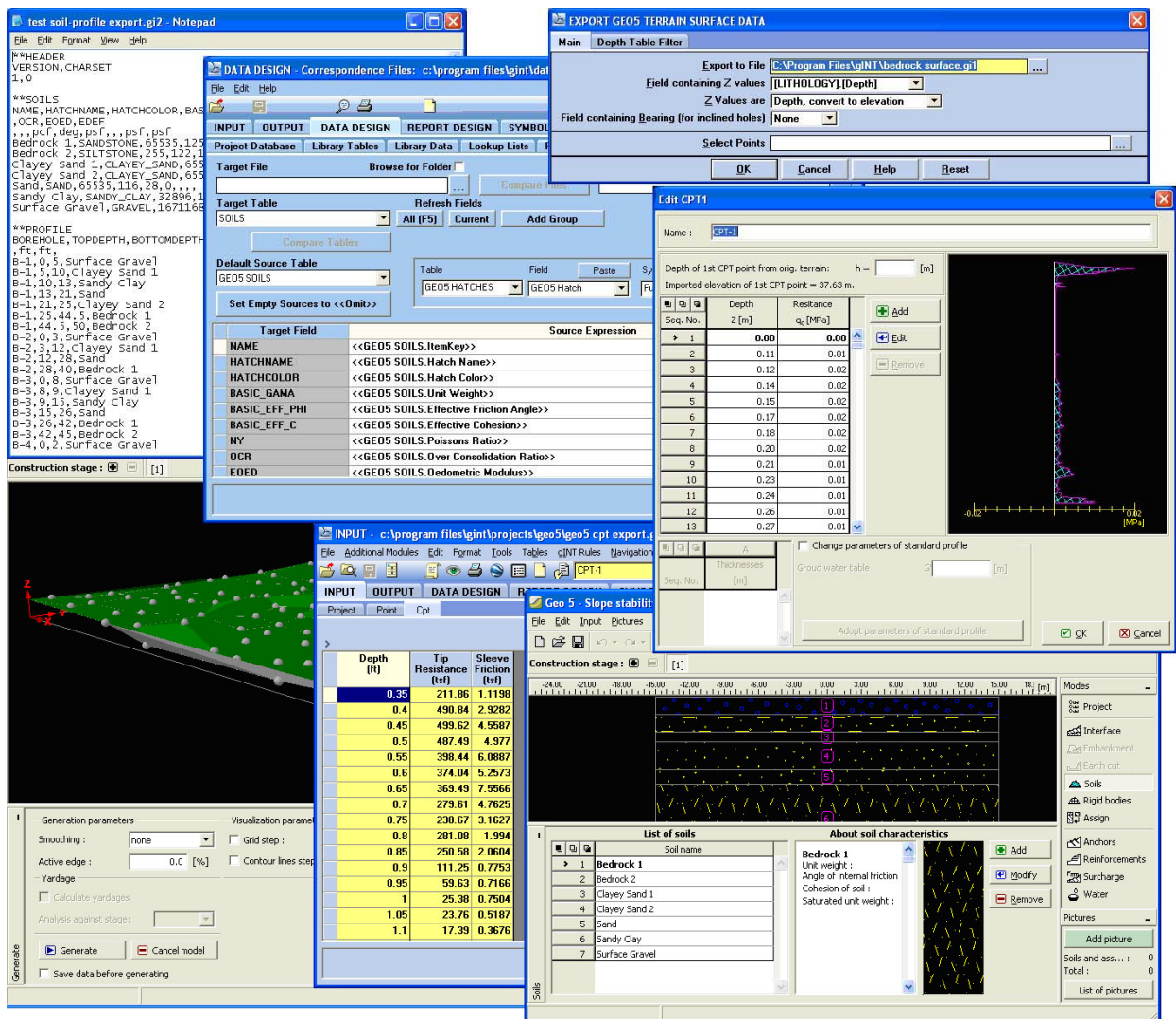


# gINT User Guide

## Integrating GEO5 with gINT



**test soil-profile export.gj? - Notepad**

```

**HEADER
VERSION,CHARSET
1,0

**SOILS
NAME,HATCHNAME,HATCHCOLOR,BAS
,OCR,EDED,EDEF
, , , pcf, deg, pcf, , dsf, pcf
Bedrock 1,SANDSTONE,65535,125
Bedrock 2,SILTSTONE,255,122,1
Clayey Sand 1,CLAYEY_SAND,655
Clayey Sand 2,CLAYEY_SAND,655
Sand,SAND,65535,116,28,0, , ,
Sandy Clay,SANDY_CLAY,32896,1
Surface Gravel,GRAVEL,1671168

**PROFILE
BOREHOLE,TOPEPTH,BOTTOMDEPTH,
,FT,
B-1,0,5,Surface Gravel]
B-1,5,10,Clayey Sand 1
B-1,10,15,Sandy Clay
B-1,13,21,Sand
B-1,21,25,Clayey Sand 2
B-1,25,44,5,Bedrock 1
B-1,44,5,50,Bedrock 2
B-2,0,3,Surface Gravel]
B-2,3,12,Clayey Sand 1
B-2,12,28,Sand
B-2,28,40,Bedrock 1
B-3,0,8,Surface Gravel]
B-3,8,9,Clayey Sand 1
B-3,9,15,Sandy Clay
B-3,15,26,Sand
B-3,26,42,Bedrock 1
B-3,42,45,Bedrock 2
B-4,0,2,Surface Gravel]

Construction stage: [1]
  
```

**EXPORT GEO5 TERRAIN SURFACE DATA**

Export to File: [C:\Program Files\gINT\Bedrock surface.gj] ...  
 Field containing Z values: [LITHOLOGY1,Depth] ...  
 Z Values are: [Depth, convert to elevation] ...  
 Field containing Bearing (for inclined holes): [None] ...

**DATA DESIGN - Correspondence Files: c:\program files\gint\dat**

Target Field	Source Expression
NAME	<<GEO5 SOILS.ItemKey>>
HATCHNAME	<<GEO5 SOILS.Hatch Name>>
HATCHCOLOR	<<GEO5 SOILS.Hatch Color>>
BASIC_GAMA	<<GEO5 SOILS.Unit Weight>>
BASIC_EFF_PHI	<<GEO5 SOILS.Effective Friction Angle>>
BASIC_EFF_C	<<GEO5 SOILS.Effective Cohesion>>
NY	<<GEO5 SOILS.Poissons Ratio>>
OCR	<<GEO5 SOILS.Over Consolidation Ratio>>
EDED	<<GEO5 SOILS.Dedometric Modulus>>

**Edit CPT1**

Name: [CPT1]  
 Depth of 1st CPT point from orig. terrain: h = [ ] [m]  
 Imported elevation of 1st CPT point = 37.63 m.

Seq. No.	Depth Z [m]	Resistance q <sub>t</sub> [MPa]
1	0.00	0.00
2	0.11	0.01
3	0.12	0.02
4	0.14	0.02
5	0.15	0.02
6	0.17	0.02
7	0.18	0.02
8	0.20	0.02
9	0.21	0.01
10	0.23	0.01
11	0.24	0.01
12	0.26	0.01
13	0.27	0.01

**Geo 5 - Slope stability**

Depth (ft)	Tip Resistance (tsf)	Sleeve Friction (tsf)
0.35	211.06	1.1198
0.4	490.84	2.9282
0.45	499.62	4.9587
0.5	487.49	4.9377
0.55	398.44	6.0887
0.6	374.04	5.2573
0.65	369.49	7.5966
0.7	279.61	4.7625
0.75	238.67	3.1627
0.8	281.08	1.994
0.85	250.58	2.0604
0.9	111.25	0.7753
0.95	59.63	0.7166
1	25.38	0.7504
1.05	23.76	0.5187
1.1	17.39	0.3676

**Soils**

Soil name	About soil characteristics
1 Bedrock 1	Unit weight: Angle of internal friction: Cohesion of soil: Saturated unit weight:
2 Bedrock 2	
3 Clayey Sand 1	
4 Clayey Sand 2	
5 Sand	
6 Sandy Clay	
7 Surface Gravel	

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Printed February 3, 2009

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## Overview of GEO5-gINT Integration Options

---

You export data from gINT to GEO5 in INPUT using the File ► GEO5 Export menu. There are three GEO5 export options:

- **Terrain Data:** This creates a .gi1 file, which exports the points of a surface for use in the GEO5 Terrain module. It obtains the ground surface elevations, or the top or bottom of a particular lithology layer, for each point. See “Terrain Data” on page 21.
- **Profile and Soil Data:** This creates a .gi2 file, which exports layering and soil properties information. This exported gINT data is used by all of the design and analysis modules in GEO5 (with one exception: the Terrain module only uses the soil properties). Layering information is exported from the LITHOLOGY table or equivalent, and soil properties information comes from a GEO5 SOILS table that you create. See “Profile and Soil Data” on page 4.
- **CPT Data for Pile Design:** This creates a .gi3 file, which exports borehole elevation and CPT sounding data for use in the GEO5 Pile CPT module. It uses the **Depth** and **Elevation** fields from the POINT table, and depth and tip resistance fields from a CPT table in your database. See “Pile Design CPT Data” on page 16.

Exporting from gINT to GEO5 requires:

- gINT version 8.2.003 or later
- GEO5 version 5.8 or later

## Obtaining the Demo Application

---

A sample gINT-to-GEO5 export application is provided on the gINT Software website. It provides projects, correspondence files and a library that illustrate gINT-to-GEO5 export capabilities. These files can be used to demonstrate the various export setup processes. Also, you can transfer some of the table structures and data to your own projects and library, saving data entry time. This is described later in the text.


To obtain the sample application, do the following:

1. Go to [www.gintsoftware.com/support\\_doc.html](http://www.gintsoftware.com/support_doc.html).

- Click on the link 'Data Files for GEO5 Integration User Guide only'. The zip file you download contains the following files:

Type	Files
Projects	geo5 profile-soil export.gpj geo5 cpt export.gpj geo5 terrain export.gpj
Correspondence Files	geo5 profile-soil.gcx geo5 cpt pile design.gcx
Correspondence Target Files (templates)	geo5 profile-soil template.csv geo5 cpt pile design template.csv
Library	geo5 export.glb


- Extract to the following locations:
  - The project files to your \projects\ folder
  - The correspondence files and correspondence target files to your \datatmpl\ folder
  - The library to your \libraries\ folder

 **Note:** We suggest you use the UTILITIES ► Extract From Zip option to extract the files quickly to these locations.

## Running the Demo Application

---

To see how export to GEO5 works for profile and soil data, do the following:

- Download and extract the sample application, as described in the previous section.
- In gINT, go to **INPUT**. Change libraries to 'geo5 export.glb' and open the 'geo5 profile-soil export.gpj' project.
- Select **File ► GEO5 Export ► Export GEO5 Profile and Soil Data**.
- In the **GEO5 PROFILE AND SOIL DATA** dialog box, click the Browse  button to the right of **GEO5 File**. Browse to any folder and enter a filename of 'test soil-profile export.gi2' and click **Save**.
- Click the Browse button to the right of **Correspondence File**. Select 'geo5 profile-soil.gcx' then click **Open**. Correspondence files are described in "Creating and Modifying the Correspondence File" on page 11.
- Click **OK**. The .gi2 file is generated and a status log is displayed. Click **OK** to close the status log.

- Open 'test soil-profile export.gi2' with a text editor. This is a text file with the data arranged according to a preset format.

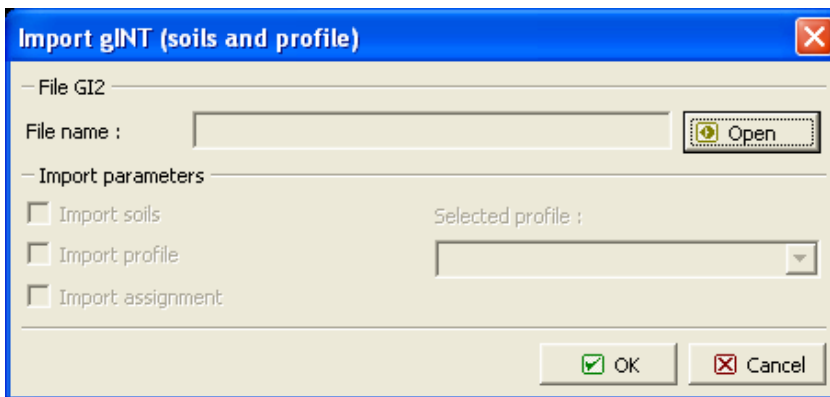
```

test soil-profile export.gi2 - Notepad
File Edit Format View Help
**HEADER
VERSION,CHARSET
1,0

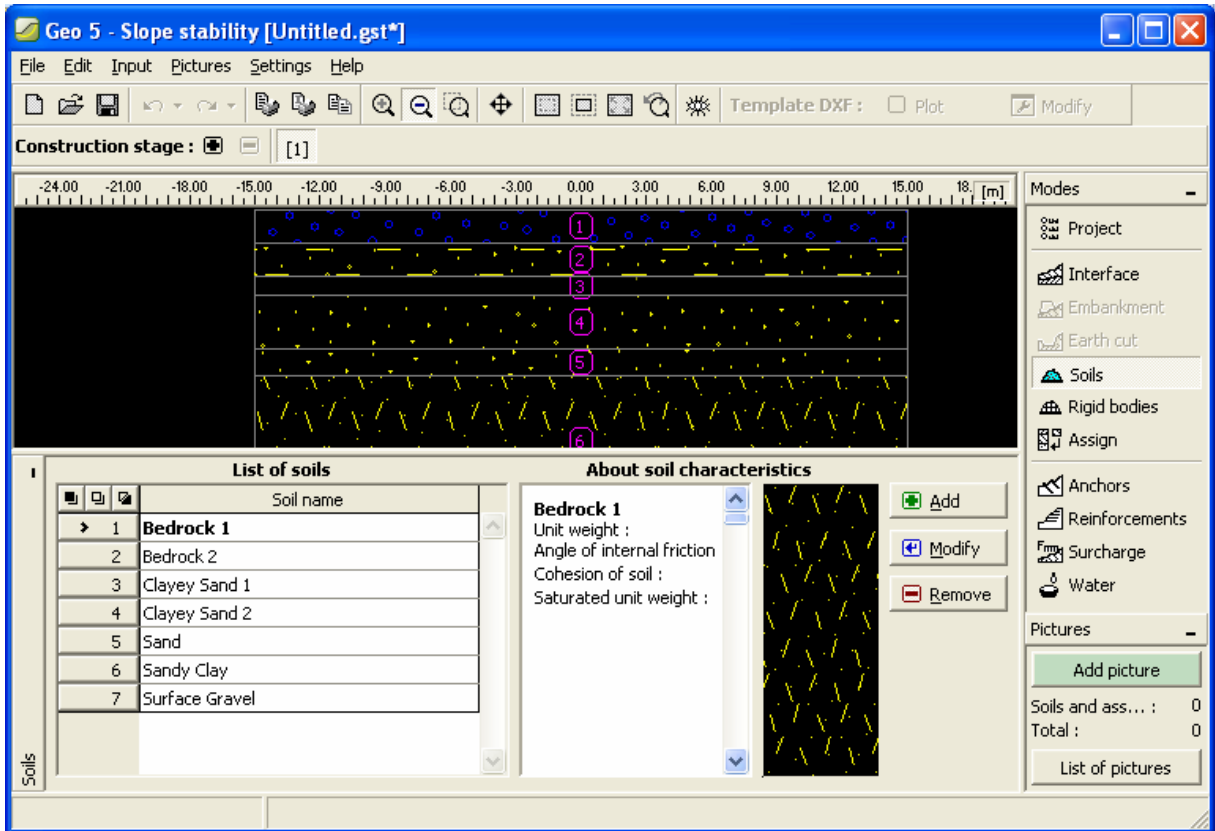
**SOILS
NAME,HATCHNAME,HATCHCOLOR,BASIC_GAMA,BASIC_EFF_PHI,BASIC_EFF_C,NY
,OCR,EOED,EDEF
,,,pcf,deg,psf,,,psf,psf
Bedrock 1,SANDSTONE,65535,125,20,9000,,,,
Bedrock 2,SILTSTONE,255,122,17,8000,,,,
Clayey Sand 1,CLAYEY_SAND,65535,115,25,200,,,,
Clayey Sand 2,CLAYEY_SAND,65535,112,29,250,,,,
Sand,SAND,65535,116,28,0,,,,
Sandy Clay,SANDY_CLAY,32896,110,15,1200,,,,
Surface Gravel,GRAVEL,16711680,120,30,300,,,,

**PROFILE
BOREHOLE, TOPDEPTH, BOTTOMDEPTH, SOIL
,ft,ft,
B-1,0,5, Surface Gravel
B-1,5,10, Clayey Sand 1
B-1,10,13, Sandy Clay
B-1,13,21, Sand
B-1,21,25, Clayey Sand 2
B-1,25,44.5, Bedrock 1
B-1,44.5,50, Bedrock 2
B-2,0,3, Surface Gravel
B-2,3,12, Clayey Sand 1
B-2,12,28, Sand
B-2,28,40, Bedrock 1
B-3,0,8, Surface Gravel
B-3,8,9, Clayey sand 1
B-3,9,15, Sandy Clay
B-3,15,26, Sand
B-3,26,42, Bedrock 1
B-3,42,45, Bedrock 2
B-4,0,2, Surface Gravel
    
```

- Close the text editor.
- Open the Slope Stability module in GEO5.
- In GEO5, select **File ► Import ► Format GI2 (gINT soils and profiles)**.



- Click the **Open** button and browse to the .gi2 file you previously exported.
- In the **Selected Profile** dropdown, select borehole B-1. Click **OK**.
- Click the **Soils** tab in the **Modes** list at right.
- The lithology layers for borehole B-1 appear in GEO5 Slope Stability, with the soil types listed in the lower half.



15. Close GEO5. Click No when you are prompted to save.

## Profile and Soil Data

Setting up your project databases and related files for GEO5 profile/soil data export includes the following steps:

- Copying the hatch patterns library table from the demo application
- Copying the GEO5 SOILS database table from the demo application
- Configuring the units in GEO5 SOILS
- Performing GEO5 SOILS data entry
- Adding a field to your lithology layers table
- Replacing your standard data template with the modified database structure, and applying this to projects
- Creating the correspondence file

After this set of steps has been performed once, you can perform regular exports of layer and soil data from gINT projects to GEO5. The steps are described in detail in the subsections that follow.

## Setting up gINT Tables in your Project and Library

---



You need appropriate tables and fields in your gINT database before you can export to .gi2 format:

- A **library table of hatch pattern names**: This needs to be in your library with all the valid GEO5 hatch names. You can copy this from the library in the demo application.
- A **database table with soils data**: You will need to create this in your project. You can copy it from the project in the demo application.
- A **database table of lithology layers**, such as LITHOLOGY (in standard gINT projects) or STRATA MAIN (in AGS compatible projects). This table probably exists, but you will need to add one field and perform data entry into it.

### Hatch Patterns (Library Table)

There are forty hatch pattern names currently accepted in GEO5 applications. In your soils table (which we create shortly), you need to assign one of these to each soil you use. Rather than manually entering the hatch pattern name for each soil, which is slow and prone to mistakes, you create the list of hatch patterns as a library table. This library table can be used as a lookup in the Hatch Name field for each soil.

Since this library table already exists in the demo application's library, you can copy it to your library using **Lib Merge/Copy**. Do the following:

1. If you have not installed the demo application files, do this first. Instructions are in "Obtaining the Demo Application" on page 1.
2. Open your library (the library you normally use).
3. Go to **UTILITIES ► Lib Merge/Copy**.
4. Select the **Merge From** radio button.
5. Click the **Browse** button to the right of **Source Library File**. Browse to the 'geo5 export.glb' file and click **Open**.
6. Highlight 'GEO5 HATCHES' in the **Available Source Tables** list, then click the **Move Item Right**  icon. Click **Execute**.
7. In the **GEO5 HATCHES** dialog box, click the **Move All Items Right**  icon then click **OK**.
8. Click **OK** to dismiss the **Merge/Copy Completed** message box.

- Go to DATA DESIGN ► Library Data and select 'GEO5 HATCHES' in the object selector. The lookup list appears:

GEO5 Hatch	Hatch Name
BRECCIA	Breccia
CLAY	Clay
CLAYEY_GRAVEL	Clayey Gravel
CLAYEY_SAND	Clayey Sand
CLAYSTONE	Claystone
COARSE_GRAINED_FILL	Coarse Grained Fill
CROSS_HATCH_DASHED_LINES_45_135	Cross hatch dashed lines at 45° and 135°
CROSS_HATCH_SOLID_LINES_30_120	Cross hatch solid lines at 30° and 120°
CROSS_HATCH_SOLID_LINES_60_150	Cross hatch solid lines at 60° and 150°
DISCONTINUITY_FILLINGS	Discontinuity Fillings
FILL	Fill
FINE_GRAINED_FILL	Fine Grained Fill
GABRO	Gabro
GRANITE	Granite

Notice that the Hatch Name field makes it possible for you to translate the names into another language, if your country is non-English-speaking. However, you should not change the values in the GEO5 Hatch field, since these values need to be passed as written to GEO5.

### Soils Data (Database Table)

You will need to set up a table in your gINT project to store your soil definitions. This will act as a lookup in associating a soil to a layer. It also assigns a set of properties to each soil that you will need in GEO5.

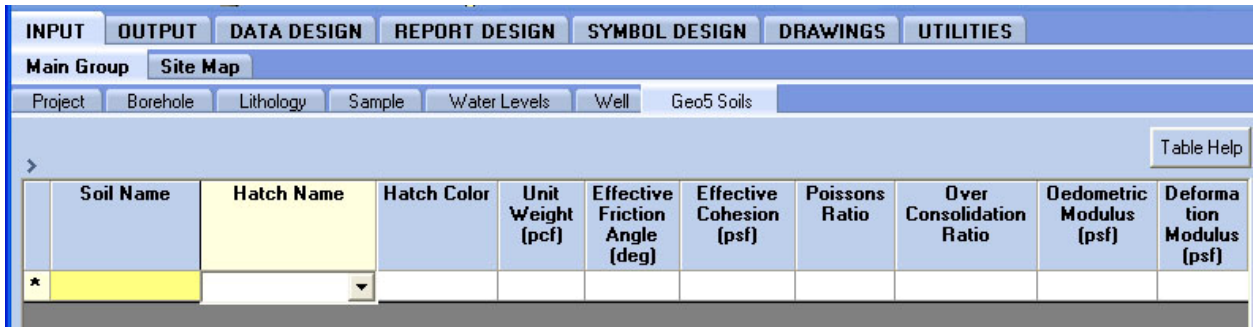
You can manually create the table and all the fields in DATA DESIGN, but since this already exists in the demo application, it's faster to copy it from there. Do the following:

- Go to DATA DESIGN ► Project Database.
- Open the project that you will be exporting to GEO5.
- Select Tables ► Import Table. In the CHOOSE A DATABASE file browser, select 'geo5 profile-soil export.gpj' from the demo application then click Open. The table selection dialog box appears:



- Select 'GEO5 SOILS' in the Source Table dropdown then click OK.

- Go to **INPUT**. There is now a **Geo5 Soils** tab. Click this tab. The data entry grid for the GEO5 SOILS table appears:



- Click in the **Hatch Name** field. Notice that there is a lookup that includes all the hatch names in the GEO5 HATCHES library table. Press **Esc**.

**Setting up the Units**

The units have to be defined for each field that is expressed in specific units. To do this, right-click the cell under each of the following fields, select **Field Properties**, and select the appropriate **Units** property value for your data. The following table shows acceptable **Units** values for the indicated fields. If you need a unit that is not available in the **Units** property value in **Field Properties**, add it first in the 'Field Units' library table in **DATA DESIGN ► Library Data**.

Field	Units
Unit Weight	In the imported table the units are 'pcf', but you can change this to any of the following: <ul style="list-style-type: none"> <li>• kN/m3: KiloNewtons per cubic meter</li> <li>• N/ft3: Newtons per cubic meter</li> <li>• kcf: Kips per cubic foot</li> <li>• kci: Kips per cubic inch</li> <li>• pcf: Pounds per cubic foot</li> <li>• pci: Pounds per cubic inch</li> </ul>
Effective Friction Angle	In the imported table the units are 'deg', but you can change this to any of the following: <ul style="list-style-type: none"> <li>• deg: degrees</li> <li>• rad: radians</li> <li>• mrad: milliradians</li> <li>• grad: 1/400th of a full circle. Also known as "gon", "grade", and "gradian". 100 grads = 90 degrees.</li> </ul>
Effective Cohesion Oedometric Modulus Deformation Modulus	In the imported table the units are 'psf', but you can change this to any of the following: <ul style="list-style-type: none"> <li>• Pa: Pascals</li> <li>• kPa: Kilo Pascals</li> <li>• MPa: Mega Pascals</li> <li>• ksf: Kips per square foot</li> <li>• psf: Pounds per square foot</li> <li>• ksi: Kips per square inch</li> <li>• psi: Pounds per square inch</li> </ul>

☞ **Note:** The units listed here are the units that are accepted by GEO5. You can set up any units you want in INPUT, then perform a conversion on export to units that GEO5 accepts. This is configured in the correspondence file. See “Calculated Expressions for Units Conversion” on page 13.

### **Data Entry**

To populate the SOILS GEO5 table, you will need to review your field and laboratory results to obtain a reasonable value for each of the properties that will be used. Here are explanations of these fields:

- **Soil Name:** Enter an arbitrary name for the soil. This name will be assigned to particular lithology layers. A soil can be assigned to multiple layers. Note that this name must be unique within the SOILS GEO5 table.
- **Hatch Name:** This field specifies the GEO5 hatch pattern that will be associated with the soil type. GEO5 will use this hatch pattern when drawing any layer that uses this soil.
- **Hatch Color:** This specifies the color that will be used in displaying or printing the hatch pattern. Select this from the dropdown list.
- **Unit Weight:** The total unit weight of the soil. This will translate into the **BASIC\_GAMMA** field in GEO5.
- **Effective Friction Angle:** The effective friction angle of the soil. This will translate into **BASIC\_EFF\_PHI** in GEO5.
- **Effective Cohesion:** The effective cohesion of the soil. This will translate into **BASIC\_EFF\_C** in GEO5.
- **Poissons Ratio:** This will translate into **NY** in GEO5. This field is unitless.
- **Over Consolidation Ratio:** This will translate into **OCR** in GEO5. This field is unitless.
- **Oedometric Modulus:** This will translate into **EOED** in GEO5. Search for "Oedometric Modulus" in GEO5 Help while in the Settlement module for details.
- **Deformation Modulus:** This will translate into **EDEF** in GEO5. Search for "Deformation Modulus" in GEO5 Help while in the Settlement module for details.

☞ **Note:** It is not necessary to enter values in all fields for each soil type. You only need to provide the soil properties for the items that will be needed in the specific analyses that you will be carrying out in GEO5. For example, if you are performing settlement analysis, you must provide the **Over Consolidation Ratio** and either the **Oedometric Modulus** or **Deformation Modulus**, but **Effective Friction Angle** and **Effective Cohesion** are not used. If you are analyzing a cantilever wall, **Over Consolidation Ratio**, **Oedometric Modulus**, and **Deformation Modulus** are not used.

### **Lithology Data (Database Table)**

Your database should already have a table that identifies lithology layers. In many standard gINT databases this is LITHOLOGY. In AGS databases it is STRATA MAIN. For export to GEO5, your lithology layers database needs to have fields with the following data:

- **Borehole number:** This is the **PointID** field.
- **Top depth:** This is the **Depth** field.

- **Bottom depth:** This is the **Bottom** field in some databases. Alternately you may have a **Length** field that is added to **Depth** to obtain the bottom depth value. Either of these table designs is acceptable.
- **Soil:** You have to add a field to your table for this. We will call it **GEO5 Soil**. This field will let you associate the lithology layer with a soil type record in GEO5 SOILS. This is necessary for all the layer rows you are exporting to GEO5.

Note that units need to be specified for the top depth and bottom depth fields. You can verify this by looking for the units in parentheses in the column headings in INPUT, as shown. If not present, specify the units by highlighting a cell in each of these columns then choosing **Table ► Field Properties** or right-click ► **Field Properties** then selecting a value for **Units**.

Depth (ft)	Bottom (ft)	USCS	Graphic
0	5	GW-GC	GW-GC

### GEO5 Soil Field

To create and configure the **GEO5 Soil** field in the lithology table, do the following:

1. In INPUT, select the lithology table (generally the **Lithology** tab).
2. Select **Tables ► Add Field**.
3. In the **Field Properties** dialog box, enter the following values:

Property	Value	Notes
Name	GEO5 Soil	
Type	Text	
Lookup	PRJTBL!geo5 soils	To specify the lookup: <ol style="list-style-type: none"> <li>1. Click the <b>Browse</b> button to the right of <b>Lookup</b>.</li> <li>2. In the <b>Type</b> dropdown, select 'PRJTBL'.</li> <li>3. In the <b>Name</b> dropdown, select 'GEO5 SOILS'.</li> </ol>
Must Use Lookup	checked	

4. Click **OK** to close **Field Properties** and save the new field in the database structure.
5. Click in the **GEO5 Soil** field for one of the lithology records. Notice that a dropdown list appears. Click on the dropdown arrow. If you have entered data in the **SOILS DATA** table, the **Soil Name** values in records there will appear in the dropdown list.
6. Press **Esc** to close the dropdown.

### Modifying and Using your Standard Data Template

The table and field properties for the new GEO5 SOILS table, and field properties for the GEO5 Soils field in the lithology table, should be saved to your data template. Then this template can be used to replicate these changes in other project databases. There are utilities you can use to accomplish this.

***Saving Changes to the Data Template***

1. Select **Tools ► Make Data Template**.
2. Specify the location and name of the data template to create. Click **Save**.

***Convert Databases***

This project conversion method converts many database files at once, but also deletes all tables and fields that aren't in the data template. If this limitation is not a problem, this is the fastest conversion technique for multiple files.

 **Note:** Initially you should test this on one project, after making a backup copy of the project.

To use this method, do the following:

1. Go to **UTILITIES ► Convert Projects**.
2. Click the **Browse ...** button to the right of **Data Template**. Select the data template you just created, and click **Open**.
3. Click the **Browse** button to the right of **Convert Files**. Select as many project files as you want to convert, using **Shift**-clicking and/or **Ctrl**-clicking. Click **Open**.
4. Click the **Execute** button. The specified project files are converted, if possible.
5. View the status log. This indicates success or problems with the conversion.
6. Click **OK** to close the status log.
7. In **INPUT**, open the project that was converted. Verify that the changes are what you wanted.
8. Repeat the process for a larger group of projects.

***Merge All Tables and Fields***

If **Convert Databases** is too destructive, an alternative is the **Merge All Tables and Fields** option in the **Tables** menu in **INPUT** or **DATA DESIGN**. This method has to be performed on each project one at a time. However, the benefit is that it does not delete any tables or fields in the database that differ from the template. To use this method, do the following:

1. Go to **INPUT** or **DATA DESIGN ► Project Database**. Open the project you want to convert.
2. Select **Tables ► Merge All Tables and Fields**.
3. In the **CHOOSE A DATABASE** dialog box, select the master data template from the `\datatmpl\` folder and click **Open**.
4. Notice in the object selector that there is now a **GEO5 SOILS** table in your project. Also, if you select the **LITHOLOGY** table in the object selector, notice that there is a **GEO5 Soil** field in the table.

The tables and data entry grids in the converted project are now correctly configured for GEO5 soil and profile export.

5. Replace your existing data template (**Tools ► Make Data Template**).

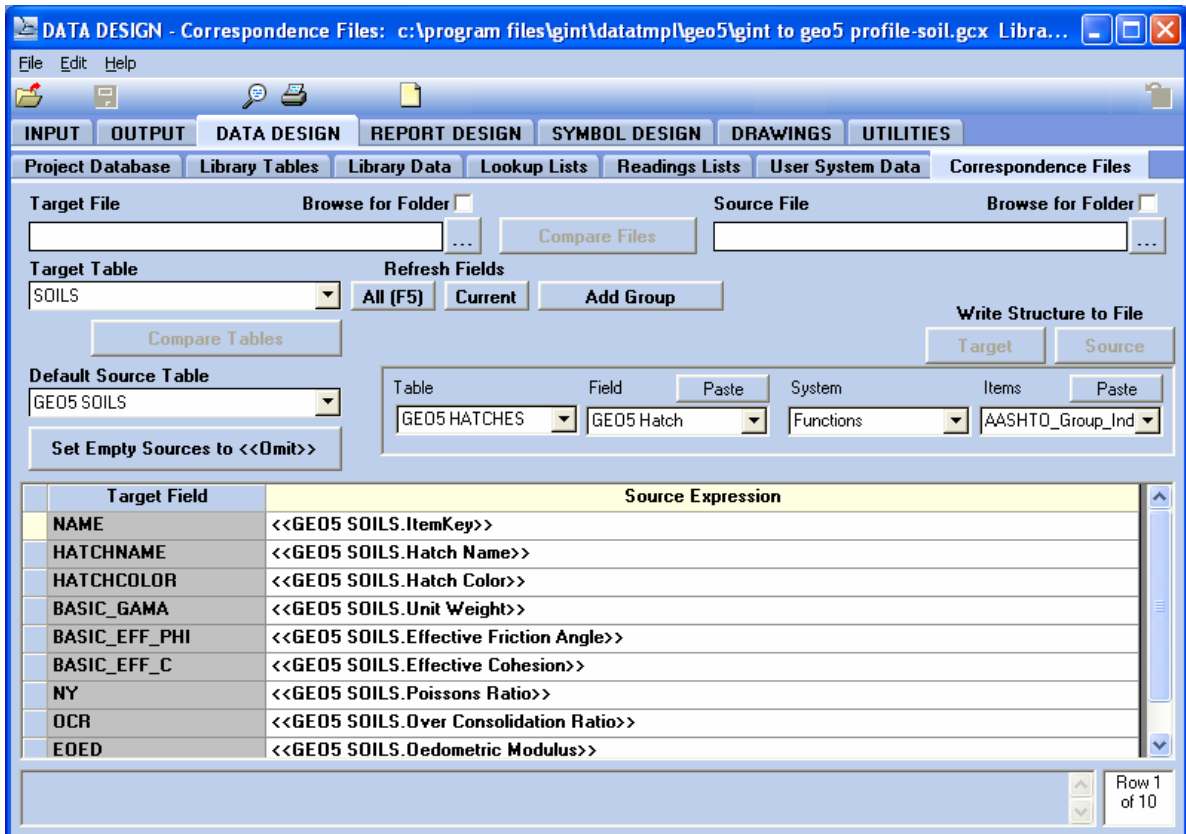
## Creating and Modifying the Correspondence File

You need an appropriately configured correspondence file to convert a project’s lithology and soil data to .gi2 format. Once this correspondence file is created, you can use it to convert any project that has been structured as described in the previous section.

We will create a correspondence file from scratch. However, if you are already familiar with correspondence files and your project is similar to the demo project, you can modify the example correspondence file that was provided in the demo application. To create the correspondence file, do the following:

1. Go to DATA DESIGN ► Correspondence Files.
2. Select File ► Open. Select ‘geo5 profile-soil.gcx’ in the OPEN CORRESPONDENCE FILE dialog box, and click Open.

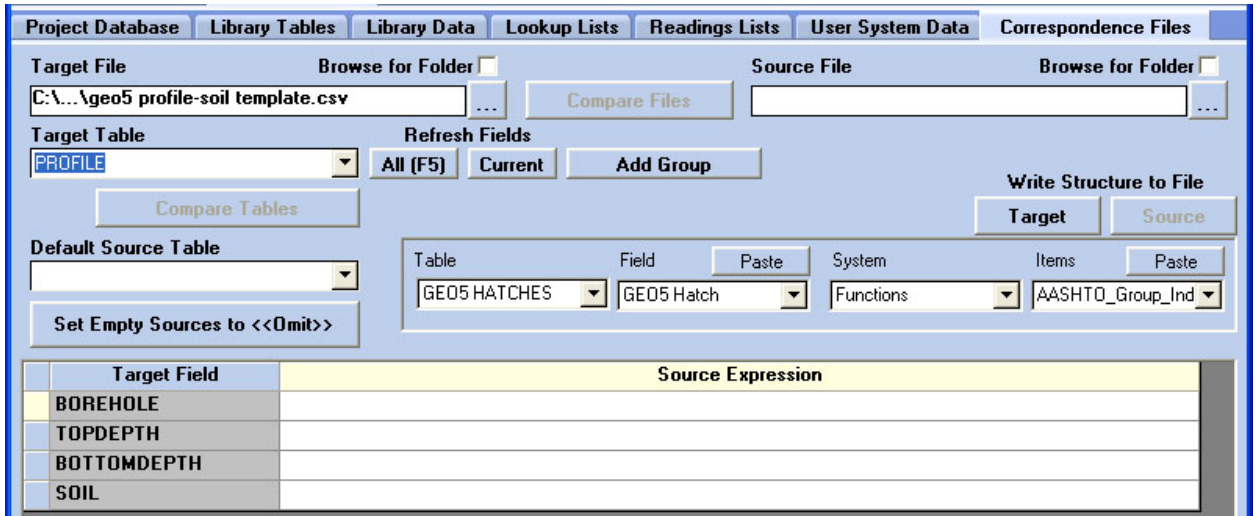
The file looks like this in the Correspondence Files tab:



Creation and editing of a correspondence file takes place here.

3. Select File ► New File. This clears the settings.
4. Click the Browse ... button to the right of Target File. Select ‘Text Files’ in the Files of Type dropdown, and open ‘geo5 profile-soil template.csv’.


Data appears in the tab.



5. Click the Target Table dropdown. Notice that two table names appear: SOILS and PROFILE. These are the table names that GEO5 expects on import.
6. Select SOILS in the Target Table dropdown. Notice that a different list of fieldnames appears in the gray Target Field column in the data entry grid.

The Target Field column lists the fields that GEO5 expects in the incoming PROFILE or SOILS table. When the Target Table is 'SOILS', the list of SOILS fields appears, and similarly for 'PROFILE'.

We have identified the names of the output (GEO5) tables and fields (thanks to the template file we opened). Now we need to identify the names of the input (gINT) tables and fields.

7. Click the Browse  button to the right of Source File. Select 'gINT' in the Files of Type dropdown, navigate to your \datatmpl folder, and open the data template you created.
8. Ensure that 'SOILS' is selected in the Target Table field.
9. In the Default Source Table dropdown, select 'GEO5 SOILS'.
10. In the Table dropdown in the Data Tool (the set of four dropdowns with Paste buttons) select 'GEO5 SOILS'.
11. Enter each of the following values by 1) clicking in the Source Expression cell to the right of a corresponding Target Field, 2) selecting the source field from the Field dropdown in the Data Tool, 3) clicking the Paste button above the Field dropdown, and 4) pressing the Tab key:

Target Field	Source Field
NAME	<<GEO5 SOILS.ItemKey>>
HATCHNAME	<<GEO5 SOILS.Hatch Name>>
HATCHCOLOR	<<GEO5 SOILS.Hatch Color>>
BASIC_GAMA	<<GEO5 SOILS.Unit Weight>>
BASIC_EFF_PHI	<<GEO5 SOILS.Effective Friction Angle>>
BASIC_EFF_C	<<GEO5 SOILS.Effective Cohesion>>

Target Field	Source Field
NY	<<GEO5 SOILS.Poissons Ratio>>
OCR	<<GEO5 SOILS.Over Consolidation Ratio>>
EOED	<<GEO5 SOILS.Oedometric Modulus>>
EDEF	<<GEO5 SOILS.Deformation Modulus>>

12. Change the Target Table to 'PROFILE'.
13. Change the Default Source Table and Table dropdowns to 'LITHOLOGY' (or whatever the name is of your lithology layers table).
14. Enter the following values in the grid. This assumes that you are using a standard gINT database, with a LITHOLOGY table and typical field names. Otherwise, use the appropriate field names in your database.

Target Field	Source Field
BOREHOLE	<<LITHOLOGY.PointID>>
TOPDEPTH	<<LITHOLOGY.Depth>>
BOTTOMDEPTH	<<LITHOLOGY.Bottom>>
SOIL	<<LITHOLOGY.GEO5 Soil>>

15. Select File ► Save As, save to 'geo5 profile-soil.gcx' in \datatmpl\ (this overwrites the original).




For more complete information on creating and modifying correspondence files, see the "Correspondence Files" chapter in the *Using Data Design* tutorial. Alternately, go to Help ► Index ► Correspondence Files.

**Note:** The correspondence file is designed to create the '\*\*SOILS' and '\*\*PROFILE' sections of the .gi2 file. This will work even if you use File ► Import/Export ► Export to Text File rather than File ► GEO5 Export. However, GEO5 also expects a short '\*\*HEADER' section at the beginning of a .gi2 file, which the GEO5 Export option will create and the Export to Text File option will not.

### Calculated Expressions for Units Conversion

The units exported to the .gi2 file for each field are obtained from the Units setting in the field definitions, as described in "Setting up the Units" on page 7. However, the units in your gINT database table may differ from the units you want exported to GEO5, possibly because your units are not supported in GEO5. This conversion can be performed in the correspondence file.

For example, we defined the conversion for the Unit Weight field in GEO5 soils, which converts to a field in GEO5 called BASIC\_GAMA, as follows:

Target Field	Source Expression
NAME	<<GEO5 SOILS.ItemKey>>
HATCHNAME	<<GEO5 SOILS.Hatch Name>>
HATCHCOLOR	<<GEO5 SOILS.Hatch Color>>
BASIC_GAMA	<<GEO5 SOILS.Unit Weight>> 

As written, the **Source Expression** for this field performs no units conversion. However, if your unit weights are in Mg/m<sup>3</sup> in the table, and you want to export them to kN/m<sup>3</sup>, you would need an expression like this:

```
<<Calc(<<GEO5 SOILS.Unit Weight>> * 9.807)>>
```

This will export the correct converted value. However, the stated units for **BASIC\_GAMA** in the header of the '\*\*SOILS' section will still be the **Units** setting for the **Unit Weight** field in the GEO5 SOILS table, namely 'Mg/m<sup>3</sup>'. This will cause the exported data to be incorrectly interpreted in GEO5. To force the output file to use different units than what is in the **Units** setting for the field, you include a **FieldUnits()** expression next to the **Calc()** expression. The argument for the **FieldUnits()** function is 'kN/m<sup>3</sup>' in this case, as shown:

```
<<FieldUnits(kN/m3)>>
```

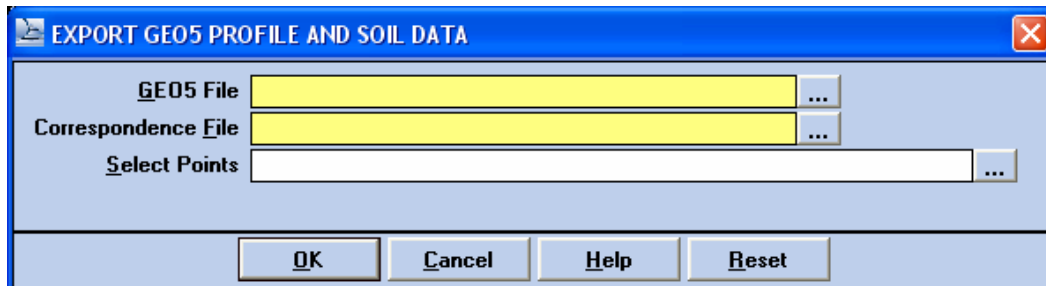
The complete **Source Expression** value for **BASIC\_GAMA** would thus be the following:

```
<<FieldUnits(kN/m3)>><<Calc(<<GEO5 SOILS.Unit Weight>> * 9.807)>>
```

## Exporting the .gi2 File

After you have completed the steps in the previous sections you can generate a .gi2 file for export to GEO5. Do the following:

1. Go to **INPUT**. Ensure that the project you want to export is open.
2. Select **File ► GEO5 Export ► Export GEO5 Profile and Soil Data**. The following dialog box appears:



3. Click the **Browse ...** button to the right of the **GEO5 File** property. In the file browser dialog, select an output folder, enter a filename for the .gi2 file, and click **Save**.
4. Click the **Browse** button to the right of the **Correspondence File** property and specify the .gcx file you previously created. Click **Open**.
5. If you only want to export data for some of the points in the project, click the **Browse** button to the right of **Select Points**, choose the desired points, and click **OK**. Otherwise, leave the **Select Points** property blank, and all points are exported.
6. Click **OK**. A status log window appears.
7. Verify that the export was successful according to the log then click **OK**.
8. Open any GEO5 module (whichever one you want to import the data into).
9. Select **File ► Import ► Format GI2 (gINT soils and profile)**

10. Click the **Open** button and browse to the .gi2 file you previously exported.
11. In the **Select Profile** dropdown, select the desired borehole. Click **OK**. The profile and soils data for the borehole is imported from the .gi2 file.

## File Design CPT Data

---

Setting up your project databases and related files for GEO5 CPT data export includes the following steps:

- Ensuring that the proper fields are present in POINT and your CPT table and that units are specified
- Creating the correspondence file

Once this set of steps has been performed once, you can perform regular exports of CPT data from gINT projects to GEO5. The steps are described in detail in the subsections that follow.

### *Configuring the Database Tables*

---

The following tables need to be correctly configured for CPT data export:

- **POINT table:** Make sure that the **Depth** and **Elevation** fields have units and **Elevation** is Required.
- **CPT table:** Make sure that the table is a child of POINT, that there is a depth and a resistance value for each sounding, that these have units specified.

#### **POINT Table**

The **Elevation** field is present in all gINT project databases, so it does not need to be added. However, you need to set the **Units** property for the field in **INPUT ► Tables ► Field Properties** or **DATA DESIGN ► Project Database** to one of the following:

- mm: millimeters
- cm: centimeters
- dm: decimeters
- m: meters
- in: inches
- ft: feet

## CPT Table

You need to have a table containing CPT data in your database. It must be a child of POINT, and needs to contain the following numeric fields (not necessarily with the names shown):

Field	Description	Allowable Units
Depth	Depth of the sounding, in distance units.	mm: millimeters cm: centimeters dm: decimeters m: meters in: inches ft: feet
Resistance	Resistance reading from the sounding, in pressure units.	Pa: Pascals kPa: Kilo Pascals MPa: Mega Pascals ksf: Kips per square foot psf: Pounds per square foot ksi: Kips per square inch psi: Pounds per square inch

To specify the units for each of these fields, set the **Units** property in **INPUT ► Tables ► Field Properties** or **DATA DESIGN ► Project Database**.


## Updating your Data Template

You need to export the above project structure changes to your standard data template. To do so, choose **Tools ► Make Data Template** in **INPUT**. Then these changes should be propagated to your projects using one of the techniques described in “Modifying and Using your Standard Data Template” on page 9.

## Creating the Correspondence File

You need a correspondence file to convert CPT (and parent POINT) data to .gi3 format. Once this correspondence file is created, you can use it to convert any project that has been structured as described in the previous section.

We will create the correspondence file from scratch.

1. Go to **DATA DESIGN ► Correspondence Files**.
2. Select **File ► New File**.
3. Click the Browse  button to the right of **Target File**. Specify a **Files of Type** of 'Text File' and select 'geo5 cpt pile design template.csv' from '\gINT\datatmpl\'. Click **Open**.
4. Click the Browse button to the right of **Source File**. Specify a **Files of Type** of 'gINT' and open the 'geo5 cpt export.gpj' project.
5. Select a **Target Table** of 'CPTLIST'.

6. Select 'POINT' in the **Default Source Table** dropdown and the **Table** dropdown in the Data Tool.
7. Enter each of the following values by 1) clicking in the **Source Expression** cell to the right of a corresponding **Target Field**, 2) selecting the source field from the **Field** dropdown in the Data Tool, 3) clicking the **Paste** button above the **Field** dropdown, and 4) pressing the **Tab** key:

Target Field	Source Field
NAME	(see "Conditional Export of POINT Records" below)
ELEVATION	<<POINT.Elevation>>

8. Select 'CPT' in the **Target Table** dropdown.
9. Select the name of your CPT table in the **Default Source Table** dropdown and the **Table** dropdown in the Data Tool.
10. Enter each of the following values (as above):

Target Field	Source Field
NAME	<<CPT.PointID>>
DEPTH	<<CPT.Depth>>
RESISTANCE	(see "Data Conversion and Conditional Export of CPT Records" below)

11. Select **File ► Save As**, and save to 'gint to geo5 cpt pile design.gcx' in \gINT\datatmpl\ (this overwrites the original).

### Conditional Export of POINT Records

You will need to eliminate the export of points that have no CPT soundings. There may be POINT records that have no child records in the CPT table. In gINT this is allowed, but a .gi3 file with childless CPT records will be rejected by GEO5.

Suppression of childless points can be accomplished in the NAME field in the POINT section of the correspondence file using the <<ExportKey>> data item. <<ExportKey>> will suppress the output of a record if a field or calculated expression on the same row of the correspondence file returns a null value. Therefore, we use the <<ExportKey>> data item followed by the following Iif (immediate If) expression:

```
<<IIf(<<Count(<<CPT.Tip Resistance>>)>> > 0,<<POINT.PointID>>)>>
```

This expression counts the number of CPT records with a non-empty **Tip Resistance** field. If the count is greater than zero, there is at least one non-empty CPT record for the current point. The Iif() function will return the PointID of the POINT record; otherwise it will return a null value.

By combining the above Iif() expression with <<ExportKey>>, a null Iif() return value will suppress output of the point's record. Thus we enter the following in the **Source Expression** for the NAME target field in target table CPTLIST:

```
<<ExportKey>><<IIf(<<Count(<<CPT.Tip Resistance>>)>> > 0,<<POINT.PointID>>)>>
```



For more information on the <<ExportKey>> data item, see [Help ► Index ► ExportKey \(data item\)](#).

### Data Conversion and Conditional Export of CPT Records

Some CPT tip resistance units, such as tsf, are not supported in GEO5. In this case you need to convert the value to the appropriate number as well as change the units setting using FieldUnits(). For example, a change from tsf to ksf would require the following expression:

```
<<FieldUnits(ksf)>><<Calc(<<CPT.Tip Resistance>> * 2)>>
```

Also, gINT should be prevented from exporting CPT records with null tip resistance values, as this would cause GEO5 to reject the import file. Hence, you would use <<ExportKey>> with the tip field if it requires no conversion:

```
<<ExportKey>><<CPT.Tip Resistance>>
```


or with FieldUnits() and a conversion expression:

```
<<ExportKey>><<FieldUnits(ksf)>><<Calc(<<CPT.Tip Resistance>> * 2)>>
```

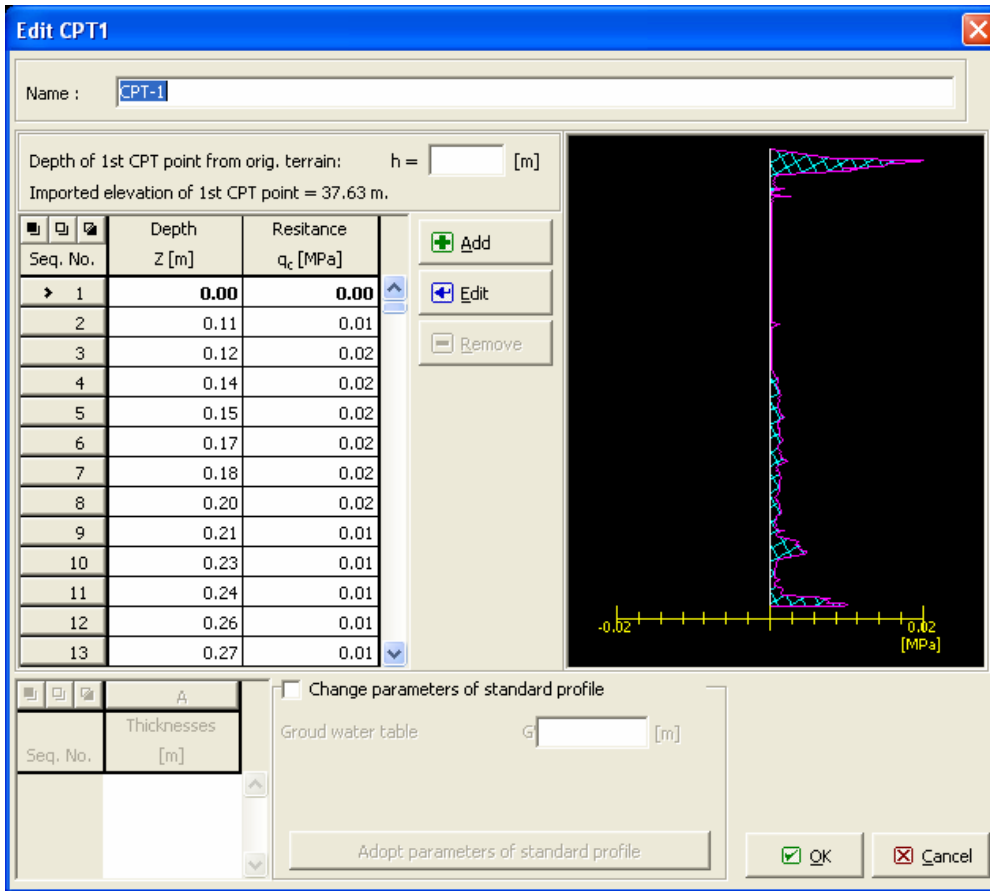
### Exporting the gi3 File

---

Using the previously created correspondence file you can generate a .gi3 file for export to GEO5 CPT Pile Design. Do the following:

1. Go to **INPUT**. Ensure that the project you want to export is open.
2. Select **File ► GEO5 Export ► Export GEO5 CPT Data for Pile Design**.
3. Click the Browse  button to the right of the **GEO5 File** property. In the file browser dialog, select an output folder, enter a filename for the .gi3 file, and click **Save**.
4. Click the Browse button to the right of the **Correspondence File** property and specify the .gcx file you previously created. Click **Open**.
5. If you only want to export data for some of the points in the project, click the Browse button to the right of **Select Points**, choose the desired points, and click **OK**. Otherwise, leave the **Select Points** property blank, and all points are exported.
6. Click **OK**. A status log window appears.
7. Verify that the export was successful according to the log then click **OK**.
8. Open the GEO5 Piles CPT module.
9. Click the **Experiments** tab in the vertical tab bar at right.
10. Click the **Import** button at bottom right.
11. In the **Import CPT** dialog box select 'Format gINT' in the **Type of File** dropdown.
12. Click the **Add** button. Select the .gi3 file you just exported and click **Open**.
13. Click **Import**. Your imported points are listed in the table at the bottom of the **GEO5 - Piles CPT** window.

14. To view the imported CPT soundings for one of the CPT points, double-click on the point's row in the table. A dialog box for viewing and editing the soundings data appears.



## Terrain Data

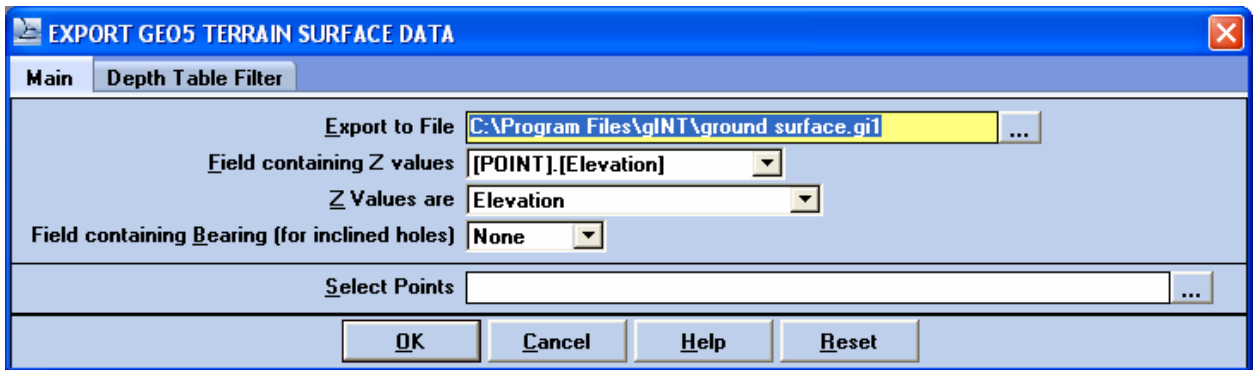
The Terrain module in GEO5 can use imported gINT data that models surfaces. Typically the kinds of surfaces you will export from gINT are the ground surface and the depths of particular lithology layers. Each surface must be exported to a separate .gi1 file. Note that unlike the other gINT-to-GEO5 exports, export of surface/terrain data does not use a correspondence file.

We will show a simple export process for two surfaces then briefly discuss more complex surface export scenarios.

### Exporting Ground and Top of Bedrock Surfaces

We will show the export of two surfaces, ground surface and top of bedrock. Both use standard features in the interface, and require no customization.


1. In INPUT, open the 'geo5 terrain export.gpj' project.
2. Select File ► GEO5 Export ► Export GEO5 Terrain Surface Data. You see the EXPORT GEO5 TERRAIN SURFACE DATA dialog box:



3. Enter the following values in the Main tab:

Field Name	Value	Comments
Export to File	ground surface.gi1	Click the Browse button and specify a the file name and location, then click Save.
Field containing Z values	[POINT].[Elevation]	
Z Values are	Elevation	

The program assumes that the X and Y values are the native North and East coordinates in the project database. The Field Containing Bearing field is only applicable if you have inclined holes. However, inclination of the hole has no effect on the Z values on a ground surface.

4. If you want to export only specific boreholes, click the Browse  button on the Select Points field to select the boreholes you want to export. Otherwise, leave the field blank to export all points.

5. Click the **Depth Table Filter** tab. Specify 'None' for the **Filter Field**.
6. Click **OK**. A status log tells you how many records were exported. Click **OK** to dismiss the status log.
7. To see the structure of the data being exported:
  - a. Open **ground surface.gi1** in Excel
  - b. Highlight the first column
  - c. Select **Data ► Text to Columns**
  - d. Select **Delimited**, then check the **Comma** delimiter checkbox, then click **Finish**. A sample appears below:

	A	B	C	D	E	F	G	H	I	J	K
1	**HEADER										
2	VERSION CHARSET										
3	1	0									
4											
5	**POINTS										
6	ID	X	Y	Z							
7		ft	ft	ft							
8	B- 1	562.7	1434.5	40							
9	B- 2	660.6	1452.9	35							
10	B- 3	769.7	1437.8	30							
11	B- 4	875.5	1454.6	25							
12	B- 5	956	1454.6	20							
13	B- 6	1019.8	1473.1	15							
14	B- 7	1120.5	1463	10							
15	B- 8	1219.6	1474.7	15							
16	B- 9	1431	1469.7	20							
17	B- 10	1583.8	1476.4	25							
18	B- 11	1860.7	1444.5	30							
19	B- 12	556.6	1254.8	35							
20	B- 13	679.1	1233	30							
21	B- 14	568.3	1065	30							
22	B- 15	526.3	878.7	25							
23	B- 16	536.4	777.6	20							

8. Notice that the first column in the '\*\*POINTS' section holds PointID values, and the three columns that follow (X, Y and Z) hold East, North and Elevation values.
9. Close Excel, and do not save the changes.

We will export another gi1 file, this time for top of bedrock values.

1. Select **File ► GEO5 Export ► Export GEO5 Terrain Surface Data**.

2. Select the following values in the **Main** tab of the EXPORT GEO5 TERRAIN SURFACE DATA dialog box:

Field Name	Value
Export to File	Bedrock Surface.csv
Field containing Z values	[LITHOLOGY].[Depth]
Z Values are	Depth, convert to elevation

Notice that we are exporting LITHOLOGY records, as opposed to POINT records (exported in the previous export operation). We will need to filter the data to obtain records for bedrock lithology layers only.

3. Click the **Depth Table Filter** tab. The Filter Field value must be in the same table as the Z values. Enter the following values:

Field Name	Value
Filter Field	[LITHOLOGY].[Graphic]
Filter Operator	=
Filter Comparison	bedrock
Which Depth	First

The criterion expressed here is "the **Graphic** field value in the LITHOLOGY table is equal to 'bedrock'." By setting **Which Depth** as 'First', the top depth of the bedrock layer is selected rather than the bottom depth.

4. Click **OK** to generate the export file then click **OK** to dismiss the status log.

## ***Importing the Surface Files into GEO5***

---

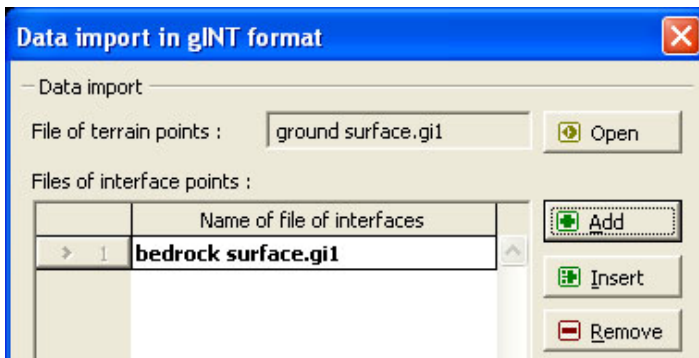
In the GEO5 Terrain module, one surface must be specified as the 'Terrain' (ground surface), and additional surfaces can then be specified. Do the following:

1. Open the GEO5 Terrain module.
2. Select the **Basic Data** tab in the vertical tab bar at right.

3. Select **File ► Import ► Format GI1 (gINT interface points)**. The **Data Import in gINT Format** dialog box appears.

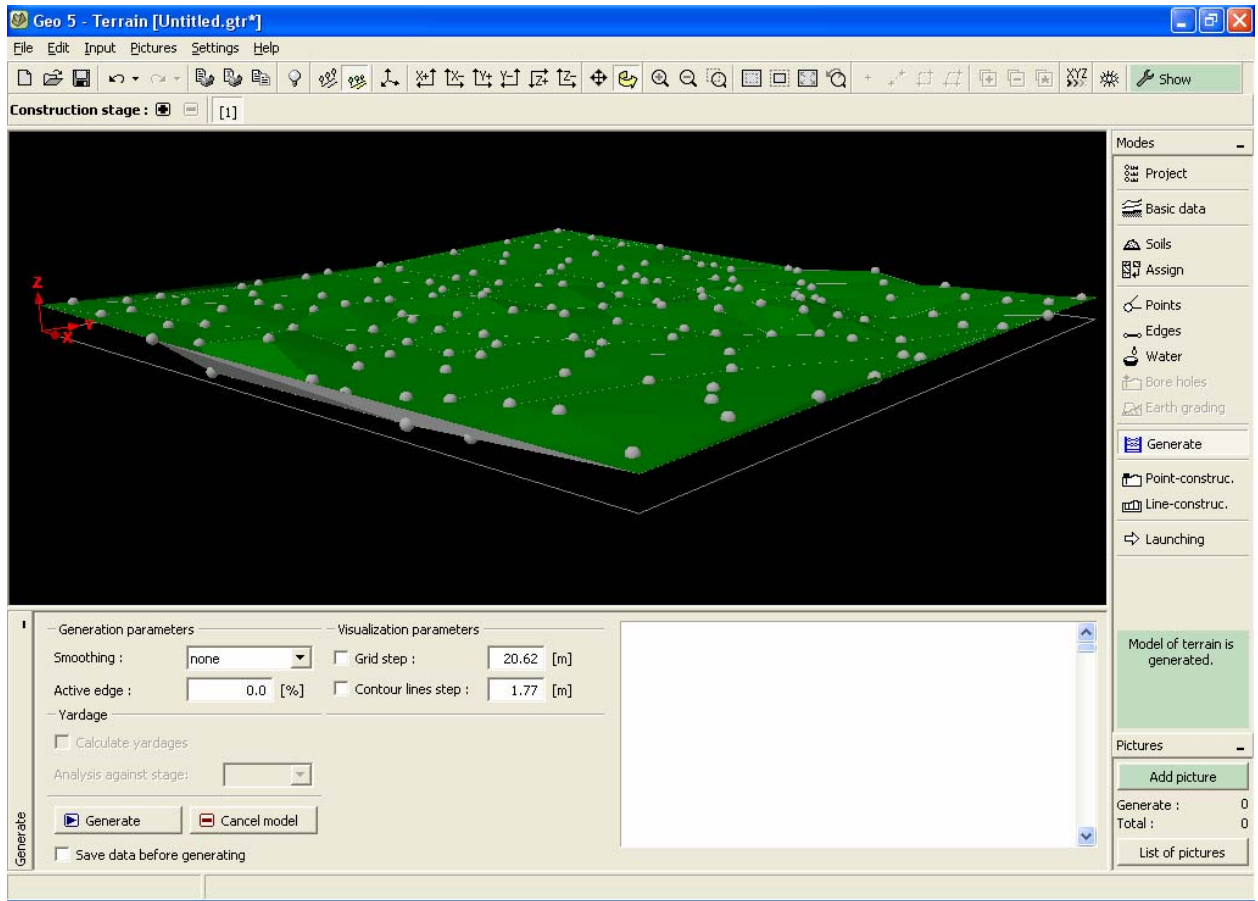


4. Click the **Open** button. This is to open the data file for the ground (terrain) surface.
5. Select 'ground surface.gi1' and click **Open**. This sets the **File of Terrain Points** setting to 'ground surface.gi1'.
6. Click the **Add** button. Select the 'bedrock surface.gi1' file and click **Open**. This adds the data from this file to the list of subsurface layers.



7. Click **OK**. The points are added to the GEO5 display.

- Click the **Generate** tab in the right-hand tab bar, then the **Generate** button at lower left. The two surfaces are plotted.



## More Complex Surface Export Scenarios

### Using the Standard Export Dialog Box

The online help topic, [Help ► Index ► Exporting to a Contouring Program \(how-to guide\)](#), describes a number of ways to use the fields in the EXPORT GEO5 TERRAIN SURFACE DATA dialog box. This help topic is actually written for the [File ► Import/Export ► Export Contouring Data](#) option, but the fields have the same names and functionality. The following surface export scenarios (using the export dialog box) are described in the help topic:

- Surface Elevation
- Water Depth
- Water Elevation
- Strata Top Elevations
- Strata Bottom Elevations
- Top Surface of Chemical Concentration Above a Particular Value
- Bottom Surface of Chemical Concentration Above a Particular Value

### Using a Text Table Report Form


For completely customized surface output to a .gi1 file, you can design a Text Table report form and use it to generate the data file directly in OUTPUT. This approach does not use the File ► GEO5 Export options at all.

To see an example of how a custom .gi1 file can be exported using text table report output, do the following:

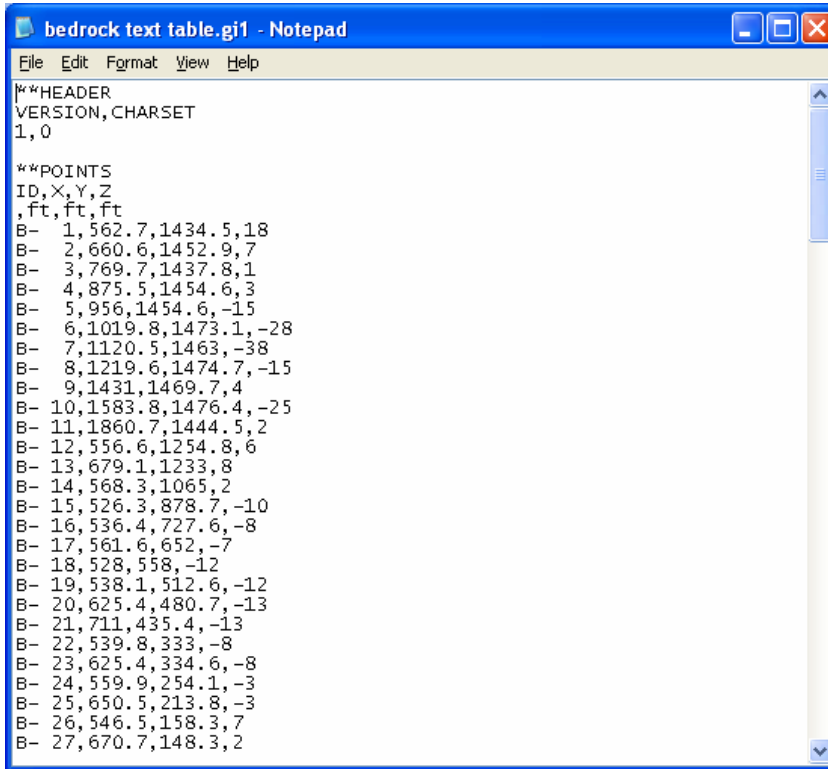
1. Ensure that the 'geo5 terrain export.gpj' project and 'geo5 export.glb' library are active.
2. Go to OUTPUT ► Text Tables.
3. Select the 'CONTOUR STRATA TOP GEO5 TERRAIN' report in the object selector.
4. Preview the report. In the Report Variables dialog box, enter 'bedrock' for Stratum Name then click OK. The text table preview appears:

```

STRATA TOP ELEVATIONS
ID          X          Y          Z
          ft          ft          ft
=====
B-  1      562.7      1434.5      18
B-  2      660.6      1452.9       7
B-  3      769.7      1437.8       1
B-  4      875.5      1454.6       3
B-  5       956       1454.6     -15
B-  6     1019.8     1473.1     -28
B-  7     1120.5     1463       -38
B-  8     1219.6     1474.7     -15
B-  9     1431       1469.7       4
B- 10     1583.8     1476.4     -25
B- 11     1860.7     1444.5       2
B- 12     556.6     1254.8       6
B- 13     679.1     1233         8
B- 14     568.3     1065         2
B- 15     526.3     878.7      -10
B- 16     536.4     727.6       -8
B- 17     561.6     652         -7
B- 18     528       558        -12
B- 19     538.1     512.6      -12
B- 20     625.4     480.7      -13
B- 21     711       435.4      -13
B- 22     539.8     333         -8
B- 23     625.4     334.6       -8
B- 24     559.9     254.1       -3
B- 25     650.5     213.8       -3
    
```

5. Close the preview. Click the Browse  button to the right of Export to File. Select a Save as Type of 'GEO5 Terrain Surface (\*.gi1)' and enter a file name of 'bedrock text table'. Click Save.
6. Click the Export button in the OUTPUT tab. As before, enter 'bedrock' in the Stratum Name report variable, and click OK to close the report variables dialog box.

- Open the 'bedrock text table.gi1' file with a text editor.



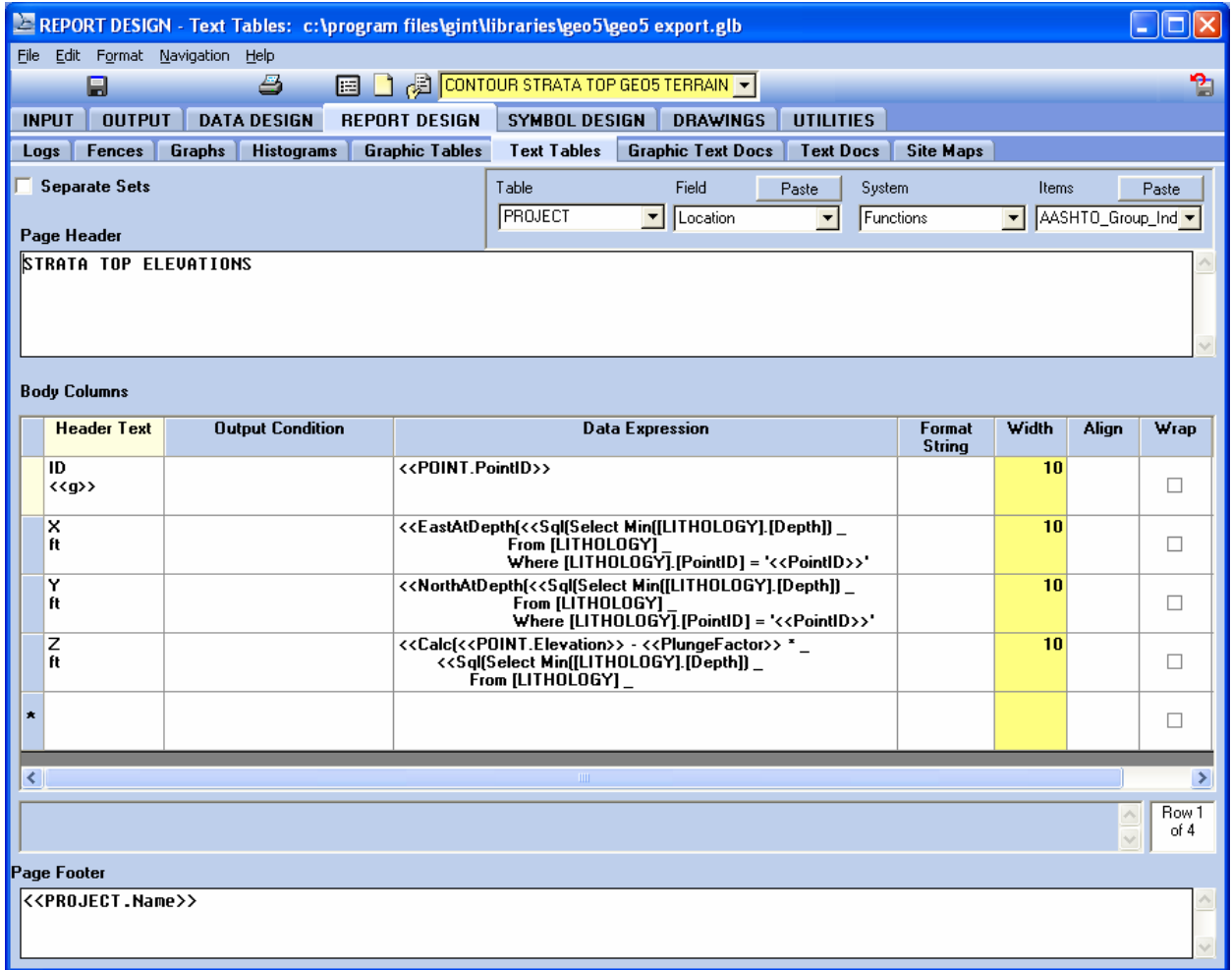
```
bedrock text table.gi1 - Notepad
File Edit Format View Help
**HEADER
VERSION, CHARSET
1, 0

**POINTS
ID, X, Y, Z
, ft, ft, ft
B- 1, 562.7, 1434.5, 18
B- 2, 660.6, 1452.9, 7
B- 3, 769.7, 1437.8, 1
B- 4, 875.5, 1454.6, 3
B- 5, 956.1, 1454.6, -15
B- 6, 1019.8, 1473.1, -28
B- 7, 1120.5, 1463, -38
B- 8, 1219.6, 1474.7, -15
B- 9, 1431, 1469.7, 4
B- 10, 1583.8, 1476.4, -25
B- 11, 1860.7, 1444.5, 2
B- 12, 556.6, 1254.8, 6
B- 13, 679.1, 1233, 8
B- 14, 568.3, 1065, 2
B- 15, 526.3, 878.7, -10
B- 16, 536.4, 727.6, -8
B- 17, 561.6, 652, -7
B- 18, 528, 558, -12
B- 19, 538.1, 512.6, -12
B- 20, 625.4, 480.7, -13
B- 21, 711, 435.4, -13
B- 22, 539.8, 333, -8
B- 23, 625.4, 334.6, -8
B- 24, 559.9, 254.1, -3
B- 25, 650.5, 213.8, -3
B- 26, 546.5, 158.3, 7
B- 27, 670.7, 148.3, 2
```

Notice that this is a .gi1 file in correct format.

- Close the text editor.

- Go to REPORT DESIGN ► Text Tables. The report form we just used for the export appears as shown:




- Notice that the report layout is in three sections: Page Header, Body Columns, and Page Footer. The Page Header and Page Footer sections only apply when you preview or print. They are ignored when you export.

In the Body Columns section you are defining output, as a table of comma-separated text values, of the points in the project. The desired output will look like this:

```
ID,X,Y,Z
,ft,ft,ft
B- 1,562.7,1434.5,18
B- 2,660.6,1452.9,7
B- 3,769.7,1437.8,1
B- 4,875.5,1454.6,3
(etc.)
```

- The “header” of the “table” consists of two rows, one containing the field names required by GEO5 (ID,X,Y,Z), the other containing the units (null,ft,ft,ft in this case).
- The “body” of the “table” consists of rows of data, each with the values for each of the four fields for a given point.

 **Note:** The '\*\*HEADER' section and '\*\*POINTS' title are added automatically when you choose .gi1 as an export format, and so are not included in the report design.

To accomplish this you create four rows in the **Body Columns** section of the report layout, one for each of the four fields.

- o In the **Header Text** column, you enter the two lines of text that is to appear in the two "table header" rows for the field.
  - For the **ID** field, this is 'ID', followed by **Enter**, followed by '<<g>>'. The '<<g>>' character is a non-breaking space, and creates the null output we want on the units line.
  - For the **X, Y and Z** fields this is the field name, followed by **Enter**, followed by the units.
- o In the **Data Expression** column, you enter a SQL expression that calculates the value of the given output field for each data point to be exported.

11. To see the full contents of a **Data Expression** SQL statement, double-click the one in the second row, for **X**. This is the SQL statement:

```
<<EastAtDepth(<<Sql(Select Min([LITHOLOGY].[Depth]) _
                From [LITHOLOGY] _
                Where [LITHOLOGY].[PointID] = '<<PointID>>' And _
                [LITHOLOGY].[Graphic] = '<<Report Var.Stratum_Name>>'_
                )>>,_
                <<POINT.Bearing>>)_
>>>
```

This expression uses the EastAtDepth() function to generate the east coordinate from the **Depth** and **Bearing** fields. Refer to **Help ► Index ► EastAtDepth (function)** for information on this function. It also uses the Sql() function to extract the minimum depth of a specified lithology layer in a specified point (refer to **Help ► Index ► Sql (function)**). The '<<Report Var.Stratum\_Name>>' expression gets the value you enter for **Stratum Name** in the **Report Variables** dialog box.

12. Press **Esc** to exit the expression entry box.



For information on how to configure data expressions for several surface export scenarios, refer to **Help ► Index ► Exporting to a Contouring Program (how-to guide)**.