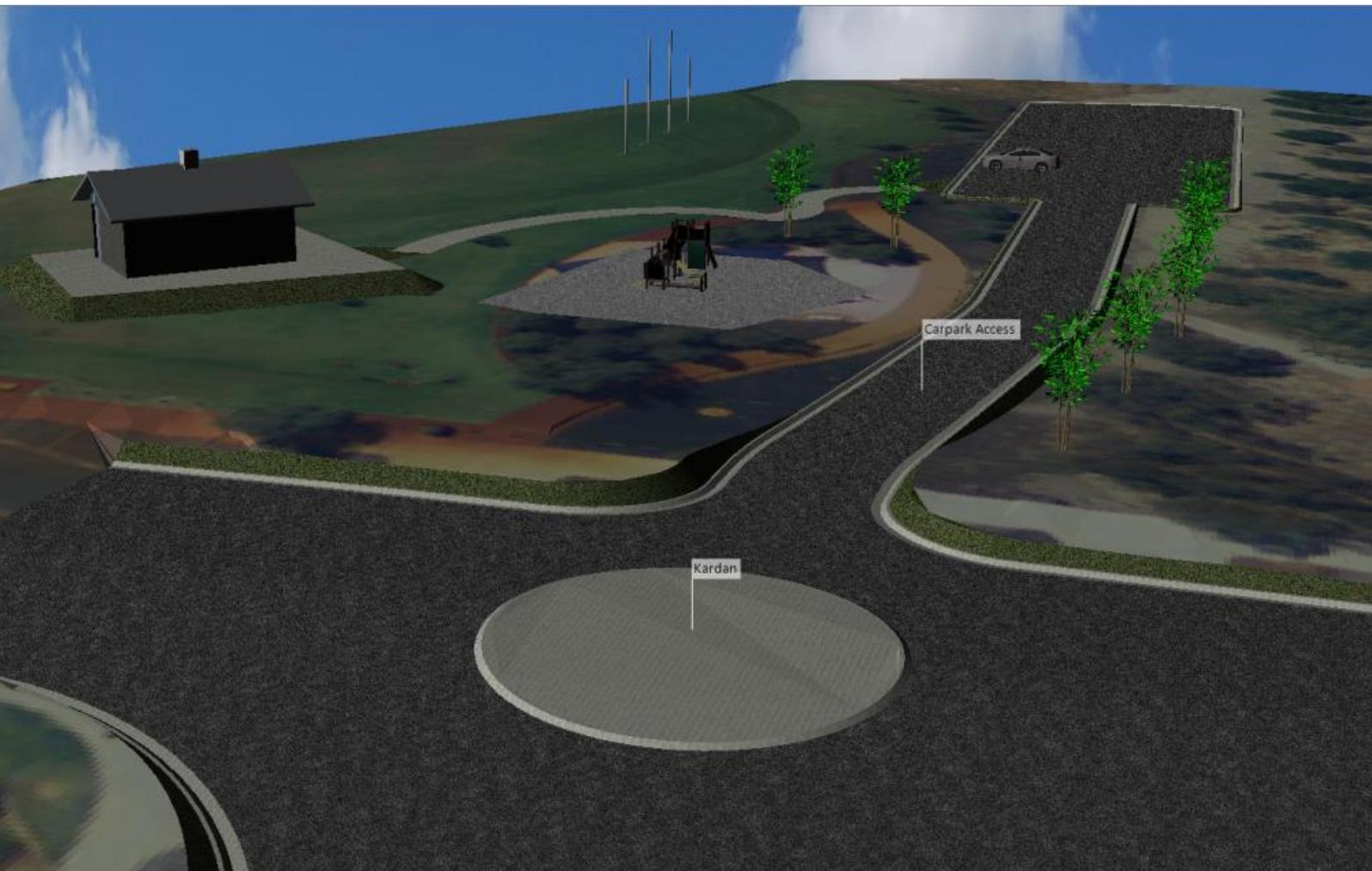


# Civil Site Design



Design - Analyse - Visualise - Deliver

## Volume Reports



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# Requirements

Civil Site Design for AutoCAD and BricsCAD users includes volume reporting functionality (as well as the capacity to create a volume surface).

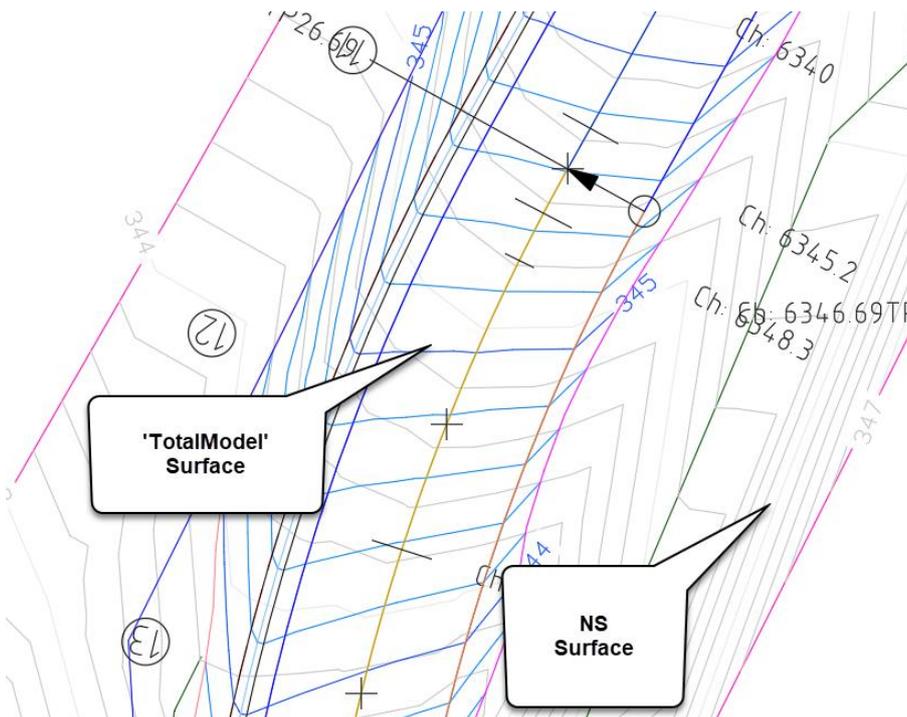
Creating volume comparisons between two surfaces requires two Surfaces to have been created, usually with one surface fully contained within the other. One of these surfaces is treated as the 'comparison' (design) surface and one as the 'base' (existing/reference) surface.

Volumes are calculated within the common overlapping boundary between the two surfaces, and is a TIN-to-TIN comparison (triangles are compared between the two surfaces, and a new triangulated mesh is calculated using the intercepts and vertices of both sets of triangles and triangle edges).

To establish 'bounded' volumes (volumes within an enclosed area) you need to create a surface with an outer boundary set to the area you need. The Copy Surface and Input > Boundaries options help handle this.

# Example

In the below example are two surfaces. One is an automated design using a Road String (from the AutoModel command) and the other is a surveyed surface:



# Process

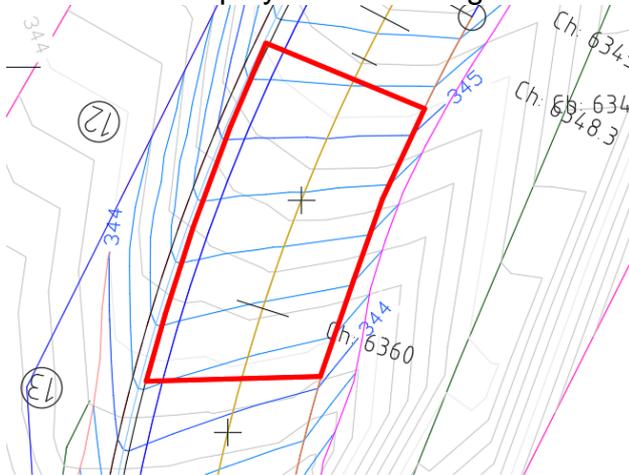
The process for bounded volumes is as follows:

- Create/Copy a surface and apply a Boundary for the desired area
- Run the Volume Report tool to generate a volume comparison output

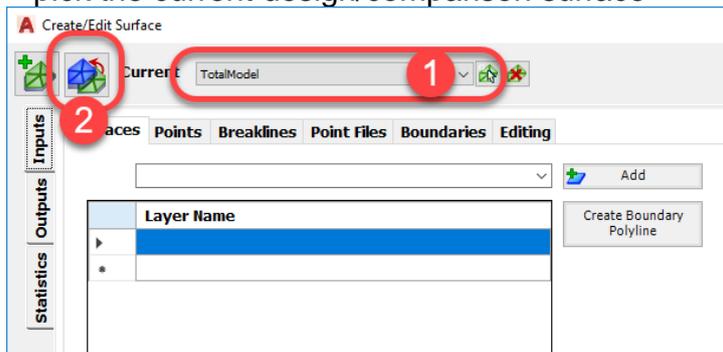
# Creating the Comparison Surface

In the example below, we have a completed design spanning across pavement, kerb and batter/daylight areas, however we are after just an internal area of pavement.

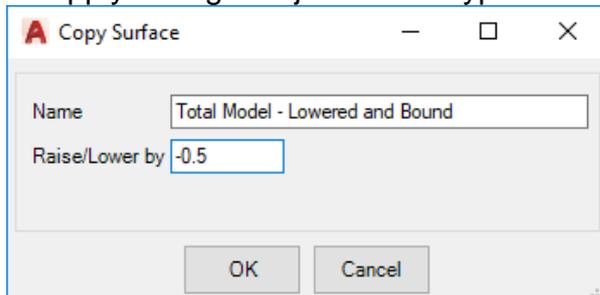
1. Draw a closed polyline describing the area within which to calculate volumes



2. Start the command **Create/Edit Surface**. You will see in this form a list of surfaces – pick the current design/comparison surface



3. Click on the  **Copy Surface** button. A form will display to set a name, as well as apply a height adjustment. Type in a value to lower the surface, if desired:

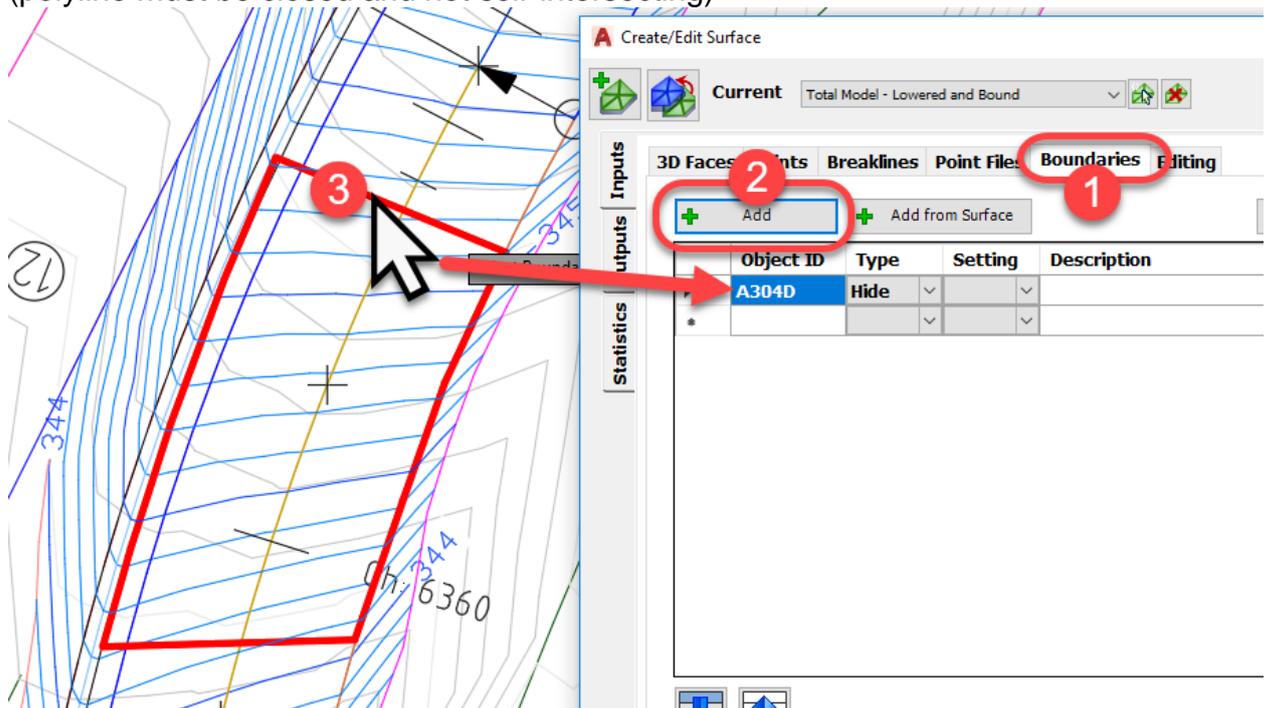


The end result is a new surface that copies the contents of the current surface.

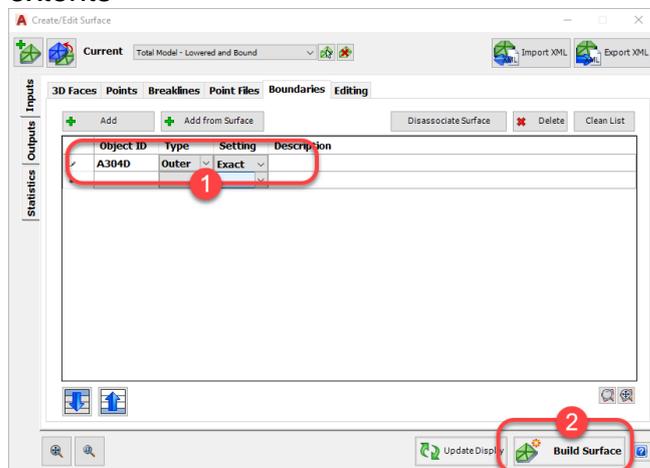
*Note: If new data is added to the current surface, then this process would have to be re-run or else you would need to replicate the new data input into the copied surface.*

4. The new surface will be made current. If it is desired to restrict the volume comparison to a selected area, you need to first put a Boundary on this surface. Click on the Inputs > Boundary tab

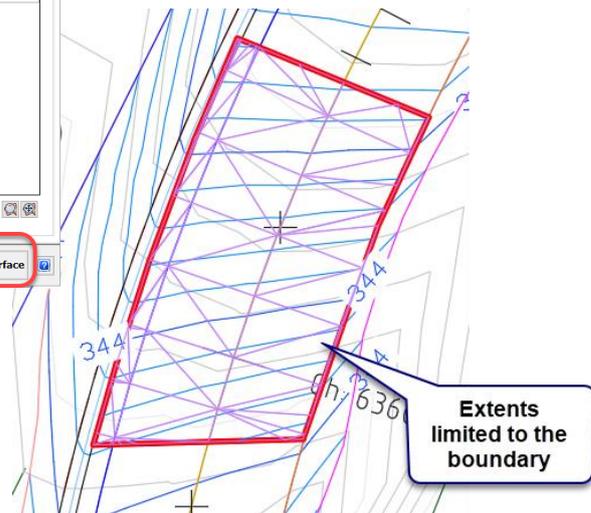
- In the Boundary tab, click on Add, then select your bounding polyline in the drawing (polyline must be closed and not self-intersecting)



- The object is added to the boundary list, by Object ID. Set the **Type** to **Outer**  
Set the **Setting** to **Exact** – this will slice the triangles to exactly match the polyline extents

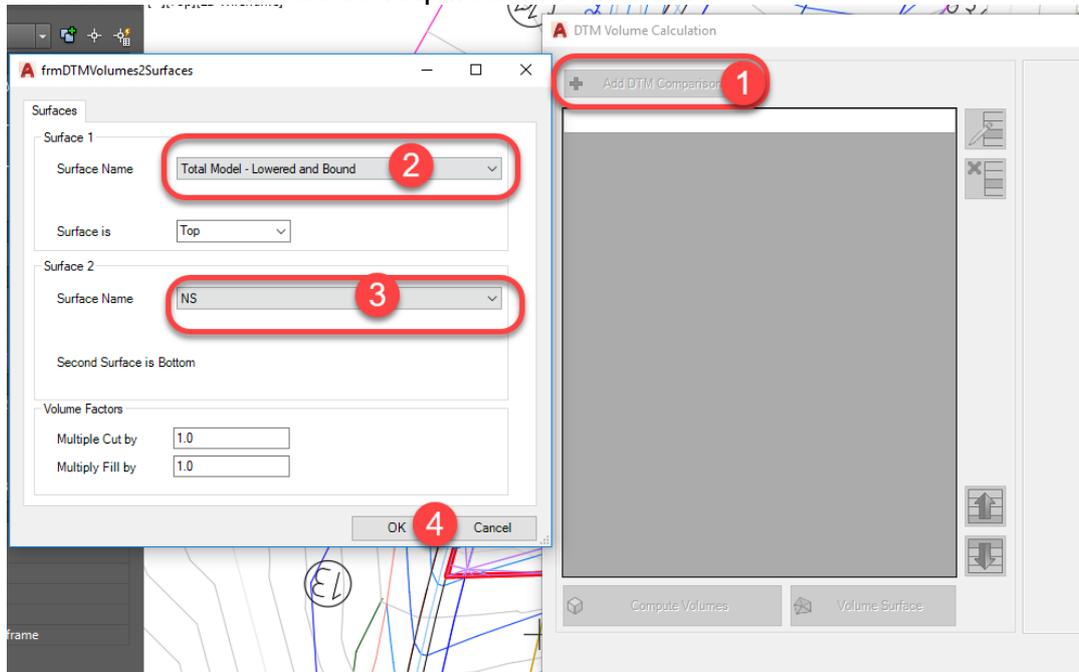


This is the output surface, bounded by the polyline. Triangles are shown to highlight the outcome.

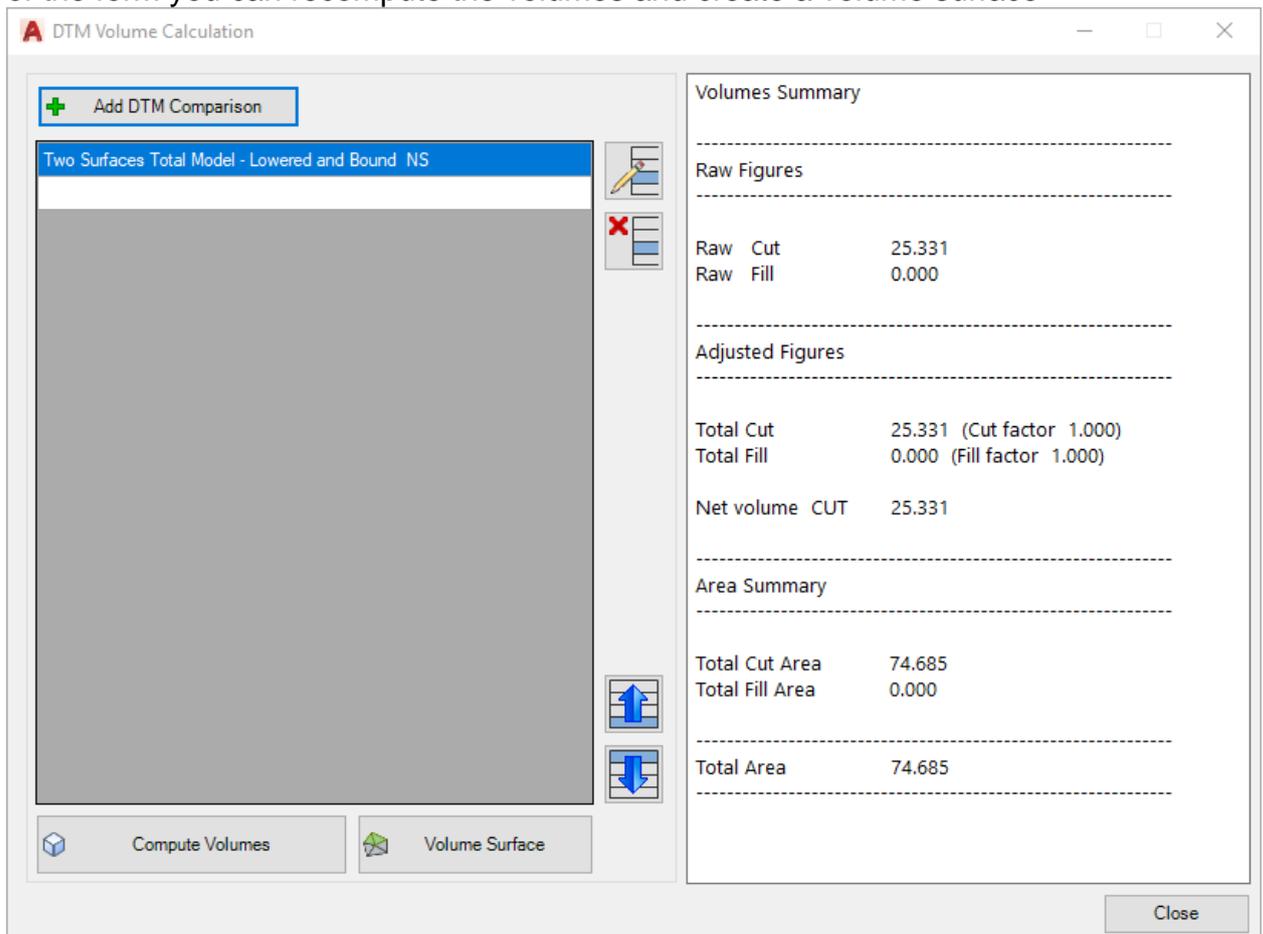


# Volume Comparison

1. Run Surfaces Tab > Outputs Panel >  Volume Reports
2. Click on Add DTM Comparison
  - a. Pick Surface 1 to be the comparison (designed) surface
  - b. Pick Surface 2 to be the existing surface
  - c. Set the Volume factors as required and click OK



- You will immediately see the volume results in the right hand panel. At the bottom of the form you can recompute the volumes and create a volume surface



If your bounded area changes, simply edit the polyline, open Surface Manager and click on Build Surface, then go into the Volume form, click on the comparison item and then

