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Profiler V3 Operation Manual

CS-8800

Version 3.2.7.10.

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Table of Contents

Table of Figures

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

Figure 1: A WalkPro with the front arm configuration. Walking Profilers also come with a laser front arm as in the cover of the manual.

3rd Wheel

When assembling the WalkPro, the location of the lone wheel on the right side of the machine can be moved along the body of the WalkPro. Insert the wheel into the dovetail slider and place in a location where the WalkPro is stable. There is a piece of nylon inside the set screw hole. This creates a secure lock between the two dove tail pieces of the wheel assembly. When the stable location is found, tighten the set screw with a ¼" allen wrench.

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.

Vibration Damper of Wheel Front Arm

To lessen the effect of rough pavement that can negatively influence the profile data, the vibration damper may be used. When tightening the bolt of the damper, be sure to not inhibit the motion of the arm. If the bolt is too tight the arm may stay elevated for a distance that is longer than the minimum scallop width after rolling over an impediment. The result would be additional counts for roughness that would not have been a factor if the arm was able to rotate freely.

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 light of the charger should turn from green to red to signify charging. When the battery is fully charged, the LED on the charger will turn green.

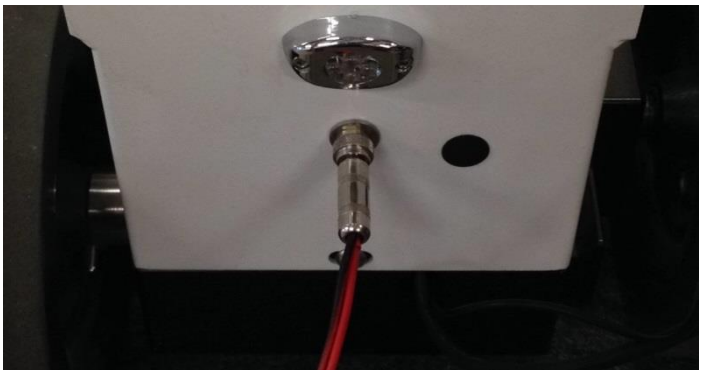


Figure 2: Configuration for charging the walking profiler.

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."

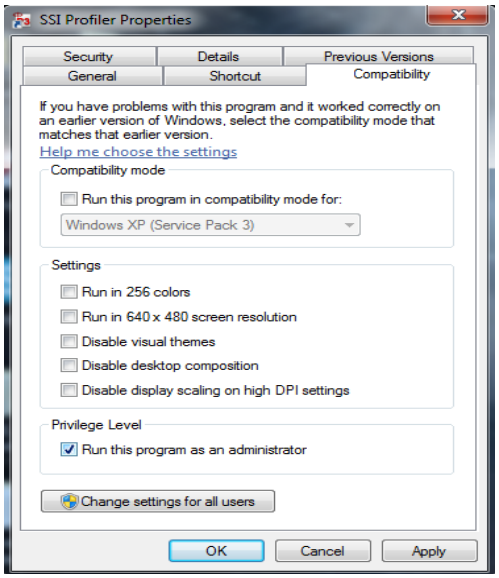


Figure 3: Compatibility window for running Profiler software as an administrator in Windows 7.

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.

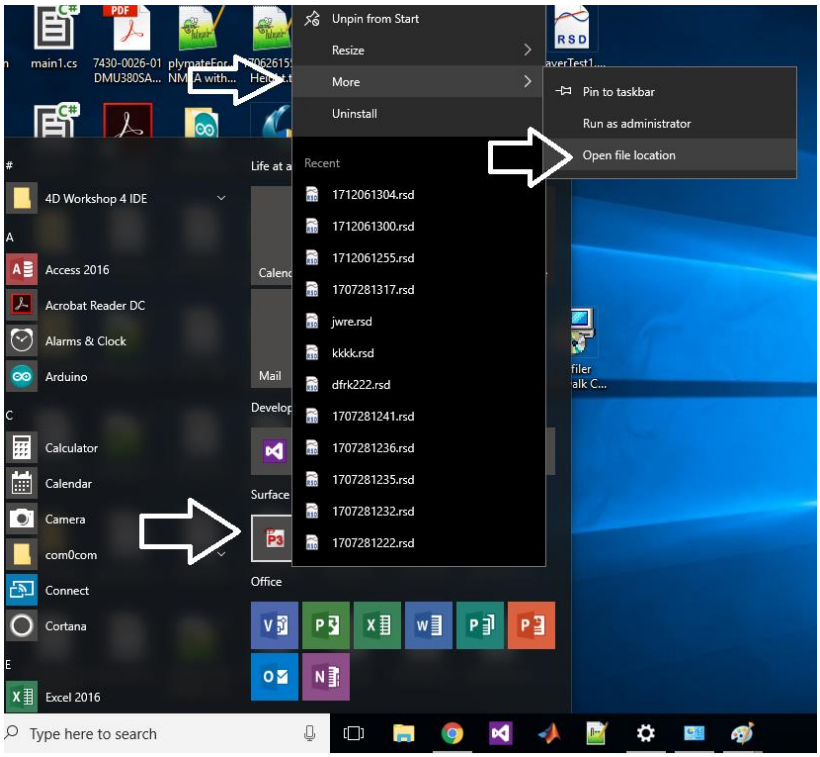


Figure 4: Searching for Profiler V3 program file.

Right click on SSI Profiler shortcut, go to properties

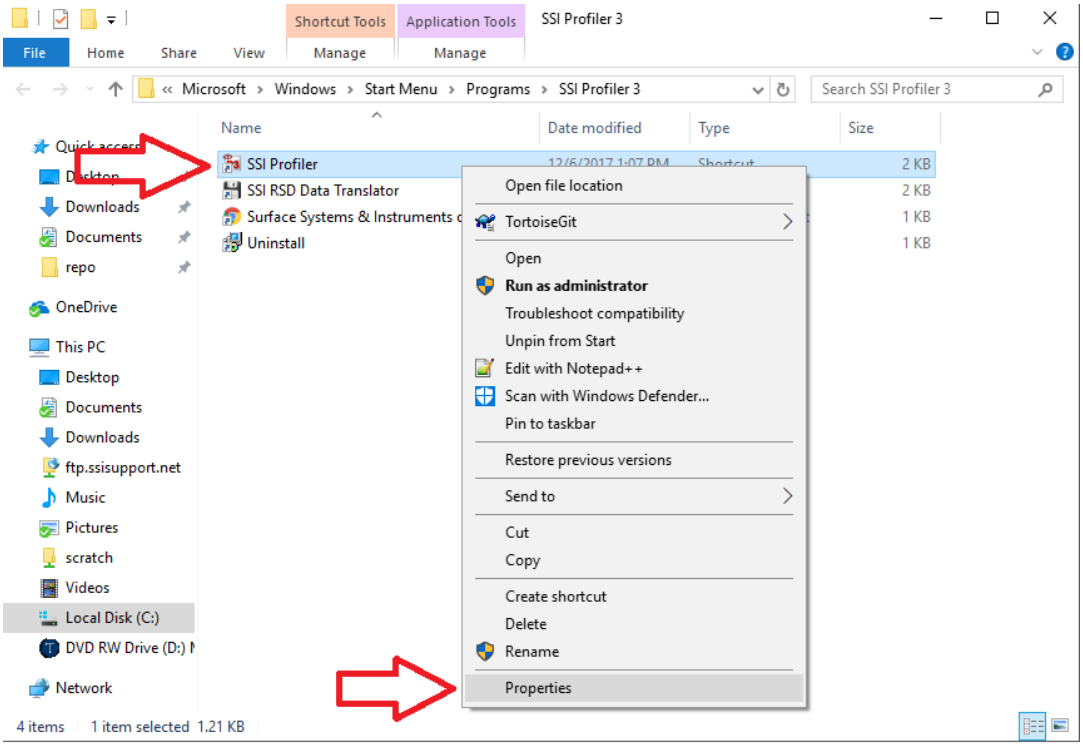


Figure 5: Selecting ‘Properties’ from drop down menu.

In Shortcut tab go to Advanced... Check ‘Run as Administrator’ and then ‘ok’.

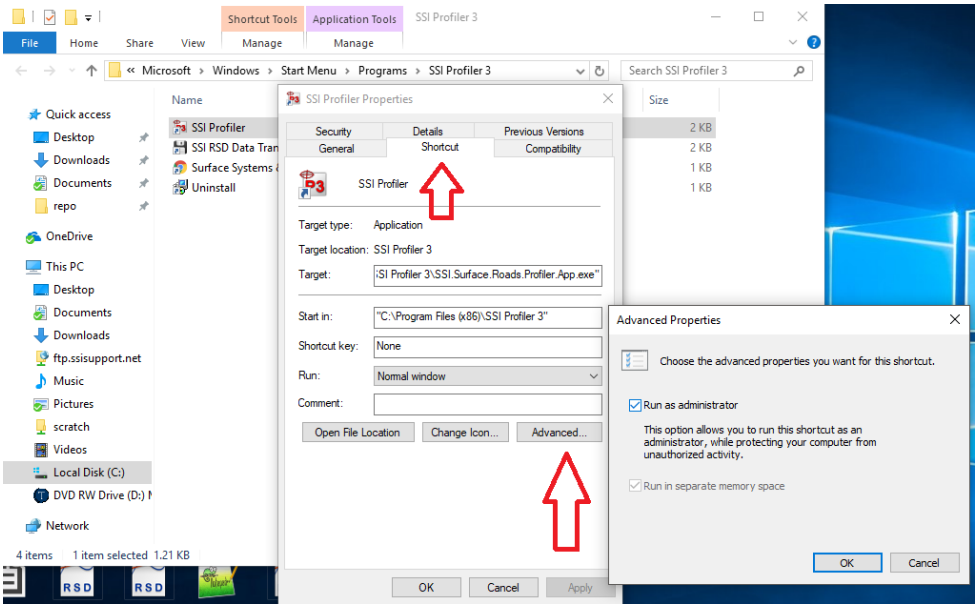


Figure 6: Check ‘Run as Administrator’ in the Short Cut tab.

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

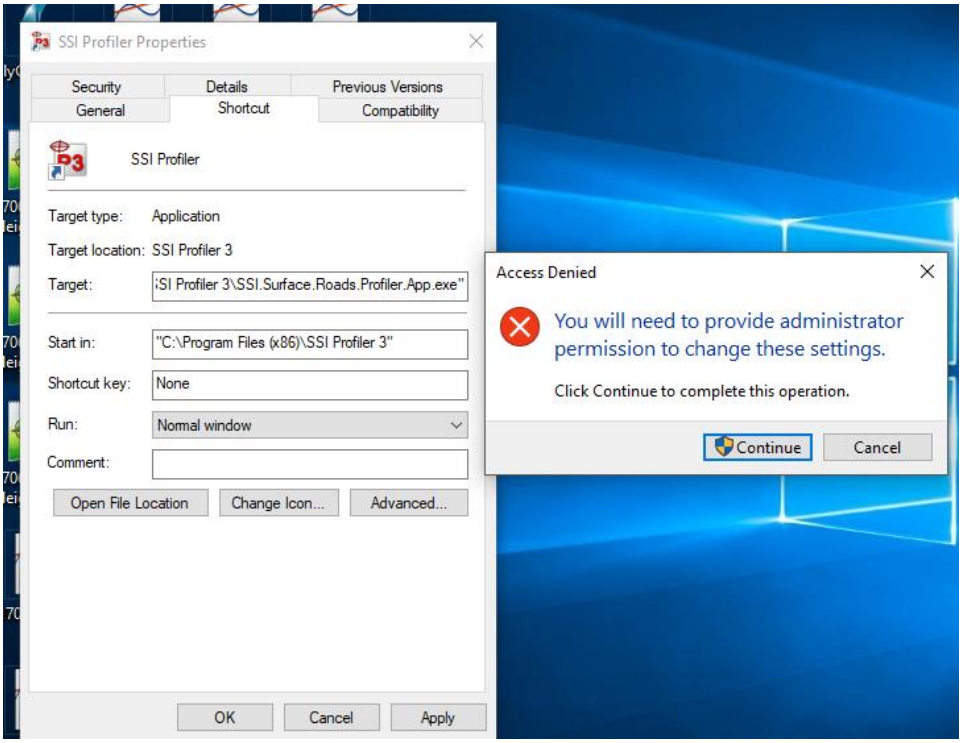


Figure 7: Click ‘OK’ and ‘Continue’ to confirm and run Profiler as Administrator.

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)

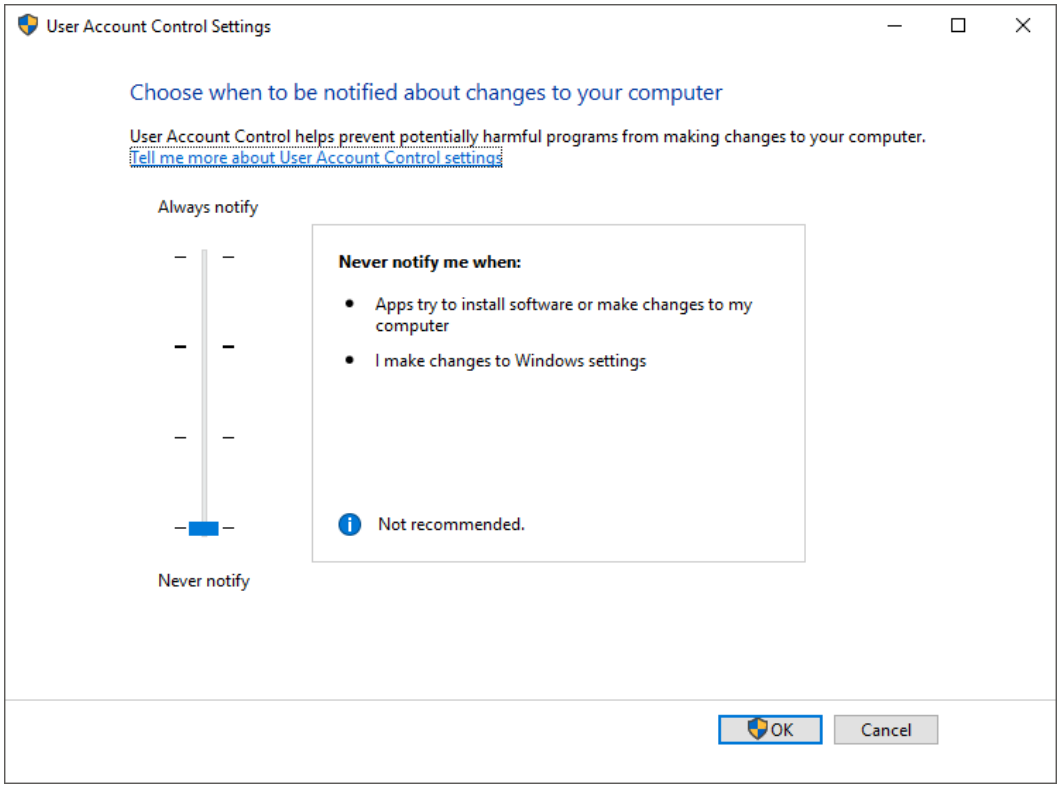


Figure 8: Window for disactivating notification of changes to computer.

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

<u>Texture Table Settings (Systems with a Laser)</u>

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.

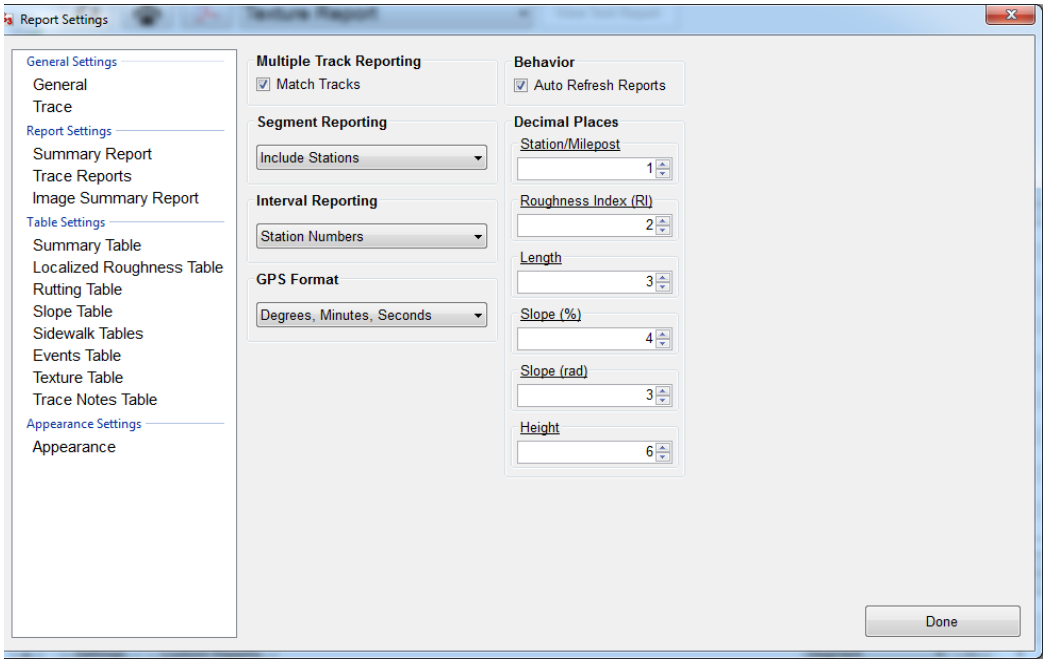


Figure 9: General Settings Window

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

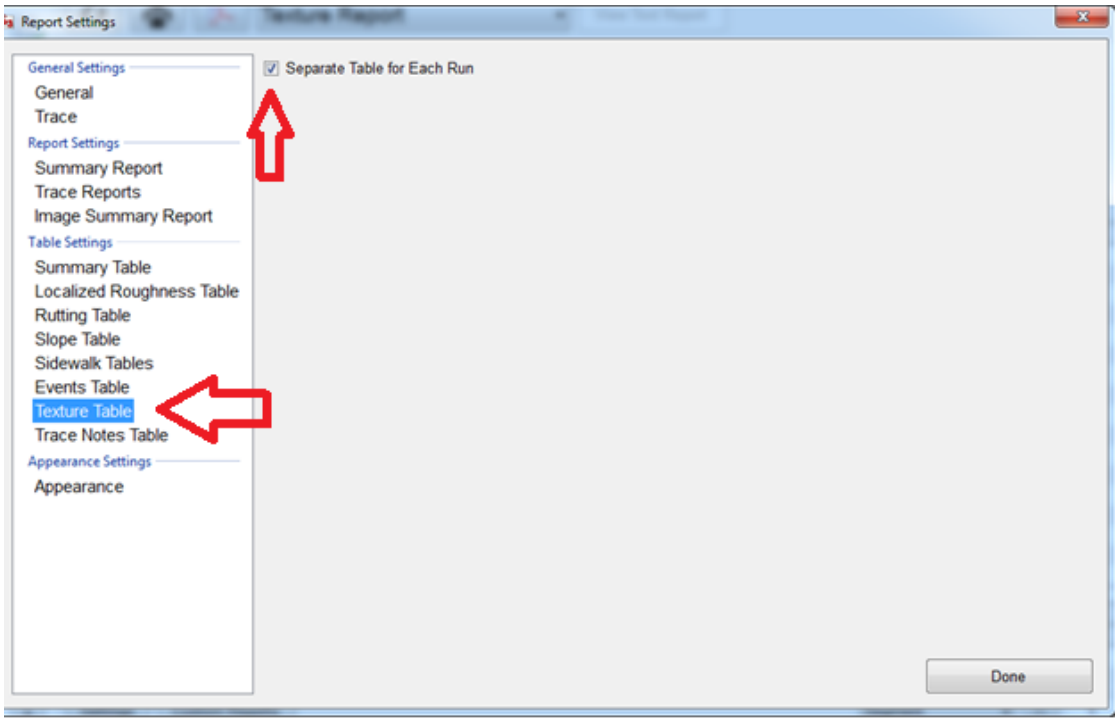


Figure 10: 'Texture Table' selected and 'Separate Table for Each Run' box checked.

<u>UDP Settings Systems with a Laser</u>

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.

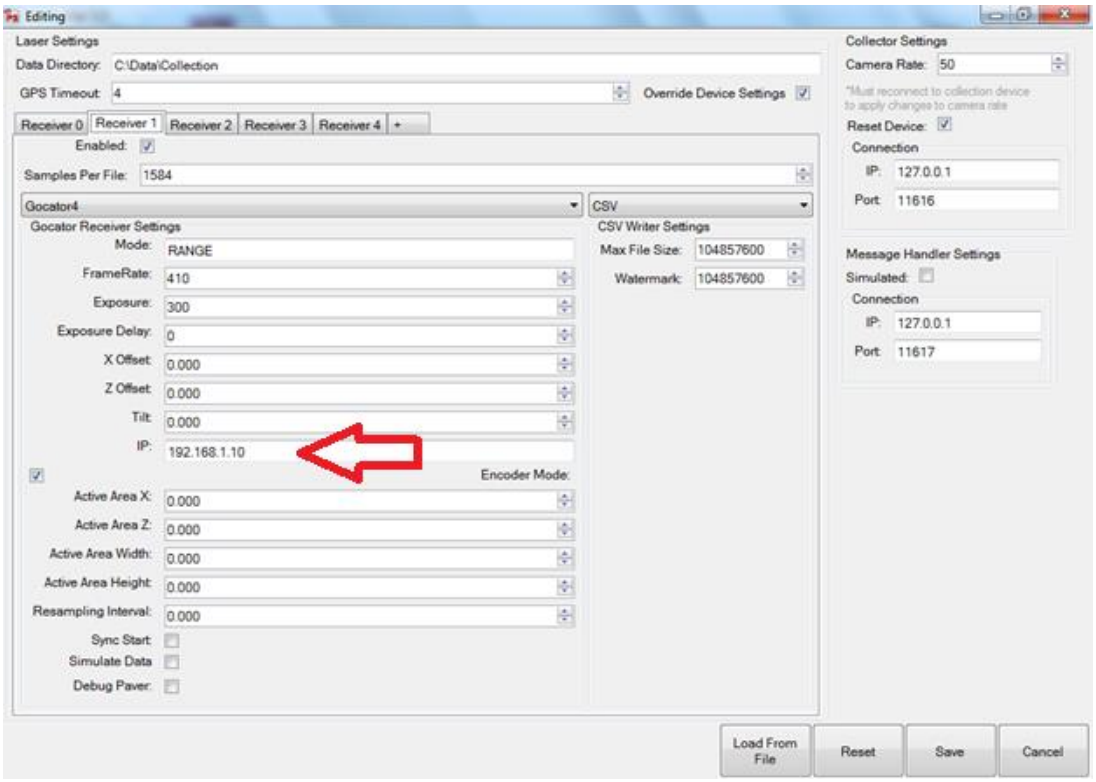


Figure 11: UDP settings

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

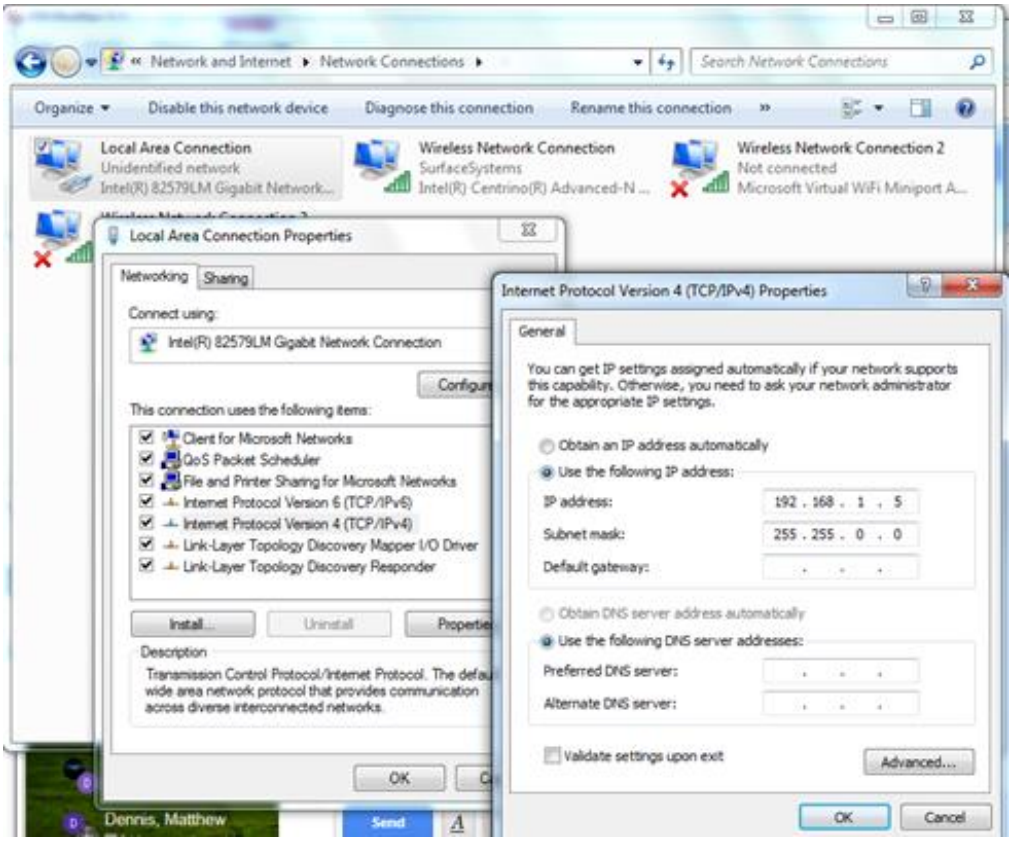


Figure 12: IP Settings for operator Toughbook Computer.

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.

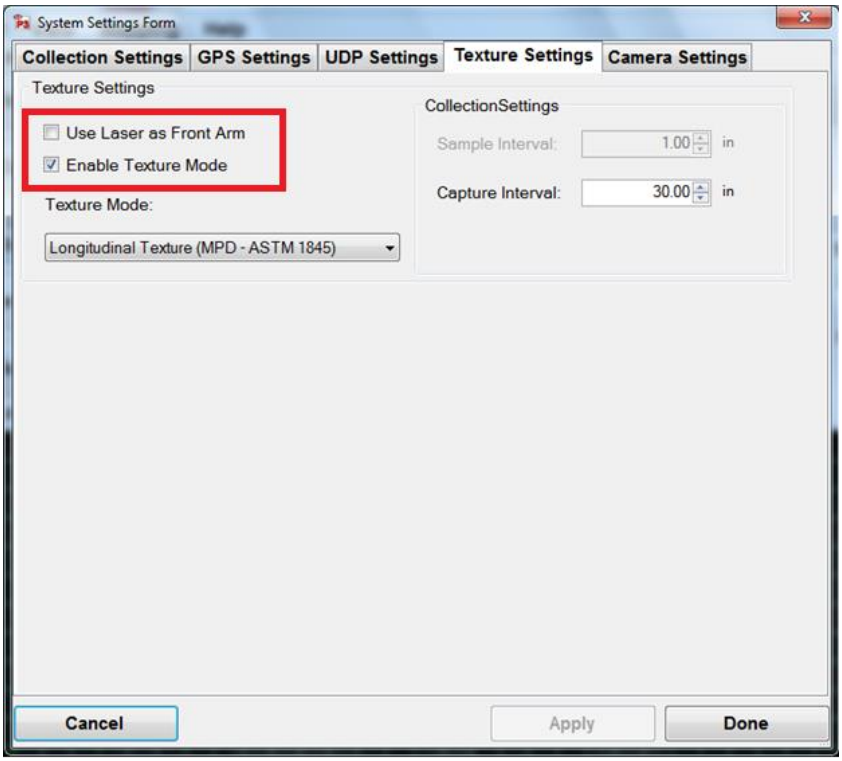


Figure 13: Texture Setting Window for systems with dot lasers.

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.

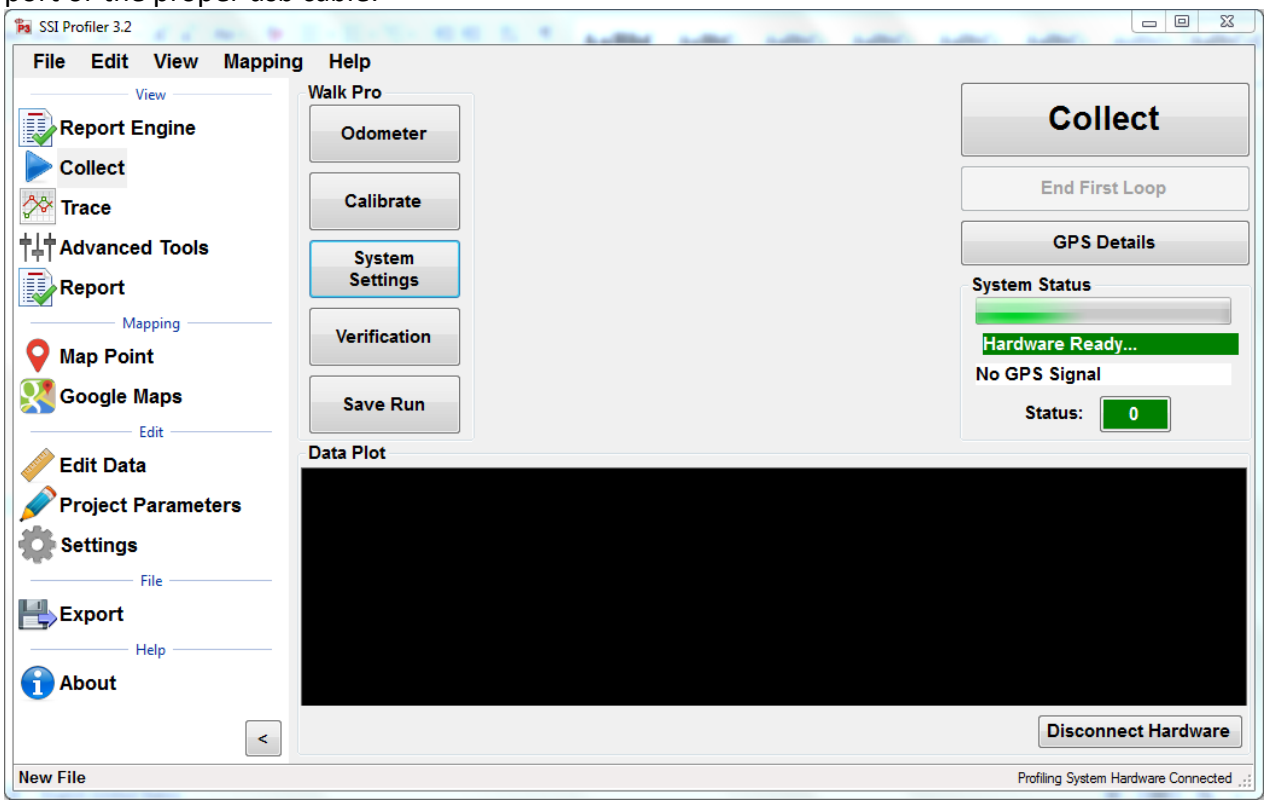


Figure 14: Main Profiler Software collection window for the WalkPro with Systems Setting button highlighted as next setup procedure.

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.

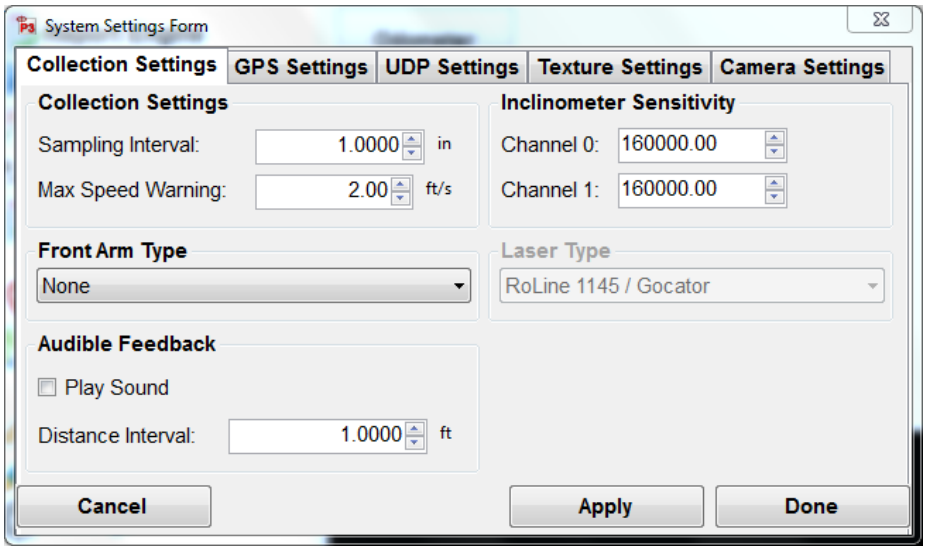


Figure 15: Collection Settings tab of a WalkPro system with same Inclinometer Sensitivity value in Channel 0 and Channel 1

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.

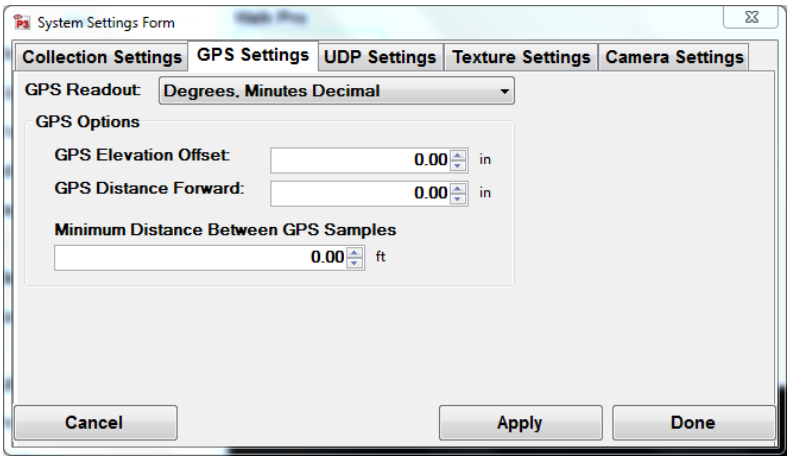


Figure 16: The GPS Settings

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.

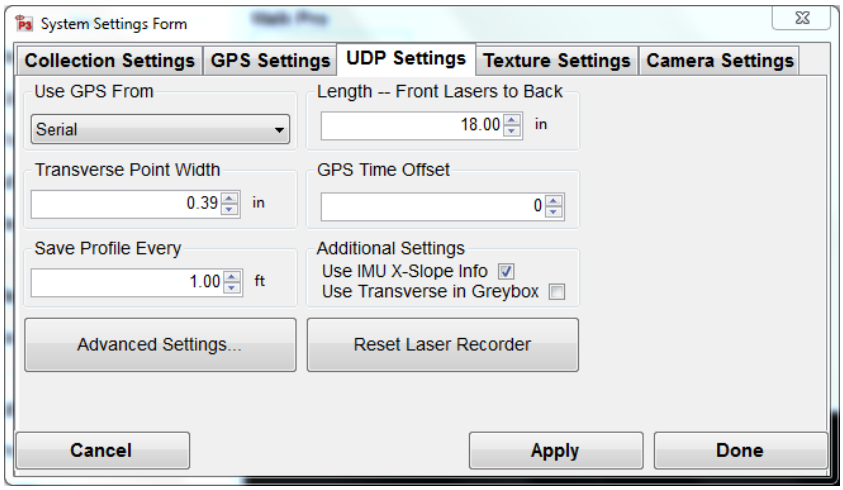


Figure 17: UDP Settings window.

UDP Advanced Settings

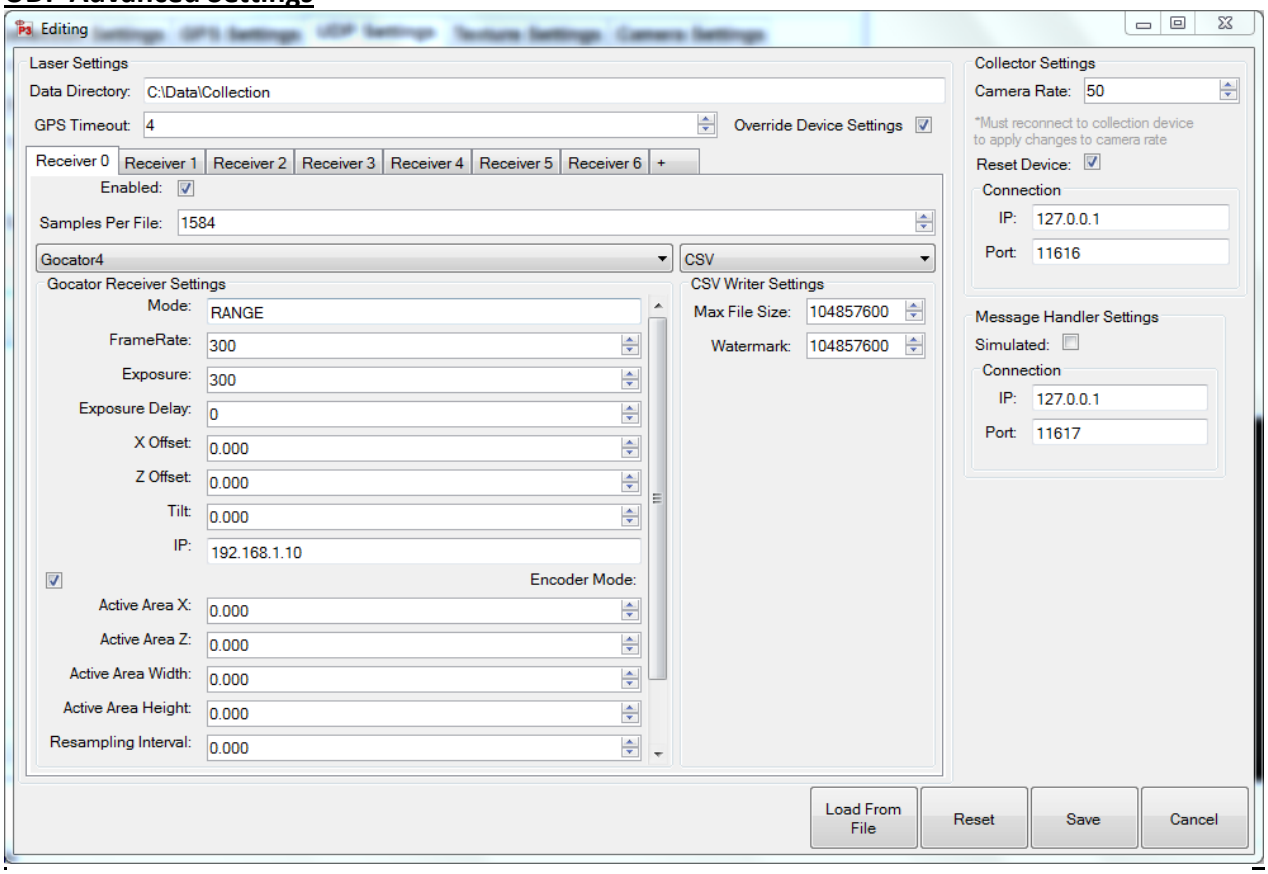


Figure 18: UDP Advanced Settings window.

Under Advanced Setting, make sure to follow the above 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.

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.

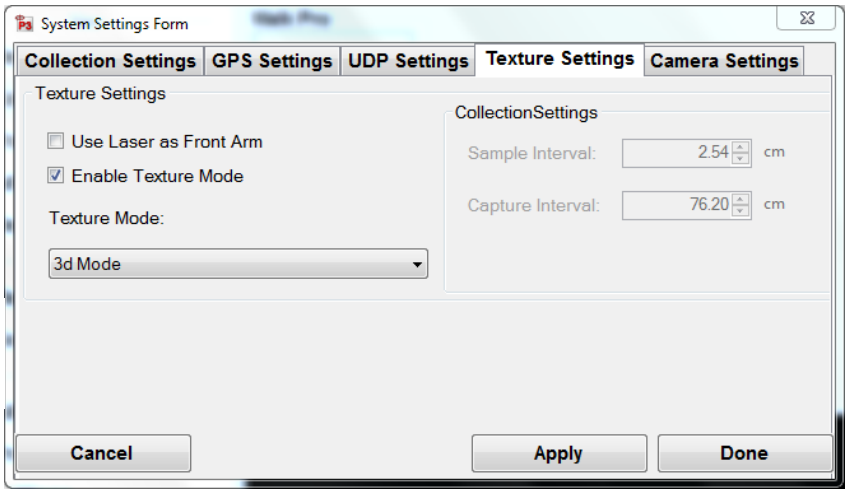


Figure 19: Texture Settings window.

Camera Settings

How to Begin Using the Camera

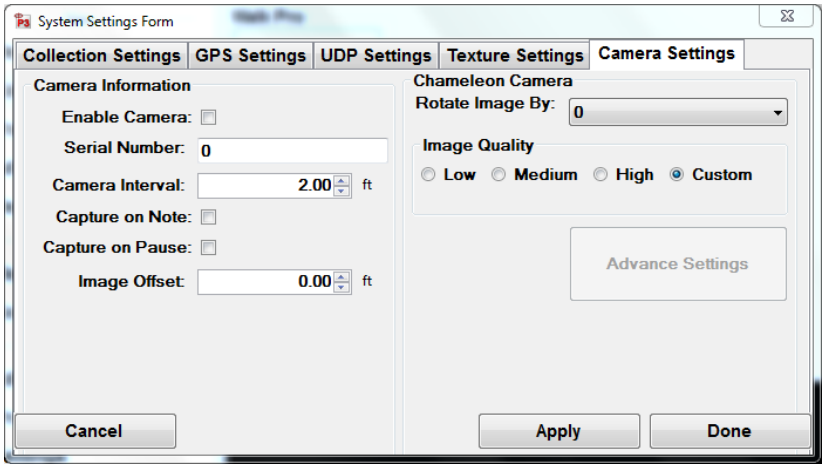


Figure 20: Camera Settings window

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.

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

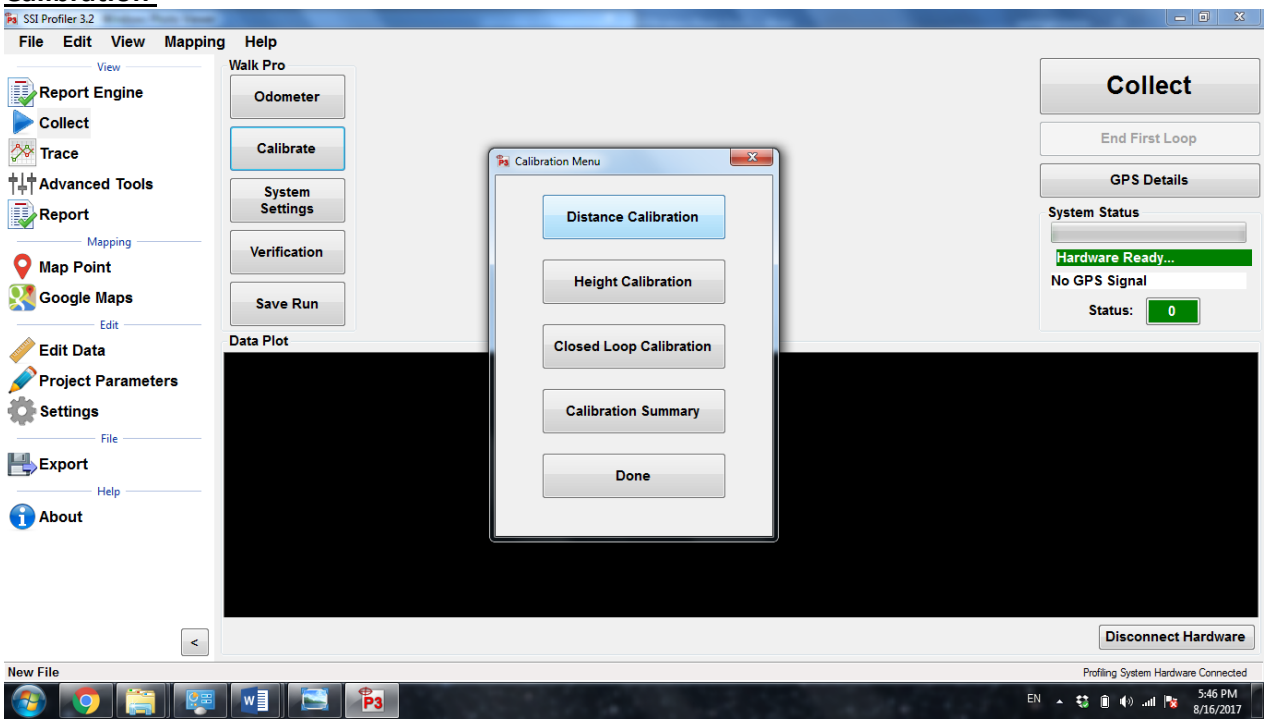


Figure 21: The Calibration menu appears after the "Calibrate" icon is selected.

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.

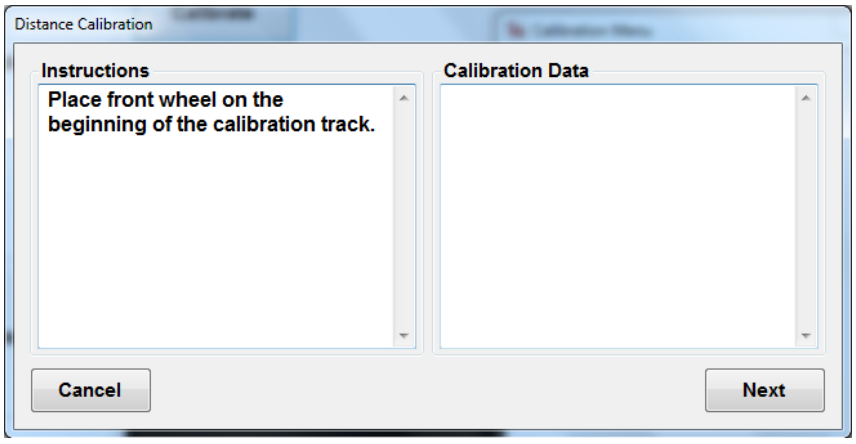


Figure 22: The initial window of the distance calibration. Once the walking profiler's front wheel is on the beginning of the track, select next.

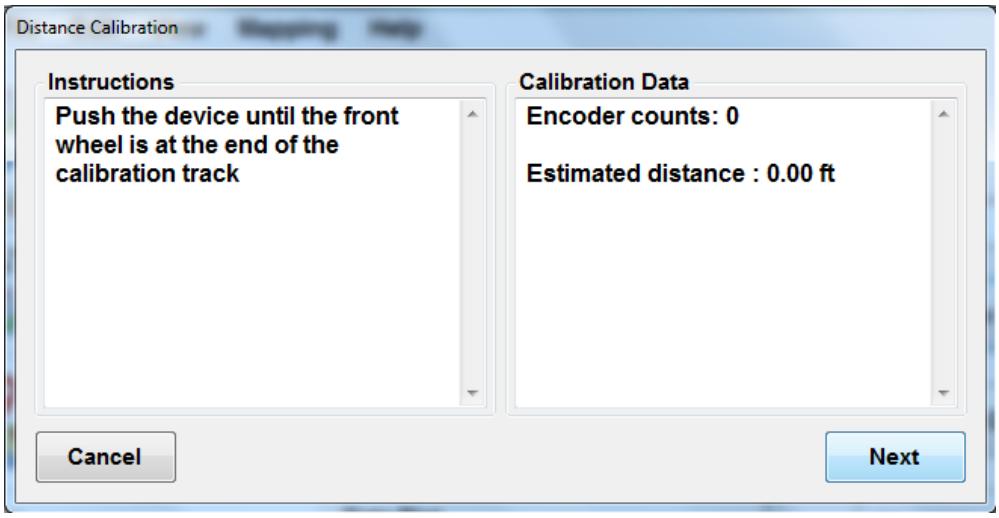


Figure 23: Follow the instructions and push the device until the front wheel is at the end of the calibration track.

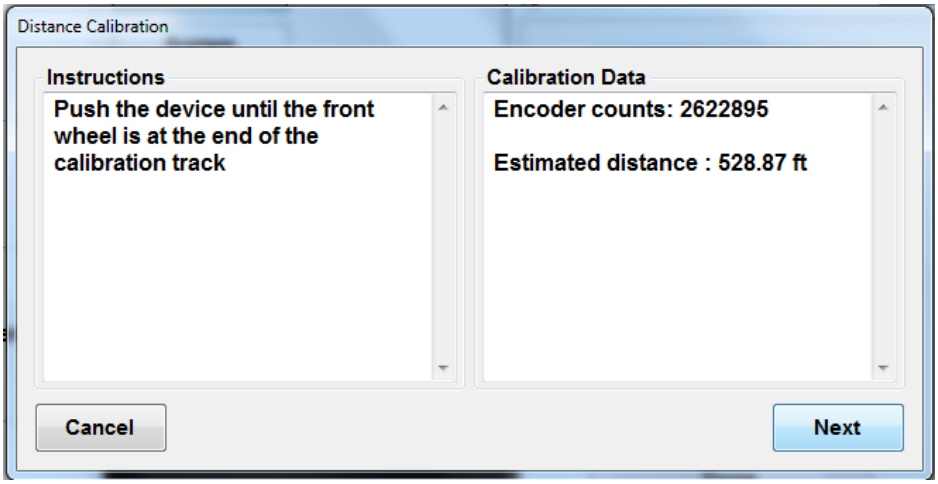


Figure 24: Calibration window with front arm at the end of the track. The estimated distance can be ignored as it will be overwritten at the end of the calibration procedure.

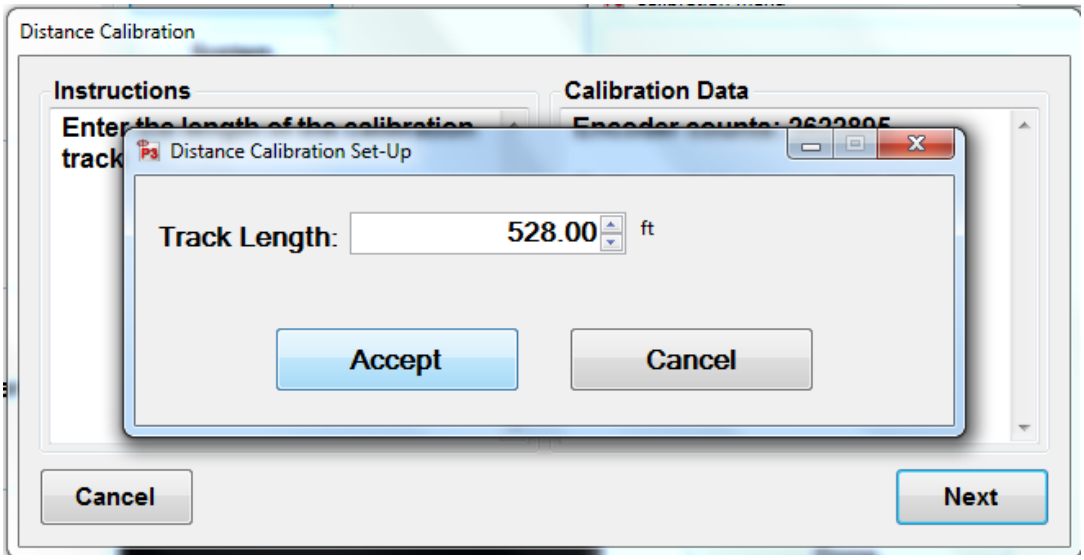


Figure 25: This is the window where the operator enters how long the calibration track is. The units can be changed by clicking on the feet (ft) and choosing the appropriate units. After the length of the track has been entered, select accept.

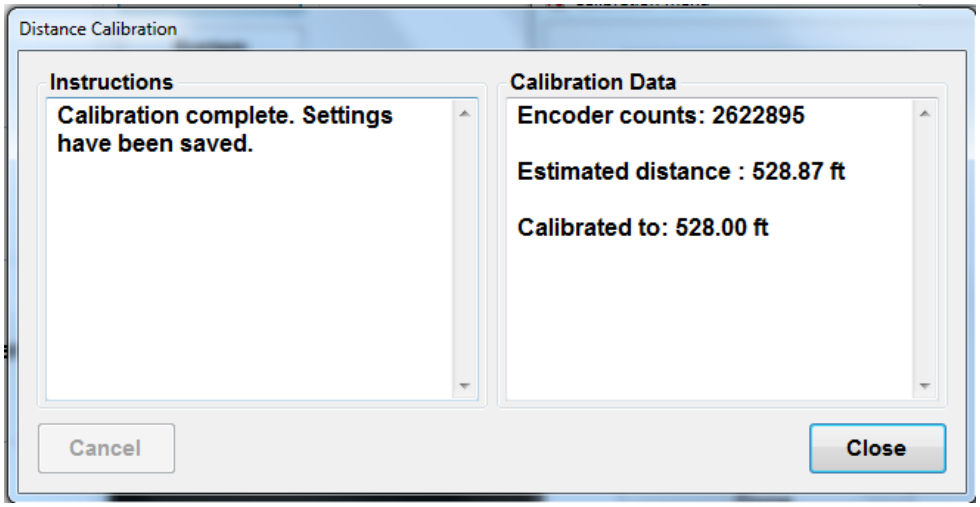


Figure 26: This window shows the number of encoder counts, the length of the track that was entered in the previous window and the estimated distance traveled based on the last calibration.

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.

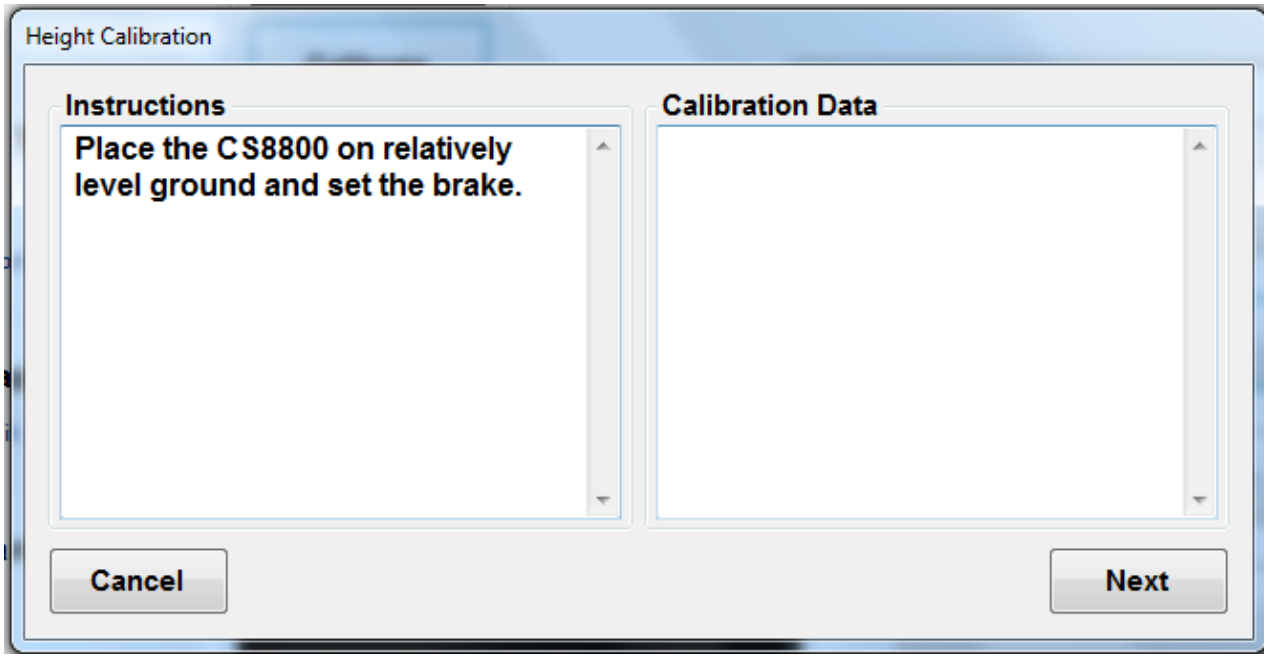


Figure 27: The first window of the height calibration. This window instructs the operator to place the walking profiler on level ground with the brake applied.

The position of the wheels must be marked in a manner similar to the image.

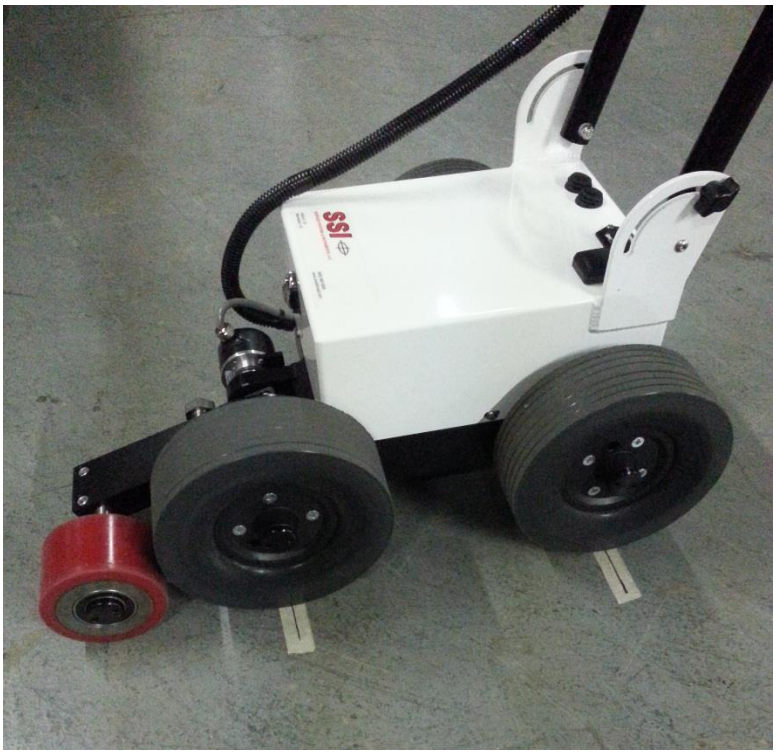


Figure 28: To begin the height calibration, the surface must be level.

Figure 29: Make sure the wheel's axels align with the markings on the floor by looking from above down at the axel.

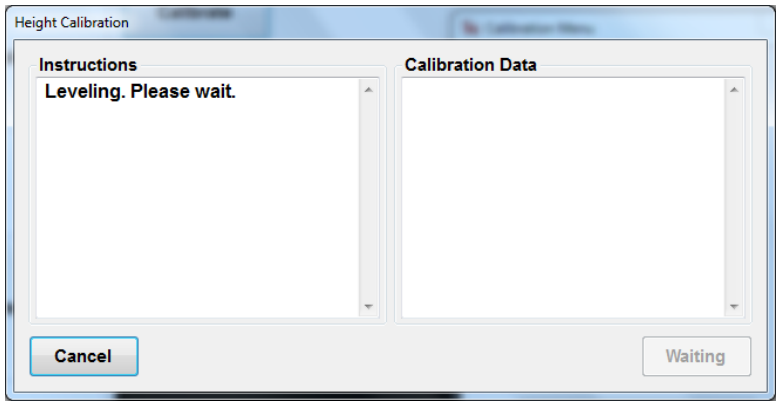


Figure 30: The software will briefly flash the “Leveling” window begore continuing the calibration.

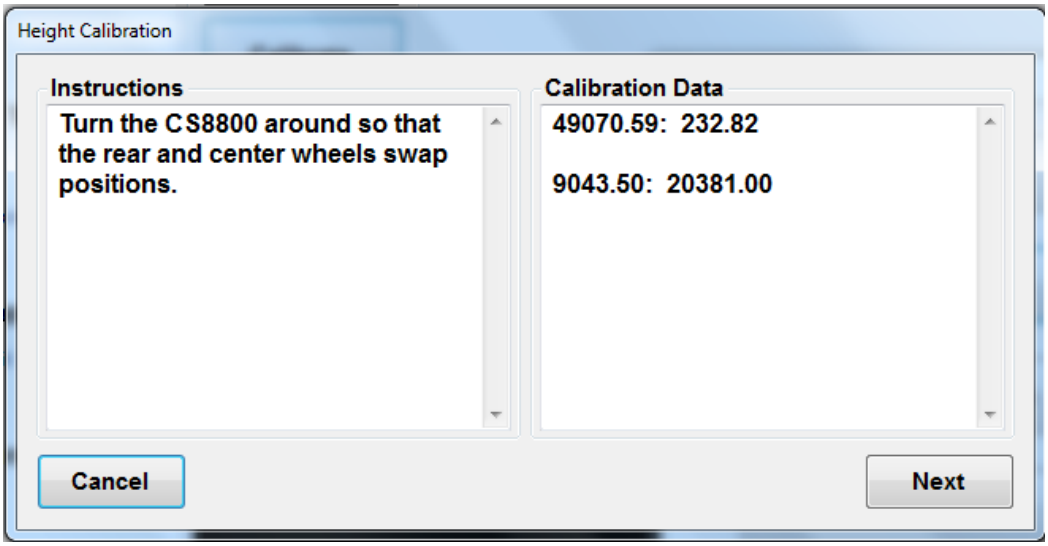


Figure 31: Height Calibration Steps. After the first phase of the height calibration, the walking profiler must be turned around 180 degrees and have its left rear wheel switch positions with the left front wheel. The wheels must interchange contact points.

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.

Figure 32: WalkPro device rotated 180 degrees. The points of contact of between wheels and floor should now be interchanged.

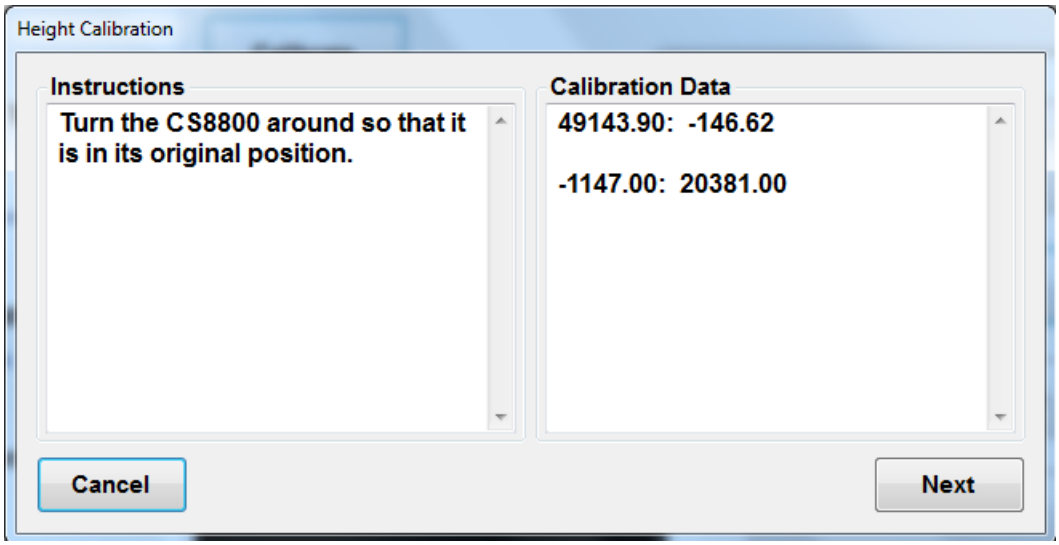


Figure 33: Follow the instructions and turn the devices around so that it's in the original position at the start of the calibration. And press next.

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.

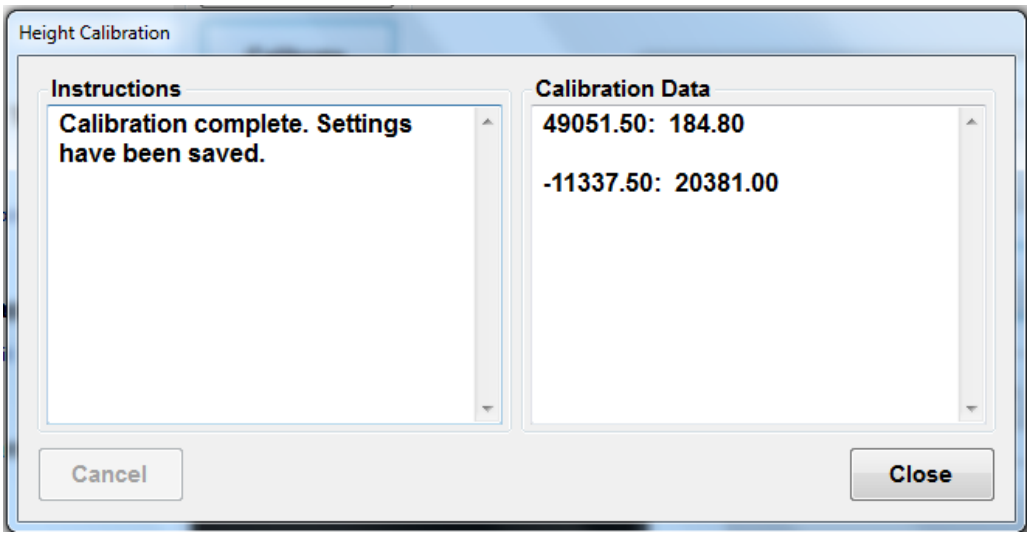


Figure 34: After a successful calibration, the settings will be saved. Select close to proceed to the next procedure.

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 is recommended for the closed loop calibration.

Calibration Instructions:

Place system laser at start of track.

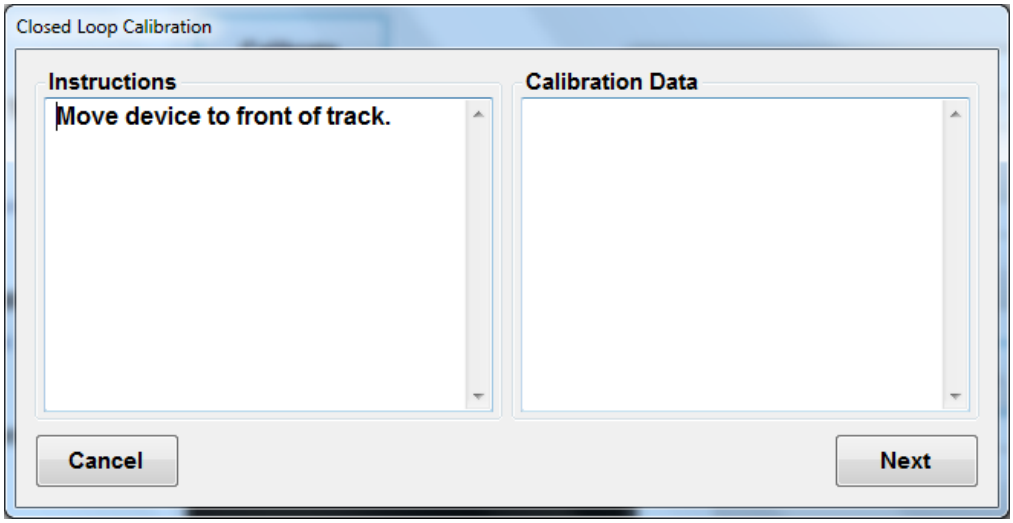


Figure 35: 1st window of the Profile Slope Calibration. The initial negative distance indicates the length between the laser and back wheel. Proceed to push system to end of track.

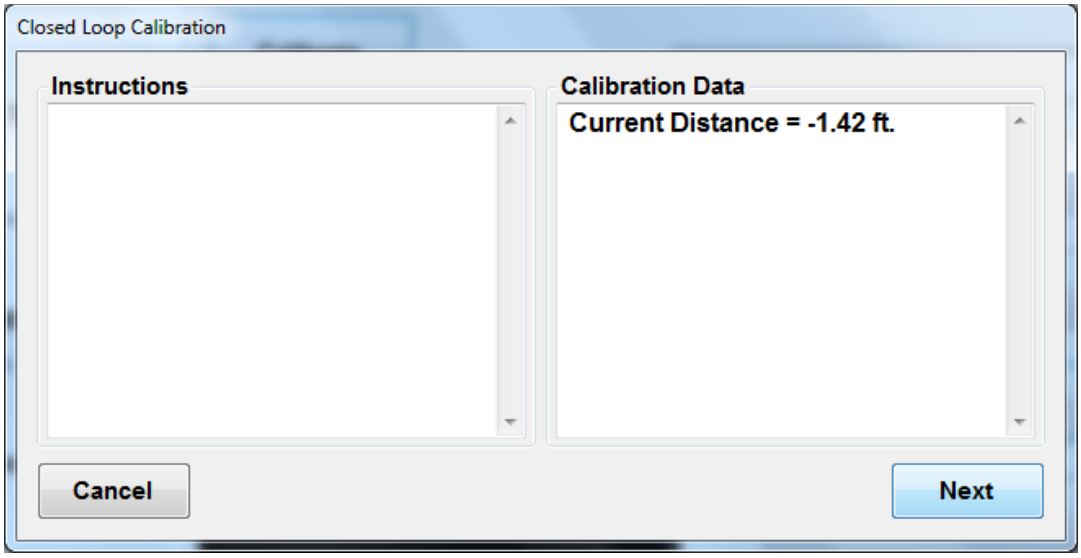


Figure 36: 2nd window of the Profile Slope Calibration. The initial negative distance indicates the length between the laser and back wheel. Proceed to push system to end of track.

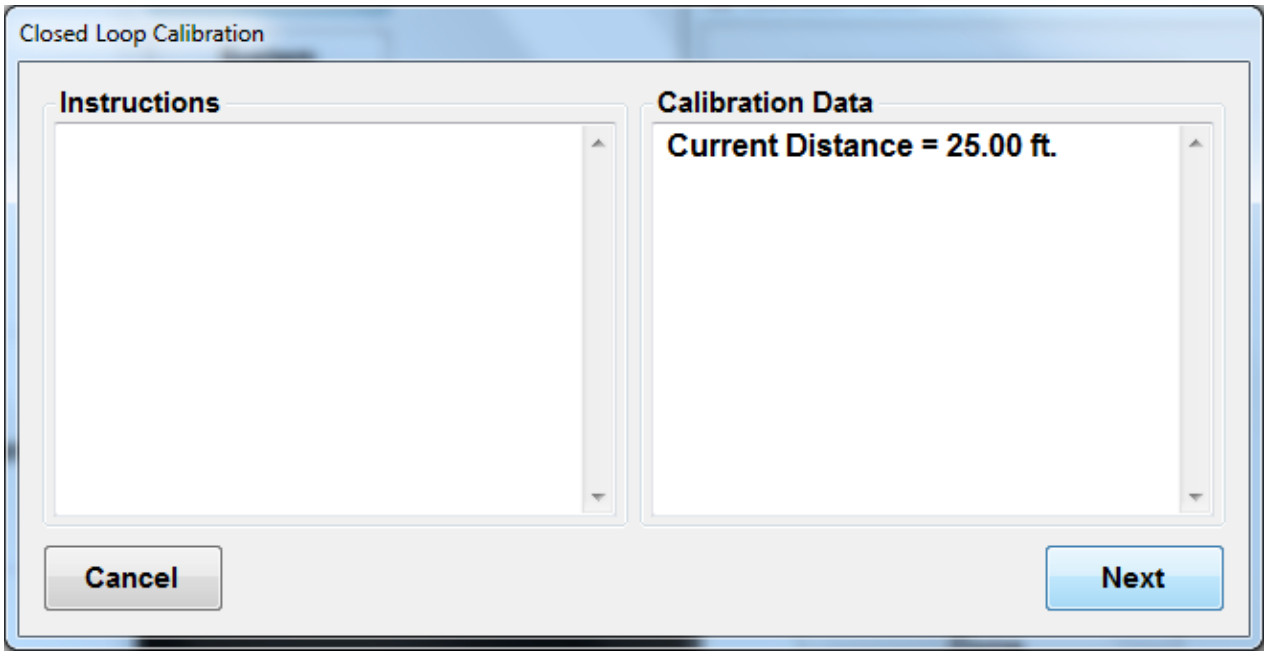


Figure 37: Profile Slope Calibration widow after device has been pushed for 25 ft along a straight calibration path. Closed loop calibrations can be no shorter than 20ft.

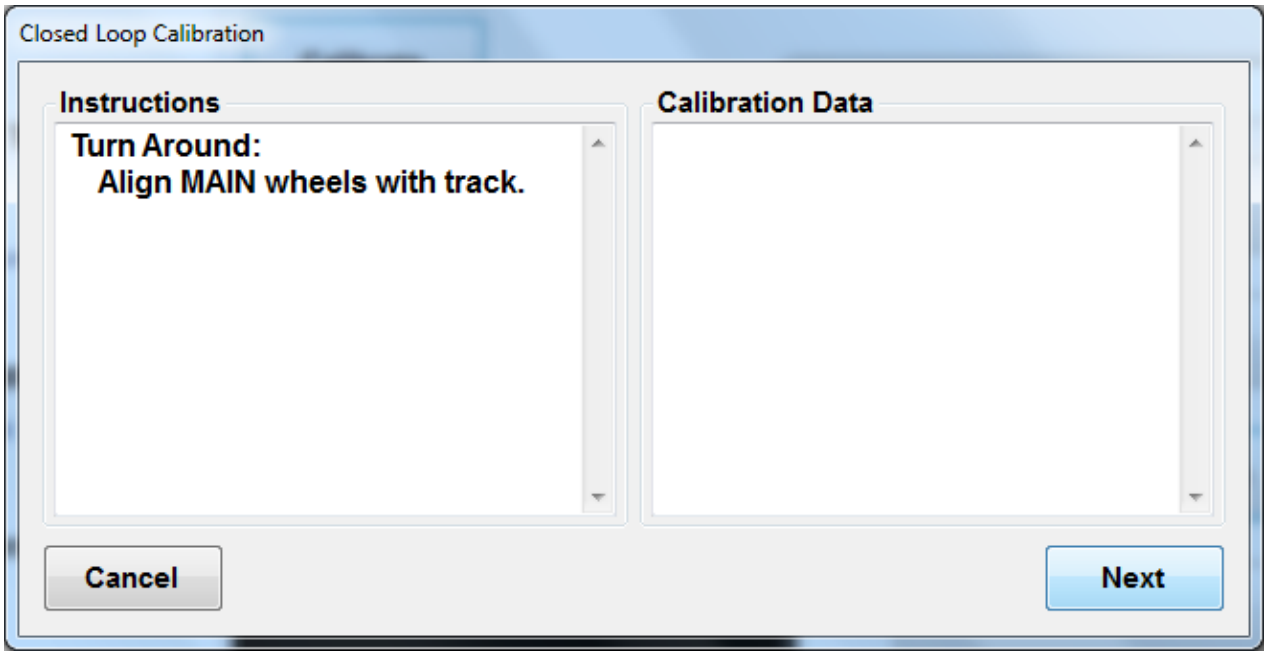


Figure 38: Window indicating operator to come back over the same calibration line starting with the laser.

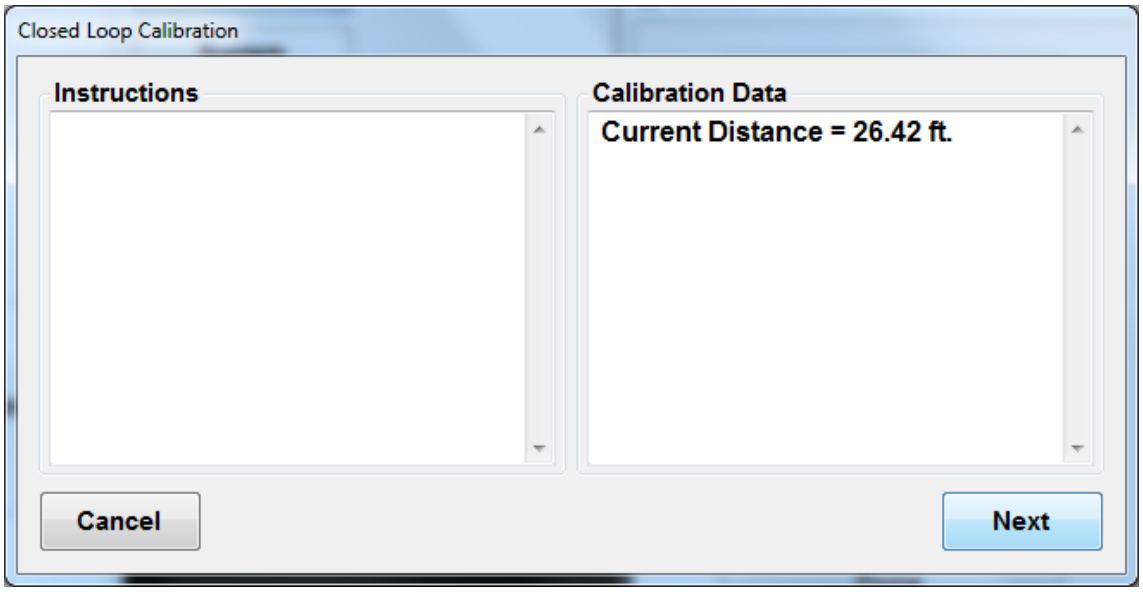


Figure 39: Window starting the second half of the closed loop calibration. Push device back to the start of the original track.

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.

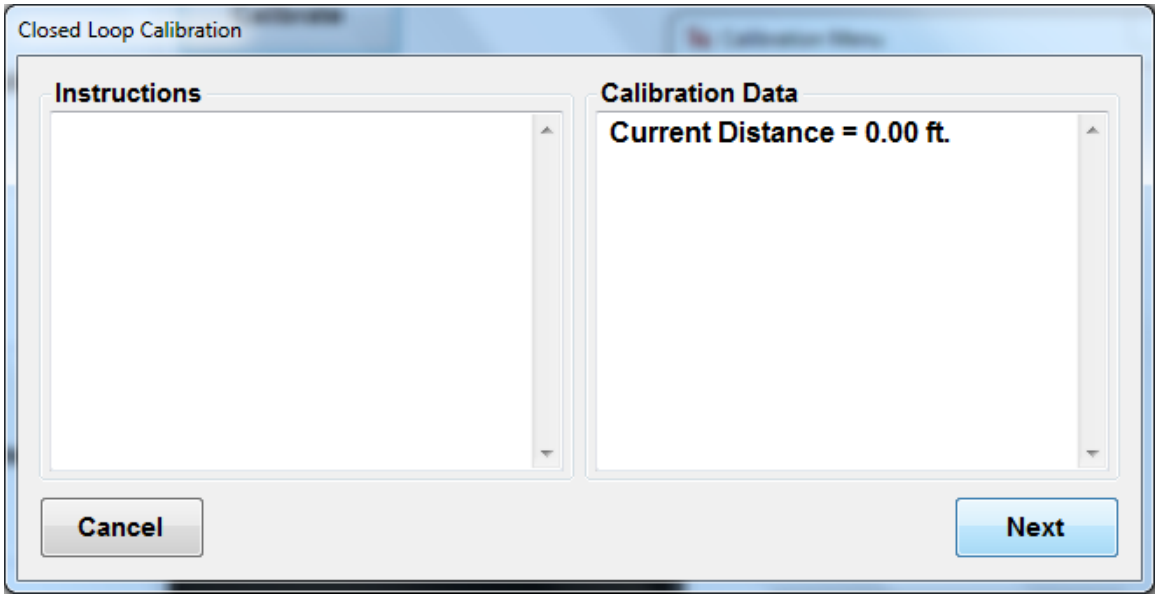


Figure 40: Window at the end of the second half of the calibration routine when the device has reached the starting point of the initial track.

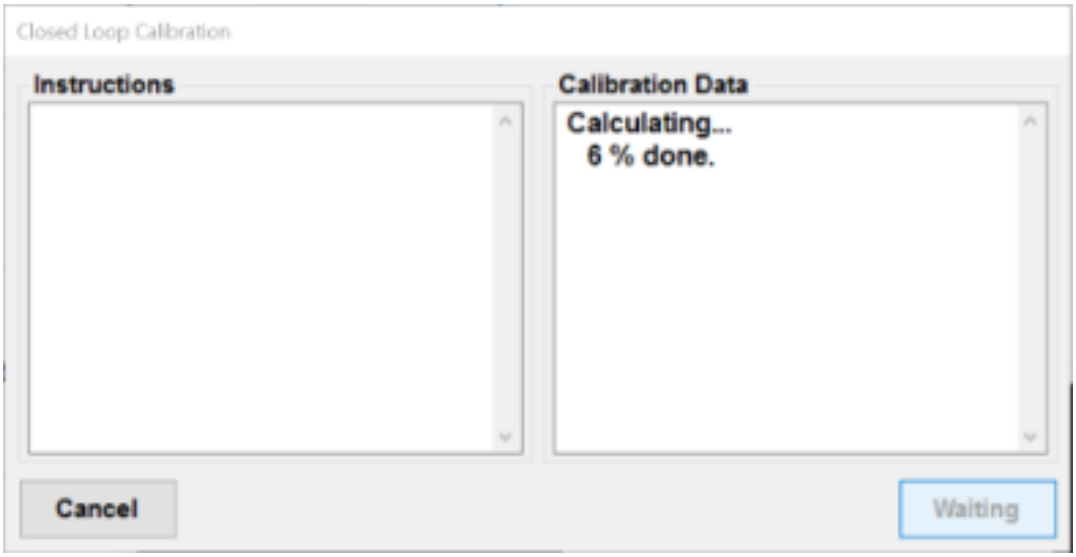


Figure 41:Calibration window calculating results

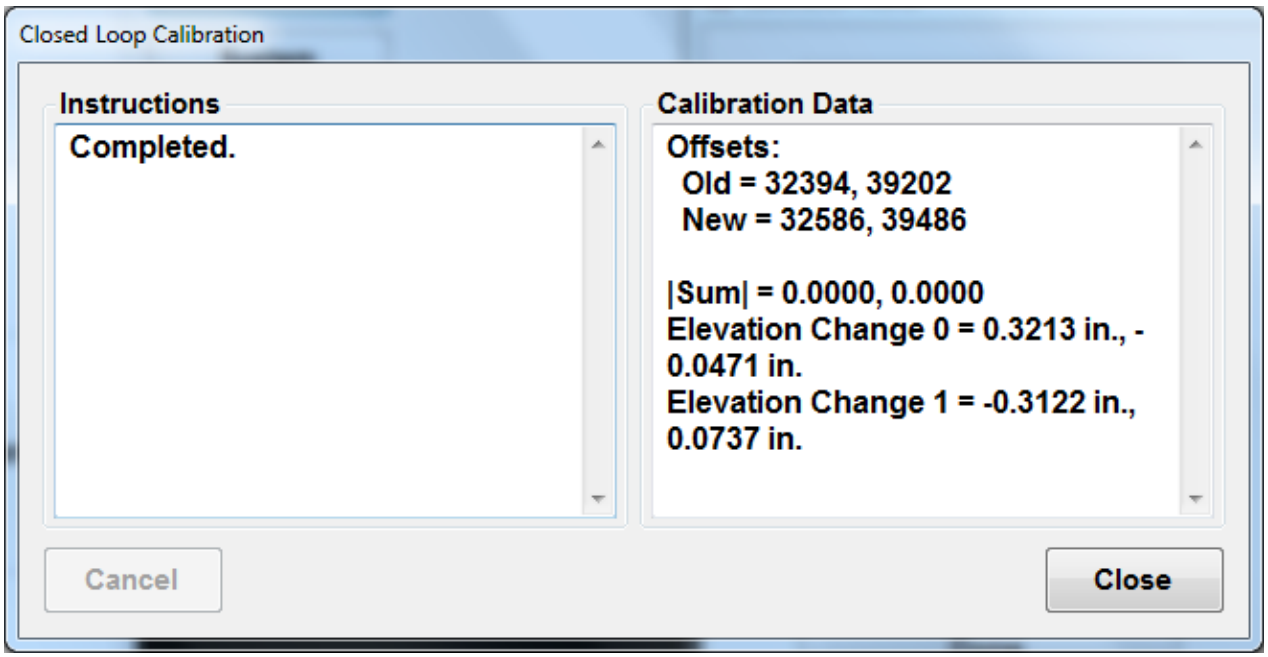


Figure 42: Last close loop calibration window indication a completed routine.

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

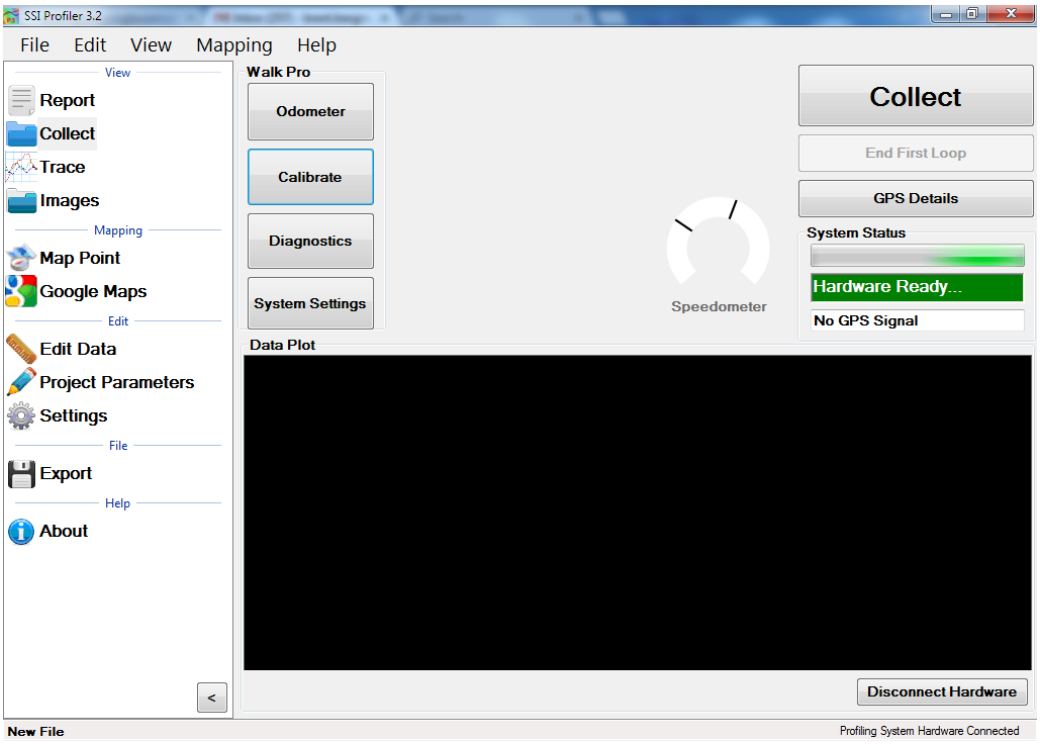


Figure 43: The main collection window for the walking profiler.

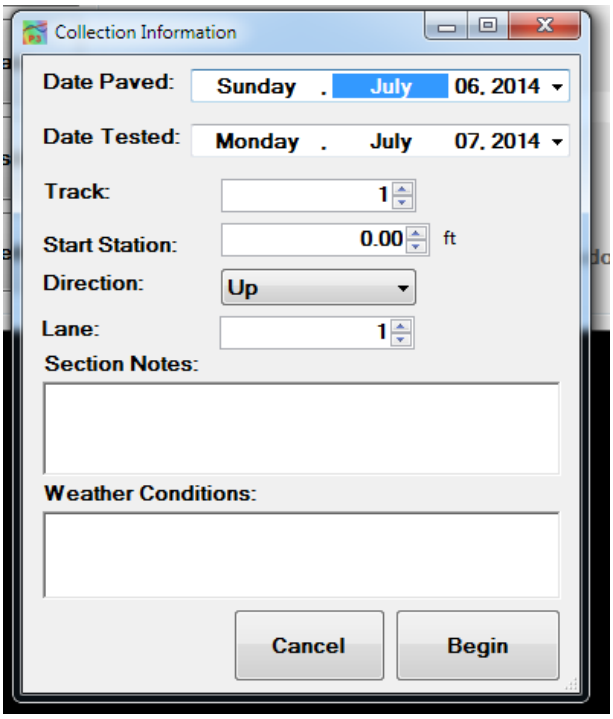


Figure 44: First window after pressing the "Collect" button.

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 red lever arm wheel 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" (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 lever wheel is on the same path as run one. The operator will select "Start Second Run" when in the start collection

position. Continue 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 (wheel on the lever arm) 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.

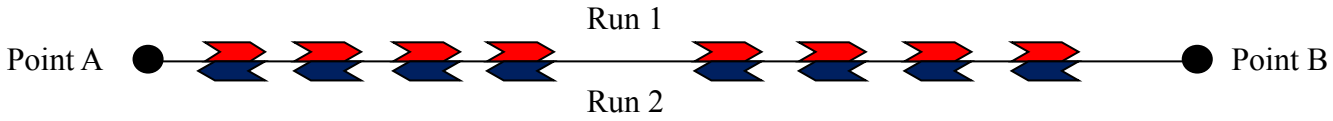


Figure 45: Collection procedure for a closed loop collection

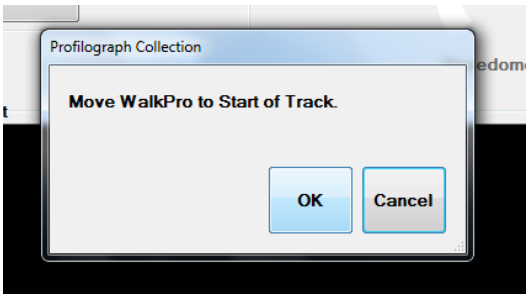


Figure 46: Start Collection.
To start the collection, move the walking profiler to the beginning of the track. Once OK is selected, data collection will begin.

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.

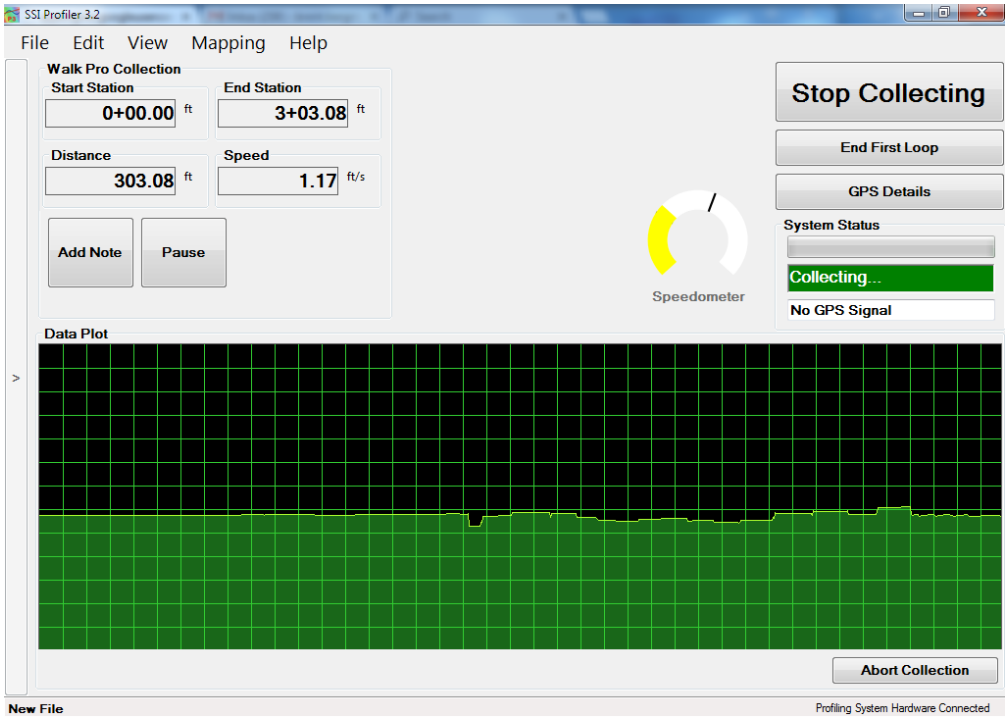


Figure 47: The collection window. It shows the initial options to stop the open loop collection or end the first loop of a closed loop collection.

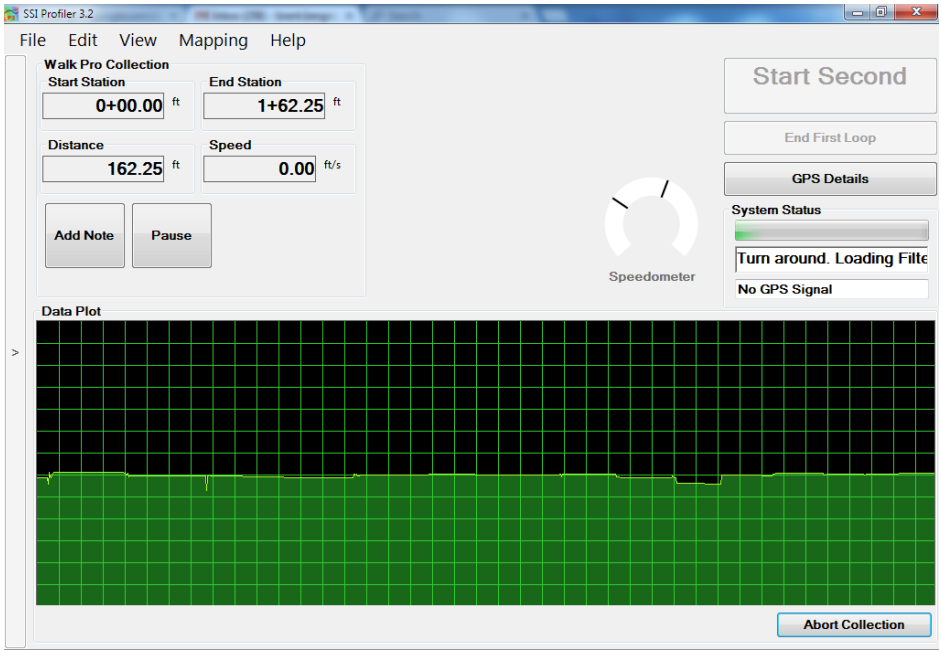


Figure 48: Window at the end of the first part of the closed loop. When the walking profiler is in place to start the second leg of the closed loop, select “Start Second Run.”

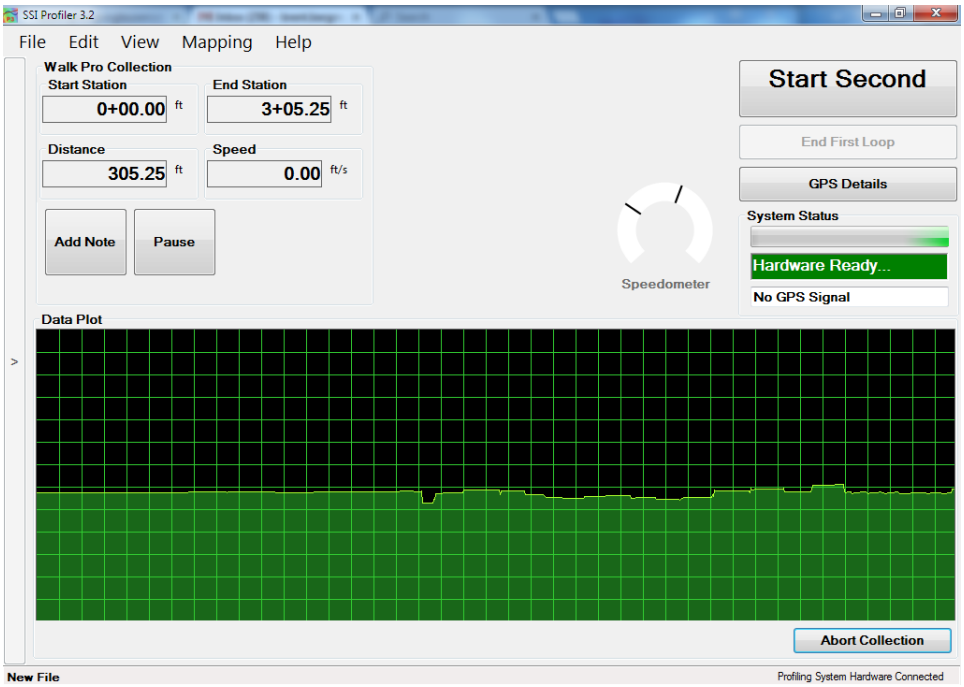


Figure 49: Begin Second Loop

Once the front left wheel is on the starting mark the operator may select “Start Second Run” of the closed loop collection.

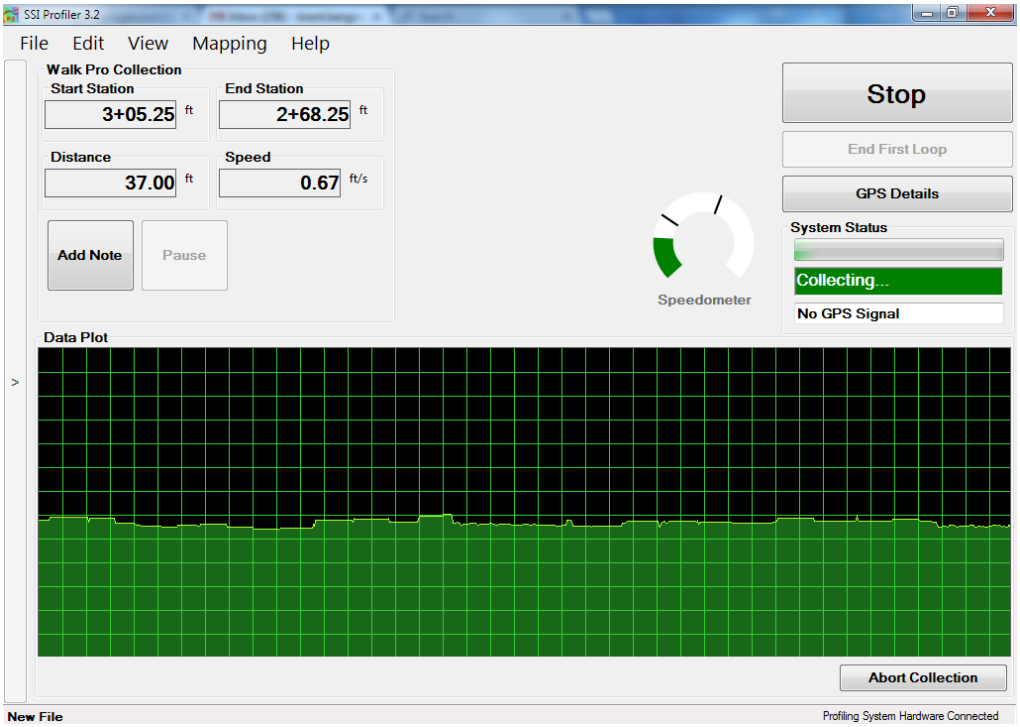


Figure 50: Once the second run is started the option to stop collecting appears. During the second leg of collection, the end station will decrease toward zero; the starting station for the first loop.

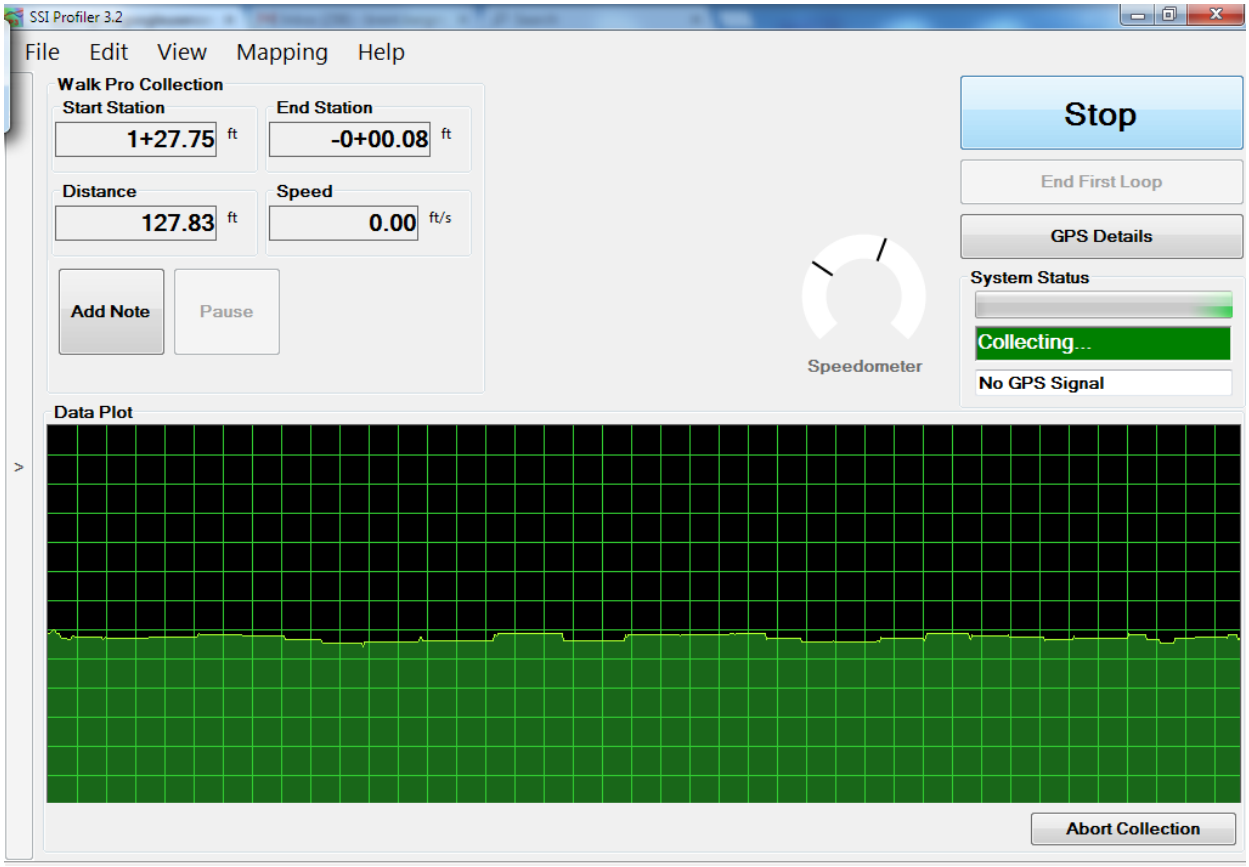


Figure 51: End of Second Loop for Closed Loop Collection

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.

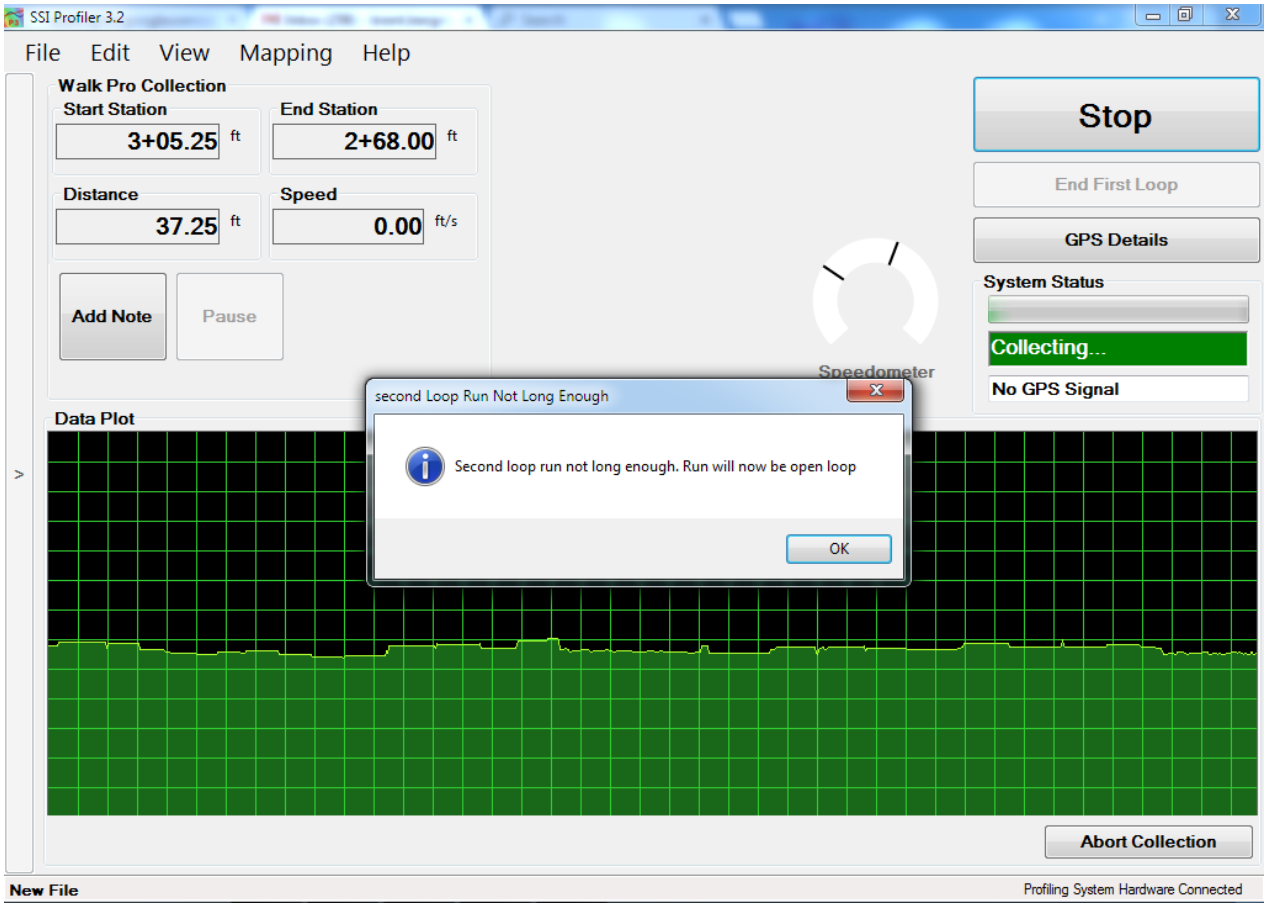


Figure 52: Second Loop Length for Closed Loop is Invalid

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.

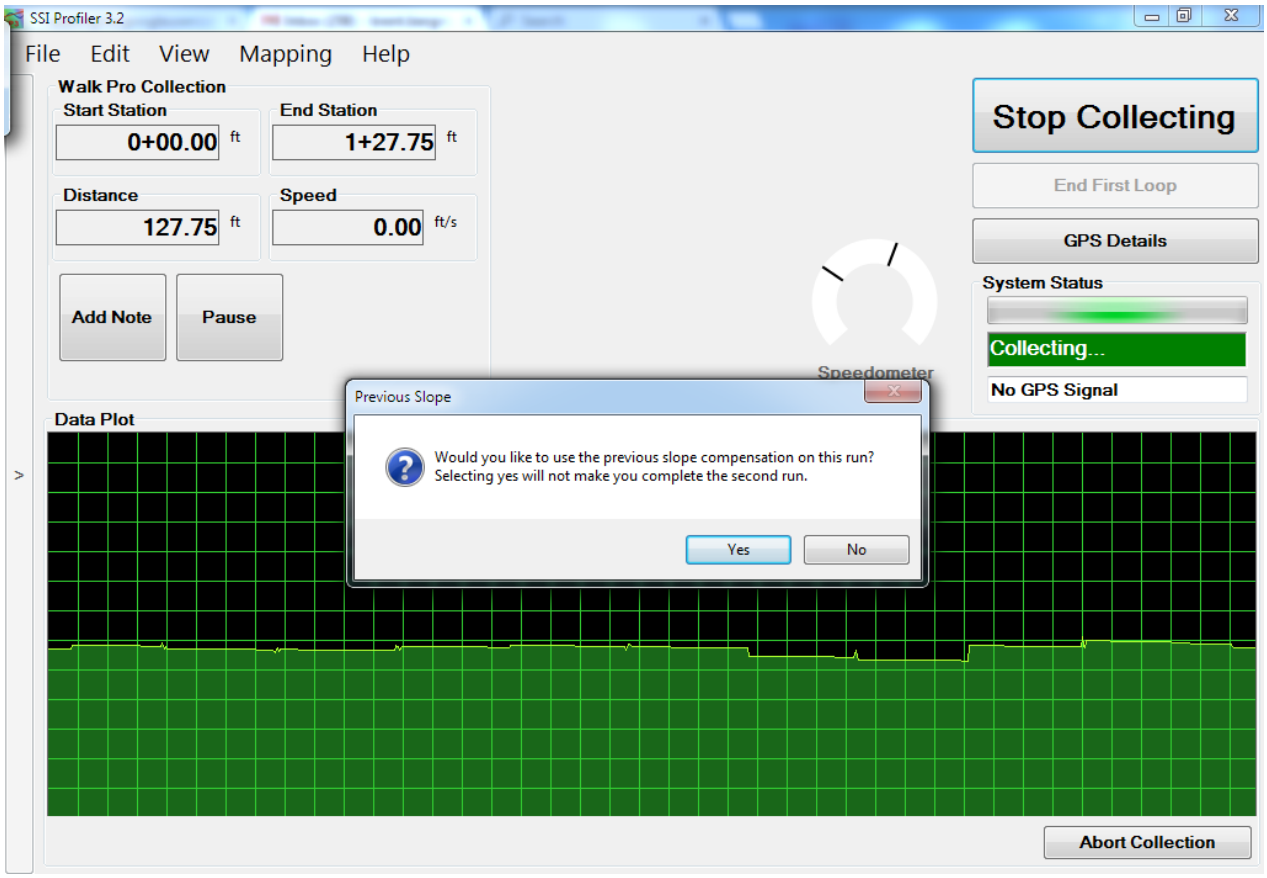


Figure 53: Prompt to Use Slope Compensation on an Open Loop Collection

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.

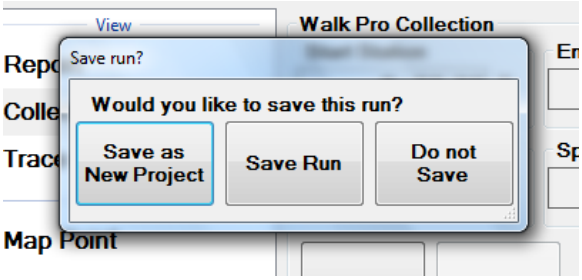


Figure 54: Saving Options after a collection

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.

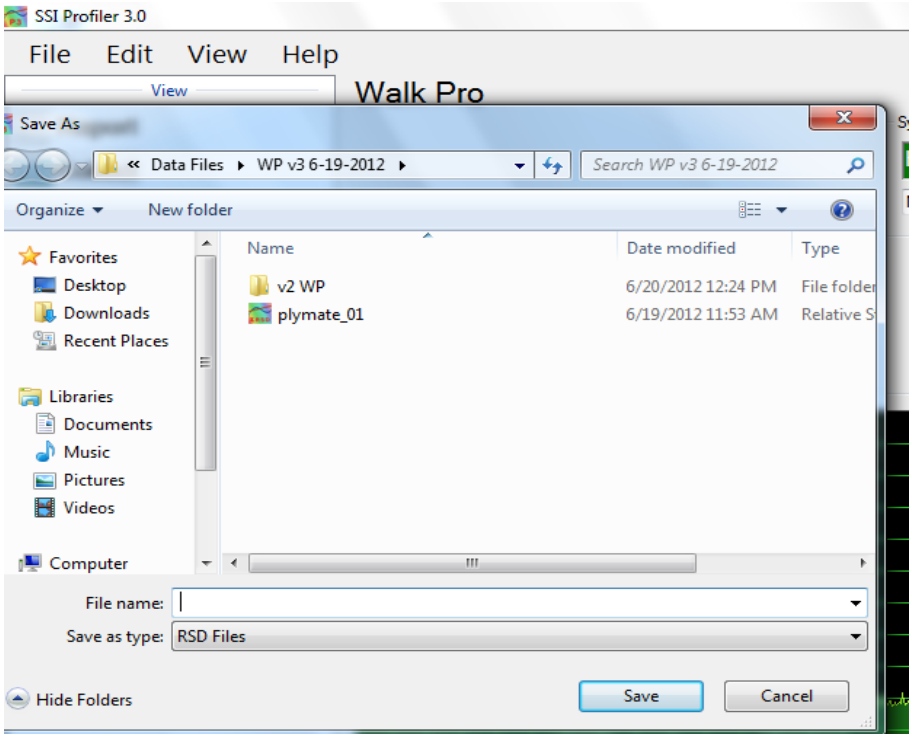


Figure 55: Windows Explorer to save the collection

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

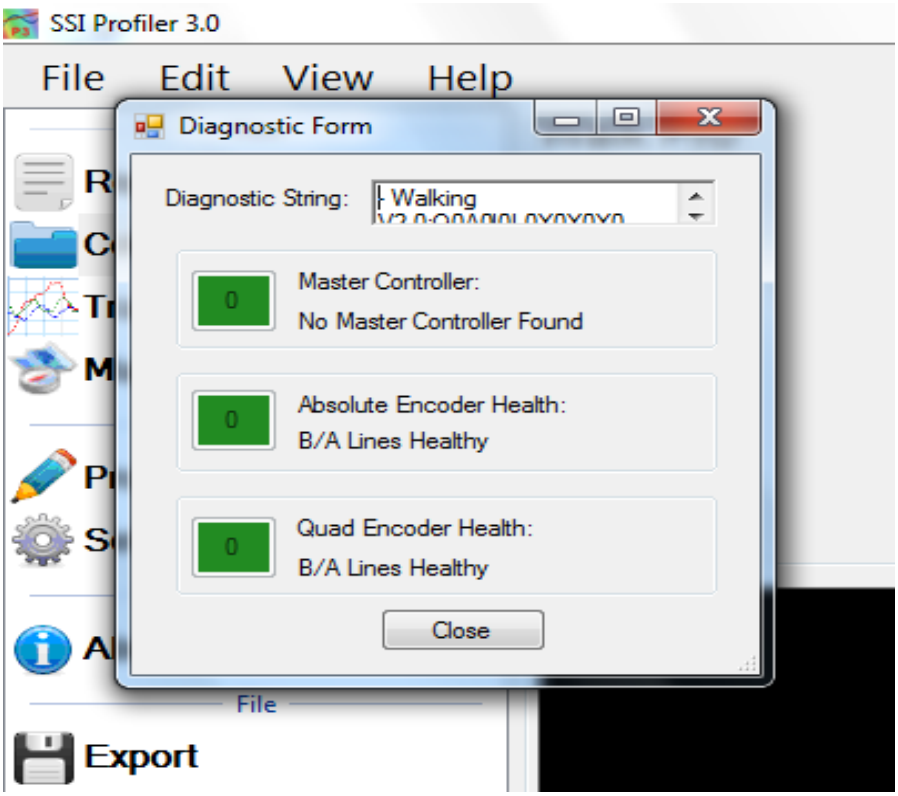


Figure 56: The diagnostics window is shown above with all of the components green and operational.

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.

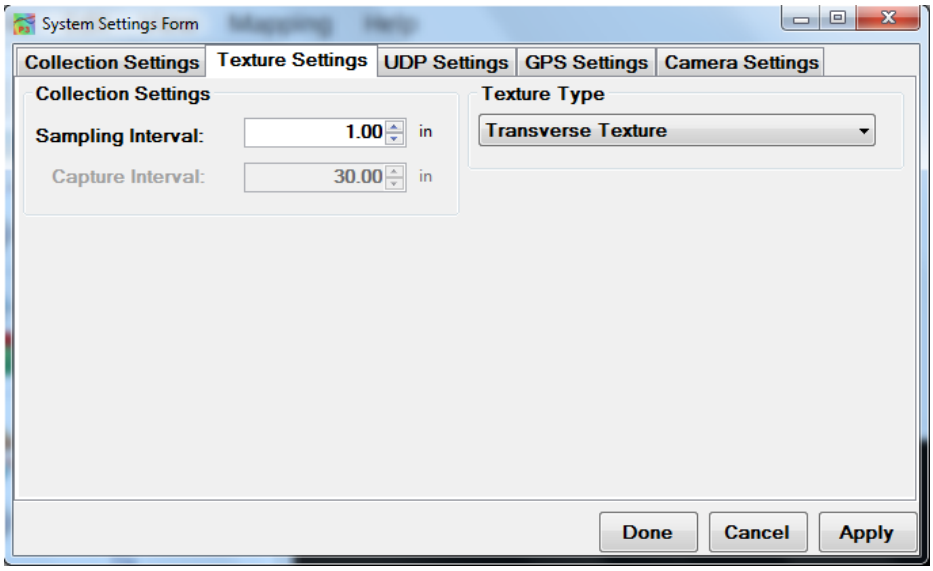
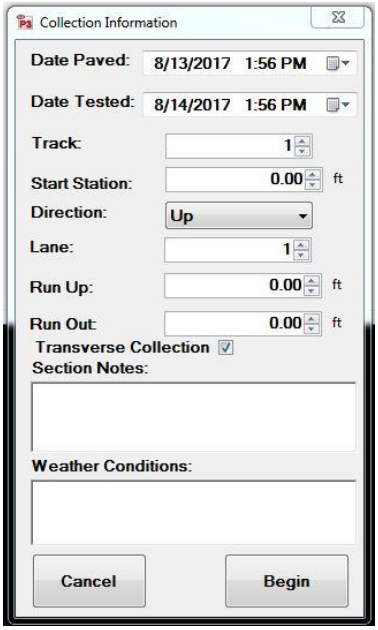


Figure 57: Texture setting tab under system setting.

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. 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.

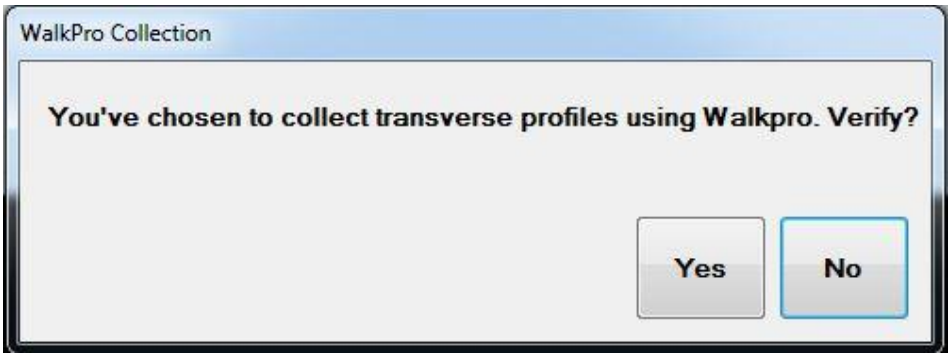


Figure 59: Verification window for collecting transverse profiles.

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.

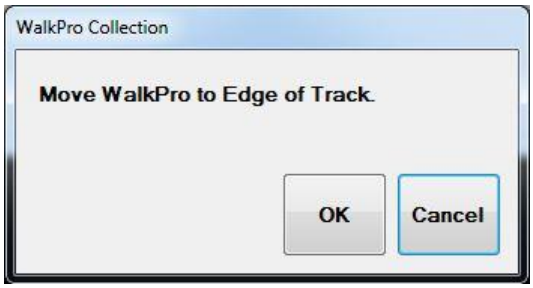


Figure 60: First Collection window for Transverse profiler.

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

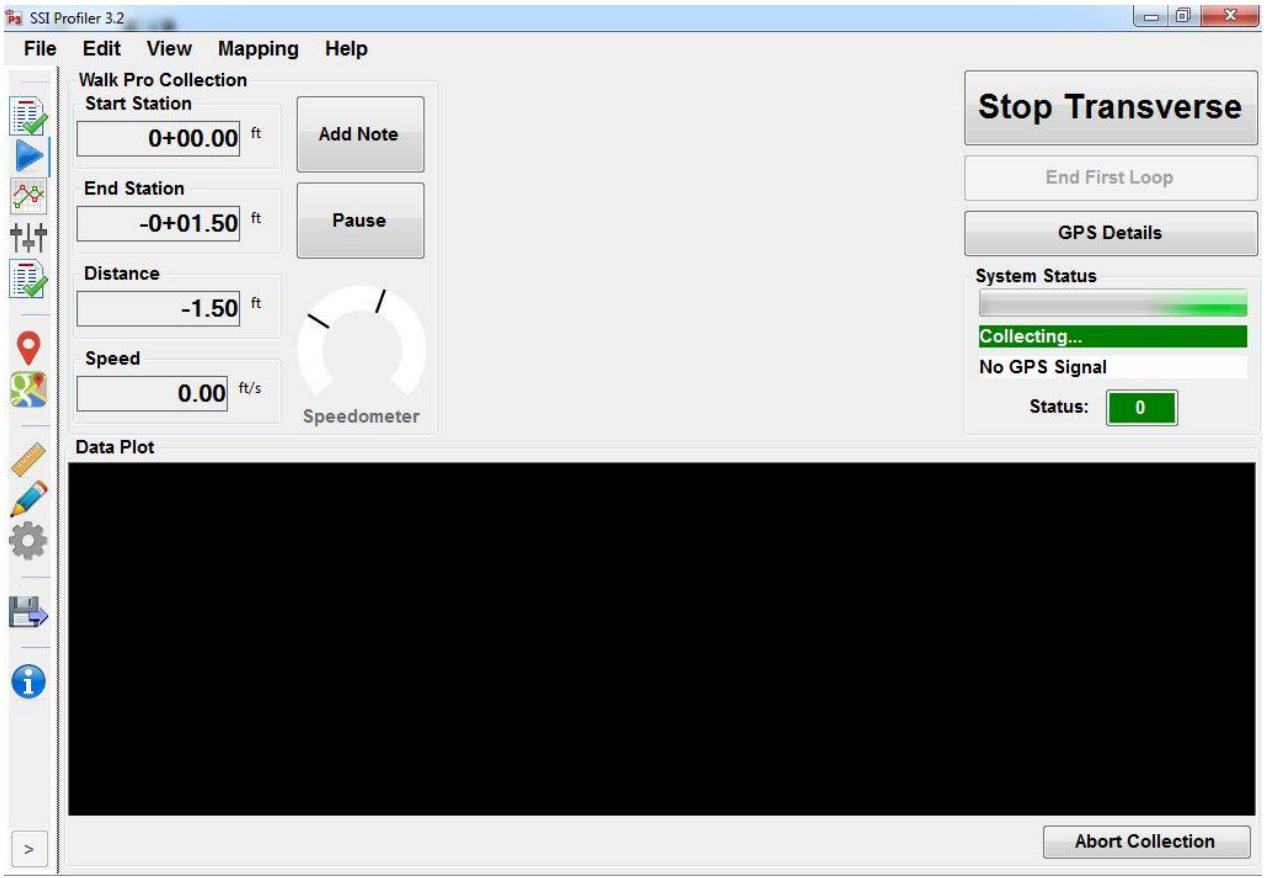


Figure 62: First Collection window after pressing collect.

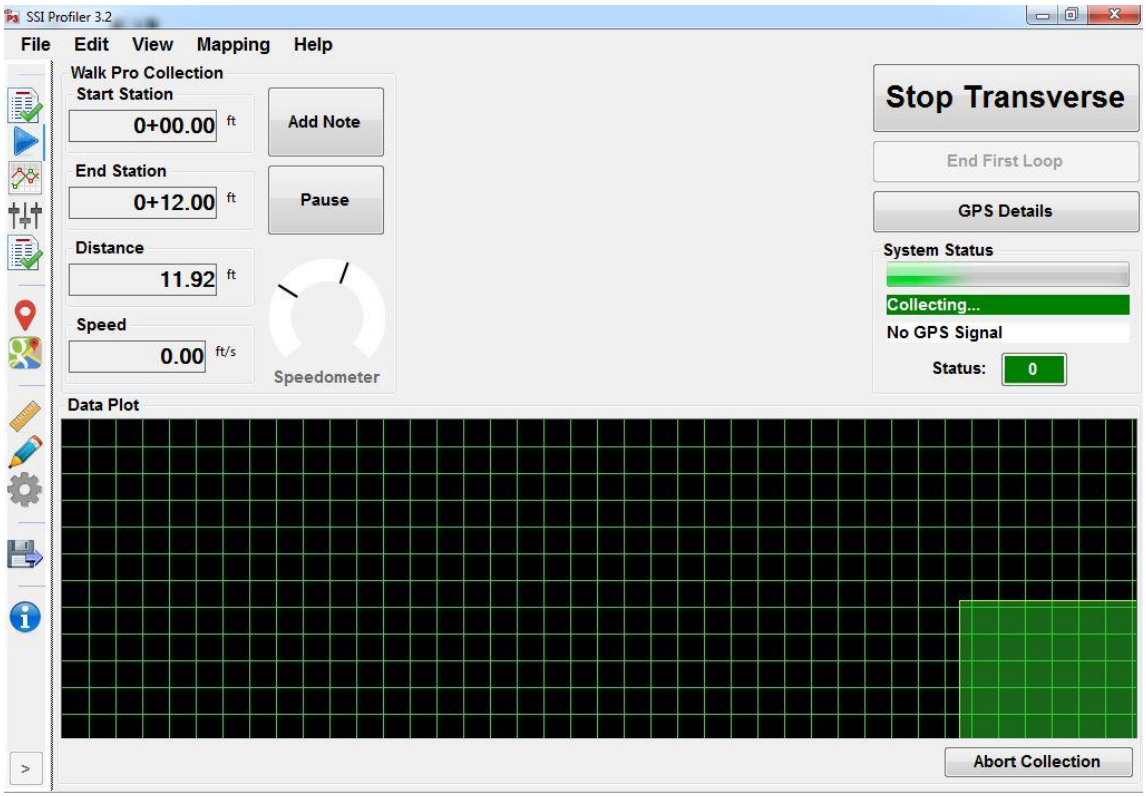


Figure 63: Collection window while profiling.

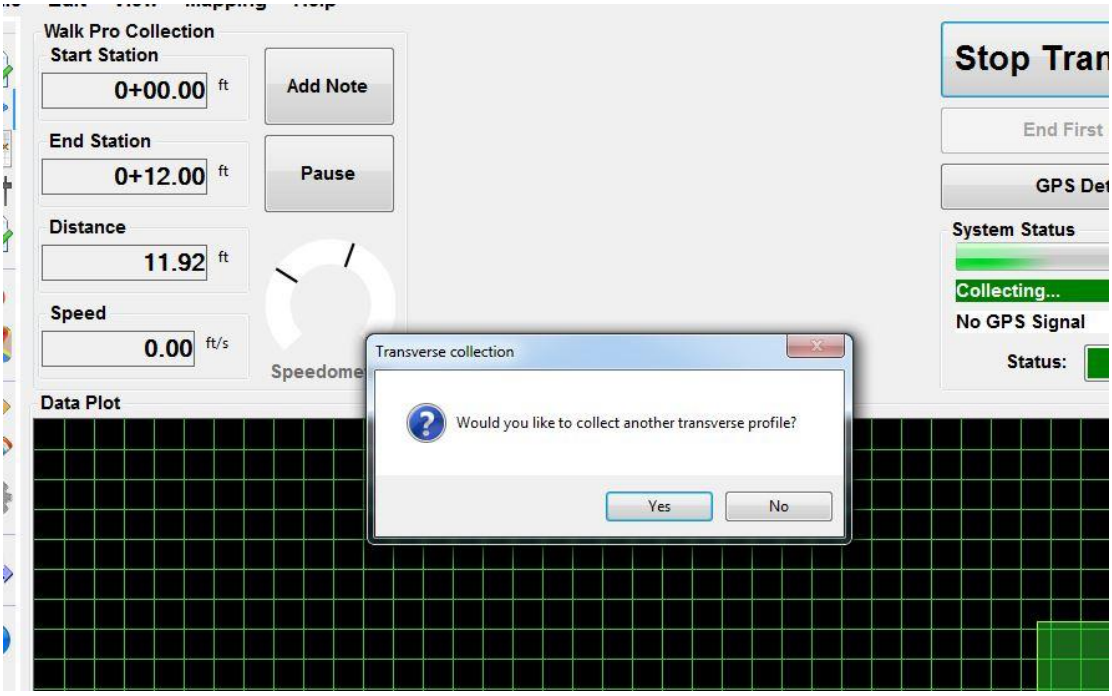


Figure 64: Window asking for another transverse profile. Pressing "No" will lead to figure 55. Pressing "Yes" will lead to figure 57.

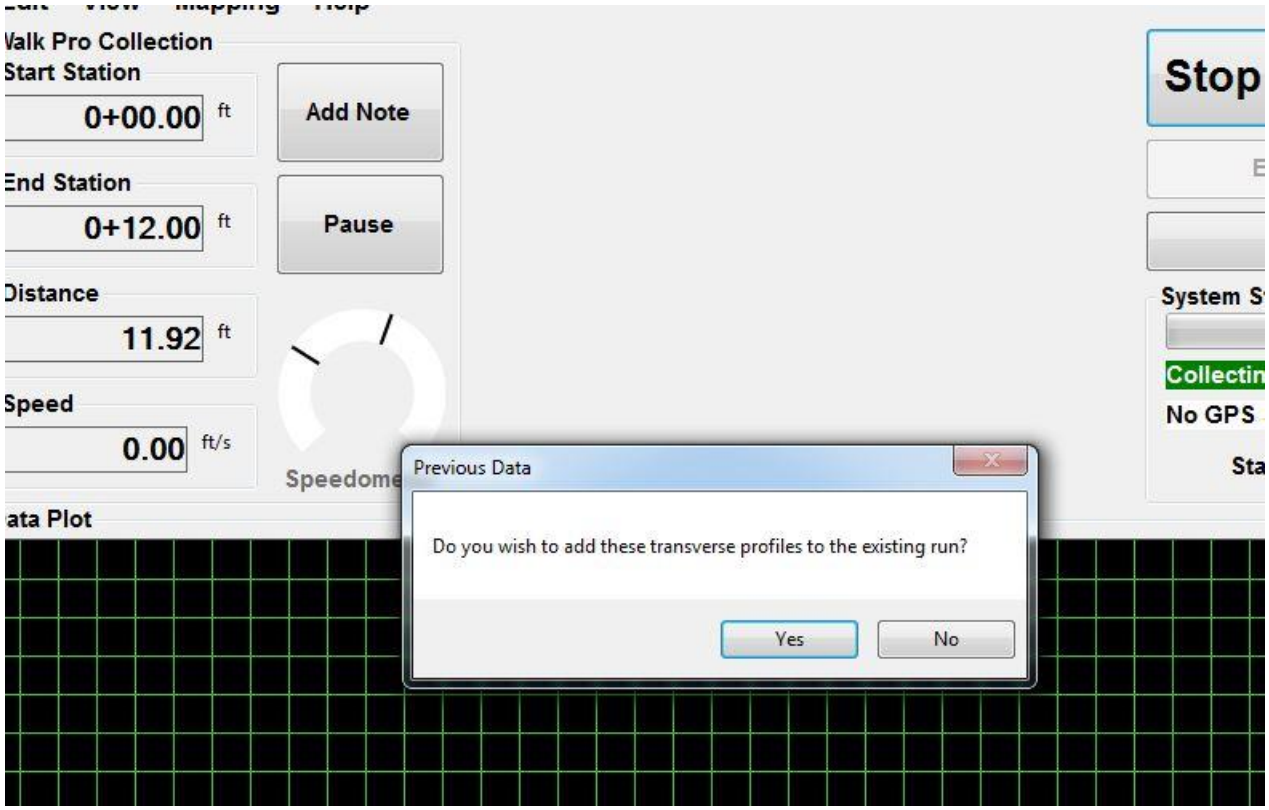


Figure 65: Add transverse profiles to existing run window.

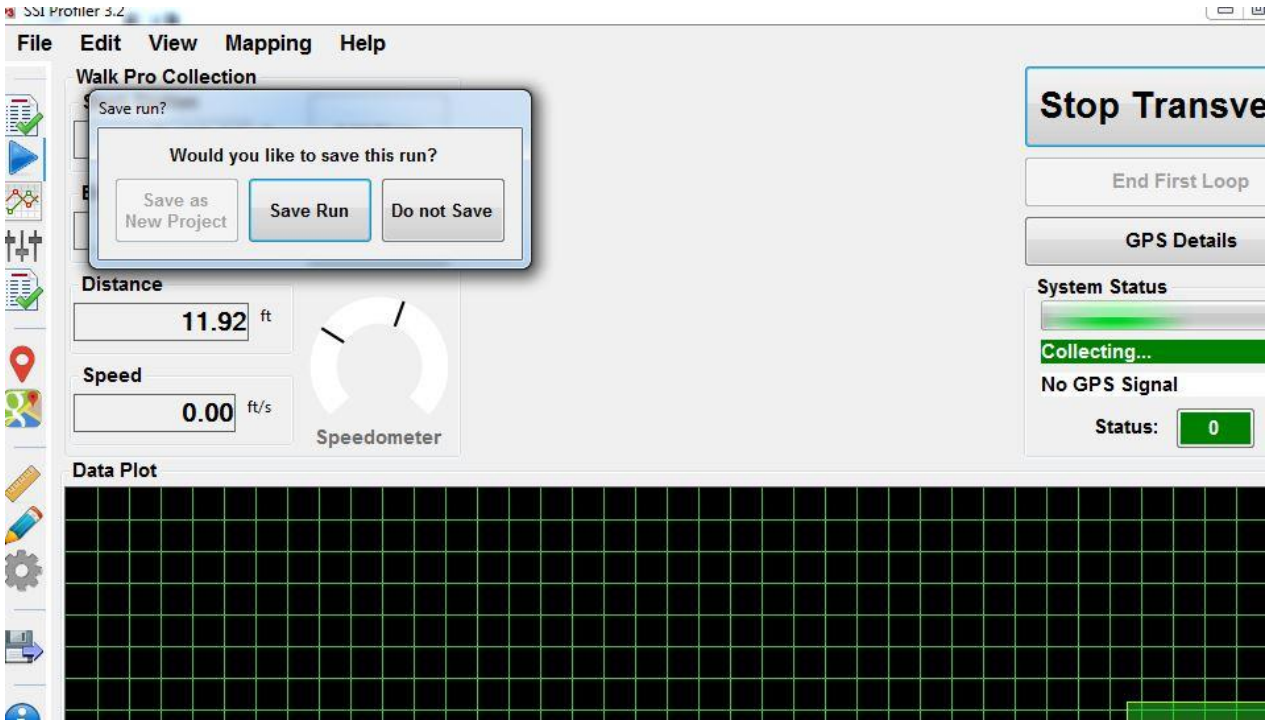


Figure 66: Save run window.

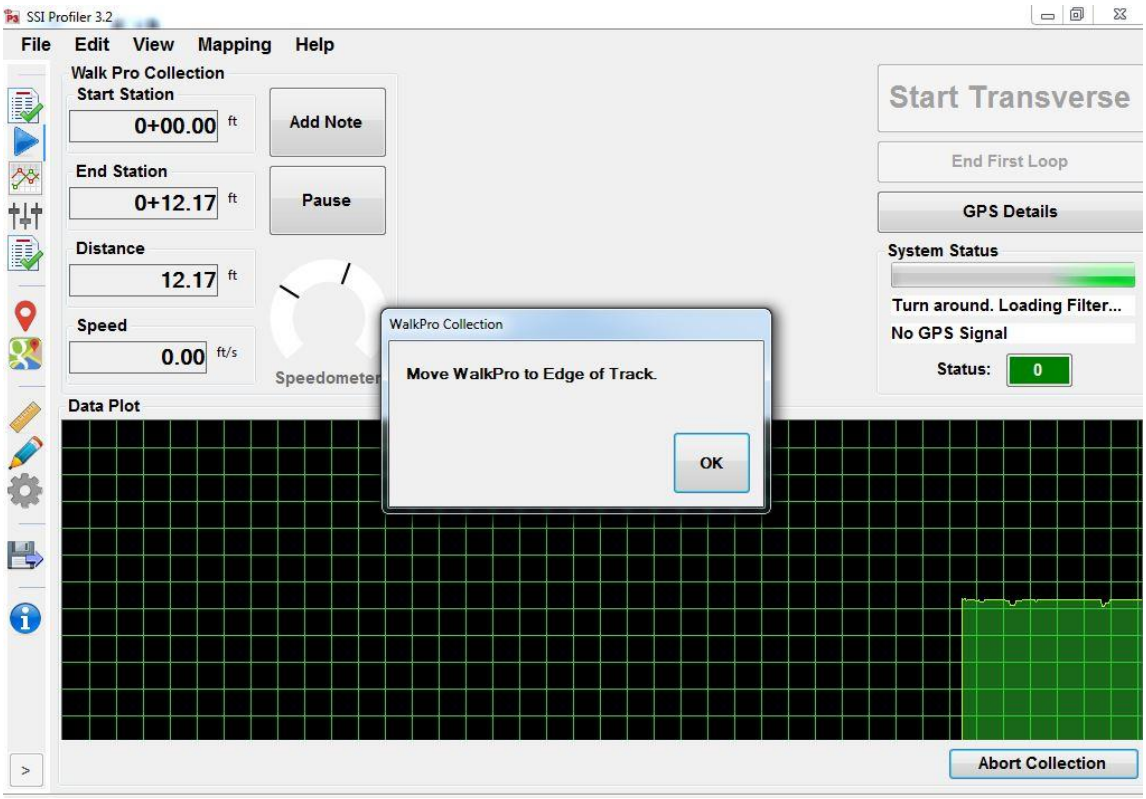


Figure 67: Window after selecting “Yes” to figure 54 for collecting another profile.

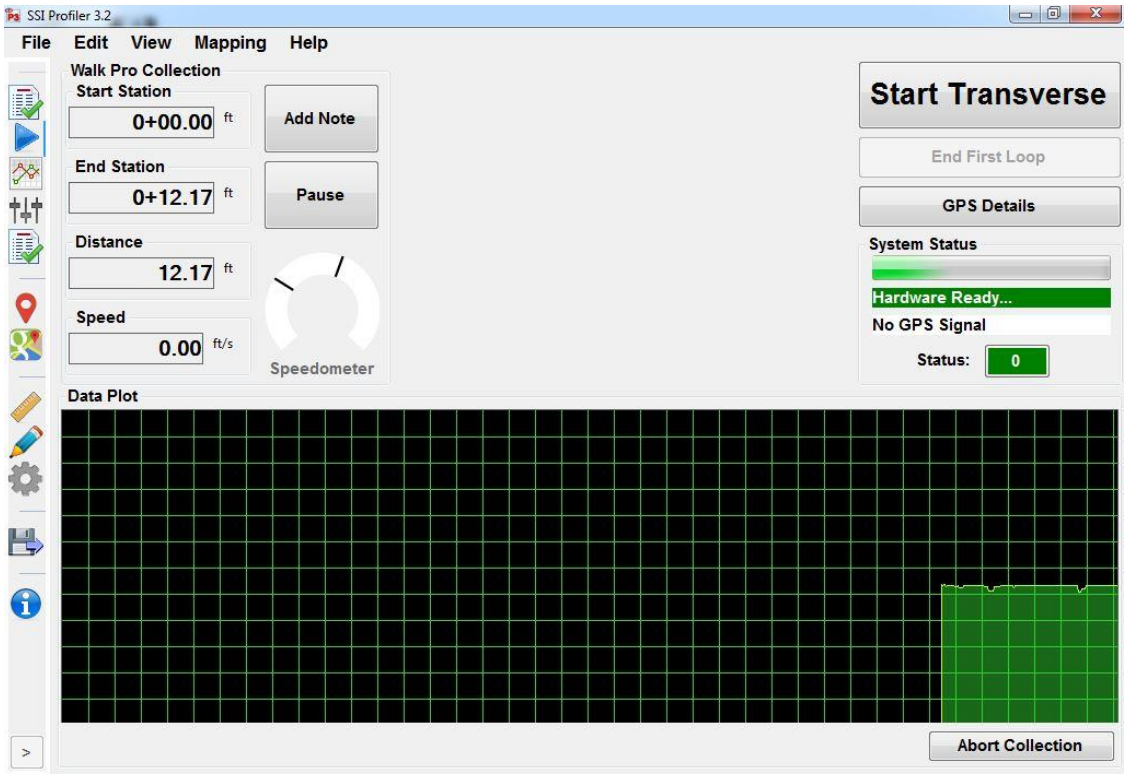


Figure 68: Collecting another transverse profile.

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.

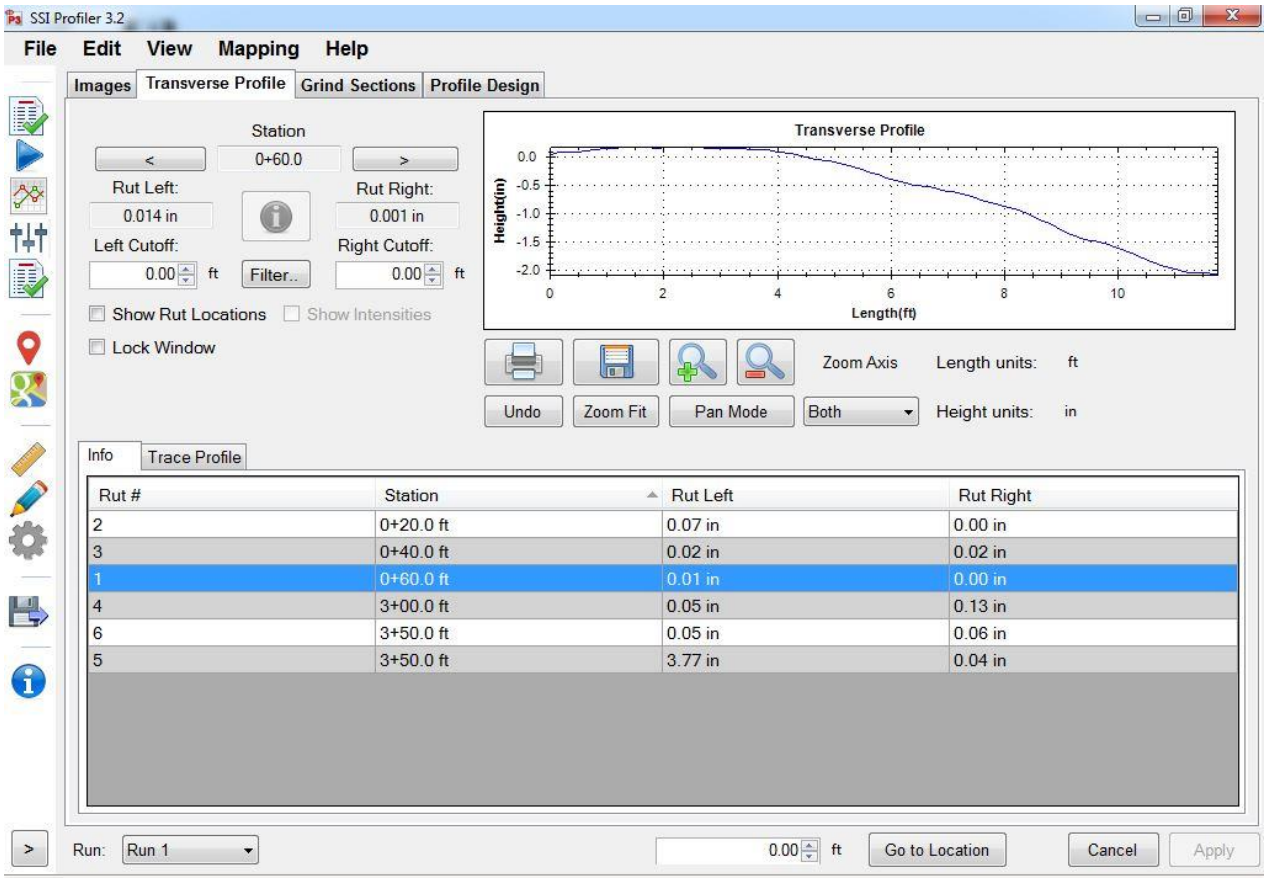


Figure 69: Transverse profile viewing

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.

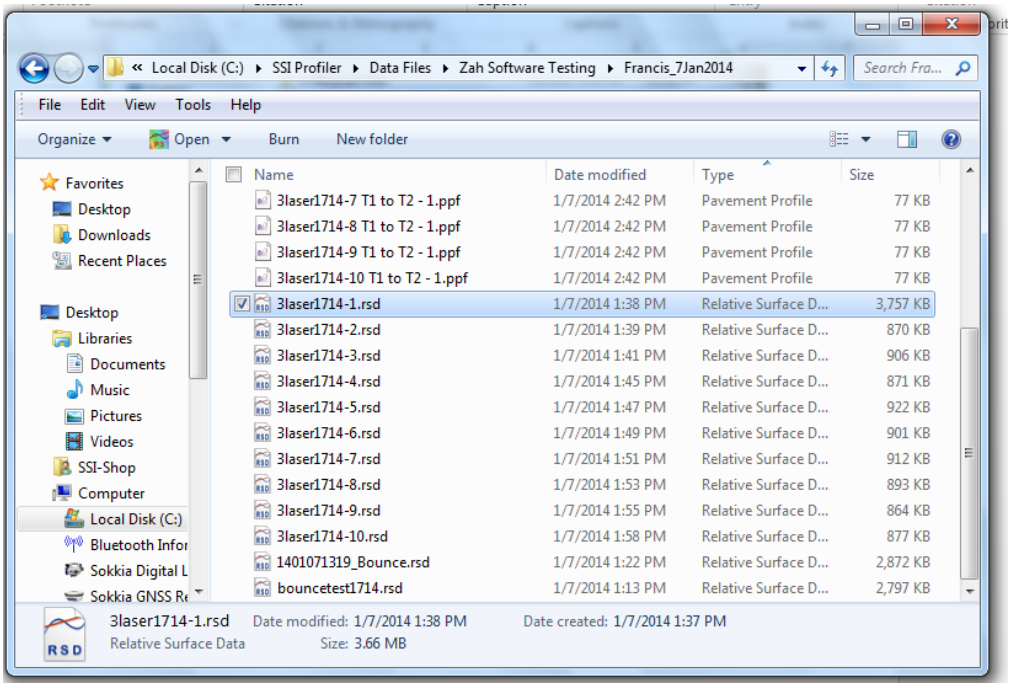


Figure 70: Opening a data file in the Profiler V3 program.

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."

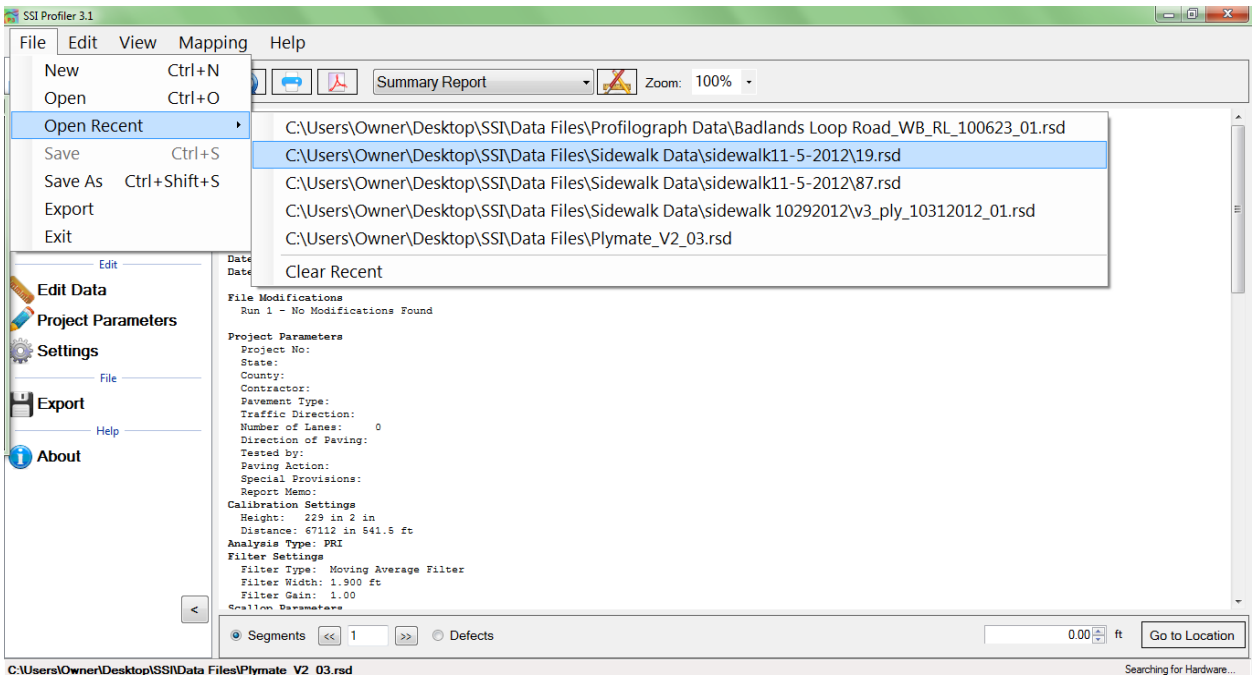


Figure 71: The Open Recent feature

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.

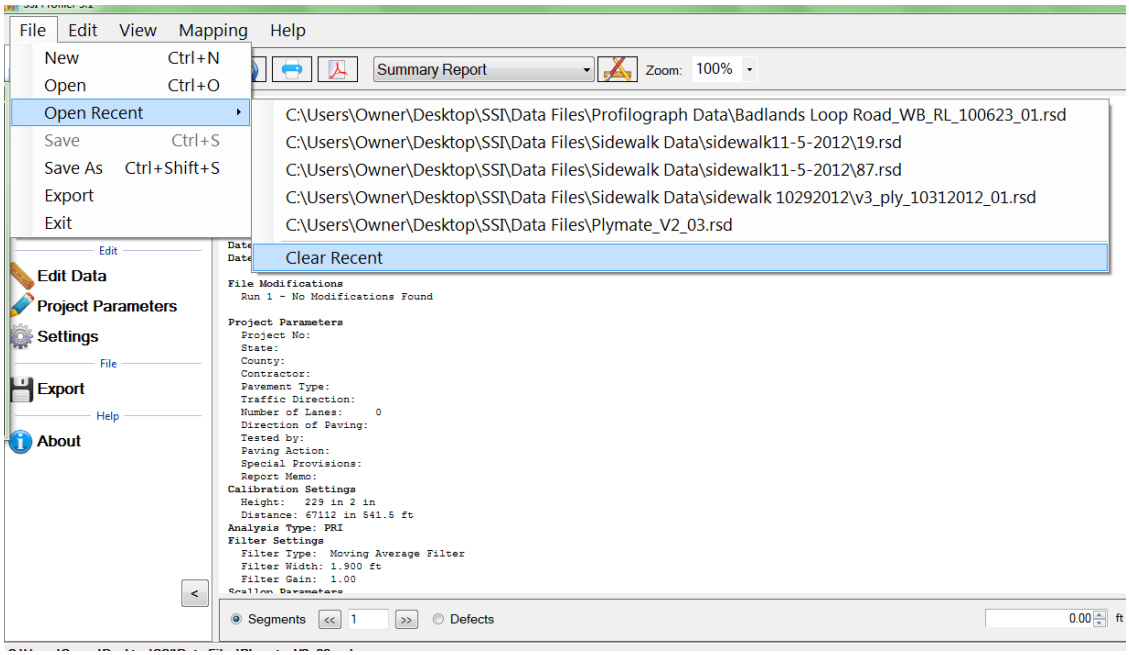


Figure 72: The clear recent feature

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

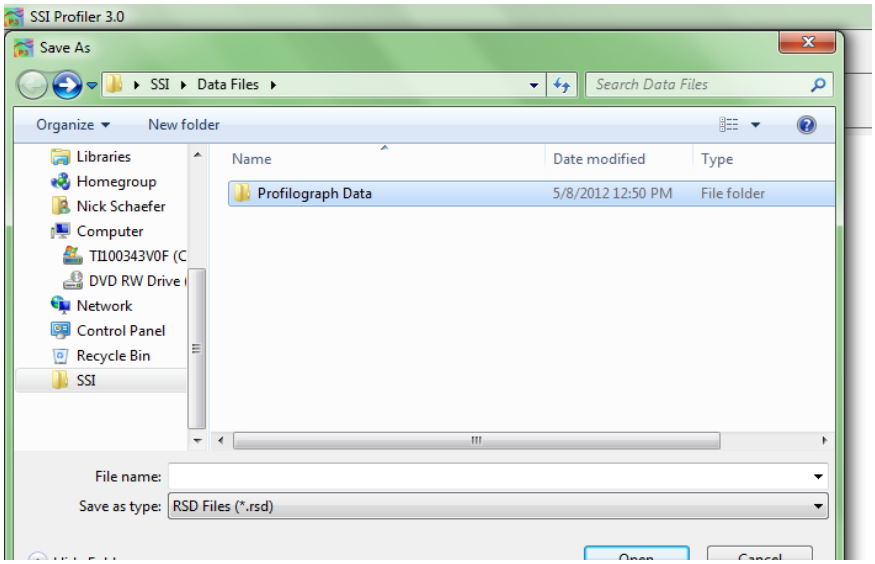


Figure 73: Saving a file through Save As in RSD format.

(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.

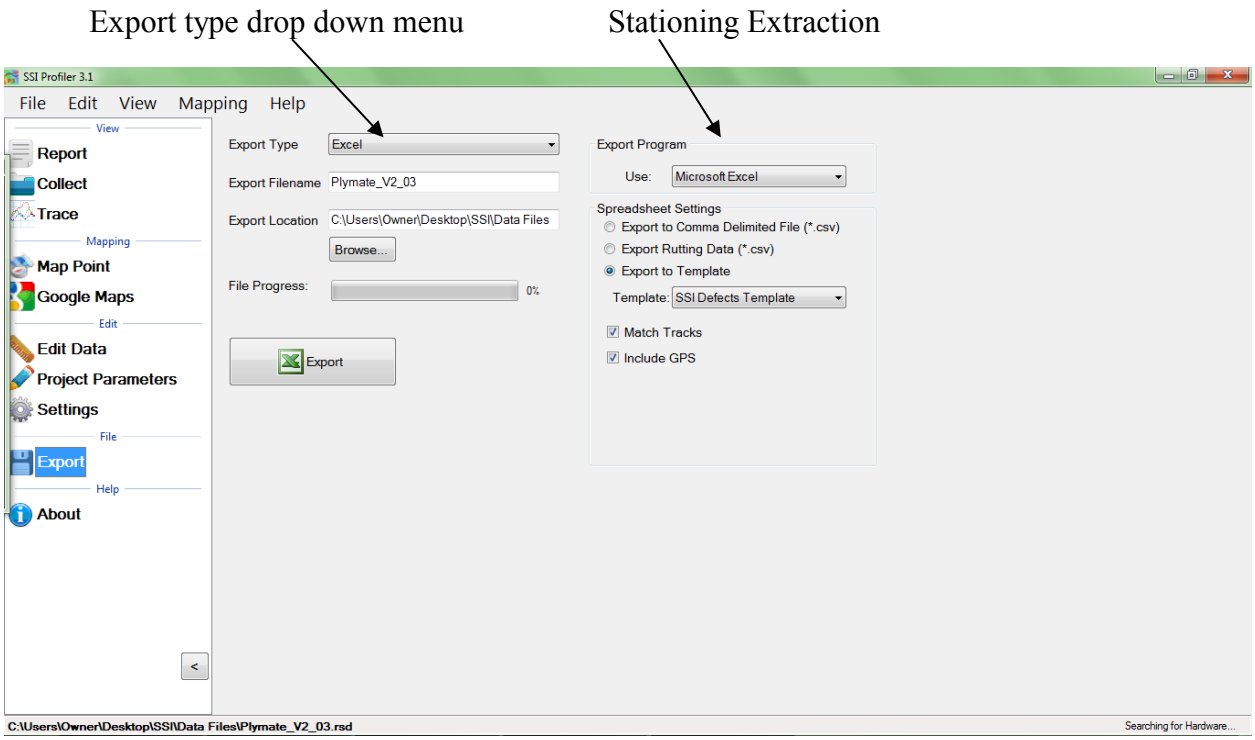


Figure 721: The export window for exporting the data into Excel format.

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.

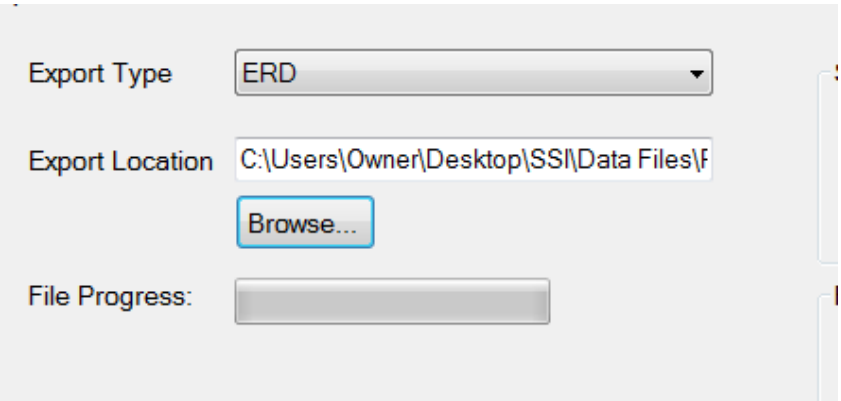


Figure 75: Selecting a location to save the exported file.

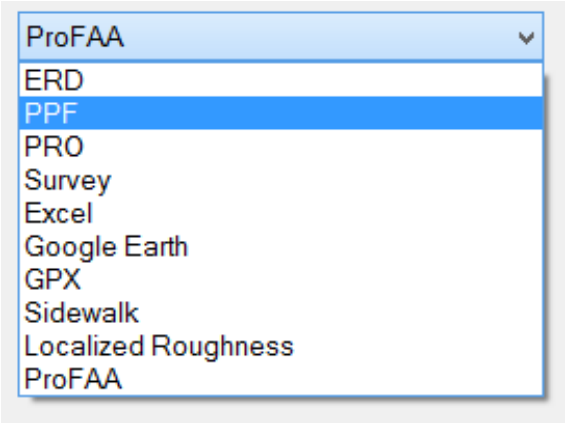


Figure 76: The export type drop down menu

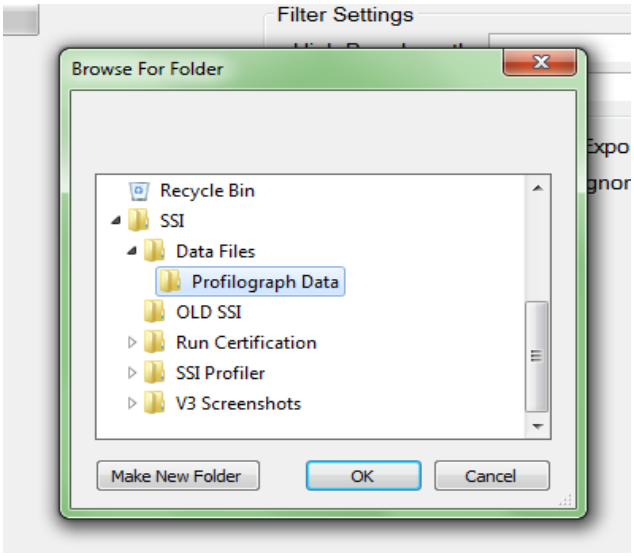


Figure 77: The export folder location selection

1.6.2. – Exporting to ERD Format

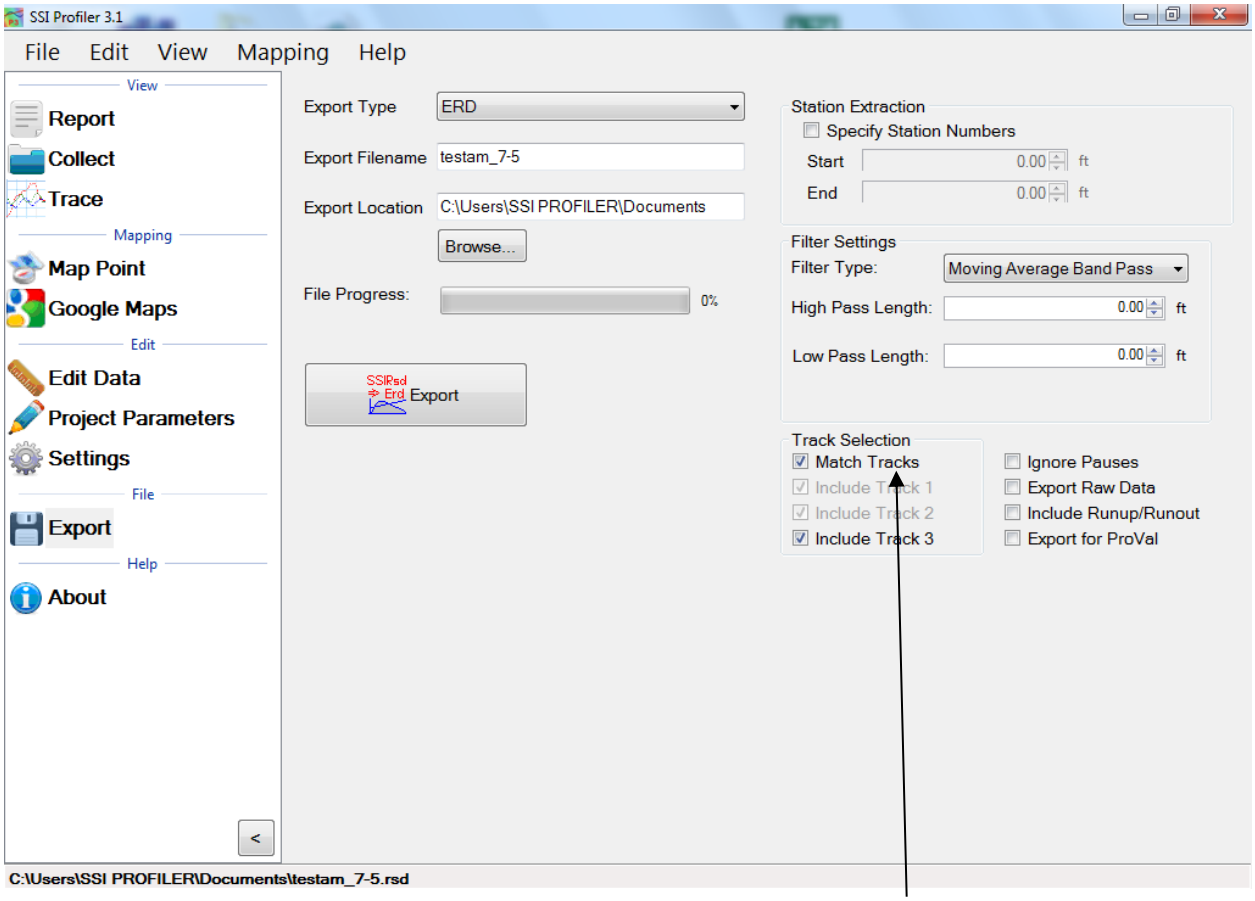


Figure 78: The ERD format export window with match tracks selected.

Match Tracks is selected

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.

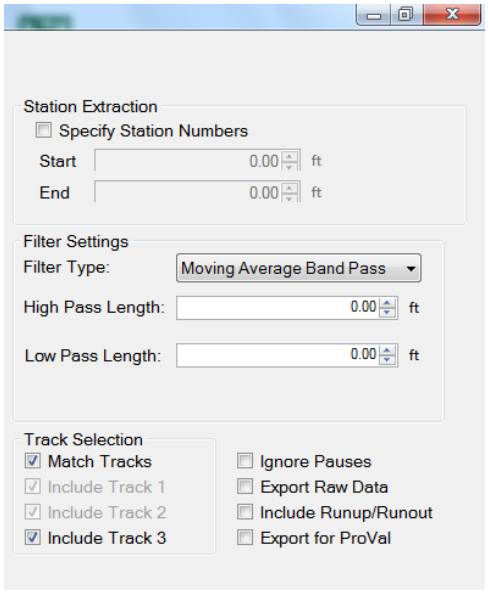


Figure 79: The ERD export window settings

1.6.3. – Exporting to PPF Format

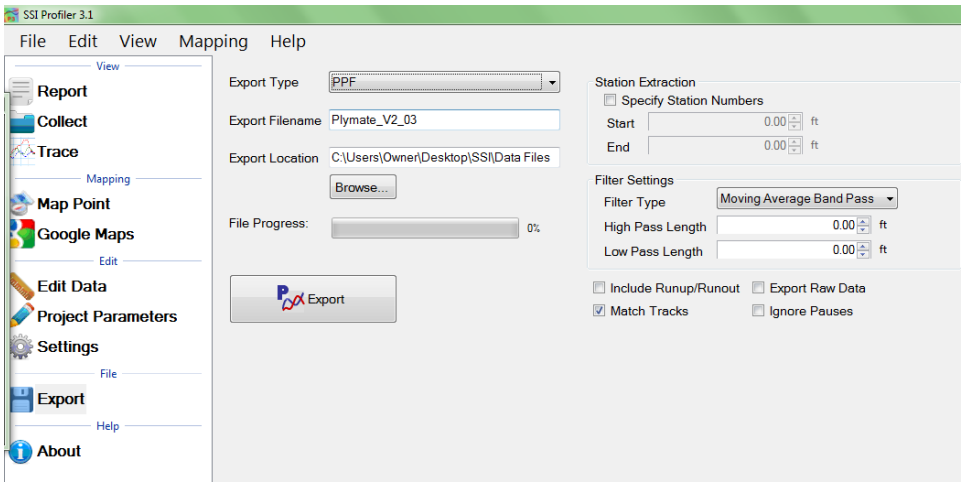


Figure 80: The PPF export window

Station Extraction

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.

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 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.

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. The file is adjusted so that the elevations begin at zero.

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 date, 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."

To import 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.

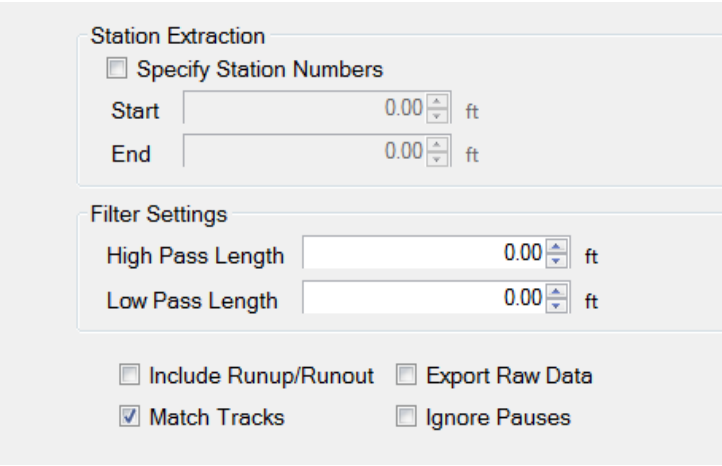


Figure 81: The optional settings when exporting in PPF format.

1.6.4. – Exporting to PRO Format

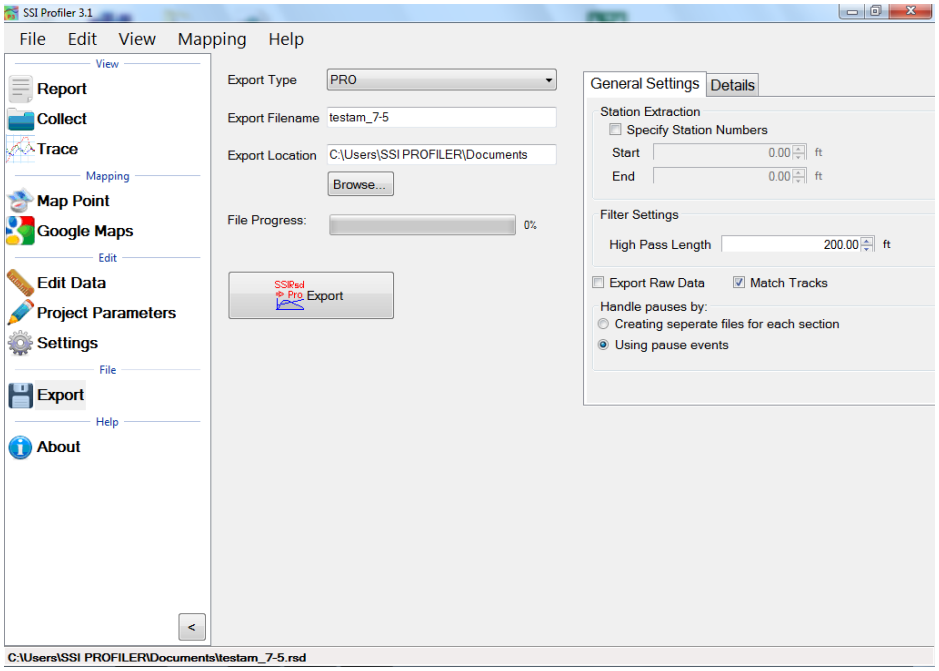


Figure 8222: The export window when PRO format is selected.

General Settings

Station Extraction

The operator has the option to only 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 pass length

It is an option to change the High pass filter length 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. 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 file can be exported with the paused sections included in one file. The difference in these two options is that creating separate file for each segment exports multiple files into the folder location, and the option of “Using pause events” exports one file to the folder location 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 that is 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.

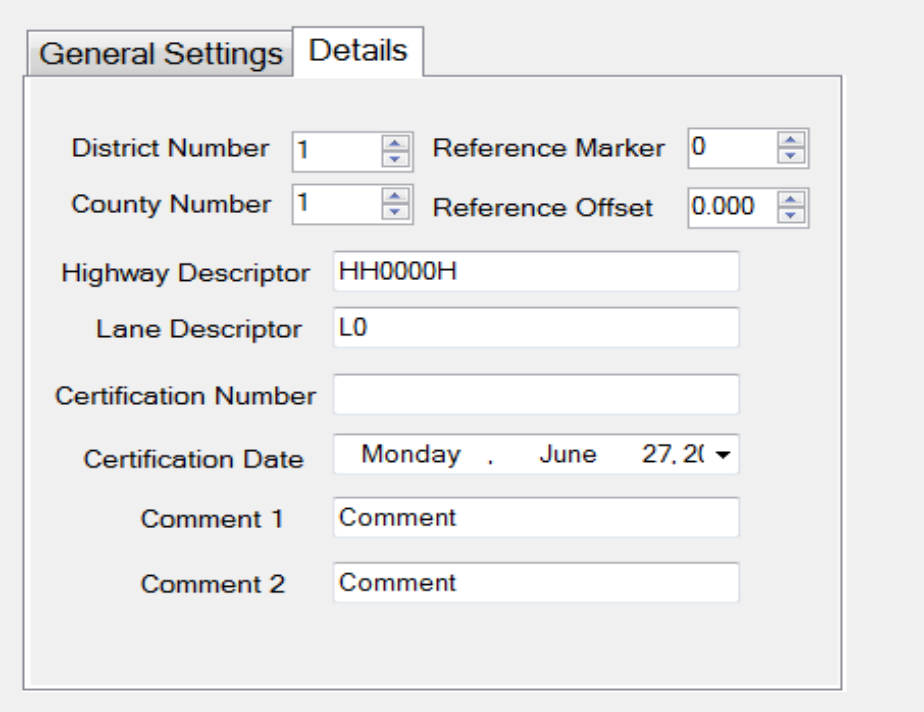


Figure 83: The Details tab contains information about the project.

1.6.5. – Exporting to Survey Format

Station Extraction

The operator has the option to only export 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.

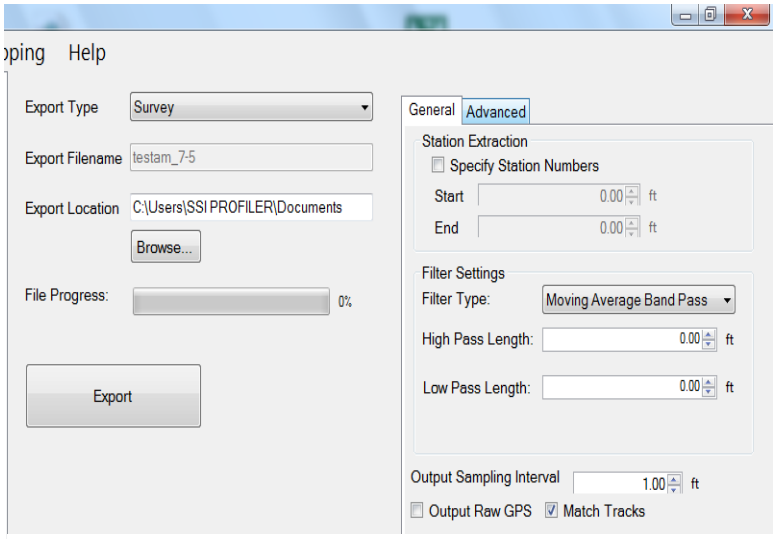


Figure 84: The window for exporting in Survey format

Filter Settings

A 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.

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.

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.

Advanced Tab
The user has the option to report the IRI ride value every interval. The figure below is set to ten feet; meaning the IRI will be displayed every ten feet of the profile.

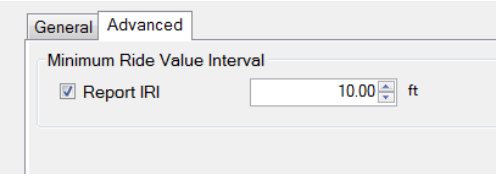


Figure 85: The Advanced Options of the Survey format

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.

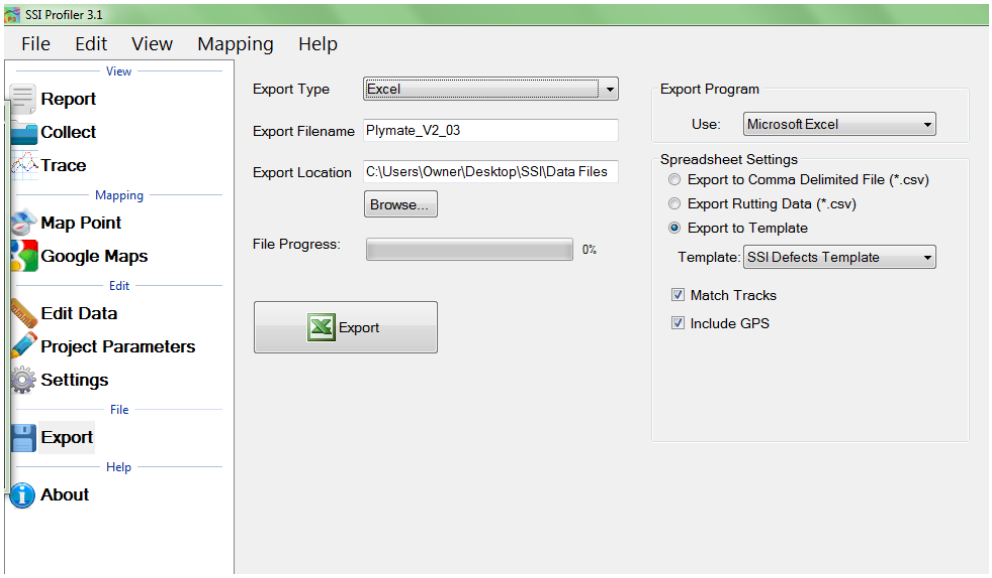


Figure 86: Exporting the data into Microsoft Excel format

Export to Comma Delimited File

The Comma Delimited file shows the track number, segment number, start and end stationing and the ride number selected in the Analysis Parameters.

Export to Template

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

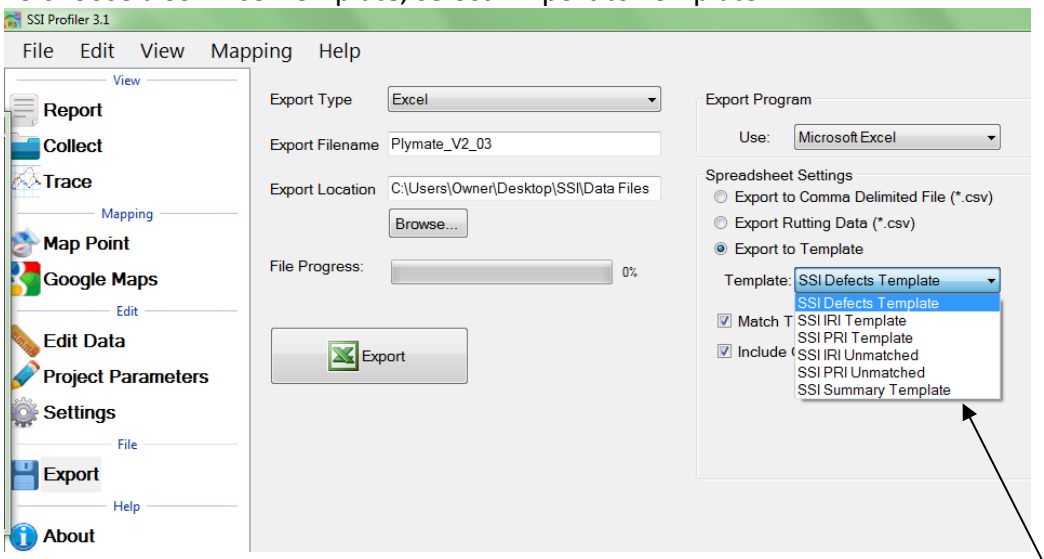


Figure 87: The types of excel formats are listed in the drop down menu.

Types of excel formats to export the collected data into.

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 gives information on the 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.

IRI Unmatched

The IRI Unmatched Template shows the calculated IRI for each track along with the defect heights, defect locations and settings.

PRI Unmatched

The PRI Unmatched Template shows the calculated PRI for each track along with the bump heights, locations and settings in spreadsheet form.

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 into 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.

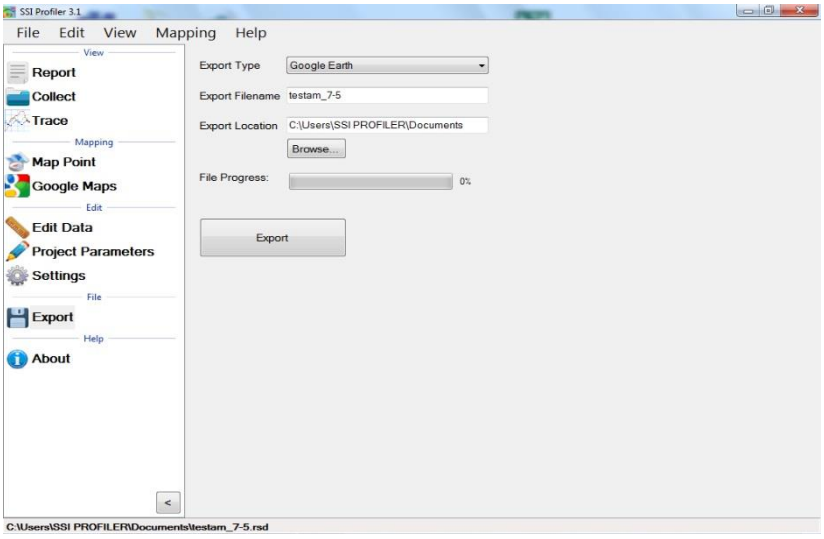


Figure 88: Google Earth

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.

1.6.8. – Exporting GPX

The GPS coordinates can be exported into a format that describes the locations of the defect stations. 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."

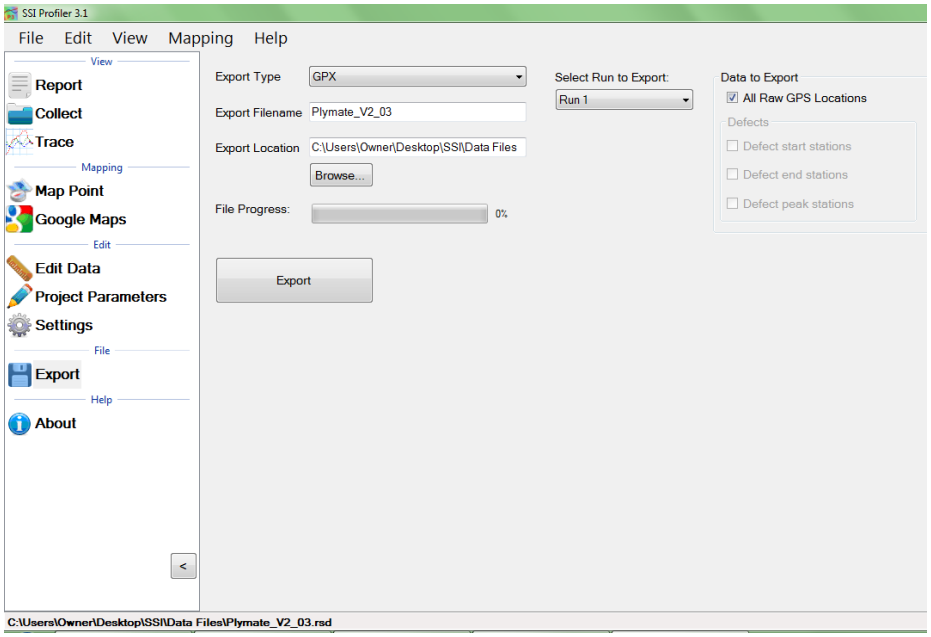


Figure 89: The export window when the GPX format is selected.

Under the title of 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 not be checked. 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 within them are:

File Type

ngd

Ngd format contains synchronized distance, time, and gyroscopic data for a specified collection interval.

pxyzd

This format is the three dimensional profile derived from the travel grade and gyroscope.

pxyzdg and pxyzdinc

These formats are the same as the format pxyzd, except these two formats do not have 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.

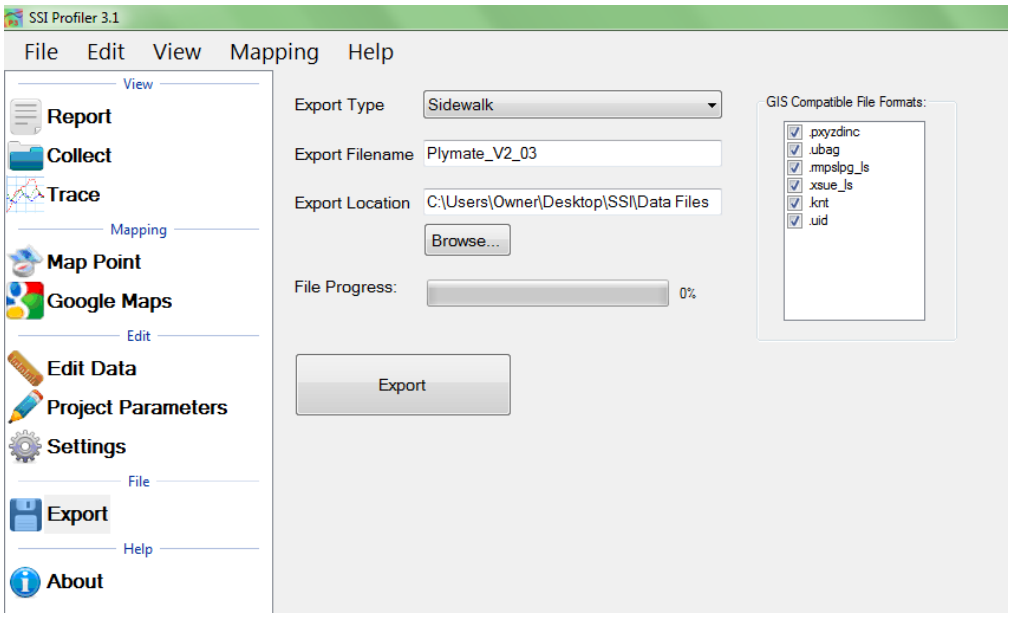


Figure 90: The Sidewalk Export Window.

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.

Specify Station Numbers

If the users 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 to be 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 in the spreadsheet. The columns types at the top of the "Columns in File" side the left-most columns in the exported Excel file.

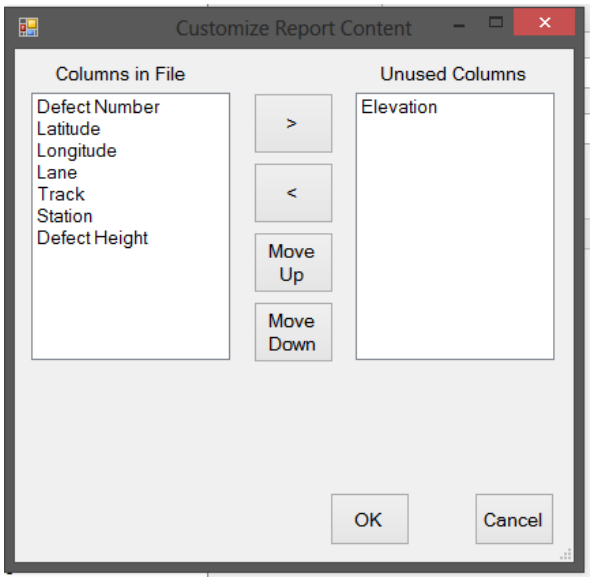


Figure 91: The Customize Window

Merging

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 use will have the options 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.

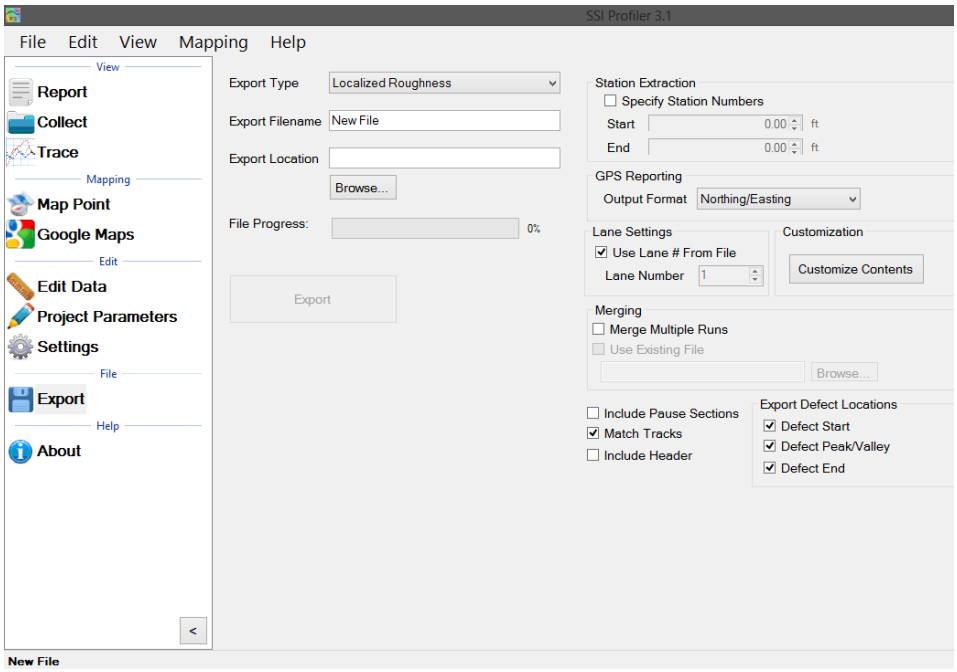


Figure 92: The Localized Roughness Export Template

1.6.11 – ProFAA

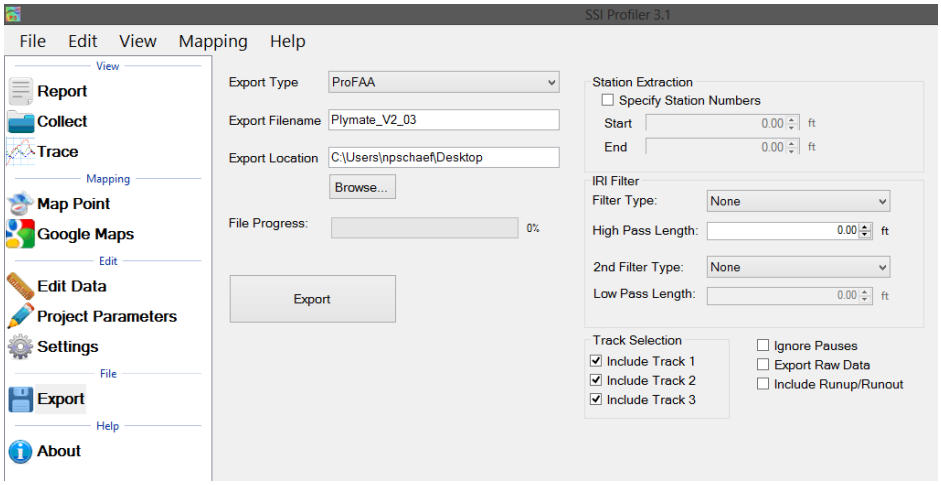


Figure 93: ProFAA Matching

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.

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.

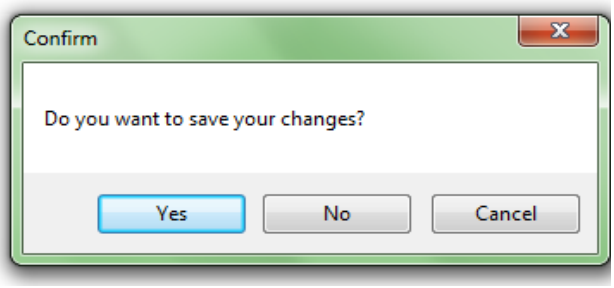
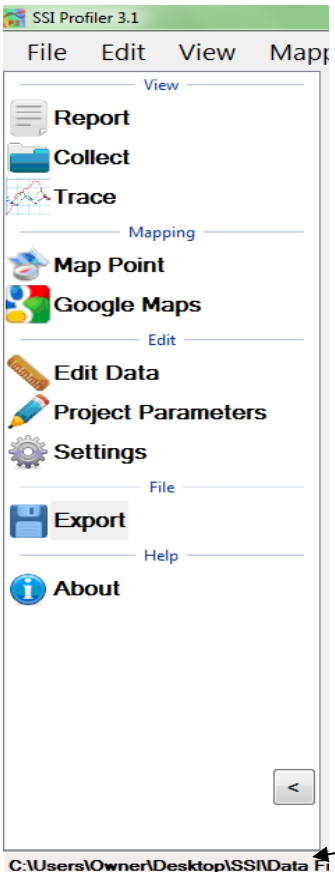


Figure 94: Exiting the program- Saving

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 95: 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 amount of Run Up or Run out data
4) **Select apply.**

Edit Runs

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."

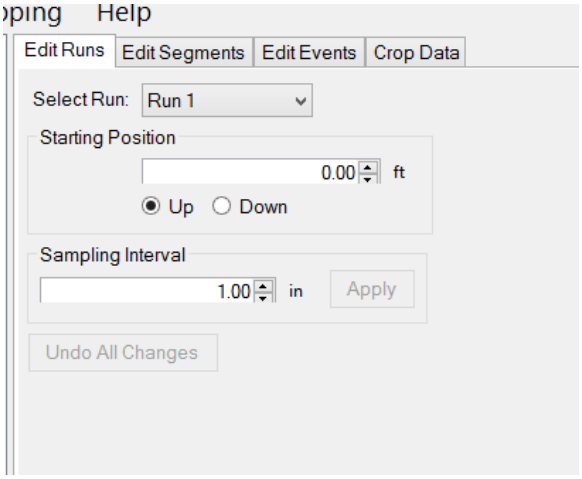


Figure 96: The Edit Run Options

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 to exceed AASHTO m328 and ASTM specifications.

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.

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.

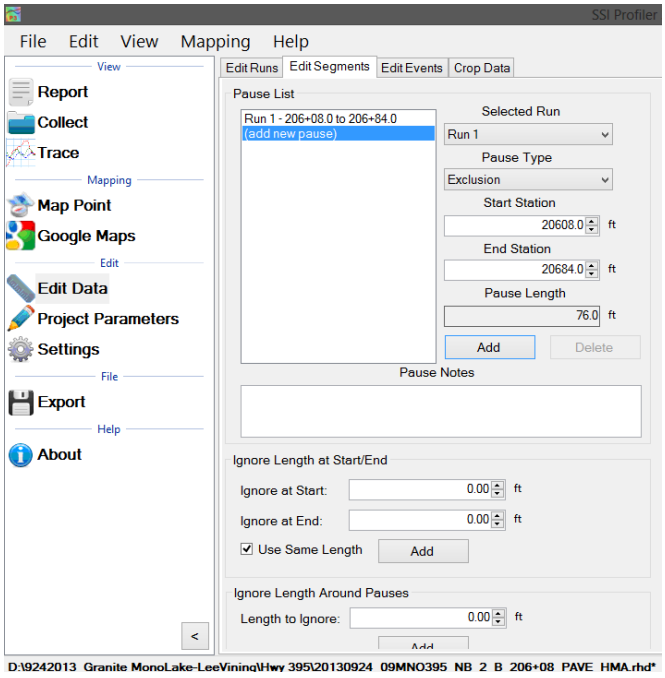


Figure 97: Adding or removing pauses from the

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 included 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.

Ignore Length Around Pauses
This feature increases the pause length around the pause by adding longitudinal length to the pauses. This length will be automatically added to all of the pauses in the Pause List.

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.)
6) **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**

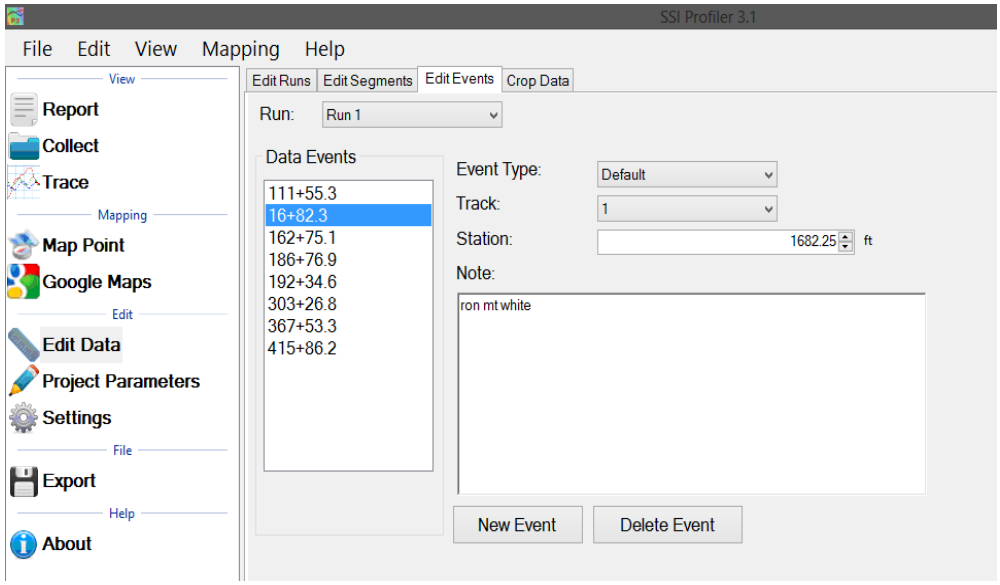


Figure 98: Edit Events Tab

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**.

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.

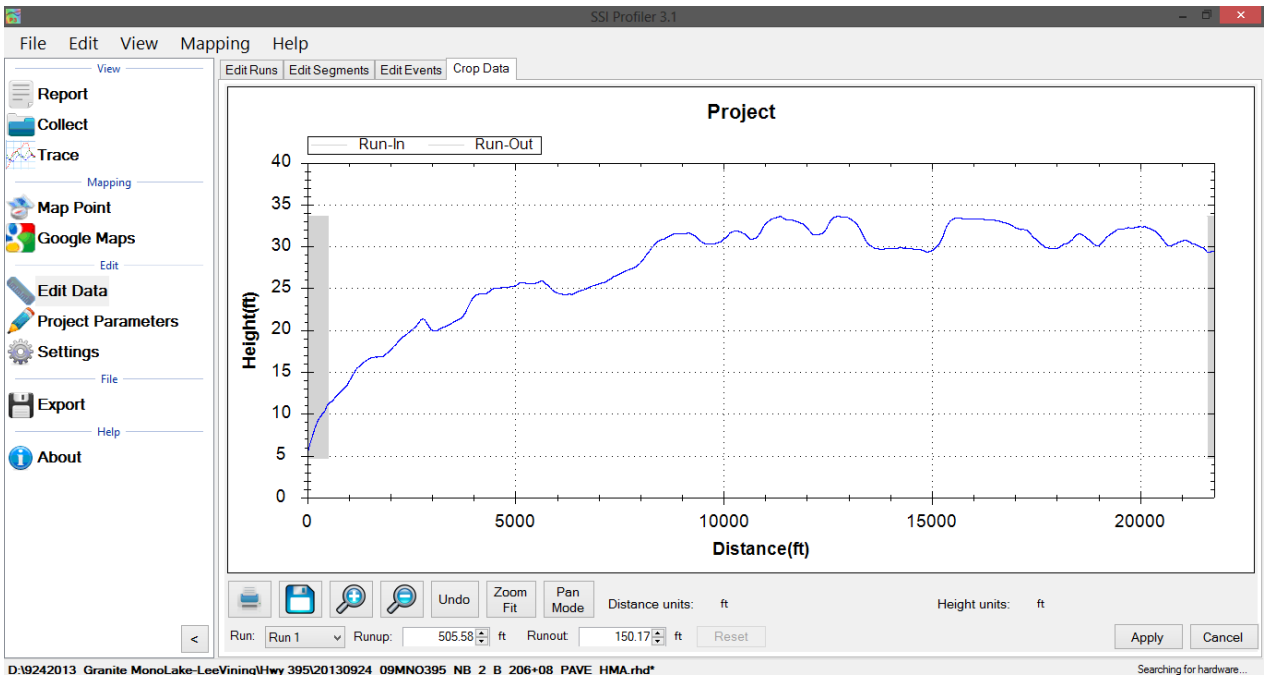


Figure 99: The Crop Data Tool

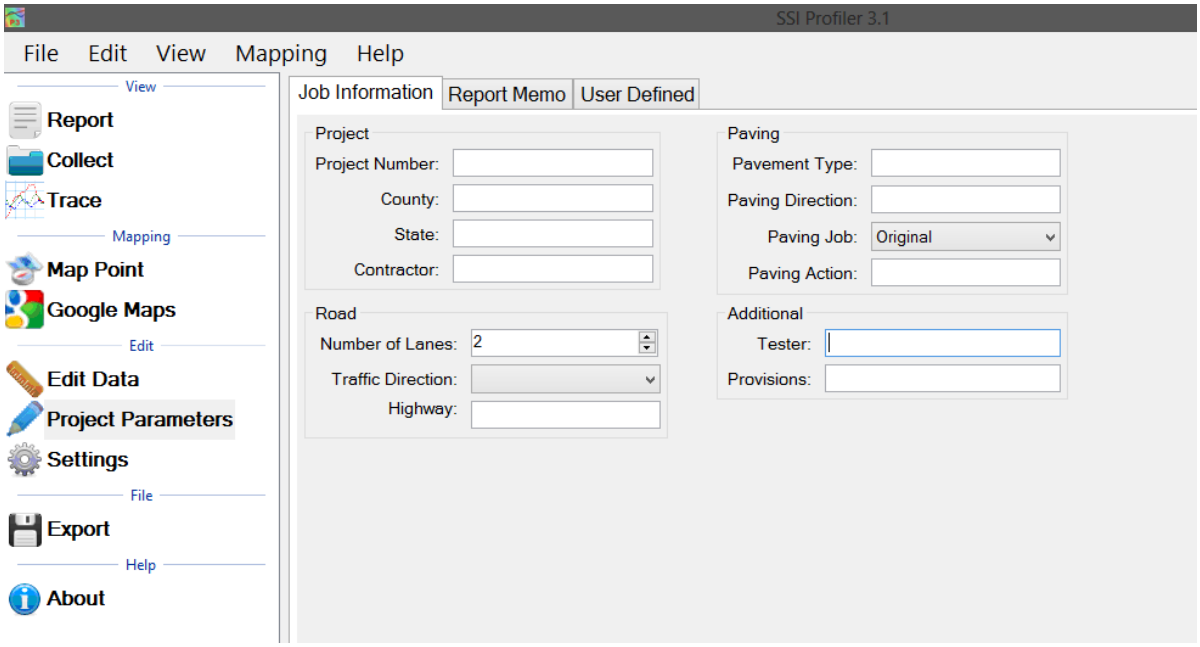


Figure 100: The Project Parameters window

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.

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.

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.

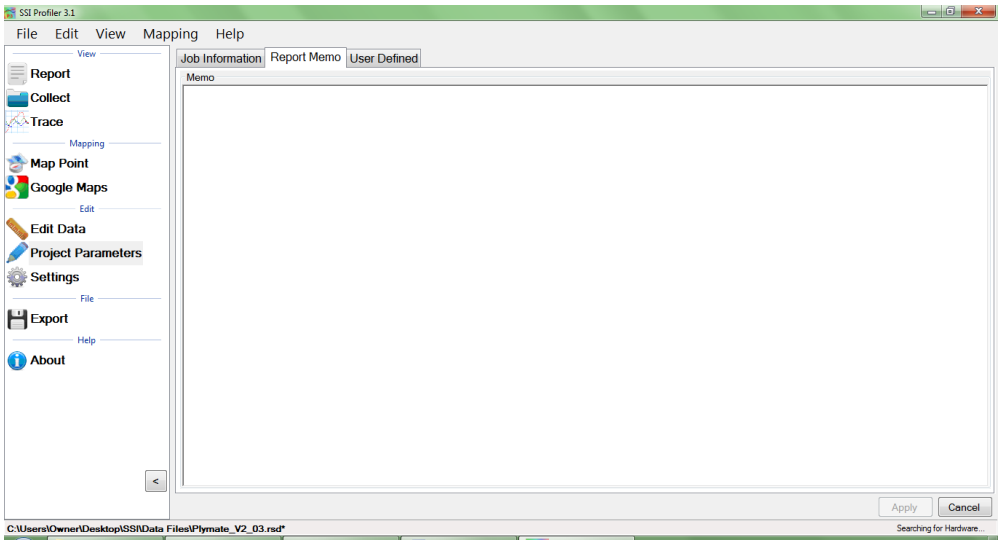


Figure 101: The Report Memo window

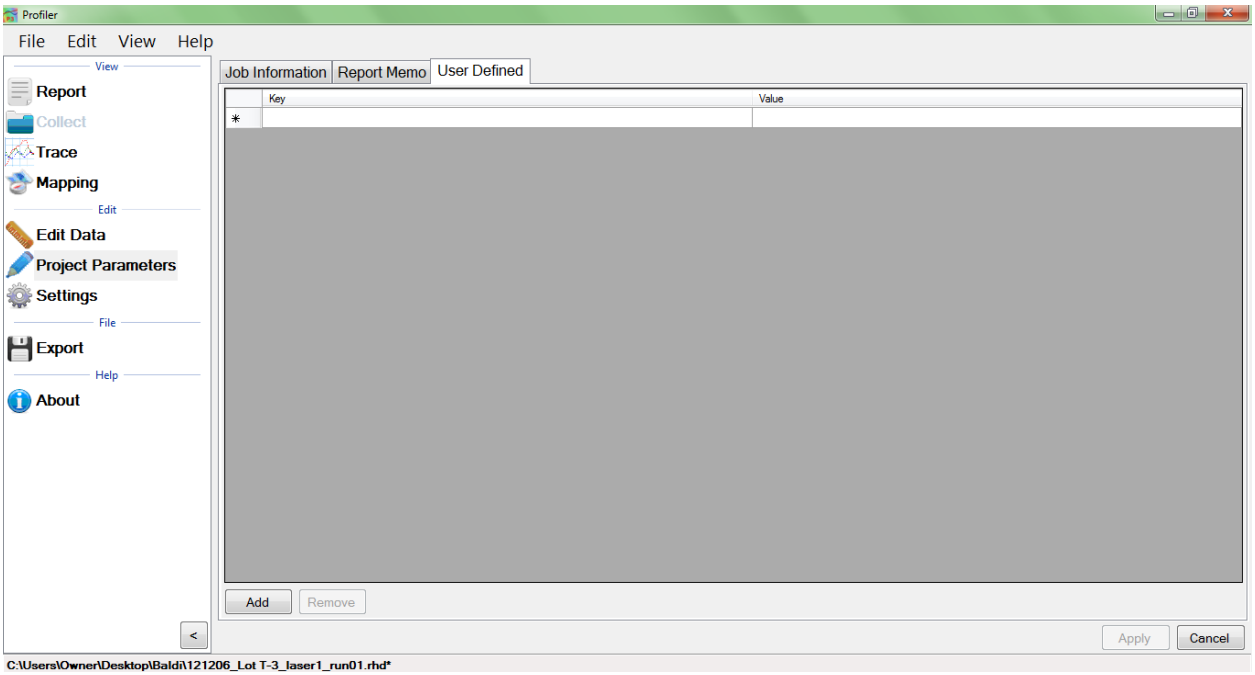


Figure 102: The User Defined window

2.2. - Settings

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.

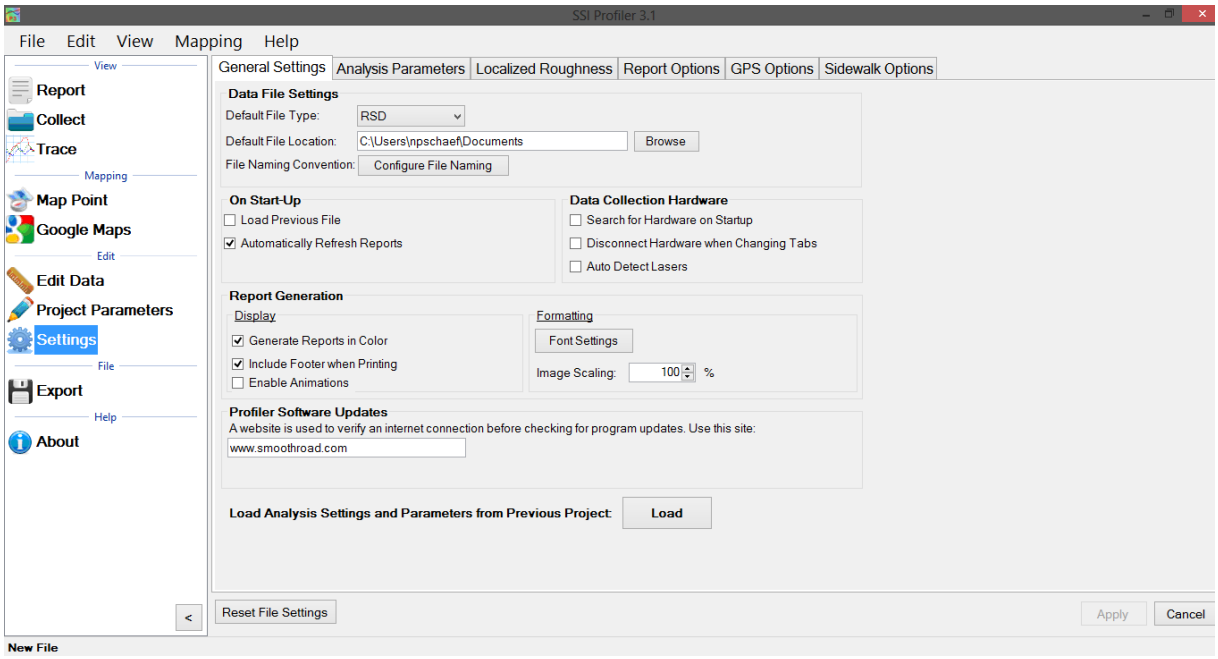


Figure 103: The General Settings window

Section 1 – Units

Default File Type (RSD, RHD)
The drop down menu can be used to select the type of file to be used 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 when opening files when the program opens directly to the file location. Select **Apply** after a folder is chosen.

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

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

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

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.

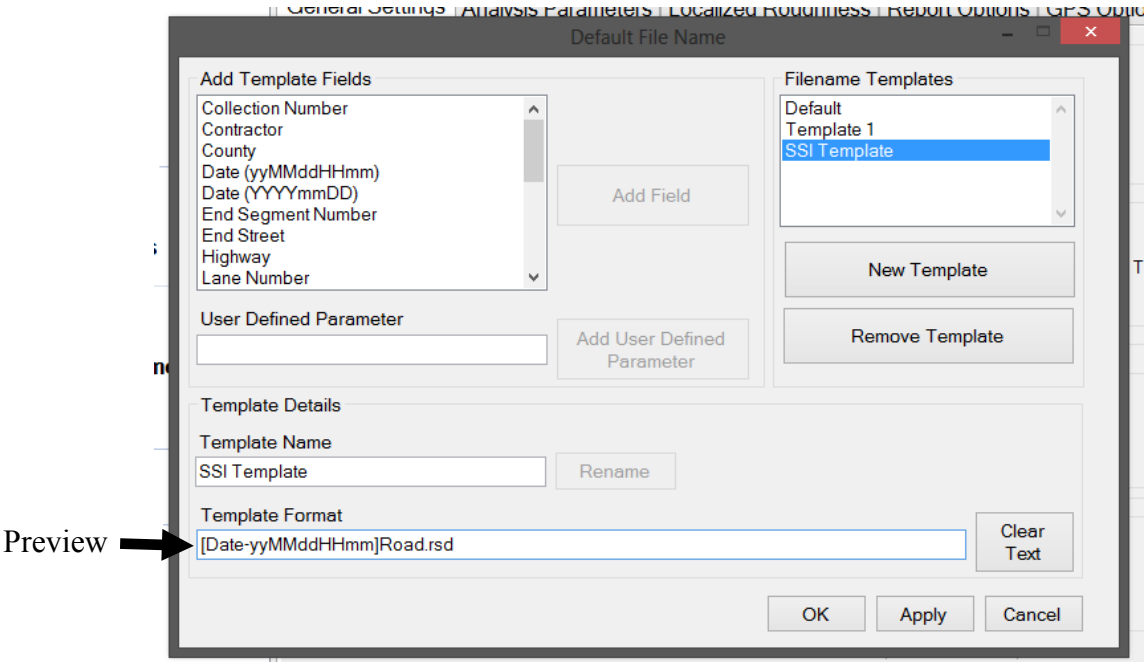


Figure 104: The custom file naming convention window

On Startup

Load Previous File on Startup

If this box is selected, 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.

1) Use Last File's Parameters

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

2) 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.

3) Set File Parameters after Collection

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

Automatically Refresh Reports

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

Data Collection Hardware

Search for Hardware on Startup

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

Disconnect Hardware When Changing Tabs

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

Auto Detect Lasers

This feature will use the health string to determine the type of laser that is connected to the system. This is not an end-all solution. Please check the laser type in the System Settings under the collection window prior to any data collection or perform a height verification.

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.

Enable Animations

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

Formatting

Font Settings

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

Image Scaling
The default for this value 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 in size.

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 at 528 feet. English units use inches for the height of the defects and counts for roughness settings, while using feet for scallop width and filter lengths. After every adjustment of units, select apply in the lower right corner to save changes.

Metric Meters
In the Metric Meters setting, 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
In the Metric Centimeters setting, 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
In the Metric Millimeters setting, 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 of the specification of the California Bridge Profilograph, which is twelve feet long instead of the California Profilograph 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 for simulation of the 12 foot frame of the Bridge Profilograph. 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.

Section 2 - Segment Settings

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 it is less than

If the last segment is a short length, the last segment can be merged into the second-to-last segment. 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.

Paused Sections Drop Down Menu

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 calculation which is universal or roads around the world from concrete and asphalt surfaces. 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 and set the defect settings. Once the defect settings are correct, select Apply and then view a report to observe the PRI ride values.

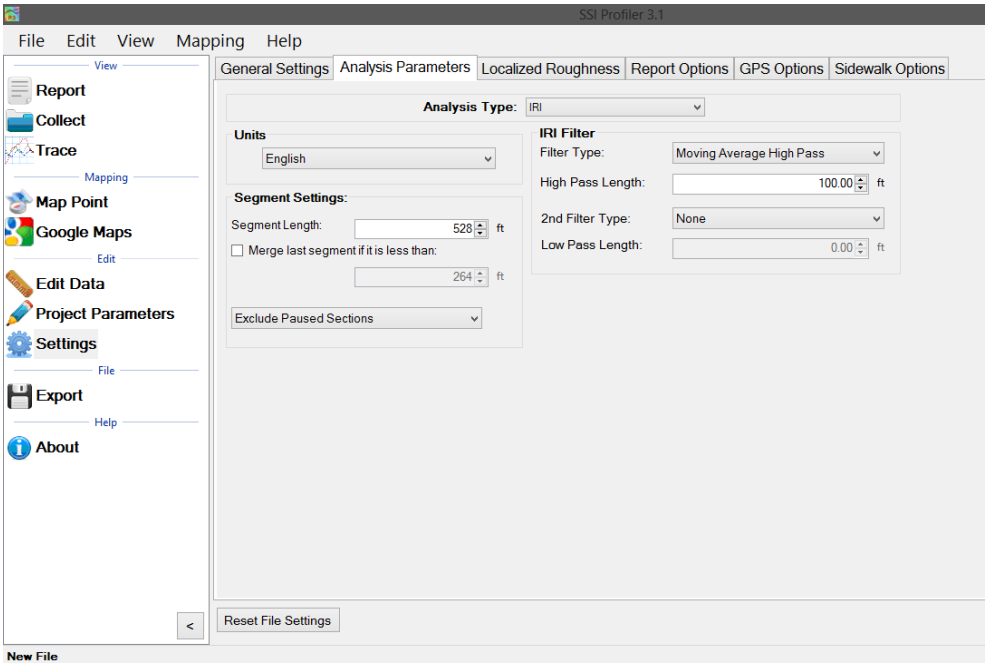


Figure 105: The IRI Analysis Parameters window

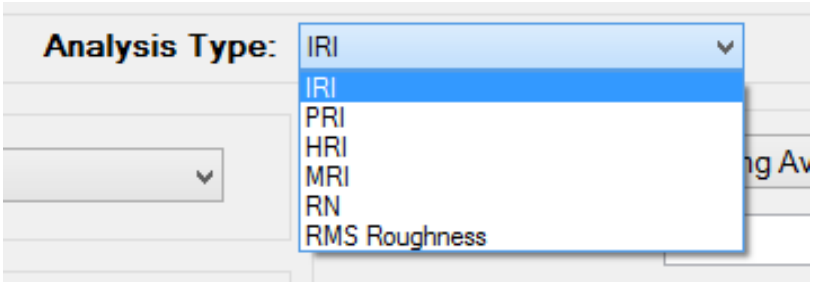


Figure 106: The Analysis type drop down menu displaying all of the Ride Values options

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*.

Scallop Definition

Scallops are the deviations of the profile trace from the limit of the localized roughness line. 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 the defect is not included in the Ride Values, the deviation is still exceeding the defect height parameter which adds 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.

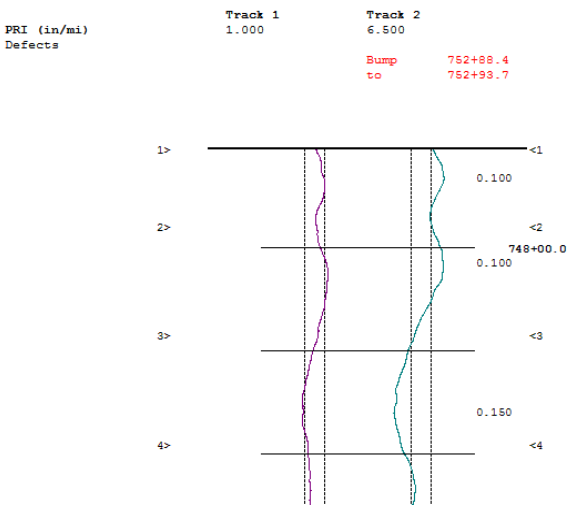


Figure 107: An example of the blanking band in the

Minimum Scallop Height

The minimum scallop height is the minimum height that is seen to be a deviation from the 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 of the profiler. 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.

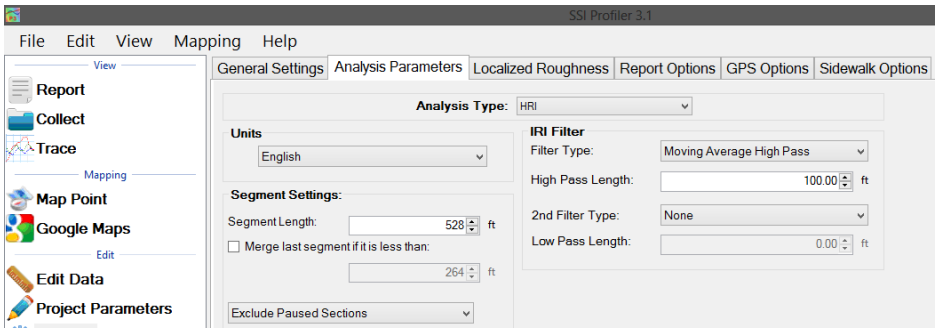


Figure 108: The HRI analysis window with the available filter settings.

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.

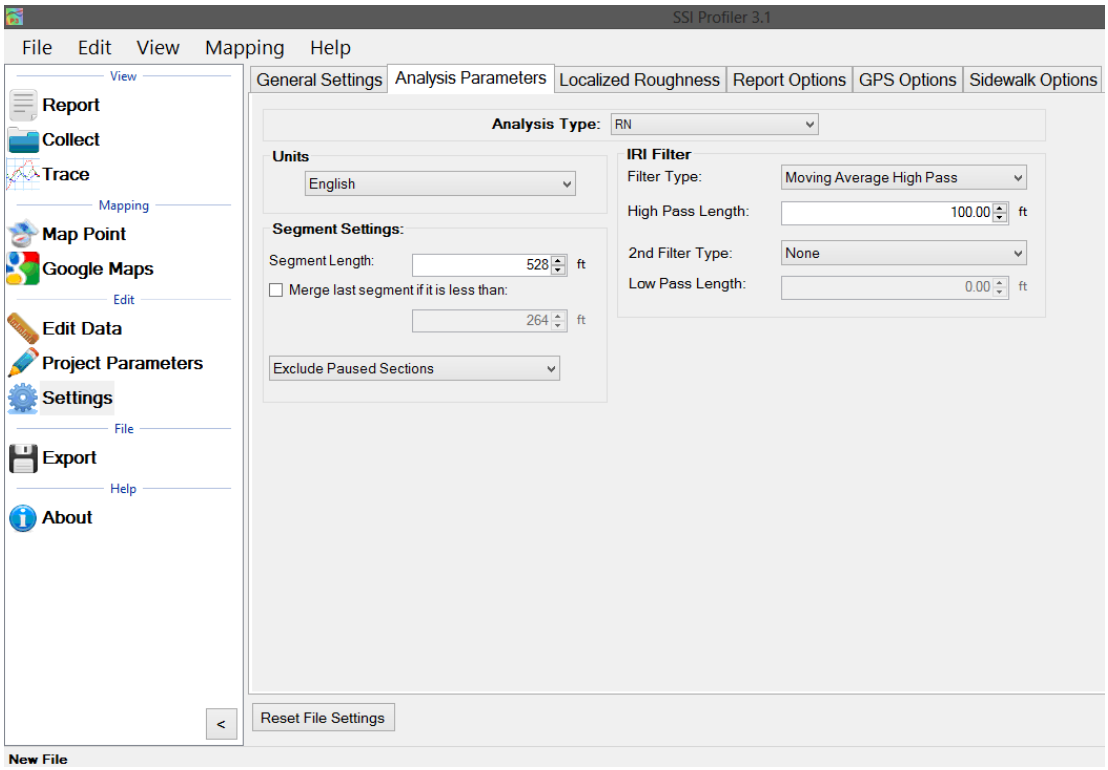


Figure 109: The RN analysis window with the filter options shown.

RMS Roughness

The RMS roughness is another ride value method that is calculated by the profile height over a base length of 25 feet. This is how RMS roughness gets the units of inches.

2.2.3. – Analysis Parameters: Filters

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

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 that is 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.

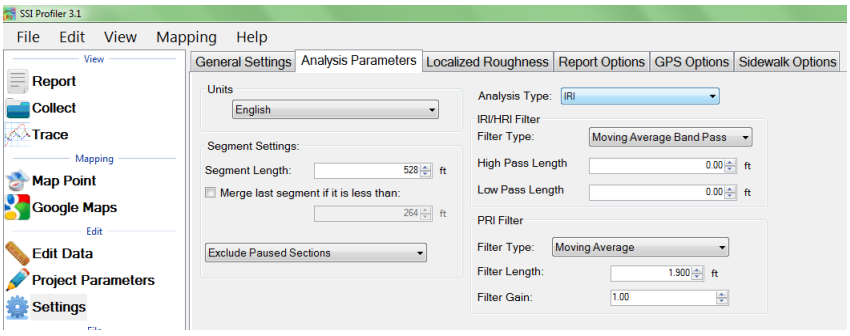


Figure 110: The filters within the IRI analysis parameter window

Section 2 - PRI Filter

Filter Type

Moving Average

A Moving Average Filter of length 1.90 feet can be chosen by the operator, depending on the contract specification. The use of the moving average filter was developed by the Kansas Department of Transportation.

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.

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.

Filter Gain—1.00

The filter gain is to only be used when adjustments are necessary 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 so they are more accurate. A filter gain setting of 1.00 does not affect the collected data. For typical profiling use the default setting of 1.

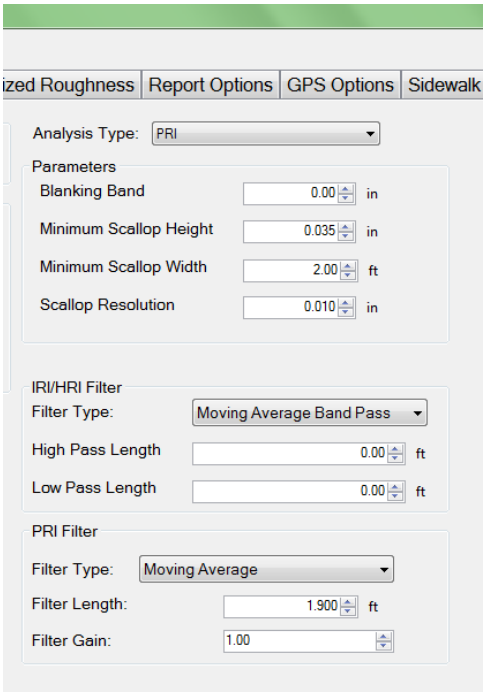


Figure 111: The filters for PRI

2.2.4. –Localized Roughness

Localized roughness refers to the bumps and dips that occur over a distance (longitudinal distance is the width of the bump).

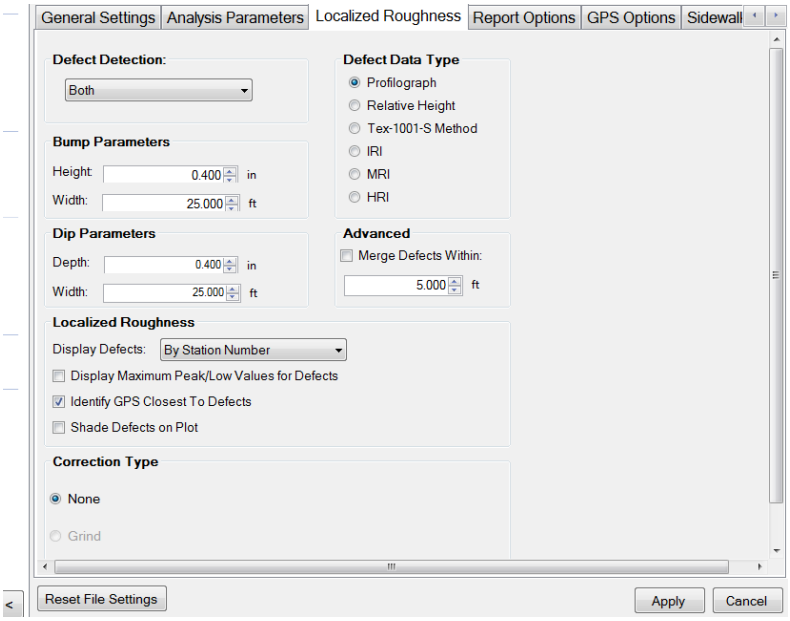
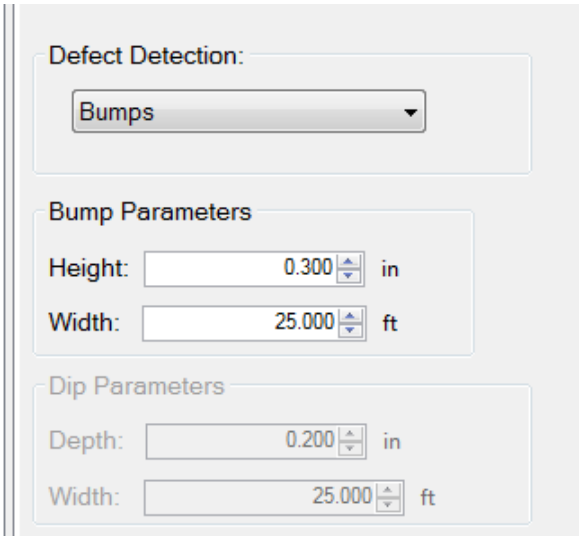


Figure 112: The Localized Roughness window with the defect

Section 1 - Defect Detection

The operator may choose the type of defect detection to implement 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.



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.

Figure 113: When only bumps are selected from the drop-down menu, the dip parameters become unavailable.

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

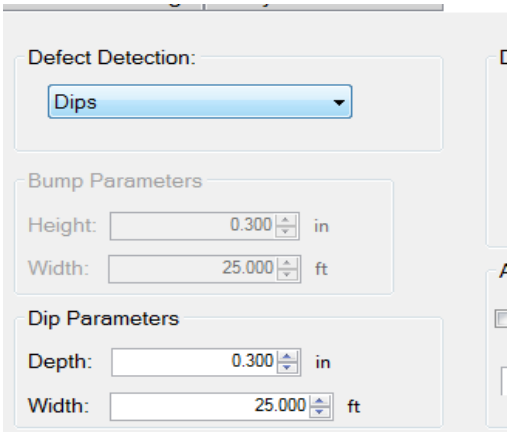


Figure 114: Only dips selected.

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.

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

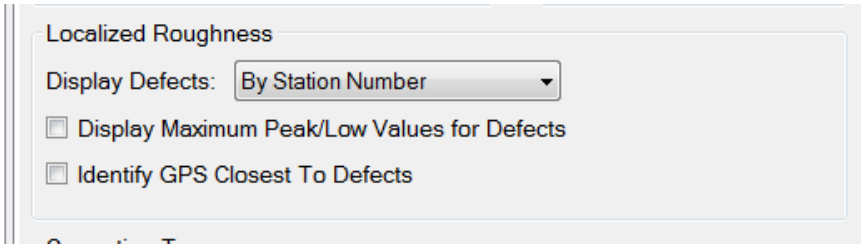


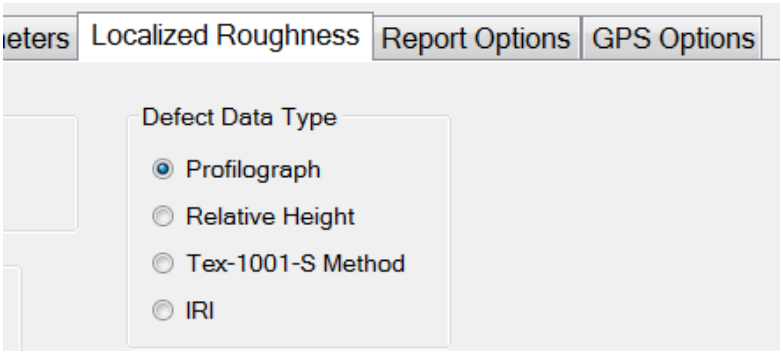
Figure 115: The localized roughness settings for displaying defects

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.

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 116: The types of testing available to find the defects in the data.

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 – Advanced

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."

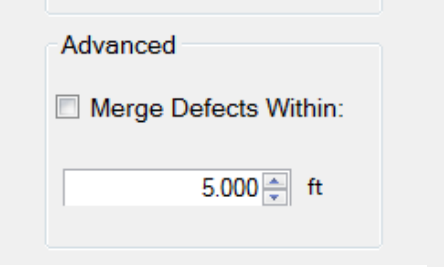


Figure 117: Merge Defects

Section 7 – Correction Type

When PRI is selected as the Analysis Type, the correction type may be chosen. The three options for Correction Type are None, Grind, and Overlay. When IRI, HRI, or RN are selected as the Analysis Type, the only Correction Type option is to select None.

When modifications are made to the settings, select 'Apply' to save the changes.

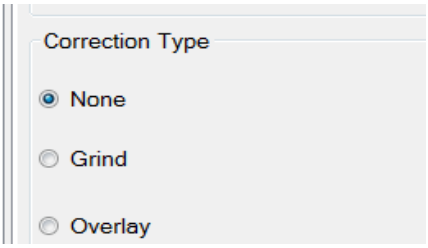


Figure 118: Correction Types

2.2.5. - Report Options

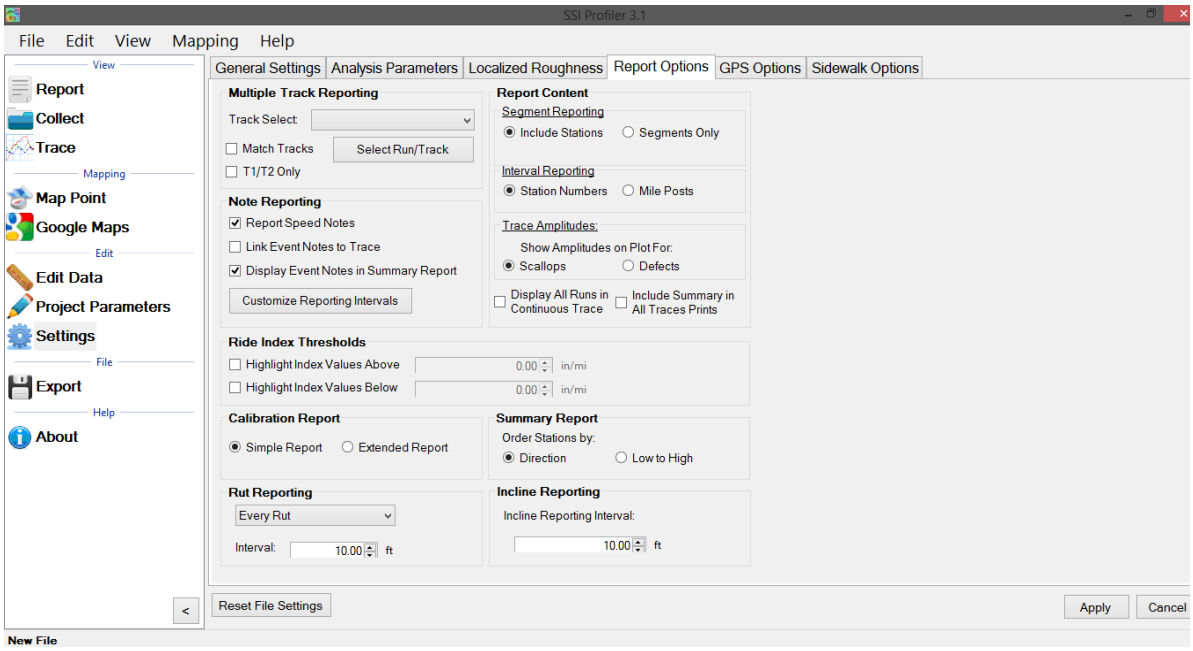


Figure 119: The report options window.

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.

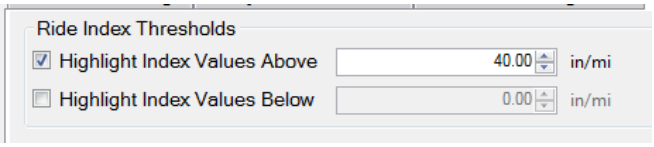


Figure 120: Highlighting IRI values over a threshold

Trace Amplitudes

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

Show Amplitudes on trace for Scallops or Defects

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.

Display All Runs in Continuous Trace Report

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.

Include Summary in All Traces Prints

The summary header will be included in the All Traces report when this feature is selected.

Incline Reporting

To adjust the frequency that Profiler V3 displays the incline data from the inclinometer, change this setting. If there are changes made, select **Apply.**

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
The reporting intervals are the distances traveled while collecting data to between a GPS, Speed or Incline 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:
Maximum GPS Note Reporting Interval
Minimum Speed Not Reporting Interval
Minimum Incline 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.

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."

Report Type
This section changes parameters that appear on the reports.

Station Numbers – The Default Setting
When Station Numbers is selected, the segment stationing will be giving in the form of station numbers. Such as: 'Track 1 Segment 1 Station: 0+00.0 to 5+28.0.' In order to save changes made to the Report Type, always select **Apply** after making any changes.

Mile Posts
When Mile Posts are selected, the segment position will be given in terms of miles. This number will be in decimal form. Such as: 'Track 1 Segment 1 Station: 0.0 to 0.10." In order to save changes made to the Report Type, always select **Apply** after making any changes.

Summary Report – Order Stations By:
Direction
The summary report will be organized by the direction of the profiling motion. The stationing direction will not be relevant.

Low to High
The stationing in the reports will be displayed from low to high numbers when the low to high feature is selected.

Calibration Report

Simple 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 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. To review the calibration report, select the Report tab and select the Calibration Report from the drop down menu.

2.2.6. – GPS Options

The operator has the option to choose the type of GPS to use for collection. If a survey system is being used, use the GPS supplied with the collection device.

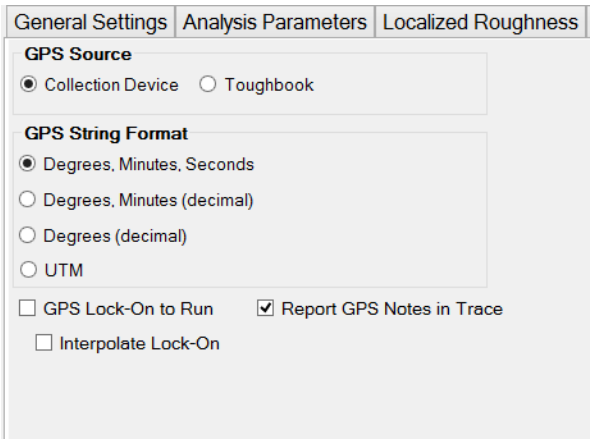


Figure 122: The GPS options tab

GPS Lock-On to Run

The GPS signal will reference the GPS coordinates of the collection while the system is in motion.

Report GPS Notes in Trace

To report GPS notes in the trace select this box. The GPS notes will be at the bottom of the trace with carrots and numbers signifying where the note it located.

Interpolate Lock-On

When between GPS points, the interpolation give the user a more accurate current location. The interpolation uses the two nearest GPS points and the position given by the profiler distance to give a location between the GPS points.

Sidewalk Options

When using a SSI Sidewalk Profiler, the sidewalk parameters can be changed in the Settings under the Sidewalk Options tab. The non-conforming parameters of the collected surface will be displayed in the report. At this location the user may change:

Maximum Running Grade

Maximum running grade is the maximum value that the running grade cannot exceed. If this value is exceeded, the sidewalk report will list the sections of non-conforming sidewalk sections by GPS and stationing.

Running Grade Cutoff
Running grade cutoff is the value that is the maximum output allowed in the reports. Values over this threshold will be displayed as this maximum value in the report.

Maximum Cross Slope
Maximum cross slope is the value that is the maximum output allowed in the report. If this value is exceeded, the cross slope report will list the non-conforming sidewalk sections.

Cross Slope Cutoff
Cross slope cutoff is the value that is the maximum output allowed in the reports. Values over this threshold will be displayed as this maximum value in the report.

Slope Range Interval
Slope range interval is size of the percentage range that the user desired to report running grade and cross slope.

Minimum Interval Length
Minimum length is the shortest distance or length that can be reported for a given running grade or cross slope range. Most sidewalks will have a reporting distance of 24 inches based off of a wheelchair.

Maximum Vertical Bump Height
Maximum vertical bump height is the maximum deviation from the running height. The height is measured from sharp peaks for relatively short distances. Bumps are characterized by a length to height ratio of 1:2. All bumps that are ***over*** this ratio are classified under this maximum bump height.

Maximum 1:2 Bevel Bump Height
Maximum bevel bump height applies to bumps that have a height less than the length to height ratio of 1:2.

Include Interval Types
To include an interval type that will be used during collection select the options individually. To include all interval types, select the check box to the left of, “Include All Sidewalk Interval Types.”

When a setting is changed, select **Apply** to save the changes.

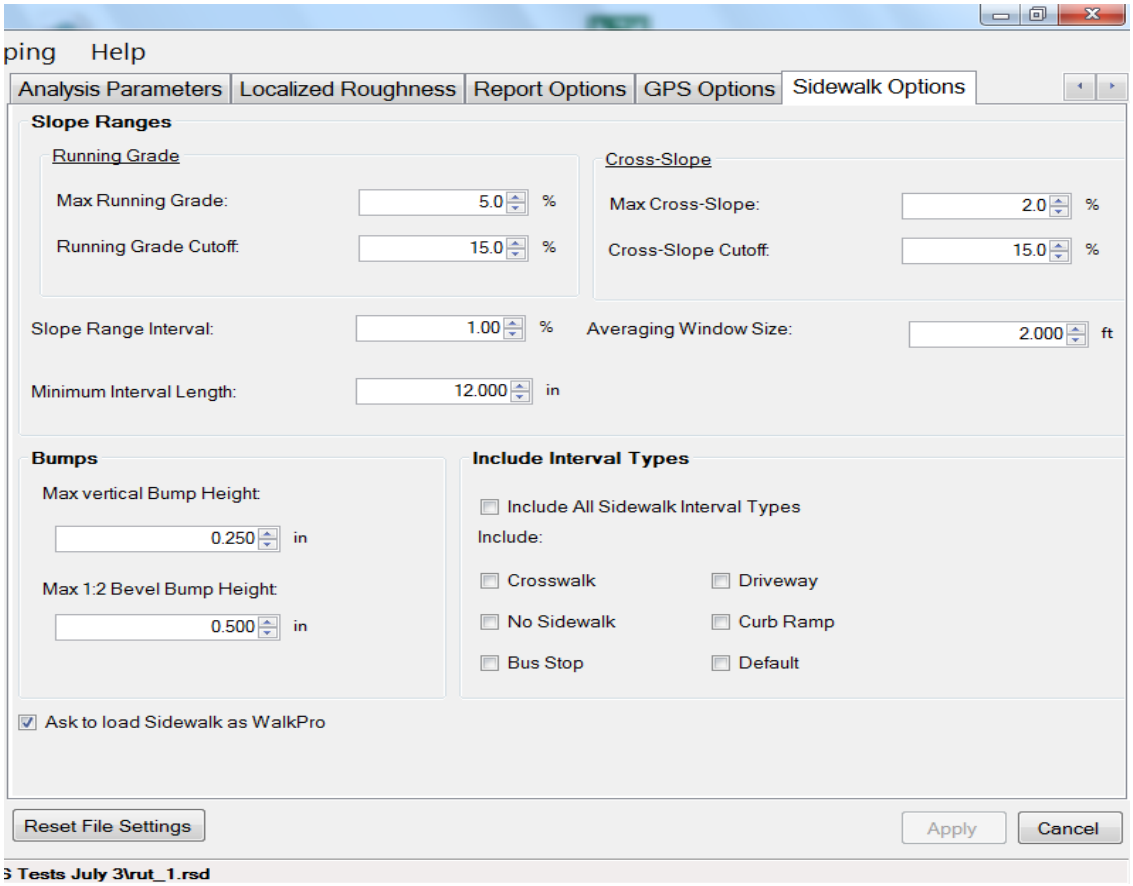


Figure 123: The Sidewalk Options

3. 0 – View

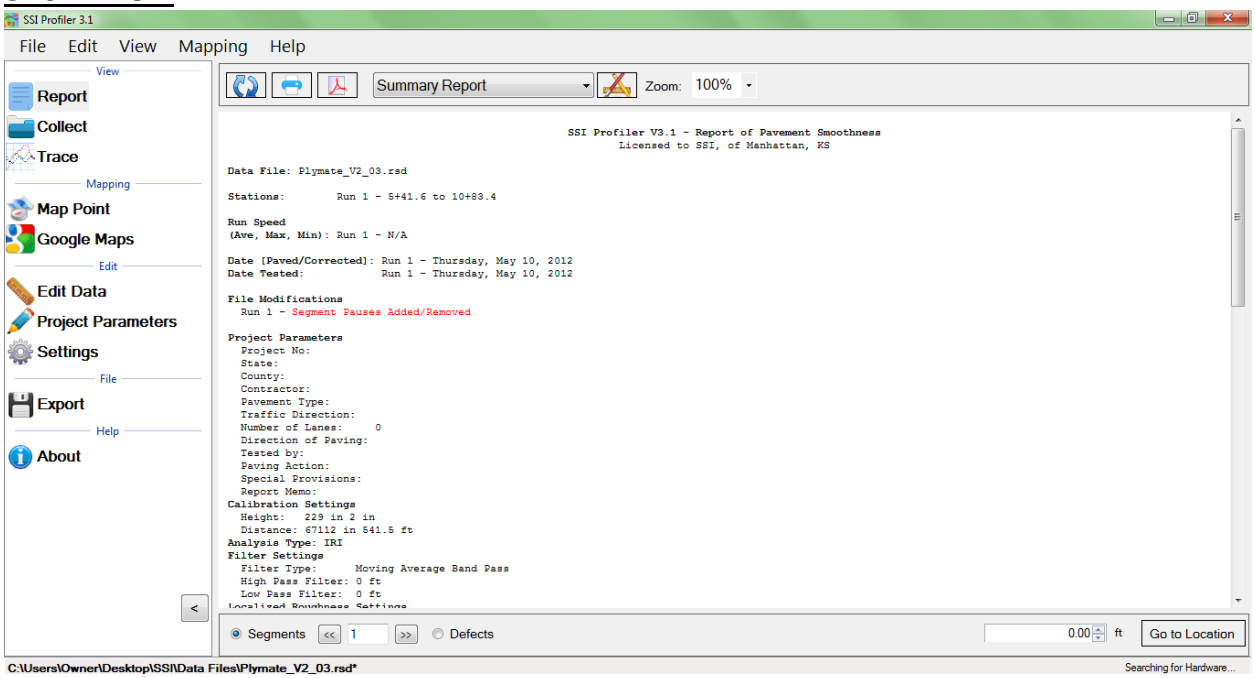


Figure 124: The summary header of a single trace report.

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.

Enable of 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.

At the bottom of the Enable or Disable Window the user may choose which report type is opened by defa.ult with a new file. In the connecting figure, the summary report is the file that will be shown when a file is opened.

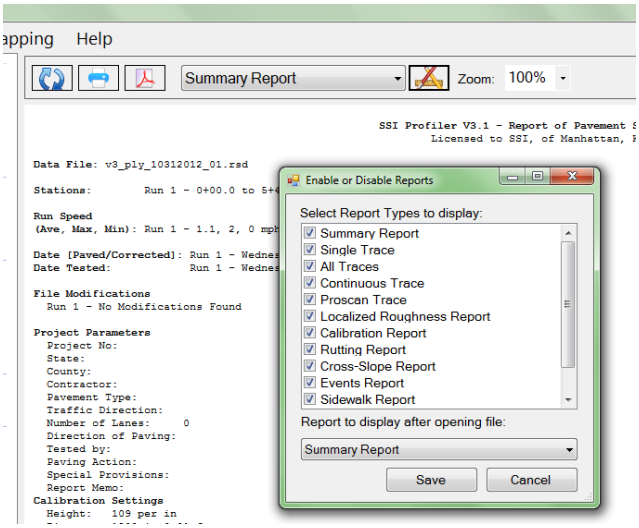


Figure 125: Enable and Disable Reports Window

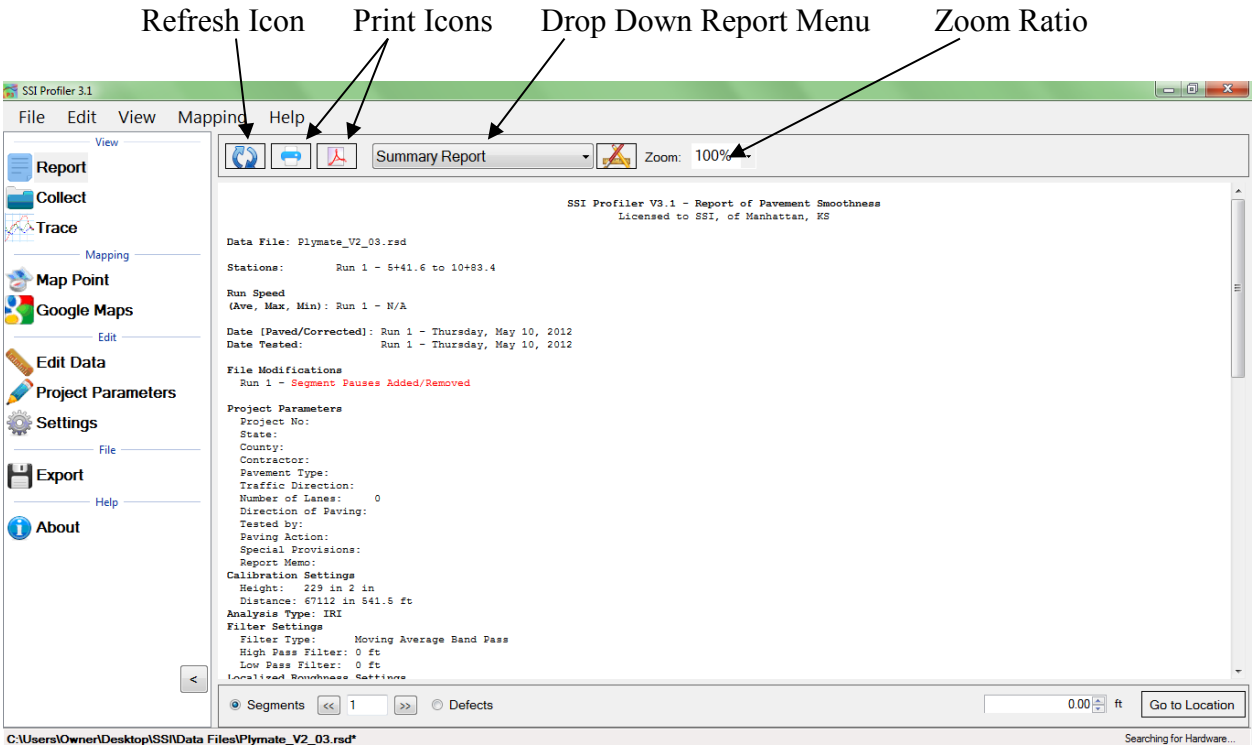


Figure 126: The tool bar for the report window

Print

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.

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.

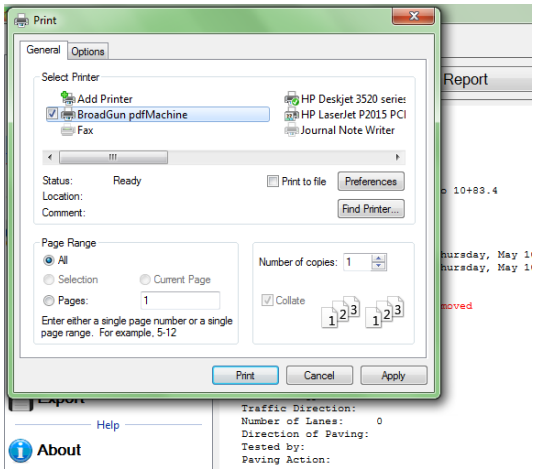


Figure 127: Printing Options Window

Report Options

The Report Options available in Profiler V3 are Summary Report, Single Trace, All Trace, Continuous Trace, Proscan Trace, Defects Report, Calibration Report, Rutting Report, Cross-Slope Report, Text Report, and QA Suite 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.

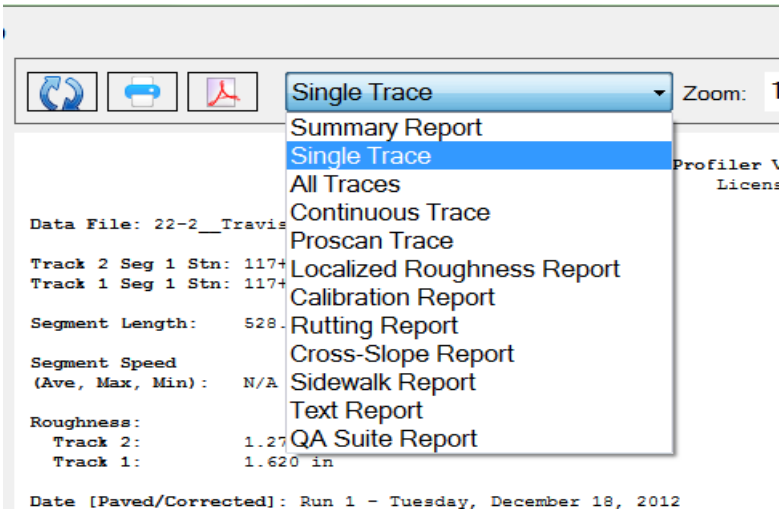


Figure 128: The drop-down menu for the report options

Zoom

The zoom feature is used to adjust the size of the Report window. To change the view of the Report window, left click on the Zoom box or on the arrow to the right of the box. Selecting the arrow will only allow the window to change to the preset values of 50%, 75%, 100%, 250% and 500%. If the operator chooses to left click within the zoom box, the keyboard can be used to type in the desired zoom percentage. After the zoom percentage is entered, select 'Enter.'

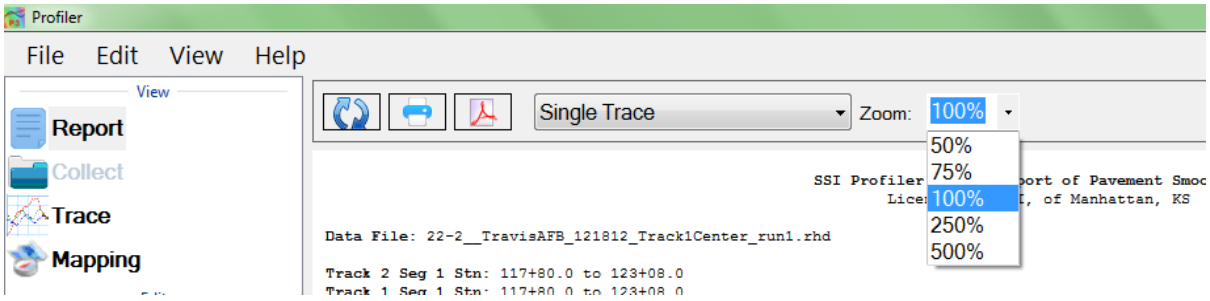


Figure 129: The built in zoom ratios

View by Segments or Defects

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. When Defects are selected, the same procedure is used to navigate throughout the file to the defect locations. This is a shortcut for moving throughout segments and finding defects while in the Single Trace report option.

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.

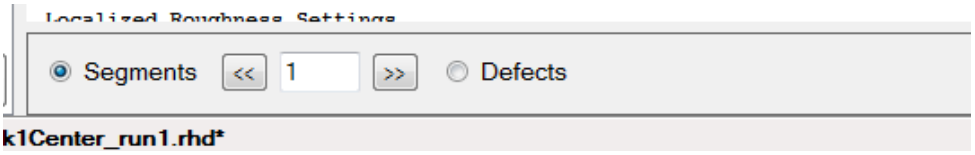


Figure 130: The segment or defect navigator

Go to Location

The Go to Location Feature moves the report window to the position of the profile (a distance) entered in the box. By entering the station number in decimal form and selecting 'Go to Location' the segment containing the entered station number will be displayed in the Report window.

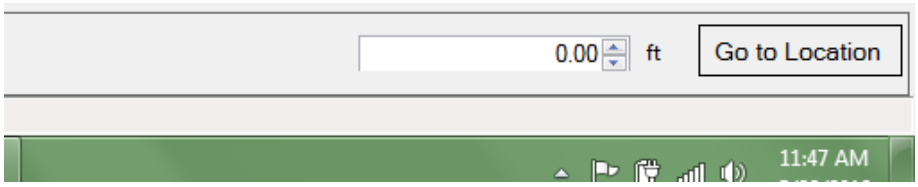


Figure 131: Go to Location Feature

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.

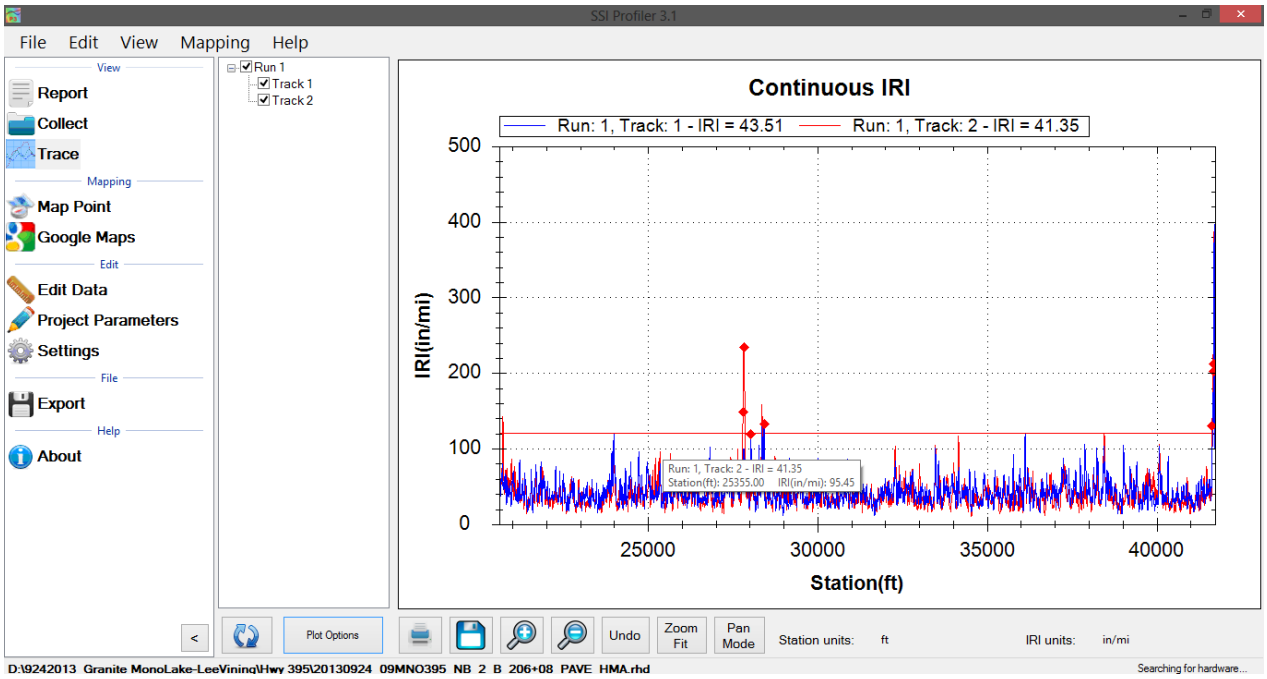


Figure 132: An example of the profile trace

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

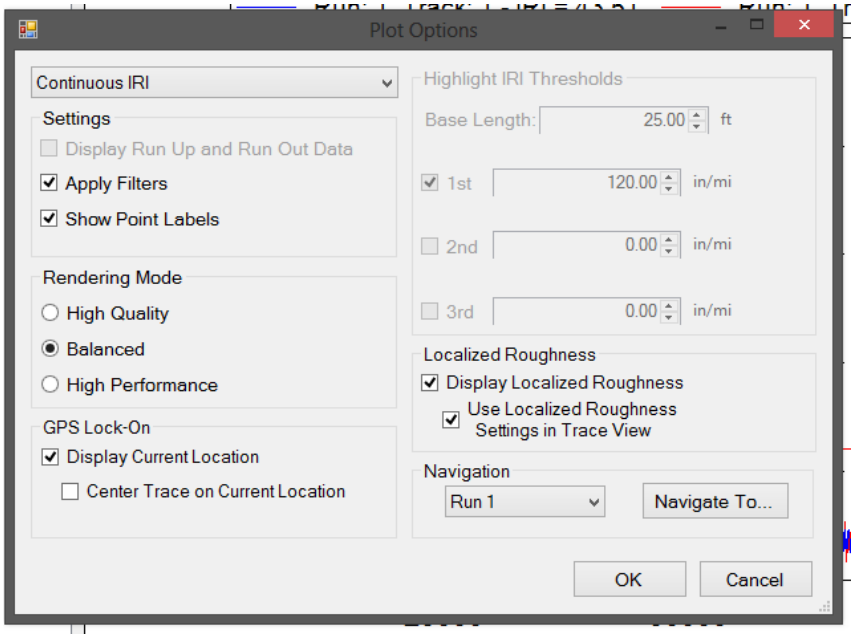


Figure 133: The plot options window

Profile/Continuous IRI

The drop down menu allows the user to select options of Profile and Continuous IRI, MRI or HRI. When Continuous IRI is selected, the operator may not choose the option to include Run Up and Run out data.

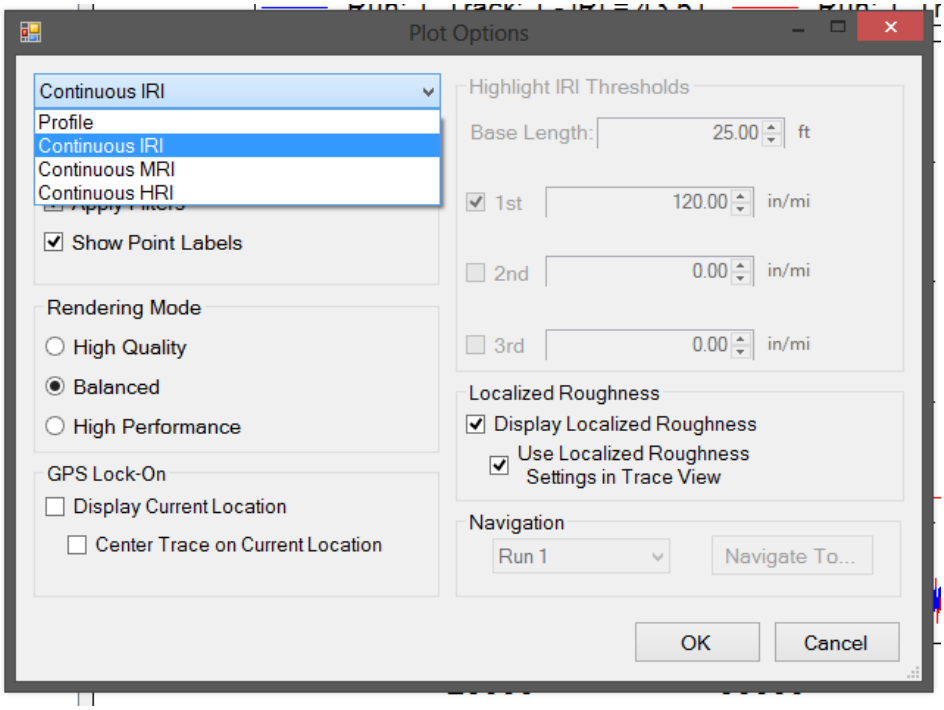


Figure 134: Plot Options Window

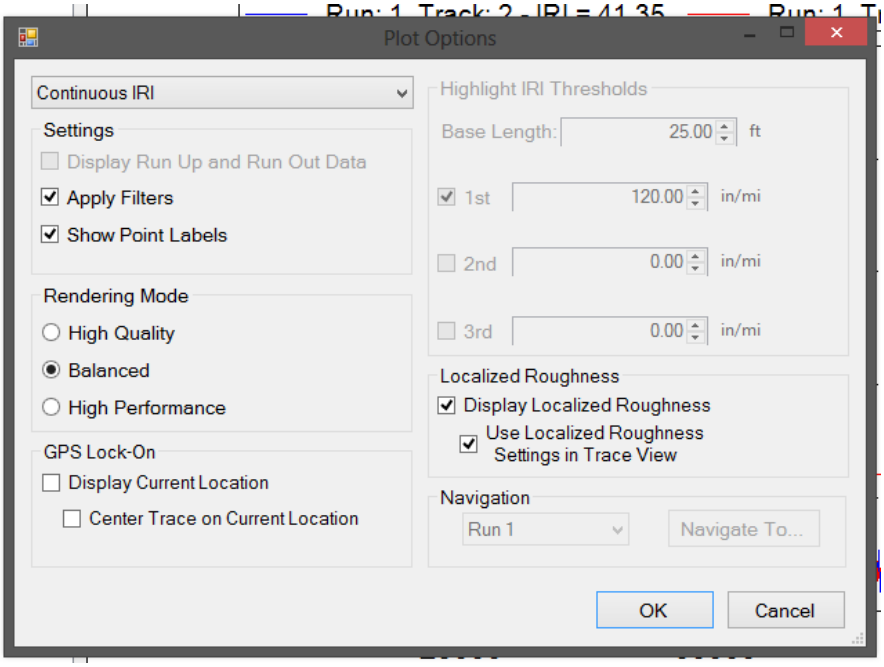


Figure 135: Continuous IRI Window.

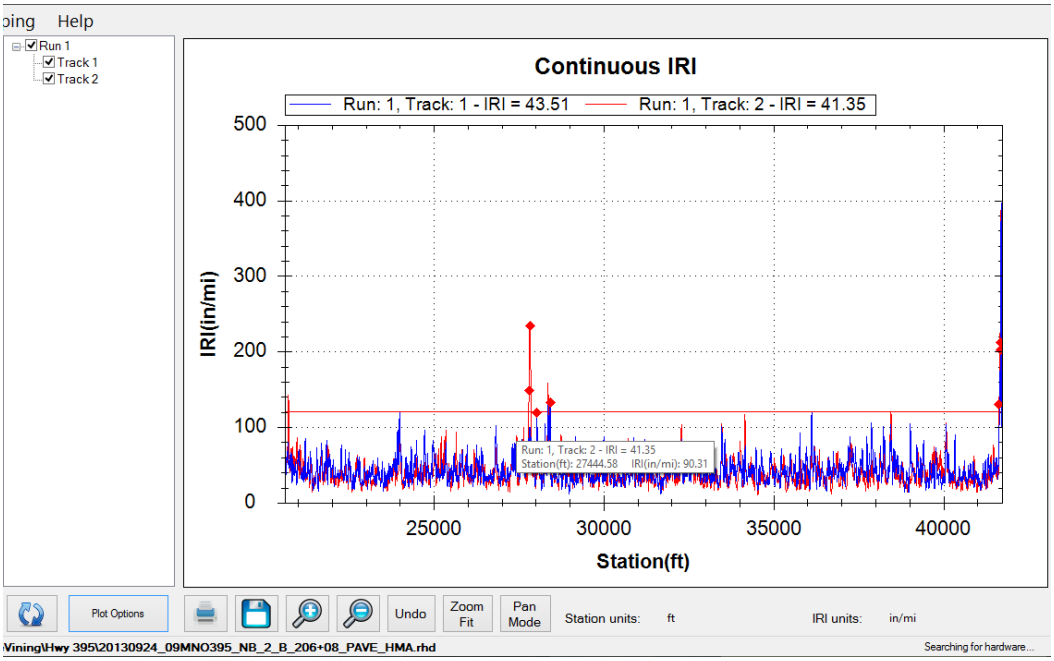


Figure 136: The plot of the Continuous IRI trace

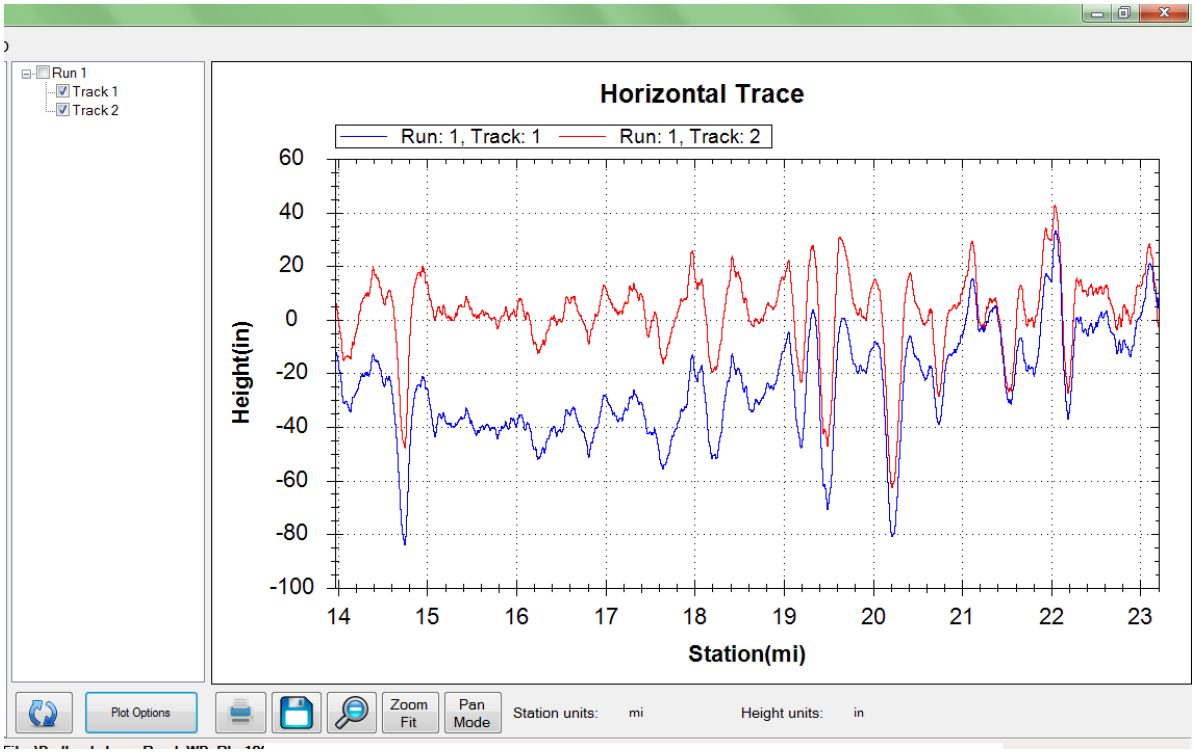


Figure 137: The plot of the profile trace

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.

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.

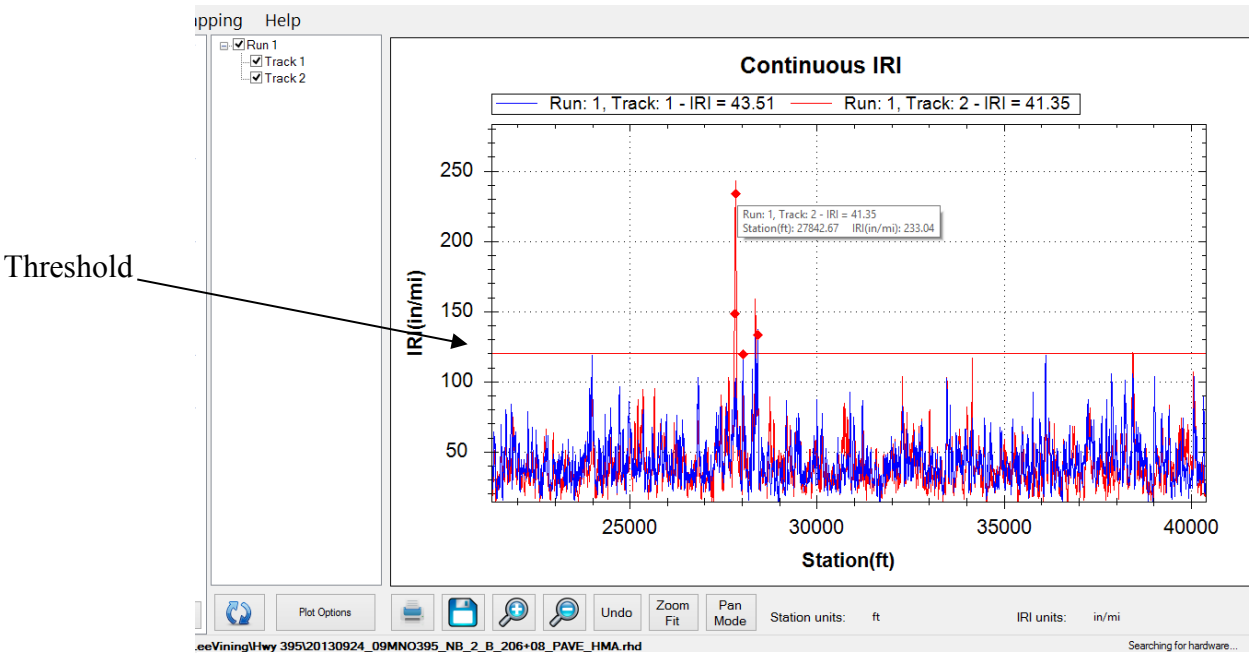


Figure 138: The Continuous IRI trace with the localized roughness diamonds

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.***

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.

To Navigate:

1) Select the run that the desired point of localized roughness, segment, station or GPS coordinate is found in under the Plot Options Menu.
2) Select Navigate To…
3) Use the drop down menu to select the type of location: defect (localized roughness), segment, station, or GPS coordinate.

4) Select a location from the list and then select the green “Start Navigation” icon

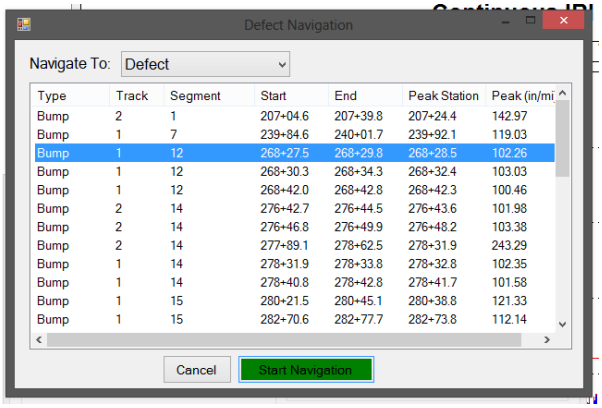


Figure 199: A Location selected and ready to start navigation

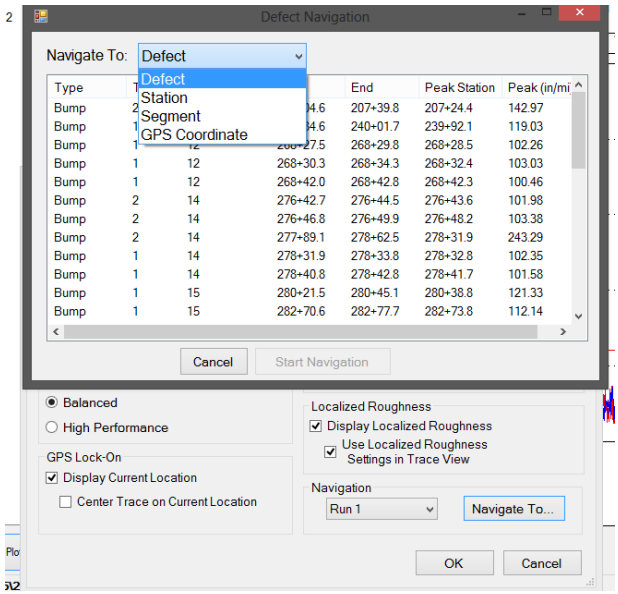


Figure 140: The Trace Navigation Options

<u>GPS Coordinate Navigation</u>

To navigate to a GPS coordinate, type in the GPS coordinates for longitude and latitude.

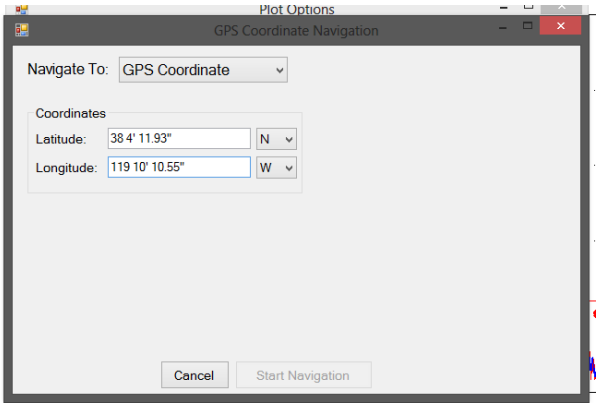


Figure 141: Navigate to GPS Coordinate

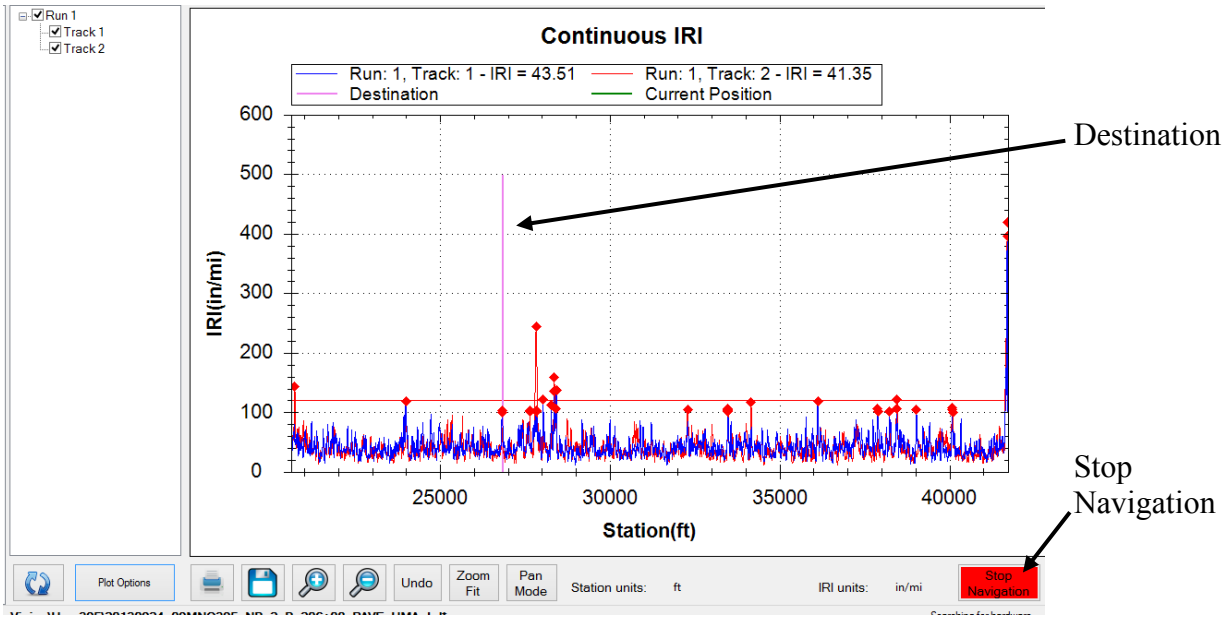


Figure 142: The Navigation started. The pink line is the destination

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.

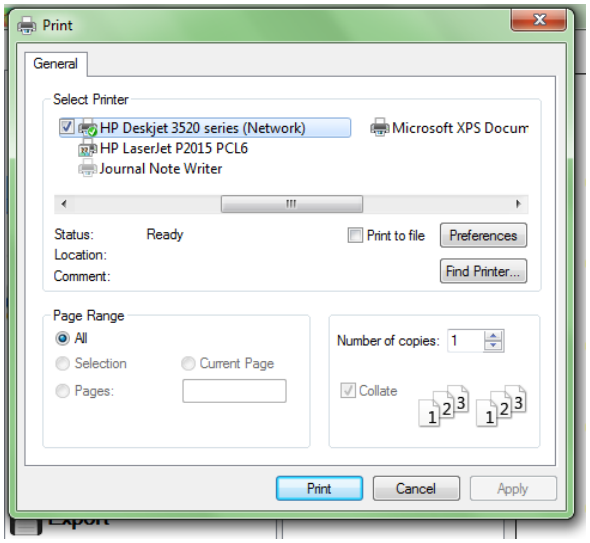


Figure 143: The Print window that appears after the print icon is selected

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.

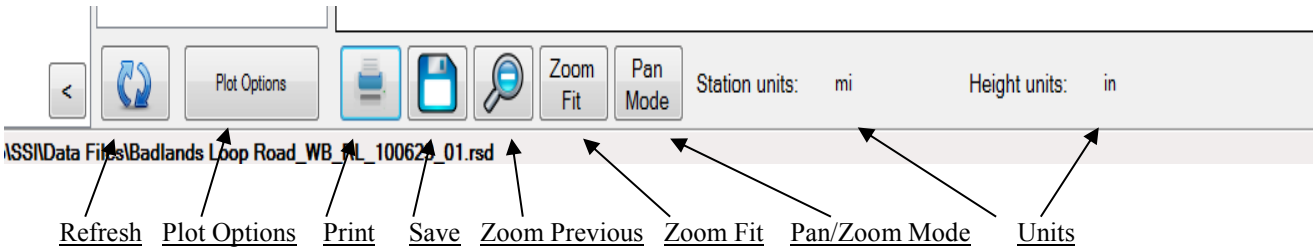


Figure 144: The tool bar for the trace window

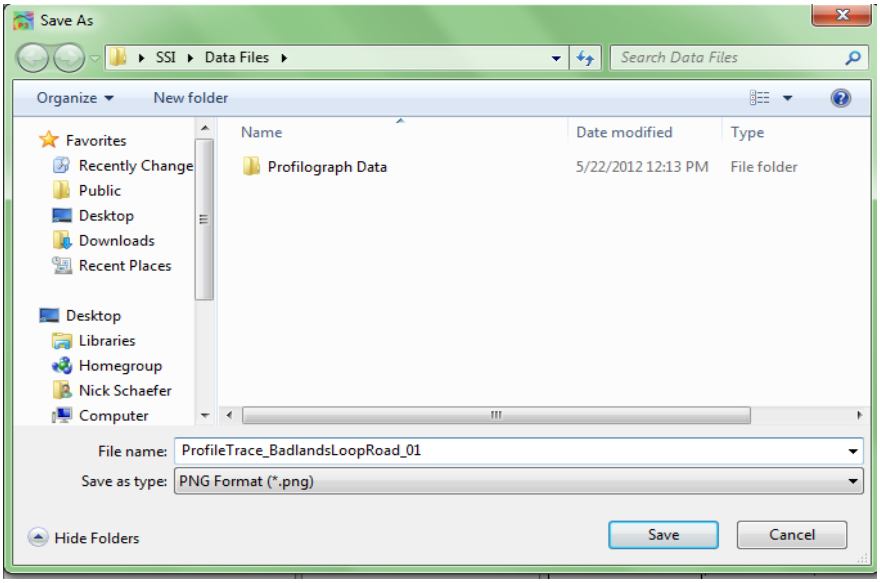


Figure 145: Windows explorer to save a picture of the graph.

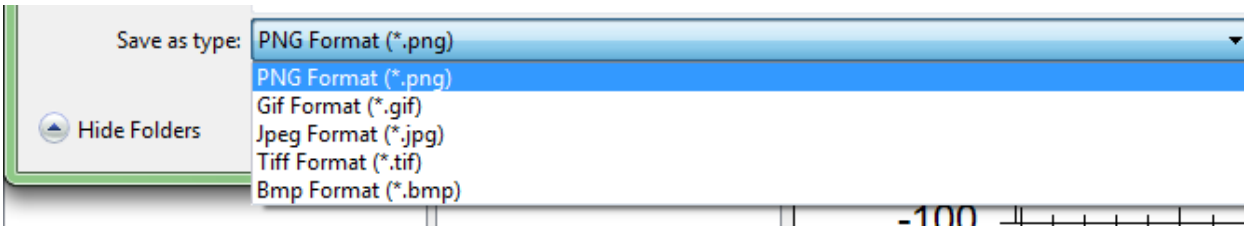


Figure 146: Available picture formats to save the trace graph

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.

4.0. – Mapping

The Profiler V3 program has two separate mapping programs to choose from. Map Point can be used to travel to the point of defects or other points of interest on the run path. For this reason, *Map Point requires a connected GPS device to function*. Google Maps can be used to show the real world location of the event, segment, and collection path. Both of these features are used after a collection has been completed with GPS coordinates.

4.1. – Map Point

Map Point is used to navigate to points of interest along the path of collection.

The Map Point feature can be used to navigate to defects in the profile based on the GPS coordinates. Map Point can be used in trace view or through the compass and distance readout on the Map Point window. To navigate to a defect using Mapping:

1) Open a file in SSI Profiler with defects
2) Open the Mapping window through the shortcut bar or through View>Mapping.
3) At the top, select a run and click on the "Navigate To" icon.

4) The user may choose to navigate to a defect, station, segment, or a specific GPS coordinate. Choose the option from the drop down menu. Select a location and click on the green Start Navigation icon.

5) Follow the instructions of the mapping to get to the destination.

Note: A GPS signal and a collection using GPS is required to use Mapping feature.

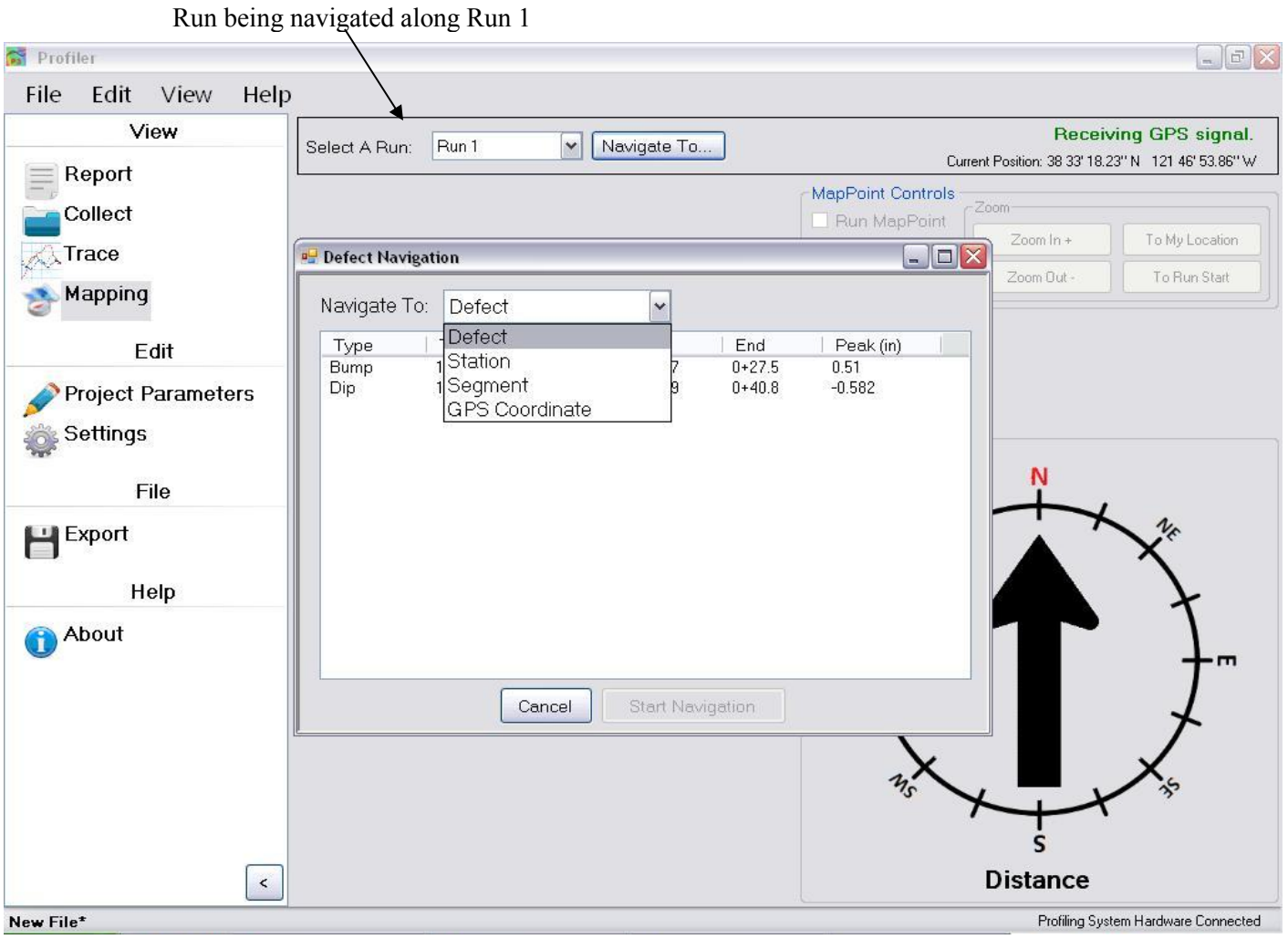


Figure 147: The drop-down menu for Mapping

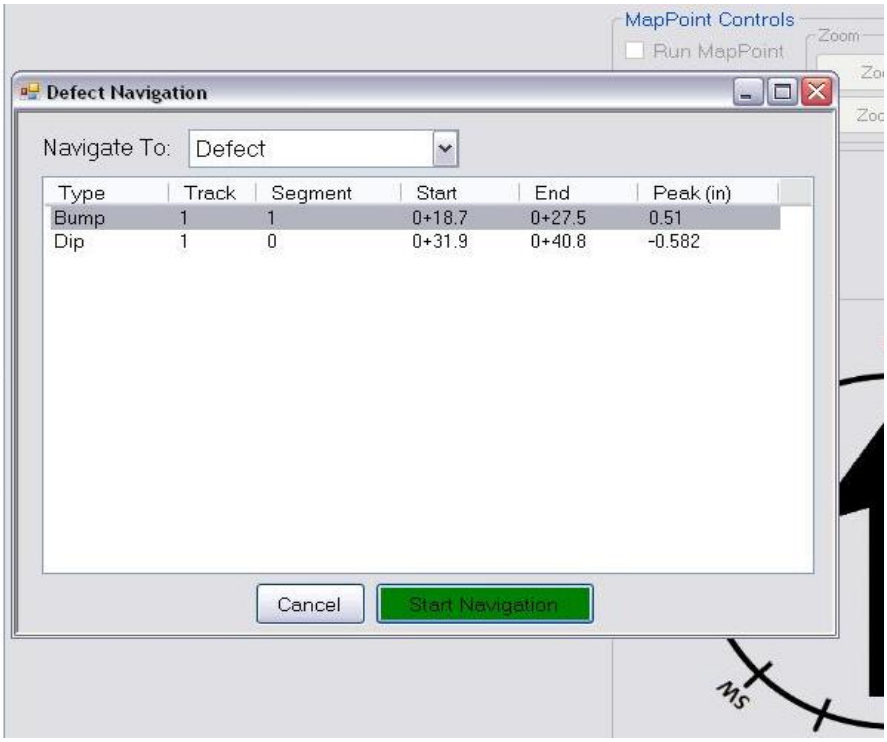


Figure 2448: A bump is selected in Mapping

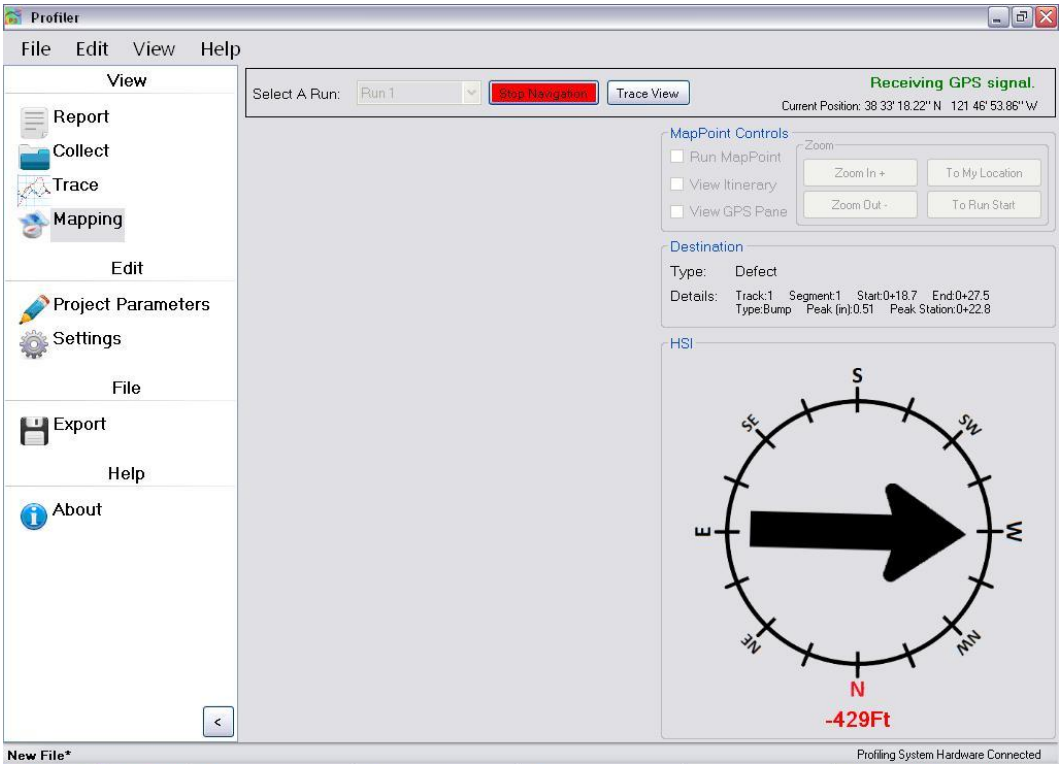


Figure 149: Navigation to a point in Mapping

4.2 – Google Maps

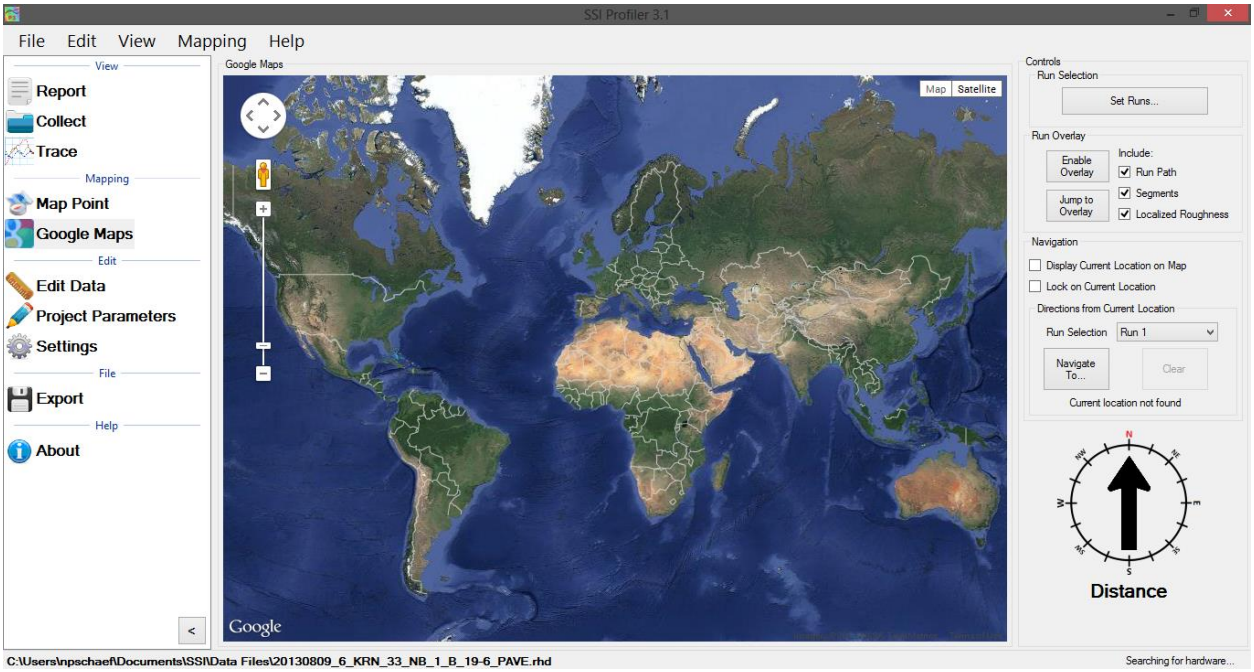


Figure 150: Initial Google Maps Screen

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, 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.

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.

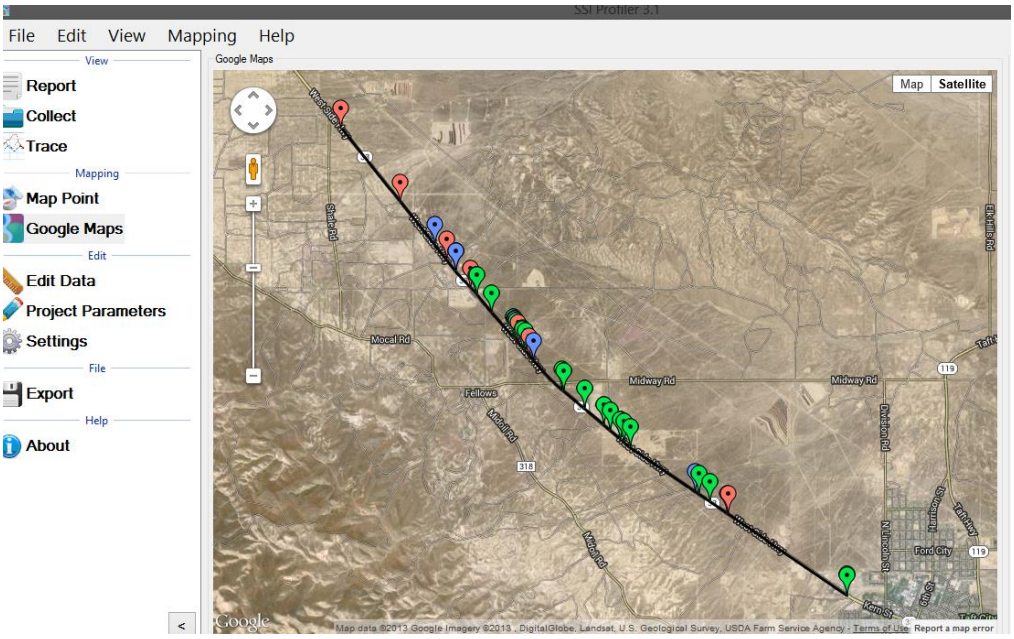


Figure 151: Google Maps showing the localized roughness

5.0 – About

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.

Profiler V3 License Information

The computer's Profiler V3 license information can be viewed in the About window. The details will display all of the additional features and collection devices attributed to the license.
The update icon will allow the operator to choose an installation file from the computer to update the Profiler V3 software.

Manual

The manual can be found under the Help Tab or on the About Section window. Otherwise, the manual is save to the Desktop or in the "Manuals" folder under ***C:\Program Files (x86)\SSI Profiler 3\Manuals***.

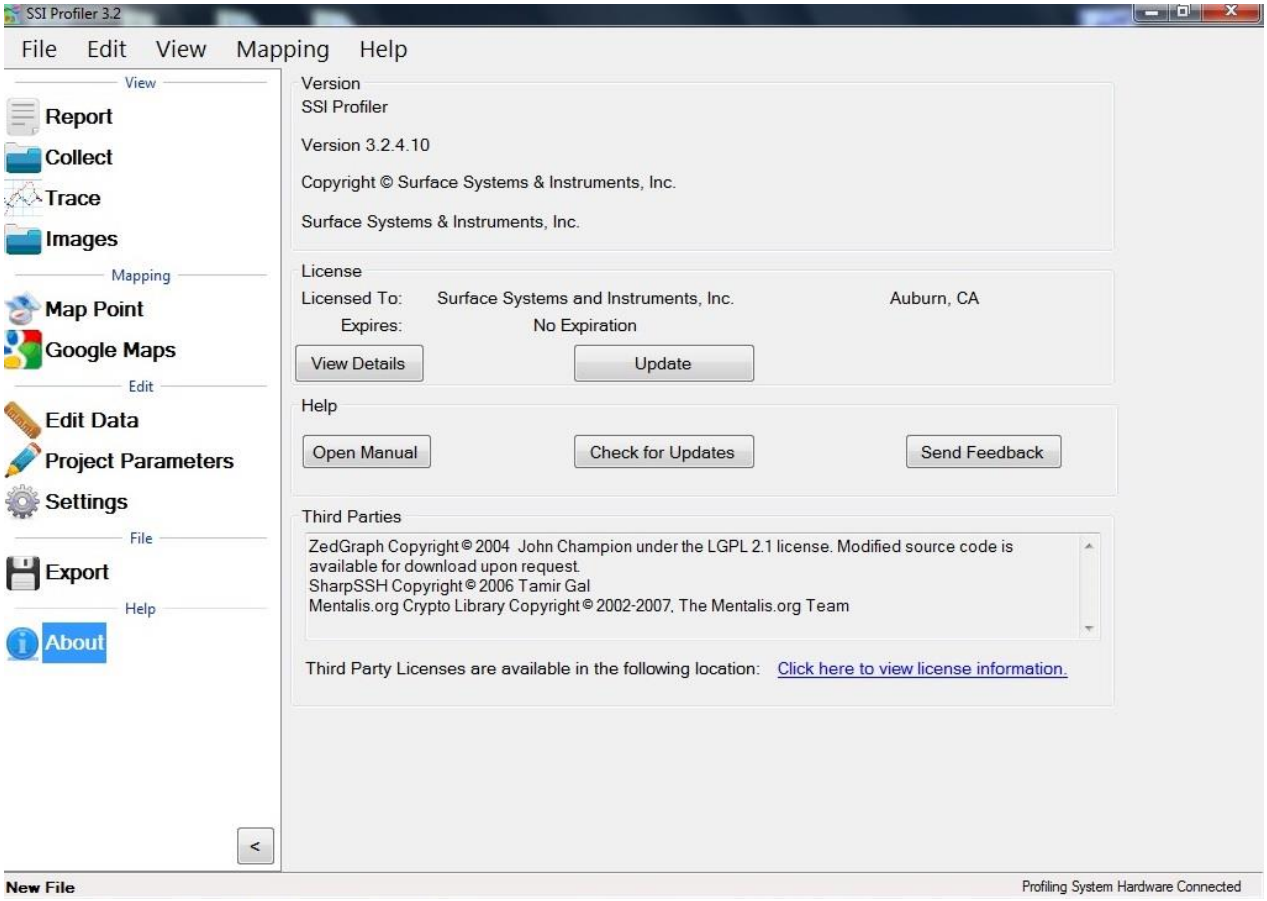


Figure 152: The About Window

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.

Troubleshooting

CS8800 Profiling System Software. For technical support for the CS8800 electronics or software, contact SSI by email at support@smoothroad.com or telephone at:

(785) 539-6305 (Kansas, USA)
or
(530) 885-1482 (California, USA).

Necessary software updates and periodic version upgrades can be downloaded the Profiler V3 program when internet access is available. If there is an update, the program will ask the operator to install the current version.
For customer specific downloads, visit the SSI website at: SSI Download Site. Contact SSI customer support for a user ID and password, or for further assistance.

CS8800 Profiling System Hardware. For hardware or spare parts, contact James Cox & Associates office in Auburn, California at (530) 885-1482 or by email at:
mchadd@smoothroad.com. Operators can also contact SSI by email at support@smoothroad.com or telephone at (785)539-6305 (Kansas, USA) or (415)383-0570 (California, USA).

Panasonic Toughbook Computer. For technical support for Panasonic Toughbook computers, contact Panasonic Technical Support at 1-800-Laptop 5 (800- 527-8675) or go to the this link: Panasonic Toughbook Support.

Paper Supplies or Printer Servicing. For printer paper supplies or printer servicing, contact SSI Customer Support.

No GPS Signal

Check the connections of the GPS antenna. If the location of the antenna is beneath the Toughbook stand or if the profiler is in an area of low reception, the GPS position may not be found. Review the GPS settings under Settings to see if collection device is selected. Under the Collect tab, select the GPS icon to view the number of satellites and signal information.

Will Not Find Hardware

The electronics will not be found if the system does not have sufficient power or if it is not connected to the computer.

1) Check that the system has power
2) Check the integrity of the cables. Have special attention to the DB-9 serial cable.

Abnormal Collection Results

If the system returns multiple defects or localized roughness and high ride numbers, review the calibration information. As needed, recalibrate the absolute encoder, distance, and height sensor.

Battery is Not Charging

1) Check the charger for a red LED
2) Turn off the power to the CS8800 and turn it back on after 3 seconds. This will refresh the battery gauge
3) A pin or a wire is not making connection for power within the device.