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Profiler V3 Operation Manual

CS-8800

Version 3.2.7.10.

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Safety

Turn on headlights when profiling to alert other drivers and co-workers of your presence.
Road profilers are precision instruments, handle with care. Improper maintenance and use will reduce system life and collection accuracy.

Avoid Excessive Speed

The optimal WalkPro collection speeds are below one foot per second. Exceeding this threshold will create varying elevations when compared against the true profile. The operator can choose the operational speed by adjusting the warning speed on the speedometer. When the warning speed is exceeded the computer will beep.
It is recommended that the WalkPro not collect data over 4 feet per second (1.2 meters/second).

Charge Batteries

Fully charge the walking profiler battery before each use. The walking profiler battery will last for a much longer duration if the walking profiler is not also charging the Toughbook. To extend the profiling period, have an extra fully charged Toughbook battery to be exchanged with the operating computer's battery when the original Toughbook battery becomes low on power.

Avoid over-discharge of the lithium-ion battery and premature degradation of the battery. Charge the WalkPro battery periodically to prevent over-discharge. During long storage periods the temperature should remain within the thresholds of 20 ± 5°C, Humidity 45-85%. Keep battery 40-60% charged during the periods of storage.

Set Up

Laser Front Arm

The laser front arm should be installed at the recommended measurement height of 12 inches for the Gocator 2342. This height is measured from the bottom of the laser to the measurement surface. When the laser is within its measurement range the "Range" LED will be illuminated.

If using the laser front arm assure that the front arm type is correct under Collect>System Settings.

Brake

The brake is located at the rear of the WalkPro and acts on the left rear wheel. This is the wheel that is attached to the distance encoder. Be cautious to never push the WalkPro while the brake is engaged. The rubber of the rear wheel can be damaged in this way. If the damage is severe, it can affect the quality of the profiling data.

Computer

Always charge the operating computer so that the profiling time is not limited by battery power. If possible keep an extra charged battery to exchange with the original one to extend battery life. The operating computer may be charged by the WalkPro; however, the battery charge of the WalkPro will be depleted in a shorter amount of time.

Charging the Battery

To charge the WalkPro insert the leads into their corresponding ports on the rear of the WalkPro (The power unit/cable comes with the CS8800). An LED light bar on the rear top of the system will indicate the amount of charge. When the battery is fully charged, all the LED bars will be full.

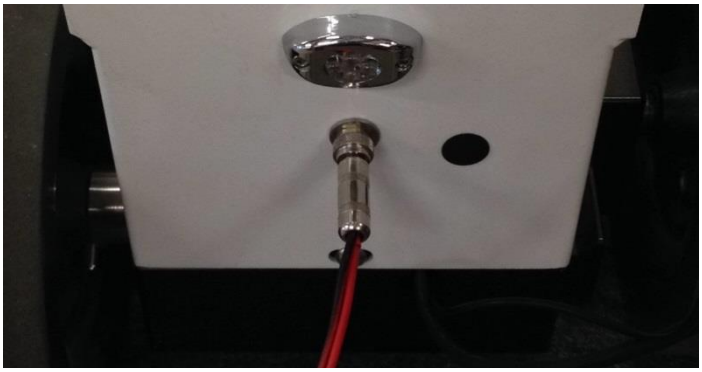


Figure 1: Configuration for charging the walking profiler.

Cables

The walking profiler has cables for the 9-pin data cable (which can also be a usb cable on some models), power cable for the Toughbook and an ethernet cable for front arm laser models. The Toughbook power cable does not need to be connected to collect. If the Toughbook power cable is connected, the battery life of the walking profiler will be reduced.

Lights

The lights on the WalkPro are turned on by flipping the switch on the housing of the WalkPro. The lights can only turn on when the power switch is in the on position.

Run as Administrator (Windows 7)

Front arm laser models with ethernet connection require Profiler to be run as Administrator. Go to the Desktop, right click on the SSI Profiler icon and select the "Compatibility" tab. At the bottom of the window under "Privilege Level", select the check box for "Run this program as an administrator."

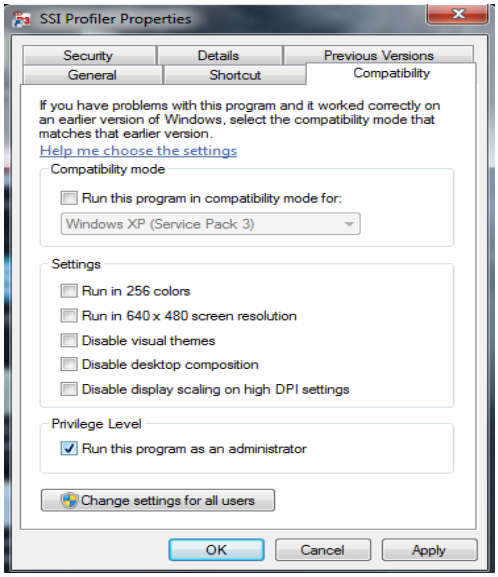


Figure 2: Compatibility window for running Profiler software as an administrator in Windows 7.

Run as Administrator (Windows 10)

Front arm laser models with ethernet connection require Profiler to be run as Administrator.
Right click on the Profiler V3 icon 'P3', go to More>Open File Location.

Right click on SSI Profiler shortcut, go to properties
In Shortcut tab go to Advanced... Check 'Run as Administrator' and then 'ok'.

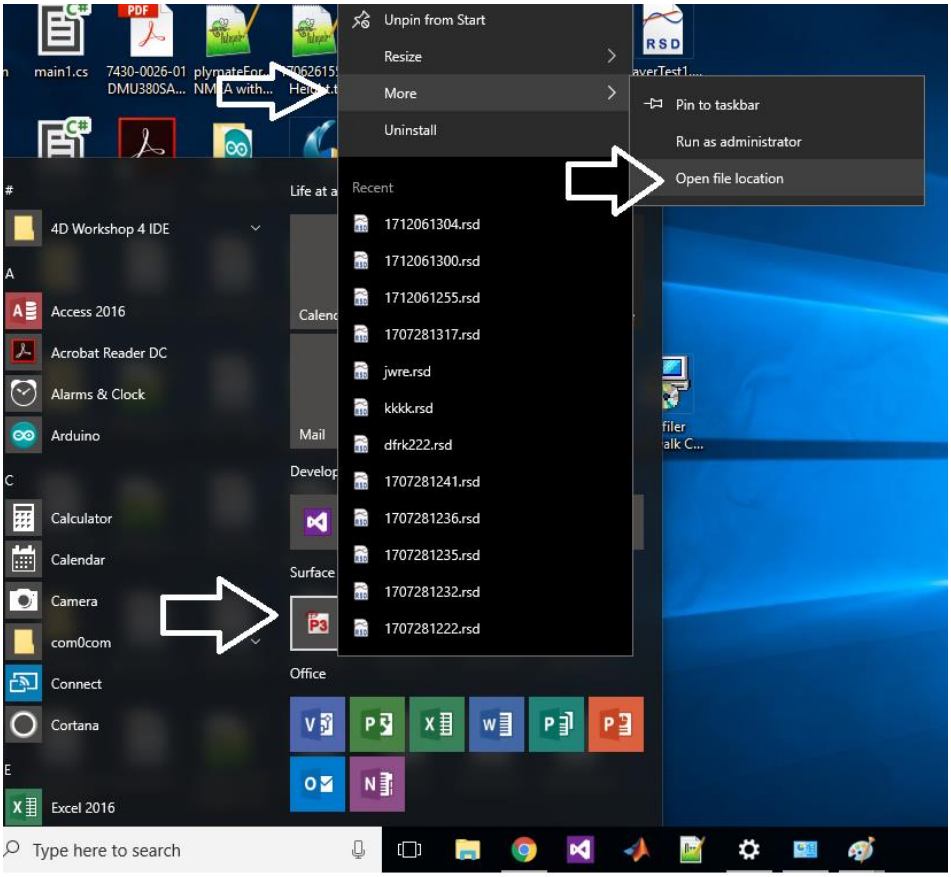


Figure 3: Searching for Profiler V3 program file.

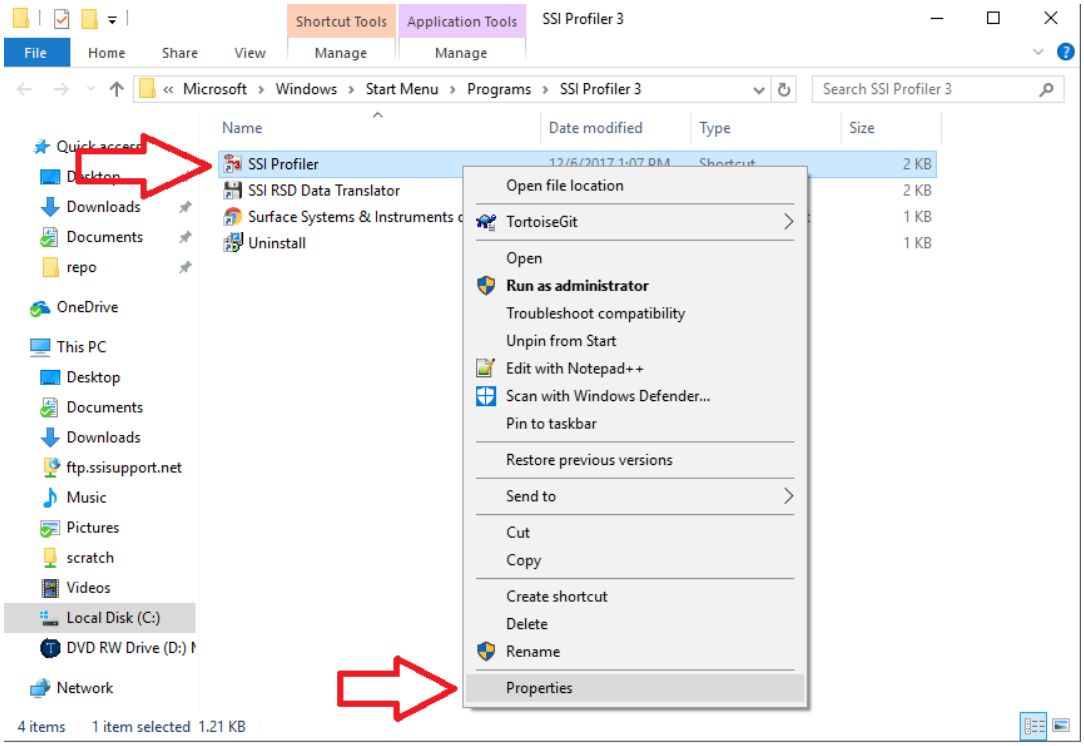


Figure 4: Selecting ‘Properties’ from drop down menu.

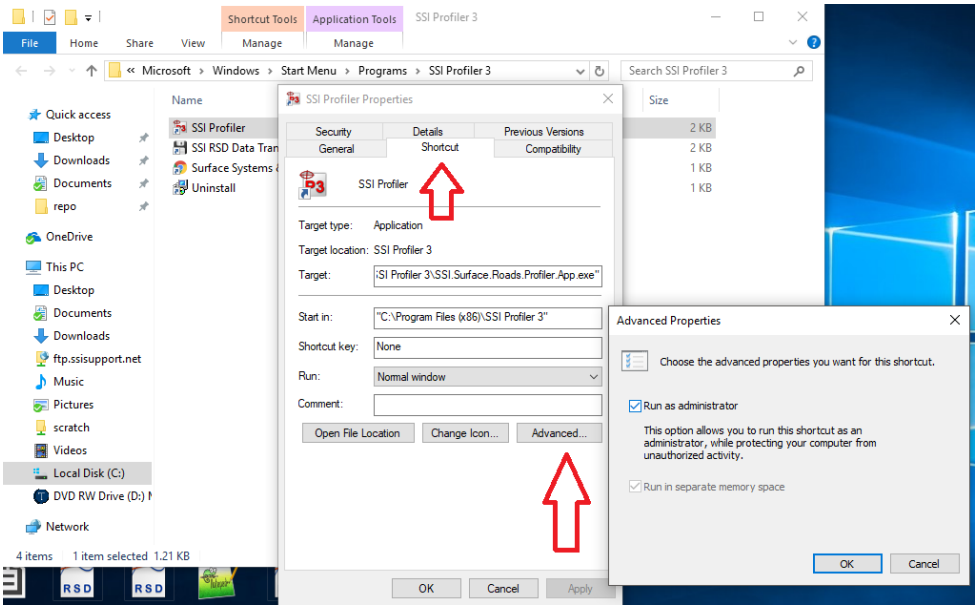


Figure 5: Check ‘Run as Administrator’ in the Short Cut tab.

Click ‘Continue’, in Access Denied window for Profiler to run as Administrator every time opened.

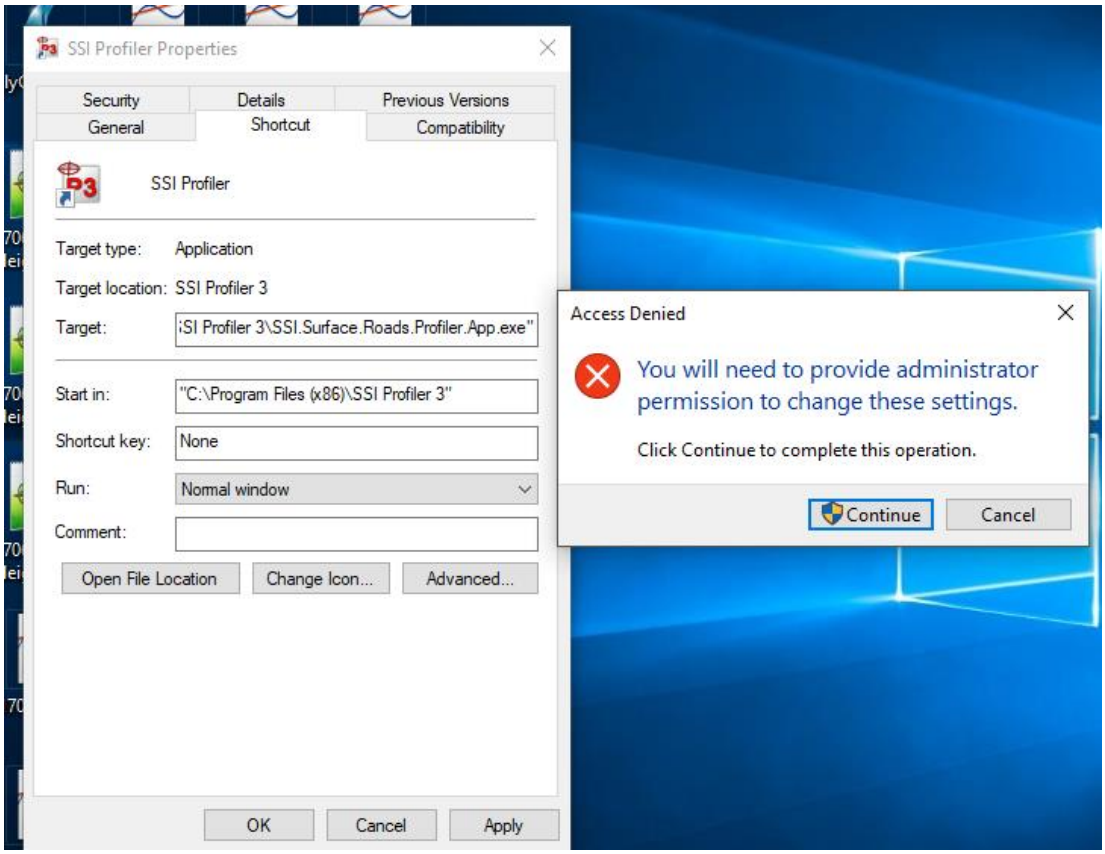


Figure 6: Click ‘OK’ and ‘Continue’ to confirm and run Profiler as Administrator.

After setting Profiler V3 to run as Administrator, a popup with appear every time you open the program. To get rid of the popup search "user account control" and set to "never notify" (this is Optional)

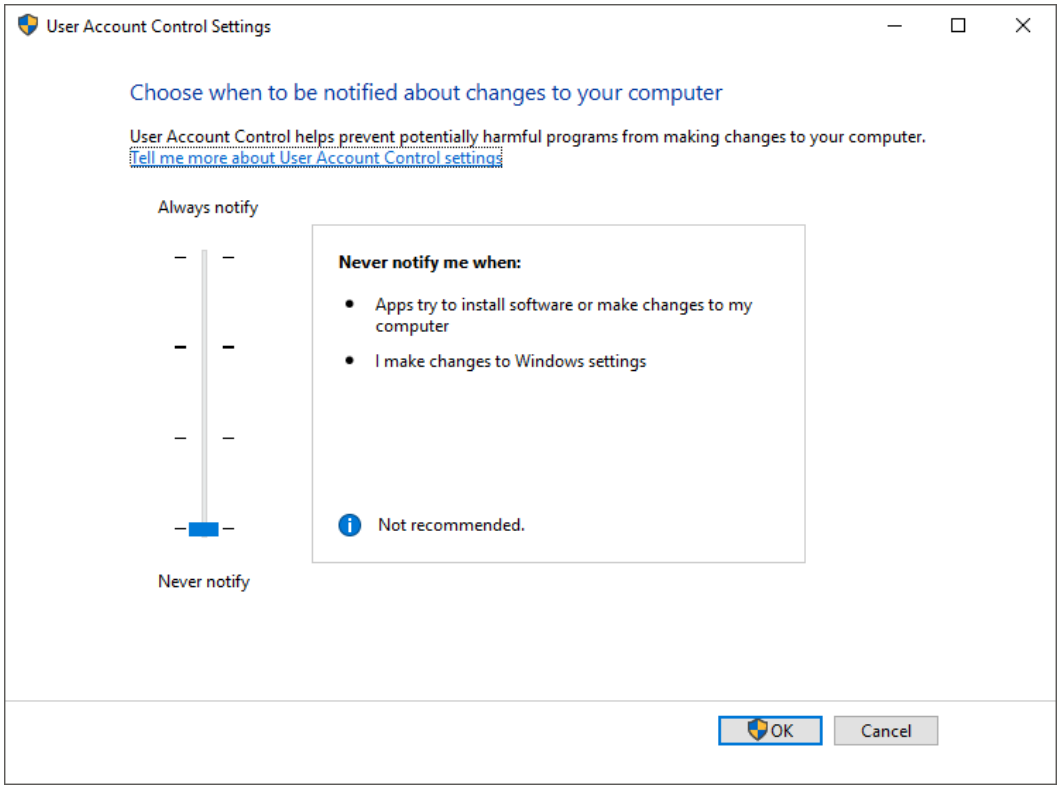


Figure 7: Window for disactivating notification of changes to computer.

Note: The settings.xml file goes in C:\Users\SSI PROFILER\AppData\Roaming\SSI\SSI.Surface.Roads.UDP.LaserRec

Texture Table Settings (Systems with a Laser)

It's recommended when using the texture table to change the decimal paces to around 6. Go to Report Engin>Settings>General and change it to 6.

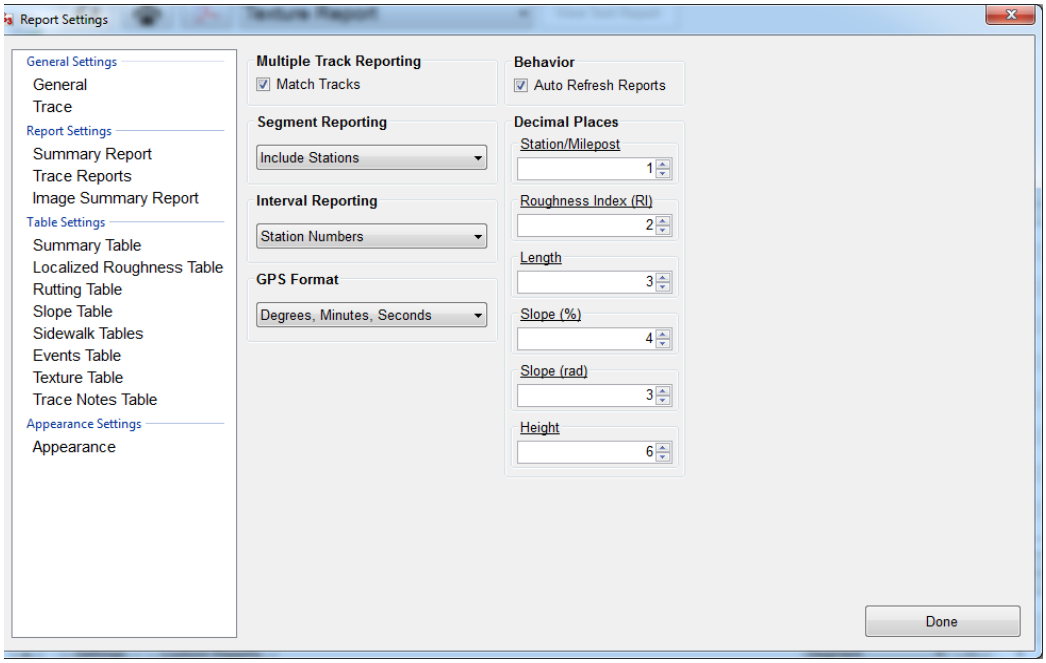


Figure 8: General Settings Window

After changing the decimal places, click on “Texture Table” and check the “Separate Table for Each Run” check box.

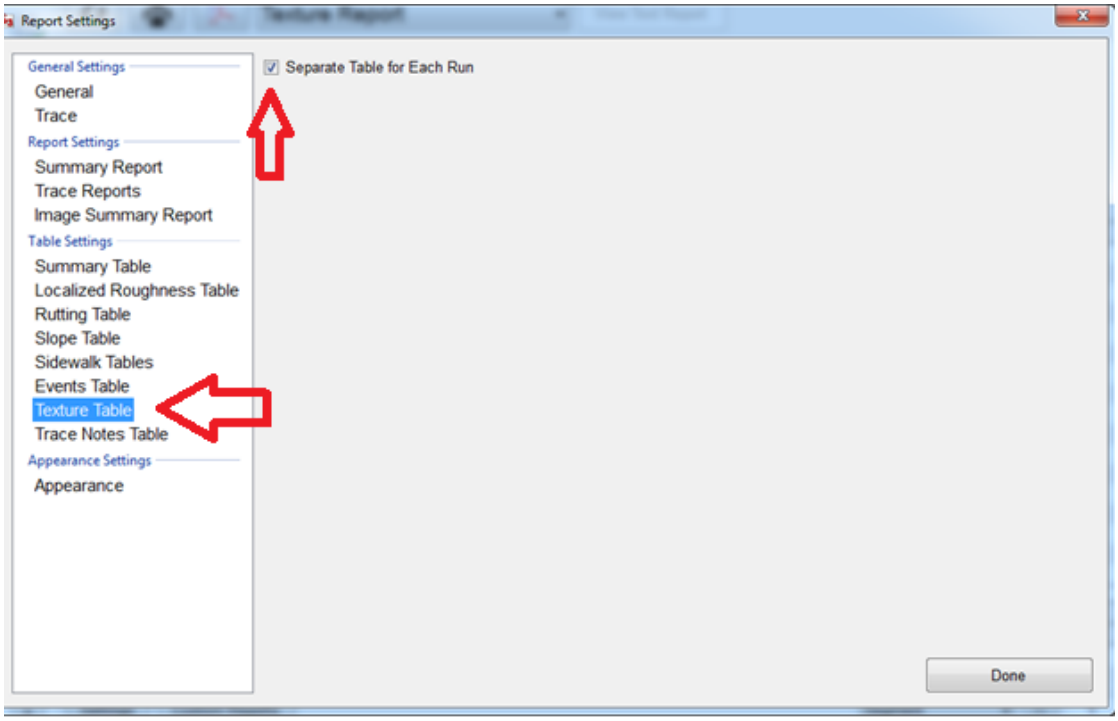


Figure 9: ‘Texture Table’ selected and ‘Separate Table for Each Run’ box checked.

UDP Settings Systems with a Laser

For WalkPro systems with a laser, make sure that it has the IP address 192.168.1.10. This change can be made under System Settings>UDP Settings>Advanced Settings. Make sure all the settings are the same as in figure 10.

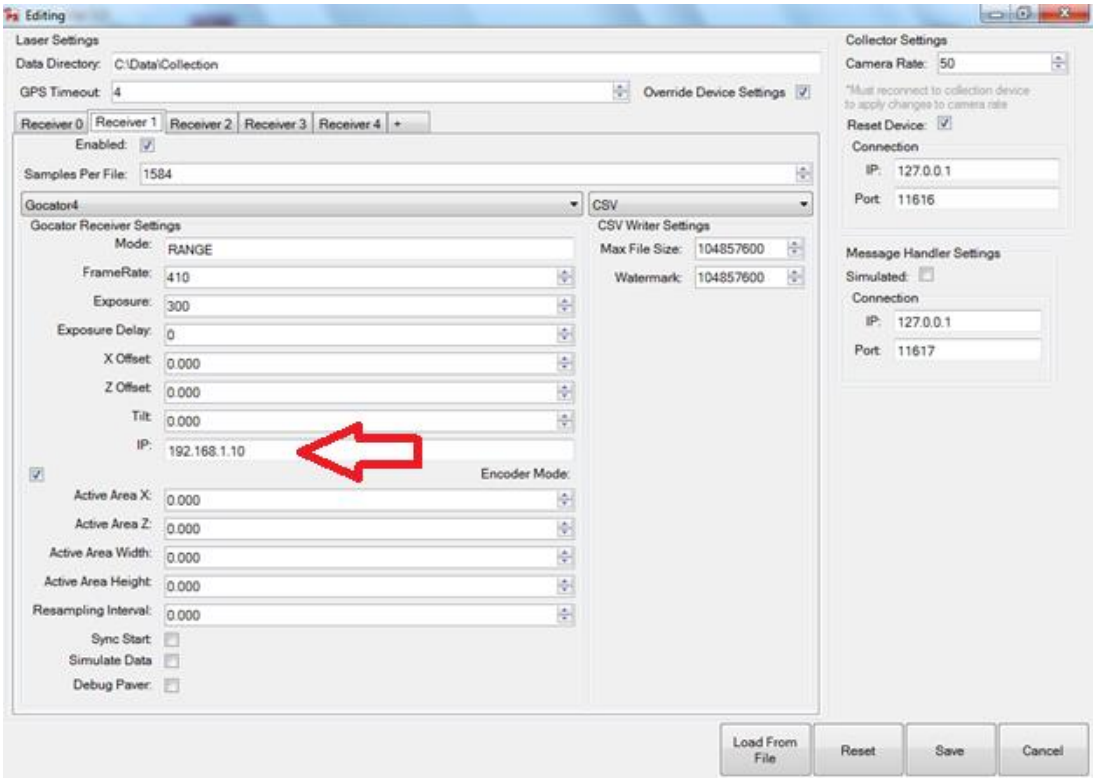


Figure 10: UDP settings

Toughbook operator computers should already be set up with the correct IP address. In any case this can be done 'Local Area Connection Properties'.

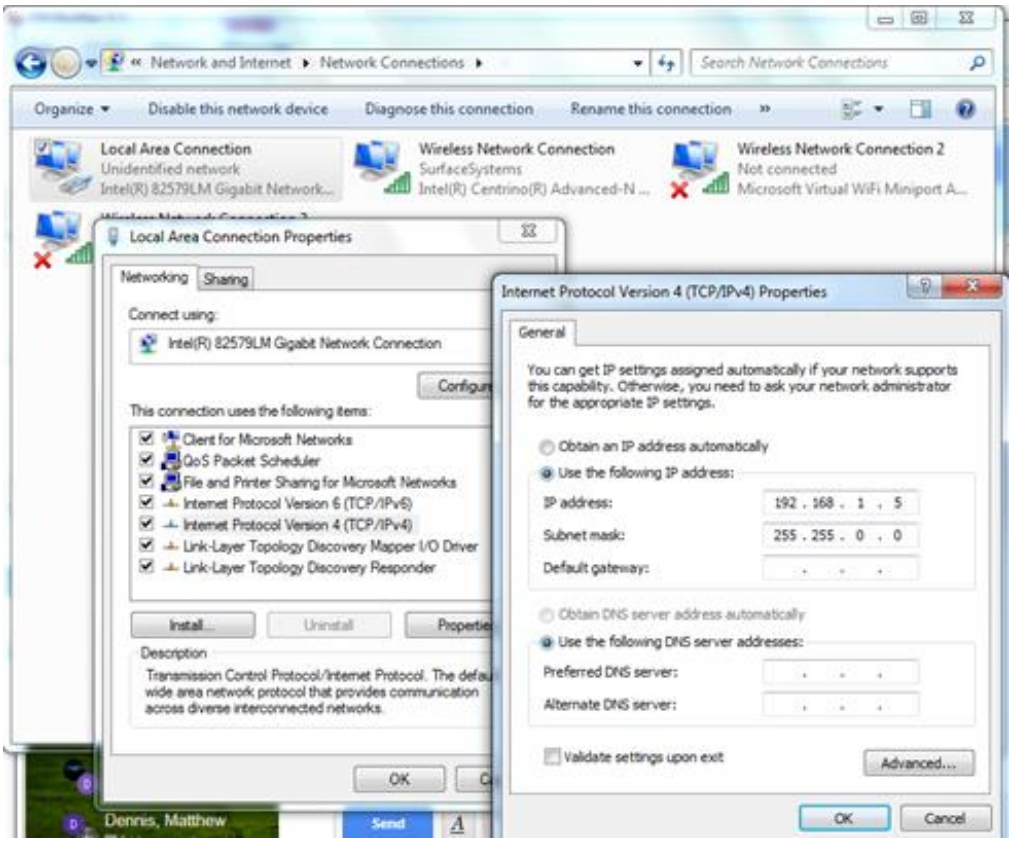


Figure 11: IP Settings for operator Toughbook Computer.

Dot lasers only work with Longitudinal Texture mode. Go to System Settings>Texture settings and check the "Enable Texture Mode" box. Do not enable the "Use Laser as Front Arm" box.

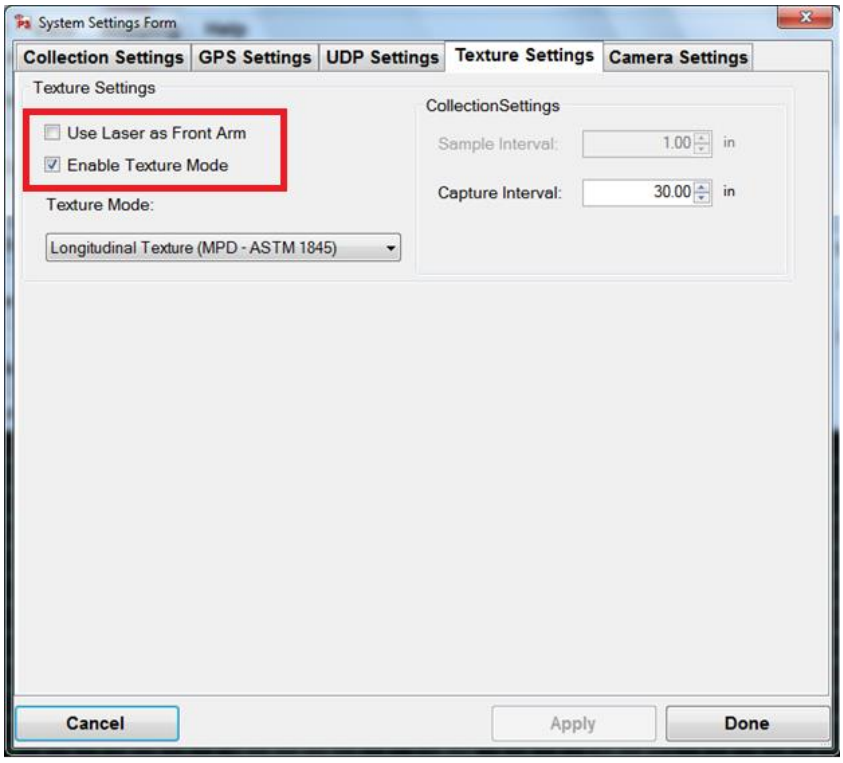


Figure 12: Texture Setting Window for systems with dot lasers.

Collect

Opening Profiler Software

Open the Profiler software by selecting the Profiler icon on the desktop, or through the folder destination of MyComputer>C:\ProgramFiles\SSIProfiler3 and selecting the 'SSI.Surface.Roads.Profiler.App.exe' file. The software will only detect the hardware if the electronics are powered on and the computer is connected to the device through the DB-9 serial port or the proper usb cable.

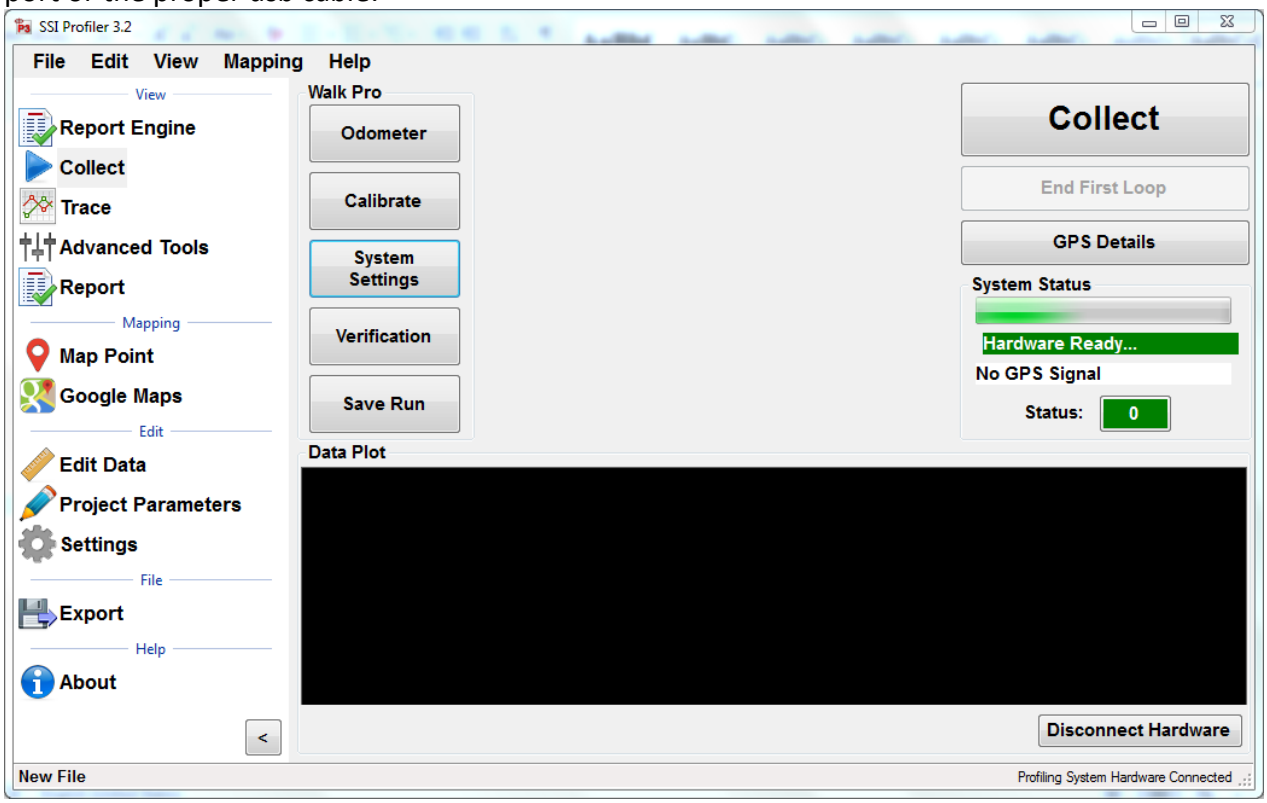


Figure 13: Main Profiler Software collection window for the WalkPro with Systems Setting button highlighted as next setup procedure.

Hardware Detected and Discovered

Once hardware is properly connected and set up, the Profiler program will recognize the hardware once the Collect window is opened. When the hardware is found, "Profiling System Hardware Connected" will be displayed at the bottom right corner of the window.

System Settings

Inclinometer Sensitivity

Under System setting there are text boxes to enter the inclinometer sensitivity. Before performing the height calibration make sure the inclinometer sensitivity is set up correctly. Enter the same number in Channel 0 and Channel 1 for the CS8800. For the CS8850 Sidewalk Profiler there are different numbers for each channel. You can find your inclinometer sensitivity from the documentation provided by your SSI Representative. The inclinometer sensitivity is based on the scaling factor of the inclinometer.

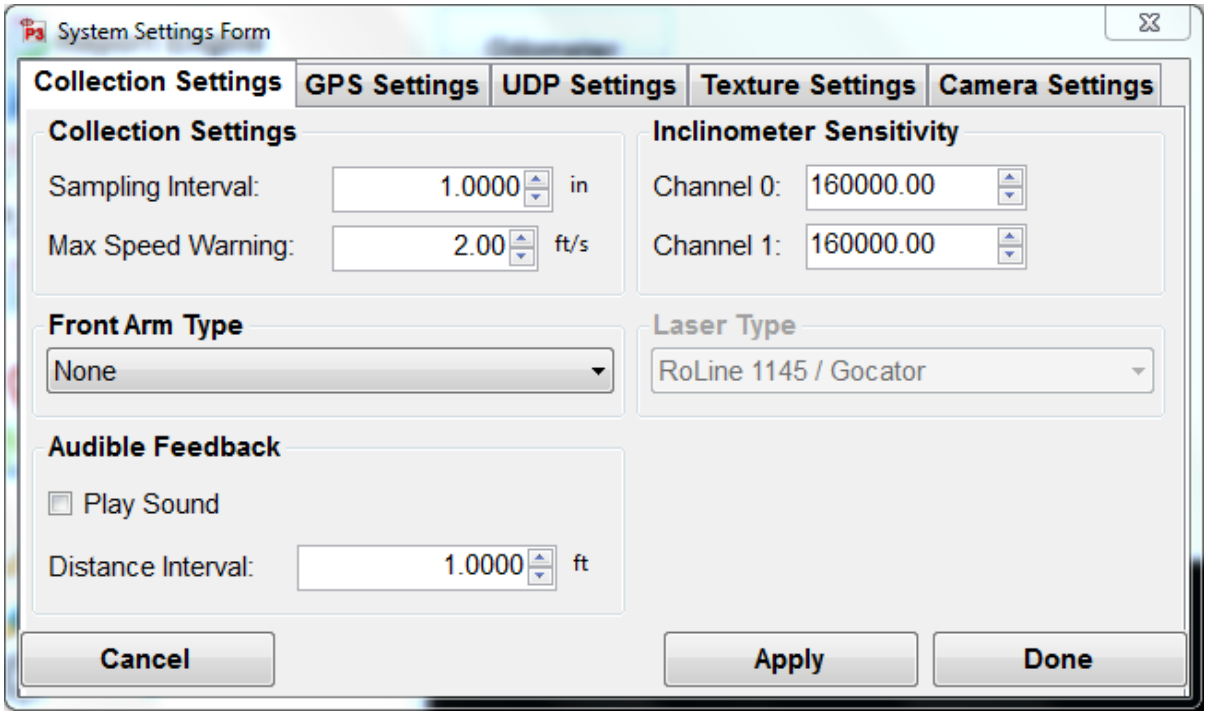


Figure 14: Collection Settings tab of a WalkPro system with same Inclinometer Sensitivity value in Channel 0 and Channel 1

The sampling interval should be set at one inch unless directed by a SSI Representative. The one-inch sampling interval allows the CS8800 to be a Class I profiler for use in comparison with high speed inertial systems.

The maximum speed warning can be adjusted based on the type of work being collected. As the collection speed increases the accuracy of the system decreases. For optimal results, collect data at one to 1.2 foot per second. Do not exceed two feet per second.

Front Arm Setting (If Applicable)

Depending on the type of front arm the operator should set the type of front arm being used. The parameters will be entered in the Collect window under System Settings and Collection Settings. There are no calibrations for the laser front arm.

GPS Settings

The CS8800 operator can select the type of GPS string to display in the Collect Window, and enter the parameters of the GPS antenna location for more accurate GPS positioning. The minimum GPS sampling can be set to the default value of 0.00 for the maximum amount of samples.

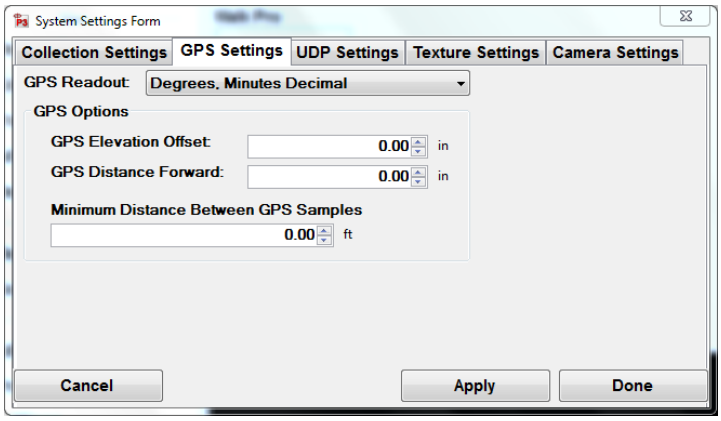


Figure 15: The GPS Settings

UDP Settings

Chose the appropriate UDP setting according to the configuration of your system. For devices with a front arm laser, use “The Advanced setting” to configure the particular laser.

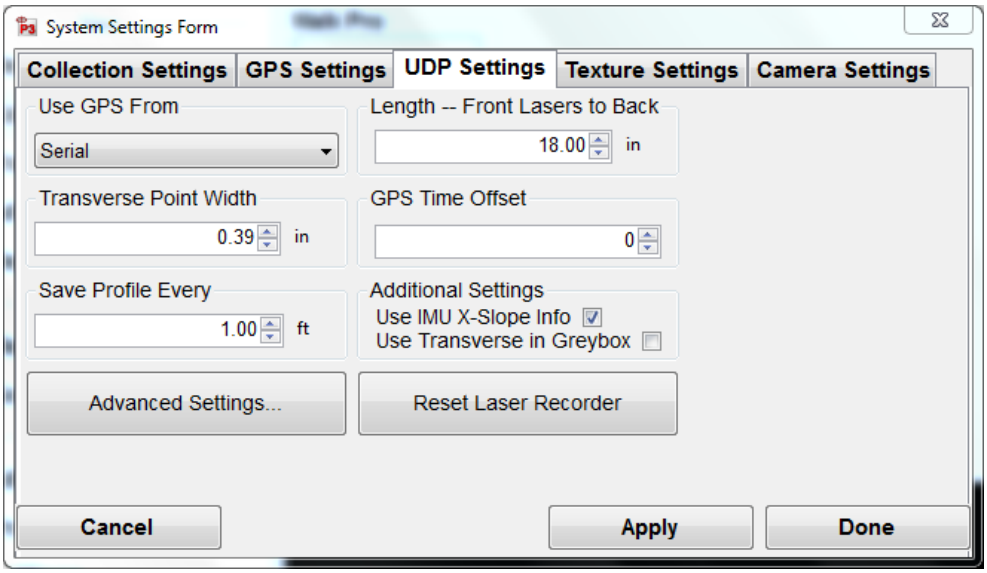


Figure 16: UDP Settings window.

UDP Advanced Settings

Under Advanced Setting, make sure to follow the below image. The tab for “Receiver 0” should be active and enabled. Make sure to select “Gocator 4” above the Gocator Receiver Settings and take particular care in copying the correct inputs for Mode, FrameRate, Exposure, and the IP address.

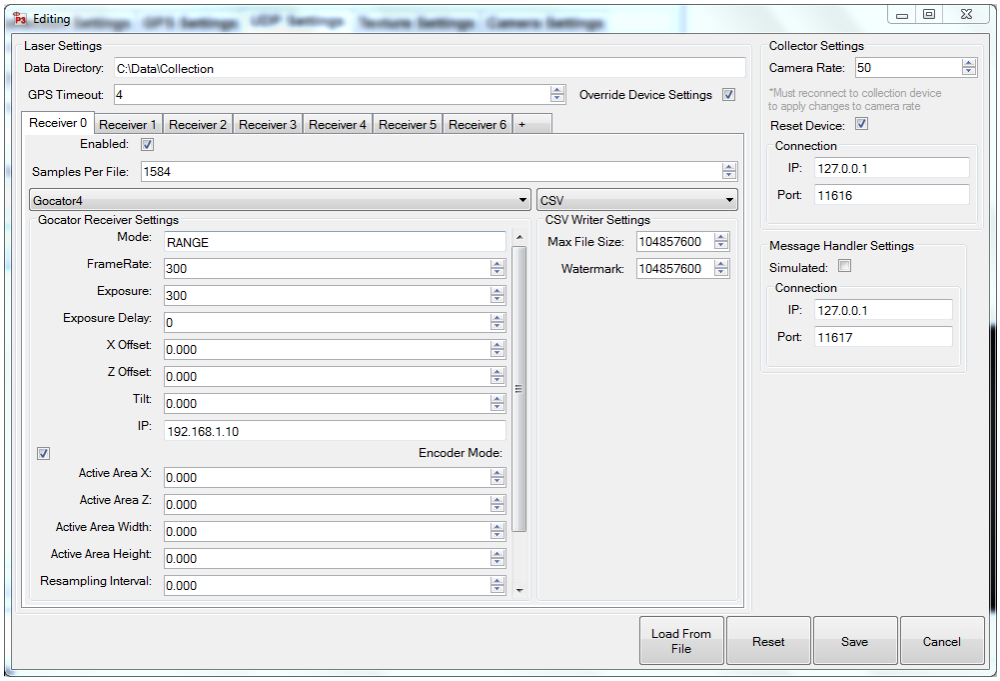


Figure 17: UDP Advanced Settings window.

Texture Settings

Under the Texture Setting window, make sure to select the "Enable Texture Mode" checkbox. SSI recommends the Texture Mode set to "3d Mode" for most applications.

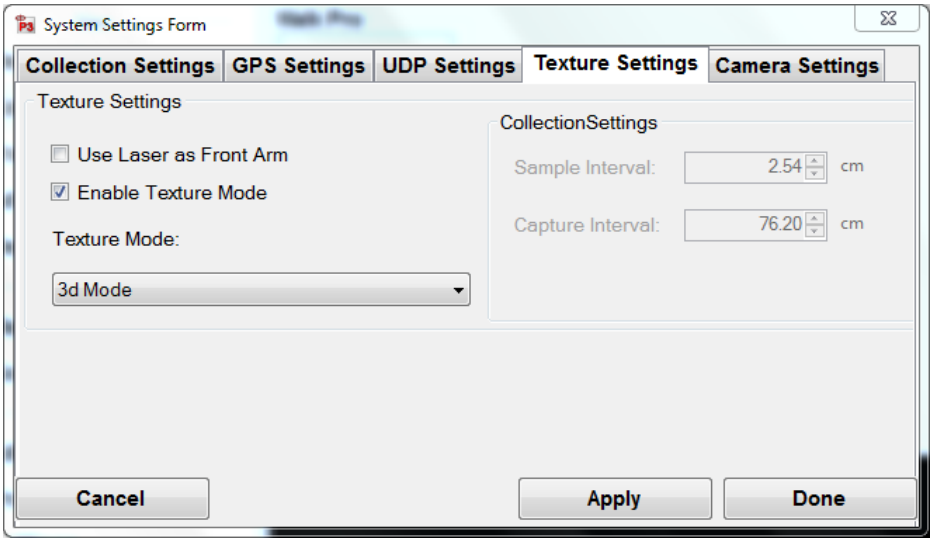


Figure 18: Texture Settings window.

Camera Settings

How to Begin Using the Camera

Install the Flycap2Viewer driver located on the disk supplied by SSI (or already installed on the computer). The correct driver depends on if the computer is 32 or 64 bit. To check this, open the start menu and right click on My Computer (or My PC) and choose 'Properties'. On this window find the System Type and view if the system is 32 or 64 bit. If the computer is 32-bit, install the x86 flycap2viewer. If the system is 64-bit, install the x64 flycap2viewer. Once the driver is installed, plug in the Chameleon Camera to the computer's USB port and the camera's back cover. The computer will sound two pings and install the driver software for the camera. Once finished, a notification window will appear in the bottom right of the screen to say that a Chameleon camera is connected. Now the camera can be enabled in the Profiler V3 program.

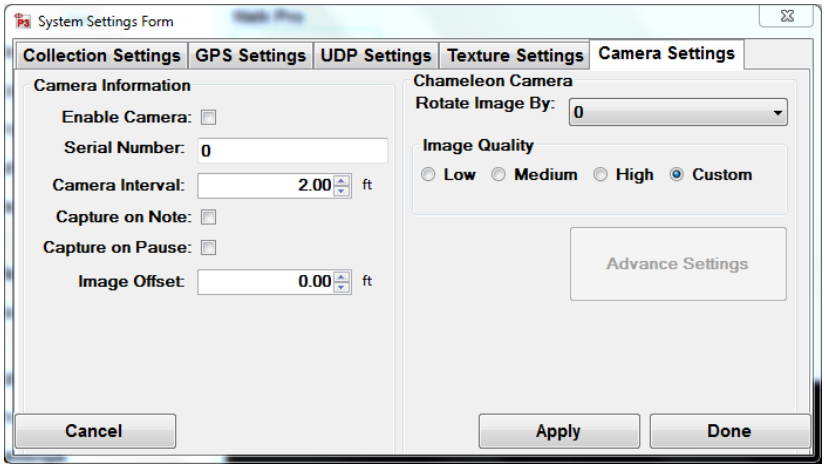


Figure 19: Camera Settings window

Enabling Camera Settings

Once the profiling system is connected and the Collect tab is open, the operator can enable the camera. At this time make sure the flycap2viewer driver is installed and the camera is connected. Open the collect window and once the hardware is found, select System Settings. Under the system settings window, select the Camera Settings tab. To enable the camera feature, select the check box under the Camera Settings Tab. The camera interval is the distance between each picture. This can be set to any interval, however, the more pictures taken results in more data saved to the file and more time that post-processing will take. If the camera is not mounted

upright, enter the correct rotation angle in degrees, selecting one of the four options. The camera is focused on the physical lens. Enter the serial number of the camera which is on the sticker on the back panel of the camera. Once apply is selected the camera will be found in under one minute for the first use. Once the settings are saved, the serial number will fade out.

If the camera image preview is not in color: Under Collect Window > System Settings > Advanced Camera Settings > Standard Video Mode, select the button for the resolution and pixel type to be Y8 and 1280 x 960. The frame rate should be at 15 Hz. This will make the camera take color pictures (as seen in the preview window also). Also make sure that the pixel type is Raw 8 and the mode is '0' under the custom video modes tab.

The image preview should appear in the Collect window in color and at the correct orientation. If not, change the settings to the appropriate orientation or open the Advanced Settings.

To reduce the size of the image, change the resolution of the camera medium or low. This will decrease the processing time and RSD file size. The Advanced Options can be changed by the user under Custom Mode.

Calibration

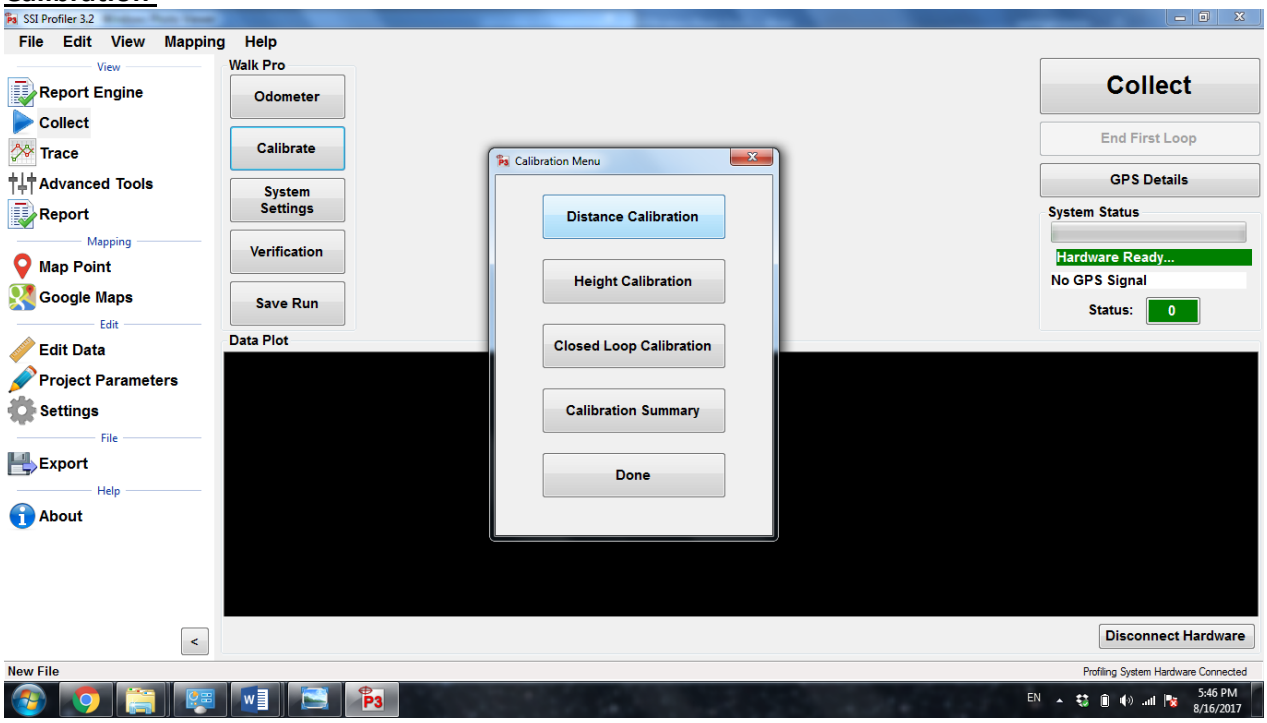


Figure 20: The Calibration menu appears after the "Calibrate" icon is selected.

Distance Calibration

Prepare a test track by measuring out 528 ft (160 meters) with a rolling wheel measuring device in a marked and straight path. 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.

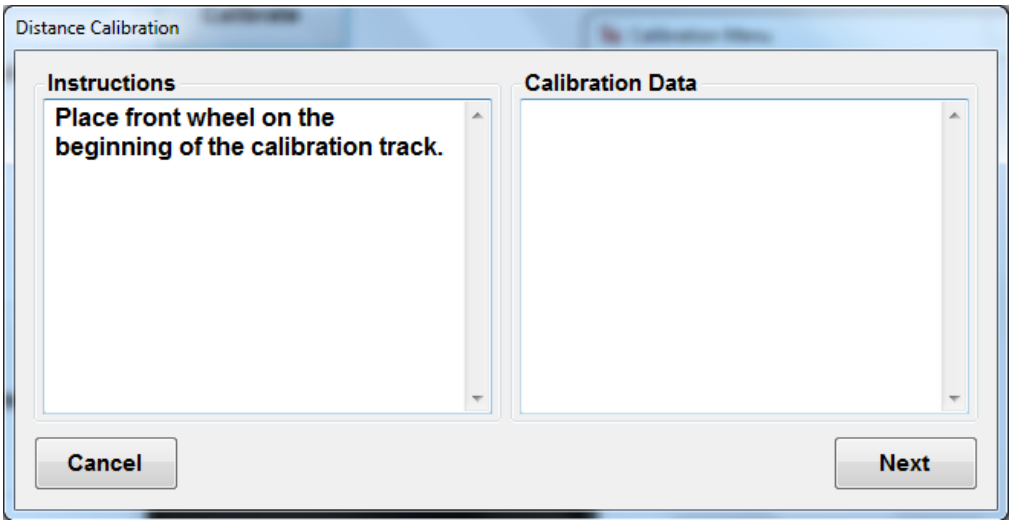


Figure 21: The initial window of the distance calibration. Once the walking profiler's front wheel is on the beginning of the track, select next.

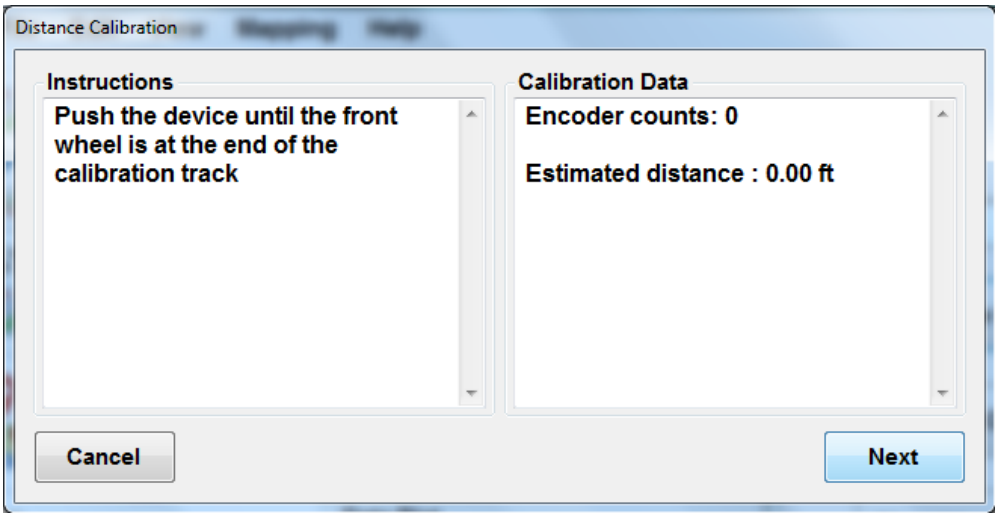


Figure 22: Follow the instructions and push the device until the front wheel is at the end of the calibration track.

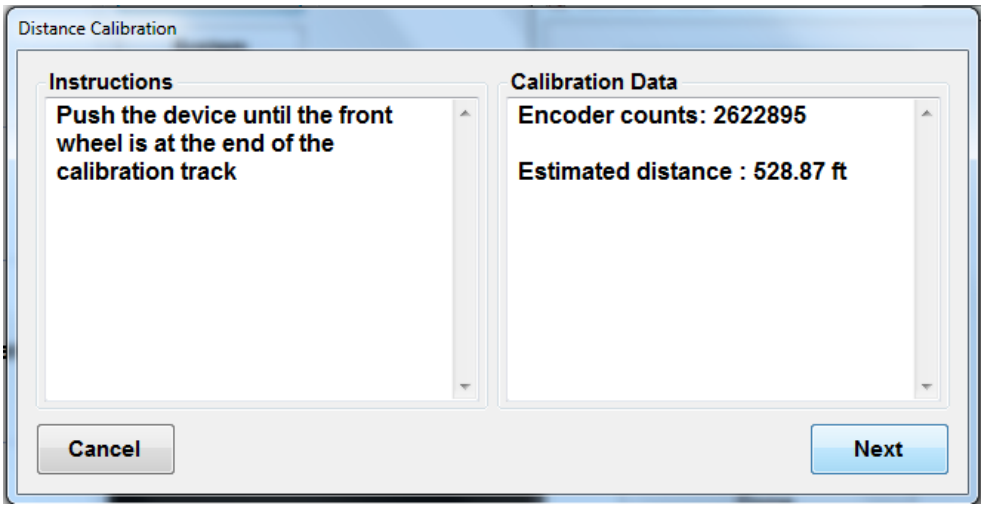


Figure 23: Calibration window with front wheel at the end of the track. The estimated distance can be ignored as it will be overwritten at the end of the calibration procedure.

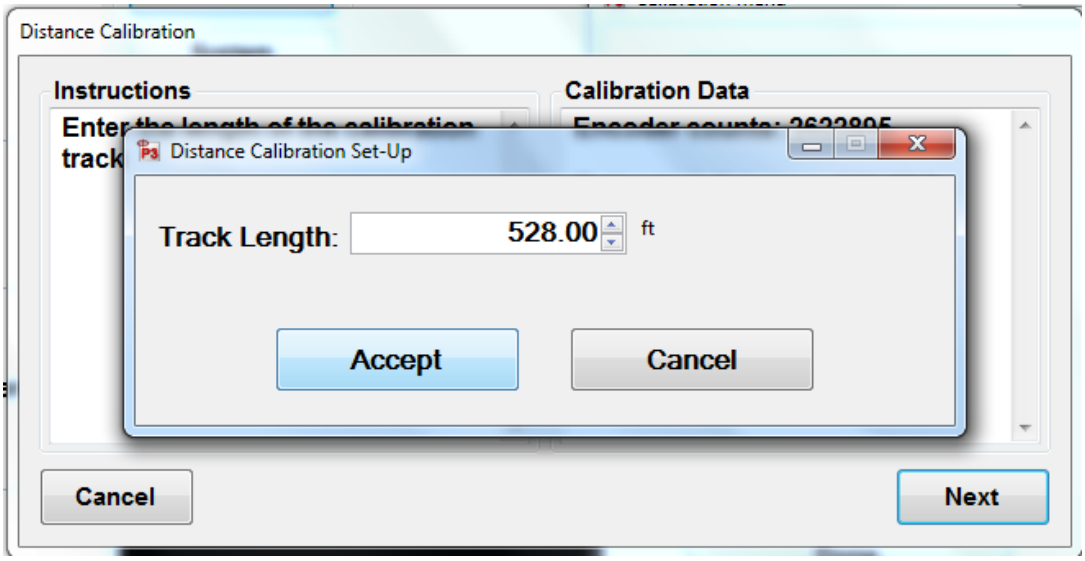


Figure 24: Window where the operator enters length of calibration track is. The units can be changed by clicking on the feet (ft) and choosing the appropriate units. After the length of the track has been entered, select Next.

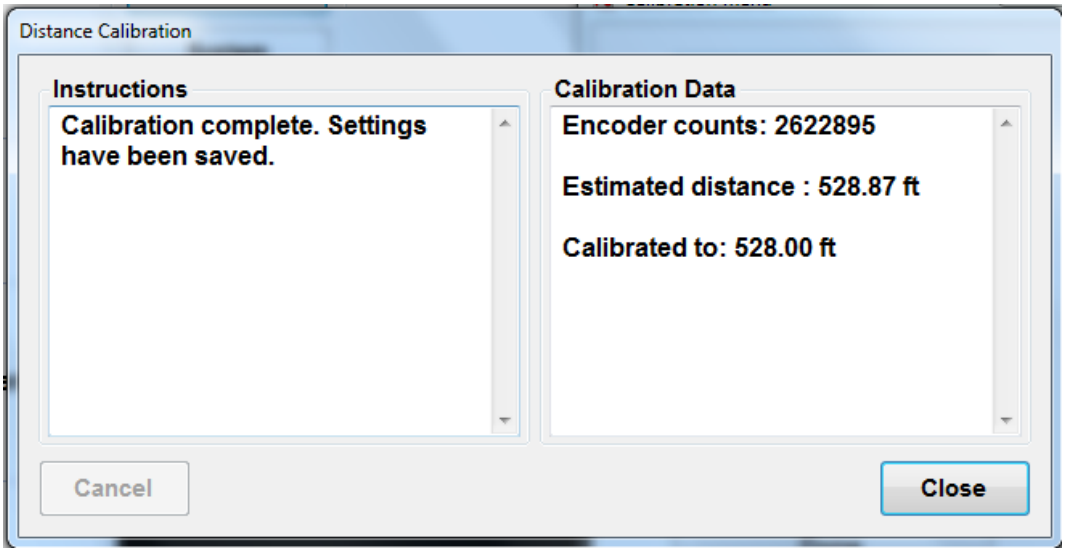


Figure 25: This window shows the number of encoder counts, the length of the track that was entered in the previous window and the estimated distance traveled based on the last calibration.

Height Calibration

Before performing the height calibration make sure the inclinometer sensitivity is set up correctly under System Settings. Enter the same number in Channel 0 and Channel 1. You can find your inclinometer sensitivity from documentation from your SSI Representative. The inclinometer sensitivity is based on the scaling factor of the inclinometer.

To perform a height calibration, the walking profiler needs to be placed on a level surface. Mark the locations of the main wheels on the ground and begin the calibration process. These wheels

do not move along the body of the walking profiler, so they are a good reference point. While the inclinometer is calibrating, do not touch or move the walking profiler.
Once the first step is complete, rotate the walking profiler 180 degrees so that the wheels switch positions and resume the calibrations. Last, return the device to its initial position on the marks. These steps are listed in the procedures while performing the height calibration. Follow the images and instructions below.

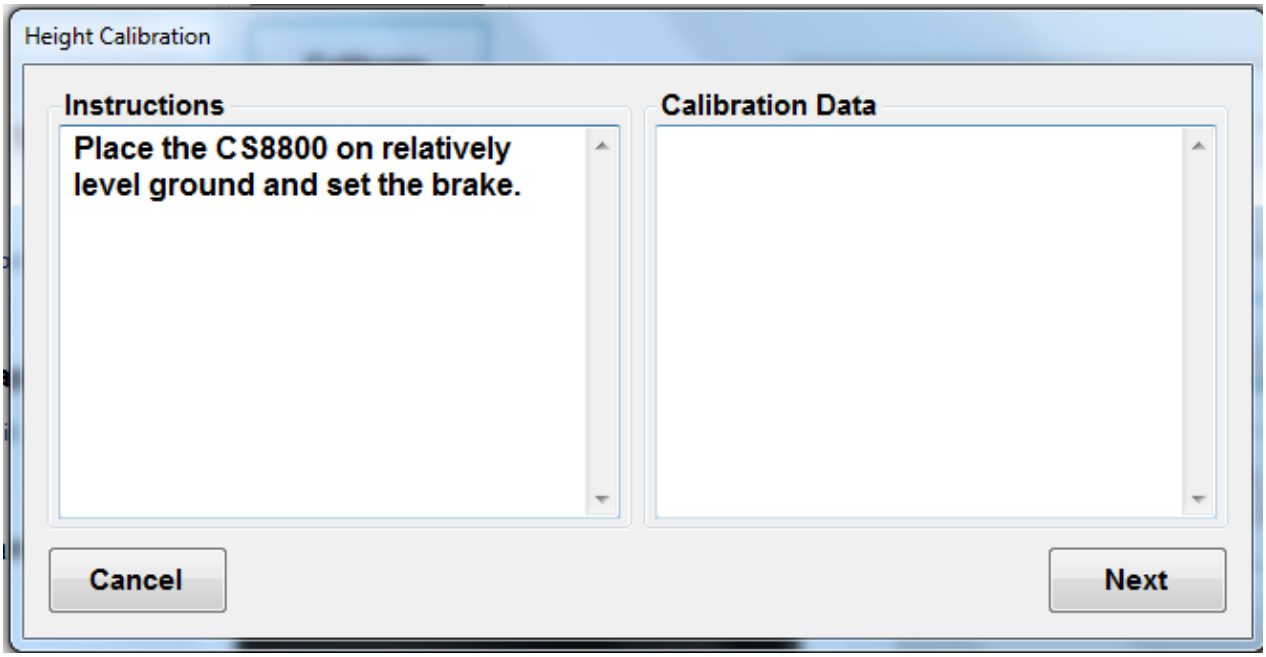


Figure 26: The first window of the height calibration. This window instructs the operator to place the walking profiler on level ground with the brake applied.

The position of the wheels must be marked in a manner similar to the image. To begin the calibration, the surface must be close to level.

Figure 27: First Step to Height Calibration

Make sure the wheel's axels align with the markings on the floor by looking from above down at the axel. Look that the axels align with both marking, and that the wheels are exactly above the intersecting points of the markings.

Figure 28: Align wheels and axels with marks on the floor

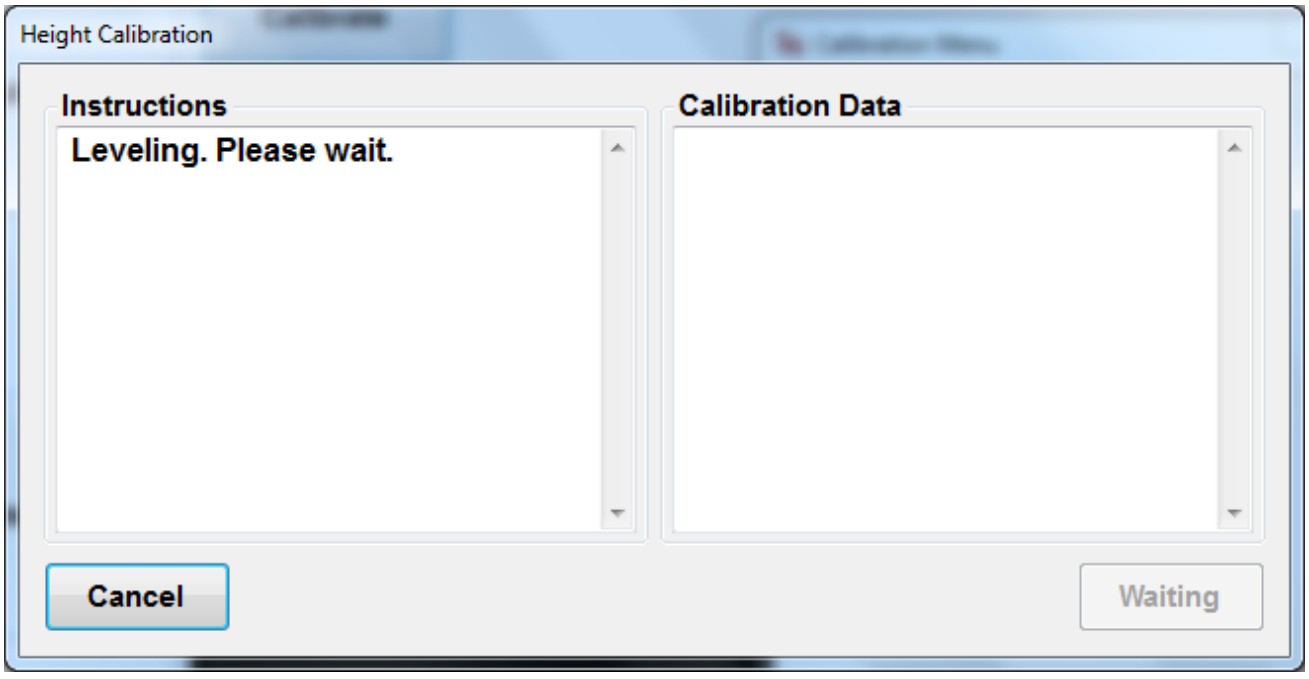


Figure 29: The software will briefly flash the "Leveling" window before continuing the calibration.

After the first phase of the height calibration, the walking profiler must be turned around 180 degrees and have its left rear wheel switch positions with the left front wheel. The wheels must interchange contact points.

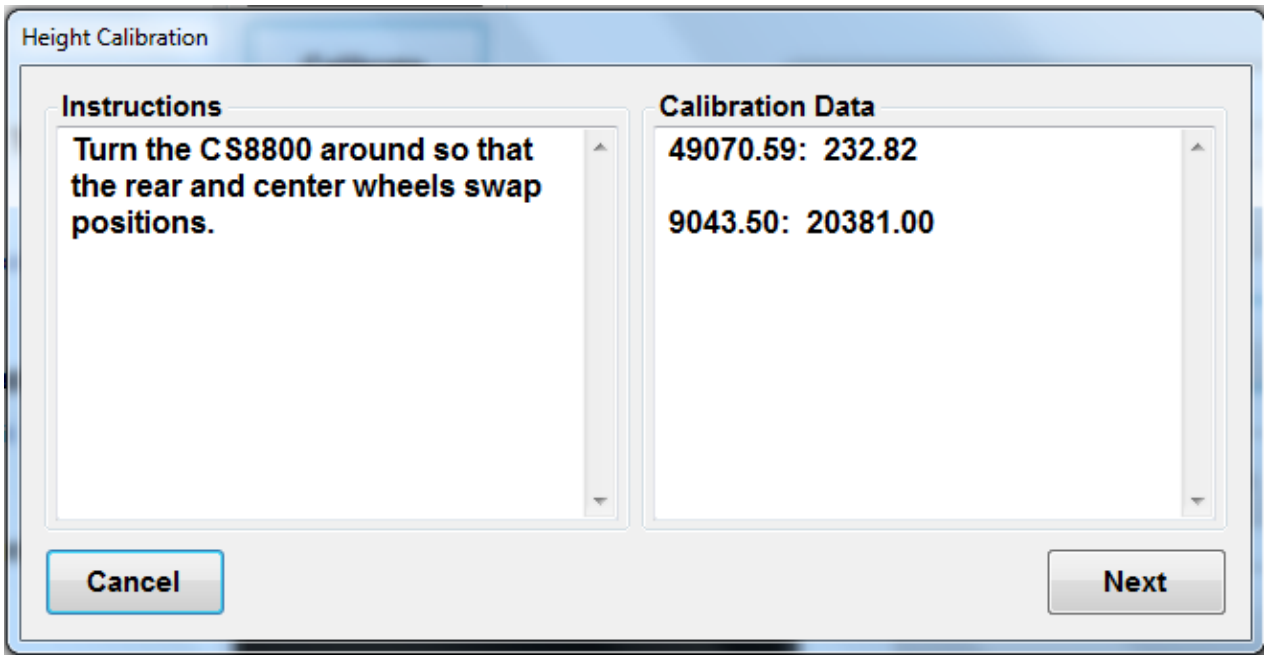


Figure 30: Next step Height Calibration

After the first phase of the calibration, rotate the walking profiler 180 degrees so that it is facing the other direction. Line up the wheels on the same marks that were made in phase one; the back wheel has switched positions with the front wheel. Finish the calibration procedures given by the program. The points of contact of between wheels and floor should now be interchanged.

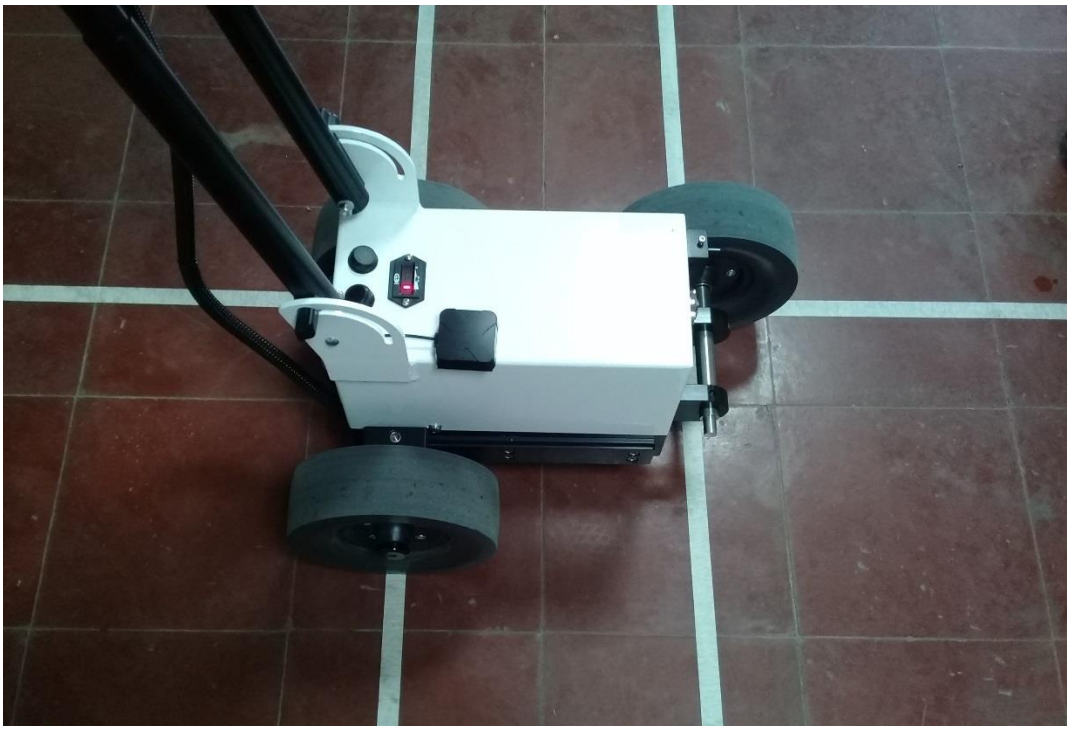


Figure 31: WalkPro device rotated 180 degrees.

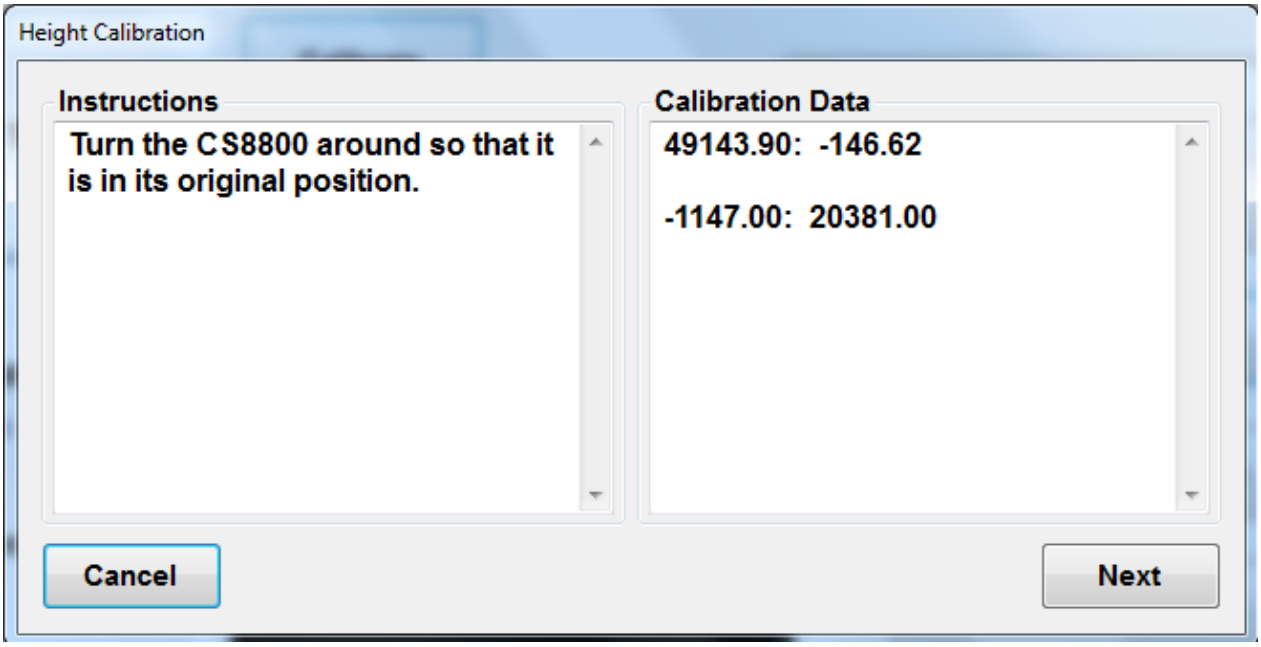


Figure 32: Window instructing to turn the devices around so that it's in the original position.

This last step of the height calibration will only appear if the system hasn't been recently calibrated. If the device has valid height calibration settings, the calibration routine will stop after rotating the system 180 degrees and pressing next.

Figure 33: The system turned back to it's original position.

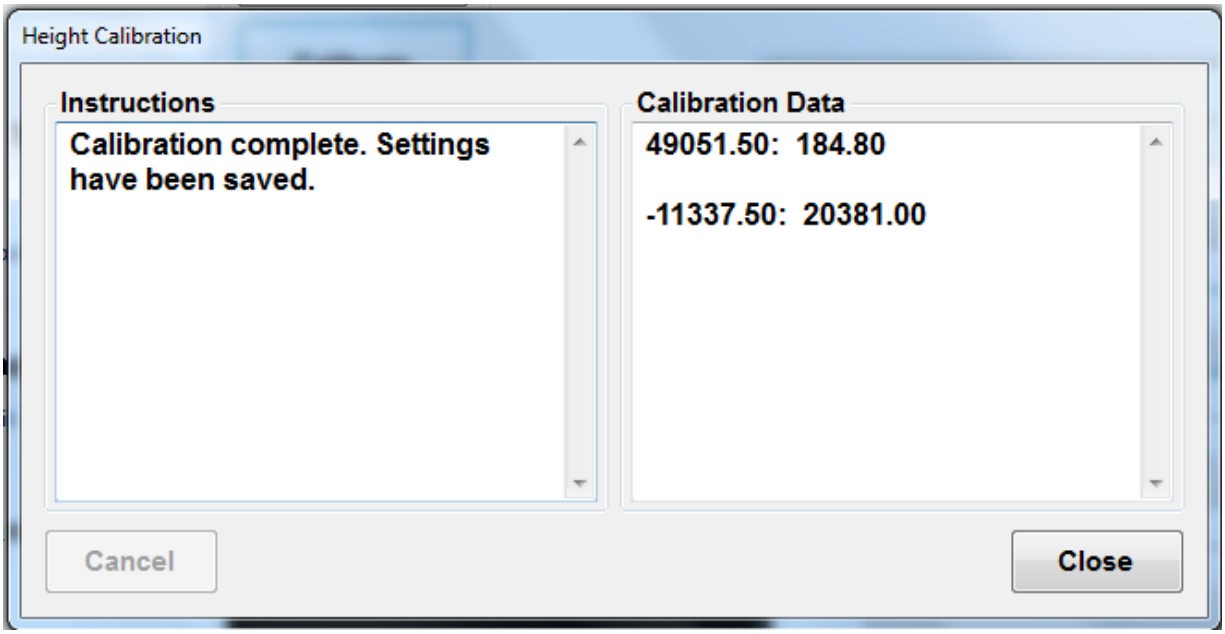


Figure 34: After a successful calibration, the settings will be saved. Select close to proceed to the next procedure.

Profile Slope Calibration (Closed Loop Calibration) - Optional

This calibration allows the system to determine the inclinometer drift and compensate for it. The closed loop calibration is not required for operation of the CS8800. By compensating for the drift the elevation profile will be more accurately represented. The calibration is called a closed-loop calibration because the operation is performed down and back along the calibration track. A distance of 20ft-25ft is recommended for the closed loop calibration (20ft is the minimum).

Calibration Instructions:

Place front wheel (or laser for laser systems) at start of track. Finish with rear wheel.

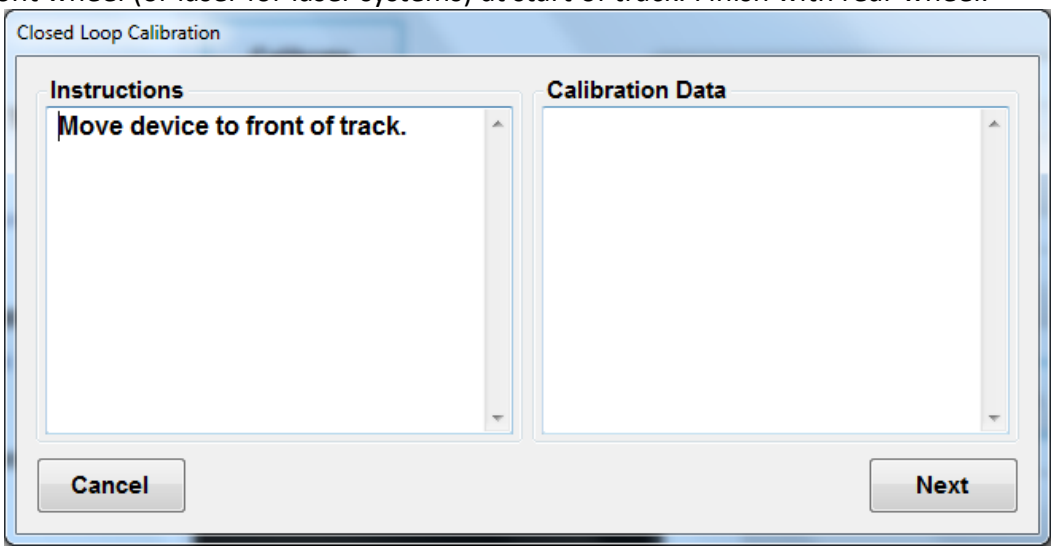


Figure 35: 1st window of the Profile Slope Calibration.

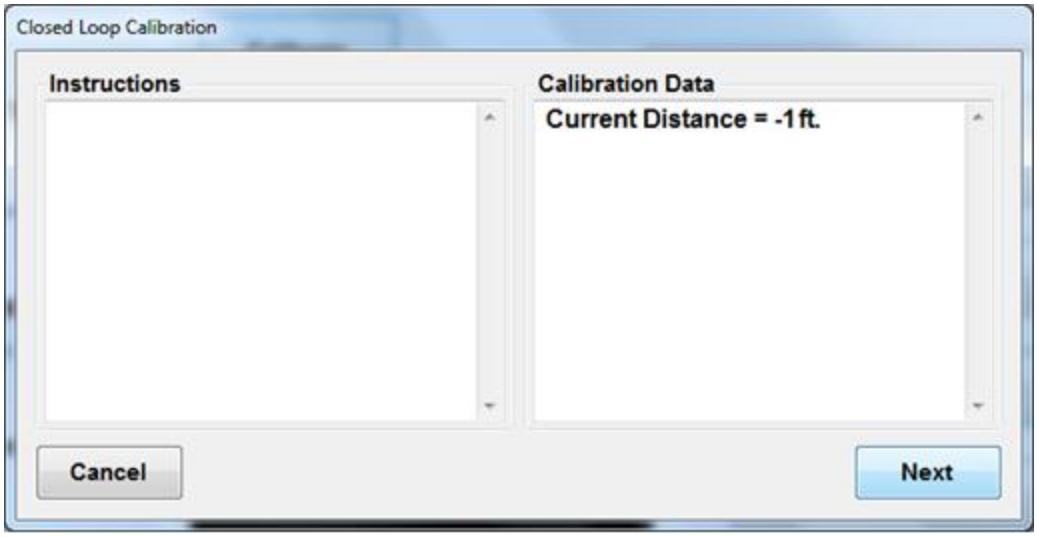


Figure 36: 2nd window of the Profile Slope Calibration. The initial negative distance indicates the length between the front and back wheel. Proceed to push system to end of track.

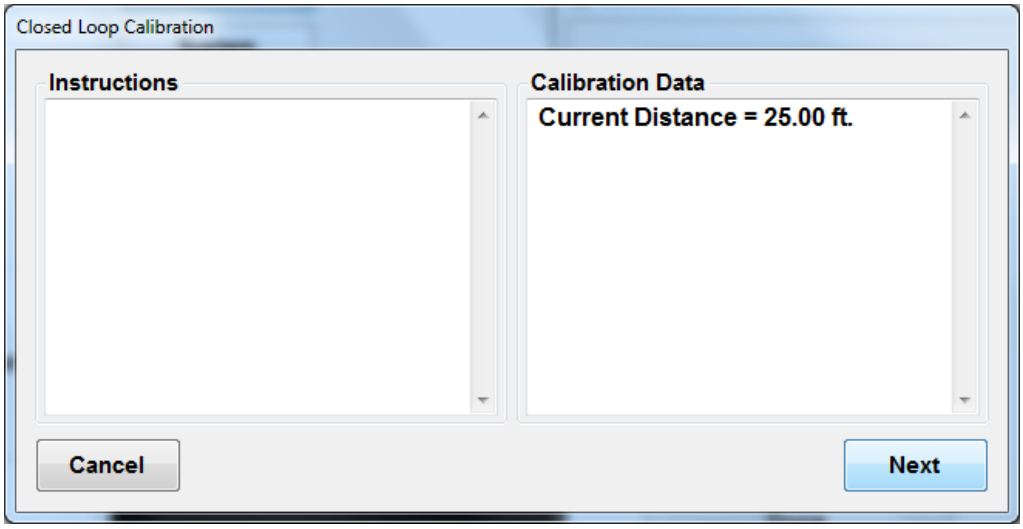


Figure 37: Profile Slope Calibration widow after device has been pushed for 25 ft along a straight calibration path. Closed loop calibrations can be no shorter than 20ft.

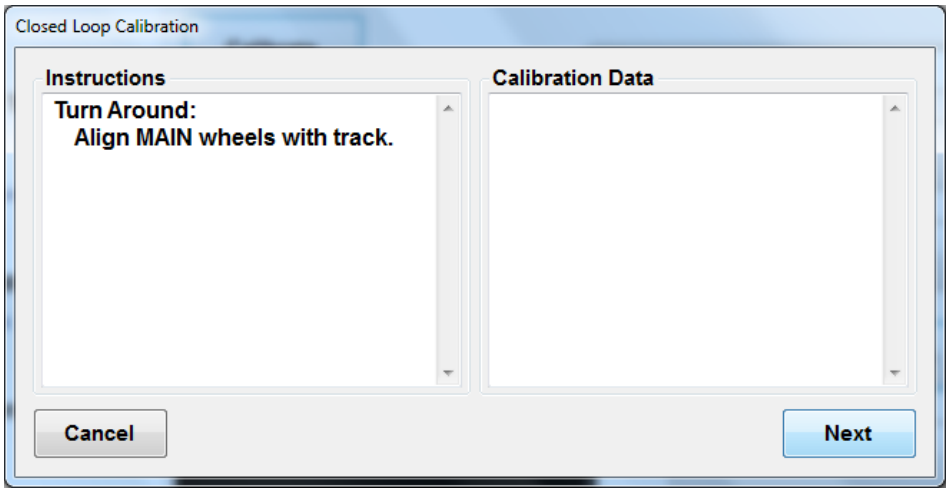


Figure 38: Window indicating operator to come back over the same calibration line

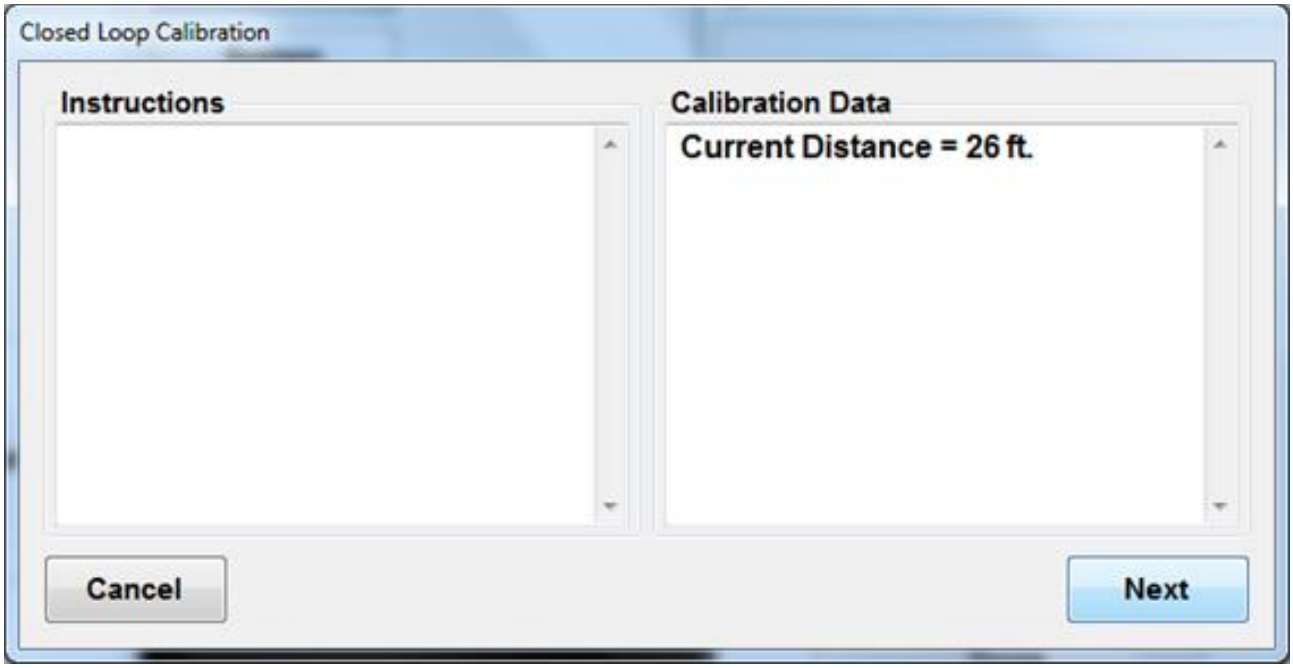


Figure 39: Window starting the second half of the closed loop calibration. Push device back to the start of the original track.

With the system facing the opposite direction and laser at the end of the track, where the back wheel ended, push system back to initial starting point. The main wheels should go over the same line. The distance traveled will be reversed. Stop when the onscreen "Current Distance" shows 0.00 feet.

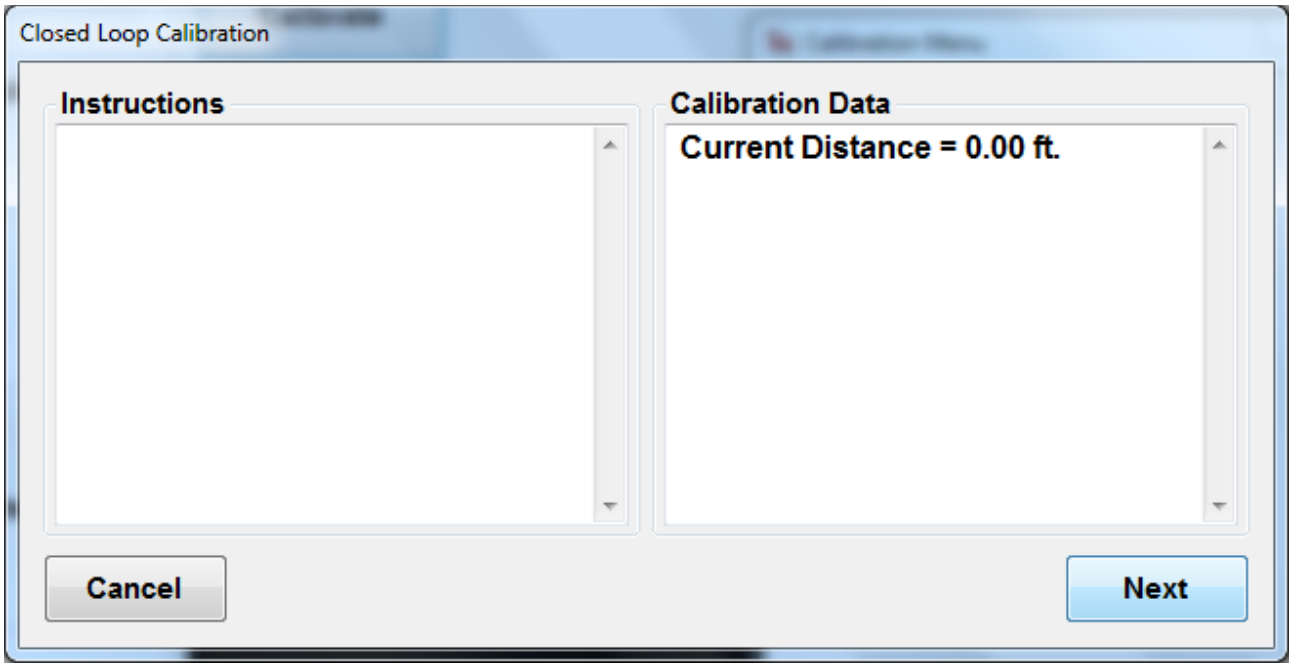


Figure 40: Window at the end of the second half of the calibration routine when the device has reached the starting point of the initial track.

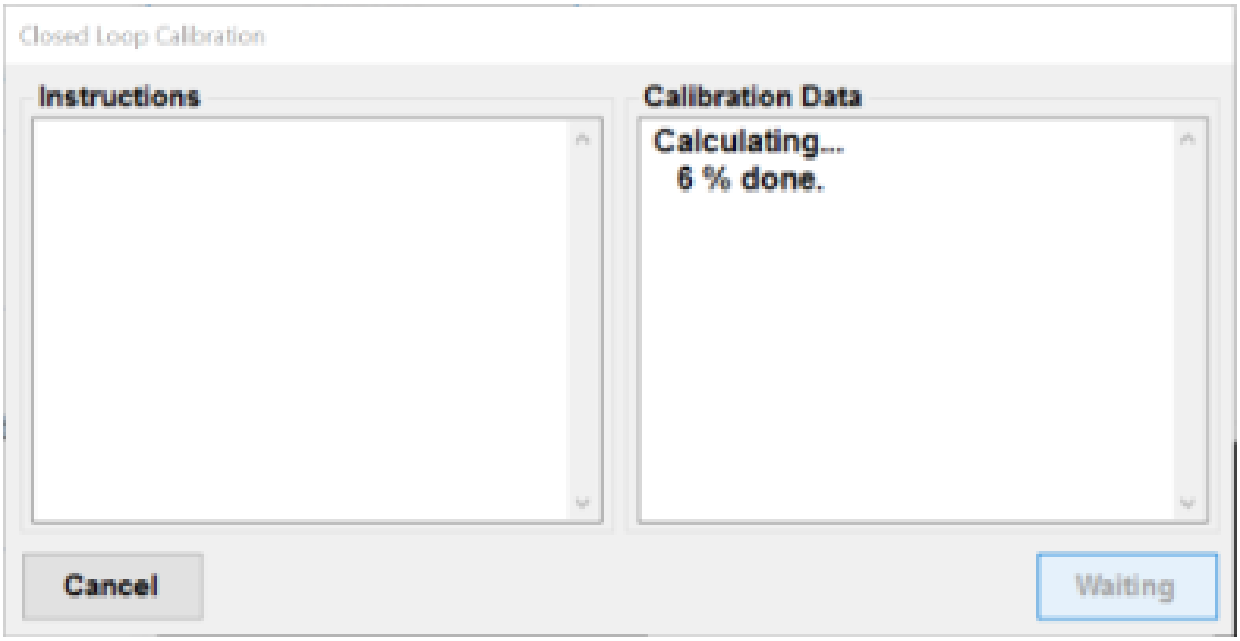


Figure 41:Calibration window calculating results

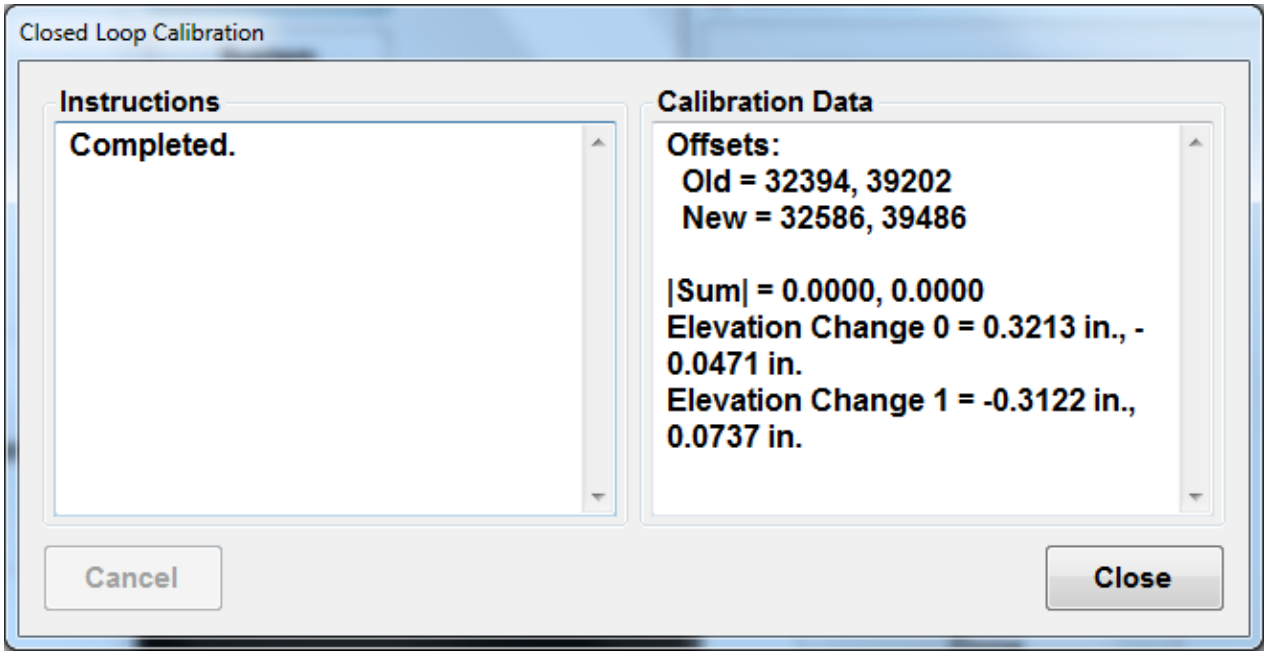


Figure 42: Last close loop calibration window indication a completed routine.

GPS Reporting Notes

If WalkPro is equipped with 5 Hertz (Hz) GPS, the coordinates of the profile will be included with the data. The GPS system is maintenance free and does not require any set up as long as the antenna is fixed to the WalkPro housing. The reporting interval of the GPS coordinates can be adjusted within Profiler V3. Navigate to the Report Options tab under Settings. Select the icon labeled “Customize Reporting Intervals” and enter the appropriate distance between GPS coordinates.

Create A New Job Folder on the Hard Drive For Organization

Prior to starting a profile job, it is recommended to organize the files into a folder where all of the files can be easily accessed. Each job should have its own folder. To create a new folder right click within windows explorer and select New>Folder.

Collecting Data

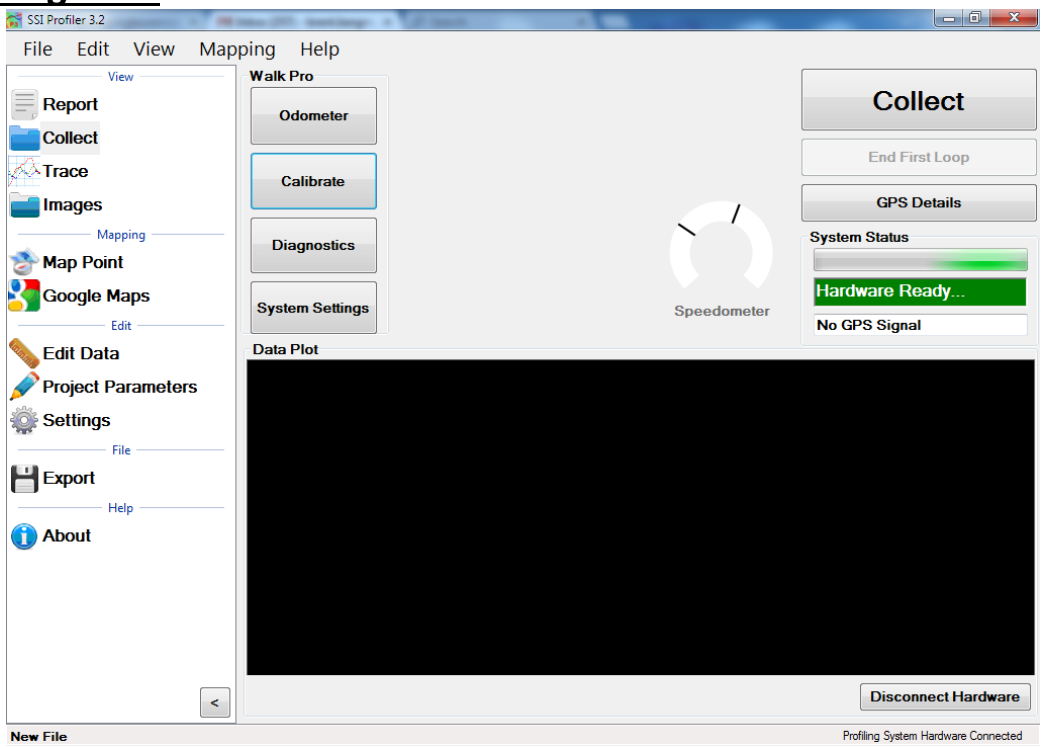


Figure 43: The main collection window for the walking profiler.

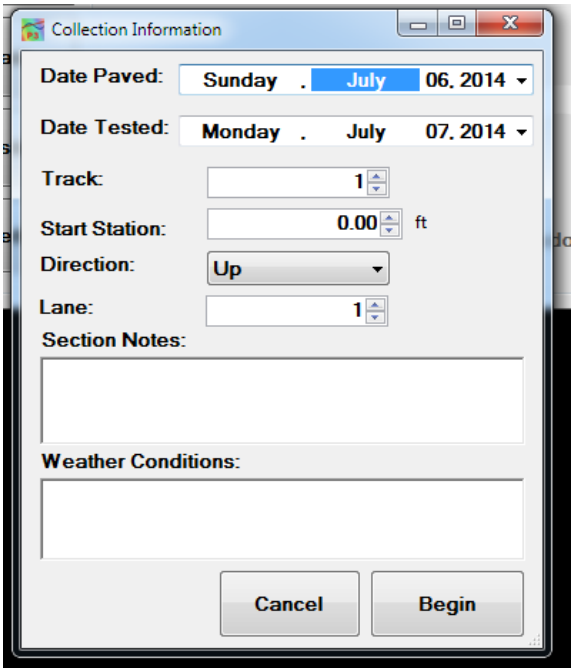


Figure 44: First window after pressing the “Collect” button.

Closed Loop Collections and Slope Compensation

Closed loop collections are not mandatory to operate the WalkPro. The operator has the right to only run open loop collections (one collection direction).

Closed loop collections eliminate inclinometer drift by subtracting the elevation changes from sequential samples through the profile. A closed loop collection collects one run up and the second run down the collection path. A slope compensation value is determined from the first closed loop collection and is used in the subsequent collections of the WalkPro as long as the device hardware is not disconnected. If the hardware is disconnected the slope compensation value is deleted and the operator must perform another closed loop collection to determine the drift coefficient.

The two main left wheels should follow the same path for both collection directions.

Every time the hardware is disconnected the slope compensation value is lost and another closed loop collection is required to replace the drift coefficient.

To collect a closed loop collection, begin the collection by connecting the WalkPro hardware and selecting Collect icon to input the collection parameters. Start the collection with the front left wheel (lever wheel) on the starting position. Select "OK" to begin collecting. Once the collection device's rear left wheel is over the end point select "End First Loop" below "Stop Collecting" See figure 47 (End First Loop is a closed loop collection; Stop Collecting is an open loop collection). Once the operator selects "End First Loop" the WalkPro should be turned 180 degrees so the main wheels are on the same path as run one. The operator will select "Start Second Run" when in the start collection position. Push system to the beginning point of run one and end the collection by selecting "Stop." At this time the program will determine a drift coefficient for the current hardware connection.

If the second loop is not approximately the same length as the first loop (1 foot tolerance) the program will make the collections into open loop runs.

The physical procedure for closed loop collections is shown below. Begin at a point A and end at point B, then turn around to begin at point B to end at point A. The exact path of run 1 is followed until the collection is ended at point A. Do no drastically lift the wheels of the walking profiler while reversing its direction. Execute multiple "Y" turns to rotate the walking profiler 180 degrees. Begin the collection of run one at point A with the axle of the front measurement wheel centered on the starting line. End run 1 at the ending station (point B) with the left rear wheel centered over the end line (the wheel that the brake acts on). This ending position may be marked to find the same point to start run two. Begin run two with the measurement wheel (let front wheel) centered on the marked line showing the end of run one. Run two ends at point A with the left rear wheel over the initial starting point.

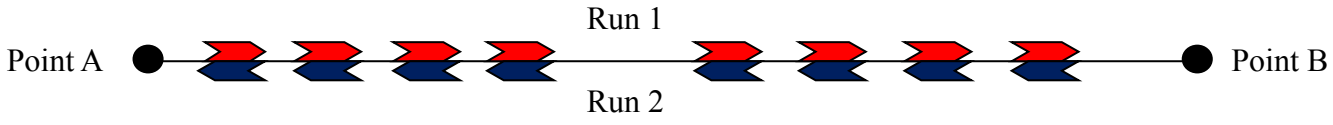


Figure 45: Collection procedure for a closed loop collection

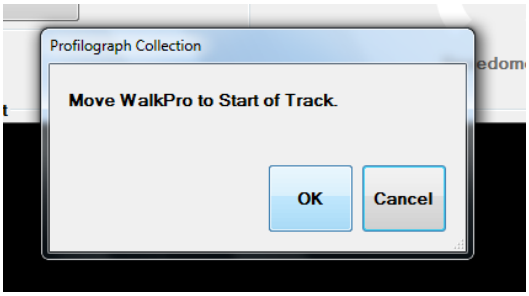


Figure 46: Start Collection.
To start the collection, move the walking profiler to the beginning of the track. Once OK is selected, data collection will begin.

The collection speed should not exceed one foot per second to have the most accurate profile collections. The speed limit is denoted by the red area of the speedometer. The operator is able to change the warning speed at their discretion. As the collection speed increases the accuracy of the WalkPro decreases.

It is not recommended to collect WalkPro profiles faster than 4 feet per second. For the most accurate profiles set the speedometer for a maximum speed of 1 foot per second.

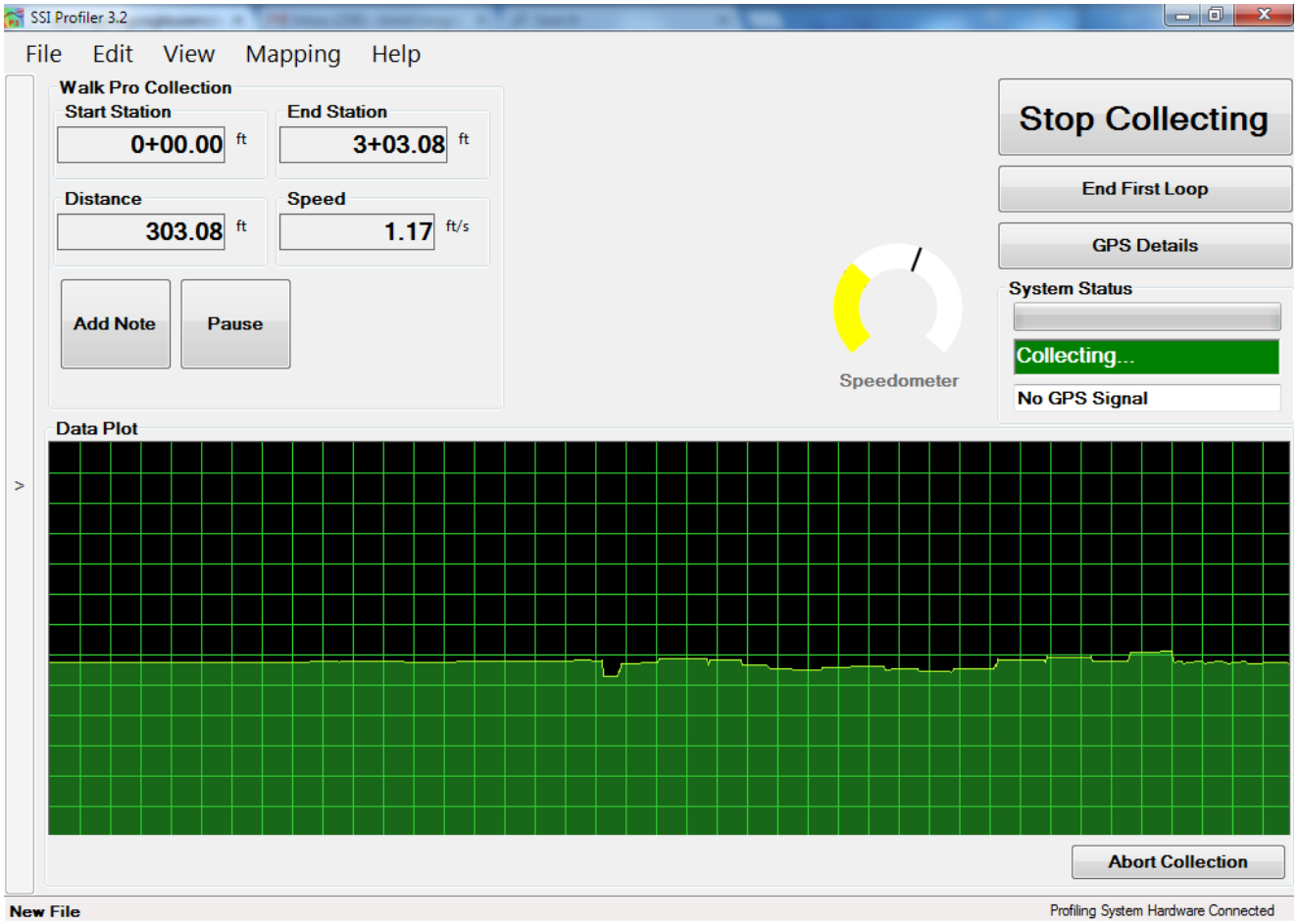


Figure 47: The collection window. It shows the initial options to stop the open loop collection or end the first loop of a closed loop collection.

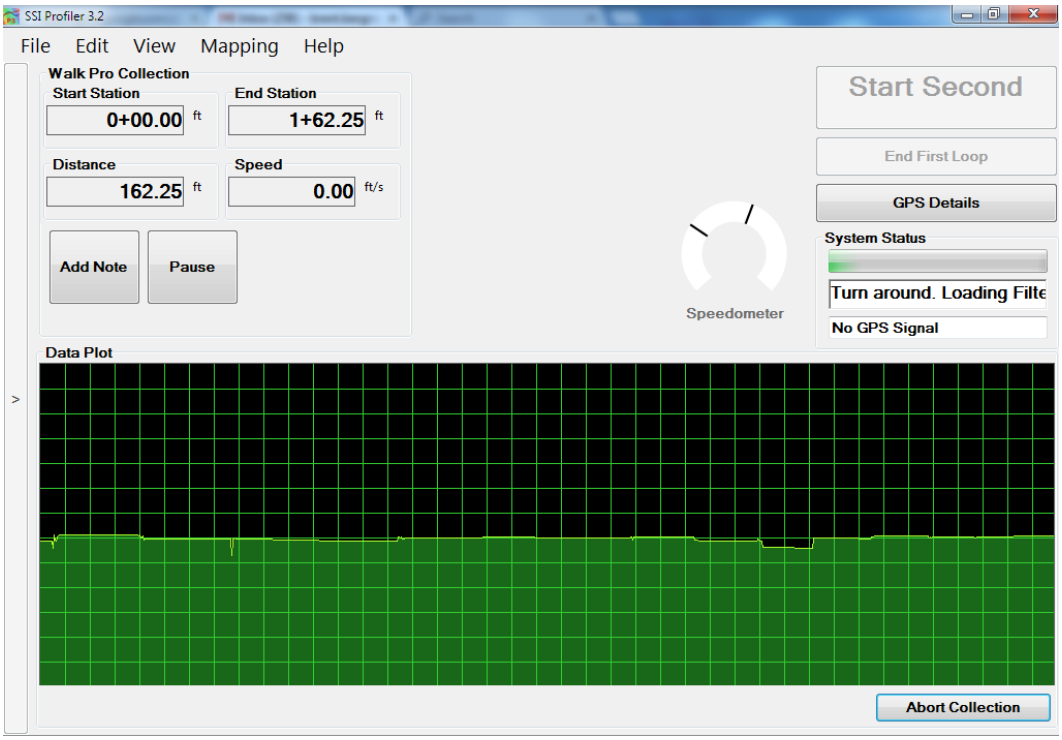


Figure 48: Window at the end of the first part of the closed loop.

When the walking profiler is in place to start the second leg of the closed loop, woth the front left wheel on the starting mark the operator may select “Start Second”.

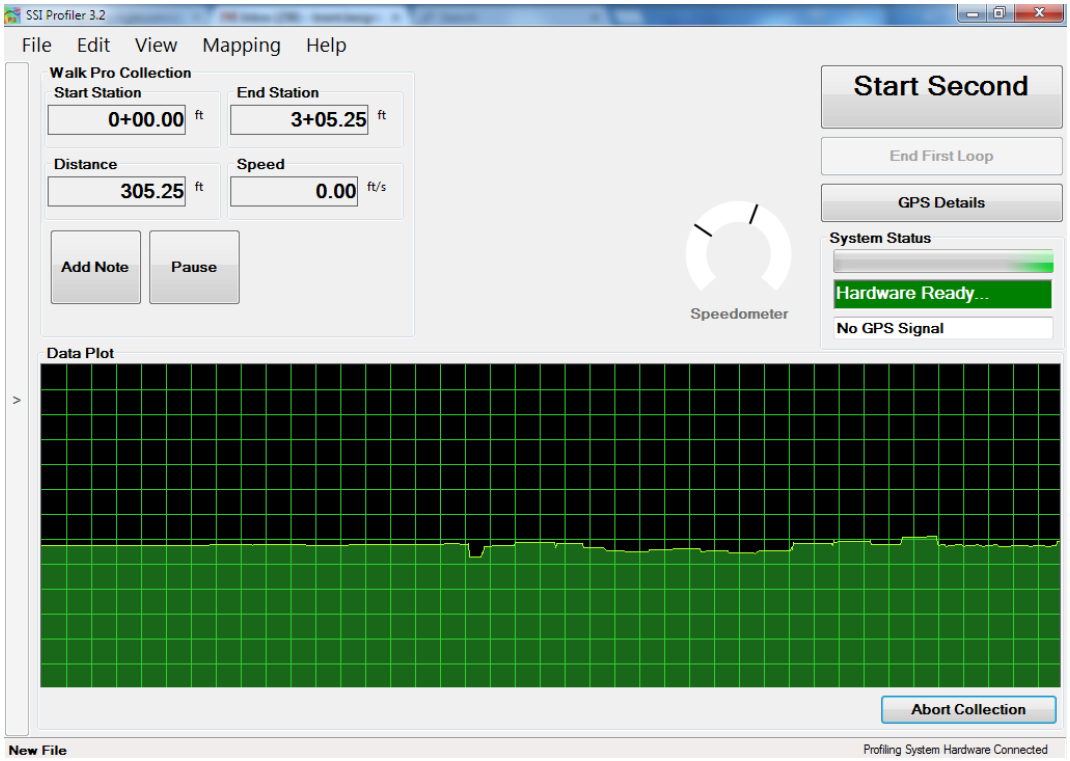


Figure 49: Begin Second Loop window

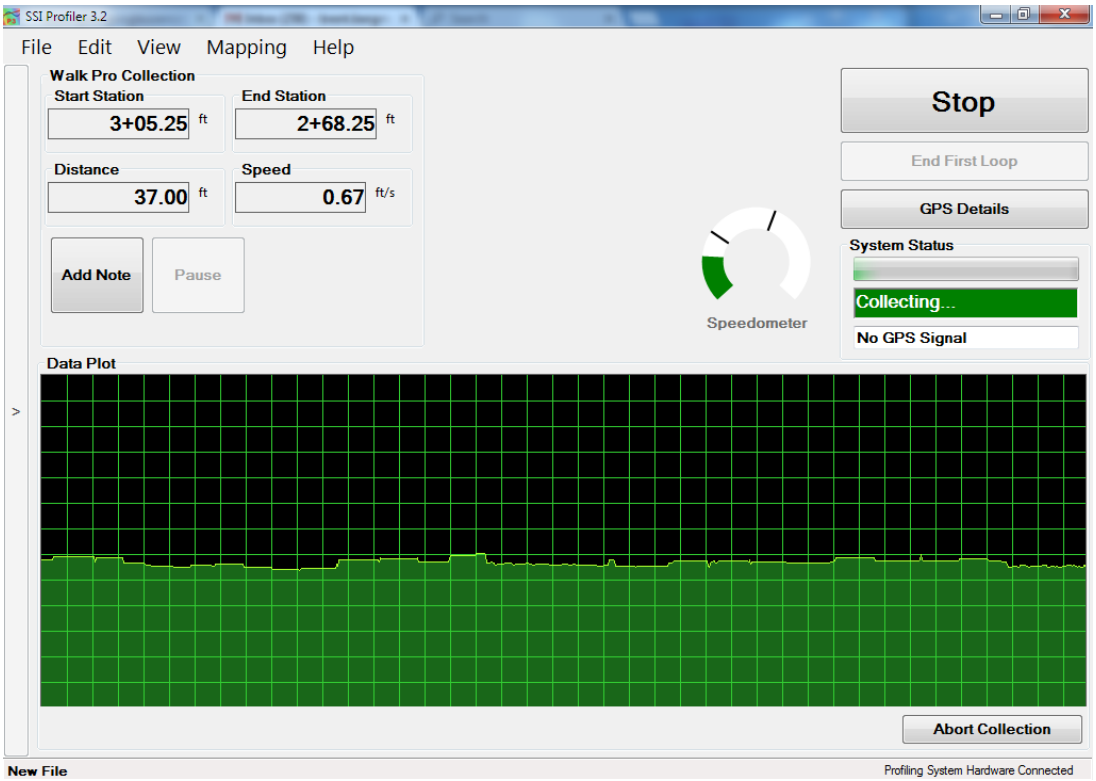


Figure 50: collection window for second part of closed loop run

Once the second run is started the option to stop collecting appears. During the second leg of collection, the end station will decrease toward zero; the starting station for the first loop.

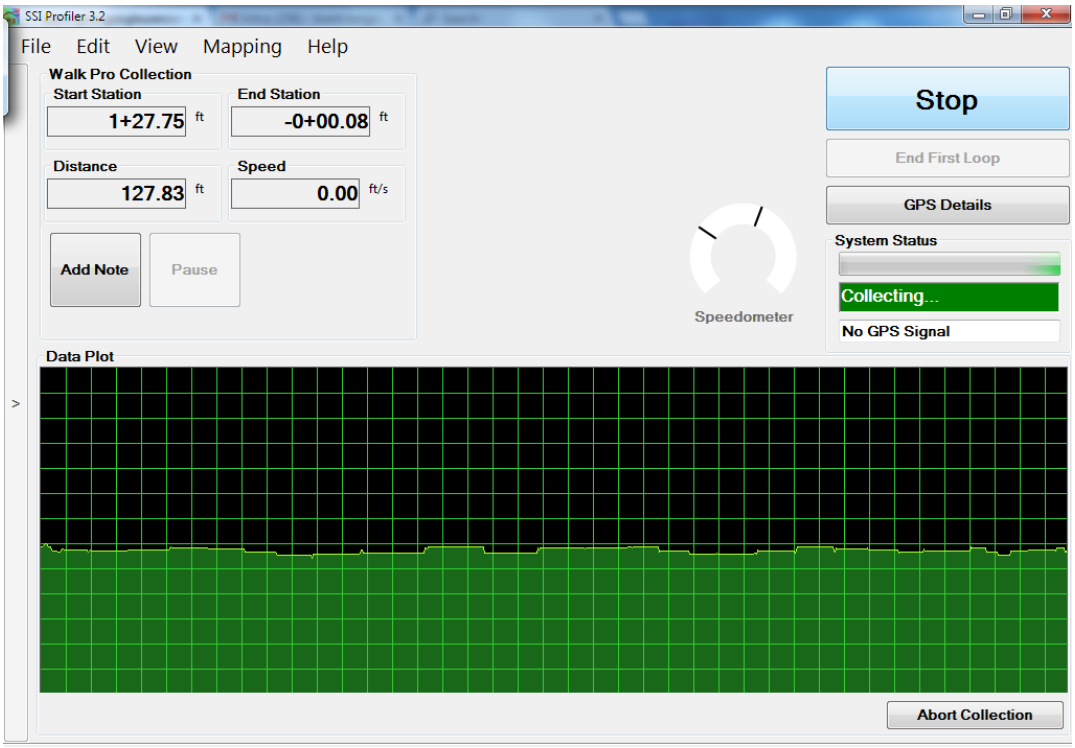


Figure 51: End of Second Loop for Closed Loop Collection

Closed Loop Requirements

If the second leg of the closed loop collection is not as long as the first leg the Profiler program will give the operator an error. The tolerance for this error is one foot. The ending station of the second loop must accurately match the beginning station of loop one for the slope compensation feature to function.

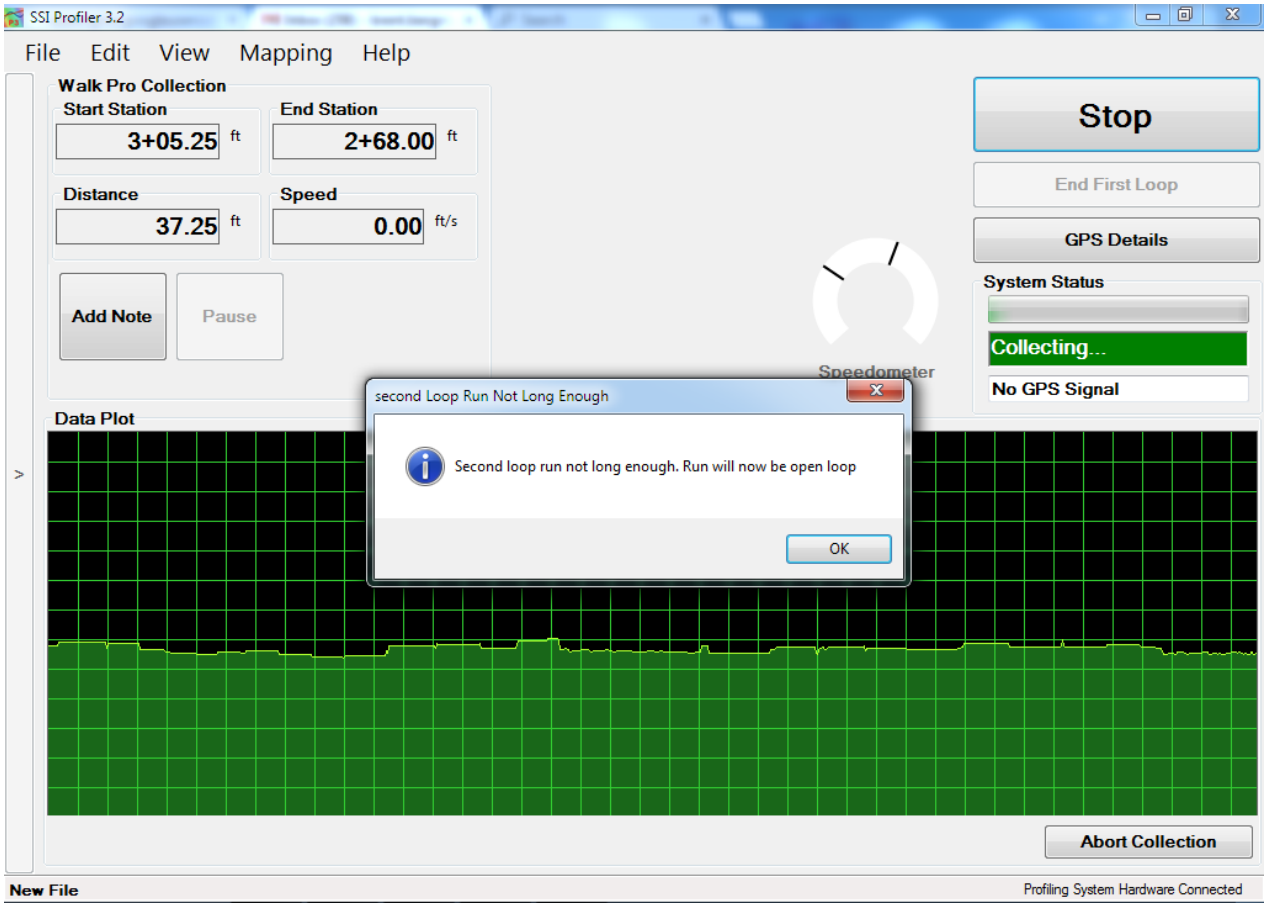


Figure 52: Second Loop Length for Closed Loop is Invalid

Slope Compensation

After the operator has collected a valid closed loop run the WalkPro software will save the slope compensation value until the hardware is disconnected. To use the slope compensation feature with open run collections, select “Yes” after an open loop collection. The slope compensation allows one direction open loop collections to be closed loop collections. Either method, closed loop or slope compensation, will produce accurate profiles without inclinometer drift. The slope compensation is much faster and more efficient and will reduce the number of runs collected by the operator.

For instructions on performing a closed loop collection, see the closed loop section above.

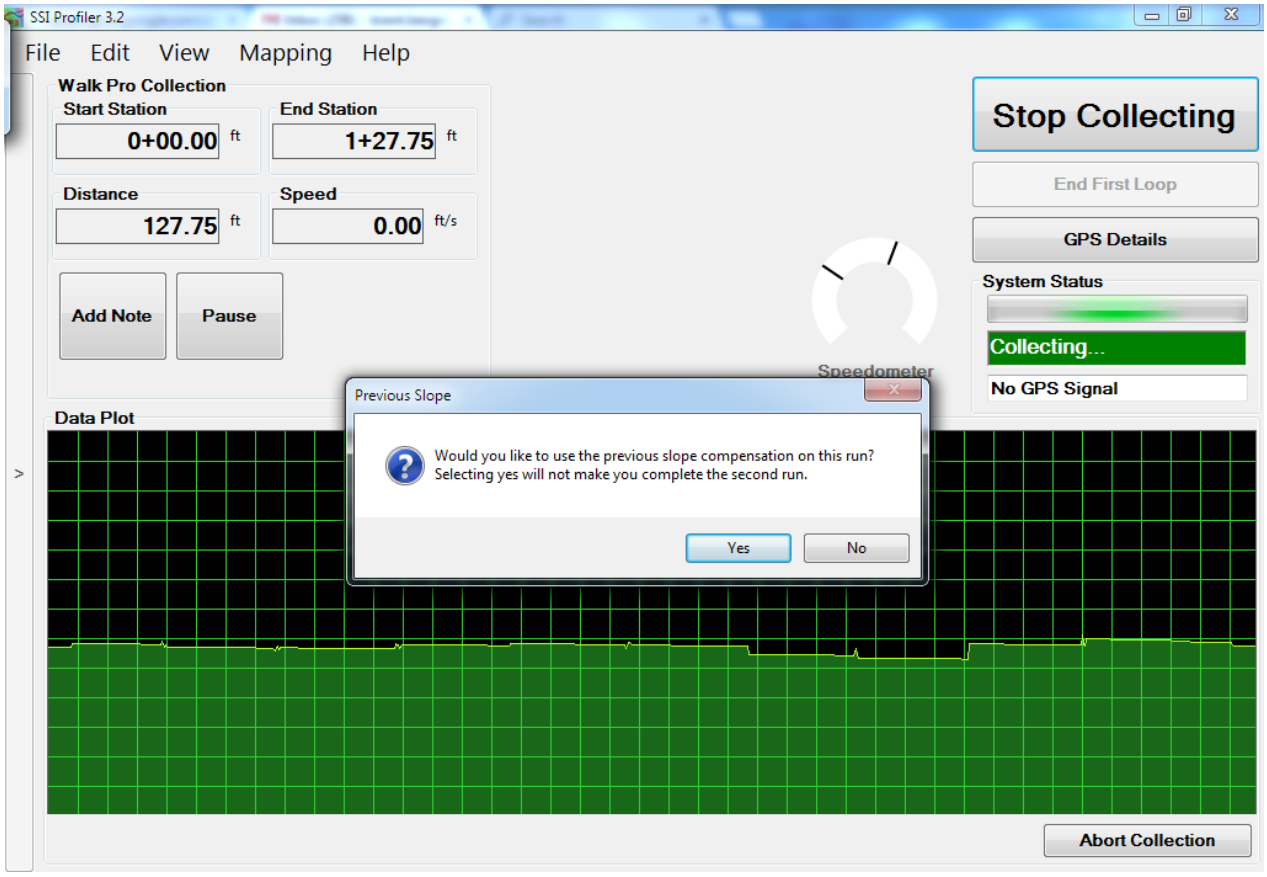


Figure 53: Prompt to Use Slope Compensation on an Open Loop Collection

Add Note

Adding notes is a valuable tool when pausing or explaining information that is not included in the profile data. This can be information on manholes, drainage structure, bridge decks or any other obstruction. Adding notes assures the operator that the data will be able to be deciphered at a later date, and any questions can be answered. Notes, also known as events, can be changed or edited in post processing under the Edit Data>Edit Events tab in Profiler V3.

Pauses

Pausing is allowed for certain obstructions in the profiling path. These are for instance, drainage structures, bridge decks and manholes. Review the overseeing agency's specifications for paused and excluded data. Pausing the data run still collects the distance traveled, but the height data is omitted. The trace will still show the trace of the paused section. If the operator decides to review the paused sections, these sections can be analyzed alone, with the rest of the data, or excluded. When the paused sections are excluded, the data within the paused section will not affect the localized roughness or ride value calculations. This option can be found in General Settings within the drop-down menu under the label Pause Section Analysis.

New pauses, adjustments to the run up/out data, and stationing changes can be made after the data has been collected. To adjust these settings, navigate to the Edit Data section under the Edit tab.

Saving the New Collection

After collection of the data the Profiler program will ask the operator to Save as New Project, Save Run, or Do Not Save. The options of Save as New Project and Save Run will open windows explorer to choose a folder destination for the new file. If do not save is chosen, the program will keep the last collection, but it will not be saved. To save the collection after selecting do not save, open the file>Save As in the menu bar.

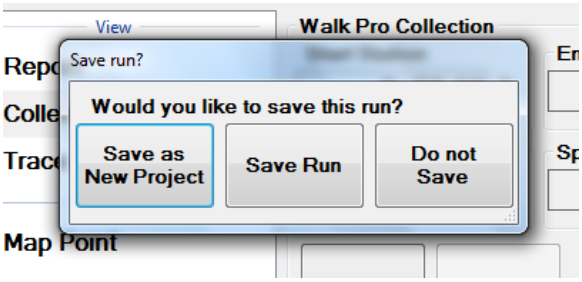


Figure 54: Saving Options after a collection

When there is unsaved data or changes in Profiler V3, the file name in the lower left corner will have an asterisk (*) after the file name.

The save as new feature can be used if a new file was not created before collection. If the data was collected under an old file name and the operator does not want the recent data to be saved under this old file, choose Save As New. If the operator created a new file prior to collection Save As New and Save Run will perform the same function.

Save the file by selecting File>Save or File> Save As. This will allow the operator to save the collection data.

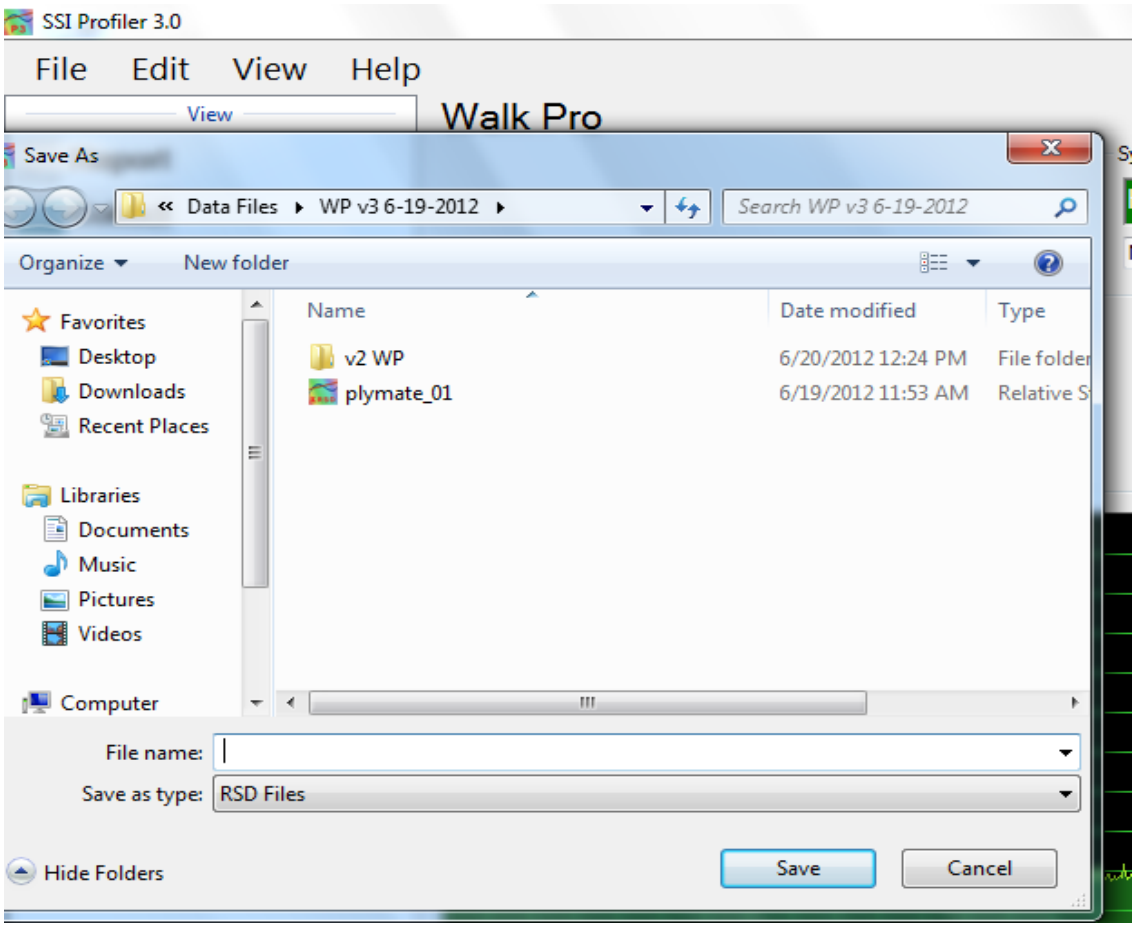


Figure 55: Windows Explorer to save the collection

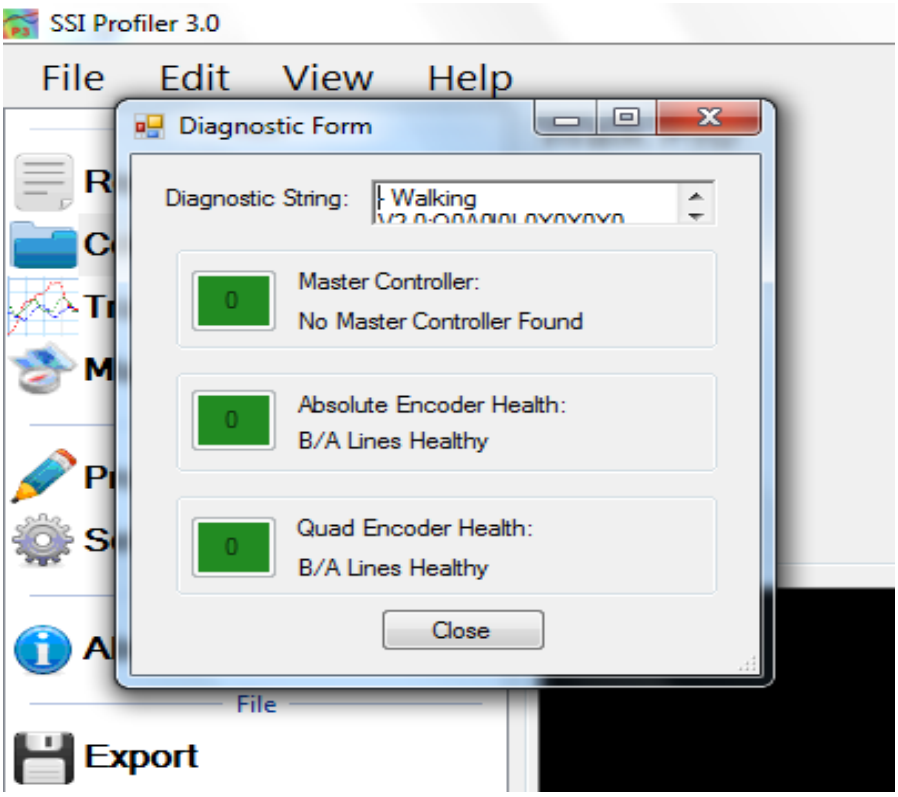


Figure 56: The diagnostics window is shown above with all of the components green and operational.

Texture Measurement

Using the laser front arm the WalkPro can collect high frequency elevation samples to be used to calculate texture or Mean Profile Depth (MPD). The collection procedure is the same as the regular WalkPro collections, however there are new parameters that need to be entered prior to collection such as texture sampling interval and laser front arm type. The collection program uses SSI's Laser Recorder program that has the ability to collect a high amount of laser samples in different modes. Under Collect>System Settings>Texture Settings the operator can choose one of three texture modes: Longitudinal, Transverse and 3D Modes. The sampling interval is the length of the texture sample while the capture interval is the length between texture patches.

- Longitudinal Texture Mode

  Collects longitudinal texture along a thin line, only using the center elevation readings of the laser. A four-inch (10.16 cm) strip is used to calculate the texture value.

- Transverse Texture Mode

  Collects transverse texture at the specified sampling interval.

- 3D Texture Mode
  - Full and continuous texture profile at 1mm x 1mm resolution.

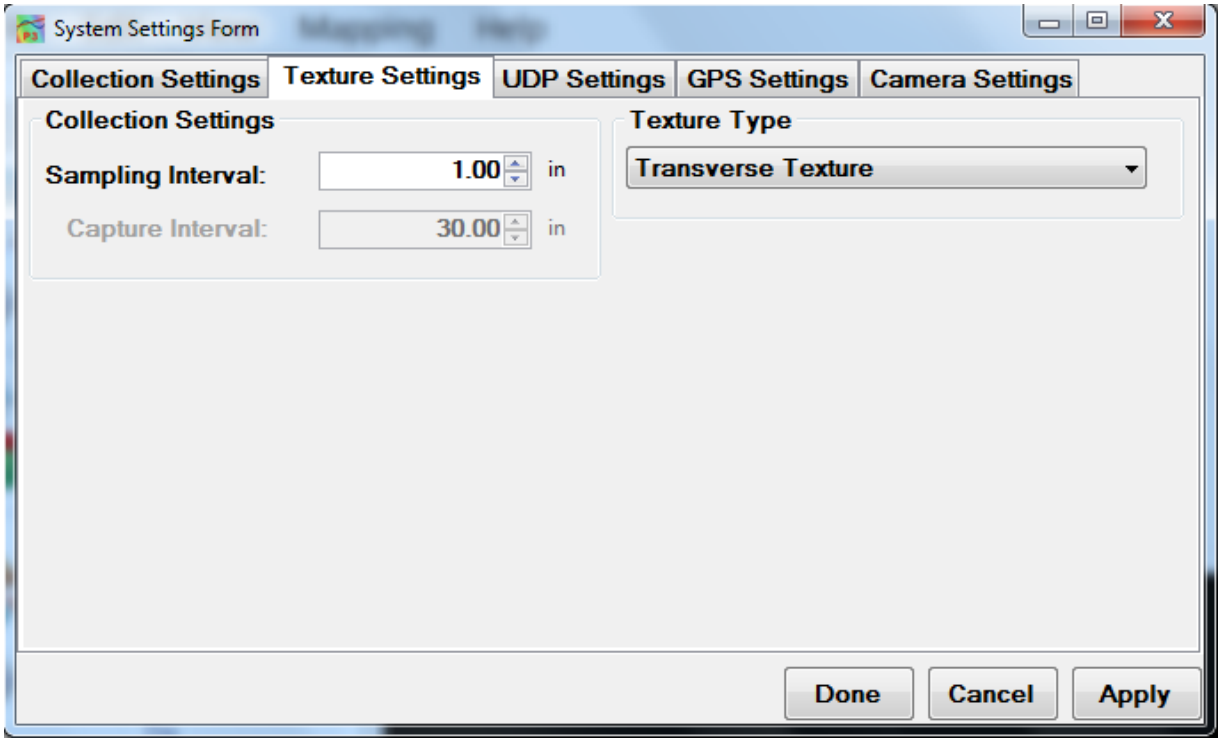
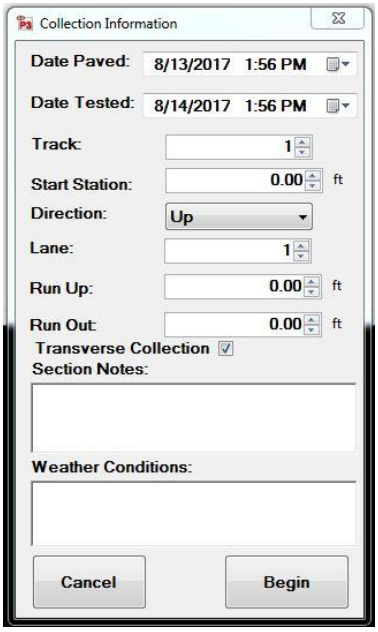


Figure 57: Texture setting tab under system setting.

Transverse Profile Collection

The WalkPro CS8800 is able to collect transverse profiles with no change in hardware. In order to complete this operation, the user must select the check box under the run out input of the Collection Parameters window (appearing after clicking on the Collect icon). The transverse collection procedure is similar to the longitudinal collection and the calibrations are the same.



After selecting the 'Collect' icon at the top right corner of the Collect window the user is presented with the Collection Parameters window. To collect transverse runs select the checkbox below the run out input. After selecting begin the operator will be asked if the collection type is desired to be transverse (see figure 59 below). Before proceeding the CS8800 should be near the starting point of the collection. The collection will begin after the SSI Profiler program confirms the CS8800 is at the edge of the collection track, or path, and the user enters the starting station and station direction.

Figure 58: First Collection window after pressing collect.

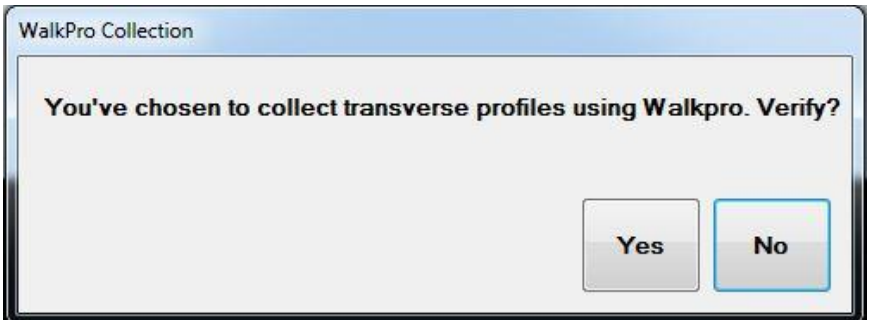


Figure 59: Verification window for collecting transverse profiles.

The transverse data will be displayed within the collection screen along with the distance traveled, speed and station position. To end the collection, select the icon at the top right of the window, 'Stop Transverse'.

At the end of the collection the SSI Profiler program will ask if more transverse profiles will be collected. If no other collections will be made the previous collection will be saved.

Data Saving Option A:

If additional transverse data will be collected the program will ask how to save the additional runs. The user may save the additional runs to the currently open RSD file. The SSI program will automatically categorize the collections as sequential Run 1, Run 2, etc.
If another transverse collection will be saved to the current RSD file, the user shall move the CS8800 to the edge of the collection track when prompted by the software. The collection will start once the user selects OK under the, 'Move WalkPro to Edge of Track' window. Additional transverse collections will be terminated the same way as previous runs. Additional collections may be saved under one RSD file. SSI recommends a maximum of twelve collections under one RSD file.

Data Saving Option B:

The user may save each transverse collection as an independent RSD file. This is the preferred collection method when post-processing will be performed. After each collection the operator shall decline to collect additional transverse collections and will save each file as a new RSD file. Once the user is ready for another collection, it is recommended to create a new file. A new RSD file can be created through File>New or CTRL+N.

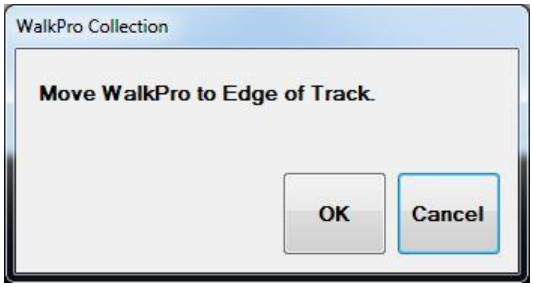


Figure 60: First Collection window for Transverse profiler.

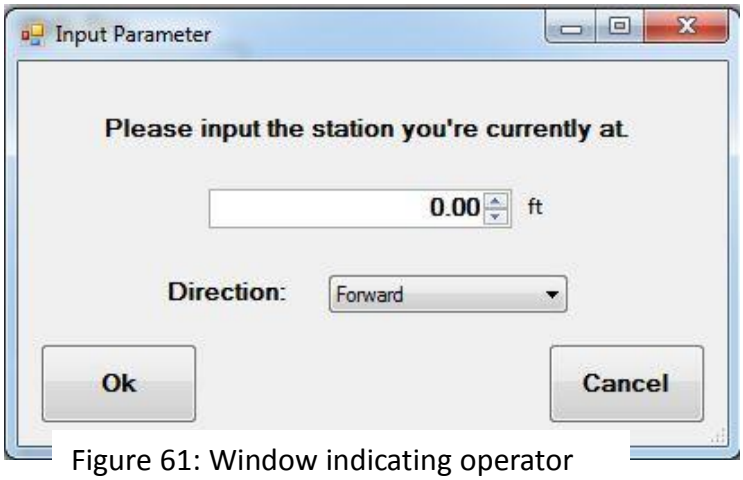


Figure 61: Window indicating operator to input start station and direction of

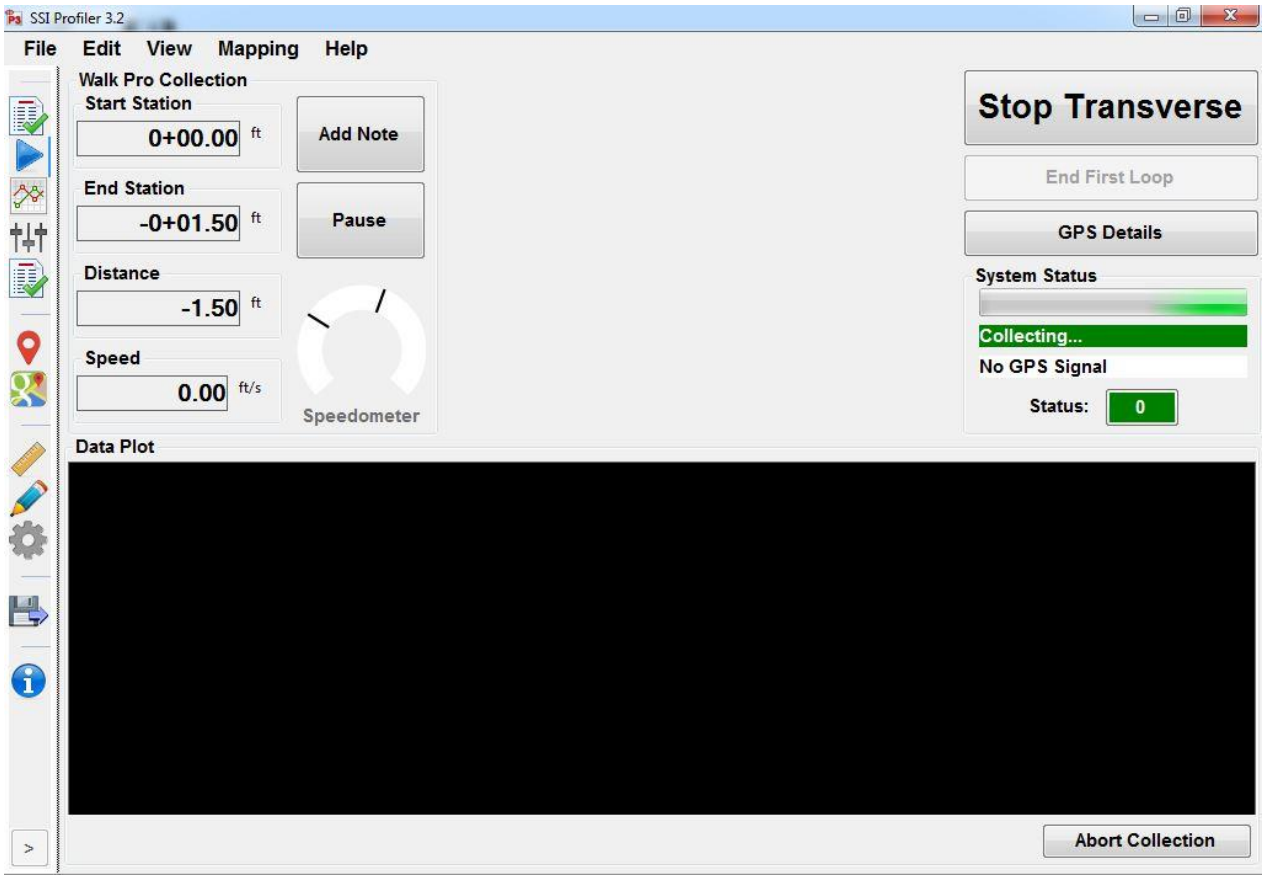


Figure 62: First Collection window after pressing collect.

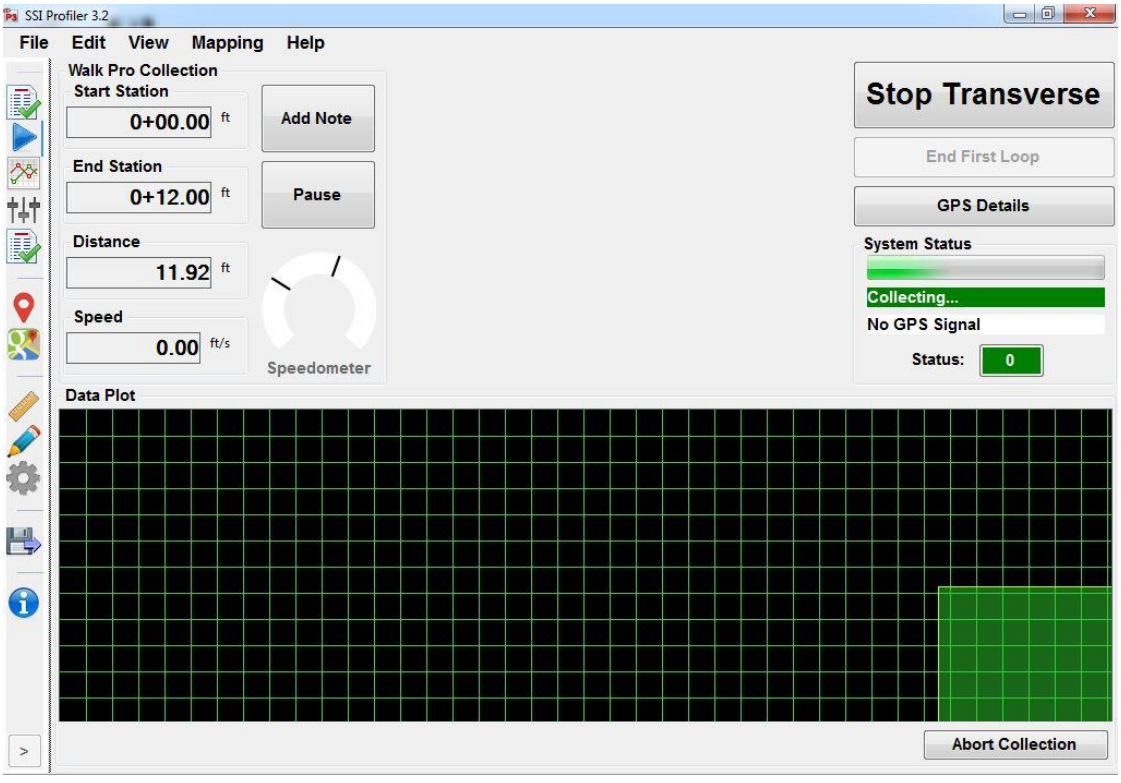


Figure 63: Collection window while profiling

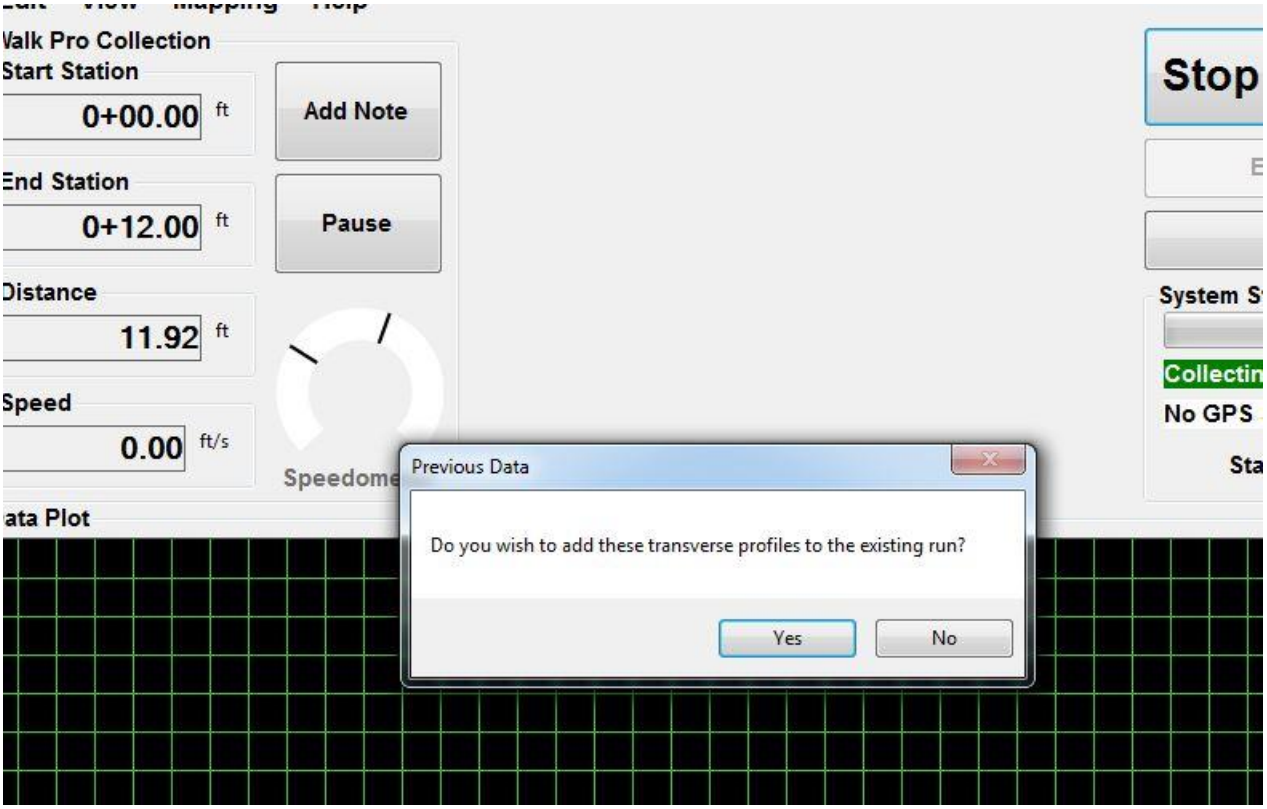


Figure 64 : Window asking for another transverse profile. Pressing “No” will lead to figure 55. Pressing “Yes” will lead to figure 57.

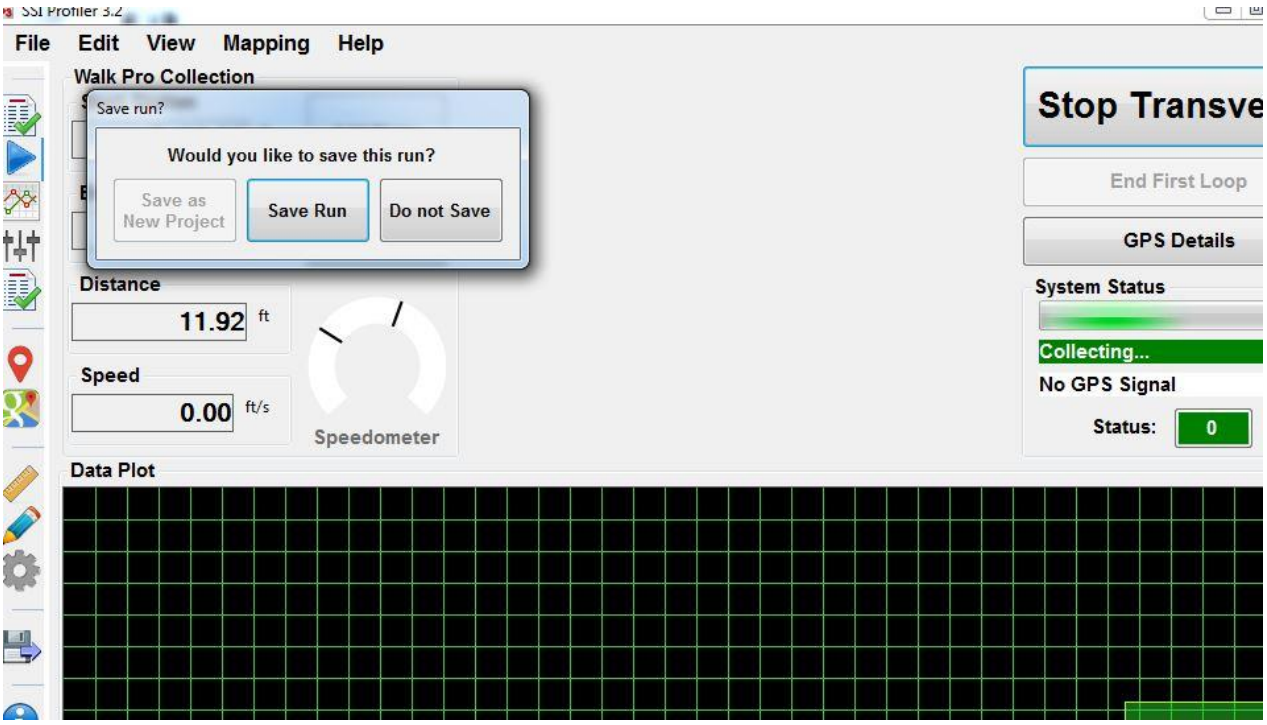


Figure 65: Save run window.

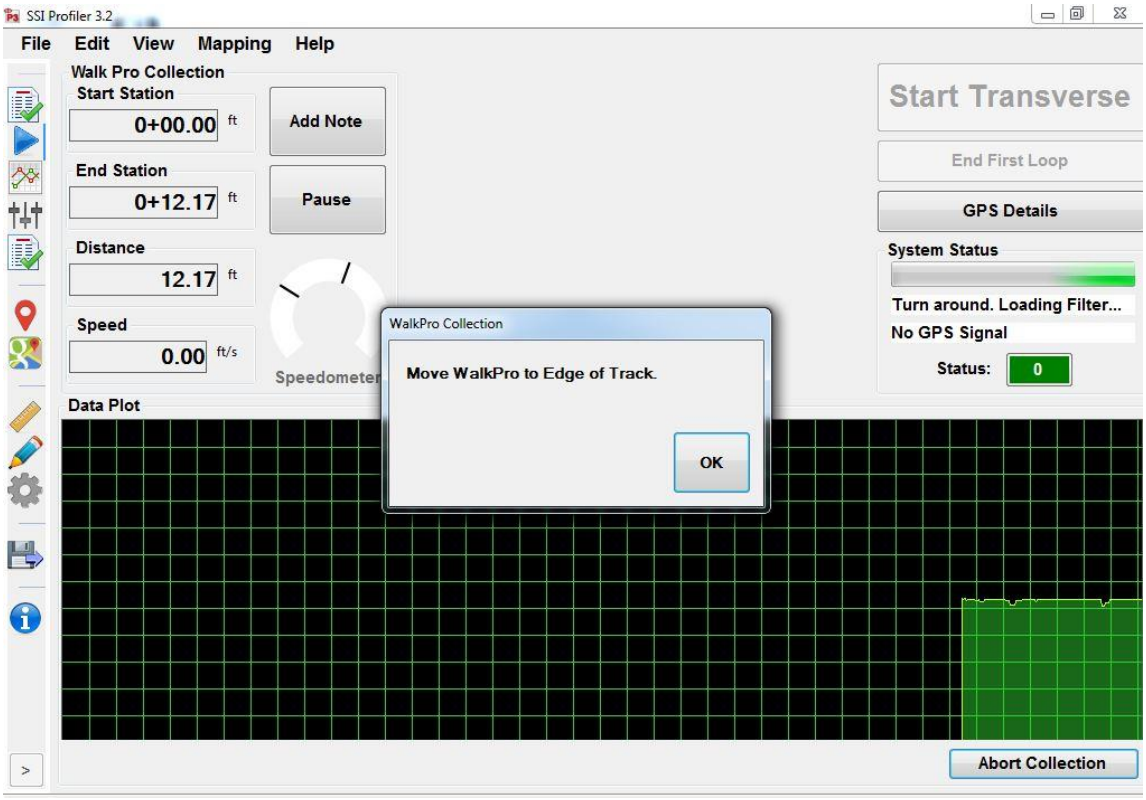


Figure 66: Window after selecting “Yes” to figure 54 for collecting another profile.

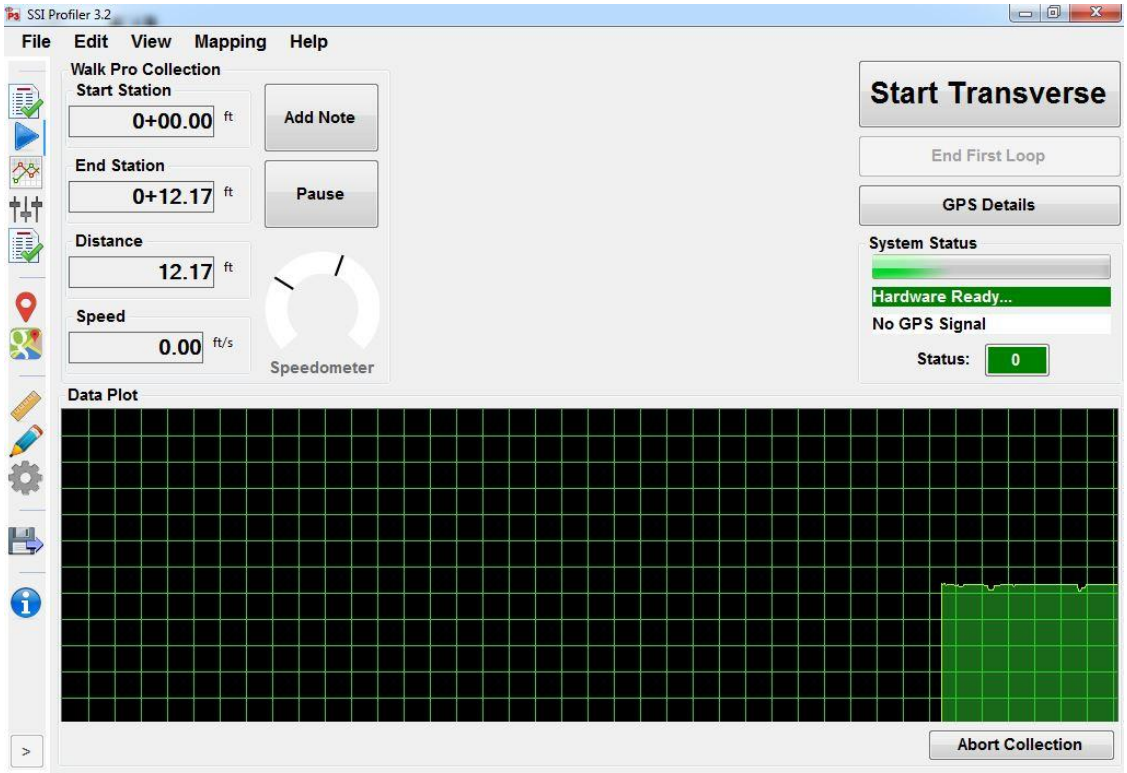


Figure 67: Collecting another transverse profile.

Viewing Transverse Profiles

The transverse collections will be available for viewing under the Advanced Tools section of SSI Profiler. The tab will be labeled, 'Transverse Profile'. Within this window the user may review the elevation trace, longitudinal station, and rut depth. Each transverse profile can be edited under this window by cropping either side of the collection.

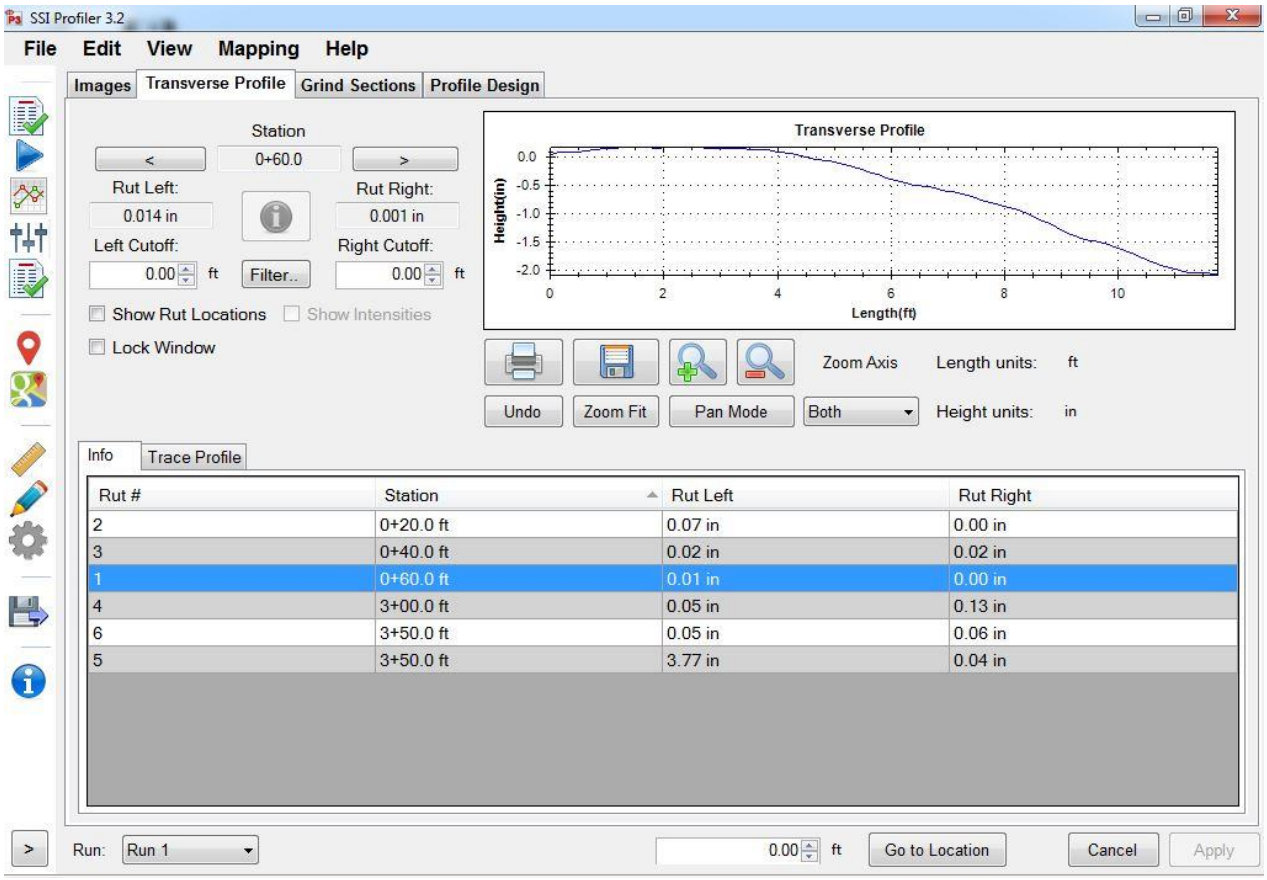


Figure 68: Transverse profile viewing window.

Reporting and Exporting

1.0- File Tab

1.1. - 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 as asterisk as "New File*."

1.2. – 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 Profiler V3. If your file is in another format, use the appropriate translators found on the support website (http://www.smoothroad.com/support/download.asp) or contact S.S.I. 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.

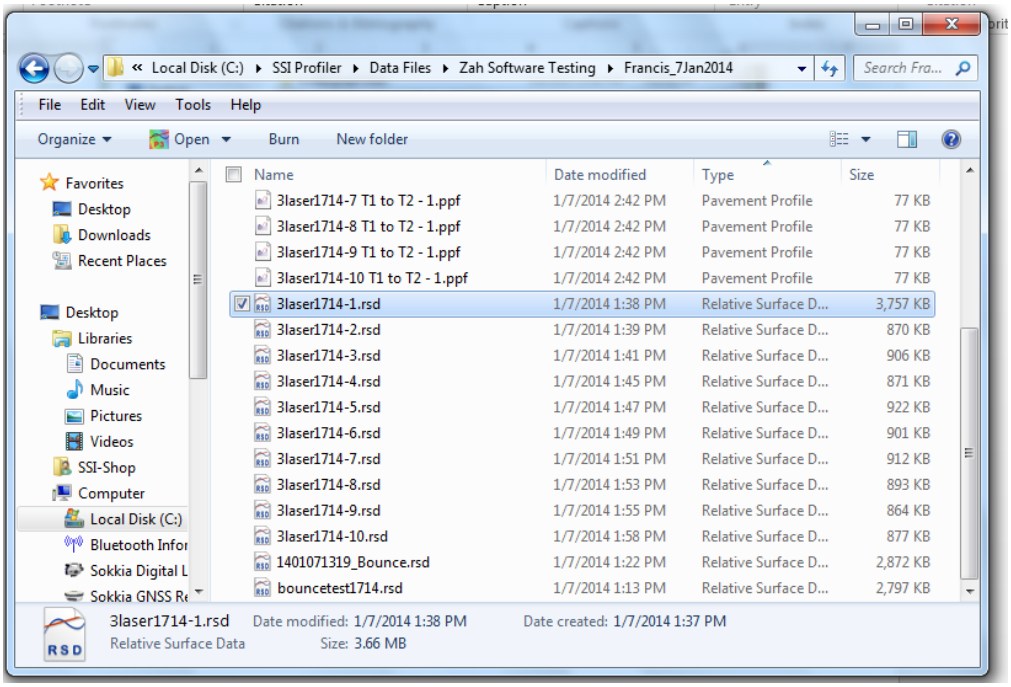


Figure 69: Opening a data file in the Profiler V3 program.

1.3. - 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."

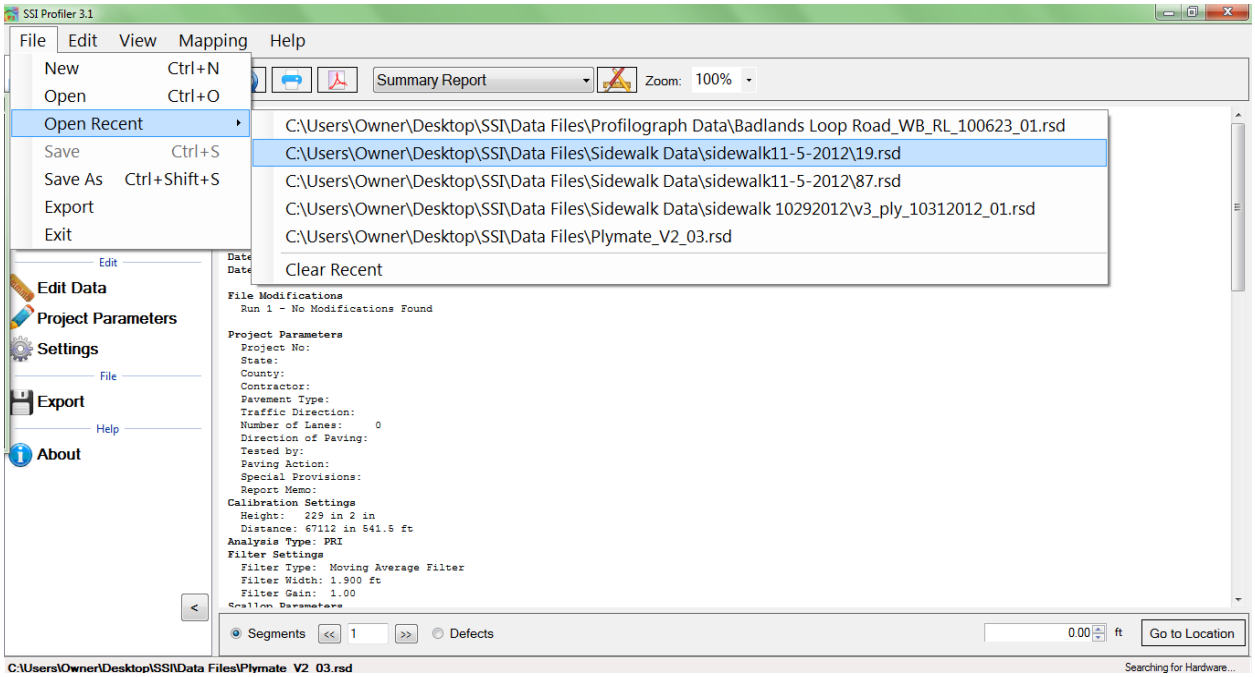


Figure 70: The Open Recent feature

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.

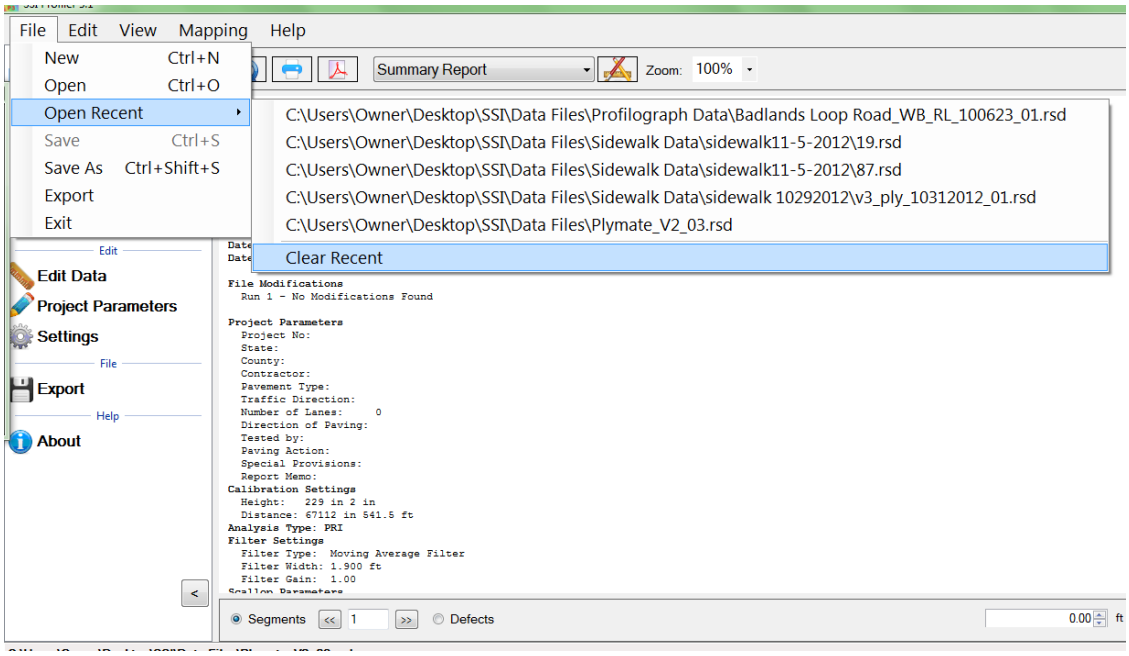


Figure 71: The clear recent feature

1.4. – 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 patented RSD format. If another format is required, visit the SSI support website (http://www.smoothroad.com/support/download.asp) to download the latest translators or contact SSI Customer Support.

1.5. - 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 patented RSD format. If another format is required, visit the SSI support website

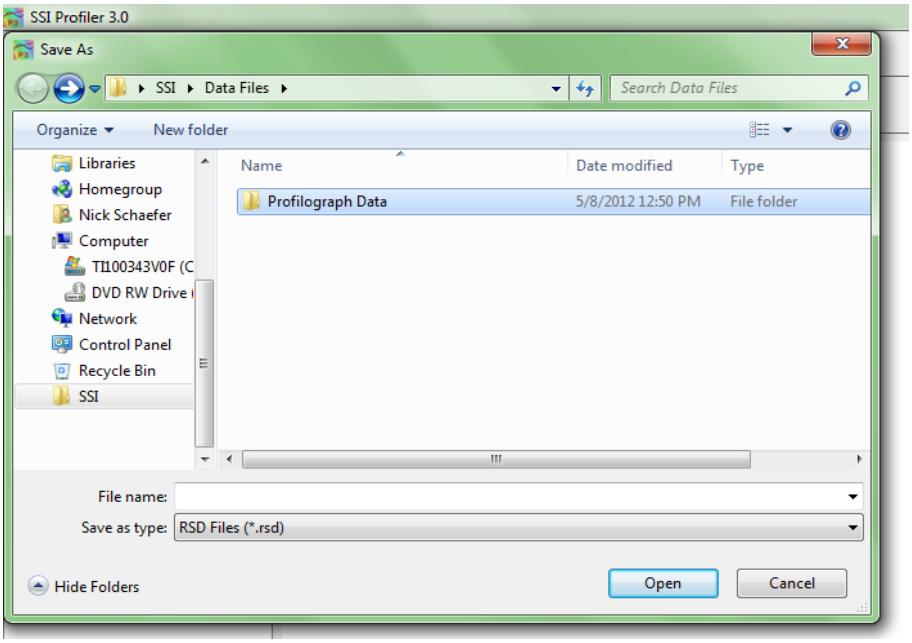


Figure 72: Saving a file through Save As in RSD format.

(http://www.smoothroad.com/support/download.asp) to download the latest translators 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.

1.6. - Exporting

Exporting allows the operator to create files in **ERD, PPF, PRO, Survey, GPS Matching, and Excel** formats. The settings for each export feature are described below. For each of the exporting 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.

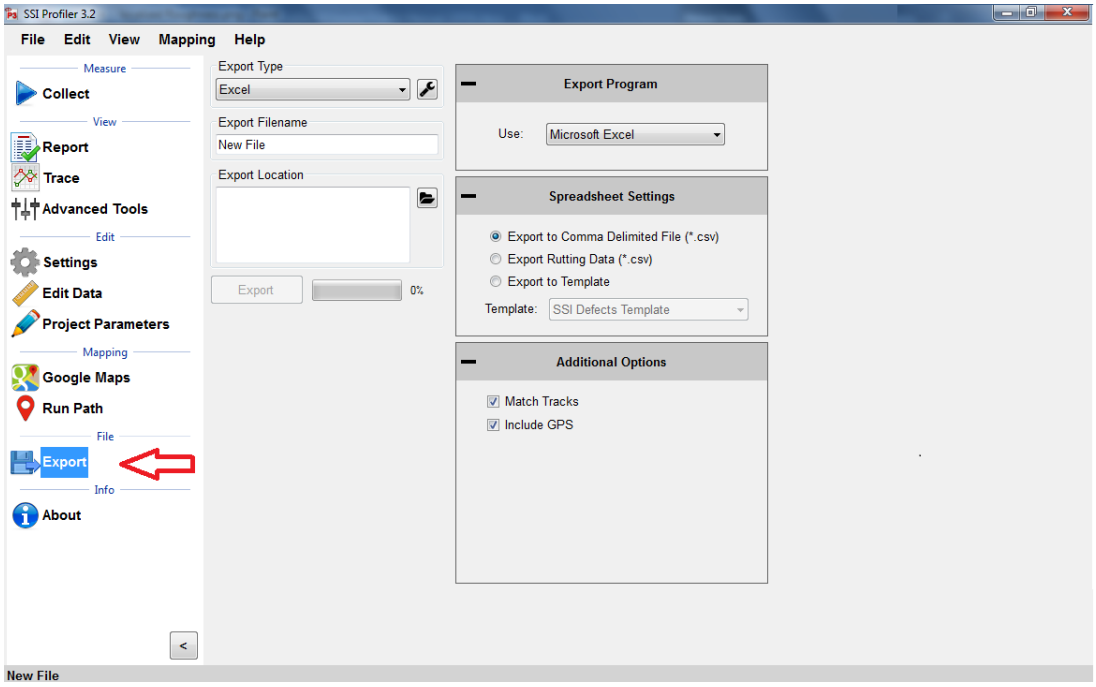


Figure 73: The export window for exporting the data into Excel format.

1.6.1. Export Location

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.

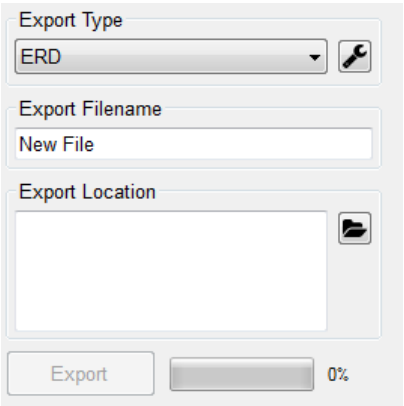


Figure 74: Selecting a location to save the exported file.

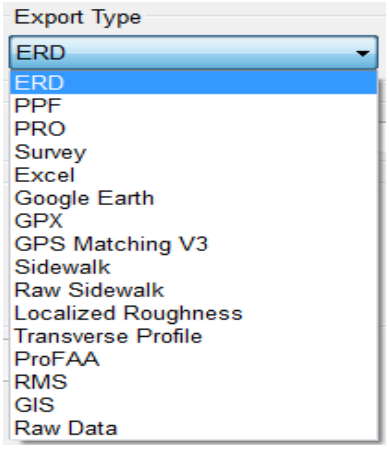


Figure 75: The export type drop down menu

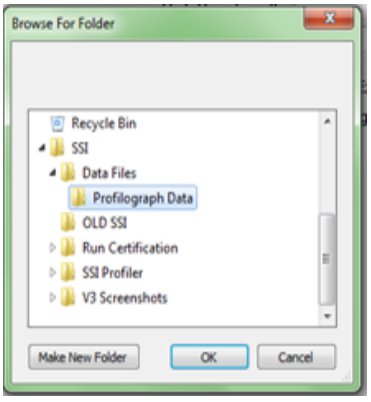


Figure 76: The export folder location selection

1.6.2. – Exporting to ERD Format

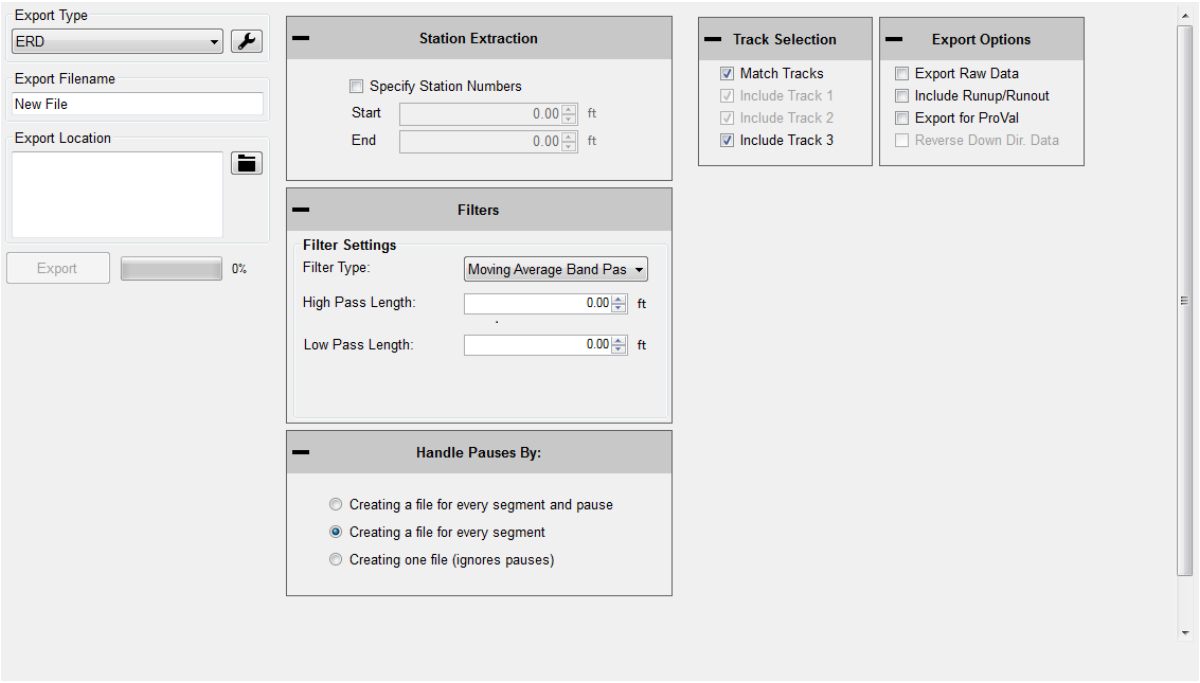


Figure 77: The ERD format export window with match tracks selected.

Station Extraction

The operator has the option export only certain sections of the data, based on the stationing set within the profiling data. To use this feature, select the check box near "Specify Station Numbers." When the box is selected, the operator will be able to adjust the stationing numbers. The 'Start' stationing is the initial stationing where the exported file will begin, while the 'End' stationing is the point where the exported file will finish. These values can be adjusted by typing values into the box or by using the arrow keys to the right of the box.

Filter Settings—High & low pass length

The exported data file can have additional filters applied while being processed into the chosen format. To not filter the data, leave the filter lengths at the default value of 0.00 feet.

Moving Average High Pass Filter

A high pass filter will remove any trend that is shorter than the selected length. Typical range of length for this filter is one hundred feet (100 ft.) through two hundred feet (200 ft.).

Moving Average Band Pass Filter

This filter only allows the desired frequency of data to be shown. Adding this filter will adapt the profile trace to remove the high frequency motions. Moving average filters are typically used for short data runs less than two hundred feet (200 ft.).

Butterworth High Pass Filter

High pass filters allow the high frequency characteristics of the data plot to pass through while blocking the lower frequency attributes of the data run. Butterworth filters do not introduce a phase shift into the plot like moving average filters. Butterworth filters are traditionally used for longer data runs over two hundred feet.

Butterworth Band Pass Filter

This filter will perform both a high pass and low pass Butterworth filter operation on the data. The result is a run that has frequencies within the lower and upper bounds. Butterworth filters do not

introduce a phase shift into the plot like moving average filters. Butterworth filters are traditionally used for longer data runs over two hundred feet.

Include Run Up – Run Up Data

Some High-Speed Profiling data files have Run Up and/or Run out data associated with them, depending on the practice used to collect the data. If this data exists in the data file, it will be included in the exported file if this box is selected. Run Up and Run out is used to allow the electronics to settle on the accurate profile.

Run Up data exists in HSP data files if the operator selected a Run Up and/or Run out distance in the initial stages of setting up a collection. In the HSP collection software, the Run Up and Run out settings are found on the last window before performing a collection. Use run up and run out to stabilize the electronics before the starting location is reached.

Export Raw Data

Selecting the Export Raw Data check box assures the operator that only unfiltered data collected from the profile will be exported into the chosen file.

Match Tracks and Choosing Tracks

Match Tracks

Selecting 'Match Tracks' exports all of the tracks associated with the lane file. For the three laser systems, this includes Track 1, 2 and the center trace. For Profilograph files, the tracks are matched based on the settings entered prior to profiling. The label of the track number and stationing cannot be changed after collection.

Choosing Tracks

The tracks that are exported are checked under "Track Selection." If Match Tracks is selected the user cannot deselect track 1 or 2.

Ignore Pauses

Pauses are useful when an obstruction comes into the profiling path or when a section of pavement is not to be profiled. When Pause is activated, the stationing remains constant and under the same file. Pauses can either be omitted or included in reports and exported files of Profiler V3 software. To omit pauses from the exported file, select the check box, "Ignore Pauses."

Include Run Up/ Run out

When this option is selected, the Run Up and Run out data collected during the collection will be included in the export data.

Export for ProVal

When the user exports an ERD file for use in ProVal, it changes the file's default filters and settings to more accurately match the values in ProVal.

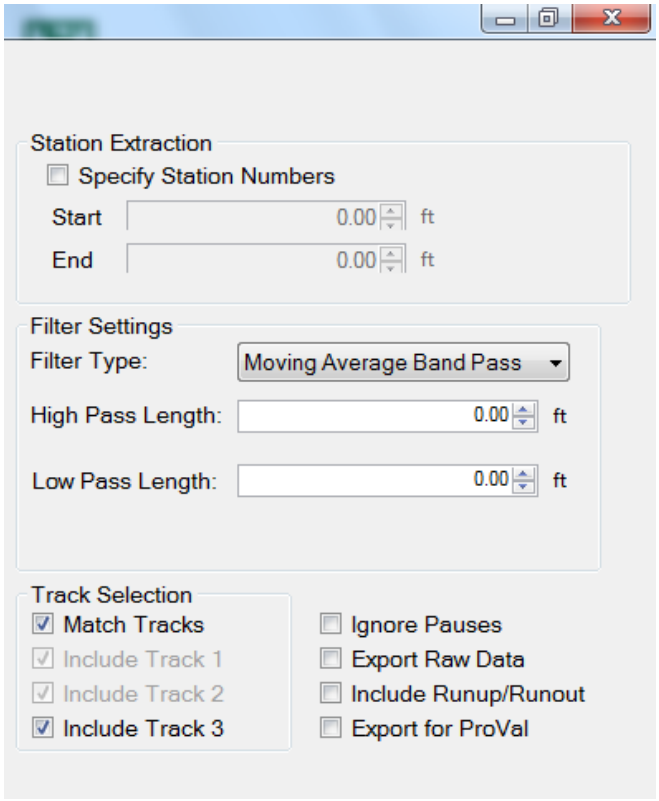


Figure 78: The ERD export window settings

1.6.3. – Exporting to PPF Format

Station Extraction

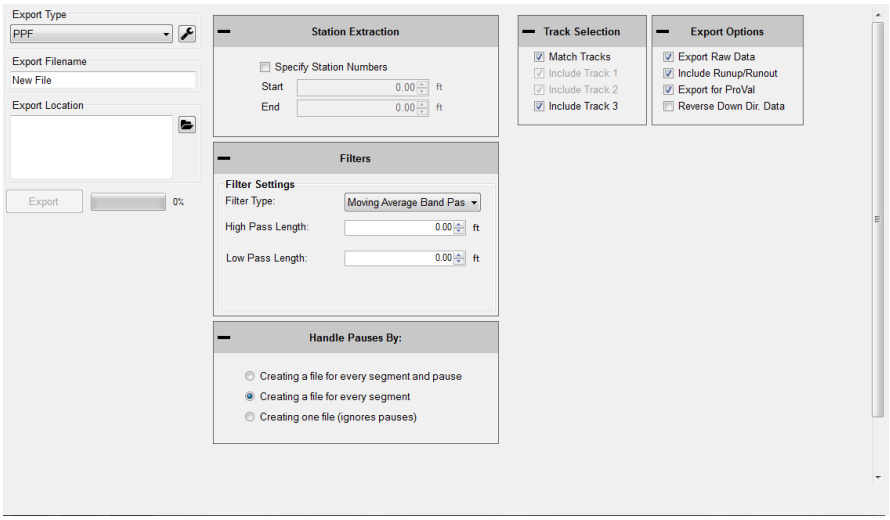


Figure 79: The PPF export window

The operator has the option to export only certain sections of the data, based on the stationing set within the profiling data. To use this feature, select the check box near "Specify Station Numbers." When the box is selected, the operator will be able to adjust the stationing numbers. The 'Start' stationing is the initial stationing where the exported file will begin, while the 'End' stationing is the point where the exported file will finish. The start and end stationing can be adjusted by typing values into the box or by using the arrow keys to the right of the box.

Filter Settings—High & Low Pass Length

The exported data file can have an additional filter applied while being processed into the chosen format. To not filter the data, leave the filter lengths at the default value of 0.00 feet.

Available Filters:

Moving Average High Pass Filter
Moving Average Band Pass Filter
Butterworth High Pass Filter
Butterworth Band Pass Filter

Include Run Up and/or Run out Data

Some High-Speed Profiling data files have Run Up and/or Run out data associated with them, depending on the practice used to collect the data. If this data exists in the data file, it will be included in the exported file if this box is selected.

Run Up data only exists in HSP (High Speed Profiler) data files if the operator selected a Run Up and/or Run out distance in the initial stages of setting up a collection. In the HSP collection software, the Run Up and Run out settings are found on the last window before performing a collection.

Match Tracks

Selecting 'Match Tracks' exports all of the tracks associated with the lane file. For the three laser systems, this includes Track 1, 2 and the center trace (track 3). For the Profilograph files, the tracks are matched based on settings entered prior to profiling. The stationing and number label assigned to the track are settings that cannot be changed after collection.

Ignore Pauses

Pauses are used when an obstruction comes into the profiling path or when a section of pavement is not to be included in the calculation of ride values and localized roughness. While Pause is activated, the program will continue to collect stationing data, but will not collect height data. Pauses can either be omitted or included in reports and exported files. To omit pauses from the exported file, select the check box, "Ignore Pauses."

For importing into ProVal, the best method is to include pauses. The pauses of the rsd file will turn into a leave-out section within ProVal. If pauses are not included during export, it will result in two PPF files for the same track. There will be one more PPF file than the number of pauses.

Export for ProVal

When the user exports a file for use in ProVal, it adds a negative sign in front of all stationing. This is done because ProVal does not use stationing, it only uses forward distance. If you collect data down station, you must check the Export for ProVal box to keep accurate stationing through the collection. ***Always choose "Export for ProVal" when importing into ProVal.***

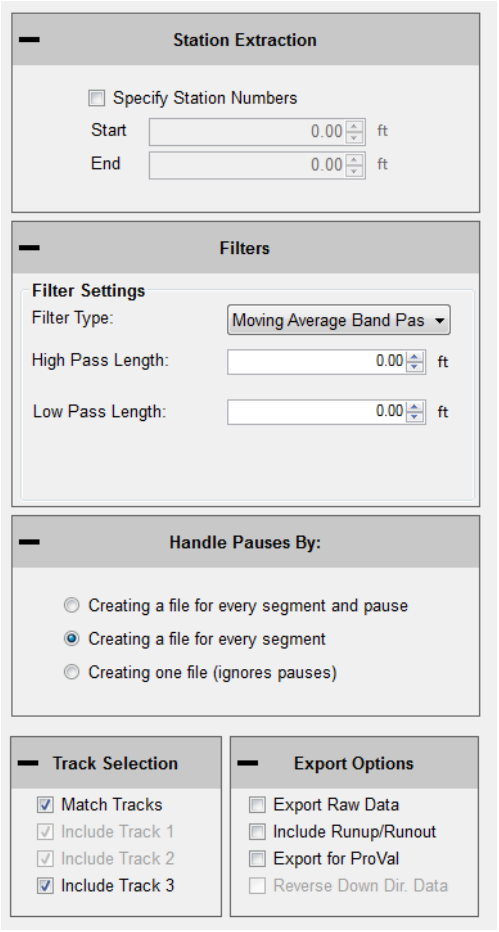


Figure 80: The optional settings when exporting in PPF format.

1.6.4. – Exporting to PRO Format

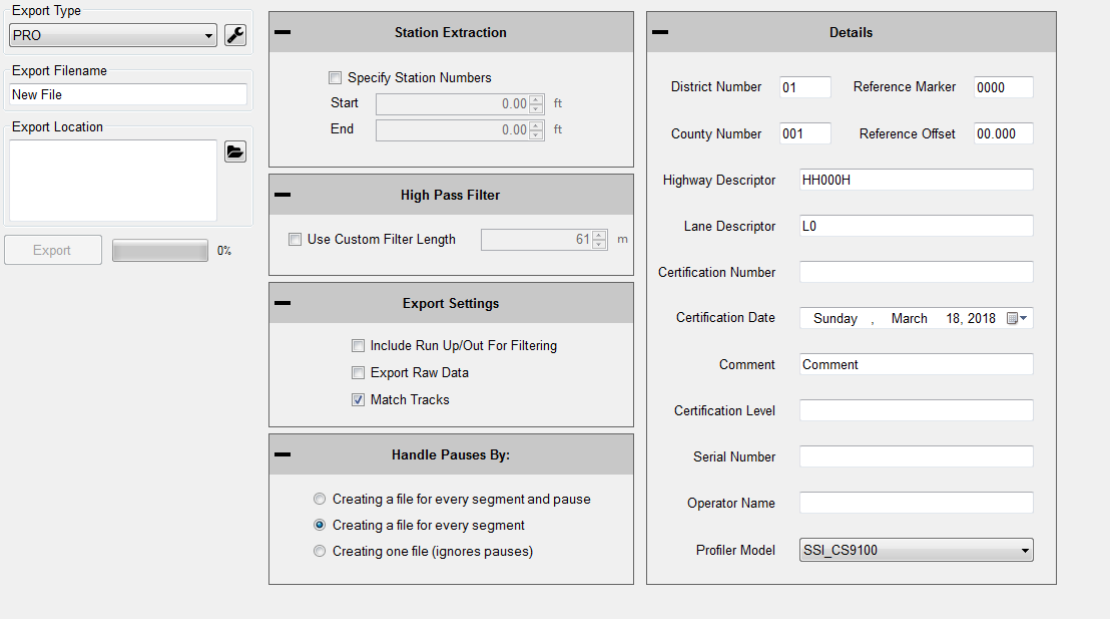


Figure 81: The PRO format window.

General Settings

Station Extraction

The operator has the option to export only certain sections of the data, based on the stationing set within the profiling file. To use this feature, select the check box near "Specify Station Numbers." When the box is selected, the operator will be able to adjust the stationing numbers. The 'Start' stationing is the initial stationing where the exported file will begin, while the 'End' stationing is the point where the exported file will finish. These values can be adjusted by typing values into the box or by using the arrow keys to the right of the box.

Filter Settings-High Pass Length

The High pass filter length can be changed when exporting files to PRO format. A High Pass Filter removes all of the data trends below the filter length. The default length of the High Pass Filter is 200 feet. In order to export the data without filtering, the 'Export Raw Data' check box must be selected. See 'Export Raw Data' below.

Export Raw Data

Selecting the Export Raw Data check box assures the operator that only unfiltered data collected from the profile will be exported into the chosen file.

Match Tracks

Selecting 'Match Tracks' exports all of the tracks associated with the lane file. For the three laser systems, this includes Track 1, 2 and the center trace (Track 3). For the Profilograph files, the tracks are matched based on settings entered prior to profiling. The label of the track cannot be changed after collection.

Handle Pauses By:

The paused sections within the collected data can be exported in two ways. Separate files can be created for each segment or the profile data can be exported with the paused sections included in one file. The difference in these two options is that creating separate files for each segment exports multiple files into the folder location, while the "Using pause events" option exports one file including all of the data. If the pauses were used to omit data because of pavement anomalies, use the option of ignoring the pauses.

Details

The details section of PRO exporting is the job specific information saved with the file, such as **District Number, County Number, Reference Marker, Reference Offset, Highway Descriptor, Lane Descriptor, Certification Number, Certification Date, and Comments.** This information is then saved with the PRO file to be displayed when the file is opened or printed using another program.

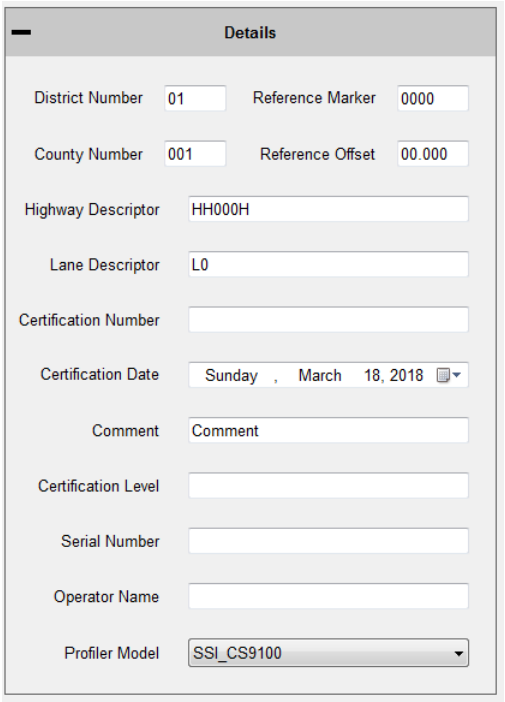


Figure 82: The Details tab contains information about the project.

1.6.5. – Exporting to Survey Format

Station Extraction

The operator has the option to export only certain sections of the trace, based on the stationing set within the profiling data. To use this feature, select the check box near "Specify Station Numbers." When the box is selected, the operator will be able to adjust the stationing numbers. The 'Start' stationing is the initial stationing where the exported file will begin, while the 'End' stationing is the point where the exported file will finish. These values can be adjusted by typing values into the box or by using the arrow keys to the right of the box.

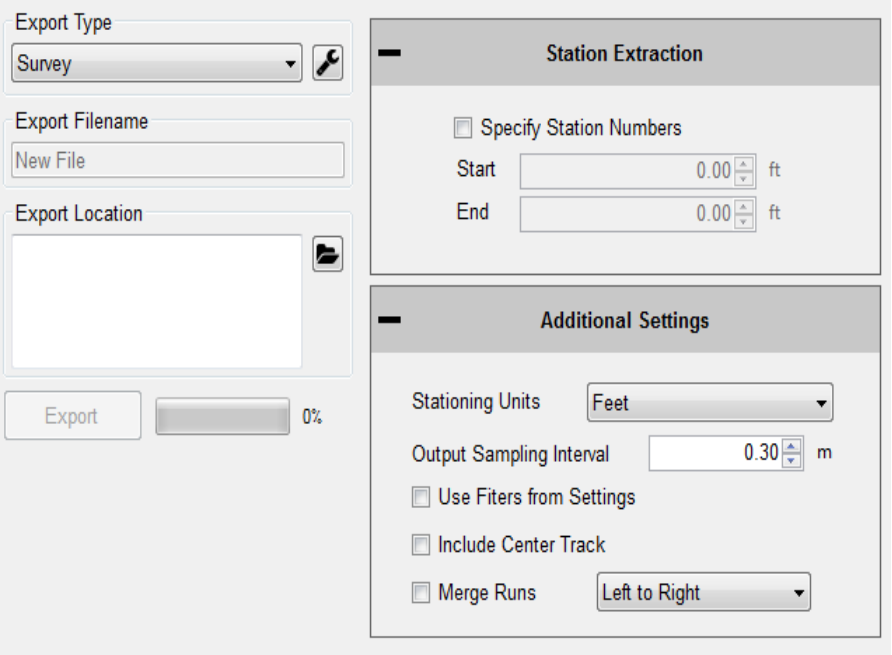


Figure 83: The window for exporting in Survey format

Filter Settings

High and Low Pass filters are optional when exporting to survey format. The exported data file can have an additional filter applied while being processed into the chosen format. To not filter the data, leave the filter lengths at the default value of 0.00 feet.

Available Filters:

Moving Average High Pass Filter
Moving Average Band Pass Filter
Butterworth High Pass Filter
Butterworth Band Pass Filter

Output Sampling Interval

The sampling interval is the distance between readings of the SSI survey system. The default length of this interval is 1 foot. This feature allows other intervals to be implemented, depending on the accuracy specifications required in the surveying program.

The raw GPS will be exported in a separate text file in a NMEA (GPGGA) GPS string format.To match tracks 1 and 2 within the same file select the match tracks option.

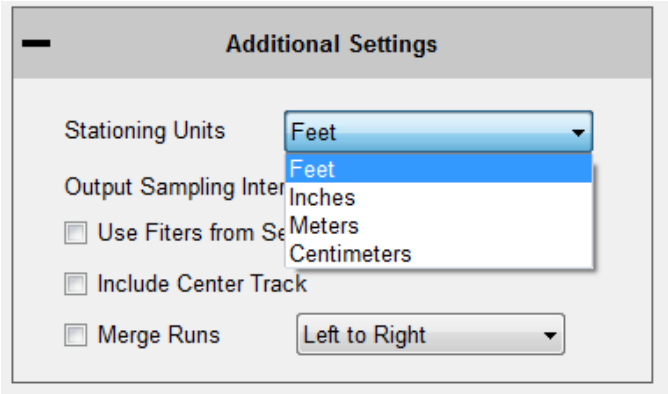


Figure 84: Stationing units dropdown menu and options.

1.6.6. – Exporting to Excel Format

Exporting the profile data to excel gives the operator versatility and efficiency when an adjustable numerical printout is needed.

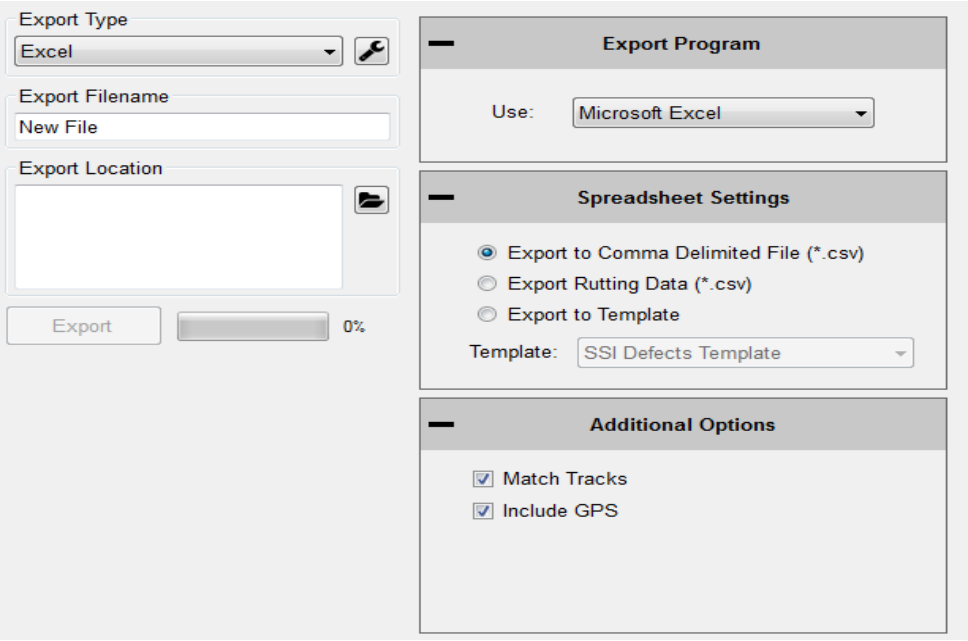


Figure 85: Exporting the data into Microsoft Excel format.

Export to Template

To choose a SSI Excel Template, select "Export to Template."

Defects Template

The Defects Template shows the locations and heights of the defects and information about the file in spreadsheet form.

IRI Template

The IRI Template shows IRI statistics along with the defect locations and heights.

PRI Template

The PRI Template lists the PRI for each track along with the bump heights, locations and settings.

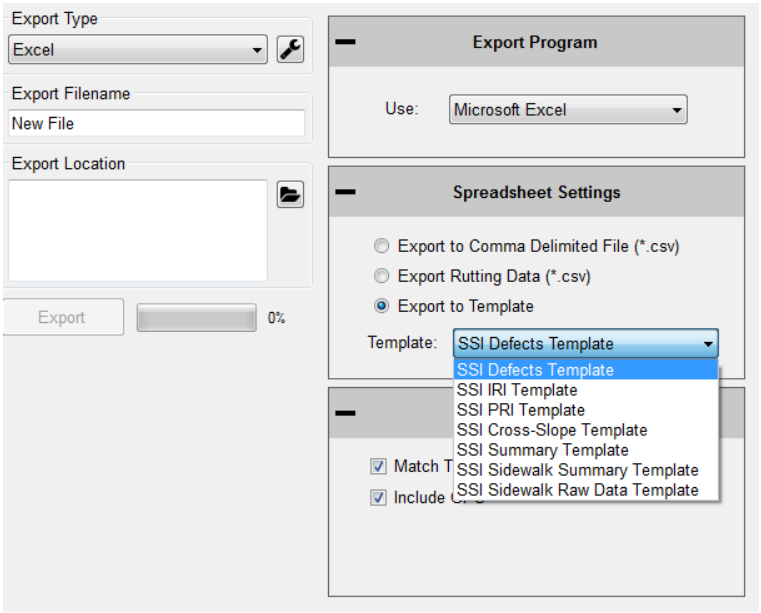


Figure 86: The types of excel formats are listed.

Summary Unmatched

The Summary Template shows a version of the summary report the calculated PRI for each track along with the bump heights, locations and settings in spreadsheet form.

Note: Sidewalk templates are reserved for Sidewalk Profiler. For more info visit www.smoothroad.com

1.6.7. – Exporting to Google Earth

The export to Google Earth feature allows operators with Google Earth installed on their computers to view the test data in the real environment. The view of the Google Earth feature shows the project area with the traces superimposed onto the window. The user may view the traces and project from any view or angle. For this feature to be used, the operating computer must have Google Earth installed.

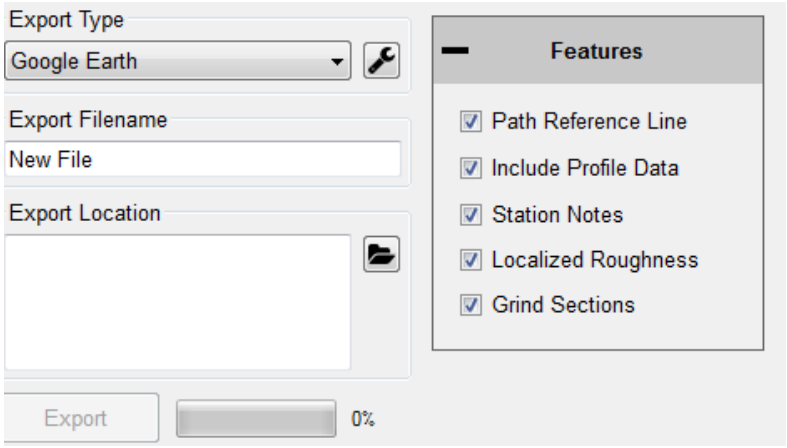


Figure 87: Google Earth export

The user may then use Google Earth to view the profile trace in their computer, tablet or smart phone as long as the device has Google Earth installed. The .kmz file can be emailed to the device or sent via Bluetooth if your Toughbook is equipped.

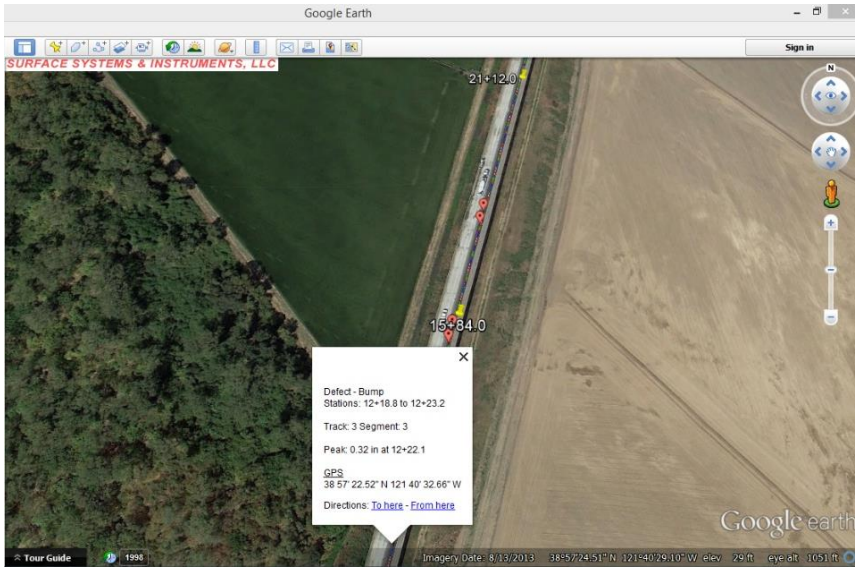


Figure 88: Google Earth view on laptop.

1.6.8. – Exporting to GPX Format

The GPS coordinates can be exported into a format for submittals. The GPS coordinates of the defect can be viewed through the defect start station, defect end station or the defect peak station. Specific runs can be chosen to retrieve the GPS coordinates by adjusting the drop-down menu under the title, “Select Run to Export.”

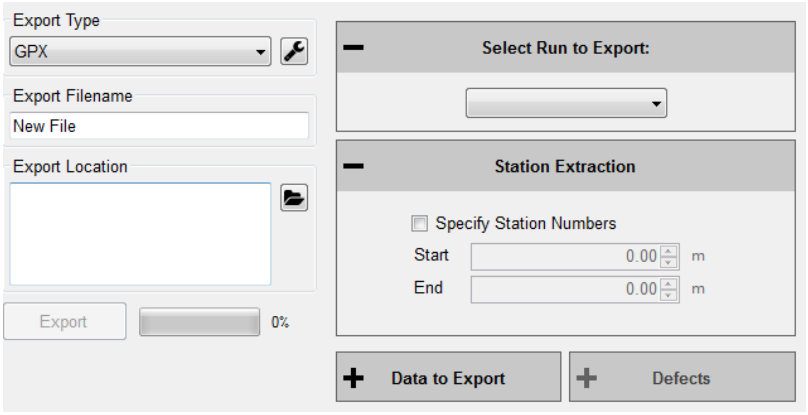


Figure 89: The export window for GPX format.

Under the title "Data to Export" there are multiple check boxes. In order to export the defect’s GPS coordinates, the "All Raw GPS Locations" check box must be unchecked. Once the "All Raw GPS Locations" box is deselected, the options to export the defect stationing GPS coordinates become available.

1.6.9 – Exporting to Sidewalk Format

This option is only to be used with files collected with the SSI Sidewalk Profiler (CS-8850). The sidewalk format has all of the information of the collection exported into GIS compatible file types. These files types and the corresponding information (See Glossary for explanation) within them are: ngd, pxyzd, pxyzdg and pxyzdinc, rmpslp, rmpslpg, rmpslpg_ls, ubag.

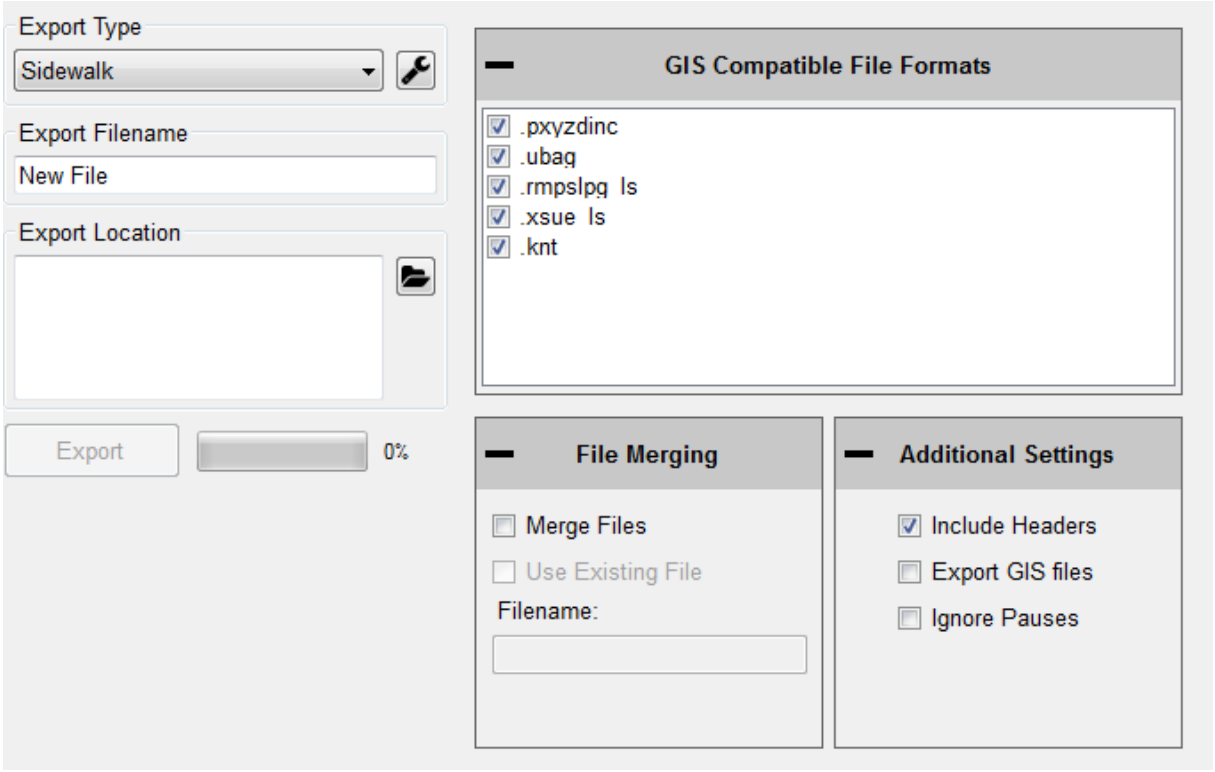


Figure 90: The Sidewalk Export Window options.

1.6.9 – Exporting to Sidewalk Format

This option is only to be used with files collected with the SSI Sidewalk Profiler (CS8850). The sidewalk format has all of the information of the collection exported into GIS compatible file types. These files types and the corresponding information within them are:

File Type

Ngd: Contains synchronized distance, time, and gyroscopic data for a specified collection interval.
pxyzd: The three dimensional profile derived from the travel grade and gyroscope.
pxyzdg and pxyzdinc: Same as pxyzd, except without column headers for the data.
rmpslp: Rmpslp is the ramp and running slope exceptions. The column headers are travel distance, marker distance, time, ramp type, and casename.
rmpslpg: Rmpslpg contains the same data as the file rmpslp, except rmpslpg does not have column headers. This format contains travel distance, marker distance, time, ramp type, and casename.
rmpslpg_ls: Rmpslpg_ls is a line segment version of rmpslpg without column headers.
uba: This file contains the bump height and bevel slope data. The column headers are; travel distance, bump type, bump height [inches], bevel slope, and the casename.
ubag: Ubag contains the same data as uba, but ubag does not have column headers for the data. This format contains travel distance, bump type, bump height [inches], bevel slope, and the casename.

1.6.10 – Exporting to Localized Roughness

The localized roughness export feature allows the user to create an excel spreadsheet of the localized roughness, or defects, for the collected data.

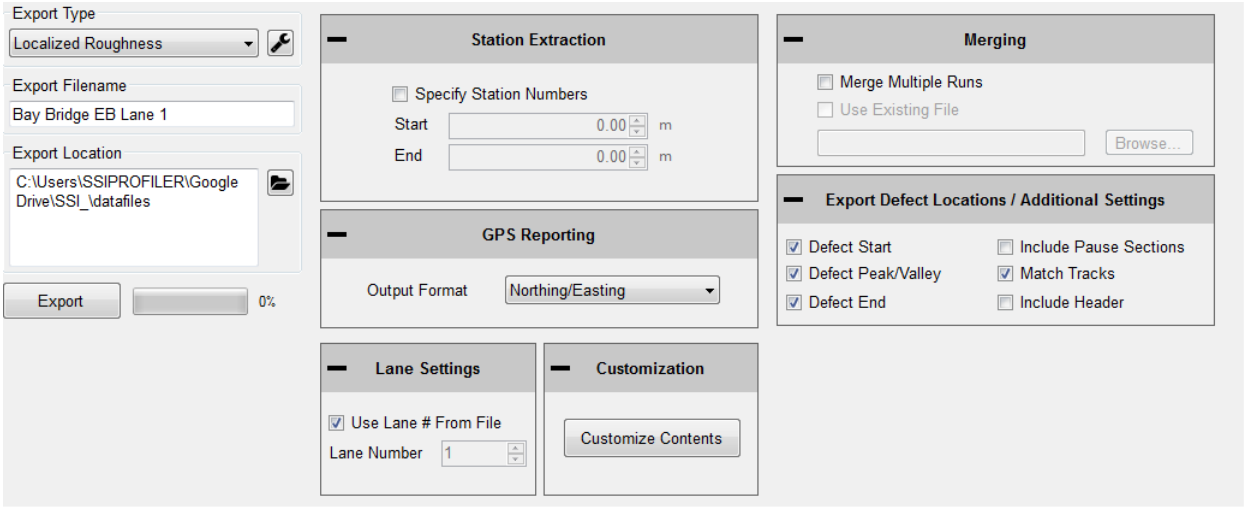


Figure 91: The Localized Roughness export options window.

Specify Station Numbers

If the user desires to only export a section of the collection, select this check box and enter the start and end stationing of the soon to be exported section. If the specify station numbers is not selected, the entire collection will be exported.

GPS Reporting

To choose the type of GPS format used in the export, select Northing/Easting, Decimal Degrees, or NMEA Format from the drop down list.

Lane Settings

The user may change the lane number that is currently in the collection file by selecting this check box and entering the correct lane number. To change the lane number, deselect the check box and change the lane number in the input location.

Customization

The user may add, move and remove columns from the Excel spreadsheet format. To do this, open the “Customize Contents” window and use the arrow keys. Move up and move down to change the order of the included columns. The columns types are at the top of the “Columns in File” side the left-most columns in the exported Excel file.

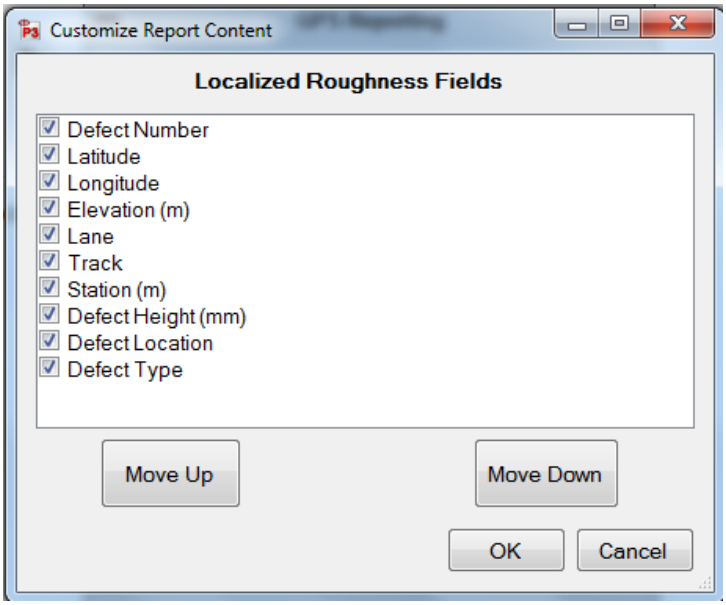


Figure 92: The Customize Window

Merging

The ´Merge Multiple Runs´ check box allows the user to include multiple collection runs in the spreadsheet. Runs that are saved in a separate file can be opened and exported alongside the current file by selecting “Use Existing File” and browsing to enter the location of the file.

Export Defect Locations

Use the check boxes to select whether the program will export the start, peak and end of the defect in the spreadsheet. The user will have the option to match tracks 1 and 2, include the paused sections, and include the header information. When paused sections are included the defects within the paused sections will be listed.

1.6.11 – ProFAA

ProFAA is the format used for the Federal Aviation Administration (FAA) profiling program. This is the program that uses the Boeing Bump test method. The user can enable high and low pass filters, change the start and end stationing, including the pauses and exclude specific tracks from the exported data.

Exporting raw data will force the data through a linear regression filter and have the data begin and end at zero elevation. The Run Up and Run out data can be included by selecting the check box.

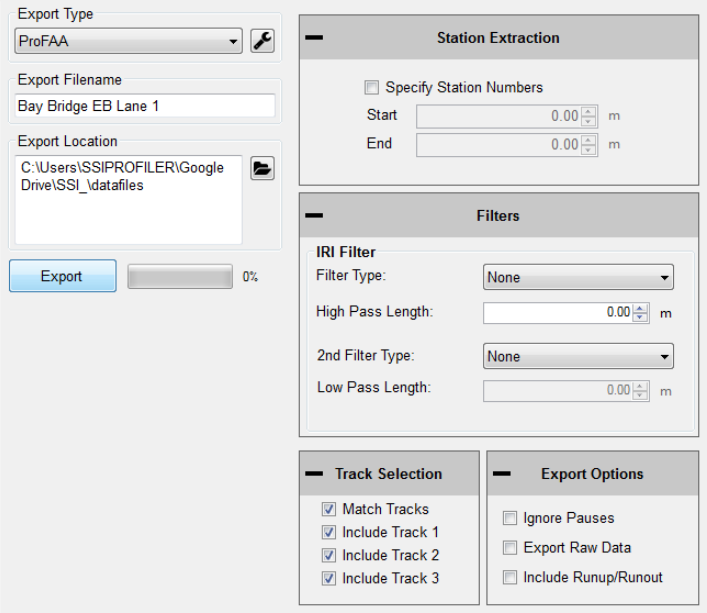


Figure 93: ProFAA window

1.6.12. – RMS Export

The RMS export is a normalization of the profile data. RMS removes the influences of long wavelengths and grades while focusing on the amplitudes of the wavelengths in the profile. The RMS output does not show the frequency of these amplitudes in the profile, only that they exist.

Set the RMS base length for continuous RMS and the sampling/segment interval.

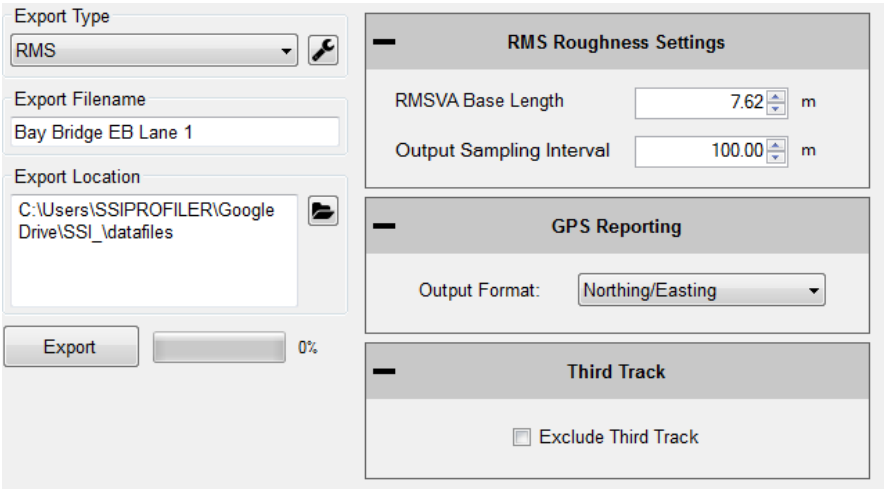


Figure 94: RMS export settings

1.6.13. – GIS Export

The GIS export will create shape files for the segments, localized roughness, events, and track path for the profile. These files will be organized into their own folder entitled GIS Files under the destination folder.

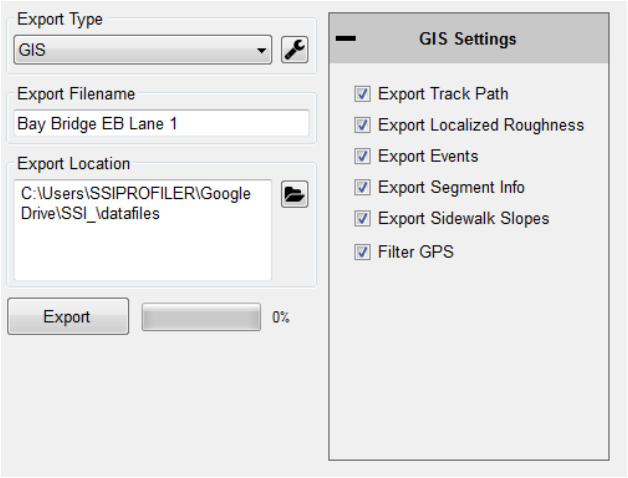


Figure 96: GIS export settings

1.6.14. – Exporting Raw Data

The user can export raw elevation data, GPS data and GPS height data. The settings can be changed to export certain GPS string formats. It is recommended to use the Linear Regression Removal Filter to set the raw elevations along the null line. Otherwise there can be drift in the trace and give inaccurate elevation data.

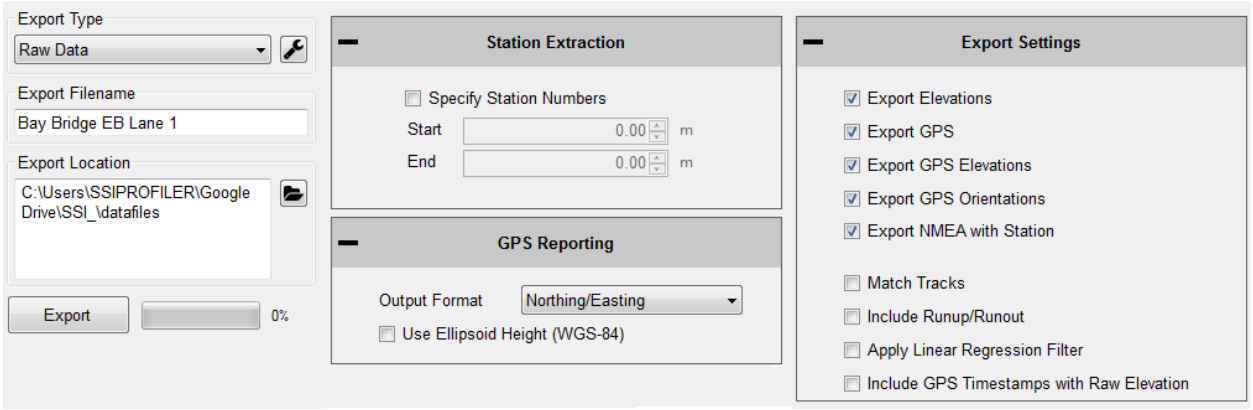


Figure 97: Exporting Raw Data Settings.

1.7. – 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.

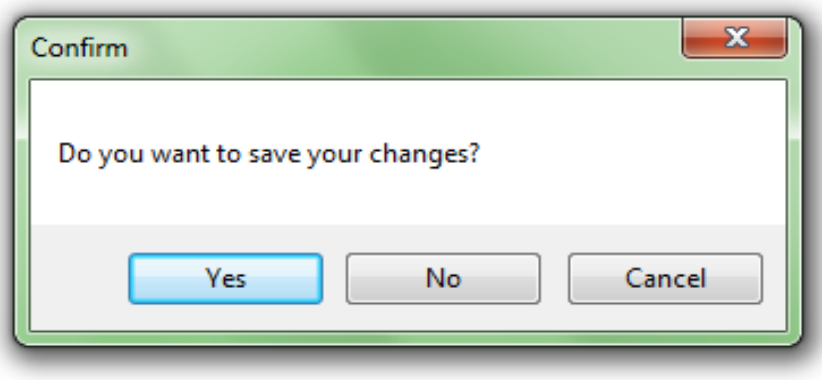
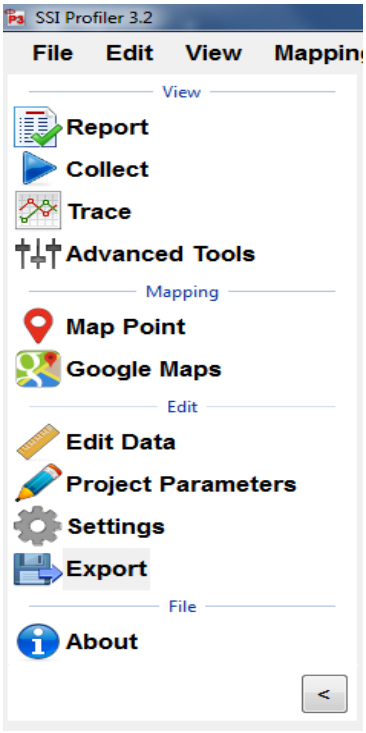


Figure 98: Exiting the program- Saving



1.8. – 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 99: The shortcut bar with all of the frequently used windows

Hide the shortcut bar by selecting the Hide Icon

2.0. - Edit

2.1 – 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. To edit the collection:

1) Open the tab that has the information that needs adjustment. (Edit, Runs, Segments, Events)
2) Select the run that needs to be adjusted from the drop-down menu.
3) Change the parameter of starting position, run direction, and Run Up or Run out data.
4) **Select apply.**

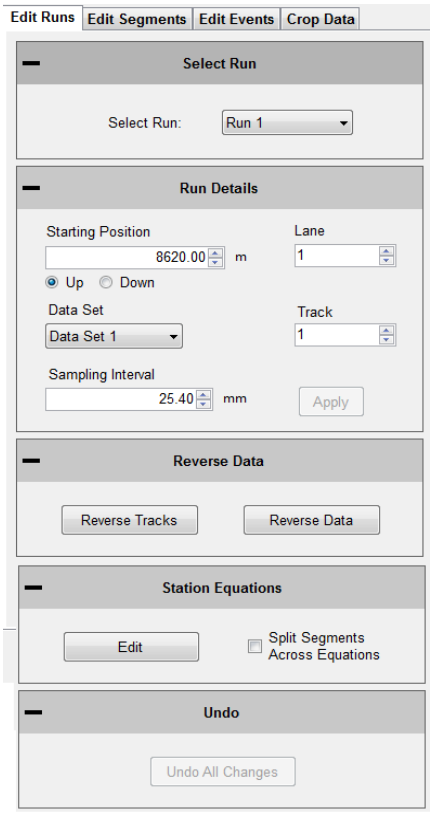


Figure 100: The Edit Run Options

Edit Run

Under Edit Runs the user can adjust the starting position and change the Run Up or Run out lengths. If the data was collected in the wrong station direction, this can also be reversed by changing the bullet selection to “Up” or “Down.”

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.

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. The data will not be included in calculation of the PRI.

Adding & Editing Pauses

To add a pause

1.New Pause will be added above the highlighted blue bar "(add new pause)."
2.Select the run number to add the pause to from the drop down menu.
3.Select the pause type (Exclusion, Bridge, Intersection)
4.Enter the start station for the pause
5.Enter the end station for the pause (The pause length will be updated automatically)
6.Select Add. The pause stations will appear in the Pause List.
7. The user will now be able to add Pause Notes.

a.Select **Apply** to save the pause note.
Note: A pause will not be added unless the Start Station is different than the End Station.
The pause can be edited at any time. Any pause or edit made after collection will be displayed in the report header under file modifications.

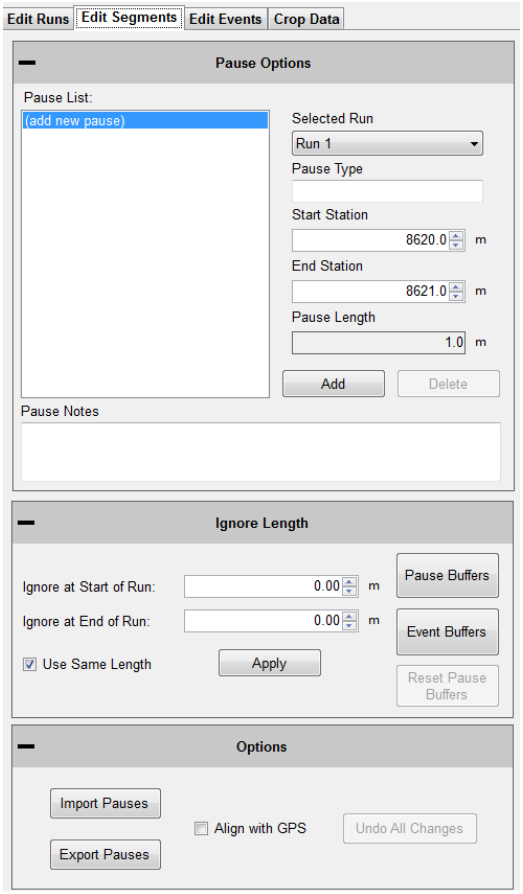


Figure 101: Adding or removing pauses from the collection

To Edit a pause

1.Select the paused section to be edited in the Paused list. It is selected when the blue bar is highlighting the pause title (Ex. "Run 1 - 0+00.0 to 0+010.0")
2. Change the stationing.
3. Select Save to set the changes.
4.Select **Apply** for the changes to take effect

Note: The run(s) that the pause is applied to cannot be changed through Edit Run. Please create a new Pause to change the pauses of a run. See directions above to create a pause.
If the pause is going to be deleted, select the* Delete *icon to remove it from the list.

Pause Definition

When the collection system is paused, height data is omitted but the 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.

Pause Notes

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

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.”

Start Station

The Start Station in 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.

Save Pause Icon

When the operator selects a created pause in the Pause List by left clicking on it and highlighting it blue, the two options of Save and Delete appear in the middle of the window. To save the selected pause in the Pause List, left click Save.

Ignore Length at Start/End

This feature ignores a distance at the ***start and end of a collection*** by adding a pause at these locations. If the “Use Same Length” box is not selected, the ignored distance at start and end will be the same.

Pause Buffers

The Pause Buffer icon opens a new window to add length around pauses in the Pause List. Choose the Pause in the Pause Buffer window and add the buffer length. Select OK when finished.

Event Buffers

The Event Buffer icon opens a new window to add length around events around events in the Events Tab. Choose the event in the Event Buffer window and add the buffer length. Select OK when finished.

Use Same Length

When the Use Same Length check box is selected, the runs will be trimmed to the same length.

Edit Events

Edit Events allows the user to input events that were not added during collection, or to delete saved events. The events can have information associated with them that is inputted into the text box. The types of events for walking profilers (Sidewalk) are Height and Width obstruction. High speed and Profilograph systems should use the “Default” Event Type.

To add an Event

1. Select the run to add the event to
2. Select New Event
3. Change the Stationing to the correct point location
4. Adjust the Event type to explain the event
5. Under notes, add information about the event. (Start Structure, manhole, drainage, etc.)
7. **Select Apply**

Editing an Event

1) Select the event in the Data Events list to highlight it blue.
2) While highlighted, the event stationing, type or notes can be changed
3) **Select Apply**

Deleting Events

1) Select the event in the Data Events list
2) Select Delete to remove the event.
3) **Select Apply to save the changes**

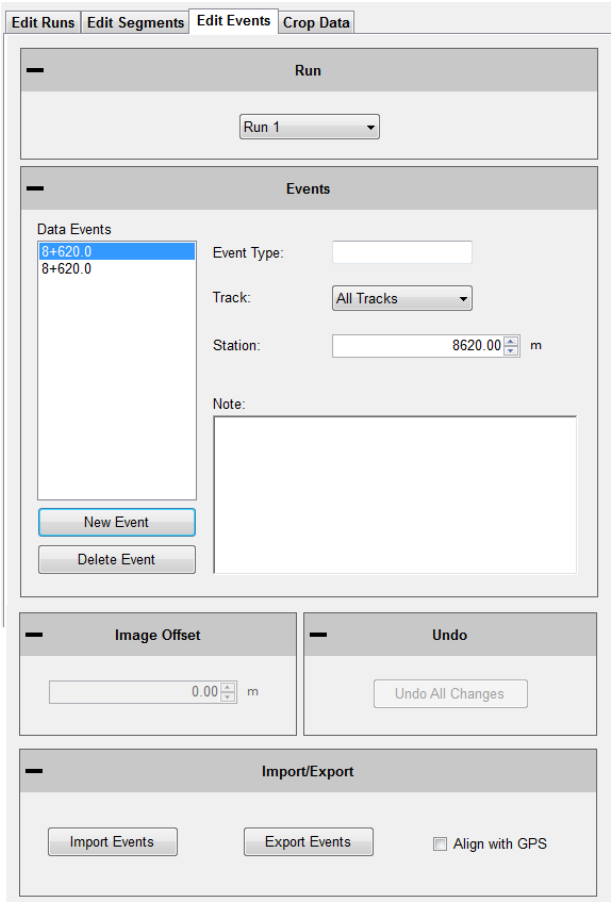


Figure 102: Edit Events Tab

Crop Data

The Crop Data tool 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**.

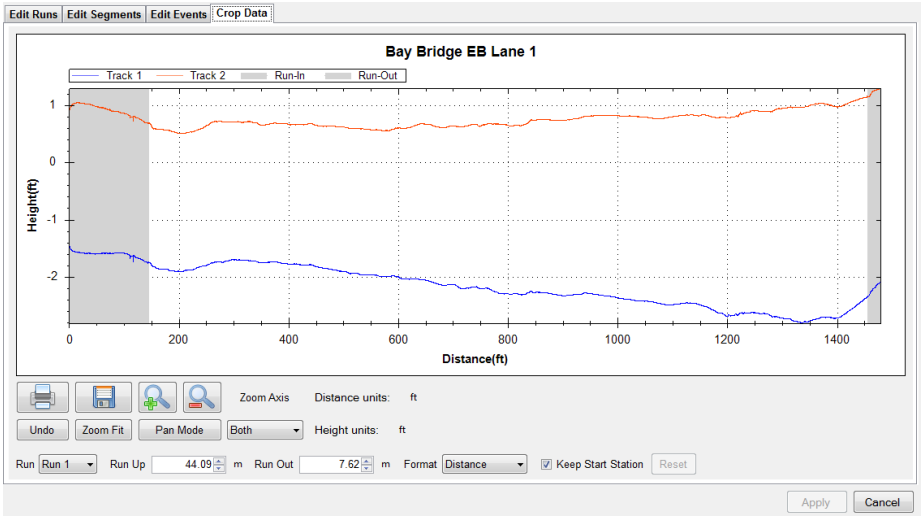


Figure 103: The Crop Data Tool

To reset the run up and run out to the original lengths select the rest icon next to run out. This icon will become available once a change has been made ***and*** Apply has been selected.
It is recommended to use the dropdown menu and choose the "Station" option instead of the distance option for cropping data.

2.2 - Project Parameters

The Project Parameters section is the location where the job information is inputted. 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.

2.2.1. - Job Information

The job 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.

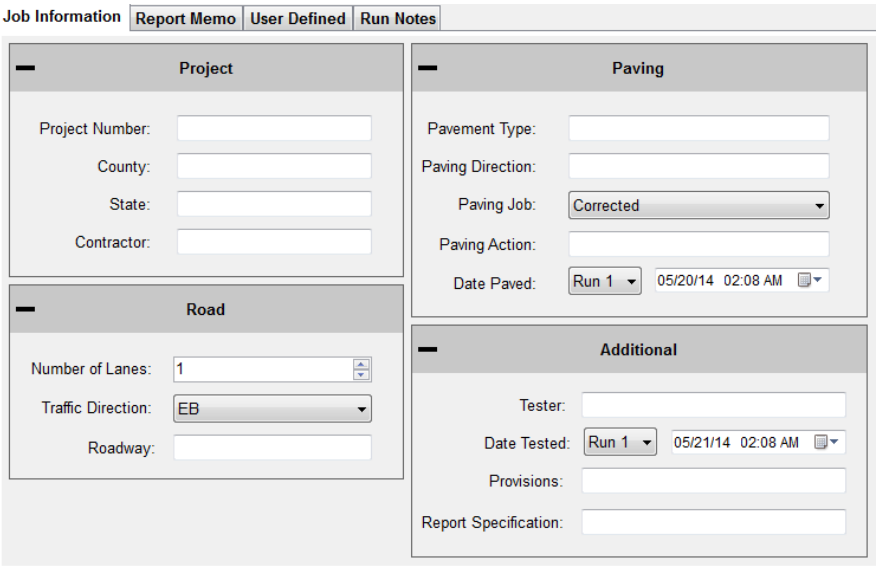


Figure 104: The Project Parameters window

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.

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.

2.2.2. - 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.

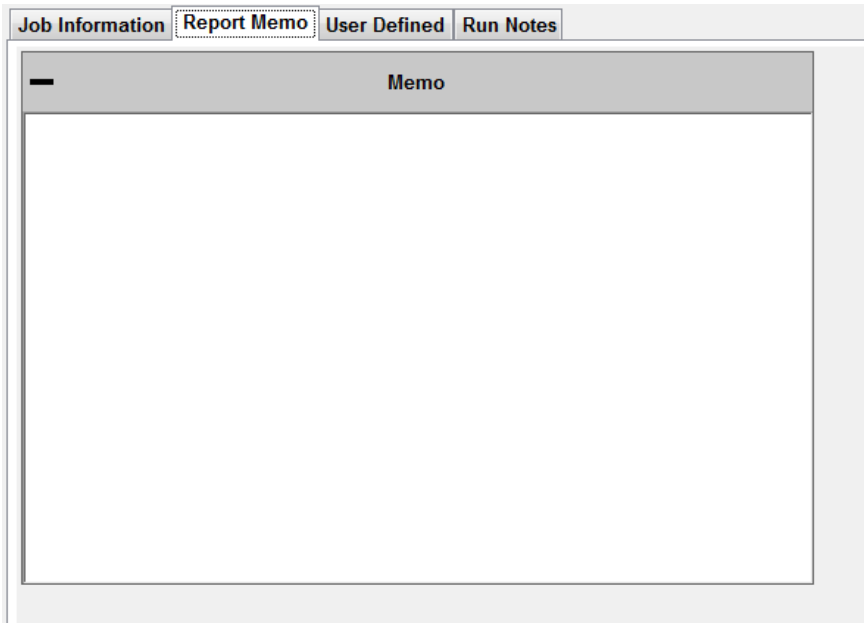


Figure 105: The Report Memo window

2.2.3. - 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.

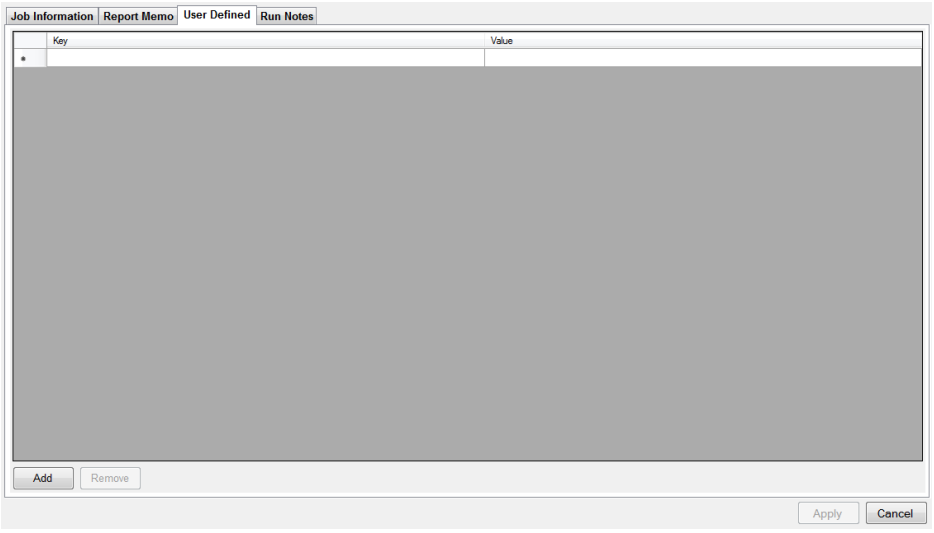


Figure 106: The User Defined section

2.2. - Settings

User defined parameters can be used in conjunction with the Default File Naming tool.

2.2.1. – General Settings

The default file preferences and settings for report generation can be changed under the "Settings". Whenever a change is made, always select the **Apply** icon in the lower right corner.

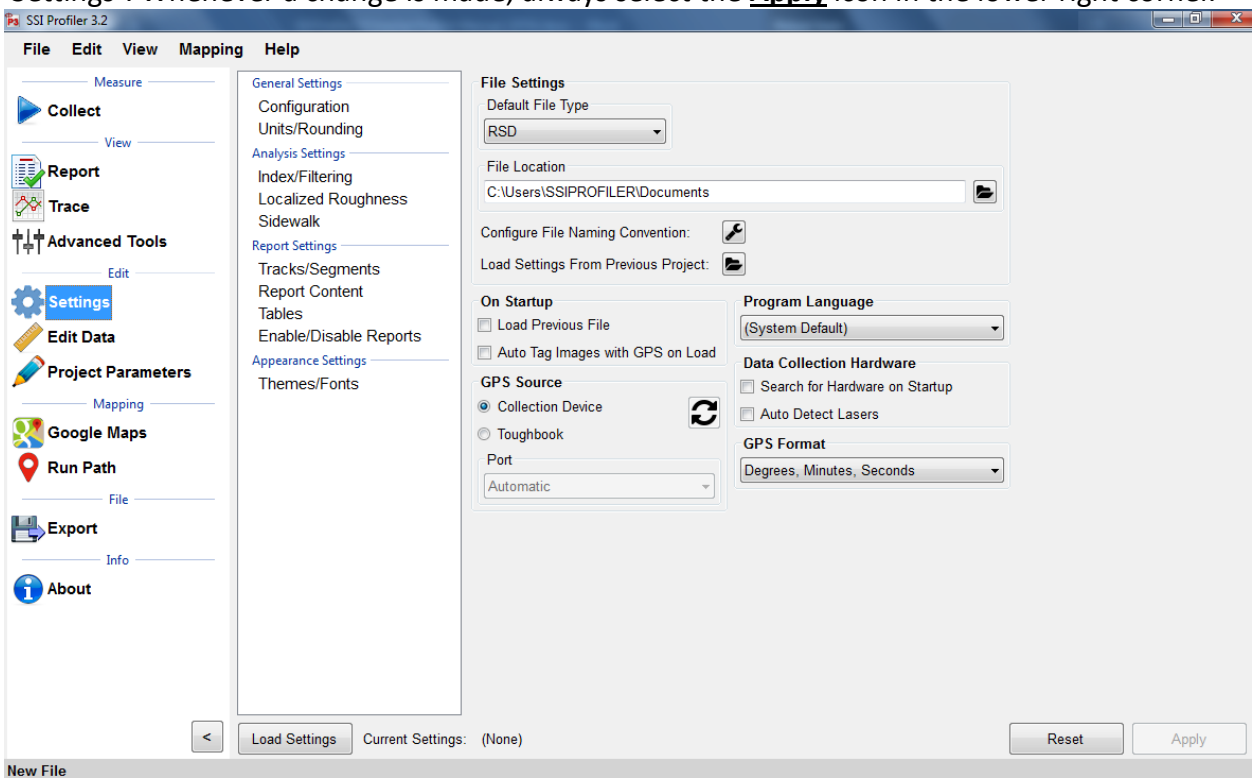


Figure 107: The General Settings window showing the Configuration

Section 1

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.***

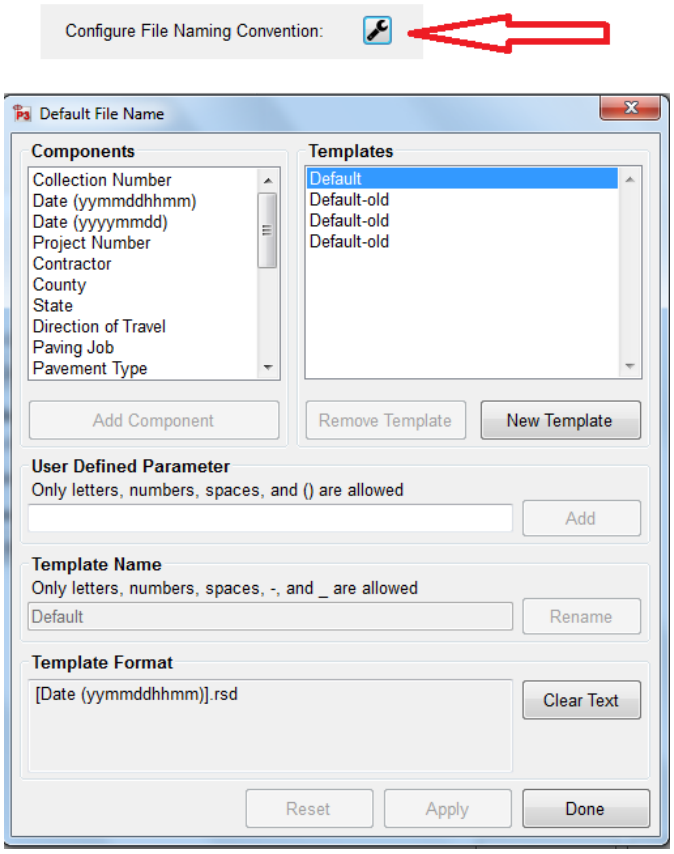


Figure 108: The custom file naming convention

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.

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 in figure 85, 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.

Resize for Printrex

Check this box if printing with a Printrex 422 and uncheck include the footer. This option allows the operator to correctly scale the trace for use with a sliding scale if necessary.

Report Scale

Depending on the specification and system type, the operator may choose between a 1”:25’ or a 1”:15’ scale. The bridge profilograph is usually a 1”:15’ scale while the California profilograph and all road profiling is 1”:25’ scale.

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.

2.2.2. – Analysis Parameters (Ride Values)

Changing the units alters the specifications for defects and the ride numbers.

Section 1 – Units

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

Selecting Metric Meters 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 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.

CA Bridge

The CA Bridge setting is based off the California Bridge Profilograph specification, which is twelve feet long instead of the California Profilograph's 25 foot length. The CA Bridge setting is in English units and has a segment length of 100 feet. After every adjustment of units, select apply in the lower right corner to save changes.

CA Bridge Metric

This setting is used for simulating the Bridge Profilograph's 12 foot frame. The Bridge Metric setting is the metric version of the CA Bridge Profilograph. Its segment length is 90 meters and the defects and counts for roughness are in millimeters and meters. After every adjustment of units, select apply in the lower right corner to save changes.

Segment Length

Segment length is the interval of profiling that is used to calculate ride values. Traditionally the distance used for segment length is one-tenth of a mile, or 528 feet (160 meters).
This section is adjusted by using the arrow keys or double-left clicking in the box to type the segment length.

Merge Last Segment if Less Than

If the last segment is shorter than the segment length, it can be merged into the segment before it. This will prevent large ride values from short distances. Only use if your specification does not require a specific segment length for pay incentives. The last segment length will be changed if this feature is used.

Exclude Paused Sections

When Exclude Pause Sections is selected, the paused sections created during collection or through the Segment Adjustment window will not be included in the report or the calculation of the ride values.

Include Paused Sections

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

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 and used to calculate ride values and counts for roughness.

Section 3 - Analysis Type

IRI

The International Roughness Index is a universal ride index for concrete and asphalt roads around the world. The profile is analyzed using a quarter-car simulation that is weighted towards the frequencies of body and vehicle bounce; the most uncomfortable riding conditions.
To calculate IRI in Profiler V3, select IRI from the drop down menu, then adjust the filter settings if necessary according to the contract specifications. View the report under the Report Tab to observe IRI.

$$IRI = \frac{Standarized\ Vehicle's\ Accumulated\ Suspension\ Motion}{Distance\ Traveled}$$

PRI

The Profile Ride Index is a simple calculation to classify the smoothness of a road profile against other roads. The formula for this calculation is:

English Units:

$$5280\ ft \times (Total\ Roughness\ in\ inches\ in\ Segment)/(Segment\ Length\ [ft])$$

Metric Units:

$$1000\ m \times (Total\ Roughness\ in\ m, cm, or\ mm\ in\ segment)/\ (Segment\ Length\ [m])$$

To calculate the PRI in Profiler V3, select PRI from the Analysis Type drop down menu. Once the settings are correct, select Apply and then view a report to observe the PRI ride values.

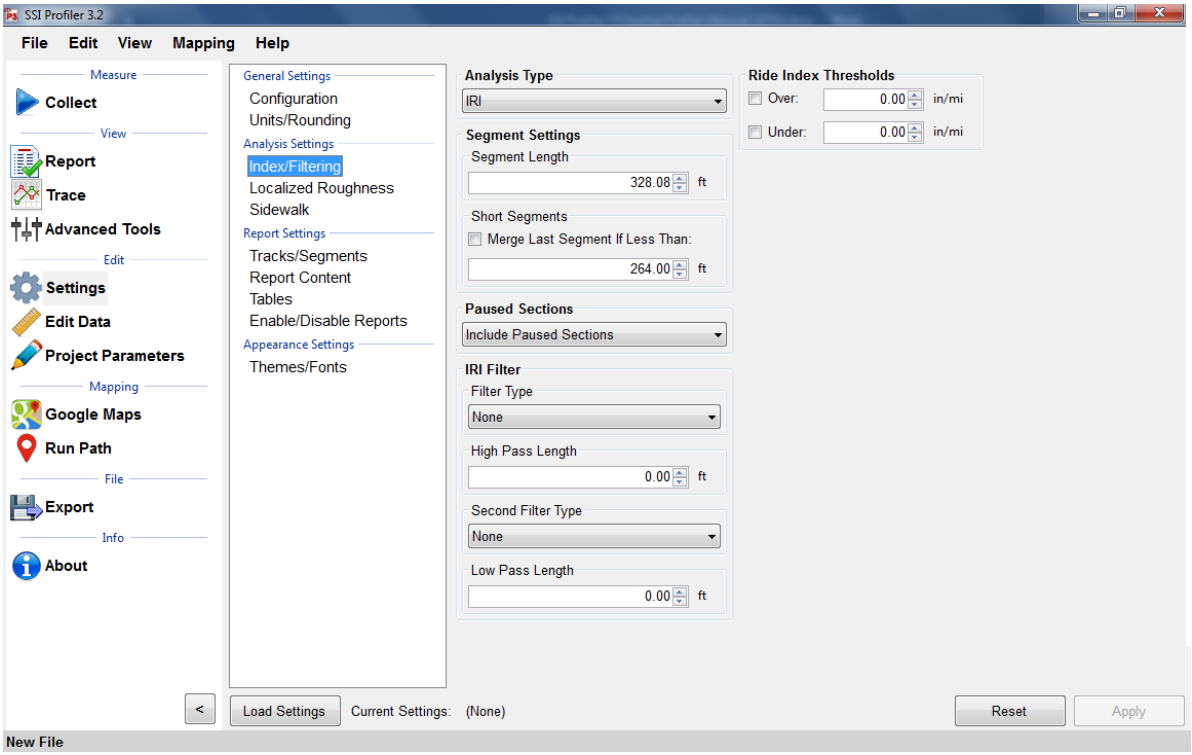


Figure 109: The IRI Analysis Parameters window

PRI Parameters

Note that the PRI Parameters are only for the calculation of the Profile Ride Index (PRI). Blanking Band, and Scallops have no connection to the manner in which defects are found. For defect settings, see *Localized Roughness*.

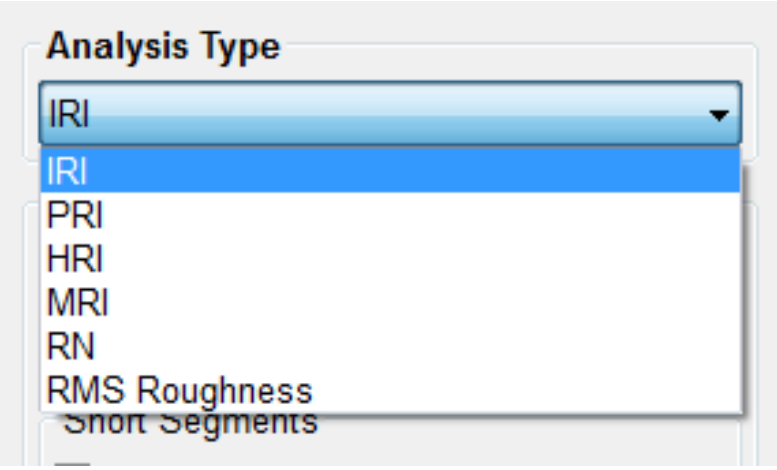


Figure 110: The Analysis type drop down menu

Scallop Definition

Scallops are the deviations of the profile trace from the blanking band. If the trace exceeds the defect height but the minimum width of the scallop is not reached, the deviation is not included as a defect. Although defects are not included in Ride Values, if the deviation still exceeds the defect height parameter, it adds to counts for roughness.

Blanking Band

The blanking band is a null area that classifies the height of all sections of the trace within its borders as zero. Therefore, a trace that remains within the borders of the blanking band would have zero counts for roughness and a PRI of zero.

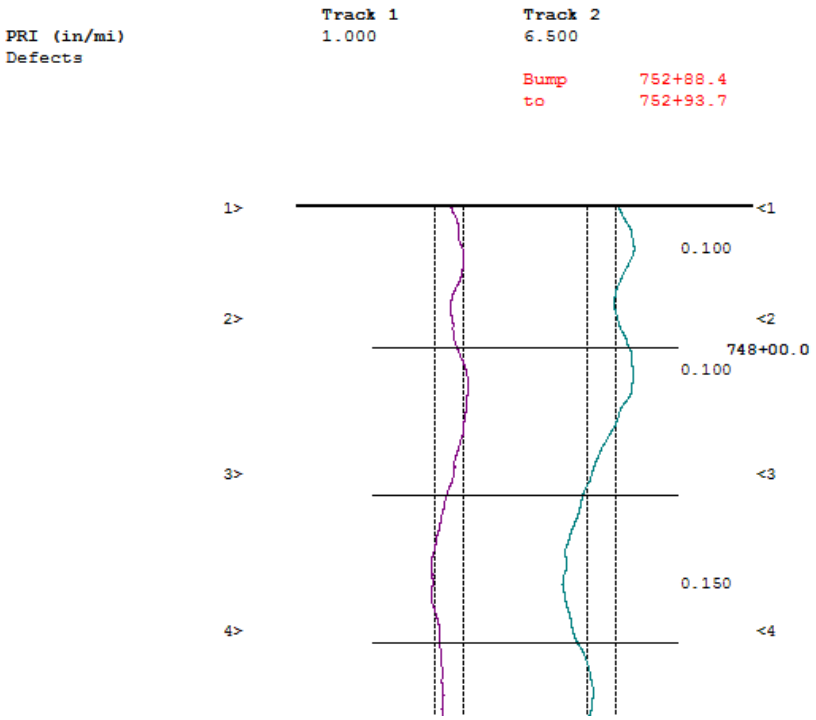


Figure 111: An example of the blanking band in the trace report.

Minimum Scallop Height

The minimum scallop height is the minimum deviation height from the blanking band or null line. Frequently, the value for minimum scallop height is 0.035 or 0.9mm, which is the default value for the Profiler V3 program.

Minimum Scallop Width

The minimum scallop width is traditionally 2 feet (0.61 meters). Review the Department of Transportation smoothness specification that pertains to the project. The minimum scallop distance is the minimum longitudinal length (the direction of traffic) that is used to find the deviations of the profile off of the null line or blanking band. The setting of 2 feet or 0.61 meters is the default setting for Profiler V3.

Scallop Resolution

The scallop resolution is the accuracy of the height measurement. Current equipment is accurate to 0.01 inches, the default value for Profiler V3 software. A resolution of one-hundredth of an inch means that the scallop heights will always be rounded to the hundredth decimal. Consult the recent smoothness specification released by the overseeing agency to confirm the scallop resolution value.

Reset File Settings

Selecting this icon brings all values in Settings to their default program values.

Minimum Scallop Height Inclusive

When this box is selected, the minimum scallop height will be included as a scallop. Meaning, if the minimum scallop height is 0.035, 0.035 will be the minimum instead of 0.0351.

HRI

The Half Car Ride Index (HRI) is found by applying IRI to an average of two profiles. HRI uses a half car simulation, unlike IRI which uses a quarter car simulation. To calculate the HRI in Profiler V3, select HRI from the Analysis Type drop down menu and verify the settings of filter length based on the project specifications. Once the filters are correct, select **Apply** to save the settings. To view the calculated HRI, view one of the reports under View>Report.

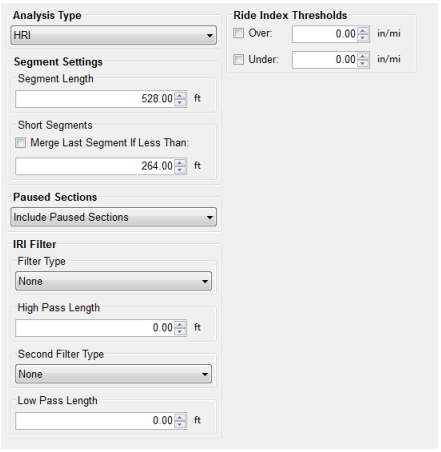


Figure 112: The HRI analysis window with the available filter settings.

RN

The Ride Number (RN) can be calculated in Profiler V3 by selecting RN from the Analysis Type drop down menu and verifying the settings of filter length based on the project specifications. Once the filters are correct, select Apply to save the settings. To view the calculated RN values, view one of the reports under View>Report.

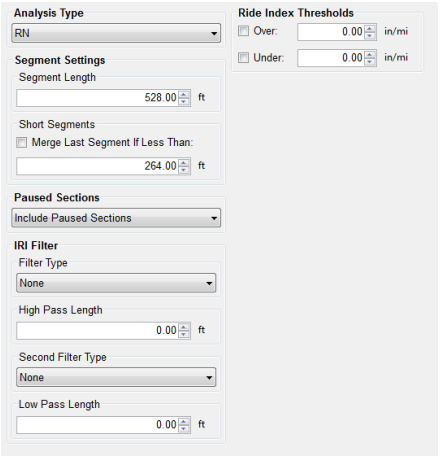


Figure 113: The RN analysis window with the filter options shown.

RMS Roughness

The RMS roughness is a ride value method calculated by profile height over a base length of 25 feet. This is how RMS roughness gets inches as it´s units. The RMS Roughness report gives a depiction of the amplitude and wavelength but does not necessarily give the frequency that this amplitude and wavelength occurs. The output is similar to a PSD plot.

Ride Index Thresholds

Highlight Index Values Above

The operator may choose the threshold in which to highlight a certain interval of ride index values above a number. The highlight color is red and can be seen in the summary table of the reports. Only the segment ride values are highlighted, not the total ride values. This is convenient for comparing segment ride indexes to determine where grinding should be done.

Highlight Index Values Below

The operator may choose the threshold to highlight a certain interval of ride index values below a chosen number. The highlight color will be green and it is seen in the summary table of the reports. Only the segment ride values are highlighted, not the total ride values. This is convenient for comparing segment ride indexes to determine where grinding should be done.

2.2.3. – Analysis Parameters: Filters

Section 1 - IRI/HRI Filter----Same for IRI, HRI, RN

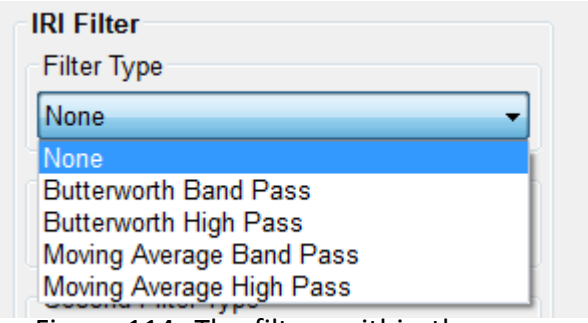


Figure 114: The filters within the IRI analysis parameter window

High Pass Filter – The High Pass Filter will remove any trend in the data that is less than the chosen length. The length can be selected by typing the value in the box or by using the arrows to adjust the input.

Low Pass Filter – The Low Pass Filter will remove any trend in the data greater than the chosen length. The length can be selected by typing the value in the box or by using the arrows to adjust the input.

Section 2 - PRI Filter

Filter Type

Moving Average

A length of 2.0 feet can be chosen for the Moving Average Filter, depending on the contract specification. The use of the moving average filter was initially used by the Kansas Department of Transportation (see Report No. K-TRAN: KSU-9302 "An Automated System for Determination of Pavement Profile Index and Location of Bumps for Grinding from the Profilograph Traces.)

Butterworth

The third order Butterworth filter has a default length of 2.0 feet. The Butterworth filter is not required for updated profiling specifications. The Butterworth filter was used for the original automated Profilograph systems.

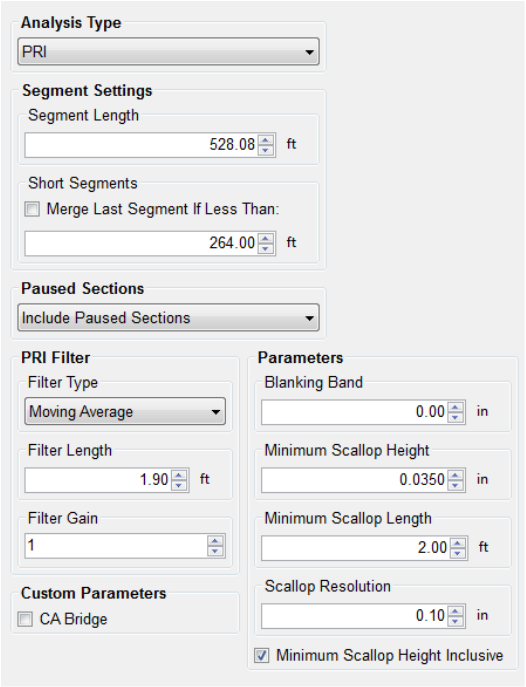


Figure 115: The filters for the PRI analysis parameter

Available Filters:

Moving Average High Pass Filter
Moving Average Band Pass Filter
Butterworth High Pass Filter
Butterworth Band Pass Filter

Filter Gain—1.00

The filter gain is only used for necessary adjustments while comparing different profiling systems. The filter gain does not need to be used in normal profiling environments. When comparing high speed profiling systems to other Profilograph systems, the filter gain may be used to change the output of the data files. A filter gain setting of 1.00 does not affect the collected data. For typical profiling, use the default setting of 1.

2.2.4. –Localized Roughness

Localized roughness refers to the bumps and dips that occur over a determined distance.

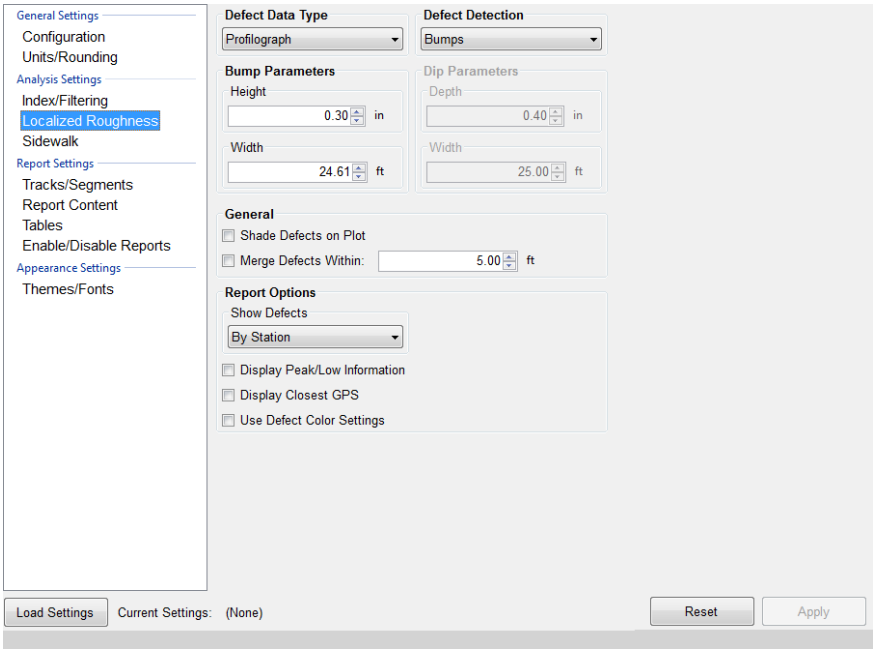


Figure 116: The Localized Roughness window with the defect settings.

Section 1 - Defect Detection

The operator may choose the mode of defect detection in Profiler V3. The options to choose from are Bumps, Dips, Both, and None. To select the type, use the drop down menu labeled Defect Detection. ***No filters are associated with localized roughness***. "Both" is selected by default.

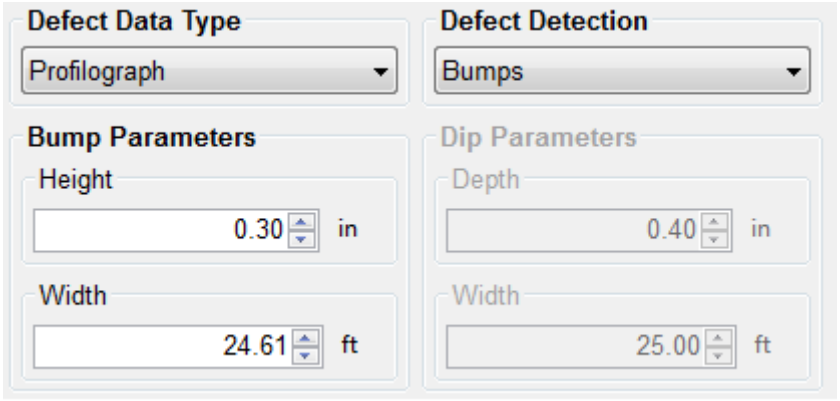


Figure 117: When only bumps are selected , the dip parameters become unavailable.

If only one defect type is chosen, be sure to change the correct settings. Do not change the dip parameters instead of the bump parameters by mistake. The report section of Profiler V3 can be used to review the settings and traces of the collection.

Section 2 - Bump Parameters

Height

Bump height is the maximum distance that a profile may deviate within the width of the bump. The width of the bump is the length of a Profilograph, or 25 feet (7.62 meters). A typical value for bump height is 0.3 inches. When the settings are changed for the bump parameters, always select **Apply** to save changes.

Width

The width of a bump is based on the length of a Profilograph; 25 feet or 7.62 meters. This is the default value for the Profiler software.

Section 3 - Dip Parameters

Depth

The depth of a dip is the maximum distance a profile trace may deviate within the width of the dip (25 ft or 7.62 m). The default value for dip height is 0.4 inches or 10.2 millimeters. When the settings are changed for the dip parameters, always select **Apply** to save changes.

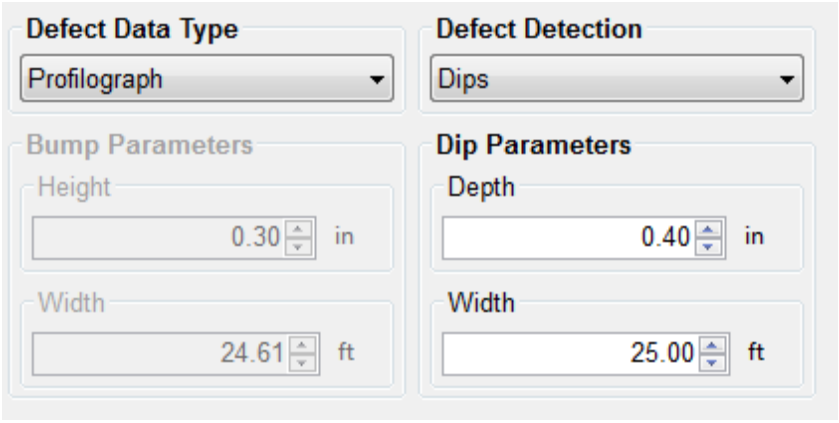


Figure 118: When only dips are being tested for, the bump parameters become unavailable.

Width

The width of a dip is based on the length of a Profilograph; 25 feet or 7.62 meters. This is the default value for the Profiler V3 software.

Section 4 - Localized Roughness Report Options

Display Defects By:

The operator has the option to display defects by the station number or by the track in the report. To modify this setting, choose the desired display setting then select apply to save the changes. When displaying the defects by track, the defects are split up into their respective tracks. When the defects are organized by stationing they are listed in the same classification.

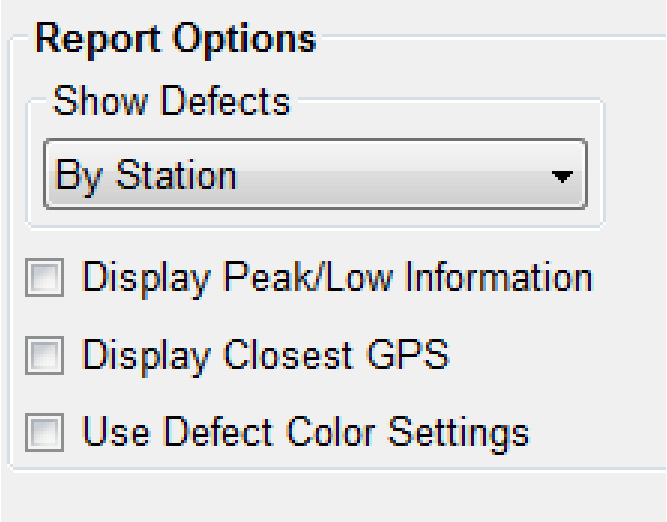


Figure 119: The localized roughness settings for displaying defects

Display Maximum Peak/Low Values for Defects

Selecting this check box shows the peak values for the defects when viewing the summary report. When altering the settings, select **Apply** to save the changes.

Identify GPS Closest to Defects

To show the closest GPS reading to each defect, select this check box. When viewing the summary, the GPS coordinates will be in the table with Defect Type, Track, Segment, and Stationing of the defect.

Section 5 - Defect Data Type

Profilograph

The Profilograph defect data type is the most common method used to find defects. The settings are the same as described above in Analysis Parameters, defect detection, bump parameters and dip parameters.

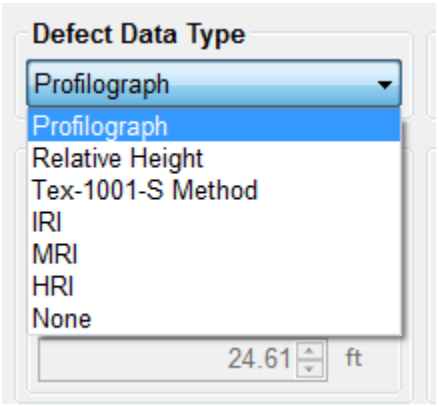


Figure 120: The types of testing available to find the defects in

Relative Height

Relative Height defect data type finds the defects of the profiled surface through the local differences in the trace. The settings required to be inputted within the Localized Roughness tab of the Settings Window are the bump and/or dip parameters.

Texas-1001-S Method

The Texas 1001-S Method is used mainly by the Texas DOT for profiling with inertial profilers. The procedures and information for this test method can be found on the Texas DOT website; a direct link is below.

ftp://ftp.dot.state.tx.us/pub/txdot-info/cst/TMS/1000-S_series/pdfs/spe1001.pdf

The Texas-1001-S method detects localized roughness (defects) of the profiled surface by applying the base length and the threshold values saved in the Settings Window.

IRI

When IRI Defect Data type is selected, the IRI calculation will be used to find the road's defects (localized roughness) of the profiled surface. If this setting is selected the IRI ride value will not be shown in the summary. To list the IRI ride values on the reports, select the analysis type to be IRI in the Analysis Parameters tab. The ride interval is set (usually to 25 feet, in English units) and is used as a sliding guide across the profile. When the summation of the profile's IRI exceeds the threshold, the entire continuous length which exceeds the threshold will be an area of localized roughness.

Section 6 –General in Localized Roughness

Merge Defects within:

The operator is able to merge multiple defects into one defect to eliminate high frequency grinding patterns. The action of merging defects does not affect the ride values or the defect heights. Merging adjusts the start and end stationing of two defects into one length. The default value of the merge defects tool is 5 feet. To use this feature, select the check box next to "Merge Defects Within."

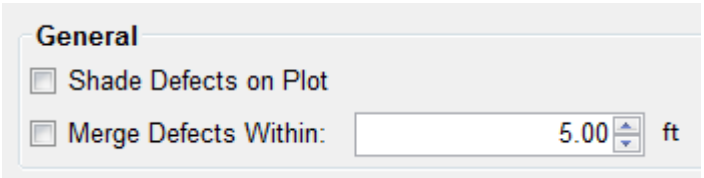


Figure 121: Merge Defects

Shade Defects on Plot

The operator may use this feature to help identify defects.

2.2.5. - Report Settings

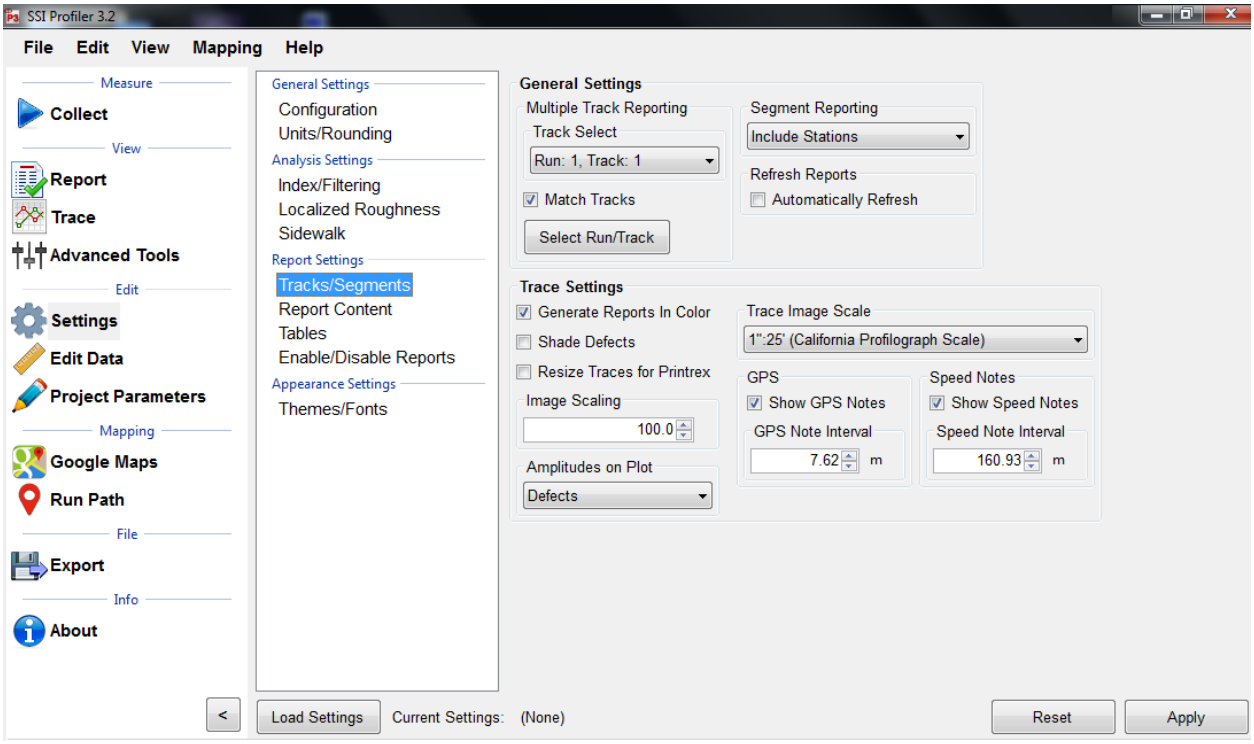


Figure 122: The report options window.

Track/Segments General Settings

Multiple Track Reporting Track Select

Track Select is the tool that is used to select the track which will to be shown in the reports. From the drop-down menu, select a single track based on the label of [Run: Number, Track: Number].

When Match Tracks is not selected, the reports will only show one trace. The selected run in the drop-down menu will be the only run shown in the Reports of Single Trace, Continuous Trace, and All Traces.

To plot multiple or all tracks that are saved within the file, select Match Tracks. See below for information on Match Tracks. When Match Tracks is selected, the run shown on the collapsed Track Select drop down menu will be on the left side of the trace in the report. The figure above will have Run 1, Track 1 on the left side trace report.

To report specific runs and tracks, select the "Select Runs" icon under Multiple Track Reporting. Here the user can select certain tracks or runs that will be included in the reports, localized roughness and ride value calculations.

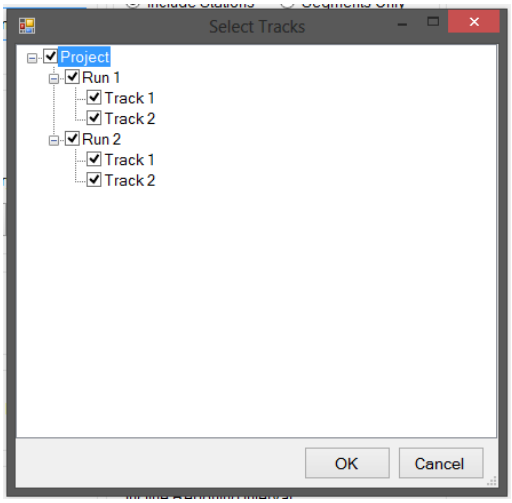


Figure 123: The Track and Run Selection Window

Match Tracks

When the Match Tracks check box is selected, all of the tracks associated with the file will be displayed in the reports of Single Trace, Continuous Trace, and All Traces.

With Profilograph profiles for the Profilograph, there are only two-wheel paths, while with some High-Speed Profiling Systems there have three traces. When dealing with multiple traces, the Track Select can change the order in which the tracks are displayed in the reports. The track that is selected in the drop-down menu within "Track Select" will be the trace that is on the left side of the report of the single trace, continuous trace and all traces plots.

In order to save changes made to the Multiple Trace Reporting Section, always select **Apply**.

Segment Reporting

The operator can choose to Include Stations and Segments Only. To include station and segment numbers in the continuous trace report select "Include Stations." To only display the segment numbers select, "Segments Only."

Trace Settings

This section relates to the amplitudes of the collected data relative to the trace.

Amplitudes on Plot

The operator has the option of showing the amplitudes for either the scallops or the defects on the plot. When comparing the reports to the SSI spreadsheet defects templates, the operators should choose to show only the defect heights. Scallops are the deviations of the trace outside of the centerline or blanking band. The defect heights will also be shown when scallops are selected, however there will be more labels on the deviations. Therefore, it is acceptable to leave the amplitudes on scallops.

Note Reporting

Report Speed Notes

To have the speed notes included in the printed report, the check box to the left of "Report Speed Notes" should be selected. To change the interval which the notes are reported, select the "Customize Reporting Intervals" icon. If changes are made, select **Apply**.

Report GPS Notes

To have the GPS notes included in the report, select this box. If this box is not selected, the GPS notes will not be shown at the bottom of the report.

Customize Reporting Intervals (GPS/Speed Notes)

The reporting intervals are the distances traveled while collecting data to between a GPS and or the Speed note on the report. A new note will be shown each time the distance of the interval is traveled. The types of intervals that can be adjusted are:

GPS Note Reporting Interval

Speed Note Reporting Interval

In the case that the report becomes cluttered with the report notes, the operator may increase the reporting intervals to simplify the printout.

Report Content

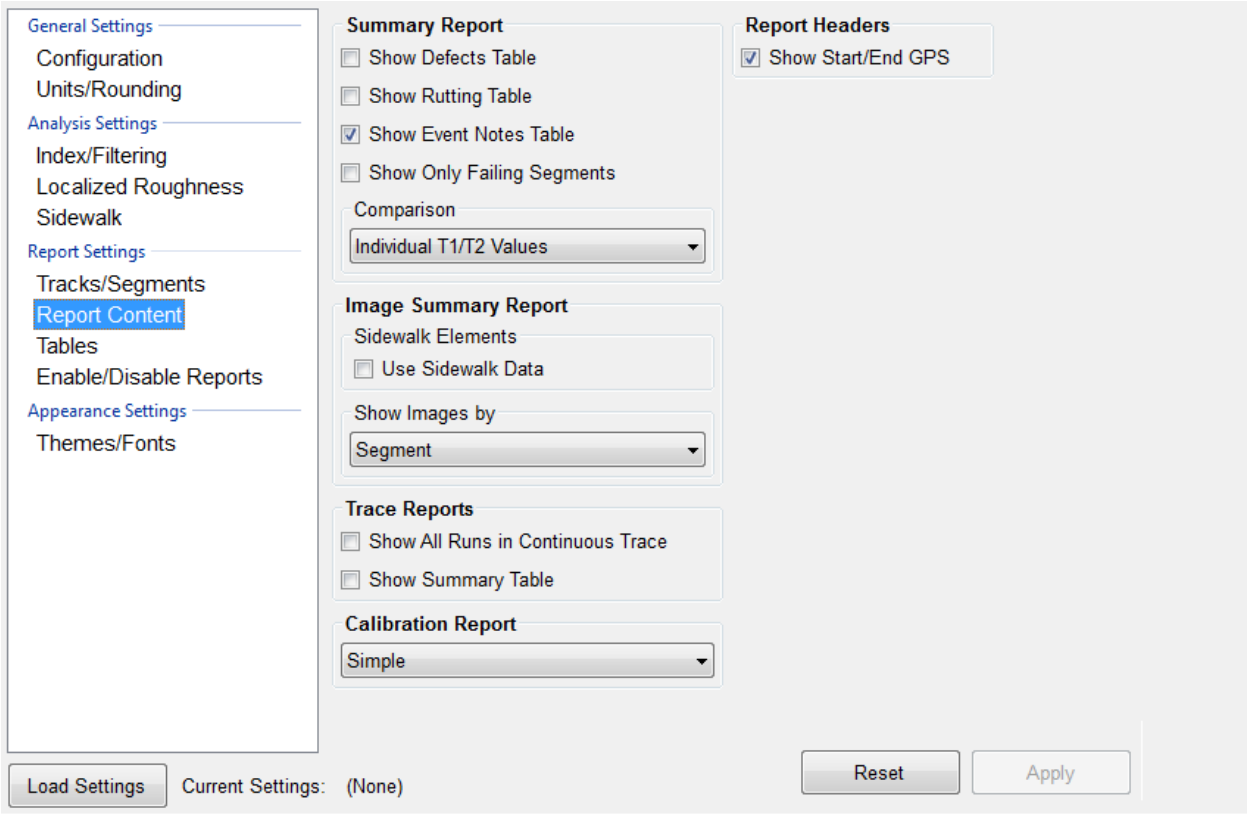


Figure 124: The Report Content window

Summary Report

The operator can decide the data to report in the summary report. These include: The Defects Table, the Rutting Table, the Events Note Table or to Show Only Failing Segments. The data can be compared by individual Track 1 and Track 2 values or using the average of these.
The Report Headers option lets the operator choose the Show Start/End GPS coordinates for the run.

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. For Sidewalk Profilers, the operator should select the checkbox above the drop-down menu.

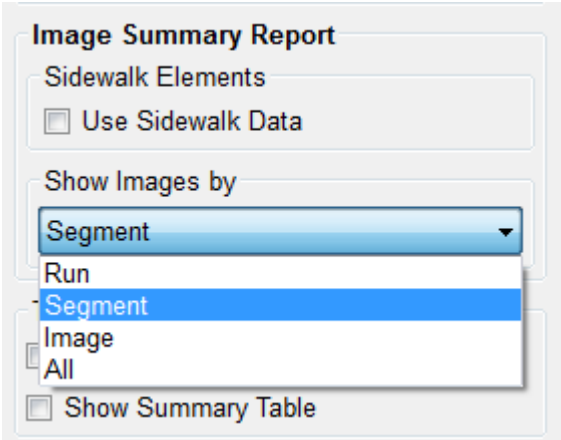


Figure 125: The Image Summary Report options under Report Content.

Trace and Calibration Reports

The operator can choose to **Show All Runs in Continuous Trace.** When this box is selected, all runs within the file will be displayed within the continuous trace. The organization of the runs and tracks is always the same when this option is selected. If Run 1 will come first, then Run 2. Track 1 will always be the left-most trace on the report.

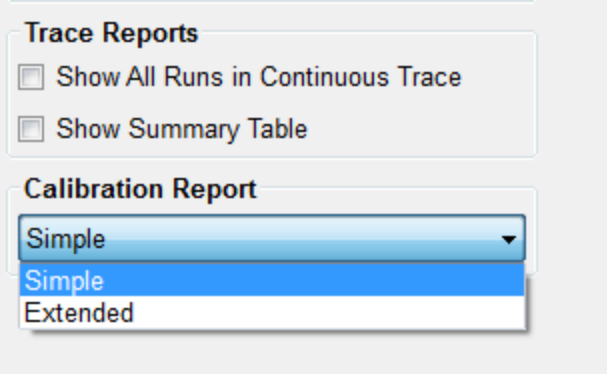


Figure 126: The Trace and Calibration Report options.

Show Summary in Table

When this box is selected, the summary header will be included in the All Traces report.

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.

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

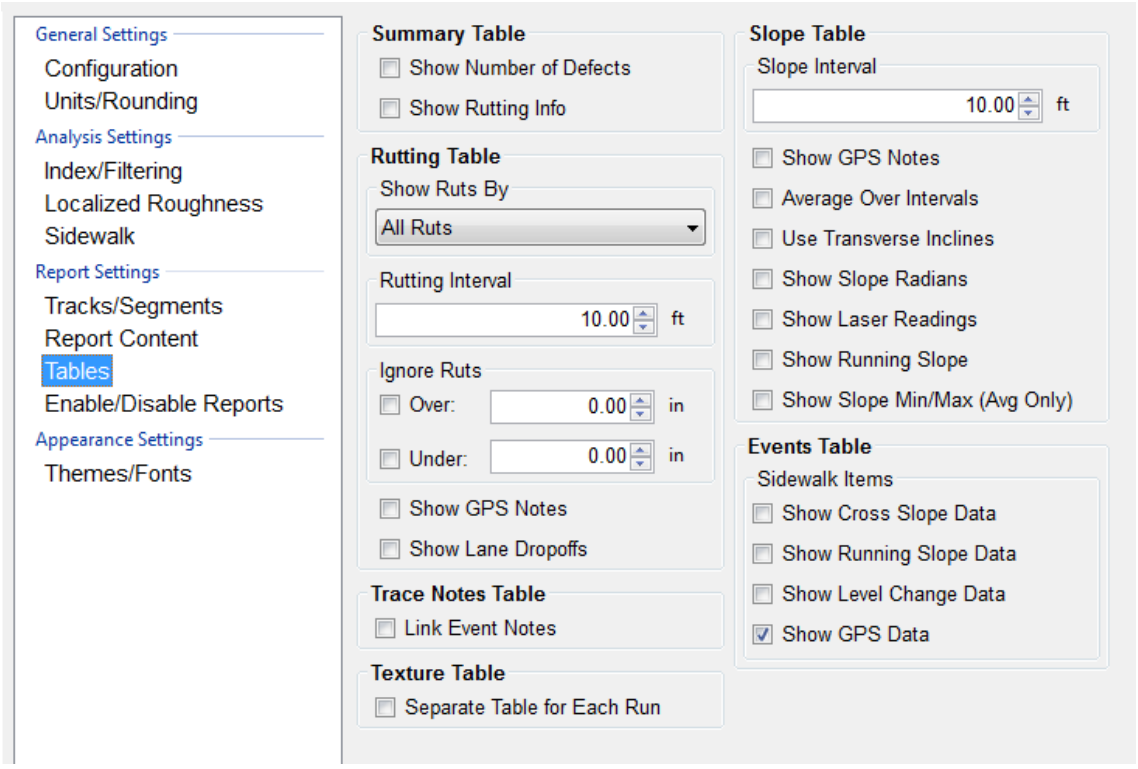


Figure 127: The Table options under Report Settings.

The table options under report setting lets the operator chose what tables to include in the report. **The Summary**, **Trace Notes** and **Events** Table are used thought SSI's Profiling systems. The Summary Table section includes the 'Show number of Defects' and the 'show Rutting Info' checkboxes. **Show GPS Data** is selected by default in the Events Table.

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 figures 108 and 109.

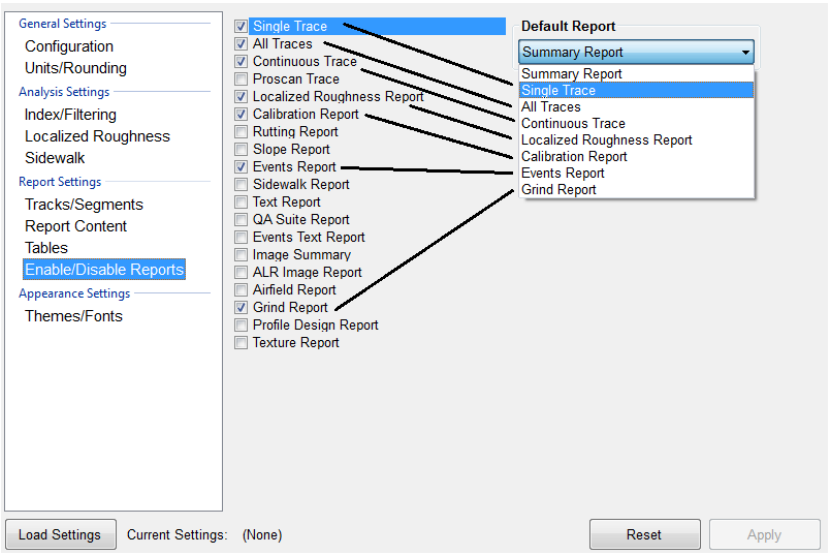


Figure 128: The Enable/Disable Reports selection window

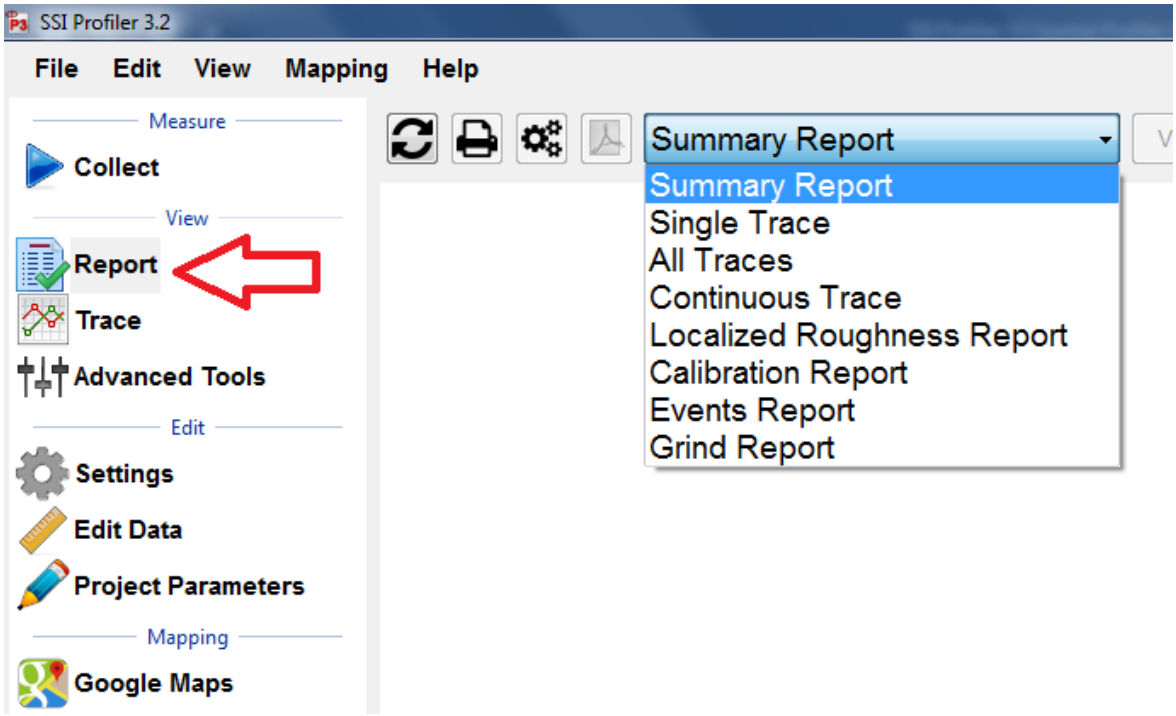


Figure 129: The Enable/Disable Reports selection reflected in the main Report tab of Profiler V3.

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**.

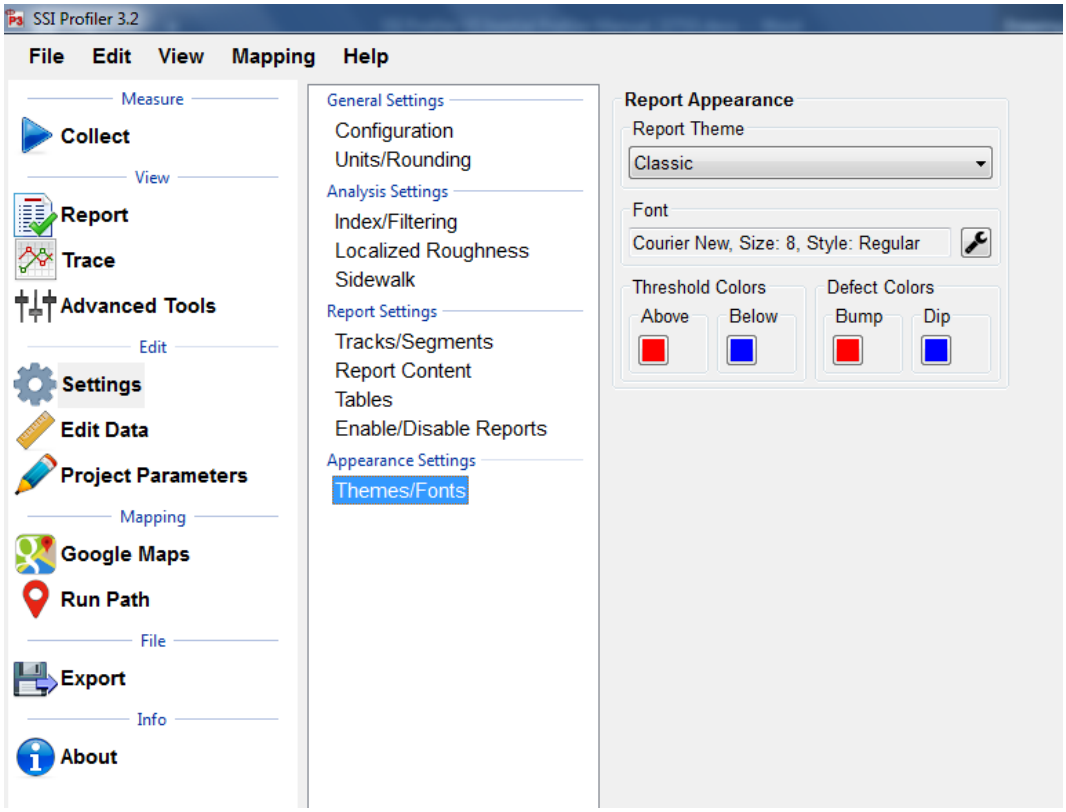


Figure 130: Themes and Fonts option under Appearance settings.

3. 0 – View

Figure 131: The summary header of a single trace report.

3.1. - 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.

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.

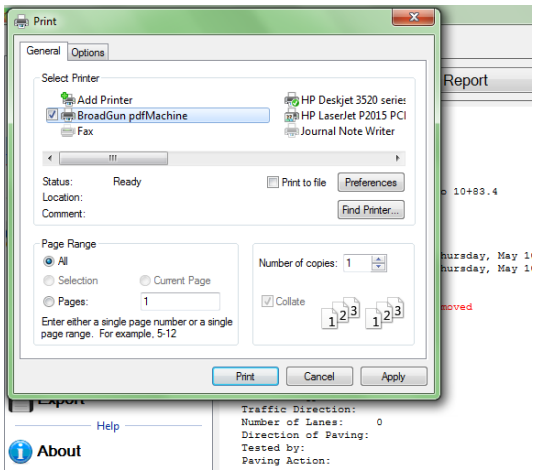


Figure 132: Printing Options

Printrex 422 Thermal Printer

Confirm under the settings for the Printrex 422 that the paper size is 4 inches wide on a 150-foot roll. This setting can be chosen under Preferences>Advanced Settings. It is recommended to use Contiguous as the end of page control.

To PDF

The Adobe Symbol between the Printer symbol and the report type will print the report to PDF format if the Broadgun PDF printer is installed. Contact SSI support is Broadgun is not installed or 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.

Unless directed by the overseeing agency, the frequently used reports are Summary Report, Single Trace, Continuous Trace and Calibration Report. These reports are commonly used due to the information provided within them. All of these reports have the locations of defects and the information entered in Project Parameters and Localized Roughness.

Figure 133: The drop-down menu for the report options

View by Segments

By selecting Segments (the default setting) the operator may navigate through the segments of the file by typing in the segment number and selecting 'Enter', or by using the arrow keys to the right of the box.

Figure 134: The segment or defect navigator

If the operator is not in Single Trace while using this feature, the program will adapt and open Single Trace when the Report window generates.

3.2 – 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.

3.3. – 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 of 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 the changes will not be shown.* Review the legend to verify that all of the selected tracks are shown in the plot.

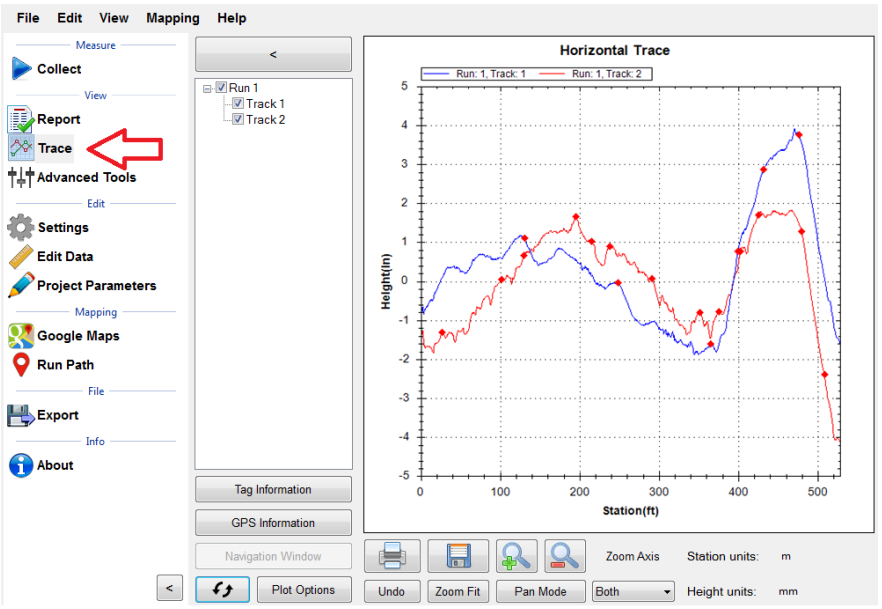


Figure 135: An example of the profile

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 Icon

Profile/Continuous IRI

The drop-down menu allows the user to select options of Profile and Continuous IRI, MRI or HRI, Median Profile, Segmented Bar IRI and Birds Eye View. It is recommended to use the median profile option when reviewing the collected relative elevation profile. The operator may view two graphs simultaneously by selecting the secondary plotter option.

When Continuous IRI is selected, the operator may not choose the option to include Run Up and Run out data.

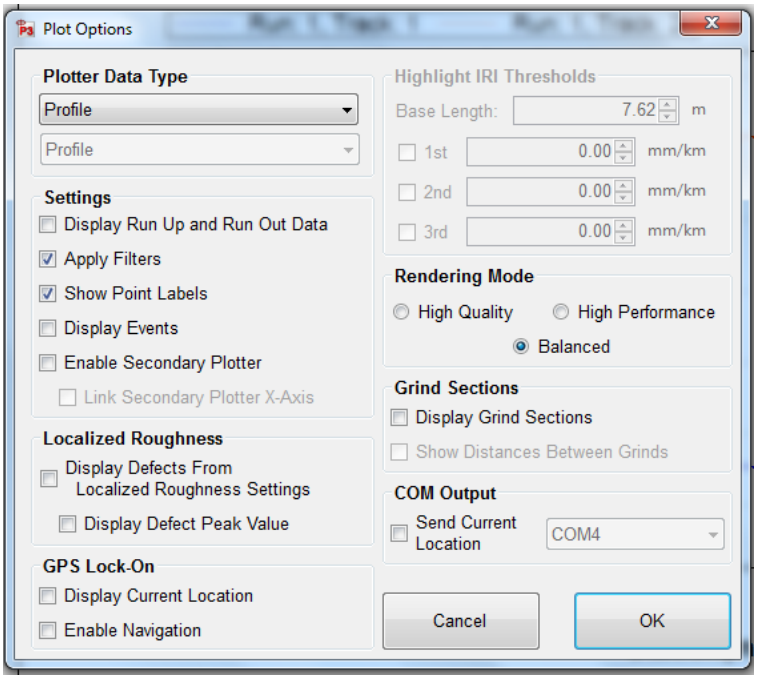


Figure 136: Recommended Plot Options

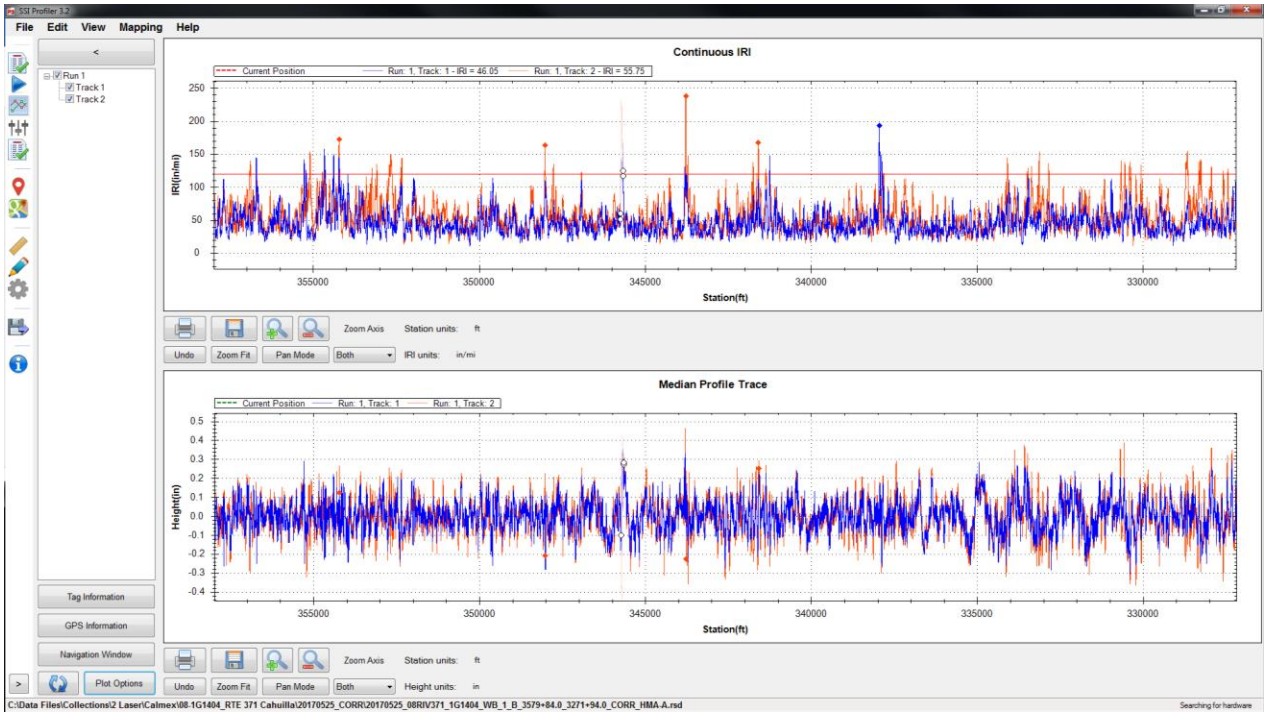


Figure 137: The dual plot of the Continuous IRI and Median Profile

Plot Options Settings

Display Run in/ Run out Data

Many High Speed Profiler data files have Run in and/or Run out data associated with them. To include this data in the trace, select the check box next to “Display Run Up and Run out Data.”

Apply filters

To apply the 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.

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.

GPS Lock-On

Display Current Location

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, allowing the user to locate the points of localized roughness.

Center Trace on Current Location

Then this box is checked, the trace will pan with the motion of the vehicle so that the current location is always in the center of the window. ***This option is required for any navigation feature.***

Highlight IRI Thresholds

Base Length

The base length is the length of the California Profilograph or 25 feet. It will be the basis of the IRI localized roughness calculations.

1st, 2nd, 3rd [in/mi]

Three separate thresholds can be set to depict which plots exceed the thresholds on the graph. These thresholds will be plotted as a horizontal line across the trace graph at the IRI values of the threshold in inches per mile.

Localized Roughness in Trace View

Be aware that when using the localized roughness the defects can appear below the threshold line. This is because the localized roughness is based off of a 25 foot length and not the entire profile.

Display Localized Roughness

When this box is selected the trace view will have the localized roughness location marked with a diamond. If the user places the cursor over the red diamond, the information about the localized roughness will be displayed.

Use Localized Roughness Settings in Trace View (Recommended)

By selecting this box the IRI Localized Roughness threshold established under the Settings and Localized Roughness Tab will be used to find and display the localized roughness in Trace View. If the other thresholds are used, the number of defects displayed in the trace may be different than the number in the report. ***This selection displays the same localized roughness as in the report.***

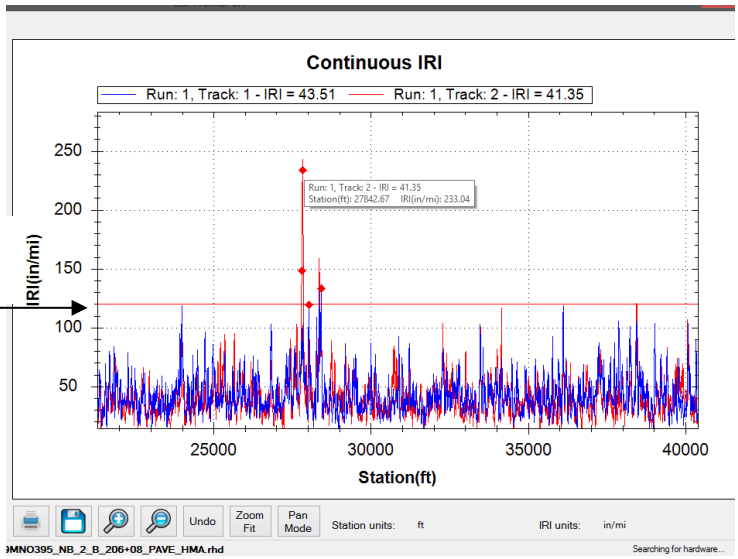


Figure 138: The Continuous IRI trace with the localized roughness diamonds shown

Navigation

Trace View has a navigation feature as long as the GPS is connected. **See Section 4.3. – Trace Navigation**

In order to use the Navigation feature in Trace View the GPS must be connected and you must select the "Display Current Location" check box under GPS Lock-On in the Plot Options Window.

GPS Tagging Tool

Based on the GPS coordinates from the collection, the program can add events and pauses to the collection information. There are two ways of adding the events and pauses; dynamic and static tagging. The tagging tool is included in a deluxe Profiler license. ***Tagging tolerances are dependent on the accuracy of the GPS system used.***

Dynamic Tagging

Dynamic tagging involves being physically at the location of the start or end of the pause or the event. The GPS string will be visible in the tagging window with the option of also having your current location displayed on the trace. Choose the type of location from the options and move to the next area.

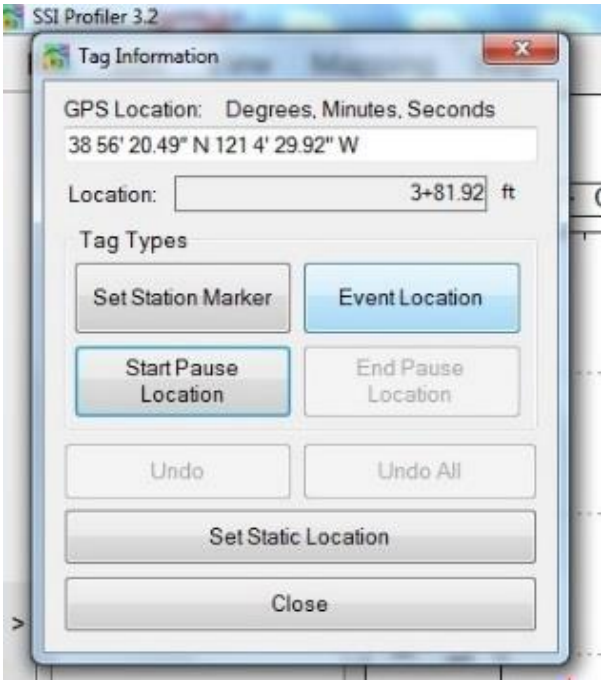


Figure 139: Dynamic Tagging

Static Tagging

The static tagging feature allows the operator to enter a GPS location from a remote location, like your office. As long as the location's GPS coordinates are known, a pause or event can be created.

Grinding Simulation and Navigation

SSI has developed a feature to assist contractors in the removal of IRI Areas of Localized Roughness (ALR). The Grinding Simulation is included in a deluxe license of Profiler. ***Navigation tolerances are dependent on the accuracy of the GPS system used to collect and layout roughness.***

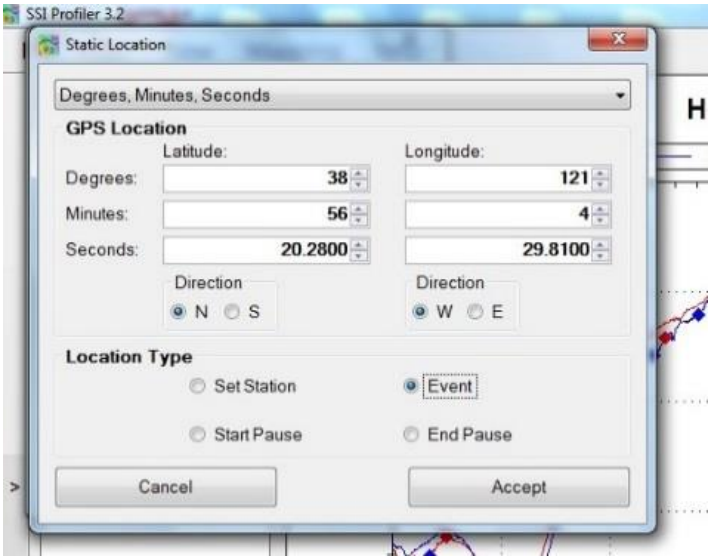


Figure 140: Static Tagging Feature

After collecting the data ALR can be determined from the amount of suspension movement over certain locations. These areas can be determined in SSI Profiler's Localized Roughness section. However, grinding the ALR does not have the best result in removing roughness. This is because ALR can now include dips and bumps. Grinding dips takes a special procedure.

The FHWA program ProVal (roadprofile.com) has a tool to simulate the best grinding strategy for grinding. Input the correct settings for the IRI tolerances in ProVal's SAM analysis and choose AutoGrind, then Grind. This will give you locations along to profile to grind. Unfortunately, ProVal does not accept GPS coordinates so the table can be copied (right click in the grind table) and pasted into a notepad file and saved for the lane and wheel path. This notepad file can be imported into the SSI Profiler program within the Advanced Tools>Grind Sections>Manage Grind Info. Confirm that the track is correct before applying these locations.

Figure 141: Grinding Navigation with green current location displayed

The locations for track 1 and 2 will appear in the trace window with paired GPS coordinates. You can use the green line to display current location and visually track your position until you get to the beginning and end of a grind, in order to layout the location on the pavement.

Under the navigation window icon in trace view you may choose to auto-center the current location and choose the Simple Grinds option. The simple grinds window displays the location of the grinds relative to the current position through numbers and colors.

Print

To print the trace, select the Print Icon in 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.

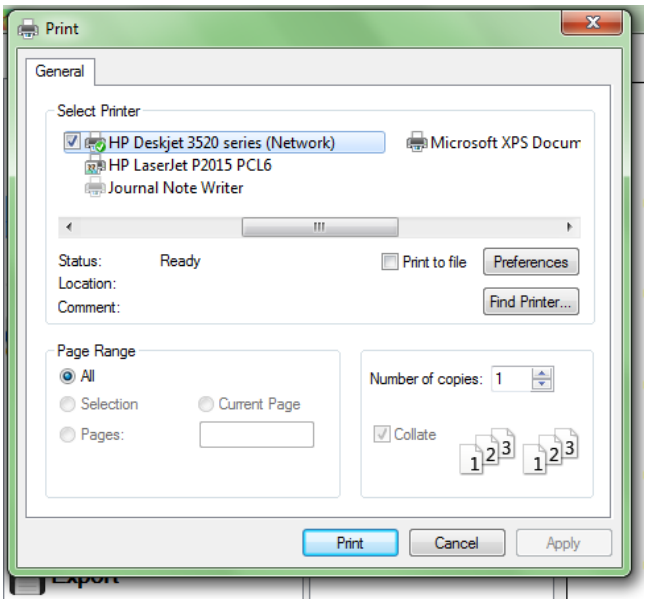


Figure 142: The Print window after the print icon is selected

Save

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.

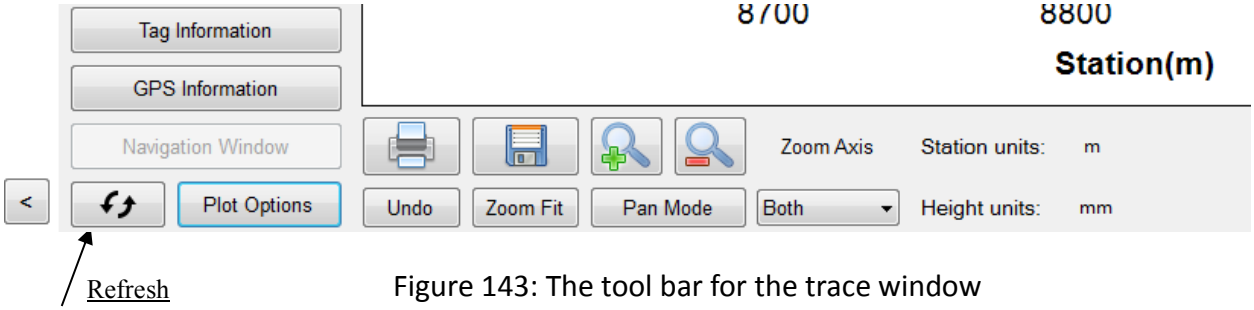


Figure 143: The tool bar for the trace window

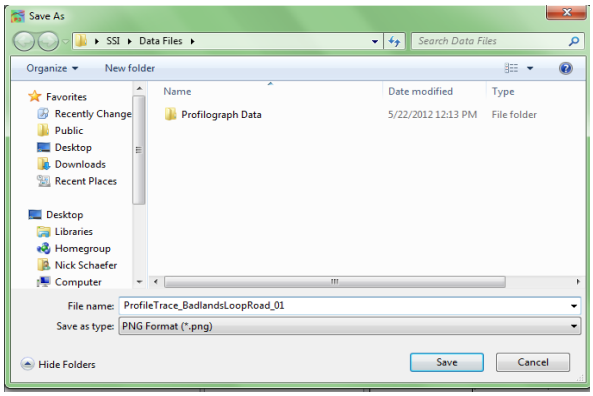


Figure 144: Windows explorer to save a picture of the graph.

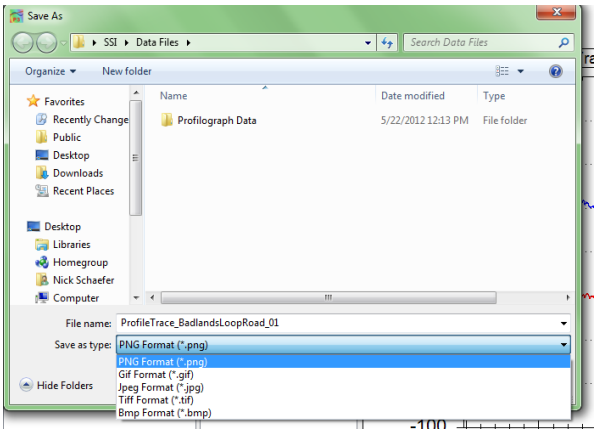


Figure 145: The available picture formats to save the trace graph.

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.

4.0 Advanced Tools

The Advanced Tools window contains options for images, transverse profile viewer, grind sections and profile design. These options will only be available if the user license permits this additional analysis. Contact SSI for a license upgrade.

4.1 – Images Window

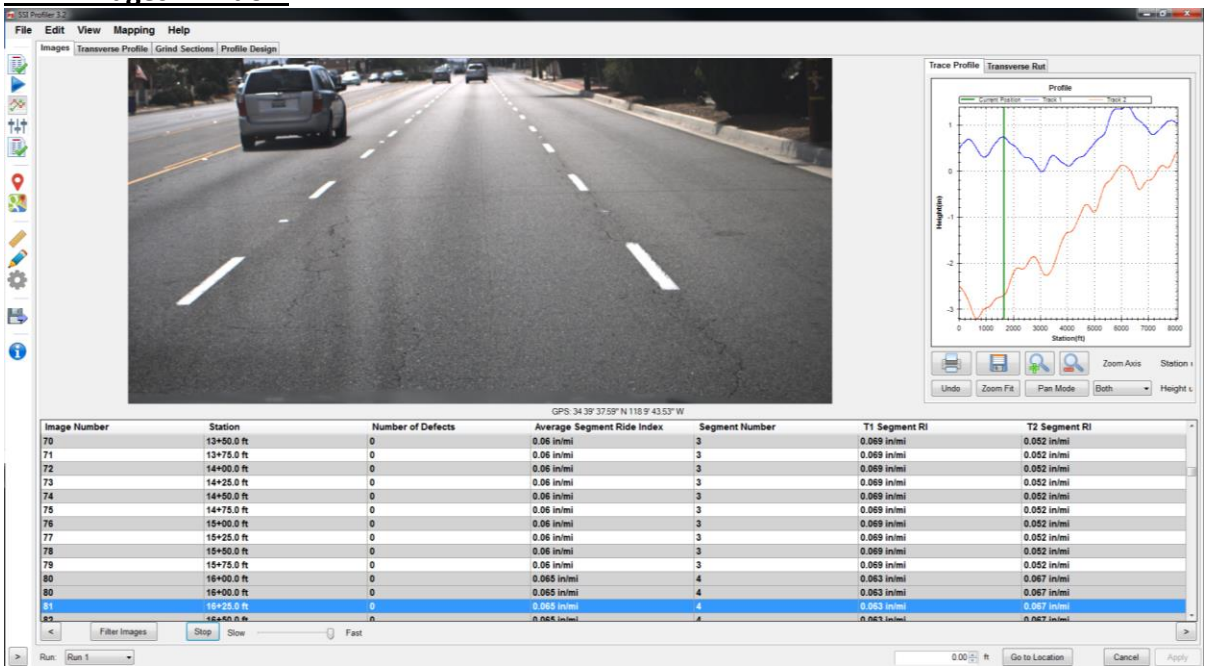


Figure 146: The Images Window under Advanced

Within the images window the user can perform multiple filtering options to show only certain characteristics of the collection. The data can be filtered by station, defects or ride value. The software automatically enters the minimum and maximum values for each of these three fields. The units of these parameters can be changed by selecting the current units to enable to drop down menu to choose new units. After the operator has changed the parameters according to the range desired, select “Filter”. The images will reorganize and the new images will not be reverted until the parameters are changed to the original setting (“Reset”).

The information in the table below the image will be populated as long as the location is not in the run up distance and there is sufficient data. If the system was not a full lane width 5-laser system the rutting depths will read ‘N/A’.

The arrow keys on your 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.

The GPS string of the Images Window is based off of the nearest GPS coordinate and should not be used as a reference station.

Images in the Report

The images captured during data collection can be viewed alongside the trace within the any of the three trace reports. The user can view the images with the trace in the Single Trace, All Traces, and Continuous Trace reports. If the user hovers the cursor over the camera icon the image will appear.

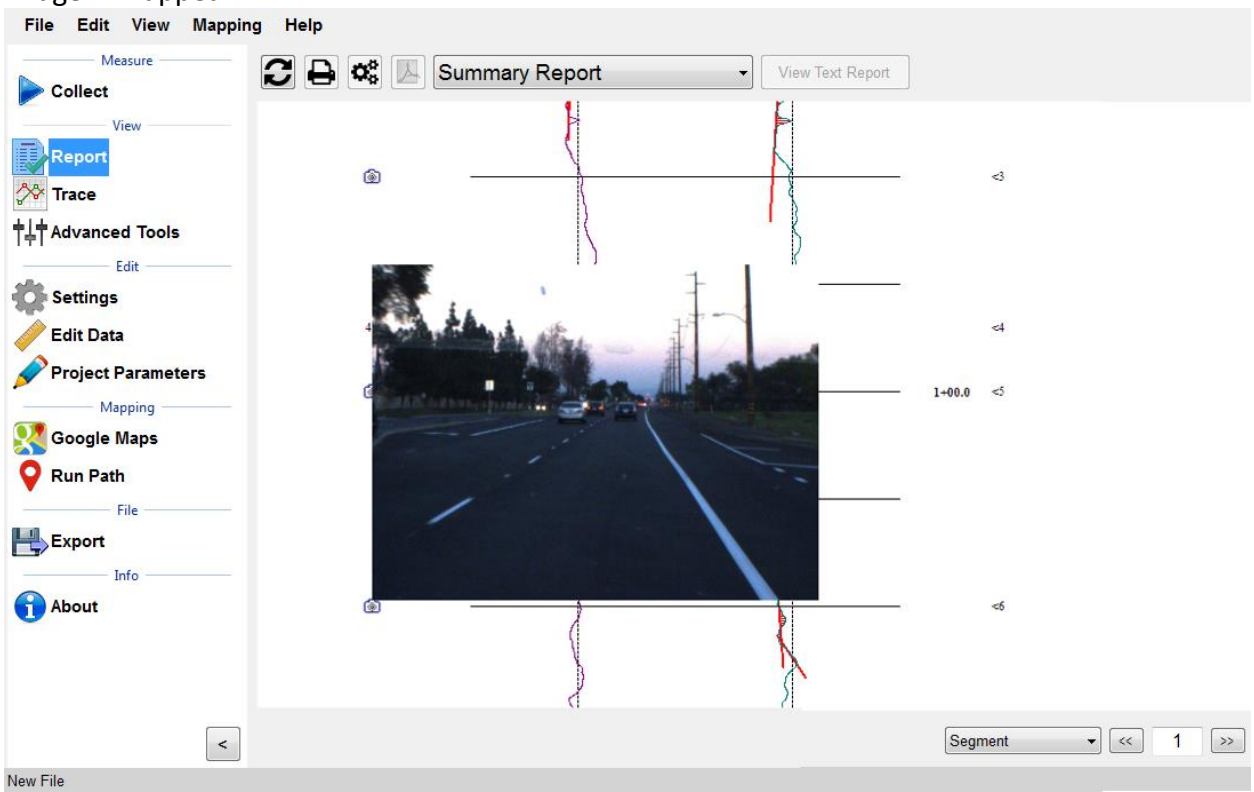


Figure 147: The Continuous Trace Report with Images.

The user can right click on the image in the image window or on the trace to save it to the computer or other external device. As long as the user left-clicks above the image, windows explorer will open to choose where to save the image file. The following formats are available: BMP, JPEG, GIF, PNG, TIF. Right click to save image.

4.2 – Grind Sections

Corrective grinding locations can be imported from a grinding plan into SSI Profiler through a text or CSV file through the grind sections tab of the Advanced Tools under “Manage Grind Info….” Grinds should be imported using wheel path (track 1 and track 2) or full lane width grind plans. After the grinds have been imported, the user can merge grinds within a certain length or combine all grinds transversely across the lane (merge tracks 1 and 2). The grind locations can be edited or deleted within the manage grind info icon.

5.0. – Navigation (Map Views)

The Profiler V3 program two methods of location navigation: Google Earth and Trace View. They can be used to travel to the point of localized roughness, Segments, Events, or a GPS coordinate. For this reason, *all three navigation options require a GPS device to function*.

5.1 – Google Maps

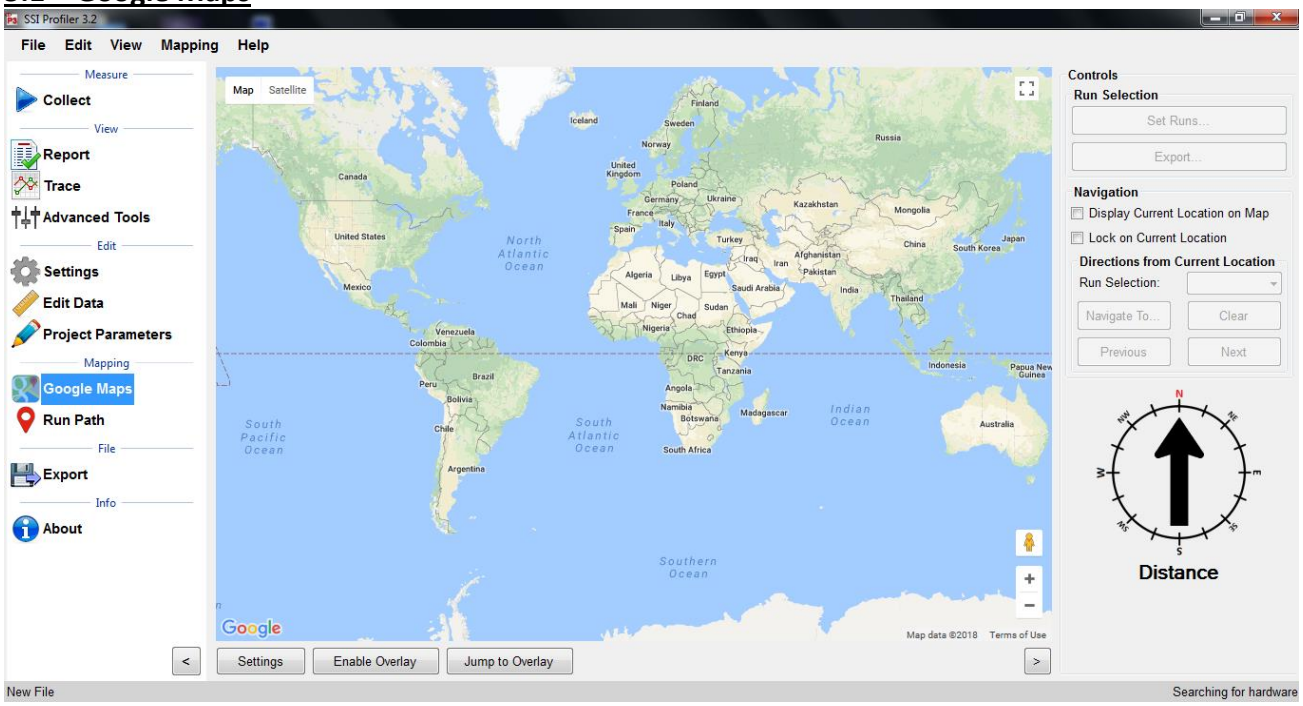


Figure 148: The Google Maps start window.

An internet connection is required for use of Google Maps

Google Maps can be used to show the location of the run path, segments, and localized roughness. Google Maps can also be used within Profiler V3 to navigate to defects, the start of the run or the end of the run.

To view the location of the collection without any collection information displayed:

1) To begin, select the Google Maps icon in the shortcut bar.
2) The world view will be the initial view in the window.
3) The right side of the window has the controls section. Choose the run number of the collection to be viewed in the map.
4) Select Jump to Overlay or "Navigate To…" and select an event.

To view the Run Path, Segments, and Localized Roughness:

1) Select their corresponding check boxes of the parameters. If one parameter is not desired, do not select its check box
2) Select the "Enable Overlay" icon.
3) Select Jump to Run
4) If the push-pin is selected, the statistics and information for that location will be displayed.

For Localized Roughness: Red Pin is Track 1, Blue Pin is Track 2, and the Green Pin is Track 3. To deselect a track to not show it on the map, select the "Set Runs" icon and uncheck the box next to the unwanted track.

Once the run is displayed in Google Maps, use the scrolling and cursor to navigate through the run. The run path, segments and localized roughness are shown if their respective box is selected. These features can be shown if the box is checked reading, "Disable Overlay."

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.

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.

Figure 149: Google Maps showing the localized roughness

Directions from Current Location

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

To navigate to an event, pause, segment, or defect, select the correct run number and hen 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 and Map Point features.

6.0 – About

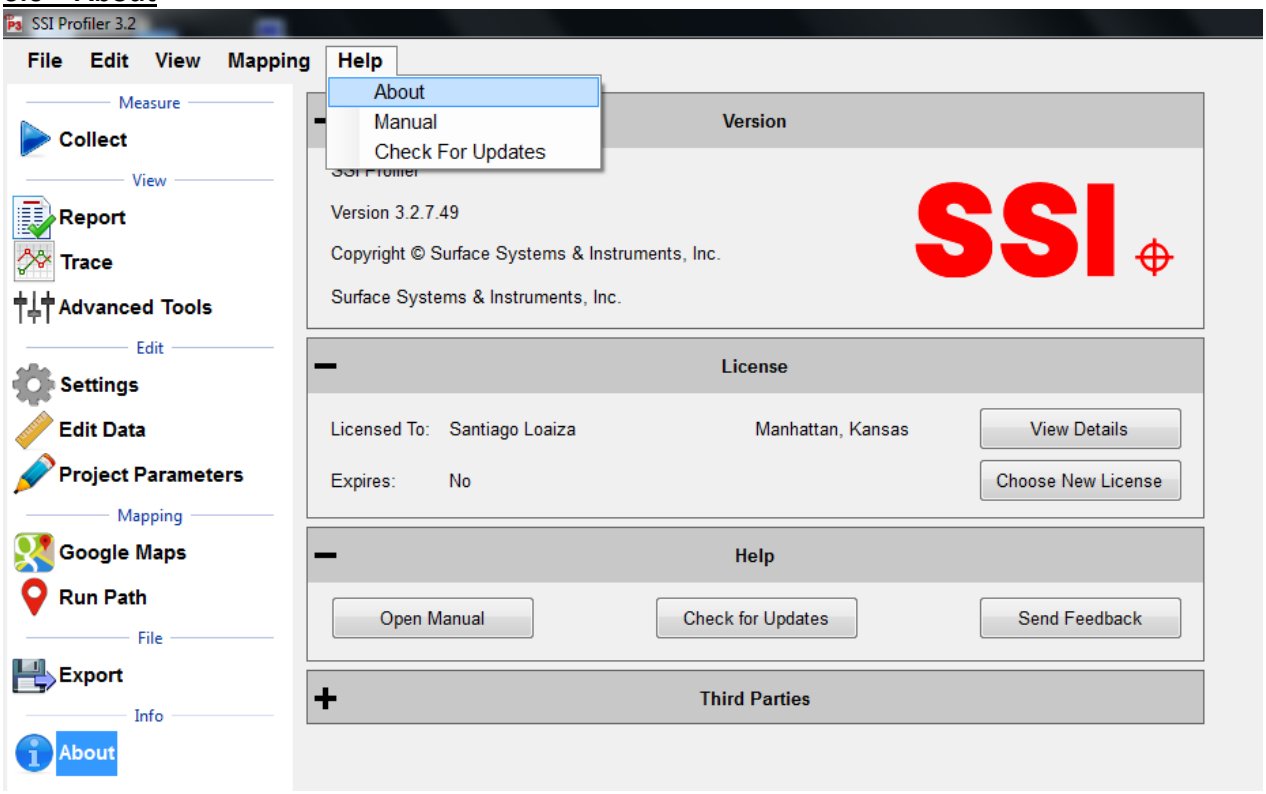


Figure 149: The About Window

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.

7.0 Recommended Tools

7.1 – Create a personal default file name convention for you project

Under General Settings the operator may select “Configure File Naming” to create a new file name convention for FHWA and State DOT submissions.

7.2 – 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.

7.3 – 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.

7.4 – Use the extended calibration report to print PDFs

The extended calibration report option is located under Settings>Report Options. The extended calibration report adds the bounce and laser height verifications to the calibration report.

7.5 – Use dual plotter in trace view

Under trace view the plotters can be viewed to see the elevation and the IRI roughness. This is useful when determining if an area of roughness is caused by a bump or a dip in the profile trace. It is highly recommended to use this feature for correction operations. The trace view can be chosen under Trace>Plot Options and Enable Secondary Plotter. It is also recommended to link the secondary plotter X-axis.

7.6 – Use GPS navigation within trace view

During correction operations it is important to be accurate. The SSI Profiler system allows for the user to navigate along the collection path using GPS. Depending on your GPS system you may have to connect to hardware and have your antenna attached. The GPS accuracy can be found listed on your profiling documents or by calling your SSI representative. The GPS navigation can be enabled under Trace>Plot Options>GPS Lock-On options. The check boxes should be enabled for Display Current Location and Enable Navigation.

7.7 – 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.

7.8 – Import grind locations into Profiler for use in trace view navigation

Once grind locations are created the grinding plan can be imported into Profiler through the Advanced Tools>Grind Sections tab. The locations can be added through the Manage Grind Info Icon. Once the locations are added, they will appear within the trace view to be used with the GPS navigation. Under Trace View>Navigation>Simple Grinds the window can display the distance to the grind locations per wheel path.

7.9 – Use Google Maps to crop and edit data based on stationing and pin information

Google Maps can be used to compare multiple runs to each other and determine the stations to crop an RSD file back. The operator may use landmarks, a collection event or a previous collection to adjust a starting location.

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 High Speed Profiler (HSP) software contact SSI to obtain a User ID and Password to download the most recent updates from the www.smoothroad.com website. 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

Topcon V2.1: Q0G0r1r0d0P0P0x0

'0' means that device is connected

G is Topcon GPS

'r1r0' means that the electric eye is disconnected.

d is the symbol for a dot laser

P0P0 is the symbol for connected inclinometer (only for 3 laser survey systems).

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 Roline 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?

Failing Accelerometer Calibration

Main Cause: Not rotating both accelerometers at the same time or a connection issue.

Are you:

Rotating both accelerometers during calibration?

Matching the white lines on the accelerometer and cable disconnects?
Check the condition of the small pins within the disconnect cable and the secureness of the serial connections to the grey box.

Lasers Not Firing

Main Cause: None/ not sufficient power reaching the lasers

- Is the blue light flashing on the Roline 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?

Failed Bounce Test

When were the accelerometers calibrated?
Are the front wheels straight?
Is the vehicle moving forward and backward while bouncing?

This causes the lasers to read additional height differences, adding to the ride value.

Is the bouncing only vertical? (No transverse rocking)
Is the laser type correct under System Settings?
What are the shift calibration values?
If none of these work, try the Simulated Travel option under the 'Advanced' tab of the Collection Parameters window. Follow AASHTO R57 to complete the bounce test.

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?

High IRI/Ride Value

Are the lasers firing and streaming?
What does the diagnostic string look like?
Are the lasers or accelerometers loose and/or vibrating?
When were the last accelerometer calibration and height verifications performed?
Is the laser type correct in the System Settings? (Check with a laser verification)

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