

Trimble Business Center

String Conformance Workflow

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Introduction and background information

The '**String Conformance Report**' command provides reporting functionality commonly required to produce reports comparing as-built strings against design strings. The function is useful for producing conformance reports associated with items such as kerbs, drains, walls and barriers. The following workflow shows users how to perform these conformance reports.

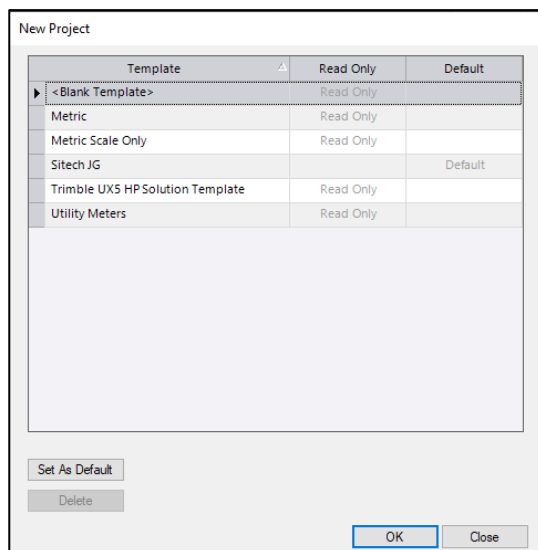
1.Importing Data

Launch a new project

In Trimble Business Centre, 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 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. Then **click Import**.




2. Open the command

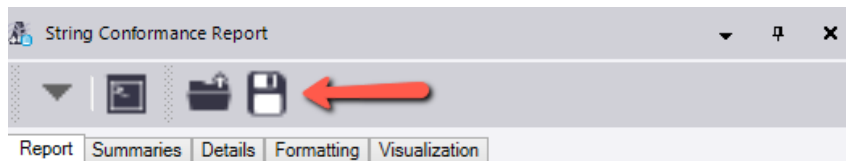
Navigate to **String Conformance Report** or press F12 and type in the command name.

The String Conformance Report window should now display.

3. Save and Load Templates


The string 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:

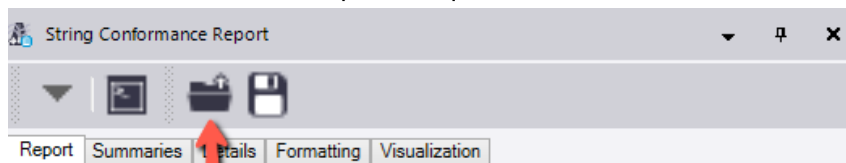
- Clicking the  icon in the top of the quick access tool bar.



- Navigate to the folder you wish to save the template in, give the file a name then click **Save**.

To import a saved template into the string conformance report tool do the following:

- Click the  icon at the top of the quick access toolbar.



- Navigate to the folder containing the saved template you wish to load, select the file then click **Open**.

The file should have loaded into the string conformance report window, filling in the information defined in the saved template.

4. Reference File Data

When using the reports, the following picker is available on some selection boxes. When you see the “Ref...” button it means that you can select a line from a reference file. This allows you to keep the design and as-built files as separate TBC projects, reducing duplication.



5. Report Tab

The report tab is where most of the settings are located.

As-Built

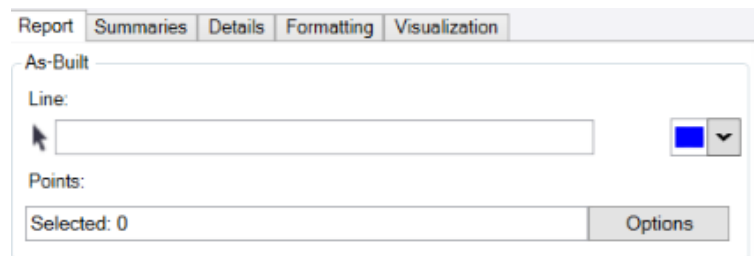
The as-built features can be picked up as either strings, pipe strings or points.

Note: the options button provides more tools to select points.

- Start by clicking in the **As-built** box. Select the associated as-built string in the plan view.
- **As-built points** can also be used at the same time or on their own.

Note: the highlight colour of linestrings can be changed using the drop down.

- Selected **pipe strings** will activate the **pipe level** drop down box, where the measured elevation of the pipe can be chosen.

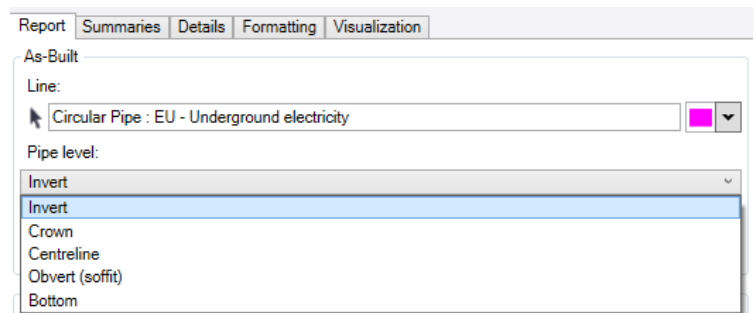


Report | Summaries | Details | Formatting | Visualization

As-Built

Line: [Empty dropdown] [Blue highlight color]

Points: Selected: 0 [Options]



Report | Summaries | Details | Formatting | Visualization

As-Built

Line: Circular Pipe : EU - Underground electricity [Pink highlight color]

Pipe level:

- Invert
- Crown
- Centreline
- Obvert (soffit)
- Bottom

Design

The **Design** string is what the as-built points or line is reported against. The horizontal and vertical differences between the design and as-built features are calculated and displayed in the report. A vertical offset can be used to apply an adjustment to the design string.

- Select the design box, select the design string in plan view. Enter required **Vertical offset** or leave it set to 0 if there is no offset.
- Selecting a pipe string will trigger the **pipe level** drop down box to confirm elevation level is either; *invert, crown, centreline, obvert* or *bottom*.



Design

Line: Line string : EU [Red highlight color] [Ref...]

Line vertical offset: 0.000

Control

The control alignment string is used as a reference in which chainage and offset of the as-built vertices are calculated from.

Note: Design and control strings can be the same.

- Select the **Control** box, and in the plan view select the alignment string required.

- If required, tick the **restrict chainage** box and enter a start and end chainage to the length of line calculated.
- Tick the **Extend Control and Design strings** function to extend the control and design strings on grade by the specified distance allowing As-Built points just beyond the design string to be reported.

Tolerances

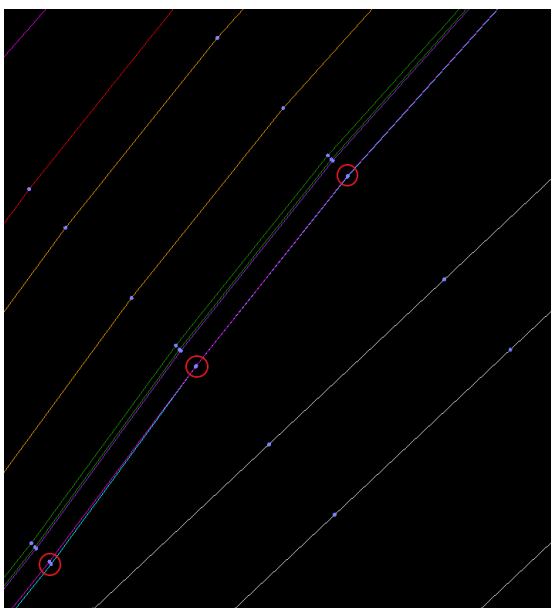
Upper and lower tolerances refer to the vertical tolerance, left and right tolerances refer to the horizontal. These tolerances set the parameters for the vertices, if an as-built node is beyond the set tolerance from the design it is flagged in the report.


- Set the vertical and horizontal tolerances.

Note: Horizontal Tolerances are always set as a positive number.

Reporting intervals

- Check the **Report at As-Built nodes** to perform calculations at the as-built nodes.
- **Report at regular Control interval** is used for QA types like walls that may not need to be reported at just the pickup locations.



Note: The **Report at As-Built nodes** takes the points along the string that were picked up in the field and creates the conformance report referencing these nodes. To view the nodes of the line marking in the plan view like the image to the left, click the  (toggle line marking) button on the bottom quick access toolbar.

As-built length

Check the **Measure as-built length** to report as-built length offsets. Use the start and end offsets to adjust the design length location reported against.

Note: This length is measured along the “control” alignment

As-built length

Measure as-built length

Start offset: End offset:

Display Options

- Check the **include points ID** box if you wish to include the associated point ID's in the report (only works if as-build points are used).
- Check the **Include codes** box if you wish to include the feature code of the points in the report (only works if as-build points are used).
- The **Include easting/northing delta** option can be used for reporting deltas (differences) in Easting and Northings

Display options

As-Built point IDs As-Built point codes Easting/northing delta

6. Summaries Tab

The summaries tab allows users to select the header summary fields that you wish to include in the report.

Detail

Include information about the report such as Job Description and Job reference number.

Example of detail header in a report.

String Conformance Report
Job Description: QA Kerb Lip
Job Reference No: 200915AA1
Control String: MCX1
Design String: KLL
Vertical Offset: 0.000
Upper Tolerance: 0.010
Lower Tolerance: -0.010
Left Tolerance: 0.020
Right Tolerance: 0.020
As-Built String: KL
Date: 14-Oct-20
Report Author: Surveyor

Vertical

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

Example of a vertical summary header in a report.

Vertical Summary	
Points Tested: 59	
Within Tolerance: 46	78.0%
Too High: 9	15.3%
Too Low: 4	6.8%
Average Conformance: 0.001	
Standard Deviation: 0.011	
Max Conformance: 0.037	
Min Conformance: -0.015	
Vertical deltas are As-Built minus Design (+ve if above design, -ve if below)	

Horizontal

Include information and summary on the horizontal tolerances and statistics of the nodes.

Example of a horizontal summary header in a report.

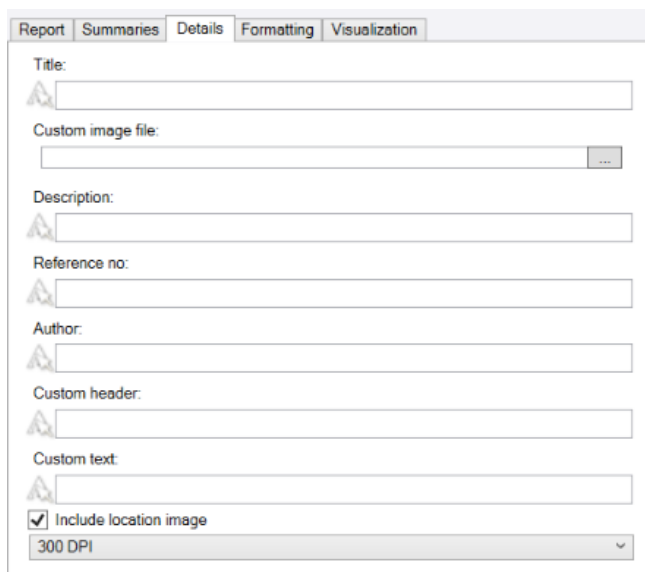
Horizontal Summary	
Points Tested: 59	
Within Tolerance: 36	61.0%
Too Left: 21	35.6%
Too Right: 2	3.4%
Average Left: -0.023	
Average Right: 0.011	
Horizontal deltas are -ve when left of design, +ve when right	

7. Details Tab

The details tab is used to create the detail header discussed above. Information such as the report title, description, reference number (job number) and surveyor name are all defined by the user in this tab. The image below shows an example of information that can be input in the details tab.

Select a “png” or “bmp” image file to be added as a custom image file to the top right corner of the report. E.g., company Logo or project image. This only appears if you have a **Title** filled out.

Check the **Include location image** box to add a snapshot of your current view to the report. The image clarity can be controlled by the DPI dropdown.



The screenshot shows a software interface with four tabs: 'Report', 'Summaries', 'Details', and 'Visualization'. The 'Details' tab is selected. It contains the following fields and controls:

- Title:** A text input field with a small image icon to its left.
- Custom image file:** A text input field with a small image icon to its left and a file selection button (three dots) to its right.
- Description:** A text input field with a small image icon to its left.
- Reference no.:** A text input field with a small image icon to its left.
- Author:** A text input field with a small image icon to its left.
- Custom header:** A text input field with a small image icon to its left.
- Custom text:** A text input field with a small image icon to its left.
- Include location image**
- A dropdown menu currently showing **300 DPI**.

8. Formatting Tab

The formatting tab is used to adjust the colour variations to the generated report.

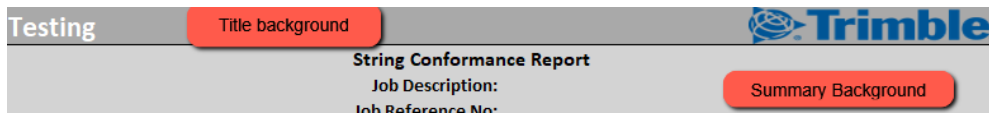
Use **Reset to Defaults** to revert to the default colours, shown below.

The screenshot shows a software interface with five tabs: Report, Summaries, Details, Formatting, and Visualization. The 'Formatting' tab is active. Under the heading 'Colors', there are four color selection options, each with a small colored square and a dropdown arrow:

- Out of tolerance: Coral
- Missing data: Red
- Summary background: LightGray
- Title background: DarkGray

At the bottom of the panel is a button labeled 'Reset to Defaults'.

Note: Title background is active when there is a Title used in the details tab, shown in #7.



9. Visualization Tab

The visualisation tab is used to set the parameters for the visualisation tool. Notice down the bottom of the String Conformance report window there is a visualise button. By setting the parameters in the visualize tab and then clicking the visualize button, text with information detailing the string conformance is created.

Create Visualisation Layers

This creates new layers in TBC with the visualisation points as part of those layers. Ensure the create visualisation layers tab is **checked** if you want the text to be created when you click create report.

Layer Prefix

This is user defined, it gives the created visualisation layers a unique prefix so they can be easily identifiable in the layer manager or view filter. Set the **layer prefix name** to your own name or leave default "StringConformance".

Text height

The text height field is used to set the size of the CAD text created. **Input** the desired **text height**

Text Style

The text style drop down is used to choose an existing or create a new text style for the conformance text. **Select** an **existing text style** or create a **new text style**.

Gap

The Gap setting is the distance in metres that the insertion point of the text will be right of the node it is created for.

Clear Visualisation Layers

This is used if the visualisation tool is used consecutively. By checking this box, whenever the visualize tool button is pressed the previous points are deleted from that layer and new points are added. Ensure the Clear Visualisation Layers box is **checked** unless you want to keep the previous data.

Include data prefix

The include data prefix allows the data prefix such as conformance, design, As-built etc. to be toggled on or off. By default, this box is ticked.

The screenshot shows the 'Visualization' tab of a software interface. It contains several sections of controls:

- Text**:
 - Create visualization layers
 - Layer prefix:
 - Text height:
 - Text style:
 - Gap:
 - Draw leader line with gap
 - Clear visualization layers
 - Include data prefix
- Data and prefixes**:
 - Horizontal delta:
 - Elevation delta:
 - Design level:
 - As-built level:
- Colours**:
 - InTolerance:
 - AboveTolerance:
 - BelowTolerance:
 - Right:
 - Left:
- Align text square to line

At the bottom of the tab are three buttons: 'Create Report', 'Visualize', and 'Close'.

Data

Check the boxes for the data you need to see on screen. The headings can be adjusted by the user.

- **Horizontal** – Delta offset.
- **Elevation** – Delta Elevation.

Colours

Adjust the colours used in the plan view.

Click the **Visualize** button to create customised text in the model view (plan and 3D) on specific layers. View the results.

10. Create Report

The final step in the workflow is to create the report, if you are satisfied with the defined settings click the **create report button**.

An excel spreadsheet will then open with all the report information.

Note: the bigger the project and more points the longer it will take to load the report.

Below is a sample created from the String Conformance Report. The header summaries are the same as those outlined in 6 and have been cropped out from the image.

As-Built String Vertices								
Relative to Control		As-Built Coordinates						
Chainage	Offset	Point ID	Easting	Northing	As-Built Level	Design Level	Horizontal Delta	Vertical Delta
0.323	10.084		506470.835	6940871.169	33.364	33.374	-0.023	-0.010
4.938	9.801		506474.444	6940874.060	33.247	33.209	-0.014	0.037
10.052	9.476		506478.450	6940877.254	33.068	33.035	0.008	0.032
14.892	9.187		506482.230	6940880.291	32.915	32.881	0.010	0.034
20.285	8.949		506486.371	6940883.730	32.776	32.763	-0.050	0.013
25.063	8.936		506489.894	6940886.926	32.664	32.644	0.038	0.020
30.019	8.974		506493.506	6940890.287	32.523	32.519	0.027	0.004
35.029	8.996		506497.159	6940893.683	32.406	32.400	0.004	0.006
39.922	8.994		506500.735	6940896.991	32.322	32.321	0.006	0.001
44.730	8.983		506504.247	6940900.243	32.252	32.243	0.017	0.009

Note: the orange highlighted cells represent the nodes that are out of the set tolerance.

As-Built String Vertices										
Relative to Control		As-Built Coordinates								
Chainage	Offset	Point ID	Easting	Northing	E Delta	N Delta	As-Built Level	Design Level	Horizontal Delta	Vertical Delta
0.323	10.084		506470.835	6940871.169	0.014	-0.018	33.364	33.374	-0.023	-0.010
4.938	9.801		506474.444	6940874.060	0.009	-0.011	33.247	33.209	-0.014	0.037
10.052	9.476		506478.450	6940877.254	-0.005	0.006	33.068	33.035	0.008	0.032
14.892	9.187		506482.230	6940880.291	-0.007	0.008	32.915	32.881	0.010	0.034
20.285	8.949		506486.371	6940883.730	0.034	-0.036	32.776	32.763	-0.050	0.013
25.063	8.936		506489.894	6940886.926	-0.026	0.028	32.664	32.644	0.038	0.020
30.019	8.974		506493.506	6940890.287	-0.018	0.020	32.523	32.519	0.027	0.004
35.029	8.996		506497.159	6940893.683	-0.003	0.003	32.406	32.400	0.004	0.006
39.922	8.994		506500.735	6940896.991	-0.004	0.005	32.322	32.321	0.006	0.001
44.730	8.983		506504.247	6940900.243	-0.012	0.013	32.252	32.243	0.017	0.009

Below is an example of a report with the include **eastings/northing delta box checked**. Below is an example of a report created with the **regular control interval set to 10m**.

At Intervals									
Relative to Control		As-Built Coordinates							
Chainage	Offset	Point ID	Easting	Northing	As-Built Level	Design Level	Horizontal Delta	Vertical Delta	
10.000	9.479		506478.410	6940877.222	33.069	33.037	0.008	0.032	
20.000	8.962		506486.153	6940883.548	32.784	32.769	-0.067	0.014	
30.000	8.973		506493.492	6940890.274	32.523	32.519	0.027	0.004	
40.000	8.994		506500.792	6940897.043	32.320	32.320	0.006	0.001	
50.000	9.002		506508.065	6940903.840	32.163	32.164	-0.002	-0.001	
60.000	8.993		506515.352	6940910.673	32.017	32.016	0.007	0.001	
70.000	9.004		506522.632	6940917.529	31.870	31.874	-0.004	-0.004	
80.000	9.009		506529.915	6940924.381	31.727	31.737	-0.009	-0.010	

Example report

Below is an example report.

String Report		Trimble						
String Conformance Report Job Description: QA Drainage Job Reference No: Asbuilt Drainage Control String: C870 Design String: C870 Vertical Offset: 0.000 Upper Tolerance: 0.010 Lower Tolerance: -0.010 Left Tolerance: 0.010 Right Tolerance: 0.010 As-Built String: Unknown Date: 16-Apr-26 Report Author: Excellent Surveyor TIC Project: Civil Data - Conformance		Vertical Summary Points Tested: 6 Within Tolerances: 6 100.0% Too High: 0 0.0% Too Low: 0 0.0% Average Conformance: -0.002 Standard Deviation: 0.002 Max Conformance: 0.002 Min Conformance: -0.004 Vertical deltas are As-Built minus Design (+ve if above design, -ve if below)						
Horizontal Summary Points Tested: 6 Within Tolerance: 3 50.0% Too left: 2 33.3% Too Right: 1 16.7% Average Left: -0.012 Average Right: 0.012 Horizontal deltas are -ve when left of design, +ve when right		Length Summary Start: long 0.359 End: short -4.359 As-Built Grade: -0.36% Design Grade: -0.36%						
Location								
As-Built String Vertices								
Relative to Control		As-Built Coordinates						
Chainage	Offset	ID	Code	Easting	As-Built Level	Design Level	Horizontal Delta	Vertical Del
0.091	-0.019	019	PSHT	507120.106	18.616	18.620	-0.004	-0.004
3.950	0.010	018	PSHT	507120.914	18.603	18.606	0.003	-0.003
7.986	-0.011	017	PSHT	507121.809	18.592	18.591	-0.001	0.001
12.918	-0.009	016	PSHT	507122.876	18.570	18.574	-0.004	-0.003
18.014	0.015	015	PSHT	507123.956	18.557	18.555	0.002	0.002
23.016	-0.010	014	PSHT	507125.065	18.533	18.537	-0.004	-0.004