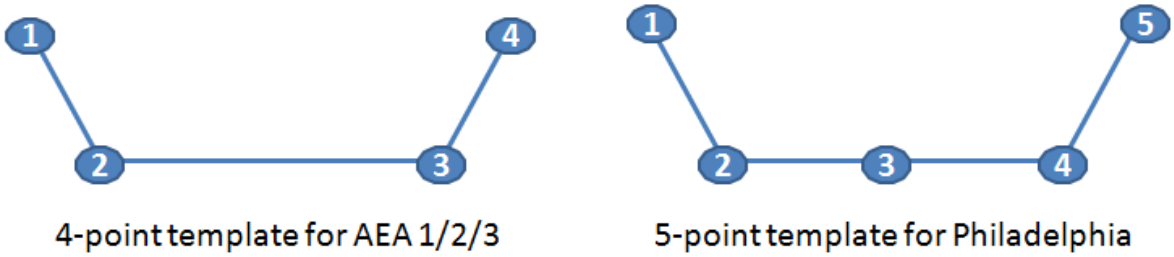
Changes to CROSS SECTIONS AND VOLUMES (CSV)

By Pat Sanders

One of the downsides to CSV is that certain methods will only work with a fixed number of template points. For example, the AEA 1/2/3 methods requires 4 points, whereas the Philadephia PreDredge and PostDredge methods require 5 points.

FIGURE 1.



4-point template for AEA 1/2/3 5-point template for Philadelphia

This limitation eliminated these methods from consideration when you had channels with multiple side slopes or turning basins.

In preparation for the HYPACK® 2012 release, CSV has been modified so that the AEA and Philadelphia methods will now work with non-standard templates. You can have one cross sectional design template with four points and the next section with six points and the next section with five points.

CSV now examines the template information to try to determine what regions of the template should be allocated to the left slope, center (left and right of center for Philadelphia) and right slope. Let's take a look at some possible templates we might encounter.

FIGURE 2. *2-Template Points in CSV Template:*

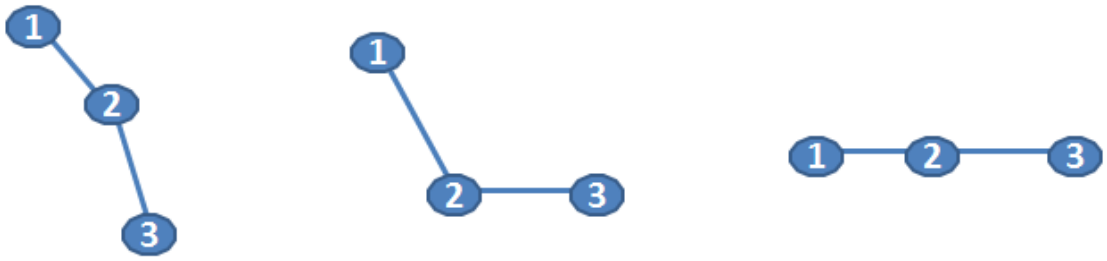
Template points must still be created from the left side of the channel towards the right side of the channel.

- In our first case (leftmost in Figure 2), since Template Point 1 (TP1) is shoaler than Template Point 2 (TP2), the routine will determine that material above this segment will be assigned to the left side slope.
- In our 2nd case (center in Figure 2), since TP1 and TP2 are at the same depth, the routine assigns the material to the center channel.

If you are using the Philadelphia methods, the program wants to divide the center material into Left of Center and Right of Center. Since there are only two template points, the routine will subdivide the center segment in the middle, creating a 'faux' center line template point midway between the two. This assumption could lead to material being mistakenly assigned to the Left of Center or Right of Center regions. However, the total material will be correct.

- In our 3rd case (rightmost in Figure 2), since TP1 is deeper than TP2, the routine will determine that material above the segment will be assigned to the right side slope.

FIGURE 3. *3 Template Points*

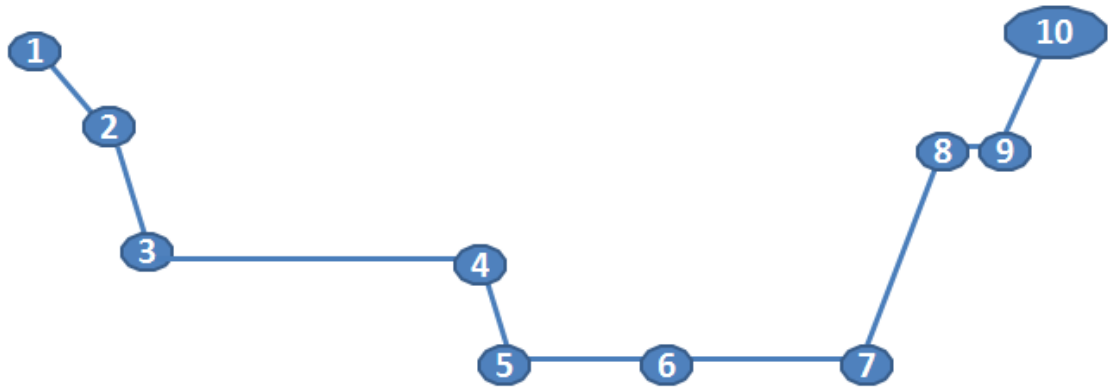


- In our first case (left in Figure 3), TP1 is shoaler than TP2, which is shoaler than TP3. The routines will assign all of the material between TP1 and TP3 to the left side slope. **This means that the AEA and Philadelphia methods can now handle multiple side slopes!**
- The next case (not drawn) is the same for the right side slope. If TP1 is deeper than TP2, which is deeper than TP3, then all of the material will be allocated to the right side slope.
- Our next case (middle in Figure 3), TP1 is shoaler than TP2, which is the same depth as TP3. Material between TP1 and TP2 will be allocated to the left slope, while material between TP2 and TP3 will be allocated to the center channel.

  Once again, since the Philadelphia Method wants to subdivide the center material into Left of Center and Right of Center, it will subdivide the region between TP2 and TP3 into Left of Center and Right of Center regions.
- The next case (not drawn) is where TP1 is the same depth as TP2, which is shoaler than TP3. In this case, material between TP1 and TP2 is assigned to the center channel, while material between TP2 and TP3 is assigned to the right slope. For the Philadelphia method, the region between TP1 and TP2 is subdivided into Left/Right of Center regions.
- Our final case (right in Figure 3), all of the Template Points are at the same depth.
  - The Philadelphhia Method will allocate material between TP1 and TP2 to the Left of Center and material between TP2 and TP3 to Right of Center.
  - The AEA methods will allocate all material between TP1 and TP3 to the Center Channel.

Let's look at an "extreme" case:

FIGURE 4. *Extreme Case:*



If we were using one of the AEA 1/2/3 methods:

- Material above the polyline created by the TP1, TP2, TP3, TP4 and TP5 would be allocated to the Left Side Slope.
- Material above the polyline created by TP5, TP6 and TP7 would be allocated to the Center Channel.
- Material above the polyline created by TP7, TP8, TP9 and TP10 would be allocated to the Right Side Slope.

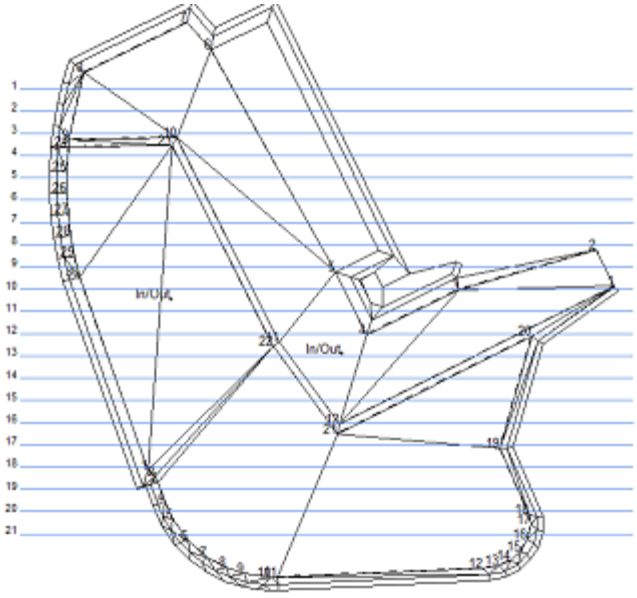
If we were using the Philadelphia PreDredge or Philadelphia PostDredge methods:

- Material above the polyline created by the TP1, TP2, TP3, TP4 and TP5 would be allocated to the Left Side Slope.
- Material above the polyline created by TP5 and TP6 would be allocated to the Left of Center Channel region.
- Material above the polyline created by TP6 and TP7 would be allocated to the Right of Center Channel region.
- Material above the polyline created by TP7, TP8, TP9 and TP10 would be allocated to the Right Side Slope.

What if I want the material above the polyline created by TP3 and TP4 to be allocated to a separate "Left Turning Basin" region?

Then your best bet is to create separate reporting zones in ADVANCED CHANNEL DESIGN.

FIGURE 5. *Complex Channels Like This Require ADVANCED CHANNEL DESIGN*

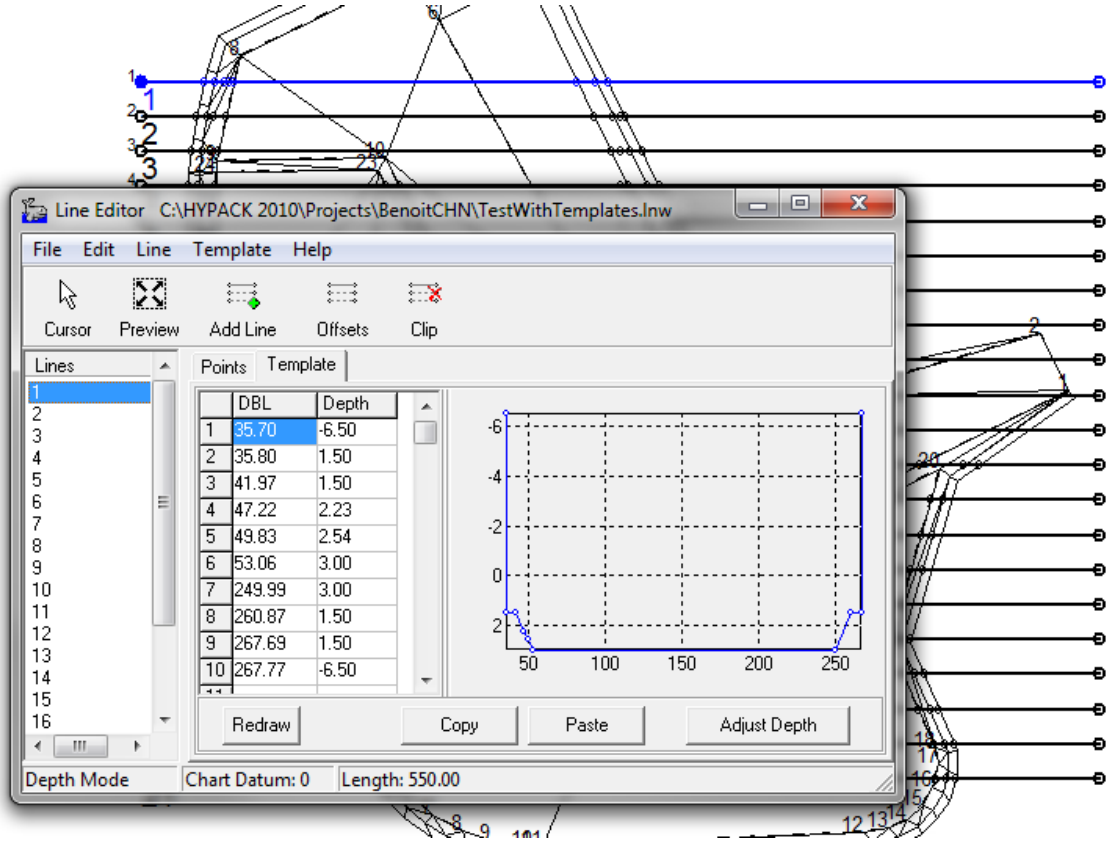


One of the upcoming changes in the ADVANCED CHANNEL DESIGN program is the ability to create a 3D surface, import a standard HYPACK Planned Line file (*.LNW) and then export a Planned Line file (*.LNW) that has a template point at each intersection location.

Figure 5 shows a complex harbor design, created a couple of years ago by HYPACK-Master Benoit Fraleu.

I imported the CHN file into the new ADVANCED CHANNEL DESIGN program. I then imported the planned line file which consisted of only waypoints with no template information. I then exported a planned line file with the same waypoints, but with a template point at each transition point of the 3D surface.

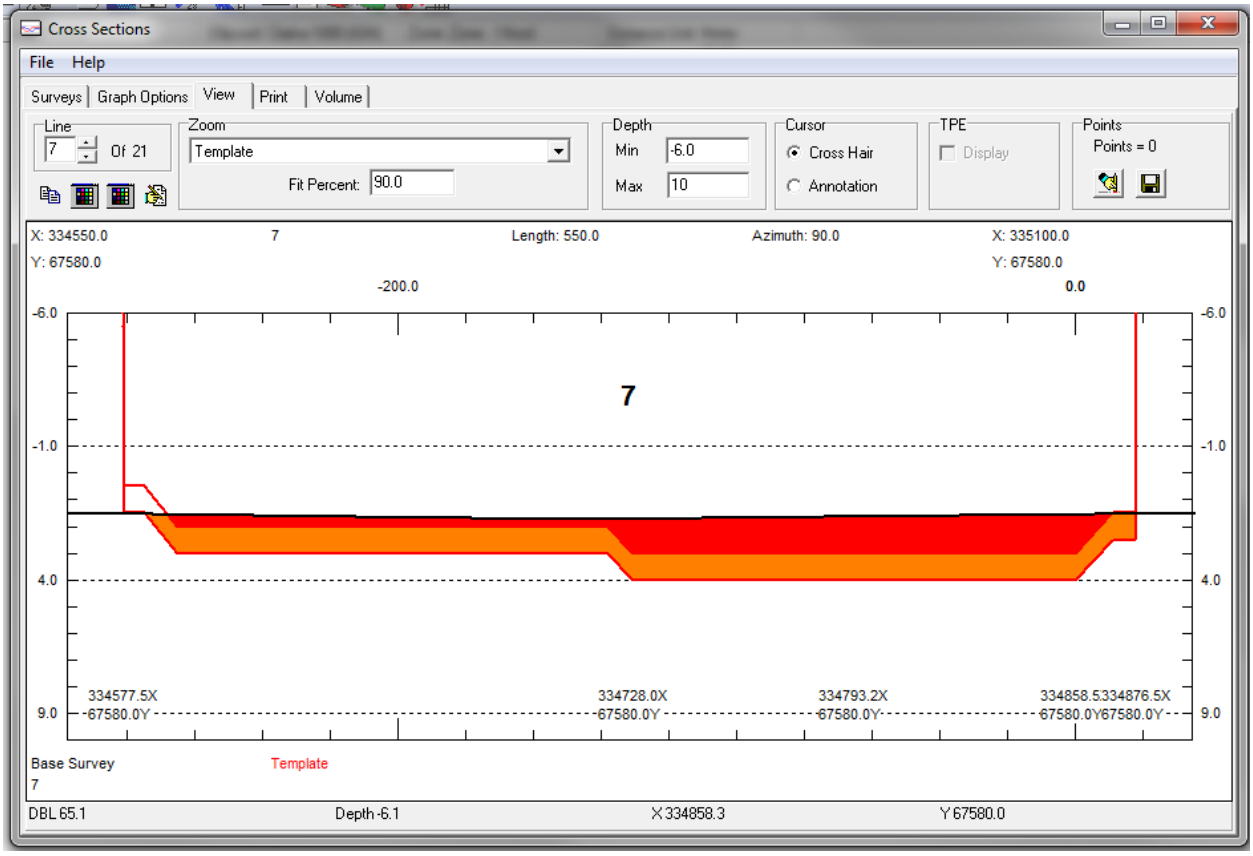
FIGURE 6. *Viewing the Channel Templates in the LINE EDITOR*



Looking at Line 1 (the high-lighted blue line), you can see the template points that were automatically created by ADVANCED CHANNEL DESIGN. You could now take sections along those lines and compute volumes in CSV.

If you had multibeam survey data, you could take the data into the TIN MODEL, along with the planned line (*.LNW) create in ADVANCED CHANNEL DESIGN and cut sections along each line. These sections would have the template points embedded and you could then load those sections into CSV to display profile cuts through the complex project.

FIGURE 7. *The Resulting Sections in CSV*



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