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Definitions for the SSI CS8600 Ultra-Light Profiler

Event

Point events, also known as notes, are items or features at specific locations that the user wants to store and identify within the data. Events can also be used to identify spots of the sidewalk that do not meet specifications through height or width requirements.

Pause

A pause is a section of the profile that can be excluded from the report or specifically viewed to determine its sidewalk characteristics. Pause is also referred to as Exclude/Resume. Pauses may include crosswalks, driveways, sections without sidewalks, curb ramps, and bus stops which are related to the profile.

Collection

When a data collection begins, the profiler will collect the profile of the sidewalk. Once the profile collection is started, events can be entered in the form of point events or segment pauses.

CS8600 Profiler Hardware

Computer

Toughbook CF-20 (or similar) contains all software and user interface necessary to collect data.

Power Switch

To supply power to the CS8600 electronics, turn the switch located near the Segway's key to the On position.

Camera

USB interfaced camera connects to the computer for logging images at user specified intervals.

Laser

The laser is mounted between the rear and front wheels of the Segway and is connected to both the embedded electronics and computer (ethernet cable). Ensure there are no obstructions between the laser and the ground. When powered on and connected to the electronics the "POWER" and "LASER" LEDs will illuminate though the "RANGE" LED and beam on the ground will only be visible when collecting data.

Battery

The CS8600 electronics battery is housed in the glove compartment of the Segway and is separate from the Segway's main battery.

Battery Meter

The battery meter indicates the amount of power left in the battery and that power is being supplied to the electronics.

Charger

To charge the battery, mate the charging plug to its receptacle. The LED on the charger will turn red when there is a load on the circuit due to charging. The LED will become green when charging is complete. In some cases, the charger may need to be plugged into to 120v AC before connecting to the profiler. Note: Electronics Battery and Segway Battery need charged separately.

DMI

Distance Measuring Instrument (DMI) is located between the rear wheel and axle of the Segway and is comprised of an optical encoder and a pulley system.

Electronics

Grey box housed in the Segway's glove compartment interfaces all external components and hosts data acquisition.

Tires and Pressure

The Segway Se-3 platform is equipped with one front and two back wheels. Tires should be inflated to 10-15 psi.

Connecting to Hardware

Connecting Device

Connection of the CS8600 system is through the USB and Ethernet ports located on the supplied Toughbook computer. Once connected, open the Profiler V3 software and click the "Collect" button. The software should display "Profiling System Hardware Connected" in the bottom right corner.

Power On

The device is powered on when the battery meter light is on or the switch indicates power is on. If the meter light is off, check the power switch or charge the battery. Always power on the device before selecting "Collect" in the Profiler V3 program.

Opening Profiler V3

To open the SSI Profiler V3 program select the SSI Profiler V3 icon on the desktop or select the same icon by navigating to the folder: C:\Program Files\SSI Profiler 3\SSI.Surface.Roads.Profiler.App

Collect Window

With power on, navigate to the Collect window by clicking "Collect" in the left task pane. Once in the Collect window, the software will attempt to connect to hardware.

Hardware Connected

When the device is turned on, properly connected to the operator computer, and Profiler V3 is running in the “Collect” window, the software should indicate “Profiling System Hardware Connected”. If hardware is not found and these requirements are fulfilled, check the connections and device system power. If the device was powered on after the collect window was entered, close the program and reopen it with the profiler powered on. If problem persists, contact SSI Customer Support for assistance.

Troubleshooting

If the system displays an error asking to reconnect the hardware, shut down the SSI Profiler V3 program and reopen SSI Profiler V3 keeping power to the profiler on. If this does not solve the problem, power down the device and close the SSI Profiler V3 program. After 10 seconds, power on the device and reopen SSI Profiler V3.

Calibration Procedures

INS Alignment

INS Alignment must be performed each time the system is booted.

For the CS8600 to collect accurate slope and position data, the GNSS/INS system component must be aligned. After the device is powered on and connected in Profiler V3 software, the INS alignment process will begin automatically. To aid in alignment, ensure a clear view of sky (minimal trees and buildings nearby), introduce dynamics such as wide “figure 8s” and occasional stops (normal driving will align INS eventually). The INS Information status window will progress from INS_INACTIVE to INS_HIGH_VARIANCE to INS SOLUTION_GOOD through the alignment process.

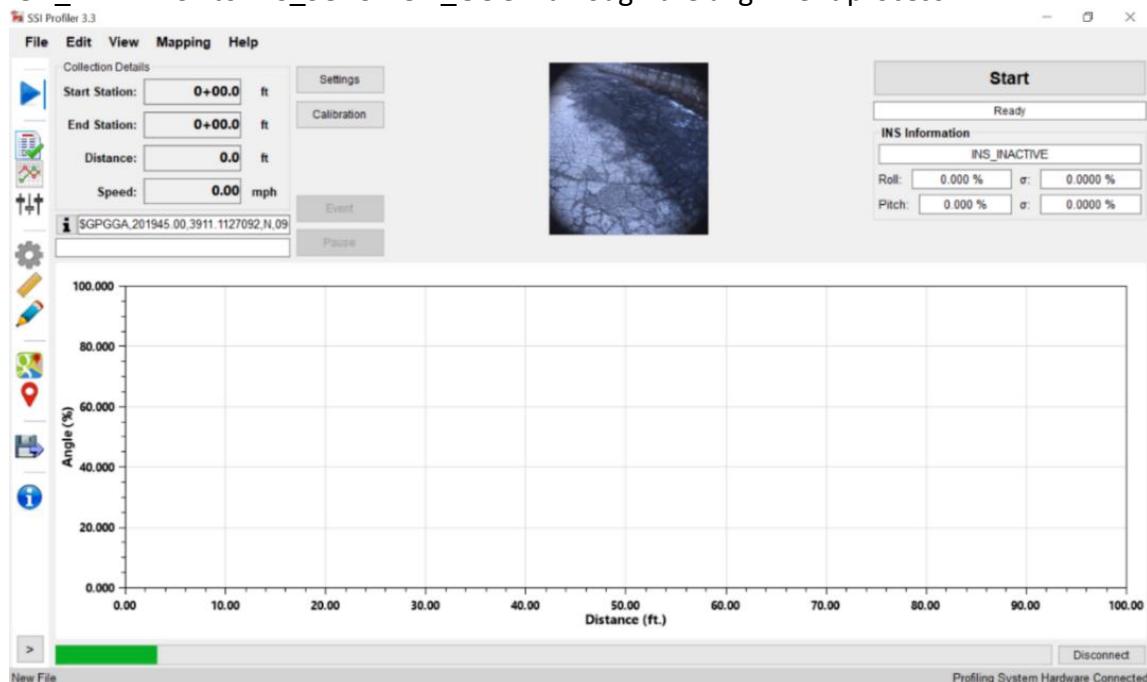


Figure 1. GPS only, INS_INACTIVE

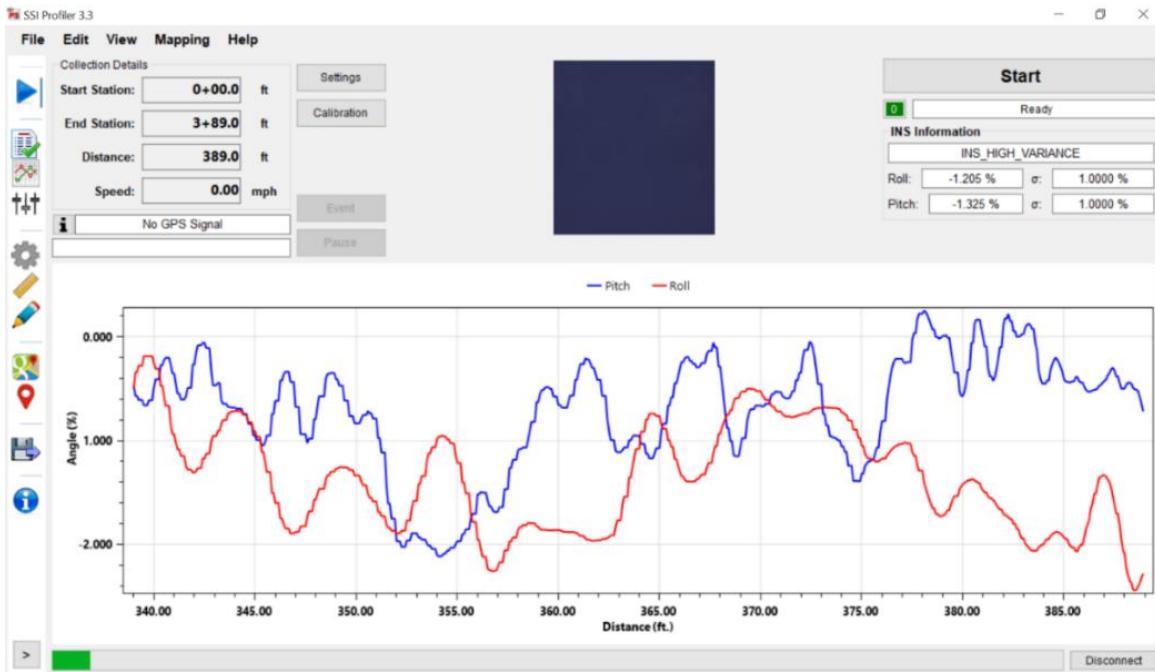


Figure 2. INS_HIGH_VARIANCE

INS_HIGH_VARIANCE status indicates the GNSS/INS component is still in its alignment process. Continue driving to complete alignment.

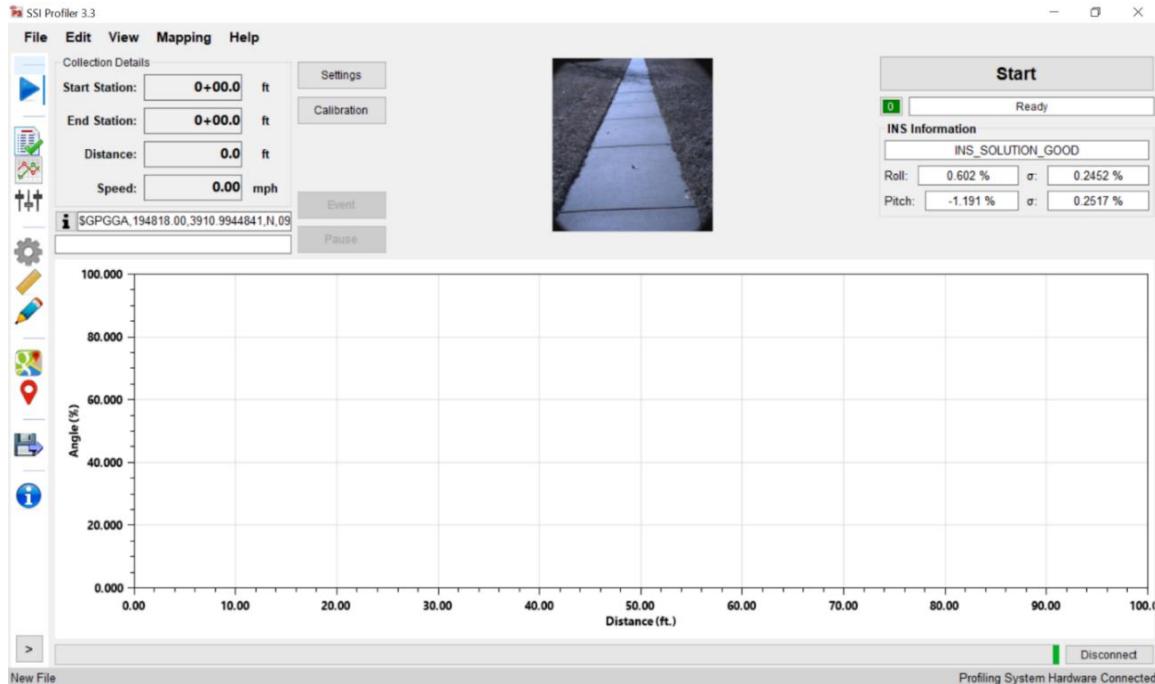


Figure 3. INS_SOLUTION_GOOD. Ready to collect.

INS_SOLUTION_GOOD indicates the GNSS/INS component has completed alignment and is ready for data collection.

Calibrations

When connected to hardware, the Calibration button will activate. Select the “Calibration” button. See Figure 4 below.

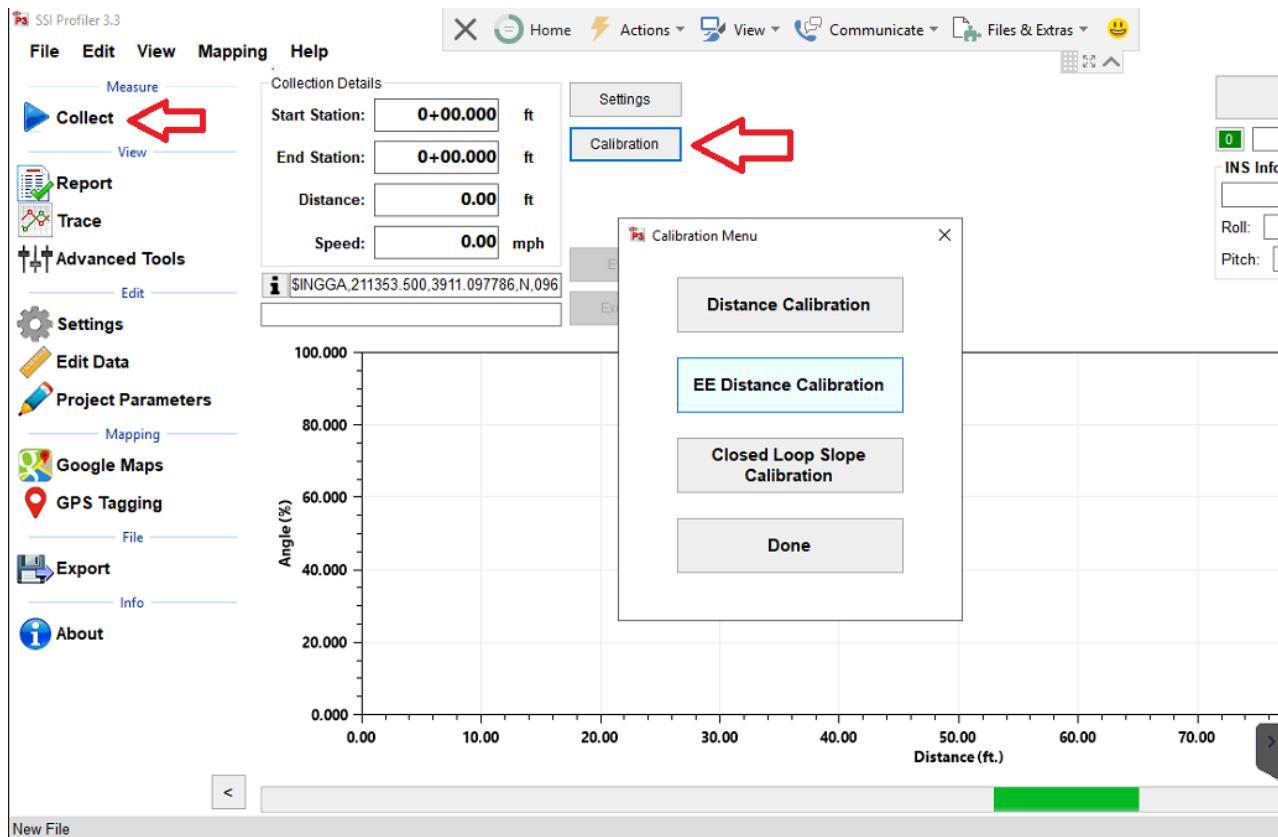


Figure 4. Press the Calibration button on the upper middle part of the collection screen

Distance Calibration

Distance Calibration needs to be performed when tire pressure/size has changed. This can occur due to temperature changes, wear, and leaks. The Distance Calibration information is saved to the computer and does not need to be performed every time the system is booted.

Calibrate the distance readings of the device by measuring out 528 ft (160 meters) with a rolling wheel measuring device or steel tape. Clearly mark start and end points. The calibration track should be as straight and level as possible. Once the test track is prepared, start the calibration procedures through the Calibrate icon in the Collect window. Select Distance Calibration and follow the steps precisely to complete a successful calibration.

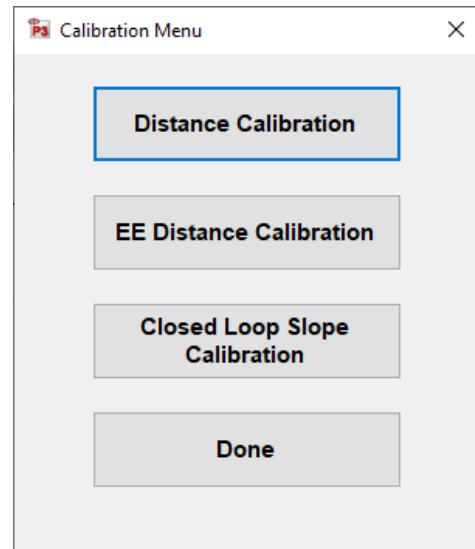


Figure 5: Close up of the calibration menu which appears after the “Calibrate” icon is selected.

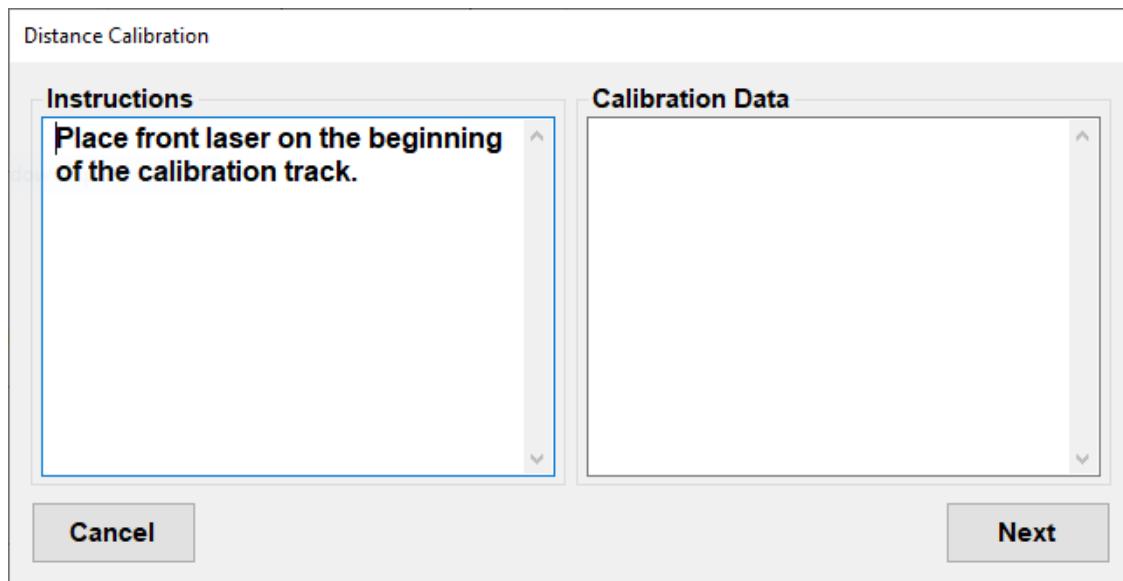


Figure 6. Initial window of the Distance Calibration

Align laser or reference point with the starting point. The laser is located 1.5ft from the rear wheel axle. Click next and proceed to end point. **Because the laser is not visible from operator position, rear wheels can also be used as reference point for distance calibration.**

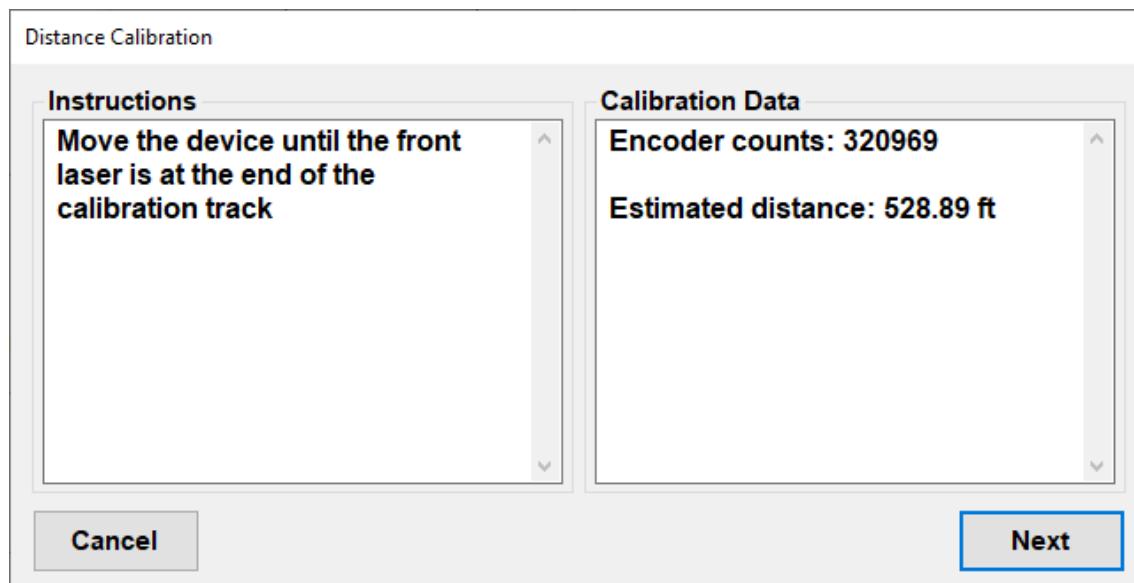


Figure 7. Instructions during Distance Calibration

When the device reaches the end of the calibration section, align reference point (rear wheel) with measured end point and press next.

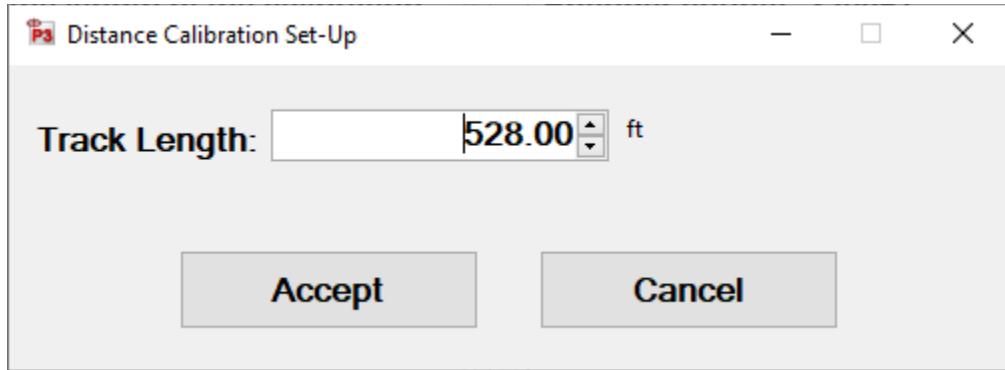


Figure 8. User inputted track length

Enter distance wheel or steel tape measured track length.

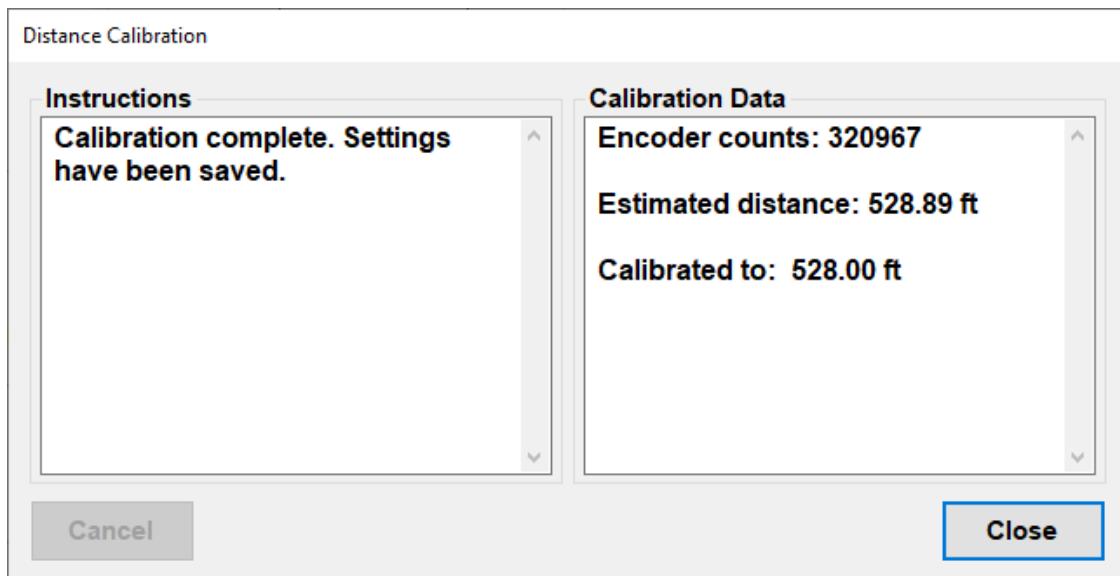


Figure 9. Window showing the distance calibration summary

Displayed are the number of encoder counts, the length of the track that was entered in the previous window and the estimated distance traveled based on the last calibration.

If the estimated distance is significantly different than the "Calibrated to" distance, it could be that the system has never been calibrated, the last calibration was performed improperly, or tire pressure has changed significantly. It is normal for the estimated distance to be off because of lack of use, changes in hardware or change in atmospheric conditions.

If multiple distance calibrations reveal >2% inconsistencies, there could be a problem with the system's hardware. In this case please contact SSI Customer Support.

Electric Eye Distance Calibration

If the device is equipped with a photoelectric cell (electric eye, EE), an EE Distance Calibration may be performed. This is similar to the Distance Calibration, but the start and end points of the calibration surface may be triggered using the electric eye and reflective tape (DOT-C2), allowing the user to travel a consistent speed throughout the surface. To perform, click “EE Distance Calibration” in the Calibration Menu.

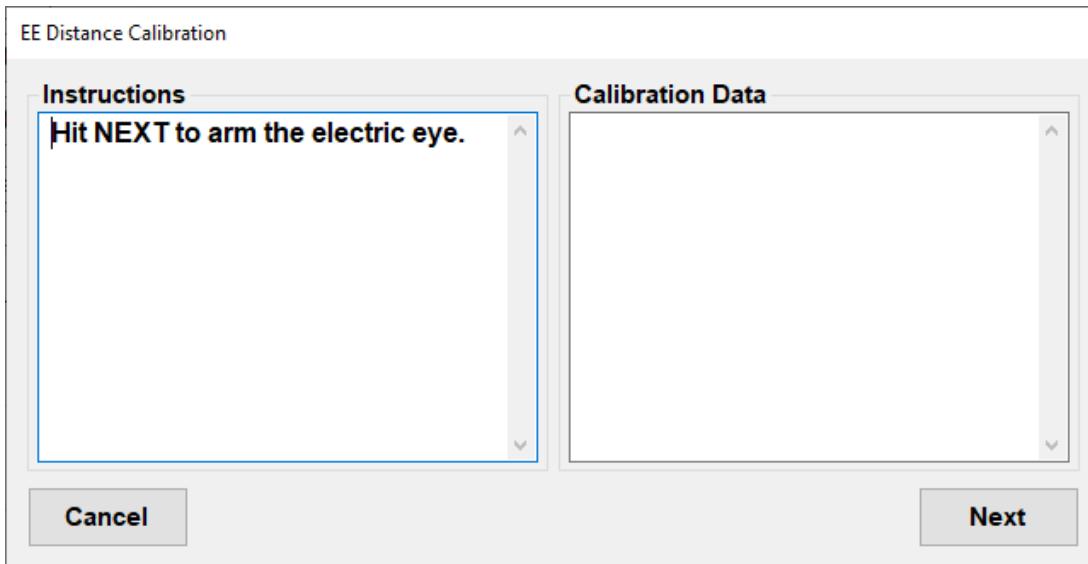


Figure 10. Click Next to begin EE Distance Calibration

Align device to traverse calibration surface and click the Next button to arm the electric eye.

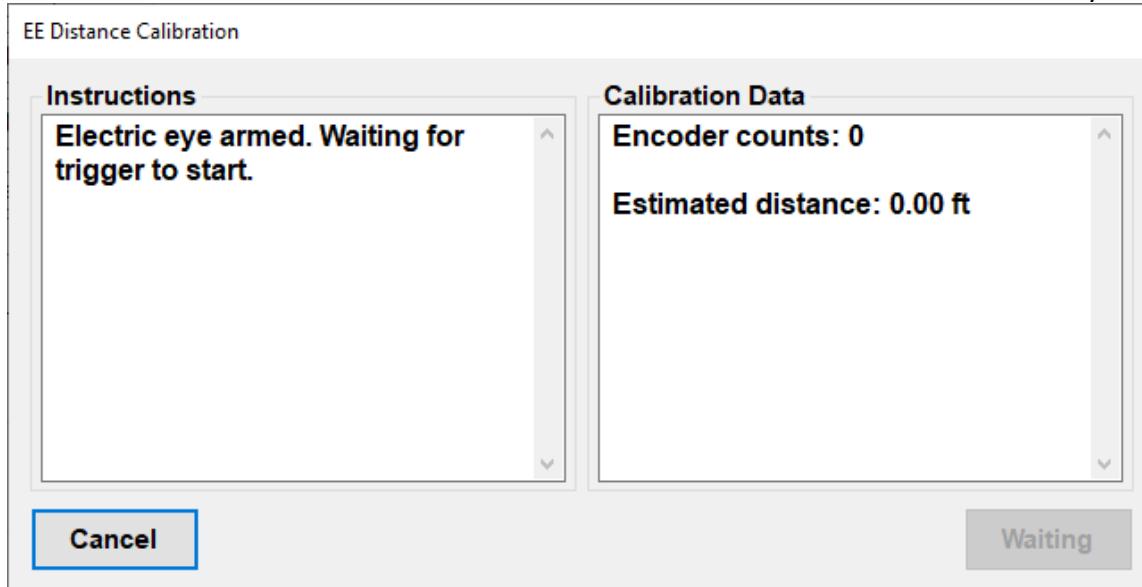


Figure 11. Electric Eye waiting for start trigger

After the electric eye is armed, proceed toward first reflective strip.

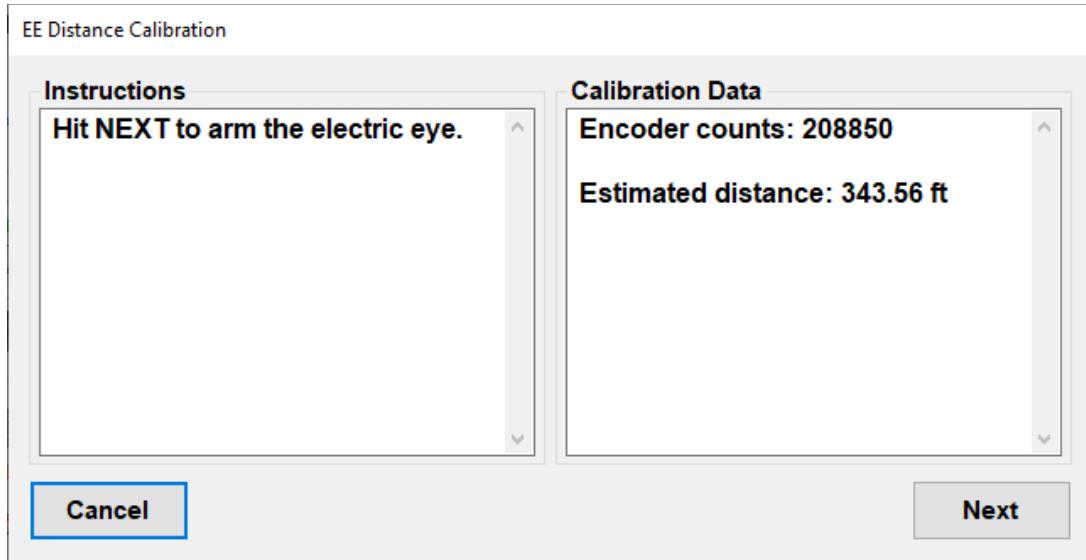


Figure 12. Display while traversing the calibration surface

Continue travelling through the calibration surface. Click next to arm the electric eye for the end reflective tape.

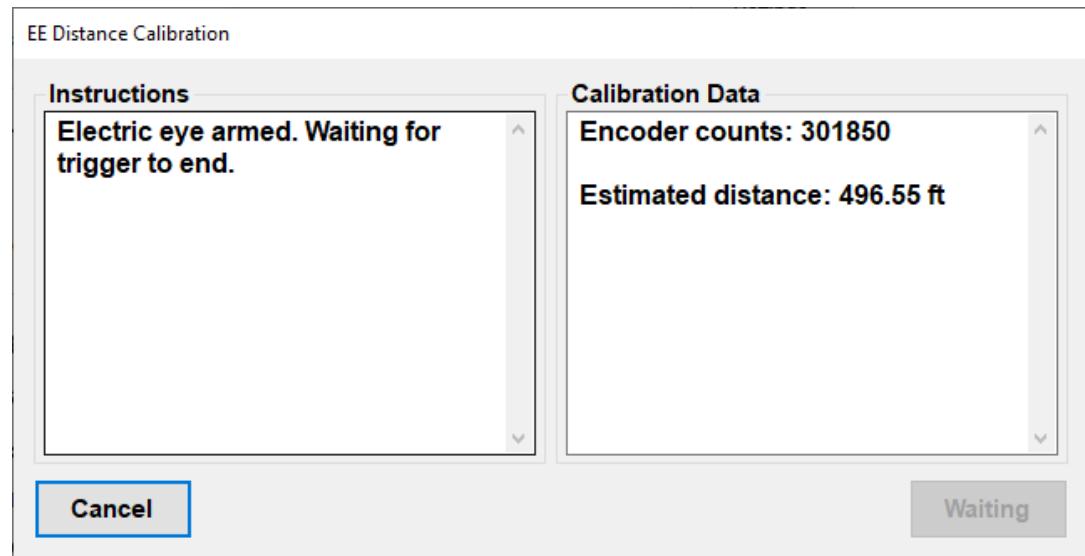


Figure 13. Electric Eye waiting for end trigger

Electric eye awaiting end trigger from reflective tape. Proceed through the end of the calibration surface.

Input calibration distance and view calibration summary per the “Distance Calibration” section.

If electric eye does not trigger at start or end reflective tape, visually inspect sensor and reflective tape for debris and alignment.

Closed Loop Slope Calibration

Closed Loop Slope Calibration information is saved to the computer and does not need performed on every bootup. This calibration needs performed when tire pressures have significantly changed or when hardware has changed or been replaced. Distance calibration must be performed prior to the closed loop calibration.

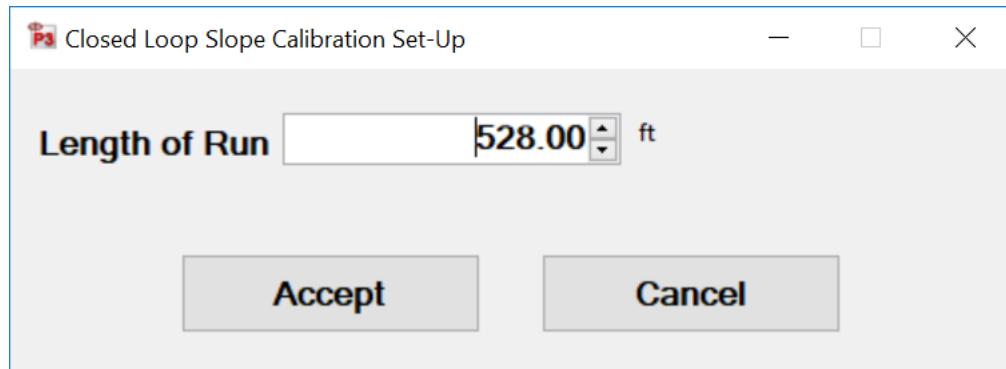


Figure 14. Distance input after pressing the Closed Loop Slope Calibration button

Calibrations should be performed on a relatively uniform surface. The distance of the track should be 528 ft. Shorter distances can be used if under physical constraints. Use the center front wheel to go over the calibration track. Closed Loop Calibration procedure is similar to the EE Distance Calibration, but traversing the surface in both directions.

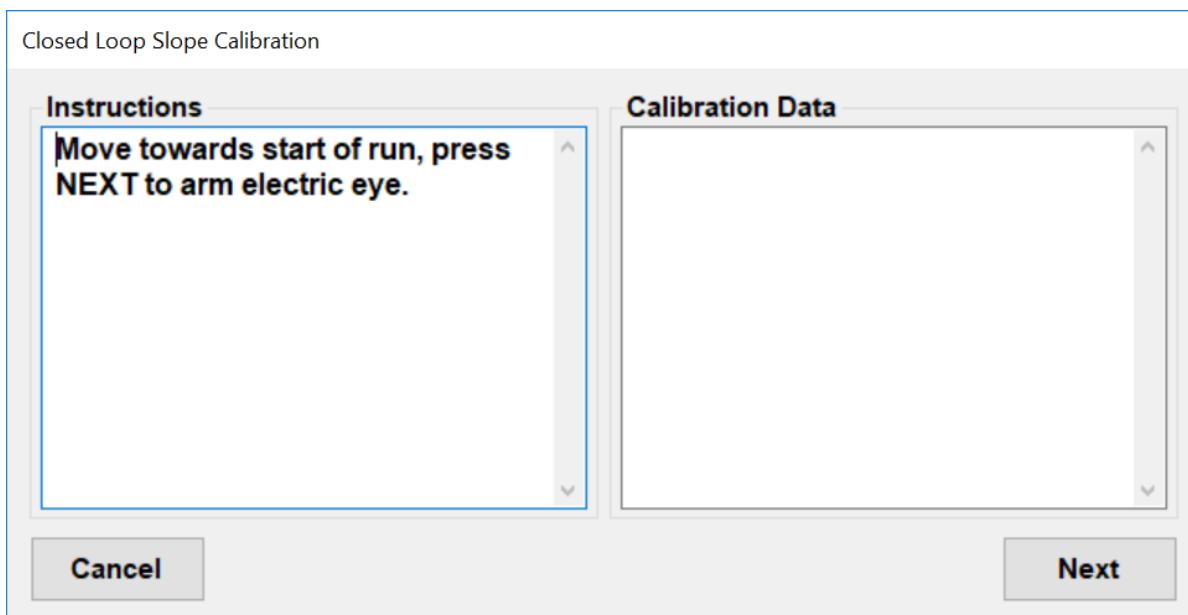


Figure 15. Move Segway to the start of the surface before the reflective tape

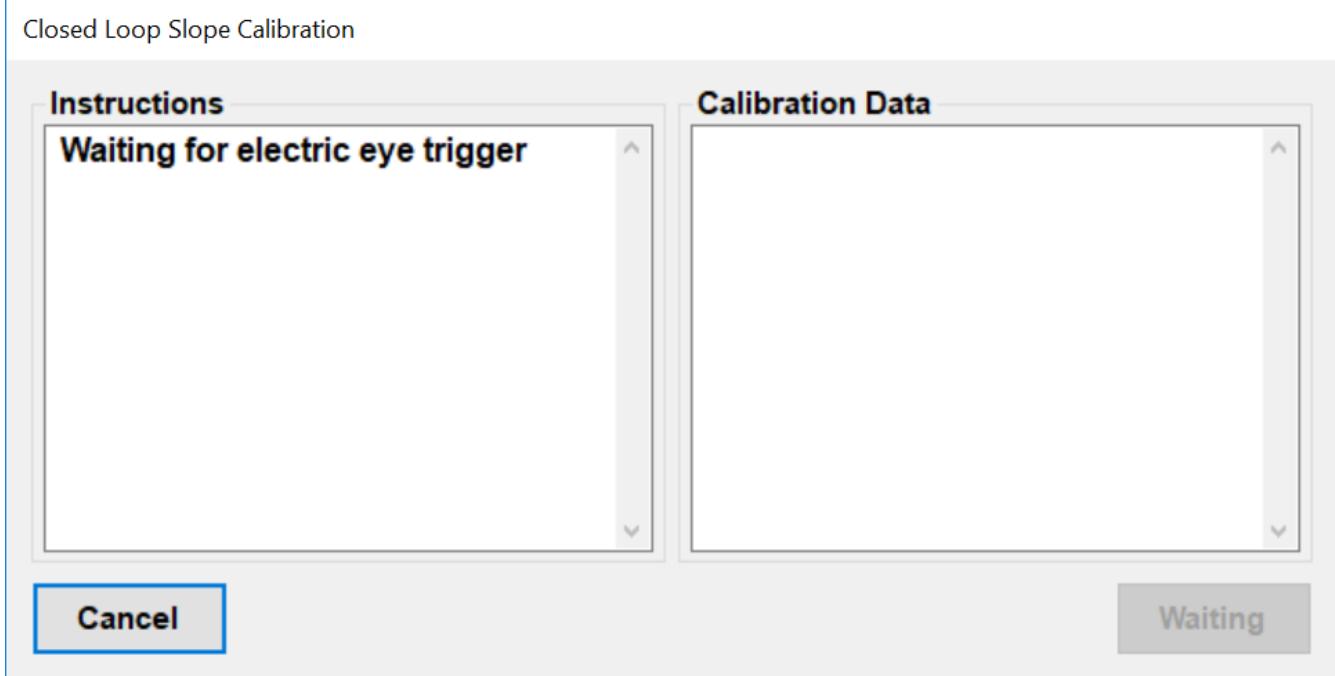


Figure 16. Waiting for the electric eye trigger to start calibration

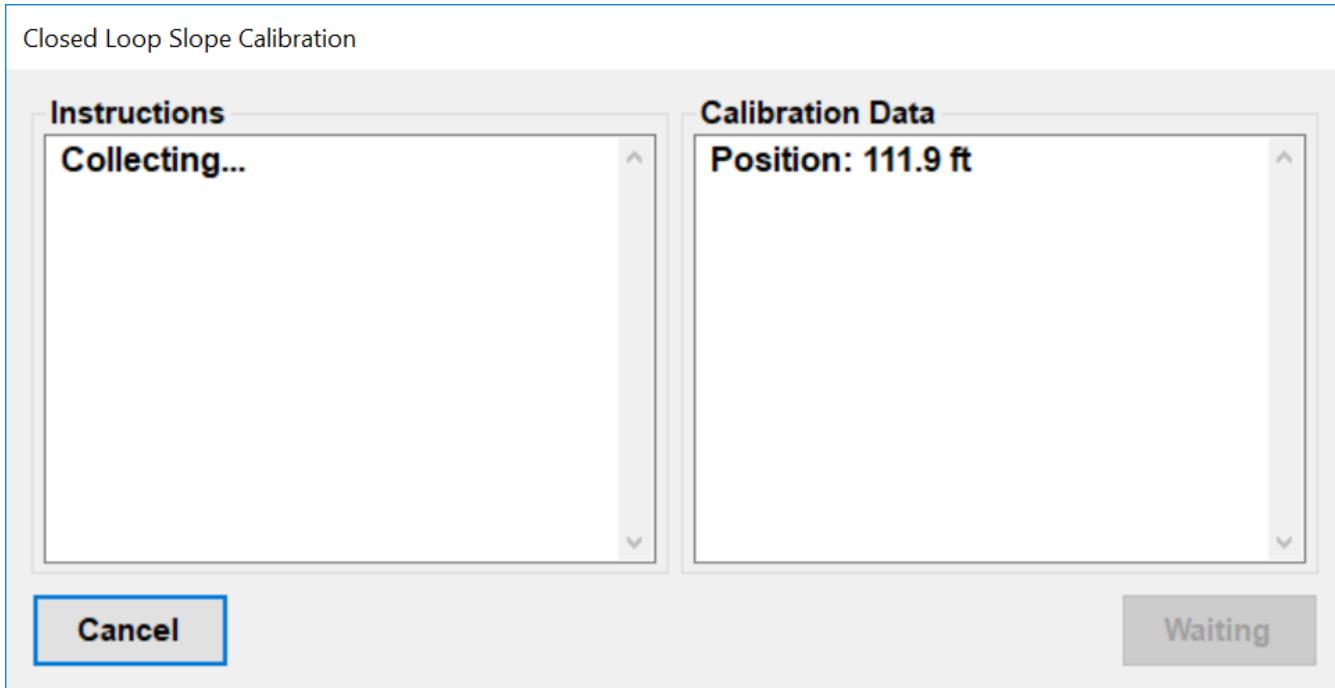


Figure 17. System collecting during the calibration

Closed Loop Slope Calibration

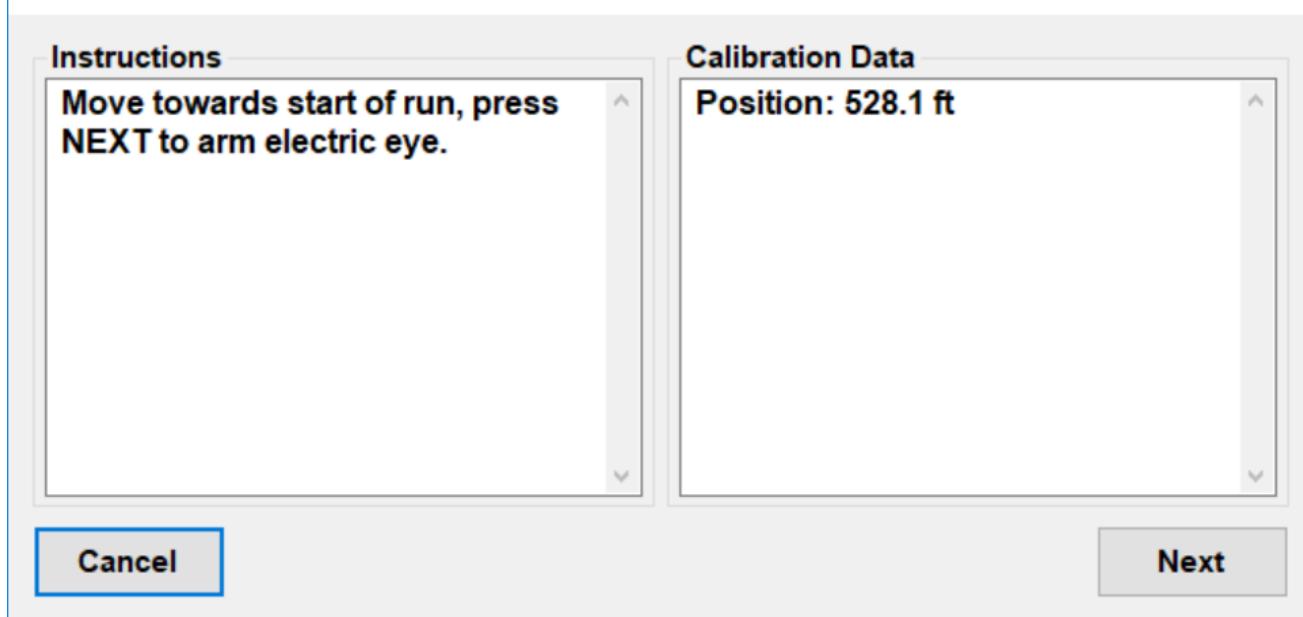


Figure 18. End of the first part of the closed loop calibration

Once the end of the track has been reached, the system is to be turned around to collect the same track in the opposite direction. Make sure center wheel goes over the same track as the first pass.

Closed Loop Slope Calibration

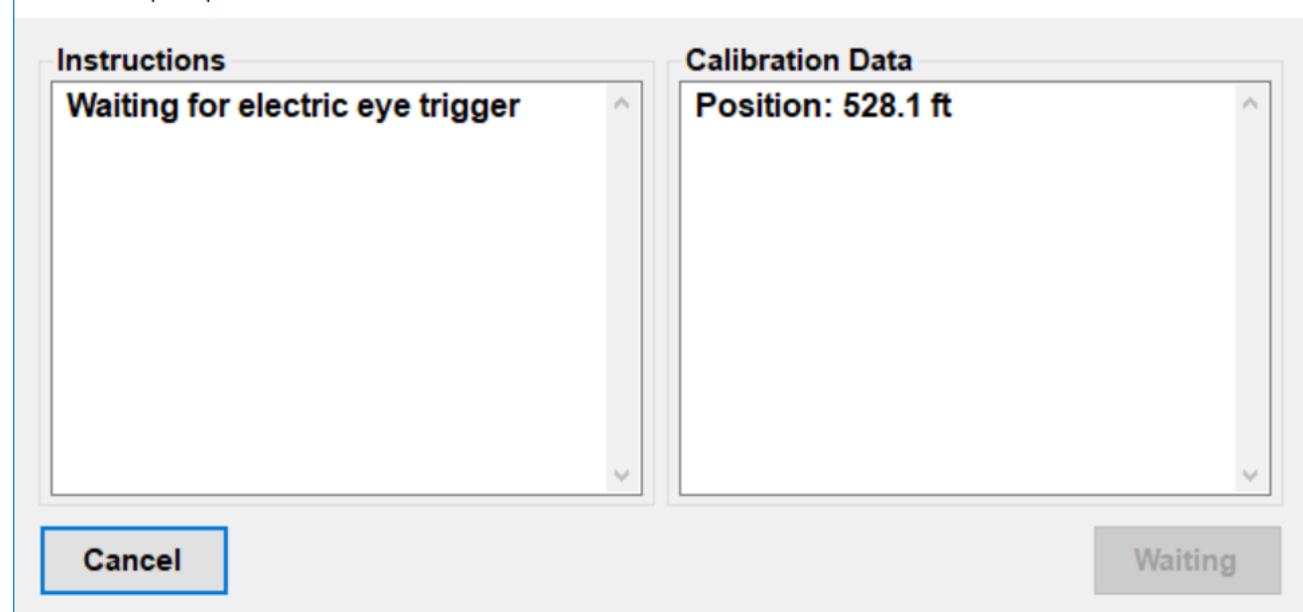


Figure 19. Waiting for EE trigger right before end of calibration

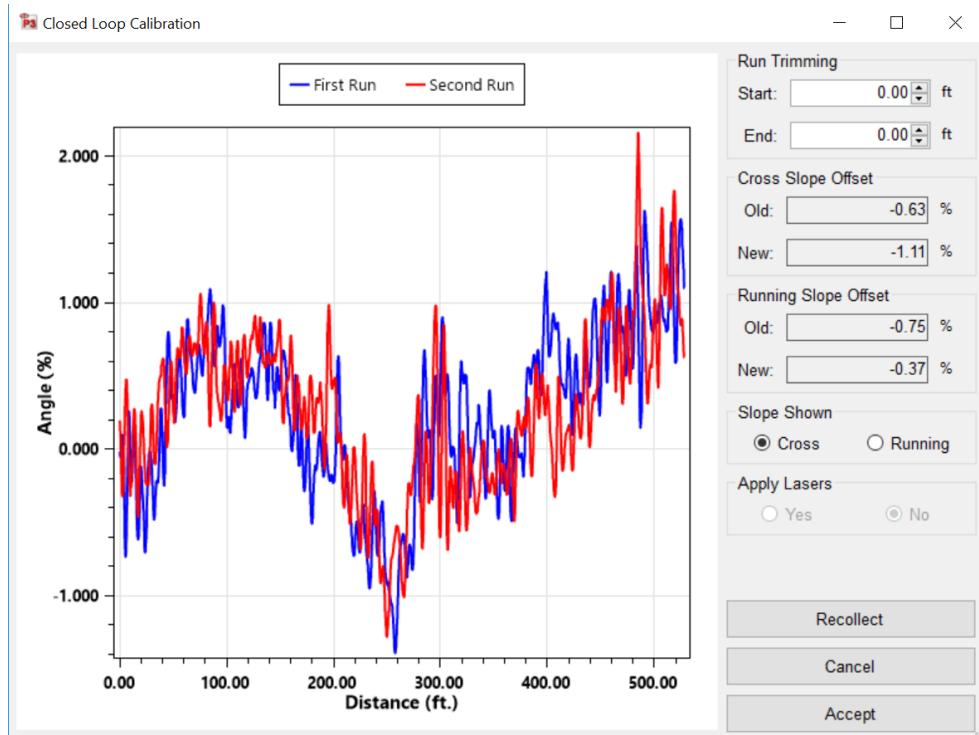


Figure 20. Cross Slope data shown at the end of the closed loop calibration

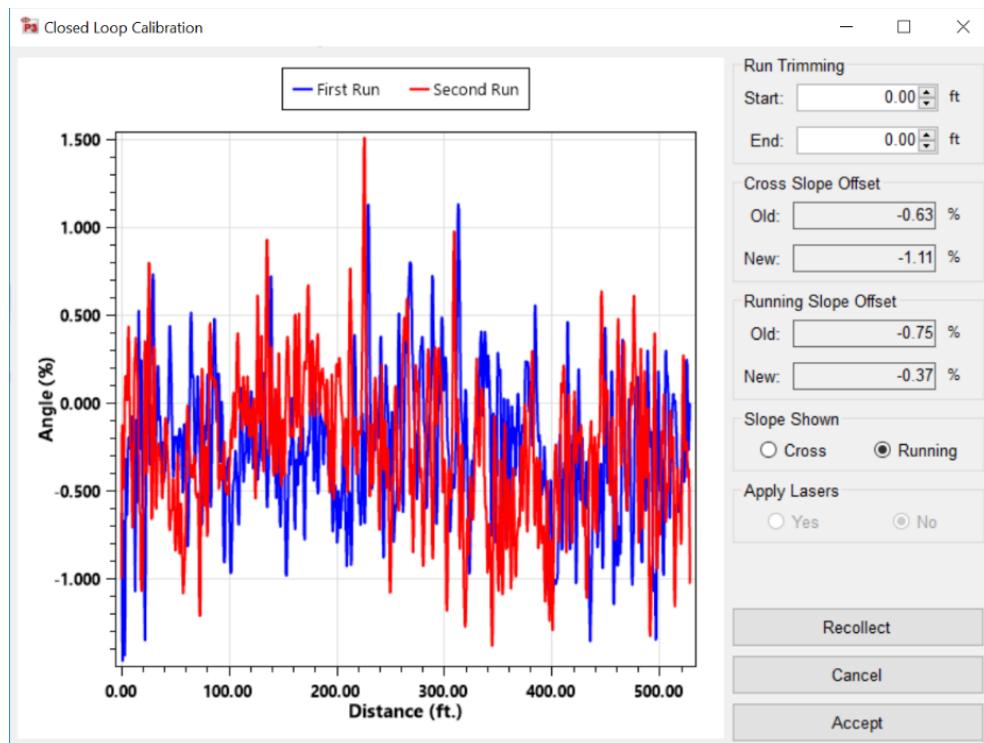


Figure 21. Running Slope data at the end of the closed loop calibration

After completing the second pass, the Closed Loop Calibration summary window will display. Run Trimming can be used to cut poor quality data off the ends of the calibration surface. This is used when the beginning and end of the calibration track are tracked imperfectly or the lead in/run out surface is challenging. Cross Slope Offset and Running Slope Offset display “Old” and “New” offset values. Offsets correct for mounting imperfections. Slope Shown changes whether “Cross” or “Running” slope data is displayed in the plot. To save the “New” offset values, click “Accept”. “Recollect” starts the Closed Loop Slope Calibration over and “Cancel” exits the window without saving “New” offset values.

System Settings

System Settings will be saved to the computer and typically only need configured once.

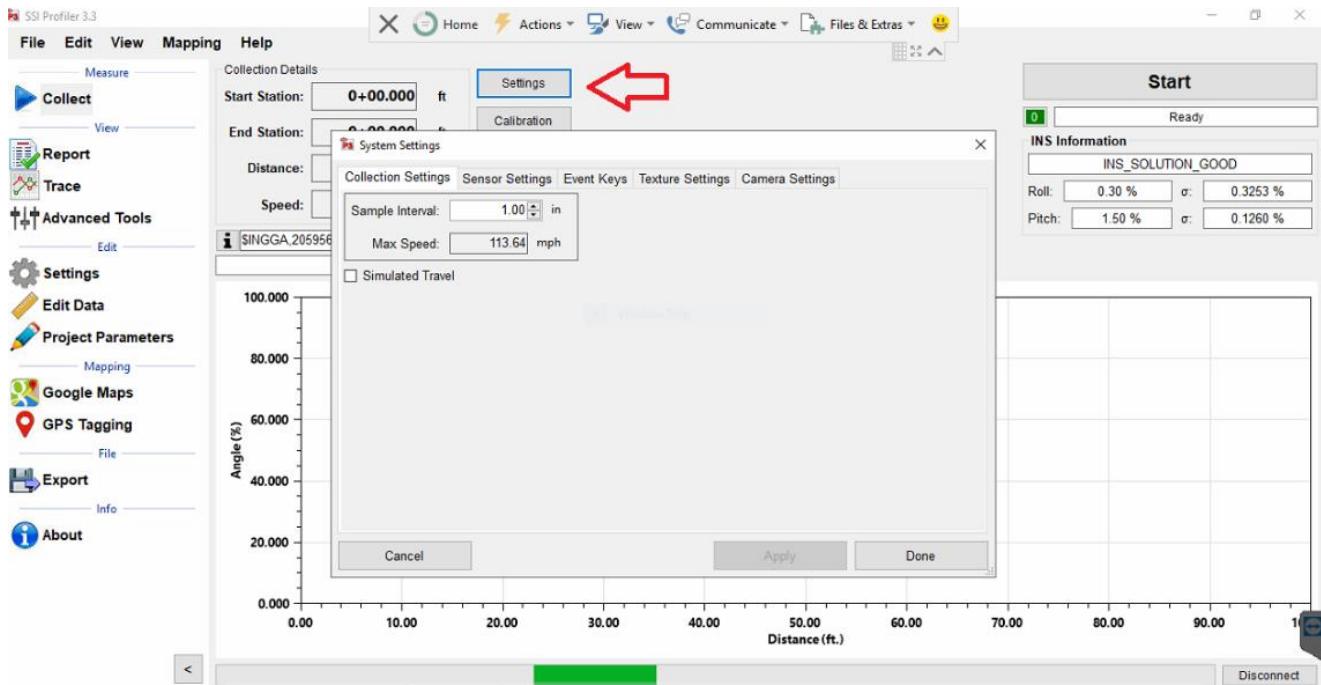


Figure 22. After pressing the Settings button on the collection window.

Collection Settings tab

Sample interval is default 1 inch for class 1 profilers and similar equipment. Change only when specifically needed. The max speed of the Segway SE-3 is 15 mph. Limit any jumping/bouncing of the Segway for best data. Some surfaces will cause the Segway to bounce even at low speeds (<7mph). Avoid these dynamics to preserve data integrity.

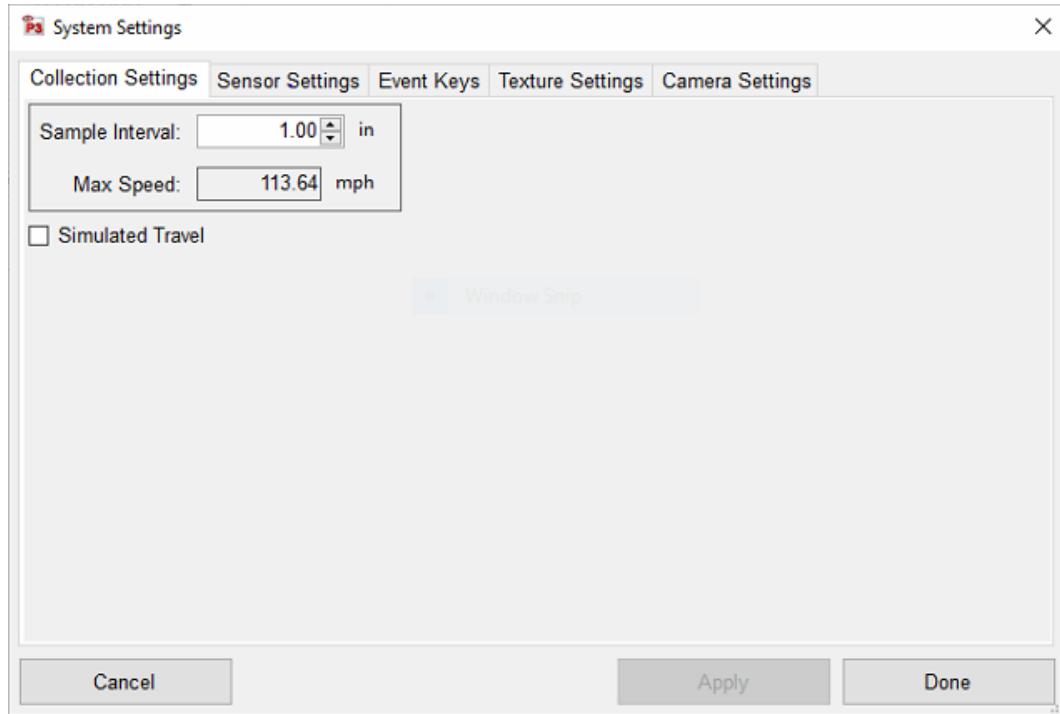


Figure 23. Collection Settings window.

Sensor Settings Tab

The CS8600's IMU uses the following coordinates system: X positive is forward (direction of travel), Y positive is right and Z positive is down. Offsets are measured from the IMU (embedded in electronics module; "grey box") to the antenna.

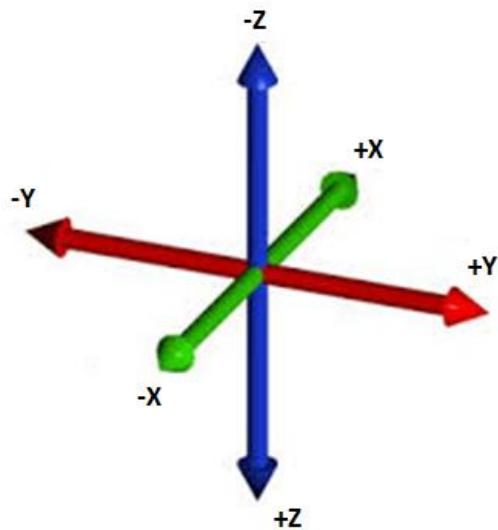


Figure 24. Coordinate system for the CS8600 IMU

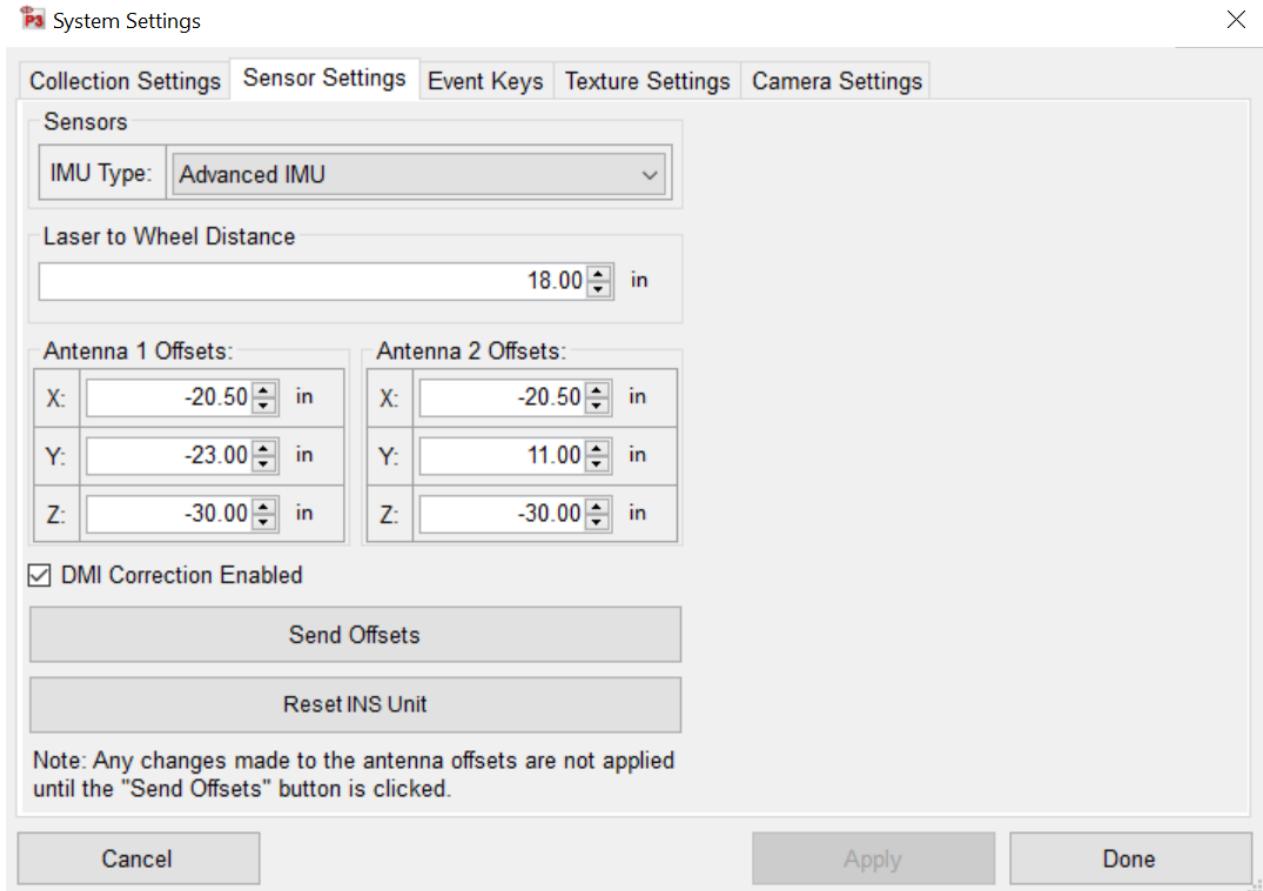


Figure 25. Sensor Settings tab

Event Keys Tab

The event keys tab allows the user to choose any key on the keyboard (letters and numbers only) as a button to a specific event. Events are singular data points. Exclude/Resume (Pause) will have a beginning and end. Buffers can be set for specific events. The buffer length will be added to the distance of the event or pause associated with it.

Event Keys						
Add		Delete		Edit Buffer		
Event buffers are only applied to events, pauses, EE events, and EE pauses.						
Enabled	Key	Function	Function Type	Buffer Enabled	Front Buffer	Rear Buffer
<input checked="" type="checkbox"/>	D	Exclude/Resume	Driveway	<input type="checkbox"/>	0.00 ft	0.00 ft
<input checked="" type="checkbox"/>	B	Event	Branch	<input type="checkbox"/>	0.00 ft	0.00 ft
<input checked="" type="checkbox"/>	M	Event	Manhole	<input type="checkbox"/>	0.00 ft	0.00 ft

Figure 26. Event Keys tab

Texture Settings Tab

The Enable Level Change Detection checkbox must be selected, and is by default, to collect level change data. If Data Recorder doesn't connect at the beginning of a collection, press the "Reset Data Recorder" button. Connecting to the laser may take up to 60 seconds.

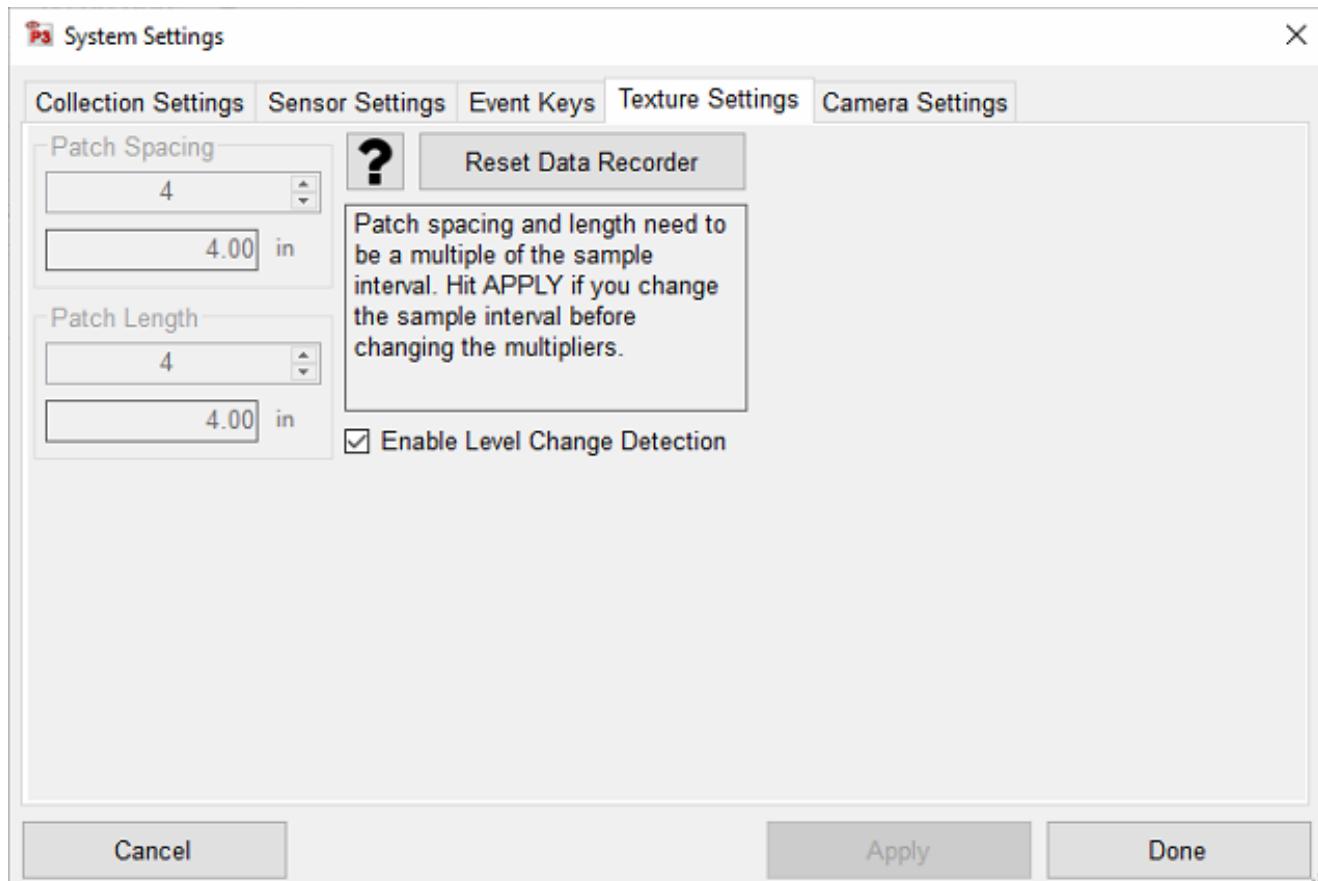


Figure 27. Texture Settings tab with the Reset Data Recorder button

Camera Settings Tab

Ensure the "Enable Camera" box is checked to use camera. The serial number needed can be found on the camera's label. "Camera Interval" is the interval in which images will be stored to the collection file. "Image Offset" is the distance the image will be offset back relative to forward travel direction. "Capture on Note" (Event) and "Capture on Pause" (Exclude/Resume) captures an additional image when events and pauses are selected during collection. The camera's image can be rotated 90 degrees in any direction to allow for various mounting configurations in "Rotate Image By:" (0,90,180,270 degrees). "Image Quality" allows the user to adjust image resolution and associated file size. Select "High" for optimal quality.

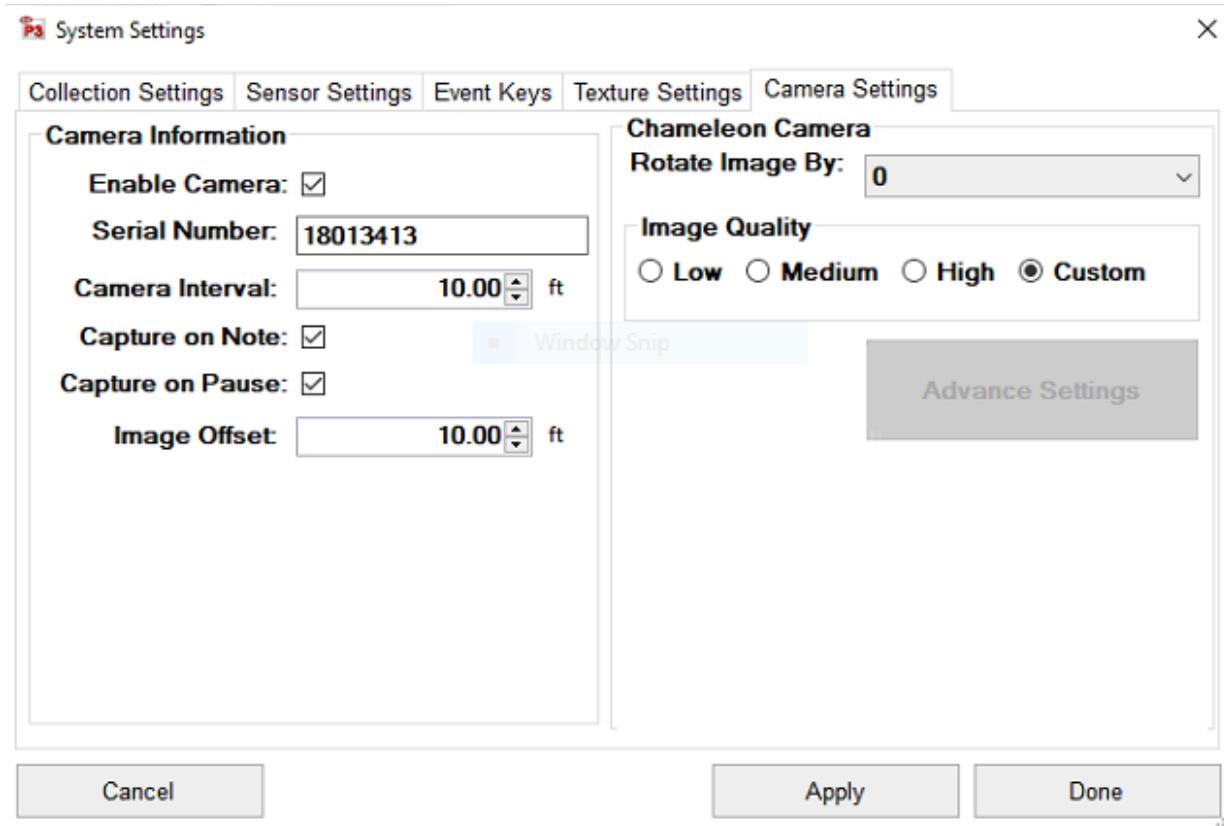


Figure 28. Camera Settings tab

Pre-collection

Data Recorder

If Data recorder does not connect, go to System Setting>Texture and press the Reset Data Recorder button. See Figure 27.

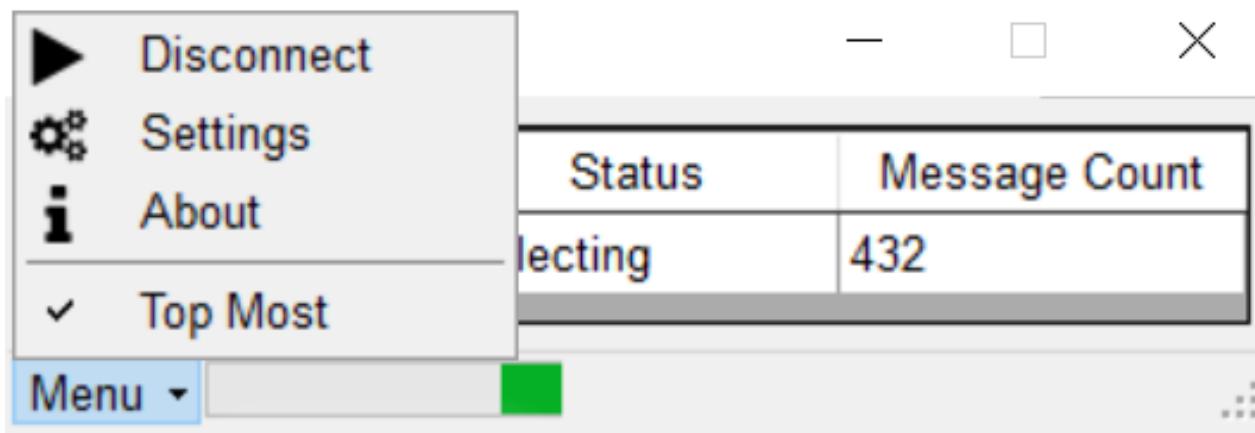


Figure 29. Data Recorder Menu

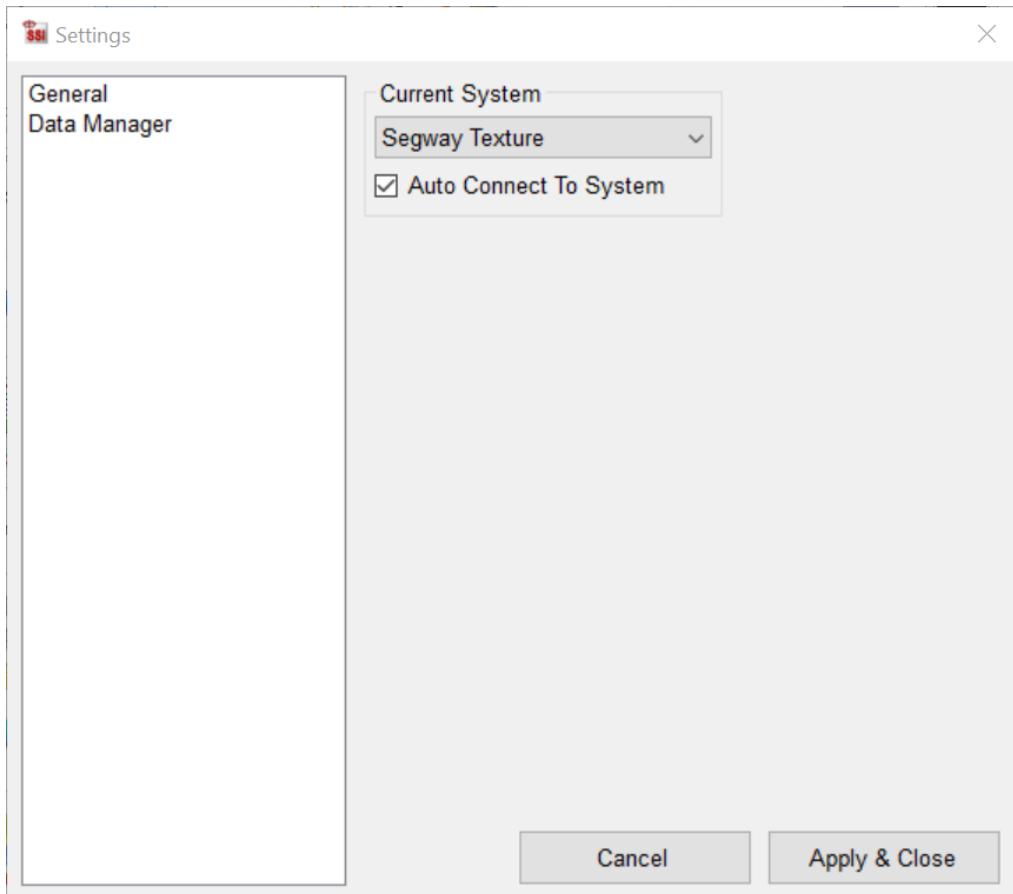


Figure 30. Data Recorder: Segway Texture

Device	Status	Message Count
192.168.1.10	Disconnected	0

Figure 31. Data Recorder disconnected.

Device	Status	Message Count
192.168.1.10	Connected	0

Figure 32. Data recorder connected

Data Recorder will alternate between ‘Connecting’ and ‘Disconnected’ for about 30 seconds until the laser boots up. Then it will change to ‘Connected’ when communication between the laser and the computer is established.

The Data Recorder window can be minimized, but it can’t be closed. If the window is closed the system will stop receiving data from the laser.

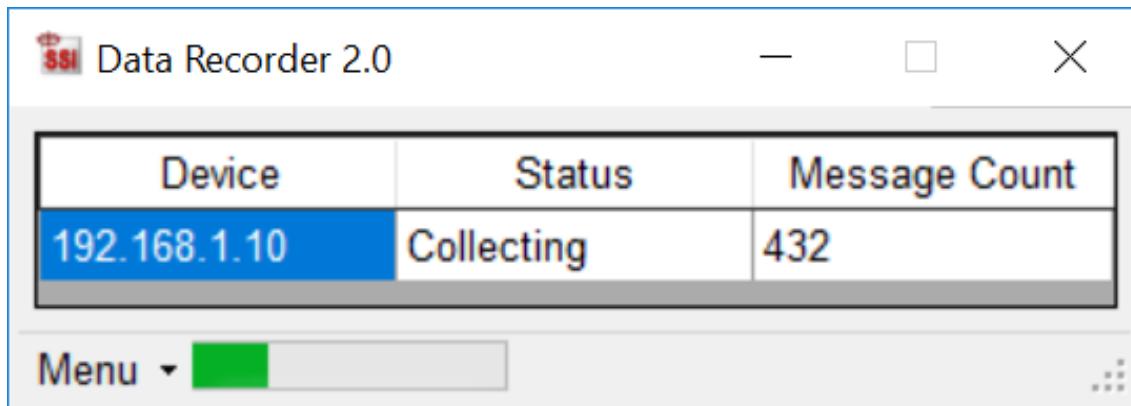


Figure 33. Data Recorder receiving data during collection

Move Profiler to Start of Track

Select Start to initiate data collection. The profiler’s laser should be on the position of the starting point when ‘Begin’ is selected from the Collection Information window. The collection will start when ‘Begin’ is selected.

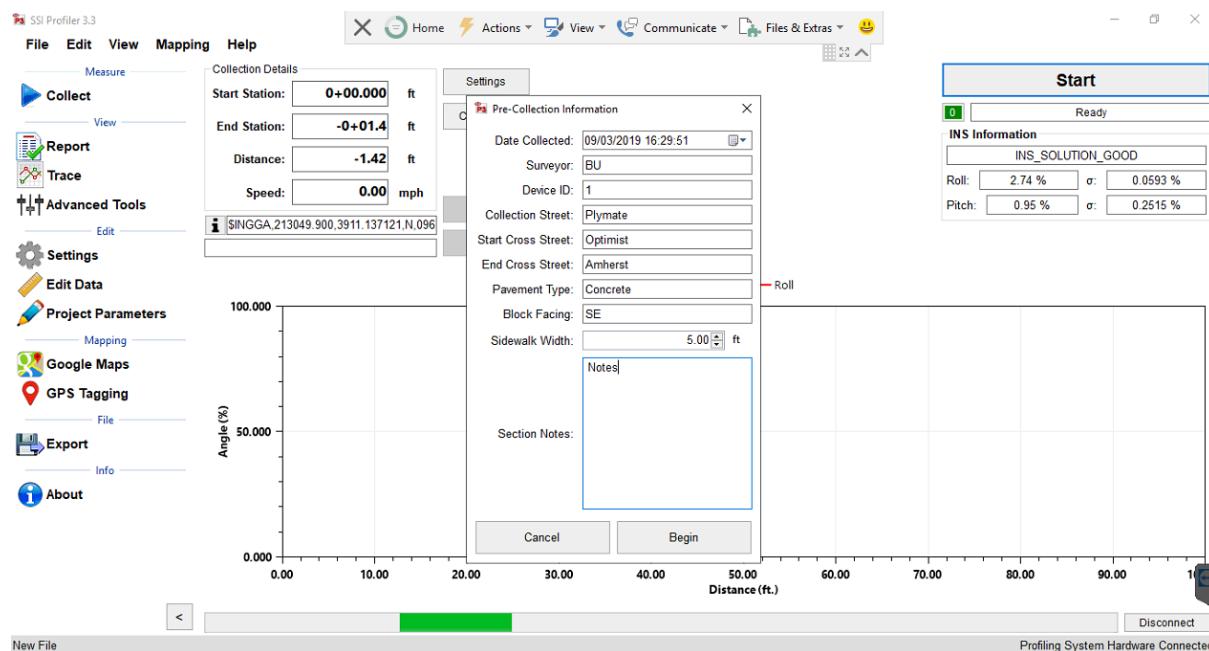


Figure 34. Pre-Collection window after “Start” is selected

Pre-Collection Information

The Pre-Collection Information can be accessed by selecting the “Start” button in the Collect Window. Enter information pertaining to the collection. This information will be used in reporting and GIS exports, but can be edited post-collection.

Figure 35. Pre-Collection Information window

Pre-Collection Information	
Date Collected:	01/31/2019 16:14:55
Surveyor:	
Collection Street:	
Start Cross Street:	
End Cross Street:	
Pavement Type:	
Block Facing:	
Sidewalk Width:	5.00 ft
Section Notes:	
Cancel	
Begin	

Date Collected

Date Collected is the day that the smoothness or sidewalk testing is occurring. Date Collected defaults to the computer’s current date.

Surveyor

Name of the operator conducting the test.

Collection Street

Collection Street is the street where the profiler tested the sidewalk.

Start Cross Street

Start Cross Street is the transverse street which marks the location of the profiler at the starting point of the collection. This street input is not the Collection Street.

End Cross Street

End Cross Street is the name of the transverse street where the profiler will end the collection.

Pavement Type

Enter primary pavement type comprising the test surface.

Block Facing

Enter the cardinal direction that the block is facing. For reporting purposes only, no bearing on GIS data.

Sidewalk Width

Nominal width of sidewalk being collected.

Section Notes

Section Notes is the information related to the collection such as landmarks and the visible condition of the pavement.

Weather Conditions

Note pertinent Weather Conditions.

Collecting Data

Now the system is ready to collect. The collection should be started with the laser above the starting point. The collection should end with the rear wheels centered over the ending point.

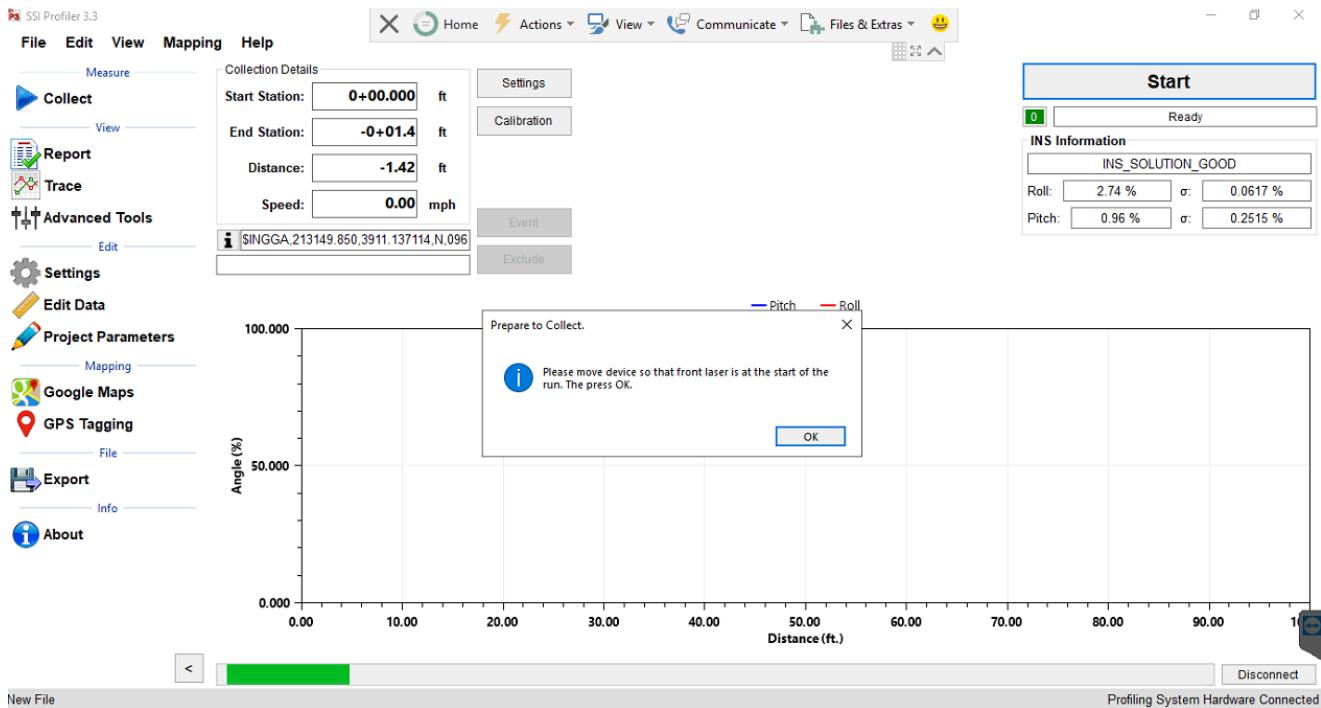


Figure 36. Window indicating to move the system to the beginning of the collection track

Press “Start” to begin collecting data. Once “Start” is selected, Pre-Collection Information filled out, and “Begin” pressed, the below window will appear.

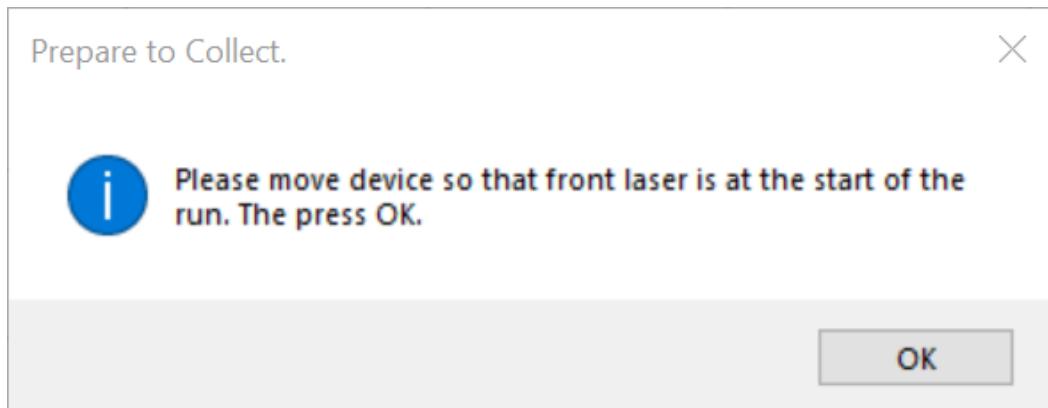


Figure 37. Window after pressing start

Ensure device is oriented properly then click OK.

The laser is located 1.5 feet in front of the rear axle of the Segway

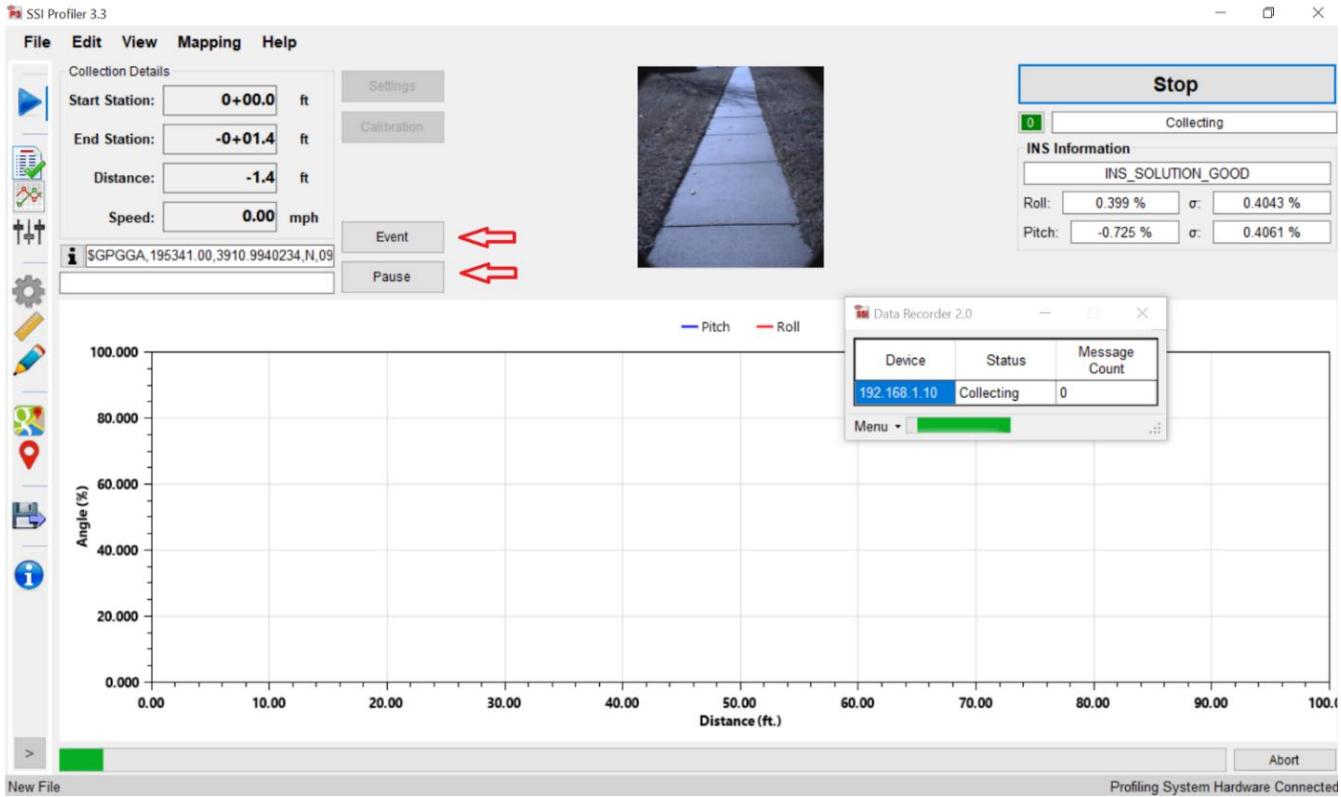


Figure 38. Initial collection window before the system has moved.

Proceed over the collection surface at a speed that minimizes vehicle dynamics.

Event and Pause Buttons

The 'Event' and 'Pause' buttons are now activated.

The Event button will assign a specific note to a station. Click the button when passing by the event. At the end of the collection an event window will appear where the operator can change the default name of the event. See Figure 46.

The Pause button will indicate the start of a section which will be excluded from the usual collection data. Once the pause button has been clicked, it will show 'Resume'. Press the resume button at the end of the paused section to continue normally collecting data.

Both the Event and Pause buttons can be configured with the Event Keys so the operator can automatically select, for example, 'm' for Manhole, 'd' for Driveway, 'w' for Water meter, 's' for Storm drainage and 'i' for Image capture. The Pause button functions the same as Exclude/Resume hot keys. Please see Figure 26.



Figure 39. Collection window mid-collection

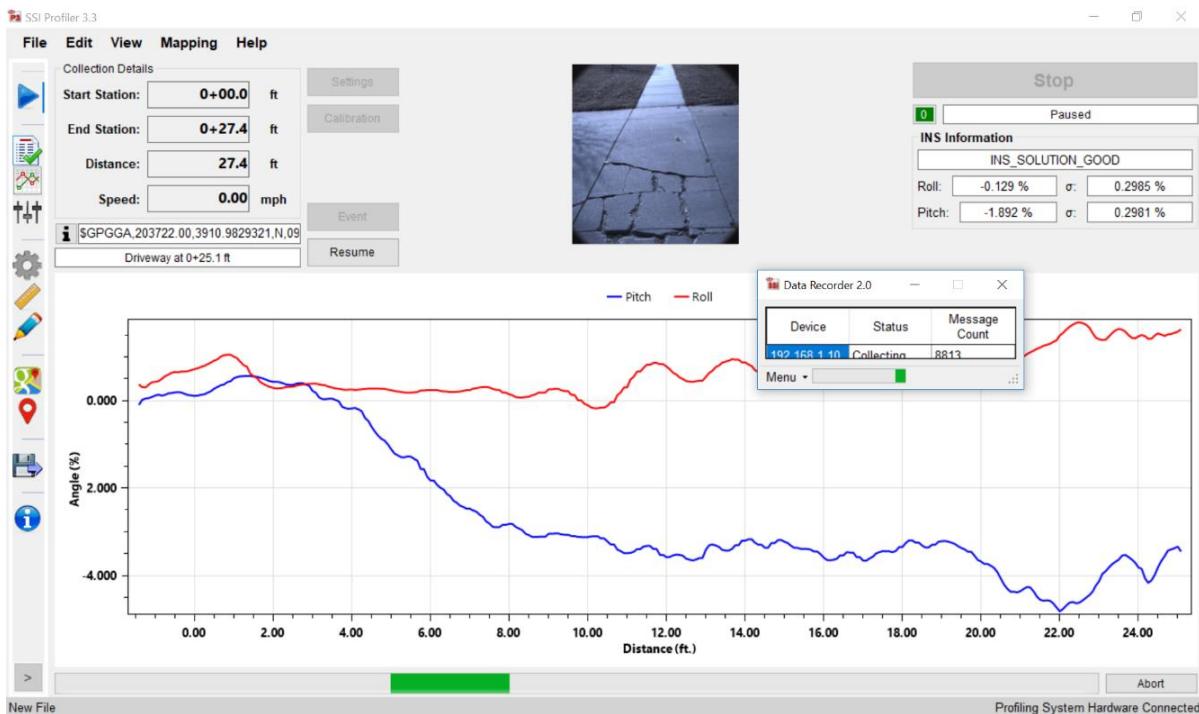


Figure 40. Driveway pause initiated with use of Exclude/Resume Event Key

The Pause (Exclude/Resume) has been initiated with the use of the direct event key for driveway. The “Pause” button automatically becomes the “Resume” button. The text box to the left of the Pause/Resume button will indicate the event and the station. To end the Pause and resume the collection press “Resume” or press the designated Event Key.

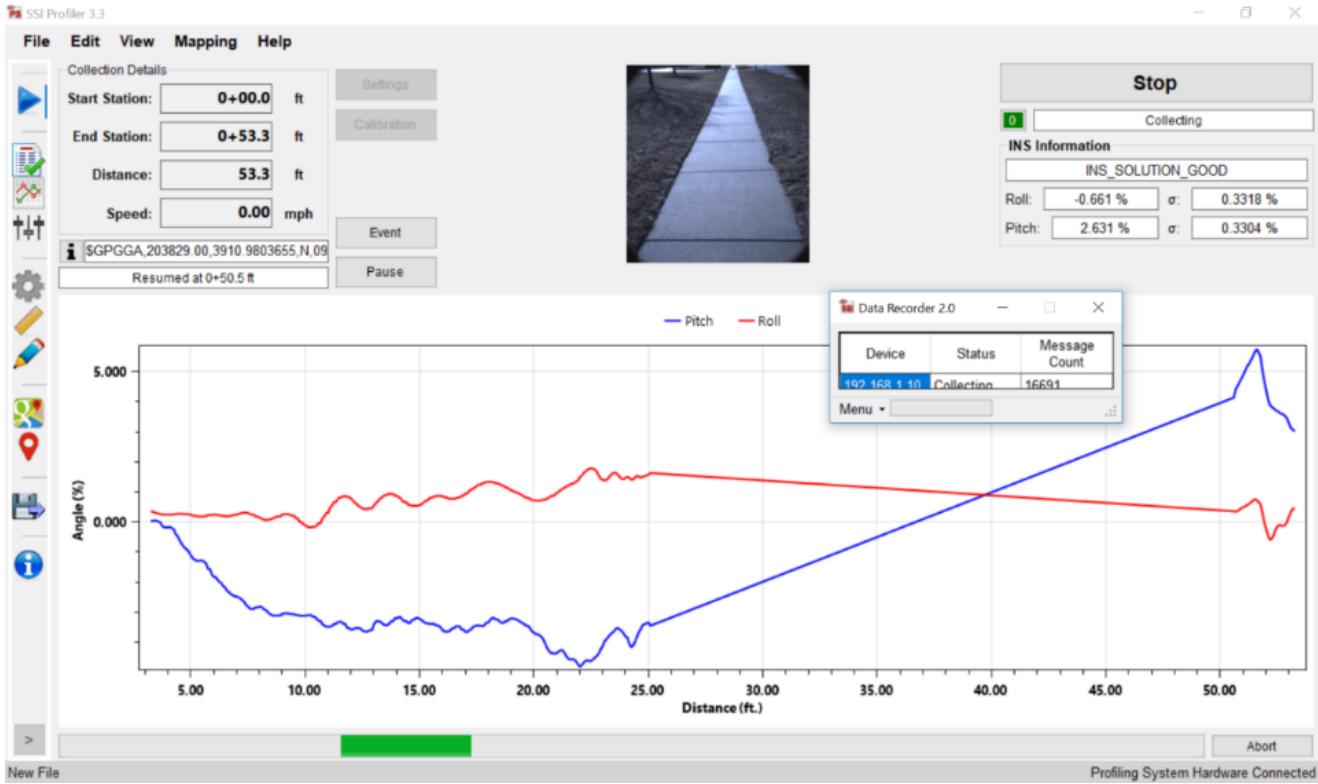


Figure 41. Resuming collection after Pause

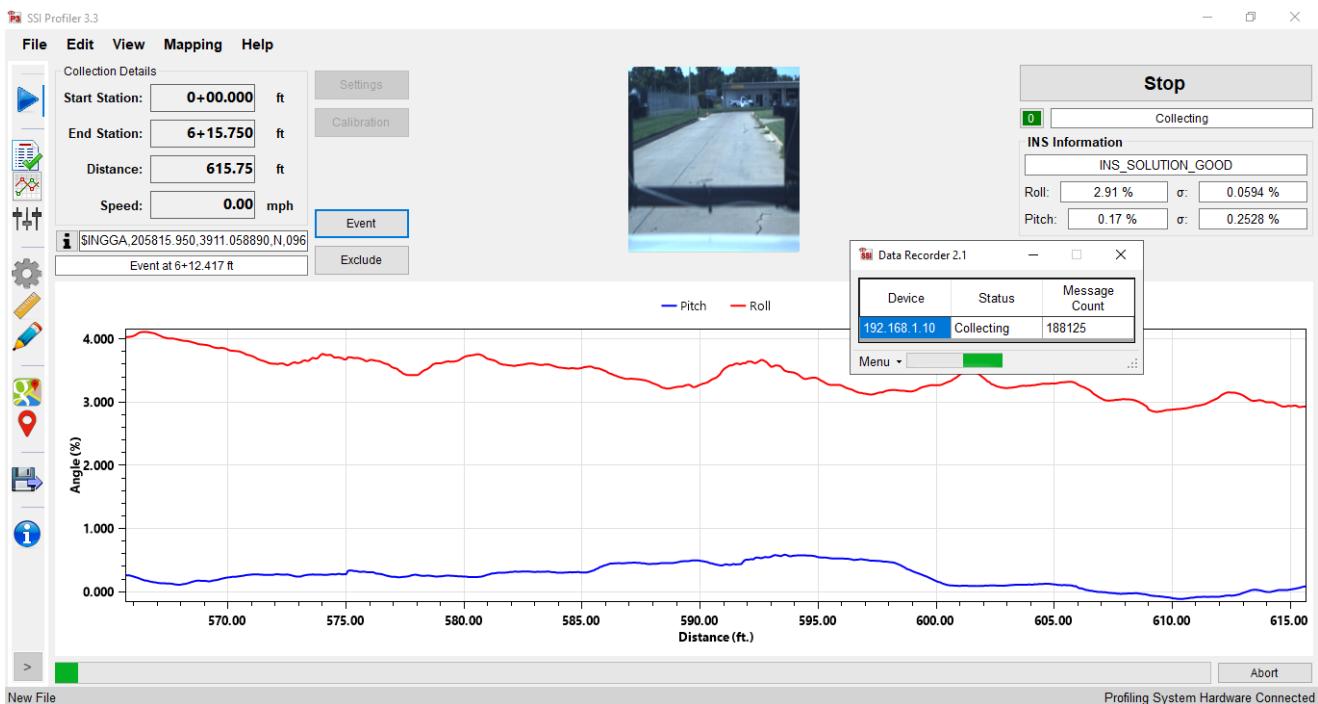


Figure 42. Event button pressed during a collection

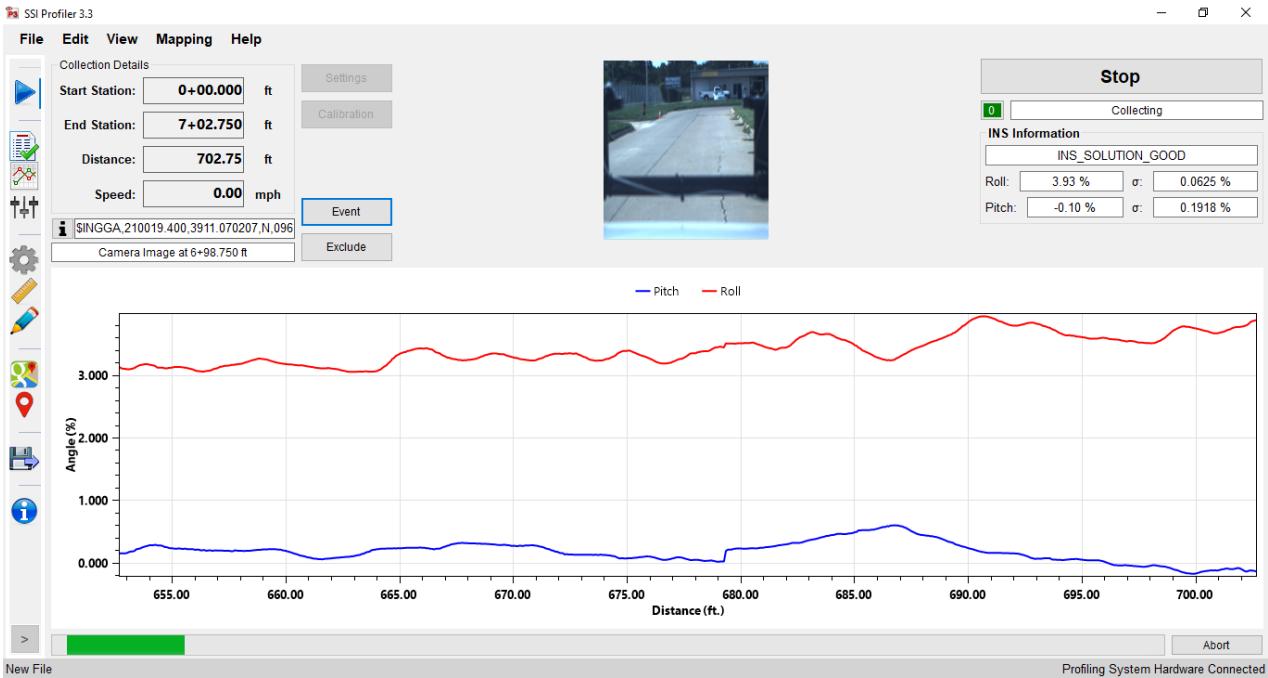


Figure 43. Camera image taken for a specific station using a Hot Key

When finished with collection of the surface, align the rear axle with the end point and click the “Stop” button.

Post Collection

After “Stop” is pressed, “Loading Texture Data” window will appear accompanied by “Processing” status. Events Form and Post-Collection Information Check windows will also pop up after “Stop” is pressed, followed by the save window.



Figure 44. Collection window immediately after hitting Stop

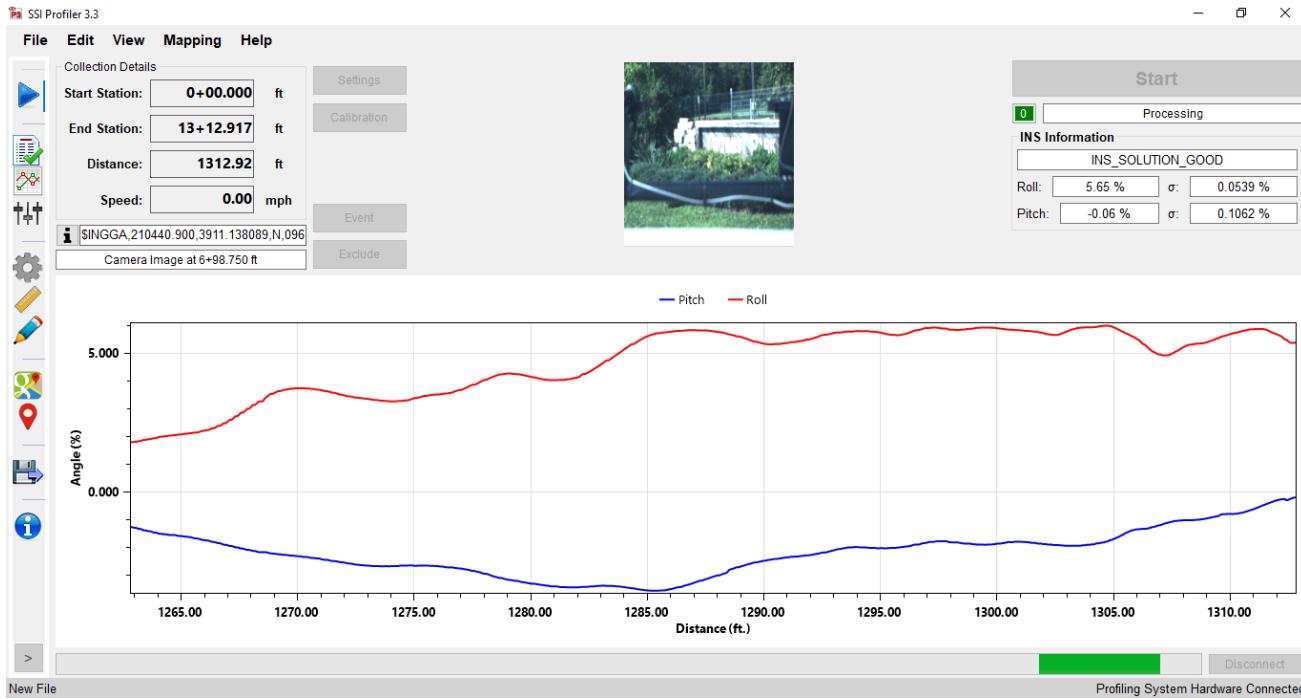


Figure 45. Window after hitting stop and texture data has been loaded, “Processing”

Events Form Post-Collection

The Events Form window will pop up after the collection has ended indicating the events taken during the collection. In case an event needs to be edited and/or changed, click on an event to modify. The operator can edit the events from the collection and specify default events. User Note Type/Information will be included in reports and GIS data.

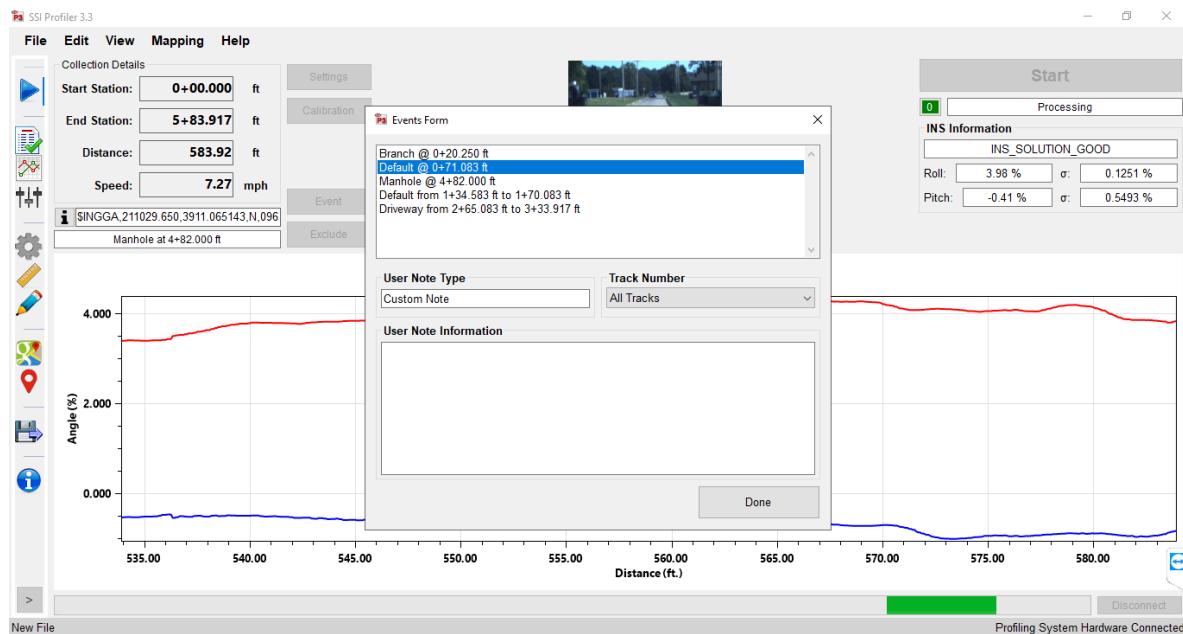


Figure 46. Form will automatically popup after collection.

The post collection information screen appears at the end of a collection in case information needs to be modified depending on the route ultimately collected. Click “Accept” when finished making changes.

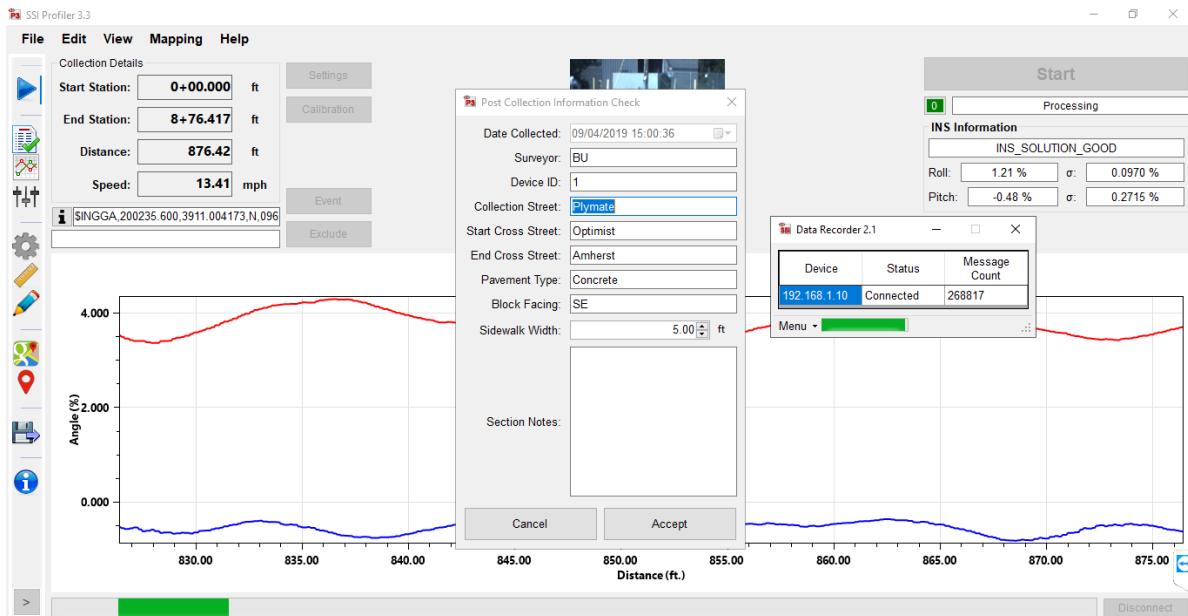


Figure 47. Post-Collection Information Check screen.

Saving Data

SSI recommends using the ‘Save as New Project’ button after each collection to save each collection as a separate file. Saving various collection in the same file, using the “Save” button, can complicate analysis and exporting and increases chance of data loss. “Do not Save” does not create a .rsd file, but still allows viewing of the data and can be saved later. Files that contain unsaved data will be followed by an “*”. The current open file’s directory is displayed in the bottom left hand corner of the screen.

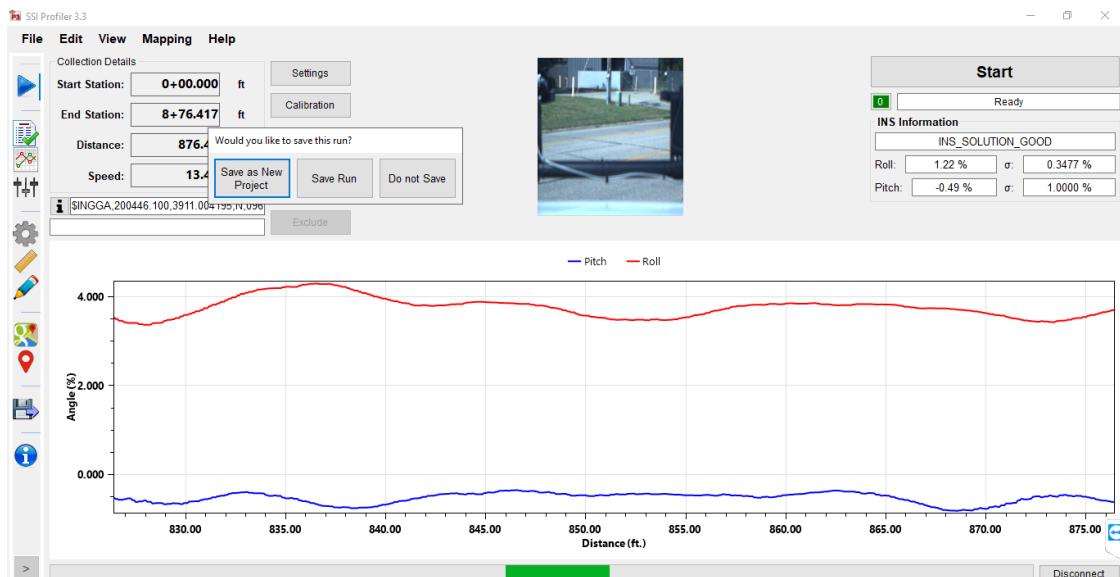


Figure 48. Save window after a collection

The Executing Auto Export window will appear after a collection if the check box is enabled under the configuration tab of the General settings. Please see Figure 72.

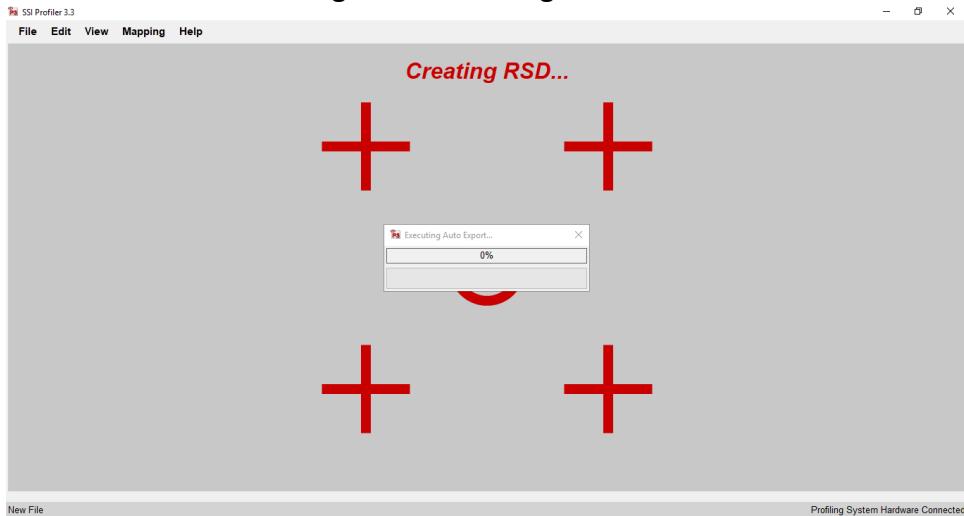


Figure 49. Auto export status after collection

New File

To start a new file for next collection, click the “File” tab in the top left corner of the window, then “New” (Ctrl-N). If an open file contains unsaved changes, the “Changes Made” window will pop up when creating a new file. Select “Save As” to create a copy of the open .rsd file with previously unsaved changes. Select “Save” to save current changes to the open file. Select “No” to reset changes made since last save, and “Cancel” to not create new file (current file will remain open).

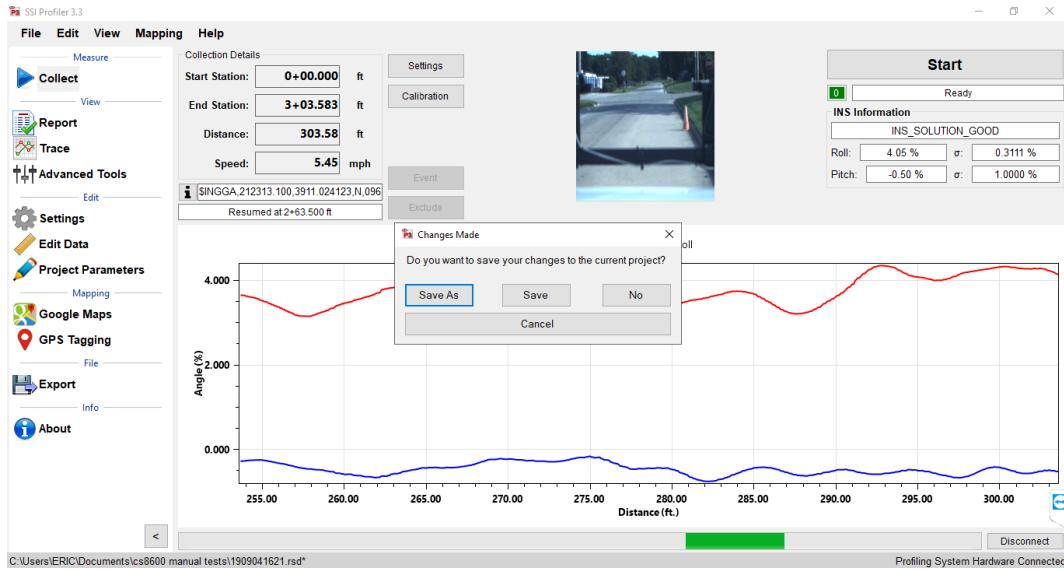


Figure 50. Changes Made window

Choose “Use Settings from Current File” to carry over settings to new file (common, default). “Use Settings from Previous Collection (Browse)” brings up windows explorer and allows for selection of previously collected .rsd file’s settings to be used in new file. “Set Settings after Collection” allows settings to be configured post-collection.

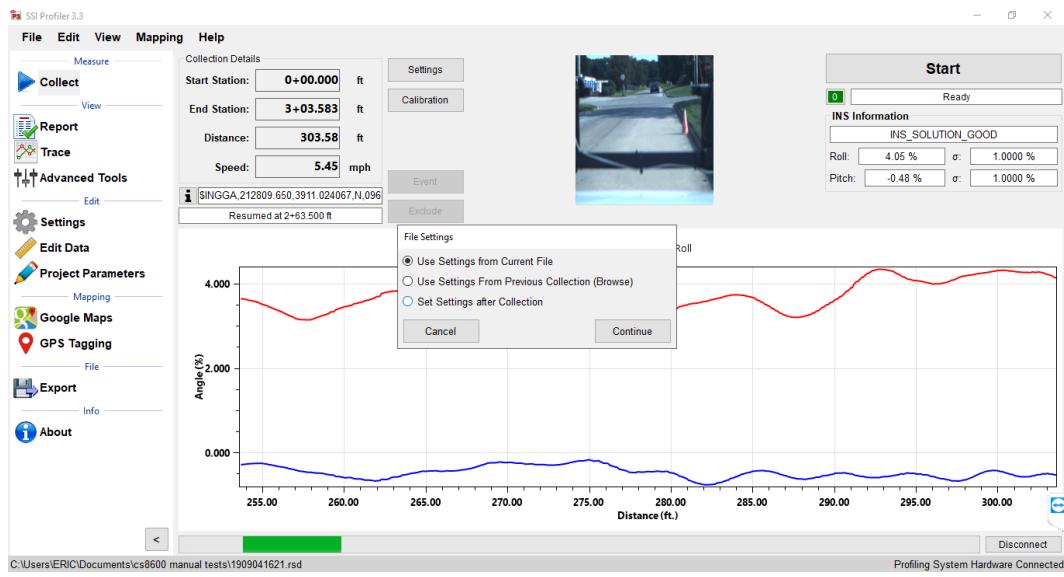


Figure 51. File Settings window when creating New File for next collection

File Tab

New

Selecting New creates a new project file to be saved on the operator's computer or external device. The file will open automatically and the bottom left corner of the program will display "New File." If data has been collected with this file, the name will be displayed with an asterisk as "New File*."

Open

Opens a project file previously saved on the operating computer or connected external device. Profiler V3 creates RSD type files. The RHD file type from the previous version of Profiler can also be opened in Profiler V3. If your file is in another format contact SSI Customer Support. The only two file formats used in the Profiler V3 program are RHD and RSD. Profiler V3 only collects data in the **RSD** format.

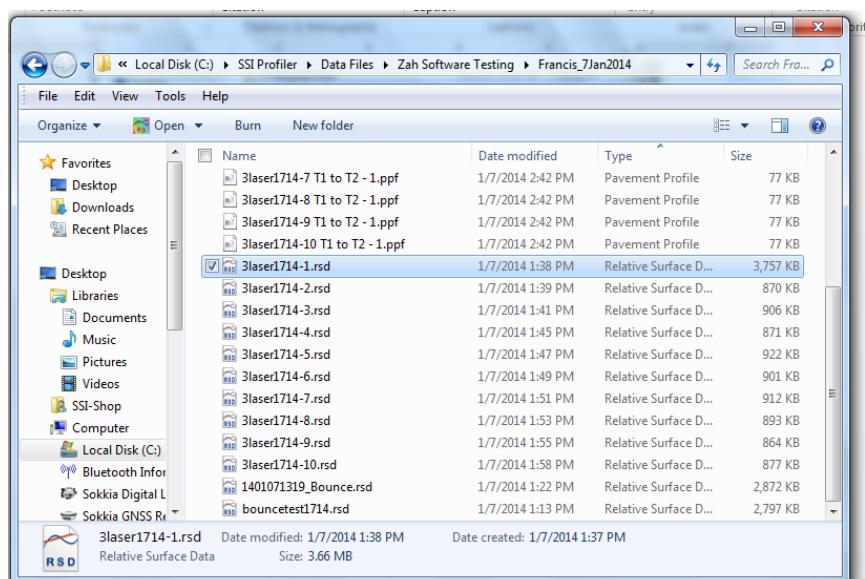


Figure 52. Opening a data file in the Profiler V3 program

Open Recent

Opens recently viewed or created project files. Files will only be available if they are saved on the operating computer or connected external device. The Open Recent feature is a shortcut to find current profiling data. It is also possible to use the File>Open tool to open saved data. The only two file formats used in the Profiler V3 program are RHD and RSD. Files can only be saved in RSD.

The default file to be searched for in Window's Explorer can be changed under General Settings and the "Default File Type."

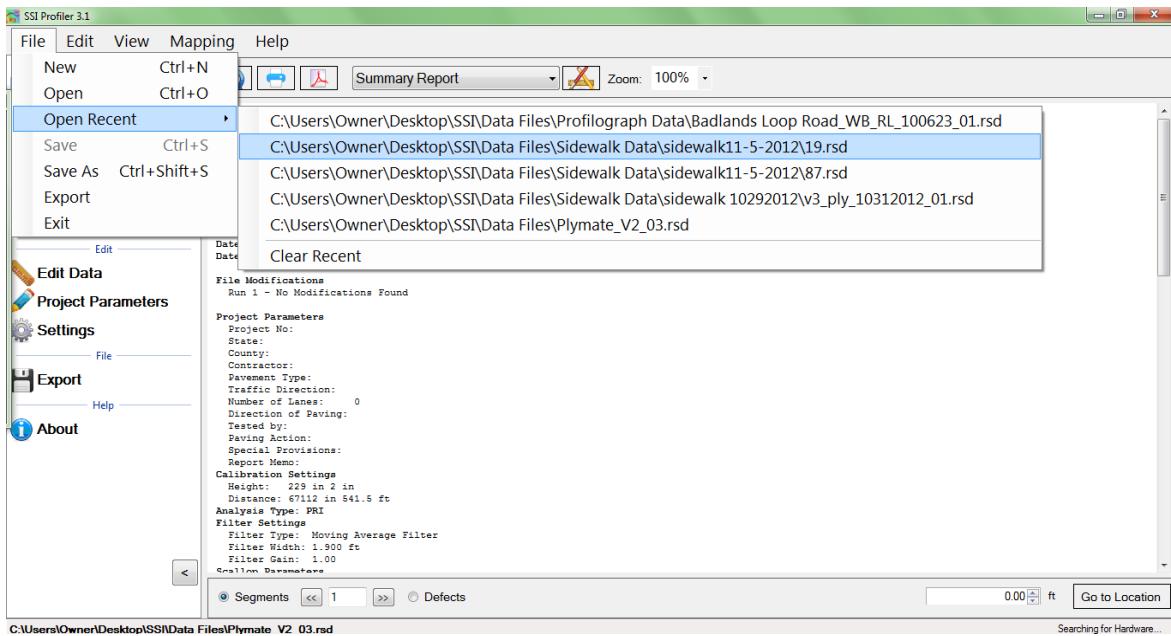


Figure 53. Open Recent feature

Clear Recent

Clear Recent deletes the history of previously viewed RHD and RSD files. Once the history is cleared it cannot be reversed. The operator must navigate to File>Open to view saved files.

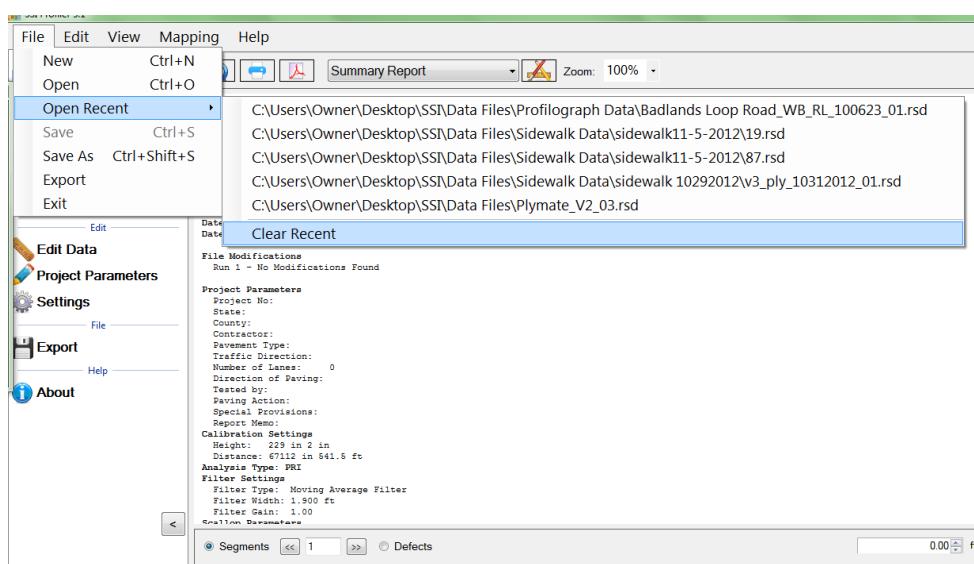


Figure 54. Clear Recent option below the recently opened files

Save

Save allows the operator to save the current file in RSD format on the operating computer or connected external device. If 'Save' is selected while an unsaved file is open, the operator will be prompted to choose a file name and folder destination to save the current file. The file will be saved in SSI's proprietary RSD format. If another format is required, use RSD Translator or contact SSI Customer Support.

Save As

When Save As is selected, the operator will be prompted to choose a file name and folder destination in which to save the current file. The file will be saved in SSI's proprietary RSD format. If another format is required, use RSD Translator or contact SSI Customer Support.

Note: Save and Save As are only available after data has been collected or if changes are made to preexisting file.

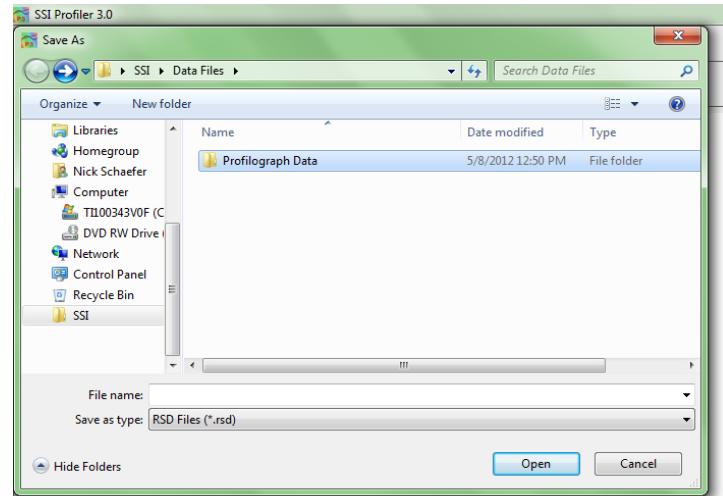


Figure 55. Saving a file through Save As in RSD format

Sidewalk Report

The sidewalk report displays the same information that is exported to the csv files. Refer to Analysis Settings – Sidewalk for more information on report content.

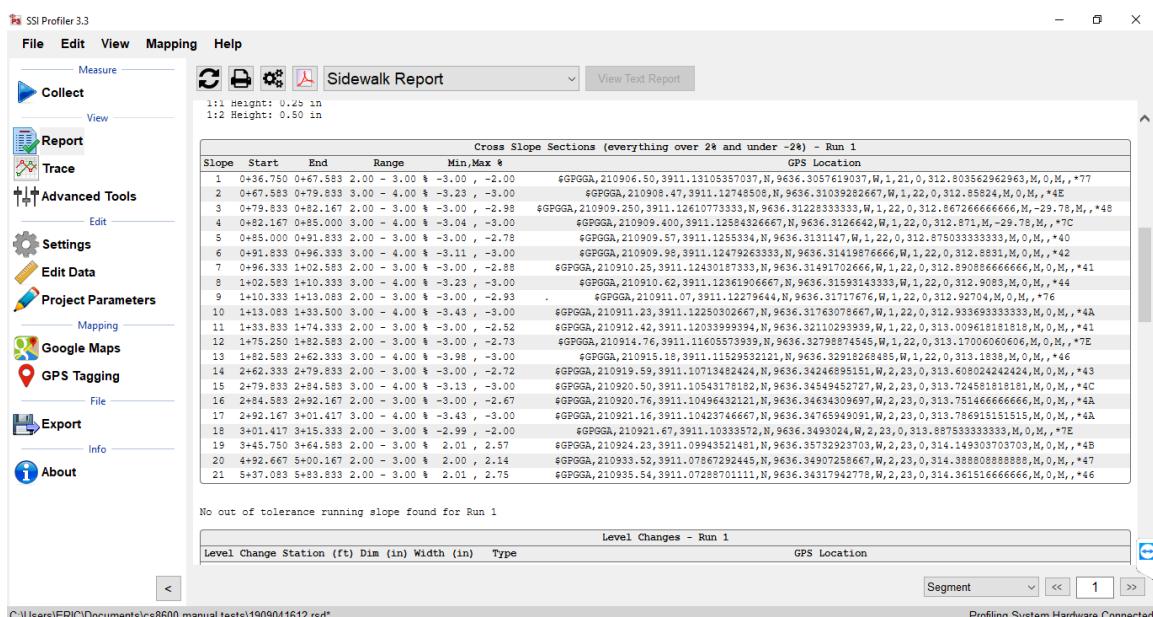


Figure 56. Cross Slope Sections of the sidewalk report

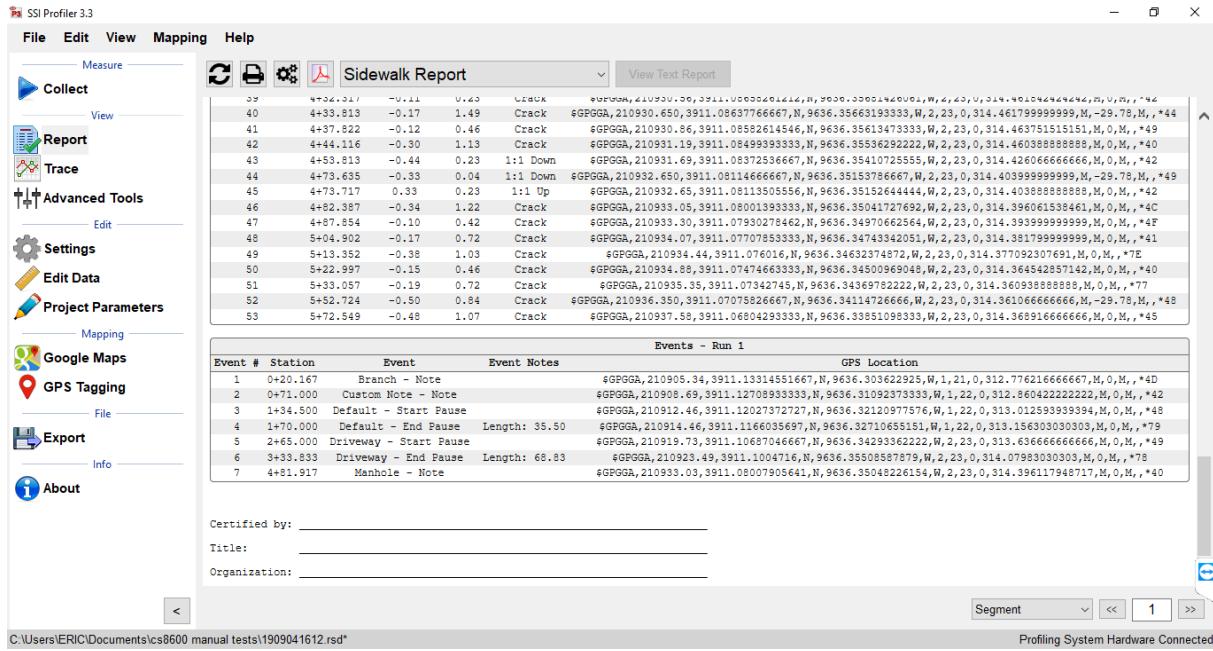


Figure 57. Events/Pauses in the Sidewalk Report

Image Summary Report

The Image Summary Report displays images captured during collection along with data associated with the image interval. When “Use Sidewalk Data” is enabled in Settings>Report Content, Station, Image File Name, GPS Location, Cross Slope, Running Slope, and Level Change data (if present) will be displayed.

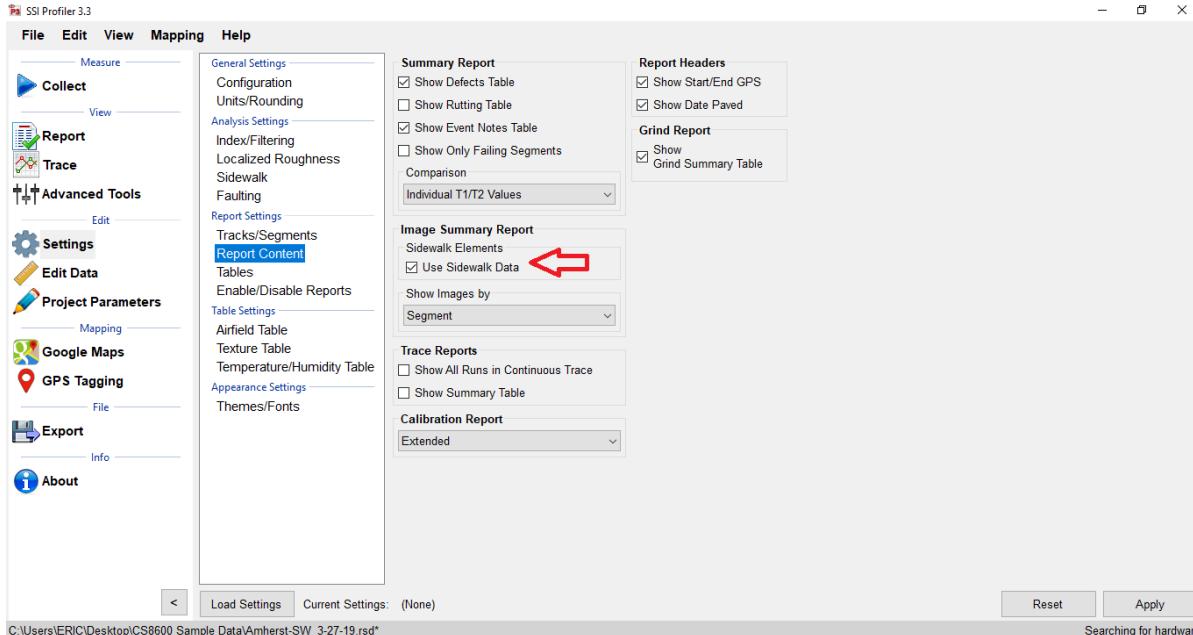


Figure 58. Use Sidewalk Data checkbox enabled under Image Summary Report

Make sure the 'Use Sidewalk Data' checkbox is selected for CS8600 and Sidewalk systems.

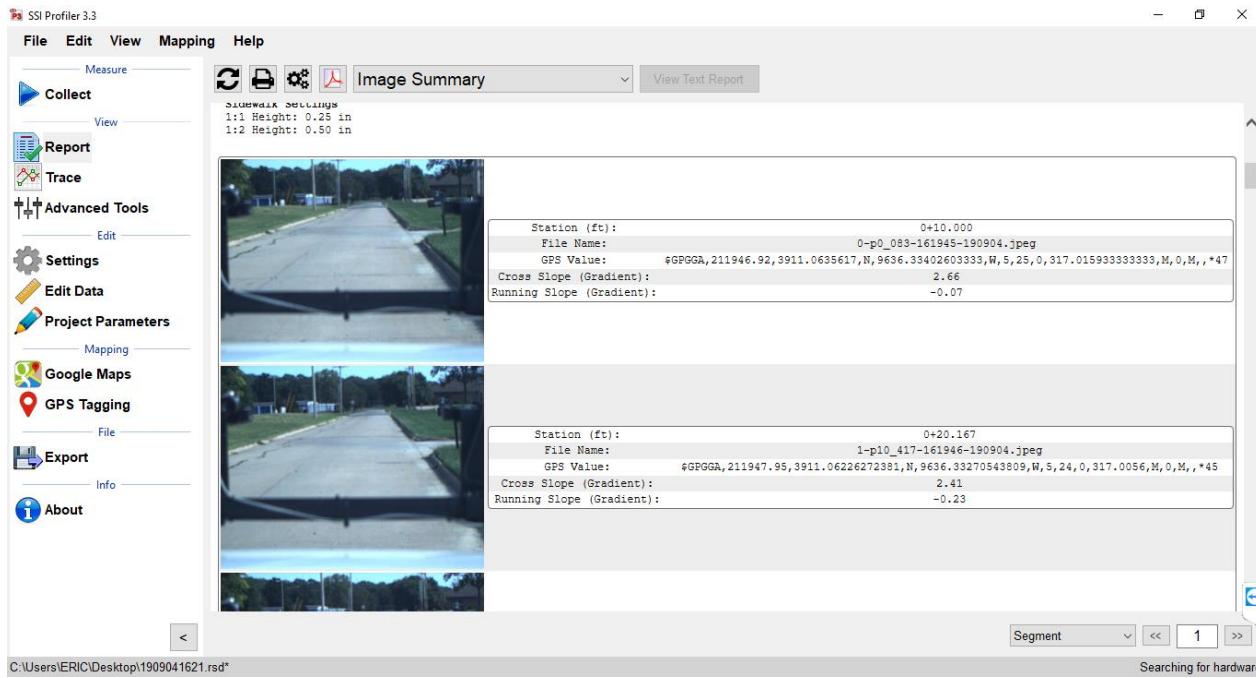


Figure 59. Image Summary Report

Texture Report

The Texture Report can display MPD (mean profile depth), ETD (estimated texture depth), and RMS (root mean squared) texture values. Check desired values to display in Settings>Texture Table. Interval Length is the distance over which values will be averaged.

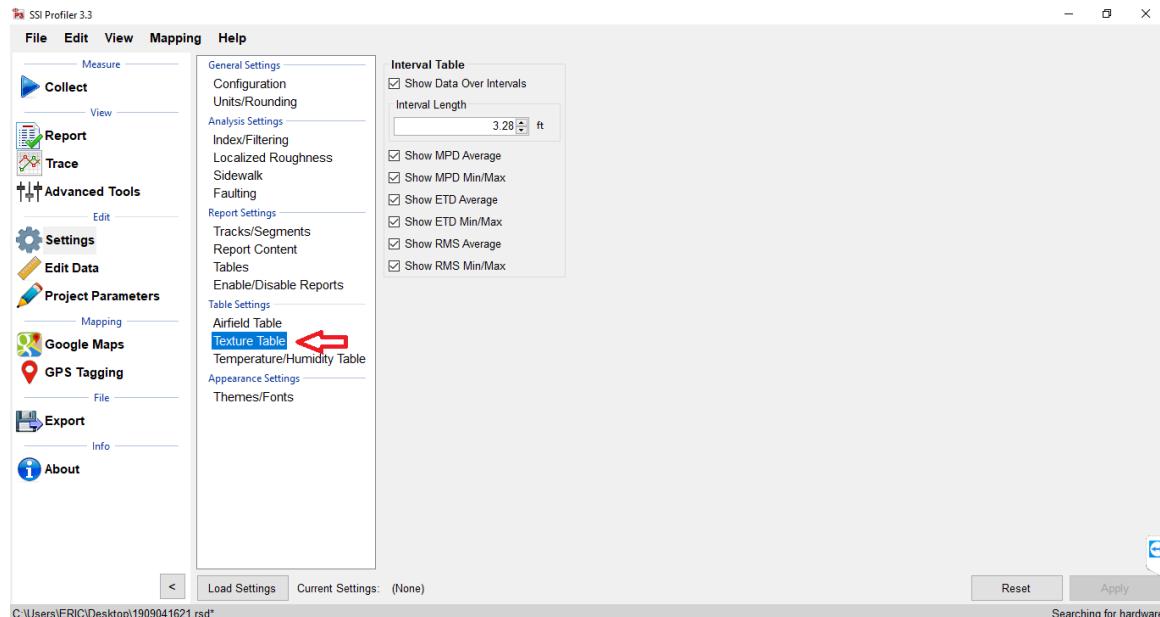


Figure 60. Texture Table Parameters

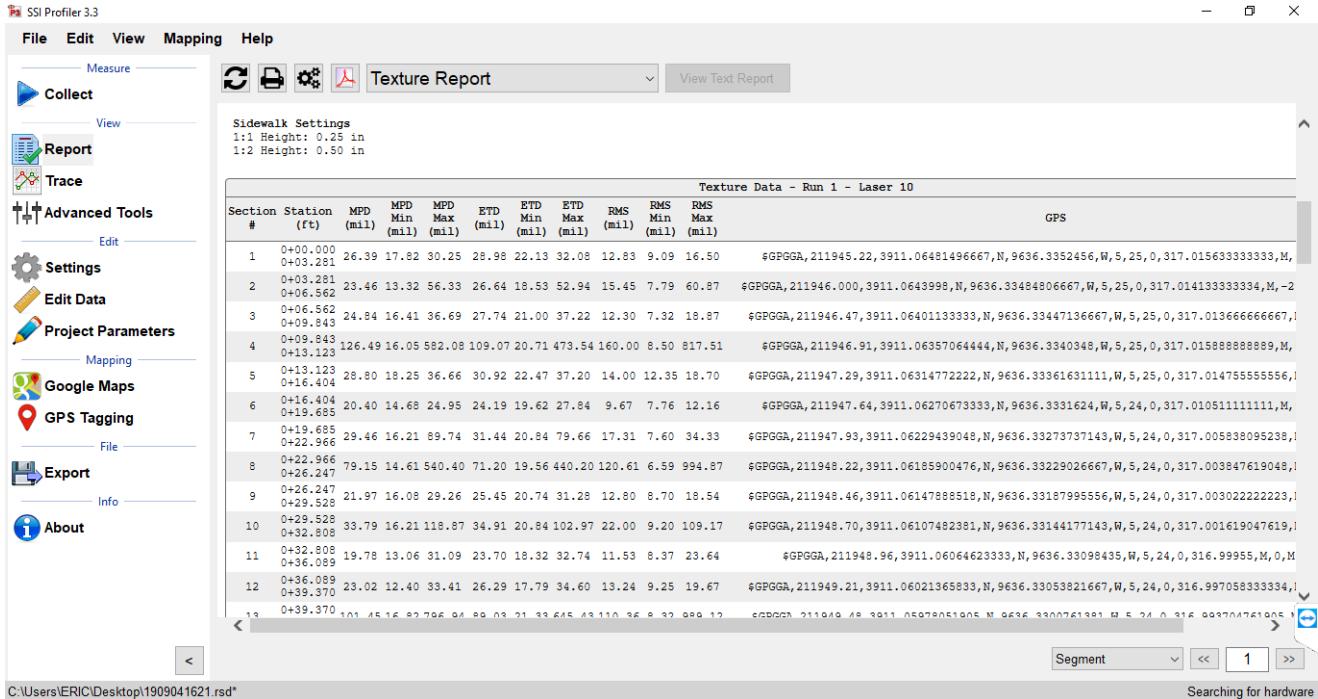


Figure 61. Texture Report

Export

Exporting allows the operator to create files to be used in third party GIS software and Excel. The settings for each export feature, for CS8600 data, are described below. For each of the export formats, a folder destination is required. The Export feature can be found in the shortcut bar on the left-hand side of the Profiler V3 window and in File>Export.

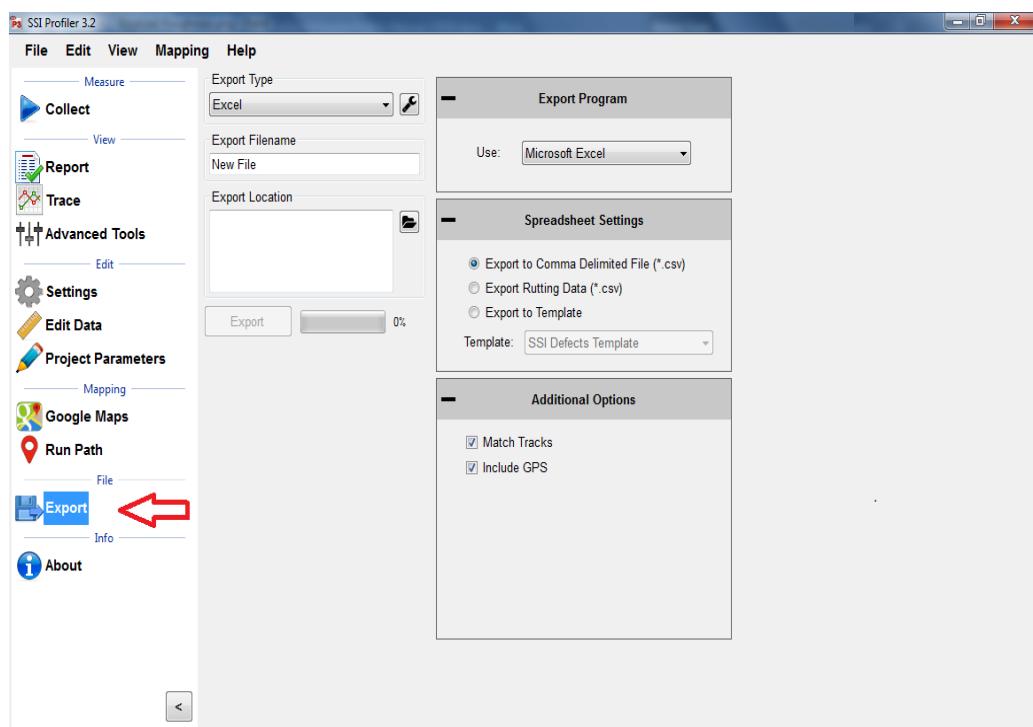


Figure 62. Window for exporting the data into Excel format

To select the folder destination, select 'Browse' and navigate through Windows Explorer to the desired folder. Once the folder destination is reached and selected, left click on 'OK' at the bottom of the window to save the folder location.

Figure 63. Select location to save the exported file

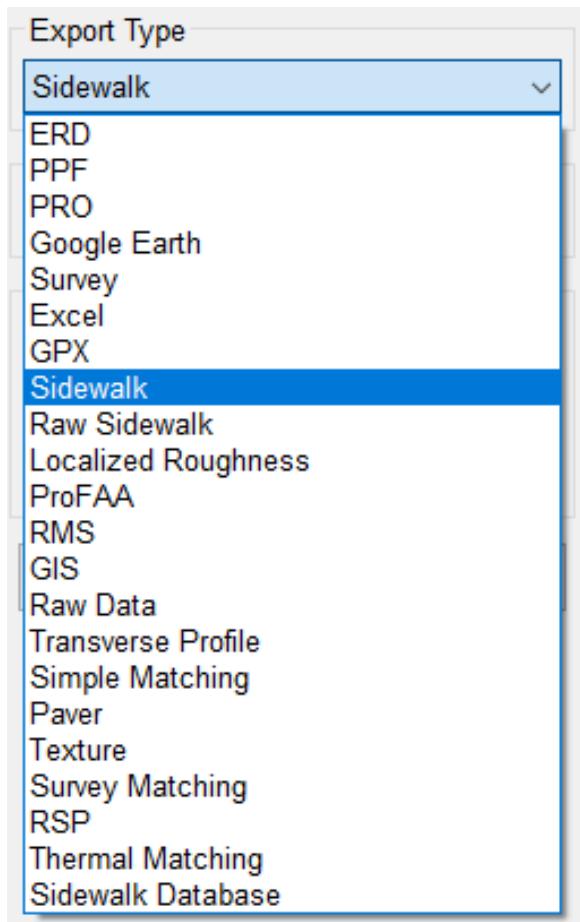
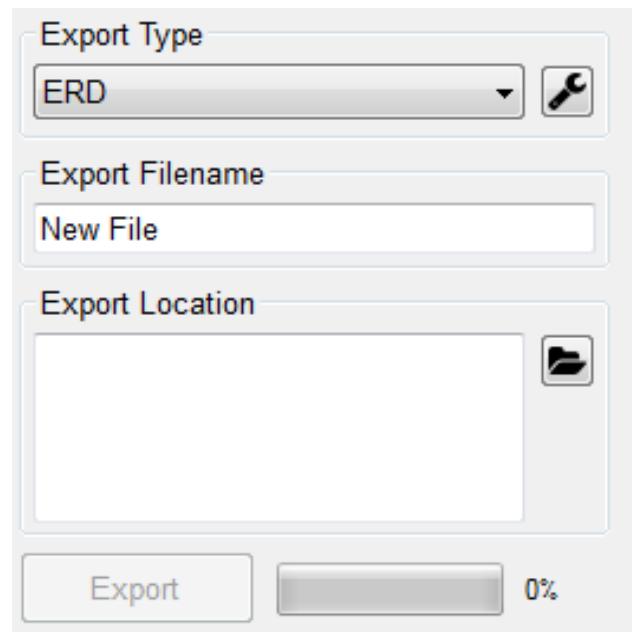


Figure 65. Export type drop down menu

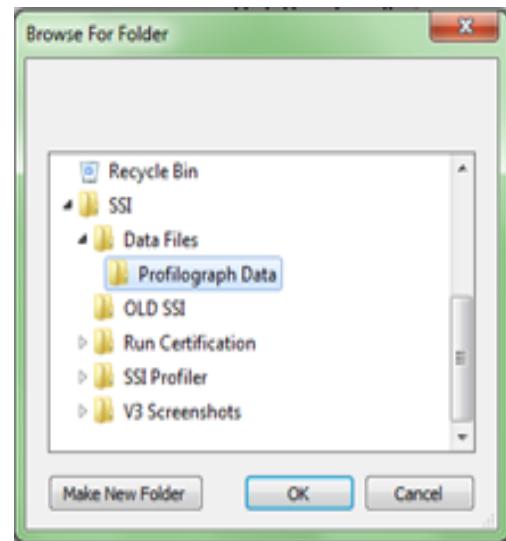


Figure 64. Export folder location selection

Exporting to Sidewalk Format (GIS Format Files)

Sidewalk export type outputs individual data sets for Run Path, Level Change, Running Slope, Cross Slope, Events and Exclusions, and Images in GIS (geographic information system) compatible formats. Desired file types can be selected with the check boxes. If a data set is not needed, it may be unchecked and not exported. The files will be exported to the chosen export location. This location can be changed through the “Browse” icon.

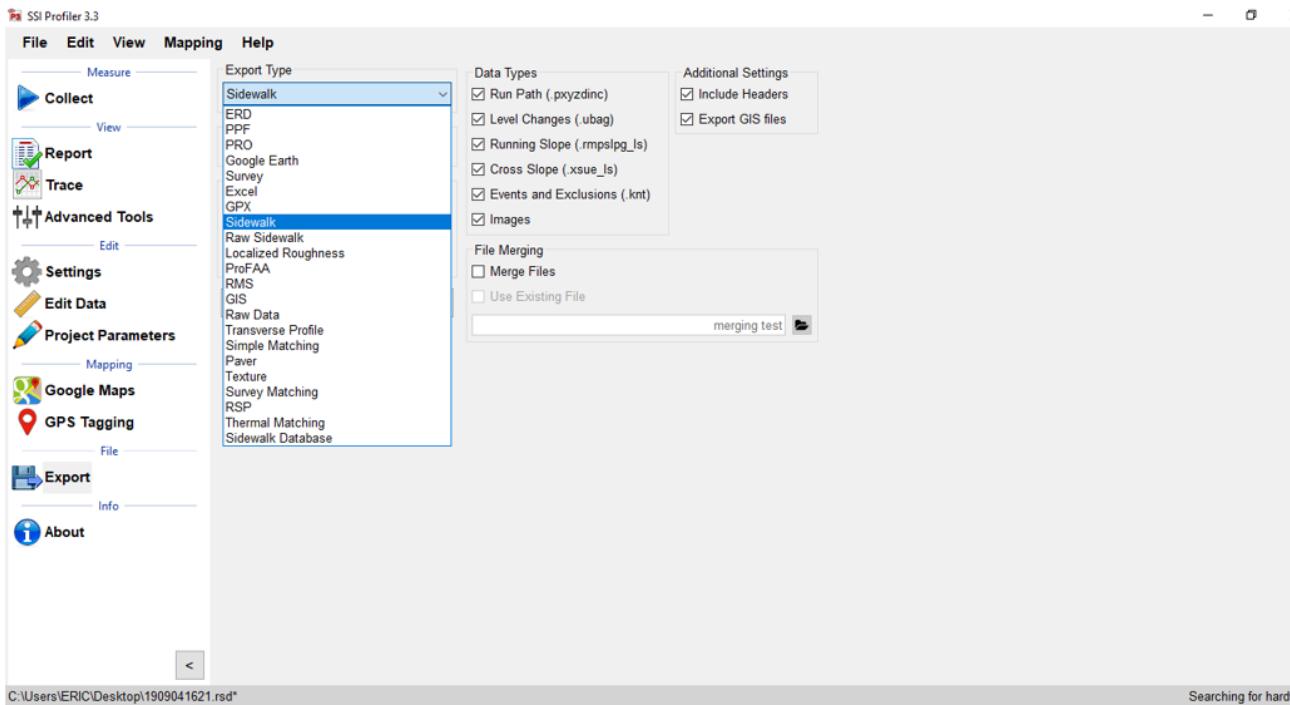


Figure 66. Exporting to Sidewalk type GIS files

GIS File Types

The Sidewalk export has all the information of the collection exported into GIS compatible file types. The files types and the corresponding information are:

knt: Event and Exclusion data, ASCII format. Columns are File Name, Surveyor, Device ID, Survey Street, Start Street, End Street, Orientation, Sidewalk Width (ft), Key Event Start (ft), Key Event End (ft), Key Event Type, Measurement Notes, Start GPS, End GPS.

pxyzdinc: Three-dimensional profile derived from the travel grade and gyroscope, ASCII format. Columns are File Name, Surveyor, Device ID, Survey Street, Start Street, End Street, Orientation, Sidewalk Width (ft), GPS, Run Start (ft), Run End (ft), Run Notes.

rmpslpg_ls: Running slope exceptions, ASCII format. Columns are File Name, Surveyor, Device ID, Survey Street, Start Street, End Street, Orientation, Sidewalk Width (ft), Measurement Start (ft), Measurement End (ft), Measurement Range (%), Start GPS, End GPS.

ubag: Level change height and bevel slope data, ASCII format. Columns are File Name, Surveyor, Device ID, Survey Street, Start Street, End Street, Orientation, Sidewalk Width (ft), Station (ft), Height/Depth (in), Width (in), Type, GPS.

xsue_ls: Cross slope exceptions, ASCII format. Columns are File Name, Surveyor, Device ID, Survey Street, Start Street, End Street, Orientation, Sidewalk Width (ft), Measurement Start (ft), Measurement End (ft), Measurement Range (%), Start GPS, End GPS.

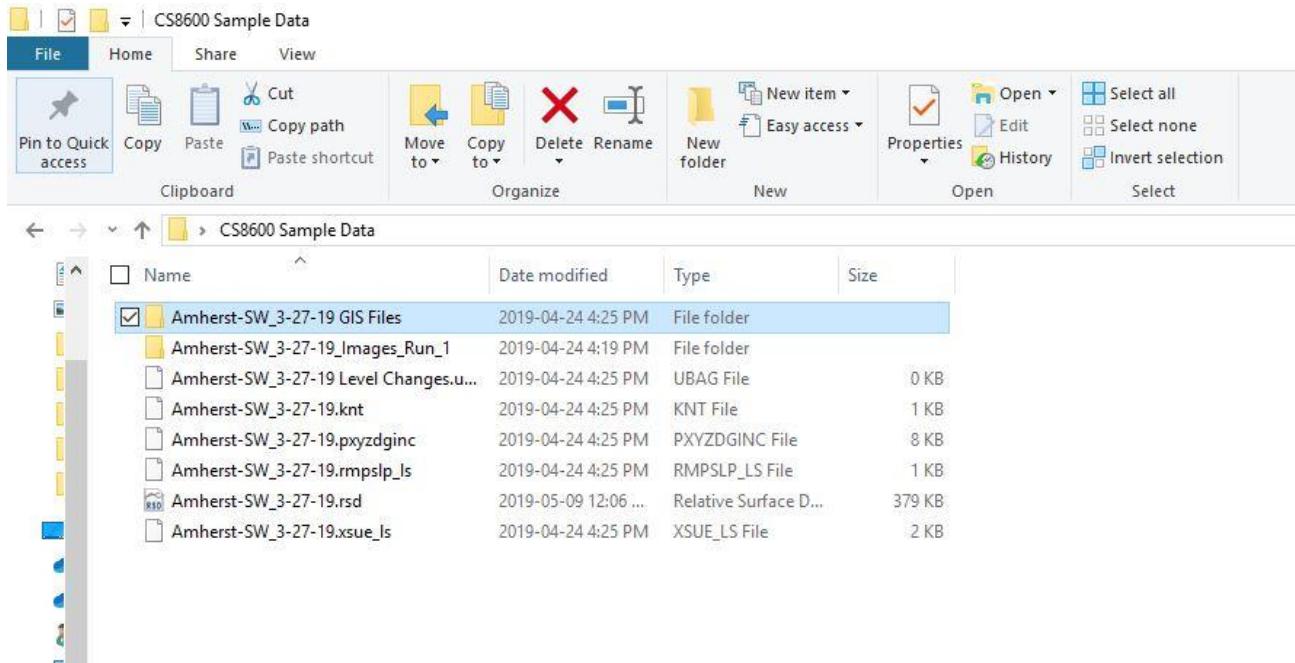


Figure 67. Export directory in Windows Explorer with Sidewalk Export files

A “*FileName* GIS Files” folder will also be created during the Sidewalk Export routine. The GIS Files folder contains subfolders for each sidewalk data type (see above descriptions) with the addition of an Image Data folder. These folders contain Shapefiles (.shp) which can be read into most GIS software.

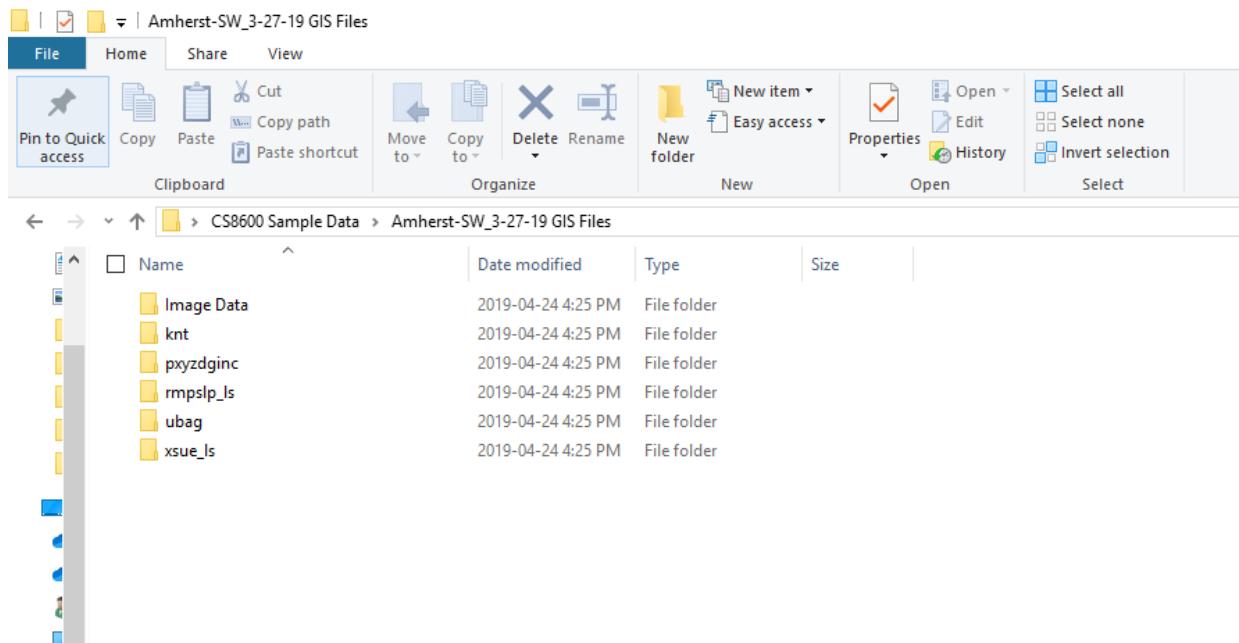


Figure 68. GIS Files folder

The Image Data folder also contains a .csv file for matching image files to other associated GIS data. Columns are File Name, Surveyor, Device ID, Survey Street, Start Street, End Street, Orientation, Sidewalk Width (ft), Station (ft), Image Filename, GPS. Note: Image files in the “*FileName*_Images_Run #” are also “geotagged” and can be directly read into most GIS software.

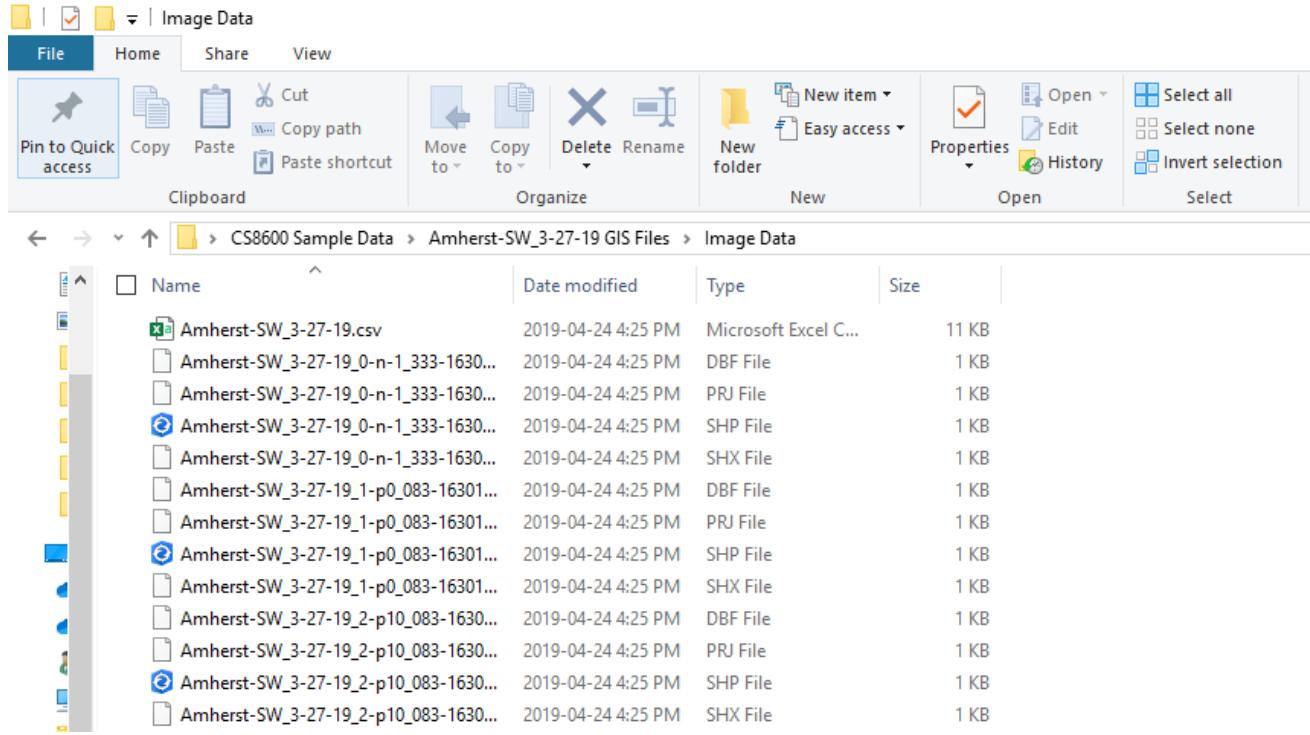


Figure 69. Image Data Folder

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	File Name	Surveyor	Device ID	Survey Street	Start Street	End Street	Orientation	Sidewalk Width (ft)	Station (ft)	Image Filename	GPS					
2	amherst_seg_eBU							5	5 0-p0_167-145624-190315	\$PGGGA	195623.3	3910.921	N	9636.396	W	
3	amherst_seg_eBU							5	15 1-p10_25-145626-190315	\$PGGGA	195625.1	3910.923	N	9636.394	W	
4	amherst_seg_eBU							5	24.9 2-p20_083-145627-190315	\$PGGGA	195626.1	3910.923	N	9636.393	W	
5	amherst_seg_eBU							5	34.9 3-p30_167-145627-190315	\$PGGGA	195626.9	3910.924	N	9636.392	W	
6	amherst_seg_eBU							5	45 4-p40_417-145628-190315	\$PGGGA	195627.7	3910.924	N	9636.391	W	
7	amherst_seg_eBU							5	55.1 5-p50_167-145629-190315	\$PGGGA	195628.4	3910.925	N	9636.39	W	
8	amherst_seg_eBU							5	65 6-p60_25-145630-190315	\$PGGGA	195629.2	3910.926	N	9636.389	W	
9	amherst_seg_eBU							5	74.9 7-p70_083-145630-190315	\$PGGGA	195629.9	3910.926	N	9636.388	W	
10	amherst_seg_eBU							5	84.9 8-p80_167-145631-190315	\$PGGGA	195630.6	3910.927	N	9636.387	W	
11	amherst_seg_eBU							5	95.1 9-p90_167-145632-190315	\$PGGGA	195631.2	3910.928	N	9636.385	W	
12	amherst_seg_eBU							5	104.9 10-p100-145632-190315	\$PGGGA	195631.7	3910.929	N	9636.384	W	
13	amherst_seg_eBU							5	115 11-p110_583-145633-190315	\$PGGGA	195632.2	3910.93	N	9636.382	W	
14	amherst_seg_eBU							5	125 12-p120_25-145633-190315	\$PGGGA	195632.7	3910.931	N	9636.381	W	
15	amherst_seg_eBU							5	135.1 13-p130_417-145634-190315	\$PGGGA	195633.2	3910.931	N	9636.38	W	
16	amherst_seg_eBU							5	145.1 14-p140_333-145634-190315	\$PGGGA	195633.7	3910.932	N	9636.378	W	
17	amherst_seg_eBU							5	155 15-p150_25-145635-190315	\$PGGGA	195634.2	3910.933	N	9636.377	W	
18	amherst_seg_eBU							5	165.1 16-p160_583-145635-190315	\$PGGGA	195634.7	3910.934	N	9636.375	W	
19	amherst_seg_eBU							5	175.1 17-p170_5-145636-190315	\$PGGGA	195635.1	3910.935	N	9636.374	W	
20	amherst_seg_eBU							5	185 18-p180_25-145636-190315	\$PGGGA	195635.6	3910.936	N	9636.372	W	
21	amherst_seg_eBU							5	195 19-p190_167-145637-190315	\$PGGGA	195636.1	3910.937	N	9636.371	W	
22	amherst_seg_eBU							5	205 20-p200_333-145637-190315	\$PGGGA	195636.6	3910.938	N	9636.369	W	
23	amherst_seg_eBU							5	215 21-p210_333-145638-190315	\$PGGGA	195637	3910.939	N	9636.368	W	
24	amherst_seg_eBU							5	225 22-p220_25-145638-190315	\$PGGGA	195637.5	3910.94	N	9636.366	W	
25	amherst_seg_eBU							5	238.2 23-p233_25-145639-190315	\$PGGGA	195638.1	3910.941	N	9636.364	W	
26	amherst_seg_eBU							5	245 24-p240_417-145639-190315	\$PGGGA	195638.5	3910.942	N	9636.363	W	
27	amherst_seg_eBU							5	255 25-p250_167-145640-190315	\$PGGGA	195638.9	3910.943	N	9636.362	W	

Figure 70. Example Image Data .csv file

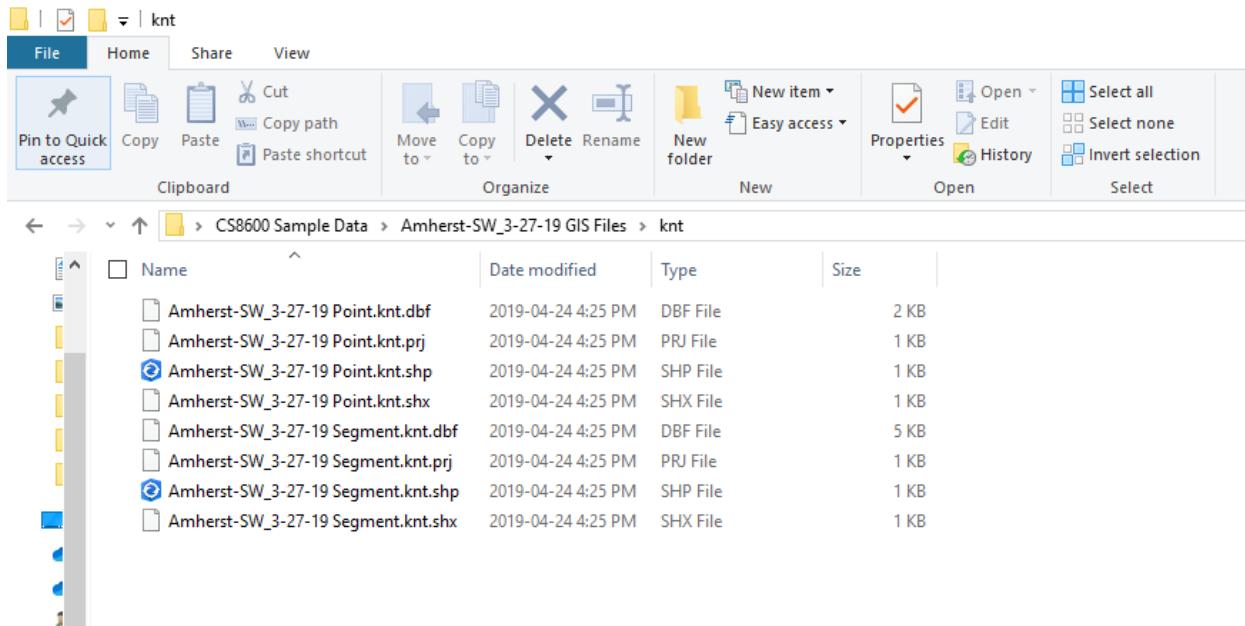


Figure 71. knt folder opened with the Events and Exclusions GIS data

Auto Export

Auto Export on Run Completion enables the export of data automatically following the completion and saving of a collection. Most export types are supported in this feature. Auto Export on Run Completion must be enabled in Settings>Configuration.

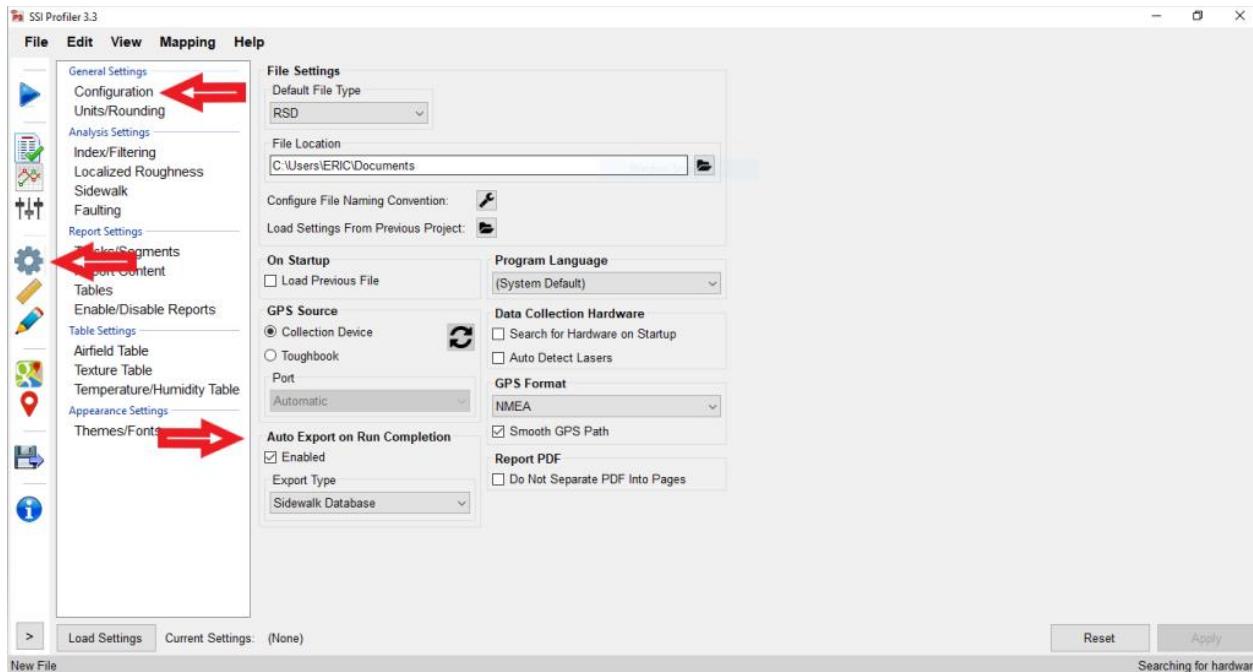


Figure 72. Configuration window with Auto Export enabled

Sidewalk Database

If Auto Export on Run Completion is enabled, and “Sidewalk Database” selected from the drop-down menu in the Configuration window, pertinent sidewalk data will export automatically after a collection is completed. When “Append To File” is checked, each new data collection will be added to end of the last collection in existing .csv file. **Ensure .csv files being appended to are not open when auto export is attempted (run completion). Auto Export files are dependent on current Settings; configure before collection.**

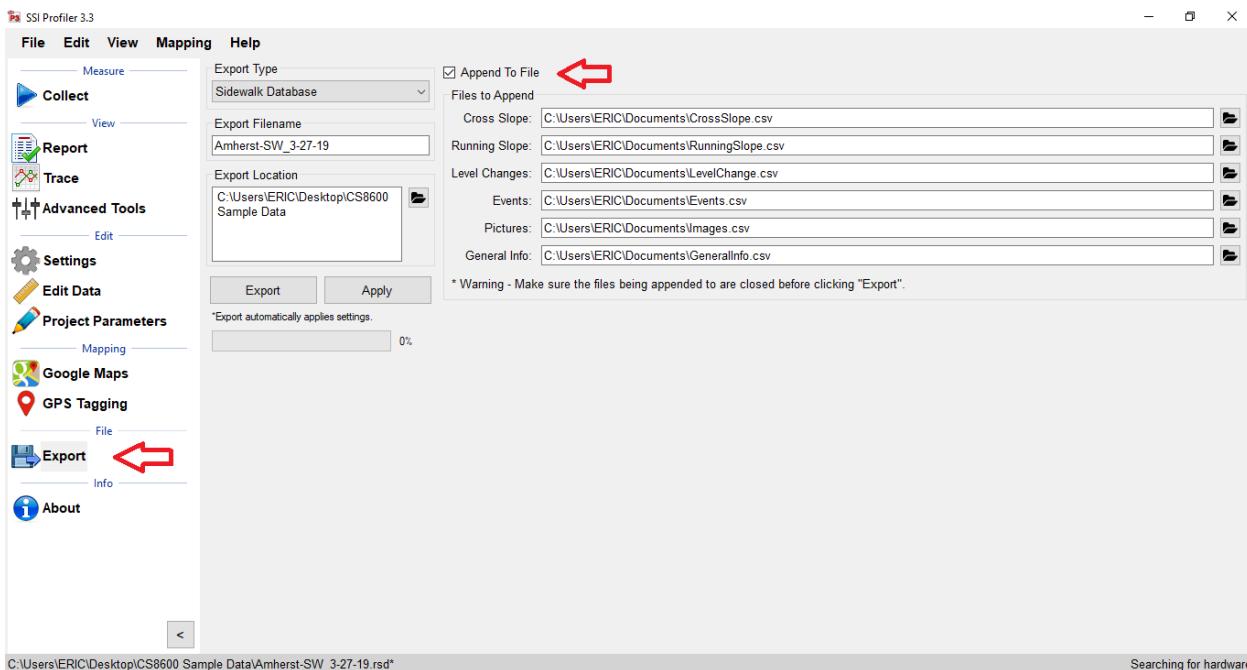


Figure 73. Sidewalk Database export option

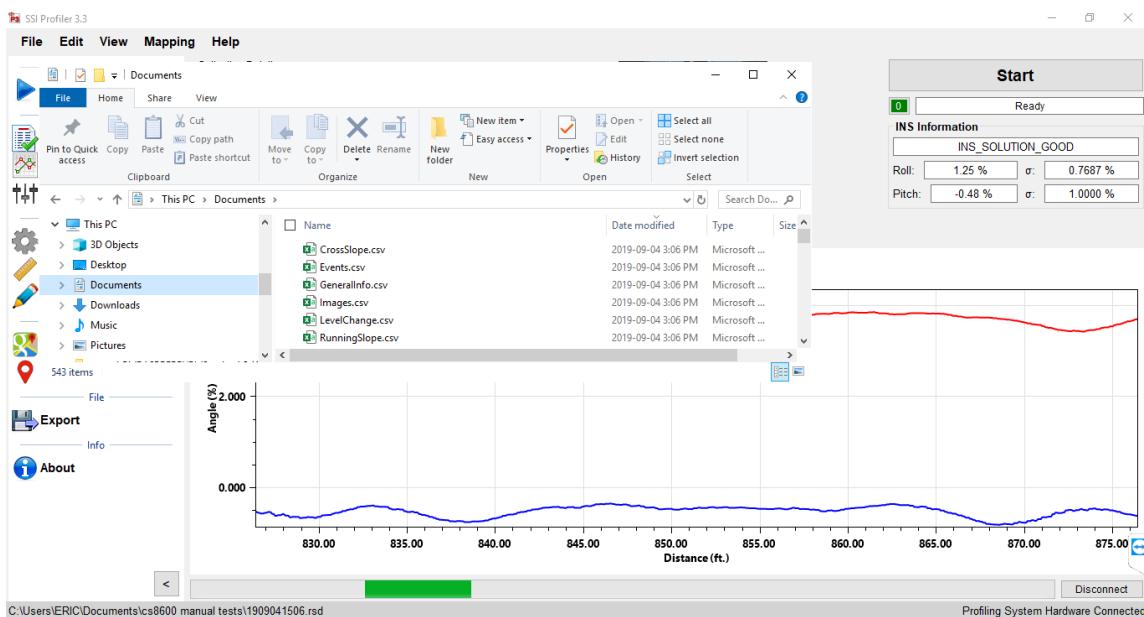


Figure 74. Auto Export CSV files

CrossSlope.csv - Excel

Bryant Umscheid Share

Slope	Start_ft	End_ft	Start_Latitude	Start_Longitude	End_Latitude	End_Longitude	Range_Min_%	Range_Max_%	Min_%	Max_%	Session_ID	Device_ID	Session_N	Date_Time	Operatic	Note
1	0+11.333	0+14.583	39.18531867	-96.60576304	39.18532297	-96.60575309	2	3	2	2.05	1	1	1	1.91E+09	2019-09-04 15:00	
2	2+0+2.083	0+64.583	39.18531566	-96.60560518	39.18531129	-96.6055989	-2	-3	-2.11	-2	1	1	1	1.91E+09	2019-09-04 15:00	
3	3 0+71.750	0+74.583	39.185297	-96.60558417	39.18529059	-96.60557967	-2	-3	-2.19	-2.01	1	1	1	1.91E+09	2019-09-04 15:00	
4	4 0+86.667	1+58.833	39.18526189	-96.60557199	39.185122	-96.60557295	-2	-3	-2.92	-2	1	1	1	1.91E+09	2019-09-04 15:00	
5	5 2+02.583	2+27.750	39.1850783	-96.60586128	39.18501884	-96.60593713	2	3	2	2.99	1	1	1	1.91E+09	2019-09-04 15:00	
6	6 2+27.750	2+33.917	39.18501884	-96.60593713	39.18500836	-96.60595527	3	4	3.01	3.45	1	1	1	1.91E+09	2019-09-04 15:00	
7	7 2+33.917	2+38.667	39.18500836	-96.60595527	39.1850018	-96.60596877	2	3	2.79	3	1	1	1	1.91E+09	2019-09-04 15:00	
8	8 2+38.667	2+45.750	39.18500018	-96.60596877	39.18498699	-96.60598874	3	4	3	3.23	1	1	1	1.91E+09	2019-09-04 15:00	
9	9 2+45.750	2+54.000	39.18498699	-96.60598874	39.18497011	-96.60600965	2	3	2.78	3	1	1	1	1.91E+09	2019-09-04 15:00	
10	10 2+54.000	2+59.083	39.18497011	-96.60600965	39.18495867	-96.60602139	3	4	3	3.29	1	1	1	1.91E+09	2019-09-04 15:00	
11	11 2+59.083	2+69.333	39.18495867	-96.60602139	39.1849315	-96.60604029	2	3	2	2.98	1	1	1	1.91E+09	2019-09-04 15:00	
12	12 2+74.083	2+90.083	39.18491789	-96.60604044	39.18486976	-96.60604149	2	3	2.01	3	1	1	1	1.91E+09	2019-09-04 15:00	
13	13 2+90.083	3+01.333	39.18486976	-96.60604149	39.18483985	-96.60601996	3	4	3.01	3.5	1	1	1	1.91E+09	2019-09-04 15:00	
14	14 3+01.333	3+04.500	39.18483985	-96.60601996	39.18483261	-96.60601274	2	3	2	3	1	1	1	1.91E+09	2019-09-04 15:00	
15	15 3+81.083	5+30.833	39.18466548	-96.60584471	39.18434006	-96.60551352	2	3	2	2.73	1	1	1	1.91E+09	2019-09-04 15:00	
16	16 5+92.167	5+98.583	39.18420822	-96.60537593	39.18419483	-96.60536212	2	3	2	2.14	1	1	1	1.91E+09	2019-09-04 15:00	
17	17 6+04.250	6+44.083	39.18418245	-96.60534934	39.18409641	-96.60525928	2	3	2	2.76	1	1	1	1.91E+09	2019-09-04 15:00	
18	18 6+48.417	6+56.750	39.18408689	-96.60524932	39.18406937	-96.605231	2	3	2	2.19	1	1	1	1.91E+09	2019-09-04 15:00	
19	19 6+58.333	6+66.250	39.18406578	-96.60522728	39.18404837	-96.60520917	2	3	2	2.17	1	1	1	1.91E+09	2019-09-04 15:00	
20	20 7+36.083	7+41.333	39.18389719	-96.60505303	39.18385686	-96.60504124	2	3	2	2.08	1	1	1	1.91E+09	2019-09-04 15:00	
21	21 7+48.417	7+54.417	39.183887	-96.6050252	39.18385738	-96.60501228	2	3	2	2.17	1	1	1	1.91E+09	2019-09-04 15:00	
22	22 7+56.000	8+26.750	39.18385372	-96.60500855	39.18369969	-96.6048505	2	3	2	2.72	1	1	1	1.91E+09	2019-09-04 15:00	
23	23 8+29.583	8+50.833	39.18369358	-96.60484404	39.18364761	-96.60479574	2	3	2	2.7	1	1	1	1.91E+09	2019-09-04 15:00	
24	24 8+54.750	8+71.167	39.18363896	-96.60478663	39.1836051	-96.60475108	2	3	2	2.29	1	1	1	1.91E+09	2019-09-04 15:00	
25	25 8+75.000	8+76.333	39.18360099	-96.60474678	39.18359977	-96.6047455	2	3	2	2.06	1	1	1	1.91E+09	2019-09-04 15:00	
26	27															

Figure 75. Cross Slope CSV file example

Exporting to Excel Format

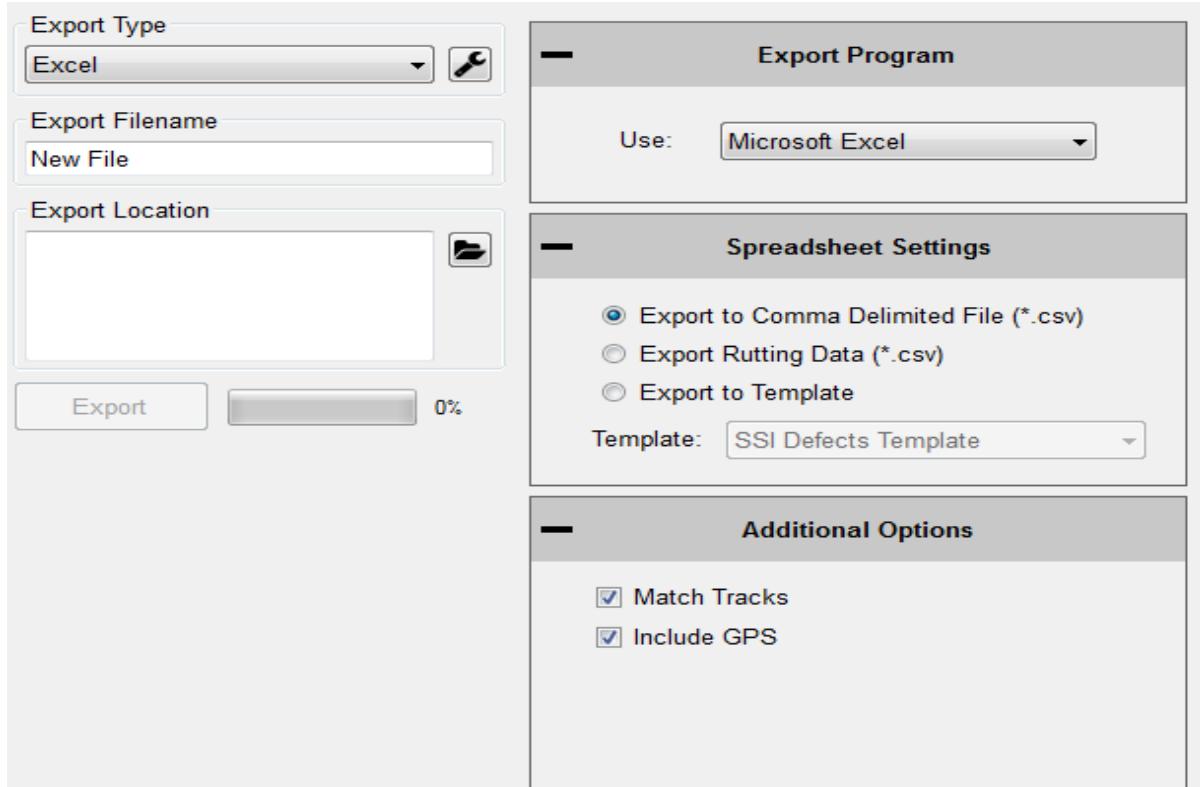
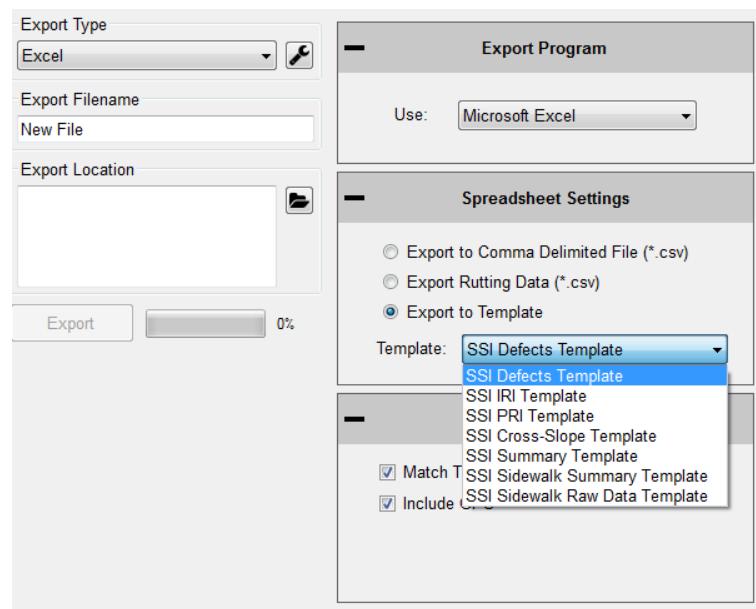


Figure 76. Exporting the data into Microsoft Excel format

Export to Template

To choose a SSI Excel Template, select “Export to Template.”

Only “SSI Sidewalk Summary Template” and “SSI Sidewalk Raw Data Template” can be used with the CS8600 system.



SSI Sidewalk Summary Template

The SSI Sidewalk Summary Template contains Cross Slope, Running Slope, Level Changes, and Event Notes information in four separate sheets. Cross Slope and Running Slope sheets contain only “out of tolerance” sections.

Figure 77. Types of Excel formats are listed

SSI Sidewalk Raw Data Template

SSI Sidewalk Raw Data Template contains Station (inch increments), Cross Slope, Running Slope, Level Changes, Events, and GPS Location in one sheet. Contains all data collected.

General Settings

Configuration

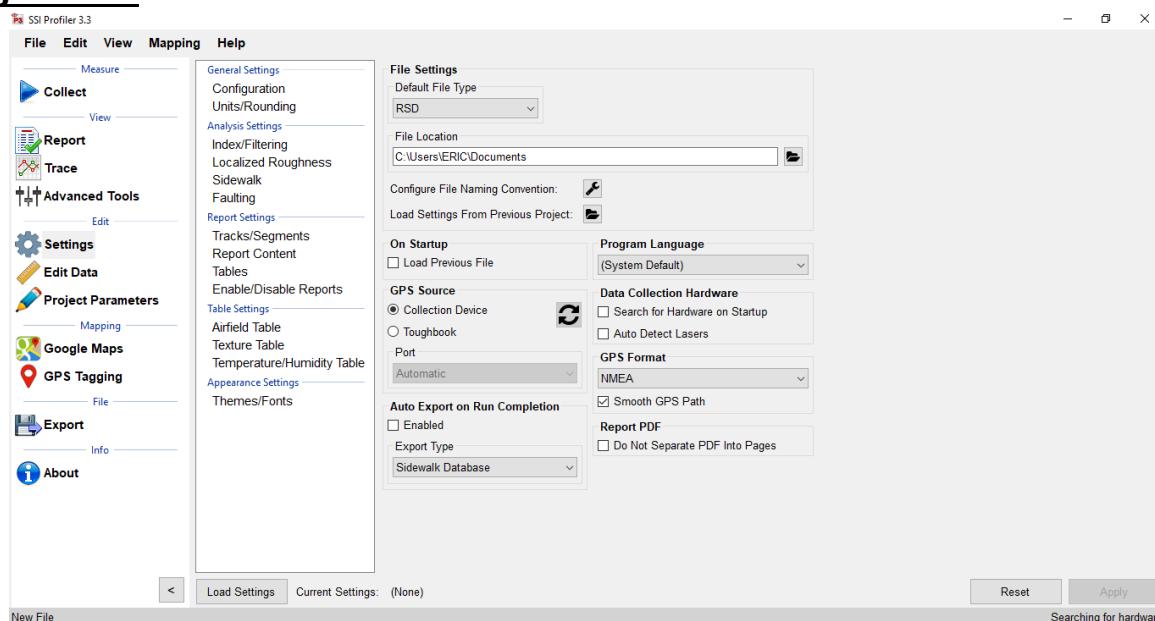


Figure 78. Configuration window under General Settings

File Settings

Default File Type (RSD, RHD)

The drop-down menu can be used to select the type of file opened in Profiler V3. Both RHD and RSD files can be imported into the program at any time. The default file type is the file format that will be used automatically when files are opened. **Profiler V3 only saves in the RSD format.**

Default File Location

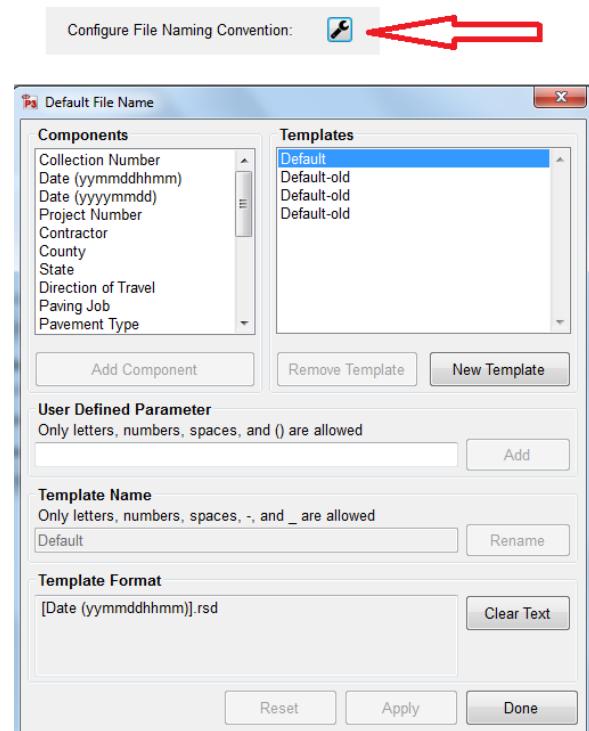
The default file location is the folder on the computer or external device that Profiler will search for the default file type. This folder can be changed through the Browse icon. If a location is used to open a file, the program will use this location to open files for future attempts. This feature saves time opening files since the program opens directly to the file location. Select **Apply** after a folder is chosen.

Default File Name

The file name can be chosen to have a name based on parameters of the program or by using a pre-loaded template. The parameters can be chosen from the list of (multiple can be chosen): Contractor, Country, Tester, etc. When a template is selected there will be a preview at the bottom of the window. Select OK and Apply to set this configuration as the default file name.

Creating a New Template

Create a New Template by selecting the “New Template” icon on the right side of the window. Select the template’s name to rename it and append parameters to it. ***The template will be used as long as it is selected when OK is selected at the bottom right corner when exiting the Default File Name tool.***



User Defined Parameter

To create parameters that are specific to the job, type a new parameter name into the User Defined Parameter text box and select “Add User Defined Parameter.” The bracketed variable will appear in the filename preview. To add information to the user defined parameter, open Project Parameters and the User Defined Tab. The name of the parameter will be under the Key column. Under the Value column, enter the information that is needed in the filename.

Figure 79. Custom file naming convention

Changing the Template Name

The template's name can be changed by changing the characters under Template Name. Once a change is made, the Rename icon will be available. Select OK or Apply to save the changes.

Adding Parameters to the Template

When adding parameters to the template they will only be added to the right end of the template, as seen in the naming preview. **Select *Apply* after changes are made to the template.**

On Startup

Load Previous File on Startup

If this box is selected in figure 85, the file that was open when profiler closed last will be reopened when the program is started. A report of this file will be generated when the program is opened.

Load Previous File's Settings

The user may choose a previous file to save time if entering the same analysis parameters or project parameters under "Settings." To load a previous file's setting's, choose the file under General Settings **or** start a new file and choose one of the three options.

Use Last File's Parameters

This option will use the last file's settings under the localized roughness and project parameters.

Choose from a Previous File (Browse)

When this option is chosen a window explorer window will appear and the user may select a file that is saved on the computer to import the saved file's parameters under analysis and project parameters.

Set File Parameters after Collection

By choosing this option the user will not import a previously collected file but will instead manually set the parameters after the collection has finished.

Automatically Refresh Reports

The reports will automatically refresh when the operator navigates to the report window from another tab. When the user makes a change of report type within the report window, the refresh button will have to be selected manually.

Data Collection Hardware

Search for Hardware on Startup

If this option is selected the program will search for hardware and, if available, will connect to it upon opening the program.

Disconnect Hardware When Changing Tabs

If this feature is checked the program will disconnect from the hardware when the operator leaves the collect tab.

Report Generation

Generate Reports in Color

If the reports are generated in color, the defect types will be more visible. On the trace reports dips will appear be highlighted blue and bumps will be highlighted red.

Include the Footer

If the footer is included, the file name and the page number will be printed at the bottom of each page for the report. Select the check box to apply this feature.

Do not include the footer while printing with a Printrex 422.

Enable Animations

When enable animations is selected, the windows within Profiler V3 will slide across the screen whenever the operator moves from one section to another (Reports to Collect). This feature does not affect the functionality of the program, but adds an aesthetic behavior when changing windows.

Formatting

Font Settings

The report font can be changed by selecting the Font Settings icon under formatting. This allows the user to make the size of the font smaller or larger. The image scaling allows the user to print off less pages by increasing the scaling factor. The window that appears can also change the font to a strike-through or an underline.

Image Scaling

The default for the image scaling is 100%. When image scaling is set to a percentage greater than 100%, it acts the same way as the zoom function. The size of the traces within the reports will increase.

Profiler Software Update

Profiler V3 will check the internet connection by attempting to connect to the website listed under this location. If the internet connection is found, the updates will be available for download from the SSI server.

Program Language

Choose between English, Spanish (North/Central America) and, Spanish (South America)

Analysis Parameters (Ride Values)

Profiling Units

English

Selecting English units sets the segment length to 528 feet. English units use inches for the height of the defects, counts for roughness settings, and feet for scallop width and filter lengths. After every change of units, select apply in the lower right corner to save.

Metric Meters

In Metric Meters units, the blanking band, scallop height and scallop resolution are all in cms.

The rest of the measurements for scallop width and filter lengths are in meters. The Metric Meters and Metric Centimeters settings have the same units of centimeters for height, and meters for length for all sections of defects and roughness. After every adjustment of units, select apply.

Metric Centimeters

Selecting Metric Centimeters units, the blanking band, scallop height and scallop resolution are all in centimeters. The rest of the measurements for scallop width and filter lengths are in meters. The Metric Meters and Metric Centimeters settings have the same units of centimeters for height, and meters for length, for all sections of defects and roughness. After every adjustment of units, select apply in the lower right corner to save changes.

Metric Millimeters

Selecting Metric Millimeters units, the blanking band, scallop height and scallop resolution are all in millimeters. The rest of the measurements for scallop width and filter lengths are in meters. After every adjustment of units, select apply in the lower right corner to save changes.

Exclude Paused Sections

When selected, the paused sections created during collection or through the Segment Adjustment window will not be included in the report.

Include Paused Sections

When Include Paused Sections is selected, the paused sections are included with the actual collection. The report will show the paused sections in the segment summary and the trace view.

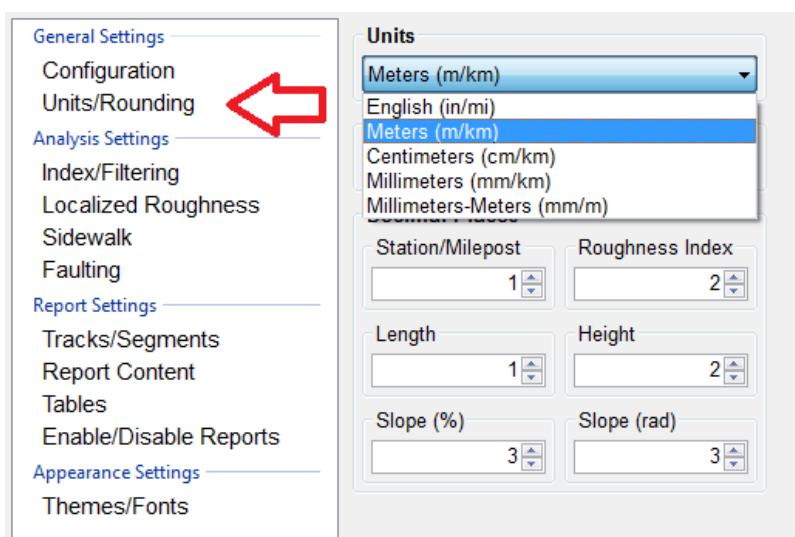


Figure 80. Units and rounding section of the General Settings

Paused Sections Only

When 'Include Paused Sections Only' is selected from the drop-down menu, only the paused sections created during collection or through the Segment Adjustment Window will be displayed in reports.

Analysis Settings For Sidewalk

Sidewalk settings affect the Sidewalk Report, Image Summary Report, and all Sidewalk related exports.

ADA compliance standards dictate default values for Max Running Grade (5%), Max Cross Slope (2%), Level Changes 1:1 Height (.25"), 1:2 Height (.5"). However, these values can be adjusted by the user.

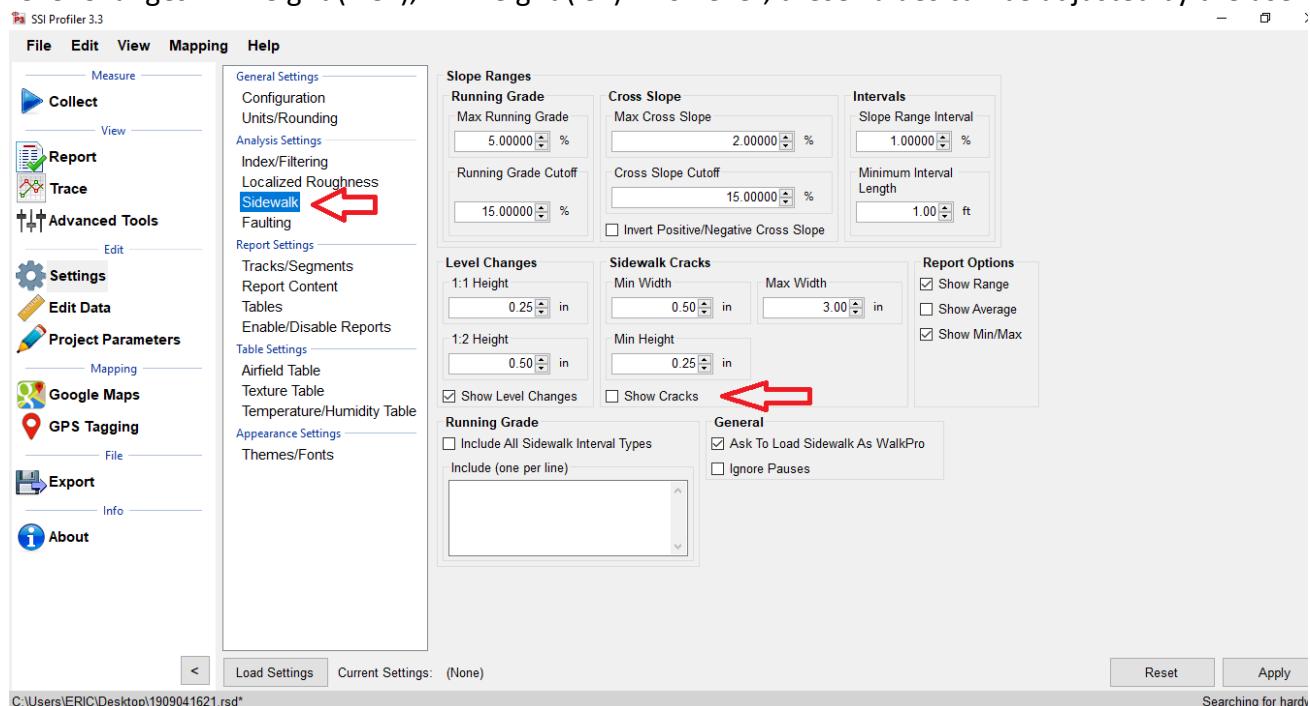


Figure 81. Sidewalk parameters under Analysis Settings

Running Grade

Max Running Grade (%): Running slope (pitch) greater than this threshold will be counted as out of tolerance for reports and exports.

Running Grade Cutoff (%): Running slope greater than this threshold will be grouped into one interval. For example, all slopes over 15% will be 15%+.

Cross slope

Max Cross Slope (%): Cross slope (roll) greater than this threshold will be counted as out of tolerance for reports and exports.

Cross Slope Cutoff (%): Cross slope greater than this threshold will be grouped into one interval, for example, all slopes over 15% will be 15%+.

Intervals

Slope Range Interval (%): Running Grade and Cross Slopes sections will be grouped together when inside this range for reports and exports. For example, setting of 1% would result in intervals of 2-3%, 3-4%, 4-5%, etc.

Minimum Interval Length: Out of tolerance slopes must be out of specified range for at least this length to be counted.

Level Changes

1:1 Height (in): Refers to rise over run (1:1) height that must be surpassed in order to be considered an out of tolerance level change. For example, a surface elevation change of .20" in .25" run will not be considered a level change if 1:1 height is .25".

1:2 Height (in): Refers to rise over run (1:2) height that must be surpassed in order to be considered an out of tolerance level change. For example, a surface elevation change of .45" in 1.0" run will not be considered a level change if 1:2 height is .5".

Show Level Changes: Must be checked to report and export level change data.

Cracks

Min Width (in): Minimum width required to be considered a crack.

Max Width (in): Maximum width to be considered a crack. Wider depressions will be subject to Level Change requirements.

Min Height (in): Minimum depth from travelled surface to bottom of depression to be considered a crack.

Show Cracks: Must be checked to report and export crack data. Crack data will be included with level change data.

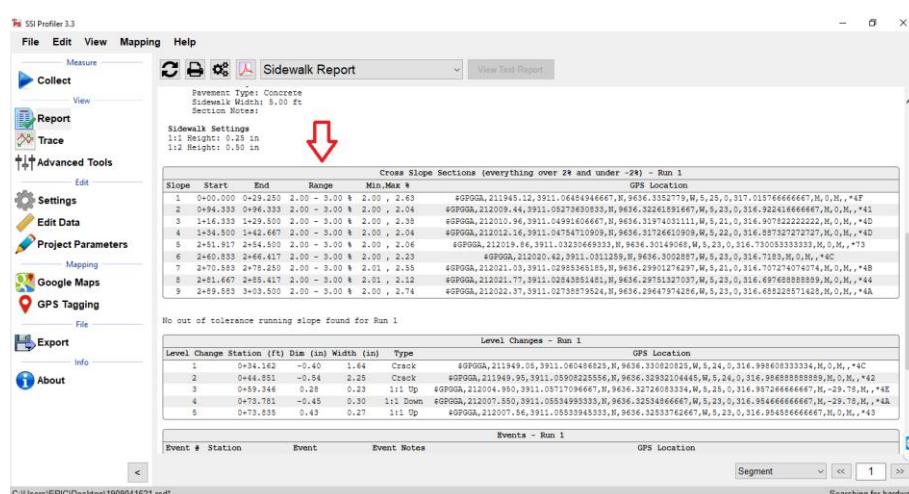
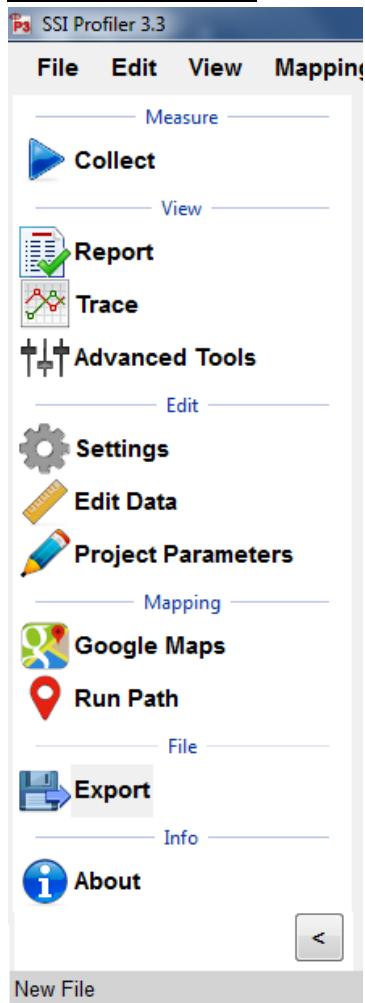


Figure 82. One percent range shown in the report for 2% max cross slope

Shortcut Bar



The Shortcut Bar is located at the left side of the main window. The shortcut bar is used to navigate around the profiler program without using the menu bar.

The shortcut bar can be hidden by selecting the arrow at the bottom of the window. The direction that the arrow is pointing is the direction that the shortcut bar will move. It will either become hidden or reappear.

Figure 83. Shortcut bar with all the frequently used windows.

Edit Data

Note: Any edit to the data will be described in the report header under File Modifications.

The edit data feature allows the user to adjust the starting station, insert pauses, or add events. All of this can be done in post processing, after a collection has been completed.

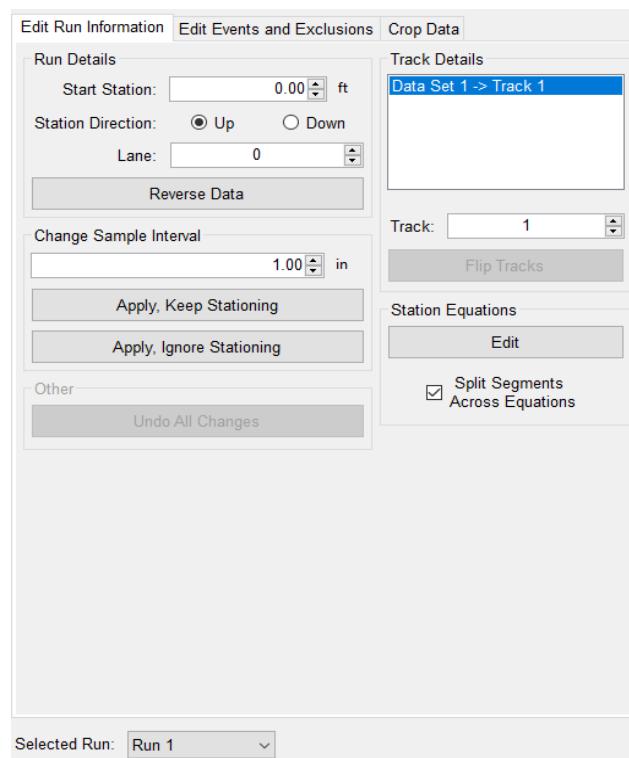


Figure 84. Edit run information tab

Edit Run

Open the Edit Data feature in the shortcut bar (Look for the ruler icon). Under Edit Run Information Tab, the user can adjust starting station, Lane, Track, and Station Equations. If the data was collected in the wrong station direction, the operator can change to Station Direction to Up or Down or use the 'Reverse Data' button.

Sampling Interval

The sampling interval is the distance between readings of the electronics of the profiling system (DMI, lasers, etc.). This is usually set to 1 inch, but can be changed under the 'Change Sample Interval'. Do not change the sample interval unless strictly necessary.

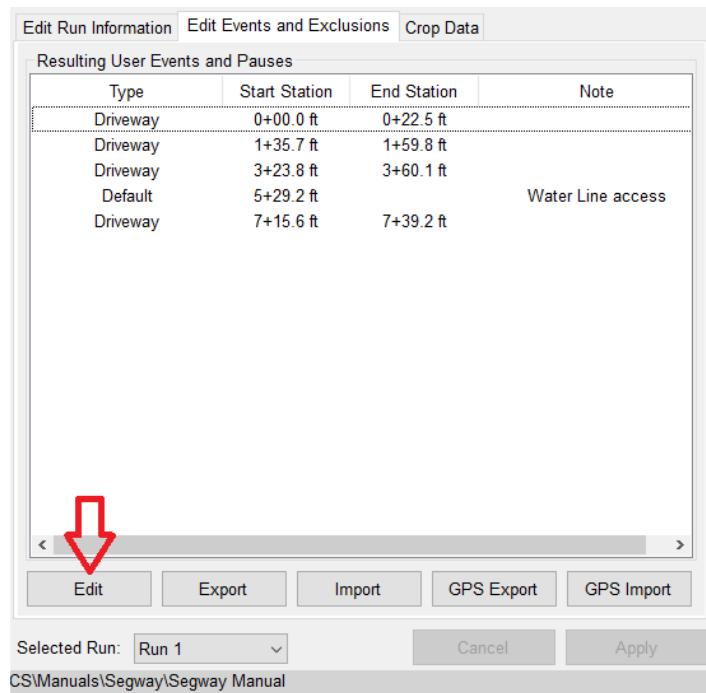
Edit Segments

The Edit Segment feature allows the user to add pauses to the collection or to ignore a certain distance of collected data at the beginning or end of the run.

Figure 85. Adding or removing pauses from the collection

Pause List

The Pause List shows all of the paused sections of the selected runs. The runs are selected from the drop-down menu of "Add Pause to Run."



Edit a Pause/Event

1. Select the pause or event to be edited in the left column list. It is selected when the blue bar is highlighted the Pause/Event title. See figure 86.
2. On the right side of the window, Select the run number to add the pause to from the drop-down menu.
3. Change the Type of Pause/Event
4. Change the Start and End Station.
5. Add a Note to the Pause/Event
6. Change Buffer settings.
7. Select the Apply button

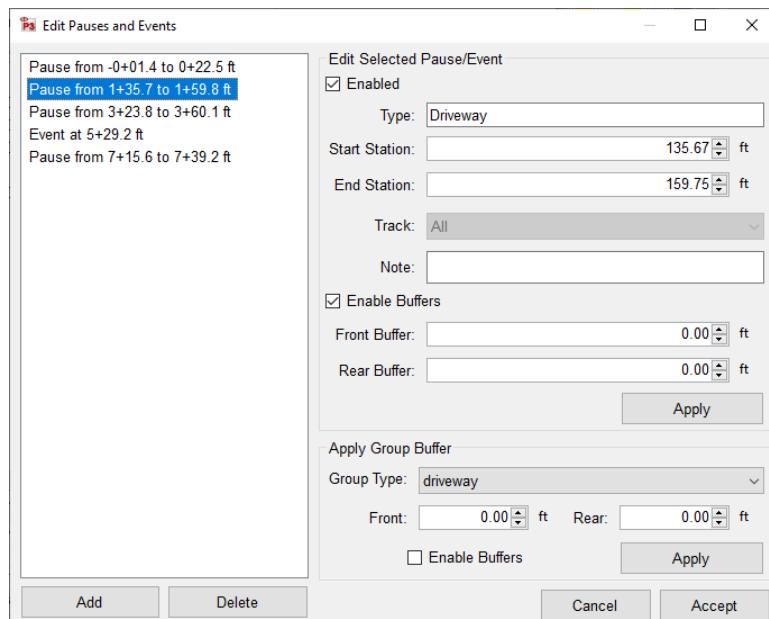


Figure 86. Edit pause and events window

Note: If the pause is going to be deleted, select the Delete icon to remove it from the list.

Add a Pause/Event

1. Select the 'Add' button under the Pause/Default list in figure 86 above.
2. Select Pause or Event
3. Enable Pause/Event information
4. Choose Type, Start Station and End Station
5. Add notes and/or buffers
6. Select the 'Add' button

Pause Definition

When the collection system is paused, height data is omitted but distance is still collected. When the paused sections are excluded, the height values are not used in the calculation of localized roughness or ride values.

Start Station

The Start Station is the stationing where the pause is to begin.

End Station

The End Station is the stationing where the pause will stop, and collection will resume.

Pause Notes

To explain the reason for the pause/event or the location, enter the information in the pause notes. This information will appear in the track notes of the trace reports. See figure 87.

Pause/Event Buffers

Choose the Pause/Event Front and Rear Buffers. The units can be changed by simply clicking on the unit icon to the right of the buffer and a dropdown list will appear. Select Add when finished.

Crop Data

The Crop Data tool (See figure 88 below) allows the user to trim the collections before analysis and reporting. If any changes are made to the file, the information that was changed will be described in the report header under File Modifications. To crop the collection, change the distances for the run up and/or run out distances. When the lengths are at the desired distances, select Apply.

Change the distance units and height units of the graph by clicking on the units icon and selecting from the drop down menu. The graph can also be seen in the Pan or Zoom mode with an option to apply on either the x axis, y axis or both.

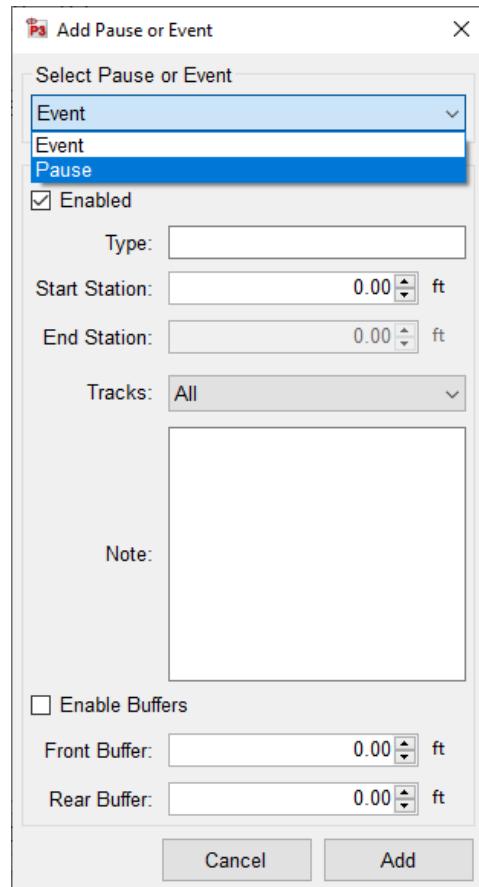


Figure 87. Add Pause/Event window

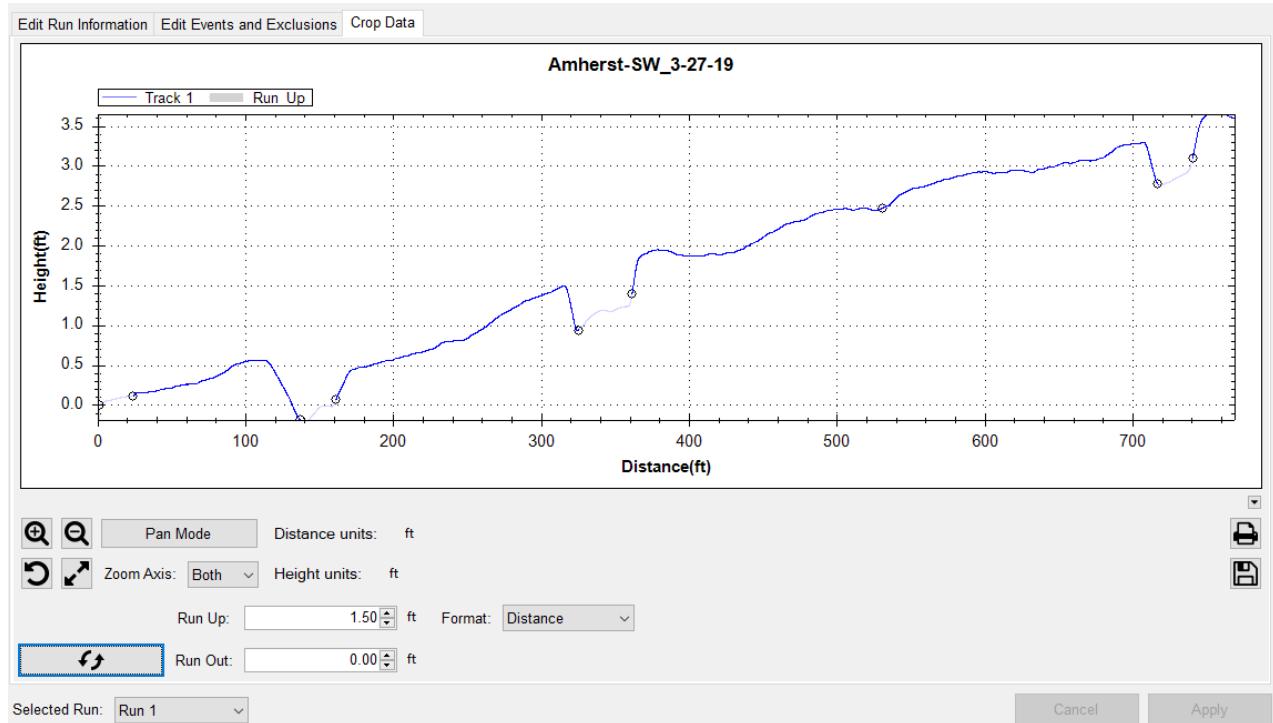


Figure 88. Crop Data Tool

Project Parameters

The Project Parameters section is the location where the job information is entered. This information appears on the header of the reports and the exported excel templates. Before leaving the Project Parameters window, always select 'Apply' if changes were made.

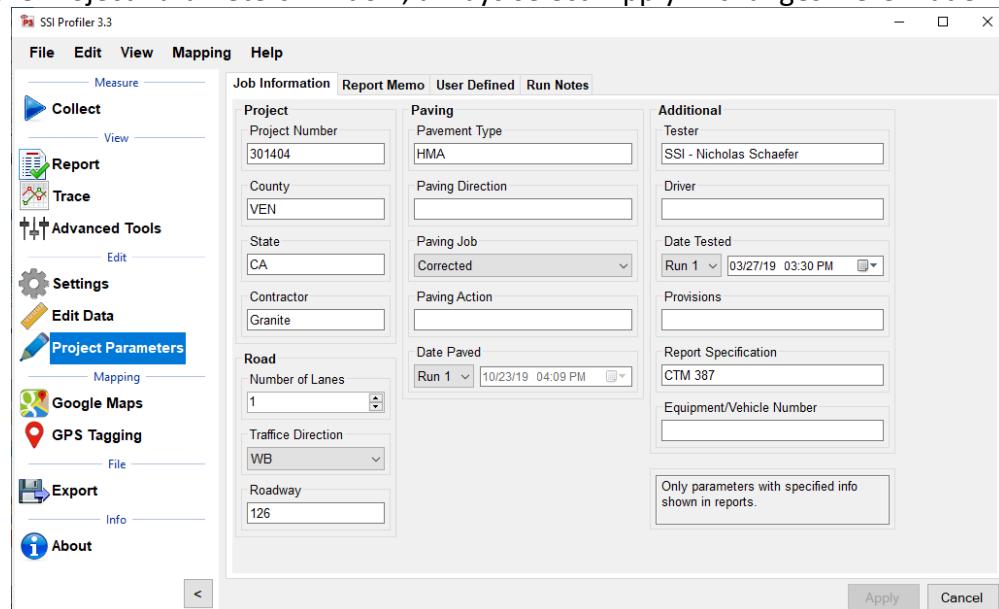


Figure 89. Project Parameters on the Job Information tab

Job Information

The job information tab specific criteria listed below are descriptive information about the project. Review the contract to enter the required information into the sections listed below. These sections can be edited at any time within Profiler V3.

Project

Project Number

The Project Number is unique to each project. This is to be determined by the State, Federal DOT or by the contractor. This information will be listed in the project contract.

County

This location is reserved to list the county where the profiling is taking place.

State

The state in which the profiling is taking place and the job is located.

Contractor

This section is for the name of the paving company or for the company operating the profiler.

Road

Traffic Direction

The traffic direction of the lane to be profiled.

Number of Lanes

The number of lanes of the project. This section can be changed by inputting values directly or by using the arrow keys. Traditionally, the number of lanes is the number of lanes travelling in the same direction for main line freeways. Use a classification system that can be understood during post-collection analysis.

Figure 90: Project Parameters window

Paving

Pavement Type

Input the type of pavement here. Enter pavement types such as Cold-in-Place Asphalt, HMA, JPCP, CRCP, Open Grade etc.

Paving Direction

Enter the direction of the paver when placing the pavement.

Paving Job

Specify the type of paving job, either corrected or original.

Paving Action

Under paving action list any further information about the paving process.

Additional

Tester

The individual operating the profiling equipment over the pavement surface.

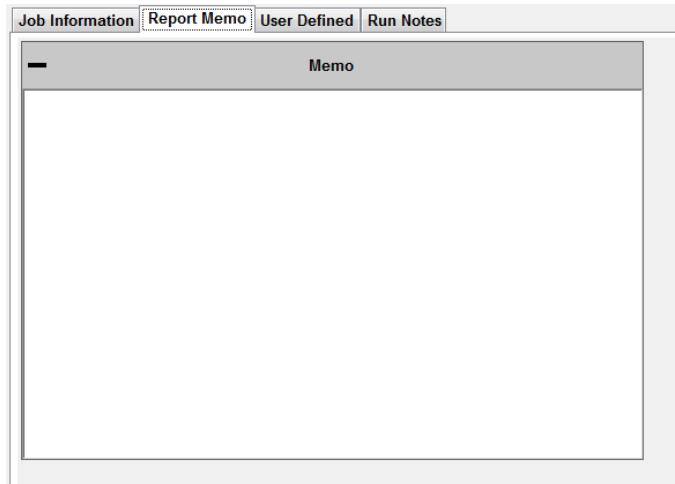
Provisions/Weather

The weather at the time of profiling the pavement. Such as: Cold, Hot, Overcast, Morning, Afternoon, Evening, etc.

Report Memo

Report Memo is a section available for inputting large amounts of text to be saved along with the data file. Anything from reminders to stationing can be inputted into the Report Memo and not influence the data.

Figure 91: Report Memo window



User Defined

Additional parameters can be stored in the data file as desired by the operator. Consult the contract for any additional user defined parameters that may be required for the profile data files. Add new parameters by selecting 'Add' at the bottom of the window. The parameters are entered by double-left clicking on the 'Key' column and typing in the required information.

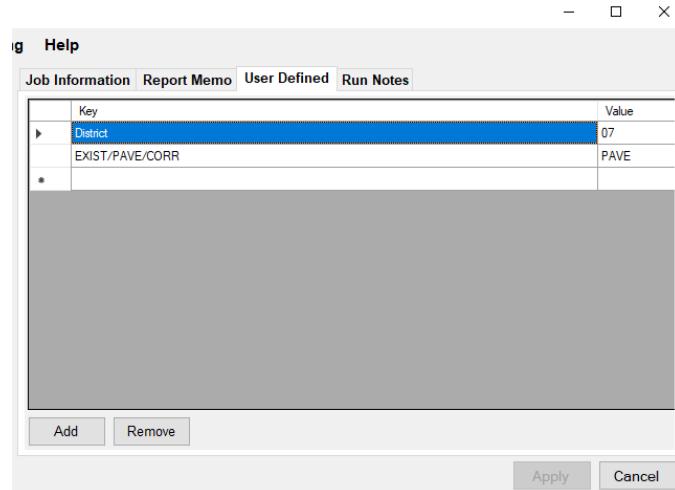
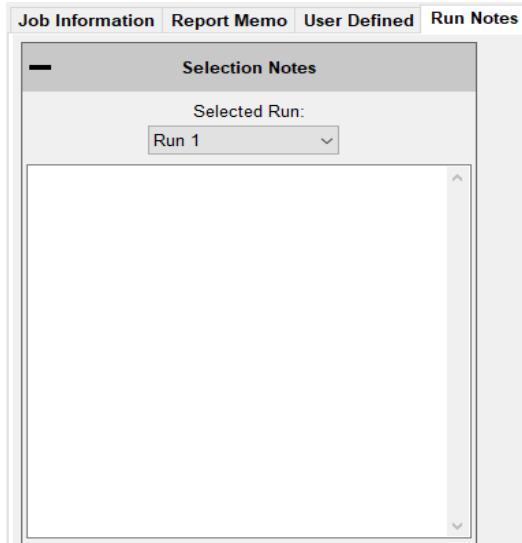


Figure 92. The user defined window

Run Notes

The Run Notes lets the user add specific notes to the run indicating whatever useful knowledge the operator wishes to associate and save with the file and run. This can include road and weather conditions. Press 'Apply' to save the changes.

Figure 93. The Run Notes window.



Settings

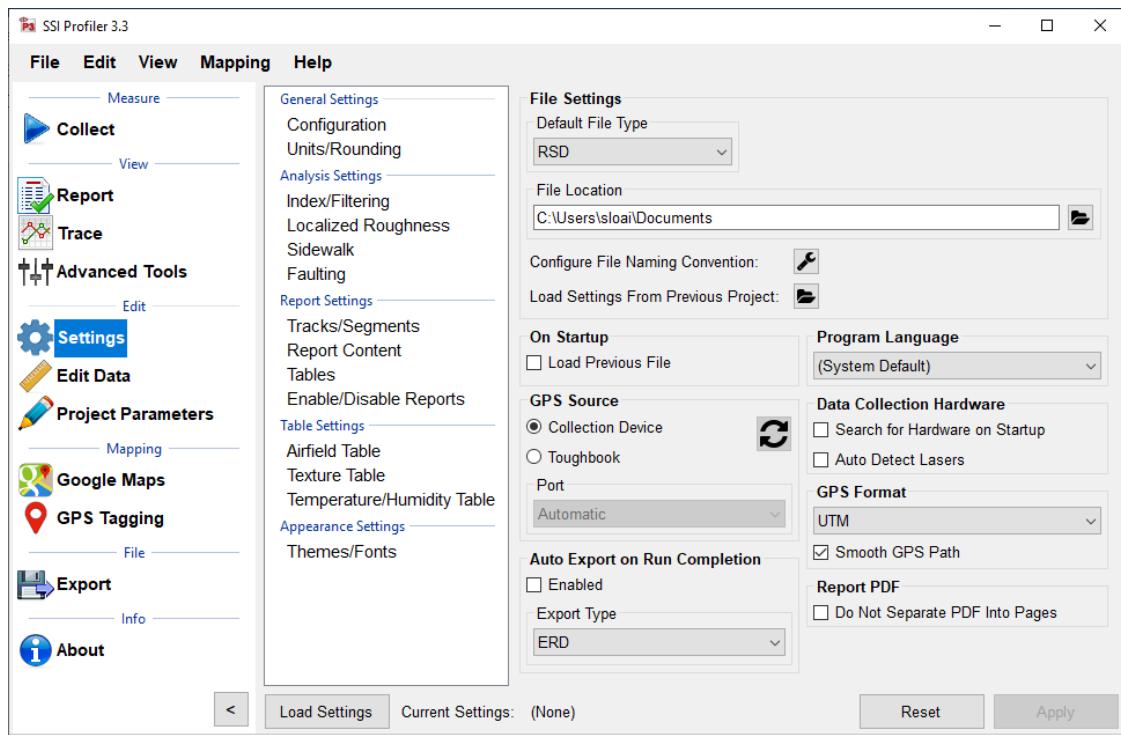


Figure 94: Report options window

Report Content

Chose which parameters to show in the Summary Report by clicking on the checkbox next to the following options: Show Defects Table, Show Rutting Table, Show Event Notes Table, Show Only Failing Segments. Below, the operator can choose whether to show Individual track 1 and track 2 Values or an Average for track 1 and track 2 values.

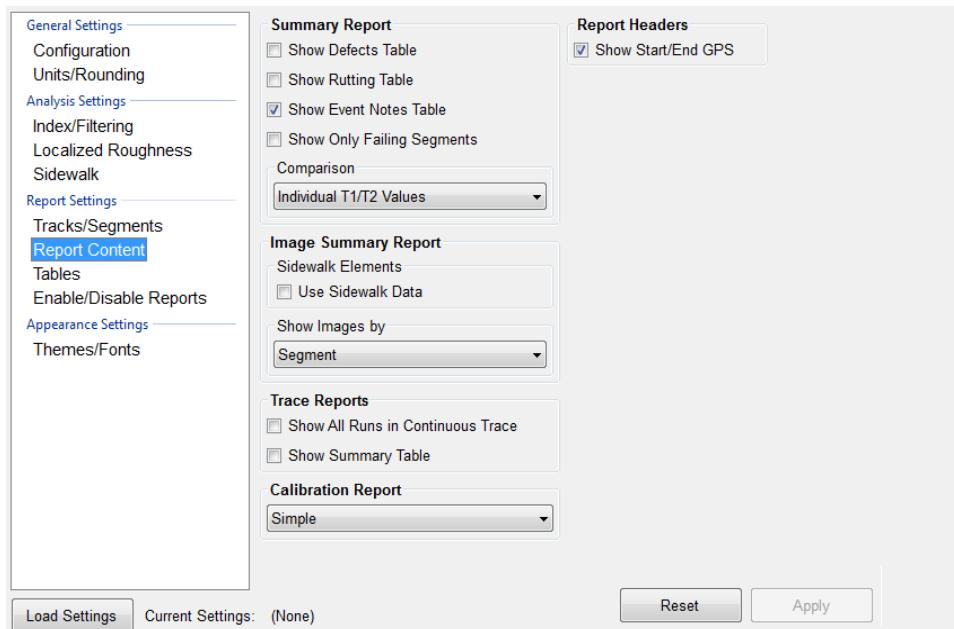
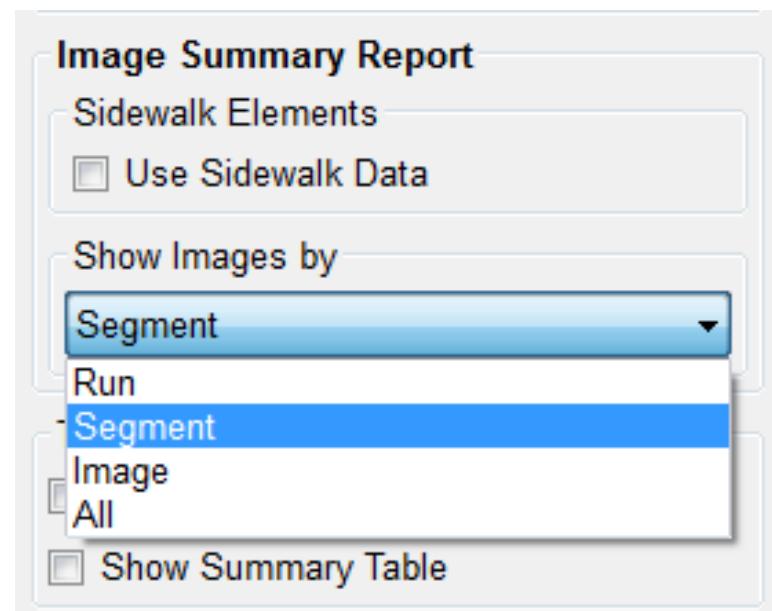


Figure 95. Report Content window

Image Summary Report

This section of the Report Content Tab allows for the operator to choose how to show the images collected (applicable to systems with a camera). The images can be shown by Run, Segment, Image or All. To configure for sidewalk data, check the “Use Sidewalk Data” box.

Figure 96: Image Summary Report options under Report Content.



Trace Reports

Choose to Show All Runs in a Continuous Trace and/or show the summary table by clicking on the checkboxes next to each option.

Calibration Reports

Simple Calibration Report

The simple report contains information about the software version and the calibration summary. The included calibrations are the accelerometer calibration constants, distance calibration counts, and inclinometer calibration settings.

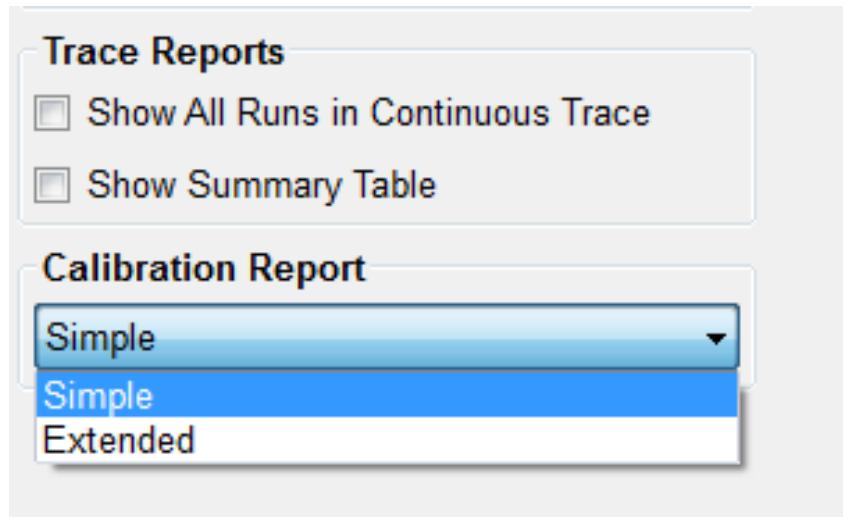


Figure 97. Calibration Report options

Extended Calibration Report

The extended report has the calibration and the verification data from the last verification procedures. The verifications for the inclinometer, height sensor, and the bounce test are all included along with the calibrations for the accelerometer, inclinometer, and distance encoder.

Tables

Select content desired to be reported in the Summary Table, the Rutting Table, The Trace Notes Table, the Slope Table and the Events Table. These will appear as additional columns.

Note: The Rutting table only applies to laser systems with more than three lasers. The Slope table only applies to systems with IMUs including some laser systems and the CS8600 system.

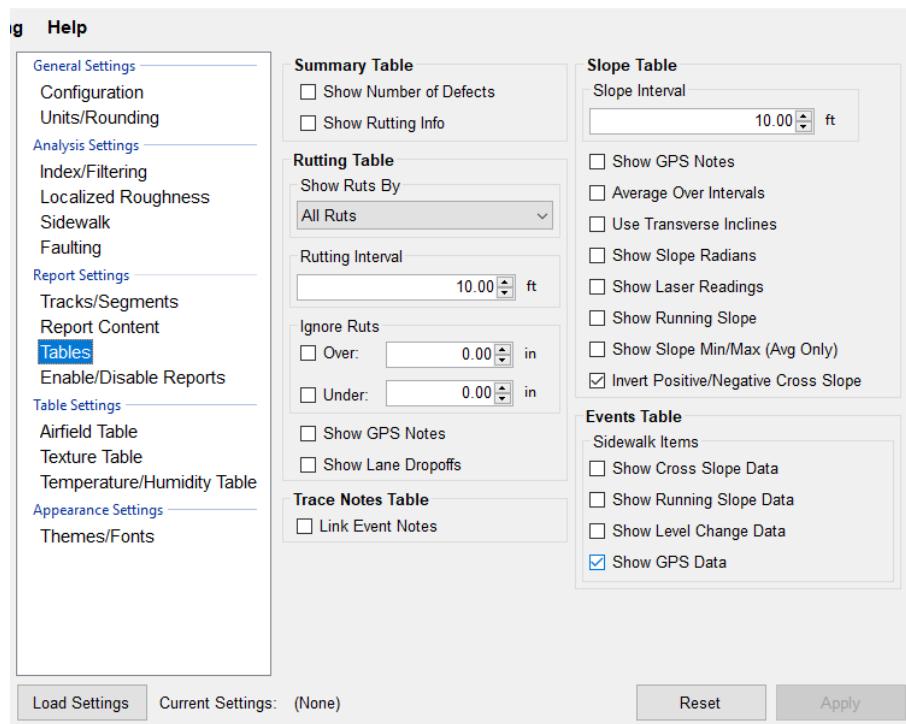


Figure 98. The Table options in Report Settings.

Enable/Disable Reports

This feature allows the user to select the type of reports that appear in the drop-down menu. To have a report not be displayed in the drop-down menu, deselect the check box. These reports will be reflected in the dropdown menu to the right and also in the Reports Section of Profiler V3. See figure 104.

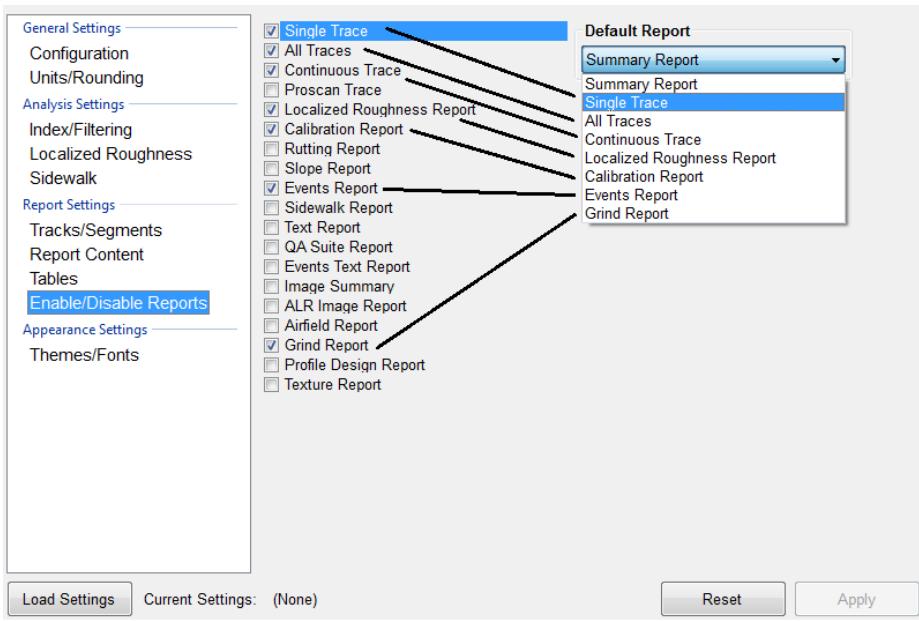
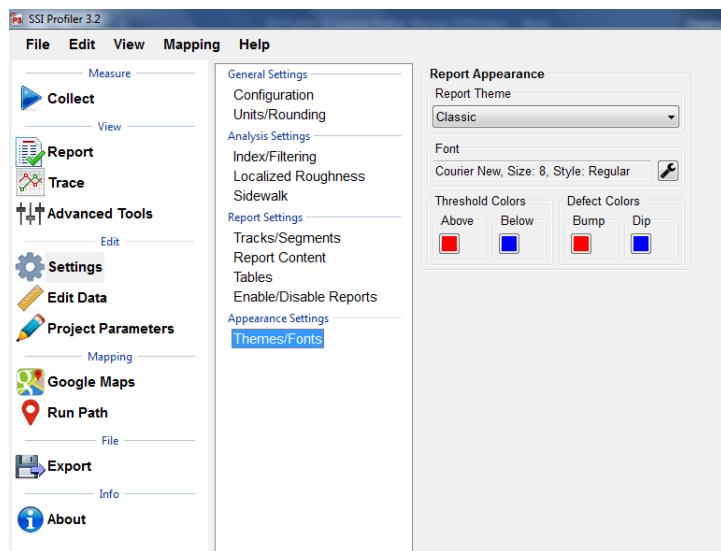


Figure 99. Enable/Disable Reports window

Themes/Fonts

Profiler V3 lets the operator choose between two different Reports Themes: Classic (default) and Light. The Font can also be changed along with the Threshold Colors and the Defect Colors.

Figure 100. Themes and Fonts option under Appearance settings.



View

Refresh Icon Print Icons Page Setup PDF Drop Down Report

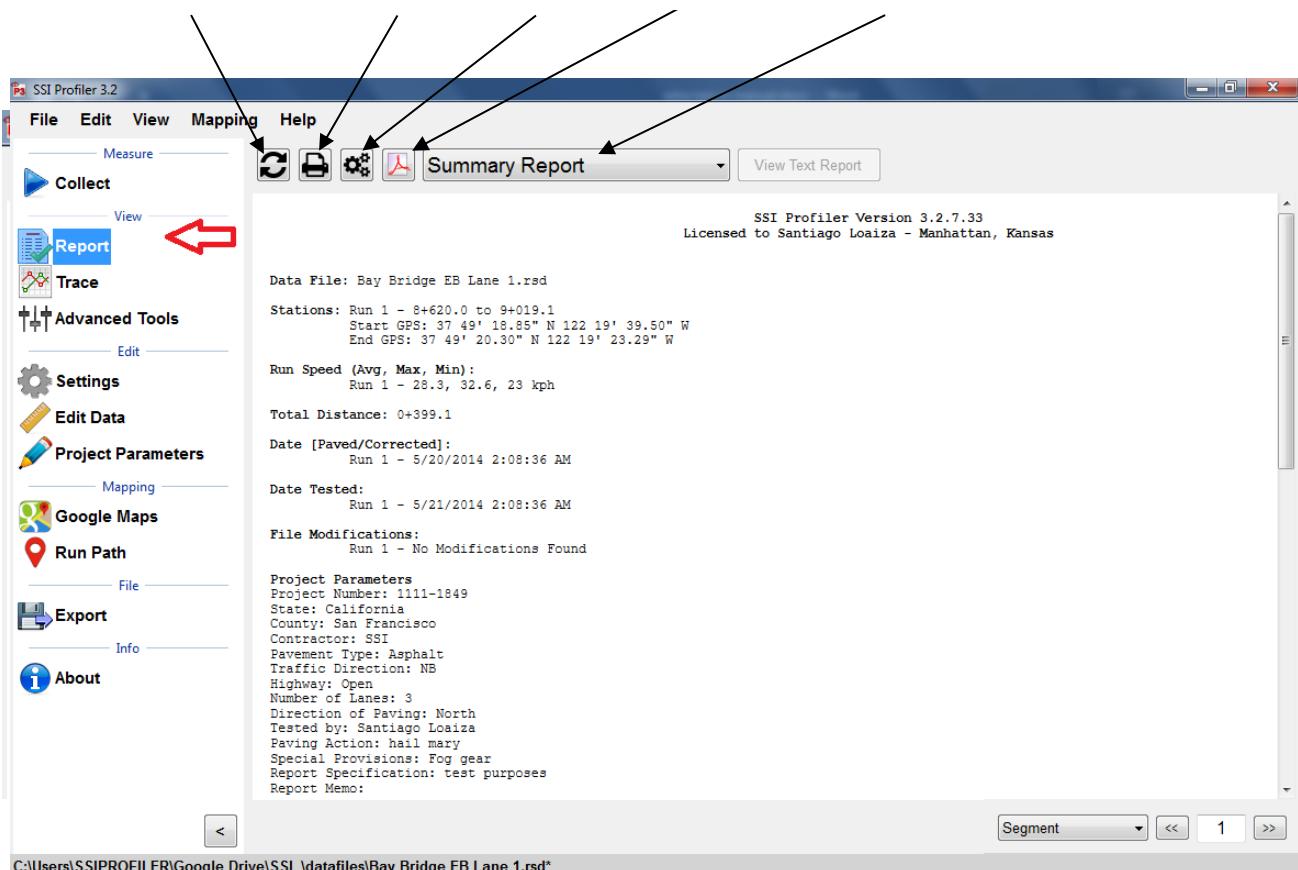


Figure 101: Summary header of a single trace report

Report

Refresh

It is required to refresh the Report window whenever a change is made to the Project Parameters, Settings, or Report Options. The refresh icon is located at the top left of the Report window. Select the refresh button and verify that the information is accurate before printing. Automatically Refresh may be selected in Tracks/Segments settings window. With this selected, reports will automatically refresh when changes are made.

Print

Always confirm the correct report is being printed by selecting the refresh icon.

A Connected Local Printer

To print a report select the print icon in the Report window or select CTRL+P on the keyboard. The print window will appear. Within the window, select the printer to be used and verify that the printer settings are correct. When 'Print' is selected, the document will be sent to the printer.

If more printing options are needed, select the 'Preferences' icon. This icon will open a window that is printer specific that contains information about the orientation, paper size, and image quality.

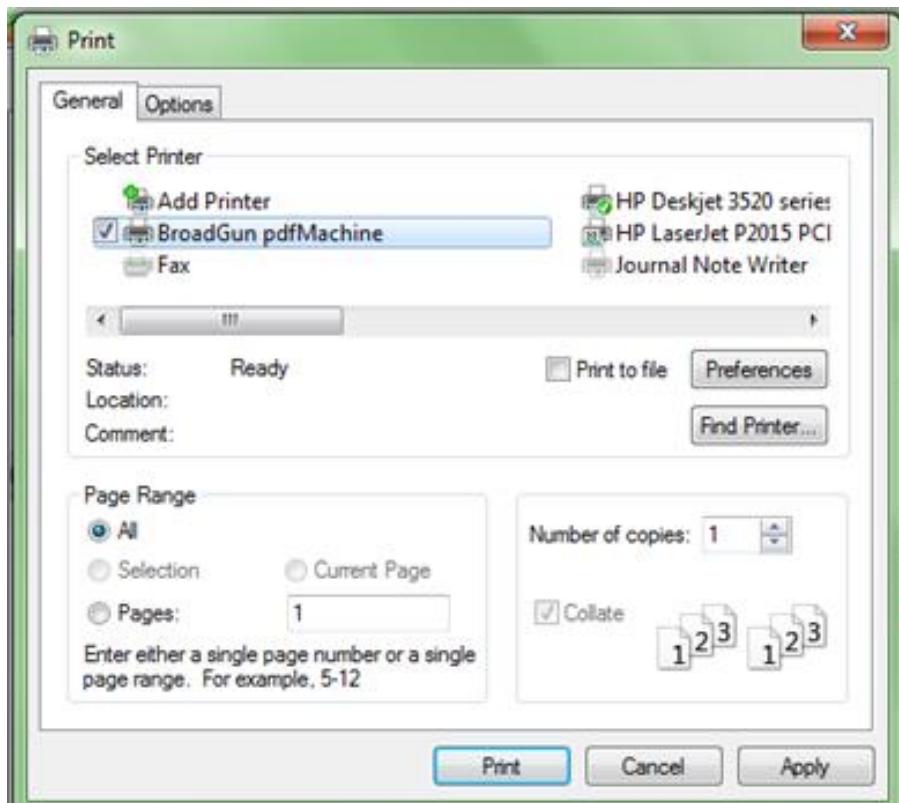


Figure 102. General tab window for printer settings.

To PDF

The Adobe Symbol between the Printer symbol and the report type will print the current report to PDF format if a PDF printer is installed. Contact SSI support if you are having issues with your PDF printer.

Report Options

The Report Options available in Profiler V3 are Summary Report, Single Trace, All Traces, Continuous Trace, Proscan Trace, Localized Roughness Report, Calibration Report, Rutting Report, Slope Report, Events Report, Sidewalk Report, Text Report, QA Suite Report, Events Text Report, Image Summary, ALR Image Report, Airfield Report, Grind Report, Profile Design Report, Texture Report.

Reports containing Sidewalk data are “Sidewalk Report”, “Image Summary Report”, and “Texture Report”.

Figure 104. Drop-down menu for the report options



Collect

To collect data the operator should select the Collect Icon when the hardware is attached. Once the hardware is found, the data collection may begin. See the Collection section of this manual for procedures to perform prior and during a collection.

Trace

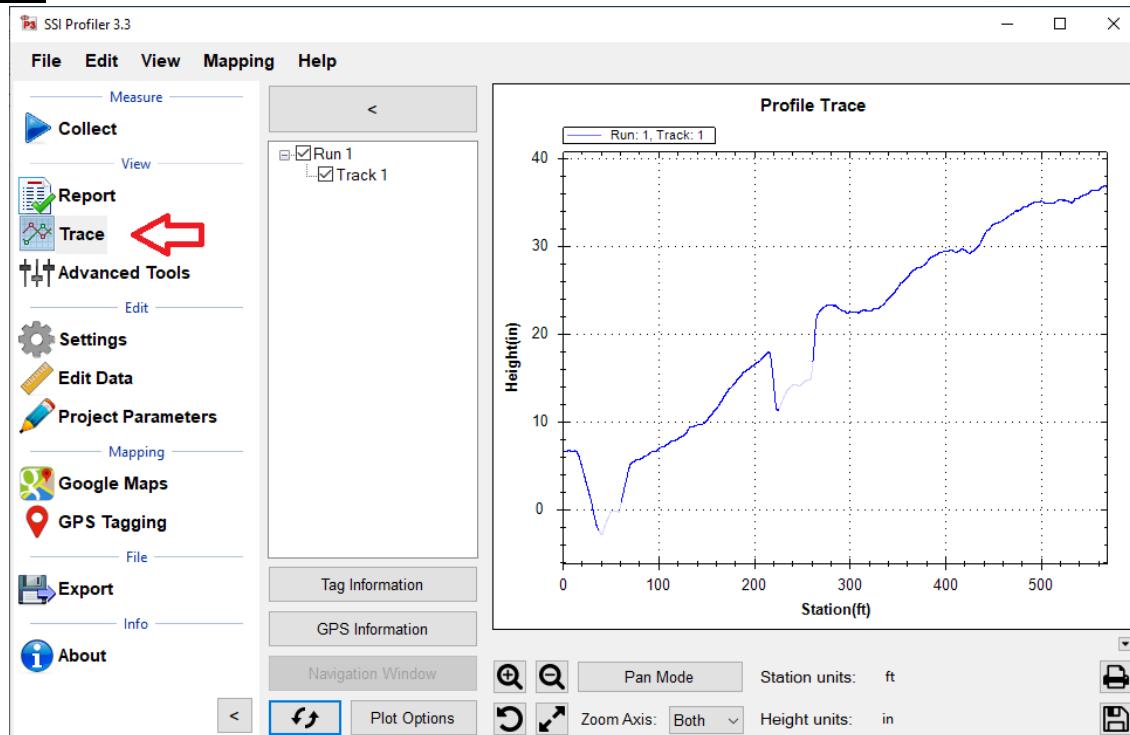


Figure 105: An example of the profile trace

Choosing Tracks for Plotting

To choose tracks for plotting in the trace window, select the check box next to the desired tracks. Once all the necessary tracks are checked, select the refresh icon to view the tracks within the plot.

Whenever a change is made by deselecting a track or checking a new track, select the refresh icon to have it appear in the trace. *If the refresh icon is not selected, the trace will not update and changes will not be shown.* Review the legend to verify that all the selected tracks are shown in the plot.

Refresh

It is required to refresh the Trace window whenever a change is made to the track selections. The refresh icon is located at the bottom left of the Trace window. Select the refresh button and verify that the trace is accurate before a print is made.

Plot Options

Plotter Data Type

Select between Profile, Continuous IRI, MRI and HRI, Median Profile, Segmented Bar IRI, Birds Eye View, Continuous IRI vs Speed, and Rolling Straight Edge.

Apply filters

To apply filters select the check box "Apply Filters."

Show Point Labels

Showing point labels allows the user to move the cursor over the profile to find the stationing and height at a certain point of the plot. When the cursor stays over a point for one second, a dialogue box appears that gives information on station number and height at the cursors current position. The units of the stationing and height are the same as the units of the axes.

Enable Secondary Plotter

Select the 'Enable Secondary Plotter' to add another graph to the window making for easier analysis when comparing profiles.

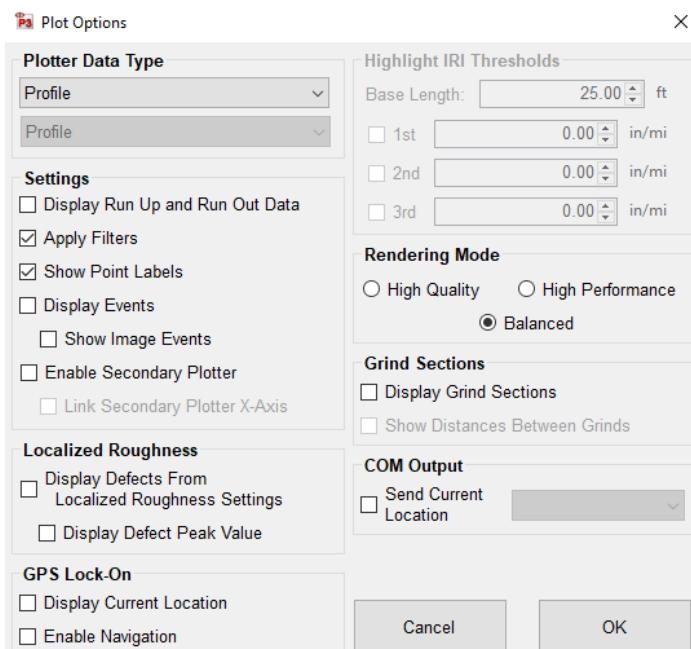


Figure 107. The plotter options window.

Localized Roughness

Select the 'Display Defects' checkbox to show Bumps and/or Dips according to the previously chosen Localized Roughness Settings. Select the 'Display Defect Peak Value' to show the max height of the bumps/dips.

GPS Lock-On

Select the 'Display Current Location' checkbox to indicate GPS position. Select the 'Enable Navigation' checkbox This feature will display a vertical line at the vehicle's current GPS location. This vertical line will move through the trace as the vehicle moves.

Rendering Mode

Under the Rendering Mode section the operator can choose the type of rendering to increase the speed or increase the quality when refreshing the graph. When using the high quality rendering, the time it takes to refresh will be longer, however the resolution of the trace will be optimum.

Grind Sections

Select the 'Display Grind Section' and then select 'Show Distance Between Grinds' for complete grind information.

COM Output

Select the 'Send Current Location' to output GPS location data to another device

Tag Information

The tag feature allows the user to add pauses, events and station markers to previously collected data. The system must be connected to GPS for it to work. With GPS Location displaying position choose 'Set Station Marker', 'Event Location', 'Start Pause Location', 'End Pause Location', 'Start Grind Location', 'End Grind Location'.

Use the 'Undo' and 'Undu All' buttons to eliminate any changes.

The 'Set Static Location' button will popup the Static Location window allowing the input of a GPS location. The window will also allow the user to select the Location Type. Choose between 'Set Station', 'Start Pause', 'Event', and 'End Pause'.

The 'Import Locations' button will allow the user to import and use previously defined GPS Locations.

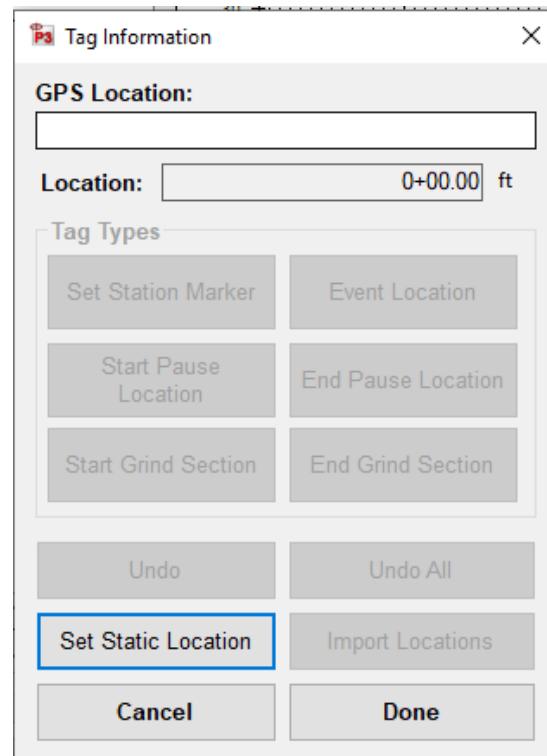


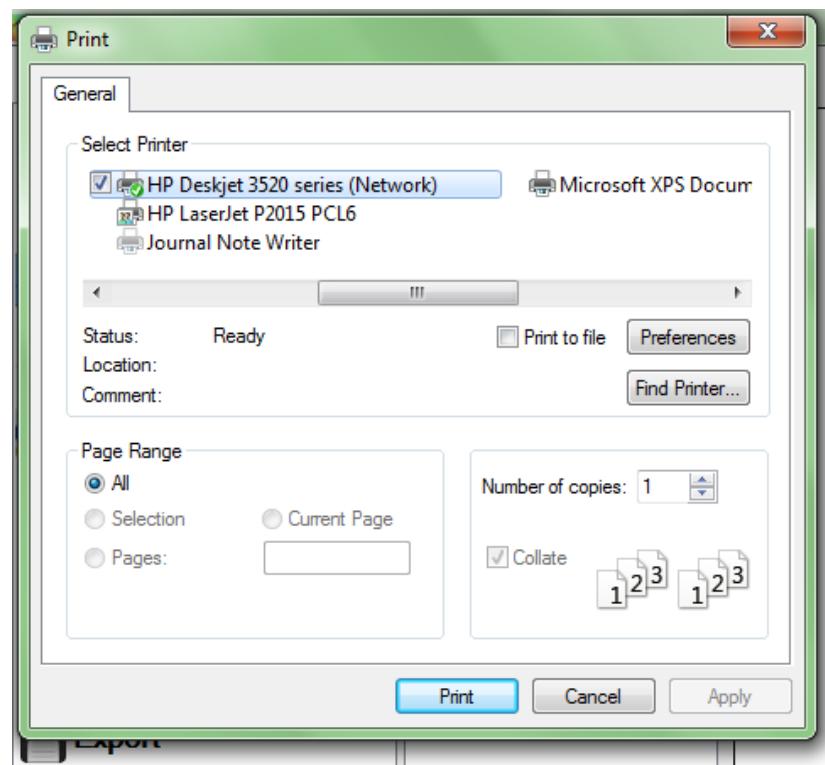
Figure 108: Static Tagging Feature

Print

To print the trace, select the Print Icon in the lower right-hand corner of the window or select CTRL+P on the keyboard. The print window will appear at this time. Within the window, select the printer to be used and verify that the printer settings are correct. When 'Print' is selected, the document will be sent to the printer.

If more printing options are needed, select the 'Preferences' icon. This icon will open a window that is printer specific containing information about the orientation, paper size, and image quality.

Figure 109. Print window after the print icon is selected



Save

Click on the Save icon in the lower right-hand corner of the trace window. When the Save icon is selected, the user is able to save the trace as an image in png, gif, jpeg, tiff, and bmp format. The image can be saved on the operating computer or on a connected external device.

Zoom

To zoom in the trace window, verify that the Pan/Zoom Mode icon displays 'Pan Mode.' To zoom in on the plot, left click and hold while dragging the cursor over the area to be blown up. While dragging the cursor, a dotted box will appear. This dotted box contains the area of the plot that will be blown up, by being fit to the size of the plot window.

Zoom Previous Icon

When Zoom Previous is selected, the last 'zoom in' action is undone.

Zoom Fit Icon

To return to the original aspect ratio, also known as the home view, select Zoom Fit.

Pan/Zoom Mode Icon

The Pan/Zoom Mode icon has two functions. When Pan Mode is displayed, the cursor may be used to zoom in on the plot. To zoom in on the plot, hold down the left mouse button and move

the cursor over the plot area to be blown up. The dashed box contains the area that will be enlarged.

When Zoom Mode is displayed, the operator may use the cursor to pan across the plot area. The pan mode allows the user to navigate through the plot area without changing the aspect ratio, or zooming out.

Units for Height and Station

The units for height (y-axis) and stationing (x-axis) can be changed by left clicking upon the current units and selecting the necessary units from the dialogue box that appears. The units available are mils, inches, feet, yard, miles, millimeters, centimeters, meters, and kilometers. The units scale the plot area.

GPS Editing and Tagging

The operator can use the GPS signal to edit the start and stop locations of the collections and add events to the collection.

Advanced Tools

Images Window

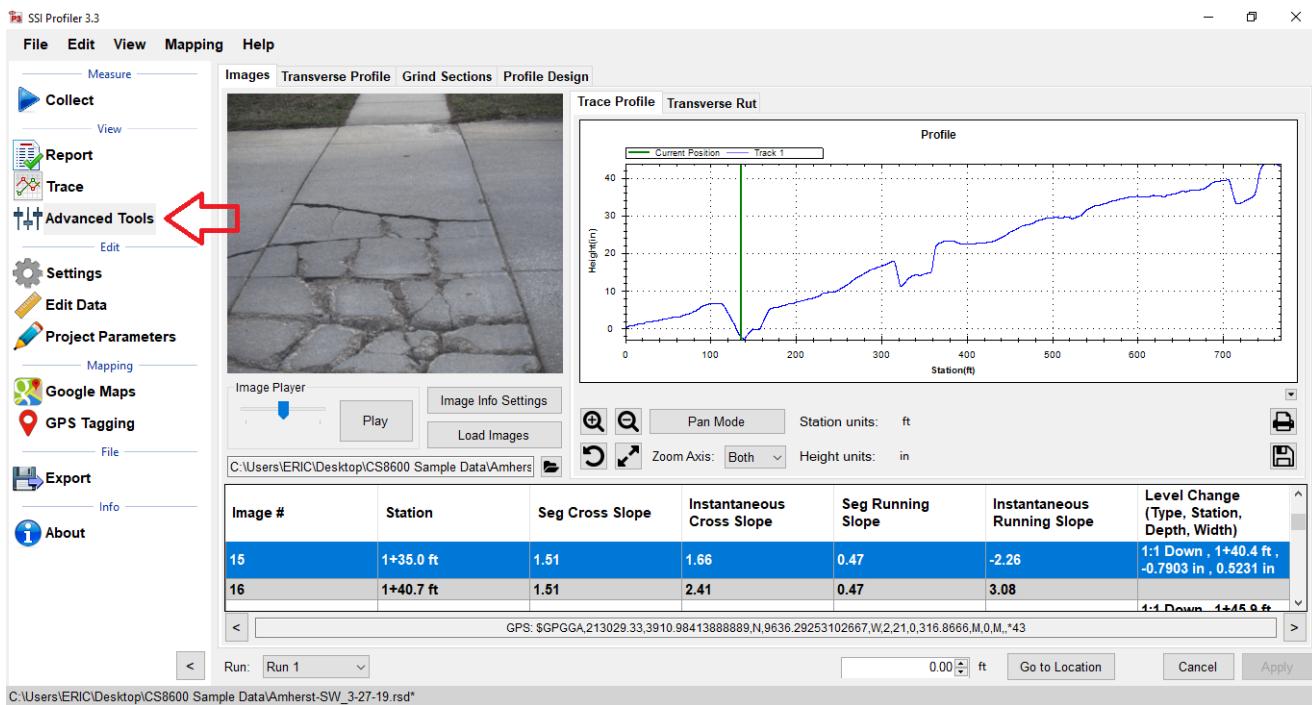


Figure 110. Advanced Tools Images window with an image loaded

Once the 'Load Images' button is selected, the software will load the images found in the directory listed below the button. The default address is where they are initially saved after collection. If the directory where they were initially saved to is changed and software closed, the next time Profiler 3

is opened the address box will say 'Image directory not found'. **Displayed content can be modified by right clicking on the header row.**

For CS8600 systems Image #, Station, Seg Cross Slope, Instantaneous Cross Slope, Seg Running Slope, Instantaneous Running Slope, and Level Change can be viewed. Seg Cross/Running Slope computes the average slope over the "Segment Length" which can be configured in Settings>Index/Filtering. Instantaneous Cross/Running Slope displays the slope reading at the station the image was taken plus/minus image offset.

The arrow keys on the computer's keyboard can be used to advance the images. There will be a lag using the computer's keyboard until the images are populated from the files. After the images are loaded the operator will be able to constantly hold the up/down arrow keys to view a slide show of the collection.

Mapping

Google Maps

Google Maps allows visualization of data within SSI Profiler 3 software. The data depicted in Google Maps will be the same as exported Sidewalk GIS files.

***An internet connection is required for use of Google Maps**

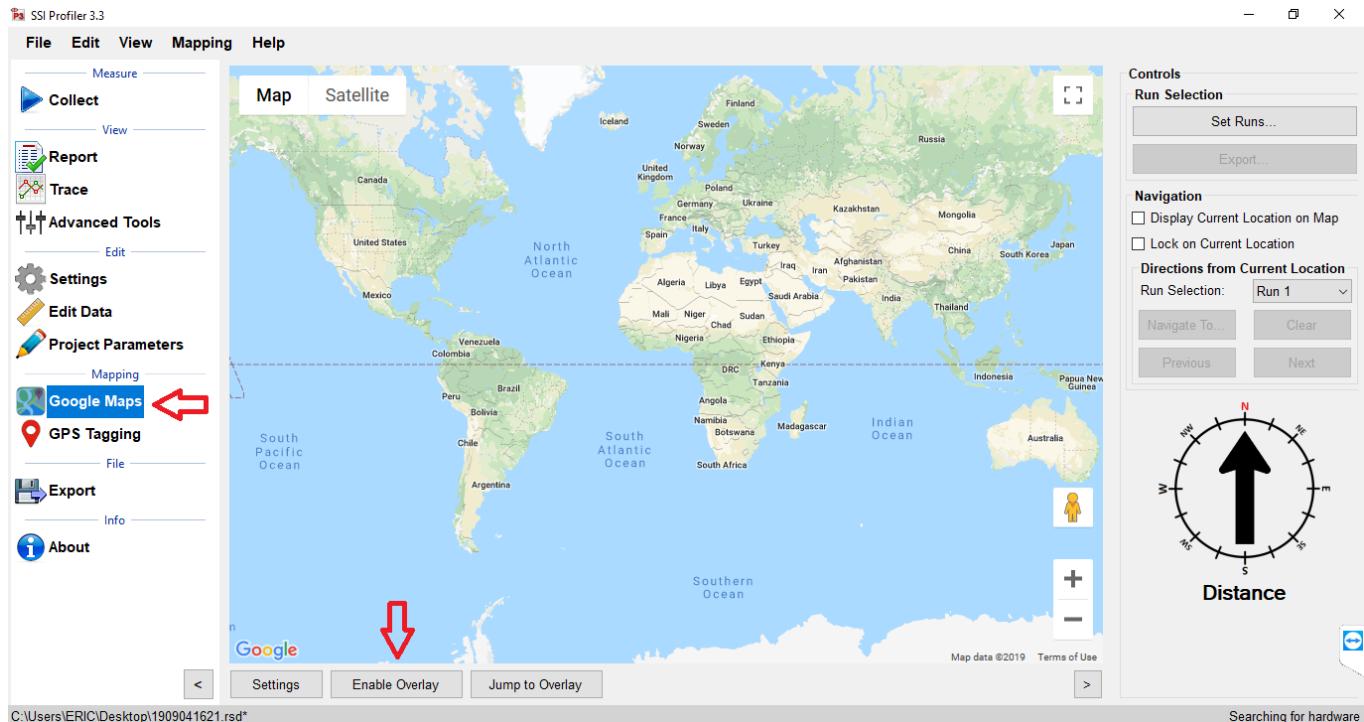


Figure 111. Google Maps Initial Screen

With a file loaded, press “Enable Overlay” to superimpose data on the map. “Jump to Overlay” zooms in on the loaded dataset.

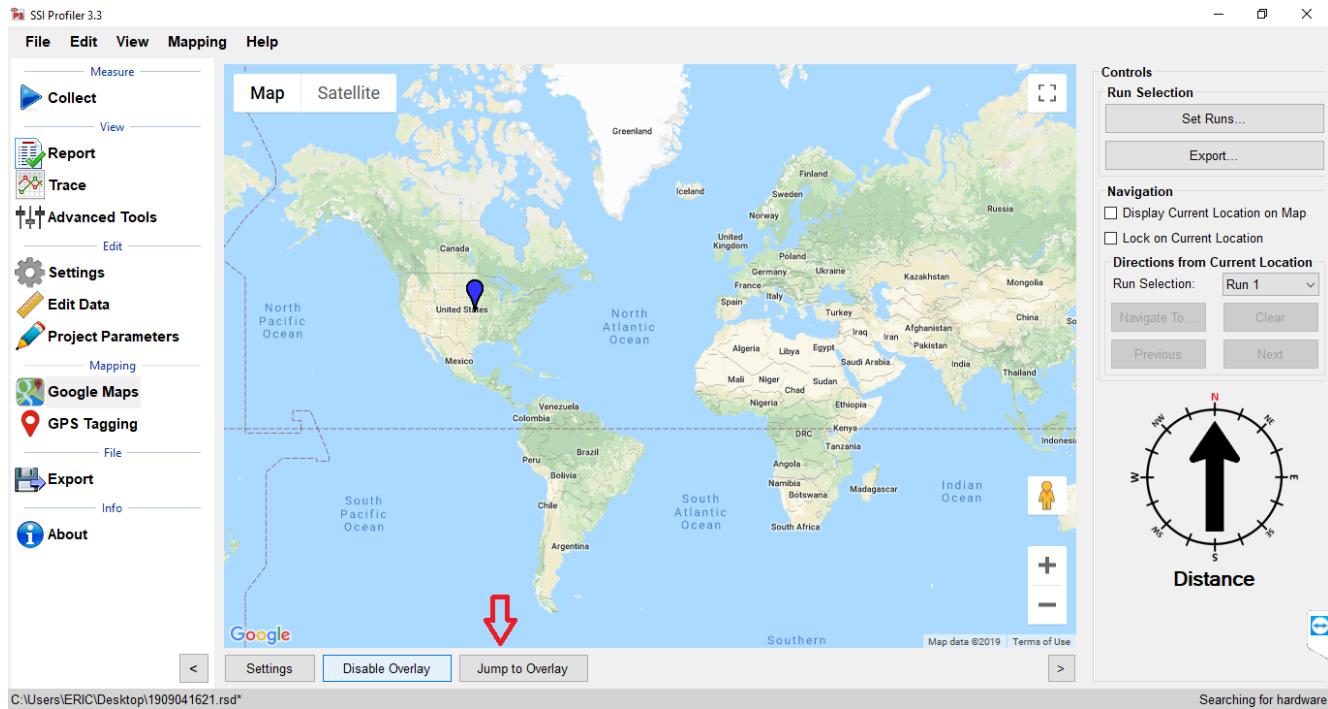


Figure 112. Google Maps Jump to Overlay

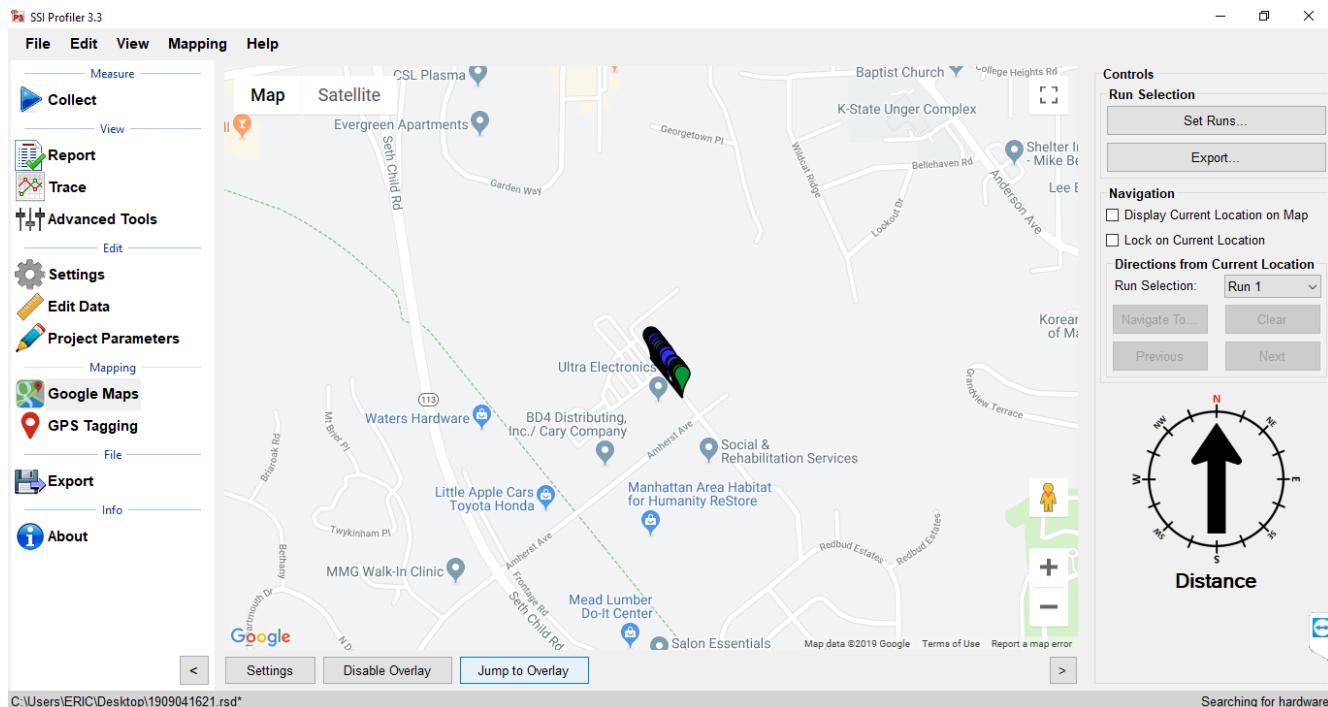


Figure 113. Google Maps after Jump to Overlay

The pins displayed in Google Maps represent sidewalk features. When selected, each pin displays its relevant data.

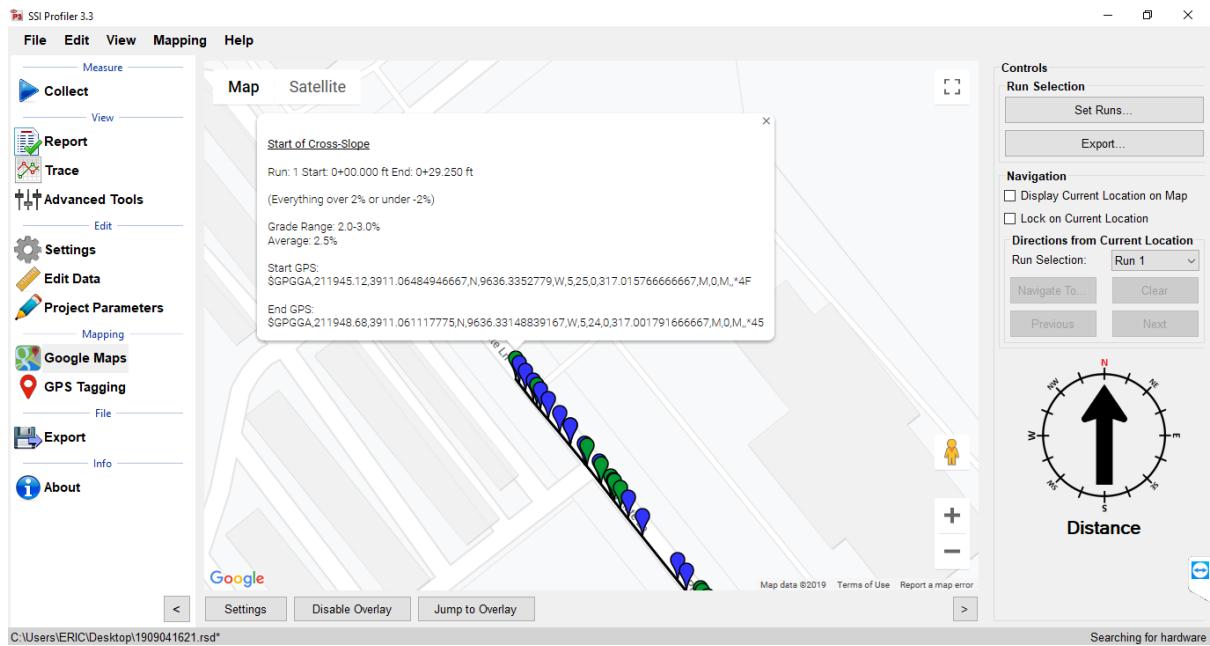


Figure 114. Google Maps Overlay zoomed in with pin clicked for information

“Settings” allows configuration of which features are displayed in Google Maps under Display Options. Path Display Type changes how the traveled path is depicted. Pin colors can be edited as desired through Map Pins>Edit Pins.

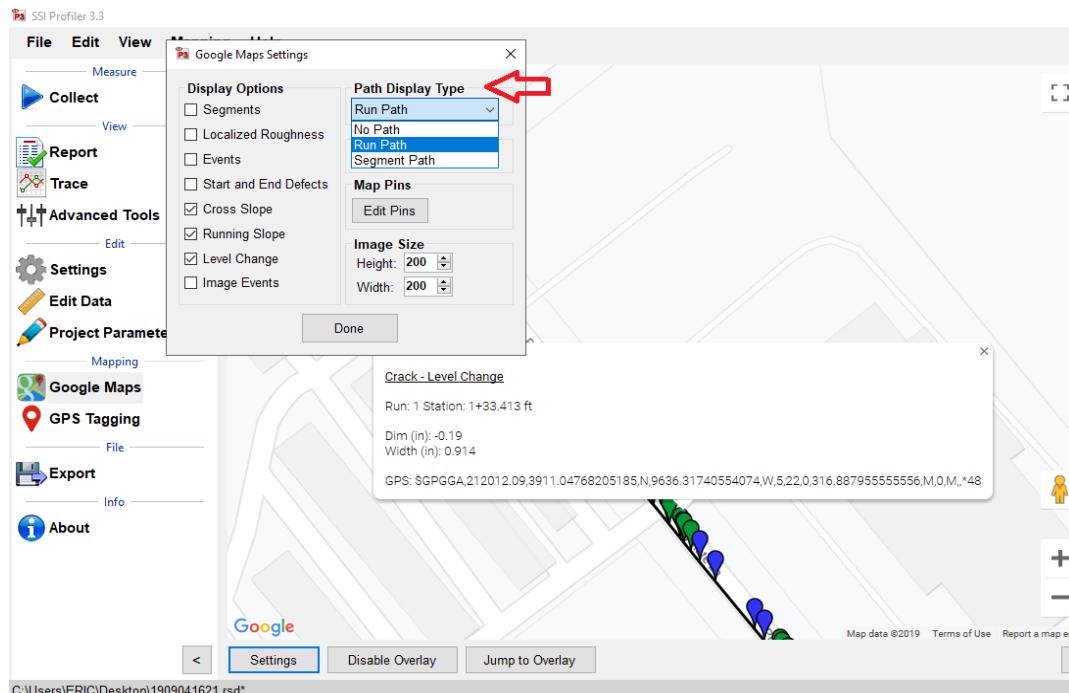


Figure 115. Google Maps Settings: Path Display Type

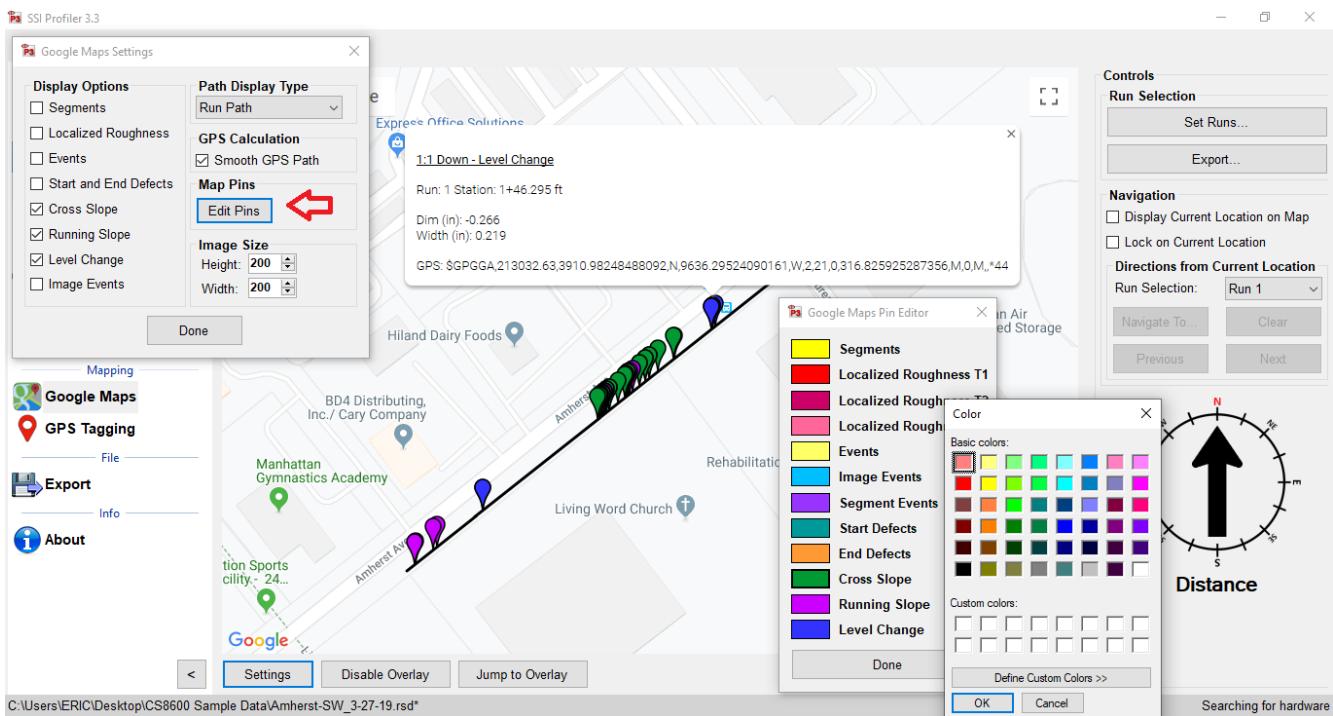


Figure 116. Google Maps Settings: Edit Pins

Data can be exported to .kml format through the Google Maps window by clicking “Export” under Run Selection. KML files can be viewed in most GIS software, for example, ESRI ArcGIS Earth and Google Earth.

Display Current Location on Map

If this check box is selected, the current location of the profiler is marked by a large green arrow in the map window. Must be connected to system with GPS to use this feature.

Lock on Current Location

If the check box for “Lock on Current Location” is selected, the location of the profiling system will remain in the center of the map window. The map will move with the GPS system in real time. Must be connected to system with GPS to use this feature.

Directions from Current Location

The V3 program will navigate to the start or end of the run and other information found during collection. Select the destination from the drop-down menu and select the calculate icon. The route will appear as a blue line from your current location to the “B” landmark.

To navigate to an Event, Pause, Segment, Image, GPS Coordinate, or Station, select the correct run number and then the “Navigate To” icon. If GPS is connected the program will ask the user where to be navigated to. Once the location is selected Profiler will direct the device to the location.

Note: GPS must be connected to use the Google Maps Navigation feature.

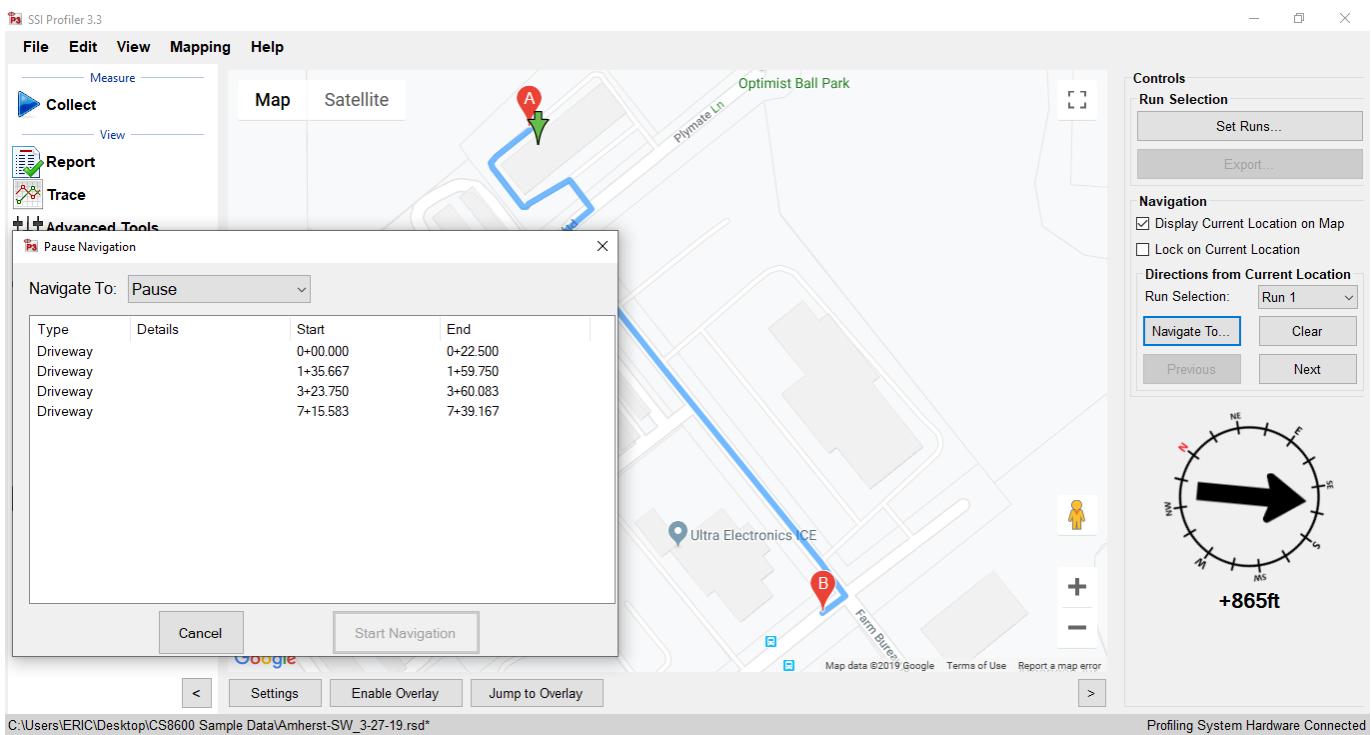


Figure 117. Google Maps Navigation

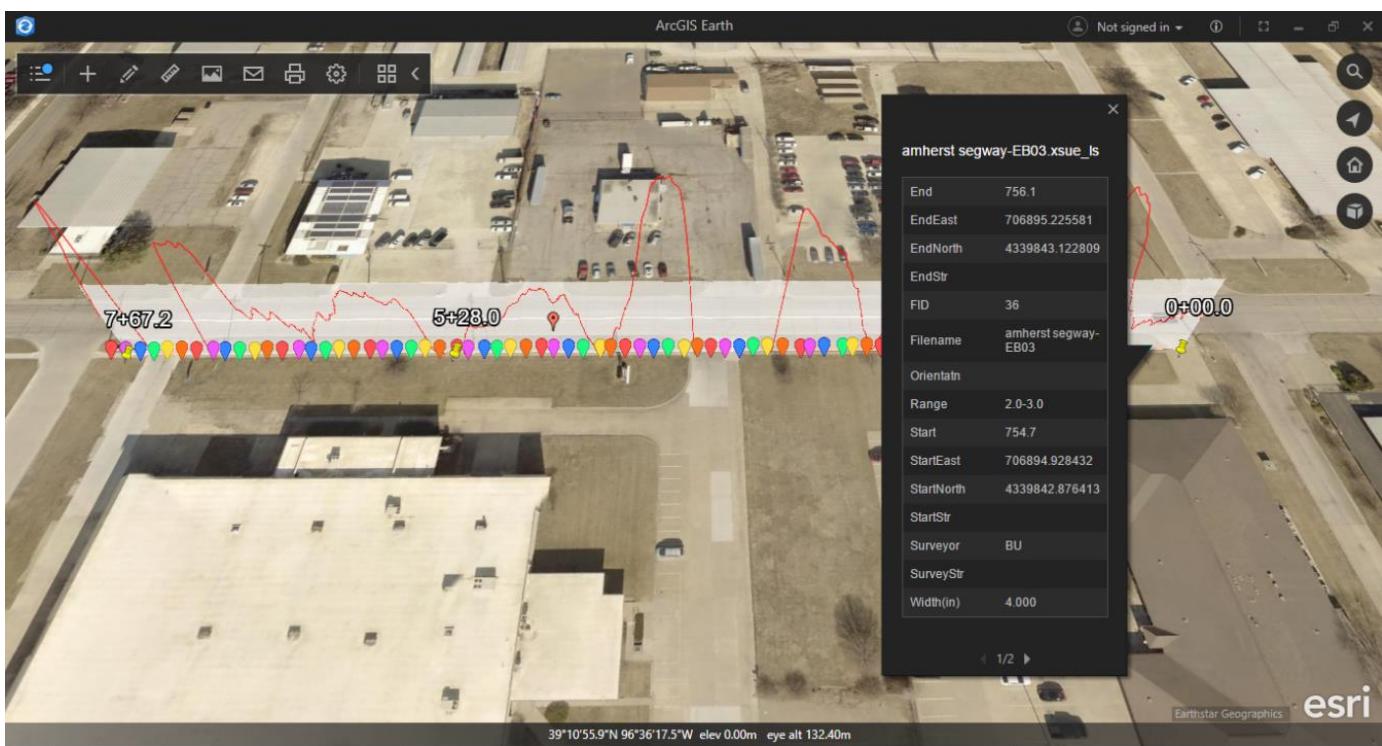


Figure 118. KML export in ArcGIS Earth

About

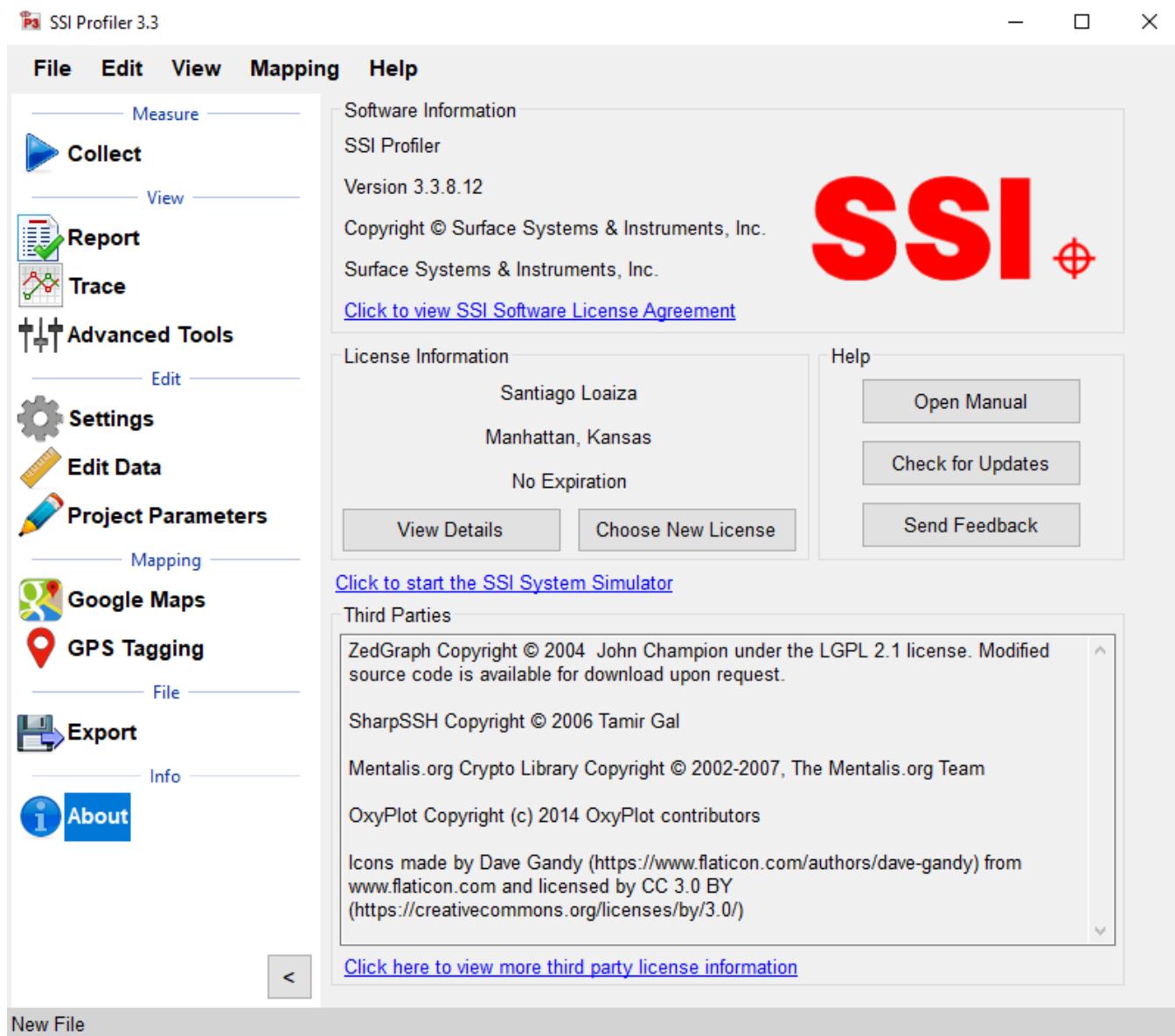


Figure 119: About Window

The About section has information concerning Profiler V3 software and its licenses. The software version, copyright and license can all be found in the 'About' window. Additionally, third party software licenses are listed in the About window.

The About window is where the user can view the terms and features enabled with their license. Select View details to see the applicable collection devices and software features that are enabled. The update icon allows the user to update to the latest version of software.

Manual

The manual can be found under the Help Tab or on the About Section window.

Check for Updates

The operator can manually check for updates through Help>Check For Updates. By default, the program will check for updates every time it is opened. To not check for updates at each opening, deselect the check box in this window.

Send Feedback

If SSI should be informed of issues or advancements of the software, please send us feedback so we can improve our services.

Third Party Components

The Third Party Components of Profiler V3 are:

ZedGraph Copyright © 2004 John Champion under the LGPL 2.1 license.

Modified source code is available for download at:

<http://www.smoothroad.com/support/download.asp>.

SharpSSH Copyright © 2006 Tamir Gal

Mentalis.org Crypto Library Copyright © 2002-2007. The Mentalis.org Team

Full copies of all third party licenses can be found in the Licenses folder located inside the Profiler V3 installation directory.

Exiting Program

To exit the Profiler V3 program, save current project and click the red “X” at the top right corner or navigate to the File tab and select Exit. If the current project is not saved when the program is terminated, Profiler V3 will ask if the operator would like to save the current project. To save and exit the program, select “Yes.” If you do not wish to exit to program, select cancel and the program will remain open.

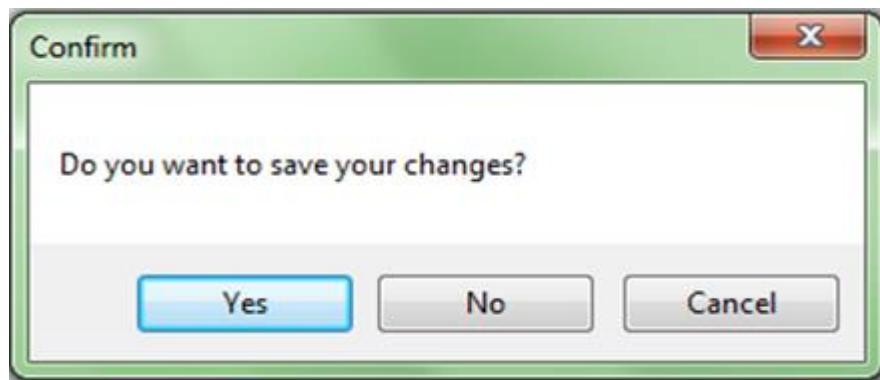


Figure 120. Exiting Program window, chose 'Yes' to save changes, 'No' or 'Cancel'

Recommended Tools

Create a personal default file name convention for your project

Under General Settings the operator may select “Configure File Naming” to create a new file name convention.

Load analysis parameters and settings from previous projects

When a previous file has the correct project information and settings saved within it, the operator may load the previous file’s settings into the current file. By selecting “Load” under General Settings the user may select the previous RSD file and load its settings into the current project.

Set a default file location

The user may select a default folder to save all files and reports under General Settings. It is recommended paste the folder destination into the address input.

Use hot keys during collection

During collection the operator can assign a command to any keyboard key except for the space bar and the enter key. The keys can start or end a collection, arm and electric eye or create an event for various types of scenarios such as pavement distresses or debris.

Troubleshooting and Support

When Contacting SSI Technical Support

If possible, have the profiler system type, profiler software version, operating system, computer model number, and company of ownership ready. If an internet connection is available, SSI staff may request your data files for comparison and troubleshooting.

Attaining Profiler Software and Replacement Parts

For technical support with the CS8600 software contact SSI. Software issues should also be reported to SSI by email at support@smoothroad.com, with a copy of any data files to be reviewed by SSI technical support staff. SSI support staff can also be contacted by telephone at (530) 885-1482 (Auburn, CA); or (785) 539-6305 (Manhattan, KS).

Parts can be ordered online from SSI at <http://www.smoothroad.com>. For support issues involving the profiler hardware (DMI, Pelican cases, hardware, cables, etc.), contact the SSI office in Auburn, California at (530) 885-1482 or by email at support@smoothroad.com.

Panasonic Toughbook Computer

For technical support for Panasonic Toughbook computers, contact Panasonic Technical Support at 1-800-Laptop5 (800- 527-8675) or go to the Panasonic support website at:

<http://www.panasonic.com/business/toughbook/support.asp>.

Paper Supplies or Printer Servicing.

For printer paper supplies or printer servicing, contact SSI at support@smoothroad.com or (530) 885-1482.

Is your Software Up to Date?

Contact SSI to upgrade your software if your problems reoccur after support assistance.

Do Not Attempt To Repair Electronic Components

All of the electronics within the SSI Profiler systems are built custom for Surface Systems and Instruments. Do not attempt to fix issues without contacting SSI.

Is your Power LED Illuminated?

No power to the system would cause the hardware to disconnect from the software.

Hardware Not Found

Check the cables of your system for any wire breaks. If the Amphenol connections are twisted, it can break the soldered wires. If problem persists, contact SSI Support Staff.

Example Diagnostics

By selecting the button on the upper right of the Collect screen with a single digit number on it. The single digit number will be the same as the number of lasers on your system. The button is colored green for systems without an issue, yellow for systems with a device disconnected and red for connectivity issues.

SSI Profiler 2.1: Q0g0r0r0x0x0x0

'0' means that the device is connected.

Q is the encoder symbol

g is Trimble GPS

r is for a Roline laser. The order is Track 1 laser, Track 2 laser, Track 3 laser (if equipped).

x is an open port

Failed Height Verification

- 1) Check block Orientation. Do not block receiving laser sensor.
- 2) Check Laser Type in System Settings

- 3) Check the integrity of the cables and pins. Make sure the pins are not bent inside the connectors and that the cables are not damaged.
- 4) Check the height of the lasers from the measurement surface. For Gocator and low stand-off spot lasers the minimum height is 200 mm (7.8 inches). For high stand-off spot lasers the minimum height is 12.8 inches (325mm).
- 5) Is there a glare on the verification blocks?

Lasers Not Firing

Main Cause: No/ insufficient power reaching the lasers

- Is the blue light flashing on the laser?
- Is the blue LED on the white housing emitting light?
- Are the red lights on the grey box serial ports emitting solid red light?
- Check the condition of the pins in the cables.
- Is the vehicle off or running?
- Does the same problem happen with the engine running?

Distance Not Correct

When was the last calibration performed?

Was the actual distance traveled during calibration entered correctly?

Is the DMI damaged or loose?

Is the DMI Amphenol cable attached correctly?

How long is your calibration track?

Is there a large temperature gradient?

Is the calibration track a straight line?

Electric Eye Events/Pause/Start/Stop Collection Did Not Work

Is the correct EE turned on?

There will be an amber or green light on the back of the EE. Flip the switch on the white housing if it is not on.

Is DOT-C2 reflective tape being used?

Is the angle of the reflector matching with the EE orientation?

GPS Navigation Timed Out (Map Point, Google Maps, Trace View)

- 1) Check if the system lost GPS signal (Open the Collect window then GPS Options to check the satellite reception).
- 2) Disconnect hardware and reconnect hardware.
- 3) Check that all cables are securely connected.
- 4) Check power source for consistency.
- 5) If using a Topcon system, review the MC-R3 rover settings for accurateness.

The Camera is not taking color pictures

- 1) Choose another pre-formatted option (Low, Medium and High Resolution).

Advanced User Options (Custom Resolution)

- 1) The camera settings can be found under the Collect window in System Settings.
- 2) Go to the Camera Settings tab
- 3) Open Advanced Camera Settings
- 4) Review Custom Video Mode to affirm that Raw 8 is the pixel type.
- 5) Select Standard Video Mode
- 6) Select the button for resolution and pixel type to be Y8 (Raw 8) and 1280x960.
 - a. Once this change is made the preview will also be in color

Profiler Hardware Not Found

Check the serial port connection from the profiler to the computer. Check that the profiler has power and is charged. If software disconnects from hardware, close SSI Profiler and reopen the program with the profiler powered on. If problem persists, close the program and shut the power off to the profiler. Wait five seconds then turn the power to the profiler on. Then open the SSI Profiler program. If the issue is not solved, contact SSI customer support.

Do Not Replace the Device Components with Store Bought Items

Surface Systems and Instruments designs and manufactures their custom-built profilers in house. Replacing damaged parts that are inadequate will adversely affect the ability to collect accurate profiles. Please contact SSI for replacement parts.

Updating the Software

If your SSI Profiler license has expired, you will not be able to update. Contact SSI to renew your license and receive new software updates.