

User Guide

PAVER™ Version 7.1

July 2021



***NEW DIMENSIONS IN PAVEMENT
MAINTENANCE MANAGEMENT***

US Army Corps of Engineers



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1. Overview

System Requirements

Recommended Hardware

Memory: 4 GB RAM for 32-bit desktop
8 GB RAM for 64-bit desktop for small to medium databases
16 GB RAM for 64-bit desktop for large databases (10,000+ sections)

Updating to PAVER™ 7

PAVER™ 7 supports the import of *.e60, *.e65, *.e70 -, and .e71 files. Users should export their file(s) to one of these formats, and then, import the file(s) into PAVER™ 7 using the File Menu: New/Import >> E60/E65 Import.

PAVER™ 5.x users will need upgrade to PAVER™ 6 and then export an *.e60 or *.e65 file. PAVER™ 7 does not support the import of *.e5x files. PAVER 7.0.11, and 7.1 can import .e71 but earlier versions of PAVER 7 cannot.

32-bit and 64-bit Versions of PAVER™

PAVER™ 7 can be installed on 32-bit or 64-bit Windows computers. On a 64-bit computer, desktop icons for both versions will be put on the desktop during the install.

With the 32-bit version of PAVER™ 7, the user can use JET (Microsoft Access-based) and/or SQL databases. If the user chooses to use SQL databases, then the computer must be able to access an instance of SQL (Express, Server, etc.).

The 64-bit version uses only use SQL databases so an instance of SQL must be available for use by the PAVER™ inventories.

Using SQL

SQL Server/Express 2012 or later is required. Inventories in SQL are stored in SQL's data directory, not in the user data folder. Prior to upgrading SQL, users should backup databases to E70 in order to prevent data loss during the upgrade process.

PAVER™ 7 Licensing

Activation Screen

On the first attempt to open PAVER™ 7, a form will appear, prompting the user to activate the program. On the Product Activation form, enter the serial number provided by the distributor. Select the Local Activation radio button for Terminal Services or the Remote Server Only radio button for a WCF connection.



After the serial number entry, choose one of the following five options:

- **Automated Web Activation:** Select to activate your copy of PAVER™ 7 automatically online.
- **Manual Web Activation:** Select to activate your copy of PAVER™ 7 via a website.
- **Email Activation:** Select to activate your copy of PAVER™ 7 via email (an email application such as Outlook must be used with this option).
- **Phone Activation:** Select to activate your copy of PAVER™ 7 over the phone with the phone number provided in the next screen.
- **CAC Activation:** Select to activate your copy of PAVER™ 7 via government certificates stored on a CAC.

Automatic Web Activation

When Automated Web Activation is selected the screen below will be shown.

Activate PAVER via Internet connection

Please enter your contact information below. Press 'Activate' to complete the activation process.

Serial Number: J93-1TRP-5HW6

Please enter your contact information

*Agency/Company Name: PAVEMENT

*Contact Name: J Doe

City:

State:

Country:

*Email Address: jdoe@123.com

*Confirm Email Address: jdoe@123.com

Secondary Email:

Phone:

*Indicates a required field

Cancel Activate

Fields marked by an asterisk are required, all other fields are optional. Once all required fields are populated, click the “Activate” button to complete the activation process.

Manual Website Activation:

When Manual Web Activation is selected, the following screen will open, along with a webpage where required information needs to be entered. The System ID information will be automatically populated. **Do not close PAVERTM until the activation is completed.**

PAVER VALIDATION

Log In

Activation Code Generated

Thank you for activating your license. Please enter (may copy and paste) the following Activation Code in the Web Activation window on your desktop. This Activation Code must be used before PAVERTM 7 PC Install is closed.

Activation Code: 123456789

SOLO Lite Version 1.23

PAVER VALIDATION

Log In

Serial Number: AAA - AAAA - AAAA

System ID: A12345 - B67890

Please enter or update your contact information:

Agency/Company Name: * PAVEMENT

Contact Name: * J Doe

City:

State:

Country:

E-Mail Address: * jdoe@123.com

Confirm E-Mail Address: * jdoe@123.com

Secondary E-Mail:

Phone:

* Required

Next >>

Once required information is entered, the Next button on the bottom of the webpage will be activated. Click on the Next button to receive the activation number. Enter the activation number on the Web Activation form.

Activate PAVER via Website

Please complete or edit the contact information on the web page provided. Enter the Activation key you receive below.

Activation Key: 123456789

Activate

Email Activation:

When activating PAVER™ 7 via Email, first enter the required information in the image below.

Activate PAVER via Email

To activate your software, please enter or update your contact information. Your correct Email address is important to receive notification of program updates. Press 'Activate' when you are finished.

Serial Num: J93-1TRP-5HW6

Please enter your contact information

*Agency/Company Name: PAVEMENT

*Contact Name: J Doe

City:

State:

Country:

*Email Address: jdoe@123.com

*Confirm Email Address: jdoe@123.com

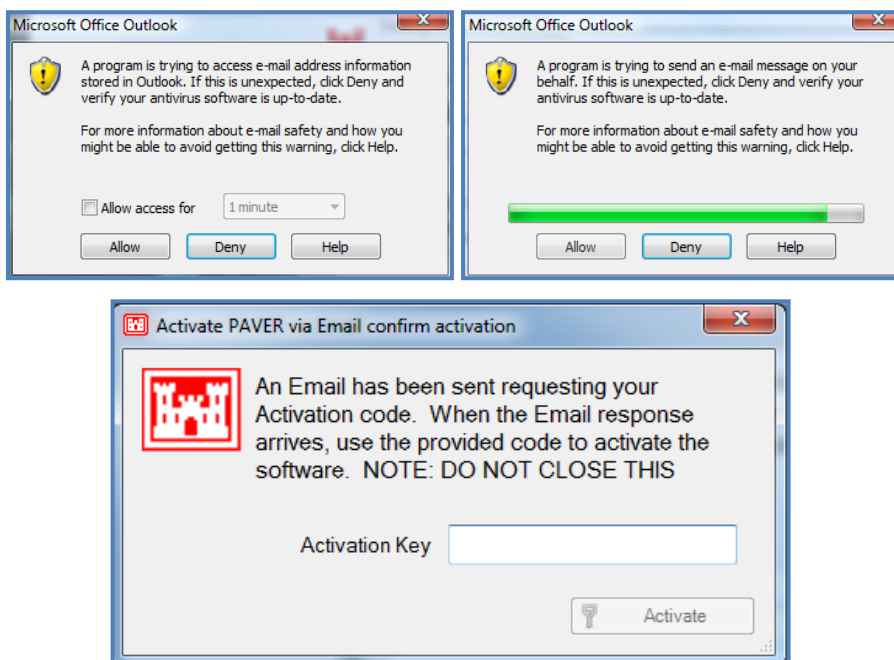
Secondary Email:

Phone:

*Indicates a required field

Cancel Activate

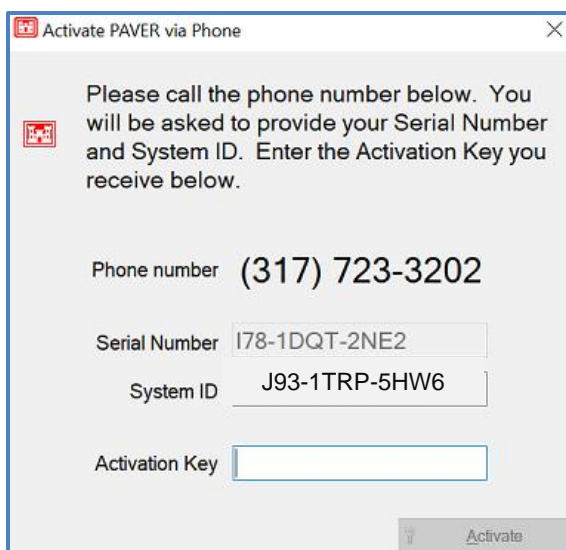
After clicking “Active” via Email, PAVER™ 7 will automatically use your email application to send an email to the licensing server, which will send an email reply containing the activation code. Enter the activation code from the reply email and click Activate.



Phone Activation:

When activating PAVER™ 7 over the phone:

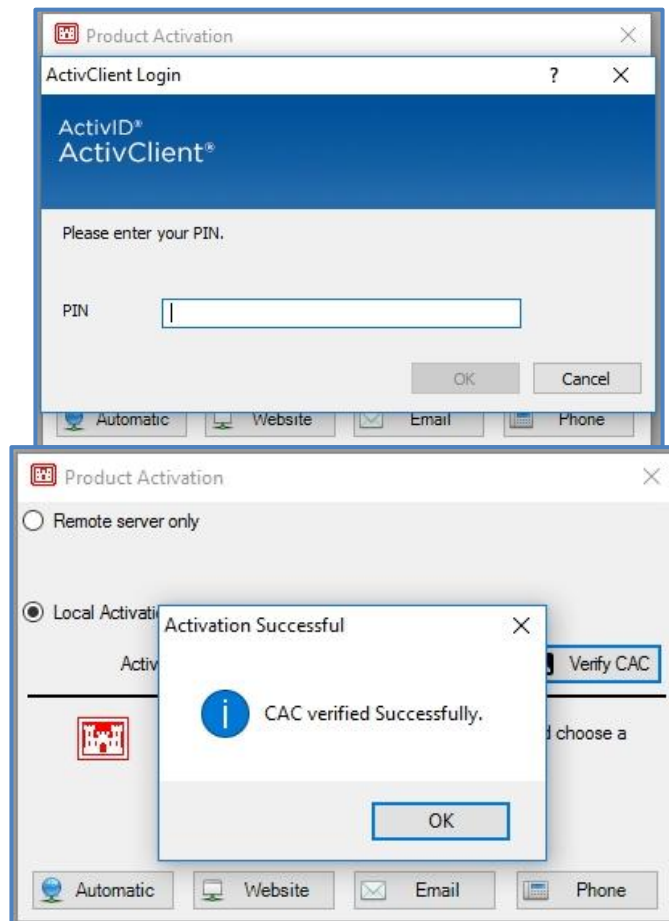
- The serial number will be populated automatically from the first activation screen.
- The system ID will be populated automatically from your computer.
- Call the number shown on the screen and provide the serial number and system ID shown to receive an activation code to enter in the “Activation Key” box.
- Once the activation code has been entered, select “Activate” to activate your copy of PAVER™ 7.



CAC Activation

When activating PAVER 7™ with a CAC:

- Ensure the CAC is in the reader.
- Click Verify CAC, and a list of certificates will be shown. Click OK.
- User will be prompted to enter a PIN, and click OK.



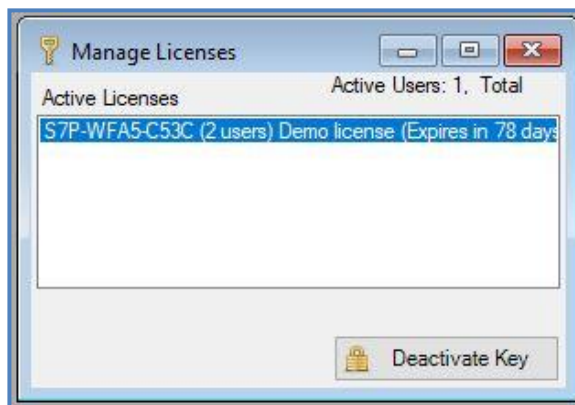
Activation Complete:

If a valid activation code has been entered the screen below will be shown indicating that PAVER™ 7 has been activated and is now ready for use.

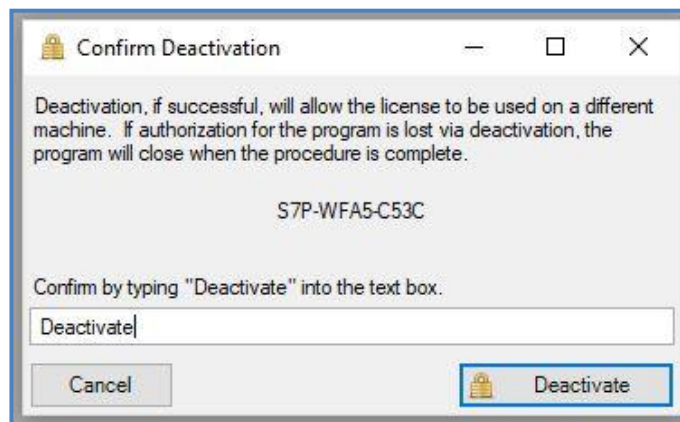


Deactivation:

To deactivate PAVER™ 7, open the program and select System Tables and Tools >> Manage License. Select the license you wish to deactivate.



Confirm that you wish to deactivate by typing "Deactivate" into the box. After PAVER™ 7 is deactivated you can install the software on a different computer.



Note: Only one deactivation is allowed per activation.

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PAVER™ 7 Version History

Introduction to PAVER™

PAVER™ 7 for Windows is an automated pavement management system (PMS). It is a decision-making tool for the development of cost-effective maintenance and repair alternatives for roads and streets, parking lots, and airfields. PAVER™ provides you with many important capabilities, including:

- Pavement network inventory
- Pavement condition rating
- Development of pavement condition deterioration models (Family Curves)
- Determination of present and future pavement condition (Condition Analysis)
- Determination of maintenance and repair (M&R) needs
- Analyzing the consequence of different budget scenarios (Work Planning)
- Project Formulation

PAVER™ 7 Improvements

- **Administrator Login and Control:** Administrators may now control Licensing and Read/Write permissions of individual users.
- **64-bit Option:** On a 64-bit Windows desktop, PAVER™ 7 is installed in both 32-bit and 64-bit versions. The 64-bit option is useful and recommended for large databases - those over 10,000 sections. It only uses SQL Server databases. The 32-bit version can use both SQL Server and JET (Access) databases.
- **Shared System Tables:** System Tables may now be set to be exclusive to a particular inventory or used by all inventories.
- **PAVER™ External Tools incorporated into program:** The External Tools of earlier versions of PAVER™ have been incorporated into the PAVER™ 7 program. Import/Export options are now in the File menu. Database Verification Tools are in the Inventory menu.
- **Redesigned PAVER™ Button Bar:** The Button Bar has been redesigned to take advantage of newer graphics and icons as well as the new and relocated tools and options of PAVER™ 7. Use the drop-down menus to get familiar with the new look and locations.
- **Redesigned Database Verification Tools:** The Database Verification Tools now run a critical set of verifications during import.
- **File Menu:** New/Import, Open, Add, Locate, Export, Combine, and Delete Pavement Database options are now located in the File menu.

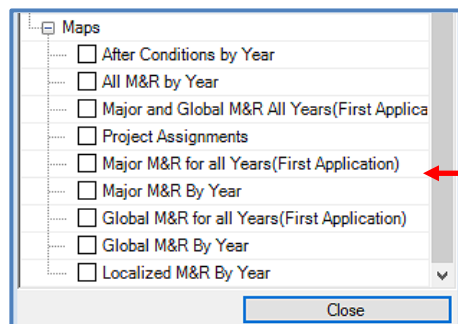
- **Optimized Analysis Tools:** The Work Plan and Condition Performance Analysis have been optimized to provide faster results.
- **ASTM PCI Calculation Update and Improvements:** Update to the latest ASTM Standards for PCI calculations and improvements to eliminate or minimize anomalies resulting from having more than one severity level of the same distress in a sample unit.
- **EMSTTM Image Viewer:** Image Viewer now has a new slideshow option as well as forward and reverse buttons.
- **Languages:** Option to have PAVERTM 7 in languages other than English by selecting an option from the Preferences menu.

PAVERTM 7.0.7 Improvements

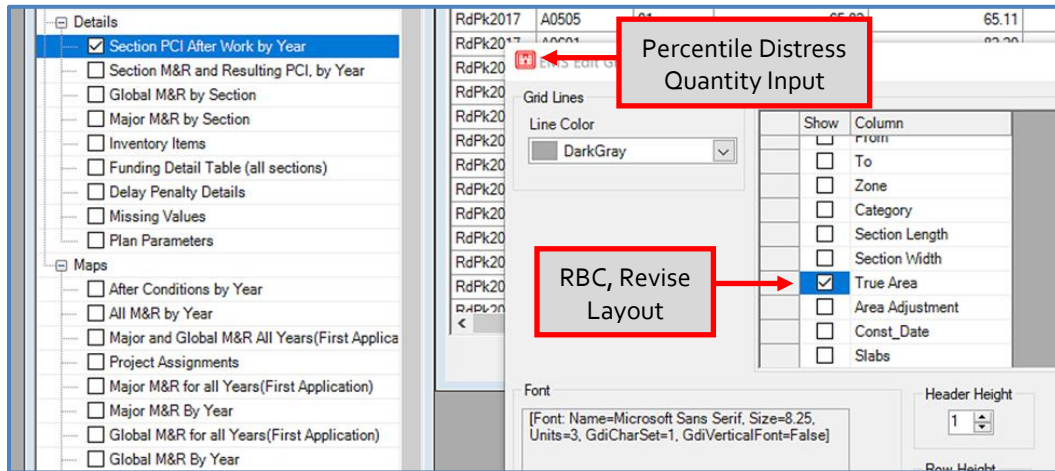
- **User Roles:** Ability for PAVER Administrator to limit user access to PAVERTM features. Roles operate alongside other permission tools such as read only or read write access to data modifications.
- **Combine Database:** Added ability to select an existing database to combine.
- **Other Condition Scales:** FOD Potential Numerical Rating and EA Rating added. In addition to the new built in scales, other condition scales can be defined by Add Ins such as those for other assets.
- **Expanded Inventory Sample Support**
- **Database Properties:** Separate database specific items from preferences.
- **Support for Local Db Engine:** Integrated for PCASE. Single user replacement for large databases.
- **Improved Printing for GIS maps:** Resolution quality improved.

PAVERTM 7.0.8 - 7.0.9 Improvements

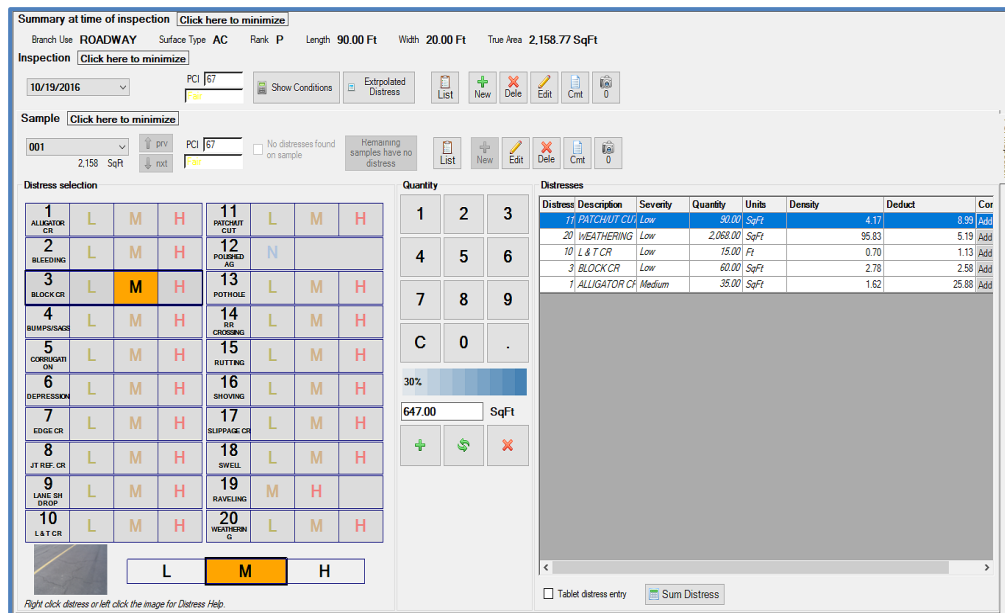
- **Work Plan:** Added ability to add Global M&R for All Years GIS View. Major, Global, and Major and Global for All Years GIS views should color sections always based on the first plan year where work is planned. Add (First Application) to view titles. For example, If the Work Plan analysis period is 10 years, and a pavement section is scheduled for Global in years 2 and 8, only the Global in year 2 will be displayed.



- **Work Plan Section Level Views (Detail):** Section True Area and area adjustment now available in extended columns.



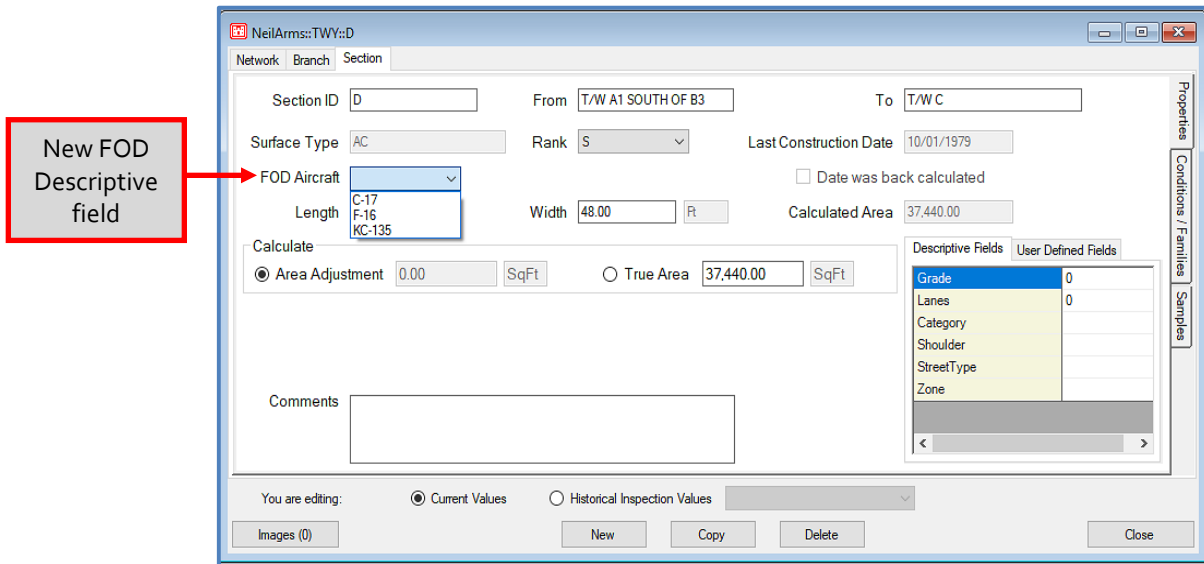
- **Condition analysis:** Section PCI by Year has most of the extended columns from the inventory data, but not Section True Area.
- **Edit Inspection form:** Tabular input mode layout updated to improve user



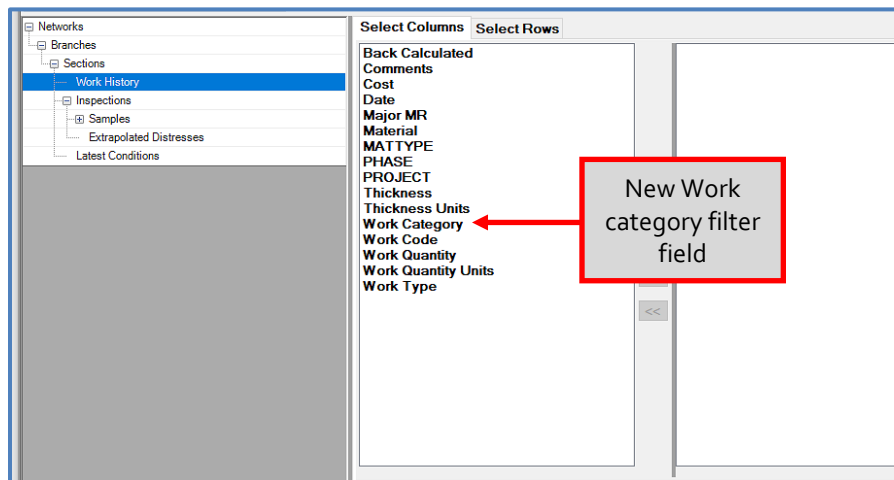
experience. Addition of percentile distress quantity input selection.

- **Tabular and GIS import or Update:** Total Slabs were added as a Section level field for users who have a precise count of their slabs. Total Slabs are now calculated based on Section True Area and Slab size if not in the import table.

- **Query Tool:** Operators (- >, <, >=, and <=) are now available for all fields except: Branch Use, Surface Type, User Defined “List” type fields, and Family Model Query Tool “List” type fields.
- **PAVER™ Activation:** Updated activation system to work with contemporary tools, operating systems and hardware, as well as provide enhanced reporting. CAC card activation added for DoD users.
- **Inventory:** FOD Aircraft – is now a Descriptive field as compared to a User Defined Field in version 7.0.8.



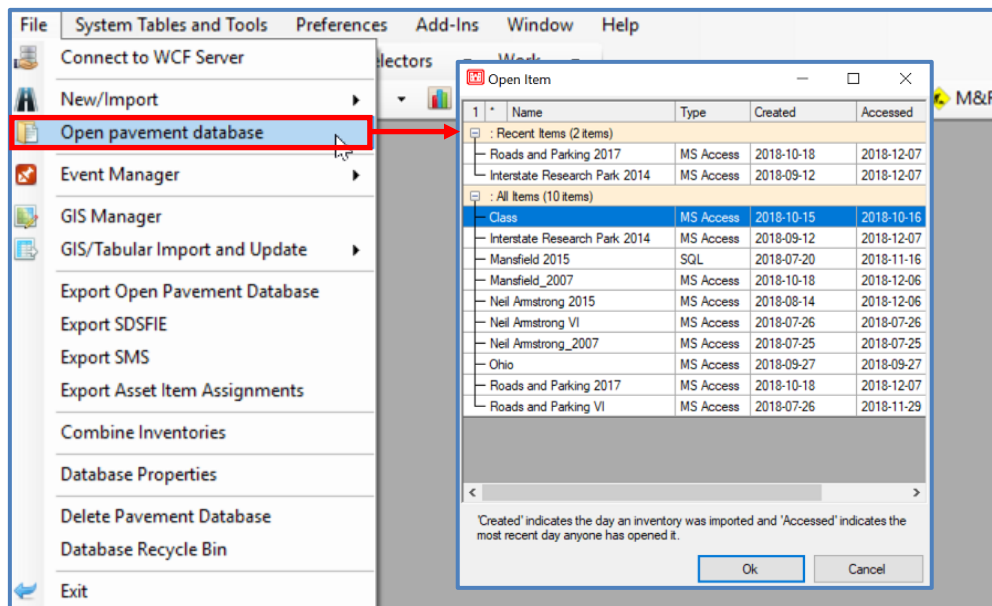
- **Database Clean Up Tools:** Work type clean up now nominates work types which are only used in consequence of work records.
- **System Table:** User can now delete Unknown Condition measures created by Database Verification Tools.
- **Work Required:** Improved Section assignment speed to projects for larger databases.
- **Query Tool (Work History):** Added Work Category as a selectable column and row filter field.



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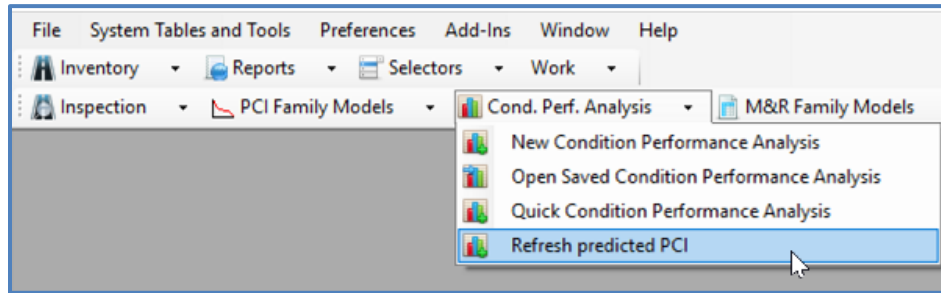
PAVER™ 7.0.9 - 7.0.10 Improvements

- **Open Pavement Database:** Most recently opened databases now show above the complete and alphabetized list of databases.

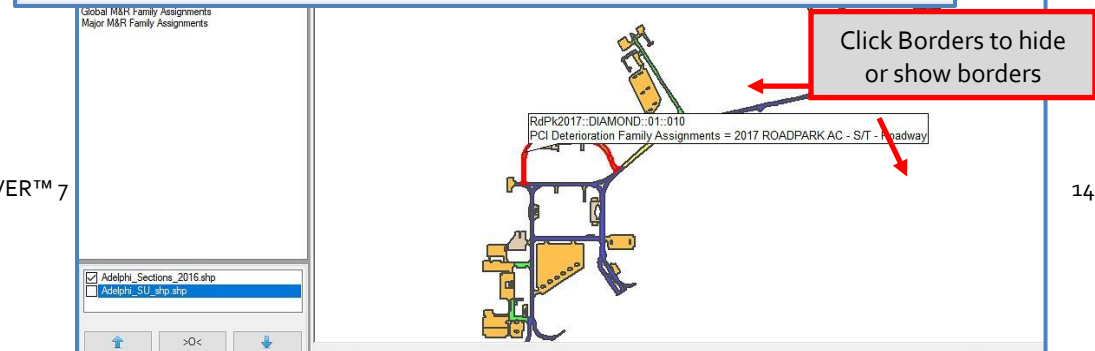
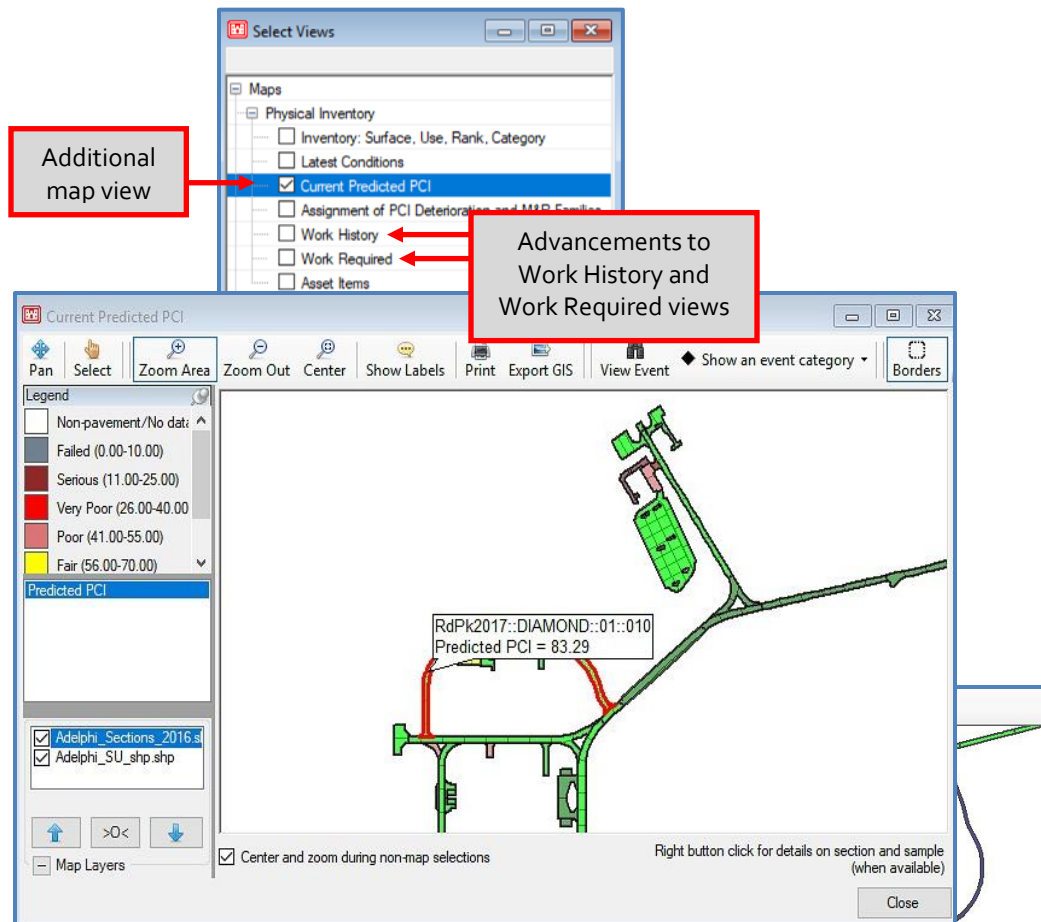


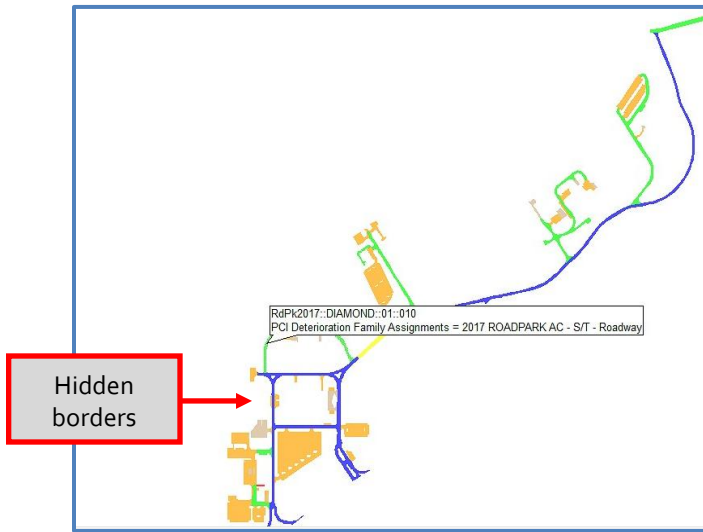
- **Condition Perf. Analysis:** Addition of “Refresh Predicted PCI.” This feature allows the most current PCI to be available in several reports within the program such as; GIS Reports and Summary Charts. The “Refresh Predicted PCI” functionality also

enhances the EMS™ query tool’s capabilities by allowing the selection of sections, based on current conditions.



- **GIS Reports: Additional and improved Views.**
 - New inclusion of Current Predicted PCI View.
 - Improved upon Work History and Work Required Views. Click [here](#) to see new views.
 - Ability to hide or show polygon borders in GIS Reports.



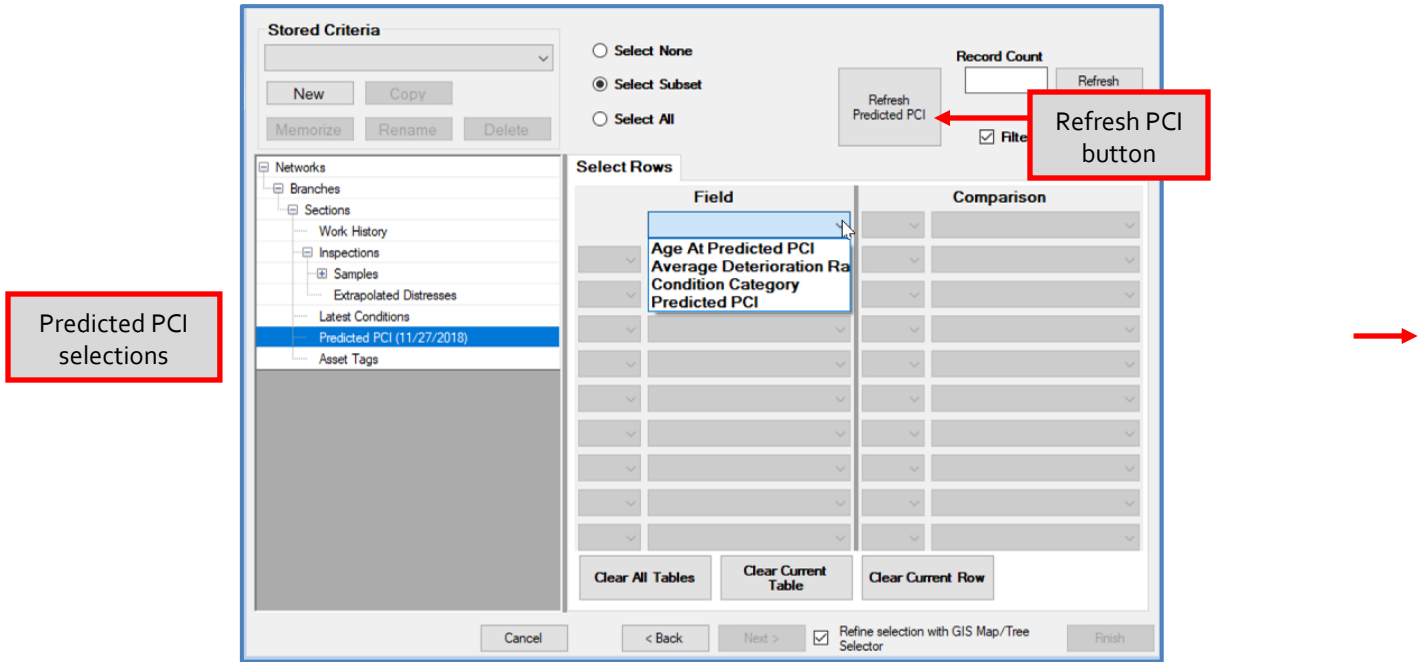


- **Summary Charts:** Additional views.

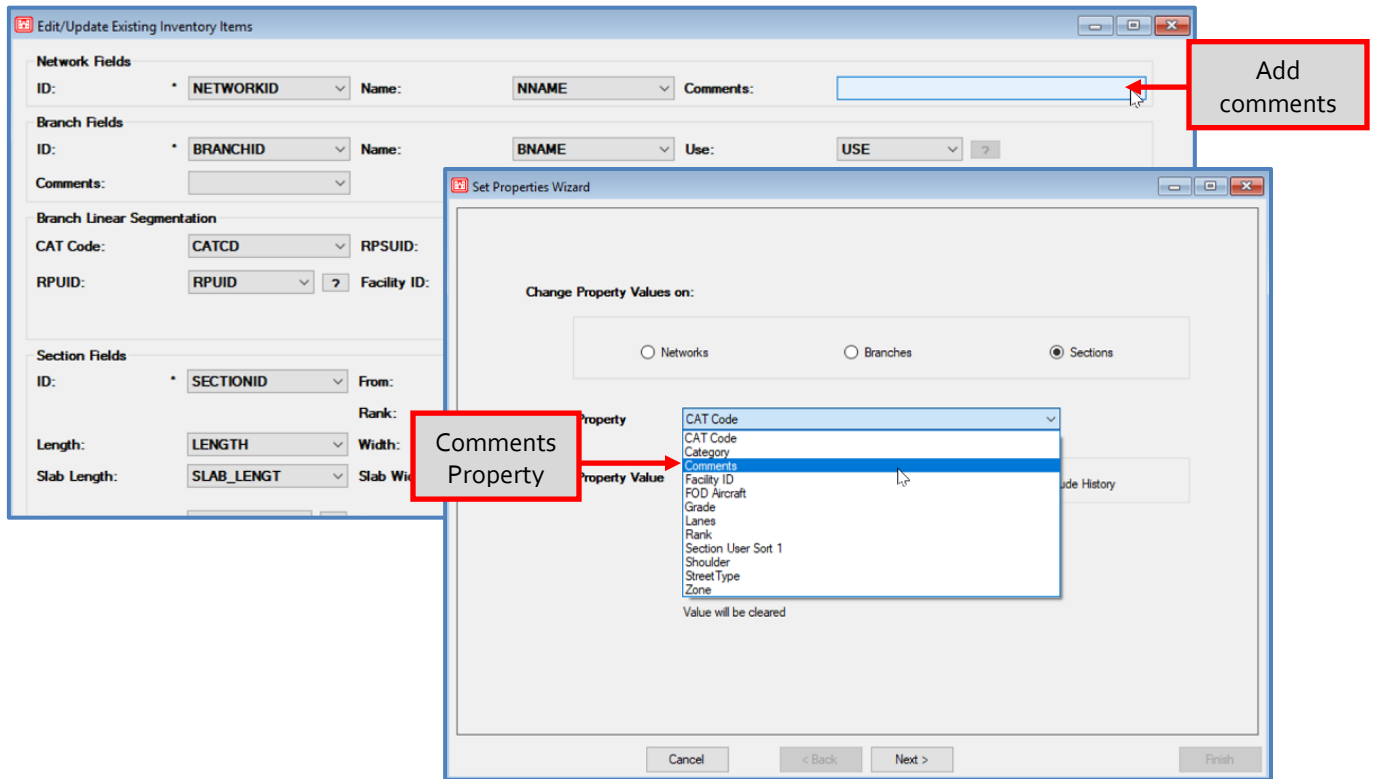
- PCI at Last Inspection
- Predicted PCI views



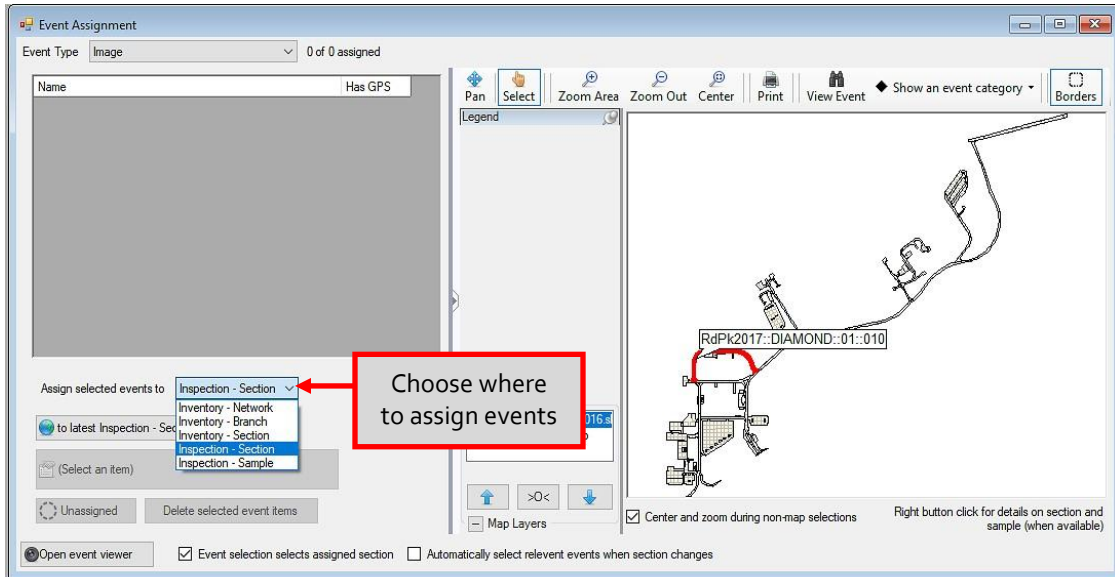
- **EMS Query Tool:** Make selections based on Current Predicted PCI with the ability to refresh PCI from the Query Tool.



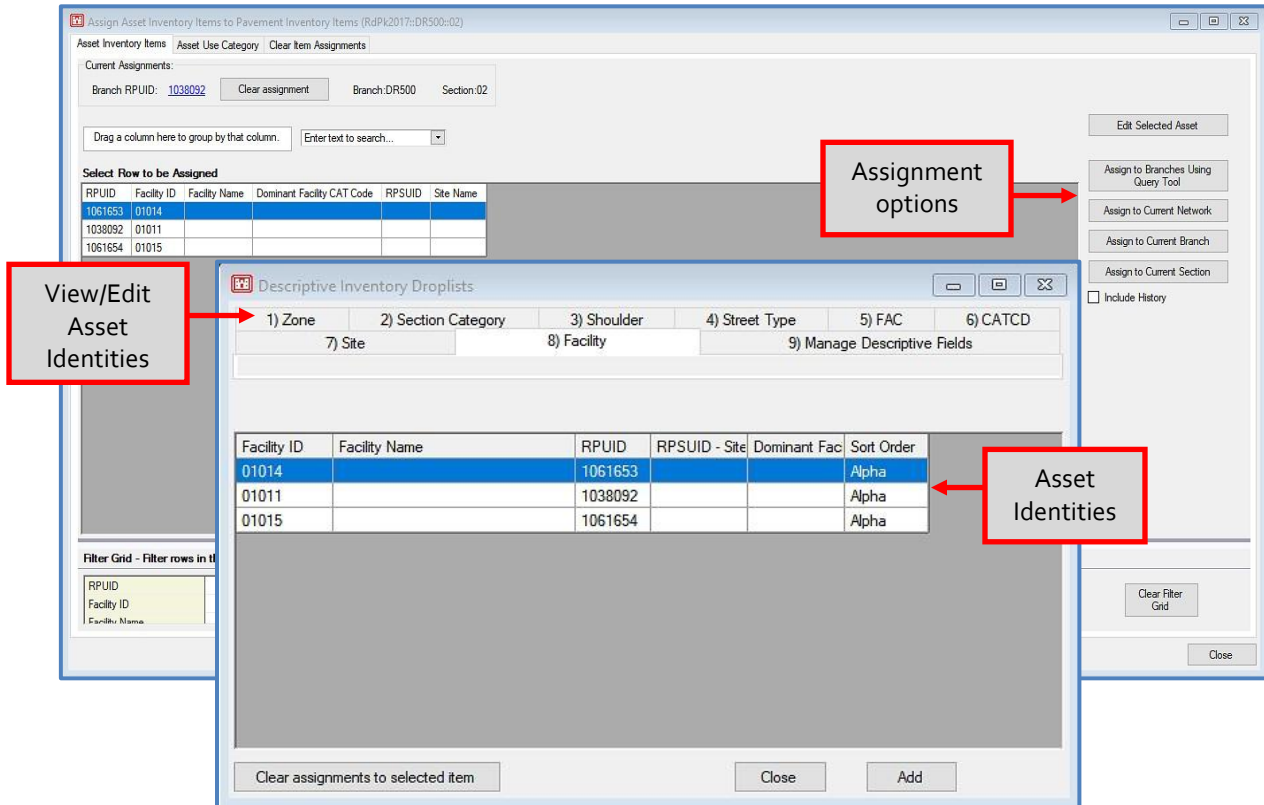
- **Set Properties Wizard and Edit/Update Existing Inventory Items:** Add comments at Network, Branch, and Section levels.



- **Event Assignment:** Furthered capabilities in event/image assignment with the ability to assign events with GPS to the latest inspections at Section or Sample levels.



- **Asset Management:** Advancements in assigning and unassigning Asset items, as well as viewing and editing of Asset identities. Asset Management tools become visible in the Inventory dropdown menu when Show Asset Items is selected in File >> Database Properties.



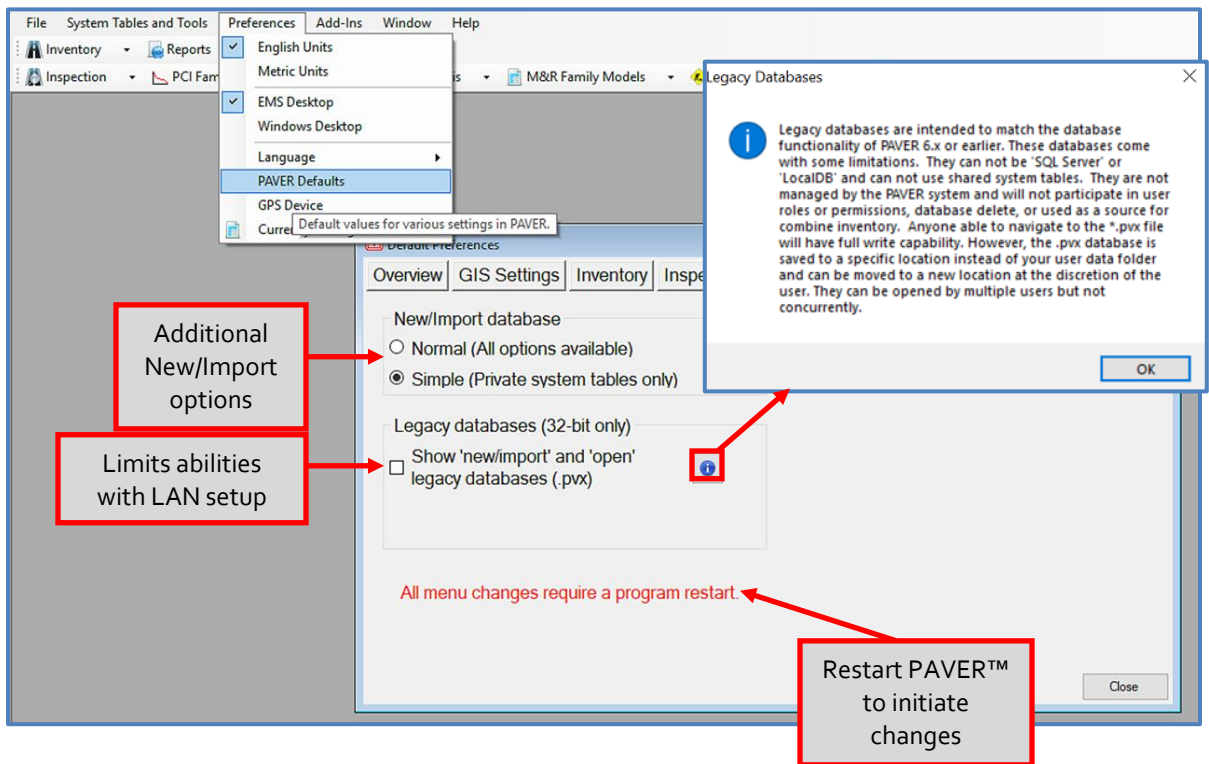
- Centralized Asset Management:** Allows importing of Organization Asset Tables and the creation of Asset Identities (accessible through System Tables >> Edit Inventory Pick List >> Tab 8). Once Asset Identities have been created, they will remain even if the Organization Asset Table is deleted. Centralized Asset Management tools can be found in the Inventory dropdown, once Show Asset Items has been selected in File >> Database Properties.
- Export Open Pavement Database:** When exporting a combined database as an E70 file that contains multiple shapefiles, exported E70s now include the associated Section and Sample files, as compared to inclusion of all shapefiles in version 7.0.9.
- Database Cleanup Tools (Database Verification Tools):** Now nominates unused PCI Family Models that have “Prevent Changes to Model” checked in Family Modeling Tab 3 (Options).
- Database Cleanup Tools (Database Verification Tools):** Now nominates unused PCI Family Models that have “Prevent Changes to Model” checked in Family Modeling Tab 3 (Options).

The screenshot displays the 'Database Cleanup Tool' dialog box. It features a table titled 'Unused System Table Items to Delete' with 185 items found. The table columns are Table, Code, Description, and Selected. The 'Selected' column contains checkboxes, with the first row (Site) checked. Below the table are buttons for 'Select All', 'Select None', 'Delete Selected Items', and 'Close'. A red text box at the bottom of the dialog states: 'Some clean up operations require a program restart to fully complete.'

In the background, the 'Family Modeling' options are visible. The 'Prevent Changes to Model' checkbox is checked and highlighted with a red box. A red text box at the bottom of the page states: 'Selecting this option disables modifiable parameters'.

Table	Code	Description	Selected
Site	7666	Adelphi Laboratory Center	<input checked="" type="checkbox"/>
Minimum Condition Table:	Critical PCI 60		<input type="checkbox"/>
Maintenance Policies	SAFETY M&R, RO		<input type="checkbox"/>
Maintenance Policies	PREVENTIVE, RC		<input type="checkbox"/>
Maintenance Policies	LOCALIZED SAFE		<input type="checkbox"/>
Maintenance Policies	LOCALIZED PREV		<input type="checkbox"/>
Cost Tables	2012 Adelphi Loc I		<input type="checkbox"/>
Cost Tables	2012 Adelphi PCC		<input type="checkbox"/>
Cost Tables	2012 Adelphi AC S		<input type="checkbox"/>
Cost Tables	2012 Adelphi PCC		<input type="checkbox"/>
Cost Tables	2012 Adelphi Stop		<input type="checkbox"/>
Cost Tables	2012 Adelphi AC, F		<input type="checkbox"/>

- **Preferences:** Improved PAVER™ Defaults; addition of Private System Tables Only option that limits the creation and/or import of a database.
- **Legacy Databases:** Ability to limit use of PAVER 7.0.10 in a LAN setup like PAVER™ 6.x. The database can be installed on a server and be accessed by client computers. The multi-user feature will not be available, nor the ability to limit roles of different users.

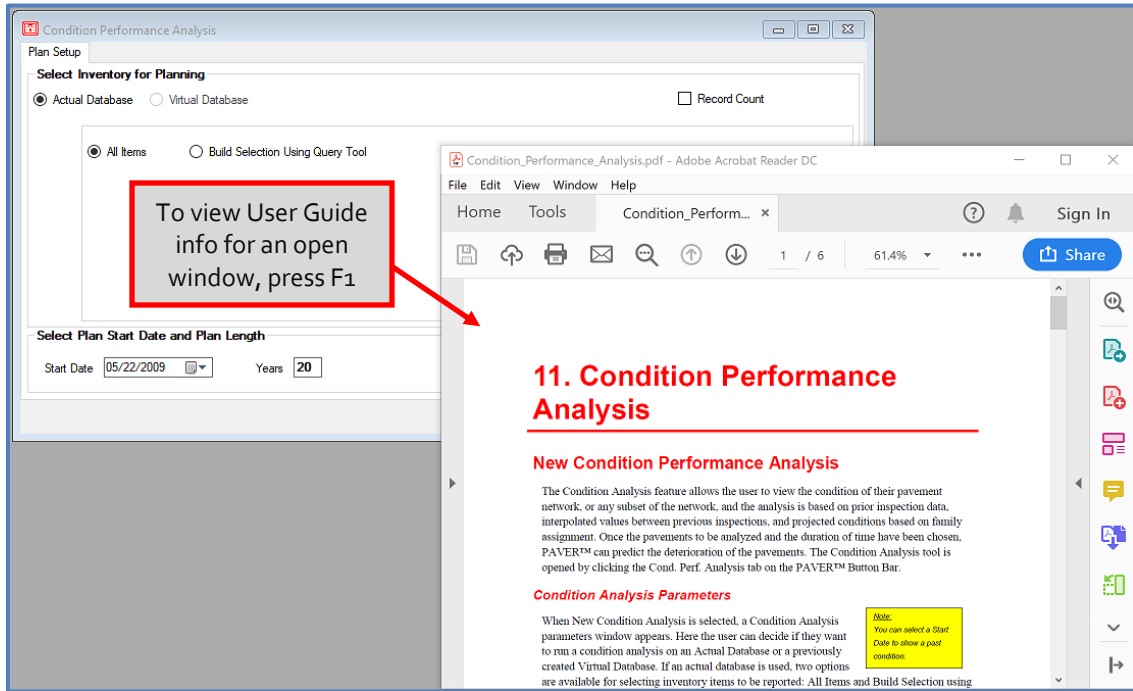


- **Work Required:** Users can now select which repairs to include in a project when using the Distress Maintenance Policy in Project Formulation. Additionally, users can see which distresses are being repaired under the Comments field

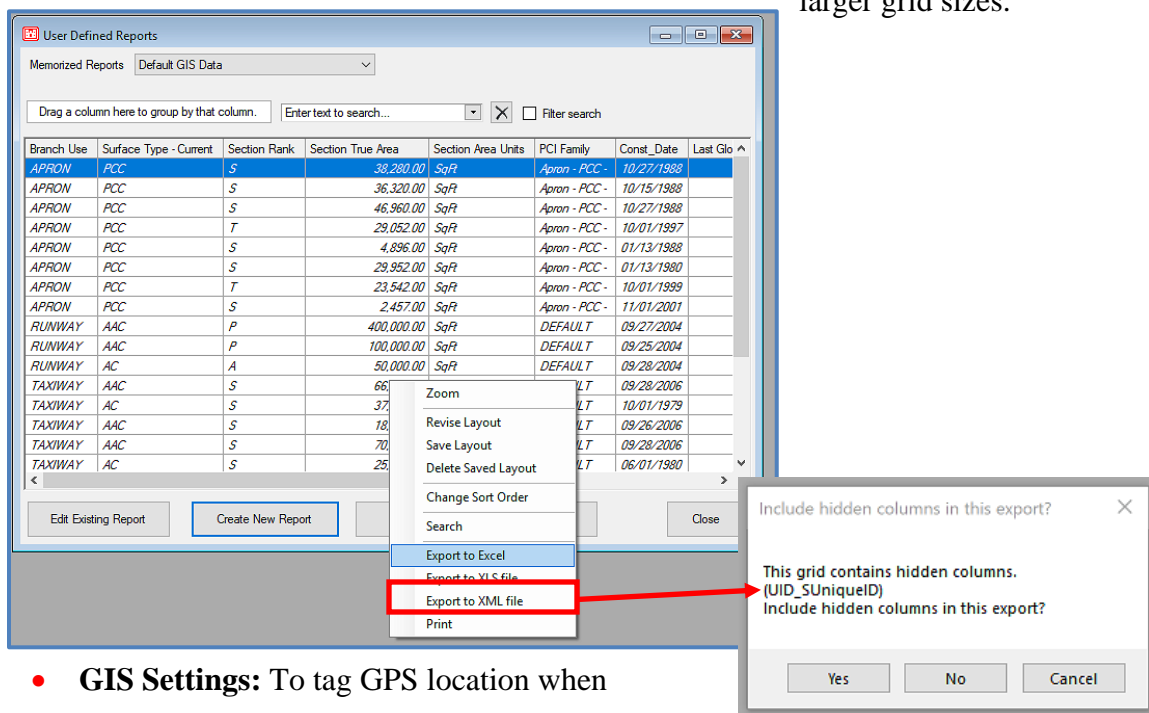
- Section Trend Report:** Now shows current Section Predicted PCI, as well as the Section Average rate of deterioration calculated as the loss in PCI, divided by the Section age.

PAVER™ 7.0.10 – 7.0.11 Added Features

- Pressing F1 on any of the main forms/windows now opens the PAVER™ User Guide to the corresponding information.

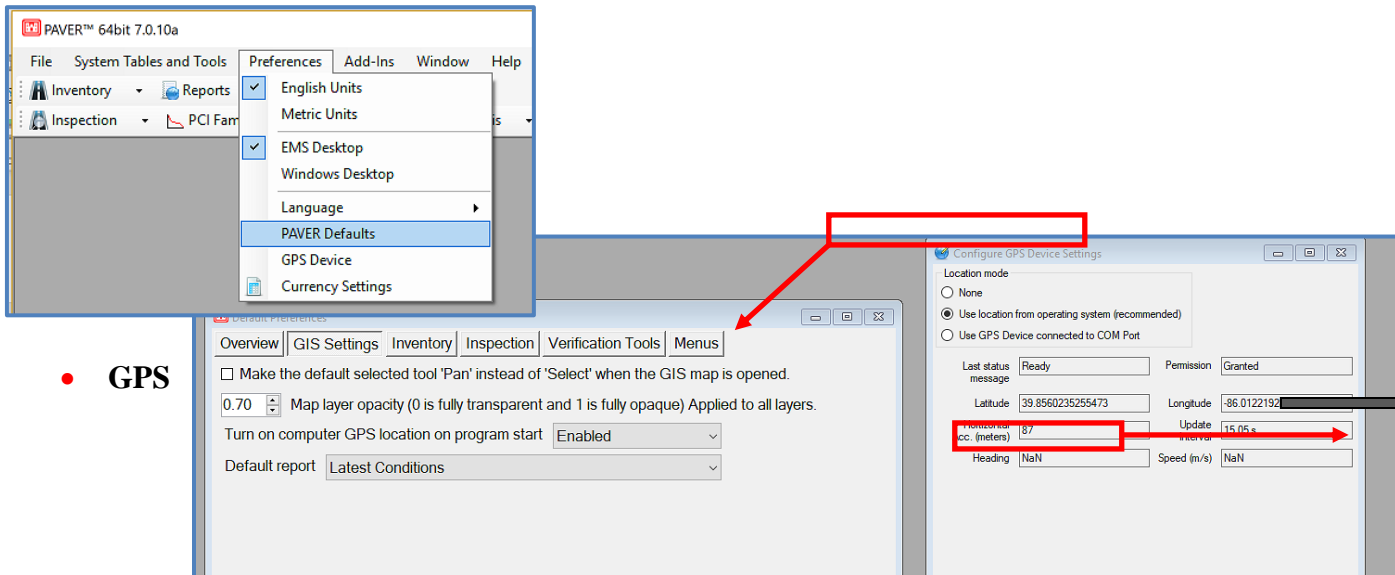


- User Defined Reports:** Added option to include Section Unique ID and other hidden columns (when available) for Excel Export. This option also allows for export of larger grid sizes.

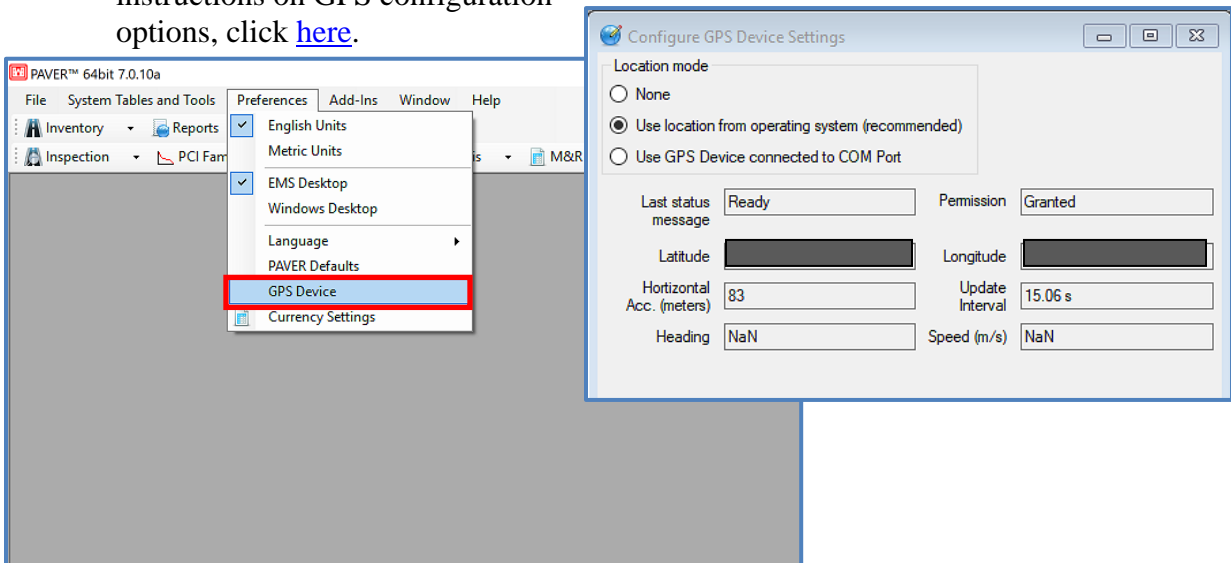


- GIS Settings:** To tag GPS location when

collecting field data; ensure GPS location is enabled (as shown below). Disable this option if distress data entry is performed at an office location.



Device: The Device Location Window has been improved. The Horizontal Accuracy will improve when a GPS Device is connected to the computer or tablet. For instructions on GPS configuration options, click [here](#).



- **PCI Family Models:** Added Nominated Critical PCI based on PCI Family Model Inflection Point. Valid only for Third Degree Polynomial (4 Coefficients) or higher – it is possible that a High Degree Model may have two Inflection Points.

1. Review Model Data 2. Use Boundary / Outlier 3. Options 4. View Equations and Stats 5. Assign Family

Model includes localized preventive work

Associated Database: Neil Armstrong 2015

Critical Condition: 55

Associated Memorized Query: Back Calculation Points Excluded
(Name of the memorized query used in model data harvest.)

Critical Condition Nomination

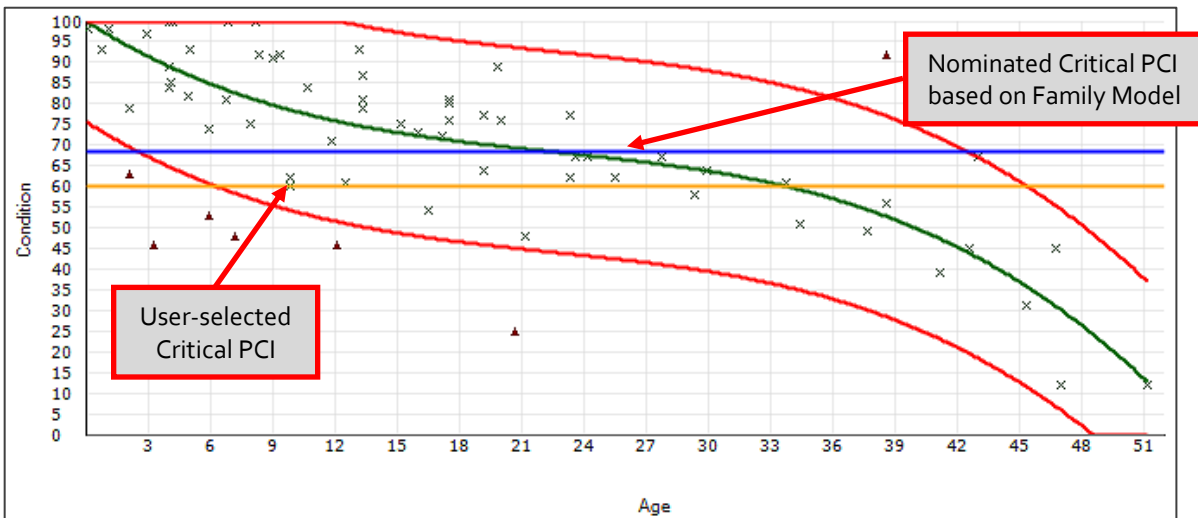
Slope: Constrained Unconstrained

Prevent Changes to Model

Automatically Calculates Number of Coefficients

Include a construction inspection point for each section in calculation

Family Modeling



Example 1 - Critical PCI-based on Inflection Points

- **PCI Family Modeling graph points identification:** Clicking a point on the graph will now identify the corresponding pavement section in the Review Model Data table, as well as any open map or report.

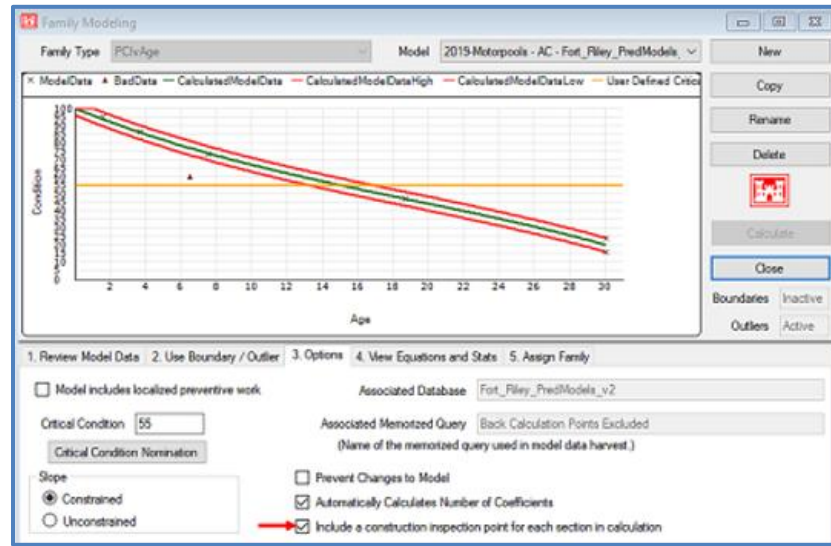
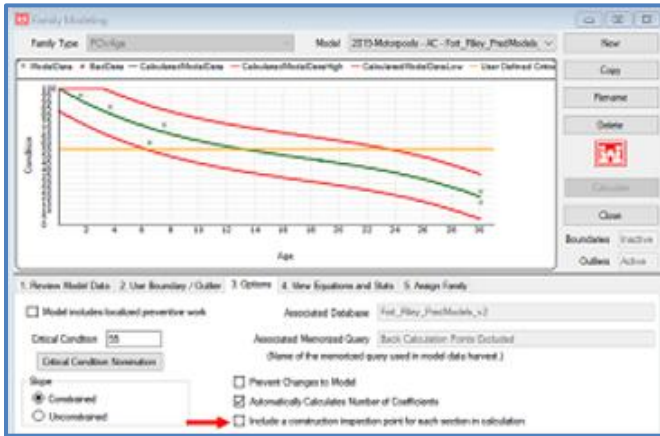
The screenshot shows the software interface with the Family Modeling graph, a data table, and a map. The graph shows Condition vs Age with a red line and a horizontal blue line. The data table has the following columns: Date, Activity, Condition, Work Type.

Date	Activity	Condition	Work Type
06/01/1987	Major	100	New Construction
07/17/1995	Inspection	85	
05/15/1999	Inspection	85	
04/19/2003	Inspection	72	
05/09/2003	Major	100	Back-calculated
08/14/2008	Inspection	81	
08/13/2012	Inspection	84	
05/02/2016	Major	100	Cold Mill and Ov
10/19/2016	Inspection	100	

The map shows a road network with a red line indicating a nominated critical PCI. A red box labeled 'Nominated Critical PCIs' points to this red line.

Example 2 - Critical PCI-based on Inflection Points

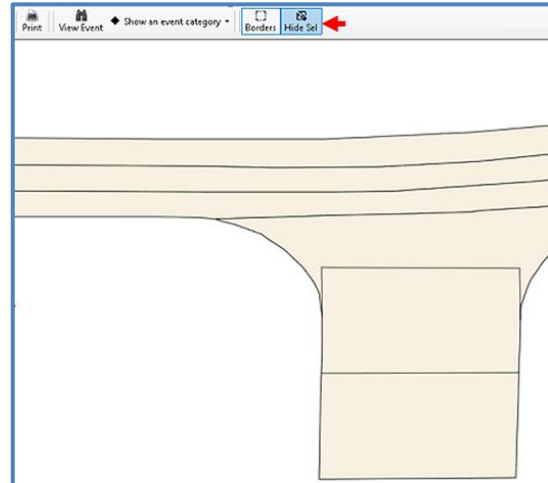
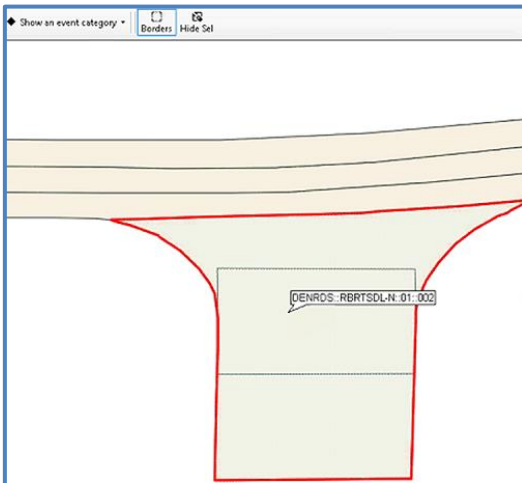
- PCI Family Modeling construction inspection points:** Added ability to include PCI = 100 at age 0 for each pavement section in the model that reflects the condition at construction.



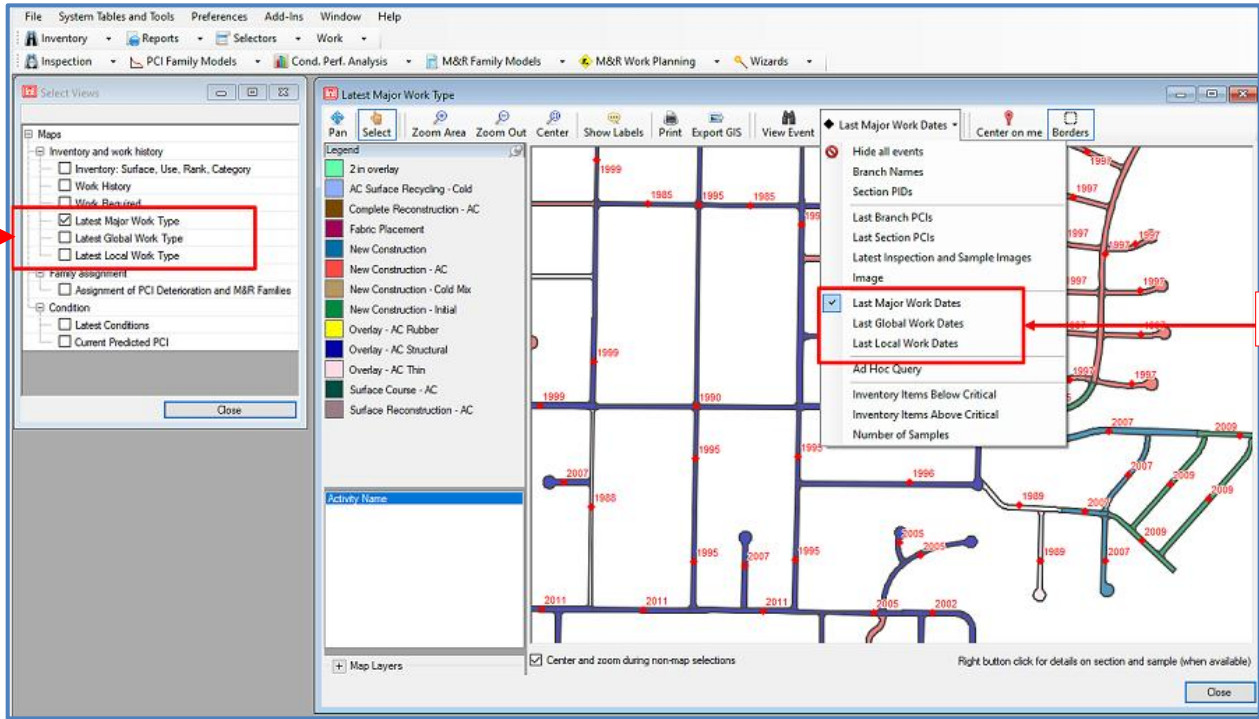
- Define Inventory:** The “From” and “To” fields are no longer mandatory when creating a new Section.

- **Inspection form:** Added ability to use multiplication and addition when entering data in the Edit Inspection form. *Note: Multiplication is the first order of operation.*

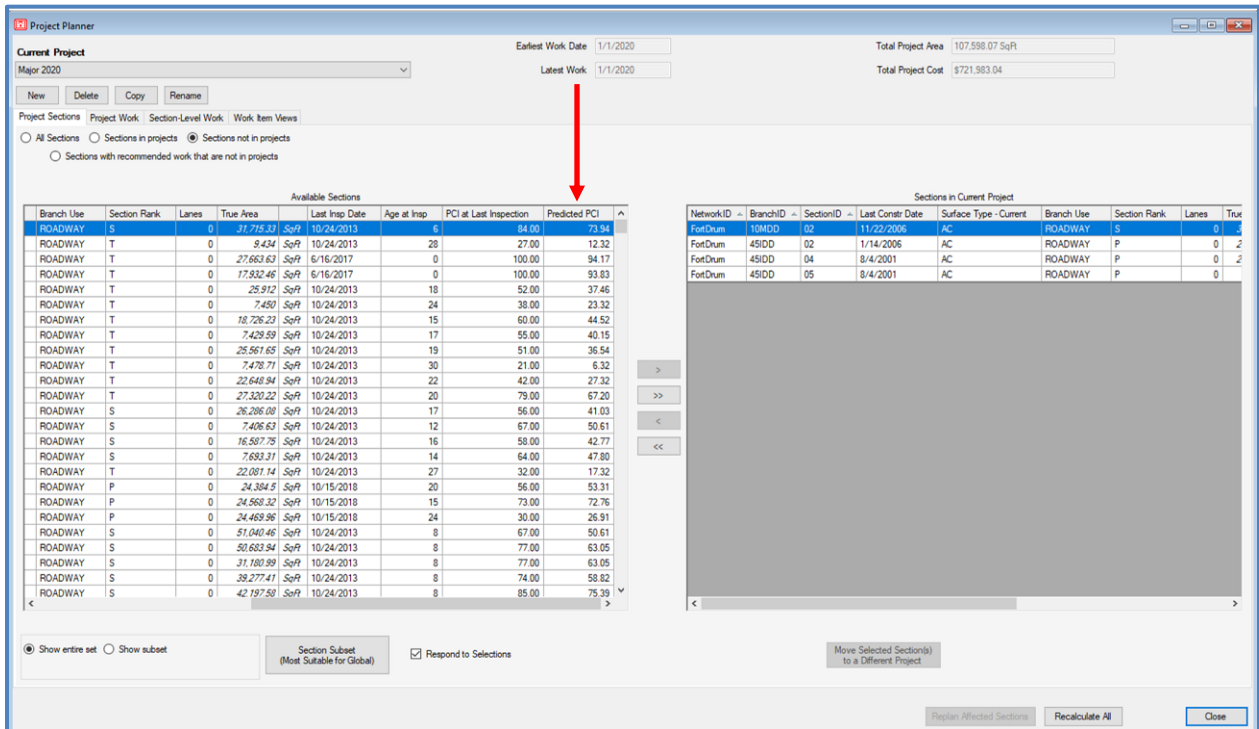
- **GIS display (hide balloon):** Added a feature where the balloon can be hidden with a new “Hide Sel” button.



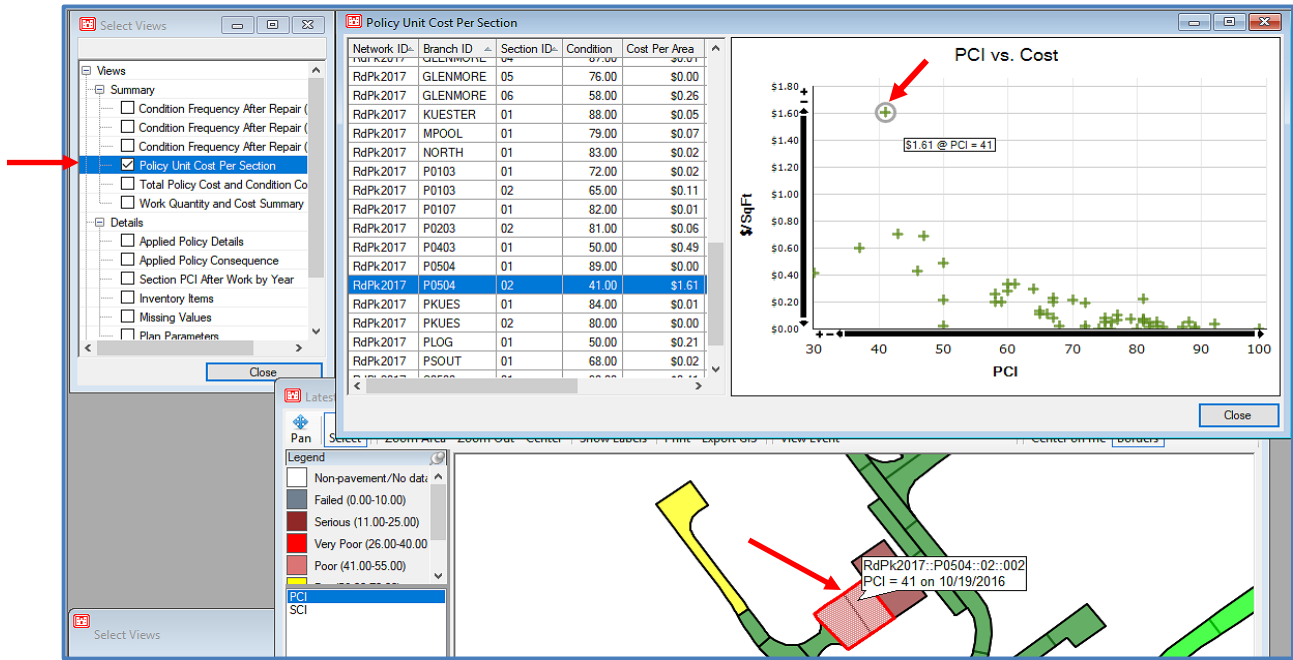
- **GIS reports:** Added 3 views for Latest Work Types (1) and the ability to overlay Work dates (2).



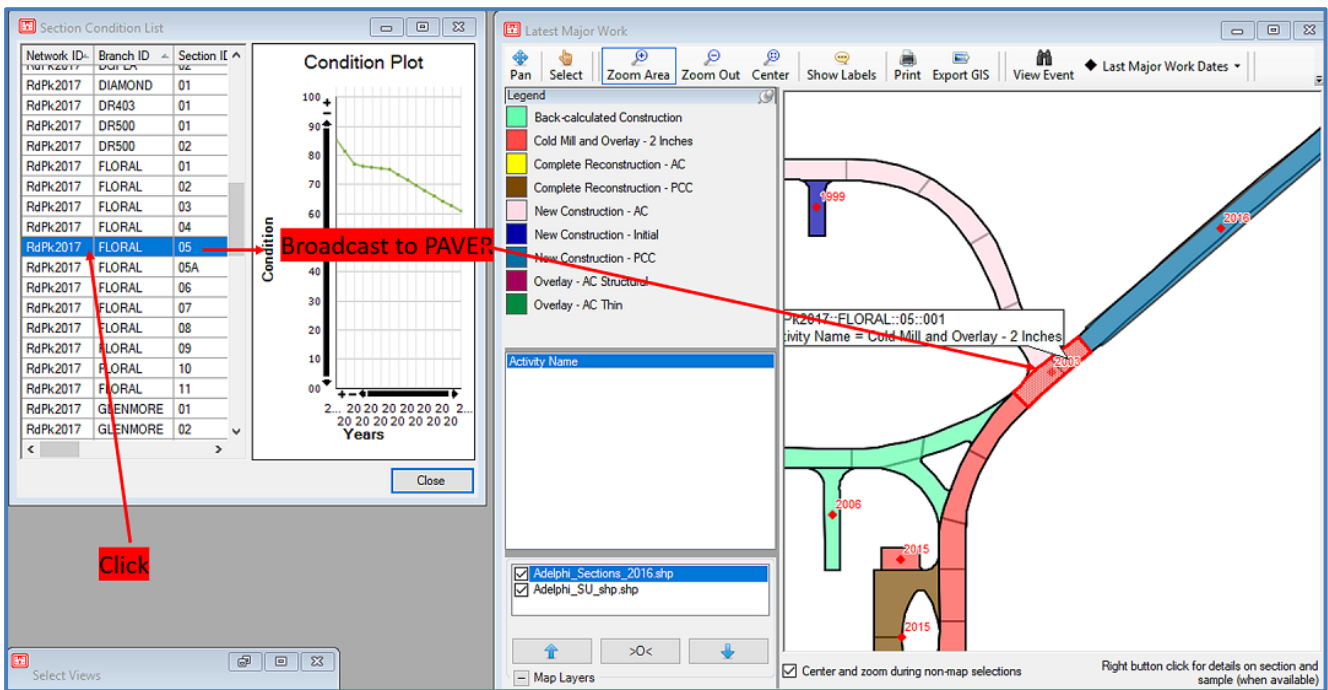
- **Project formulation:** A Predicted PCI column field has been added to the Project Sections tab.



- **Work Plan graph points identification (Consequence Analysis > Policy Unit Cost view):** Clicking a point on the graph will identify the corresponding pavement section in the Policy Unit Cost table, as well as on any open map.



- **Grids containing pavement sections:** Now act as one-way broadcasters.



- Improved surface calculation:** Surface calculations were improved to address conflicting Work History data, and to correctly calculate surface changes when the initial section surface definition is “unsurfaced.” In the example below, new construction AC and PCC were entered on the same day.

Network	Branch	Section	Exceptions	Details
MANSFIE	14-32	F (inter)	Cached inventory surface changed	10/01/2008: Unknown -->> A
MANSFIE	APRON	B	Cached inventory surface changed	01/13/1983: PCC -->> APC
MANSFIE	APRON	B	Cached inventory surface changed	01/05/2001: PCC -->> APC
MANSFIE	APRON	B	Cached inventory surface changed	05/24/2002: AC -->> APC
MANSFIE	RUNUP AR	14	Cached inventory surface changed	01/13/2001: PCC -->> APC
MANSFIE	RUNUP AR	14	Cached inventory surface changed	06/24/2009: APC -->> AC
MANSFIE	RUNUP AR	14	Cached inventory surface changed	11/30/2015: APC -->> AC
MANSFIE	RUNUP AR	14	Changed current surface	APC -->> AC
MANSFIE	RUNUP AR	32	Cached inventory surface changed	09/20/2005: PCC -->> AC
MANSFIE	TWY	A1	Cached inventory surface changed	07/10/1980: AC -->> AAC
MANSFIE	TWY	A1	Cached inventory surface changed	05/17/2002: AC -->> AAC
MANSFIE	TWY	A2	Cached inventory surface changed	01/13/1979: AC -->> AAC
MANSFIE	TWY	A2	Cached inventory surface changed	05/17/2002: AC -->> AAC
MANSFIE	TWY	D1	Cached inventory surface changed	01/13/1963: PCC -->> AC
MANSFIE	TWY	D1	Cached inventory surface changed	07/10/1980: PCC -->> AAC
MANSFIE	TWY	D1	Cached inventory surface changed	05/13/2002: AC -->> AAC
MANSFIE	TWY	D1-1	Conflicting Work History Items could not calculate surface on this date	01/13/1946: AC
MANSFIE	TWY	D1-2	Conflicting Work History Items could not calculate surface on this date	01/13/1946: AC
MANSFIE	TWY	D1-3	Conflicting Work History Items could not calculate surface on this date	01/13/1946: AC
MANSFIE	TWY	D1-4	Conflicting Work History Items could not calculate surface on this date	01/13/1946: AC
MANSFIE	TWY	D1-4	Cached inventory surface changed	09/20/2005: AAC -->> AC
MANSFIE	TWY	D1-4	Cached inventory surface changed	12/03/2015: AAC -->> AC
MANSFIE	TWY	D1-4	Changed current surface	AAC -->> AC
MANSFIE	TWY	D2	Cached inventory surface changed	07/10/1980: AC -->> AAC

Date	Work	Work Code	Material	Material Code	Thickness	Thickness Units	Major MR
01/13/1946	New Construction - AC	NC-AC			.00	in	<input checked="" type="checkbox"/>
01/13/1946	New Construction - PCC	NC-PC	Portland Cement Concrete	110	9.00	in	<input checked="" type="checkbox"/>
01/13/1946	Subbase - Aggregate	SB-AG	Gravel and Crushed Stone	211	5.00	in	<input type="checkbox"/>

- Changes to support more secure cryptography requirements:** Changed password tokens to a more secure format. In multi-user mode, users will have to type in their password after upgrading to 7.0.11. During this upgrade, the old password is removed. If you decide to downgrade to 7.0.10 or earlier, you must have your administrator reset PAVER™ user passwords. *Note: During a downgrade, user accounts will be “non-password protected.”*

- Procedure to reset password if “Username or Password Incorrect” message is displayed.**

- Find the user data folder. The default location is C:/Users/Public/Public Documents/SMS User Data.

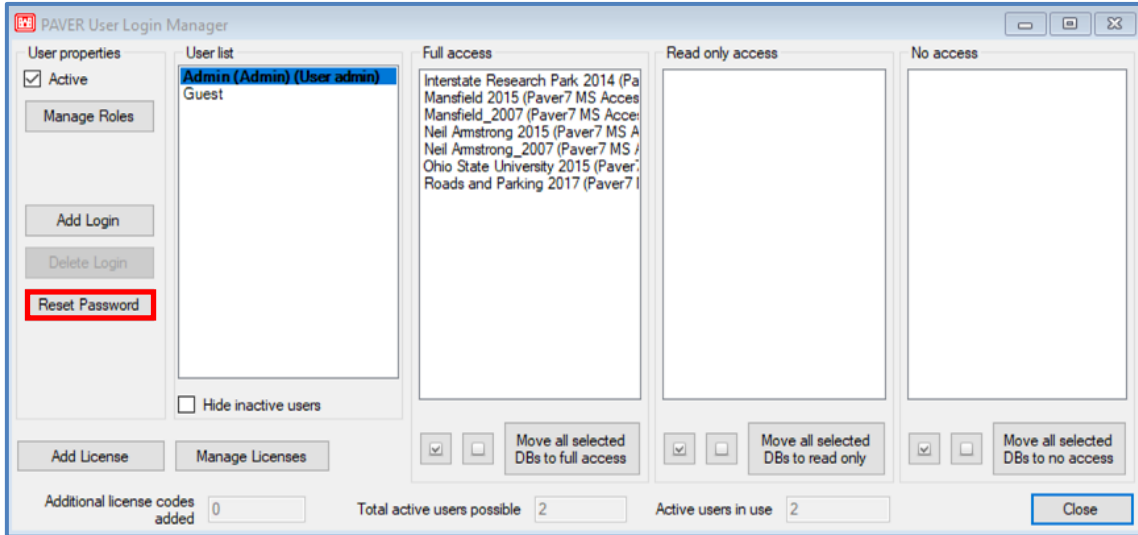
Note: If this folder was not used to store your user data, you can find your user data folder by running: C:/Program Files (x86)/EMS/Bin71/WorkgroupConfiguration.exe

- Copy the file path for the user data folder into Windows File Explorer.
- Navigate to <User Data>\Shared\System\sms070.dat which contains any user names that were set up and their permissions.
- Delete sms070.dat

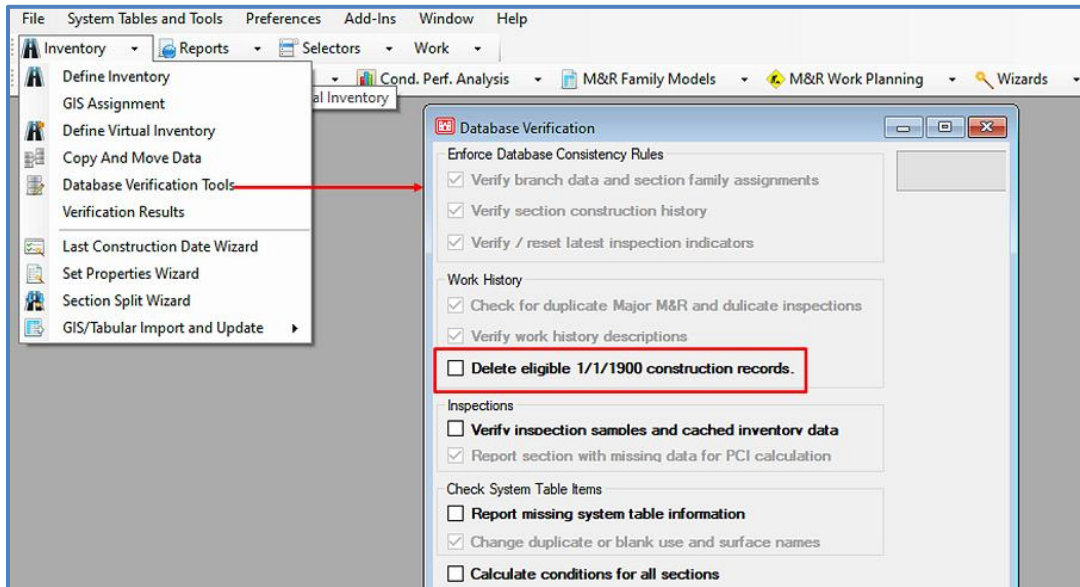
Note: This should only be done in a single-user environment to prevent having to re-enter additional PAVER™ license keys.

- You should now have the ability to log into PAVER™ as “Admin” user.

Note: The password field is ignored in PAVERTM 7.0.7 + for “Admin” until it is set.



- **Delete 1900 construction dates:** Added a Wizard with the ability to delete 1/1/1900 Major M&R; provided there is another Major M&R recorded and no inspections will be left as orphans.



- **Additional 7.0.11 changes:**
 - Improved the round-off of distress % area for inspection area measured distresses.
 - Improved formula for calculating total number of slabs and Joint length to account for section area adjustment.
 - Increased the number of stored digits when creating new User Defined fields using Real Number.
 - Removed the Window Minimize and Maximize buttons when installing PAVER on the Cloud to avoid user confusion.
 - Database import function has been updated to automatically repair data that is not supported by SQL Server. Data repair may be necessary for older databases that were originally created using Microsoft Access, with functions that are not allowed using SQL.

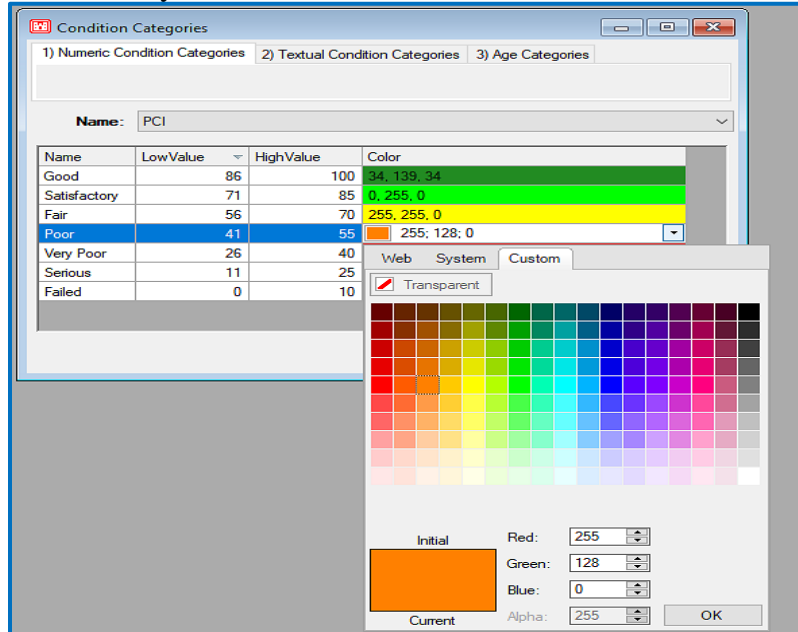
- **Corrected 7.0.11 issues:**
 - The last opened database now automatically opens when PAVER™ is opened.
 - Sample distresses without severity levels, such as concrete “Shrinkage Cracking,” will now show “N/A” for the severity level instead of “Low” on the Edit Inspection form.
 - Corrected an error associated with the import of Inventory Sample Units using Excel.
 - Resolved an error that occurred when replacing Networks during the database combine function.

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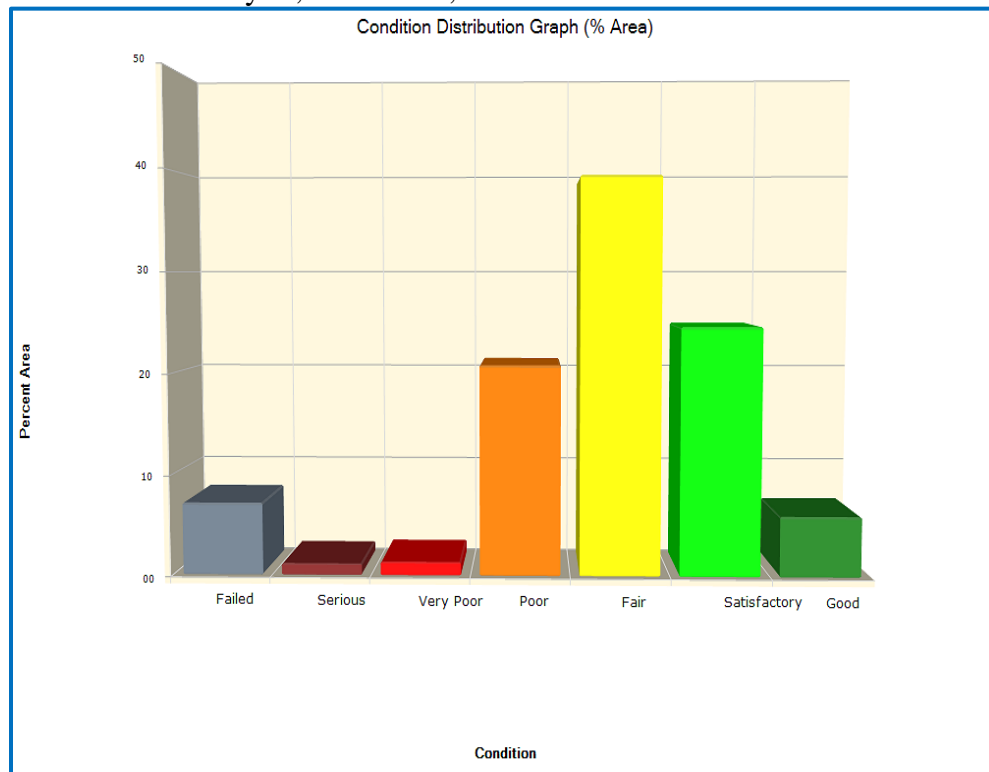
PAVER™ 7.0.11 – 7.1 Added Features

- **System Tables – Condition Categories:**

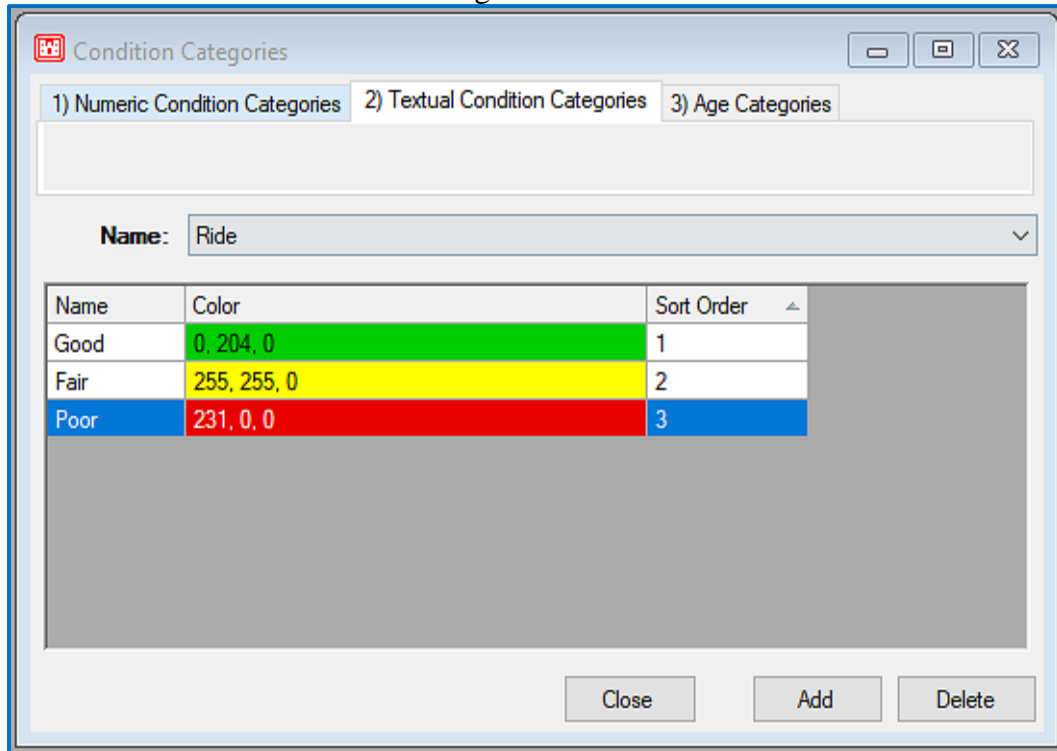
- Added the ability to choose custom colors.



- The colors are utilized throughout PAVR including: Summary Charts, Condition Analysis, Work Plan, and GIS

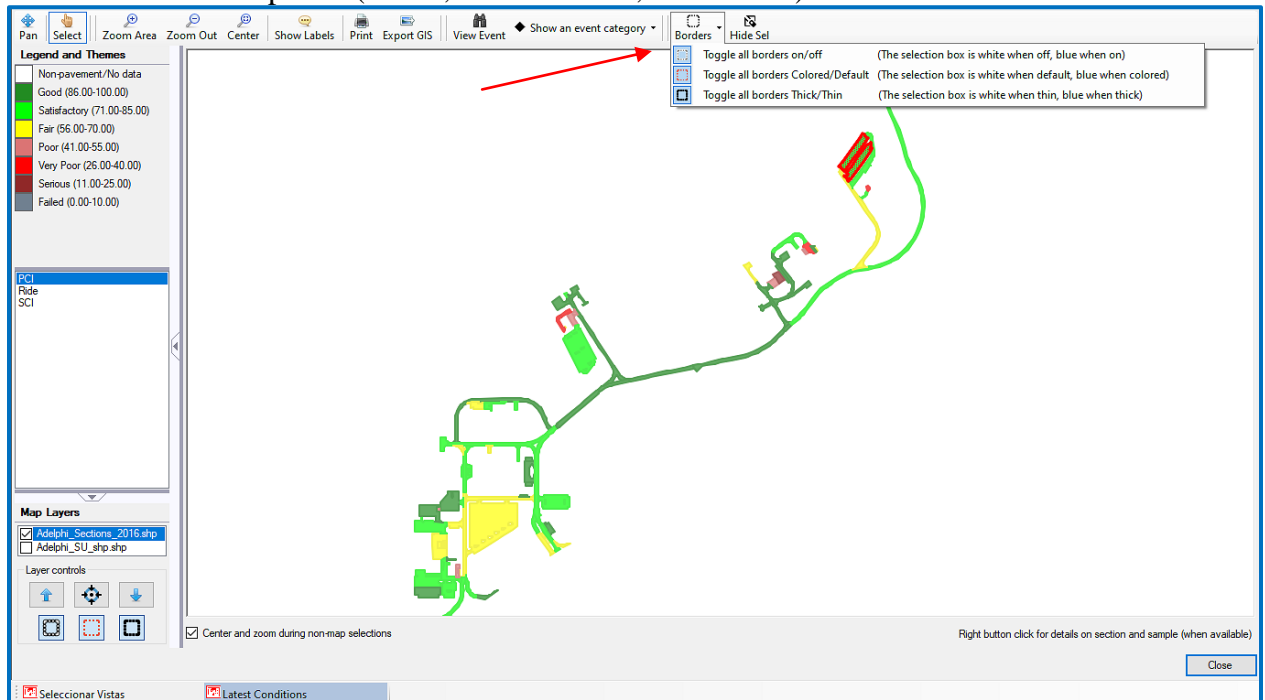


- Added Textual Condition Categories.

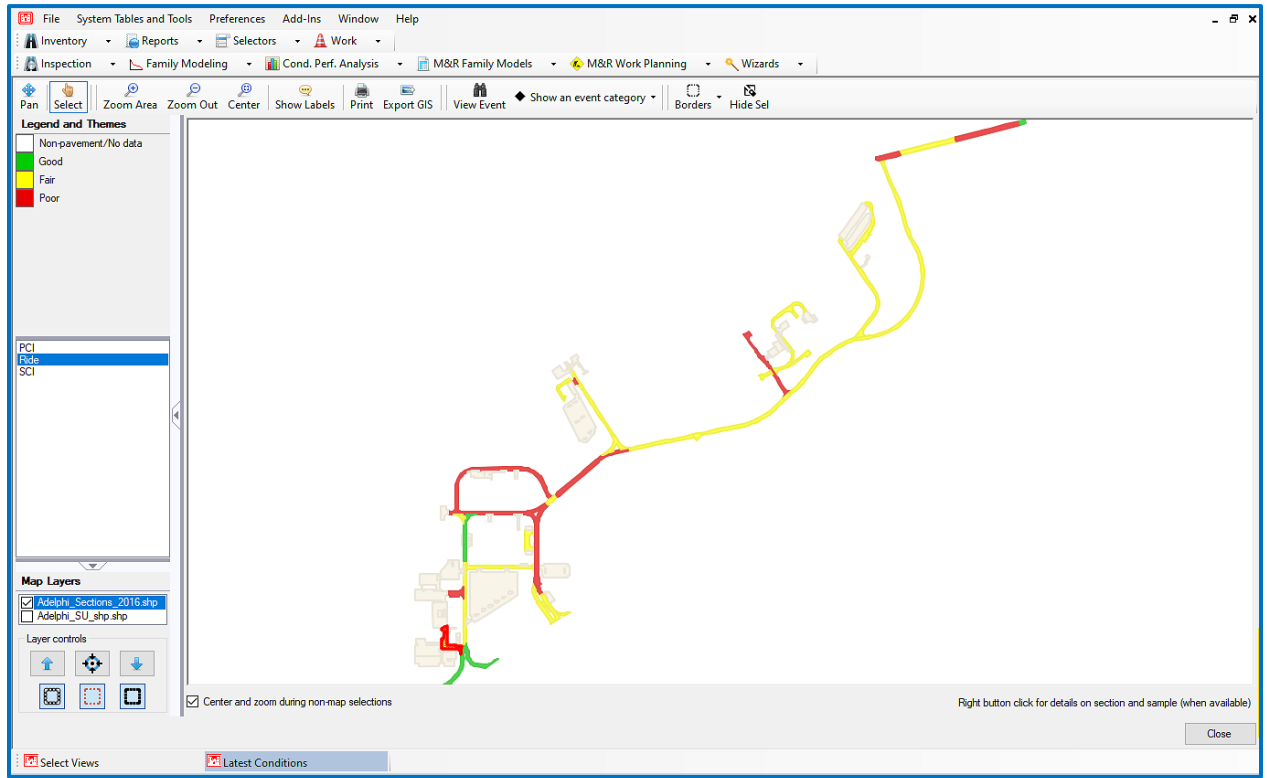


- **GIS Views:**

- Added Border Options (on/off, Colored/Dark, Thick/Thin).

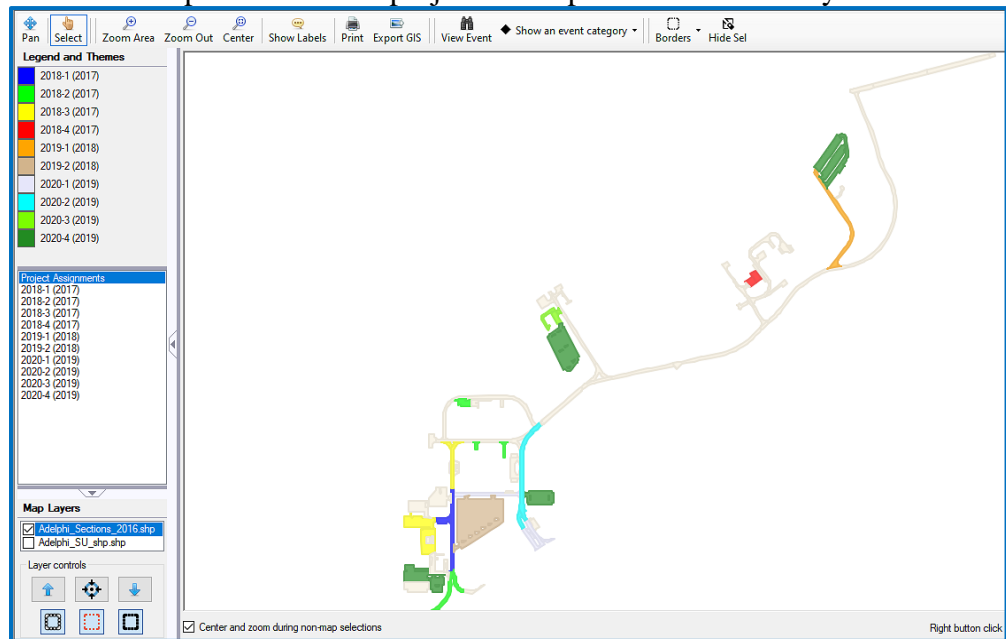


- Added Textual Conditions:

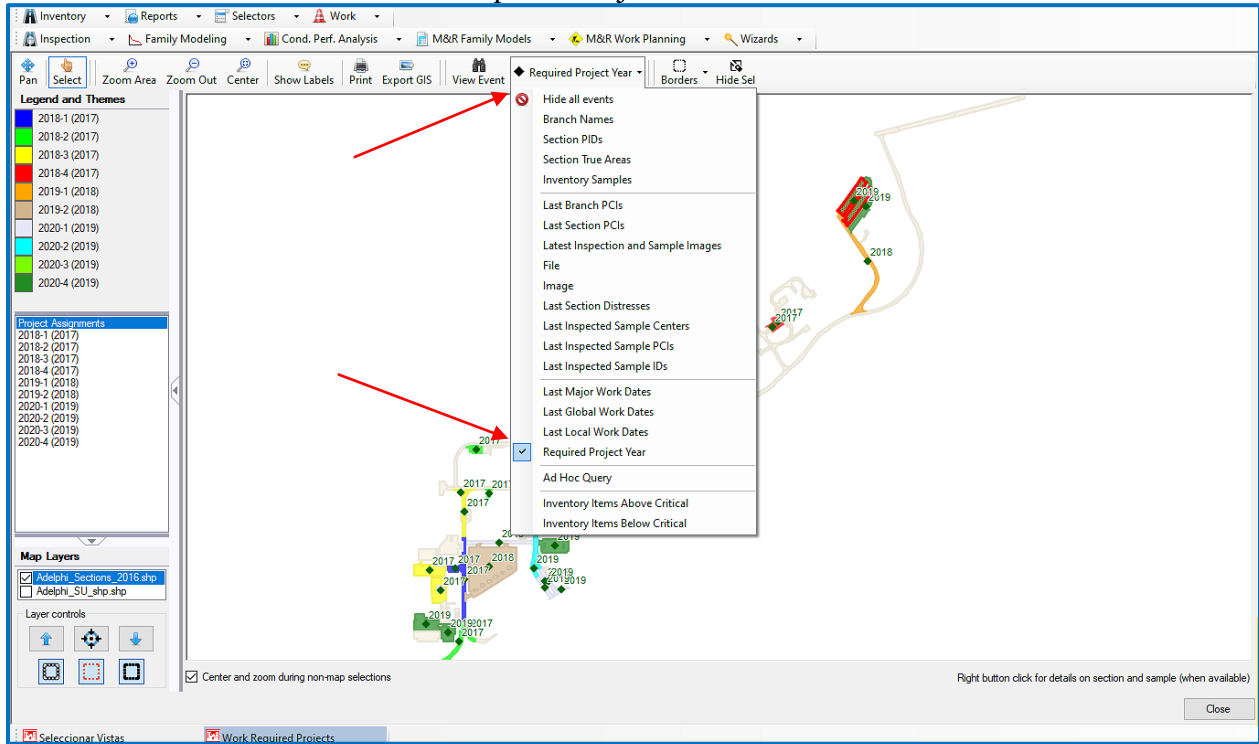


- Work Required Projects:

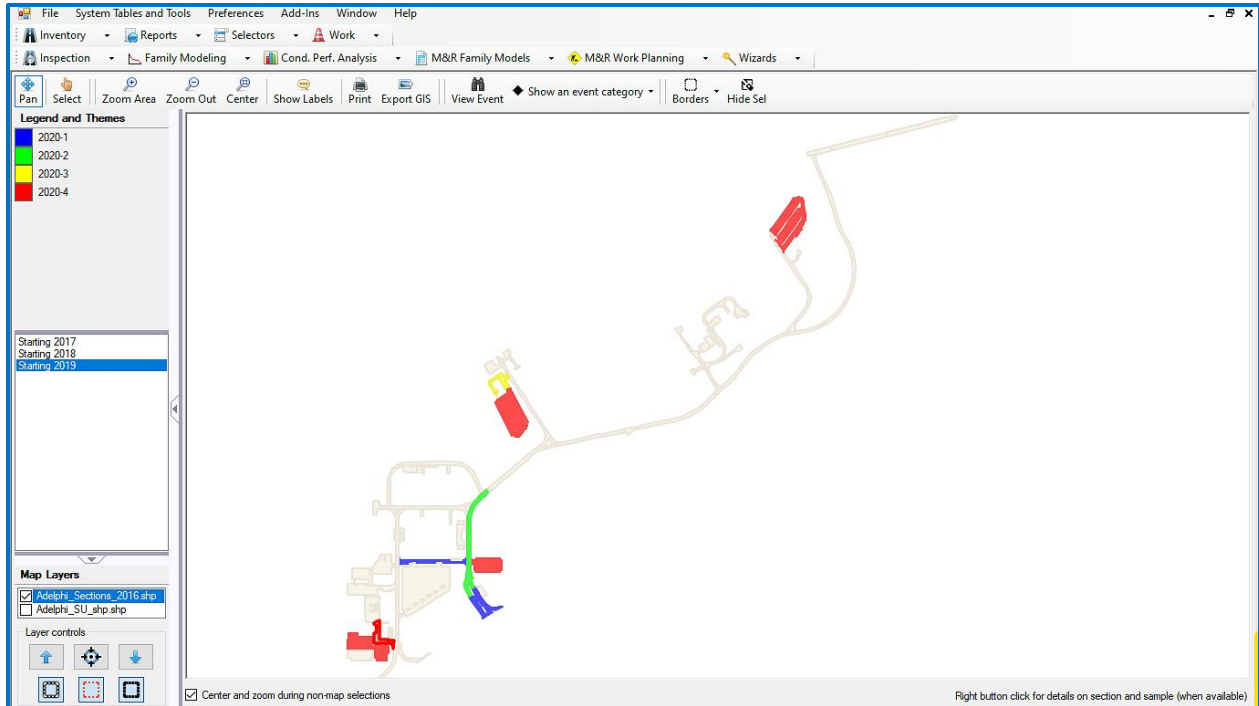
- Improved to show projects even planned before today.



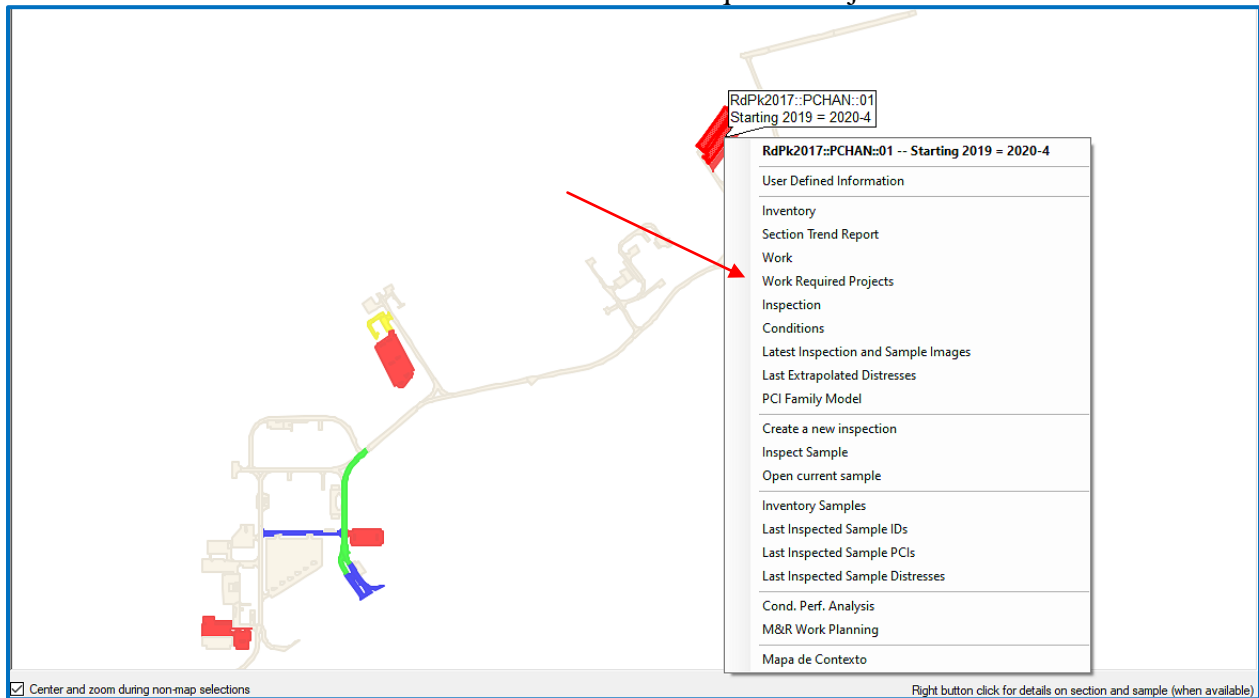
- Show an Event Category:
 - Added “Required Project Year”:



- Work Required Projects By Year:
 - Added new view:



- Right-button click:
 - Added view for Work Required Projects

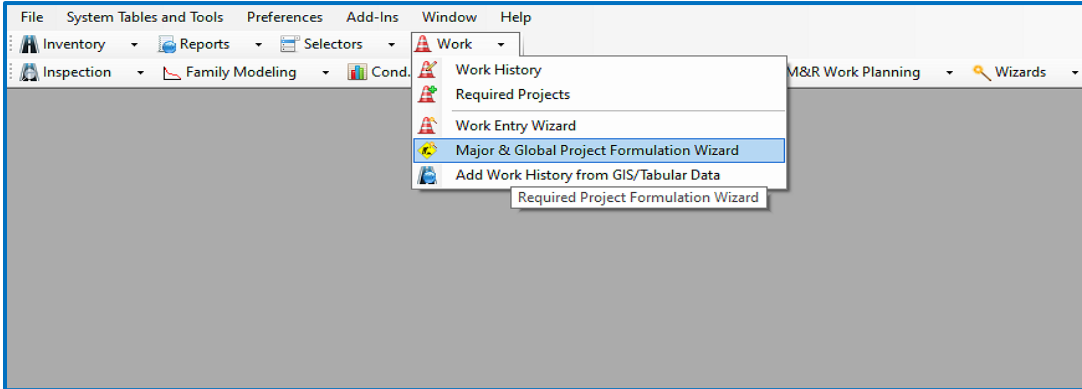


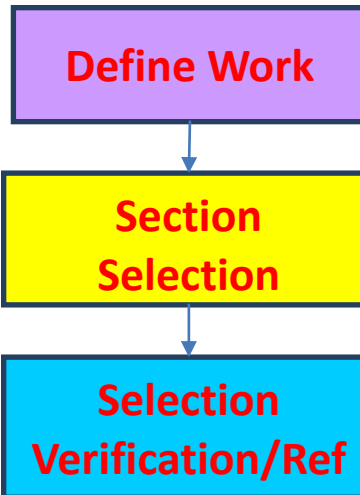
Project Name	Total Cost	Total Area (SqFt)	Section Count	Start Date	End Date
2020-4	\$122,891.34	190,685.65	6	10/01/2019	10/01/2019

PID	Work Category	Work	Activity Date	Cost	Quantity
<i>RdPk2017::PCHAN::01</i>	Localized MR	Crack Sealing - AC	10/01/2019	\$2,550.00	1,020.00 Ft
<i>RdPk2017::MPOOL::01</i>	Localized MR	Crack Sealing - AC	10/01/2019	\$820.20	328.08 Ft
<i>RdPk2017::PKUES::02</i>	Localized MR	Crack Sealing - AC	10/01/2019	\$3,000.00	1,200.00 Ft
<i>RdPk2017::P0107::01</i>	Localized MR	Crack Sealing - AC	10/01/2019	\$115.75	46.30 Ft
<i>RdPk2017::PEAST::01</i>	Localized MR	Crack Sealing - AC	10/01/2019	\$662.50	265.00 Ft
<i>RdPk2017::ACHAN::01</i>	Localized MR	Crack Sealing - AC	10/01/2019	\$57.50	23.00 Ft
<i>RdPk2017::ACHAN::01</i>	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$9,789.10	16,315.16 SqFt
<i>RdPk2017::P0107::01</i>	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$9,359.93	15,599.89 SqFt
<i>RdPk2017::PCHAN::01</i>	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$24,846.71	41,411.18 SqFt
<i>RdPk2017::MPOOL::01</i>	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$16,922.80	28,204.66 SqFt
<i>RdPk2017::PKUES::02</i>	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$36,580.61	60,967.69 SqFt
<i>RdPk2017::PEAST::01</i>	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$16,912.24	28,187.07 SqFt
<i>RdPk2017::MPOOL::01</i>	Localized MR	Patching - AC Deep	10/01/2019	\$1,274.00	182.00 SqFt

- **Project Formulation Wizard:**

- A new Wizard with new capabilities
- When creating projects use predicted PCI at time of project start date.
- When creating projects, time since Major or Global, should optionally consider already defined projects.
- Global frequency does not apply to time since Major.





1. Select Major or Global Work Type
2. Select Pre-Application Distress Maintenance Policy
3. Select Work Type Cost Table
4. Section Selection > EMS Query (optional)
+ Selection Set:
 - 1 of 3 > Engineering Fields.
 - 2 of 3 > Age and Condition Parameters.
 - 3 of 3 > Distress Type/Severity ranges to limit section inclusion
1. Selection Verification/ Refinement
 - a. Using Tree/ Map
 - b. Using Grid
2. View of Final Project Map

- Add Global or Major Work Type:

Edit Work Item -- Project Level

Work Category * Global MR Work Type * (ST-MS) - Surface Treatment - Micro Surface

Work Date * 03/15/2022 Material Type

Thickness 0.00 in

Select Item to Be Calculated

Unit Cost \$0.35 / SqFt Unit Cost From Table \$0.60

Quantity 1,029,916.45 SqFt 2012 Adelphi Global

Total Cost \$360,470.76

Comments

* PAVER Mandatory field

OK Cancel

Add Work Edit Work Delete Work

- Pre-Application Distress Maintenance Policy:

Pre-Application Localized M&R Policy

Localized Policy Work Activity Date 03/15/2022

Select Distress Maintenance Policy to pre-apply.

PREVENTIVE , ROADS (DEFAULT) Edit

Distress	Severity	Description	Code	Work Type	Work Unit
01 - ALLIGATOR CR	Medium	ALLIGATOR CRACKING	PA-AD	Patching - AC Deep	SqFt
01 - ALLIGATOR CR	High	ALLIGATOR CRACKING	PA-AD	Patching - AC Deep	SqFt
03 - BLOCK CR	High	BLOCK CRACKING	CS-AC	Crack Sealing - AC	Ft
03 - BLOCK CR	Medium	BLOCK CRACKING	CS-AC	Crack Sealing - AC	Ft
04 - BUMPS/SAGS	Medium	BUMPS/SAGS	PA-AS	Patching - AC Shallow	SqFt
04 - BUMPS/SAGS	High	BUMPS/SAGS	PA-AS	Patching - AC Shallow	SqFt
05 - CORRUGATION	Medium	CORRUGATION	PA-AS	Patching - AC Shallow	SqFt
05 - CORRUGATION	High	CORRUGATION	PA-AS	Patching - AC Shallow	SqFt
06 - DEPRESSION	High	DEPRESSION	PA-AD	Patching - AC Deep	SqFt
06 - DEPRESSION	Medium	DEPRESSION	PA-AD	Patching - AC Deep	SqFt
07 - EDGE CR	Medium	EDGE CRACKING	CS-AC	Crack Sealing - AC	Ft
07 - EDGE CR	High	EDGE CRACKING	PA-AS	Patching - AC Shallow	SqFt
08 - JT REF. CR	High	JOINT REFLECTION CRACKING	PA-AS	Patching - AC Shallow	SqFt

- Localized M&R Cost Table:

Localized M&R Policy Unit Costs

Select Cost table: 2012 Adelphi Loc Preventive

Code	Name	Cost	Units
<i>NONE</i>	<i>No Localized M & R</i>	\$0.00	<i>SqFt</i>
<i>CS-AC</i>	<i>Crack Sealing - AC</i>	\$2.50	<i>Ft</i>
<i>JS-SI</i>	<i>Joint Seal - Silicon</i>	\$3.50	<i>Ft</i>
<i>CS-PC</i>	<i>Crack Sealing - PCC</i>	\$2.50	<i>Ft</i>
<i>GR-PP</i>	<i>Grinding (Localized)</i>	\$4.80	<i>Ft</i>
<i>JS-LC</i>	<i>Joint Seal (Localized)</i>	\$2.50	<i>Ft</i>
<i>PA-AD</i>	<i>Patching - AC Deep</i>	\$7.00	<i>SqFt</i>
<i>PA-AL</i>	<i>Patching - AC Leveling</i>	\$1.50	<i>SqFt</i>
<i>PA-AS</i>	<i>Patching - AC Shallow</i>	\$3.25	<i>SqFt</i>
<i>PA-PF</i>	<i>Patching - PCC Full Depth</i>	\$25.00	<i>SqFt</i>
<i>PA-PP</i>	<i>Patching - PCC Partial Depth</i>	\$6.50	<i>SqFt</i>
<i>SH-LE</i>	<i>Shoulder leveling</i>	\$2.00	<i>Ft</i>
<i>SL-PC</i>	<i>Slab Replacement - PCC</i>	\$18.00	<i>SqFt</i>
<i>UN-PC</i>	<i>Undersealing - PCC</i>	\$2.50	<i>Ft</i>

- Selection Set:

Section Selection

Restrict Selections?

Query Tool

Select a subset of Sections Using the Query Tool

Selection Set

New/Saved Selection Set

Example Global M&R Selection Set

Buttons: Create New, Copy, R, Copy

New Selection Set dialog box:

Name:

Buttons: OK, Cancel

Selection Sets consist of Engineering Fields, Age and Condition Ranges, and Distress Ranges.

- Selection Set 1 of 3:

Major & Global Project Formulation Wizard

Selection Set 1 of 3 - Engineering Fields (Micro Surfacing)

Update Section counts based on selection.

Branch Use

Selected	Name	Section Count
<input checked="" type="checkbox"/>	ROADWAY	40
<input type="checkbox"/>	PARKING	0
<input type="checkbox"/>	STORAGE	0

Select All Select None

Surface Type

Selected	Name	Section Count
<input checked="" type="checkbox"/>	AAC	13
<input checked="" type="checkbox"/>	AC	27
<input type="checkbox"/>	PCC	0

Select All Select None

Section Rank

Selected	Name	Section Count
<input checked="" type="checkbox"/>	S	15
<input checked="" type="checkbox"/>	T	5
<input checked="" type="checkbox"/>	P	20

Select All Select None

- Selection Set 2 of 3:

Major & Global Project Formulation Wizard

Selection Set 2 of 3 - Age and Condition (Micro Surfacing)

Treat selected work required projects as work history.

Copy values from saved Selection Set:

Age and Condition Filters	Selected	Minimum	Maximum
Predicted PCI at Project Start Date	<input checked="" type="checkbox"/>	60.00	96.00
Time Since Major (years)	<input checked="" type="checkbox"/>	2.00	100.00
Time Since Global (years)	<input checked="" type="checkbox"/>	6.00	100.00
PCI at Last Insp.	<input checked="" type="checkbox"/>	.00	100.00
% Climate at Last Insp.	<input checked="" type="checkbox"/>	.00	100.00
% Load at Last Insp.	<input checked="" type="checkbox"/>	.00	100.00
Latest FOD Index	<input checked="" type="checkbox"/>	.00	100.00
Latest SCI	<input checked="" type="checkbox"/>	.00	100.00

- Selection Set 3 of 3:

Major & Global Project Formulation Wizard

Selection Set 3 of 3 - Define Distress Ranges (Micro Surfacing)

Select a Distress Range set to apply. Changes to these ranges will save automatically.

Distress Severity and Density Ranges to include: Example Roadways - Slurry Seals

Distress code	Severity	Minimum Density	Maximum Density
01 - ALLIGATOR CR	L + M + H	0	10
01 - ALLIGATOR CR	M + H	0	5
05 - CORRUGATION	L + M + H	0	25
06 - DEPRESSION	L + M + H	0	30
06 - DEPRESSION	M + H	0	10
08 - JT REF. CR	M + H	0	10
10 - L & T CR	M + H	0	10
13 - POTHOLE	L + M + H	0	20
13 - POTHOLE	M + H	0	20
15 - RUTTING	M + H	0	10
16 - SHOIVING	L + M + H	0	10
17 - SLIPPAGE CR	L + M + H	0	10
18 - SWELL	M + H	0	20

Buttons: New Table, Copy Table, Delete Table

Buttons: Cancel, < Back, Next >, Finish

- Selection Refinement:

Refine Selected Sections

Legend

- Adelphi_Sections_2016.sj
- Adelphi_SU_shp.shp

Map Layers

29 Sections Selected

Buttons: Pan, Select, Select Area, Zoom Area, Zoom Out, Center, Print, View Event, Show an event category, Borders, Hide Sel

Buttons: >O<, Map Layers

Center and zoom during non-map selections

Right button click for details on section and sample (when available)

• Selection Verification:

Verify Selected Sections														
Selected	NetworkID	BranchID	SectionID	Branch Use	Surface Type - Current	Section Rank	Last Constr Date	True Area	Last Insp Date	Age at Insp	Global M&R Cost	Localized M&R Cost	Predicted PCI at Project Start Date	Total Cost
<input checked="" type="checkbox"/>	RdPk2017	NORTH	01	ROADWAY	AAC	P	08/12/2006	24,395.57	10/19/2016	10	\$9,538.45	\$449.12	72.39	\$9,987.57
<input checked="" type="checkbox"/>	RdPk2017	KUESTER	01	ROADWAY	AC	S	06/01/2007	15,988.49	10/19/2016	9	\$5,595.97	\$922.25	76.38	\$6,518.22
<input checked="" type="checkbox"/>	RdPk2017	KUESTER	02	ROADWAY	AAC	S	05/02/2016	7,904.44	10/19/2016	0	\$2,766.55	\$0.00	82.99	\$2,766.55
<input checked="" type="checkbox"/>	RdPk2017	GLENMORE	01	ROADWAY	AAC	P	04/28/2003	11,239.58	10/19/2016	13	\$3,933.85	\$53.64	64.19	\$3,987.49
<input checked="" type="checkbox"/>	RdPk2017	GLENMORE	03	ROADWAY	AAC	P	08/13/2008	10,412.31	10/19/2016	8	\$3,644.31	\$617.75	66.91	\$4,262.06
<input checked="" type="checkbox"/>	RdPk2017	GLENMORE	04	ROADWAY	AAC	P	08/13/2008	3,230.71	10/19/2016	8	\$1,130.75	\$45.01	76.04	\$1,175.76
<input checked="" type="checkbox"/>	RdPk2017	GLENMORE	05	ROADWAY	AAC	P	08/13/2008	5,197.9	10/19/2016	8	\$1,819.27	\$23.10	66.00	\$1,842.37
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	02	ROADWAY	AC	P	12/01/2003	4,624.37	10/19/2016	13	\$1,618.53	\$237.11	72.38	\$1,855.64
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	03	ROADWAY	AAC	P	11/17/2005	8,073.63	10/19/2016	11	\$2,825.77	\$376.36	71.46	\$3,202.13
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	04	ROADWAY	AC	P	12/01/2003	27,572.24	10/19/2016	13	\$9,650.63	\$1,336.14	65.09	\$10,986.77
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	05	ROADWAY	AC	P	12/01/2003	3,176.42	10/19/2016	13	\$1,111.75	\$10.00	65.09	\$1,121.75
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	05A	ROADWAY	PCC	P	01/01/2016	12,985	10/19/2016	0	\$4,544.75	\$0.00	87.90	\$4,544.75
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	06	ROADWAY	AC	P	05/02/2016	7,498.91	10/19/2016	0	\$2,624.62	\$0.00	87.99	\$2,624.62
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	07	ROADWAY	AC	P	05/02/2016	14,582.22	10/19/2016	0	\$5,103.78	\$0.00	87.99	\$5,103.78
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	08	ROADWAY	AC	P	05/02/2016	23,607.08	10/19/2016	0	\$8,262.48	\$0.00	87.99	\$8,262.48
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	09	ROADWAY	AC	P	05/02/2016	1,986.44	10/19/2016	0	\$695.25	\$0.00	87.99	\$695.25
<input checked="" type="checkbox"/>	RdPk2017	FLORAL	10	ROADWAY	AAC	P	04/28/2008	66,959.5	10/19/2016	8	\$23,435.83	\$9,274.17	70.55	\$32,710.00
<input checked="" type="checkbox"/>	RdPk2017	DR500	01	ROADWAY	PCC	T	06/13/1993	1,455.66	10/19/2016	23	\$509.48	\$0.00	72.13	\$509.48
<input checked="" type="checkbox"/>	RdPk2017	DR500	02	ROADWAY	AAC	T	10/25/2015	5,069.57	10/19/2016	1	\$1,774.35	\$404.85	78.65	\$2,179.20
<input checked="" type="checkbox"/>	RdPk2017	DIAMOND	01	ROADWAY	AC	S	05/26/2010	33,534.49	10/19/2016	6	\$11,737.07	\$317.17	77.02	\$12,054.24
<input checked="" type="checkbox"/>	RdPk2017	DAHLGREN	02A	ROADWAY	AC	S	03/29/1988	20,497.58	10/19/2016	28	\$7,174.15	\$1,681.44	61.92	\$8,855.59
<input checked="" type="checkbox"/>	RdPk2017	D0507	01	ROADWAY	AC	T	09/01/2008	2,915.96	10/19/2016	8	\$1,020.59	\$0.00	78.65	\$1,020.59
<input checked="" type="checkbox"/>	RdPk2017	AURORA	01	ROADWAY	AC	S	10/25/2015	10,626.88	10/19/2016	1	\$3,719.41	\$0.00	82.99	\$3,719.41
<input checked="" type="checkbox"/>	RdPk2017	AURORA	02	ROADWAY	AC	S	11/13/2002	943.97	10/19/2016	14	\$330.39	\$0.00	79.12	\$330.39

Select All Select None

• Project Map:

Legend

- Global and Local
- Global Only

Project Work

Map Layers

- Adelphi_Sections_2016.s...
- Adelphi_SU_shp.shp

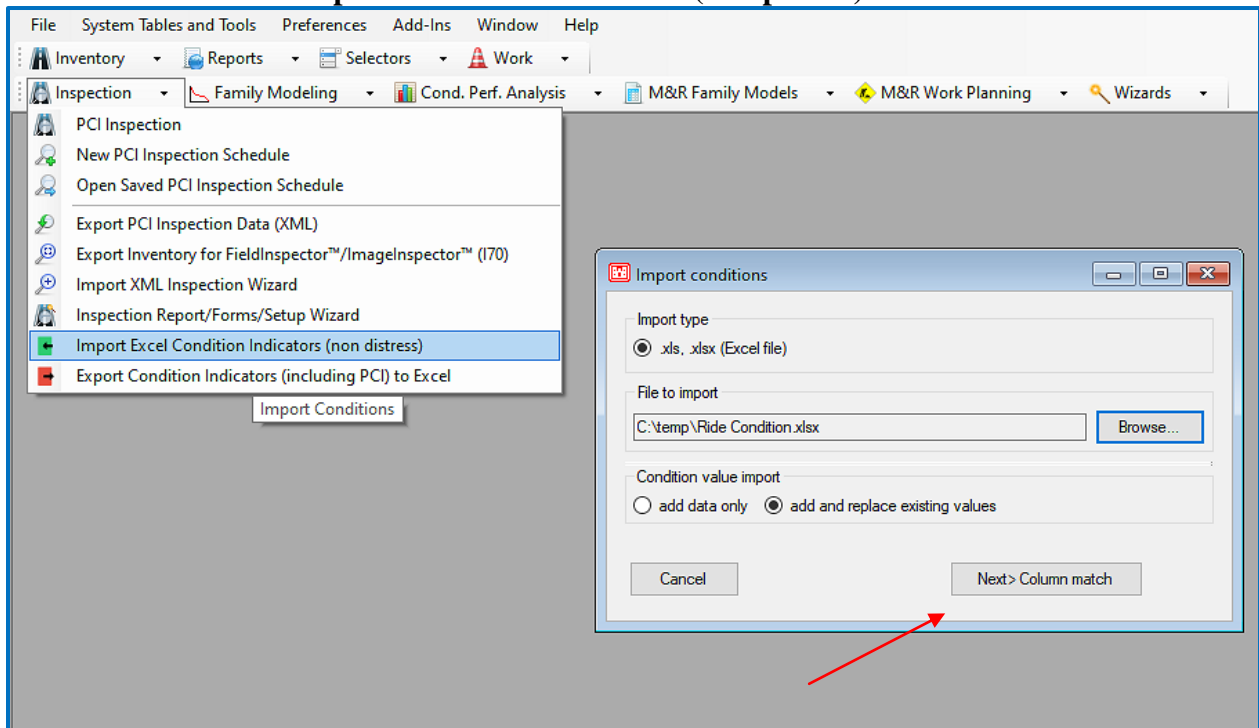
Center and zoom during non-map selections

Right button click for

- **Inspection – New Features:**

- Import Condition Indicators (except PCI) from Excel.
- Export Condition Indicators (including PCI) to Excel.
 - All
 - Most recent.
 - Range of dates.
 - Select dates.
- New grid showing actual sample distresses collected in addition to the grid showing reduced distresses after correction (if required) for multiple severities of the same distress.

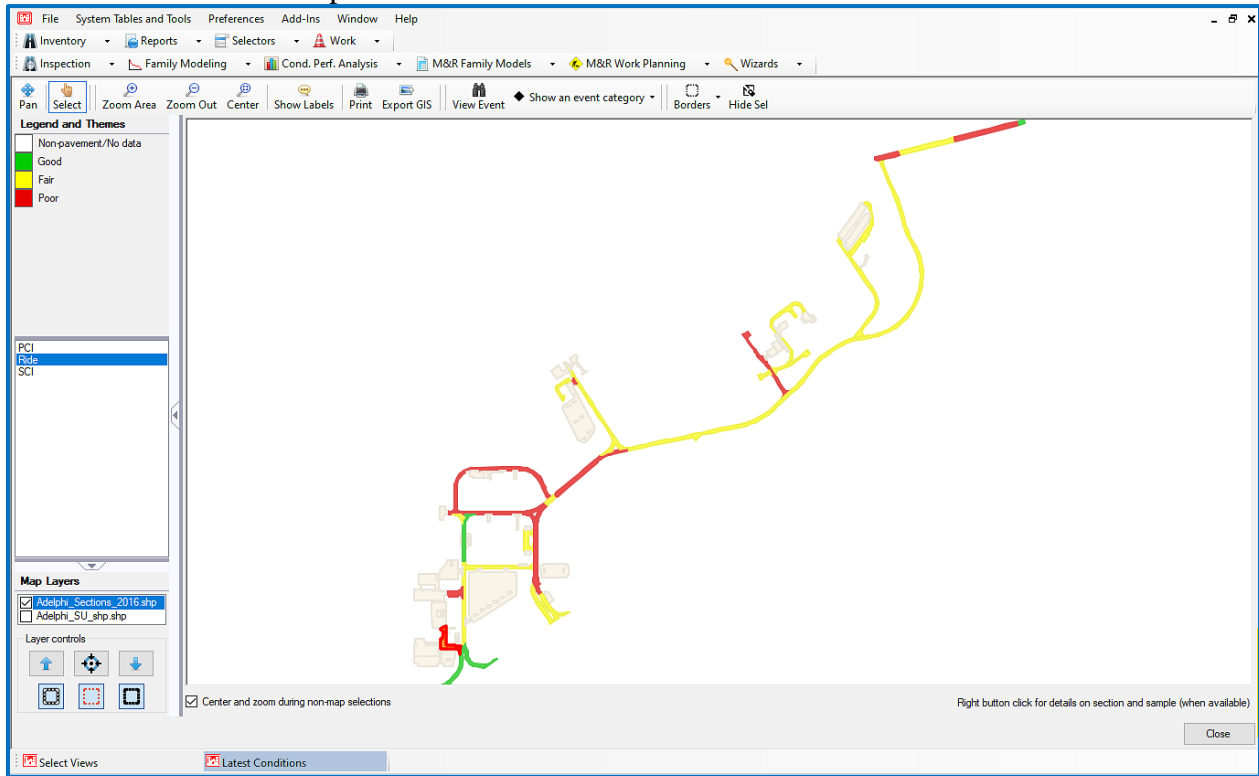
- **Import Condition Indicators (except PCI) from Excel:**



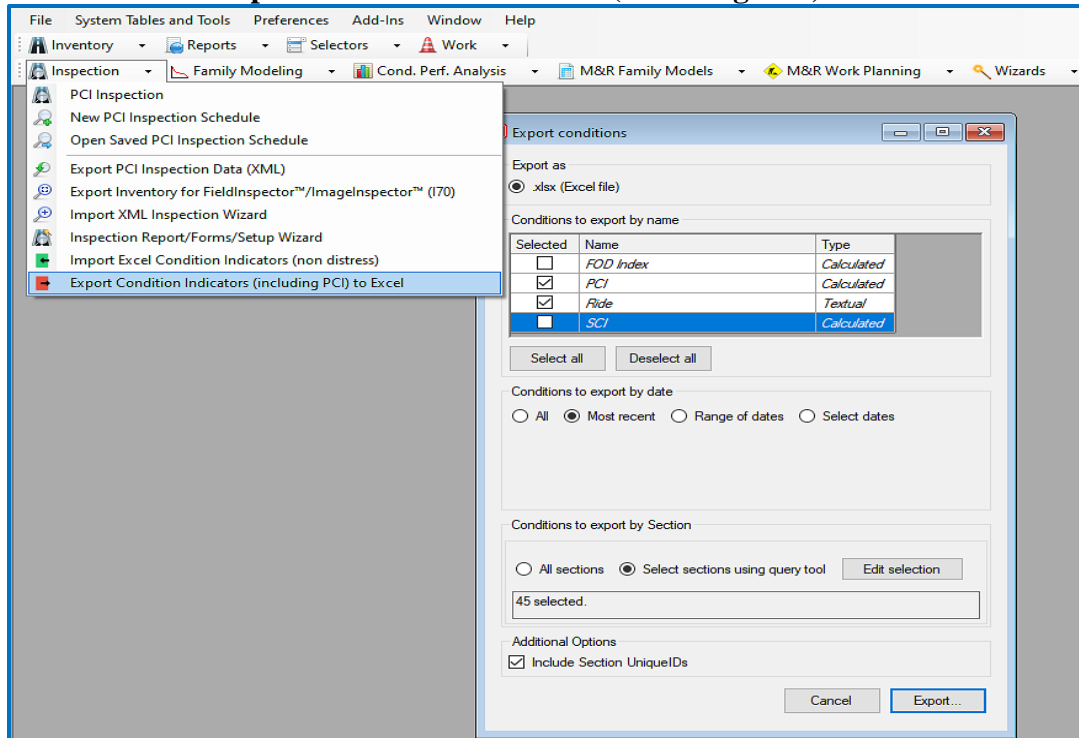
- **Example .xlsx Condition Import:**

NetworkID	BranchID	SectionID	RQ	Date
<i>RdPk2017</i>	<i>DAHLGREN</i>	<i>01</i>	<i>Good</i>	03/03/2015
<i>RdPk2017</i>	<i>DAHLGREN</i>	<i>02</i>	<i>Fair</i>	03/03/2015
<i>RdPk2017</i>	<i>DAHLGREN</i>	<i>03</i>	<i>Poor</i>	03/03/2015

• **Imported Condition View:**



• **Export Condition Indicators (including PCI) to Excel:**



• **Example Export of Condition Indicators:**

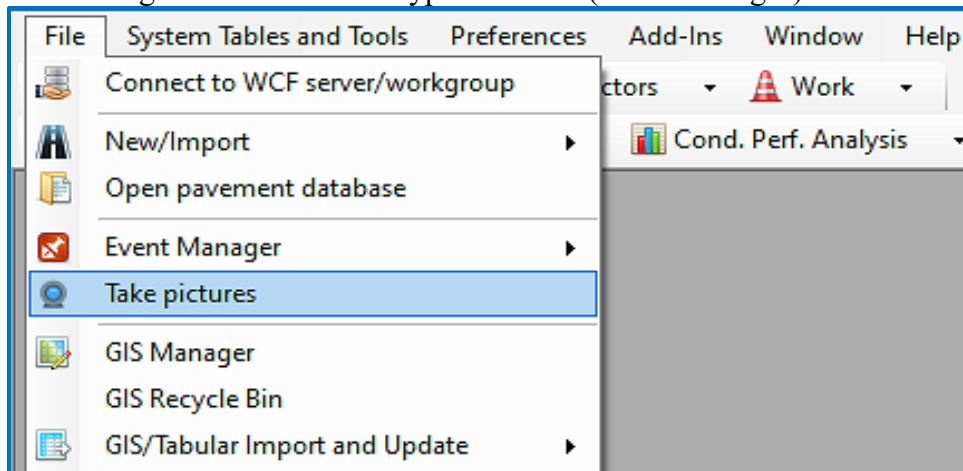
NetworkID	BranchID	SectionID	Date	PCI	Ride
RdPk2017	GLENMORE	01	10/19/2016		74
RdPk2017	GLENMORE	01	03/03/2015		Good
RdPk2017	GLENMORE	02	10/19/2016		64
RdPk2017	GLENMORE	02	03/03/2015		Fair
RdPk2017	GLENMORE	03	10/19/2016		77
RdPk2017	GLENMORE	03	03/03/2015		Good
RdPk2017	GLENMORE	04	10/19/2016		87
RdPk2017	GLENMORE	04	03/03/2015		Good
RdPk2017	GLENMORE	05	10/19/2016		76
RdPk2017	GLENMORE	05	03/03/2015		Good
RdPk2017	GLENMORE	06	10/19/2016		58
RdPk2017	GLENMORE	06	03/03/2015		Fair
RdPk2017	KUESTER	01	10/19/2016		88
RdPk2017	KUESTER	01	03/03/2015		Fair
RdPk2017	KUESTER	02	10/19/2016		100
RdPk2017	KUESTER	02	03/03/2015		Fair

- Recorded vs Calculated Sample Distresses:

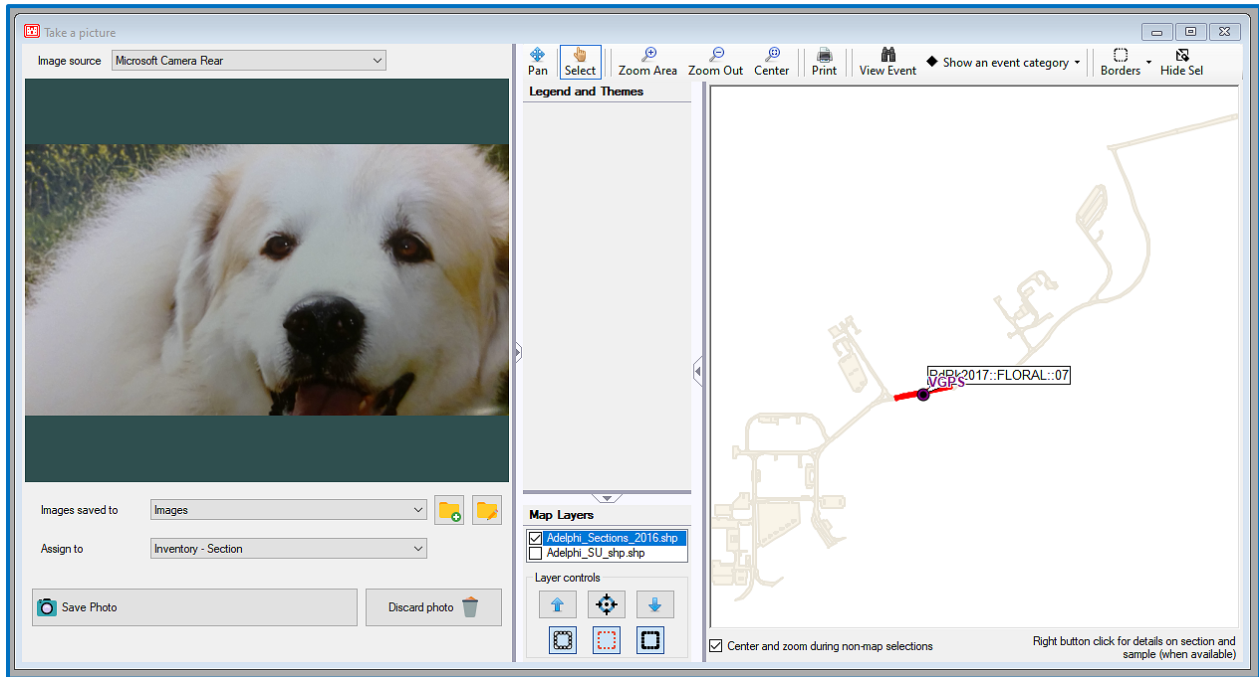
Index: PCI Date: 10/19/2016					Index: PCI Date: 10/19/2016				
Condition Indices	Recorded Sample Distresses	Calculation Sample Distresses	Condition Indices	Recorded Sample Distresses	Calculation Sample Distresses				
Sample Number-	Distress-	Description	Severity	Density	Sample Number-	Distress-	Description	Severity	Density
004	1	ALLIGATOR CR	Low	0.45	004	1	ALLIGATOR CRACKING	Low	0.45
004	7	EDGE CR	Medium	0.23	004	7	EDGE CRACKING	Medium	0.68
004	7	EDGE CR	Low	0.45	004	9	LANE/SHOULDER DROP	Medium	3.18
004	9	LANE SH DROP	Low	1.59	004	9	LANE/SHOULDER DROP	Low	1.59
004	9	LANE SH DROP	Medium	3.18	004	10	LONGITUDINAL/TRANSVERSE	Low	0.27
004	10	L & T CR	Low	0.27	004	11	PATCH/UTILITY CUT	Low	1.50
004	11	PATCH/UT CUT	Low	1.50	004	13	POTHOLE	Low	0.05
004	13	POTHOLE	Low	0.05	004	20	WEATHERING	Low	98.50
004	20	WEATHERING	Low	98.50					

- Event Manager – New Features:

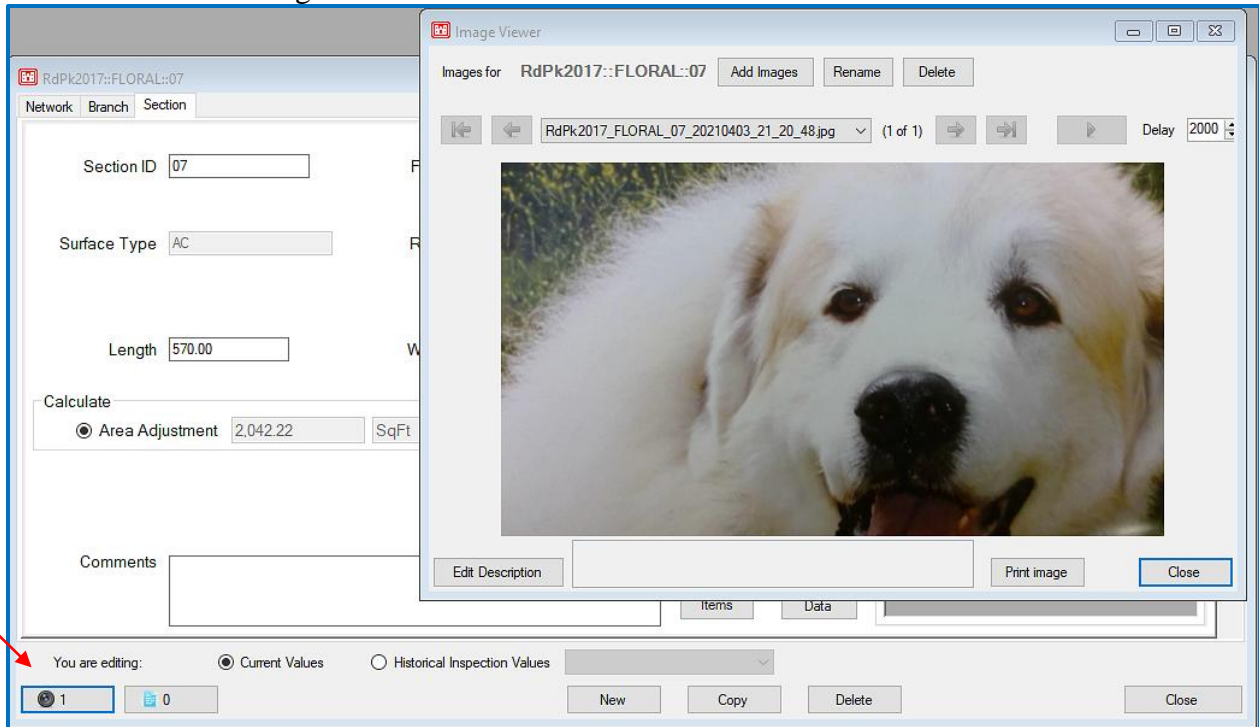
- Take pictures (important for tablet inspection)
- Adding “Files” as another type of events (besides Images) that can be assigned.



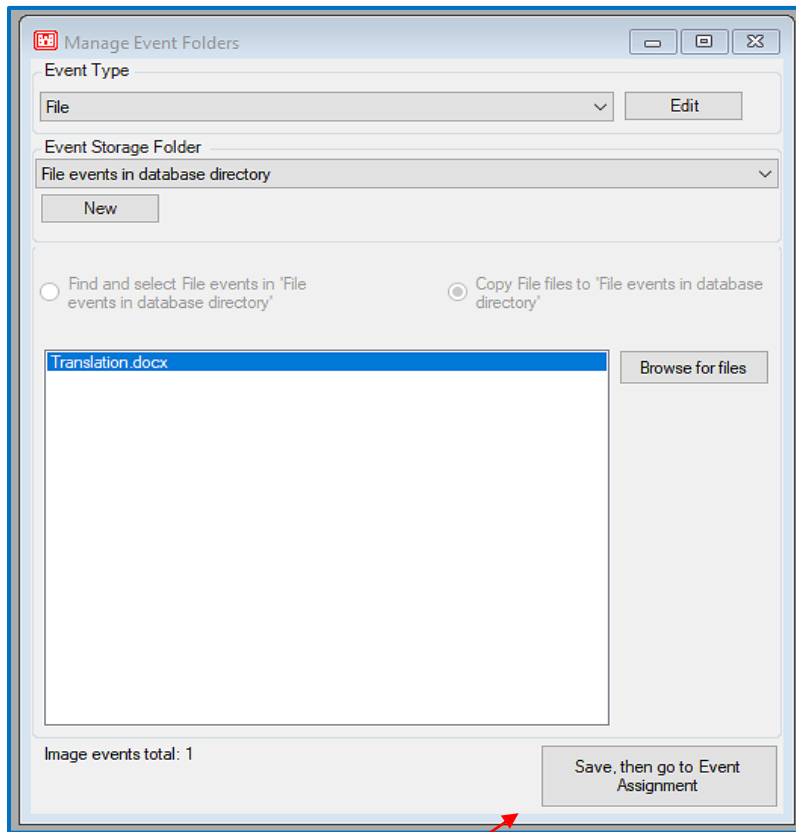
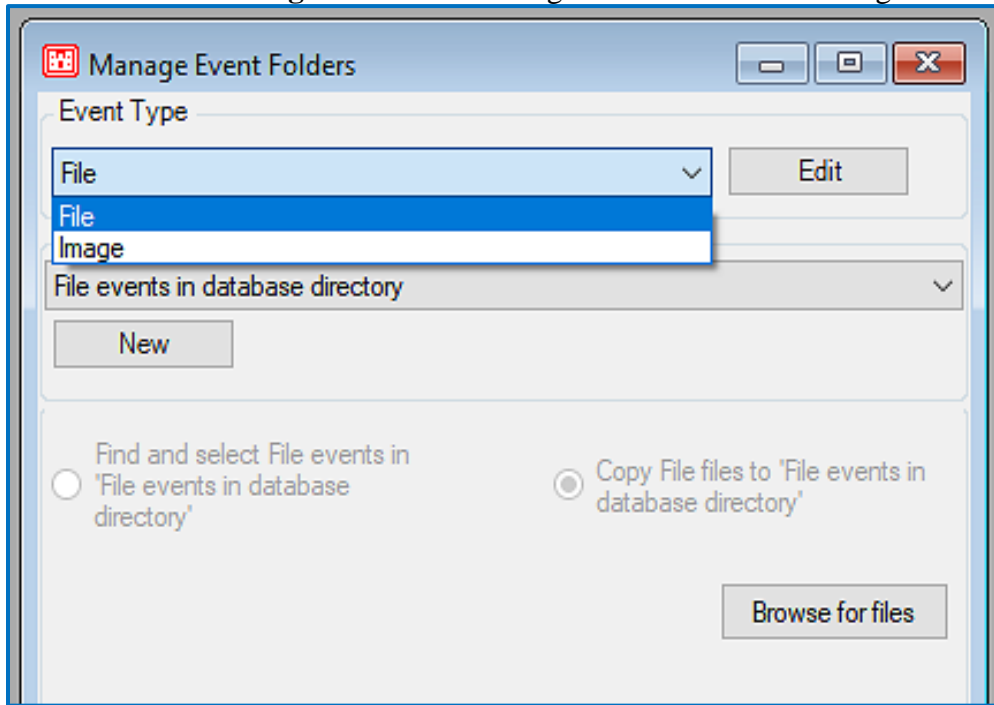
- **Take Pictures – main view:**



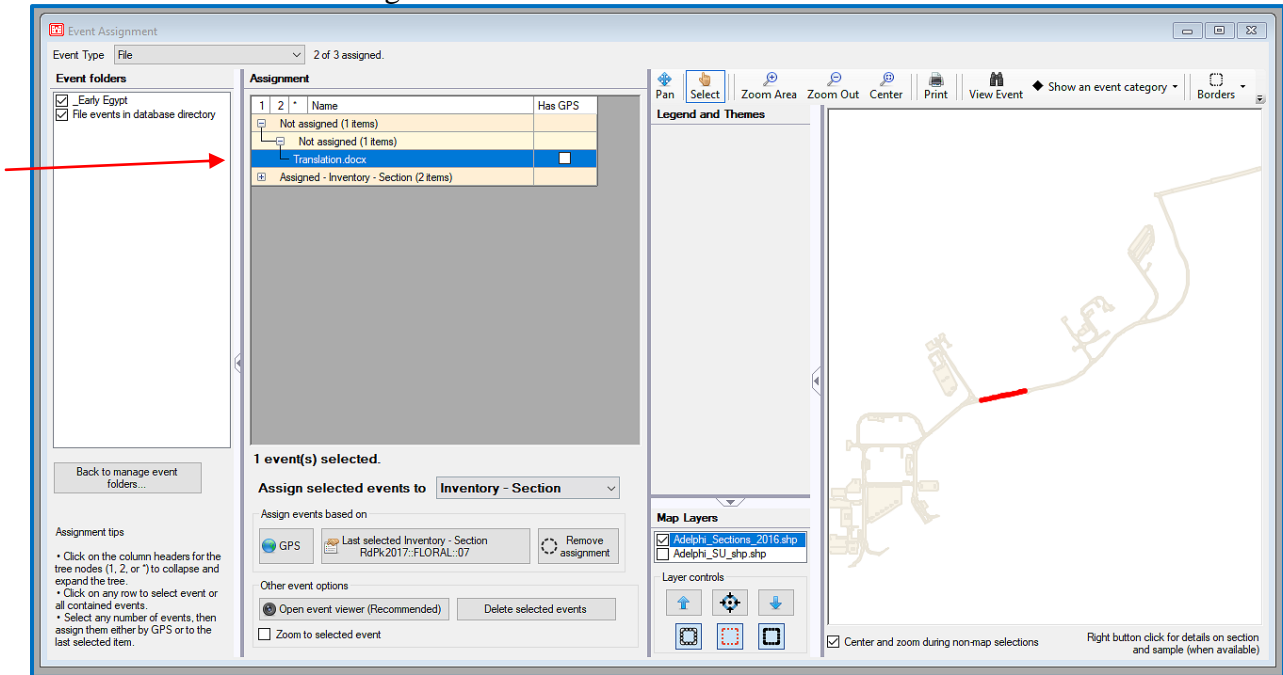
- **Image viewer:**



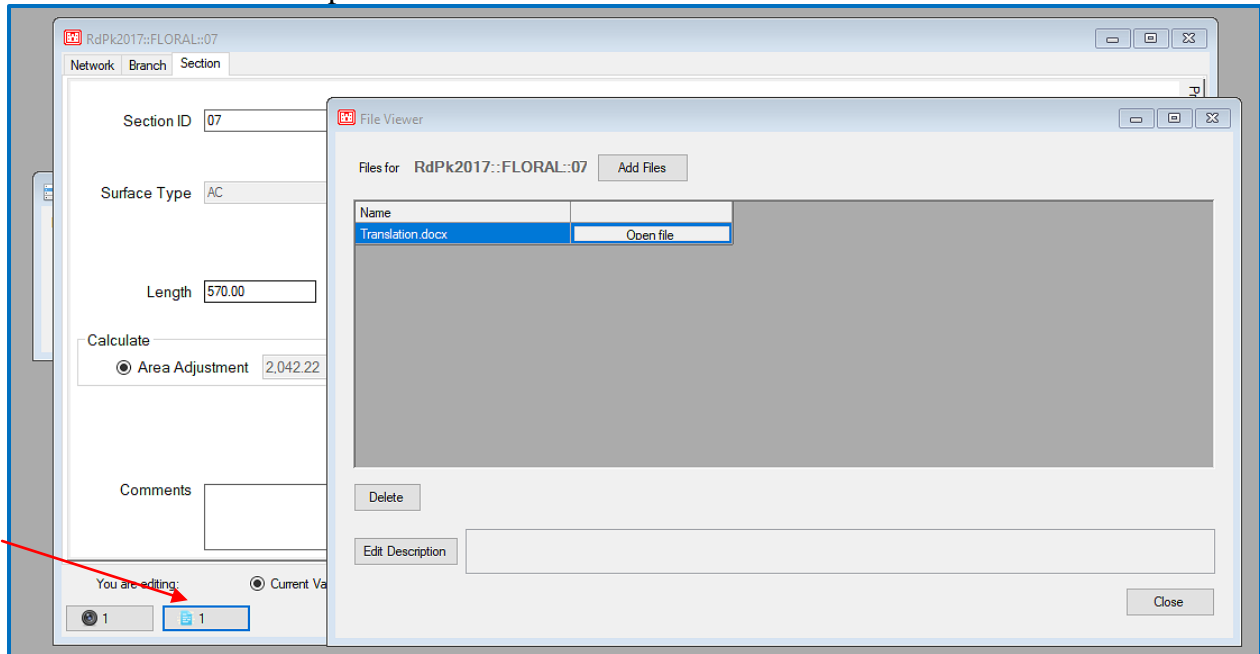
- **Event Manager** – Add file management in addition to images:



- **File Assignment:**

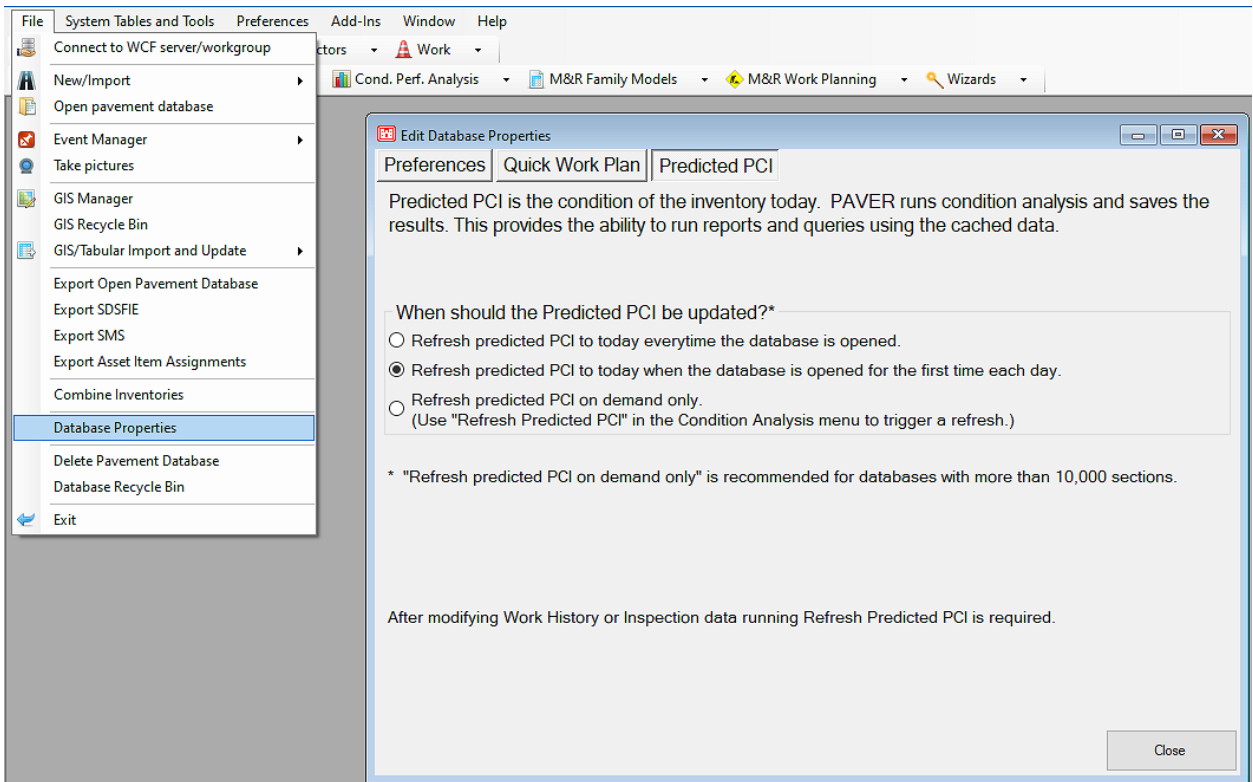


- **File Open:**



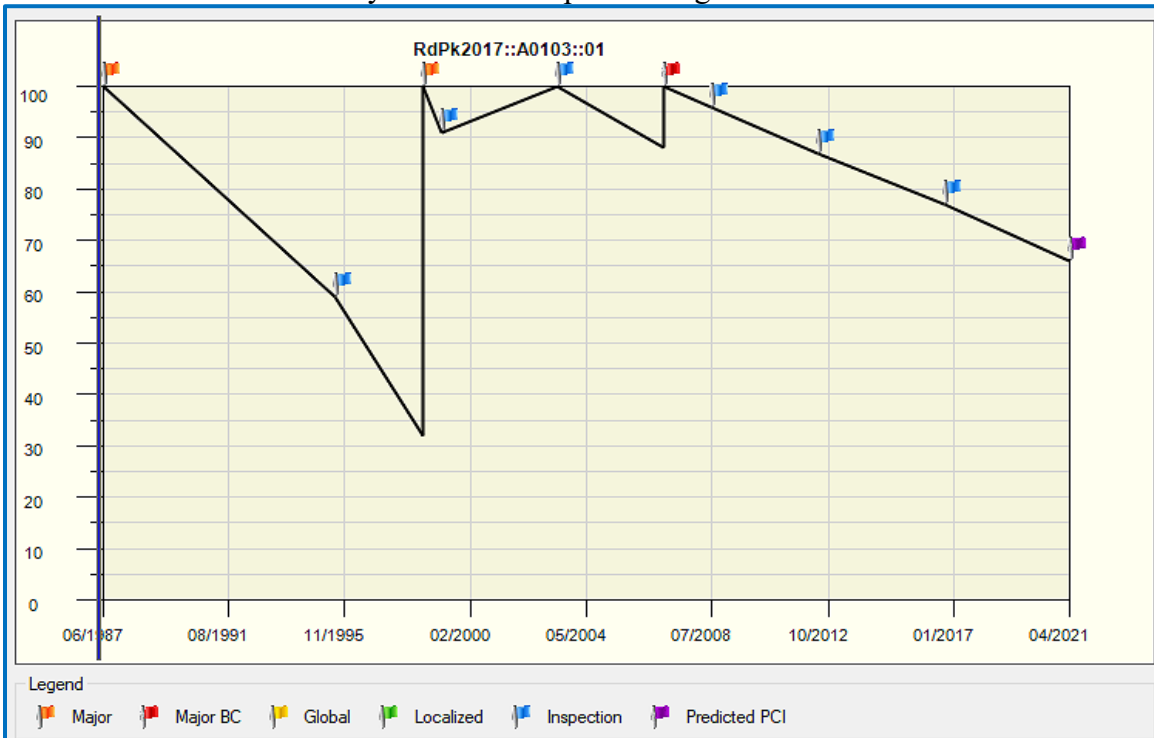
- **Database Properties:**

- Predicted (Today's) PCI -Added the option to refresh only once per day:



- **Section Trend Report – New Features:**

- Extended to today's date and improved flag colors:

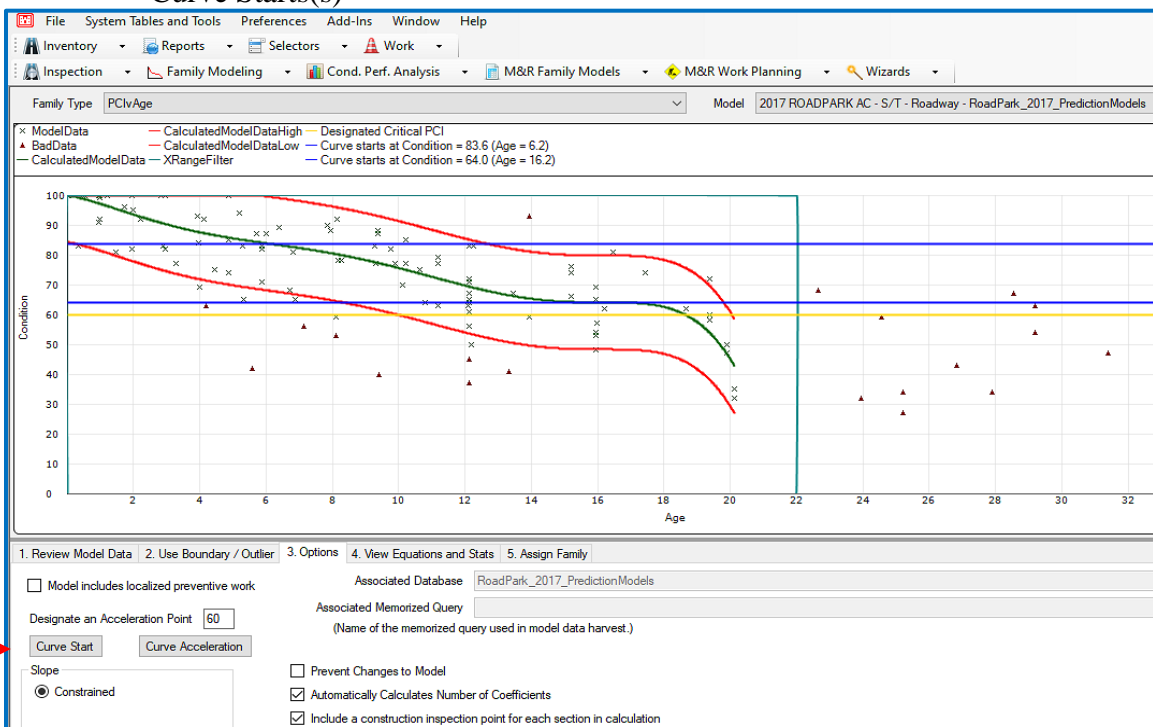


- Added ability to export Work/Inspection History to Excel:

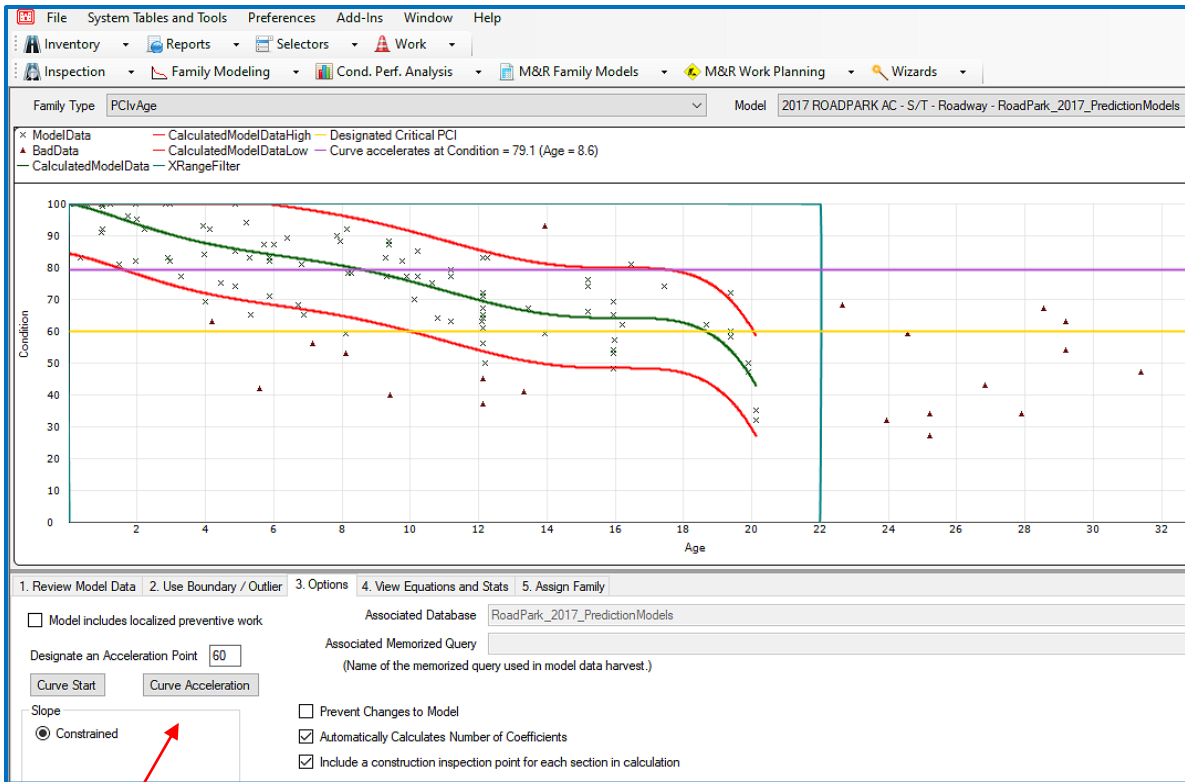
Date	Activity	Condition	Work Type	Back Calculated
06/01/1987	Major	100	New Construction - Initial	False
07/12/1995	Inspection	59		
06/01/1998	Major	100	Overlay - AC Thin	False
05/15/1999	Inspection	91		
04/19/2003	Inspection	100		
11/22/2006	Major	100	Back-calculated Constructi	True
08/14/2008	Inspection	96		
08/13/2012	Inspection	87		
10/19/2016	Inspection	77		

- Unzoom
- Revise Layout
- Save Layout
- Delete Saved Layout
- Change Sort Order
- Search
- Open in Excel
- Export to file (*.xlsx)
- Export to file (*.xml)
- Print

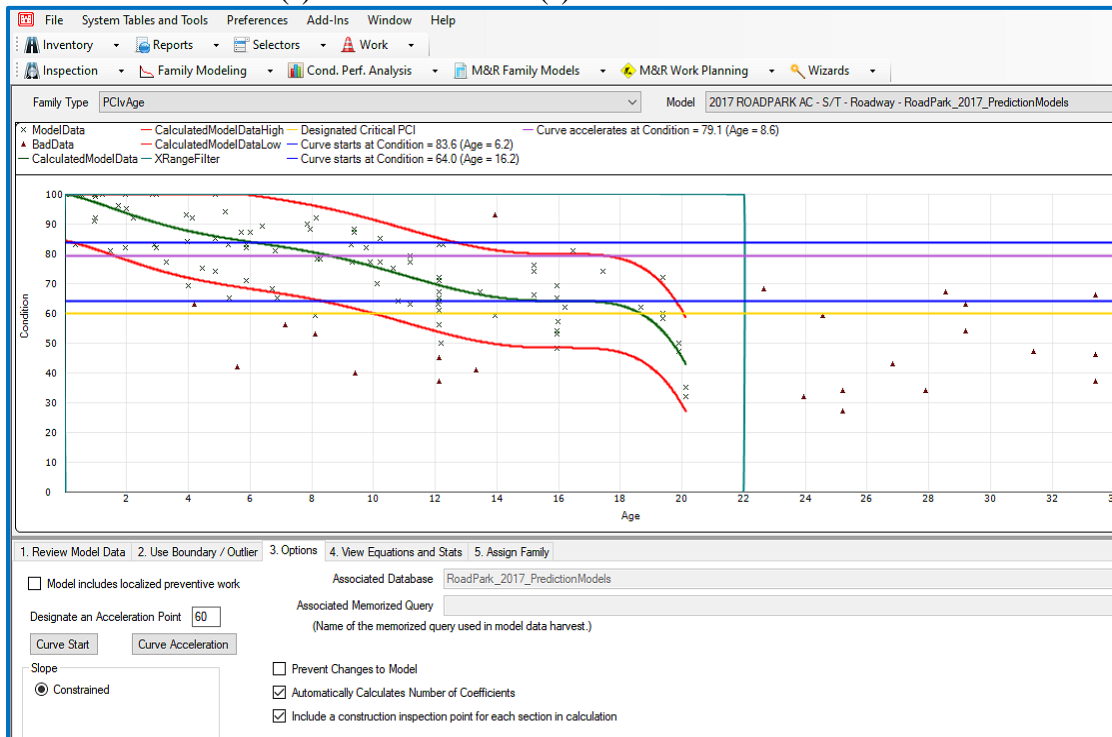
- **Family Modeling – PCI vs. Age:**
- Curve Starts(s)



- Curve Acceleration(s)



- Curve Start(s) and Acceleration(s)



- New modeling capability – Localized Cost vs. PCI

- Setup:

Name

Distress Maintenance Policy

Cost by Work Type

Cost Multiplier

- The model is then determined by selections in the Query Tool Wizard:

Query Tool Wizard - Family Model

Stored Criteria

New Copy Memorize Rename Delete

Select None
 Select Subset
 Select All

Record Count Refresh

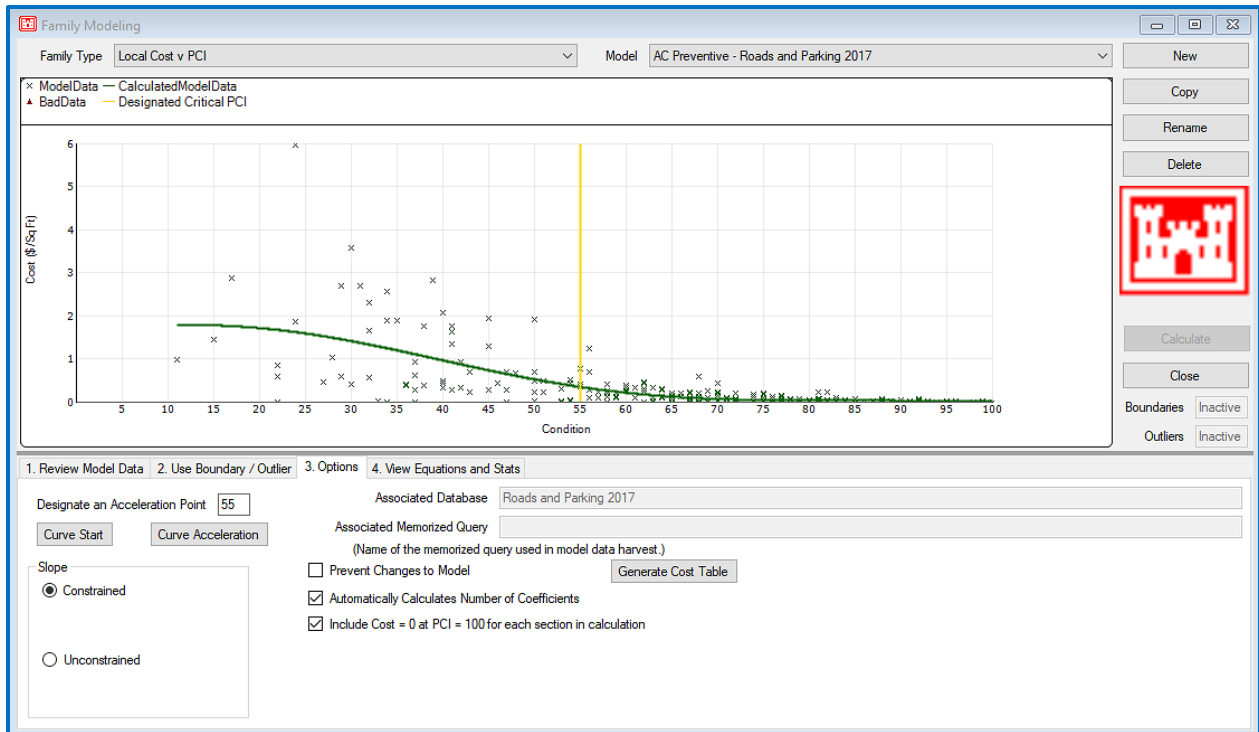
Filter Value Lists

Select Rows

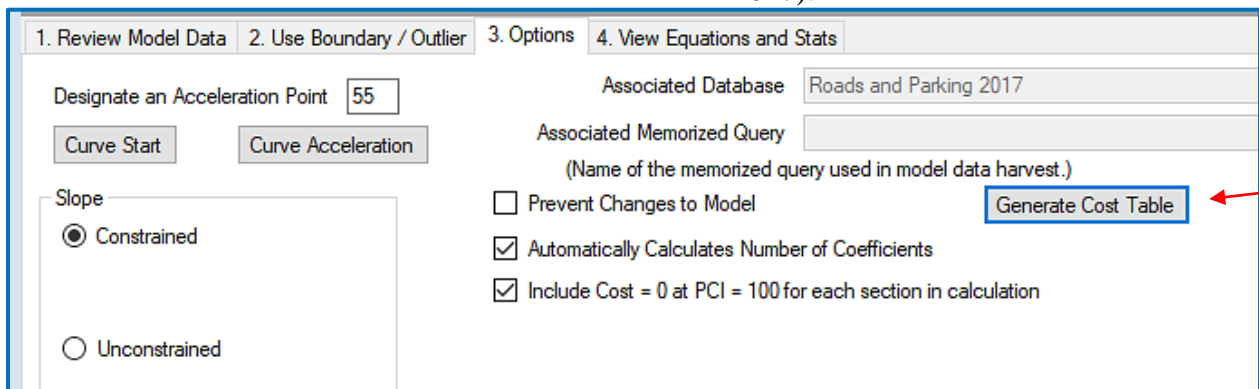
	Field	Comparison	Comparison
	Inspected Surface	<>	Portland Cement Concreti
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Clear All Tables Clear Current Table Clear Current Row

Exclude Inspection data with Cancel < Back Next > Refine selection with GIS Map/Tree Selector Finish

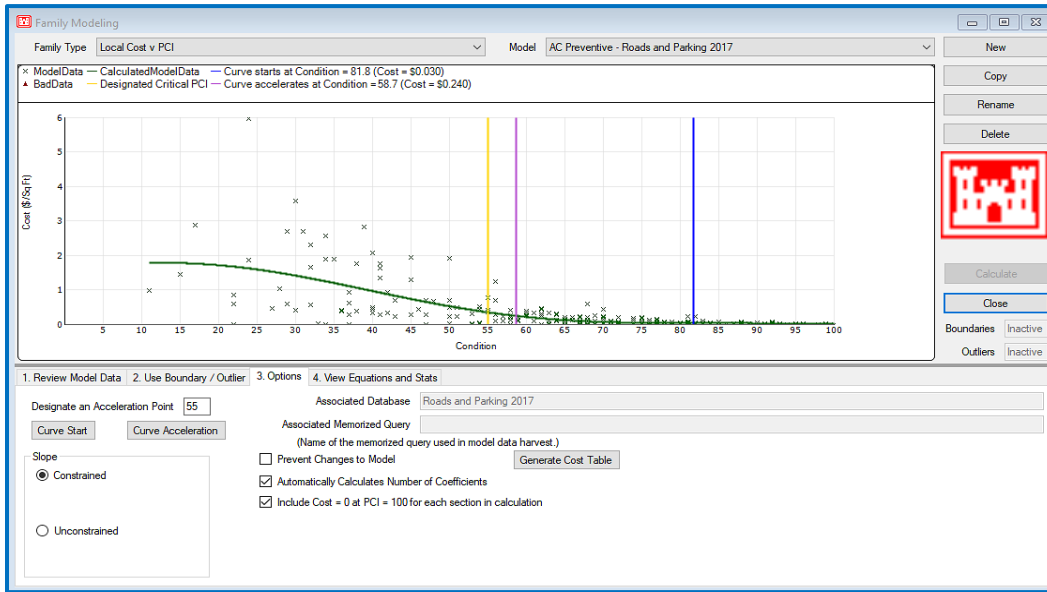


- Auto Generation of Loc. Cost Table (AC Preventive – Roads and Parking 2017):

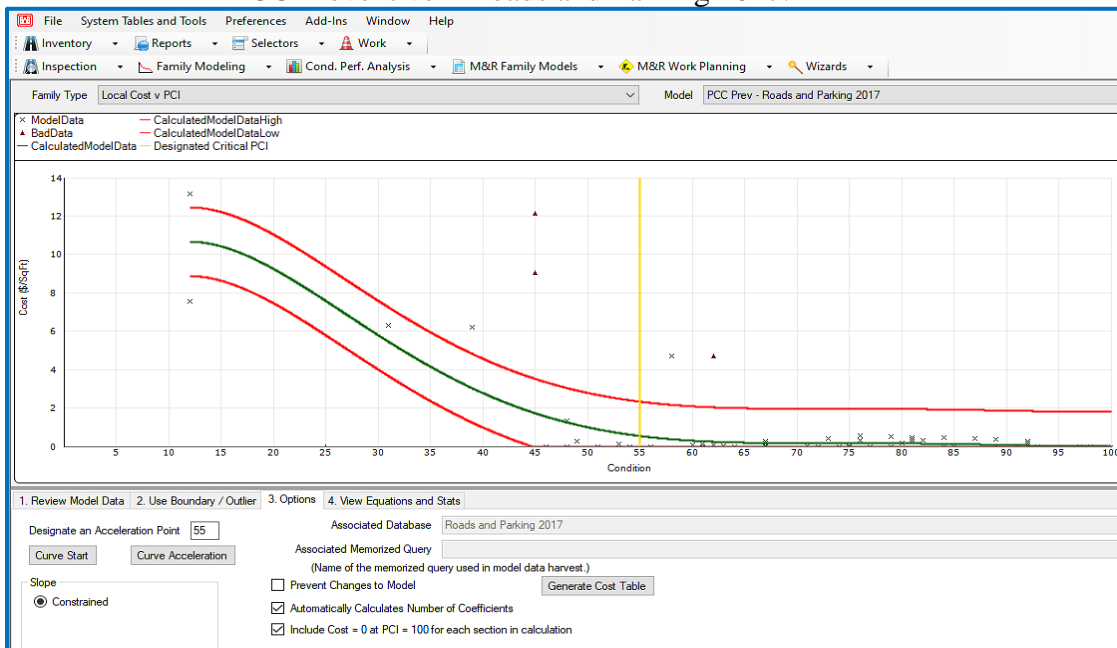


Condition	Cost	Units
0	1.893	\$/SqFt
10	1.796	\$/SqFt
20	1.709	\$/SqFt
30	1.409	\$/SqFt
40	0.961	\$/SqFt
50	0.52	\$/SqFt
60	0.208	\$/SqFt
70	0.064	\$/SqFt
80	0.034	\$/SqFt
90	0.024	\$/SqFt
100	0	\$/SqFt

- Curve Start and Acceleration:



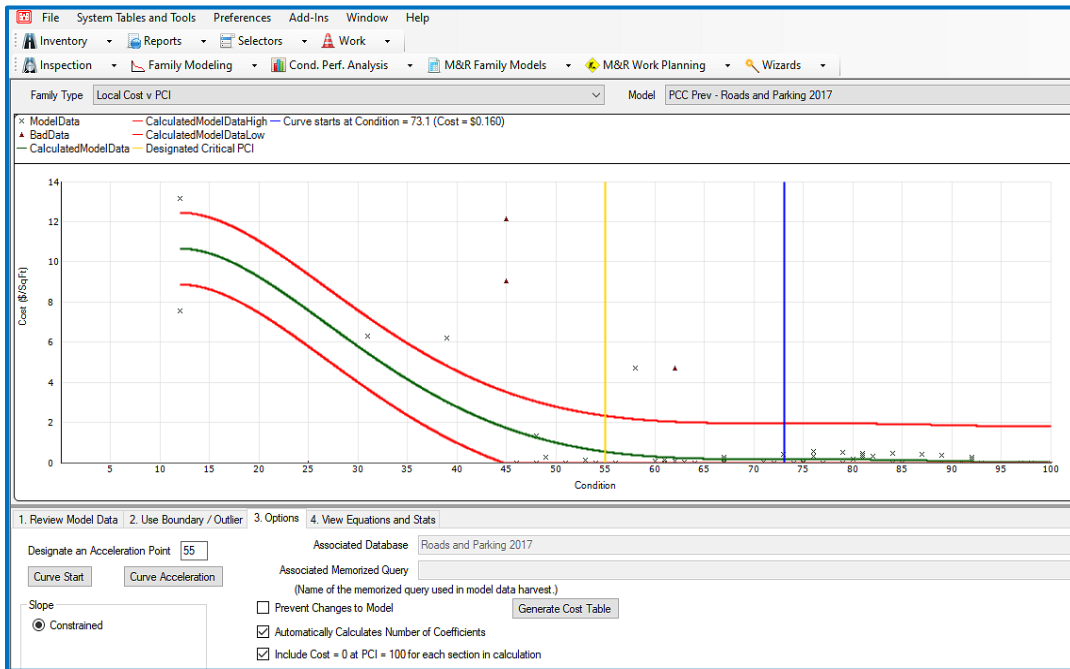
- PCC Preventive – Roads and Parking 2017:



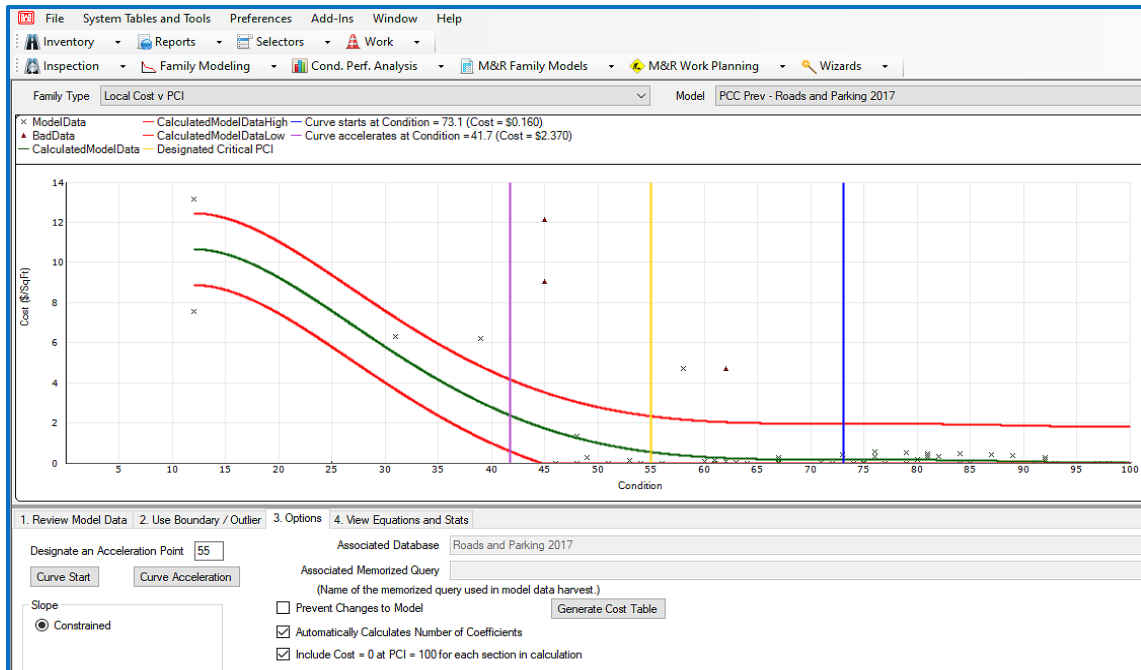
- Auto Generation of Local Cost Table:

Condition	Cost	Units
0	13.109	\$/SqFt
10	11.067	\$/SqFt
20	9.25	\$/SqFt
30	5.799	\$/SqFt
40	2.777	\$/SqFt
50	0.994	\$/SqFt
60	0.294	\$/SqFt
70	0.166	\$/SqFt
80	0.154	\$/SqFt
90	0.07	\$/SqFt
100	0	\$/SqFt

• Curve Start:



• Curve Start and Acceleration:



If the curve doesn't go all the way to PCI=0, then

- Calculate Cost vs. PCI slope from the last 10 PCI points.
- Use the slope to calculate cost from missing table values.

• Translation:

- Updated Italian:

Degrad.	Descrizione	Severità	Quantità	Units	Densità
48	FESSURA L & T	Medium	35.00	Ft	
48	FESSURA L & T	Low	15.00	Ft	
48	FESSURA L & T	Low	65.00	Ft	
57	EROSIONE	Low	4,850.00	SqFt	

• Updated Spanish:

Resumen en el momento de inspección | [Hacer click aquí para minimizar](#)

Uso de Rama: TAXIWAY | Tipo de Superficie: AC | Rango: S | Longitud: 1,348 Ft | Anchura: 35 Ft | Área Verdadera: 61,090 F12

Inspección | [Hacer click aquí para minimizar](#)

09/25/2015 | List | Nue | Edita | Elimi | PCI: ??? | Necesita recal | Calo Condiciones | Deterioro Extrapolado | Cmt | 0 | 0

Muestra | [Hacer click aquí para minimizar](#)

03 | 4,900.00 F12 | List | Nue | Edita | Elimi | PCI: 80.3 | Satisfactory | No se encontraron deterioros en la muestra | Muestras restantes no tienen deterioro | Cmt | 0 | 0

Selección de Deterioro

41	L	M	H	51	N		
42	N			52	L	M	H
43	L	M	H	53	L	M	H
44	L	M	H	54	L	M	H
45	L	M	H	55	N		
46	N			56	L	M	H
47	L	M	H	57	L	M	H
48	L	M	H				
49	N						
50	L	M	H				

48 AGR L & T - M

Cantidad

1	2	3
4	5	6
7	8	9
C	0	.

35.00 Ft

Deterioros

Deterio	Descripción	Severidad	Cantidad	Units	Densidad	Deducir	Comentario
48	AGR L & T	Low	15.00	Ft	0.31	3.6	Agregar
48	AGR L & T	Low	65.00	Ft	1.33	5.7	Agregar
57	INTEMPERISMO	Low	4,850.00	F12	98.98	6.0	Agregar
48	AGR L & T	Medium	35.00	Ft	0.71	9.7	Agregar

Suma de Deterioro (no se usa actualmente en esta forma)

• Added Turkish:

İnceleme zamanındaki gözet | [Küçültmek için buraya tıklayınız](#)

Bölüm Kullanımı: TAXIWAY | Yüzey Tipi: AC | Derece: S | Uzunluk: 1,348 Ft | Genişlik: 35 Ft | Gerçek Alan: 61,090 fitkare

İnceleme | [Küçültmek için buraya tıklayınız](#)

09/25/2015 | List | Yeni | Düz | Del | PCI: ??? | Yenden hesa | Durumları Hesapla | Uygüleneni rlmış Rozulma | Cmt | 0 | 0

Örnek | [Küçültmek için buraya tıklayınız](#)

03 | 4,900 fitkare | List | Yeni | Düz | Del | PCI: 80.3 | Satisfactory | Örnekte bozulma bulunamadı | Kalan örneklerde bozulma yoktur. | Cmt | 0 | 0

Bozulma seçimi

41	L	M	H	51	N		
42	N			52	L	M	H
43	L	M	H	53	L	M	H
44	L	M	H	54	L	M	H
45	L	M	H	55	N		
46	N			56	L	M	H
47	L	M	H	57	L	M	H
48	L	M	H				
49	N						
50	L	M	H				

48 B & E ÇAT. - M

Miktar

1	2	3
4	5	6
7	8	9
C	0	.

35.00 Ft

Bozulmalar

Bozulm	Tarım	Bozulma Se	Miktar	Units	Yoğunluk	Azalt
48	B & E ÇAT.	Medium	35.00	Ft	0.71	9.7
48	B & E ÇAT.	Low	15.00	Ft	0.31	3.6
48	B & E ÇAT.	Low	65.00	Ft	1.33	5.7
57	AŞINMA (YOZE)	Low	4,850.00	fitkare	98.98	6.0

Toplam Bozulma

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Organization

The main features of PAVER™ are accessible from ten buttons arrayed across the top of the PAVER™ Desktop. The button array, referred to as the PAVER™ Button Bar, is arranged to reflect the logical sequence of pavement management, and initiates the most frequently used features in PAVER™. By clicking on one of the buttons, you launch one of nine principal PAVER™ components; each button also contains a drop-list of additional options:

- **Inventory:** Create and/or edit inventory data, add images to associate with section data, or view historical data.
 - The drop-list for the Inventory button also contains options for GIS Assignment, Asset Management (if Show Assets has been turned on in File > Database Properties > Preferences), Define Virtual Inventory, Copy and Move Data, and Database Verification Tools.
 - Below the above options are also three Wizards and a GIS/Tabular Import and Update option.
- **Reports:** PAVER™ reporting features including GIS Reports, Summary Charts, Enterprise Summary Reports, Standard Reports, User Defined Reports, Section Trend Report, and Rollup Report.
- **Selectors:** Options for specifying a focus of attention.
- **Work:** Work History and Required Projects
 - Below the above options are also a Work Entry Wizard and a Add Work History from GIS/Tabular Data option.
- **Inspection:** Field inspection data entry
- **PCI Family Models (Prediction Modeling):** Build and assign condition prediction models
- **Condition Performance Analysis:** Condition analysis report
- **M&R Work Planning:** Maintenance and repair planning report
- **Wizards:** Step-by-step guide to aid in basic PAVER™ functions
 - Last Construction Date
 - Set Properties
 - Section Split
 - Work Entry
 - Add Work History from GIS/Tabular Data
 - Add Inventory from GIS/Tabular Data
 - Update Inventory from GIS/Tabular Data
 - Import Inventory Samples from GIS/Tabular Data
 - Export Inspection Data (XML)
 - Export Inventory for FieldInspector™/ImageInspector™ (I70)
 - Import XML Inspection

- Inspection Report/Form/Setup
- Import Default Inventories

Like other Windows programs, additional program features are accessed from the drop-down menus located above the PAVER™ Button Bar. The PAVER™ Menu provides standard Windows features such as file services, editing, Windows management and help.

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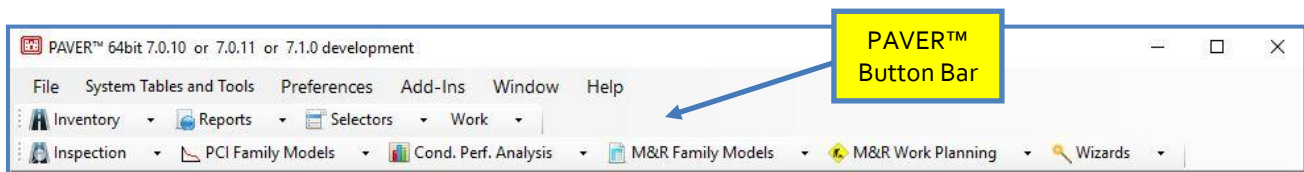
2. User Interface

Toolbar and PAVER™ Button Bar

The PAVER™ program is designed using commercial Windows components and the user interface follows standard Windows protocols. Familiarity with basic Windows user skills is assumed in the design of the program, the preparation of program documentation, and the design of the help system.

Like other Windows programs, additional program features are accessed from the drop-down menus. The toolbar provides standard Windows features such as File, Windows management, and Help.

The PAVER™ button bar provides tools specific to PAVER™. Note: clicking on the toolbar icon brings up the first item in the drop-down list. To access other items, click on the down arrow to the right of the drop-down menu to be used.

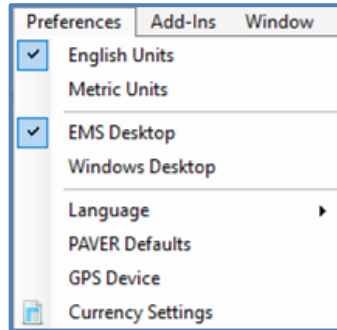


Details on menus are found in the following Chapters:

- Chapter 3 File
- Chapter 4 PAVER™ System Tables and Tools
- Chapter 5 Inventory
- Chapter 6 Reports
- Chapter 7 Selectors
- Chapter 8 Work
- Chapter 9 Inspection
- Chapter 10 PCI Family Models
- Chapter 11 Cond. Perf. Analysis
- Chapter 12 M&R Family Models
- Chapter 13 M&R Work Planning
- Chapter 14 Wizards

Preferences

The Preferences Menu provides specialized PAVER™ options for changing the units of measure from English to metric, changing the Desktop area, changing the Language, and defining the default selector. *Note: An Inventory must be open before selecting any Preferences.*

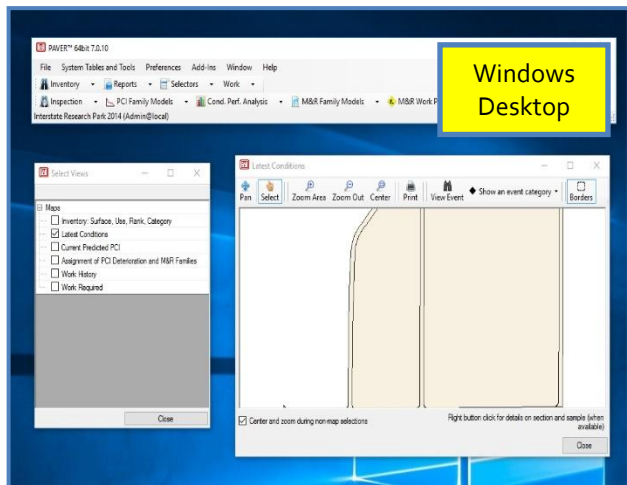
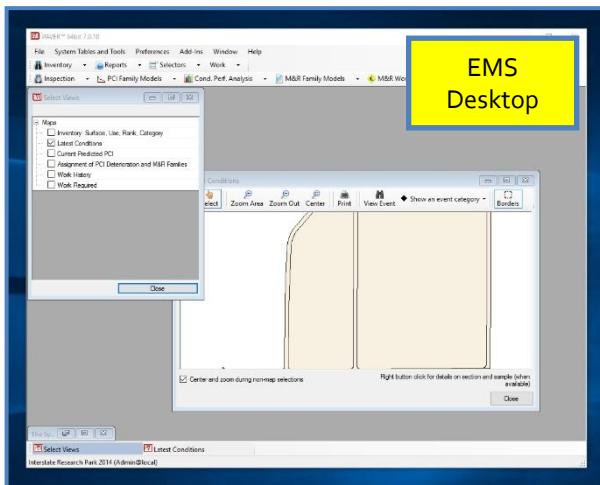


Units

English is the Default for Units. To change units from English to metric, select Preferences on the menu, and then select Metric Units. Rounding error is not introduced into stored data values if repeated changes between English and metric units occur, because all measurement values in PAVER™ are stored as metric values. Changing the setting in Preferences changes the filters that are used for presenting data on PAVER™ screens and reports. To ensure that the display properly reflects the unit change, it is best to close all data entry and report screens before switching preferences.

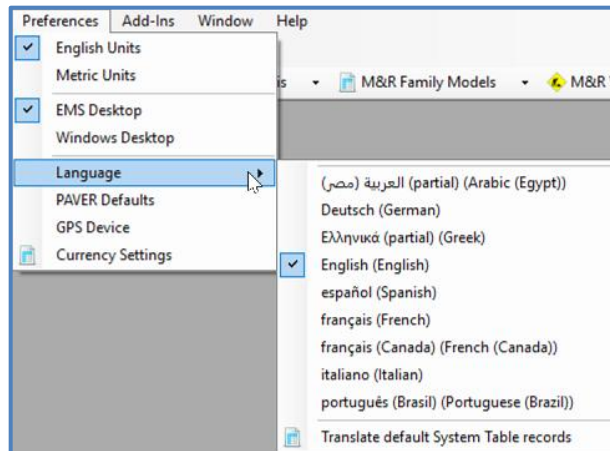
Desktop

The Desktop may be viewed in two different ways. The Default Desktop is EMS Desktop. It displays the screens in the PAVER™ application. The Windows Desktop allows the screens to float on the desktop without being anchored to the PAVER™ application



Language

English is the default language of PAVER™. Another language may be selected by using the drop-down menu. This selection handles the majority of translation in the screens of the PAVER™ program. Language preference is user specific, and PAVER™ remembers the user's selection from session to session. When using multiuser PAVER™, each user is able to view the program in the language of their choice.



Translate Default System Table Records

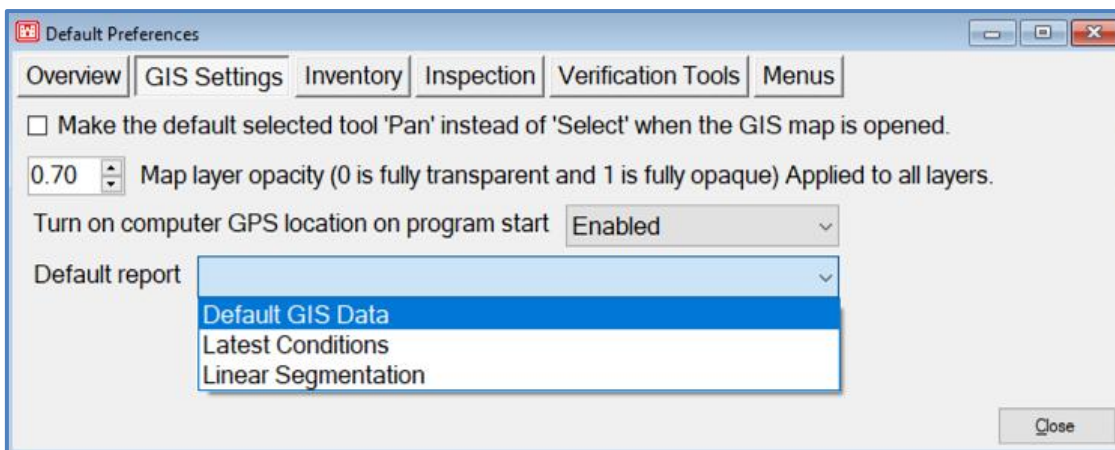
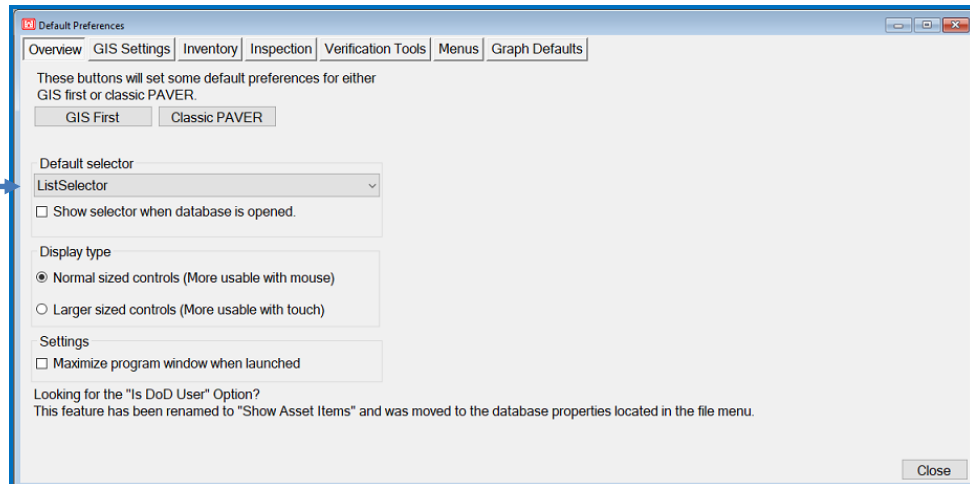
English is the default language of PAVER™ system table names. Once a language has been applied to the PAVER™ screens, it must then be applied to the system tables through this menu item. After the translation has been applied to the system tables, users can switch the language preference if desired, but the system tables will remain in the language last applied. System table names can then be modified by the user.

Note: A modified system table name is not translatable by PAVER™ and will revert to the predefined system table name if the system tables are translated again. It is recommended that the user's system table language preference be set before modifying system table names.

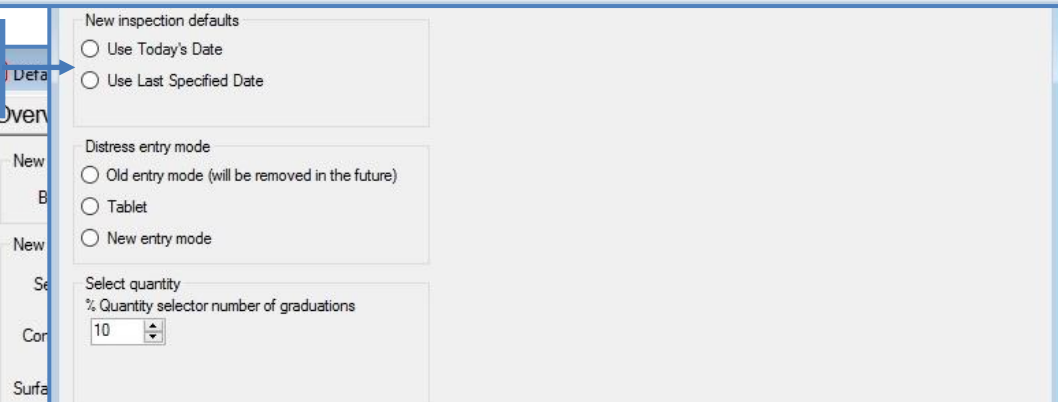
PAVER™ Defaults

Users can change defaults for the general program, GIS, Inventory, Inspection, Verification Tools, Menu, and Graph Defaults settings.

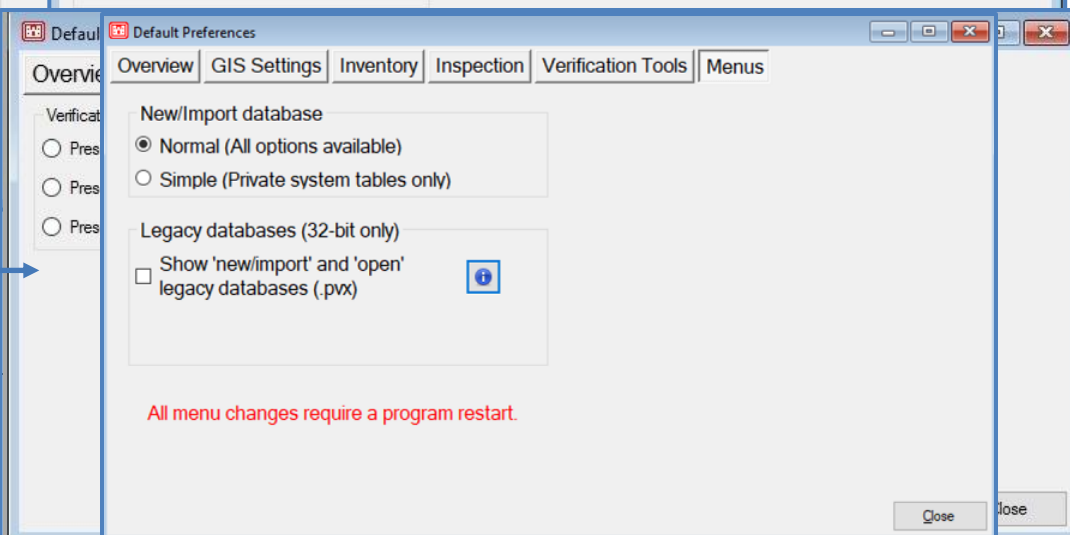
Select List or Map Selector



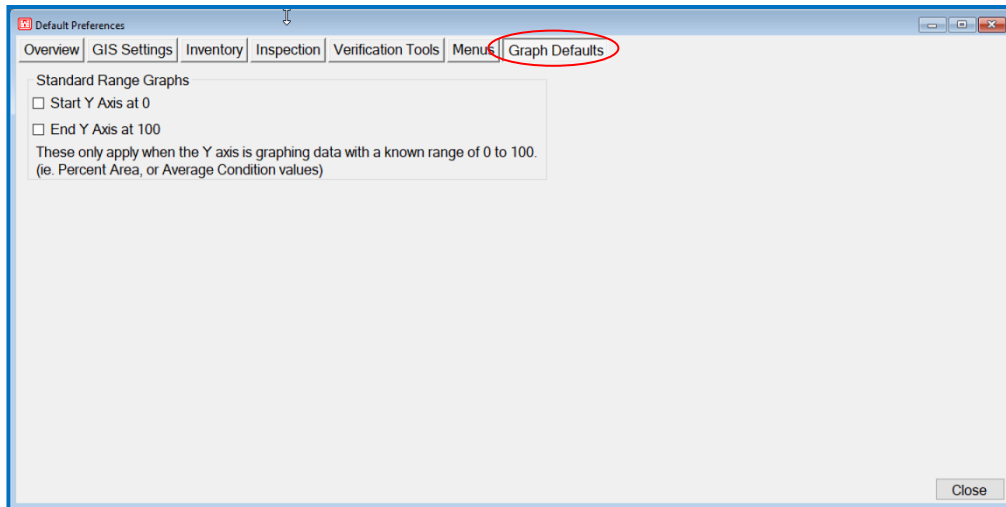
Inspection Date Defaults



Preselection Defaults



User Guide

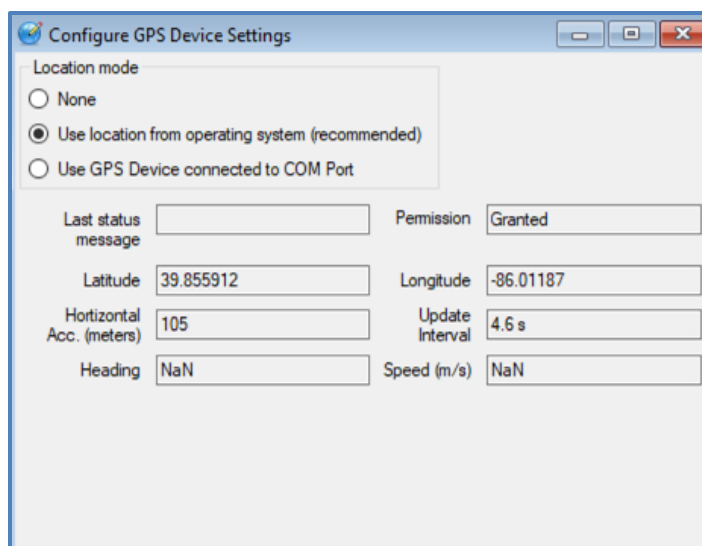


GPS Device

There are two ways to configure PAVER™ GPS settings.

Note: If you are working on a tablet computer that you are exclusively using in the field, you may want to enable the “Turn on computer GPS location on program start” setting in Preferences > PAVER Defaults > GIS Settings menu. This will enable location from the operating system whenever PAVER™ is started. This mode will not ask for permission and will fail if that right is not already granted.

The OS attempts to coordinate between location providers to give the most accurate position. If the correct drivers are installed for your GPS device, this is the best mode to use. No configuration is required, and this option works in both 32 and 64-bit modes. When “Use location from operating system” has been selected, Windows will ask for permission to use your location information—if it doesn’t already have permission. Permission must be granted, in order for your location to be reported. When this option is enabled, a “horizontal accuracy” reading populates. If the number in this field is 75+ meters, your GPS device probably isn’t reporting location yet. After the GPS device locks on to satellites and starts reporting location, the accuracy radius will decrease, giving you a more accurate lock on your position. Operating system-level this setting can searching for settings” in the configuration of be viewed by “Location privacy control panel.



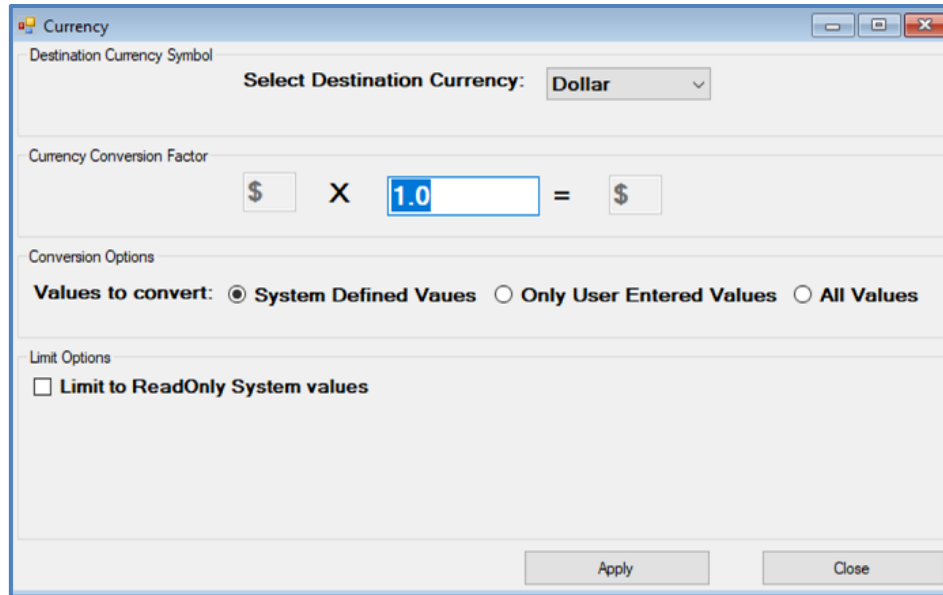
If, for whatever reason, your GPS device does not communicate with the operating system, you can use the “GPS Device connected to COM port” option. This option can only be used in 32-bit mode. Additionally, you may have to enter the COM port and Baud rate manually.



Currency Settings

The US dollar is the default currency of PAVER™. Currency type is associated with the database and cannot be automatically converted by PAVER™. There is a limited ability for users to provide a conversion rate for PAVER™ to change the currency used by the program.

Note: It is recommended that the currency for a shared database be set one time only by a single user. Users sharing a database must agree on a type of currency for that database.



Add-Ins:

The Add-Ins manager allows import of data into PAVER™ from specialized software tools and programs.

Window:

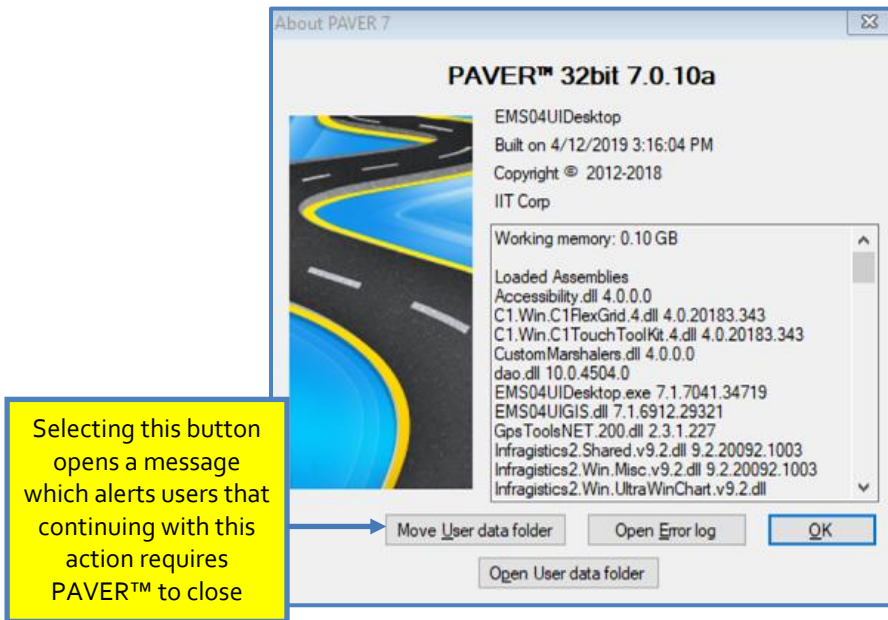
Standard Windows options which allow the user to Tile Horizontally, Tile Vertically, Cascade, and Arrange Icons.

Help:

The Help menu provides access to this User Guide, the Glossary, the Workshops, about PAVER™, about PAVER™ Translations, and the Program Version windows.

Included in the Program Version window, in addition to the version number and build date of PAVER™, are two buttons for additional functionality. Open Error Log will open a window outside of the PAVER™ Desktop, while clicking the Move User Data Folder button will close PAVER™ and open a configuration application.

Note: Spanish translation improvements for the User Manual are in progress for this updated version, please excuse any discrepancies.



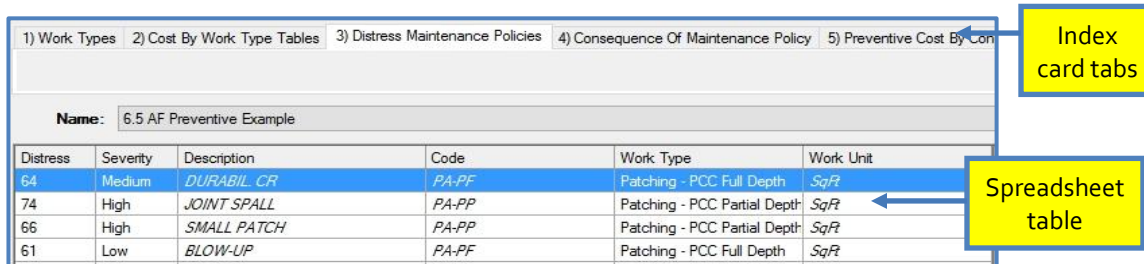
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General

Spreadsheet Forms

The basic form for editing and viewing data in PAVER™ is a table that operates like a spreadsheet. In some instances, these forms are used only to present data and the values displayed cannot be edited. On other occasions, you are able to edit the data or add new lines to the table.

As with other tools, highlighting the spreadsheet and right-clicking reveals a menu with spreadsheet tools. Depending on the context, some of the right-button click features may not be available, and are consequently listed in the menu as light gray. The basic right-button click spreadsheet features allow table zoom, table layout customizing, add/edit/delete record, search, import/export, print table, and graph options. It should be noted that there is a limit of 65,000 rows per table when exported to versions of Excel prior to 2010.



Index Cards

Index-style data entry windows are used in several forms by PAVER™: Inventory, Prediction Modeling, Condition Perf. Analysis, M&R Planning, and EMS™ Query. The index-style windows place data entry fields on multiple forms that look and operate like paper index cards, and allow the user to switch between multiple cards without opening or closing additional windows.

When a window containing index-style data cards first opens, the form's initial active index card is visible and can be edited. Each index card form includes a tab with a descriptive title, and only this tab portion of unselected index cards is visible.

To change the active index card, use the mouse to point to an inactive index card title and left-click. The selected card becomes the active card and the previously active card becomes inactive. You can now edit or add entries to the fields on the active index card. After editing is complete, click the close button on the form or use the Windows close form menu. Your data is saved to the database in real-time as you make your edits. This means there is no action required to save your changes.

Note

Changes made on the index data cards are made real-time. PAVER™ automatically saves any changes the user makes.

Tab Tables

PAVER™ Tab Tables are spreadsheet-like tables used in PAVER™ to display and edit system configuration information. The Tab Tables are accessed from the PAVER™ System Tables and Tools menu option, and look and operate like spreadsheets. Right-button click features are used to print, zoom and configure the tables, and buttons on the bottom of the tab form are used to add and delete records.

There are two types of Tab Tables, basic (independent) and linked (dependent). The basic table operates like a standard spreadsheet except that data input into the table is controlled by the series of buttons (Close, Add and Delete) that are arrayed along the bottom of the Tab Table forms. Clicking the Add button inserts a new record into the table, which can then be edited. The Delete button removes the highlighted record in the table, and the mouse or arrow keys are used to move up and down the rows and across columns in the active Tab Table.

The second type of Tab Table is a linked table. The linked table uses the records of a basic table or tables as the basis for its data entry. The linked table is referred to as the child, or dependent table, and the basic table is the parent (independent) table. For example, the work type cost table uses three work type tables: localized, global and major as the basis for its entries. Therefore, when you add a record to the work type cost table (a linked table), you click

the Add button and get a picklist of possible values to add. The table is formed from the entries in the linked table's parent table(s) (localized, global, and major M&R tables in this case).

Linked tables help PAVER™ enforce consistency in its data tables. For example, if the work type cost table was not linked to the M&R tables, it would be possible to develop costs for M&R procedures that were not defined. This type of inconsistency can damage the accuracy of analysis routines such as the Work Plan.

Printing Screen Images

Printing in PAVER™ is accomplished in one of two ways. First, the standard PAVER™ reports include specialized forms for printing reports (see the Standard Reports section). Right-button clicking on tables or graphs provides a method of printing tables or graphs.

You can also print screen images using PAVER™ by right-button clicking on a form. Select Capture Form Image from the dropdown list to save and print the image.

Adjusting Table and Graph Sizes

Tables and graphs automatically resize to the available space on your computer display. As the number of active tables increases, the number of lines allocated to each table reduces. If a table is associated with a graph, the table and the graph share the horizontal space that is allocated to the table. You can adjust the space allocated between a table and its associated graph by pointing to the vertical bar that separates a table from its graph and then, while pressing the left mouse button, drag the separator bar to the right or left. You cannot manually increase or reduce the vertical space allocated to a table in the EMS™ Report Viewer. If you want to increase the vertical space available for a table you must close one of the other (EMS™ Report Viewer tables. You may use the zoom function on active tables with the right-button click tool for a temporary larger presentation of a table or a graph.

Right-button Click

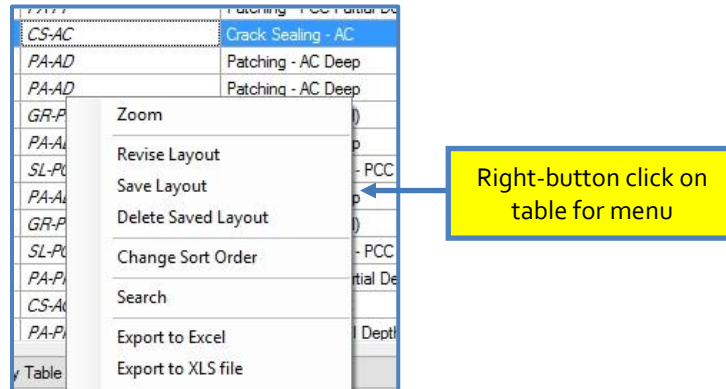
Right-button Click on Tables

Whenever possible, information in PAVER™ is presented in tables. These tables are used to input, edit, and review reports (EMS™ Report Viewer and Reports). The tables in PAVER™ are equipped with several features that enhance the capabilities of the PAVER™ system. These features include:

- Zooming in on the table
- Revising the Layout (including adding or removing fields)
- Saving the Layout
- Deleting a Saved Layout

- Changing Sort Order
- Search
- Exporting the table to Excel, XLS, or XML
- Table printing

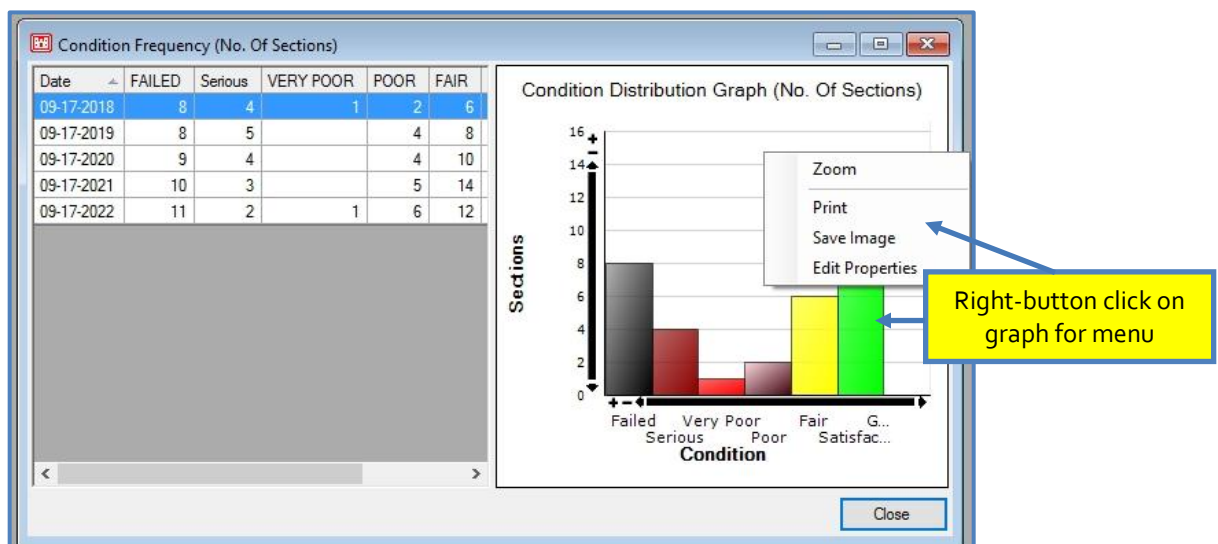
To access the extended table features you must first make the spreadsheet table active by clicking on the table. Once the table is active and the mouse pointer is over any portion of the table, right-click to invoke the menu of extended table features.



In addition to the right-button click table features, column widths can be reduced or enlarged when a table is active. To change column width, point to the vertical line positioned between the columns. When the mouse pointing indicator changes from the large arrow to the small double arrow icon, click and drag the column border to the desired size.

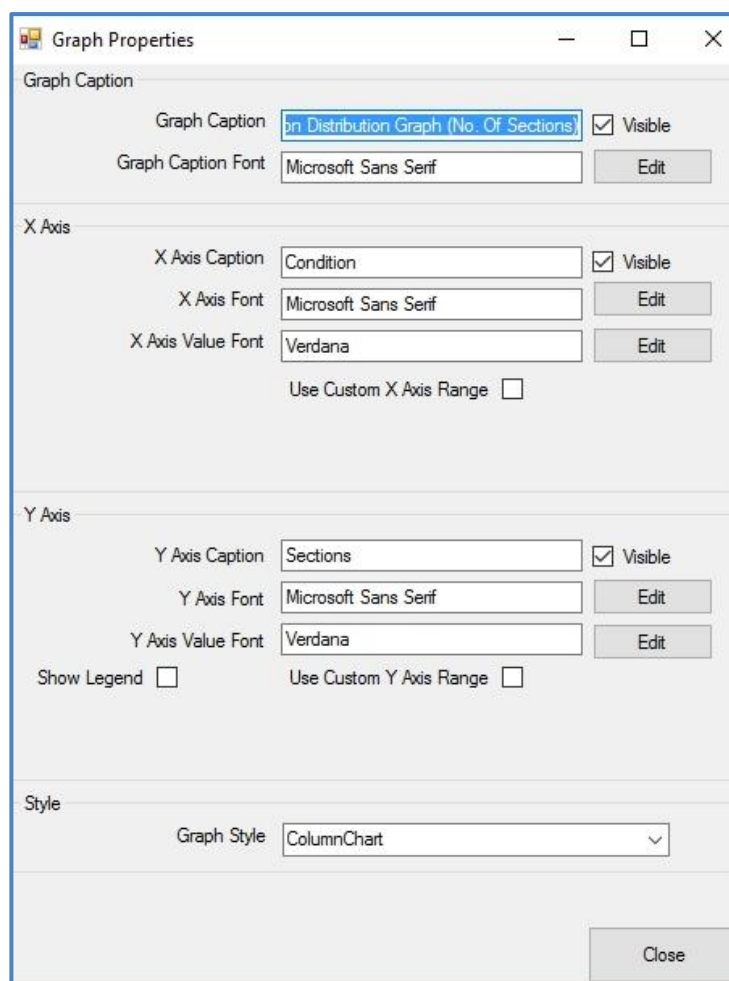
Right-button Click on Graphs

PAVER™ graphs can be printed, customized and zoomed in the same manner as PAVER™ tables. To view a PAVER™ graph, make the graph active by clicking on the graph. While the graph is active and the mouse pointer is anywhere on the graph, right-click to invoke the graph menu. Select items from the graph feature menu, which is accessible with a right- button click.



You can customize the look of PAVER™ graphs on the fly by using the EMS™ right-button click tools. The graph Zoom feature enlarges the graph to the full extent of the window in which the graph is located. The image can be saved to the clipboard to later paste into spreadsheets, presentation programs, or other Windows applications. This can be done in either normal or zoomed view. To return to the original window from zoom, right-click on the zoomed graph and select Unzoom.

Edit Properties invokes a graph editor (Graph Properties) that allows you to customize graph type and presentation. For example, you may change the graph type from a two-dimensional bar graph to a three-dimensional pie chart. It also allows editing of captions, fonts, and whether they are visible or not.

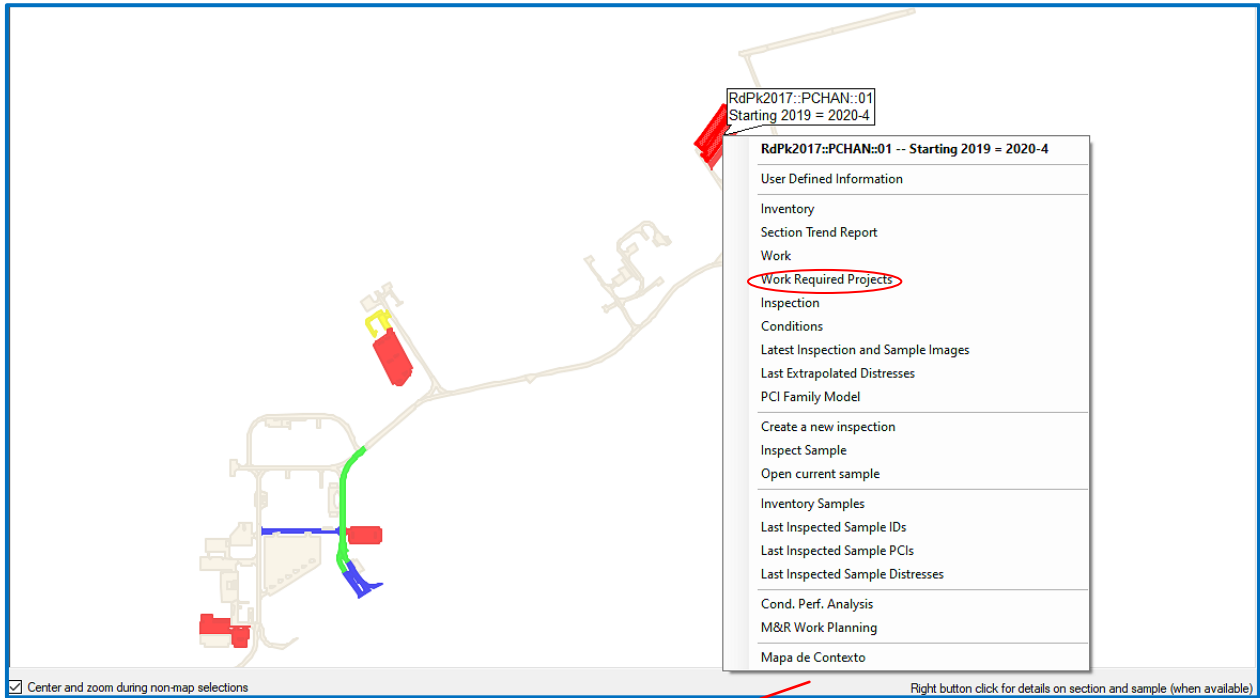


Toolbar invokes a graph editor (Graph Properties) that allows you to customize graph type and presentation. For example, you may change the graph type from a two-dimensional bar graph to a three-dimensional pie chart. The Save Layout feature saves the current graph configuration

so that on subsequent visits to the current graph it will retain the graph properties you specify using the Toolbar. Print allows you to print your graph to a Windows printer.

Right-button Click on GIS Maps

The user can access a wide variety of other features throughout the PAVER™ by right-button clicking on GIS Maps, such as Work Required Projects (shown below).



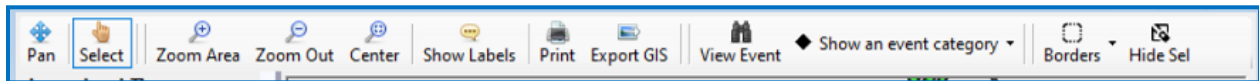
Project Name	Total Cost	Total Area (SqFt)	Section Count	Start Date	End Date
2020-4	\$122,891.34	190,685.65	6	10/01/2019	10/01/2019

PID	Work Category	Work	Activity Date	Cost	Quantity
RdPk2017::PCHAN:01	Localized MR	Crack Sealing - AC	10/01/2019	\$2,550.00	1,020.00 Ft
RdPk2017::MPOOL:01	Localized MR	Crack Sealing - AC	10/01/2019	\$820.20	328.08 Ft
RdPk2017::PKUES:02	Localized MR	Crack Sealing - AC	10/01/2019	\$3,000.00	1,200.00 Ft
RdPk2017::P0107:01	Localized MR	Crack Sealing - AC	10/01/2019	\$115.75	46.30 Ft
RdPk2017::PEAST:01	Localized MR	Crack Sealing - AC	10/01/2019	\$662.50	265.00 Ft
RdPk2017::ACHAN:01	Localized MR	Crack Sealing - AC	10/01/2019	\$57.50	23.00 Ft
RdPk2017::ACHAN:01	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$9,789.10	16,315.16 SqFt
RdPk2017::P0107:01	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$9,359.93	15,599.89 SqFt
RdPk2017::PCHAN:01	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$24,846.71	41,411.18 SqFt
RdPk2017::MPOOL:01	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$16,922.80	28,204.66 SqFt
RdPk2017::PKUES:02	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$36,580.61	60,967.69 SqFt
RdPk2017::PEAST:01	Global MR	Surface Treatment - Micro Surface	10/01/2019	\$16,912.24	28,187.07 SqFt
RdPk2017::MPOOL:01	Localized MR	Patching - AC Deep	10/01/2019	\$1,274.00	182.00 SqFt

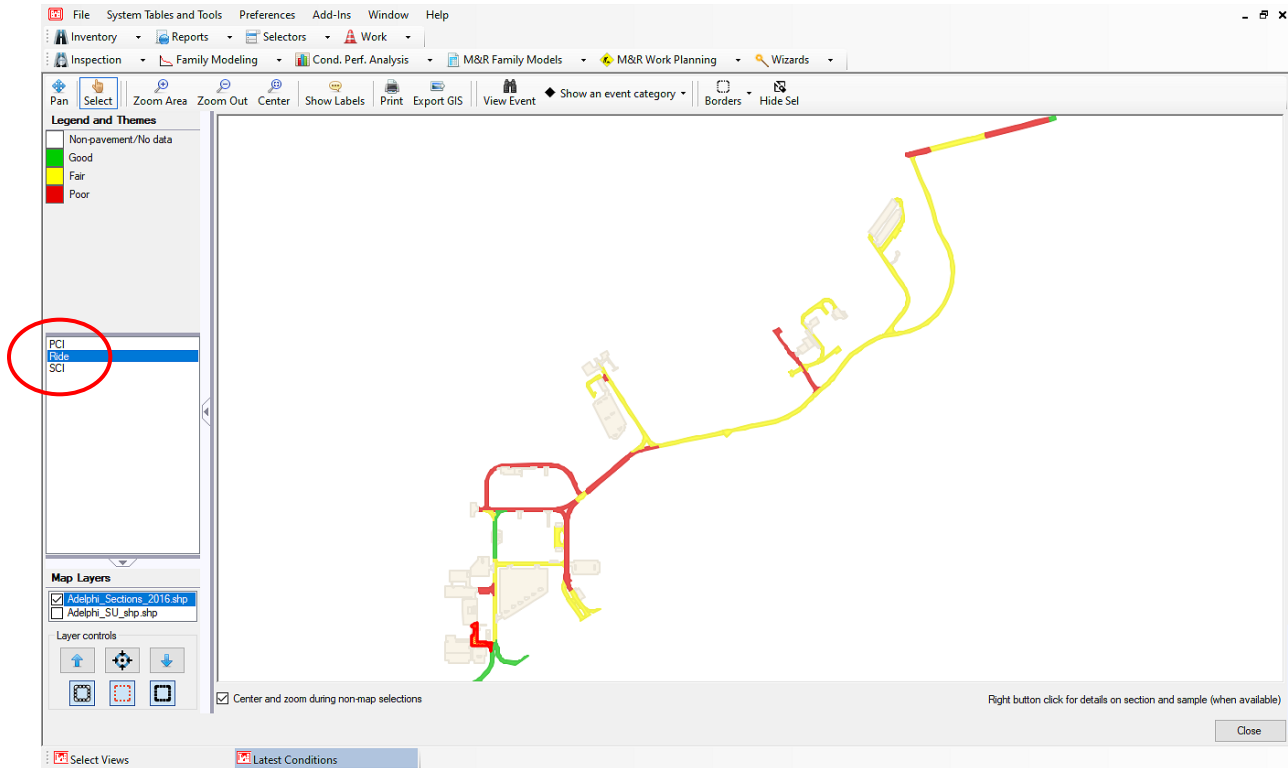
GIS Views

GIS Maps are used throughout many features in PAVER™. To navigate these views, use the GIS Viewer Buttons, which function in the following manner:

- **Center:** Centers the current view at full extent.
- **Pan:** Allows the user to move around the view at the current zoom level.
- **Select:** Activates the selector tool so the user can utilize the GIS view as an inventory selector.
- **Zoom Area:** Allows the selection of a portion of the view to zoom in on
- **Zoom In and Out:** Zoom in one level on the current view, or zoom out one level on the current view.
- **Show Labels:** Shows Network ID, Branch ID, and Section ID on map.
- **Print:** Prints a copy of the view and the legend
- **Export GIS:** Exports the map and legend using a selected format.
- **Show an Event Category:** Dropdown list that offers additional options including; ability to hide all events, show Branch names on map, show map PIDs, show last Branch or Section PCI, images, last load defects, inventory items above or below critical, etc.
- **Borders:** Toggle borders on/off, Colored/Default, Thick/Thin.
- **Hide Selection:** No longer highlight the selected section on the map.



The Legend and Themes panel to the left side will display color-codes associated with the theme of the selected GIS view. You can toggle between selections (again, based on the GIS map being viewed), such as PCI, non-PCI conditions, and Textual Conditions as displayed below:



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Specialty Tools

Selectors

PAVERTM provides several options for choosing the portion of inventory with which the user wants to work. These “selectors” make moving from one part of the inventory to another quick and easy. The selectors are accessed directly from the Selectors menu on the main toolbar. Detailed information on Selectors may be found in Chapter 7 [Selectors](#).

EMS™ Query Tool

The EMS™ Query Tool is utilized in several places within PAVERTM to facilitate the selection of a subset of pavement sections to use in reports and data modeling. The query tool can also be used to specify the sorting of data. Selection and sorting criteria specifications can be stored and retrieved by name in the Stored Criteria box. The query tool also reports the record count (number of sections selected) as filtering queries are built.

Note

Clicking the Record Count checkbox shows real-time updates of how many pavement sections are currently selected by the query tool.

Filter criteria are entered using the drop boxes arrayed across the query form. Fields are entered from left to right and top to bottom. As you enter query information, only the next field will be highlighted for user selection. For example, use the first entry in the Field column to select Surface. Once you have selected Surface, the Comparison field is highlighted. After selecting a query field and the comparison evaluator (=, >, <, >=, <=, <>), the Compare To field becomes active. The drop-down list on the Compare To field lists the available choices in the database for the selection you made in the Field column. If the number of available choices is larger than 1000, the first couple of characters can be typed in the box to narrow down the number of items populated. After you make a selection in the Compare To field, the record count indicator will change as the query you are building is applied to the database in real-time.

The first column on the query form contains the query statement operators (And/ Or). These operators are used to join the individual query statements. To see the Structured Query Language (SQL) query that you have built with the query tool, click the View Text button at the bottom of the screen. The Clear All button removes all selection criteria on the screen. Click the Save button on the EMS™ Query Tool to save a set of report criteria.

The And/ Or operators require additional clarification. For example, if the user wants to include pavement sections constructed with asphalt and concrete then the correct operator is Or, and the query will return any sections that fit either of the conditions. The And operator returns only sections that fit all of the listed conditions. For example, selecting asphalt surfaces and Branch Use equal to parking lots with the And operator, returns only asphalt parking lots. Using And with the first example will return nothing, since it is impossible for a section to be both asphalt and concrete surfaced.

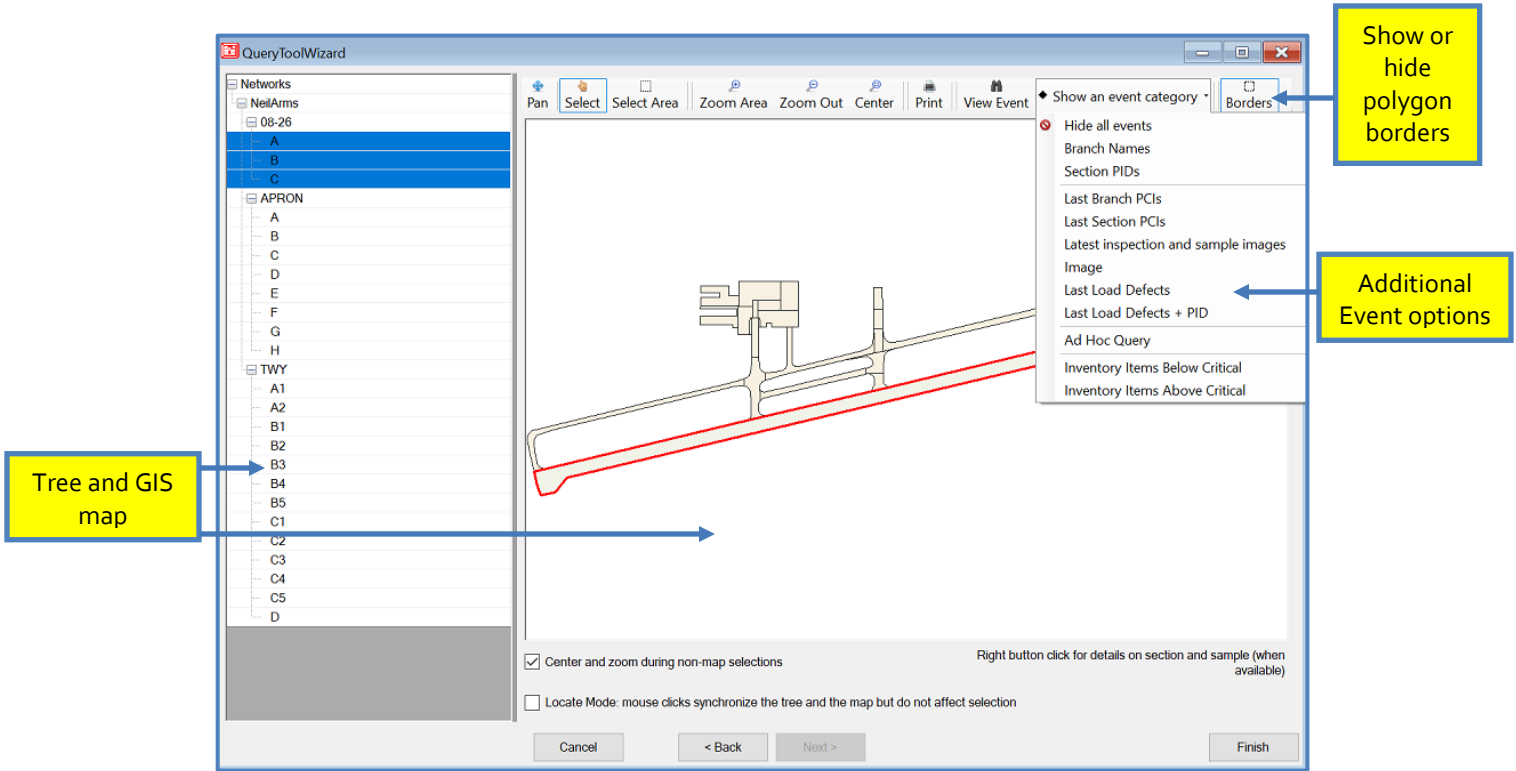
The
Tool in
always

EMS™ Query
Family
Modeling is
in locate mode.

Store query criteria

Indicated number of records in selection

Select query criteria



EMS™ Report Viewer

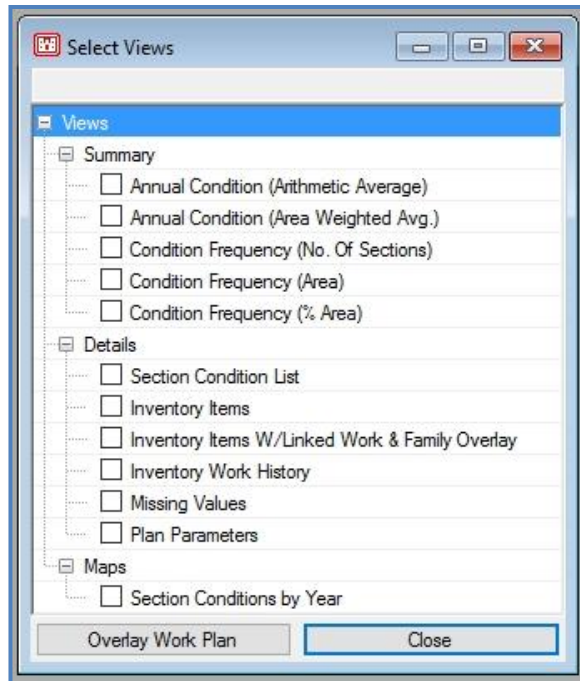
The PAVER™ analysis reports (Condition Analysis Report and the M&R Work Planning Report) are presented in the EMS™ Report Viewer, a tool that provides a framework for displaying spreadsheet-like tables that contain report information. The spreadsheets in the EMS™ Report Viewer can be associated with graphs that operate in conjunction with the spreadsheet tables. The EMS™ Report Viewer organizes the presentation of report results in three views: Summary, Detail, and Map. The summary view includes high-level views of summarized report data. The detail version includes section by section details that are covered in the summary version of the reports. The map view includes information on a map. Each View selected comes up in a separate form.

Select Views Menu

The EMS™ Report Viewer includes a Select Views form that is used to open and close the various views of the report data. Checking a box brings up a report form with the selected information. Un-checking the box, closes the report. Reports may also be closed with the Close or X buttons.

Note

Each report type has its own unique file extension: Condition analysis reports are *.rpc files and M&R Work Planning reports have *.rpw extensions. These extensions should be maintained when you name a report file.



EMSTTM Report Viewer Tables

The spreadsheet tables in the report viewer are standard PAVERTM tables and support the right-button click on tables features. When an EMSTTM Report Viewer report (i.e. Condition Analysis or M&R Work Plan) is displayed, the tables are made active with a left-click.

Spreadsheets in the EMSTTM Report Viewer can be associated with graphs. These graphs are implemented in two different ways. The first type associates a graph directly with a single row, the active or highlighted row, of the table. In this case, as the user changes the active row in the spreadsheet, the graph dynamically adjusts so that the graph reflects the active row in the spreadsheet.

The second type of graph association is as an overlay on an existing graph. For example, in the Condition Analysis Report a table showing combined section condition history and projections is linked to a graph that plots the condition over time. This graph can further be overlaid with a plot of the family curve assigned to the section. As elsewhere in the program, graphs in the EMS™ Report Viewer can be zoomed, printed, saved, or configured with the right-button click on graphs feature.

The screenshot displays the PAVER™ 32bit 7.0.11 application window. On the left, a 'Select Views' dialog box is open, showing a tree view of report components. A yellow callout box points to the checked items: 'Annual Condition (Arithmetic Average)' and 'Section Condition List'. Below this, another yellow callout box points to the 'Report View' button. The main interface shows two report windows. The top window, titled 'Annual Condition (Arithmetic Average)', contains a table of data and a line graph titled 'Annual Condition Plot (Arithmetic Avg.)'. The bottom window, titled 'Section Condition List', contains a table of data and a line graph titled 'Condition Plot'. Both graphs show a downward trend over time from 2019 to 2026.

Network ID	Branch ID	2018	2019	2020	2021
(All)	(All)	70.22	67.64	65.15	62.76
RdPk.2017	(All)	70.22	67.64	65.15	62.76
RdPk.2017	A0103	73.21	70.64	68.17	66.10
RdPk.2017	A0106	42.11	35.10	28.07	21.06
RdPk.2017	A0403	22.26	16.76	11.35	5.96
RdPk.2017	A0500	85.54	82.62	79.84	77.32
RdPk.2017	A0505	65.70	64.85	63.95	63.00
RdPk.2017	A0601	49.50	47.03	44.46	41.82
RdPk.2017	ACHAN	67.94	65.93	64.61	64.05
RdPk.2017	ANAVA	64.15	62.44	60.76	59.11

Network ID	Branch ID	Section ID	2018	2019	2020
RdPk.2017	A0103	01	73.21	70.64	68.17
RdPk.2017	A0106	01	42.11	35.10	28.07
RdPk.2017	A0403	01	25.59	18.58	11.55
RdPk.2017	A0403	02	18.94	14.94	11.11
RdPk.2017	A0500	01	93.07	89.31	86.11
RdPk.2017	A0500	02	78.02	75.92	73.51
RdPk.2017	A0505	01	65.70	64.85	63.95
RdPk.2017	A0601	01	73.45	72.12	70.81
RdPk.2017	A0601	01A	25.55	21.93	18.01
RdPk.2017	ACHAN	01	67.94	65.93	64.61
RdPk.2017	ANAVA	01	64.15	62.44	60.76

Exiting the EMS™ Report Viewer

When you have completed reviewing an EMS™ Report Viewer report, close the report by closing the EMS™ Report Viewer window. After you close a report, you are prompted to save the report. If you choose to save the report, a file dialog box window is presented so that you can name the report to be saved.

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3. File Menu

File Menu options

File Menu:

- Connect to WCF Server/Workgroup
- New/Import
 - New Database
 - Import Default Inventories
 - E60/E65 Import
 - E70 Import
 - GIS/Tabular Import
- Open Pavement Database
- Event Manager
 - Manage Event Folders
 - Assign Events
- Take pictures
- GIS Manager
- GIS Recycle Bin
- GIS/Tabular Import and Update
 - Add Inventory from GIS/Tabular Data
 - Update Inventory from GIS/Tabular Data
 - Import Inventory Samples from GIS/Tabular Data
- Export Open Pavement Database
- Export SDSFIE
- Export SMS
- Export Asset Item Assignments
- Combine Inventories
- Database Properties
- Delete Pavement Database
- Database Recycle Bin
- Exit

Connect to WCF Server/Workgroup

In multi-user mode, this option allows the user to connect to PAVER™ on a server setup. For further instructions on WCF Server Installation, see [Appendix H](#). For Terminal Services Installation instructions, see [Appendix I](#). Both appendices sections explain workgroup configuration.

File System Tables and Tools Preferences
Connect to WCF server/workgroup
New/Import
Open pavement database
Event Manager
GIS Manager
GIS/Tabular Import and Update
Export Open Pavement Database
Export SDSFIE
Export SMS
Export Asset Item Assignments
Combine Inventories
Database Properties
Delete Pavement Database
Database Recycle Bin
Exit

Connect to WCF server or workgroup
Saved Connections Click here to show connection details
Local Databases
Delete
Automatically connect with these settings next time.
Help Cancel Log in

Check Workgroup to connect using an independent set of PAVER™ users and data that was previously set up in Workgroup Configuration

Host Information
 WCF connection //localhost/
 Workgroup
User Credentials
User name Admin
Password ●●●●
Save parameters as...
Automatically connect with these settings next time.
Help Cancel Log in

Shows connection option types

Enter a server's remote address for WCF connection

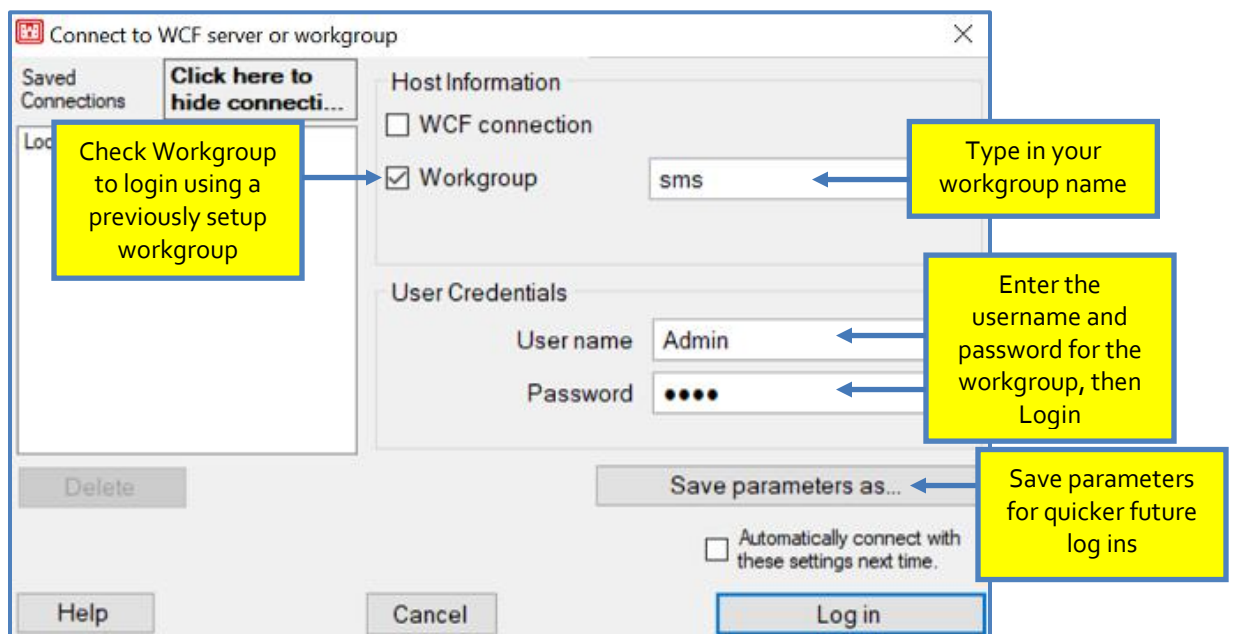
The default password is Admin

Save parameters for quicker future log ins

Admin User is a default user that is created when you log into PAVER™ for the first time, it grants permission to manage other user's access to databases (each license key will grant 2 active users)

For a client connection; use the Click Here to Show Connection Details button to see WCF connection options, then check WCF Connection under Host Information. Type in the server's remote address, typically this is a web or IP address. If your server has a static IP, you can use this address. It can also be a subnet IP if your network is configured in that way.

Set up Workgroups prior to running PAVER™ for the first time. Workgroups are needed if you would like to create an independent set of users and data, where separation is absolutely necessary (eg., if you do not want clients to see each other's databases and you would like the program to operate as a separate installation for each Workgroup). If you will only ever support a single collection of users for PAVER™ on the same machine, you do not need to set up Workgroups. Having independent sets of users will require each Workgroup to have its own set of license keys. For instructions on completing Workgroup set up, see [Appendix H](#). Once Workgroups are set up, configure user permissions in: System Tables and Tools > Manage User Logins.



New/Import

This option allows the user to create a new PAVER™ inventory, or import a PAVER™ database from an E60, E65, or E70, or do a GIS/Tabular Import.

New Database

Selection of New Database allows the user to create a new pavement database. Databases can be created in SQL Server or Microsoft Access formats. SQL Server supports larger databases and many users. SQL is recommended for databases of more than 10,000 sections. It also requires use of SQL Server software. Microsoft Access supports smaller databases and individual or a small number of users. Choose the Microsoft Access option to import an E60/E65 from PAVER™ 6.

Import Default Inventories

Default Inventories were added to support LAN mode, in order to allow multiple users access to the same database on a networked drive.

*Note: It is important to remember that this is **NOT** a good choice for concurrent multi-user setups. This is primarily for serial connections where a small group of people share the same databases **one at a time**.*

Default Inventories simulate the way databases were managed in PAVER 6.x. They are user managed and do not participate in roles or permissions. In order to use Default Inventories, you must go to Preferences -> PAVER Defaults -> Menu Tabs -> Check the appropriate box.

As of PAVER 7.0.10, this feature is only available in 32-bit mode with MS Access databases. There are other additional restrictions which can be learned by pressing the info button on the Preferences form. After restarting PAVER, you will now have two new menu items. Use File > New/Import > Import Default Inventories (.pvx) to either create a blank or import a file, just like you would with a normal database. The unique step here is choosing a location to save the database. This location can be anywhere and can be changed afterwards.

Once the import or create is complete, you will find the folder package in the location provided. This folder has a special .pvx file which is used in the same way that .pvr files worked in Paver 6.x. The second new menu option is Open > Open default inventory (.pvx). You can either browse to a .pvx file or open a recent item.

Note: Because these databases are moveable, you will have to use the browse dialog to find a moved .pvx file.

E60/E65 Import

To import an E60/E65, open File >> New/Import >> E60/E65 Import. Chose Microsoft Access as the Database Type to Import to on the Import Pavement

Note:

If an inventory of the same name already exists in the directory, the user must choose a different inventory name to continue.

Database form and then click Next. Browse to the location of the E60/E65 and double-click or click Open so that the file shows up in the form. Type a New inventory name or accept the one that shows on the form. An additional data directory will be created using the New inventory name by default in the C:\Program Files\EMS\User Data directory. The data directory should be located wherever the \EMS\User Data directory has been installed. Use the Browse button at the bottom of the form to set the location.

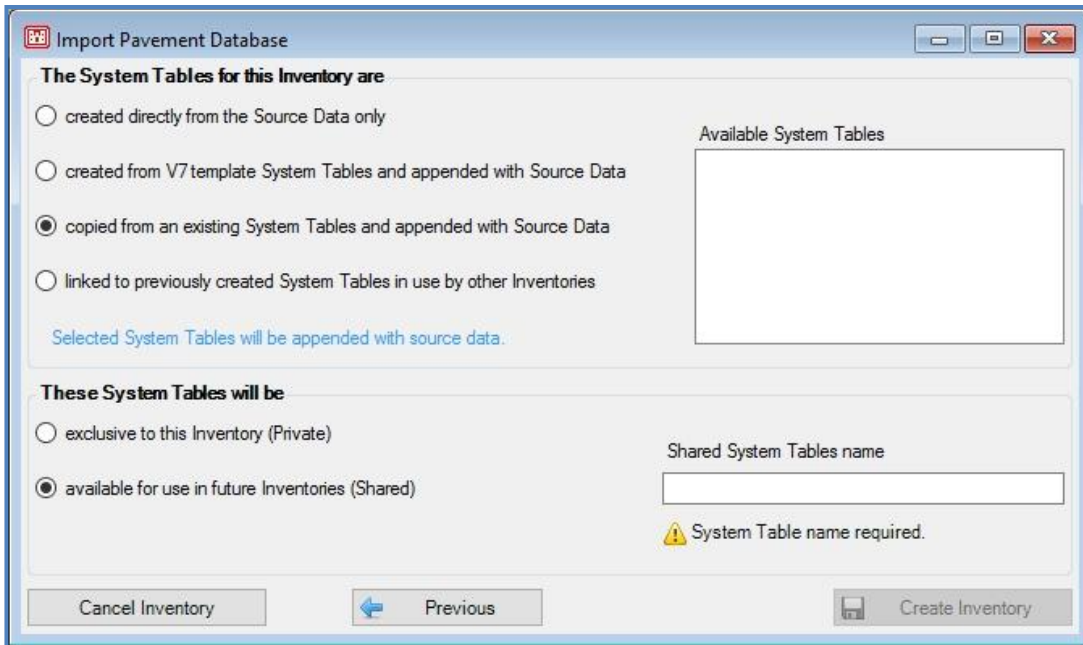
Click Next to choose which System Tables are to be used for this inventory.

The options for The System Tables for this Inventory are:

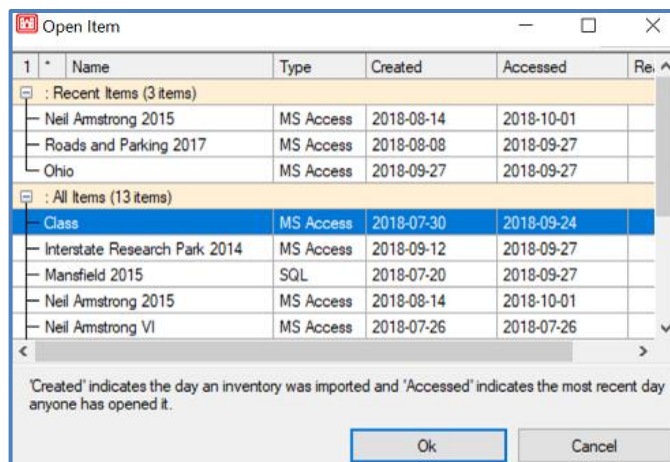
- created from V7 template System Tables and appended with Source Data
- copied from an existing System Tables and appended with Source Data (a box will open on form with available list of System Tables)
- linked to previously created System Table in use by other Inventories (a box will open on form with available list of System Tables)

The user may also choose whether These System Tables will be:

- exclusive to this Inventory (Private)
- available for use in future Inventories (Shared) (a box will open on the form asking for a Shared System Tables name)



After choosing the desired System Tables options, click Create Inventory to create the new inventory. The user can now open the inventory by going to File >> Open Pavement Database, and choose the inventory from the drop-down list.



E70 Import

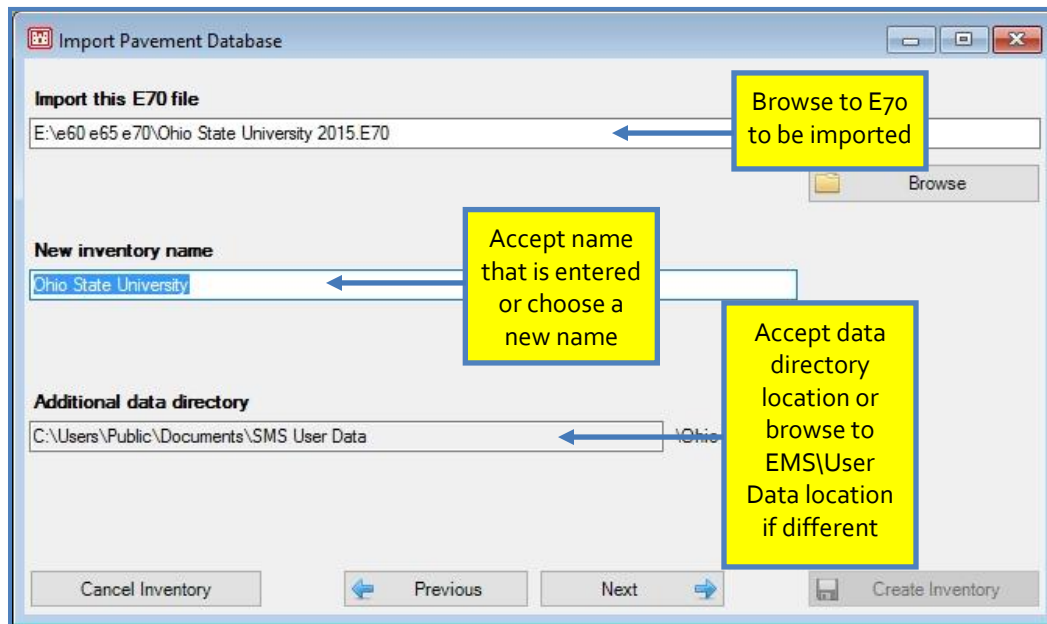
To import an E70, open File >> New/Import >> E70 Import. Choose SQL Server or Microsoft Access as the Database Type To Import To on the Import Pavement Database form depending on the type of E70 file to be imported.

Microsoft Access Import

If Microsoft Access is chosen, click Next. Browse to the location of the E70 and double-click or click Open so that the file shows up in the form. Type a New inventory name or accept the

Note:
64-bit PAVER™ 7 only uses SQL Server databases.
32-bit PAVER™ 7 may use either Access or SQL Server.

one that shows on the form. An additional data directory will be created using the new inventory name by default in the C:\Program Files\EMS\User Data directory. The data directory should be located wherever the \EMS\User Data directory has been installed. Use the Browse button at the bottom of the form to set the location.



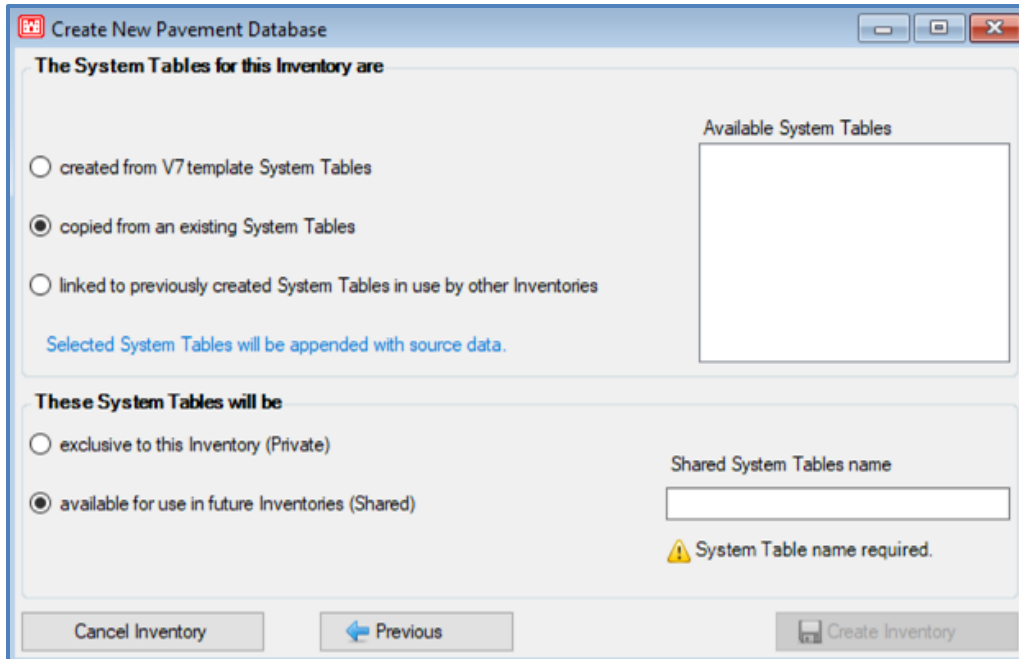
Click Next to choose which System Tables are to be used for this inventory.

The options for the System Tables for this inventory are:

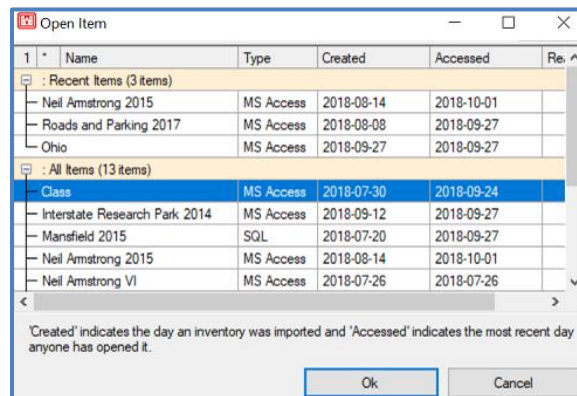
- created from V7 template System Tables
- copied from an existing System Tables (a box will open on the form with a list of available System Tables)
- linked to previously created System Table in use by other Inventories (a box will open on the form with a list of available System Tables)

If the first or second option are chosen, a user may choose whether the System Tables will be:

- exclusive to this Inventory (Private)
- available for use in future Inventories (Shared) (a field will pop up on the form asking for a Shared System Tables name)



After choosing the desired System Tables options, click Create Inventory to create the new inventory. The user can now open the inventory by going to File >> Open Pavement Database, and then, choosing the inventory from the drop-down list.

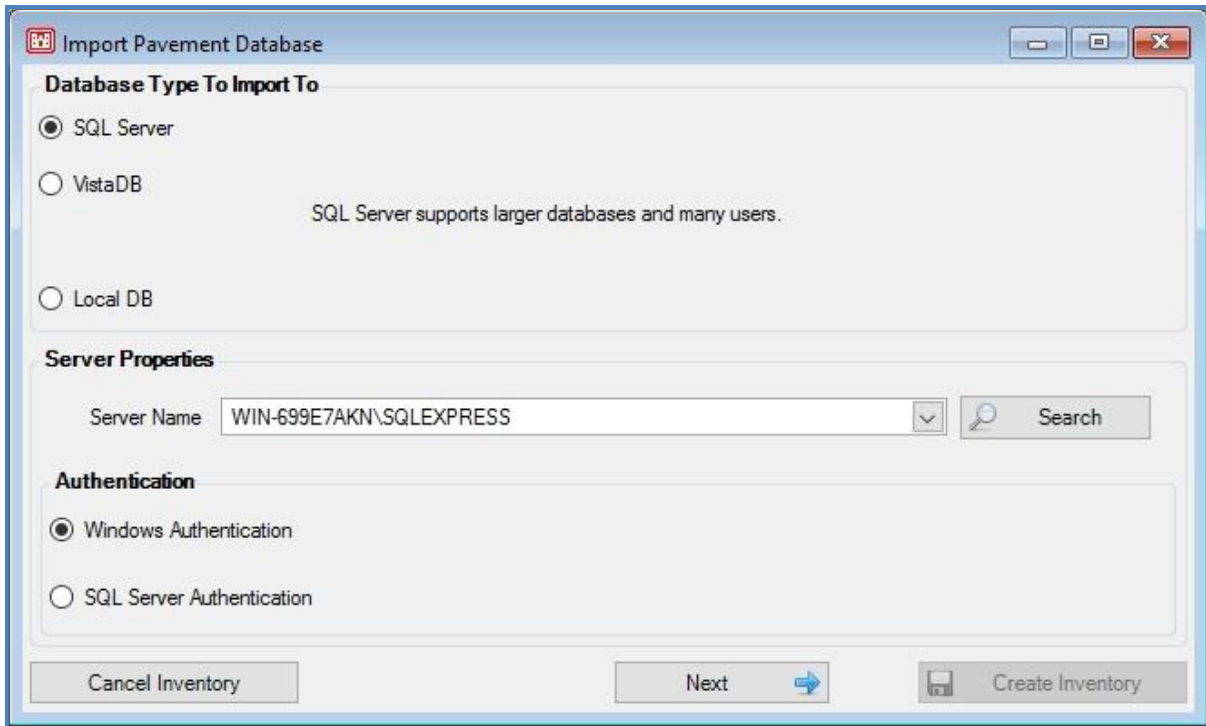


SQL Server Import

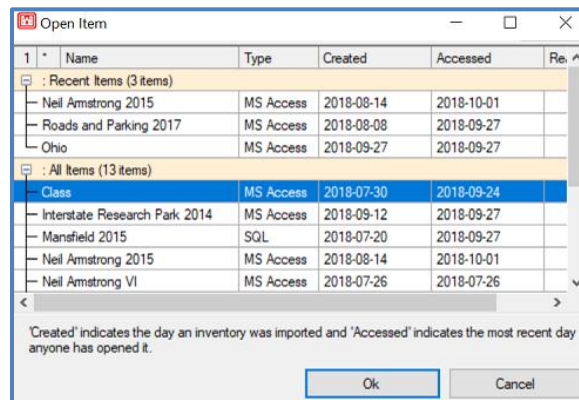
To import a SQL Server E70, the user must choose the Server Name from the drop-down box for Server Properties and whether to use Windows or SQL Server Authentication. Authentication information should be available from the user's Network Administrator. Click Create Inventory.

Note:

If an inventory of the same name already exists in the directory, the user will need to choose a different inventory name to continue.



The user can now open the inventory by going to File >> Open Pavement Database, and then, choosing the inventory from the drop-down list.



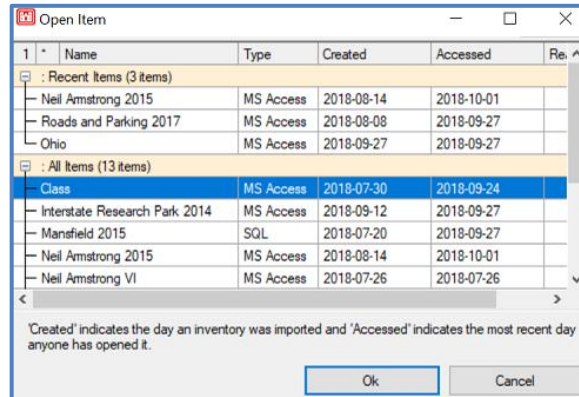
GIS/Tabular Import

PAVER™ can create an Inventory using the attributes of the Shapefile. This option imports those GIS and Tabular Data results into PAVER™.

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Open Pavement Database

Open a pavement database by clicking File >> Open Pavement Database. Use the Open Item menu to choose the database to be opened. Choose from recently opened databases from the top tree or select from all databases in the All Items tree below Recent Items.

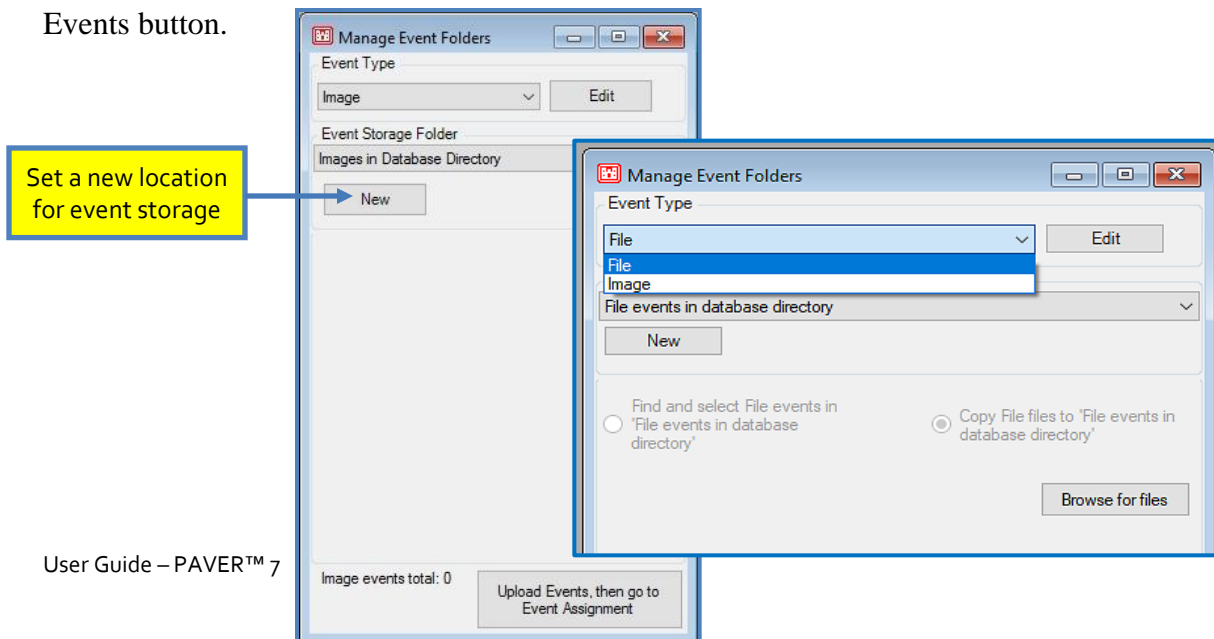


Event Manager

Manage Event Folders

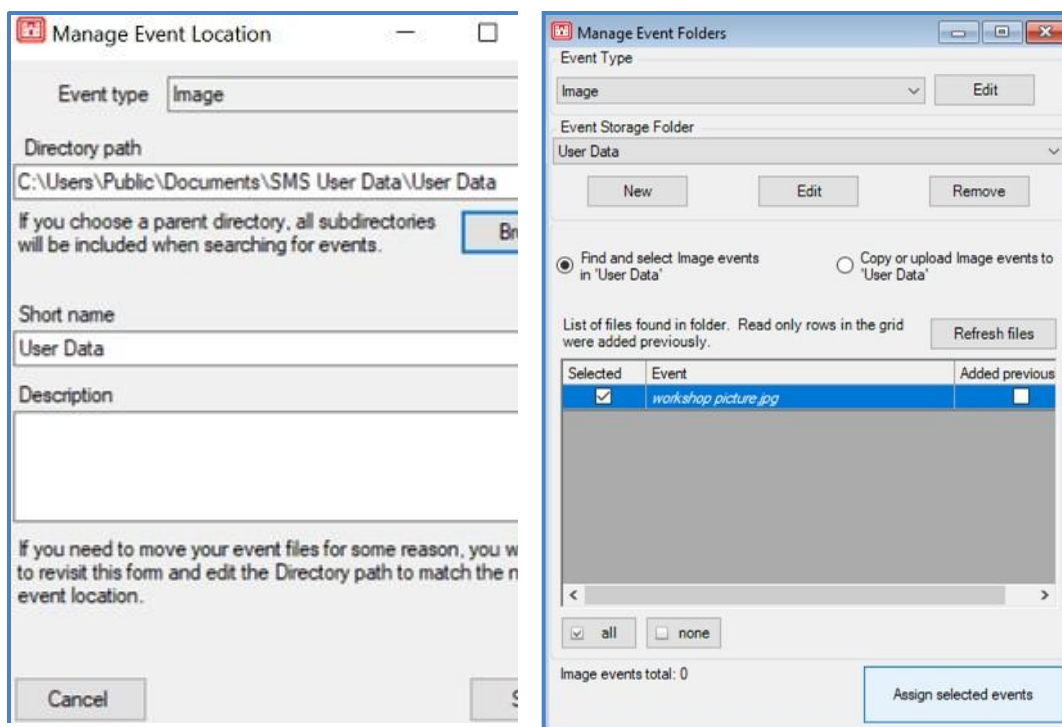
This option allows the user to locate images/events in order to assign them to a section. Images can be assigned in this way in addition to files such as Excel, Word, and PDF files.

Select the Manage Event Folders option under Event Manager on the File menu. Choose events from the list of files in the table with Find and Select Image Events in 'Saved Pictures' selected. To copy or upload events to the displayed Event Storage Folder, choose the alternative option to browse for files. A new event storage folder can be added, edited, or removed using the buttons above these two options. Once you're happy with your selections, click on the Assign Selected Events button.



By default, images are stored in the database directory. Be aware that images can take up a significant amount of space. Instead, the user should choose to manage images externally (on a flash drive, for example).

To manage the images externally, a location needs to be set up so that the program can easily find them. Click New to open the Manage Event Location window. Browse for the Directory Path to navigate to the file location of the images. Select a Short name or accept the one suggested, then click on Save. The saved location will now be available for the program to access the images for assignment.



Once an Event storage folder has been established, it becomes available in the dropdown menu and the images can be found or copied for assignment.

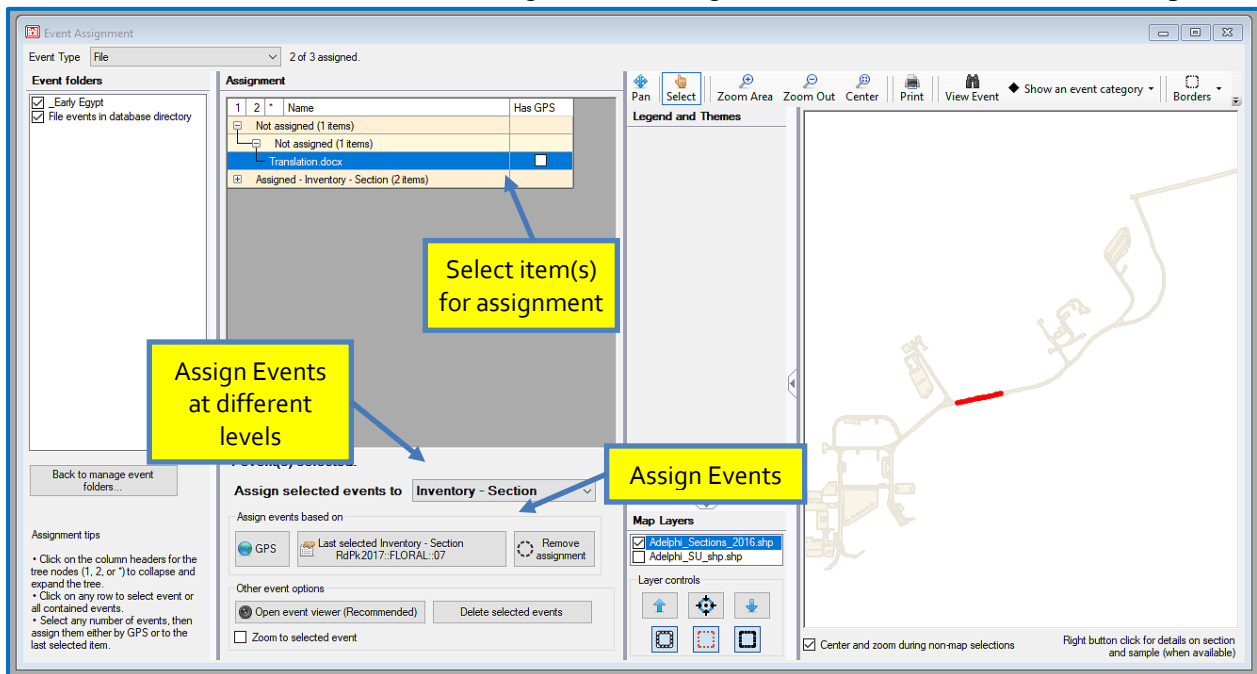
If the user chooses to manage images within the database, navigate to the location of the images by using the Browse button. Select images to be uploaded and double click so the file names appear in the box next to the Browse button. Multiple images can be selected for upload by holding the Shift or Control keys. Click the Upload Selected Events button to open the Event Assignment window.

Note: If a user encounters issues viewing uploaded Events; first ensure the image directory that was utilized is valid.

Assign Events

This screen will open after clicking Upload Events, then Go to Event Assignment button in the Manage Event Folders form. It can also be accessed by selecting the Assign Events option under the Event Manager on the File Menu.

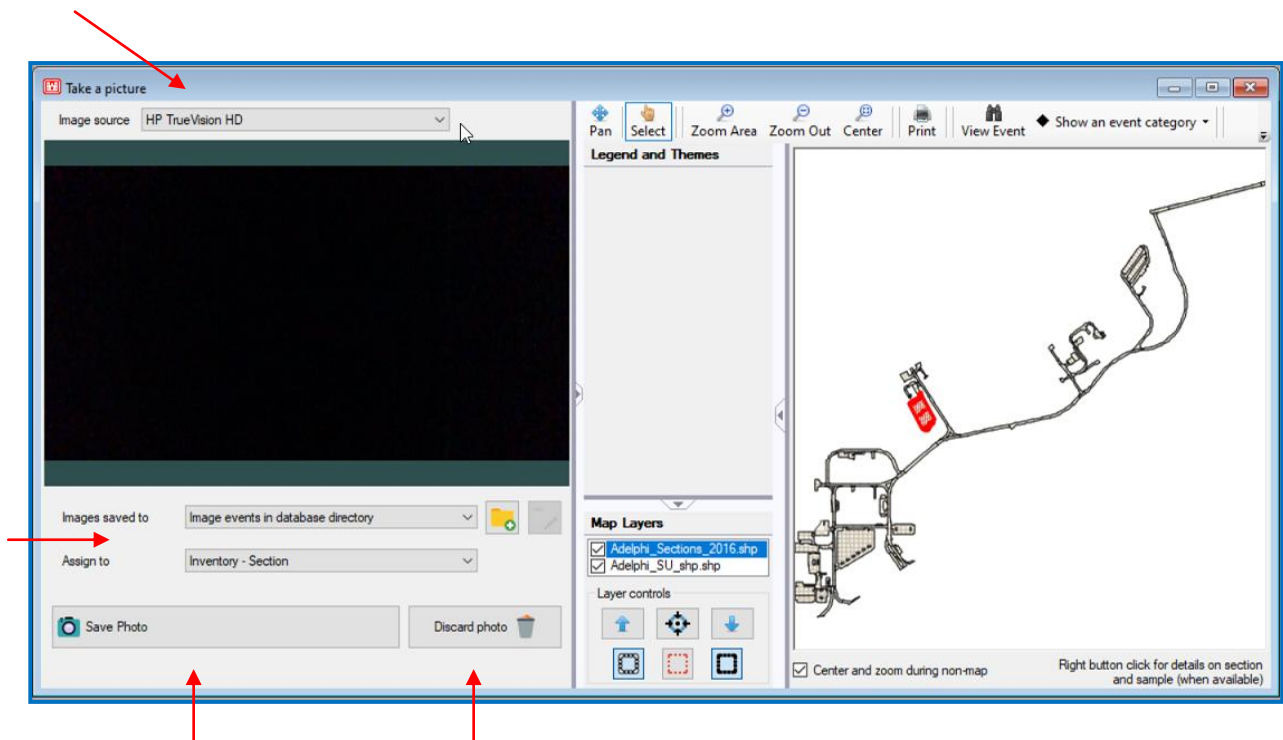
To assign Events to a section, select the image event from the table on the left. Multiple images can be selected and added simultaneously. Click on Open Event Viewer to confirm the correct image is being assigned, once the Event(s) have been assigned you can also click on the image within the map to view the Event. In the map on the right side of the form, select a section to which the event will be assigned. Assign or unassign the event by selecting the appropriate button towards the bottom of the window: Assign to Inspection (Section or Sample) or Inventory (Network, Branch, or Section) or Unassigned. The assigned event will be shown on the map.



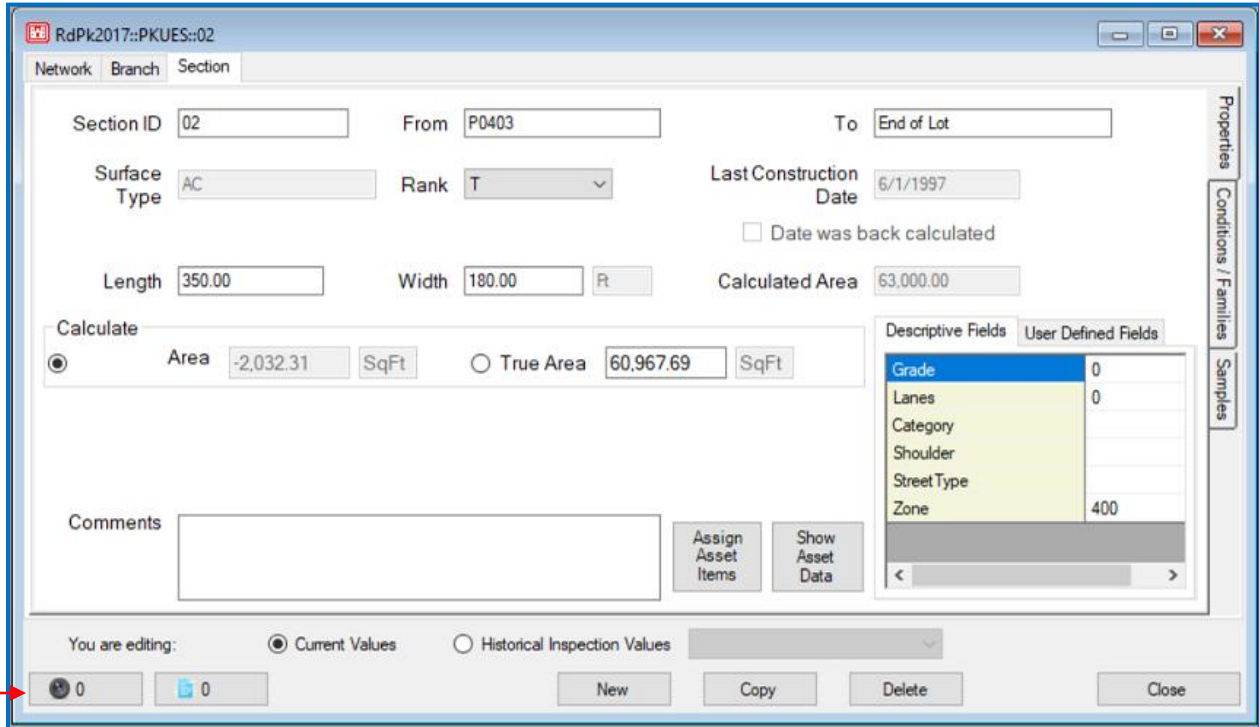
Take Pictures

This tool allows users to take pictures and assign them to an inventory Network, Branch, or Section as well as Inspection Samples and Sections. This is particularly useful for tablet users in the field.

The Image Source button at the top of the screen allows for the choice of any camera attached to a device. The Take Photo button actually takes the picture, at which point the buttons will change to Save Photo or Discard Photo. If saving the photo is desirable, the directory can be chosen using the buttons next to “Save to”, and the “Assign to” button determines how the image is saved. The map can be used as a Selector tool for assignment.



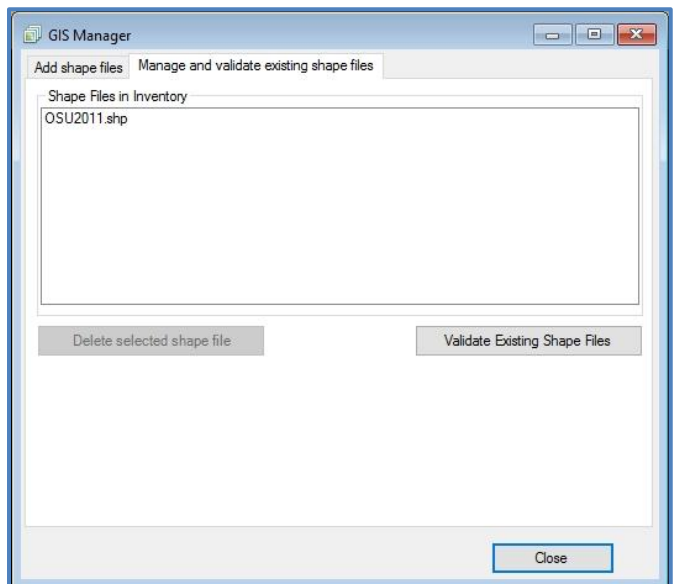
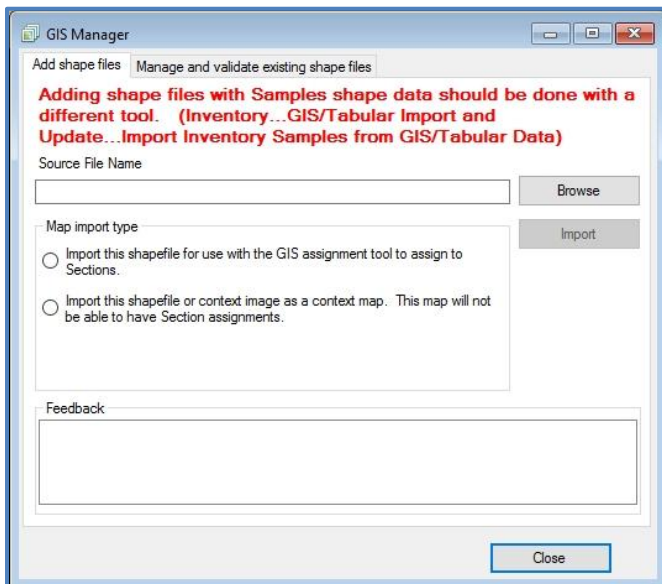
This Image Viewer function can also be found at the bottom left-hand corner of the Define Inventory screen on all three tabs, depending on the assignment.



GIS Manager

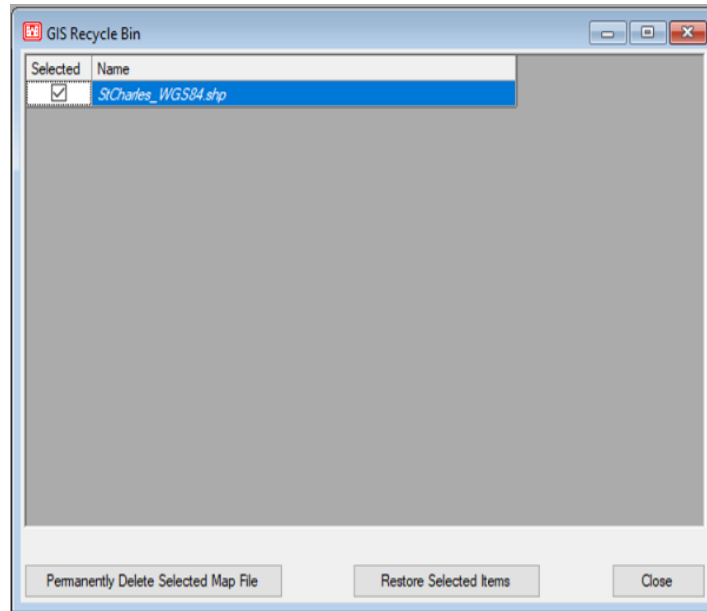
The GIS Manager allows users to attach a shapefile map to a PAVER™ database and to delete or validate a shapefile already attached to a database.

Note: To add a shapefile that includes samples which also need to be added, use the GIS/Tabular Import and Update option in the File Menu.



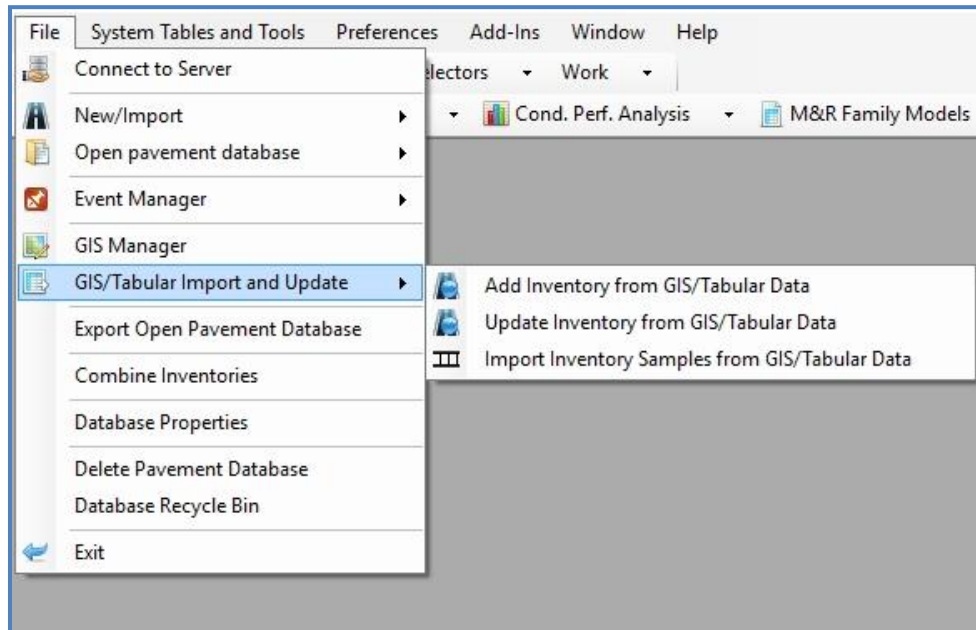
GIS Recycle Bin

When a shapefile is deleted in the GIS Manager, it is sent to the GIS Recycle Bin. Here, the shapefile can either be permanently deleted or restored to its previous place within the database.



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GIS/Tabular Import and Update

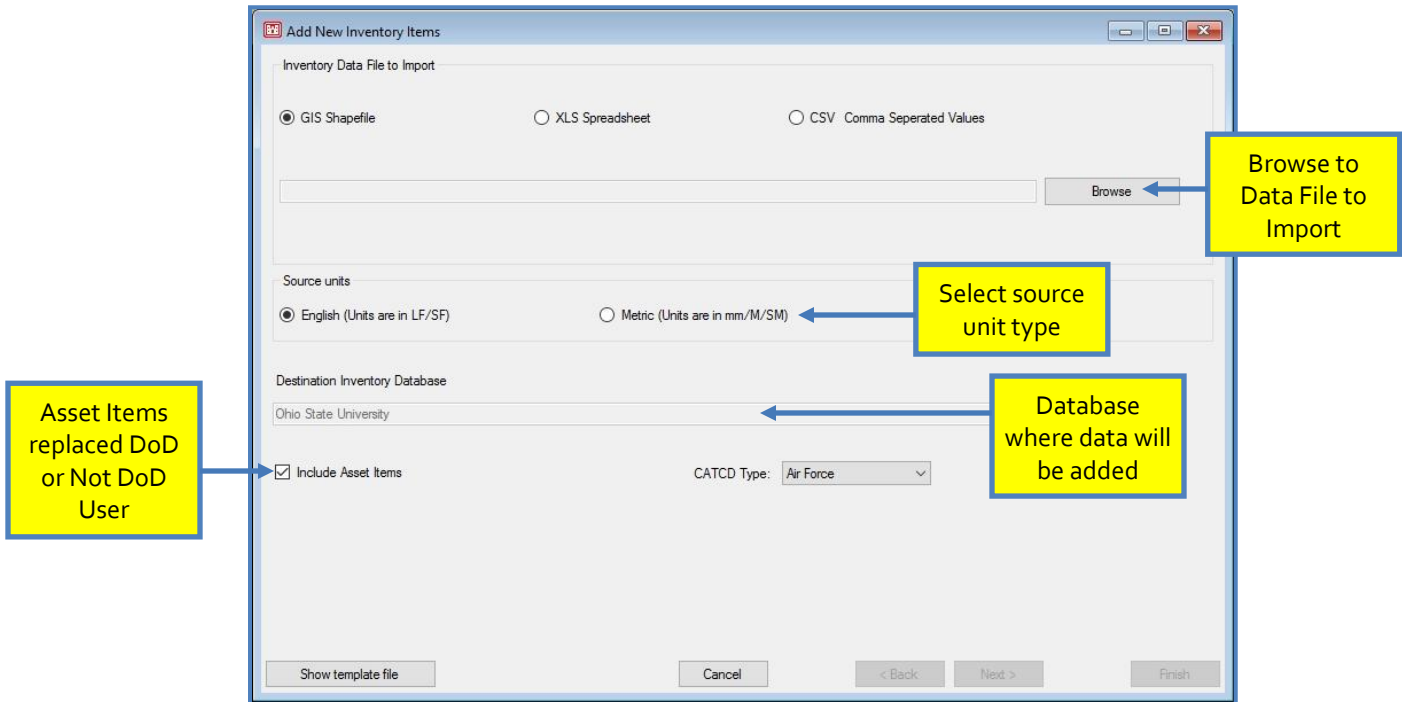


Add Inventory from GIS/Tabular Report

This option allows the user to add inventory data from a GIS/Tabular report. To add an inventory from GIS/Tabular data, open the appropriate database; then go to File => GIS/Tabular Import and Update choose the first option to add an inventory.

The Add New Inventory Items form will open. Choose the type of Inventory Data to Import: a GIS Shapefile, an XLS Spreadsheet, or a CSV - Comma Delimited Text file. There are 15 mandatory PAVER™ fields that must be populated in the attribute table. The example below shows the Shapefile option.

Browse to the File to Import, select source units (English or Metric), and indicate whether User is a Department of Defense (DOD) User or not. The database will show automatically. Click Next.



Choose the appropriate fields by using the drop-down menus. Fields with an asterisk (*) are mandatory. The Next button will not enable until all mandatory fields are filled in. Click Next to continue after entering all appropriate information.

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The screenshot shows the 'Add New Inventory Items' dialog box with the following sections:

- Network Fields:** ID: NETWORKID, Name: NNAME, Comments: (empty)
- Branch Fields:** ID: BRANCHID, Name: BNAME, Use: USE, Comments: (empty)
- Branch Linear Segmentation:** CAT Code: CATCD, RPSUID: RPSUID, Site Name: SiteID, RPUID: RPUID, Facility ID: FacilID, Facility Name: FacilNM, Facility CAT Code: (empty)
- Section Fields:** ID: SECTIONID, From: FROM_, To: TO_, Surface: SURFACE, Rank: RANK, Construction: CONST_DATE, Length: LENGTH, Width: WIDTH, True Area: TrueArea, Slab Length: SLAB LENGT, Slab Width: SLAB_WIDTH, Total Slabs: (empty), Zone: Zone, Category: Category, Shoulder: Shoulder, Street Type: Street Typ, Lanes: Lanes, Grade: Grade, Comments: (empty)
- Section Linear Segmentation:** CAT Code: CATCD, RPSUID: RPSUID, Site Name: SiteID, RPUID: RPUID, Facility ID: FacilID, Facility Name: FacilNM, Facility CAT Code: (empty)
- PAVER Mandatory Field:** (empty)

Buttons at the bottom: Show template file, Cancel, < Back, Next >, Finish.

Select the Inventory Level to be Added, the Source Field from the drop-down menu, the type of Field and Display Width, and whether the data should be added at the System Level or for This Database Only. Click Add Field so the field shows in the box on the left. Continue adding until all needed fields are entered. Click Next.

The screenshot shows the 'Add New Inventory Items' dialog box with the 'Import from source file into User Defined Fields' section. It includes a table and configuration options:

Inventory Level-	Field	Display Name	Type	Size	System Level

Inventory Level: Network Branch Section

Source Field: (drop-down menu)

Type: (drop-down menu)

Size: (text input)

PAVER Usage: System Level This Database Only

Buttons: Show template file, Cancel, < Back, Next >, Finish, Delete Field.

The results of the add will show in the box on the left. Click Finish. The data will be imported and Import and Validation status will show in the status box along with information on the number of Valid and/or Invalid Records.

o	Surface	Rank	ConstructionDate	Length	Width	TrueArea	SlabLength	SlabWidth	Zone	Category	Shoulder	StreetType	Lanes
	AC	P	1/1/1995	1,000.00	25.00	27,500.00	.00	.00	X	Y	PS	SUR	2
	AC	P	1/1/1996	1,000.00	25.00	25,000.00	.00	.00	X	Y	PS	SUR	2
	PCC	P	1/1/2000	100.00	100.00	10,000.00	10.00	10.00	H	P	NC	DOD	0
	PCC	P	1/1/2000	100.00	100.00	10,000.00	10.00	10.00	H	P	NC	DOD	0
	PCC	P	1/1/2000	100.00	100.00	10,000.00	10.00	10.00	H	P	NC	DOD	0

Validation Complete *****

Valid Records: 5 Invalid Records: 0

Number of Records

Update Inventory from GIS/Tabular Data

This option allows the user to update inventory data from a GIS/Tabular report. To update an inventory from GIS/Tabular data, open the appropriate database; then go to File > GIS/Tabular Import and Update and choose the second option to update the current inventory.

The screenshot shows the 'Edit/Update Existing Inventory Items' dialog box with the following settings and annotations:

- Inventory Data File to Import:**
 - Selected: GIS Shapefile
 - Other options: XLS Spreadsheet, CSV Comma Separated Values
 - Annotation: **Browse to Data File to Import** points to the 'Browse' button.
- Source units:**
 - Selected: English (Units are in LF/SF)
 - Other option: Metric (Units are in mm/M/SM)
 - Annotation: **Select source unit type** points to the radio buttons.
- Destination Inventory Database:**
 - Selected: Ohio State University
 - Annotation: **Database where data will be added** points to the text field.
- Include Asset Items:**
 - Selected: Include Asset Items
 - Annotation: **Asset Items replaced DoD or Not DoD User** points to the checkbox.
- Update Level:**
 - Options: Network Only, Network and ...
- Buttons:** Show template file, Cancel, < Back, Next >, Finish
- Other Annotations:**
 - Status of Import and Validation** points to the top right corner of the dialog.

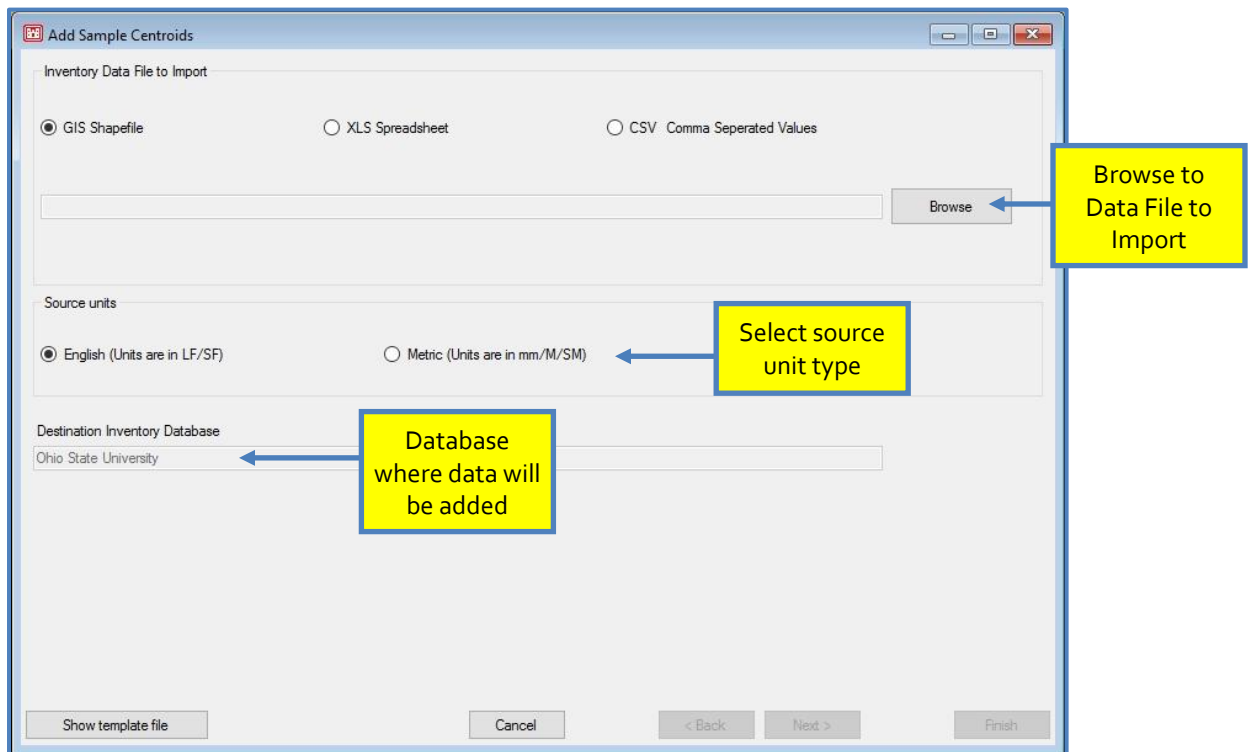
The Edit/Update Existing Inventory Items form will open. Choose the type of Inventory Data to Import: a GIS Shapefile, an XLS Spreadsheet, or a CSV - Comma Delimited Text file. There are 15 mandatory PAVER™ fields that must be populated in the attribute table.

For an example, see Add Inventory from GIS/Tabular Data in the section above as the process for import is the same for either option.

Import Inventory Samples from GIS/Tabular Data

This option allows the user to import inventory samples from a GIS/Tabular report. To import inventory samples from GIS/Tabular data, open the appropriate database; then go to File > GIS/Tabular Import and Update and choose the third option to import samples to the current inventory. This process gives the user the optional ability to have finer grain tracking within branches and is most useful when a GIS map is also added.

Note: This import will not update data previously added.



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Add Sample Centroids

Network Fields
ID: NETWORKID

Branch Fields
ID: BRANCHID

Section Fields
ID: SECTIONID

Sample Fields
ID: RPUID Area: Slabs: Latitude (Y): Longitude (X): Comments:

Options
Migrate data to previous samples
 Do not apply geospatial data to previously inspected samples.
 Update all geospatial data in previously inspected samples.

* PAVER Mandatory Field

Show template file Cancel < Back Next > Finish

Add Sample Centroids

Selected	PID	NetworkId	BranchId	SectionId	SampleID	Area	Slabs	Latitude	Longitude	Comments	Status
<input type="checkbox"/>	MAFBTEST::HPAD::A	MAFBTEST	HPAD	A	80801						
<input type="checkbox"/>	MAFBTEST::HPAD::B	MAFBTEST	HPAD	B	80801						
<input type="checkbox"/>	MAFBTEST::HPAD::C	MAFBTEST	HPAD	C	80526						
<input type="checkbox"/>	MAFBTEST::VERSION7::1	MAFBTEST	VERSION7	1	80526						
<input type="checkbox"/>	MAFBTEST::VERSION7::2	MAFBTEST	VERSION7	2	80526						

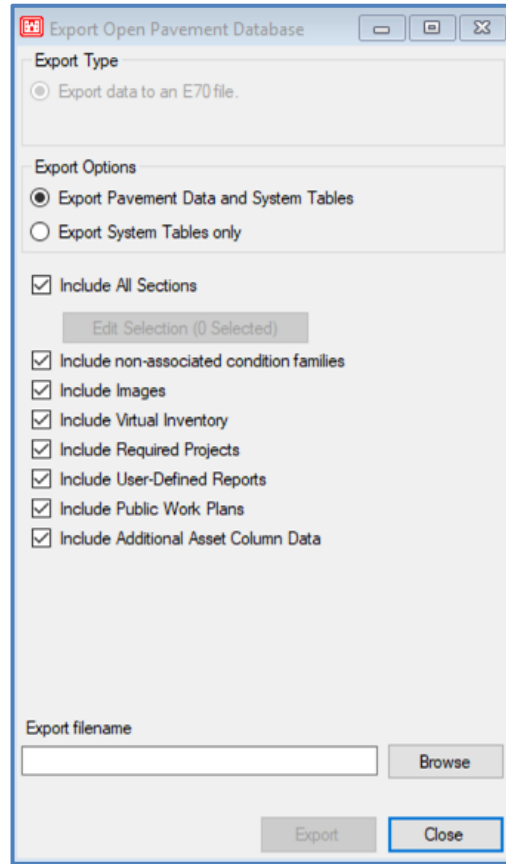
Message
***** Validation Complete *****

Valid Records: 0 Invalid Records: 5

Show template file Cancel < Back Next > Finish

Export Open Pavement Database

Export a pavement database, by clicking File > Export Pavement Database. The exported file will have an .E70 extension after the file name. Export options include exporting the Pavement Data and System Tables or exporting the System Tables Only.



Export Pavement Data and System Tables

This option creates an E70 with the Pavement Data and the System Tables. By default, the following are included in the export:

- Non-associated condition families
- Images
- Virtual Inventory
- Required Projects
- User-Defined Reports
- Public Work Plans
- Additional Asset Column Data

Any of these options may be unchecked and will not be included in the export. Choose a name and location for the E70 and click Export.

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Export System Tables Only

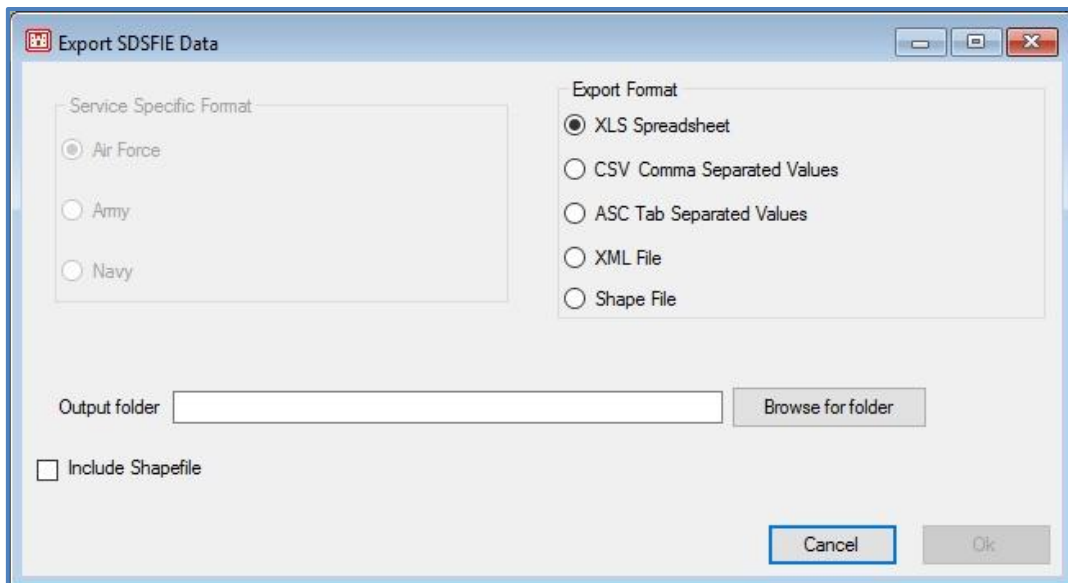
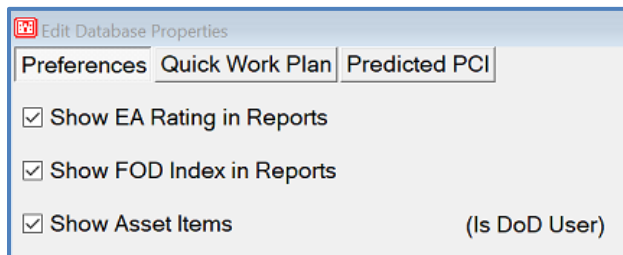
This option creates an E70 with the System Tables only. By default, the following are included in the export:

- M&R Tables
- Inventory Picklists
- Condition Families
- Condition Types and Categories
- User-Defined Fields
- User-Defined Reports

Any of these options may be unchecked and will not be included in the export. Choose a name and location for the E70 and click Export.

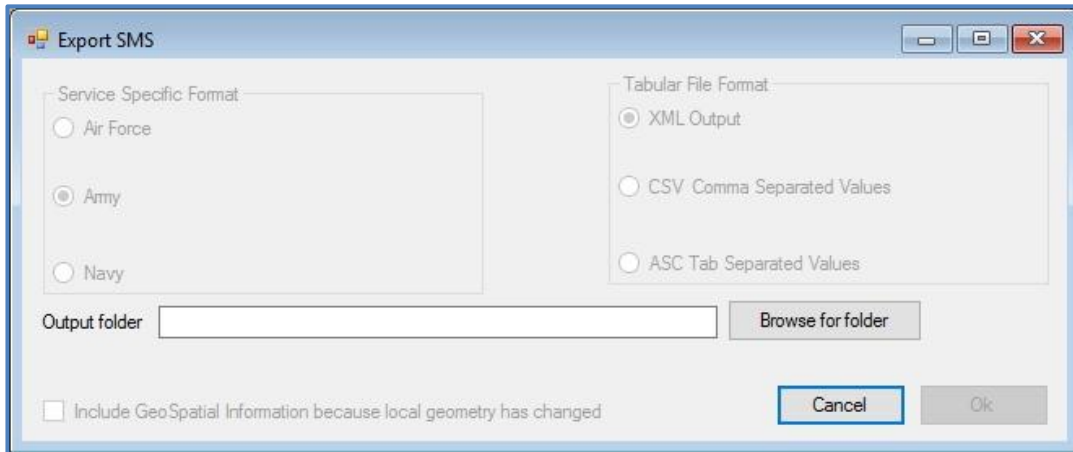
Export SDSFIE

Note: For the Export SDSFIE option to appear in the File menu, the Show Asset Items box must be checked on the Database Properties screen. All three export options enabled by the Show Asset Items checkbox are DoD specific formats.



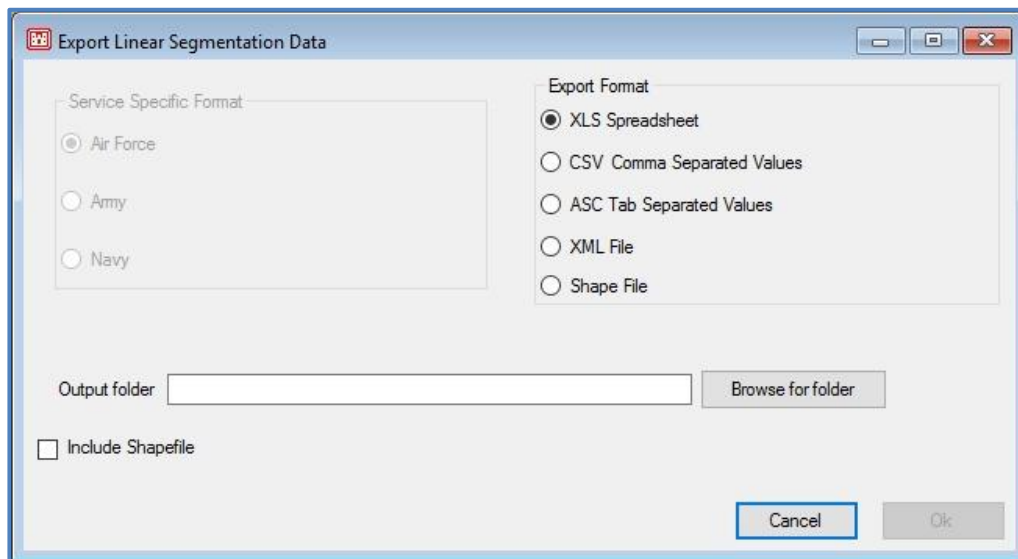
Export SMS

Note: For the Export SMS option to appear in the File menu, the Show Asset Items box must be checked on the Database Properties screen. All three export options enabled by the Show Asset Items checkbox are DoD specific formats.



Export Asset Item Assignments

Note: For the Export Asset Item Assignments option to appear in the File menu, the Show Asset Items box must be checked on the Database Properties screen. All three export options enabled by the Show Asset Items checkbox are DoD specific formats.

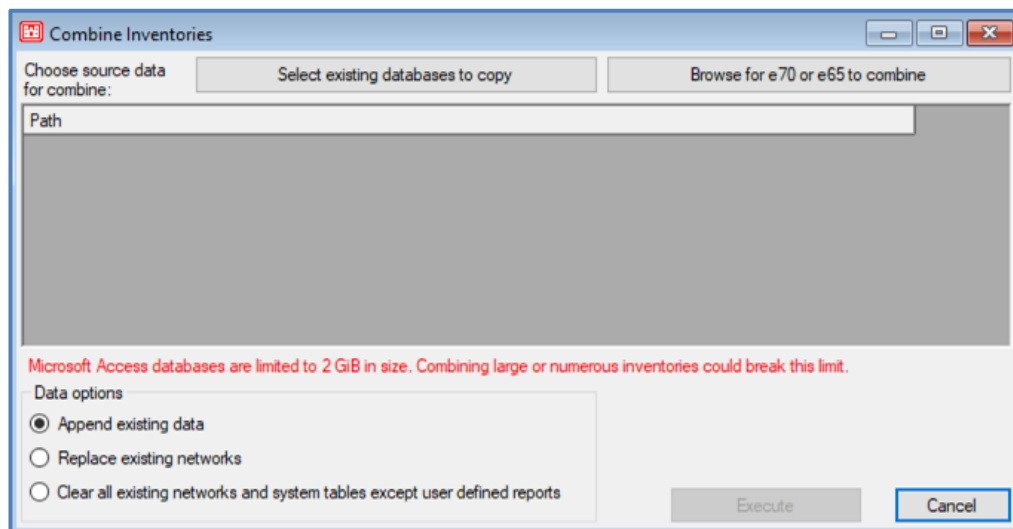


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Combine Inventories

The Combine Inventories option enables the user to combine multiple databases or database segments into a single database. The Combine option also allows the user to make a copy of a database. To access this option, open File > Combine Inventories.

Note:
It is recommended that you utilize a new blank database as the destination for all Combine operations.



The Combine form has three components: source file selection, processing status, and data options. Click the Browse for e70 of e65 to combine button associated with the large file selection list window, labeled Source, to identify the files to be combined or click the Select existing databases to copy button to identify the file to be copied.

The Execute button launches the Combine operation. The processing status area of the screen monitors the progress of your operation and posts the results. Once complete, click Close to return to the PAVER™ desktop. Use the File >> Open Pavement Database option from the PAVER™ menu to select the newly combined or copied database.

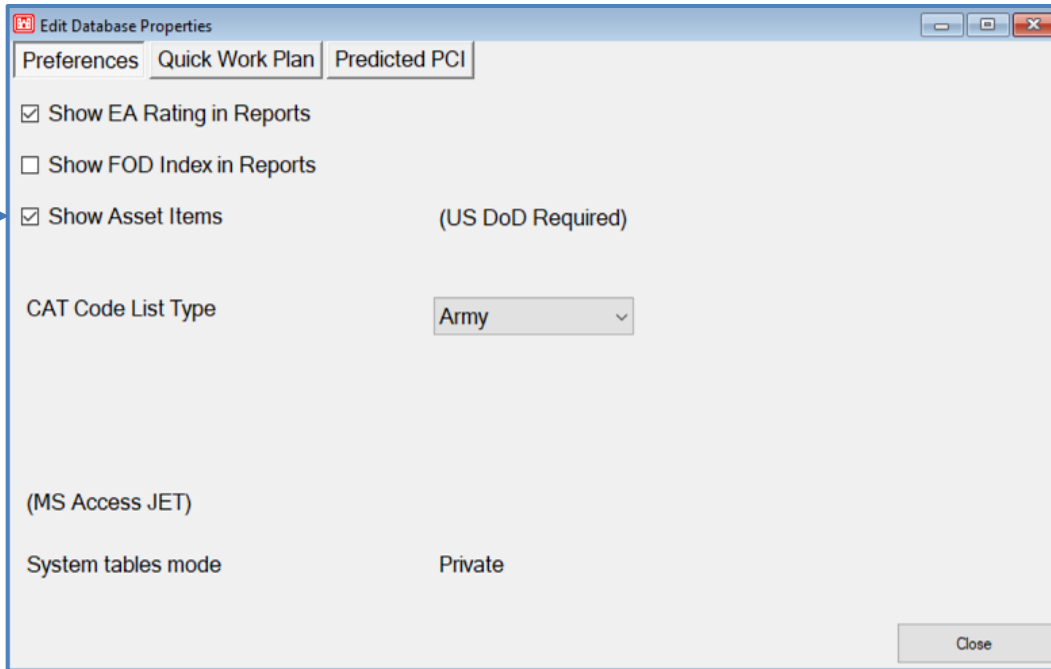
Note: Modifications to a combined inventory will not update data in source files and will be lost on the next combine operation. Desired changes should be communicated to the official maintainer of each individual database.

Database Properties

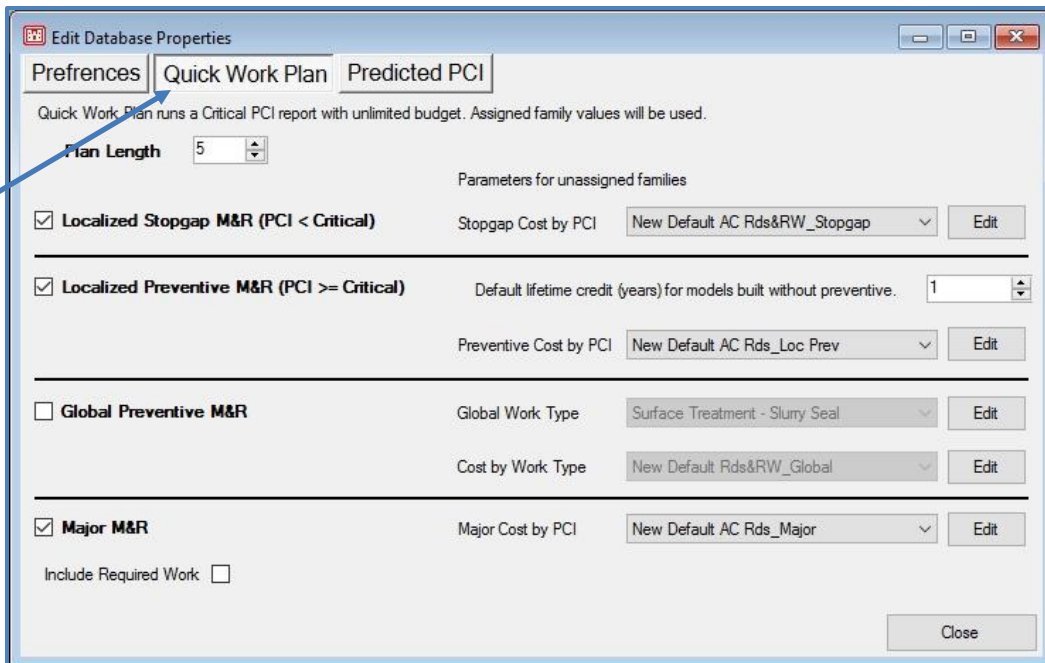
The menu item to change Database Properties has moved and now appears within the File menu. The three buttons at the top of the Database Properties window allow users to change preferences, Quick Work Plan, and Predicted PCI settings for the currently open database.

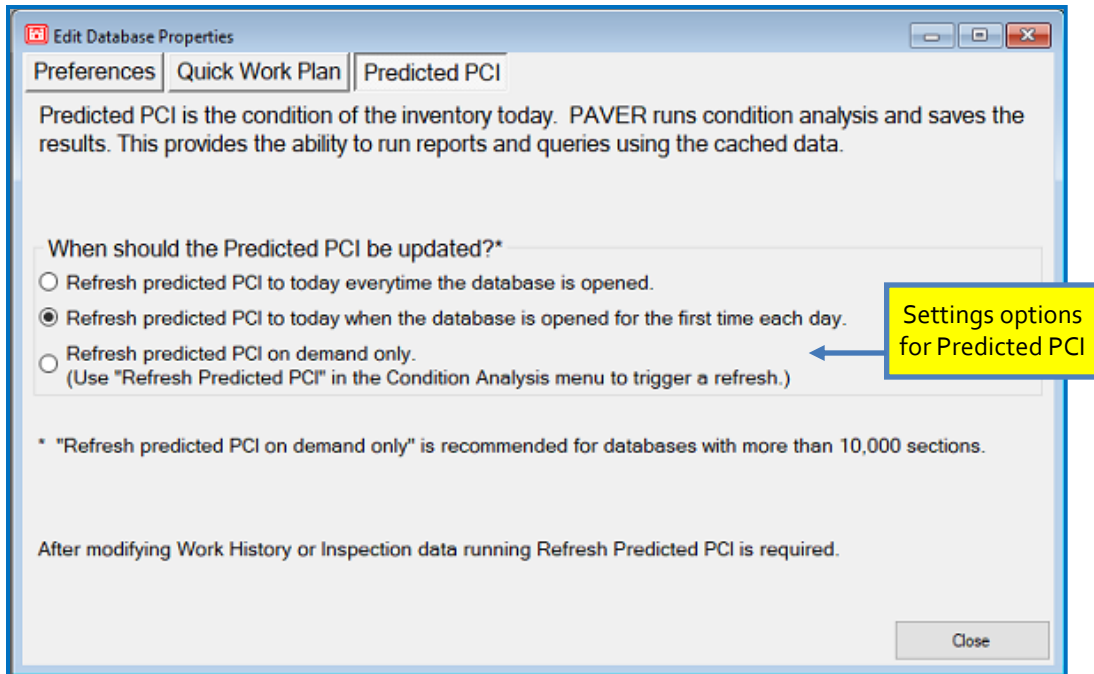
Settings in this window are database specific and will persist through export and import functions.

Replaced
Not DoD
User / DoD
User



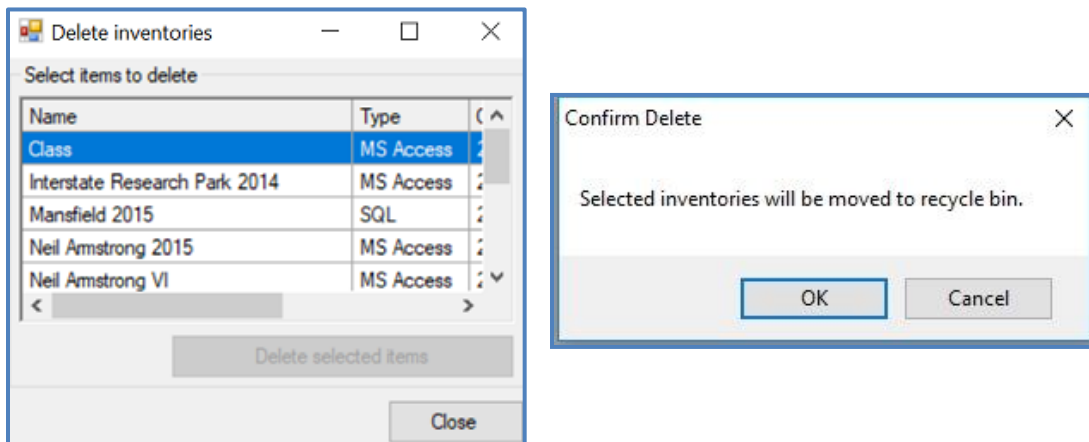
Settings
options for
Quick M&R
Work Plan





Delete Pavement Database

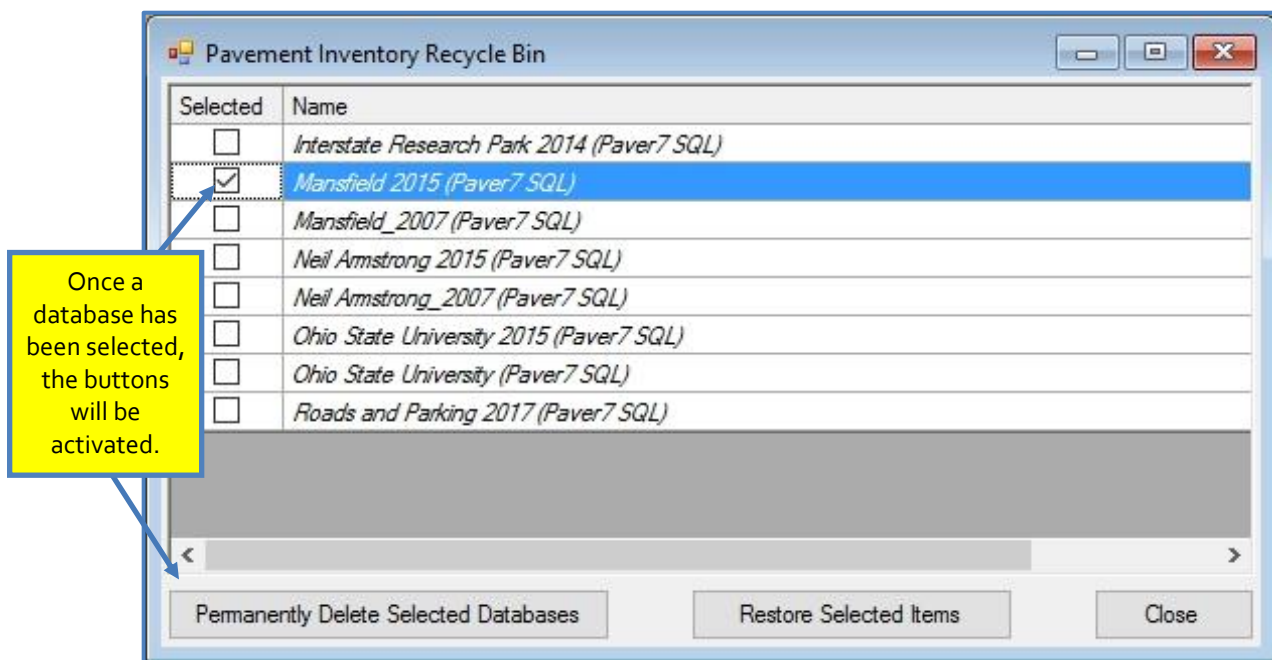
Delete a pavement database, by clicking File > Delete Pavement Database. The Delete Inventory form will open. Choose the database to be deleted from the drop-down menu and highlight it. Click Delete selected items. A Confirm Delete form will open.



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Database Recycle Bin

Once a database has been selected for deletion, it will automatically be sent to the Database Recycle Bin. Any deleted databases will remain in this location until the user takes action to either permanently delete the database or restore it. To access the bin, click File > Database Recycle Bin. Once a database has been selected in the list, the buttons for Permanently Delete Selected Databases and Restore Selected Items will become active. If the user clicks Permanently Delete Selected Databases, the database(s) will disappear from the list and will be permanently removed from the User Data folder upon the next use of PAVER™. If the user clicks Restore Selected Items, the database will immediately be available to reopen in PAVER™.



Exit

To Exit PAVER™ 7, the user can either go to File >> Exit and click or click on the "X" in the upper right corner.

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4. System Tables and Tools

System Tables and Tools menu options:

- User Defined Inventory Fields
- Edit Inventory Picklists
 - Engineering Fields
 - Descriptive Fields
- M&R Work Plan Tables & Families
 - Localized Stopgap M&R Tables & Families
 - Localized Preventative M&R Tables & Families
 - Global Preventative M&R Tables & Families
 - Major M&R Tables & Families
 - Priority Tables
 - Layer Types and Costs
 - Budgets
- Condition Tools
 - Select Condition Types
 - Define Condition and Age Categories
 - Define User Distress Indices
- Misc Other Tables
 - Materials
 - Units of Measure
 - Event Types
- Manage Logins
- Manage Licenses
- Change Password

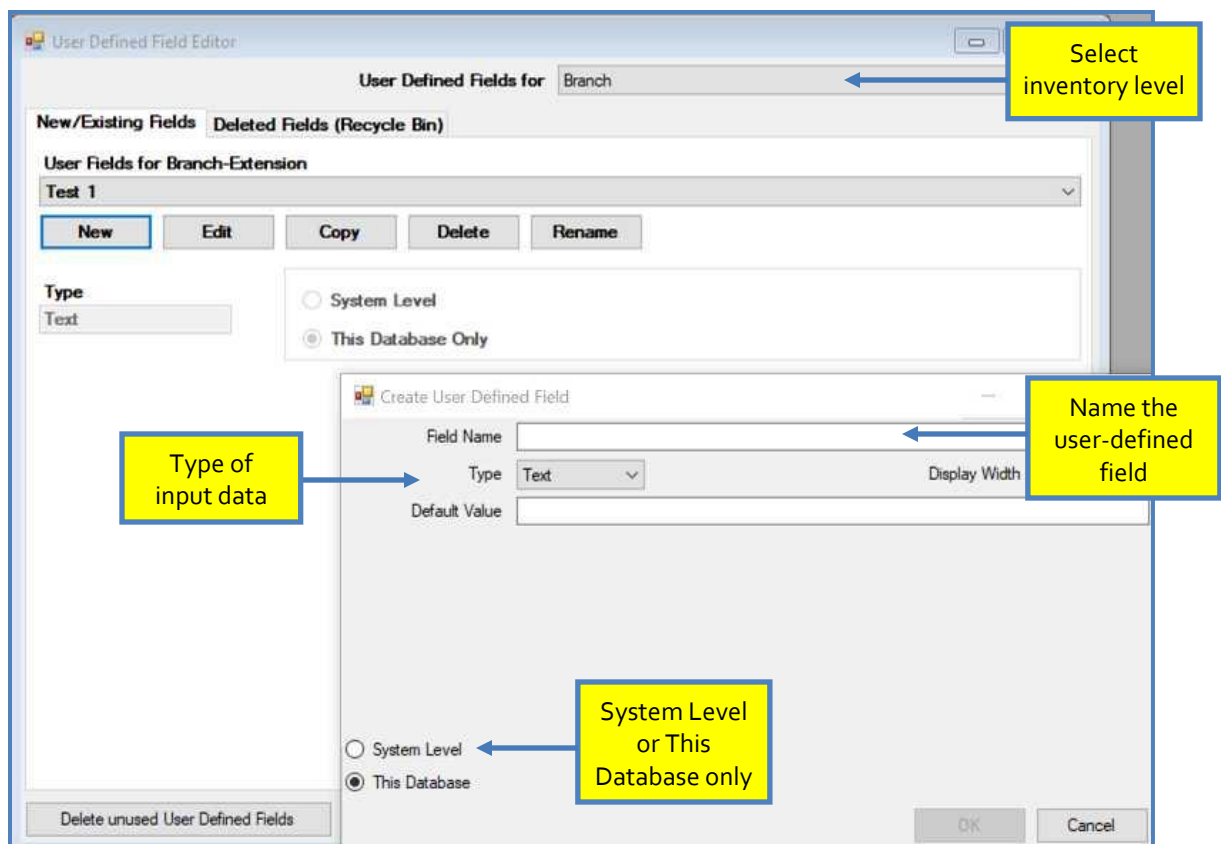
User Defined Inventory Fields

The PAVER™ system is designed so that the user may assign user-defined fields to each level of the inventory (network, branch, and section.) The advantage of this capability is that PAVER™ allows the user to sort the database at any level according to criteria that the user has defined. This is helpful to select certain networks, branches, or sections for reports or work plans.

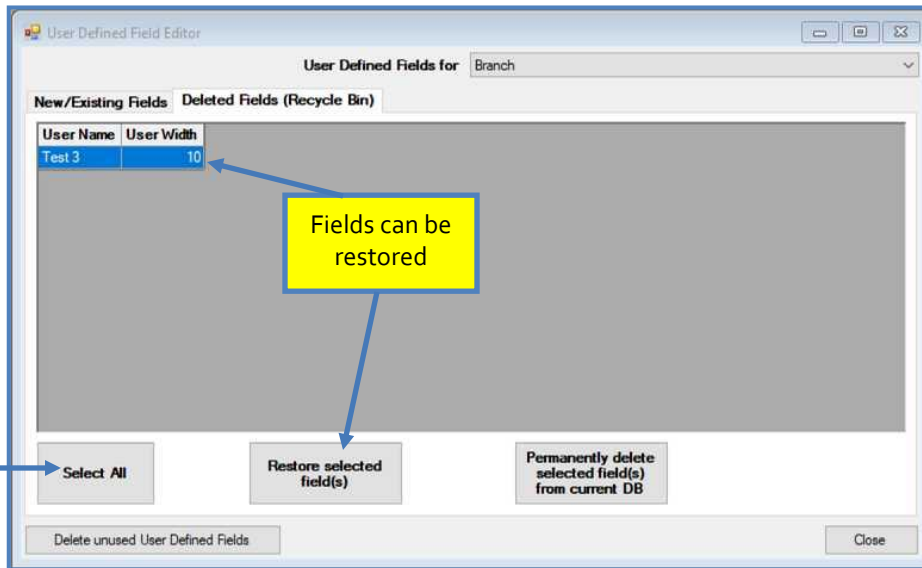
The user can create user-defined fields in which data may be entered. From the PAVER™ main menu, select System Tables and Tools >> User Defined Inventory Fields to access the User Field Editor. On the New/ Existing Fields tab, the user can create a new field by first

selecting the desired inventory level (network, branch, or section) and selecting new. Within the new window, the following information needs to be defined.

- **Field Name:** The entry for this is displayed as the Additional User Field name when using this capability in PAVER™.
- **Type:** Designate what kind of data is to be put into the field: True/False, Currency, Date, Integer, Text, List, etc. When you use the Additional User Field in PAVER™, you are only able to enter data of the type you specify. To edit the type of an already existing entry, select it from the list of User Fields and click on Edit. To copy the field, click on Copy and assign a new name for the field. Delete deletes the selected field, and Rename allows you to edit the Field Name.
- **Create at the System Level:** This option will create the field in the system tables where it will appear in any database opened with the system.
- **Create for This Database Only:** This option will create the field only for the current database (the field will not be created in any other database).

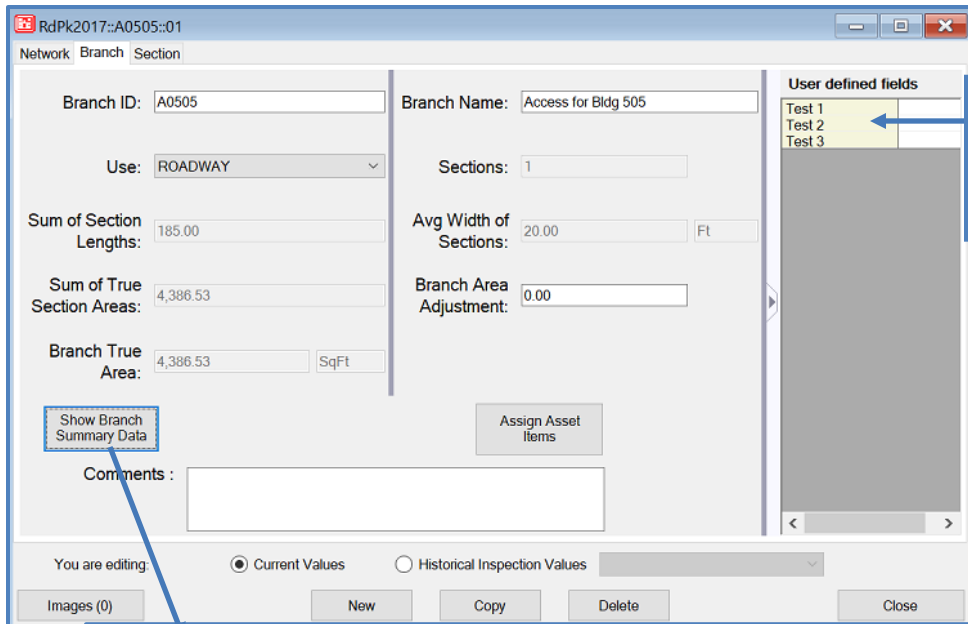


- Under the Deleted Fields (Recycle Bin) tab, the user has the ability to retrieve a deleted field. PAVER™ provides a list of fields that can be restored. The user can retrieve a field by selecting the field and clicking Restore Selected Field(s), or can alternatively Permanently Delete Selected Field(s) From Current Database.

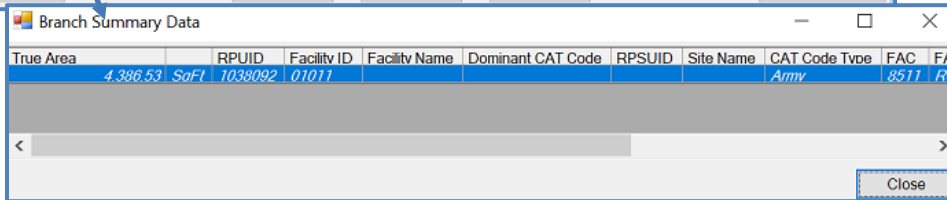


Opens table in a new window

Fields can be restored



Example of created user-defined fields



Special Note about NSORT, BSORT, and SSORT: These fields are not available in PAVER™ 7. If they exist in an imported inventory, they will be converted automatically to user-defined fields.

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Edit Inventory Picklists

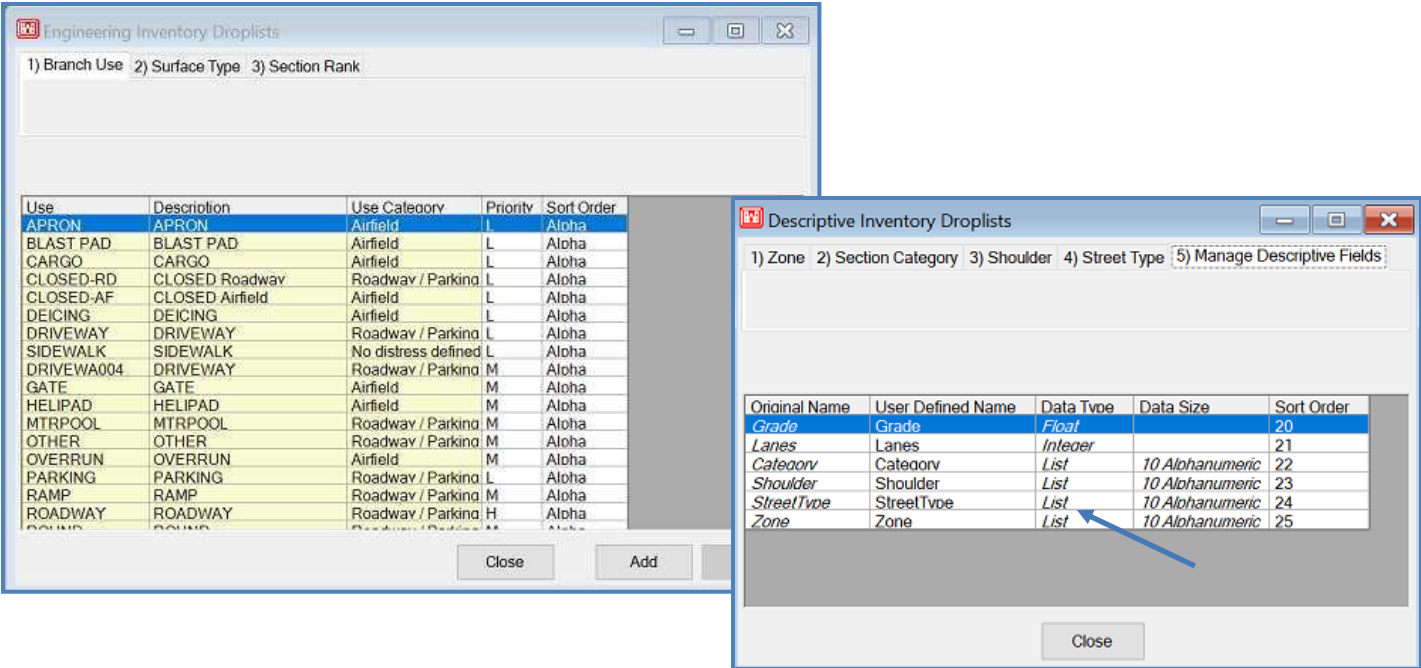
There are two types of Inventory Picklists: Engineering Fields and Descriptive Fields. This window displays tabs that provide editing access to a group of picklists within PAVER™. All of these tabs allow the user to add items to the current list. In some cases, existing table data is considered to be default and cannot be deleted. In most areas, PAVER™ will direct the process of data input to conform to the necessary PAVER™ database formatting. Some fields allow you to enter any text value, while other fields produce a prompt to the user to select an option from a list that is displayed.

Note
On the Section Rank tab, the user cannot add entries or edit the existing section rank names.

Examples of using this window are:

- Customizing Zone names
- Naming a new Surface Type
- Adjusting M&R priorities for different Rankings

Clicking Add, adds a new record to the bottom of the table. Change the Sort Order to arrange items to your liking. Before clicking Delete, first highlight the desired record by clicking on the record line. PAVER™ asks you to confirm every Delete action.



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M&R Work Plan Tables and Families

All tables found under this category are tables that PAVER™ uses when executing the M&R plan. Like previous tables, most of these tables allow you to add items and delete non-default items. To edit a cell in the table, click on the cell you wish to edit and enter the new value. Once changes are made, they are automatically saved to the system. A brief description of each table follows.

Localized Stopgap M&R Tables and Families

- **Work Types:** A listing of all work types classified as localized repairs. Work types can be added or deleted by clicking on the associated buttons on this tab.
- **Cost by Work Type Tables:** You can create different cost tables to correspond with different jobs or regions. Previously created tables can be seen by clicking on the drop-down list box. Tables can be created, deleted, or renamed by clicking on the associated buttons. If a new table is created, a window will first appear prompting the user to enter a name for the new table. This window also provides the user the ability to copy the default table to use as a template. The costs associated with the work types can be customized on any of the tables, including the default table. If a desired work type is not included on a table, the work item must first be entered on the Work Types tab. Once the new item has been entered on the Work Type tab, the Add or Delete button can be used to modify any table. There must be a cost entered for all work types listed.
- **Distress Maintenance Policies:** You can define separate tables and group different localized work types for different maintenance scenarios.
- **Consequence of Maintenance Policy:** For every work type listed on the Work Types tab, there is an associated table here. Each table consists of a list of all distresses related to a particular work type, and the distress produced as a result of performing the specified work. This assists the Work Plan in predicting future PCIs.
- **Stopgap Cost by Condition:** On this tab, M&R costs are related to the condition of the pavement. As seen in the default table, costs to repair a pavement increase as the pavement condition (PCI) decreases.
- **Stopgap M&R Families:** On this tab, Stopgap M&R Families can be defined for use with the M&R plan. Once a new M&R family has been created, the previously defined Distress Maintenance Policy, Cost by Work Type, Cost by Condition, and Sort Order can be assigned to it. To add sections to a M&R family, refer to M&R Family Assignment.

Code	Name	Work Unit	Sort Order
NONE	No Localized M & R	SqFt	Alpha
BS-SE	Break and Seat	SqFt	Alpha
CS-AC	Crack Sealing - AC	Ft	Alpha
JS-SI	Joint Seal - Silicon	Ft	Alpha
JS-PC	Joint Sealant Replacement	Ft	Alpha
CM-LO	Cold Milling-Localized	SqFt	Alpha
CS-PC	Crack Sealing - PCC	Ft	Alpha
SS-LO	Surface Seal	SqFt	Alpha
IN-AC	Infrared Patch	SqFt	Alpha
GR-BL	Gravel-Blading	SqFt	Alpha
GR-PP	Grinding (Localized)	Ft	Alpha
JS-LC	Joint Seal (Localized)	Ft	Alpha

Localized Preventative M&R Tables and Families

- **Work Types:** A listing of all work types classified as localized repairs. Work types can be added or deleted by clicking on the associated buttons on this tab.
- **Cost by Work Type Tables:** You can create different cost tables to correspond with different jobs or regions. Previously created tables can be seen by clicking on the drop-down list box. Tables can be created, deleted, or renamed by clicking on the associated buttons. If a new table is created, a window will first appear prompting the user to enter a name for the new table. This window also provides the user the ability to copy the default table to use as a template. The costs associated with the work types can be customized on any of the tables, even the default table. If a desired work type is not included on a table, the work item must first be entered on the Work Types tab. Once the new item has been entered on the Work Type tab, the Add or Delete button can be used to modify any table. There must be a cost entered for all work types listed.
- **Distress Maintenance Policies:** You can define separate tables and group different localized work types for different maintenance scenarios.
- **Consequence of Maintenance Policy:** For every work type listed on the Work Types tab, there is an associated table here. Each table consists of a list of all distresses related to a particular work type, and the distress produced as a result of performing the specified work. This assists the Work Plan in predicting future PCIs.
- **Preventive Cost by Condition:** On this tab, M&R costs are related to the condition of the pavement. As seen in the default table, costs to repair a pavement increase as the pavement condition (PCI) decreases.

- **Preventive M&R Families:** On this tab, Preventive M&R Families can be defined for use with the M&R plan. Once a new M&R family has been created, the previously defined Distress Maintenance Policy, Cost by Work Type, Cost by Condition, and Sort Order can be assigned to it. To add sections to a M&R family, refer to M&R Family Assignment.

The screenshot shows a software window titled "Preventive M&R Tables" with several tabs: "4) Consequence Of Maintenance Policy", "5) Preventive Cost By Condition", "6) Preventive M&R Families", "1) Work Types", "2) Cost By Work Type Tables", and "3) Distress Maintenance Policies". The "1) Work Types" tab is active, displaying a table with the following data:

Code	Name	Work Unit	Sort Order
NONE	No Localized M & R	SqFt	Alpha
BS-SE	Break and Seat	SqFt	Alpha
CS-AC	Crack Sealing - AC	Ft	Alpha
JS-SI	Joint Seal - Silicon	Ft	Alpha
JS-PC	Joint Sealant Replacement	Ft	Alpha
CM-LO	Cold Milling-Localized	SqFt	Alpha
CS-PC	Crack Sealing - PCC	Ft	Alpha
SS-LO	Surface Seal	SqFt	Alpha
IN-AC	Infrared Patch	SqFt	Alpha
GR-BL	Gravel-Blading	SqFt	Alpha
GR-PP	Grinding (Localized)	Ft	Alpha
JS-LC	Joint Seal (Localized)	Ft	Alpha

A yellow callout box on the left contains the text "All localized Work Types are listed here" with an arrow pointing to the "NONE" row in the table. The window also has "Close", "Add", and "Delete" buttons at the bottom.

Global Preventative M&R Tables and Families

- **Work Types:** This is a listing of all work types considered Global. This includes M&R work applied over a larger area of pavement. Other data in this table includes the Application Interval that work would be reapplied, and the Delta Age, or change in age, of the pavement. This “Delta” is defined as the time (in years) it would take for the condition of the pavement to return to where it was prior to application of the global treatment. Again, the M&R Plan uses these numbers when predicting condition.
- **Consequent Surface:** This table provides data as to the consequent (resultant) surface produced when a given work type is performed over different surface types. Yellow fields indicate changes in surface type.
- **Cost by Work Type Tables:** This is similar to Localized. The user can create different cost tables depending on the scenario.

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Code	Name	Application Interval	Delta T	Changes Surface	Work Unit
NONE	No Global M & R		0	<input type="checkbox"/>	SqFt
DT-CS	Double Surface Treatment - Cape Sea	7	3	<input checked="" type="checkbox"/>	SqFt
ST-MS	Surface Treatment - Micro Surface	6	4	<input type="checkbox"/>	SqFt
MI-SF	Micro Surfacing	6	4	<input type="checkbox"/>	SqFt
ST-CS	Surface Treatment - Cape Seal	8	6	<input type="checkbox"/>	SqFt
GL-AT	Overlay - AC Thin (Global)	10	8	<input checked="" type="checkbox"/>	SqFt
SS-CT	Surface Seal - Coal Tar	5	2	<input type="checkbox"/>	SqFt
SS-FS	Surface Seal - Fog Seal	5	2	<input type="checkbox"/>	SqFt
SS-RE	Surface Seal - Rejuvenating	5	3	<input type="checkbox"/>	SqFt
ST-SB	Surface Treatment - Single Bitum.	5	3	<input type="checkbox"/>	SqFt
ST-SS	Surface Treatment - Slurry Seal	5	3	<input type="checkbox"/>	SqFt

Major M&R Tables and Families

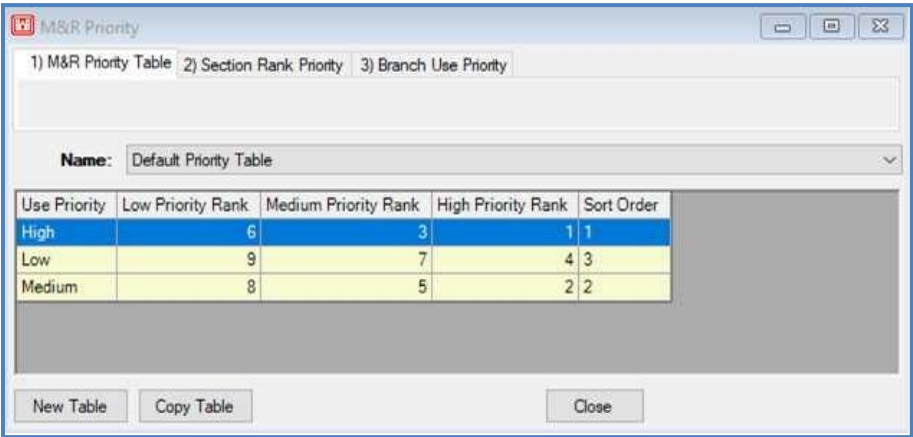
- **Work Types:** All work types considered to be major are listed here.
- **Cost by Work Type Tables:** All costs associated with Major M&R work types are listed here.
- **Cost by Condition:** All costs associated with specific condition types are listed here.
- **Consequent Surface:** This is similar to Global, and lists surface types which result from the performance of work types on different surfaces.
- **Minimum Condition:** This table allows the user to set the critical PCI (Minimum Condition) for each year.

Select priority for Major M&R for each Branch Use

Code	Name	Work Unit	Consequent Surface	Sort Order
NONE	No Major M & R	SqFt	(Consequent Surface Tab)	Alpha
NC-AC	New Construction - AC	SqFt	AC	Alpha
SU-AC	Surface Course - AC	SqFt	(Consequent Surface Tab)	Alpha
HI-AG	New Construction - PCC	SqFt	(Consequent Surface Tab)	Alpha
SU-PC	Surface Course - PCC	SqFt	(Consequent Surface Tab)	Alpha
OL-AT	Overlay - AC Thin	SqFt	(Consequent Surface Tab)	Alpha
NC-PC	New Construction - PCC	SqFt	PCC	Alpha
SU-PF	Surface Course - Porous Friction	SqFt	(Consequent Surface Tab)	Alpha
SU-DB	Surface Course - Double Bitum.	SqFt	(Consequent Surface Tab)	Alpha
SA-MI	Stress Absorbing Membrane Interlaye	SqFt	(Consequent Surface Tab)	Alpha
NC-CM	New Construction - Cold Mix	SqFt	(Consequent Surface Tab)	Alpha
AR-CO	AC Surface Recycling - Cold	SqFt	(Consequent Surface Tab)	Alpha
AR-HO	AC Surface Recycling - Hot	SqFt	(Consequent Surface Tab)	Alpha

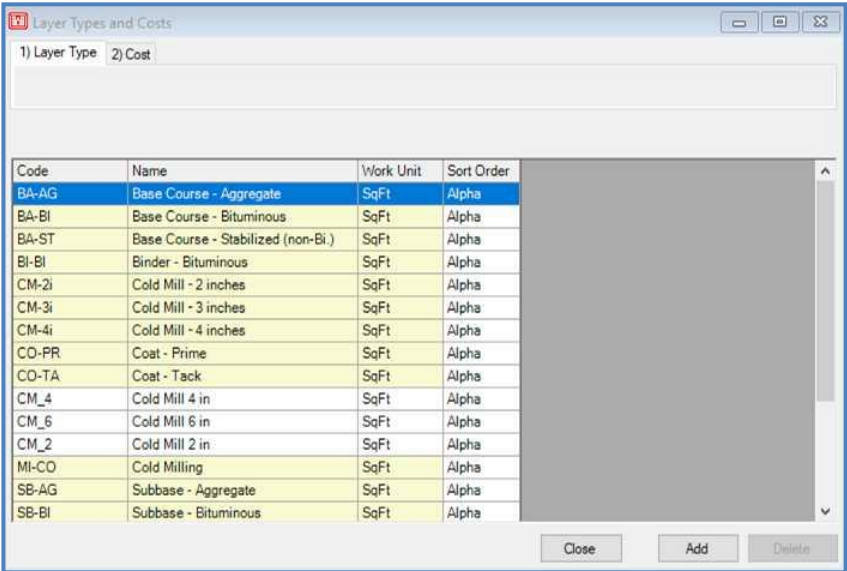
Priority Tables

- M&R Priority Table:** This table allows the user to prioritize pavements based on branch use and section rank. The default table is ranked from 1, highest priority, to 9, lowest priority. New tables must have a ranking for each category, and two or more categories are able to have the same ranking.
- Section Rank Priority:** The user may assign a priority to pavements based on section rank.
- Branch Use Priority:** The user has the ability to assign a priority to pavements based on their declared usage. Branch use priority is considered during M&R Plan execution and determines how limited funds are allocated.



Layer Types and Costs

- Layer Types:** Codes and work units for all layer types are listed here.
- Costs:** Costs associated with layer types are listed here.



Budgets

Here, you can create tables to specify a budget for each year. When running the Work Plan, you can select from a list of budgets. To create your own budget, click on New Table. You are given the option of copying the budget that is displayed. When creating a new table, select the copy option to save time entering data if most values are the same. Enter Year and budget Amount information. By placing actual budget numbers in a budget table, you can restrict the spending of the work plan to a specific budget. Creating different budget tables also allows you to compare the results of different Work Plan scenarios.

Hint

You can create a budget of \$10,000/Year by using the Budget multiplier feature, in the M&R Work Plan.

The screenshot shows a window titled "Budget" with a dropdown menu for "Name" set to "1 Million per Year". Below is a table with columns "Year" and "Amount". The table contains data for years from 1/1/2000 to 1/1/2014, with all amounts set to 100,000.00. At the bottom of the window are buttons for "Generate a Budget", "New", "Copy", "Del Table", "Close", "Add", and "Delete".

All budgets in your system are listed here

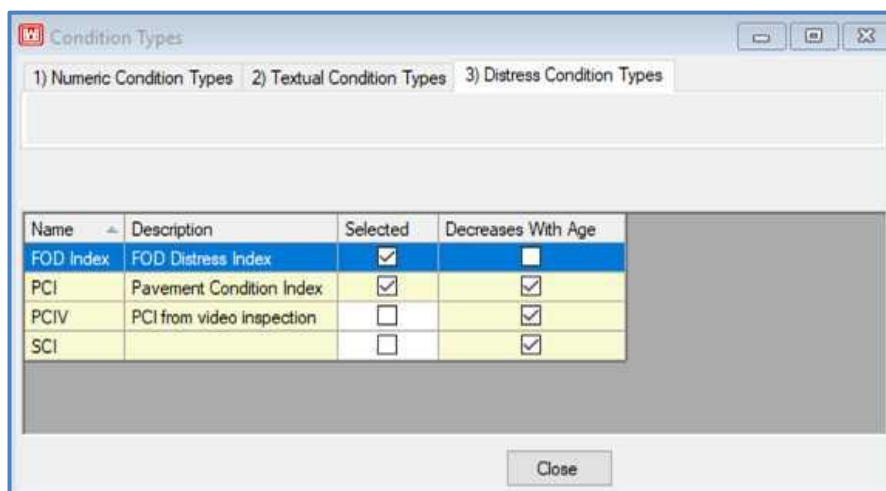
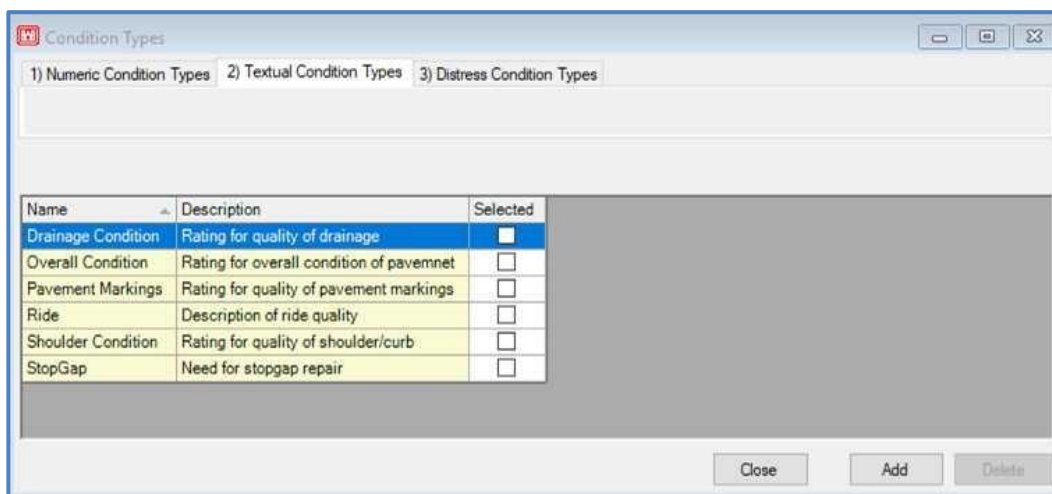
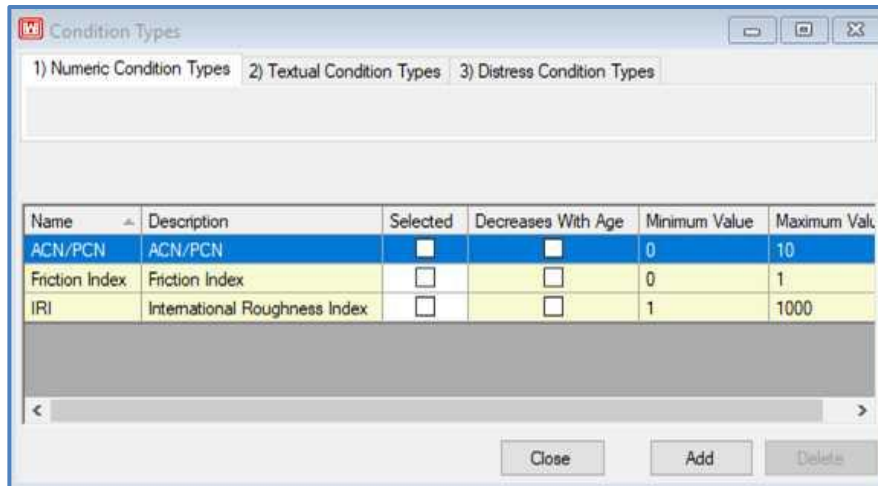
Enter a budget amount for each year

Year	Amount
1/1/2000	100,000.00
1/1/2001	100,000.00
1/1/2002	100,000.00
1/1/2003	100,000.00
1/1/2004	100,000.00
1/1/2005	100,000.00
1/1/2006	100,000.00
1/1/2007	100,000.00
1/1/2008	100,000.00
1/1/2009	100,000.00
1/1/2010	100,000.00
1/1/2011	100,000.00
1/1/2012	100,000.00
1/1/2013	100,000.00
1/1/2014	100,000.00

Condition Tools

Select Condition Types

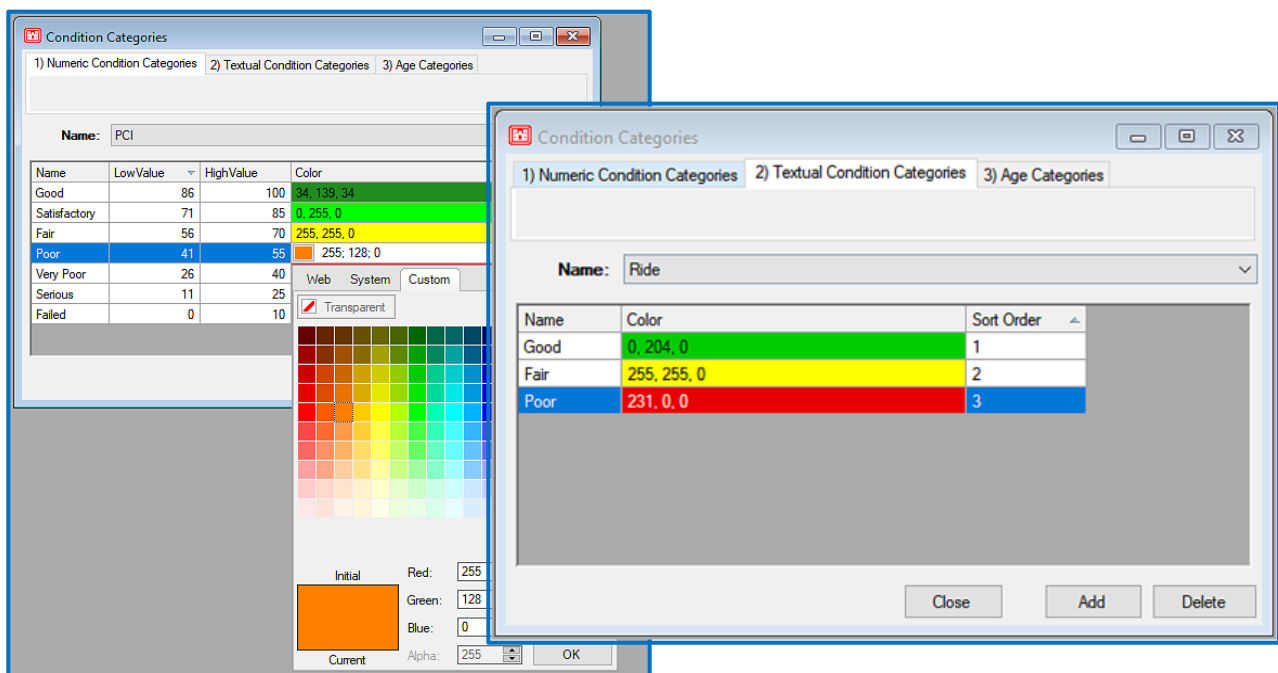
To make condition types available for use in PAVER™, they must be declared in this window. Condition types will be classified as Numeric, Textual or Distress. The user may declare Minimum and Maximum Values for Numeric Condition Types, and for Numeric and Distress Condition Types, the user may declare that the condition Decreases with Age. To make a condition available for use in PAVER™, check the box for that condition in the Selected column. In addition to the new built in condition scales, other condition scales can be defined by Add Ins, such as those for other assets.



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Define Condition and Age Categories

The user may establish a set of categories for each condition available in PAVER™. The table for each set of condition categories consists of a name for the category (i.e. “Good”, “Poor”, etc.), a high and low value to establish the range for the category, and associated colors for each category to be used in the graph and GIS text. The Age Categories tab is simply a table of age brackets by which you can group pavements. These tables are used in the graphical display of condition information throughout PAVER™. Note that custom colors can be selected from the Numeric Condition Categories and Textual Condition Categories tabs. These colors will be utilized throughout PAVER™, such as Summary Charts, Condition Analysis, Work Plan, and GIS.

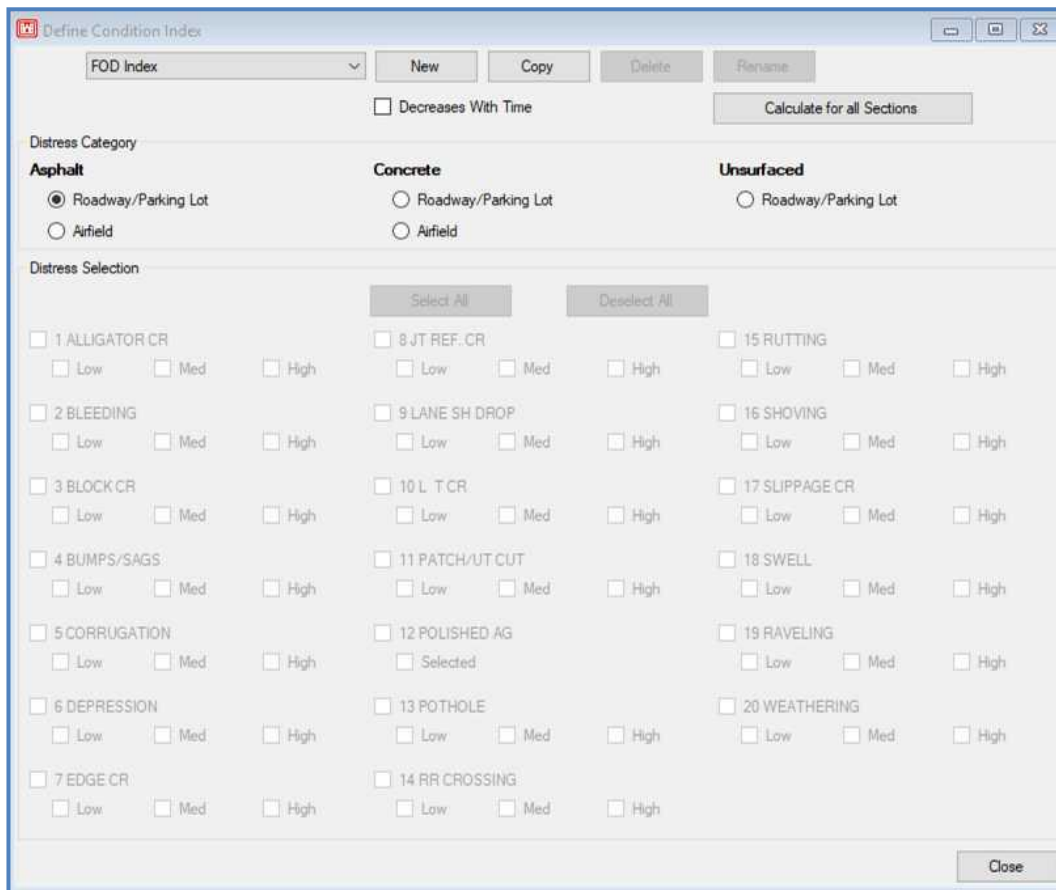


Define User Distress Indices

The user has the option to create a user-defined index. These indices are computed with the same engine that PAVER™ uses to calculate the PCI, so the index is a customized PCI. After naming the index, select every distress and severity level that is to be included in the computation. At this point, PAVER™ then uses deduct values from only the specific distresses indicated, ignoring other distresses. After naming the index and selecting the applicable distresses, this distress appears on the Numeric Condition Types tab of the Condition Type Selection table. To delete the newly created index, return to the User-defined Distress Indices table.

Note:

You may create your own condition index based on your selection of distresses

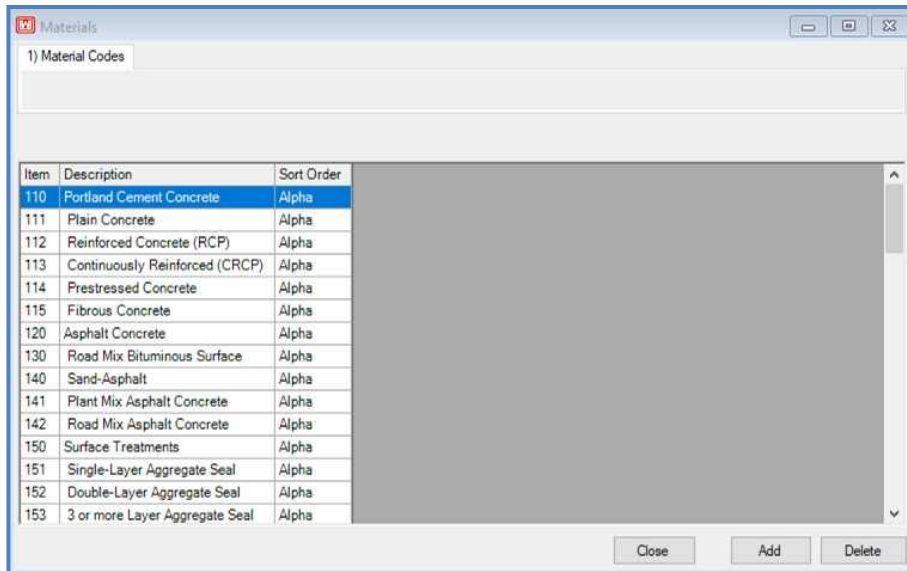


Miscellaneous Other Tables

There are three tables that allow you to enter specific information into PAVERTM:

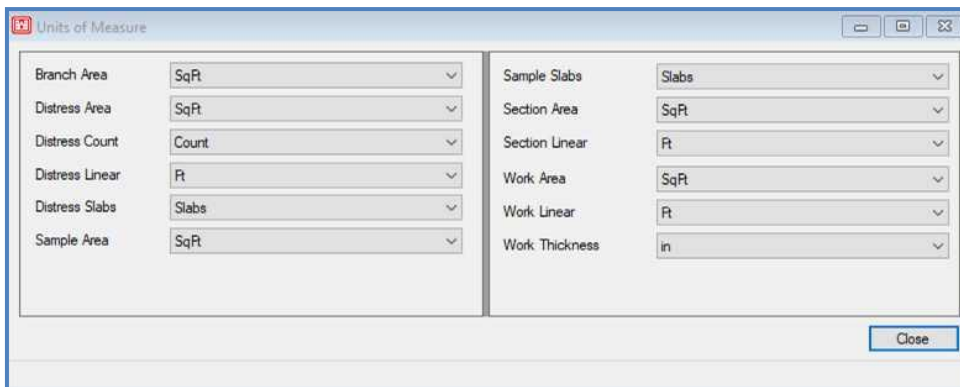
Materials

This table is a list of all material types, including Item number and Description, which are available for selection within PAVERTM. These are used in the Work section of PAVERTM, where you can list the specifics of work that has been performed, including the type of material used. You can add any material types to this list by entering an Item and Description.



Units of Measure

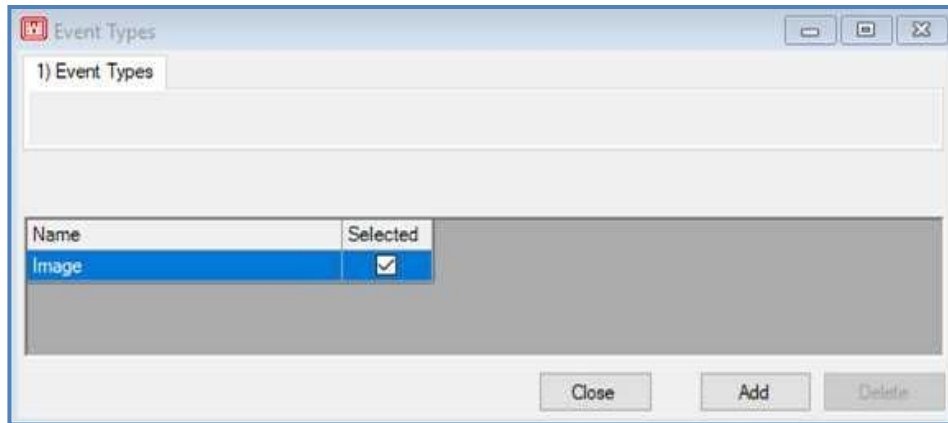
Here, select a particular unit from a picklist to be associated with measurements used within PAVER™.



Event Types

Here, select a particular event type from a picklist to be associated events used within PAVER™. Currently, images are the only event type built into PAVER™ 7.

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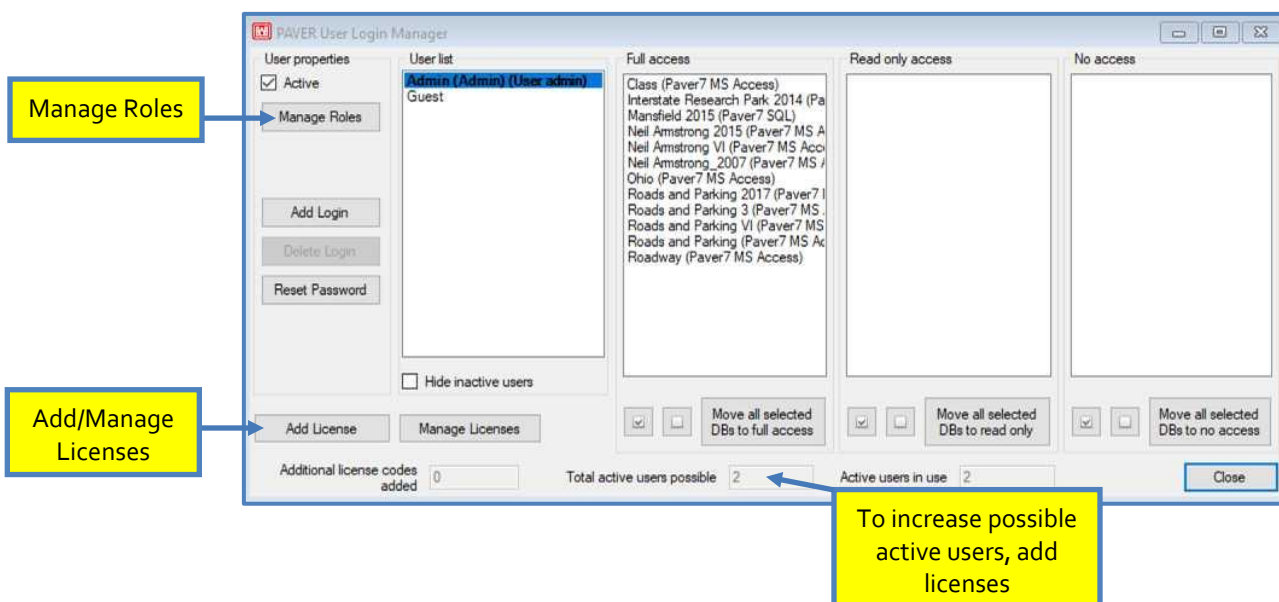


Manage Logins

From the user login manager, users can be added or deleted, passwords can be changed, users' access to databases can be modified, and licenses can be added or removed. Typically, these processes will be used only by the administrator.

The Add Login button will allow a new user to be added to the user list. New users will appear in light gray text until they are activated by clicking the Active checkbox. The number of active users possible and users currently active are displayed at the bottom of the manager window. To increase possible active users, add additional licenses. A demo license must be upgraded to a full license before a second license can be added.

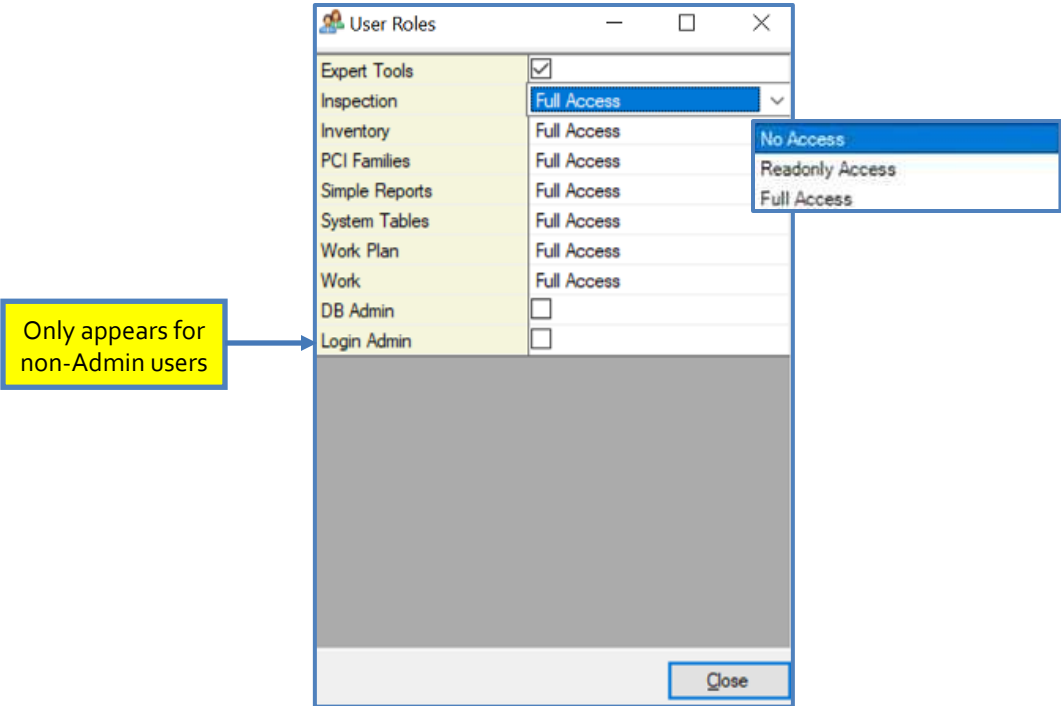
Databases can be set by the user to full access, read only, or no access. First, select the desired user and then the databases to be moved, then click the Move all Selected DBs to xx button underneath the applicable window to move the chosen databases.



Manage Roles

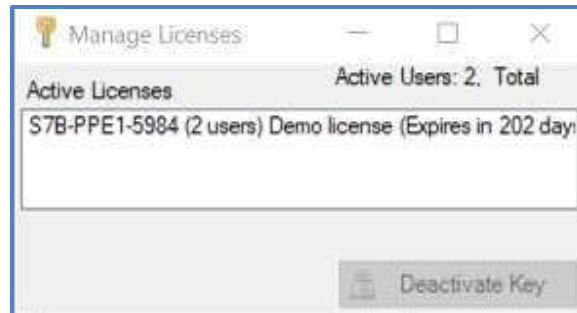
From the User Login Manager, select a user and then click the manage roles button to change a user's access. There are 10 fields, the majority of which have a dropdown box for access settings. The remaining fields are either active or not, as indicated by a checkbox. The first of the two Admin lines at the bottom give users the ability to create or delete databases. The second Admin line gives the user full access to the PAVER™ system, and there will typically be only one user with this box checked. A checkmark in this box also allows users to access the PAVER™ User Login Manager window.

Note: User role settings will supersede individual database settings.



Manage Licenses

From the PAVER™ User Login Manager or the System Tables and Tools menu, users can access the manage licenses screen, which allows users to verify the license keys used and deactivate licenses. Users will be unable to deactivate the primary license key until all other licenses have been deactivated.



Change Password



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5. Inventory

Inventory Menu Options

Menu options:

- Define Inventory
- GIS Assignment
- Assign Asset Items
- Define Virtual Inventory
- Copy and Move Data
- Database Verification Tools
- Verification Results
- Last Construction Date Wizard
- Set Properties Wizard
- Section Split Wizard
- GIS/Tabular Import and Update
 - Add Inventory from GIS/Tabular Data
 - Update Inventory from GIS/Tabular Data
 - Import Inventory Samples from GIS/Tabular Data

Define Inventory

Basic Operations

The Inventory button provides tools to view, edit, and define pavement networks. Clicking on the Inventory button opens two windows: List Selector and inventory data.

The List Selector is a series of drop-down boxes that allow you to navigate to a specific point in the inventory. Select the particular inventory item by working down the hierarchy of the database, from network to branch to section, at each level selecting an item by its ID or Name.

Note:

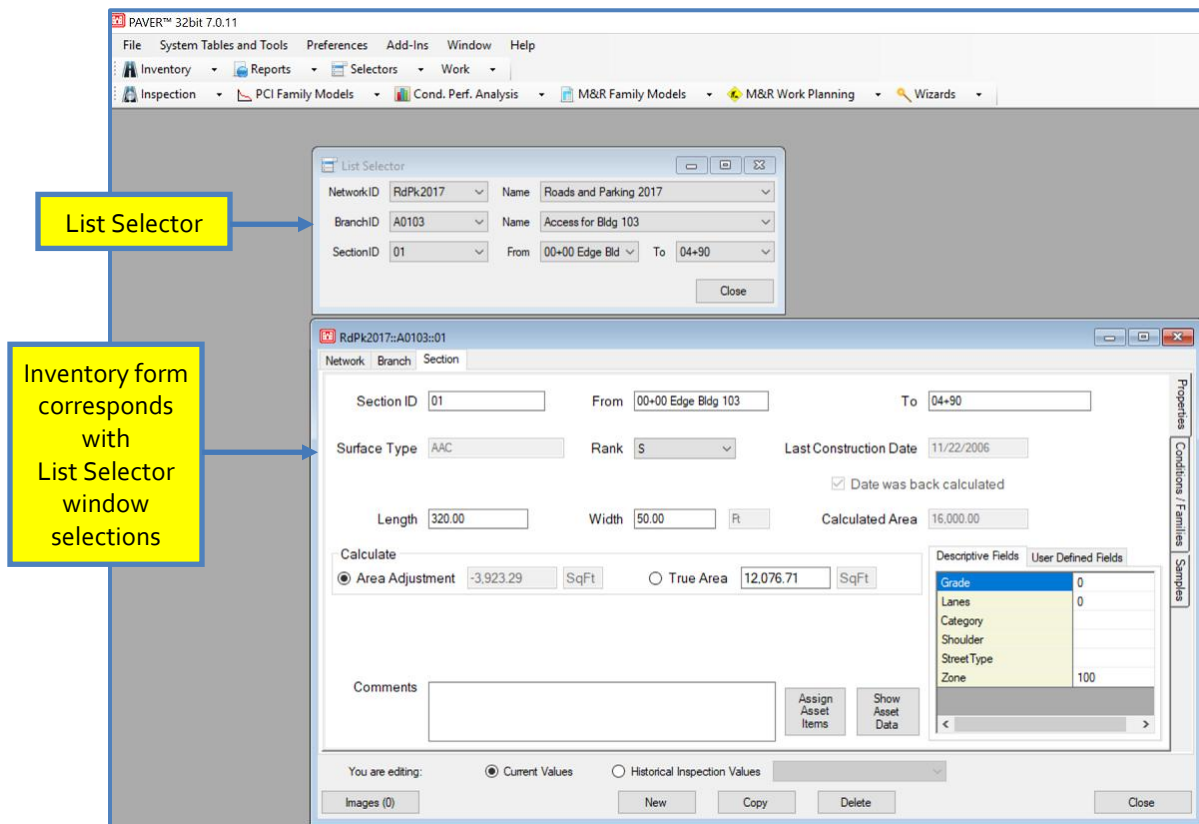
To view data for a specific network, it must be chosen in one of the Inventory Item Selectors.

In the inventory data window the user can edit inventory data. Access data for a particular level by clicking the tab for Network, Branch, or Section. To change the displayed inventory item, locate the item in the List Selector and the inventory data window will update itself accordingly.

At the bottom of the inventory data window, the user is able to select the type of inventory data values to edit. The user can edit Current Values, which are the current data values used for new inspections and calculations, or Historical Values, which are relative to past inspection data. Modified Historical Values do not have any effect on current PCI values and calculations. For Historical Values, PAVER™ will provide a range of inspection dates affected with consistent inventory data values.

You may move to different fields on the inventory data form by clicking on the field you wish to edit in order to enter information. You may also move from field to field on the form by pressing the tab key. Each press of the tab key shifts the selected field once to the right, and at the end of a row the tab key shifts the selected field down one row to the furthest left field.

Data fields in PAVER™ 7 only accept entries of a determined type of characters. For example, a distance field can contain only numeric information, and if you try to enter non-numeric characters into a distance field, the program will not accept your entry.



Each of the inventory cards (Network, Branch, and Section) has five buttons along the bottom of the form. The New button is for adding new inventory items. The Copy button is used to create a new network, branch, or section identical to the selected network, branch, or section, except that the Network, Branch, or Section ID will include the characters “CC” to indicate that it is a copy. None of the copied network’s children (branches and sections) are copied when a network is copied. Likewise, when a branch is copied, none of its sections are copied.

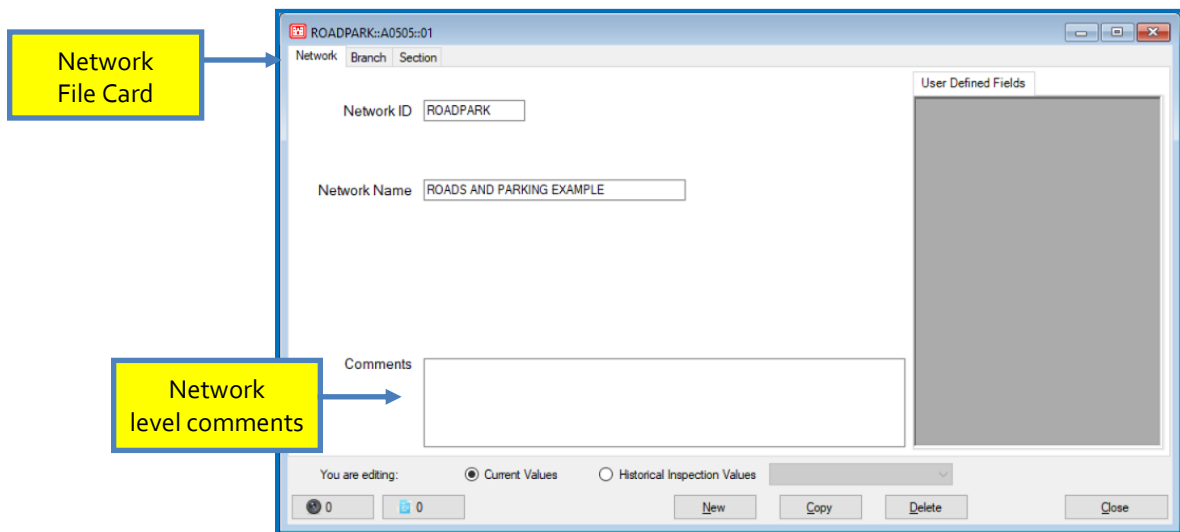
Clicking Delete deletes the selected network, branch or section. Clicking Images launches the EMST™ Image Viewer. Close closes the Inventory program.

You may also assign values for user-defined fields once parameters for the user-defined fields have been established (See System Tables and Tools>> User Defined Inventory Fields). When completed, the inventory can be sorted based on user-defined criteria for many applications in PAVER™.

Creating Networks

The first step in building a pavement inventory for a military installation, city, or airport, is to create a network. A hierarchical structure exists for pavement inventory items in PAVER™ 7. Networks are the parents of branches, and branches are the parents of sections. To create pavement branches and sections, first create a network.

To create a network, click Inventory (or Define Inventory on the Inventory drop-down menu) on the PAVER™ Button Bar. The inventory data form appears with the Network file card displayed. Click the New button at the bottom of the Network file card to populate all fields identifying the current network. The fields: Network ID, Network Name, and Comments, should be edited to the desired values. You may also enter data in any User Defined Fields that you have created.



Creating Branches

To create a branch, click the Inventory button on the PAVER™ Button Bar. The Define Inventory data window appears with the Network file card displayed. Click the file card tab Branch to access the Branch file card. If you have just added a new network, the network will have no branches defined. Click the New button at the bottom of the file card to enter a new branch. The fields on the branch data entry form become populated with the label "new" or blank, depending on the type of field (i.e. text, numeric, or picklist. Enter the appropriate values. Some fields are locked and will automatically reflect section data once sections for the branch are created.

The contents of the Use field are limited to a single value that is selected from a preexisting list of choices. To enter a value in the Use field, select the field, and a down arrow will appear on the right side of the field data entry area. Click on the arrow for a list of available choices in a scrolling picklist.

If there are more items in the list than can be shown in a single short list (usually 5 to 10 items), the list is displayed with a scroll bar arranged along the right side of the list. Use the scroll bar arrows to select an item not visible in the list. When the picklist is very long, you may want to locate items in the list by typing the first character of your selection. The program seeks out matches for the characters you type.

Note:

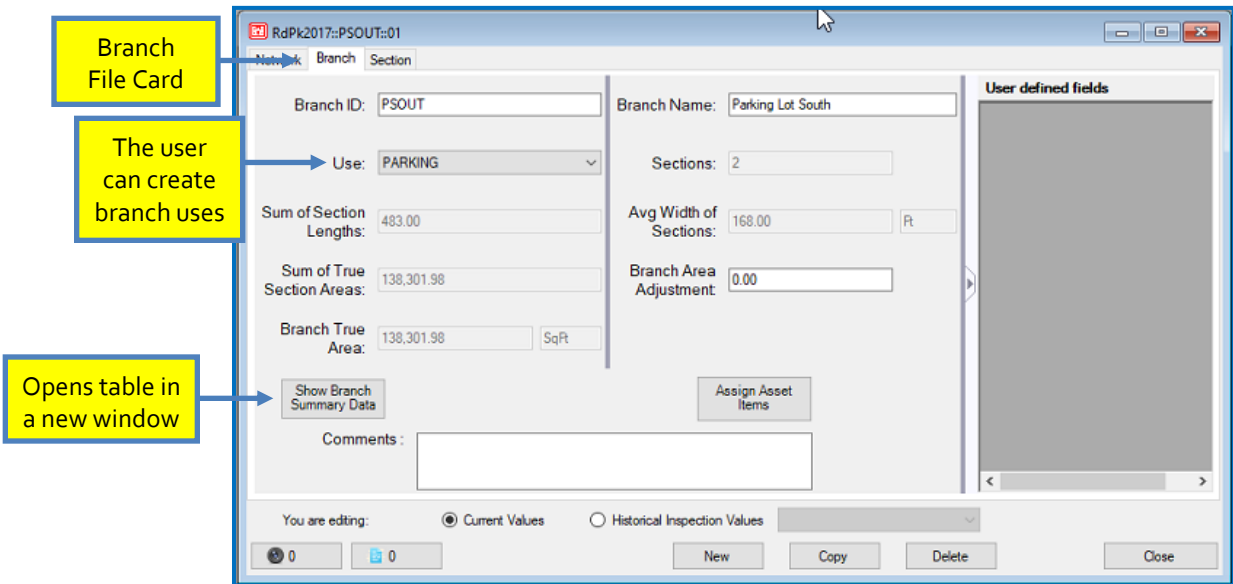
You may add items to the Use picklist under Define User Fields in System Tables.

The contents of the Use field are limited to a single value that is selected from a preexisting list of choices. To enter a value in the Use field, select the field, and a down arrow will appear on the right side of the field data entry area. Click on the arrow for a list of available choices in a scrolling picklist.

If there are more items in the list than can be shown in a single short list (usually 5 to 10 items), the list is displayed with a scroll bar arranged along the right side of the list. Use the scroll bar arrows to select an item not visible in the list. When the picklist is very long, you may want to locate items in the list by typing the first character of your selection. The program seeks out matches for the characters you type

If the picklist does not contain the item you wish to enter, you need to add the item to the picklist. To enter a new item to the Use picklist, select System Tables and Tools from the PAVER™ Menu located along the top of the PAVER™ screen, then Edit Inventory Picklists, and then either Engineering Fields, and the Branch Use tab. For further information, see Chapter 4 System Tables and Tools >> [Edit Inventory Picklists](#).

The Branch file card contains three area fields: Calculated Area (Sum of Sections), Area Adjustment, and True Area. The Calculated Area field is the sum of the true section areas of the branch. The Area Adjustment field is used to reflect special knowledge the user may have about branch area, which is not incorporated in the Calculated Area. Decreases in branch area should be entered as negative values. The Section card also has an area adjustment field, so the user does not need to reflect section level area adjustments in the branch Area Adjustment field. True Area is Calculated Area plus Area Adjustment. True Area is the value used in PAVER™ calculations and reports.



Creating Sections

To create a section, click on Inventory on the PAVER™ Button Bar. The Define Inventory data form appears with the Network file card as the active form. Click the file card tab Section to bring focus to the Section data card. If you have just added a new branch, that branch will not have defined sections.

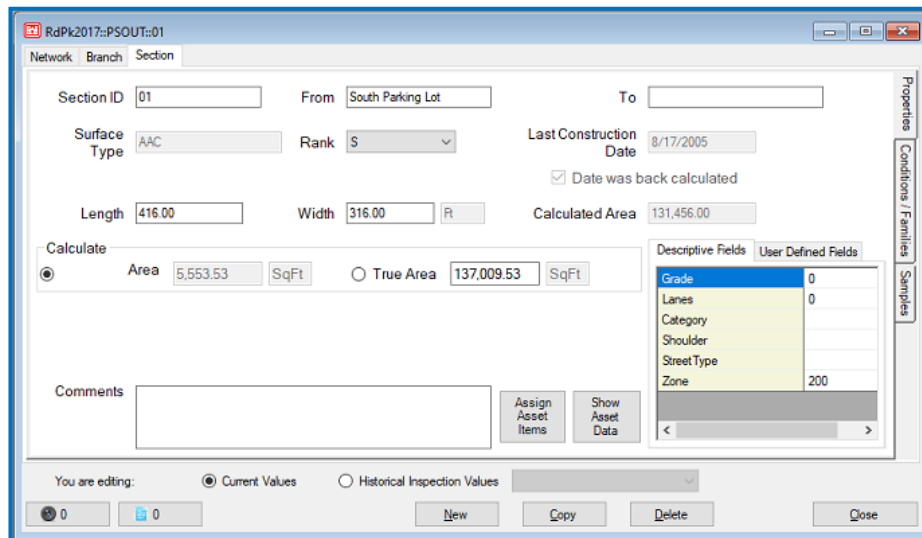
Click New at the bottom of the screen to create a new section, and enter section information in the fields starting with Section ID. Note that the Unit field cannot be directly edited by the user (see System Tables and Tools >> Misc. Other Tables >> Unit of Measure for details).

The Section file card contains three area fields: Calculated Area, Area Adjustment, and True Area. The Calculated Area is the product of the section's user-entered length and width and cannot be edited. The Area Adjustment field is used to reflect special knowledge the user has about section area. The user must still enter length and width

Note:
Use Area Adjustment to reflect cutouts, or enter the True Area and PAVER™ will automatically calculate the Area Adjustment.

information, as failure to do so will create problems in other functions of PAVER™. Decreases in section area resulting from items like cutouts should be entered as negative values. The Branch file card also has an area adjustment field, so the user does not need to reflect Branch-level area adjustments in the section Area Adjustment field. Calculated Area and Area Adjustment are added to obtain True Area, the value used in PAVER™ calculations and reports. The True Area field may be edited directly if the true area of a section is known, then PAVER™ will calculate the Area Adjustment.

For concrete sections there are four additional user-entered fields: Slab Length, Slab Width, Total Slabs, and Joint Length. These fields aid in determining the sections total joint length, an essential factor when determining the cost of a joint sealing project. Joint sealing is the process of cleaning and sealing or resealing PCC joints. This technique is used to mitigate surface water infiltration into the pavement foundation and to stop the accumulation of incompressibles in the joints.



The formula for calculating Total Slabs is based on the sections True Area and the average slab length and width. See below.

$$Total\ Slabs = \frac{True\ Area}{Slab\ Length \times Slab\ Width}$$

$$Total\ Slabs = \frac{11,200}{20 \times 14} = 40\ Slabs$$

The formula for calculating Joint Length is based on the average slab length and width, along with the dimensions of the section. The above image shows user-entered inventory data for

IRP_IRESE_01, which has a calculated Joint Length of 932 feet. The formula for Joint Length is shown below, along with the calculation for section IRP_IRESE_01.

$$\text{Joint Length} = \left[\left(\frac{\text{Section Length}}{\text{Slab Length}} \right) - 1 \right] \times \text{Section Width} + \left[\left(\frac{\text{Section Width}}{\text{Slab Width}} \right) - 1 \right] \times \text{Section Length}$$

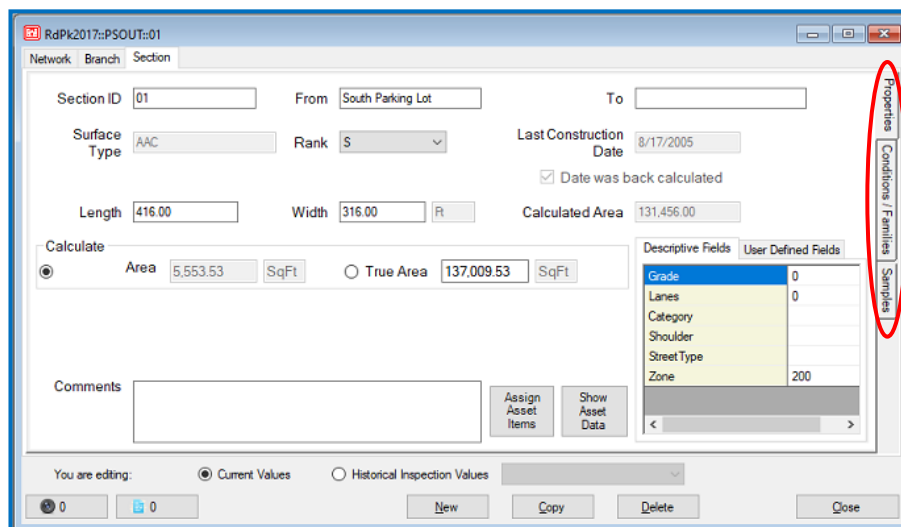
$$\text{Joint Length} = \left[\left(\frac{400}{20} \right) - 1 \right] \times 28 + \left[\left(\frac{28}{14} \right) - 1 \right] \times 400$$

$$\text{Joint Length} = 532 + 400 = 932 \text{ Ft}$$

If the user has specifically measured Joint Length and/ or Total Slabs, these calculated values can be overridden, allowing the user to enter their measured values.

Some of the section fields can only be changed using the choices in the picklists. Picklist choices can be edited or expanded through the System Tables and Tools button above the PAVER™ Button Bar. (See Chapter 4 System Tables and Tools >> [Edit Inventory Picklists](#) for further directions.) After the basic section information, there are two boxes: Conditions and Families. Condition information cannot be edited from the Section file card, but rather can be entered in the routines run from the Field Inspect button on the PAVER™ Button Bar. The family assignment for the section (or other sections) can be changed by using the mouse to point at the Family box and double-clicking the left mouse button. Family information can also be assigned under the PCI Family Models button.

User-defined section fields are arranged along the right of the screen. These fields are used to contain user-defined inventory information and can be used to sort and select inventory, maintenance, and inspection information.



Conditions/Families

This tab provides a quick reference to condition and family assignment data for the selected section in four preset views:

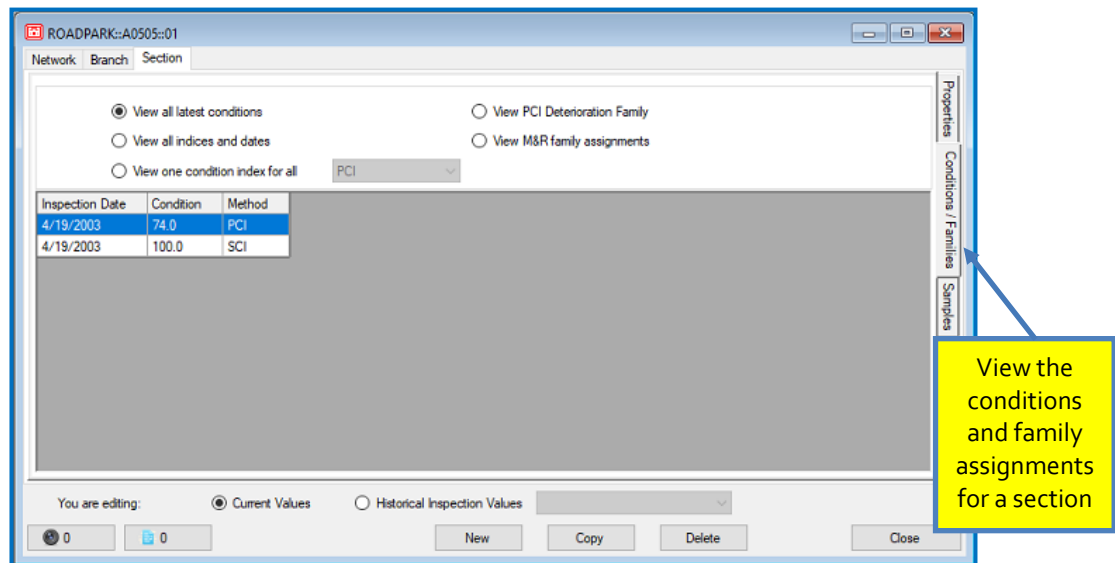
- **View all latest conditions:** A table with the last computed (last entered) condition indices associated with the section.
- **View one condition index for all dates:** Shows every date for which one selected index occurred for the current section. A drop-down list box allows the user to choose the condition for which they would like to display information.
- **View all indices and dates:** The complete listing of every condition index for every date occurrence listed in the section history.
- **View family assignments:** Shows what the current family assignment (Prediction Model) is for the selected section. Double-clicking in the Family column opens the Change Family Assignments window, providing the user the option to change the family assignment.

Note:

The Conditions/Families tab provides a quick way to see the conditions associated with all construction and inspection dates.

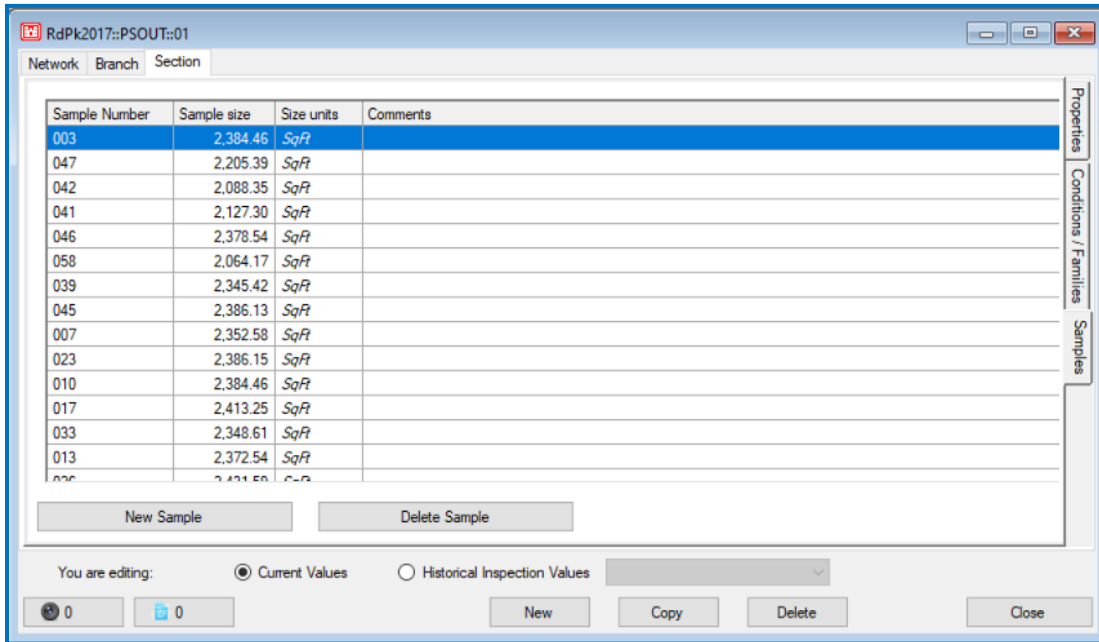
As with other tables in PAVER™, right-clicking on any of these tables allows the user to revise the table layout, sort the data, print, or export the data.

Condition and Age Categories, Condition Type Selection, and User-defined Distress Indices are all discussed in Chapter 4 System Tables >> [Condition Tools](#).



Samples

New Slab Samples can be added or deleted at the Sample-level using the New Sample or Delete Sample buttons in the Samples Tab.



GIS Assignment

What is the GIS Assignment Tool?

The GIS Assignment Tool links the PAVER™ data for individual pavement sections to GIS data, providing a ‘point-and-click’ interface to create, remove, or change the link between pavement sections and map features. Using the same visual layout as the Selectors, the tool reduces the time required to create or change the link between GIS and pavement data.

Using the GIS Assignment Selection Tool

- To practice using the GIS Assignment Tool, Import the Interstate Research Park.e65 sample database that should have been installed in the User Data folder with your installation of PAVER™ 7 (located in C:\Program Files\EMS\User Data or C:\Program Files (x86)\EMS\User Data). If a new database is not opened, PAVER™ will access the database used most recently by the machine.
- Open Inventory >> GIS Assignment.
- If the GIS data is correctly associated with the PAVER™ database, the GIS Assignment Tool dialog box that opens will contain the PAVER™ tree menu, as well as a graphical representation of the base- the GIS map. The PAVER™ Tree

Menu is a tree listing of the networks, branches, and sections that are entered in the active PAVER™ database. Each pavement section has a unique identification associated with it in PAVER™, used to link the GIS features to the pavement sections. The link is automatically maintained, even if the network, branch, or section identifications change.

- The colors in both the PAVER™ Tree Menu and the GIS map have different meanings: Green sections are assigned, and red sections are unassigned.

GIS Assignment Tool Button Functions

- The Select Item tool located at the top of the GIS Assignment Tool dialog box, allows the user to associate the PAVER™ data with the GIS map.

The GIS map of the base assigns different colors to sections with different linkage distinctions. Specifically, areas represented in green are assigned to a pavement section in the database, and areas in red are unassigned. The current sections will normally be highlighted in the PAVER™ tree menu. The Select Item tool will continue to be active, and may be used again, until another tool is selected.

Note:
The GIS Assignment Tool has the same buttons found on the GIS and Tree/GIS selectors.

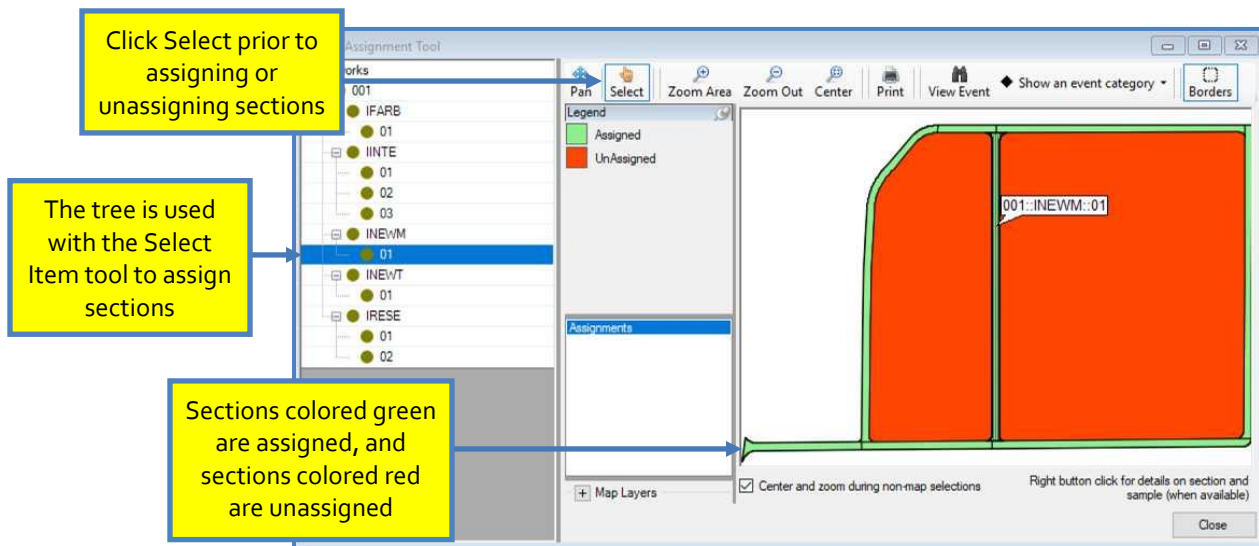
1. To determine the PAVER™ section identification of a section on the GIS map:
To use the Select Item tool, click Select Item and the mouse icon will change to an arrow and a question mark. Click on a green section and that green section will become current. The corresponding section identification will be automatically highlighted in the tree menu to the left.
2. To determine the location on the GIS map of a PAVER™ section:
At any time, whether the Select Item tool is active or not, click on a section identification in the PAVER™ tree menu and the corresponding area(s) will be highlighted on the GIS map. This section and all these areas associated with this particular section identification will become active.
3. To newly assign a PAVER™ section identification to a section on the GIS map:
Verify that the Select Item tool is active. If it is not, click Select Item, then click on the area on the map that you want to assign a PAVER™ section identification to. Next, click on the section identification (in the tree menu) to be associated with the section.

You can also do the above task in reverse order, that is to first select the section identification in the tree menu and then select the area on the map. Either method will accomplish the same thing.

It is possible to include more than one area in one section identification. Add an additional area to a section by highlighting the particular section identification in the PAVER™ tree menu and clicking on another area. The additional area will be added to the section, and any previous areas associated with the section identification will remain associated.

4. To change the current PAVER™ section identification assignment of a section on the GIS map:

Double-click on an area that is green and that area will color red, no longer being associated with any pavement sections. Click on a red area, then click on a corresponding section in the tree menu, and that area will become green; indicating that it is now an area associated with the current section. The current section(s), or any section represented in green, will always be assigned to a section. When another section becomes current, the original red section will change to green and will be associated with the section that was highlighted last in the PAVER™ tree menu. Click on a new section in the PAVER™ tree menu, to change the section identification assignment of the current, or highlighted section.



▪ To customize the view of the GIS map:

1. The Center tool will zoom to the original view of the entire GIS map, and will center the map on the screen. To use the Center tool, click Center.

2. The Pan tool allows the user to move the view of the GIS map, while maintaining the current zoom factor. To use the Pan tool, click Pan, and the mouse icon will become a double-arrow. Find the spot on the map you would like to move to, and place the double-arrow over it. Click and hold down the left-button on your mouse, and move the double-arrow to a new location and release. The view window of the GIS map will move so that the point first selected is moved to the point of release. The Pan tool will continue to be selected, and may be used again, until another tool is selected.
3. The Select tool allows you to determine the PAVER™ section identification of a section on the GIS map without changing the assignment of the active area, the current section, or the association of an area to a section identification. To operate the Select tool, click Select, and then click on any section of any color, and the corresponding section will be highlighted in the PAVER™ tree menu. The Select tool will continue to be active, and may be used again, until another tool is selected.
4. The Zoom Area tool allows the zoom factor of the GIS map to be changed, and allows the user to zoom in on a specific area quickly. To use the Zoom Area tool, click Zoom Area, and the mouse icon will become a cross. Position the intersection of the cross at one corner of the desired window, click and hold the left-button on the mouse and drag it to the opposite corner of the desired window, creating a box outline. If you begin the zoom window at the upper-left corner, you will drag to the bottom-right, and vice versa. If you begin the zoom window at the upper-right corner, you will drag to the bottom-left, and vice versa. Release the right-button on the mouse and the GIS map will automatically zoom to the largest view that includes everything in your zoom window. The zoom area tool will continue to be active, and may be used again, until another tool is selected. To decrease the zoom factor, use the Center tool, and start over, or use the Zoom In tool.
5. The Zoom Out tool allows you to zoom out from a specific location. To use the Zoom Out tool, click Zoom Out, and the mouse icon will become an arrow. Position the tip of the arrow over the point you want to zoom out from, and click the left-button on the mouse. The GIS map view will increase, as the scale of the map decreases at scale factor of 2:1. The new view window will be centered on the tip of the arrow. The Zoom Out tool will continue to be active, and may be used again, until another tool is selected.

6. The Print tool allows the user to print a hard copy of the GIS map. To use the Print tool, click Print. The default print setup will print the entire GIS map only on a letter-sized sheet to the default printer. The print setup may be changed using File >> Printer Setup.
7. The View Event tool allows the user to view assigned events, when a polygon on the map is selected. Once the area you'd like to view on the map is selected, click on the View Event Tool to see assigned events.
8. The Show an Event Category tool exhibits a dropdown menu of options like: Branch Names, Section PIDs, Inventory Samples, Last Branch PCIs, Ad Hoc Query, Inventory Items Below Critical, etc.
9. The Borders tool allows the user to remove or add borders to map polygons.

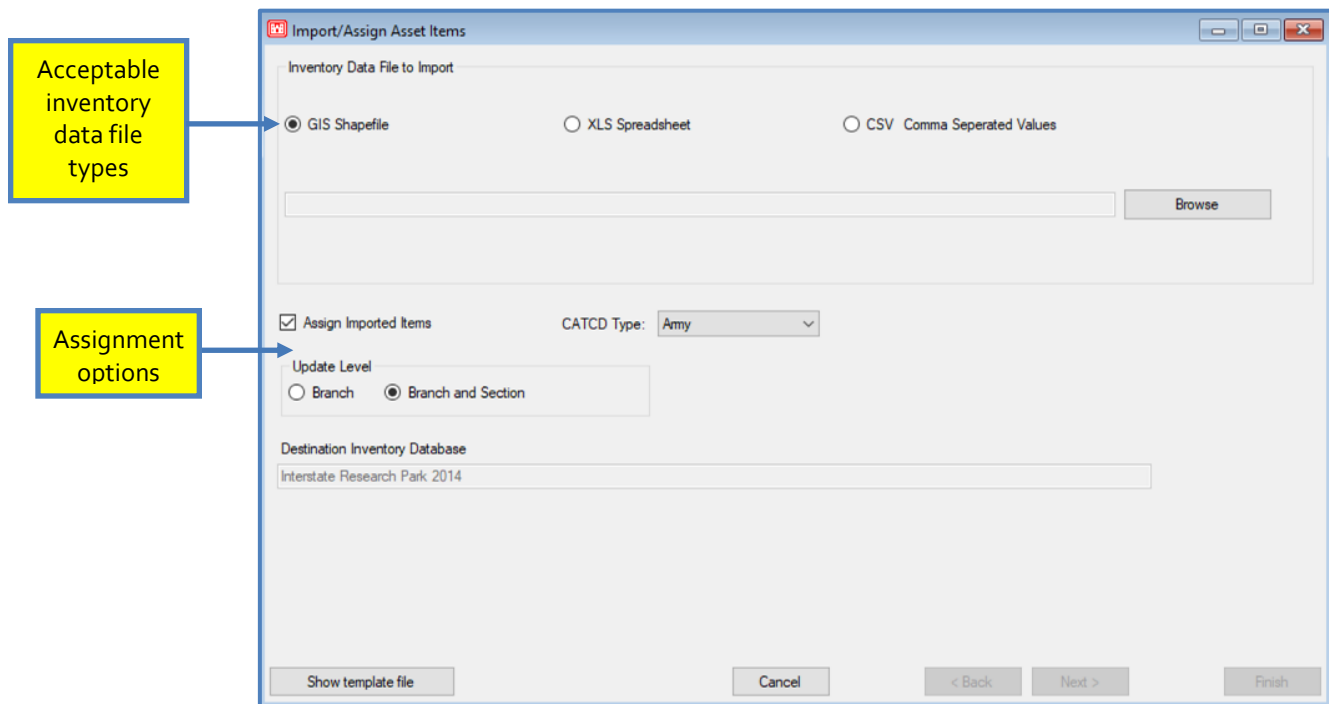
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Asset Management

The addition of Asset Items allows PAVER™ users to view an inventory through an Asset Management perspective. By assigning Assets to the inventory, users create an association between the pavement inventory and the Real Property inventory. Once this link has been established; Summary Charts, User Defined Reports, and the EMS™ Query Tool can be run with asset parameters.

Note: For the Assign Asset Items option to appear in the Inventory menu, the Show Asset Items box must be checked in the Database Properties screen.

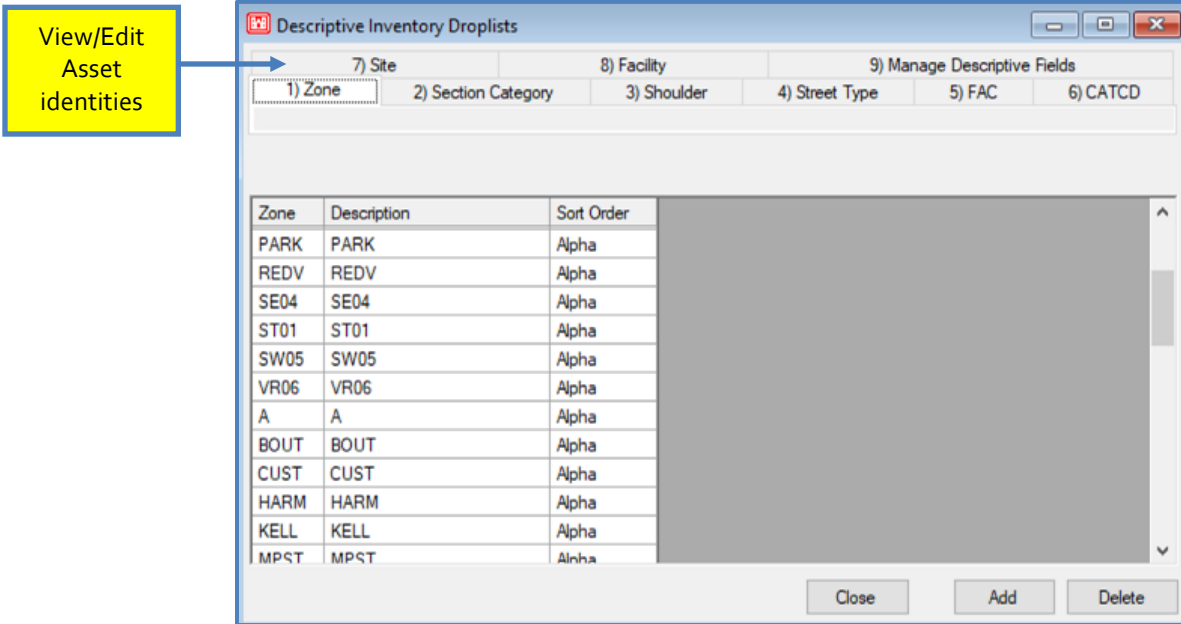
Asset Management tools become accessible by clicking on Inventory, then Asset Management from the PAVER™ button bar. Users can import or assign asset items using GIS/Tabular Import, view and/or edit asset identities, and assign or unassign asset items using these tools.



Adding and Assigning Asset Items

Assets can be assigned to Branches and Sections within PAVERTM. There are several tools for assigning Assets. Adding your Assets to your system tables and assigning them to your inventory can be done as a single step within PAVERTM or as individual steps.

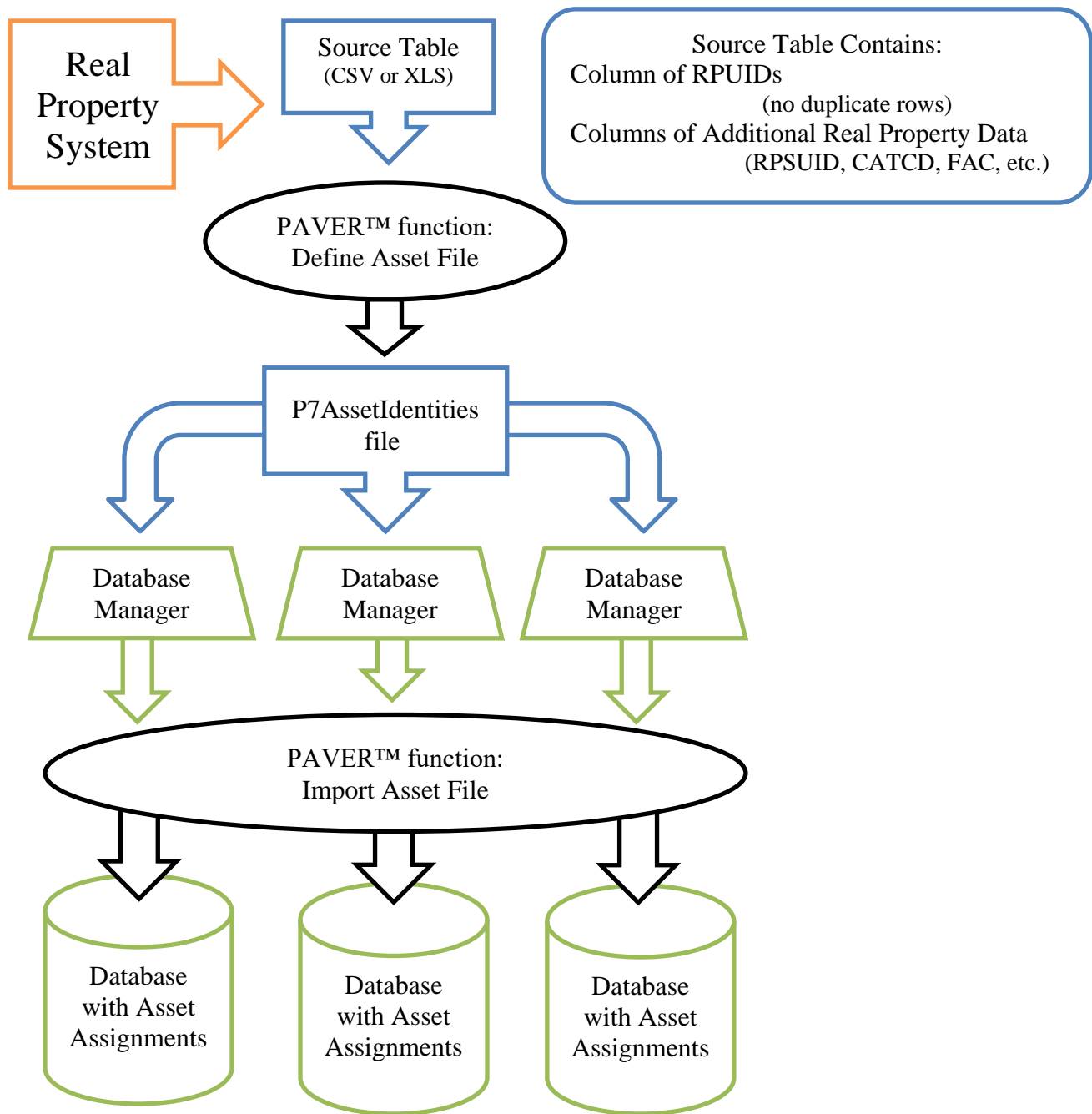
- **GIS Import:** GIS Import allows you to import and assign your Assets by including the Asset information in a GIS shapefile as attributes of the associated sections shapes. If all sections in a branch have the same assignment, PAVERTM will automatically bubble that assignment up to the branch so it only needs to be managed in one place going forward.
- **Tabular Import and Assign:** Tabular import can be used to perform import and assignment in a single step, similarly to GIS import. For tabular import, the row of data must include the Network ID, Branch ID, and optionally the Section ID along with the Asset information. Section ID is only required if you have multiple assets within a branch.
- **Tabular Import:** Tabular import can also be used to only import Asset information into your system tables. Create a spreadsheet with column headers and one row per Asset. This tool operates like all the other versions of tabular import in PAVERTM but does not ask for Network, Branch, or Section information.
- **Manual Add/Edit:** Assets can be created and edited one at a time in the system tables using the View/Edit Asset Items menu item in Asset Management.

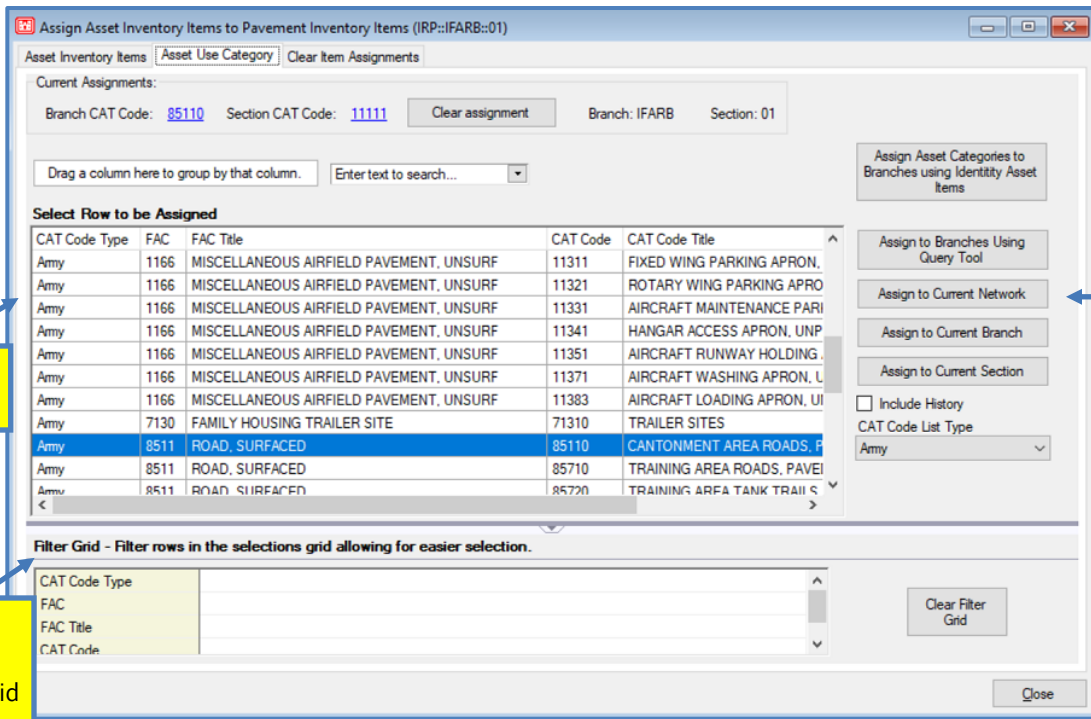


- **Assign/Unassign Asset Items:** The assignment screen has multiple tools for assigning Asset items and types to Branches and Sections. The first and second tabs operate similarly; the first tab is used to assign Asset items, and the second tab is used to assign Asset types. The third tab allows you to clear assignments in bulk which is primarily used to allow items to be deleted before they are replaced.

Centralized Asset Management

Additionally, Asset files can be created for distribution or imported using Centralized Asset Management tools (located beneath the Asset Management option in the Inventory dropdown). Centralized Asset Management is intended for organizations with Centrally Managed Assets of multiple inventories.





Create Asset File for Distribution

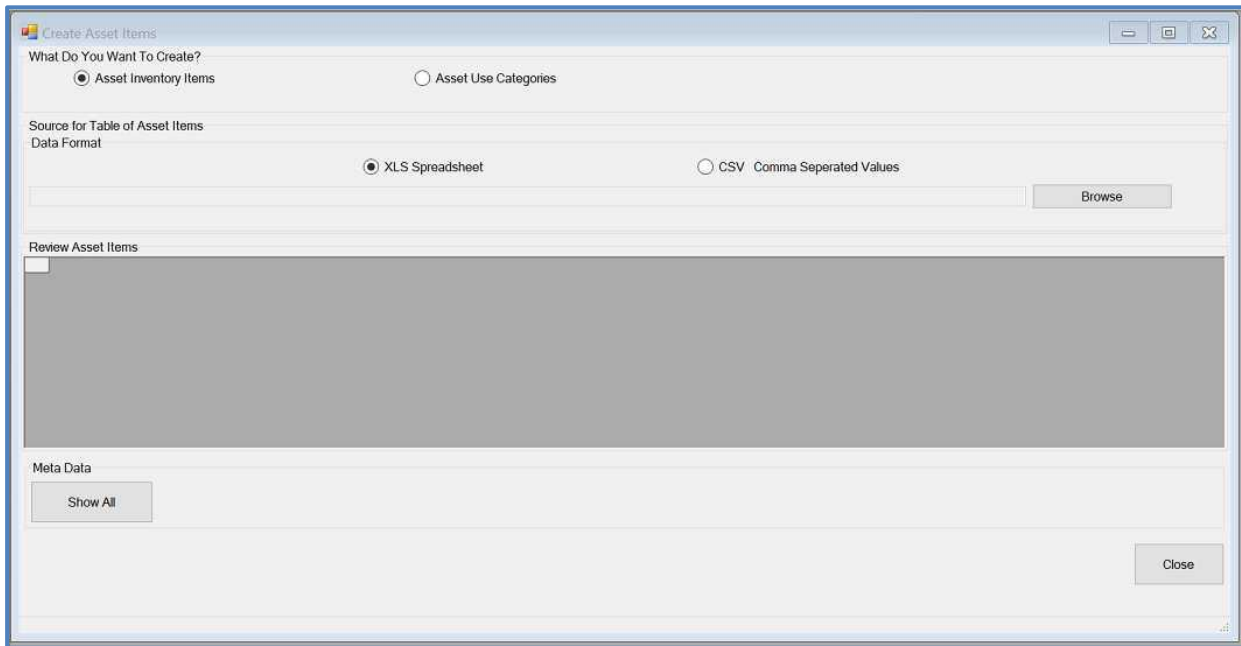
This function should only be accessed by a single user within an organization to prepare the organization’s Asset Items.

From a Real Property system, the organization’s appointed user should create a source table, an excel spreadsheet with a single sheet containing all desired RPUIDs to be tracked. The Define Asset File function supports CSV and XLS file formats.

The file to be imported must contain a column of RPUIDs which does not contain duplicate row values. This column should be named RPUID. Additional columns from real property systems should also be included for import to PAVER™ as this table will replace the Site and Facility system tables. Recommended columns include RPSUID, Site Name, Facility ID, Facility Name, Dominant CATCD, or other identifiers. Note: Only include desired data in the exported file as hidden rows and columns will also be imported. Filtering on FACs applicable to PAVER™ is advised if your system supports it.

Once the source table has been created and formatted, it can be converted into a P7AssetIdentities file. First, ensure the “Show Asset Items” box is selected within the Database Properties window of the File Menu. Navigate through the Add-Ins menu to Add-In Manager and select “Define Asset File” in the grid. Then navigate through the Add-Ins menu to the newly added “Define Asset File” item and select it. A window will open to allow the user to select the source table file and convert it into a P7AssetIdentities file.

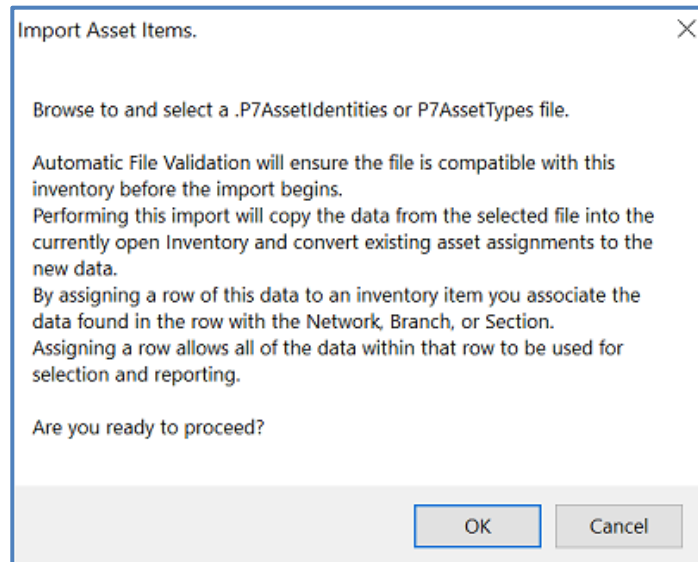
Once the table file has been selected the User will select the real property unique identifier column name and, optionally, the dominant CAT code column. If the desired column name is not shown in the real property unique identifier drop box, the program has found duplicate values in the column. To continue, the user can click Show All to select from all columns. If using show all, the user should edit duplicate values in their desired real property unique identifier column because the program will only save the first row with each value in the selected real property unique identifier column.



Import Asset File

After the P7AssetIdentities file has been created, it can be imported to the appropriate database. Open the database and navigate through the Inventory menu to Asset Management and select “Import Additional Asset Column File” from the dropdown menu.

PAVER will compare the existing asset information in the inventory to the file being imported and only proceed if all of the current asset RPUIDs can be matched up to IDs in the file. It is recommended that you back up your Inventory before importing. It can also be useful to create a user defined report of your asset data and assignments and save it to an Excel file before importing.



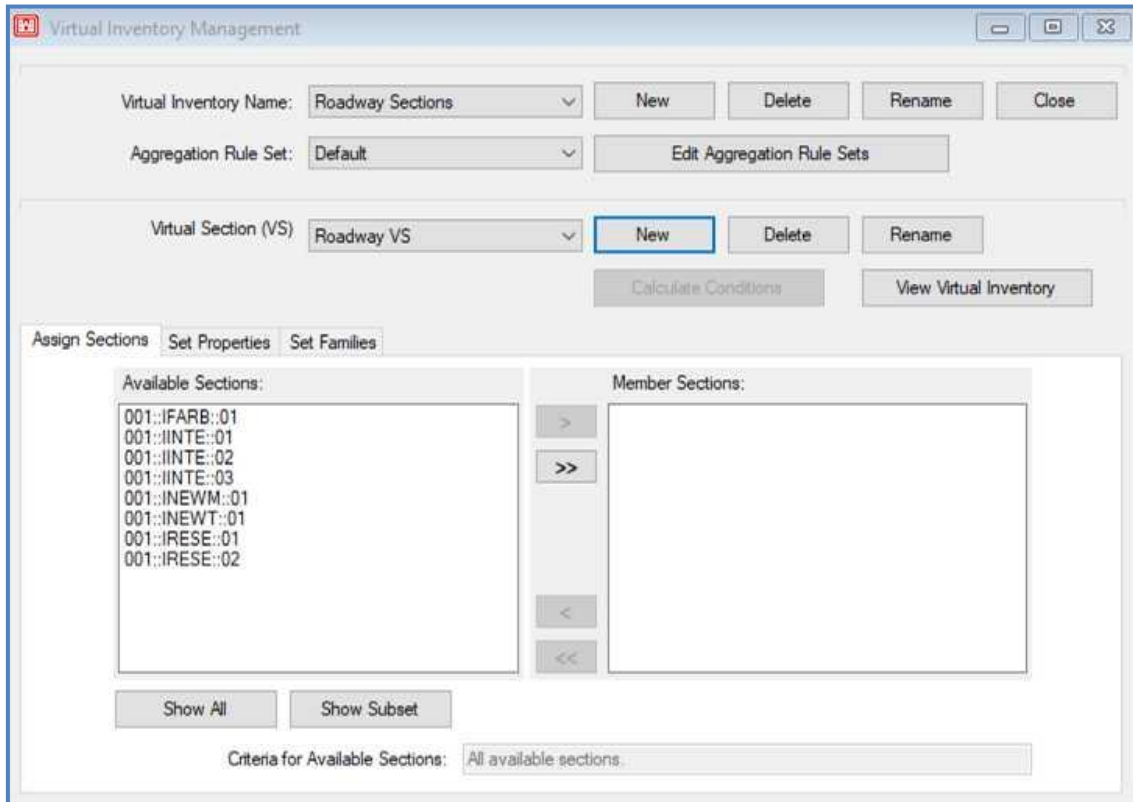
Define Virtual Inventory

The actual inventory consists of the original sections that were defined when the database was created, each with a PCI value. If the user wants to investigate the condition of a collection of sections, then the use of a Virtual Inventory may be of aid. The original database uses default aggregation rules, where properties (condition, construction date, grade, lanes) are calculated as averages weighted by area. If the user wants to use an alternative aggregation rule, they can utilize a Virtual Inventory.

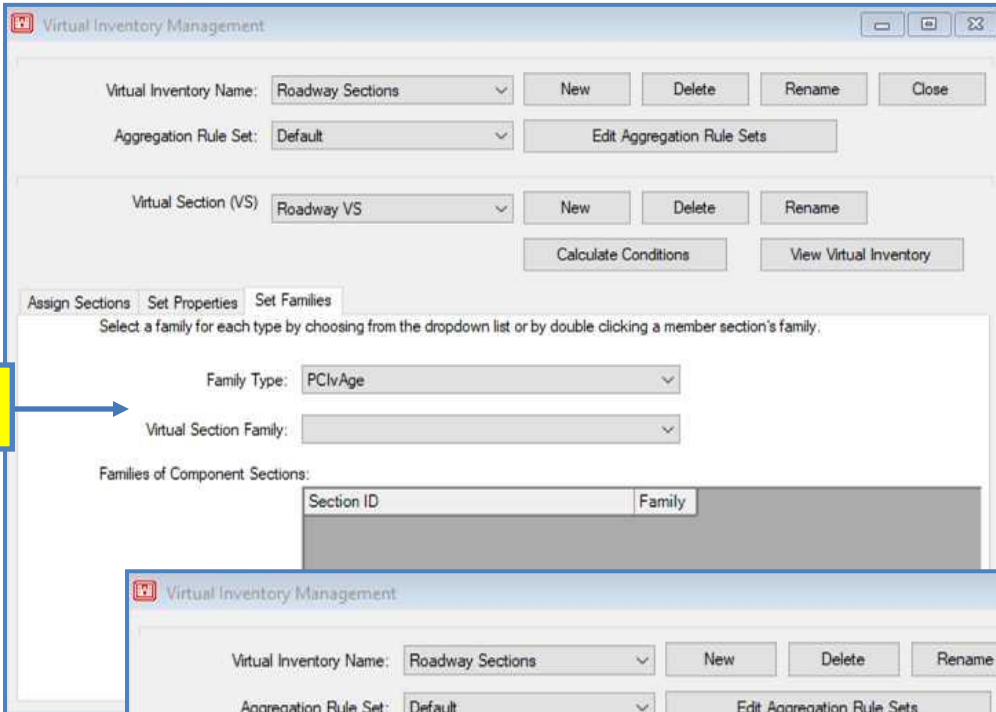
The Define Virtual Inventory option in PAVERTM 7 provides the user the ability to make copies of existing inventories, in which physical sections may be combined to make a Virtual Section. For example, a virtual inventory can be created where all roadway sections may be combined to create a virtual “roadway” section. Conditions may then be calculated as well as reports for the virtual section.

To create a virtual inventory, go to Inventory >> Define Virtual Inventory. Click New and enter a name for the new virtual inventory. The user has the option to use different aggregation rules. To do this, click Edit Aggregation Rule Sets and create a new rule set. Select a Time interval for inspection aggregation and select the Aggregation Rule relevant to each property. Now Virtual Sections need to be created. Click New and enter a name for the virtual section. Under the Assign Sections tab, define the new virtual section. PAVERTM provides a list of available sections from the original inventory, and the user can select multiple sections from this list and use the arrow buttons to move them under Member Sections. This collection of Member sections will be combined to define the selected virtual section. Repeat these steps to produce additional virtual sections.

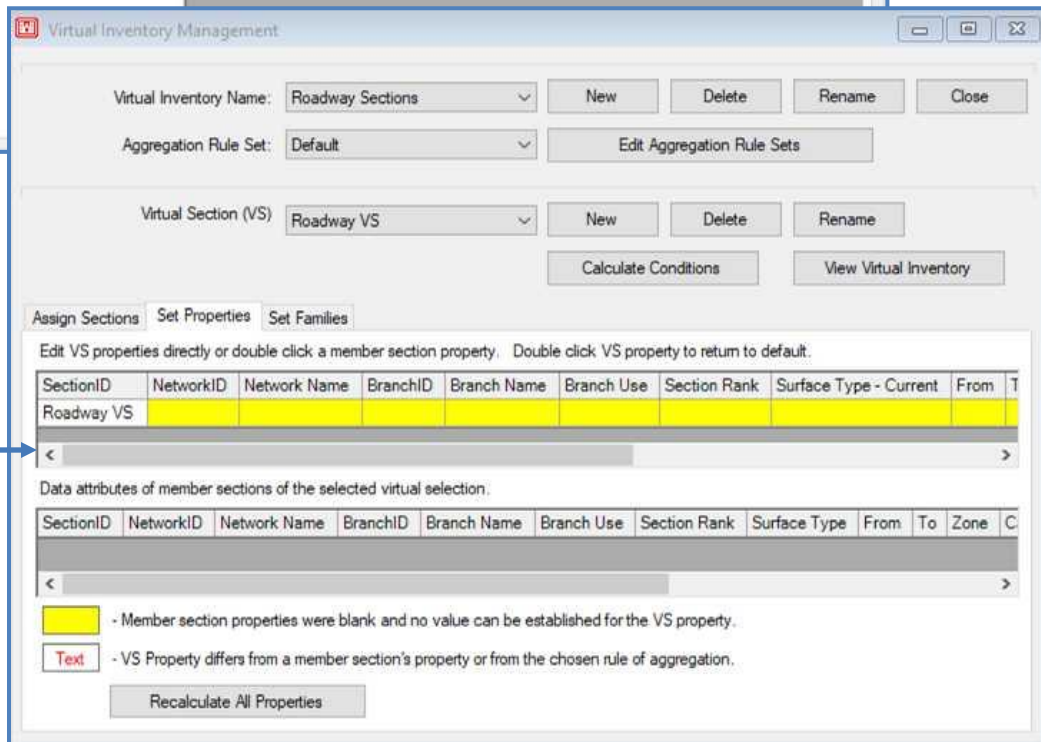
After creating virtual sections, the user can review or edit the virtual section properties under the Set Properties tab. PAVER™ will display the virtual section properties (computed according to the selected Aggregation rule set) and data attributes of each of the member sections (from the original inventory), that were combined to form the virtual section. Under the Set Families tab, the user can assign the selected virtual section a Family Type and a Virtual section family.



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Set Families tab



Set Properties tab

Copy and Move Data

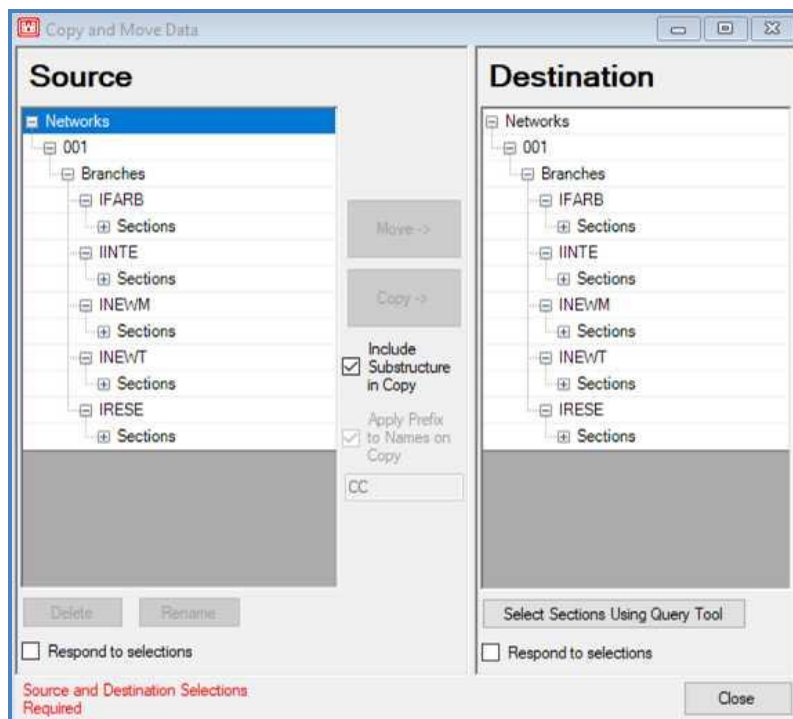
The Copy and Move Data tool is available in the Inventory menu on the PAVER™ Button Bar. First, select the inventory item you wish to move or copy under Source. Then select the Destination for the inventory item you wish to move or copy. Move relocates the item to the specified location, while Copy leaves the original item in its location and places a specified destination. The Move and Copy buttons remain gray until an acceptable combination of source and destination locations are chosen. For example, you cannot move a network into a section. All data movement is restricted within the open database. To move data items between databases, the user will have to combine databases using Combine Inventories in File menu. After two databases have been combined, move or copy the data items and then split the database back into its original components.

Note:

When using the Move command:

- You may only move one source to one destination.
- All children (sub-items within a section) move with the parent.

The Copy and Move Data tool also allows the user to delete and rename items by highlighting the item and clicking Delete or Rename under the Source side. The EMS™ Query Tool can eliminate any data the user does not want to view, by the selection of Subset from the View box, and then Select. The Generate Selections and Respond to Selections checkboxes link the Copy and Move utility with the other selection tools. For all components of PAVER™ that use inventory items (Network, Branch, and Section), there is one active selection. Therefore, the user can use the Copy and Move utility to generate selections in other inventory selectors, or Copy and Move can be selected to respond to selections made by another selector.



Note:

The user can delete from Source, but not from Destination.

Note:

When using the Copy command:

- One source can be copied to one or more destinations.
- There is a choice to copy all children to the parent.

Tools

The Database Verification Tools are a good place to start when encountering errors. They are available as an option under Inventory on the PAVER™ Button Bar. Some options in the Database Verification tool are grayed out (shown below with box checked). They run automatically when the tool is used. Others are options that the user may choose to use or not (shown below with unchecked box). Each checkbox represents a separate segment of the verification process

Note:

The Database Verification Tool makes irreversible changes to your data. It is STRONGLY recommended that you backup your data before using this tool!

Enforce Database Consistency Rules

- Verify branch data and section family assignments:** Ensures that branch summaries correspond to section totals, that only one family model is assigned to each section, and that there is only one set of user-defined field data for each section.
- Verify section construction history:** Ensures the LCD (Last Construction Date) agrees with data in the Work History table.
- Verify/reset latest inspection indicators:** Ensures data matches last inspection data.

Work History

- Check for duplicate Major M&R and duplicate inspections:** Eliminates duplicate Major M&R (i.e. same date, same work type) and duplicate inspections (i.e. same section, same PCI).
- Verify work history descriptions:** Ensures all work history and work required entries have a work type description. Reports sections and dates that have work codes no longer in the system tables.

Inspections

- Verify inspection samples and cached inventory data:** Ensures all sample units either have distresses or are marked “inspected but no distresses”. Checks and fixes cached inventory data associated with inspections.
- Report sections with missing data for PCI calculation:** Reports all sections missing data needed for PCI calculation.

Check System Table Items

- Report missing system table information:** Lists networks, branches, and sections containing data that is missing from the System Tables.
- Change duplicate or blank use and surface names**

Calculate conditions for all sections: Reports invalid or incomplete distress entries. Recalculates PCI and other selected distress indices (for large databases, this option may take considerable time).

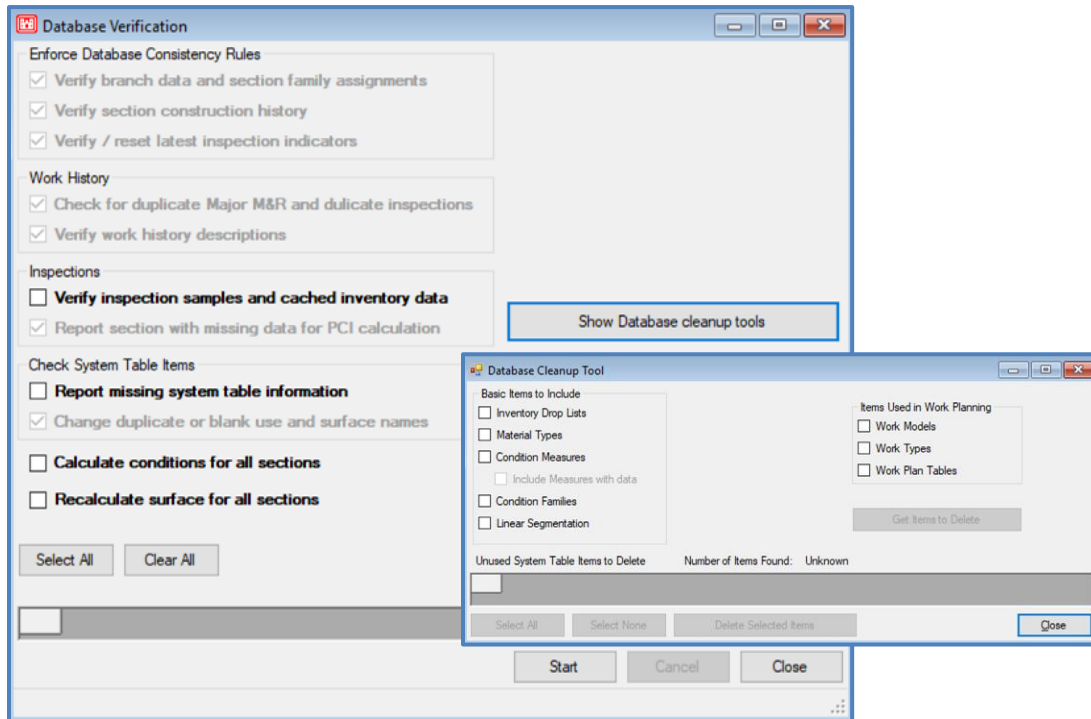
Recalculate surface for all sections: Ensures that the surface type (AAC, APC, PCC, etc.) for each section is correct according to the work history.

Select the Database Verification Tools to run, as well as any corresponding options, and then click Start. PAVER™ will run the selected Database Verification Tools and produce a verification report, listing all the sections that were altered and the associated actions carried out for each error. The user can select more Database Verification options using the Show Database Cleanup Tools button.

Show Database Cleanup Tools

Choose specific parameters to clear data that is no longer relevant for a database. Select each checkbox that applies; the Get Items to Delete button will activate once the first selection has been made. The items that pertain to each checkbox category will populate in the grid, and each item that populates can be selected individually or in multiples.

Note: In order to reflect the changes made using this functionality, you must close and reopen PAVER™ after selecting and applying options for deletion.



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Verification Results

Default pre-selections for the Verification Results screen can be changed from the PAVER™ Defaults menu by clicking the Verification Tools button.

Network	Branch	Section	Exceptions	Details
IRP	IINTE	01	Adding History Inspection	7/1/1963
IRP	IINTE	02	Adding History Inspection	6/1/1983
IRP	INEWT	01	Adding History Inspection	6/1/1983
IRP	IINTE	03	Adding History Inspection	6/1/1983
IRP	INEWT	01	Adding History Inspection	
IRP	IINTE	03	Adding History Inspection	
IRP	IINTE	01	Adding History Inspection	
			Missing or blank work type code and description	INKT - UNKNOWN WC
			Condition Name is used more than once and should be renamed	Friction Index
*	*	*	Work Type Code is used more than once and should be renamed	PA-AC - Localized MR
*	*	*	Work Type Code is used more than once and should be renamed	SS-FS - Localized MR
*	*	*	Work Type Code is used more than once and should be renamed	SS-LO - Localized MR
*	*	*	Work Type Code is used more than once and should be renamed	ST-SB - Localized MR
*	*	*	Work Type Code is used more than once and should be renamed	ST-SS - Localized MR
*	*	*	Work Type Code is used more than once and should be renamed	ST-CS - Global MR
*	*	*	Work Type Code is used more than once and should be renamed	ST-MS - Global MR

Inventory Wizards

Information on the Inventory Wizards: Last Construction Date Wizard, Set Properties Wizard, and Section Split Wizard may be found in [Chapter 14 Wizards](#).

GIS/Tabular Import and Update

Add Inventory from GIS/Tabular Data

See [Add Inventory from GIS/Tabular Data](#) in Chapter 3: File Menu.

Update Inventory from GIS/Tabular Data

See [Update Inventory Data from GIS/Tabular Data](#) in Chapter 3: File Menu.

Import Inventory Samples from GIS/Tabular Data

See [Import Inventory Samples from GIS/Tabular Data](#) in Chapter 3: File Menu.

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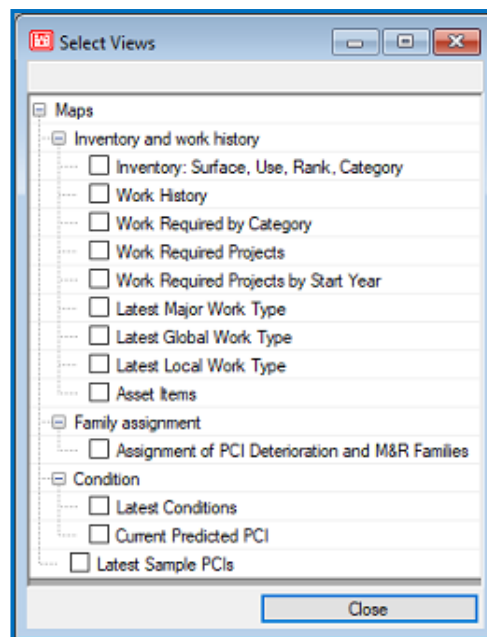
6. Reports

Reports menu options:

- GIS Reports
- Summary Charts
- Enterprise Summary Report
- Standard Reports
- User Defined Reports
- Section Trend Report
- Rollup Report

GIS Reports

The GIS Reports are a series of preset views that allow the user to see a variety of information about their database in a graphical display. These reports require that a shapefile be linked to the PAVER™ database (see Chapter 5 Inventory >> [GIS Assignment](#)). Viewing a GIS Report effectively creates a shapefile, with the PAVER™ data pertaining to the GIS Report view populating the shapefile's attribute table. For more information on accessing these individual report shapefiles, see Chapter 5 Inventory >> [GIS Assignment](#).



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The Map views are grouped into several sections including: Inventory, Latest Conditions, Current Predicted PCI, Assignment of PCI Deterioration And M&R Families, Work History, Work Required, and Asset items. To navigate these views, use the GIS Viewer Buttons, which function in the following manner:

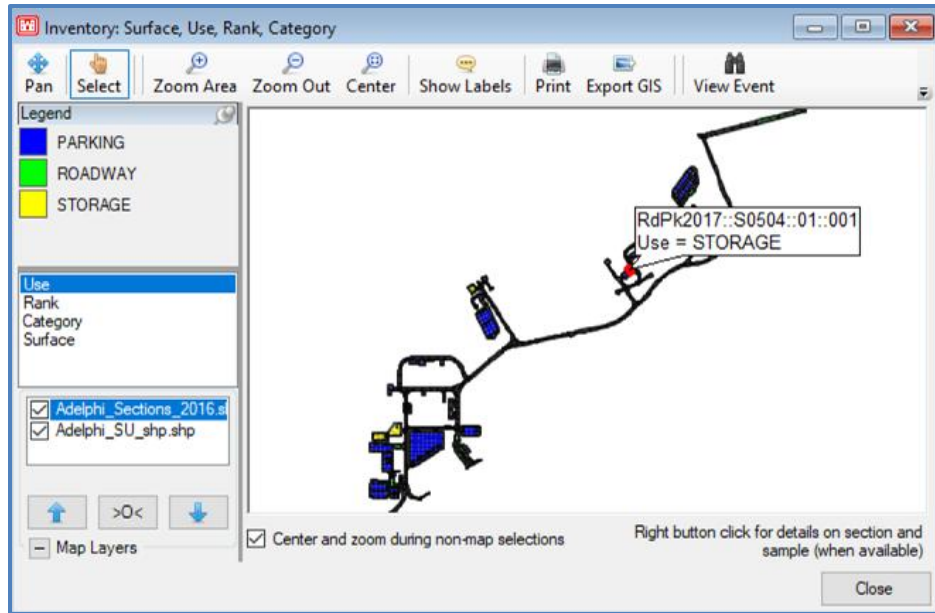
- **Center:** Centers the current view at full extent.
- **Pan:** Allows the user to move around the view at the current zoom level.
- **Select:** Activates the selector tool so the user can utilize the GIS view as an inventory selector.
- **Zoom Area:** Allows the selection of a portion of the view to zoom in on
- **Zoom In and Out:** Zoom in one level on the current view, or zoom out one level on the current view.
- **Show Labels:** Shows Network ID, Branch ID, and Section ID on map.
- **Print:** Prints a copy of the view and the legend
- **Export GIS:** Exports the map and legend using a selected format.
- **Show an Event Category:** Dropdown list that offers additional options including; ability to hide all events, show Branch names on map, show map PIDs, show last Branch or Section PCI, images, last load defects, inventory items above or below critical, etc.
- **Borders:** Toggle borders on/off, Colored/Default, Thick/Thin.
- **Hide Selection:** No longer highlight the selected section on the map.

Inventory

The Inventory GIS view consists of four distinct layers:

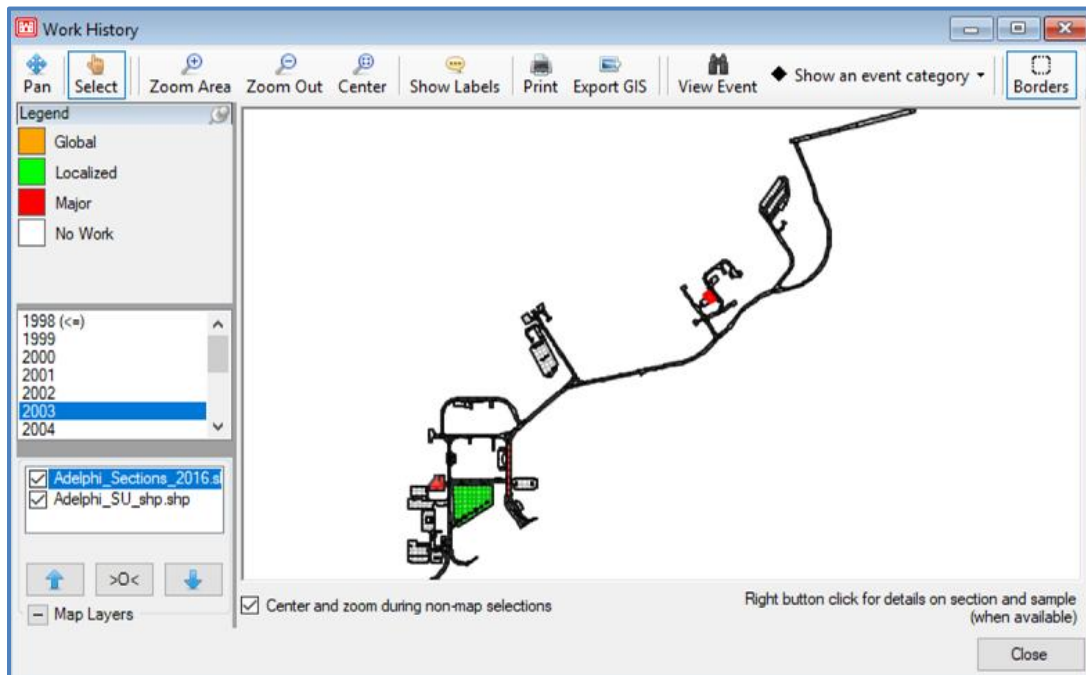
- Surface
- Use
- Rank
- Category

The categories and associated color schemes in these views are preset and cannot be changed. Since the Inventory view has four layers, only the top-most checked layer will be displayed. Each layer name has a checkbox next to it. If only one box is checked, then only that layer displays. If more than one layer is checked, the layer that is highest in location on the list displays. The up and down arrows under the layers box can be used to move layers up or down on the list. Highlight a layer and use the arrows to move it to a different location in the list.



Work History

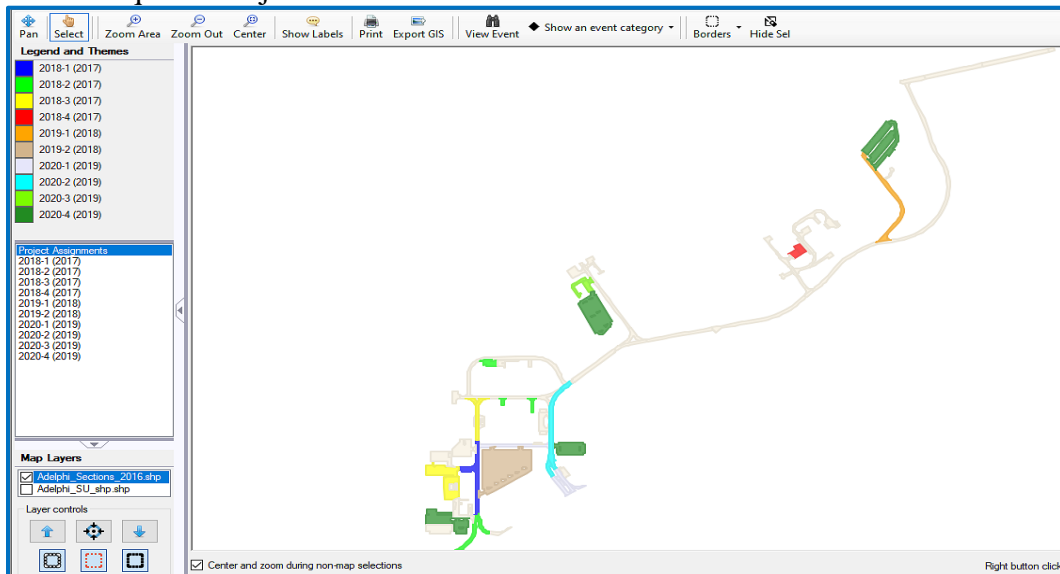
The Work History GIS view allows for selection of Work History dates to view the sections affected by historical maintenance within a selected year.



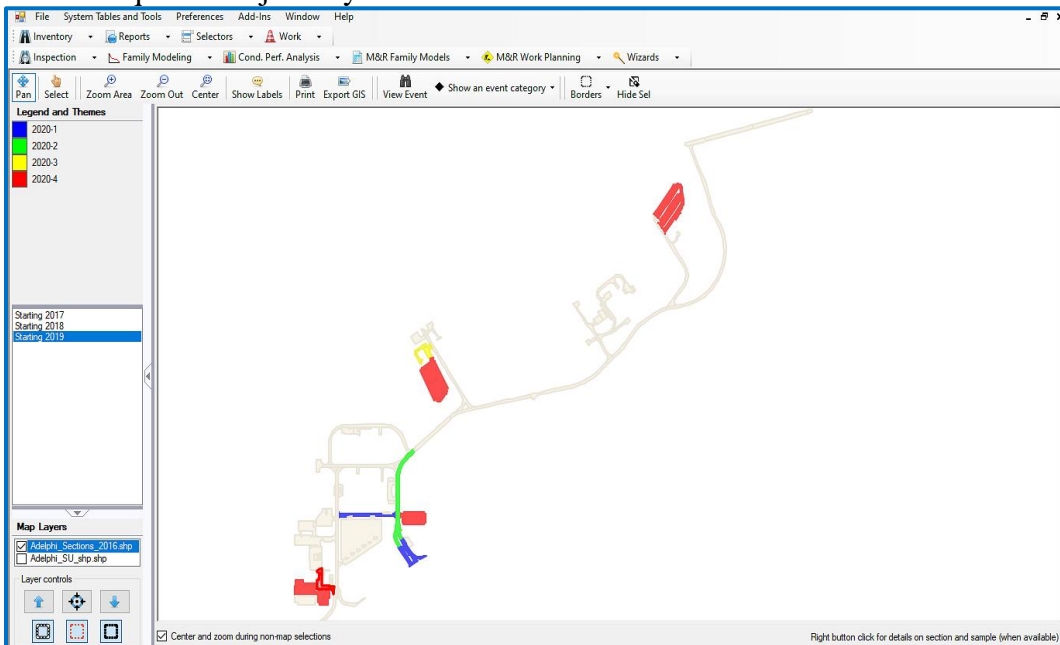
Work Required

There are three GIS views that allow the user to see a graphical map of the scope of work established in Required Projects: Work Required by Category, Work Required Projects, and Work Required Projects by Start Year. Work Required by Category and Work Required Projects can display projects that were planned before the current date.

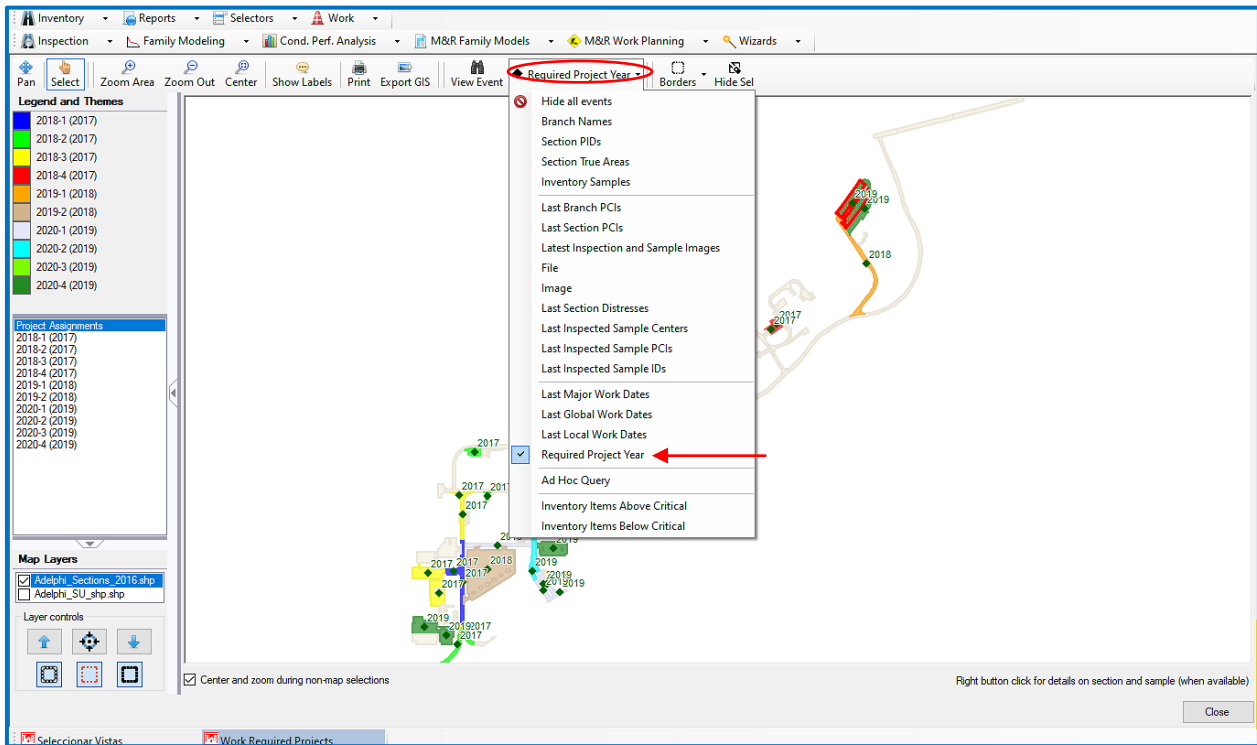
Work Required Projects:



Work Required Projects by Start Year:

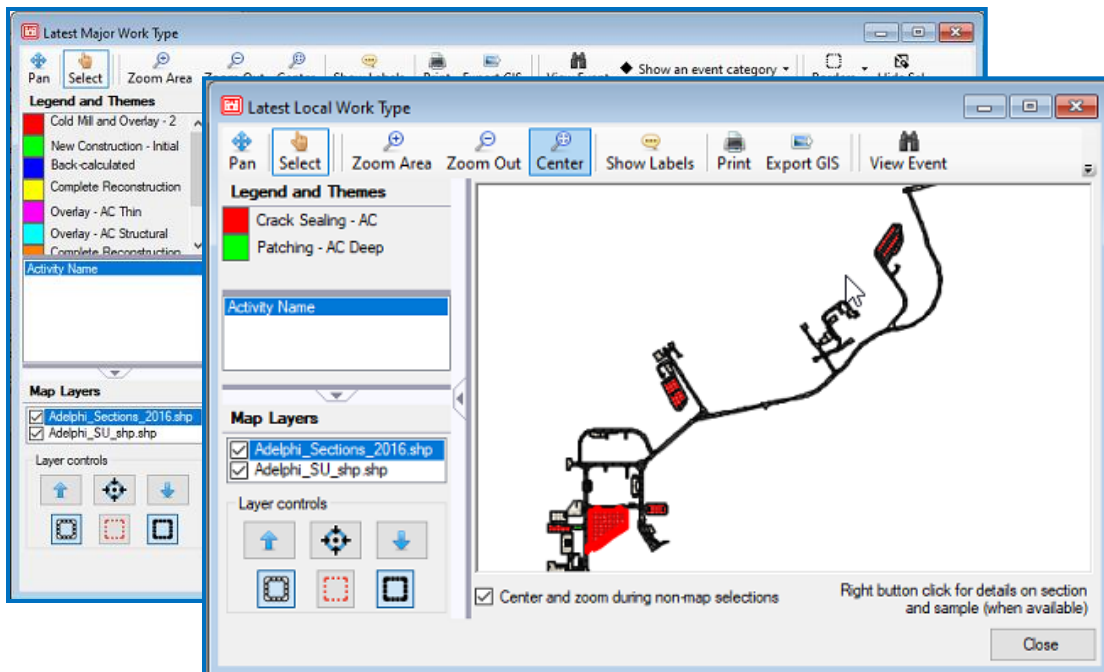


Required Project Year can also be displayed for each section by clicking on the Show an Event Category button.



Latest Work Type

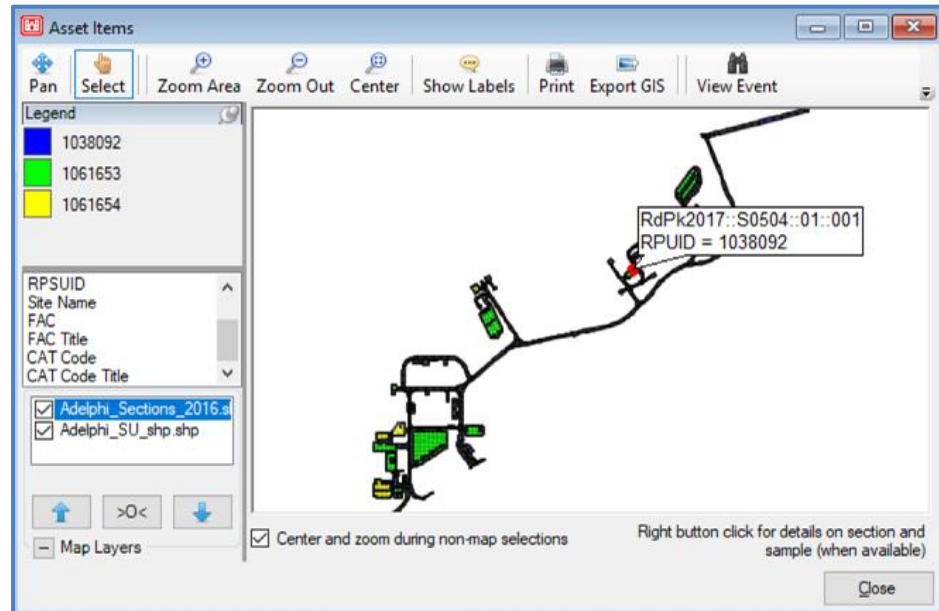
There are three GIS views you can select for latest Work Types: Latest Major Work Type, Latest Global Work Type, and Latest Local Work Type.



Asset Items

Selecting Asset Items displays filterable views that can be defined by the user:

- RPUID
- Facility ID
- Facility Name
- RPSUID
- Site Name
- FAC
- FAC Title
- Cat Code
- Cat Code Title

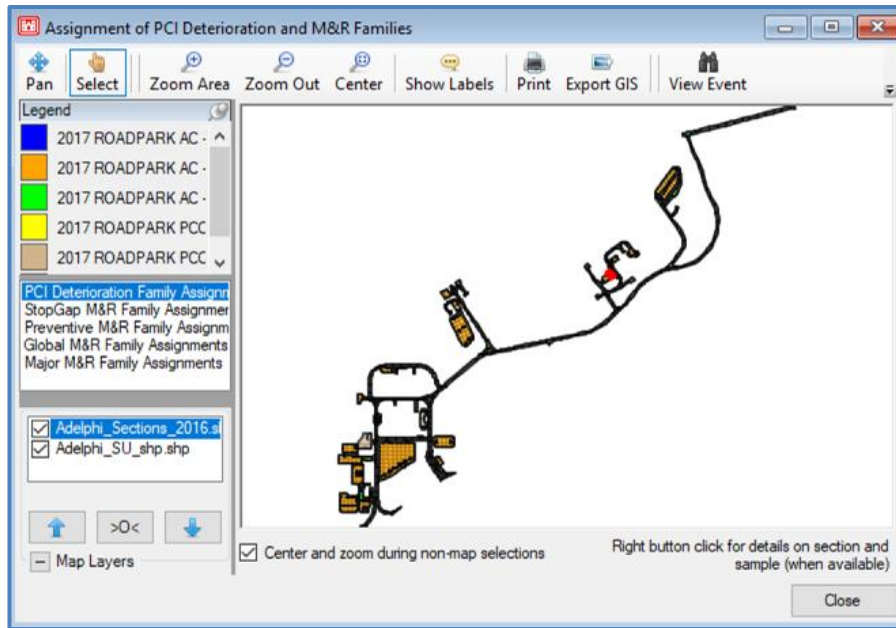


Assignment of PCI Deterioration and M&R Families

The Assignment of PCI Deterioration And M&R Families GIS view consists of five distinct layers:

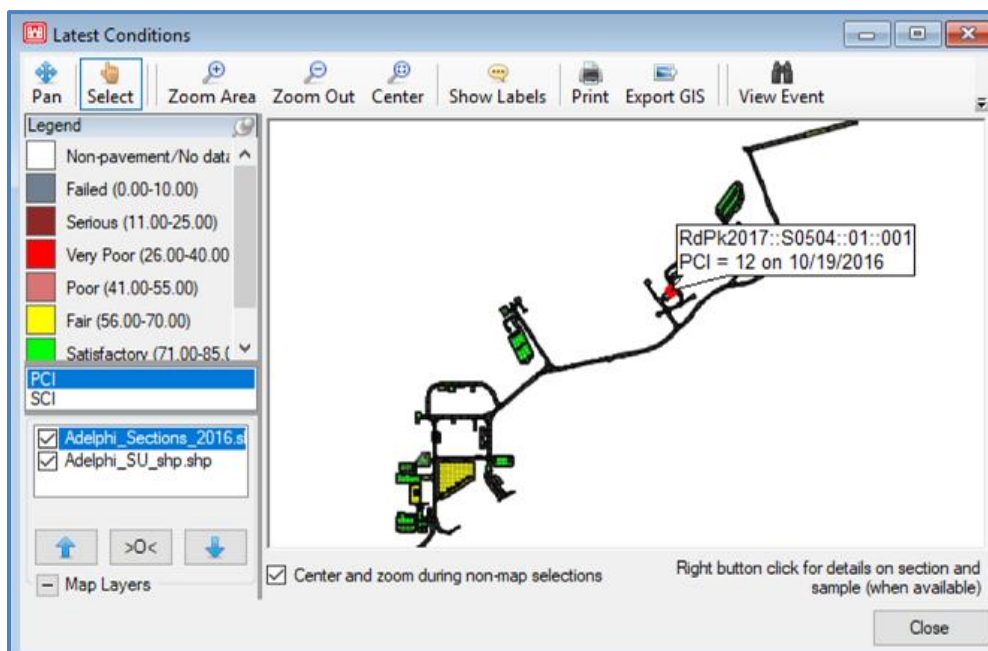
- PCI Deterioration Family Assignments
- Stop Gap M&R Family Assignments
- Preventive M&R Family Assignments
- Global M&R Family Assignments
- Major M&R Family Assignments

As in the Inventory GIS view, the top-most checked layer has priority in the display. Highlight a layer and use the arrows to move it to a different location in the list and thus change its priority or display rank.



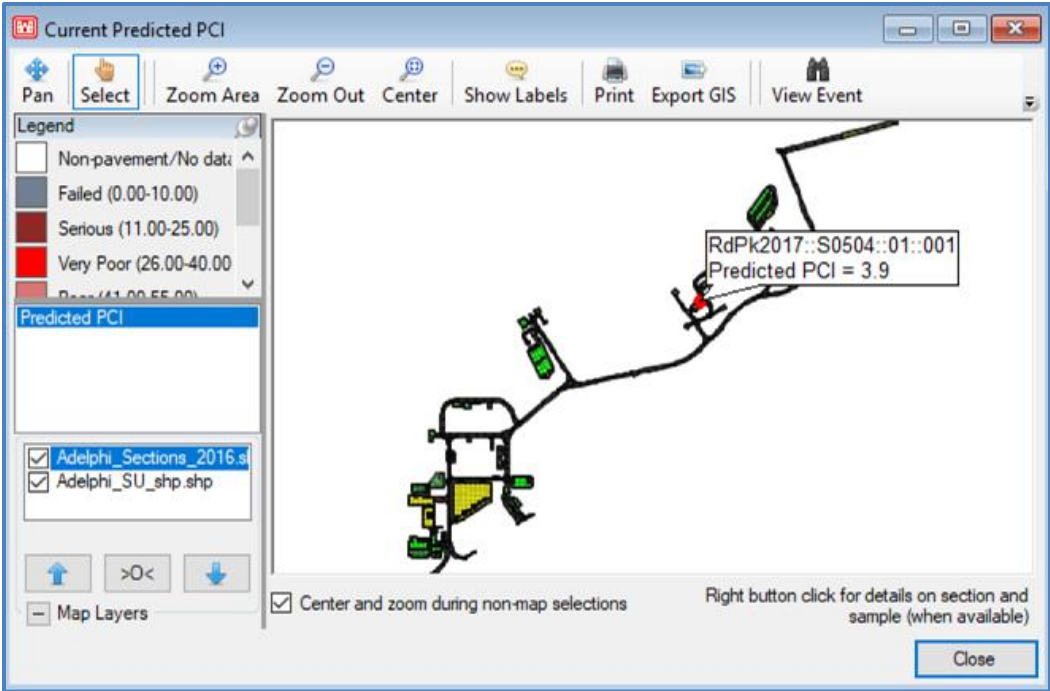
Latest Conditions

This view displays the current/ latest PCI value for each section in the view. The PCI value comes from the last inspection date (or last major M&R activity date). Select Condition Tools > Define Condition and Age Categories in System Tables and Tools on the menu bar to define the categories and range of values, as well as associated GIS and graphical colors. On the Condition Categories tab, select PCI in the Name drop-down list box to make new categories, change names, assign numeric ranges, and manipulate color schemes.



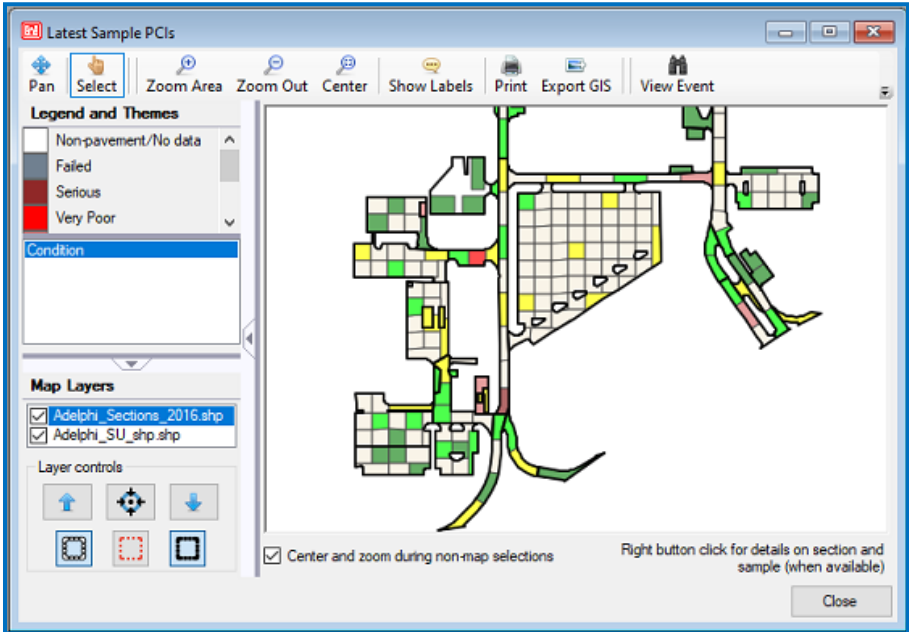
Current Predicted PCI

View the most recent Predicted PCI calculation and date for sections.



Latest Sample PCI

You can also graphically display the latest PCI condition of each section.



Summary Charts

Summary Charts are a feature designed to allow you to graph and compare any two attributes of a database. For example, you can view the average condition of your network based on surface type. To access the Inventory Summary Charts select Reports >> Summary Charts. The Summary Charts window appears and awaits the user's selection of a category to represent the X- and Y-axis. Using the drop-down list boxes labeled X-Axis and Y-Axis, select an X-Axis for the graph you wish to produce. The drop-down list box for the Y-Axis selections is hidden until the user makes a selection for the X-axis. The third drop-down list box requests that the user make a selection of which condition index they wish to use. For the charts to work properly, the user must have condition data available for the index they have selected. PAVER™ automatically associates a PCI with every section in the users database. Every other index requires that the user either input the value manually or establish a definition for the index (see Chapter 9 Inspection/ Conditions >> Other Conditions >> [User-Editable Condition Indices](#)).

After the user has made valid selections, the graph and data table will populate. Some combinations may produce a null set of sections and hence no graph. Dragging the border of the table at the bottom of the page can modify the field widths. Right-clicking on the table presents the Print and Export options for the table.

The screenshot shows the 'Summary Charts' window. The X-Axis is set to 'Surface Type', the Y-Axis is 'Wt Avg Condition', and the Condition is 'PCI at Last Inspection'. The bar chart displays three bars for AAC (red), AC (yellow), and APC (green). Below the chart is a data table with columns: Surface Type - Current, Wt Ava Condition, Pavement Area, Unit, Pct Area, Num Sections, Pct Sections, Age at Report, Wt Age, Ava Age at Insp, and Wt Ava Ac.

Surface Type - Current	Wt Ava Condition	Pavement Area	Unit	Pct Area	Num Sections	Pct Sections	Age at Report	Wt Age	Ava Age at Insp	Wt Ava Ac
AAC	54.81	717,203.01	SoFt	16	20	38	17	22	13	
AC	59.99	1,826,182.34	SoFt	42	23	44	34	18	28	
APC	82.42	1,815,277.05	SoFt	42	9	17	9	7	6	

Callouts in the image:

- Define graph axes:** Points to the X-Axis and Y-Axis dropdown menus.
- Select the Condition type to display:** Points to the Condition dropdown menu.
- Choose All Sections or define a Subset of Sections:** Points to the radio buttons for 'All Sections' and 'Subset of Sections'.

Enterprise Summary Reports

Enterprise Summary Reports are a reporting feature that allows users to select a Subset/All Sections from a database that can then be grouped by a selection of properties and a selection of condition types for weighted average condition parameters. Once calculated, the results can be exported to Excel from the Condition Groupings window.

Summary For Enterprise

Generate reports that group by the selected attributes on the left and summarize the area weighted average conditions selected on the right.

Group by

Selected	Name
<input type="checkbox"/>	Age at Last Inspection
<input checked="" type="checkbox"/>	Age at Time of Report
<input checked="" type="checkbox"/>	Branch Use
<input checked="" type="checkbox"/>	CAT Code
<input type="checkbox"/>	CAT Code Title
<input type="checkbox"/>	Category
<input type="checkbox"/>	Condition
<input type="checkbox"/>	FAC
<input type="checkbox"/>	FAC Title
<input type="checkbox"/>	Facility ID

Condition types to include

Selected	Name
<input type="checkbox"/>	ACN/PCN
<input type="checkbox"/>	FOD Index
<input type="checkbox"/>	FOD Potential C-17
<input type="checkbox"/>	FOD Potential F-16
<input type="checkbox"/>	FOD Potential KC-135
<input type="checkbox"/>	FOD Potential Rating
<input checked="" type="checkbox"/>	PCI at Last Inspection
<input checked="" type="checkbox"/>	Predicted PCI

● All Sections ○ Subset of Sections

Cancel Calculate

Calculate to view results

Condition Groupings

Grouping	Property	Value	Pavement Area	Unit	Wt Avg Condition
PCI By Age	Age	0 - 10	29,052.00	SqRt	82.00
PCI By Age	Age	10 - 20	1,077,052.00	SqRt	72.00
PCI By Age	Age	20 - 30	4,896.00	SqRt	21.00
PCI By Age	Age	30 - 40	62,860.00	SqRt	77.00
PCI By CAT Code	CAT Code	All	1,173,860.01	SqRt	71.88
PCI By CAT Code	CAT Code	All	1,173,860.01	SqRt	71.88
PCI By Rank	Rank	S	571,266.01	SqRt	72.44
PCI By Rank	Rank	P	500,000.00	SqRt	70.20
PCI By Rank	Rank	T	52,594.00	SqRt	77.97
PCI By Rank	Rank	A	50,000.00	SqRt	76.00
PCI By Rank	Rank	All	1,173,860.01	SqRt	71.88
PCI By RPUID	RPUID		1,173,860.01	SqRt	71.88
PCI By RPUID	RPUID			SqRt	71.88
PCI By Surface	Surface			SqRt	78.32
PCI By Surface	Surface			SqRt	72.25
PCI By Surface	Surface			SqRt	64.16
PCI By Surface	Surface			SqRt	71.88
PCI By Surface	Surface			SqRt	77.39
PCI By Surface	Surface			SqRt	70.73
PCI By Surface	Surface			SqRt	71.88

Right-click on table to view additional options

- Zoom
- Revise Layout
- Save Layout
- Delete Saved Layout
- Change Sort Order
- Search
- Export to Excel
- Export to XLS file
- Export to XML file
- Print

Close

Standard Reports

There are five Standard Reports accessed through Reports Menu: Branch Listing, Work History, Branch Condition, Section Condition, and Linear Segmentation.

- **Branch Listing Report:** Produces a list of all branches and associated information including usage, number of sections, total area, etc. The last page is a summary of all branches in the network(s).
- **Work History Report:** Produces a section by section report of all work completed within that section over the life of the database, and includes data such as work type, work date, and cost.
- **Branch Condition Report:** Displays the average and weighted average condition of each branch, including standard deviations as well as a summary of all branches on the last page.

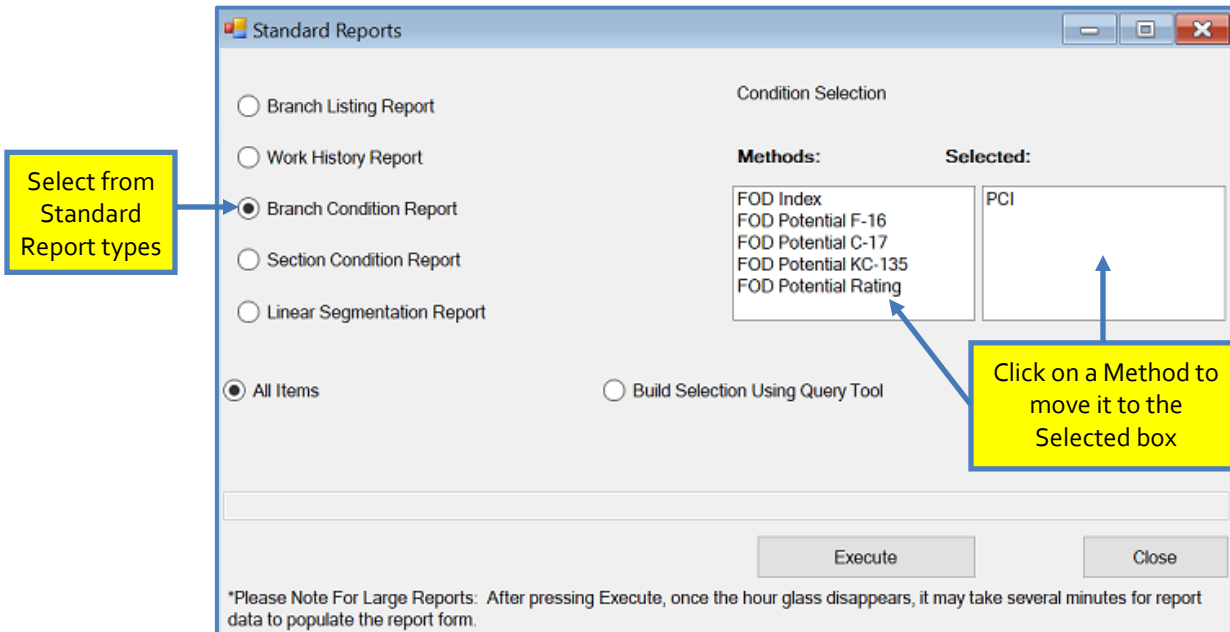
- **Section Condition Report:** The same as the Branch Condition Report except the data is displayed at the section level. A summary is included on the last page of the report.
- **Linear Segmentation Report:** Produces a report of Real Property asset information in the database. Show Asset Items must be checked on the Database Properties form for this option to appear in the Standard Reports list.

Define the subset of the database you wish to run the report on by clicking on Build Selection Using Query Tool. The subset can range from one section to the entire database, which is the default if selection criteria is not established. Clicking on Build Selection Using Query Tool opens the EMS™ Query Tool.

Before the Branch and Section Condition Reports can be executed the user must select which condition index to use. This is done by clicking on the desired condition in the Condition Selection Methods box, this places that condition type in the Selected box, at which point execution of the report can continue. To deselect an item in the Selected box, double-click on it to send it back to the Methods box. Only one condition index can be used per report.

Note:
For Standard Reports, there is no Order Rows tab in the EMS™ Query Tool, since reports are created in a standard layout.

The top of each report includes a tool bar, which is used to manipulate the report. Left and right arrow buttons are used to go forward and backward through the report. Below and to the right of the arrows is a display of the current page and the total number of pages in the report. There is a Print button and an Export button to send the report to a printer or to a file; and zoom icons that allow the user to size the report for easier viewing



User Defined Reports

The EMS™ User-defined Reports Tool can be accessed under Reports >> User-Defined Reports, and offers three options: display a Memorized Report, Create New Report, and Edit Existing Report.

The user-defined reporting tool gives the user the ability to create their own report, and display it in table form, which can then be printed or exported to another application (such as Microsoft Excel). As with other tables in PAVER™, right-clicking displays the print and export options menu.

The screenshot shows a window titled "User Defined Reports" with a dropdown menu for "Memorized Reports" set to "Latest Conditions". Below the menu is a search bar and a group-by field. The main area contains a table with the following data:

NetworkID	BranchID	Last Major Work Date	SectionID	Surface Type - Current	PCI	PCI Category	PCI Pct Climate	PCI Pct Load	PCI Pct Other
IRP	IFARB	3/1/1990	01	AC	39.00	Very Poor	32	50	18
IRP	IINTE	8/1/1983	01	AAC	24.00	Serious	13	80	7
IRP	IINTE	8/1/1983	02	AAC	46.00	Poor	24	76	0
IRP	IINTE	8/1/1983	03	AAC	50.00	Poor	35	56	9
IRP	INEWM	7/1/1968	01	AC	18.00	Serious	41	53	6
IRP	INEWT	8/1/1983	01	AAC	70.00	Fair	45	25	30
IRP	IRESE	6/1/1977	02	PCC	73.00	Satisfactory	56	40	4
IRP	IRESE	6/1/1978	01	PCC	47.00	Poor	43	37	20
IRP	IRESE	11/14/2018	03	PCC	100.00	Good	0	0	0

At the bottom of the window are buttons for "Edit Existing Report", "Create New Report", "Map it", "GIS Export", and "Close".

Display a Memorized Report

This is a report that the user has created and saved. It is available from the Memorized Reports picklist at the top of the window, and regenerates each time the user selects it, so all displayed information is current.

Create New Report

Click Create New Report to display the EMS™ User-Defined Reports window. On the left of the definition window, there is a tree that reflects the database structure. On the right there is a window with two tabs. Use the tree on the left of the window to select a component of the hierarchy that contains the data elements that you would like displayed in your report. All associated elements are displayed in the left window of the Select Columns tab. Scroll through the various

Note:

Selected Rows determines which records will be included in the table. Selected Columns determines what data from each record is displayed.

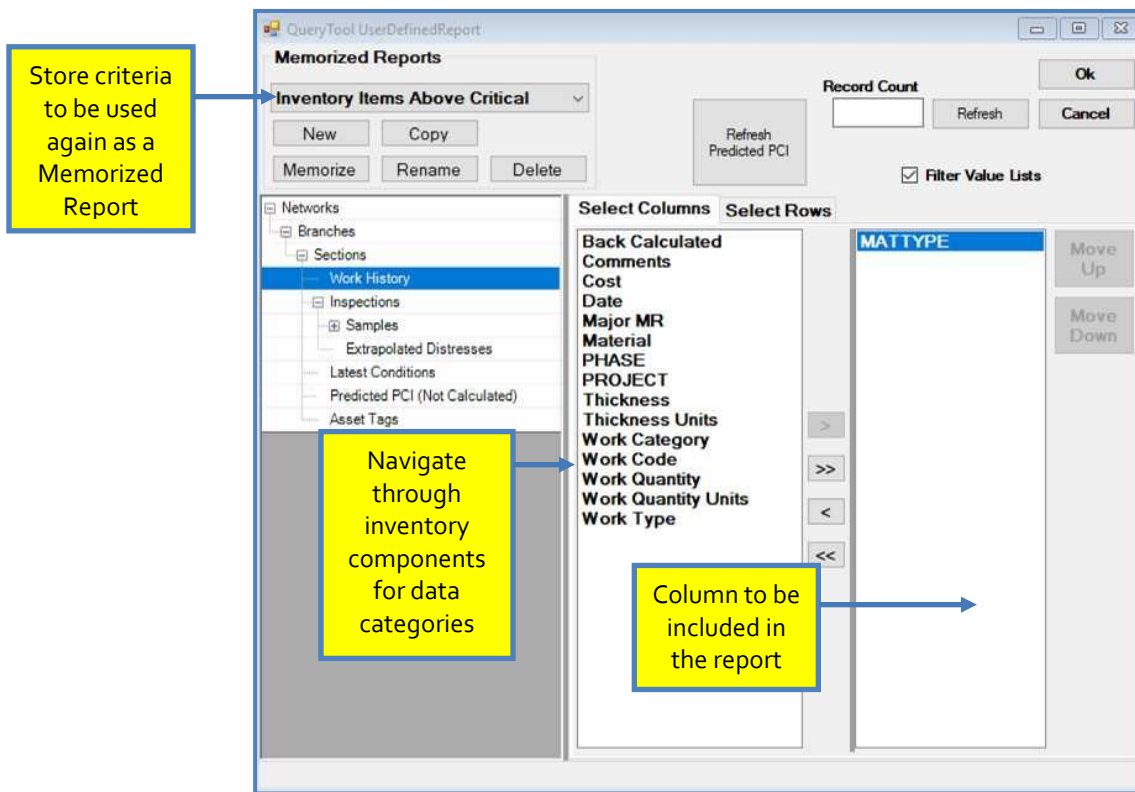
levels of the tree on the left of the window, to see which elements are associated with the different levels of the inventory structure.

Select Columns requires the user to specify the data items that are displayed in each column. Select individual components and move them to the window on the right. All elements in this window become the column headers for the report. Only the elements the user selects from the center window and moves to the right, are integrated into the report.

Select Rows invokes the EMST™ Query Tool and allows the user to build the selection.

In between the two windows of the Selected Columns tab and the Select Rows tab, there are two types of arrows. Double arrows move all items in the window, and single arrows only move the selected item. If you choose to deselect an item, move it back to the left box and it is removed from the list. The Move Up and Move Down buttons allow the user to position the selected components in the desired order.

The New, Copy, Memorize, Rename, and Delete buttons; located in the top left of the window, become available to perform the corresponding actions as the circumstances allow. Previously saved formats are in the Memorized Reports dropdown list box.



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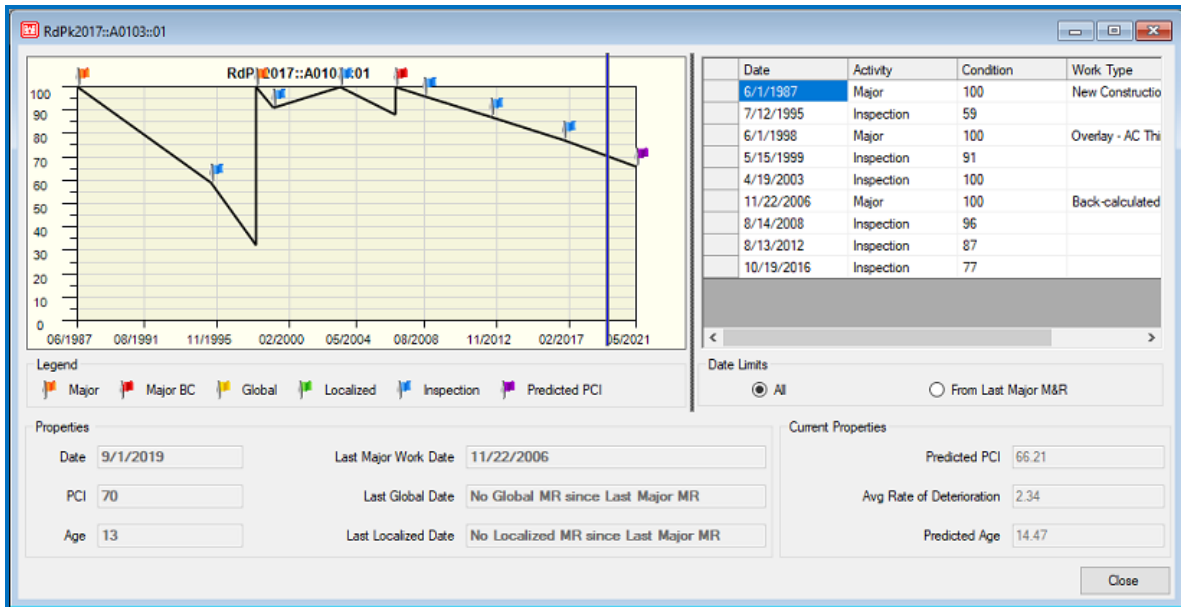
Edit Current Report

The first step to editing a report is to select the desired report from the Memorized Reports drop-down list box at the top of the window, and the populated table appears. The report generates at the moment of selection, so all data is current. Select Edit Existing Report to make query selections. When editing is complete, the changes take effect immediately, and are reflected the next time the report is ran.

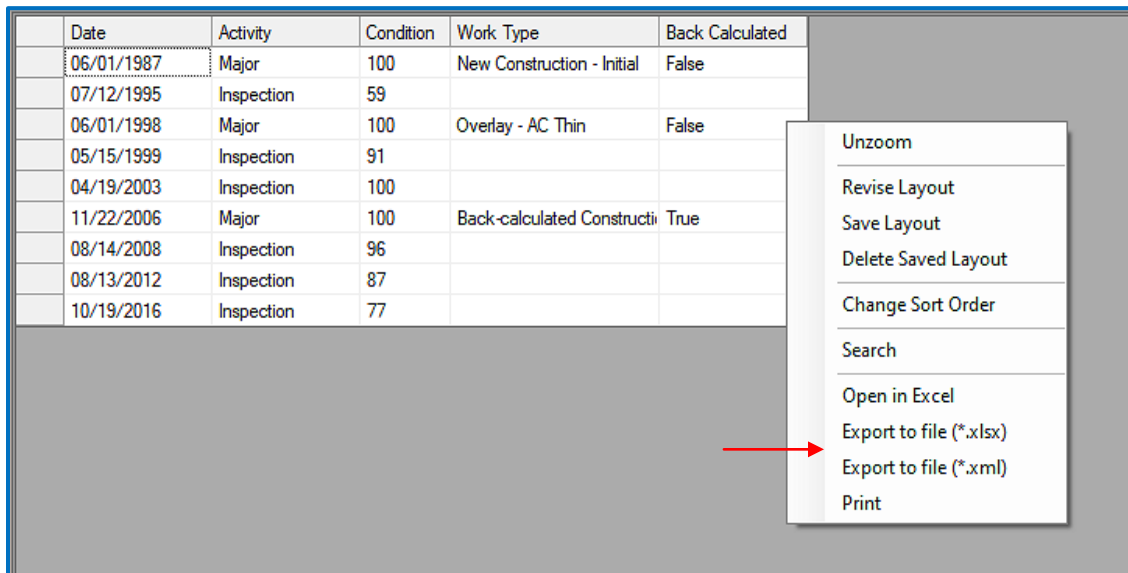
To run a report, select the report from the drop-down list box at the EMS™ User-defined Reports Tool window. The report generates at the moment of selection, so all data is current. Use the Map It button to select the themes you would like to show on the map and then view GIS map results. Selecting the GIS Export button, prompts you to select an Export Format and Output Folder for the GIS map results.

Section Trend Report

The Section Trend Report is a graph that displays the work and inspection history of the selected section. To run this report go to Reports >> Section Trend Report. A chart on the right side of the tool lists date, activity, condition, and work type chronologically in coordination with the graph. The historical data in the chart corresponds to colored flags on the graph, which are color coded to signify Major work, Major BC, Global work, Localized work, Inspections and Predicted PCI. The Date Limits buttons beneath the chart allow the user to view all of the section's history, which is the default, or only the work and inspections since the last Major work (From Last Major M&R). Clicking on the graph itself allows the user to see the date, PCI, age, date of last major work, date of last global work, and date of last localized work for the section according to that point on the graph. This information is displayed in the Properties section at the bottom of the tool. The Current Properties section shows Predicted PCI, Average Rate of Deterioration, and Predicted Age values.



In addition, right-clicking allows the user to export work/inspection data to Excel.



Rollup Report

The Rollup Report is a spreadsheet that breaks down the entire database by pavement types and conditions. To run this report, go to Reports >> Rollup Report. An Excel spreadsheet will be generated automatically. The left side of the report is a breakdown of pavement rankings, sorted by the categories of Area, Age, Weighted Area Average PCI, Average deterioration PCI points per year, Area of pavement below various conditions, Adequate Engineering Assessment, and Overall Engineering Assessments. These categories are broken down by corresponding metrics for pavement types, with the two engineering assessment categories being an exception. Adequate Engineering Assessment and Overall Engineering Assessments have unique metrics dealing with area rated as adequate, degraded, unsatisfactory, and not rated. The user can print, save, or use any other standard Excel feature in conjunction with the Rollup Report.

Rollup Report - Interstate Research Park 2014										
AREA	Total (SqFt)	Total (%)	AC (SqFt)	AC (%)	PCC (SqFt)	PCC (%)	AAC (SqFt)	AAC (%)	APC (SqFt)	APC (%)
P Pavements										
Secondary Pavements	111,096	51.16%			49,840	100.00%	81,256	46.15%		
Tertiary Pavements	106,040	48.84%	34,554	100.00%			71,486	53.85%		
All Pavements	217,136	100.00%	34,554	100.00%	49,840	100.00%	132,742	100.00%		
AGE (Area in SqFt)	Total (SqFt)	Total (%)	00-02	%	03-05	%	06-10	%	11-15	%
P Pavements		0.00%								
Secondary Pavements	111,096	51.16%								
Tertiary Pavements	106,040	48.84%								
All Pavements	217,136	100.00%								
PCI										
Weighted Area Average PCI for Airfield Pavement	All Types		AC		PCC		AAC		APC	
P Pavements										
Secondary Pavements	53				67		42			
Tertiary Pavements	41		18				52			
All Pavements	47		18		67		47			
Average deterioration PCI points per year	All Types		AC		PCC		AAC		APC	
P Pavements										
Secondary Pavements	3.79				1.76		5.43			
Tertiary Pavements	5.71		2.93				7.06			
All Pavements	4.73		2.93		1.76		6.51			
Area of pavement with PCI 85 and below (SqFt)	Total (SqFt)	Total (%)	AC (SqFt)	AC (%)	PCC (SqFt)	PCC (%)	AAC (SqFt)	AAC (%)	APC (SqFt)	APC (%)
P Pavements										

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7. Selectors

Selectors menu options:

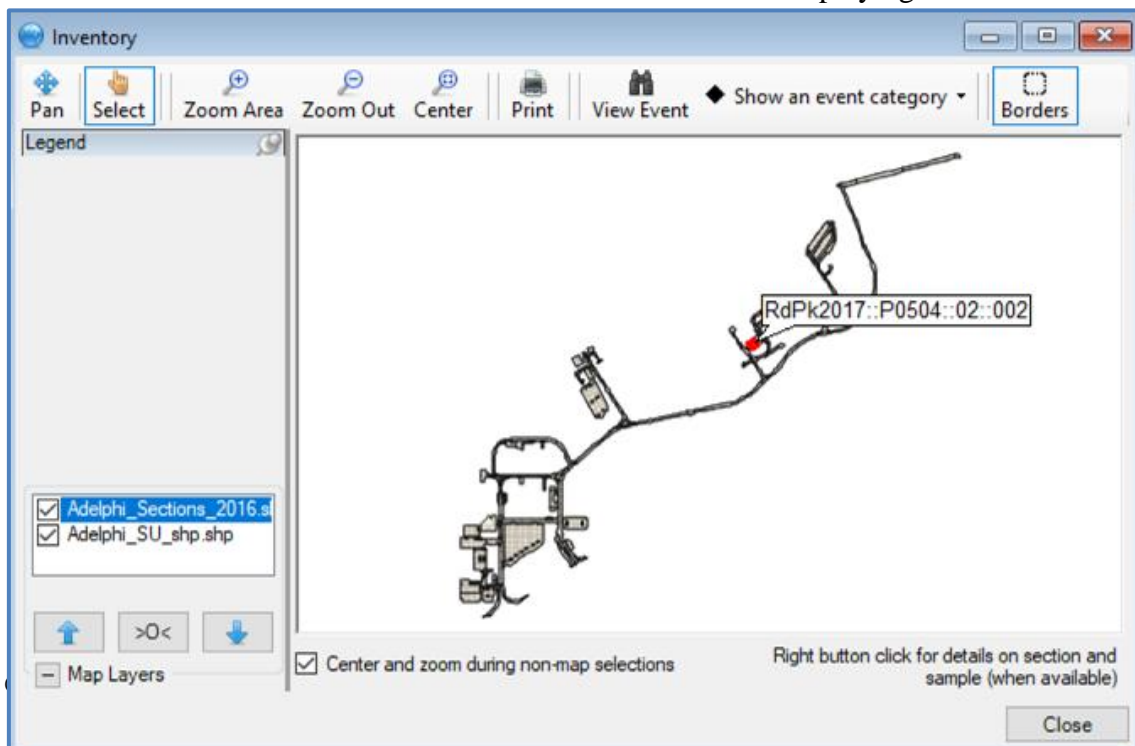
- GIS Selector
- GIS/Tree Selector
- List Selector
- Asset List Selector
- Tree Selector
- Tree Date Selector
- Search Selector

Selectors

PAVER™ provides several options for choosing the portion of inventory with which the user wants to work. These “selectors” make moving from one part of the inventory to another quick and easy. The selectors are accessed directly from the Selectors menu on the main toolbar. Other parts of the program that require the user to specify a component of the inventory (i.e. Network, Branch, Section) respond to the input received from the selection tools. There are five selector types available from the Selectors menu in the following order: GIS, GIS/Tree, List, Tree, and Search (as well as Asset if Show Assets is turned on under Database Properties).

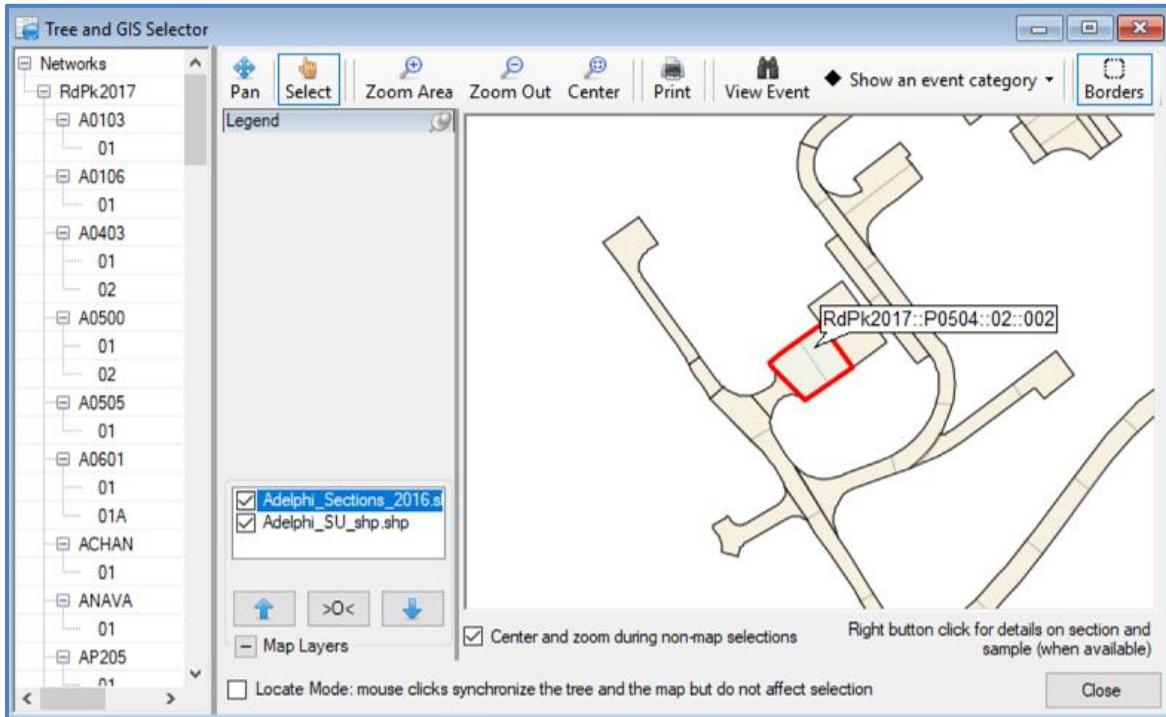
GIS Selector

Because GIS is integrated into PAVER™, the user can select an inventory item using GIS coverage. This first requires the database to be linked to coverage via the PAVER™ GIS process. Once the GIS link has been completed, the map can be viewed via the GIS Selector. By simply pointing and clicking on any polygon in the coverage, the selector makes the link to that section. The GIS Selector allows for selection but not the displaying of data.



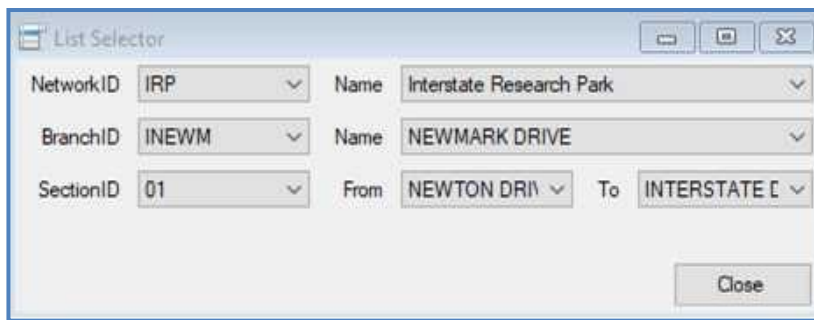
GIS/Tree Selector

The GIS/Tree Selector is simply a combination of the Tree and GIS selectors displayed in one window. This allows the user to select an inventory item using the simplest method for that particular inventory item. For example, if you know only the location of the pavement, the GIS selector is most useful. If you need to trace through the hierarchy, the Tree Selector is the logical choice. The GIS/Tree Selector combines both of these features into one compact tool.



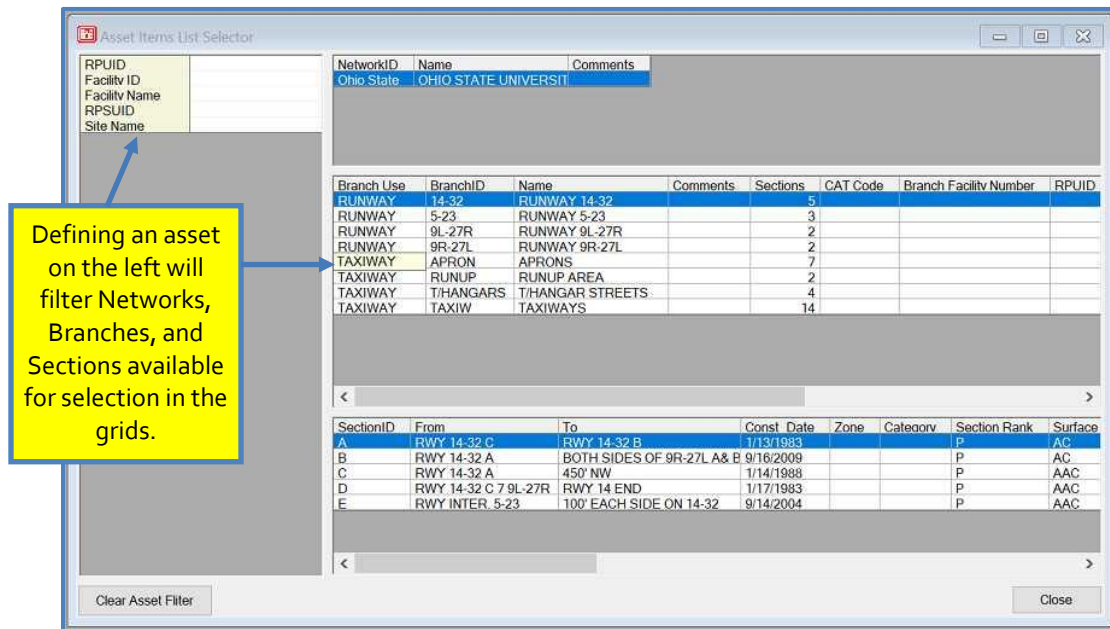
List Selector

This is the same selection tool used in Inventory management.



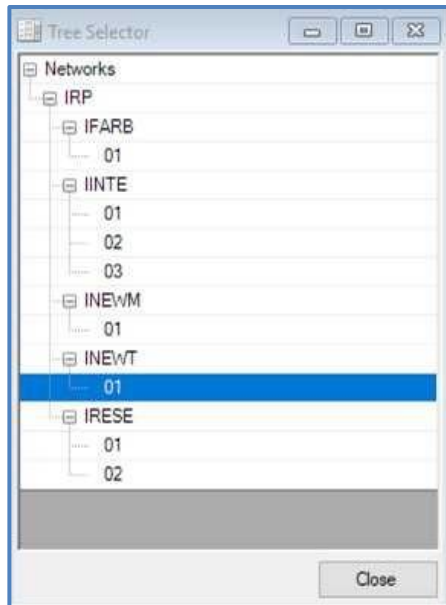
Asset List Selector

This selector allows the user to select inventory sections based on Real Property asset filters.



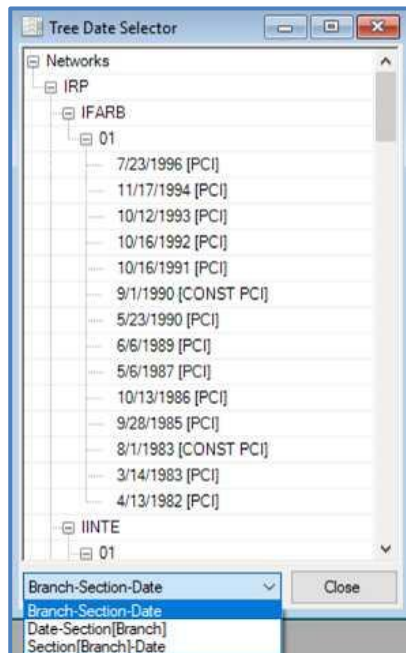
Tree Selector

Since the inventory in PAVER™ is represented in a hierarchy similar to the file structure in Windows, it is logical to navigate this structure in a tree format. Much like the Explorer tool in Windows, the Tree selector allows you to move through the hierarchy of your database and select the specific network, branch or section from which information is needed. This is done by moving down the “tree” until you arrive at the desired location.



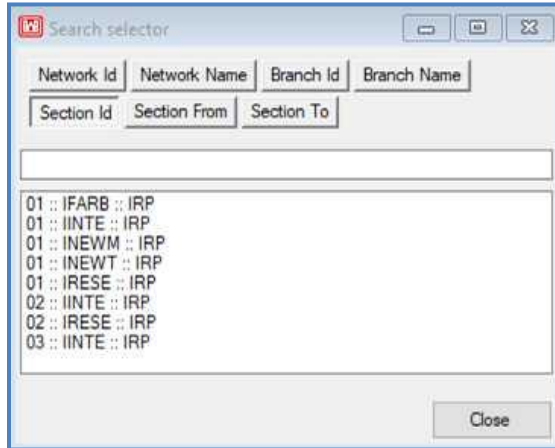
Tree Date Selector

The Tree Date Selector can for bring up work items and inspections by date. This selector can be accessed by clicking Selectors >> Tree Date Inspector. Clicking construction dates within the tool will select the section corresponding to the chosen construction date. If the user clicks an inspection date while the Edit PCI screen is open, Edit PCI will automatically switch to the chosen inspection.



Search Selector

The Search Selector can be used to search based on seven different categories listed on the buttons across the top of the form.



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8. Work

Work menu options:

- Work History
- Required Projects
- Work Entry Wizard
- Major & Global Project Formulation Wizard
- Add Work History from GIS/Tabular Data

Work History

Extensive connections exist in PAVERTM between construction date and predicted PCI. The system must have an accurate account of the last construction date for each section, in order to accurately predict future pavement performance, maintenance requirements, cost, and inspection schedule. PAVERTM updates the last construction date for the section to correspond with the most recent major M&R. The History and Required forms provide an interface for easily entering work history data for a particular pavement section. In order to enter work information for a particular section, it must be selected in the Select Inventory Item window.

For a new record, click Add and then enter the information either by typing or selecting from a drop-down list box of options. You may edit entries by typing over existing text. PAVERTM does not allow the user to delete ALL the construction dates in a work history profile, and if there is only one construction date the entry cannot be removed.

Existing entries can be edited by selecting the record from the table and clicking on the Edit button. Copy invokes the Copy and Move

Data utility, which is used to move data elements to other compatible areas of the database. In this case, work records will be copied or moved.

Note:

Work quantities should be entered as positive values, except for cold milling, which is a negative value.

Maintenance, repair, and construction activity information is managed through the Work file tab.

The Graphs tab contains a graphic component which presents graphs for each section, relating condition to work history.

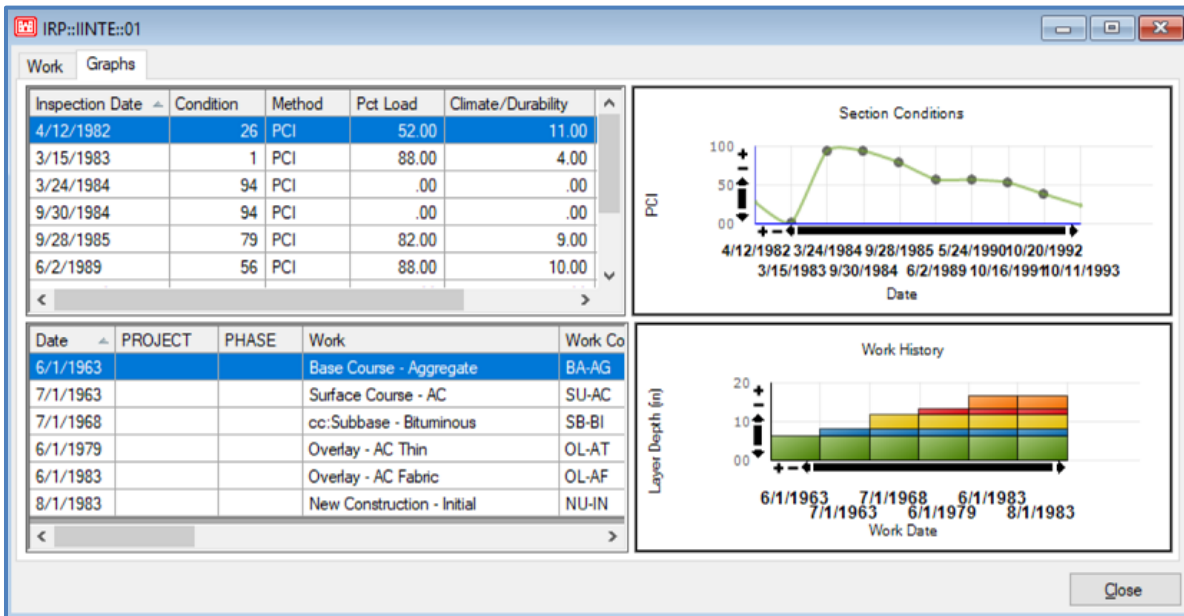
IRP::IINTE::01

Work Graphs

Date	PROJECT	PHASE	Work	Work Code	Quantity
6/1/1963			Base Course - Aggregate	BA-AG	.00
7/1/1963			Surface Course - AC	SU-AC	.00
7/1/1968			cc:Subbase - Bituminous	SB-BI	.00
6/1/1979			Overlay - AC Thin	OL-AT	.00
6/1/1983			Overlay - AC Fabric	OL-AF	.00
8/1/1983			New Construction - Initial	NU-IN	.00

Add Edit Copy Delete

Close



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Required Projects

Required Projects can be accessed via the Work tab on the PAVER™ Button Bar. The Project Planner window will appear and in the upper-left corner, a Current Project field. Here, previously created projects can be selected using the drop-down arrow to select from the list, or new projects can be created by selecting New. Projects can be copied, renamed, or deleted by clicking on the appropriate buttons. Any completed projects can be moved to PAVER™ Work History by using the Project Completed - Move to Work History button on the top-right corner of the window.

To create a new project, first name the project, then begin assigning sections and their associated work to the project. On the Project Planner window, there are four tabs: Project Sections, Project Work, Section-Level Work, and Work Item Views. On the Project Sections tab, sections are assigned to the project. The table on the right lists all the sections that are currently assigned to the chosen project, while the table on the left is mainly there to view the sections that have not been assigned to the current project. To assign a section to a project, highlight the desired section in the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table and assign it to the selected project. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Similarly, the left-pointing arrows move sections to the left table from the right table. Moving sections to another project can be done by highlighting them and clicking Move Selected Section(s) to a Different Project, located at the bottom of the window. This button also gives the user the option to move section level work for the section(s) as well.

Once sections have been assigned to a project, the user can begin to assign work, using the three remaining tabs: Project Work, Section-Level Work, and Work Item Views. The Project Work tab is used to assign work items that are to be applied to all of the sections in a project, the Section-Level Work tab is used to assign work to individual sections in a project, and the Work Item Views tab is a summary of the assigned projects.

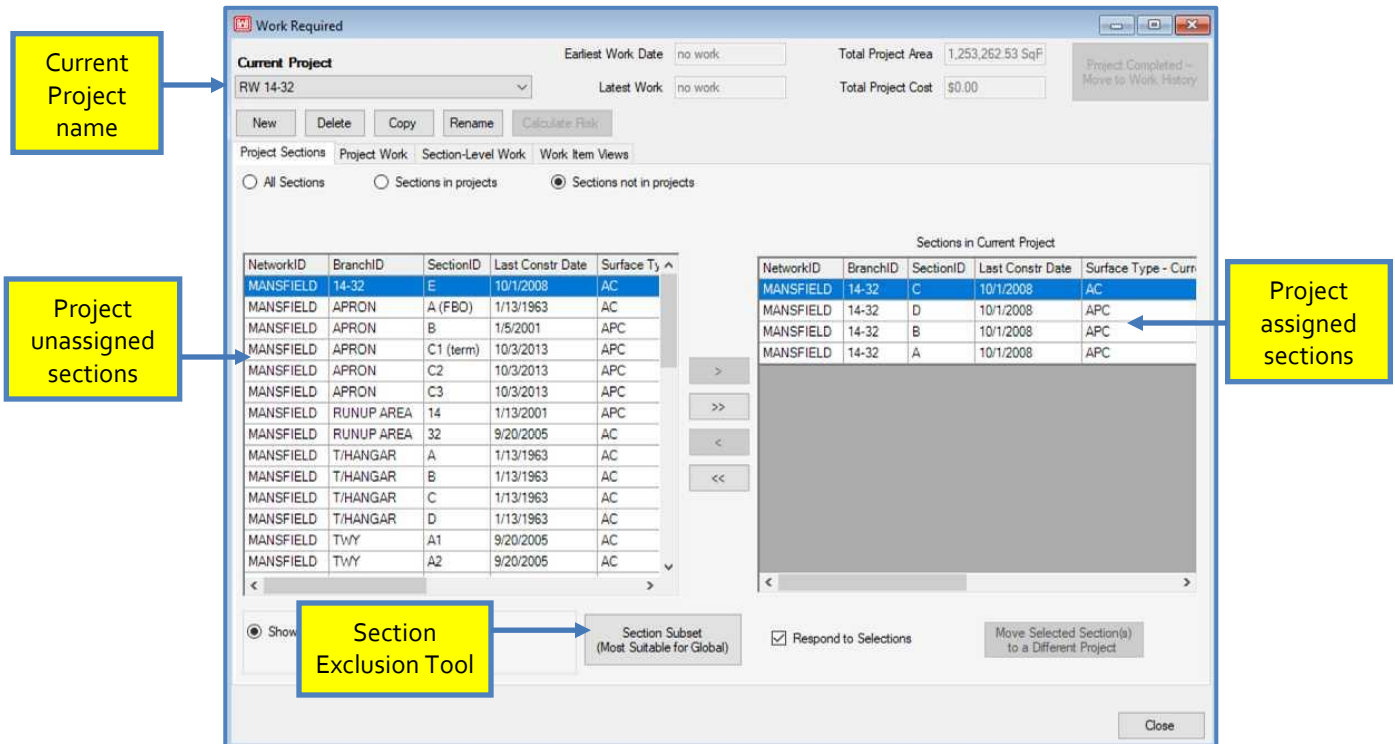
On the Project Work tab, any previously assigned project level work will be listed in the table area. To the right of the table there are three buttons to modify project work items: Add, Edit, and Delete. To add project work, select Add, and a new window appears called Add Work Item - Project Level. Here, the Phase of the project, Work Category, Work Date, Work Type, Material Type, and Thickness are entered.

Costs can be entered in two different ways for project work. The first method is to base the work cost on an area unit cost, by selecting the Calculate Unit Cost option and then a default or customized Cost Table via the drop-down arrow. Once the Cost Table is selected, click Unit

Note:

Work quantities should be entered as positive values, except for cold milling, which is a negative value.

Cost from Table and PAVER™ will calculate the Total Cost. The second method to enter a work cost is to simply enter the pre-determined Total Cost, by selecting the Total Cost option and then entering the Total Cost in the space provided. After any Comments have been entered at the bottom of the window, select OK to exit out of the window, or select Apply to add another work item. Once back on the Project Work tab, all of the project level work will be listed in the table for easy review.



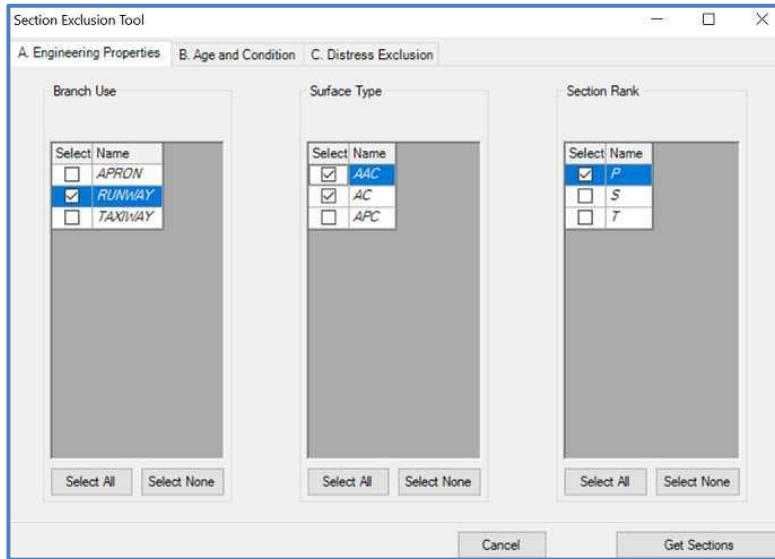
The Section-Level Work tab operates like the Project Sections tab. On the left-side of the tab there is a table listing all of the sections in the current project. When a section is highlighted in the left table, the right table will display what work items are associated with that section. Any project work that has been assigned on the previous tab will appear for every section. The buttons on the far right of the tab are used to modify the individual work items. To edit or delete any of the items, highlight the desired work item in the table, and this will activate the edit and delete buttons. If any new items are added or old items are edited, the user form operates and looks like the Add Work Item - Project Level. Project level work must be edited on its own tab and cannot be edited on the Section-Level Work tab.

The Work Items View tab gives a summarized view of the work items, a view of policy work, or you can select to view the details of each work item.

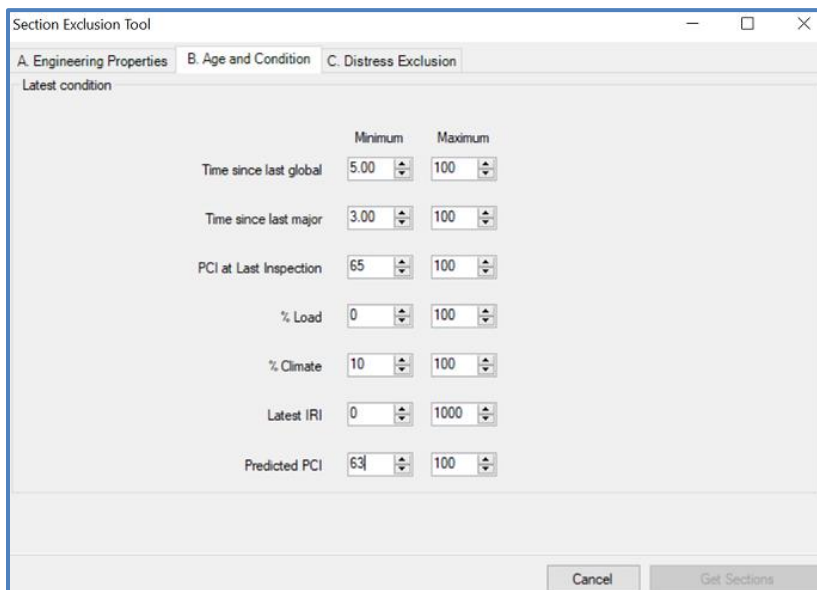
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Section Exclusion Tool

The Section Exclusion Tool is a new way to subset the available sections when creating a project. To use the tool, first create a new project in the work required window. Before beginning to assign sections and associated work to the project, click the Section Subset button at the bottom of the form. This will open the Section Exclusion Tool window which has three tabs: A. Engineering Properties, B. Age and Condition, and C. Distress Exclusion.



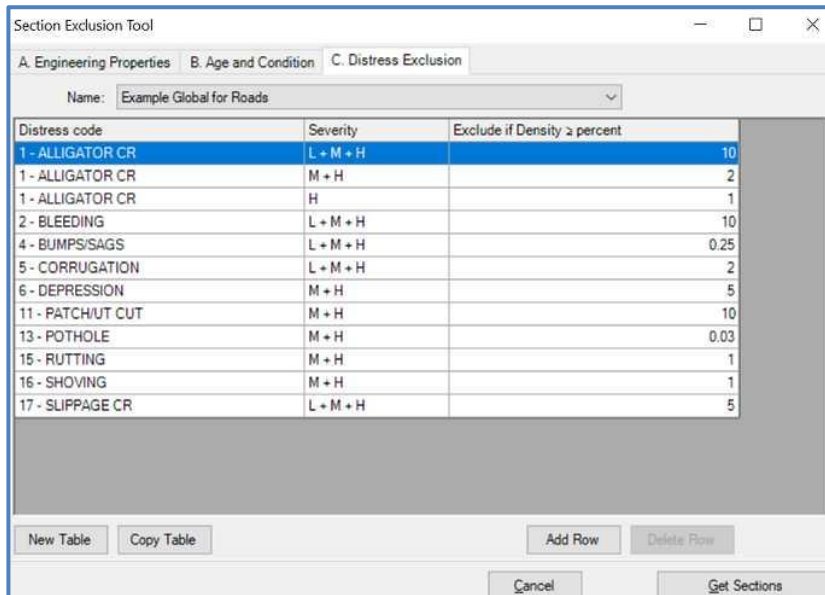
The Engineering Properties tab allows the user to select branch use, surface type, and section rank parameters. At least one selection must be made for each attribute in order to activate the get sections button at the bottom right corner of the window. Sections without the selected values will be excluded from the result set.



The Age and

Condition

tab allows the user to set minimums and maximums for years since last global and last major, PCI, percent load, percent climate, and IRI. Sections will be excluded if their latest values fall outside these ranges.

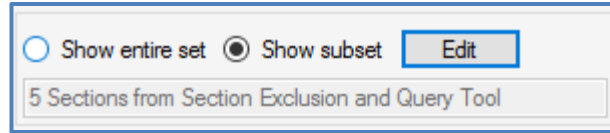


The Distress Exclusions tab allows the user to exclude sections based on the presence of distresses. The user can add rows for distress codes which they wish to plan around. Distress codes can then be constrained by severity and exclusions by density can be set. This tab also allows users to save sets of distress exclusions for reuse in additional projects. An example distress exclusion set is also included.

Once the desired parameters have been set in the Section Exclusion Tool window, click the Get Sections button at the bottom right. If the Get Sections button is not enabled, return to the Engineering Properties tab and confirm at least one selection has been made for each category. If the parameters that have been selected result in 0 sections, a dialog prompt will open, allowing the user to either cancel the subset or modify the selections made.

The sections remaining after the parameters have been applied will appear on the left side of the Work Required window. The user can then click the edit button to the right of the radio buttons to open the standard query tool. After entering query information and clicking the finish button, a dialog box will open if section exclusion parameters are active. Selecting yes will display the intersection of the Section Exclusion Results and Query Tool Results in the Work Required window, and selecting no will display only the query tool results.

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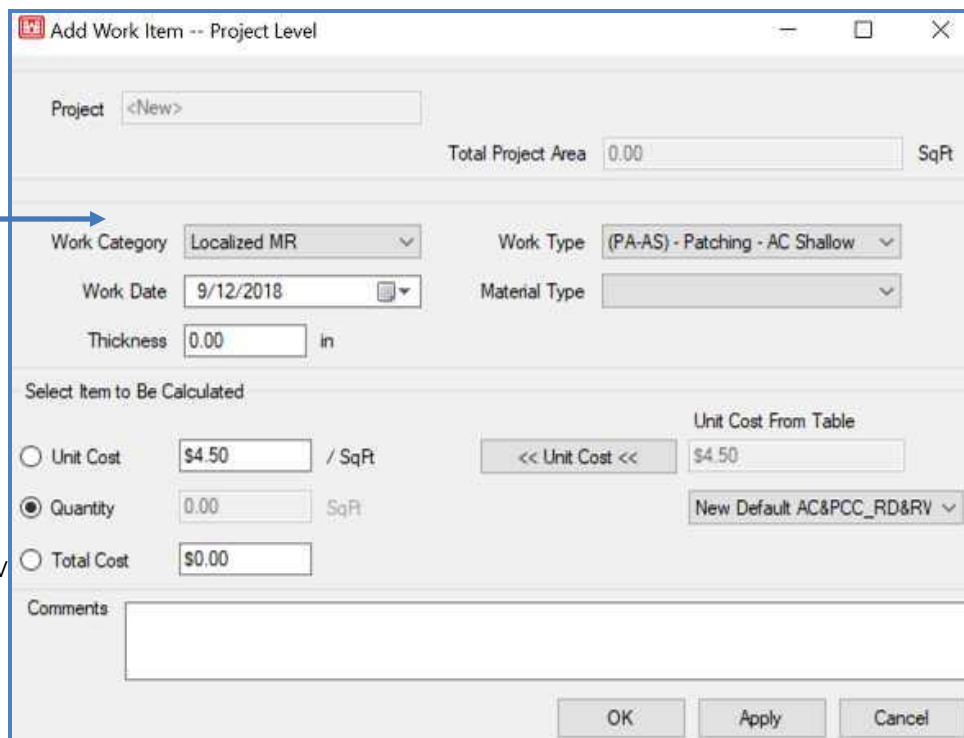


The area between the radio buttons and the Select sections button will change to indicate how many sections are being displayed and from which tools the sections were curated. If the intersection results in 0 sections, the user will be prompted to choose one result set to use.

Work Entry Wizard

The use of the Work Entry Wizard is a convenient way for the user to apply multiple work items to multiple sections, as well as have the option to create a work history report. Once work items are added to sections, the user does not have the ability to delete or edit any of the items in the Work Entry Wizard. However, this can be done in the Work form on a per section basis.

Access the Work Entry Wizard from the PAVER™ Button Bar, by choosing Wizards. Start by clicking Add Work to start creating work items to be applied. A new window titled Add Work Item will appear, allowing the user to specify the parameters for an individual work item being added. Parameters include work category, work type, work date, material type, and thickness. Selecting Calculate Total Cost from Unit Cost and Section Area, causes PAVER™ to automatically look up the Unit Cost according to the Unit Cost From Table, relative to the Work Category that was chosen. The user also has the option to select Calculate Section Cost from Total Cost and Section Area, and then enter in the Total Cost. Comments can be added which will be linked to the individual work item being entered. After entering in all the parameters for the work item, click OK if finished, or click Apply to enter another work item. Choosing Apply clears the window, allowing the user to repeat the same steps of adding a work item.



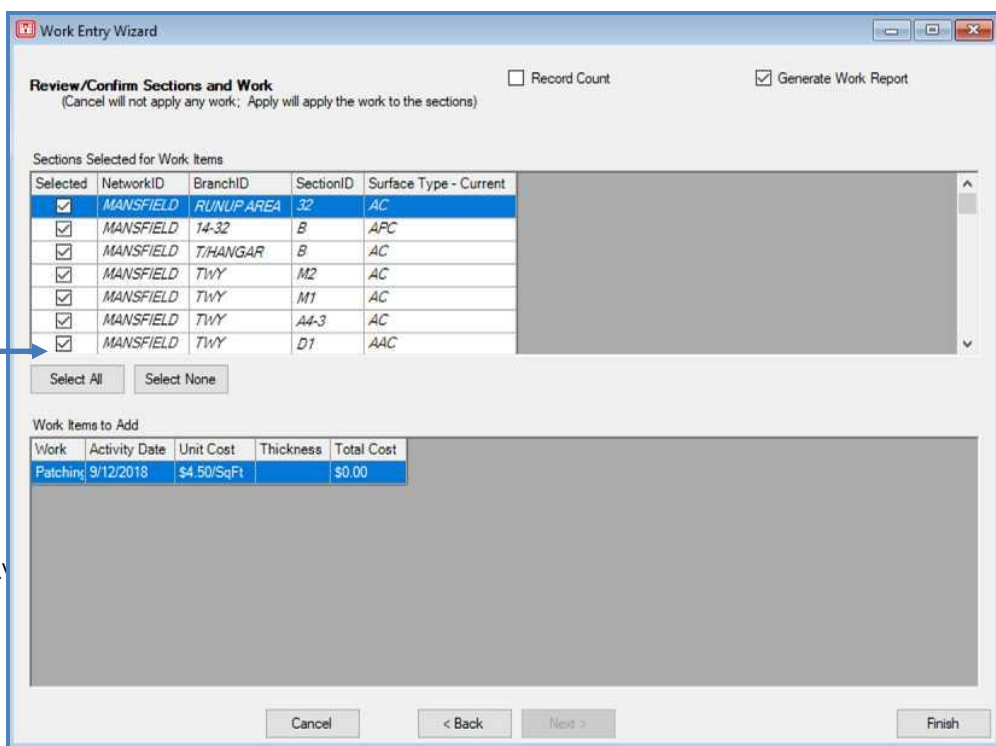
Add Work Items and parameters

After entering all the work items, PAVER™ will list them in the Work Entry Wizard window, where the user is able to review them and edit or delete any as necessary. In the Settings to apply to all the individual work items, the user can specify whether the work items that are being entered are Work History or Work Required items. The user can also add Project Name/ Number, Phase, and Comments. These settings will be applied to all the work being applied to sections. When finished, click Next to continue. Next, select the sections for the work items to be applied to utilizing the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included. After selecting the desired sections, click Next and review the list of the Sections Selected for Work Items and the Work Items to Add. The user has the option of generating a work history report by selecting Generate Work Report. Run the Work Entry Wizard by clicking Finish, and PAVER™ will apply the work items to the sections entered.

Note:
Once work items are added to sections, the user is not able to delete or edit any items in the Work Entry Wizard.

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Review sections for work items to be added



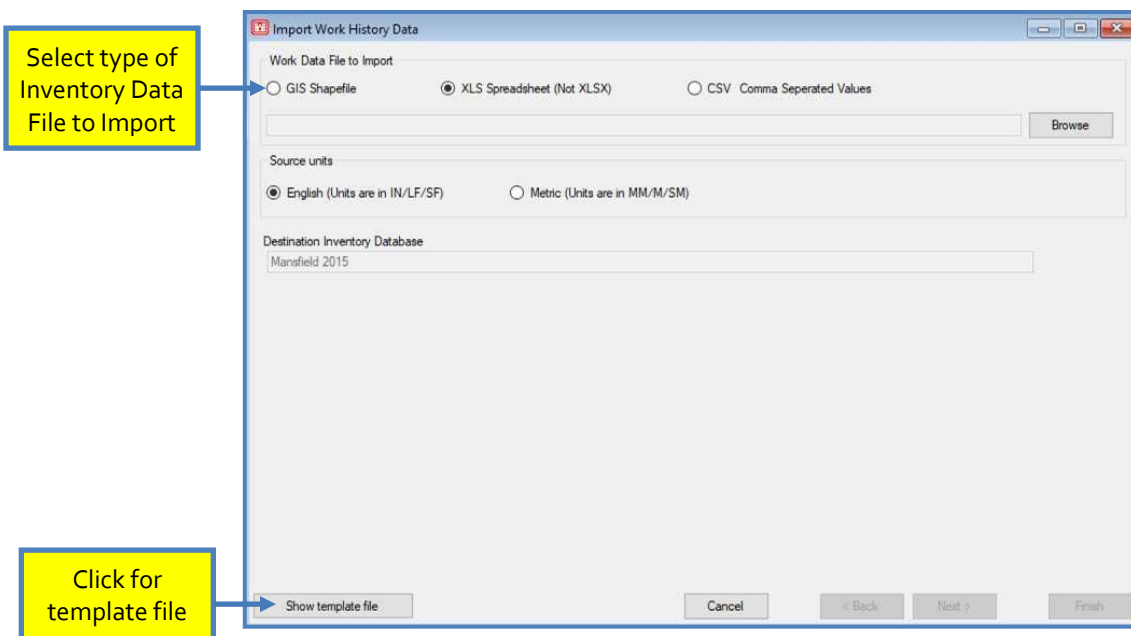
Project Formulation Wizard

See Chapter 14 on [Wizards](#).

Add Work History from GIS/Tabular Data

This option allows the user to import work history from a GIS Shapefile or tabular report in a manner very similar to the Add/Update Inventory Data from GIS/Tabular Data option covered in Chapter 3 >> [File Menu](#). The process for using this tool is very similar except that the initial screen does not prompt the user to differentiate between being a DoD User or Not DoD User, and the second screen requires significantly less information than a full inventory add or update.

On the initial screen, select the type of file for import: GIS Shapefile, XLS Spreadsheet (Not XLSX), or CSV Comma Separated Values file. A template file can be generated by clicking “Show Template File” in the bottom left of the form or a csv template can be found at the end of this user guide section. Browse to the location of the file for import and select it. Select the unit type, English or Metric of the source file. Select Next to continue.



Choose the appropriate Section PID and Work History Fields by using the drop-down menus. Fields with an asterisk (*) are mandatory. It is important to note that only certain values are allowable in the Work Category column in the tabular data file. They are as follows:

"Localized MR"

"LOCALIZED", "LOCAL", "LOCALIZED MR", "LOCALIZEDMR"

"Global MR"

"GLOBAL", "GLOBAL MR", "GLOBALMR"

"Major MR"

"MAJOR", "MAJOR MR", "MAJORMR"

"Layer Construct"

"LAYER", "LAYER CONSTRUCT", "LAYER CONSTRUCTION"

The Next button will not enable until all mandatory fields are filled in. Click Next to continue after entering all appropriate information.

The screenshot shows the 'Import Work History Data' dialog box. It contains several fields for data entry, organized into two sections: 'Section PID' and 'Work History Fields'. The 'Section PID' section includes 'Network ID', 'Branch ID', and 'Section ID'. The 'Work History Fields' section includes 'Date', 'Project', 'Phase', 'Work Code', 'Quantity', 'Cost', 'Material Type', 'Work Category', 'Thickness', and 'Comments'. A yellow callout box with a blue arrow points to the 'Phase' dropdown menu, containing the text: 'Choose appropriate fields using drop down menus'. At the bottom of the dialog, there are buttons for 'Show template file', 'Cancel', '< Back', 'Next >', and 'Finish'. A second yellow callout box with a blue arrow points to the 'Next >' button, containing the text: 'Select Next after all fields are completed - button will enable when required fields are completed'. A legend at the bottom left indicates that an asterisk (*) denotes a 'PAVER Mandatory Field'.

The results of the import will show in the box on the next screen. Validation status will show in the status box along with information on the number of Valid and/or Invalid Records. Review and correct as needed. Click Finish, and the data will be imported.

Import Work History Data

Selected	PID	NetworkID	BranchID	SectionID	Project	Work Date	Work Code	Work Quantity
<input checked="" type="checkbox"/>	MANSFIELD::05-23::A	MANSFIELD	05-23	A	3-39-0049-01	06/14/2011	OL-AS	70,304.37
<input checked="" type="checkbox"/>	MANSFIELD::05-23::B	MANSFIELD	05-23	B	3-39-0049-01	06/14/2011	OL-AS	16,722.54
<input checked="" type="checkbox"/>	MANSFIELD::14-32::A	MANSFIELD	14-32	A		06/14/2011	OL-AS	63,239.10
<input checked="" type="checkbox"/>	MANSFIELD::14-32::B	MANSFIELD	14-32	B		06/14/2011	CR-PC	4,906.44
<input checked="" type="checkbox"/>	MANSFIELD::14-32::C	MANSFIELD	14-32	C		06/14/2011	OL-AS	42,712.17
<input checked="" type="checkbox"/>	MANSFIELD::14-32::D	MANSFIELD	14-32	D		06/14/2011	OL-AS	5,574.18
<input checked="" type="checkbox"/>	MANSFIELD::14-32::F (inter)	MANSFIELD	14-32	F (inter)		06/14/2011	OL-AS	16,025.77
<input checked="" type="checkbox"/>	MANSFIELD::APRON::B	MANSFIELD	APRON	B		06/14/2011	OL-AS	11,347.45
<input checked="" type="checkbox"/>	MANSFIELD::APRON::C1 (term)	MANSFIELD	APRON	C1 (term)		06/14/2011	NC-PC	9,009.45
<input checked="" type="checkbox"/>	MANSFIELD::APRON::C2	MANSFIELD	APRON	C2		06/14/2011	OL-AS	606.70
<input checked="" type="checkbox"/>	MANSFIELD::APRON::C3	MANSFIELD	APRON	C3		06/14/2011	OL-AS	684.13
<input checked="" type="checkbox"/>	MANSFIELD::RUNUP AREA::14	MANSFIELD	RUNUP AREA	14		06/14/2011	OL-AS	2,972.89
<input checked="" type="checkbox"/>	MANSFIELD::RUNUP AREA::32	MANSFIELD	RUNUP AREA	32	3-39-0049-18	06/14/2011	NC-AC	2,787.09
<input checked="" type="checkbox"/>	MANSFIELD::TWY::A1	MANSFIELD	TWY	A1	3-39-0049-18	06/14/2011	SU-AC	46,774.35
<input checked="" type="checkbox"/>	MANSFIELD::TWY::A2	MANSFIELD	TWY	A2	3-39-0049-18	06/14/2011	SU-AC	245.91

**** Validation Complete ****

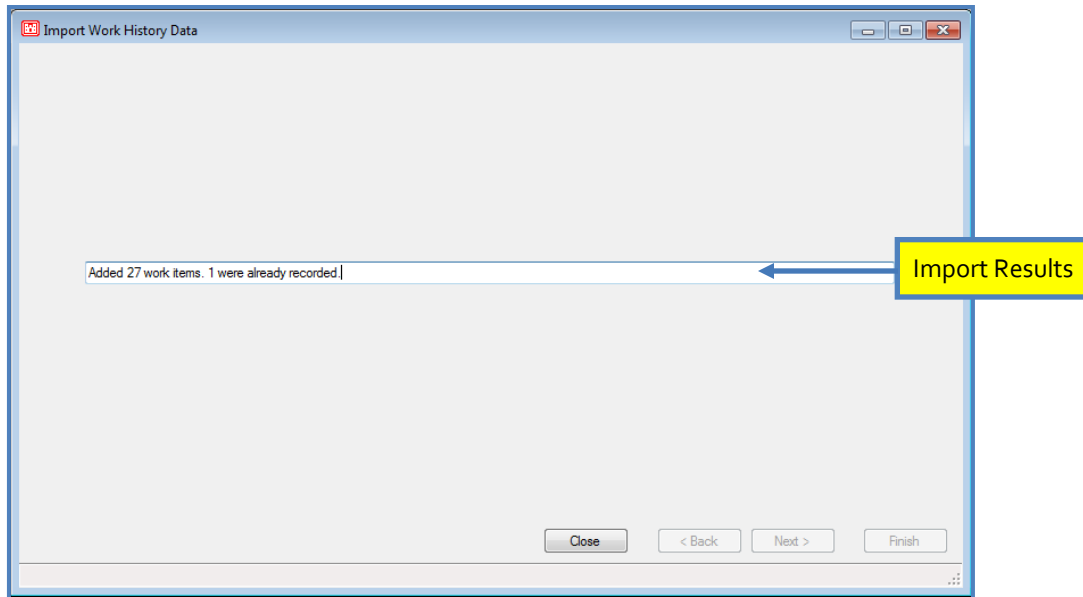
Valid Records: 28 Invalid Records: 0

Buttons: Cancel, < Back, Next >, Finish

Validation results

Select Finish to import data

Number of Valid and Invalid Records



CSV Template File

```

NetworkID,BranchID,SectionID,Date,Project,Phase,Work
Code,Quantity,Cost,Material,Work Category,Thickness,Comments,Notes
MAFBTEST,VERSION7,1,1/1/2012,1,1,CS-AC,2000,3000,,Localized MR,0,Crack
Sealing - AC,"Acceptable values for 'WorkCat' column are :
'LOCALIZED', 'LOCAL', 'LOCALIZED MR', 'LOCALIZEDMR'"
MAFBTEST,VERSION7,2,1/2/2012,2,2,OL_2,2000,3000,,Major MR,2,2 in
overlay,"Acceptable values for 'WorkCat' column are : 'MAJOR', 'MAJOR
MR'", 'MAJORMR'"
MAFBTEST,VERSION7,1,1/3/2012,1,3,CS-AC,2000,3000,,Localized MR,0,Crack
Sealing - AC,"Acceptable values for 'WorkCat' column are :
'LOCALIZED', 'LOCAL', 'LOCALIZED MR', 'LOCALIZEDMR'"
MAFBTEST,VERSION7,2,1/4/2012,2,4,OL_2,2000,3000,,Major MR,2,2 in
overlay,"Acceptable values for 'WorkCat' column are : 'MAJOR', 'MAJOR
MR'", 'MAJORMR'"
MAFBTEST,VERSION7,1,1/4/2011,,,,ST-CS,,,,Global MR,,Surface Treatment -
Cape Seal,"Acceptable values for 'WorkCat' column are : 'GLOBAL',
'GLOBAL MR', 'GLOBALMR'"
MAFBTEST,VERSION7,2,1/4/2011,,,,CM_2,,,,Layer,2,Cold Mill 2
in,"Acceptable values for 'WorkCat' column are : 'LAYER', 'LAYER
CONSTRUCT', 'LAYER CONSTRUCTION'"

```

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9. Inspection

Inspection menu options:

- Edit Inspection
- Export PCI Inspection Data (XML)
- New Inspection Schedule
- Open Saved Inspection Schedule
- Export Inventory for FieldInspector™/ImageInspector™ (I70)
- XML Inspection Import Wizard
- Inspection Report/Forms/Setup Wizard

Edit Inspection

PCI and Distress Indices


Collection and recording of field inspection data are among the most frequently repeated tasks in PAVER™. The Inspection component of PAVER™ can be launched from the Inspection button on the PAVER™ Button Bar. Always refresh PCI to reflect true values, after making edits.

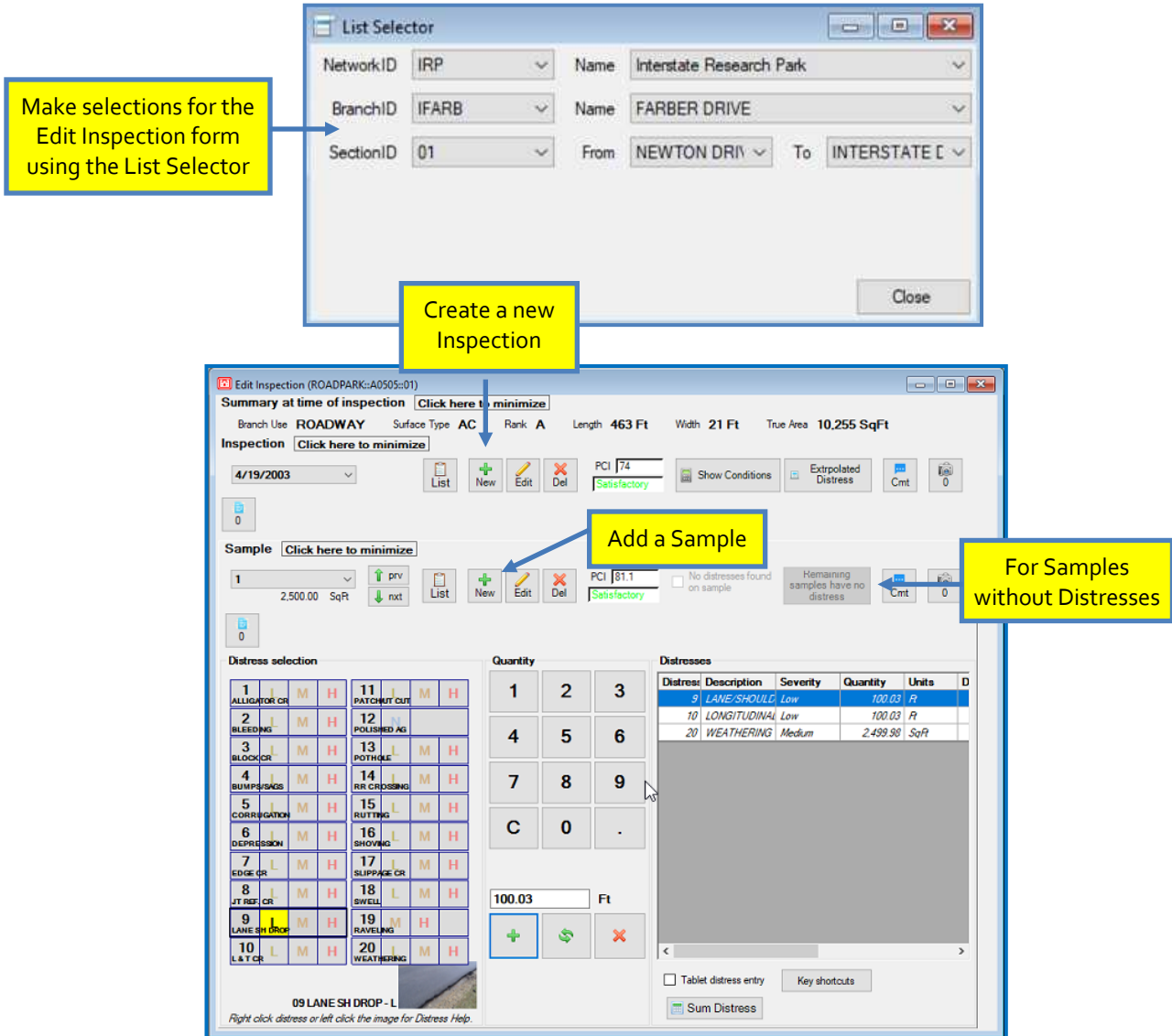
Entering Inspection Dates and Samples

To enter inspection information, first verify that the desired network/branch/section is selected using the Select Inventory Item window. Notice that the name of the window corresponds to the network/ branch/section that is currently selected. The Inspection Date drop-down list box allows the user to select a previous inspection according to its inspection date, which is useful if the user needs to add or edit information for a previous inspection. To enter information for a new inspection, click Edit next to the Inspection Date window. The Inspections window appears, displaying a list of past inspections. Click New and a new inspection, with the current date, appears at the top of the list.

When you first create a new inspection date, the new inspection has the same sample information as the previous inspection. If the actual inspection date is different, click on the date and edit it. Other fields in the window, including entering a comment for the inspection, may be edited. When the inspection date and other fields are as desired, click Close to return to the Inspection Data Entry window (the most recent inspection will be the currently selected one).

Note:
Distress information entered into PAVER™ is associated with a specific date.


To enter comments for an inspection date, click the Inspection Comments box  and enter a comment, which is stored with that inspection date. To view the comments for a given date, select the date in the Inspection Date window and click the Inspection Comments box.





The screenshot displays two windows from the PAVERTM software. The top window is the 'List Selector' dialog, which allows users to choose specific sections for inspection. It includes dropdown menus for NetworkID (IRP), BranchID (IFARB), and SectionID (01), along with text boxes for Name (Interstate Research Park, FARBER DRIVE) and From/To locations (NEWTON DRIVE, INTERSTATE). A yellow callout box points to the dropdown menus with the text 'Make selections for the Edit Inspection form using the List Selector'. Another yellow callout box at the bottom of this window says 'Create a new Inspection'. The bottom window is the 'Edit Inspection' main interface. It shows a summary of the inspection (ROADWAY, AC, Rank A, Length 463 Ft, Width 21 Ft, True Area 10,255 SqFt) and the inspection date (4/19/2003). A yellow callout box points to the 'New' button with the text 'Add a Sample'. Another yellow callout box points to the 'Cmt' button with the text 'For Samples without Distresses'. The interface also features a 'Distress selection' grid, a 'Quantity' keypad, and a 'Distresses' table.


Distress	Description	Severity	Quantity	Units	D
9	LANE SHOULDR	Low	100.03	Ft	
10	LONGITUDINAL	Low	100.03	Ft	
20	WEATHERING	Medium	2,499.98	SqFt	

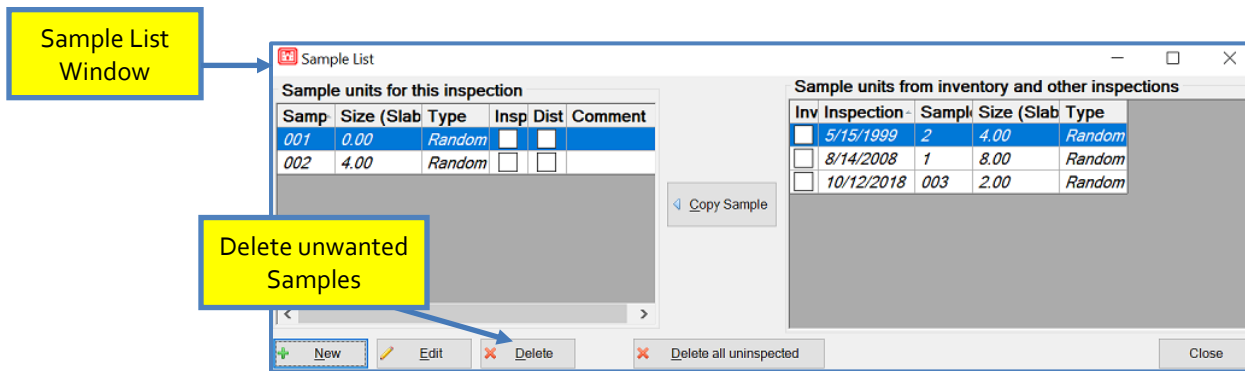
While the user can inspect each section in its entirety, it is not practical to do so, and it is acceptable to inspect only portions of a section. PAVERTM utilizes sampling techniques for performing inspections, whereby each section is divided into smaller pieces called sample units. Inspection information is then collected from one or more sample units.

The PAVERTM Inspection Data Entry window matches the field inspection and allows the user to enter survey information. Click , near the Sample Unit window, to bring up the Select Samples window, which contains two lists. The left side shows the samples to be included in

this inspection, and the right side shows samples that were used in previous inspections. To use a sample defined in a previous inspection, click the sample and then click the arrow button located between the two lists.

To add a completely new sample, click  New to edit the Sample form. The Sample Number field defaults to 001 for the first Sample entry, you can adjust the Sample Number if you would like in this form. Entering a Sample Size will activate the OK button. The user may also switch the Sample Type between Random (R) and Additional (A). Comments can be added in the Edit Inspection form using the Sample Comment button .

If there is a sample definition in the Sample List that you do not wish to use, click the sample to be removed using Sample List button , then click Delete. If the sample already has inspection information (as can occur when editing the sample list for an existing inspection), PAVER™ verifies that the user would like to delete the Sample prior to deletion.



Entering Inspection Information

The PAVER™ Inspection Data Entry window is designed to be easy to use and to allow experienced users to rapidly enter large amounts of inspection data. It is possible for the user to enter all inspection information for an entire section using only the keyboard.

Once the section is selected and the inspection date and samples are set up, the user is ready to enter individual distresses. Select the Distress Type and desired Distress Severity level, and then enter the Distress Quantity. Note that the distress codes available in the list depend on the type of pavement inspected, since some distresses are only found on a particular surface. PAVER™ likewise modifies the available Distress Severity levels, as some distresses cannot be assigned a severity level. If no distresses were recorded for a sample, select No distresses found during inspection checkbox. For PAVER™ to calculate the PCI or condition for a section, all samples created must have at least one distress or be identified as No distresses found during

Note:
 You may enter duplicate distress types and severities.
 For example:
 Alligator L 50
 Alligator L 40

inspection. If you finish entering the inspection information and there are undefined samples with no distresses, click the Remaining Samples Have No Distress button and PAVER™ will assign them as so. The Database Verification Tools can be utilized to easily verify inspection samples and manage samples with no distresses (see Chapter 5 Inventory >> [Database Verification Tools](#)).

After you have entered the Distress Type, Distress Severity, and Distress Quantity, click Add Distress. To delete an existing distress from the list, highlight a row and click Delete Distress. The Replace Distress button deletes the highlighted record and replaces that information with the current Distress Type/ Distress Severity/ Distress Quantity information. If you wish to enter a comment for the distress, click Add in the list of distresses Comment Column.

Once you have entered inspection data for an entire sample, proceed to the next sample in the list by choosing another sample from the Sample Unit dropdown list box. Review previously entered data by using the Sample Unit dropdown list box.

Summary at time of inspection [Click here to minimize](#)

Branch Use **TAXIWAY** Surface Type **AC** Rank **S** Length **1,348.00 Ft** Width **35.00 Ft** True Area **61,090.00 SqFt**

Inspection [Click here to minimize](#)

9/25/2015 PCI ??? Needs recalc 0

Sample [Click here to minimize](#)

03 4,900 SqFt PCI 80 Satisfactory No distress found on sample 0

Distress selection

41	L	M	H	51	N		
42	N			52	L	M	H
43	L	M	H	53	L	M	H
44	L	M	H	54	L	M	H
45	L	M	H	55	N		
46	N			56	L	M	H
47	L	M	H	57	L	M	H
48	L	M	H				
49	N						
50	L	M	H				

Quantity

1 2 3
4 5 6
7 8 9
C 0 .

35.00 Ft

Distresses

Distr	Description	Severity	Quantity	Units	Density
48	L & T CR	Medium	35.00	Ft	0.71
48	L & T CR	Low	15.00	Ft	0.31
48	L & T CR	Low	65.00	Ft	1.33
57	WEATHERING	Low	4,850.00	SqFt	98.98

Tablet distress entry

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For Maximum Speed - Keyboard Only

The most repetitive part of inspection data entry is inputting the distress data. Once familiar with the PAVER™ Inspection Data Entry window, distress data entry can be performed completely on the keyboard.

To perform keyboard-only data entry, first set up the inspection and sample information as described in the previous section. All distress codes are two-digit numbers shown to the left of the Distress Type. Select the proper Distress Severity by typing “L” for Low, “M” for Medium, and “H” for High. To enter “Bleeding” with medium severity, for example, type the code “02M.” Selection is only made once a valid Distress/Severity combination is entered. Once you enter a Distress Severity, the cursor immediately moves to the Distress Quantity field where you can type in the distress quantity. Note that the entire Distress Quantity field is highlighted, meaning that anything in the box is immediately overwritten by what you type.

Once you have typed in a distress quantity, add the distress to the list by typing “A” for Add, or by pressing the Enter key. A new row is created in the list of distresses.

To enter a comment, use the mouse to click Add in the Comments field in the list of distresses entered, and type in the comment.

When you are finished entering all the distresses for a sample, move to the next sample by typing “Page Up” for Next, or move to a previous sample by typing “Page Down” for Previous.

Calculating PCI after Inspection

An Assessment Results window allows the user to view the condition of an individual section immediately after distress data is entered. To access this window, click Calculate Conditions in the Inspection Data Entry window. The section properties are displayed at the top of the window. In the middle of the window, Condition Index, Inspection Date, and Condition Value are displayed. This window also gives you basic information about the section that you are viewing:

- **Condition Indices:** Displays the Condition Value for all conditions associated with the current section.
- **Sample Distresses:** Displays section inspected sample units and their corresponding distress codes, descriptions, severity, quantity, density, and deduct.
- **Sample Conditions:** The top displays section inspected sample units and the individual unit’s sample type, size, and PCI. The bottom displays the number of

Inspection Schedule

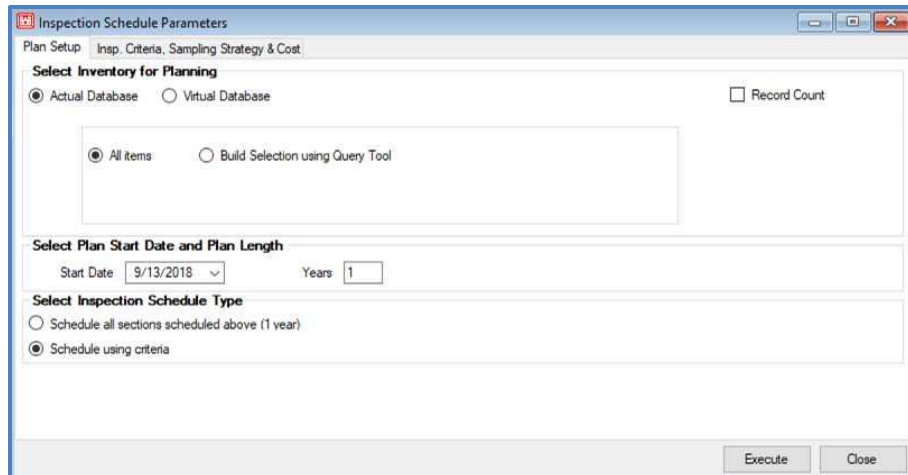
The Inspection Schedule report selects sections for inspection, subject to minimum condition criteria or projected deterioration rates, and operates like the Condition Analysis and M&R Work Plan reports. When the report is opened, the user may configure the parameters of the report and then execute the report. The completed report is presented in the EMS™ Report Viewer.

Start the Inspection Schedule report by choosing Inspection >> New Inspection Schedule. Select either the actual database or a virtual database to include in the report on the Plan Setup tab, under Select Inventory for Planning. To select all items from the database, choose All Items. To select a subset of the database using the EMS™ Query Tool, choose Build Selection, and then click Edit Selection.

The Select Plan Start Date and Plan Length portion of the Plan Setup tab is used to specify the scheduling period, when Schedule using criteria is highlighted under Select Inspection Schedule Type. Otherwise, Schedule all sections selected above is highlighted, specifying a complete inspection.

The Insp. Criteria, Sampling Strategy & Cost tab, allows the user to specify Sampling Strategy and Inspection Expenses per sample unit, when Schedule all sections selected above is highlighted on the Plan Setup tab. Select the Sampling Strategy for the determination of the number of samples to inspect for each section. The Inspection Expenses per sample unit will be used to calculate the inspection cost for each section.

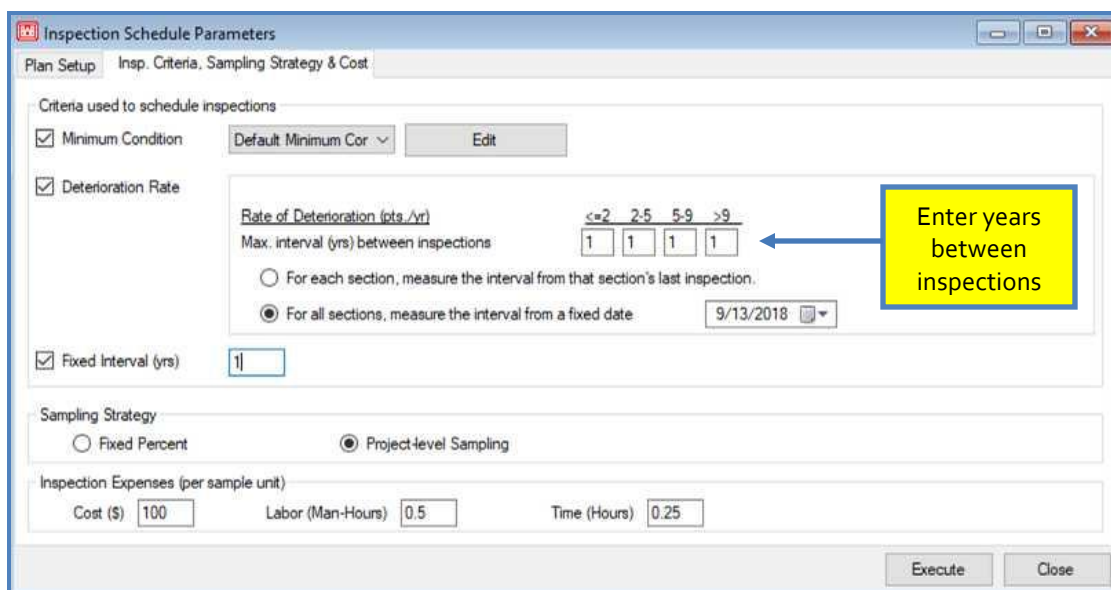
If All Sections Scheduled Above (1 year) is chosen on the Plan Setup tab, then on the Insp. Criteria, Sampling Strategy & Cost tab, the user additionally specifies the Minimum Condition and Deterioration Rate. Use the checkboxes to enable or disable each option, which may be run together or separately.



The user may choose to schedule inspections according to a table of minimum acceptable conditions. If the Minimum Condition box is checked, projected section conditions are compared to a list of minimum conditions, and a section is only scheduled for inspection if that section's condition falls below the matching record in the minimum condition table. When the Minimum Condition alternative is selected, the user may specify a minimum condition table. Use the drop-down list box immediately to the right of the Minimum Condition checkbox, to select a table of acceptable minimum conditions. The Edit button can be used to review and edit the selected minimum condition table. The tables are arranged with an associated Minimum Condition for each Year.

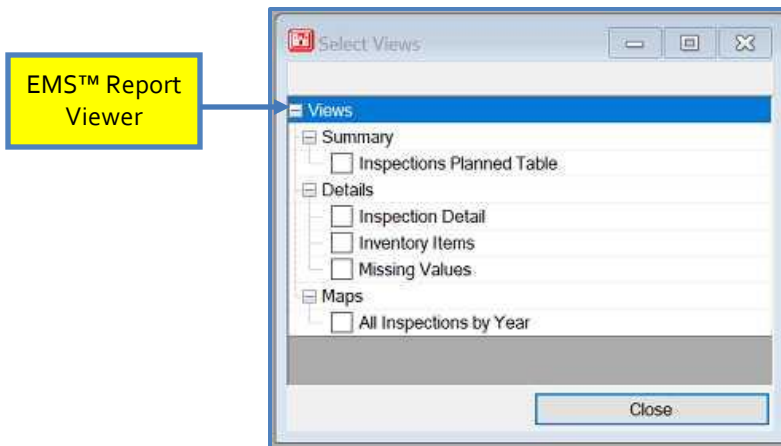
If the Deterioration Rate box is selected, the user is able to configure the relationship between deterioration and inspection frequency. PAVER™ checks the rate of deterioration for a section included in the report, and categorizes it based on the numbers placed in each Rate of deterioration category.

Select the Sampling Strategy for the determination of the number of samples to inspect for each section, and enter in the Inspection Expenses (per sample unit) data which will be used to calculate the inspection cost for each section.



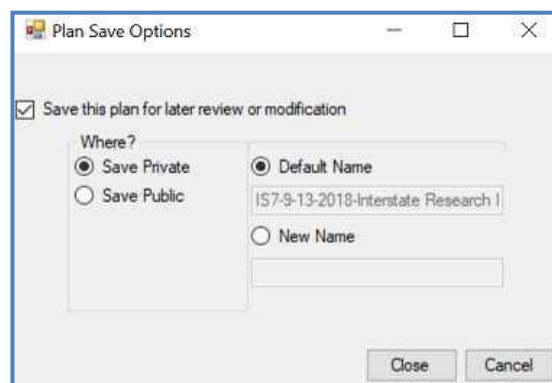
Run the Inspection Schedule report by clicking Execute. The Inspection Schedule report is presented in the EMS™ Report Viewer with the default view as a summary of inspections per year. To obtain a version of the report that lists the individual sections inspected for each year of the report period, check the boxes for desired views.

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When closing the report, PAVER™ will ask you if you want to save it. If you save the plan, it will create a file name of your choice with a *.IS7 extension. The user will be given the opportunity to save the file as Private or Public and to accept the Default Name or create one.

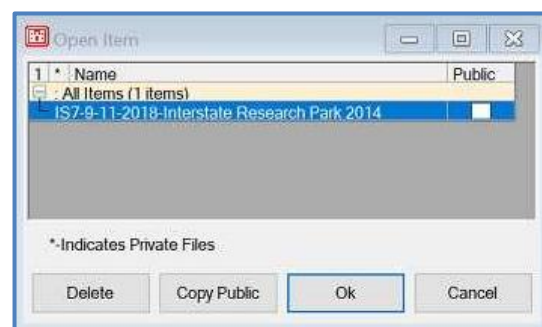
Note: In a multi-use environment, Private refers to data saved on a local machine and Public refers to data saved on a server.



Open Saved Inspection Schedule

To open an existing Inspection Schedule go to Inspection >> Open Saved Inspection Schedule, select the desired Inspection Schedule from the drop-down list, and click OK.

Export



Inventory for

FieldInspector™/ImageInspector™ (I70)

See Chapter 14 >> [Wizards](#).

XML Inspection Import Wizard

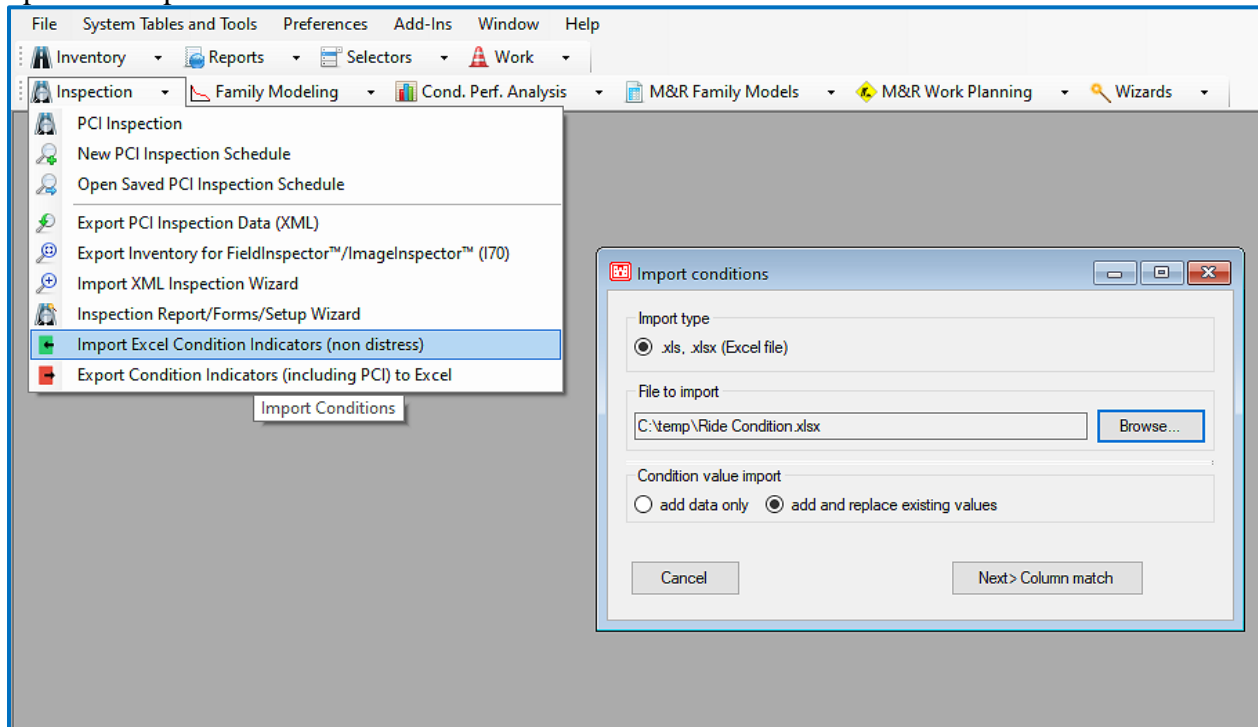
See Chapter 14 >> [Wizards](#).

Inspection Report/Forms/Setup Wizard

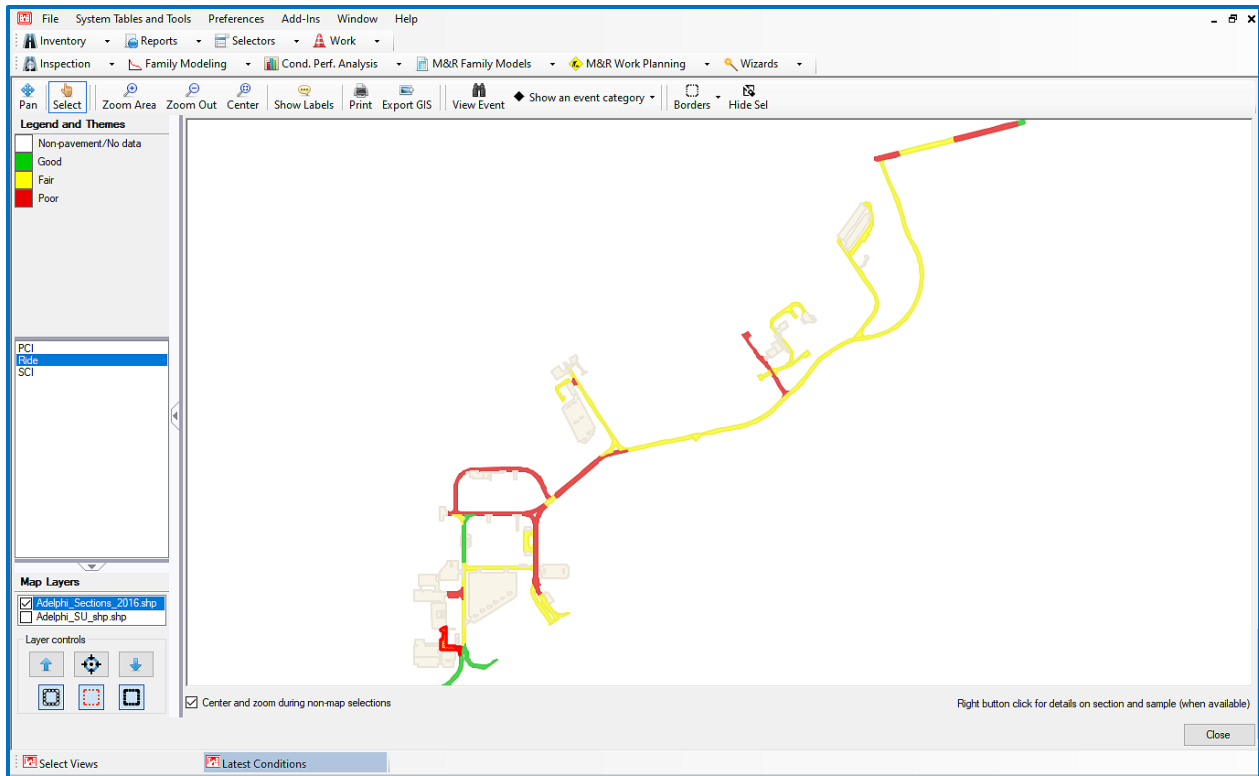
See Chapter 14 >> [Wizards](#).

Import Condition Indicators (non distress)

This tool allows users to import non-PCI inspection data from Excel spreadsheets. To use it, open the Inspection menu.



After the data is imported from the spreadsheet, a map screen will pop up with colors representing non-PCI data.

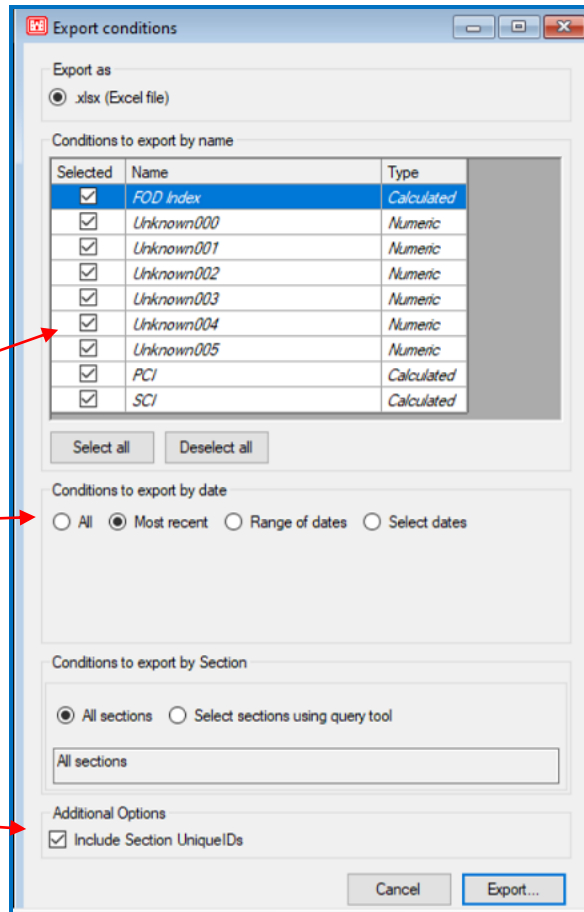


Export Condition Indicators (including PCI) to Excel

This tool allows users to export inspection data from Excel spreadsheets. This differs from the Import from Excel tool because it allows PCI data to be exported. To use it, open the Inspection menu.

Conditions can be individually exported by checking or unchecking the boxes on the grid. The radio buttons give a variety of options for how to select inspection dates. The sections to be exported can also be selected by using the Query Tool.

After making selections and pressing Export. Choose a destination for the file.



The report will then be available for use.

SectionUniqueID	NetworkID	BranchID	SectionID	Date	FOD Index	PCI	SCI
040199144Q_*,E+M3PW(	RdPk2017	A0103	01	10/19/2016			77
040199144Q_*,E+M3PW(	RdPk2017	A0103	01	11/22/2006			81
040199144??A>98+N1#A	RdPk2017	A0106	01	10/19/2016			60
040199144H-78VPG*<W-	RdPk2017	A0403	01	10/19/2016			37
0401991445\2N2KBG2X.	RdPk2017	A0403	02	10/19/2016			25
0401991445\2N2KBG2X.	RdPk2017	A0403	02	1/29/1996			42
040199144\QF<&DKU@%@	RdPk2017	A0500	01	10/19/2016			99
040199144\QF<&DKU@%@	RdPk2017	A0500	01	10/26/2001			100
IITDBJPR)GMX7E#BZHU8	RdPk2017	A0500	02	10/19/2016			81
IITDBJPR)GMX7E#BZHU8	RdPk2017	A0500	02	5/6/2000			90
IITDBO*Q2OX>IETGEVW^	RdPk2017	A0505	01	10/19/2016			67
040199144M\$%>))A#<-+	RdPk2017	A0601	01	10/19/2016			76
IITDBV<#L0\$XX'%,Z&&Y	RdPk2017	A0601	01A	10/19/2016			31
040199144.I+@5X]-=(F	RdPk2017	ACHAN	01	10/19/2016			72
040199144)F18#PSE^=\$	RdPk2017	ANAVA	01	10/19/2016			67
040199144)F18#PSE^=\$	RdPk2017	ANAVA	01	4/18/2003			73
040199144Z(+?_Y)ZAL[	RdPk2017	AP205	01	10/19/2016			98
040199144[,A&.Z(.%B	RdPk2017	AP403	01	10/19/2016			43
IITDBJEO0TF(SW/%J;IZ\	RdPk2017	AURORA	01	10/19/2016			100
IITDBJEO0TF(SW/%J;IZ\	RdPk2017	AURORA	01	7/11/2000			100
IITDB.CW/A82ZKS/7+**	RdPk2017	AURORA	02	10/19/2016			93
0401991440.L(XAZ@M^C	RdPk2017	CHANCE	01	10/19/2016			58
040199144&Y\$. _9SQG_&	RdPk2017	D0203	01	10/19/2016			69
040199144&Y\$. _9SQG_&	RdPk2017	D0203	01	7/26/2003			93
IITDB (M*:.0]8X\$\$9%	RdPk2017	D0203	01A	10/19/2016			72
							81

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10. PCI Family Models

Create and Maintain PCI vs Age Models

Building Family Models

The prediction modeling (family modeling) process identifies and groups pavements of similar construction, that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. The historical data on pavement condition can be used to build a model which can accurately predict the future performance of a group of pavements with similar attributes. In PAVER™, this model of a pavement's life is referred to as a "family".

Each pavement section is assigned a family. When predictions about the future performance of a pavement are desired, its family model is used to predict its future condition. If the user has not assigned a family model to a section, its default family is used to predict future pavement performance. Assigning sections to a PCI deterioration Family is discussed in this chapter under [Assign Family](#).

Factors such as original construction, maintenance, weather, and traffic, greatly affect the life of a pavement. A generic guess or assignment to the default family is not likely to be as accurate as a model that takes these factors into consideration. The Prediction Model is designed to allow users to blend unique knowledge about their pavements, measured local condition information, and powerful modeling tools, together to produce highly accurate estimates of future pavement life.

Using the Prediction Model

Click the PCI Family Models tab to display the Prediction Modeling window. The Prediction Modeling window can also be reached by clicking on the Prediction Modeling button on the PAVER™ Button Bar. The top-half of the Prediction Modeling window is a graph. Two drop-down list boxes are located above the prediction model graph. By clicking the drop-down arrow on the right side of these boxes, the user can select a Family Type as well as a previously saved Prediction Model. Select a Model from the list, and PAVER™ loads all the data points used to build the model, and the settings used to generate the model. It then plots the data points and the estimated condition prediction function.

Note:
When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.

The upper right corner of the Prediction Modeling form contains a series of buttons: New, Copy, Rename, Delete, Calculate, and Close. The Calculate button causes the model to estimate the condition prediction function and plot the curve through the data points. The Close button closes the Prediction Modeling window. Any models you have built are automatically saved when the Close button is clicked. The prediction model plot operates like other PAVER™ graphs, where right-clicking on the graph displays the extended graphing features menu.

Located just below the Close button are the Boundaries and Outliers status indicators. Once a model is selected or created, the Boundaries and Outliers status indicators are activated. These indicators report the status of the boundary data filter located on tab 2-Use Boundary/Outlier, and the statistical outlier analysis feature that is configured on tab 3-Options. These options, and all other family model building variables, are configured on the index card style data entry forms located on the lower half of the Prediction Modeling form.

The screenshot shows the 'Family Modeling' window. At the top, there are dropdown menus for 'Family Type' (set to 'PCIvAge') and 'Model' (set to 'Other-AC-S - ROADPARK'). Below these are buttons for 'New', 'Copy', 'Rename', 'Delete', 'Calculate', and 'Close'. To the right of the 'Calculate' and 'Close' buttons are status indicators for 'Boundaries' (Active) and 'Outliers' (Active). The main area is a graph with 'Condition' on the y-axis (0-100) and 'Age' on the x-axis (1-20). The graph displays several data series: 'ModelData' (black 'x' markers), 'BadData' (red 'x' markers), 'BoundaryFilterLower' (cyan line), 'BoundaryFilterUpper' (magenta line), 'CalculatedModelData' (green line), 'CalculatedModelDataLow' (red line), 'CalculatedModelDataHigh' (blue line), and 'Designated Critical PCI' (yellow line). Below the graph is a table with columns: NetworkID, BranchID, SectionID, Age at Insp, PCI, Insp Date, Model, and Difference. The table contains several rows of data. At the bottom right, there are 'Add' and 'Delete' buttons, and a 'Go To Family Assignment' button.

Callout boxes point to the following elements:

- Create new model**: Points to the 'New' button.
- Copy existing model**: Points to the 'Copy' button.
- Family Model name**: Points to the 'Model' dropdown menu.
- Status of boundaries and outliers**: Points to the 'Boundaries' and 'Outliers' status indicators.
- Choose Family Type**: Points to the 'Family Type' dropdown menu.

Review Model Data

This card is used to collect data from the active PAVER™ database and to build a new family model or adjust an existing family model. To create a new model, click New. You are prompted to provide a name for the new family model being created (entries may be up to 64 characters in length). After naming the family model click OK and the EMST™ Query Tool is presented so that you may select a subset, if desired, of the active database. After selecting the filter criteria (which

Note:
When a prediction model is created, only data points that are at least one year old are used.

can be none), the age verses condition points for the pavement sections selected are placed in the grid on the Review Model Data card, as well as displayed on the graph.

The Get Data button at the bottom of the Review Model Data card is used to modify the data used in an existing family model. After clicking Get Data, the user is prompted to use the query tool. Copy creates a new model based on the family model that was active when the Copy button was clicked. To change the name of the model, click Rename, and to delete the active model, click Delete. Extended features can be accessed by right-clicking on the table. The Status column contains no entry for records that are used to calculate the condition prediction curve. Points that are removed from the prediction process by boundary conditions or outlier analysis are labeled as “Out of Range” or “Outlier” points. You can add points to this table if you wish to influence the curve in a particular area. If any records are added or deleted, you must recalculate to refresh the graph.

Note:
Points can be added to the Review Model Data table, to influence the model curve. When entering data, only enter Age and PCI values.

Use Boundary/Outlier

Upper and lower model boundaries are specified on the Use Boundary/Outlier card. Age vs. PCI points that fall outside the boundaries are marked as “Out of Range” in the Review Model Data table, and are not considered when the predicted condition function is estimated. Points marked as “Out of Range” can be reintroduced into the analysis by turning off the boundaries or shifting the location of the boundaries so those points are in the allowable range. The X Range Filter is used to specify a range on the x-axis from which you want to include data. Data points outside the specified range are ignored.

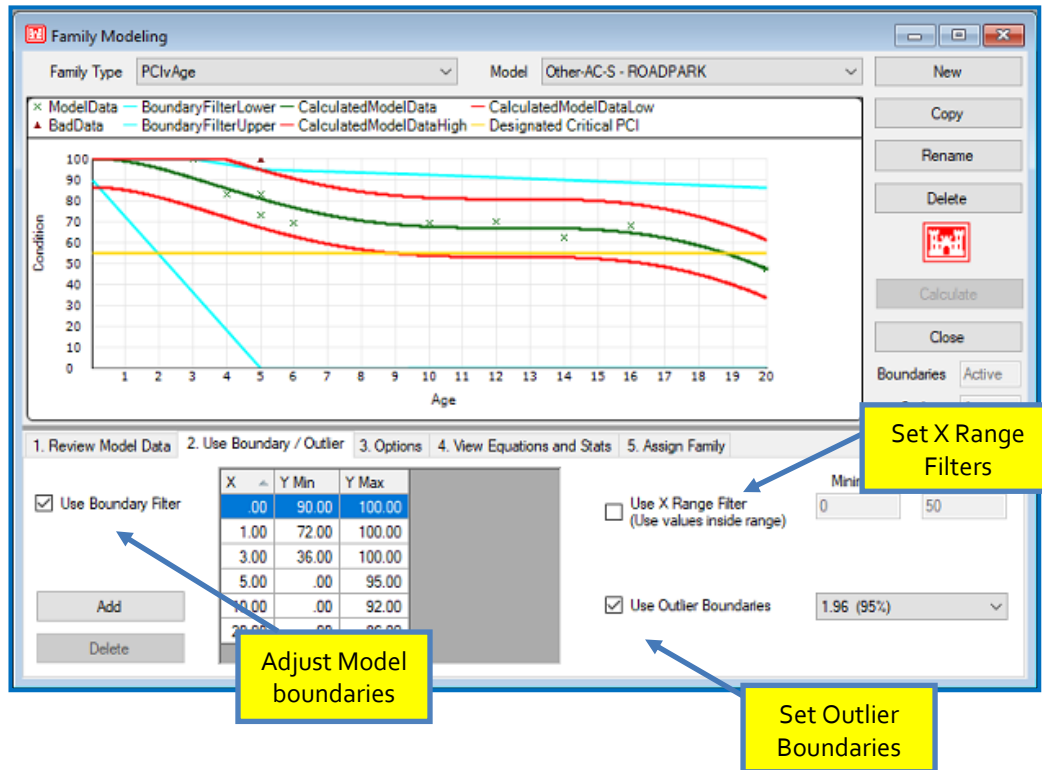
Note:
To edit Use Boundary/Outlier or Collect Model Data tabs, make sure the checkbox next Prevent Changes to Model, in the Options tab, is unchecked.

Model Boundary Filter are adjusted by changing the values in the table on the Use Boundary/Outlier card. To edit or change a value, highlight the row in the table you want to change, and then select the column you wish to edit (year, lower or upper bound) and type the new value (numeric entries only).

New rows can also be added to the table with the right-click menu. The Add option inserts a blank row in the last row of the boundary data table. Records in the Boundary Filter data table are sorted in ascending order by age (year). Edited and new records are out of order until the model is recalculated. If any new information is entered that differs from the current model, the Calculate button will be activated. After the model is recalculated, the boundary table entries will be in the proper sort order.

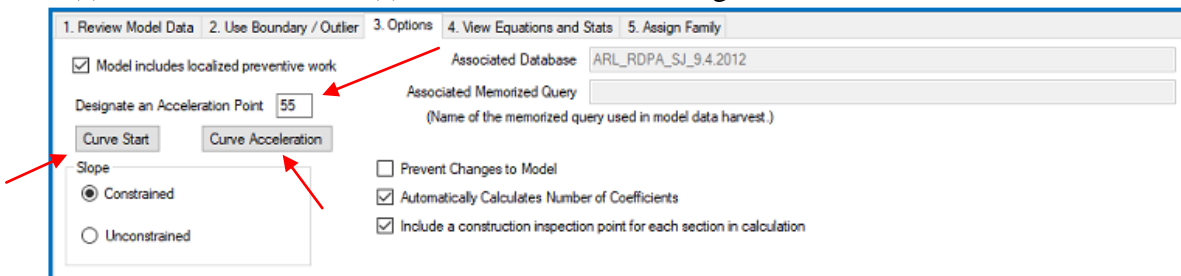
Note:
To add or delete rows of boundary data, right-click on the table.

The outlier boundaries are used to limit the number of data points used in the computation of the curve. Options for outlier constraints range from 50 to 100 percent. Changing these various options and recalculating, produces different curve results. Use Tab 4. View Equation and Stats, to determine the statistical soundness of your curve.

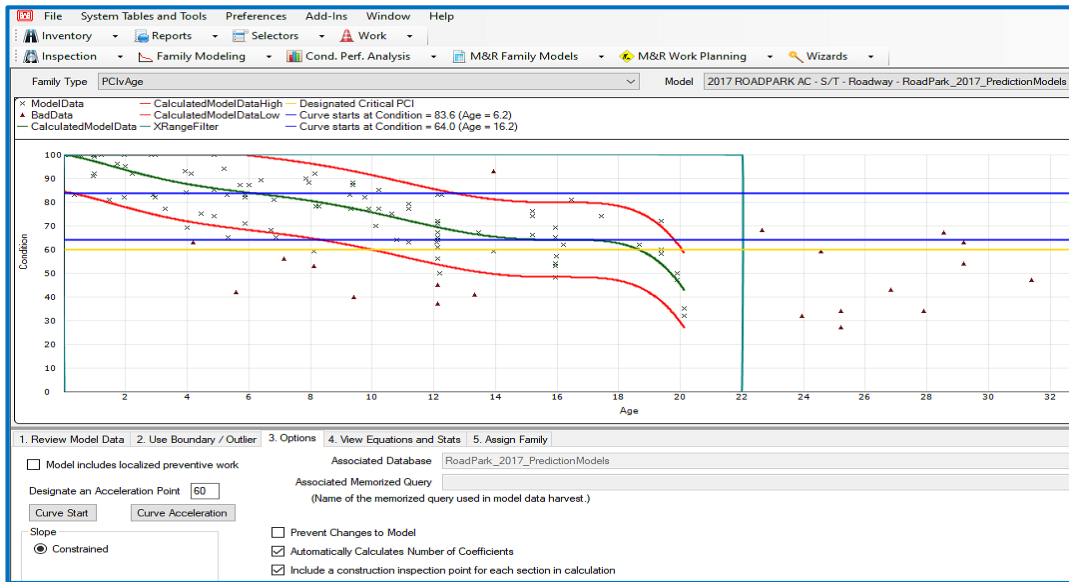


Options

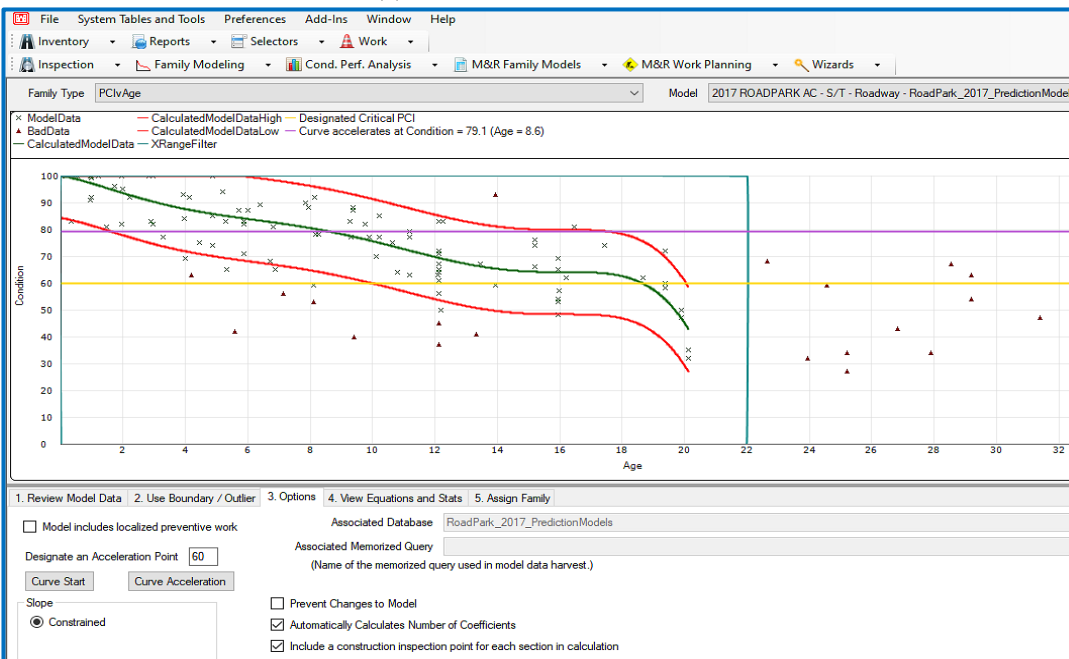
The Options card is the heart of the statistical analysis performed in the prediction modeling tool. In the “Slope” section, the user can choose to constrain the curve upward or downward, or to leave it unconstrained. To prevent changes to the model select the checkbox associated with the label Prevent Changes to the Model. This is also where you can select to display Curve Start(s), Curve Acceleration(s), or both based on a designated Acceleration Point.



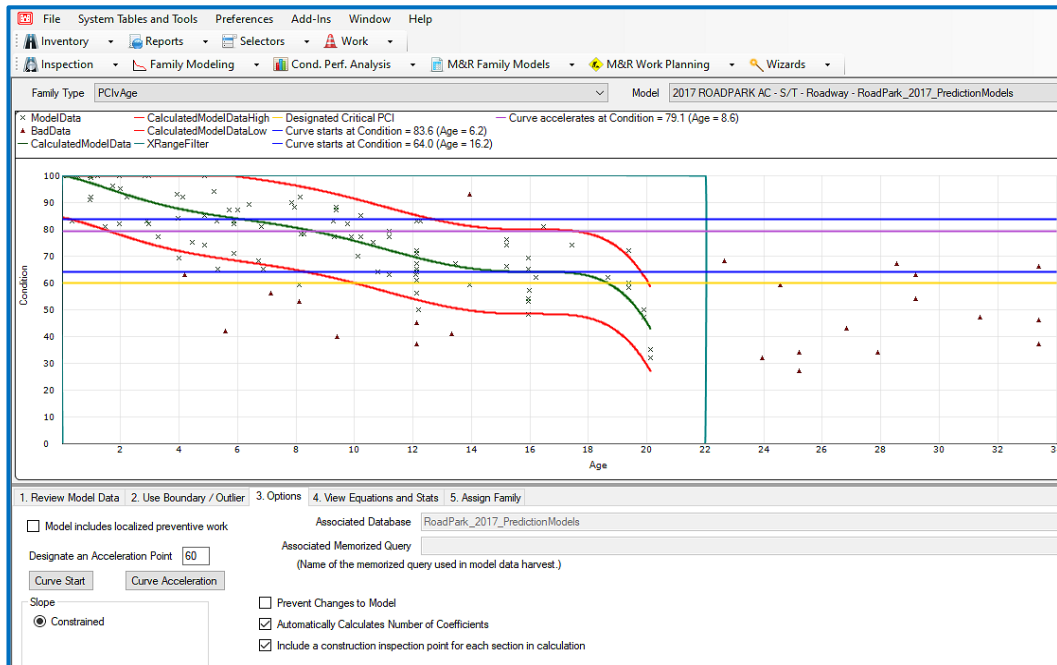
With Curve Start(s):



With Curve Acceleration(s):



With Curve Start(s) and Acceleration(s):



View Equation and Stats

The View Equations and Stats card displays the intercept and coefficient values for the equation estimated to be the best fit for the data. The card also lists various “goodness-of-fit” statistics for the estimated model.

Assign Family

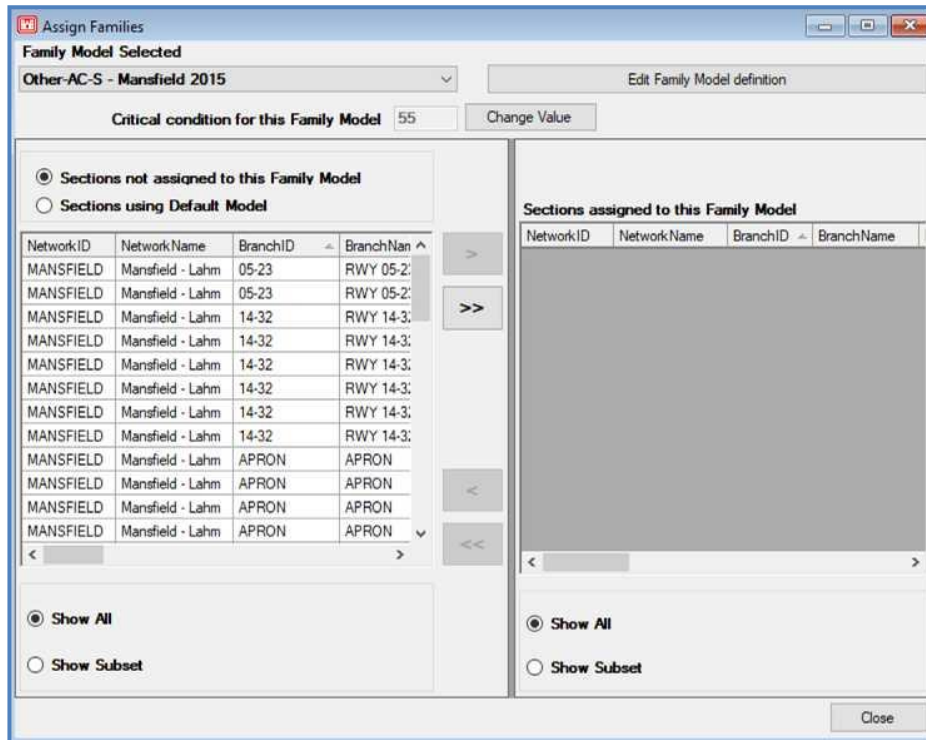
The Assign Family tab allows individual sections to be assigned to the prediction models they created. Sections assigned to a prediction model curve make up a family. To assign the entire family of sections used to create the prediction curve, select Assign Family to Sections. After this selection, all of the sections will be listed on this card. To unassign any section from a family, highlight the section in the table and select Unassign Family from Selected Section. The Family Assignment tool is described in detail in this chapter under [Assign Family](#).

Assign PCI vs. Age Families

Deterioration Families

A Deterioration Family is a group of pavement sections that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. In the previous chapter, we built Prediction Models to predict the future performance of a group of pavements that possess similar attributes. Now that we have developed the deterioration curves, we need to assign

individual pavement sections to their corresponding curves. As was mentioned in the previous chapter, any sections that are not assigned to a deterioration family will automatically be assigned to a default deterioration family.

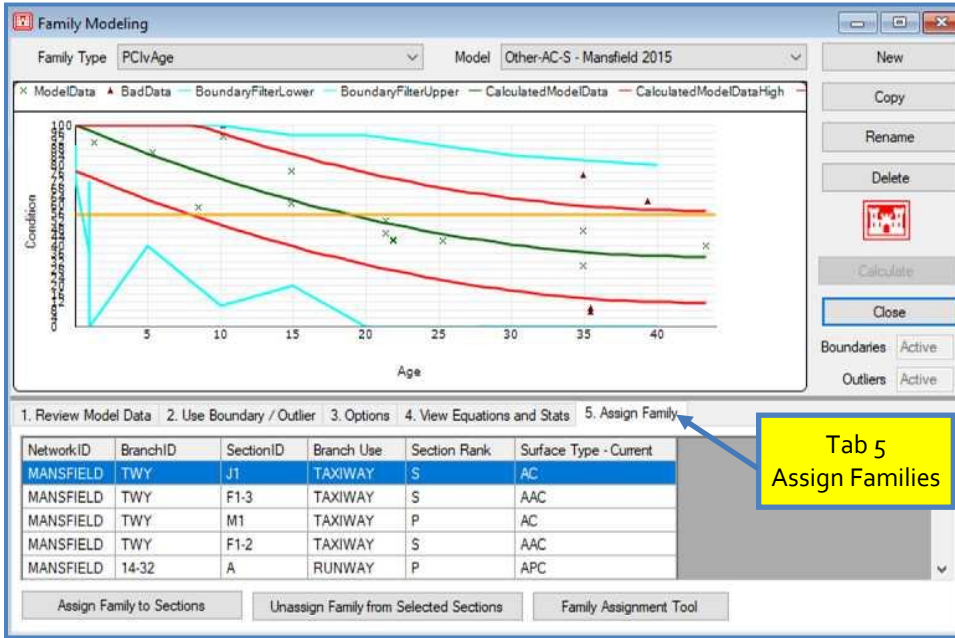


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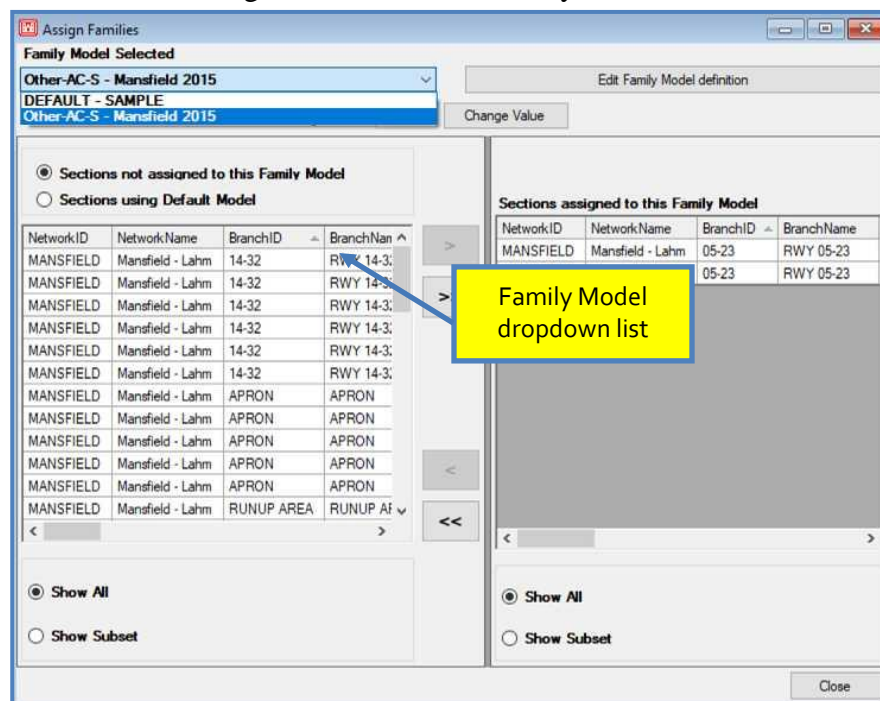
Assign Family

To assign sections to a previously created family model, open the Assign PCI Deterioration Families window. There are two ways to reach the Assign PCI Deterioration Families window. The first method is accomplished by selecting PCI Family Models >> Assign PCI Deterioration Families (see above). The second way is to click on the Family Assignment Tool button on the Tab 5. Assign Family, via the Prediction Modeling window (see below).

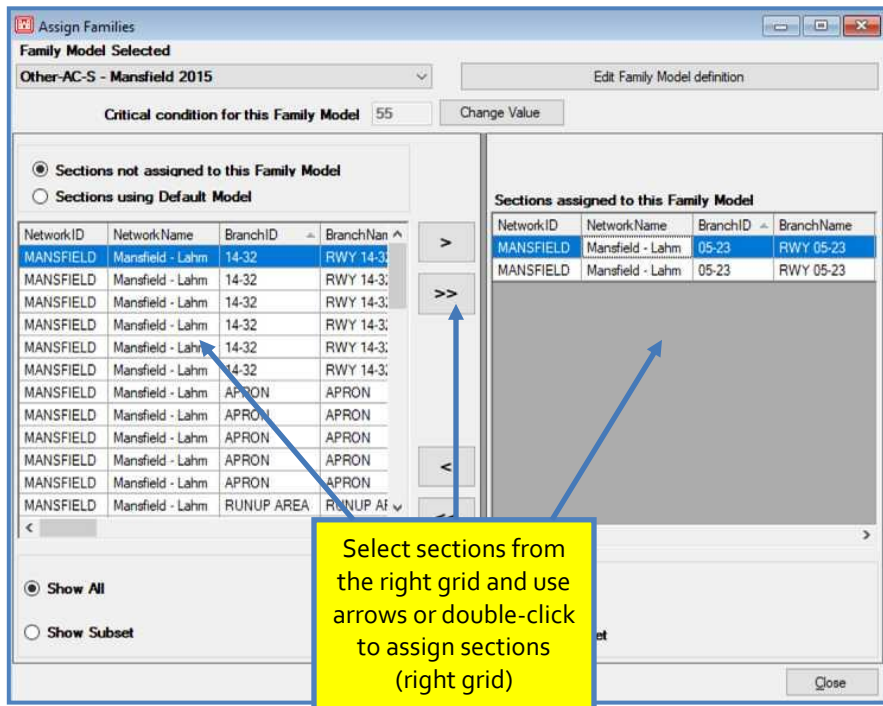
Note:
When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.



Once the Family Assignment Tool window is open, a drop-down list box labeled Family Model Selected appears and is where the user will select the Prediction Model to assign a family of sections to. On the window to the right, there is a button labeled Edit Family Model Definition which reverts the user back to the Prediction Modeling window for any editing. Directly below, there is a window to manually enter a Critical condition for this Family Model, which will be set to a default PCI value of 55. This value will tell PAVER™ when to flag sections for M&R based on the family model chosen. Below the critical PCI section there are two tables side by side. The table on the right lists all the sections that are currently assigned to the chosen family model. The table on the left has several view options, but is mainly there to view what sections have not been assigned to the current family model.

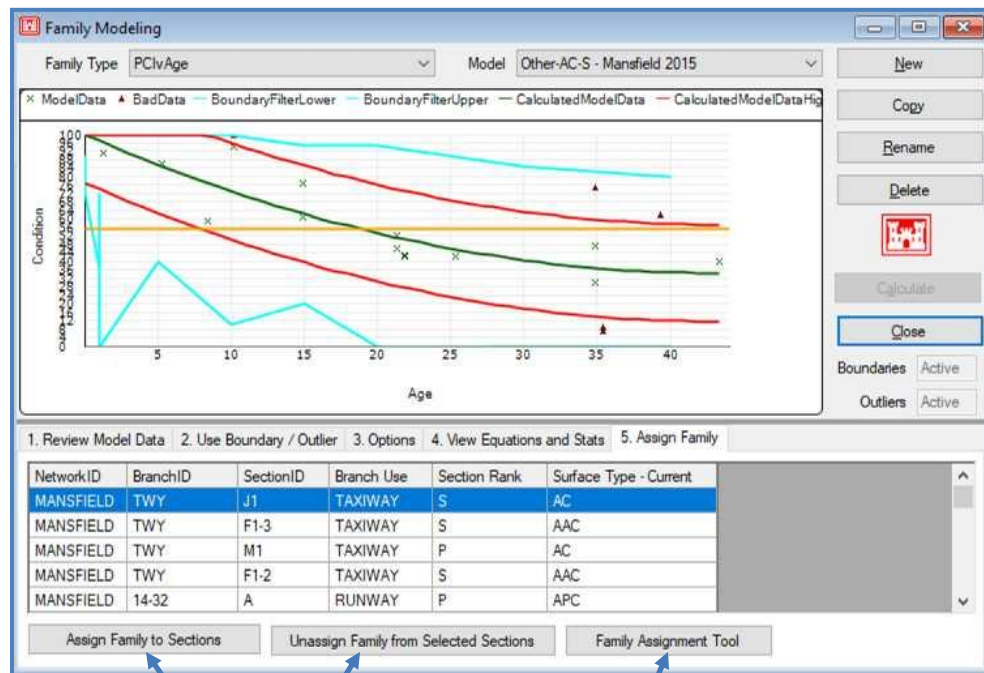


To assign sections to a family model, highlight the desired section on the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table, assigning it to the selected family model. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Similarly, the left-pointing arrows move sections to the left table from the right table. Once all desired sections have been assigned, press Close to exit the assignment tool window.



When viewing the table on Tab 5, Assign Family in the Family Modeling window, the sections assigned through the Family Assignment Tool are present. On the tab, there are three buttons below the table: Assign Family to Sections, Unassign Family from Selected Section, and Family Assignment Tool. The Family Assignment Tool was described in the previous section. The other two buttons allow for the editing of the assigned family on the fly, without the assignment tool. To delete an assigned section(s) from a family model, highlight the section in the table and then click Unassign Family from Selected Section. PAVER™ will ask if you are sure that you would like to delete the desired section from the family. After clicking the OK to delete the member(s), the selected section(s) will be removed from the list. When the Assign Family to Section button is selected, the EMS™ Query tool will open, allowing the user to

assign a group of sections at once. Depending on the variability of a large database, the user may want to avoid this method of assigning.



Assign or unassign inventory items used to build model as a Family member

Select the Prediction Model to assign a family of sections to using this tool

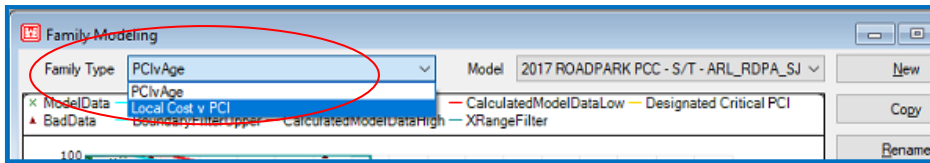
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Create and Maintain Localized Cost vs PCI Models

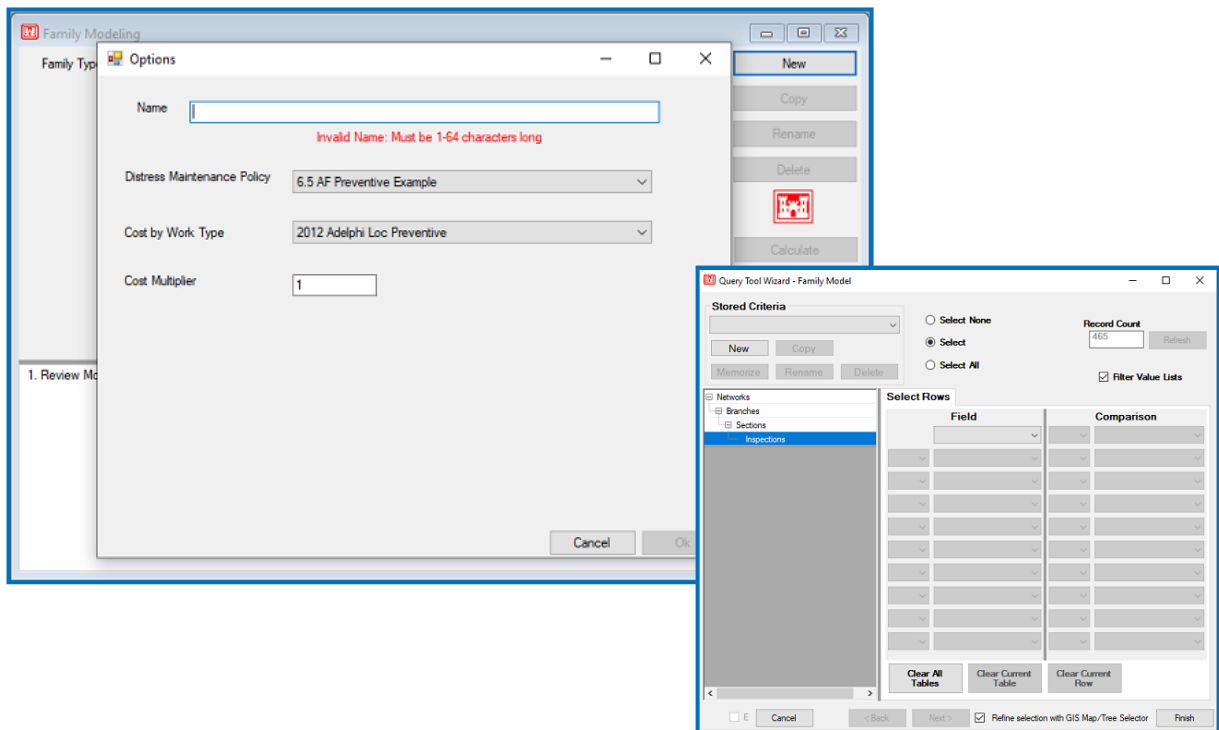
Using the Prediction Model

Click the PCI Family Models tab to display the Prediction Modeling window. The Prediction Modeling window can also be reached by clicking on the Prediction Modeling button on the PAVER™ Button Bar. Click the drop-down arrow on the left side to switch from PCI vs Age to Local Cost vs PCI.

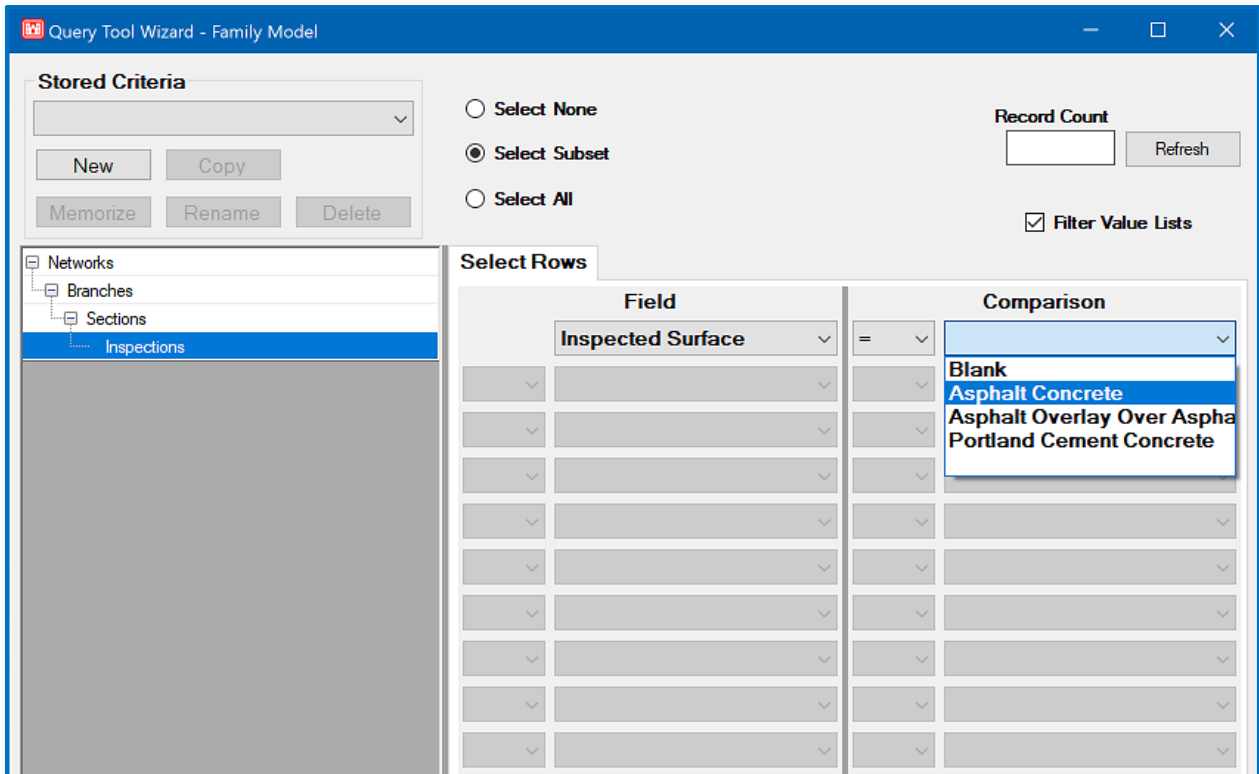
Note:
When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.



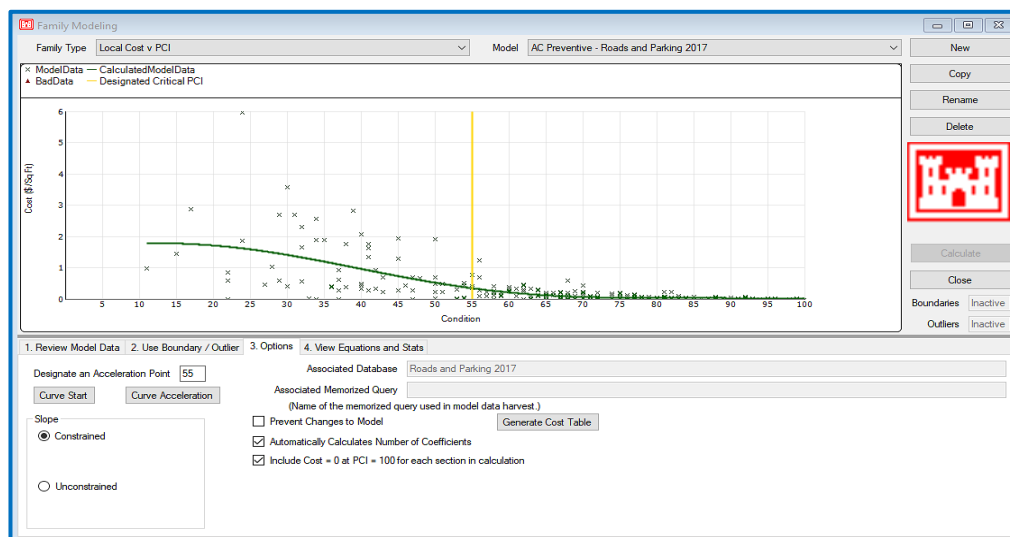
A name (up to 64 characters) will be required before continuing to selections. Select the “Distress Maintenance Policy” and “Cost by Work Type”. Once the “Ok” button is clicked, the EMS Query Tool will pop-up for making selections.



It is recommended that the “Inspected Surface” be used to make the selection.



Once a model is selected or created, the use of eth model tabs is similar to PCI vs. Age with minor exceptions.



Review Model Data

This card is used to collect data from the active PAVER™ database and to build a new family model or adjust an existing family model. To create a new model, click New. You are prompted to provide a name for the new family model being created (entries may be up to 64

characters in length). After naming the family model click OK and the EMS™ Query Tool is presented so that you may select a subset, if desired, of the active database. After selecting the filter criteria (which can be none), the age verses condition points for the pavement sections selected are placed in the grid on the Review Model Data card, as well as displayed on the graph.

The Get Data button at the bottom of the Review Model Data card is used to modify the data used in an existing family model. After clicking Get Data, the user is prompted to use the query tool. Copy creates a new model based on the family model that was active when the Copy button was clicked. To change the name of the model, click Rename, and to delete the active model, click Delete. Extended features can be accessed by right-clicking on the table. The Status column contains no entry for records that are used to calculate the condition prediction curve. Points that are removed from the prediction process by boundary conditions or outlier analysis are labeled as “Out of Range” or “Outlier” points. You can add points to this table if you wish to influence the curve in a particular area. If any records are added or deleted, you must recalculate to refresh the graph.

Use Boundary/Outlier

Upper and lower model boundaries are specified on the Use Boundary/Outlier card. Age vs. PCI points that fall outside the boundaries are marked as “Out of Range” in the Review Model Data table, and are not considered when the predicted condition function is estimated. Points marked as “Out of Range” can be reintroduced into the analysis by turning off the boundaries or shifting the location of the boundaries so those points are in the allowable range. The X Range Filter is used to specify a range on the x-axis from which you want to include data. Data points outside the specified range are ignored.

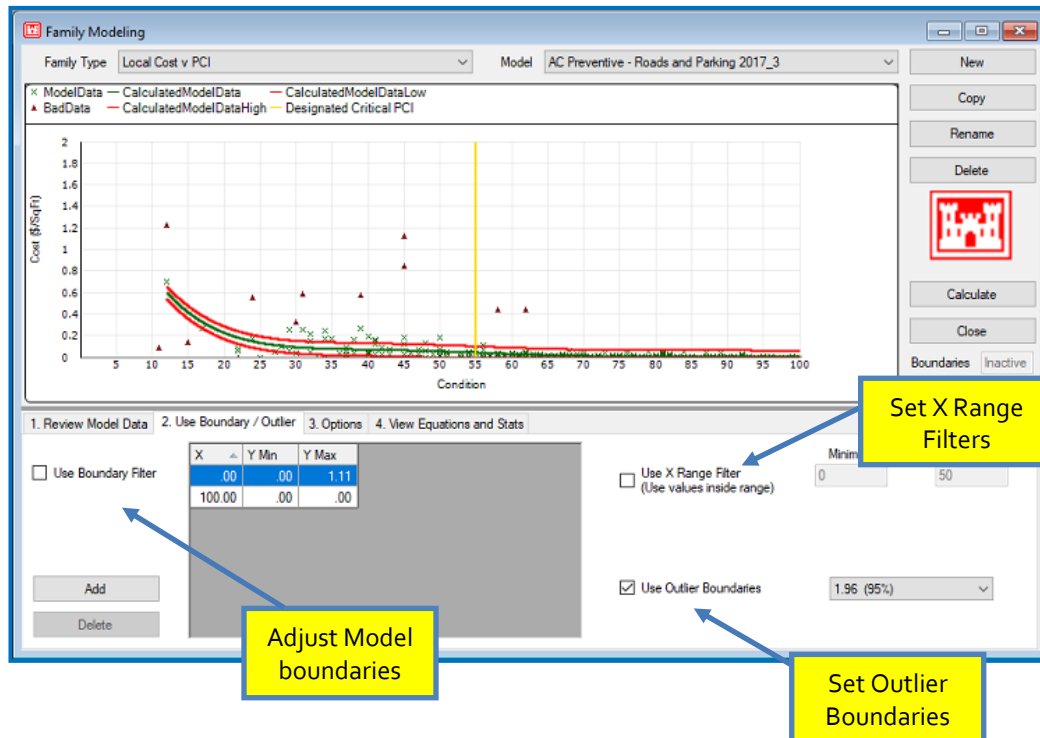
Note:
To edit Use Boundary/Outlier or Collect Model Data tabs, make sure the checkbox next Prevent Changes to Model, in the Options tab, is unchecked.

Model Boundary Filters are adjusted by changing the values in the table on the Use Boundary/Outlier card. To edit or change a value, highlight the row in the table you want to change, and then select the column you wish to edit (year, lower or upper bound) and type the new value (numeric entries only).

Note:
To add or delete rows of boundary data, right-click on the table.

New rows can also be added to the table with the right-click menu. The Add option inserts a blank row in the last row of the boundary data table. Records in the Boundary Filter data table are sorted in ascending order by age (year). Edited and new records are out of order until the model is recalculated. If any new information is entered that differs from the current model, the Calculate button will be activated. After the model is recalculated, the boundary table entries

will be in the proper sort order. The outlier boundaries are used to limit the number of data points used in the computation of the curve. Options for outlier constraints range from 50 to 100 percent. Changing these various options and recalculating, produces different curve results. Use Tab 4. View Equation and Stats, to determine the statistical soundness of your curve.



Options

The Options card is the heart of the statistical analysis performed in the prediction modeling tool. The top-left is where a designated Acceleration Point is set for the user of Curve Start(s), Curve Acceleration(s), or both. In the “Slope” section, the user can choose to constrain the curve upward or downward, or to leave it unconstrained. To prevent changes to the model select the checkbox associated with the label Prevent Changes to Model. If Prevent Changes to Model is unchecked, you will have the option to Automatically Calculate Number of Coefficients or set them manually by unchecking the option, and you will be able to choose whether or not to include Cost = 0 at PCI = 100 for each section in calculation.

The other option available when leaving Prevent Changes to Model unchecked is a button that will allow you to Generate Cost Table.

Condition	Cost	Units
0	1.893	\$/SqFt
10	1.796	\$/SqFt
20	1.709	\$/SqFt
30	1.409	\$/SqFt
40	0.961	\$/SqFt
50	0.52	\$/SqFt
60	0.208	\$/SqFt
70	0.064	\$/SqFt
80	0.034	\$/SqFt
90	0.024	\$/SqFt
100	0	\$/SqFt

1. Review Model Data | 2. Use Boundary / Outlier | 3. Options | 4. View Equations and Stats

Designate an Acceleration Point:

Associated Database: Roads and Parking 2017

Curve Start: Curve Acceleration:

Associated Memorized Query:

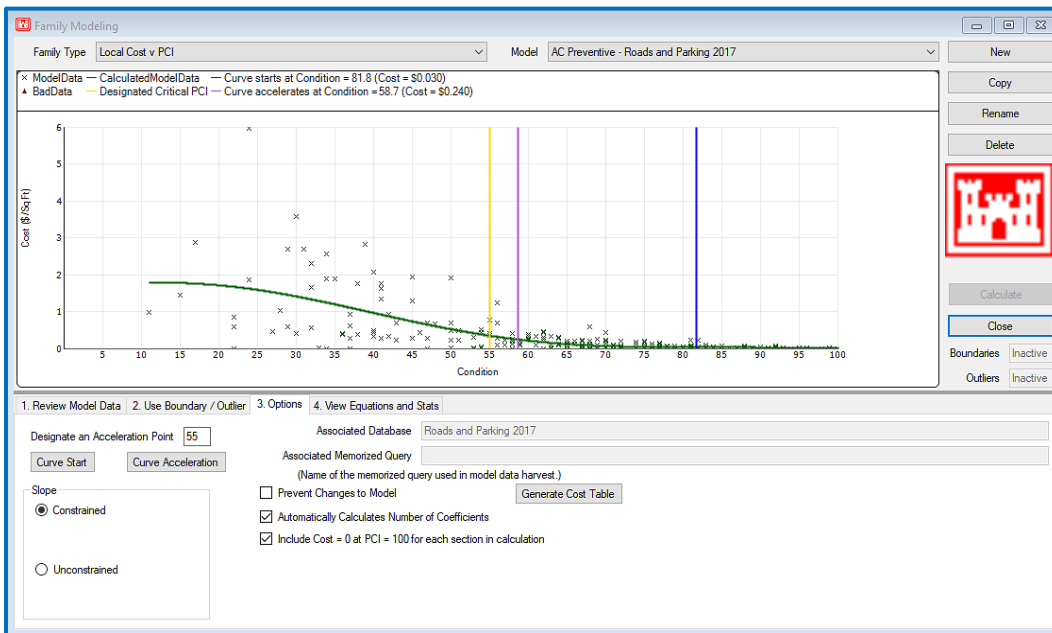
Prevent Changes to Model

Automatically Calculates Number of Coefficients

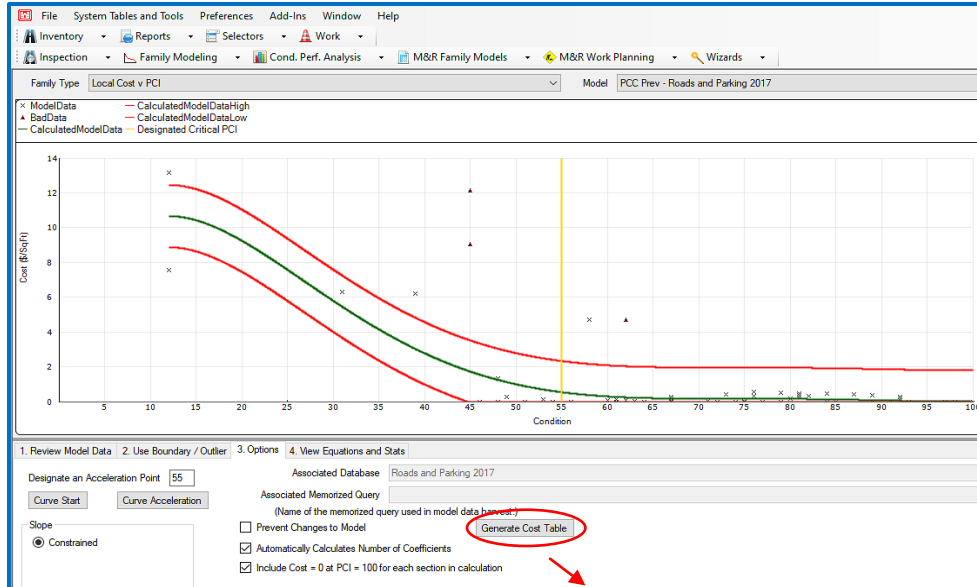
Include Cost = 0 at PCI = 100 for each section in calculation

Slope: Constrained Unconstrained

Curve Start and Acceleration (AC Preventive – Roads and Parking 2017):

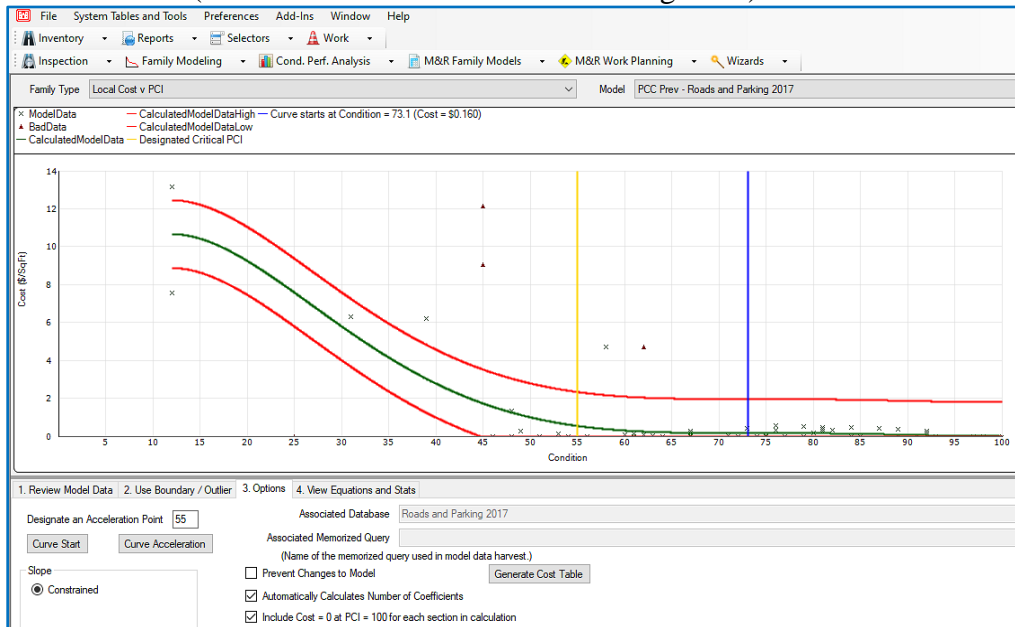


PCC Preventive:

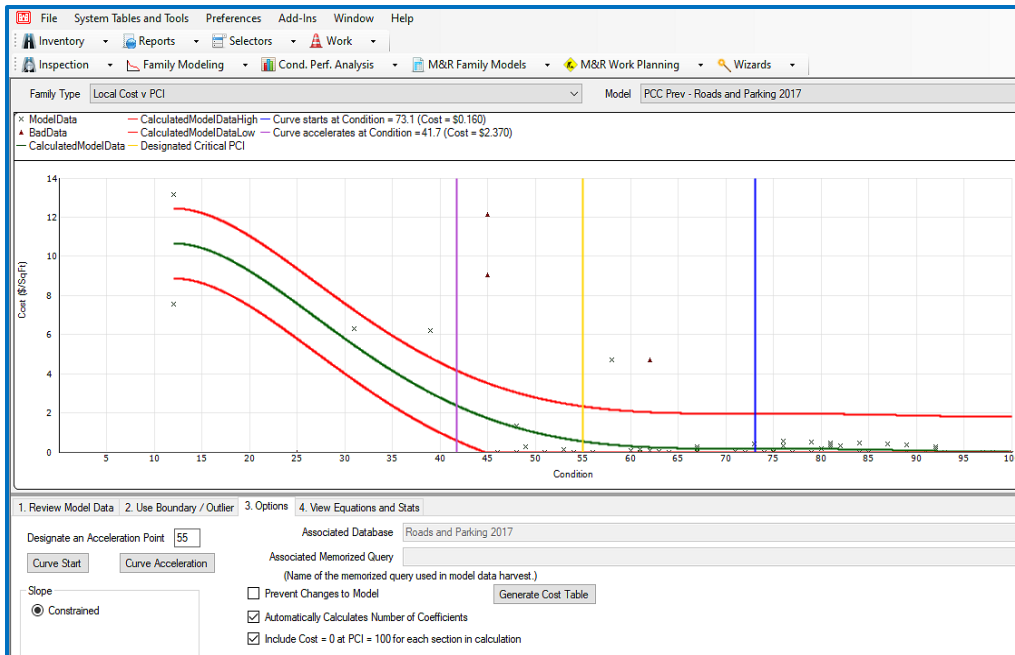


Condition	Cost	Units
0	13.109	\$/SqFt
10	11.067	\$/SqFt
20	9.25	\$/SqFt
30	5.799	\$/SqFt
40	2.777	\$/SqFt
50	0.994	\$/SqFt
60	0.294	\$/SqFt
70	0.166	\$/SqFt
80	0.154	\$/SqFt
90	0.07	\$/SqFt
100	0	\$/SqFt

Curve Start (PCC Preventive - Roads and Parking 2017):



Curve Start and Acceleration:



If the curve doesn't go all the way to PCI = 0, then

- Calculate cost vs. PCI slop from the last 10 PCI points.
- Use the slope to calculate cost for missing table values.

View Equation and Stats

The View Equations and Stats card displays the intercept and coefficient values for the equation estimated to be the best fit for the data. The card also lists various “goodness-of-fit” statistics for the estimated model.

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11. Condition Performance Analysis

New Condition Performance Analysis

The Condition Analysis feature allows the user to view the condition of their pavement network, or any subset of the network, and the analysis is based on prior inspection data, interpolated values between previous inspections, and projected conditions based on family assignment. Once the pavements to be analyzed and the duration of time have been chosen, PAVER™ can predict the deterioration of the pavements. The Condition Analysis tool is opened by clicking the Cond. Perf. Analysis tab on the PAVER™ Button Bar.

Condition Analysis Parameters

When New Condition Analysis is selected, a Condition Analysis parameters window appears. Here the user can decide if they want to run a condition analysis on an Actual Database or a previously created Virtual Database. If an actual database is used, two options are available for selecting inventory items to be reported: All Items and Build Selection using Query Tool, the default is set to All Items. Choose Build Selection using Query Tool to select a subset for the report. After selections are made, the selection criteria are shown in the previously empty box below the Edit Selection button. The Record Count box shows the number of sections included in the current plan.

Note:
You can select a Start Date to show a past condition.

At the bottom of the window the plan start date and plan length, in years, can be defined. The report includes historical information and predicted conditions for selected sections, for each annual interval over the defined plan length.

Viewing the Condition Analysis Report

Once the report has been configured, click Execute to start calculating the report. After the report calculations are completed, the EMS™ Report Viewer tool is presented.

EMS™ Report Viewer

The View menu in the EMS™ Report Viewer can be used to add or remove tables and associated graphs from the report viewer screen. It can also be used to switch between the summary, detail, and map views of the report. The various report views can be selected by clicking the checkboxes next to each corresponding report.

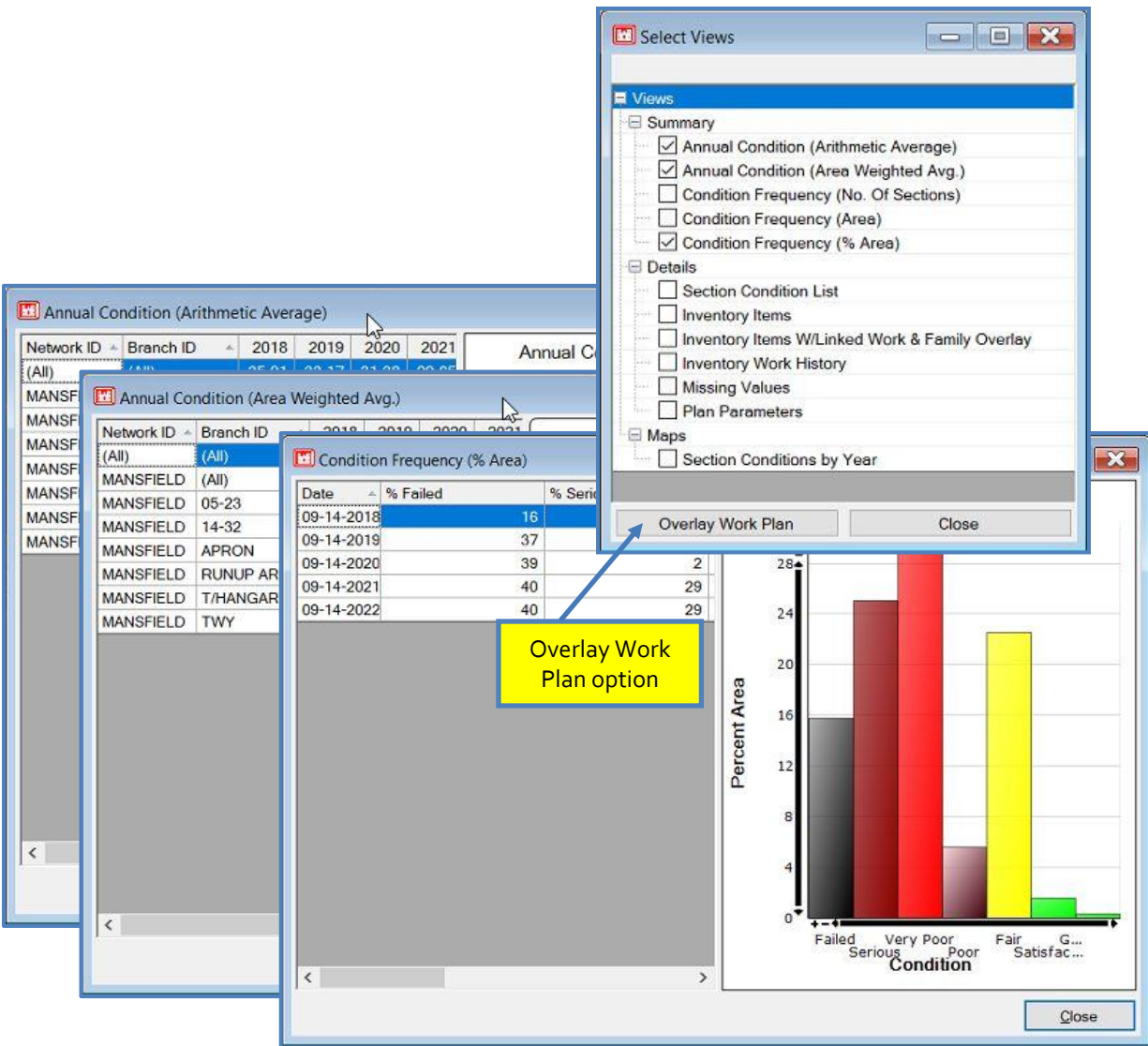
As usual, in order to zoom in on a table or graph, right-click on the desired object and select Zoom. Other options can be selected with a right-click such as: Revise Layout, Change Sort Order, Export, and Print Table.

Note:
Data shown in the Summary View is branch level data, while data shown in the Detail View is section level data.

Summary Views

The Summary version includes the following available views:

- **Annual Condition (Arithmetic Average):** Shows the Annual Condition Arithmetic Average for each branch, for each year, in the reporting period. The first row of the table summarizes all branches included in the report. To view individual branches, click the desired Branch ID to highlight the section. The condition summary table is accompanied by a graph that plots the average condition for the highlighted branch (row) in the condition summary table.
- **Annual Condition (Area Weighted Average):** Shows the Annual Condition Area Weighted Average for each branch, for each year, in the reporting period. The first row of the table summarizes all branches included in the report. To view individual branches, click the desired Branch ID to highlight the section. The condition summary table is accompanied by a graph that plots the average condition for the highlighted branch (row) in the condition summary table.
- **Condition Frequency (Number of Sections):** This table is divided into six default, unless otherwise specified, PCI categories (excellent, very good, good, fair, poor, and failed). Under each of these categories, the number of sections are presented for each year in the reporting period. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.
- **Condition Frequency (Area):** This table is divided into six default, unless otherwise specified, PCI categories (excellent, very good, good, fair, poor, and failed). Under each of these categories the section area is presented for each year in the reporting period. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.
- **Condition Frequency (% Area):** This table is divided into six default, unless otherwise specified, PCI categories (%excellent, %very good, %good, %fair, %poor, and %failed). Under each of these categories, the percent section area relative to the total area is calculated for each year in the reporting period. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.
- **Overlay Work Plan:** Allows the user to choose a previously made work plan, and apply it to the current condition analysis report. This allows the user to see the effect of any planned work on the database, over the length of the analysis.



Note: Selecting Overlay Work Plan will open a form where you can choose a plan name and overlay type to be applied. The Annual Condition (Area Weighted Avg.) window opens with a table of results and a graph.

Detail Views

The Detail version includes the following available views:

- **Section Condition List:** A representation of the condition plot for each section over the length of the reporting period. Highlighting a record in the table causes the graph to respond, displaying the condition information for that section only. To see an average for all sections included in the report, go to the summary views.

- **Inventory Items:** Each row in the table represents one section in the pavement network. As the highlighted row in the Inventory Items table is changed, the Section Condition table updates with historical, interpolated historical, and projected condition values for that section. Each time the Section Condition table is updated, the graph associated with the table re-plots the graphical view of the section condition. This allows the user to quickly analyze the history and predicted condition of the network section by section.
- **Inventory Items W/Linked Work & Family Overlay:** The Inventory Items W/Linked Work & Family Overlay view displays three tables; Inventory item data and corresponding Family Overlay data, along with Activity data, and a Section Condition W/Family Curve graph.
- **Inventory Work History:** The Inventory Work History view displays ALL work history records for every item in the current database.
- **Missing Values:** The Missing Values table displays all values that were not included in the report for the listed description in the table.
- **Plan Parameters:** The Plan Parameters table lists all of the parameters that were defined for the current condition analysis report.

Select Map Views

In addition to the EMS™ Report Viewer, the Condition Analysis report opens a Select Map Views window. This window contains a preset view, Section Conditions by Year, which is linked to the results of the current Condition Analysis report. The resulting display is a year-by-year view of the conditions of each section included in the condition analysis. This GIS view quickly shows the difference in condition from year to year.

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Display or remove borders from polygons

Choose to display Condition by year

PAVER™

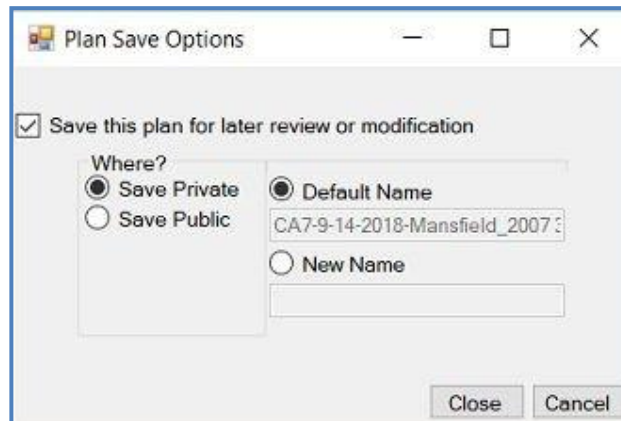
216



Open Saved Condition Performance Analysis

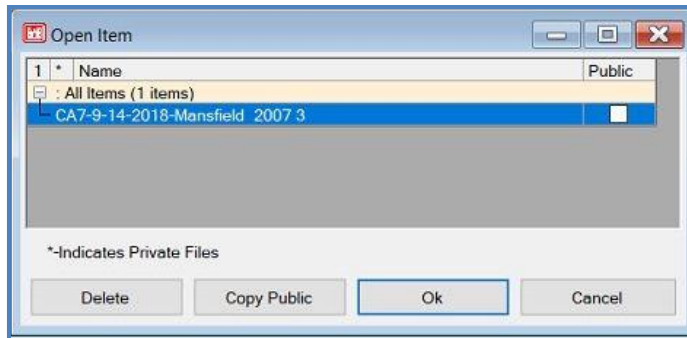
When closing the report, PAVER™ will ask you if you want to save it. If you save the plan, it will create a file name of your choice beginning with "CA." The user will be given the opportunity to save the file as Private or Public and to accept the Default Name or create one.

Note: In a multi-use environment, Private refers to data saved on the local machine and Public refers to data saved on a server.



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You can view a previously saved report by clicking View Existing Report, to the left of Execute, on the Condition Analysis Parameters window. Another method of opening a report is by selecting Cond. Perf. Analysis >> Open Saved Condition Analysis. Select the saved file from the drop-down list on the Open an Existing Item form and click OK to open the saved report.

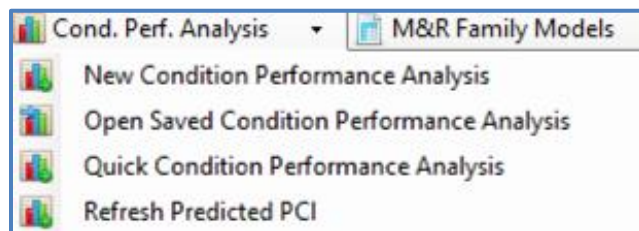


Quick Condition Performance Analysis

A Quick Condition Performance Analysis can be run for five years from the current date to give the user a quick number to reference while in an interface outside of PAVER™ without requiring input from the user.

Refresh Predicted PCI

The Refresh Predicted PCI option can be found listed as the last option in the Cond. Perf. Analysis menu. Use this option when changes have been made to analysis data in order to view the most accurate Predicted PCI results, especially when editing Inspections or Work History data. The same refreshing function can be used through the EMS™ query tool.



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12. M&R Family Models

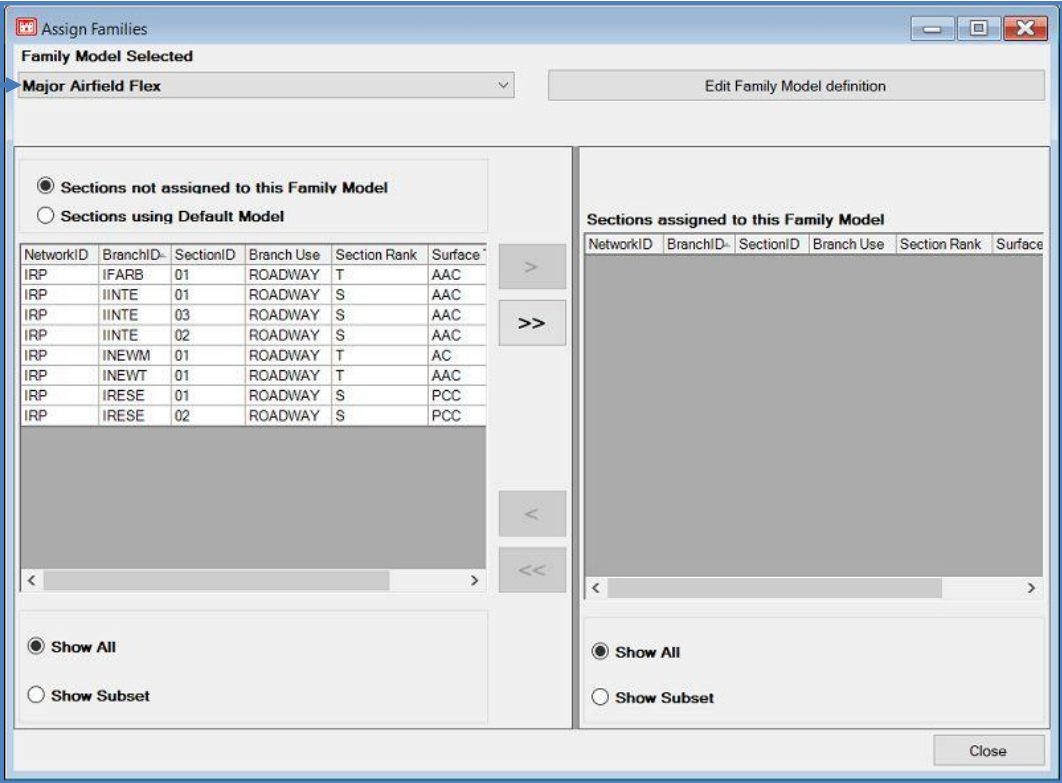
Assign M&R Families

The M&R Family Assignment Tool is used to designate sections to receive specific M&R work, including:

- Localized Stopgap
- Localized Preventative
- Global Preventative
- Major M&R.

Assigning sections to receive specific M&R work helps the user develop a work plan tailored to their specific site. Once sections have been assigned to M&R Families, the M&R Plan is executed (see Chapter 13 [M&R Plan](#)).

M&R Family Assignment selected work type



Assign Families

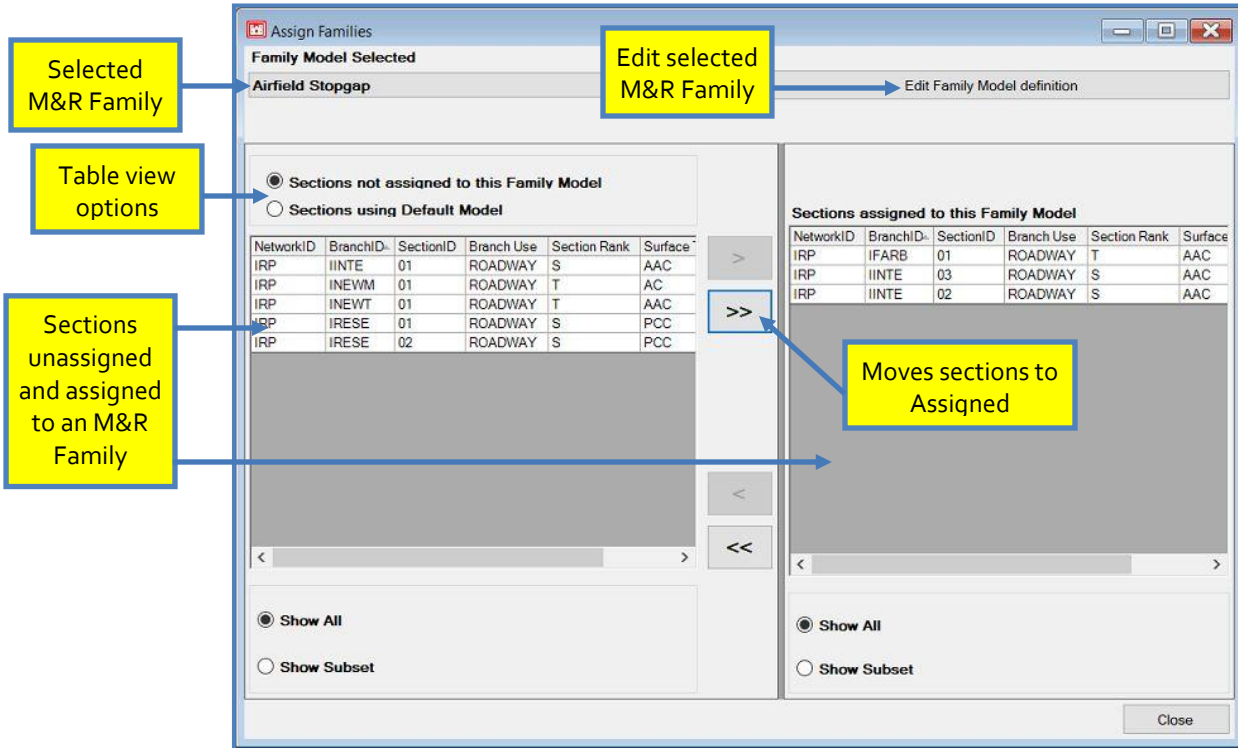
To assign M&R Families select the M&R Family Models tab. If the arrow next to the M&R Family Models button is clicked, the different categories of M&R work will be displayed:

- Localized Stopgap M&R Families
- Localized Preventive M&R Families
- Global Preventive M&R Families
- Major M&R Families

Once an M&R Family Assignment work type has been chosen, the assignment window will open. The M&R Family Assignment Tool interface is very similar to the Condition Model Family Assignment Tool. On the top of the form, the user can select which M&R Family to build upon. There are two previously created default families for every work type, roadway, and runway. Sections can be assigned to the default families, or the user can name and build a new family by clicking on Edit to the right of the selected M&R Family. The user can delete or define a new family with the Delete and Add buttons.

Below the M&R Family selection there are two tables side-by-side. The table on the left shows what sections have not been added to the current family model, and allows the user to build a subset. The table on the right lists all the sections that are currently assigned to the chosen M&R Family.

To assign sections to a M&R Family, highlight the desired section on the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table, assigning it to the selected M&R Family. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Alternately, the left-pointing arrows move sections from the right table to the left table. Once all desired sections have been assigned, press Close to exit the assignment tool window.



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13. M&R Work Planning

New M&R Work Plan

Overview

The PAVER™ Work Plan is a tool for planning, scheduling, budgeting, and analyzing alternative pavement maintenance and repair (M&R) activities. The M&R Plan utilizes basic inventory data combined with inspection information, maintenance policies, maintenance costs, and predictions about future pavement condition. Work Plan results are specific to the user's site, and all factors used in determining future M&R or construction activity, or the associated costs, can be configured to reflect specific pavement management practices and costs.

The Work Plan Parameters window is opened by clicking M&R Work Planning on the PAVER™ Button Bar. The Work Plan report operates like the Condition Analysis report. The Work Plan Parameters window is organized with these five tabs: Plan Setup, Budget, M&R Categories, M&R Families, and Project Planning. When the Work Plan report is configured, execute the report and view the results in the EMS™ Report Viewer.

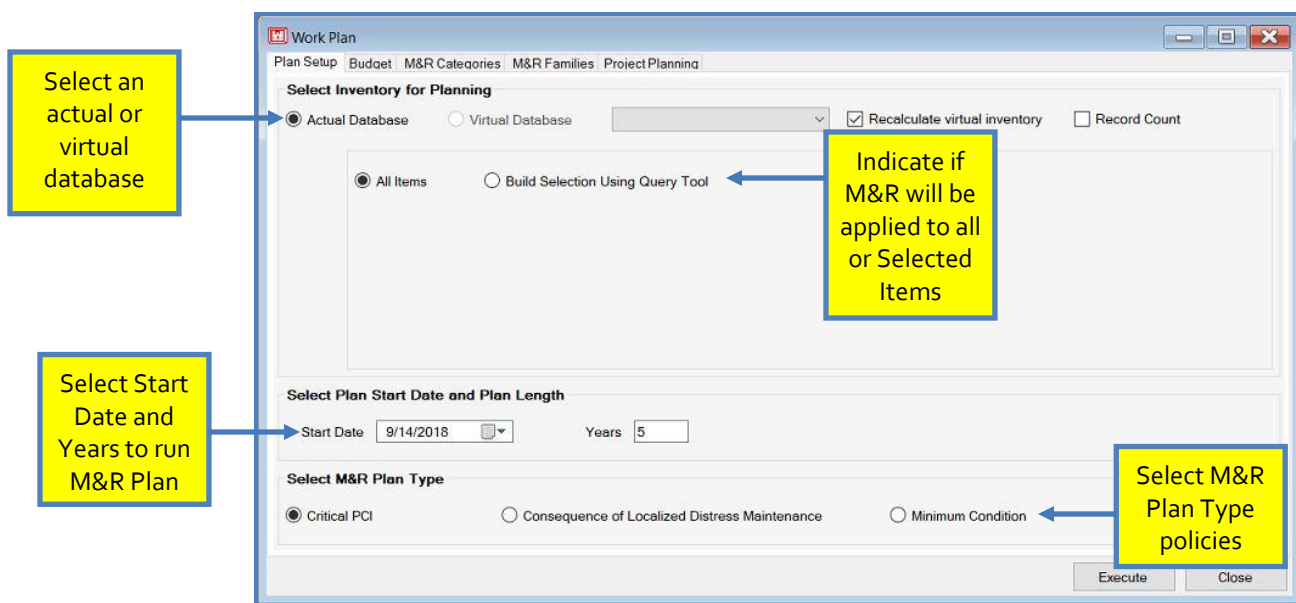
Tab 1 - Plan Setup

The first step when developing a work plan is to establish an inventory. On the Plan Setup tab, the user can decide if they would like to run an analysis on the Actual Database that is currently open, or a preciously created Virtual Database. If the user decides to use an Actual Database, two options are available for selecting inventory items to be reported: All Items and Build Selection using Query Tool. The default is set to All, but to choose a subset of sections or records for the report, select Build Selection using Query Tool. The EMS™ Query Tool window will appear allowing the selection of a subset. If a graphical selection of subsets is wanted, select None, and then OK in the EMS™ Query Tools window. A GIS map and tree selector window will appear, allowing the user to select the desired sections to include in the report. Note that if a GIS map has not been converted into PAVER™, the GIS window will be blank (for further information regarding converting a GIS map into PAVER™, see [Chapter 14](#)). After selections are made in either the Query or GIS windows, click OK to exit out of the selection process. In the M&R Plan Parameters window the selection criteria is shown. When checked, the Record Count box shows the number of sections included in the current plan.

Note:
Selecting the Consequence Model option, on the Plan Setup tab, automatically forces the Years value on the Timing tab to "1".

Below the inventory selection is Select Plan Start Date and Plan Length. Enter the desired Start Date and the number of Years to run the M&R Plan. The Start Date field must be entered in mm/dd/yy format. The drop-down arrow next to the Start Date activates a calendar window for ease of viewing. The Plan Start Date cannot be set to an earlier date than the current date, and the Plan Length must be between one and twenty years.

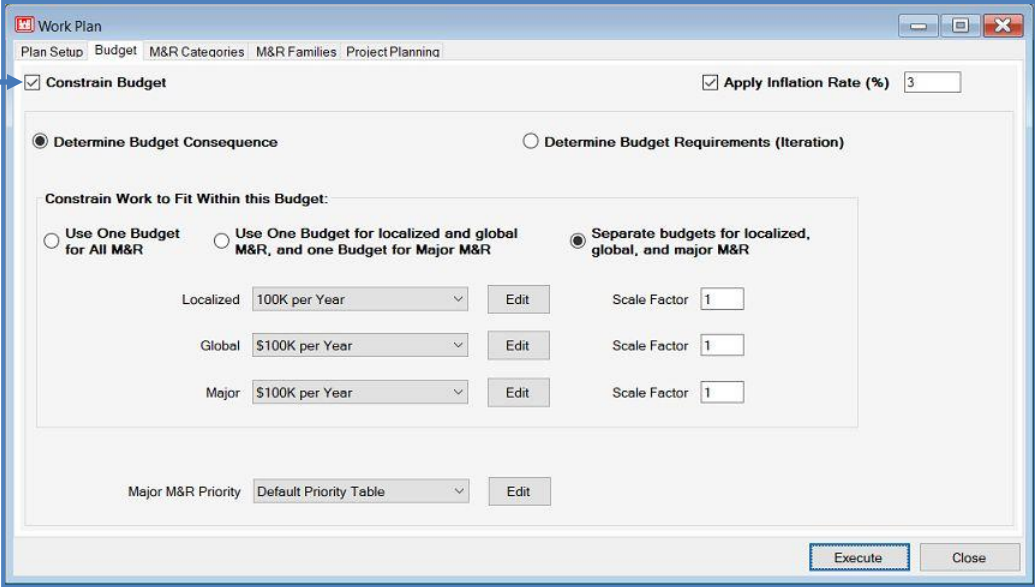
At the bottom of the Plan Setup tab there are three variations of the Work Plan. The first, Critical PCI, optimizes M&R activity against a specified budget, or determines the budget needed to maintain a specified condition Level. The second, Consequence of Localized Distress Maintenance, calculates the cost and resulting condition of immediate implementation of local M&R, for the year of the most recent inspection. Choosing Consequence Model automatically changes the work plan duration in the Timing tab to one year. The Third, Major M&R based on Minimum Condition, lets the user set the lowest pavement condition (PCI) that is allowed per year. To edit or add a new minimum condition table, refer to Chapter 4 System Tables and Tools >> M&R Tables and Families >> [Major M&R Tables and Families](#).



Tab 2 - Budget

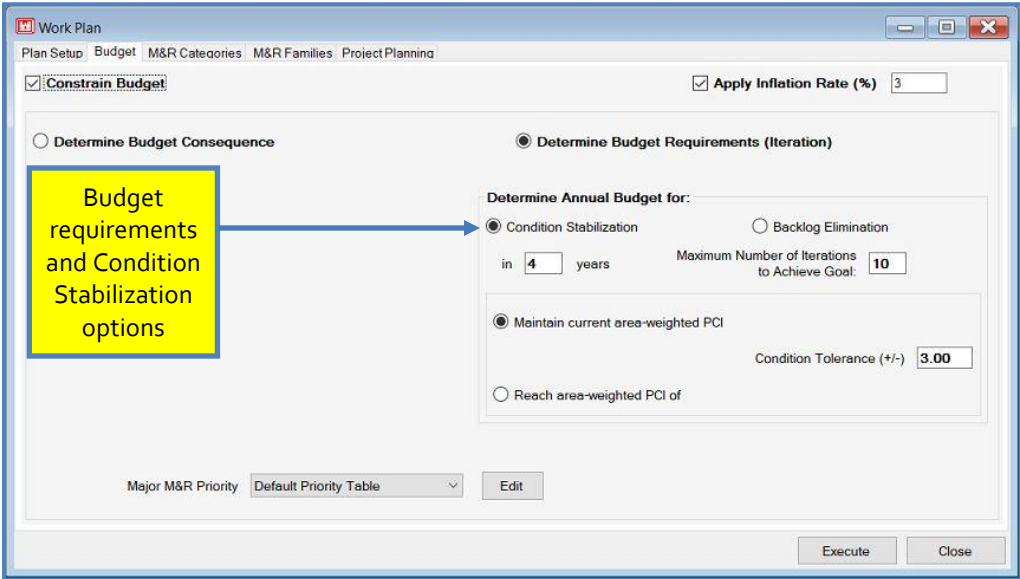
The user can choose to use three different budget split scenarios: one budget (for all M&R), two budgets (one for localized and global M&R and one for major M&R), or separate budgets (for localized, global, and major M&R). Next to each Budget there is a drop-down list box, used to select a previously created PAVER™ M&R budget table for the report. To the right of the drop-down list box is the Edit button, which is used to review and edit the selected budget table, or for creating a new table. The Scale Factor window allows the user to multiply or scale the currently selected budget.

Select if a custom budget is wanted

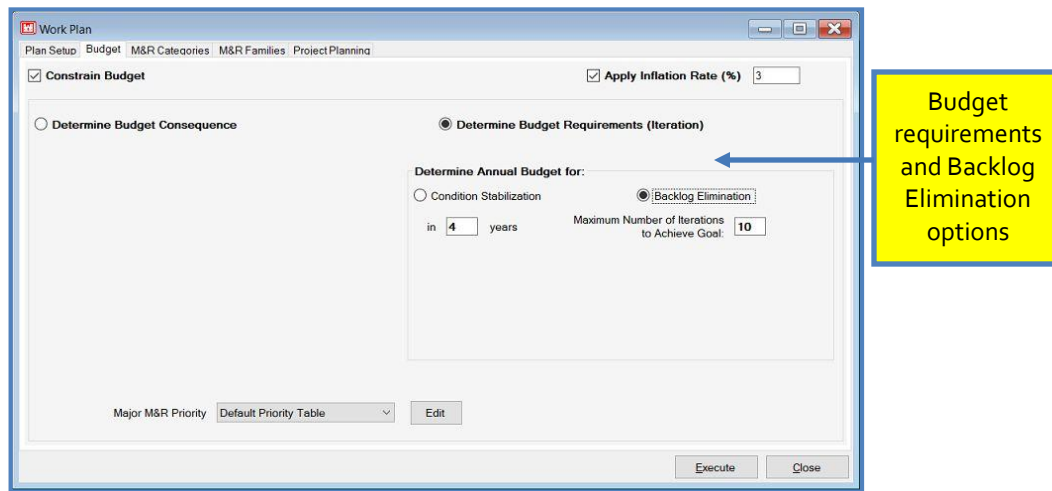


The other main option, Determine Budget Requirements (Iteration), allows the user to view what budget and M&R is necessary to achieve a user-defined goal. When selecting Determine Budget Requirements, two options/ goals appear to choose from: Condition Stabilization or Backlog Elimination in X amount of years. When Condition Stabilization is chosen, two more options appear. The user must specify either Maintain current area-weighted PCI or Reach area weighted PCI of X. Along with these two options are the following plan requirements: Condition Tolerance (+/-) and Maximum Number of Iterations to Achieve Goal. Condition tolerance allows the desired goal to vary within the set tolerance, while the number of iterations tells the program how many times to run to achieve the desired outcome.

Hint:
You can create a budget of \$100,000/Year using the Budget multiplier feature in the M&R Work Plan.



Selecting Backlog Elimination will report what M&R budget is required to achieve an overall section level PCI above critical within X amount of years. Once Backlog Elimination is selected, the year toggle and Maximum Number of Iteration to Achieve Goal options appear. The year toggle sets the number of years to reach backlog elimination. This value must be equal to or less than the total number of years the report was set to run on the Plan Setup tab. Like the Condition Stabilization goal, the maximum number of iterations tells the program how many times to run to achieve the desired outcome.



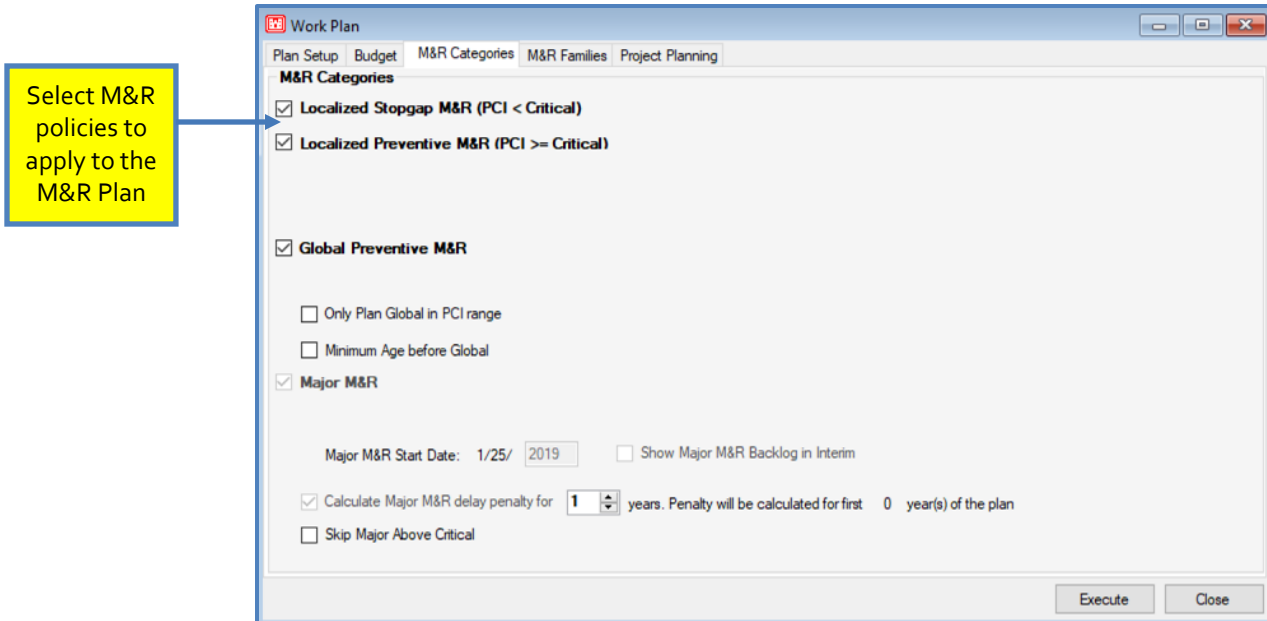
Below the main Use Budget checkbox, is the checkbox to apply an Inflation Rate. Once this is checked, the program will run the report with the defined inflation rate. The default inflation rate is set to 3%.

Tab 3 - M&R Categories

The M&R Categories tab is where the user selects which policies to use in the work plan. The Localized Stopgap (PCI < Critical) option is used to indicate the use of Safety M&R policies, which allows PAVERTM to plan localized stopgap M&R work (pothole filling, etc.) on areas where the PCI is below the critical level. The Localized Preventative M&R (PCI >= Critical) checkbox allows PAVERTM to plan M&R work in localized areas where the PCI is above critical. Just below the local preventative checkbox is a white box with a toggle switch. Here, life extending credit, in years, can be given to any localized preventative work. Applying any preventative work where the PCI is still above critical will save money and add years to the pavements life. The Global Preventative M&R checkbox allows PAVERTM to plan M&R work on a global level. This M&R includes any slurry seal or other global preventative work where the pavements life is increased. The Major M&R checkbox allows PAVERTM to plan major M&R work. Work in this area includes any overlay or other major work where the resulting pavement has a PCI of 100. Below the Major M&R checkbox is an option to specify the Start Date of the Major work, a value within the

Note:
The user may create multiple M&R Cost by Condition tables.

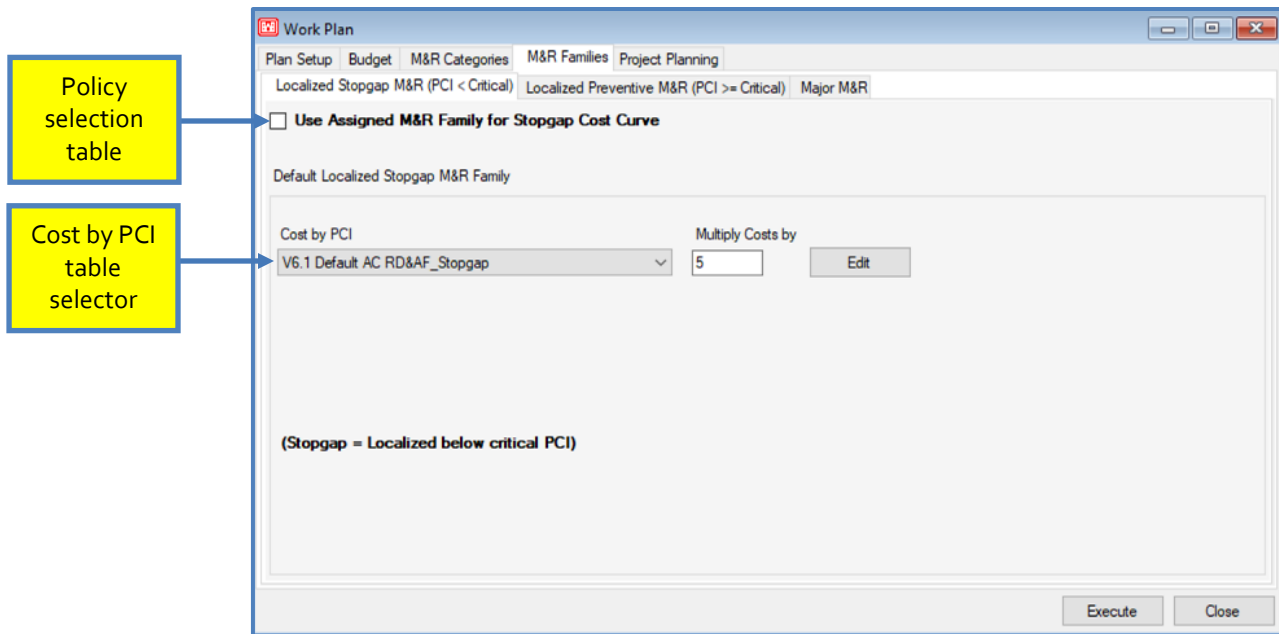
specified plan length set on the Plan Setup tab. Below and beside the Start Date are the checkboxes: Calculate Major M&R delay penalty and Show Major M&R Backlog in interim. Calculate Major M&R delay penalty reports any delay costs associated with delaying the start date of Major M&R over the length of the work plan. Show Major M&R Backlog in interim displays any remaining backlog between the years of calculation.



Tab 4 - M&R Families

On this tab, M&R Families are assigned to four specific M&R policies, arranged in tabular form: Localized Stopgap M&R, Localized Preventative M&R, Global Preventative M&R, and Major M&R. On each of the four policy tabs there is a checkbox to Use Assigned M&R Families. If the checkbox is selected for any of the policies, the box below will prompt the user for information regarding unassigned sections. On the Localized Stopgap M&R, Localized Preventative M&R, and Major M&R tabs, the individual Cost By PCI tables can be chosen by the drop-down arrow, or viewed by the Edit button. On the Global Preventative M&R tab, the cost table can also be chosen or Edited and the specific Global Work Type defined. For further information about editing any of the policy Cost By PCI tables please refer to Chapter 3 System Tables. Like the Budget tab, there is also a Multiply Cost window that can be used scale the already existing cost table which is being used. If none of the boxes are checked, or no M&R Families have been created, PAVER™ will assign all sections to the default family for that policy. Please refer to Chapter 12 [M&R Family Assignment](#), for more information on assigning sections to M&R Families.

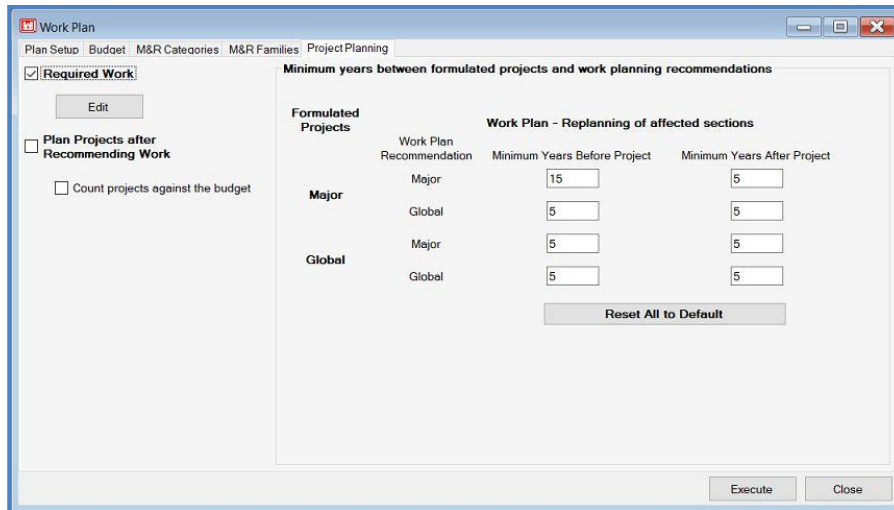
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Tab 5 - Project Planning

On the left-side of the Project Planning tab, there are two main options: Required Work and Plan Projects after Recommending Work. If Required Work is selected, PAVER™ will include in its M&R analysis, any previously designated required projects. The edit button below the selected Required Work option is used to create and edit projects. If Plan Projects after Recommending Work is selected, PAVER™ will allow the user to plan M&R after the plan is executed through a Project Planner window. This window will open automatically, along with the Executed M&R Plan results, and allows the user to apply any created projects to the executed plan directly. If either Required Work and/ or Plan Projects after Recommending Work is selected, a work interval section is shown on the right-hand side of the tab. This section sets a minimum and maximum time interval for which PAVER™ is allowed to recommend work in the work plan, on any required projects. The time interval can be set for both Required Major and Required Global work types, and their appropriate global and major work intervals.

To view existing projects or plan required projects, click Edit below the Required Work checkbox. When this is clicked, a new Project Planner window will appear, and in the upper-left corner, a Current Project box. Here, previously created projects can be selected by the drop-down arrow, or new projects can be created by selecting New. Projects can be copied, renamed, or deleted by clicking on the appropriate buttons. Any completed projects can be moved to PAVER™'s work history by using the Project Completed - Move to work History button on the top-right corner of the window.



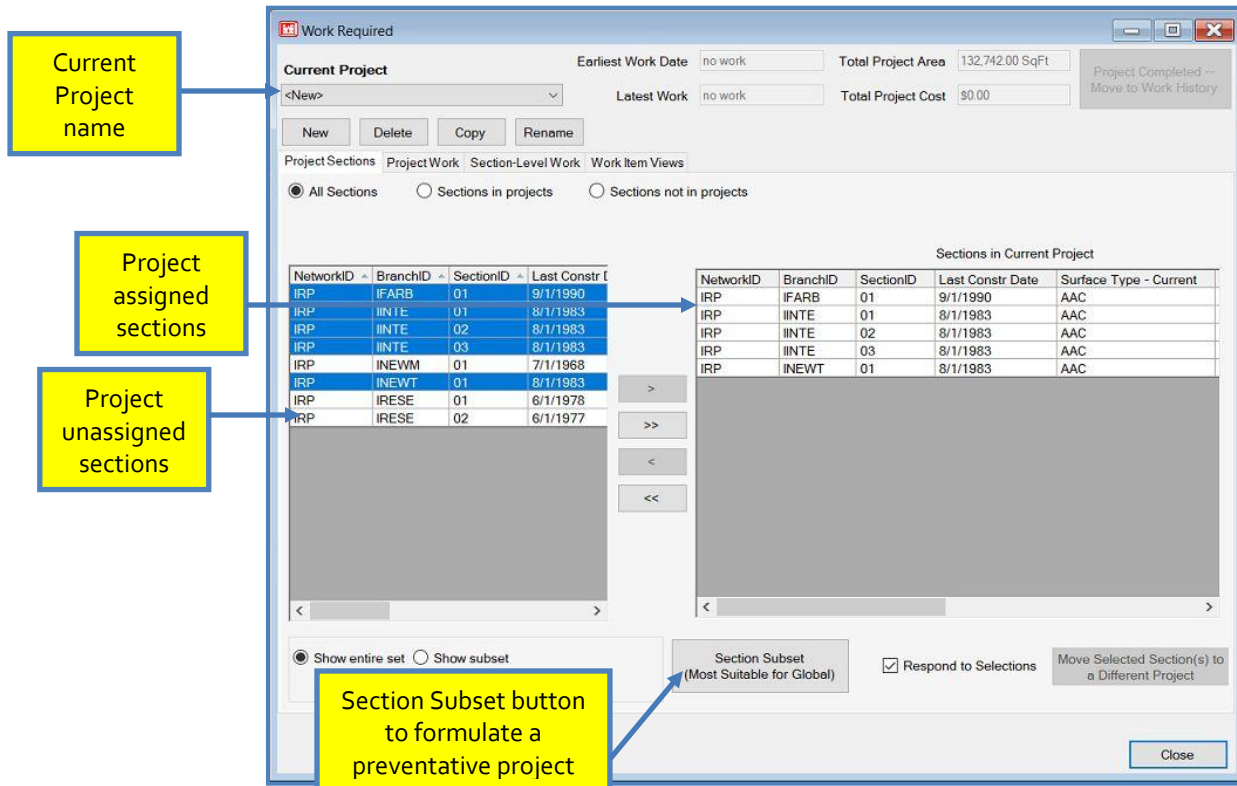
To create a new project, first name the project, then begin assigning sections and their associated work to the project. On the Project Planner window, there are three tabs: Project Sections, Project Work, and Section-Level Work. On the Project Sections tab sections are assigned to the project. The table on the right lists all the sections that are currently assigned to the chosen project, while the table on the left is mainly there to view the sections that have not been assigned to the current project. To assign a section to a project, highlight the desired section in the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table and assign it to the selected project. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Similarly, the left-pointing arrows move sections to the left table from the right table. Moving sections to another project can be done by highlighting them and clicking Move Selected Section(s) to Different Project, located at the bottom of the window. This button also gives the user the option to copy the associated work with the section(s).

Once sections have been assigned to a project, the user can begin to assign work, using the three remaining tabs: Project Work, Section-Level Work, and Work Item Views. The Project Work tab is used to assign work items that are to be applied to all of the sections in a project, the Section-Level Work tab is used to assign work to individual sections in a project, and the Work Item Views tab is a summary of the assigned projects.

On the Project Work tab, any previously assigned project level work will be listed in the table area. To the left of the table there are three buttons to modify project work items: Add, Edit, and Delete. To add project work, select Add, and a new window appears called Add Work Item - Project Level. Here, the Phase of the project, Work Category, Work Date, Work Type, Material Type, and Thickness are entered. Costs can be entered in two different ways for project work. The first method is to base the

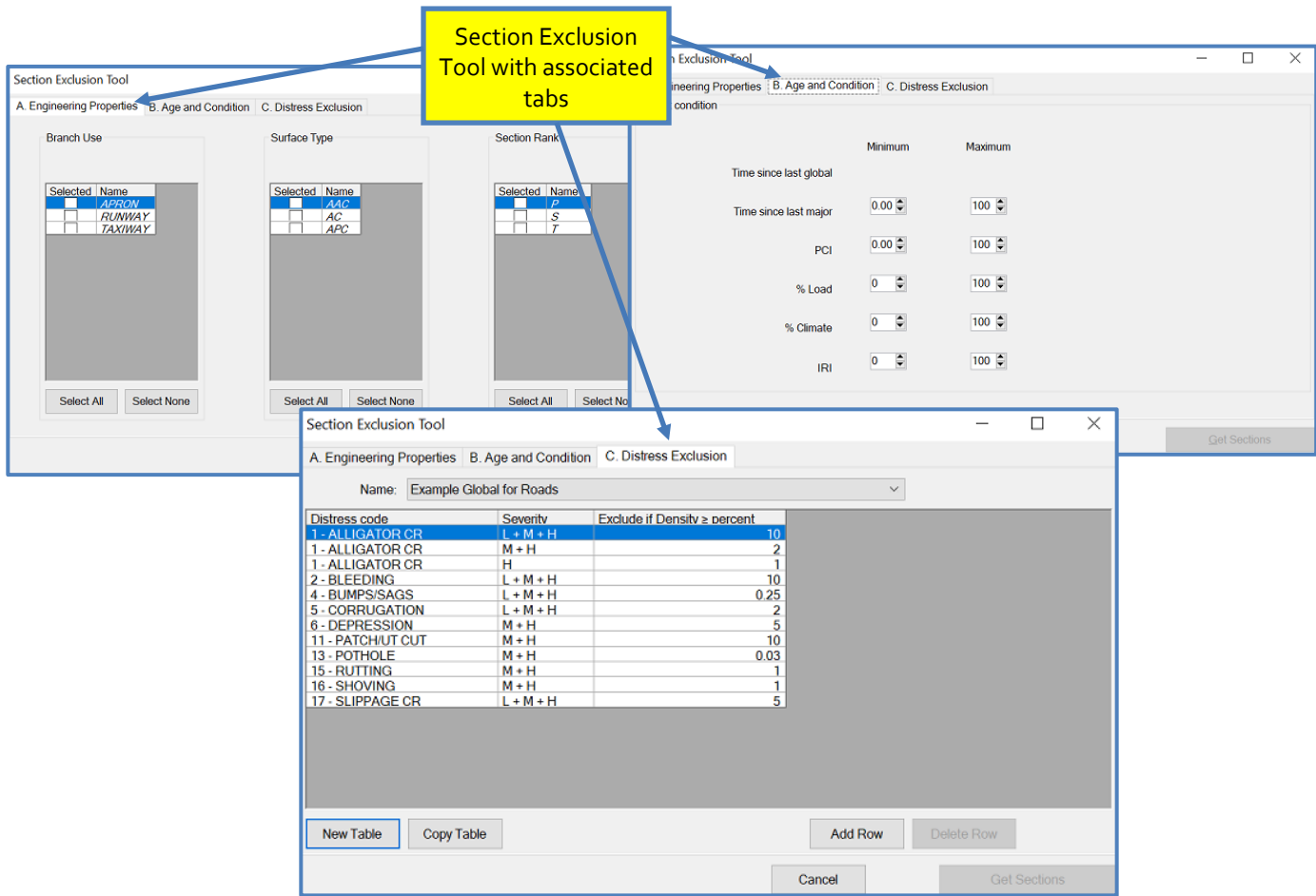
Note:
 Work quantities should be entered as positive values, except for cold milling, which is a negative value.

work cost on an area unit cost, by selecting the Calculate Unit Cost option and then a default or customized Cost Table via the drop-down arrow. Once the Cost Table is selected, click Unit Cost from Table and PAVER™ will calculate the Total Cost. The second method to enter a work cost is to simply enter the pre-determined Total Cost, by selecting the Total Cost option and then entering the Total Cost in the space provided. After any Comments have been entered at the bottom of the window, select OK to exit out of the window, or select Apply to add another work item. Once back on the Project Work tab, all of the project level work will be listed in the table for easy review.



To formulate a preventative project, first create a new project in the work required window. Before beginning to assign sections and associated work to the project, click the Section Subset button at the bottom middle of the form. This will open the Section Exclusion Tool window, which has three tabs: A. Engineering Properties, B. Age and Condition, and C. Distress Exclusion. The Engineering Properties tab allows the user to set Branch Use, Surface Type, and Section Rank parameters. At least one selection must be made for each branch attribute in order to activate the Get Sections button at the bottom right corner of window. The Age and Condition tab allows the user to set latest condition minimums and maximums for time since last global and last major, PCI, percent load, percent climate, and IRI. On the Distress Exclusion tab, the user can add rows for desired distress codes. Distress codes can then be constrained by severity and exclusions by density can be set. This tab also allows users to save sets of distress exclusions for application to additional preventative projects.

Once the desired parameters have been set in the Formulate Preventive Projects window, click the button at the bottom right. If the Get Sections button is not enabled, return to the Engineering Properties tab and confirm at least one selection has been made for each category. If the parameters that have been selected result in 0 sections, a dialog prompt will open, allowing the user to either cancel the project or modify the selections made. See Chapter 8, [Required Projects](#) for more information on the Section Exclusion Tool.



The sections remaining after the parameters have been applied will appear on the left side of the Work Required window. The number of sections returned from Project Formulation will also be displayed left of the Select Sections button. The user can then click the Edit button to the right of the radio buttons which will open the standard Query Tool. After entering query information and clicking the finish button, a dialog box will open if project formulation parameters are active. Selecting yes will display the intersection of the Project Formulation Results and Query Tool Results in the Work Required window, and selecting no will display only the query tool results. The area between the radio buttons and the Select sections button

will change to indicate how many sections are being displayed and from which tools the sections were curated.

The Section-Level Work tab operates like the Project Work tab. On the left-side of the tab there is a table listing all of the sections in the current project. When a section is highlighted in the left table, the right table will display what work items are associated with that section. Any project work that has been assigned on the previous tab will appear for every section. The buttons on the far right of the tab are used to modify the individual work items. To edit or delete any of the items, highlight the desired work item in the table, and this will activate the edit and delete buttons. If any new items are added or old items are edited, the user form operates and looks like the Add Work Item - Project Level. Project level work must be edited on its own tab and cannot be edited on the Section-Level Work tab.

Work Items View tab gives a summary view of the work items, or you can select to view the details of each work item.

Once all of the desired work has been planned, close out of the Project Planner to return to the main M&R Plan Parameters window. Once the Work Plan has been fully configured, clicking Execute on the bottom of the M&R Plan form launches the process. The plan analysis may take some time, depending on the plan configuration as well as the database size.

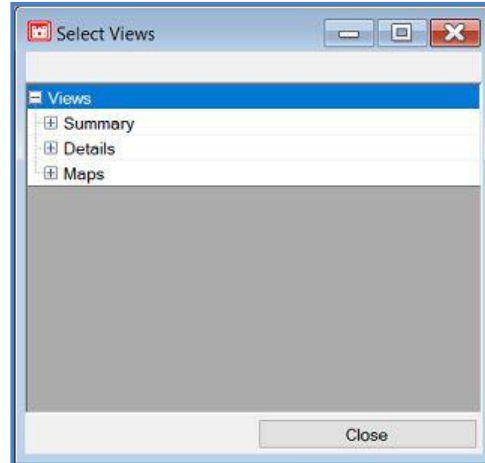
The screenshot shows the 'Add Work Item -- Project Level' dialog box. It contains the following fields and controls:

- Project:** A text box containing '<New>'. A callout box labeled 'Current project name and phase' points to this field.
- Total Project Area:** A text box containing '132,742.00' with 'SqFt' to its right.
- Work Category:** A dropdown menu showing 'Localized MR'.
- Work Type:** A dropdown menu showing '(PA-AS) - Patching - AC Shallow'.
- Work Date:** A date picker showing '9/14/2018'. A callout box labeled 'Work details' points to this field.
- Material Type:** A dropdown menu.
- Thickness:** A text box containing '0.00' with 'in' to its right.
- Select Item to Be Calculated:** A section with three radio buttons:
 - Unit Cost:** A radio button (unselected), a text box containing '\$4.50', and '/ SqFt' to its right. A callout box labeled 'Cost of project work' points to this section.
 - Quantity:** A radio button (selected), a text box containing '0.00', and 'SqFt' to its right.
 - Total Cost:** A radio button (unselected), a text box containing '\$0.00'.
- Unit Cost From Table:** A section with a button '<< Unit Cost <<', a text box containing '\$4.50', and a dropdown menu showing 'New Default AC&PCC_RD&RW'.
- Comments:** A large text area.
- Buttons:** 'OK', 'Apply', and 'Cancel' buttons at the bottom right.

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Analyzing M&R Activity

When the report calculations are completed, the Work Plan report is presented in the EMS™ Report Viewer tool. The views on the EMS™ Report Viewer tool can be changed between a Summary, Detail, and Map views.



Summary View Section

The Select Views menu is used to add or remove tables and their associated graphs from the report viewer screen. Tables or graphs which are active in the current report view, have a checkmark to the left of the table or graph's name.

Note:

Data shown in the Summary View is branch level data, while data shown in the Detail View is section level data.

Summary views include:

- **Condition Frequency Before Repair:** This table is divided into six default PCI categories unless otherwise specified (excellent, very good, good, fair, poor, and failed). Under each of these categories, the number of sections is presented for each year in the reporting period before repair. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.
- **Annual Condition After Repair:** Displays the condition of each branch and the entire network(s) after the recommended work has been performed.
- **Condition Table:** Shows a “before and after” average condition of all sections included in the current plan and for each year of the plan.
- **Total Funded/ Total Unfunded:** These tables show how much money was spent (Funded) and how much PAVER™ wanted to spend but did not have the funds (Unfunded or Backlog).

- **Expenditure Summary:** Lists the category and amount spent per year. Project Summary: Lists all of the projects and project details that were included in the M&R Plan report.
- **Project Contents (link Project Summary):** This table is linked with the Project Summary table, and lists the sections and section details of the project that is highlighted on the Project Summary table (which is included in the M&R Plan report).
- **Expenditure Summary:** Displays an overview of funding by year.
- **Workplanner Funded Table:** Shows a breakdown of work costs generated by the Workplanner by year and work type.
- **Required Funded Table:** Shows a breakdown of work costs related to Required Projects.

Detail View Section

The Detail section of the Work Plan includes Section M&R and Resulting PCI by Year table, Major M&R by Section table, Inventory Items table, Funding Detail Table, Delay Penalty Details table, Missing Values table, and Plan Parameters table.

Table definitions include the following:

- **Section M&R and Resulting PCI by Year:** Displays a detailed section list of the M&R that PAVER™ recommends be completed on a yearly basis.
- **Major M&R by Section:** These tables further break down the PAVER™ recommended M&R, by separating the Major M&R by section. The separated Major M&R tables are also accompanied by specific M&R section details.
- **Inventory Items:** Displays all inventory items included in the report by section, and lists section details.
- **Funding Detail Table (all section):** Shows a detailed breakdown of the funding categories, for all sections included in the M&R Plan report.
- **Delay Penalty Details:** Shows a detailed breakdown of costs associated with delaying work.
- **Missing Values:** Displays all values that were not included in the report, for the listed description in the table.
- **Plan Parameters:** Shows the parameters that were defined for the current condition analysis report.

As with the Condition Analysis Report, the M&R Report also produces a Maps section that allows the user to see GIS views associated with the current M&R Report. The preset views are:

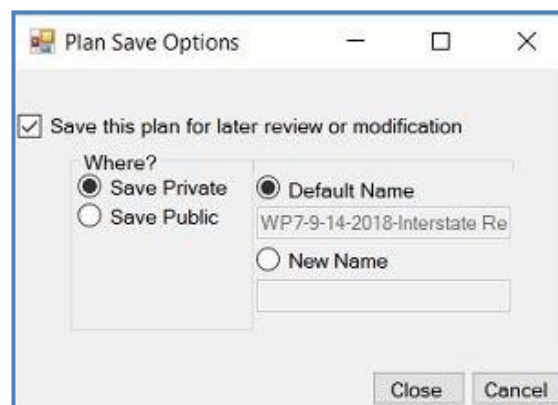
- **After Conditions by Year:** Shows the condition of each section in the report “after” the funding (work) has been applied to that section.
- **All M&R by Year:** Shows the PAVER™ recommended M&R, both Global and Major, for each year of the M&R Plan report.
- **Major and Global M&R All Years:** Shows the PAVER™ recommended Global and Major M&R over the entire length of the M&R Plan report.
- **Project Assignments:** Displays the planned projects (sections included) that were created before running the report.
- **Major M&R for all Years:** Displays the time period within the length of the plan at which Major M&R is recommended.
- **Major M&R By Year:** Displays only on Major M&R work per year, and is split into two categories: Above Critical (for sections above the critical PCI) and Below Critical (for sections below critical).
- **Global M&R By Year:** Displays only on Global M&R work per year. Localized M&R by year: Displays only on Local M&R work per year.
- **Localized M&R By Year:** Displays which type of Localized M&R is recommended by year.

Note: GIS views are only available if a coverage or shapefile is linked to a database (See Chapter 5 [GIS Assignment Tool](#)).

Open Saved M&R Work Plan

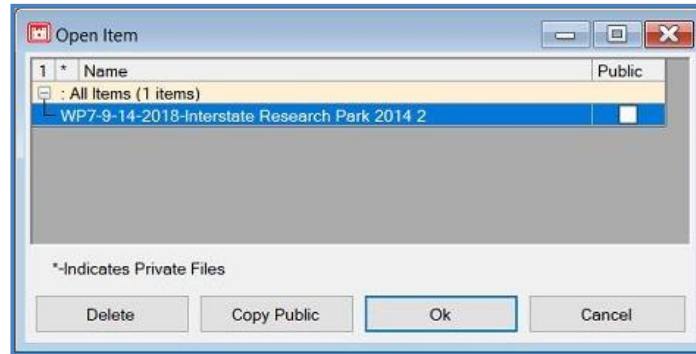
As with the Condition Analysis reports, a user can save any M&R Plan that is run, saving the time it takes to execute the report. Depending on the speed of the computer, the parameters of the report, and the size of the database, this could be a significant advantage. Saving a M&R Plan also provides an easy and efficient method to compare different reports.

The Save option opens when the user closes the EMS™ Report Viewer.



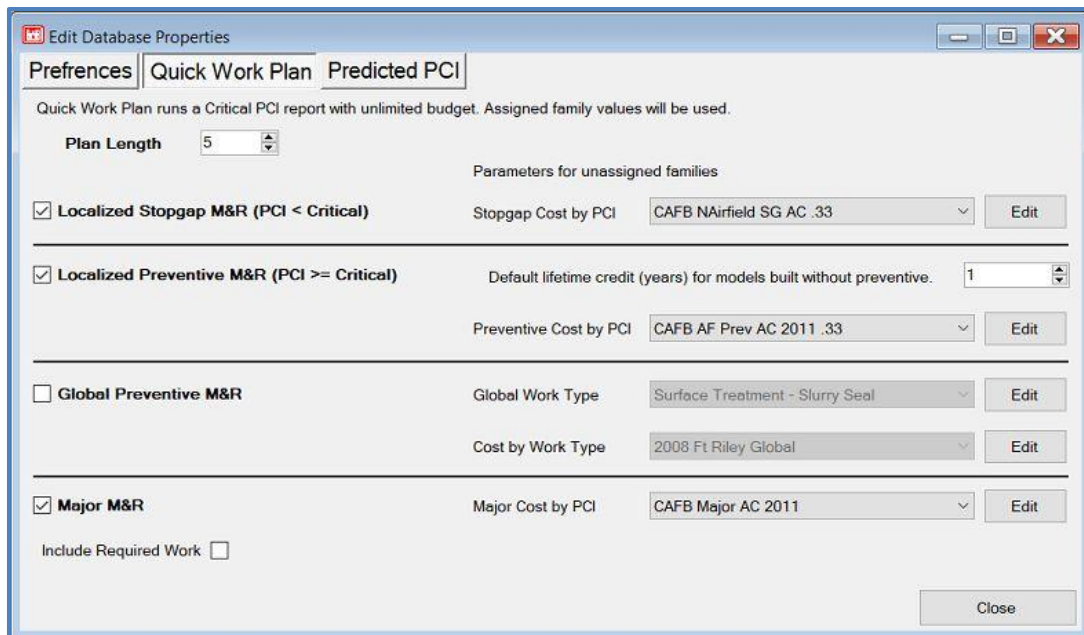
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To Open an Existing M&R Plan go to M&R Work Planning >> Open Saved M&R Work Plan, select the desired Work Plan from the dropdown list, and click OK.



Quick M&R Work Plan

A Quick M&R Work Plan can be run to give the user a Critical PCI report with an unlimited budget to reference while in an interface outside of PAVER™ without requiring input from the user. The parameters for a Quick M&R Work Plan can be changed by selecting the second button at the top of the Database Properties window.



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14. Wizards

The Wizards menu includes:

- Last Construction Date Wizard
- Set Properties Wizard
- Section Split Wizard
- Work Entry Wizard
- Add Work History from GIS/Tabular Data
- Add Inventory from GIS/Tabular Data
- Update Inventory from GIS/Tabular Data
- Import Inventory Samples from GIS/Tabular Data
- Export Inspection Data (XML)
- Export Inventory for FieldInspector™/ImageInspector™ (I70)
- Import XML Inspection Wizard
- Inspection Report/Forms/Setup
- Import Default Inventories

Last Construction Date Wizard

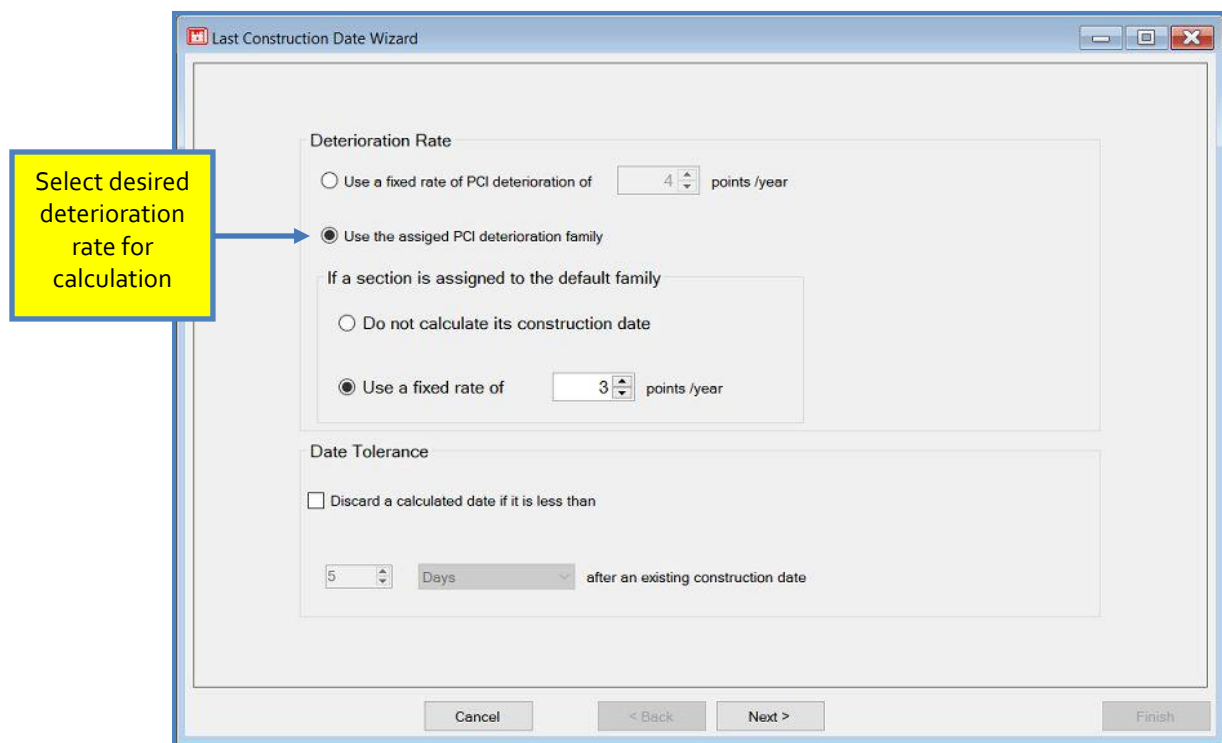
The Calculate Last Construction Date Wizard is utilized to determine the most recent construction date for selected sections. The wizard conducts the calculation according to a specified deterioration rate, and discards any inconsistent data.

Access the Calculate Last Construction Date Wizard from the PAVER™ Button Bar by choosing Wizards and selecting Last Construction Date Wizard. First, choose the Deterioration Rate. Selecting Use a fixed rate of PCI deterioration will enable PAVER™ to use the current PCI and linearly backtrack to the construction date (to a PCI of 100) with the specified points per year. Selecting Use the assigned PCI deterioration family causes PAVER™ to use the current PCI, and the assigned PCI deterioration family model, to determine the construction date. For sections assigned to the default family, the user can choose not to calculate its construction date or to Use a fixed rate of a specified points/ year. Under Date Tolerance, the user has the option to discard a calculated date if it is less than a specified time interval after an existing construction date. This allows PAVER™ to keep any existing construction date that is reasonable, when compared to the calculated date. If the calculated date is less than the existing construction date, the calculated date is automatically thrown-out and will not be used. After selecting calculation parameters, click Next and Select the sections

Note:
If calculated dates are before an existing construction date, PAVER™ will automatically discard the calculated date.

to be included with the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included.

Select Calculate to run the Calculate Last Construction Date Wizard. PAVER™ will display the Results, listing the sections and relevant information such as the calculated construction dates. Select Show rejected dates, and PAVER™ will display any sections that were discarded (any sections with calculated dates before existing dates, or sections not meeting the specified tolerance). Review the results and deselect any sections you do not want the new calculated construction date applied to. The user can click Select All or Clear All, which will select/ clear all the sections in the Results table, or the user can select/ clear a section one at a time in the table. Select A Subset, allows the user to create a subset of sections to select. The Generate Work Report checkbox allows the creation of a work report for the sections. Once the results are reviewed, click Finish and PAVER™ will assign the new calculated construction date to the selected sections and generate a work report if desired.



All PAVER™ calculated last construction dates can be viewed using User-defined Reports. To view all of the sections that have had their last construction dates calculated, select Reports >> User Defined Reports >> Create New Report. Select all of the standardized columns used when creating a report (Network ID, Branch ID, Section ID, Date, etc.), and then highlight Latest Work on the tree selector and open the Select Rows tab. In the Field list box, select Work. In the Comparison list box, select =. In the Compare To list box, select Back-

calculated Construction. Once the drop-down list boxes are defined, select OK to view all of the sections that have had their last construction dates calculated.

Set Properties Wizard

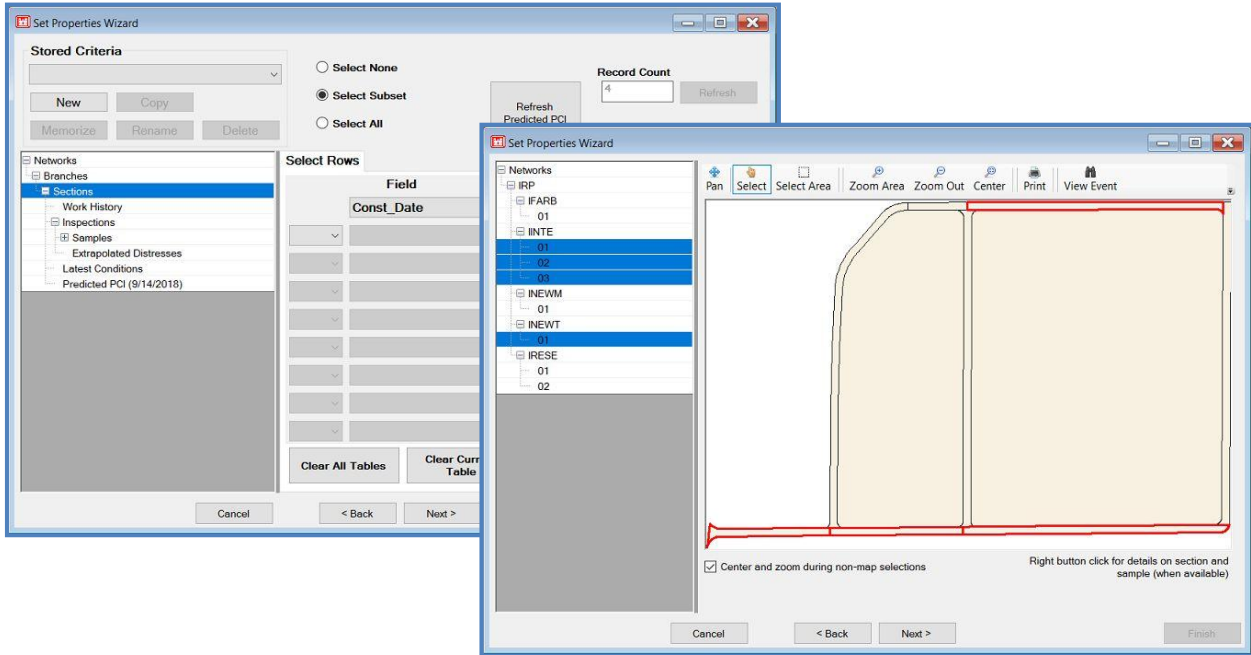
The Set Properties Wizard is utilized to update or clear a specified inventory property for selected sections. This wizard is limited to inert properties which do not affect the PCI calculations or prediction modeling of family models.

Access the Set Properties Wizard from the PAVER™ Button Bar by choosing Wizards and selecting Set Properties Wizard. Start by specifying the property to revise. Under Change Property Values on, select the type of the property as Networks, Branches, or Sections.

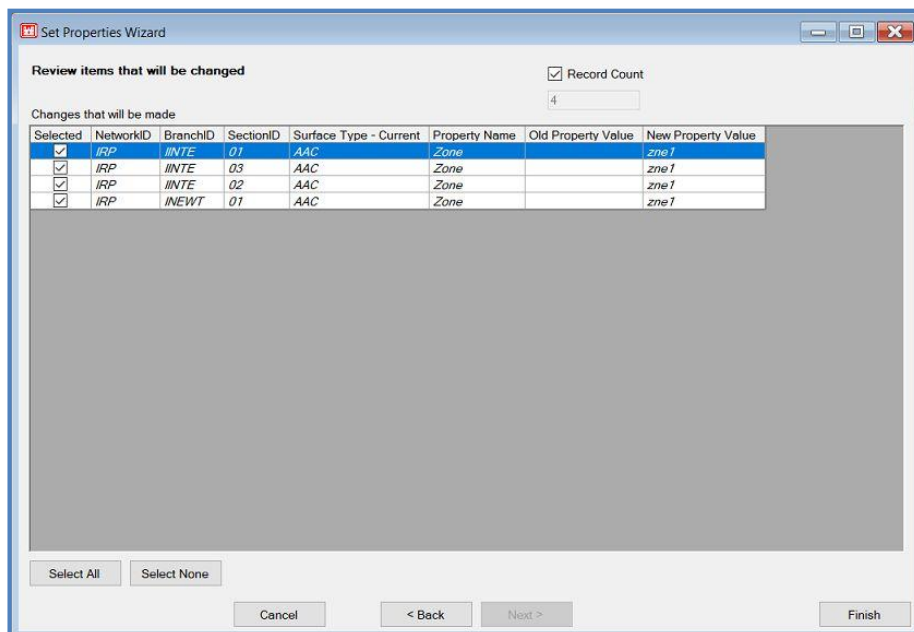
PAVER™ will then provide a list of available properties in the Property drop-down list box, where the user can select the property to change. Once the property is selected, PAVER™ will display the available actions that can be performed on the property. Selecting Clear will clear the specified property of the sections. If allowed, the user can also Set or change a property of the sections. If the Property value comes from a list, PAVER™ will provide the list where the user can select the value to set the property to. If the Property value is a number, then the user is able to enter in the value which the property is set to.

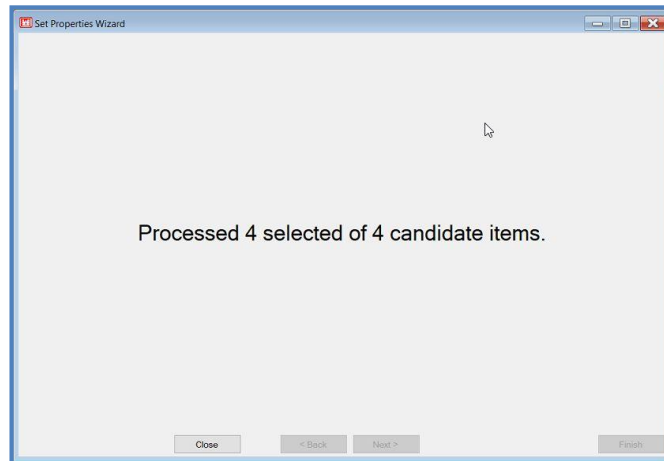
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Once the desired property and action is specified, click Next and select the sections to update/clear with the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included.



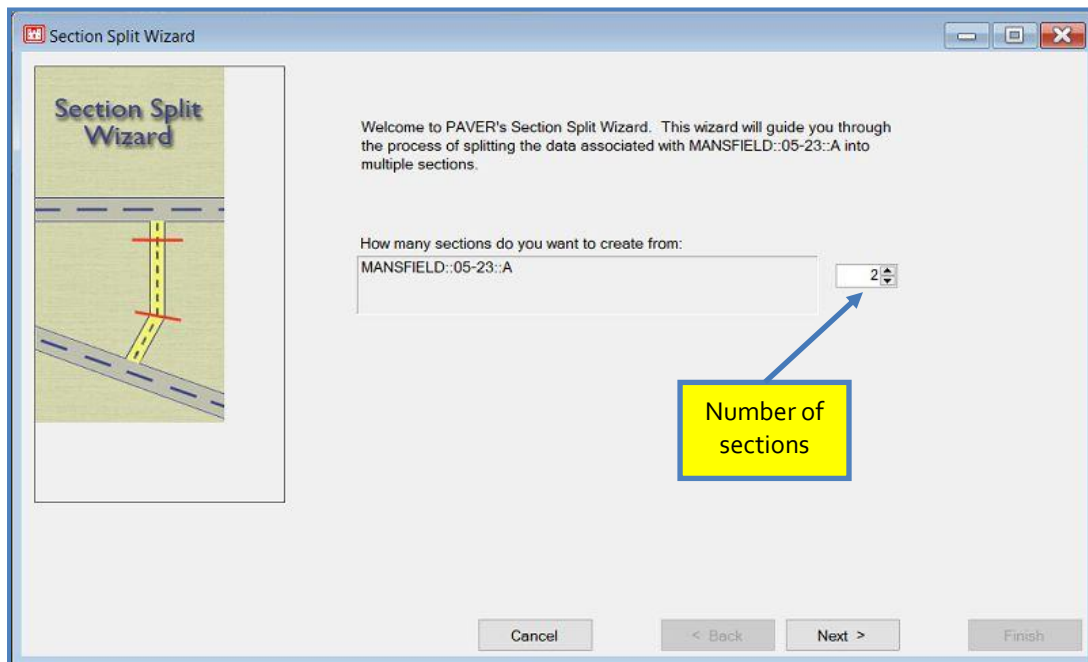
After selecting the desired sections, click Next and PAVER™ will display all the sections that will be changed, allowing the user to review items that will be changed, and to deselect any changes that they do not want to take place. Run the Inventory Property Change Wizard by clicking Finish and PAVER™ will update the selected sections.





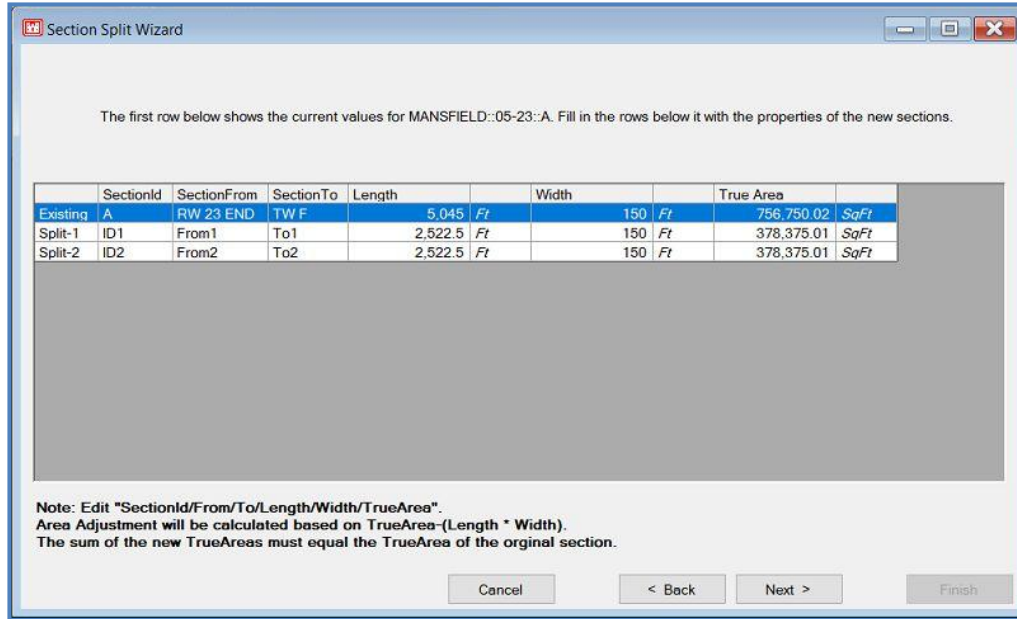
Section Split Wizard

The Section Split Wizard is utilized to separate Sections into a desired division of subsections that can be analyzed individually using any tool in PAVER™. Access the Section Split Wizard from the PAVER™ Button Bar by choosing Wizards and selecting the Section Split Wizard. The tool will default to splitting whichever Section is currently displayed by the Selector Tool in use. The initial screen allows the user to choose how many subdivisions of the default Section will be created. Click Next after choosing the number of subsections that will be split.

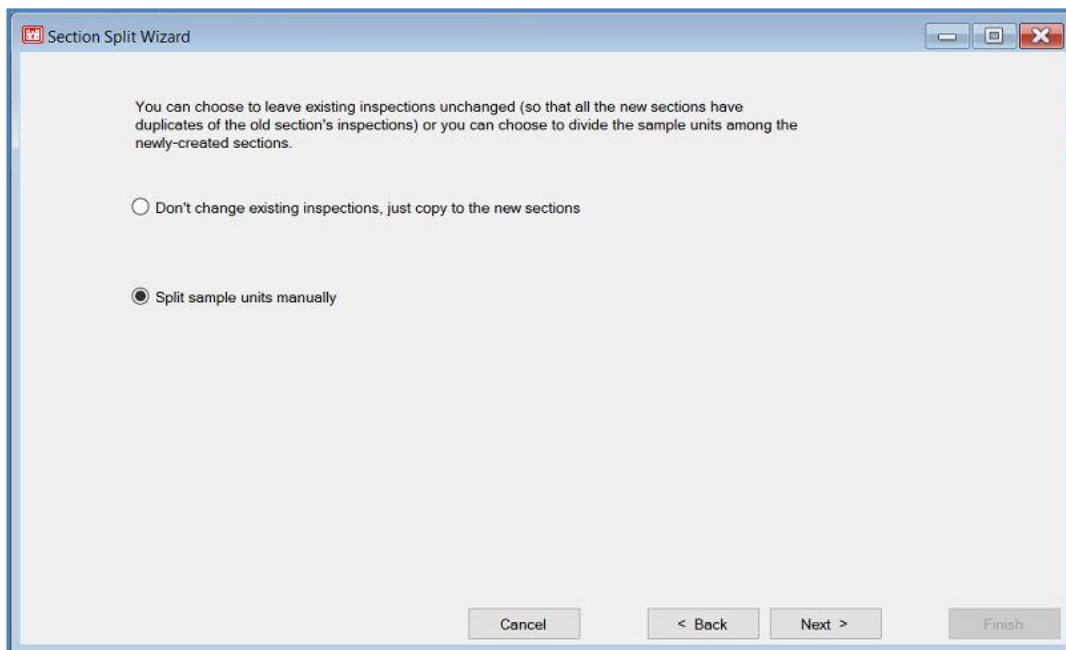


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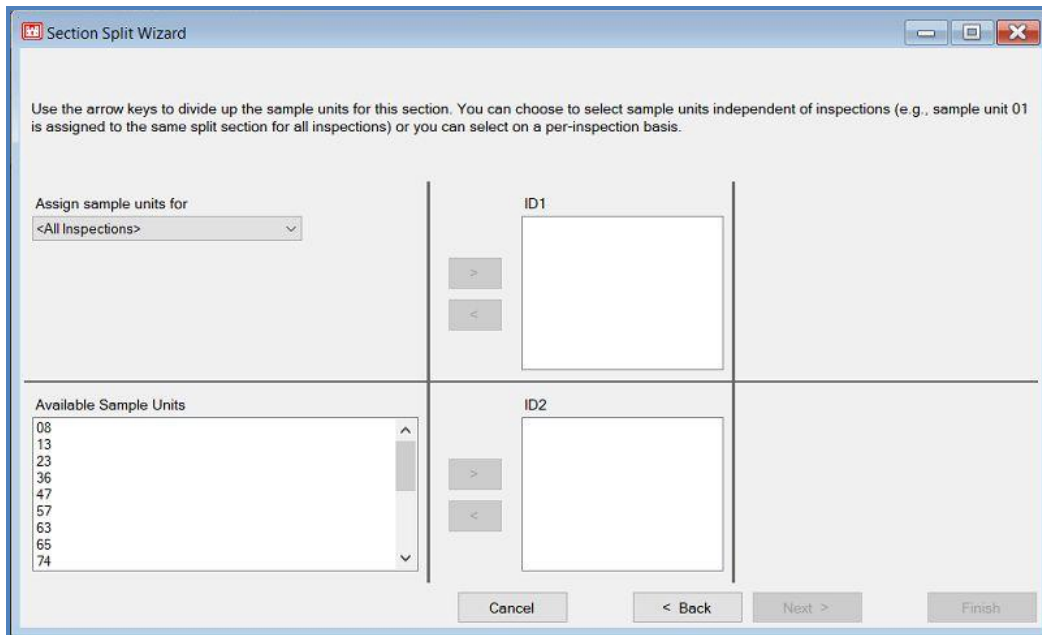
The following screen will display the existing Section as well as the desired split sections according to Section ID, From, To, Length, Width, and True Area. All of these attributes for the split sections can be edited by clicking in the corresponding fields in the table. After entering the desired information, click Next.



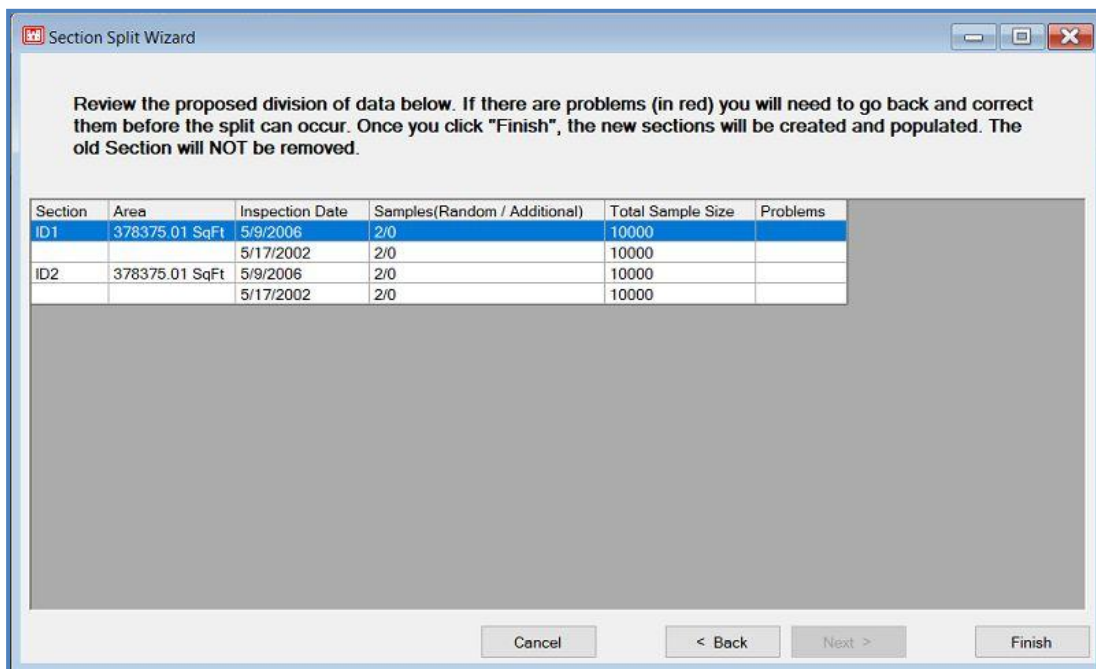
The following screen gives the user the choice of either copying existing inspection information to the split sections or splitting sample units manually. After making a selection, click Next.



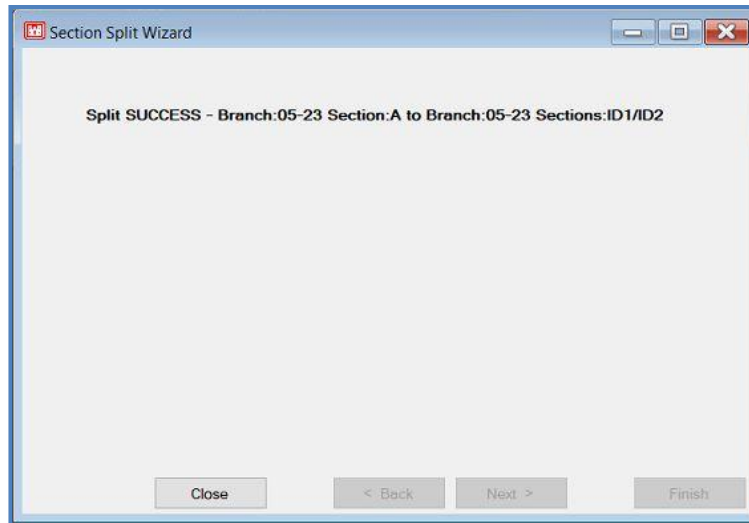
The following screen gives the user the option to divide up sample units independent of inspection or on a per inspection basis. All information for the split sections is reviewable in a table on the following screen.



If any problems are found, they will be listed in red, and the user cannot click the Finish button until they have been resolved. If there are no problems, click Finish to complete the section split.



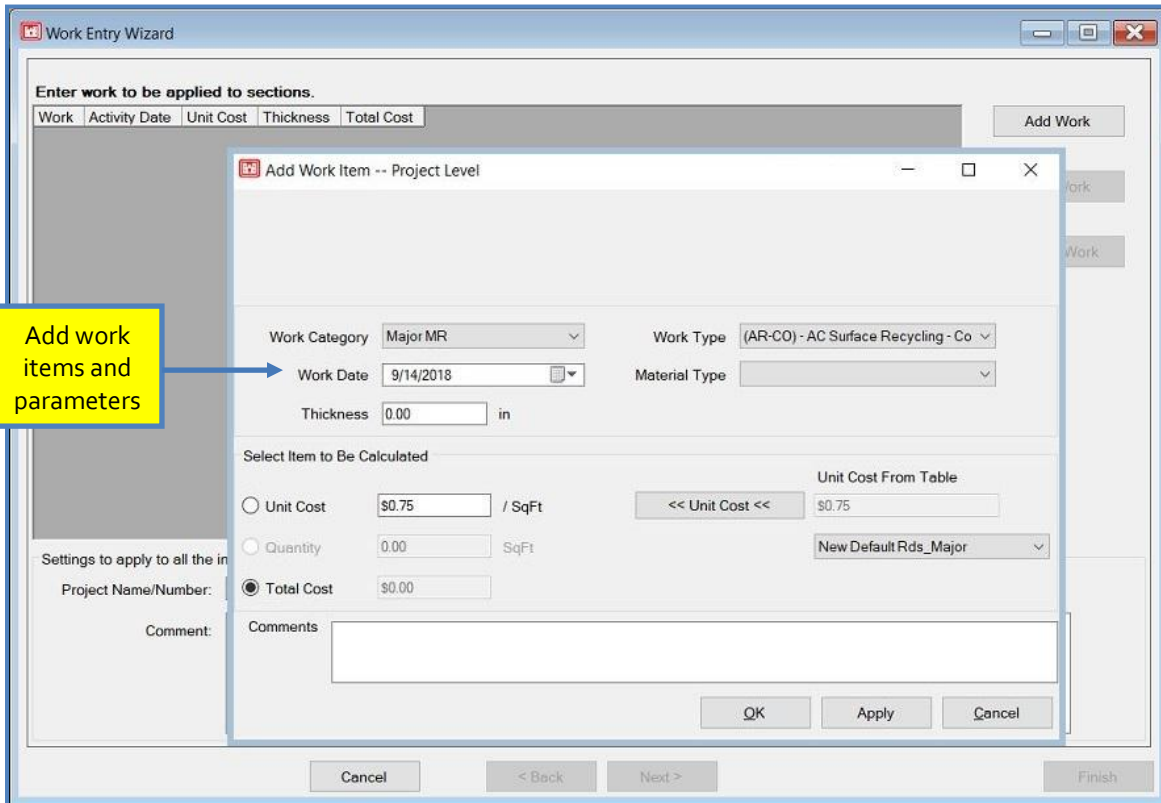
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Work Entry Wizard

The use of the Work Entry Wizard is a convenient way for the user to apply multiple work items to multiple sections, as well as have the option to create a work history report. Once work items are added to sections, the user does not have the ability to delete or edit any of the items in the Work Entry Wizard. However, this can be done in the Work History form on a per section basis.

Access the Work Entry Wizard from the PAVER™ Button Bar by choosing Wizards and selecting the Work Entry Wizard. Start by clicking Add Work to start creating work items to be applied. A new window titled Add Work Item will appear, allowing the user to specify the parameters for an individual work item being added. Parameters include work category, work type, work date, material type, and thickness. Selecting Calculate Total Cost from Unit Cost and Section Area causes PAVER™ to automatically look up the Unit Cost according to the Unit Cost From Table, relative to the Work Category that was chosen. The user also has the option to select Calculate Section Cost from Total Cost and Section Area, and then enter in the Total Cost. Comments can be added which will be linked to the individual work item being entered. After entering in all the parameters for the work item, click OK if finished, or click Apply to enter another work item. Choosing Apply clears the window, allowing the user to repeat the same steps of adding a work item.

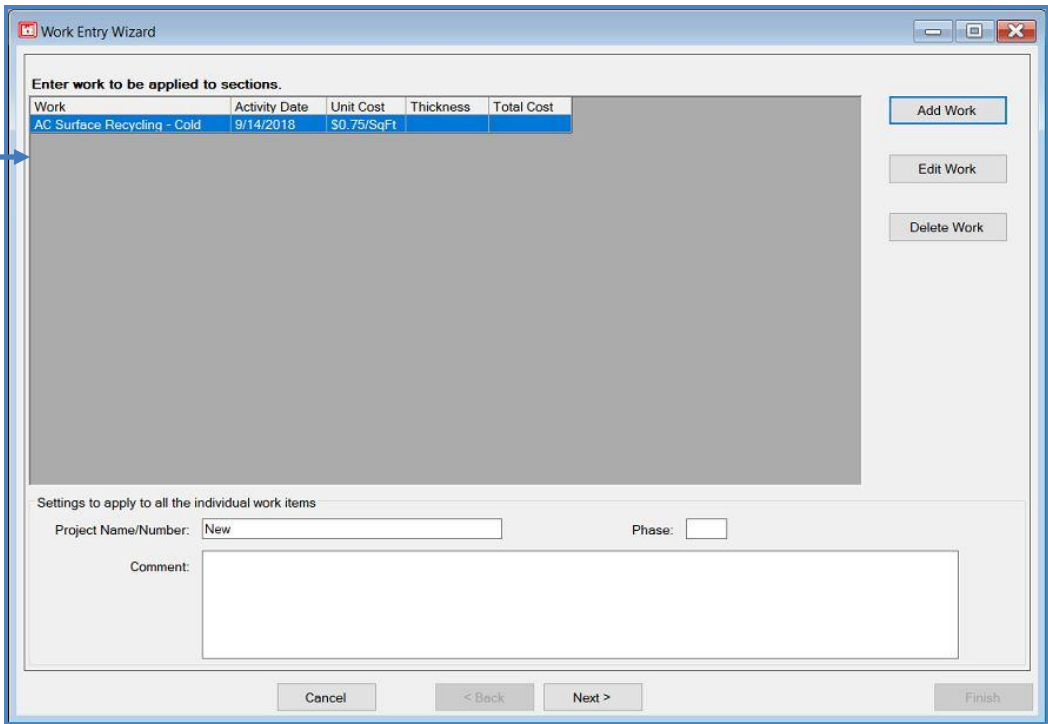


After entering all the work items, PAVER™ will list them in the Work Wizard window, where the user is able to review them and edit or delete any as necessary. In the Settings to apply to all the individual work items, the user can specify whether the work items that are being entered are Work History or Work Required items. The user can also add Project Name/ Number, Phase, and Comments. These settings will be applied to all the work being applied to sections. When finished, click Next to continue. Next, select the sections for the work items to be applied to utilizing the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included. After selecting the desired sections, click Next and review the list of the Sections Selected for Work Items and the Work Items to Add. The user has the option of generating a work history report by selecting Generate Work Report. Run the Work Entry Wizard by clicking Finish, and PAVER™ will apply the work items to the sections entered.

Note:
Once work items are added to sections, the user is not able to delete or edit any items in the Work Entry Wizard.

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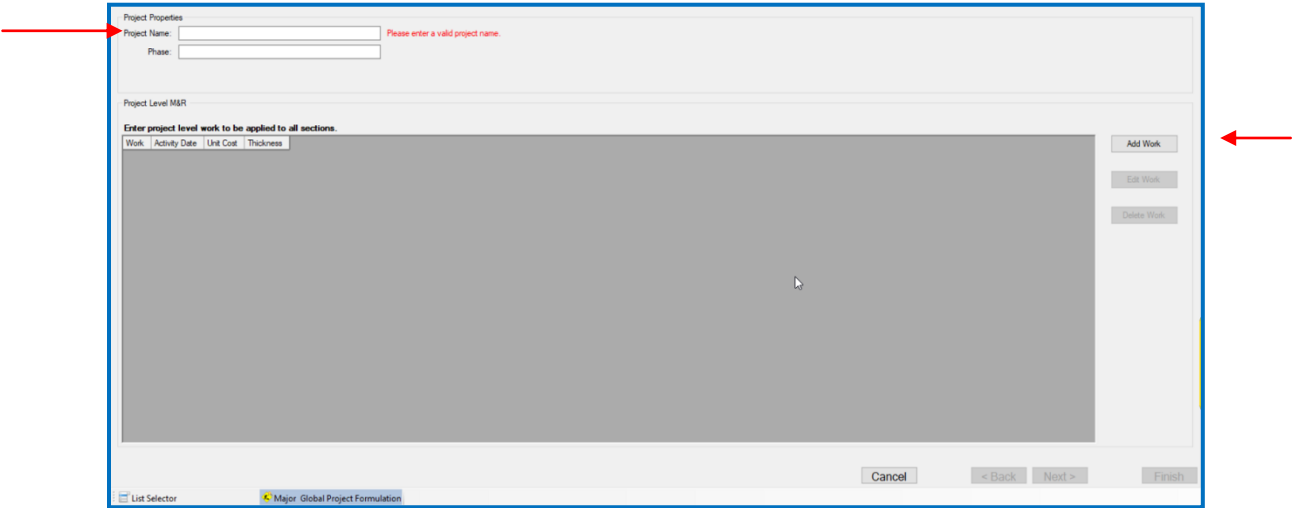
Review sections for work items to added



Project Formulation Wizard

The Project Formulation Wizard allows the user to plan Major and Global work projects within specified sections with specified criteria. It allows for the use of Predicted PCI at the start of the project, and Global frequency does not apply to time since Major Work.

The wizard can be found in both the Wizards menu and the Work menu. To get started, a name for the project is required to move forward. Work items can be added, edited, or deleted on the same screen as the naming of the project.



The next step is to pick a pre-application localized M&R policy.

Pre-Application Localized M&R Policy

Localized Policy Work Activity Date: 10/20/2021

Select Distress Maintenance Policy to pre-apply:

NONE [Edit]

Distress	Severity	Description	Code	Work Type	Work Unit
----------	----------	-------------	------	-----------	-----------

Buttons: Cancel, < Back, Next >, Finish

Next, select a Work Type Cost Table to continue. The cost multiplier can be changed with the arrows, and the Edit button will open the System Tables for the chosen table for editing.

Localized M&R Policy Unit Costs

Select Cost Table: 2012 Adelphi Loc Preventive [Cost Multiplier: 1.0] [Edit]

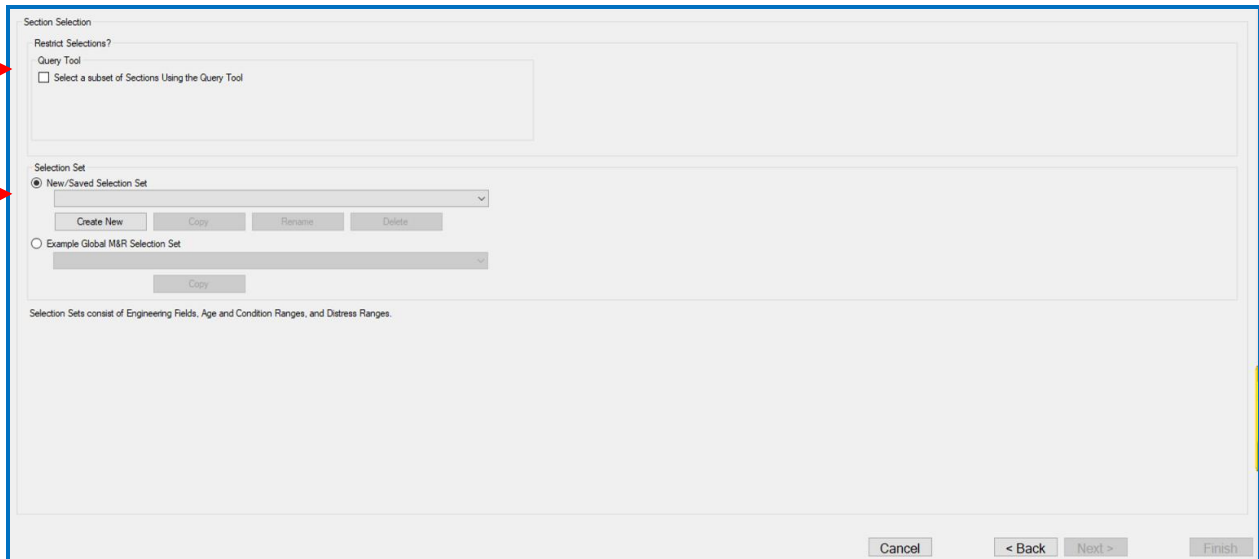
Code	Name	Cost	Units
NONE	No Localized M&R	\$0.00	SqFt
CS-AC	Crack Sealing - AC	\$2.50	ft
JS-SI	Joint Seal - Silicon	\$3.50	ft
CS-PC	Crack Sealing - PCC	\$2.50	ft
GR-PP	Grinding (Localized)	\$4.80	ft
JS-LC	Joint Seal (Localized)	\$2.50	ft
PA-AD	Patching - AC Deep	\$7.00	SqFt
PA-AL	Patching - AC Leveling	\$1.50	SqFt
PA-AS	Patching - AC Shallow	\$3.25	SqFt
PA-PF	Patching - PCC Full Depth	\$25.00	SqFt
PA-PP	Patching - PCC Partial Depth	\$6.50	SqFt
SH-LE	Shoulder leveling	\$2.00	ft
SL-PC	Slab Replacement - PCC	\$18.00	SqFt
UV-PC	Undersealing - PCC	\$2.50	ft

Work Types missing costs used in the selected maintenance policy:

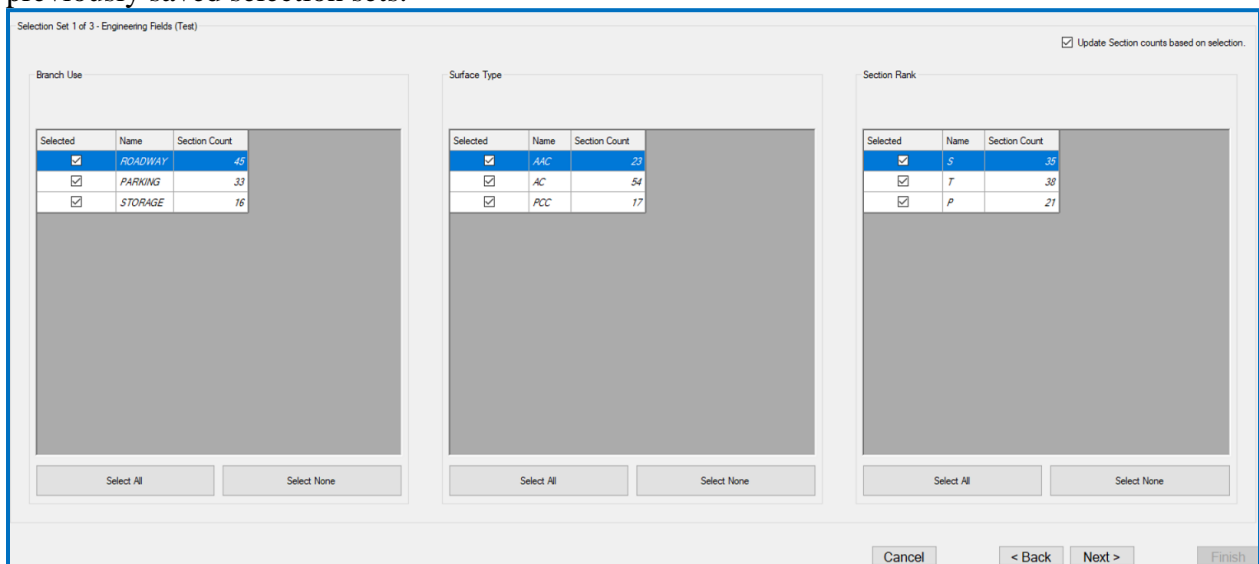
Code	Work Type
------	-----------

Buttons: Cancel, < Back, Next >, Finish

The next step is to select sections for the project. These can be restricted with the Query Tool if desired. The choice to create a New Section Set or use a previously saved set is achieved by using the drop-down menu.



The next three screens allow for refining selection sets based on Engineering Fields, Age and Condition, and Defining Distress Ranges. Both the second and third steps can be copied from previously saved selection sets.



Selection Set 2 of 3 - Age and Condition (Test)

Copy values from saved Selection Set:

Age and Condition Filters	Selected	Minimum	Maximum
<i>Predicted PCI at Project Start Date</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>Time Since Major (years)</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>Time Since Global (years)</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>PCI at Last Insp.</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>% Climate at Last Insp.</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>% Load at Last Insp.</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>Latest FOD Index</i>	<input checked="" type="checkbox"/>	.00	100.00
<i>Latest SCI</i>	<input checked="" type="checkbox"/>	.00	100.00

Treat selected work required projects as work history.

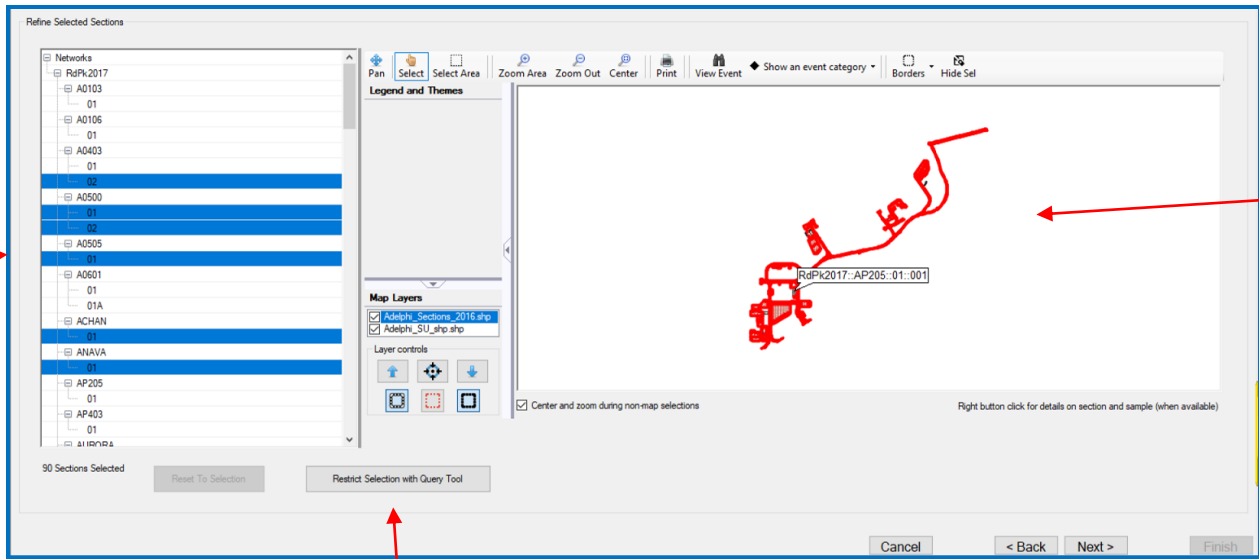
Selection Set 3 of 3 - Define Distress Ranges (Test)

Distress Type/Severity ranges to limit section inclusion.
Only listed distress types and severities will limit section inclusion.

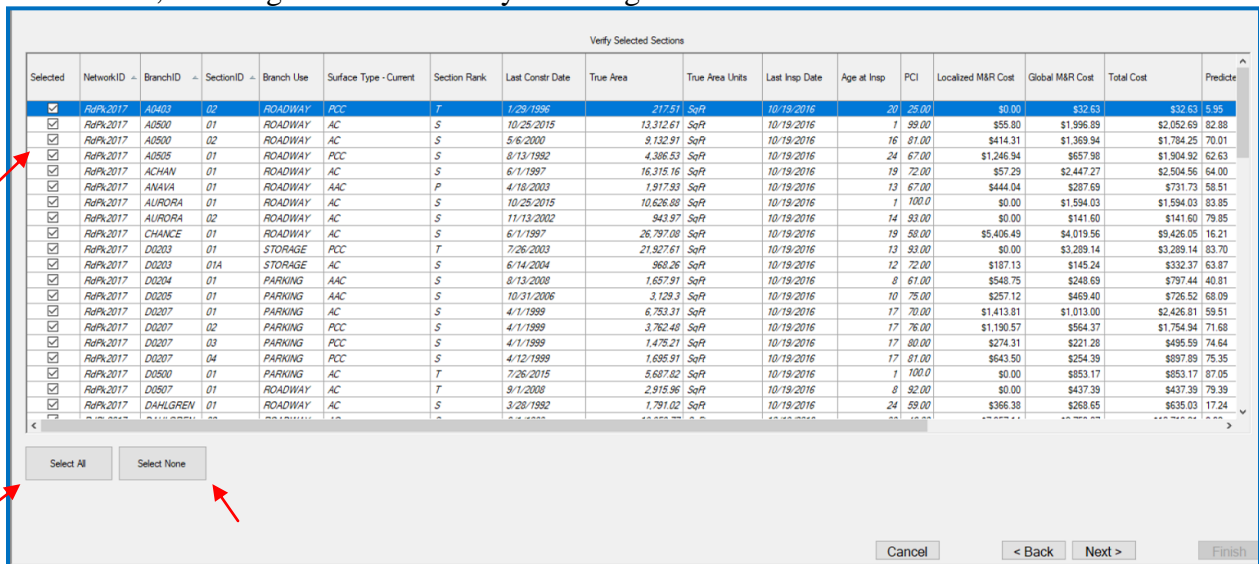
Copy values from saved Selection Set:

Distress code	Severity	Minimum Density	Maximum Density
01 - ALLIGATOR CR	L + M + H	0	10
01 - ALLIGATOR CR	M + H	0	5
05 - CORRUGATION	L + M + H	0	25
06 - DEPRESSION	L + M + H	0	30
06 - DEPRESSION	M + H	0	10
08 - JT REF. CR	M + H	0	10
10 - L & T CR	M + H	0	10
13 - POTHOLE	L + M + H	0	20
13 - POTHOLE	M + H	0	20
15 - RUTTING	M + H	0	10
16 - SHOWING	L + M + H	0	10
17 - SLIPPAGE CR	L + M + H	0	10
18 - SWELL	M + H	0	20

The following step allows for selection refinement featuring the database's map. Selections can be made by clicking on a section on the map, in the Tree Selector, and/or by using the Query Tool.



The next step is to verify selected sections. Individual sections can be removed by clicking the checkboxes, or changes can be made by choosing to Select All or Select None.



The final step of the Wizard is to review the details of the project. This includes the option to view the Project Work By Category on a map. After clicking Finish, a Required Project will be created.

Project Properties

Project Name: TEST1

Global M&R Date: 10/20/2021 Major M&R Date: Localized M&R Date: 10/20/2021 Section Count: 85

Total Global M&R Cost: \$147,170.13 Total Major M&R Cost: \$0.00 Total Localized M&R Cost: \$104,456.12 Total Section Area: 981,134.21 SqFt Total Project Cost: \$251,626.26

View M&R Summary
 Pre-application Policy Details
 Pre-application Policy Summary
 Section Details

Work	Work Category	Work Items	Quantity	Total Cost
Crack Sealing - AC	Localized Preventive	42	5,665.46	\$14,163.66
Patching - AC Deep	Localized Preventive	34	5,360.52	\$37,523.67
Shoulder leveling	Localized Preventive	10	1,931.84	\$3,863.70
Patching - AC Shallow	Localized Preventive	8	85.27	\$277.13
Slab Replacement - PCC	Localized Preventive	2	2,470.00	\$44,460.00
Joint Seal (Localized)	Localized Preventive	8	1,464.39	\$3,660.97
Crack Sealing - PCC	Localized Preventive	1	13.50	\$33.75
Grinding (Localized)	Localized Preventive	2	33.00	\$158.40
Patching - PCC Partial Depth	Localized Preventive	2	48.44	\$314.84
Surface Seal - Coal Tar	Global MR	85	981,134.21	\$147,170.13

List Selector Major Global Project Formulation

Add Work History from Tabular Data

See Chapter 8 >> [Work](#).

Add Inventory from GIS/Tabular Data

See Chapter 3 >> [File Menu](#).

Update Inventory from GIS/Tabular Data

See Chapter 3 >> [File Menu](#).

Import Inventory Samples from GIS/Tabular Data

See Chapter 3 >> [File Menu](#).

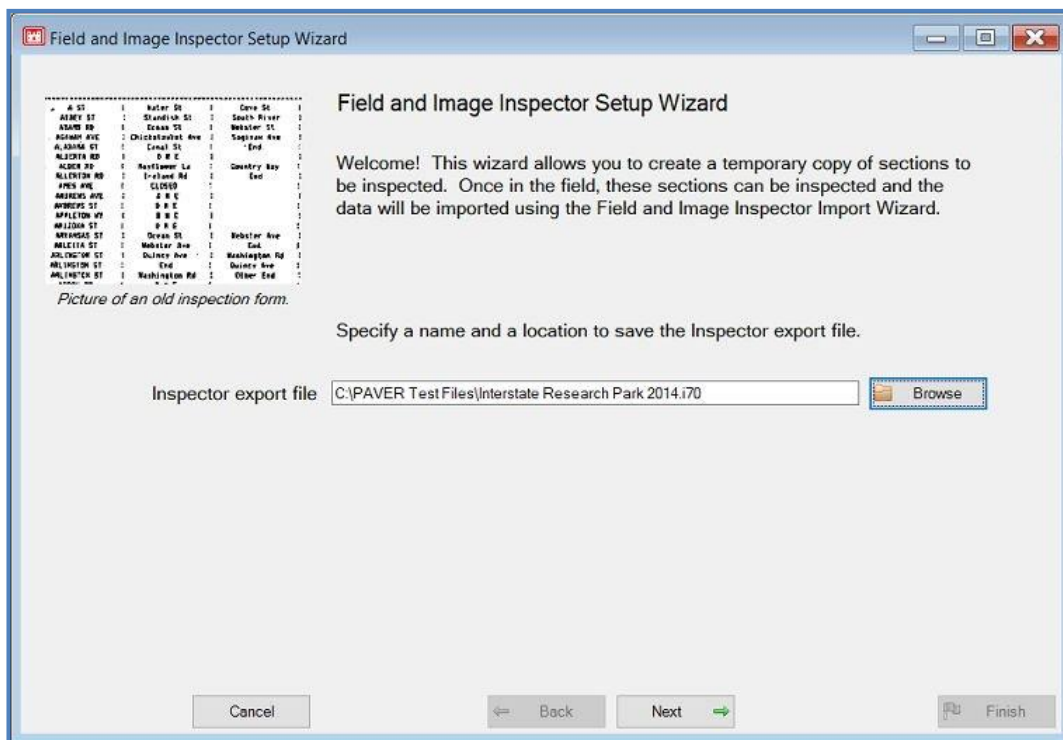
Export Inspection Data (XML)

See Chapter 3 >> [File Menu](#)

Export Inventory for FieldInspector™/ImageInspector™ (I70)

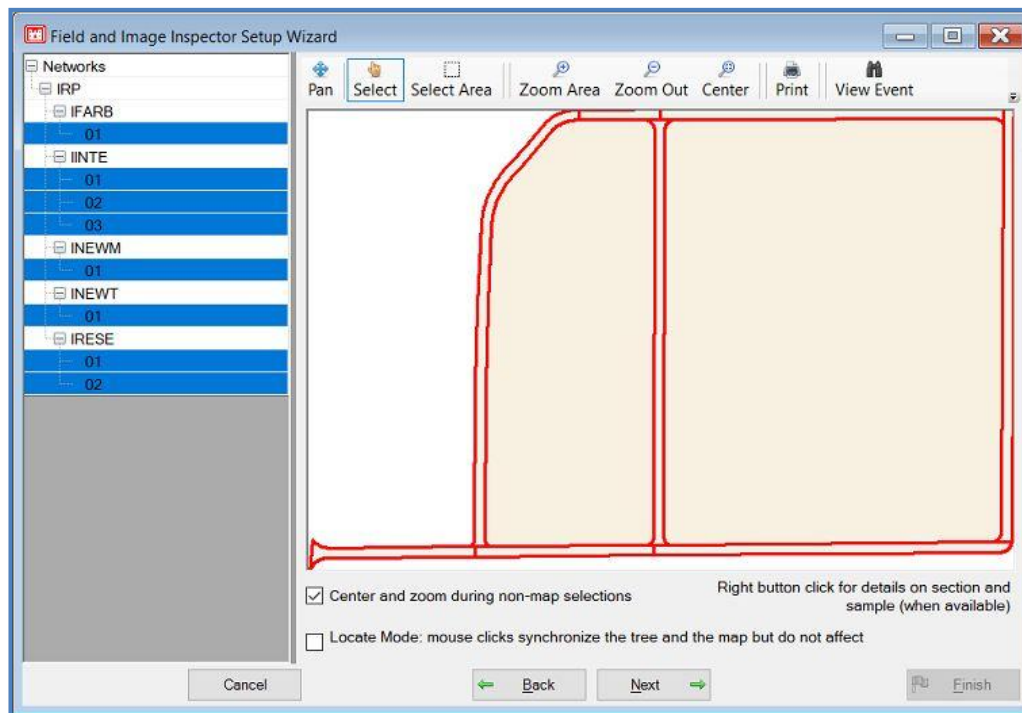
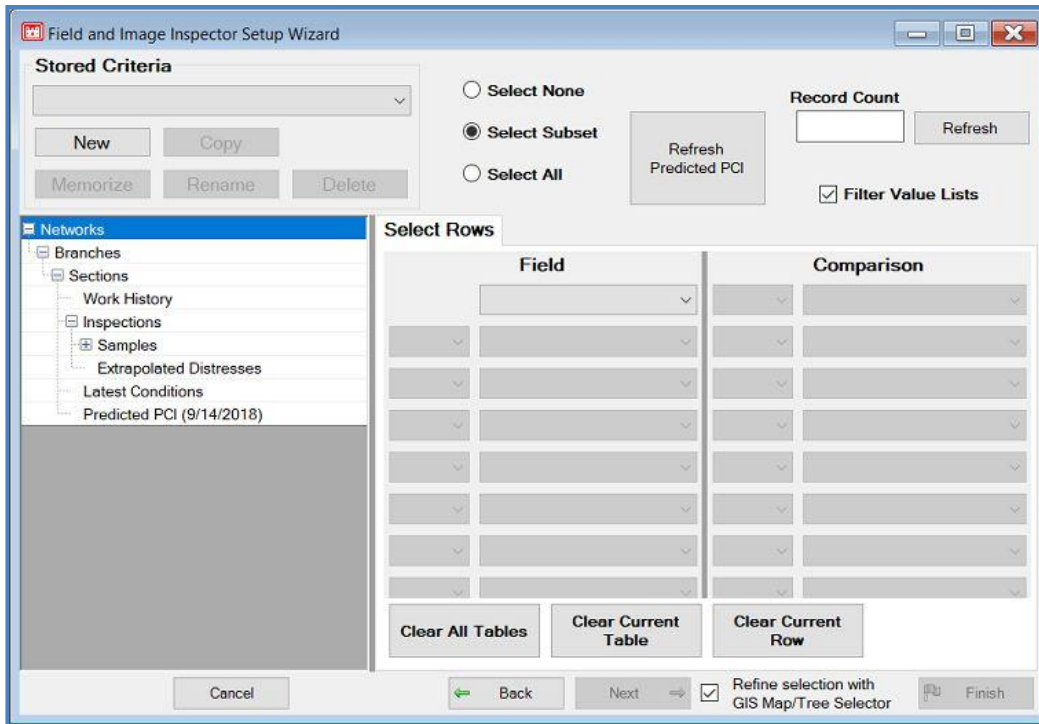
PAVER™ 7 includes a feature to export sections to be surveyed in preparation for use in the PAVER™ FieldInspector™ / ImageInspector™. This Export tool uses an *.I70 file to export information about sections to be surveyed in the PAVER™ sister programs. This wizard provides a step by step procedure to export data to be used by the PAVER™ FieldInspector™ / ImageInspector™. Access the PAVER™ FieldInspector™ / ImageInspector™ Data Inspection Export Wizard from the PAVER™ Tool Bar, by selecting Wizards.

The FieldInspector™ / ImageInspector™ Data Inspection Export Wizard contains five display screens. The first display screen seen below prompts the user to define the file name to export to. After this has been defined, the Next button on the bottom of the wizard will become active.

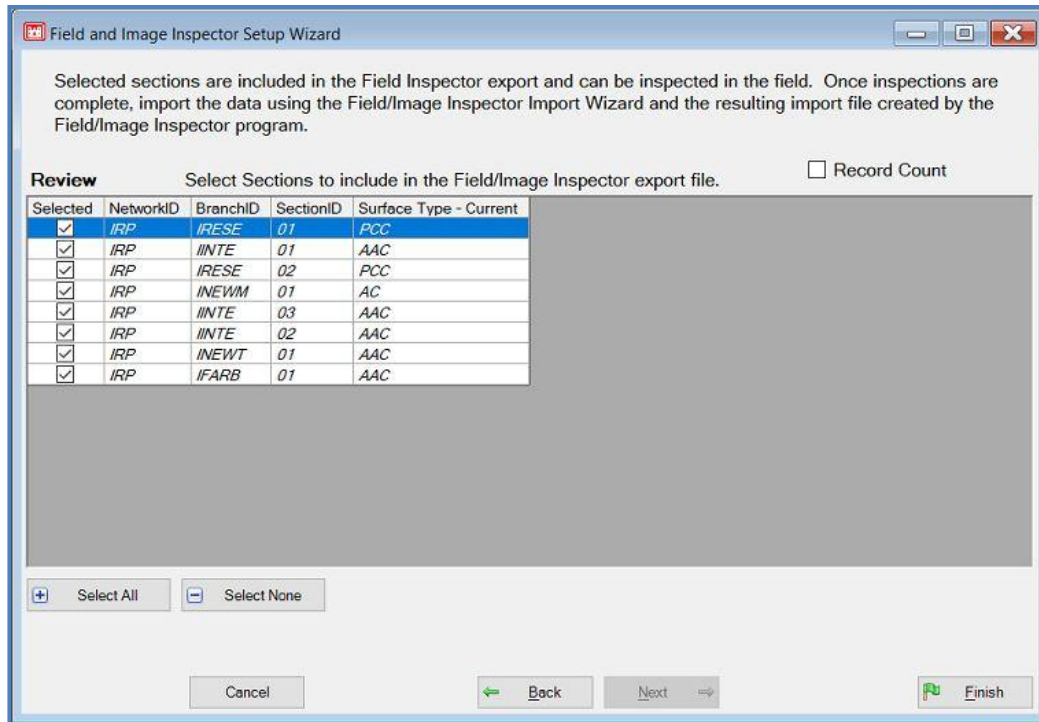


The second screen displayed below is a query tool. This tool lets the user define what sections are going to be surveyed. The user can define a group of sections at this time or after Next is selected they can redefine or further define a selection based on a GIS map. This screen shot is also displayed below.

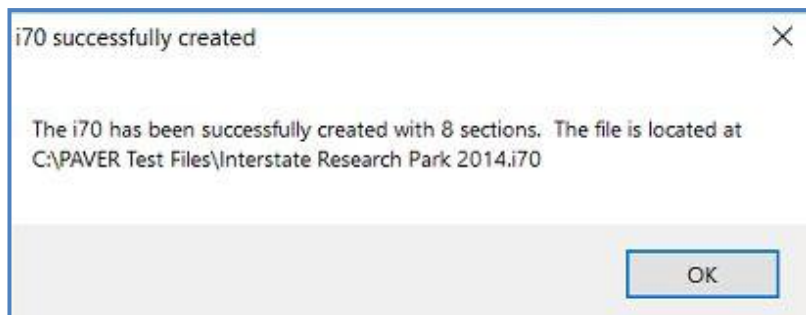
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After a final selection has been made and Next is selected on the GIS selection tool, the following screen will appear. This screen summarizes what sections have been selected to survey. Further revisions can be made by individually checking or unchecking sections in the Selected column.



After review, select Next, PAVER™ will place the named *.I70 file on the computers desktop with the associated name previously defined. Now all sections selected are ready to import into the FieldInspector™ / ImageInspector™ and ready for use in a pavement condition inspection survey. The*.I70 file also contains a linked copy of the GIS shapefile that is associated with the main PAVER™ inventory. A form with information on the location and number of sections will appear after the i70 is successfully created.

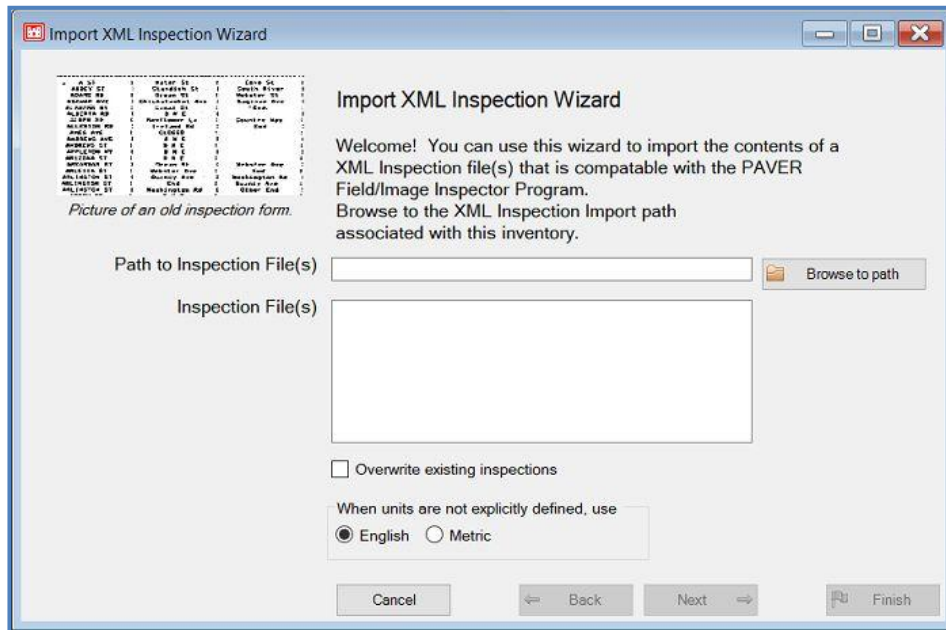


Import XML Inspection Wizard

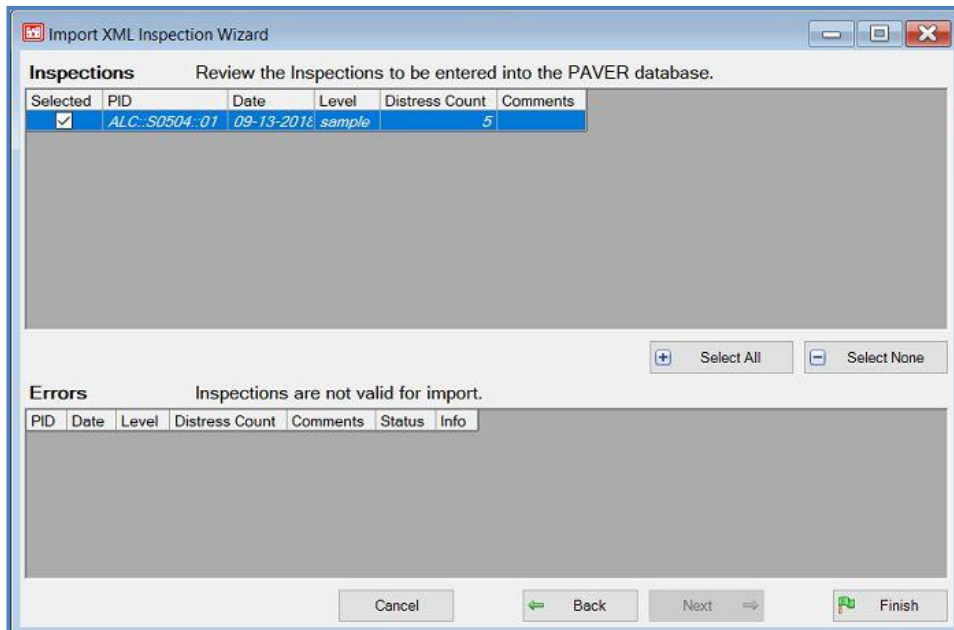
PAVER™ 7 includes a method to import survey information into a database. This import tool uses an XML file to import survey conditions at the frame, sample, or section level. Using a specified XML format (XML format defined in [Appendix B](#)), PAVER™ includes a wizard to help guide the user through the import process. This wizard also provides data verification to insure that survey information is being imported properly into the database. Access the XML

FieldInspector™ / ImageInspector™ Data Import Wizard from the PAVER™ Button Bar by choosing Wizards.

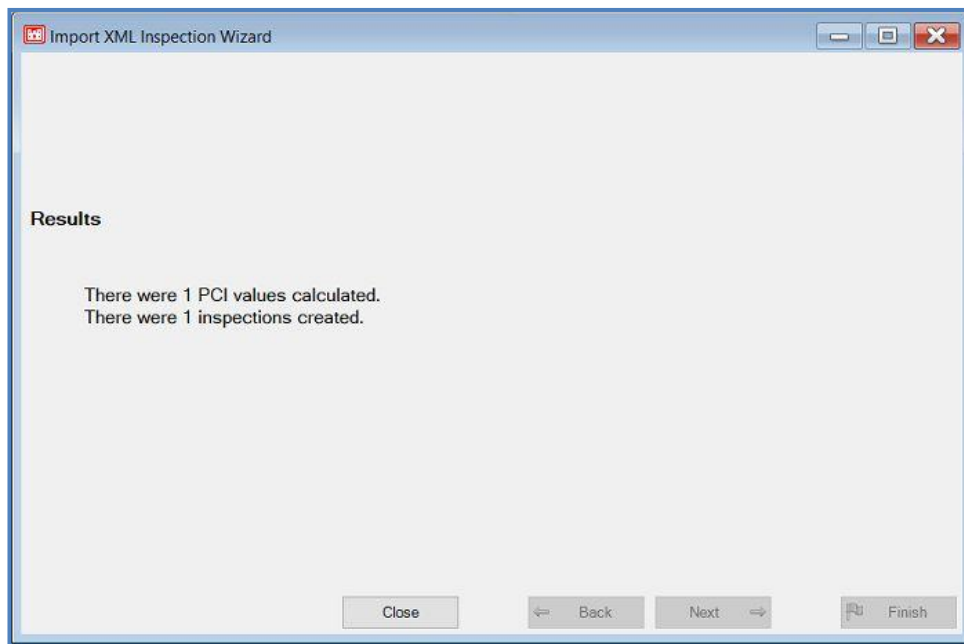
The first form is the XML file location. Browse to the location of the XML file for import. Select Next for the Review screen.



The second form allows the user to review the Inspections to be entered into the PAVER™ database and to view those Inspections that are not valid for import. This allows the user to remove or correct any corrupted information before the inspection information is imported into PAVER™. Select Finish to import the Inspections into PAVER™.



The final screen will indicate the number of PCI values calculated and the number of inspections created by a successful import.

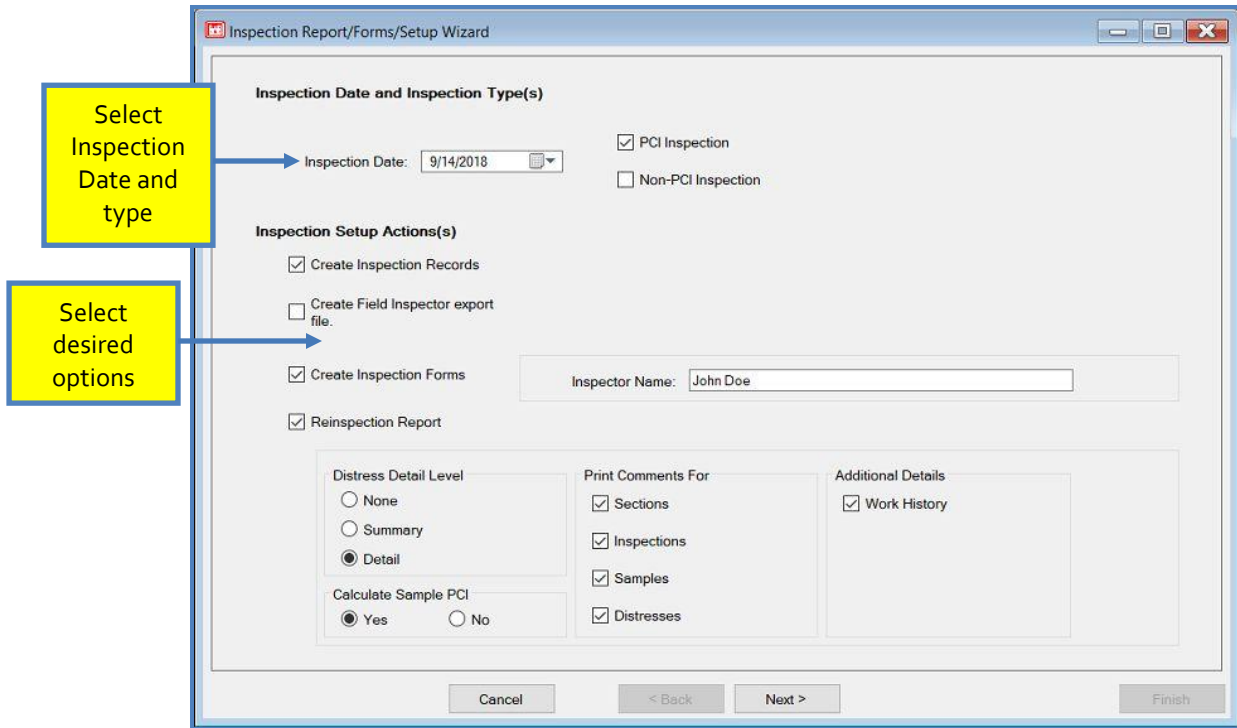


Inspection Report/Forms/Setup

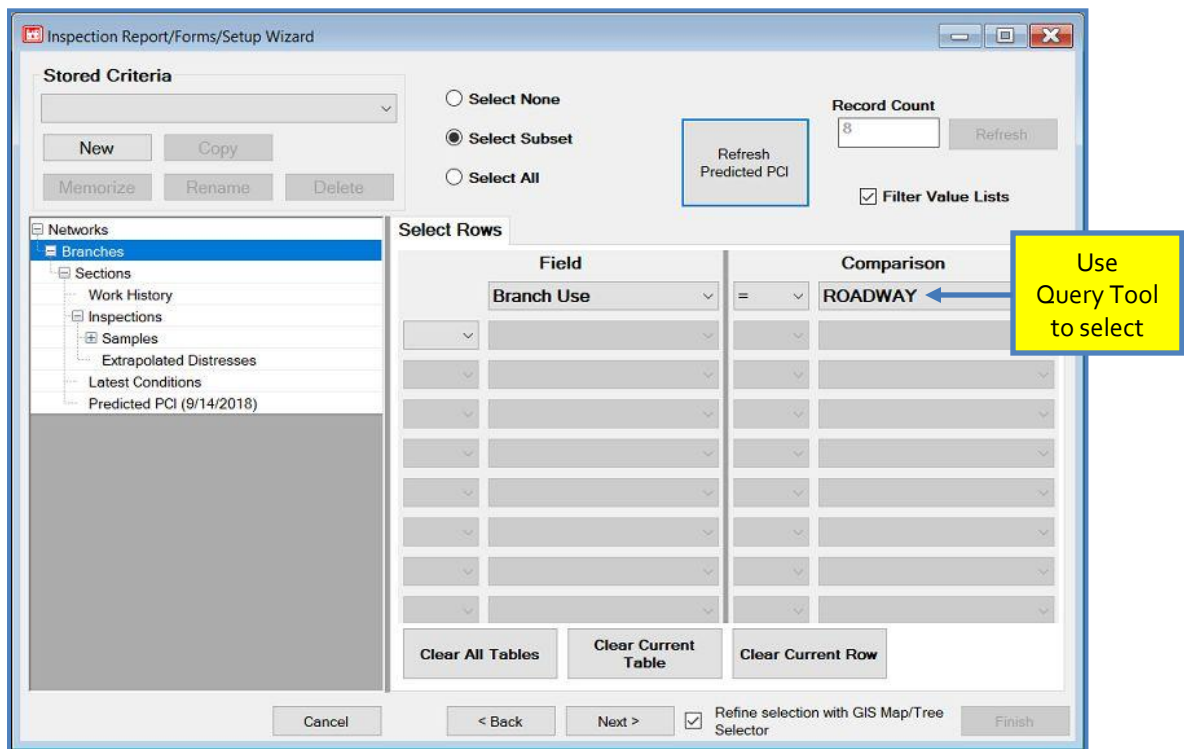
The Inspection Report/Forms/Setup wizard allows the generation of Inspection Records, Inspection Forms, and a Reinspection Report for the inspection process. The user is able to create these records, forms, and report, over multiple sections for the inspection.

Access the Inspection Setup Wizard from the PAVER™ Button Bar, by choosing Wizards. Start by entering in the Inspection Date and Inspection Type(s). Choose the desired action(s) of creating Inspection Records, Inspection Forms, and/ or a Reinspection Report, and specify the parameters. Then click Next to select the sections to be included with the EMS™ Query Tool.

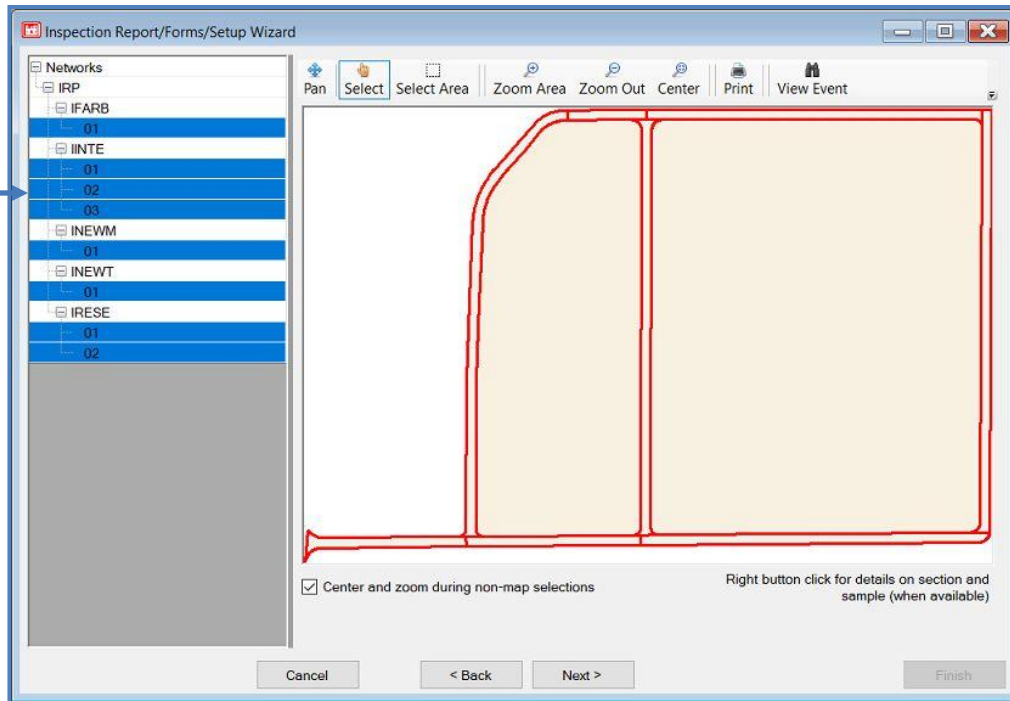
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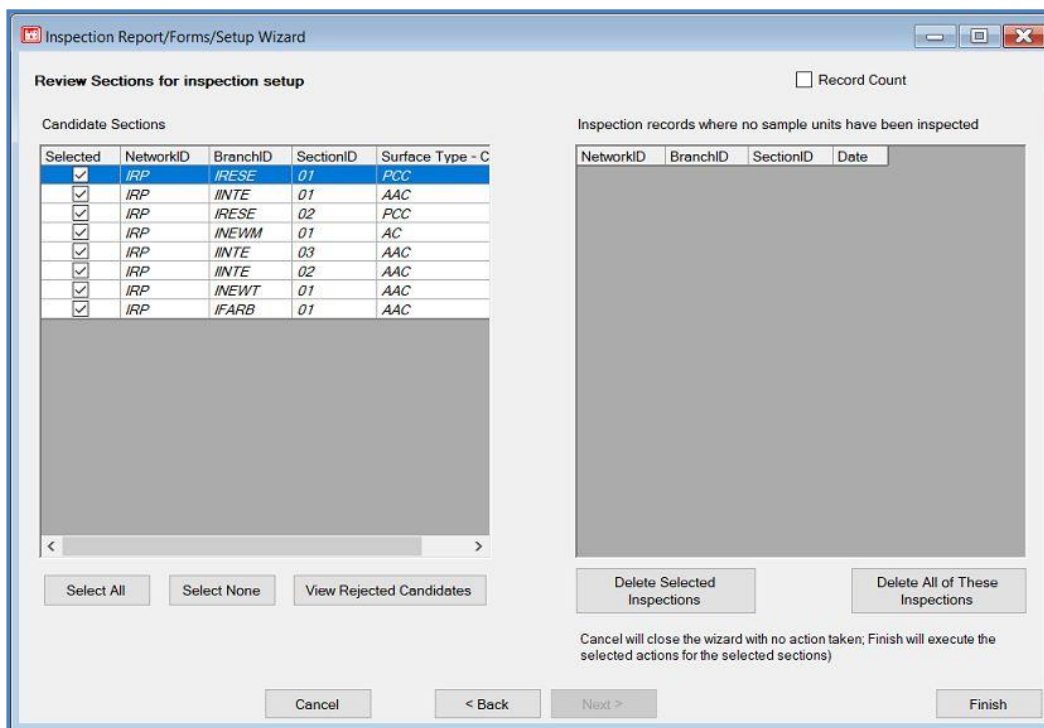
Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included.



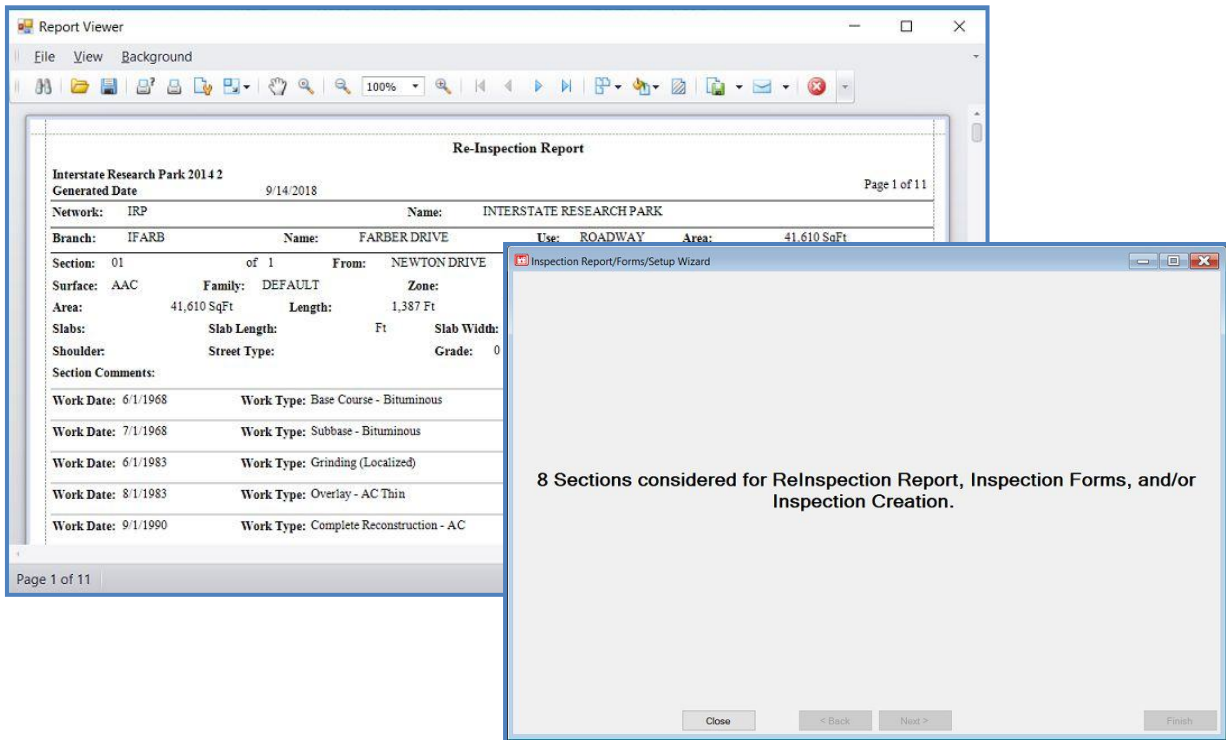
Use GIS Map tree to select



Click Next and PAVER™ will review the sections for inspection setup, in order to check for any sections with insufficient data.



Run the Inspection Setup Wizard by clicking Finish, and PAVER™ will create the desired records, forms, and/ or report.



Inspection Records

Before data from an inspection can be entered into PAVER™, Inspection Records need to be created for the sections that were inspected. Inspection Records consist of a record of the date of inspection. The Inspection Setup Wizard allows the creation of Inspection Records for multiple sections. If the user wishes to delete or edit an inspection record, or to add additional inspection data, this is done in the PCI form. Inspection Records can also be created one at a time for each section in the PCI form.

Inspection Forms

During an inspection, the use of Inspection Forms is a convenient method for recording the distresses. When an Inspection Form is created for a given section using the Inspection Setup Wizard, the form will include relevant information for that section such as PID, inspector name, inspection date, branch use, surface type, location details, and section dimensions. According to the surface type of the section, the form will additionally include a list of the pertinent distress codes for that type of surface. For each sample of a given section, the form will have an area to record the distress, the severity, and any sketch or comments. The user can print these Inspection Forms, and conduct surveys and inspections using the forms. When viewing these forms, PAVER™ will show them as a continuous page, but will print separate pages for each section. Example Inspection Forms can be found in [Appendix E](#).

Reinspection Report

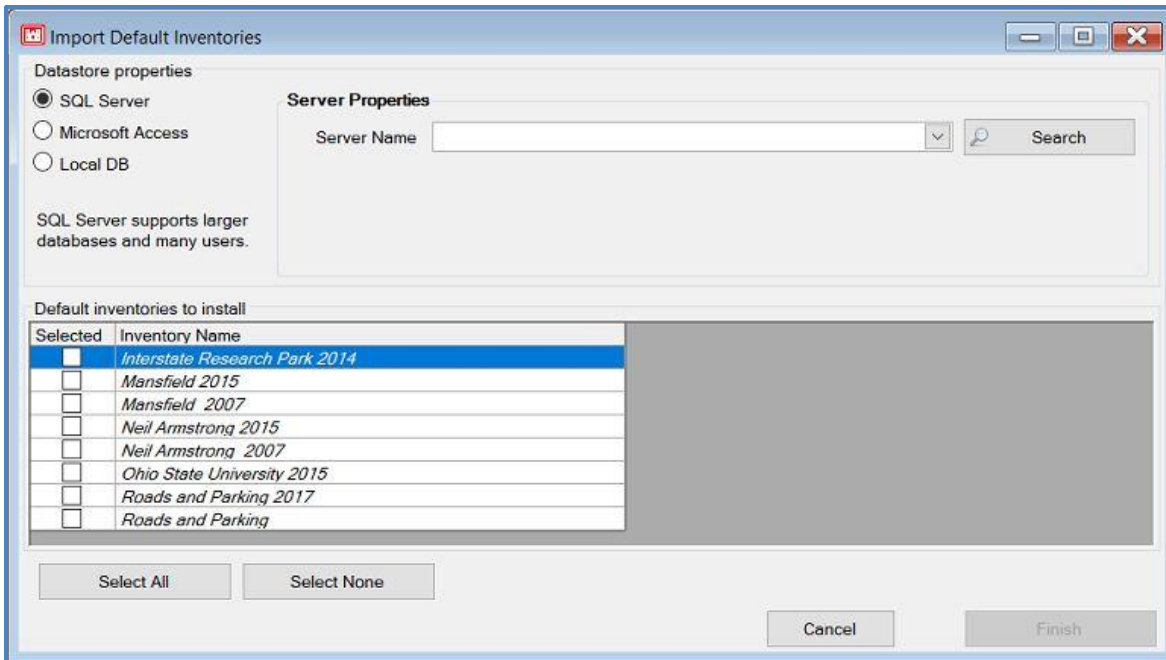
The Reinspection Report is designed to produce a listing of information about the last inspection for each section included in the report. The Reinspection window offers several options for configuring the report:

- **Distress Details:** This section gives you the option to display recorded distress information from the last inspection in three levels of detail (Remember: Distresses are entered at the sample level and are associated with a specific inspection date.):
 - None: No distress details shown.
 - Summary: Distress code and severity level of each distress in the sample unit are shown.
 - Detail: Complete details for every distress listed in the current sample are shown.
- **Calculate Sample PCI:** This produces a PCI for each sample listed. Although PAVER™ works with section-level PCI's throughout the program, this shows the PCI of each inspected sample.
- **Report Sample Ordering:** This gives you control over how the Reinspection Report sorts and orders the samples in each section – numerical or alphanumerical. Your choice is based on how you have chosen to name your samples.
- **Print Comments/Print Options:** Checking any combination of these boxes enables the report to display comments that were entered at that level. Within the program, you can enter comments in a text field, at any of those levels – here is where those comments can be printed out.

Now that you have configured your report, click Next to bring up the EMS™ Query Tool. At this point, you can select the whole database or specific sections to be included into the report. Click Next once sections are selected with the Query Tool (saying Next to an empty query selects the entire database). PAVER™ will review the sections for inspection setup, in order to check for any sections with insufficient data. Click Finish to run the Inspection Setup Wizard and PAVER™ will create the desired records, forms, and/ or report.

Import Default Inventories

PAVER™ is packaged with several default/example inventories when it is shipped. The user can access these databases under the Wizards tab by clicking Import Default Inventories. The import screen will pop up, and the user can select which of the default databases to import and whether they will utilize Microsoft Access or SQL Server. Click Finish. The selected inventories will now be available the next time Open Pavement Database is selected under the File menu.



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Appendix A

Inspection Information File Format (Standard and Extended Formats)

Inspection Information File Format (Standard and Extended Formats)

The following description is based on a “Card” model, where the “Cards” are now represented by lines in a text file. Files are in ASCII text, fixed width format.

Note: PAVER™ 4.1 and later support the extended branch and section number fields.

07 (AC Or GR) And 10 (PCC) Card Format

These cards contain section header information and supplemental inspection. One card required per section inspected.

FieldName	Format	Columns-Standard	Columns-Extended
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Riding	Alpha-Numeric	18-20	30-32
Safety	Alpha-Numeric	21-23	33-35
Drainage	Alpha-Numeric	24-26	36-38
Shoulder	Alpha-Numeric	27-29	39-41
Overall	Alpha-Numeric	30-32	42-44
FOD	Alpha-Numeric	33-35	45-47
Total No. of Samples in Section	Numeric	36-38	48-50

Select * from [Plan Parameters]

08 (AC Or GR) And 11 (PCC) Card Format

These cards contain sample unit and distress information. One or more cards are required per sample unit inspected and can contain up to four distresses per card. (I.E. A separate card may be used for each distress.) *nnnnn.nn is a decimal number*

FieldName	Format	Columns-Standard	Columns-Extended
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Sample Unit ID	Alpha-Numeric	18-20	30-32
Sample Type	Alpha-Numeric	21	33
Area/ No. of Slabs in Sample	nnnnn.nn	22-29	34-41
Distress Code	Numeric	30-31	42-43
Severity	Alpha-Numeric	32	44
Quantity	nnnnn.nn	33-40	45-52
Distress Code	Numeric	41-42	53-54
Severity	Alpha-Numeric	43	55
Quantity	nnnnn.nn	44-51	56-63
Distress Code	Numeric	52-53	64-65
Severity	Alpha-Numeric	54	66
Quantity	nnnnn.nn	55-62	67-74
Distress Code	Numeric	63-64	75-76
Severity	Alpha-Numeric	65	77
Quantity	nnnnn.nn	66-73	78-85

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Appendix B

XML Inspection Data Import Format (XML)

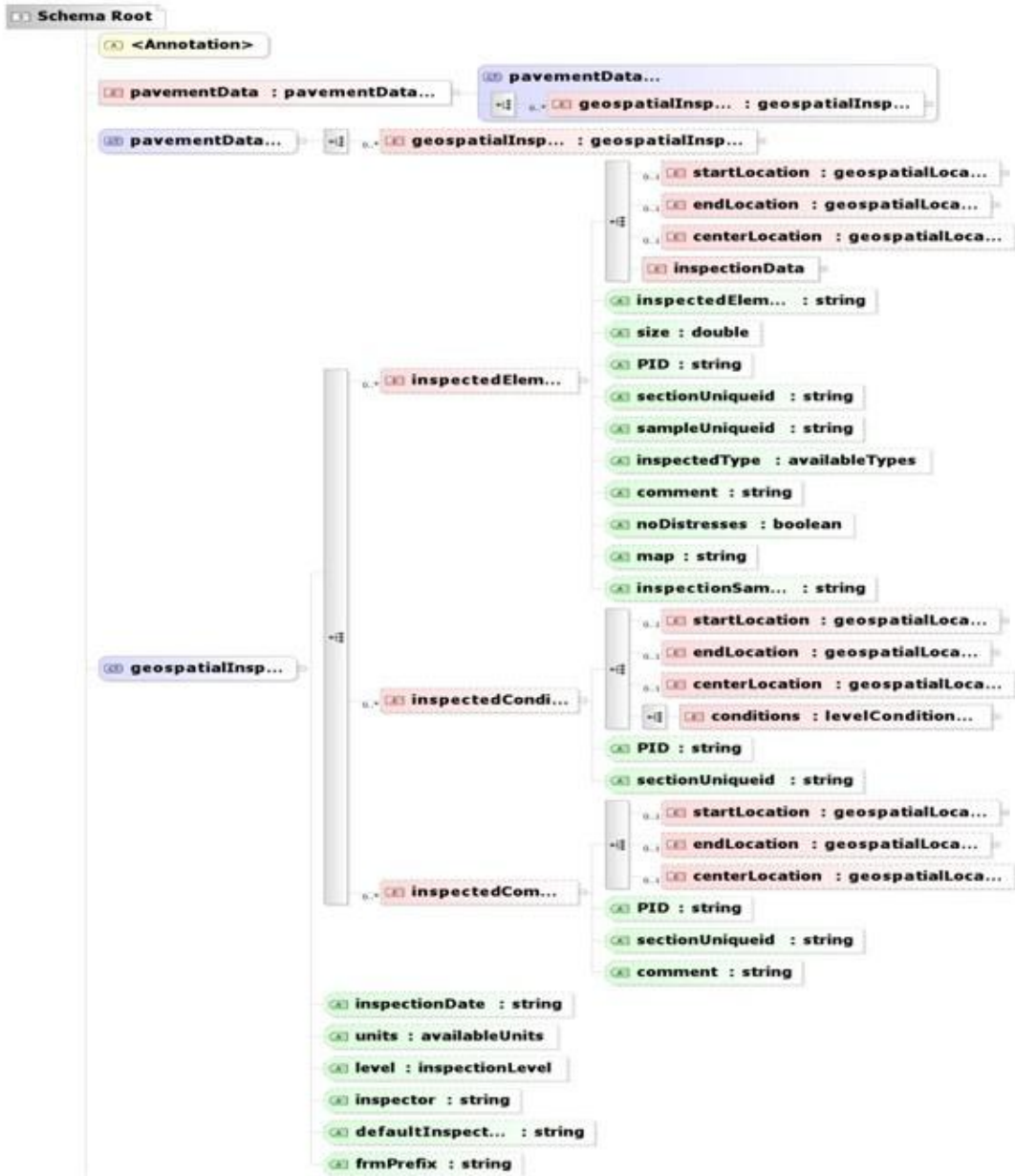
Video Inspection Import Data Format

Video Inspection Import Data Format (Access Database)

XML Inspection Data Import Format (XML)

File Specifications for XML Interface to PAVER™

The XML Inspection Data Import provides a vendor independent format for transferring field inspection data to PAVER™. An XML Schema “PavementInspectionData.xsd” has been developed to provide validation of data contained in the XML data files and can be found in the \EMS Program Files \Paver\Templates directory. The XML data dictionary layout is presented below.



The XML format presented above does include items that are not currently supported by PAVER™ but are there as place holders for future versions of the program. Other items included in the data dictionary are used for XML verification purposes. Below describes the common items used to import inspection data. Mandatory items for a proper XML import are denoted below.

The starting Reference node is “pavementData”. An Attribute to this node is the data dictionary.

The data dictionary is used to verify an XMLs format before importing it into PAVER™. Any XML errors during the format check will found when the XML is being imported using the PAVER™ XML import tool.

A child node to “pavementData” is “geospatialInspectionData”. The “geospatialInspectionData”

contains properties which are used throughout the XML statement. These attributes are:

- “InspectionDate” – All inspection data collected within the XML file will be associated with this date. It is in MM/DD/YYYY format. (Mandatory)
- “level” – This will be either “SAMPLE”, “FRAME”, or “SECTION” to indicate the mode of data collection. This property is Optional and if left out or blank will default to “FRAME”.
- “Units” – This will be either “English” or “Metric” to indicate the need for numeric conversion during import. This property is Optional and if left out or blank will default to English.

Children of the “geospatialInspectionData” node include “inspectedElement”, “inspectedCondition” and “inspectedComments”. These nodes contain the information pertaining to the inspection.

The “inspectedElement” node contains direct attributes and children nodes. The children nodes are “startLocation”, “endLocation”, “centerLocation” and “inspectionData”. The children contained in “startLocation”, “endLocation” and “centerLocation” are “latitude” and “longitude”. Each of these nodes contain these attributes:

- “degrees” – GPS string of degrees.
- “minutes” – GPS string of minutes.
- “seconds” -- GPS string of seconds.
- “northSouth” (latitude only) – Represented by “N” or “S”.
- “eastWest” (longitude only) – Represented by “E” or “W”.

The child contained in “inspectionData” is “PCIDistresses”.

The “PCIDistresses” nodes contain a child “levelDistress” which contains these attributes:

- “distressCode” – The code of the distress.
- “quantity” – The measured size or number of the distress.

- “severity” – Represented by “L”, “M” or “H”

Direct attributes defined for the “inspectionElement” node are:

- “inspectedElementID” – A unique identifier within a section and inspection date. (Mandatory)
- “size” – The size of the inspected element, corresponding to the “Units” attribute described in the “geospatialInspectionData” element above. (Mandatory)
- “PID” – This is the identifier of the section which owns this inspection. It is formatted as: “NETWORKID::BRANCHID::SECTIONID”. (Mandatory if sectionUniqueid not defined)
- “sectionUniqueid” – Similar to the PID, this value describes which section owns this inspection. This ID is pre-generated by PAVER™ and can be used in place of the “PID” value. (Mandatory if PID not defined)

The “inspectedCondition” node contains the children “startLocation”, “endLocation”, “centerLocation” and “inspectionData”. The children and attribute structure for “startLocation”, “endLocation” and “centerLocation” are the same as described for the “inspectedElement” node above. Direct attributes for “inspectedCondition” include “PID” or “sectionUniqueid” as defined above. The child for “inspectedCondition” is “levelCondition” which contains these attributes:

- “condition” – Condition value. (If desired to import. Mandatory)
- “conditionText” – Test pertaining to condition value.
- “comment” – Inspection comments, if wanted.
- “cndMeasure” -- Type of condition being recorded. (If desired to import, Mandatory)
- “source” – Source of recorded data

The “inspectedComment” node again contains the children “startLocation”, “endLocation” and “centerLocation”. The children and attribute structure for “startLocation”, “endLocation” and “centerLocation” are the same as described for the “inspectedElement” node above. Direct attributes for “inspectedComment” (If desired to import, Mandatory), “PID” or “sectionUniqueid” as defined above. (If desired to import, only one attribute Mandatory)

The XML tree node and attribute structure above describes common ways to import inspection data at different levels. The data dictionary used to verify xml formatting contains extra nodes not described above and only is used internally during the XML import into PAVER™. In the same location as the data dictionary, examples XMLs are provided to aid in the understanding of the structure. These example XMLs use the default database Roads and Parking in PAVER™. The following image depicts one of the example XML’s importing at the sample level.

```

<pavementData xsi:noNamespaceSchemaLocation="PavementInspectionDataV2.xsd">
  <geospatialInspectionData inspectionDate="7/13/2008" units="English" level="SAMPLE">
    <inspectedElement inspectedElementID="0001" size="2500" PID="ROADPARK::PKUES::2">
      <centerLocation>
        <latitude degrees="28" minutes="28" seconds="8.262177" northSouth="N"/>
        <longitude degrees="80" minutes="32" seconds="38.72498" eastWest="W"/>
      </centerLocation>
      <inspectionData>
        <PCIDistresses>
          <levelDistress distressCode="03" quantity="238.136804221442" severity="L"/>
          <levelDistress distressCode="19" quantity="42.9508250808349" severity="M"/>
        </PCIDistresses>
      </inspectionData>
    </inspectedElement>
    <inspectedElement inspectedElementID="0002" size="2500" PID="ROADPARK::PKUES::2">
      <centerLocation>
        <latitude degrees="28" minutes="28" seconds="7.726593" northSouth="N"/>
        <longitude degrees="80" minutes="32" seconds="39.32922" eastWest="W"/>
      </centerLocation>
      <inspectionData>
        <PCIDistresses>
          <levelDistress distressCode="19" quantity="243.108692233997" severity="M"/>
        </PCIDistresses>
      </inspectionData>
    </inspectedElement>
    <inspectedElement inspectedElementID="0003" size="2500" PID="ROADPARK::PKUES::2">
      <centerLocation>
        <latitude degrees="28" minutes="28" seconds="7.108612" northSouth="N"/>
        <longitude degrees="80" minutes="32" seconds="39.87854" eastWest="W"/>
      </centerLocation>
      <inspectionData>
        <PCIDistresses>
          <levelDistress distressCode="19" quantity="244.657117518622" severity="L"/>
        </PCIDistresses>
      </inspectionData>
    </inspectedElement>
  </geospatialInspectionData>
</pavementData>

```

Video Inspection Import Data Format (ASCII Text)

File Specifications for PCIVideo Interface to PAVER™

Example User Interfaces

PCIVasc2PVR.exe

User interface for the use of Distress Data collected into ASCII files. It is recommended that the complete parameter string be enclosed in quotes (“”).

Command Line Parameters:

PVR=C:\EMS Program Files\	Directory containing the PAVEMENT.MDB
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the ASCII text files
IDIR=C:\EMS Program Files\PCIVideo	Directory containing the ASCII text files
INSP=PCIVInspection.txt	File containing Inspection information
SAMP=PCIVSample.txt	File containing Sample information
FRAM=PCIVFrame.txt	File containing Frame information
DIST=PCIVDistress.txt	File containing Distress information
COND=PCIVCondition.txt	File containing Condition information
OPTN=PCIVOptions.txt	File containing PCIVideo options
INTERACTIVE	If present, force display of UI

PCIVdb2PVR.exe

User interface for the use of Distress Data collected into a pre-configured Access database. It is recommended that the complete parameter string be enclosed in quotes (“”).

Command Line Parameters:

PVR=C:\EMS Program Files\ PDIR=C:\EMS Program Files\User Data\Sample\ IDIR=C:\EMS Program Files\PCI Video INTERACTIVE	Directory containing the PAVEMENT.MDB Directory containing PCIVIntermediateFile.mdb If present, force display of UI
--	---

Six text files are needed to perform an import of video inspection data.

The following file formats support the import of collected frame distress data:

- Fields are separated by commas
- Strings are enclosed by quotes
- Dates are enclosed by pound signs
- Network, Branch, and Section are separated by 2 colons
- Optional fields may be blank but present

PCIVideoOptions.txt

Line 1:
FieldA,FieldB,FieldC
"Metric","Data collected in contract #xxx","PID"

Line 2..n: Optional)
Spacer:00000
DEFAULTFRAMESIZE:260
DEFAULTFRAMEUNITS:SQF

Where:

<u>Line 1:</u>	
FieldA	Data values were collected in “English” or “metric”
FieldB	Comment to associate with the execution of this
FieldC	process Method of data association (UniqueId / PID / SID)

PCIVideoInspection.txt

FieldA,FieldB,FieldC,FieldD,FieldE
"RSPARK::IFARB::01",#6/5/2000#,"optional",4,"optional"

Where:

FieldA	The identifier of the section which “owns” this inspection NETWORKID::BRANCHID::SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections

just pick a day)
 FieldC Usually some observations resulting from inspection
 FieldD How many samples in the inspection
 FieldE Indicates the origin of the inspection data

PCIVideoSample.txt

FieldA,FieldB,FieldC,FieldD,FieldE, FieldF, FieldG
 "RSPARK::IFARB::01",#6/5/2000#,"1SMP2","R",52.95,"SqM","Sample Comment"

Where:

FieldA The identifier of the section which "owns" this inspection
 NETWORKID::BRANCHID::SECTIONID
 SPACER
 FieldB Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
 FieldC Assigned by video vendor for this video sample (must be unique within section and inspection date)
 FieldD Type of Sample - "R" for Random and "A" for Additional
 FieldE Size of Sample
 FieldF Unit of measure (as defined in PAVER™) for the Sample Size
 FieldG Survey or Detail Comment regarding Sample

PCIVideoFrame.txt

FieldA,FieldB,FieldC,FieldD,FieldE, FieldF, FieldG, FieldH, FieldI, FieldJ
 "RSPARK::IFARB::01",#6/5/2000#,"1FRM2","",52.95,"SqM","START","END","LATITUDE","LONGITUDE"

Where:

FieldA The identifier of the section which "owns" this inspection
 NETWORKID::BRANCHID::SECTIONID
 SPACER
 FieldB Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
 FieldC Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)
 FieldD Identifies the sample (optional)
 FieldE Size of frame

FieldF	Unit of measure (as defined in PAVER™) for the frame size
FieldG	Distance from start of film to beginning of inspection frame (optional)
FieldH	Distance from start of film to end of inspection frame (optional)
FieldI	LATITUDE-GPS String of Degree, Minutes, Seconds (optional)
FieldJ	LONGITUDE -GPS String of Degree, Minutes, Seconds (optional)

PCIVideoDistress.txt

FieldA,FieldB,FieldC,FieldD,FieldE, FieldF, FieldG, FieldH, FieldI, FieldJ
 "RSPARK::IFARB::01",#6/5/2000#,"","1FRM2", 7 ,"H", 1.46304001808166 ,"M","EDGE CRACKING"

Where:

FieldA	The identifier of the section which “owns” this inspection NETWORKID::BRANCHID::SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
FieldC	Sample number which owns this distress (if any)
FieldD	Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)
FieldE	The distress code as used in PAVER™ (integer)
FieldF	H, M, L, (if severity is used for the given distress code)
FieldG	The quantity of the distress (for distress numbers with quantity defined)
FieldH	Unit of measure (as defined in PAVER™ for the quantity)
FieldI	Available for any comment/observation by the data collector (optional)

PCIVideoCondition.txt

FieldA,FieldB,FieldC,FieldD,FieldE, FieldF, FieldG, FieldH
 "RSPARK::IFARB::01",#6/5/2000#,"","", 21 ,"","IRI","Automated data collection"

Where:

FieldA	The identifier of the section which “owns” this inspection NETWORKID::BRANCHID::SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just

	pick a day)
FieldC	Sample number which owns this distress (if any)
FieldD	Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)
FieldE	The Numeric Condition value to be recorded. Only populate FieldE or FieldF as determined by the data type for the Condition Method
FieldF	The Textural Condition Value to be recorded
FieldG	The Condition Method (IRI/PCI/PCIV/etc.)
FieldH	Source of the condition value (optional)

Units of Measure Valid for PCI Video

<u>UNIT</u>	<u>System</u>
F	English
FT	English
LF	English
SF	English
SQF	English
SQFT	English
M	Metric
SM	Metric
SQM	Metric
COUNT	Metric or English
SLAB	Metric or English
SLABS	Metric or English

Video Inspection Import Data Format (AccessDatabase)

There are five data tables that can be created in Microsoft Access to input data. They include the following:

- PCIVideoDistress
- PCIVideoCondition
- PCIVideoInspection
- PCIVideoSample
- PCIVideoFrame

At least one of the two tables in bold type are required. Optional tables can be used to record additional descriptive data, if available. In general, data values that have been filled in are required, and those listed as optional can be omitted.

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Appendix C

Abbreviations of Surface Types

Abbreviations of Surface Types

<u>Abbreviation</u>	<u>CompleteName</u>	<u>DistressManualReference</u>
AAC	Asphalt overlay over asphalt concrete	Asphalt
ABR	Asphalt over brick	Asphalt
AC	Asphalt concrete	Asphalt
ACT	Asphalt over cement treated base	Asphalt
APC	Asphalt overlay over Portland cement concrete	Asphalt
APZ	Asphalt over pozzolanic base	Asphalt
BR	Brick	Asphalt
COB	Cobblestone	Asphalt
GR	Gravel	Unsurfaced
MAT	Matting	
PCC	Portland cement concrete	Concrete
PVB	Paving blocks	Asphalt
SS	Stabilized Surface	
ST	Surface treatment	Asphalt
X	Other	Asphalt

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Appendix D

Pavement Data Exchange (PDE) Format

Pavement Data Exchange (PDE) Format

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	SITE			SITE.DBF (Database and Contact Information)
Field	AGENCY	Text	61	PAVER™ Agency responsible for data
Field	SECUR	Text	25	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNIT	Text	7	Data units in “ENGLISH” or “METRIC”
Field	NAME	Text	25	PAVER™ Data Coordinator Name
Field	ADDR	Text	52	PAVER™ Data Coordinator Address
Field	CTYSTA	Text	30	PAVER™ Data Coordinator City and State
Field	ZIPCODE	Text	10	PAVER™ Data Coordinator Zip Code
Field	PHONE	Text	21	PAVER™ Data Coordinator Phone Number
Field	PASSWRD	Text	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	AGENCYID	Text	5	PAVER™ Agency Id

Table	FAMILY			FAMILY.DBF (Family Models)
Field	FAMILY	Text	20	Model name.
Field	MAXAGE	Number (Double)	8	Max age to be used for model.
Field	COEFF1	Number (Double)	8	Model 1st coefficient.
Field	COEFF2	Number (Double)	8	Model 2nd coefficient.
Field	COEFF3	Number (Double)	8	Model 3rd coefficient.
Field	COEFF4	Number (Double)	8	Model 4th coefficient.

Table	POLICY1			POLICY1.DBF (Maintenance Policy Names)
Field	POLICY	Number (Double)	8	Maintenance policy Id
Field	DESCRIPT	Text	30	Description of maintenance policy

Table	POLICY2			POLICY2.DBF (Maintenance Policy Details)
Field	POLICY	Number (Double)	8	Maintenance policy Id
Field	DISTRESS	Number (Double)	8	Distress for policy consideration
Field	SEVERITY	Text	1	Distress severity for policy consideration
Field	WORKTYPE	Text	5	Work type considered for distress and severity
Field	MATERIAL	Number (Double)	8	Material type considered for distress and severity
Field	EXTRA1	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	EXTRA2	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNITCOST	Number (Double)	8	Cost per work type unit

Table	NETWORK			NETWORK.DBF (Pavement Network Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	NAME	Text	61	Description of pavement network.
Field	NSORT1	Text	10	Supplemental value for selecting networks
Field	NSORT2	Text	10	Supplemental value for selecting networks
Field	NSORT3	Text	10	Supplemental value for selecting networks

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	BRANCH			BRANCH.DBF (Pavement Branch Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	NAME	Text	25	Description of pavement branch.
Field	USE	Text	10	Branch use. ROADWAY, APRON, RUNWAY, TAXIWAY, Etc.
Field	SECTIONS	Number (Double)	8	Number of pavement sections in the branch.
Field	AREA	Number (Double)	8	Total area of all sections in the branch.
Field	COMMENTS	Text	70	Any additional comments about the branch.
Field	BSORT1	Text	10	Supplemental value for selecting branches
Field	BSORT2	Text	10	Supplemental value for selecting branches
Field	BSORT3	Text	10	Supplemental value for selecting branches
<hr/>				
Table	SECTION			SECTION.DBF (Pavement Section Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	FROM	Text	25	Starting location of pavement section
Field	TOO	Text	25	Ending location of pavement section
Field	ZONE	Text	4	User specified indicator for funding sources, maintenance areas, etc.
Field	CATEGORY	Text	1	Section category (A-Z, 0-
Field	RANK	Text	1	Pavement rank (A=Principal, B=Arterial, C=Collector, D=Industrial, E=Residential, N=Not Applicable, P=Primary, S=Secondary, T=Tertiary, X=Other)
Field	SURFACE	Text	10	Surface type (AAC, ABR, AC, ACT, APC, APZ, COB, GR, PCC, PVB, ST, X)
Field	SECLEN	Number (Double)	8	Section Length
Field	SECWID	Number (Double)	8	Section Width
Field	SECAREA	Number (Double)	8	Section Area
Field	SLABLEN	Number (Double)	8	Slab length
Field	SLABWID	Number (Double)	8	Slab width
Field	NUMSLAB	Number (Double)	8	Number of slabs
Field	JOINTLEN	Number (Double)	8	Slab joint length
Field	LCD	Date/Time	8	Last construction date
Field	LID	Date/Time	8	Last inspection date
Field	LPCI	Number (Double)	8	Last inspection PCI condition
Field	FAMILY	Text	8	Family model assigned to section
Field	SHOULDER	Text	3	Shoulder type
Field	STRTYPE	Text	3	Street type
Field	GRADE	Number (Double)	8	Pavement grade in degrees
Field	LANES	Number (Double)	8	Number of lanes in section
Field	SSORT1	Text	10	Supplemental value for selecting sections
Field	SSORT2	Text	10	Supplemental value for selecting sections
Field	SSORT3	Text	10	Supplemental value for selecting sections

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	SAMPLE			SAMPLE.DBF (Inspection Sample Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	SAMPLE	Text	10	Sample Id
Field	TYPE	Text	1	Sample type R=Random A=Additional
Field	SIZE	Number (Double)	8	Sample size, area or slabs
Field	PCI	Number (Double)	8	Sample PCI Condition
Field	DISTRESS	Number (Double)	8	Distress code
Field	SEVERITY	Text	1	Distress severity
Field	QTY	Number (Double)	8	Quantity of distress
<hr/>				
Table	XDIST			XDIST.DBF (Inspection Extrapolated Distress Information)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	DISTRESS	Number (Double)	8	Distress code
Field	SEVERITY	Text	1	Distress severity
Field	QTY	Number (Double)	8	Quantity of distress
Field	DENSITY	Number (Double)	8	Density of distress for severity
Field	DEDUCT	Number (Double)	8	PCI points to deduct for this distress for severity
<hr/>				
Table	CONDHIST			CONDHIST.DBF (Inspection Summary Results)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	RIDE	Text	3	Condition rating: Ride Quality
Field	SAFETY	Text	3	Condition rating: Safety
Field	DRAIN	Text	3	Condition rating: Drainage Condition
Field	SHOULDER	Text	3	Condition rating: Shoulder Quality
Field	OVERALL	Text	3	Condition rating: Overall Condition
Field	FOD	Text	3	Condition rating: Foreign Object Damage
Field	SAMPLES	Number (Double)	8	Samples in section
Field	SAMPLE	Number (Double)	8	Samples in section
Field	PCI	Number (Double)	8	Condition rating: PCI
Field	RANDOM	Number (Double)	8	Random samples in section
Field	ADDITION	Number (Double)	8	Additional samples in section
Field	MINSAM	Number (Double)	8	Minimum number of samples recommended for section
Field	PCISTA	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	LOAD	Number (Double)	8	Percent of distress due to: LOAD
Field	CLIMATE	Number (Double)	8	Percent of distress due to: CLIMATE
Field	OTHER	Number (Double)	8	Percent of distress due to: OTHER

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	TRAFFIC			TRAFFIC.DBF (Traffic survey Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	SURVEY	Date/Time	8	Starting date of traffic survey
Field	AIRTYPE	Text	15	(Airfields) Aircraft model
Field	ANNDEP	Number (Double)	8	(Airfields) Annual number of departures
Field	AVDAILY	Number (Double)	8	(Airfields) Average number of daily departures
Field	PERDESGN	Number (Double)	8	(Roadways) Percent of traffic in design lane
Field	PER2AT	Number (Double)	8	(Roadways) Percent of twin axle trucks in design lane
Field	PER3AT	Number (Double)	8	(Roadways) Percent of trucks with 3 or more axles in design lane
Field	ESAL	Number (Double)	8	(Roadways) Annual ESAL in design lane
Field	COMMENT	Text	70	Comments related to traffic survey
Field	ENDDATE	Date/Time	8	Ending date of traffic survey

Table	MATPRO			MATPRO.DBF (Laver and Materials Testing Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LAYER	Text	10	Layer type: OVERLAY, SURFACE, BASE, SUBBASE, SUBGRADE
Field	TESTTYPE	Text	50	Test type
Field	TESTDATE	Date/Time	8	Date of test
Field	TESTLOC	Text	10	Location of test
Field	TESTVAL	Text	10	Result value of test
Field	DEPTH	Number (Double)	8	Depth from layer surface
Field	COMMENT	Text	70	Comments related to Material Test

Table	WORREO			WORKREO.DBF (Pavement Work Required Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5	Work type code
Field	STADATE	Date/Time	8	Date to start project
Field	IDDATE	Date/Time	8	Proposed date to start project
Field	PROPOSAL	Text	12	Proposal Id
Field	PHASE	Text	2	Project phase
Field	ACCOMP	Text	1	Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8	Quantity of work type to be performed
Field	COST	Number (Double)	8	Cost based on work type and quantity
Field	MATERIAL	Number (Double)	8	Material type used for work type
Field	THICK	Number (Double)	8	Thickness of material
Field	COMMENT	Text	70	Comments related to project

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	WORKHIST			WORKHIST.DBF (Pavement Work History Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5	Work type code
Field	COMPLETE	Date/Time	8	Date work completed
Field	MATERIAL	Number (Double)	8	Material type used for work type
Field	THICK	Number (Double)	8	Thickness of material
Field	ACCOMP	Text	1	Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8	Quantity of work type to be performed
Field	COST	Number (Double)	8	Cost based on work type and quantity
Field	COMMENT	Text	70	Comments related to project
Field	STADATE	Date/Time	8	Date project started
Field	IDDATE	Date/Time	8	Proposed date to start project
Field	PROPOSAL	Text	12	Proposal Id
Field	PHASE	Text	2	Project phase
<hr/>				
Table	NDT1			NDT1.DBF (FWD Testing Summary) (Not imported into PAVER™ 4.0)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8	Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8	Station number tested
Field	TESTDATE	Date/Time	8	Date of testing
Field	TEMP	Number (Double)	8	Air temperature
Field	LOAD	Number (Double)	8	Test load in kilograms
Field	MAXDEF	Number (Double)	8	Maximum deflection in mils
Field	TRANSFER	Number (Double)	8	Load transfer in percent
Field	TESTTYPE	Text	1	NDT type: D=Design, A=Average
<hr/>				
Table	NDT2			NDT2.DBF (FWD Testing Detail) (Not imported into PAVER™ 4.0)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8	Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8	Station number tested
Field	TESTDATE	Date/Time	8	Date of testing
Field	TEMP	Number (Double)	8	Air temperature
Field	LOAD	Number (Double)	8	Test load in kilograms
Field	SENSOR	Number (Double)	8	Sensor measured
Field	DISTANCE	Number (Double)	8	Sensor distance from load
Field	DEFLECT	Number (Double)	8	Sensor deflection in mils

Appendix E

Example Pavement Survey Forms

Example Pavement Survey Forms

Included on the following pages are some example forms for surveying asphalt and concrete pavements. The six example forms are:

- Concrete Surfaced Roads and Parking Lots
- Asphalt Surfaced Roads and Parking Lots
- Airfield Concrete Pavement
- Airfield Asphalt Pavement
- Unsurfaced Roads
- Deduct Values

Concrete Surfaced Roads and Parking Lots

PCC ROADWAY PAVEMENT CONDITION SURVEY DATA SHEET								
PID				INSPECTOR NAME				
FROM				BRANCH USE		DATE INSPECTED		
TO				SECTION WIDTH		SECTION LENGTH		
SLAB WIDTH		SLAB LENGTH		NUMBER OF SLABS				
PCC Surfaced Distress								
21. Blowup/ Buckling		26. Joint Seal Damage		31. Polished Aggregate		36. Scaling, Cracking, Cracking		
22. Corner Break		27. Lane/ Shoulder Drop		32. Popouts		37. Shrinkage		
23. Divided Slab		28. Linear Cracking		33. Pumping		38. Spalling, Corner		
24. Durability Crack		29. Patching, Large		34. Punchout		39. Spalling, Joint		
25. Faulting		30. Patching, Small		35. Railroad Crossing				
SAMPLE NUMBER				SLABS IN SAMPLE				Sketch / Comments
DISTRESS CODE	L	M	H					
SAMPLE NUMBER				SLABS IN SAMPLE				Sketch / Comments
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	

Asphalt Surfaced Roads and Parking Lots

AC ROADWAY PAVEMENT CONDITION SURVEY DATA SHEET															
PID				INSPECTOR NAME											
FROM				BRANCH USE		DATE INSPECTED									
TO				SECTION WIDTH		SECTION LENGTH									
AC Surfaced Distress Codes															
1. Alligator Cracking		6. Depression		11. Patching & Utility Cut Patching		16. Shoving									
2. Bleeding		7. Edge Cracking		12. Polished Aggregate		17. Slippage Cracking									
3. Block Cracking		8. Joint Reflection Cracking		13. Potholes		18. Swell									
4. Bumps And Sags		9. Lane/ Shoulder Drop-Off		14. Railroad Crossing		19. Raveling									
5. Corrugation		10. Long & Trans Cracking		15. Rutting		20. Weathering									
SAMPLE NUMBER				SAMPLE AREA				Sketch / Comments							
DISTRESS CODE	L	M	H												
SAMPLE NUMBER				SAMPLE AREA				SAMPLE NUMBER				SAMPLE AREA			
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H

Airfield Concrete Pavement

PCC AIRFIELD PAVEMENT CONDITION SURVEY DATA SHEET							
PID			INSPECTOR NAME				
FROM			BRANCH USE		DATE INSPECTED		
TO			SECTION WIDTH		SECTION LENGTH		
SLAB WIDTH		SLAB LENGTH		NUMBER OF SLABS			
PCC Surfaced Distress Codes							
61. Blowup		65. Joint Seal Damage		69. Pumping		73. Shrinkage Cracks	
62. Corner Break		66. Patching, Small		70. Scaling		74. Spalling, Joints	
63. Cracks		67. Patching, Large		71. Settlement/ Faulting		75. Spalling, Corner	
64. Durability Cracking		68. Popouts		72. Shattered Slab		76. ASR	
SAMPLE NUMBER				SLABS IN SAMPLE			Sketch / Comments
DISTRESS CODE	L	M	H				
SAMPLE NUMBER				SLABS IN SAMPLE			Sketch / Comments
DISTRESS CODE	L	M	H				

Airfield Asphalt Pavement

AC AIRFIELD PAVEMENT CONDITION SURVEY DATA SHEET																
PID				INSPECTOR NAME												
FROM				BRANCH USE		DATE INSPECTED										
TO				SECTION WIDTH		SECTION LENGTH										
AC Surfaced Distress Codes																
41. Alligator Cracking	42. Bleeding	43. Block Cracking	44. Corrugation	45. Depression	46. Jet Blast	47. Jt. Reflection (PCC)	48. Long. & Trans. Cracking	49. Oil Spillage	50. Patching	51. Polished Aggregate	52. Raveling	53. Rutting	54. Shoving From PCC	55. Slippage Cracking	56. Swell	57. Weathering
SAMPLE NUMBER				SAMPLE AREA				Sketch / Comments								
DISTRESS CODE	L	M	H													
SAMPLE NUMBER				SAMPLE AREA				SAMPLE NUMBER				SAMPLE AREA				
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	

Unsurfaced Roads

UNSURFACED ROADS CONDITION SURVEY DATA SHEET								
PID				INSPECTOR NAME				
FROM				BRANCH USE		DATE INSPECTED		
TO				SECTION WIDTH		SECTION LENGTH		
Unsurfaced Distress Codes								
81. Improper Cross Section Linear Ft				85. Potholes Count				
82. Inadequate Roadside Drainage Sq Ft				86. Ruts Sq Ft				
83. Corrugations Sq Ft				87. Loose Aggregate Linear Ft				
84. Dust								
SAMPLE NUMBER		SAMPLE AREA			Sketch / Comments			
DISTRESS CODE	L	M	H					
SAMPLE NUMBER		SAMPLE AREA			SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H	

Deduct Values

No.	DEDUCT VALUES											TOTAL	q	CDV	
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

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Appendix F

Load & Climate Distresses

Load & Climate Distresses

Asphalt Surfaced Roads and Parking Lots

<u>PavementDistress</u>	<u>DistressType</u>
1. Alligator Cracking	Load
2. Bleeding	Other
3. Block Cracking	Climate/Durability
4. Bumps & Sags	Other
5. Corrugation	Other
6. Depression	Other
7. Edge Cracking	Load
8. Joint Reflection Cracking	Climate/Durability
9. Lane/Shoulder Drop Off	Other
10. Longitudinal/Transverse Cracking	Climate/Durability
11. Patch/Utility Cut	Other
12. Polished Aggregate	Other
13. Pothole	Load
14. Railroad Crossing	Other
15. Rutting	Load
16. Shoving	Other
17. Slippage Cracking	Other
18. Swell	Other
19. Raveling	Climate/Durability
20. Weathering	Climate/Durability

Concrete Surfaced Roads and Parking Lots

<u>PavementDistress</u>	<u>DistressType</u>
21. Blow Up	Climate/Durability
22. Corner Break	Load
23. Divided Slab	Load
24. Durability Cracking	Climate/Durability
25. Faulting	Other
26. Joint Seal Damage	Climate/Durability
27. Lane/Shoulder Drop Off	Other
28. Linear Cracking	Load
29. Large Patch/Utility Cut	Other
30. Small Patch	Other
31. Polished Aggregate	Other
32. Popouts	Other
33. Pumping	Other
34. Punchout	Load
35. Railroad Crossing	Other
36. Scaling	Other
37. Shrinkage Cracking	Climate/Durability
38. Corner Spalling	Climate/Durability
39. Joint Spalling	Climate/Durability

Asphalt Surfaced Airfields

<u>PavementDistress</u>	<u>DistressType</u>
41. Alligator Cracking	Load
42. Bleeding	Other
43. Block Cracking	Climate/Durability
44. Corrugation	Other
45. Depression	Other
46. Jet Blast	Other
47. Joint Reflection Cracking	Climate/Durability
48. Longitudinal/Transverse Cracking	Climate/Durability
49. Oil Spillage	Other
50. Patching	Climate/Durability
51. Polished Aggregate	Other
52. Raveling	Climate/Durability
53. Rutting	Load
54. Shoving	Other
55. Slippage Cracking	Other
56. Swell	Other
57. Weathering	Climate/Durability

Concrete Surfaced Airfields

<u>PavementDistress</u>	<u>DistressType</u>
61. Blow Up	Climate/Durability
62. Corner Break	Load
63. Linear Cracking	Load
64. Durability Cracking	Climate/Durability
65. Joint Seal Damage	Climate/Durability
66. Small Patch	Other
67. Large Patch/Utility Cut	Other
68. Popouts	Other
69. Pumping	Other
70. Scaling	Other
71. Faulting	Other
72. Shattered Slab	Load
73. Shrinkage Cracking	Other
74. Joint Spalling	Other
75. Corner Spalling	Other
76. Alkali Silica Reaction (ASR)	Other

Unsurfaced Roads

<u>PavementDistress</u>	<u>DistressType</u>
81. Improper Cross Section	Other
82. Inadequate Roadside Drainage	Other
83. Corrugation	Climate/Durability
84. Dust	Other
85. Pothole	Climate/Durability
86. Rutting	Climate/Durability
87. Loose Aggregate	Other

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Appendix G

Computing Work Quantity from Distress Quantity

Computing Work Quantity from Distress Quantity

1. We look in the “Work Conversion By Work Type” table given below. If the work type is there (which is currently only true for Slab Replacement – PCC), we say the work quantity is equal to the slab area.

<u>WorkName</u>	<u>ConversionType</u>	<u>Multiplier</u>
Slab Replacement – PCC	Slab Area	1

2. If there is no conversion by work type, we try to look up the conversion by distress type, severity, and work unit type in the table given below. If a matching record is found, we take the amount given by the conversion type column (e.g., for distress 21, we use slab width) and multiply it by the distress quantity and the value in the multiplier column to get the work quantity. The conversion type definitions are:

- Slab Width: Work quantity = distress quantity x slab width x multiplier
- Slab Length: Work quantity = distress quantity x slab length x multiplier
- Slab Area: Work quantity = (slab width x slab length) x distress quantity x multiplier
- Constant: Work quantity = distress quantity x multiplier
- Joint Calculation: Work quantity = joint length x (distress quantity/number of slabs) x multiplier
- Distress Area: Work quantity = distress area x multiplier
- Slab Length + Width : Work quantity = (slab width + slab length) x distress quantity x multiplier
- Patch Area: Work quantity = distress quantity + (0.6096 x square root (distress quantity/multiplier) x (multiplier + 1)) + 0.3716

Otherwise, work quantity = distress quantity x multiplier

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
1	Alligator Cracking	Any	Any	Patch Area	1.25
2	Bleeding	Any	Any	Distress Quantity	1
3	Block Cracking	Any	Any	Distress Quantity	1
4	Bumps/ Sags	Any	Any	Distress Quantity	1
5	Corrugation	Any	Any	Patch Area	1.25
6	Depression	Any	Any	Patch Area	1.25
7	Edge Cracking	Any	Area	Distress Quantity	0.5
7	Edge Cracking	Any	Linear	Distress Quantity	1
8	Joint Reflection Cracking	Any	Area	Distress Quantity	0.5
8	Joint Reflection Cracking	Any	Linear	Distress Quantity	1

**Note: All units are in metric

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
9	Lane/ Shoulder Drop	Any	Any	Distress Quantity	1
10	Longitudinal/ Transverse Cracking			Distress Quantity	1
11	Patch/ Utility Cut	Any	Any	Patch Area	1.25
12	Polished Aggregate	Any	Any	Distress Quantity	1
13	Pothole	H	Any	Constant	0.836
13	Pothole	M	Any	Constant	0.557
13	Pothole	L	Any	Constant	0.278
14	Railroad Crossing	Any	Any	Distress Quantity	1
15	Rutting	Any	Any	Distress Quantity	1
16	Shoving	Any	Any	Patch Area	1.25
17	Slippage Cracking	Any	Any	Patch Area	1.25
18	Swell	Any	Any	Patch Area	1.25
19	Raveling	Any	Any	Distress Quantity	1
20	Weathering	Any	Any	Distress Quantity	1
21	Blow-up/ Shatter	H	Linear	Slab Width	1
21	Blow-up/ Shatter	H	Area	Slab Width	2
21	Blow-up/ Shatter	L	Linear	Slab Width	1
21	Blow-up/ Shatter	L	Area	Slab Width	1
21	Blow-up/ Shatter	M	Linear	Slab Width	1
21	Blow-up/ Shatter	M	Area	Slab Width	1.5
22	Corner Break	L	Area	Constant	3
22	Corner Break	H	Area	Constant	3
22	Corner Break	L	Linear	Constant	2.5
22	Corner Break	H	Linear	Constant	2.5
22	Corner Break	M	Area	Constant	3
22	Corner Break	M	Linear	Constant	2.5
23	Divided Slab	Any	Linear	Slab Length + Width	1
23	Divided Slab	Any	Area	Slab Area	1
24	Durability Cracking	L	Linear	Slab Width	1
24	Durability Cracking	H	Area	Slab Area	1
24	Durability Cracking	L	Area	Slab Width	1
24	Durability Cracking	M	Linear	Slab Width	1
24	Durability Cracking	H	Linear	Slab Length + Width	1
24	Durability Cracking	M	Area	Slab Width	1.25
25	Faulting	Any	Any	Slab Width	1

**Note: All units are in metric

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
26	Joint Seal Damage	Any	Area	Joint Calculation	0.304
26	Joint Seal Damage	Any	Linear	Joint Calculation	1
27	Lane/ Shoulder Drop	Any	Area	Slab Length	1
27	Lane/ Shoulder Drop	Any	Linear	Slab Length	1
28	Linear Cracking	Any	Linear	Slab Length + Width	0.5
28	Linear Cracking	Any	Area	Slab Area	1
29	Large Patch/ Utility Cut	Any	Area	Slab Width	1.5
29	Large Patch/ Utility Cut	Any	Linear	Slab Width	1
30	Small Patch	Any	Linear	Constant	0.5
30	Small Patch	Any	Area	Constant	0.25
31	Polished Aggregate	Any	Linear	Slab Length	1
31	Polished Aggregate	Any	Area	Slab Area	1
32	Popouts	Any	Linear	Slab Length	1
32	Popouts	Any	Area	Slab Area	1
33	Pumping	Any	Linear	Slab Width	1
33	Pumping	Any	Area	Slab Width	0.304
34	Punchout	Any	Area	Slab Width	1.5
34	Punchout	Any	Linear	Slab Width	1
35	Railroad Crossing	Any	Linear	Slab Width	1
35	Railroad Crossing	Any	Area	Slab Width	1.5
36	Scaling/ Crazing	M	Area	Slab Width	1.25
36	Scaling/ Crazing	M	Linear	Slab Width	1
36	Scaling/ Crazing	L	Linear	Slab Width	1
36	Scaling/ Crazing	L	Area	Slab Width	1.25
36	Scaling/ Crazing	H	Linear	Slab Length + Width	1
36	Scaling/ Crazing	H	Area	Slab Area	1.25
37	Shrinkage Cracking	Any	Linear	Constant	1.5
37	Shrinkage Cracking	Any	Area	Constant	0.305
38	Corner Spalling	Any	Area	Constant	0.25
38	Corner Spalling	Any	Linear	Constant	0.5
39	Joint Spalling	L	Linear	Constant	0.5
39	Joint Spalling	M	Area	Slab Width	0.5
39	Joint Spalling	H	Area	Slab Width	0.5
39	Joint Spalling	M	Linear	Slab Width	0.5
39	Joint Spalling	L	Area	Slab Width	0.25
39	Joint Spalling	H	Linear	Slab Width	1
41	Alligator Cracking	Any	Any	Patch Area	1.25

**Note: All units are in metric

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
42	Bleeding	Any	Any	Distress Quantity	1
43	Block Cracking	Any	Any	Distress Quantity	1
44	Corrugation	Any	Any	Patch Area	1.25
45	Depression	Any	Any	Patch Area	1.25
46	Jet Blast	Any	Any	Distress Quantity	1
47	Joint Reflection Cracking	Any	Linear	Distress Quantity	1
47	Joint Reflection Cracking	Any	Area	Distress Quantity	0.5
48	Longitudinal/ Transverse	Any	Any	Distress Quantity	1
49	Oil Spillage	Any	Any	Patch Area	1.25
50	Patching	Any	Any	Patch Area	1.25
51	Polished Aggregate	Any	Any	Distress Quantity	1
52	Raveling	Any	Any	Distress Quantity	1
53	Rutting	Any	Any	Distress Quantity	1
54	Shoving	Any	Any	Patch Area	1.25
55	Slippage Cracking	Any	Any	Patch Area	1.25
56	Swelling	Any	Any	Patch Area	1.25
57	Weathering	Any	Any	Distress Quantity	1
61	Blow-up/ Shatter	L	Linear	Slab Width	1
61	Blow-up/ Shatter	H	Area	Slab Width	2
61	Blow-up/ Shatter	M	Area	Slab Width	1.5
61	Blow-up/ Shatter	H	Linear	Slab Width	1
61	Blow-up/ Shatter	M	Linear	Slab Width	1
61	Blow-up/ Shatter	L	Area	Slab Width	1
62	Corner Break	M	Linear	Constant	2.5
62	Corner Break	H	Area	Constant	3
62	Corner Break	M	Area	Constant	3
62	Corner Break	L	Area	Constant	3
62	Corner Break	L	Linear	Constant	2.5
62	Corner Break	H	Linear	Constant	2.5
63	Linear Cracking	Any	Any	Slab Length + Width	0.5
63	Linear Cracking	Any	Area (Slab Replacement)	Slab Area	1
64	Durability Cracking	H	Linear	Slab Length + Width	1
64	Durability Cracking	M	Area	Slab Width	1.25
64	Durability Cracking	M	Linear	Slab Width	1
64	Durability Cracking	L	Area	Slab Width	1
64	Durability Cracking	L	Linear	Slab Width	1
64	Durability Cracking	H	Area	Slab Area	1

**Note: All units are in metric

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
65	Joint Seal Damage	Any	Area	Joint Calculation	0.304
65	Joint Seal Damage	Any	Linear	Joint Calculation	1
66	Small Patch	Any	Linear	Constant	0.5
66	Small Patch	Any	Area	Constant	0.25
67	Large Patch/ Utility Cut	Any	Linear	Slab Width	1
67	Large Patch/ Utility Cut	Any	Area	Slab Width	1.5
68	Popouts	Any	Area	Slab Area	1
68	Popouts	Any	Linear	Slab Length	1
69	Pumping	Any	Linear	Slab Width	1
69	Pumping	Any	Area	Slab Width	0.304
70	Scaling	L	Area	Slab Width	1.25
70	Scaling	H	Area	Slab Area	1.25
70	Scaling	H	Linear	Slab Length + Width	1
70	Scaling	M	Linear	Slab Width	1
70	Scaling	L	Linear	Slab Width	1
70	Scaling	M	Area	Slab Width	1.25
71	Faulting	Any	Any	Slab Width	1
72	Divided Slab	Any	Linear	Slab Length + Width	1
72	Divided Slab	Any	Area	Slab Area	1
73	Shrinkage Cracking	Any	Area	Constant	0.304
73	Shrinkage Cracking	Any	Linear	Constant	1.5
74	Joint Spalling	L	Linear	Constant	0.5
74	Joint Spalling	L	Area	Slab Width	0.25
74	Joint Spalling	M	Linear	Slab Width	0.5
74	Joint Spalling	M	Area	Slab Width	0.5
74	Joint Spalling	H	Linear	Slab Width	1
74	Joint Spalling	H	Area	Slab Width	0.5
75	Corner Spalling	Any	Linear	Constant	0.5
75	Corner Spalling	Any	Area	Constant	0.25
76	ASR	L	Area	Slab Width	1.25
76	ASR	H	Area	Slab Area	1.25
76	ASR	H	Linear	Slab Length + Width	1
76	ASR	M	Linear	Slab Width	1
76	ASR	L	Linear	Slab Width	1
76	ASR	M	Area	Slab Width	1.25

**Note: All units are in metric

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Appendix H

PAVER™ WCF Service Installation

PAVER™ WCF Service Installation

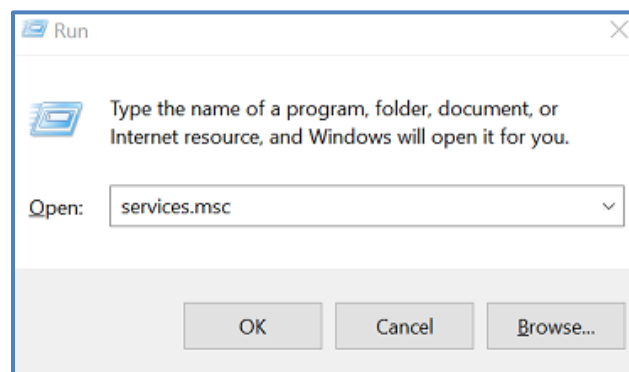
This service will allow other users to connect to a server and use the same PAVERTM databases. This guide will reference the term "WCF," which is short for "Windows Communication Foundation," a Microsoft framework that PAVERTM service is built on.

You should have two install packages (setup.exe and setup.wcf.exe). The setup.exe file is a normal PAVERTM install and should be used by any user. The setup.wcf.exe will install a complete PAVERTM 64-bit version as well as a Windows service onto the computer where you want to host PAVERTM data.

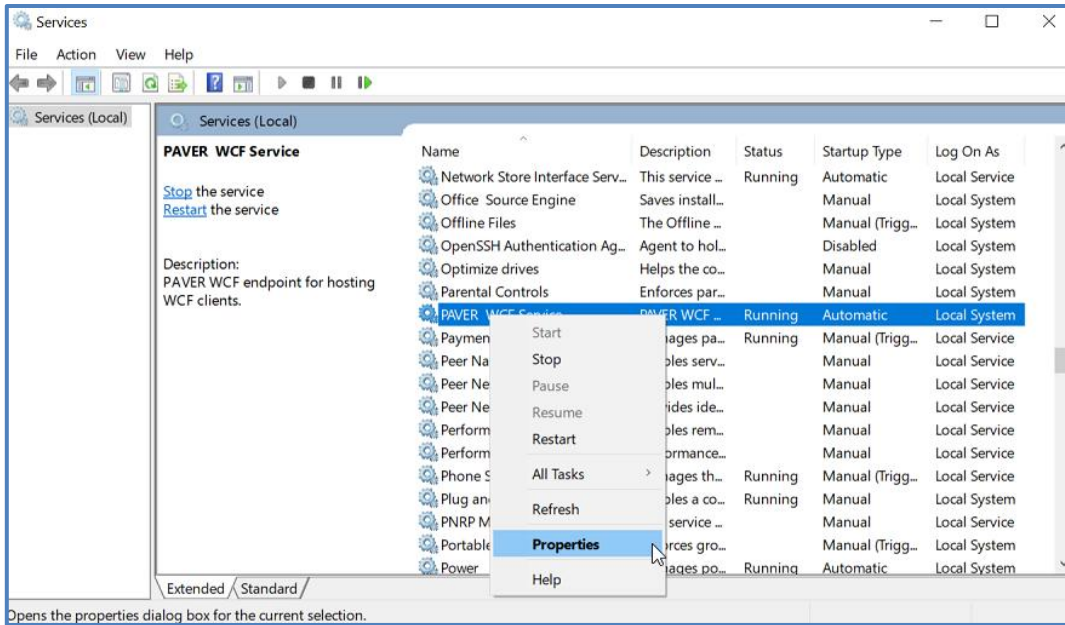
Follow these instructions for set up:

- 1) Run setup.wcf.exe on the computer that will be your server. This computer should have access to some form of SQL Server, because the service runs in 64-bit mode and cannot open .mdb databases.
- 2) After the installation is complete, but before running PAVERTM for the first time, determine whether or not you will want to use multiple workgroups. A workgroup is an independent set of PAVERTM users and data. For example, if you are a consultant, you can set up one workgroup for each of your clients so they will not see each other's databases. For each workgroup, the program will operate as if it is a separate installation of PAVERTM. Because it is an independent set of users, each workgroup needs its own set of license keys. Workgroups should only be used if separation of users and data is absolutely necessary. If you will only ever use and support a single collection of users for PAVERTM on the same machine, skip step a).
 - a) To set up workgroups:
 - Go to C:/Program Files(x86)/EMS/bin71 and run WorkgroupConfiguration.exe
 - At the top of the form, in "Workgroup Edit Mode," choose "For WCF or Terminal Services"
 - Add a new workgroup in the left pane with the "New" button
 - Change the User Data Directory to the location where you want this workgroup to store user data.
 - Once you've created all the necessary workgroups, select "Save Configuration" and then exit WorkgroupConfiguration.exe
- 3) If you do not need workgroups, just run PAVERTM (64-bit). The program will ask for your activation. You will need to use a license key from your distributor.

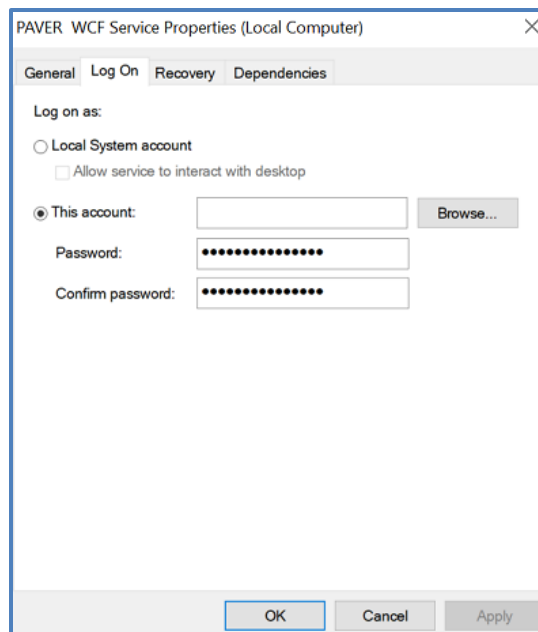
- 4) Next, if you've never run PAVER™ on this computer, it will ask for you to set up the User Data folder. You may move this folder to a new location or use the default location. *Note: If you've previously set up workgroups, you will not be prompted to set up the User Data folder.*
- 5) If you do not already have existing data, the program will open an "Install Default Databases" wizard. You may cancel this wizard, but it will continue to reopen until a database has been imported for the first time.
- 6) To manage user access; go to System Tables and Tools > Manage User Logins. You should have an "Admin" user in the User List column, this is a default that is created when you log into PAVER™ for the first time. The default account name is "Admin" and the password is also, "admin". Each license key will grant two active users, so you can now add your first user. User are inactive by default until the "Admin" grants each user either; Full access or Read Only access. You may only activate users up until you reach the limit of installed license keys. Use the "Add License" button to add license keys. *Note: It is recommended that after you add users and no longer need the Admin account, you delete this account. Please note that you cannot delete or deactivate yourself, so the only way to do this is to log in with a different user name then delete the default "Admin" account.*
- 7) The WCF service is now running under account "NT Authority/System", which is a built-in system account. SQL Server does not grant enough rights to this account for PAVER™ to operate. You either need to change the account running the PAVER™ service to an account with sufficient SQL permissions, or grant permissions to SYSTEM.
 - a) Change the account running the PAVER™ service.
 - Press Windows Key + R, then type "services.msc" and click OK



- Search the list for “PAVER WCF Service”, right-click to select Properties, then go to the “Log on” tab in the “PAVER™ WCF Service Properties” form



- Change the option to “This Account:” and either use the browse button or type the name of an account with SQL permissions (eg., the user account that installed PAVER™, or a new account created by the System Administrator)
- Enter the password, then confirm resulting popup dialogs




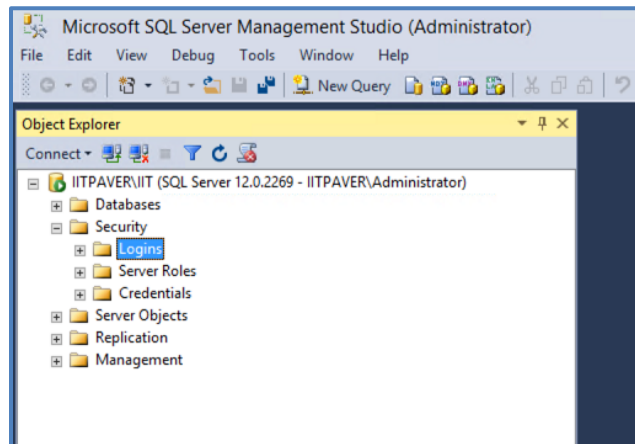
- **The service must restart successfully in order to complete this step (the password has not been validated until restart is completed)**


- To restart the service, right-click on “PAVER WCF Service” in the list and select “Restart,” make sure the PAVER™ service is listed as “Running” in the status column

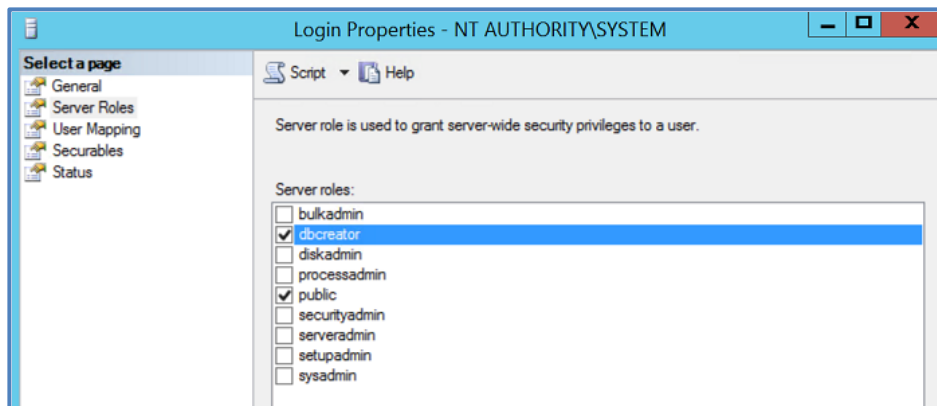
Note: If the WCF service is not running, you will fail to connect via remote client.

b) Granting SQL permissions to system accounts:

- You will need SSMS (SQL Server Management Studio) program from Microsoft
- Start SSMS  and connect to your SQL Database
- Go to Security / Logins



- If you’ve created a new account for the PAVER™ WCF service, right-click Logins, select “New Login”, then use the dialog to add the windows user you’ve created as a SQL login
- If not, expand Logins by left-clicking the  icon, then right-click “NT AUTHORITY\SYSTEM” and go to Properties
- Click “Server Roles” in the “Select a Page” column
- Check “dbcreator” in “Server Roles” to allow creation of databases



***SPECIAL NOTE FOR “NT AUTHORITY/SYSTEM”:* Because this account has very little permissions, only databases created by “NT AUTHORITY/SYSTEM” will be accessible with WCF. This means you should import databases OVER WCF using your PAVER™ client, and NOT locally via PAVER™ 7 64-bit desktop icon.**

- 8) WCF uses port 8080 to communicate. You must add rules to allow communication on this port. For less advanced configurations, this will typically mean that you need to go to Windows Firewall settings, and add Inbound and Outbound rules on port 8080. However, the requirements here depend heavily on your own configuration.
 - a) If necessary, the port designation can be changed.
 - Navigate to the “bin71” folder and locate the “pvr07ServiceHost.exe.config” file
 - Open the file in Notepad
 - Locate “8080” in the file and change it to the desired port
 - Restart the service from the services MMC
- 9) Once setup is complete, other users should be able to connect to the server. A server reboot may be required (only if the PAVER™ WCF service did not start automatically.)
- 10) For a client connection, go to the "Connect to server" screen:
 - Click the button to "Show connection details"
 - Check "Remote Connection" and type in the server's remote address. Typically, this is a web address or an IP address. If your server has a static IP, you can use this address. It can be a subnet IP if your network is configured that way
 - If you configured workgroups, check and type in the case-sensitive workgroup name. Otherwise, leave this unchecked
 - Enter username and password. You can save the parameters of this connection (or if you don't want to save the password into the connection, leave it blank) by pressing "Save as" and providing a name
- 11) Press "Log in" and it will attempt to connect. The status bar at the bottom of the PAVER™ desktop should contain the remote web address if it is successful. If not successful, the “Connect to Server” form should show up again and tell you why it was unsuccessful.

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Appendix I

PAVER™ Terminal Services Installation

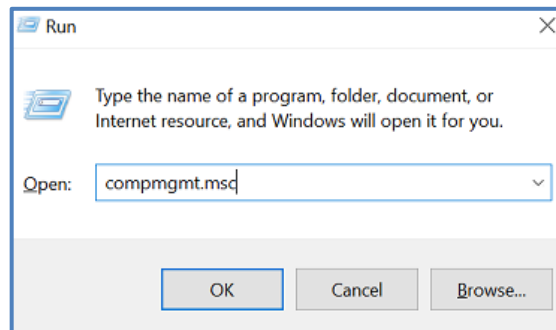
PAVER™ Terminal Services Installation

Terminal Services (TS), also known as Remote Desktop Services (RDS), is a feature of Windows Server 2012 and 2016 that allows users to run PAVER™ by taking control of a remote computer/virtual machine over a network connection, this configuration is multi-user friendly.

To enable copying/locating of files on this computer, that you may want to use in your remote session, first ensure that you are connected to the Windows Server as Administrator. Click on “Show Options” from the RDS login window and navigate to the “Local Resources” tab. Click on “More” in the “Local Devices and Resources” section, then check the “Drives” checkbox—expand “Drives” to select a specific drive to use if you do not want to enable all drives listed—click OK to save changes. When you attempt to reconnect, approve the warning prompts then click on “Connect.”

Follow these instructions for setup:

- 1) Windows Server Configuration
 - a) Open Computer Management by typing the Windows key + R
 - In the “Open” field, type in “compmgmt.msc” and click OK.



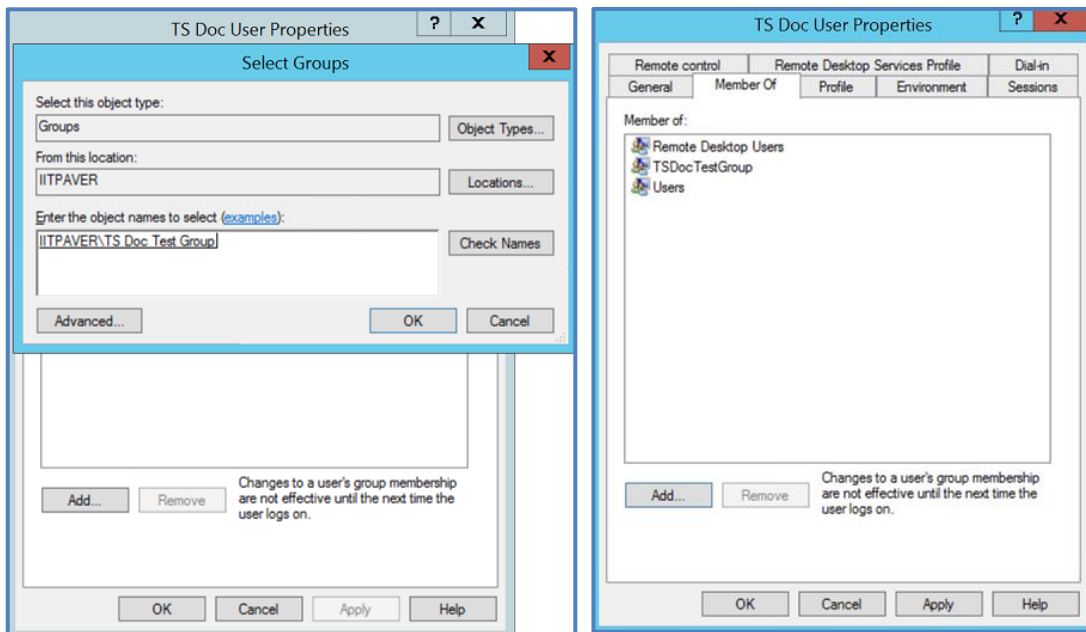
Note: If you're setting up a new group, add the group prior to adding users. If adding users to an existing group, skip step b).

- b) Add a New Group
 - Under “System Tools”, click on “Local Users and Groups”
 - Right-click on “Groups” and select “New Group”, name the group appropriately and click “Create”
 - c) Add a New User
 - Add new users by right-clicking on “Users” under, “Local Users and Groups” and complete the form

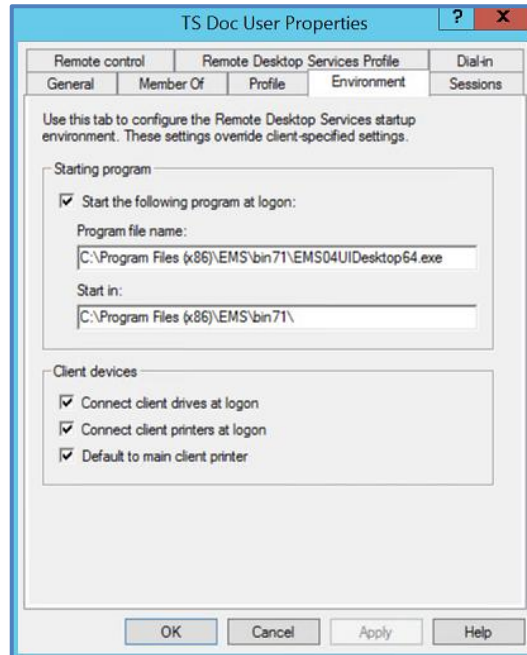
Note: Be sure to record newly-created usernames and passwords for future reference.

d) Assign Users to Groups

- Configure existing users by right-clicking on the user and selecting Properties
- On the “Member of” tab, there will already be a default group called “Users” that will show in the “Member of” box, this is a built-in group that should not be deleted
- Click “Add” and type in the created group name in the “Enter the Object Names to Select” field box—click “Check Names” to ensure the correct format populates— then click OK, add “Remote Desktop Users” as an additional group, the same way you added the created group name
- Once the required groups have been added, the “Member Of” tab window should show each group the user is a part of in the “Member Of” list, click Apply to save changes

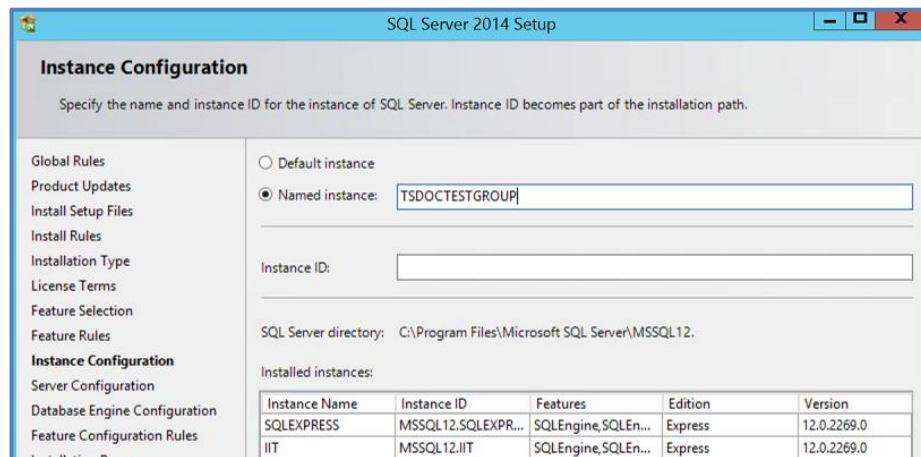


- e) On the “Environment tab”, check the “Start the Following Program at Logon” box and enter the file name: C:\Program Files (x86)\EMS\bin71\EMS04UI Desktop64.exe in the “Program File Name” field, for the “Start In” field enter: C:\Program Files (x86)\EMS\bin71\, then click Ok




2) SQL Server Configuration

- a) Begin creating a new SQL instance by locating your SQL install file or SQLEXPRESS_x64_ENU, open the file and double-click on SETUP.EXE
- b) Choose the “New SQL Server Stand-Alone Installation” option
 - Select “Perform a New Installation of SQL Server” and click “Next”
 - Accept the license terms, click “Next”, and then “Next” again
 - Name the instance in the “Named Instance” field using the Windows group name you created—be sure not to use spaces between words and type the name in all caps—then click “Next”, click “Next” again if you’re satisfied with the default settings

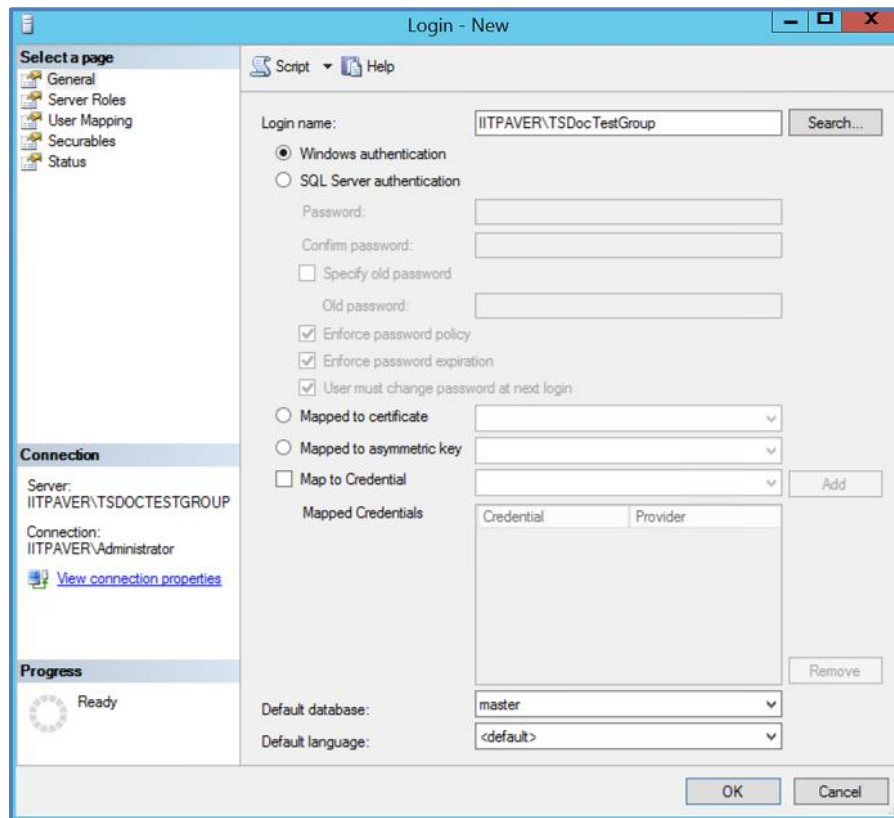


- c) In the “Database Configuration” window, under the “Server Configuration” tab, select “Windows Authentication Mode”, then click “Next”
 - Close the window

3) Configure the SQL Server Instance Security

- a) Open SQL Server Management Studio 
- b) “Connect to Server” using the instance name you created, you may need to use the “Server Name” dropdown list and select “Browse for More” to find your server name
 - Expand “Database Engine” in the “Local Servers” tree to view additional server names, once you have selected the desired server, click “Connect”
- c) Expand the “Security” tree list
 - Right-click “Logins” and select “New Login” from the dropdown menu
 - Click “Search”, beside the “Login” name field
 - Select “Object Types” to confirm that “Groups” has been checked
 - Add the Windows group name in the “Enter the Object Name to Select” field, then click Ok
 - Make a note of the qualified name for the group—like IITPAVER\TSTestDocTestGroup—as you will need this full name in Step 4
 - Click on “Server Roles” and check “dbcreator,” click OK to close the window and exit the SQL Management Studio

Note: Checking “dbcreator” allows all users within the group permission to create databases within PAVERTM. User permissions that you would like to make individual to each user can be done in PAVERTM Manage Logins, this will be one of your last steps.



4) PAVER™ Workgroup Configuration

a) Configure a PAVER™ Workgroup

Note: If this is your first workgroup configuration, it is recommended that you delete the default “SMS” Workgroup after you have completed workgroup configuration.

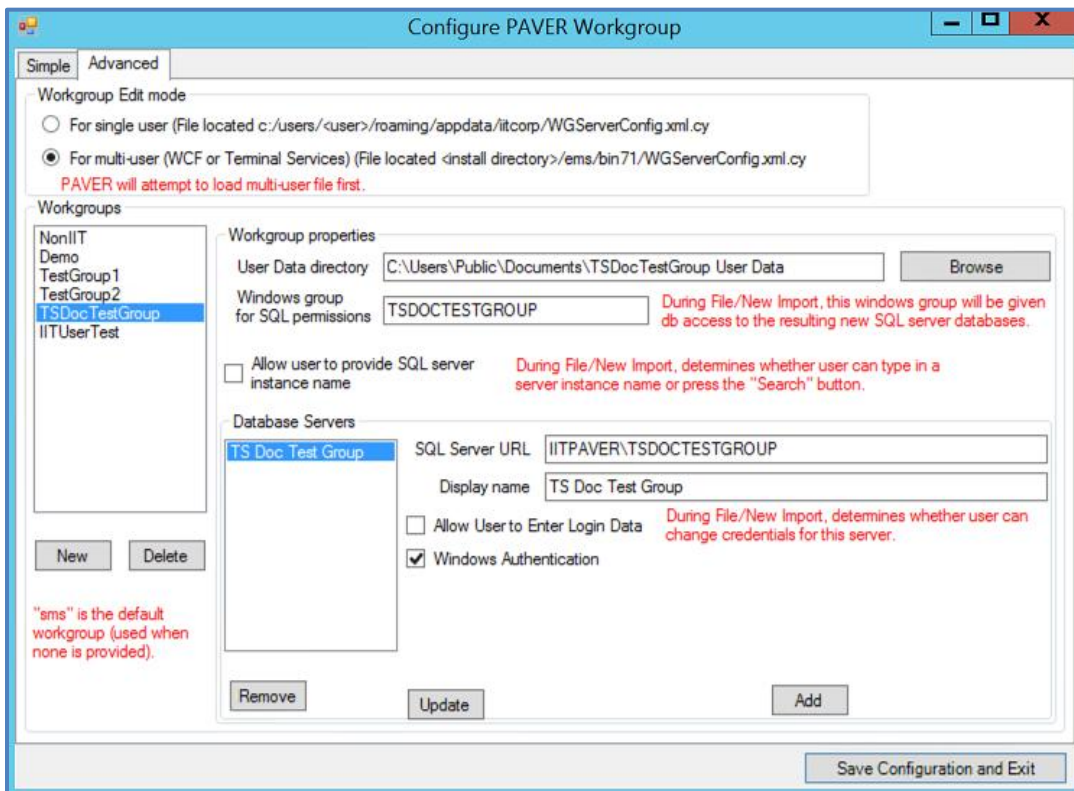
b) Navigate to C:\Program Files(x86)\EMS\bin71

c) Scroll down the alphabetized list and click on “WorkgroupConfiguration.exe,” continue on if Microsoft.Net Framework displays an unhandled exception message

d) Open the “Advanced” tab in the “Configure PAVER™ Workgroup” window

- Ensure “For multi-user (WCF or Terminal Services)...” is selected
- Click “New” and add your workgroup name, be sure to use the exact name that was used for the SQL Server instance and the Windows group name
- Select the newly created workgroup from the “Workgroups” box
- Uncheck the “Allow Users to Scan for SQL Servers” and the “Allow Users to Enter Login Data” checkboxes

- Add the fully qualified Windows group name to the “Windows group for SQL permissions” field—for example: IIT\PAVER\TestDocTestGroup—this should match the login you created for the SQL instance in Step 3
- The “User Data Directory” field will auto-populate a directory with the workgroup name, by default
- Set the “SQL Server URL” using this format: Name of the computer that hosts your server\Group Name (eg., IITPAVER\TSDOCTESTGROUP)
- Change/add a “Display Name,” then click “Add” so that the “Display Name” populates in the “Database Servers” box
- Click on “Update” to save the SQL server information you’ve entered
- Confirm that the “Windows Authentication” checkbox has been selected
- Click on “Save Configuration and Exit”



5) PAVER™ Login Manager Configuration

- Enter PAVER™ license information
 - Select the “Local Activation” radio button for TS or the “Remote Server Only” radio button for a WCF connection
- Manage logins for the users in the workgroup
 - Use the “Connect to Server” window (located in the File menu of the PAVER™ tool bar) and connect to your workgroup as Admin

- Once logged in, if the configuration was successful the user name and workgroup name should show on the bottom left of the PAVER™ window, if this is not the case; review configuration settings before proceeding
- Under “System Tables and Tools,” click on “Manage Logins” and add login credentials for each user—we suggest using the same names you used for the Windows users
- Edit each user’s permissions, see [Manage Logins](#) for more information on editing user permissions

Note: A user that is part of the Windows group must be the one to import databases/inventories for a PAVER™ Workgroup for the first time.

- c) Provide users with all relevant login credentials that were created during this process; along with the server access location, like IP address or Web Host location

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Appendix J

SQL Server Installation

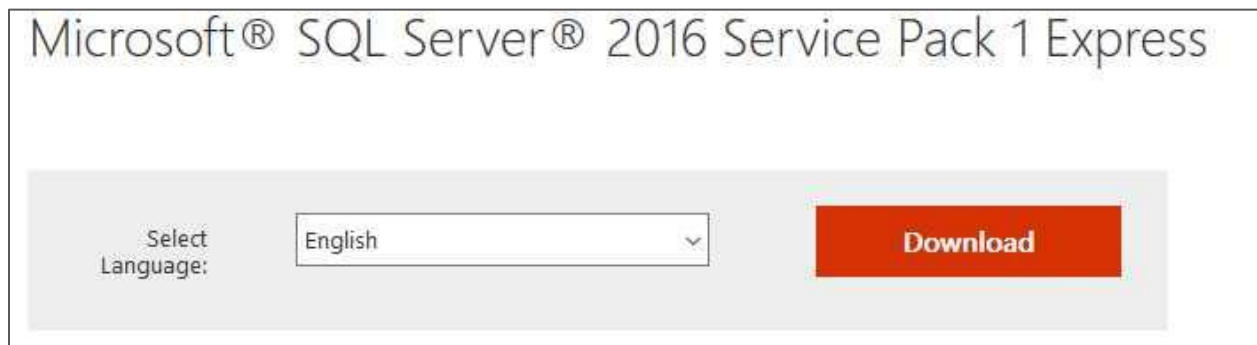
SQL Server Installation

This document is a guide for the installation of a Microsoft free download of Sequel Server Express to be used for PAVER™ 7. There are different versions of Sequel (SQL) Service. If you already have access to an advertised instance of SQL, then you are already equipped to start using SQL in PAVER™ 7.

1. Via your internet browser, navigate to the Microsoft url:

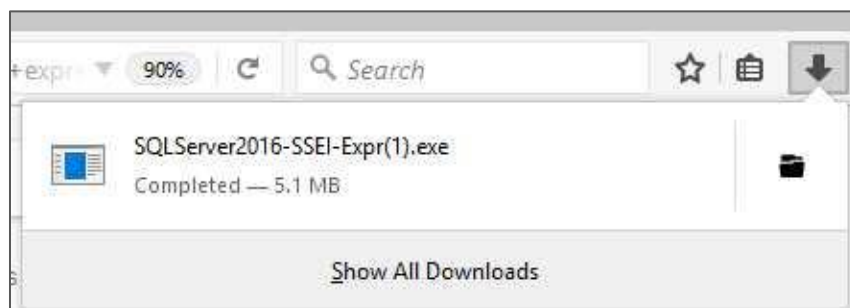
<https://www.microsoft.com/en-us/download/details.aspx?id=54284>

2. On that page you will find the download option as seen in the below screen capture. Select your desired language and then begin the download.

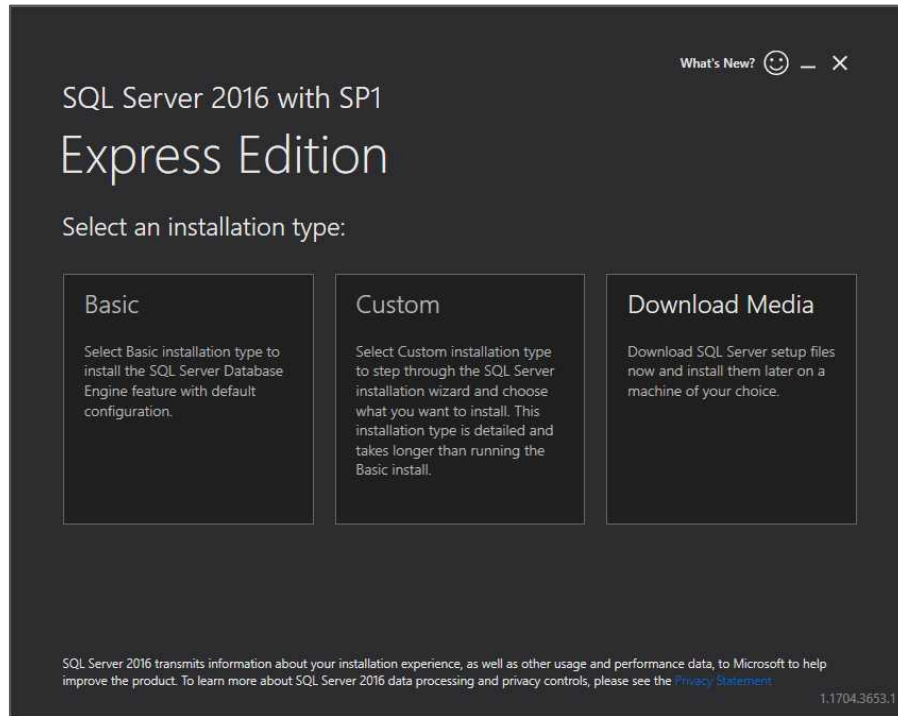


Microsoft SQL Server 2016 Service Pack 1 Express is a free and feature-rich database for developing and deploying SQL Server 2016.

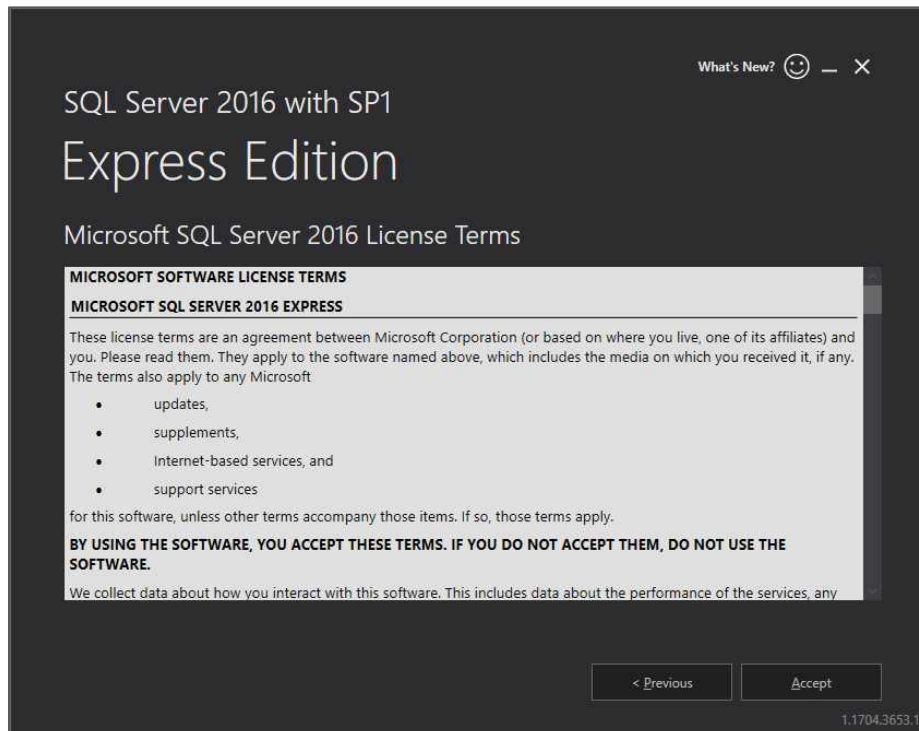
3. Run the downloaded installer.



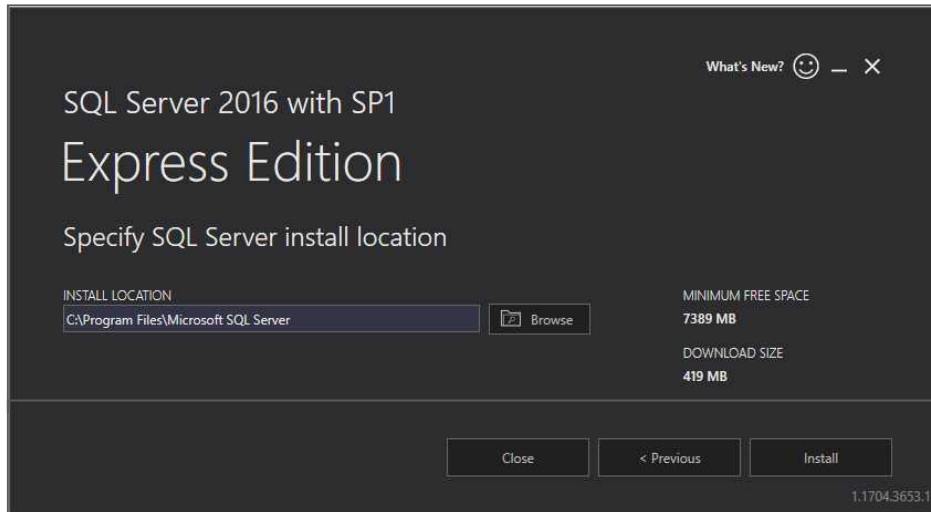
4. After the run, you will get the SQL Server Installation Center, as seen below.



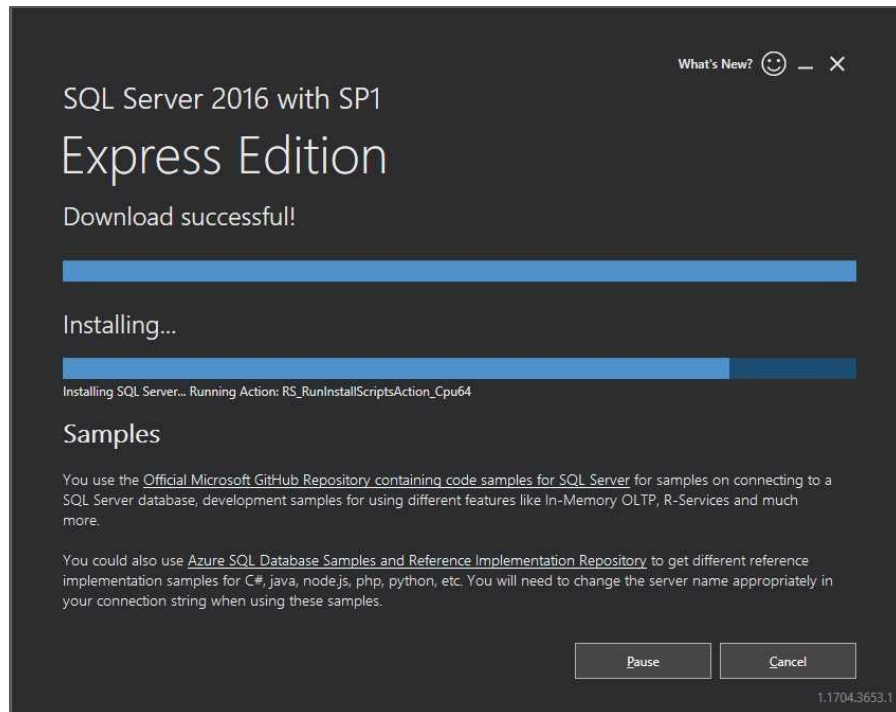
5. Click an installation type. This will start the installation setup wizard as seen below. Select "Accept" to proceed. Note: This guide will follow a basic installation.



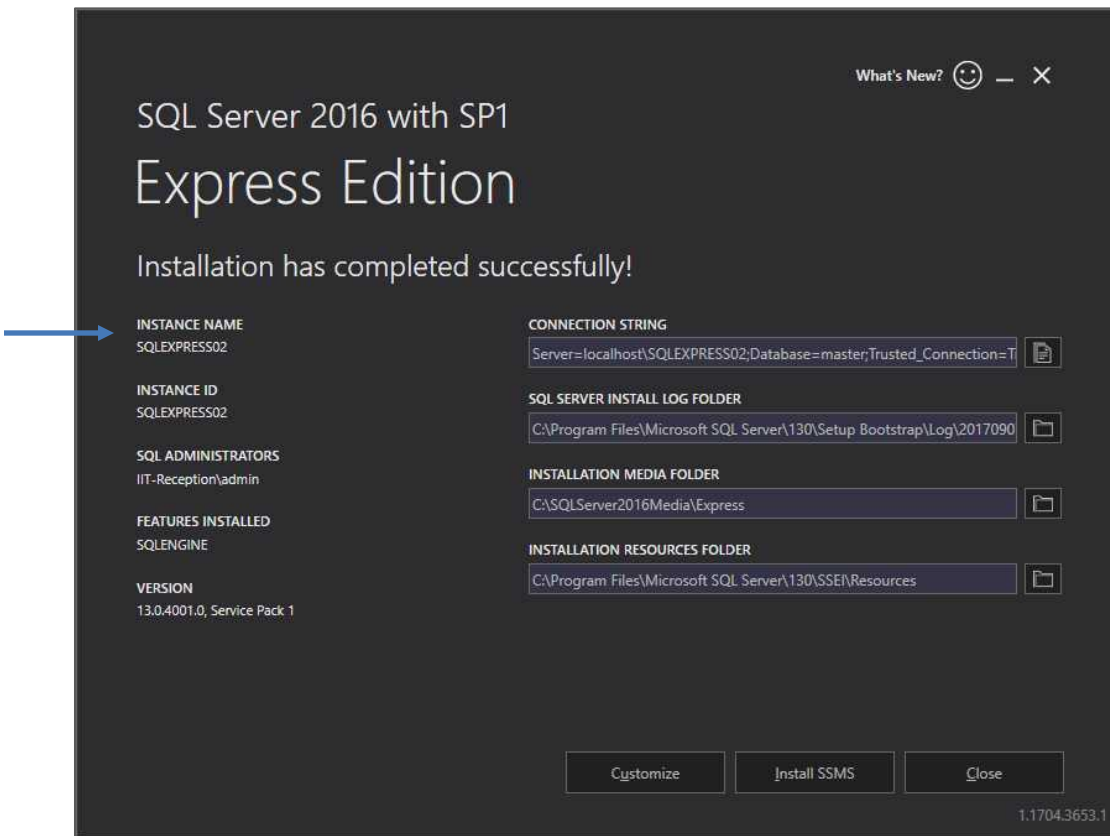
6. Specify the location for the install.



7. Click Install.

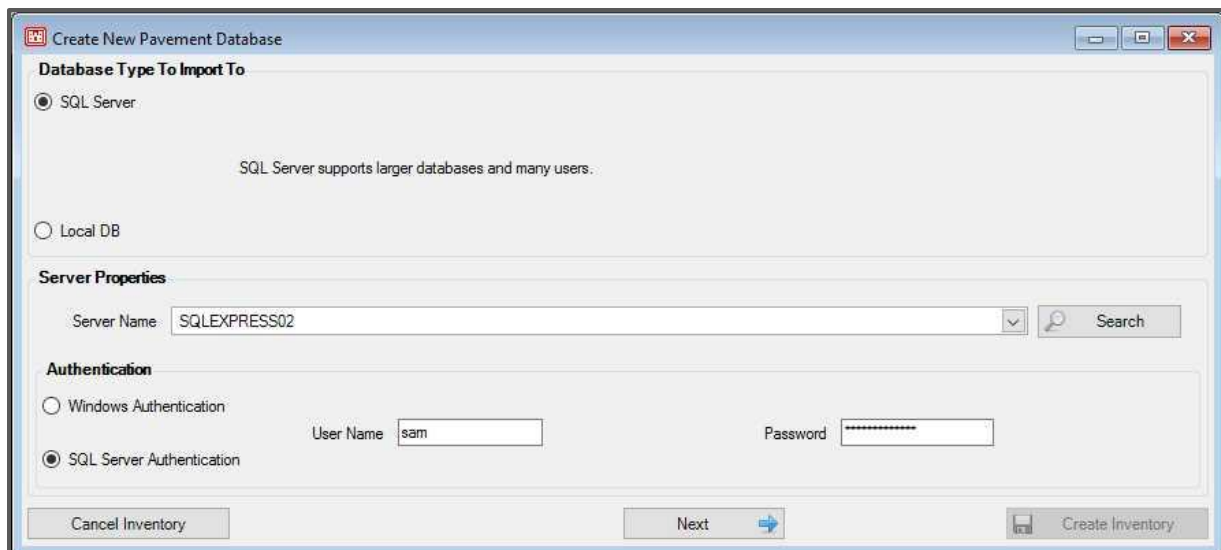


8. Record the instance name provided following the install.



9. Now in PAVER™, you can create and access your SQL databases associated with your installed SQL server.

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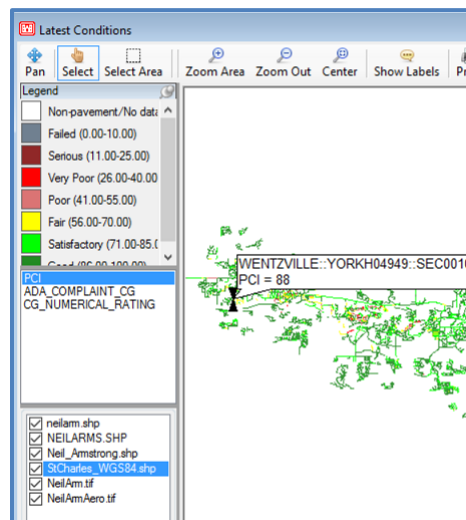
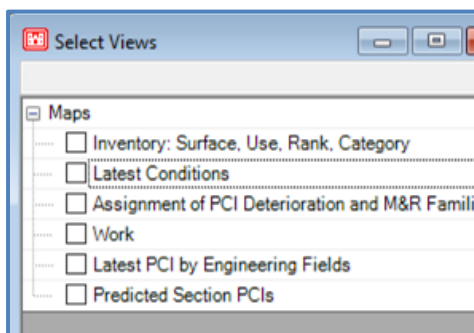
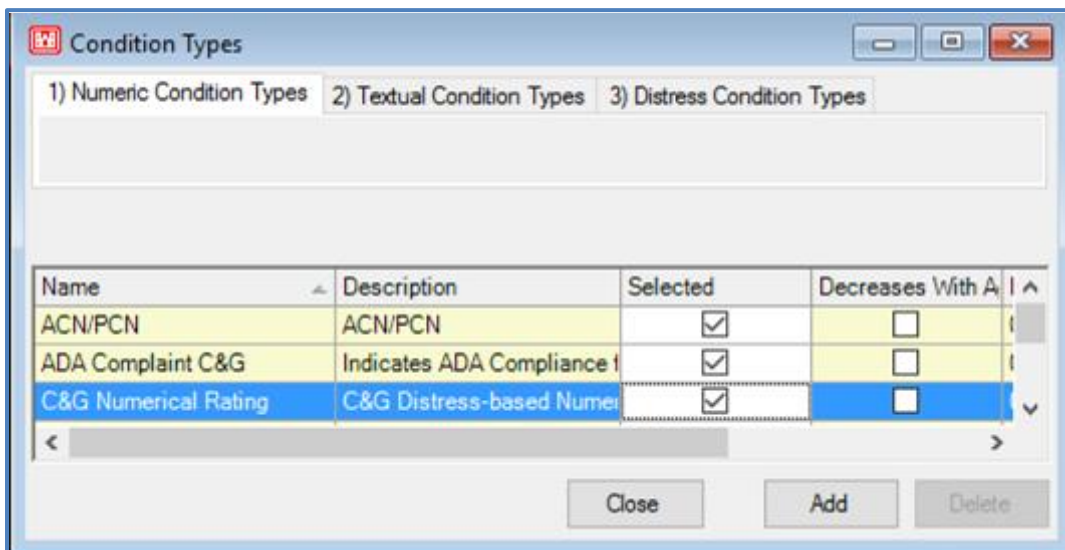
Appendix K

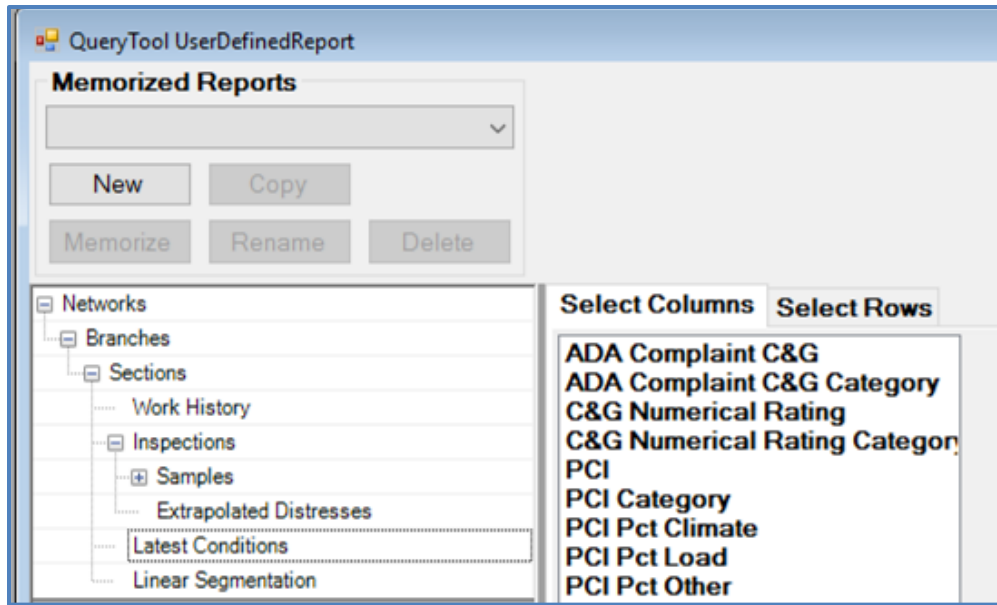
ADA Compliance and Curb and Gutter Rating

ADA Compliance and Curb and Gutter Rating

Section level inspections have gained two new condition measures in PAVER™ 7.0.6: ADA Compliance and Curb and Gutter Rating. To use these condition measures, they must be added to the Condition Types menu by selecting the applicable add-in in the Add-In Manager. If users want to use the condition measures, but not the add-in, the add-in must be activated to add the measures. The user can then disable the add-in.

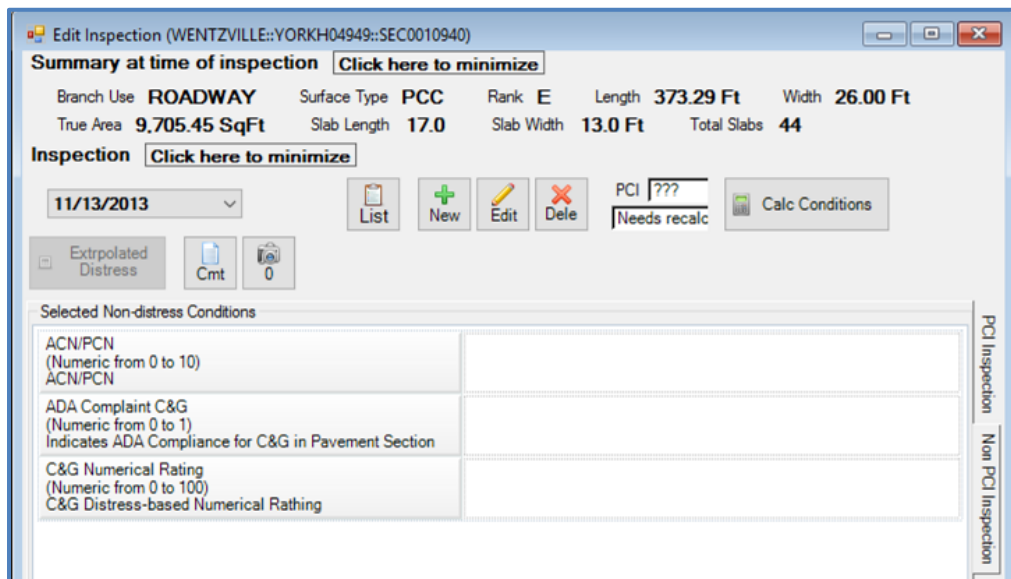
These condition values are visible in GIS reports and User Defined reports.





Entering Curb and Gutter Data

PAVER™ 7.0.6 provides two ways for users to enter applicable data. Users that have curb and gutter data sources are able to enter values directly into the inspection using the Edit PCI screen.



For users without data sources, a suite of add in tools have been added to aid in defining inventory samples, entering distresses, and rolling up.

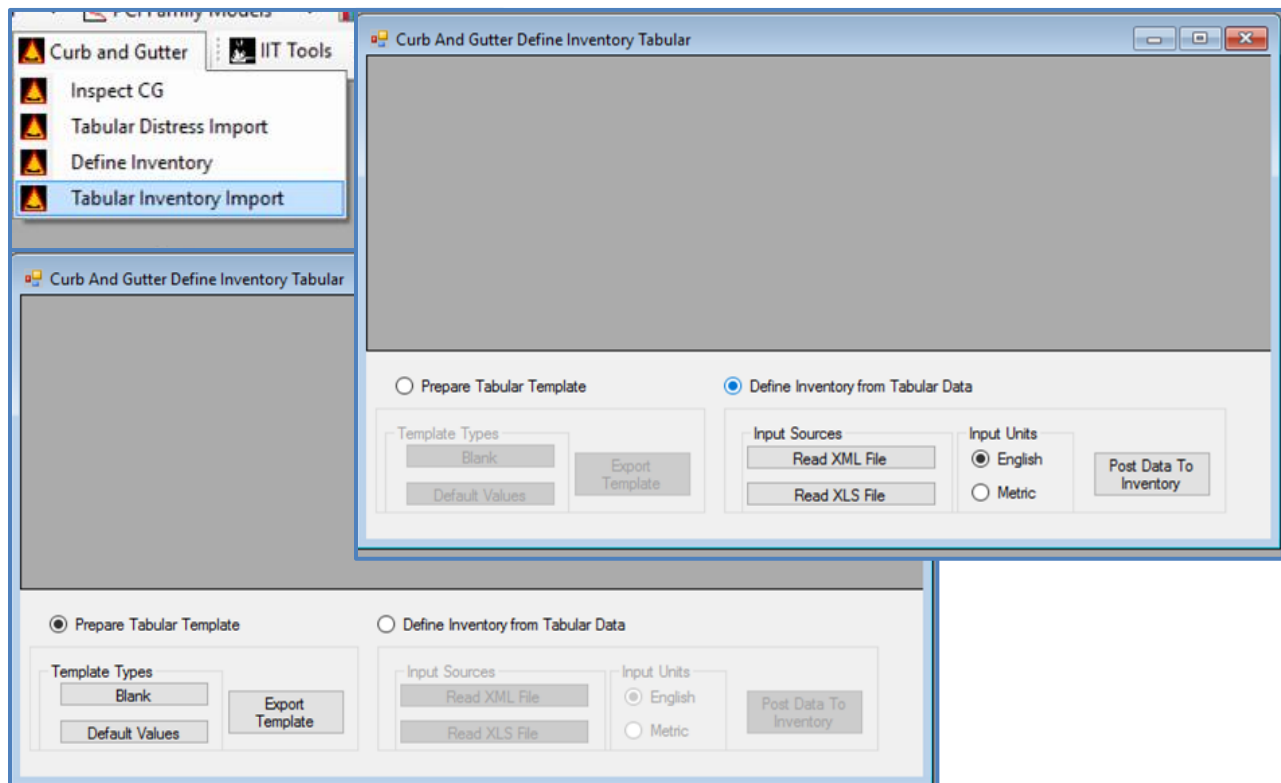
Curb and Gutter Add In

The curb and gutter add in has been created to support the creation of Curb and Gutter inventory samples and inspections.

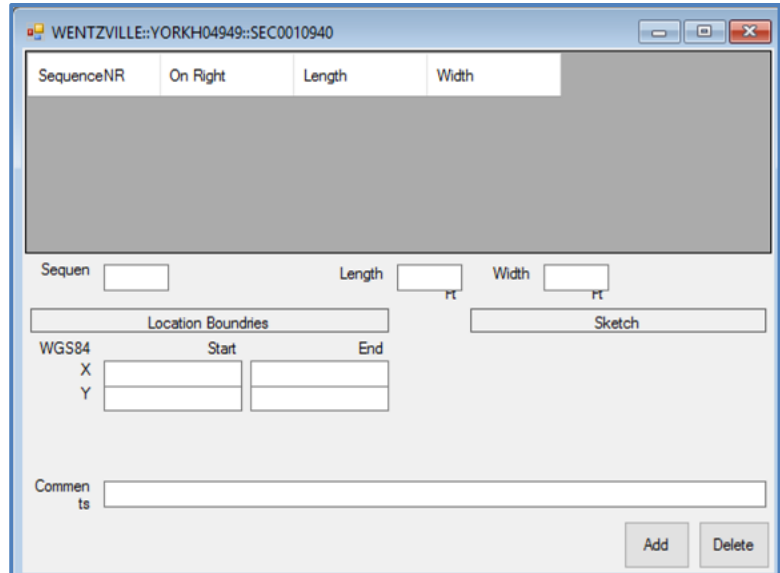
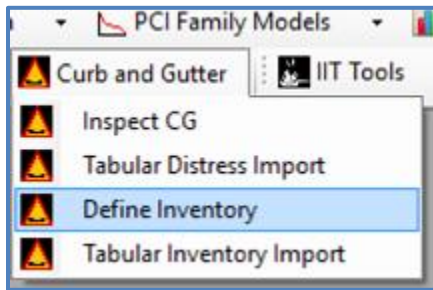
Inventory

Each curb and gutter inventory sample is typically 500 feet long and associated with exactly one section. A sample may be identified as right or left from the driver's perspective and has a sequence number that increases along the line of travel for the section.

For curb and gutter inventories, the add in is mostly used for tabular import. By using data conforming to a template, the user can import the definition of sample units as a table, which is the predominant mode of data entry with GPS coordinates. Two options exist for tabular import. The first option generates a template based on PAVER™ 7 sections lengths and the 500 foot nominal length, and the second generates a blank template.



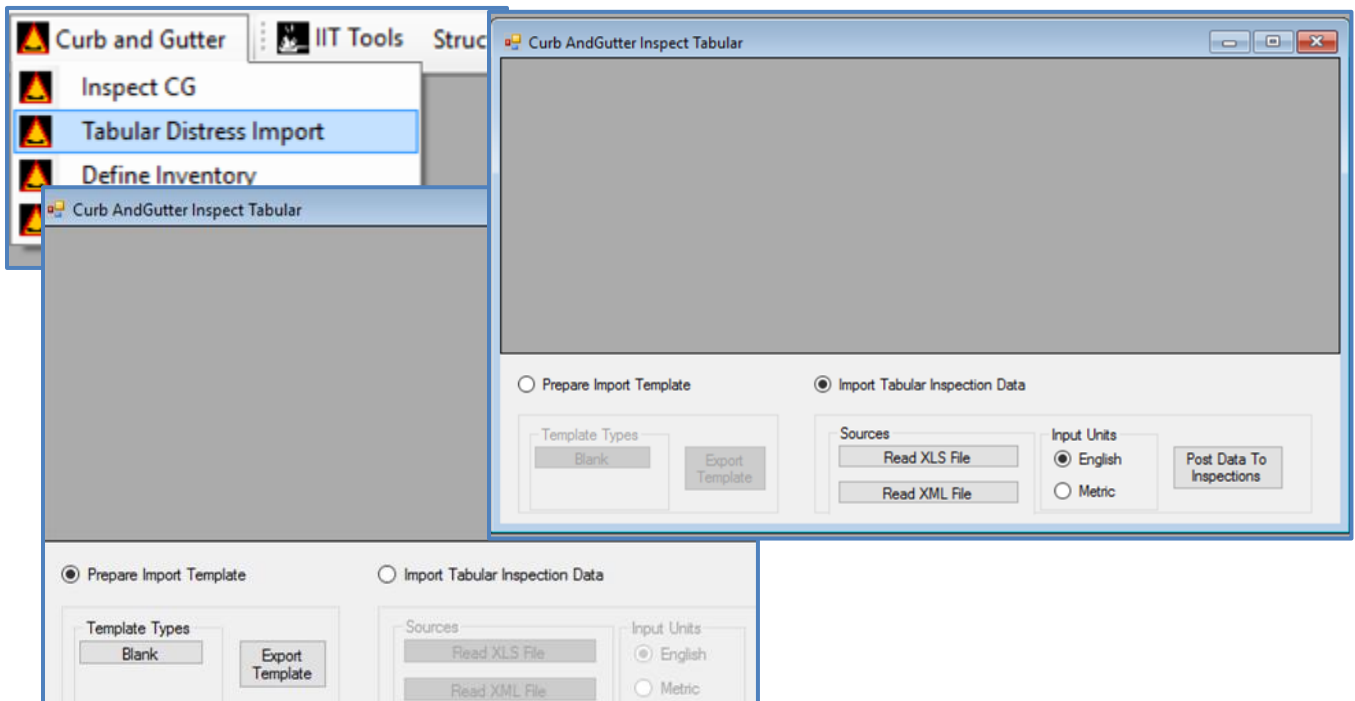
The add in also supports interactive definition of sample units. This method will not be commonly used, but will allow for occasional tweaking of settings.



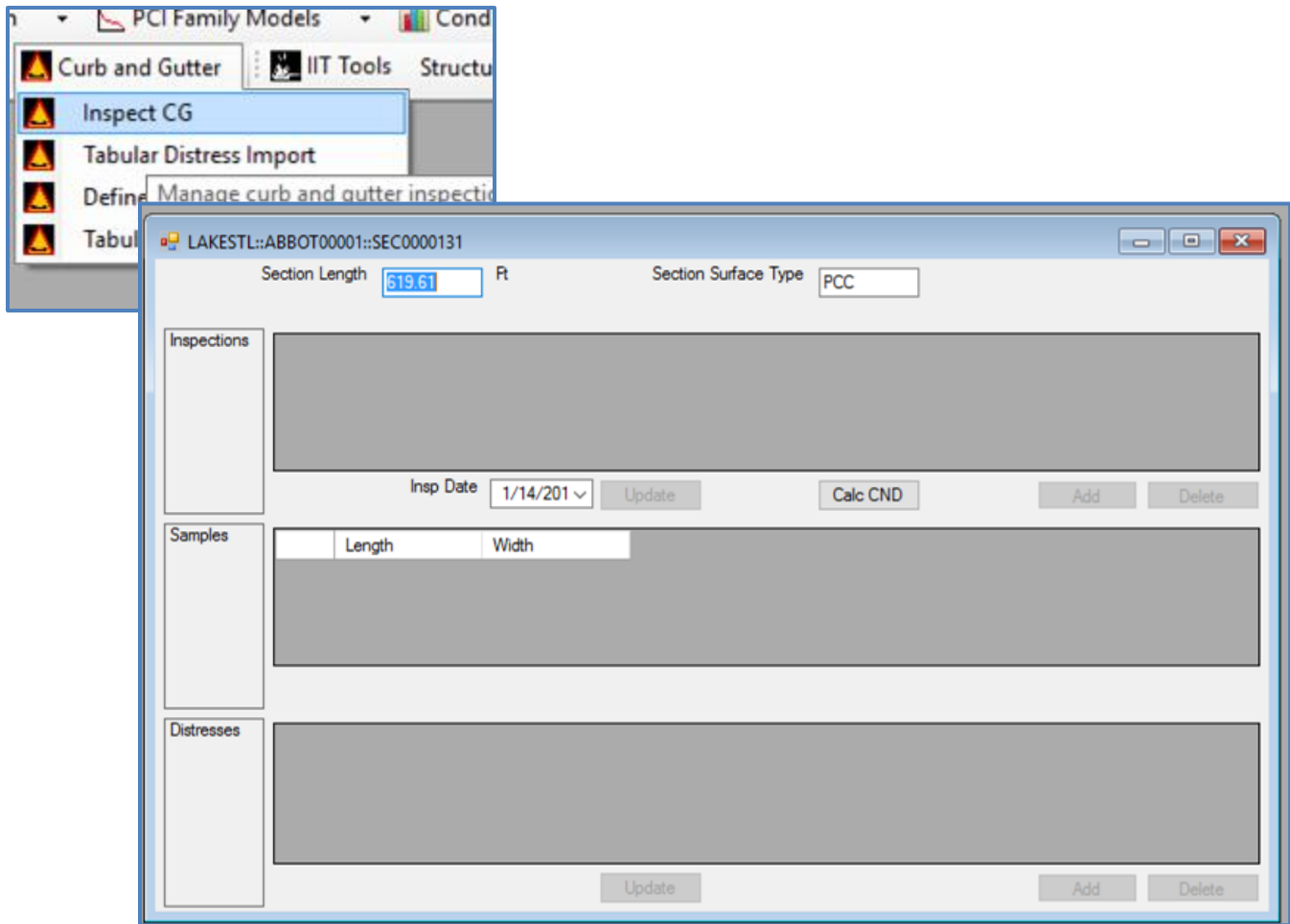
Inspection

Inspection sample records for curb and gutter inspections are derived from inventory samples and the associated distresses for those samples. Sample condition values are computed according to Airforce engineering assessment guidelines. The roll up weighs the length of the sample against the total section length.

For curb and gutter inspections, the add in is mostly used for tabular import. By using data conforming to a template, the user can import distress data for samples, and the system will calculate both sample level and section level conditions. Two options exist for tabular import. The first option generates a template with inspection samples defined, and the second generates a blank template.



The add in also supports interactive editing of inspections. This method will not be commonly used, but will allow for occasional tweaking of settings.



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Glossary

■ **Checkbox**

A Microsoft Windows standard user interface item for indicating a user selection. Checkboxes are small square items that are displayed in an array for the user to make a selection(s) from. When the mouse is pointing to the checkbox and the left mouse button is clicked a check mark or ‘X’ will appear in the checkbox. Typically checkboxes are used when more than one option can be selected from a list.

■ **Credit for Complete Global**

Gives planning/analysis credit for global preventive maintenance.

■ **Critical PCI**

Defined as the PCI value at which the rate of PCI loss increases with time, or the cost of applying localized preventive maintenance increases significantly.

■ **Drop-down Menu**

A Microsoft Windows standard menu that is associated with a data entry form or grid. The drop-down menu contains a list of the available selections for a data entry field. The drop-down list is not visible until the field associated with the drop-down list is selected by the user. When the field is selected the drop-down list is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a picklist or drop-down list.

■ **EMS™ Picture Server**

The EMS™ Picture Tool is an interface for storing images associated with a particular pavement database. Images can be associated with the a network, or assigned to individual branches and sections. It provides a convenient way to establish a pictorial record of database units.

■ **EMS™ Query**

A tool used to temporarily select a subset of pavement sections for analysis or reporting. The application of a query to the active database does not cause any records in the database to be changed or deleted. The query tool can also be used to specify the sort order of report results.

■ **Family**

A pavement “family” is defined as a group of pavement sections with similar deterioration characteristics. The family model is estimated from the plot of observed age and condition measurements for pavements with similar attributes.

■ **Geographical Information System (GIS)**

Geographical Information System (GIS) refers to a system that presents data in the context of a map. GIS can be used to display PAVERTM inventory, condition, distress, cost and other pavement data as color-coded maps.

■ **Global Preventive Maintenance & Repair (M&R)**

Defined as activities applied to entire pavement sections with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

■ **Localized Preventive M&R**

Defined as distress maintenance activities performed with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

■ **Localized Stopgap (Safety) Maintenance and Repair**

Stopgap M&R is defined as the localized M&R needed to keep the pavement operational in a safe condition. This policy is applied to pavements below the critical PCI.

■ **Major M&R**

Activities applied to the entire pavement section to correct or improve existing structural or functional requirements. It is also used to upgrade pavements below the critical PCI.

■ **Modal**

A Microsoft Windows form for displaying or collecting information. A modal form must be configured and executed or closed before you can resume other PAVERTM or Windows tasks.

■ **Parameter Collection Screen**

A Microsoft Windows form that is used to configure the PAVERTM Condition Analysis, Work Plan and Inspection Schedule Reports. The parameter collection screens displays the default settings for the various report parameters that can be configured by the user. In general the values on the form can be adjusted to reflect the desired setting. The parameter collection screen is a modal screen.

■ **Pavement Branch**

A branch is a readily identifiable part of the pavement network and has a distinct function. For example, an individual street or a parking lot would each be considered a separate branch of the pavement network. Similarly, an airfield pavement such as a runway or a taxiway would each be considered a separate branch.

■ **Pavement Condition Index (PCI)**

The PCI is the default condition index for the PAVERTM system. A numerical index, ranging from 0 for a failed pavement to 100 for a pavement in perfect condition. Calculation of the PCI is based on the results of a visual condition survey in which distress type, severity, and quantity

are identified. It was developed to provide an index of the pavement's structural integrity and surface operational condition.

■ **Pavement Identification (PID)**

Pavement Identification (PID) is the unique combination of pavement inventory information that makes a particular pavement section unique. The PID is formed from the network ID, branch ID and section ID.

■ **Pavement Network**

A logical unit for organizing pavements into a structure for the purpose of pavement management. A network will consist of one or more pavement branches, which in turn may consist of one or many pavement sections. The network is the point of origin for the hierarchy of pavement management structures.

■ **Pavement Section**

A section should be viewed as the smallest management unit when considering the application and selection of M&R treatments. It is a logical unit assigned to a stretch of pavement that exhibits a common age, construction type, traffic and other criteria. The terminus or leaf point in the hierarchy of defined pavement management structures. A pavement section will be defined as a subordinate of a pavement branch, which in turn will be a subordinate of a parent pavement network.

■ **PAVER™ Button Bar**

The array of eight buttons displayed across the top of the PAVER™ for Windows Desktop are used to invoke the most used PAVER™ for Windows features. Each button contains descriptive text and a graphic related to the function of the program the button launches.

■ **Picklist**

A Microsoft Windows standard menu associated with a data entry form or grid. The picklist menu contains a list of the available selections for a data entry field. The picklist is not visible until the field associated with the picklist is selected by the user. When the Field is selected the picklist is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a drop menu or drop list.

■ **Polygon Attribute Table (PAT)**

A Polygon Attribute Table (PAT) is a list used by a Geographical Information System (GIS) to relate database information (such as PAVER™ PCI values) to a GIS map location. In PAVERGIS the PAT is used to describe the sections in a PAVER™ database. Polygons are used in GIS to represent PAVER™ features (roads, parking lots, runways, aprons, etc) and then tabular data is attached to the features. A coverage is defined by several files. Some of the files contain graphical information, while others contain table information.

■ **Radio Button**

A Microsoft Windows standard user interface item for indicating a user selection. Radio buttons are small circular items that typically displayed in array for the user to make a mutually exclusive selection from.

■ **Real Property Unique Identifier (RPUID)**

A means of permanently and uniquely identifying land, buildings, or other property assets to enable standardization of the identification of real property information throughout the Department of Defense (DoD). Improves accountability by allowing all financial obligations and physical changes to real property to be tracked over the life of the real property asset.

■ **Real Property Site Unique Identifier (RPSUID)**

The key identifier of a real property asset or site location used to permanently and uniquely identify these assets. This identifier links to the real property common data model describing financial, legal, and physical attributes.

■ **Report Viewer**

A standard interface which presents results as spreadsheet tables with associated graphs. The Condition Analysis Report, M&R Planning Report, and the Inspection Scheduling Report all present their results in the EMS™ Report Viewer format.

■ **Right-button Click Feature**

Added capabilities available for an object, either a PAVER™ spreadsheet table or a graph that are accessed by pointing to the object with the mouse and clicking the right mouse button.

■ **Save Private**

Data is saved local to the computer and private to the current user.

■ **Save Public**

Data is saved on a service and is public or usable by all user accounts.

■ **Structured Query Language (SQL)**

A standard database access language (collection of commands, control clauses, etc) supported by all major database managers. Structured Query Language, or SQL, provides a standard way to get or view information from a database, or put information into a database.

■ **Tab Table Data**

The common PAVER™ for Windows data that is edited on Tab Table forms. Tab Table data includes the PAVER™ User-defined Fields tables, Inventory picklists, Work Plan tables, Materials, and Misc. Other Tables.

■ **Tab Table Form**

Microsoft standard form for editing and reviewing data. The Tab Table form simulates index cards that can be selected by pointing to the index tab portion of the card with the mouse and pressing the left mouse button.

■ **User-defined Fields**

Discretionary inventory information that can be added to the existing attributes for networks, branches, and sections. A total of nine user-defined fields are available, three for each inventory item.

■ **View Menu**

An item on the PAVER™ Menu, that is active only when the EMST™ Report Viewer is the active window. The View Menu lists the available tables. Open tables have a check mark to the left of the menu item.

■ **Virtual Inventory**

The virtual inventory option allows the user to make copies of existing inventories, and to combine sections according to some criteria to create a virtual section. For example, a virtual inventory can be created in which all taxiway sections of the original inventory are combined, creating a virtual “taxiway” section. Conditions can then be calculated, as well as reports formulated, for the virtual section.

■ **XML**

Extensible Markup Language or XML is a markup language created to structure, store and transport data by defining a set of rules for encoding documents in a format that can be read both by users and by computers. Markup instructs software to carry out appropriate actions, but is not seen in the version of the text that is displayed to users.

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