

DrillXS

Drillhole Plotting Software

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www.drillxs.com

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Quick Start

1. Download the free trial from the drillXS website.
2. Unzip and install in your working directory.
3. Open the database, AutoCAD should also open at the same time if you have a current version of AutoCAD.
4. Click on the red PLOT button, a plot of the trial data should appear in AutoCAD.
5. Configure AutoCAD according to your preferences, but probably a white background is best (set in preferences), a 3D modelling workspace is best, and select conceptual or realistic in the view. Enter rotate 3D to view the plot in 3D.
6. You can scroll to eight different example plots highlighting DrillXS features.
7. How to set up your data is detailed below.

Introduction

Drills is a Microsoft Access database using a combination of the Microsoft Access and AutoCAD VBA object libraries to plot drill cross sections, plans and point data in AutoCAD when linked to a drilling database. The name is derived from drill X=cross S = section XS also sounds like Access.

Drillxs can in 3d plot:

- Drill hole traces with any number of related attributes as values, colored values, colored bars, histograms, line graphs, cylinders and hyperlinks.
- Structural data as planes and dip symbols.
- Points in eight different formats.
- A grid in plan or cross section view, or a grid cage.
- A scalebar, title box, and legend.

Plotted data is in true 3d and can be viewed from any angle, rendered or sliced using the existing features of AutoCAD. Multiple cross sections or plans can be batch produced.

Using DrillXS for the first time

Software requirements

1. Windows 10 or higher
2. Any current version of AutoCAD, preferably AutoCAD map 3d, but not AutoCAD LT. AutoCAD is available only as a subscription, with a one-month free trial.
3. Microsoft Access 2013 or higher.

Hardware requirements

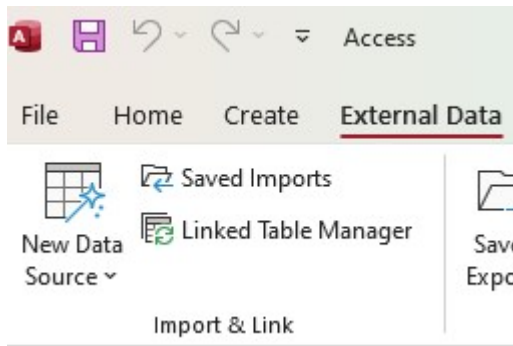
A computer with the same system requirements as AutoCAD, especially a good graphics processor. A two-screen setup is preferable, so that Drillxs can be displayed on one screen and AutoCAD on the other, although it will still work on one screen.

Installation

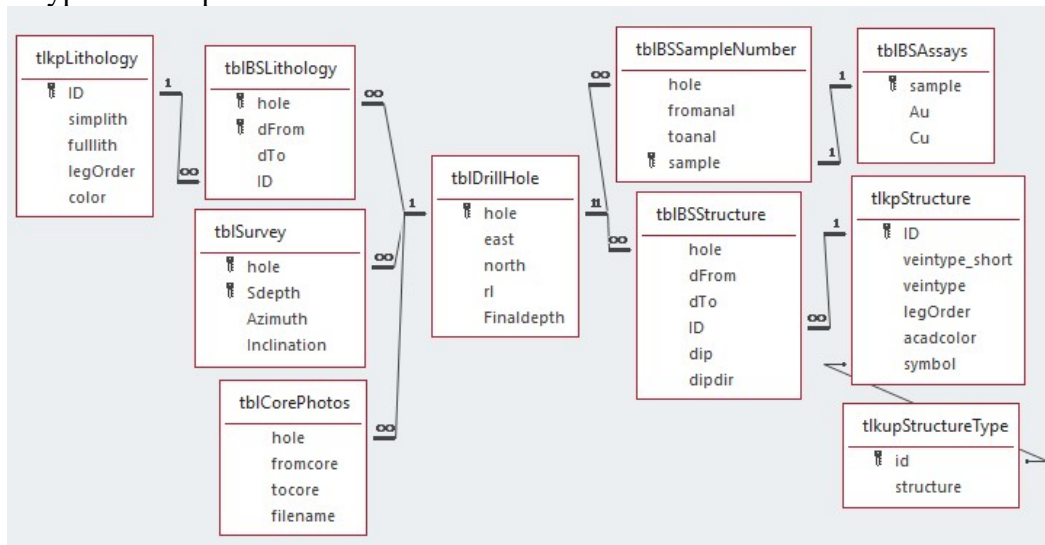
1. Download and unzip the free trial from the DrillXS website (www.drillxs.com) and place it in your working directory
2. As for all .acdde files you will get a security warning about macros when you open the file. If so, right click on file properties and in the general tab then click on unblock.
3. If you have more than one version of AutoCAD installed at the one time, for example AutoCAD, AutoCAD Map3d, AutoCAD Civil3D, then the last version closed will be opened.
4. If you have a two-screen setup then move DrillXS to one screen and AutoCAD to the other.

Importing data to the database

This follows the standard access options, where you can import from or link to a wide variety of data sources- for example you can link to or import from another Access database, an SQL server database or excel spreadsheets.



A typical example of tables used in the database is shown below:



Linking the tables is good database practice, but not strictly necessary. Having lookup tables for tables like *tblLithology* or *tblStructure* is also good practice but not strictly necessary. DO NOT put spaces in the table names, otherwise drillXS will not work.

Drillhole data

This can be divided into seven types:

String data

This is data that has a starting point then a distance, azimuth and inclination to the next point. Two tables are required, a starting point table (default name *tblDrillHole* in this database) and survey table (default name *tblSurvey* in this database). Usually this is drillhole data but it can be anything, for example tunnel data or trench data. If you use the default names then when you go to a new record you will still be connected to these tables, for example if you want to have a new type of plot using the same survey and drillhole data.

Other data

Required fields for the five other types of data are:

Drill hole	Hole	X	Y	Z	Final depth						
Drill-Survey	Hole	depth	azimuth	inclination							
Drill-number	Hole	from	to		number	units					
Drill-text	Hole	from	to		text	text long	legend order	color			
Drill-Hyperlink	Hole	from	to	Hyperlink							
Drill-structure	Hole	from	to		veintype short	veintype long	legend order	color	dip	dip direction	structure symbol
Point-number	ID	X	Y	Z	number	units					
Point-Text	ID	X	Y	Z	text	text long	legend order	color			hyperlink
point-structure	ID	X	Y	Z	veintype short	veintype long	legend order	color	dip	dip direction	structure symbol

You can use these data types to plot:

Data Type	Value*	Value	Bar*	Histogram*	Cylinder*	line graph	plane*	dip symbol*	hyper-link	Value centred*	Point*	Point leader*	Point circle*	Point square*
Drill-number	X	X	X	X	scaleable	X	X							
Drill-text	X	X	X		X									
Drill-Hyperlink									X					
Drill-structure							X	X						
Point-number										scaleable	X	X	scaleable	scaleable
Point-Text									X	X	X	X	X	X
point-structure							X	X						

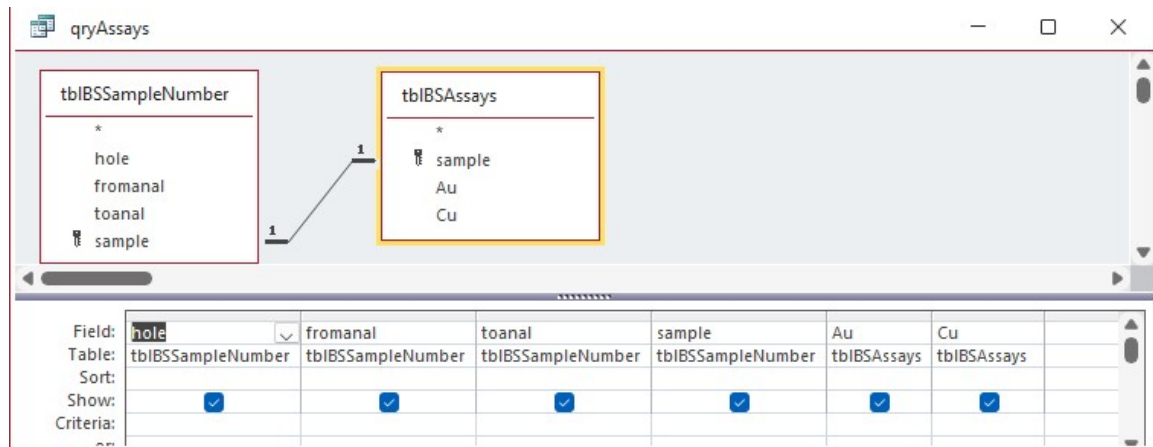
*= all of these fields are also colored according to value or text color in the associated lookup

Note: A hyperlink field for point data is optional

Making queries of the data.

To plot data the data must be in a form that can be connected to, and unless the data is contained in one table you would normally need to construct a query to get the required fields. Typical examples are:

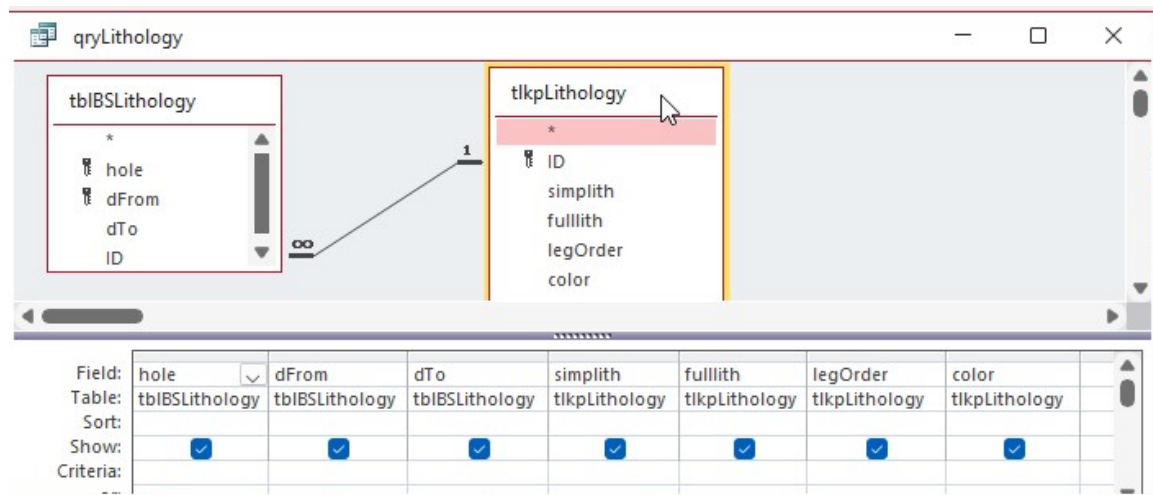
Drill- Number



SQL:

```
SELECT tblBSSampleNumber.hole, tblBSSampleNumber.fromanal, tblBSSampleNumber.toanal,
tblBSSampleNumber.sample, tblBSSAssays.Au, tblBSSAssays.Cu
FROM tblBSSAssays INNER JOIN tblBSSSampleNumber ON tblBSSAssays.sample = tblBSSSampleNumber.sample;
```

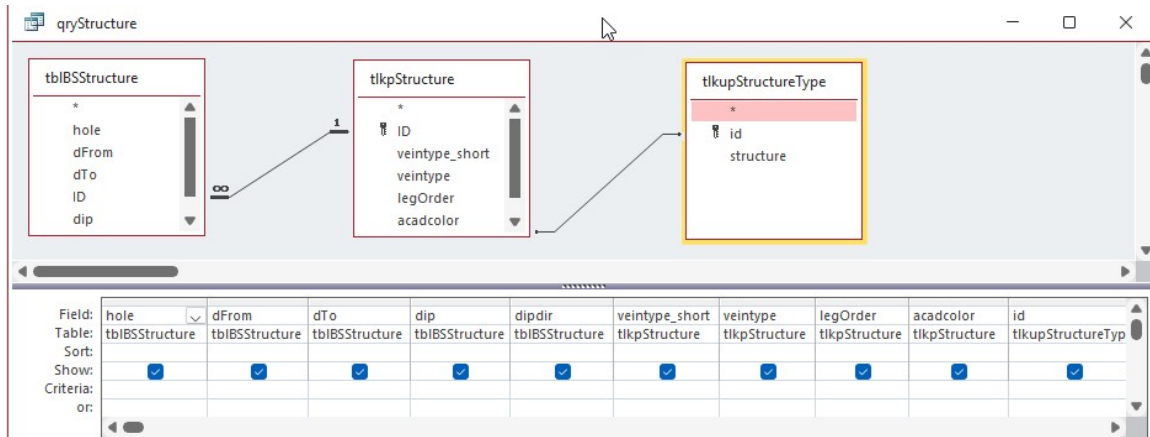
Drill- Text



SQL:

```
SELECT tblBSLithology.hole, tblBSLithology.dFrom, tblBSLithology.dTo, tlkpLithology.simplith,
tlkpLithology.fulllith, tlkpLithology.legOrder, tlkpLithology.color
FROM tlkpLithology INNER JOIN tblBSLithology ON tlkpLithology.ID = tblBSLithology.ID;
```

Drill- Structure



SQL:

```
SELECT tblBSStructure.hole, tblBSStructure.dFrom, tblBSStructure.dTo, tblBSStructure.dip,
tblBSStructure.dipdir, tlkpStructure.veintype_short, tlkpStructure.veintype, tlkpStructure.legOrder,
tlkpStructure.acadcolor, tlkupStructureType.id
FROM tlkupStructureType INNER JOIN (tlkpStructure INNER JOIN tblBSStructure ON tlkpStructure.ID =
tblBSStructure.ID) ON tlkupStructureType.id = tlkpStructure.symbol;
```

Note: These are from the example database, remove “BS” if you want to use the normal names.

Queries for point data are constructed in a similar fashion.

The Configure and Plot Form

Configuration name
Drill Histogram and linegraph cross section Help

Filter Drill or Point data
BSD74
select all drill data Help select all point data

PLOT Plan Cross Section
 Plot Data Clear
 Generate data dont plot
 Plot generated Data

Configure Drill Data **Configure Point Data**
Number Text Structure Number Text Structure

Plan/Section Drillhole Grid Point Miscellaneous hole/survey table PSpace legend/title box

	<input checked="" type="checkbox"/> Hole	<input checked="" type="checkbox"/> Depth	<input checked="" type="checkbox"/> Hole end	<input checked="" type="checkbox"/> Hole top Legend	
Font	Standard	Standard	Standard	Standard	
Height	2.00	1.00	2.50	2.00	Scale y offset 5
x offset	2.00	5.00		1.00	Scale text y offset 10
y offset	-1.00	1.00	2.00	-2.00	length of Scale 10
Dotsize->	0.5	100 <-Depth interval			Arrow size 1
Help	90	<Rotation	90	90	
		AntiClockwise>			

Drillhole Trace
 Color daughter hole traces with A to Z suffix Explode trace polyline into segments
 Average azimuth and inclination between surveys Make separate layer for each drill hole trace
 use last azimuth and inclination for interval Interval downhole surveys are calculated at: 10

Record: 2 of 8 No Filter Search

You can have any number of records in this form, each with a configuration name entered at the top of the form. Scroll to a record or create a new record using the scroll bar at the bottom of the form; delete a record by selecting the left edge of the form, which cascade deletes related records in any sub-forms.

Select the yellow help controls in each section for more information.

How to filter:

Filter Drill or Point data			
BSD53%			

select all drill data **Help** select all point data

Plot in plan or cross section and accumulate data:

PLOT	Plan	<input type="radio"/> Plot Data Clear
	Cross Section	<input checked="" type="radio"/> Generate data dont plot
		<input type="radio"/> Plot generated Data

Select and configure which data to plot:

Configure Drill Data			Configure Point Data		
Number	Text	Structure	Number	Text	Structure


And other options:

Plan/Section Drillhole Grid Point Miscellaneous hole/survey table PSpace legend/title box

Connecting to the Data

To plot anything, you must first connect to the data. For string data open the hole/survey table page and follow the instructions in the yellow control :

Plan/Section Drillhole Grid Point Miscellaneous **hole/survey table** PSpace legend/title box



Drill hole Table		Down Hole Survey Table	
tblHoleName	tblBSDrillHole	tblSurveyName	tblBSSurvey
HoleFN	hole	HoleSurveyFN	hole
XFN	east	DepthFN	sDepth
YFN	north	AzFN	Azimuth
ZFN	rl	IncFN	Inclination
EOHFN	FinalDepth	<input type="radio"/> Inclination negative down <input checked="" type="radio"/> inclination positive down	

Generate

How to update the table names and fields.

For all other data types click on the relevant blue or pink control in the configure and plot form (red arrow), for example *configure drill- number*, then click on the blue *Make Data* control which opens the make data form. Follow the instructions in the yellow control in a similar fashion to connecting to the drillhole and survey tables outlined above:

The screenshot displays the 'Configure and Plot' software interface. A main window titled 'Configure and Plot' contains a 'Configuration name' section and a table for selecting data to plot. A red arrow points to the 'Number' button in the 'Configure D' section. Another red arrow points to the 'Make Data' button. A secondary window titled 'Select a table name from Table lookup...' is open, showing a table with columns for Name, Table, Hole, From, To, Number, and Units. A yellow box in this window contains the text 'How to update the table names and fields.'.

plot	Filename	Plot Type	Detection Limit	color 1	< value	color 2	range 2	color 3	range 3	color 4	range 4
<input checked="" type="checkbox"/>	Au	Histogram	0	9	0	120	0.05	140	0.1	160	0.25
<input checked="" type="checkbox"/>	Cu	Linegraph	0								
<input checked="" type="checkbox"/>	*										

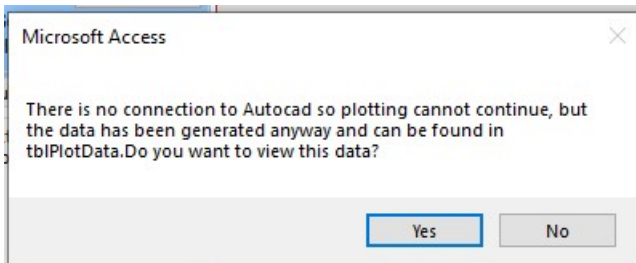
FIELD NAMES						
Name	Table	Hole	From	To	Number	Units
Au	qryAssays	hole	fromanal	toanal	Au	ppmAu
Cu	qryAssays	hole	fromanal	toanal	Cu	%Cu
test	qryAssays	hole	fromanal	toanal	Cu	%Cu
*						

Plot or Accumulate Data

Except for drill hole traces, which are polylines, all other data to be plotted is first generated as blocks and then stored in tblPlotData before being plotted. There are three options to plot the data:

Plot data option

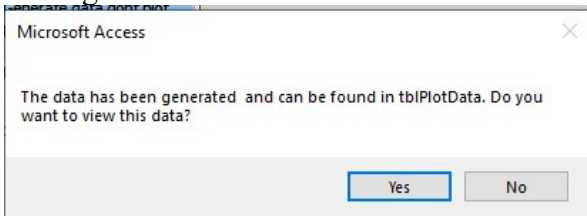
Plot data directly to AutoCAD, including drill hole traces if this option is selected. If there is no AutoCAD available you will get the following message:



And tblplotdata will open. All previous data is deleted when you use this option.

Generate data don't plot option

Generate data and store in tblplotdata, when complete you will get the following message:



And tblplotdata will open.

This data will be added to any previously plotted data unless you delete the previous data using the **Clear** button. You can also add new data by repeating this option as many times as you want. Drill hole traces are not stored.

Plot generated data option

- you can plot the generated data stored in tblplotdata.

The coordinate data stored in tblPlotData is de-survey data generated by the minimum curvature method.

Configuring Drillhole Trace Options

The drillhole trace, Hole number, Depth, End of hole and hole top legends are all plotted as string data. Options are shown in the Drillhole page:

The screenshot shows the 'Drillhole' configuration window. A red arrow points to the 'Drillhole' tab. The window is divided into several sections:

- Top Section:** Contains checkboxes for 'Hole', 'Depth', 'Hole end', and 'Hole top Legend', all of which are checked. Below these are font settings (Standard) and a 'Help' button.
- Font Settings:** A table of font settings for 'Hole', 'Depth', 'Hole end', and 'Hole top Legend'.

Property	Hole	Depth	Hole end	Hole top Legend
Font	Standard	Standard	Standard	Standard
Height	2.50	1.00	2.50	2.00
x offset	2.00	5.00		2.00
y offset	-1.00	1.00	2.00	0.50
Dotsize->	0.5	100 <--Depth interval		
- Rotation:** A section with a 'Help' button, a rotation value of 90, and the text '<Rotation AntiClockwise>'. There is also a '90' value in a separate field.
- Histogram and Linegraph:** A section with settings for 'Scale y offset' (5), 'Scale text y offset' (10), 'length of Scale' (10), and 'Arrow size' (1).
- Drillhole Trace:** A section with a checked checkbox and several options:
 - Color daughter hole traces with A to Z suffix
 - Explode trace polyline into segments
 - Average azimuth and inclination between surveys
 - Make separate layer for each drill hole trace
 - use last azimuth and inclination for interval
 - Interval downhole surveys are calculated at: 10

For the Drillhole Trace options:

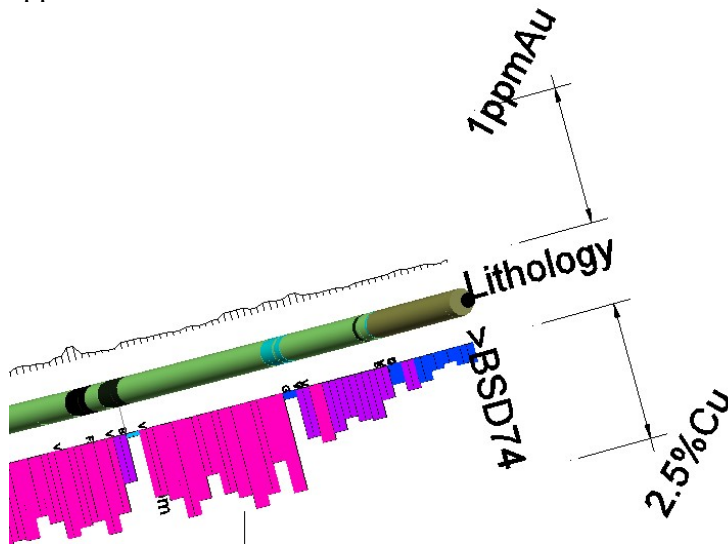
- **Average azimuth and inclination between surveys** averages this data at intervals shown in the *interval downhole surveys are calculated at* control. As a guide, for a typical drillhole if you select 1 then the error in plotting will be about 1m for a 2000m drillhole. The trace will be split up into a polyline with 1m segments and other data will be plotted with similar accuracy, but for normal purposes probably a 10m calculation interval is acceptable, and the plot will be faster.
- **Use last azimuth and inclination for interval** can be used where the trace is not a curve but changes at each survey point, for example in a traverse through the jungle. Do not use this method where the trace is curved between points.

Holetop legends

Options to plot hole top legends are also part of the Drillhole page. If you plot any data that changes scale i.e. histograms, line graphs and cylinders then if you select

Hole top Legend

then a scalebar will appear at the top of the first assay results downhole; Any data that does not change scale, for example text data type or bars will appear as a header:

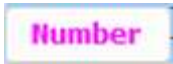


Configure Drill and Point Data

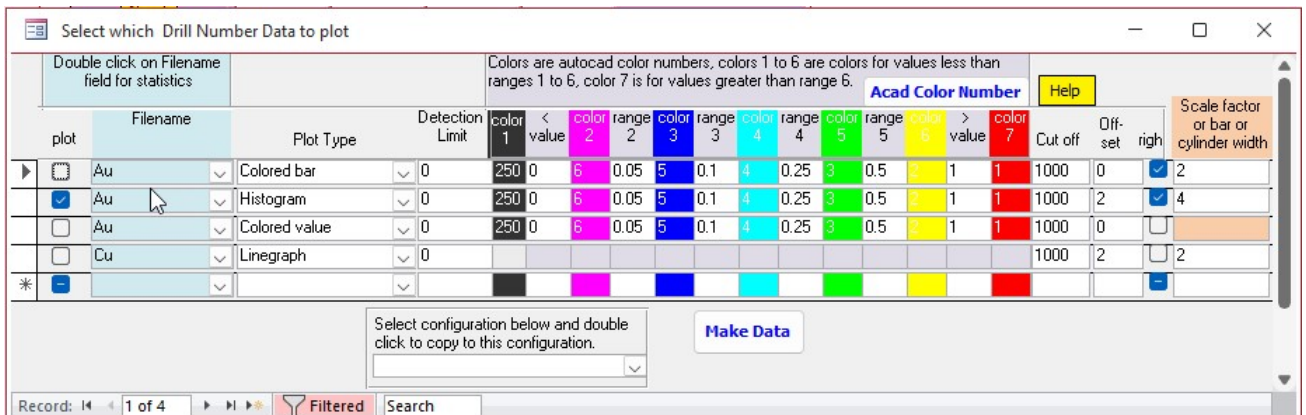


Click on the controls to open the six different data type forms. Controls turn pink when you select data to be plotted.

Drill number data.



Can be plotted as histograms, line graphs, colored bars, colored numbers or just numbers, with the color dependent on the value range and the histogram or cylinder scale dependent on the value if you select the option in miscellaneous options.

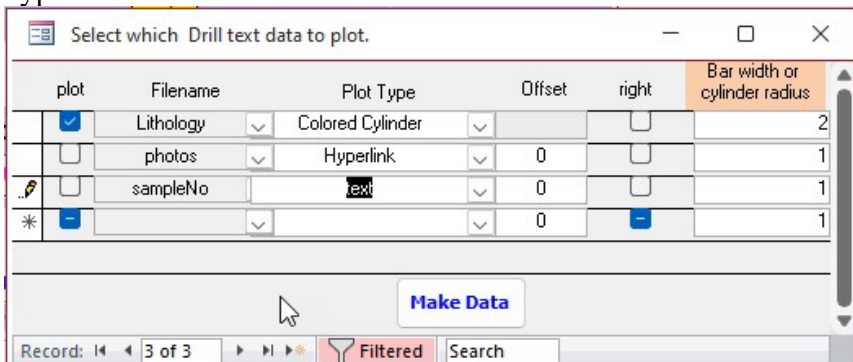


Drill text data.



Can be plotted as colored bars, colored cylinders, colored text, text or as a hyperlink. The color of the text is defined in the relevant lookup table.

. **Drill hyperlinks** are related to a drill interval, for example core photos, petrology samples etc. These are plotted as a trace. Ctrl-click on the trace to connect to the hyperlink.

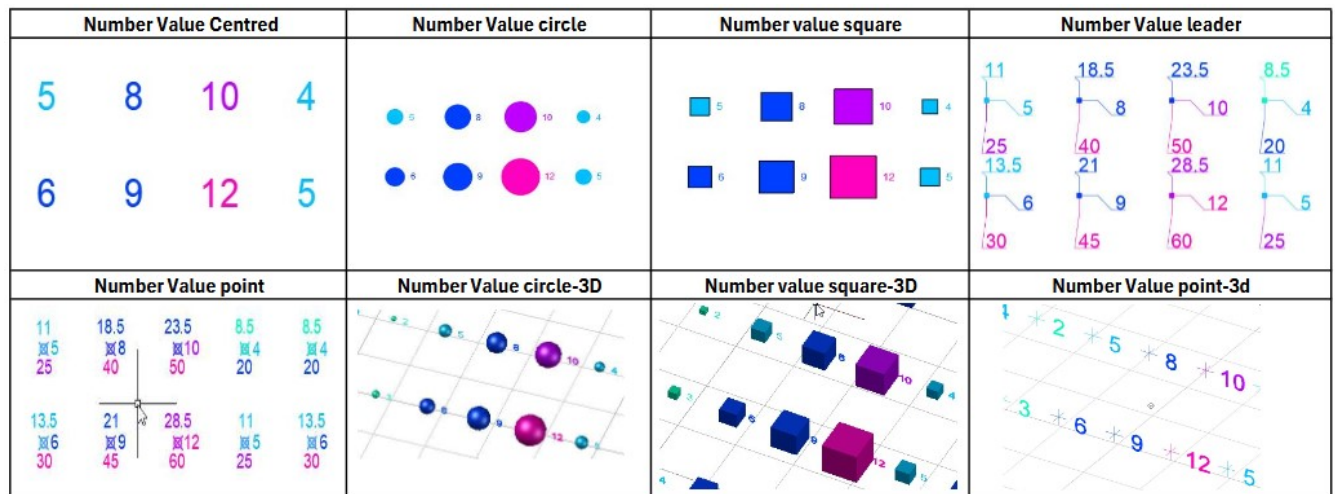
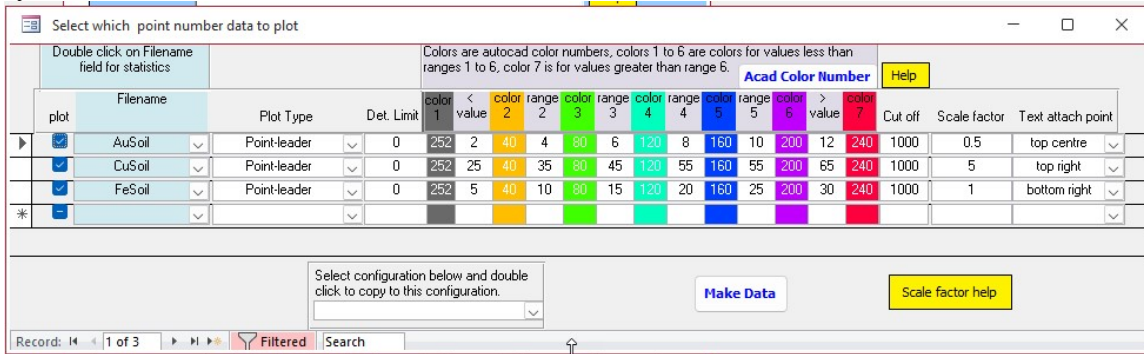


Point number data.

Number

Can be plotted as colored values, circles or squares with the color dependent on the color range and the circle or square scale dependent on the value and in a similar fashion to the drill data. Also, if you select the option in miscellaneous options then, in 3D the circles are plotted as spheres and the squares are plotted as boxes.

There are also 16 different 2D point options for the central point, and four different leader types with 16 different arrow types for the leader, but note that for each of these you can only have one type in a drawing at a time since they are controlled by the PDMODE system variable.

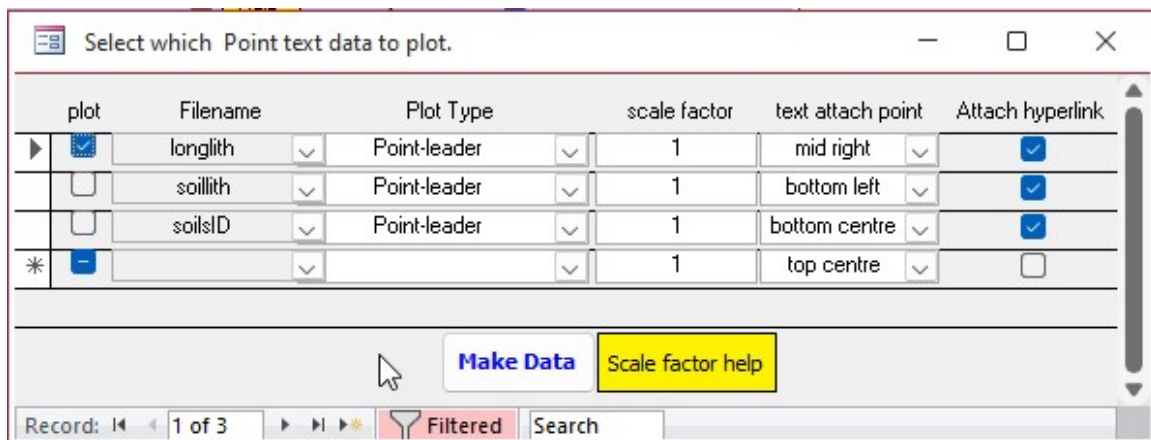


Point text data.

Text

Can be plotted as colored circles, colored squares or colored text or just text. As for drill text data, the text color can be defined in the relevant lookup table, or just plotted as text. As for point-number options, if you select the option in miscellaneous options then, in 3D the circles are plotted as spheres and the squares are plotted as boxes.

Point hyperlinks are related to the text field on the plotted point. Ctrl-click on the text to connect to the hyperlink, which could be for example an outcrop photo or a petrological report. Text with hyperlinks is highlighted.



Structures both in Drill and Point Data

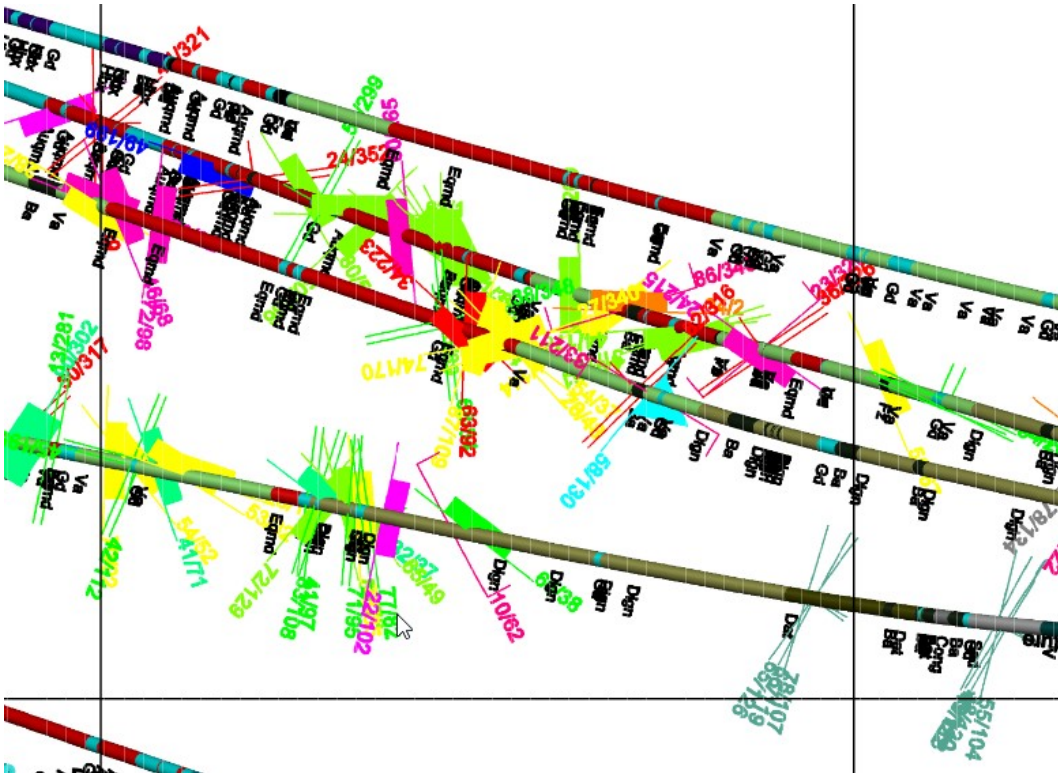
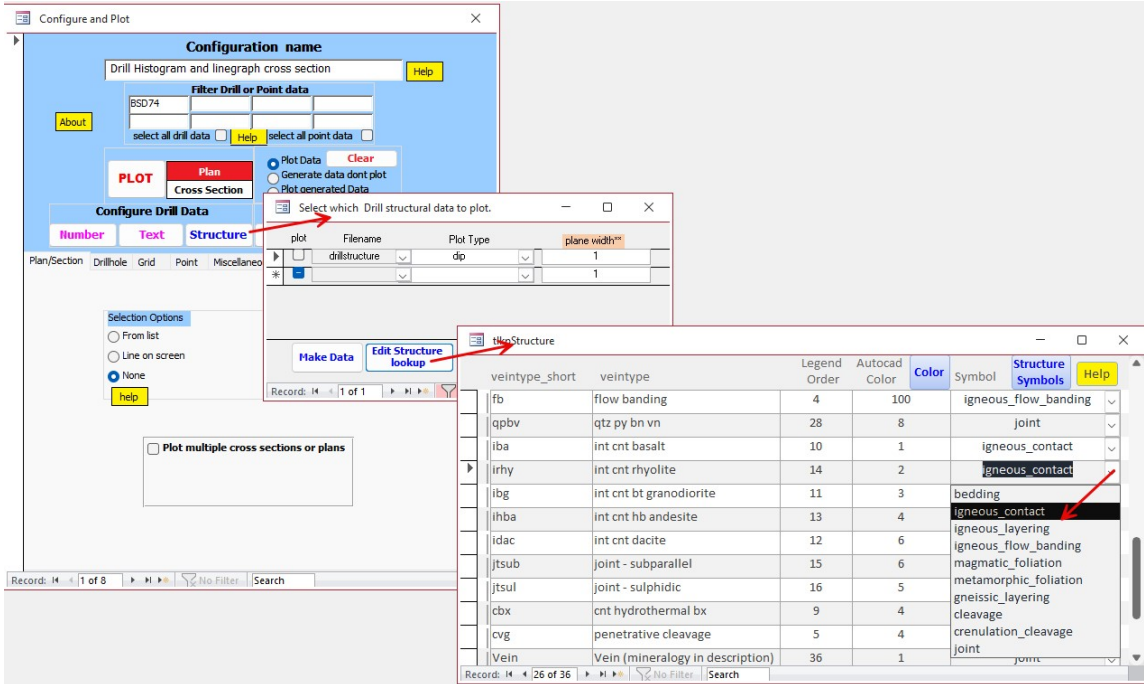
Structure

Structure data in both drill and point options can be plotted as dip symbols or as planes, which are colored according to the relevant lookup table in a similar fashion to text data,

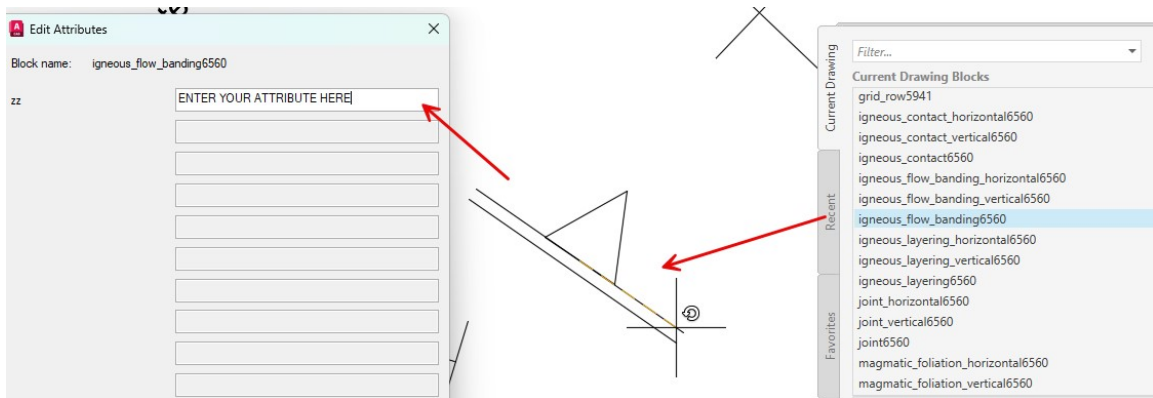
Dip Symbols

Dips are plotted as symbols using the conventions according to GSWA geological map symbology edition 2- 2016, and automatically change to the correct symbol if the

structure is vertical or horizontal. These symbols are shown in the [Structure Symbols](#) form.

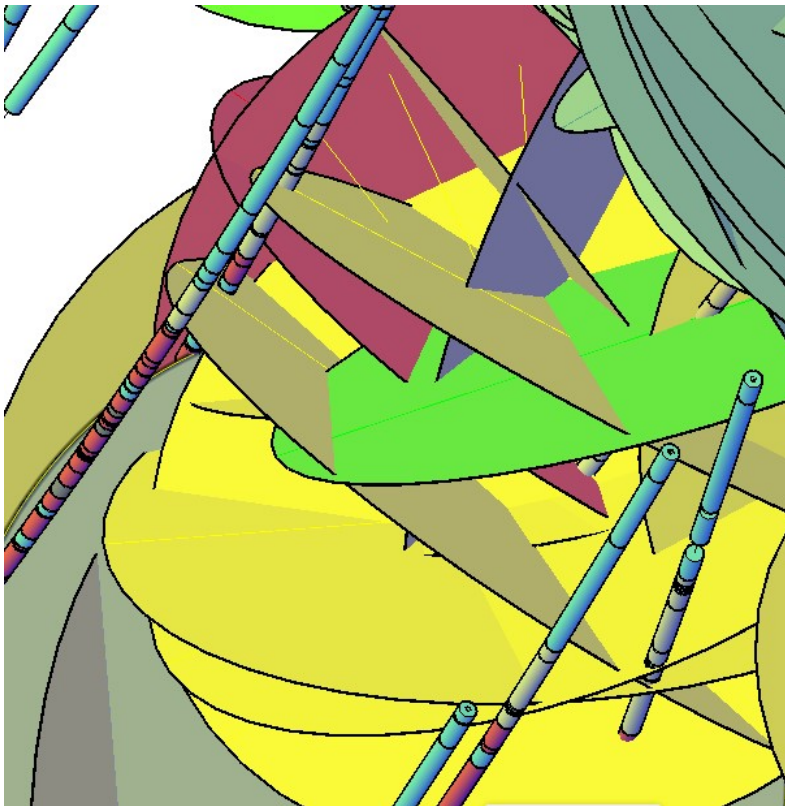


If you check the control: *add all structure blocks to drawing for later manual plotting* in the Miscellaneous page then you can use the *insert* command to plot blocks interactively on the drawing as shown below. When the blocks are inserted in the drawing a random number is added to the name so that you don't get duplicate blocks in the future.



Planes

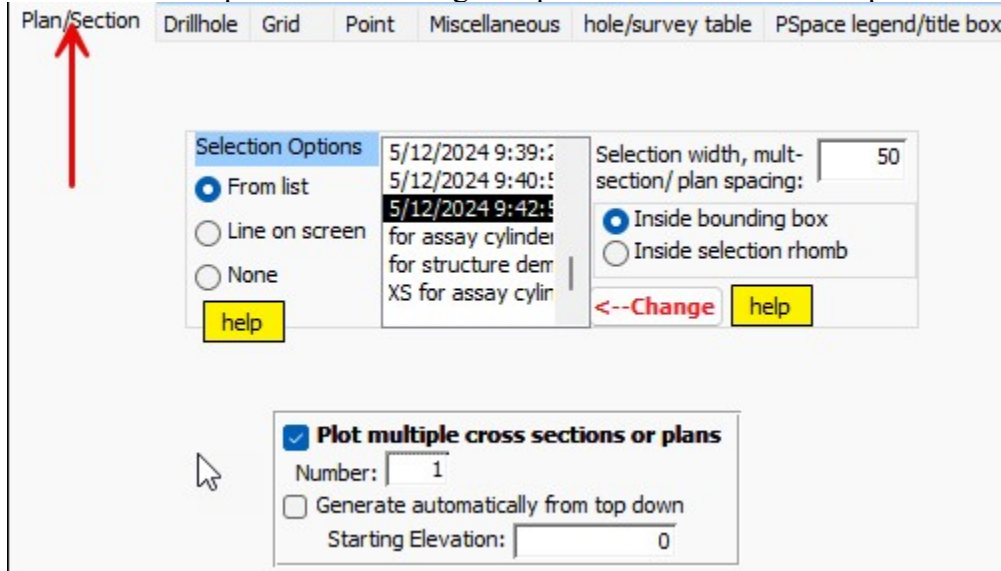
Planes are plotted as wire frame cylinders with a plane width defined in the *Drill-Structure* or *Point-Structure* form, and a color and layer defined by the structure lookup table.



In the example above, the planes are made very large to locate the projection of a structure on another drill hole, and also to show where planes intercept- for example to locate a shoot. (conceptual visual style is used).

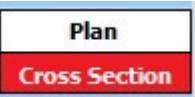
Plan/Section

There are three options for selecting the spatial extent of data to be plotted.



None option.

All the data is selected, except if you plot a grid the maximum and minimum Z cutoffs

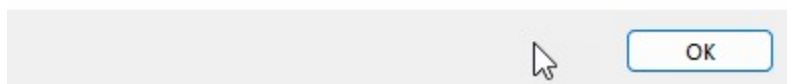
for the data are determined by the grid settings. If you select  then you need to select the viewing angle.

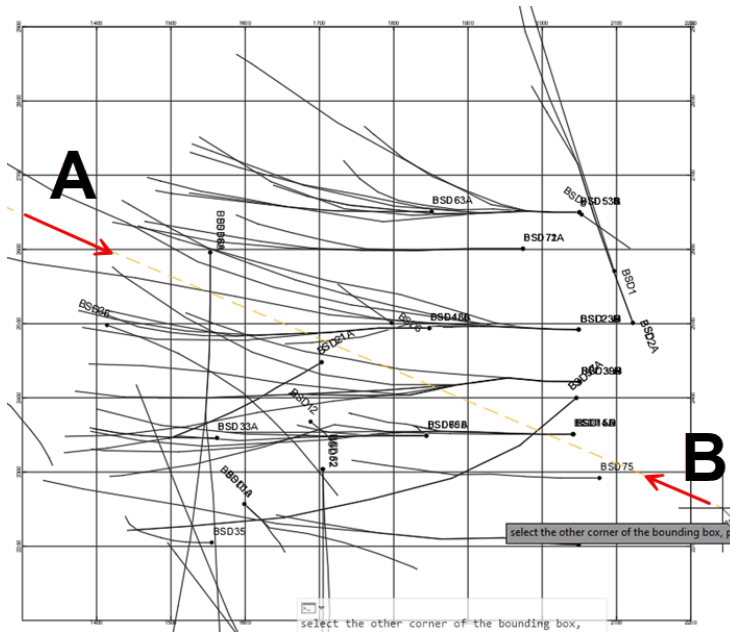
Line on Screen

With this option you interactively draw a line in AutoCAD by following the prompts. A line (A—B below) is drawn on the screen of the template drawing. Enter the path to the SectionTemplate .dwg in the *miscellaneous page*.

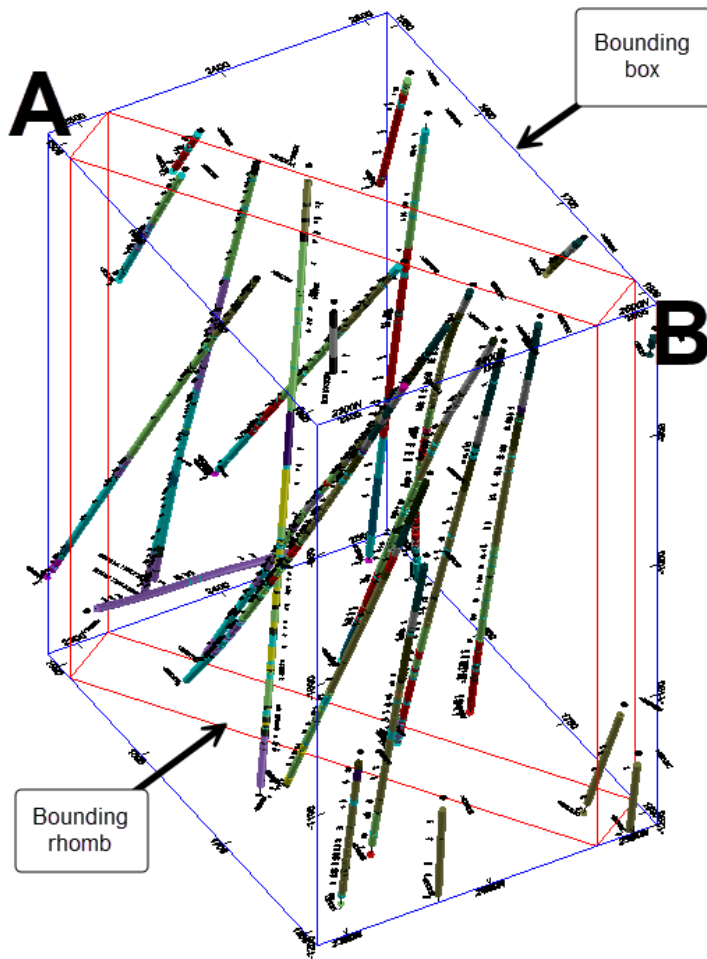


If you dont have a SectionTemplate.dwg you can make one or rename an existing drawing that encompasses the area you are working on.
 SectionTemplate.dwg is inserted into the current drawing as a block so that you can select a cross section or plan (see plan/section options),
 And then removed from the drawing again after the selection.
 The template drawing is not changed during this.



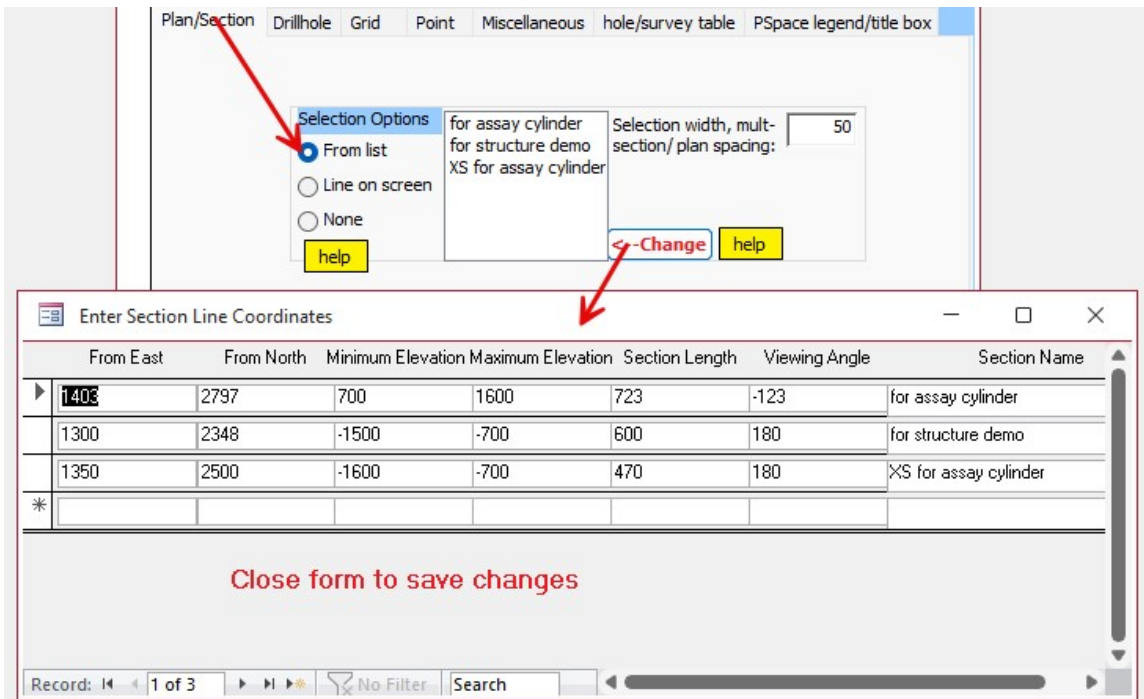
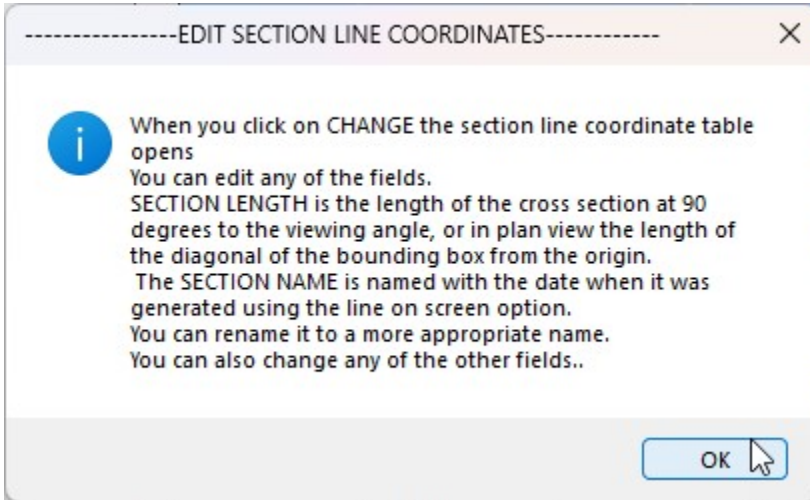


A cross section of plan is then drawn, data plotted can either be within the bounding box (blue- below) or the bounding rhomb (red-below). , with the cross section viewed at right angles to the bounding rhomb, and the section width defined in the Plan/Section page.



From List

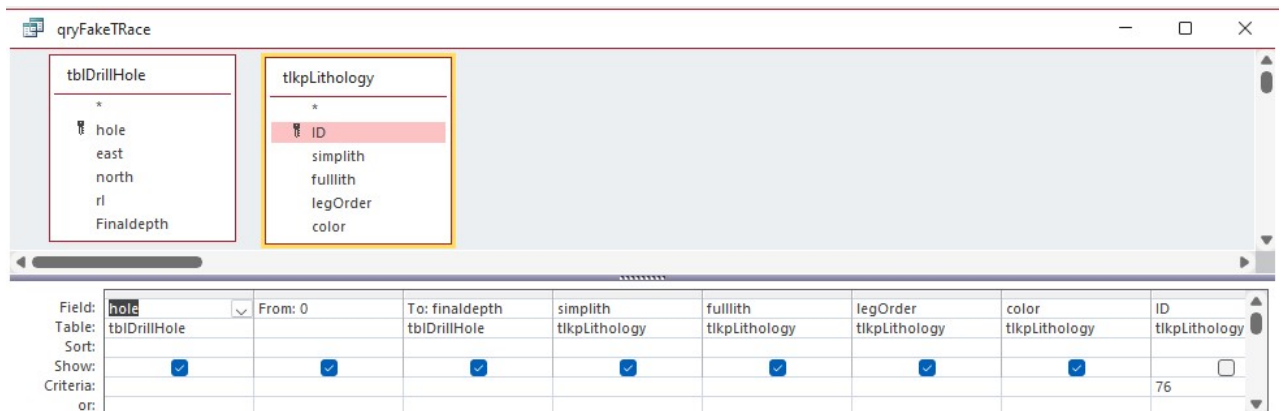
When you draw a line on the screen the data to re-create this section is stored in a section line coordinate table.



Multiple cross sections.

Apart from plotting sections and plans, data generated in tblPlotData is used to generate multiple cross sections or plans. Because the trace data is not stored traces cannot be plotted in this option.

However, you can create a fake trace- as an example see qryFakeTRace which plots a fake lithology, essentially duplicating a trace but visible in the multiple sections or plans:

**SQL:**

```
SELECT tblDrillHole.hole, 0 AS [From], tblDrillHole.finaldepth AS [To], tlkpLithology.simplith,
tlkpLithology.fulllith, tlkpLithology.legOrder, tlkpLithology.color
FROM tblDrillHole, tlkpLithology WHERE (((tlkpLithology.ID)=76));
```

Refer to the yellow help controls for more information.

The cross-section grid is oriented at right angles to the viewing angle, starting at the minimum easting and northing you enter, with a length according to what you enter.

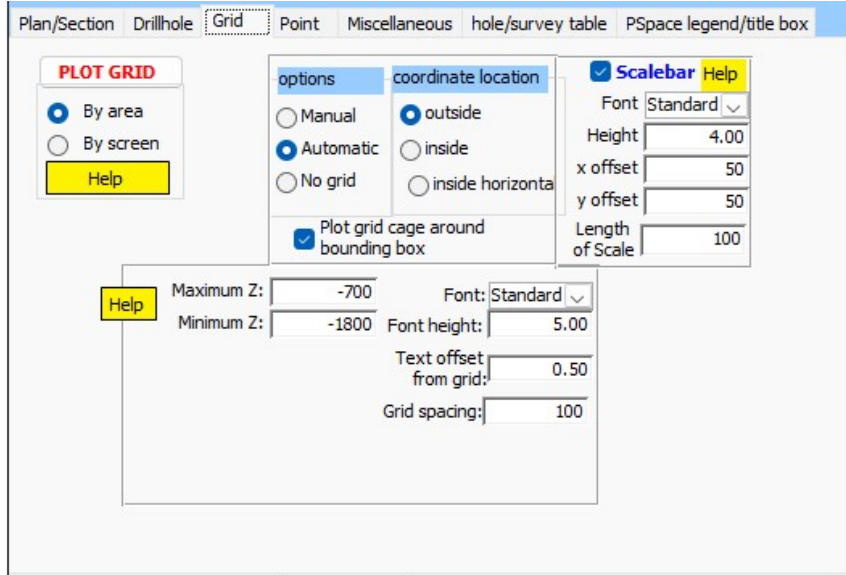
Multiple cross sections are generated from the position of the first grid and slices are selected at right angles to this grid according to the spacing and number of sections you want. Objects lying in the boundary between selections are selected twice.

The grid and scalebar are included in the multiple cross sections, but no paper space objects (legend, title box, surrounding box) are included. Multiple cross sections are named according to the origin name, if for example the viewing angle is 180 degrees, and the distance between cross sections is 25m then the first cross section will be named "minimum north"N.dwg, the next "minimum north+25"N.dwg. Drawings generated can be found in the default directory you define - see the *miscellaneous* page.

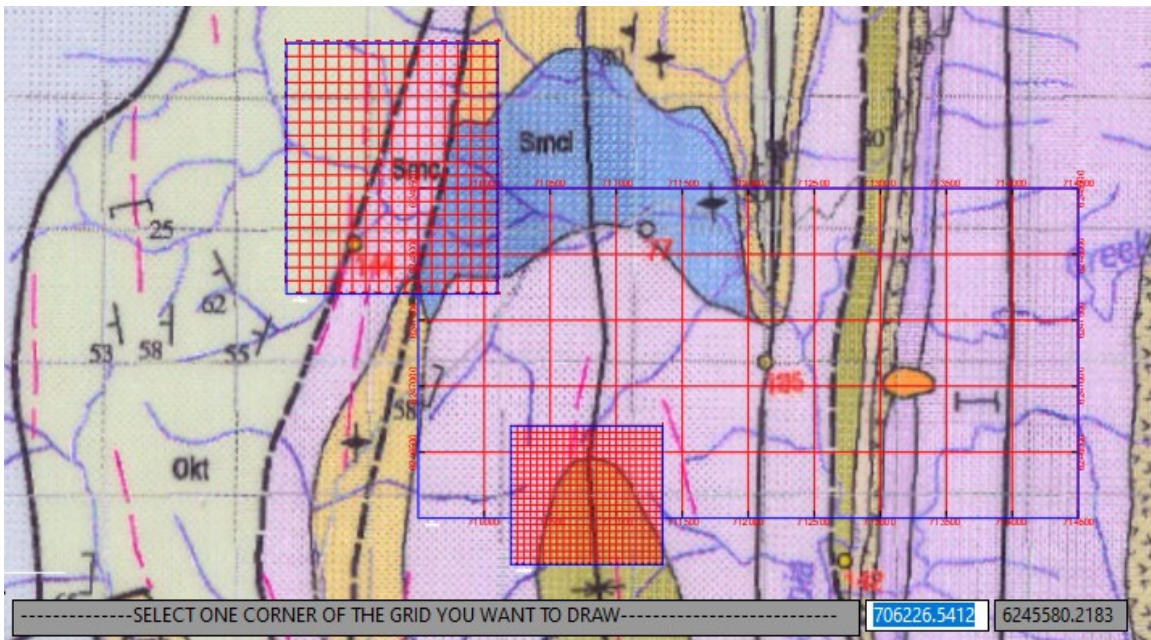
Multiple plans are generated in a similar way, from the top down.

Grids

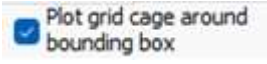
Click on the yellow Help controls for an explanation of individual features.

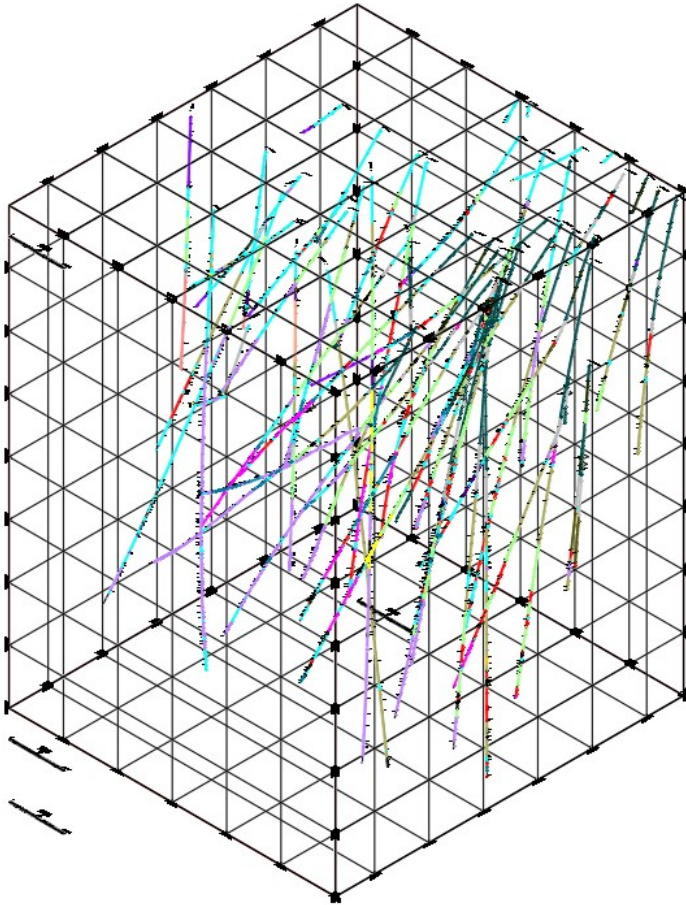


The **PLOT GRID** option lets you plot grids interactively in Autocad. With this option, you can plot many different sized grids on the same drawing, and at different scales, as shown below:

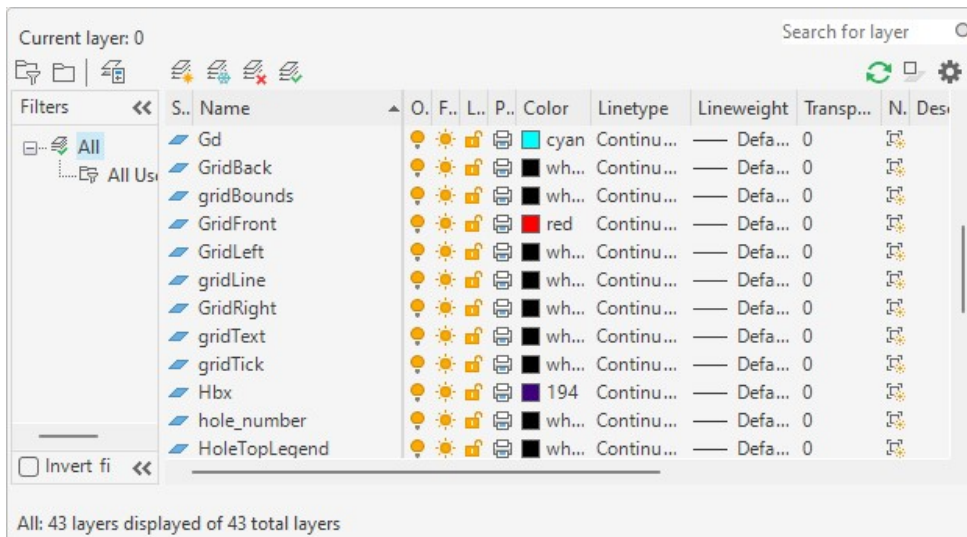


In this example, three different sized grids (shown in red) have been plotted.

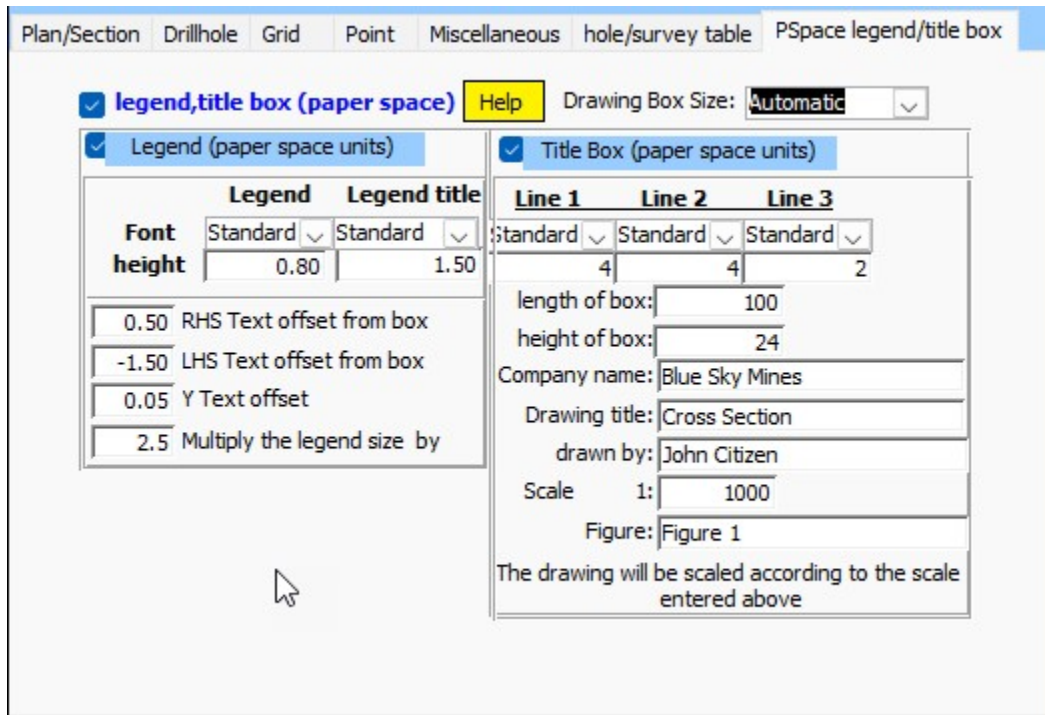
The  option constructs a grid cage around the limits of the drawing in 3D:



Each side of the grid can be turned on or off:



Legends



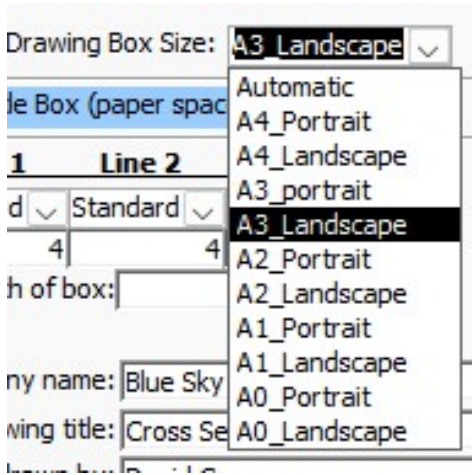
Legends, title box and drawing box are created in Paper space, whereas other data is plotted in Model space. The figure below shows the different objects in a typical drawing.

The size of the drawing box is defined by the *Drawing Box Size* options, except for the Automatic option which is set by the limits of the drawing and the scale entered in the Title box.

The scale of the Model space drawing inside the paperspace box is also defined by the scale entered in the title box, but you can change the scale to anything once the plot is complete.

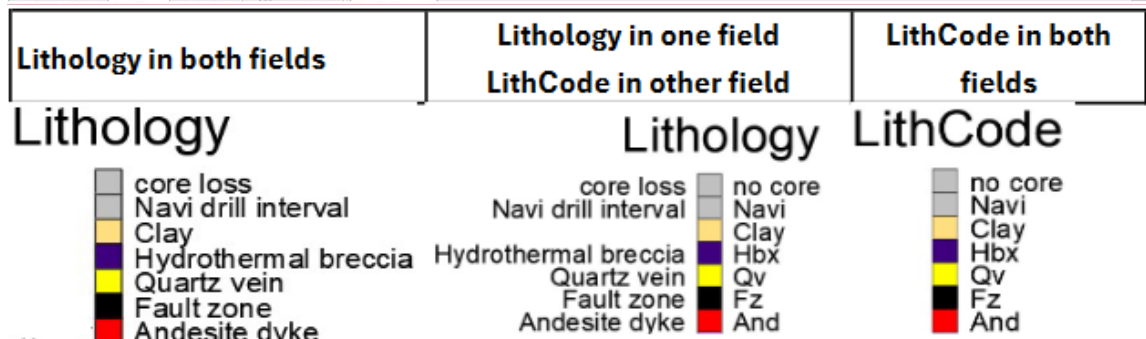
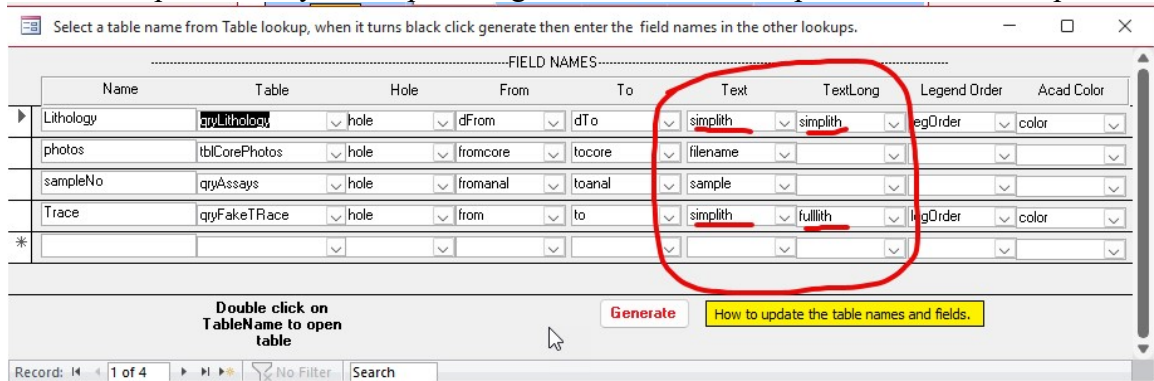
The white area in the figure below represents the size of the plot for the default plotter.



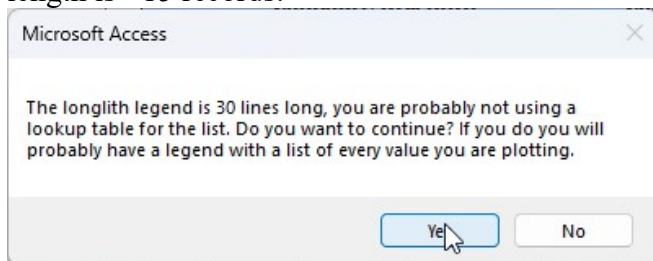


filename	eastMax	northMax
A0_Landscape	1168	820
A0_Portrait	820	1168
A1_Landscape	820	574
A1_Portrait	574	810
A2_Landscape	584	410
A2_Portrait	410	584
A3_Landscape	410	287
A3_portrait	287	410
A4_Landscape	287	200
A4_Portrait	200	287
Automatic	0	0

If you are plotting a legend for text data and you have a lookup table with both a long and short description, then you can plot a legend with both descriptions, or one description:




The legend is created by making a summary query of all the lithologies or lithCodes. If you have a table that has a different lithology for every record (i.e. no lookup) then you will get a legend with every record plotted. You will get a warning message if the legend length is >15 records:

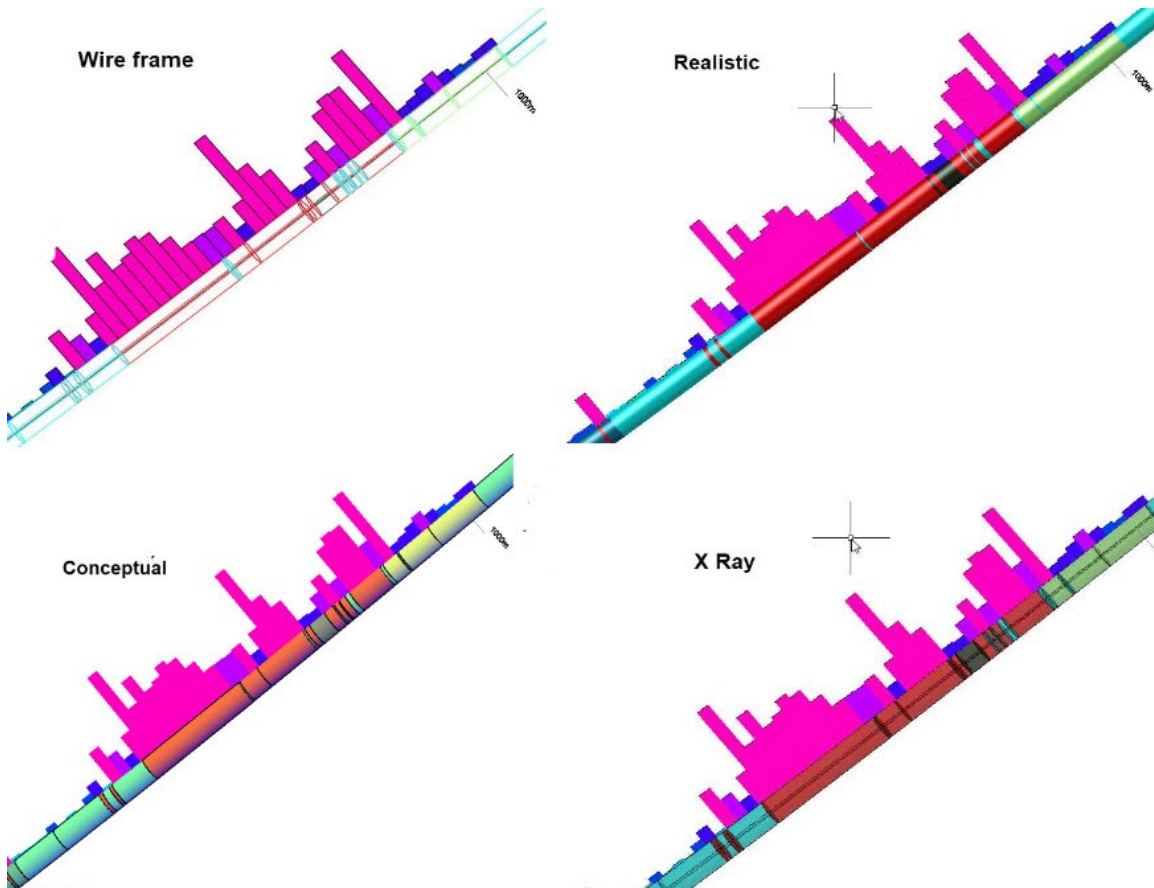


Plotting

For the first time use an example dataset is provided. This dataset is derived from a selection of real data but has been extremely modified and should only be used for illustration purposes with this database. There are eight example plot configurations provided, which you can scroll to using the record control at the bottom of the configure and plot form. These can be deleted if not needed by clicking on the bar on the left side of the form. Resultant AutoCAD drawings from the eight examples can be downloaded from the website as well as multi-layer PDF plots.

To get started select a plot configuration and click on the  button, a cross section or plan should automatically appear. Depending on how good your graphics processor is it may take some time for the plot to complete, but you can see progress in the messages and the progress bar at the bottom of the screen.

For plot configurations with cylinders the data is plotted as a 2D wire frame, selecting conceptual or realistic in the AutoCAD visual styles options results in strikingly beautiful graphics.

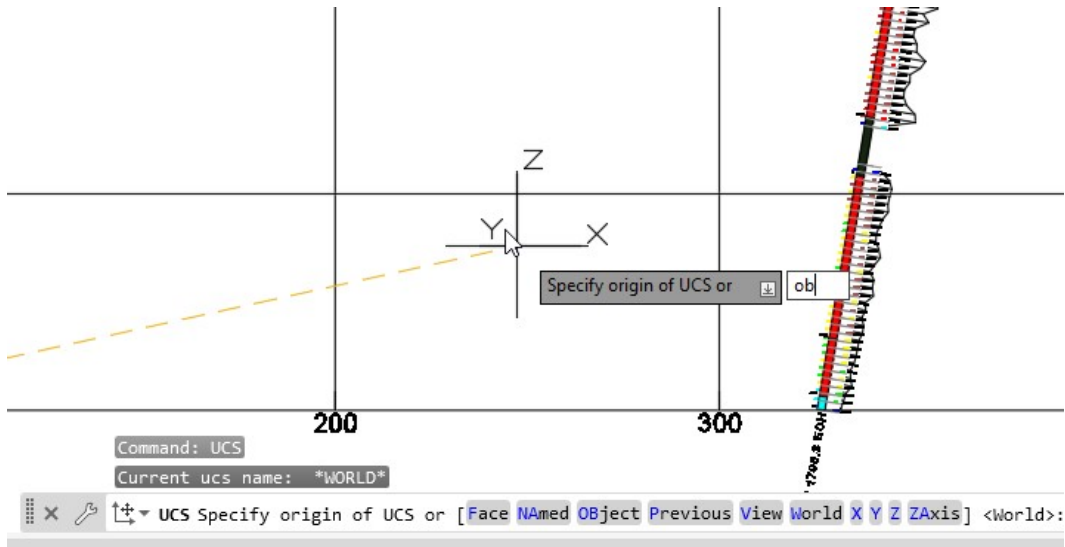


Select orbit from the navigation bar display to rotate the drawing, you can also turn on or off any layers you don't want to view, for example the grid front and left in the grid cage.

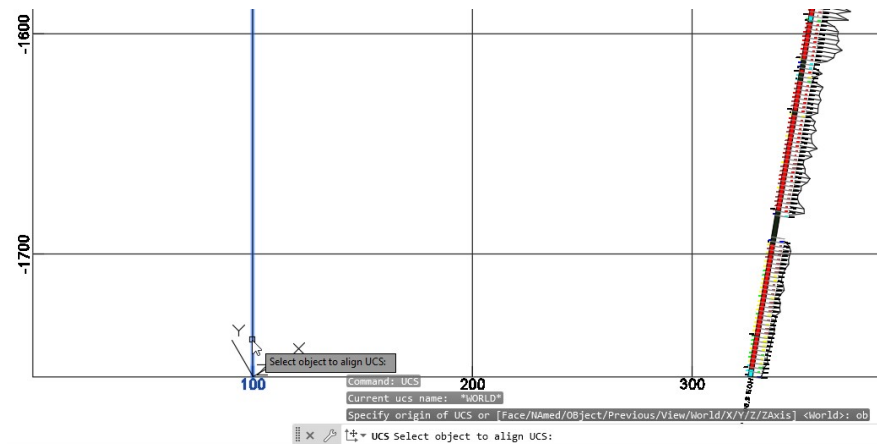
Drawing a cross section or a Level plan.

If you plot a cross section or plan with a grid, the grid is centered halfway through the cross section or at the average of the minimum and maximum elevations in the level plan. On plotting the UCS in AutoCAD is set to world.

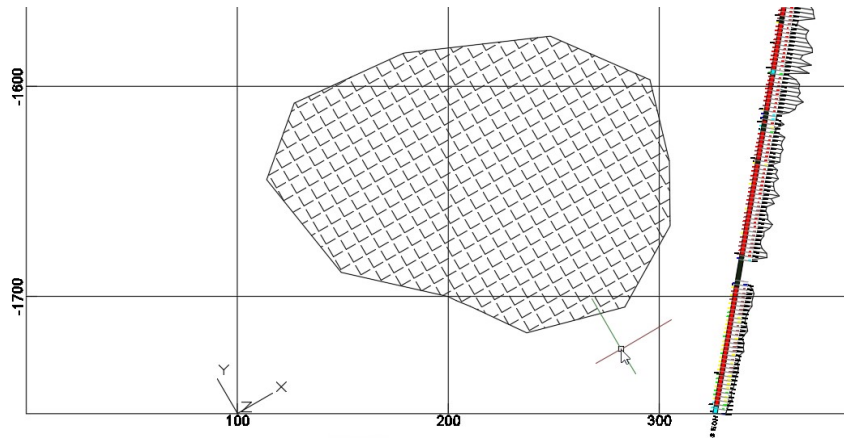
To plot on the grid type *UCS, ob* for object, then select one of the grid lines. The UCS is now aligned with the grid, and you can draw on the grid. Type *UCS select world* to go back to the normal UCS.



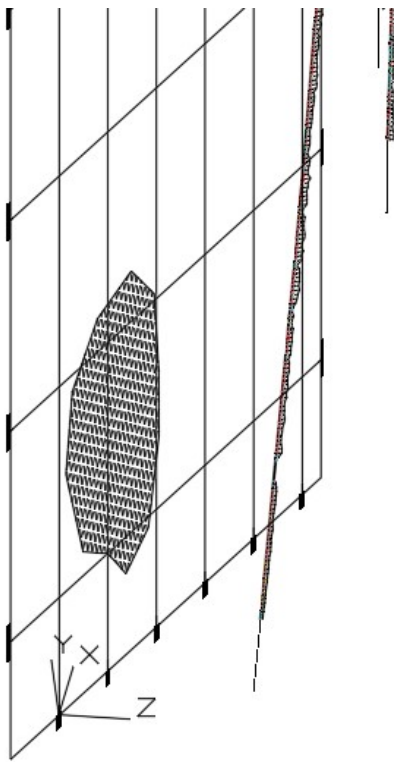
Type *UCS select ob* for object



Then snap onto one of the grid lines



You can now draw on the grid. Rotated view below.



Integrating with AutoCAD Map 3D

AutoCAD Map has a very wide range of GIS features that can be added to the drawing you create.

- Connection to raster images in a wide range of formats
- Connection to ARC GIS
- An additional range of point plotting options
- Additional scale bars, north symbols

Integrating with AutoCAD

AutoCAD also has a very wide range of features that can be added to the drawing you create. Note that when you install AutoCAD, you can install both AutoCAD and AutoCAD map as part of the same licence.

- 3D modelling
- Point clouds
- Output as dxf format to import into other programs.

Integrating with Access

Because drillXS is a compiled .accde database, the only objects you can create are tables and queries. Additional customization of the source .accdb file can be done on request. You can however link drillXS to another database where you can construct any type of access objects such as forms and reports.