



Pavement Conformance Workflow

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Introduction and background information

The **'Pavement Conformance Report (Advanced)'** provides reporting functionality commonly required by civil road authorities. The following workflow shows users how to perform conformance reporting on data typically seen on civil projects.

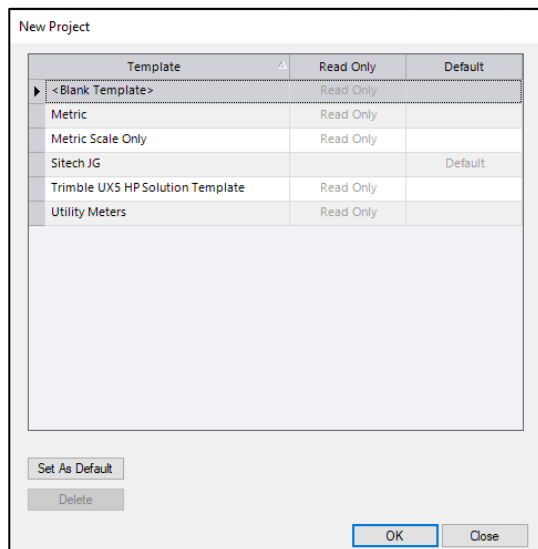
1.Importing Data

Launch a new project

In Trimble Business Center, do either of the following:

1. On the Start Page, click the **New Project** button.
2. In the TBC ribbon, select **File > New**.


The **New Project** window will display.

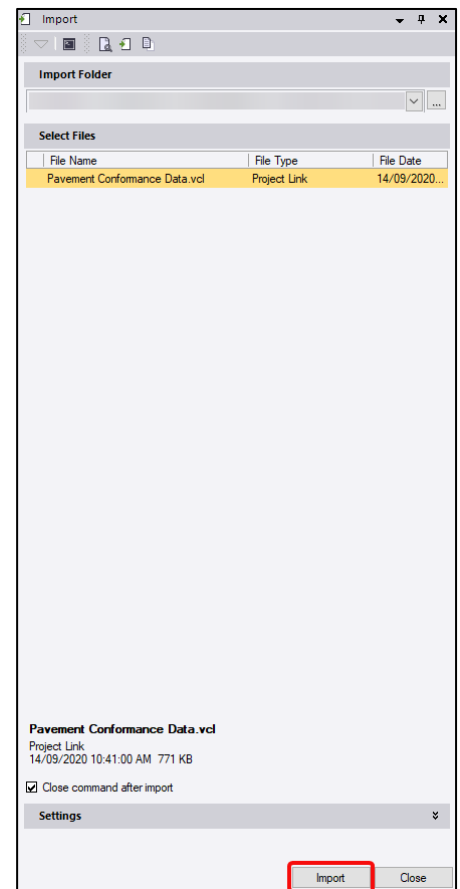


Select *Metric* template or your own default template and click **OK**. The **Plan View** will then display.


Import data

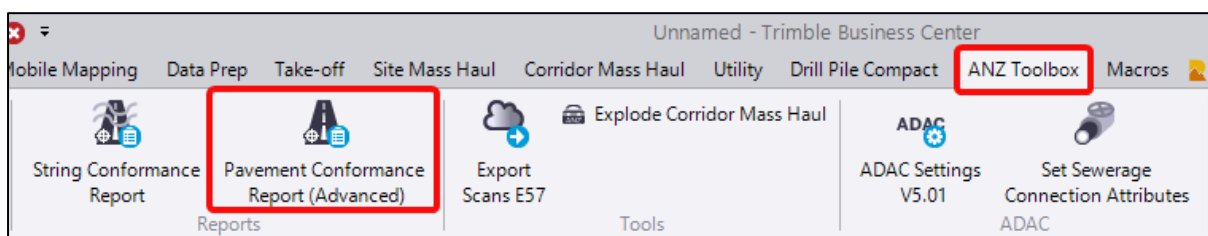
To import data:

1. Start by opening the import window. Navigate to **Home > Data Exchange > Import**.
2. In the import window **click** the  **icon**. The Import Folder window should display.
3. Navigate to the folder containing the drainage data you wish to import. **Click OK**.
4. In the import window **select** the file containing the data you wish to import. Change the settings if required. **Click Import**.



2. Open the command


The 'Pavement Conformance Report', is located on the **ANZ toolbox** ribbon tab. Click  icon to open the command or press F12 and type in the command name.

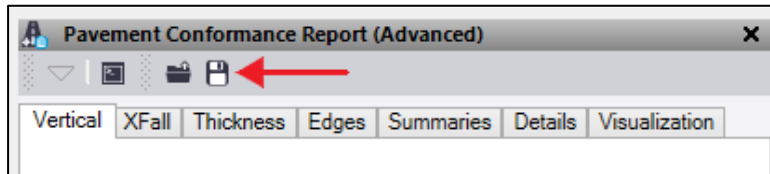


Report Settings

3. Save and Load Templates


The pavement conformance report tool allows tolerance templates to be saved and loaded into the reporting tool. This means the user can fill out information in each settings tab, then save it as a template for future use. Once you have all relevant data filled in and the report is ready to be created the template can be exported by:

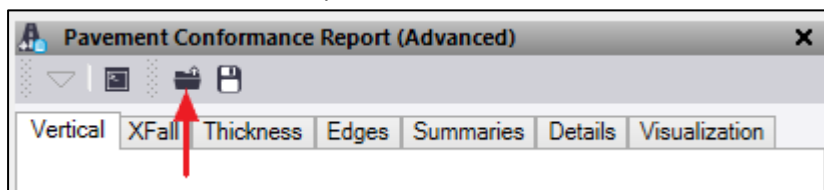
1. Clicking the  icon at the top of the tool bar.



2. Choose the folder you wish to save the template to and click **save**.

To load a saved template:

1. Click the  icon at the top of the tool bar.



2. Navigate to the file containing the template, select the file and click **Open**.

The file should load into the tool and automatically fill the predefined fields in each tab.

4. Vertical Settings Tab

The vertical setting tab provides selection fields for the data being reported as well as options and vertical tolerance settings.

Conformance points

This field requires the selection of points to be reported on. *(The options button provides selection tools to select data more easily from within the project).*

1. **Click** in the **Conformance points** field and in the plan view select all points required for conformance.

Alignment

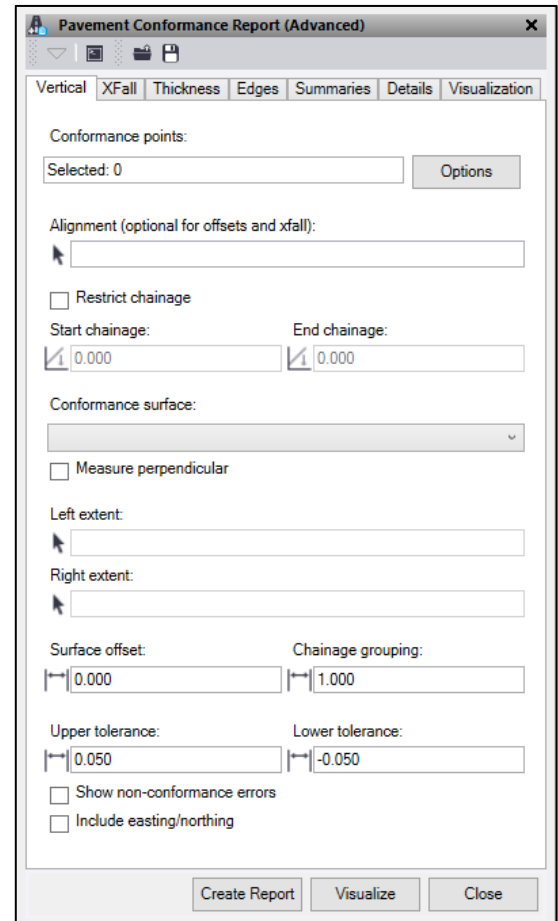
The report uses an Alignment string to report the conformance points against. *Note: This is not required for just vertical or thickness reporting.*

2. **Click** in the **Alignment** field, select in the plan view the relevant alignment string.
3. **Restrict chainage** allows for the report to be limited to between a start and end chainage, enter details here as required.

Conformance Surface

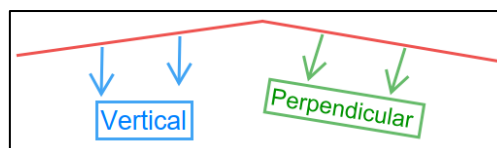
The report requires a surface to perform the conformance of the selected points against.

4. **Select** the relevant surface from the dropdown box.



Measure Perpendicular

The Measure perpendicular tick box changes the computation type from vertical to perpendicular. When measure perpendicular is selected both left and right extent strings are required.



5. If required, **click the box** to select the perpendicular measurement type.
6. **Click** in the **left extent** field and in the plan view select the relevant left extents string.
7. **Repeat** step 6 for right extent.

Note: Using the extent strings makes sure that only the relevant area of the road surface is used to report against.

Surface Offset

If you are performing conformance to a pavement subsurface layer, a surface offset depth can be applied.

8. If required, click in the **Surface offset** field, and enter a surface offset in metre units.

Chainage Grouping

Chainage grouping provides options for chainage grouping of points in the conformance report. The report will look for points cross-sectionally within this grouping distance.

9. The default setting of 1 metre should suit most cases required, however this value may need modifying depending on survey pickup interval used. click in the **Chainage Grouping** field and enter a value in metre units.

Upper/lower Tolerances

Tolerances are defined as upper and lower values in metre units.

10. **Click** in the **Upper tolerance** field, enter a suitable value.
11. **Repeat** step 10 for **lower tolerance**.

Show Non-Conformance Errors

Provides additional columns in conformance report showing the tolerance and the amount outside of that tolerance.

Include Easting/Northing

Provides additional columns in conformance report showing the Easting and Northing of the as-built point.

5. XFall Settings Tab

The XFall tab provides additional crossfall reporting options within the conformance report.

1. **Click the Include XFall** box to add crossfall reporting to the conformance report output.
2. **Click** in the **XFall tolerance** field and enter a crossfall tolerance in % grade units.

Maximum chainage delta

This distance is the maximum chainage difference that 2 points can be different by and still report cross fall deltas.

3. **Click** in the **Maximum chainage delta** field and enter a value in metre units.

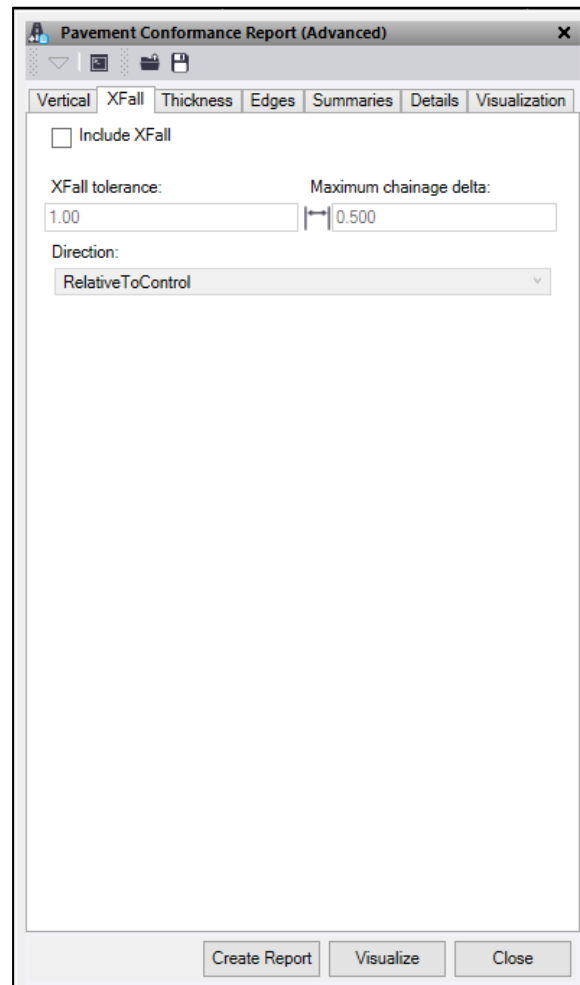
Direction

Choose the direction you want the cross fall to be reported relative to the alignment string.

Relative to Control = Normal use for Road reporting. Reported left and right of alignment.

Left to Right = Report all cross falls left to right with chainage

Right to Left = Report all cross falls right to left with chainage



The screenshot shows the 'Pavement Conformance Report (Advanced)' dialog box with the 'XFall' tab selected. The 'Include XFall' checkbox is unchecked. The 'XFall tolerance' field is set to 1.00. The 'Maximum chainage delta' field is set to 0.500. The 'Direction' dropdown menu is set to 'RelativeToControl'. At the bottom, there are three buttons: 'Create Report', 'Visualize', and 'Close'.

6. Thickness Settings Tab

The Thickness tab provides additional layer thickness reporting options within the conformance report.

1. **Click** the **Include Thickness** box to add thickness reporting to the conformance report output.
2. **Select** from the **dropdown box** the subsurface to check the thickness conformance against.

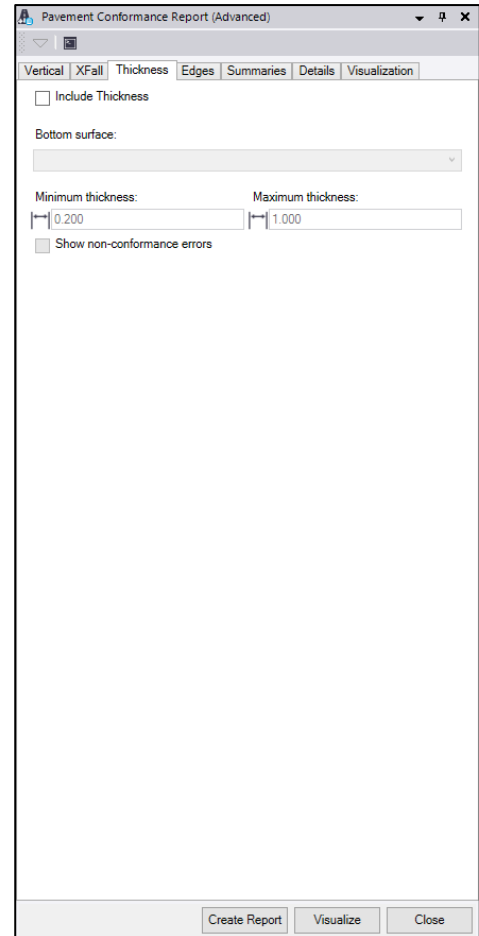
Upper/lower Tolerances

Tolerances are defined as minimum and maximum values in metre units.

3. **Click** in the **Minimum tolerance** field, enter a suitable value.
4. **Repeat** step 17 for **Maximum tolerance**.

Show Non-Conformance Errors

Provides additional columns in conformance report showing the tolerance and the amount outside of that tolerance.



The screenshot shows the 'Pavement Conformance Report (Advanced)' window with the 'Thickness' tab selected. The interface includes the following elements:

- Navigation Tabs:** Vertical, XFall, Thickness (selected), Edges, Summaries, Details, Visualization.
- Include Thickness:** A checkbox that is currently unchecked.
- Bottom surface:** A dropdown menu.
- Minimum thickness:** A text input field containing the value '0.200'.
- Maximum thickness:** A text input field containing the value '1.000'.
- Show non-conformance errors:** A checkbox that is currently unchecked.
- Buttons:** 'Create Report', 'Visualize', and 'Close' buttons are located at the bottom right of the window.

7. Edges Settings Tab

The Edges tab provides additional edge string reporting options within the conformance report.

1. Click the **Include edge report** box to add edge reporting to the conformance report output.

Left and Right Alignment

The left and right alignment are the edge strings used to report the horizontal differences in the conformance report output.

2. Click in the **left alignment** field and in the view (plan or 3D) select the relevant edge string. Repeat for **Right alignment** if required.

Left and Right Extent

Extent distances give a range which will be used to search for the points on either side of the alignment string. These numbers are always positive.

3. Type a number in metre units in the **left and right extent** boxes.

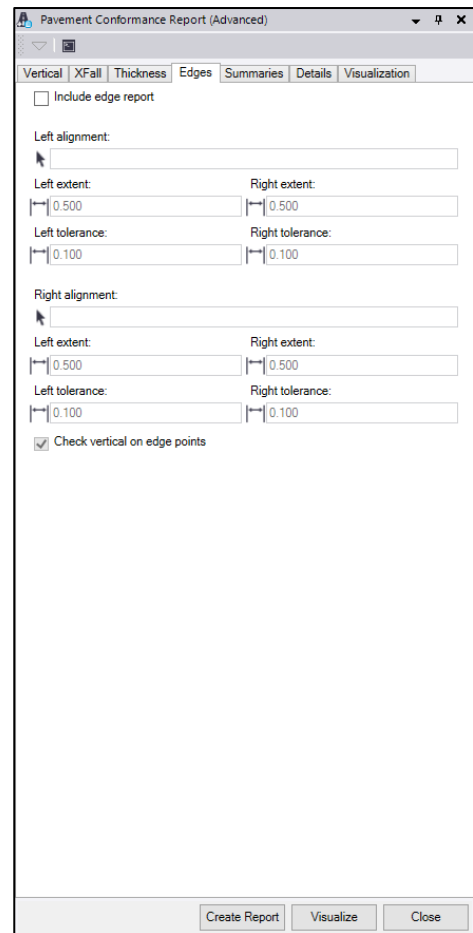
Left and Right Tolerance

Tolerances to report against are defined as left and right values and are always positive.

4. Type a number in metre units in the **left and right tolerance** boxes.

Check vertical on edge points

If this is checked then points that are reported horizontally will also be used for vertical checks. If not, then they will only be used horizontally.



8. Summaries Settings Tab

The Summaries tab provides additional reporting options and header summaries within the conformance report.

Vertical

Include information and summary on the vertical statistics of the nodes reported.

Vertical Summary	
Points Tested:	69
Within Tolerance:	69 100.0%
Too High:	0 0.0%
Too Low:	0 0.0%
Average Conformance:	0.001
Standard Deviation:	0.006
Max Conformance:	0.011
Min Conformance:	-0.012

Thickness

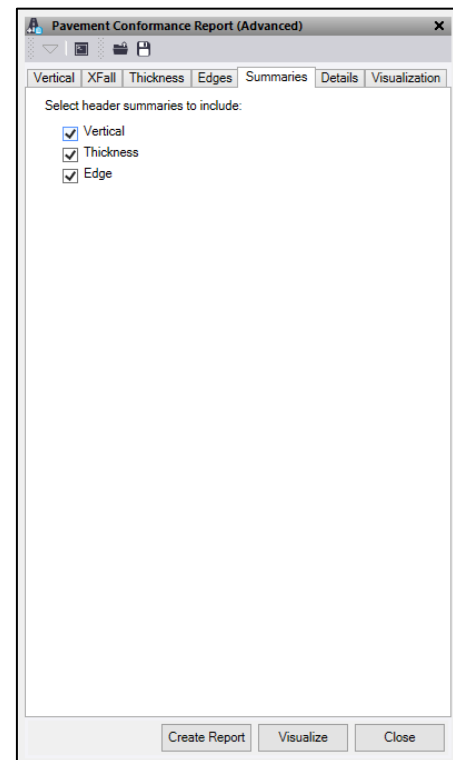
Include information and summary on the thickness statistics of the nodes reported.

Thickness Summary	
Points Tested:	69
Within Tolerance:	67 97.1%
Too Thick:	1 1.4%
Too Thin:	1 1.4%
Average Conformance:	0.351
Standard Deviation:	0.006

Edge

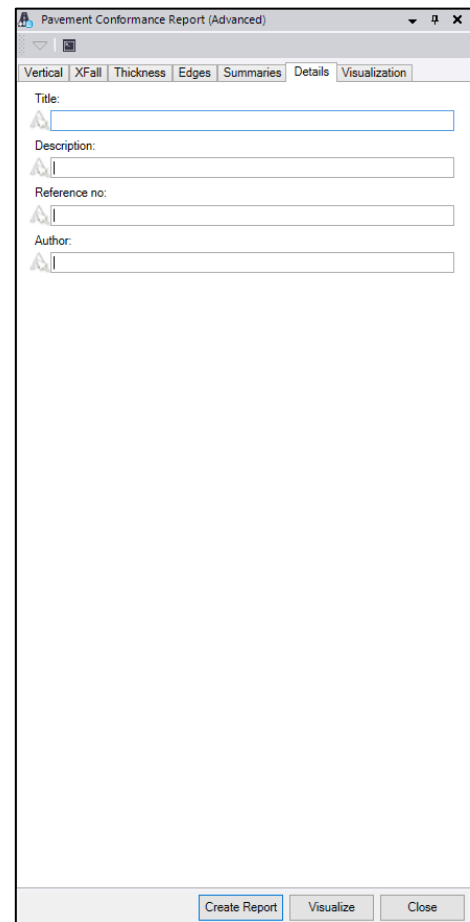
Include information and summary on the Horizontal statistics of the nodes reported.

Horizontal Summary	
Points Tested:	28
Within Tolerance:	23 82.1%
Too Wide:	0 0.0%
Too Narrow:	5 17.9%
Average Left:	-0.020
Average Right:	-0.021
(-ve values are on center line side)	



9. Details Settings Tab

The details settings tab provides fields to add report information. Information such as the report title, description, reference number (job number) and surveyor name are all defined by the user in this tab.



The screenshot shows a software window titled "Pavement Conformance Report (Advanced)". The window has a tabbed interface with the following tabs: Vertical, XFall, Thickness, Edges, Summaries, Details (selected), and Visualization. Below the tabs, there are four text input fields, each preceded by a small icon of a person. The labels for these fields are: "Title:", "Description:", "Reference no:", and "Author:". At the bottom of the window, there are three buttons: "Create Report", "Visualize", and "Close".

10. Visualization Settings Tab

The visualization tab provides options to control the information shown in the TBC model view (plan and 3D) once the visualize button is clicked.

5. **Click the Create visualization layers** box to enable the creation of conformance point objects.

Layer prefix

The layer prefix field sets a text prefix to the layers created to store the visualization points. The default prefix is 'Conformance'.

6. If the default value is not suitable, **replace** the text in the Layer prefix field.

Point Text

- Survey – displays the surveyed point level
- Design – displays the design level of the point
- Conformance – displays the conformance result
- Thickness – displays the thickness result
- XFall – displays the Xfall conformance result

Clear visualization layers

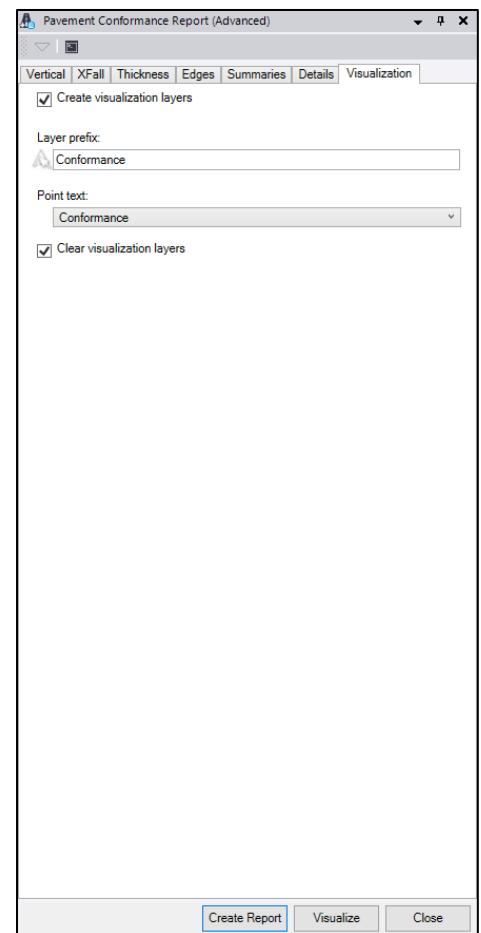
Clears all visualization point object layers each time the Visualize button is clicked. By default, this box is ticked.

7. **Click the Visualize** button to create visualization points in the model view (plan and 3D). View the results.

9. Create report

Review tabs as required to verify all options are set as required.

8. **Click the Create Report** button to generate Excel report.



11. Example report

Below is an example report.

Project Name													
Surface Conformance Report Job Description: QA Pavement Job Reference No: yymmddjob Alignment: MCW1 Conformance Surface: FSL Design Surface Offset: -0.050 (Vertical) Upper Tolerance: 0.050 Lower Tolerance: -0.050 Bottom Surface: SG Test 2 Max Thickness: 0.360 Min Thickness: 0.340 XFall Tolerance: 1.0% Date: 22-Sep-20 Report Author: A1 Surveyor								Vertical Summary Points Tested: 69 Within Tolerance: 69 100.0% Too High: 0 0.0% Too Low: 0 0.0% Average Conformance: 0.001 Standard Deviation: 0.006 Max Conformance: 0.011 Min Conformance: -0.012					
Horizontal Summary Points Tested: 28 Within Tolerance: 23 82.1% Too Wide: 0 0.0% Too Narrow: 5 17.9% Average Left: -0.020 Average Right: -0.021 (-ve values are on center line side)								Thickness Summary Points Tested: 69 Within Tolerance: 67 97.1% Too Thick: 1 1.4% Too Thin: 1 1.4% Average Conformance: 0.351 Standard Deviation: 0.006					
Point ID	Coordinate		Alignment		Levels			Pavement	Horizontal		XFall		
	Eastings	Northing	Chainage	Offset	As-Built	Design	Delta	Thickness	Side	Delta	As-Built	Design	Delta
-50FSL	495318.051	6943522.765	344.835	-3.472	64.176	64.186	-0.010	0.340	Left	-0.028			
-50FSL	495318.373	6943524.173	344.962	-2.034	64.210	64.222	-0.012	0.338			-2.35%	-2.48%	0.13%
-50FSL	495318.902	6943526.147	345.067	0.008	64.287	64.277	0.009	0.359			-3.74%	-2.70%	-1.04%
-50FSL	495319.401	6943528.045	345.177	1.967	64.341	64.330	0.011	0.361			2.78%	2.67%	0.11%
-50FSL	495319.853	6943529.474	345.187	3.466	64.364	64.374	-0.010	0.340	Right	-0.034	1.56%	2.96%	-1.40%
-50FSL	495310.238	6943525.313	353.053	-3.454	63.716	63.722	-0.005	0.345	Left	-0.046			
-50FSL	495310.737	6943526.693	353.004	-1.988	63.774	63.768	0.006	0.356			-3.93%	-3.18%	-0.75%
-50FSL	495311.402	6943528.564	352.947	-0.003	63.836	63.831	0.005	0.355			-3.12%	-3.16%	0.04%
-50FSL	495312.035	6943530.677	352.996	2.202	63.899	63.894	0.005	0.355			2.86%	2.88%	-0.01%
-50FSL	495312.405	6943531.881	353.014	3.461	63.940	63.931	0.009	0.359	Right	-0.039	3.24%	2.92%	0.33%
-50FSL	495300.689	6943528.370	363.079	-3.488	63.184	63.184	0.000	0.350	Left	-0.012			
-50FSL	495301.223	6943529.765	363.001	-1.996	63.241	63.232	0.008	0.358			-3.84%	-3.27%	-0.57%
-50FSL	495302.420	6943533.613	363.048	2.033	63.359	63.351	0.008	0.358			2.94%	2.94%	0.00%
-50FSL	495302.968	6943534.960	362.941	3.484	63.394	63.400	-0.006	0.344	Right	-0.016	2.41%	3.37%	-0.96%
-50FSL	495291.220	6943531.438	373.033	-3.486	62.685	62.684	0.001	0.351	Left	-0.014			
-50FSL	495291.694	6943532.825	373.009	-2.020	62.732	62.729	0.003	0.353			-3.18%	-3.08%	-0.10%
-50FSL	495292.308	6943534.751	373.018	0.001	62.794	62.789	0.005	0.355			-3.08%	-2.98%	-0.11%
-50FSL	495292.913	6943536.656	373.030	2.000	62.852	62.848	0.004	0.354			2.91%	2.97%	-0.06%
-50FSL	495293.357	6943538.067	373.042	3.479	62.889	62.892	-0.003	0.347	Right	-0.021	2.51%	2.96%	-0.45%