

Mn/DOT GeoTechnical Tools

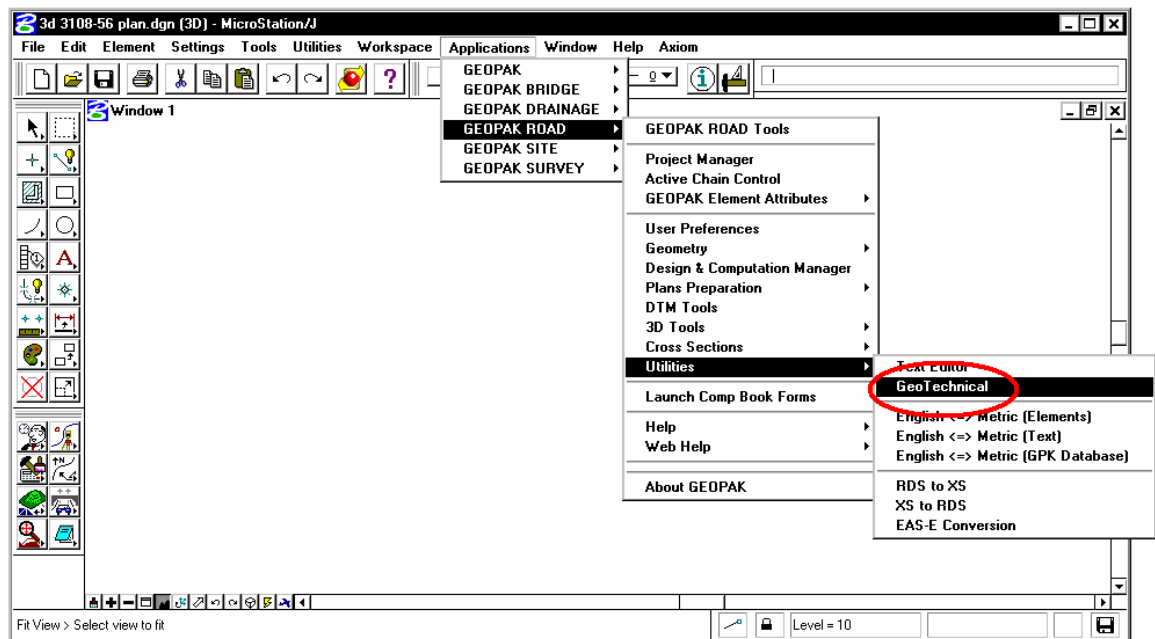
Start-up for GeoTech

After you open your design file in MicroStation, you're going to want to open up GeoTech (GEOPAK's Geotechnical tool).

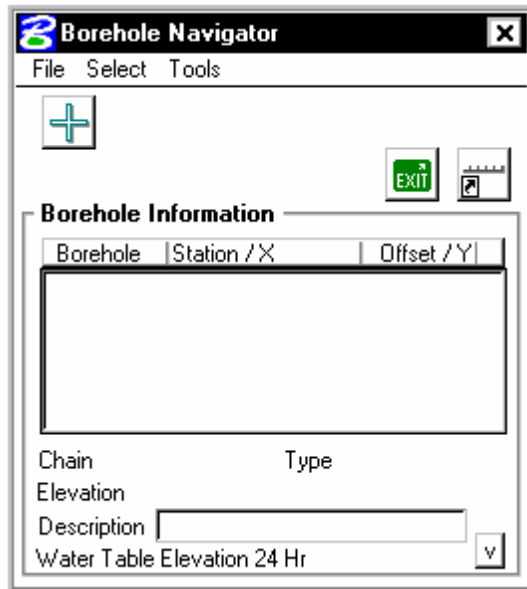
In the main MicroStation menu bar select **Applications > Activate GEOPAK**, and then select **Applications > GEOPAK ROAD > Utilities > Geotechnical**.

OR

In the main MicroStation menu bar select **Applications > GEOPAK ROAD > Utilities > Geotechnical**.

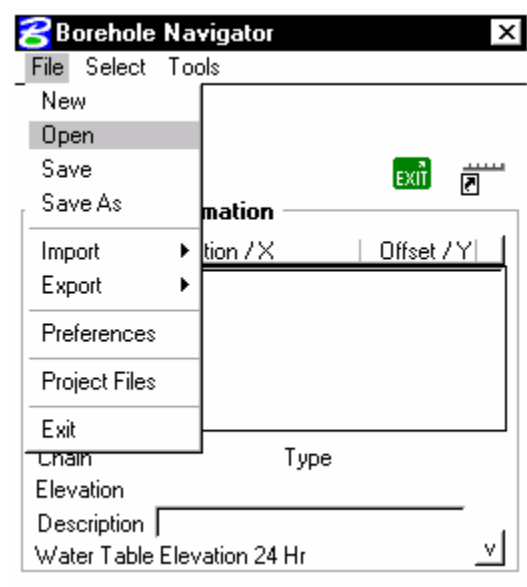


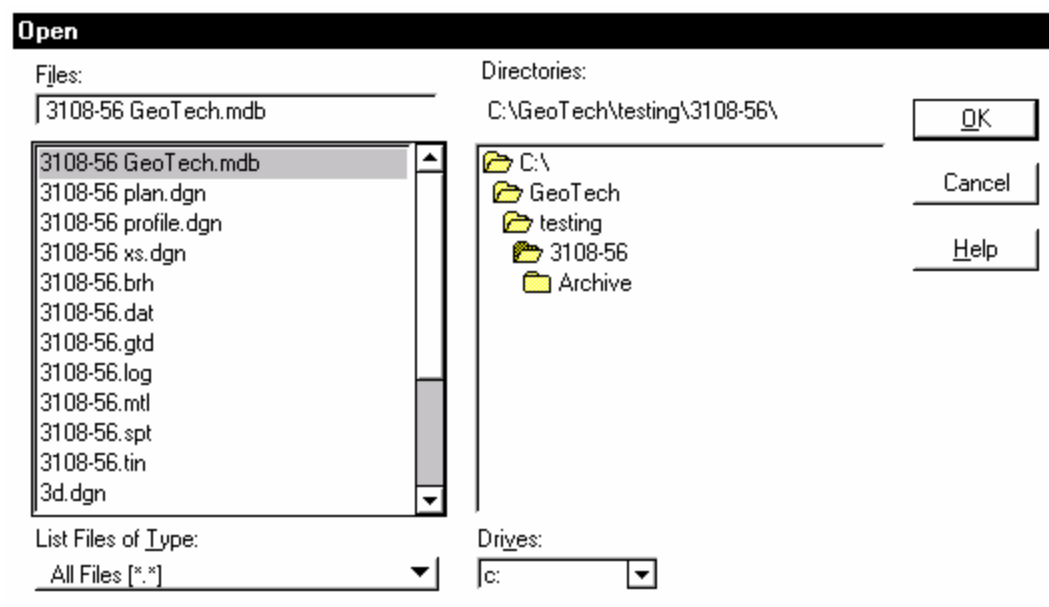
The Borehole Navigator should now appear on your screen.



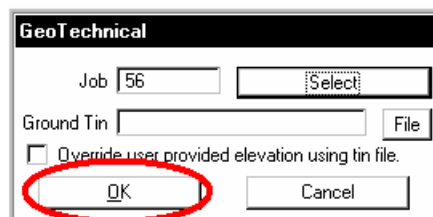
Open the Access Database in GeoTech

Now that the Borehole Navigator is open, we can open our access database file. This can be done by going to **File > Open**.





If you're opening up a database for the first time in GeoTech it'll ask you to select your project files. You **MUST** select a Job file (*.gpk file), which is GEOPAK's Alignment database. However, you don't have to select a Ground Tin at this time; you can select a tin at a later date.



Click **OK**, the project dialog box will disappear and you'll be left with just the Borehole Navigator open.

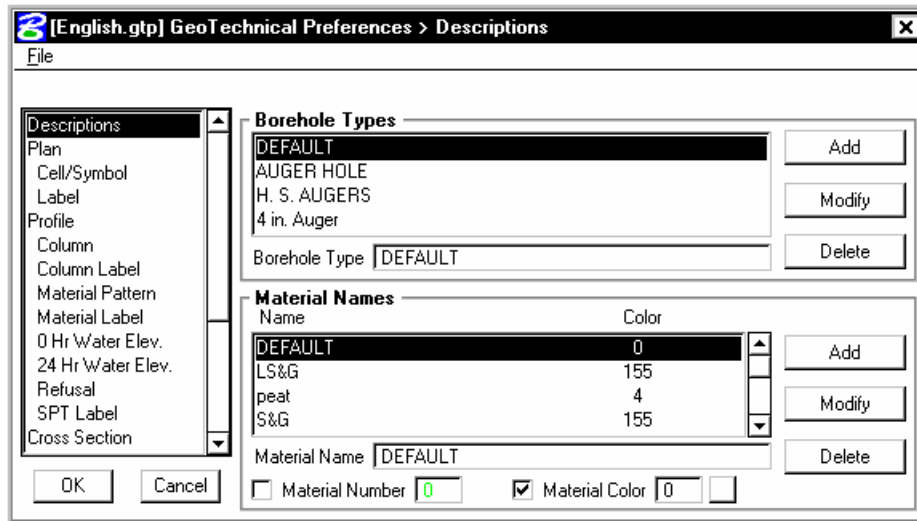
***Note-** Some common errors when opening a database:

- Two boreholes with the same station and offset.
- Two different strata with the same bottom depth.
- Borehole located outside the ground tin.

Selecting Preference Files:

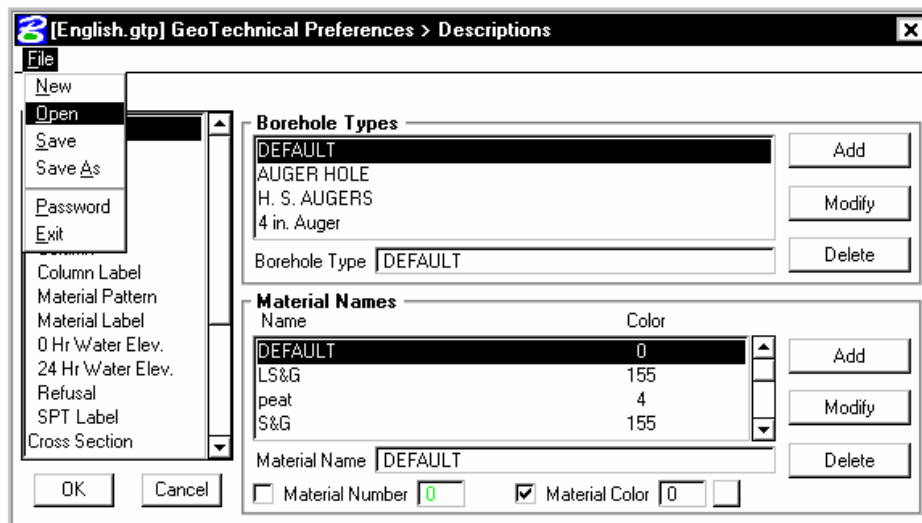
Now that a project has been started, you need to select a preference file. In the Borehole Navigator use the FILE menu and select Preferences.

- **Note** - A preference file tells GeoTech how you want the boreholes drawn onto the CAD files (plan, profile, and xs).
- **Note** –After you select a preference file, GeoTech should remember the location of the preference file. GeoTech will then remain using that preference file until you change it.



If you're not sure that you have the correct preferences file loaded, go to **File > Open**. Navigate to where your preferences files are located and select the desired preferences file.

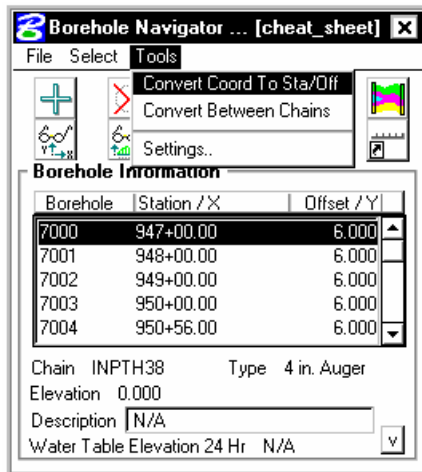
- **Note** –The preference files are stored in \MnDOT-Stds\Geopak2000\Geotech. You have the option of choosing EnglishFILL.gtp or English.gtp, there's also a MetricFILL.gtp and a Metric.gtp.



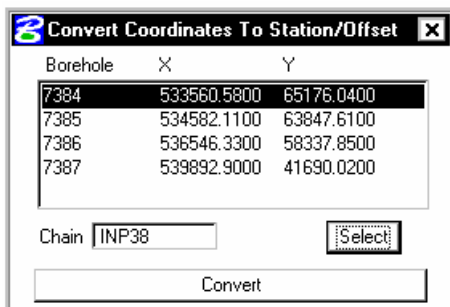
Conversion

Coordinates to Station and Offset

Choose **Tools > Convert Coord To Sta/Off**



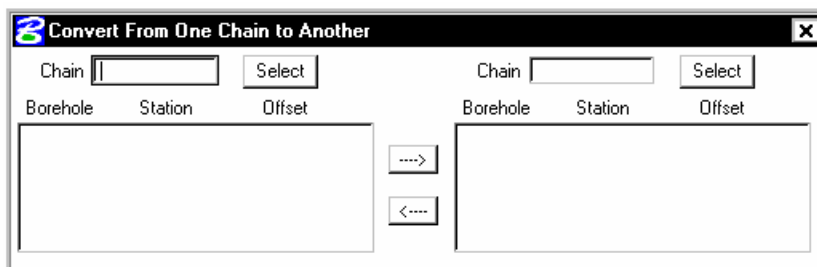
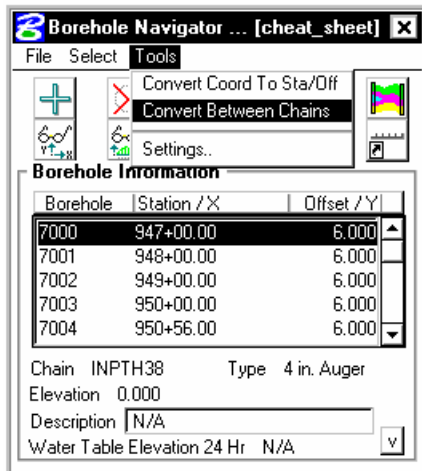
Select the Chain you want to associate your boreholes with. Then select which boreholes you want to convert and click “Convert”.



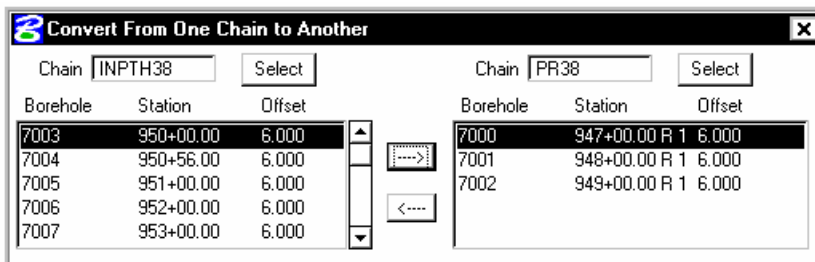
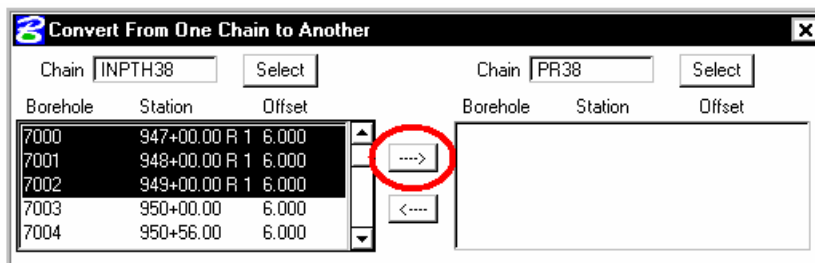
- **Note** –It’s a good idea to Save the GeoTech Project after you convert the coordinates to station and offset.

From One Chain to Another

Choose **Tools>Convert Between Chains**



First select the Chain that you want to convert boreholes from. Then choose the chain that you want to convert your boreholes to. After you have chosen your chains, choose which borings you want to convert and then click on one the arrow buttons in the middle of the dialog box.



- **Note** – It's a good idea to Save the GeoTech Project after you convert the coordinates to station and offset.

With the boreholes now populating the Borehole Navigator, we can choose one of the following:

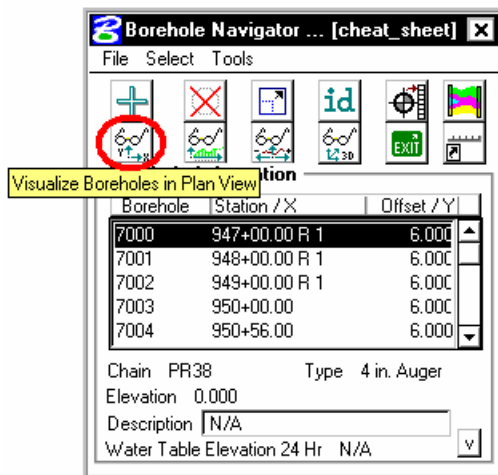
- Visualize Boreholes in Plan View
- Visualize Boreholes in Profile View
- Visualize Boreholes in Cross Section View

Visualize Boreholes on Plan View

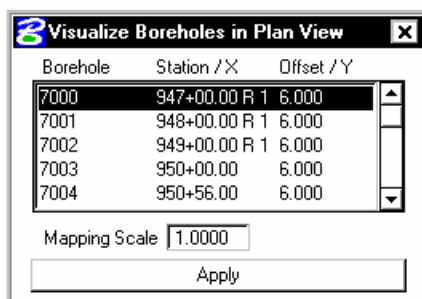
This will place a circle with an “A” in the middle, along with placing the Borehole Number, Station, and Offset right along side of the borehole.

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694+00.00 R 9
0.00
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To begin, select Visualize Boreholes in Plan View tool from the Borehole Navigator.



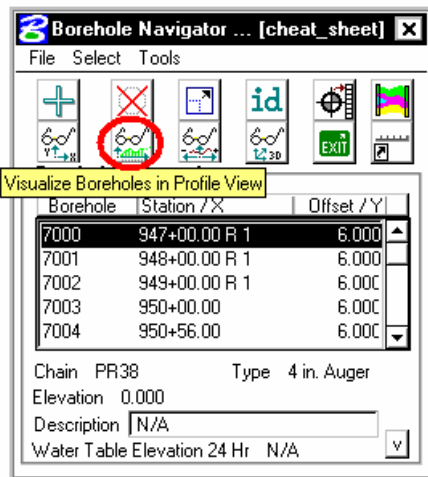
Highlight the borings to be drawn, set the Mapping Scale, then click Apply. The Mapping Scale option determines the size of the borehole information being displayed (Generally set at 1.0000 for an English 100 scale drawing).



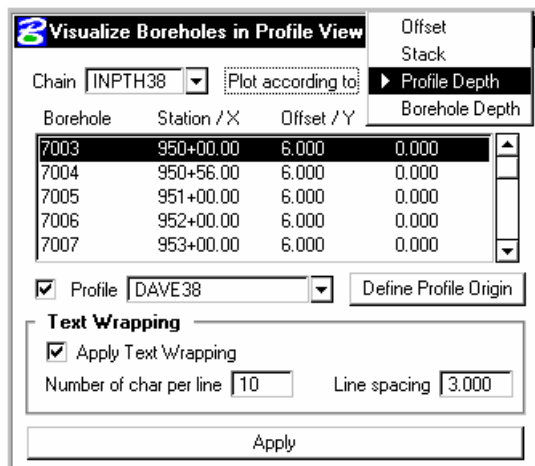
Visualize Boreholes on Profile View

This option will place the boreholes onto a profile (profiles are generated kept in the *.gpk).

First open your design file that has the profile plotted. Open GeoTech and select the Visualize Boreholes in Profile View tool.



Next choose a chain that your boreholes are associated to, this will populate the Visualize Boreholes in Profile View dialog box with your boreholes.



There are four options to choose how the boreholes will be placed onto the profile

- Offset
- Stack
- Profile Depth
- Borehole Depth

Choose which profile you want to place your boreholes onto.

Next you'll have to define where the profile starts, and you do this by clicking on "Define Profile Origin". With the Origin dialog box open, you can use two options to locate your profile.

- 1) Use the ID Cell option – Profiles are placed with an ID Cell (similar to Cross Sections). Click the ID Cell button and then choose the profile that you're interested in.
- 2) Use the DP option - first decide at what stationing and elevation you want your Data Point (DP) to be. The Data Point is going to tell GeoTech where the profile starts. Fill in the DP Station and DP Elevation fields. Next, click on the DP button in the lower left corner and then immediately place a Data Point at the station and elevation that you chose.

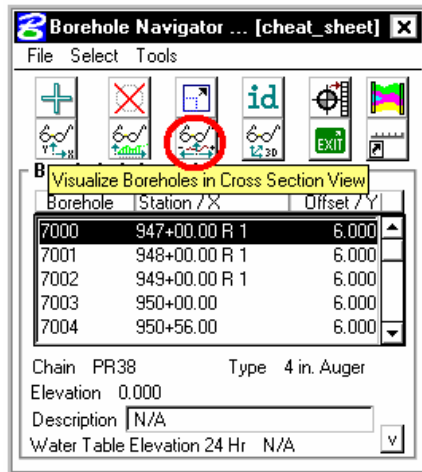
Click "OK", this will take you out of the Define Profile Origin dialog box.

Now choose which boreholes you want to place onto your profile (If Text Wrap is desired - choose the desired text length and line spacing).

Then click "APPLY" and watch the boreholes being placed onto your profile.

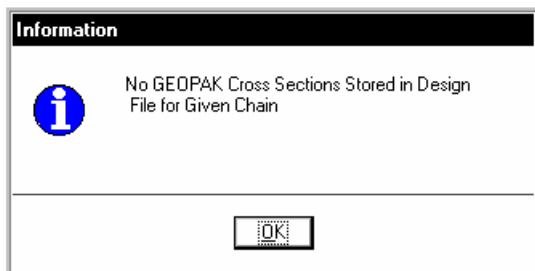
Visualize Boreholes on Cross Section View

This option will place the boreholes onto Cross Sections.



First open your cross section design file. Open GeoTech and select the Visualize Boreholes in Cross Section View tool.

When you choose to place the boreholes onto cross sections, you'll most likely get an error saying that **"No GEOPAK Cross Sections Stored in Design File for Given Chain"**. This means that the cross section file that you opened up does NOT contain any cross sections for the first chain it finds in the gpk file.



Click "OK" and then choose a chain. If the chain that you chose has your boreholes associated to it, then the Visualize Boreholes in Cross Section View dialog box will populate with your boreholes.

When you choose a chain, make sure that you choose the chain that your cross sections were created with. This can be determined by looking at the **Station Range** "Begin" and "End" fields. If this is the correct cross section file for the chain that you chose then these fields will be populated with stationing.

Under **Projection Data**, choose "Project to Nearest XS" with a Max. Projection distance of 50.0000.

Also under **Projection Data**, choose “Project at XS Ground Elev”. This will give you another option of “Define Existing Ground”. Click on the “Define Existing Ground” button and this will bring up another dialog box that will allow you to define what level, color, weight (etc.), your ground line is.

Visualize Boreholes in Cross Section View

Chain: PR38

Borehole	Station / X	Offset / Y	Elevation
7000	947+00.00 R 1	6.000	0.000
7001	948+00.00 R 1	6.000	0.000
7002	949+00.00 R 1	6.000	0.000
7003	950+00.00 R 1	6.000	0.000
7004	950+56.00 R 1	6.000	0.000

Station Range
 Begin: 944+00.00 R
 End: 707+61.00 R

Projection Data
 Project onto Nearest XS
 Max. Projection Distance: 50.0000
 Project at XS Ground Elev
 Define Existing Ground

Text Wrapping
☒ Apply Text Wrapping
 Number of char per line: 10
 Line spacing: 3.000

Apply

Projection Data
 Project onto Nearest XS
 Max. Projection Distance: 50.0000
 Project at XS Ground Elev
 Define Existing Ground

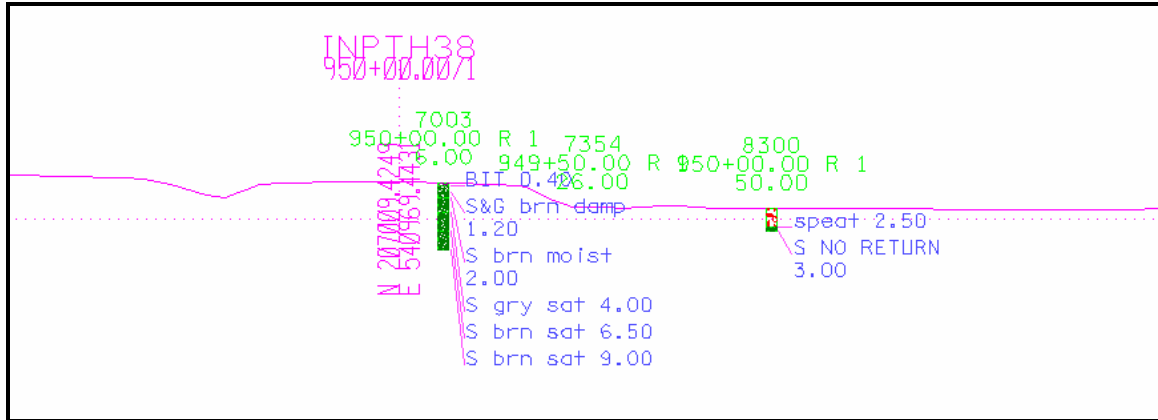
Select Search Criteria For Existing Ground

Criteria
☒ Level: Select
☒ Weight: Select
☒ Color: 0.2,5
☒ Style: Select
☒ Types: Select
☐ Hilite
 Match Reset

Preview:
 Lv: 1-2,50
 Wt: 0-5
 Lc: 0
 Ty: 3-4

If Text Wrap is desired - choose your desired text length and line spacing.

Then click “APPLY” and watch the boreholes being placed onto your cross sections.

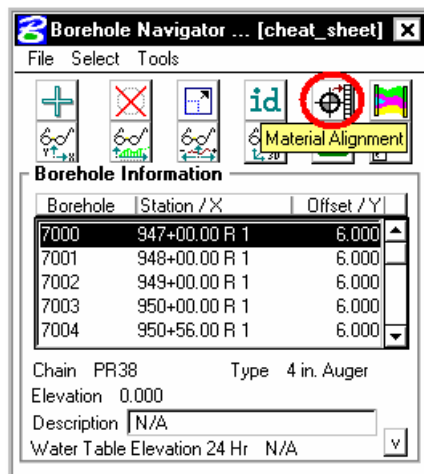


Sub-Surface TIN

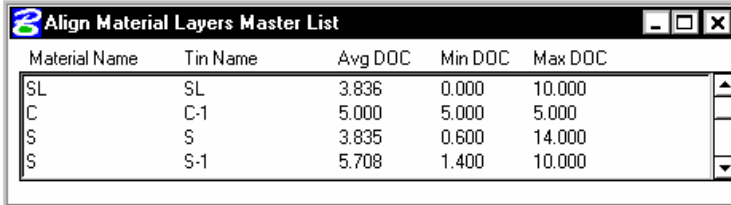
After the boreholes populate the borehole navigator, you may choose to create a Sub-Surface TIN from your strata layers. Before you create your TIN, you may want to view your strata layers to make sure that GeoTech is interpreting the stratum the same way you are. If GeoTech is NOT viewing the strata the same, you may want to modify your stratum before you create a TIN.

Align Materials (optional)

You can do all of this by choosing the **Material Alignment** Button.

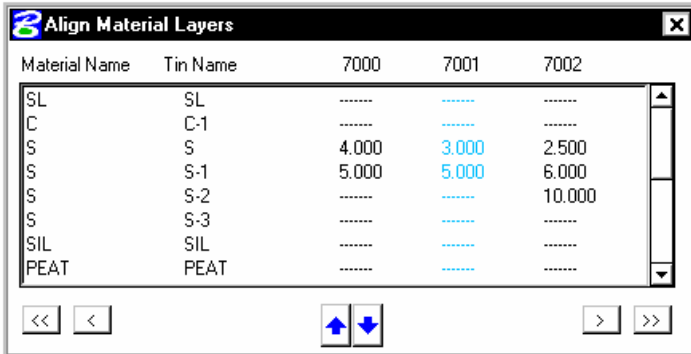


When the **Material Alignment** button is selected, two dialog boxes open up. One is the “Align Material Layers Master List” and the other is the “Align Material Layers” dialog box.



The "Align Material Layers Master List" dialog box displays a table with the following data:

Material Name	Tin Name	Avg DOC	Min DOC	Max DOC
SL	SL	3.836	0.000	10.000
C	C-1	5.000	5.000	5.000
S	S	3.835	0.600	14.000
S	S-1	5.708	1.400	10.000

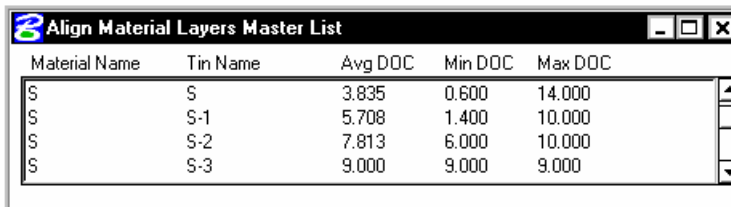


The "Align Material Layers" dialog box displays a table with the following data:

Material Name	Tin Name	7000	7001	7002
SL	SL	-----	-----	-----
C	C-1	-----	-----	-----
S	S	4.000	3.000	2.500
S	S-1	5.000	5.000	6.000
S	S-2	-----	-----	10.000
S	S-3	-----	-----	-----
SIL	SIL	-----	-----	-----
PEAT	PEAT	-----	-----	-----

The "Align Material Layers Master List" displays the Average, Minimum, and Maximum Depth of Cover for each Material Name, along with displaying the TIN name for each material layer.

*Note - If you have two separate stratum (in the same borehole) that have the same material (Example: S), you'd get a number appended onto the TIN Name (Example: S, S-1, and S-2).

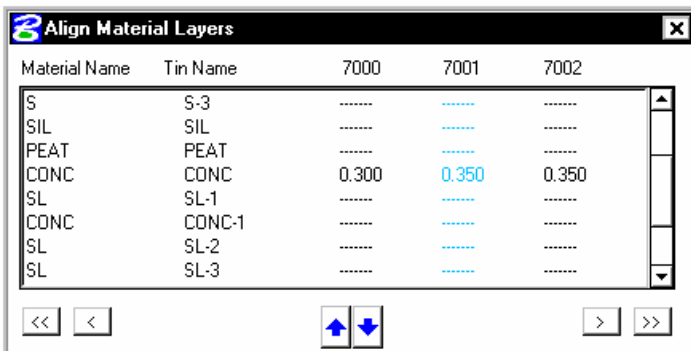


The "Align Material Layers Master List" dialog box displays a table with the following data:

Material Name	Tin Name	Avg DOC	Min DOC	Max DOC
S	S	3.835	0.600	14.000
S	S-1	5.708	1.400	10.000
S	S-2	7.813	6.000	10.000
S	S-3	9.000	9.000	9.000

The "Align Material Layers" dialog box is used to review and move your boreholes to help you get the best TIN possible.

The Material Name and TIN Name are listed on the left side.



The "Align Material Layers" dialog box displays a table with the following data:

Material Name	Tin Name	7000	7001	7002
S	S-3	-----	-----	-----
SIL	SIL	-----	-----	-----
PEAT	PEAT	-----	-----	-----
CONC	CONC	0.300	0.350	0.350
SL	SL-1	-----	-----	-----
CONC	CONC-1	-----	-----	-----
SL	SL-2	-----	-----	-----
SL	SL-3	-----	-----	-----

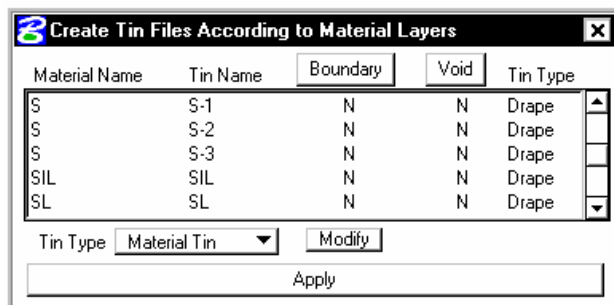
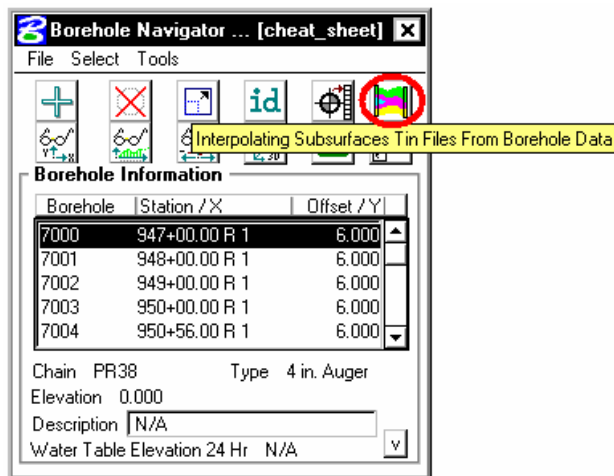
The boreholes are listed across the top with the depths of cover beneath each borehole.

To move a strata up or down (align stratum for the creation of a TIN), make sure to place the borehole that you're modifying in the middle. The borehole being changed should be easy to see on the screen because it'll be the only borehole being displayed with blue text. Next, highlight the strata that you intend to move; this will turn the text red (see above dialog box). Use the blue arrows at the bottom of the dialog to move the strata data up or down, until it lines up with the desired Material Name. It can only be aligned with another layer of the same Material Name.

Creating the Subsurface TIN

Note - Subsurface TIN files can be created for any material name as long as there's a minimum of three boreholes for the selected material.

To create TINs, select the **Interpolating Subsurface TIN Files from Borehole Data** button from the Borehole Navigator.



All Material Names found in the current GeoTechnical project will be listed in the “Create Tin Files According to Material Layers” dialog box. If you need to review or modify any of the stratum, you'll need to go back to the Material Alignment tool.

There are two TIN types that can be used:

- **Drape ExGr TIN** - The Ground TIN and borehole elevations are used in the creation of this TIN type. The new TIN that's created will mirror the Ground TIN and is adjusted for the strata depths.
- **Material TIN** - The Ground TIN won't be used in this option, and the Material TIN is created exclusively from the borehole elevations.

Modify - To change the Material TIN type, highlight the desired line, set the TIN type, and then press the Modify button. Note the type changes in the list dialog box.