# Surface Systems & Instruments, Inc.

CS8900 Sidewalk Surface Profiler

Version 3.2.0.1.

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|---|---|---|
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## Definitions for the SSI Sidewalk Profiler

**Ride Index Number**

A ride index number is the result of an equation to generalize and relate all surfaces based on their specific ride quality. Ride numbers can be in the form of Profile Ride Index (PRI) and the International Roughness Index (IRI).

**Bump and Defects**

A bump or defect is a deviation over a standardized length, such as 25 feet. Bump detection simulates the response of a straight edge on the physical surface. Bump height is the limit of this deviation. Bump heights and lengths should be specified in the contract of the project.

**Scallop**

Scallops are the deviation of the profile from the center line of the profile's moving average. The scallops have a minimum height and width (longitudinal length), so that rapid increases of profile height will not be counted towards the ride number. If an event does not meet the minimum requirements to be a scallop, it can still be localized roughness.

**IRI**

The International Roughness Index was created by The World Bank to standardize the smoothness of roads. IRI is based off of the quarter car simulation which replicates the ride quality of the road felt by the user. The value of IRI is filtered through the quarter car simulation but the equation for IRI is essentially:

$$IRI = \frac{Total\ Vehicle\ Suspention\ Motion}{Distance\ Traveled} \qquad Units = \left[\frac{in}{mi}, \frac{m}{km}\right]$$

**IRI Defects (Localized Roughness)**

Defects on the surface, sometimes referred to as "areas of localized roughness," can be determined through IRI. By changing the threshold of the IRI (in/mi, m/km) and the base length of the defect, the Profiler software is able to find the locations of the defects. A defect location occurs when the threshold is exceeded for the specified base length.

**Profilograph Defects**

Defects, bumps and dips can be found through the Profilograph defects option. This option is dependent on the height and width of the bump or dip. With the two parameters of height and width entered, a Profilograph straightedge simulation will determine the 25 foot sections of the profile that exceed these parameters.

**PRI**

Profile Ride Index is the measure of the profile deviations from the centerline. By inputting information such as the blanking band, minimum scallop height and width, and the scallop resolution the PRI is calculated. The scallops are the individual deviations from the profile. If an event in the profile does not exceed the minimum height or width for scallops, the event is not counted toward the final PRI number. The PRI is dependent on the segment width for its calculations when a full

segment is collected. In this case the segment length will be the distance traveled in feet. The equation for PRI is:

$$PRI = \frac{Counts\ for\ Roughness\ in\ inches \times 5280}{Distance\ Traveled\ in\ Feet}$$

**Point Events**

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

**Segment Events**

Segment events, also known as intervals, are interruptions or important structures that occupy intervals of the sidewalk. Segment events include crosswalks, driveways, sections without sidewalks, curb ramps, bus stops, and pauses which are related to the profile.

**Odometer**

The odometer can be found in two places within the SSI Profiler program, both under the collection window. The initial odometer is on the home screen of the collection window. This odometer will be in the form of a separate window. The second odometer aids the user in adding and editing events after a collection is ended.

**Pause**

A pause is a section of the profile that can be excluded from the report or specifically viewed to determine its profile ride number (IRI, PRI, etc.)

**Profile Collection**

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

**Interval Collection**

An interval collection is the process of adding a segment event to the collection. To add a segment event, select the 'Start Interval' icon during a collection. After the collection the user will be able to apply a type of segment event and edit the stationing before saving the collection.

## Sidewalk Profiler Hardware

**Switches**

The profiler has two switches located on the top of the electronics housing. One switch is for the power of the profiler while the second switch is used to turn on the lights. When the profiler is turned on, the battery meter will illuminate. The lights will only work if the profiler is turned on or charging.

**Laser**

The laser mounts to the front of the profiler body and is connected to the electronics via two cables. Ensure there are no obstructions between the laser and the ground. When powered on and connected to the electronics the "POWER" and "LASER" LEDs will illuminate though the "RANGE" LED and beam on the ground will only be visible when collecting data.

**Lights**

The lights on the profiler are located at the front and rear of the electronics housing. To turn on the lights, the profiler must be powered on or connected to the charger and the switch for the lights must be on.

**Battery Meter**

The battery meter not only illustrates the amount of power left in the battery, but it also indicates that the profiler is turned on.

**Charging**

To charge the profiler, connect the color coded charging terminals to the corresponding terminal color on the back of the profiler, or if equipped, simply mate the charging plug to it's receptacle. The LED on the charger will turn red when there is a load on the circuit due to charging. The LED will become green when charging is complete. In some cases the charger may need to be plugged into to 120v AC before connecting to the profiler.

**Adjusting the Right Wheel**

The right wheel is adjusted by loosening the set screw at the top of the dovetail assembly. It is important to not over-tighten the set screw because it may damage the nylon insert. The position of the right wheel is crucial to the profiler's stability. For optimum performance position the center of the dovetail 5 inches from the rear of the electronics housing.

**Tires and Pressure**

Prior to collection inspect the tires to make sure they are aligned with each other. Most units are equipped with foam tires. For pneumatic tires, the ideal tire pressure is listed on the side. For the 4-ply tires the maximum pressure is 60 pound per square inch (psi).

## Calibration Procedures

Figure 1: The calibration menu which appears after the “Calibrate” icon is selected.

### Height Calibration

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

Figure 2: System on a level surface with the position of the wheels marked.

Proceed to press the Height Calibration button on the initial “Calibration” Menu.

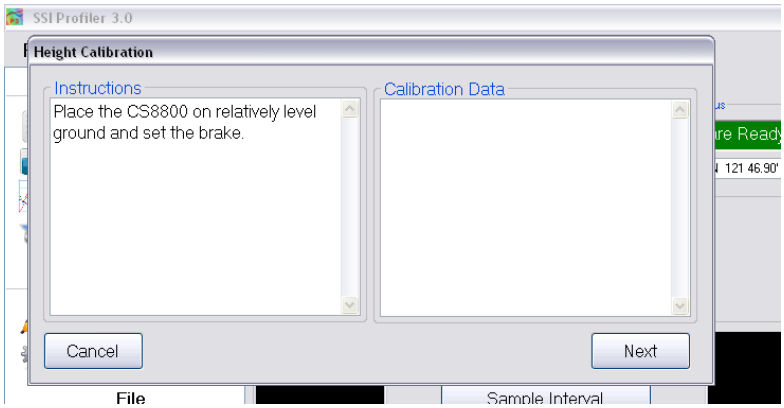



Figure 3: The first window of the height calibration instructing the operator to place the walking profiler on level ground and set the brake.

Figure 4: Brake set and profiler in place before hitting the next button.

With the brake set, line up the main wheel axles with the marks on the ground.

Figure 5: System set in its first phase position with axle of wheels lined up with marks

Press “Next” in the current calibration window.

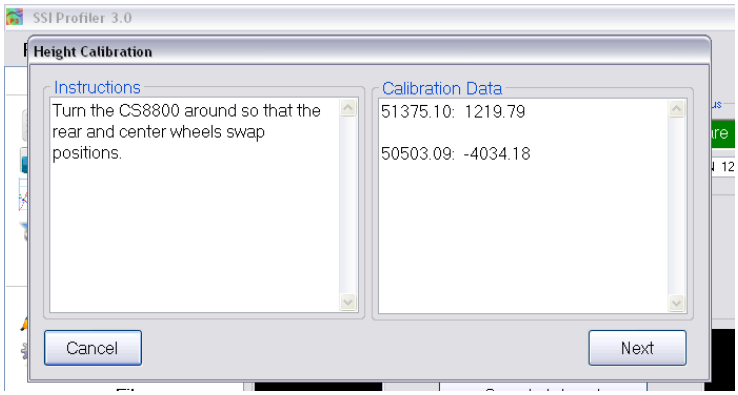



Figure 6: Calibration window after the first phase of the height calibration.

After the first phase of the height calibration the walking profiler must be turned around 180 degrees and have its left-side wheels swap positions. Each wheel should be over the exact spot the other wheel was over in phase one. When the walking profiler is in position, select next.

Figure 7: Positioning for the second phase of the calibration.

Press “Next” in the current calibration window.

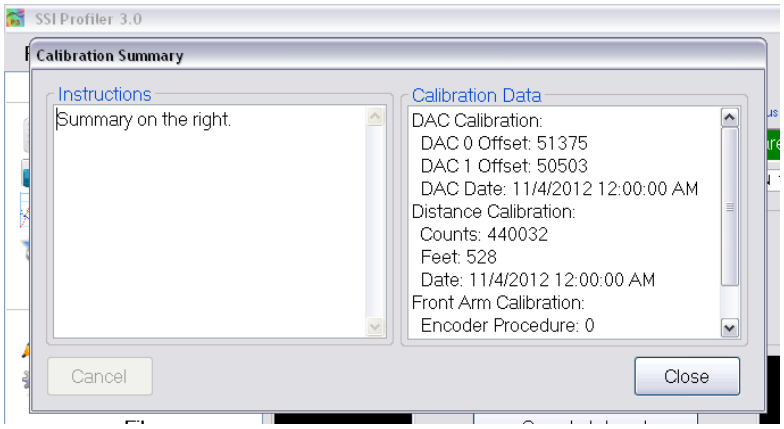



Figure 8: Window after a successful calibration.

**Distance Calibration**

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

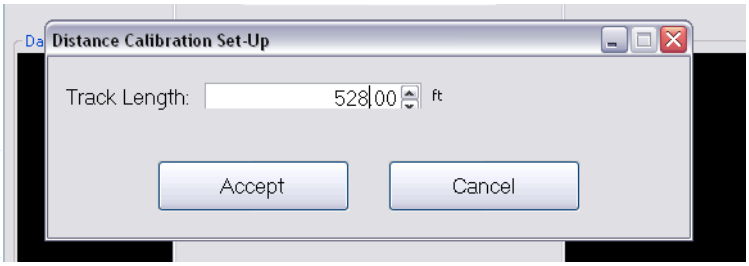



Figure 9: The initial window of the distance calibration for setting the track legth.

Set the length of the calibration track. The units can be changed by clicking on the feet (ft) symbol and choosing the appropriate units. After the length of the track has been entered, select accept.

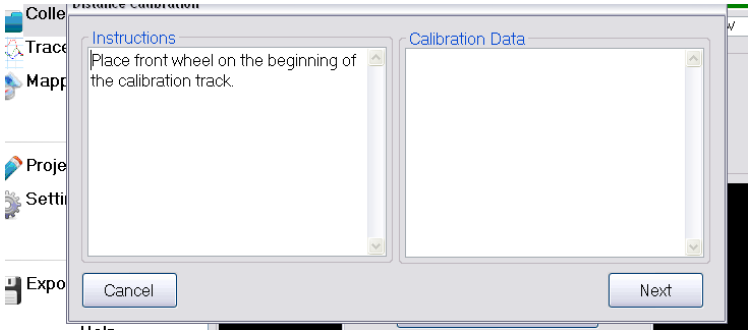



Figure 10: The instructions for the distance calibration are shown above.

Once the walking profiler's front wheel is on the beginning of the track, select next and push the device until the front wheel is at the end of the calibration track as indicated in the collection window.

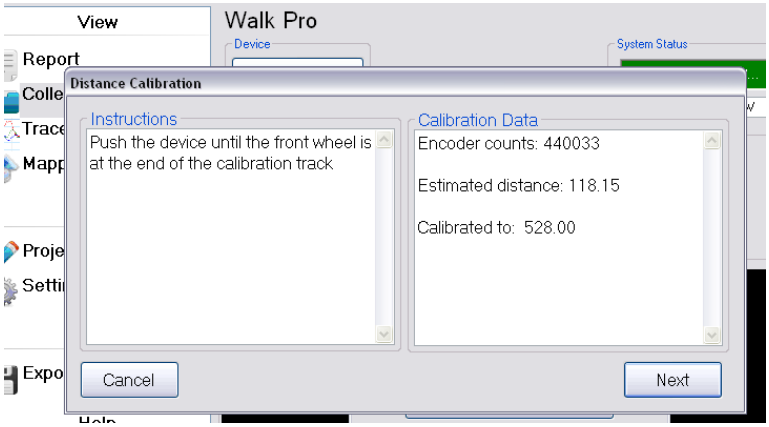



Figure 11: This window shows the distance calibration summary.

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

If the estimated distance does not match the “Calibrated to” distance, it could be that the system has never been calibrated, the last calibration was an improper, or the system had a hardware/software update (None of which are a problem).

When the end of the track is reached, select next.

**Closed Loop Calibration**

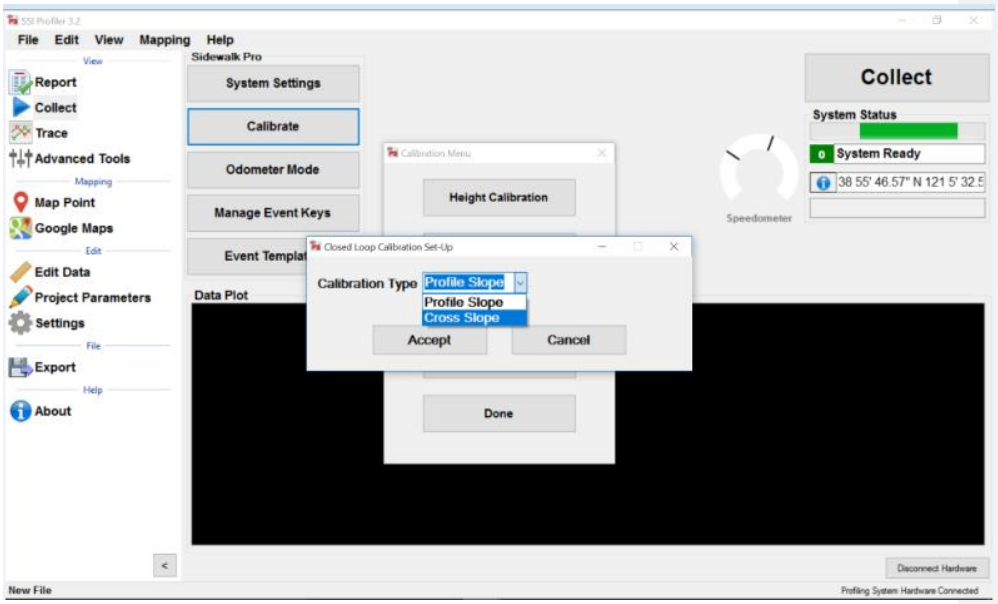



Figure 12: Window showing the two options under the Closed Loop Calibration.

Both the Profile Slope and Cross Slope calibrations should be performed on a uniform surface (ideally on a slab or an asphalt section). Do not start calibration with the wheels over a crack or change level from slab to slab during calibration. When calibrating a new device, the height and distance calibrations must be performed prior to either closed loop calibration.

The distance of the track should be between 10 and 30 feet (3 and 9 meters). This manual uses a 25ft (7.67m) segment for illustration.

Note: Base length (length from back wheel to laser) must be entered before calibrations can be performed. This value typically ranges between 17 to 18 inches.

**Profile Slope Calibration**

Place system laser at start of track.

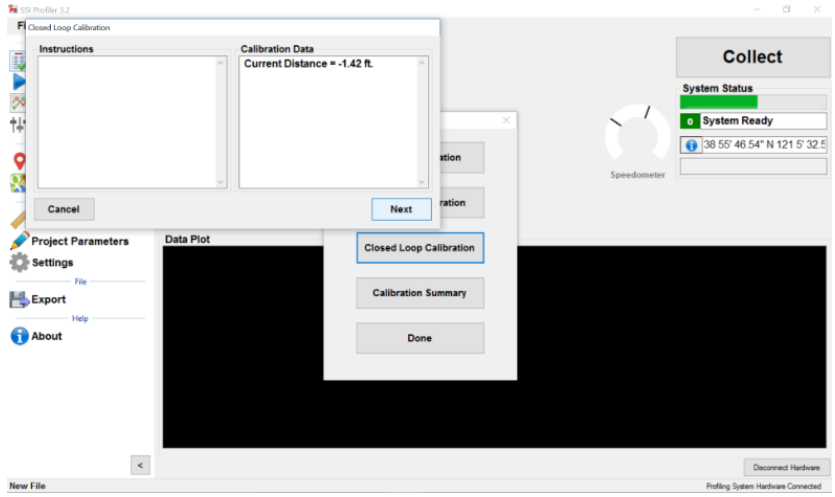



Figure 13: First window of the Profile Slope Calibration. The initial negative distance indicates the length between the laser and back wheel. Proceed to push system to end of

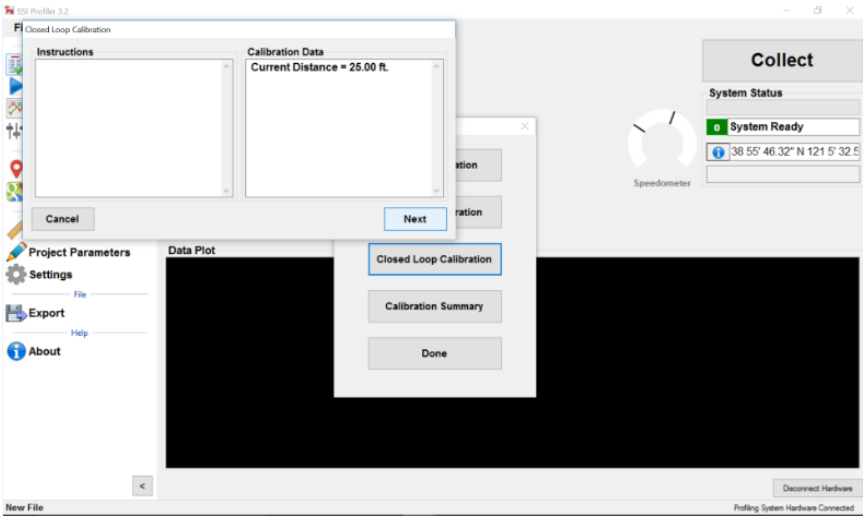



Figure 14: Calibration window with system at end of track. When the end of the track is reached, select next.

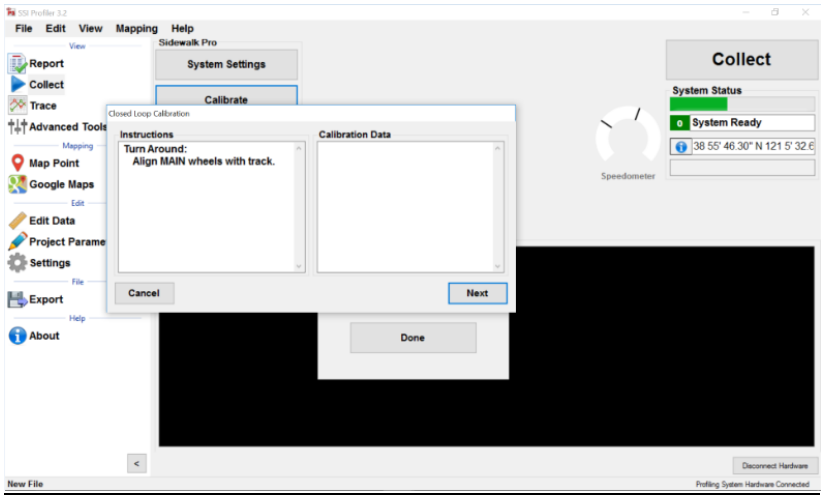



Figure 15: Calibration window indicating operator to turn the system around, align the **MAIN** wheels with the track, and press "Next".

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.

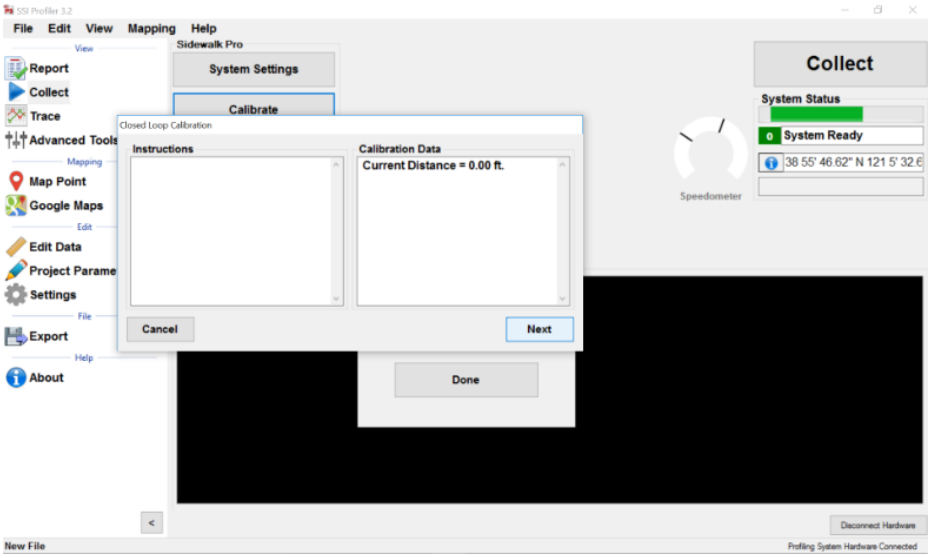



Figure 16: Calibration window indicating end of return close loop run. Press “Next”.

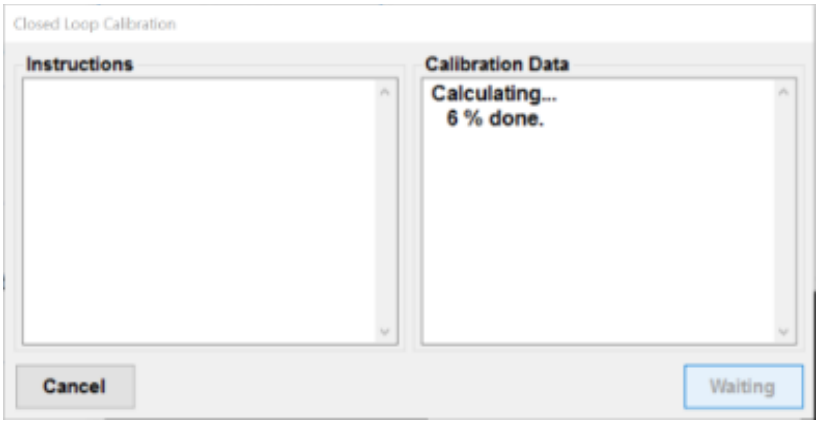



Figure 17. Calibration window calculating results.

Figure 18: Window indicating completion of Profile Slope Calibration.

**Cross Slope Calibration**

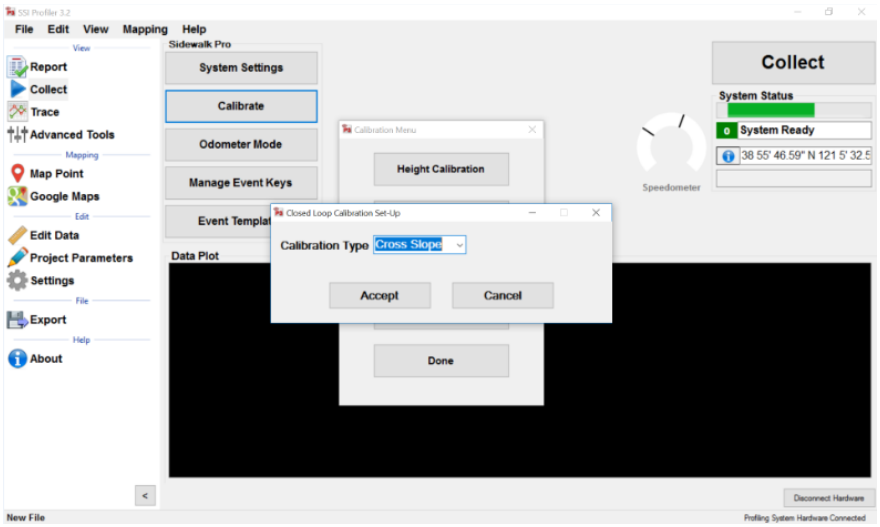



Figure 19: Closed Loop Calibration window with “Cross Slope” selected.

The first two steps are identical to the “Profile Slope” Calibration

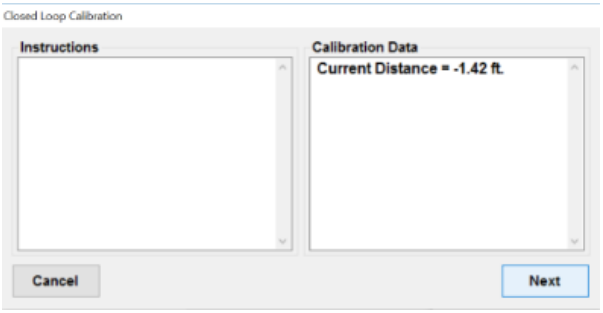



Figure 20: First window of the Cross Slope Calibration. The initial negative distance indicates the length between the laser and back wheel. Proceed to push system to end of track.

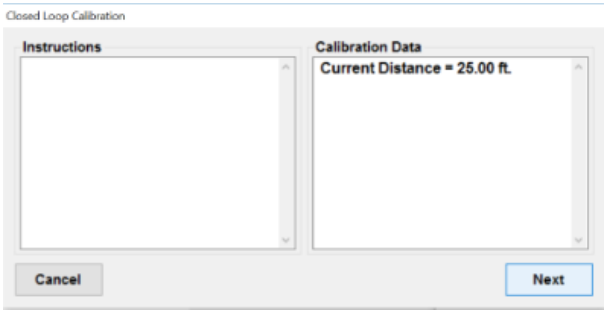



Figure 21: Calibration window with system at end of track. When the end of the track is reached, select “Next”.

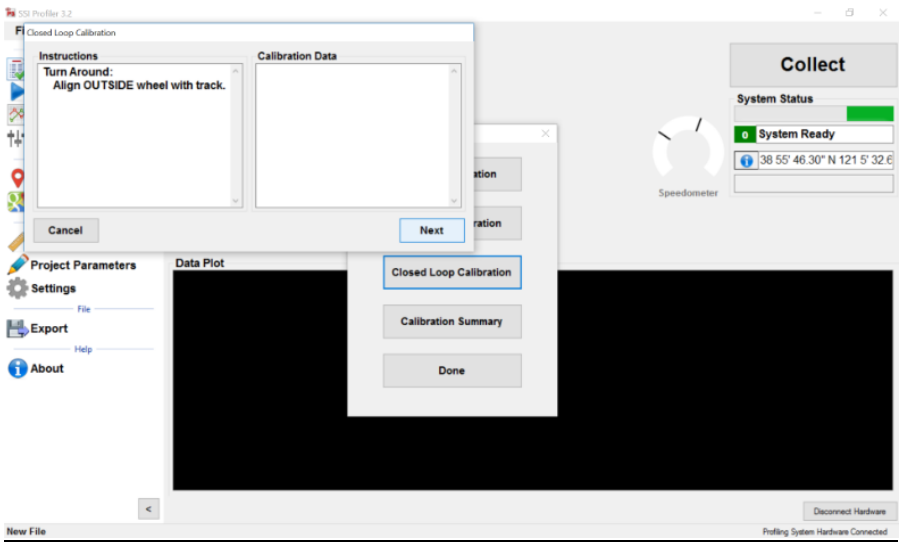



Figure 22: Calibration window indicating operator to turn the system around and align the **OUTSIDE** wheels with the track, and press “Next”.

The Cross slope Calibration is a wheel base run, meaning the system goes over same *surface*. Align the **outside** wheel over the same *track* the main wheels went over.

With The system facing the opposite direction, push system back to initial starting point. The **OUTSIDE** wheels should go over the calibration line. The distance traveled will be reversed. Stop when the onscreen “Current Distance” shows 0.00 feet.

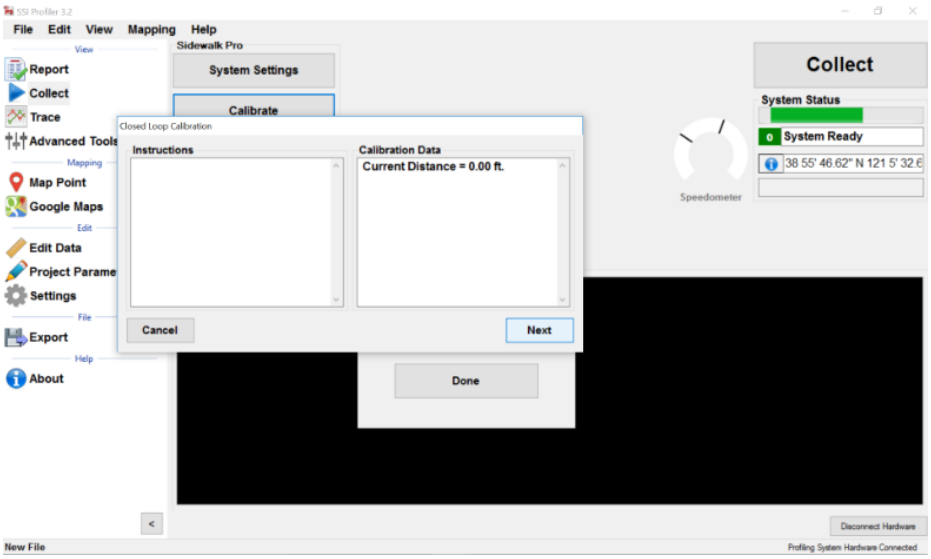



Figure 23: Calibration window indicating end of return close loop run. Press “Next”.

Figure 24: Window indicating completion of Cross Slope Calibration.

## Collection

**Connecting Device**

Connection of the profile system is through the serial or usb port located of the Toughbook computer supplied. Once connected with the Profiler V3 program, open and the power switch of the profiler on. The Program should display 'Profiling System Hardware Connected.'

**Power On**

The Profiler is powered on when the battery meter light is on. If the meter light is off, check the switch for the power or charge the battery. Always turn on the device before opening the SSI Profiler program.

**Opening Profiler V3**

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

**Hardware Found**

When the profiler is turned on, properly connected to the operator computer, and Profiler V3 is running, the software should indicate "hardware found". If hardware is not found and these requirements are fulfilled, check the connections and profiler system power. If the profiler was powered on after the program was opened, close the program and reopen it with the profiler powered on. If problem persists, contact SSI Customer Support for assistance.

**Navigate to Collection Window**

Once hardware is found, the 'Collect' icon on the shortcut bar or View>Collect will be available. To enter this section, just left click on Collect.

**Troubleshooting**

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

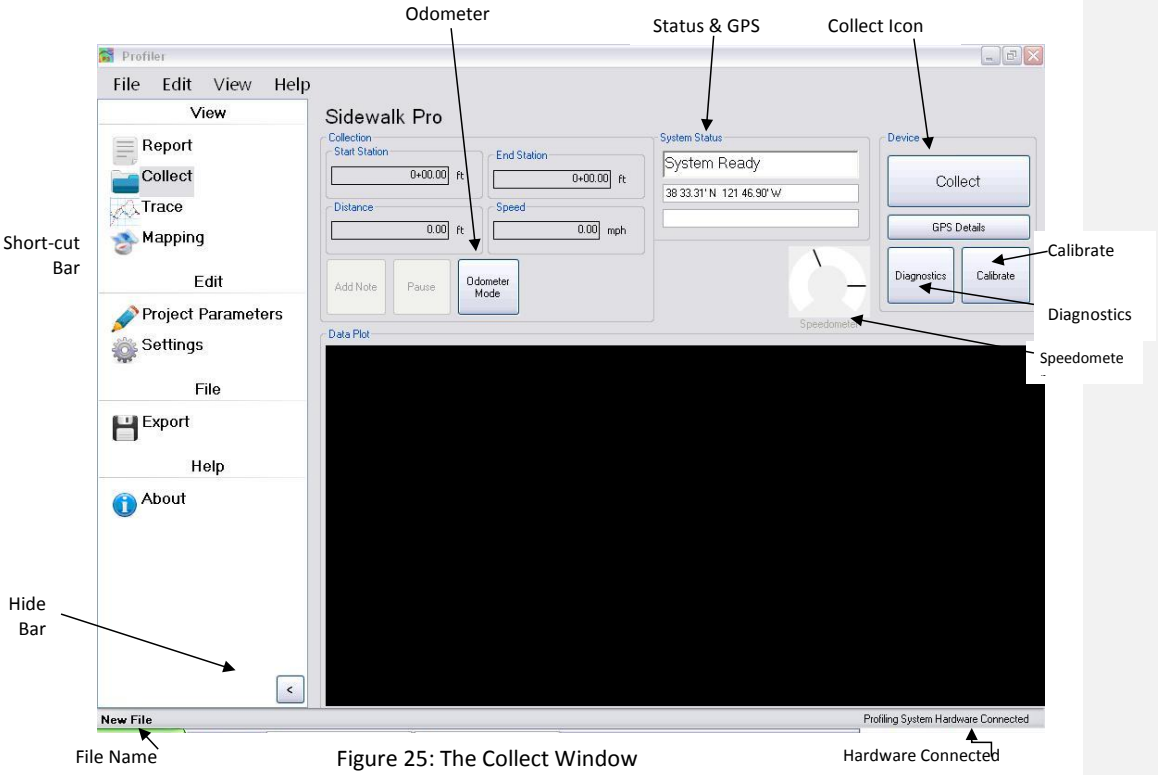



Figure 25: The Collect Window

**Odometer**

The odometer can be used to measure distances with the profiler. The odometer is only as accurate as the currently saved distance calibration.

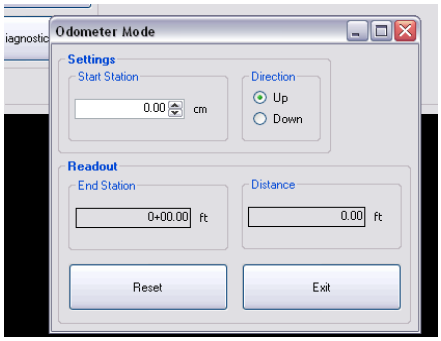



Figure 26: The odometer of Profiler V3.

An odometer is also available when editing events so that the operator can find the locations of the events that were inputted, or to add additional events.

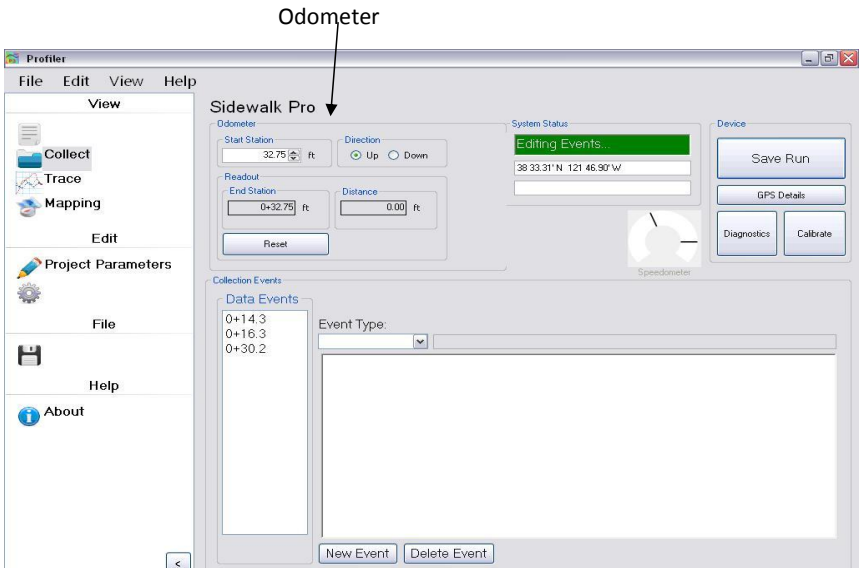



Figure 27: Odometer in Event Editing

**Diagnostics**

The diagnostics tool contains vital information for early stages of troubleshooting. The diagnostic window is color and number coded to determine problems. When no problems are encountered, the diagnostic will have all zeros and green icons. If SSI Customer Support asks for the diagnostic health string, it is located in the text box at the top of the window.

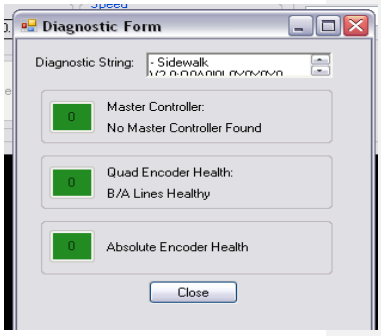



Figure 28: The Diagnostic Window above shows a healthy Profiler system.

**GPS Details**

When the collection window is opened, the GPS icon will be below the Collect icon. The GPS details show the number of satellites and the NMEA String of the data used to calculate position.

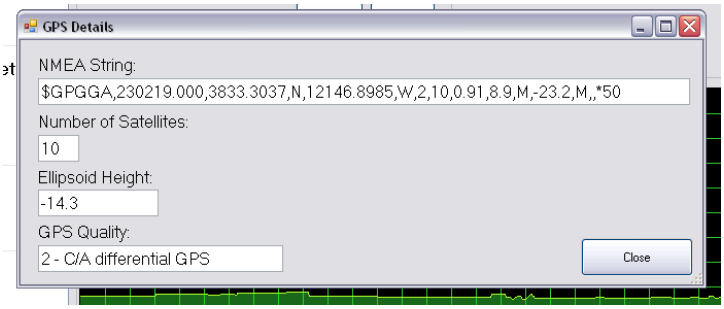



Figure 29: GPS Details window

# Collect

**Collection Information**

The collection information can be accessed by selecting the Collect icon in the Collect Window. This window is prior to starting a collection.

Figure30: Collection Information window

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

**End Cross Street**
The End Cross street is the name of the transverse street where the profiler ended the collection.

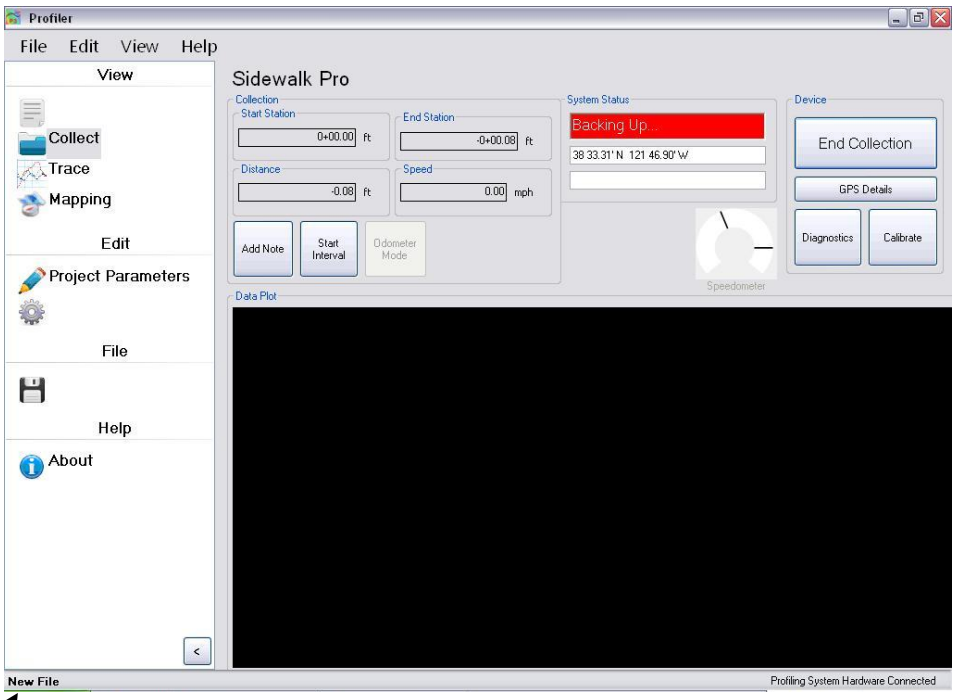
**Collection Street**
The Collection Street is the street where the profiler tested the sidewalks.

**Date Tested**
The date tested is the day that the smoothness or sidewalk testing is occurring.

**Section Notes**
Section notes is the information related to the starting point and the project such as landmarks and the visible condition of the pavement.

**Weather Conditions**
The weather conditions are important for the expansion and contraction of the pavement and the profiling equipment hardware. Keep this information updated if comparing of collections taken at two different times.

**Move Profiler to Start of Track**
The profiler's laser should be on the position of the starting point when 'Begin' is selected from the Collection Information window. The collection will start when 'Begin' is selected. The profile collection will begin, not a segment collection.




An unsaved file

Figure 31: The initial view of a new collection.

## During Collection

The collection should be started with the laser above the starting point and ended with the left rear wheel over the ending point. Keep this suggested starting point to keep consistent data collection lengths.

### File Name

In the bottom left corner is the location of the file name. If the current file is unsaved, then the name of the file will be “New File.” If that file has data associated with it, the name will have asterisk after it (New File*).

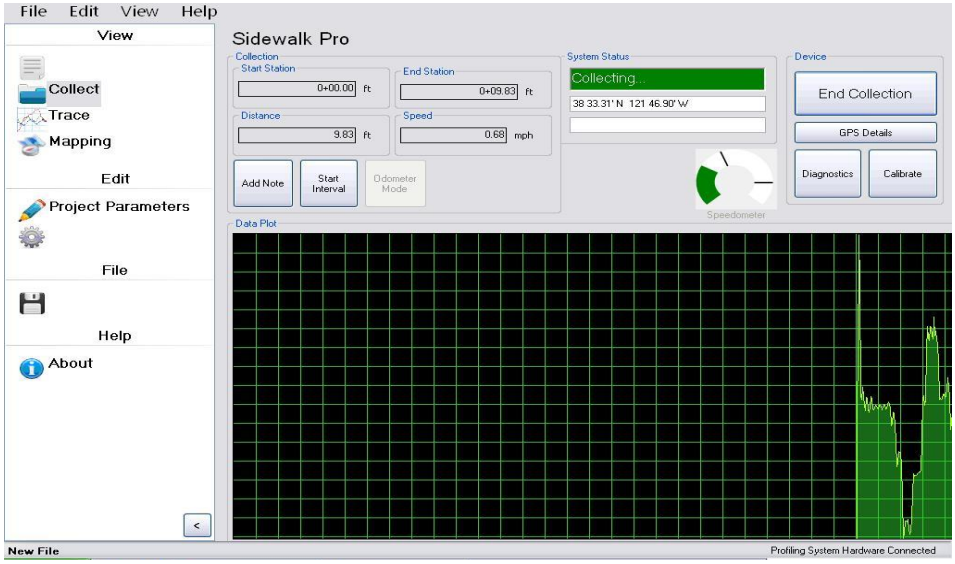



Figure 32: A collection without events selected.

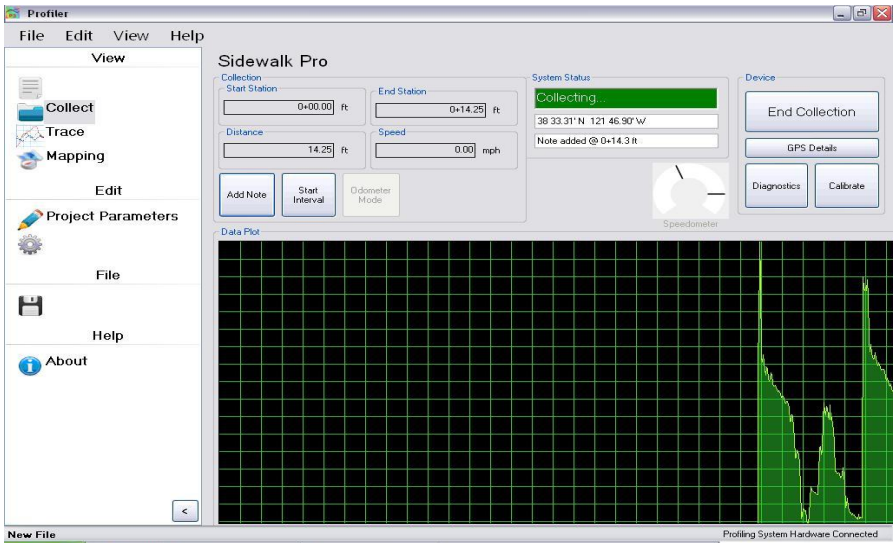



Figure 33: A collection with a point event at 0+14.3 feet.

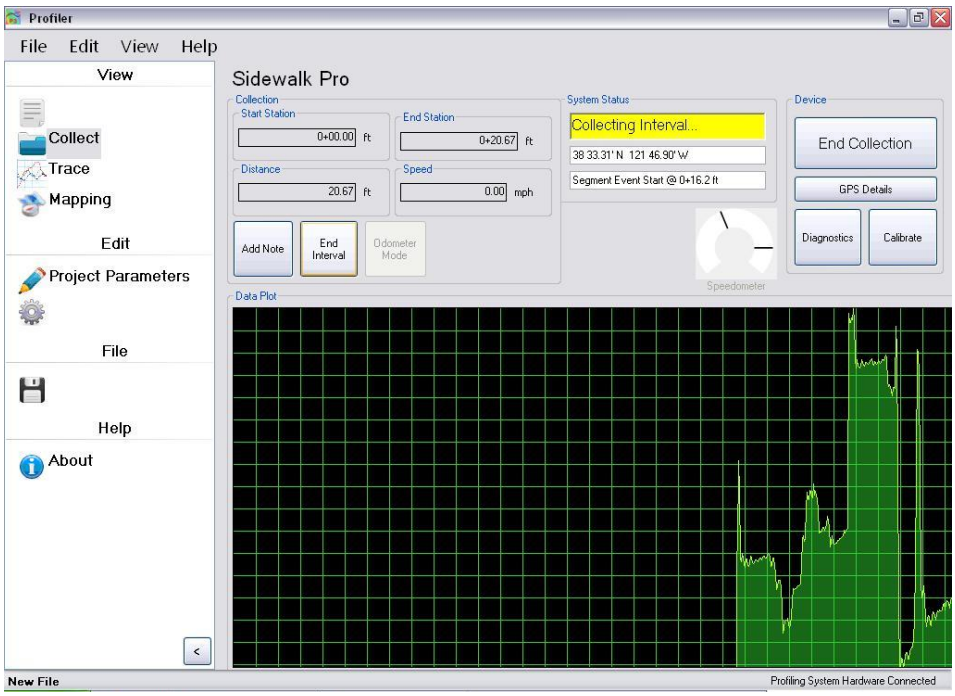



Figure 34: A collection with a segment interval being profiled. The note below the yellow status shows where the segment event started.

**Add Note**

The "Add Note" feature can add events to the reports to be viewed during post analysis. When "Add Note" is selected during collection, the user will not add the note until the current run has ended.

**Interval Collections (Input After Run)**

Interval collections are used when the user encounters curb ramps, crosswalks, driveways, no sidewalk, bus stops or other events. Information about the event can be entered in the text box at the bottom of the window. Segment events are started during a collection by selecting 'Start Interval.' At this time the status bar will turn yellow and will display the stationing of where the interval was started. To end the interval, select 'End Interval.' Segment events can be added and edited after the collection is ended, before the run is saved. Adding additional segments is where the odometer is useful.

**Event Templates**

Once the run has ended the user can edit any Notes or Intervals. Selecting a template from the templates list (on the right side of the screen) will automatically insert the template into the note. To add, edit, or remove templates click the "Event Templates" button before the start of a collection.

**Event Keys**

The user can configure event keys in order to insert events that will be prefilled with a template during a collection. To configure event keys click the "Manage Event Keys" button before the start of collection. To map a new event click on the button under the Keys column. A popup will prompt the user to press any key. Once the key is mapped the user can change the event, template, or event type that will be tied to that key. See Figure 35. Just press (do not hold) any mapped key during a collection to insert the event. If the event is an Interval, the collection will automatically switch to Interval mode. Pressing any key that is tied to an Interval event while in Interval mode will switch the collection back to normal but will not insert the event (same as clicking "End Interval").

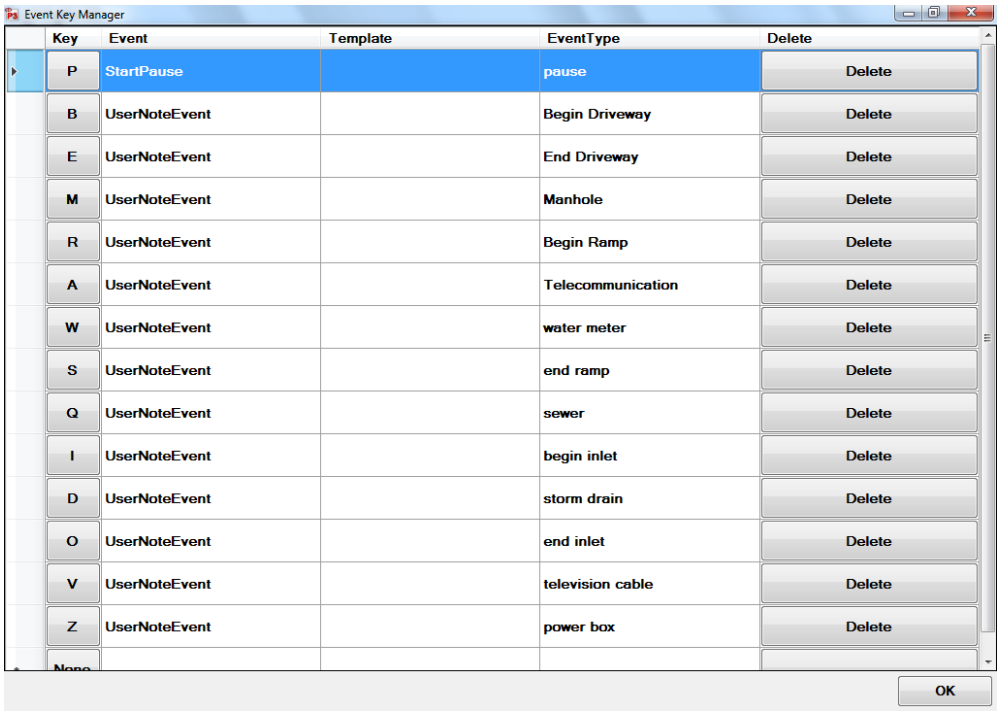



Figure 35: Example of Event Key Configuration

## Editing a Collection

After a collection which included interval (segment) or point events, the final step before saving will be to add or edit events. By default the program will take the user to this screen at the end of a collection. The operator can use the odometer on this screen with its reset button to evaluate each event position again or to add new events where the stationing is unknown. The two types of events are described below. When the operator is finished with the editing of the events, select "Save Run."

At this time, the program will display the home screen for the collection window. More runs may be collected, or collections may be viewed under reports.

**New File**
After collecting a file and before collecting another run, save the current collection and open a new file. This will prevent data from being overwritten or unorganized.

**Point Events**
Point events are the sections of the sidewalk that do not meet specifications through the height or width requirements.

**Segment Events**
Segment events are interruptions or important structures that occupy intervals of the sidewalk. Segment events include crosswalks, driveways, sections without sidewalks, curb ramps, bus stops, and pauses which are related to the profile. Segment events are started during a collection by selecting 'Start Interval.' At this time the status bar will turn yellow and will display the stationing of where the interval was started. To end the interval, select 'End Interval.' Segment events can be added and edited after the collection in ended, before the run is saved. Adding additional segments is where the odometer is useful.

**Key Press Notes**
Key Press Notes are the user inputted notes that can be entered for each event. The notes are entered through the keyboard, hence their name, key press notes. These notes will appear on the sidewalk report next to the event type and the event's location through GPS and stationing.

**Odometer**
The odometer can be found in two places within the SSI Profiler program, both under the collection window. The initial odometer is on the home screen of the collection window. This odometer will be in the form of a separate window. The second odometer aids the user in adding and editing events after a collection is ended.

**Pause**
A pause is a section of the profile that can be excluded or specifically viewed to determine its profile ride number (IRI, PRI, etc.)

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

**Interval Collection**
An interval collection is the process of adding a segment event to the collection. To add a segment event, select the 'Start Interval' icon during a collection. After the collection the user will be able to edit the event and apply a type of segment event before saving the collection.

## Finalizing a Collection

### Saving the File

After a collection is completed, the file can be viewed in reports or saved. To save the file, selecting File>Save or through Ctrl+S on the keyboard. These actions will open Windows Explorer for the file to be saved. If the file is not saved and the operator navigates away or tries to close the program, Profiler V3 will ask the operator to save the file.

#### Default Naming Convention

The default naming convention for SSI Profiler is in the form of:

YYYYMMDDTTTT.

An example of this is: 201212021635
This name means the file was saved in the year 2012, December 2nd, at 4:35pm.

### Opening a New File

To open a new file after a collection, select File>New or Ctrl+N on the keyboard. When a new file is opened, the lower left corner of Profiler V3 will display "New File."

## Mapping

The mapping feature can be used to navigate to defects in the profile based on the GPS coordinates. Mapping can be used in trace view or through the compass and distance readout on the Mapping 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.

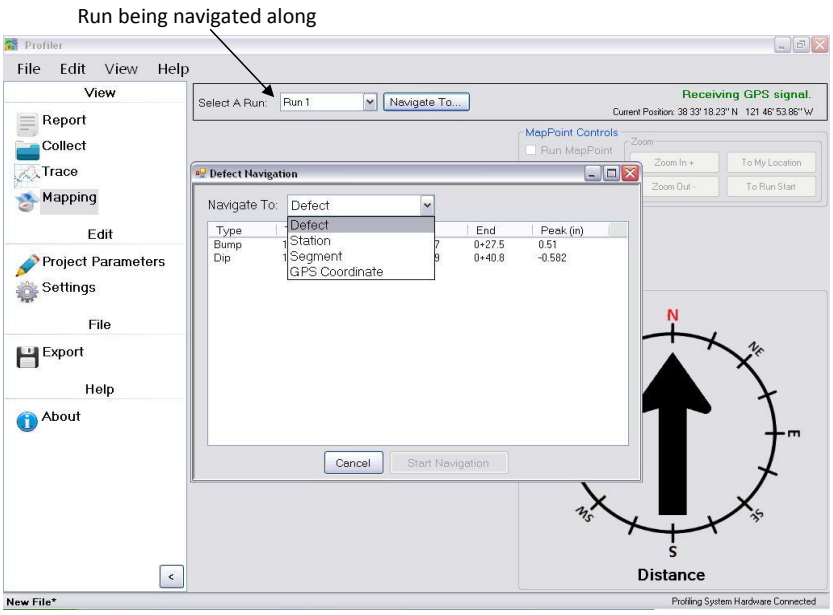



Figure 36: The drop down menu for mapping shown

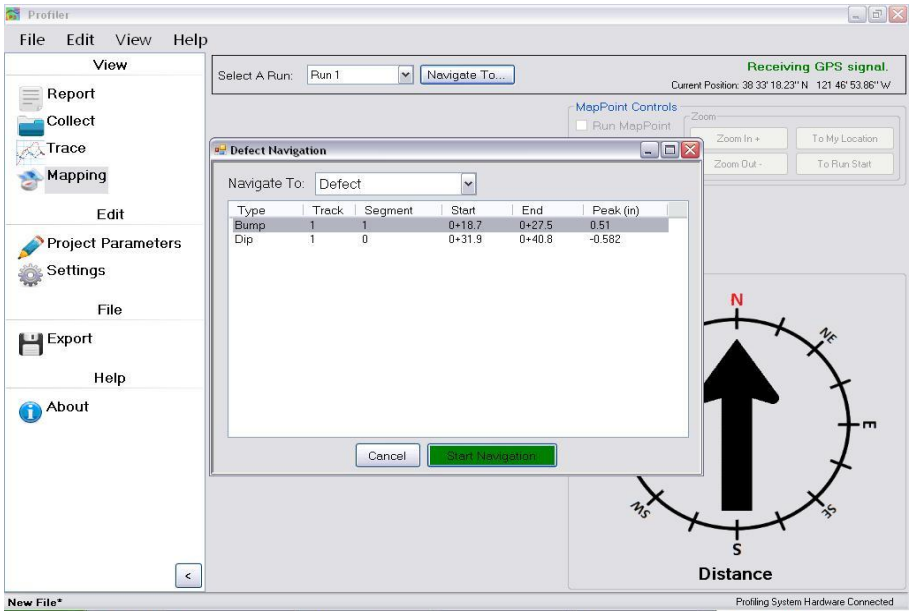



Figure 37: A bump is selected about to be navigated to.

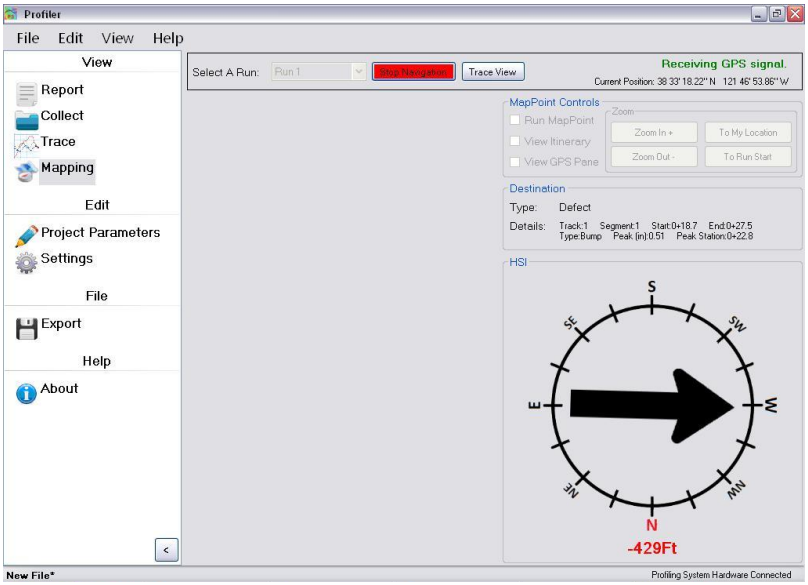



Figure 38: Navigation is started. To reach the point the machine must move 429 feet West.

## Reports and Analysis

### Sidewalk Parameters

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. Under 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 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.

**Level Changes**
Level changes are classified as either 1:1 or 1:2 (rise:run) and can be up or down. Typical parameters for 1:1 and 1:2 level changes are .25" and .5" respectively. Note, these are minimum values. Larger changes in level can be reported as either 1:1 or 1:2 depending on their slope.

**Cracks**
Cracks are calculated based on the defined parameters of min length, max length, and min depth.

**Exclude Interval Types**
To exclude an interval type from the collection or reports select the report to be omitted. To exclude all interval types, select "Exclude All Sidewalk Interval Types."

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

**Texture**
Texture (MPD) is reported per calculated sample, averaged over user defined interval, or as a maximum of the user's interval length.

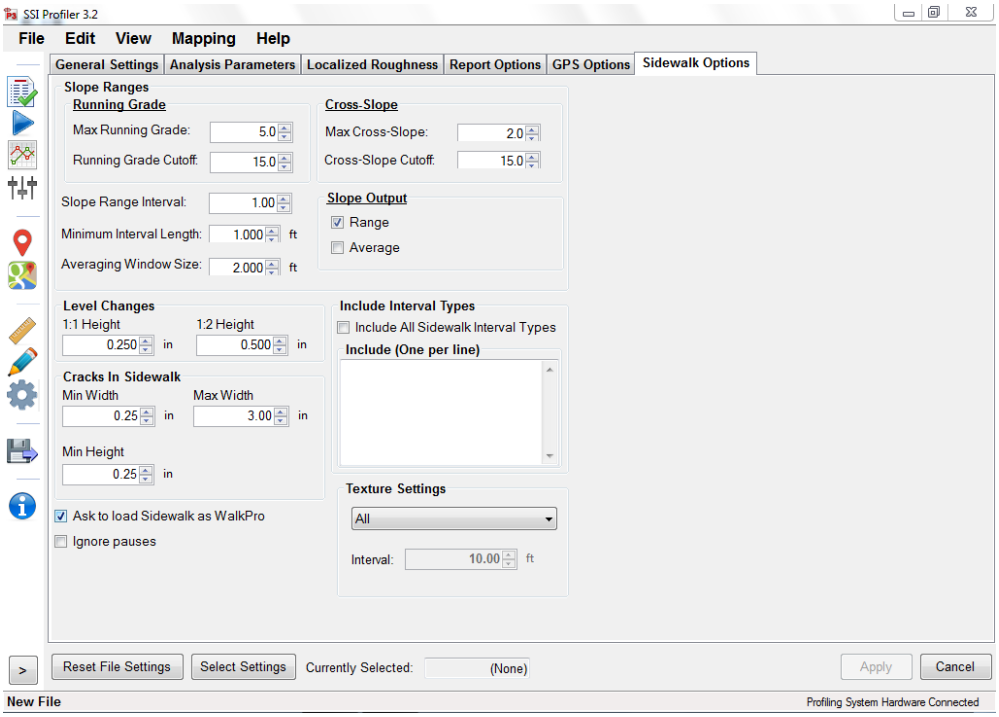



Figure 39: The sidewalk settings window

To view the results of a collection, navigate to the View>Reports tab or select Report from the shortcut bar. The top of the reports window has a refresh button, printer icon, pdf generating icon, the list of available reports and the zoom. To select a new report, select one from the drop down list, then ***select the refresh button***.

## Sidewalk Report

The sidewalk report shows the results of the running grades and bump heights of the sidewalk. The settings for the sidewalk profiler can be found in the Settings window under the Sidewalk tab.

## Key Press Notes

Key Press Notes are the user inputted notes that can be entered for each event. The notes are entered through the keyboard, hence their name, key press notes. These notes will appear on the sidewalk report next to the event type and the event's location through GPS and stationing.

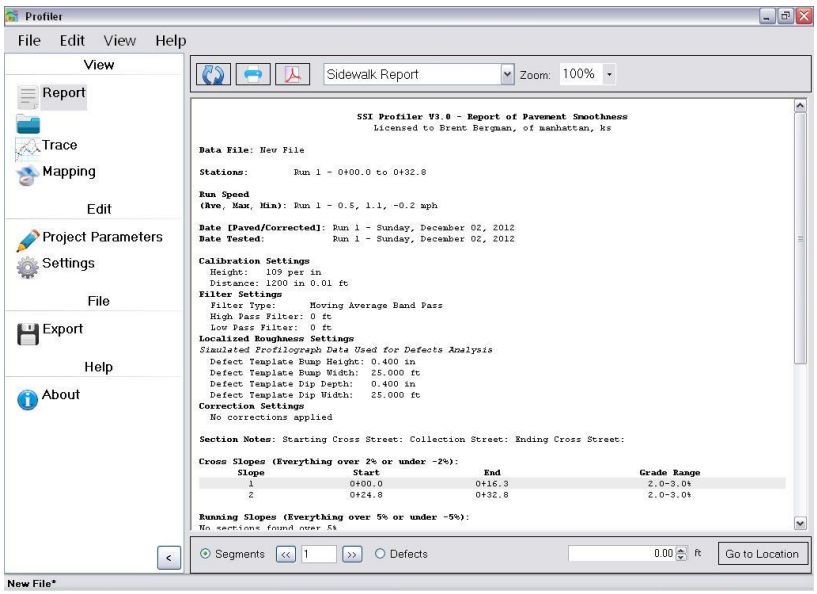


Figure 40: The top of a sidewalk report

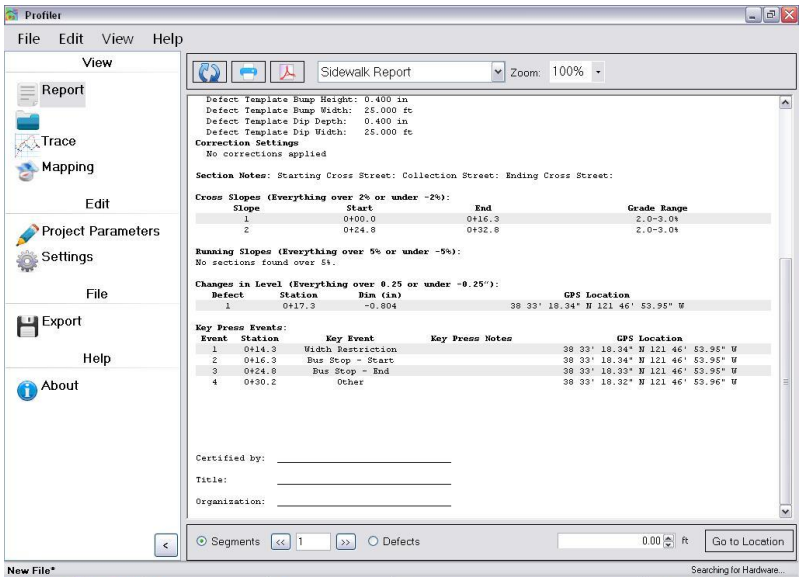


Figure 41: The collection data included in a sidewalk report.

**Single Trace**

The single trace report shows the physical profile and the profile number of the sidewalk. There will also be information about the defect height, length of collection, file name and calibration information displayed.

**Summary Report**

The summary report shows the location of the collection and the information pertaining to the sidewalks profile in tabular form. Information about the calibration, profile number, stationing, defect locations section location and section notes will be displayed.

**Cross Slope Report**

The cross slope report shows the changes in cross slope for the profile. The intervals that exceed the maximum slope will be displayed according to the preferences saved under the Sidewalk tab of the Settings window.

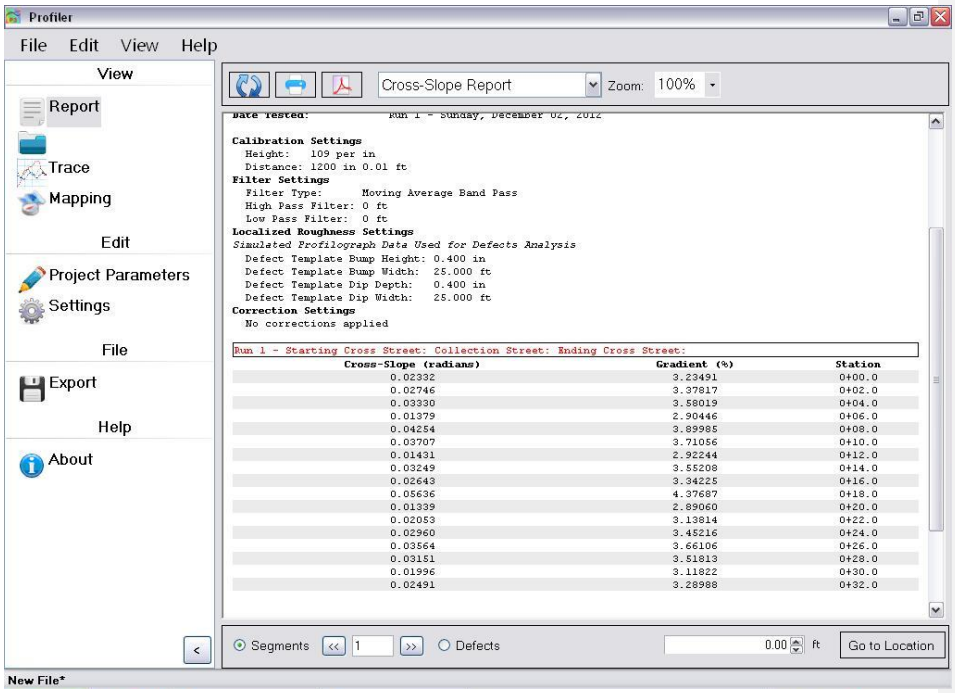



Figure 42: The cross slope report displaying the transverse slope data.

**Printing Reports**

To print the reports select either the printer icon or the pdf generator. If the printer was selected, input the correct settings of your local printer in the print options window that appears.

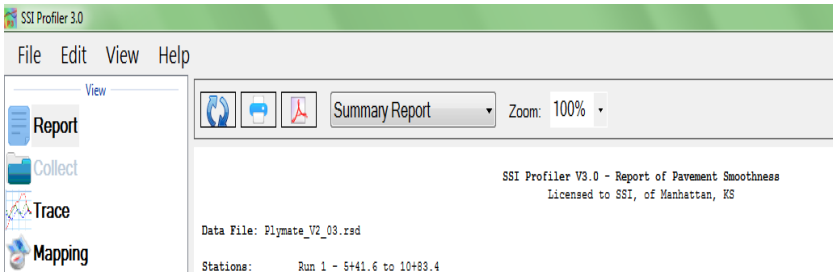



Figure 43: The Report Tools

# 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.

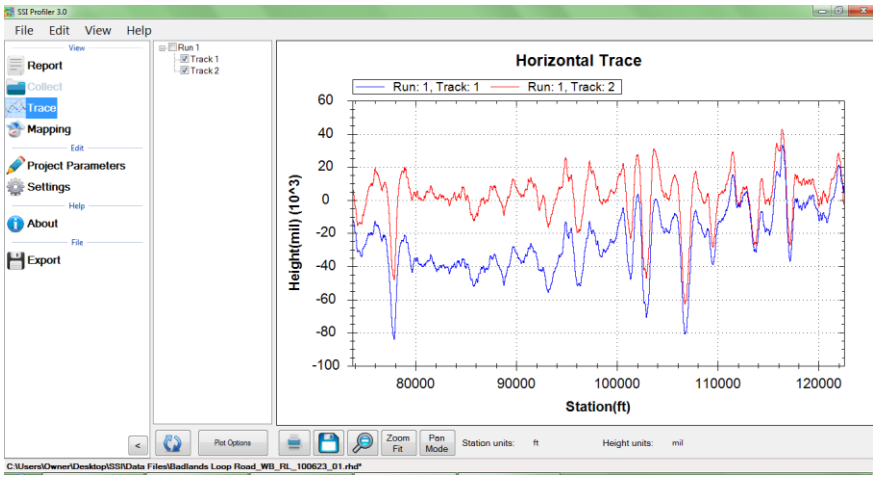



Figure 44: An example of the profile trace within the trace window.

Refreshing the trace window is requiered 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**

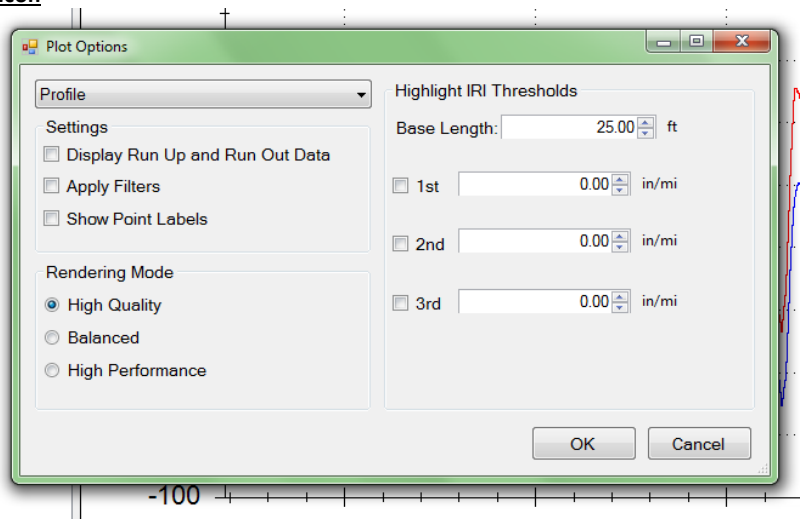



Figure 45: The plot options window

The plot options window allows the user to alter the trace for their visual benefit. By selecting a threshold the operator can quickly find the locations with excess IRI. The rendering mode options allow the operator to choose speed or high resolution traces.

## Profile/Continuous IRI

The drop down menu allows the user to select two options of Profile and Continuous IRI.
When Continuous IRI is selected, the operator may not choose the option to include run up and run out data.

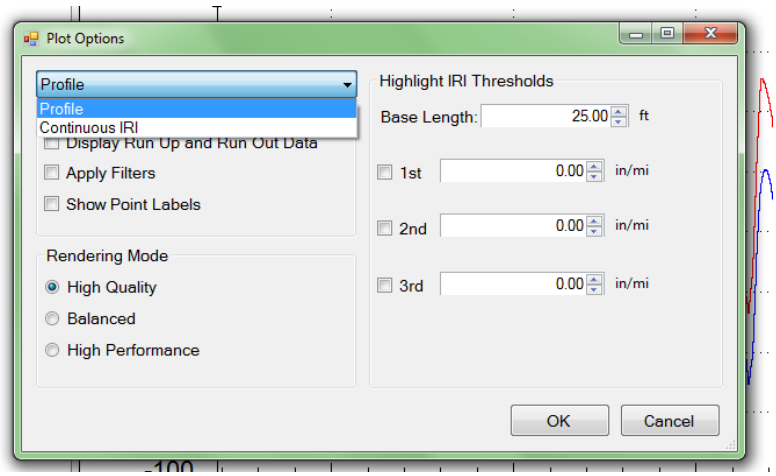



Figure 46: The drop down menu options of Profile and Continuous IRI are shown above.

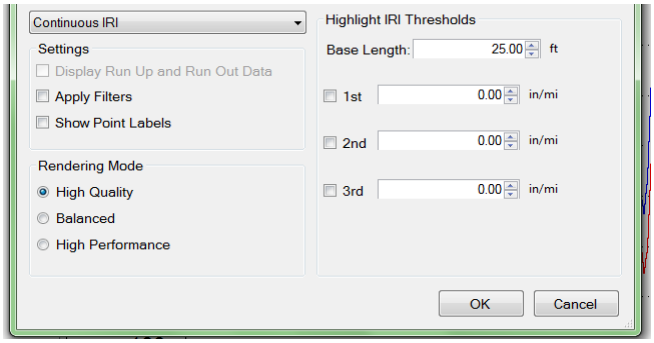



Figure 47: The Continuous IRI Plot options window.

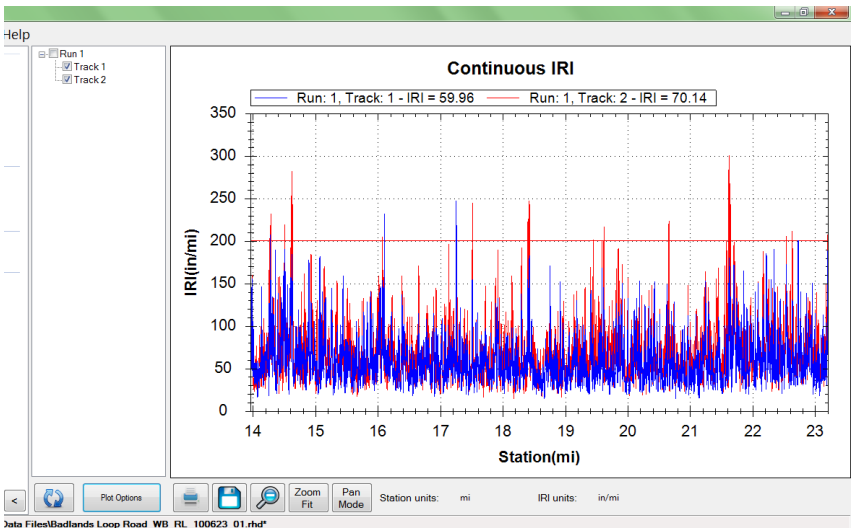



Figure 48: The plot of the Continuous IRI trace.

This setting is chosen through the plot options. To change the plot to a Profile trace, select the Plot Options Icon and change the drop down menu settings to “Profile.”

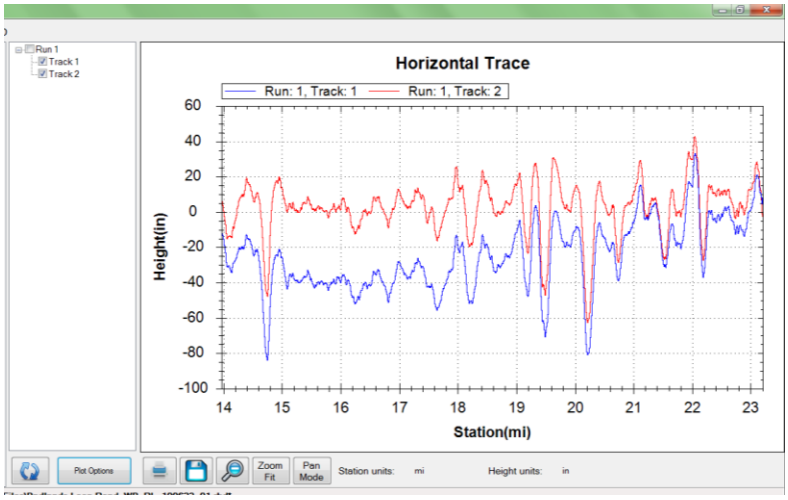



Figure 49: The plot of the profile trace.

This setting is chosen through the plot options. To change the plot to a continuous IRI graph, select the Plot Options Icon and change the drop down menu settings.

## Exporting

**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.

**Exporting to Sidewalk Format**

The operator can export to sidewalk format which formats the file to GIS compatible file types. The file types can be chosen through the check boxes. If a format is not needed, it may be unchecked and not exported. The files will be exported to the listed export location. This location can be changed through the "Browse" icon.

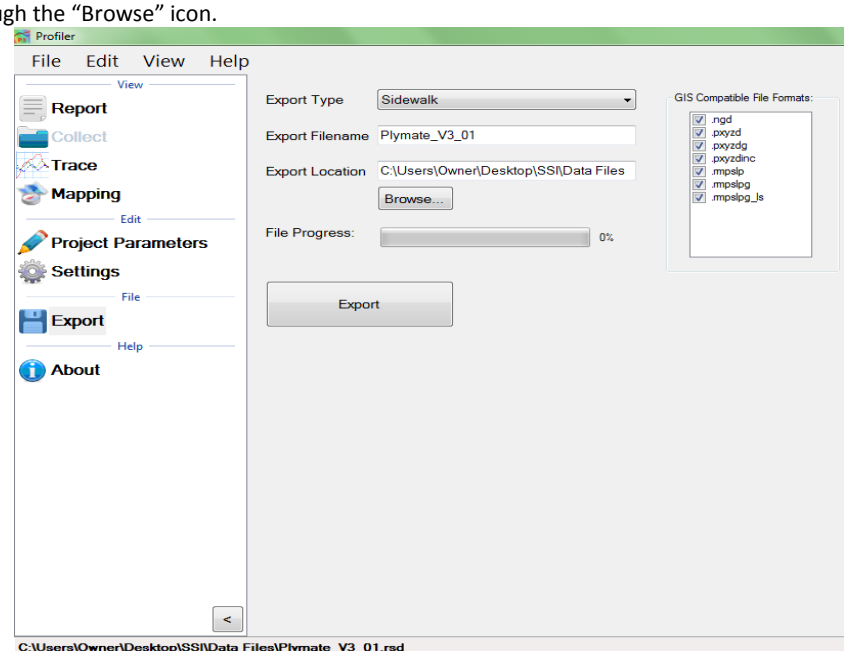



Figure 50: The sidewalk export window

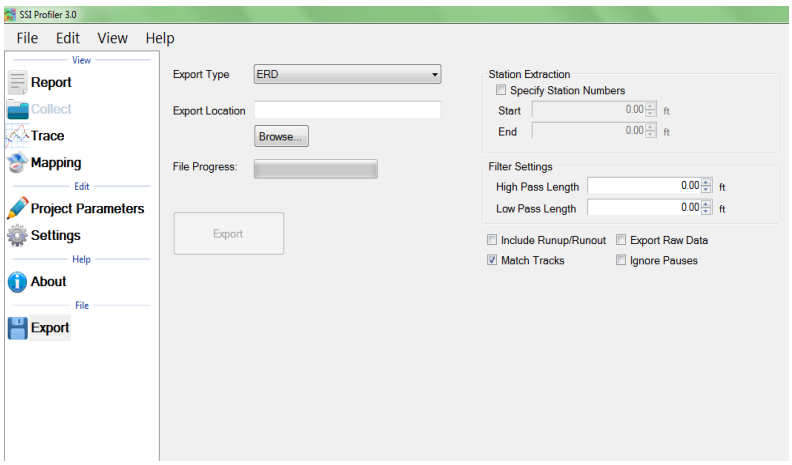



Figure 51: The export window for exporting the data into ERD format.

**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.

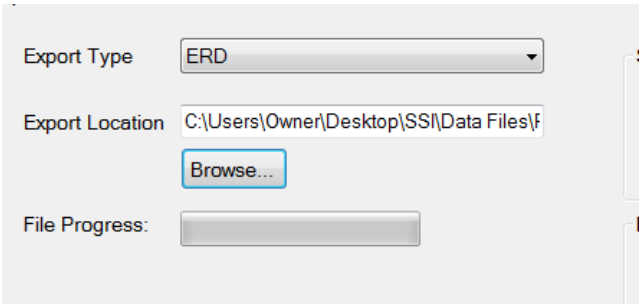



Figure 52: The export type.

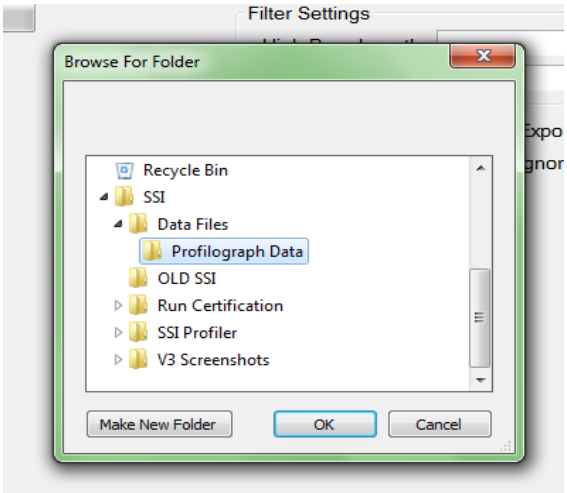



Figure 53: Selecting a location to save the exported file.

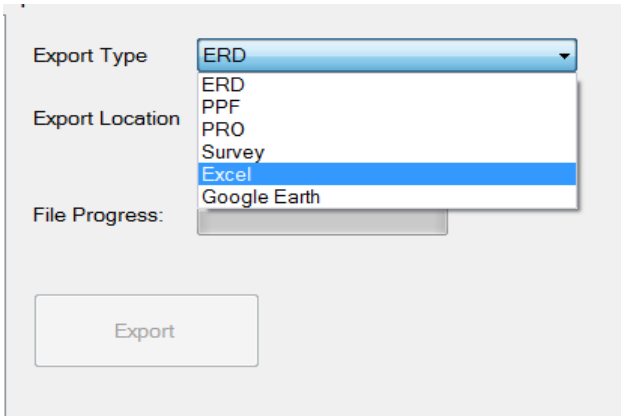



Figure 54: The export type drop down menu.

**Exporting to ERD Format**

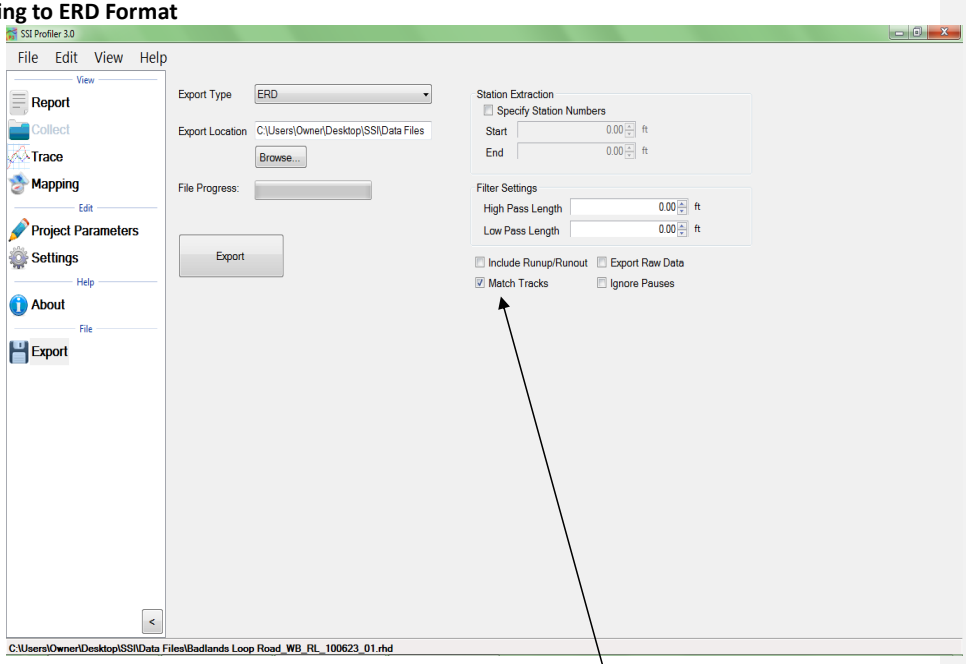



Figure 55: The ERD format export window with match tracks selected.

**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.

**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 data, leave the filter lengths at the default value of 0.00 feet.

**High Pass Filter** – The High Pass Filter will remove any trend in the data less that 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.

**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.

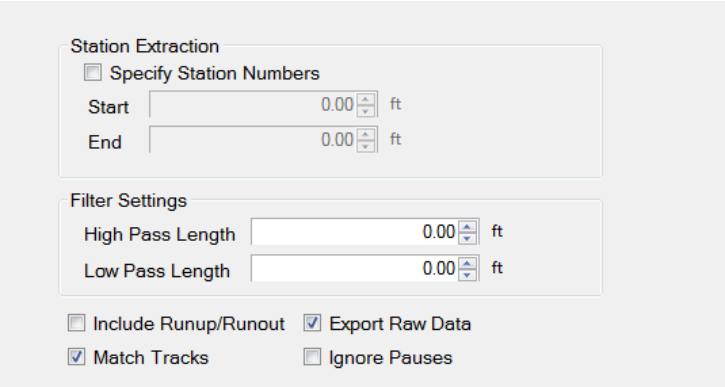



Figure 56: An enlarged view of the ERD export window settings.

The entire data run is being exported since there are not station extractions.

**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 the settings entered prior to profiling. The label of the track number and stationing cannot be changed after collection. This feature does not have to be used for the sidewalk profiler system.

**Ignore Pauses**

Pauses are used when an obstruction comes into the profiling path or when a section of pavement is not to be profiled. Stationing is to remain constant and under the same file. Pauses can either be omitted or included in reports and exported file of the Profiler V3 software. To omit pauses from the exported file, select the check box, "Ignore Pauses." Pauses are used as an interval or segment event for the sidewalk profiler system.

**Exporting to PPF Format**

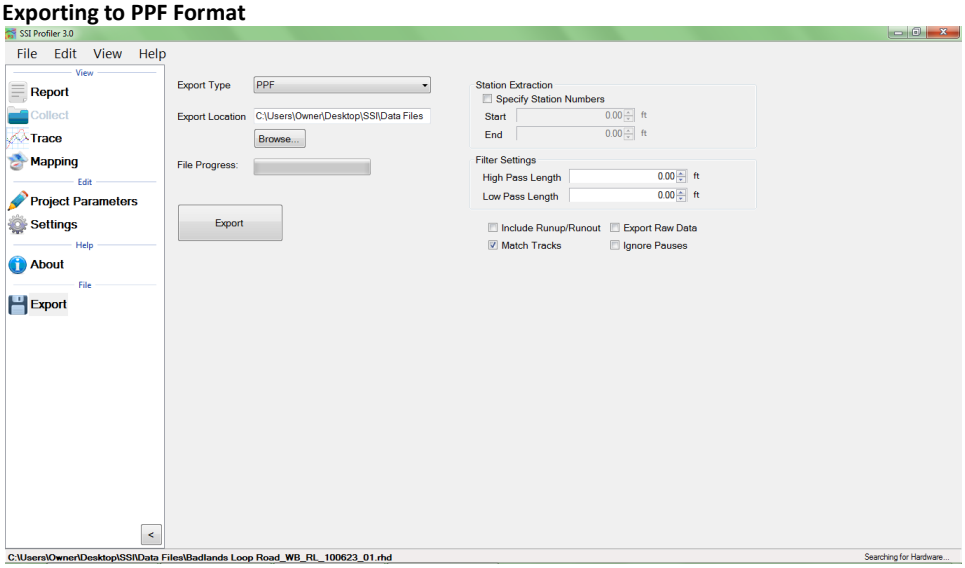



Figure 57: The PPF export window. This window has the same settings as the ERD and Survey format.

**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. 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 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.

**High Pass Filter** – The High Pass Filter will remove any trend in the data that is less that 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.

**Include Run up-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. The Run up and Run Out settings are found in the HSP collection software, in 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.

**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 number label assigned to the track and the stationing are settings that cannot be changed after collection. This feature does not have to be used for the sidewalk profiler system.

**Ignore Pauses**

Pauses are used when an obstruction comes into the profiling path or when a section of pavement is not to be profiled. During a pause distance is still collected but height data can be omitted. Pauses can be omitted or included in reports based on the selection in the Analysis Parameters window. Pauses are used as a segment or interval event for the sidewalk profiler system.

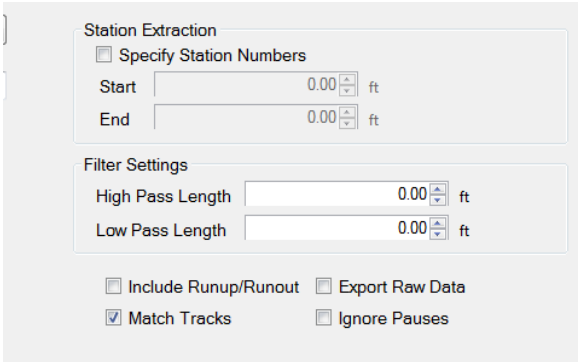



Figure 58: An enlarged view of the optional settings when exporting in PPF format.

**Exporting to PRO Format**

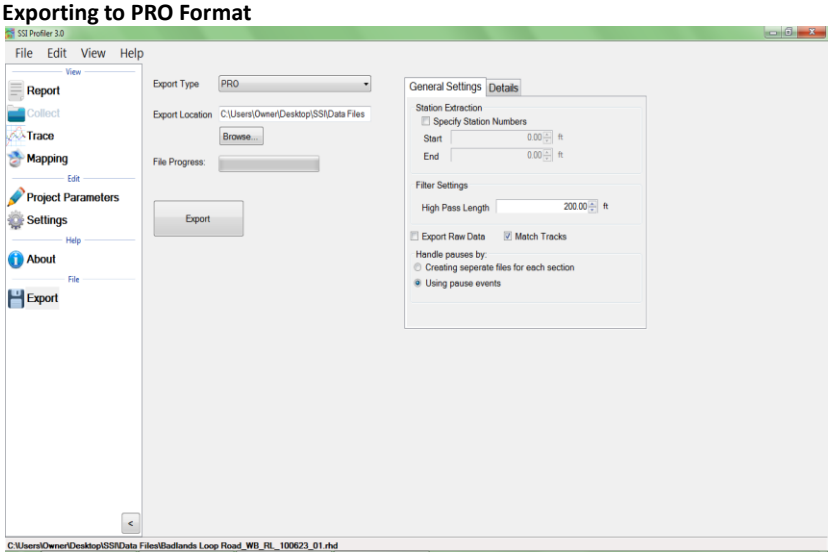



Figure 59: The export window when PRO format is selected.

**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. These values can be adjusted by typing values into the box or by using the arrow keys to the right of the box.

**Filter Settings-High Pass length**

The operator has the 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. This feature does not have to be used for the sidewalk profiler system.

**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 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

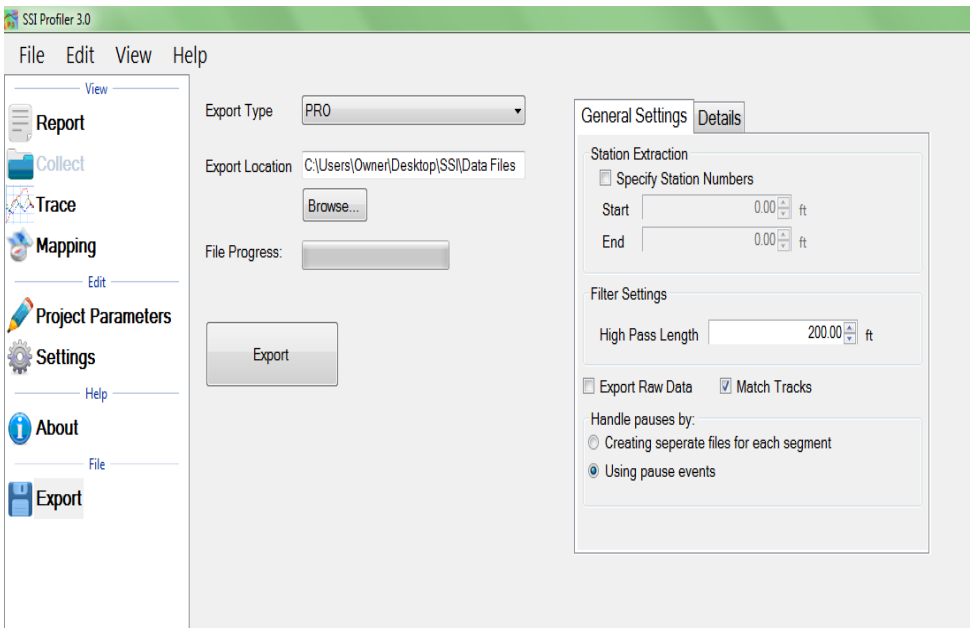



Figure 60: An enlarged view of the entire PRO export window.

The right side includes two tabs of General Settings and Details. The General Settings tab contains the station extraction tool and filters. The Details tab allows the operator to input information about the project.

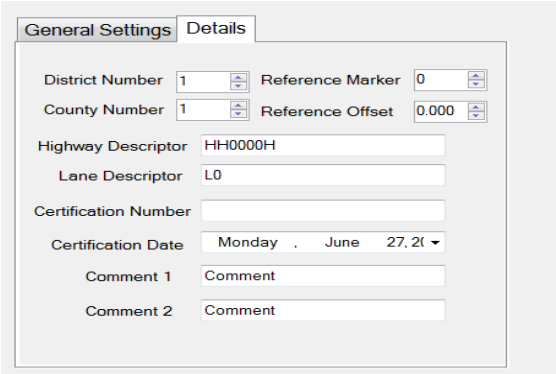



Figure 61: The Details tab contains information about the project.

**Exporting to Survey Format**

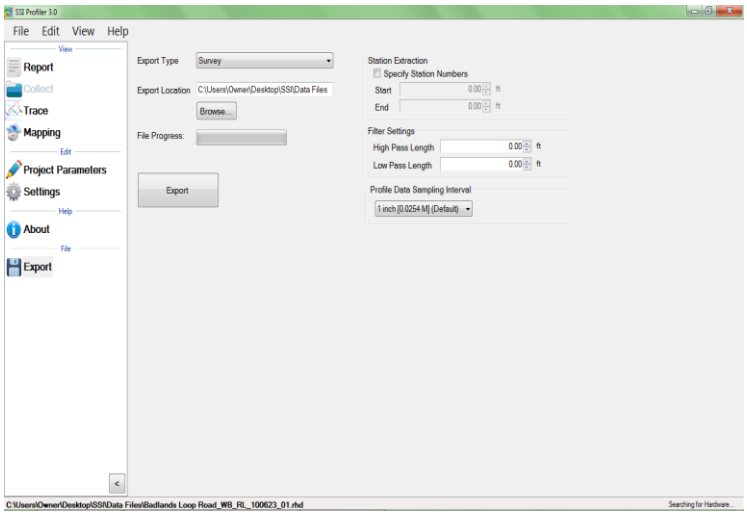



Figure 62: Exporting in Survey format window

**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.

**Filter Settings**

A High and Low Pass filter is 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.

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

**Profile Data Sampling Interval**

The sampling interval is the distance between readings of the SSI survey system. The default length of this interval is 1 inch. This feature allows other intervals of 6 and 12 inches to be implemented, depending on the accuracy needed in the surveying program.

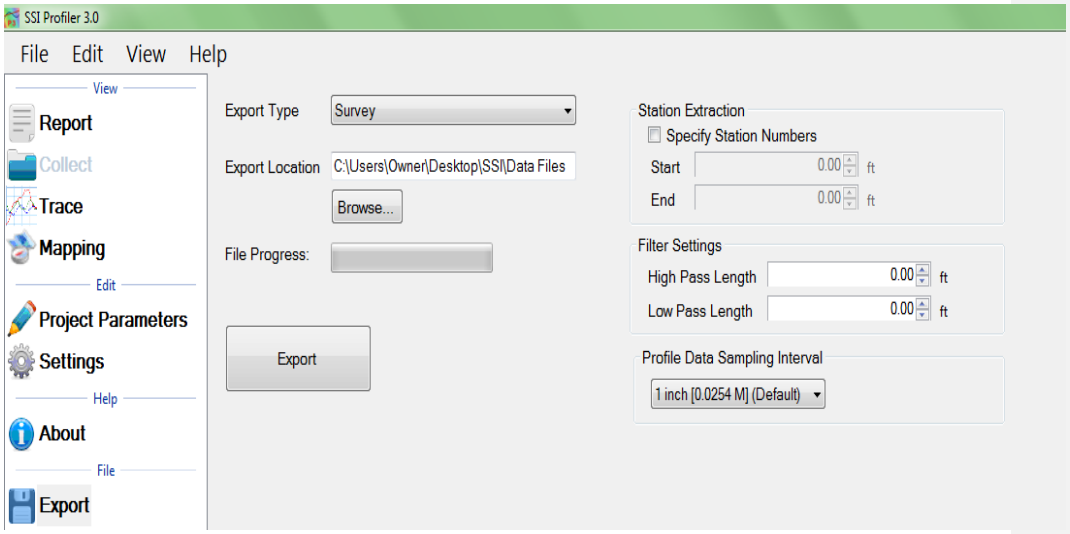



Figure 63: The enhanced view of the Survey format export window

**Exporting to Excel Format**

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

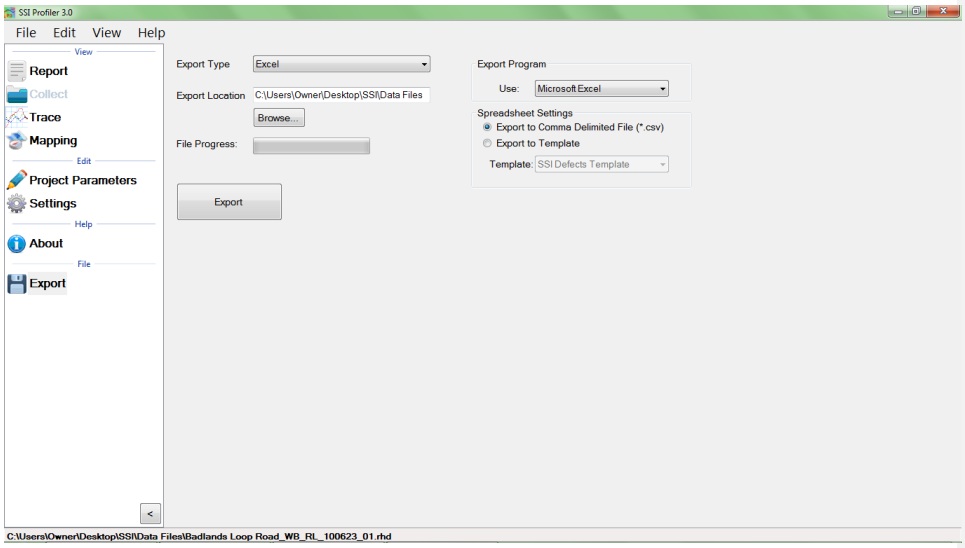
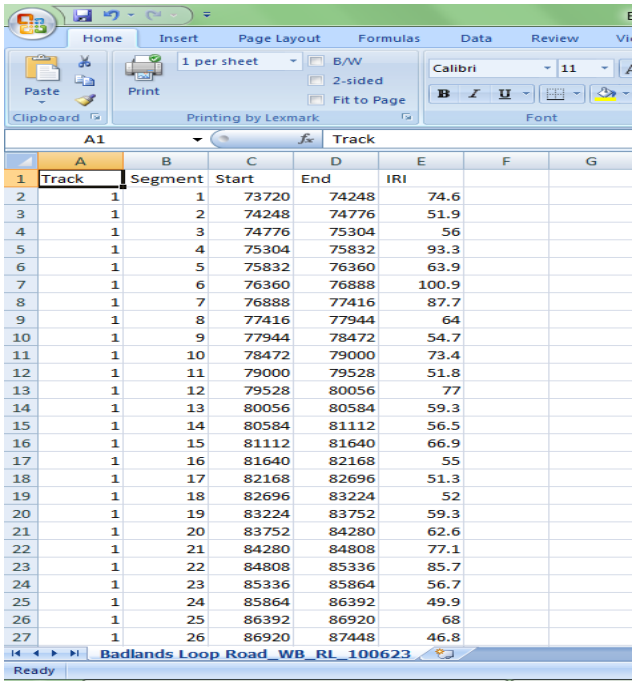



Figure 64: Exporting the data into Microsoft Excel format

**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.



| Track | Segment | Start | End | IRI |
|---|---|---|---|---|
| 1 | 1 | 73720 | 74248 | 74.6 |
| 1 | 2 | 74248 | 74776 | 51.9 |
| 1 | 3 | 74776 | 75304 | 56 |
| 1 | 4 | 75304 | 75832 | 93.3 |
| 1 | 5 | 75832 | 76360 | 63.9 |
| 1 | 6 | 76360 | 76888 | 100.9 |
| 1 | 7 | 76888 | 77416 | 87.7 |
| 1 | 8 | 77416 | 77944 | 64 |
| 1 | 9 | 77944 | 78472 | 54.7 |
| 1 | 10 | 78472 | 79000 | 73.4 |
| 1 | 11 | 79000 | 79528 | 51.8 |
| 1 | 12 | 79528 | 80056 | 77 |
| 1 | 13 | 80056 | 80584 | 59.3 |
| 1 | 14 | 80584 | 81112 | 56.5 |
| 1 | 15 | 81112 | 81640 | 66.9 |
| 1 | 16 | 81640 | 82168 | 55 |
| 1 | 17 | 82168 | 82696 | 51.3 |
| 1 | 18 | 82696 | 83224 | 52 |
| 1 | 19 | 83224 | 83752 | 59.3 |
| 1 | 20 | 83752 | 84280 | 62.6 |
| 1 | 21 | 84280 | 84808 | 77.1 |
| 1 | 22 | 84808 | 85336 | 85.7 |
| 1 | 23 | 85336 | 85864 | 56.7 |
| 1 | 24 | 85864 | 86392 | 49.9 |
| 1 | 25 | 86392 | 86920 | 68 |
| 1 | 26 | 86920 | 87448 | 46.8 |

Figure 65: An example of exporting the data into Excel.

**Export to Template**

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

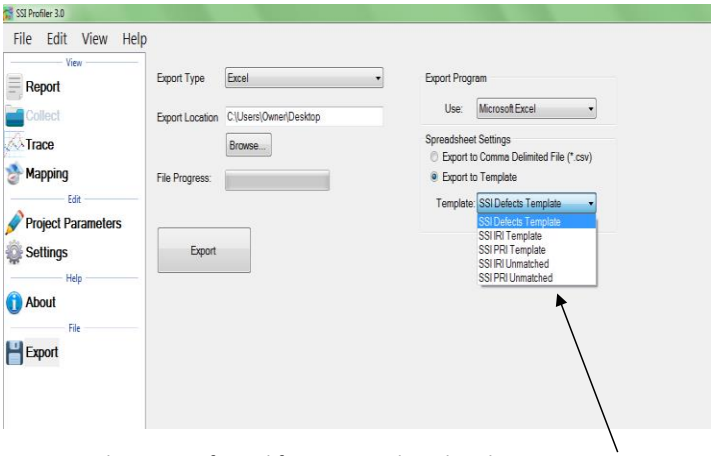



Figure 66: The types of excel formats are listed in the template drop down menu.

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.

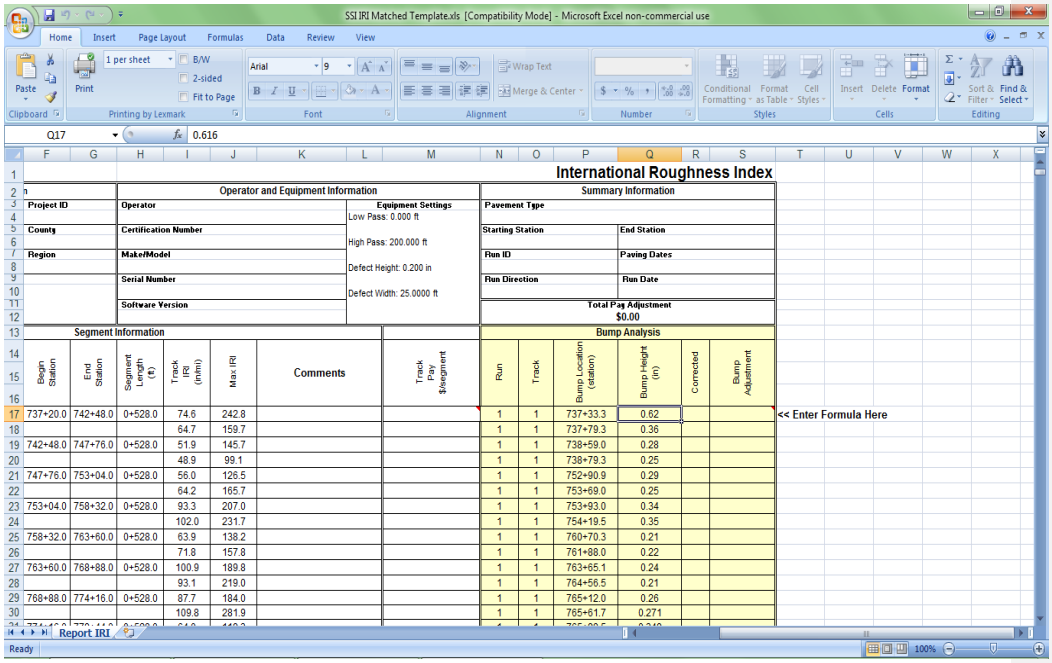
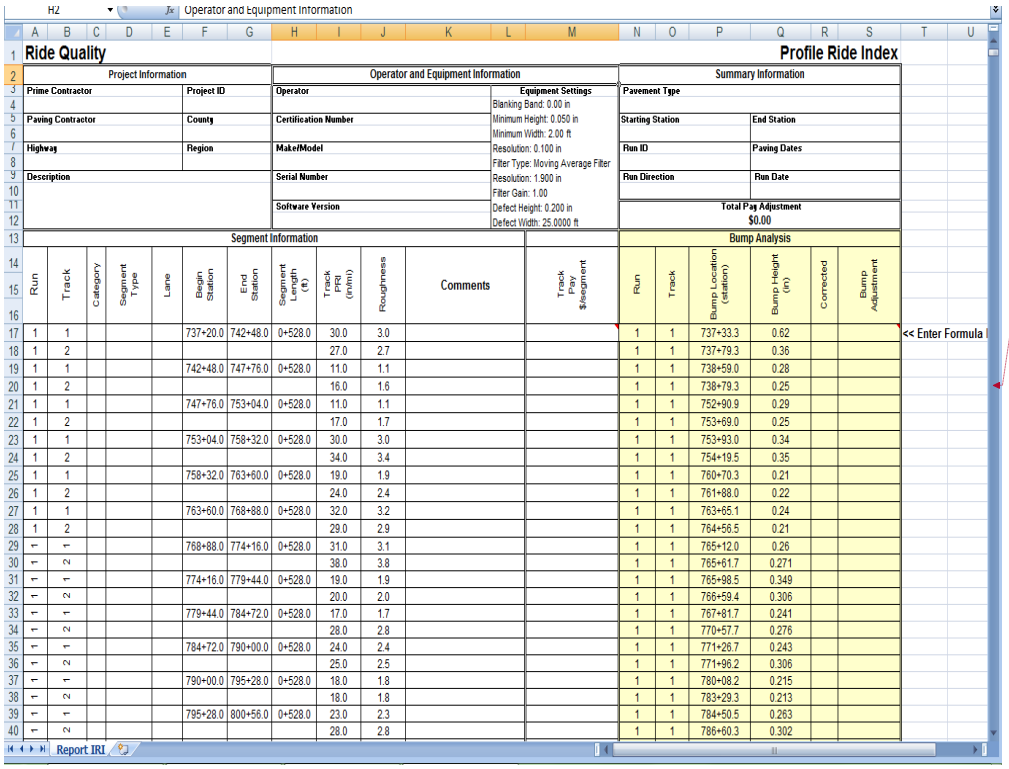



Figure 67: An example of the IRI Excel template

**PRI Template**

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



Ride Quality — Profile Ride Index

| Project Information | | Operator and Equipment Information | | Summary Information | |
|---|---|---|---|---|---|
| Prime Contractor | Project ID | Operator | Equipment Settings: Blanking Band: 0.00 in; Minimum Height: 0.050 in; Minimum Width: 2.00 ft; Resolution: 0.100 in; Filter Type: Moving Average Filter; Resolution: 1.900 in; Filter Gain: 1.00; Defect Height: 0.200 in; Defect Width: 25.0000 ft | Pavement Type | |
| Paving Contractor | County | Certification Number | | Starting Station | End Station |
| Highway | Region | Make/Model | | Run ID | Paving Dates |
| Description | | Serial Number | | Run Direction | Run Date |
| | | Software Version | | Total Pay Adjustment: $0.00 | |

Segment Information

| Run | Track | Category | Segment Type | Lane | Begin Station | End Station | Segment Length (ft) | Track PRI (in/mi) | Roughness | Comments | Track Pay $/segment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | | | | 737+20.0 | 742+48.0 | 0+528.0 | 30.0 | 3.0 | | |
| 1 | 2 | | | | | | | 27.0 | 2.7 | | |
| 1 | 1 | | | | 742+48.0 | 747+76.0 | 0+528.0 | 11.0 | 1.1 | | |
| 1 | 2 | | | | | | | 16.0 | 1.6 | | |
| 1 | 1 | | | | 747+76.0 | 753+04.0 | 0+528.0 | 11.0 | 1.1 | | |
| 1 | 2 | | | | | | | 17.0 | 1.7 | | |
| 1 | 1 | | | | 753+04.0 | 758+32.0 | 0+528.0 | 30.0 | 3.0 | | |
| 1 | 2 | | | | | | | 34.0 | 3.4 | | |
| 1 | 1 | | | | 758+32.0 | 763+60.0 | 0+528.0 | 19.0 | 1.9 | | |
| 1 | 2 | | | | | | | 24.0 | 2.4 | | |
| 1 | 1 | | | | 763+60.0 | 768+88.0 | 0+528.0 | 32.0 | 3.2 | | |
| 1 | 2 | | | | | | | 29.0 | 2.9 | | |
| 1 | 1 | | | | 768+88.0 | 774+16.0 | 0+528.0 | 31.0 | 3.1 | | |
| 1 | 2 | | | | | | | 38.0 | 3.8 | | |
| 1 | 1 | | | | 774+16.0 | 779+44.0 | 0+528.0 | 19.0 | 1.9 | | |
| 1 | 2 | | | | | | | 20.0 | 2.0 | | |
| 1 | 1 | | | | 779+44.0 | 784+72.0 | 0+528.0 | 17.0 | 1.7 | | |
| 1 | 2 | | | | | | | 28.0 | 2.8 | | |
| 1 | 1 | | | | 784+72.0 | 790+00.0 | 0+528.0 | 24.0 | 2.4 | | |
| 1 | 2 | | | | | | | 25.0 | 2.5 | | |
| 1 | 1 | | | | 790+00.0 | 795+28.0 | 0+528.0 | 18.0 | 1.8 | | |
| 1 | 2 | | | | | | | 18.0 | 1.8 | | |
| 1 | 1 | | | | 795+28.0 | 800+56.0 | 0+528.0 | 23.0 | 2.3 | | |
| 1 | 2 | | | | | | | 28.0 | 2.8 | | |

Bump Analysis

| Run | Track | Bump Location (station) | Bump Height (in) | Corrected | Bump Adjustment |
|---|---|---|---|---|---|
| 1 | 1 | 737+33.3 | 0.62 | | |
| 1 | 1 | 737+79.3 | 0.36 | | |
| 1 | 1 | 738+59.0 | 0.28 | | |
| 1 | 1 | 738+79.3 | 0.25 | | |
| 1 | 1 | 752+90.9 | 0.29 | | |
| 1 | 1 | 753+69.0 | 0.25 | | |
| 1 | 1 | 753+93.0 | 0.34 | | |
| 1 | 1 | 754+19.5 | 0.35 | | |
| 1 | 1 | 760+70.3 | 0.21 | | |
| 1 | 1 | 761+88.0 | 0.22 | | |
| 1 | 1 | 763+65.1 | 0.24 | | |
| 1 | 1 | 764+56.5 | 0.21 | | |
| 1 | 1 | 765+12.0 | 0.26 | | |
| 1 | 1 | 765+61.7 | 0.271 | | |
| 1 | 1 | 765+98.5 | 0.349 | | |
| 1 | 1 | 766+59.4 | 0.306 | | |
| 1 | 1 | 767+81.7 | 0.241 | | |
| 1 | 1 | 770+57.7 | 0.276 | | |
| 1 | 1 | 771+26.7 | 0.243 | | |
| 1 | 1 | 771+96.2 | 0.306 | | |
| 1 | 1 | 780+08.2 | 0.215 | | |
| 1 | 1 | 783+29.3 | 0.213 | | |
| 1 | 1 | 784+50.5 | 0.263 | | |
| 1 | 1 | 786+60.3 | 0.302 | | |

<< Enter Formula

Report IRI

Figure 68: An example of the Excel PRI template

**Formatted:** Justified, Indent: Left: 0", First line: 0", Space After: 0 pt

**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.

**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.

**Exporting GPX**

The GPX 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."

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.

## Troubleshooting

**Profiler Hardware Not Found**

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

**Distance or Height Readout is not Accurate**

Check the calibration of the device through the collect window, calibrate, and calibration summary. If necessary recalibrate the distance or height of the device. It does not happen frequently, but in some cases the distance encoder shaft does slips on the axle. In this case, tighten the coupler within the machine. If unsure about the steps, contact SSI Customer Support

**Do Not Replace the Device Components with Store Bought Items**

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

**Updating the Software**

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