Creating a Channel Design & Cutting XYZ Data in TIN MODEL for CSV Volumes

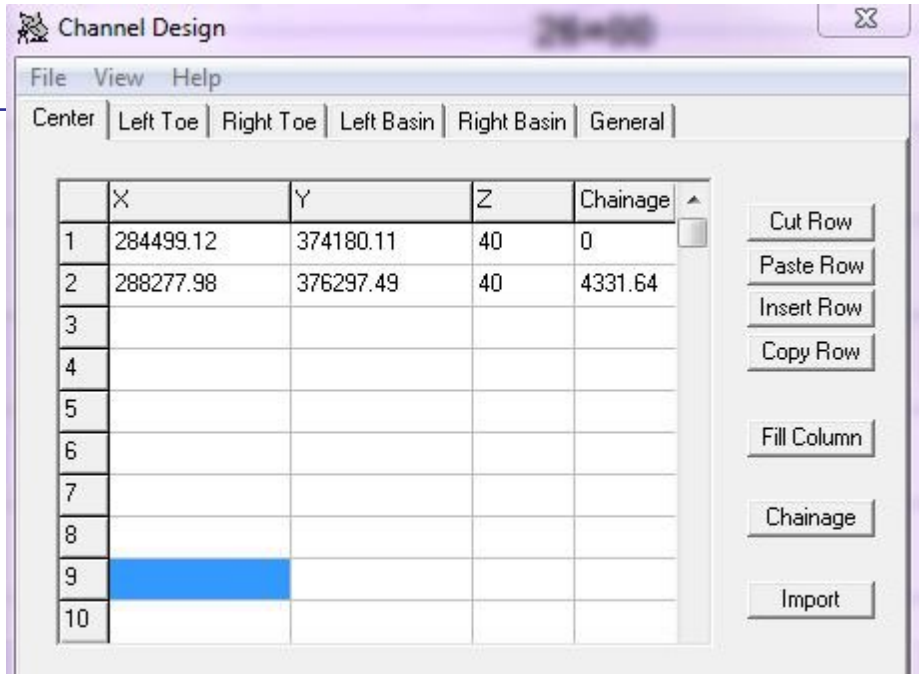
By Chistian Shaw

In the TIN MODEL program, XYZ data can be converted to HYPACK All Format files which can be used for volume calculations in the CROSS SECTIONS AND VOLUMES program. The following are the steps to (1) create a simple channel design, (2) save out a 3D Line File (LNW) with templates and (3) cut cross sections in the TIN MODEL program for volume analysis in Cross Sections and Volumes.

CREATING THE CHANNEL IN CHANNEL DESIGN

You typically generate the line work in the CHANNEL DESIGN program.

FIGURE 1. *Generating Planned Lines in the CHANNEL DESIGN Program*

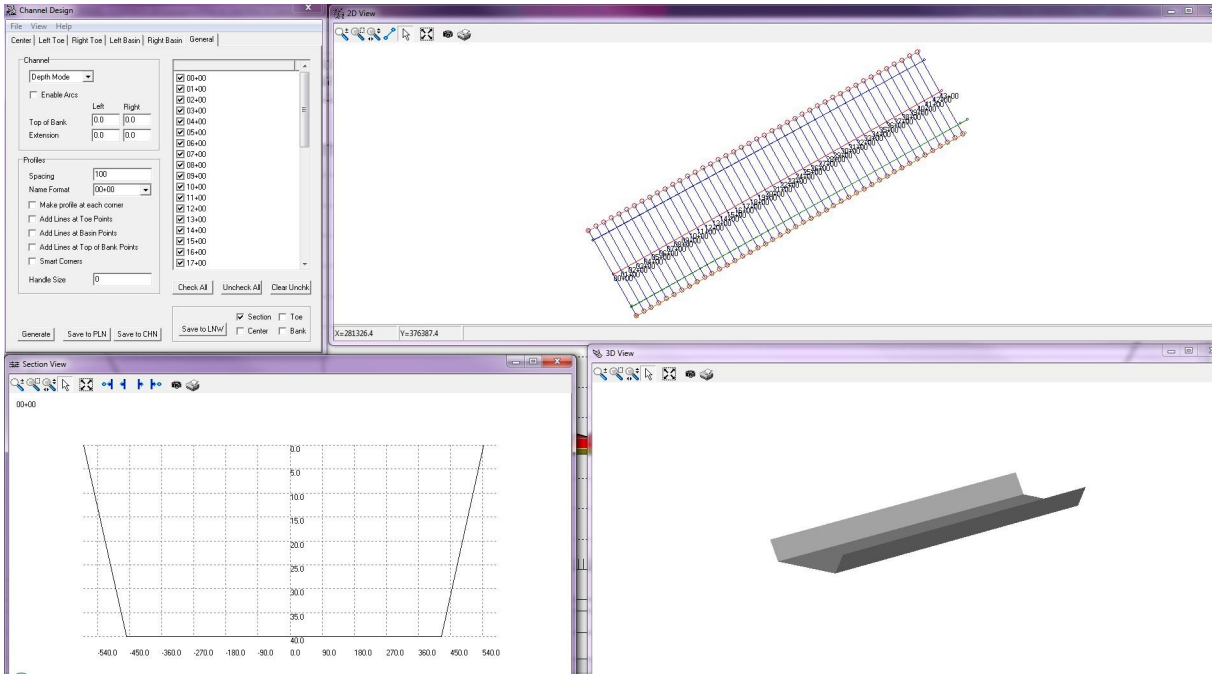


1. **Enter the Center Line, and Left and Right Toe coordinates in the corresponding tabs**.

Tip: You can import XYZ or LNW file coordinates for the center line, left and right toes (this to me lately seems the easiest!).

2. **Generate the channel** in the General tab.
3. **Verify that the design prism is correct.** Navigate to View/Tile Windows to view the 2D view, 3D View and the Section view. This is basically a quality control measure.

FIGURE 2. *Verifying your Results in CHANNEL DESIGN*



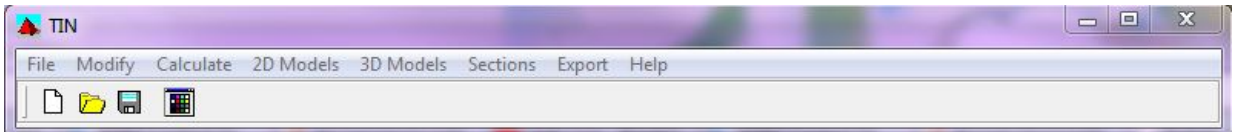
4. **Save an LNW file in the General Tab.** This is the file you will use in the TIN MODEL program so that your template is embedded in your ALL Format files.

Now onto the TIN model program.

CUTTING SECTIONS IN THE TIN MODEL PROGRAM

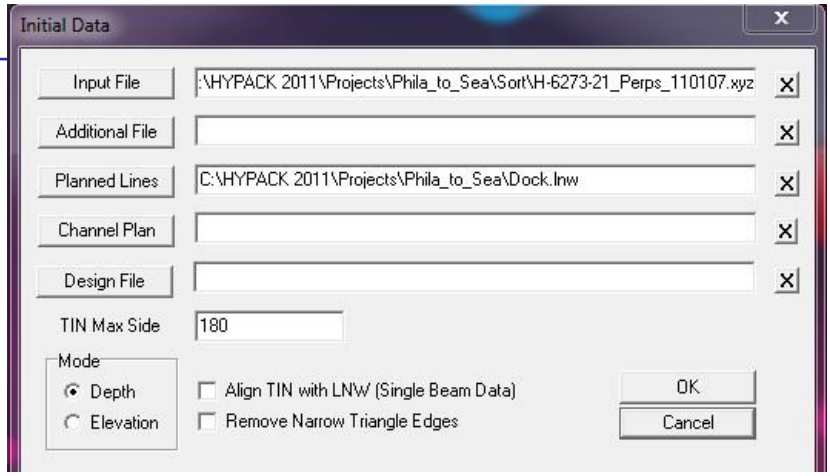
1. **In TIN MODEL, select FILE-NEW from the menu**.

FIGURE 3. *TIN MODEL Shell*



2. **Load your data in the Initial Data dialog and click [OK]**.

FIGURE 4. *TIN MODEL Initial Data Dialog*

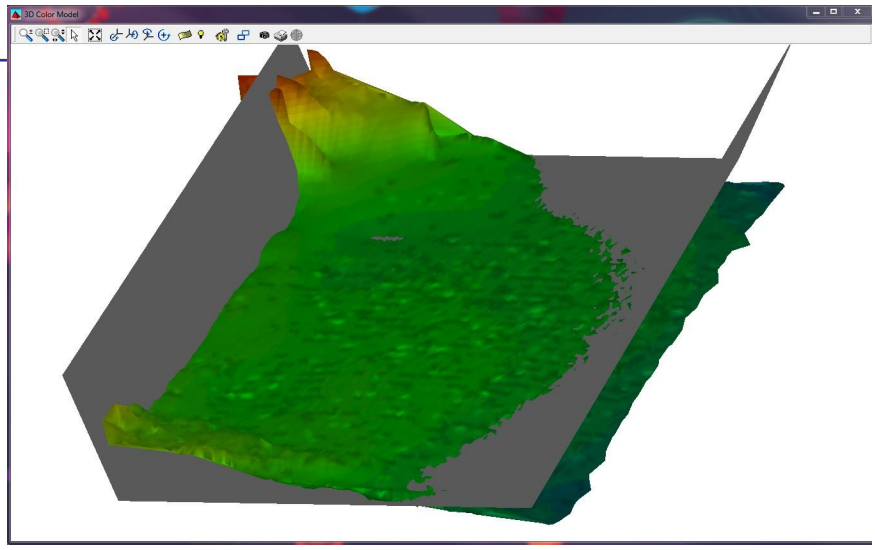


- In the **Input File** field, you should add the XYZ file.
- In the **Planned Lines** field, load the LNW file that came from the CHANNEL DESIGN program.
- The **TIN Max Side** is used to connect soundings to form the solid surface from single beam section line to section line or from XYZ gridded data. The general rule of thumb is to use 1.5 to 1.8 times the section distance for single beam surveys.

3. **Check the 3D view.** (Optional) Here you can see the survey surface relative to the Channel Design surface to determine the material above and below the template.

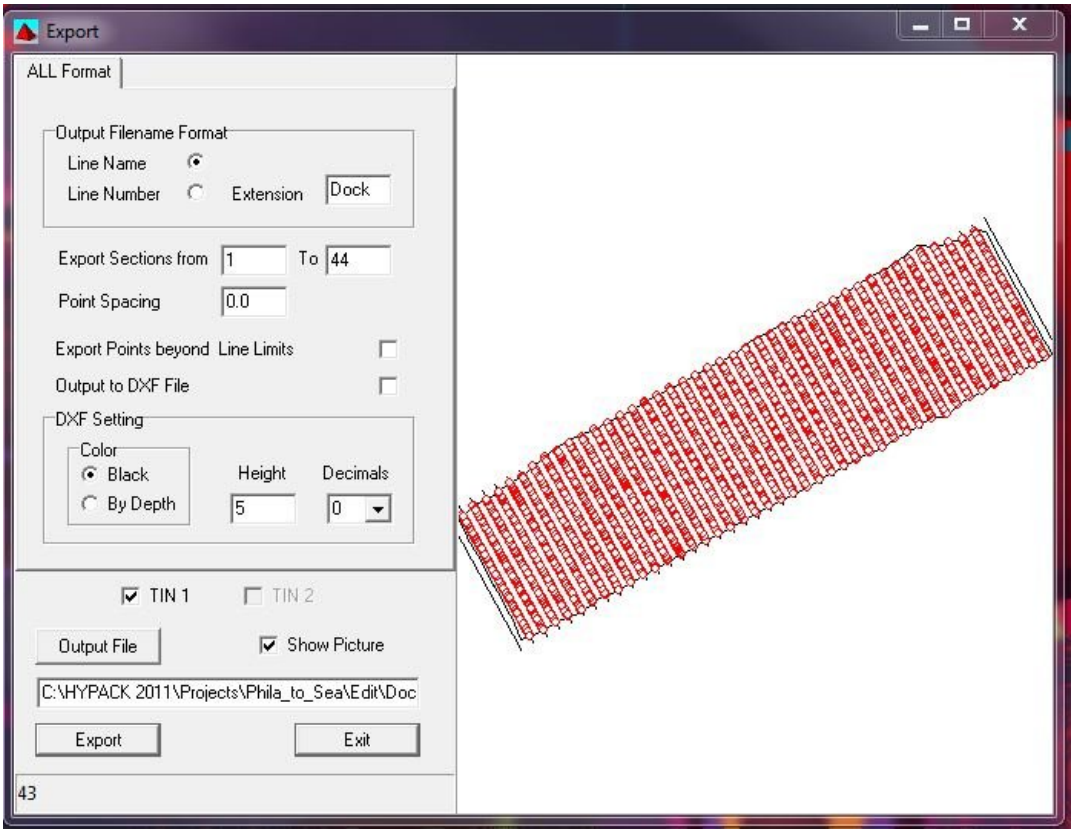
   If you are happy with the results, it is time to cut some sections.

FIGURE 5. *Checking the 3D View*



4. **Select EXPORT-ALL FORMAT** to access the options for saving your HYPACK® ALL format files and corresponding LOG file. The output files will be saved to the project's Edit folder.

FIGURE 6. *Cutting Sections in TIN MODEL*

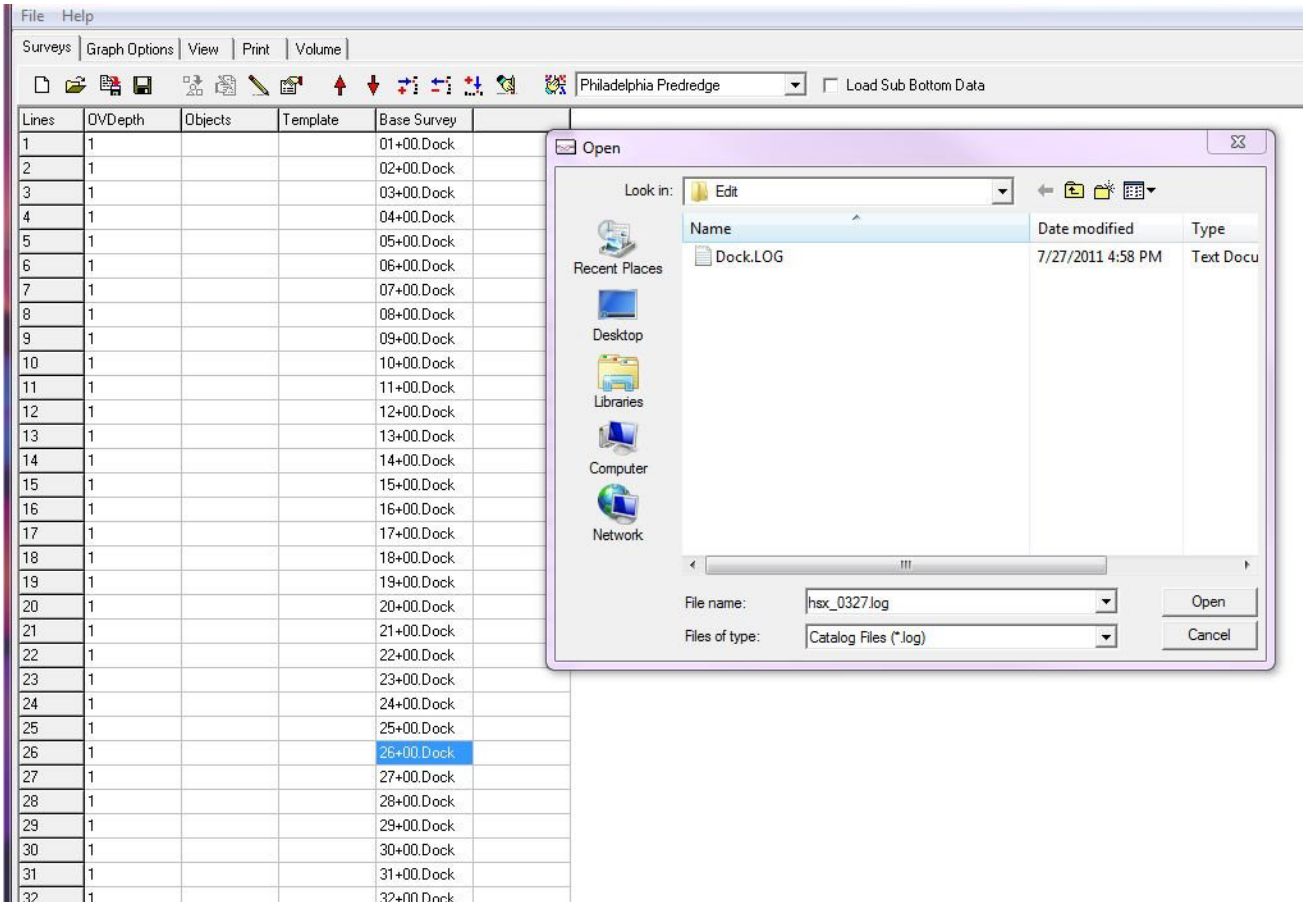


- **Output File Name Format:** Choose to use the line name or line number for each section. You can pick a custom extension for each file.
- **Export Sections** shows you how many sections will be saved out or you can specify a range of sections to export.
- **Export Points Beyond Line Limits** will include sounding data, if any, past the end of the LNW cross section lines included in the files.
- **Point spacing:** Keep just the nodes that fall on the section with the default setting of zero or set your own shot spacing.
- **Sections** can alternatively be output to DXF format.
- **Show Picture:** If there are many sections to be cut, in many cases, by deselecting “Show Picture” will make the TIN MODEL program create the sections faster. When the bottom left of the Export window reaches the desired line number output files you chose, the section slicing function is complete. In the example shown in Figure 6, the result is 43 sections and a LOG file.

CALCULATING THE VOLUMES OF YOUR SECTIONS IN CROSS SECTIONS AND VOLUMES

1. **In the HYPACK® shell, navigate to the CROSS SECTIONS AND VOLUMES (CSV) program** in the Final Products menu.
2. **In the Base Survey column of the Surveys tab, load your ALL format LOG file**. The list of sections will populate the column from top to bottom.

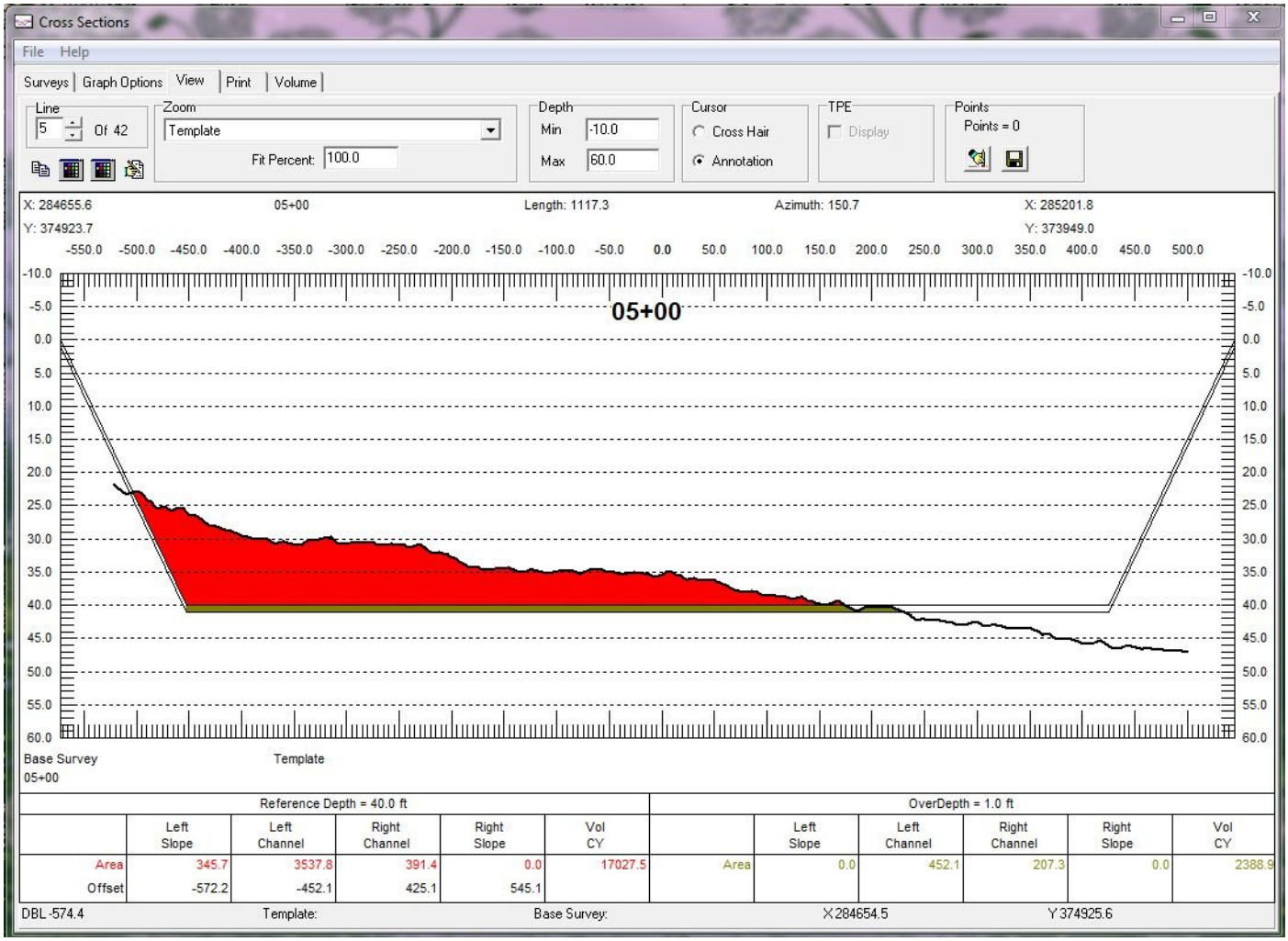
FIGURE 7. *Loading your Data to CROSS SECTIONS AND VOLUMES*



3. **Set your Graph Options.** In Figure 7, I have chosen to use the Philadelphia Pre-Dredge volume calculation method which requires you to simplify templates so that the program can calculate the Left/Right slope and Left/Right Channel Volumes and compute a cumulative volume.

Editor's Note: Beginning with the HYPACK® 2012 release, template simplification will no longer be necessary. Check the updated documentation with the 2012 release to understand how this will work.

FIGURE 8. *Displaying your Sections and Volumes in the View Tab*



4. **View your volumes report in the Volumes tab**. It incudes a header that will describe your data set by date, vessel etc and the channel information. This information is read from the LOG file and slope values are calculated from the template information in the ALL Format File.

   The Pre-Philadelphia volume method reports the following information in the header:

   - **Total Material to Project Depth** to be cut to get to design prism
   - **Total Allowable Overdepth** to be cut to get to over depth design prism.
   - **Total Pay Place** that is available in the prism that is the Design and Overdepth cumulative.

   In the volume section report in Figure 9, this information, the volumes are per left, right and for center of channel, and including the slopes with the offsets from each extent of these features from the center-line. Over-depth is also calculated along the side of design values.

If you need more help creating a more advanced channel template or using another volume method, please contact us at help@hypack.com and we will be happy to assist you in getting your template created properly and your volumes populated in the CSV program.

FIGURE 9. Sample Philadelphia Volumes Report

USACE Philadelphia — Office Engineeering Section, Survey Branch
Delaware River — Run: 7/27/2011 5:00:34 PM
M/V Shuman
October 2003

Station To Station		Project Depth	Over Depth	Left Slope	Right Slope
01+00	42+00	40.0	41.0	3.0\1	3.0\1

Dredging Quantities Summary

Total Material To Project Depth ..... 398524.3 CY
Total Allowable Overdepth 107517.3
Total Pay Place 506041.6

Dredging Quantities Computation

	Reference Depth = 40.0 ft					Overdepth = 1.0 ft				
Station	Left Slope	Left Channel	Right Channel	Right Slope	Volume (CY)	Left Slope	Left Channel	Right Channel	Right Slope	Volume (CY)
01+00	399.3	4761.5	275.7	0.0		0.0	457.2	182.0	0.0	
Offset	-577.2	-457.2	424.0	544.0						
02+00	485.4	4485.4	212.3	0.0	19666.9	0.0	455.9	211.4	0.0	2419.5
Offset	-575.9	-455.9	424.3	544.3						
03+00	367.2	4448.6	333.1	0.0	19132.4	0.0	454.7	164.4	0.0	2382.1
Offset	-574.7	-454.7	424.6	544.6						
04+00	489.7	4017.3	413.3	0.0	18647.6	0.0	453.4	177.2	0.0	2314.4
Offset	-573.4	-453.4	424.8	544.8						
05+00	345.7	3537.8	391.4	0.0	17027.5	0.0	452.1	207.3	0.0	2388.9
Offset	-572.2	-452.1	425.1	545.1						
06+00	228.1	2902.0	425.9	0.0	14501.7	0.0	450.9	210.2	0.0	2445.3
Offset	-570.9	-450.9	425.4	545.4						
07+00	159.0	2482.1	458.4	0.0	12325.3	0.0	449.6	227.6	0.0	2478.4
Offset	-569.6	-449.6	425.6	545.6						
08+00	90.8	2060.2	476.2	0.0	10604.2	0.0	448.3	247.0	0.0	2541.6
Offset	-568.4	-448.3	425.9	545.9						
09+00	84.8	1948.8	539.3	0.0	9630.3	0.0	447.1	263.1	0.0	2602.9
Offset	-567.1	-447.1	426.1	546.1						
10+00	71.8	1831.8	557.6	0.0	9321.8	0.0	445.8	269.2	0.0	2639.1
Offset	-565.8	-445.8	426.4	546.4						