

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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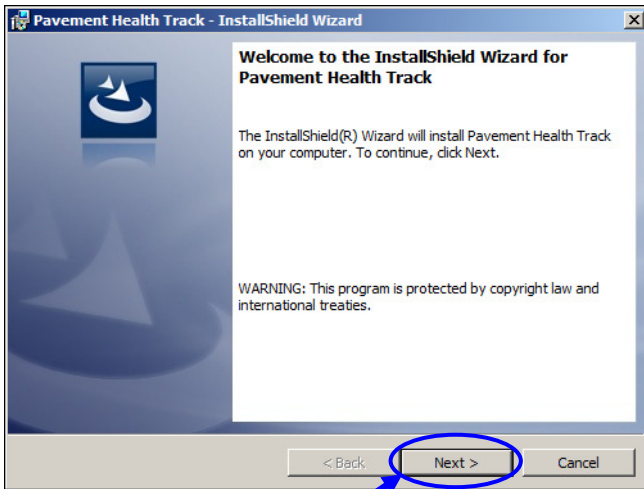
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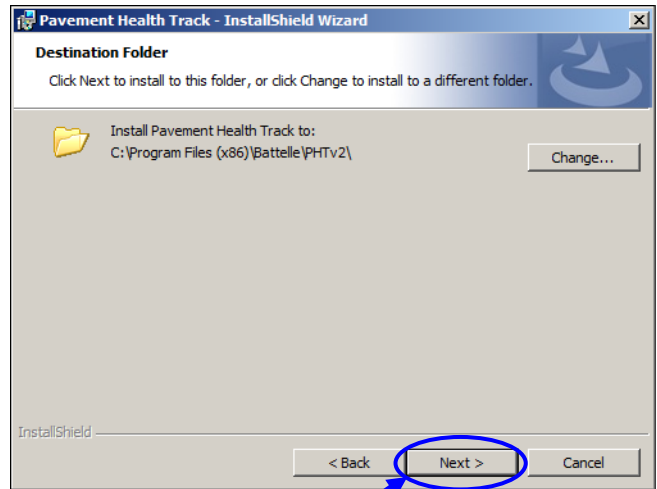
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CHAPTER 1 – SOFTWARE INSTALLATION

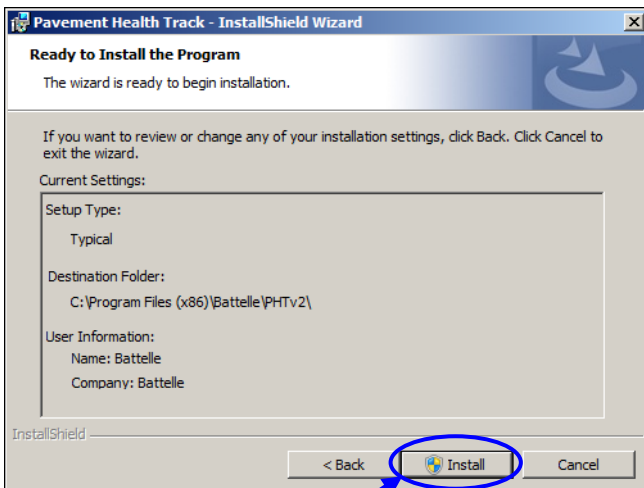
Insert the PHT CD-ROM and follow the directions below. If the CD does not auto-run, open the CD in Windows Explorer and run **setup.exe**.



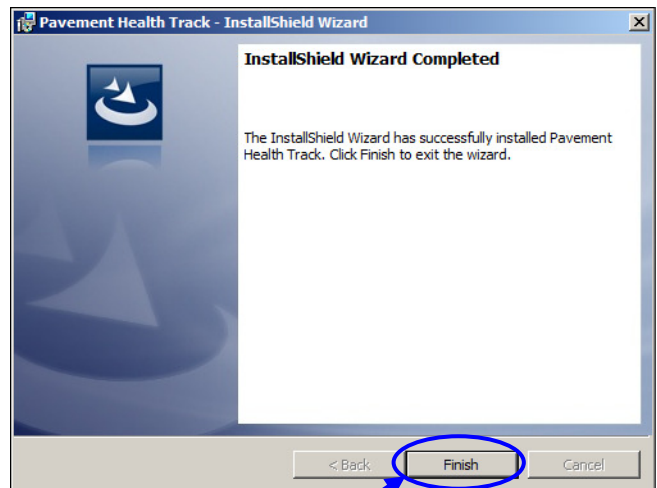
1



2



3



4

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CHAPTER 2 – GETTING STARTED WITH PHT

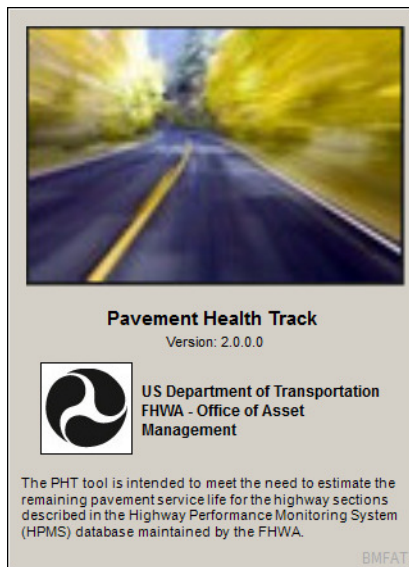
To open up the PHT analysis tool:



Double click the Pavement Health Track icon on the desktop.

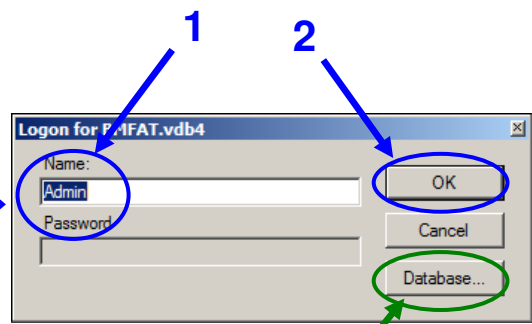
-OR-

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

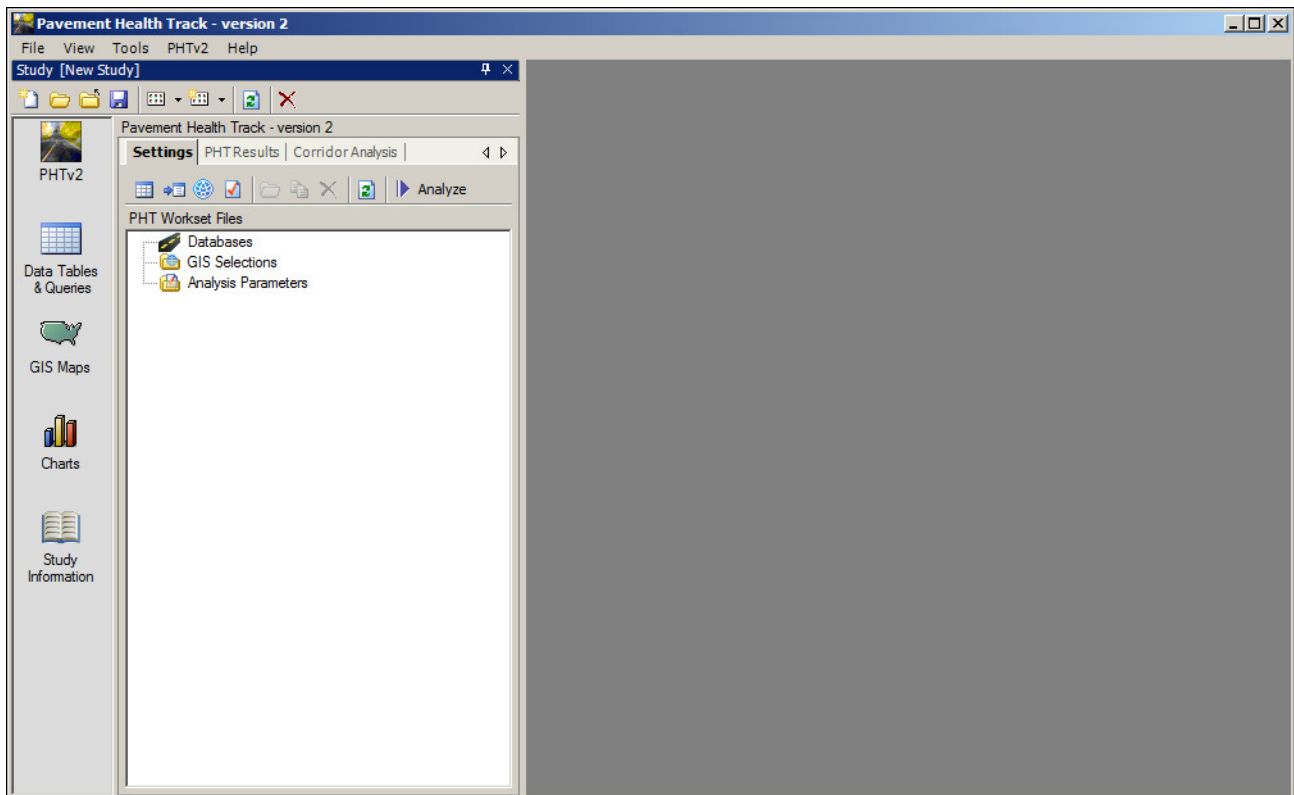
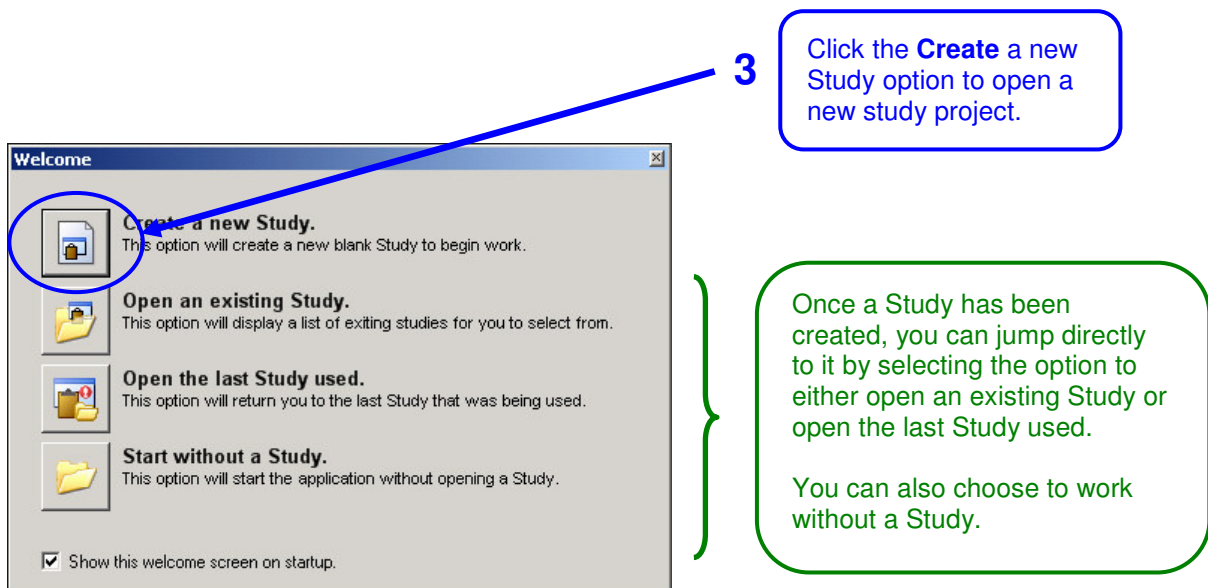


Note: This window will only appear if the application does not have enough information to connect to the database.

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.

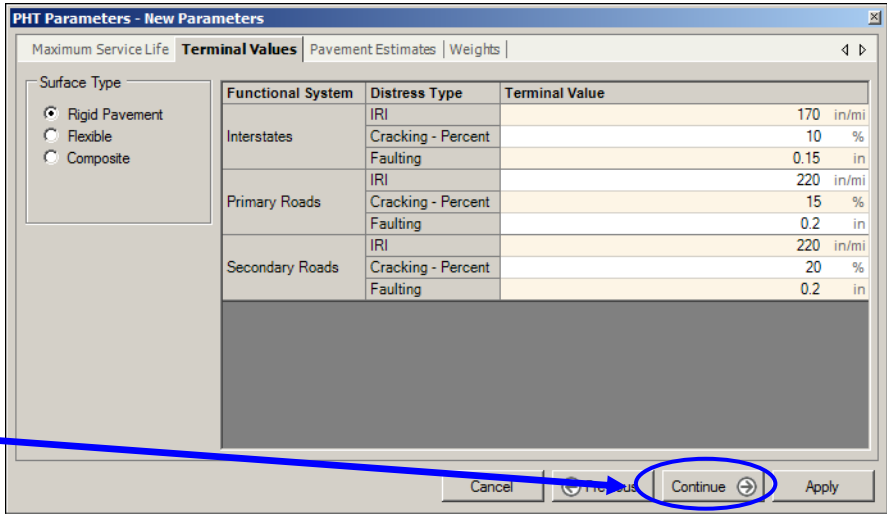
Review and edit the maximum service life for various types of pavement treatments.

Treatment Type	Maximum Service Life (years)
New HMA	20
New PCC	30
Thick AC Overlay of AC Pavement	10
Thin AC Overlay of AC Pavement	6
Thick AC Overlay of PCC Pavement	10
Unbonded PCC Overlay of PCC Pavement	25
Bonded PCC Overlay of PCC Pavement	15
Thin AC Overlay of AC/PCC Pavement	6

4 (Click **Continue**)

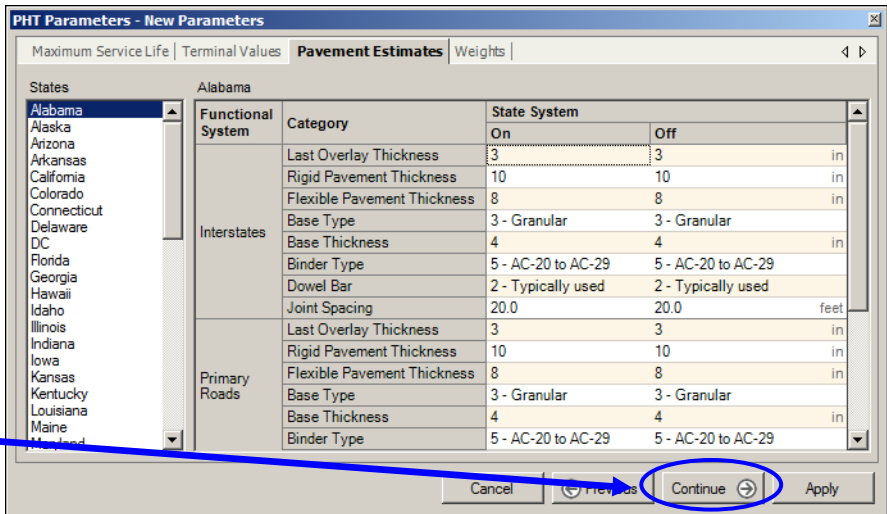
Review and edit the terminal values for various distress types for rigid, flexible and composite pavements.

5
(Click **Continue**)



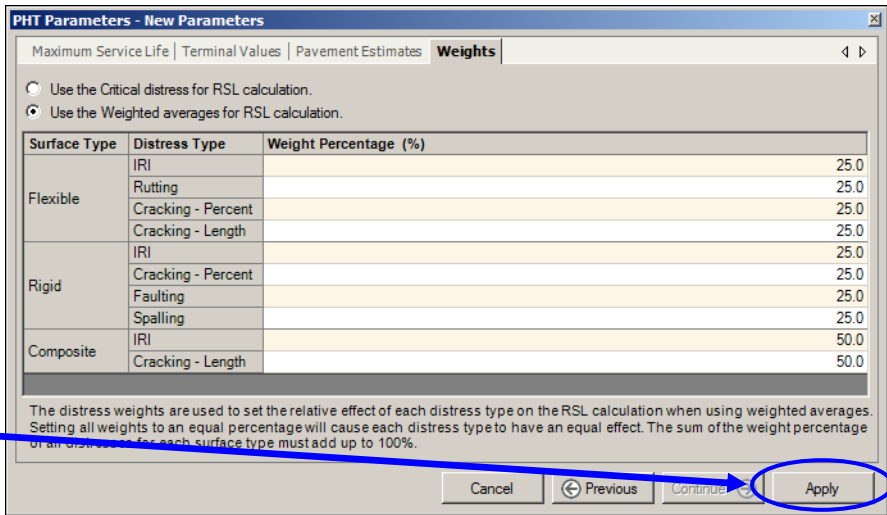
Review and edit pavement estimates that are used when measured data is not available for each individual State.

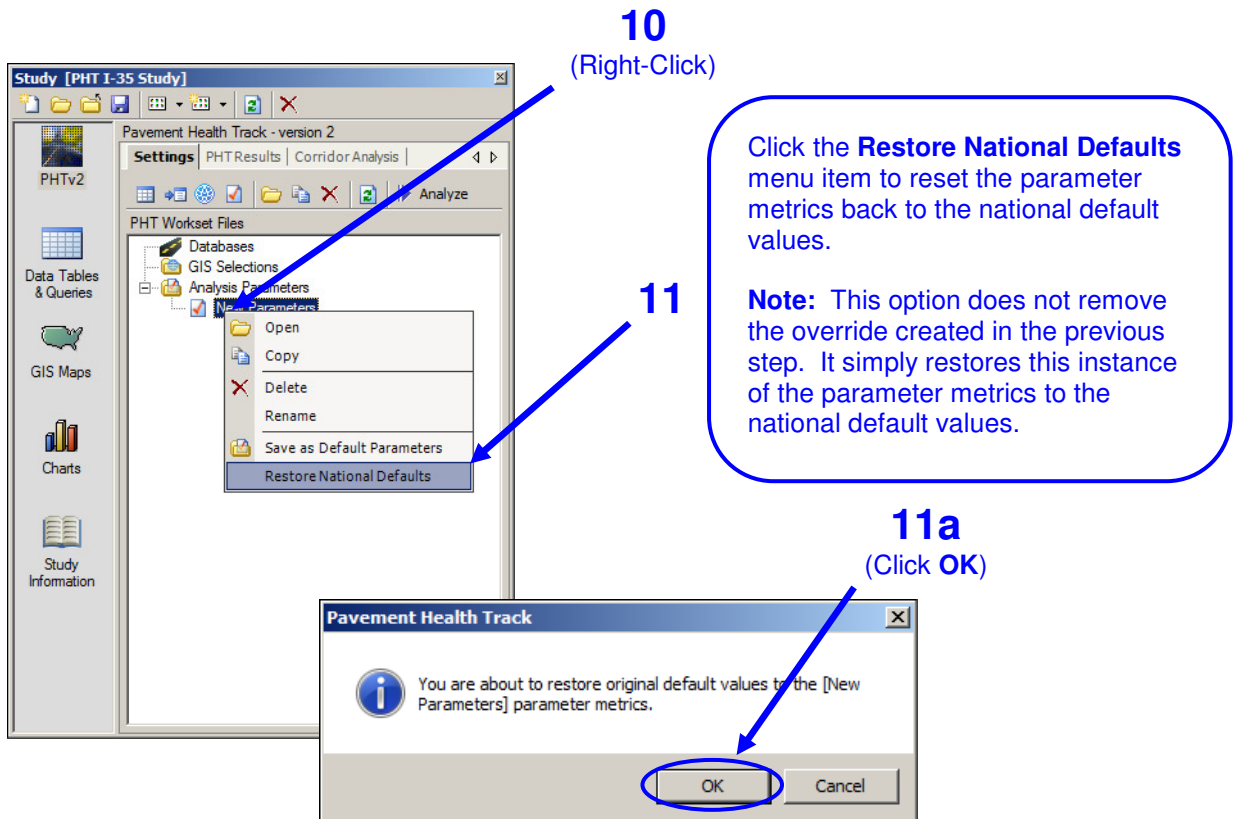
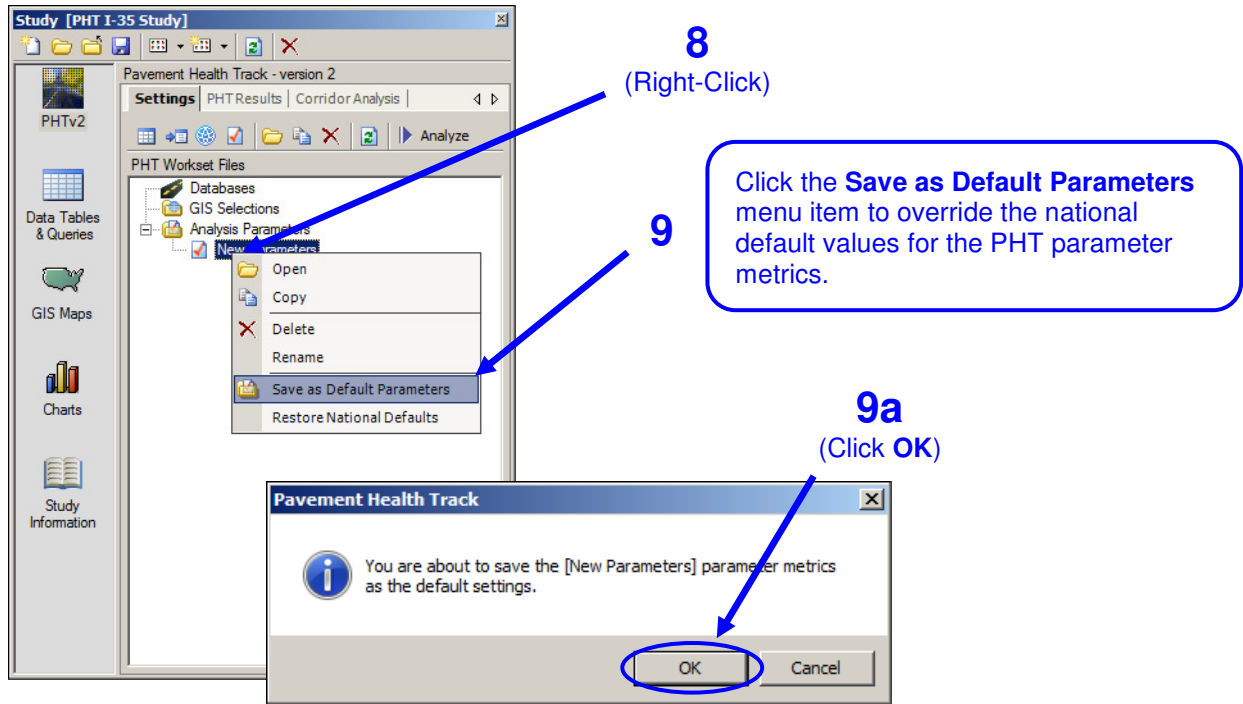
6
(Click **Continue**)



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

7
(Click **Apply**)





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.

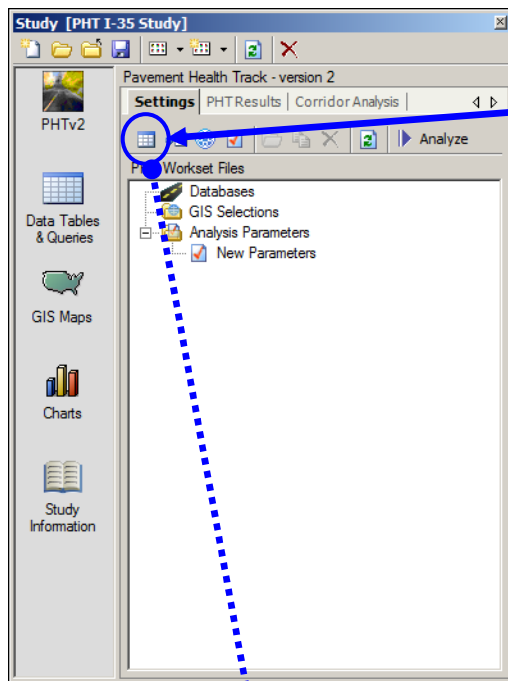
The characteristics include:

- *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.

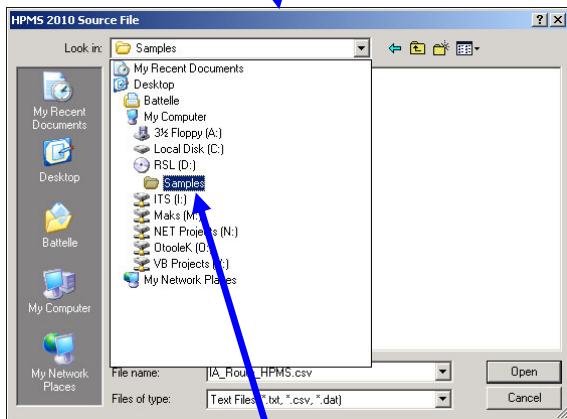
Use: The PHT tool provides very powerful features to allow a user to view and select highway sections for analysis both manually and automatically using SQL queries.

- 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.

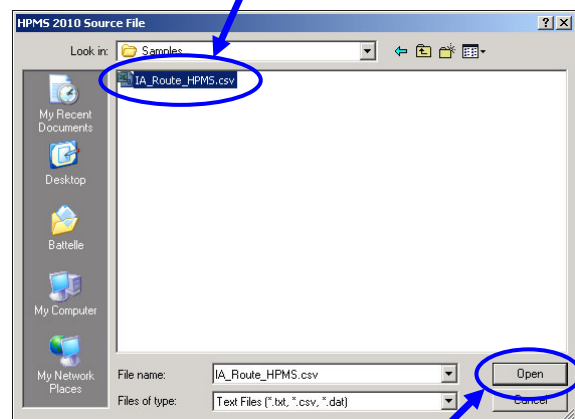


1
Click the **Read HPMS Database** button to select the source file.

Select the **IA_Route_HPMS.csv** file.



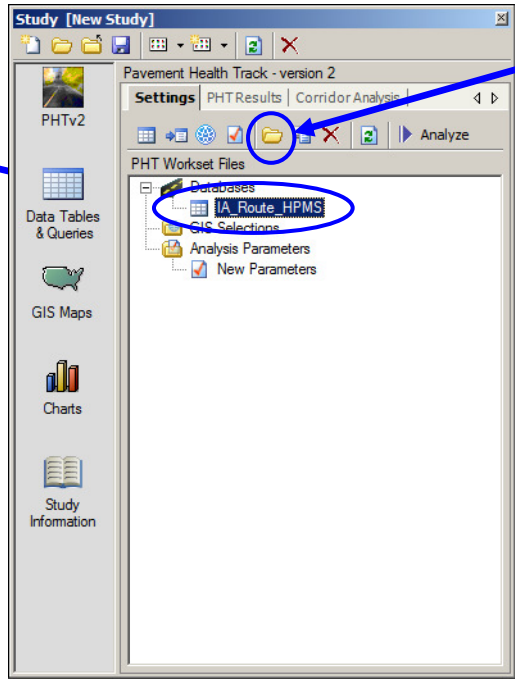
1a
Browse to the **Sample** directory on the PHT installation CD.



1b
1c
(Click **Open**)

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

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.

Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section ID	Length 006	Functional System 007	Urban Code 008
<input checked="" type="checkbox"/>	2007	19	35	0	0.0186		0.0186	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	0.0186	0.0931		0.0745	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	0.0931	0.2732		0.1801	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	0.2732	0.4471		0.1739	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	0.4471	0.503		0.0559	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	0.503	1.2793		0.7763	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.2793	1.3041		0.0248	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.3041	1.4159		0.1118	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.4159	1.43		0.0141	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.478	1.6394		0.1615	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.6394	1.6456		0.0062	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.6456	1.7202		0.0745	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	1.7202	2.012		0.2919	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	2.012	2.2915		0.2794	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	2.2915	2.3		0.0085	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	2.7635	2.9622		0.1987	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	2.9622	3.2416		0.2795	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.2416	3.2478		0.0062	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.2478	3.5397		0.2919	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.5397	3.5459		0.0062	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.5459	3.5832		0.0373	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.5832	3.6639		0.0807	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.6639	3.72		0.0561	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	3.722	3.7943		0.0621	Interstate	0
<input checked="" type="checkbox"/>	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.

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

Record: 1 of 2252 Selected: 2252

Selection Query

Filter Wizard | SQL Text

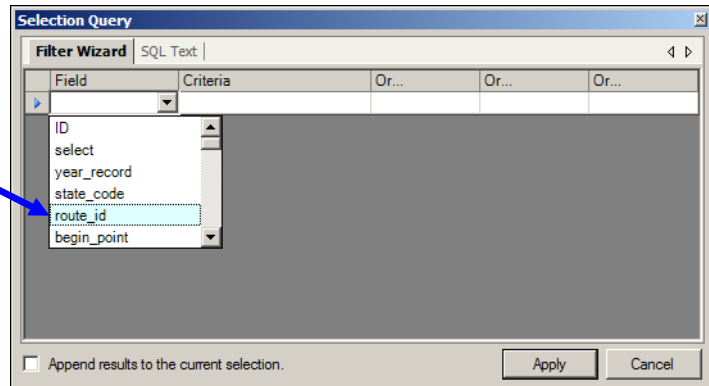
Field	Criteria	Or...	Or...	Or...
(Select Field)				

Append results to the current selection.

Apply Cancel

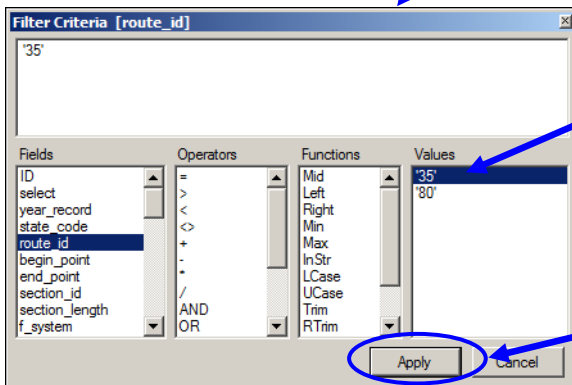
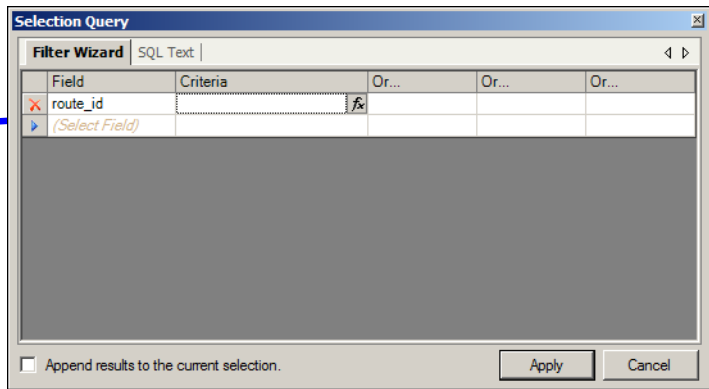
4a

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



4b

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

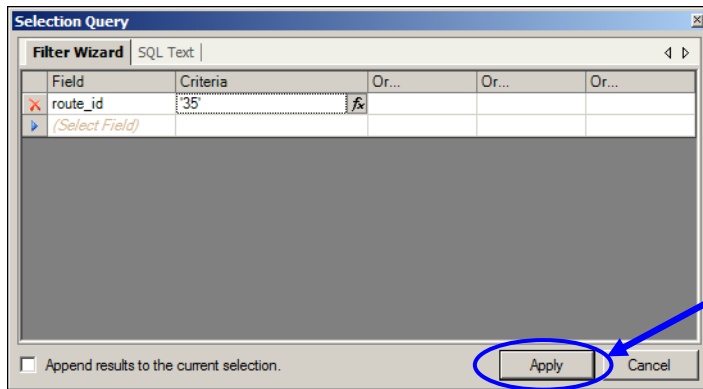


4c

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

4d

(Click **Apply**)



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

Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section ID	Length 006	Functional System 007	Urban Code 008
<input checked="" type="checkbox"/>	2007	19	35	214.3195	214.4499		0.1304	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	214.4499	214.6921		0.2422	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	214.6921	214.9467		0.2546	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	214.9467	215.0834		0.1366	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	215.0834	215.1765		0.0931	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	215.1765	215.6981		0.5216	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	215.6981	216.344		0.6458	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	216.344	216.5551		0.2111	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	216.5551	216.63		0.0749	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	216.9401	217.6916		0.7514	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	217.6916	218.5175		0.8259	Interstate	0
<input type="checkbox"/>	2007	19	80	0	0.1801		0.1801	Interstate	46
<input type="checkbox"/>	2007	19	80	0.1801	0.267		0.0869	Interstate	46
<input type="checkbox"/>	2007	19	80	0.267	0.2981		0.0311	Interstate	46
<input type="checkbox"/>	2007	19	80	0.2981	0.3167		0.0186	Interstate	46
<input type="checkbox"/>	2007	19	80	0.3167	0.4844		0.1677	Interstate	46
<input type="checkbox"/>	2007	19	80	0.4844	0.5713		0.0869	Interstate	46
<input type="checkbox"/>	2007	19	80	0.5713	0.7142		0.1429	Interstate	46
<input type="checkbox"/>	2007	19	80	0.7142	0.7949		0.0807	Interstate	46
<input type="checkbox"/>	2007	19	80	0.7949	0.9253		0.1304	Interstate	46
<input type="checkbox"/>	2007	19	80	0.9253	0.9688		0.0435	Interstate	46
<input type="checkbox"/>	2007	19	80	0.9688	0.97		0.0012	Interstate	46
<input type="checkbox"/>	2007	19	80	1.0122	1.1675		0.1553	Interstate	46
<input type="checkbox"/>	2007	19	80	1.1675	1.2793		0.1118	Interstate	46
<input type="checkbox"/>	2007	19	80	1.2793	1.6519		0.3726	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.

HPMS Validation

A total of 2809 validation errors were found in 2252 records evaluated.

Record: 5 of 2252 Selected: 2252

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.

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
<input checked="" type="checkbox"/>	2007	19	35	22.6976	22.77		0.0724	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	22.7783	23.1198		0.3415	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	23.1198	23.2316		0.1118	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	23.2316	23.44		0.2084	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	23.4428	24.1942		0.7514	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	24.1942	24.2811		0.0869	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	24.2811	24.31		0.0289	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.2871	25.6784		0.3912	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.6784	25.7405		0.0621	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.7405	25.7591		0.0186	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.7591	25.7777		0.0186	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.7777	25.9702		0.1925	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.9702	26		0.0298	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	26.1565	26.2994		0.1428	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	26.2994	26.6968		0.3974	Interstate	0

35 / 25.2871: <Error> (1068.0) Cracking percent is not a valid distress for a composite surface.
35 / 25.2871: <Error> (1073.1) Rigid Pavement Thickness must be provided for a rigid surface.

Record: 140 of 2252 Selected: 1030

Copy List
View
by Highway Section
by Error Code
All Errors

7
(Double-Click)

Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section ID	Length 006	Functional System 007	Urban Code 008
<input checked="" type="checkbox"/>	2007	19	35	22.6976	22.77		0.0724	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	22.7783	23.1198		0.3415	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	23.1198	23.2316		0.1118	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	23.2316	23.44		0.2084	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	23.4428	24.1942		0.7514	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	24.1942	24.2811		0.0869	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	24.2811	24.31		0.0289	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.2871	25.6784		0.3912	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.6784	25.7405		0.0621	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.7405	25.7591		0.0186	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.7591	25.7777		0.0186	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.7777	25.9702		0.1925	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	25.9702	26		0.0298	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	26.1565	26.2994		0.1428	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	26.2994	26.6968		0.3974	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	26.6968	26.9266		0.2298	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	26.9266	27.2992		0.3726	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	27.2992	27.7028		0.4036	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	27.7028	27.7401		0.0373	Interstate	0
<input checked="" type="checkbox"/>	2007	19	35	27.7401	28.1375		0.3974	Interstate	0

35 / 25.2871: <Error> (1068.0) Cracking percent is not a valid distress for a composite surface.
35 / 25.2871: <Error> (1073.1) Rigid Pavement Thickness must be provided for a rigid surface.

Record: 140 of 2252 Selected: 2252

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.

Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Se
<input checked="" type="checkbox"/>	2007	19	35	22.6976	22.77	
<input checked="" type="checkbox"/>	2007	19	35	22.7783	23.1198	
<input checked="" type="checkbox"/>	2007	19	35	23.1198	23.2316	
<input checked="" type="checkbox"/>	2007	19	35	23.2316	23.44	
<input checked="" type="checkbox"/>	2007	19	35	23.4428	24.1942	
<input checked="" type="checkbox"/>	2007	19	35	24.1942	24.2811	
<input checked="" type="checkbox"/>	2007	19	35	24.2811	24.31	
<input checked="" type="checkbox"/>	2007	19	35	25.2871	25.6784	
<input checked="" type="checkbox"/>	2007	19	35	25.6784	25.7405	
<input checked="" type="checkbox"/>	2007	19	35	25.7405	25.7591	
<input checked="" type="checkbox"/>	2007	19	35	25.7591	25.7777	
<input checked="" type="checkbox"/>	2007	19	35	25.7777	25.9702	
<input checked="" type="checkbox"/>	2007	19	35	25.9702	26	
<input checked="" type="checkbox"/>	2007	19	35	26.1565	26.2994	
<input checked="" type="checkbox"/>	2007	19	35	26.2994	26.6968	
<input checked="" type="checkbox"/>	2007	19	35	26.6968	26.9266	
<input checked="" type="checkbox"/>	2007	19	35	26.9266	27.2992	
<input checked="" type="checkbox"/>	2007	19	35	27.2992	27.7028	
<input checked="" type="checkbox"/>	2007	19	35	27.7028	27.7401	
<input checked="" type="checkbox"/>	2007	19	35	27.7401	28.1375	
<input checked="" type="checkbox"/>	2007	19	35	28.1375	28.3114	

35 / 25.2871: <Error> (1068.0) Cracking percent is not a valid distress for a compo
35 / 25.2871: <Error> (1073.1) Rigid Pavement Thickness must be provided for a r

Record: 140 of 2252 Selected: 2252

8
(Click **Summary**)

Select	Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section
<input checked="" type="checkbox"/>	2007	Iowa	35	22.5982	22.6355	
<input checked="" type="checkbox"/>	2007	Iowa	35	22.6355	22.6976	
<input checked="" type="checkbox"/>	2007	Iowa	35	22.6976	22.77	
<input checked="" type="checkbox"/>	2007	Iowa	35	22.7783	23.1198	
<input checked="" type="checkbox"/>	2007	Iowa	35	23.1198	23.2316	
<input checked="" type="checkbox"/>	2007	Iowa	35	23.2316	23.44	
<input checked="" type="checkbox"/>	2007	Iowa	35	23.4428	24.1942	
<input checked="" type="checkbox"/>	2007	Iowa	35	24.1942	24.2811	
<input checked="" type="checkbox"/>	2007	Iowa	35	24.2811	24.31	
<input checked="" type="checkbox"/>	2007	Iowa	35	25.2871	25.6784	
<input checked="" type="checkbox"/>	2007	Iowa	35	25.6784	25.7405	
<input checked="" type="checkbox"/>	2007	Iowa	35	25.7405	25.7591	
<input checked="" type="checkbox"/>	2007	Iowa	35	25.7591	25.7777	
<input checked="" type="checkbox"/>	2007	Iowa	35	25.7777	25.9702	
<input checked="" type="checkbox"/>	2007	Iowa	35	25.9702	26	
<input checked="" type="checkbox"/>	2007	Iowa	35	26.1565	26.2994	
<input checked="" type="checkbox"/>	2007	Iowa	35	26.2994	26.6968	
<input checked="" type="checkbox"/>	2007	Iowa	35	26.6968	26.9266	
<input checked="" type="checkbox"/>	2007	Iowa	35	26.9266	27.2992	
<input checked="" type="checkbox"/>	2007	Iowa	35	27.2992	27.7028	
<input checked="" type="checkbox"/>	2007	Iowa	35	27.7028	27.7401	
<input checked="" type="checkbox"/>	2007	Iowa	35	27.7401	28.1375	
<input checked="" type="checkbox"/>	2007	Iowa	35	28.1375	28.3114	
<input checked="" type="checkbox"/>	2007	Iowa	35	28.3114	28.36	
<input checked="" type="checkbox"/>	2007	Iowa	35	28.9945	29.1001	

Record: 140 of 2252 Selected: 1030

9a

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

9b
(Click **Refresh**)

Deficient Percent (%)	
Service Life	32
IRI	4
Rutting	0
Faulting	30
Cracking - Length	0
Cracking - Percent	8

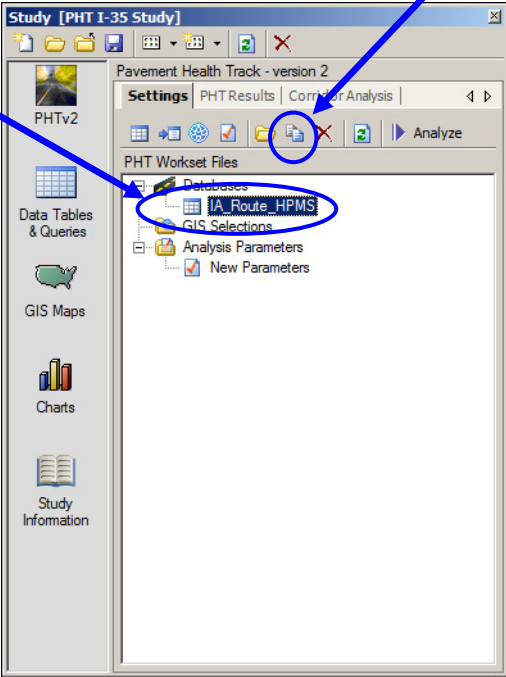
Rigid	Minimum	Maximum	Average
IRI	72	128	100
Faulting	-1	0.354	0.174
Cracking - Percent	0	0	0
Surface Age	0	15	4.4

Flexible	Minimum	Maximum	Average
IRI	39	191	90
Rutting	0.059	0.453	0.188
Cracking - Length	0	986	87
Cracking - Percent	0	51	1
Surface Age	1	20	9.3

Composite	Minimum	Maximum	Average
IRI	39	134	84
Cracking - Length	2	1340	177
Surface Age	0	21	11.1

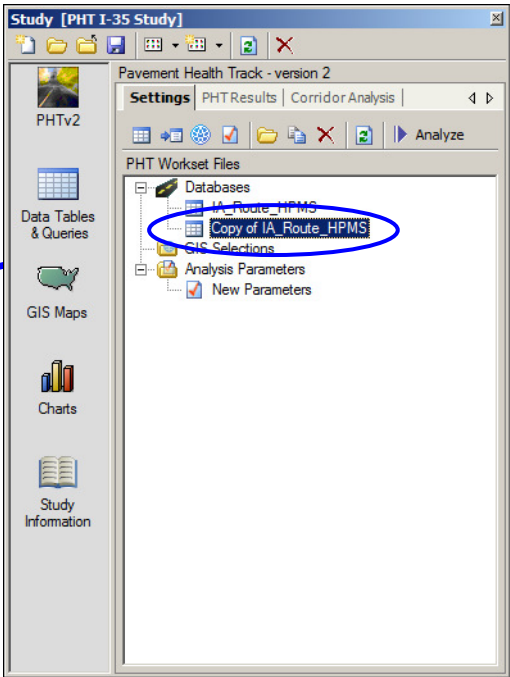
The summary window summarizes the entire data set and shows the percent of deficient highway sections and the minimum, maximum and average distress values for each pavement type.

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



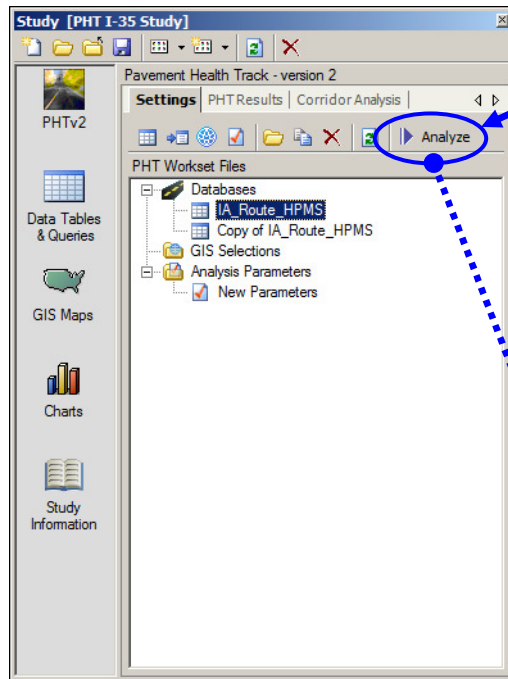
11 Click the **Copy** button to create a copy of the selected highway data set.

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.



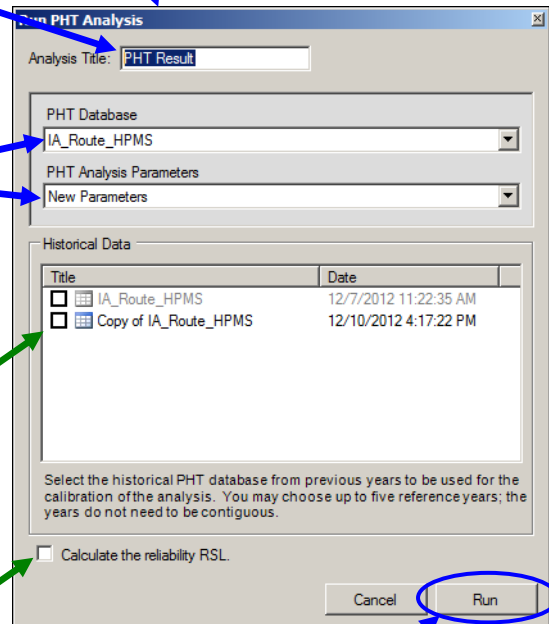
1 Click the **Analyze** button to launch the PHT analysis run wizard.

2 Enter a descriptive name for the analysis.

3 Select the highway data and analysis parameters to be used in the analysis.
Note: Only Route 35 highway sections are selected. (Chapter 4)

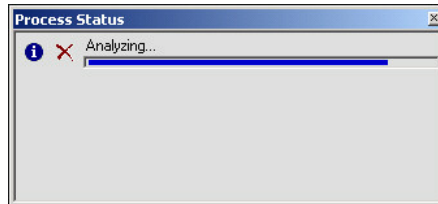
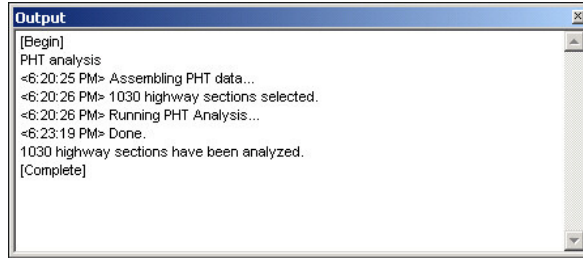
4 Optional; Select historical sets of highway data to be used for the calibration of the analysis. You may choose up to five reference years; the years do not need to be contiguous.

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

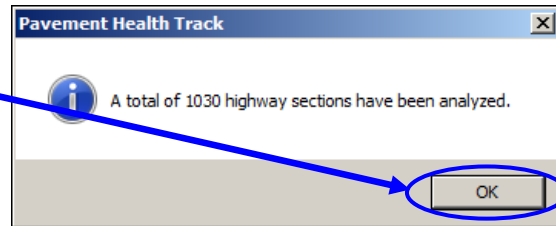


6 (Click **Run**)

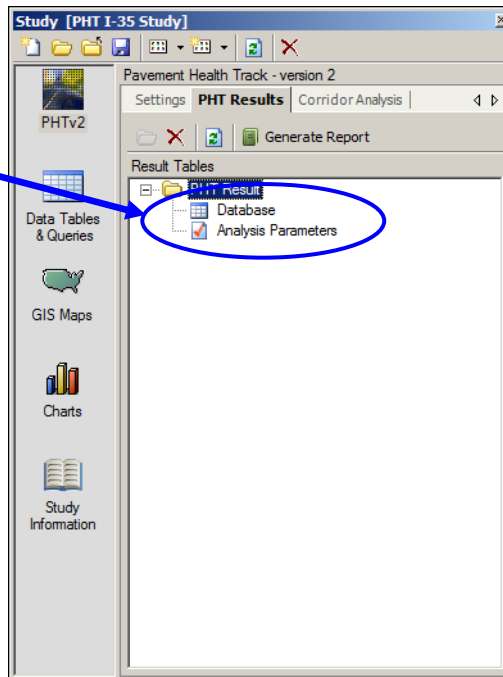
During the run of the analysis, status and progress information is displayed to the user.

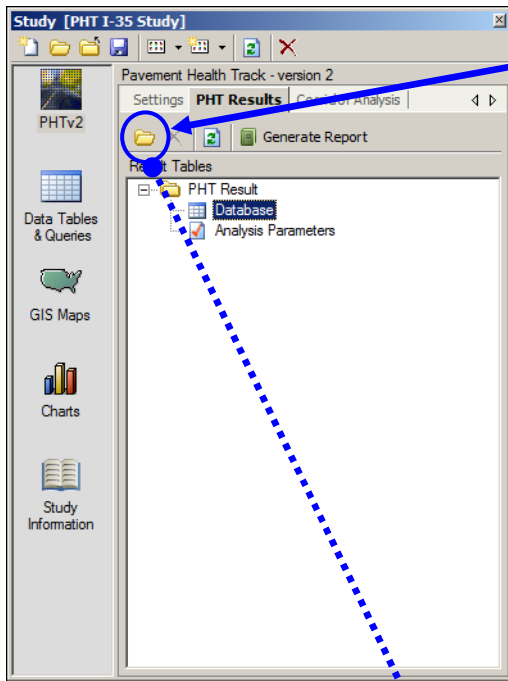


6a
(Click OK)



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.

PHT Result		Year 001	State 002	Route ID 003	Begin Milepost 004	End Milepost 005	Section ID	Length 006
Final IRI	158.563 in/mi	2007	19	35	62.1559	62.2		0.0441
Final Rutting	0.4037 in	2007	19	35	63.0129	63.9878		0.975
Final Cracking - Percent	2.4894 %	2007	19	35	63.9878	64.4722		0.4844
Final Cracking - Length	178.1422 ft/mi	2007	19	35	64.4722	64.6275		0.1553
Final Faulting	in	2007	19	35	64.6275	64.7206		0.0931
RSL for IRI	4 years	2007	19	35	64.7206	64.733		0.0124
RSL for Rutting	2 years	2007	19	35	64.733	64.7641		0.0311
RSL for Cracking - Percent	9 years	2007	19	35	64.7641	64.7951		0.031
RSL for Cracking - Length	9 years	2007	19	35	64.7951	64.8572		0.0621
RSL for Faulting	years	2007	19	35	64.8572	65.0001		0.1428
Overall RSL	2 years	2007	19	35	65.0001	65.1367		0.1366
Reliability RSL	years	2007	19	35	65.1367	65.1926		0.0559
		2007	19	35	65.1926	65.2423		0.0497
		2007	19	35	65.2423	65.2733		0.031
		2007	19	35	65.2733	65.2795		0.0062
		2007	19	35	65.2795	65.3416		0.0621
		2007	19	35	65.3416	65.9937		0.6521
		2007	19	35	65.9937	66.9811		0.9874
		2007	19	35	66.9811	67.06		0.0789
		2007	19	35	67.3164	67.5151		0.1987
		2007	19	35	67.5151	67.5586		0.0435
		2007	19	35	67.5586	67.5772		0.0186
		2007	19	35	67.5772	67.658		0.0807
		2007	19	35	67.658	67.838		0.1801
		2007	19	35	67.838	67.89		0.052
		2007	19	35	67.8939	67.956		0.0621
		2007	19	35	67.956	68.0554		0.0994
		2007	19	35	68.0554	68.1796		0.1242

Summary

General Information	
State	19
Route	35
Milepost	64.4722
Length	0.1553
Classification	Interstate
Pavement Type	Flexible
Maximum Service Life	10 years
Surface Age	1 years

Remaining Service Life	
Years	2
ESALS	1807659
Method	Critical

Distress at End-of-Service	
IRI	158.562973
Rutting	0.4037474 (deficient)
Faulting	
Cracking - Length	178.1422
Cracking - Percent	2.48938227

RSL by Distress		
	Years	ESALS
IRI	4	3725470
Rutting	2	1807659
Faulting		
Cracking - Length	9	9001956
Cracking - Percent	9	9001956

Notes

The pavement is a thick asphalt overlay over existing 4 inch thick asphalt-concrete on a 4 inch thick bituminous base.

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.

Log

```

<Info> Record Index: 228
<Info> ID = 228
<Info> YearRecod = 2007
<Info> StateCode = 19
<Info> RouteID = 35
<Info> BeginPoint = 39.2845
<Info> EndPoint = 39.2969
<Info> SectionLength = 0.0124
<Info> Fsystem = 1
<Info> FacilityType = 2
<Info> SpeedLimit = 70
<Info> ThoughLane = 4
<Info> AADT = 16600
<Info> AADTSingle = 498
<Info> AADTComboation = 4316
<Info> FutureAADT = 27200
<Info> LaneWidth = 12
<Info> ShoulderType = 1
<Info> IRI = 85
<Info> PSR = 3.7
<Info> SurfaceType = 6
<Info> YearLastConstruction = 1960
<Info> LastOverlayThickness = 2.01
<Info> ThicknessRigid = -1
<Info> ThicknessFlexible = 9
<Info> BaseType = 4
<Info> BseThickness = 4.02
<Info> ClimateZone = 1
<Info> SoilType = 1
<Info> Countycode = 39
<Info> FutureAADTYear = 2027
<Info> RUCode = 3
<Info> YearLastImproved = 1999
    
```

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.

PHT Result		Year	State	Route ID	Begin Milepost	End Milepost	Section ID
Final IRI	89.3817 in/mi	2007	19	35	38.3157	38.3343	
Final Rutting	0.3161 in	2007	19	35	38.3343	38.5393	
Final Cracking - Percent	0 %	2007	19	35	38.5393	38.5517	
Final Cracking - Length	0 ft/mi	2007	19	35	38.5517	38.6448	
Final Faulting	in	2007	19	35	38.6448	38.7442	
RSL for IRI	2 years	2007	19	35	38.7442	38.7566	
RSL for Rutting	2 years	2007	19	35	38.7566	38.7877	
RSL for Cracking - Percent	2 years	2007	19	35	38.7877	38.8001	
RSL for Cracking - Length	2 years	2007	19	35	38.8001	38.85	
RSL for Faulting	years	2007	19	35	39.2658	39.2845	
Overall RSL	2 years	2007	19	35	39.2845	39.2969	
Reliability RSL	years	2007	19	35	39.2969	39.3093	
Maintenance Option	Rehabilitation	2007	19	35	39.3093	39.7067	
Service Life Extension	10	2007	19	35	39.7067	39.9862	
Maintenance Cost	\$ 4,563	2007	19	35	39.9862	40	
Overall Benefit	\$ 12,558	2007	19	35	40.0545	40.7562	
Benefit/Cost Ratio	2.75	2007	19	35	40.7562	41	
Revised IRI	50	2007	19	35	41.5635	41.5759	
Revised Rutting	0	2007	19	35	41.5759	41.7809	
Revised Cracking - Percent	0	2007	19	35	41.7809	42.8117	
Revised Cracking - Length	0	2007	19	35	42.8117	42.85	
Revised Faulting		2007	19	35	42.9173	42.9546	
		2007	19	35	42.9546	43.5694	
		2007	19	35	43.5694	43.6004	

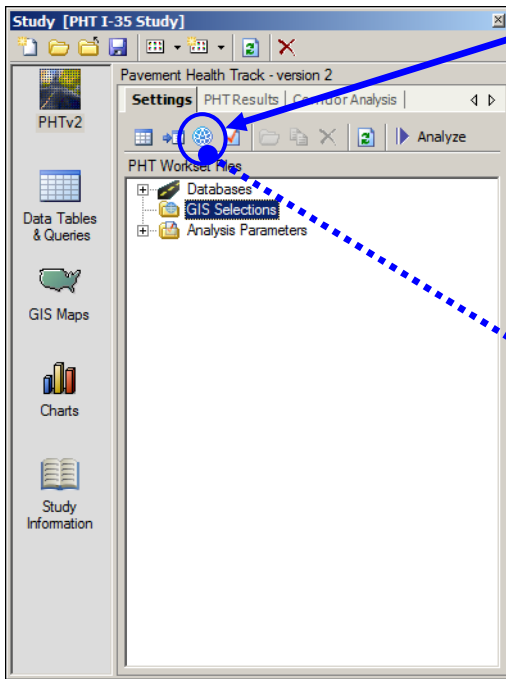
CHAPTER 6 – WORKING WITH GIS SELECTIONS

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.

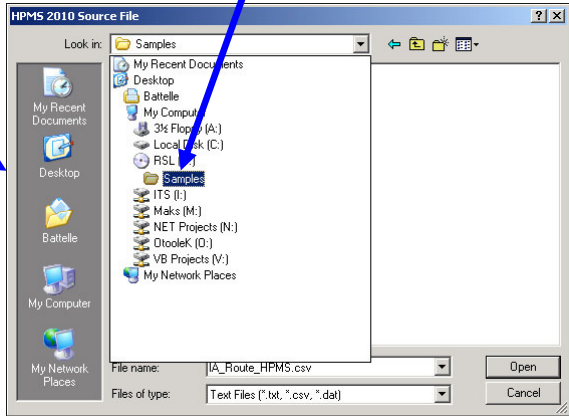
Use: GIS selections can define a sub-set of the overall highway network or define a single continuous route for a corridor analysis.

- 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



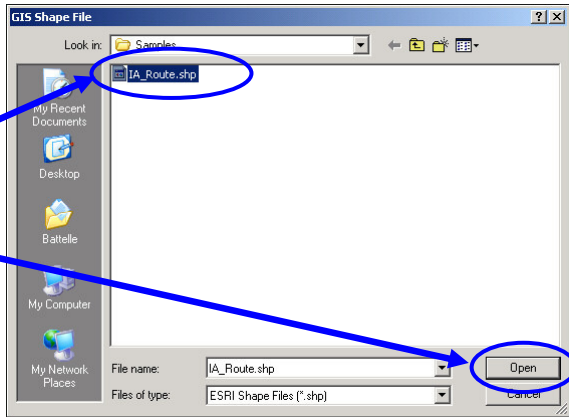
Click the **Create GIS Selection** button to select a shape file.

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



Select the **IA_Route.shp** file.

1b

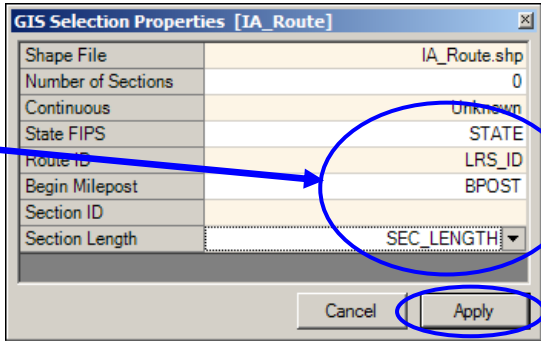


1c
(Click **Open**)

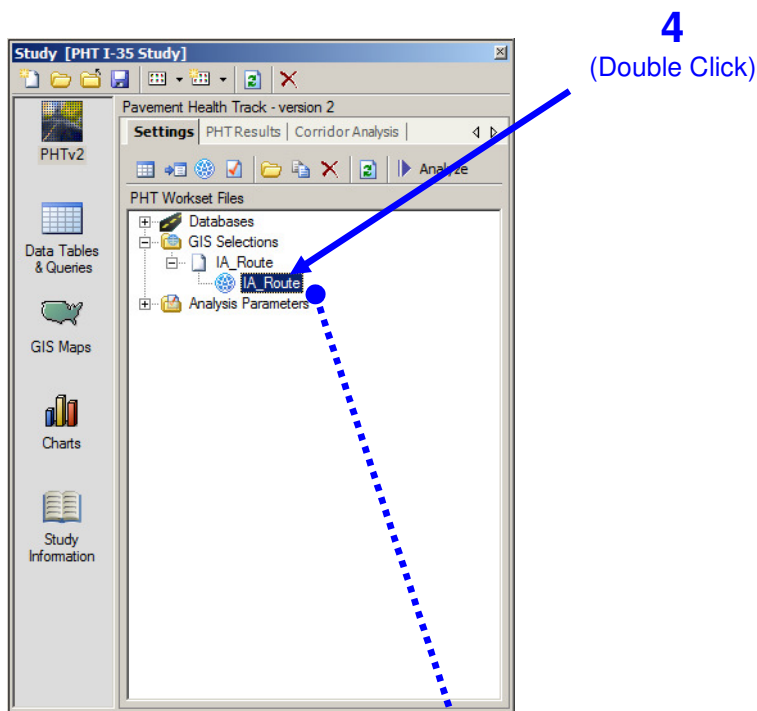
From the GIS Selection Properties window, select the data fields from the GIS shape file that contain the following information:

- 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.

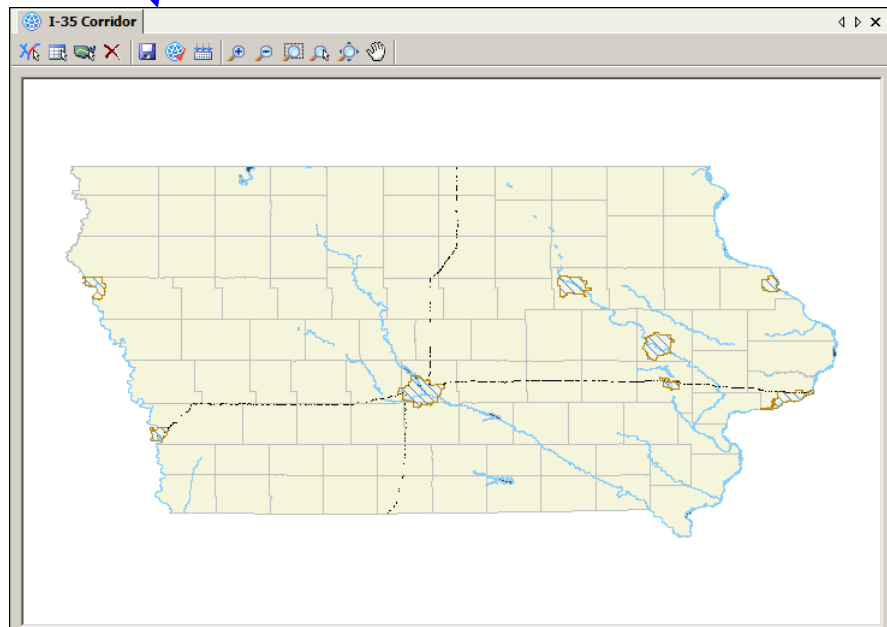


3
(Click **Apply**)



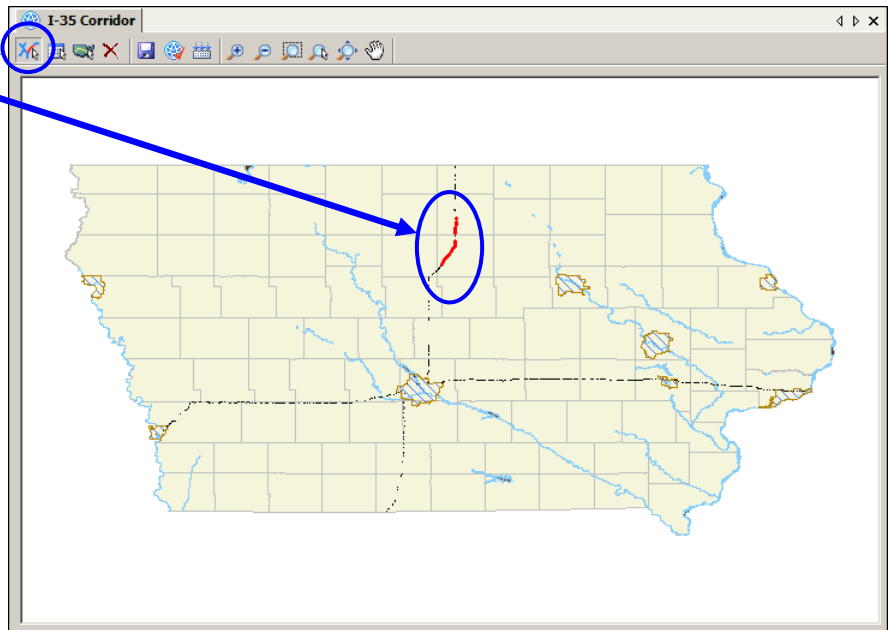
Using the State FIPS code, the PHT tool will load the appropriate background images for the State's counties, water, and urban areas to provide a context for the highway segments in the shape file.

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

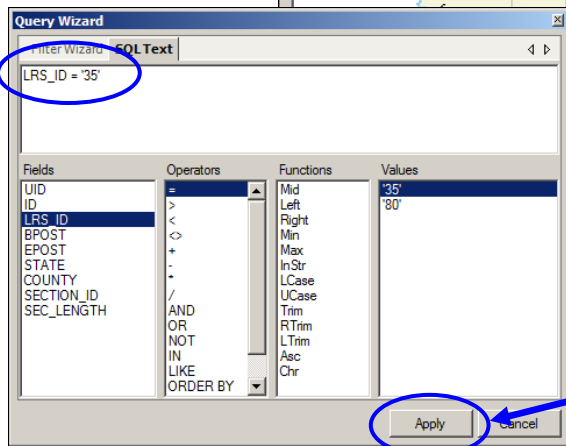


Click the attributes button to select highway sections automatically using their attributes.

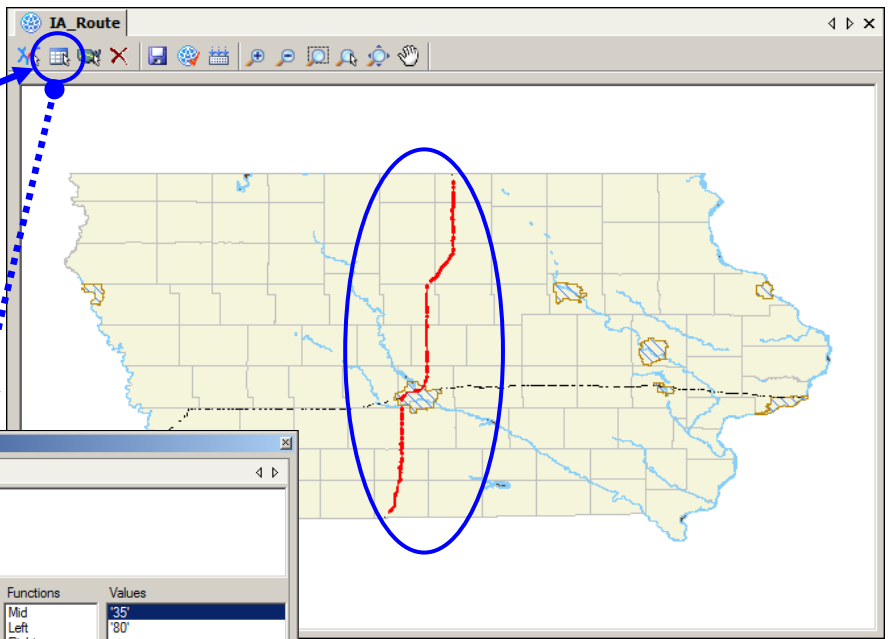
6

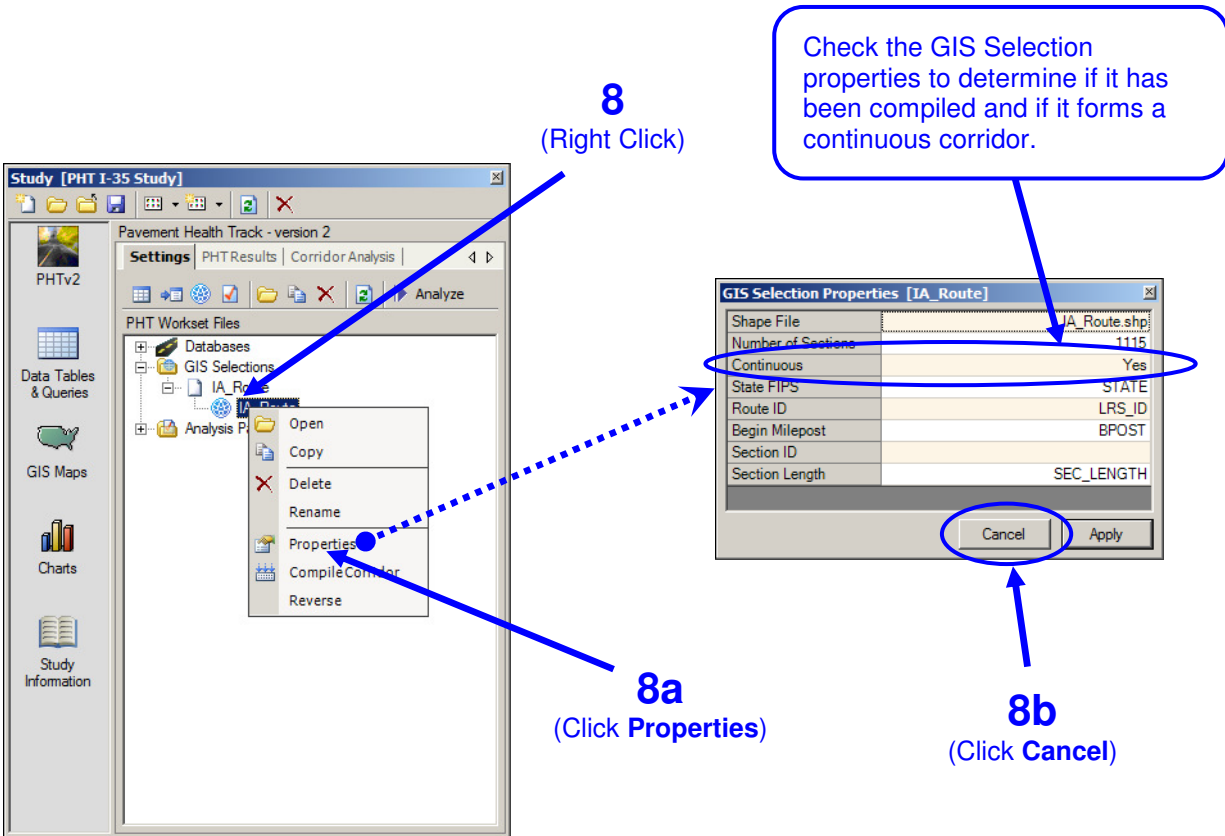
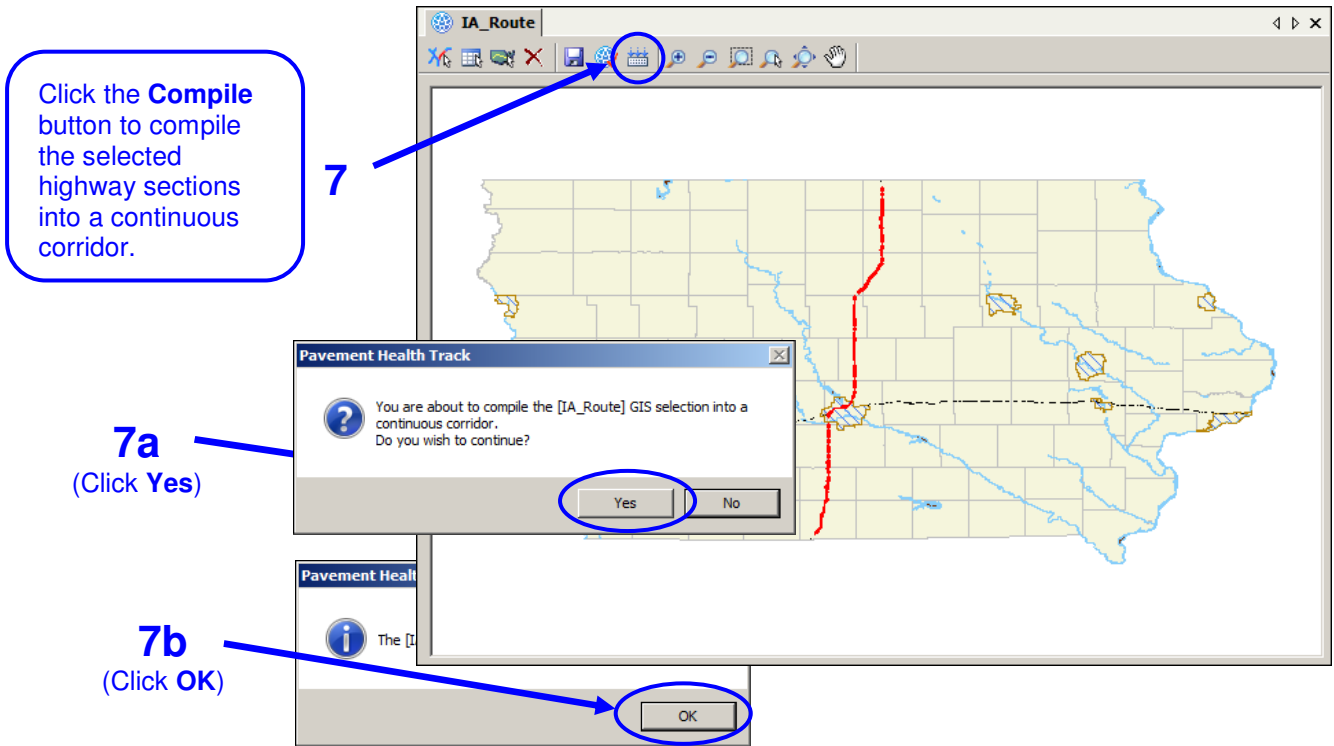
Type "LRS_ID = '35'"

6a



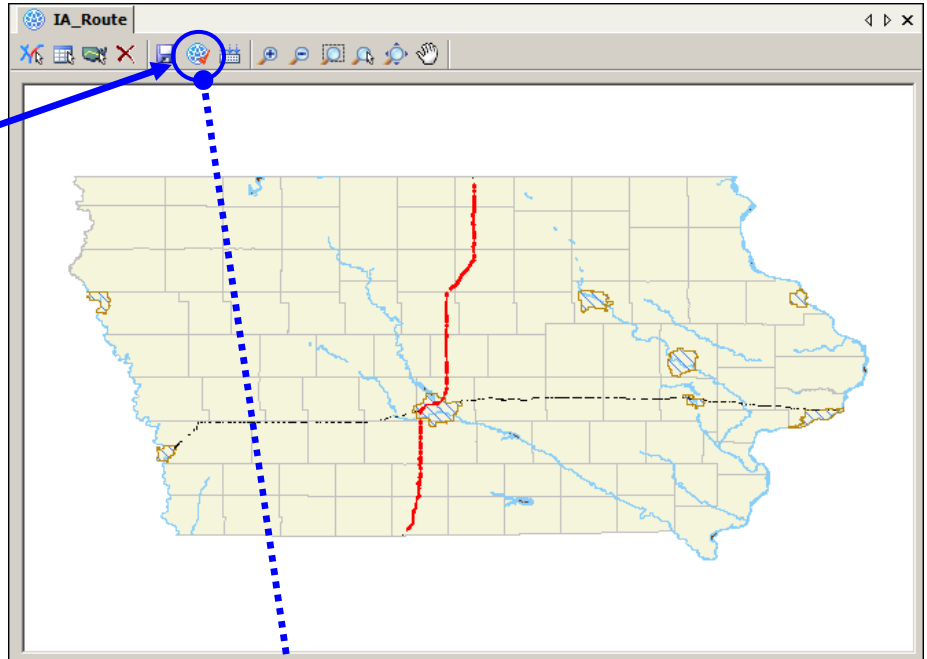
6b
(Click Apply)





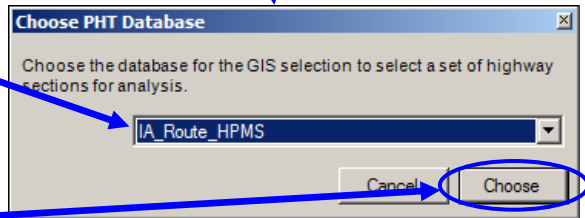
Click the **Highway** button to select a set of highway sections for the PHT analysis based on the highway segments selected in the GIS selection.

9



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

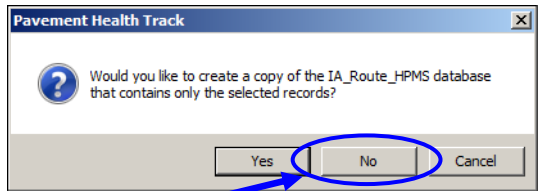
9a



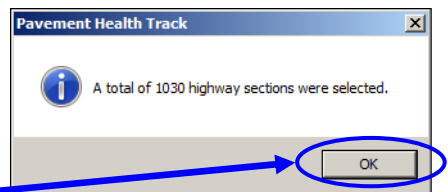
9b
(Click **Choose**)

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**)

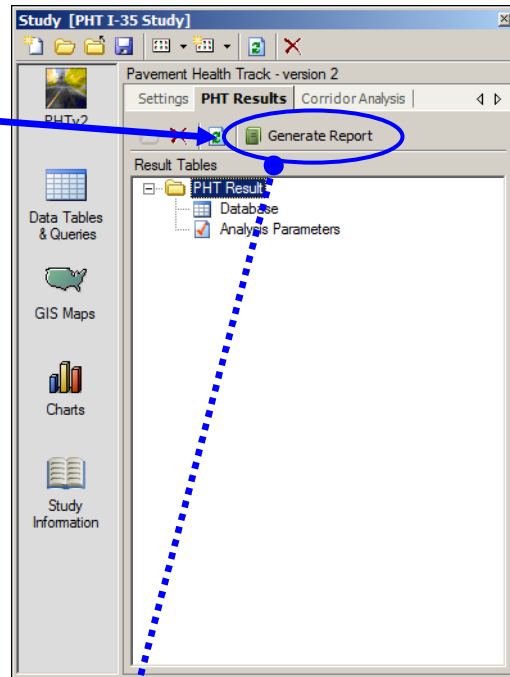


CHAPTER 7 – GENERATING REPORTS

- 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.

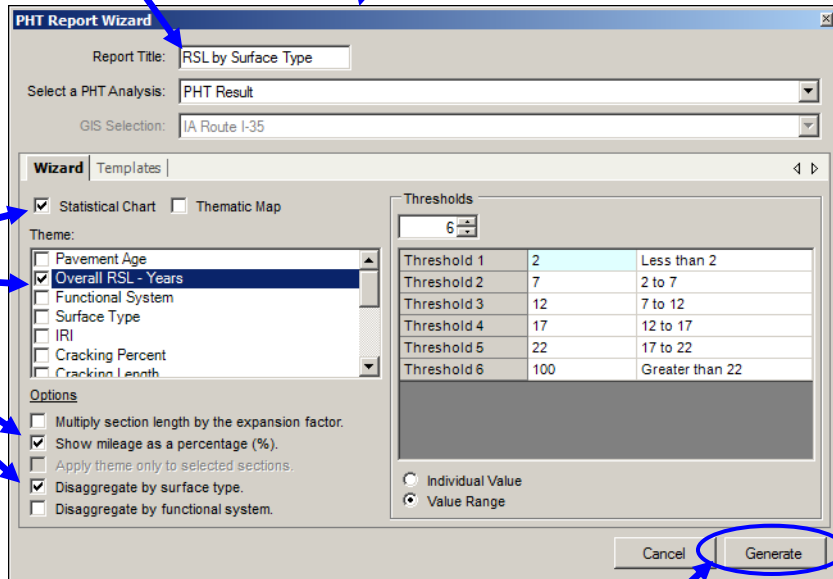
Click the **Generate Report** button to activate the report wizard.

1



Enter a descriptive name for the report.

1a



1b

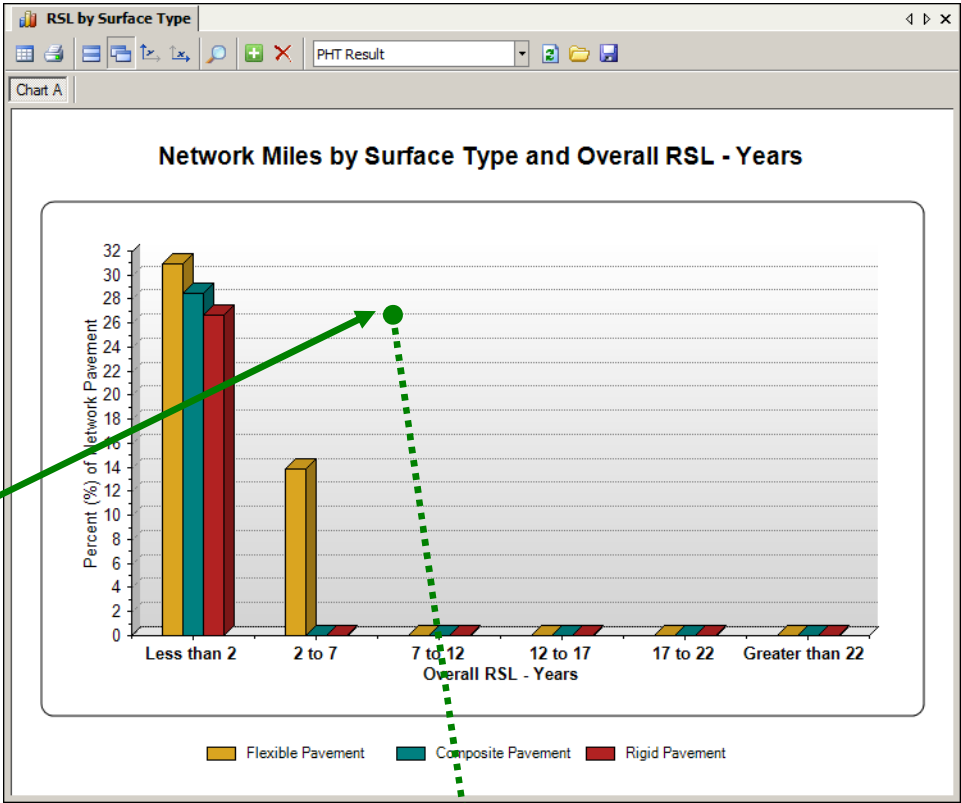
Select the statistical chart with an overall RSL theme and choose the options to show mileage as a percentage and to disaggregate the data by surface type.

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

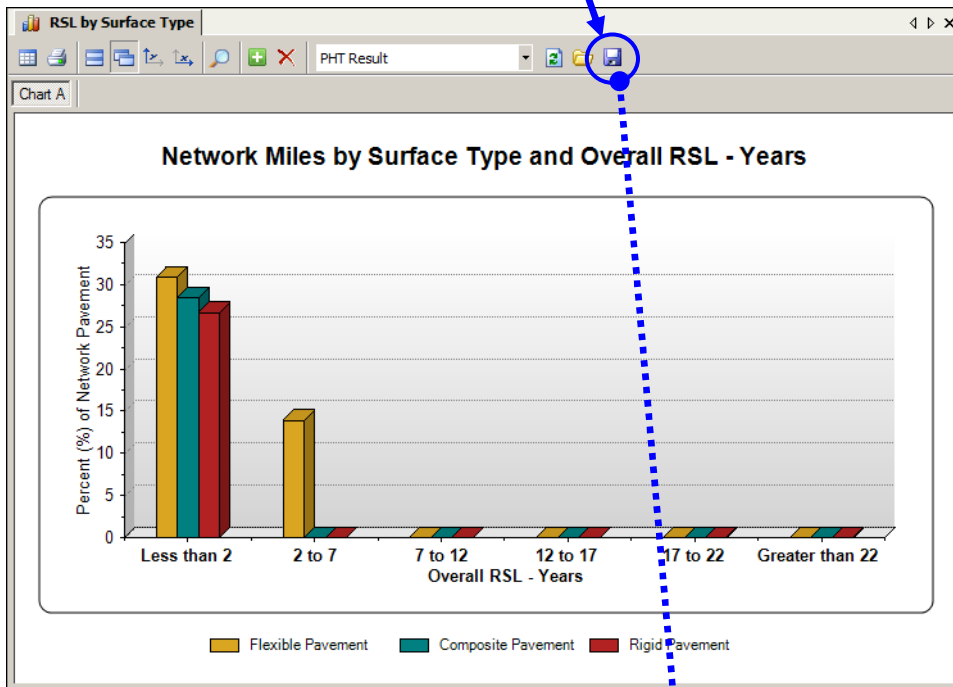
Properties - Chart A

- Border**
 - Border Style: Solid
 - Style: Solid
 - Color: Black
 - Thickness: 1
 - Rounding: 10
- Interior**
 - Interior Style: Interior Style
 - Background: White
 - Background 2: LightGray
 - Gradient Style: Vertical
 - Hatch Style: None
- Header**
 - Header: Header
 - Title: Network Miles by Surface Type and Overall RSL - Years
 - Shown: True
 - Font: Arial, 14
 - Color: Black
- 3D Effects**
 - 3D Effects: 3D Effects
 - Depth: 10
 - Elevation: 8
 - Rotation: 8
 - Shading: ColorDark

Buttons: Apply, Finish, **Cancel**

2a
(Click **Cancel**)

Click the **Save** button to save the chart format to the template library. **3**



3a
Enter a descriptive name for the template.

Please enter a name for the chart template.

RSL by Surface Type

OK

Cancel

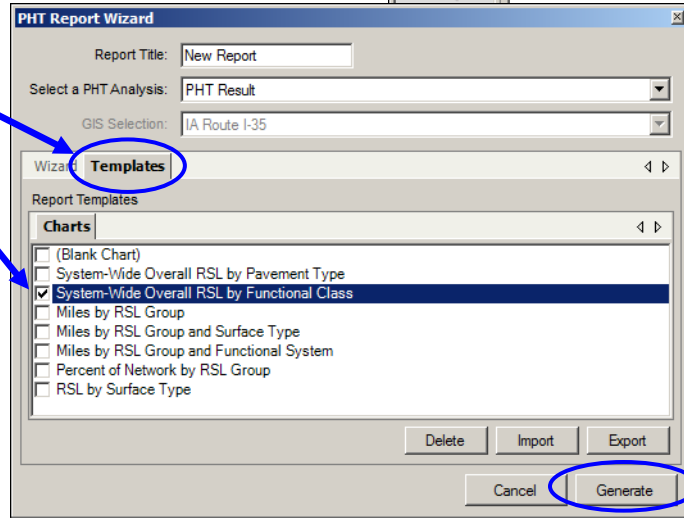
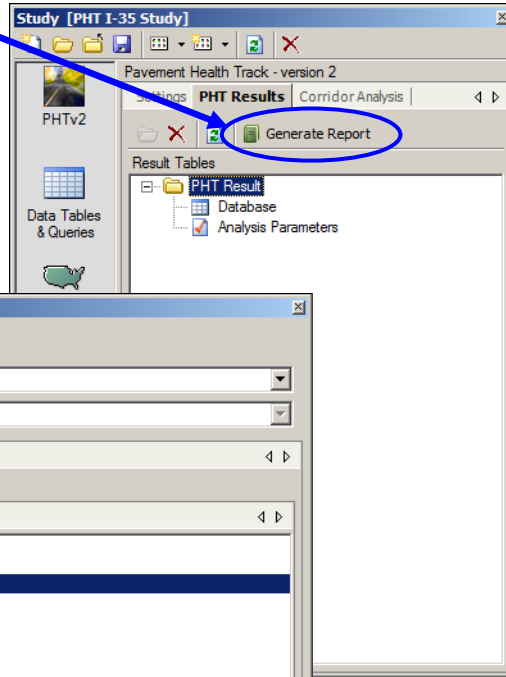
3b
(Click OK)

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

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

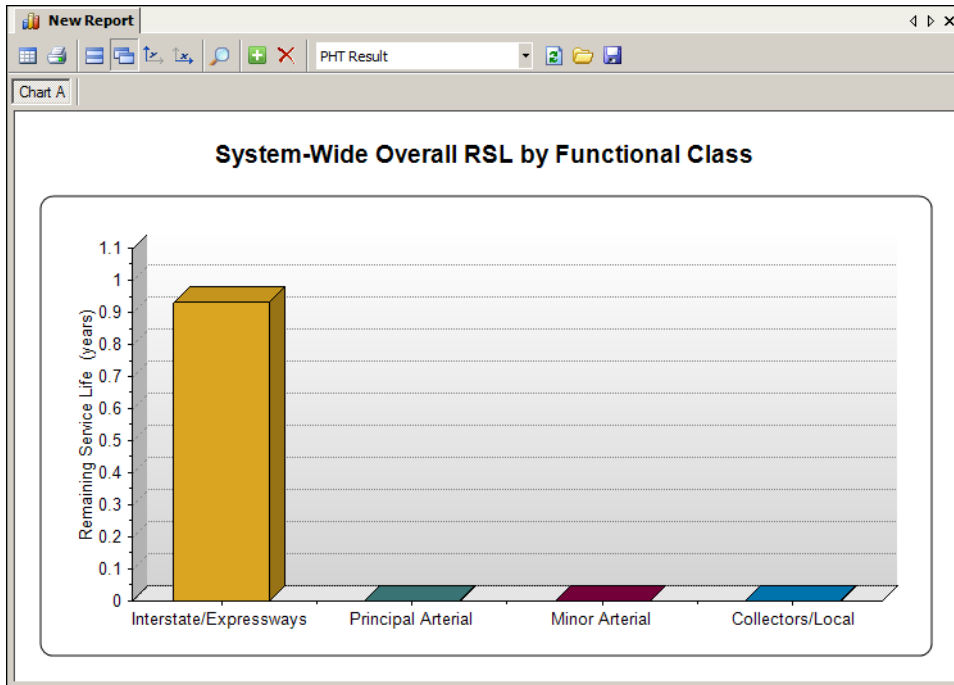
4a

4



4b

(Click **Generate**)



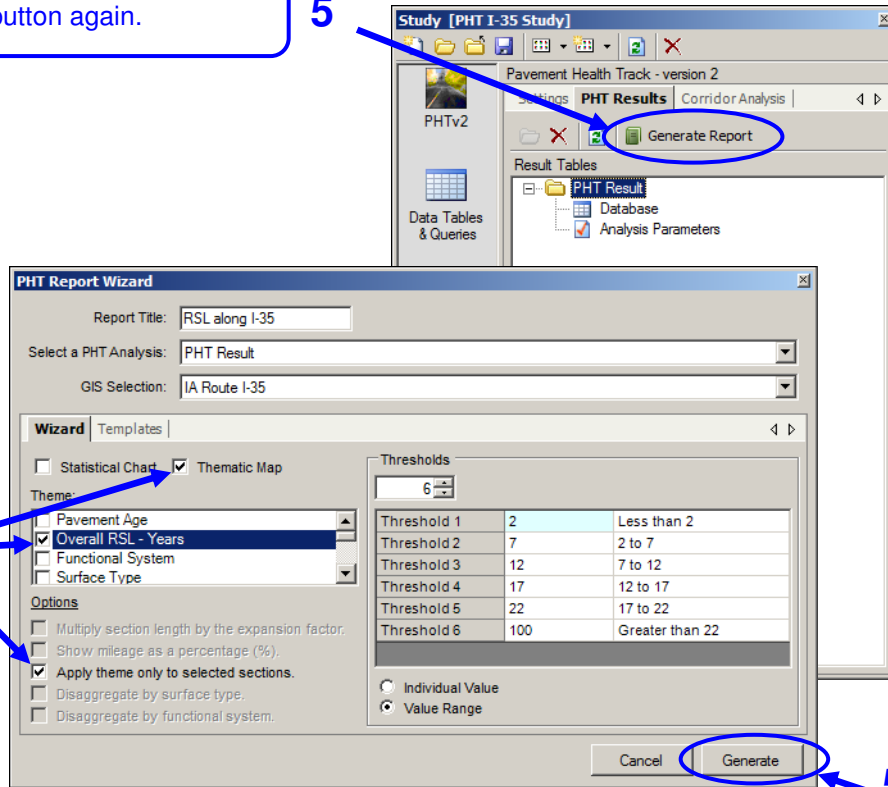
The chart template is loaded and populated with data from the selected PHT result database.

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

5

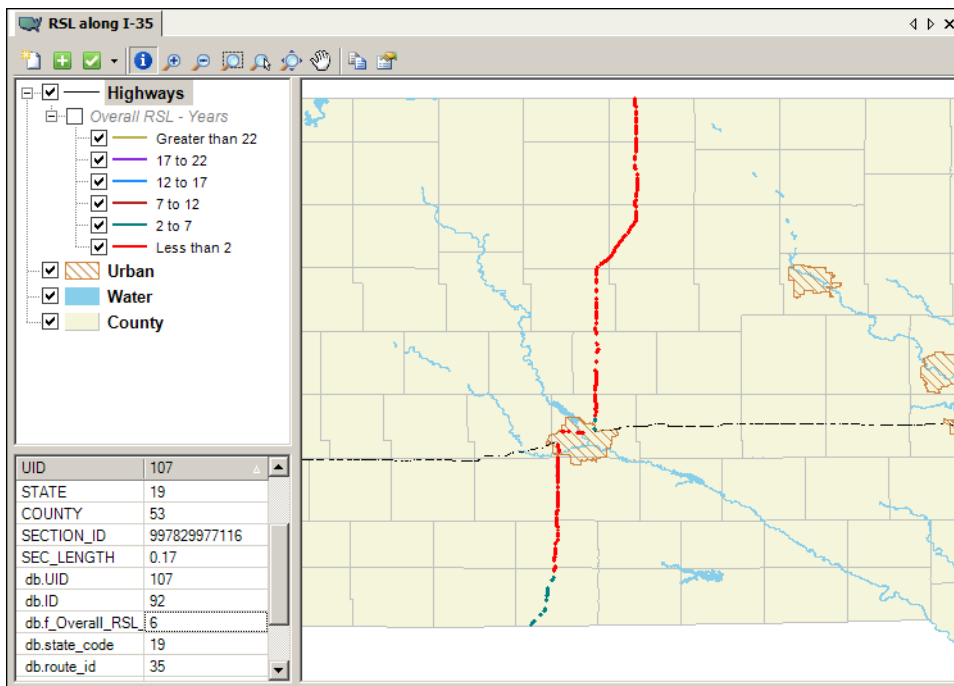
Select the thematic map option and choose the overall RSL theme and option to only apply the theme to the highway section included in the GIS selection.

5a

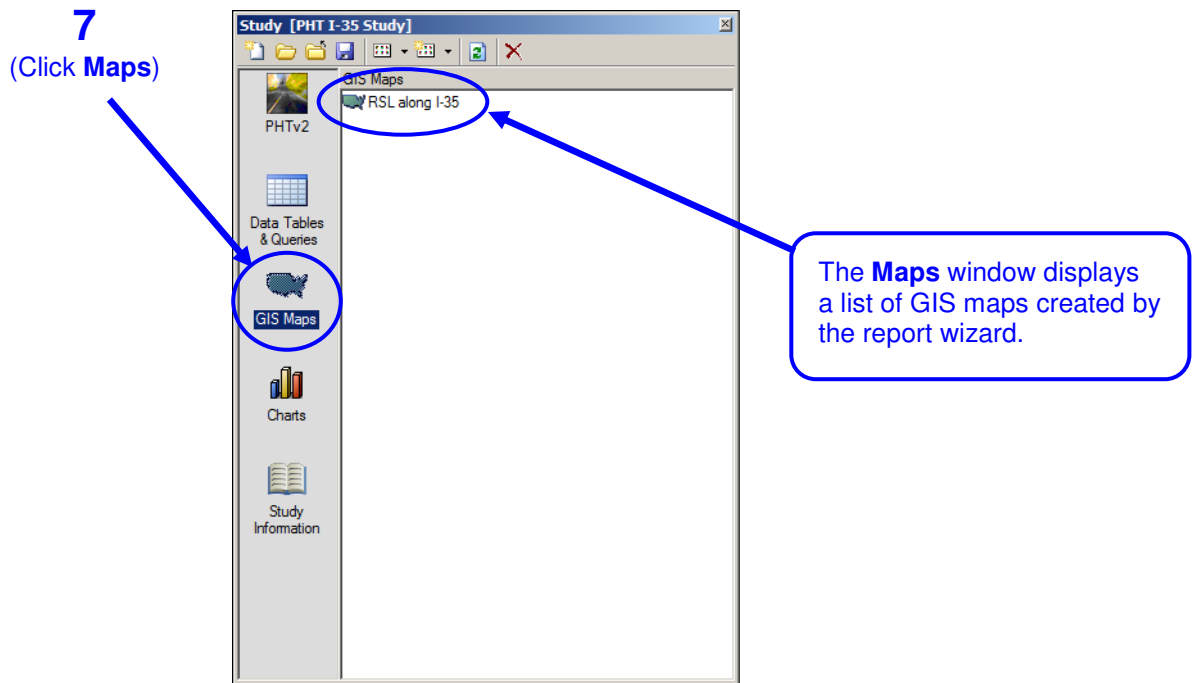
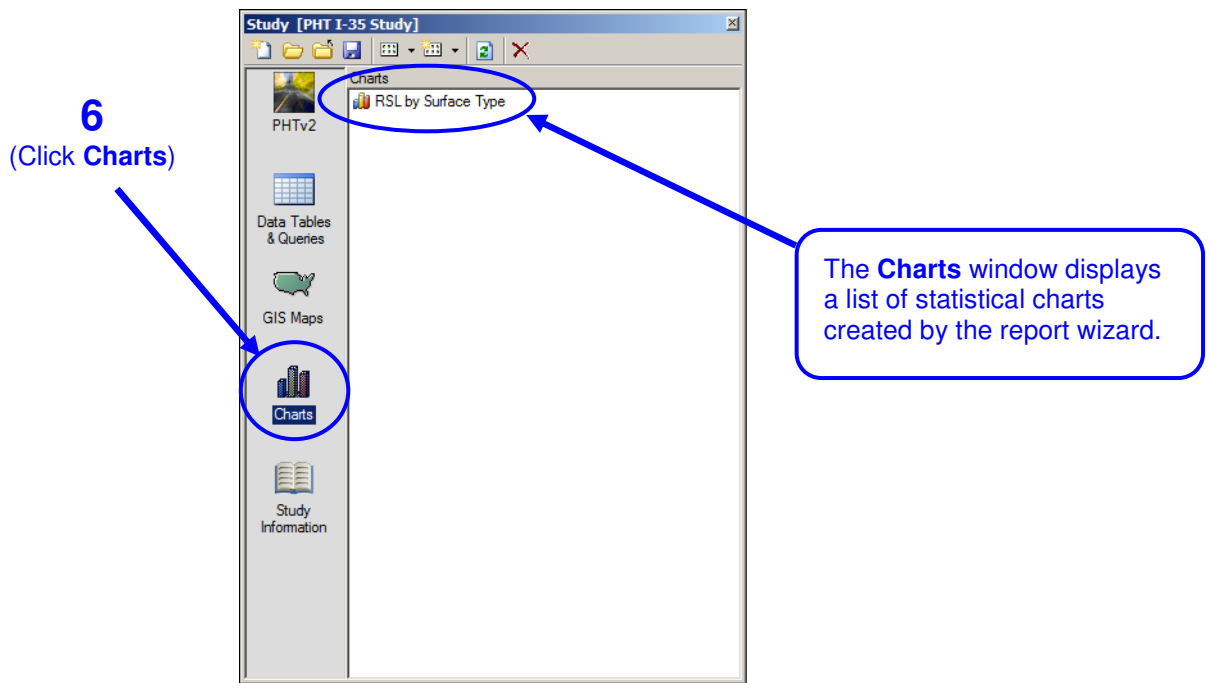


5b

(Click **Generate**)



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



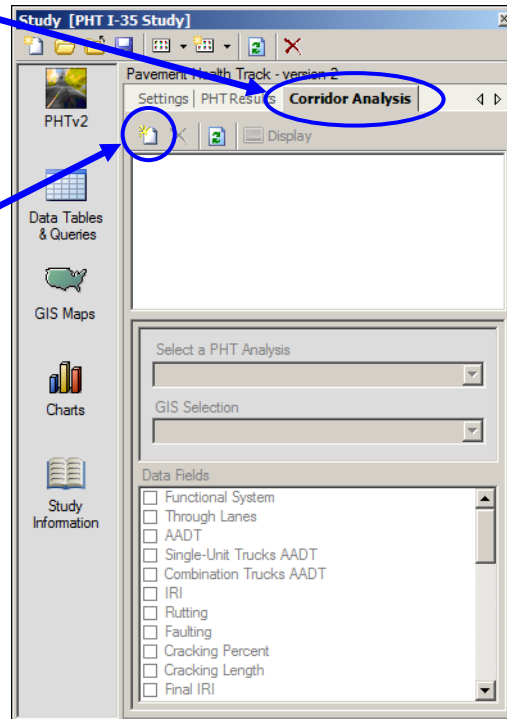
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CHAPTER 8 – CORRIDOR ANALYSIS

- 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.

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

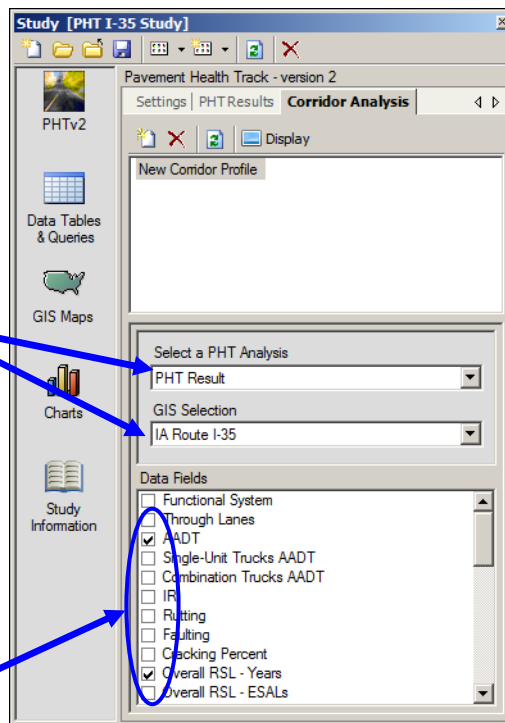
2 Click the **New Profile** button to create a new corridor profile.



3 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.

4 For the data fields select:

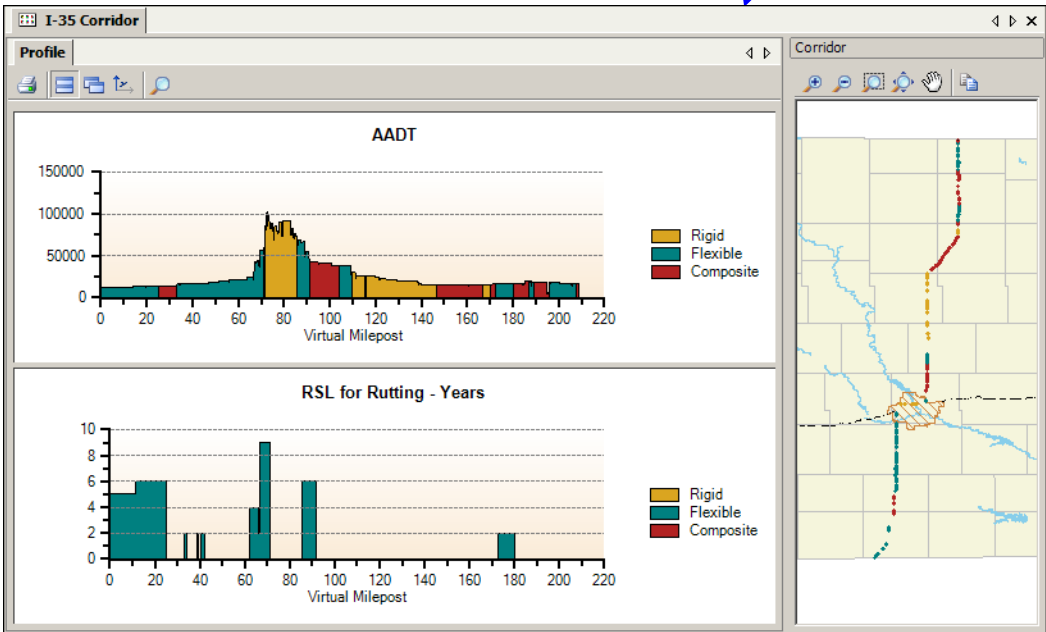
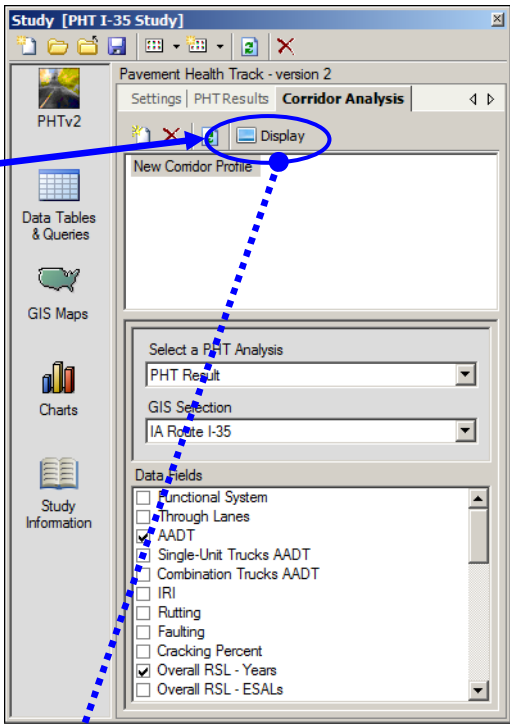
- AADT
- Overall RSL (Years)



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

5

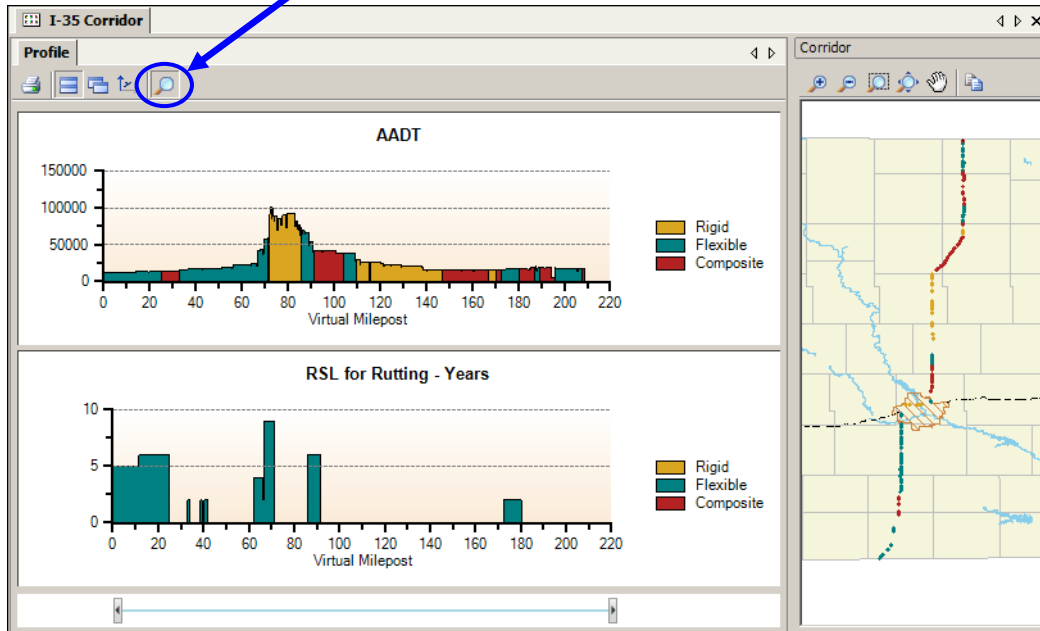
The corridor profile chart displays the values of the selected data fields along the route by virtual milepost beginning at milepost zero.



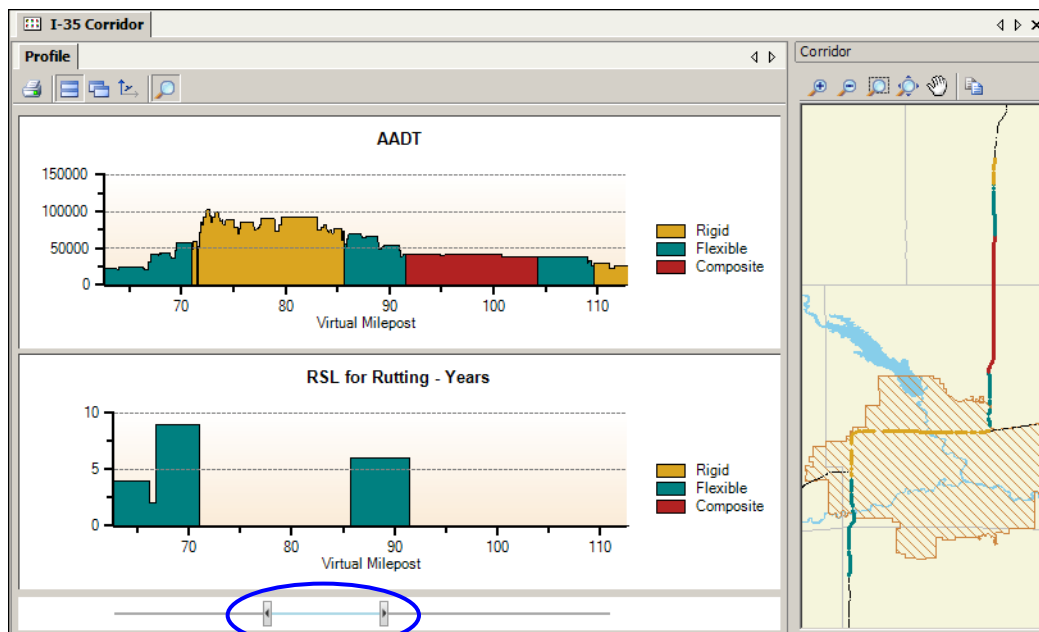
A map window is displayed to provide a geographic reference of the corridor.

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)