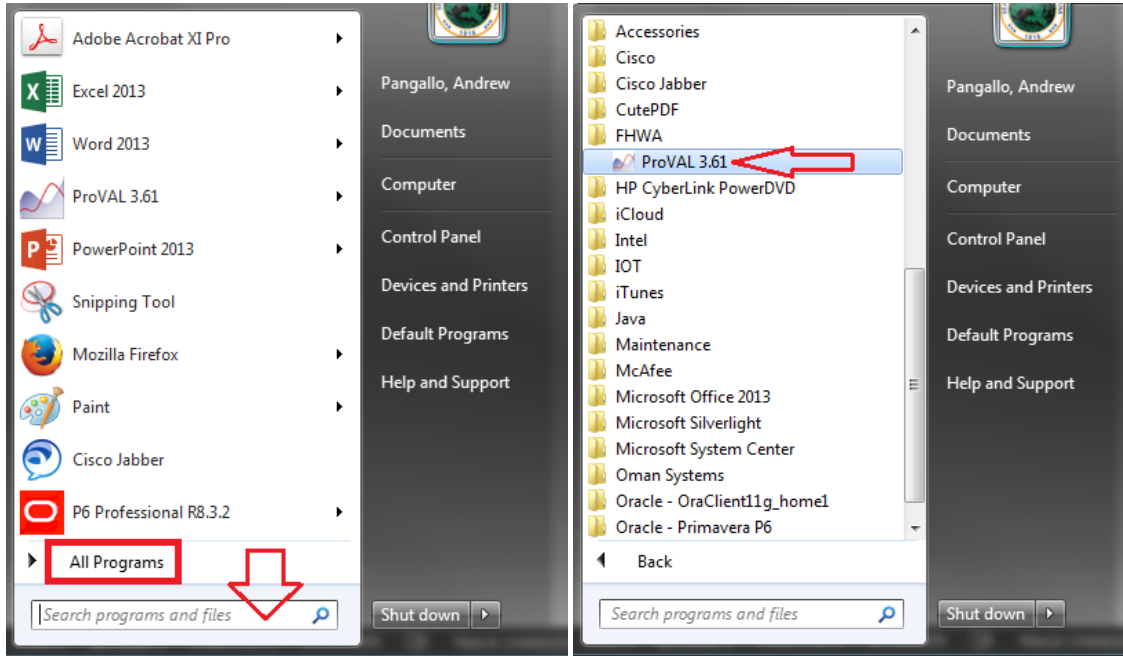


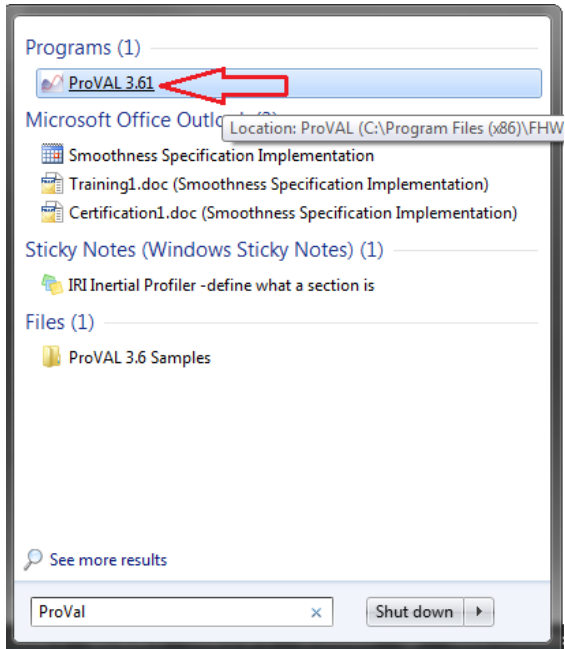
## IRI Field Guide

- 1) Open up ProVAL by either by going to the Start button → All Programs → FHWA → ProVAL or typing ProVAL into the search bar located in the Start menu.

### Desktop (Windows 7)



or



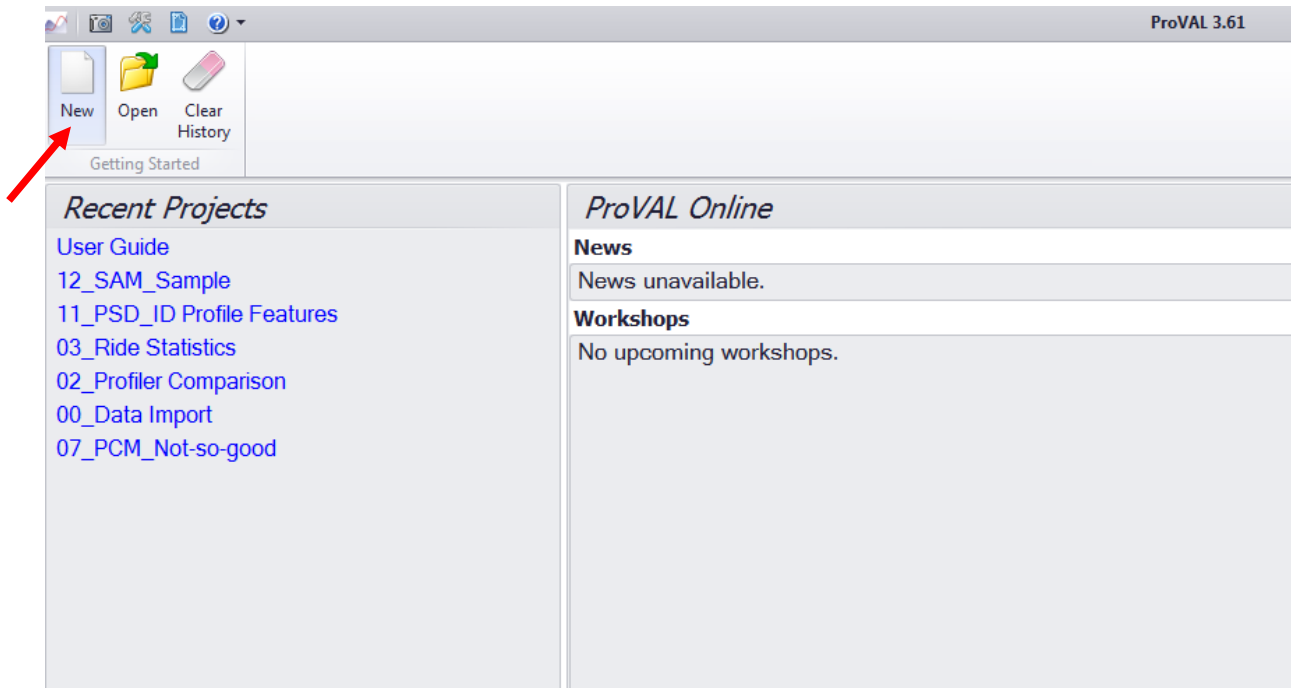
## HP Mini Elite 2 (Windows 10)

Type in “proval” into the Start Search bar. Then click on ProVAL 3.61.

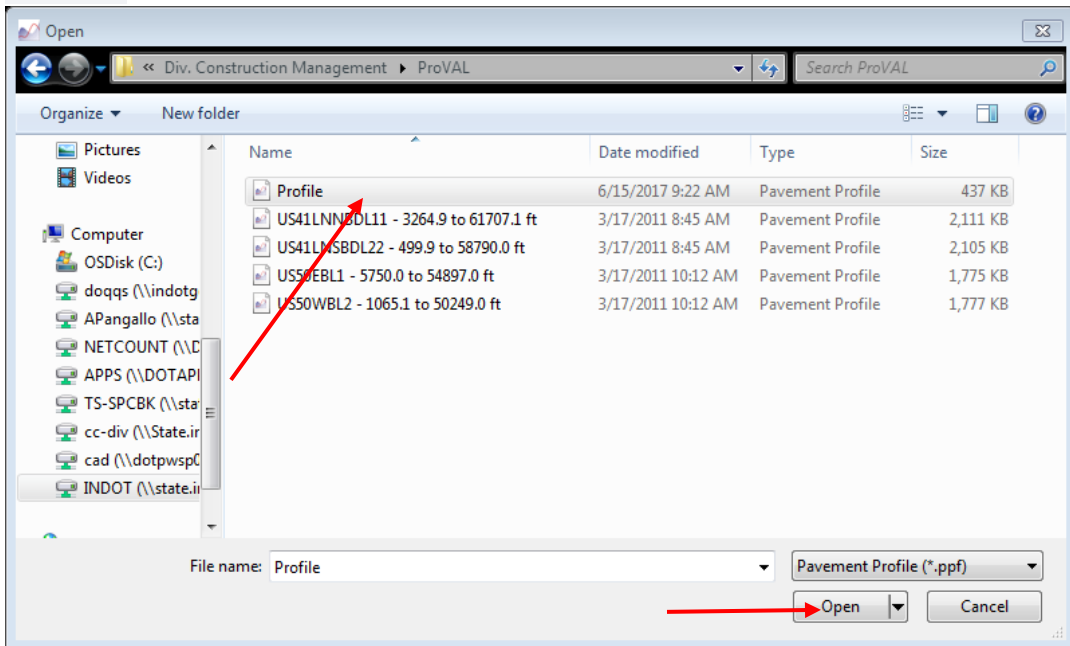


**\*\*It is important that your screen resolution be set to 100%. If it is not, the program will not display correctly and will be difficult to use. \*\***

2) Select **New** to begin a new project file

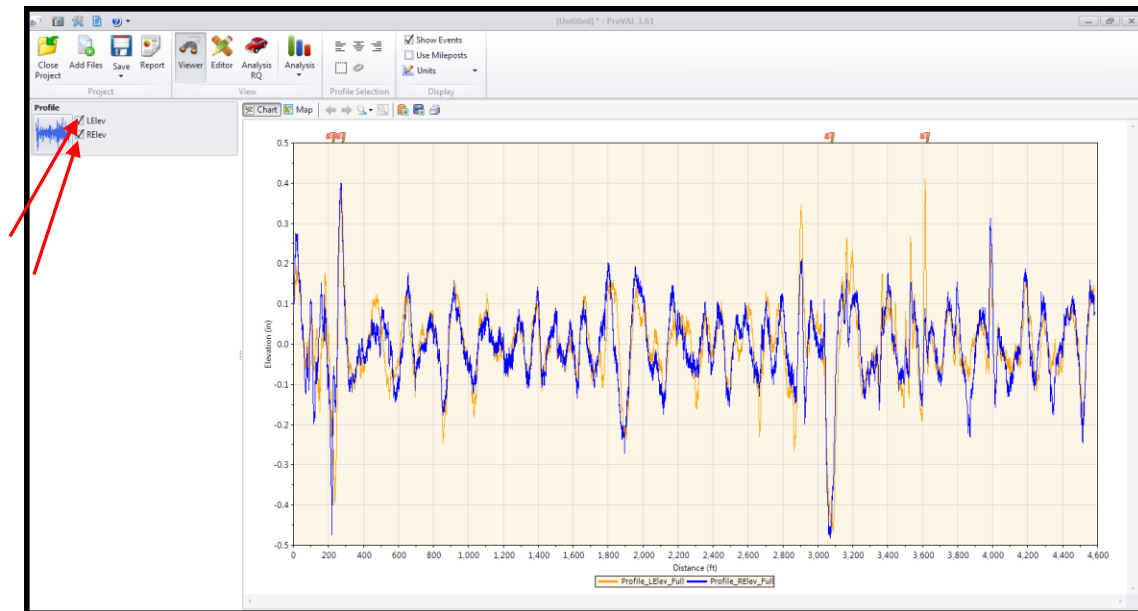


3) The data file the Contractor has sent needs to be downloaded onto this project file. Select **Add Files** and browse the folders where you placed the Contractor's data file (window below is only a example of a folder location) and open it.

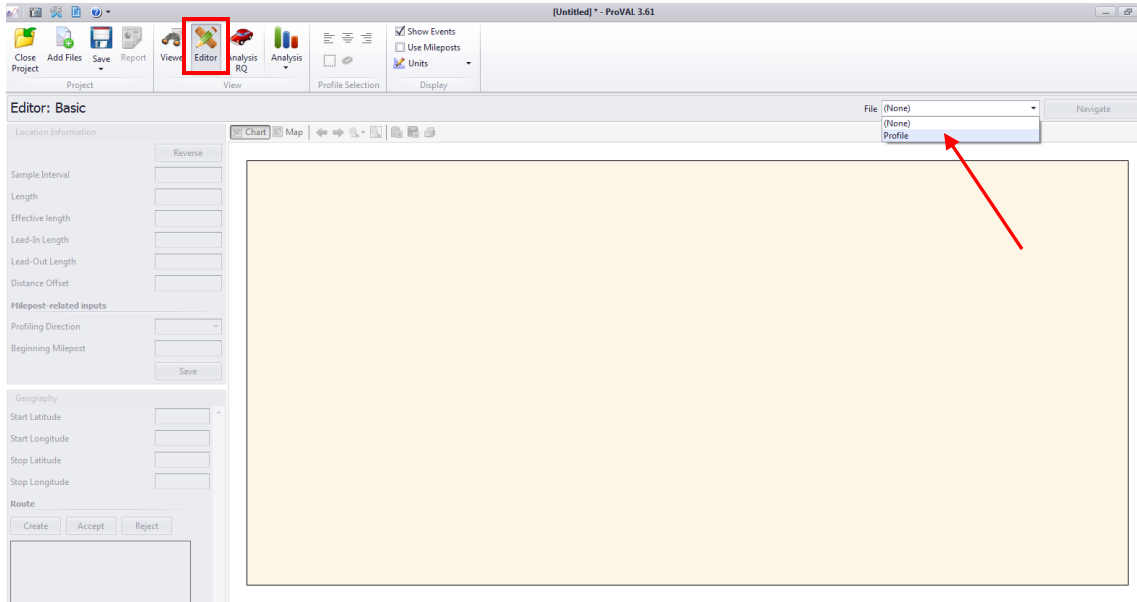


As more data is received, additional files should be added to this one project file to represent all the IRI testing for a contract.

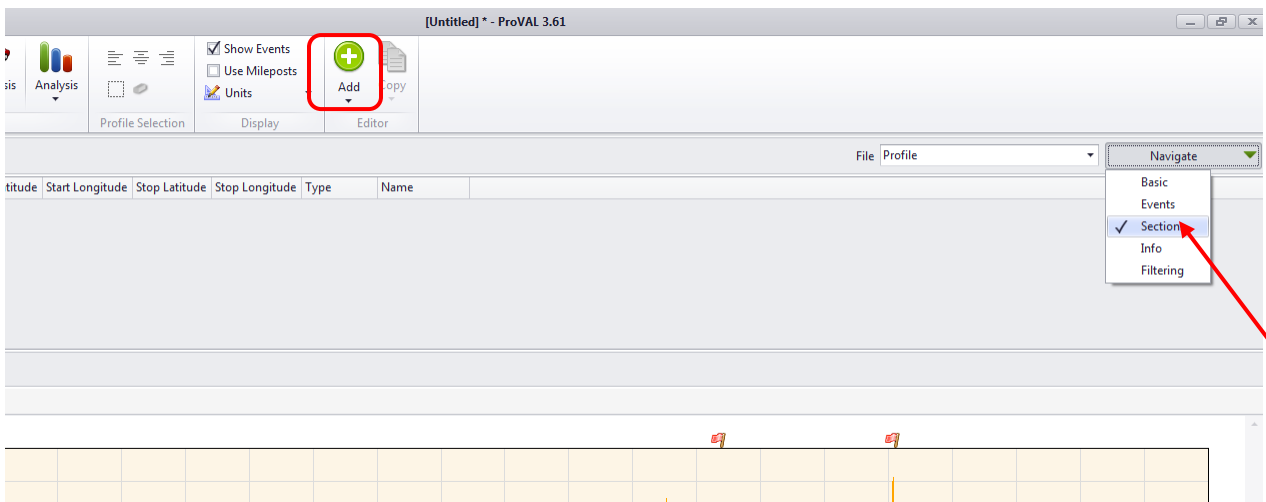
- 4) The data file will automatically begin in the **Viewer** pane. Each file will have two checkboxes for a left and right wheel path readings. Clicking on these checkboxes will display the IRI readouts for the Section tested. The x-axis is listed in feet starting at 0 feet and up to however long the inertial profiler measured.



- 5) Next, the section needs to be identified for analysis. Not all sections start at 0 feet as can be seen above for the example. The starting feet on this graph needs to correspond with a station that represents the start of paving. To identify the section, select the **Editor** icon. Now select which file you want to use from the File dropdown.



- 6) Once the file is selected, you will notice the IRI results appear as they did on the **Viewer** pane. Click the Navigate dropdown to the right of File dropdown and select **Sections**. Next, click the **Add** button and provide a meaningful name that helps identify this exact section (Line/Direction/Lane/etc.).



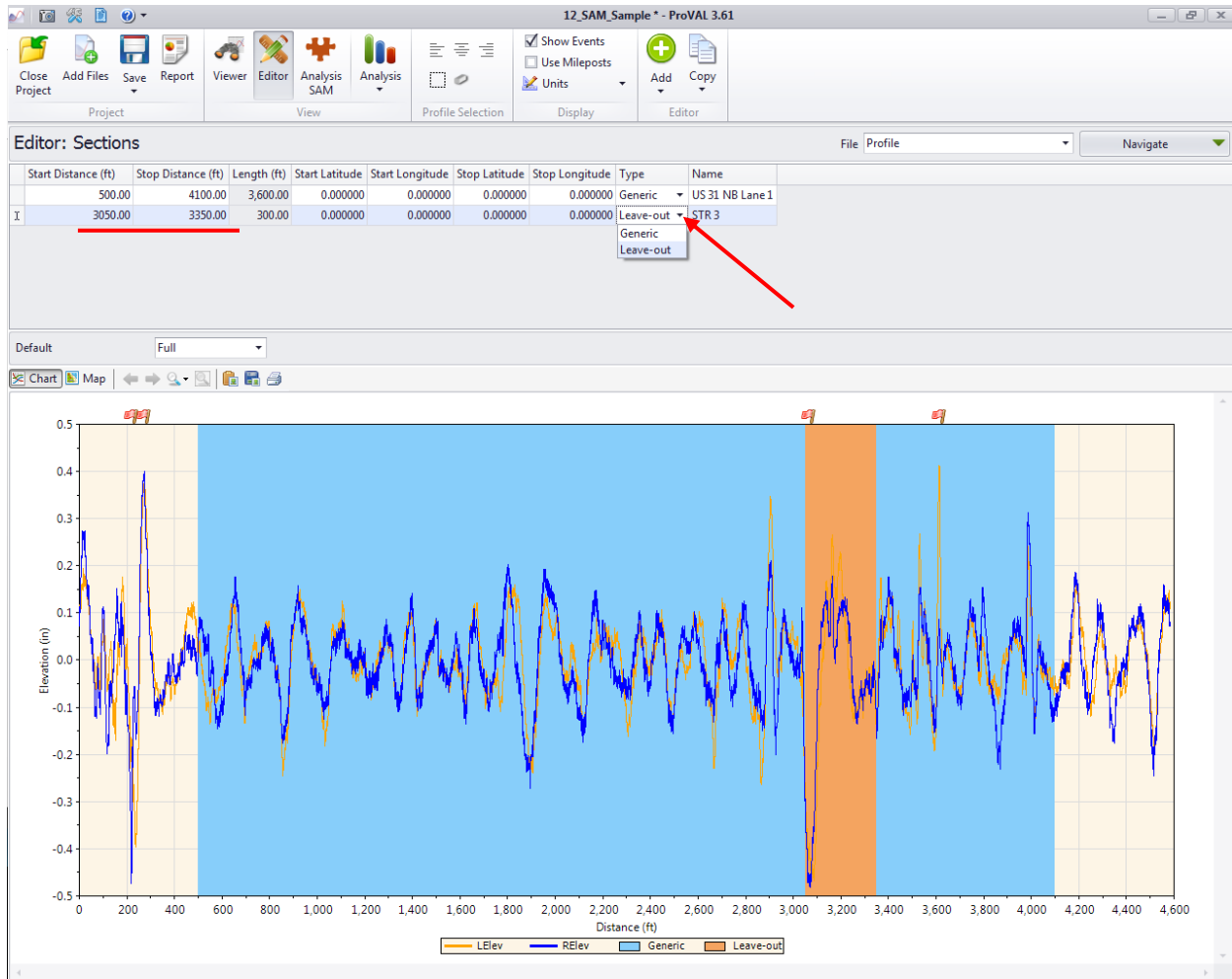
- 7) Provide the Start Distance and Stop Distance at which the Surface was measured for the contract. The distances will not always match up to your typical section stations. For example, the inertial profiler started taking measurements 500' before the construction limits and ended 500' past the construction limits on the other side of the contract. The

total distance measured was 4600. The starting station for paving is 0+00. That means distance 500' would be station 0+00 since the inertial profiler started measuring 500' before the paving limits. One of the exceptions for the inertial profiler is the first and last 50 feet of paving. Therefore, the Start Distance would be 550' and the Stop Distance would be 4050'. You will notice the blue shaded area will now shrink to the limits entered.



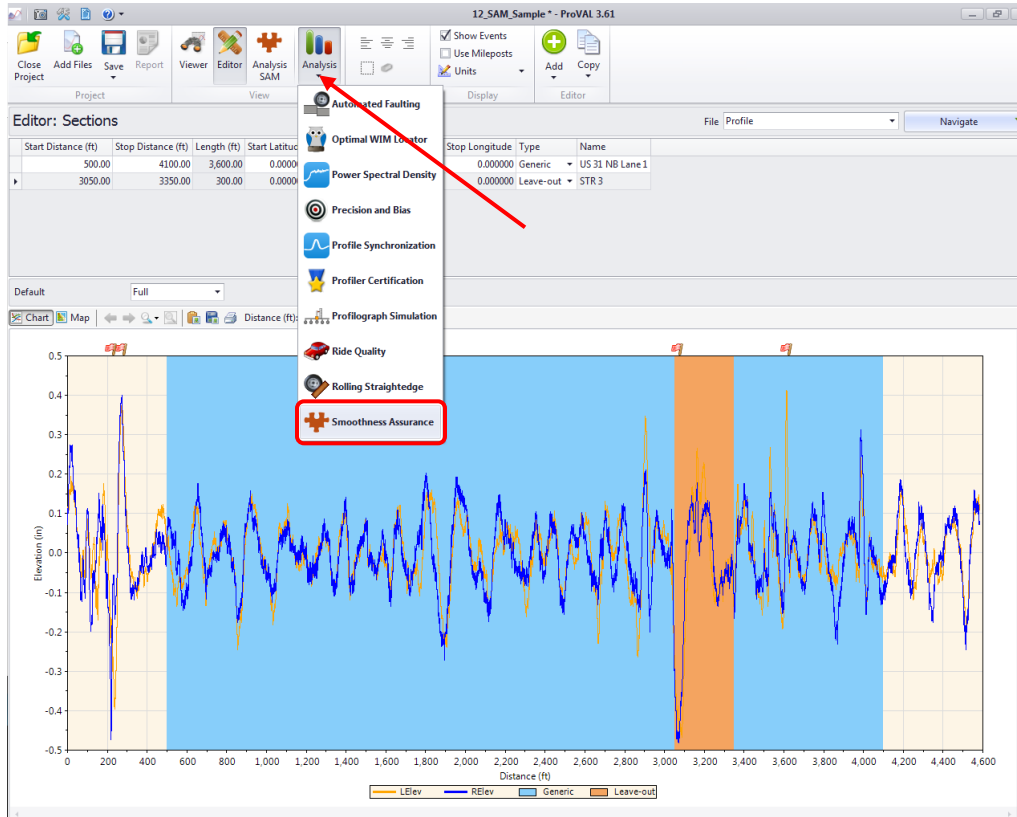
Red Flags can be seen right above the graph. These red flags represent **Events**. Events are usually accompanied by spikes in IRI because of a bridge, casting, railroad crossing or other feature that would cause a bump unrelated to the actual pavement. ITM 917 describes these exceptions and exempts 50 ft. before and through 50 ft. after these exceptions from measurement. The contractor should help identify these locations and should already be marked in the file before you receive it.

- 8) Once these exceptions are identified, these areas need to be excluded from measurement. Click **Add** button within **Editor** and provide a name that describes the exception such as STR 3 for a bridge. The Start Distance should be 50 ft. before the exception and then the Stop Distance should be 50 ft. after the end of the obstruction. For example, there is a bridge that is 160 ft. long with 20 ft. approaches and the first approach begins at 3100 ft. The Start Distance should be entered as 3050 ft. and the Stop Distance should be 3350 ft. The only difference with this section as the previous section is the selection for the dropdown under the Type column. Select **Leave-Out**.



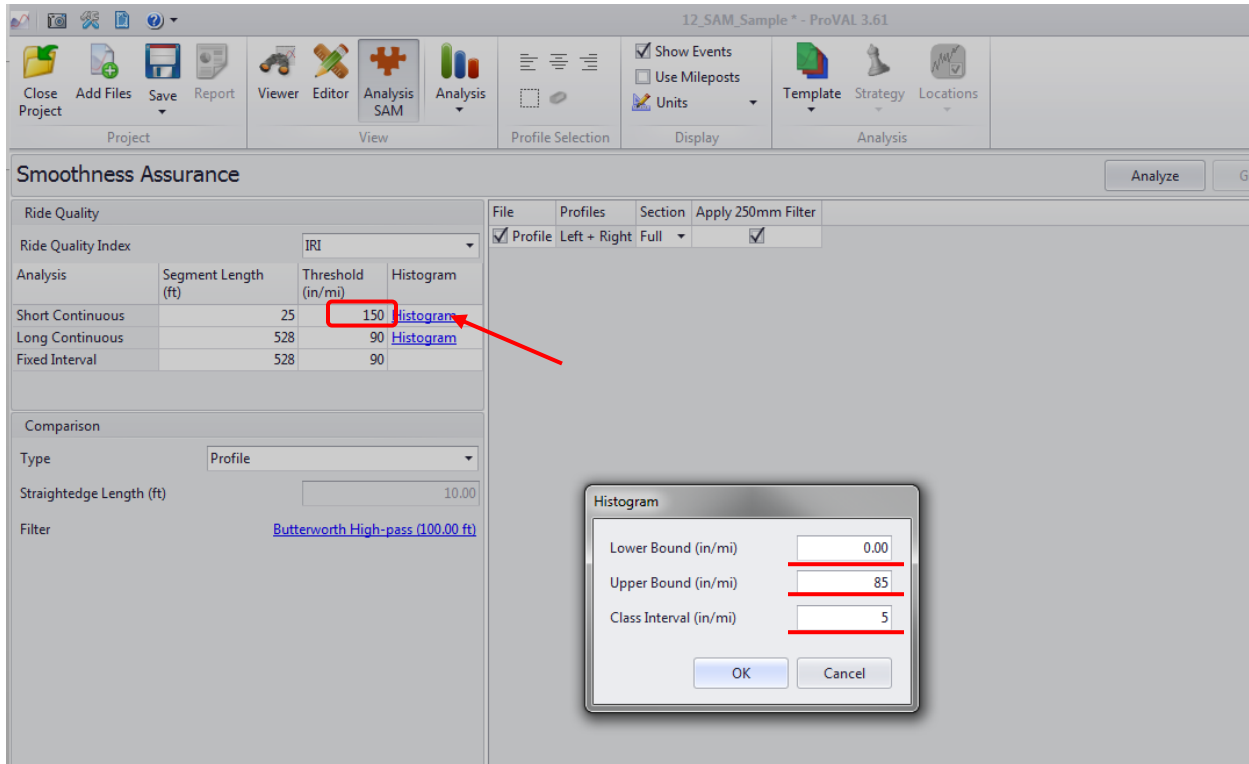
You will notice that the bridge can be seen as the orange shaded area. This area will now be excluded from IRI analysis. Repeat this process for all exception located within the section.

- 9) Now it is time to analyze the Section for IRI and eventually output to obtain pay factors (PF) for smoothness quality adjustments. Click the **Analysis** button and select **Smoothness Assurance** from the dropdown.



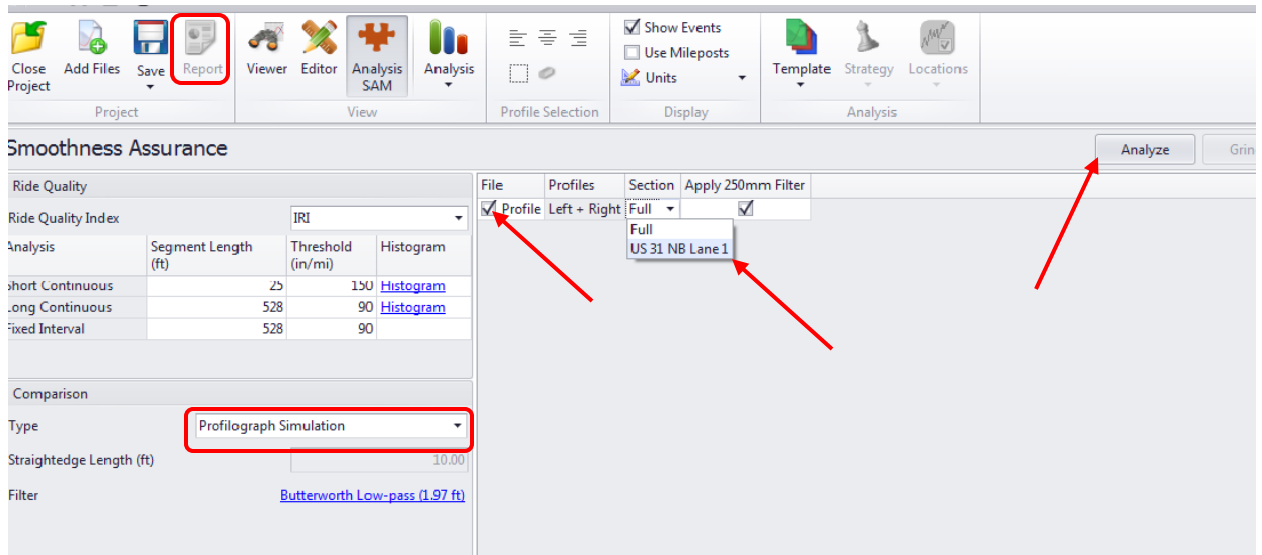


10) The Inertial Profiler specification and ITM 917 explain that a continuous measurement with a 25 interval will be used for analysis with 150 in/mi being the threshold for correction action. To set these parameters, you only need to be concerned with the Short Continuous row on the Ride Quality table. The Segment Length is already set at 25 ft. so no change is required there. Under the threshold column, enter 150 for the value for Short Continuous. Next, select Histogram on the Short Continuous row. Enter 0.0 for Lower Bound, 85 for Upper Bound, and 5 for Class Interval. This is intended to match the PF for smoothness as described in the Special Provisions and ITM 917.

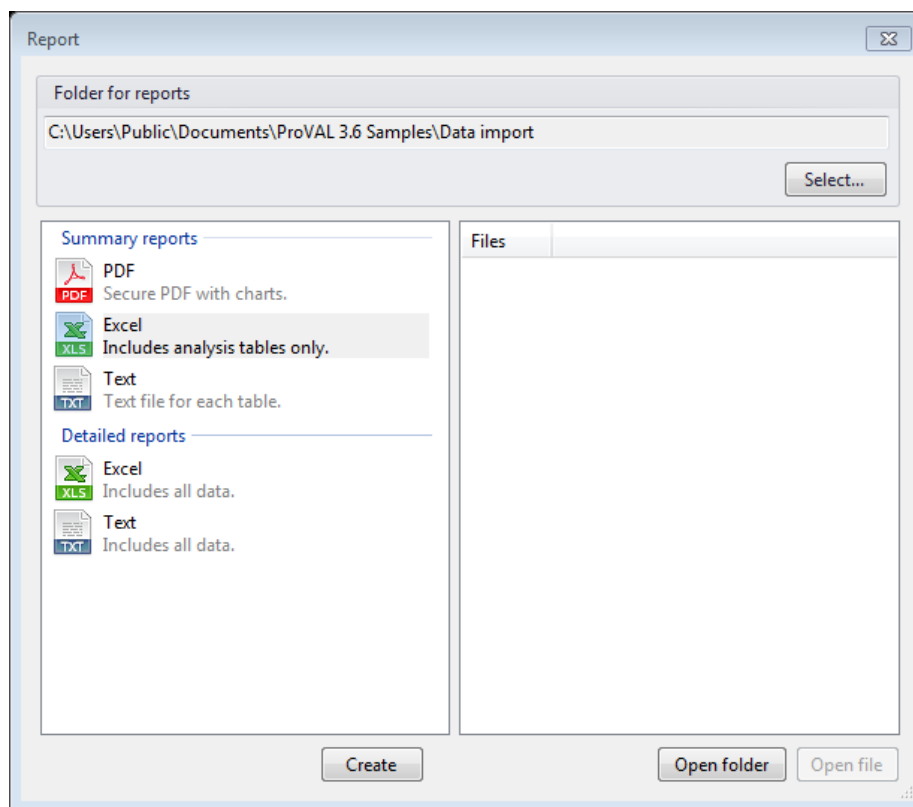


Notice below the Ride Quality table is Comparison. This will not change the IRI measurement but may help interpret the IRI data. Profilograph Simulation is an option that will show these IRI results and what it would look like on the more familiar profilograph readout. For the filter, choose Butterworth Low Pass.

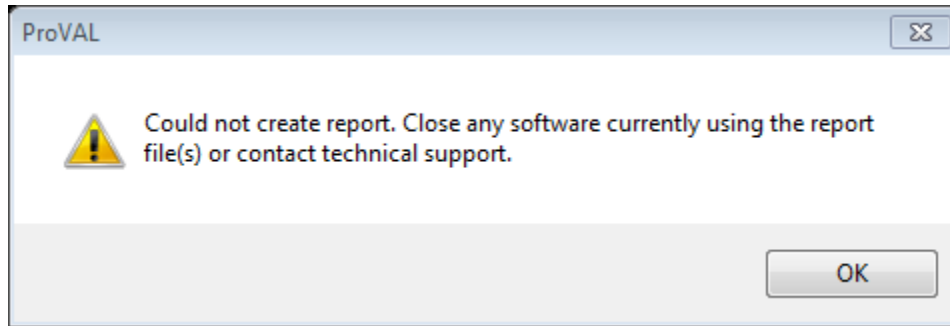
11) Now that the Short Continuous Analysis has been set to meet the specifications and any comparison graph selected as desired, check the file and select the Section from the dropdown as seen in the screenshot. Click the **Analyze** button in the top right.



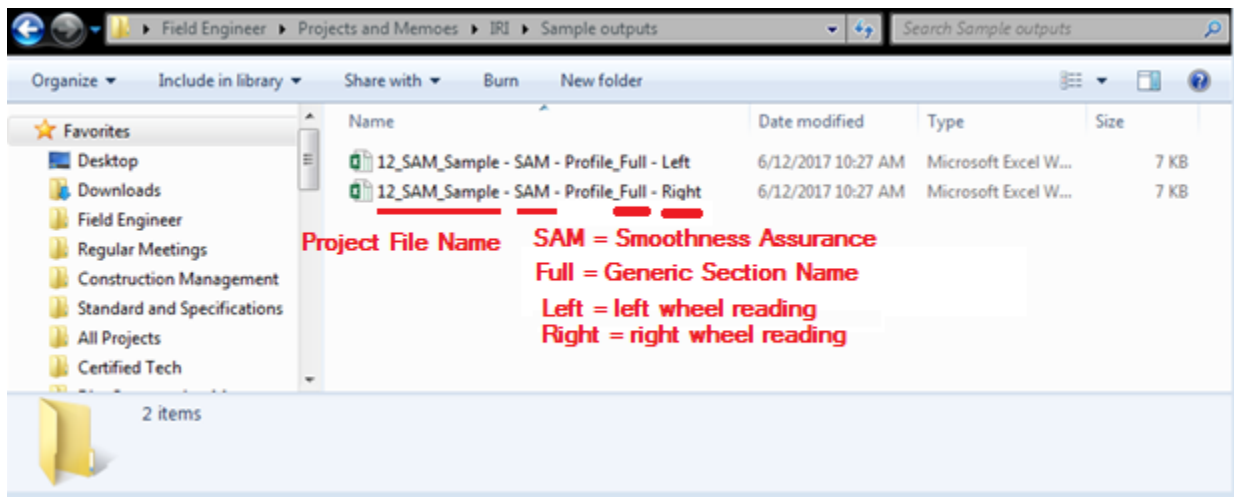
- 12) After that, select the **Report** button in the top right pane. You can click Select to browse folders for the destination of the report. Once a folder is selected, choose the Excel includes analysis tables only option on the left and click Create.



\*\*\*If you get this screen below, you may have a spreadsheet with the same exact name but by a different user. Either select a different folder or delete the old spreadsheets.  
\*\*\*



13) You are now ready to compute smoothness adjustments with the Excel Spreadsheet. Open the IRI Inertial Profiler Quality Adjustments spreadsheet wherever it is stored on your computer (email attachment or local folder). Open the two spreadsheets you created from ProVAL. Each spreadsheet should have the project file's name with one ending left profile and the other ending right profile. Below is a sample of how the file names are created and saved on your device.



14) Once you have both spreadsheets open, go to the 2<sup>nd</sup> worksheet tab labeled "Short Continuous Histogram". Copy the numbers in the Before Grinding (%) column.



- 16) Fill in all of the Section Data in the lines above such as start and end station, starting and ending width, all application rates (if HMA), and Unit price per pay items. Once all this information is entered, you will notice the highlighted cell for variable Qs will show the dollar amount for the quality adjustment. Make sure you begin stations 50 feet into paving and end station 50 feet prior to the end of paving.

Notice below the start station, end station, and width there is another cell for “Omitted Areas for Exceptions”. Click the “Enter Omitted Areas for Exceptions” button. If you had a bridge that was 200 feet plus 20’ of approaches on each side, you would enter the 240 feet for length. The 50 feet on each of end of the bridge is automatically added in the next column for total length.

Omitted Areas for Exceptions			
Type	Description (i.e. STR 3)	Length	Total
Bridge Approach	STR 3	240	340

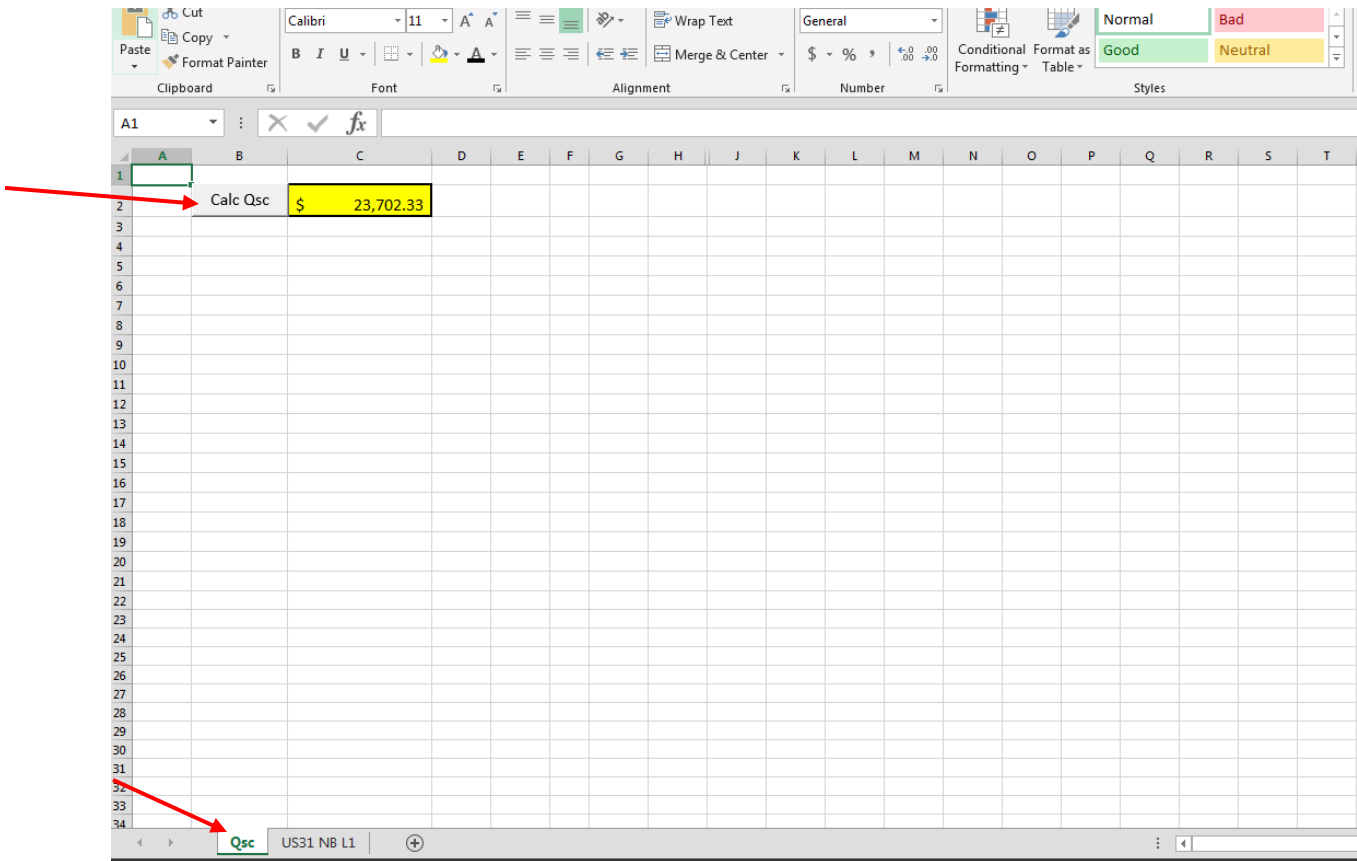
Go Back

\*Remember to start 50 feet after the beginning of paving limits and end 50 feet before the paving limits on your start and end station.\* You will notice those lengths are now in the “Omitted Areas for Exceptions” cell. This LFT will be deducted from the overall adjustment.

Clear Data	Section:	US 31 NB Lane 1				Qs:	\$ 23,702.33	New Section
	Start Station:	0+50	Surface Lay Rate:	165 lb/sys	Unit Price:	\$ 100.00		
	End Station:	199+50	Intermediate Lay Rate:	220 lb/sys	Unit Price:	\$ 90.00		
	Start Width:	12	Base Lay Rate:	330 lb/sys	Unit Price:	\$ 80.00		
	End Width:	12	Intermediate OG Lay Rate:	lb/sys	Unit Price:			
<b>Omitted Areas for Exceptions</b>		Base OG Lay Rate:		lb/sys	Unit Price:			
Total LFT of Exceptions within this section		Additional Mix Lay Rate:		lb/sys	Unit Price:			
		340						
Enter Omitted Areas for Exceptions	Max IRI	Min IRI	LW %	RW %	PF	J		
		85	6.705299854	7.877125	0.94	-0.004		
		85	1.017974854	1.884664	0.96	-0.001		
		80	1.115413308	2.88469	0.97	-0.001		
		75	1.756455421	3.661633	0.98	-0.001		
		70	1.635939479	5.73348	1	0.000		
		65	1.556450248	7.533527	1	0.000		
		60	1.474396944	9.089977	1	0.000		
		55	3.094951153	12.75161	1.02	0.002		
		50	5.271930218	15.46963	1.03	0.003		
		45	9.877176285	14.66704	1.04	0.005		
		40	14.54396439	11.48235	1.06	0.008		
		35	21.09028625	5.161671	1.06	0.008		
		30	19.282547	1.602605	1.06	0.006		
		25	9.507936478	0.200005	1.06	0.003		
		20	1.97440958	0	1.06	0.001		
		15	0.094874233	0	1.06	0.000		
		10	0	0	1.06	0.000		
		5	0	0	1.06	0.000		
Bonus/Penalty						3%		
Qsc		US31 NB L1						

When the next Section has been measured for IRI, simply click the **New Section** button right next to the Qs cell. This will copy this worksheet to the end of the worksheet tabs and maintain the information at top but clear the IRI left and right wheel % in the table.

17) Once all Sections are completed and any areas were omitted, return to the first worksheet tab called "Qsc". Simply press the **Calc Qsc** button to get the final quality adjustment for smoothness.



## Example 1

US 50 Contract Information (HMA)

**Typicals (Stations correspond to distances on ProVAL)**

EB 60+00 – 200+00

Surface - 165 lb/sys @ \$100 T

Intermediate - 220 lb/sys @ \$90 T

Base - 330 lb/sys @ \$80 T

EB 200+00 – 540+00

Surface - 165 lb/sys @ \$100 T

WB 15+00 – 500+00

Surface - 165 lb/sys @ \$100 T

Intermediate - 275 lb/sys @ \$95 T

Base - 440 lb/sys @ \$85 T

Exceptions

STR 5 (Bridge) = 190' long with 30' approaches Start Sta. (Dist) – EB 70+50

STR 6 (Bridge) = 508' long with 25' approaches Start Sta. (Dist) – EB 400+50

STR 7 (Bridge) = 305' long with 20' approaches Start Sta. (Dist) – WB 350+00

STR 300 (Inlet) = 3' long Start Sta. (Dist) – WB 100+00

**Answer: \$118,579.81**



## **Example 2**

US 41 Contract Information (PCCP)

### **Typicals**

NB 35+00 – 610+00

12' width @ \$100.00/SYS

SB 10+00 – 580+00

12' width @ \$100.00/SYS

### **Exceptions**

STR 1 (Bridge) 1,061' long with 25' approaches Start Sta. (Dist) – Begins @ NB 170+50

STR 2 (Bridge) 505' long with 25' approaches Start Sta. (Dist) – Begins @ SB 356+00

**Answer: \$259,053.02**