ProVAL Quick Reference Guide

Before Using ProVAL

Checking Contractor Profile Files

1. Contractor Profile Data submissions may be in *three* different file formats: University of Michigan's Transportation Research Institute's (UMTRI) Engineering Research Division (*.erd) file, ProVAL's Pavement Profile (*.ppf) file, or Ames Engineering's (*.adf) file.
2. The data submitted must also have the following naming convention:
   County_Route_Direction_Lane_BeginStation_EndStation
   If the data is not named in the given format, then it will be not be accepted by MDOT.

Loading ProVAL and Additional Files

1. For MDOT Personnel, all files pertaining to pavement smoothness analysis can be accessed through MDOT's Research Division Roadway Smoothness intranet site at http://rschweb/Lists/Roadway%20Smoothness/Allitems.aspx. For non MDOT personnel, all files pertaining to pavement smoothness analysis can be accessed through MDOT's Research Division internet site at http://mdot.ms.gov/portal/research.aspx and clicking the 'Roadway Smoothness' item on the left side.
2. Clicking the 'ProVAL Software Download' will take you to www.RoadProfile.com. There, at the top of the screen, you can scroll over the Software label and then click the 'Current Version'. After that, select the most recent (top) version item on the list and follow the installation instructions.
3. The other files can be downloaded and saved into any file directory of your choice. These include Pay Adjustment Spreadsheets for Asphalt and MRI Spec Template files. Be sure to download these before entering ProVAL so that you can analyze everything without having to return to the download pages.

Selecting Project Category

The most current asphalt smoothness tolerances can be found in the contract documents under subsection 907-403.03.2.1 – Smoothness Tolerances for Mean Roughness Index (MRI). There you will apply the scope of work of the project to the supplied list for the project category. **NOTE:** Depending upon the initial condition of the roadway, some projects may default to a Category C project regardless of the scope of work of the project. If a project meets this requirement, it can be found in Notice to Bidders No. 5367 in the contract documents. Bidders/contractors are responsible for collection of a preliminary smoothness profile on all Category C projects.

Getting Started with ProVAL

Removing and/or Importing ProVAL Templates

Templates are updated periodically by the Research Division when specification changes are made. After downloading the latest template file and before importing this version into ProVAL, you will want to clear out any older template files from the software to prevent confusion.

1. Open ProVAL and select the **'Manage Analysis Templates'** button at the top of the screen. This can be found just to the right of the **'Options'** button, which is a hammer and wrench icon.
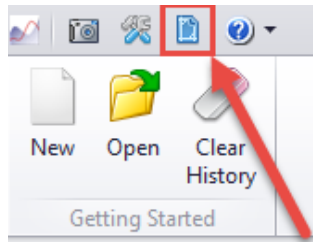
2. Once you have opened the **'Manage Analysis Templates'** menu you have several options to choose from. If you have the latest version of templates (file extension *.pvat) saved on your computer from ProVAL 3.5, you can left click the **'Add Previous'** button on the menu and these will automatically be uploaded to proper module below. These can be imported even if you have uninstalled previous versions of ProVAL.
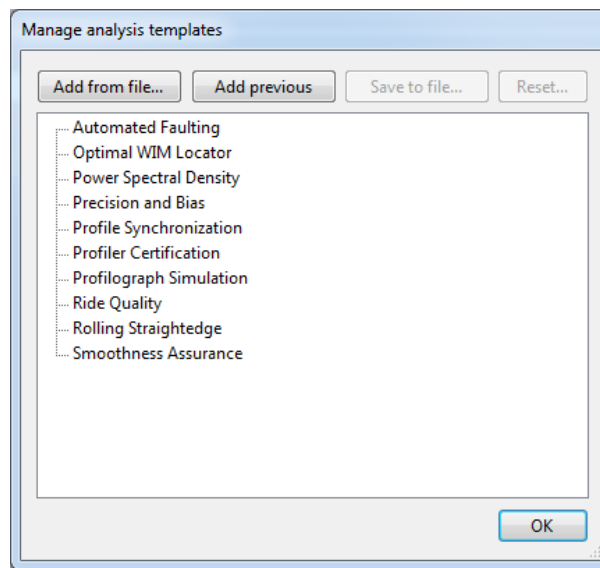
3. If you have downloaded and saved a version of the ProVAL templates from Research's Intranet or Internet site, then you may select the **'Add from file…'** button on the upper left side of the menu. Here, you will need to locate the directory where the template file has been saved and select it similarly to the screenshot on the following page.
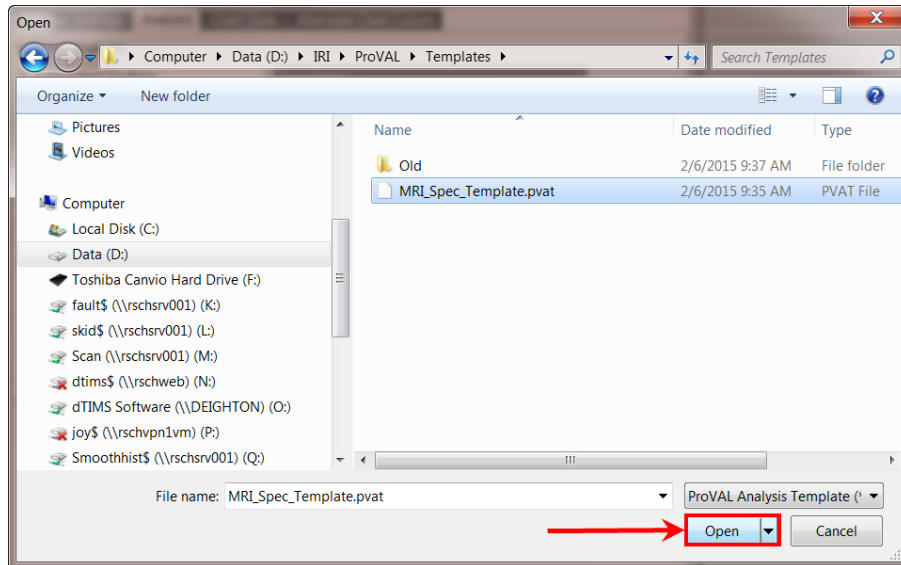
4. Proper usage of either the **'Add Previous'** or **'Add from file…'** buttons will display a '+' button next to the module where the templates have been imported (in this case, Smoothness Assurance). If you have imported properly, then menu should look like the screenshot below. There will be a separate template for each applicable MDOT project category (A, B, or C).
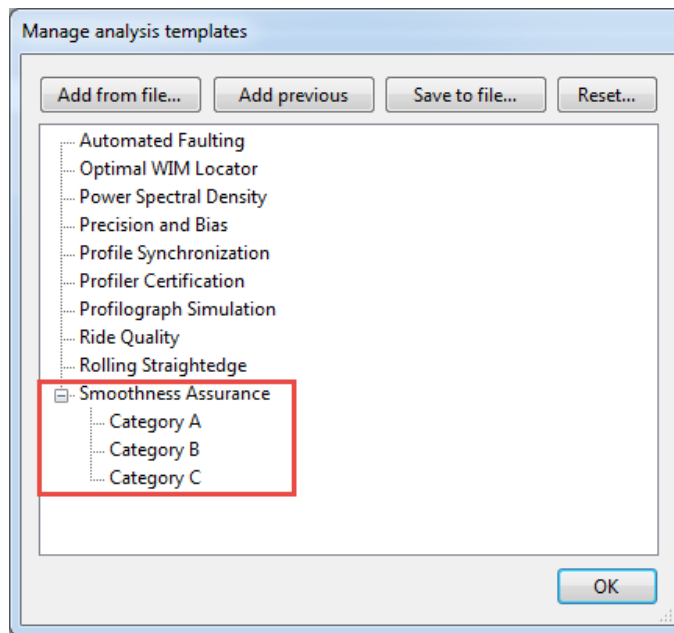
5. Unlike previous versions or ProVAL, the changes/additions of templates will be applied immediately and the software will not need to closed and reopened. If you should ever have to remove templates from the software, select the **'Reset…'** button on the upper right side of the menu. A confirmation box will pop up to confirm that you want to permanently remove all custom templates. Left click on **'Clear'**.

Changing Other Settings

Other settings can be changed in the **'Options'** window accordingly. These include: General Settings, Analysis, Chart Style, and Alternate Chart Colors.

General Settings

1. ProVAL allows you to select a default file type to search for when importing profiles. MDOT allows the use of Ames (ard, adf, ldf), ERD (erd), or Pavement Profile (ppf). This selection is the user's choice and should be the file type that you use the most within the software.
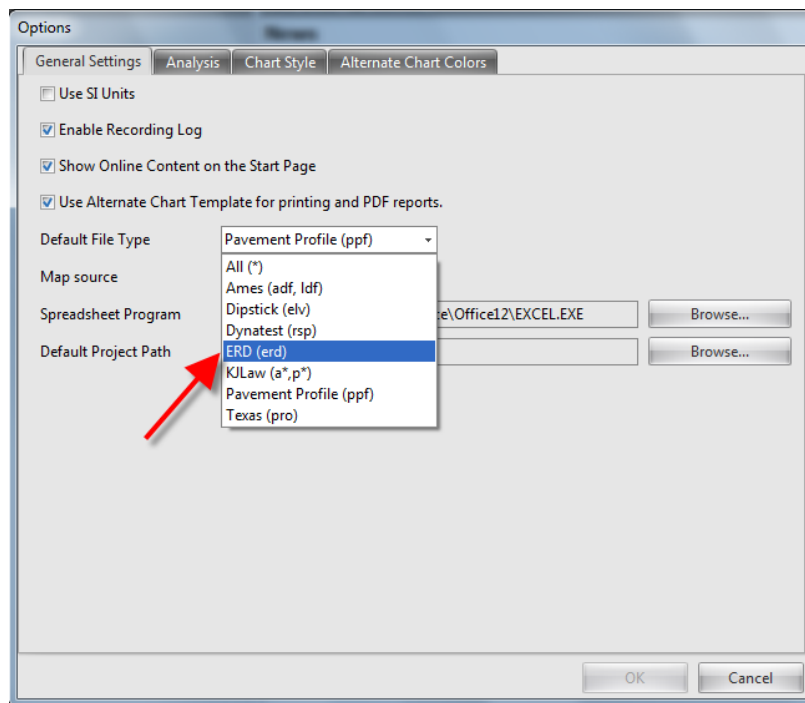
2. You can also select a default project path you can open files from. This allows you to group all of your projects within this default path for easy access in the future. As with the default file type, this can be customized as needed.
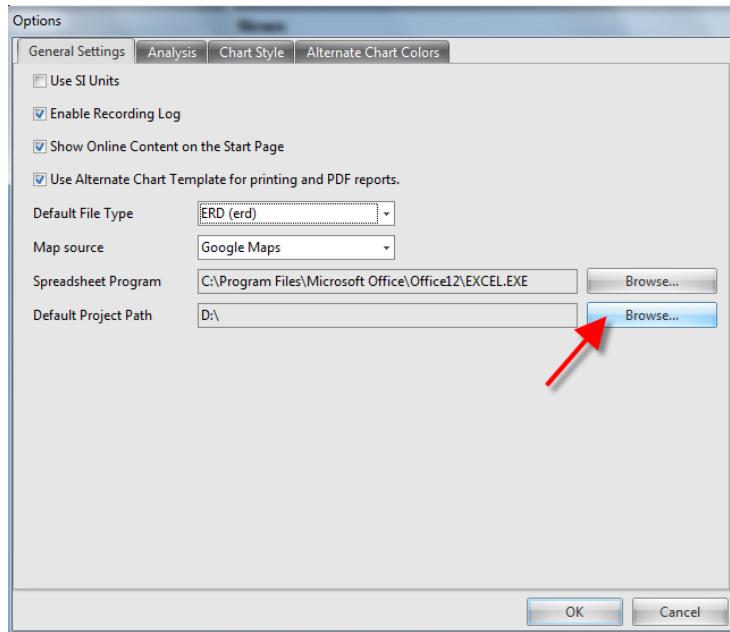
Analysis

1. This tab displays all of the modules that can be accessed within ProVAL. As an end user of the software, you will only use a few of these with primary module being Smoothness Assurance. Therefore, you will want to deselect the unused modules and make '**Smoothness Assurance'** your '**Default Analysis'**. In addition, there may be some cases where **'Power Spectral Density'** and **'Ride Quality'** will be used within the software. These options can be selected as seen below.
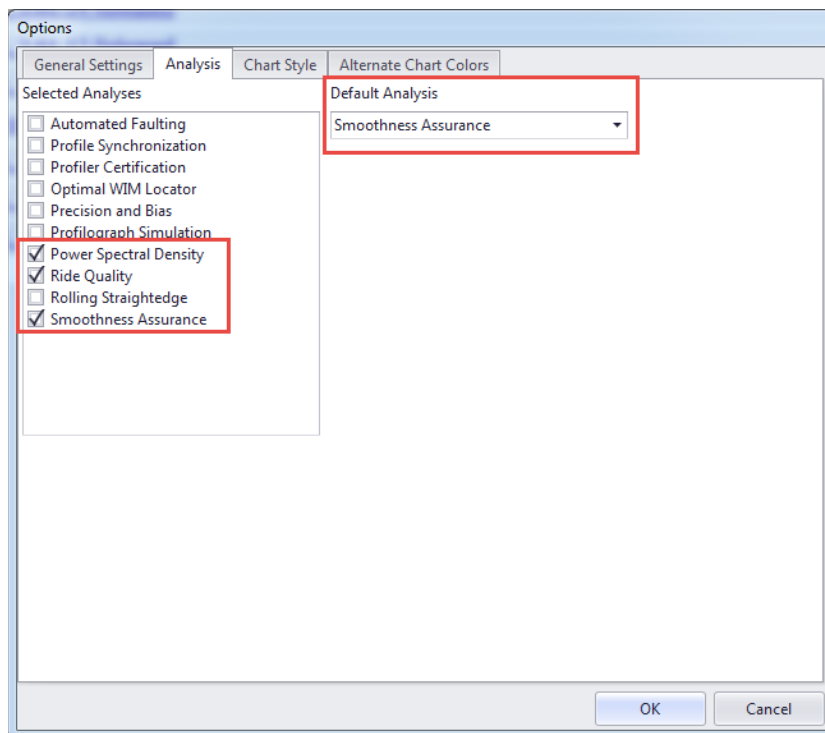
Creating a ProVAL Project

Selecting Profile Runs

1. Once you have received all profile data via Universal Serial Bus (USB) Jump Drive, upload all files onto your computer in *a single* directory named for the project. This can be named to your liking but make sure to keep all profiler runs in this particular directory for ease of access. For this example, the file directory is named **'Example_Profile_Data'**.

2. After that, click on the new ProVAL icon on your desktop. Once this window is open you will see the ProVAL main menu. On the right side of the screen, there is a section entitled **'News'**. If you have an internet connection, you will find when updates are made to the software here. **It is always best to have the latest version of ProVAL.**

3. Open up ProVAL and click **'New'** in the upper left hand corner. After that, click **'Add Files'** in the upper left hand corner.
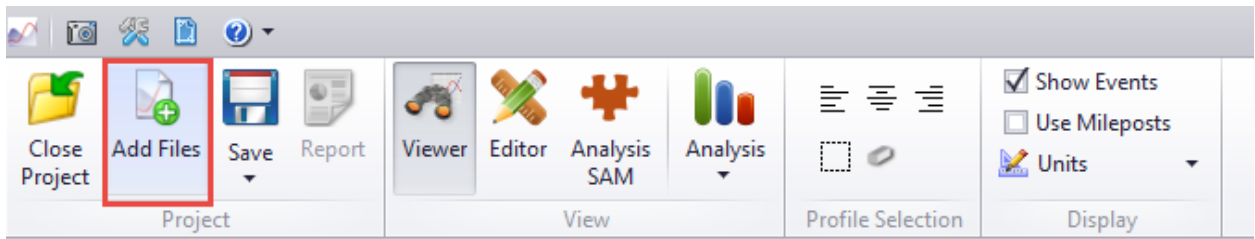
4. Select the directory created in step 2.1 and make sure you have the proper file type selected in the bottom right of the screen (should be one of the three file types discussed previously). Left click on your desired run and hit **'Open'**. If you wish to import multiple files at a time, select the first file, hit CTRL+SHIFT, and select the last file you would like to import for more efficiency.
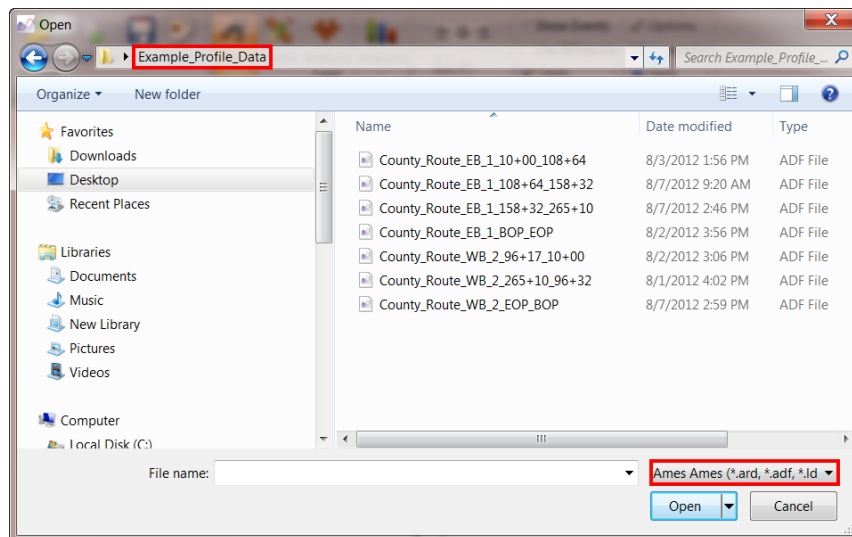
5. All files should now be listed by their title alphabetically in the left hand portion of the screen in ProVAL. Therefore, they will be separated by direction (N/S, E/W).

Saving a ProVAL Project

1. Click the **'Save'** button on the upper left hand of the screen. Here you can name your *ProVAL Project*. It's suggested to name this after the project the profile runs are being made so this was called **'MDOT_ProVAL_Example'** for purpose of this document as seen in the following screenshot. Once a *ProVAL Project* has been created, files (which are profiler runs) can be deleted or added at the user's discretion.
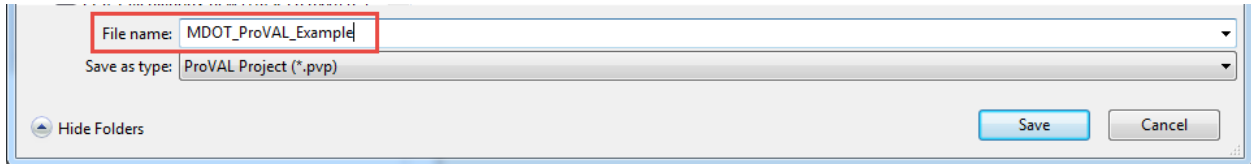
2. It's recommended to save the *ProVAL Project* in the same directory that was created for each of the profile runs on that particular project. This, again, will make things much easier for future access.
3. You can add files at any time to the same *ProVAL Project*. For example, if you receive just one run and would like to look at it, save the *ProVAL Project* as specified above. ProVAL also saves a list of recently opened projects under **'Recent Projects'** on the left side of the screen after they are closed. You can re-access a *ProVAL Project* by selecting it here or by clicking the **'Open'** button on the top left when you receive additional profiler runs. This way, you can save and organize all profiler runs into a *single ProVAL Project*.

Smoothness Assurance Module

Before File Analysis

Checking Sample Interval

1. The MDOT Spec requires a sample interval of under 3 inches. This means the profiler collecting the data must gather a data point *at a maximum* of 3 inches. Most profilers collect at a one inch interval and should not have an issue meeting this requirement.
2. To check this, navigate to and select the **'Editor'** button. This should default you to the **'Basic'** menu. If not, select **'Basic'** under the **'Navigate'** button on the right side of the screen. Select the file you'd like to look at next to the **'Navigate'** button. The **'Sample Interval'** (in inches) can be found on the left hand side as seen below. Usually, if one of the files submitted meets the requirement then all of them will but it is still best to give a quick check to all of them. If the sample interval <u>exceeds</u> 3 inches, contact Research Division about the issue.

Creating Sections

1. Sections/Leave-Outs need to be created when there are bridges, railroad crossings, leave-out sections, and other exceptions on a project. To insert these sections into a given file, you must navigate to the **'Sections'** menu under the **'Navigate'** button, as seen below.
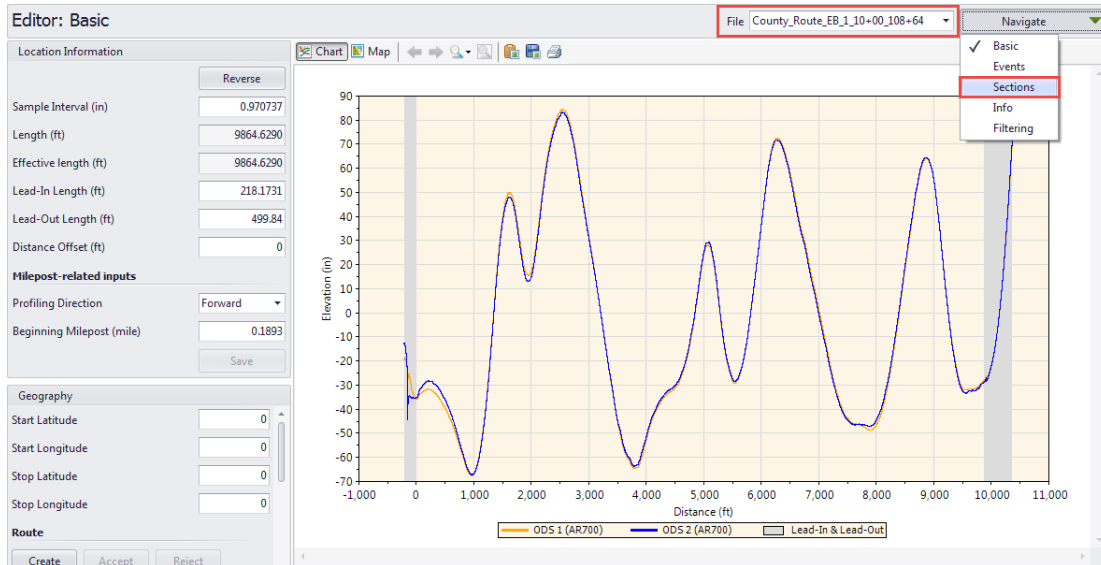
2. Be sure to select the proper file you would like to edit from the **'File'** drop down menu. Once you are in the **'Sections'** screen, you can select the **'Add'** button on the right side of the top menu. After selecting this, you can name your section as you wish. For this example, the leave out section will be called 'Bridge_1'.
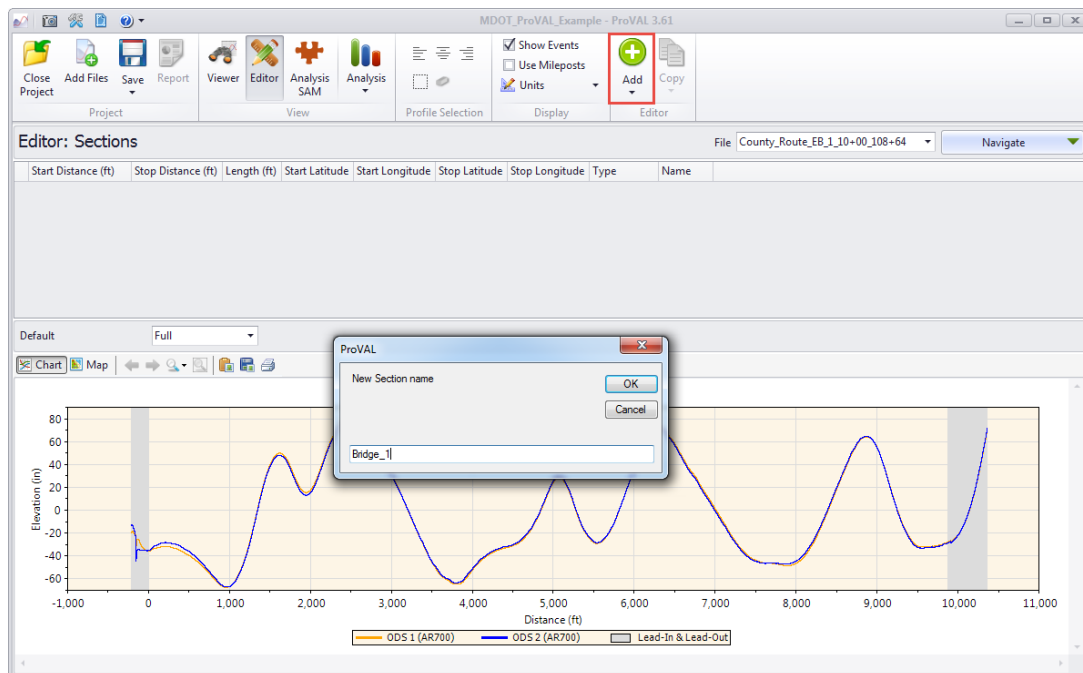
3. For this example, the limits of Bridge_1 are from stations 35+00 – 40+00 (500'). <u>Be sure to select **'Leave-Out'** under the **'Type'** heading. This will be indicated by the limits of the sections being</u>

shaded in orange on the plot on the bottom half of the screen. Leaving **'Generic'** as the type will not cause the section to be ignored, but simply gives the user to analyze that section separately and is not applicable to MDOT Projects.

4. This version of ProVAL will automatically omit 264 feet (half of 528 feet) on both sides of all leave out limits. Therefore, it's not necessary for the user to manually adjust these sections limits as with previous versions.

Adding and Copying Sections from Clipboard

1. ProVAL 3.6 allows users to copy and paste identical sections across multiple profiles. A good example of this is when you have a fourlane route with a profile for two of the lanes in each direction. If each of these lanes have the same limits for their leave outs (i.e. same bridge deck locations), the sections can simply be copy and pasted to save the user time when making sections.

2. After you have entered in all the necessary leave-outs (just Bridge_1 here) for a particular profile, you can duplicate this section table by left clicking the **'Copy'** button and selecting the **'All to section clipboard'** option.

3. Next, select the profile you would like to add this section to from the **'File'** dropdown list. After that, left click the arrow below the **'Add'** button and select **'From sections clipboard'** as seen below.
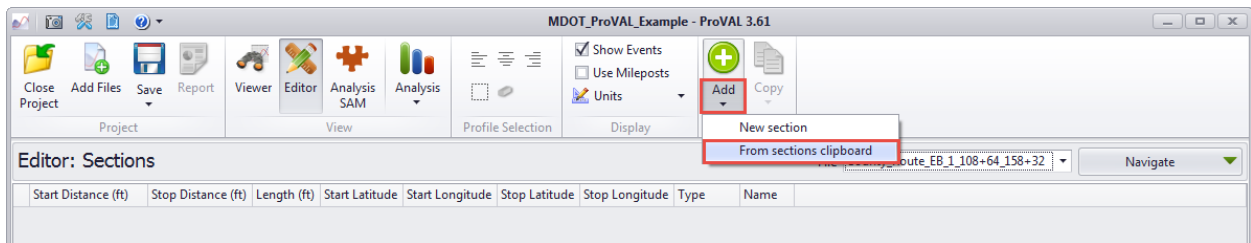
4. After you have selected this, the section information should be duplicated on that profile. If needed, you have the ability to edit any or all of these sections after they have been duplicated.

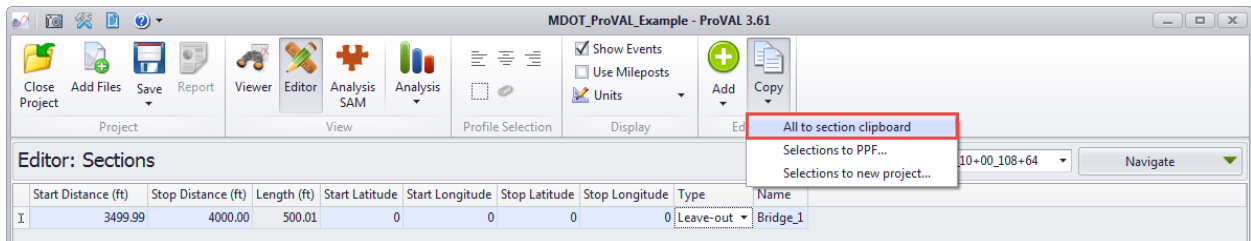## Calculating Section Limits

1. Once the section has been created, the next step is to type in the start and stop distances of the given section. For this example, there is a bridge from station 35+00 – 40+00 (500'). **NOTE:** *Be sure to select* **'Leave-Out'** *under the* **'Type'** *menu. This will be indicated by the limits of the sections being shaded in orange on the plot on the bottom half of the screen. Leaving* **'Generic'** *as the type will not cause the section to be ignored, but simply gives the user to analyze that section separately and is not applicable to MDOT Projects.*

2. **Primary Direction:** First, look at the Eastbound (or primary direction) file that contains this station number (*County_Route_EB_1_10+00_108+64*). Since the BOP is Station 10+00, the 'Start Distance'

will be calculated as 3500-1000= 2500'. The **'Stop Distance'** will be calculated as 4000-1000= 3000'. You can find this section entered into the screenshot below.
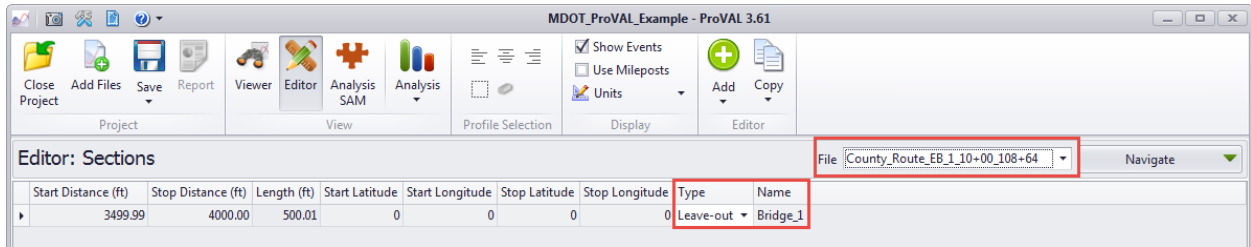
3. *Secondary Direction:* The secondary direction is not as straightforward as the primary direction. Since ProVAL *does not* plot profile in the decreasing direction, as you usually see with station numbers, a slightly more complicated calculation is required. First, select the Westbound (or secondary direction) file that contains this leave out (*County_Route_WB_2_96+17_10+00)*. The 'zero' point of this file corresponds to Station 96+17. Therefore, the **'Start Distance'** for the secondary direction will correlate to the **'Stop Distance'** in the primary, but will not be the same value. The **'Start Distance'** can be calculated as 9617-4000= 5617'. The **'Stop Distance'** will be calculated as 9617-3500= 6117'. You can find this section entered into the screenshot below.
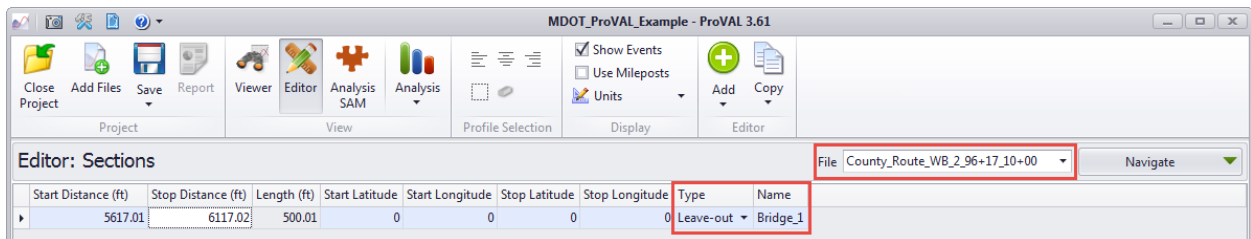
NOTE: This example is a two lane highway. A fourlane project will require these sections be added in for the other two lanes. The process will also be the same for any other required **'Leave Outs'** as per the latest specification.

Applying Proper Settings before Analysis

1. Now that a *ProVAL Project* has been created and saved and every **'Leave Out'** Section has been included in each of the applicable files, all the profiles can now be analyzed in the **Smoothness Assurance Module (SAM)**. First, make sure that the **'*MDOT_MRI_Spec_Templates.pvat'*** file has been imported into ProVAL properly.

2. Select the proper Project Category template under the **'Template'** button. This particular project was a mill + one lift overlay, which corresponds to a Category B project in the MDOT MRI Smoothness Specification. Select the **'Apply'** button for this Category.
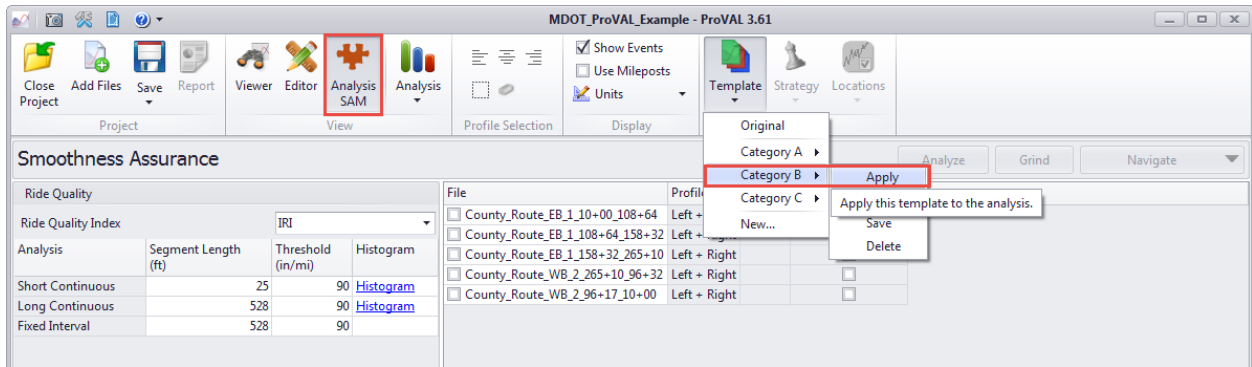
3. Observe the Short Continuous and Long Continuous values and make sure that they have changed to the proper values under the inputs menu (in this case Category B).

4. Select a file to analyze. For Manufacturer brands used in Mississippi, the **'Apply 250mm Filter'** box *will need to be checked* when analyzing each profile. Click the **'Analyze'** button.

Analyzing Profile Data

Short Continuous 'Must Correct' Locations

1. The first thing to determine from the files collected is the **'Must Correct'** locations throughout the project. Therefore, when analyzing the first set of files, the only results you will need to look at are **'Short Continuous'**.

2. **'Must Correct'** locations occur where the short continuous threshold has been exceeded. The **'Short Continuous'** threshold is 160 inches/mile for each project category. To check this, click the **'Navigate'** button on the right side of the screen and select the **'Short Continuous'** item.

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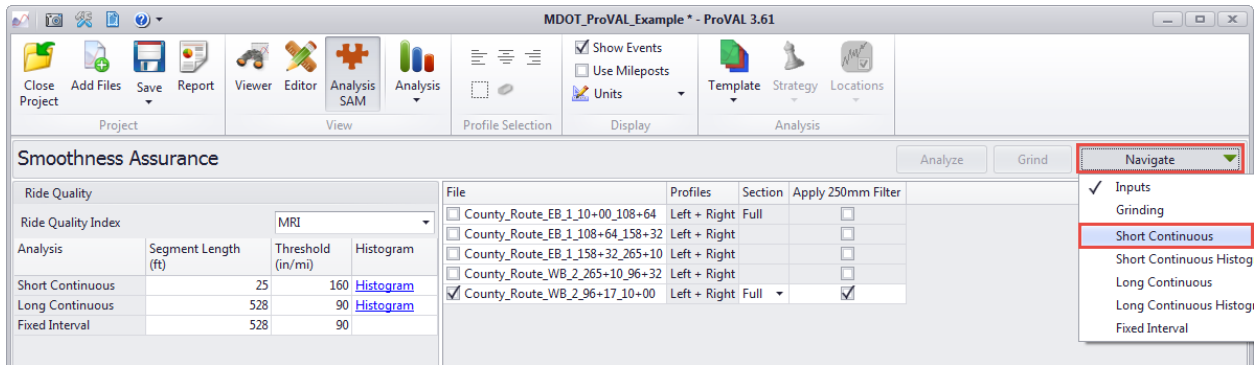
3. The next screen will display a graphical view of the Short Continuous MRI values for this particular profile. Also, it will have a chart on the left hand side of the screen that displays the distances at which the set threshold (160 inches/mile) has been exceeded. The distances given in the table locates the areas that must be corrected by the Contractor.
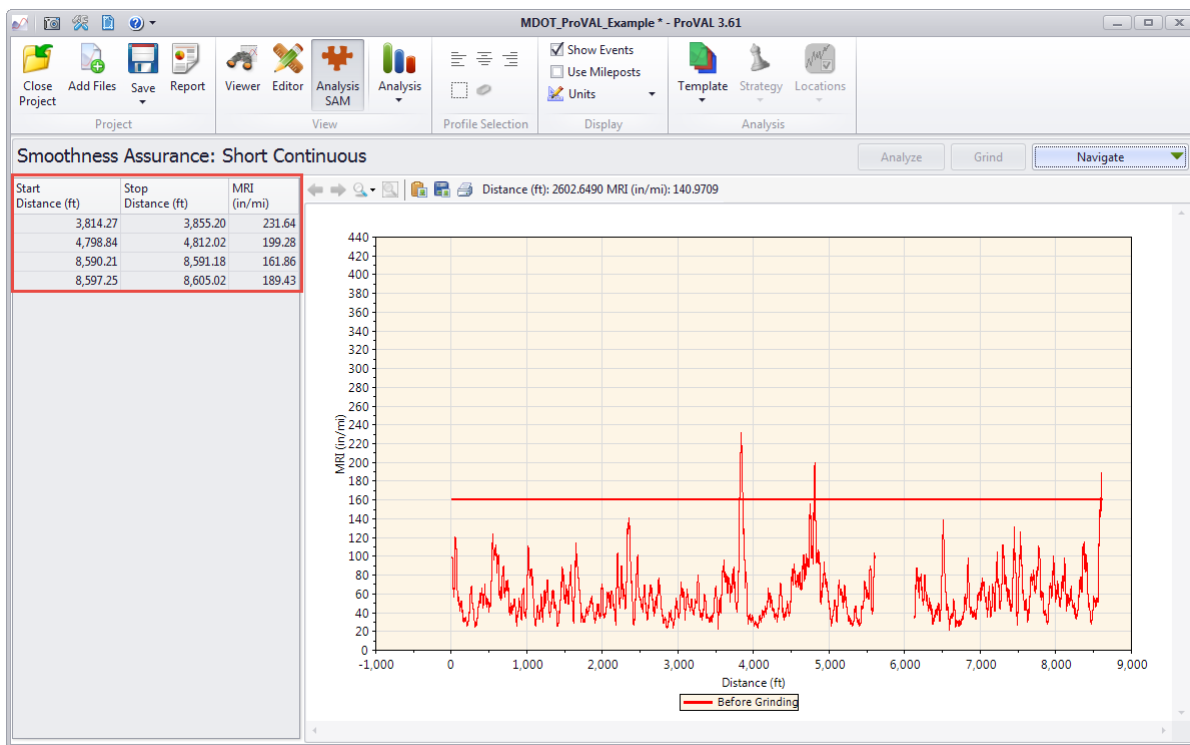
4. This process will need to be repeated for each of the profiles that were received on the project. In the case that the distances on ProVAL do not correlate to Station numbers in the field (as with this example), the distances will need to be converted to stations in a manner similar to Leave Out Section calculations. All must correct locations need to be documented for future reference. An easy and efficient way to do this will be covered in a future section.

Short Continuous with Profilograph Simulation Comparison

1. The previous graph of the **'Short Continuous'** displays the amount of *localized roughness* in an area but does not display what the actual defects are. A good way to look at what is actually there is to

look at the **'Short Continuous'** plot and **'Profilograph Trace'** together. To do this, go back to the **'Inputs'** screen via the **'Navigate'** tab.

2. On the left side of the screen, beneath the **'Ride Quality'** section, you will see another portion entitled **'Comparison'**. Here you can a plot to compare the MRI graph to. ProVAL gives you the option to compare it to a *Profilograph Simulation, Profile,* or *Rolling Straightedge.* The *Profilograph Simulation* is probably the best comparison for a few reasons: 1) it is the basis for the old specification and can be interpreted more easily and 2) it is a good indicator of what features are out there (bumps/dips) and how you need to correct them.

3. Select **'Profilograph Simulation'** in this box. The bottom option will be to select a Filter. Left click where it shows **'None'** and you'll see the **'Wavelength Filter'** box appear. Under **'Filter Type'**, select **'Butterworth Low-pass'** and use the default cutoff length of 1.97 feet as seen below.
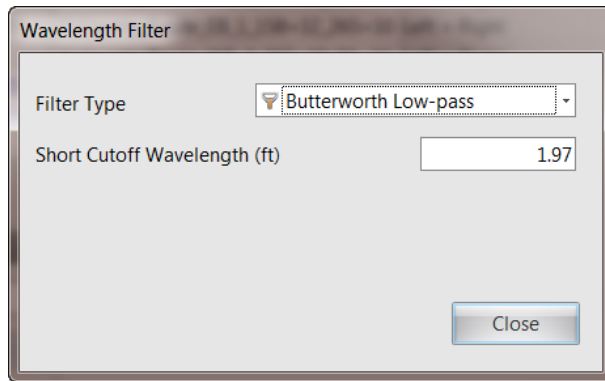
4. Click **'Close'** and then click **'Analyze'** in the top right hand corner. Navigate to **'Short Continuous'** and you will see a plot of two graphs similar to the one below.
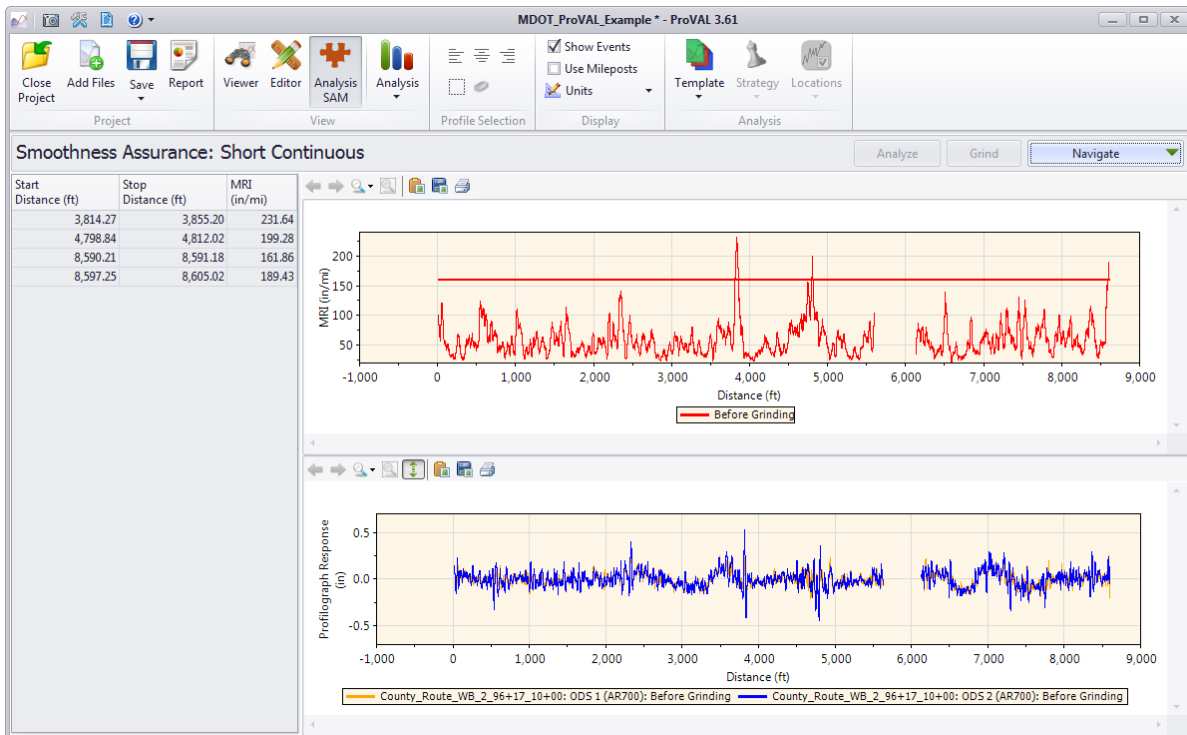
5. You can now zoom in on areas of localized roughness and compare it to the **'Profilograph Simulation'**. Looking at each of these will give a better indication of what is there and how the corrective action needs to be addressed.

Short Continuous with GPS Mapping Comparison

1. The newest version of ProVAL allows the user to view must correct locations overlaid onto a MapQuest map. In order for ProVAL to display this, a contractor's profiler must have GPS capability. Some manufacturer's native file types, such as Ames Engineering (ard, adf, ldf) will automatically have the GPS coordinate data attached when files are imported into ProVAL. This is a useful tool for assisting in properly locating 'Must Grind' locations throughout a project.

2. To check to see if a file has GPS coordinates, go to the **'Editor'** menu and navigate to **'Basic'**. The **'Geography'** information on the left hand side will display start/stop latitude and start/stop longitude as well as a smaller map image as seen below.
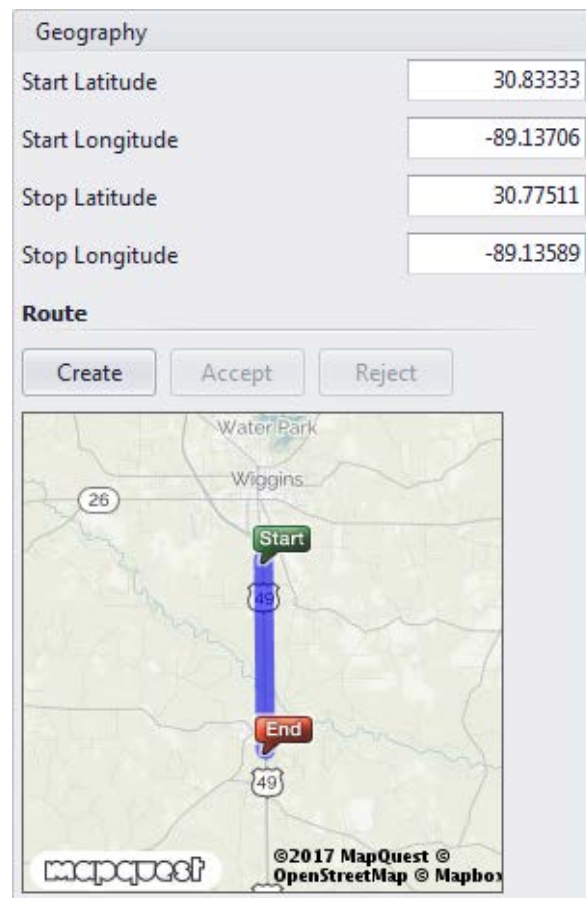
3. To view where the Short Continuous (or 'Must Grind') threshold has been exceeded, repeat the steps outlined in the Short Continuous 'Must Correct' Locations subsection above. After you have navigated to **'Short Continuous'** following the file analysis, select the **'Map'** button on top of the graphs and next to the **'Chart'** button.

Smoothness Assurance: Short Continuous

Start Distance (ft)	Stop Distance (ft)	MRI (in/mi)
12,066.33	12,076.75	184.53
13,157.08	13,177.83	197.72
17,934.58	17,942.25	164.96
17,943.17	17,967.75	197.89
22,536.50	22,557.50	211.61
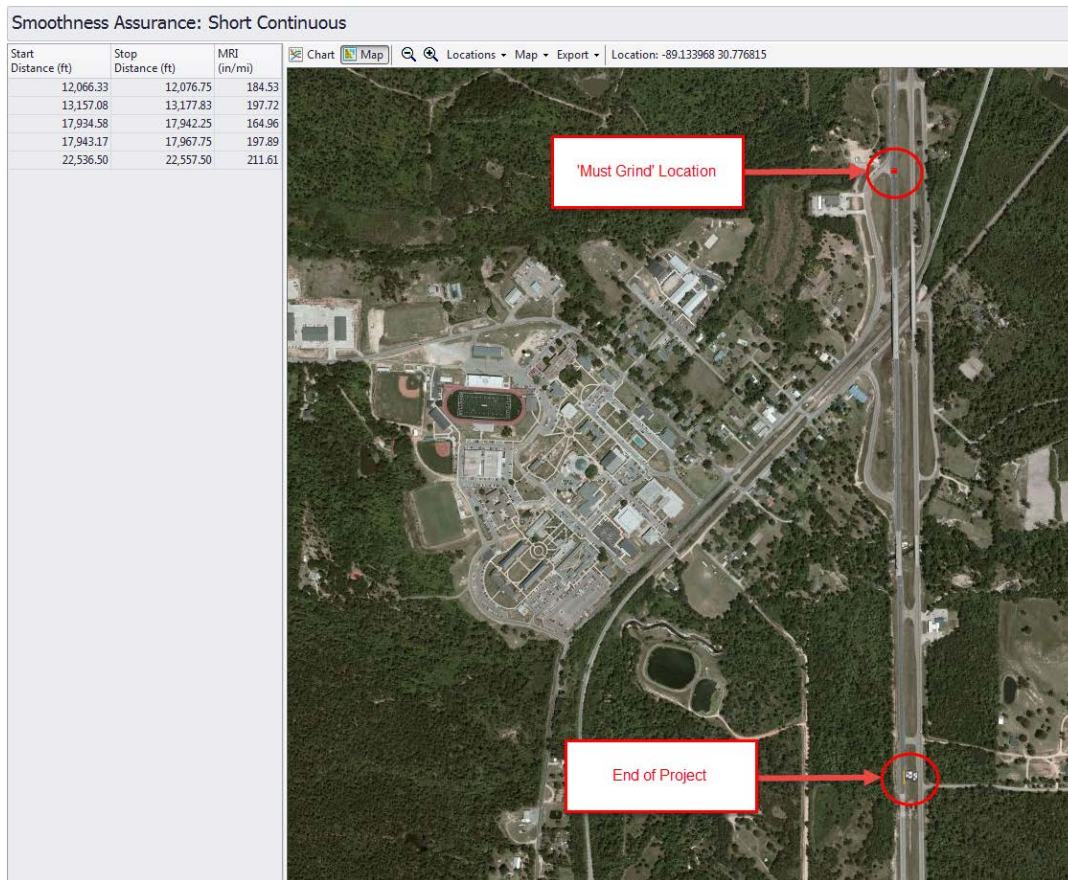
4. The must grind locations (as indicated in the specification) are only 25' long and may require some panning and zooming on the map to see clearly. The map will also display the beginning and ending limits with flags along the route. Since the above screenshot has been zoomed in, only the ending flag is pictured.

Long Continuous

1. MDOT Personnel will also need to check the **'Long Continuous'** thresholds for each profile run to ensure that no section is over the **'Remove and Replace'** threshold.

2. To check this, simply go to the **'Navigate'** pane (as seen in the preceding screenshot) and select **'Long Continuous'**. If any of the profiles contain sections in the **'Remove and Replace'** threshold, the table on the left side of the screen will display the start and stop distances of these sections. These will need to be documented in the same way the **'Short Continuous'** defects are.

3. If none of the profiler runs have this issue, then you will just need to focus on the **'Short Continuous'** locations exceeding the threshold for the time being. Later, the **'Long Continuous Histogram'** will be used to determine Pay Adjustments and is outlined in the following section.

Creating a PDF Report

1. ProVAL has the option to create a Report of analysis the in **SAM Module** in PDF Format. This is the easiest way to document each of the profiler runs and where they exceed their respective thresholds. To do this, when you are in the **'Analysis'** screen, simply hit the **'Report'** button at the top. A box will appear that shows what file directory to save this report into and what format it should be in. ProVAL should default to the file directory where both your profiler runs and ProVAL

project are saved. If it does not, be sure to select that file directory. Once the directory is set, select the **'PDF'** button as seen in the screen below and left click the **'Create'** button.
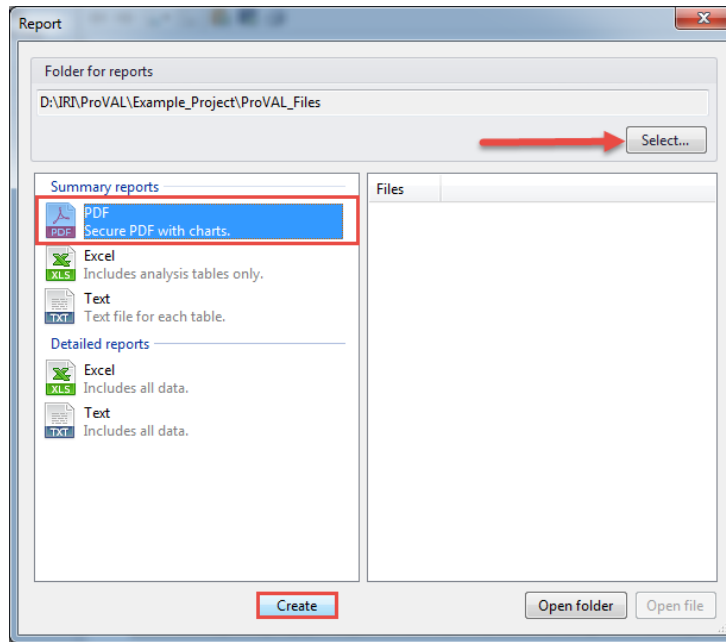
2. After you have selected the PDF format, the file should appear on the screen. Within this report you will find the following items that will be useful to you: 1) *File Name,* 2) *Leave Outs (if applicable),* 3) *Short Continuous Information (Graphs, Tables, and Histograms)*, 4) *Long Continuous Information (Graphs, Tables, and Histograms),* and 5) *Fixed Interval Information (Not applicable to MDOT's spec and should be ignored).*
3. ProVAL has the default title of **'SAM – Results'** for every file you produce a report for. Therefore, each of the reports must be renamed so they are not automatically overwritten. The simplest method of naming is to use the same title as the file name. After you have created the PDF report, you can left click the **'Open file'** button on the bottom right corner of the report window. When the PDF has been opened, hit **'File'** in the top left corner of the PDF file, then **'Save As'**, and then **'PDF'** as seen in the screenshot below.
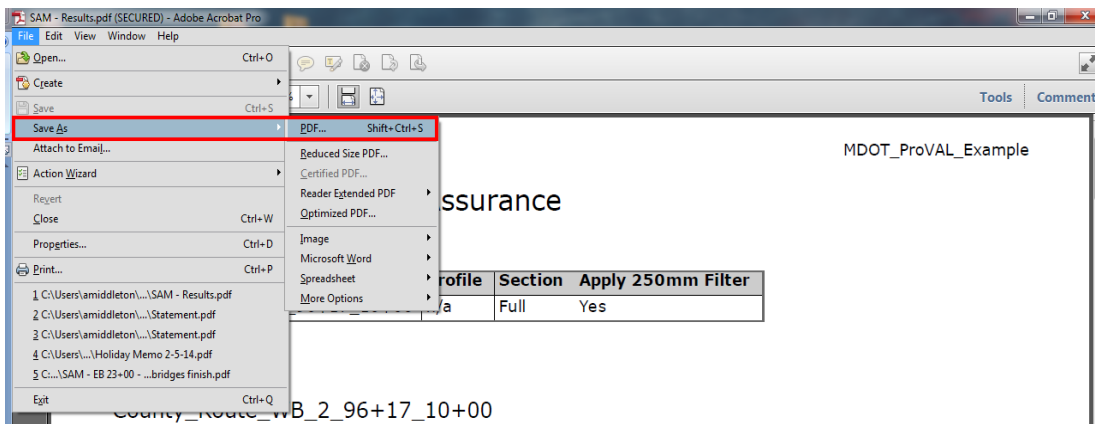
4. After that, a **'Save As'** box should appear. Where it says file name, rename the PDF file to the same title as the analyzed file it represents (for this example: County_Route_WB_2_ 96+17_10_00). Once you have renamed the file correctly, hit the **'Save'** button as seen in the following screenshot.
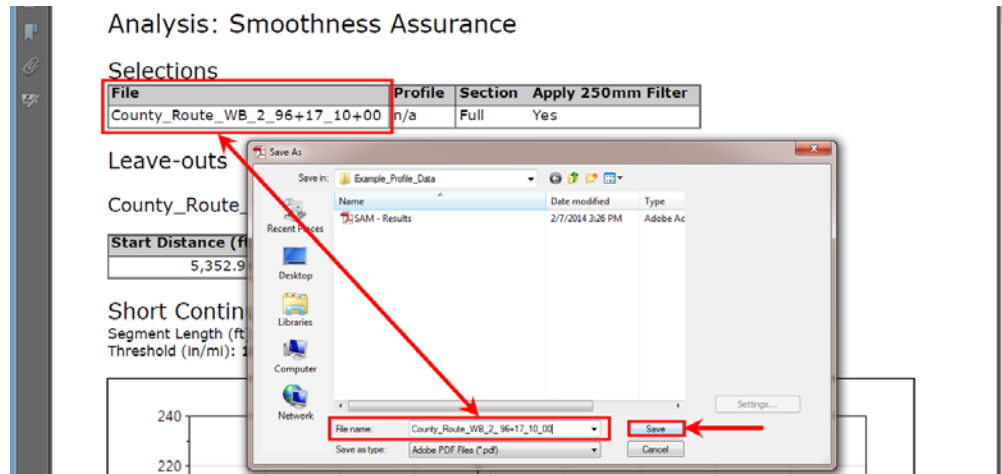
5. As with the previous steps, you repeat this process for each profile run within the project.

Category A/B Pay Adjustment Spreadsheet

Saving and Preparing the Spreadsheet

1. You must have the latest *'MRI_Pay_Adjustment_Template_Asphalt'* spreadsheet loaded on your computer from the *Loading ProVAL and Additional Files* section of this document. If this has already been done, open up the spreadsheet.
2. First, you need to save this spreadsheet in the same directory you saved the profile data and ProVAL Project. To do this, click the **'Windows'** button in the top left corner and click **'Save As'**. Once you've done that, the **'Save As'** box will appear. Rename the file name to the same name as your ProVAL Project (in this case *'MDOT_ProVAL_Example'*) and also place it in the proper file directory as seen in the following screenshot. After that, hit **'Save'**.
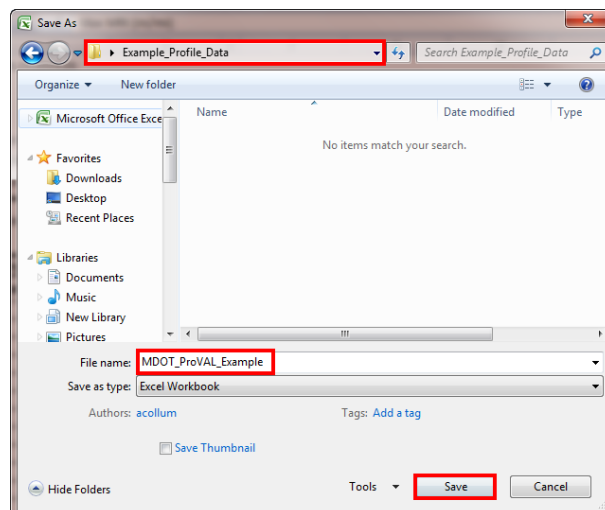
3. The first tab of the of the spreadsheet is title **'Project Information'** and will need to be filled out before any profile data is placed into the spreadsheet. Enter the items as they apply to the project and select the proper drop down menu value for 'Surface Lift Thickness' and 'Lane Width' cells. These two items along with 'Asphalt Unit Price' will be used in the pay adjustment calculations. Since you have saved this spreadsheet specifically for this project, it's best to delete the Category A and Category C worksheets so that they are not used accidentally. To do this, simply left click on the sheet title and select **'Delete'** as seen below.
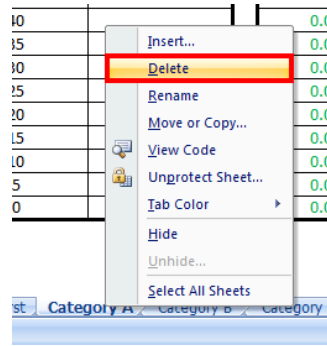
Exporting ProVAL's Long Continuous Histogram

1. Once you have the PDF reports saved for all profiler runs, documented and identified all **'Must Correct'** locations on the project, and opened you can begin to analyze each run for Pay Adjustment. As mentioned earlier, the Pay Adjustment for MDOT MRI Projects is based on the **'Long Continuous Histogram'** in ProVAL. To access this histogram, repeat the analysis steps from earlier. Just select the proper file *with correct template and filter settings checked*, click **'Analyze'**, click on the **'Navigate'** button and scroll down to **'Long Continuous Histogram'** as seen in the screenshot below.

2. Once you've clicked on the **'Long Continuous Histogram'** button, you will see the histogram on the right side of the screen. On the left, you will find a chart that groups the percentage of the selected profiler run (by length) into various MRI value ranges. The *MDOT MRI Templates* already have the proper histogram settings imported to be compatible with the spreadsheet. This chart copies directly into the spreadsheet. However, it's best to have the spreadsheet open *before* copying the chart out of ProVAL. Open the spreadsheet from your chosen directory from the beginning of this guide. Next, you can copy the chart into the spreadsheet. To copy the chart, left click on the **'Max MRI'** box at the top left of the chart and select **'Copy table to Clipboard'** as seen below.

3. Next, you will paste this chart directly into the spreadsheet. Be sure to select the sheet that corresponds to the proper MRI Category (in this case Category B). Just left click the same **'Max MRI'** box that you did in ProVAL and select **'Paste'** as seen in the following screenshot.

Completing the Spreadsheet

1. From the previous step, we copied a **'Long Continuous Histogram'** into the **'Category B'** worksheet. To keep it organized, rename the worksheet by left clicking on the sheet name and selecting **'Rename'** (see above). The best naming convention is to use the ProVAL file name but excluding the county and route (in this case *WB_2_96+17_10+00)*. Also, place the direction, lane (if necessary), and station limits of the run in the **'Section/Lane'** blank on the spreadsheet as seen below.

2. The final step for completing the spreadsheet is to find the effective (or net) section length that can be found in ProVAL. To find it, go into the **'Editor'** menu, select the proper run under the **'File'** drop down box, and select **'Basic'** (if it does not by default). This takes you to the same screen as seen in the **'Checking Sample Interval'** on page 6. You will see 'Effective Length' on the left hand side.
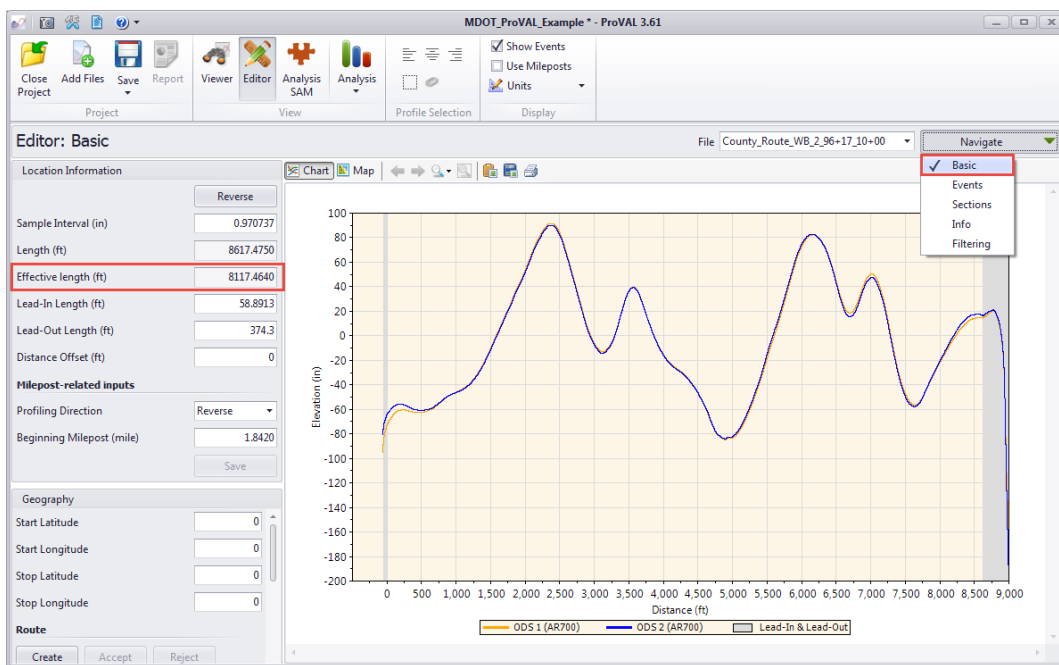
3. This length does not account for leave outs. You will have to manually subtract the sum of the leave out distances from this total length. For this example, we had a 500' bridge. So the length for the spreadsheet would be 8617.5-(500+264+264) = 7589.5 feet.

4. After you've calculated the *net length* of a profiler run, you can complete the required inputs. For this example, assume a surface thickness of 1.5 inches and a unit bid price of 85 dollars on the 'Project Information' tab. Place 7589.5 in the **'Section Length'** cell on the current sheet. This will give you a completed worksheet as seen in the following screenshot.

Pavement Category B

100% PAY THRESHOLD = 70 inches/mile

Project: MDOT_ProVAL_Example

Section/Lane: WB_2_96+17_10+00

Section Length (feet) =   7,389.50

Total Section Tonnage =   812.85

Max MRI (in/mi)	Min MRI (in/mi)	Before Grinding (%)	Before Grinding (ft)		Tonnage	Price Before Adjustment	Price After Adjustment	Difference
∞	120	0	0		0.00	$0.00	$0.00	$0.00
120	115	0	0		0.00	$0.00	$0.00	$0.00
115	110	0	0		0.00	$0.00	$0.00	$0.00
110	105	0	0		0.00	$0.00	$0.00	$0.00
105	100	0	0		0.00	$0.00	$0.00	$0.00
100	95	0	0		0.00	$0.00	$0.00	$0.00
95	90	0	0		0.00	$0.00	$0.00	$0.00
90	85	1.734468	127.0557		14.10	$1,198.37	$958.69	-$239.68
85	80	2.999232	219.704		24.38	$2,072.22	$1,761.38	-$310.84
80	75	1.429733	104.7329		11.62	$987.82	$889.03	-$98.79
75	70	4.771506	349.5291		38.78	$3,296.72	$3,131.88	-$164.84
70	65	9.255462	677.9943		75.23	$6,394.76	$6,394.76	$0.00
65	60	23.3569	1710.973		189.86	$16,137.70	$16,137.70	$0.00
60	55	12.73929	933.1968		103.55	$8,801.80	$8,801.80	$0.00
55	50	18.79618	1376.885		152.78	$12,986.62	$12,986.62	$0.00
50	45	22.0211	1613.121		179.00	$15,214.77	$15,519.06	$304.29
45	40	2.896127	212.1512		23.54	$2,000.98	$2,081.01	$80.03
40	35	0	0		0.00	$0.00	$0.00	$0.00
35	30	0	0		0.00	$0.00	$0.00	$0.00
30	25	0	0		0.00	$0.00	$0.00	$0.00
25	20	0	0		0.00	$0.00	$0.00	$0.00
20	15	0	0		0.00	$0.00	$0.00	$0.00
15	10	0	0		0.00	$0.00	$0.00	$0.00
10	5	0	0		0.00	$0.00	$0.00	$0.00
5	0	0	0		0.00	$0.00	$0.00	$0.00

ProVAL Long Continuous Histogram

Total   -$429.83

5. You can repeat this process for each run you have in your ProVAL Project. The spreadsheet is designed to sum the amount listed in the **'Total'** cell for all worksheets *between* the **'First'** and **'Last'** sheets. Therefore, you can copy this sheet for however many runs are on a project and *if kept between* *'First' and 'Last'* will give you the project's pay on the **'Total'** sheet. To do this, left click on the worksheet name and select **'Move or Copy'** (see screenshot on page 15). A new **'Move or Copy'** dialogue box will appear be sure to check the **'Create a Copy'** box and select where you would like to place the sheet. MAKE SURE ALL SHEETS ARE BETWEEN **'FIRST'** and **'LAST'**. A screenshot of the **'Move or Copy'** box is on the following page.

6. You can print out each of these worksheets along with the **'Project Information'** worksheet to submit with the Final Plans for approval. It's best to have Station Numbers in the 'Section/Lane'

blank on each sheet to show that the entire project (where applicable) has been analyzed for smoothness.

Post Corrective Action Profile Runs

1. Following Corrective Action from the Contractor based on the **'Short Continuous'** report, the contractor is also required to rerun each lane of the entire project to ensure that all areas are within tolerance.
2. These final runs must be reanalyzed to ensure that everything falls into specification. Simply repeat the steps outlined in the **'Smoothness Assurance Module'** section and check if both the **'Short Continuous'** and **'Long Continuous'** results are beneath the thresholds. If they are not, some additional corrective action must take place before acceptance.

# Category C Pay Adjustment Spreadsheet

General Information

1. Starting in 2015, changes to smoothness requirements for Category C projects have altered the analysis process. Therefore, Category C projects now have their own Price Adjustment Template for Smoothness. Similarly to the Category A/B template, it should be downloaded from the Research Division website.
2. Contractors will be required to collect an initial profile prior to any work being performed. This initial profile will be used as a comparison to the final profile for acceptance and price adjustment purposes. *For that reason, it is imperative that the initial and final profiles' starting and ending points, as well as all exclusions, match up as closely as possible.*
3. A new spreadsheet will have to be created for each lane on a single project. However, each lane may be up to any length to fit into the spreadsheet.

Pay Adjustment Spreadsheet

Saving the Spreadsheet

1. You must have the *'MRI_Pay_Adjustment_Template_Asphalt_CategoryC'* spreadsheet loaded on your computer from the *'Loading ProVAL and Additional Files'* section of this document. If this has already been done, open up the spreadsheet.
2. First, you need to save this spreadsheet in the same directory you saved the profile data and ProVAL Project. To do this, click the **'Windows'** button in the top left corner and click **'Save As'**. Once you've done that, the **'Save As'** box will appear. Rename the file name to the same name as your ProVAL Project (in this case *'MDOT_ProVAL_Example'*) and also place it in the proper file directory as seen in the following screenshot. After that, hit **'Save'**.
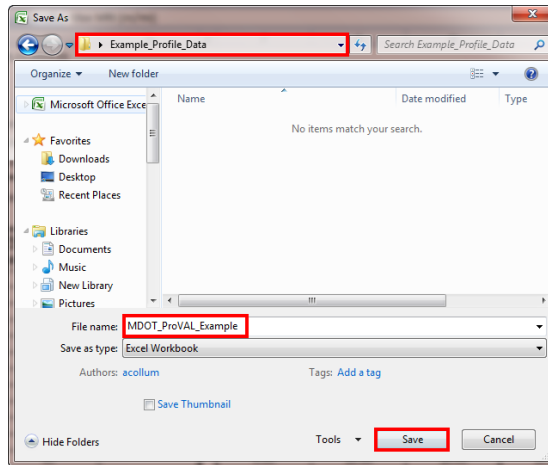
Preparing the Spreadsheet

1. The second tab of the spreadsheet is titled **'Results'** and will need to be filled out before any profile data is placed into the spreadsheet. The following items need to be addressed on this sheet are *Date, Project Number, County (drop down box), Route (drop down box), Lane Width (drop down box), Surface Lift Thickness (drop down box), Asphalt Unit Price, and Profile.* District will auto fill based upon the County. The following screenshot displays the **'Results'** sheet with the appropriate values for the example project filled in.


2. The first tab, **'Data Input'**, is where the data is copied and pasted from ProVAL. This sheet allows for four pairs of profiles (initial and final) to be analyzed for price adjustment.

ProVAL Editing and Exporting

1. Please refer to the preceding sections on how to import data files, save a ProVAL Project, and edit profile data for leave outs. Again, it is very important for the initial and final profiles to have the same starting/ending points and exclusions. This concept is referenced on the first screenshot of the following page. In the case of this example, the exclusion boundaries were at the same distances. However, in reality, there may be some minor deviations between where exclusions occur between profiles on some projects.

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2. After selecting the <u>Category C Template</u> and the preferred file (w/ 250 mm Filter box checked), click the **'Analyze'**. To access this table, click on the **'Navigate'** button and scroll down to **'Fixed Interval'** as seen in the screenshot on the following page.
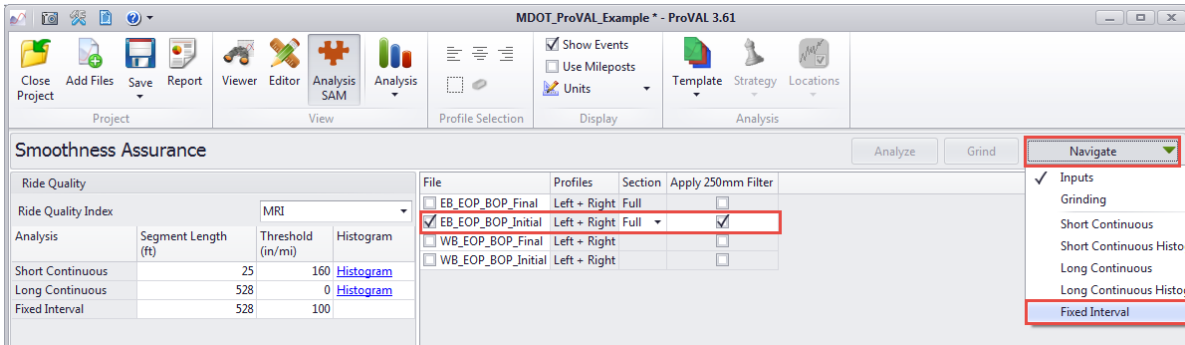
3. Pay Adjustment for Smoothness is based on the **'Fixed Interval'** chart in ProVAL for Category C Projects as opposed to the **'Long Continuous Histogram'**. This Fixed Interval is taken at 528' (0.1 mile) as indicated by the above screenshot. Once you've clicked on the **'Fixed Interval'** button, you will be defaulted to the Fixed Interval chart. However, the spreadsheet requires the Table with the average MRI values to be copied into it. Select the **'Table'** button to pull this up and right click on the '**Start Distance (ft.)'** label. After that, click the **'Copy table without column names'** option as seen below. The chart will display a horizontal line indicating average MRI values above 100 inches/mile by default. However, this is simply for reference as the specification indicates that only the *initial MRI values* on the same segment will have any bearing on a unit price adjustment.
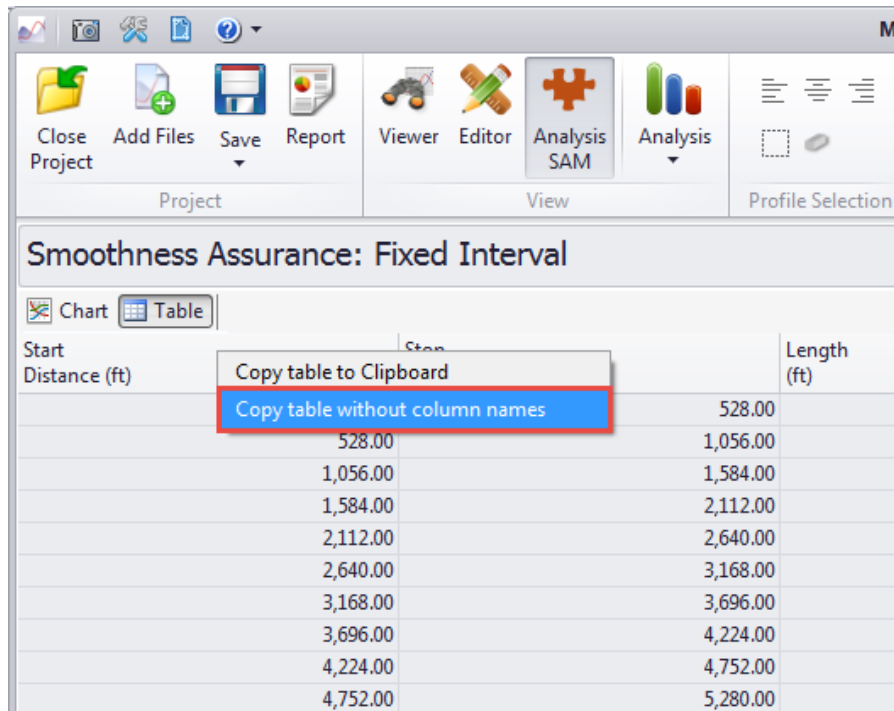
4. This chart copies directly into the spreadsheet. However, it's best to have the spreadsheet open *before* copying the chart out of ProVAL. Open the spreadsheet from your chosen directory from the

beginning of this guide. Next, you can copy the chart into the spreadsheet. To copy the chart, select the **'Data Input'** sheet and right click on the cell directly below **'Start Distance (ft.)'** as displayed in the following screenshot. Be sure you are pasting in the correct area for either the Initial Profile or the Final Profile.

	A	B	C	D	E	F	G
1				**Initial Surface Values**			
2		Start Distance (ft)	Stop Distance (ft)	Length (ft)	MRI (inches/mile)	Defect Count	
3		0	527.9997	528	206.3062	7	
4		527.9997	1055.999	528	188.0712	5	
5		1055.999	1583.999	528	180.8311	13	
6		1583. Paste Options:		528	159.6218	13	
7		2111 A		528	178.1856	14	
8		2639.999	3167.998	528	189.3253	14	
9		3167.998	3695.998	528	186.4156	10	
10		3695.998	4223.998	528	236.2459	5	
11		4223.998	4751.998	528	176.6897	12	
12		4751.998	5279.997	528	198.7735	7	
13		5279.997	5807.997	528	180.5475	8	
14		5807.997	6335.997	528	142.6208	19	
15		6335.997	6766.974	431	169.7973	12	
16		7110.073	7638.072	528	193.5855	13	
17		7638.072	8166.072	528	203.1105	7	
18		8166.072	8694.071	528	201.2858	8	
19		8694.071	9222.071	528	173.9915	13	
20		9222.071	9750.071	528	186.0525	15	

5. Repeat this process for all initial and final profiles (and sections of profiles, if applicable). Be sure that all of the profiles have been named consistently to your liking, correspond to one another, and the lengths do not deviate significantly between initial and final values.

Viewing Spreadsheet Results

1. Once you have copied and pasted all the required data in the **'Data Input'** sheet, proceed to the **'Results'** tab for the finalized data summaries. Make sure you have entered all of the project information into the **'Results'** tab as seen in the 'Preparing the Spreadsheet' section.

2. Below that, you will see the table that has the calculated values for each 528' segments along the profile. Tonnages are based on *theoretical density* along with the *lane width* and *surface lift thicknesses* from the **'Project Information'** sheet. If a section adjacent to any exclusion is less than 528', then that section will be combined with the previous section and the section length, tonnage, and MRI will be recalculated based on a weighted average value.

	Segment	Distance (feet)			Tonnage	MRI VALUES (IN/MILE)		% Improvement Deducts		
		From	To	Combined Length		Existing	Final	Percent Improvement	Accepted/ Removal/ Deduct %	Deduct Amount
58	40	23181	23709	528	58.1	188.2	45.8	75.7%	Accepted	$0.00
59	41	23709	24237	528	58.1	187.4	46.9	75.0%	Accepted	$0.00
60	42	24237	24765	528	58.1	180.5	41.3	77.1%	Accepted	$0.00
61	43	24765	25293	528	58.1	139.1	46.6	66.5%	Accepted	$0.00
62	44	25293	25821	528	58.1	72.0	40.8	43.3%	Accepted	$0.00
63	45	25821	26349	528	58.1	165.7	55.8	66.3%	Accepted	$0.00
64	46	26349	26877	1018	112.0	177.6	50.8	71.4%	Accepted	$0.00
65	47	26877	27367							
66	48	28167	28695	528	58.1	155.1	53.7	65.4%	Accepted	$0.00
67	49	28695	29223	528	58.1	95.6	51.4	46.2%	Accepted	$0.00
68	50	29223	29751	528	58.1	139.7	37.6	73.1%	Accepted	$0.00

3. Below the inputs section, the sheet will display a **'Lane Total'** for the table occupied on the **'Results'** sheet. Note that Category C projects are not eligible for any unit price increases and will only be subjected to deductions or section removal. Therefore, this value will either be zero or negative. In the case below, the total was zero.

	A	B	C	E	G	J	K	L	M	N
1	Version	2.0.1	2016.10.19.009						Date:	1/1/2017
2			**MISSISSIPPI DEPARTMENT OF TRANSPORTATION**							
3			**MRI Percent Improvement Smoothness Price Adjustment**							
4										
5	Project Number:		Example					Unit Bid Price:		$85.00
6										
7	County:		Adams					Lane Width (ft):		12.0
8										
9	District:	7	Route:	553				Surface Thickness (in):		1.5
10										
11										
12										
13	Length (feet|miles):	77602	14.697					Profile: Eastbound		
14										
15	Tonnage:	8539						Total Deduct:		$0.00

4. Any sections that do not meet the 50% improvement provision outlined in the specifications will incur a unit price deduct and will be highlighted red on the spreadsheet as seen below.

Segment	Lane	Distance (feet)			Tonnage	MRI VALUES (IN/MILE)		Percent Improvement	Accepted/ Removal/ Deduct %	Deduct Amount
		From	To	Combined Length		Initial	Final			
45	Westbound 1	23232	23760	528	58.08	175.4	60.1	66%	Accepted	$0.00
46	Westbound 1	23760	24288	528	58.08	149.3	84.4	43%	90%	-$493.68
47	Westbound 1	24288	24816	528	58.08	179.8	49.5	72%	Accepted	$0.00
48	Westbound 1	24816	25344	528	58.08	179.2	69.3	61%	Accepted	$0.00

5. You will want to save this spreadsheet in the same directory as your ProVAL files for easy reference in the future. For this example, the file was renamed **'MDOT_ProVAL_Example'**.

6. The spreadsheet has been formatted for easy printing and for saving as a PDF. All general information and labels will repeat at the top when printed out or saved as a PDF.

Troubleshooting

For any issues that may arise during analysis with contractor profiles or the ProVAL Software, please contact the Research Division at 601-359-7650.