



TIN Volumes: DUAL TIN – Understanding the Volume

By Christian Shaw

HYPACK® TIN MODEL can compute a TIN-to-TIN volume as it relates to a channel template (CHN). Questions arise about what comprises the final volume. I will attempt to describe what the final volume reports.

Notice the footprint change between the pre-dredge survey and post-dredge survey files:

FIGURE 1. Pre-dredge Survey

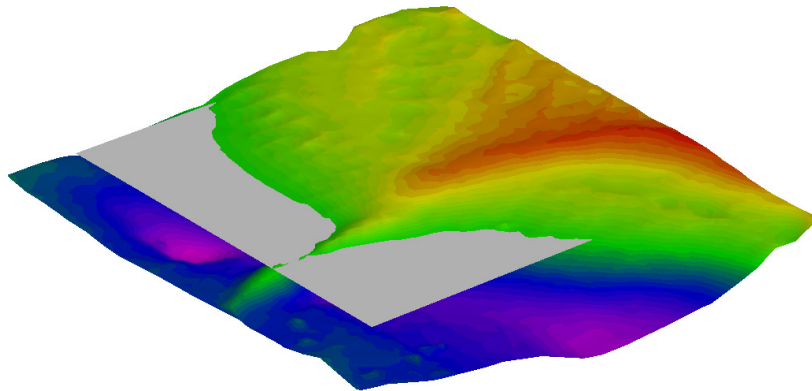
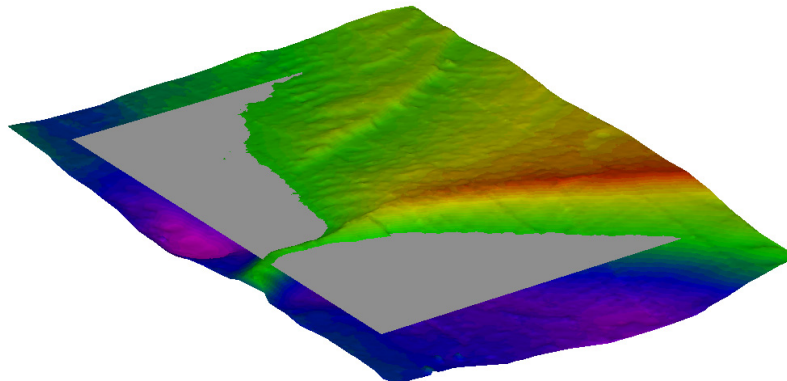


FIGURE 2. Post-dredge Survey



If I run pre-dredge survey versus the CHN volumes calculations, and separately run post-dredge survey versus the CHN, I can manually calculate the following volume for the remaining material to the CHN Surface:

Pre: 28,208

Post: 30,498

Volume Difference by hand calculations: 2,290

Volume unit: Cubic Yard
 TIN vs Channel Volume Totals - Itemized by Channel Zones
 TIN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Sort\XXX_Pre.xyz
 CHN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Template.chn

Zone	Design Cut Volume
Center	28208.6
Total	28208.6

This is the amount of material above grade from my 40' CHN surface relative to my Pre survey

Volume unit: Cubic Yard
 TIN vs Channel Volume Totals - Itemized by Channel Zones
 TIN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Sort\XXX_Post.xyz
 CHN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Template.chn

Zone	Design Cut Volume
Center	30498.8
Total	30498.8

This is the amount of material above grade from my 40' CHN surface relative to my Post survey

Volume unit: Cubic Yard
 Dual TIN vs Channel Volume Totals - Itemized by Channel Zones
 TIN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Sort\XXX_Pre.xyz
 Second TIN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Sort\XXX_Post.xyz
 CHN File: C:\HYPACK 2015\Projects\Dual TIN SB Article\Template.chn

TIN vs TIN Zone	Design Cut Volume	Design Fill Volume
Center	3539.6	5831.6
Total	3539.6	5831.6

Cut Volume is the Gross volume removed

Fill Volume is the Infill

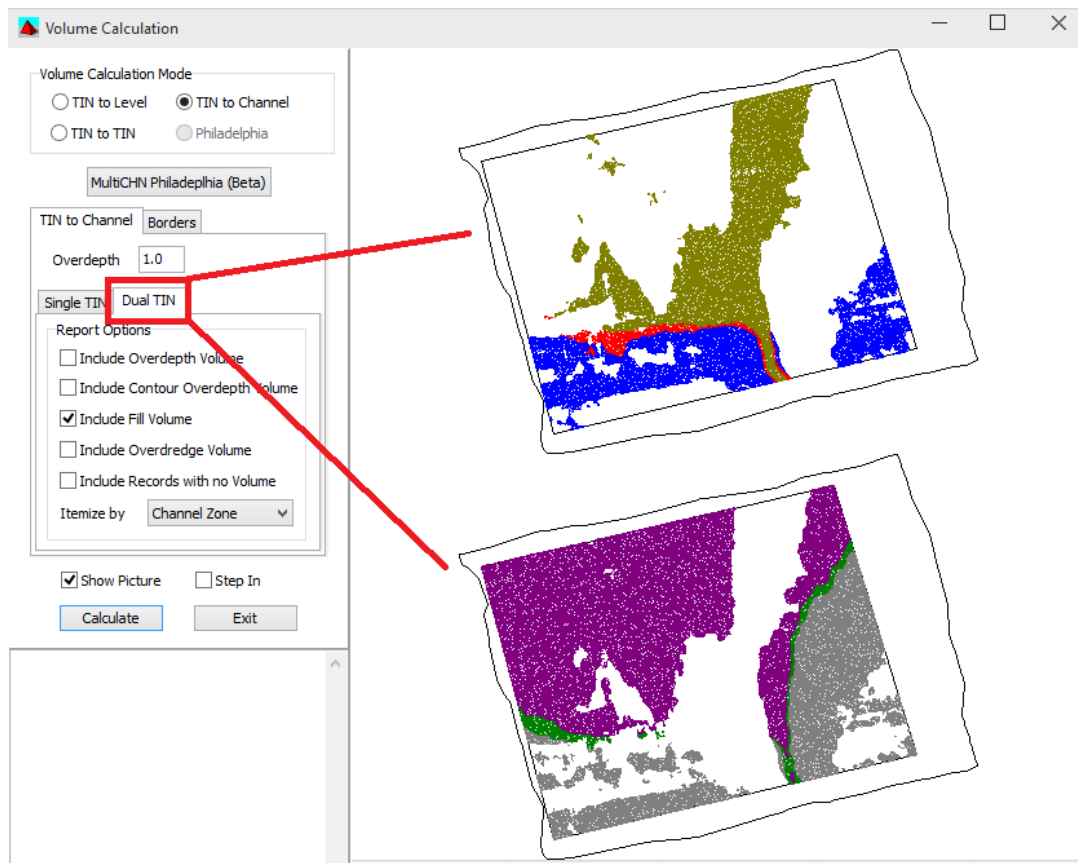
The last volume in the report is the Dual TIN volume:

Cut: 3,539

Fill: 5,831 (Infill)

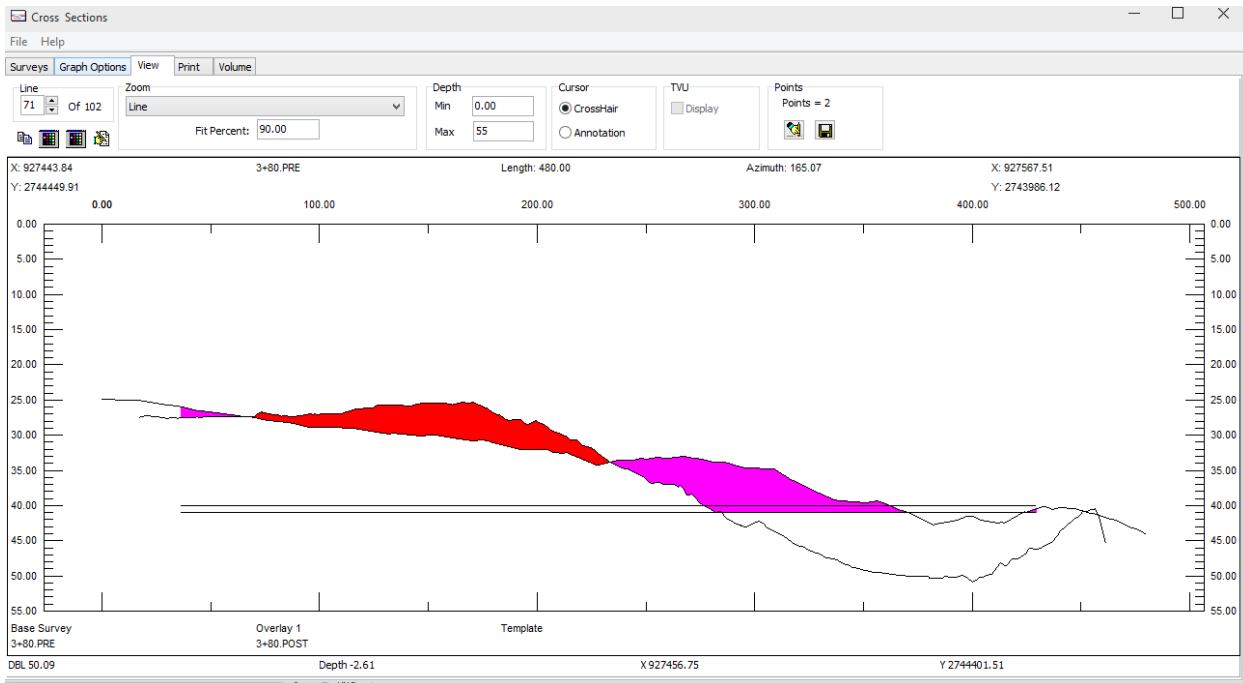
If you subtract the Cut from the Fill it equals 2,292. This is the net difference of material. The post-dredge survey shows much more material than the pre-dredge survey!

FIGURE 3. Dual TIN Volumes



As a sanity check, I cut cross sections in TIN MODEL with a (planned line) LNW file to check my answer with the Philly Post -dredge volume method in CROSS SECTIONS AND VOLUMES (CSV). This is a good litmus test. It will validate my description of each volume value for the Dual TIN report.

FIGURE 4. Cut Sections from TIN MODEL in CROSS SECTIONS AND VOLUMES



The red is the material from the pre-dredge survey that is available above the channel template.

The pink is the material that the post-dredge survey is showing up as Infill relative to my pre-dredge survey.

FIGURE 5. Report from CROSS SECTIONS AND VOLUMES

<u>Dredging Quantities Summary</u>			
Materials	Gross Material	Infill	Net Material
Total Removed To Project Depth	3542.29	5772.19	-2229.90
Total Pay Removed In Overdepth	394.26	273.29	120.97
Total Pay Removed	3936.55	6045.48	-2108.92
Total Removed	5367.29	10119.24	-4751.95
Total Remaining Above Project Depth .	30388.10		30388.10
Total Overdredged Material	1430.74	4073.76	-2643.03
Total Infill Material		10119.24	

By viewing the CROSS SECTIONS AND VOLUMES report my sanity check is complete. Here are the morals:

- **Dual TIN Cut** volume is the gross volume of the two surfaces relative to the CHN surface.
- **Dual TIN Fill** volume is the Infill where the post-dredge survey is higher than the pre-dredge surface relative to the CHN surface.
- **Dual Tin Net** material can be computed by subtracting the Fill volume from the cut volume.
- **CSV volumes will differ from TIN model volumes.** TIN MODEL versus an Average End Area. In this example it is very close! If you compute the pre-dredge vs CHN and post-dredge vs CHN volumes separately in TIN MODEL, it will only give you the net change