Pavement Health Track (PHT) Analysis Tool Graphical User Interface

Hands-On Workbook

Version 2.x

Federal Highway Administration
Office of Asset Management

Sept 2013

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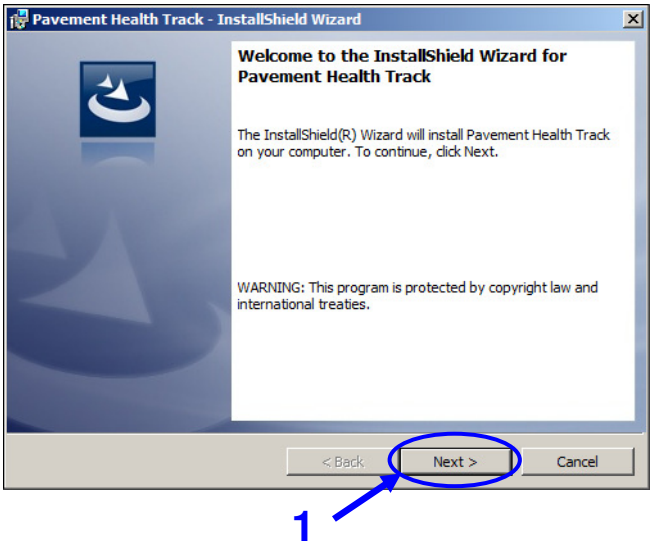
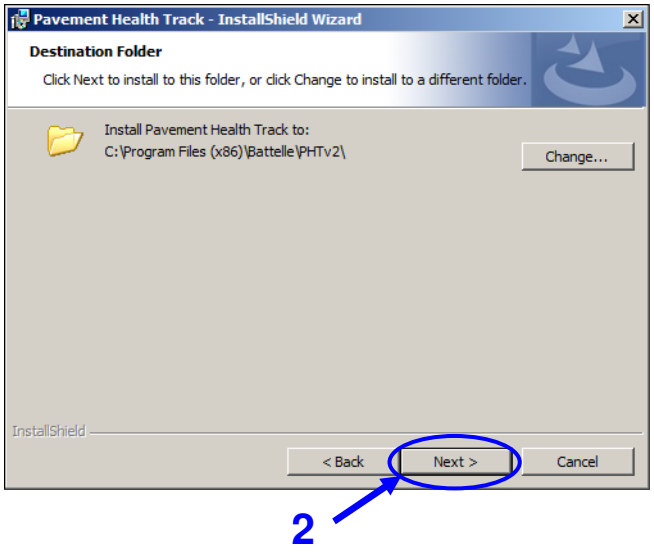
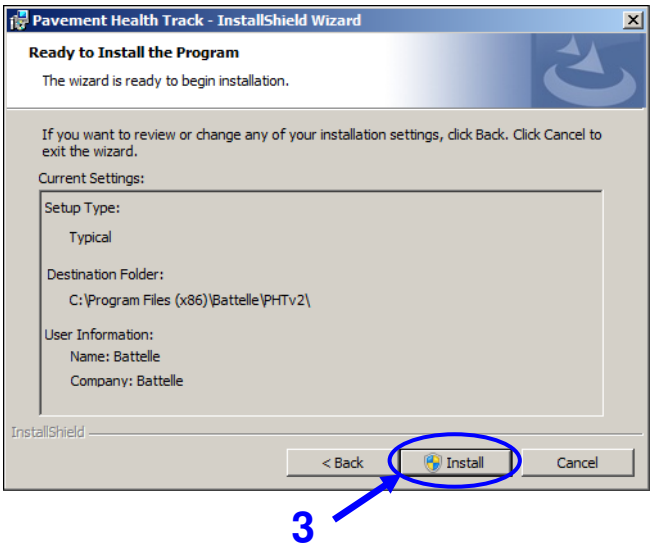
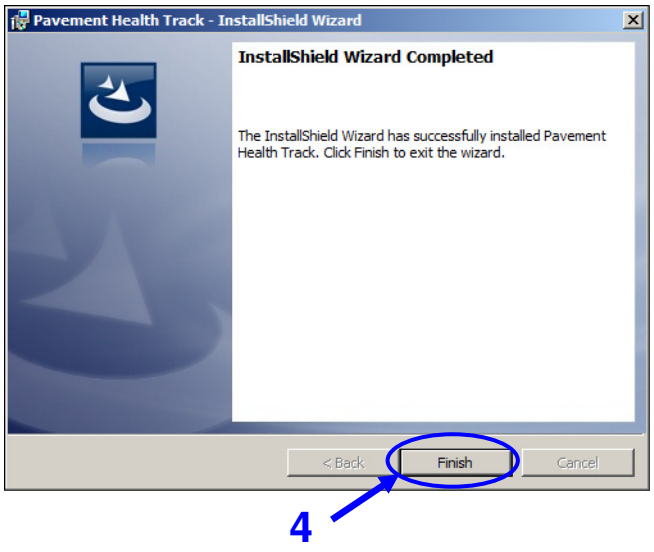
CHAPTER 1 – SOFTWARE INSTALLATION

Insert the PHT CD-ROM and follow the directions below. If the CD does not auto-run, open the CD in Windows Explorer and run **setup.exe**.









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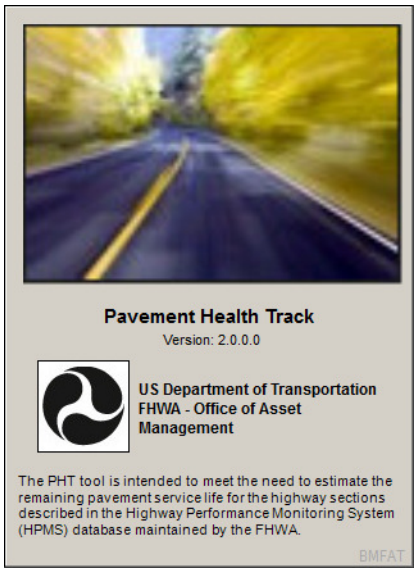
CHAPTER 2 – GETTING STARTED WITH PHT

To open up the PHT analysis tool:

Double click the Pavement Health Track icon on the desktop. 

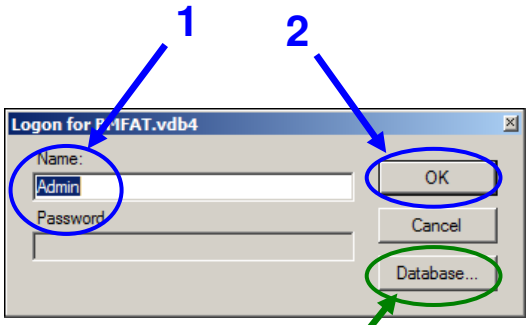
-OR-

Select Start > All Programs > Pavement Health Track > Pavement Health Track

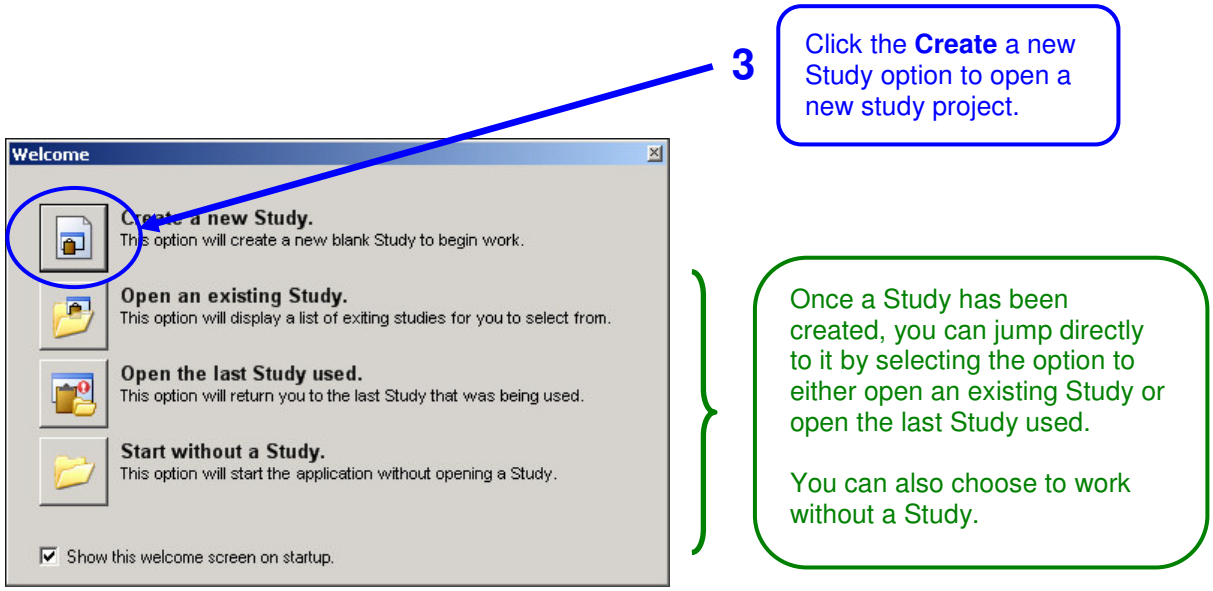


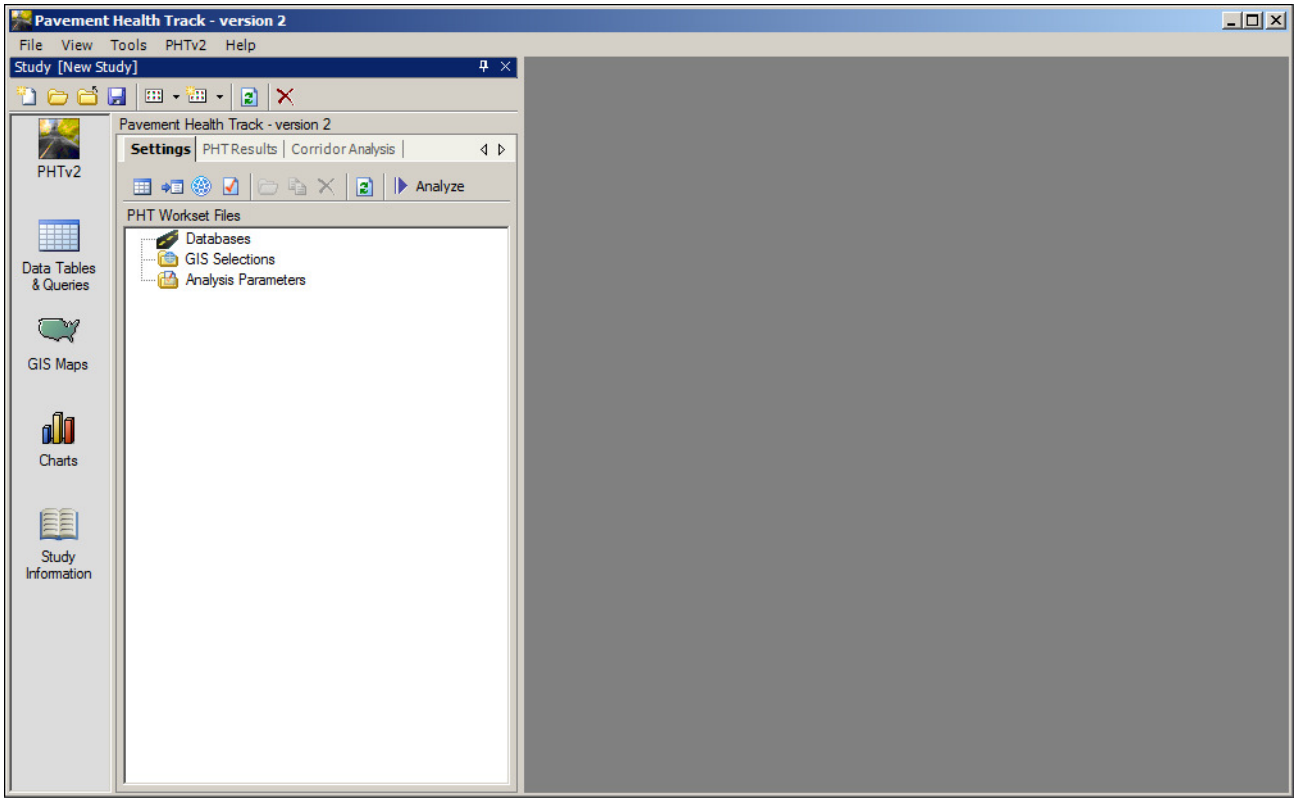
Note: This window will only appear if the application does not have enough information to connect to the database.

The application keeps track of who performs work via a username. Enter any name to be associated with your analysis. The password feature is not implemented at this time.



Optional: The Database button allows the user to select a particular database before entering the software. First time users will use the default database.





The PHT analysis tool is loaded into a new Study and is ready for use.

CHAPTER 3 – PREPARING FOR THE ANALYSIS

Objective: View and modify the PHT Analysis Parameters.

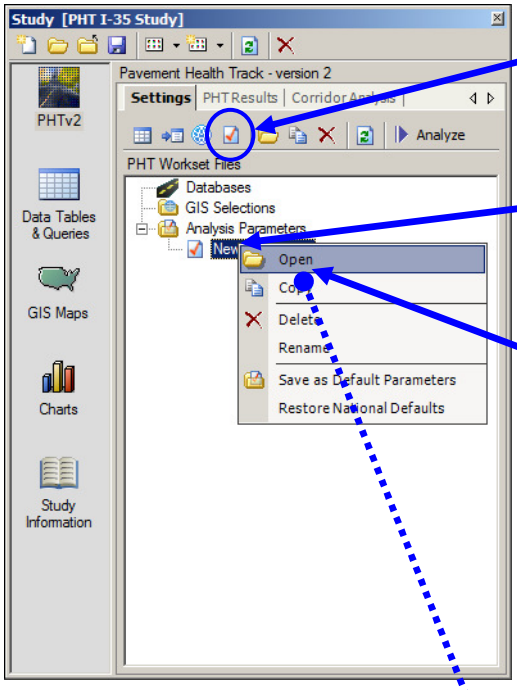
Specifics: PHT ships with default analysis parameters based on National averages. Users may need to customize the parameters to suit their own needs.

Use: PHT provides access to all of the parameters that affect the analysis including maximum service life, terminal values, pavement estimates and distress weights.

Tasks: 1) View and modify PHT Analysis Parameters.

2) Override the national defaults with user customized values.

3) Restore the national default values.



1

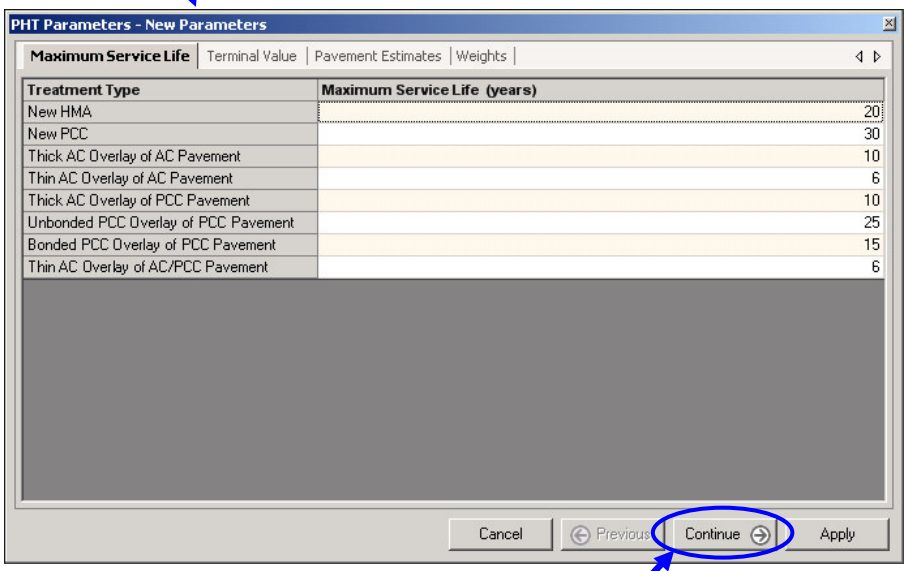
Click the **New Parameters** button to create a new set of PHT parameter metrics.

2

(Right-Click)

3

Click **Open** to display the parameter wizard.



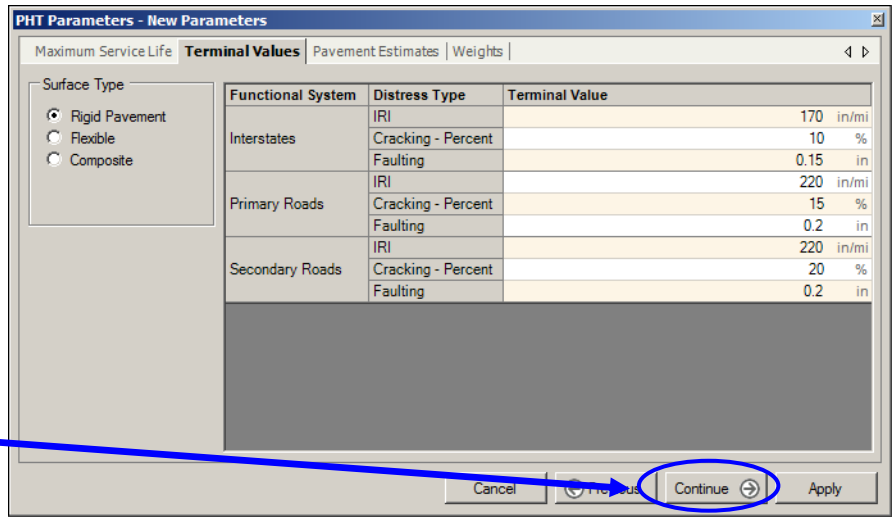
Review and edit the maximum service life for various types of pavement treatments.

4

(Click **Continue**)

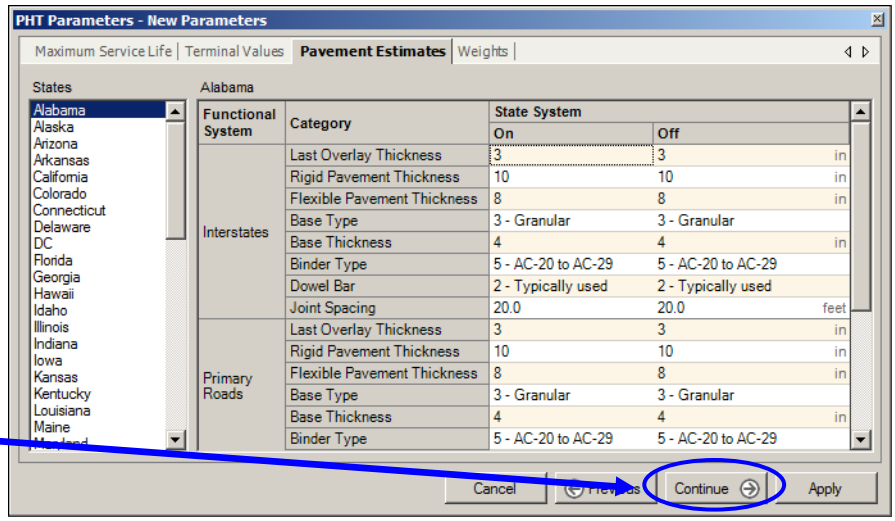
Review and edit the terminal values for various distress types for rigid, flexible and composite pavements.

5
(Click **Continue**)



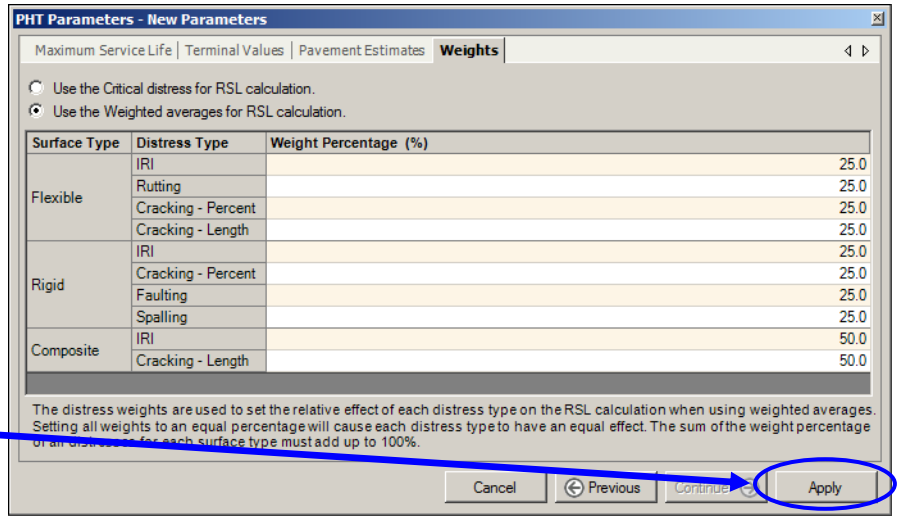
Review and edit pavement estimates that are used when measured data is not available for each individual State.

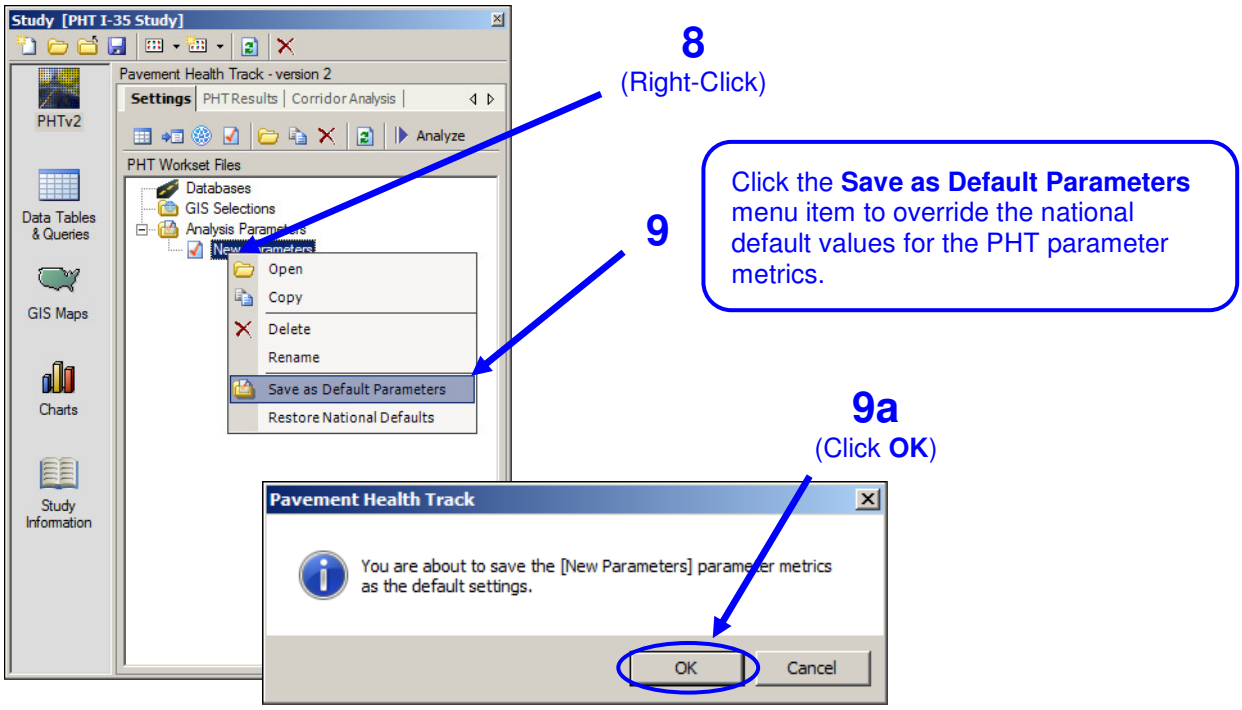
6
(Click **Continue**)

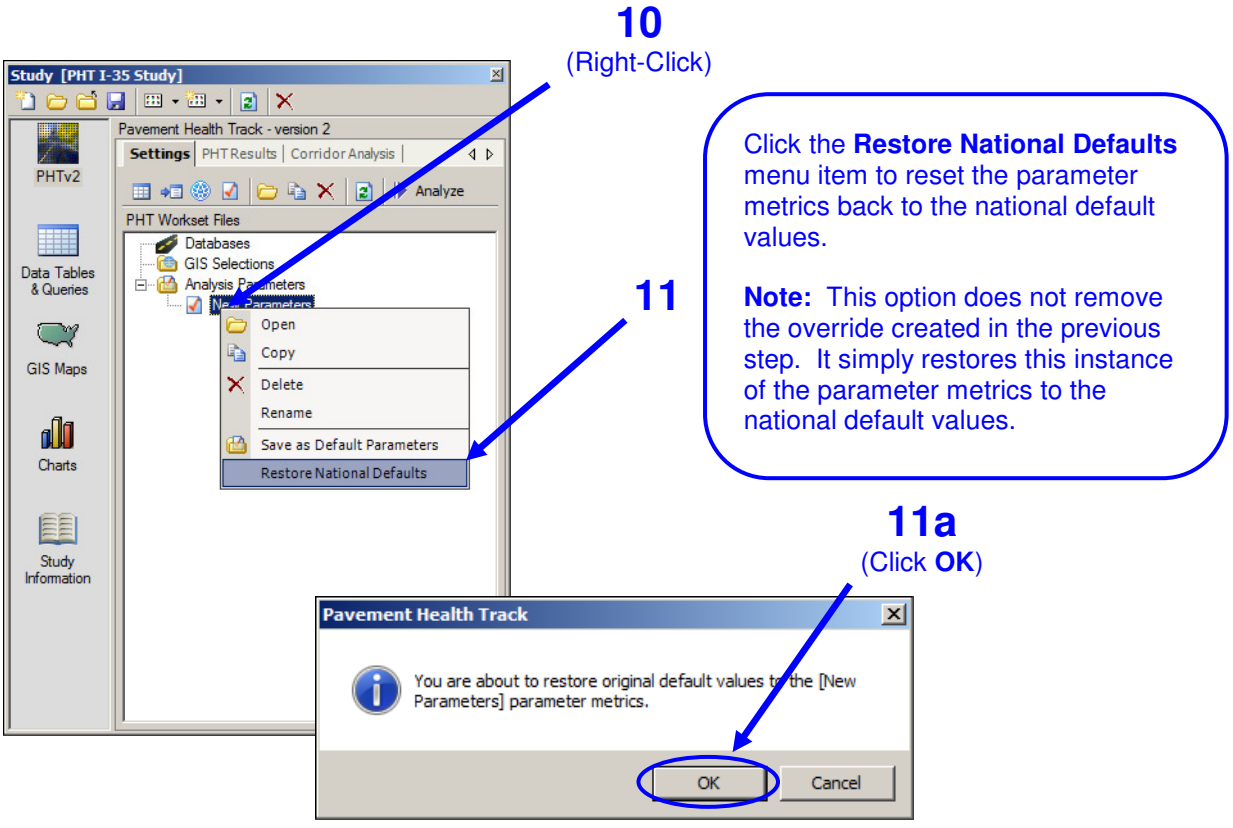


Optional; Review and edit distress weights to set the relative effect of each distress type on the RSL calculation.

7
(Click **Apply**)




Study [PHT I-35 Study]
Pavement Health Track - version 2
Settings
PHT Results
Corridor Analysis
Analyze
PHT Workset Files
Databases
GIS Selections
Analysis Parameters
Open
Copy
Delete
Rename
Save as Default Parameters
Restore National Defaults
PHTv2
Data Tables & Queries
GIS Maps
Charts
Study Information
8
(Right-Click)
9
Click the **Save as Default Parameters** menu item to override the national default values for the PHT parameter metrics.
9a
(Click **OK**)
Pavement Health Track
You are about to save the [New Parameters] parameter metrics as the default settings.
OK
Cancel


Study [PHT I-35 Study]
Pavement Health Track - version 2
Settings
PHT Results
Corridor Analysis
Analyze
PHT Workset Files
Databases
GIS Selections
Analysis Parameters
Open
Copy
Delete
Rename
Save as Default Parameters
Restore National Defaults
PHTv2
Data Tables & Queries
GIS Maps
Charts
Study Information
10
(Right-Click)
11
Click the **Restore National Defaults** menu item to reset the parameter metrics back to the national default values.
Note: This option does not remove the override created in the previous step. It simply restores this instance of the parameter metrics to the national default values.
11a
(Click **OK**)
Pavement Health Track
You are about to restore original default values to the [New Parameters] parameter metrics.
OK
Cancel

CHAPTER 4 – WORKING WITH HIGHWAY DATA

Objective: Become familiar with the features of the PHT tool for reading, viewing, editing, and selecting highway data records for the PHT analysis.

Specifics: The Highway Data file is a user-provided data file which describes several different characteristics and variables associated with each road section in the user's system.

The characteristics include:

- *Identification Information* such as State, County, Route ID;
- *Pavement Characteristics*, such as pavement type, thickness, roughness, rutting, faulting, cracking, etc.
- *Traffic/Capacity Data* such as AADT, speed limit, peak capacity, percent trucks and future year AADT forecasts.

Formatted similar to the highway performance monitoring system (HPMS 2010) data, the data needs to be in the same order and same structure as HPMS as defined in the HPMS Field manual, appendix G. The source highway data can also be in other formats such as comma-delimited CSV or DBF files or other ODBC connective data sources that can be manually mapped to the PHT database schema.

Use: The PHT tool provides very powerful features to allow a user to view and select highway sections for analysis both manually and automatically using SQL queries.

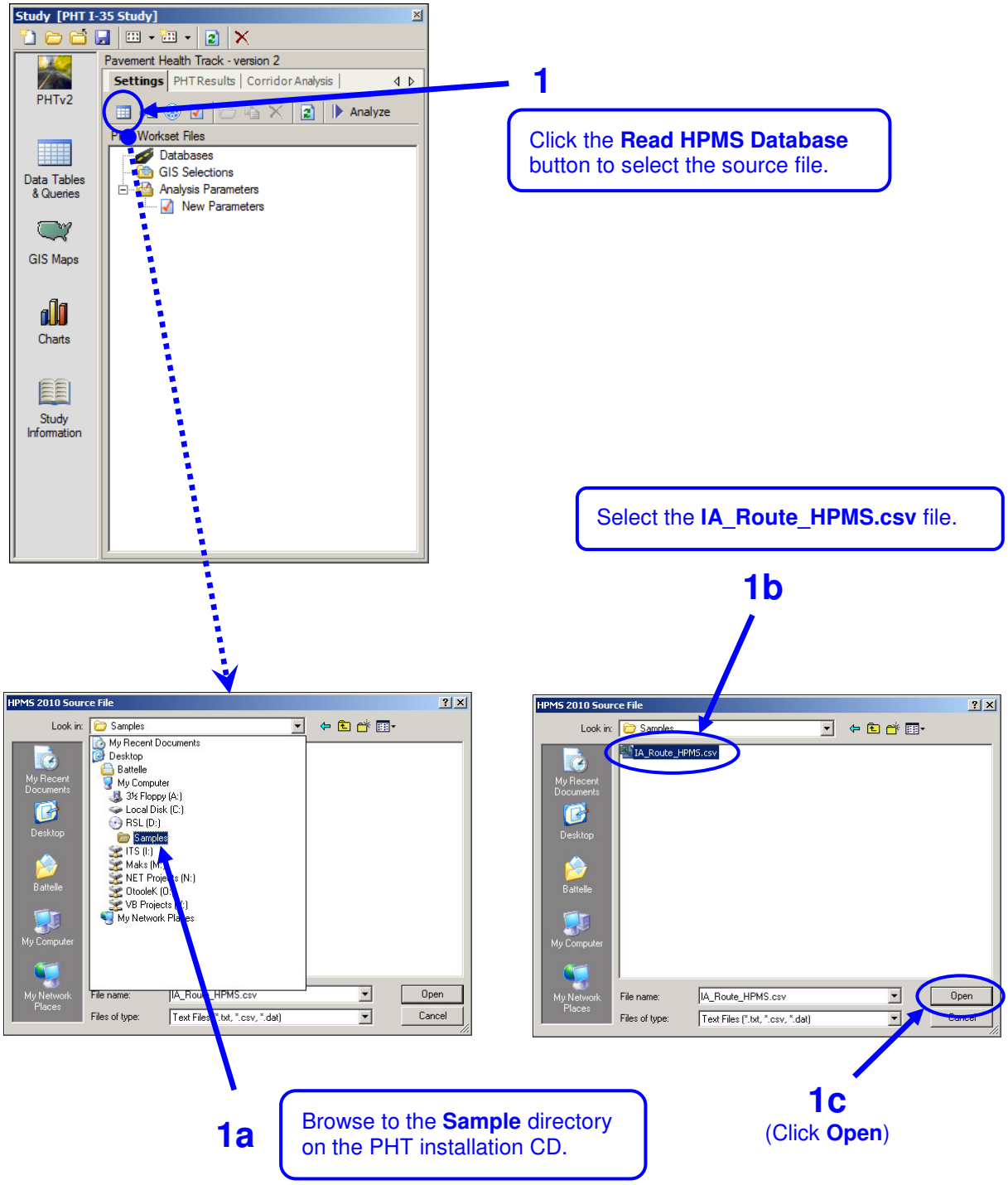
Tasks: 1) Read highway data from an HPMS 2010 formatted file.

2) View and manipulate the highway data.

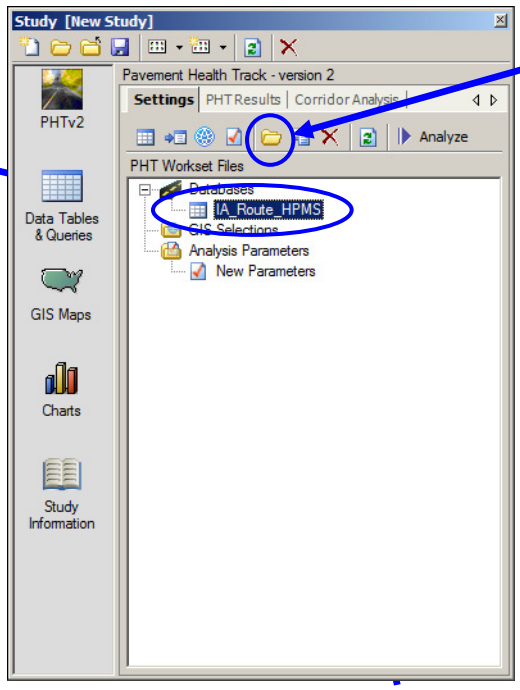
3) Select records for analysis.

4) Create copies of the highway data.

5) View a summary of the highway data.


Study [PHT I-35 Study]
Pavement Health Track - version 2
Settings
PHT Results
Corridor Analysis
Analyze
Workset Files
Databases
GIS Selections
Analysis Parameters
New Parameters
PHTv2
Data Tables & Queries
GIS Maps
Charts
Study Information
1
Click the Read HPMS Database button to select the source file.
Select the IA_Route_HPMS.csv file.
1b
HPMS 2010 Source File
Look in:
Samples
My Recent Documents
Desktop
Battelle
My Computer
Local Disk (C:)
RSL (D:)
Samples
My Network Places
File name:
IA_Route_HPMS.csv
Files of type:
Text Files (*.txt, *.csv, *.dat)
Open
Cancel
1a
Browse to the Sample directory on the PHT installation CD.
1c
(Click Open)

After the HPMS data is read, it will be displayed in the Settings tree under the **Databases** branch.



2

Click the **Open** button to display the highway data.

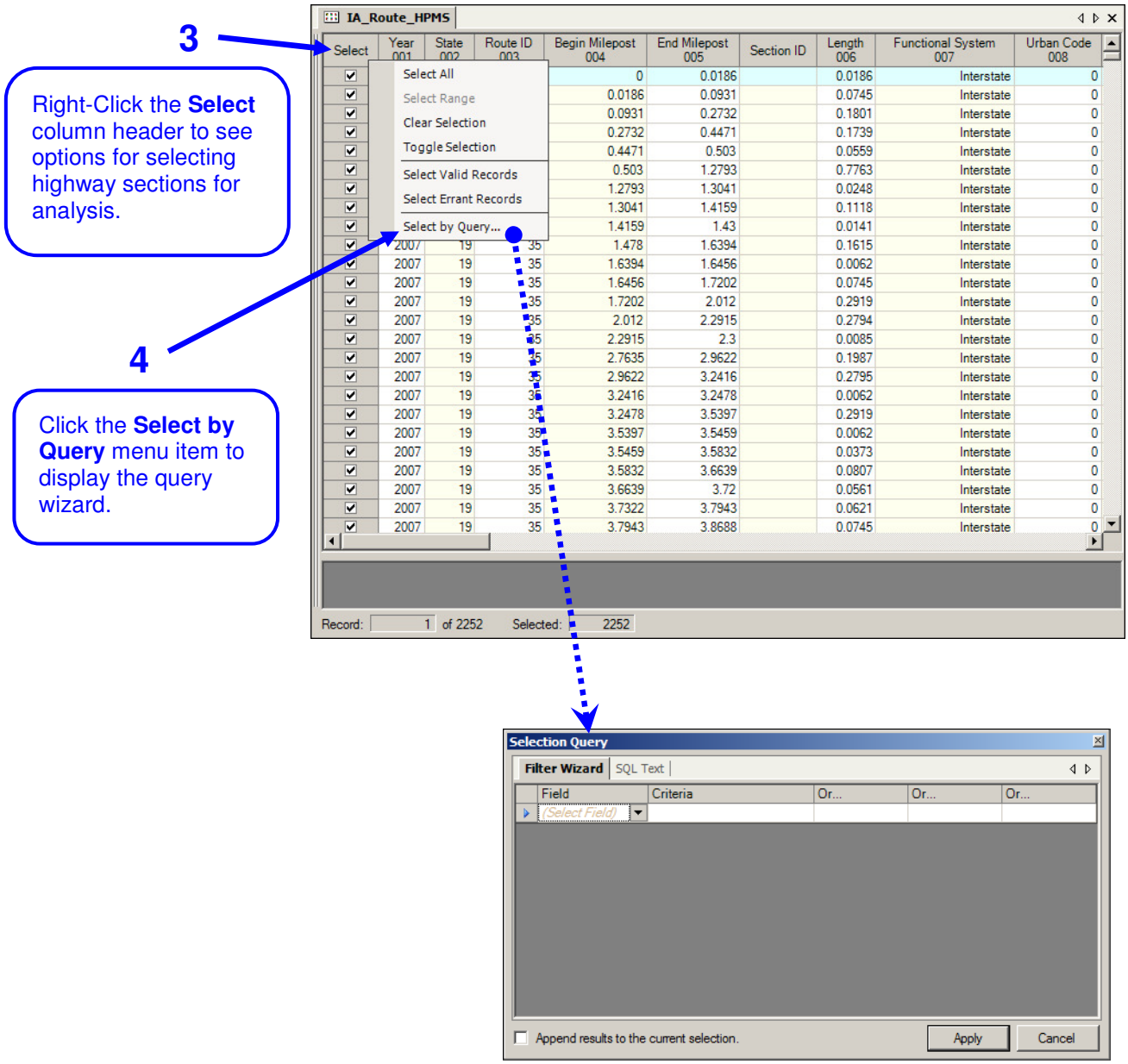
The highway data is displayed in a table that can be browsed and edited.

By default, all highway sections are selected for analysis.

IA_Route_HPMS

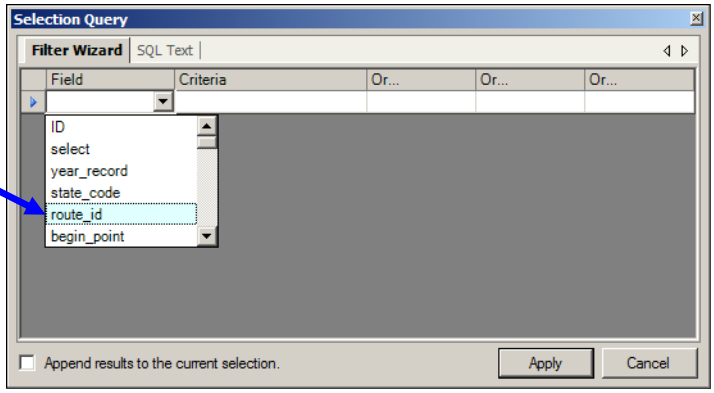
Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section ID	Length 006	Functional System 007	Urban Code 008
☑	2007	19	35	0	0.0186		0.0186	Interstate	0
☑	2007	19	35	0.0186	0.0931		0.0745	Interstate	0
☑	2007	19	35	0.0931	0.2732		0.1801	Interstate	0
☑	2007	19	35	0.2732	0.4471		0.1739	Interstate	0
☑	2007	19	35	0.4471	0.503		0.0559	Interstate	0
☑	2007	19	35	0.503	1.2793		0.7763	Interstate	0
☑	2007	19	35	1.2793	1.3041		0.0248	Interstate	0
☑	2007	19	35	1.3041	1.4159		0.1118	Interstate	0
☑	2007	19	35	1.4159	1.43		0.0141	Interstate	0
☑	2007	19	35	1.478	1.6394		0.1615	Interstate	0
☑	2007	19	35	1.6394	1.6456		0.0062	Interstate	0
☑	2007	19	35	1.6456	1.7202		0.0745	Interstate	0
☑	2007	19	35	1.7202	2.012		0.2919	Interstate	0
☑	2007	19	35	2.012	2.2915		0.2794	Interstate	0
☑	2007	19	35	2.2915	2.3		0.0085	Interstate	0
☑	2007	19	35	2.7635	2.9622		0.1987	Interstate	0
☑	2007	19	35	2.9622	3.2416		0.2795	Interstate	0
☑	2007	19	35	3.2416	3.2478		0.0062	Interstate	0
☑	2007	19	35	3.2478	3.5397		0.2919	Interstate	0
☑	2007	19	35	3.5397	3.5459		0.0062	Interstate	0
☑	2007	19	35	3.5459	3.5832		0.0373	Interstate	0
☑	2007	19	35	3.5832	3.6639		0.0807	Interstate	0
☑	2007	19	35	3.6639	3.72		0.0561	Interstate	0
☑	2007	19	35	3.7322	3.7943		0.0621	Interstate	0
☑	2007	19	35	3.7943	3.8688		0.0745	Interstate	0

Record: 1 of 2252 Selected: 2252


3
Right-Click the **Select** column header to see options for selecting highway sections for analysis.
4
Click the **Select by Query** menu item to display the query wizard.
IA_Route_HPMS
Select
Year 001
State 002
Route ID 003
Begin Milepost 004
End Milepost 005
Section ID
Length 006
Functional System 007
Urban Code 008
Select All
Select Range
Clear Selection
Toggle Selection
Select Valid Records
Select Errant Records
Select by Query...
Record: 1 of 2252
Selected: 2252
Selection Query
Filter Wizard
SQL Text
Field
Criteria
Or...
(Select Field)
Append results to the current selection.
Apply
Cancel

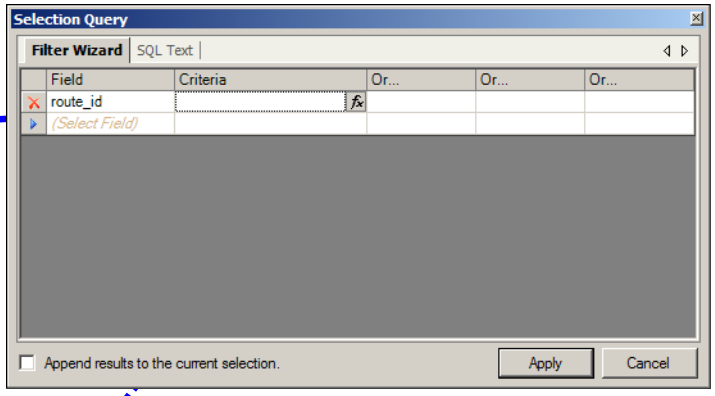
4a

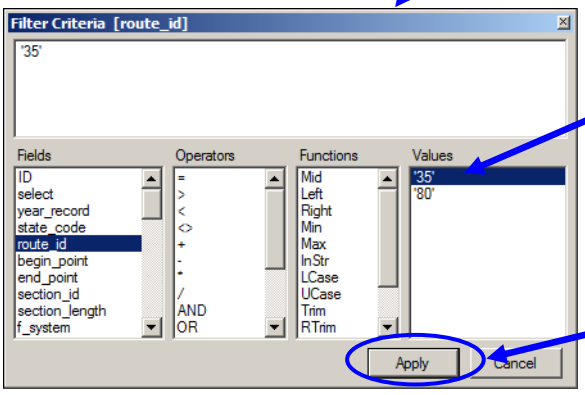
Select the **route_id** data field from the dropdown list.



4b

Click the **Function** button to display the query builder.



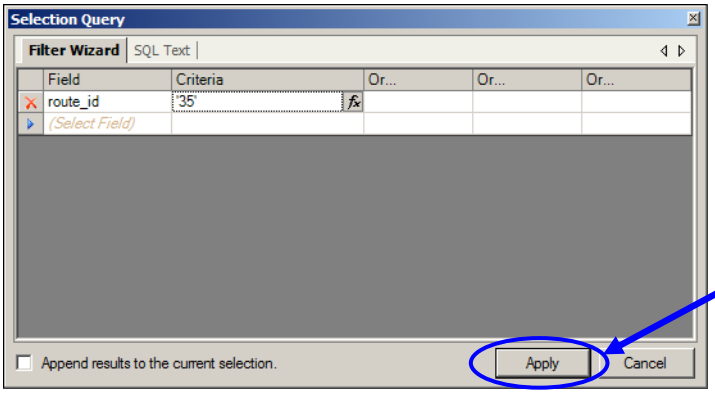


4c

Double-Click on the **'35'** from the values list.

4d

(Click **Apply**)



4e
(Click **Apply**)

Only the highway sections with a route identifier of '**35**' are selected.

IA_Route_HPMS

Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section ID	Length 006	Functional System 007	Urban Code 008
☑	2007	19	35	214.3195	214.4499		0.1304	Interstate	0
☑	2007	19	35	214.4499	214.6921		0.2422	Interstate	0
☑	2007	19	35	214.6921	214.9467		0.2546	Interstate	0
☑	2007	19	35	214.9467	215.0834		0.1366	Interstate	0
☑	2007	19	35	215.0834	215.1765		0.0931	Interstate	0
☑	2007	19	35	215.1765	215.6981		0.5216	Interstate	0
☑	2007	19	35	215.6981	216.344		0.6458	Interstate	0
☑	2007	19	35	216.344	216.5551		0.2111	Interstate	0
☑	2007	19	35	216.5551	216.63		0.0749	Interstate	0
☑	2007	19	35	216.9401	217.6916		0.7514	Interstate	0
☑	2007	19	35	217.6916	218.5175		0.8259	Interstate	0
☐	2007	19	80	0	0.1801		0.1801	Interstate	46
☐	2007	19	80	0.1801	0.267		0.0869	Interstate	46
☐	2007	19	80	0.267	0.2981		0.0311	Interstate	46
☐	2007	19	80	0.2981	0.3167		0.0186	Interstate	46
☐	2007	19	80	0.3167	0.4844		0.1677	Interstate	46
☐	2007	19	80	0.4844	0.5713		0.0869	Interstate	46
☐	2007	19	80	0.5713	0.7142		0.1429	Interstate	46
☐	2007	19	80	0.7142	0.7949		0.0807	Interstate	46
☐	2007	19	80	0.7949	0.9253		0.1304	Interstate	46
☐	2007	19	80	0.9253	0.9688		0.0435	Interstate	46
☐	2007	19	80	0.9688	0.97		0.0012	Interstate	46
☐	2007	19	80	1.0122	1.1675		0.1553	Interstate	46
☐	2007	19	80	1.1675	1.2793		0.1118	Interstate	46

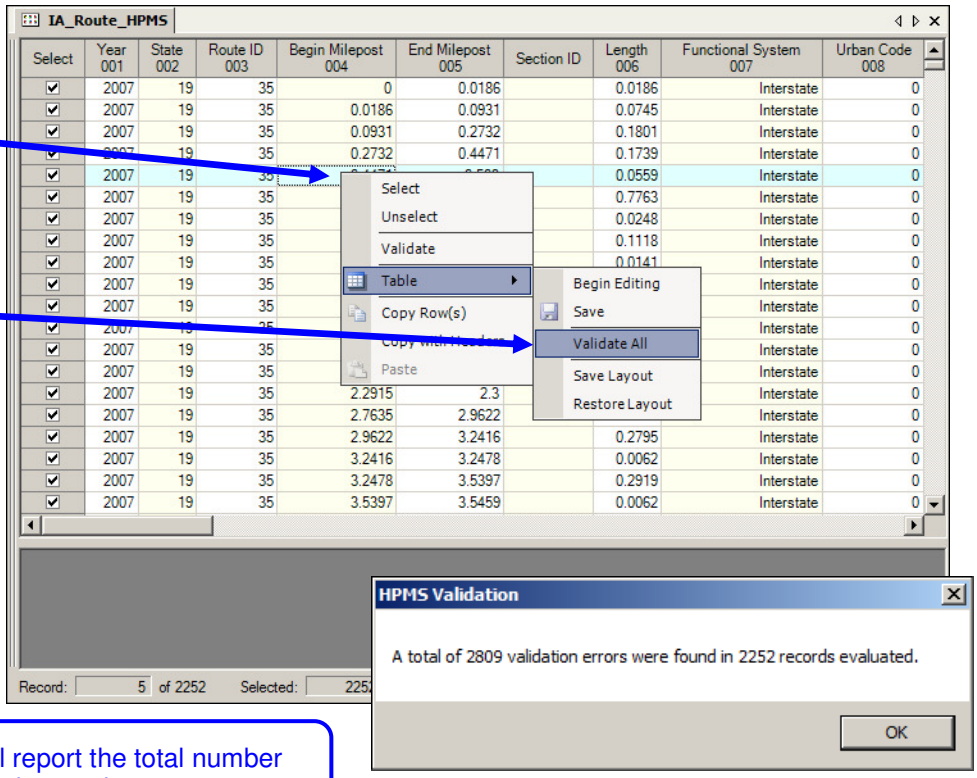
Record: 1 of 2252 Selected: 1030

The total number of selected highway sections are shown here.

5
(Right-Click)

6

Click the **Validate All** menu item under the **Table** sub-menu.



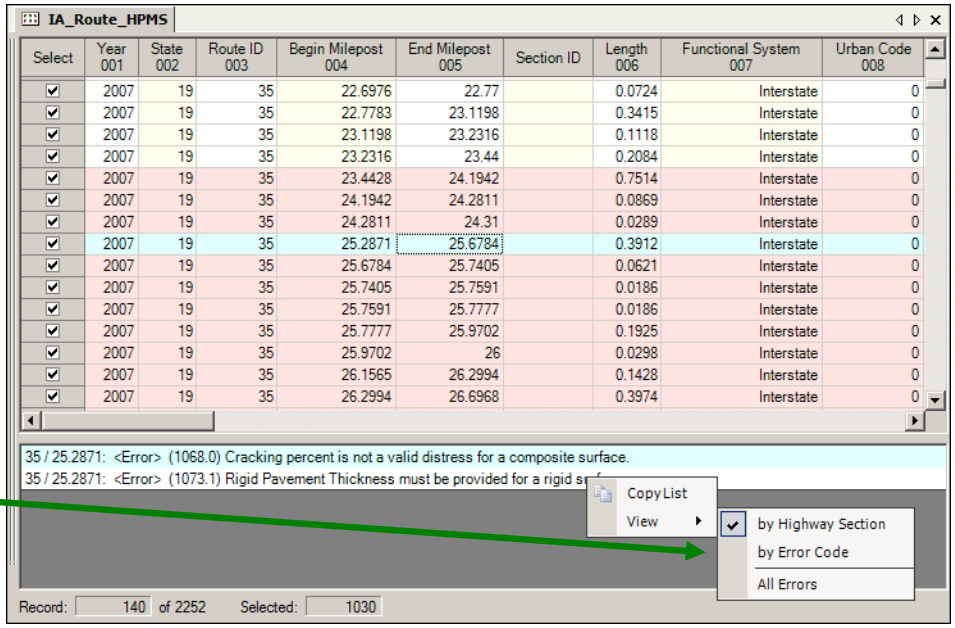
The application will report the total number of validation errors detected.

Highway sections that have validation errors are highlighted.

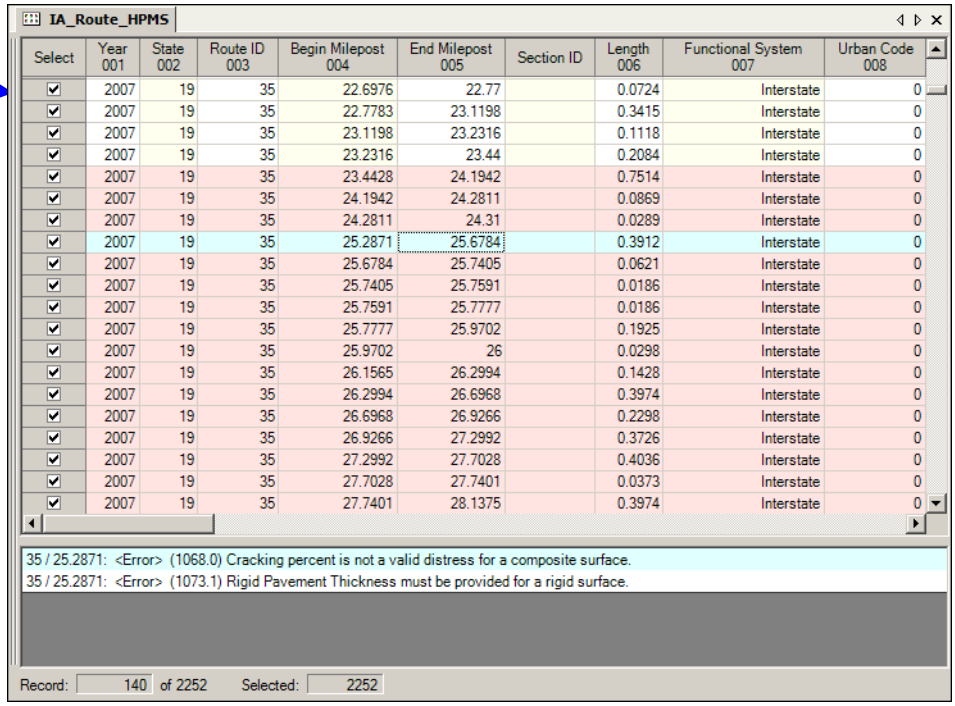
When a highway section is selected, a list of its validation errors is displayed in the bottom pane.

6a

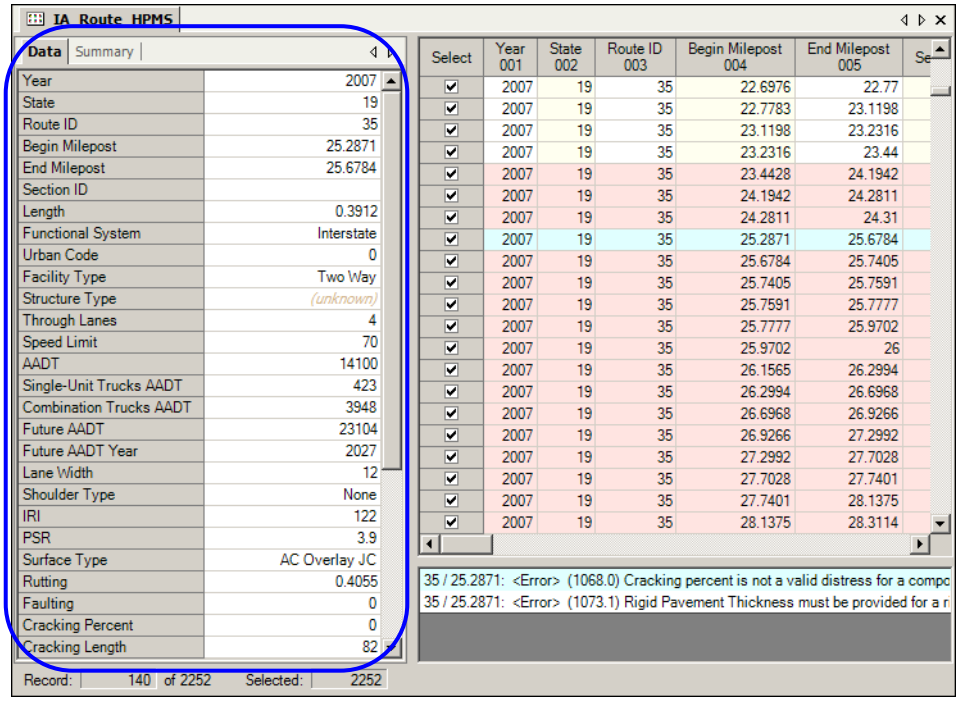
Right-click to choose how the validation error messages are displayed.



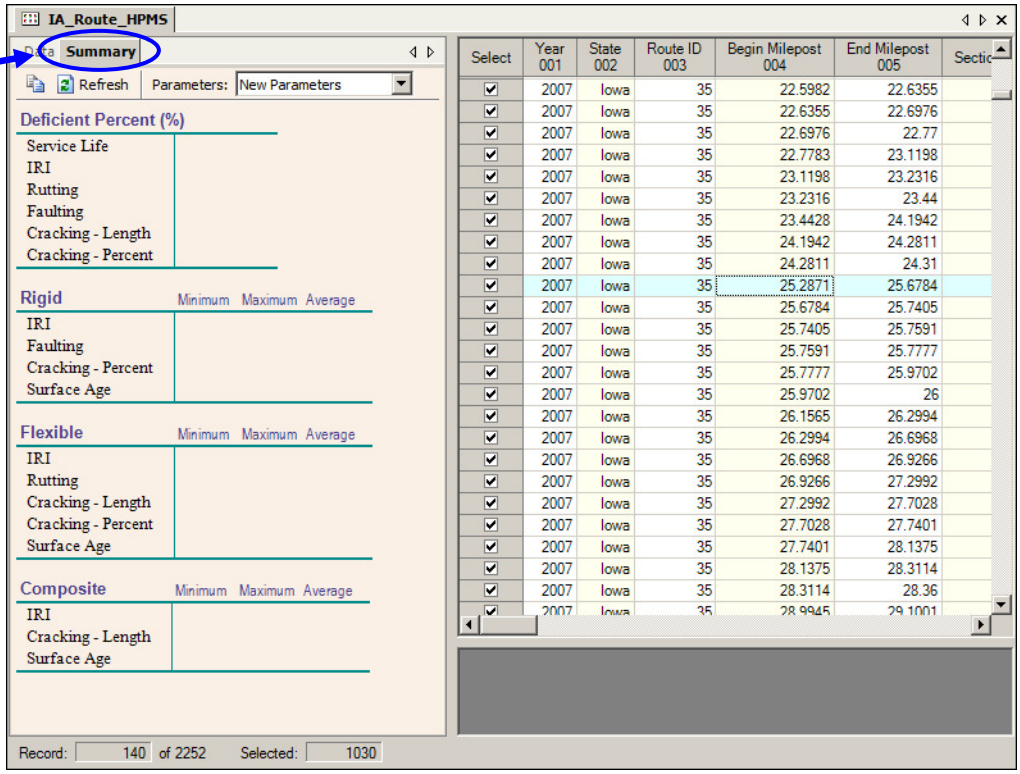
7
(Double-Click)



A panel expands from the left of the window that shows the data items for the selected highway section in a more convenient vertical format.



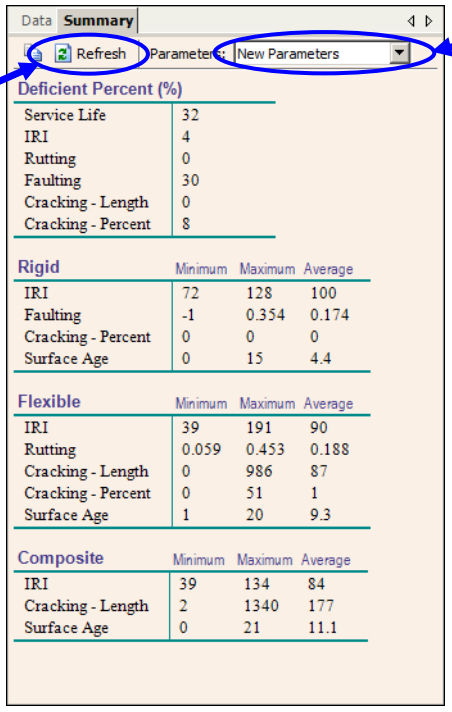
8
(Click **Summary**)



9a

Select a set of Analysis Parameters to use for the summary.

9b
(Click **Refresh**)



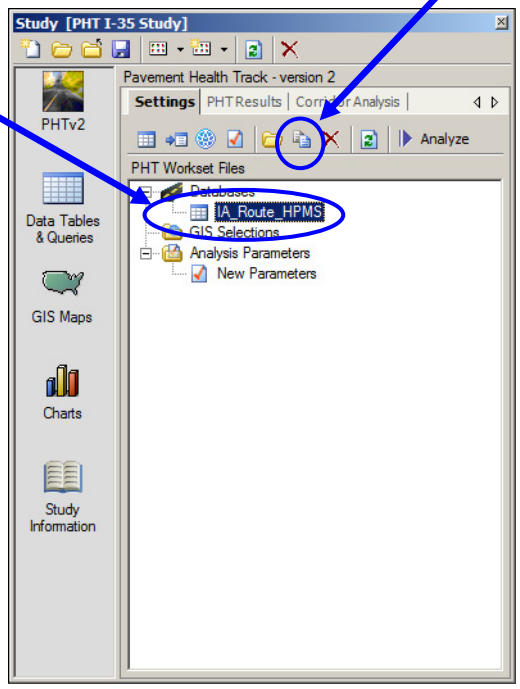
The summary window summaries the entire data set and shows the percent of deficient highway sections and the minimum, maximum and average distress values for each pavement type.

Ensure that the highway data item is selected in the settings tree.

10

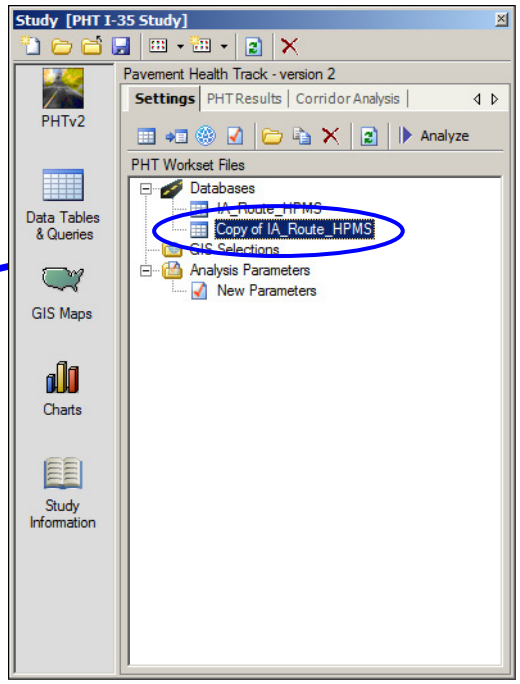
11

Click the **Copy** button to create a copy of the selected highway data set.



A copy of the highway data has been created and displayed in the settings tree.

Only the highway sections that were selected are included in the copy so, in this case, only the highway sections whose Route ID is 35 are part of the new highway data set.



CHAPTER 5 – RUNNING THE ANALYSIS

Objective: To perform the PHT Analysis using settings from previous exercise.

Specifics: Use the PHT analysis run wizard to select the highway data, parameter analysis and historical data to conduct the PHT analysis and view the results.

Use: The PHT analysis is a complex process that uses many inputs. The run wizard makes it simple for the user to select the input data and parameters and conduct the analysis.

Tasks:

1) Review components of the analysis run

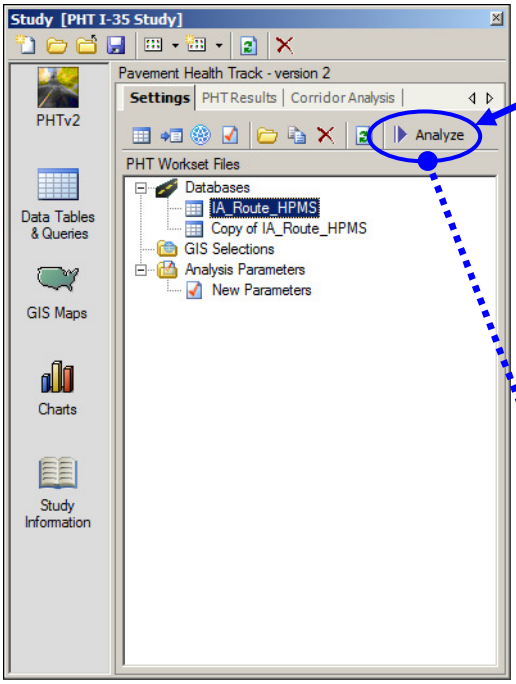
2) Conduct the PHT analysis

3) View the analysis results.

4) View a summary of the results for each record.

5) View the analysis log.

6) Apply the maintenance model to the analysis results.



1 Click the **Analyze** button to launch the PHT analysis run wizard.

Enter a descriptive name for the analysis.

2

Select the highway data and analysis parameters to be used in the analysis.

Note: Only Route 35 highway sections are selected. (Chapter 4)

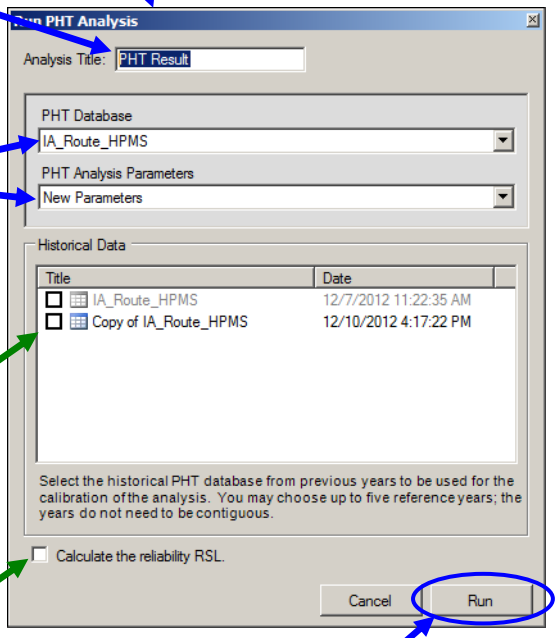
3

Optional; Select historical sets of highway data to be used for the calibration of the analysis. You may choose up to five reference years; the years do not need to be contiguous.

4

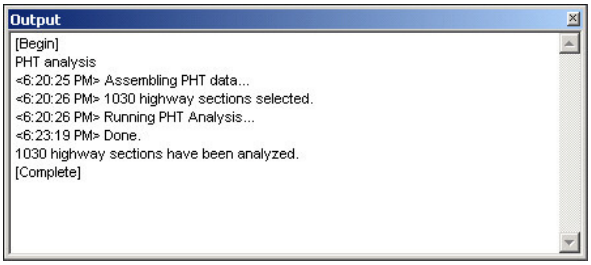
Optional; Check this option to have the PHT analysis calculate the reliability RSL value.

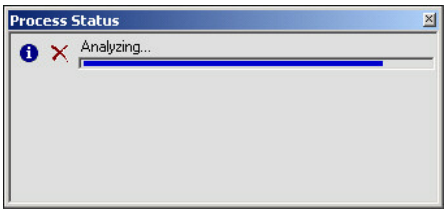
5



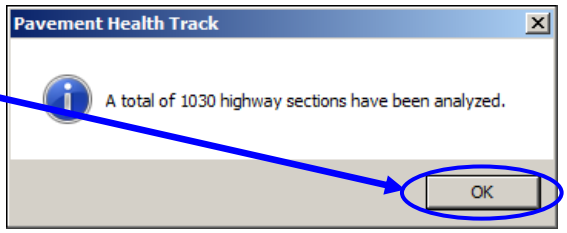
6 (Click **Run**)

During the run of the analysis, status and progress information is displayed to the user.

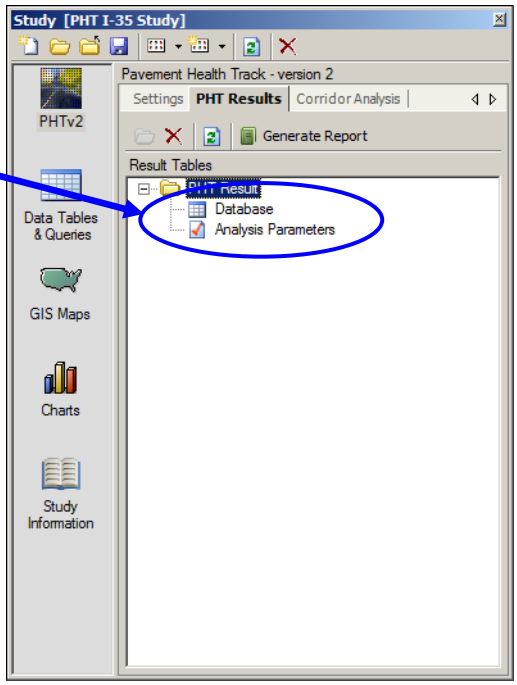


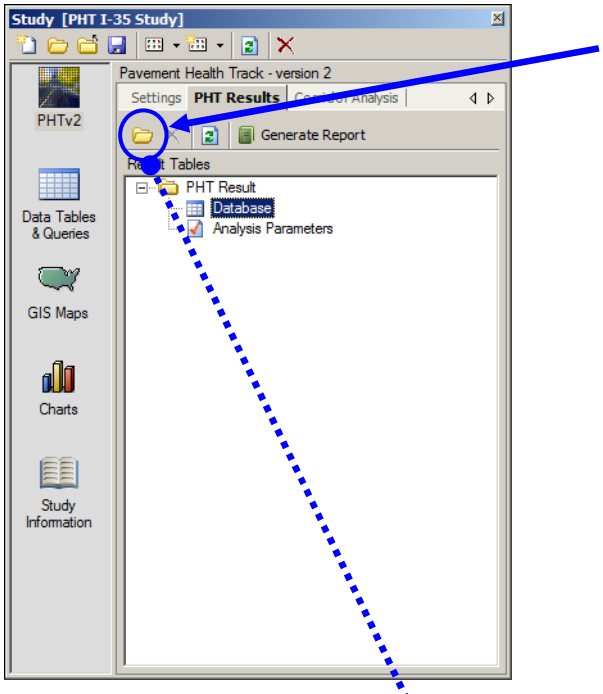


6a
(Click **OK**)



After the analysis is complete the analysis results along with all of the original highway data and parameter metrics are displayed in the results tree.

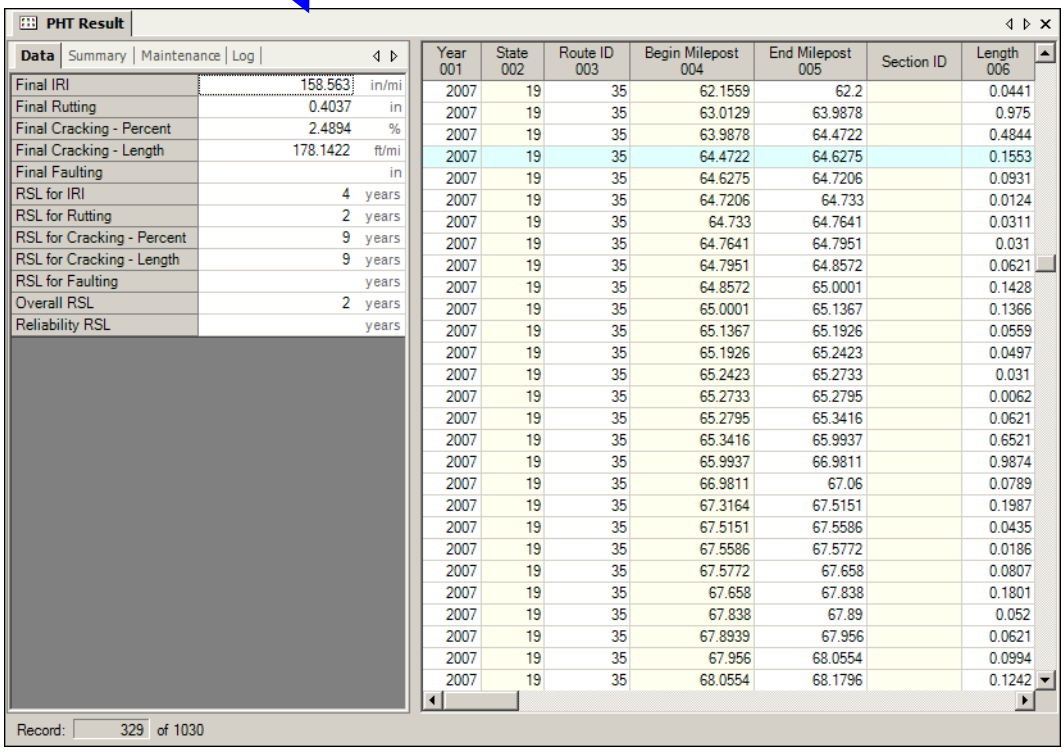


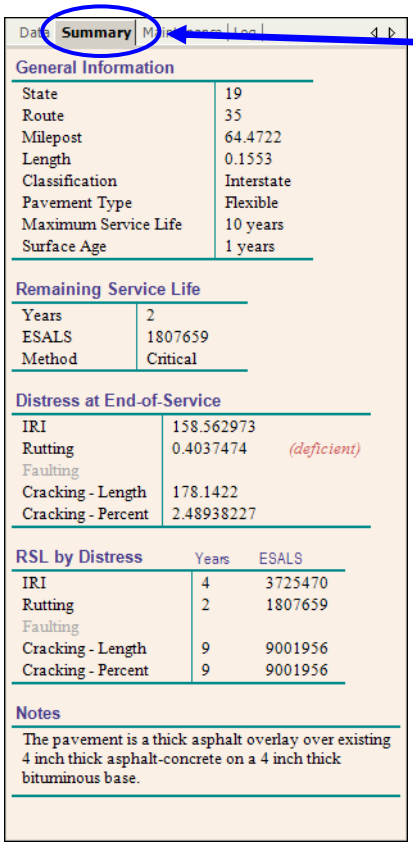


7 Click the **Open** button to display the original highway data and the PHT analysis results.

The original highway data is displayed in the right window.

The PHT Analysis results for the selected highway section are displayed in the left window.

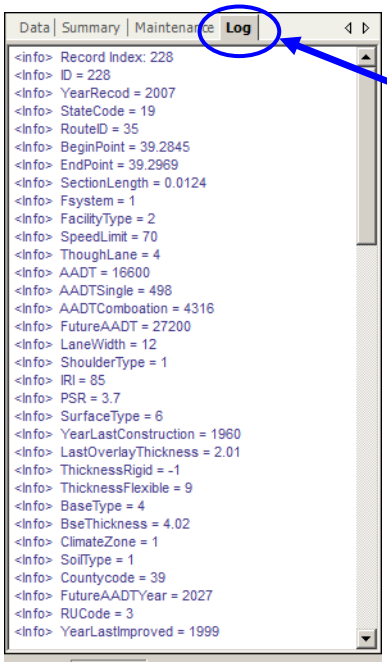




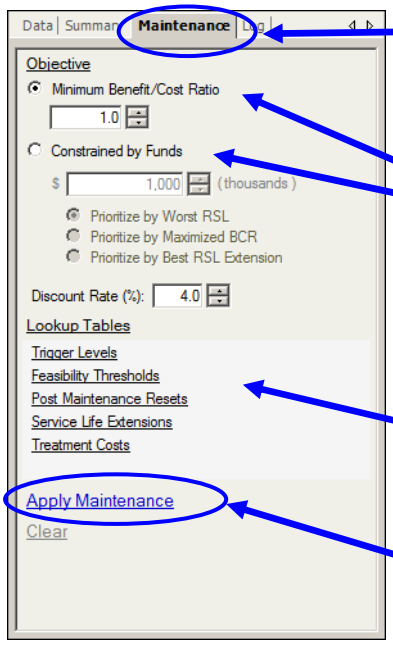
8 Click the **Summary** tab to view a summary of the PHT analysis for the selected highway section.

The summary highlights the estimated RSL for the pavement surface and illustrates the distresses and service life limits that contributed to the RSL estimate.

The summary also annotates the analysis with notes that describe the pavement construction and any unusual conditions in the data.



9 Click the **Log** tab to view a log of the analysis for the selected highway section.



10 Click the **Maintenance** tab to apply the PHT maintenance model to the analysis results.

10a Select the objective of the maintenance model. The model can either select maintenance projects that return a specified minimum BCR, or prioritize them as constrained by a funding level.

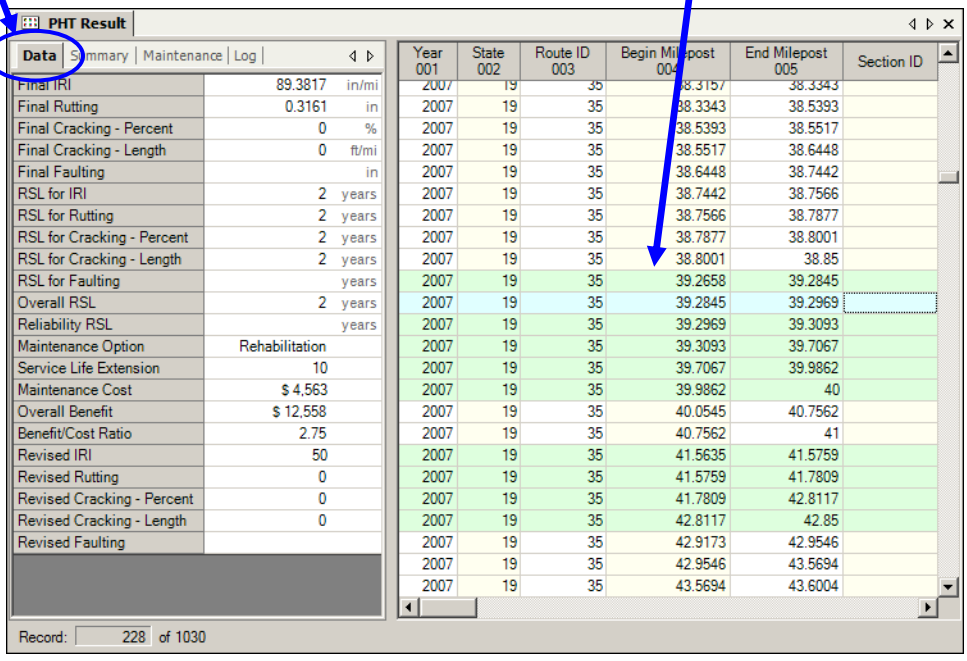
10b The look up tables provides trigger levels, feasibility thresholds, post maintenance resets, service life extensions and treatment costs to the maintenance model.

10c
(Click **Apply Maintenance**)

10d
(Click **Data**)

Highway sections that were selected for a maintenance treatment are highlighted in the table.

The results of the maintenance analysis are displayed on the **Data** tab.



CHAPTER 6 – WORKING WITH GIS SELECTIONS

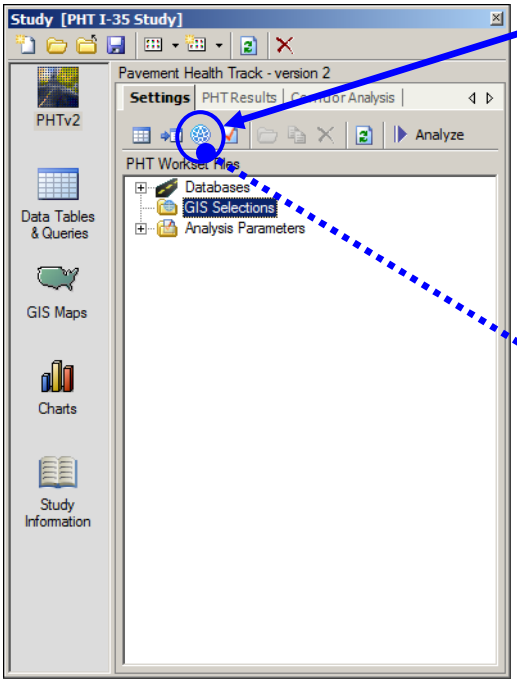
Objective: Create selections of highway sections using a GIS map.

Specifics: GIS maps provide a graphical means of selecting highway sections for the PHT analysis.

Use: GIS selections can define a sub-set of the overall highway network or define a single continuous route for a corridor analysis.

Tasks:

1. Create a GIS Selection and associated it with the highway data
2. Select highway sections using various methods
3. Compile a GIS selection into a continuous corridor
4. Select the highway data records for analysis using the GIS selection

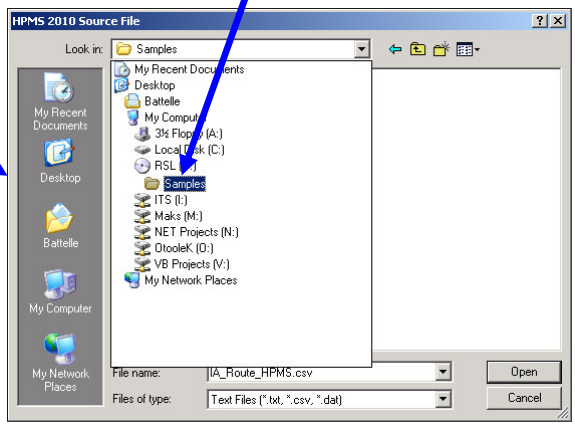


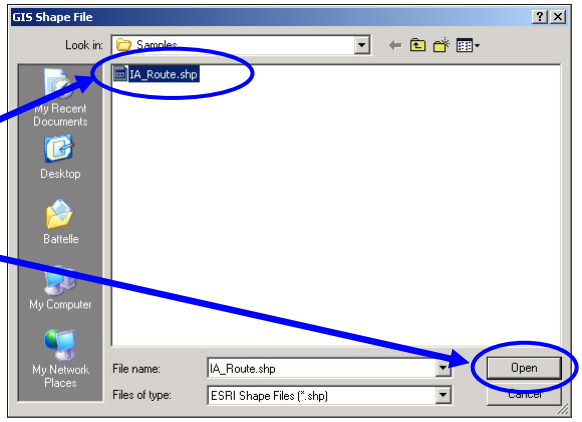
1

Click the **Create GIS Selection** button to select a shape file.

1a

Browse to the **Sample** directory on the PHT installation CD.





Select the **IA_Route.shp** file.

1b

1c

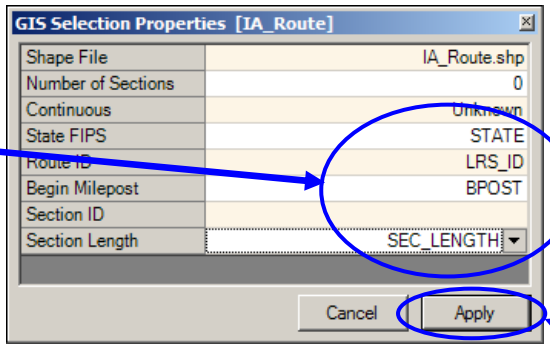
(Click **Open**)

From the GIS Selection Properties window, select the data fields from the GIS shape file that contain the following information:

- State FIPS Code
- Route Identifier
- Beginning Milepost
- Section Identifier
- Section Length

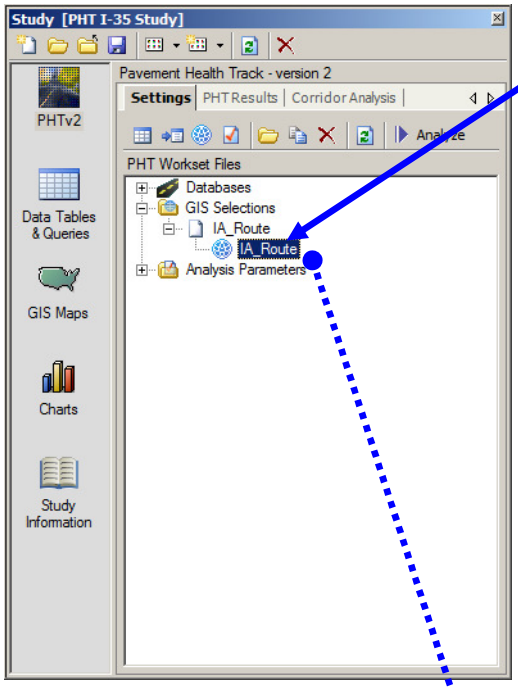
Note: You may specify the route identifier and beginning milepost fields, or just the section identifier field if available.

2

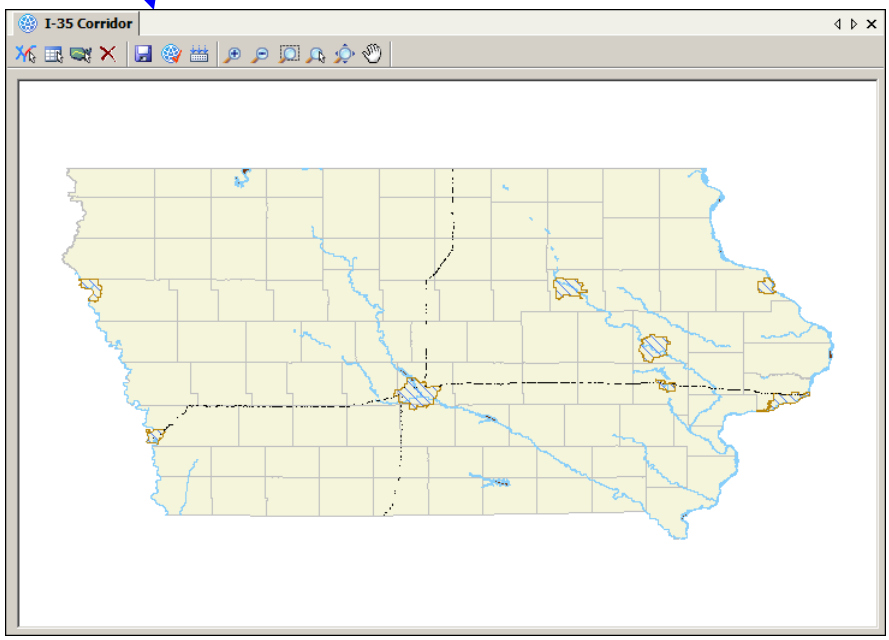


3

(Click **Apply**)



4
(Double Click)

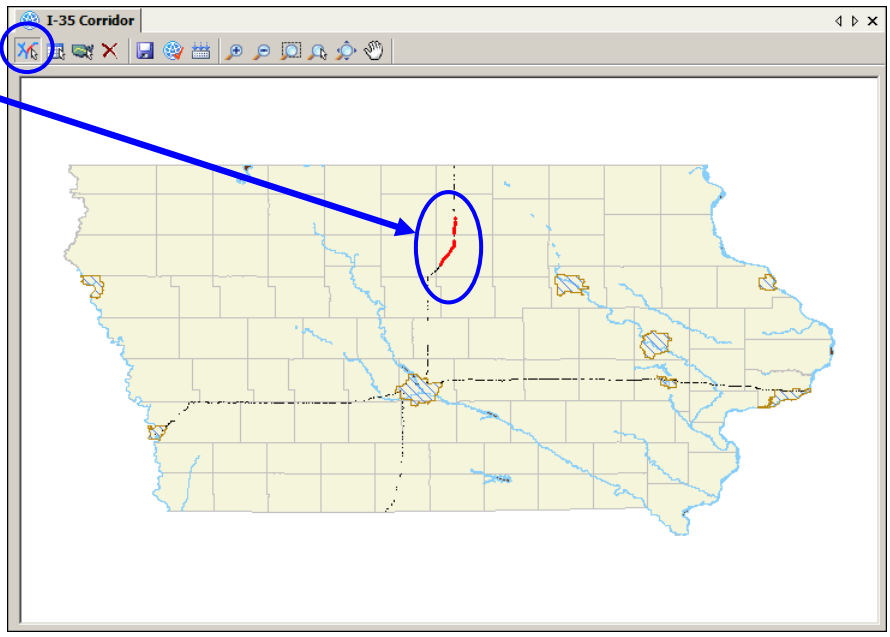


Using the State FIPS code, the PHT tool will load the appropriate background images for the State's counties, water, and urban areas to provide a context for the highway segments in the shape file.

Note: The background images are provided by the NTAD data pointed to in the PHT properties window.

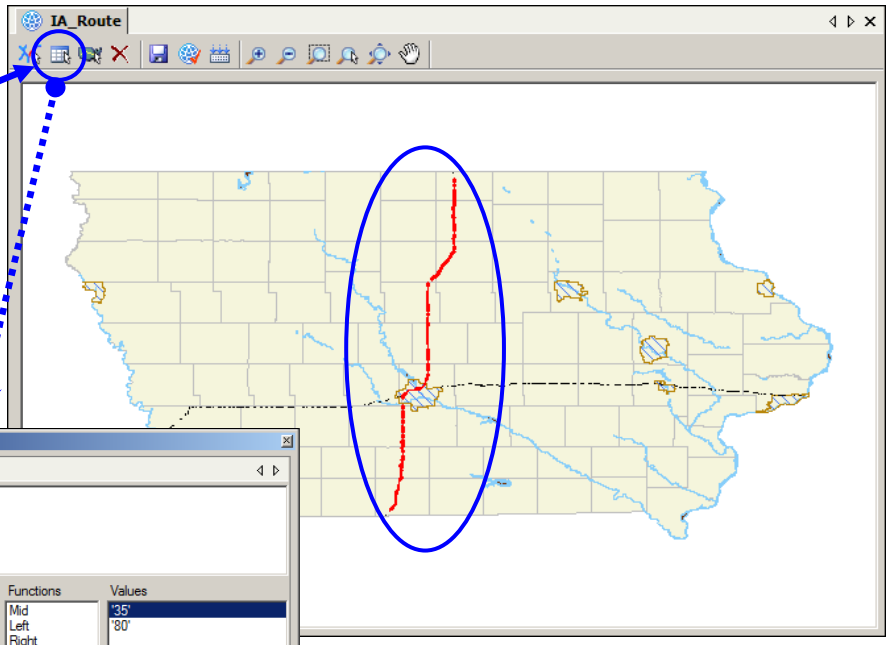
Click the manual selection button to select highway sections by clicking on them directly in the map.

5



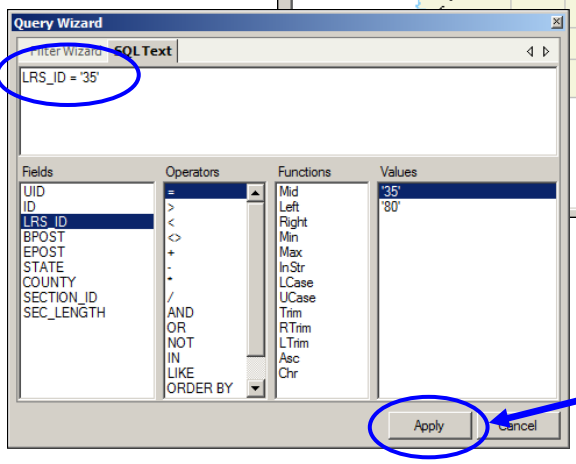
Click the attributes button to select highway sections automatically using their attributes.

6

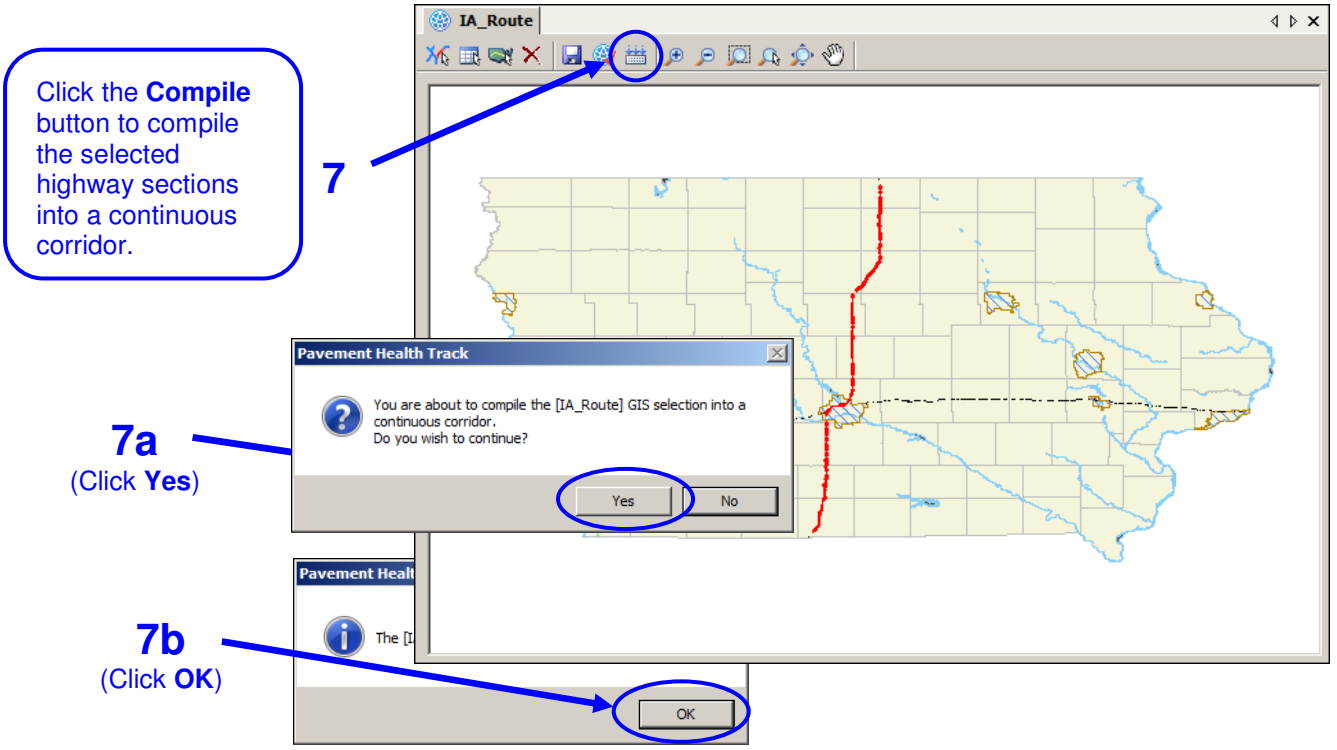


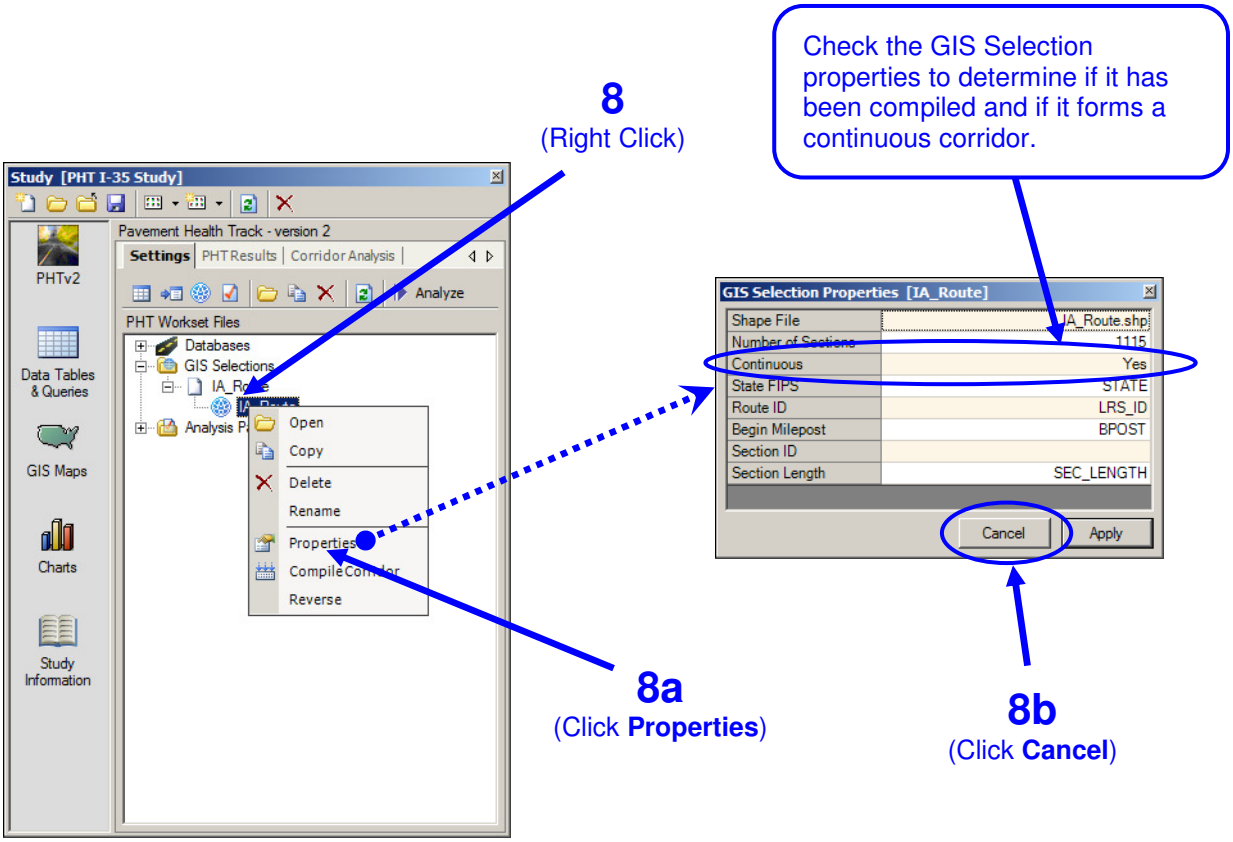
Type "**LRS_ID = '35'**"

6a



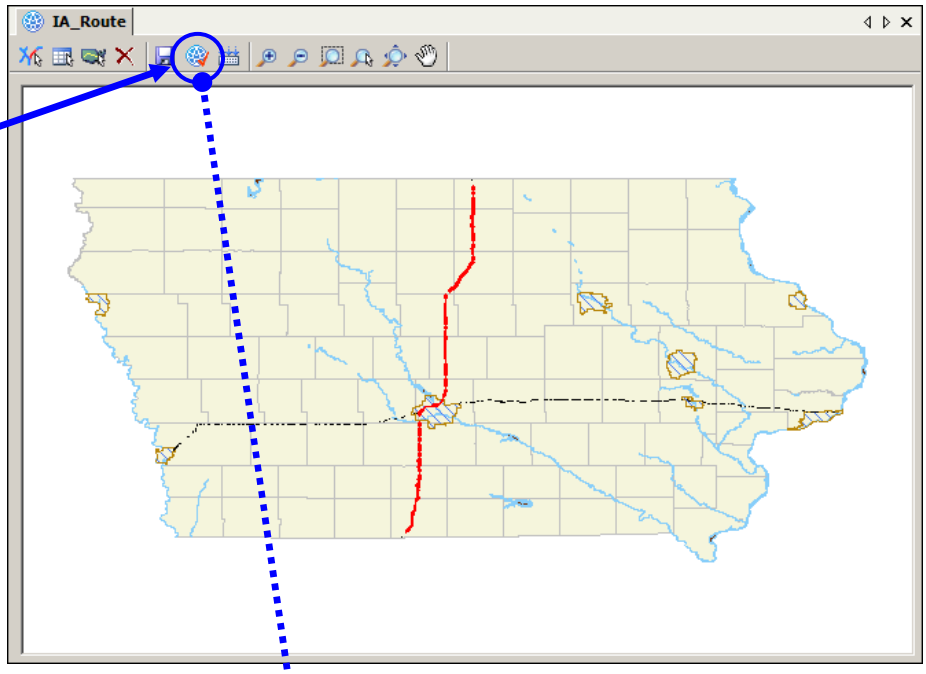
6b
(Click **Apply**)


Click the **Compile** button to compile the selected highway sections into a continuous corridor.
7
IA_Route
Pavement Health Track
You are about to compile the [IA_Route] GIS selection into a continuous corridor.
Do you wish to continue?
Yes
No
7a
(Click **Yes**)
7b
(Click **OK**)
OK


8
(Right Click)
Check the GIS Selection properties to determine if it has been compiled and if it forms a continuous corridor.
Study [PHT I-35 Study]
Pavement Health Track - version 2
Settings
PHT Results
Corridor Analysis
Analyze
PHT Workset Files
Databases
GIS Selections
Open
Copy
Delete
Rename
Properties
Compile Corridor
Reverse
PHTv2
Data Tables & Queries
GIS Maps
Charts
Study Information
GIS Selection Properties [IA_Route]
Shape File
IA_Route.shp
Number of Sections
1115
Continuous
Yes
State FIPS
STATE
Route ID
LRS_ID
Begin Milepost
BPOST
Section ID
Section Length
SEC_LENGTH
Cancel
Apply
8a
(Click **Properties**)
8b
(Click **Cancel**)

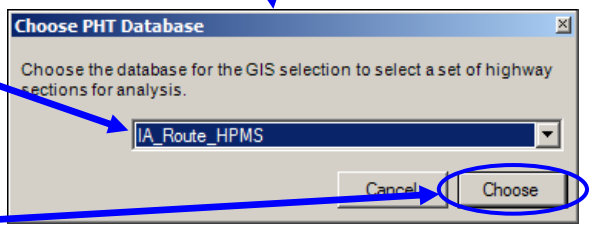
Click the **Highway** button to select a set of highway sections for the PHT analysis based on the highway segments selected in the GIS selection.

9



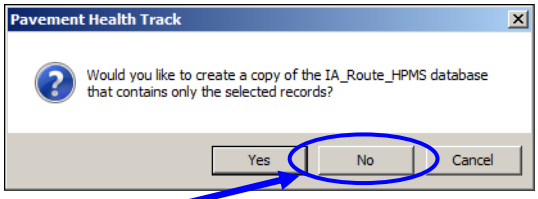
Select the highway data set that you would like to select highway sections from.

9a

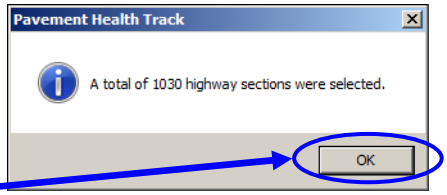


9b
(Click **Choose**)

Optional; you can choose to create a copy of the original highway data set that contains only the selected highway sections.



9c
(Click **No**)



9d
(Click **OK**)

CHAPTER 7 – GENERATING REPORTS

Objective: Become familiar with the report wizard for the PHT tool.

Specifics: The PHT tool provides a report wizard to quickly visualize the PHT analysis results.

Use: The report wizard provides a library of predefined report templates and options to quickly create a variety of charts based on a PHT analysis.

Tasks: 1) Launch the Report Wizard and select the options to create a report.

2) Create a statistical chart and save it to the chart template library.

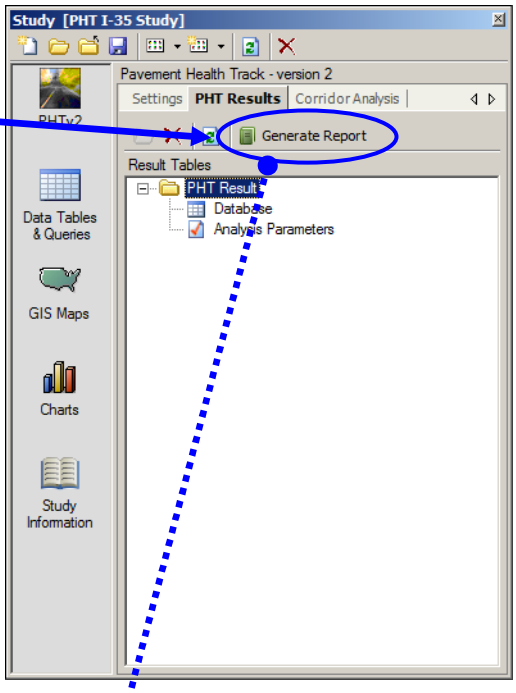
3) Load a chart from the chart template library.

4) Create a thematic GIS Map.

5) Browse and view the reports created by the wizard and managed by the Study.

Click the **Generate Report** button to activate the report wizard.

1

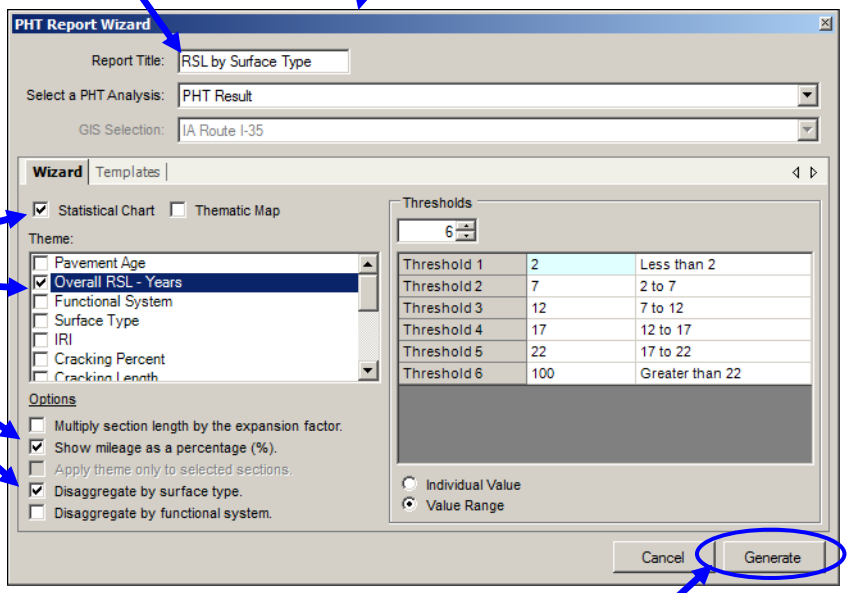


Enter a descriptive name for the report.

1a

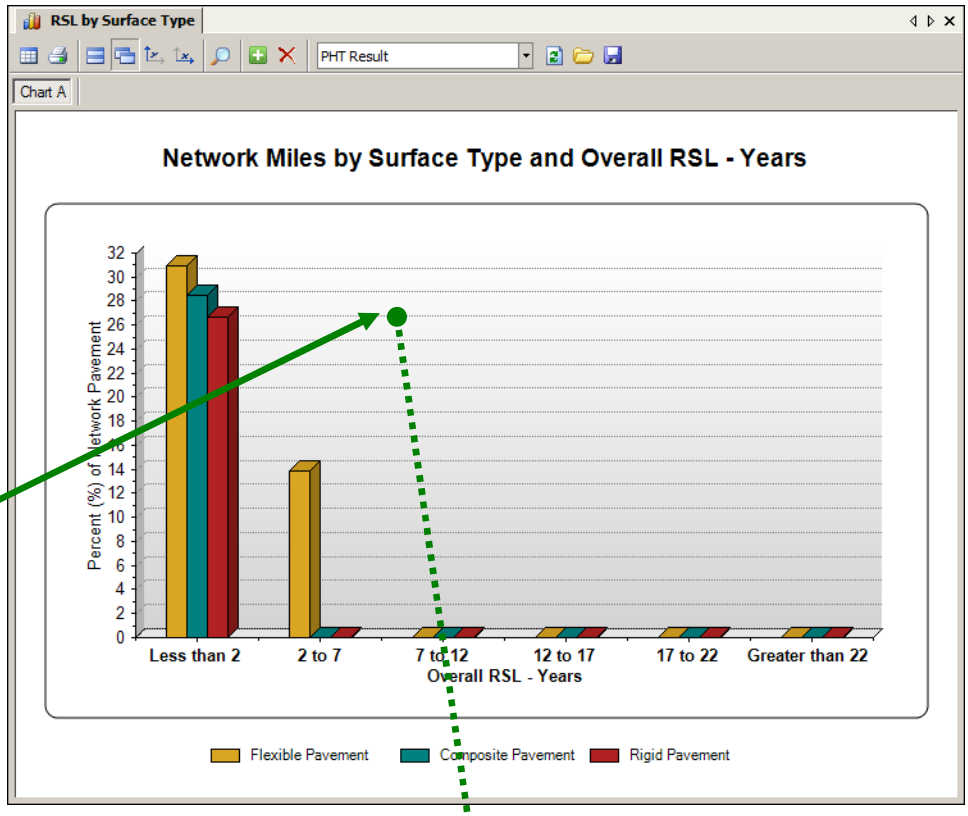
1b

Select the statistical chart with an overall RSL theme and choose the options to show mileage as a percentage and to disaggregate the data by surface type.



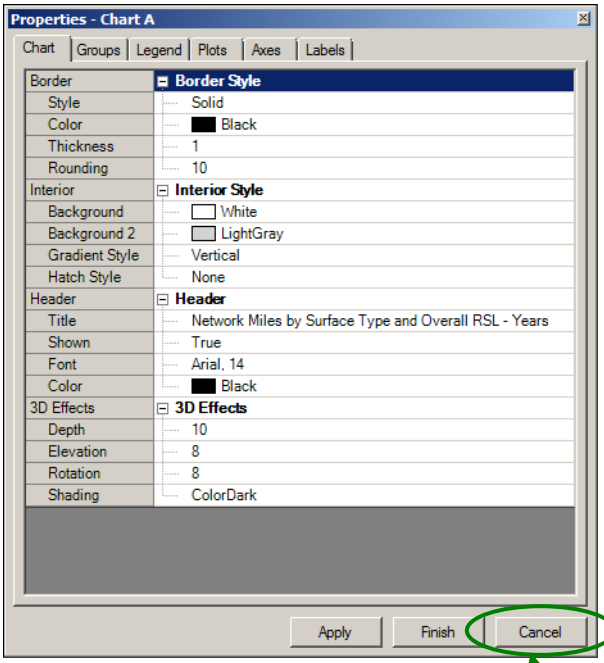
1c
(Click **Generate**)

The data for the report is queried from the selected set of PHT results and displayed in a formatted chart.



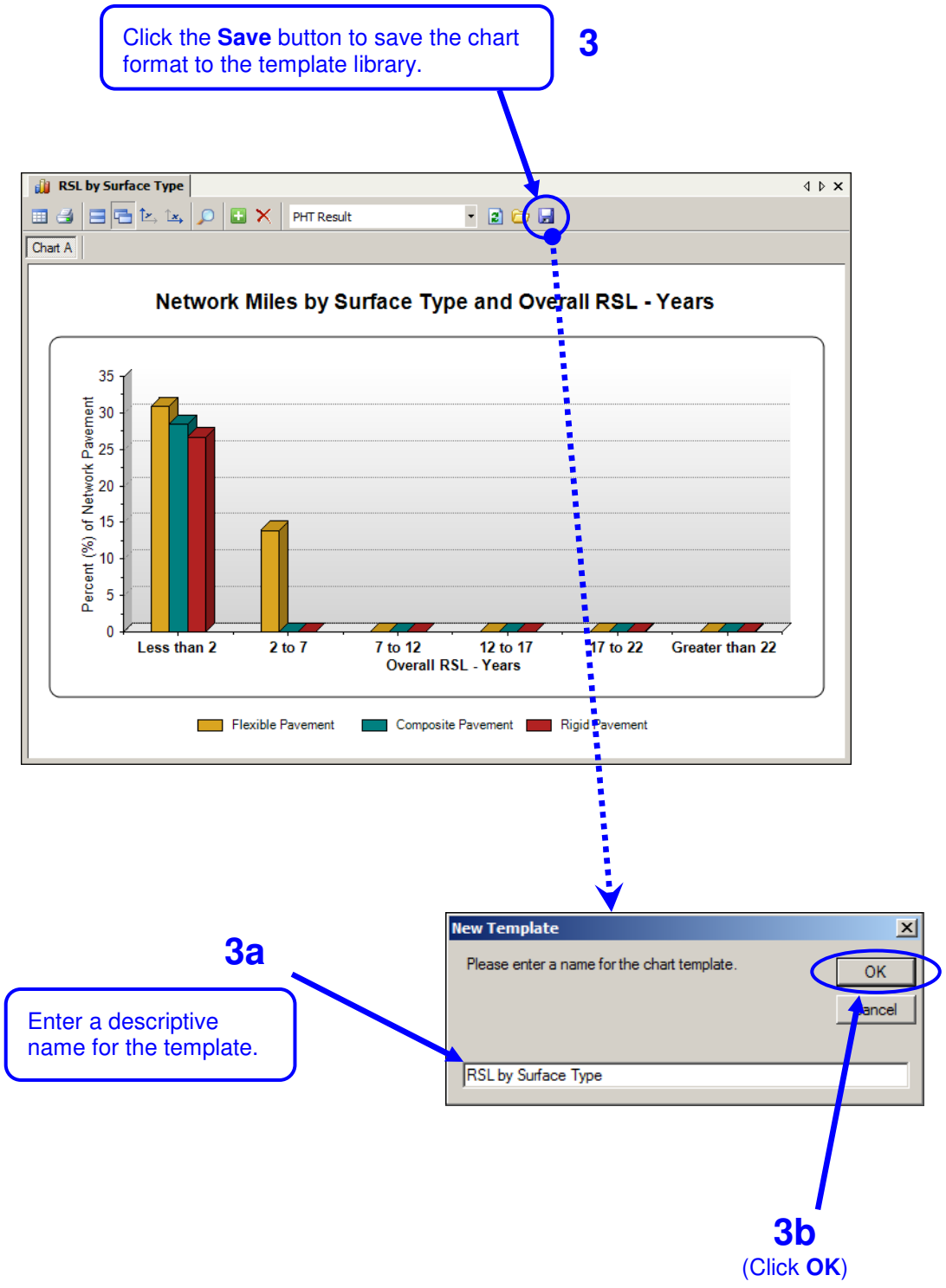
2

Right-Click on the Chart to display its properties window.



The chart has many properties to customize its format and appearance

2a
(Click **Cancel**)

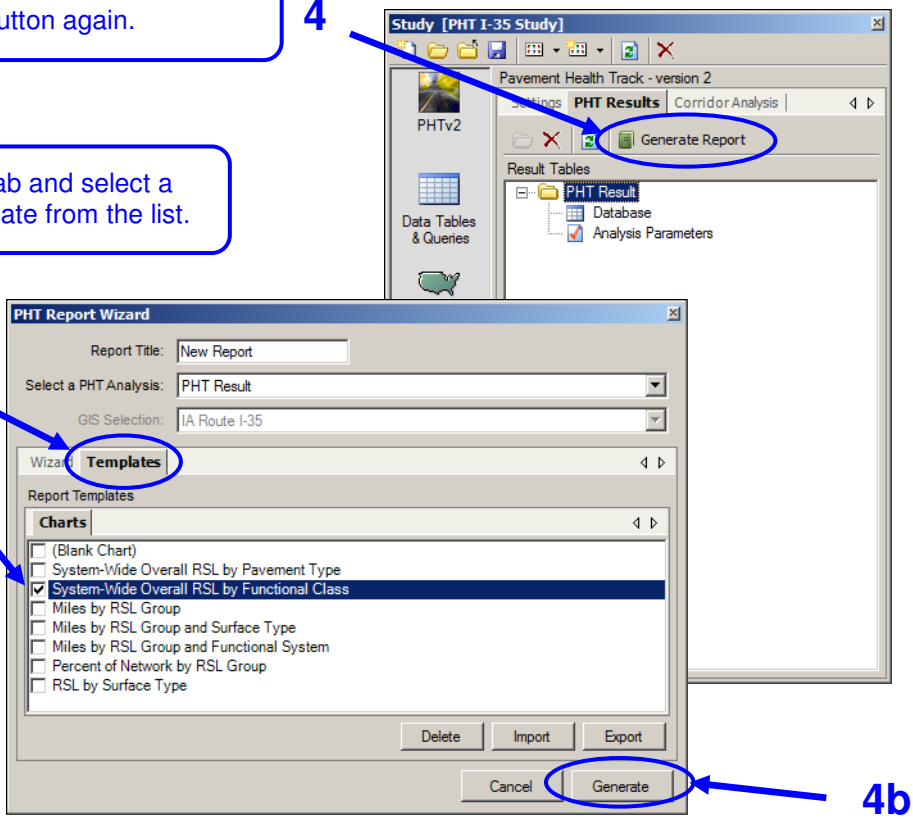

Click the **Save** button to save the chart format to the template library.
3
RSL by Surface Type
PHT Result
Chart A
Network Miles by Surface Type and Overall RSL - Years
Percent (%) of Network Pavement
35
30
25
20
15
10
5
0
Less than 2
2 to 7
7 to 12
12 to 17
17 to 22
Greater than 22
Overall RSL - Years
Flexible Pavement
Composite Pavement
Rigid Pavement
3a
Enter a descriptive name for the template.
New Template
Please enter a name for the chart template.
OK
Cancel
RSL by Surface Type
3b
(Click **OK**)

Return to the Study window and click the **Generate Report** button again.

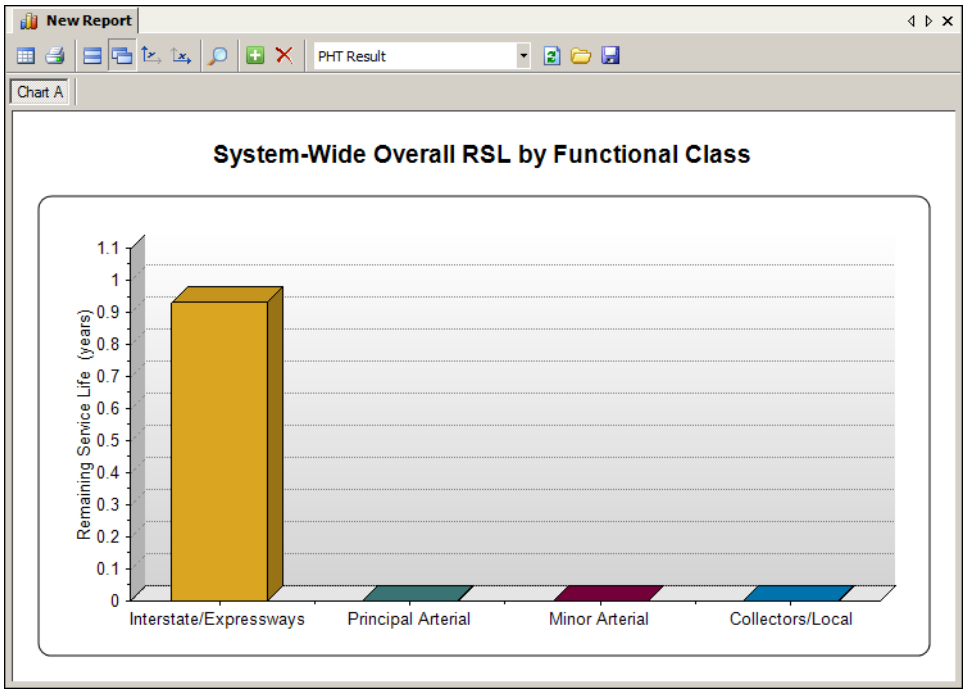
4

Click the **Templates** tab and select a predefined chart template from the list.

4a



4b
(Click **Generate**)



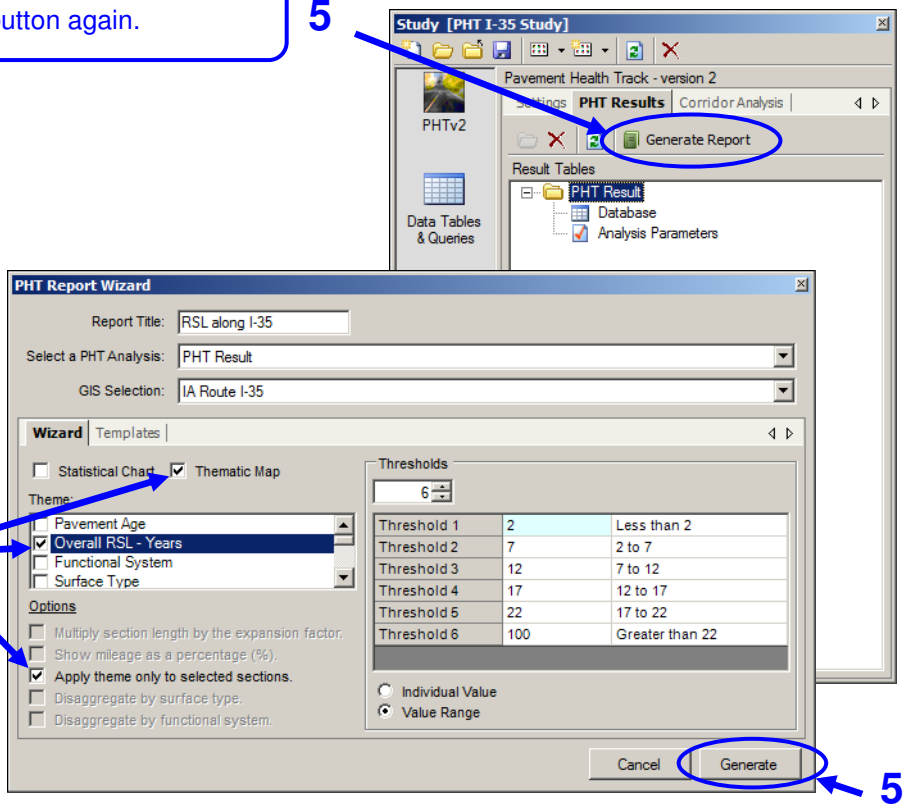
The chart template is loaded and populated with data from the selected PHT result database.

Return to the Study window and click the **Generate Report** button again.

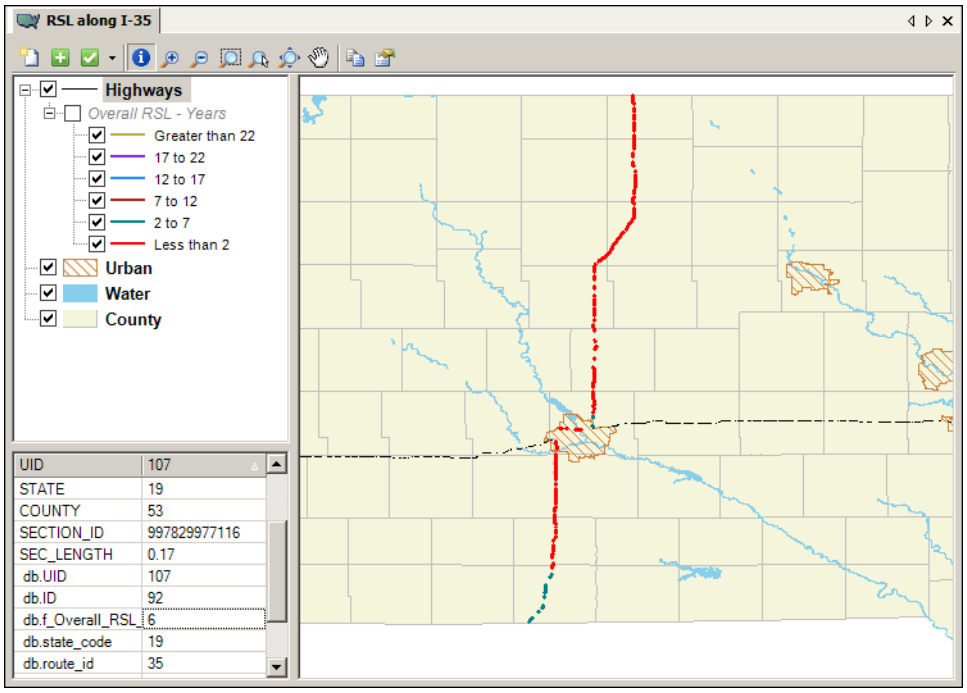
5

Select the thematic map option and choose the overall RSL theme and option to only apply the theme to the highway section included in the GIS selection.

5a

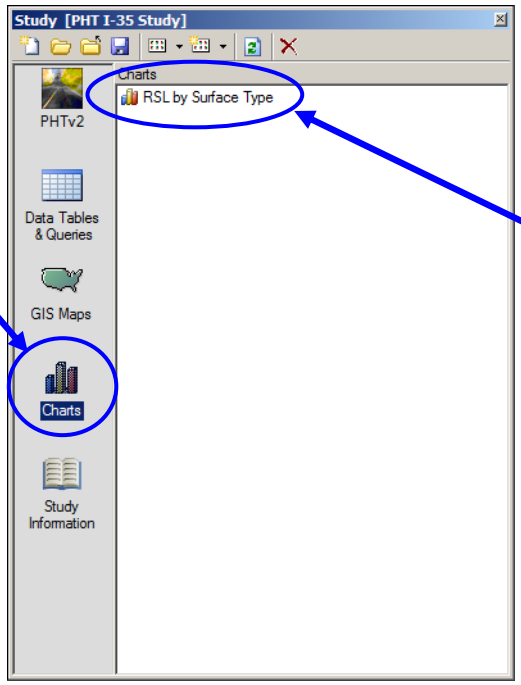


5b
(Click **Generate**)



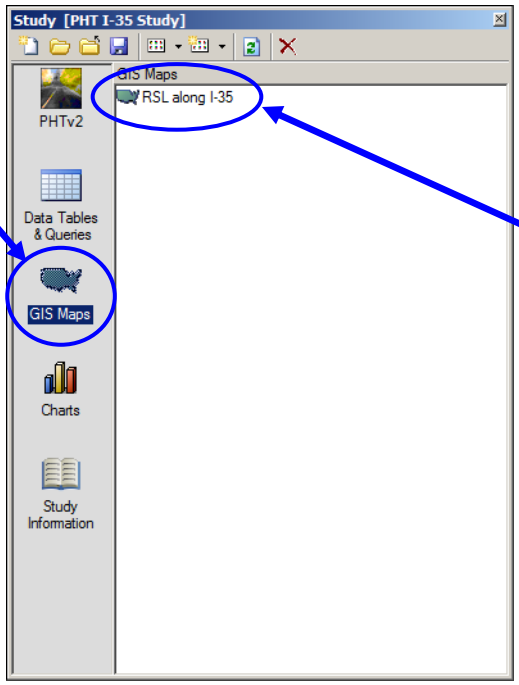
The thematic map is created using the selected PHT analysis result database and GIS selection.

6
(Click **Charts**)



The **Charts** window displays a list of statistical charts created by the report wizard.

7
(Click **Maps**)



The **Maps** window displays a list of GIS maps created by the report wizard.

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CHAPTER 8 – CORRIDOR ANALYSIS

Objective: Become familiar with the PHT corridor analysis feature.

Specifics: The PHT tool provides for evaluating the analysis results for a specific corridor.

Use: The corridor analysis provides a profile along the corridor by virtual milepost where the beginning of the corridor is set to 0. Up to four result data elements can be profiled simultaneously.

Tasks: 1) Create a new corridor profile.

2) Select the associated analysis results and GIS selection.

3) View the corridor profile.

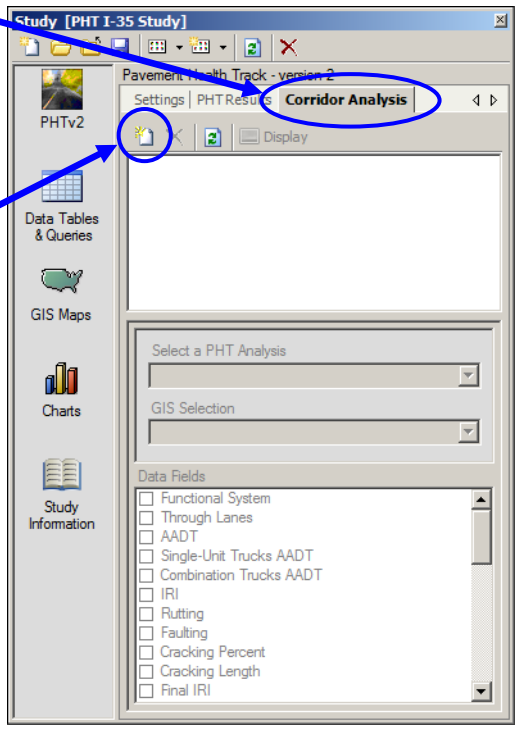
4) Use the zoom controls to zoom into specific areas along the corridor.

Select the **Corridor Analysis** tab in the window.

1

Click the **New Profile** button to create a new corridor profile.

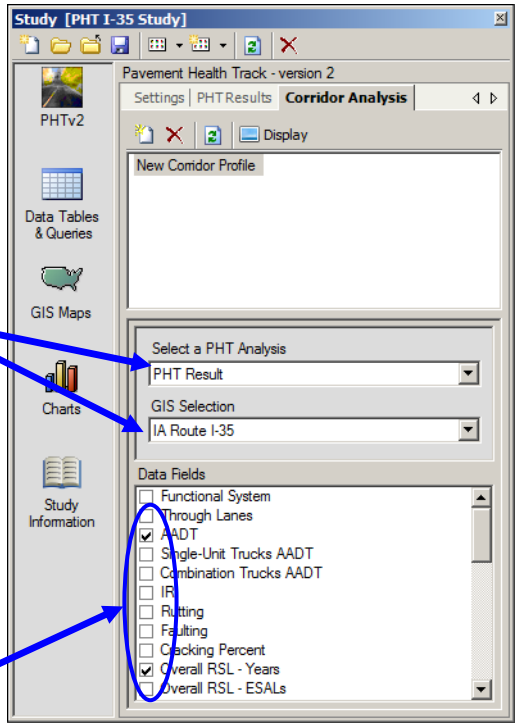
2



Select the PHT analysis results and GIS selection to be associated with the corridor profile.

Note: The GIS selection must be compiled to a continuous corridor to be used with a corridor profile analysis.

3



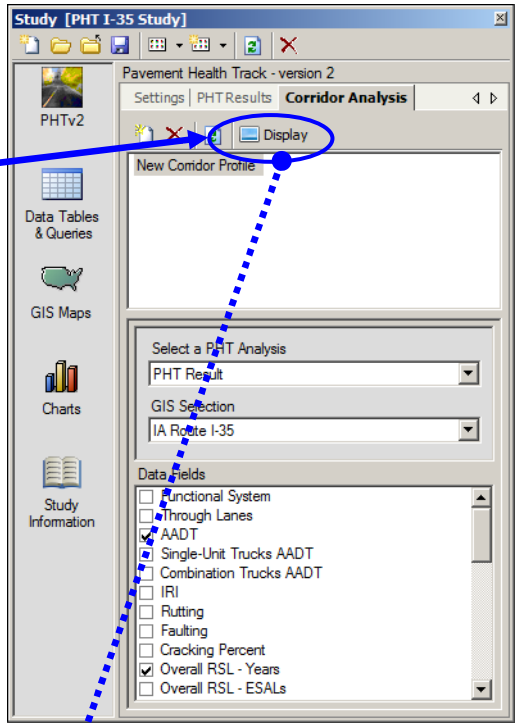
For the data fields select:

- AADT
- Overall RSL (Years)

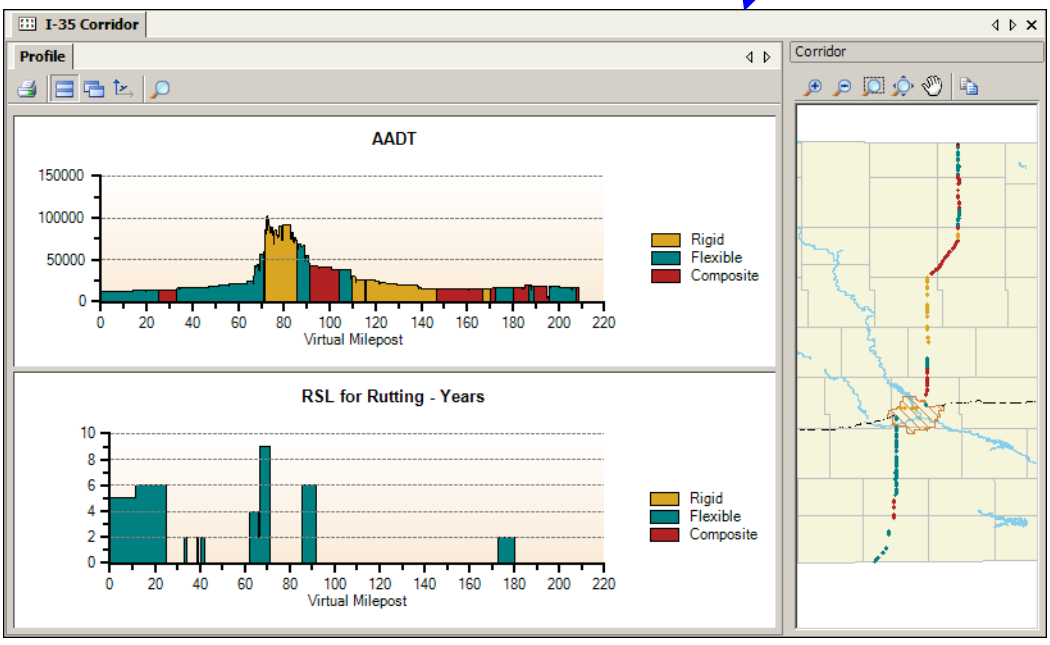
4

Click the **Display** button to display or refresh the corridor profile charts.

5



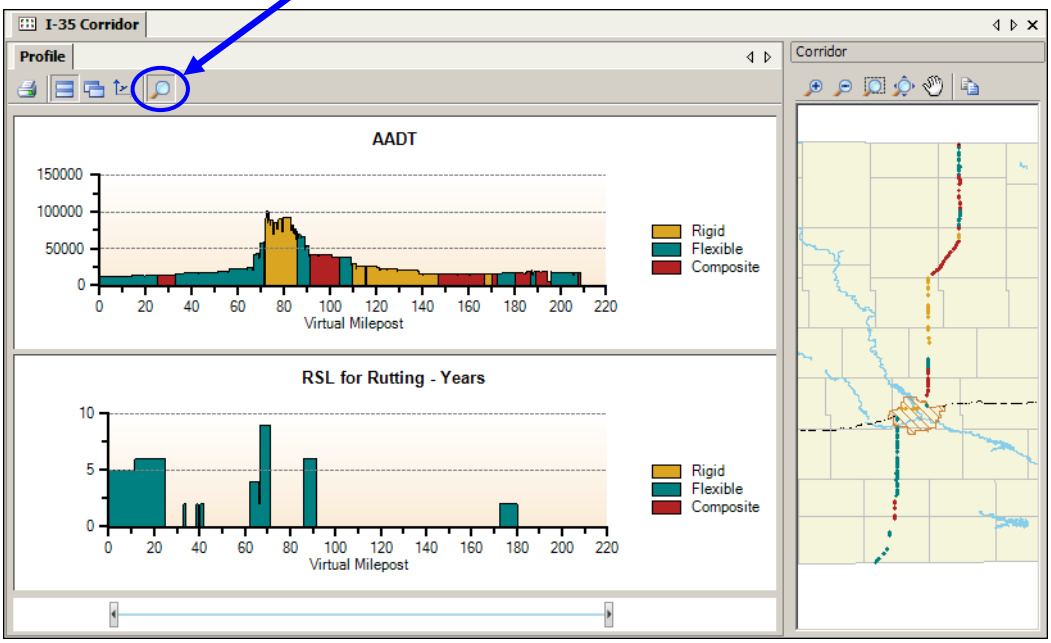
The corridor profile chart displays the values of the selected data fields along the route by virtual milepost beginning at milepost zero.



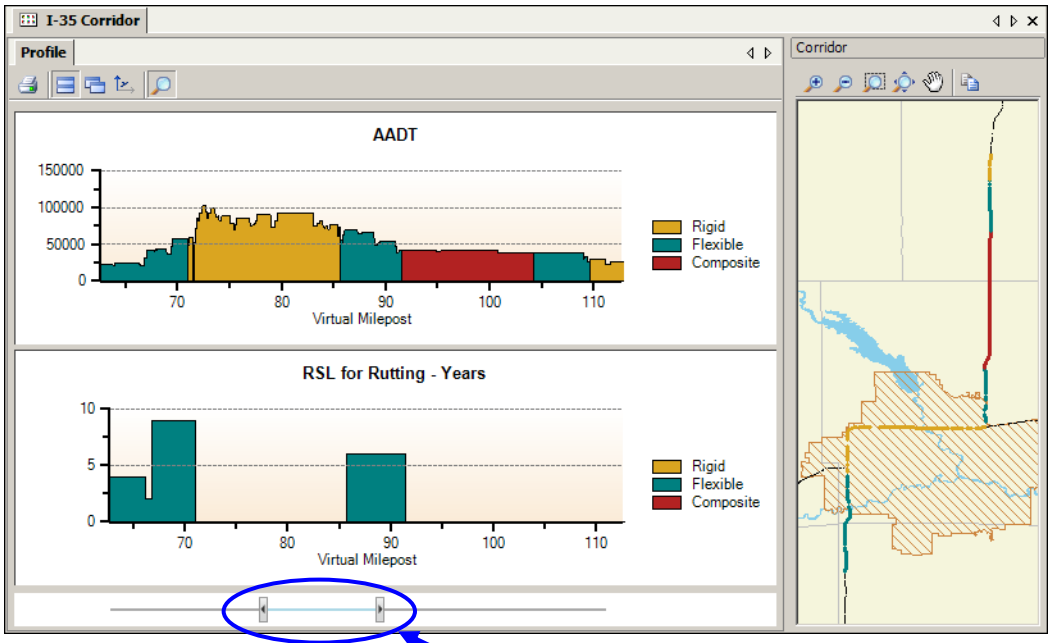
A map window is displayed to provide a geographic reference of the corridor.

6a

(Click the **Zoom** button)



Use the sliders on the zoom bar to zoom in and out of areas along the corridor.



When you zoom into an area along the corridor, the reference map also zooms into the same area.

6b

(Move the Zoom sliders)