## Workflow IR 10 - Calculate Volume

This document guides you through three methods to calculate volume: Grid, Triangle, and End Area.

## **Calculating Grid Volumes**

Calculate the volume between the existing surface and the proposed surface using the grid volume method.

- 1. Select Tools > Customize > [Toolbars] and check on Volume. <D> Close to dismiss the *Customize* dialog.
- 2. Select the **Grid Volume** command.



- Select the desired **Original Surface**.
- Select the desired **Design Surface**.
- Enter the *Grid Interval*. Ideally, this should be equal to or a factor of the template drop interval or the interval at which data was collected.
- Set the desired the *Cut Factor* and *Fill Factor*.
- 3. **<D> Apply**.



4. Record the results.

If you would like an electronic copy of the Grid Volume:

5. **<D>** the **Results** button. This displays the Results dialog box with the volume data.

🐂 Grid Volume			- • •
Fence Mode:	Ignore	Factors	Apply
Original Surface:	12345 existing groun	✓ Cut: 1.0000	Close
Design Surface:	SH 86	▼ Fill: 1.0000	Results
Grid Interval:	50.00	+	Hala
Results			Help
Cut: 14	81803.16 cu ft	54881.60 cu yd	
Fill: 32	97787.27 cu ft	122140.27 cu yd	
Net: -18	15984.11 cu ft	-67258.67 cu yd	

- 6. In the *Results* dialog box, *<*D*>* the Save As button.
- 7. Navigate to the desired folder, enter a *File name*, then <D> Save to create the report file.

🙀 Save As		
Save in:	🕌 Reports 💌	G 🌶 🖻 🛄 -
Recent Places	Hecent Items Lesktop	Date modified Type search.
Desktop	Chris Ferree Computer Local Disk (C:)	
Libraries	12345     Design     Design     Design     Design	
	DVD RW Drive (D:) 102_FUJI 102_FUJI	
Network	File name: SH 86 Grid Volume.bd	✓ Save
	Save as type: Text Files (*.bd)	Cancel     Help

- 8. **<D> Close** to dismiss the *Results* dialog box.
- 9. **<D> Close** to dismiss the *Grid Volume* command.

## **Calculating Triangle Volumes**

Calculate the volume between the existing surface and the proposed surface using the triangle volume method.

1. From the *Volumes* toolbar select the **Triangle Volume**.



🐂 Triangle Volum	e		- • <b>×</b>
Mode: Surface Sets Original Surface: Design Surface:	Entire Surface    I2345 existing grour:  SH 86	Cut Factor: 1.0000 Fill Factor: 1.0000	Apply Close Help
Original Surface	Design Surface	Cut Factor Fill Factor	
	Add	Change Delete	

- Set the *Mode* to Entire Surface.
- Select the desired *Original Surface*.
- Select the desired *Design Surface*.
- Set the *Cut Factor* and *Fill Factor* as required for the project.
- 2.  $\langle D \rangle$  the **ADD** button.
- 3. **<D> Apply**.

This method will take longer to process than the grid method.

- 4. The results are displayed in the **Bentley Civil Report Browser** dialog box.
- 5. Use the Triangle Volume.xls template to review the report.

If you would like an electronic copy of the Triangle Volume:

- 6. Select **File > Save** from the menu bar.
- 7. Navigate to the desired folder, enter a *File name*, then *<D> Save* to create the report file.
- 8. **<D> Close** to dismiss the *Triangle Volume* command.

## **Calculating End-Area Volumes**

Calculate the volume between the existing surface and the proposed surface using the end-area volume method (CDOT standard method). With the first run, you will not take the subgrade into account.

In order to use this command, you must be in the design file where your final cross sections were cut.

1. Open the desired cross section design file.

2. From the Cross Sections dialog box, select the End-Area Volumes from the dialog box explorer.

K Cross Sections		
File		
Cross Section Set: SH 86  Create Cross Section  Annotate Cross Section  Consultation  Compute Quantities  Compute Quantities  Unsuitable Materials by Feature  Unsuitable Materials by Station  Comparing Com	Mode:	Aay Off Method Standard Correct for Curvature Limits Station Range Start: 203+80.28
OutsainCalors     Volume Exceptions     Added Quantities     Forced Balance     As Built     Annotation     Mass Haul Diagram	Imperial Units	Stop: 203+80.28 + Ignore Areas Smaller Than: 0.00
	Apply	Preferences Close Help

- 3. Select the desired Cross Section Set using the drop down menu.
  - **Note:** End area volumes are calculated based on the cross section graphics. If the selected set does not contain sections for the full length of the project, or the design toes fall outside the cross section grid, then the volumes will not be correct for the project.

4. Identify the surfaces to be compared from the Surfaces list. There must be one Existing type surface and one Design type surface.

File		
rite Cross Section Set: SH 86  Create Cross Section  Annotate Cross Section  Update Cross Section  End-Area Volumes	Mode:      Refresh Display On Displa Start: 203+80.28 Stop: 260+43.16 Surface Type 12345 existing Lisiting SH 86 Design	y Off Method Standard Correct for Curvature Umits Station Range
Unsuitable Materials by Station     Classifications     Compaction/Expansion     Volume Exceptions     Added Quantities     Forced Balance     As Built     Annotation     Mass Haul Diagram	Imperial Units Cubic Yards Cubic Feet  Create XML Report	Start: 203+80.28 + + Stop: 203+80.28 + + Ignore Areas Smaller Than: 0.00
	Apply	Preferences Close Help

- 5. Set *Imperial Units* to Cubic Yards.
- 6. Toggle on Create XML Report.

K Cross Sections		
File		
Cross Section Set: SH 86	Mode:         Image: Refresh         Display On         Display	play Off 6
Create Cross Section Annotate Cross Section Update Cross Section End-Area Volumes	Surface Type 12345 existing Existing SH 86 Design	Method Standard Correct for Curvature Limits Station Range Start: 203+80.28 + Stop: 203+80.28 +
	Imperial Units © Cubic Yards © Cubic Feet Create XML Report	Ignore Areas Smaller Than: 0.00
	Apply	Preferences Close Help

7. **<D> Apply**.

- 8. The *Bentley Civil Report Browser* appears. There are several report templates that are useful. Some recommended templates to look at are:
  - EndAreaVolume.xsl
  - EndAreaVolumePage Totals.xsl
  - ♦ Volumes.xls

The first two are standard end area volume reports. the Volume.xls also has the same volume data, but is formatted differently. It also contains volume information on the closed shape template components contained in the design surface.

If you would like an electronic copy of the End Area Volume:

- 9. Select **File > Save** from the menu bar.
- 1. Navigate to the desired folder, enter a *File name*, then *<D> Save* to create the report file.
- 2. Close the Bentley Civil Report Browser.