.

Tab/Screen Navigation:

The Tabs for specifying the parameters for this analysis must be navigated sequentially. Move to the next or previous tab by clicking on it, or by using the **Next** and **Back** buttons.

2.52. Screen CIS800 - Volume Data Extract

Description:

This screen is used to extract a CSV file of Traffic Volume data for Uniform Traffic Volume Sections (UTVS) for specified LKI segments.

Business Rules:

- Date Range **From** date must be prior to or equal to the Date Range **To** date.
- Month range may span the year end (e.g. November to February is allowed).
- If the first Segment field is "ALL", the other segment fields must all be blank.

Field Descriptions:

Date Range From (and To)	Define the period for which you want traffic volumes retrieved.
Month Range (From and To)	These fields can be used to limit to particular month ranges. The month range may span the year end (e.g. November to February is allowed).
Segments (10 fields)	Enter the LKI segments for which traffic volumes are to be retrieved. Code "ALL" in the first field, and leave all the others blank, to get traffic volumes for all LKI segments

Buttons:

	Open the date selection dialog in a pop-up window, and insert the selected date into the adjacent date field.
Create Volume Extract	Starts the batch job for generating the CSV data file extract. Download the CSV file using the link on the batch job screen.

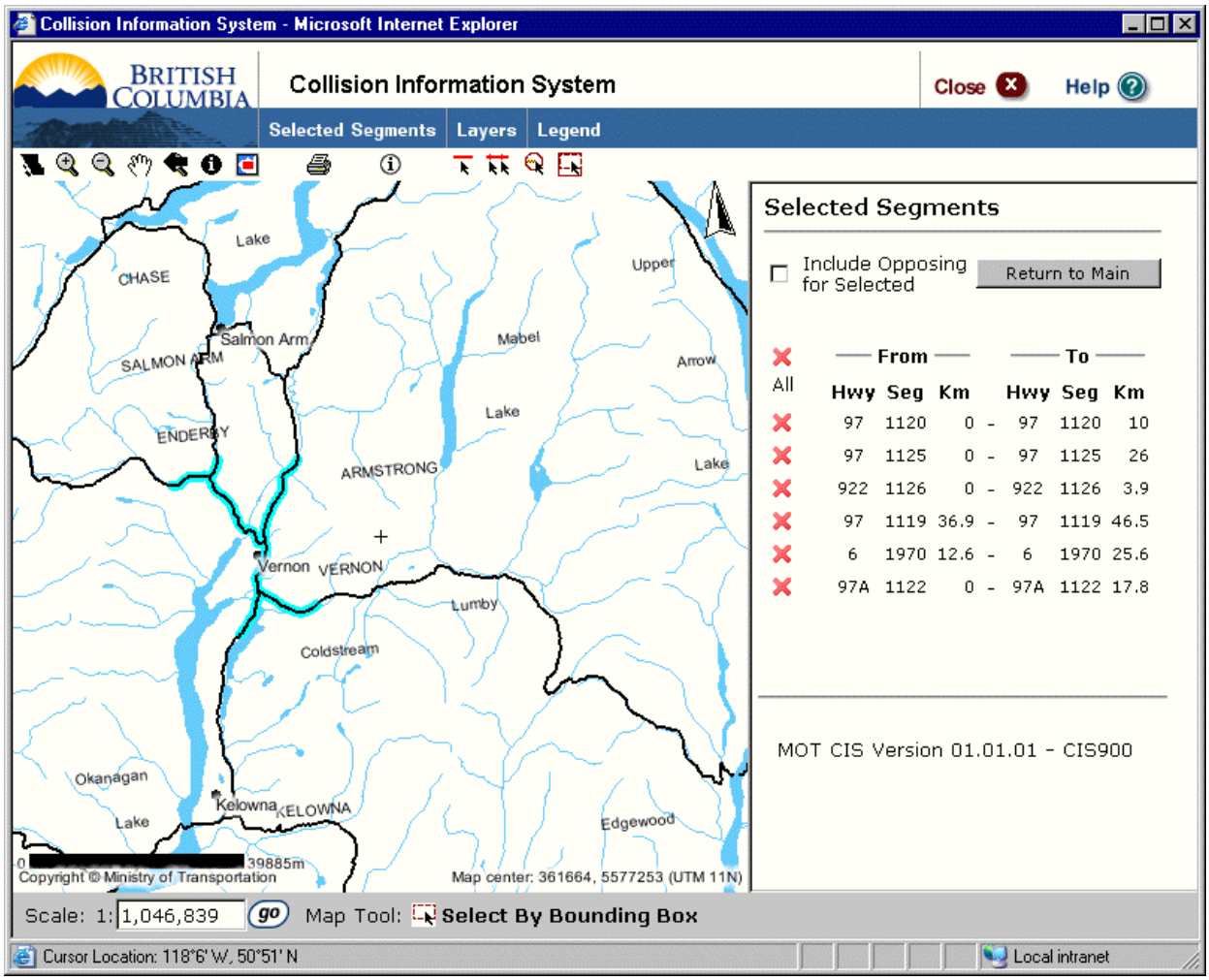
2.53. Screen CIS900 – Selected Segments

Description:

This screen is displayed in the Data Frame of the Map Interface window, when in Selection mode.. It displays the currently selected highway sections (LKI segments and sub-segments), and allows all or individual sections to be de-selected.

(Note: CIS900 is also used for displaying collision subset information when the Map Interface is in Reporting mode.)

Example:



Field Descriptions:

☑ **Include Opposing for Selected**	Checking this option is equivalent to checking the Include Opposing option on screen CIS110. Note that this will not cause opposing sections to be highlighted in the Map Frame, but it will cause opposing sections to be included (where they exist) when the query is run.
From – To / *Hwy* Seg Km	Each row in this table defines a selected highway section. This information is copied to the From-To list on screen CIS110.

Buttons:

✖ All	This top delete button will delete all sections from the selected section list. All blue highlighting will be removed from the Map.
✖	The delete button next to a section will delete just that section from the list. The associated blue highlighting will be removed from the Map.
Close Map Window	This button closes the Map Interface window, copying the selected sections (and the Include Opposing option) to the From-To list on screen CIS110.

2.54. Geographic Query

Description

The Geographic Query is the part of a collision query which defines the subset of the (LKI) Highway Network from which collisions are to be selected.

The Geographic Query is defined on one or more of the following Geographic Query sub-tab screens:

Segment Selection,

Section Def. File,

MoT Admin Area,

Landmark Type

Highway Class

Selection using the spatial interface (the interactive map-based method) is done via the Segment Selection screen.

Using Multiple Geographic Selection methods

If more than one of the selection methods are used, it is the *intersection* of the subsets which is ultimately selected. I.e. "AND" logic is used between the various subsets of the highway network.

For example if Highway 1 is specified on the Segment Selection screen 'From-To' list, and District 6 is specified on the MoT Admin Area screen, collisions will be selected from all sections of Highway 1 which are in District 6.

Use the **None** option rather than the **Entire Highway Network** option on the Segment Selection screen to indicate “no restrictions” when you are using other geographic selection methods. This will prevent an unnecessary, time-consuming search-path set-intersection calculation.

2.55. Query Control Box

Description:

This group of buttons and output fields appears at the top right of all Geographic Query and Collision Query screens. The **Calc** and **Map** functions allow you to view the results of your query without creating a collision subset. The **Run Query** button creates the subset.

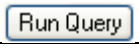
Buttons and Output Information:

Save Query Profile	Saves the query profile so that it will be available after the end of the current user session. See How Queries are Saved.

Collision Period:	This shows the date range as entered on the Query Profile tab.
Edit	Clicking this button takes you back to the Query Profile screen where you can change the collision date range. (This is equivalent to clicking on the Query Profile tab.)

Total Kms:	After the **Calc** button has been clicked, the total kilometres of road in the current geographic query will be displayed. For Secondary queries, this will come from the selected input subset.
Calc	Calculate and display the total number of kilometres of road in the current geographic query. ***

Total Collisions:	After the Calc button has been clicked, the total number of collisions selected by the current query will be displayed.
Calc	Calculates and displays the total number of collisions in the current query.***

Output Subset	The name shown is the name which will be given to the output subset query when the **Run Query** button is clicked. To change this name, go to the **Query Profile** tab.
	Starts a batch job to run the query, and create the collision subset.

*** The **Calc** buttons are recommended for use with small geographic areas only. They require the system to do most of the work of running the query, but the work is done while you wait rather than in a batch job. If the wait is unacceptably long, use the **Run Query** button, which will do the query as a batch job. The query results and mapping function will be available from the Subset screens.

3. The Map Interface

3.1. Map Interface

The CIS map interface is used to graphically select highway sections for a collision query, and to view query results (collision subsets). LKI Segment and Landmark layers can be displayed.

When defining a geographic query From-To List (Query View):

- the map appears at the right of the Geographic Query / Subset Selection screen (CIS110), when the From-To List option is selected. (It may be necessary to scroll to the right, or widen the Web Browser window to see the map.)
- sections of highway to query may be selected on the map as an alternative to defining them in the From-To List.
- changes made on the map are reflected in the From-To List, and vice versa.

When viewing a collision subset (**Subset View**):

- the Search Path and map appear at the bottom of the Subset Overview screen CIS300.
- the Search Path Subset Sections are shown on the map.
- the locations of collisions in the collision subset are indicated on the map.
- collision locations, LKI Landmarks, LKI Segments and Subset Sections can be clicked on to obtain more information (i.e. they are Identify-enabled).

3.2. Map Pan and Zoom

Pan

Pan mode is indicated by the graphics cursor being a hand.

When in Pan mode, hold down the left mouse button and drag the map.

This also works in Edit Section mode, when the mouse pointer is *not* at the terminus of a selected section.

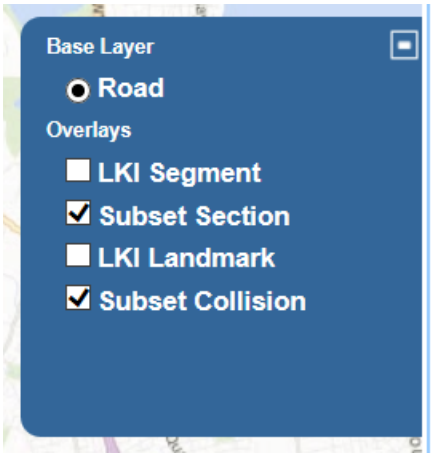
Zoom

To zoom the map in our out, do any of the following:

- Use the mouse wheel.
- Drag the bar between "+" and "-" in the zoom control at top left. (Note, the bar does not move until you release the mouse button.)
- Click in one of the spaces between "+" and "-" in the zoom control at top left.

3.3. Map Layers

Click the  icon at the top right of the map to display the Layers list:



Click on an overlay layer name to turn the layer on or off.

Click the minus sign icon at the top right to close the Layers list.

There is no Collision layer available in Query View.

In Subset View, the four Overlay layers are Identify-enabled.

Base Layer

The base map information comes from the Microsoft Bing map service.

Standard highways are coloured yellow, and divided highways are coloured purple.

This layer cannot be unselected.

LKI Segment Layer

LKI Segments are shown as darker, thinner lines within the base layer road lines.

The centre-line geographic data for the LKI Segments comes from the CHRIS system.

Where there is a divergence between the LKI Segment and base layer road, the LKI Segment is drawn as a purple line.

LKI Segment numbers are labelled in purple.

The LKI Segment lines have arrows which indicate the direction of measurement in the LKI. (For single-direction segments, this is also the direction of travel.)

When in Subset View, LKI Segments are Identify-enabled.

Subset Section Layer

Subset Sections:

- are shown in blue.
- are labelled with the LKI Segment number, start km - end km.

In **Query View**, Subset Sections:

- correspond to the sections defined in the From-To List.
- are editable.
- may include a node at each end

A Sync to Map operation may be required after editing the From-To List to update the map.

One From-To line may result in multiple Subset Sections on the map

In **Subset View**, Subset Sections:

- are the sections from which collisions were selected for the Collision Subset.
- are the sections defined in the subset Search Path
- are non-editable.
- do not include nodes.
- are Identify-enabled.

Note that the nodes in the Search Path are not displayed on the map. When there are sections defined on both sides of a node, there will be a 100m gap between the blue lines of those sections. (If the Subset Collision layer is on, and there are collisions at the node, a collision marker will show at the node location.)

LKI Landmark Layer

When the Landmark layer is selected, LKI landmarks are shown as labelled triangles on the map.

Note that landmark marker placement does not always line up with the underlying map.

There are two reasons for this:

- landmark KmMarks are stored to 1-decimal place (100m accuracy) in CIS,
- the landmark geographic coordinates are calculated in CIS, using the landmark KmMark and the centre-line geometry of the segment as obtained from CHRIS. (The Latitude and Longitude stored with most landmarks in the LKI Landmark table are NOT used.)

The landmark markers are coloured as follows:

- Intersections (A1, A2, A3, A5) are red.
- Lane controls (A6, A7, A8, B3, B4) are yellow.
- Commercial interests (C1, C2, E1, E2, F1, F2, G1, G2) are brown.
- Structures (D1, D2) are burnt orange.
- Political and jurisdictional boundaries (XB, XD, XM, XR, XU) are navy blue.

- Parks, pullouts and miscellaneous accesses (XN, XP, Y2, Y3, Y4, Y5, Y6, Y7, Y9) are green.
- Miscellaneous landmarks (Z1, Z2, Z3) are black.
- Civic address landmarks (Z4) have a white outline only.
- Signs (S1,S2,S3,S4) are not shown.

When in **Subset View** (screen CIS300), landmarks are Identify-enabled.

If there are multiple landmarks at the same location in the LKI:

- only one marker and label is shown,
- details of all landmarks at the location will be displayed if the marker is clicked on.
- the marker of the landmark type of the first landmark in the LKI (i.e. with Landmark Number = 1) will be shown.
- the marker label *should* be the description of the first landmark; however as of CIS version 2.0.1, it is the description of the *last* landmark which is displayed. (This will be corrected in a later version of CIS.)

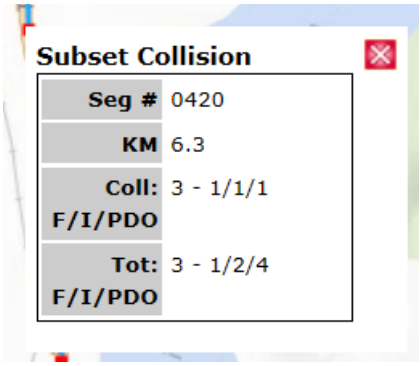
If overlapping landmark markers are clicked on, information associated with multiple markers will be displayed.

Subset Collision Layer

This layer is only available in Subset View.

A red square is shown at each location where there are one or more collisions in the selected Collision Subset.

Clicking on a collision marker will cause the following information to be displayed:



The "Coll:" row shows the total number of collisions, then the number of Fatal / Injury / PDO collisions.

The "Tot:" row *is mislabelled* as of CIS version 2.0.1.

The numbers on this row are:

- the number of collisions at this location (same as in the "Coll" row.)
- the number of fatal victims (people killed)
- the number of injury victims (people injured)
- the number of vehicles involved in the collision.

If the collision marker is at an LKI Node, multiple information boxes may be displayed: one for each Segment-Km combination stored for collisions at the node.

Clicking on collision markers which are adjacent or overlapping will cause multiple information boxes to be displayed: one for each marker close to the click-point.

3.4. Map-Based Geographic Query Editing

Query Editing Tools

In query editing mode, the following tool icons are displayed at the top-right of the map:

 Edit Section

 Add Sections

 Subtract Sections

 Pan

Clicking an icon puts the map into the mode for that function.

The icon of the currently active mode is shown with an orange background.

You can zoom the map in any mode, but you can only pan in Pan and Edit Section modes.

Divided Highway LKI Segment pairs are treated as one by these functions.

Add Sections

To get into Add Sections mode, click on  at the top-right of the map.

Click on a segment to select the entire LKI Segment as a Subset Section.

or

Draw a rectangle to define as Subset Sections all the sub-segments within the rectangle.

Subset Sections are coloured blue.

To exit Add Sections mode, click on one of the other mode icons at top-right.

Subtract Sections

To get into Subtract Sections mode, click on  at top-right of the map.

Click on a Subset Section (coloured blue) to remove it.

or

Draw a rectangle to remove all portions of Subset Sections inside the rectangle.

To exit Subtract Sections mode, click on one of the other mode icons at top-right.

Edit Section

To get into Edit Section mode, click on  at top-right of the map.

In "Edit Section" mode, you can adjust a Subset Section's endpoints, as follows:

Click on a (blue) Subset Section.

- The section will turn magenta, with a circle around each end-point.
- 2 icons will appear under the "Edit Section" icon: a green tick, and a red X.

Place the mouse cursor over an end-point

- the cursor will change from an arrow to 4-directional arrows.

Drag the end-point along the road to the desired new end-point. (You cannot drag past the end of an LKI segment.)

Repeat with the other end of the section, if desired.

To put the change into effect, click on the green tick icon.

- the screen will be refreshed,
- Edit Section mode will be ended, returning to Pan mode,

- the colour of the edited section will return to blue,
- the From-To List will be updated.

To cancel the change, click on the red X icon.

3.5. Divided Highways on the Map

The LKI Segments on both sides of a divided highway are treated together by the map functions.

When zoomed out so that both directions appear as one line, clicking on the road-line selects both directions.

When zoomed in, so that the two directions are separate lines, clicking on one side still selects both sides.

When a divided highway segment pair is selected on the map, two From-To List lines are created: one for each segment

If you want to select just one side of a divided highway, you can select both on the map, then delete the segment you don't want from the From-To List.

3.6. Map Identify Function

In Subset View the CIS Overlay layers are Identify-enabled. This means that you can click on a feature on the map to display information about that feature. For example clicking on a collision marker brings up collision counts by severity for that location.

In Subset View the mouse cursor is a hand (which indicates that the map can be panned by dragging). Ideally the cursor would change to a pointer over an Identify-enabled entity such as a collision marker, but that ideal has not been implemented, due to programming cost and response time considerations. So just point with the middle of the hand icon.

If two or more markers of the same type are close together, clicking among them may bring up details of more than one of them.

When multiple types of Identify-enabled features are at the same place, the Identify function selects the first feature type in the following hierarchy:

1. Subset Collision
2. LKI Landmark
3. Subset Section
4. LKI Segment

4. Landmark Kilometre Inventory

4.1. Introduction to the Landmark Kilometre Inventory

The Collision Information System (CIS) is built upon the BC Landmark Kilometre Inventory (LKI). The LKI includes all the officially numbered highways, plus other provincial-jurisdiction roads, plus some roads which *were* provincial jurisdiction but are no longer. Collisions on road segments which are not defined in the current LKI are not available in CIS.

The LKI breaks the network of provincial highways into uniquely numbered segments. An LKI segment may include both sides of the highway, or each side of the highway may be defined as separate segments - especially in the case of divided highways. Each segment has a designated origin for measuring purposes. One-way segments (e.g. one side of a divided highway) are always measured in the direction of travel. The distance along a segment from its designated origin is called a KmMark (or sometimes simply a Km, or a Km Offset.).

Thus a location on a highway can be identified by its LKI segment number and Kmmark. The location identification is unique except at segment connect points. (See the definition of Nodes.)

An inventory of landmarks, such as bridges, intersections, railroad crossings, etc., is maintained for each segment in the LKI. When recording the location of a collision, the police officer refers to this inventory to get the KmMark of the nearest landmark, then measures or estimates the distance to the collision location to get the Kmmark of the collision.

Highways, Segments, Kmmarks and Landmarks are the core concepts of the LKI. The concepts of Nodes and Continuity were added in order to describe how segments connect. MoT Regions, Districts and Contract Areas are defined in the LKI. Highway Classifications and Traffic Volumes are defined according to the LKI, but have their own sections in this documentation.

Look on the CIS Launch page for links to published LKI data.

4.2. LKI Highway

A Highway is identified by a 1, 2 or 3 digit number, or by a 1 or 2 digit number followed by one letter.

In the LKI, each Segment is given one and only one *primary* Highway assignation, and zero or more other highways. It is the primary Highway assignations alone which constitute the Highway definitions as far as CIS is concerned. I.e. in CIS (as in HAS), a segment is on one and only one Highway.

For example in the real world, and in the LKI, segment 0920 between Cache Creek and Kamloops is on both Highways 1 and 97, with highway 1 being the primary highway. In CIS, segment 0920 is on Highway 1. Period. A CIS query of all the segments on Highway 97 would NOT include segment 0920.

It is an absolute rule in the LKI that Highway assignations do not change in mid-segment.

LKI Segments which are not on any official numbered highway are given pseudo highway numbers in the range 901 to 999. (These numbers were assigned to group together all such segments according to the Highway Districts at the time.)

(The term **Route** is synonymous in the LKI, but is not used in CIS. If CIS were ever enhanced to be aware of multiple-highway segments, "Route" could be used to as the more inclusive term.)

4.3. LKI Segment

An LKI Segment is a section of provincial highway which is identified with a unique four digit number.

An LKI segment may be **1-way or 2-way**. A 1-way segment has just one direction of travel, and may be a 1-way road such as an interchange ramp, or may be one side of a divided highway. A 2-way segment has two directions of travel, i.e. both sides of a highway.

Paired segments are the segments on each side of a divided highway. Each of the pair is the **opposite segment** to the other. They are each measured in their own direction of travel.

Each segment has a designated origin for measuring purposes. One-way segments are always measured in the direction of travel. The distance along a segment from its designated origin is called a Kmmark (or sometimes simply a Km, or a Km Offset.).

Segment end-points are called Nodes, and usually occur at major intersections.

In general, segment breaks occur at major intersections.

The LKI includes some segments which are no longer provincial jurisdiction. This will be the case after they have been *devolved* to a municipality. The current (2006) policy is to keep devolved segments in the LKI for at least 5 years, so that collision data remains available for analysis in case of litigation.

See the following topics for details on nodes, continuity, mid-segment connections , and examples.

Note that in the English language, "segment" and "section" are synonymous when referring to a linear object such as a road. In the LKI, and in CIS, "segment" is generally reserved to mean an LKI Segment, and "section" is used as the general term. Hence a "section" might span a Node or include multiple LKI segments, but a "sub-segment" would not.

4.4. LKI KmMark

A KmMark is a distance from the start of a segment measured in kilometres. In the LKI the distances are measured to 2 decimal places (i.e. an accuracy of 10 metres).

The MV6020 accident report has space for 1 decimal place. 2 digits are sometimes squeezed into that space. When the MV6020 accident report data is entered at ICBC, KmMarks are entered with only 1 decimal place. Since mid-2006, they are rounded to 1 decimal place by the data-entry personnel. Prior to that, they were truncated. CIS collision data comes from the ICBC system (TAS), so KmMarks on collisions in CIS have just one decimal place.

A KmMark is sometimes referred to as a "Km Offset", an "Offset", or simply a "Km"

4.5. LKI Location Code

A Location Code consists of a Highway number, Segment number, and KmMark. It is a field near the top of the MV6020 accident report form.

In CIS, a Segment number implies the Highway, so the Highway is redundant information. Thus the Segment and KmMark are all that are needed to define a location in the LKI.

4.6. LKI Landmark

A Landmark is an intersection or a road-side feature, identified with a Segment, Kmmark, and Landmark Type. Landmarks are usually *visible* features, but often less visible MoT assets such as traffic counters are included. Intersections are the key landmarks. Other less-visible landmarks, such as signs, culverts and private accesses are not included consistently. Where intersections are sparse, other landmark types are more likely to be included.

Landmark IDs (a unique number for each landmark) are being introduced in 2006 for possible future use.

Note that multiple landmarks may exist at the same location.

A Landmark has a "Side" attribute, which may be one of:

- L - Left
- R - Right
- B - Both
- (blank) - not associated with a side e.g. an overpass.

A Landmark Type is a two digit code which defines the type of feature: e.g. intersection, railway crossing, etc. The Landmark Types may be revised from time to time, but as of July 21, 2006, the list is as follows:

Code	Description
A1	Intersection with stop sign or flashing red lights, no turning slots
A2	Intersection with stop sign or flashing red lights, and turning slots
A3	Intersection with traffic control lights, no turning slots
A5	Intersection with traffic control lights, and turning slots
A6	Lane Merge
B3	Interchange Off Ramp
B4	Interchange On Ramp
C1	Controlled Railway Grade Crossing
C2	Uncontrolled Railway Grade Crossing
D1	Major Structure (visible in winter, e.g. bridge structures, overpasses)
D2	Minor Structure (invisible in winter, e.g. culverts, cattle guards)
E1	Weigh Scale
E2	Ferry Ramp/Terminal
F1	Permanent Traffic Count Station
F2	Temporary (Short) Traffic Count Station
G1	Business/Commercial Access
G2	Private Access
XD	District Boundary

XM	Municipal Boundary
XN	National Park Boundary
XP	Provincial Park Boundary
XR	RCMP Boundary
Y2	Picnic Area
Y3	Viewpoint
Y4	Point Of Interest
Y5	Rest Area / Pullout
Y6	National Park Access
Y7	Provincial Park Access
Y9	Other non-private access
Z1	Miscellaneous
Z2	Begin Segment
Z3	End Segment

4.7. LKI Node

A Node is the end point of a segment, which may be the connecting point of zero or more other segments.

- the **Begin Node** of a segment is the node at KmMark 0.0 of the segment.
- the **End Node** of a segment is the node at KmMark = segment length.
- a **Null Node** is where a segment ends and does not connect to any other segment, e.g. at a ferry terminal, OR where a segment joins another at a Mid-Segment Connection.

Where segments join, there are multiple possible location codes to describe the same location: e.g. the end of one segment, or the beginning of the next segment. The Node concept was added to the LKI so that a unique identifier could be assigned to connection points, and so that the collisions at a node could be known to be at the same place, no matter what segment they were coded on.

Segments should be connected at the same level before they are considered to be sharing a node. See the section on Interchanges.

Currently (2006) nodes are not a part of the field-workers' view of the LKI. E.g. police officers are not aware of node names. For a collision at a node, they code one of the segment end-points. Similarly, nodes are not used when specifying a Geographic Query in the Collision Information System. Node names *are* used, however, on CIS reports, as a unique label for locations with multiple location codes.

Node Names

Node names are 8 characters long, and, are constructed as follows:

- Null End Node - the segment number followed by "NULL" - e.g. 1234NULL
- Null Begin Node - "NULL" followed by the segment number - e.g. NULL1234
- when two or more segments connect at a Node, the Node name should consist of any two of the connecting segment numbers. When possible, the first segment number should be that of a segment which ends at the node, and the second should be the number of a segment which begins at the node. - e.g. 12341235

A Node has ONLY ONE NAME! If five segments connect at a Node, only two of those segment numbers are represented in the Node name. In fact, Nodes could be named without using any of the connecting segment numbers, but the convention described above was decided upon to make it easier for a human to locate a Node, given the Node name.

4.8. LKI Mid-Segment Connection

Ideally, when an LKI segment joins an LKI highway, there would be a segment break in the major highway, so that there is just one node for the intersection. However this is not always the case. If a segment joins another mid-segment, this is called a **Mid-Segment Connection**. In this case the connecting segment ends (or starts) with a Null Node. Note that collisions coded at such a null node, (using the joining segment number) will not show up on CIS queries of the segment to which it joins. I.e. the LKI, and thus CIS, do not *know* that the two segments join.

For example, if segment A km 0 is at km 5 in the middle of segment B, then A km 0 is a null node, and is treated as a separate location to B km 5.

Most mid-segment connections occur where a minor or secondary highway joins a major highway. Where mid-segment connections are at major intersections, segment breaks are likely to be introduced in future LKI revisions, to improve the ability of CIS to properly analyse the intersections. A current (2006) example is the intersection of Highway 1 and McKenzie Ave near Victoria.

When doing localised analysis, CIS users must be aware of this possibility, and thus be familiar with the LKI.

As with other LKI improvements, requests to introduce segment breaks can be made - see LKI Maintenance.

4.9. LKI Nodes at Interchanges

At interchanges, level separations and physical barriers result in separate nodes. I.e. two segments share a node only if a vehicle can have its front wheels on one segment and its rear wheels on the other. (Being connected by nearby ramps does not count.)

For example at a junction of a divided highway with an undivided highway, where the divided highway passes over (or under) the undivided highway, there may be three separate nodes: 1 for each side of the divided highway, and another on the undivided highway. If the undivided highway starts (or ends) at the interchange, it should have a null node at the interchange. (It is also possible that there will be **no** nodes at such an interchange - the segments of all three through routes could continue uninterrupted.)

Notes

Prior to the January 2005 LKI revision, this rule was not documented, nor applied consistently. Through the Fraser Valley it was done this way, but, for example, the top of Taylor way in North Vancouver was given the same node name as the connection between the two East-bound highway 1 segments which start/end there. Thus a HAS query of Highway 1 would have included the collisions coded at the top of Taylor Way (under the overpass) with the collisions coded on highway 1 on the bridge above. As of 22-Jan-2005 this is no longer the case.

There are some interchanges in the Vancouver area where every ramp is defined as a separate segment. The ends of these segments are null nodes, because the main-line segments either do not break at the interchange, or do not break at every entrance and exit. The node assignations in these interchanges were not changed in Jan 2005.

At most interchanges in the province, where the ramps are **not** defined as separate segments, the police are likely to code a ramp collision as being on the closest main segment, but will code an 11 (Entrance Ramp) or 08 (Exit Ramp) in field 2 of the MV6020 accident form. This is called "Accident Location" on the accident form, and called "Location Type" in the Collision Information System.

The non-rigorous approach to interchange ramps creates artificial network discontinuities in CIS. This only has real consequences for the Collision Prone Section program: it cannot identify a collision-prone section spanning a discontinuity. The alternative extreme - calling each interchange one big node, would be great for continuity, but result in inflated collision counts when searching straight through interchanges, and make it difficult to separate collisions from different parts of the interchange. The rigorous segment-node solution would be to define as separate segments: each side of every road, every ramp, and all the small sections between exits and entrances through every interchange! This is not considered practical at the moment.

4.10. LKI Segment Continuity

A Continuity attribute is associated with each end of each segment. A segment is Continuous at a Node if there is a segment connecting at that node measured in the same direction.

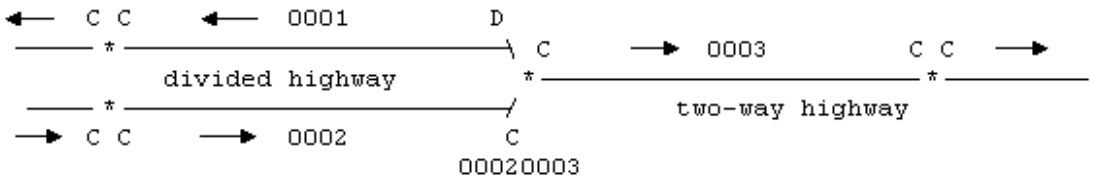
- A Segment is continuous at its End Node only if that Node is also a Begin Node for another Segment, and it is possible to drive (legally!) directly from one segment to the other in the direction of measurement.
- A Segment is continuous at its Begin Node only if that Node is also an End Node for another Segment, and it is possible to drive directly from one segment to the other in the direction of measurement.

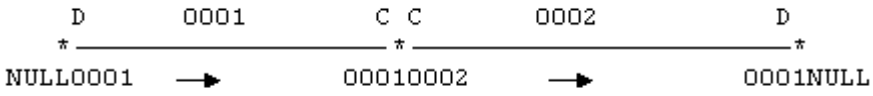
The continuity attributes are used in Collision-Prone Sections analysis to determine whether a section can span a node.

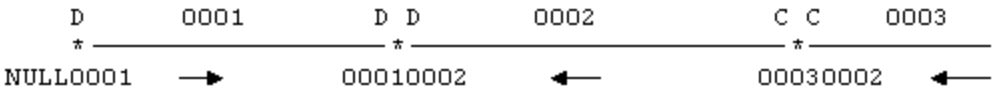
4.11. LKI Segment, Node, Continuity Examples

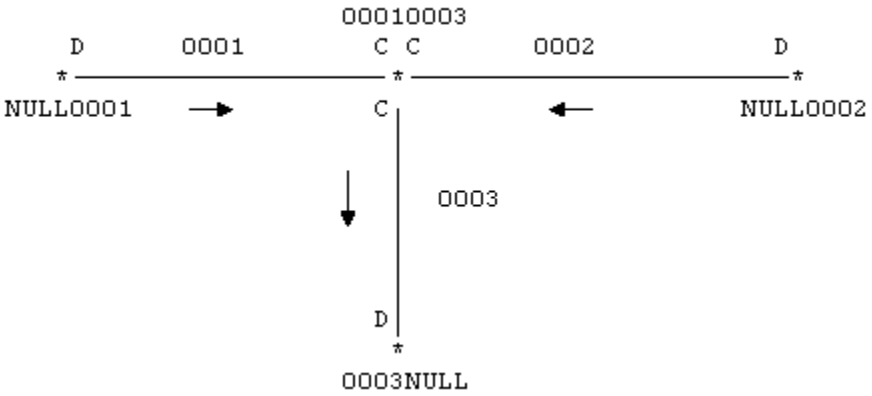
Key to Diagrams

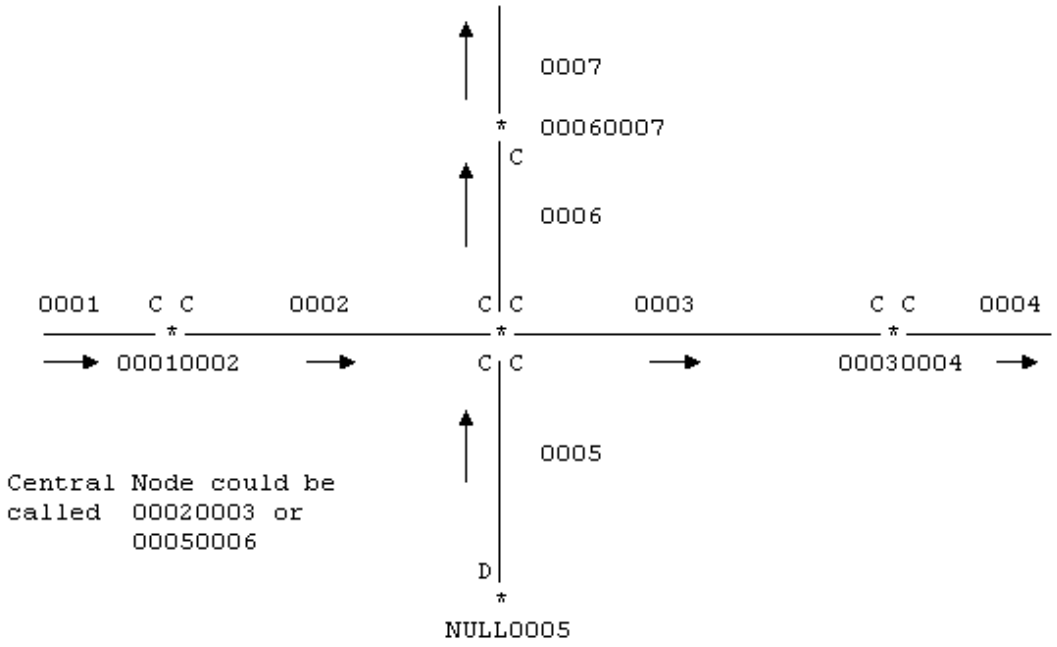
*	Node
---->	Direction of Measurement
C	Continuous
D	Discontinuous
00010001	Node Name
NULL0001	Null Node Name
0001	Segment Number











4.12. LKI Segment Search Sequence

The Highways and Segments of the LKI have a defined Search Sequence. Highways are ordered such that the un-lettered highways come first, then the lettered highways, then the un-numbered (900+) "highways". Within a highway, segments are ordered in the direction of measurement along the highway, ignoring opposite segments. After the end of the highway is reached, any opposite segments (1-way segments driven and measured in the opposite direction) come next, in order back down the highway.

Thus, given any two segment numbers, there is a well-defined ordered list of segments which occur between them.

The Search Sequence is used by all CIS programs which analyse or report collisions in physical order. For example the Collision-Prone Sections program searches through the collision data in the defined order, allowing it to analyse sections which are continuous across Nodes.

The following example shows how a series of segments may be selected by specifying a From and a To segment. (The segment numbers are fictitious)

Highway	Segment	Segment-Search-Sequence	
1	0123	1	
1	0023	2	\ From 0023
1	8048	3	|
1	0001	4	|
2	0347	1	> selected segments
2	0002	2	|
2	0842	3	|
3	1111	1	/ To 1111
3	0011	2	

4.13. LKI Versions and Transformations

Whenever revisions are made in the Landmark-Kilometre Inventory (LKI), there will be LKI locations coded according to an earlier LKI version which either refer to a different location in the new LKI or are no longer a valid.

In CIS (as in the preceding system, HAS), when a new version of the LKI is implemented, collision location codes are transformed as required to refer to the new version of the LKI. Thus the CIS user always works with the current LKI only, and

can work with collision data over a long time period as if the current LKI has always been in effect. (The original collision location codes are also kept, so that re-transforming is possible.)

LKI updates are usually not implemented in CIS until about 6 months after the LKI version is published.

When a segment is significantly revised, it is given a new segment number. (This policy came into effect in 2005.) While this can cause downstream workload, it eliminates confusion over the LKI version of a given LKI location code.

There are LKI transformation utilities and services available for converting LKI location codes between LKI versions. email menicoll@CypherConsulting.com for details.

4.14. LKI Maintenance

The Landmark Kilometre Inventory is currently (2018) maintained for the MoTI under contract by Cypher Consulting

LKI users (e.g. CIS users) are encouraged to report LKI problems to Matthew Nicoll by email at menicoll@CypherConsulting.com.

LKI updates are typically published once per year. "Publishing" involves:

- producing the LKI_BC.PDF report file.
- copying the PDF report and source database files to the MoT LAN in folder p:\HQ\Eng\Safety - Highway Engineering\has\LKI.
- updating the LKI_BC.PDF file on the MoT web site at: https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/landmark-kilometre-inventory
- sending the data to GeoBC (who send it on, re-organized, to the RCMP).
- updating the Collision Information System (usually about 6 months later, after the RCMP have started using it.)
- updating the representation of the LKI in CHRIS.

Data for LKI updates come from a variety of sources:

- RPMS photos
- Google Earth / Maps / Streetview
- MoT field personnel
- Photolog
- CHRIS
- Engineering drawings

A detailed LKI Maintenance guide is available at:
p:\HQ\Eng\Safety - Highway Engineering\LKI\LKI_Maintenance_Guide.doc

5. Highway Classification

5.1. Highway Classification

Introduction

Highways are classified in 6 Categories. In each Category, two or more Characteristics may be assigned.

An example of a Category is TERRAIN. Possible TERRAIN Characteristics are MOUNTAINOUS, ROLLING, LEVEL, coded using Characteristic Codes M, R or L.

Characteristic Code

Each Characteristic is represented by a single letter, called a Characteristic Code. E.g. M for Mountainous, R for Rolling, etc.

The Characteristic Codes need to be unique only within each Category. E.g. U may stand for Urban in the Urban/Rural Category, and for Undivided in the Divided/Undivided Category.

Current Classification Scheme

1 - Primary / Secondary / Other (Functional Classification)

P	Primary	For definitions of *Primary* and *Secondary,* see the Highway Planning Branch's **Functional Classification Manual.**
S	Secondary	
O	Other	

2 - Urban / Rural

U	Urban	increased access density and posted speed generally less than 60 km/hr except for urban freeways. Urban freeways generally are freeways within a major urban area.
R	Rural	Lower access density and posted speed generally greater or equal to 70 km/hr.

3 - Arterial / Expressway / Freeway

A	Arterial	at grade intersections and mid block access
E	Expressway	at grade intersections and no mid-block access
F	Freeway	no access other than grade separated interchanges

4 - Divided / Undivided

D	Divided	by a median or a concrete barrier.
U	Undivided	
X	Unknown	

5 - Lane Class

2	2-3	Up to 3 lanes
4	4 +	4 or more lanes
X	Unknown	

The "Lane Class" category of the Highway Classification indicates the number of lanes for BOTH DIRECTIONS, even if the LKI segment is only one direction.

6 - Terrain

L	Level	average grade <1.5%
R	Rolling	average grade >=1.5% and < 3.5%
M	Mountainous	average grade >= 3.5%
X	Unknown	

Category Order

The classification categories have a defined order, called the 'Category Order'. This enables categories to be indicated by position in the Classification Code and Classification Set (defined below).

Highway Classification Code

A Highway Classification Code (often referred to as simply a Highway Classification) is a string containing up to six characters - one Characteristic Code for each Category, in Category order. The first character is a Characteristic Code of the first Category, the second for the second, etc.

For example:

PRED4R	Primary, Rural, Expressway, Divided, 4-Lane, Rolling
SUAU2L	Secondary, Urban, Arterial, Undivided, 2-Lane, Level

A Highway Classification Code may not contain embedded blanks.

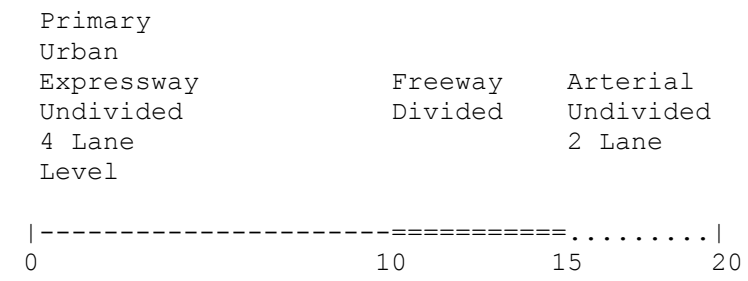
5.2. Composite and Predominant Hwy Class Codes

Composite and *Predominant* Highway Classification Codes are used to describe a highway section whose classification is non-uniform throughout its length.

The *predominant* classification of a section is the classification applied to a greater part of the section than any other classification.

The *composite* classification is like a Highway Classification, but has an asterisk for categories which are non-constant over the length of the section.

For example, given the following section of highway:



The Predominant Classification would be that of the 0-10 subsection: `PUEU4L`

The Composite Classification would be `PU***L`

5.3. Highway Classification Set

A **Highway Classification Set** is used to define a SET of highway classifications.

A Highway Classification Set is a string containing blank delimited substrings: one substring for each Category, in Category order. Each substring will be either an asterisk, or one or more Characteristic Codes. An asterisk is used to indicate ALL of a certain Category. Trailing asterisks may be omitted.

For example:

`P U EF`	Primary, Urban, Expressway or Freeway
`P UR F`	Primary, Urban or Rural, Freeway
`* U * * * *`	all Urban
`* U`	also all Urban
`* * F`	all Freeways

5.4. Summary of Highway Classification Terms

Name	Example	Notes

Category	Terrain	Something by which the highway is classified
Category Order		The order in which categories are defined.
Characteristic	Mountainous	A classification within a Category
Characteristic Code	M	A one-character code for a characteristic - normally the first letter.
Highway Classification Code	URED4R	One character per category. No embedded blanks.
Highway Classification Set	'U * EF D 4'	A way of defining a SET of highway classifications. Embedded blanks separate the Categories.
Predominant Highway Classification	URED4R	A Highway Classification Code which describes a greater part of a highway section than any other classification.
Composite Highway Classification	URED*R	A Highway Classification for a section with asterisks indicating categories with non-constant characteristics over the section.

6. Collision Data

6.1. MV6020 Form

The collision data in the Collision Information System comes from the **British Columbia Motor Vehicle Traffic Accident Police Investigation Report**.. Details of the form are available in files named `MV6020*.pdf` in folder "`p:\HQ\Eng\Safety - Highway Engineering\CIS\Documentation`" on the MoT LAN.

In that same folder, see file `FieldNames_for_CIS_Users.xlsx` to see the how field names used in CIS correspond to fields on the MV6020 form.

The MV6020 form is filled in by the attending police officer. If a collision is not police-attended, the form may be filled in at a police station when the collision is reported. The LKI Location Code, if it is coded, is determined by referencing the MoT LKI landmark data, either from the MoT LKI landmark listings, or from a listings reformatted by the RCMP.

For Property Damage Only (PDO) collisions, the form is not required to be filled out if the damage is apparently less than $1000, or $600 for a motorcycle.

See MV6020 Processing for a description of the journey the collision data takes.

6.2. MV6020 Processing

Detailed instructions for updating CIS with new MV6020 data from ICBC can be found in the following file:

"P:\HQ\ENG\Safety - Highway Engineering\CIS\Documentation\CIS_Update_Instructions.docx "

The process is summarized here:

To ICBC

The MV6020 **Traffic Accident Police Investigation Report** forms are sent to ICBC, Client Record Services, in Victoria. The data is entered into the Traffic Accident System (TAS). About 84% of the reports are in TAS within a month of the collision occurring. 92% within 2 months, and 99% within 3 months. The occasional report comes in up to a year or more late.

From ICBC

The collision data is selected from TAS (or from a data warehouse based upon TAS) on a monthly basis. Data entered into TAS during a given month is available for extraction (and delivery to MoTI) after the first Sunday in the following month.

All collision records are extracted, despite the fact that CIS ultimately only works with collisions which occurred somewhere on the LKI. Selecting only those collisions which had the Jurisdiction code = 1 (Provincial) would get most of the data wanted, but because that field is not always coded correctly, and because there are usually a few devolved (non-provincial) segments lingering on the LKI, *all* collisions are iincluded.

Not all fields from the MV6020 are extracted. E.g. peoples' names and drivers licence numbers are not included.

A second extract is done at the same time, of records which were originally entered in a previous month, but edited (changed) in the extract month. See the document referred to at the top of this topic for how these "replacement" records are processed.

The extracted data is made available to the CIS Administrator.

Initial Data Scan

The CIS Administrator runs preliminary checks on the MV6020 data to collect simple statistics (e.g. record counts), and catch invalid codes not handled by CIS

Into CIS

The collision data from ICBC is loaded into CIS by the CIS Administrator. The data is processed to select the collisions which are on the LKI, and have (or can be given) a valid LKI location code.

Validation - Fatal Collisions

All fatal collisions are manually checked to ensure the jurisdiction and LKI location codes are correct, and consistent with other information on the record. Police detachments are contacted if necessary for clarification.

Validation - Non-Fatal Collisions

Note: "JUR", in this topic, refers to the Jurisdiction field as coded on the MV6020:
1: Provincial, 2: Municipal, 3:Rural

In CIS the following collisions are manually checked:

- all JUR 1
- JUR 2 & 3, where the LKI Location field is non-blank

Also manually checked are JUR 2 & 3 collisions which meet all of the following conditions:

- a blank LKI Location field,
- a non-blank AT field,
- an ON field which is a Highway number, a Highway name, or the name of a municipal street which is also a Highway,

(This latter set of collisions is determined using a query from outside of the CIS application.)

When manually editing, the LKI location code of the collision is determined using information in fields:

- Location Code (LKI Hwy, segment, Km)
- Latitude and Longitude
- PLACE, ON and AT (text)
- Speed Limit
- Road characteristics (curve, grade)

Occasionally, information on news web sites is used to confirm a collision location.

For fatal collisions, the location code may be obtained by contacting the source police department.

Process Changed Records

There is currently no functionality in CIS for updating existing promoted collision records.

Hence the CIS Administrator runs processes and queries on a Windows workstation to identify which of the changed MV6020 records provided by ICBC require a collision in CIS to be replaced. These are deleted from CIS using a CIS Administrator function, then the replacement records are loaded as a separate batch, then validated and promoted as described above.

(Processing of changed records started with the changes done at ICBC in October 2017.)

Validation Pre-2009 (Non-Fatals)

In the old Highway Accident System (HAS), collisions with valid LKI location were accepted without being manually checked. (They are now checked, because 5 to 10% of them have been found to be incorrect according to the ON/AT or LAT/LON information).

In the HAS collision data loading process, a non-fatal accident record was:

- automatically rejected if: JUR is NOT 1, and the Location Code is blank.
- automatically accepted if the Location Code is valid. (JUR is ignored in this case.)
- presented for manual editing if the Location Code is nonblank, but is not a valid LKI location code. (JUR is ignored in this case.)
- presented for manual editing if the Location Code is blank, and JUR = 1.

GPS Locations

Starting in 2010, Latitude and Longitude were provided on MV6020 collision records. In mid-2010 about 15% of all MV6020 records had Lat/Lon data. By 2021 this increased to about 33%. The percentage of on-LKI (i.e. Provincial Jurisdiction) roads with GPS data higher. In 2020 about 65% of on-LKI collision records had Lat/Lon. In 2021 this went down to about 55%.

About 10% of GPS locations are not valid - i.e. not on or near a road.

CIS displays a nearest LKI Location calculated from the Lat/Lon, using the highway centreline geometry. The person doing the validation can also paste the Lat/Lon into Google Earth or Google Maps enabling the location to be assessed for validity.

Promotion

Only those collisions which have valid LKI location codes after the validation process is complete are promoted into the main CIS data tables, where they become available for reporting and analysis by CIS users. The other records are archived, but not available to users.

See the following topic for statistics of the validation process.

6.3. Collision Data Loading Statistics

Up-to-date statistics, by collision month, batch, and police detachment, can be found in Excel files in the following folder:

"P:\HQ\ENG\Safety - Highway Engineering\CIS\Standard_Reports\Monthly_Collision_Updates"

The following statistics are based upon the results of Highway Accident System processing of the MV6020 records provided by ICBC in the years 2001 to 2005.

The following terms are used to describe groups of collisions:

Prov	on Provincial jurisdiction highways and roads which were on the LKI. Note that in fact this includes a small number of roads which are now devolved to municipalities, and does NOT include many provincial jurisdiction side-roads. A collision may be considered Provincial even if its LKI location code cannot be completely determined.
Inv	LKI location code invalid or missing when received from ICBC.
Fixed	LKI location code determined and entered manually, to replace an invalid or missing one.
Lost	Not available for analysis by CIS.
All	All MV6020 page 1 records received from ICBC, all jurisdictions.

Severity	Group	Percent 2001-2005	Percent 2016-2020	Of
Fatal	All	0.77	0.83	All
Fatal	Prov	58	58	All Fatal
NonFatal	Prov	28	28	All NonFatals
NonFatal	Prov Inv	22	58	All NonFatals Prov
NonFatal	Prov Inv Fixed	67	85	All NonFatals Prov Inv
NonFatal	Prov Inv Lost	7	8	All NonFatals Prov

Summary for Prov non-fatals, 2001-2001

22% of accident records from on-LKI roads have an LKI location code which is either missing or invalid. 67% of those are fixed manually, and 33% of them are unlocatable and thus "lost". These "lost" records comprise 7% of the total number of on-LKI non-fatal collision records.

Summary for Prov non-fatals, 2016-2029

58% of accident records from on-LKI roads have an LKI location code which is either missing or invalid. 85% of those are fixed manually, and 15% of them are unlocatable and thus "lost". These "lost" records comprise 8% of the total number of on-LKI non-fatal collision records.

6.4. Location Type

Field 2 of the MV6020 form is labelled ACCIDENT LOCATION on the form. In the Collision Information System, this data field is called the **Location Type**, to avoid confusion with the Location Code, which consists of the Highway, Segment and KmMark.

The Location Type is similar in purpose to the LKI Landmark Type, except the the Location Type is filled in by the reporting police officer. In a perfect world, if the Location Type = 01 (Intersection), then if the collision location is looked up on the LKI, the Landmark Type would also indicate an intersection. Imperfections exist in both the LKI and the reporting (and subsequent data entry), so Location Types and Landmark Types for a collision do not always match up.

When obtaining statistics (for intersections, for example), it can be instructive to compare results when intersections are identified one way or the other. The Collision-Prone Locations program has options to allow choice in how locations are identified.

The Location Types, as described on the MV6020 form, are as follows:

00	Unknown
01	At Intersection
02	Between Intersection / Exchanges
03	Intersection of Road & Driveway or Alley
04	Bridge
05	Ferry or Dock
06	Tunnel
07	Exit Deceleration Lane
08	Exit Ramp
09	Exit Intersection
10	Entrance Acceleration Lane
11	Entrance Ramp
12	Entrance Intersection
13	Off Highway
14	Parking Lot Single / Multilevel
15	RR Crossing
16	Industrial Road
17	Transit Express lane
18	Forest Service / Logging Road
19	Public Driveway
98	Not Applicable
99	Other

7. Collision Data Analysis

7.1. CSR - Collision Severity Ratio

$$CSR = \frac{FAT \times 100 + INJ \times 10 + PDO}{FAT + INJ + PDO}$$

Where:

FAT is the number of Fatal Collisions

INJ is the number of Injury Collisions

PDO is the number of Property Damage Only collisions

(In the Highway Accident System, CSR was called ASR - Accident Severity Ratio.)

7.2. Collision Rates

Traditional Collision Rate

For Locations:

$$CollisionRate = \frac{\#Collisions \times 1,000,000}{\#Vehicles}$$

units: collisions per million vehicles

For Sections

$$CollisionRate = \frac{\#Collisions \times 1,000,000}{SectionLength \times \#Vehicles}$$

units: collisions per million vehicles-kms

where #*Vehicles* is the ADT times the number of days in the data period.

Road-Weighted Collision Rate

A Road-Weighted Collision Rate is calculated in the same manner as the Traditional Collision Rate, but instead of accumulating the number 1 for each collision, the road-weight (W_r) causal factor for each collision is accumulated.

For (a simplistic) example, if all the collisions being averaged had $W_r = 0.5$, then the Road-Weighted Collision Rate would be half of the Traditional Collision Rate.

Severity-Weighted Collision Rate

This rate is calculated in the same manner as the Traditional Collision Rate, but instead of accumulating the number 1 for each collision, the Fatal, Injury or PDO weight is accumulated. (These weights are currently defined as 100, 10 and 1.)

So if 1 fatal, 2 injury and 3 PDO collisions were being averaged, 123 would be used instead of 6 in the collision rate calculation.

Fatal Collision Rate

This rate is calculated counting only the fatal collisions. Each collision is counted as 1 (one) even if more than one person died in the collision.

Fatal Collision Rates are usually expressed in units of: collisions per *hundred* million vehicle(-kms)

Fatality Rate

This rate is calculated using the total number of people killed in place of the number of collisions.

7.3. Collision Rate Ratio

The Collision Rate Ratio is the Collision Rate divided by the Critical Collision Rate.

Collision Rate Ratios may be calculated for Traditional collision rates, Road-Weighted collision rates and for Severity-Weighted collision rates. (All are described in the Collision Rate section.)

7.4. Average Collision Rates

Average Collision Rates are collision rates averaged over many locations or sections. Location and Section rates are calculated separately. There are a number of types of collision rates: Traditional, Road-Weighted, Severity-Weighted, Fatal, plus the weighted variants of Fatal. See the Rate Table program topics for details.

Average Collision Rates are often calculated for a number of *Reference Groups*. A Reference Group may be defined by one or more of Highway Classification, Traffic Volume range, and (for Locations) by Landmark Type. An example of a Location reference group might be: Signalized intersections on Urban Expressways with a volume range of 10,000 to 20,000 vehicles per day.

Average Collision rates are used for comparison with localised collision rates, and for calculating Critical Collision rates. The Collision-Prone Locations and Sections programs use Critical Collision rates for comparing with individual collision rates to determine whether a Location or Section is "Collision-Prone". The Specified Section Analysis program also uses Average Collision Rates, but just for reporting purposes. These programs obtain their average collision rates from Average Collision Rate files, which are described in the next section. Note that these programs, and thus the Average Collision Rate files, do not handle reference groups defined by traffic volume, and work with just Traditional, Road-Weighted and Severity-Weighted average collision rates.

Average collision rates are calculated by the Rate Table program, with the Collision-Prone Locations program being used to separate out the collisions in the required Location reference groups.

7.5. Average Collision Rate Files

Average Collision Rates are described in the previous section.

Average Collision Rate files are CSV files. There are separate files for Location and Section average rates, but they both have the same format.

The files have no heading record.

The files have one record per reference group.

The files must have the following fields:

1. Highway Classification Set .
2. For Locations: - zero or more blank-separated landmark type codes.
   For Sections: - a null field.
3. Traditional average collision rate.
4. Road-Weighted average collision rate.
5. Severity-Weighted average collision rate.

Example: (Locations:)

```
P U A D * * ,A1 A2 A3 A5,  1.09,  0.22,  0.50
P R A D * * ,A1 A2 A3 A5,  0.80,  0.16,  0.50
P U A U * * ,A1 A2 A3 A5,  0.14,  0.03,  0.50
P R A U * * ,A1 A2 A3 A5,  1.31,  0.24,  0.50
```

```
P U EF D * *,A1 A2 A3 A5,  0.64,  0.12,  0.50
P U EF U * *,A1 A2 A3 A5,  1.49,  0.20,  0.50
P R EF U * *,A1 A2 A3 A5,  0.24,  0.05,  0.50
P R         ,           ,  0.20,  0.05,  0.50
P U         ,           ,  0.25,  0.05,  0.50
```

Notes:

- if no landmark types are specified in a *Locations* Average Collision Rate file, the supplied average rates apply to any location in the Highway Classification Set, i.e. at a location with any or no landmark type.
- the reference groups may overlap
- average rates for a section or location are looked up in order through the average rates file until a match is found, so put more general reference groups at the end.
- as of CIS version 3.0.1, the CPL process will use a Collision Rate record with no landmark types specified for a location, but the SSA process will not. I.e. SSA, when doing a "Location" analysis, will not find an Average Collision Rate if the location is not at a landmark, or is at a landmark of a type not included in any Average Collision Rate file records. (This SSA limitation will be removed in a future release.)

7.6. The Counter-Measure Method

Description

The Counter-Measure Method is a method of identifying Collision-Prone Locations and Sections. It is so named because it may identify sections or locations where road-design measures can be taken to counter a type of collision which is occurring disproportionately.

The object of the Counter-Measure Method is to identify sections and locations which have a proportion of one type of collision which is larger than the average for the highway class or location type. These sections and locations may not be identified by the other methods, but are likely to be candidates for cost-effective treatment.

(As elsewhere in CIS the general term *Location* is used, but the type of location studied is usually *intersections*.)

The following collision types are analysed:

1. right angle
2. left turn opposing
3. straight ahead rear end
4. left turn rear end
5. right turn
6. sideswipe
7. head on
8. off road
9. fixed object
10. parked
11. general rear end
12. pedestrian
13. animal

For any location or section, and for each collision type, a ratio can be calculated of the number of collisions of that type to the total number of collisions at the location or section:

$$p_i = \frac{x_i}{n}$$

where:

p_i is the collision type ratio for collision type i

x_i is the number of collisions of type i at the location or section

n is the total number of collisions at the location or section

For each of the Collision Reference Groups, and for each of the collision types, average collision type ratios are calculated. Collision type ratios at individual locations or sections can then be compared to the averages for the province.

The ratio files are personal: each user, can create one or more pairs of ratio files to suit his/her requirements. When running the Collision-Prone Locations or Sections programs, the user then selects the desired ratio file.

Average Collision Type Ratio Calculation

$$\bar{p}_{ij} = \frac{\sum_{k=1}^{m} x_{ijk}}{\sum_{k=1}^{m} n_{ijk}}$$

where

$\bar{p}_{ij}$	is the average collision type ratio of type *i* for reference group *j*.
x_{ijk}	is the number of collisions of type *i* at location *k* in reference group *j*.
n_{ijk}	is the total number of collisions at location *k* in reference group *j*.
m	is the total number of locations in reference group *j*.

Determining an Over-Representation

The calculations are defined here assuming a particular section or location, in a particular reference group, and a particular collision type. Thus subscripts i,j and k introduced in the previous section are omitted.

Assuming:

- "collision type" = "counter-measure collision type"
- $\bar{p}$ is the average collision type ratio for the collision type
- *p* is the collision type ratio for the collision type at the location or section
- *x* is the number of collisions of the collision type at the location or section
- *n* is the total number of collisions at the location or section

For the section or location in question, first calculate the collision type ratio:

$$p = \frac{x}{n}$$

Next calculate the chi square statistic for the collision type as:

$$CHI^2 = \frac{(x - \bar{p}n)^2}{\bar{p}n} + \frac{((n - x) - n(1 - \bar{p}))^2}{n(1 - \bar{p})}$$

which simplifies to:

$$CHI^2 = \frac{(x - \bar{p}n)^2}{(\bar{p}n)(1 - \bar{p})}$$

The value of CHI^2 is compared to the value CHI^2_a obtained from the following table, using a user-specified level of significance:

Level of Significance	CHI^2_a
0.5%	7.879
1.0%	6.635
2.5%	5.024
5.0%	3.841
10.0%	2.706

If p is greater than $\bar{p}$, and CHI^2 is greater than CHI^2_a, then the location or section is considered collision prone, for the collision type.

The CHI-squared comparison causes an over-representation of a collision type to be taken more seriously for larger sample sizes.

It is important to note, when performing these calculations over all collision types, that a collision may be of more than one (counter-measure) collision type.

Determining Counter-Measure Collision Types:

A number of collision data fields must be examined to determine to which collision type(s) a collision belongs. The types are defined below, using the following field names:

DIAGRAM - MV6020 diagram number

PREACTNn - pre-collision action of vehicle n (MV6020 fields 25 and 26)
(This is considered the First Event for the vehicle.)

TYPE2ND1 - second event code for vehicle 1 (MV6020 field 21)
(This is the first *collision* event.)

TYPE3RD1 - third event code for vehicle 1 (MV6020 field 22)

TYPE3RD2 - third event code for vehicle 2 (MV6020 field 23)

PEDNACTN - pedestrian action code (MV6020 field 30).

... and the symbols & for a logical AND.

Note that a collision may not fit into any of these classifications, and may fit into more than 1 classification.

1	Right Angle	DIAGRAM = 5
2	Left Turn Opposing	DIAGRAM = 11 or 13
3	Straight Ahead Rear End	DIAGRAM = 1 & PREACTN1 = 1 & PREACTN2 = 1
4	Left Turn Rear End	(DIAGRAM = 1 or DIAGRAM = 12) & (PREACTN1 = 3 or PREACTN2 = 3) - this will include left turn side-swipes.
5	Right Turn	DIAGRAM = 7 or 9
6	Sideswipe	DIAGRAM = 3 or 16
7	Head On	DIAGRAM = 2
8	Off Road	DIAGRAM = 14 or 15
9	Fixed Object	TYPE2ND1, TYPE3RD1 or TYPE3RD2 in

		(25,32,20,21,26,35,28,36,24,33)
10	Parked	PREACTN1 = 11 or PREACTN2 = 11
11	General Rear End	DIAGRAM = 1 & (not type 3 or 4)
12	Pedestrian	TYPE2ND1 = 3 & PEDNACTN not in (0, 98, 99)
13	Animal	TYPE2ND1 = 5

7.7. Average Collision Type Ratio Files

Each record in Average Collision Type Ratio files contains a ratio for each of the 13 Counter-Measure Collision types, labelled with a Highway Classification Set, and, for Locations, a list of Landmark Types.

Average Collision Type Ratio files can be created with the CIS Average Collision Type Ratio program.

The files are used by the Collision-Prone Locations and Sections programs, which compare ratios they calculate for individual locations and sections with the averages provided in the files.

CIS accepts two formats for these files:

1. Fixed Column format (same format as used by HAS):

Columns	Field Name	Notes
1-25	Reference Group Name	- description of the reference group defined by this record.
27-46	Highway Classification Set	- Highway Classification Set
47-63	Landmark Types	- up to six 2-character Landmark Type codes separated by single blanks. - for Section ratio files, this field will always be blank.
65-144	13 Ratios	- 13 Average Collision Type Ratios - each with format x9.999 (where x is a blank).

2. CSV format (comma-separated fields):

Field	Field Name	Notes
1	Reference Group Name	- description of the reference group defined by this record.
2	Highway Classification Set	- Highway Classification Set
3	Landmark Types	- up to six 2-character Landmark Type codes separated by single blanks. - for Section ratio files, this field will always be blank.
4 - 16	13 Ratios	- 13 comma-separated Average Collision Type Ratios - up to 3 decimal places accepted..

7.8. Collision-Prone Locations Analysis

Collision-Prone Location parameters are specified on a series of screens starting with CIS400

Description

The Collision-Prone Locations program searches along highways identifying collision-prone locations. The user specifies:

- the type of locations to analyse (typically these are intersections)
- the location radius.
- the criteria for classifying a location as collision-prone by specifying 1 to 3 conditions involving the number of collisions, the collision rate, and the collision severity ratio (CSR), and/or by specifying collision types for the counter-measure method.

Collision-Prone Location Identification

Collision-Prone Locations are identified as follows:

1) There must be one or more collisions at a location.

2) The location must be a "Potential Collision-Prone Location". This is determined as follows:

a) the location must be an LKI Landmark, and one of the landmark types listed for that location in the LKI must match one of the landmark types entered on the Collision-Prone Locations Parameter Menu,

OR

b) the Location Type field on at least one of the collisions at the location must match one of the location types entered on the Collision-Prone Locations Parameter Menu.

3) The number of collisions "attributed" to the location is counted. The number of collisions "attributed" to a location is the number of collisions within the Location Radius of the location. For example, at a Potential Collision-Prone Location at Km 3.3:

```
Km:                    3.1  3.2  3.3  3.4  3.5
# collisions:          4    10   3    7    2
Location Radius 0.                3
                                  \_________/
Location Radius 0.1                   20
                                  \_____________________/
Location Radius 0.2                   26
```

4) Traffic Volume for the data period at the location is looked up. Volume data must be available in CIS for the entire period of the collision subset. (CIS does no interpolation or extrapolation - any such infilling of traffic volumes is done prior to loading into CIS.)

5) The Collision Rates and Collision Severity Ratio (CSR) are calculated. (See the Report section below for more details.)

6) Any required lookups and/or calculations are done for determining critical numbers, CSRs or collision rates.

7) For the specified collision types (if any), the collision type ratio is calculated.

8) Average Collision Type Ratios are looked up, and for any specified collision type which has a ratio greater than the average for that type, the Chi-square statistic is calculated.

Finally, the criteria which the user specified on the parameter screens are evaluated, to determine if the location is Collision-Prone.

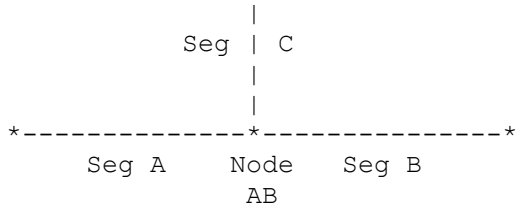
NOTE: There must be at least one collision at a location before the location becomes a Potential Collision-Prone Location. Even if there were 200 collisions 0.1 km before and after the location, and the Location Radius was 0.1 or more, the location will not be considered a Collision-Prone Location if there are no collisions coded exactly at the location.

Discontinuities

The specification of a non-zero Location Radius will not cause collisions to be counted from beyond a discontinuity.

Nodes

All collisions at a node will be considered if the node is a Potential Collision-Prone Location, however in the case of a non-zero Location Radius, only collisions along the Search Path are attributed to the location. I.e. the radius is not extended along other segments which may share the node.



In the diagram, if segments A and B are on the Search Path, the Location Radius will be extended from node AB back along segment A, and forward along segment B, but will NOT be extended up segment C.

Overlaps

If a non-zero Location Radius is specified, it is quite possible that KmMarks within two Location Radii of each other will be Collision-Prone Locations, with some of the same collisions contributing to the collision counts in each Collision-Prone Location. This situation is termed an Overlap.

Collisions which are counted twice in this manner are only written once to the Selected output collision subset.

An Collision-Prone Location which overlaps a previously identified Collision-Prone Location is flagged on the Collision-Prone Location Report with an asterisk immediately before the "LMK" or "LOC" characters in the TYPE field. Thus strings of overlapping Collision-Prone Locations can be identified on the report (if it is sorted by Search Sequence) by vertical strings of asterisks.

The first Collision-Prone Location in a string of overlapping Collision-Prone Locations is not flagged.

7.9. Collision-Prone Sections Analysis

Collision-Prone Section parameters are specified on a series of screens starting with CIS500.

Description

The Collision-Prone Section program searches along highways identifying collision-prone sections. The user specifies the section length. The user specifies the criteria for classifying a section as collision-prone by specifying 1 to 3 conditions involving the number of collisions, the collision rate, and the collision severity ratio (CSR), and/or by specifying collision types for the counter-measure method.

Critical values may be specified, or they can be calculated from looked up average collision rates.

In the case of overlapping collision-prone sections, this process identifies the total extent of overlapping collision-prone sections, and the single most collision-prone section within it.

Details are included in the definition of the following terms:

Fixed Section Length

- the user specified section length

Fixed Length Collision-Prone Section

- a section of highway starting at a collision location, and extending the Fixed Section Length from that starting point, in which there are at least the Critical Number of Collisions.

  NOTE that a Fixed Length Collision-Prone Section of length L starting at KMMARK A includes KMMARKS A through to A + L - 0.1. KMMARK A + L is NOT included. This is because KMMARKs are coded to 0.1 km accuracy, so the section of highway from A - 0.05 through to A + 0.05 is represented by KMMARK A. Consequently, the section from KMMARK A to A + L - 0.1 includes collisions from A-0.05 to A + (L - 0.1) + 0.05, which is a section of length L !
- indicated with an “N” (for “Normal”) in the SecType column of the CSV output.

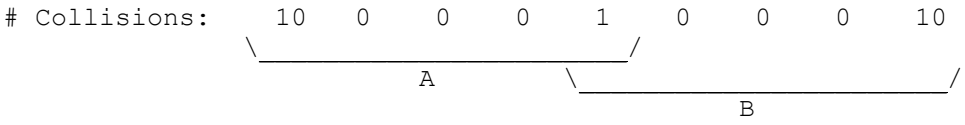
Short Collision-Prone Section

- a section of highway which meets the Collision-Prone criteria, but which ends in a discontinuity before the Fixed Section Length is reached.
- indicated with an “S” in the SecType column of the CSV output.
- identifiable on the PDF report (and the CSV output) by a section length less than the specified Fixed Section Length.

Extended Collision-Prone Section

- an Extended Collision-Prone Section is defined as the total extent of a set of overlapping Fixed Length Collision-Prone Sections. Thus it will start at the beginning of the first Fixed Length Collision-Prone Section, and end at the end of the last one.
- it is quite possible that an Extended Collision-Prone Section will contain a section of the Fixed Section Length which is not collision-prone. This is because of the possibilities of uneven collision spacing in overlapping Fixed Length Collision-Prone Sections. Consider the following example, in which the Fixed Section Length is 0.5 km, and the Critical Number of Collisions is 11:
- note that it is also possible to have an extended section with counter-measure fields blank, even though one or more of its fixed length sections are collision-prone by the CM method.

```
KMMARK:          4.0   4.1   4.2   4.3   4.4   4.5   4.6   4.7   4.8   4.9
```



A and B are both Fixed Length Collision-Prone Sections. The Extended Collision-Prone Section extends from 4.0 to 4.8, but a section of the Fixed Section Length starting at 4.2 is not collision-prone.

- indicated with an “E” in the SecType column of the CSV output.
- identifiable on the PDF report (and the CSV output) by a section length greater than the specified Fixed Section Length.

Worst Fixed Section

- the Fixed Length Collision-Prone Section within an Extended Collision-Prone Section with the highest number of collisions.
- when there are > 1 Fixed Length Collision-Prone Sections in an Extended Collision-Prone Section with the highest number of collisions, the FIRST one will be identified as the Worst fixed Section.
- appears on a separate line in the PDF report, following the Extended Section which contains it.
- indicated with an “W” in the SecType column of the CSV output.

Node Spanning

- Collision-Prone Sections may span nodes, as long as both connecting segments are Continuous at the Node.

7.10. Specified Section Analysis

Specified Section Analysis produces collision statistics for specified sections of highway. A "section" may be as large as an entire highway (or all the highways in the Province), and may be as small as a single location.

The statistics produced are written to a CSV file, and are similar to those produced by the Collision-Prone Sections program: counts, collision rates, collision severity ratio etc. Optionally, the collision rates for a section may be calculated as in the Collision-Prone Locations program: in units of Collisions per Million Vehicles, instead of Collisions per Million Vehicle-Kilometres.

The sections must be defined in a Section Definitions File. Sections defined therein may be given identifiers, and may have individually specified date ranges. Traffic volumes, average collision rates and landmark types may be specified in the SDF, if you wish to over-ride the data looked-up in CIS.

Selected and *Excluded* collision subsets can be created with this program. Selected collisions are those which fall into one or more of the specified sections.

Specified Section Analysis parameters are specified on a series of screens starting with CIS670.

Column-headings in the output CSV file can be looked up in the Definition of Output Values section.

7.11. Critical Collision Rate Calculation

A **Critical Collision Rate** (CR), for a location or section is calculated as follows:

$$CR = X_R + k\sqrt{\frac{X_R}{V} + \frac{0.5}{V}}$$

where:

X_R is either the standard, road-weighted or severity-weighted Average Collision Rate for the reference group - depending upon which critical rate is being calculated.

V is the traffic exposure: million vehicles for locations, million vehicle-kilometres for sections.

k is a constant looked up on the following table from the user-specified **Level of Significance**:

Level of Significance	K

0.01%	3.719
0.05%	3.290
0.10%	3.090
0.50%	2.576
1.00%	2.326
5.00%	1.645

Critical Collision Rates are calculated by the Collision-Prone Locations, Collision-Prone Sections, Specified Sections Analysis and Rate Table analysis programs IF a file of Average Collision Rates is provided. See Rate Table - Critical Collision Rates.

7.12. Section Definition Files

The Section Definitions File (SDF) is a Comma-Separated-Values (CSV) file which defines the highway sections to be analysed. The idea is that the section definitions be compiled in a spreadsheet program (e.g. Excel) on a PC, exported to a CSV file, then uploaded to the Collision Information System.

The *columns* in the spreadsheet become *field*s in the CSV file. The word *field* is used in the following description.

The fields in the SDF must be identified in a heading record, which must be the first non-blank record in the CSV file. The fields may be in any order, and additional fields may exist in the file without causing any problems. The Specified Section Analysis program will simply ignore any fields whose names it does not recognize. Many of the fields which the program *does* recognize are optional.

Following is the smallest possible Section Definitions file, for the analysis of a single location:

```
seg,km1,km2
0304,1,1
```

This specifies that the location at km 1.0 on segment 0304 is to be analysed.

The following example would have exactly the same effect:

```
Priority,Km1,km2,Shoesize,Segment,Engineer,Highway
7, 1.0,1.0,13,0304,Smith,17
```

The following defines the same location, and also a section from km 1 to km 2.5

```
seg,km,km2
0304,1,1
0304,1,2.5
```

Following are descriptions of all the fields which are recognized by the Specified Section Analysis program. Some field names have aliases which are also recognized. The field names are not case sensitive. Only **seg1** and **km1** (or one of their aliases) are mandatory. An optional field is "omitted" for *all* sections by omitting the field heading (i.e. omitting the entire column). A field can be omitted for a single section by simply having a null or blank field.

Seg1 = Seg, Segment, Segment1

- the LKI segment number of the start of the section.
- leading zeros are optional.

Km1 = Km, KmMark, KmMark1

- the Km offset (on Seg1) of the start of the section
- decimal point is optional
- will be rounded to 1 decimal place, if > 1 specified.

Seg2 = Segment2

- the LKI segment number of the end of the section.
- leading zeros are optional.
- if omitted Seg2 to is set to Seg1
- Beware: If Seg2 does not follow Seg1 in the Segment Search Sequence, all intervening segments in the sequence will also be selected!.

Km2 = KmMark2

- the Km offset (on Seg2) of the end of the section
- decimal point is optional
- will be rounded to 1 decimal place, if > 1 specified.
- if omitted, Km2 is set to the end of the segment2 (specified or assumed)
- if coded as 999.9, the length of segment Seg2 will be automatically substituted.

IncOpp = Include Opposing = IncOpposing

- this is a Yes/No field. "Yes" is indicated by any string which starts with Y or y. Anything else means No.
- If Yes is indicated, any segments which are opposite the primary section defined by Seg1, Km1, Seg2, Km2 will be included as part of the "section".
- e.g. if you define a section which is one side of a divided highway, then coding Yes will cause the corresponding section on the other side of the highway to be included.
- coding Yes when there is no opposing segment will have no effect.
- Seg2 must not already be opposite any of the segments in the Seg1 to Seg2 range.
- See Segment Search Sequence to understand Segment Ordering.
- If the primary section includes one or more nodes, the length (0.1 km) and traffic volume of those nodes will be accumulated again if the opposing segments also include those nodes.
- the included opposite sections are added as extensions to the primary 1-way sections: the lengths are added, the traffic volumes are averaged in.
- the PrimLength and OppLength output fields may be of interest if this option is used.

ID = Project, ProjectID, GroupID

- may contain any characters *(Restriction: as of Nov 2018, CIS requires integers.)*
- may be up to 20 characters long.
- if omitted, a numeric ID is generated.
- need NOT be unique, i.e. multiple section records may have the same ID.
- WARNING: Excel will not open a csv file whose first characters are ID!

Date1

- earliest date for selecting collisions for this section.
- may be in any of the following formats:

```
yyyymmdd
yyyy-mm-dd
yymmdd
yy-mm-dd
```

- if omitted, the start of the date range of the input collision subset is used.

Date2

- latest date for selecting collisions for this section.
- same formats as Date1.
- if omitted, the end of the date range of the input collision subset is used.

ADT = AADT

- Average Daily Traffic count to use in calculating collision rates.
- if omitted, or if = 0, the CIS traffic volume for the section and date range is used.

Loc/Sec

- any string starting with an **L** indicates that *Location-type* collision rate calculations are to be done. I.e. the collision rates will be in units of Collisions per Milliion Vehicles. For *Calculated Critical Collision Rates*, the *Location* average collision rate (if not specified) will be looked up according to the highway class at the start of the section, and using the looked up or specified Landmark Type.
- any string starting with an **S** indicates that *Section-type* collision rate calculations are to be done. I.e. the collision rates will be in units of Collisions per Million Vehicle-Kilometres. For *Calculated Critical Collision Rates*, the *Section* average collision rate (if not specified) will be looked up according to the highway class at the start of the section. (Note that the section length used is the end km minus the start km plus 0.1 km.)
- If omitted or blank, **Section** is assumed.

LmkType = Landmark Type

- Landmark Type, used for looking up Location average collision rates.
- If omitted, the landmark type at the *start* of the section will be looked up.
- Ignored for Section calculations.

AveRate = Average Rate

- Average Collision Rate, used for calculating Calculated Critical Collision Rates.
- If omitted, the Average Collision Rate is looked up by Highway Class and (for Location calculations) Landmark Type, on the Location and Section Average Collision Rate files.

RWAveRate = RW Average Rate

- Road-Weighted Average Collision Rate, used for calculating Calculated Road-Weighted Critical Collision Rates.
- If omitted, the RW Average Collision Rate is looked up by Highway Class and (for Location calculations) Landmark Type, on the Location and Section Average Collision Rate files, as specified on the PARF panels.

SWAveRate = SW Average Rate

- Severity-Weighted Average Collision Rate, used for calculating Calculated Severity-Weighted Critical Collision Rates.
- If omitted, the SW Average Collision Rate is looked up by Highway Class and (for Location calculations) Landmark Type, on the Location and Section Average Collision Rate files, as specified on the PARF panels.

Note = Notes, Description

- The contents of this field are copied through to the output CSV file. (If necessary the information is truncated to 98 characters on output.)

7.13. Definition of Output Values

The following table describes values and statistics which may be found in CIS output: reports and CSV files, listed by the headings found in the reports and CSV output files.

Heading	Description
ADT	Average Daily Traffic - for the data period at the location or for the section. - blank if no traffic volume data available
Area	MoT Contract Management Area
ASR	See CSR.
AveRate	Average Collision Rate
Class	Highway Classification - if the class changes over a section, the Predominant Highway Classification will be shown, followed by '*****' - if the class changed over the Data Period, the Class which was in effect for more time than any other will be shown, followed by '**!**' - if the class changes over both time and section, the class will be followed by '**%**'
ClassTimeChange	Y or N to indicate whether the Highway Classification changed over the time period of the collision query.
Clsn Rate (Trad) Rate	Traditional Collision Rate
CSR	Collision Severity Ratio
Clsn-Rate - Rwtd	Road-Weighted Collision Rate
Clsn-Rate - Swtd	Severity-Weighted Collision Rate
CM Area	MoT Contract Management Area
CM Clsn Type	Counter-Measure Collision Type CPL and CPS output: • if any counter-measure collision types were specified, and if any of those collision types were over-represented, then these fields are filled. • if more than one collision type was over-represented, the *most* over-represented collision type is put in the TYP column. • the collision type ratio, expressed as a percent, is put into the % column. E.g. if a quarter of the collisions at this location were of the offending type, then the percent column would contain 25.
CM Clsn Ratio CM Ratio	Counter Measure Collision Type Ratio The number of collisions of one CM Collision Type divided by the total number of collisions.
CM Clsn %	The Counter Measure Collision Type Ratio expressed as a percent. I.e. the CM Clsn Ratio times 100.
CompClass	Composite Highway Classification
CritRate	Critical Collision Rate
Date1, Date2	Start and end dates of the collision query.
Dist	MoT District
Fatals / Clsn Fat#Clsn	The number of collisions in which there were one or more fatalities..
Fatals / Kld	The number of fatalities (people killed)

Fat#Kld Fat#Fat	
Fatals / Inj Fat#Inj	The number of peple who were injured in collisions involving fatalities
Group ID	For CPL, CPS and SSA output, this is an identifier for a location or section. Collisions in "Selected" output subsets will have this ID in the GroupID field in the collision record. This allows for subsequent analysis of the collisions by location or section.
Highway	LKI Highway
IncOpposite	For sections specified on just one of a segment pair, this field will contain a Y or N to indicate whether the Opposite Section has been included.
Injury / Clsn Inj#Clsn	The number of non-fatal collisions in which there were one or more injuries.
Injury / Inj Inj#Inj	The number of people who were injured in non-fatal collisions.
Km, KmMark	LKI KmMark
Km1, Km2	KmMarks of the start and end locations of a section.
Length	The Length of a section. For sections where collision rate and other statistics are provided, such as CPS and SSA output: • the Length will be the end km minus the start km + 0.1 km. This is because the collision locations are coded to 100m accuracy, so collisions which occurred 50m outside each end of the strict definition of the section will be included. For CPS output: • the Length will be greater than the user-specified section length for Extended Collision-Prone Sections.
LmkType	Landmark Type
LocType	Location Type
Node	LKI Node
OppLength	Opposite Length - when a section has been specified on just one segment of a segment pair, the Opposite Length is the length of the opposite section.
PDO	Property Damage Only collisions. (I.e. no fatalities or injuries)
PDO#Clsn	Number of Property Damage Only collisions
PrimLength	Primary Length - when a section has been specified on just one segment of a segment pair, the Primary Length is the length of the actual section specified.
Rate / Crate	Collision Rate Ratio
Reg	MoT Region
RW AveRate	Road-Weighted Average Collision Rate
RW CritRate	Road-Weighted Critical Collision Rate
RW Rate	Road-Weighted Collision Rate
SW AveRate	Severity-Weighted Average Collision Rate
SW CritRate	Severity-Weighted Critical Collision Rate
SW Rate	Severity-Weighted Collision Rate
SecType	Section Type (in Collision-Prone Sections output): N - Normal S - Short(er than the specified fixed length) E - Extended W - Worst normal or short section in an extended section
Segment	LKI Segment
Seg1, Seg2	LKI Segment numbers of the start and end locations of a section.
Number / Clsn #Clsn	Number of collisions (e.g. of a location or section)
Number / Veh	Number of vehicles involved in all the collisions (e.g. of a location or section).

#Veh	
Type (on CPL report)	On the Collision-Prone Locations (CPL) report, this field indicates the type of location, how it was identified, and whether it overlaps with a previous collision-prone location. There are 3 sub-fields in the Type field: **Overlap Indicator** - an asterisk indicates an overlap. **LOC or LMK** - indicates whether the location was identified as a potential CPL by a Location Type match or a Landmark Type match. If both matched, LMK will be displayed. **Type Code** - If preceded by "LOC" - the Location Type from a collision record. If preceded by "LMK" - the Landmark Type at the location which matched the specified CPL criteria.
Volume	Total number of vehicles over the entire data selection time period. This is the ADT multiplied by the number days in the period. May be zero, if no traffic volume data is available.

8. Collision Rate Table

8.1. Rate Table – Introduction

The Collision Rate Table has columns for user-specified Highway Classification Sets, and rows for user-specified traffic volume ranges. Each cell of the table contains Average Collision Rates and (optionally) other statistics. The statistics in each cell are calculated using collision data from sections of highway with a Highway Classification and traffic volume in the ranges defined for that cell.

For a general discussion of average collision rates, see Average Collision Rates.

Following topics contain detailed desciptions of how average collision rates are calculated by the Rate Table.

It is important to note that the results depend upon the input Collision Subset:

- the results reflect only sections of highway included in the Search Path of the Subset,
- only collisions which are in the Subset are counted,
- the date range of the Subset is used to determine traffic volumes.

There are three different calculation methods. One is by highway SECTIONs, and there are two different LOCATION methods. (The LOCATION methods can be used to get collision rates at intersections.)

The basic colllision rate provided in the table is called a Weighted Average Collision Rate, because (in the SECTION case), the collision rate of each section is weighted by its length and traffic volume. Collision rates in the two other types of tables are weighted by traffic volume only.

Below is a conceptual example, showing the general layout:

	Highway Classification Sets			
Traffic Volume Ranges (ADT)	1	2	3	4
	U EF	R EF	* C	*
0 - 5000	1.23	1.56	0.67	2.34
5001 - 10000	2.34	2.34	1.56	0.56
7000 - 50000	1.23	2.34	2.56	1.67

This is a simple example. The following topics explain the following additional features:

- various other rates and statistics which may be included in each cell of the table,
- details of the three different types of rate calculations,
- the optional Class-Rate report.

8.2. Rate Table – Optional Cell Information

The basic item in each cell of the Rate Table is called the Weighted Average Accident Rate. Additional information may be requested on the Rate Table screen (CIS710). The complete list of possible cell contents are shown below.

Note that “A” for Accident is used (instead of “C” for Collision) in formula symbols.

Option on Screen CIS710	**Option Details**	**Symbol in Formulae**
(not optional)	Wtd. Avg. Collision Rate	WAAR
Statistics	Mean Clsn. Rate Standard Deviation (Sigma) N (# Sections) for Locations: For Location calculations, each Location is considered a 0.1 km section, so “N (# Sections)” is the number of locations in the sample.	MAR SIGMA N T
Fatal & Injury Collision Rates	Wtd. Avg. Fatal Clsn. Rate Wtd. Avg. Injury Clsn. Rate	WAFAR
Victim Rates	Wtd. Avg. Fatality Rate Wtd. Avg. Injury Rate	
Victim Counts	Number of People Killed Number of Injured People	

Road-Weighted Rate	Rate using Road Causal Factor instead of 1	RWAR
Road-Weighted Fatal Rate	Fatal Collision Rate using Road Causal Factor	RWFAR
Severity-Weighted Rate	Rate using Fatal, Injury and PDO weights	SWAR
Collision Severity Counts	# Fatal Collisions # Injury Collisions # PDO Collisions	
Collision Severity Percents	% Fatal Collisions % Injury Collisions % PDO Collisions	
Total Number of Collisions	Total Number of Collisions	

For Section Calculations Only:

Total Length	Total Length (km)	L
Calculated Critical Collision Rate		
Calculated Road-Weighted Critical Collision Rate		
Calculated Severity-Weighted Critical Collision Rate		

For Location and Landmark collision rate calculations, the Total Length is the length of highway which was scanned for locations with collisions (i.e., the length of the search path falling within each cell).

8.3. Rate Table – Calculation Types

The Collision Rate Table calculation type is specified on the initial Collision Rate Table Report screen CIS700.

There are two basic Collision Rate Table calculation types: SECTION and LOCATION.

There are two types of LOCATION calculations: LOCATIONS WITH COLLISIONS and LOCATIONS AT LANDMARKS. These types are sometimes called simply LOCATION and LANDMARK, respectively, when a shorter name is needed.

The SECTION calculation involves collision rates calculated over sections of highway, in units of collisions per vehicle-kilometers.

The LOCATION calculation deals with collision rates at individual locations, in units of collisions per vehicle. The difference between the two LOCATION methods is a matter of what is considered a 'Location' for the purposes of the Rate Table.

In the LOCATIONS-WITH-COLLISIONS method, every location (segment-kmmark) which is represented by one or more collisions in the input collision subset is considered. Therefore, to create a Rate Table with collision rates at intersections, a subset would have to be created containing only collisions at intersections, before running the Rate Table program.

A problem with the LOCATIONS-WITH-COLLISIONS method is that locations (e.g. intersections) which have no collisions will not be represented in the input collision subset, so the resulting average collision rates will not have been influenced by those collision-free intersections. Thus, the collision rates will be higher than the true intersection collision rates.

In the LOCATIONS-AT-LANDMARKS method, landmark types are specified, and the LKI Landmark table is used to determine which locations are included in the calculation. For each section of highway defined in the Search Path of the input collision subset, the corresponding section of the Landmark table is scanned for locations of the specified type(s). The important features of this method are:

- Only collisions at those qualifying locations are counted. (All other collisions are ignored.)
- **If there are no collisions at a qualifying location, the zero collision count is included in the calculation of the average collision rate** (thus reducing it).

To summarize, the following defines which locations are included in the Rate Table calculations for the two LOCATION calculation types:

LOCATIONS with COLLISIONS	only those locations with one or more collisions in the input subset are counted
LOCATIONS at LANDMARKS	all, and only, locations at specified landmark types are counted, whether or not those locations have collisions.

When considering which LOCATION method to use, and when interpreting the results, keep in mind:

- the accuracy of Location Code (segment-kmmark) coding by the police,

- the accuracy of the Location Type coding by the police,
- the completeness and accuracy of the LKI Landmark table,
- the processes which have created the input collision subset.

8.4. Rate Table – Section Lengths

By default, the length of each 'section' in the SECTION calculation type is the extent of each section of uniform Highway Classification. Sections cannot span LKI Segments.

Optionally, maximum section lengths may be specified for Urban and Non-Urban highway classes, so that long sections are broken artificially into a series of smaller sections. This increases the sample size (N), and therefore makes Mean Collision Rates and Standard Deviations more meaningful. When a section spans multiple traffic volume zones, the volume for the section is obtained by averaging the volumes, weighted by zone lengths. So breaking long sections into short sections will reduce the amount of volume averaging, which may be desirable if the rate table is being divided into volume ranges.

Notes:

- Nodes are considered to be short sections, 0.1 km. long.
- A section break is created when there is a change in ANY of the Highway Classification categories, not just the categories used to define dht Rate Table columns.
- If a Highway Classification changes during the period of the collision subset, the classification in effect for the majority of the period of the collision subset is used.

8.5. Rate Table – Symbol Definitions

This topic defines the symbols and acronyms used in the Collision Rate Table formulae in following topics.

The following terms are used in the symbol definitions:

Accident	is synonymous with **Collision.**
Section	a Node, or a section of highway with uniform Segment number and uniform Highway Classification.
Location	a Node, or a location on a highway denoted with a Segment and a KMMARK.

For a set of Sections or Locations within a defined Highway Classification Set and Traffic Volume range (i.e., within a particular cell of the Rate Table):

MAR	Mean Accident Rate (defined below)
WAAR	Weighted Average Accident Rate (defined below)
WAFAR	Weighted Average Fatal Accident Rate - calculated as WAAR but counting only fatal accidents (fatal ACCIDENTS, not FATALITIES)
RWAR	Road-Weighted Accident Rate (depends on the road weights in each accident record)
RWFAR	Road-Weighted Fatal Accident Rate - calculated as RWAR, using only fatal accidents.
SWAR	Severity-Weighted Accident Rate - calculated as WAAR, but with fatal, injury and PDO accident counts weighted by 100, 10 and 1 respectively.
RS	Section Accident Rate
RL	Location Accident Rate

i	is the index of a section.
j	is the index of a location within a section.
k	is the index of a location throughout all sections.
l	is the index of an accident within a section, among all accidents at a location, or among all accidents at all locations.
A_i	is the number of Accidents in section i.

	- for Location-Landmark calculations, this includes only those accidents which are at specified Landmarks. - for Fatal accident rates, this includes only fatal accidents.
B_{ij}	is the number of accidents at location j in section i.
B_k	is the number of accidents at location k.
L_i	is the length of section i.
V_i	is the traffic Volume of section i.
V_k	is the traffic Volume of location k.
W_{il}	is the road Weight of accident l in section i.
W_{kl}	is the road Weight of accident l at location k.
W_l	is the road Weight of accident l.
W_{fat}	is the Fatal accident weight (e.g. 100)
W_{inj}	is the Injury accident weight (e.g. 10)
W_{pdo}	is the Property Damage Only accident weight (e.g. 1)
M_i	is the number of locations in section i.
N	is the Number of sections.
T	is the number of locations in all sections.
P_i	is the number of accidents in section i.
P_k	is the number of accidents at location k.
Q	is the total number of accidents, at all locations in all sections.
Q_{fat}	is the total number of fatal accidents.
Q_{inj}	is the total number of injury accidents.
Q_{pdo}	is the total number of PDO accidents.
F	is a factor: 1 million for Accident Rates, 100 million for Fatal Accident Rates.

8.6. Rate Table – Weighted Average Collision Rates

This topic describes how the Collision Rate Table program calculates all its collision rates: weighted by section lengths and traffic volume. Road-Weighted and Severity Weighted collision rates have *additional* weighting applied.

A weighted average is an average where each sample is weighted according to some attribute of the sample.

A weighted average of samples x_i where i goes from 1 to N can be expressed as:

$$\frac{\sum_{i=1}^{N} x_i w_i}{N} \quad where: \quad \sum_{i=1}^{N} w_i = N$$

or as:

$$\sum_{i=1}^{N} x_i f_i \quad where: \sum_{i=1}^{N} f_i = 1$$

If each sample x_i is to be weighted by an associated value v_i, the weighting factor f_i can be calculated as follows:

$$f_i = \frac{v_i}{\sum_{i=1}^{N} v_i}$$

(It is simple to verify that the sum of the f_i equals 1.)

In the Rate Table case where collision rates are calculated by SECTION, the collision rates of individual sections of highway are weighted by the length of the section, and by the traffic volume on the section. In other words, collision rates are weighted by the vehicle-kilometres of the section.

If L is the length of a section, and V is the traffic volume, then for section i, the accident rate RS_i is weighted by L_iV_i. Substituting this into the formula above, we get the following expression for the weighting factor:

$$f_i = \frac{L_i V_i}{\sum_{i=1}^{N} (L_i V_i)}$$

The Rate for Section i (where F is a factor of 1 million) is:

$$RS_i = \frac{A_i}{L_i V_i} \times F$$

So the Weighted Average Accident Rate, over N sections, is:

$$WAAR = \sum_{i=1}^{N} (RS_i f_i) = \sum_{i=1}^{N} \left(\frac{A_i}{L_i V_i} \frac{L_i V_i}{\sum_{i=1}^{N} (L_i V_i)} \right) \times F = \frac{\sum_{i=1}^{N} A_i}{\sum_{i=1}^{N} (L_i V_i)} \times F$$

Symbol definitions

8.7. Rate Table – Section Formulae

Collision Rate Table formulae for SECTION type calculations:

$$RS_i = \frac{A_i}{L_i V_i} \times F$$

$$MAR_s = \frac{\sum_{i=1}^{N} RS_i}{N} \times F = \frac{\sum_{i=1}^{N} \frac{A_i}{L_i V_i}}{N} \times F$$

$$WAAR_s = \frac{\sum_{i=1}^{N} A_i}{\sum_{i=1}^{N} (L_i V_i)} \times F$$

$$RWAR_S = \frac{\sum_{i=1}^{N} \sum_{l=1}^{P_i} W_{il}}{\sum_{i=1}^{N} (L_i V_i)} \times F = \frac{\sum_{l=1}^{Q} W_l}{\sum_{i=1}^{N} (L_i V_i)} \times F$$

$$\text{SWARs} = \frac{\left(Q_{fat} W_{fat} + Q_{inj} W_{inj} + Q_{pdo} W_{pdo}\right)}{\sum_{i=1}^{N} (L_i V_i)} \times F$$

Symbol definitions

8.8. Rate Table – Location Formulae

Collision Rate Table formulae for LOCATION type calculations:

In the following equations, derivations are included where appropriate to show how calculations can be done section by section. (Mathematically, sections are irrelevant to LOCATION and LANDMARK rate table accident rates.)

$$RL_k = \frac{B_k}{V_k} \times F = RL_{ij} = \frac{B_{ij}}{V_i} \times F$$

$$MAR_L = \frac{\sum_{k=1}^{T} RL_k}{T} = \frac{\sum_{k=1}^{T} \frac{B_k}{V_k}}{T} \times F = \frac{\sum_{i=1}^{N} \sum_{j=1}^{Mi} \frac{B_{ij}}{V_i}}{\sum_{i=1}^{N} M_i} \times F = \frac{\sum_{i=1}^{N} \frac{A_i}{V_i}}{\sum_{i=1}^{N} M_i} \times F$$

$$WAAR_L = \frac{\sum_{k=1}^{T} B_k}{\sum_{k=1}^{T} V_k} \times F = \frac{\sum_{i=1}^{N} \sum_{j=1}^{Mi} B_{ij}}{\sum_{i=1}^{N} \sum_{j=1}^{Mi} V_i} \times F = \frac{\sum_{i=1}^{N} \sum_{j=1}^{Mi} B_{ij}}{\sum_{i=1}^{N} (M_i V_i)} \times F = \frac{\sum_{i=1}^{N} A_i}{\sum_{i=1}^{N} (M_i V_i)} \times F$$

$$RWAR_L = \frac{\sum_{k=1}^{T} \sum_{l=1}^{P_k} W_{kl}}{\sum_{k=1}^{T} V_k} \times F = \frac{\sum_{i=1}^{N} \sum_{l=1}^{P_i} W_{il}}{\sum_{i=1}^{N} (M_i V_i)} \times F = \frac{\sum_{l=1}^{Q} W_l}{\sum_{i=1}^{N} (M_i V_i)} \times F$$

$$\text{SWAR L} = \frac{\left(Q_{fat} W_{fat} + Q_{inj} W_{inj} + Q_{pdo} W_{pdo}\right)}{\sum_{k=1}^{T} V_k} \times F$$

Symbol definitions

8.9. Rate Table – Critical Collision Rates

The Collision Rate Table program calculates Critical Collision Rates in the same manner as in other CIS programs.

Critical Collision Rate calculation is only an option for SECTION-Type calculations.

The Average Collision Rates used to calculate the Critical Rates are the ones looked up on the specified Average Collision Rate file - **not** the Average Rates calculated in the current run of the Rate Table program! Thus you might perform the following steps in sequence:

1. run the Rate Table program with a large sample of data to calculate average collision rates,
2. put those rates into an Average Collision Rate file, then
3. run the Rate Table program on a smaller sample, using the Average Collision Rate file just populated to calculate critical rates for the smaller sample.

9. Traffic Volume Data Preparation

9.1. Traffic Volume - Introduction

The Collision Information System (CIS) takes as input monthly average daily traffic volumes (MADT) assigned to LKI sub-segments and Nodes. These sub-segments are referred to as Uniform Traffic Volume Sections (UTVS).

The 1987 to 2002 traffic volumes in CIS come from the Highway Accident System (HAS). The HAS traffic volumes came from the old Perm/Short count system, and then the Traffic Information Management System (TIMS). The HAS data included extrapolated data for the years 2003 to 2009. This extrapolated data was initially also used in CIS. In June 2010, the 2003 to 2009 traffic volume was (mostly) replaced with data from the Traffic Data System (TRADAS), administered by Opus International. In early 2021, TRADAS was replaced by a system called "Jackalope". (References to "TRADAS" data" in this document should be understood to include the Jackalope data.)

The traffic count data comes from permanent and short count stations. Short counts are done for only a few weeks, usually in the summer. Data for the rest of the year for those locations is estimated using patterns from from Permanent Counts. TIMS used a regression method, and the current TRADAS uses the Factoring method. The Factoring method is described in the U.S. Department of Transportation Traffic Monitoring Guide, Section 2 (Introduction to Traffic Monitoring), Chapter 4.

CIS stores separate traffic volumes for Nodes. As of June 6, 2010, node volumes for all years are calculated (prior to loading into CIS) as described in the Traffic Volume At Nodes topic.

See the Traffic Volume Calculations section for details on how CIS calculates volumes from the provided data.

9.2. Traffic Volume - User Expectations

It is important for CIS users to understand that CIS is not guaranteed to provide accurate traffic volume data for any given location. Most of the data we have comes form short counts - counts taken for about two weeks in the summer, and extrapolated to the entire year using statistical techniques. After that, over half of MADTs are obtained by interpolation or extrapolation within the MADT time series. (64% for years 2003 – 2021.)

It is currently up to the CIS user to verify that the traffic volumes which CIS provides are suitably accurate for the research being done, in the area of study. There is a utility for extracting from CIS the traffic volumes for any segment. (Under Reports on the CIS main screen, or from the Reports menu, select Volume Data Extract)

If you are not happy with the volumes, contact the CIS Administrator for information on the how particular traffic volumes were determined.

(Note that the Specified Section Analysis program allows user-specified traffic volumes to be used instead of the CIS traffic volumes.)

9.3. Traffic Volume Data Preparation, 1987-2002

The 1987 to 2002 traffic volumes in CIS come from the final product of the Highway Accident System traffic volume sub-system. This topic describes how that data was prepared.

The HAS traffic volumes came from the old Perm/Short count system, and later from the Traffic Information Management System (TIMS). TIMS supplied 1-directional data at single points. 12 Monthly Average Daily Traffic (MADT) counts were provided for each point and year. Data was not provided for every month, or every year, for every point.

TIMS also supplied counter location information: descriptive and also some LKI (Segment & Km) locations.. TIMS was missing many of the LKI locations, and many were not consistent with the HAS version of the LKI. Consequently considerable effort went into a version of the counter location data which was consistent with the LKI.

Directional and lane counts were combined as required to get one count for all lanes of the LKI segment at the counter location. This was done in MS-Access, before the data went into HAS.

If traffic volumes at a count station were missing for one or more months or years, the HAS traffic volume preparation programs attempted to fill the data in as follows:

- the first year of data may be duplicated back one year,
- the last year of data may be duplicated forward one year,
- missing years are filled by interpolation. (Missing monthly counts are interpolated using that month's counts in previous and following years.)

To map the station counts to sub-segments:

First: a program attempted to calculate a single monthly traffic volume for each highway segment, by averaging data from count stations on, or adjacent to, each segment. This is done on a yearly basis: all the counters which have any data for a year are used to calculate the MADTs for that year. This process relies on having correct LKI locations for count stations. Since not all segments have count stations, this does not cover all segments. The file of data produced is referred to as SEGVOL1.

Second: the-Sub-segment Counter Map is implemented, producing traffic volumes for all the sub-segments and years defined therein. This data is merged with the data in SEGVOL1 to produce a more detailed traffic volume file called SEGVOL2.

Following are the number of on-LKI traffic count points for which TIMS-provided data. (Before any in-filling.)

Year	Perm	Short	Total
1987	19	461	480
1988	19	546	565
1989	21	528	549
1990	23	560	583
1991	33	489	522
1992	42	534	576
1993	50	510	560
1994	52	284	336
1995	52	537	589
1996	53	353	406
1997	53	278	331
1998	52	418	470
1999	58	406	464
2000	59	357	416
2001	65	302	367
2002	61	100	161

9.4. Traffic Volume Data Preparation, 2003 +

For years 2003 onward, the traffic volumes for CIS come from the Traffic Data System (TRADAS), a system developed by Chaparral Systems Corporation. All the TRADAS-related data processing is done by Opus International.

TRADAS itself does not provide MADTs for short counts. The methods used to create full sets of MADTs from short counts is described in the following document on the MoT LAN:

P:\HQ\ENG\Safety - Highway Engineering\CIS\Volume\AutomatedCountProgramTechnicalReview.pdf

(where drive p is mapped to: \\Nimbus.idir.bcgov\S3018).

The following is a description of the processing done in 2010 for the 2003 to 2009 traffic volume data. In following years the process is expected to be similar, with the UTVS LKI transformation being for just one LKI version change.

For the 2003 to 2009 traffic volumes, Opus provided to Cypher Consulting two sets of MADTs, one for Perm counts, and one for Short counts. Each MADT is identified with a UTVS ID, year and month.

After transforming the UTV Section definitions to the 200907 LKI, and loading the provided MADTs into an MS-Access database, the following processing was done to prepare the data for CIS:

The volumes were copied from the original to the CIS-compatible UTV Sections, halving them where a section had been split.

An interpolation / extrapolation in-fill process was run to fill in as many missing MADTs as possible.

The following table shows the number of 200907 LKI UTV Sections with at least one MADT, in the data provided by Opus International, from TRADAS: (Total number of UTV Sections = 667)

Year	Perm	Short	Total
2003	117	125	242
2004	124	0	124
2005	124	283	407
2006	125	159	284
2007	124	216	340
2008	130	107	237
2009	121	0	121

9.5. Traffic Volume – In-Filling 2003 +

The sparse MADTs for years 2003 on, provided by Opus International from the TRADAS system, are interpolated / extrapolated before loading into CIS, using the following algorithm:

For each TRADAS MADT time series starting from 2003 (where each UTVS-month is a separate time series):

Case 0: 7 years of data:
- nothing to do.

Case 1: no TRADAS data, got HAS extrapolated data.
- copy in the HAS extrapolated data

Case 2: no TRADAS data, no HAS extrapolated data.
- nothing to do, volumes remain missing

Cases 3 to 5: 3 to 5 years of TRADAS data:
- FILL* using all TRADAS points

Cases 6: 6 or more years of TRADAS data,with at least one year missing
- FILL* using all TRADAS points

Case 7: 2 years of data, pre-2003 HAS data exists
- call the 2 points T1 and T2
- find the latest HAS MADT up to 2002, call it H
- FILL* using H, T1 and T2

Case 8: 2 years of data, no HAS data:
- FILL* using the two TRADAS points (T)

Case 9: 1 year of TRADAS data, HAS data exists
- find the latest maximum of 4 HAS points in years 1995 to 2002
- FILL* using the HAS data and the single TRADAS data point

Case 10: 1 year of TRADAS data, no HAS data.
- copy the 1 volume to the other 6 years..

* FILL Algorithm:
- fit a line straight through the provided points using linear regression.
- interpolate from the line, within the envelope of each spanning pair of data points.
- extrapolate forwards using values from the line, inside an envelope with a lower limit of of the last data point, and an upper limit of a line starting at the last data point and increasing 10% per year. (If the line slope is negative, the last data point is simply copied forwards.)
- extrapolate backwards using values from the line, inside an envelope with an upper limit of the first data pont, and a lower limit of a line starting at the the first data point and decreasing 10% per year. (If the line slope is negative, the first data point is simply copied backwards.)

Fill Volume Results (June 2022, years 2003 to 2021)

Case	Count
0	373
1	84
2	0
3	867
4	1020
5	955
6	3922
7	829
8	26
9	324
10	24

100801 MADTs filled, out of a total of 158340 (63.7%)

9.6. Traffic Volume – At Nodes

The Highway Accident System (HAS) calculated Node volumes by simply averaging the adjacent volumes on the segments named in the node name. (This was acknowledged to be crude, but the plan was for node volumes to be defined with a node counter mapping. This manual job was never done.)

These HAS node volumes were initially copied into CIS.

In June 2010, node volumes were re-calculated, for all years, using the algorithm descibed below. The idea being to sum the volume ENTERING the node.

Node volume calculation algorithm:

For null nodes, use the adjacent UTVS volume.

For all other nodes, sum:

- half the volume of a 2-way UTVS beginning or ending at the node
- the entire volume of a 1-way UTVS ending at the node
- none of the volume of a 1-way segment beginning at the node.

For the null node case, and the case of a simple connection of two 2-way segments, this duplicates what HAS did.

But for other nodes, especially those with more than 2 connecting LKI segments, it can result in higher volumes at the node.

Note that this process does NOT include volumes entering a node from non-LKI roads.

There are some anomalies at the boundaries of provincial jurisdiction. E.g hwy 17 at Tolmie the volume is half of what it "should" be because only the s/b hwy 17 volume is counted. Refinements may be implemented in the future to eliminate such anomalies. (Send suggestions or examples to the CIS Administrator, identified on the CIS Launch page.)

9.7. Uniform Traffic Volume Sections

The Uniform Traffic Volume Sections (UTVS) used in TRADAS were defined in 2004 (or there abouts). The section definitions are the responsibility of the Construction and Maintenance Branch, Traffic Data Program.

For use by CIS, UTV Sections must be defined according to the version of the LKI current in CIS, and no UTVS may span multiple LKI segments. The following is done (at Cypher Consulting) after each LKI version is released, to create the CIS-compliant set of UTV Sections:

- The old UTVS LKI start and end-points were run through an LKI transformation procedure to get end points according to the new LKI.
- Where the resulting UTVS span an LKI Segment break, the UTVS is broken in two.
- Where the LKI segment has been split lengthwise into single-direction LKI segments (e.g. for divided highways), the UTVS is split into two, with a flag set to indicate that volumes from the old UTVS should be halved before assigning to the new UTVSs.
- Various other start and end-point adjustments are done manually to reflect highway changes.

For the 200907 LKI, this resulted in the 641 old UTV Sections being expanded into 667.

For the 202107 LKI, there are 702 UTV Sections.

9.8. Traffic Volume - Counter Mapping

Counter Mapping was a Highway Accident System mechanism for applying point traffic counts to sub-segments. (This was done years before the MoT UTVSs were defined.) This is relevant to CIS, because the pre-2003 CIS traffic volumes are the product of the HAS traffic volume system. Thus the pre-2003 UTVSs in CIS are defined by this counter mapping.

Sub-segment traffic volumes are defined by specifying up to 8 Count IDs, and a weighting factor for each. (A weight may be negative to use a counter to reduce a traffic volume.) This is called a Counter-Subsegment Map, because the volumes of individual Counters are mapped to sub-segments. The traffic volume for the sub-segment is calculated by summing the individual weighted traffic volumes.

Each Counter Map has a year range attached, so that the mapping can be year-specific.

The counter mapping was originally (1995) done by regional Highways personnel. In 2002 it was updated using counter mapping done by Peter Lyall (APEX Engineering), with MoT Regional review and input. Subsequently it was maintained by Cypher Consulting to keep up with LKI revisions.

9.9. Traffic Volumes - Extrapolation of HAS Data

In the Highway Accident System (HAS), the traffic volumes for years past 2002 were obtained by extrapolating from the previous years' volumes. This extrapolated data was copied into CIS. Most of this extrapolated data was replaced in June 2010 with data from TRADAS, but in places where no TRADAS data was available, this extrapolated HAS data remains.

The extrapolation was done on the Station (point) volumes, before they were fed into to the HAS Traffic Volume processing sub-system. It was the final product of that system which was copied into CIS.

The extrapolation algorithm is as follows:

```
For each MADT time series:
   If the series extends to year 2000 or later
      If there are at least 3 counts in the last 5 years
         - Fit a straight line through the last 5 years
         - extrapolate to year 2008, on the line
         - limit extrapolated values to an envelope of 10% per
           year applied to the maximum value at the last year with
           data.  (For negative slope extrapolation use the mininum
           value instead.)
      else
         - duplicate the last count, through to 2008.
      endif
   endif
endfor
```

Note: "last 5 years" means the 5 year period up to and including the last year for which there is data.

Here are the stats on the last extrapolation (done in April 2009):

```
42744 MADT series (# stations * 12)
20760 extrapolations done on MADT series.
1574  extrapolations limited by 10% envelope.
3108  MADT series extended by copying last count.
```

10. Traffic Volume Calculations

10.1. Traffic Volume Calculations - Introduction

In the CIS database, where data is complete, 12 Monthly Daily Traffic Volumes (MADT) are stored for each year, for one or more Uniform Traffic Volume Sections (UTVS) within each LKI segment. Likewise MADTs are stored for each year for each LKI Node.

The preparation of the Traffic Volume data is described in the previous "book" of this Help system.

When determining the Average Daily Traffic (ADT) or Total Volume for a highway section and time period for reports and collision rate calculations, CIS programs must accomodate the following complications:

- The number of MADTs available in a particular year for a particular UTVS or Node may be anywhere between zero and 12.
- The number of UTV sections, and their start and end points, may vary from year to year.
- An LKI Segment, in a particular year, may be completely covered by UTV sections, partially covered by UTV sections, or have no UTV sections at all. (See Coverage Statistics.)
- The date range for the calculation may start and end on any day of the year. (The date range is usually the "Collision Period" of a collision subset, specified on screen CIS100.)
- A month range e.g. June to August, or November to February, may be specified, in which case only volumes from those months should be used. (The month range is that of a collision subset, specified in the query on screen CIS210.)

Starting with CIS version 1.7, if any MADT is missing for any sub-segment or node in a specified section and time span, the result is "No Volume Available". (The idea is that all interpolation and extrapolation should be done prior to loading into CIS.)

Note: the algorithms described in the following sections are derived from Highway Accident System documentation and PL/I code. The actual implementation in CIS may be slightly different, but the effect should be the same.

10.2. Traffic Volume Calculation – Internal Sub-Segments

An "internal sub-segment" is any contiguous part of an LKI Segment which does NOT include a Node.

Given:

- LKI segment number
- start and end km of the sub-segment
- start and end dates
- a month range (which may span the year end)

For each year in the date range:
  For each UTVS spanned (fully or partially) by the sub-segment in that year:
    For each MADT which is in the year, the date range, and the month range, obtain:
      V - the MADT
      D - the number of days which are in the month (and in the date range),
      K - the distance (in kms) of the portion of the UTVS which is in the sub-segment.
      VDK = V * D * K
      Accumulate totals in Total_VDK, Total_DK

To check to see if any MATDs were missing, or any length not covered by UTVSs, we calculate:
  L - the length of the sub-segment
  N - the number of days in the date range
  Complete_DK = N * L

If Total_DK < Complete_DK, then return zero (No Volume Avalailable)

The Total Volume – the total number of vehicles which (theoretically) drove from one end of the sub-segment to the other, in the date and month rages – is calculated as:
  Total_Volume = Total_VDK / L

(Total_Volume has units of "vehicles" because V represents vehicles PER DAY. The units of K and L are kms, so they cancel. D in VD cancels the PER DAY, leaving Vehicles.)

  The Average Daily Traffic (ADT) over the whole date range and subsegment can then be calculated by dividing the Total Volume by the number of days in the date range:
  ADT = Total_Volume / N

*Note that if ADT is an integer, a fractional part of the result will be lost, so ADT * N may not exactly equal Total_Volume. Total_Volume is usually recalculated as ADT * N before reporting. When accumulating many Total_Volumes, it makes sense to do the ADT * N recalculation once at the end, but considering the number of significant figures in a Total_Volume number, it probably is of no consequence (e.g. for a Collision rate) if and when it is done.*

10.3. Traffic Volume Calculation – Nodes

Given:

- an LKI Node name
- start and end dates
- a month range (which may span the year end)

Obtain all the MADTs for the node in the date range.

For each MADT which is in the month range, obtain:

V - the MADT
D - the number of days which are in the month (and in the date range),
VD = V * D
and accumulate the totals in Total_VD and Total_D

Calculate:

ADT = Total_VD / Total_D

Total_Volume = ADT * N

... where N is the number of days in the date and month ranges.

10.4. Traffic Volume Calculation – Section of a Search Path

Introduction

The ADT of a Section is calculated as the length-weighted average of all the ADTs of the sub-segments and nodes which comprise the Section.

A "Section" in this context:

- is any part of the Search Path of a collision subset.
- may be a single node, a single non-node location, an internal sub-segment, or it may span one or more nodes and segments.
- is defined by a start location and an end location (each defined as a segment and kmmark).

When the start and end locations are on different segments, the subset Search Path defines what sub-segments and nodes between the two locations were searched for collisions by the collision query which created the subset. The Search Path is obtained from the collision Subset History

Algorithm

Given:

- a collision subset history
- section start and end locations (as segment & kmmark)

Extract the date range, month range and Search Path from the subset history.

Find the search path elements which contain the section start and end locations.

For each search path element completely or partially in the Section:

For search path element type:
Seg: get the sub-segment Volume of the part of the subsegment which is inside the Section
Node: get the Node Volume

Accumulate (using Length = 0.1 km for a node):
Total ADTK = ADT times Length in km (0.1 km for a node)
Total_K = Length

Calculate:

ADT = Total_ADTK / Total_K

Total_Volume = ADT * N

(N being the number of days in the date and month ranges)

11. CIS Administrator Screens

11.1. Screen CIS840 – Code Table Management

No Help Yet

11.2. Screen CIS850 – Collision Import Box

Description:

This is a CIS Administrator screen, not accessible to most CIS users.

This screen is used to manage batches of MV6020 data from ICBC: loading the text data files, validating the LKI locations, and promoting collisions with valid LKI locations to the CIS collision tables queryable by CIS users. (CIS_COLLISION_EXT is the top level table of promoted collisions.)

Validation:

The objective is to get the Jurisdiction field set to 1 (Provincial) on all on-LKI collisions, and to get valid LKI location codes on as many of those as is practical, using primarily the LKI location code (if provided), the Latitude and Longitude (if provided), and the textual ON and AT information (if provided). For Fatals, the police detachment which filed the MV6020 is phoned if necessary.

For details, see document:
CIS_Update_Instructions.docx
in the folder on the MoTI LAN specified at the end of topic: CIS Documentation.

Field and Button Descriptions:

Upload New	Use the Browse button to select a text file of MV6020 collision data obtained from ICBC.
Batch Name	Typically a 6-digit year and month of the month in which the data-entry was done at ICBC. E.g. "202106" for data entered in June 2021. Prefix that with an "R" for batches of "Replacement" records - records entered at ICBC in previous months, but edited (i.e. changed) during the indicated month.
Description	Normally left blank. Enter a description to explain special cases.
Load Now	Make sure that the Batch Name is correct, then click to load the selected text file of MV6020 collision data.
FIND COLLISION: Case Number	To open a particular collision in the currently selected batch, enter the MV6020 case number (8 characters, with no leading or trailing blanks), then press the Find button.
Current Batch	Use the drop-down button to select the batch of collision data to work with. NOTE: A batch with all valid locations (eg a test batch, or small batch of replacement collisions) is classified as "Completed", so is not shown in the drop-down list until the **Show Completed Batches** box is checked.
Show Completed Batches in List	Check this box. See the NOTE in the above Current Batch description. In future versions of CIS (post 3.2.0) this field will be replaced, or be checked by default.
Delete Batch	If a batch was loaded in error, or if for any reason you want to reload a batch, this button can be used to delete a batch of loaded data from the CIS_ICBC tables. *** This will wipe out any validation work which has been done on the batch.* *** If any collisions in the batch have been promoted, the collisions will NOT be deleted from the promoted collision tables.*
COLLISION FILTERS	These checkboxes filter the collisions shown in the lower portion of the screen. After changing the selections, click the Refresh button.
Status	• The **Validated**, **Rejected** and **Failed** Status checkboxes correspond to codes VAL, REJ and FAILV in the CIS_ICBC_COLLISION_STATUS_TYPE table, pointed to by the ICBC_COLLISION_STATUS_TYPE_ID field in CIS_ICBC COLLISION table.

	• There is no such explicit **Promoted** status stored. A collision is considered Promoted if the CIS_ICBC_COLLISION table field COLLISION_EXT_ID is not NULL. (COLLISION_EXT_ID points to the promoted collision in the CIS_COLLISION_EXT table.)
Jurcode	These checkboxes filter on the JURCODE field in the Working (i.e. edited) copy of the record in the CIS_ICBC_COLLISION_DETAIL table.
Severity	These checkboxes filter using the TOTALINJ and TOTALKLD fields of the CIS_ICBC_COLLISION_DETAIL table. (These fields cannot be edited, so whether the Original or Working copy of the record is used makes no difference.)
MVB Locn	MVB_LOCN is an 11 character field of the CIS_ICBC_COLLISION_DETAIL table consisting of the LKI Highway, Segment and KMMARK fields as coded on the MV6020. This field is not changed when the HIGHNUM, HIGHLET, SEGNUM and KMMARK fields are edited, so checking the "Non-Blank" box selects collisions where *something* was originally coded in any of the LKI location fields on the MV6020.
Refresh	This button re-applies the filter specified in the COLLISION FILTERS checkboxes.
Validate Selected	This button re-runs the validation procedure on the selected collisions.
Reject Selected	Sets, in table CIS_ICBC_COLLISION, ICBC_COLLISION_STATUS_TYPE_ID to 2 = Rejected from Import ICBC_CLLSN_JRECTION_TYPE_ID to 7 = Manual Rejection by User on the selected collisions.
Promote Selected	Starts a batch job to promotes the selected collisions. ("Promotion" is described below.) Since a maximum of 100 collisions are displayed at a time on this screen, this promote method is limited to promoting 100 collisions at a time.
Promote All Validated Jur 1 Collisions	Starts a batch job to promote all the collisions in the batch which are validated, and have Working (edited) copy jurisdiction = 1
Update Collision Geometry	It is unclear why this button is on this screen. In a test on 2021-11-10 it started a batch job which ran for 1 second and did not appear to do anything.
Case Number	Click on a Case Number to open the collision for editing.

When a collision is Promoted:

- a new row is created in the CIS_COLLISION_EXT table.
- the ID of that new row is also stored in the COLLISION_EXT_ID field of the CIS_ICBC_COLLISION, linking the ICBC data with the promoted data, and indicating that the ICBC collision has been promoted.
- the data in the CIS_ICBC tables for the collision is copied into the CIS_COLLISION_EXT row, and its many sub-tables.
- for each version of the LKI currently in CIS (normally PUBLISHED and ARCHIVED) a row is created in the CIS_COLLISION_LKI_LOCATION table, with the Segment and Kmmark transformed, if necessary, to the target LKI version. The BC Albers coordinates of the LKI location is also calculated, using the segment geometry in the CIS_LKI_SEGMENT_GEOMETRY_EXT table, and stored in the GEOMETRY field.

Notes:

- Collision data validation always uses the PUBLISHED LKI, no matter which LKI is selected on the LKI Management screen.
- If a collision is:
  - promoted in batch A,
  - later deleted from the promoted tables (e.g. using screen CIS851),
  - re-uploaded and promoted in batch B

  the collision will show as "Validated" (not Promoted) in batch A.
  (See the notes on the Status checkboxes in the table above for an explanation.)
- When a promoted collision is deleted (using screen CIS851), the COLLISION_EXT_ID in the corresponding row in the CIS_ICBC_COLLISION table is set to NULL.

11.3. Screen CIS851 – Edit Promoted Collision

Description:

This is a CIS Administrator screen, not accessible to most CIS users.

This screen is used to delete or update collisions that have previously been promoted through the Collision Data Management promotion process.

It is reached by selecting **Collision Data Management** from the **Data Management** menu or from the CIS home screen, then selecting the **Manage Promoted Collisions** tab.

Usage:

Enter a Case number in the FIND COLLISION Case Number field.

WARNING: leading and trailing spaces are significant, and will cause the search to fail!

Click **Find**

If there are mulitple collisions with the same Case, the Case numbers and dates will be displayed. Select the one you want.

Make corrections as required.

NOTE: SEGNUM and KMMARK are the VALIDATED location code, so enter the location according to the LKI which was in effect at the time of the collision.

Enter a reason for the change in the **Reason** field.

There is no need to detail the actual change made – that is logged automatically.

To save the changes, click the **Save and Update Geometries** button.

Field Descriptions:

Case Number	CIS_COLLISION_EXT.CASE_NUMBER
SEGNUM	CIS_COLLISION_EXT.VALIDATED_SEGMENT LKI Segment number (at time of collision).
KMMARK	CIS_COLLISION_EXT.VALIDATED_KILOMETER_MARK LKI Km distance from start of segment (at time of collision)
DATE	CIS_COLLISION_EXT.OCCURENCE_DATE Date of collision.
TIME	CIS_COLLISION_EXT.OCCURENCE_HOUR, CIS_COLLISION_EXT.OCCURENCE_MIN Time of collision.
POLICECD	CIS_COLLISION_EXT.POLICE_DETACHMENT_TYPE_ID 4-digit Police (detachment) code.
POLICEFILE	CIS_COLLISION_EXT.POLICE_FILE_NUMBER Police file number.
REASON	CIS_COLLISION_EXT_HISTORY_NOTE.TEXT

Buttons:

Find	Searches all promoted collisions for the specified case number The case number must be an exact match, and is not a “wild card” search.
View Audit History	Changes tabs to View Promoted Collision Audit History and pre-loads the data for the collision that is displayed
Delete Collision	Deletes the selected collision, after a confirmation. If confirmed, the collision is deleted and all subsets that reference that collision will no longer be valid.
Save & Update Geometries	Saves the updated Collision information, after a confirmation. Creates a new record to be inserted into the <AUDIT_HISTORY> table containing all changes performed

	Regenerates the geometries for the updated collision Re-transforms all working, published, and archived LKI geometries (Updates or adds records to the CIS_COLLISION_LKI_LOCATION table as required, with the location code re-transformed to the related LKI version.) Invalidates all subsets that reference the changed collision.

Notes:

The "Original" data line is original just for this editing session. If the collision has previously been edited, it is NOT necessarily as originally promoted.

When a promoted collision is updated, all subsets that reference that collision are marked as Not Valid. The subsets will still be usable however, and will reflect the changes just made.

11.4. Screen CIS852 – View Promoted Collision Audit

No Help Yet

11.5. Screen CIS870 – UTVS Management

Each volume data load must contain a complete traffic volume dataset, for all years, nodes and sections.

Screen CIS870 will only allow a load if the Working version of volume data is cleared.

The data load file must be a zip file containing separate CSV files for sections and for nodes.

Section volume CSV files must contain fields:

Segment_Number, start_km, end_km, Year, Month, MADT

Node volume CSV files must contain fields:

Node_Name, Year, Month, MADT

Each CSV files must include a header record.

The CSV file names are not important - the section or node file type is determined from the number of fields.

In the simplest case, the zip file will contain just two CSV files - one for sections and one for nodes. But there may be multiple CSV files, in any order. E.g. there could be separate files for each year.

11.6. Screen CIS880 – LKI Management

Description:

This is an Administrator screen, reached from the **Data Management** menu, or the CIS Home screen CIS000.

This screen is used to load a new version of the LKI as the Working LKI, or to promote or demote loaded LKI versions.

LKI Load File:

The LKI Load file must be a zipped set of XML LKI tables. The XML files, in name and structure, must correspond to their target CIS Oracle tables:

```
CIS_CONTRACT_AREA_LKI_SEG_EXT.xml
CIS_HIGHWAY_CLASSIFICATION.xml
CIS_HIGHWAY_CLASSN_SCHEME.xml
CIS_HIGHWAY_CLASSN_VALUE.xml
CIS_LKI_HIGHWAY_EXT.xml
CIS_LKI_HIGHWAY_LKI_SEGMENT.xml
CIS_LKI_LANDMARK_EXT.xml
CIS_LKI_LANDMARK_LOCATION_EXT.xml
CIS_LKI_LANDMARK_TYPE.xml
CIS_LKI_SECTION_CLASSN_VALUE.xml
CIS_LKI_SEGMENT_EXT.xml
CIS_LKI_SEGMENT_NODE_EXT.xml
CIS_LKI_SEGMENT_SECTION_EXT.xml
CIS_LKI_SEGMENT_TFRM_GRP_EXT.xml
```

```
CIS_LKI_SEGMENT_TRANSFORM_EXT.xml
CIS_LKI_SEG_TFRM_GRP_TRVL_DIR.xml
```

The Transform tables should contain the Delta transform only - i.e the transform from the previous LKI version to the new one.

On the Cypher Consulting workstation (January 2009):

LKI_DATA.mdb	is the master LKI database.
CIS_LKI_empty.mdb	defines the CIS table structures in MS-Access
Convert_LKI_to_CIS.mdb	contains VBA code which links to the LKI_DATA tables, copies CIS_LKI_empty to a new mdb file, copies in all the LKI data, exports to XML files, and zips them.

Field Descriptions:

Set Default LKI... ARCHIVED PUBLISHED WORKING	This selection indicates which version of the LKI is used for subsequent queries in this session. (Each collision has up to 3 locations stored in table CIS_COLLISION_LKI_LOCATION, one for each LKI version.) Note: • the map interface will not reflect the Working LKI, because a corresponding LKI Geometry must be loaded, and that load will not work unless the Working LKI is empty! (That suboptimal feature should be changed one day.) • this selection does NOT affect the validation of loaded collision data, which is always done using the PUBLISHED LKI.
Load "WORKING" LKI using	Enter (or select) the full name of the LKI Load zip file (described above).
Name	Enter a name for the version of the LKI being loaded. E.g. "200806" is the name of the LKI which was released in June 2008. (Longer names are allowed.)

Buttons:

Promote	If an ARCHIVED version of the LKI exists, that version of the LKI, and associated collision locations are discarded. The PUBLISHED LKI and associated collision locations become ARCHIVED. The WORKING LKI and associated collision locations become PUBLISHED. The WORKING LKI becomes empty. (Disabled if there is no WORKING version.)
Rollback	This does the opposite of Promote. ARCHIVED moves to PUBLISHED, PUBLISHED moves to WORKING, and WORKING is discarded. (Disabled if there is no ARCHIVED version.)
Clear WORKING	Deletes the WORKING version of the LKI, and associated collision locations. (Disabled if there is no WORKING version.) • note that sometimes this does not seem to do anything, possibly when there are any other CIS processes going. • if it works, it runs in under 10 minutes. • so if after 10 or so minutes, Working LKI is not clear, try again, maybe late at night.
Load Now	Loads into WORKING the specified LKI file, with the specified name. (Disabled if WORKING is not clear.)
Generate LKI Report	Creates the PDF LKI report which users can obtain using the **LKI Report** link on the CIS welcome screen CIS000

Generate Transform	Re-generates all the Published locations in the CIS_COLLISION_LKI_LOCATION table, using the VALIDATED_LKI_SEGMENT and VALIDATED_KILOMETER_MARK fields in the CIS_COLLISION_EXT table, and the Transform data associated with the Published version of the LKI. This is done in a batch job, which takes about 3 hours.

11.7. Screen CIS890 – LKI Geometry Management

Description:

Field Descriptions:

Set Default LKI.Geometry.. ARCHIVED PUBLISHED WORKING	This selection indicates which version of the LKI Geometry is used for subsequent queries and map displays in this session.
Name	Enter a name (e.g. the LKI version) for this geometry load.

Buttons:

Note that the LKI Geometry and the LKI versions are processed in tandem, because the LKI Landmarks contain geometry (= Lat/Lon locations) calculated from the “LKI Geometry”

Promote	If an ARCHIVED version exists, that version of the LKI geometry is discarded. The PUBLISHED LKI and LKI geometry becomes ARCHIVED. The WORKING LKI and LKI geometry becomes PUBLISHED. The WORKING LKI and LKI geometry becomes empty. (Disabled if there is no WORKING version.)
Rollback	This does the opposite of Promote. ARCHIVED moves to PUBLISHED, PUBLISHED moves to WORKING, and WORKING is discarded. (Disabled if there is no ARCHIVED version.)
Clear WORKING	Deletes the WORKING version of the LKI geometry. (Disabled if there is no WORKING version.)
Load Now	Loads the geometry of LKI segments into WORKING, directly from the CHRIS database. Copies the PUBLISHED LKI into WORKING LKI, and regenerates the Landmark Geometries. Generates WORKING (or copies from published?) collision locations (in table CIS_COLLISION_LKI_LOCATION) and calculates their Lat/Lon locations using the WORKING LKI Geometry just loaded. (Disabled if WORKING is not clear.)
Regenerate Collision Geometries	Using the currently selected version of the LKI Geometry, recalculates the Lat/Lon locations of all collisions for the same version of the LKI. (WORKING, PUBLISHED or, ARCHIVED), in table CIS_COLLISION_LKI_LOCATION. (This is done automatically after a “Load”.)
Regenerate Landmark Geometries	Using the currently selected version of the LKI Geometry, recalculates the Lat/Lon locations of all LKI Landmarks, for the same version of the LKI (WORKING, PUBLISHED or, ARCHIVED), in table CIS_LKI_LANDMARK_EXT. (This is done automatically after a “Load”.)

Notes:

See issues CIS-419, CIS-270, CIS-391.

12. Index

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