# The Highway Performance Monitoring System

## Windows Software Version 6.0
## User's Guide

Office of Highway Policy Information February, 2004

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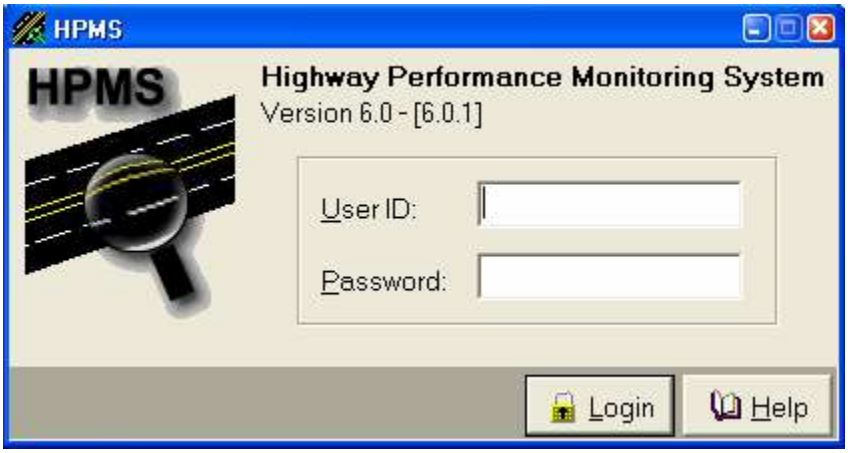
# System Administration

## Starting the System

To start the HPMS software system, go into the HPMS program group and double click on the HPMS for Windows icon.

**Figure 1: Login Screen**




The Login/Security screen will appear.

The Login dialog asks the user to enter both User ID and Password. If the wrong combination of User ID and Password are given, the software will display a warning message indicating the type of problem found. If the correct combination of User ID and Password are entered, the software will go on to the next dialog when you click on LOGIN. When running HPMS for the first time, the security table will be empty. The user **must** enter the User ID *hpmssub* and the Password *june15* to gain access into HPMS. To create new User IDs see Setting Users ID/Security.

The items to be completed are:

- User ID: First time the user enters the system, User ID = **hpmssub**.
- Password: First time the user enters the system, Password = **june15**.

Click on Login to continue.

**Note**: The user must delete the default **hpmssub** user and create user ID's for those who will be using the system. That ID must be used when entering the system after the first session. See Setting User ID/Security Levels.

# The Menu Bar

**Figure 2: Main Menu Bar**

The user can rearrange the lines of the menu bar by clicking on the front of the line and dragging that line to the desired location.

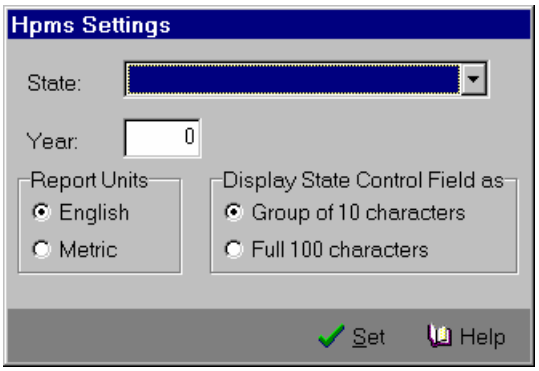
**Figure 3: Rearranged Main Menu Bar**

The line in the middle of the screen contains the speed buttons for Import, Export, Group Records, Section Editor, Calculations and Validations.

# Setting State/Year

When running the HPMS software for the first time, the user is required to set the State, the year for the data you want to manipulate, and the reporting units.

**Figure 4: Setting State/Year Screen**




To select a State, highlight appropriate State name from the pull down menu. Enter the appropriate year, select the reporting units – English or Metric, and select how the State control Field is to be displayed in the EDITOR – Group of 10 characters or Full 100 characters. Click *Set* to save the settings.

The State, year, and display State Control Field can be changed by selecting *Tools|Change State/Year* from the menu bar and entering the new values.

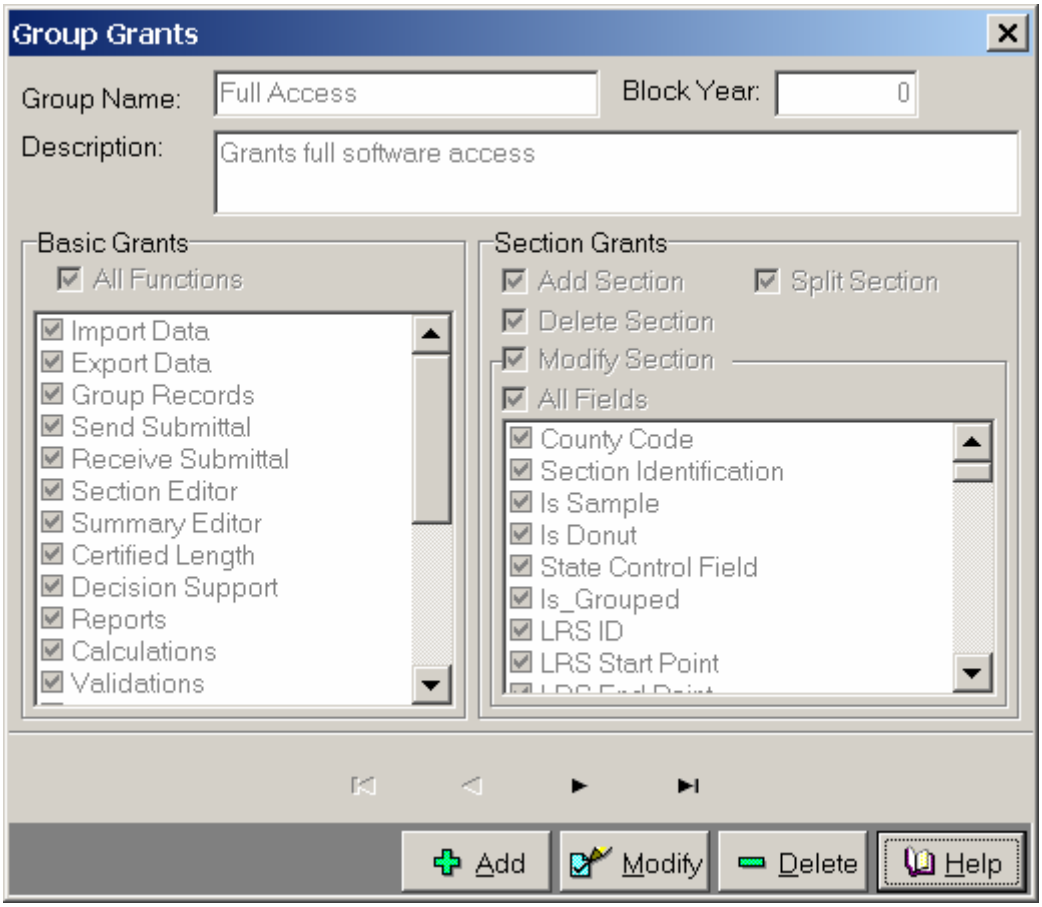
**Note:** The reporting units – English or Metric – **can not** be changed once the HPMS data is imported into the system.

## Setting User ID/Security Levels

A User ID and password should be set for each user of the system. When the user ID is set, security rights to the system must be assigned for that user. Does the user have the rights to use all features of the system – edit the data, modify the data, etc or does the user have limited rights? If a user enters the system by entering the default User ID (hpmssub) and Password (june15), Full Access to the system is granted.

Prior to setting the user IDs (accounts), **Group Grants** (security levels) must be set up for the system. A group is assigned to each user as the ID is assigned. To set the Group Grants, from the menu bar select *Tools|Security|Group Grants*.

**Figure 5: Security Screen – Setting Group Grants**



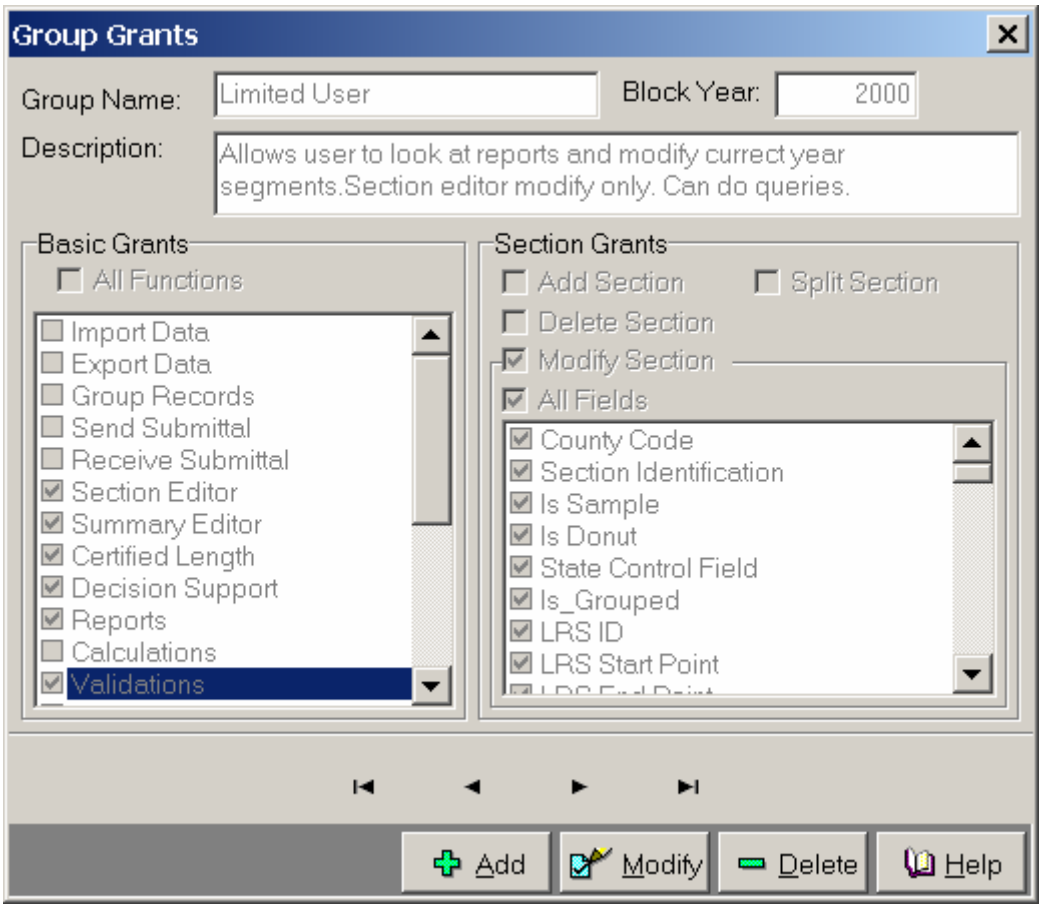

There is no limit on the number of group grants that can be set for the system. Select *Add* to define the group grants (security levels). For each group assign a name, description and what grants are to be assigned to that group. Block Year is coded if the user is not allowed to change the data for the coded year and all prior years. Basic Grants are the functions in the software that the user is allowed to perform. Section Grants are the options in the *Editor|Section* that the user is allowed to perform on the HPMS section and which data

item(s) apply to the options granted. Each group needs to have Basic Grants and if appropriate Section Grants assigned. A check in the box in front of the function or section option enables that feature for the group. If the group has Section Grants, the group can be given rights to all data fields or limited to specific data fields. Once all rights for the group has been assigned, click the *Save* button. To add more groups, repeat the process until all groups are defined. Group Grants can be *Modified or Deleted* at any time by selecting the appropriate option on the screen. Additional Group Grants can be defined at any time by selecting *Add*.

**Note:** Under the Basic Grants is the option to assign a user the right to set User Accounts (IDs) and/or define the Group Grants. There is no limit as to how many users can be granted these rights.

The following screen shows how a group might be set up named Limited User. A user assigned to this group is not allowed to change any data for 2000 or any year in the data table prior to 2000. The user is allowed to modify the data for the current year 2001; however, he or she cannot Add a new section, Delete a current section or Split a current section. This group also allows the user to view Reports, use Decision Support and run the Validation checks.

**Figure 6: Setting up a Group for Limited User**




The next step is to set up the **User Account** (user ID). Select *Tools|Security|User Accounts*.

**Figure 7: Security Screen – Setting User Accounts**

This is the default User Account for the system. This User ID can be deleted from the system **but do not** delete until a user has been set up with **all rights to the system including Security rights**.

Select *Add* to bring up the screen to enter the information for a new user account. Enter the User ID, Password, Full Name, and Phone Number. Select the Group Grants for the user from the pull down menu.

**Figure 8: Security Screen – Adding User Account**

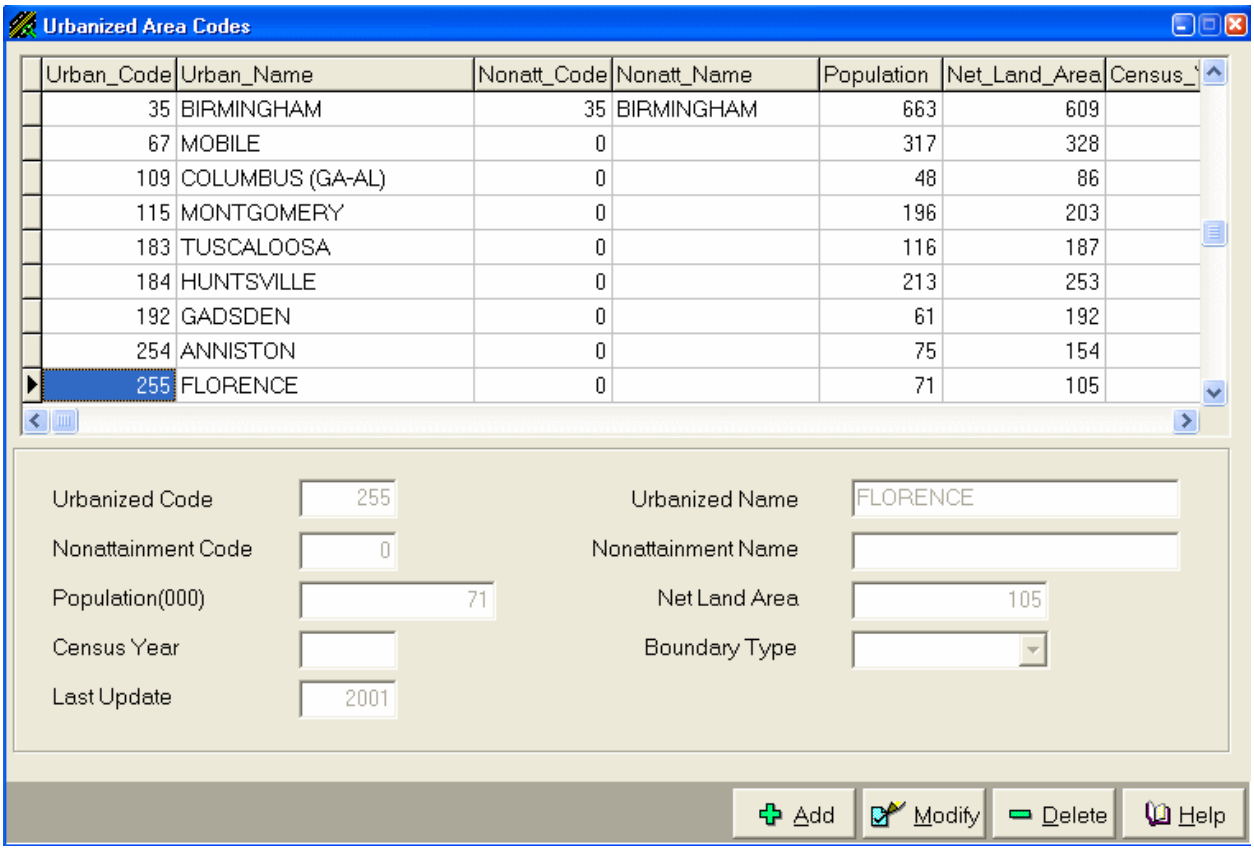
Once all information is entered, *Save* the information. The user account and rights are now set up for the user, Example Guide.

Additional user accounts can be assigned at any time. Current user accounts can be modified to change the group grants or any of the user information, select *Modify*. Users can be deleted from the system, select *Delete*.

# Maintaining Urbanized Area Names

The user **must** maintain the directory with the Urbanized Area names, population, land area, and nonattainment areas that are used in the system. Any new urbanized area **must** be added to the directory along with the population, land area, and if appropriate, the nonattainment area information. The population and land area for each area **must** be updated as needed. Enter the year when the information for the urbanized area was updated. To view or update the urbanized area information select *Tools|Urbanized Area Names.*

**Figure 9: Urbanized Area Codes Directory Screen**




The dialog displays the list of urbanized area codes ordered by urban code ID.

To add a new urbanized area: select *Add*, a blank Urbanized Area Codes screen will appear to enter all the appropriate information. Enter the information and *Save*.

To modify the information for the urbanized area: Select the record that needs to be modified from the list and click *Modify*, update the information and *Save* the changes.

Selecting *Delete* will remove any urbanized area from the directory.

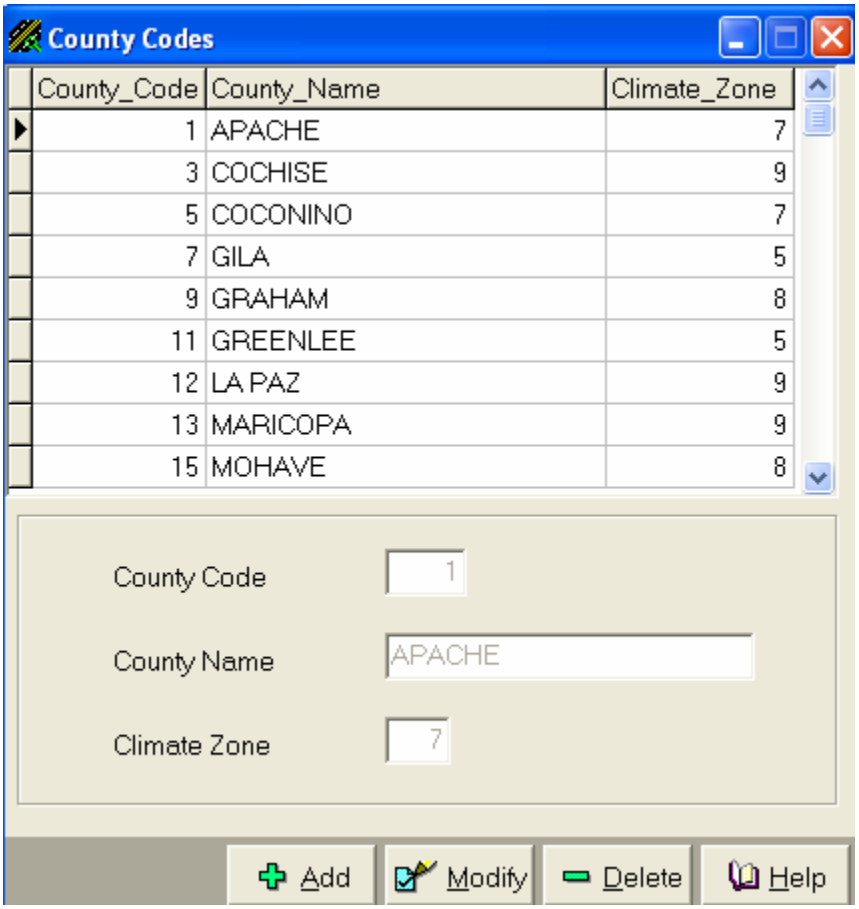
**Note**: Urbanized area codes entered in the HPMS data segments will be checked with the codes in the directory. All codes used in the data **must** be in the directory. <u>The population and land area for the urbanized area **must** be for the current year,</u> this is the only place

where the user enters this information for the urbanized area. All urbanized area codes in the directory must be for current areas in the State. Codes no longer used should be deleted from the directory.

## Maintaining the County Codes

The user **must** maintain the directory with the county codes and county names that are used in the system. Any new county code **must** be added to the directory along with the climate zone. The information for each county **must** be updated as needed. To view or update the county code information select *Tools|County codes*.

**Figure 10: County Codes**




The dialog lists all the county codes which is ordered by the county code ID.

To add a new county code: select *Add*, a blank County Codes screen will appear to enter all the appropriate information. Enter the information and *Save*.

To modify the information for a county code: Select the record to be modified from the list and click *Modify*, update the information and *Save* the changes.

Selecting *Delete* will remove any county code from the directory.

# Putting the Data Table on a Network to Share the Data

**Note:** The program, HPMS6.0, **must not** be running during this process.

The HPMS data can be shared by placing the data table on the network. The software must remain on the desktop computer of each user. Under the FHWA\HPMS6 folder, *Hpms6.mdb* is the table to place on the network server. On the shared drive set up a folder and copy Hpms6.mdb to the folder, for example, *I:\HPMS6DATA\Hpms6.mdb* or *J:\HPMS6\Hpm6.mdb*.

There are two settings that must be changed – the location of the data table in the INI file and the data table setting in the ODBC Data Source.

<u>To change the location of the data table in the INI file</u>*:*
In the FHWA\HPMS6 folder locate the text file Hpms6.ini. This is the file that you need to edit. Since this is a text file you can **edit with Notepad**. The contents of Hpms6.ini are:

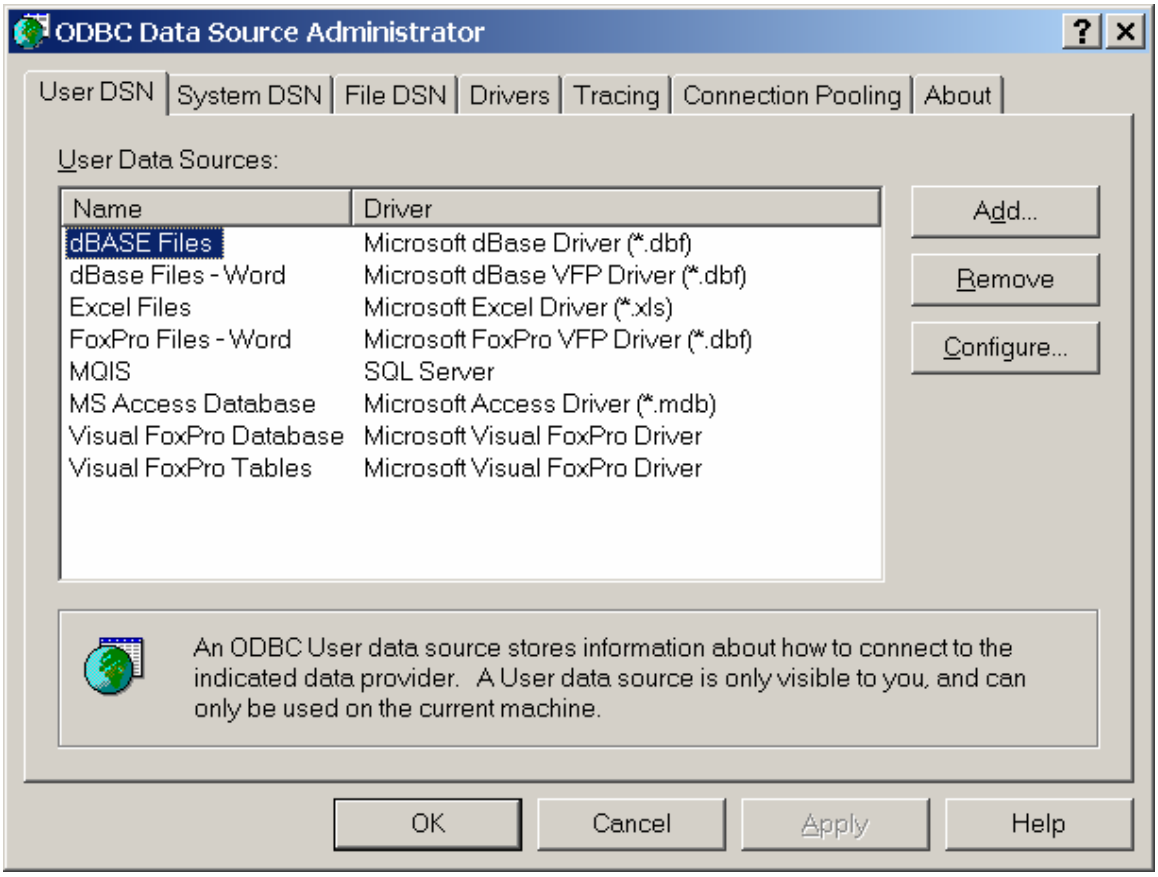
[Database]
Location=C:\FHWA\Hpms6\Hpms6.mdb

Edit Hpms6.ini so that line 2 reads: Location=Drive on network:\folder on network\Hpms6.mdb
Example: Location=I:\HPMS6DATA\Hpms6.mdb
Save the file back into the FHWA\HPMS6 folder on your desktop computer.

<u>To change the setting in the ODBC Data Source:</u>

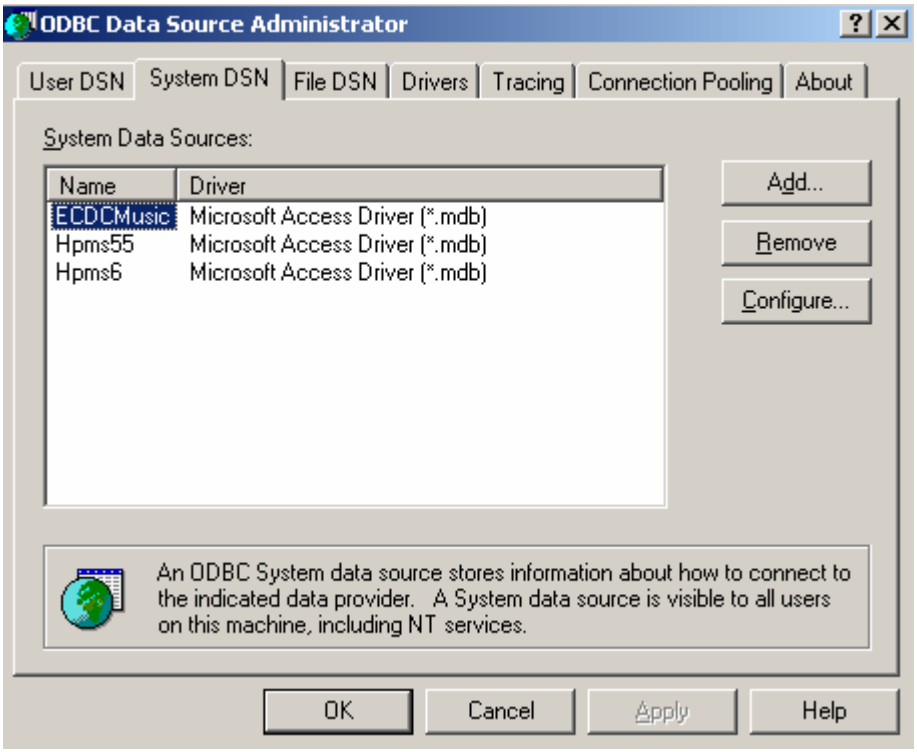
Windows NT 4.0: Go to Start, Settings, Control Panel, ODBC Data Source.
Windows 2000: Go to Start, Settings, Control Panel, Administrative Tools, Data Sources (ODBC)
Open the ODBC Data Source.
You should see the screen below.

**Figure 11: ODBC Data Source Administrator Screen**



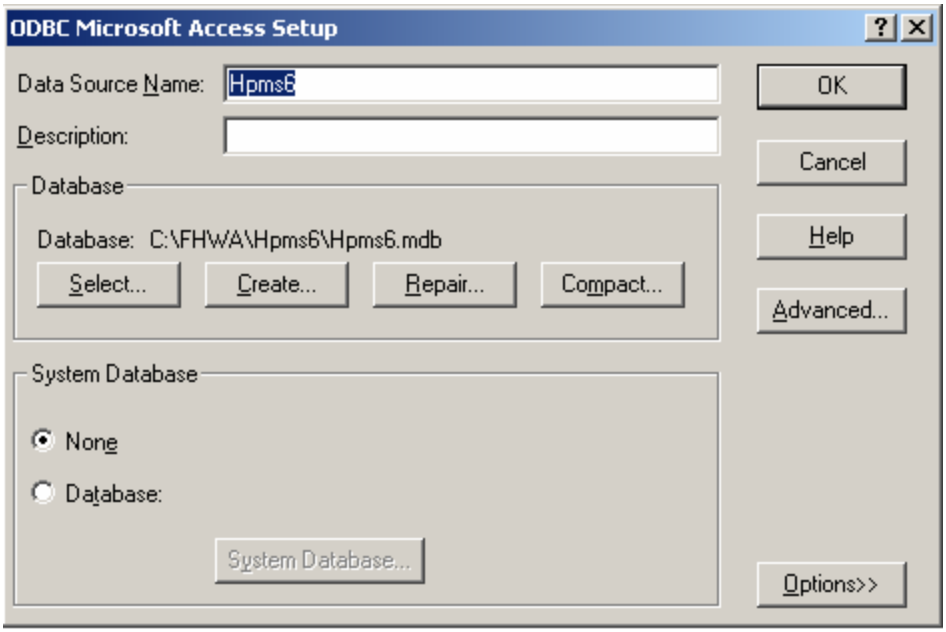

On the ODBC Data Source Administrator screen click on *System DSN* tab.
The next screen will appear.

**Figure 12: ODBC Data Source Administrator Screen with System DSN Selected**



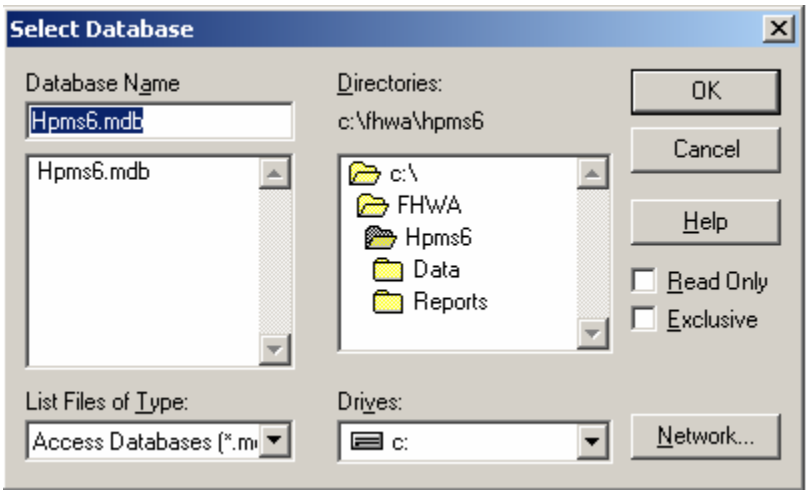

Select *Hpms6* then click on the *Configure* button.

**Figure 13: ODBC Microsoft Access Setup Screen with Hpms6 Selected**




You need to change the setting for the Database: C:\Hpms6\Hpms6.mdb.
On the ODBC Microsoft Access Setup screen, under Database, click *Select*.

**Figure 14: Select Database Screen**




On the Select Database screen

Locate Drive for the server under *Drives*
Locate folder on server where database was placed
Select database *Hpms6.mdb*
Then click OK

On the ODBC Microsoft Access Setup screen under Database, you will see the path. Verify this is correct.
Select OK.
Close the ODBC Data Source Administrator. Close the Control Panel.

**Note:** All users of the data table do not have to use the same letter to map to the network directory. Any letter available on the individual desktop may be used.

## Backing up the Data Table

The user needs to backup the data table to retain a copy of the data. To do this on your desktop computer create a folder to store the backup. Copy *Hpms6.mdb* to the folder. If the data table is on a Network server and the server is backed up each night, the user should not find it necessary to backup the data table.

Backups should be done often when the data is being changed during the process of getting the data ready for sending to FHWA. It is recommended that the backup be done after the Access table has been repaired and compacted. See below.

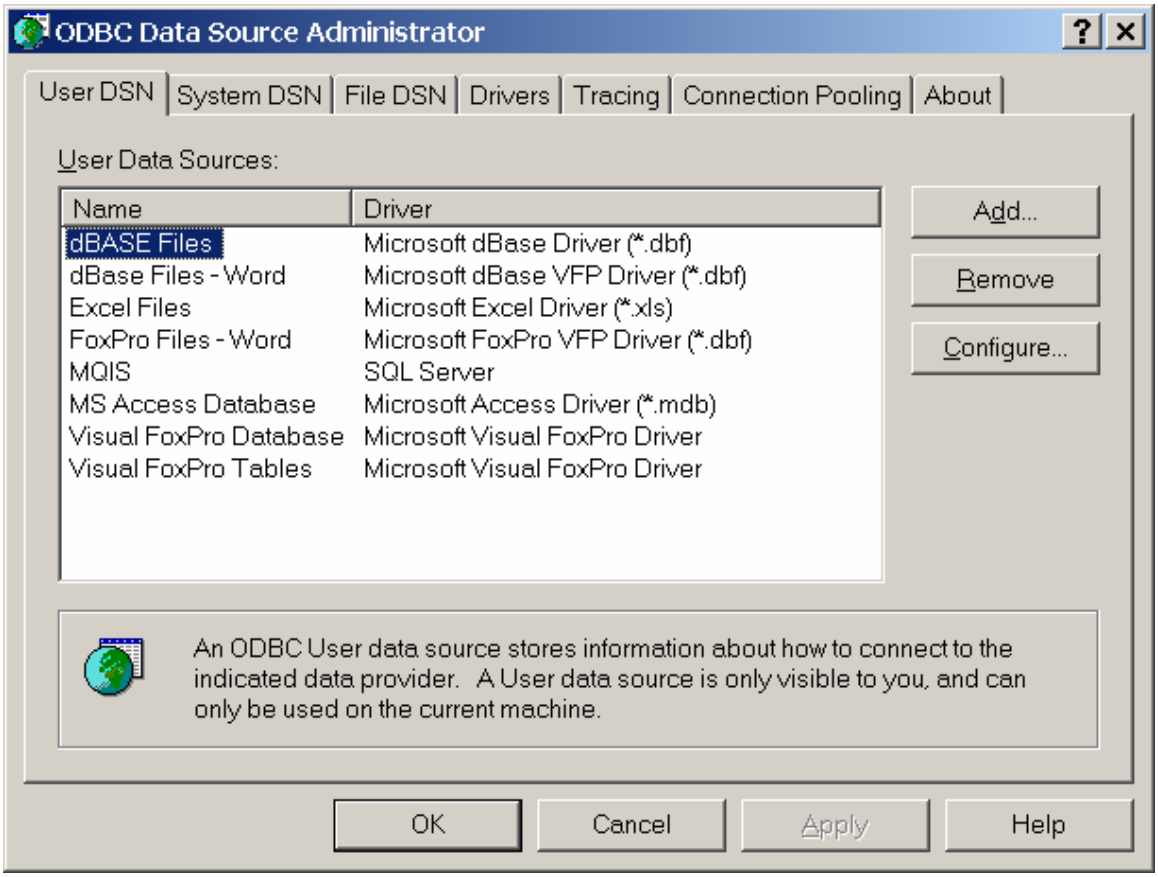
## Maintaining the Access Table

**Note:** only one user should do Maintenance of the Access table. This user is considered the "Keeper of the HPMS Data". The program, HPMS6, **must not** be running during this process. If you have the system on more than one Desktop computer and the data table is on a server, **all** users must be out of the system.

The user needs to maintain the Access table after a major change – Import, Remove Year, Batch Update – to the table. There are two steps to maintaining the Access table – Repair and Compact. It is recommended to do the Repair first; then the Compact.

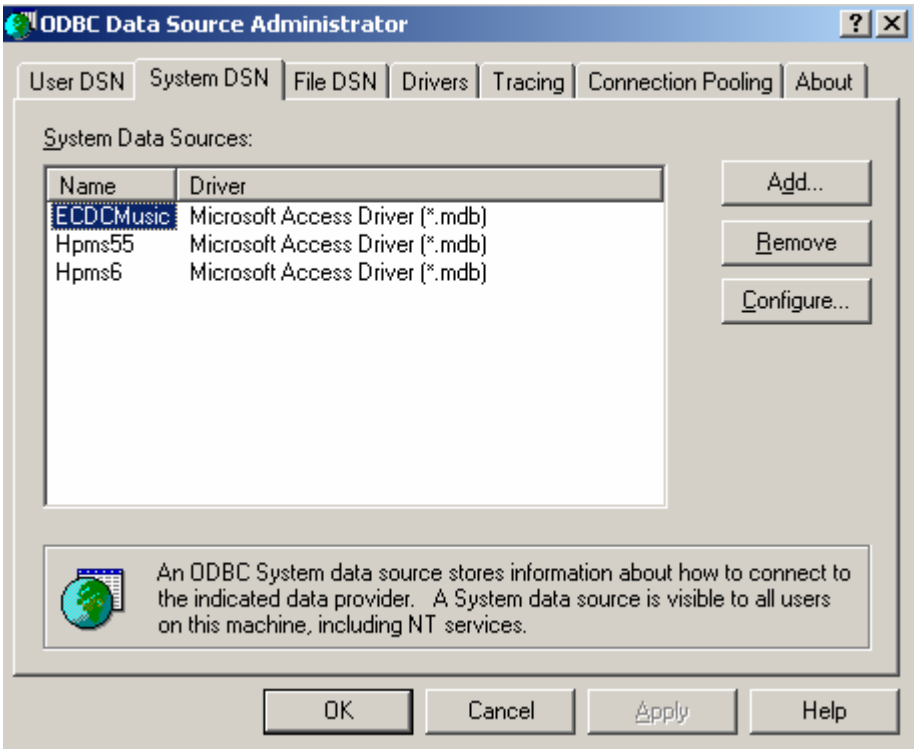
To Repair or Compact the table, go to the Start button, Settings, Control Panel, ODBC Data Source.
Windows 2000: Start, Settings, Control Panel, Administrative Tools, Data Sources (ODBC).

**Figure 15: ODBC Data Source Administrator Screen**



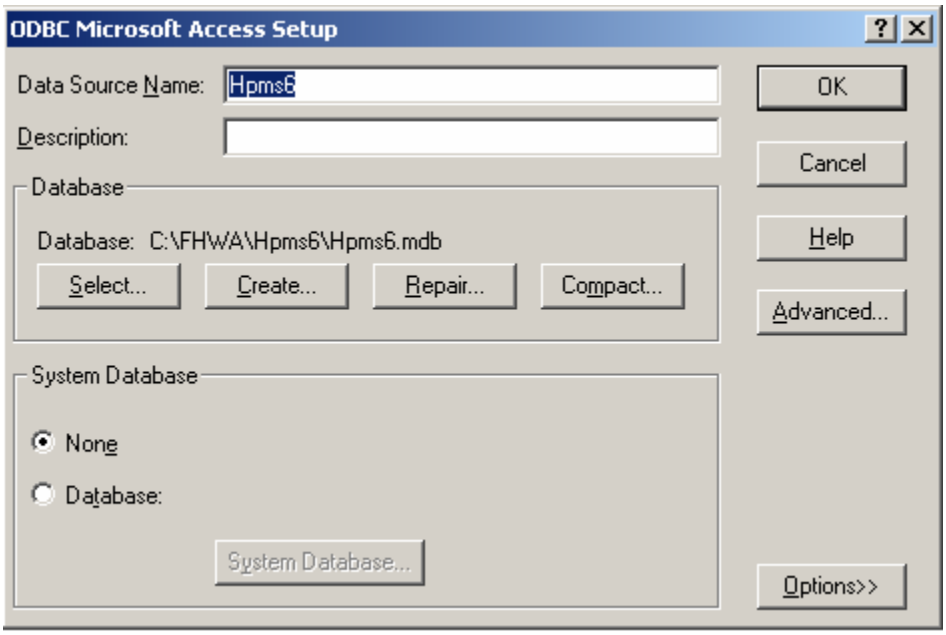

Click on the *System DSN* tab.

**Figure 16: ODBC Data Source Administrator Screen with System DSN Selected**




On the ODBC Data Source Administrator screen, select Hpms6.
Click on the *Configure* Button.

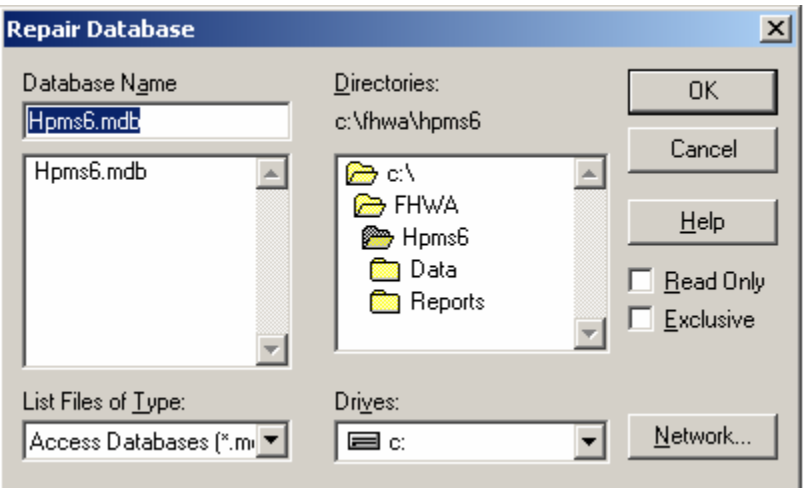
**Figure 17: ODBC Microsoft Access Setup Screen with Hpms6 Selected**



## Repair the table

On the ODBC Microsoft Access Setup screen, click *Repair.*
The Repair Database screen will come up.

**Figure 18: Repair Database Screen**




Click on OK.
The Repair process will start.
A message screen will appear when the process is completed.

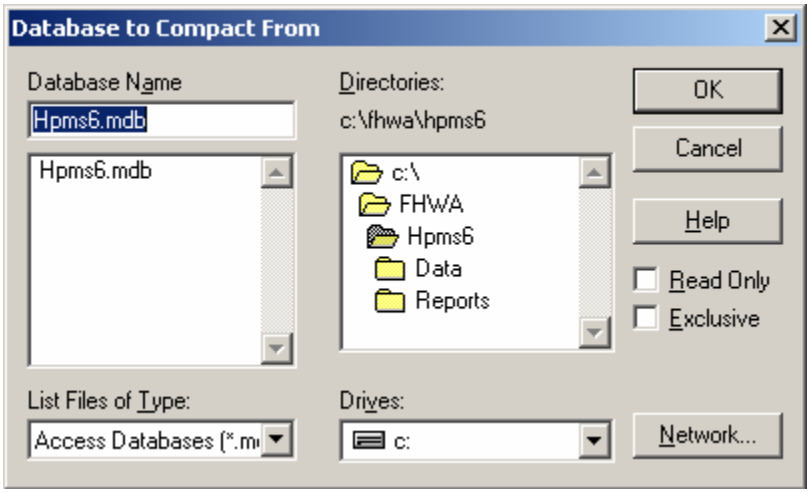
**Figure 19: Screen – Repair Complete**

Click on OK.
The ODBC Microsoft Access Setup screen will appear.

## Compact the table

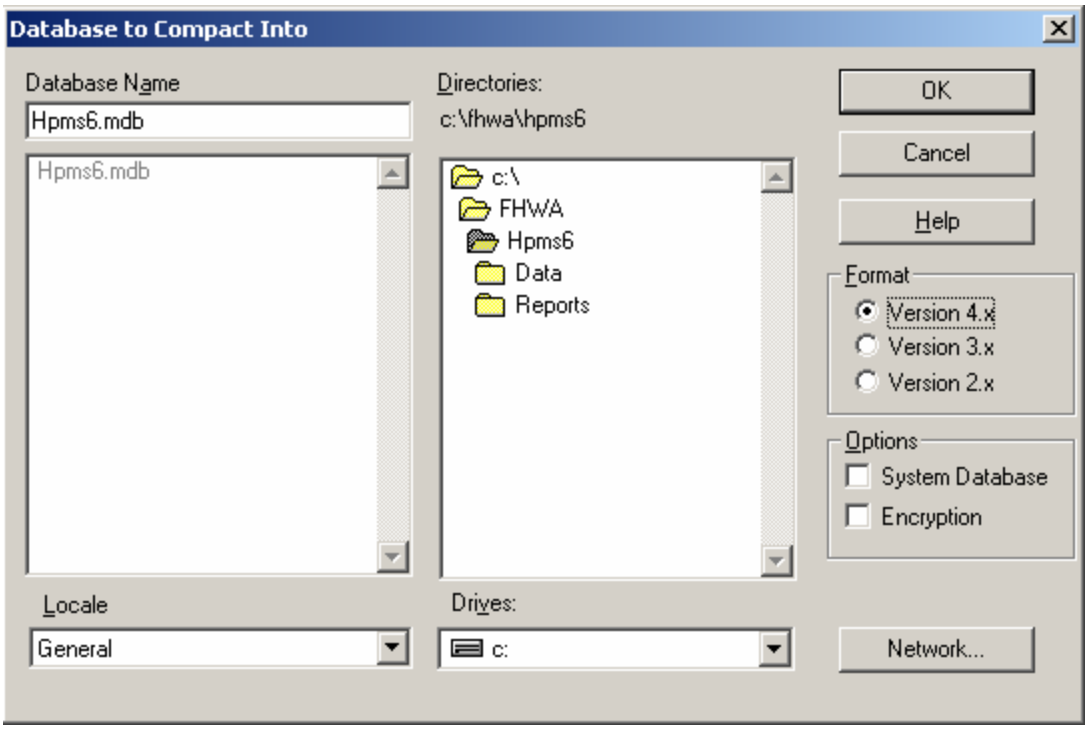
On the ODBC Microsoft Access Setup screen, click on *Compact*.
The Database to Compact From screen will come up.

**Figure 20: Database to Compact From Screen**




On the Database to Compact From screen, verify that the Database Name is correct. Click OK.
The Database to Compact Into screen will come up.

**Figure 21: Database to Compact Into Screen**

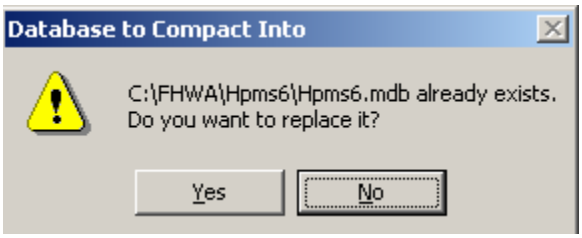



On the Database to Compact Into screen, choose a name and where to put the compact database. The table can be compacted into itself. On the right under *Format* you **must** <u>select Version4.x</u>

Click OK to start the compact process.

The following message will appear if you are using the Hpms6.mdb table for the compact.

**Figure 22: Message Screen - Confirm the Compact**




Click on Yes to continue the compact.

A message will appear when the process is complete.

Click on OK.
The ODBC Microsoft Access Setup screen will appear.
Click OK.
The ODBC Data Source Administrator screen will appear.
Close the screen. And close the Control Panel screen.

# File Menu

## Import HPMS Data

The State's roadway information data prepared for the HPMS submission is imported into the software system as a comma delimited ASCII file. The data must be coded as outlined in Chapter IV of the *HPMS Field Manual, December 2000* and must follow the file description listed in Appendix B.

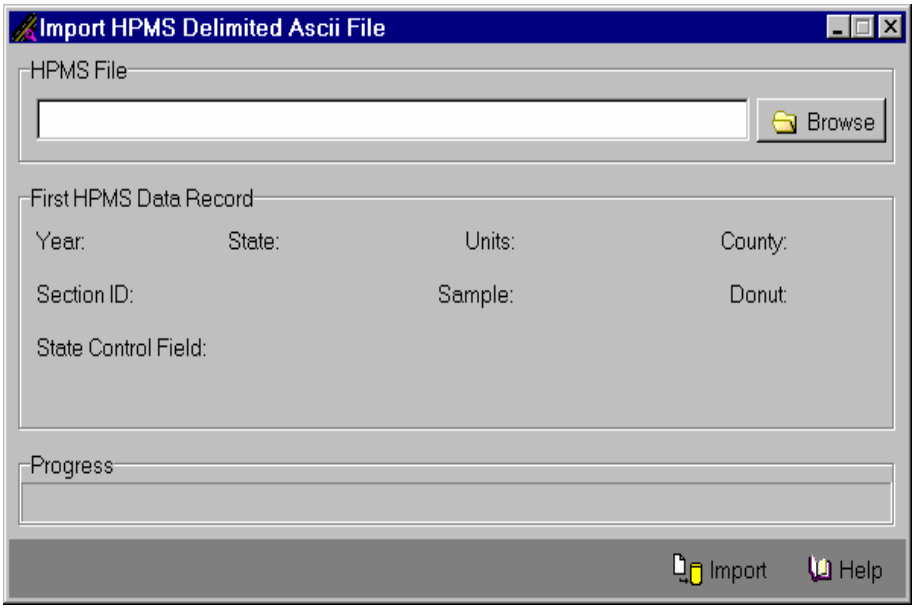
The HPMS data is stored as a Microsoft Access 2000 table (See Appendix C for the table layout). Therefore, each data segment in the file must have a unique Section ID (Item 5) within the county code (Item 4); the Section ID **must not** contain all blanks or all zeros. These data items are two of the record keys for the HPMS table in the Microsoft Access 2000 database. All sample data segments must have a unique Sample ID (Item 47).

The State's historical HPMS data prepared for prior years (1993 – 2001) can be imported from the Access 2000 table used in Version 5.5 of the HPMS Submittal Software. All of the data stored in the Access table, Hpms5.5.mdb, can be imported. The data can be imported for a selected year or for all the years in the table.

### Importing a Comma Delimited ASCII File

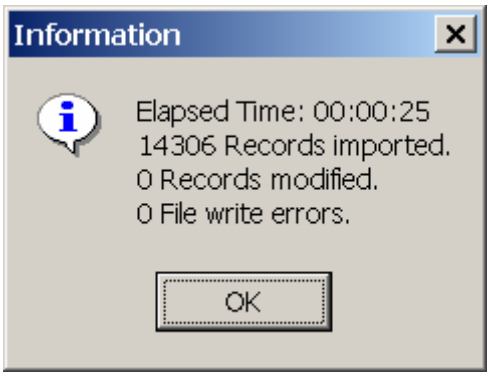
To import the HPMS data into the system as a comma delimited ASCII file select *File|Import|HPMS File Format*.

**Figure 23: Import HPMS Delimited ASCII File Screen**




Enter the HPMS file to be imported using the Browse button or by entering the location and file name. When the file to import is opened the information for the first section in the file is displayed. Click on the *Import* button to start the process.

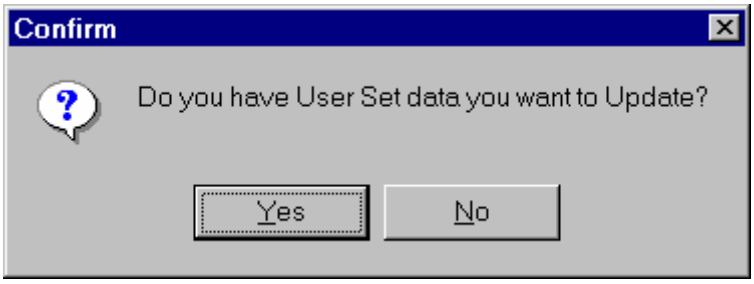
**Figure 24: Information Screen – Number of Records Imported**




The above message screen appears when the Import Process is completed. The number of records imported is given and the number of records modified. If there was a problem while writing to the file this will be indicated. The first time the data is imported into the system for a year the number of modified records should be zero.

After all of the HPMS data sections have been imported the following screen will appear.

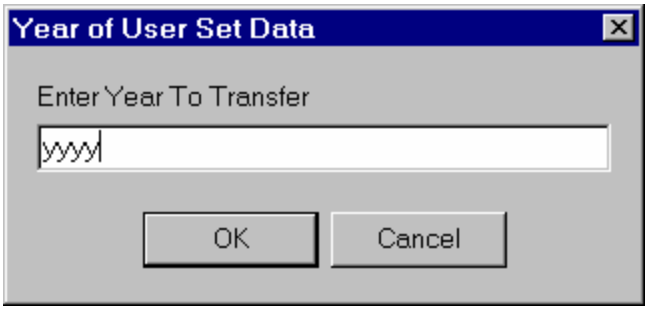
**Figure 25: Confirmation Screen – User Set Capacity**




Select *Yes* if State coded capacity or climate zones were set in the previous year's data and are to be retained for the HPMS data for the year imported. Select *No* if State coded capacity or climate zones are not used - all capacity and climate zones are determined from the calculation procedures in the HPMS Submittal software.

If you select *Yes,* the screen below will appear.

**Figure 26: Set year for User Set Data Screen**

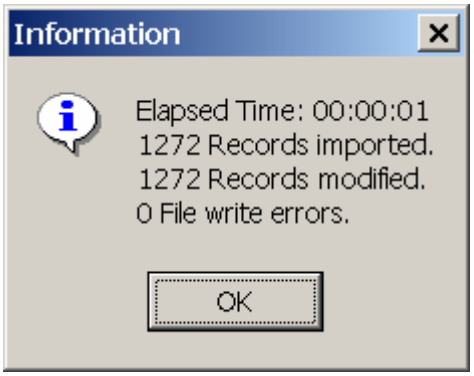



Enter the year for the User Set table that is to be updated to the year of the data just imported.
Click *OK* to update the year and data in the User Set table.

**Note**: If the number of records modified is greater than zero, this indicates a record was imported which contained the same section ID (Item 5). The imported record with the same section ID will be placed in the data table over the original record with the ID. The section length and data coded for the original record will be lost. The original record **can not** be located in the HPMS table. If the imported file is for the same year with the same section ID's that is already in the data table the number of records modified will be greater than zero.

If sections were modified the following screen will appear which indicates the number of records modified.

**Figure 27: Information Screen – Number of Records Modified**




Click on *OK* . The screen below will come up indicating that the modified sections will be displayed in Notepad. Once *OK* is clicked on this screen the sections will appear in Notepad. The listing can be used to verify the data.

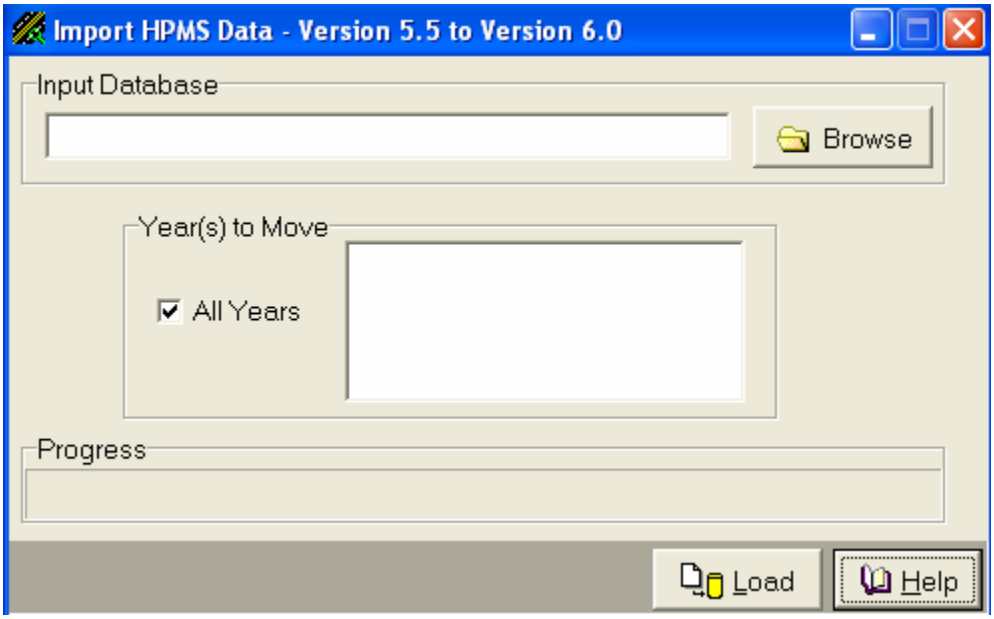
**Figure 28: Modified Sections Displayed in Notepad Screen**

To return to the system you must exit from Notepad. Once Notepad is closed the screen asking about the User Set data will appear. In most cases No should be clicked, returning the user to the Import screen.

## Importing Data from Access Table

To import the historical HPMS data from Version 5.5 Access table, Hpms5.5.mdb, select *File|Import|DataBase.*

**Figure 29: Importing HPMS Data from Database Screen**




Enter the HPMS Database to be imported using the Browse button or by entering the location and database table name, *Hpms5.5.mdb*. The system will query the database table to determine which years are present in the Access table. The years will appear in the *Year(s) to Move* selection box.

The default for *All Years* is selected. If you do not want to import all the years in the database table, uncheck the *All Years* selection. This will turn off All Years and enable the selection box. The desired years to import may now be selected. Once all the years have been selected, click the *Load* button.

This will start the process to load the database tables for each year(s) that you have selected. The data table will be loaded for the HPMS, summaries, summaries donut, summaries travel, summaries urban, certified mileage length, the county codes directory, the urbanized code directory, the user set capacity/climate zones, any saved Decision Support queries, Security Groups, Security Users and the Submission flags. As each type of data is transferred a screen will appear with the number of records added and the number modified. Click *OK* to change the caption on the screen for the next data being loaded. Once all the data are loaded the screen with the caption "All Loading done!" will appear. Click *OK* to close the process.

## Export HPMS Data

The HPMS data can be exported four different ways: as a comma delimited ASCII file (CSV), HPMS Import File; CSV File (Selected Fields); XML File (Selected Fields); or Transaction File.

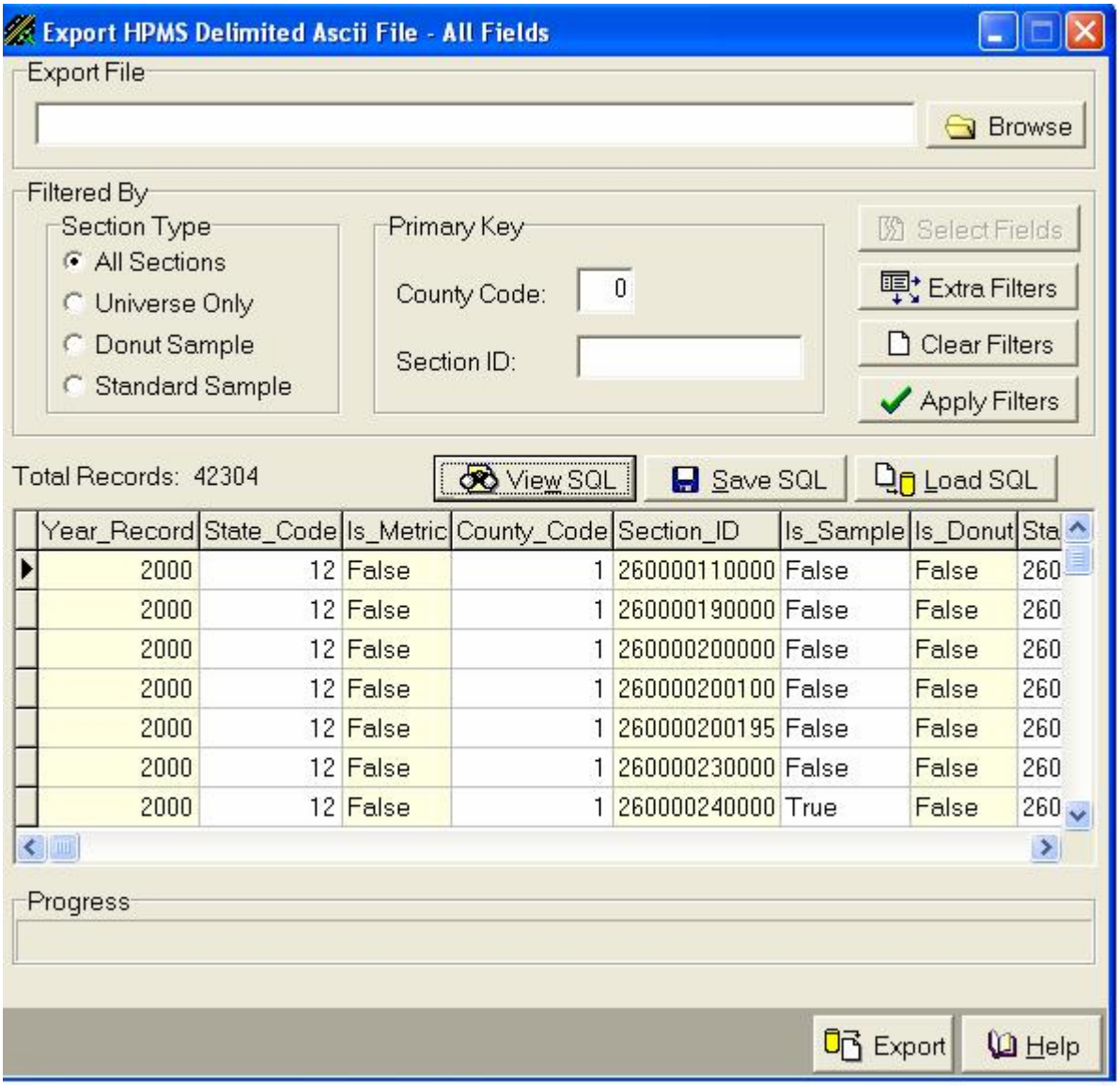
To export the HPMS data, select *File|Export*. A menu will appear with the four choices for the type of file to export.

The *HPMS Import File* data is exported as a comma delimited ASCII file (CSV). <u>All data items</u> for a section are exported. All sections in the HPMS table can be exported or filters

can be set to export specific sections. If filters are set by section type and extra filters are not applied, all sections that qualify for the section type are exported. If a section type is selected and extra filters are desired additional query information must be entered. The layout for the comma delimited ASCII file is found in Appendix B. The screen below will appear if HPMS IMPORT FILE is selected.

The main screen for the export below shows, in the center, the SQL statements for the filter in effect for the sections that are listed in the list box at the bottom. When the screen comes up the filter is set to the default of All Sections and the filter box shows the SQL statements for this filter. If you change the Section Type to Standard Samples and click Apply Filters, the SQL statements in the box will change. A filter must be changed and applied for the filter SQL statements to change. If Extra Filters are applied the specified criteria will show in the filter box once the user clicks Apply Filters. Clearing Filters does not change the filters SQL statement box. The filter box will always show the SQL statements for the filter that is in effect for the sections that are listed in the section list box at the bottom of the screen.

**Figure 30: Export Screen – Export HPMS Delimited ASCII File – All Fields**



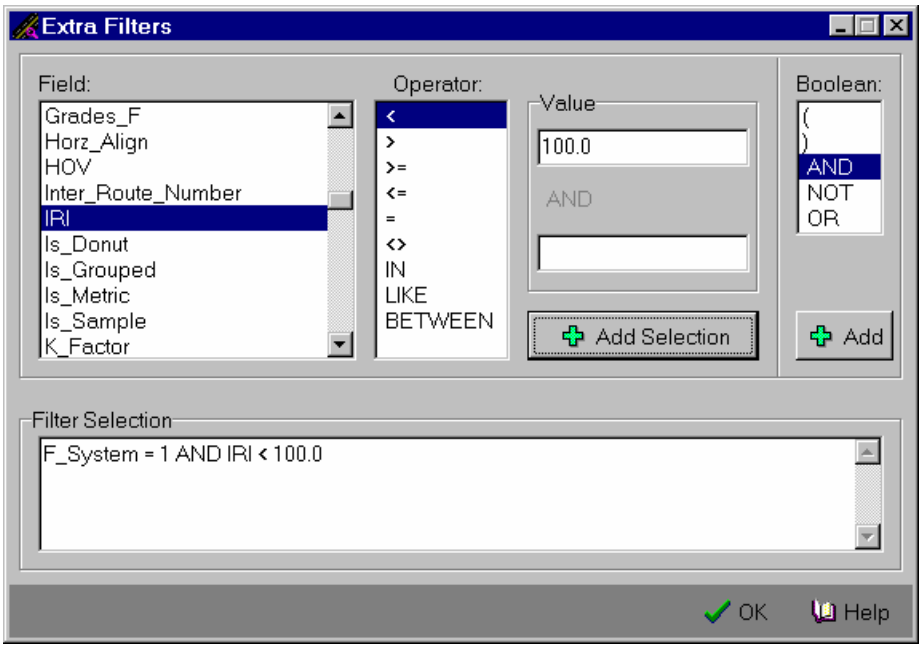

In the Export File information box, enter the name and location where the file is to be stored, either by using the *Browse* button or entering the information. When exporting a CSV or LRS file an option will be provided to include column headings in the file. If you would like to export the column headings, check the box next to *Include column headings*.

To export the HPMS data by *Section Type*, select one of the section types – All Sections, Universe Only, Donut Sample or Standard Sample. *All Sections* selected will export the data for all data sections. *Universe Only* selected will export the data for the sections that are universe data records. *Donut Sample* selected will export the data for the sections that are donut only samples or samples that are both a donut sample and a standard sample. *Standard Samples* selected will export the data for the sections that are a standard sample or both a standard sample and a donut sample. Select the section type, then click *Apply Filters*. The list box will contain the sections to be exported. Click the *Export* button to start the process.

Under the Primary Key the section type selected can be applied to a specific County by coding the county code. Select the section type, enter the code for the county desired, then click *Apply Filters.* The list box will contain the sections for the section type selected and county code entered. Click the *Export* button to start the process to export these sections. Specific Section ID criteria may also be applied by entering the section identifier criteria in the box. The criteria specified would apply to the section type selected and county code selected. When selecting sections by their identifier, **wildcards** can be used to help narrow the search for the sections. Using wildcards in the Section identifier is discussed under Maintaining the HPMS Data using the *Editors|Section*. Once the section identifier criteria are entered, click *Apply Filters*. The list box will contain the sections for the section type selected, the county code entered, if any, and the section identifier criteria. Click the *Export* button to start the process to export these sections.

Additional criteria can be applied to the section type/county code/section ID selected to export sections that meet specific criteria. The specific criteria are defined as filters for the data. Extra filters can be applied to the section type/county code/section ID selected by clicking the *Extra Filters* button. The screen below will appear.

**Figure 31: Extra Filters Screen**




The filter selection criteria must be defined by selecting the data field, operator, value, and Boolean connector. Highlight the data field and operator and enter the value to apply; then, click Add Selection. To select a Boolean connector, highlight and click on the Add button. The criteria selected will show in the Filter Selection box. Once all of the criteria are defined, click the *OK* button to return to the Export HPMS Delimited ASCII File – All Fields screen.

**Note**: The user can enter the criteria directly in the Filter Selection box.

When the Export screen appears, click the *Apply Filters* button for the criteria to be applied to the Section Type selected and the primary key criteria. The sections that meet the

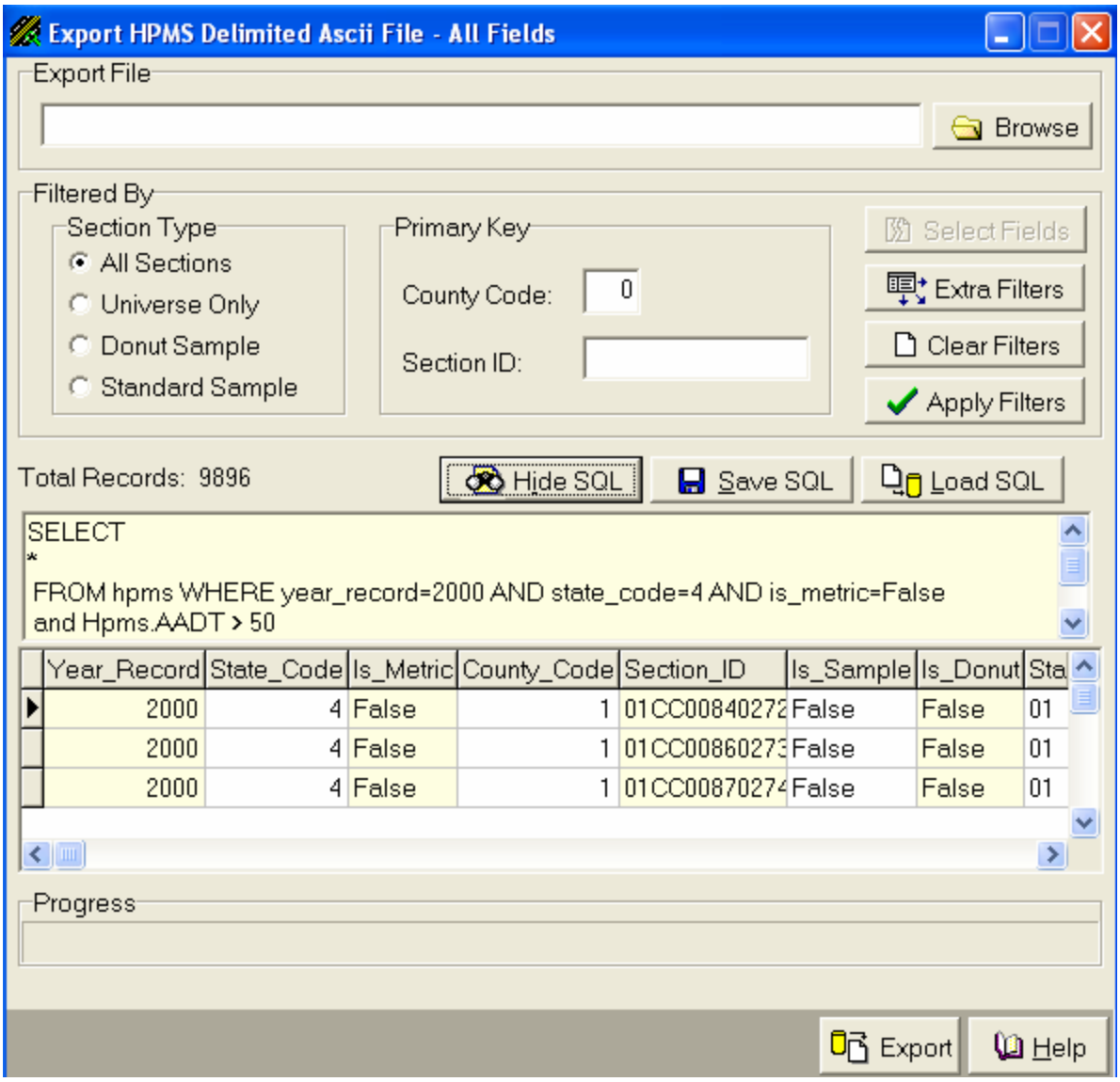
section type, primary key criteria and the extra filters criteria will appear in the list box. Click the *Export* button to start the process.

If additional data is to be exported with different selection criteria, the criteria set up for the Extra Filters **must** be cleared. Click the *Clear Filters* button to remove the Extra Filters that were defined. Extra Filters remain set until they are cleared.

**Note**: The Export set up in the above screens will export all sections that are a rural Interstate with IRI less than 100.0.

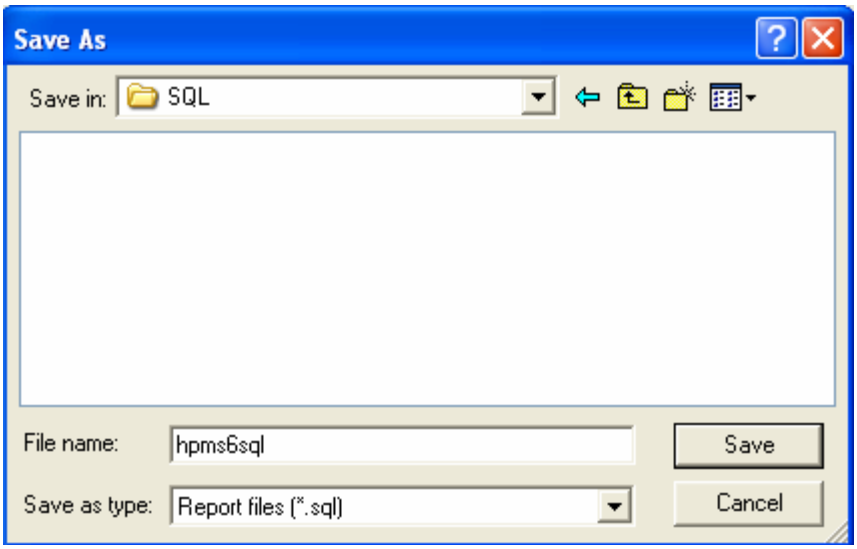
The user can save and load the SQL query that was applied under the Extra Filters. Once the criteria for the Extra Filters are applied the SQL statements for the query are listed in the center of the Section Data Selector screen, Figure 33.
The **SQL** statement used to select records is shown in the display box below the selection criteria by clicking the *View SQL* button.

**Figure 33 : Export Screen – Export HPMS Delimited ASCII File – All Fields with SQL statement**




To revert back to the default mode from the SQL display mode you may click on *Hide SQL* button which will hide the SQL text being displayed on the window. You may save the SQL statement by clicking on the *Save SQL* button.

**Figure 32: Save SQL Query Screen**

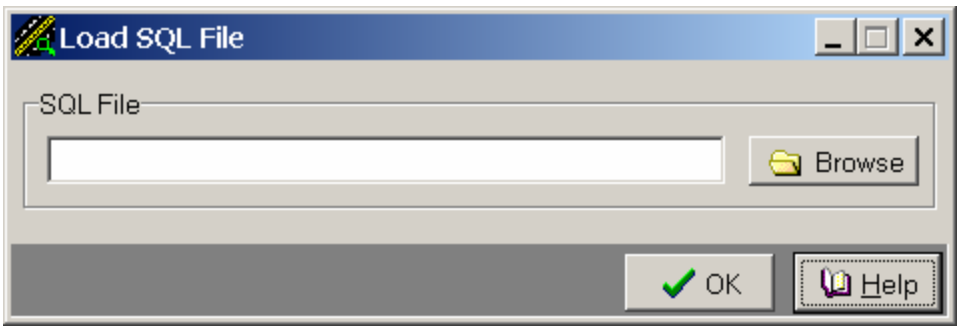



You may also load previously stored SQL statements by clicking on the *Load SQL* button.

**Suggestion/Hint**: Set up a folder on your hard drive where you can save all of the submittal software queries in one location. This will allow you to go to one location to view all of the SQL queries that you saved with the Extra Filters criteria.

The user can load a previously saved SQL query by clicking on the *Load SQL* button. The following screen will appear:

**Figure 33: Load SQL File Screen**




Locate the saved SQL by using the Browse button or entering the location and name. Click *Load*.
This will load and apply the criteria in the SQL statements. Saved SQL queries can be used in any of the Export features or in the Section Editor where filters can be applied to the data. You cannot use these saved SQL statements in the Decision Support. See Decision Support as to how to save queries for later use.

The *CSV File (Selected Fields)* will export a CSV file that has as the first record the names of the fields selected to be exported. All sections in the HPMS table are exported or filters can be set to export specific sections. Filters can be set by section type, specific county, section identifier criteria or extra filters can be applied. In addition, the data fields to be exported

may be selected so that a partial HPMS record results. *CSV File (Selected Fields)* screens are listed later.

The *XML File (Selected Fields)* will export an XML file that has as the first record the names of the fields selected to be exported. The format of the XML file meets the published standard for XML files. All sections in the HPMS table are exported or filters can be set to export specific sections. Filters can be set by section type, specific county, section identifier criteria or extra filters can be applied. In addition, the data fields to be exported may be selected so that a partial HPMS record results. *XML File (Selected Fields)* screens are listed later.

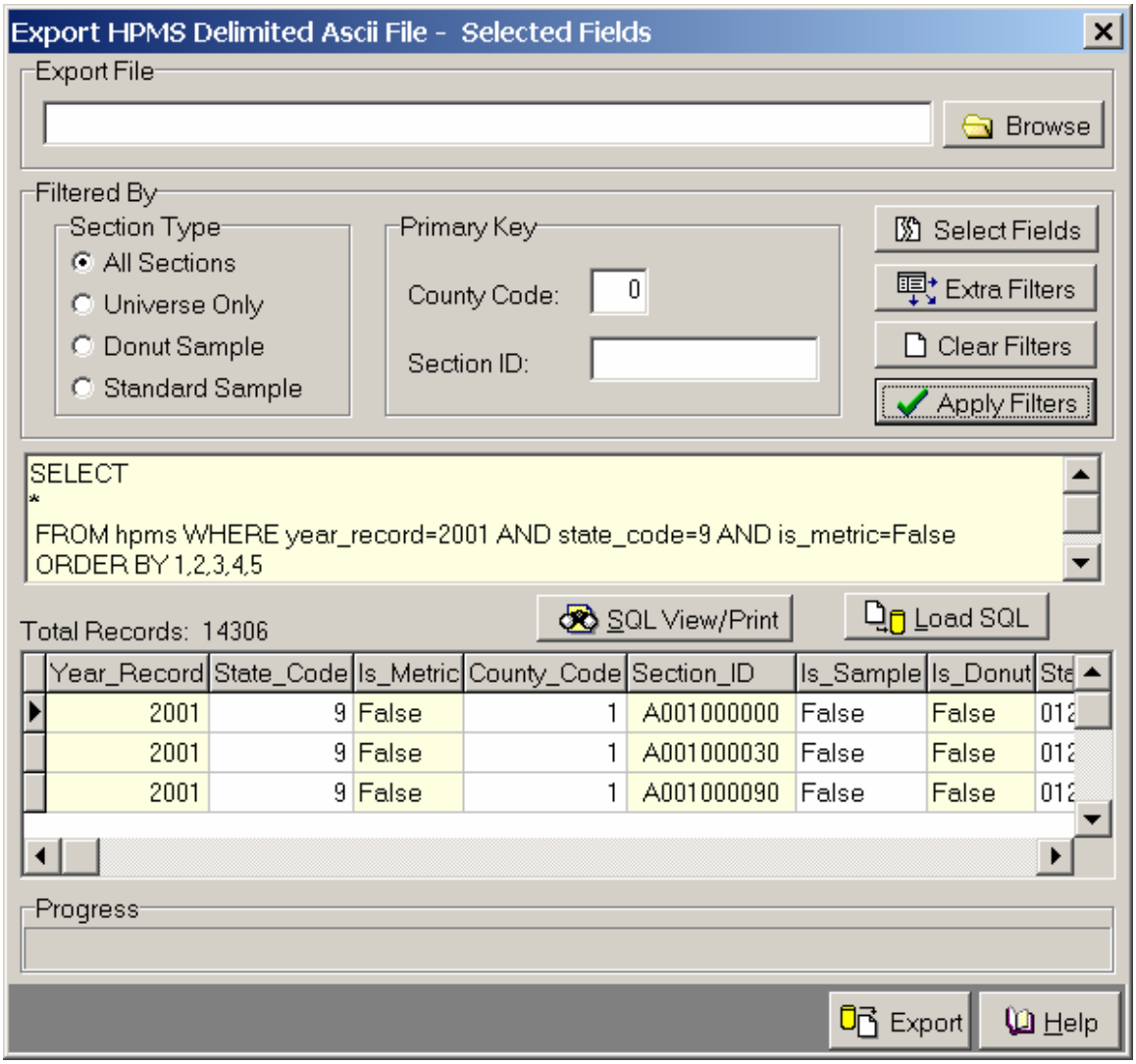
The *Transaction File* will export a file that is compatible with the *Batch Updates* function. All sections in the HPMS table are exported or filters can be set to export specific sections. Filters can be set by section type, specific county, section identifier or extra filters can be applied. In addition, the data fields to be exported may be selected so that a partial HPMS record results. *Transaction File* screens are listed later.

The *LRS Export File* will export a CSV file with the data from the HPMS table matching the sections that belongs to the LRS export. The first field in the file is the LRS Key, which is a combination of LRSID, and the county code followed by other selected fields.

To export the HPMS data as a *CSV File (Selected Fields), XML File (Selected Fields), Transaction File, or LRS Export file* select *File*|*Export*|one of the above choices.

The screen that appears will have the file type in the name at the top of the screen: Export HPMS Delimited ASCII File, - Selected Fields, Export HPMS XML File – Selected Fields, Export HPMS Transaction File. The actual screen is the same for all of the choices.

**Figure 34: Export Screen: Export HPMS Delimited ASCII File – Selected Fields**




In the Export File information box, enter the name and location where the file is to be stored, either by using the *Browse* button or entering the information.

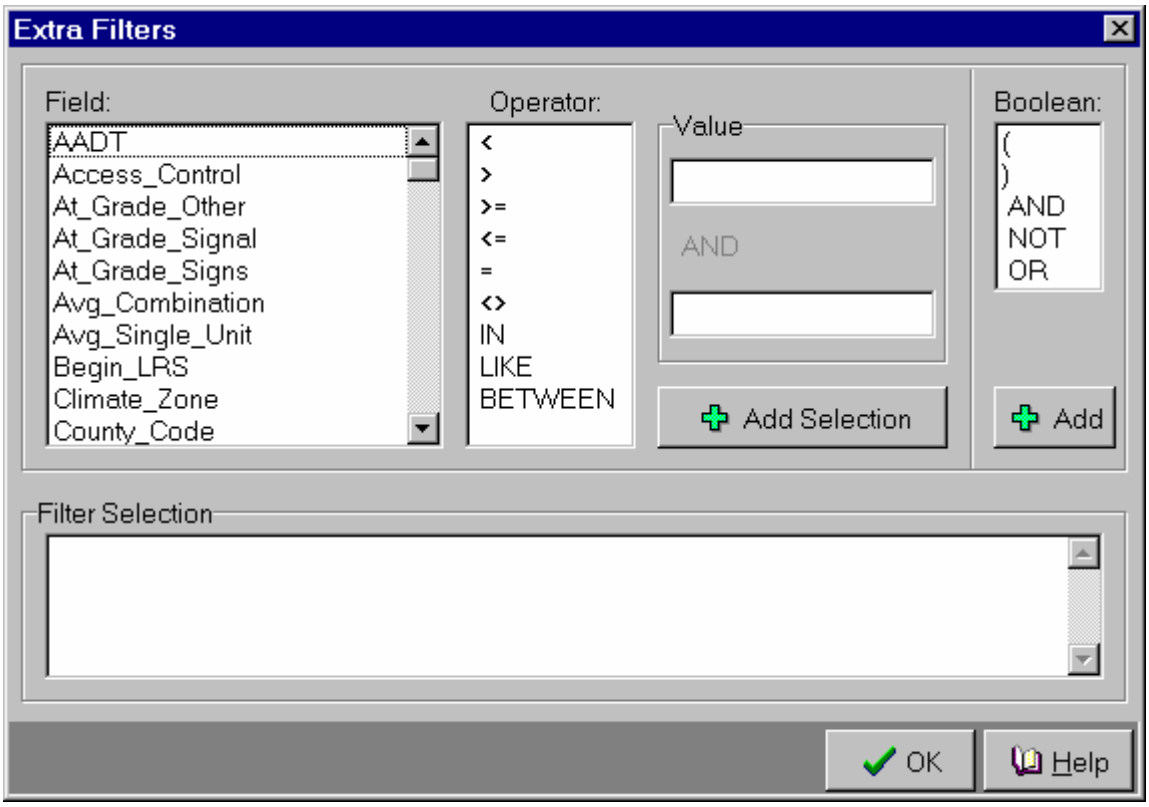
To export the HPMS data by *Section Type*, select one of the section types – All Sections, Universe Only, Donut Sample or Standard Sample. *All Sections* selected will export the data for all data sections. *Universe Only* selected will export the data for the sections that are universe data records. *Donut Sample* selected will export the data for the sections that are donut only samples or samples that are both a donut sample and a standard sample. *Standard Samples* selected will export the data for the sections that are a standard sample or both a standard sample and a donut sample. Select the section type, then click *Apply Filters*. The list box will contain the sections to be exported. Click the *Export* button to start the process.

Under the Primary Key the section type selected can be applied to a specific County by coding the county code. Select the section type, enter the code for the county desired, then click *Apply Filters.* The list box will contain the sections for the section type selected and

county code entered. Click the *Export* button to start the process to export these sections. Specific Section ID criteria may also be applied by entering the section identifier criteria in the box. The criteria specified would apply to the section type selected and county code selected. When selecting sections by their identifier, **wildcards** can be used to help narrow the search for the sections. Using wildcards in the Section identifier is discussed under Maintaining the HPMS Data using the *Editors|Sections*. Once the section identifier criteria are entered, click *Apply Filters*. The list box will contain the sections for the section type selected, the county code entered, if any, and the section identifier criteria. Click the *Export* button to start the process to export these sections.

Additional criteria can be applied to the section type/county code/ section identifier selected to export sections that meet specific criteria. The specific criteria are defined as filters for the data. Extra filters can be applied to the section type/county code/ section identifier selected by clicking the *Extra Filters* button.

**Figure 35: Extra Filters Screen**




The filter selection criteria must be defined by selecting the data field, operator, value, and Boolean connector. Highlight the data field and operator and enter the value to apply; then, click Add Selection. To select a Boolean connector, highlight and click on the Add button. The criteria selected will show in the Filter Selection box. Once all of the criteria are defined, click the *OK* button to return to the Export HPMS Delimited ASCII File screen.

**Note**: The user can enter the criteria directly in the Filter Selection box.

When the Export screen appears, click the *Apply Filters* button for the criteria to be applied to the Section Type selected. The sections that meet the section type selected and the

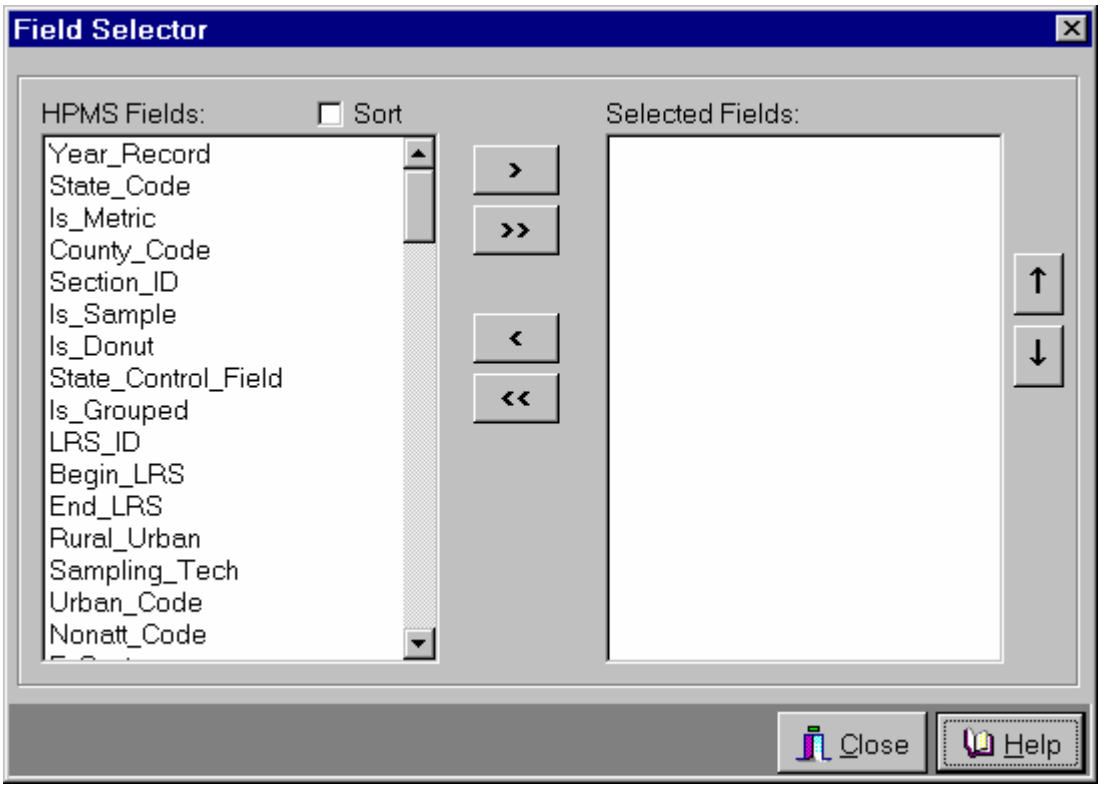
primary key criteria and the extra filters defined criteria will appear in the list box. Click the *Export* button to start the process.

If additional data is to be exported with different selection criteria, the criteria set up for the Extra Filters **must** be cleared. Click the *Clear Filters* button to remove the Extra Filters that were defined. Extra Filters remain set until they are cleared.

**Note**: The criteria for the Extra Filters in the SQL query can be saved. See the discussion under the section Export HPMS Data – HPMS Import File.

To export the HPMS data by selected fields (partial record output), click the *Select Fields* button on the Export HPMS Delimited ASCII File - Selected Fields screen. The following screen appears:

**Figure 36: Field Selector Screen**




The HPMS data fields are shown in the left selection box in the order that they appear in the data table. The data fields can be sorted alphabetically by turning the SORT box on. The data will be exported in the order that the fields are listed in the Selected Fields selection box.

To select a field, highlight the name of the data field, then click on the **>** *button*. This moves the highlighted data field into the Selected Fields box on the right. Using the **>>** *button* moves all data fields into the selection box on the right.

To remove a data field from the Selected Fields box on the right, highlight the data field and click on the **<** *button*. Using the **<<** *button* moves all data fields in the Selected Fields box on the right back to the left box.

To move a data field in the Selected Fields box, highlight the data field and click on the *up* or *down arrow* on the right side of the selection box. The data field will move up or down one data item
Once all the desired data fields have been placed in the selection box; click on the *Close* button. This will return you to the Export HPMS Delimited ASCII File – Selected Fields screen. The list box will show the data for the fields selected.

**Note:** Section type/county code/section identifier filters and extra filters can be applied before or after the data fields have been selected. *Apply Filters* must be clicked to apply section type/county code/section identifier criteria or extra filter criteria.

Click *Export* to export the desired data fields and section type with primary key criteria and/or extra filters.
*Clear Selection* will clear the extra filters and selected data fields. The data will remain in the list box.

**Hint**: If the SQL statements on the following Notepad screen was saved for the Export with selected data fields, this query could be loaded and applied in the Export HPMS Import file that does not allow the selection of specific data fields. The SQL statements would be changed by the system to select all data items. The second screen shows how the query would be changed.

**Figure 37: Screen with SQL Query**

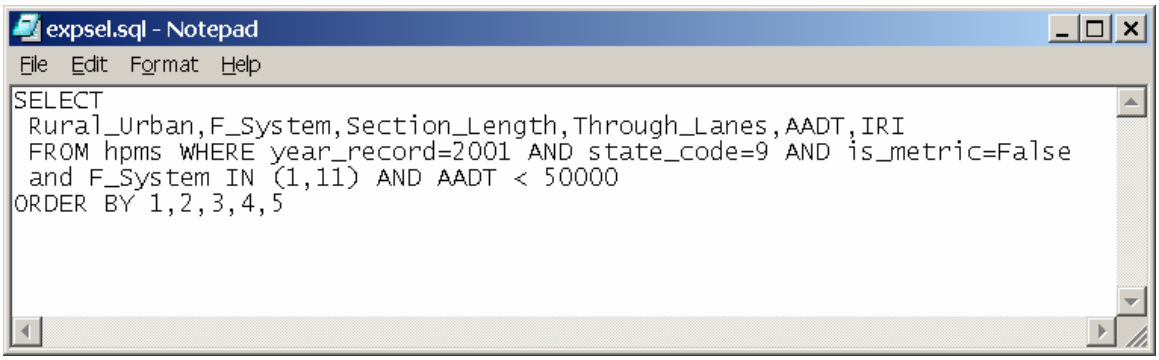
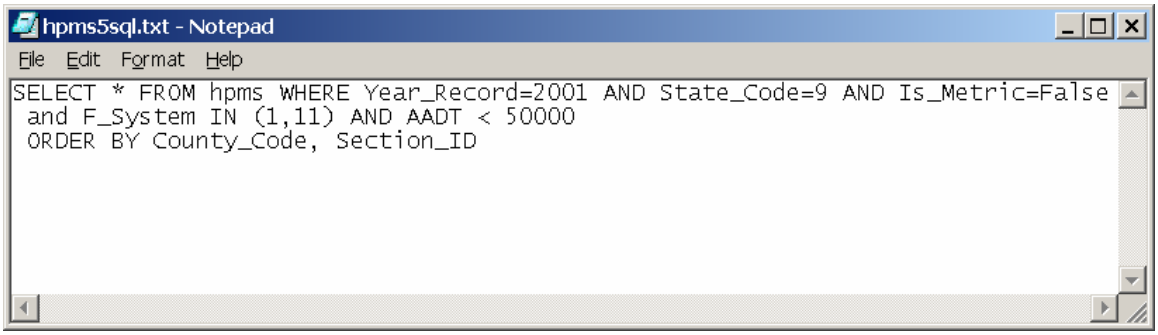



**Figure 38: Notepad Screen with the Modified SQL Query**



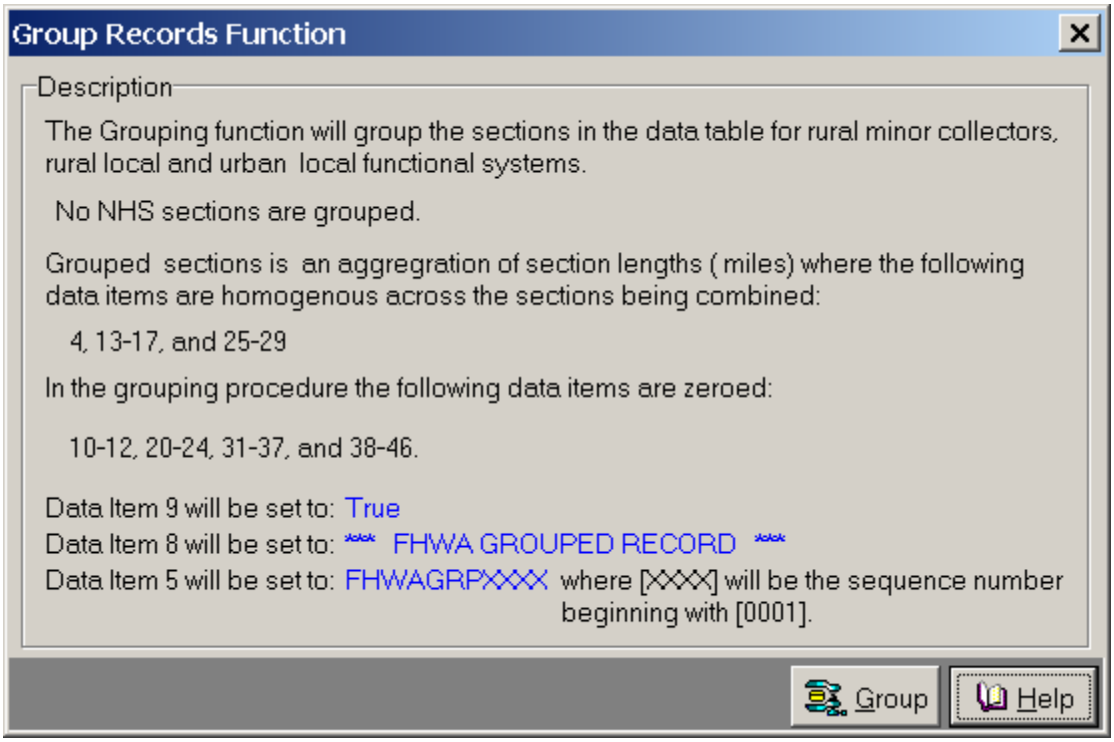
# Group Records

The Group Records Function groups the section lengths for rural minor collector, rural local, and urban local functional systems (Item 17 = 8, 9, 19). In the grouping function, sections **will not be grouped** if the section is on the national highway system (Item 19 > 0) or the section is unbuilt (Item 20 = 2). Combining these functional systems into homogenous grouped records reduces the number of sections in the HPMS data table and allows the data to be processed faster in the microcomputer environment.

The data section lengths are grouped as long as the data reported for the sections are homogenous for:
county code (Item 4), rural/urban designation (Item 13), urbanized area sampling technique (Item 14), urbanized area code (Item 15), nonattainment are code (Item 16), functional system (Item 17), governmental ownership (Item 25), special systems (Item 26), type facility (Item 27), designated truck route (Item 28), and toll (Item 29). The lengths for sections are combined until at least one of the data item changes.

To group the data, select *File*|*Group Records*.

**Figure 39: Group Records Function Screen**




To group the data records, click on *Group.*

The sections that are grouped will have several data items changed. In the grouping process, Is Section Grouped (Item 9) is set to 'true' and the State Control Field (Item 8) will be changed to the character string '***^^^FHWA Grouped Record ^^^***' where ^ indicates a blank and the remaining 69 characters of the State Control Field will be blank. The Section Identification (Item 5) will be reset with the first eight positions containing

'FHWAGRUP' and the last four positions containing a sequential number beginning with 0001. The number begins with 0001 for each State and increments throughout the State. It does not reset for each new county.

The remaining data items for the grouped section are set to zero during the process. The data items set to zero are: LRS Identification (Item 10), LRS Beginning Milepoint (Item 11), LRS Ending Milepoint (Item 12), Planned Unbuilt Facility (Item 20), Official Interstate Route Number (Item 21), Route Signing (Item 22), Route Signing Qualifier (Item 23), Signed Route Number (Item 24), Donut Area AADT Volume Group (Item 31), Standard Sample AADT Volume Group (Item 32), AADT (Item 33), Number of Through Lanes (Item 34), Measured Pavement Roughness (IRI) (Item 35), Present Serviceability Rating (PSR) (Item 36), HOV Operations (Item 37) , and Highway Surveillance Systems (Items 38-46).

The following information is displayed on the screen when the Group Records Function *Process* is complete.

**Figure 40: Information Screen - Group Records Function**

**Figure 41: Information Screen – Group Records is Finished**

**Note**: The sections **cannot** be ungrouped once the Group Records Function *Process* is selected and the process starts.

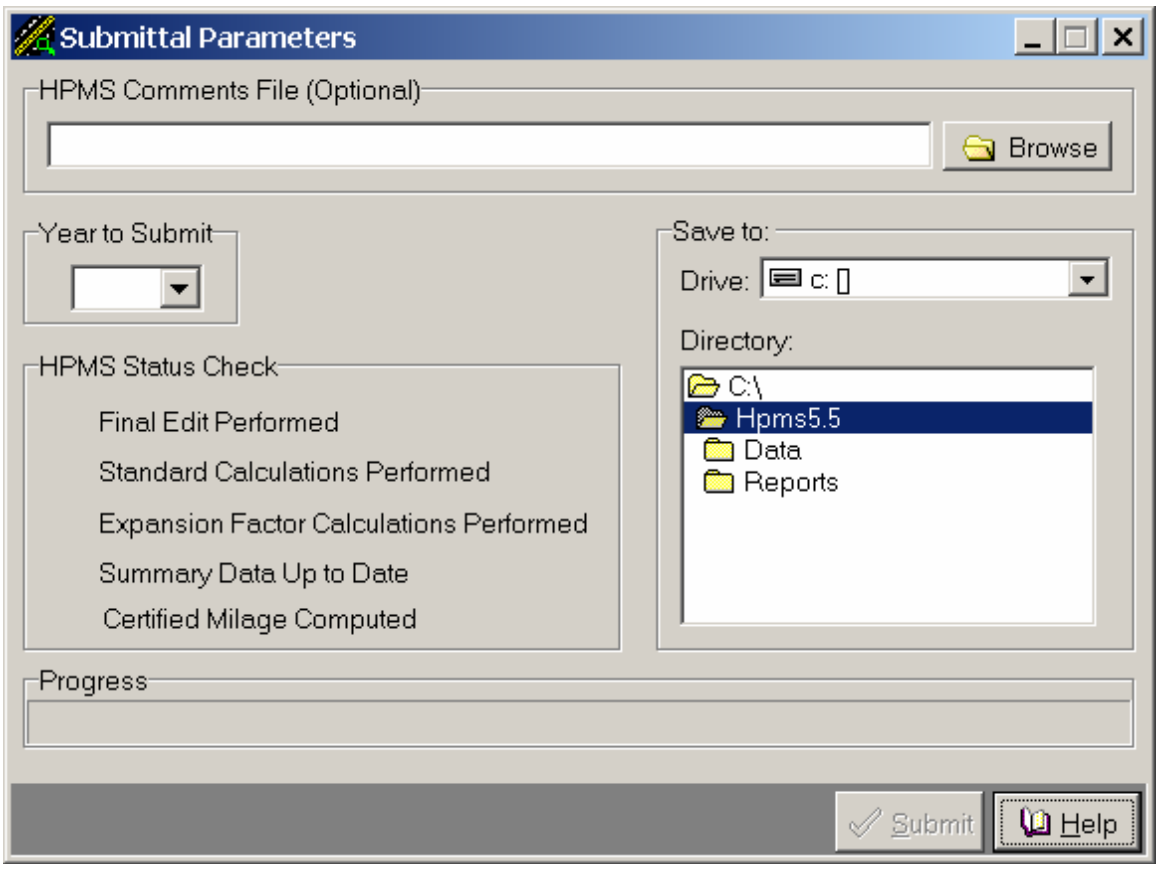
**Note**: The sections need not be grouped in order to Send a submittal

# Send Submittal

The HPMS data is submitted to FHWA each calendar year. The data, due June 15th, is the inventory of the State's public road mileage as of December 31st of the year prior to the June submittal.

The data can be sent to FHWA electronically, on a CD-ROM, or on a diskette. Included with the data should be a comment file which addresses any remaining issues with the data – validation errors which are valid for the State, missing data not collected, etc. The comment file should be saved as a rich text format (RTF) file from the software used to create the file. To create the data file for submittal, select *File|Send Submittal*.

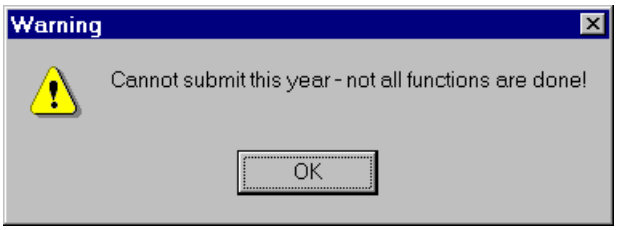
**Figure 42: Submittal Screen**




The submittal parameters must be completed on the screen – location and name of the HPMS Comments File, the Drive and Directory where the file will be saved and Year to Submit.

Before the HPMS data can be submitted to FHWA, the following functions **must** be performed for the year of the HPMS data being submitted: Final Edit, Standard Calculations, Expansion Factor Calculations, Summary Data up to Date and Certified Mileage Computed. The data **cannot** be submitted if **all** of these functions are not completed. A check on the submittal screen indicates the function was performed; a circle with a line indicates the function was not performed. When the year to submit is selected, the screen below will appear if all functions are not completed.

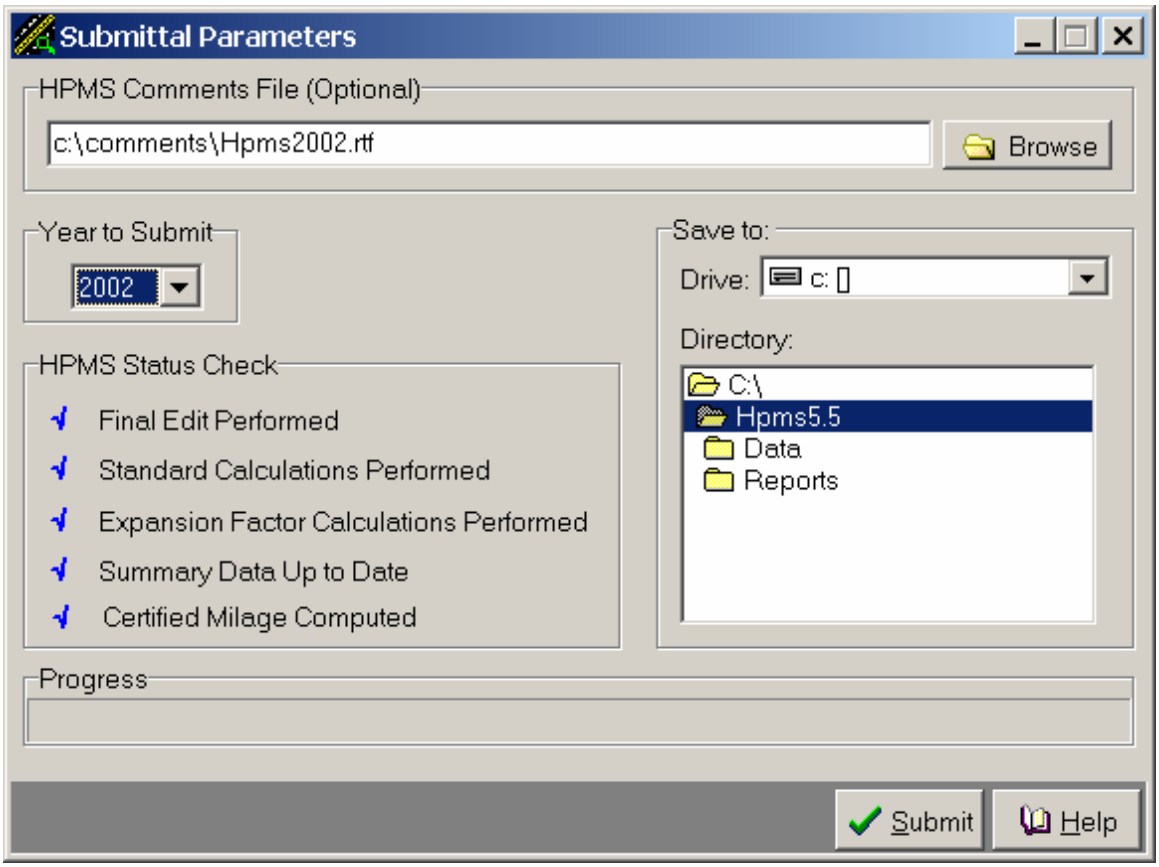
**Figure 43: Warning Screen when Submittal not complete**




If all functions are not performed and the message above appears, the process cannot proceed to prepare the data file for submittal. The data is not ready to be sent to FHWA. **All** of the functions not performed **must** be completed; then, Send Submittal can be completed.

Once the year to submit is selected and **all** the functions have been completed the bottom of the Submittal Parameters screen will change. The *Submit* button will appear.

**Figure 44: Submittal Screen With Send Option**




The records are grouped automatically in the file being created.
**Note**: Records are only grouped in the file, but not in the Database.

Click on *Submit* to start the process to create the file to send to FHWA. The name of the file will be Syyyy_xx.ZIP where yyyy is the year of the data and xx is the State FIPS Code. The file will be on the drive and location that was specified.

A message **will appear** when the Submittal process is complete.

**Figure 45: Confirm Screen**

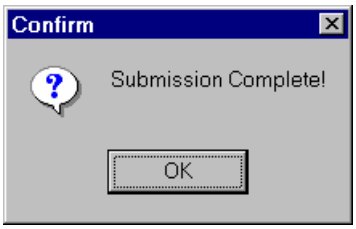
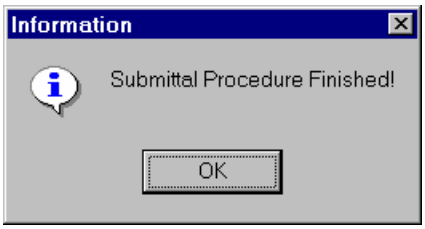



**Figure 46: Information Screen**

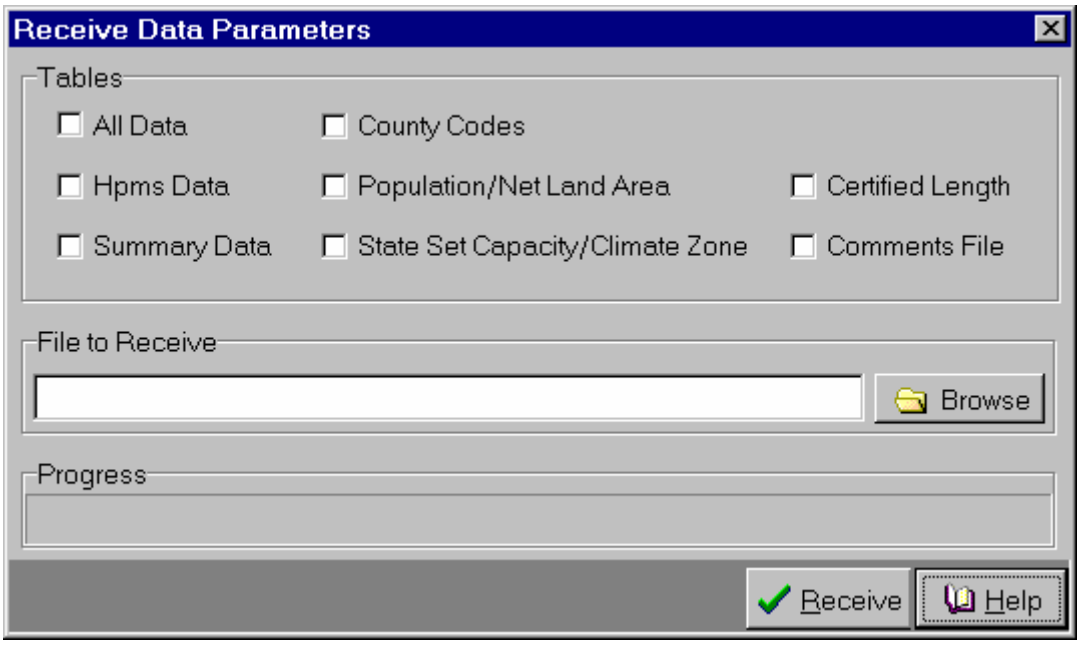



**Note**: Send submittal **does not** physically send the data to FHWA. The submittal process prepares the data file to be sent by the user.

## Receive Submittal

Receive submittal is used to load the file output by the Send Submittal process into the system. The file, Syyyy_xx.ZIP, where yyyy is the year of the data and xx is the State FIPS code, is loaded into the software data table. The file does not need to be unzipped. To load the file, Select *File|Receive Submittal.*

**Figure 47: Receive Submittal Screen**



To select which data to load, click in the box in front of the Tables data types. Most, if not all, of the time *All Data* should be selected to be loaded. In the File to Receive box *Browse* or enter the location and name of the file to load. To load the data, click *Receive.*

A message **will appear** as each type of data loaded is completed. Click **OK** until all types of data are loaded. The time required to load the data will depend on the size of the file and the computer being used.

# Editors Menu

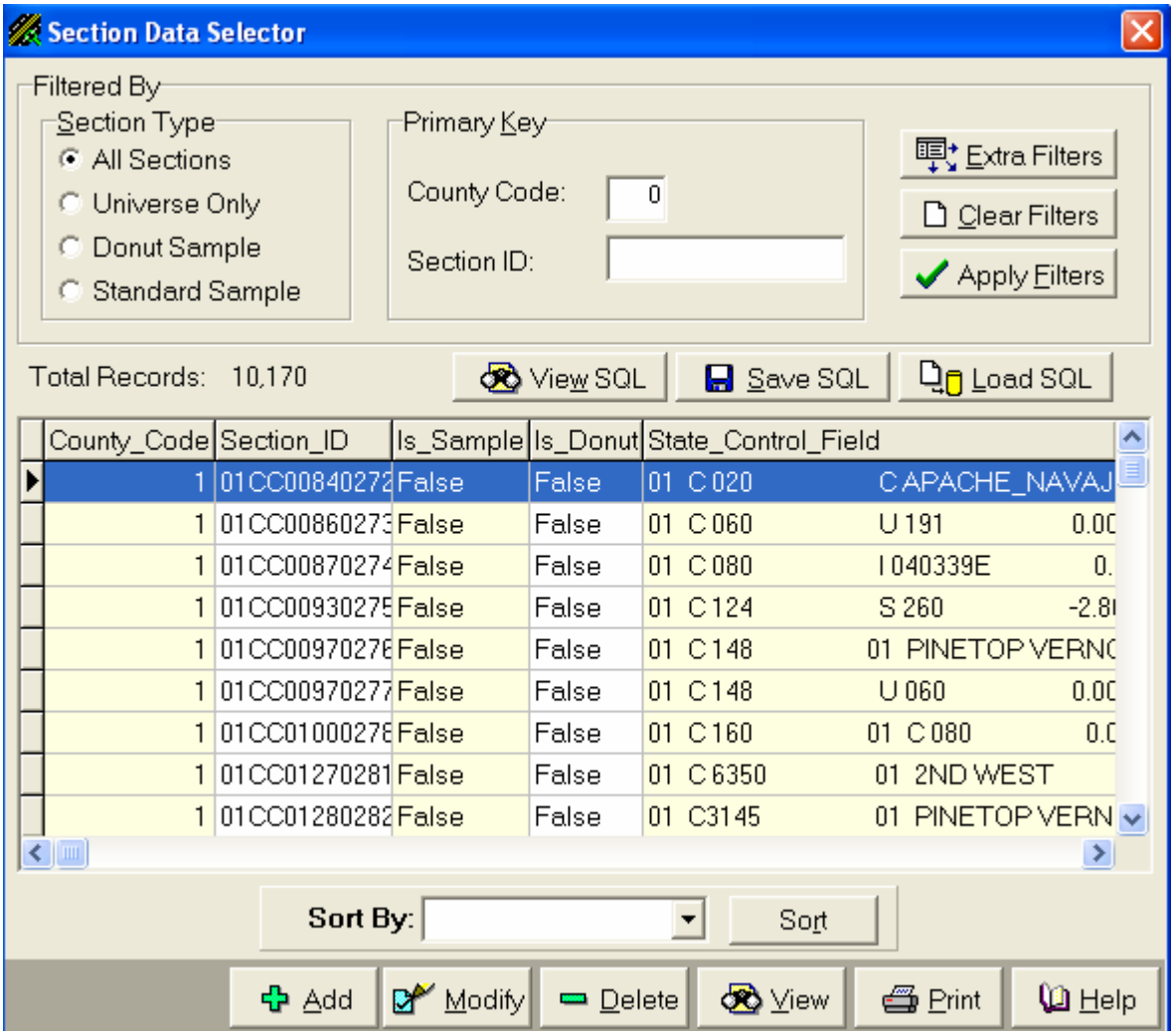
## Section Editor

The user can maintain the HPMS data using the available features of the software. The data coded for any section can be modified. Sections can be added to the data table or deleted from the data table. The section type can be changed, e.g., universe section to a standard sample section. A section can be split into two segments – a universe section into two universe segments, a donut only sample section into donut only sample segment and a universe segment, and a standard sample section into a standard sample segment and a universe segment. The section can be viewed or printed to see how each data item is coded.

The editor is used to maintain the HPMS data. Select *Editiors*|*Section* to bring up the section editor which enables the user to Add or Modify or View or Delete a section.

The main screen for the Section Data Editor below shows, in the center, the SQL statements for the filter in effect for the sections that are listed in the list box at the bottom. When the screen comes up the filter is set to the default of All Sections and the filter box shows the SQL statements for this filter. If you change the Section Type to Standard Samples and click Apply Filters, the SQL statements in the box will change. A filter must be changed and applied for the filter SQL statements to change. If Extra Filters are applied the specified criteria will show in the filter box once the user clicks Apply Filters. Clearing Filters does not change the filters SQL statement box. The filter box will always show the SQL statements for the filter that is in effect for the sections that are listed in the sections list box at the bottom of the screen.

**Figure 48: Section Data Selector Screen**




To display the sections in the list box by *Section Type*, select one of the section types – All Sections, Universe Only, Donut Sample or Standard Sample. *All Sections* selected lists all HPMS sections. *Universe Only* selected lists the HPMS sections that are universe data records. *Donut Sample* selected lists the HPMS sections that are a donut only sample or a sample that is both a donut sample and a standard sample. *Standard Sample* selected lists the HPMS sections that are a standard sample or both a standard sample and a donut sample. Select the section type, than click *Apply Filters*. The list box will contain the sections for the section type selected.

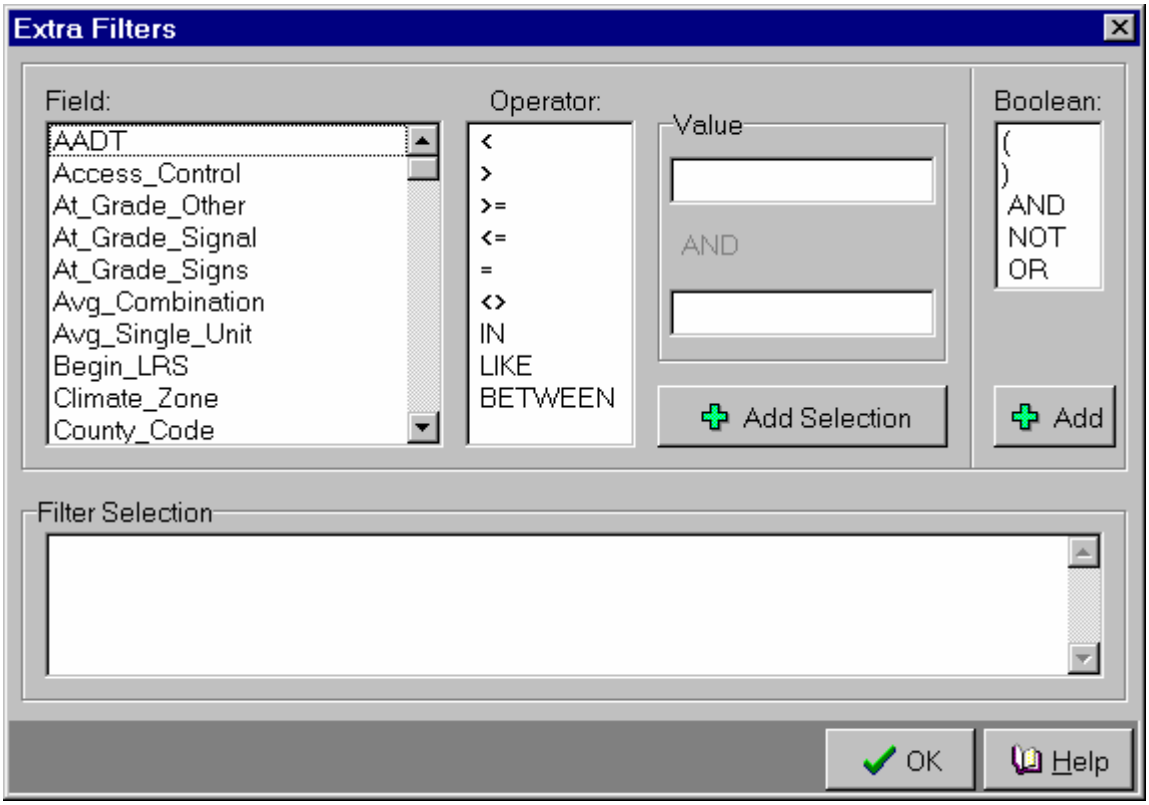
Under the Primary Key the section type selected can be applied to a specific County by coding the county code. Select the section type, enter the code for the county desired, then click *Apply Filters.* If a specific section is to be listed in the list box, enter the Section ID, than click *Apply Filters*.

When modifying, deleting, viewing or listing sections, **wildcards** can be used to help narrow the search for sections with specific ID's. Wildcards can be used as follows:

- A **%** in the section ID matches more than one character. For example, 12% will search for all Section ID's beginning with 12.
- A __ in the section ID matches exactly one character. For example, RTN_13749248 will search for Section ID's RTN*E*13749248, RTN*W*13749248, RTN*5*13749248, etc.

Additional criteria can be applied to the section type selected and Primary Key criteria to list sections that meet specific criteria. The specific criteria are defined as filters for the data. Extra filters can be applied to the section type selected and Primary Key criteria by clicking the *Extra Filters* button.

**Figure 49: Extra Filters Screen**




The filter selection criteria must be defined by selecting the data field, operator, value, and Boolean connector. Highlight the data field and operator and enter the value to apply. Than click Add Selection. To select a Boolean connector, highlight and click on the Add button. The criteria selected will show in the Filter Selection box. Once all of the criteria are defined, click the *OK* button to return to the Section Data Selector screen, Figure 50.

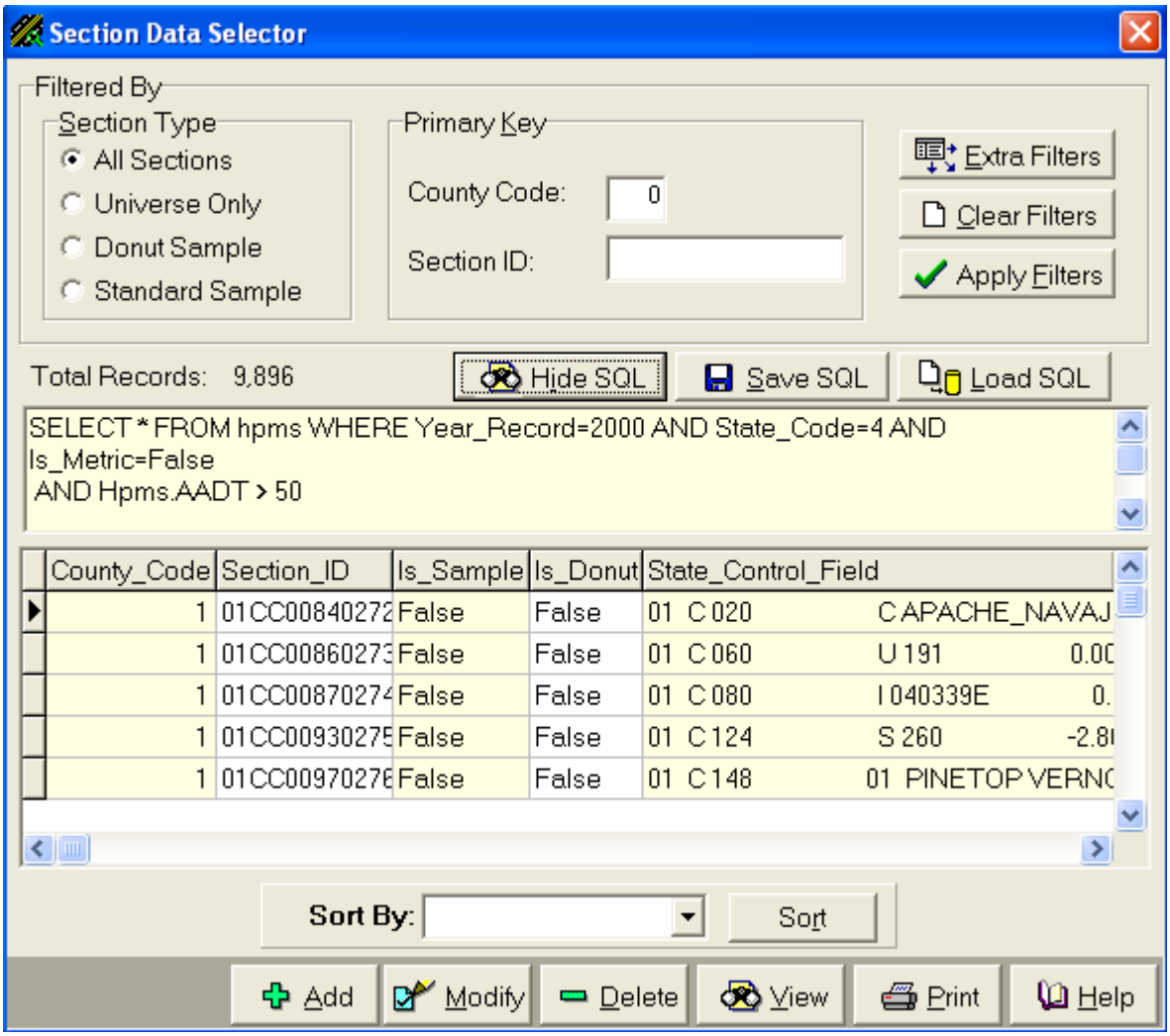
**Note**: The user can enter the criteria directly in the Filter Selection box.

When the Section Data Selector screen appears, click the *Apply Filters* button for the extra filters criteria to be applied to the Section Type selected and Primary Key criteria. The sections that meet the section type and Primary Key criteria and the Extra Filters defined criteria will appear in the list box.

Extra Filters criteria remain set until they are cleared. Each time the user clicks *Apply Filters* any defined criteria for Extra Filters is applied. Click the *Clear Filters* button to remove the Extra Filters that were defined.

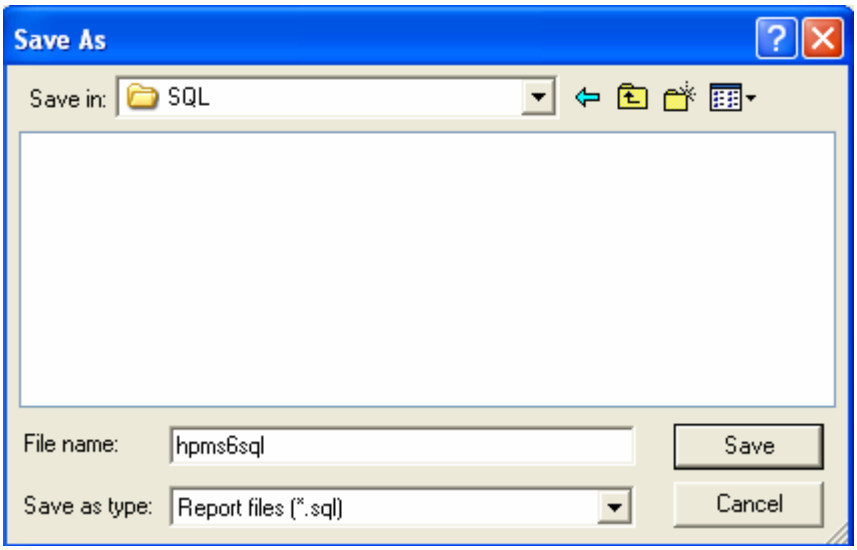
The user can save and load the SQL query that was applied under the Extra Filters. Once the criteria for the Extra Filters are applied the SQL statements for the query are listed in the center of the Section Data Selector screen, Figure 52. The following screen appears when the Extra Filters criteria are applied.
The **SQL** statement used to select records is shown in the display box below the selection criteria by clicking the *View SQL* button.

**Figure 52: Section Data Selector Screen with SQL statement**




To revert back to the default mode from the SQL display mode you may click on *Hide SQL* button which will hide the SQL text being displayed on the window. You may save the SQL statement by clicking on the *Save SQL* button.

**Figure 50: Save SQL Query Screen**

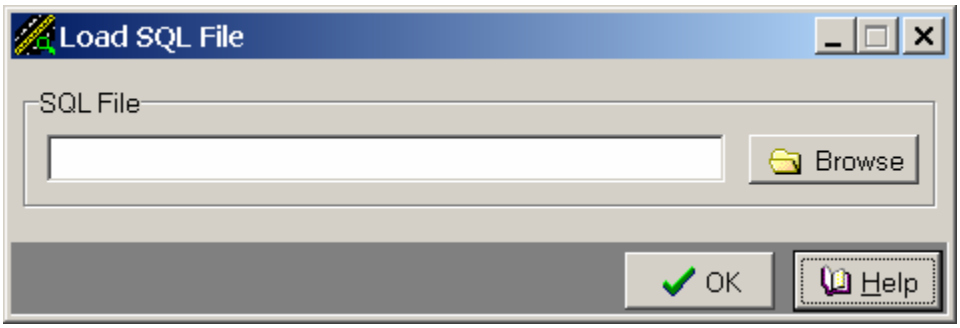



You may also load previously stored SQL statements by clicking on the *Load SQL* button.

**Suggestion/Hint**: Set up a folder on your hard drive where you can save all of the submittal software queries in one location. This will allow you to go to one location to view all of the SQL queries that you saved with the Extra Filters criteria.

The user can load a previously saved SQL query by clicking on the *Load SQL* button. The following screen will appear:

**Figure 51: Load SQL Query Screen**




Locate the saved SQL by using the Browse button or entering the location and name. Click *Load*. This will load and apply the criteria in the SQL statements. Saved SQL queries can be used in any of the Section Editor or Export features where filters can be applied to the data. You cannot use these saved SQL statements in the Decision Support. See Decision Support as to how to save queries for later use.

**Sorting** a section in the list box – the sections in the list box can be sorted by any of the data items. On the Section Data Selector Screen, Figure 50, select the data item the sections are to be sorted by using the drop down beside the *Sort By* button. Click the *Sort*

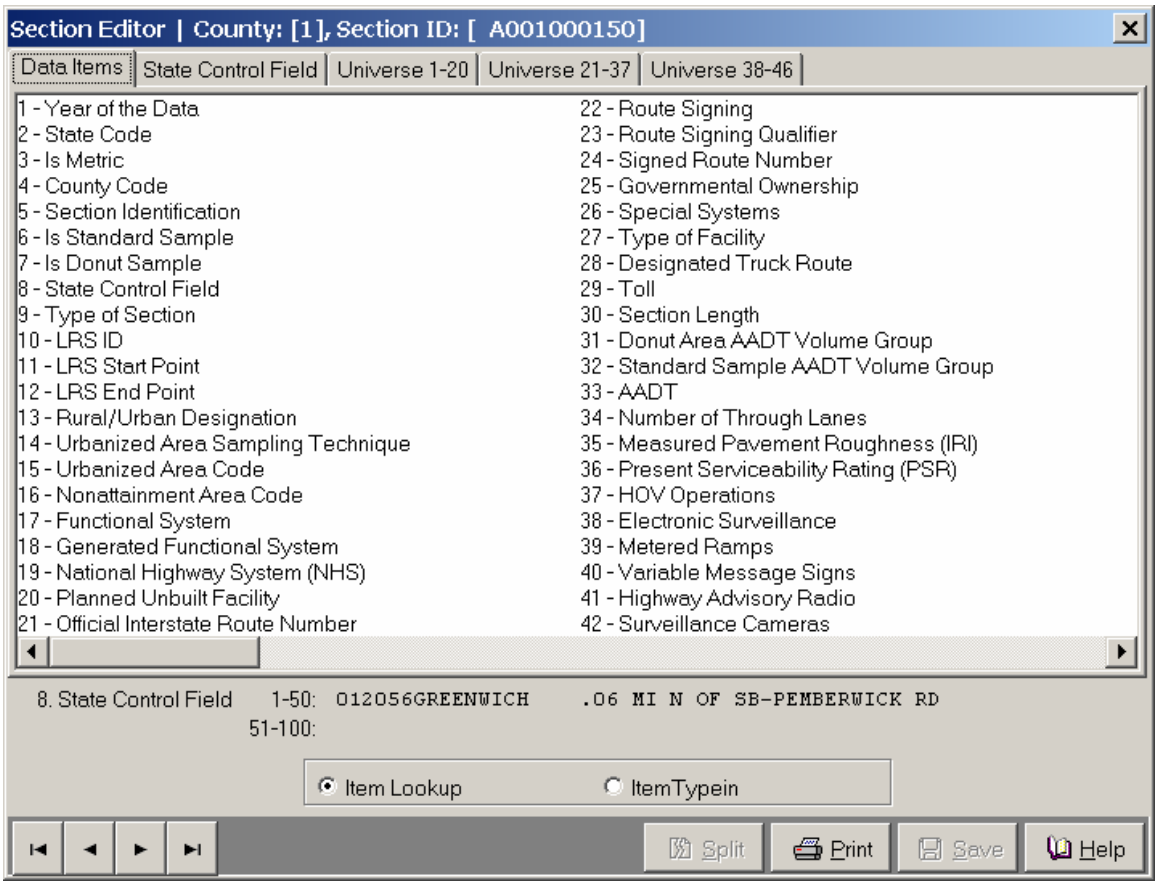
button to sort the sections in ascending order. The sections in the list box can only be sorted in ascending order and only for one data element.

**Viewing** a section in the list box – all the data items coded for the section are listed and can be viewed by highlighting a section and scrolling to the right. A **universe** section will have *Is Standard Sample* and *Is Donut Sample* both set to *False*. A **standard sample** will always have *Is Standard Sample* set to *True, Is Donut Sample* will be set to *True* if the standard sample is also a donut sample, *Is Donut Sample* will be set to *False* if the standard sample is not a donut sample. A **donut sample** will always have *Is Donut Sample* set to *True*, *Is Standard Sample* will be set to *True* if the donut sample is also a standard sample, *Is Standard Sample* will be set to *False* if the donut sample is not a standard sample. Data items Is Grouped, Special Systems, Designated Truck Route, Toll, and all Highway Surveillance Systems items will be *True* if the data item applies to the section and *False* if the date item does not apply to the section.

To **print** all the sections in the list box click on *Print* on the Section Data Selector screen, Figure 50.

To **View** a section, highlight the desired section in the list box and click on *View* on the Section Data Selector screen, Figure 50.

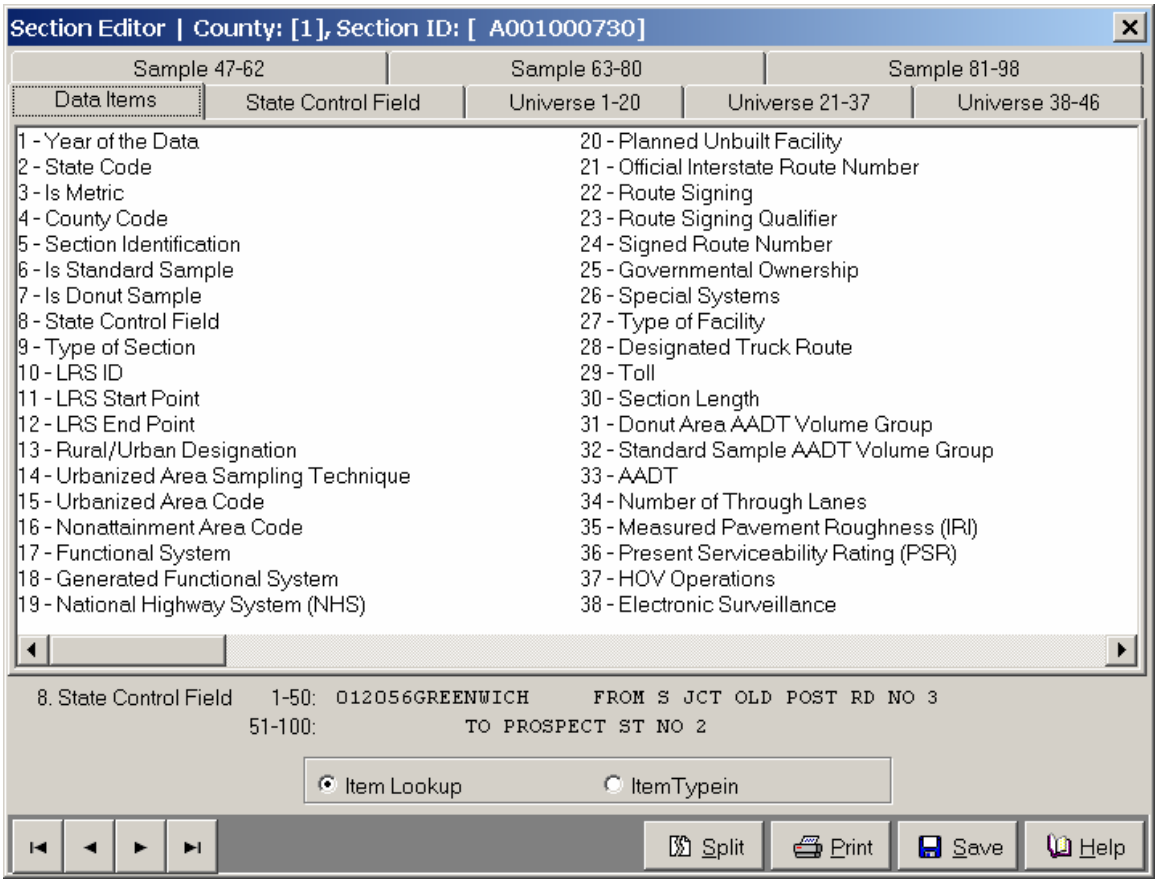
**Figure 52: Screen to View a section in the Section Editor**



Select the Data Items group to view the value coded for each data item. Click on the *Print* button to print the section. No changes can be made to the section.

To **Modify the data coded for a section, split the section or change the section type**, highlight the section in the list box and click on the *Modify* button on the Section Data Selector screen, Figure 50.

**Figure 53: Screen to Modify a Section**

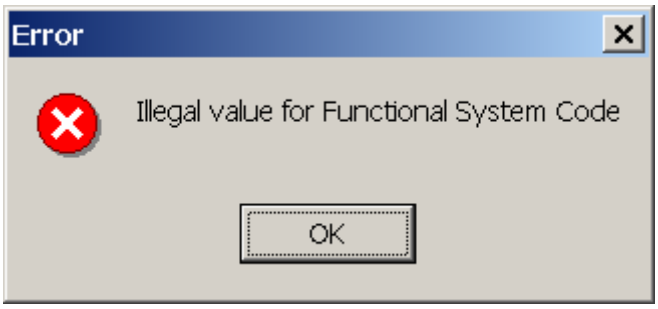



To **change the value coded for a data item(s),** select the Data Items group with the data item(s) to be modified. Enter the new value for each data item. Once <u>all</u> changes are made for the section click on *Save*. This will save the new data values for the section. Click on the *Print* button to print the section with the new values.

The *Item Lookup* button and the *Item Typein* button are used to control the drop down for the data items that have specific data values, e.g. Governmental Ownership or Access Control. If the *Item Lookup* button is selected the user selects the data value for the data item from the drop down which contains the valid codes for the data item. If the *Item Typein* button is selected the user must code the data value for the data item. The user cannot enter a non-numeric value for a data item with all numeric valid codes. If an invalid code is entered the system will not allow you to move the cursor to the next data item. A message will come up when the Tab button is clicked indicating that the code entered is not valid. Click on *OK* and correct the invalid code.

E.g., Functional system is being updated. The user enters '15' which is not a valid code. Clicking the Tab button will bring up the following message.

**Figure 54: Error Message Screen**

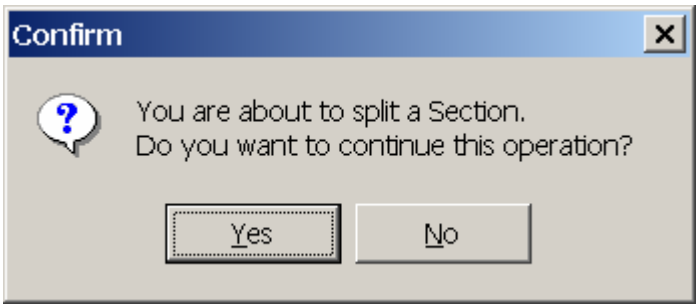



Click OK and correct the invalid code of '15' that was entered.

To **split the section**, click on *Split.* If the section is a universe section the split function will split the section into two universe sections. If the section is a donut only sample the split function will retain the original section as a donut only sample with the new piece a universe section. If the section is a standard sample (standard sample only or both standard sample and donut sample) the split function will retain the original section as a standard sample (if also a donut this is retained) with the new piece a universe section.
The section split from the original section is placed at the end of the sections in the list box.

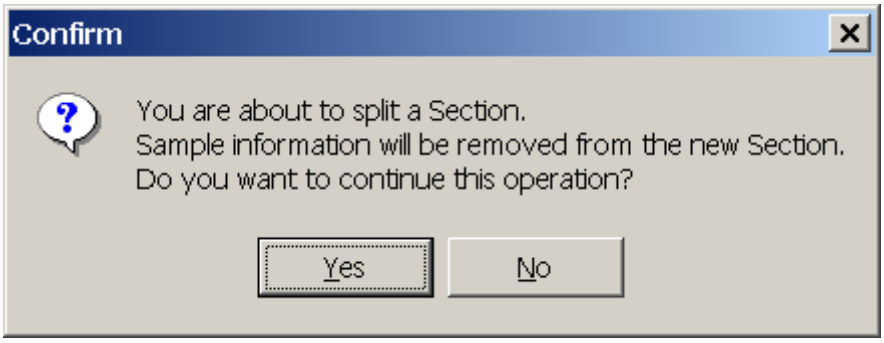
Click on the *Split* button. One of two screens will come up.

**Figure 55: Confirm Screen to Split a Universe or Donut Only Sample Section**




This screen will come up if you are splitting a universe section or a donut only sample section.

**Figure 56: Confirm Screen to Split a Standard Sample Section**



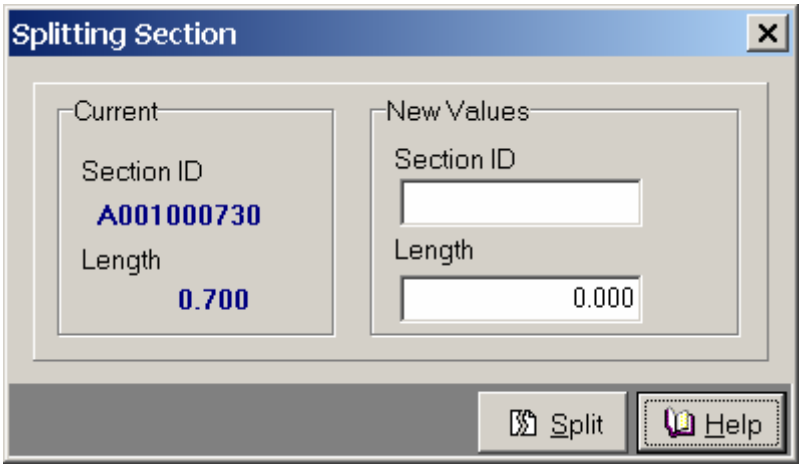

This screen will come up if you are splitting a standard sample section or a section that is both a standard sample and a donut sample.

Verify that you have the section that you want to split  Click the *NO* button if this is not the right section or you do not want to continue the operation for some other reason.  The section will not be split.  The system will return to the Section Editor screen.

Click *Yes* if you have the correct section and wish to continue the splitting process.

Continuing the split operation will bring up the screen below.

**Figure 57: Splitting Section Screen**




Enter the Section ID and length for the new universe section. The section ID and length must be coded. Click on *Split* to start the process.

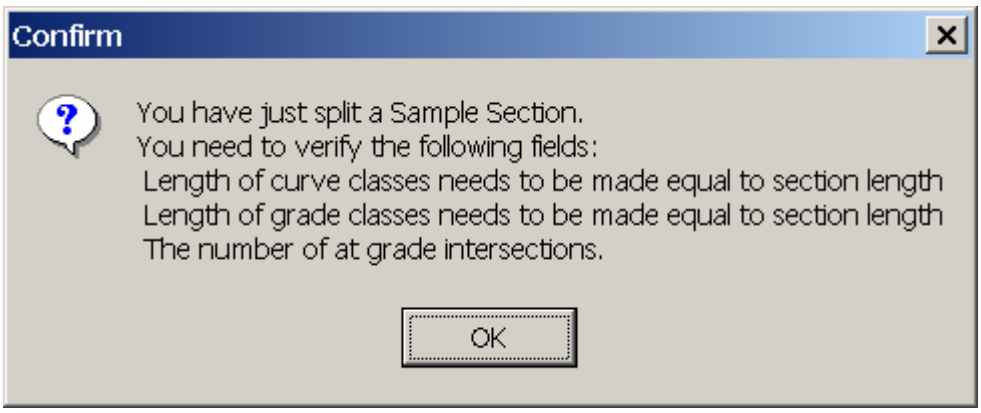
**Note:** The Section ID **must** maintain the uniqueness rules for the county. When you code the length for the new section, the length for the current section decreases by the amount you entered.

The original section will be saved with the length decreased by the amount entered for the new universe section.  The new universe section will be saved with the section ID and length you entered on the above screen. The system automatically saves the original section with the adjusted length and the new section with the information you entered.  No other data is changed in either the original section or the new section.

If you were splitting a current universe section or donut only sample section, once the split process is completed the system will return to the Section Data Selector screen, Figure 50. The new universe section will show at the bottom of the sections in the list box.

If you are splitting a standard sample section or a section that is both a standard sample and a donut sample, once the split process is completed the following screen will come appear.

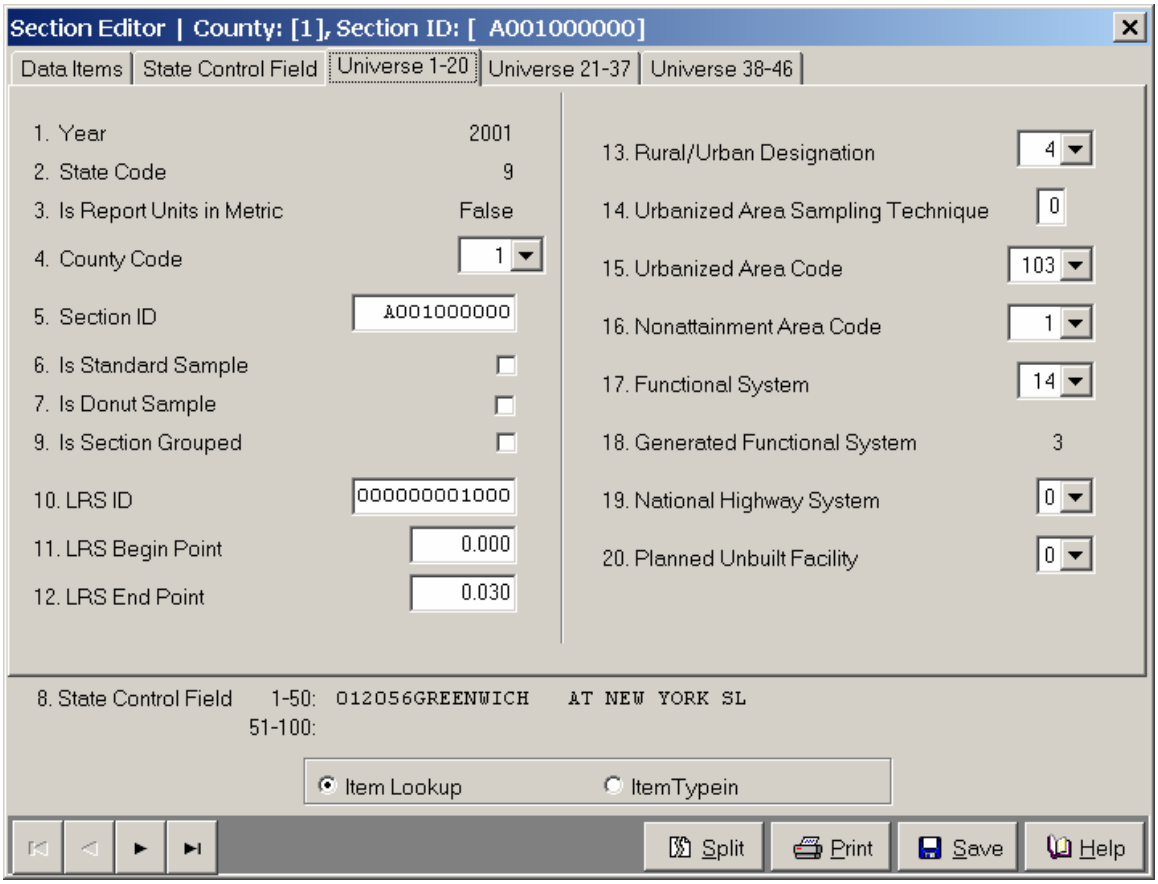
**Figure 58: Confirm Screen with Information for Split Sample Section**




This screen is to remind you that at a minimum these data items need to be updated on the original standard sample section to reflect the change in the section length. Click *OK* to return to the Section Data Selector screen, Figure 38. The new universe section will show at the bottom of the list box. You will have to enter the Section ID or scroll in the list box to locate the original sample section.

To **change the section type**, on the Section Editor screen select Data Items group Universe 1-20.

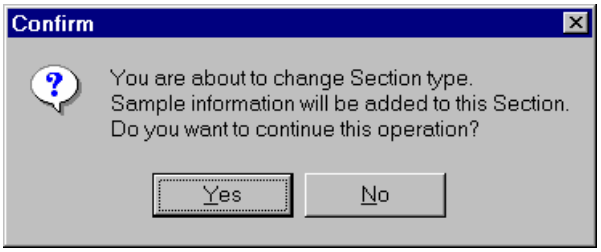
**Figure 59: Change the Section Type Screen**




To change a **Universe section** to a standard sample click on *Is Standard Sample* to turn on the switch. If the standard sample is both a standard sample and a donut sample also click on *Is Donut Sample* to turn on that switch. To change a **universe section** to a donut only sample click on *Is Donut Sample* to turn on that switch. To change a **standard sample and /or donut sample** to a universe section turn off the switch for *Is Standard Sample* and/or *Is Donut Sample.*

When **changing a universe section to a standard sample**, the following message comes up when *Is Standard Sample* is clicked.

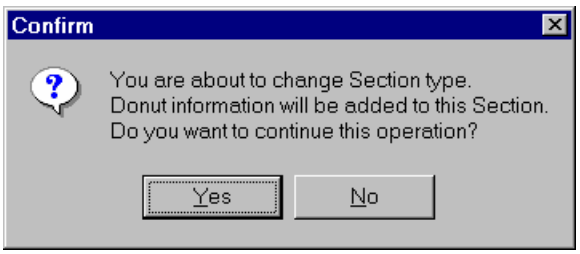
**Figure 60: Confirm Screen Change Section Type**



If the operation is continued by answering *Yes*, the switch, *Is Standard Sample,* will be set. *T*he screen will change to show the Data Items groups for the sample data items with the universe groups. The values can be entered for the sample data items by selecting the different data item groups. Once all data is entered, *Save* the data for the new standard sample section.

When **changing a universe section to a donut only sample**, the following message comes up when *Is Donut Sample* is clicked.

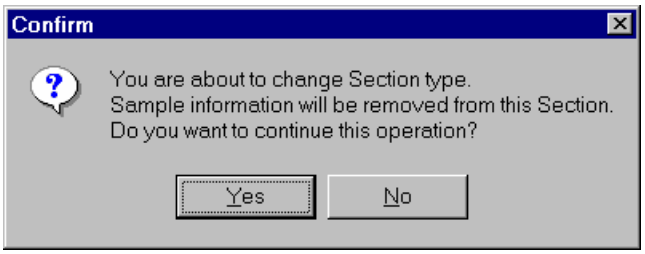
**Figure 61: Confirm Screen Change Section Type**




If the operation is continued by answering *Yes*, the switch, *Is Donut Sample,* will be set. *T*he screen will change to show the Data Items group for Donut 47-48 with the universe groups. The value can be entered for the donut sample ID by selecting the Donut group. Once all data is entered, *Save* the data for the new donut only sample section.

When **changing a standard sample to a universe section**, the following message comes up when the switch for *Is Standard Sample* is turned off.

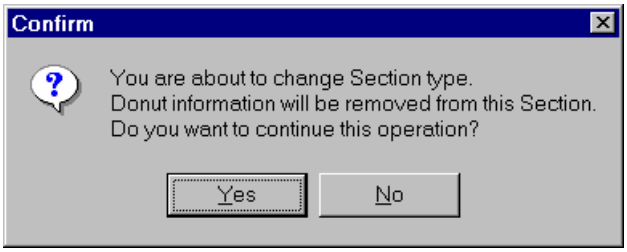
**Figure 62: Confirm Screen Change Section Type**




If the operation is continued by answering *Yes*, the switch *Is Standard Sample* will be turned off. The screen will change by removing Data Items groups for the standard sample data items. *Save* the data for the new universe section.

When **changing a donut only sample to a universe section**, the following message comes up when the switch for *Is Donut Sample* is turned off.

**Figure 63: Confirm Screen Change Section Type**




If the operation is continued by answering *Yes*, the switch *Is Donut Sample* will be turned off. The screen will change by removing Data Items group Donut 47-48 data items. *Save* the data for the new universe section.

When **changing a universe section to a section that is both a standard sample and a donut sample** turn on the switch for *Is Standard Sample* and follow the instructions above for universe to standard sample; then turn on the switch for *Is Donut Sample*. Code the data for the sample data items; then, *Save* the data for the new sample section.

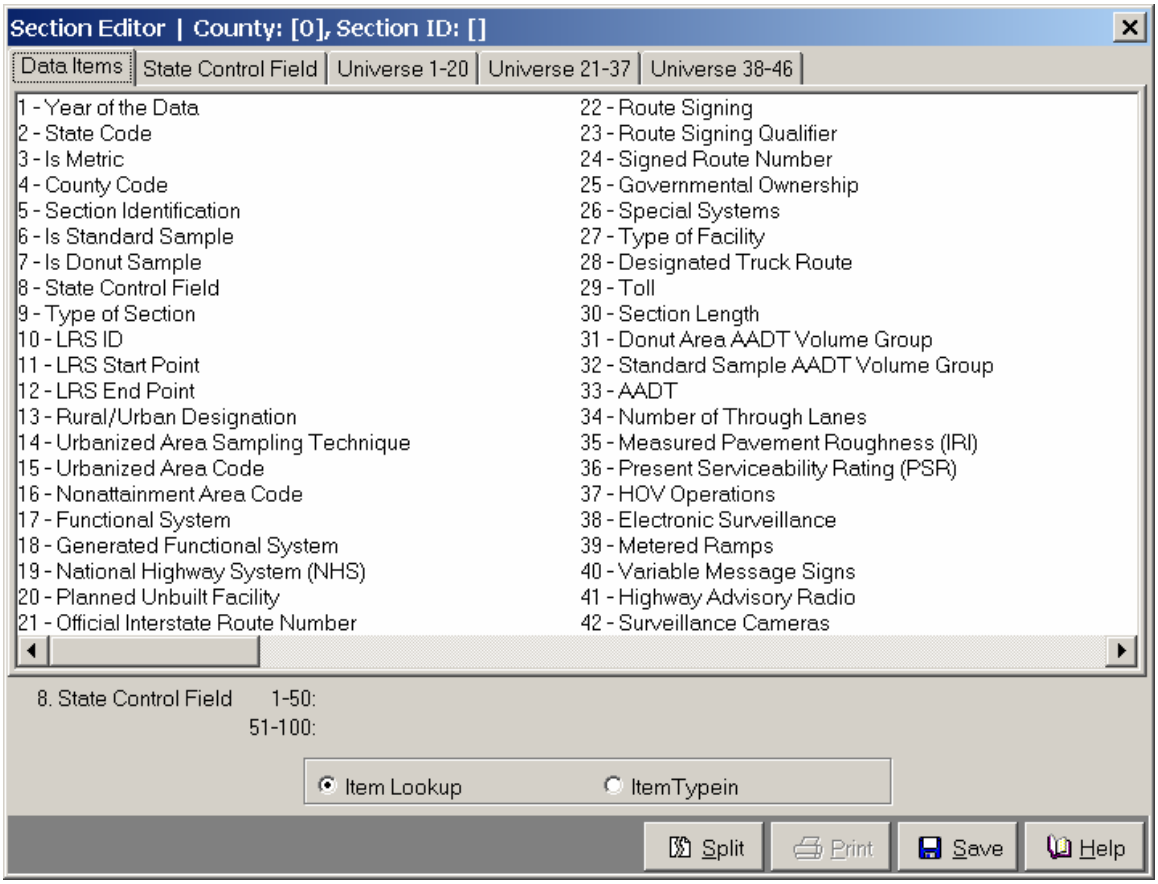
When **changing a section that is both a standard sample and a donut sample to a universe section** turn off the switch for *Is Standard Sample*; then turn off the switch for *Is Donut Sample*. *Save* the new universe section.

When **changing a section that is both a standard sample and a donut sample to a donut only sample section** turn off the switch for *Is Standard Sample. Save* the new donut only sample section.

When **changing a section that is both a standard sample and a donut sample to a standard sample section** turn off the switch for *Is Donut Sample. Save* the new standard sample section.

To **Add a new section to the HPMS** on the Section Data Selector (*Editors*|*Section)* screen, Figure 50, click on the *ADD* button.

**Figure 64: Add a Section Screen**

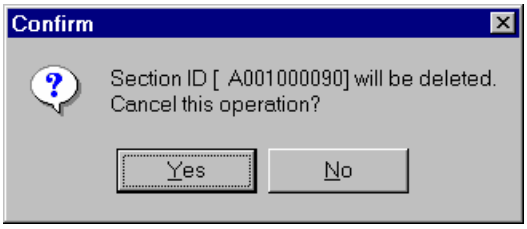



The Section Editor screen comes up on the screen with the Data Items groups for a Universe section. Select the Data Item group to code the data for the section. The screen with the data items for a universe section **will always** come up when adding a new section. If adding a standard sample and/or donut sample under the Universe 1-20 group turn on the appropriate switch for the type of section *Is Standard Sample* for a standard sample and *Is Donut Sample* for a donut sample. If the new section is both a standard sample and a donut sample, both switches **must** be turned on. If the new section is a universe section **do not** turn on either the *Is Standard Sample* or *Is Donut Sample* switch. *Save* the section when all the available data is entered. The new section is placed at the end of the sections in the list box.

**Note**: When adding a new section all of the data items do not have to be entered at the same time. As a minimum **for all sections** enter the Section ID (Item 5), County Code (Item 4), Rural/Urban Designation (Item 13), Functional System (Item 17) and Section Length (Item 30). When adding a sample section, either donut or standard sample, the Sample Identifier (Item 47) **must be coded** along with any data item beyond item number 49.

To **delete a section from the HPMS** on the Section Data Selector (*Editors*|*Section*) screen, Figure 38, highlight the section to delete in the list box. Click on the *Delete* button.

**Figure 65: Confirm Screen to Delete a Section**




The screen to confirm the delete will come up. Verify that the section ID is the correct one to delete. Answer *No* to delete the section. Answer *Yes* to cancel the operation. All sections deleted are placed in a table and can be restored later if it is determined that the incorrect section was deleted. See Restore Deleted Sections.

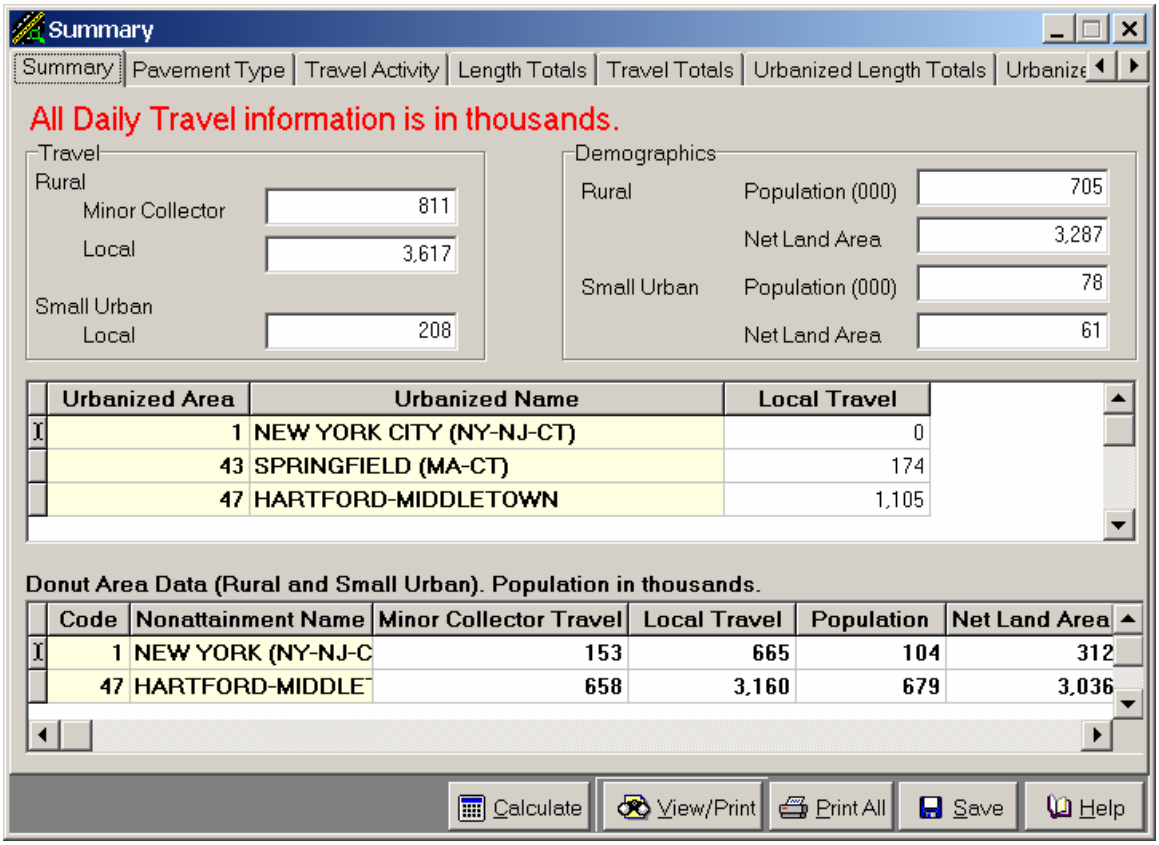
## Summary Data

The HPMS data does not contain the travel (daily vehicle miles traveled) for the rural minor collectors, rural local highways, small urban local highways, and the local highways for each urbanized area. The HPMS data does not contain the population and land area for the rural and small urban areas in the State. In the nonattainment areas the travel, population and land area for the rural major collectors and the rural and small urban locals is not available from the HPMS data. The amount of paved and unpaved mileage needs to be provided for the rural major collectors, rural locals and the urban locals. Travel Activity data needs to be provided for each vehicle type and functional system or functional system grouping. The user **must** provide all this information as a part of the Summary Data. Chapter III, Summary Data Requirements, in the *HPMS Field Manual, December 2000* contains the reporting requirements for the HPMS summary data.

Summaries for length and daily travel by functional class for rural, small urban, urbanized areas with population less than 200,000 and urbanized areas with population greater than or equal to 200,000 are included for the user to verify the length and travel coded in the HPMS data. Length and travel by functional system for each urbanized area are also included. The length and travel totals are computed from both the universe data and from the sample data.

To enter the information for the rural major collectors and all locals and to view the summaries for length and travel, select *Editors*|*Summary*.

**Figure 66: Summary Screen**



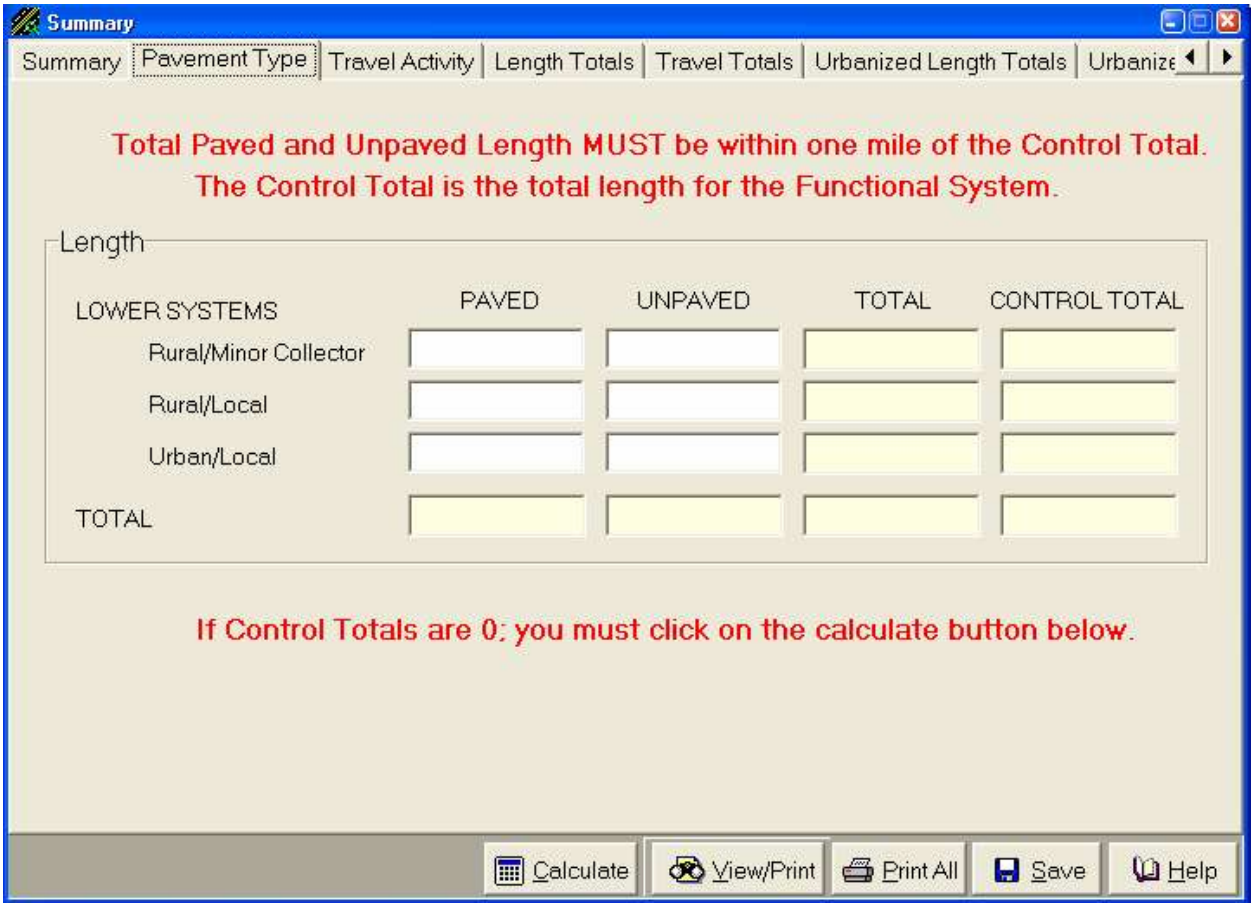

On the Summary screen enter the **daily travel and demographic** information. Daily travel is entered in thousands. *Save* the information. Click on the View|*Print* button to print the data or to print a blank screen prior to entering the data. The *Calculate* button **does not** bring any data into this screen. The user **must** enter **all** the data required on this screen.

To **print all information screens under Summary** click on the *Print All* button. Each one of the information screens will automatically go to the printer.

**Note**: All information screens under Summary will be available for printing when View|*Print* is selected from any of the screens. Only the desired screens need to be printed.

To enter the **pavement data,** paved and unpaved lengths, for the rural major collectors, rural locals and urban locals, click on *Pavement Type.*

**Figure 67: Summary Pavement Type Screen**




The *Calculate* button will calculate the Control Total for each of the systems from the HPMS data. The Control Total is the total length that needs to be coded for the Paved and Unpaved length for that system. The **user must** enter all the information for each system. *Save* the data. The user will not be allowed to save the data if the paved and unpaved length entered does not equal the control total for the functional system. Click on View|*Print* if a printed copy is desired (see note above).

To enter the **travel data by vehicle type** information for rural and urban by functional system, click on the *Travel Activity* button. The screen is shown on page III-4 in the *HPMS Field Manual, December 2000*. The percentage of travel is reported for each vehicle type relative to the total vehicle travel for each functional system by rural and urban areas. The values for each functional system should sum to 1.000(100 percent). The individual vehicle type data cell values must be entered as a decimal number to the nearest thousandth. All of the data does not have to be entered at the same time. *Save* the data prior to leaving the screen. Click on View|*Print* to print the information or a blank screen (see note above). The *Calculate* button does not bring data into the screen.

The **Length Totals, Travel Totals, Urbanized Length Totals,** and **Urbanized Travel Totals** under Summary are used to verify the data provided in the HPMS for length and travel. The totals summarize the length and AADT coded for all the sections and for the standard sample sections. The length totals and travel totals are by functional system for rural, small urban, urbanized < 200,000, and urbanized >= 200,000. The urbanized length totals and urbanized travel totals are by functional system. The user **cannot** enter any data

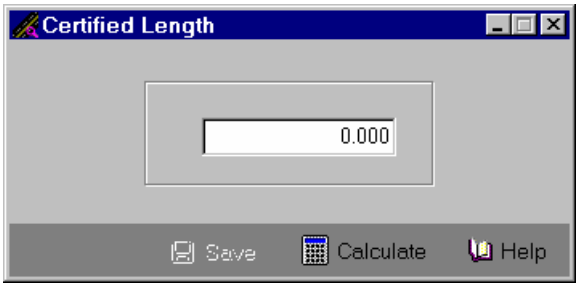
on these screens. This information is used to verify the HPMS data. Does the length in the HPMS equal the State's length for each functional system? Does the travel (AADT * section length) in HPMS equal the State's DVMT?

Click on *Length Totals*, *Travel Totals*, *Urbanized Length Totals*, or *Urbanized Travel Totals* to bring up the screen so that the HPMS data can be verified. Click *Calculate* on any screen to bring data into all of the screens. During the data preparation process, it is recommended that *Calculate* be used each time the screens are previewed. This will ensure that the summary data is derived from the latest HPMS data.
The information can be printed by clicking the View|*Print* button.

## Certified Length

All the public road mileage for the State should be included in the HPMS data. The total length included in the HPMS sections should be equal to the public road mileage certified each year by the State. To determine the total length included in the data, select *Editors*|*Certified Length*.

**Figure 68: Certified Length Screen**




Click the *Calculate* button to determine the length of all the sections coded in the data. The length should match the certified length for the State. If the length in the data is not within one or two miles of the certified length, the data needs to be checked to determine where the length is missing.

The certified length can be entered manually by clicking in the length box. Once the length is entered click the *Save* button to save the length entered.

# View Menu

## Decision Support

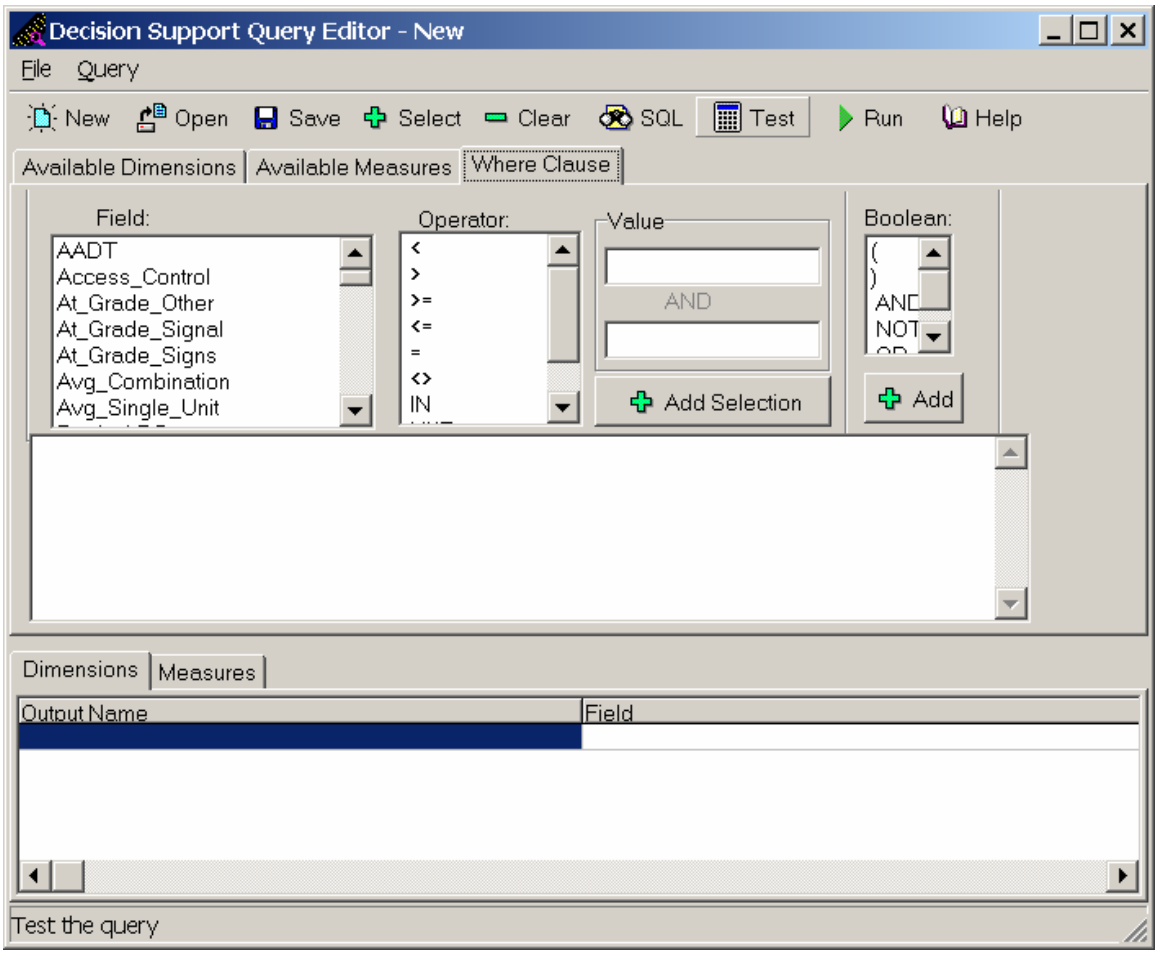
The Decision Support Query Editor is used to analyze the HPMS data by user-defined criteria. Length and lane length can be obtained for universe and standard samples for applicable data items and criteria. Length can be obtained for donut samples for the appropriate data items and criteria. Daily vehicle miles of travel (DVMT) can be obtained for universe, standard samples and donut samples for specified criteria.

The user defines what data items are to be included in the analysis, how the data is to be accumulated, and what criteria are to be applied to which data items. The results are

available in a table (grid) or in a bar graph. The grid and graph can be printed. The graph can be copied to bring into Word where text can be added.

To use the Decision Support Query Editor select *View|Decision Support*.
The following screen appears:

**Figure 69: Decision Support Query Editor Screen**




This is the main screen for the Decision Support Query Editor.

- *Available Measures* contains the measures that are available - length, lane length, and DVMT and what type data is to be used - universe, standard sample or donut sample.

- *Available Dimensions* is used to select the coordinates for the grid/graph.

- *Where Clause* is used to define specific conditions to be applied in the development of the grid/graph.

- *Save* will save the Query that is set up.

- *Open* is used to retrieve a Query that was saved.

- *Select* adds the highlighted dimension or measure to the Output dimension or measures box at the bottom of the screen.

- *Clear* removes the selections from the Output box.

- *SQL* allows the user to review the SQL setup.

- *Test* lets the user see if there is any data for the Query.

- *Run* starts the process to develop the grid/graph for the Query defined.

For each analysis of the data the user needs to select the measure, dimension and if desired define specific criteria (Where Clause) that is to be applied in the development of the grid/graph.

To remove a selection in the Output Box right click on the mouse and then click on Delete.

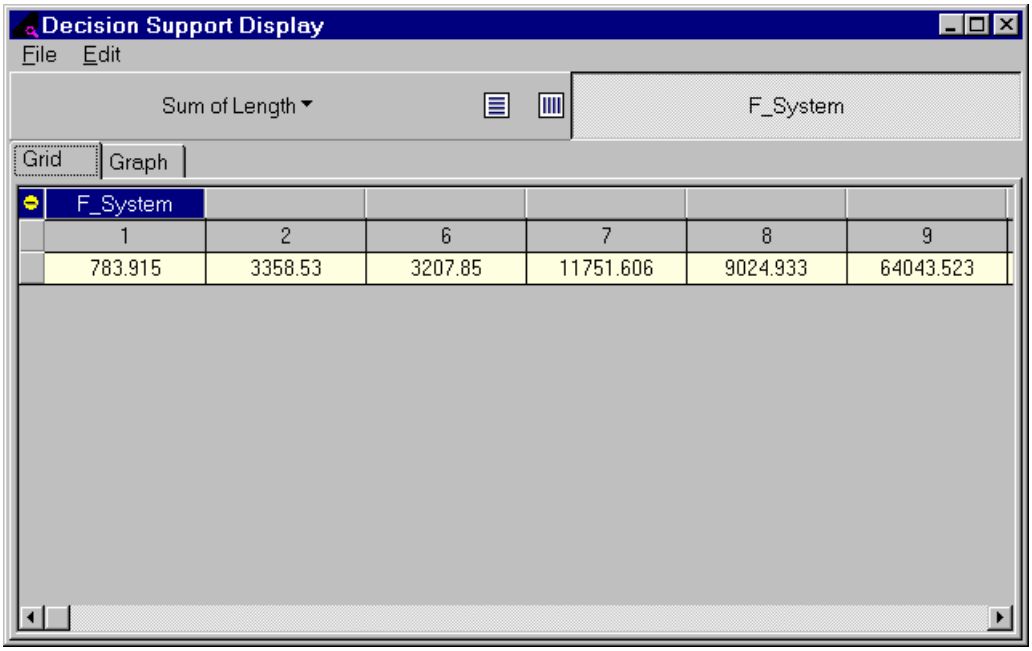
If the HPMS table contains data for more than one year, year (Year_Record) **must be** included as one of the Available Dimensions or the year (Year_Record) for the analysis **must be** included as part of the specific criteria in the Where Clause. If the year **is not** included as either a dimension or in the specific criteria, the grid will be for all the years in the table, i.e., the length for a functional system would be for all years combined into one number for that functional system. The year as a dimension will have numbers in the grid for each year in the HPMS data. The year as part of the specific criteria will have numbers in the grid for the year set in the criteria, i.e., Year_Record = 2000 summarizes the HPMS data for 2000 and no other year in the data table.

Example: What is the length included in the HPMS by functional system?

Select Available Measure: Universe, Length – double click on entry in Available Measures to add to
Output box.
Available Dimensions: F_Sytem Functional System – double click on entry in Available Dimensions
to add to the Output box.
**Note:** In this example there is only one year in the HPMS table.

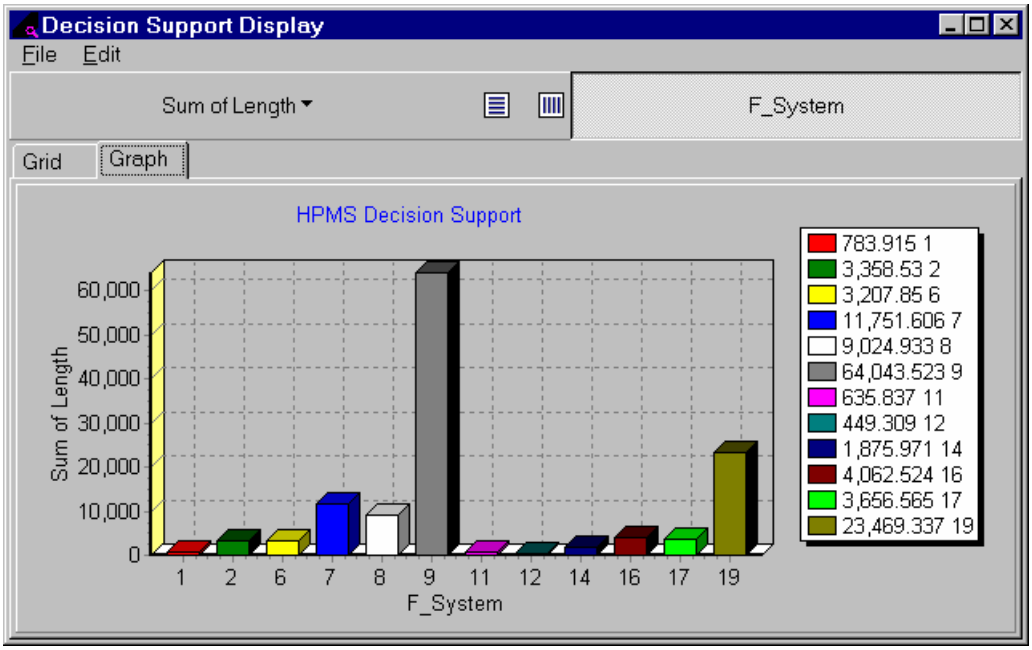
This is all that is needed for the grid/graph.
Click on *Run*.

**Figure 70: Decision Support Display Screen - Grid Display**




This is the screen with the length by functional system.
Click on *Graph* to see the graph.

**Figure 71: Decision Support Display Screen – Graph Display**




The graph can be copied to bring into Word to add text. Use the Copy under Edit.
The colors and bars on the graph <u>cannot</u> be changed.

Example: What is the travel and length for the NHS by area for paved segments with IRI < 170?

Select Available Measure : Universe Length and Universe Travel

Both can be selected at the same time. There will be a grid for travel and one for length.

The universe is used since the NHS requires IRI and AADT to be coded for all segments.

Select Available Dimensions: Rural_Urban and NHS

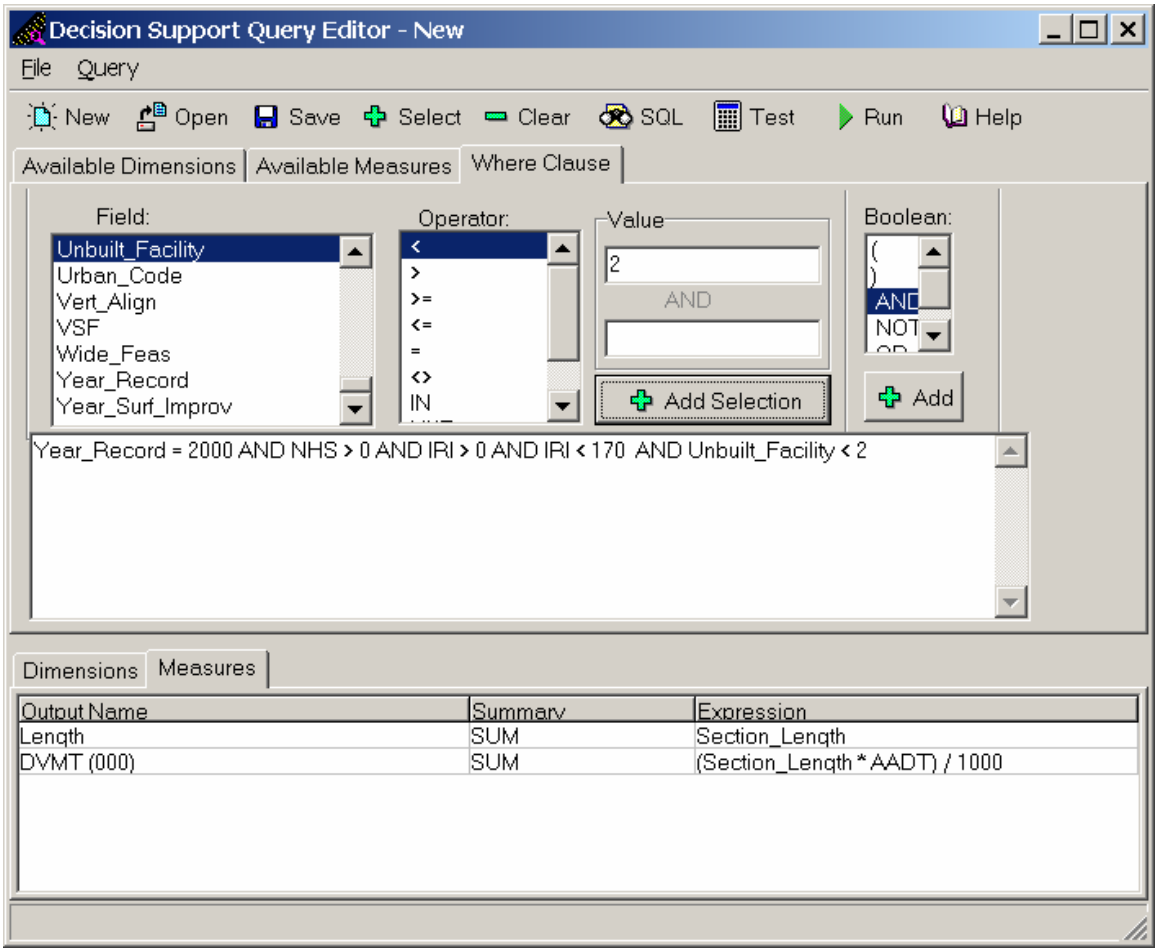
Need the rural urban code since the table is to be by area.

NHS is needed if it is desired to see the table by the type of NHS, if you do not want to see the results by the type of NHS do not use NHS as a dimension.

Additional criteria (Where clause) needs to be defined to get the desired results – the NHS code must be > 0; IRI must be > 0 and IRI must be < 170; and the unbuilt segments must be removed. If your HPMS table contains more than one year you will need to specify the year desired. In this example there is more than one year in the HPMS table, Year_record = 2000 is included in the Where clause.

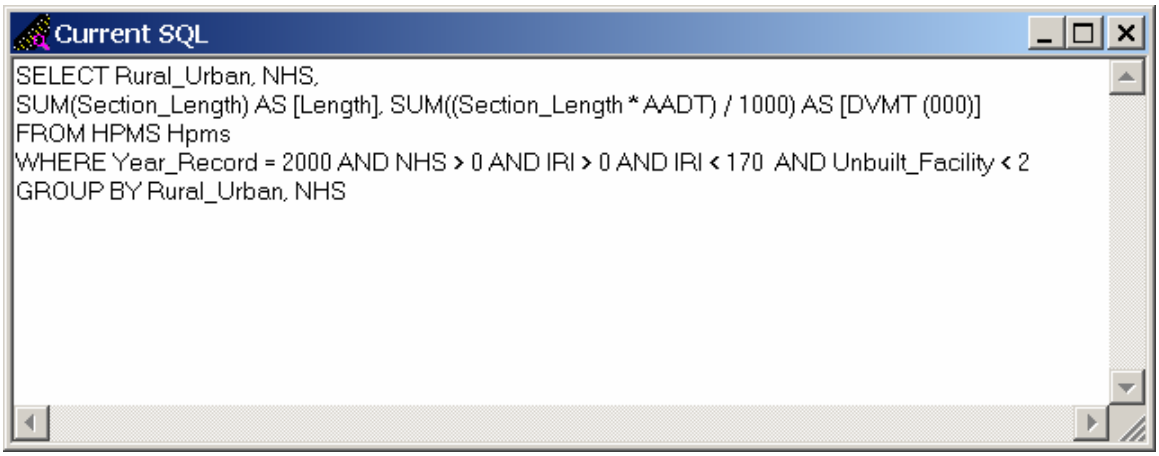
NOTE: If the IRI is zero the IRI was not reported or the segment is unpaved. IRI must be reported for all NHS sections. IRI is reported for all NHS segments universe and sample. The pavement type code for unpaved or paved cannot be used since this is a sample data item.

**Figure 72: Decision Support Query Editor Screen with Specific Criteria Defined**




This is the screen with the specific criteria defined.
Click on SQL to see the statements.

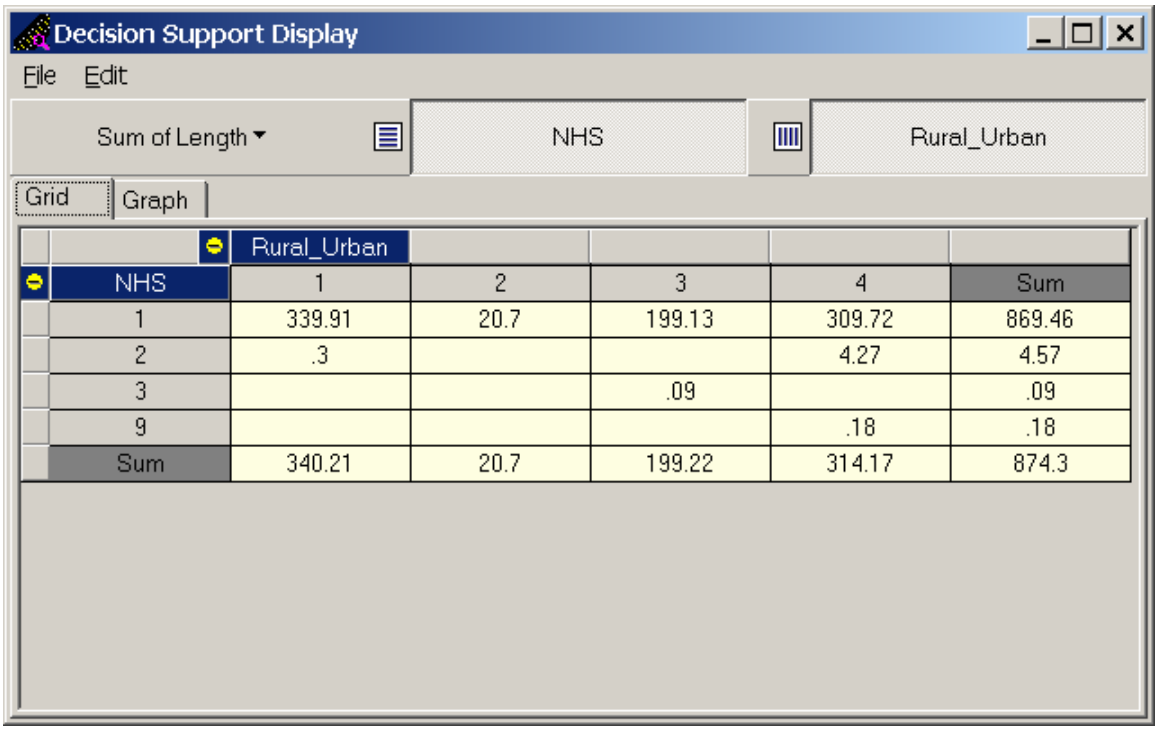
**Figure 73: Current SQL Statements Screen**



Note: The Select shows the data items there were selected in the Available Dimensions; also in the Group By. The Sum statements are the Available Measures that were selected. The Where statement contains the specific criteria that you entered for the table/graph.

Click on *Run* to obtain the grid/graph. There will be one for length and one for travel.

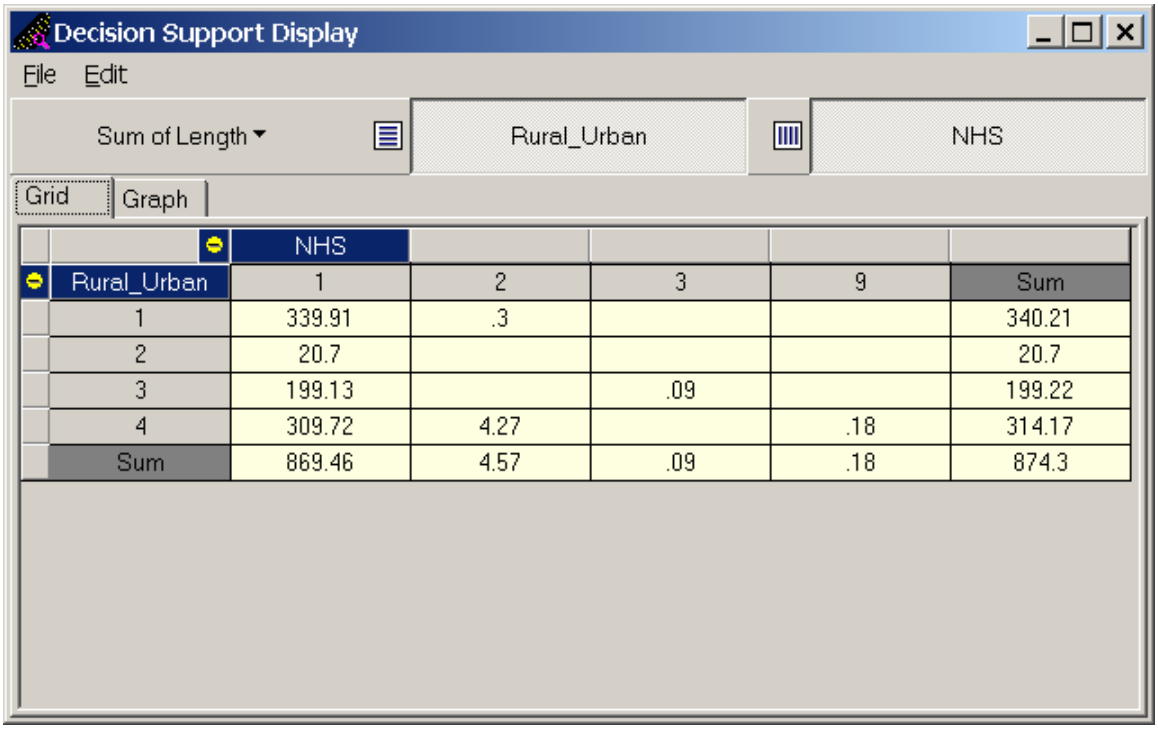
**Figure 74: Decision Support Display Screen - Grid for Length**




| | Rural_Urban | | | | |
|---|---|---|---|---|---|
| NHS | 1 | 2 | 3 | 4 | Sum |
| 1 | 339.91 | 20.7 | 199.13 | 309.72 | 869.46 |
| 2 | .3 | | | 4.27 | 4.57 |
| 3 | | | .09 | | .09 |
| 9 | | | | .18 | .18 |
| Sum | 340.21 | 20.7 | 199.22 | 314.17 | 874.3 |

Click on Sum of Length to bring up the other grid/graph.
The rows and columns of the grid can be switched by dragging the Rural_Urban in the grey box over to the other side. NHS and Rural_Urban will switch positions. Drag until the two arrows line up then release the mouse.

**Figure 75: Decision Support Display Screen – Grid for Length with Rows and Columns Switched**




| | NHS | | | | |
|---|---|---|---|---|---|
| Rural_Urban | 1 | 2 | 3 | 9 | Sum |
| 1 | 339.91 | .3 | | | 340.21 |
| 2 | 20.7 | | | | 20.7 |
| 3 | 199.13 | | .09 | | 199.22 |
| 4 | 309.72 | 4.27 | | .18 | 314.17 |
| Sum | 869.46 | 4.57 | .09 | .18 | 874.3 |

The yellow buttons with the minus or plus are used to minimize/ maximize the rows/columns in the grid.

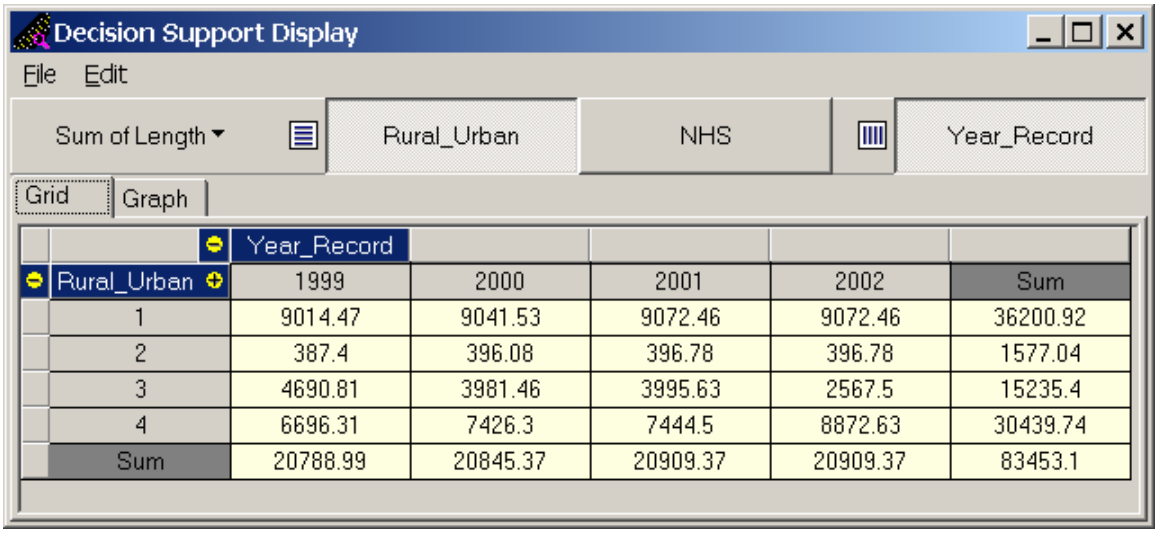
Click on graph to see the graph for length and/or travel.
The graph can be copied to bring into Word to add text.

**Note**: The Decision Support may be set up with one, two or more dimensions. When using multiple dimensions the resulting table may exceed the capacity of the Decision cube. You may get the message "The Decision Cube capacity is low. Please deactivate dimensions or change the dataset". If this occurs the data items used for the dimensions probably do not form groups.

E.g., Dimensions set are year record, section ID, NHS, IRI
The section ID is a data item that is unique for each section within the county. The grid would not contain a grouping for the section ID and becomes too large.

The following screen shows a grid for <u>three</u> dimensions.

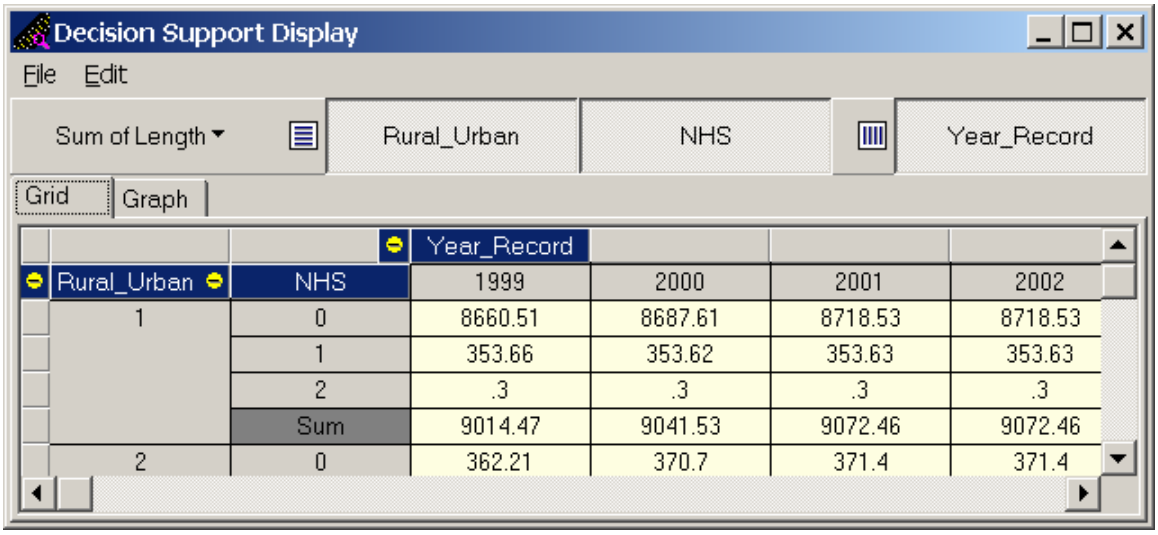
**Figure 76: Decision Support Display Screen - Three Dimensions**




| | Year_Record | | | | |
|---|---|---|---|---|---|
| Rural_Urban | 1999 | 2000 | 2001 | 2002 | Sum |
| 1 | 9014.47 | 9041.53 | 9072.46 | 9072.46 | 36200.92 |
| 2 | 387.4 | 396.08 | 396.78 | 396.78 | 1577.04 |
| 3 | 4690.81 | 3981.46 | 3995.63 | 2567.5 | 15235.4 |
| 4 | 6696.31 | 7426.3 | 7444.5 | 8872.63 | 30439.74 |
| Sum | 20788.99 | 20845.37 | 20909.37 | 20909.37 | 83453.1 |

To see the third dimension, NHS, click on the NHS button at the top of the screen.

**Figure 77: Decision Support Display Screen– Three Dimensions Shown**




| | | Year_Record | | | |
|---|---|---|---|---|---|
| Rural_Urban | NHS | 1999 | 2000 | 2001 | 2002 |
| 1 | 0 | 8660.51 | 8687.61 | 8718.53 | 8718.53 |
| | 1 | 353.66 | 353.62 | 353.63 | 353.63 |
| | 2 | .3 | .3 | .3 | .3 |
| | Sum | 9014.47 | 9041.53 | 9072.46 | 9072.46 |
| 2 | 0 | 362.21 | 370.7 | 371.4 | 371.4 |

Clicking on the data item name button will display or remove the data item in the grid.

**Printing the Decision Support query Table (grid)**
The table (grid) with the results of the Decision Support query can be printed. On the Decision Support Display screen under File select Print.

**Figure 78: Decision Support Display Screen**

Decision Support Display

File Edit

Sum of Length | F_System | NHS

Grid | Graph

| | NHS | | | | | |
|---|---|---|---|---|---|---|
| F_System | 1 | 2 | 3 | 7 | 9 | Sum |
| 1 | 101.26 | | | | | 101.26 |
| 2 | 252.34 | .3 | | | | 252.64 |
| 7 | .02 | | | | | .02 |
| 11 | 244.91 | | | | | 244.91 |
| 12 | 183 | 4.32 | | | | 187.32 |
| 14 | 174.76 | | .44 | 1.01 | | 176.21 |
| 16 | | | | | .51 | .51 |
| 17 | .24 | | | | .32 | .56 |
| 19 | | | | | .06 | .06 |
| Sum | 956.53 | 4.62 | .44 | 1.01 | .89 | 963.49 |

Clicking on Print will bring up Notepad with the results in the table listed as a CSV file.

**Figure 79: Notepad Screen**

hpms5decisprint.txt - Notepad

File Edit Format Help

```
,NHS,,,,,
F_System,1,2,3,7,9,Sum
1,101.26,,,,,101.26
2,252.34,.3,,,,252.64
7,.02,,,,,.02
11,244.91,,,,,244.91
12,183,4.32,,,,187.32
14,174.76,,.44,1.01,,176.21
16,,,,,.51,.51
17,.24,,,,.32,.56
19,,,,,.06,.06
Sum,956.53,4.62,.44,1.01,.89,963.49
```

Save the CSV file by selecting File Save AS. Specify a folder on your hard drive to place the file and name for the file. Once the file is saved the CSV file can be opened in Excel or Access. Bring into Excel or Access as a comma delimited file.

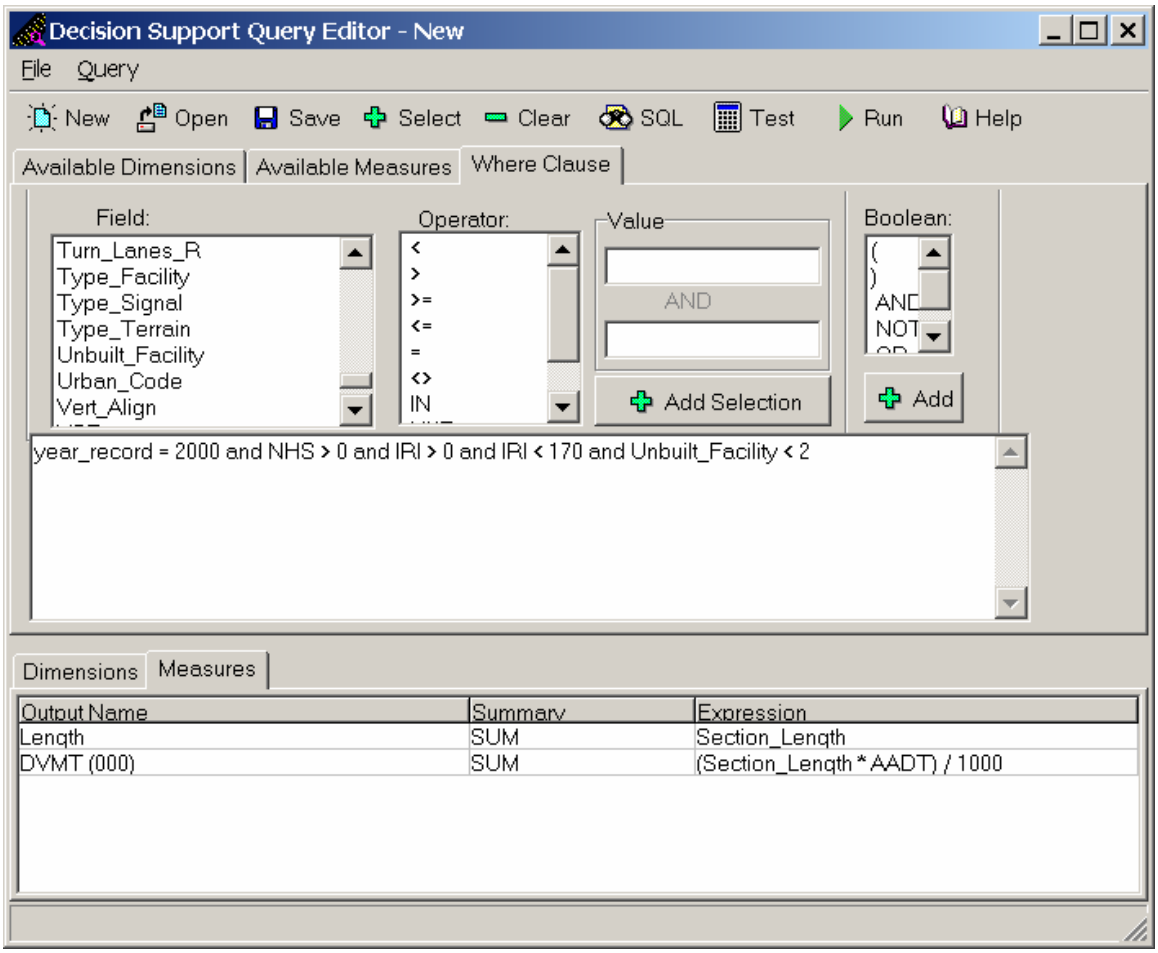
**Printing or Coping the Decision Support query Graph**

The graph with the results of the Decision Support query can be printed. On the Decision Support Display screen under File select Print. The graph can be copied and pasted into Word. Text can then be added to document the graph. On the Decision Support Display screen under Edit click Copy. Open Word and paste the graph into Word.

**Saving a SQL Query used in the Decision Support Where Clause**

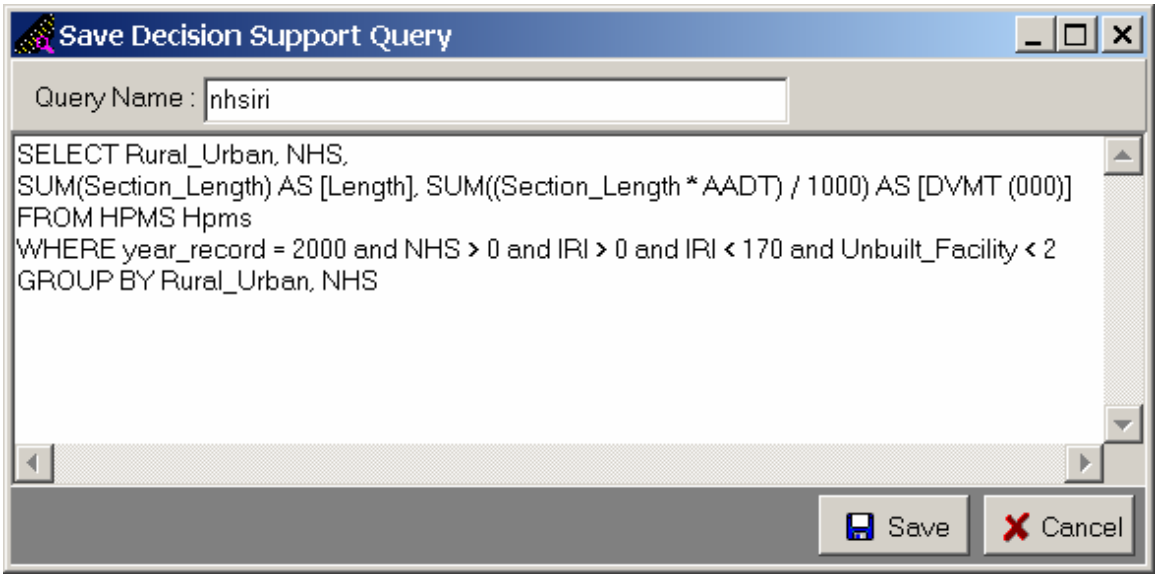
The SQL query that was used to develop the table (grid) may be saved and used at another time in the Decision Support. To save the SQL query follow these steps:

**Figure 80: Decision Support Query Editor Screen**




On the Decision Support Query Editor screen click the *Save* button.
The following screen will come up.

**Figure 81: Save Decision Support Query Screen**

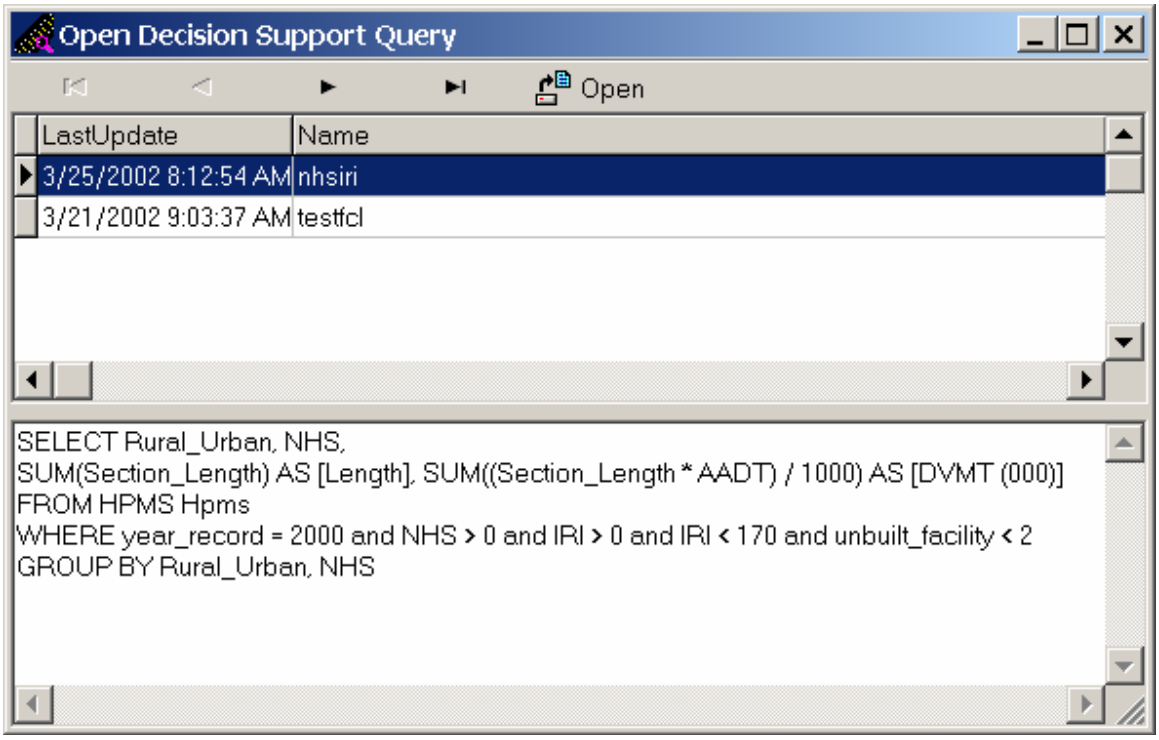



On the Save Decision Support Query screen enter a Query Name.
Click the *Save* button.

The SQL query statements will be saved in the Decision Support Query table set up by the software. All of the queries saved in the Decision Support will automatically go to this table. The SQL queries saved in the Decision Support cannot be used in any other Extra Filters. The table where they are saved is only available to the Decision Support and the structure of the query is not the same as used in the Export feature and the Section Editor.

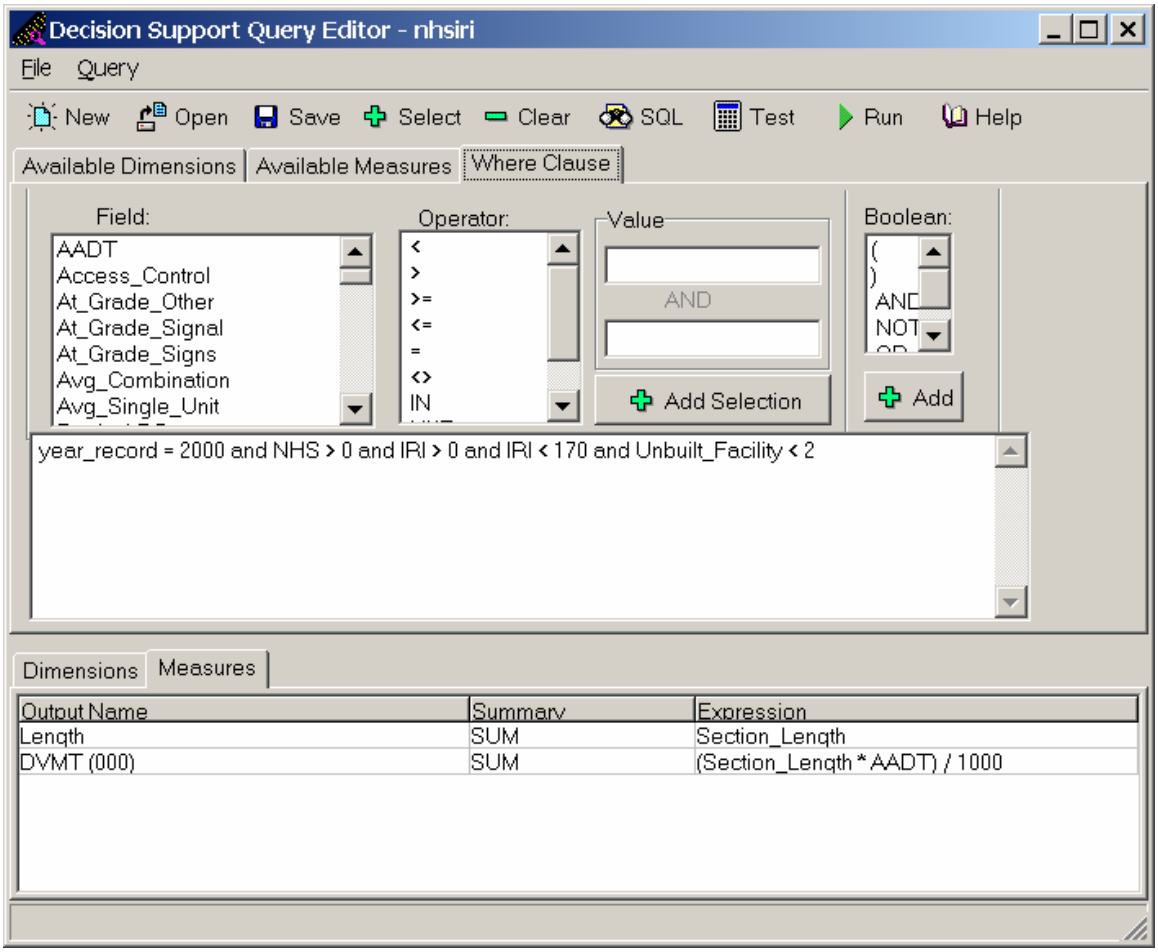
**Using a Saved SQL Query in the Decision Support**
To use a saved SQL query in the Decision Support be in the Decision Support feature – *View|Decision Support.* On the Decision Support Query Editor screen, select *Open* button on the menu bar.
The following screen will come up:

**Figure 82: Open Decision Support Query Screen – Saved Queries**




The box at the top half of the screen will show the SQL queries that you have saved by Last Update and Name. Highlight the Name of the query to see the SQL statements in the lower box. Double click on the Name of the query that you want opened in the Decision Support. The following screen will come up – the main screen for the Decision Support

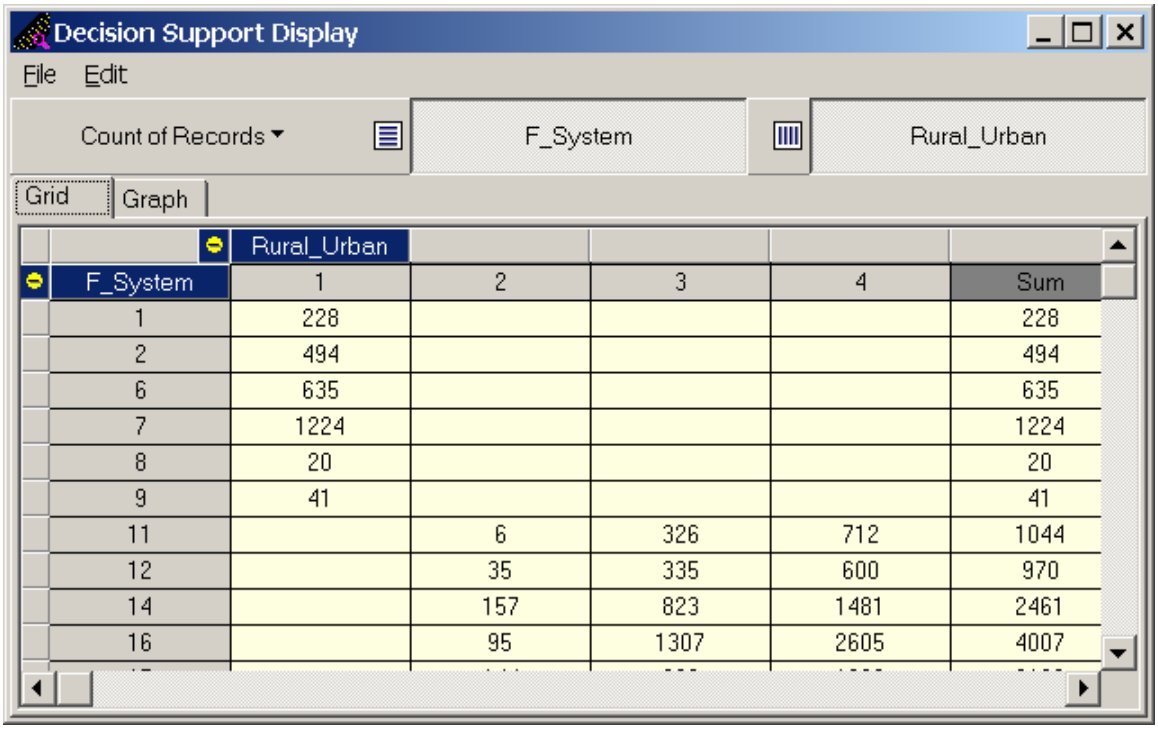
**Figure 83: Decision Support Query Editor – Saved Query NHSIRI**




The Available Dimensions will be the data items after the Select and used in the Group BY; Available Measures will be the items listed in the SUMMARY; specific criteria will be the Where Statement.
Select *Run* to see the table(grid)/graph.

**Note:** If you place your cursor on *SUM* under SUMMARY, a drop down will appear. If you hit the drop down arrow a *Count* option will show. Selecting *Count* will give you a count of sections that are valid for the criteria you have defined for the grid. The next screen illustrates how the Count would show in the grid.

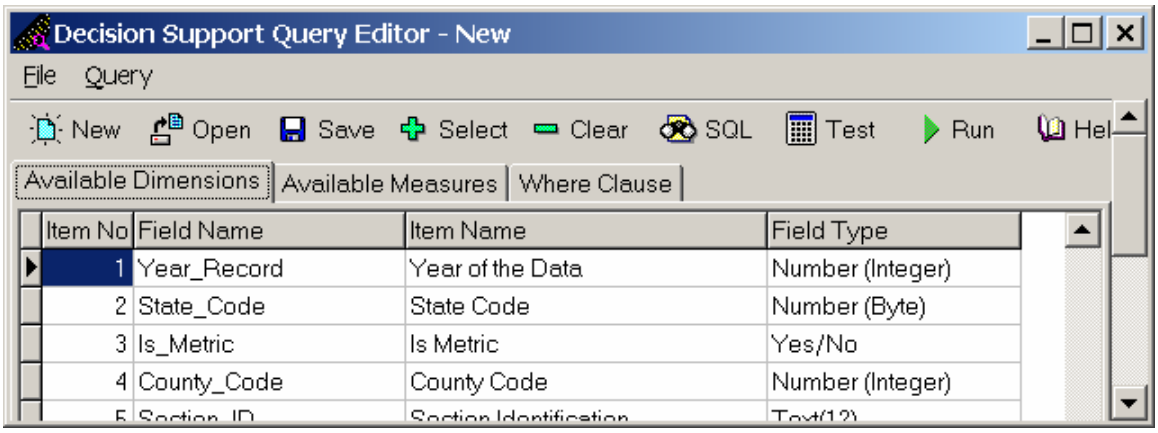
**Figure 84: Decision Support Display Screen – Count for Sections with Defined Criteria**




| | Rural_Urban | | | | |
|---|---|---|---|---|---|
| F_System | 1 | 2 | 3 | 4 | Sum |
| 1 | 228 | | | | 228 |
| 2 | 494 | | | | 494 |
| 6 | 635 | | | | 635 |
| 7 | 1224 | | | | 1224 |
| 8 | 20 | | | | 20 |
| 9 | 41 | | | | 41 |
| 11 | | 6 | 326 | 712 | 1044 |
| 12 | | 35 | 335 | 600 | 970 |
| 14 | | 157 | 823 | 1481 | 2461 |
| 16 | | 95 | 1307 | 2605 | 4007 |

**Deleting a Query from the Saved Query Table for the Decision Support**
The Decision Support table that is used to save the SQL statements can be looked at and maintained by the user. Go into the Decision Support – *View|Decision Support.*

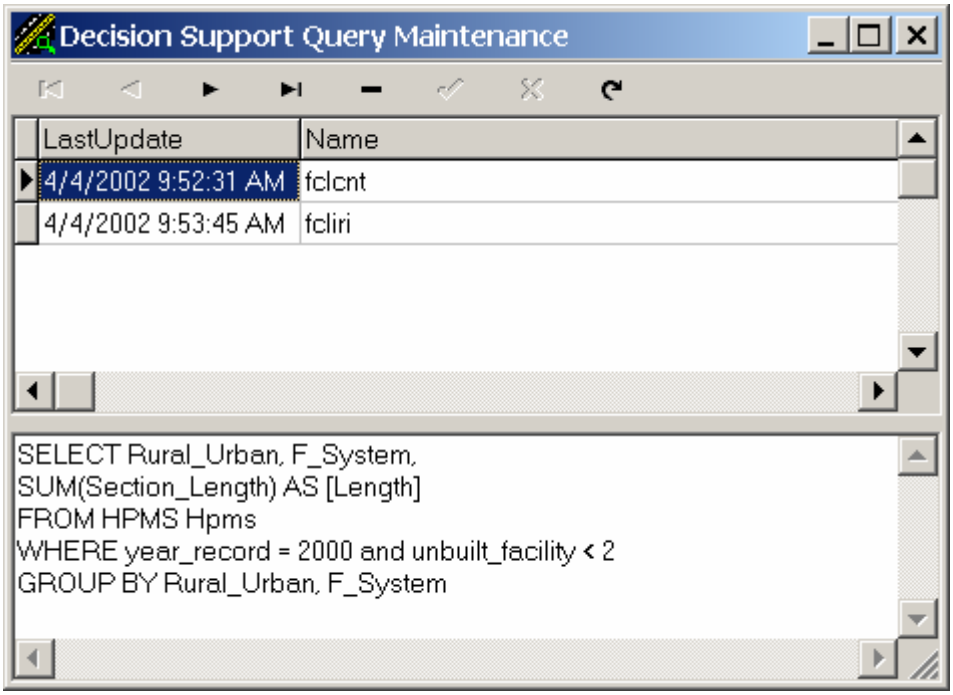
**Figure 85: Decision Support Query Editor Screen**




| Item No | Field Name | Item Name | Field Type |
|---|---|---|---|
| 1 | Year_Record | Year of the Data | Number (Integer) |
| 2 | State_Code | State Code | Number (Byte) |
| 3 | Is_Metric | Is Metric | Yes/No |
| 4 | County_Code | County Code | Number (Integer) |

On the Decision Support Query Editior Screen go to Query and Click. Select Delete at the bottom of the drop down. Click on Delete.

**Figure 86: Decision Support Query Maintenance Screen**




The Decision Support Query Maintenance screen will come up. The saved queries will show in the upper box. Highlight the name of any query to see the statements for that query in the lower box. The arrow buttons will move you through the list.

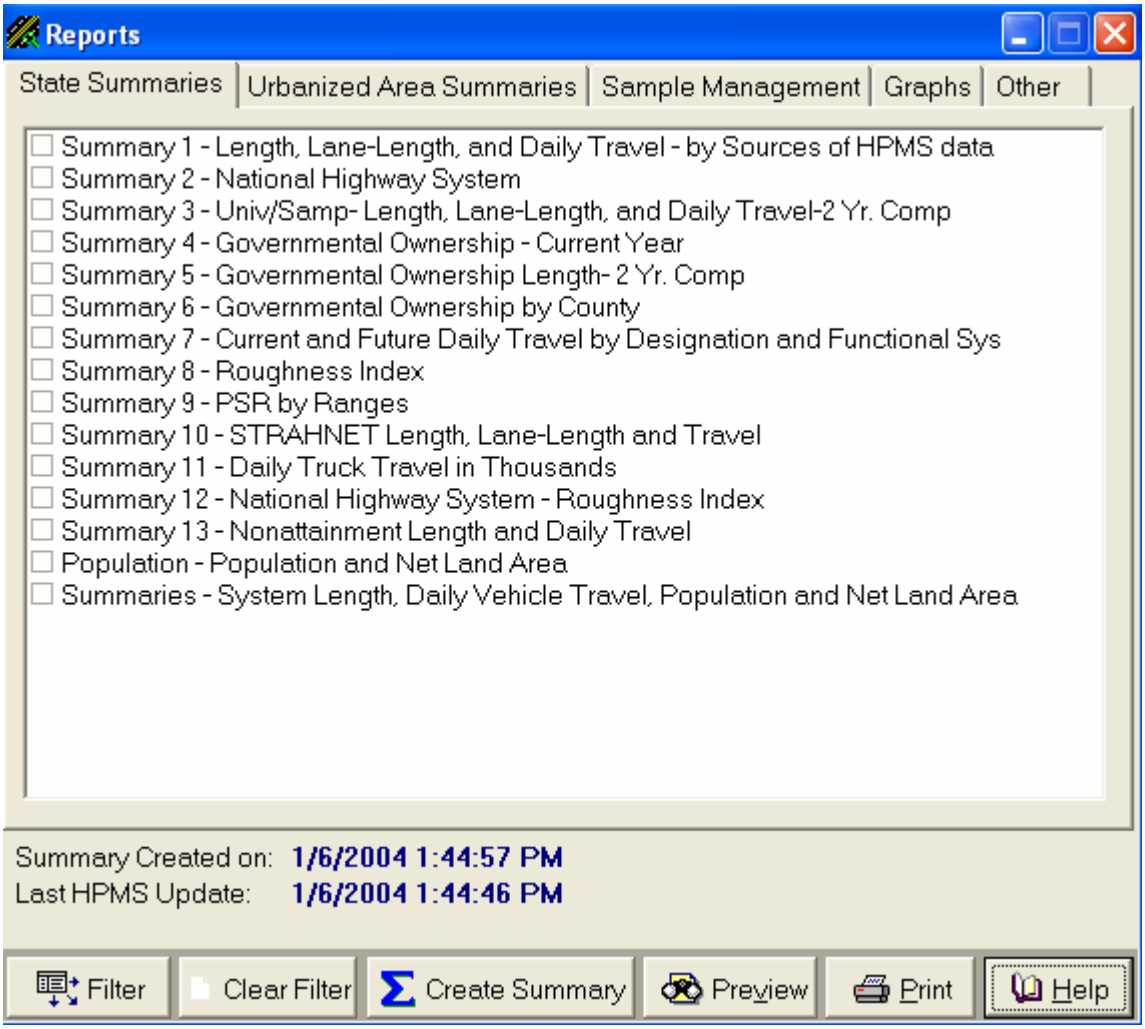
To *Delete* a query from the table, highlight the query name and click on the **—** (**bar**), Delete Record.
Close the screen when you are finished with the Delete. This returns you to the main screen for the Decision Support system.

## Reports

Reports are available that summarize the data for the current year for the State and for individual urbanized areas. Some of the reports compare the current year's data with the data provided for the previous year. Included are reports that deal with sample issues and problems. Graphs are available for various data items. The reports are divided into the categories: State Summaries, Urbanized Area Summaries, Sample Management, Graphs, and Other.

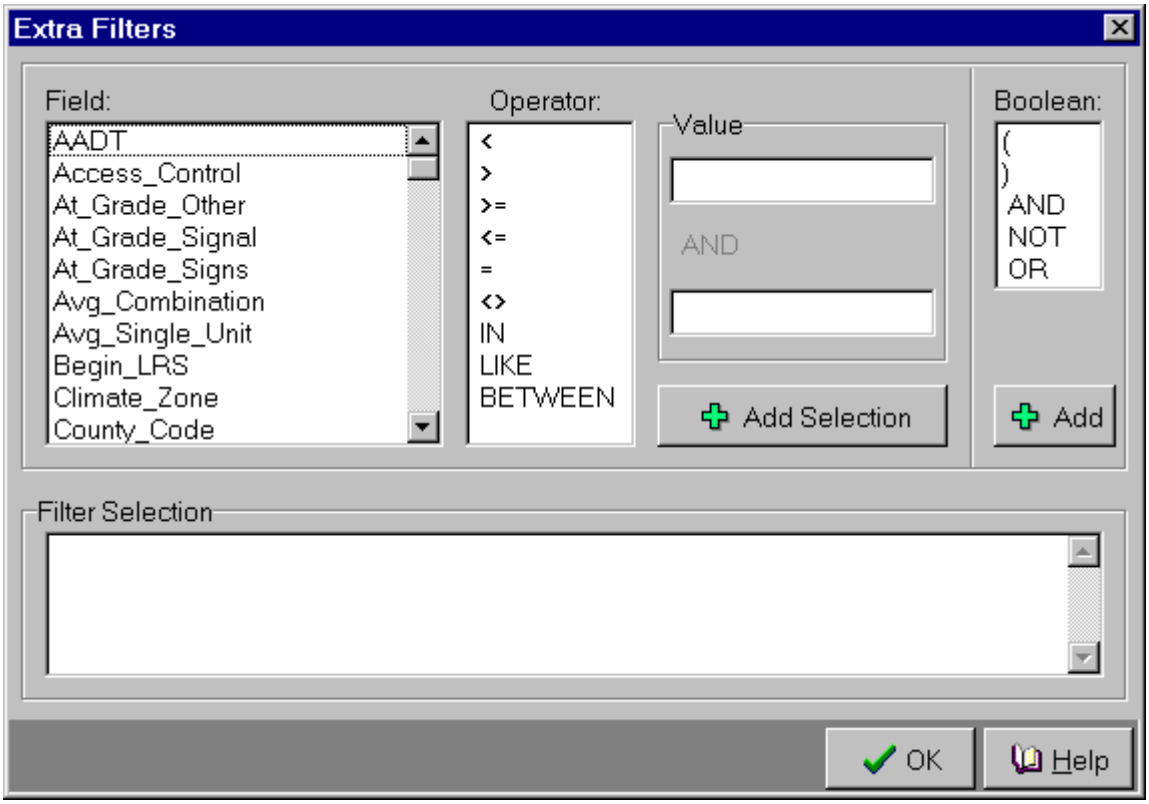
To produce the reports, select *View*|*Reports*.

**Figure 87: Available Reports Screen – State Summaries Reports**




This is the main screen for Reports. Click on the appropriate tab to bring up the screen with the group of desired reports. Turn the switch on for the report. *Preview* will bring the report up on the screen. The report can be printed from the preview screen. Select *Print* to print the report directly. Turn off the switch after viewing or printing the report. You may use filter for reports that use HPMS data by clicking on the *Filter button.*

**Figure 92a: Extra Filters Screen**




The filter selection criteria must be defined by selecting the data field, operator, value, and Boolean connector. Highlight the data field and operator and enter the value to apply. Than click Add Selection. To select a Boolean connector, highlight and click on the Add button. The criteria selected will show in the Filter Selection box. Once all of the criteria are defined, click the *OK* button to return to the Section Data Selector screen, Figure 50.

**Note**: The user can enter the criteria directly in the Filter Selection box.

When the Section Data Selector screen appears, click the *Apply Filters* button for the extra filters criteria to be applied to the Section Type selected and Primary Key criteria. The sections that meet the section type and Primary Key criteria and the Extra Filters defined criteria will appear in the list box.

Extra Filters criteria remain set until they are cleared. Each time the user clicks *Apply Filters* any defined criteria for Extra Filters is applied. Click the *Clear Filters* button to remove the Extra Filters that were defined.

The following reports use the HPMS data that shall use filter are as listed:

*State Summaries*
Summary 7 - Current and Future Daily Travel by Designation and Functional System
Summary 8 - Roughness Index
Summary 9 - PSR by Ranges
Summary 10 - STRAHNET Length, Lane-Length and Travel
Summary 11 - Daily Truck Travel in Thousands
Summary 12 - National Highway System - Roughness Index

*Urbanized Area Summaries*
Urbanized 5 - Current and Future Daily Travel

*Sample Management*
Sample 1 - Samples which are Structures
Sample 2 - Unsampled Volume Groups
Sample 3 - Unsampled Donut Area Volume Groups
Sample 4 - Standard Sample Volume Groups
Sample 5 - Donut Area Volume Groups
Sample 9 - Estimates of Standard Sample Adequacy (Sheet 1)
Sample 10 - Estimates of Standard Sample Adequacy (Sheet 2)
Sample 11 - Estimates of Donut Sample Adequacy (Sheet 1)
Sample 12 - Estimates of Donut Sample Adequacy (Sheet 2)

*Graphs*
Graph 1 - IRI Frequency Graphs
Graph 2 - K-Factor Frequency Graphs
Graph 3 - Truck Percentage Frequency Graphs

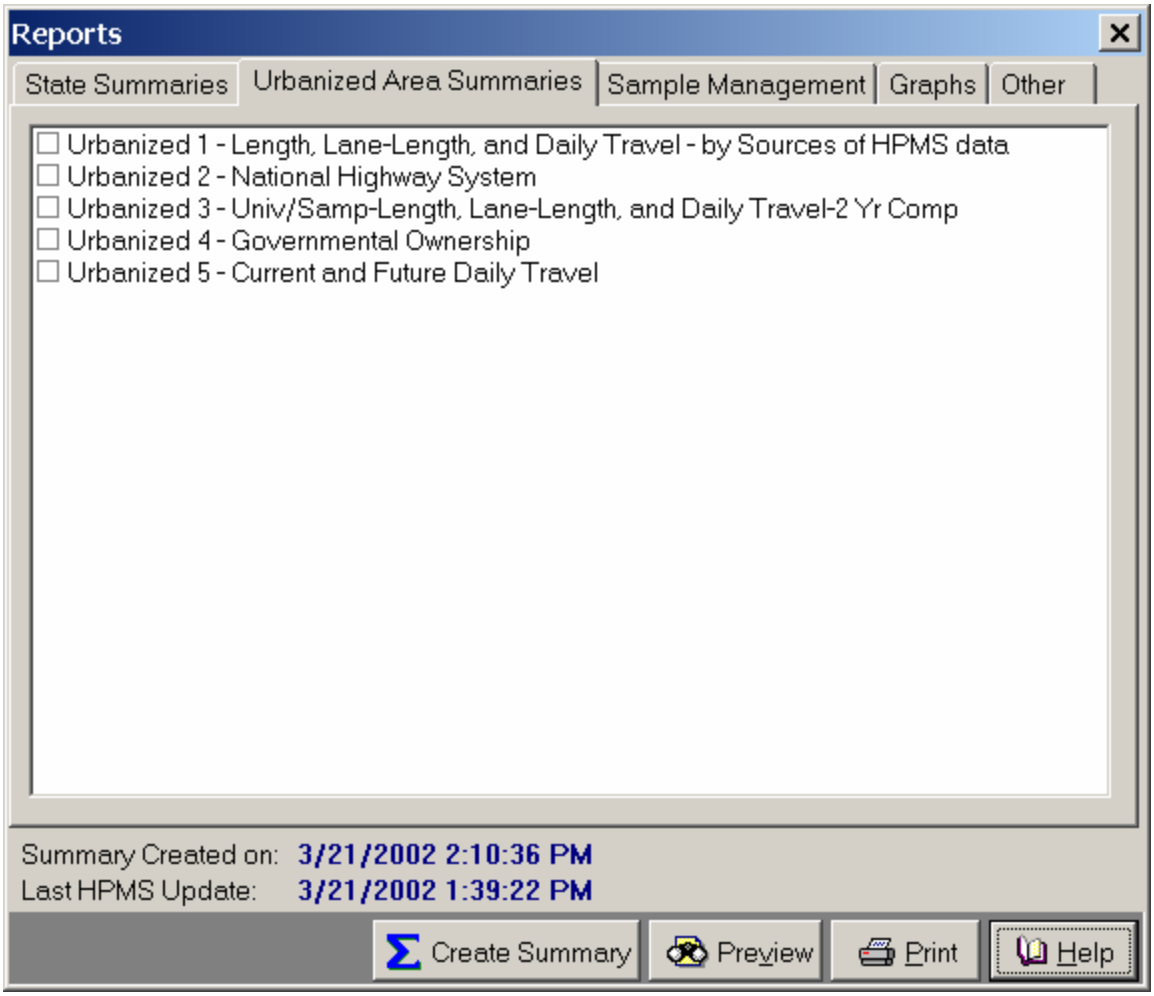
*Other*
Other 1 - Interstate System Routes - Built Routes
Other 2 - Interstate System Routes - Unbuilt Routes
Other 6 - Validation Errors Long Error Messages
Other 7 - Validation Errors Short Error Messages
Other 8 - LRS Mpt/KMpt Errors
Other 9 - Validation Results Report

*Create Summary* is used to develop all of the reports for all categories. The summaries are retained for all reports until create summary is applied again. The user **needs** to observe the two dates on the screen **each time** Reports are selected**.** The 'Summary Created on' date and time **must** be after the 'Last HPMS Update' date and time. If this is not the case, *Create Summary* needs to be applied.

**State Summaries** includes 15 reports that summarize the HPMS for the State. Summary 1, Summary 2 and Summary 3 should be run and checked prior to submitting the HPMS data.

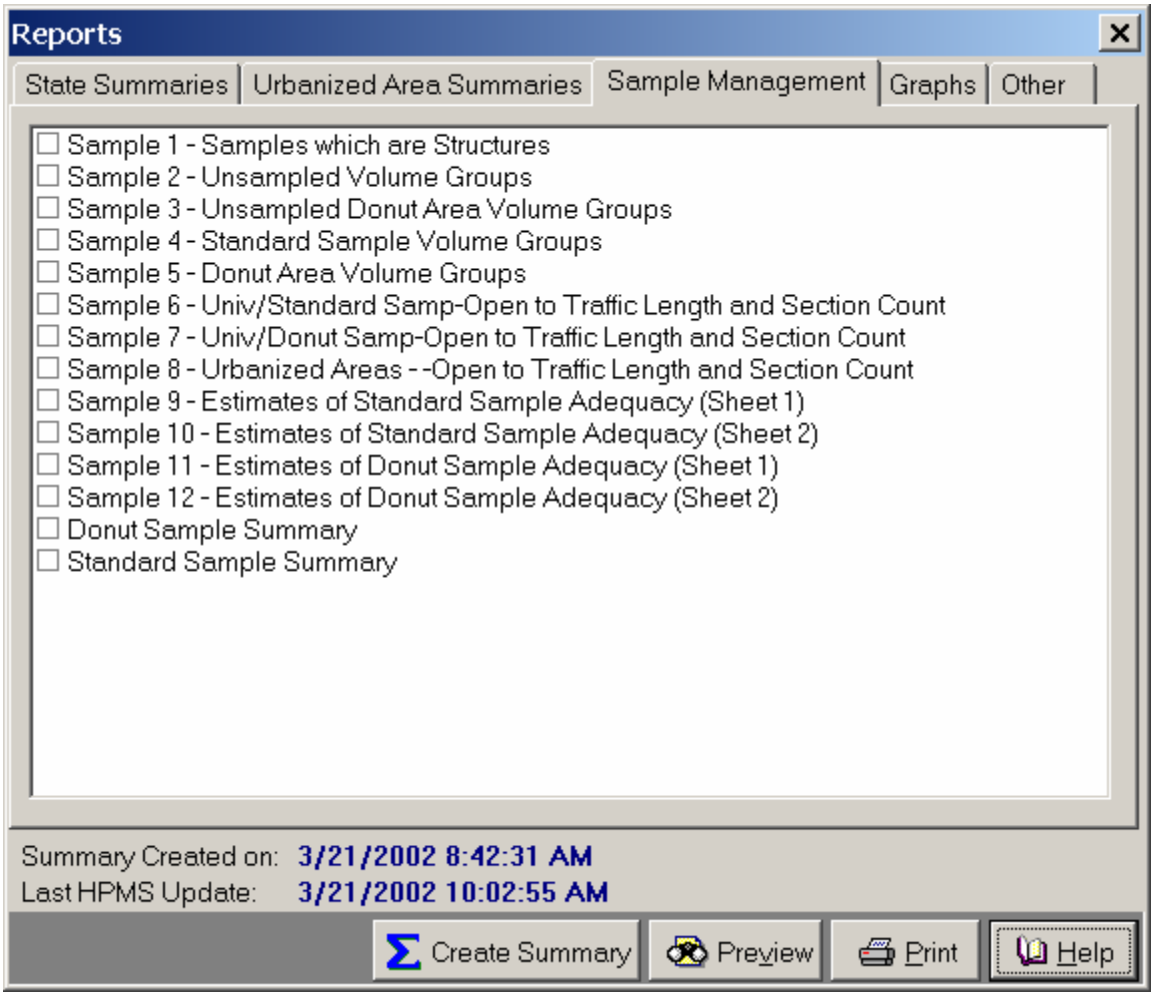
**Urbanized Area Summaries** includes 5 reports that summarize the HPMS data for each urbanized area coded in the data. Urbanized 1, Urbanized 2 and Urbanized 3 contain the same information as Summary 1, Summary 2 and Summary 3.

**Figure 88: Available Reports Screen – Urbanized Area Summaries Reports**




**Sample Management** has reports that verify and check sample requirements for the HPMS. These reports should be used to check the standard sample and the donut sample requirements and to assist in the management of the sample. Sample 1 lists the standard samples that are entirely on structures. This report should be used to determine if there are other universe sections in the volume group that could be used as a sample allowing the sample structure to be removed. Sample 2 and Sample 3 lists the volume groups that do not have any samples for the standard sample and the donut sample. Sample 4 and Sample 5 summarizes the volume groups that have less than three samples. Sample 7 and Sample 8 look at universe/standard sample open to traffic length and count. Sample 9, Sample 10, Sample 11 and Sample 12 are the Sample Adequacy reports. Standard Sample Summary and Donut Sample Summary summarize the current sample by area, functional system and volume group.

**Figure 89: Available Reports Screen – Sample Management Reports**



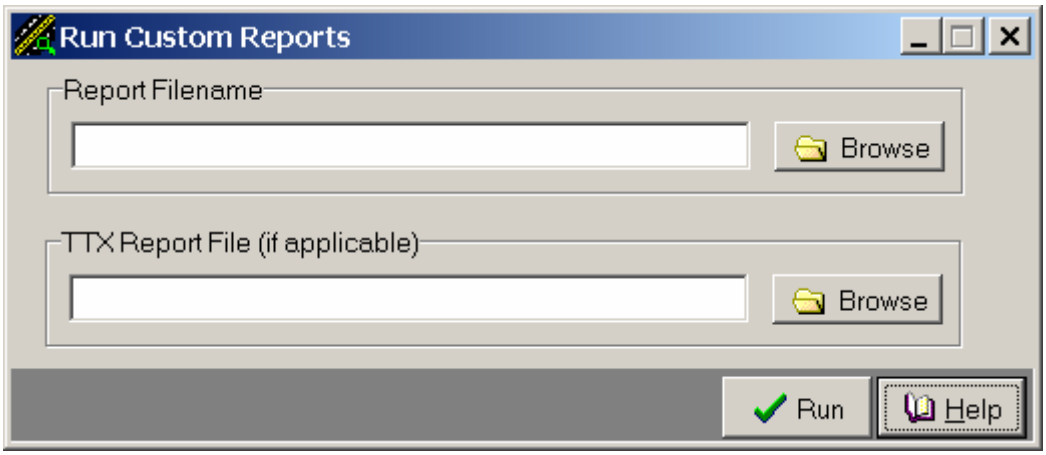

**Graphs** by functional system for various data items are included in this category. Graphs are included for IRI frequency. Graphs are included for each category of percent trucks, along with graphs for K-factor.

**Other** includes reports for the Interstate system routes, user set values for capacity and climate zone, validations, and expansion factors. Other 1 summarizes length, lane length and travel for the Interstate system routes by built, open to traffic. Other 2 summarizes the planned unbuilt Interstate routes. If the user has manually entered capacity values and/or climate zones, the summary of the sections with the manually coded values is found in the report, Other 3. The summary of the standard expansion factors is found in report, Other 4; the donut expansion factors in Other 5. Other 6-9 are the reports available from the last validation run by the user.

# Custom Reports

The user can run a previously built Crystal 8.5 or later report by selecting *View|Custom Reports*. The following dialog screen will appear:

**Figure 90: Custom Reports Screen**




Browse to the directory where the State developed reports were saved. Select the Report Filename ( name of report with the .rpt extension) you wish to run Click on the *Run* button. The report will load and display on the screen like the other reports.

**Note:** For users who have coded reports to run off a dataset for which <u>they have supplied the SQL and TTX definitions</u> you may do the following:

You must enter a name on both lines in the Run Custom Reports box. Browse to find the Report Filename for the report that has the corresponding report filename with the TTX extension. Then move to the TTX Report File (if applicable) box and browse to find the report with the same filename that has the TTX extension.

Once both names have been selected, click *Run*. The report will load and display on the screen.

There are some rules for constructing your report so that it can be shown within the system. You **must** define the following formulas (they can all have one space in them):

fVersion

fYear

fState

fUnits

You do not have to use them – only define them. A report called Base.rpt is included in the reports directory to show you how we use them.

# User Selected Sections

The User Selected Sections function allows the user to select sections to be printed or viewed in the Section Editor by generating a comma separated variable (CSV) listing file containing the county codes and section ID's for the desired sections. The user loads the CSV file into the software. The sections will be selected from the database for each county code and section ID pair in the CSV file.

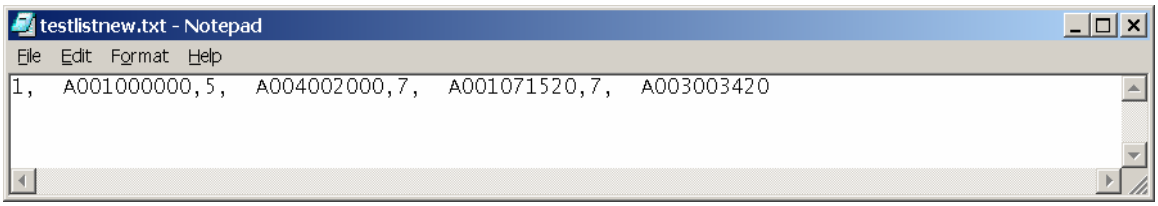
The CSV file must be in the following format:

county code, section ID, county code, section ID, county code, section ID

There is no fixed number of county code, section ID pairs entered on a record (line) in the CSV file. You may code as many as will go on in a record (line), one pair per record, two pairs per record, etc. The county code, section ID pair **must not** be on a separate line. The file may be saved with a *TXT* or *CSV* extension.

Following is an example of a file created in Notepad:

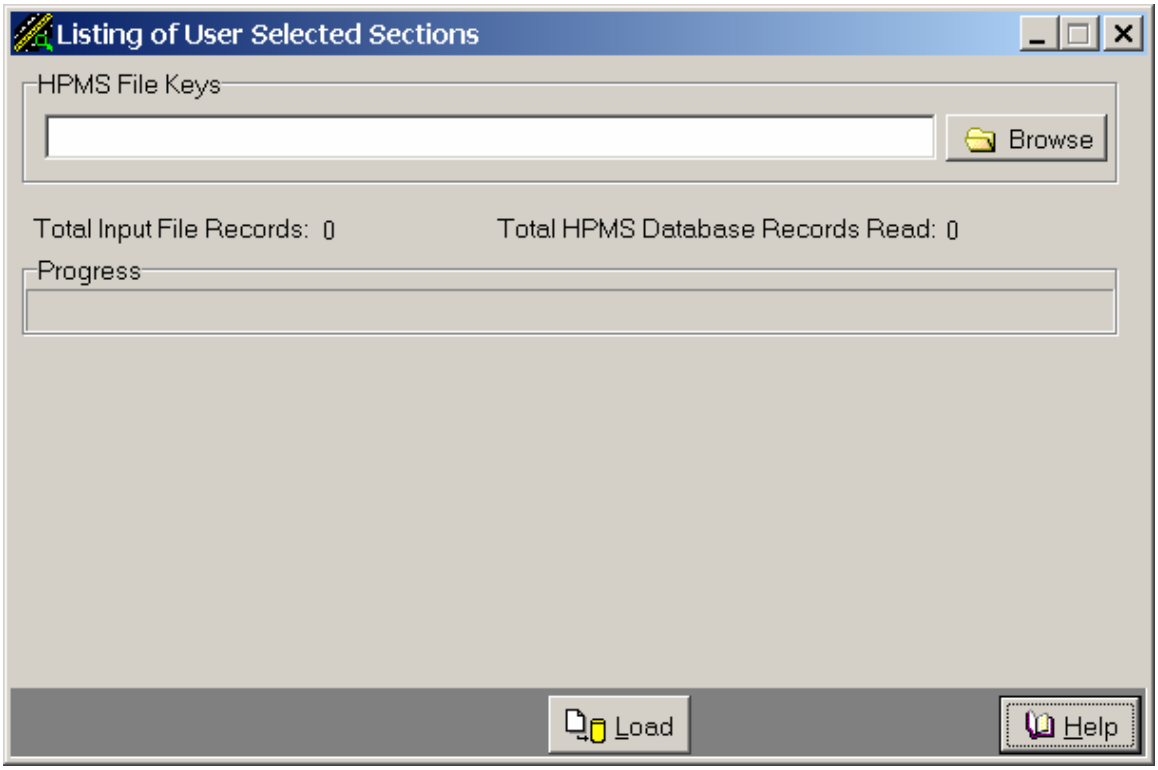
**Figure 91: Notepad Screen with the Example of the CSV file**




**NOTE**: The county code may be listed without the leading zeroes. The twelve characters for the section ID **must** be entered exactly as coded in the database. In the above example each section ID has two blanks at the beginning of the section ID. If the section ID includes leading spaces and embedded spaces, they **must be** coded in the exact same position in the 12-character section identifier in the listing file.

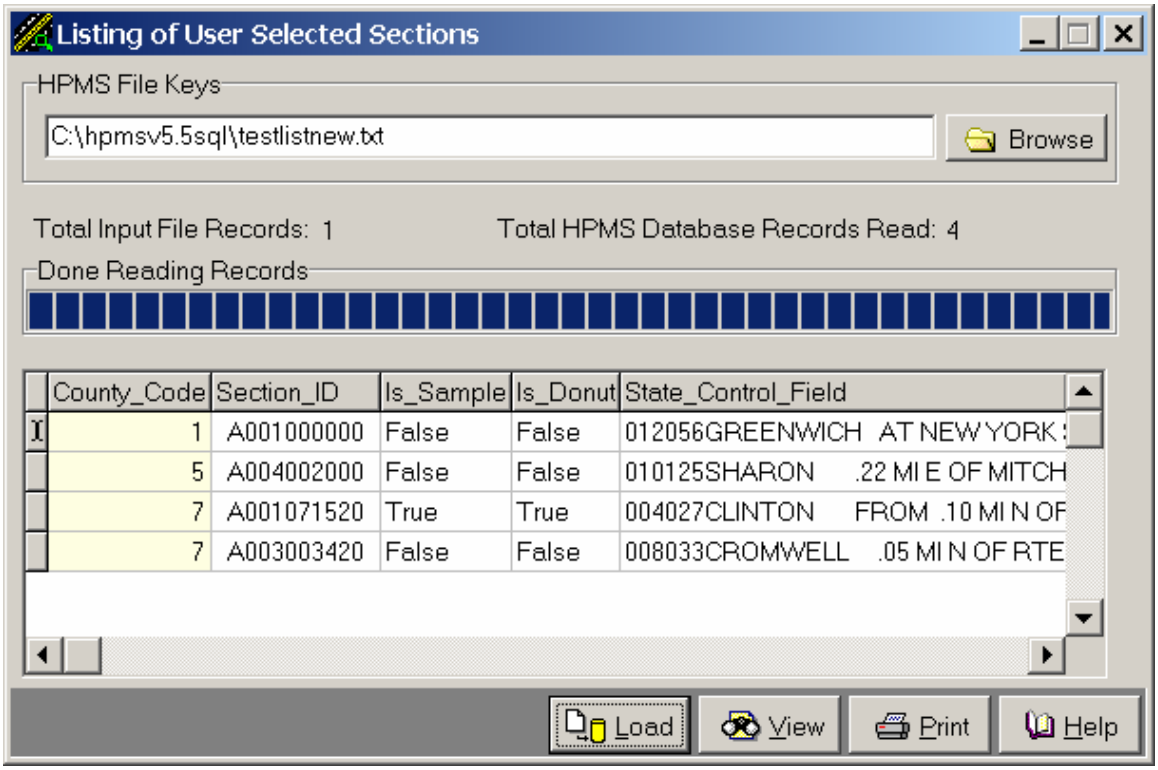
To start the User Selected Sections function select *View|User Selected Sections*. The screen below will appear.

**Figure 92: User Selection Sections Screen**




Select the generated CSV file with the county codes and section ID's by entering the location and name of the file or use the *Browse* button to locate the file. Click the *Load* button to load the file. Once the file is loaded and the sections selected, the following screen appears.

**Figure 93: User Selected Sections Screen with Sections Selected**




The Total Input File Records are the number of lines in the CSV or TXT listing file. The Total HPMS Database Records Read are the number of sections in the database which matched the county code, section ID pairs listed in the file. The matched sections appear in the list box.

Select the *View* button to bring the sections up in the Section Editor. The Section Editor will come up in the view mode where you can go through the sections using the editor screens.

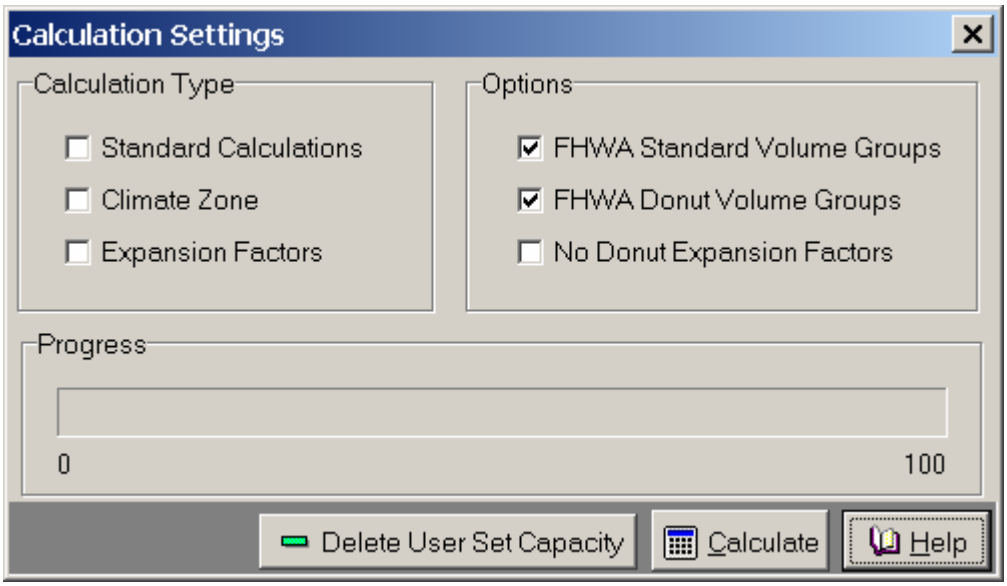
Select the *Print* button to print the sections in the list box. A HPMS Section Report will come up for each section in the list box. All or part of the sections may be printed from the available reports.

# Analysis Menu

## Calculations

The procedures to determine a generated functional system code, standard AADT volume group, donut AADT volume group, weighted design speed (WDS), rural horizontal alignment adequacy, rural vertical alignment adequacy, volume-to-service ratio, capacity, standard expansion factor, donut expansion factor and climate zone are included in the software. The calculation procedures **cannot** be run until the data contains valid codes for all data items. Expansion factors, both standard sample and donut sample, **cannot** be calculated until the other calculated values have been determined. To calculate the data items, select *Analysis*|*Calculations*.

**Figure 94: Calculation Settings Screen**




Set the switch for **Standard Calculations** to calculate the generated functional system code, standard AADT volume group, donut AADT volume group, weighted design speed (WDS), rural horizontal alignment adequacy, rural vertical alignment adequacy, volume-to-service ratio and capacity. Appendix N in the *HPMS Field Manual* outlines the procedures for estimating highway capacity; Appendix M, outlines the procedures for estimating weighted design speed. A log report is generated when the calculations are completed.

If the **State does not use** the FHWA defined volume groups for selecting the standard samples, under Options, turn off the switch for FHWA Standard Volume Groups. If the **State does not use** the FHWA defined volume groups for selecting the donut samples, turn off the switch for FHWA Donut Volume Groups. The State user must code the volume groups in the data based on the AADT ranges they have defined.

**All** sections, universe and sample, **must** have the AADT coded in order for the standard sample volume groups and donut sample volume groups to be set by the software. If AADT is not coded for all sections (universe and sample) on the functional systems where a sample is taken, the user must code the volume groups – sample and/or donut.

If the State has coded user set capacities for selected standard samples, clicking the *Delete User Set Capacity* button prior to clicking *Calculate* **will remove all user set** capacities and allow all standard samples with user set capacity be determined by the software. This feature should only be used when the user wishes to have the system determine the capacity on all of the standard samples for which the State had determined the capacity. See the discussion Enter Manual Capacities for more details on coding user set capacity.

Set the switch for **Climate Zone** to set the climate zone. The climate zone for each county in County Codes is coded for the climate zone data item. A log report is generated when the process is completed.

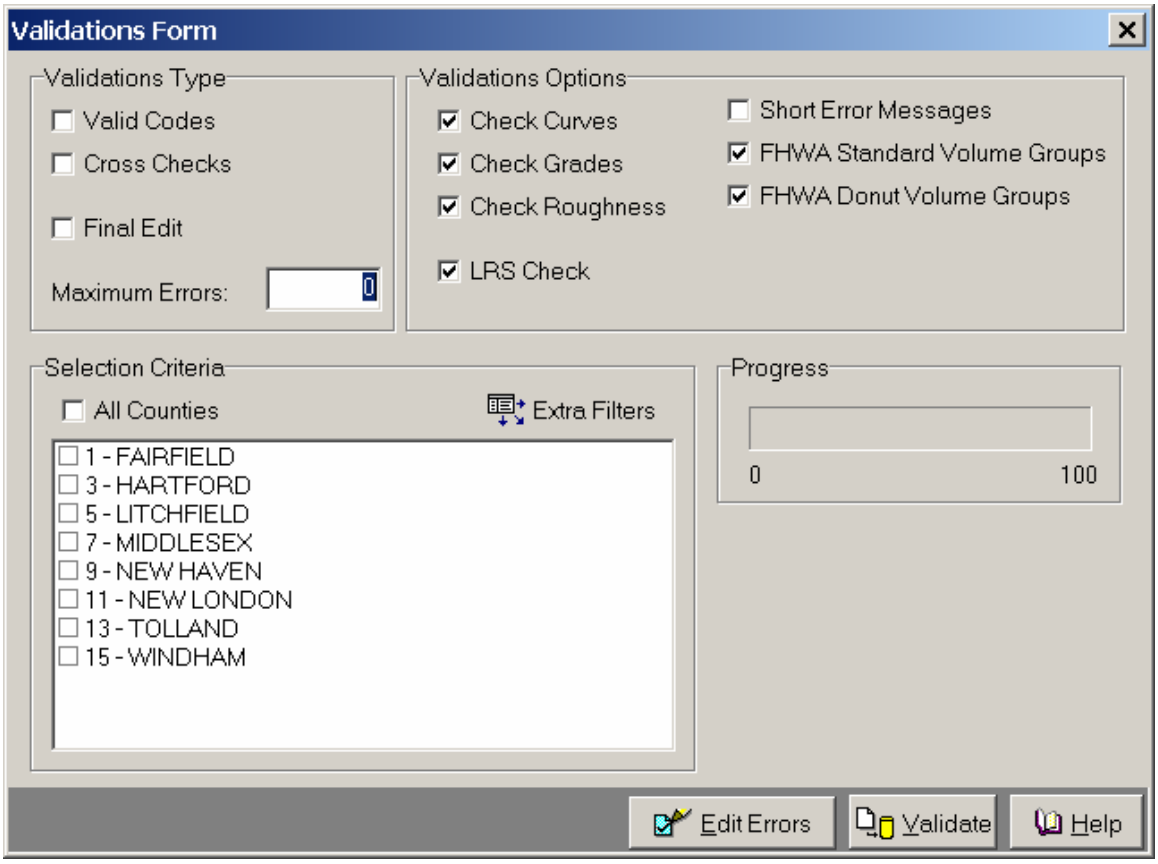
Set the switch for **Expansions Factors** to calculate the standard sample expansion factors and/or the donut sample expansion factors. If it is desired to not have donut expansion factors calculated, turn on the switch, No Donut Expansion Factors, under Options. Reports are generated when the calculations are complete. The reports need to be reviewed to verify all factors where determined. The report will also indicate universe volume groups for which there are no sample miles.

To start the standard calculations, climate zone calculations or the expansion factors calculations, click on *Calculate.*

## Validations

Validations **must** be run and the HPMS data errors eliminated prior to submitting the data to FHWA. Valid code errors **must** be eliminated in the data before selecting the validations type, Cross Checks. To run the edit select *Analysis*|*Validations*.

**Figure 95: Validations Form Screen**




To check the data for **valid codes** on the Validations Form screen under Validations Type select Valid Codes. Under the Validations Options, select the options to be checked.

Check Curves
If curve data is provided, turn the switch on to have the data verified.

Check Grades
If grade data is provided, turn the switch on to have the data verified.

Check Roughness
If roughness data is provided for the required sections, turn the switch on to have the data verified.

LRS Check
If LRS data are provided for the required sections, turn the switch on to have the data verified.

Short Error Messages
Turn on the switch for error messages without the section's data listed.

FHWA Standard Volume Groups
If the sample was selected using the FHWA defined volume groups, turn on the switch.

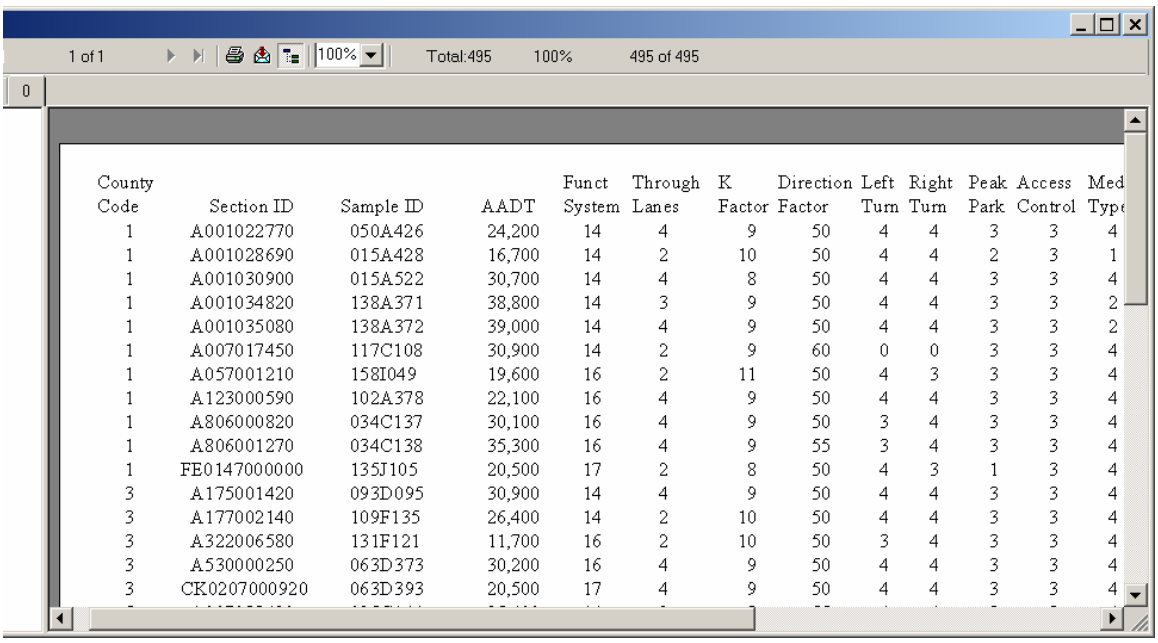
FHWA Donut Volume Groups
If the sample was selected using the FHWA defined volume groups, turn on the switch.

The *Maximum Errors* can be set if the user elects to limit the number of sections that are to be processed in a validation run. This would be used if the data has a high number of errors. Limiting the number of errors would make it easier to find the errors.

**Note:** The *Validation Errors Summary Report* has a drill down feature. For each error message listed in the report, you can drill down to get a report with the county code and section ID for the sections in error. Place the cursor on the error message and click the mouse. The report with the county code and section ID can be printed. To close this report use the red X on the top left of the screen. Do not use the exit on the right. The section ID and county code can be used to find the section with errors in the *Editors*|*Section* on the Section Data Selector screen.

Drilling down on the error message "VSF must be less than or equal to 1.20" will bring up a report which list the sections in error. Selected data items for the sections are listed.

**Figure 96: Drill down Error Messages Screen for VSF**




| County Code | Section ID | Sample ID | AADT | Funct System | Through Lanes | K Factor | Direction Factor | Left Turn | Right Turn | Peak Park | Access Control | Med Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A001022770 | 050A426 | 24,200 | 14 | 4 | 9 | 50 | 4 | 4 | 3 | 3 | 4 |
| 1 | A001028690 | 015A428 | 16,700 | 14 | 2 | 10 | 50 | 4 | 4 | 2 | 3 | 1 |
| 1 | A001030900 | 015A522 | 30,700 | 14 | 4 | 8 | 50 | 4 | 4 | 3 | 3 | 4 |
| 1 | A001034820 | 138A371 | 38,800 | 14 | 3 | 9 | 50 | 4 | 4 | 3 | 3 | 2 |
| 1 | A001035080 | 138A372 | 39,000 | 14 | 4 | 9 | 50 | 4 | 4 | 3 | 3 | 2 |
| 1 | A007017450 | 117C108 | 30,900 | 14 | 2 | 9 | 60 | 0 | 0 | 3 | 3 | 4 |
| 1 | A057001210 | 158I049 | 19,600 | 16 | 2 | 11 | 50 | 4 | 3 | 3 | 3 | 4 |
| 1 | A123000590 | 102A378 | 22,100 | 16 | 4 | 9 | 50 | 4 | 4 | 3 | 3 | 4 |
| 1 | A806000820 | 034C137 | 30,100 | 16 | 4 | 9 | 50 | 3 | 4 | 3 | 3 | 4 |
| 1 | A806001270 | 034C138 | 35,300 | 16 | 4 | 9 | 55 | 3 | 4 | 3 | 3 | 4 |
| 1 | FE0147000000 | 135J105 | 20,500 | 17 | 2 | 8 | 50 | 4 | 3 | 1 | 3 | 4 |
| 3 | A175001420 | 093D095 | 30,900 | 14 | 4 | 9 | 50 | 4 | 4 | 3 | 3 | 4 |
| 3 | A177002140 | 109F135 | 26,400 | 14 | 2 | 10 | 50 | 4 | 4 | 3 | 3 | 4 |
| 3 | A322006580 | 131F121 | 11,700 | 16 | 2 | 10 | 50 | 3 | 4 | 3 | 3 | 4 |
| 3 | A530000250 | 063D373 | 30,200 | 16 | 4 | 9 | 50 | 4 | 4 | 3 | 3 | 4 |
| 3 | CK0207000920 | 063D393 | 20,500 | 17 | 4 | 9 | 50 | 4 | 4 | 3 | 3 | 4 |

The sections with errors that need to be corrected can also be found by clicking on the *Edit Errors* button on the Validations Form screen. This will bring up the following screen:

**Figure 97: Edit Error Screen with Summary of All Error Messages**

Select Error to Edit

Print

| Error_Level | Error_Number | Error_Sub | Error_String | '# Records' |
|---|---|---|---|---|
| 0 | 1035 | 6 | If a universe section on the NHS or PAS(F_System=14 not included) is paved | 2 |
| 0 | 1035 | 7 | If a universe section is a paved Urban Principal Arterial, IRI should NOT be 0 | 7 |
| 0 | 1087 | 5 | For an Urban, 2-way facility, Number of Peak Lanes should not = Number of | 5 |
| 0 | 1096 | 0 | VSF must be less than or equal to 1.20 | 21 |
| 2 | 1033 | 4 | Low AADT per lane count (<500) when through lanes are > 4. | 2 |
| 2 | 1059 | 2 | Shoulder Width - Right should be a value from 1 to 12 feet (0.3 to 3.6 meters) i | 19 |
| 2 | 1060 | 2 | Shoulder Width - Left should be a value from 1 to 12 feet (0.3 to 3.6 meters) if | 7 |
| 2 | 1086 | 2 | Directional Factor should be a value from 50 to 70 if Type Facility is 2. | 36 |
| 3 | 1033 | 3 | At peak capacity for more than 13 hours. | 8 |
| 3 | 1034 | 5 | 1 Lane Pas Section | 7 |
| 3 | 1035 | 5 | Extremely High IRI (>=400.0 in English or >= 6.31 in Metric) | 55 |
| 3 | 1051 | 3 | SN or D should be a value from 1.0 to 7.0 if Surface Type is flexible (2,3,4,6). | 114 |
| 3 | 1059 | 3 | Narrow Right Shoulder Width (less than 2.4 Meters or less than 8.0 feet) on Int | 9 |
| 3 | 1079 | 2 | Low Weighted Design Speed (< 110 KMPH or < 70 MPH) on Interstate. Check | 12 |
| 3 | 1080 | 3 | Low Speed Limit (< 80 KMPH or < 50 MPH) on Interstate | 9 |
| 3 | 1082 | 0 | % Peak Singl Trucks > % Avg Daily Single Trucks | 38 |

This screen contains the message for all the errors that were found when the Validations were run. Double clicking on an error message will take you to the Section Editor. The Section Editor will be in the *Modify* mode. All sections with the error that you selected will be available to be corrected. Closing the Section Editor will take you back to the above screen, so that another error message can be selected. If a section has multiple errors it will come up again when the error message is selected with another error for that section.

If you highlight one of the error messages and click on the *Print* button at the top of the screen the sections with that particular error can be printed. When the HPMS Section Report screen comes up all or part of the sections with the error can be printed to check the coding for all the data items.

**Note**: The Extra Filters option in the editor can also be used to find the sections in error. The error message will have enough information to define the selection criteria to find the sections with the error.

The validations can be run on the sections in a single county, selected counties, or all counties. Under Selection Criteria, select *All Counties*, a single county or several counties for which the section data are to be verified.

Additional selection criteria can be applied to select the sections for which the data are to be verified. Click on *Extra Filters*. This will bring up the screen to set up the additional selection criteria. The process for defining the criteria is the same as outlined under Maintaining the HPMS Data or Export HPMS Data. Once the criteria are defined in the Filter Selection box, click on *OK* to return to the Validations Form screen.

Once all the options for the validations are defined, click *Validate* to start the process to verify the data. **All valid code errors must** be eliminated in the data. **Do not** validate the

data for the Cross Checks until all valid code errors are eliminated. Use *Modify* under the section editor (*Editors|Section)* to eliminate the errors identified or the *Edit Errors* button on the Validations Form screen.

After all valid codes errors are eliminated, the data needs to be verified for the **cross checks**. Prior to validating the data for cross checks **standard calculations must be run.** The editing between data items uses the calculated data items. To check the data for **cross checks** on the Validations Form screen under Validations Type select Cross Checks. Under the Validations Options, select the options to be checked. Under Selection Criteria select the county or counties for which the section data are to be verified. Extra Filters can be defined. Once all the options for the validations are defined, click *Validate* to start the process to verify the data.

**All sections with cross checks errors must** be checked to determine if the errors are a 'true' error or if the error is an 'unusual condition' type error with the data valid for the section. All errors that are 'true' errors need to be eliminated from the data. **All** remaining errors <u>need to be discussed</u> in the Comments file that is sent with the data. Use *Modify* under the section editor (*Editors|Section)* to eliminate the errors identified or the *Edit Errors* button on the Validations Form screen.

**Final validations must** be run after all valid code errors are eliminated and after all cross checks that are 'true' errors are eliminated. **Do not** run the final validations until all modifications to the data are completed. Final validations must be run before the data can be processed to send to FHWA.

# Tools Menu

## Batch Updates

Batch updating in the HPMS system assumes that a batch transaction file has been prepared outside of the system and is available for use. This file consists of a series of transaction records whose first 17 characters are in fixed field form which represent the action to take and the highway segment key on which to take the action. The fixed fields are:

**Action Field** (one character) in position 1 of the transaction record. The acceptable actions are:

A add a new highway segment or portion of a highway segment to the data table.
M modify an existing highway segment in the data table.
D delete an entire highway segment from the data table.

**Note:** Once the segment is deleted in a batch update the segment **cannot** be retrieved and put back in the table. It is recommended that the delete in the batch update be used with extreme care. If the segments are deleted using the EDITOR feature in the software one at a time, a table is built with the deleted segments and they can be retrieved if the wrong segment is deleted.

**County Code** (three characters) in positions 2 to 4 of the transaction record. Leading zeros must be coded.

**Section Identifier** (twelve characters) in positions 5 to 16 of the transaction record. If the transaction is to take place on an existing segment, M or D, the section identifier (Item 5) **must be**
coded exactly as in the existing data segment. If the transaction is A, add a new segment to the data table, the section identifier **must not** match any existing section ID within the county.

**Place Holder** (one character) in position 17 **must be a** semicolon (;).

**Note:** If the action is **D**, delete an existing segment, the transaction would end with the 17 positions coded.

Starting in position 18 code the transaction specific information. This information consists of a repeating set of data including:

**Data Item Number** (as contained in Chapter IV) followed by a comma (,).
**Data Value** (specific to the item number- see comma delimited ASCII file description) followed by a semicolon (;).

The types of data values are:

**Assigned values (codes) -** the value must be coded precisely as listed in the table with the codes for the particular data item.
**Character data -** any alphanumeric character (A through Z; 0 through 9; space) can be coded. Do **not** use double quotes ("), a comma (,) or a semicolon (;) within the character string. Leading or embedded spaces **are** required. Trailing spaces **are not** required.
**Numeric data** can be either **integer** or **decimal**. Leading zeros **are not** required for an integer. A leading zero **must be** coded in decimal values when the value is less than an integer (length = 0.21); otherwise, leading zeros **are not** required. Decimal points **are** required and one digit **must be** coded after the decimal point (PSR = 3, code 3.0); additional trailing zeros **are not** required for the decimal portion. When data are not reported or missing, code "0" or "0.0" as appropriate.

These sets (data item number, data value;) are repeated until the batch update information for a particular highway segment key is specified on the transaction record. There is no limit to the length of the transaction record. The set **must** end with a semicolon (;).

The data item number **must be** coded as listed for the data item in Chapter IV. To code the right shoulder width to "10" one would code 59,10; The State Control Field, Item 8, needs to have only the positions used coded – i.e., to code the data in the 5-15$^{th}$ positions of the 100 character field, one would code
bbbbMain Street; (where 'b' indicates a space would be coded).

If the **action field is M**, modify an existing segment in the data, the section identifier in the transaction record **must be** coded exactly as the section ID (Item 5) in the data table. If the segment section ID includes leading spaces and embedded spaces, they **must be** coded in the exact same position in the 12- character section identifier in the transaction record.

If the **action field is A**, add a new section, all data items for the universe, donut, or standard sample segment do not have to be coded on the transaction set (data item number, data value;). The rural urban designation (Item 13), functional system (Item 17), and section length (Item 30) **must be coded** for any section added. When adding a sample

segment, either donut or standard sample, the sample identifier (Item 47) **must be coded** along with any data items beyond item number 49. For the added segment numeric data items not coded will be set to zero in the data table and character fields will be blank. The section identifier coded on the transaction record **must not** be the same as any section ID (Item 5) for an existing segment in the county where the segment to be added is located.

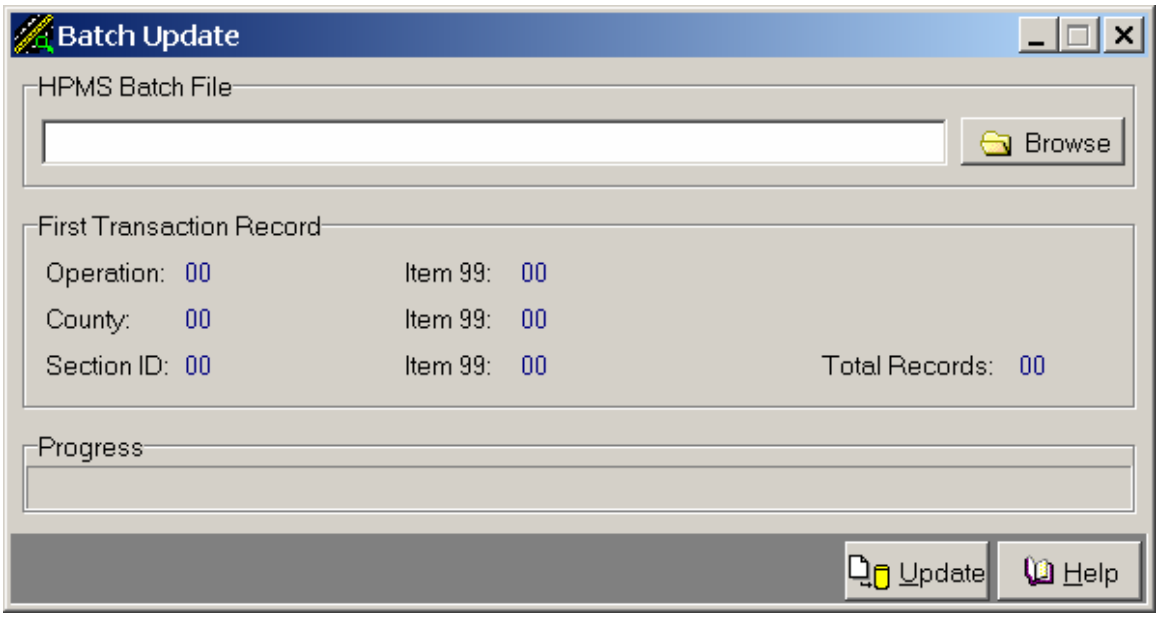
When doing a batch update the following rules apply:

- **do not** delete a segment and add the same segment in the same execution.
- **do not** add a segment and then modify that segment in the same execution.
- the only validation of the data values is that a numeric field cannot contain a character value.

**Note:** The *File|Export* feature will export the *transaction file* that is required for the *Batch Updates* function. All sections in the HPMS table are exported or filters can be set to export specific sections. Filters can be set by section type, specific county, section identifier or extra filters can be applied. In addition, the data files to be exported may be selected so that a partial HPMS record results. See **Export HPMS Data**.

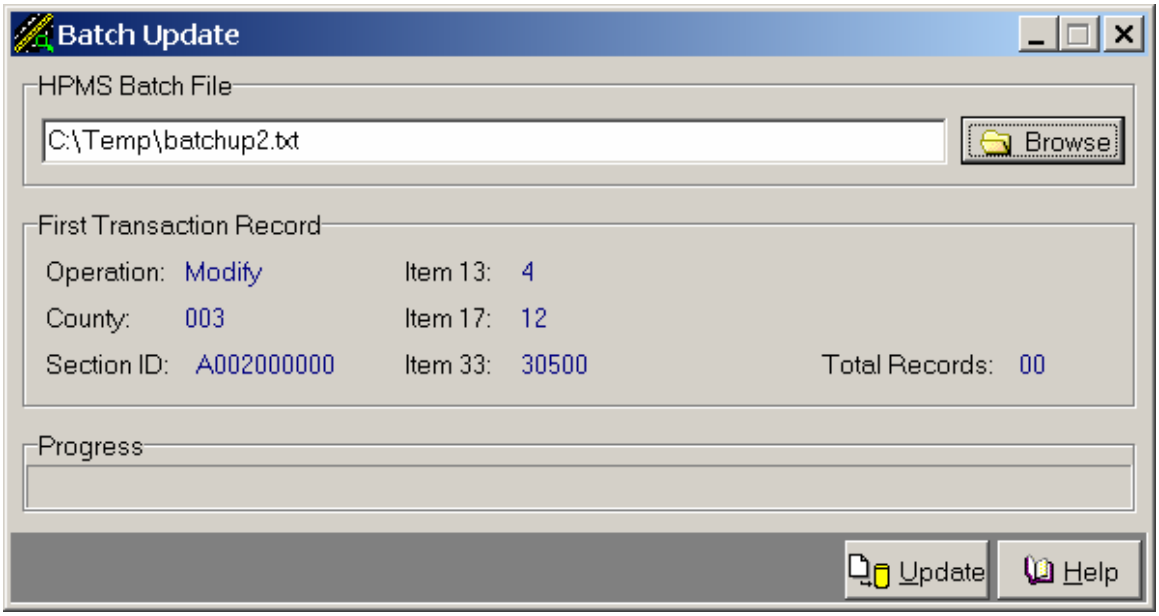
Select *Tools|Batch Updates* to start the update process.

**Figure 98: Batch Update Screen**




The transaction file name and location must be entered or Browse to find the file. Once the file is indicated, the first transaction record will be listed on the screen.

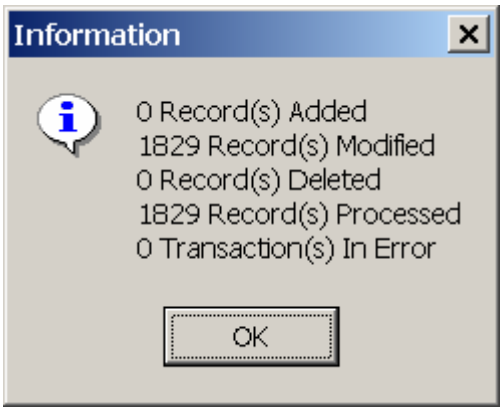
**Figure 99: Batch Update Screen With the First Transaction Record**




Click on *Update* to start the process.

A count is given when the batch update is completed. The following screen will come up:

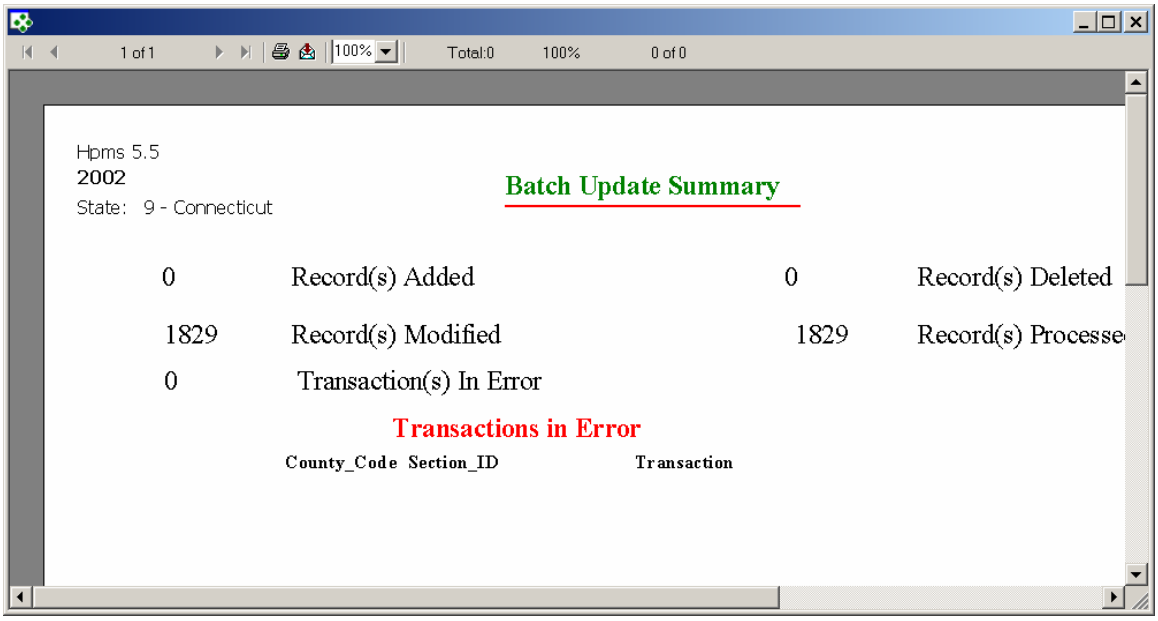
**Figure 100: Information Screen – Batch Update**




Click on OK. The following report will become available:

The report shows the counts that were listed on the above screen. If there was a transaction(s) in error, the county code, section ID and transaction will be listed for each one in error. The report can be printed.

**Figure 101: Batch Update Summary Report Screen**




**Examples:**

A001TEST ADD 111;8,Peach Street;13,2;17,16;25,1;

Add a universe segment in county 001 with section ID TEST ADD 111. The segment is on Peach Street in a small urban area, functional system 16, and is owned by the State.

M003R17 003 3285;19,4;34,6;87,3;

Modify an existing segment in county 003 with section ID R17 003 3285. Three data items are to be updated – NHS, number of through lanes and number of peak lanes.

D112U22112144875;

Delete an existing segment in county 112 with ID U22112144875. Once the segment is deleted it cannot be retrieved.

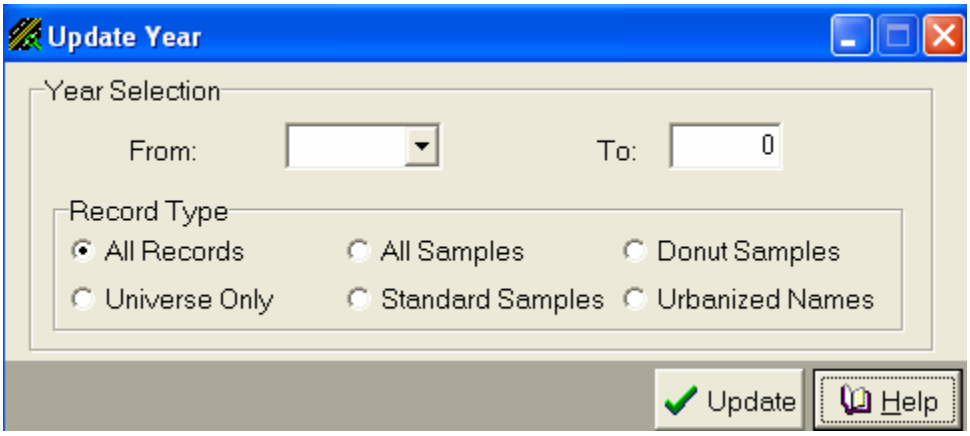
A123ADDSAMP34186;8,STATE HIGHWAY 34;13,1;17,2;19,1;47,341 86 12323;54,12;55,2;

Add a standard sample segment in county 123 with ID ADDSAMP34186 on State Highway 34. The segment is rural, functional system 2, on the NHS, sample identifier 341 86 12323, lane width 12, and access control 2.

## Update Year

The user can update the year of the HPMS data. The year of the data will be changed to the year specified by the user. **All** of the data items **will** remain as coded. To update the year select *Tools|Update Year*.

**Figure 102: Update Year Screen**




Enter the year to update as the *From* year and the year the data is to be updated to as the *To* year, i.e., update the year from 2000 to 2001, *From* is set to 2000 and *To* is set to 2001. Select the type of record that the update year is to be applied. All *Records* updates the year for all data sections. *Universe Only* updates the year on the sections that are universe data records. *All Samples* updates the year on the sections that are a standard sample, donut only sample or both a standard sample and a donut sample. *Standard Samples* updates the year on the sections that are a standard sample or both a standard sample and a donut sample. *Donut Samples* updates the year on the sections that are donut only samples or both a standard sample and a donut sample. *Urbanized Names* will update the Urbanized Area codes table. Click *Update* to start the process. The HPMS data table will contain identical data for the data items for the record type selected for both the years.

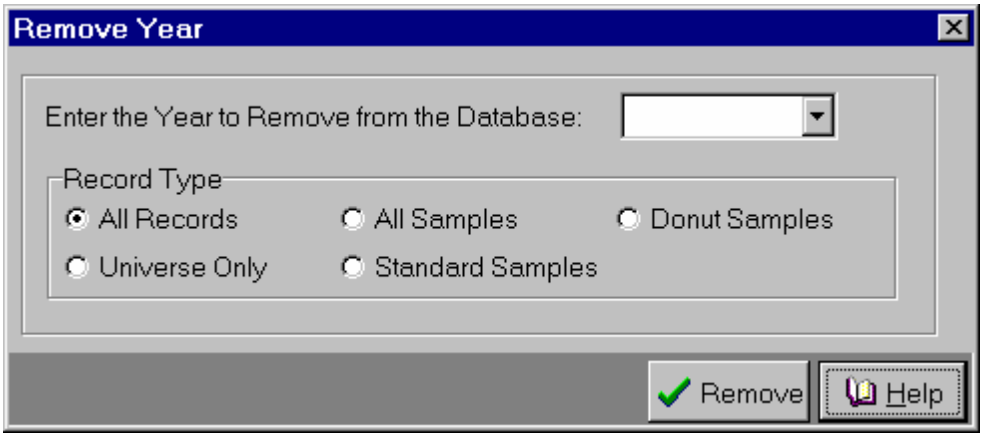
**Note**: Urbanized Names will update only if the from year is greater than 2000.

**Note:** Update year will also update the User Table year if capacity or climate zone data has been provided by the State in place of the values calculated by the HPMS software.

## Remove Year

The user can remove a year from the HPMS table. The data for each highway segment in the table is eliminated for the year to be removed. To remove the data for any year from the data table, select
*Tools|Remove Year*.

**Figure 103: Remove Year Screen**




Enter the year to remove from the database. Select the type of record that the remove year is to be applied. All *Records* removes the year entered for all sections. *Universe Only* removes the year entered for the sections that are universe data records. *All Samples* removes the year entered for the sections that are a standard sample, donut only sample or both a standard sample and a donut sample. *Standard* Samples removes the year for all sections that are standard samples or both a standard sample and a donut sample. *Donut* Samples removes the year entered for all sections that are donut only or both a standard sample and a donut sample. All data for the year entered is removed – HPMS, Summary, User Set. Click *Remove* to start the process. The HPMS data table will have all the data removed for the record type selected and year entered.

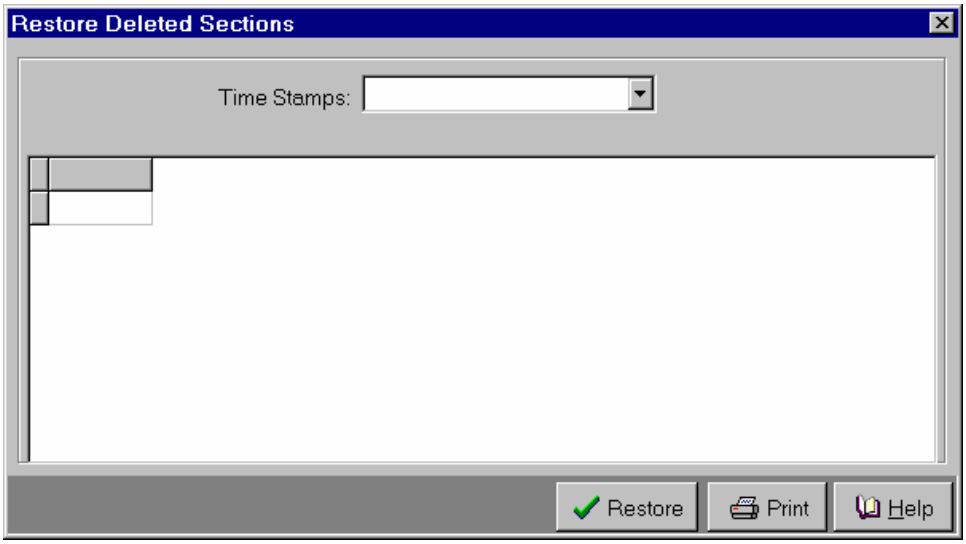
**Note:** If the wrong year is entered for the year to remove and the remove process is started, the data for that year **cannot** be retrieved. Check the year entered before clicking the Remove button.

## Restore Deleted Sections

Any section that is deleted from the HPMS data table using the *Editors*|*Section* is placed in a data table by the system and can be restored to the HPMS data table. To see a list of the sections deleted or to restore deleted sections select *Tools*|*Restore Deleted Sections*.

To restore deleted sections, select the section(s) to be restored form the pull down menu, *Time Stamps*. The Time Stamps are the date and time that one or more sections were deleted. **All** sections deleted at the same date and time will be restored. Once the time stamp is selected, click *Restore* which will start the process.

**Figure 104: Restore Deleted Sections Screen**



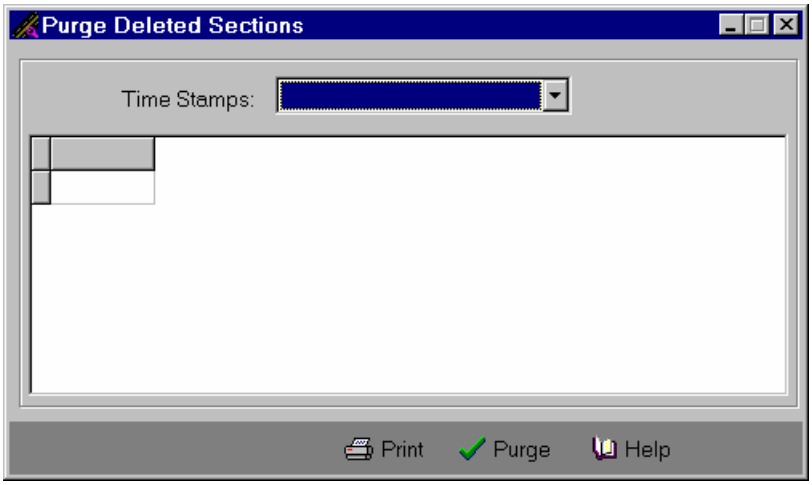

To print the deleted sections or to view the sections deleted on the screen, select the section(s) to be printed or viewed from the pull down menu, *Time Stamps*. The Time Stamps are the date and time that one or more sections were deleted. All sections deleted at the same date and time will be listed in the list box. Once the stamp is selected, click on the *Print* button to view or to print a list of the sections deleted.

**Note**: All sections deleted while in the Editor will have the same Date and Time Stamp. If you close the section Editor then come back into the Editor to delete additional sections, these will have a different Date and Time Stamp.

## Purge Deleted Sections

Any section that was deleted from the HPMS data table using the *Editors*|*Section* is placed in a data table by the system. The user can purge the sections from the delete table at any time. To purge sections from the delete table select *Tools*|*Purge Deleted Sections*.

**Figure 105: Purge Deleted Sections Screen**




To purge deleted sections, select the section(s) to be purged form the pull down menu, *Time Stamps*. The Time Stamps are the date and time that one or more sections were deleted. **All** sections deleted at the same date and time will be purged from the system. Once the time stamp is selected, click *Purge* which starts the process.

To print the deleted sections or to view the sections deleted on the screen, select the section(s) to be printed or viewed from the pull down menu, *Time Stamps*. The Time Stamps are the date and time that one or more sections were deleted. All sections deleted at the same date and time will be listed in the list box. Once the stamp is selected, click on the *Print* button to view or to print a list of the sections deleted.

**Note**: Once deleted sections are purged from the table, the sections **can not** be restored to the HPMS data table. Before the purge process is started be sure the correct date and time has been selected from the pull down menu.

# Enter Manual Capacities

The software system contains procedures to determine the capacity for each standard sample highway segment in the data. The procedures used in the HPMS software for calculating highway capacity conform to the Highway Capacity Manual (HCM). Capacity calculation procedures are described in Appendix N of the *HPMS Field Manual*.

The capacity calculations are based on service flow rates for level of service E and are for the peak direction. The capacity coded in HPMS is used for system planning analysis, not project level analysis. The number of peak lanes (number through lanes used in the peak period in the peak direction) coded in HPMS (Item 87) is used in the procedures for determining capacity. The number of through lanes coded in HPMS (Item 34) is used in the procedures to determine the number of lanes on the facility. The assumptions made by FHWA for adjustment factors used in the procedures are consistent with the recommended values in the HCM.

The user can override the calculated capacity if it is determined that the capacity is too low or too high because of operational conditions that are not appropriately reflected in the HPMS data items used in the calculation. Once the capacity has been entered manually, the

system will flag that highway segment and will not overwrite the capacity when running calculations. Once the switch is set, it will remain set for future year's data as well as for the current year's data. If in the future the user wants the system to calculate the capacity, enter a zero for the capacity for that highway segment. This will remove the flag the system has set for that highway segment in the data table. If **all** user set capacities are to be calculated by the system, click the *Delete User Set Capacity* on the Calculation Settings screen prior to the calculation of Standard Calculations.

A report is available that lists all segments with the capacity set by the user. For each segment with a user set capacity the county code (Item 4), sample identifier (Item 47), and peak capacity (Item 95) are listed.

**Note:** *Delete User Set Capacity* will also delete any user set climate zones.

# Enter Manual General Climate Zone

The software system contains procedures to locate the standard sample highway segment in one of nine general climate zones. This numeric item is coded from county/climate zone equivalency tables. The definitions for the nine climate zones are included in Appendix I of the *HPMS Field Manual.*

The climate zone should be checked and can be changed if found not to be representative of the area in question. The climate zone can be manually entered into individual highway segments or entered into the county name directory in the software. Entering the climate zone information into the county name directory will apply the new climate zone information to all sections in the county after running calculations. When entering the climate zone information segment-by-segment, the software flags the segments and will not overwrite the climate zone when running calculations. If in the future the user does not want the manual climate zone coded, turn the flag off by entering a zero and the software will calculate the climate zone for the affected segment(s).

A report is available that lists all segments with the climate zone set by the user. For each segment with a user set climate zone the county code (Item 4), sample identifier (Item 47), and climate zone (Item 52) are listed.

# Appendix A

## Helpful Hints/Suggestions

Included in this section are some examples of Extra Filters that can be used in the Section Editor to locate the sections that have data errors; how to use the Access table wildcards- % and _ ; etc.

More than one person prepares the HPMS data
If more than one person prepares the HPMS data, we recommend that one person be assigned the task of running the process to determine the Standard Calculations and the Expansion Factors. Only one person should do Batch Updates. Only one person should use the process Update Year or Remove Year. One person should be assigned the task of the "Keeper of the System". The "Keeper of the System" should be the only one that does major changes to the data – changes that affect the complete table.

Only the "Keeper of the System" should maintain the Access table – Repair or Compact the table.

Using Wildcards to List Sections
When modifying, deleting, viewing or listing sections, wildcards can be used to help narrow the search. These would be used in the Section Editor (*Editors*|*Section*) or the Export feature. Wildcards can be used as follows:

- % can be used to match more than one character
- _ can be used to match exactly one character

For example:

- It is desired to have all sections with a section ID that starts with bbA00 where b is a blank
  On the editor screen for the Section ID code bbA00%
  Apply the filter to get the desired sections.
- It is desired to have all sections that are on Main Street.
  Under Extra Filters, for the field select State Control Field, for Operator select Like, for the value code %MAIN%
  Once the filter is applied this will bring all sections into the list box with MAIN in any positions of the 100 character field.
- It is desired to have all sections with a section ID that has a 'D' in the second position of the
  12-character field.
  On the editor screen for the Section ID code _D%
  Apply the filter to get the desired sections.

Using Left, Mid, Right Function to search a character field:
A query can be set up in the Extra Filters to search a character field for a particular value or a string of values. Using the left, mid, and right option for a SQL statement can be used for this search. The syntax is as follows:

Left(data item name, number of positions) = 'character to search for'
E.g., left(state_control_field,2) = '26'

Start with the left most character in the State Control field, first 2 characters = 26

Mid(data item name, position to start the search, number of characters) like 'character to search for'
E.g., mid(state_control_field,7,5) like 'GREEN%'
Start in the 7th position of the State Control field, for 5 characters with the value GREEN

Right(data item name, number character) = 'character to search for'
E.g., right(state_control_field, 3) = 'NEN'
Start at the right most position in the State Control field, first 3 characters = NEN

The Mid option is probably the best to use since it can be used with any position in the character field.
**Notice** that you can use operators = or like in your query.

Finding Sections with Errors
In the section editor queries can be set up to locate the sections that have errors. The queries are set up using the Extra Filters option on the Section Data Selector screen. The messages that are listed on the Validation Results Report are used to set up the criteria.

On the Section Data Selector screen (*Editors*|*Section*) select the Section Type, then Extra Filters.
On the Extra Filters screen highlight the data Field, select the operator and code in the value.
Once the criteria are set click OK, then Apply the filter on the Section Data Selector screen.
The list box will contain the sections with the error(s) set up in the criteria.

The following examples are setup by the Validation message:

Message: NHS must be 1 if functional system is in the range [1,11].
Section Type: All Sections
Criteria: NHS <> 1 and F_System in (1,11)

Message: Median Type must be less than 4 if Median Width greater than zero.
Section Type: Standard Sample
Criteria: Median_Type >= 4 and Median_Width > 0

Message: Weighted Design Speed must be a value from 30 to 70 (50 to 110 kmh) if section is paved
Section Type: Standard Sample
Criteria: Design_Speed < 30 and Design_Speed > 70 and Pavement_Type > 1

Message: Number of Through Lanes must not be zero if functional system not in the range (8,9,19)
Section Type: All Sections
Criteria: Through_Lanes = 0 and F_System in (1,2,6,7,11,12,14,16,17)

Message: Number of Peak Lanes must be equal to Number of Through Lanes if section is Rural 2 or 3
lane facility.
Section Type: Standard Sample

Criteria: Rural_Urban = 1 and Through_Lanes in (2,3) and (Peak_Lanes <> Through_Lanes)

Message: Peak % Single Unit Trucks plus Peak % Combination Trucks should not be > 40%
Section Type: Standard Sample
Criteria: (Perc_Single_Unit + Perc_Combination) > 40
Note: The criteria need to be entered in the Filter Selection box by the user.

Message: At peak capacity for more than 13 hours.
Section Type: All sections
Criteria: for Interstate segments:
Unbuilt_facility < 2 and through_lanes > 0 and f_system in (1,11) and
((AADT/(2200*through_lanes)) > 13.0)
For all other segments:
Unbuilt_facility < 2 and through_lanes > 0 and f_system not in (1,11)
and ((AADT/(2000*through_lanes)) > 13.0)

Note: The criteria need to be entered in the Filter Selection box by the user.

Message: Urban, 2way, >=4 lanes with at-grade signals left turns permitted and no left turn lane (turning
lanes left = 4)
Section Type: Standard Sample
Criteria:Rural_Urban > 1and Type_Facility = 2 and Through_Lanes >= 4 and at_grade_signal > 0 and
Turn_Lane_L = 4

Message: Unusually high number of intersections (>25 per mile)
Section Type: Standard Sample
Criteria: (At_Grade_Signal + At_Grade_Signs + At_Grade_Other) > 25 * Section_Length
Note: The criteria need to be entered in the Filter Selection box by the user.

# Appendix B

## HPMS Comma Delimited ASCII File

The layout for the comma delimited ASCII file that is imported into and exported from the HPMS Windows-based software is shown in the table below. The ASCII file contains items included in the *HPMS Field Manual, December 2000*. The following table lists the data items in the order they appear in the ASCII file. The first five items are record keys for the HPMS table in the Microsoft Access database.

| Item # | Item Name | Data Type | Max. Length |
|---|---|---|---|
| 1 | Year of the Data | Numeric; Integer | 9999 |
| 2 | State Code | Numeric; Codes | 99 |
| 3 | Is Metric | Numeric; Integer | 9 |
| 4 | County Code | Numeric; Codes | 999 |
| 5 | Section Identification | Character Field | Max 12 characters * |
| 6 | Is Standard Sample | Numeric; Codes | 9 |
| 7 | Is Donut Sample | Numeric; Codes | 9 |
| 8 | State Control Field | Character Field | Max 100 characters * |
| 9 | Is Section Grouped | Numeric; Codes | 9 |
| 10 | LRS ID | Character Field | Max 12 characters * |
| 11 | LRS Start Point | Numeric; Decimal | 99999.999 |
| 12 | LRS End Point | Numeric; Decimal | 99999.999 |
| 13 | Rural/Urban Designation | Numeric; Codes | 9 |
| 14 | Urbanized Area Sampling Technique | Numeric; Integer | 9 |
| 15 | Urbanized Area Code | Numeric; Integer | 999 |
| 16 | Nonattainment Area Code | Numeric; Integer | 999 |
| 17 | Functional System | Numeric; Codes | 99 |
| 18 | Generated Functional System | Numeric; Codes | 9 ** |
| 19 | National Highway System (NHS) | Numeric; Codes | 9 |
| 20 | Planned Unbuilt Facility | Numeric; Codes | 9 |
| 21 | Official Interstate Route Number | Character Field | Max 5 characters * |
| 22 | Route Signing | Numeric; Codes | 9 |
| 23 | Route Signing Qualifier | Numeric; Codes | 9 |
| 24 | Signed Route Number | Character Field | Max 8 characters * |
| 25 | Governmental Ownership | Numeric; Codes | 9 |
| 26 | Special Systems | Numeric; Codes | 9 |
| 27 | Type of Facility | Numeric; Codes | 9 |
| 28 | Designated Truck Route | Numeric; Codes | 9 |
| 29 | Toll | Numeric; Codes | 9 |
| 30 | Section Length | Numeric; Decimal | 99999.999 |
| 31 | Donut Area AADT Volume Group | Numeric; Integer | 9 |
| 32 | Standard Sample AADT Volume Group | Numeric; Integer | 99 |

| Item # | Item Name | Data Type | Max. Length |
|---|---|---|---|
| 33 | AADT | Numeric; Integer | 9999999 |
| 34 | Number of Through Lanes | Numeric; Integer | 99 |
| 35 | Measured Pavement Roughness (IRI) | Numeric; Decimal | 999.99 |
| 36 | Present Serviceability Rating (PSR) | Numeric; Decimal | 99.9 |
| 37 | HOV Operations | Numeric; Codes | 9 |
| 38 | Highway Surveillance Systems A | Numeric; Codes | 9 |
| 39 | Highway Surveillance Systems B | Numeric; Codes | 9 |
| 40 | Highway Surveillance Systems C | Numeric; Codes | 9 |
| 41 | Highway Surveillance Systems D | Numeric; Codes | 9 |
| 42 | Highway Surveillance Systems E | Numeric; Codes | 9 |
| 43 | Highway Surveillance Systems F | Numeric; Codes | 9 |
| 44 | Highway Surveillance Systems G | Numeric; Codes | 9 |
| 45 | Highway Surveillance Systems H | Numeric; Codes | 9 |
| 46 | Highway Surveillance Systems I | Numeric; Codes | 9 |
| 47 | Sample Identifier | Character Field | Max 12 characters * |
| 48 | Donut Area Expansion Factor | Numeric; Decimal | 99999.999 ** |
| 49 | Standard Expansion Factor | Numeric; Decimal | 99999.999 ** |
| 50 | Surface/Pavement Type | Numeric; Codes | 9 |
| 51 | SN or D | Numeric; Decimal | 999.9 |
| 52 | Climate Zone | Numeric; Codes | 9 |
| 53 | Year of Surface Improvement | Numeric; Integer | 9999 |
| 54 | Lane Width | Numeric; Decimal | 999.9 |
| 55 | Access Control | Numeric; Codes | 9 |
| 56 | Median Type | Numeric; Codes | 9 |
| 57 | Median Width | Numeric; Decimal | 999.9 |
| 58 | Shoulder Type | Numeric; Codes | 9 |
| 59 | Shoulder Width – Right | Numeric; Decimal | 99.9 |
| 60 | Shoulder Width – Left | Numeric; Decimal | 99.9 |
| 61 | Peak Parking | Numeric; Codes | 9 |
| 62 | Widening Feasibility | Numeric; Codes | 9 |
| 63 | Curves by Class A | Numeric; Decimal | 99.999 |
| 64 | Curves by Class B | Numeric; Decimal | 99.999 |
| 65 | Curves by Class C | Numeric; Decimal | 99.999 |
| 66 | Curves by Class D | Numeric; Decimal | 99.999 |
| 67 | Curves by Class E | Numeric; Decimal | 99.999 |
| 68 | Curves by Class F | Numeric; Decimal | 99.999 |
| 69 | Horizontal Alignment Adequacy | Numeric; Codes | 9 ** |
| 70 | Type of Terrain | Numeric; Codes | 9 |
| 71 | Vertical Alignment Adequacy | Numeric; Codes | 9 ** |
| 72 | Grades by Class A | Numeric; Decimal | 99.999 |
| 73 | Grades by Class B | Numeric; Decimal | 99.999 |
| 74 | Grades by Class C | Numeric; Decimal | 99.999 |
| 75 | Grades by Class D | Numeric; Decimal | 99.999 |
| 76 | Grades by Class E | Numeric; Decimal | 99.999 |
| 77 | Grades by Class F | Numeric; Decimal | 99.999 |
| 78 | Percent Passing Sight Distance | Numeric; Integer | 999 |

| Item # | Item Name | Data Type | Max. Length |
|---|---|---|---|
| 79 | Weighted Design Speed | Numeric; Integer | 999 ** |
| 80 | Speed Limit | Numeric; Integer | 999 |
| 81 | Percent Peak Single Unit Trucks | Numeric; Integer | 999 |
| 82 | Percent Average Daily Single Unit Trucks | Numeric; Integer | 999 |
| 83 | Percent Peak Combination Trucks | Numeric; Integer | 999 |
| 84 | Percent Average Daily Combination Trucks | Numeric; Integer | 999 |
| 85 | K-Factor | Numeric; Integer | 99 |
| 86 | Directional Factor | Numeric; Integer | 999 |
| 87 | Number of Peak Lanes | Numeric; Integer | 99 |
| 88 | Turning Lanes – Left | Numeric; Codes | 9 |
| 89 | Turning Lanes – Right | Numeric; Codes | 9 |
| 90 | Prevailing Type of Signalization | Numeric; Codes | 9 |
| 91 | Typical Peak Percent Green Time | Numeric; Codes | 999 |
| 92 | Number of At-Grade Intersections – Signals | Numeric; Integer | 99 |
| 93 | Number of At-Grade Intersections – Signs | Numeric; Integer | 99 |
| 94 | Number of At-Grade Intersections – Other | Numeric; Integer | 99 |
| 95 | Peak Capacity | Numeric; Integer | 99999 ** |
| 96 | Volume/Service Flow Ratio (V/SF) | Numeric; Decimal | 9.99 ** |
| 97 | Future AADT | Numeric; Integer | 9999999 |
| 98 | Future AADT Year | Numeric; Integer | 9999 |

* Character fields do not use double quotes (") within the data item.
** Field calculated by the software.

All fields should be separated by comma (**,**).
All character fields should be enclosed with double quotes (**"**).

For Numeric Data Items:

- leading zero must be coded in a decimal value when the value is less than an integer (length = 0.21); otherwise, leading zeros are not required.
- decimal points are required for all data items labeled "Numeric; Decimal"; i.e.: those reported in tenths, hundredths, or thousandths (PSR=2.3, length = 8.253, etc.).
- one digit must be coded after a decimal point for all data items labeled "Numeric; Decimal"; PSR = 3 must be coded 3.0; additional trailing zeros are not required for the decimal portion of a data value.
- when data not available, code "0" or "0.0" as appropriate.

For Character Data Items:

- any alphanumeric character (A through Z; 0 through 9; space) can be coded.
- DO NOT use double quotes within the character data item.
- Leading and embedded spaces are required, trailing spaces are optional.

For Data Items with Assigned Values (Codes):

- select the appropriate value from the table.
- the value must be coded precisely as listed in the table.

**HPMS record with Universe only information**:

All 98 HPMS Data Items must be accounted for in the comma delimited record. The record for a universe section would look like:

---

1999,44,0,1,"SECTION63810",0,0,"State Control Field",0,"000006395102",1.35,
10.0,4,0,26,26,14,0,0,0,"00000",3,0,"00000103",1,0,2,0,0,2.063,23145,4,0,3.5,0,0,0,0,0,
0,0,0,0,0,,,

| Item # | Item Name | Data Value |
|---|---|---|
| 28 | Designated Truck Route | 0 |
| 29 | Toll | 0 |
| 30 | Section Length | 2.063 |
| 31 | Donut Area AADT Volume Group | 0 |
| 32 | Standard Sample AADT Volume Group | 6 |
| 33 | AADT | 23145 |
| 34 | Number of Through Lanes | 4 |
| 35 | Measured Pavement Roughness (IRI) | 0 |
| 36 | Present Serviceability Rating (PSR) | 3.5 |
| 37 | HOV Operations | 0 |
| 38 | Highway Surveillance Systems A | 0 |
| 39 | Highway Surveillance Systems B | 0 |
| 40 | Highway Surveillance Systems C | 0 |
| 41 | Highway Surveillance Systems D | 0 |
| 42 | Highway Surveillance Systems E | 0 |
| 43 | Highway Surveillance Systems F | 0 |
| 44 | Highway Surveillance Systems G | 0 |
| 45 | Highway Surveillance Systems H | 0 |
| 47 | Highway Surveillance Systems I | 0 |
| 47-98 | Sample Data Items | 51 Commas are coded |

# Appendix C

## HPMS Microsoft Access Data Table Layout

The following table lists the data items in the order they appear in the table. The first five items are record keys for the HPMS table in the Microsoft Access database. This table has the data type listed the way the data is defined in the Microsoft Access data table.

| Item # | Item Name | Data Type | Max. Size |
|---|---|---|---|
| 1 | Year_Record | Numeric(4) | 9999 |
| 2 | State_Code | Numeric(2) | 99 |
| 3 | Is_Metric | Boolean | 0 or 1 |
| 4 | County_Code | Numeric(3) | 999 |
| 5 | Section_ID | String(12) | Max 12 characters |
| 6 | Is_Sample | Boolean | 0 or 1 |
| 7 | Is_Donut | Boolean | 0 or 1 |
| 8 | State_Control_Field | String(100) | Max 100 characters |
| 9 | Is_Grouped | Boolean | 0 or 1 |
| 10 | LRS_ID | String(12) | Max 12 characters |
| 11 | Begin_LRS | Numeric(5,3) | 99999.999 |
| 12 | End_LRS | Numeric(5,3) | 99999.999 |
| 13 | Rural_Urban | Numeric(1) | 9 |
| 14 | Sampling_Tech | Numeric(1) | 9 |
| 15 | Urban_Code | Numeric(3) | 999 |
| 16 | Nonatt_Code | Numeric(3) | 999 |
| 17 | F_System | Numeric(2) | 99 |
| 18 | GF_System | Numeric(1) | 9 * |
| 19 | NHS | Numeric(1) | 9 |
| 20 | Unbuilt_Facility | Numeric(1) | 9 |
| 21 | Inter_Route_Number | String(5) | Max 5 characters |
| 22 | Route_Signing | Numeric(1) | 9 |
| 23 | Route_Qualifier | Numeric(1) | 9 |
| 24 | Route_Number | String(8) | Max 8 characters |
| 25 | Ownership | Numeric(1) | 9 |
| 26 | Special_Systems | Boolean | 0 or 1 |
| 27 | Type_Facility | Numeric(1) | 9 |
| 28 | Truck_Route | Boolean | 0 or 1 |
| 29 | Toll | Boolean | 0 or 1 |
| 30 | Section Length | Numeric(5,3) | 99999.999 |
| 31 | Donut_Volume_Group | Numeric(1) | 9 |
| 32 | Std_Volume_Group | Numeric(2) | 99 |
| 33 | AADT | Numeric(7) | 9999999 |
| 34 | Through_Lanes | Numeric(2) | 99 |
| 35 | IRI | Numeric(3,2) | 999.99 |

| Item # | Item Name | Data Type | Max. Size |
|---|---|---|---|
| 36 | PSR | Numeric(2,1) | 99.9 |
| 37 | HOV | Numeric(1) | 9 |
| 38 | Surv_A | Boolean | 0 or 1 |
| 39 | Surv_B | Boolean | 0 or 1 |
| 40 | Surv_C | Boolean | 0 or 1 |
| 41 | Surv_D | Boolean | 0 or 1 |
| 42 | Surv_E | Boolean | 0 or 1 |
| 43 | Surv_F | Boolean | 0 or 1 |
| 44 | Surv_G | Boolean | 0 or 1 |
| 45 | Surv_H | Boolean | 0 or 1 |
| 46 | Surv_I | Boolean | 0 or 1 |
| 47 | Sample_ID | String(12) | Max 12 characters |
| 48 | Donut_Exp_Factor | Numeric(5,3) | 99999.999 * |
| 49 | Std_Exp_Factor | Numeric(5,3) | 99999.999 * |
| 50 | Pavement_Type | Numeric(1) | 9 |
| 51 | SN_D | Numeric(3,1) | 999.9 |
| 52 | Climate_Zone | Numeric(1) | 9 |
| 53 | Year_Surf_Improv | Numeric(4) | 9999 |
| 54 | Lane_Width | Numeric(3,1) | 999.9 |
| 55 | Access_Control | Numeric(1) | 9 |
| 56 | Median_Type | Numeric(1) | 9 |
| 57 | Median_Width | Numeric(3,1) | 999.9 |
| 58 | Shoulder_Type | Numeric(1) | 9 |
| 69 | Shoulder_Width_R | Numeric(2,1) | 99.9 |
| 60 | Shoulder_Width_L | Numeric(2,1) | 99.9 |
| 61 | Peak_Parking | Numeric(1) | 9 |
| 62 | Wide_Feas | Numeric(1) | 9 |
| 63 | Curves_A | Numeric(2,3) | 99.999 |
| 64 | Curves_B | Numeric(2,3) | 99.999 |
| 65 | Curves_C | Numeric(2,3) | 99.999 |
| 66 | Curves_D | Numeric(2,3) | 99.999 |
| 67 | Curves_E | Numeric(2,3) | 99.999 |
| 68 | Curves_F | Numeric(2,3) | 99.999 |
| 69 | Horz_Align | Numeric(1) | 9 |
| 70 | Type_Terrain | Numeric(1) | 9 |
| 71 | Vert_Align | Numeric(1) | 9 |
| 72 | Grades_A | Numeric(2,3) | 99.999 |
| 73 | Grades_B | Numeric(2,3) | 99.999 |
| 74 | Grades_C | Numeric(2,3) | 99.999 |
| 75 | Grades_D | Numeric(2,3) | 99.999 |
| 76 | Grades_E | Numeric(2,3) | 99.999 |
| 77 | Grades_F | Numeric(2,3) | 99.999 |
| 78 | Perc_Sight | Numeric(3) | 999 |
| 79 | Design_Speed | Numeric(3) | 999 * |
| 80 | Speed_Limit | Numeric(3) | 999 |
| 81 | Perc_Single_Unit | Numeric(3) | 999 |
| 82 | Avg_Single_Unit | Numeric(3) | 999 |

| Item # | Item Name | Data Type | Max. Size |
|---|---|---|---|
| 83 | Perc_Combination | Numeric(3) | 999 |
| 84 | Avg_Combination | Numeric(3) | 999 |
| 85 | K_Factor | Numeric(2) | 99 |
| 86 | Dir_Factor | Numeric(3) | 999 |
| 87 | Peak_Lanes | Numeric(2) | 99 |
| 88 | Turn_Lanes_L | Numeric(1) | 9 |
| 89 | Turn_Lanes_R | Numeric(1) | 9 |
| 90 | Type_Signal | Numeric(1) | 9 |
| 91 | Perc_Green | Numeric(3) | 999 |
| 92 | At_Grade_Signal | Numeric(2) | 99 |
| 93 | At_Grade_Signs | Numeric(2) | 99 |
| 94 | At_Grade_Other | Numeric(2) | 99 |
| 95 | Peak_Capacity | Numeric(5) | 99999 * |
| 96 | VSF | Numeric(1,2) | 9.99 * |
| 97 | Fut_AADT | Numeric(7) | 9999999 |
| 98 | Fut_AADT_Year | Numeric(4) | 9999 |

* Field calculated by the submittal software.