

# User Guide

# SITE

## Site Data Management

Version 8.09



Site – Site Data Management – Version 8.09  
User Guide

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Published by: SOBEK TECHNOLOGIES INC.  
4205 Northcliffe  
Montreal (Quebec)  
H4A 3L2  
Tel: (514) 285-4873  
Email: [genevieve@sobek-technologies.com](mailto:genevieve@sobek-technologies.com)

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# SITE - SITE DATA MANAGEMENT

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## 1. INTRODUCTION

The **Site** module is used for the interactive treatment of geographical information relative to sites. It allows the user to display borings and their geotechnical properties in a spatial system in 2D and 3D in addition to a cartographic map.

Site uses a Graphical User Interface (i.e. with windowing) that is compatible with Microsoft Windows 7, 8 and 10.

Site uses the Geo, X3D and SM2 libraries created by Sobek Technologies Inc. for data editing, the definition of the presentation style, and viewing and editing graphic results. Please refer to the Frm, X3D and SM2 guides for all details.

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## 2. LAUNCHING THE SITE MODULE



To open **Site**, double-click on the icon shown here.

The connection to the database can be done directly when calling Site by entering the following string as target. The string will be:

***C:\Geotec80\Bin\Site.exe username/password@odbc:connection\_alias***

See paragraph 2 of chapter 2 of the X3D guide for all the details about the connection to a database. Once the connection to a database is done, the user can execute a data query to produce a plan or 3D view.

When **Site** is first launched, the following files are loaded from **C:\Geotec80\Style**:

- the markers file **geotec8.mrk**;
- the patterns file **geotec8.ptn**;
- the style file **site\_landscape.sty** which is a classic presentation model showing a plan view.

The user can begin working with this initial presentation, or open another style file included with the software. He can modify the style file and save it in a new presentation. In subsequent loadings, Site opens the style, markers and patterns files that were in use when Site was closed.

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## 3. FILE, EDIT AND INSERT MENUS

None of the options of the **File**, **Edit** and **Insert** menus is specific to Site. The detailed description of each option of these menus is done in chapters 2, 3 and 4 of the X3D library guide.

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## 4. VIEW MENU

The **2D View** and **3D View** options of the **View** menu and this button  are used to change the view of the PLAN\_VIEW graph.

In the axes editing window, it is possible to change from 2D to 3D view and vice-versa for PLAN\_VIEW. For the sub-graphs, the box cannot be checked.

The **OpenGL mode** can be used with Site. OpenGL is used to view solids and surfaces with hidden lines and faces and shadows in 3D. See paragraph 5.1.4 for more details. The **XVT mode** is the standard display mode.

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## 5. TOOLS MENU

The options of the **Tools** menu are used to define the utilisation parameters of Site and to edit the graphic components produced by Site: the characteristics of the graphic page, the graph, sub-graphs and their curves, the legends, the axes, the markers and patterns used. All these options are described in details in chapter 6 of the X3D library guide.

**Options** is specific to Site. It is presented in paragraph 5.3. The definitions of the graphs and curves are presented succinctly in the following paragraphs.



The **SM2 Mode** option is also specific to Site. It opens the SM2 library for the site mapping and modeling. This button is equivalent. See the SM2 guide for all the details.

### 5.1. Definition of the graphs



The list of graphs is established and updated in the graph editing window opened by selecting the **Graphs...** option of the **Tools** menu or by clicking the button shown on the left. More details about the graph editing are available in paragraph 4 of chapter 6 of the X3D guide. Figure 1 shows the graph editing window in Site.

The table in this window contains all the graphs defined in the style file used. Each graph is identified by a unique number in the **#** column. The first graph is always **Page** with **# 0**. This graph represents the graphic page and cannot be deleted.

Among the graphs, there is the **primary graph PLAN\_VIEW** whose **#P cell is 0** and the **sub-graphs** whose **#P cell is a negative value**.

#### 5.1.1. The primary graph

The primary graph is the **PLAN\_VIEW** graph (#1). This graph cannot be deleted. This graph can also be set in 3D. A topographic background can be displayed in the plan view (in 2D and 3D).

The plan view shows the location of the borings with markers. Specific information from the BORING table can also be displayed under each boring point displayed. In addition, the axes can be displayed, markers showing their turning points and their ends. Paragraph 11.1 presents this graph.

When the graph is in 3D, the tridimensional view shows as columns the borings and their properties defined as sub-graphs. Paragraph 11.2 presents this graph.

For the primary graph, the **Left, Width, Right, Bottom, Height** and **Top** fields define its position and dimensions; the user can modify these values.

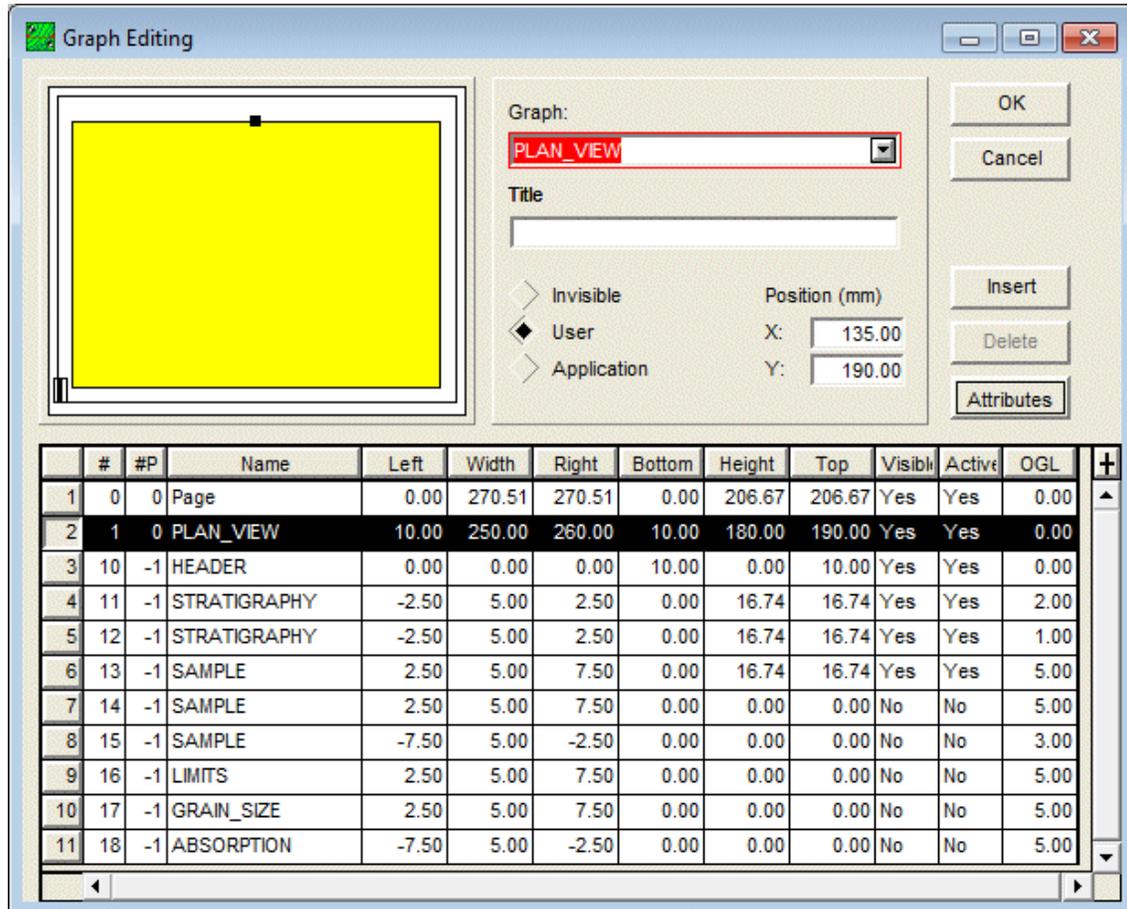


Figure 1 - Graph editing window

### 5.1.2. The sub-graphs

Among the sub-graphs (negative value in their **#P** cell), **HEADER** is different from the other sub-graphs; it defines the boxes that include the identifiers of the borings in the tridimensional view.

The other sub-graphs define the presence and the size of the property columns of the borings represented in the 3D view. The content of these graphs is defined in the legend and curves editing window. See paragraph 5.2 for details.

For the **HEADER** sub-graph, the **Left, Width, Right, Bottom, Height** and **Top** fields reflect the position and size of the eventual identification boxes of the borings in the 3D view. See paragraph 12.4 for the details.

For the other sub-graphs, the **Left**, **Width** and **Right** fields define the layout of the property columns with respect to the axis of the boring and the width of these columns. The **Bottom**, **Height** and **Top** fields are not used.

### 5.1.3. Addition and substitution of graphs

The user can add a graph or replace a graph with another. **Site** automatically manages the numbering of the graphs. The user selects the graph name in the scrolling list displayed by clicking on the button to the right of the **Name** cell.

The scrolling list of graphs presented in figure 2 shows the **PLAN\_VIEW** and **HEADER** graphs, which are presented at paragraphs 11.1 and 12.4 respectively. These graphs are followed by the list of tables and views in the database that contain a depth field and / or a sample number.

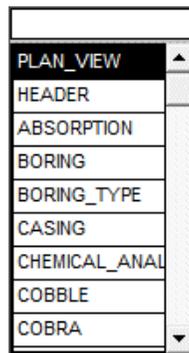


Figure 2 - Scrolling list of graphs

After selecting in the scrolling list a table or view name, the user will be able to create a sub-graph. Paragraph 12.1 presents this creation in details. Some sub-graphs have a predefined display in **Site**. Details are presented in paragraph 12.

After creating a new graph or replacing a graph with another, the user must execute a new query for the data associated to the new graph to be read in the database and the graph filled with information.

The user can also define a graph whose name is not in the scrolling list to add objects in the space occupied by this graph. These objects are usually general information such as the site number, the company logo, etc. Chapter 4 of the X3D library guide describes object editing.

### 5.1.4. OpenGL

The last column (OGL) of the graph editing window is used only for the OpenGL mode in 3D. The user enters the value of the radius corresponding to the maximum scale for the numerical values. For example, if an OGL of 5 is entered for the SAMPLE graph displaying the RQD of the samples, an RQD of 100% will be 5m in OpenGL, of 20% will be 1m, etc.

In OpenGL mode, the user can then save his data file in an .iges format to export in CATIA.

## 5.2. Definition of the curves



The list of curves of a graph is established and updated in the legend and curves editing window opened by selecting the **Legend** option of the **Tools** menu or by clicking on the button

shown here. More details about the legend and curves editing are available in paragraph 5 of chapter 6 of the X3D guide. Figure 3 shows the curves editing window for a STRATIGRAPHY sub-graph. Paragraph 12.1 explains the creation of sub-graphs and the definition of their curves.

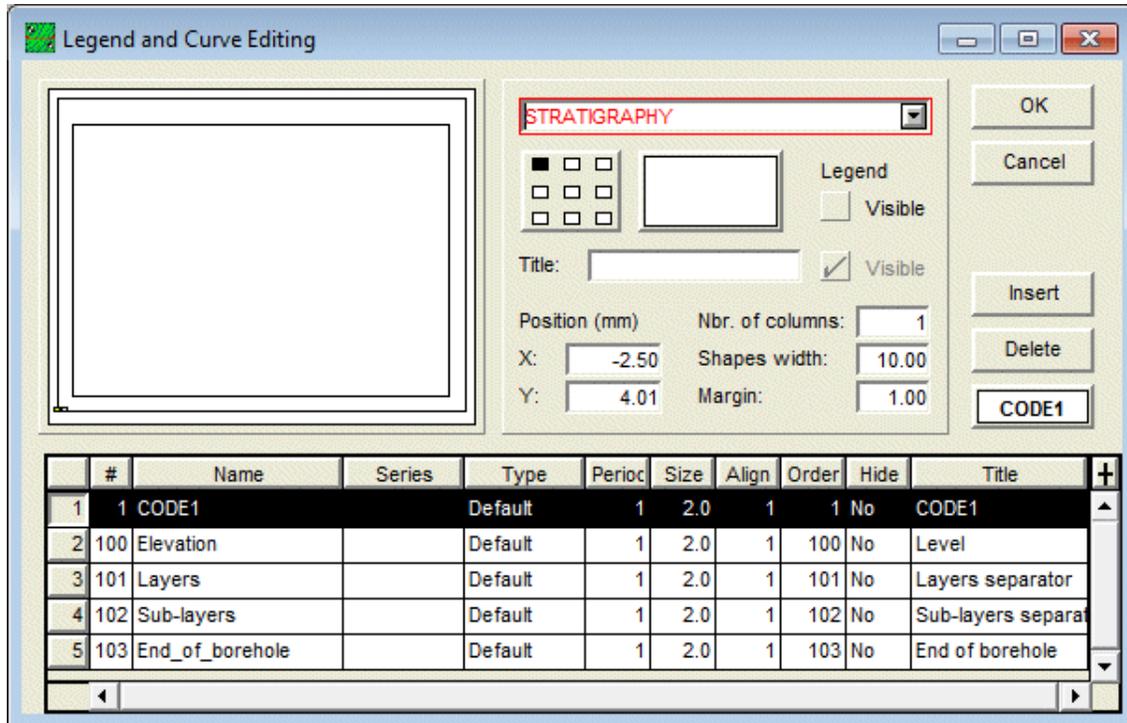


Figure 3 - Curves editing window

The **PLAN\_VIEW** primary graph has predefined curves. They are described in paragraphs 11.1 and 11.2. The other curves are defined by the user and are used to display information from various fields of the BORING table under each boring point.

If the selected graph has predefined curves, they will be displayed in the table at the bottom of the window with a number greater or equal to **100**. If the user deletes the predefined curves, they will be regenerated when he opens the window again.

Except for the **PIEZOMETER** sub-graph which only contains predefined curves (see paragraph 12.7), the user can define one or several curves per sub-graph. For this, the user inserts a curve whose number is automatically generated and chooses the name of the curve from the scrolling list associated to the **Name** field. The scrolling list is the list of the fields from the table to which the sub-graph is associated.

If the user replaced a sub-graph with another one, the curves are not automatically modified. The user will delete the curves from the previous sub-graph or choose the new curves from the scrolling list of the **Name** column.

## 5.3. Options



The **Options** item of the **Tools** menu or the button shown here opens the window of options for data display, shown in figure 4, where the user can define the display parameters of the borings, axes, limits, etc. in the plan view (and 3D view).

### 5.3.1. Maps and domains display

- Upon navigating, the user can choose to display only the **current site** or **all the sites** at once. When all the sites of a query are displayed, they are shown according to the option selected for the **calculated domain** (see below). By navigating among the records, the current site is shown in red.
- The user can **display** the **site map** and/or the **region map** in the plan view or 3D view by checking the corresponding box. The site map is entered in the **FILE\_NAME** field of the **SITE** table, must be located in the directory of the input files and of a **.sit extension**. The region map is entered in the **FILE\_NAME** field of the **REGION** table, for the region associated to the site and must also be in the directory of the input files or have its complete path and be of **.sit extension**.
- A scrolling list is used to choose the **basis of the calculated domain**:
  - **The SITE table** - based on the EASTING, NORTHING, WIDTH, HEIGHT and ANGLE fields of the SITE table.
  - **The site map** - based on the site map in a .sit file (the **site map** must be displayed).
  - **The REGION table** - based on the EASTING\_MIN, EASTING\_MAX, NORTHING\_MIN and NORTHING\_MAX of the REGION table for the region associated to the site.
  - **The region map** - based on the region map in a .sit file for the region associated to the site (the **region map** must be displayed).
  - **Borings location** - the area including all the borings retrieved. This mode is particularly useful for the early detection of errors in the coordinates.
  - **Axes location** - the area including all the turning points of the axes and the associated profiles retrieved (for the 3D view).
  - **Axes and borings location** - the area including all the borings and axes retrieved.
  - **Limit defined domain** - the area including the polygonal limit retrieved, the one whose name is the same as the site retrieved, or the one that has the site retrieved as reference.
  - **All available data** - the area including all borings, axes and domains associated to the sites and regions and to their respective topographic maps.
- Check the box **Display domains** to display the outlines of the domains specified below.
- Check the box **Detect domains** to display information about the domains in a tooltip when the user moves the mouse on a domain outline. The domains must be displayed for this option to be available.
- With the option **Display file with extension**, the user can display an additional topographic file, on top of the site map (.sit). The file displayed will be the one whose name is indicated

in the FILE\_NAME field of the SITE table, located in the input files directory, and with the extension selected in the scrolling list.

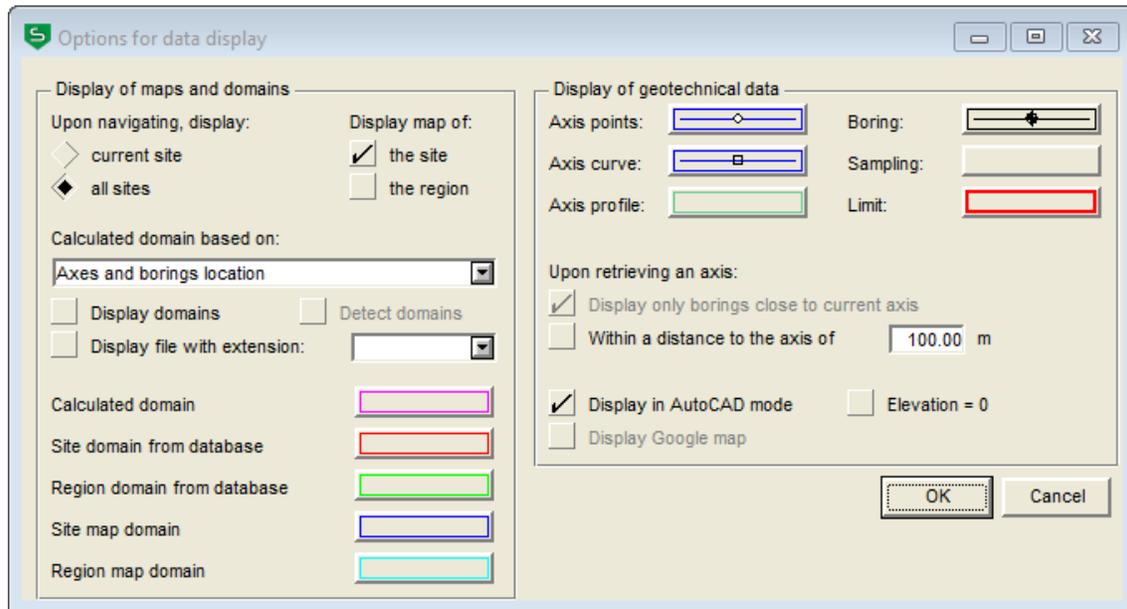


Figure 4 - Data display options

- The next five buttons open the drawing attributes configuration window, and correspond to the curves numbered #130 to #134 in the legend and curves editing window for the PLAN\_VIEW graph (see figure 11). It is possible to define the attributes from both locations. See paragraph 11.1 for all the details.
  - The button next to the label **Calculated domain** corresponds to the **dom\_calculated** curve (#134), which delimits the resulting domain, calculated according to the option selected in the drop-down list.
  - The buttons next to the labels **Site domain from database** and **Region domain from database** correspond to the **dom\_site\_db** (#130) and **dom\_region\_db** (#131) curves, which delimit the domain of the site and of the region, as defined in the database.
  - The buttons next to the labels **Site map domain** and **Region map domain** correspond to the **dom\_site\_map** (#132) and **dom\_region\_map** (#133) curves, which delimit the site map and region map in the .sit files.

### 5.3.2. Geotechnical data display

- The buttons in this section open the drawing attributes configuration window, and correspond to the curves numbered 100 to 102, 110 and 120 in the legend and curves editing window for the PLAN\_VIEW graph (see figure 11). It is possible to define the attributes from both locations. See paragraph 11.1 for all the details.
  - The **Axis points** button corresponds to the **Axis\_Points** curve (#100) and is used to define the line passing through the turning points of the axes and the markers at these points.
  - The **Axis curve** button corresponds to the **Axis\_Curve** curve (#101) and is used to define the curvature of the axes, their identification and their symbol for their end points.

- The **Axis profile** button corresponds to the **Axis\_Profile** curve (#102) and is used to define the position of the geophones and the profiles obtained.
- The **Boring** button corresponds to the **Boring** curve (#110) and is used to define the identification of the borings in the plan view, their symbol and their projection.
- The **Sampling** button is not used.
- The **Limit** button corresponds to the **Limit** curve (#120) and is used to define the rectangular or polygonal limits.

If the retrieval is done via the Axis entry form (similarly to the usage in Pro):

- Check the box “**Display only borings close to current axis**” to retrieve a rectangular limit around the axis, of a distance specified in the following **field (m)**. If the option ‘display all sites’ is selected, Site retrieves only the borings around the current axis, otherwise a very large number of data could be returned. In this case, the box cannot be unchecked.
- Check the box “**Within a distance to the axis of**” to display only the borings located at a distance to the axis smaller or equal to the **distance (m)** indicated in the related field.
- Check the box **Display in AutoCAD mode** to set the texts in geographic coordinates instead of millimeters, for a better compatibility of the .dxf files produced for AutoCAD. This box is not active if the Google map is displayed.
- The **Elevation = 0** checkbox is used solely for AutoCAD mode. The distances are then calculated horizontally instead of in 3 dimensions, using elevations of 0.
- Check the box **Display Google map** to display the Google map in background. This box is not active if the AutoCAD mode is used.

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## 6. DATA MENU

The options of the **Data** menu are detailed in chapter 7 of the X3D guide. The options are mainly used to retrieve data in the tables of the **Geotec** database. In Site, the default retrieval (**simple query**) is done on the **Site** table or the **Axis** table.

In Site, the data entry options available in the **Data** menu (**Entry** option) and with the buttons of the application toolbar () are those of **Site**, **Axis**, **Boring**, **Stratigraphy** and **Sample**. The user first inserts the sites, followed by the axes and borings related to the sites, then the stratigraphy of the borings, and finally the samples from the borings. Some fields are mandatory and are identified by different background and text colors, defined in the preferences editing window (see paragraph 7 of chapter 6 of the X3D guide).



The **Color Selection** option is used for the cartographic maps in OpenGL mode. It is detailed in the SM2 guide.

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## 7. WINDOW AND HELP MENUS

None of the options of the **Window** and **Help** menus is specific to Site. A detailed description of each option of these menus is done in chapter 8 of the X3D guide.

## 8. INTERACTIVE EDITING



The **Site** module allows the interactive editing of geotechnical entities, provided that the option **Detect geotechnical entities** in the **Preferences editing** window is checked (see paragraph 7.1.4 of the X3D guide). The interactive menu differs depending on the 2D or 3D mode and on where the cursor is located.

With any interactive menu, it is possible to **launch the modules** of Geotec to show the types of data that can be displayed for the current boring or axis with the Site, Pro, Log and Lab modules.

### 8.1. Interactive editing in 3D view

In the **3D view**, if the user right clicks, the contextual menu shown in figure 5 is displayed. The first and third items are active only when the mouse is over a property column.

The first item is used to **create** a new record in the table whose data are displayed in the column. The depth clicked will be displayed by default for the new record. For a sample, it will be its top depth. For a stratum, it will be its bottom depth, unless the user clicks in a stratum that is already defined, in which case it will be the depth of a text type record. For the other tables, it will be the top depth or average depth of the record.

When the cursor is on a record of a property column, the **Information** option of the interactive menu opens the appropriate entry form on the data of the current record where the user clicked. Double-clicking on data has the same role.

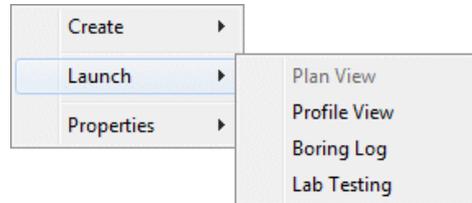


Figure 5 - Interactive menu in 3D view

### 8.2. Interactive editing in 2D view

In the **2D view**, if the user right clicks anywhere other than over a boring or an axis, the contextual menu shown in figure 6 is displayed.

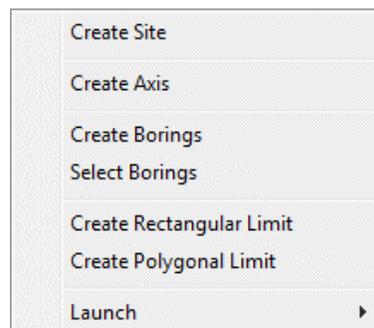


Figure 6 - Interactive menu in 2D view

When the **Properties** option of the interactive menu is available, it opens the appropriate entry form on the axis, boring or limit clicked. Double-clicking on the data has the same role.

### 8.2.1. Creating a site

By selecting **Create Site**, the cursor takes this format: . If the user wants to cancel right away, right click and select **Cancel**. To create the site, left click at one corner of the new site, hold down and move the cursor to the diagonally opposite corner; a dotted line shows the area created. When the button of the mouse is released, the site entry form is displayed; the X and Y coordinates of the bottom left corner as well as the width and height of the area are automatically entered.

The user must then enter the site number and any other information in the entry form, and save the new site by pressing **[F10]** or the  button in the entry form. To cancel, simply close the entry form without saving the record.

### 8.2.2. Creating and modifying an axis

By selecting **Create Axis**, the cursor takes this format: . Left click at each point of the axis. A dotted line shows the movement of the cursor. When the last point of the axis is defined, right click to display the pop-up menu and select **Cancel** to erase the axis being created, or **Terminate** to edit and save the new axis in the axis entry form that is then displayed and showing the coordinates of each point clicked.

The user can then enter the axis number and any relevant information in the entry form, before saving by pressing **[F10]** or the  button in the entry form. To cancel the axis creation, close the entry form without saving the record.

Any **planned** axis (state of axis: P) can be modified with the mouse. When the cursor is on an axis, it takes this format: . By right clicking, the menu shown in figure 7 is displayed.

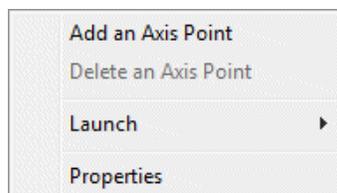


Figure 7 - Interactive editing of an axis

When **adding an axis point**, the cursor becomes . The point will be added between the two closest points to the cursor. A message is displayed, showing the exact coordinates of the point. To stop the addition of points, right click and select **Terminate**.

When the cursor is over an axis point and there are more than two points in the axis, the option **Delete an Axis Point** is active. A message is displayed to confirm the deletion of the point.

When the cursor is on an axis point, it takes this format: . By clicking on the point, it takes the format . Move the point to the desired position, and release the button of the mouse; a message is displayed to confirm the move.

### 8.2.3. Creating and modifying borings

By selecting **Create Borings**, the cursor takes this format:  $\oplus$ . Left click at the location of the first boring. A dotted line shows the movement of the cursor. Left click as many times as desired to add borings. When the last boring is defined, right click to display the pop-up menu and select **Cancel** to erase all borings being created, or **Terminate** to edit and save the new borings. The window shown in figure 8 is then displayed.

The boring editing window shows:

- The **region number**, associated to the site selected.
- The **site number**. The user can select another from the list of all sites currently displayed.
- The **boring type**. The user can select another from the list of types of borings that have a defined maximum depth.
- The **year** of the projected borings, as “yy”. This is added to the boring numbers.
- The number of borings clicked.
- The number for the **beginning of the sequence**. By default, the number is one greater than the largest boring number found in the site selected.
- The **first boring number**. The number is a concatenation of the type - sequence - year.
- The **maximum depth** of all planned borings.
- The **axis number** to which the borings are attached.

When the user clicks OK, the borings are added in the plan view using the marker for the corresponding type of planned borings, and their coordinates are also entered in their record.

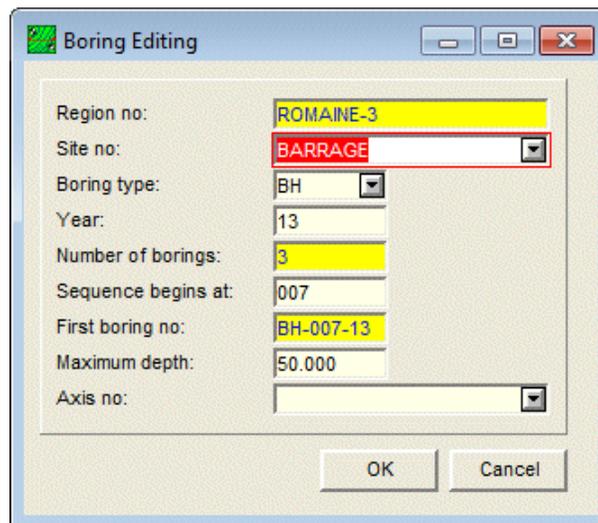


Figure 8 - Edition of new borings

When the cursor is over a planned boring (state of boring: P), it takes this format:  $\oplus$ . By clicking on the boring, it takes the format  $\oplus$ . Move the boring to the desired position, and release the button of the mouse; a message is displayed to confirm the move.

By right clicking on a planned boring, the option **Delete Boring** is active. A message is displayed to confirm the deletion of the boring.

#### 8.2.4. Selecting borings

By clicking **Select Borings**, the cursor takes this format: . Click and drag a rectangle containing the desired borings. The borings selected are then displayed in red. The user may also select or unselect borings by pressing the [Ctrl] key and clicking on the desired borings.

When all desired borings are selected, right click to display the menu shown in figure 9. The option **Create Group of Borings** will open the selection entry form; each boring selected is identified with its site and boring number. A selection number corresponding to the current boring number is displayed by default, and can be modified.

The user then enters any other information in the entry form, and saves the new group of borings by pressing **[F10]** or the  button in the entry form. To cancel, close the entry form without saving the record.

With the option **Delete Borings**, all borings selected and whose state is **Planned** will be deleted, after confirming the message displayed. Records for borings of another state cannot be deleted this way.

**Cancel** will cancel the boring selection.



Figure 9 - Interactive editing of selection of borings

#### 8.2.5. Creating and modifying a rectangular limit

By selecting **Create Rectangular Limit**, the cursor takes this format: . If the user wants to cancel right away, right click and select **Cancel**. Left click at one corner of the rectangular limit, hold down and move the cursor to the diagonally opposite corner; a dotted line shows the area created. When the button of the mouse is released, the limit entry form is displayed; the X and Y coordinates of the four corners of the limit are automatically entered. The current site number is displayed as reference site.

The user then enters the limit number and any other information, and saves the new rectangular limit by pressing **[F10]** or the  button in the entry form. To cancel, simply close the entry form without saving the record.

#### 8.2.6. Creating and modifying a polygonal limit

By selecting **Create Polygonal Limit**, the cursor takes this format: . If the user wants to cancel right away, right click and select **Cancel**. Left click at each point of the polygonal limit. A dotted line shows the movement of the cursor. When the last point of the polygonal limit is defined, right click to display the pop-up menu and select **Terminate**. The limit entry form is

then displayed; the X and Y coordinates of all points of the limit are automatically entered. The current site number is displayed as reference site.

The user then enters the limit number and any other information, and saves the new polygonal limit by pressing **[F10]** or the  button in the entry form. To cancel, simply close the entry form without saving the record.

Any rectangular or polygonal limit can be modified with the mouse. When the cursor is on a limit, it takes this format: + ? . By right clicking, the menu shown in figure 10 is displayed.

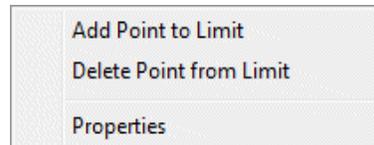


Figure 10 - Interactive editing of a limit

When **adding a point to the limit**, the cursor becomes +  . The point will be added between the two closest points to the cursor. A message is displayed, showing the exact coordinates of the point. To stop the addition of points, right click and select **Terminate**.

When the cursor is over a point of the limit, the option **Delete Point from Limit** is active. A message is displayed to confirm the deletion of the point.

When the cursor is on a point of the limit, it takes this format: +  . By clicking on the point, it takes the format  +  . Move the point to the desired position, and release the button of the mouse; a message is displayed to confirm the move.

## 9. ORGANIZATION OF THE PLAN VIEW

**Site** produces one type of primary graph: a plan view (**PLAN\_VIEW**). This graph can also be put in 3 dimensions. We will refer to the plan view and the 3D view, but both correspond to the same **PLAN\_VIEW** graph. Use the View menu to set the graph in 2D or 3D.

The sub-graphs are only displayed in the 3D view:

- One of these sub-graphs, **HEADER**, displays the symbols and names of the borings.
- The other sub-graphs show properties measured along the borings; for example, the stratigraphy, results of laboratory tests, results of in-situ tests such as the absorption etc.

These sub-graphs are considered property graphs; they are displayed as columns drawn parallel to the axis of the borings. The number and type of the property graphs are decided by the user; some of these graphs have predefined displays.

Each boring displayed in the 3D view will show the defined sub-graphs.

The primary graph and the sub-graphs are defined in the style file by their number, name and graphic characteristics.

The association between the data and sub-graphs is done:

- By a correspondence between the names of the sub-graphs defined in the style file and the names of the tables from the database, and by a correspondence, for each sub-graph, between the names of the curves of the sub-graph and the names of the fields of the table.



The sub-graphs are defined in the graph editing window opened by selecting the **Graphs** option of the **Tools** menu or by clicking the button shown here. Paragraph 4 of chapter 6 of the X3D guide provides more details.



The curves of a sub-graph are defined in the legend and curves editing window opened by selecting the **Legend** option of the **Tools** menu or by clicking the button shown here. Paragraph 5 of chapter 6 of the X3D guide provides more details.

- By inserting, in an object anchored to the page or to the primary graph (PLAN\_VIEW), a keyword referring to a value from a table of the database, to a predefined value such as a logo, or to a value provided by the system like the date or by the application like the page number. Objects cannot be anchored to the sub-graphs.

The addition of data from the database to “text” and “text zone” objects is described in details in paragraphs 8 and 9 of chapter 4 of the X3D guide. The association is done with a keyword like **&&table.field** to display the field value, or by a keyword like **@@table.field** to display an expression equivalent to the field value.

In a style file:

- There can be as many sub-graphs as desired and sub-graphs can be superimposed;
- The column graphs display properties taken along the borings. These graphs, as well as the HEADER graph, must be defined as sub-graphs with a negative #P value;
- The curves representing fields from the table displayed by the graph must be defined in the curve editing window, except if the graph has predefined curves (see paragraph 10).

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## 10. GRAPHS WITH PREDEFINED DISPLAY

**Site** associates to certain graphs a display that is completely or partially predefined. These graphs are described in the table.

The predefined curves have numbers greater or equal to **100**. **Site** manages the display of these curves, but the user can still modify some of the drawing attributes of the curves.

Paragraph 5.2.3 of chapter 6 of the X3D guide explains how to modify the display attributes of a curve.

Graph	Characteristics
<b>PLAN_VIEW</b>	<p>The <b>PLAN_VIEW</b> primary graph shows the borings and axes in a plan view. It has ten (10) curves automatically generated:</p> <ul style="list-style-type: none"> <li>• The <b>Axis_Points</b> curve shows the turning points of the axes</li> <li>• The <b>Axis_Curve</b> curve shows the curve of the axes, their identification and their symbol</li> <li>• The <b>Axis_Profile</b> curve shows the position of the geophones and the profiles obtained</li> <li>• The <b>Boring</b> curve shows the numbers and symbols of the borings and their projection</li> <li>• The <b>Limit</b> curve shows the rectangular or polygonal limits</li> <li>• The <b>Dom_site_db</b> curve delimits the domain of the site as defined in the database</li> <li>• The <b>Dom_region_db</b> curve delimits the domain of the region as defined in the database</li> <li>• The <b>Dom_site_map</b> curve delimits the site map in the .sit file</li> <li>• The <b>Dom_region_map</b> curve delimits the region map in the .sit file</li> <li>• The <b>Dom_calculated</b> curve delimits the domain calculated according to the option selected in the options window</li> </ul> <p>Curves showing fields from the BORING table can be added to display information textually under each boring point</p>
<b>HEADER</b>	<p>The <b>HEADER</b> sub-graph, with its <b>Boring</b> curve, shows the symbols of the borings and their numbers.</p> <p>The <b>BORING</b> table provides information about the borings retrieved, including their number, their type (which influences the display of their marker or box) and their position.</p>
<b>STRATIGRAPHY</b>	<p>Typically, the <b>STRATIGRAPHY</b> sub-graph shows the symbols of the stratigraphic horizons (CODE1 field) or the color of their material (MATERIAL field).</p> <p>The STRATIGRAPHY sub-graph has predefined curves if the field displayed is CODE1, DEPTH_TOP or DESCRIPTION.</p>
<b>SAMPLE</b>	<p>Often, a <b>SAMPLE</b> sub-graph is defined to show the RQD of the cores.</p> <p>Special displays exist for the numbers and the state symbols of the samples.</p>
<b>BORING</b>	<p>The <b>BORING</b> sub-graph is mainly used to display the water levels, defined by <b>WATER_DEPTH</b> and <b>STABLE_WATER_DEPTH</b> and their respective dates.</p>
<b>PIEZOMETER</b>	<p>The <b>PIEZOMETER</b> sub-graph shows the installations of the piezometers, of the observation and supply wells and the measurements of the last piezometric levels.</p> <p>This sub-graph displays the contents of the <b>PIEZOMETER</b>, <b>PIEZOMETER_SEAL</b> and <b>PIEZOMETRIC_LEVEL</b> tables. It only contains predefined curves.</p>

Graph	Characteristics
<b>LIMITS</b>	The <b>LIMITS</b> sub-graph shows the measurements of the Atterberg limits. A predefined curve displays the plastic and liquid limits using their typical representation (vertical dashes joined by a horizontal line) and the water content represented by a circle.
<b>CONSOLIDATION</b>	The <b>CONSOLIDATION</b> sub-graph shows the results of consolidation tests. A predefined curve displays the minimum and maximum preconsolidation stresses using their typical representation (vertical dashes joined by a horizontal line) and the probable preconsolidation stress represented by a down arrow.
<b>ROCK_JOINT</b>	A special display exists to represent jointly the type, angle and azimuth of the joints, or to represent the angle of the joints.
<b>CPTU_ZONE</b>	The <b>CPTU_ZONE</b> sub-graph shows the ranges of SBT zones if the #1 curve is SBT. 9 predefined curves in the Page allow the user to define the colors of the 9 different ranges.

## 11. THE PRIMARY GRAPH

**Site** only has one primary graph: PLAN\_VIEW. It is described below. If the graph is set in 3D, it acts as a 3D graph. It is described in paragraph 11.2.

### 11.1. The PLAN\_VIEW graph

The **PLAN\_VIEW** graph shows the plan view of the selected site, region or domain. It should always be numbered #1. The plan view displays:

- the symbols of the borings with their identification as well as their projection, if applicable. The borings are displayed on the plan view if their coordinates are defined or if they are associated to an axis retrieved and have a chainage and an offset.
- information from the BORING table as texts, displayed under each boring point
- the axes retrieved with their identification next to their end points; an axe must have at least 2 turning points.
- a topographic background, if requested by the user. See paragraph 5.3.1.

#### 11.1.1. Predefined curves

Figure 11 shows the predefined curves (#100 to #134) of the PLAN\_VIEW graph. The display of these curves is not affected by their type.

- For each axis, the **Axis\_Points** curve shows:
  - markers at the turning points of the axis; these markers are different from the end points of the axis;
  - a line passing through the turning points of the axis; this line merges with the outline of the axis except in the curved sections of the axis;
  - the attributes that can be modified for the **Axis\_Points** curve are the line and the marker.
- For each axis, the **Axis\_Curve** curve shows:

- its outline; this line follows the eventual curves defined by a radius at turning points;
  - its identification; the name and symbol of the axis are displayed at both ends of the axis; the orientation of the text shows the origin of the axis: in reading position, the origin is left;
- the marker used for each axis is the one in the current markers file whose name is the concatenation of the type and state of the axis, for example, LS\_R for a realised seismic line. If no corresponding marker is found, the one defined for the Axis\_Curve curve will be used. The color and dimension of the markers can always be modified.
- the attributes that can be modified for the **Axis\_Curve** curve are the line, the text and the marker (color and dimension, the symbol has no effect if there exists a marker for the type and state of the axis in the markers file).
- For each axis, the **Axis\_Profile** curve shows:
    - the location of the geophones; their location is shown by a marker;
    - the profile obtained; the thickness and color of the line can be modified by the user;
    - the attributes that can be modified for the **Axis\_Profile** curve are the line and marker.

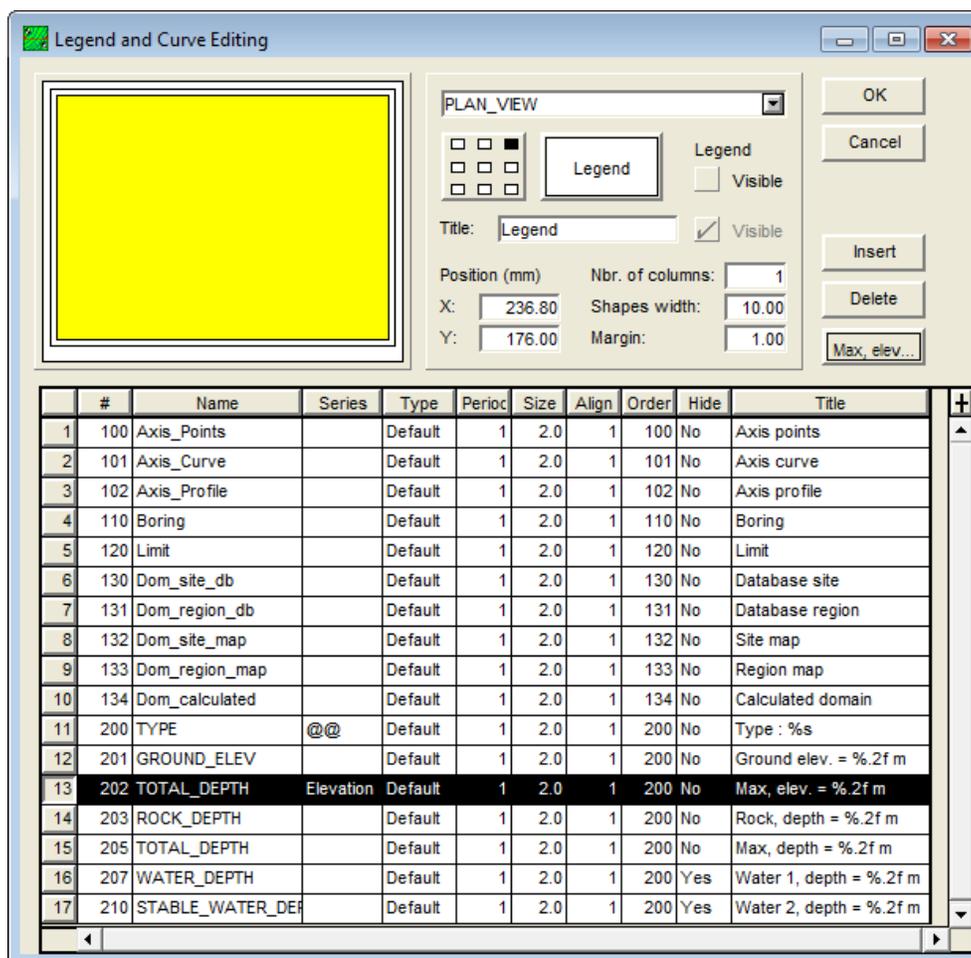


Figure 11 - Predefined curves of the PLAN\_VIEW graph

- For each boring, the **Boring** curve shows:

- its identification;
- its symbol; the marker used for each boring is the one in the current markers file whose name is the concatenation of the type and state of the boring, for example, TP\_R for a realized test pit. If no corresponding marker is found, the one defined for the Boring curve will be used. The color and dimension of the markers can always be modified.
- the projection of the boring on the axis, if the boring is inclined (with an azimuth and a dip);
 

this projection is a line starting at the center of the boring's symbol, oriented according to its azimuth, and whose length is the projection value of the boring onto the axis; a marker, as a dash, is displayed at the end of the projection line. If the user does not want to see the marker for the projection, he will set the period of the Boring curve to anything other than 1.
- the attributes that can be modified for the **Boring** curve are the line (for the projection and its dash), the text and the marker for the boring (color and dimension, the symbol has no effect if there exists a marker for the type and state of the boring in the markers file).
- The **Limit** curve shows the rectangular or polygonal limits. The attributes that can be modified for the **Limit** curve are the line and the marker (for each corner of the limit).
- The **Dom\_site\_db** curve delimits the domain of the site as defined in the database. The attributes that can be modified for the **Dom\_site\_db** curve are the line and the marker (for each corner of the domain).
- The **Dom\_region\_db** curve delimits the domain of the region as defined in the database. The attributes that can be modified for the **Dom\_region\_db** curve are the line and the marker (for each corner of the domain).
- The **Dom\_site\_map** curve delimits the site map in the .sit file. The attributes that can be modified for the **Dom\_site\_map** curve are the line and the marker (for each corner of the domain).
- The **Dom\_region\_map** curve delimits the region map in the .sit file. The attributes that can be modified for the **Dom\_region\_map** curve are the line and the marker (for each corner of the domain).
- The **Dom\_calculated** curve delimits the domain calculated according to the option selected in the options window (see paragraph 5.3.1). The attributes that can be modified for the **Dom\_calculated** curve are the line and the marker (for each corner of the domain).

### 11.1.2. Curves of information

It is possible to display information textually under each boring present in the plan view, as illustrated in figure 12.

In the legend and curves editing window, for the PLAN\_VIEW graph, the user inserts a curve whose number # is 200 or more (see figure 11). In the scrolling list associated to the **Name** cell, the user chooses the field name of the BORING table to display. Only information from the BORING table can be displayed.

In the **Series** column, the user can select “Elevation” - the elevation will be calculated for the depth selected, or “@@” - the equivalence to the value in the EQUIVALENCE table or in the LIST\_ENG table will be displayed, if defined.

The user can modify the display format in the **Title** column as well as the drawing attributes for each curve. The information is displayed in ascending order of the curve numbers (#).

TP-12  
  
 Type : Test pit  
 Ground elev. = 410.20 m  
 Max, elev. = 405.50 m  
 Rock, depth = 4.70 m  
 Max, depth = 4.70 m

Figure 12 - Example of textual information added in PLAN\_VIEW

## 11.2. The 3D\_VIEW

When the PLAN\_VIEW is set in 3D, it shows a tridimensional view. The 3D graph has the same curves as the PLAN\_VIEW graph, except the **Boring** curve. The domains are displayed at their smallest elevation. Note that if no elevation is found for the domain, it is displayed at Z = 0.

The 3D\_VIEW shows:

- the borings according to their dip and their sub-graphs of properties as columns parallel to the boring; the display of the properties of the borings is managed by the sub-graphs.
- the identifiers of the borings with their number and/or a marker characteristic of the type and state of the boring, or their number in a box.

if the markers are used, each boring will have as marker the one in the markers file whose name is the concatenation of the type and state of the boring, for example TP\_R for a realized test pit. If no corresponding marker is found, the one defined for the Boring curve of the HEADER sub-graph will be used (see paragraph 12.4).

for boxes to be used, their dimensions in millimeters must be defined by the user for the HEADER sub-graph (see paragraph 12.4); the test pits and trenches have rectangular or square boxes; the other borings have elliptical or circular boxes.

- the projections on a horizontal plan of the axes retrieved with their identification next to their ends; an axis must have at least 2 turning points.
- the profiles of the stratigraphic horizons measured using geophysical methods;  
 the profiles are defined in the **AXIS\_PROFILE** table, each profile being identified by a type of material defined in the **AXIS\_STRATA** table. The color of each profile is the one associated to the material of code **S** defined in the **MATERIAL** table for the **SPEC** site. If the material is not defined in the **MATERIAL** table with the **S** code, the color of the **Axis\_Profile** curve is then used.
- a 3D topographic background, if requested by the user. See paragraph 5.3.1.

## 12. THE SUB-GRAPHS

The sub-graphs define the identification of the borings (HEADER sub-graph) as well as the columns of properties of the borings in the tridimensional view.

Figure 1 shows the graph and sub-graph editing window. Contrary to PLAN\_VIEW, the position and dimensions of the sub-graphs are not relative to the page.

The position of the top of each boring is its position in X, Y and Z, in the **3D view**.

The display of each boring represented in the 3D view is done according to its apparent dip, i.e. the tip of the boring's projection onto the plane perpendicular to the direction of observation of the 3D block. The angle and the length of the projection of each boring determine the angle and the length of the columns, therefore of the property graphs.

For the property graphs, the **Left**, **Width** and **Right** fields define the layout of the columns with respect to the axes of the borings and the width of these columns. A property graph with a value of 0.00 in the **Left** cell will lie against the right side of the boring. If a width of 0.00 is defined for a sub-graph, the column is not displayed. The **Bottom**, **Height** and **Top** fields are not used.

### 12.1. Creation of a property graph

A property graph is created in the graph editing window. More details about graph editing are available in paragraph 4 of chapter 6 of the X3D guide. Figure 1 shows the graph editing window in Site. To create a property graph:

- In the graph editing window:
  - Click on the **Copy** button, which creates a complete copy (with axes and curves) of the sub-graph selected, or substitute a graph by another.
  - Enter a **negative value** in the **#P** column of the graph.
  - In the scrolling list of the **Name** cell, select the name of the table from the Geotec database that contains the property to display. Many graphs can have the same name because they will not have the same number.
  - Define the position of the property column with respect to the borings in the **Left**, **Width** and **Right** cells.
  - Define the graph as **Visible**.
  - Click OK.
- In the legend and curves editing window:
  - Select the new property graph in the scrolling list at the top of the window.
  - Delete all the curves from the previous graph.
  - Click on **Insert** and choose the name of the field from the table whose data are to be displayed, in the scrolling list of the **Name** cell.
  - Choose the type of curve and define its drawing attributes by clicking on the button under Delete.

- Click **OK**.
- Execute a new data query to fill the new graphs.
- In the axes editing window, configure the limits of the X-axis of the property graph.

## 12.2. Types of curves in the sub-graphs

There are several display types for the values in the property graphs: **Default**, **Text**, **Point**, **Histo**, **Step**, **Polyline**, **Polygon**, **Color** and **Pattern**. All types are described in details in paragraph 12 of the Log guide.

## 12.3. Format of the numerical values

The user can define the desired format for the display of numerical values in the **Format** field of the drawing attributes window for each curve; for example, "9.999" to have 3 decimals.

No format is predefined for texts placed as graphic objects representing numerical values from the database. The user can define a format right after the value string in the object's property window. For example, to display with 1 decimal number the dimensions of the site at the top of the report, the user will define a graphic object of **Text** type with the value "**&&SITE.WIDTH**"9.9" , **&&SITE.HEIGHT**"9.9" "

## 12.4. HEADER sub-graph

The **HEADER** sub-graph is the graph for the identification and positioning of the borings in the tridimensional view. For each boring, the **HEADER** sub-graph can show:

- Its symbol (a marker or an identification box)
- Its number

The anchor point of the symbol of each boring is its position in X, Y and Z, in the **3D\_VIEW**.

To define the identifiers in boxes, the user will modify the **HEADER** sub-graph. The test pits and trenches have rectangular or square boxes; the other borings, elliptical or circular boxes. The **Left**, **Width**, **Right**, **Bottom**, **Height** and **Top** fields reflect the position and size of the boxes that include the identifiers of the borings:

- the **width** and the **height** define the size of the boxes, in millimeters; the two values must be positive.
- the **right** and the **left** indicate the position, in millimeters, of the right and left sides of the boxes with respect to the verticals at the implementation points of the borings.
- the **bottom** indicates at which distance, in millimeters, the bottom of the boxes will be located from the anchor points of the borings.

To display a marker instead of the boxes, the height or width of the **HEADER** sub-graph must be 0. The **bottom** indicates at which distance will be located, in millimeters, the center of the markers from the anchor points of the borings. The other values are not used.

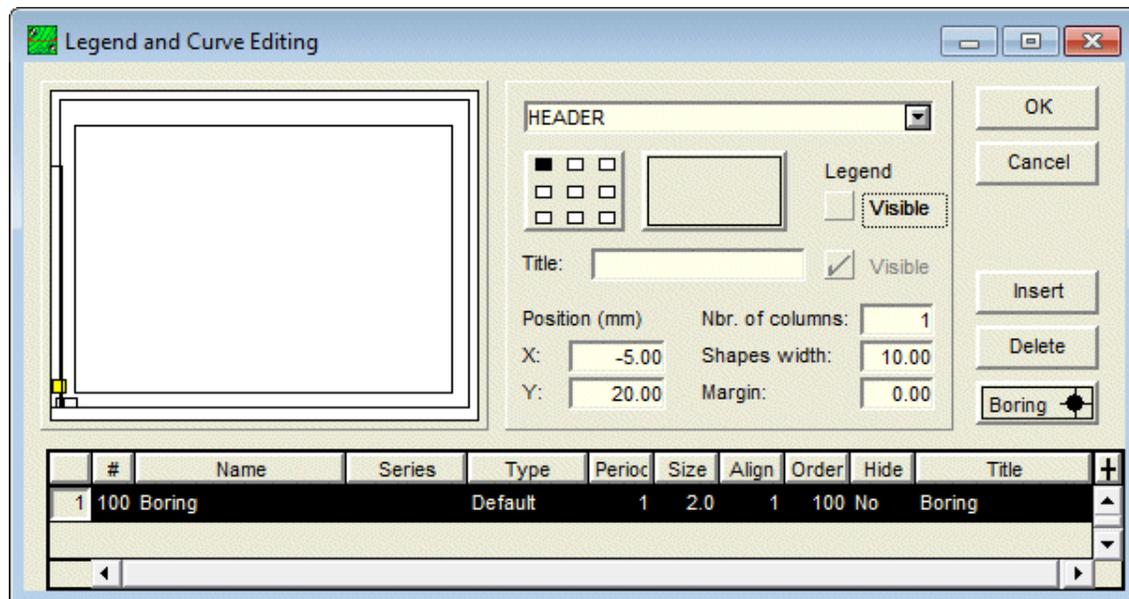


Figure 13 - Predefined curve of the HEADER sub-graph

For each boring, the **Boring** curve shows:

- the marker for the boring, if it has a positive size and if the HEADER sub-graph has at least one dimension at 0.

The marker is characteristic of the type and state of the boring; the marker used for each boring is the one in the current markers file whose name is the concatenation of the type and state of the boring, for example TP\_R for a realized test pit. If no corresponding marker is found, the one defined for the **Boring** curve of the HEADER sub-graph is used.

The markers are centered on the verticals at the implementation points of the borings. Vertically, the centers of the markers are located at a distance indicated by the **bottom** value defined for the HEADER sub-graph, from the anchor points of the borings.

- the line between the anchor point and the **bottom** value of HEADER; if the boring number is in a box, the border of the box will have the same drawing attributes as the line.
- the boring number, with the text attributes.
- the button identified **Boring** opens the drawing attributes window, where the user can define how the boring numbers, the boxes and / or the markers (color) will be drawn. The marker defined for this curve will only be used for the borings for which the concatenation of the type and state does not correspond to any marker in the **.mrk** file used.

The drawing attributes of the **HEADER** sub-graph are not used.

## 12.5. STRATIGRAPHY sub-graphs

The stratigraphy of a boring is read in the **STRATIGRAPHY** table. Generally, the user displays the symbols representing the materials of the stratigraphic layers, by defining the CODE1 curve. Figure 14 shows the predefined curves associated to the CODE1 field. The user also often displays the color of the materials constituting the layers (MATERIAL field).

The content of the other fields of the STRATIGRAPHY table can also be displayed. The STRATIGRAPHY sub-graph has predefined curves if the field displayed is CODE1, DEPTH\_TOP or DESCRIPTION.

### 12.5.1. Layers and sub-layers

The layers and sub-layers are strata, which are records in the **STRATIGRAPHY** table.

- the strata can be classified as three **types**: **R** (rock classification), **S** (simplified classification) or **U** (unified classification);
  - for an **R** type stratum, only one material can be defined; its code is entered in **code 1**;
  - for an **S** type stratum, up to six materials can be defined; their codes (one character each) are entered in **code 1**;

the relative proportions of the materials are entered in the **proportion** field; the main material has a proportion of 1, a material with traces has a proportion of 4; the proportions must be entered in the same order as the materials in code 1; more than one material can have the same proportion;

**code 2** is used to indicate grain size or plasticity characteristics, it does not have an impact on the display;

the **line** can be used to force the display of the top horizon limit using a specific format; the type of line requested will prevail over the one used for the lines belonging to the curve; the types of line that can be imposed are:

- **L0** blank line;
- **L1** continuous line;
- **L2** dotted line;
- **L3** dashed line;

the values of L0 to L3 entered in **code3** in the previous versions of Geotec will be used if there are no values in Line.

- for a **U** type horizon, two materials can be defined in **code 1** from the scrolling list; they are separated by a dash;
- each layer is limited by top and bottom depths and can have a text description.

In addition to the strata:

- descriptions can be added at specific depths along the boring; these records of type **T** (text) have a top depth but no bottom depth;
  - if a record of type **T** has a negative depth, its description is displayed above the top line of the column, generally the ground surface;
  - if there is no record of type **T** at a negative depth, Site automatically displays, at the top of the log, the title of the **Elevation** curve of the **STRATIGRAPHY** sub-graph associated to the **DESCRIPTION** field;
- a description can be associated to the bottom of the boring; this record of type **E** has a top depth but no bottom depth;
  - if there is no record of type **E**, Site automatically displays at the bottom of the column the title of the curve **End\_of\_borehole** of the **STRATIGRAPHY** sub-graph associated to the

**DESCRIPTION** field;

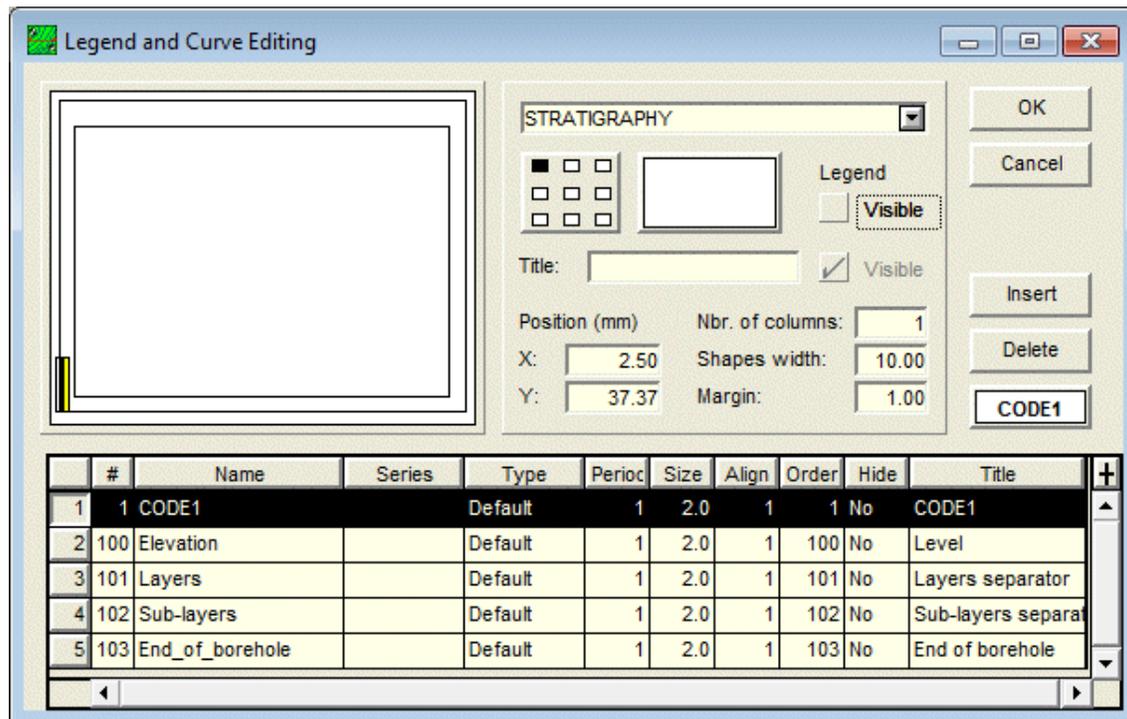


Figure 14 - Predefined curves of a STRATIGRAPHY sub-graph

A stratum is a **layer** if its classification type, its code 1 **or** its proportions (for the S type) is different than the preceding stratum.

A horizon is a **sub-layer** if its classification type, its code 1 **and** its proportions are the same as those from the preceding stratum.

The **Layers** and **Sub-layers** curves affect the stratigraphic layers and sub-layers.

### 12.5.2. Display of the STRATIGRAPHY sub-graph for the CODE1 field

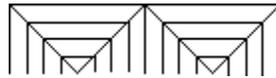
Depending on the field specified as the non-predefined curve of the **STRATIGRAPHY** sub-graph, the display associated to the curves varies and depends on Site.

The only case described in this guide is the one where the field entered as the non-predefined curve is **CODE1**, which is the most common case. The reader can find information in [paragraph 16 of the Log guide](#) about the display particularities when the field entered as the non-predefined curve is **DEPTH\_TOP**, **DESCRIPTION**, **MATERIAL** or another field.

If the **CODE1** curve is of **Default** type:

- The column shows the stratigraphic symbols in graphic format if they are defined in the current **.ptn** pattern file, otherwise using a text format (see paragraph 12.5.3 about the display of stratigraphic symbols).
- The **Elevation** curve displays nothing.

- The **Layers** curve displays the upper limit of the layers.
- The **Sub-layers** curve displays the upper limit of the sub-layers.
- The **End\_of\_borehole** curve displays the end of boring limit and, if the record of type **E** has a **code 1** of **R**, the bedrock symbol (illustrated below) indicating the refusal (or stop) of the boring on the bedrock, is drawn with the drawing attributes of the curve.



If the **CODE1** curve is of **Text** type, the column displays the stratigraphic symbols using a text format and the predefined curves are not considered. The attributes of the limits of the layers and sub-layers and of the textual stratigraphic symbols are those defined for the **CODE1** curve.

If the **CODE1** curve is of a type other than **Default** or **Text**, nothing is displayed in the column. The types of the predefined curves are irrelevant.

### 12.5.3. Display of the stratigraphic symbols

To graphically display a stratigraphic symbol, an X3D pattern must be associated to the material code to be represented in the pattern file (**.ptn**) used (and the **CODE1** curve must be of **Default** type). Otherwise, the material will be represented textually.

- If a record is of type **R**, its code 1, for example **CAL**, will be represented graphically if there is a pattern named **R\_CAL**, according to our example.
- If a record is of type **S**, the graphic representations of the materials specified in code **1** will be superimposed if a pattern exists for each of these codes, whose name begins with **S\_** followed by the code to be represented and the proportion of the material;  
for example, the **CMG** code with a proportion of **123** will be represented by three superimposed patterns if the patterns **S\_C1**, **S\_M2** and **S\_G3** exist in the **.ptn** pattern file being used.
- If a record is of type **U**, if a pattern exists for the complete **code1**, for example **ML-MH**, and whose name is **U\_ML-MH**, it will be used for the graphic representation.

The **geotec8.ptn** file provided with the installation contains patterns for most of the standard codes used. The user can refer to the **X3D** library guide for information about how to look up, edit and create patterns.

## 12.6. SAMPLE sub-graphs

Often, a **SAMPLE** sub-graph is defined to show the **N** or **RQD** of the samples. The content of the other fields of the **SAMPLE** table can also be displayed. The curves **SAMPLE\_NO**, **STATE**, **USCS** and **MATERIAL** have a special display.

### 12.6.1. Display of the **SAMPLE\_NO** curve

If the **SAMPLE\_NO** curve is of **Text** type, only the sample number is displayed.

If the **SAMPLE\_NO** curve is of **Default** type, it shows the sample numbers concatenated to their type, for example **SS-01**; this layout cannot be modified.

The user can modify the attributes of the text and line showing the top and bottom depths of each sample.

### 12.6.2. Display of the STATE curve

If the **STATE** curve is of **Text** type, the states of the samples are represented by their textual code.

If the **STATE** curve is of **Default** type, a graphic symbol represents the state of the samples along their entire length.

Four symbols, shown in figure 15, are generally used to represent the state of the samples.

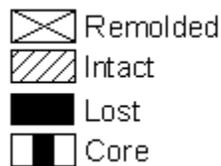


Figure 15 - Symbols representing the state of the samples

To display these symbols, the drawing attributes of the **STATE** curve must be defined as follows:

- The **Line** is defined with the color, type and size desired; the line attributes apply to all states; the line is used as the symbol border and for the cross, for a **remolded** sample;
- The **Pattern** must contain an **X3D** pattern (usually a hatched pattern); this pattern applies only to **Intact** samples.
- The **Filling** applies to the **Lost** and **Core** samples; it must be defined in two steps:
  - It must be defined with the desired color;
  - It must be "erased" with the "-" button for the filling not to affect the intact samples.

The **remolded** samples are the only ones with a symbol set by the **Site** module; only the line attributes forming the cross can be modified.

The **lost percentage** of a sample can be graphically represented at the bottom of the sample with a height proportional to the lost percentage. To do this, indicate a **period of 2** for the **STATE** curve. The filling attributes will be used. If a sample has a **recovery of 0%**, it is drawn as '**lost**'.

### 12.6.3. Display of the USCS curve

If the **USCS** curve is of **Default** type with a **period of 1 or less**, the column shows the X3D patterns defined in the current **.ptn** patterns file, named "**U\_USCS**", for example, **U\_GW**.

If the **USCS** curve is of **Default** type with a **period greater than 1**, the column shows the colors associated to the materials of code **U** defined in the **MATERIAL** table for the **SPEC** site.

If the **USCS** curve is of **Text** type, the column shows the USCS classification in text format. The attributes of the text and of the limits between the samples are defined for the **USCS** curve.

If the **USCS** curve is of a type other than **Default** or **Text**, nothing is displayed in the column.

#### 12.6.4. Display of the MATERIAL curve

If the **MATERIAL** curve is of **Default** type, the column shows the background colors for the materials constituting the samples (materials of the borrow pits). The colors are the ones associated to the materials of code **S** defined in the **MATERIAL** table for the **SPEC** site.

If the **MATERIAL** curve is of **Text** type, the column shows the codes of the materials in text format. The attributes of the textual materials and of the limits between the layers are defined by the **MATERIAL** curve.

If the **MATERIAL** curve is of a type other than **Default** or **Text**, nothing is displayed in the column.

#### 12.6.5. Selection of the types of samples to present

**Site** allows the user to restrict the display of the samples to just one type. To do this, indicate the type of samples to display in the **Series** column. In the example in figure 16, "**SS**" requests the representation of the split spoons.

Each cell of the **Series** column has a scrolling list which displays all the types of samples inserted in the current database.

The user can select a different type for each curve of a **SAMPLE** sub-graph. Only the values associated to the selected type will be displayed. If the cell of the **Series** column is empty or if it contains "@@", all the samples will be represented for this curve.

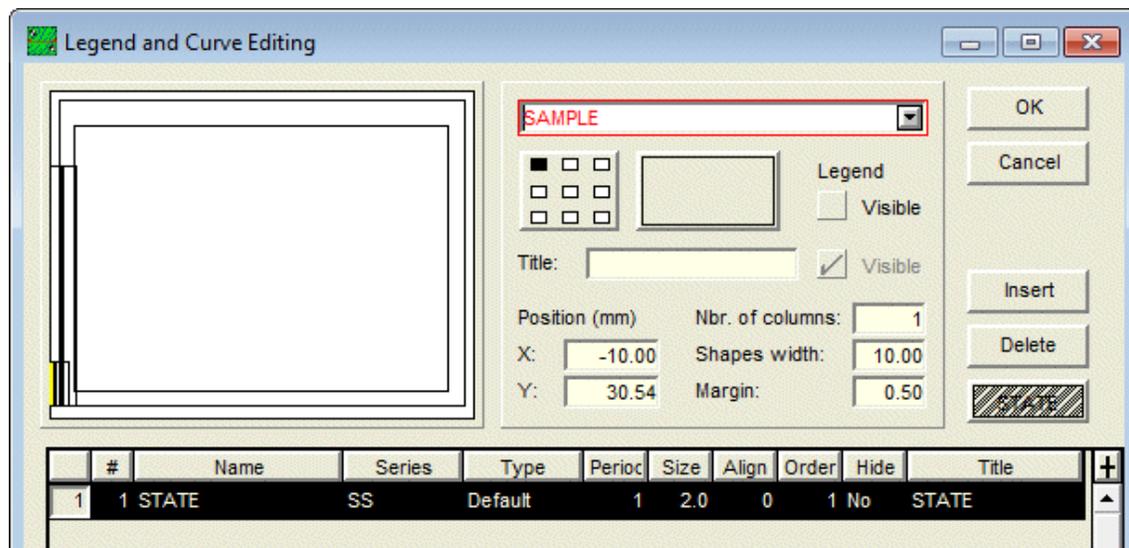


Figure 16 - Selection of a sample type in a **SAMPLE** sub-graph

## 12.7. PIEZOMETER sub-graph

The installations of the piezometers, observation and supply wells as well as the seals, lanterns and piezometric levels are shown in the **PIEZOMETER** sub-graph.

Site reads the information about the piezometers in the **PIEZOMETER** table, the information about the seals and lanterns in the **PIEZOMETER\_SEAL** table and on the piezometric levels in the **PIEZOMETRIC\_LEVEL** table.

The **PIEZOMETER** sub-graph can only contain the predefined curves shown in figure 17, which are of Default type. The type of the curves has no effect on the display. [Paragraph 18 of the Log guide](#) gives a complete description of each predefined curve of **PIEZOMETER**. Please refer to it.

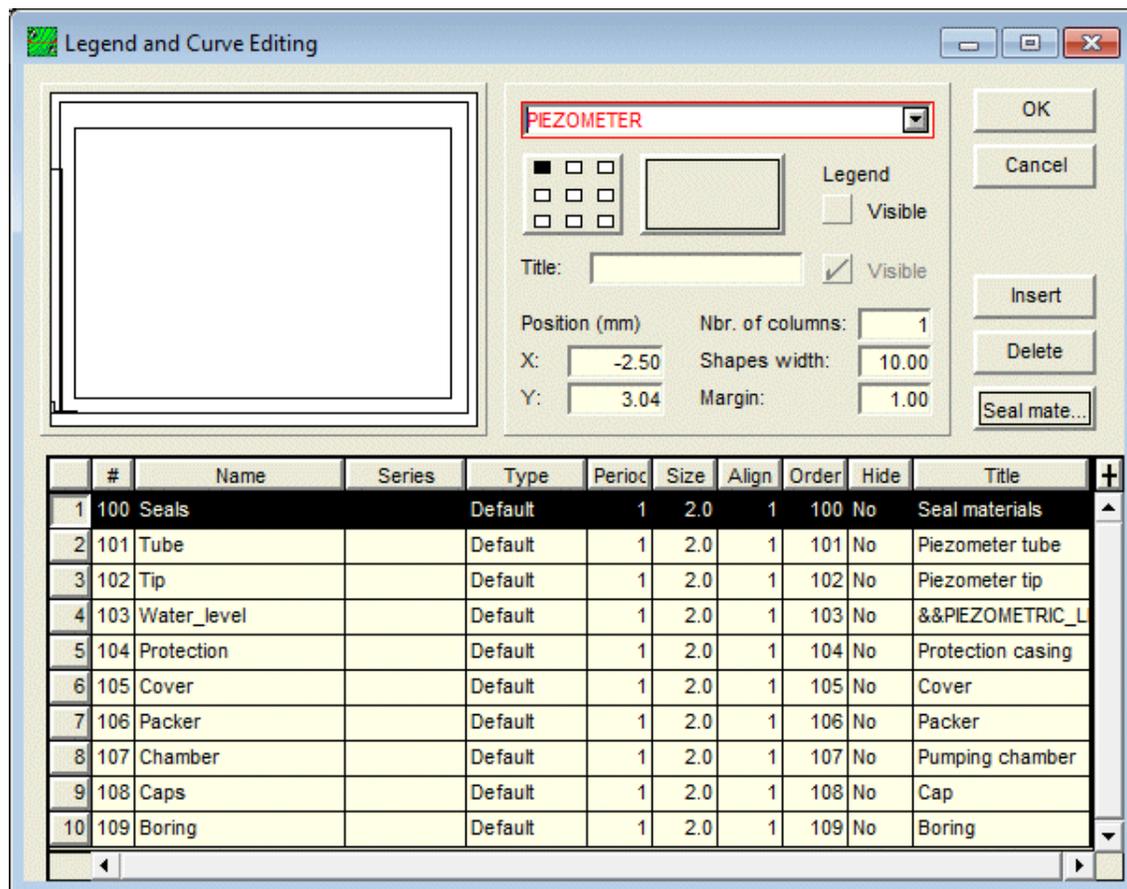


Figure 17 - Predefined curves of the **PIEZOMETER** sub-graph

## 12.8. LIMITS sub-graph

The **LIMITS** sub-graph displays the results of the Atterberg limits measurements: the plastic limit, the liquid limit and the water content. **Site** reads the data in the **LIMITS** table.

When a **LIMITS** sub-graph is created, the predefined curve **PL-LL** is created, as shown in figure 18. This curve shows a typical display, i.e. two vertical dashes representing the plastic and liquid limits and joined by a horizontal line, as well as an empty circle representing the

water content. The curve type is Default. The symbols are positioned at the depth corresponding to the center of the samples.

The user can open the drawing attributes window and modify the **marker**, which will then be the symbol for the water content. The **line** can be modified; it will have an effect on the horizontal line and the vertical dashes for PL and LL. The **text** is displayed by default, but can be modified or removed ("-") button) via the attributes window.

If the user does not want to display any marker, he will enter a size of 0 for the PL-LL curve. If he only wants the markers for the limits, he will enter a period of 0 in the attributes window for the curve.

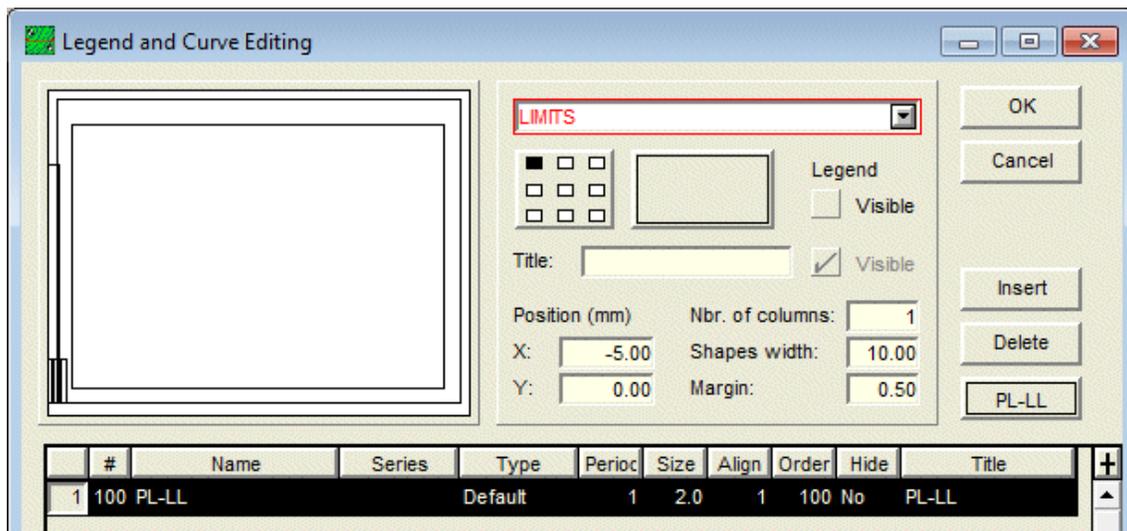


Figure 18 - Predefined curve of the LIMITS sub-graph

It is also possible to add curves for the **W**, **LL** and **PL** fields to impose a specific display; for example, to connect all the plastic limits, the liquid limits and the water contents, select the **Polyline** type for these curves. Each polyline is defined by the **line** attribute. If the **W**, **LL** and **PL** curves are of **Point** type, only the markers will be displayed.

## 12.9. CONSOLIDATION sub-graph

The **CONSOLIDATION** sub-graph displays the measurements of consolidation pressures read in the **CONSOLIDATION** table.

When a **CONSOLIDATION** sub-graph is created, the predefined curve **PCMIN-PCMAX** is created, as shown in figure 19. This curve shows a typical display, i.e. two vertical dashes representing the minimum and maximum preconsolidation stresses and joined by a horizontal line, as well as an empty down arrow representing the probable preconsolidation stress. The curve type is Default. The symbols are positioned at the depth corresponding to the center of the samples.

The user can open the drawing attributes window and modify the **marker**, which will then be the symbol for the probable PC. The **line** can be modified; it will have an effect on the horizontal

line and the vertical dashes for the minimum and maximum preconsolidation stresses. The **text** is displayed by default, but can be modified or removed (“-” button) via the attributes window.

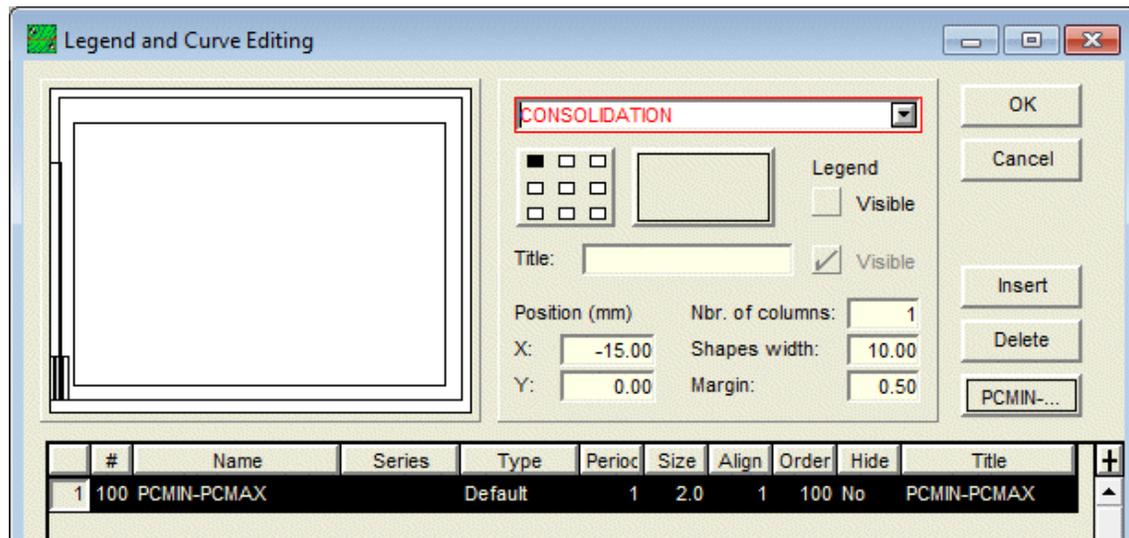


Figure 19 - Predefined curve of the CONSOLIDATION sub-graph

If the user does not want to display any marker, he will enter a size of 0 for the PCMIN-PCMAX curve. If he only wants the markers for the minimum and maximum stresses, he will enter a period of 0 in the attributes window for the curve.

It is also possible to add curves for the other fields of the table, the same way as for the curves of the LIMITS sub-graph (see paragraph 12.8).

### 12.10. ROCK\_JOINT sub-graphs

All the fields from the **ROCK\_JOINT** table can be displayed in curves of a **ROCK\_JOINT** sub-graph.

The **ALPHA** (or **ANGLE** in the previous versions of Geotec), **DIP** and **TYPE** curves have a special display. These three curves cannot be displayed in the same sub-graph.

The curve associated to the **ALPHA** (or **ANGLE**) field has a specific display if it is of **Default** type. It then displays the joints as lines inclined according to their angle relative to the core axis and centered on their average depth. The lines have a length of 80% of the column's width. The elements that can be edited for the **ALPHA** (or **ANGLE**) curve depend on the type of curve chosen.

The display is similar for the curve associated to the **DIP** field, except that the line is inclined relative to the horizontal, in counter-clockwise direction.

The curve associated to the **TYPE** field (see figure 20) is used to display information relative to three fields: **TYPE** and of one of the following pairs depending on the reference taken for the measurement of the angles: **ALPHA** and **BETA**, or **DIP** and **DIRECTION**. If a marker named **J\_type** is defined and an angle is entered in the database for the same depth, the marker representing the type will be displayed at the location of the value between 0 and 90 on the X

axis, and will be inclined according to the azimuth value (between 0 and 360). If no azimuth value is defined, a value of 0 (vertical) will be used. For this display, the **TYPE** curve must be of **Default** type. If the curve is of **Text** type, only the type values will be displayed textually.

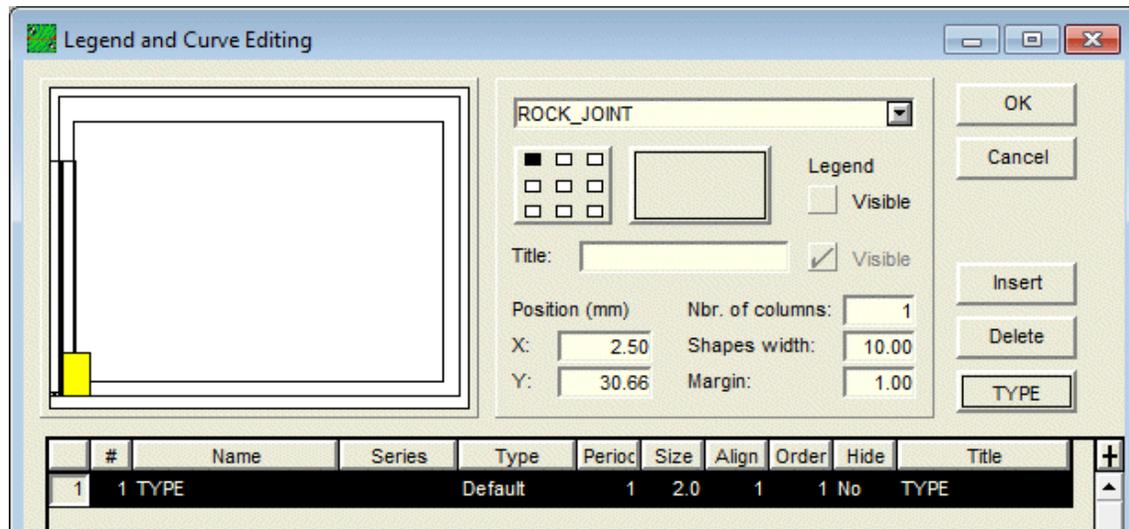


Figure 20 - TYPE curve of the ROCK\_JOINT sub-graph

### 12.11. CPTU sub-graphs

It is possible to display the ranges of SBT zones calculated as histograms or as textual description for the results of piezocone tests. For this, the curve #1 of the CPTU\_ZONE sub-graph must be associated to the **SBT** field.

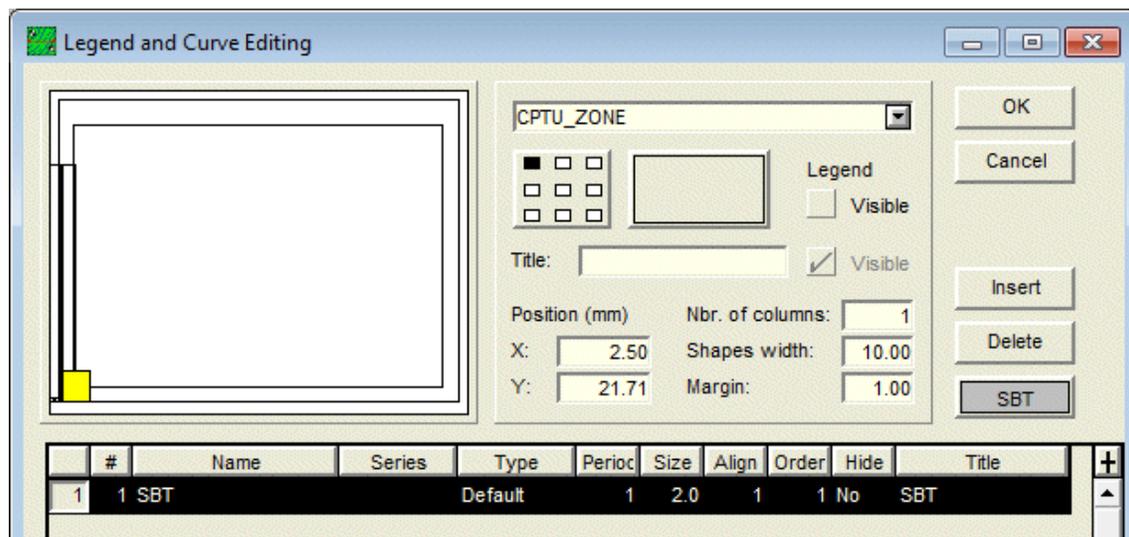


Figure 21 - Curve of the CPTU\_ZONE sub-graph

- If the **Series** cell of the SBT curve is empty, the column will display the ranges of SBT zones as histograms. The period for the curve must be 0 or a filling must be defined for the curve to show the different colors for the ranges.

- If the **Series** cell of the SBT curve contains "@@", the column will display the SBT ranges as descriptions. If the **EQUIVALENCE** table contains the description of the zones as equivalences to their value, this description is displayed; otherwise, the numbers of the zones are displayed.

Nine predefined curves are automatically included in the **Page** graph when the SBT curve of CPTU\_ZONE is displayed. These curves named "**Zone\_1**" to "**Zone\_9**" are used to define the colors of the various values of SBT zones. A series of colors commonly used is proposed by default. However, the user can modify these colors by editing the "**Zone\_n**" curves.

## 12.12. Display of property values or of concentrations of contaminants

The **PROPERTY\_VALUE** table contains the values of various properties according to depth; the properties are defined by the user. Also, the **CONCENTRATION** table contains the concentrations according to depth of various contaminants defined in the **CONTAMINANT** table.

To display the values of the **PROPERTY\_VALUE** table for a specific property in a column, the user must:

- associate the **PROPERTY\_VALUE** table to a sub-graph;
- define at least one curve associated to a field of the table in the curve editing window; usually, it is usually the **CVALUE** field.
- in the **Series** column of the curve definition, enter the property for which values are to be represented;

The display in a column of values from the **CONCENTRATION** table for a contaminant is done the same way, with the name of the **contaminant** in the **Series** cell.

## 12.13. Display of elevations and information associated to a depth curve

In a sub-graph other than the ones described above, we can define curves associated to a field starting with **DEPTH\_** or finishing with **\_DEPTH**. These curves must be of **Default** type. We can add information at each depth in the sub-graph by entering the information to be displayed in the title of the **DEPTH\_xxx** or **xxx\_DEPTH** curve.

The information displayed can be any text. It can contain the value of a field from a **Geotec** table; the syntax is then **&&table\_name.field\_name"format"** to display the values, or **@@table\_name.field\_name"format"** to display the values or eventual equivalences (see paragraph 12.14). The format is not required.

For example, the user can create a column to display the initial and stabilized depths of the water table using a marker and the reading date. For this:

- the user associates the **BORING** table to a sub-graph;
- the user defines two curves. The first curve is associated to the **WATER\_DEPTH** field and has this expression in the **Title** cell: **&&BORING.WATER\_DATE"yyyy-mm-dd"**. The second curve is associated to the **STABLE\_WATER\_DEPTH** field and has this expression in the **Title** cell: **&&BORING.STABLE\_WATER\_DATE"yyyy-mm-dd"**. A marker for the water level can be associated to each curve.

It is also possible to display the elevations corresponding to the depths presented. These elevations are displayed if the **ELEVATION** keyword is specified in the title of the curve. These keywords cannot be included in a string. The dip of the boring is taken in account to determine the value of the elevations.

If no title is provided for a **DEPTH\_xxx** or **xxx\_DEPTH** curve of **Default** type, the depth is then displayed.

If the user wants to display the depths and the elevations, two **DEPTH\_xxx** or **xxx\_DEPTH** curves of **Default** type must be created in the sub-graph. One of the titles will remain empty, while the other will be **ELEVATION**. By aligning the characters of a curve by the top and the other by the bottom, both texts will not be superimposed in the graph.

#### 12.14. Display of equivalences to values

It is possible to display equivalent expressions to some values in a curve if the following conditions are met:

- The curve does not belong to a sub-graph with **predefined curves**;
- The curve does not belong to a sub-graph representing the **CONCENTRATION** or **PROPERTY\_VALUE** table.
- The curve does not represent a **DEPTH\_xxx** or **xxx\_DEPTH** field;
- Expressions equivalent to one or many values are defined in the **EQUIVALENCE** table or in the **LIST\_ENG** table for the field represented by the curve;
- The @@ expression is entered in the **Series** column of the curve.

Regardless of whether the field values are numerical or textual, if the equivalent expressions are textual, they will only be displayed if the curve is of **Default** or **Text** type. If the equivalent expressions are numerical, they can be displayed regardless of the type of curve.