12dModel

Getting Started for Surveying

Version 10.0

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12d Model 9 Getting Started for Surveying Manual

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Preface

Why a ‘Getting Started for Surveying’ Manual ?

12d Model is supplied with a comprehensive on-line Reference manual which describes the function of each menu option in detail. It is a Reference manual however and makes no attempt to describe how to use 12d for production surveying and civil engineering work.

This *Getting Started for Surveying* manual is designed to show you how to install *12d Model*, work with the on-line help system, and then as the first section of Training, help you start to learn how to use 12d to achieve typical surveying tasks. The *Getting Started for Surveying* manual uses examples where possible to clarify usage. It complements rather than replaces the on-line Reference manual. In general, information in the on-line Reference manual will not be duplicated here.

The Getting Started for Surveying manual is available as a printed manual and as a PDF file on the *12d Model Training DVD*.

Training Material

The training tutorials assumes that a series of files are already on your hard disk. These tutorial files are automatically installed from the DVD during installation of the 12d Model software.

Getting Started for Design

There is also a *Getting Started for Design* manual which has the first seven chapters in common with the *Getting Started for Surveying* manual (on-line help and basic modelling) but then diverts to cover topics from the direction of a civil designer whereas the *Getting Started for Surveying* manual continues on with surveying techniques.

The Getting Started for Design manual is available as a printed manual and as a PDF file on the *12d Model Training DVD*.

Using the Practise and Small Versions of 12d Model

The Practise version of *12d Model* is limited to a maximum of 5,000 points. Following the procedures as stated in the Training Manual may create projects with more than 5,000 points.

Where appropriate, the text will suggest how to vary the input for each instruction so that the example feature can be completed within the limits of the *12d Model Practise* version.

The number of points used at any time in the Practise and small versions can be displayed by the option

Projects => Check base points

The easiest way to reduce the current point count is to delete any unwanted models with

Models => Delete

The installed icon on your desktop for running the practise version of 12d with these training files is labelled ***12d 8 Practise***.

Please Note: Projects created by Practise versions of *12d Model* cannot be accessed by Release versions of 12d Model and vice-versa.

1 Installing 12d Model

The *12d Model 10 Installation DVD* can be used to install the *Release* and *Practise* versions of ***12d Model 10***.

The *Practise* version is limited to a maximum of 5,000 points and creates projects that cannot be accessed by the *Release* versions of *12d Model* and vice-versa. However the Practise version can be used free of charge by *12d Solutions* customers and registered Practise Users.

Installing the Release Version for Sites Not Running 12d Model 9 or 12d Model 10

For a **new** installation of the **Release** version of *12d Model 10*, the user is provided with

(a) one *12d Model* dongle

(b) one *12d Model 10 Installation DVD*

(c) an email with the *12d Model 10* authorization file *nodes.12d10n* attached, or a folder with the *12d Model 10* authorization file *nodes.12d10n* or *nodes.4d* in it.

Please check that you have all three items before commencing the installation.

The ***notes*** and ***video*** for a new install of the *Release* version of *12d Model 10* are on the ***12d Model 10 Installation DVD*** or can be downloaded from the 12*d* web site *www.12d.com* under the *Updates* area.

Installing the Release Version for Sites Already Running 12d Model 9 or 12d Model 10

Existing *12d Model 9* or *12d Model 10* users already have a dongle and so are only provided with

(a) one *12d Model 10 Installation DVD*

(b) an email with the *12d Model 10* authorization file *nodes.12d10n* attached, or a folder with the *12d Model 10* authorization file *nodes.12d10n* or *nodes.4d* in it.

For existing *12d Model 9* users, your existing dongle can be used with *12d Model 10*. If *12d Model 10* is **already** running on your computer, please **uninstall** it before installing a new version of *12d Model 10*.

The ***notes*** and ***video*** for a new install of the *Release* version of *12d Model 10* are on the ***12d Model 10 Installation DVD*** or can be downloaded from the 12*d* web site *www.12d.com* under the *Updates* area.

Installing the Practise Version:

To install a **Practise** version of *12d Model 10*, all that is needed is:

one *12d Model 10 Installation* DVD

or *12d Model 10 Practise* downloaded from www.12d.com

The *Practise* version must be Registered with *12D Solutions* once it is installed on a computer. A new Registration is required for each computer that the Practise version is run on.

The ***notes*** and ***video*** for installing the practise version of 12d Model 10 are on the *12d Model 10 Installation DVD* or can be downloaded from the 12*d* web site *www.12d.com* under the *12d Model 10 Practise* area.

2 Before You Begin the Training

2.1 Installing the Training Files

If you have installed Training from the *12d Model Installation DVD*, then the *Training* folder will have been automatically created for you but where the files reside on the disk depends on whether you installed the *Release* version or the *Practise* version of 12d Model.

The Training manual dialogue assumes that the working folder (i.e. shortcut) of your ***12d Model 10*** or ***12d Model 10 Practise*** icon is set to

c:\12d\10.00 for the *Release* version of 12d Model

and

c:\12 Model 10 Practise for the *Practise* version of 12d Model

The training files can be place in any sub-folder on your hard disk but for convenience in this manual, it is assumed that the training files are installed in

c:\12d\10.00\Training

All the required material is already in the ***Training*** folder.

2.2 12d Icons on your Desktop

It is recommended that you use the ***12d Model 10*** icon for the ***Release*** version or ***12d Model 10 Practise*** icon for the ***Practise*** version whilst initially working with this training manual. The reason for this is that the icon points directly to the folder that containing the ***Training*** folder.

2.3 Using the Practise Version

Remember that the ***Practise*** version of 12d Model is limited to a maximum of 5,000 points.

Following the procedures as stated in the Training Manual may create projects with more than 5,000 points. Where appropriate, the text will suggest how to vary the input for each instruction so that the example feature can be completed within the limits of the *12d Model Practise* version.

2.4 Overview of 12d File and Folder Structures

Before you begin using 12d, it is useful to understand how 12d uses the file and folder structure under Windows XP, Vista and 7.

12d recognises long filenames up to 256 characters so you are not limited to the old DOS convention of 8.3 filenames.

The 12d software and its support files are installed on your hard disk, the program itself is installed into the folder c:\Program Files\12d and various subfolders below. The training data and user areas, are installed into the folder c:\12d10.00 and subfolders below.

When the software was installed, the ***12d Model 10*** program icon is setup to point to the folder c:\12d\10.00.

The tutorial is about designing a road and the training the files have been set up in a folder c:\12d\10.00\Training\10.00\Design\Getting Started Basic.

As each 12d Model project you work on will have different files, it is strongly recommended that you keep each project in a separate subfolder. This can be anywhere on your hard disk or network. For convenience, you may prefer to keep them all under one major folder e.g. c:\12djobs.

In the general case for production work however, if you were about to start work on a new project by the name ‘Highway’, you would like it to be in a new folder under say 12djobs i.e. c:\12djobs\Highway. This is simply done from within 12d Model where a folder of the same name as the project is automatically created with the project inside it.

Either numeric or alpha characters and spaces can be used in 12d Model project names so you may prefer to use your job name as the project name. Also 12d project names are *not* case sensitive so ‘Highway’ is seen as the same name as ‘highway’.

2.5 Why Keep Projects in Separate

12d can have more than one project within the one Windows folder. For example, projects under ‘Highway’ might be ‘Stage 1’ and ‘Stage 2’ or ‘Fred’ and ‘Bill’. Each project has its own data and configuration setup which controls the number of views, which models are on display etc.

However although most internal 12d project files are kept separate another projects internal files, all *input* and *output* files, *mtf* files, *chains*, *plots* and *reports* go into the folder containing the project and are not held inside the project itself. Hence to prevent projects interfering with each other, it is best to create a separate folder and create each project in its own folder.

For example, if the Highway project has two stages, create the project ***Stage 1*** in the folder ***Highway\Stage 1*** and the project ***Stage 2*** in the folder ***Highway\Stage 2***

Once inside 12d, from within any one project, it is possible to import any or all data from another project so there is some flexibility on a major job to move/copy survey or design data between stages if staging is used and then have multiple users perform parallel development. Model and tin sharing could later be used to subsequently assemble staged project data at the completion of a major job. Within any one project, model names must be unique so some planning is necessary if parallel development streams are subsequently to be reassembled. Models can be renamed at any time. Models are discussed in See Chapter 3.11 (on page 36).

Provided no 12d user is currently accessing a particular project, the project (and the folder containing it) can be copied, renamed, moved and deleted from within 12d.

WARNING - information inside the project itself ***should not*** be manipulated except from within ***12d Model*** since this may corrupt the project and data could be lost. For example, model names can only be renamed from within 12d Model.

If you need to manually place any files on disk for a project (e.g. survey files from a total station or CAD files to get data into 12d), it is recommended that you place them in the folder containing the project. that way all the data and the project are in the one folder.

2.6 File Backup Procedures

To ensure that you can retrieve any job or project at any time from backup procedures, it is important that a complete ‘set’ of files is taken whenever backup is created. To backup the files associated with the ‘Highway’, you would typically backup all files and sub-folders in and below

c:\12djobs\Highway

There are configuration files used that may be used in the Highway job, that are supplied by 12D Solutions and are automatically installed from the 12d Model Installation DVD. These files are in

c:\Program Files\12d\12dmodel\10.00\set_ups

c:\Program Files\12d\12dmodel\10.00\library

There are other user configurable files that 12d may use and require to fully recreate all steps of a project. They are not supplied on the 12d Model Installation DVD. These files are typically in

c:\12d\10.00\user

c:\12d\10.00\user_lib

These folders may contain files that have been configured specifically for your site e.g. your corporate standard mapping, template and plot parameter files, your particular Total Station survey macros and any user defined macros etc. In general, such files are not project specific, however because these files are user configurable they may be changed at any time and hence particular project specific versions of them may be needed as part of the complete file set of a project.

In the above case, the folders shown are for 12d Model 10. As implied, the files in these folders will never be changed automatically by the installation process when you reinstall a later version of 12d.

The above paths are indicative only. It is possible that folders have been setup at different places for your site. For more information on exactly where all library and user folders are located, refer to the following environment variables in Appendix A of the on-line Reference manual.

USER_4D
USER_LIB_4D
SET_UPS_4D
LIB_4D

3 Basic Operations

3.1 The 'Mouse'

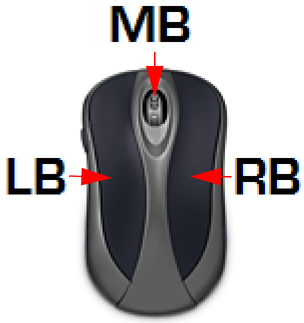
12d works best with a three button mouse (preferable a wheel mouse). 12d will work with a (Microsoft) two button mouse but the lack of the middle button means that you have extra mouse clicks to perform.

All 12d Documentation uses the following notation for mouse functions.

LB = left mouse button - used for picking screen items, menus etc.

MB = middle mouse button - used to accept the highlighted item

RB = right mouse button - used to pop up a list of alternatives



The left button is the 'Select' button – typically used to select graphic items or text. The middle button (or wheel) is the 'Accept' button, used to confirm a selection. The right button is the 'Menu' button. It is context sensitive and often displays a list of alternatives available at that instant.

With a two button mouse you achieve this functionality by clicking the right mouse button to pop up the 'Pick Operations' menu and then clicking LB on **Accept** or by simply pressing the <Enter> key

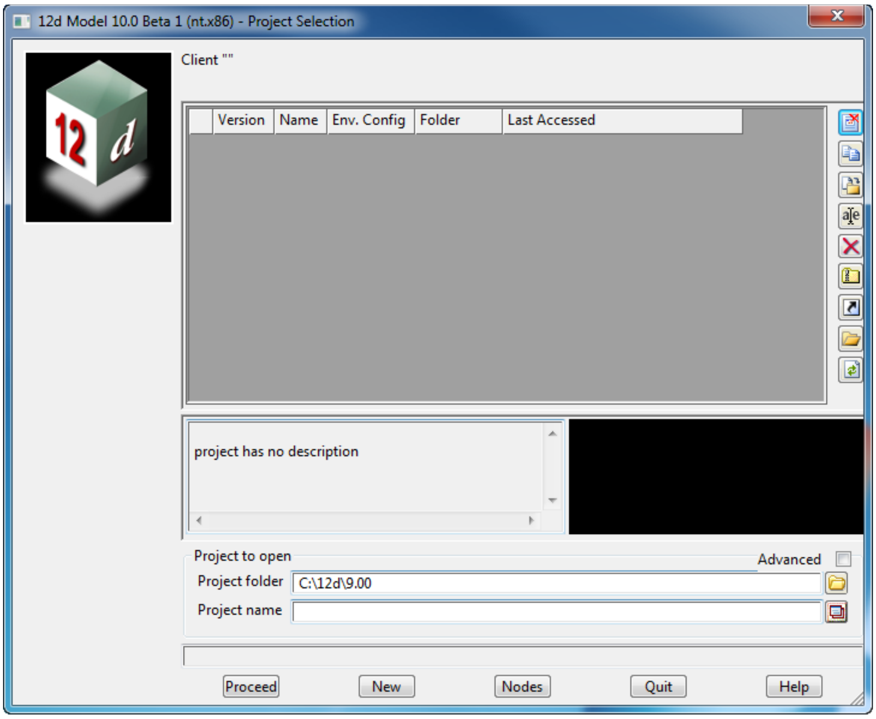
The term 'clicking' a button means pressing it down and releasing it again. The position of the mouse is taken at the time the button is released. In this tutorial manual, items that are selected by a mouse click are in **bold**.

As we get more experienced, we will also introduce the term 'dragging' the mouse for some advanced 12d operations. We do this by pressing down a button and whilst still holding it down, moving the mouse so that the screen cursor moves. Once a definite distance has been achieved, just a millimetre or two is sufficient, release the button. 12d notes the vector you defined and can use this information to detect the direction in which you dragged the mouse.

Finally, we will use the term 'double clicking'. This is where we press the button twice in quick succession. This is often used for short-cuts.

3.2 Starting Up - The Project Selection panel

If you installed ***12d Model*** from the *12d Model Installation DVD*, then a ***12d Model 10.0*** icon will have been created on your desktop. Double clicking on this icon will take you directly into the 12d\10.00 folder.



12d Model 10.0 Beta 1 (nt.x86) - Project Selection

Client ""

project has no description

Project to open

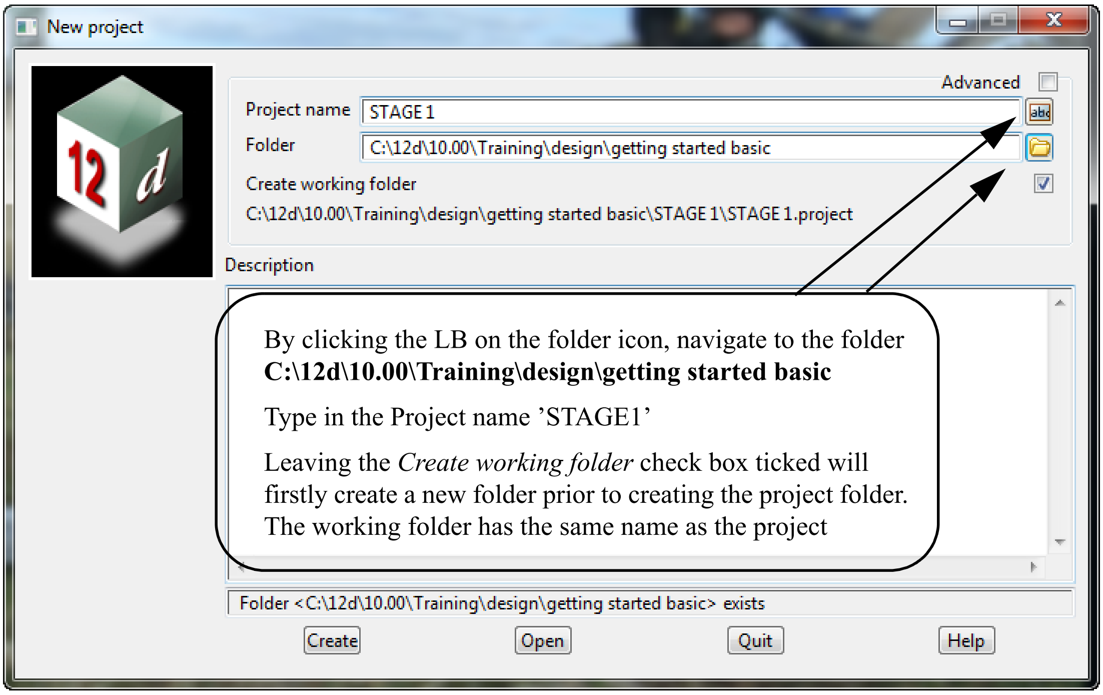
Advanced ☐

Project folder C:\12d\9.00

Project name

Once you are inside 12d, the Project Selection panel will appear.

To create a new project click the LB on *New* button at the bottom of the panel.



New project

Advanced ☐

Project name STAGE 1

Folder C:\12d\10.00\Training\design\getting started basic

Create working folder ☑

C:\12d\10.00\Training\design\getting started basic\STAGE 1\STAGE 1.project

Description

By clicking the LB on the folder icon, navigate to the folder **C:\12d\10.00\Training\design\getting started basic**

Type in the Project name ’STAGE1’

Leaving the *Create working folder* check box ticked will firstly create a new folder prior to creating the project folder. The working folder has the same name as the project

Folder <C:\12d\10.00\Training\design\getting started basic> exists

Click LB on *Create* button to create the project.

Notes:

1. It is important to select names that are meaningful to your job as you may have several projects associated with a large or complex job.
2. You only need to create a new project once. To access this project in subsequent 12d sessions, double click the LB on the project name from the pop up list. 12d will normally pop up the list automatically. If needed, you can use the button to open the list manually.

RULES FOR ENTERING DATA INTO PANELS

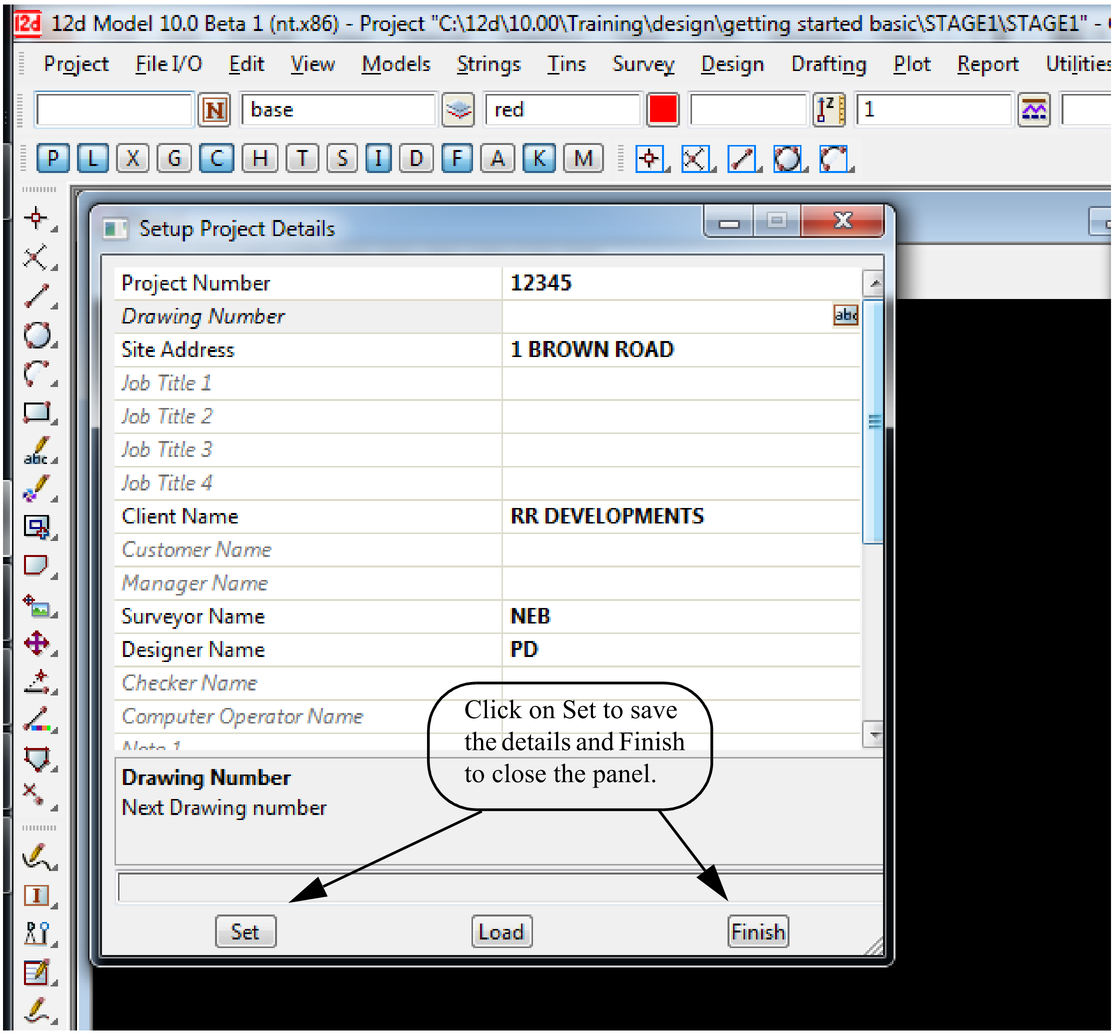
Important: The cursor must be locked into the appropriate data entry field when typing data into a 12d panel. Often this will happen automatically. If you cannot see the cursor flashing in the data field in which you want to enter data, use the mouse to position the cursor anywhere over the data field and click the LB to lock the cursor into the field before typing any data. Terminate the data entry sequence by pressing the Enter key.

If you make a mistake, you can always select the erroneous entry by double clicking over it with the mouse LB. The text should then appear highlighted. As you retype it, the old entry is deleted.

When filling in data in any 12d panel, it is not essential to terminate the entry of data by pressing the 'Enter' key. You can use the 'Tab' and 'BackTab' keys to move from field to field. You can also use the mouse to jump between fields. If you do press the Enter key to terminate the entry of data into a field, 12d will immediately validate the data in that field and supply an error message if appropriate

Once a project is selected, the graphics screen will display, with the *Setup Project Details* panel open. Fill in the panel with the relevant required details

Note that you must use the LB to click between fields and cannot use the 'Enter' or 'Tab' keys


12d Model 10.0 Beta 1 (nt.x86) - Project "C:\12d\10.00\Training\design\getting started basic\STAGE1\STAGE1" -
Project File I/O Edit View Models Strings Tins Survey Design Drafting Plot Report Utilities
base
red
1
P L X G C H T S I D F A K M
Setup Project Details
Set
Load
Finish

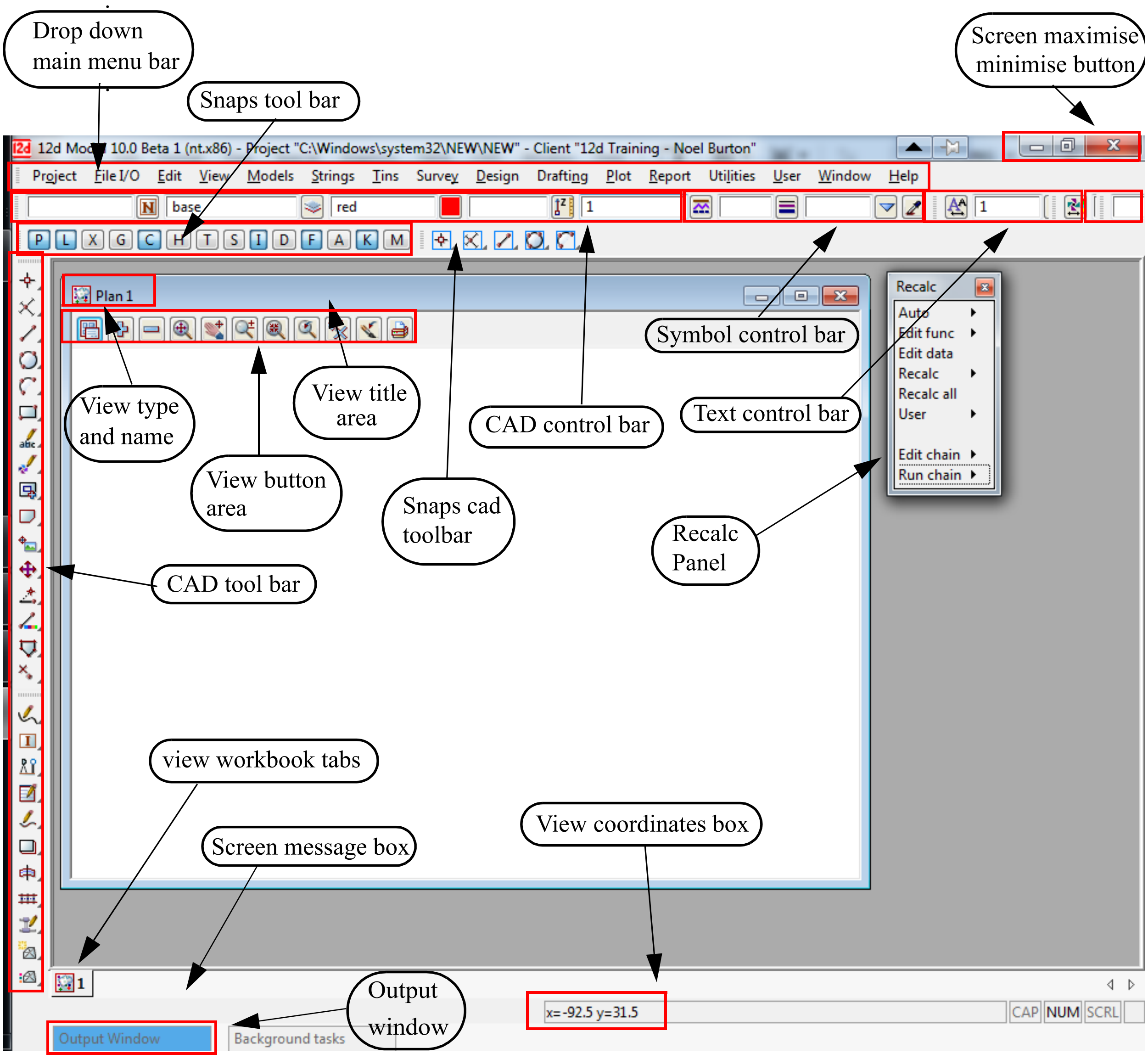
Project Number	12345
Drawing Number	
Site Address	1 BROWN ROAD
Job Title 1	
Job Title 2	
Job Title 3	
Job Title 4	
Client Name	RR DEVELOPMENTS
Customer Name	
Manager Name	
Surveyor Name	NEB
Designer Name	PD
Checker Name	
Computer Operator Name	

Drawing Number
Next Drawing number

Click on Set to save the details and Finish to close the panel.

3.3 The Initial Screen Layout

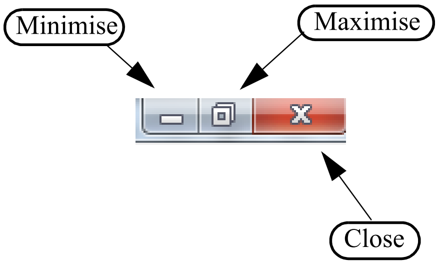
The default background colour for a view is black. Black is the best colour for reducing eye strain, and for distinguishing colours displayed in the view. The names we use for the various parts of the screen are shown on the diagram below. Your screen may not appear exactly as shown as most components on the screen can be moved or turned off by user configuration options.


Drop down main menu bar
Snaps tool bar
Screen maximise minimise button
12d Model 10.0 Beta 1 (nt.x86) - Project "C:\Windows\system32\NEW\NEW" - Client "12d Training - Noel Burton"
Project File I/O Edit View Models Strings Tins Survey Design Drafting Plot Report Utilities User Window Help
base
red
1
P L X G C H T S I D F A K M
Plan 1
Symbol control bar
Text control bar
CAD control bar
View type and name
View title area
View button area
Snaps cad toolbar
Recalc Panel
Recalc
Auto
Edit func
Edit data
Recalc
Recalc all
User
Edit chain
Run chain
CAD tool bar
view workbook tabs
Screen message box
View coordinates box
Output window
Output Window
Background tasks
x=-92.5 y=31.5
CAP NUM SCRL

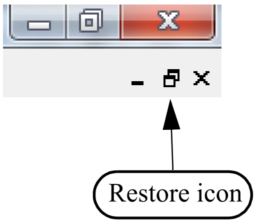
To make the *Getting Started* manuals easier to print on in-house printers, all of our illustrations have a white background colour.

Note that the View with the white background is headed ‘Plan 1’. Each View in 12d is assigned to a Window. Like all Windows, they can be Minimised, Maximised or Closed.

The Plan View "1" can be maximised by clicking LB on the square button in the top right hand corner of the view menu.

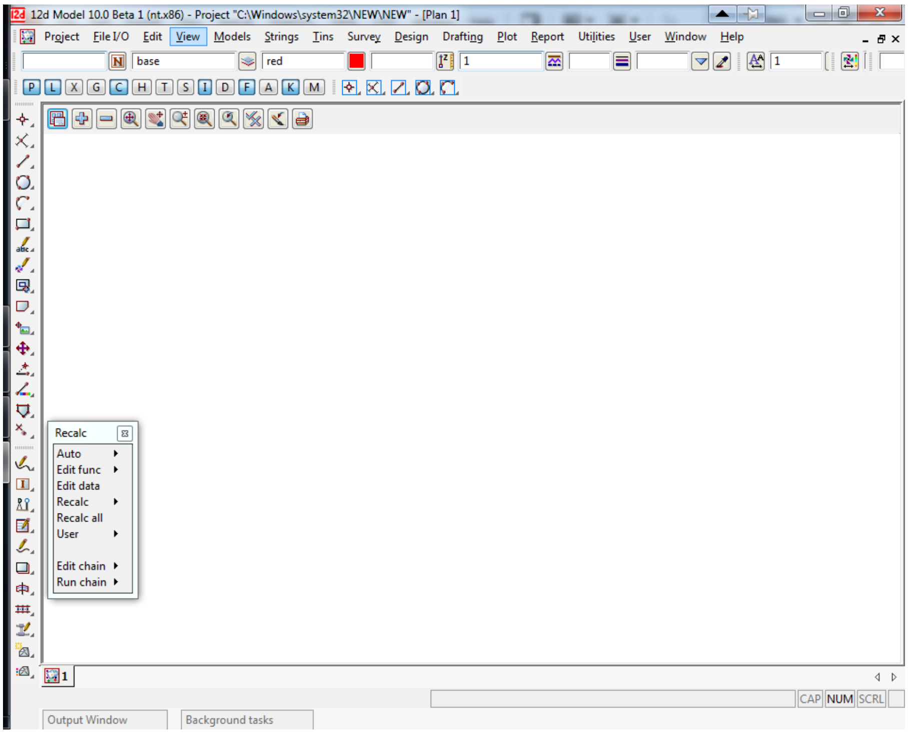

Minimise
Maximise
Close

This then takes up the entire viewing area. Alternatively, you can double click LB on the plan view title area to maximise the view (The blue area to the left of the Minimise button). To reduce it back to its original size you can hit the restore icon.


Restore icon

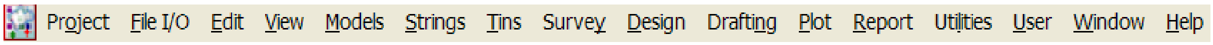
The ‘Recalc’ panel is used to quickly rerun design calculations and will be discussed later. We will move the panel down to the bottom left of the screen.

The view should then look as shown below.

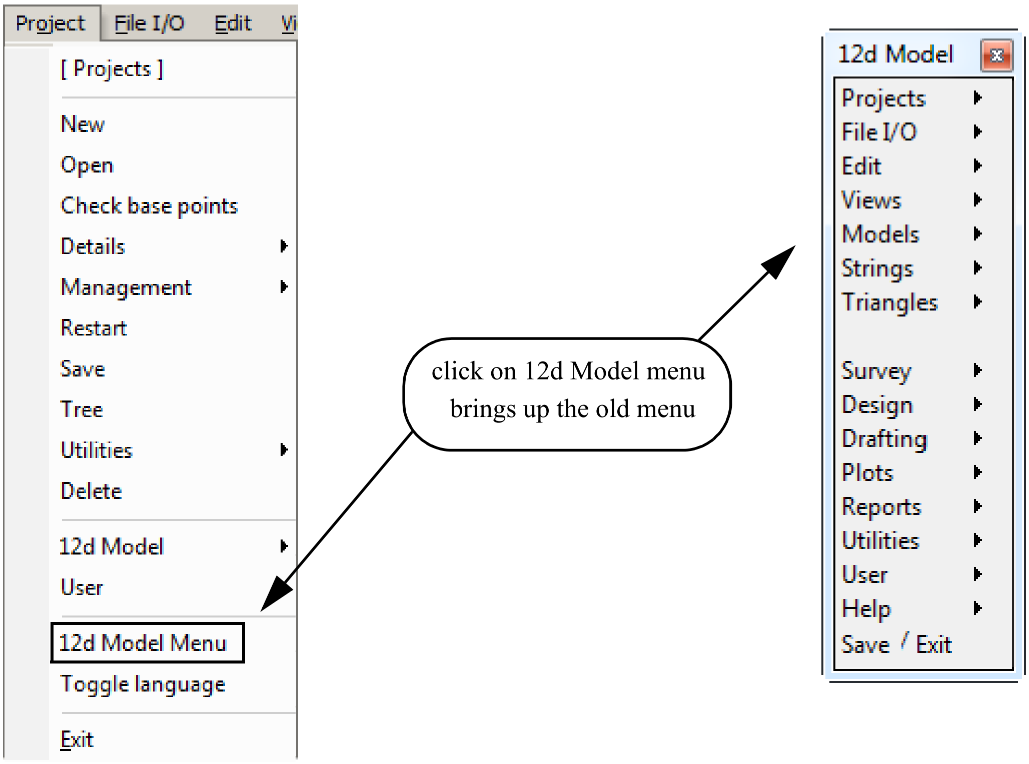

12d Model 10.0 Beta 1 (nt.x86) - Project "C:\Windows\system32\NEW\NEW" - [Plan 1]
Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Drafting
Plot
Report
Utilities
User
Window
Help
N
base
red
1
1
P L X G C H T S I D F A K M
Recalc
Auto
Edit func
Edit data
Recalc
Recalc all
User
Edit chain
Run chain
1
CAP
NUM
SCRL
Output Window
Background tasks

3.4 How to Find Your Way Around 12d Menus

12d options are run by a number of methods. The ‘Drop Down’ menu system from the bar running across the top of the screen is the main way we access 12d programs.


Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Drafting
Plot
Report
Utilities
User
Window
Help

In addition to the ‘Drop Down’ Main menu system, there is a ‘12d Model’ menu which is maintained for compatibility reasons with earlier versions of the software. This is found at **Projects=>12d Model menu**.


Project
File I/O
Edit
Vi
[Projects]
New
Open
Check base points
Details
Management
Restart
Save
Tree
Utilities
Delete
12d Model
User
12d Model Menu
Toggle language
Exit
12d Model
Projects
File I/O
Edit
Views
Models
Strings
Triangles
Survey
Design
Drafting
Plots
Reports
Utilities
User
Help
Save / Exit

click on 12d Model menu brings up the old menu

12d has a unique graphical user interface (GUI) involving hundreds of menu items. These are logically grouped by function in a ‘Walk Right’ and ‘Tear Off’ menu system. ‘Walk Right’ menus are menus designed such that if you move the mouse cursor right on a menu item containing a right arrow, a further menu will pop up, usually on the right hand side. ‘Tear Off’ menus means that a menu can be torn off it’s parent menu and relocated elsewhere on the screen for clarity of operation. In general, it is possible to have multiple copies of the same ‘Tear Off’ menu on the screen at one time.

Notice that the order of items left-to-right on the ‘Drop Down’ Main menu bar is the same as the top-to-bottom order on the ‘Walk Right’ 12d Model menu. You can select menu items from either one of these sources – the end result is the same.

The ‘Drop Down’ menu bar conforms to normal Microsoft standards so it can be dragged and placed at any of the four sides of your desktop. It is probably most useable left at the top of your desktop.

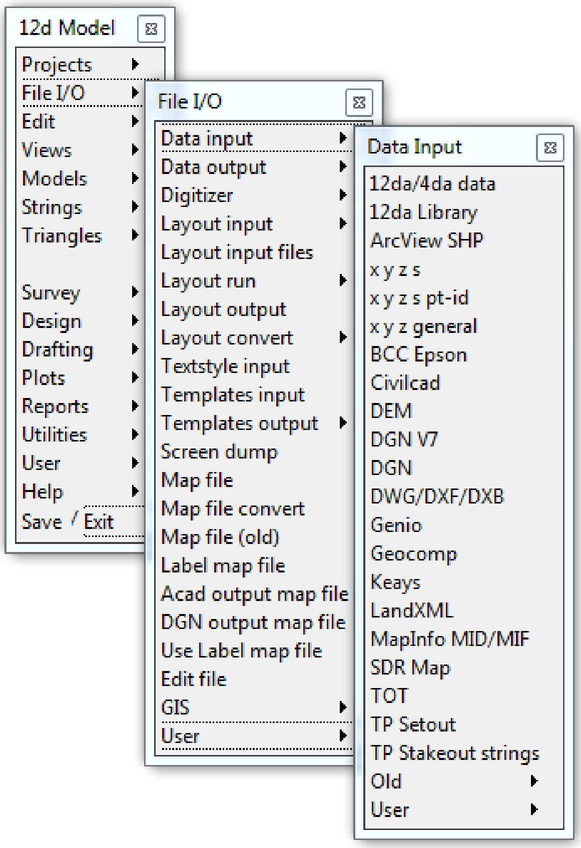
The following comments apply to ALL menus. To move any menu around on the screen, you ‘drag’ it by **depressing** the LB in the ‘blue’ coloured View Title area, anywhere other than over the ‘X’ in the top right hand corner. With the button still depressed, move the mouse to the desired location and release the button to repin the menu. The same procedures also apply when moving panels and views. When doing this just make sure that LB is clicked in the general heading area and not on a View button.

To ease the learning and usage process, a menu description system has been adopted in this manual that describes where to look to achieve a specific function. For instance, to import an AutoCAD DXF file of point and line data into 12d, you ‘Walk Right’ on the 12d Model menu or from the ‘Drop Down’ main menu bar, through two submenus and select DWG/DXF. This instruction is documented as…

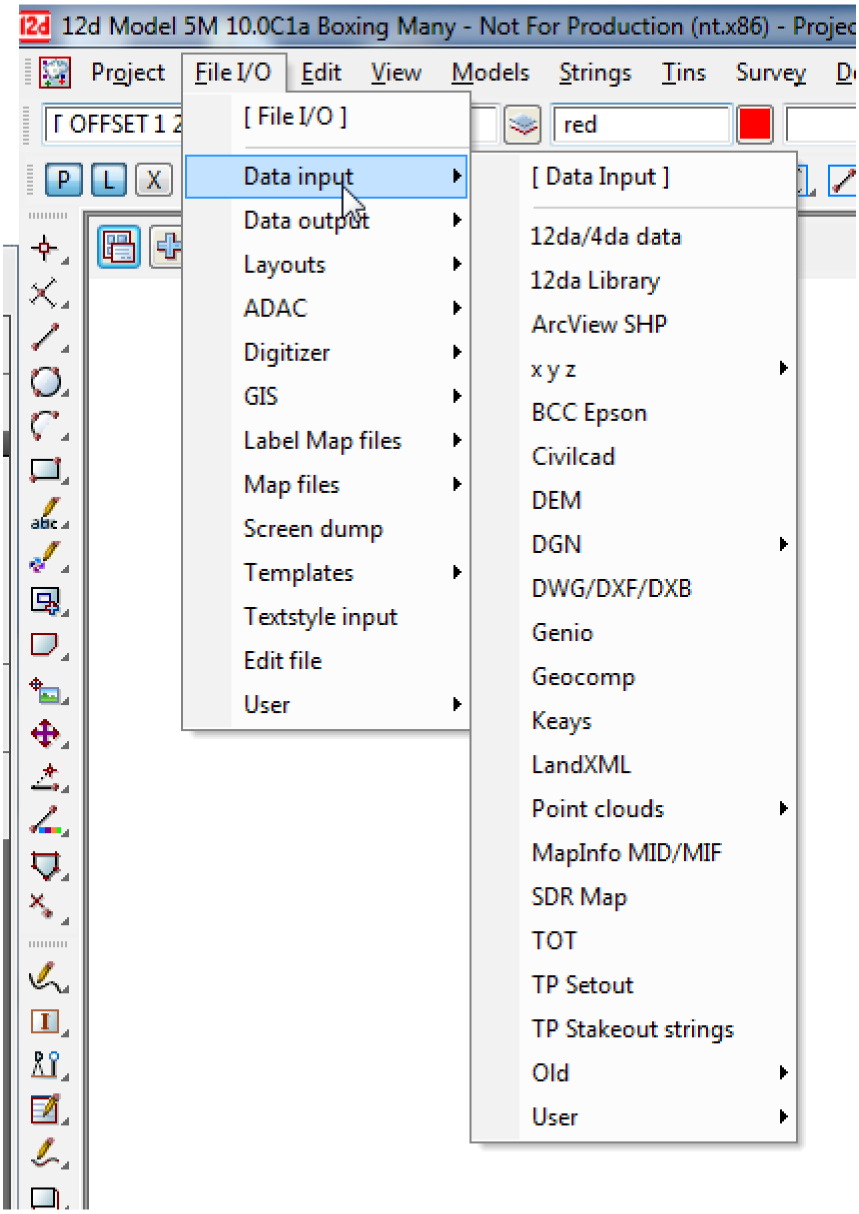
File I/O =>Data Input =>DWG/DXF/DXB

To display submenus from the ‘Walk Right’, you do not need to use the mouse buttons. Simply position the mouse cursor over the 12d Model menu and once ‘File I/O’ is highlighted, slide the mouse right over the arrow and the ‘File I/O’ menu will pop up. Slide further right on the ‘Data Input’ menu item and the ‘Data Input’ menu will pop up.

Your screen should appear as follows

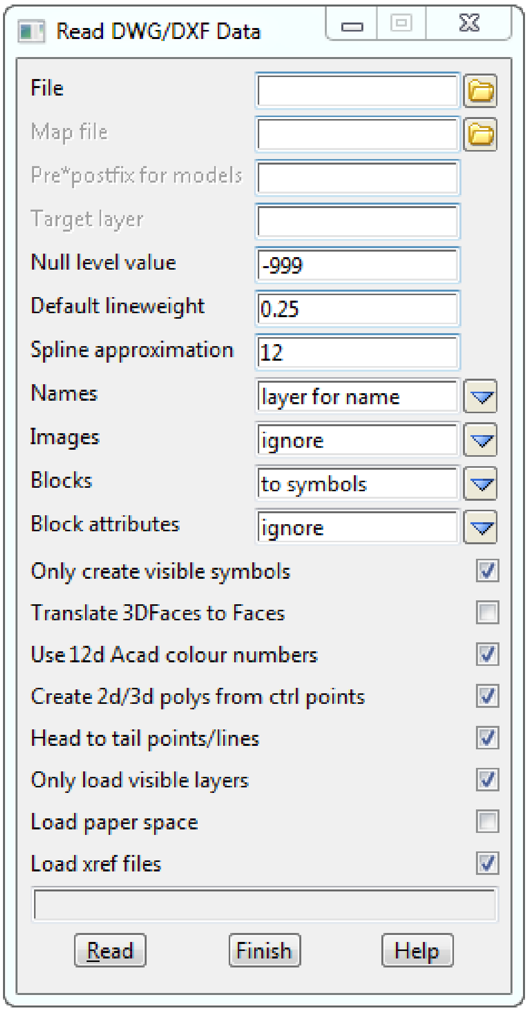

12d Model
Projects
File I/O
Edit
Views
Models
Strings
Triangles
Survey
Design
Drafting
Plots
Reports
Utilities
User
Help
Save / Exit
File I/O
Data input
Data output
Digitizer
Layout input
Layout input files
Layout run
Layout output
Layout convert
Textstyle input
Templates input
Templates output
Screen dump
Map file
Map file convert
Map file (old)
Label map file
Acad output map file
DGN output map file
Use Label map file
Edit file
GIS
User
Data Input
12da/4da data
12da Library
ArcView SHP
x y z s
x y z s pt-id
x y z general
BCC Epson
Civilcad
DEM
DGN V7
DGN
DWG/DXF/DXB
Genio
Geocomp
Keays
LandXML
MapInfo MID/MIF
SDR Map
TOT
TP Setout
TP Stakeout strings
Old
User

Alternatively, you can use the ‘Drop Down’ menu bar to get to the same point …


12d Model 5M 10.0C1a Boxing Many - Not For Production (nt.x86) - Projec
Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Γ OFFSET 1 2
red
P
L
X
[File I/O]
Data input
Data output
Layouts
ADAC
Digitizer
GIS
Label Map files
Map files
Screen dump
Templates
Textstyle input
Edit file
User
[Data Input]
12da/4da data
12da Library
ArcView SHP
x y z
BCC Epson
Civilcad
DEM
DGN
DWG/DXF/DXB
Genio
Geocomp
Keays
LandXML
Point clouds
MapInfo MID/MIF
SDR Map
TOT
TP Setout
TP Stakeout strings
Old
User

To get to this same point using the pull down system, you need to click LB on [File I/O] on the ‘Drop Down’ menu bar and then proceed as before on the walk rights as shown below.

Regardless of which menu selection method you used, place the cursor over the words ‘DWG/DXF/DXB’ and click the left mouse button (LB) once. The ‘Read DWG/DXF Data’ panel will appear.



Read DWG/DXF Data

File
Map file
Pre*postfix for models
Target layer
Null level value -999
Default lineweight 0.25
Spline approximation 12
Names layer for name
Images ignore
Blocks to symbols
Block attributes ignore
Only create visible symbols ☑
Translate 3DFaces to Faces ☐
Use 12d Acad colour numbers ☑
Create 2d/3d polys from ctrl points ☑
Head to tail points/lines ☑
Only load visible layers ☑
Load paper space ☐
Load xref files ☑

The panel is placed on the screen at the location where the mouse cursor was when LB was clicked.

Once the panel is selected, the Walk Right menu system should collapse and be removed from the screen. If you move and repin any of the menus however, they will not collapse automatically.

If a menu is in the way, you can move it as stated above. Any menu can be removed by clicking LB on the ‘X’ button in the top right hand corner.

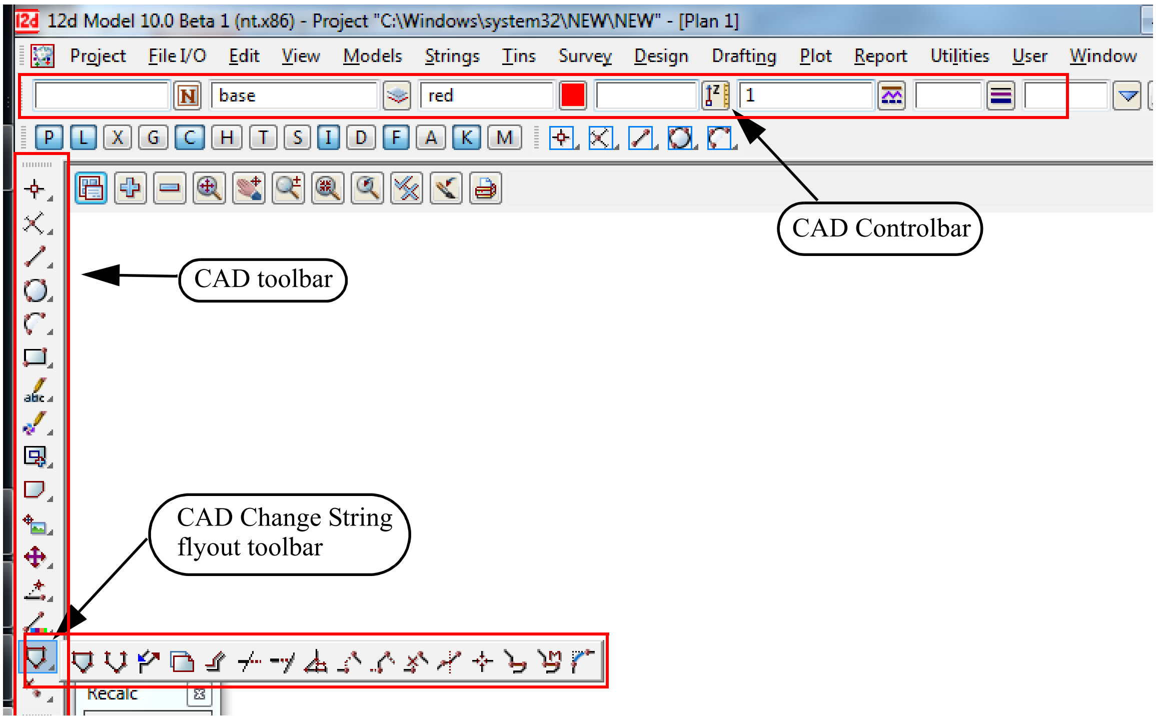
You would normally now start entering data into the panel. At this time, we will not proceed further with this panel. Shut down the panel by clicking LB on the ☒ in the top right hand corner or clicking LB on **Finish** at the base of the panel.

CAD Toolbar and CAD Contolbar

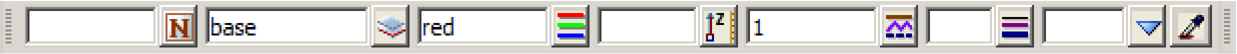
In 12d Model there are CAD options which are available under both the *Strings =>CAD* menu and on the *CAD Toolbar* on the left hand side of the 12d Model screen.

The **CAD** options create various elements using a number of methods. These options make use of **Tool bars** and **Control bars**. Tool bars just have icons on them but Control bars have icons and also controls such as a model box on them. The method groupings are shown on the toolbars (e.g. Points, Lines etc.).

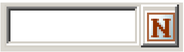
The user can select an icon on the tool bar and a **Flyout** for all options of the grouping are displayed. This can be done by selecting the appropriate group symbol by holding down the left mouse button on the icon. This shows all the different options for that grouping in a flyout panel. Whilst still holding down the left mouse button, the user can move along the flyout toolbar to the appropriate option.


12d Model 10.0 Beta 1 (nt.x86) - Project "C:\Windows\system32\NEW\NEW" - [Plan 1]
Project File I/O Edit View Models Strings Tins Survey Design Drafting Plot Report Utilities User Window
base
red
1
P L X G C H T S I D F A K M
CAD Controlbar
CAD toolbar
CAD Change String flyout toolbar
Recalc

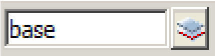
The elements created from the CAD options will have attributes as defined by the **Cad Control Bar**. This control bar is placed on the top left hand side of the screen under the main menu control bar on the creation of a project



The fields and buttons used in this control bar have the following functions.

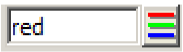
Field Description	Type	Defaults	Pop-Up
	name box		names.4d names

name of string. If a valid name already exists in names.4d, the **[N]** *button can be used to bring up a choice box of available names. On selection of a valid name, the rest of the values in the control bar will be filled out. e.g. colour, linetype etc.*


base

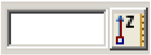
	model box	base	existing models

this field can be recognised by the model icon button on the right hand side of the field. The user can select an existing model by selecting the model icon. If a new model is to be used, the user simply types the model name into the field.


red

	colour box	red	standard 12d colours

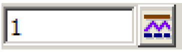
this field can be recognised by the colour icon button on the right hand side of the field. The user can select a 12d standard colour model by selecting the colour icon



	height input		Measures menu

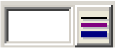
this field allows a height or z value to be assigned to the created elements. If a valid value exists, this value will be applied to the created element. This is regardless if the z value was specified in an XYZ box.

If no value is specified, the level will be interpolated where possible. A value of **null** *can be entered into the height field as well so that created points will be given a null height value.*


1

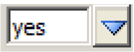
	linetype box	1	valid linestyles

this field can be recognised by the linestyle icon button on the right hand side of the field. The user can select a valid linestyle by selecting the linestyle icon



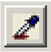
	weight box		

this field allows the user to type in a line weight for the cad item created


yes

	button		

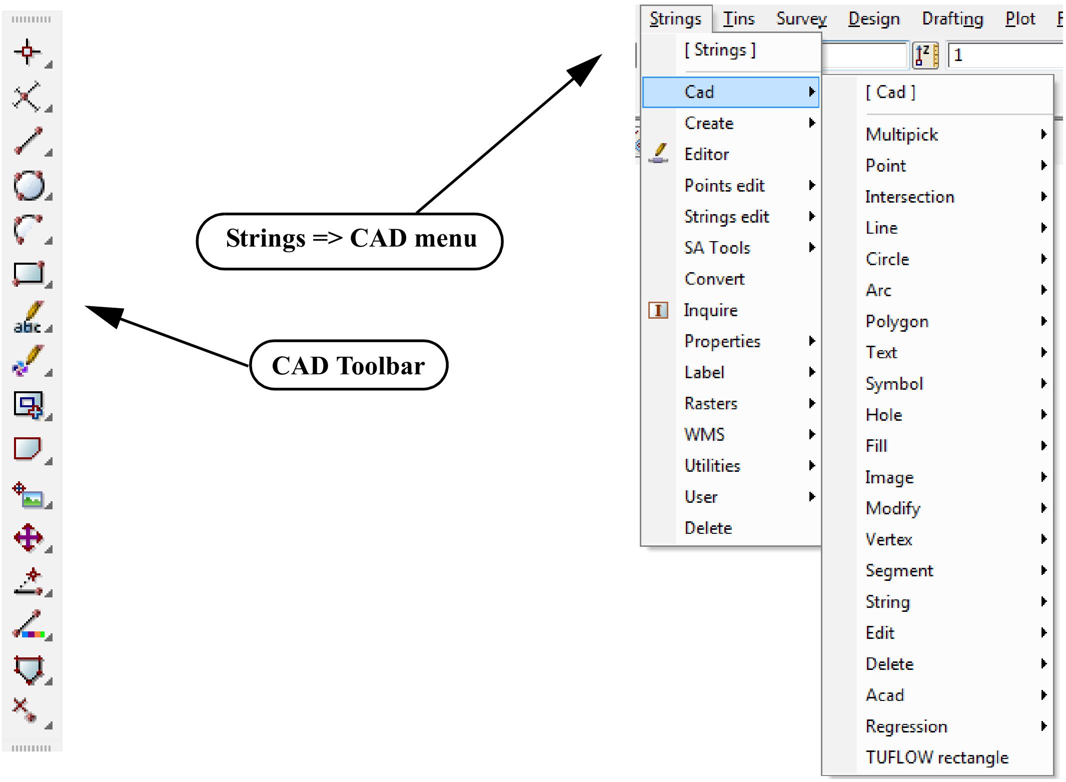
the Tinable field sets whether the vertices and segments are tinable (used in triangulations), not tinable (not used in triangulations) or only the vertices (points) are tinable.



	button		

the eye dropper allows the user to select an existing element which will define the cad control bar values.

The **CAD** options are available from the **CAD toolbar** or from the **CAD** menu under Strings.

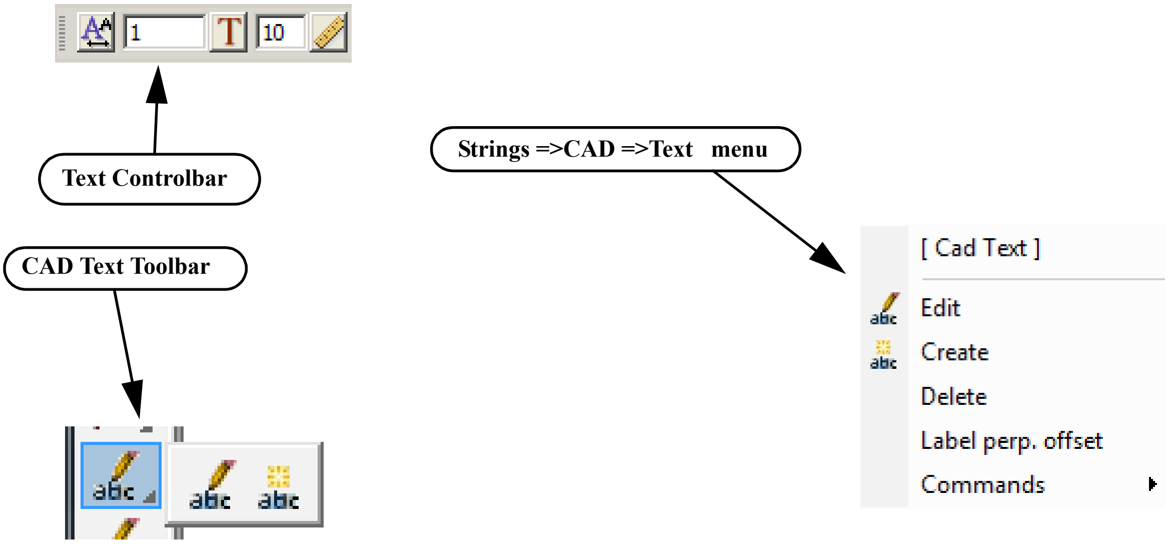

Strings => CAD menu
CAD Toolbar
Strings
Tins
Survey
Design
Drafting
Plot
[Strings]
Cad
Create
Editor
Points edit
Strings edit
SA Tools
Convert
Inquire
Properties
Label
Rasters
WMS
Utilities
User
Delete
[Cad]
Multipick
Point
Intersection
Line
Circle
Arc
Polygon
Text
Symbol
Hole
Fill
Image
Modify
Vertex
Segment
String
Edit
Delete
Acad
Regression
TUFLOW rectangle

When options are chosen from the CAD Toolbar, help messages are written to the Screen Message Box at the bottom of the 12d Model screen. Since there is no panel or menu involved with the CAD toolbar options, there is nowhere for an F1 key to function for on-line help.

Hence all the CAD options are documented under each of the walk-right menus for the *Strings =>CAD* menu.

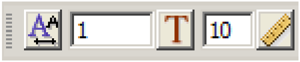
CAD Text Toolbar and Text Controlbar

The various **Text** options are:



Text can occur as a text string, on vertices of a 4d string, and on vertices and segments of a super string. Each type of text has a vertex (these are displayed when Vertices are toggled on in a plan view), a justification point, a rotation, an offset and a raise value. The vertex and justification point only coincide if the offset and raise values are both zero. All text on a 4d string must have the same height, colour, angle, offset and raise. Each part of the text on a super string vertex segment can be independently modified depending on the settings for the super string.

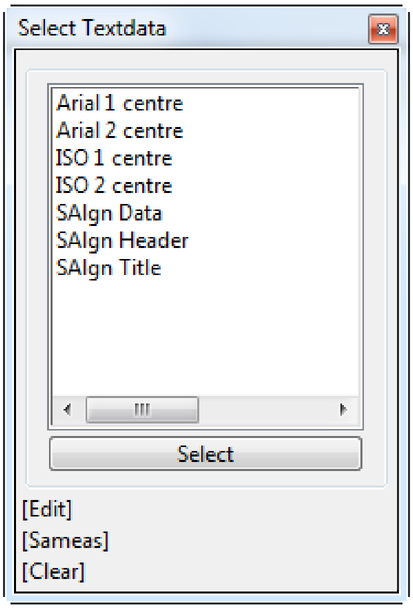
For text options, the created elements will have attributes as defined by the **Text Control Bar**. This control bar is placed at the top right of the screen under the main menu control bar on the creation of a project



The fields and buttons used in this control bar have the following functions.

Field Description	Type	Defaults	Pop-Up
	Textstyle data box		

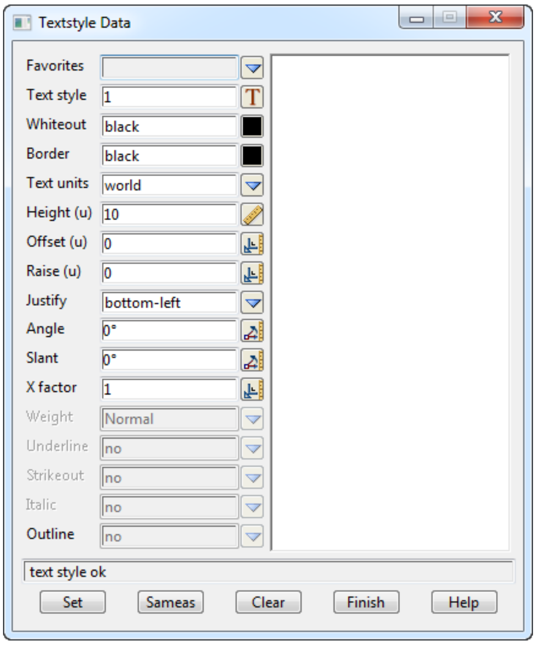
On pressing the button a list of available textdata with predefined names read from the ***texstyle_names.4d*** *file are displayed.*



Select Textdata

Arial 1 centre
Arial 2 centre
ISO 1 centre
ISO 2 centre
SAlgn Data
SAlgn Header
SAlgn Title

If you require a different textsyle, the user can edit the current settings by selecting the *[Edit]*button to bring up the **textstyle data** panel. This allows for definition of textstyle, units, height offset raise etc.



Textstyle Data

Favorites	
Text style	1
Whiteout	black
Border	black
Text units	world
Height (u)	10
Offset (u)	0
Raise (u)	0
Justify	bottom-left
Angle	0°
Slant	0°
X factor	1
Weight	Normal
Underline	no
Strikeout	no
Italic	no
Outline	no

text style ok

textstyle box 1 available textstyles

the user can select an existing textstyle by selecting the textstyle icon or entering a value into the input box to the left of the button.

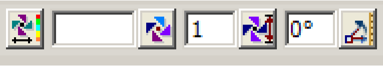
text height box 10

the user can measure a height by selecting the text height icon or entering a value into the input box to the left of the button. The value units are defaulted to world units. This can be changed in the textstyle data box

Symbol Controlbar

The ***Symbol Controlbar*** is normally at the top right of the 12d Model screen.

Symbol Control toolbar

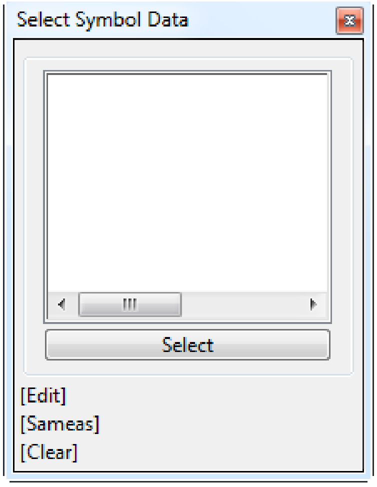


Users can define their own symbols to draw at vertices of 12d Model strings. The definition of symbols are stored in a file called symbols.4d.

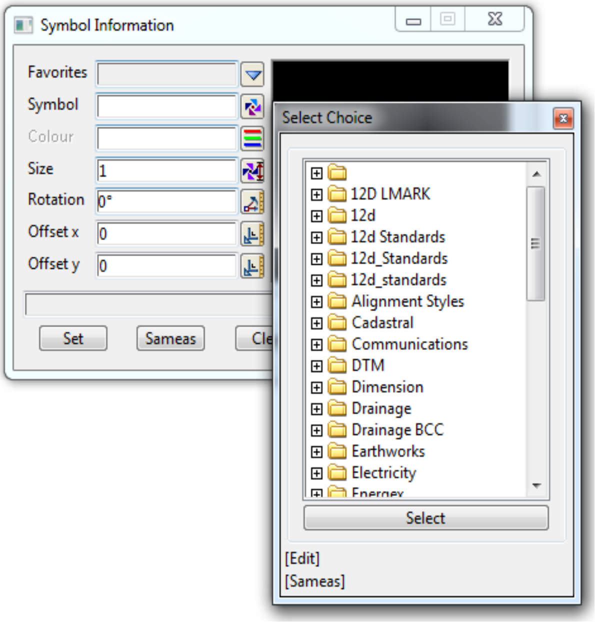
The fields and buttons used in this control bar have the following functions.

Field Description	Type	Defaults	Pop-Up
	Symbol data box		

On pressing the *Symbol data* button a panel appears

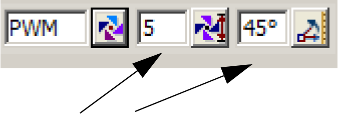

Select Symbol Data
Select
[Edit]
[Sameas]
[Clear]

If you require a different symbol, the user can edit the current settings by selecting the [Edit] button to bring up the **Symbol Information** *panel (shown below).*


Symbol Information
Set
Sameas
Cle
Select Choice
12D LMARK
12d
12d Standards
12d_Standards
12d_standards
Alignment Styles
Cadastral
Communications
DTM
Dimension
Drainage
Drainage BCC
Earthworks
Electricity
Energex
Select
[Edit]
[Sameas]

Favorites
Symbol
Colour
Size 1
Rotation 0°
Offset x 0
Offset y 0

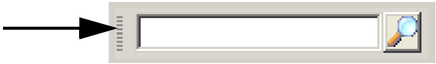
The current symbol can be selected from the Symbols list and the colour, size and rotation can be manually set



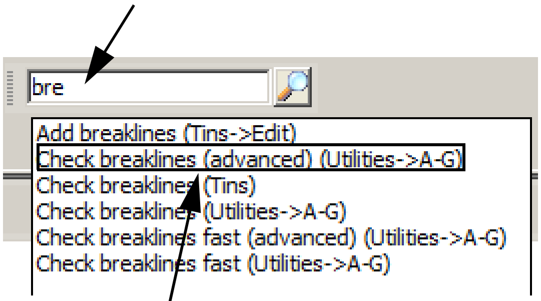
Alternatively the size and rotation (anti clockwise) can be entered manually into the boxes in the Control bar

Search Toolbar

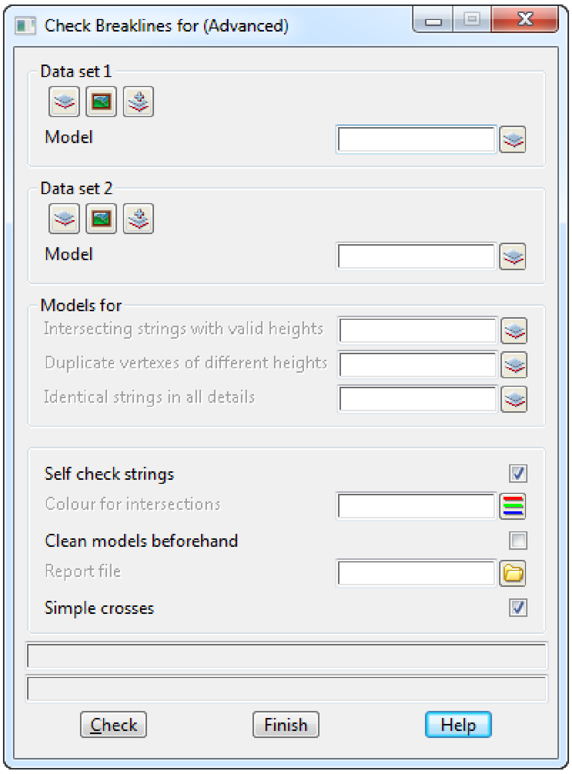
The ***Search bar*** is normally at the top right of the 12d Model screen.



Users can type in words (or part) to describe the option they require and a list of menus appear when the parameters are met

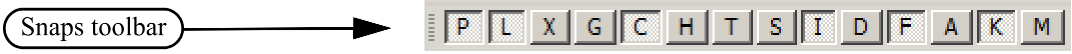

bre
Add breaklines (Tins->Edit)
Check breaklines (advanced) (Utilities->A-G)
Check breaklines (Tins)
Check breaklines (Utilities->A-G)
Check breaklines fast (advanced) (Utilities->A-G)
Check breaklines fast (Utilities->A-G)

Double clicking LB on the Topic activates the menu


Check Breaklines for (Advanced)
Data set 1
Model
Data set 2
Model
Models for
Intersecting strings with valid heights
Duplicate vertexes of different heights
Identical strings in all details
Self check strings ☑
Colour for intersections
Clean models beforehand ☐
Report file
Simple crosses ☑
Check
Finish
Help

Snaps Toolbar

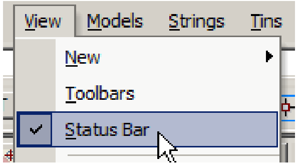
The ***Snaps Toolbar*** is normally at the top right hand corner of the 12d Model screen.



Snaps are used when picking strings - see Chapter 7.4 ’Snap Settings’.

3.6 Status Bar

The Status Bar is an optional part of your desktop. It appears at the base of your desktop. The Status Bar contains the Screen Message Box and the View Coordinates Box. It is strongly recommended that you keep it turned ON.

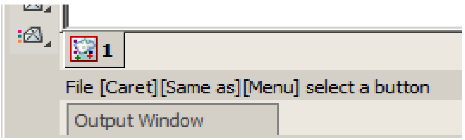


If desired, the Status Bar may be turned OFF at any time. From the **View** drop down menu bar, click LB on **View**, untick the **Status Bar** checkbox. To turn it back ON, repeat the selection but this time tick the checkbox.

3.7 Screen Message Box

The Screen Message Box contains messages that help you interact with the 12d menus. For instance, when importing a DWG/DXF/DXB file as shown previously, you have to select a file name to read. Let us investigate the messages 12d gives us to help us with this simple operation.

If the DWG/DXF/DXB Data panel is not already showing, select it again as shown previously. Click in the ‘File’ name entry data field. Observe that the following response appears in the Screen Message Box



File [Caret] [Same as] [Menu] select a button

You interpret this help message as follows. 12d is asking you to supply a file name. The three sets of square brackets [ ] correspond to your response via the three mouse buttons, LB, MB and RB.

The LB message ‘Caret’ indicates the position of the cursor if you want to type an answer using the keyboard.

To type an answer, you must first make sure that the cursor is locked onto the field you wish to modify. The cursor must appear as a flashing vertical bar before 12d will accept any data from the keyboard. You can reposition the caret anywhere in the existing word by using the LB. You could then edit it by using the ‘Backspace’ key. Alternatively you can use the ‘Delete’ key to delete the character to the right of the cursor or the Arrow keys to move within the word. The ‘Home’ and ‘End’ keys take you to either end of the existing entry. To delete the entire entry, double click anywhere in the text to highlight it. Then press the delete key to erase the entry or just start typing to replace it.

The MB message ‘Same As’ indicates that you can point at any existing item on your desktop. This would not normally be used for a file name.

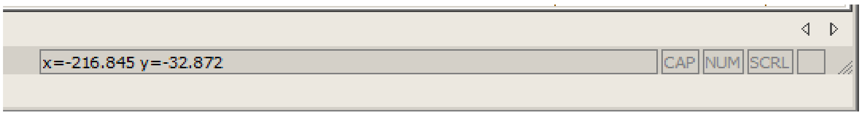
The RB message ‘Menu’ puts up a menu. At this time, no items are available. If another filename was copied to the windows clipboard then the ‘Paste’ would be highlighted.

Or finally, you can click LB on the folder icon to locate the required file

The Screen Message Box area changes dynamically with the position of the cursor on the screen so watch it closely for helpful messages.

3.8 View Coordinates Box

Note the location of the View Coordinates Box at the bottom right of the desktop. This box displays the X-Y coordinates of the cursor when in a Plan view and Chainage-Height when in a Section view.

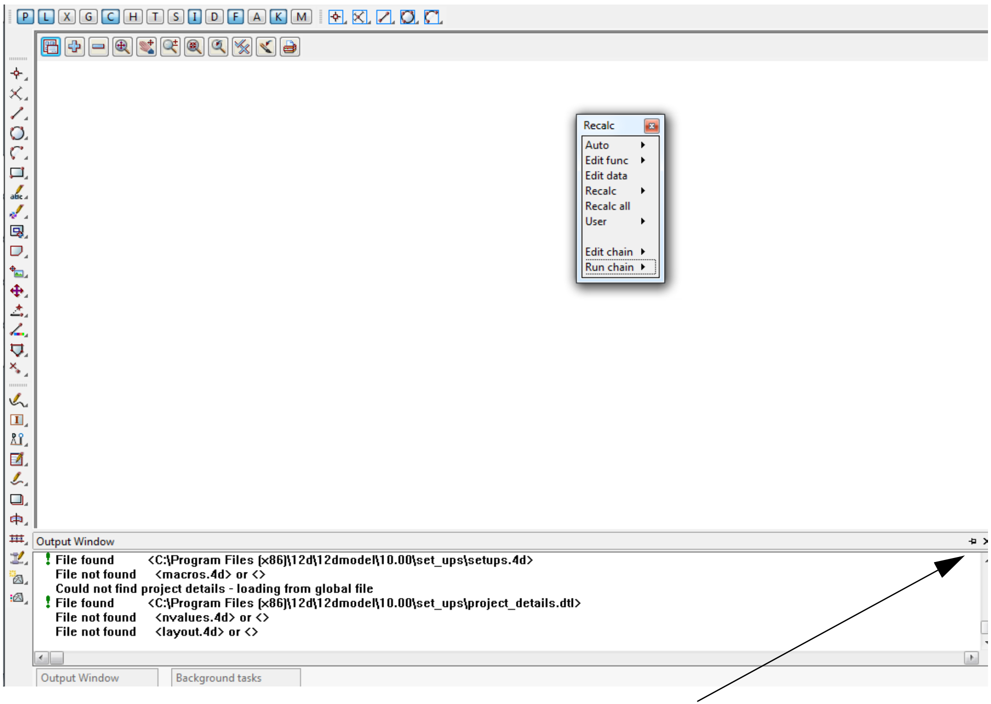


3.9 The Output Window

The Output Window appears as a tab at the bottom left of the screen and flashes if there are any messages that need to be reviewed. This Window can be pinned to your desktop, but to maximise use of your desktop for 12d views etc., it is best to leave it as is. You can also convert the output window to a view, just like a 12d View.

To turn the Output Window OFF at any time, you need to access the menu bar that appears across the top of your desktop. From the Window Drop Down menu bar, click LB on **Window**, untick the **Output Window** checkbox. To turn it back ON, repeat the selection but this time tick the checkbox.

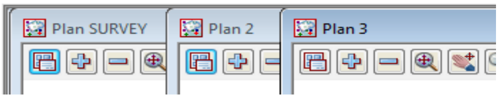
To make the Output Window appear as a normal Window on you desktop, place the cursor anywhere over the 'white' background area of the Output Window and click RB. In the pop up menu, click on the **Convert to Window** menu with the LB. The command Window will then appear somewhere on your desktop as a Window. It may be moved by clicking LB in the blue Output Window heading area, dragging the cursor to another part of your desktop and releasing the LB to pin it down.



```
! File found       <C:\Program Files (x86)\12d\12dmodel\10.00\set_ups\setups.4d>
  File not found    <macros.4d> or <>
  Could not find project details - loading from global file
! File found       <C:\Program Files (x86)\12d\12dmodel\10.00\set_ups\project_details.dtl>
  File not found    <nvalues.4d> or <>
  File not found    <layout.4d> or <>
```

If you wish to close the "floating" Output Window just click on **x** as you would with any other view.

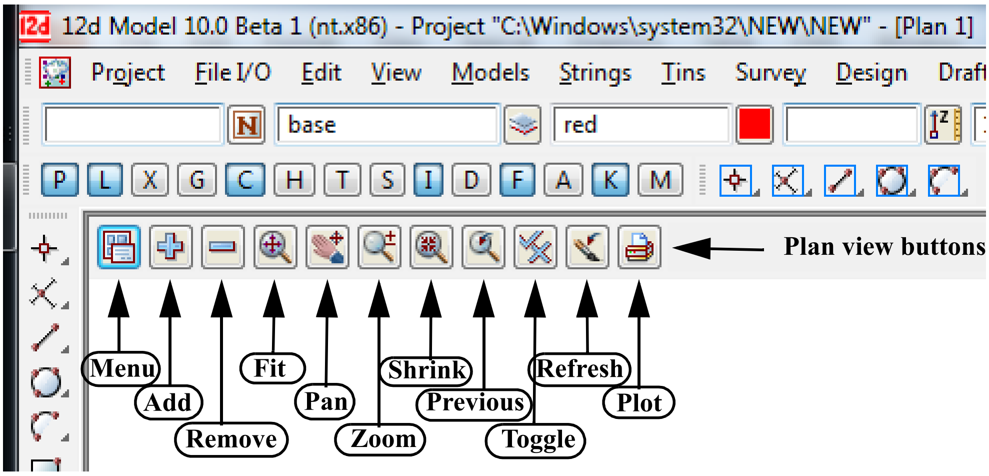
There are three view types available in 12d. They are Plan, Section and Perspective. It is possible to have multiple plan, section and perspective views on the desktop at one time, each showing different information. There is no limit to the number of views you may create.


Plan SURVEY
Plan 2
Plan 3

Each View has a View type icon and name such as ‘SURVEY’ or ‘2’ etc.

The name appears in the View Title Area. This is the blue heading at the top of each view. Just below the name is the View Button Area which contains the most common View buttons (i.e. a subset of the complete list of view options). The View buttons appears horizontally after the view name. The View Button Area appears automatically with each view as the view is created and each view type has different view buttons that reflect it’s characteristics. The view name defaults to a number but can be over typed with any alphanumerics.

The view buttons on the Plan view are:


12d Model 10.0 Beta 1 (nt.x86) - Project "C:\Windows\system32\NEW\NEW" - [Plan 1]
Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Draft
N
base
red
P L X G C H T S I D F A K M
Plan view buttons
Menu
Add
Remove
Fit
Pan
Zoom
Shrink
Previous
Toggle
Refresh
Plot

Each view also has its own menu (the view menu) which can be brought up by clicking the LB on the view button called **Menu**.

The View menus can also be brought up in another special way:

> if you click the RB in the View Button Area or the View Title Area, you will also get the View menu to pop up. Clicking RB again in the View Button Area or the View Title Area will remove the view menu.

So by using the RB, view menus can be accessed even if the Menu item is not visible in the View Button Area.

The View menu contains options available for that particular view type. It is a superset of the buttons that appear on the horizontal View Button Area. If the View is made very small or moved off the right hand side of the desktop, the various buttons on the horizontal View Button Area will not be selectable as they will not be visible. In such case, you have to use the RB in the View Button Area to get access to the various View menu items.

Views may be created, resized, overlapped, moved and deleted as required. When you create a new view, 12d will automatically supply it an ascending number for reference purposes e.g. ‘Section 2’. Views can overlap Menus and Panels that are already on the desktop.

Hence there are four menu systems in 12d, one for each view type (plan, section and perspective) and an overall main menu.

3.10 Basic View Operations

We will now practice some basic View operations

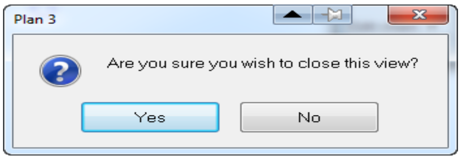
To create a new View, select **Views=>New=>Plan** from the main menu to create a view with the next view number.

Alternatively, you can use **Views=>Create=>Plan View.** Pick **Create** with the LB after first supplying a View name or accepting the 'number' supplied by 12d as the View name.

Once the View is on display, the following operations can be performed from the View Button Area at the 'top' of the View. To move a View to a new location on your desktop, depress the LB in the View Title Area – the 'blue' area showing the words '**Plan 1**'. Whilst you still have the mouse button depressed, drag the mouse and you will see the View move. 'Pin' the View again by releasing the LB.

Use the standard Windows features to change the size of the View. Place the cursor near any corner or midside of the existing plan view and when the drag arrows popup, depress and hold down the LB and drag the mouse to see the Window size change. Pin the new location of the corner by releasing the LB.

To delete a View just click LB on the '**X**' button in the top right hand corner of the view.



Are you sure you wish to close this view?

Click LB on [Yes] to confirm the action

You can also delete a view by clicking LB on the Menu button in the View Button area to popup the View menu and then click LB on **Delete**.

For the purpose of the tutorial, leave one large Plan View '1' on the desktop. We will subsequently demonstrate how the various views are linked. Information in a Plan view can also appear in Section and Perspective views for instance.

3.11 Introduction to Models

Models are a 12d concept also present in most CAD systems. It is similar for instance to the layering concept AutoCAD, or levels in Microstation. Basically each model represents a repository for data. Each point or line that is created or imported into 12d is put into a model. By turning models 'On' and 'Off', it is possible to change the amount of information that is displayed. This control is provided in each view so it is possible to have different models on display in different views.

It is important to note that the data in the various models is always permanently stored in 12d. It is a user controlled convention to only show a subset of models at any one time.

There is no limit to the number of models used in any one 12d Project.

If you want multiple copies of a certain line (i.e. string), it is possible for instance to copy the line from one model to another. The lines can then be displayed independently. If both models were on at once, the information will appear as one line instead of two since the strings are coincident. It is possible to selectively snap to and edit either line in such a case.

At any time, individual models can be **Renamed, Duplicated, Cleaned** (removes all points and lines but the name of the model is retained) or **Deleted**.

A new feature in version 9 is the **Trash Bin**. Any deleted models will be store here as a back up. Deleted models can be restored at a later time. An example of this will be shown later in the manual.

Models can be temporarily **Removed** (from selection lists) and subsequently reinstated through the **Add** function.

It is also possible to copy models between projects (See **Models=>Utilities=>Copy Project Models**). These are advanced features of 12d that we need not concern ourselves with at this time.

3.12 Introduction to Strings

12d is very much a 'strings' rather than 'points' based system. In it's simplest form, a string is a line between two points or vertices. In fact a single vertex is also a special type of string known as a 'point string'. A string may be made up of multiple straight line segments connecting many points (vertices). Strings may contain curves and arcs as well as straight lines. Strings vary in complexity from 2d (x,y and constant z value) to multidimensional (e.g. an alignment string has both horizontal and vertical geometry independently defined). In general, as well as x, y and z values, strings have properties such as string name, string type, string colour, line style, and chainage. Strings also have a 'point/line' property that can be set such that they appear as 'disconnected points' or 'connected lines'. From a design point of view, strings are much more useful than points.

3.13 Introduction to Panels

A panel is simply a means of supplying multiple answers to 12d in a concise manner. Once a panel appears on the desktop, you can use the mouse or the Tab and BackTab keys to position the cursor over any data field. Remember, when typing data from the keyboard, the cursor must be flashing in the data field for characters to be accepted.

When supplying data to a 12d panel, you do not need to terminate the entry of data into a field by pressing the *Enter* key. For instance, you can use the Tab and BackTab keys or the mouse to move to another field after entering data. If you do press the *Enter* key to terminate the entry of data into a field, 12d will immediately validate the data in that field and supply an error message if appropriate.

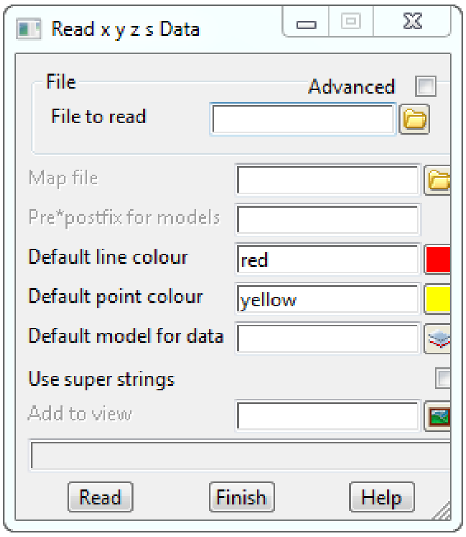
When validating supplied or previously entered data (i.e. where you do not need to change the data in a field), it is not necessary to place the cursor in the data field. Just press the *Enter* key to pass through each field in the panel in turn.

When typing data into a field, please observe that the 'Delete' key deletes a single character to the right of the cursor. The 'Backspace' key is also active. If you need to delete multiple characters, drag the LB across the characters to highlight them (or double click over a word) and press the 'Delete' key to delete them or start typing to replace them.

In general, 12d has been setup so that data can be selected from lists rather than typed from the keyboard. When entering data into a field, if there is a list of alternatives already known to 12d, pressing the LB on the icon at the end of the field will display the list.

To practice this, bring up the 'Read xyzs Data' panel - from the Main menu, click LB on

File I/O =>Data Input =>xyz=>xyzs



Advanced ☐

File to read

Map file

Pre*postfix for models

Default line colour: red

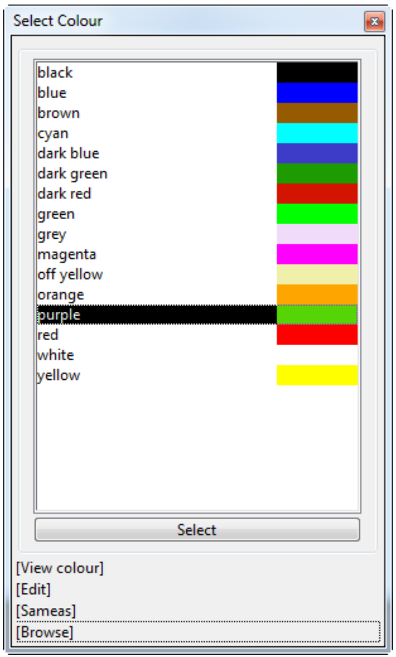
Default point colour: yellow

Default model for data

Use super strings ☐

Add to view

colour icons

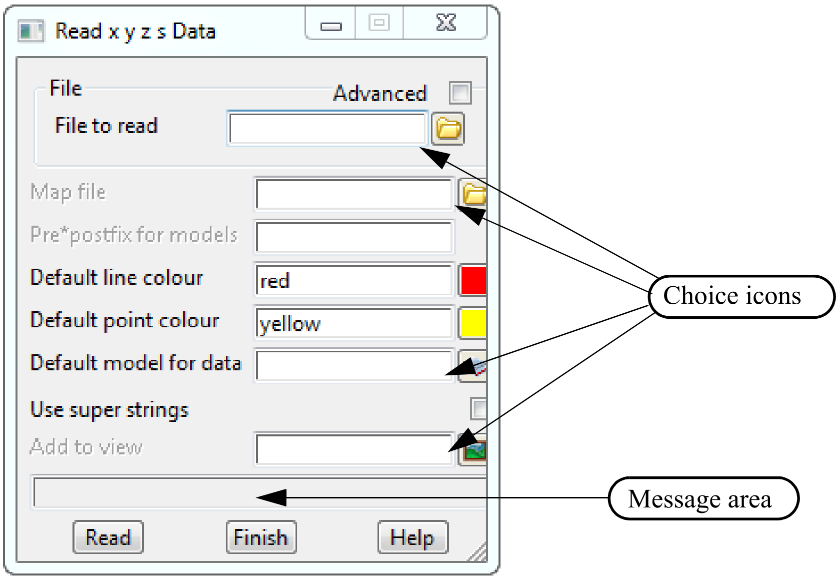


Click LB on the colour icon to bring up the list of colours

Set the ‘Default line colour’ in the above panel to ‘dark green’ by clicking LB on the colour icon (the icon to the right of the word ‘red’ in the fourth data field). A list of available colours will pop up. Use the mouse to click LB on ‘dark green’ and then process it by clicking LB on the **Select** button at the base of the panel.

Alternatives: You can double click LB on ‘dark green’ to short-cut this sequence. You could also have used the down arrow key to work your way down through the list to highlight the word ‘dark green’ and then pressed the Enter key.

In a manner similar to the colour panel field just discussed, most panel fields have a pop-up list of choices available and the list is activated by clicking on the icon at the right hand end of the panel field. Some times there will be a special icon such as the ***colour*** icon in the previous example or the file box icon at the end of the ***File*** field.



Read x y z s Data

File

Advanced ☐

File to read

Map file

Pre*postfix for models

Default line colour red

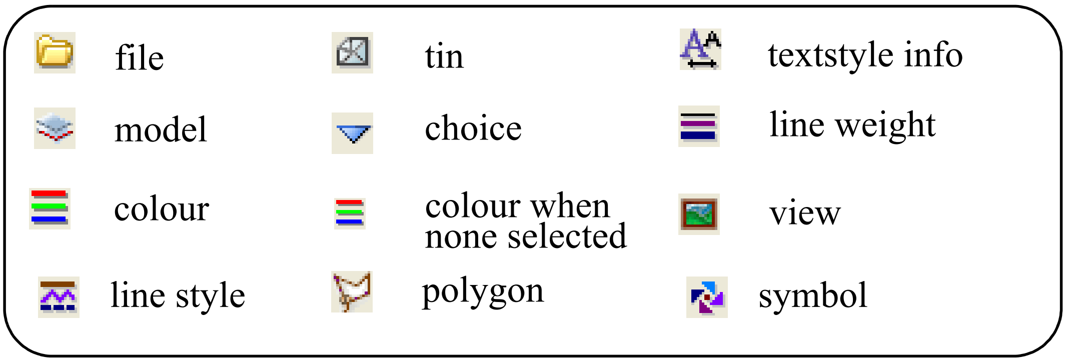
Default point colour yellow

Default model for data

Use super strings ☐

Add to view

Other icons that may be used are:



Note the message area at the base of the panel (just above the **Read** button in the ***Read xyzs Data*** panel). Each panel has its own message area to help you interact with 12d. If 12d does not appear to be working the way you think it should, you will often get helpful information in the Panel Message area if you make a mistake. Look in the Screen Message Box as well as it is also updated when interacting with panels.

If a panel is in the way, you can move it as stated above. Any panel can be removed (shut down) by clicking LB on the ‘**X**’ button in the top right hand corner or by clicking on the **Finish** button.

If you want to keep a panel that is already filled in such that you can refer to it later, you may decide to temporarily minimise it by clicking LB on the ‘**-**‘ button. It can later be maximised again by clicking LB on the ‘overlapping windows’ button (where the ‘**-**‘ used to be).

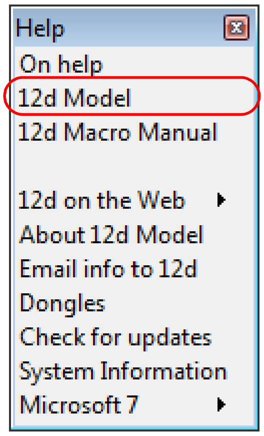
As we don’t wish to proceed further with this panel click LB on **Finish** or click LB on the **‘X’** button in the top right hand corner of the panel.

4 12d Model Help

Position of option on menu: **Help =>12d Model**

From *12d Model V5.0* onwards, the 12d Model Reference manual has been supplemented by electronic **Help** accessed from within *12d Model*.

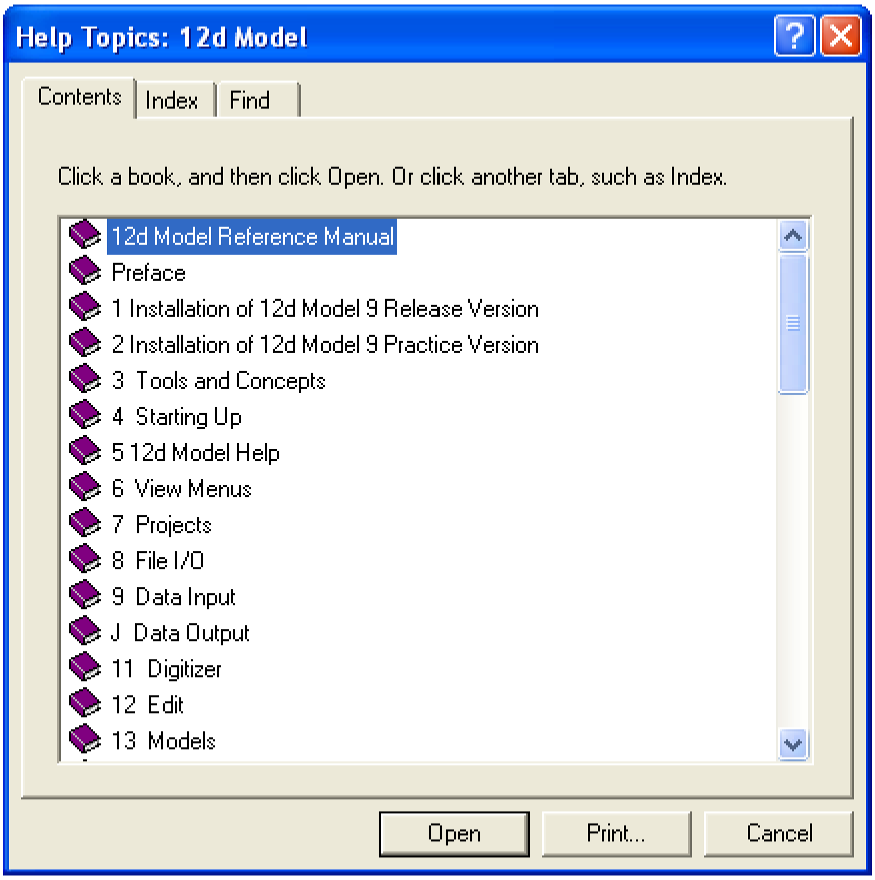
The entire *12d Model* ***Help*** manual can be accessed by selecting *12d Model* on the **Help** menu item on the main *12d Model* menu.


Help
On help
12d Model
12d Macro Manual
12d on the Web
About 12d Model
Email info to 12d
Dongles
Check for updates
System Information
Microsoft 7

Help on Microsoft's help system
12d Model help
12d macro programming language help

links to web site www.12d.com.
12d Model modules authorized, dongle number
email details of your 12d Model to 12d Solutions
dongle testing panel
check for newer versions of 12d Model
brings up Microsoft's System Information panel
For WIndows 7 and Vista - links to the WinHlp32.exe

Clicking on 12d Model brings up **Help Topics: 12d**


Help Topics: 12d Model
Contents
Index
Find
Open
Print...
Cancel

Click a book, and then click Open. Or click another tab, such as Index.

12d Model Reference Manual
Preface
1 Installation of 12d Model 9 Release Version
2 Installation of 12d Model 9 Practice Version
3 Tools and Concepts
4 Starting Up
5 12d Model Help
6 View Menus
7 Projects
8 File I/O
9 Data Input
J Data Output
11 Digitizer
12 Edit
13 Models

The panel **Help Topics: 12d** is actually using Microsoft's ***WinHlp*** system and it allows you to look at the overall structure of the *12d Model Help* and access any part of it. More information on using the tabs **Contents**, **Index** and **Find** will follow in the next section.

Alternatively, individual topics for a panel or menu can be invoked by pressing the F1 key whenever the focus is on the menu or panel, or by clicking on the *Help* button on any *12d Model* panel (see F1 Key)

For some options, there is also additional help files and videos. This is denoted by a * after **Help** on the **Help** button. That is **Help*** (see Extra Help).

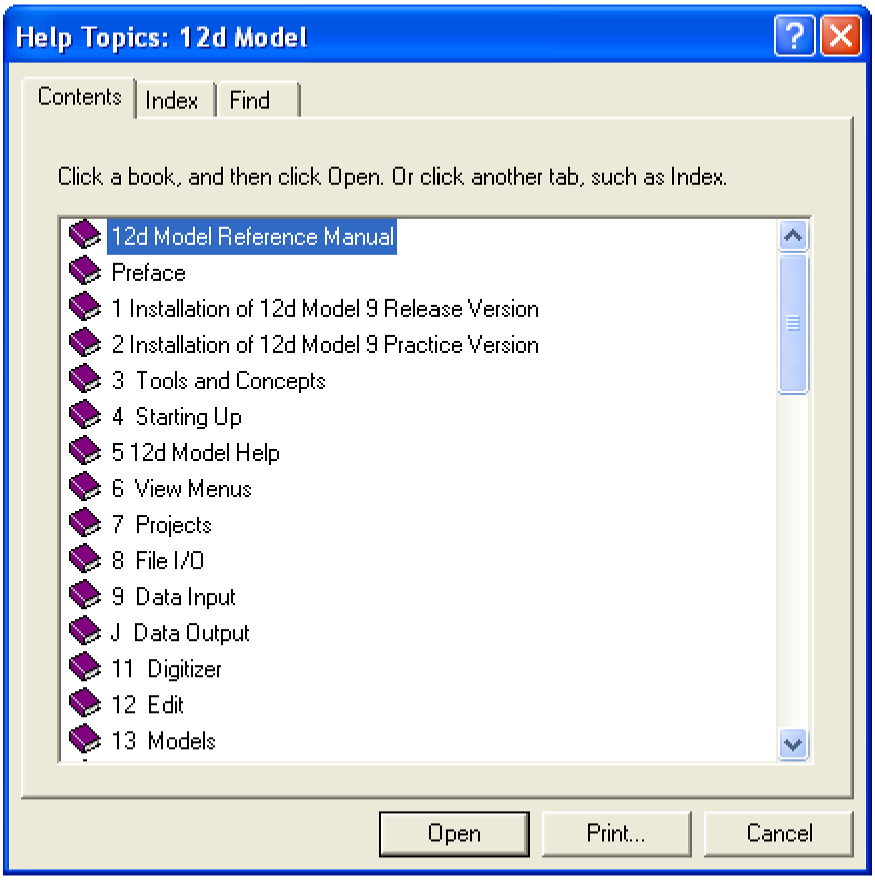
Note: The *12d Model Reference* manual is available in pdf on the *12d Model* installation DVD, or on the 12d web site www.12d.com.

More information on the **Help** system will now be given in the next section Contents.

and the following sections	Index Find Panel Help Button F1 Key Navigating in Help Extra Help

Contents

The **Contents** tab allows you to look at the overall structure of the *12d Model Help* and access any part of it.

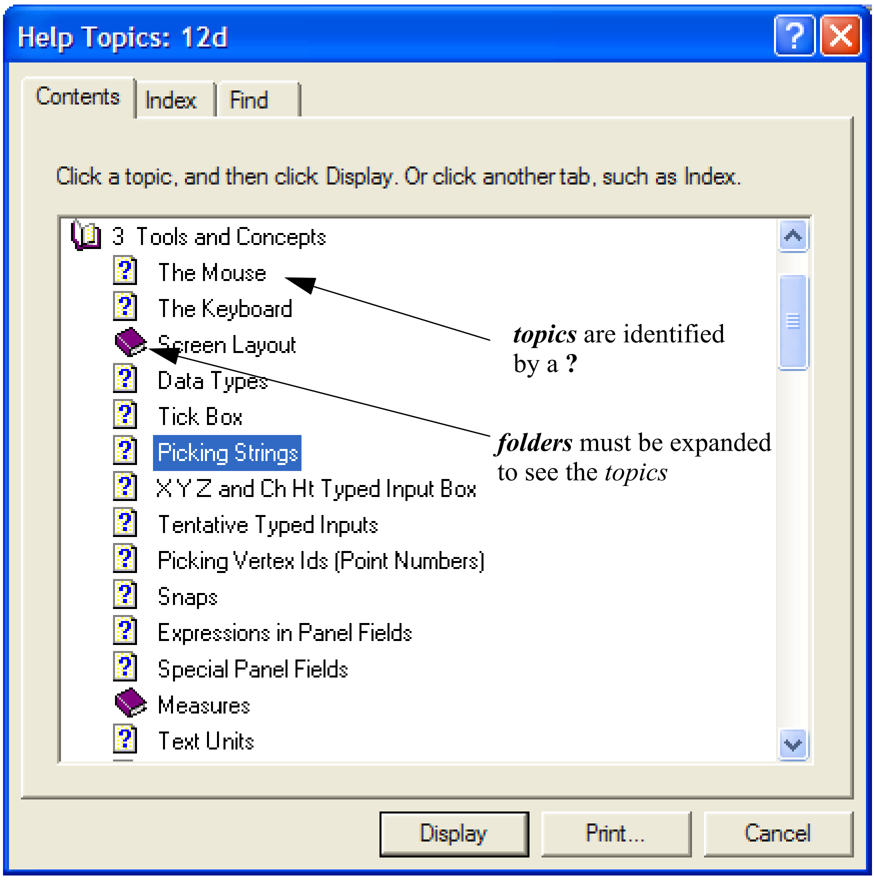


Click a book, and then click Open. Or click another tab, such as Index.

- 12d Model Reference Manual
- Preface
- 1 Installation of 12d Model 9 Release Version
- 2 Installation of 12d Model 9 Practice Version
- 3 Tools and Concepts
- 4 Starting Up
- 5 12d Model Help
- 6 View Menus
- 7 Projects
- 8 File I/O
- 9 Data Input
- J Data Output
- 11 Digitizer
- 12 Edit
- 13 Models

Warning - only *topics* in the *Contents* can be viewed in *Help* so any folders in *Contents* folders must be expanded until *topics* are displayed. *Topics* can be easily identified because they have a question mark beside them indicating that *Help* is available and can be viewed.

For example, double clicking on ***Tools and Concepts*** expands the next level of ***Tools and Contents***.



Click a topic, and then click Display. Or click another tab, such as Index.

- 3 Tools and Concepts
  - The Mouse
  - The Keyboard
  - Screen Layout
  - Data Types
  - Tick Box
  - Picking Strings
  - X Y Z and Ch Ht Typed Input Box
  - Tentative Typed Inputs
  - Picking Vertex Ids (Point Numbers)
  - Snaps
  - Expressions in Panel Fields
  - Special Panel Fields
  - Measures
  - Text Units

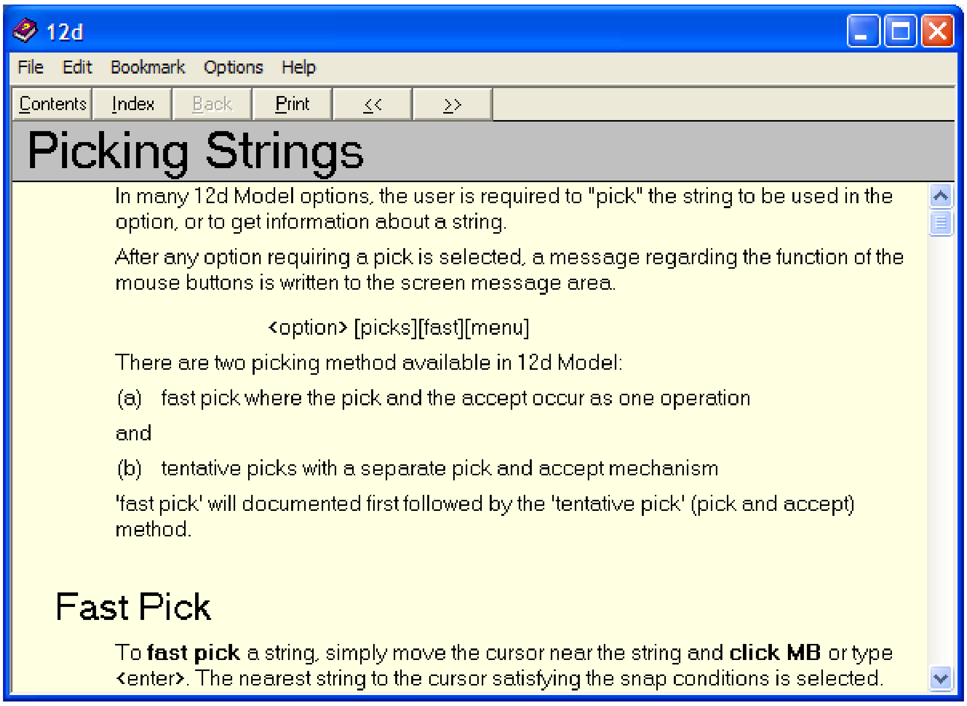
topics are identified by a **?**

folders must be expanded to see the *topics*

and topics are *The Mouse*, *The Keyboard* etc.

Double clicking on the topic ***Picking Strings*** will then display the topic.

The ***Contents*** then disappear leaving *Help* open at the selected topic.



Picking Strings

In many 12d Model options, the user is required to "pick" the string to be used in the option, or to get information about a string.

After any option requiring a pick is selected, a message regarding the function of the mouse buttons is written to the screen message area.

<option> [picks][fast][menu]

There are two picking method available in 12d Model:

(a) fast pick where the pick and the accept occur as one operation

and

(b) tentative picks with a separate pick and accept mechanism

'fast pick' will documented first followed by the 'tentative pick' (pick and accept) method.

Fast Pick

To **fast pick** a string, simply move the cursor near the string and **click MB** or type <enter>. The nearest string to the cursor satisfying the snap conditions is selected.

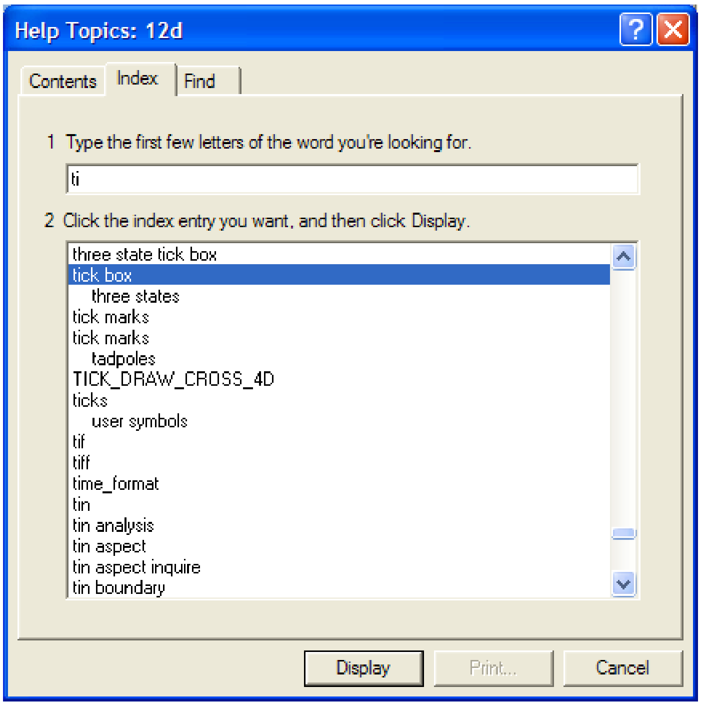
Double clicking on ***Contents*** on the top of the *Help* will bring the Contents listing back up.

More information on the **Help** system will now be given in the next section Index.

Index

The *Index* tab searches through all entries in the Index of the Help.

As the first few characters of the required entry are typed in, the matching index entries are displayed.



1 Type the first few letters of the word you're looking for.

ti

2 Click the index entry you want, and then click Display.

three state tick box
tick box
  three states
tick marks
tick marks
  tadpoles
TICK_DRAW_CROSS_4D
ticks
  user symbols
tif
tiff
time_format
tin
tin analysis
tin aspect
tin aspect inquire
tin boundary

Double clicking on the displayed entries will go to the topic in the Help containing the selected index entry. If more than one topic includes the index entry, then the list of topics is displayed.

If the index has sub-indices, they can be searched by first typing in the main index followed by a comma, then a space and the first few characters of the sub-index.

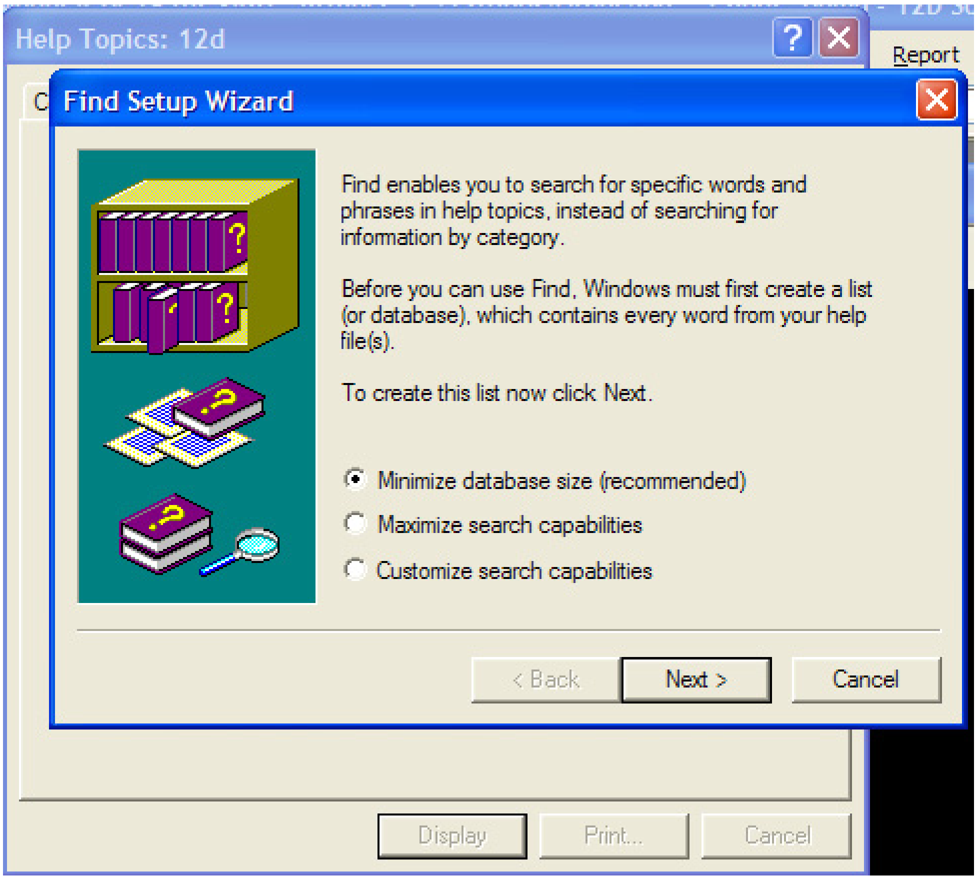
More information on the **Help** system will now be given in the next section Find.

Find

The most powerful searching method for the *Help* system is *Find*.

Simply click on the *Find* tab to search for words or phrases that may be contained in a Help topic.

If *Find* is being invoked for the first time, the ***Find Setup Wizard*** runs to create an index of every word in the Help.



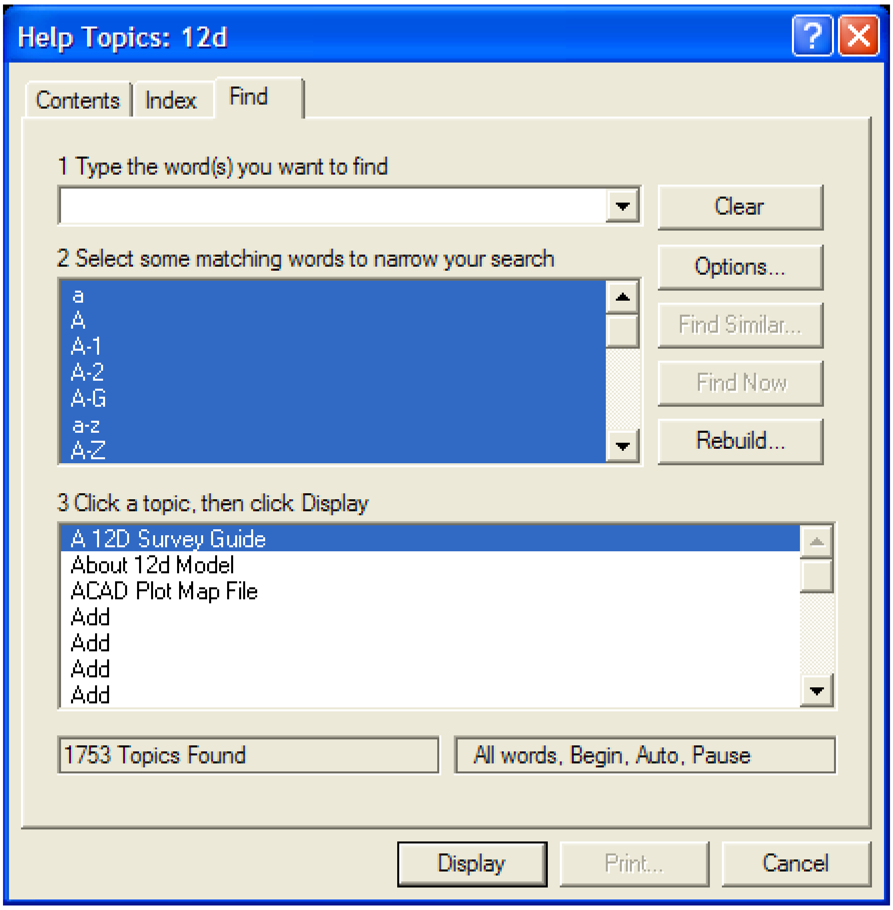
Find enables you to search for specific words and phrases in help topics, instead of searching for information by category.

Before you can use Find, Windows must first create a list (or database), which contains every word from your help file(s).

To create this list now click Next.

● Minimize database size (recommended)
○ Maximize search capabilities
○ Customize search capabilities

From then on, selecting the *Find* tab goes straight to the *Find* screen.


Help Topics: 12d
Contents
Index
Find
1 Type the word(s) you want to find
Clear
Options...
Find Similar...
Find Now
Rebuild...
2 Select some matching words to narrow your search
a
A
A-1
A-2
A-G
a-z
A-Z
3 Click a topic, then click Display
A 12D Survey Guide
About 12d Model
ACAD Plot Map File
Add
Add
Add
Add
Display
Print...
Cancel

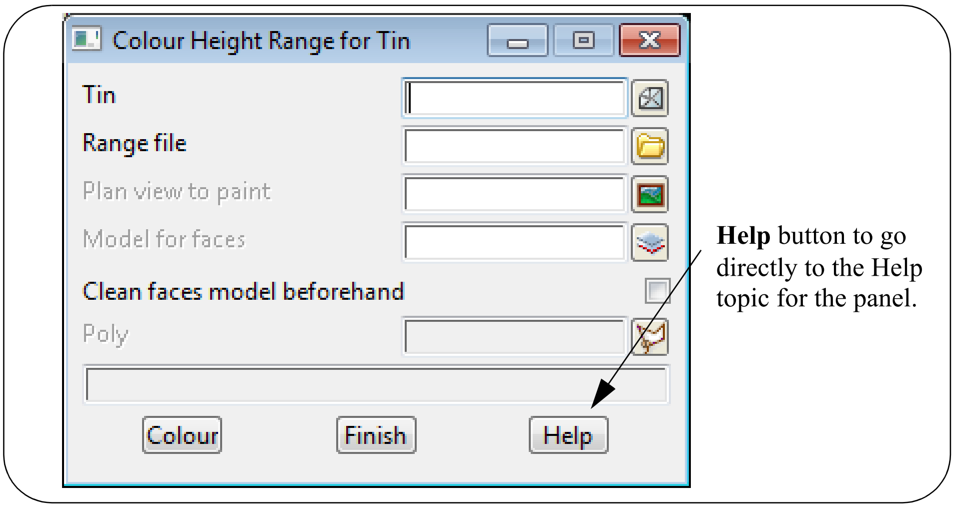
1753 Topics Found

All words, Begin, Auto, Pause

More information on the **Help** system will now be given in the next section Panel Help Button.

Panel Help Button

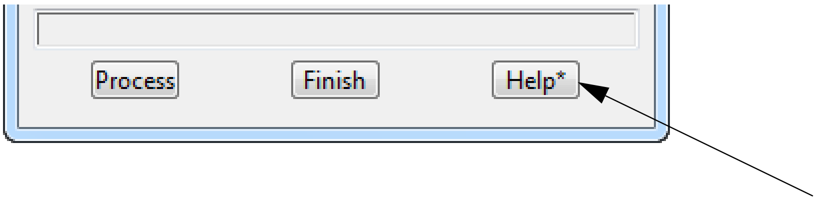
Every panel has a **Help** button which when selected goes to the *topic* describing that panel.


Colour Height Range for Tin
Tin
Range file
Plan view to paint
Model for faces
Clean faces model beforehand
Poly
Colour
Finish
Help

Help button to go directly to the Help topic for the panel.

The default *12d Model* **Help** is all in one *Winhlp* file but a method for displaying additional help information exists so 12d Solutions, 12d Distributors and Users can supply additional (extra) **Help** information.

If there is extra help available for an option, then **Help*** will appear instead of **Help** on the panel button.



If there is any documentation for the panel,
the **Help** button will be replaced with a Help *
The * indicates that there is extra help available.

Information on how the extra help is set up is given in the section Extra Help.

More information on the **Help** system will now be given in the next section F1 Key.

F1 Key

Another method of invoking **Help** is by using the **F1** key as follows:

> when a **menu** or **panel** is on the screen and has focus (the menu or panel title area will be highlighted), or the cursor is over an item on a **toolbar**, pressing **F1** will bring up the *help* for that menu, panel or toolbar item.

Warning - some of the items on the *Strings* menu automatically start up a string select and change the focus from the panel to a View. This means that pressing F1 will bring up the Help for the View and not the Help for the panel.

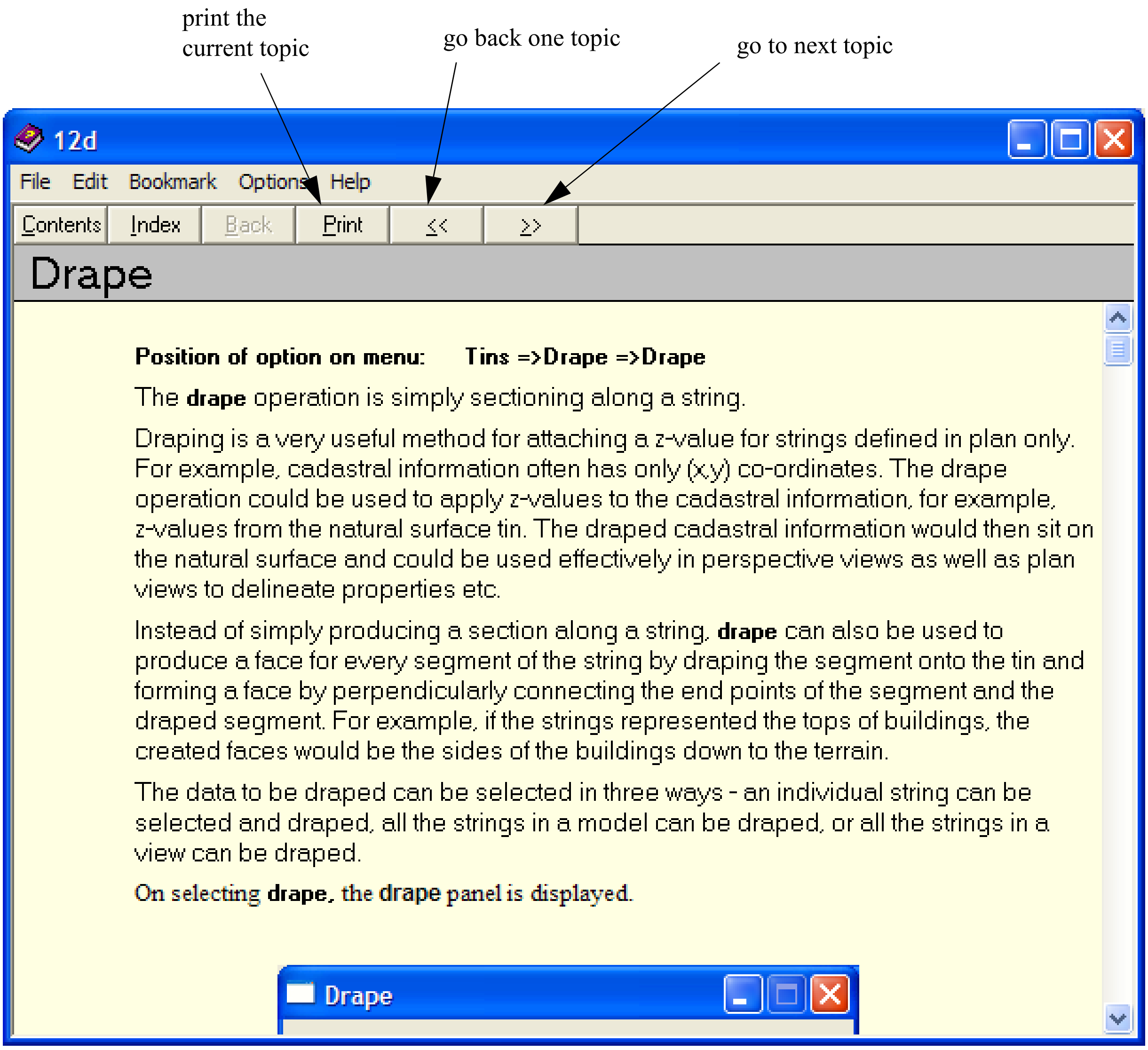
To get **Help** for such a panel, click on the panel to bring the focus back to the panel before pressing F1. The top of the panel will highlight showing that it has focus.

More information on the **Help** system will now be given in the next section Navigating in Help.

Navigating in Help

Once at a *topic* in the Help, the **<<** and **>>** buttons at the top of the Help topic will go to the previous and next Help topics respectively.

Individual Help topics can be printed by clicking ***Print*** at the top of the Help page.



Position of option on menu: **Tins =>Drape =>Drape**

The **drape** operation is simply sectioning along a string.

Draping is a very useful method for attaching a z-value for strings defined in plan only. For example, cadastral information often has only (x,y) co-ordinates. The drape operation could be used to apply z-values to the cadastral information, for example, z-values from the natural surface tin. The draped cadastral information would then sit on the natural surface and could be used effectively in perspective views as well as plan views to delineate properties etc.

Instead of simply producing a section along a string, **drape** can also be used to produce a face for every segment of the string by draping the segment onto the tin and forming a face by perpendicularly connecting the end points of the segment and the draped segment. For example, if the strings represented the tops of buildings, the created faces would be the sides of the buildings down to the terrain.

The data to be draped can be selected in three ways - an individual string can be selected and draped, all the strings in a model can be draped, or all the strings in a view can be draped.

On selecting **drape**, the **drape** panel is displayed.

Because it is difficult to print large sections of Microsoft's Help system, a PDF file of the entire ***12d Model Reference*** Manual has been created and can be used to print out large sections of the manual.

The ***12d Model Reference*** Manual PDF file is on the *12d Model 9 Installation DVD* in the folder Documentation\Reference_Manual.

More information on the **Help** system will now be given in the next section Extra Help.

Extra Help

The default *12d Model* **Help** is all in one help file but a method for displaying additional help information exists so 12d Solutions, 12d Distributors and Users can supply additional (extra) **Help** information.

How to Set Up Extra Help

Any extra help for a panel is placed in a folder with the same name as the dump name for the panel without the ending after the "." (to get the dump name, see Dumping a Panel, Creating a Screen Layout File or Default File in the chapter Tools and Concepts in *12d Help* or the *12d*

Model Reference manual).

The extra help files for that panel can have any name and can be a pdf, wmv, avi. txt etc.

For example, for the panel ***Project Tree*** brought up by selecting **Project** =>**Tree**, the extra documentation would be in a folder called ***Project_Tree.***

The folder of extra help for a panel, is then placed in any one of the three places:

(a) in the *Help* folder in the 12d Model installation area: For example, for version 9,

c:\Program Files\12d\12d Model\10.00\Help

(b) in a folder called *Help* inside the *Set_ups* folder in the 12d Model installation area. For example

c:\Program Files\12d\12d Model\10.00\Set_ups\Help

or

(c) in a folder called *Help* inside the *User* folder in the 12d User area. For example

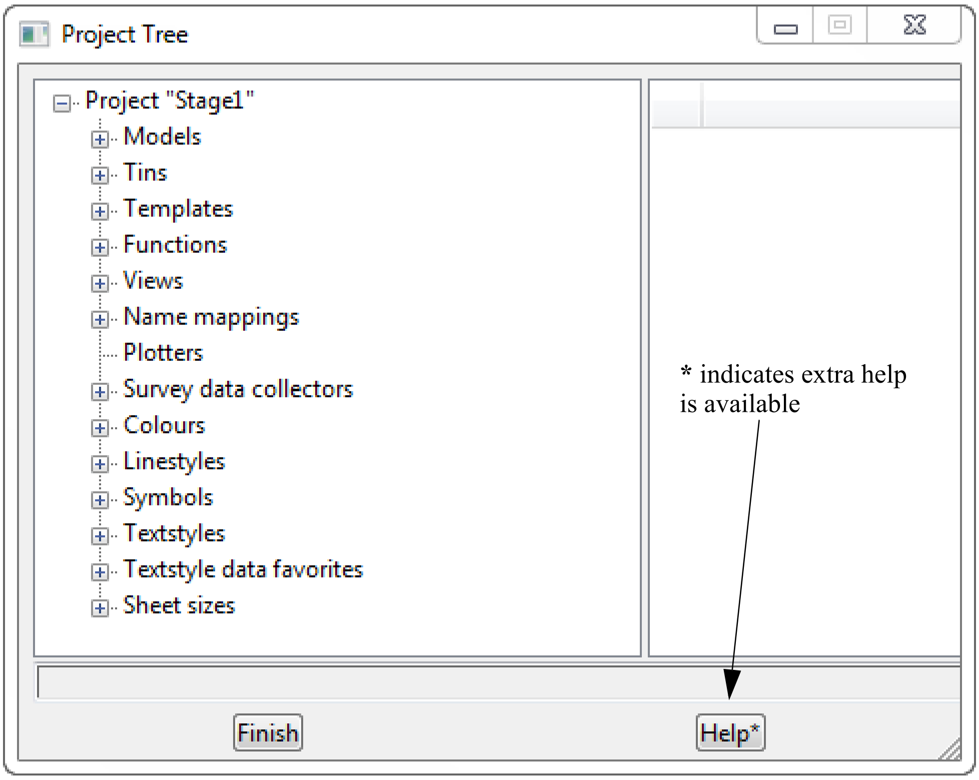
c:\12d\10.00\User\Help

For a panel, each of these areas is searched and if any extra help is found, it is listed with the full path to each extra help file.

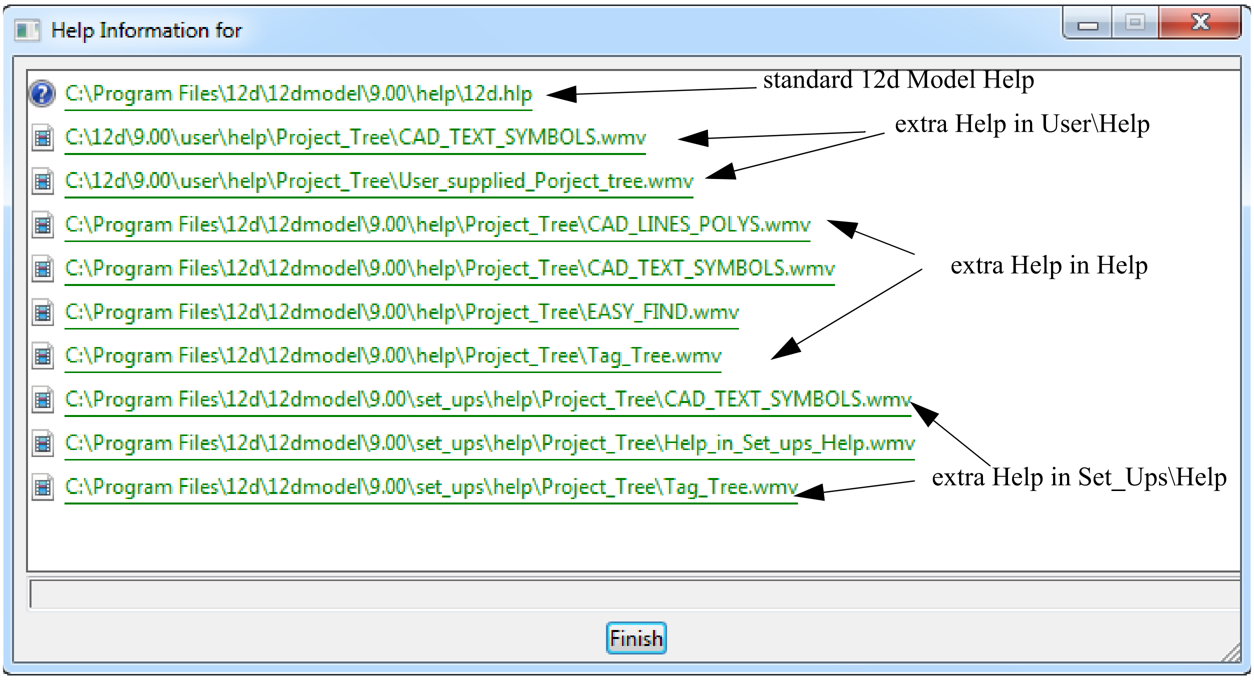
If there is any extra help for a panel, the **Help** button on the panel will be replaced with a **Help *** button. The * indicates that there is extra help available.

When you click on the **Help** * button, you will get a list of all the extra help files for that panel with the full pathname to the extra help. Clicking on the file name will bring up that extra help.

For example,


Project Tree
Project "Stage1"
Models
Tins
Templates
Functions
Views
Name mappings
Plotters
Survey data collectors
Colours
Linestyles
Symbols
Textstyles
Textstyle data favorites
Sheet sizes
Finish
Help*

* indicates extra help is available



C:\Program Files\12d\12dmodel\9.00\help\12d.hlp
C:\12d\9.00\user\help\Project_Tree\CAD_TEXT_SYMBOLS.wmv
C:\12d\9.00\user\help\Project_Tree\User_supplied_Porject_tree.wmv
C:\Program Files\12d\12dmodel\9.00\help\Project_Tree\CAD_LINES_POLYS.wmv
C:\Program Files\12d\12dmodel\9.00\help\Project_Tree\CAD_TEXT_SYMBOLS.wmv
C:\Program Files\12d\12dmodel\9.00\help\Project_Tree\EASY_FIND.wmv
C:\Program Files\12d\12dmodel\9.00\help\Project_Tree\Tag_Tree.wmv
C:\Program Files\12d\12dmodel\9.00\set_ups\help\Project_Tree\CAD_TEXT_SYMBOLS.wmv
C:\Program Files\12d\12dmodel\9.00\set_ups\help\Project_Tree\Help_in_Set_ups_Help.wmv
C:\Program Files\12d\12dmodel\9.00\set_ups\help\Project_Tree\Tag_Tree.wmv

standard 12d Model Help

extra Help in User\Help

extra Help in Help

extra Help in Set_Ups\Help

Users Own Extra Help Files

Note that users can also have their own extra help files and the files are simply placed in the correctly named folder under **User\Help**.

5 Starting the Tutorial

Before starting your tutorial, it is assumed that your overall desktop layout is as shown at the end of Chapter 4.3, i.e. one large plan view on display called ‘Plan 1’.

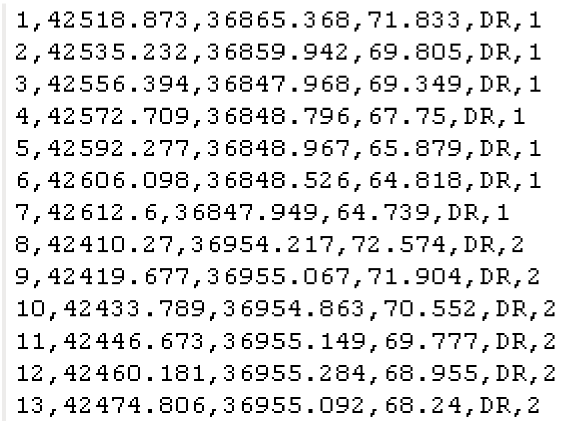
5.1 Importing Point Data into 12d

The easiest way to understand the use of Models and Panels is to import some data into 12d and see by example.

Point and Line data can be imported into 12d from a variety of sources. For the purposes of the tutorial, we will use the simplest of these - a simple ASCII file containing point number, x, y and z coordinates along with a code and string number.

We will begin by reading in a Points file called ‘DETAIL SURVEY.csv’.

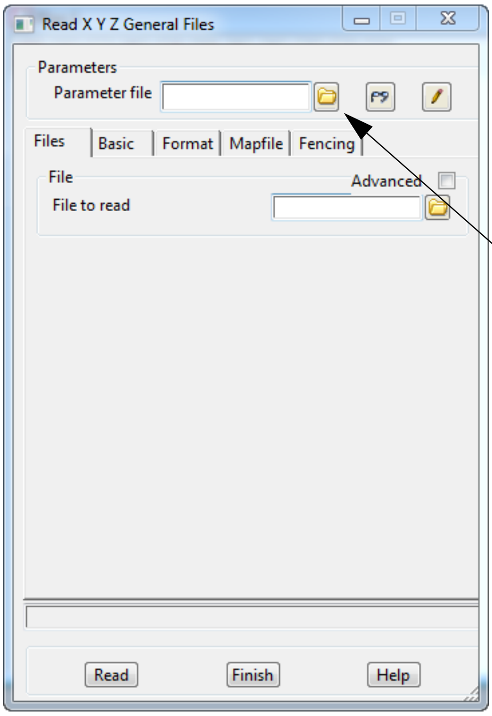
This file lies in the folder **C:\12d\10.00\Training\design\getting started basic**



```
1,42518.873,36865.368,71.833,DR,1
2,42535.232,36859.942,69.805,DR,1
3,42556.394,36847.968,69.349,DR,1
4,42572.709,36848.796,67.75,DR,1
5,42592.277,36848.967,65.879,DR,1
6,42606.098,36848.526,64.818,DR,1
7,42612.6,36847.949,64.739,DR,1
8,42410.27,36954.217,72.574,DR,2
9,42419.677,36955.067,71.904,DR,2
10,42433.789,36954.863,70.552,DR,2
11,42446.673,36955.149,69.777,DR,2
12,42460.181,36955.284,68.955,DR,2
13,42474.806,36955.092,68.24,DR,2
```

The format is one point per line containing a point number, x, y and z coordinate, string name and string number all separated by commas.

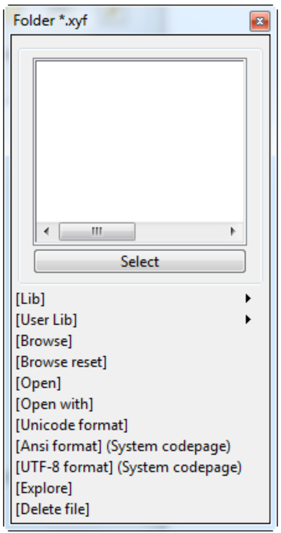
To read in the file, click LB on **File I/O =>Data Input** =>**x y z** =>**x y z general** from the Main menu.


Read X Y Z General Files
Parameters
Parameter file
Files
Basic
Format
Mapfile
Fencing
File
Advanced
File to read
Read
Finish
Help

12d gives you the ability to fill in this panel once and then save the setup to a parameter file. This allows you, on subsequent occasions, to call up the parameter file and then you only need select the data file to be read.

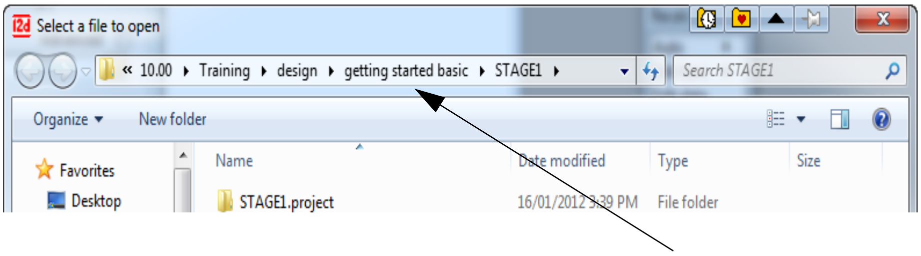
To make things easier we have already created a parameter file and stored it in **Getting Started Basic** folder.

Click on the folder icon at the end of the ***Parameter file*** field.


Folder *.xyf
Select
[Lib]
[User Lib]
[Browse]
[Browse reset]
[Open]
[Open with]
[Unicode format]
[Ansi format] (System codepage)
[UTF-8 format] (System codepage)
[Explore]
[Delete file]

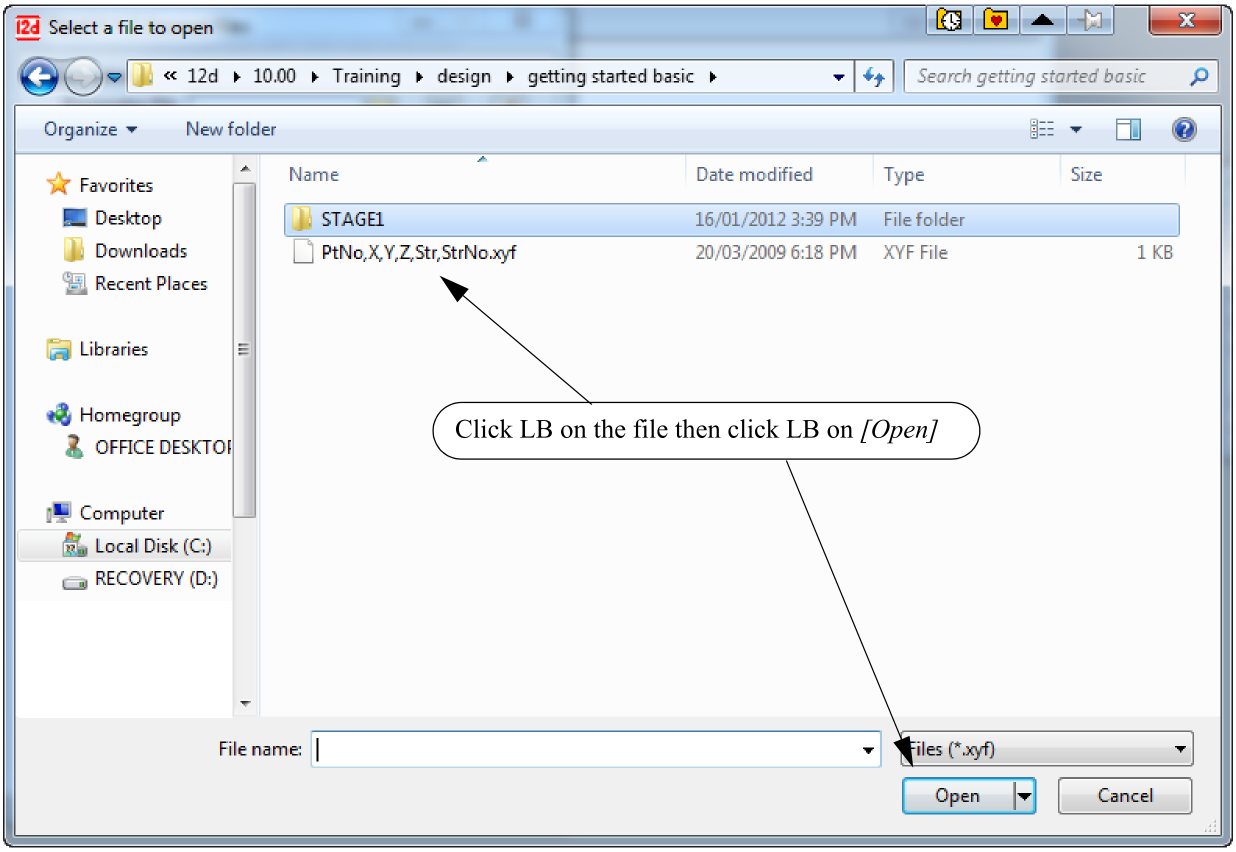
A blank folder panel will pop up, but we will browse for the parameter file

Click LB on [Browse]


Select a file to open
« 10.00 ▸ Training ▸ design ▸ getting started basic ▸ STAGE1 ▸
Search STAGE1
Organize ▾
New folder
Favorites
Desktop
Name
Date modified
Type
Size
STAGE1.project
16/01/2012 3:39 PM
File folder

Click LB on the "getting started basic" icon to move back to the **getting started basic** folder

Note that if you have created the training project in a folder different to the one shown here then you will have to navigate to the required folder

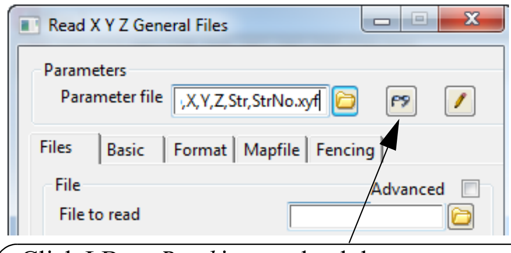

Select a file to open
« 12d ▸ 10.00 ▸ Training ▸ design ▸ getting started basic ▸
Search getting started basic
Organize ▾
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Homegroup
OFFICE DESKTOP
Computer
Local Disk (C:)
RECOVERY (D:)
Open
Cancel

Name	Date modified	Type	Size
STAGE1	16/01/2012 3:39 PM	File folder	
PtNo,X,Y,Z,Str,StrNo.xyf	20/03/2009 6:18 PM	XYF File	1 KB

File name:

Files (*.xyf)

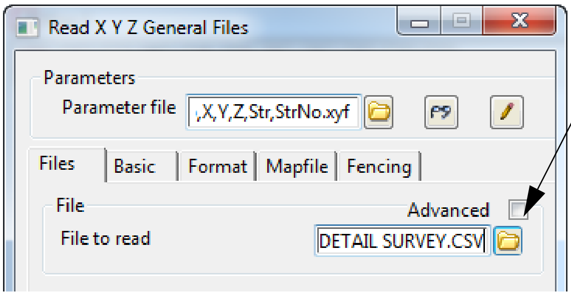
Click LB on the file then click LB on *[Open]*


Read X Y Z General Files
Parameters
Files
Basic
Format
Mapfile
Fencing
File
Advanced ☐

Parameter file ,X,Y,Z,Str,StrNo.xyf

File to read

Click LB on *Read* icon to load the parameters

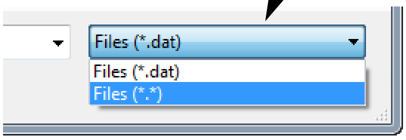

Read X Y Z General Files
Parameters
Files
Basic
Format
Mapfile
Fencing
File
Advanced ☐

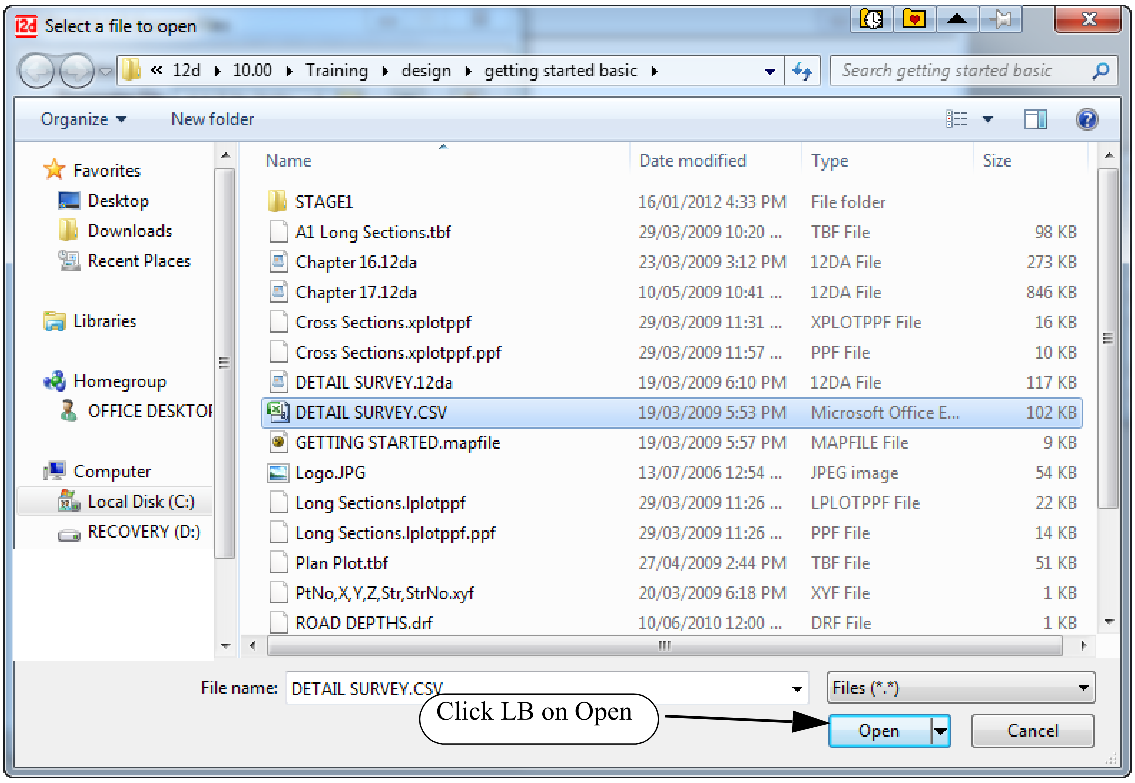
Parameter file ,X,Y,Z,Str,StrNo.xyf

File to read DETAIL SURVEY.CSV

Using the folder icon browse to the same folder that held the parameter file (**C:\12d\10.00\Training\design\getting started basic)** and locate the file DETAIL SURVEY.csv.

You will have to change the *File type* display to *All files (*.*)*


Files (*.dat)
Files (*.dat)
Files (*.*)



Select a file to open
« 12d ▸ 10.00 ▸ Training ▸ design ▸ getting started basic ▸
Search getting started basic
Organize ▾
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Homegroup
OFFICE DESKTOP
Computer
Local Disk (C:)
RECOVERY (D:)

Name	Date modified	Type	Size
STAGE1	16/01/2012 4:33 PM	File folder	
A1 Long Sections.tbf	29/03/2009 10:20 ...	TBF File	98 KB
Chapter 16.12da	23/03/2009 3:12 PM	12DA File	273 KB
Chapter 17.12da	10/05/2009 10:41 ...	12DA File	846 KB
Cross Sections.xplotppf	29/03/2009 11:31 ...	XPLOTPPF File	16 KB
Cross Sections.xplotppf.ppf	29/03/2009 11:57 ...	PPF File	10 KB
DETAIL SURVEY.12da	19/03/2009 6:10 PM	12DA File	117 KB
DETAIL SURVEY.CSV	19/03/2009 5:53 PM	Microsoft Office E...	102 KB
GETTING STARTED.mapfile	19/03/2009 5:57 PM	MAPFILE File	9 KB
Logo.JPG	13/07/2006 12:54 ...	JPEG image	54 KB
Long Sections.lplotppf	29/03/2009 11:26 ...	LPLOTPPF File	22 KB
Long Sections.lplotppf.ppf	29/03/2009 11:26 ...	PPF File	14 KB
Plan Plot.tbf	27/04/2009 2:44 PM	TBF File	51 KB
PtNo,X,Y,Z,Str,StrNo.xyf	20/03/2009 6:18 PM	XYF File	1 KB
ROAD DEPTHS.drf	10/06/2010 12:00 ...	DRF File	1 KB

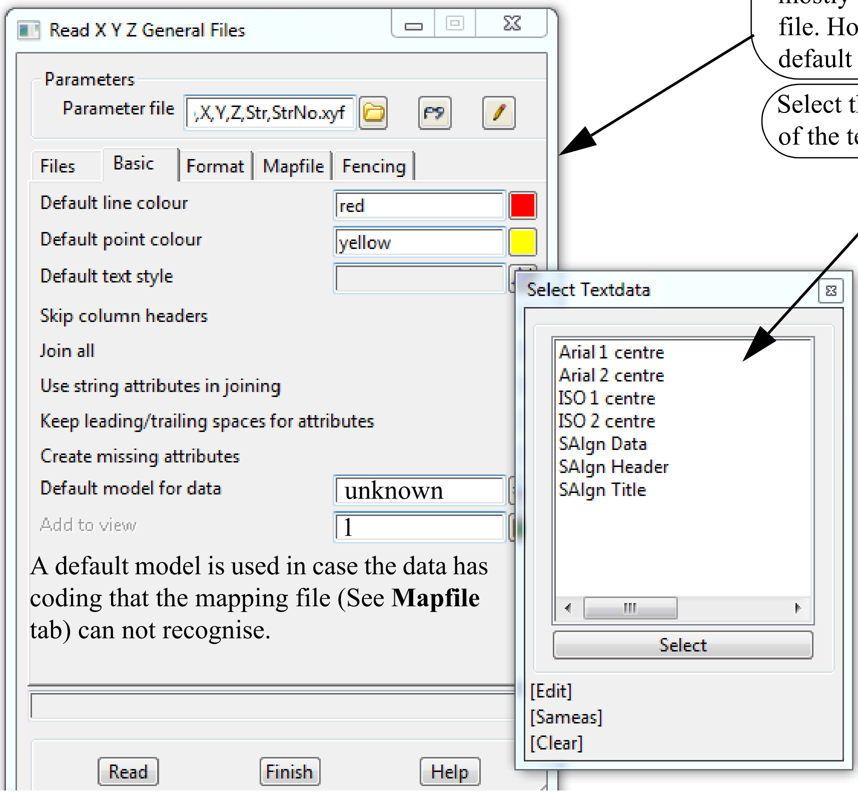
File name: DETAIL SURVEY.CSV

Files (*.*)

Open
Cancel

Click LB on Open

Select the **Basic** tab



Read X Y Z General Files
Parameters

Parameter file ,X,Y,Z,Str,StrNo.xyf

Files
Basic
Format
Mapfile
Fencing

Default line colour red

Default point colour yellow

Default text style

Skip column headers

Join all

Use string attributes in joining

Keep leading/trailing spaces for attributes

Create missing attributes

Default model for data unknown

Add to view 1

Read
Finish
Help
Select Textdata
Arial 1 centre
Arial 2 centre
ISO 1 centre
ISO 2 centre
SAlgn Data
SAlgn Header
SAlgn Title
Select
[Edit]
[Sameas]
[Clear]

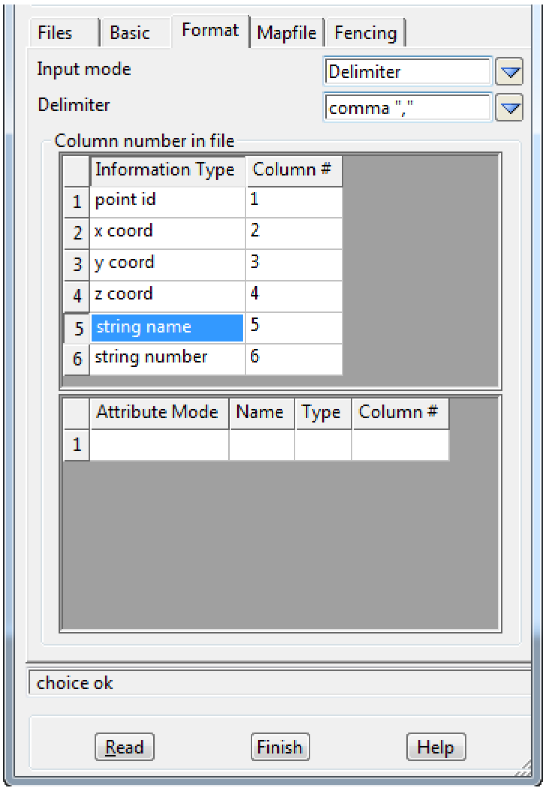
You will notice that the panel is mostly filled in from the parameter file. However, you still need to set the default text field

Select the choice icon then select any of the text style

A default model is used in case the data has coding that the mapping file (See **Mapfile** tab) can not recognise.

Select the **Format** tab

The format for the file values are set up here. No user entry is needed for this section



Input mode: Delimiter

Delimiter: comma ","

Column number in file

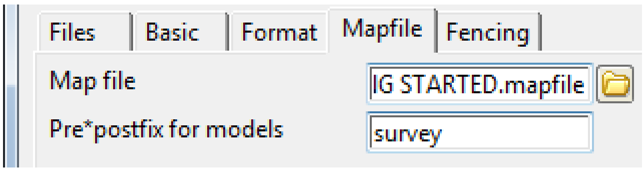
	Information Type	Column #
1	point id	1
2	x coord	2
3	y coord	3
4	z coord	4
5	string name	5
6	string number	6

	Attribute Mode	Name	Type	Column #
1				

choice ok

Select the **Mapfile** tab

A user defined mapping file uses the code found in the data file to set the parameters for the strings including the model name, linestyle, colour and more. The map file GETTING STARTED.mapfile was read from the folder **C:\12d\10.00\Training\design\getting started basic**

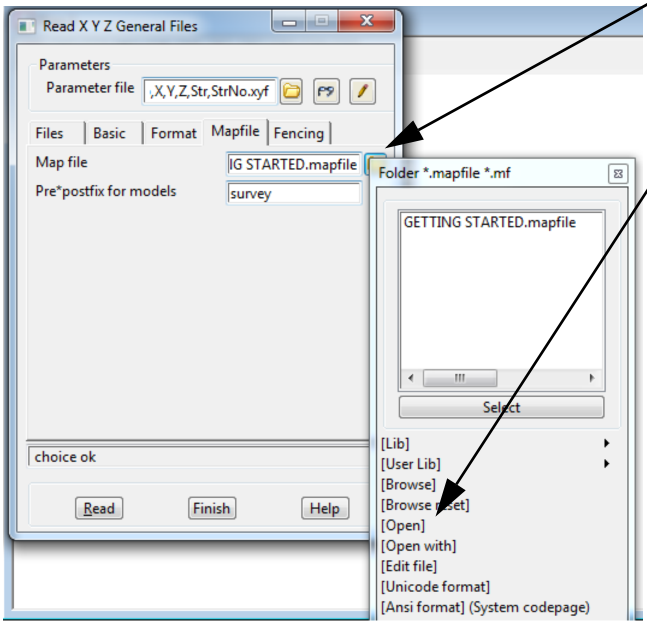


Map file: IG STARTED.mapfile

Pre*postfix for models: survey

A model prefix "**survey** " (note that there is a space after the word ***survey***) is used to group the survey models together after the map file has set the model names. This will help keep the survey data separate from the design. Using lower case for the word will send the models to the bottom of the listing

Open the map file


Read X Y Z General Files
Parameters
Files
Basic
Format
Mapfile
Fencing
Read
Finish
Help
Folder *.mapfile *.mf
Select
[Lib]
[User Lib]
[Browse]
[Browse reset]
[Open]
[Open with]
[Edit file]
[Unicode format]
[Ansi format] (System codepage)

Parameter file ,X,Y,Z,Str,StrNo.xyf

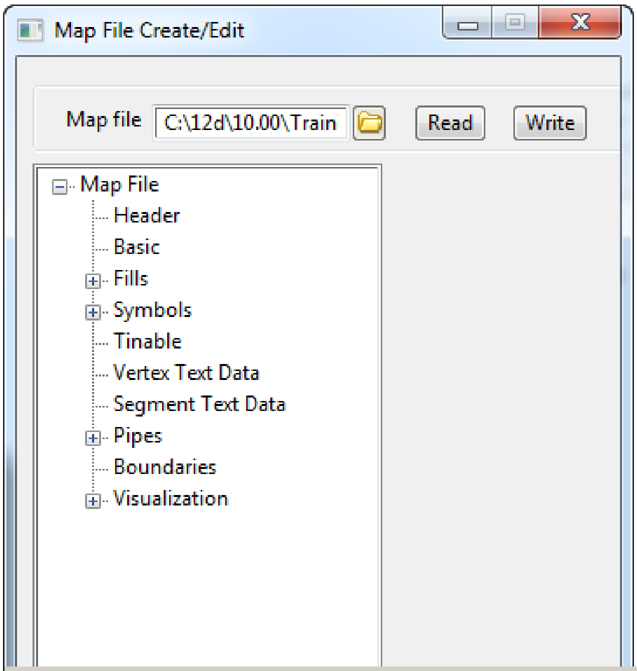
Map file IG STARTED.mapfile

Pre*postfix for models survey

GETTING STARTED.mapfile

choice ok

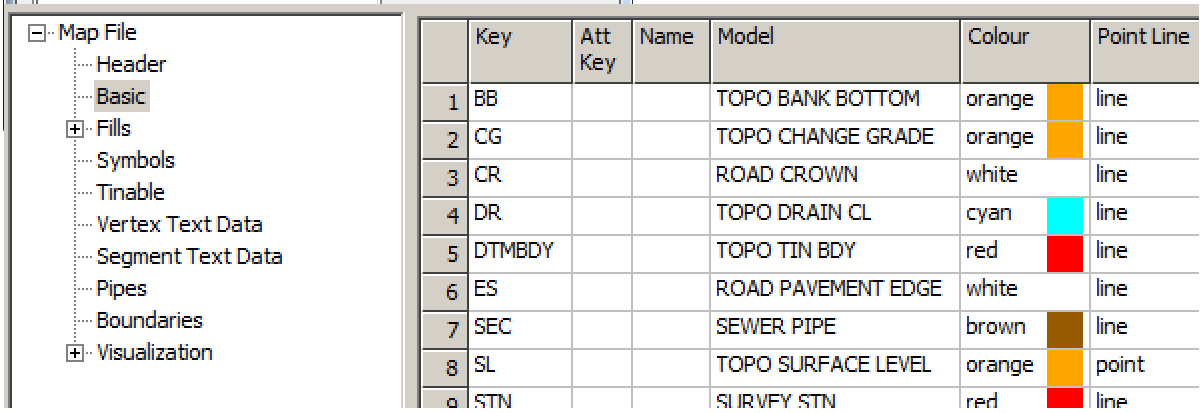
Select the folder icon then select *[Open]*


Map File Create/Edit
Read
Write
Map File
Header
Basic
Fills
Symbols
Tinable
Vertex Text Data
Segment Text Data
Pipes
Boundaries
Visualization

Map file C:\12d\10.00\Train

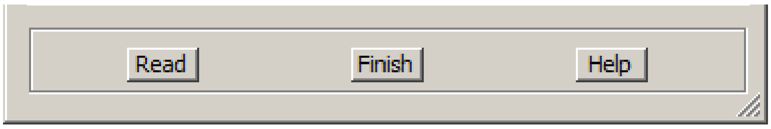
A branch structure is used to access the tabs within the map file

The Basic tab is shown below which sets the model, colour and more

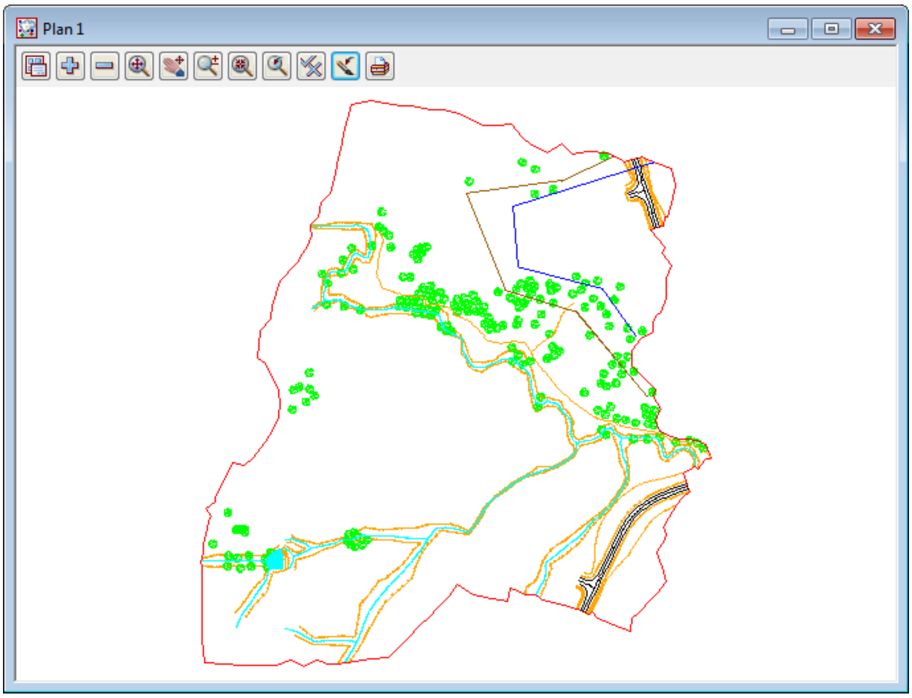

Map File
Header
Basic
Fills
Symbols
Tinable
Vertex Text Data
Segment Text Data
Pipes
Boundaries
Visualization

	Key	Att Key	Name	Model	Colour		Point Line
1	BB			TOPO BANK BOTTOM	orange	🟧	line
2	CG			TOPO CHANGE GRADE	orange	🟧	line
3	CR			ROAD CROWN	white		line
4	DR			TOPO DRAIN CL	cyan	🟦	line
5	DTMBDY			TOPO TIN BDY	red	🟥	line
6	ES			ROAD PAVEMENT EDGE	white		line
7	SEC			SEWER PIPE	brown	🟫	line
8	SL			TOPO SURFACE LEVEL	orange	🟧	point
9	STN			SURVEY STN	red	🟥	line

Click LB on *[Finish]* to exit the mapping file


Read
Finish
Help

Click LB on Read to import the data file



5.2 Plan View Operations

Now that we have some data, we can begin to look at some more of the Plan view features of 12d.

Menu

Bring up the Plan view Menu.

Adding/removing models

In the Plan View Button Area, you will observe a '+' and '-'. This is a shorthand technique for turning models on and off.

Click on the '-' sign button with LB. A list of available models to remove from the view pops up. Pick 'survey VEG TREE' and click LB on 'Select'. You will observe the tree symbols in model 'survey VEG TREE' are removed from the view. The '+' works in a similar way to add models to the View. Practice adding and removing models from the view with the + and -. Remember, the models are not being deleted with the '-', merely removed from the current View. Turn back on the tree model 'survey VEG TREE'.

Fit

After multiple pans and zooms, you sometimes wish to return to a point where all of your data appears in the view. This is equivalent to an AutoCAD Zoom-Extents. Click on Fit with LB to see all of your data.

Dynamic Pan

This facility allows you to move the centre of the view but retain the current zoom factor. Click on Pan with LB. You then press down LB on a point in the View and then drag the mouse. The data in the view will move with the mouse until LB is released.

Zoom

Select Zoom (to Zoom In) from the Plan View Button area with LB. Click LB on two diagonal points of a rectangle and then click LB once anywhere in the plan view. The information will appear enlarged based on the size of the rectangle.

MB Wheel Zoom

If your mouse has a wheel as part of the middle button, then it can be used to dynamically zoom in or out. Simply click LB in the plan view at the point you want to zoom about and then roll the wheel forward to zoom in and backwards to zoom out.

Shrink

This is equivalent to Zoom Out. It works just like Zoom but in reverse.

Previous

If you click LB on Previous, the view will appear as it was prior to the Zoom. 12d always keeps the details of the previous view setting available so that you can return to it quickly. Only one level of previous view settings is kept.

Toggle

There are multiple items under the Toggle Pop Up menu. At this time, we will try only one of them. Select **Grid** with the LB. A rectangular grid should appear. If you click LB on **Toggle =>Grid** again, the Grid will be removed from the display.

The appearance of the grid can be changed by clicking LB on the Menu button in the View Button Area and click LB on **Settings =>Grid.** You can change any of the settings in the panel. Try changing the grid spacing from 100 to 10 in both x and y directions and click LB on **Set.** You will notice that the Grid can be turned on and off from either the panel settings or the **Toggle =>Grid** switch. Click LB on **Finish** to terminate the panel.

Refresh

All the information on the view will be redrawn. This can also be achieved by clicking MB anywhere in the *View Title Area* or anywhere in the *View Button Area* except over the '+' or '-' buttons.

Plot

Bring up the Plan view Plot Menu.

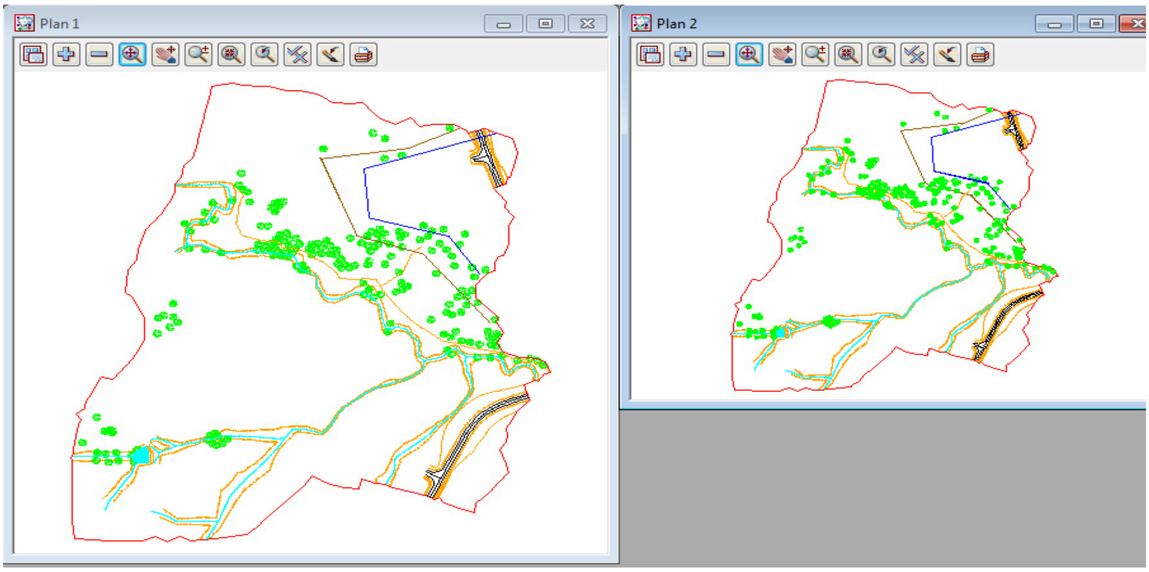
5.3 Birds-Eye Views and 'Throwing' Between Views

We saw in Chapter 3.10 'Basic View Operations' how to create a new View. To introduce some new concepts in 12d, we need a second small Plan view on the desktop. Firstly resize your existing 'Plan 1' view to take up around 2/3 of the left hand side of your desktop.

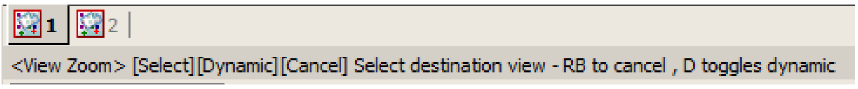
From the main menu, click LB on **Views=>New=>Plan** and place a small view about 50mm square in the top right hand corner of your desktop. This will create View 'Plan 2'. See Chapter 3.10 for full details on how to create and resize Views.

Note that when creating a View using **Views=>Create=>Plan View**, 12d pops up the 'New Plan View' panel. The View Name field will already have a 'number' in it supplied by 12d. 12d will always supply you a View number that is not currently in use. If you want, you can overtype the number suggested by 12d provided the number you type does not currently exist. If it was created earlier and has since been deleted, it is OK to reuse the view name.

In the View 'Plan 2', use the '+' sign button to turn on all of the models. From the 'Plan 2' View Button area, click LB on **Zoom** and click a point in the lower left corner of the View 'Plan 2'. Before selecting the second point of the Zoom rectangle, move the cursor into the other View i.e. 'Plan 1'.

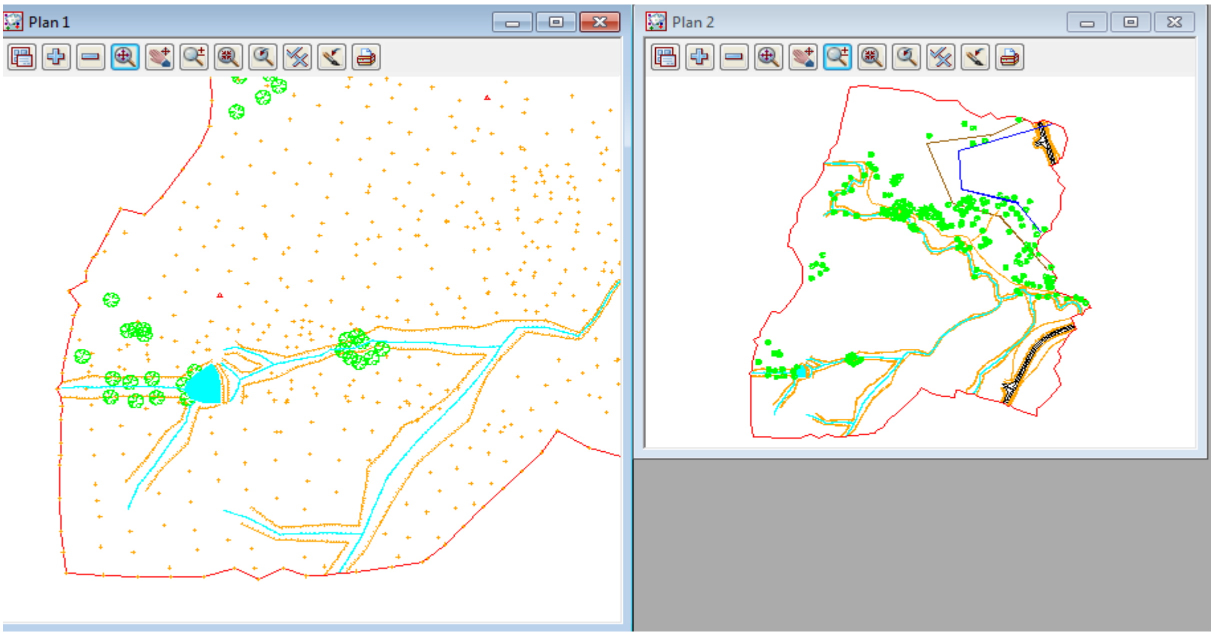


Select the second point of the Zoom rectangle in either View. After selecting the second point of the Zoom rectangle, you will notice the following prompt in the View Message Box



<View Zoom> [Select] [Dynamic] [Cancel] Select destination view - RB to cancel , D toggles dynamic

12d is prompting you to select the View you want 'zoomed'. Click LB in View 'Plan 1'. The zooming will then take effect in View 'Plan 1'.



Notice that using this technique, it is possible to achieve a birds-eye effect where the smaller View displays the complete model whilst the larger ‘working’ view is zoomed to an extent where it displays only the detail that you are currently working on. You would typically do all of your zooming in View ‘Plan 2’ but have the detail updated in View ‘Plan 1’. You could even do this with different models turned on. In the birds-eye view, you would typically only turn on sufficient detail to enable you to zoom on known features.

It is suggested you practice zooming and throwing between Views as this is a powerful concept in 12d and you should feel comfortable at using it.

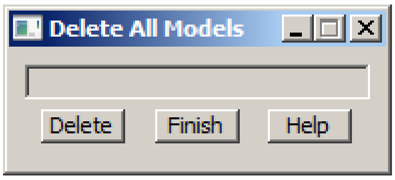
After completing this exercise, delete View ‘Plan 2’ as it is no longer needed. You will now see a second way to delete a View. Click LB in the View Menu button in the View Button Area of ’Plan 2’ and select **Delete** and **Yes** to confirm the deletion. The Delete View menu can also be brought up by clicking LB on the Menu button in the View Button Area of the View you wish to delete and select **Delete** and **Yes** to confirm the deletion.

It is suggested that you maximise ‘Plan 1’.

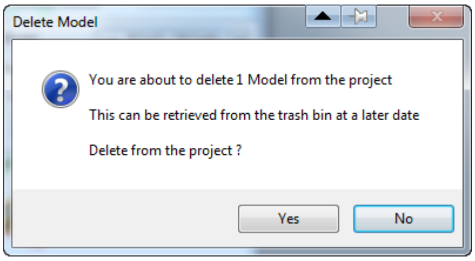
5.4 Deleting a Model

As we now wish to look at an alternative (and preferred) way of importing data into 12d, we will delete the existing models as they will be recreated in the following option.

From the Main menu, click with LB on **Models=>Delete=>Delete all models**



Click LB on **Delete**



You are about to delete 1 Model from the project

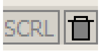
This can be retrieved from the trash bin at a later date

Delete from the project ?

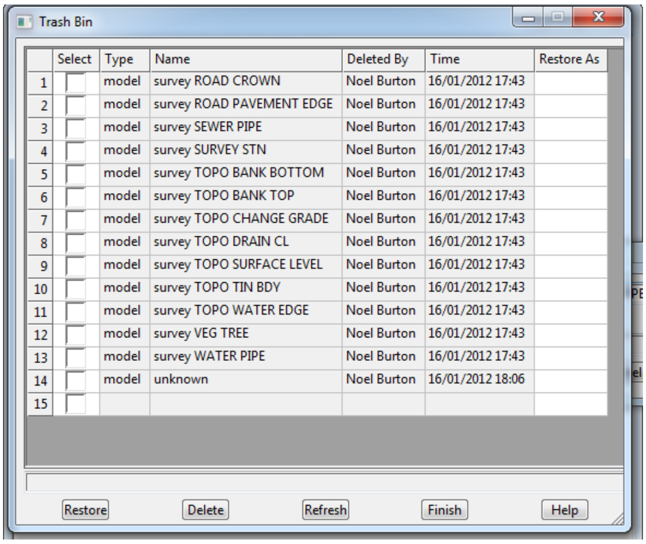
Click LB on **Yes** to confirm

When models are deleted they are sent to the **Trash Bin** in case they need to be restored at a later stage.

A trash bin icon appears at the bottom right of the 12d screen

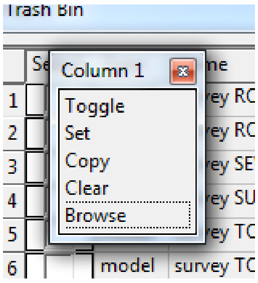


To access the deleted models double click LB on the icon or select **Project =>Management =>Trash Bin**

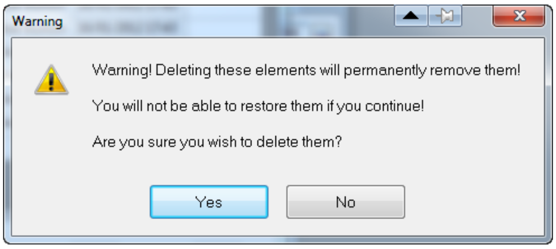


	Select	Type	Name	Deleted By	Time	Restore As
1	☐	model	survey ROAD CROWN	Noel Burton	16/01/2012 17:43	
2	☐	model	survey ROAD PAVEMENT EDGE	Noel Burton	16/01/2012 17:43	
3	☐	model	survey SEWER PIPE	Noel Burton	16/01/2012 17:43	
4	☐	model	survey SURVEY STN	Noel Burton	16/01/2012 17:43	
5	☐	model	survey TOPO BANK BOTTOM	Noel Burton	16/01/2012 17:43	
6	☐	model	survey TOPO BANK TOP	Noel Burton	16/01/2012 17:43	
7	☐	model	survey TOPO CHANGE GRADE	Noel Burton	16/01/2012 17:43	
8	☐	model	survey TOPO DRAIN CL	Noel Burton	16/01/2012 17:43	
9	☐	model	survey TOPO SURFACE LEVEL	Noel Burton	16/01/2012 17:43	
10	☐	model	survey TOPO TIN BDY	Noel Burton	16/01/2012 17:43	
11	☐	model	survey TOPO WATER EDGE	Noel Burton	16/01/2012 17:43	
12	☐	model	survey VEG TREE	Noel Burton	16/01/2012 17:43	
13	☐	model	survey WATER PIPE	Noel Burton	16/01/2012 17:43	
14	☐	model	unknown	Noel Burton	16/01/2012 18:06	
15	☐					

To restore a model click LB next to the model under the **Select** column then click LB on **[Restore]**



To delete all models in the trash bin (like emptying the Windows Recycle Bin) highlight all of the models by clicking LB then RB over the top of the select column. Click LB on **Set** to highlight the models and click LB on **[Delete]**



Warning! Deleting these elements will permanently remove them!

You will not be able to restore them if you continue!

Are you sure you wish to delete them?

Click LB on [Yes] to confirm deleting the models

5.5 Redraw - Fixing up a Modified or Erroneous View

Whenever data is removed from a View e.g. turning off the display of a model, the view does not automatically get refreshed. 12d typically removes a model by overdrawing the information using the background colour, usually ‘black’. This operation can leave the view looking speckled and unclear.

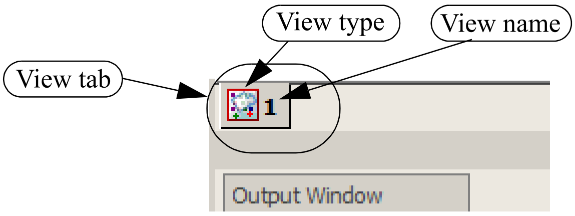
You can force the view to refresh by clicking LB on the Refresh button, or click MB in the View Button Area anywhere other than over the ‘+’ or ‘-‘ view buttons. The whole View will be repainted instantly to display the corrected information.

It is also possible that some of the menus may at times become corrupted. Windows is a very complex multitasking environment and the menus are stored in memory which is being updated continuously. If you ever get parts of your desktop that don’t look correct, you can force your entire desktop (all menus, views etc.) to be refreshed by typing Control-R at any time. Alternatively you can refresh just any one Menu by clicking MB in the menu title area.

5.6 View Tabs

There is a tab for each view on a bar just above the Status Bar at the bottom of your desktop. If you have the Output Window in the default position (the tab at the bottom left of your desktop), the tabs bar is displayed just above the Output Window.

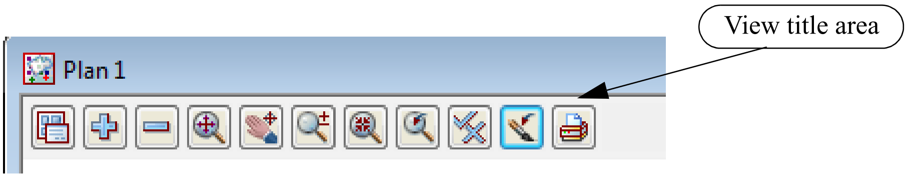
The ***View Tab*** has the icon for the view type and then the view name beside it.



Each tab corresponds to a 12d View.

To bring a 12d view to the top of all other views and to set the view as your active view, just click LB on the appropriate View Tab, or LB in the view title area of the view.

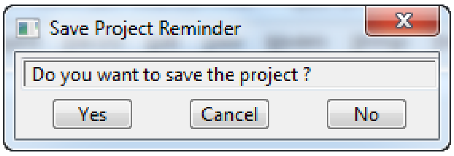
Note that when a view is active, the View title highlights in blue.



5.7 Saving a Project

The changes to the Project you are working on are currently only stored in memory. To make the changes permanent and update your files on disk you need to Save the Project. This can be done at any time by clicking LB on **Save** from the Projects Menu (**Project =>Save)**.

12d will occasionally pop up a panel reminding you 'Do you want to save the project?



Do you want to save the project ?

Click on **Yes** with LB to force a Save to occur.

The timing at which this message appears is set from the Main menu in **Project =>Management =>Defaults**. See the data field 'Save Interval (min)' under the 'System Settings' tab.

The default is every 15 minutes. You can set the time interval to zero to turn this feature off altogether.

If you ever crash out of 12d due to a power failure for instance, any changes since your last **Save** operation will be lost.

5.8 Exit

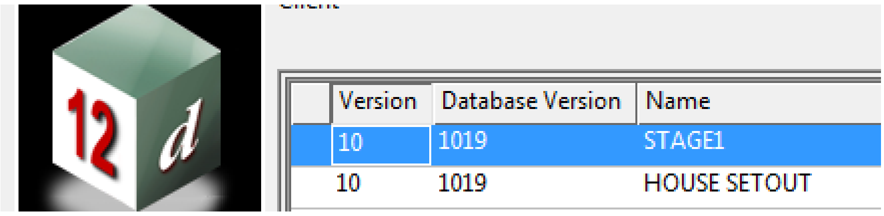
To terminate a 12d session, click LB on **Exit** from the Project menu (**Project =>Exit)**. If you try to Exit 12d after changes have been made to your Project, 12d will remind you of the changes by prompting you for a further **Save** operation.

5.9 Restarting 12d with an Existing Project

When you restart 12d and return to an existing project, the appearance of the desktop will be just as you last left it. The number of Views, appearance of all models and user defined parameters are redisplayed using the settings that are stored with the Project data.

The next time you start 12d, the project **STAGE 1** will appear in the previous projects list.

Double clicking LB on **STAGE 1** in the list and you will be taken into the project **STAGE 1**.

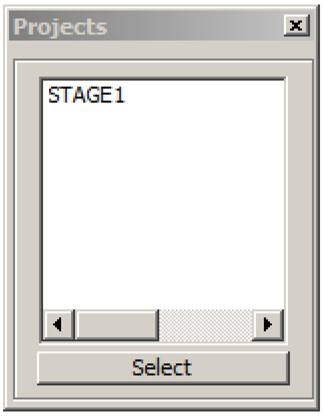


Version	Database Version	Name
10	1019	STAGE1
10	1019	HOUSE SETOUT

Alternatively, if you navigate to the folder containing the project **STAGE 1**, you will automatically get a pop up list of all available projects in that folder to select from.

Click LB on **STAGE 1** to highlight it and then click LB on the **Select** button. Alternatively, you can double click on **STAGE 1** to bypass the Select button.

If you have trouble restarting 12d, remember you called this Project **STAGE 1**. See Chapter 3.2 to remind yourself how to start 12d.



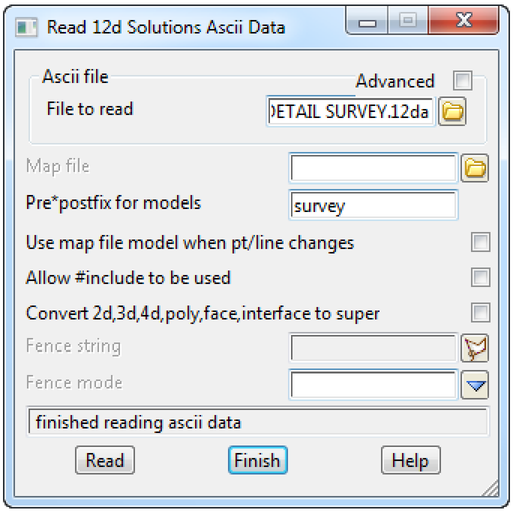
6 Basic Modelling

6.1 Alternative data entry

We will now repeat the process of importing data into 12d but this time we will use a 12d ascii file.

This option is the more common way of transferring data from Surveyor to Designer when both parties use 12d. The ascii format will often include all of the strings with the correct model, colour and other properties so that no mapping is required. Also a tin (triangulation) can be included in this file format so that the Designer has no need to create a new tin from the survey data. In this instance we will assume the coding is correct but the models are different so that mapping is required. Also a tin is not included.

We will import the file ‘DETAIL SURVEY.12da’. To read in the file, click LB on **File I/O=>Data Input=>12da/4da data** from the Main menu.



Read 12d Solutions Ascii Data

Ascii file

Advanced ☐

File to read:)ETAIL SURVEY.12da

Map file:

Pre*postfix for models: survey

Use map file model when pt/line changes ☐

Allow #include to be used ☐

Convert 2d,3d,4d,poly,face,interface to super ☐

Fence string:

Fence mode:

finished reading ascii data

Click LB on the File folder icon then browse back up to the folder **C:\12d\10.00\Training\design\getting started basic**

Click LB on the file **DETAIL SURVEY.12da**

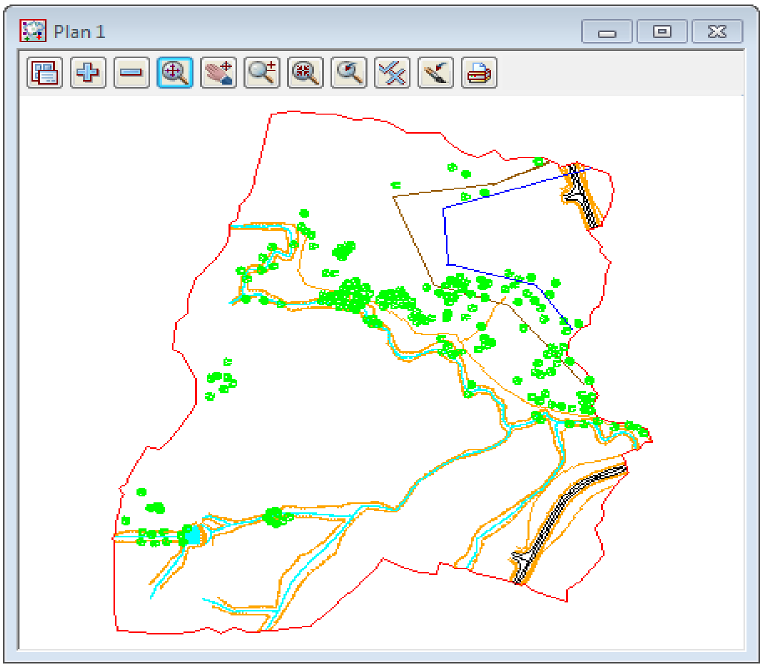
Click LB on [Open] to select the file

A map file is not required.

A model prefix ‘survey ’ is again typed in to group the survey models away from the future design models.

Click on **Read** to read the data into 12d Model.

Delete plan view 2 and then turn on all of the models in plan view 1

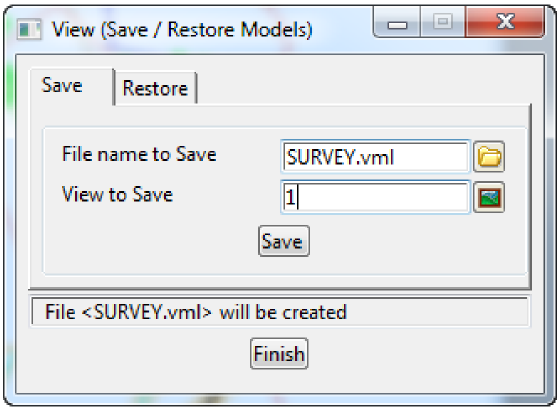


6.2 Saving model listing to a file for future use

We will now perform a function that is only meaningful later on when we are manipulating TINs. First we need to click on the 'Plan 1' view tab such that Plan View 1 is now our focus. The heading in view 'Plan 1' should appear coloured bright blue and it should be to the forefront.

The current thirteen models on the view are exactly the models that are used to create the 'natural surface' tin. We will now see how to record these models in a form that can be used in the future to restore those same models to another view.

From the Main menu click LB on **View=>Models Save/Restore**



File name to Save: SURVEY.vml

View to Save: 1

File <SURVEY.vml> will be created

Type in the file name **SURVEY**. Pressing [Enter] will add the extension **.vml**

Click LB on the view icon then select view **1**

Click LB on **Save**

Click LB on **Finish** to exit the panel

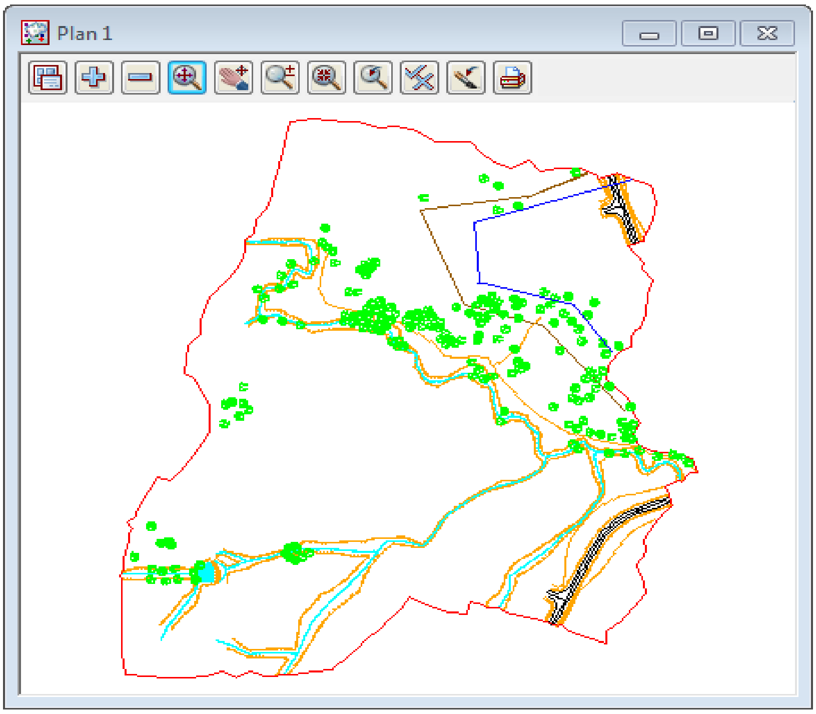
This file can be read at any future time by use of the Restore option. This will add the same models to a view which need not necessarily be plan view '1'.

6.3 Triangulation

We will now use this point and line information to create a 3d surface or TIN (Triangulated Irregular Network). One of the concepts in 12d is that a TIN can be created from a single model, a single view (and all the models on that view are used) or a model list. In general, you will use Views to create models since you can control which models are on display in a View. It is important to understand that when creating a TIN from a View, only those models on display in the View will be used in creating the TIN and only then if they are set to be tinable in the map file. For instance, if you were forming a TIN to represent the natural surface, you could leave turned ON any models that represented underground surfaces prior to creating the TIN, because in the mapping file they would be set to be non tinable.

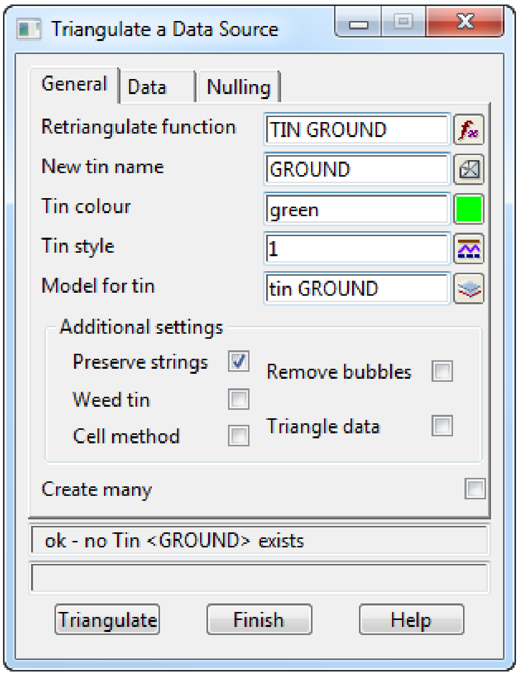
When using a mapping file to read in data, strings can be flagged as being tinable (Breaklines) or non-tinable. Only tinable strings are used in the triangulation. Breaklines are used to pick up the topographical features accurately. When forming triangles, 12d ensures that every breakline has the sides of one or more triangles along the entire breakline i.e. triangles never cross breaklines (unless the breaklines themselves cross).

In this exercise we are assuming that the survey strings have been checked for errors (See Getting started for Surveying manual)



For the purposes of the ongoing tutorial, please ensure that all models in view ‘Plan 1’ are on display prior to creating the TIN. ‘Plan 1’ should look as shown above. Note that the points do not display when zoomed out.

From the Main menu, click LB on **Tins=>Create=>Triangulate data**



Triangulate a Data Source

Retriangulate function: TIN GROUND
New tin name: GROUND
Tin colour: green
Tin style: 1
Model for tin: tin GROUND

Additional settings
Preserve strings ☑
Weed tin ☐
Cell method ☐
Remove bubbles ☐
Triangle data ☐
Create many ☐

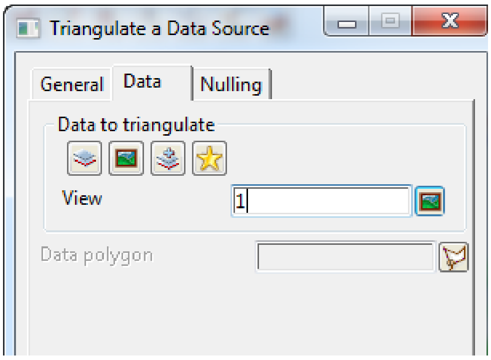
ok - no Tin <GROUND> exists

Fill in the first tab of the panel as shown.

The **Triangulation function** option is used to construct a function which, when recalculated, will run a retriangulation on the tin. Place the cursor in the data field with the LB and type in '**TIN GROUND**'

Each TIN requires a name. Position the cursor in the **New tin name** field and type in '**GROUND**'. If you press the Enter key, this name will also be used to fill in the **Model for tin** field but with the prefix 'tin ' (see panel). The TIN name is subsequently used to refer to this specific TIN.

Position the cursor in the 'Model for Tin' field and type in the suffix '**,1**' after the name so that the model is displayed as the TIN is created. It is permissible to overtype this name but this is not recommended.

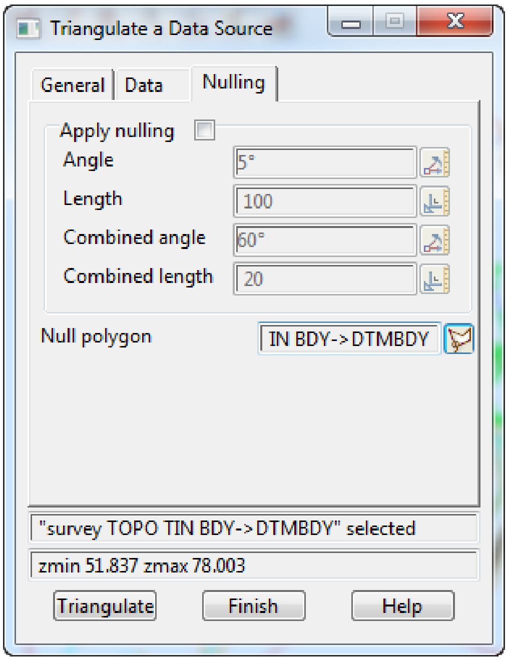


Triangulate a Data Source

Data to triangulate
View: 1
Data polygon:

Click on the **Data** tab.

As we wish to triangulate all the data in plan view "1" and leave the tinabitily to determine which data to use, click LB on the view 🖼 icon. Select '1' from the list.



Triangulate a Data Source

Apply nulling ☐
Angle: 5°
Length: 100
Combined angle: 60°
Combined length: 20
Null polygon: IN BDY->DTMBDY

"survey TOPO TIN BDY->DTMBDY" selected
zmin 51.837 zmax 78.003

Click on the **Nulling** tab.

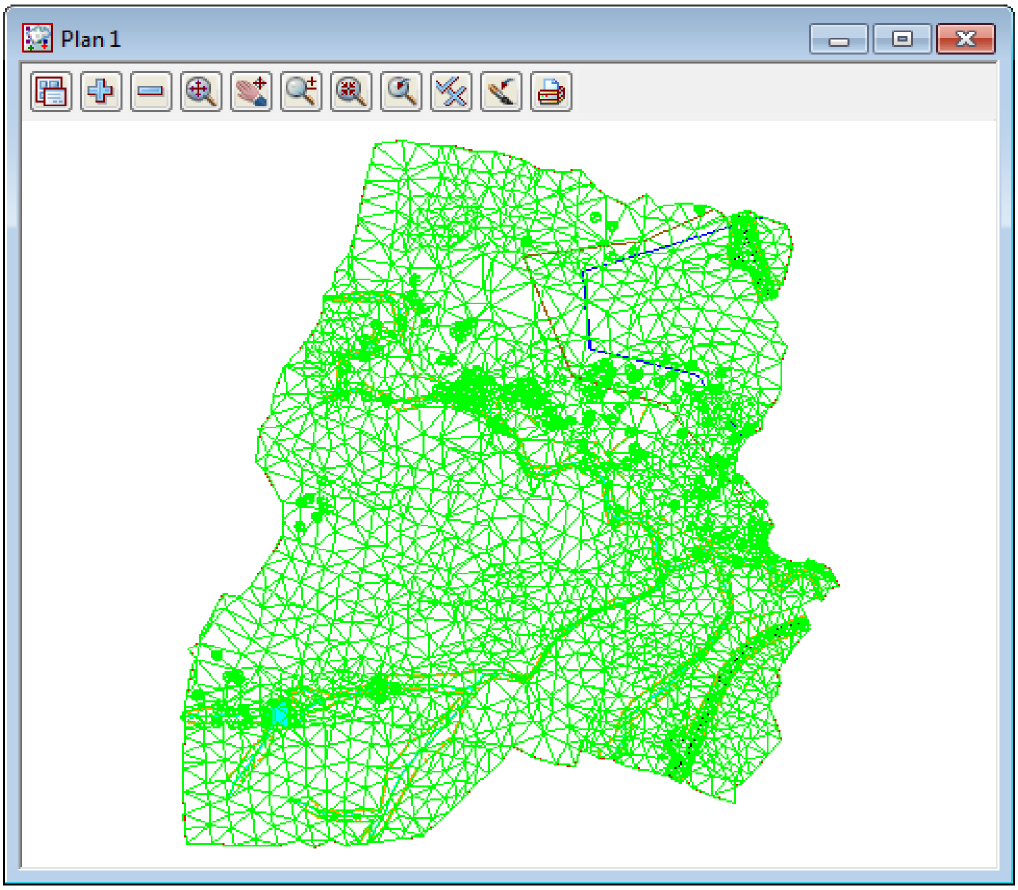
Click on the ***Apply Nulling*** check mark.

There are two options here, you can either set the parameters to null the external triangles or you can use a polygon to null all triangles outside this polygon. The **DTMBDY** string will be used as the boundary for the tin. Click LB on the **Null polygon** string icon then click LB on the **DTMBDY** string followed by clicking middle button (MB) to accept the string.

Click LB on **Triangulate** to create the TIN. There will be a short delay and then your TIN will be created and displayed as shown in the next picture.

Click LB on **Finish** to terminate the panel.

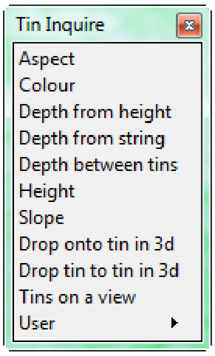
Turn on the model **tin GROUND**



Note that the TIN is clipped at the selected null polygon ensuring only the surveyed data is included. Now that we have a TIN we can display the TIN data in a variety of ways

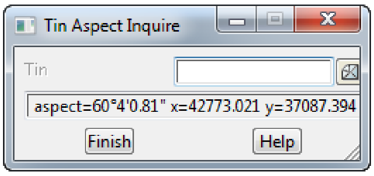
6.4 Tin inquire.

From the Main menu, click LB on **Tins=>Inquire** and the Tin Inquire panel pops up.


Tin Inquire
Aspect
Colour
Depth from height
Depth from string
Depth between tins
Height
Slope
Drop onto tin in 3d
Drop tin to tin in 3d
Tins on a view
User

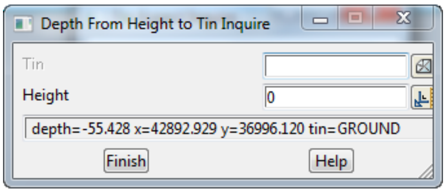
Click LB in the menu title area (where it says Tin Inquire), move the menu and Pin it with the LB. This operation is necessary to stop the menu from collapsing after the first menu pick.

Click LB on **Aspect**, and the Tin Aspect Inquire panel will pop up.


Tin Aspect Inquire
Tin
Finish
Help

```
aspect=60°4'0.81" x=42773.021 y=37087.394
```

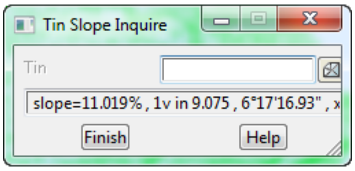
Move the cursor over the *Tin* icon button at right end of the 'Tin' field and use the LB to pop up a list of Tins. Double click LB on **GROUND**. Then click LB in the menu title area (where it says Tin Aspect Inquire), move the panel to a clear area of your screen and pin it with the LB. Do <u>not</u> Click on the Finish button in the panel.


Depth From Height to Tin Inquire
Tin
Finish
Help

Height 0

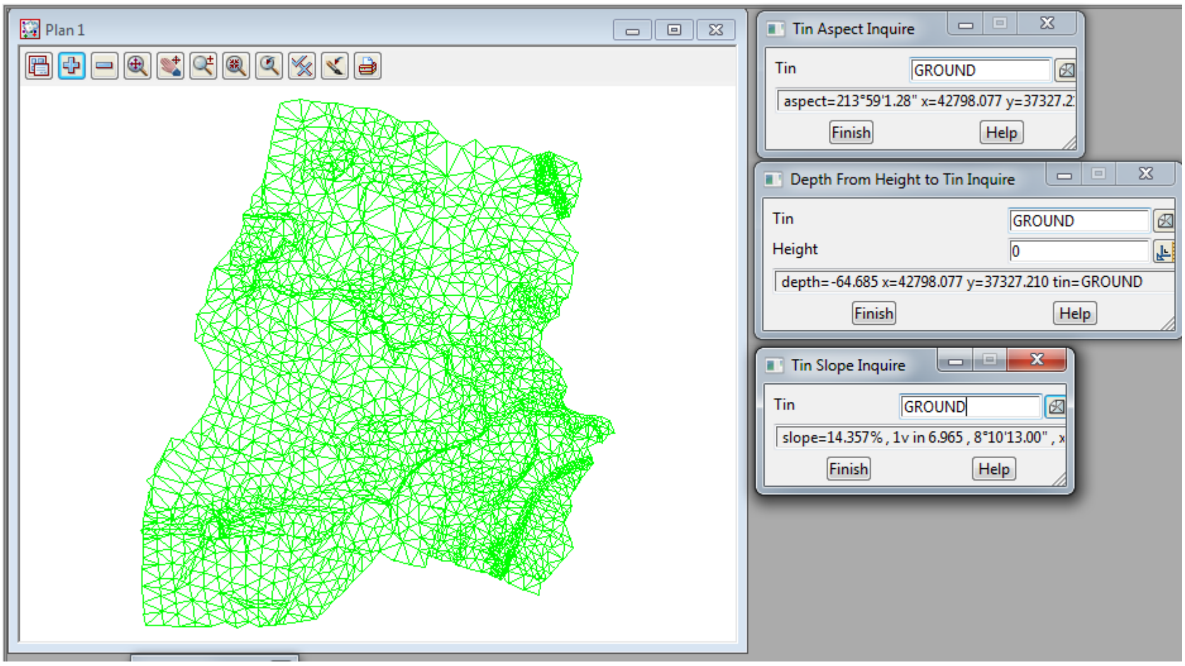
```
depth=-55.428 x=42892.929 y=36996.120 tin=GROUND
```

Repeat this procedure with both the **Height** and **Slope** menu items.


Tin Slope Inquire
Tin
Finish
Help

```
slope=11.019% , 1v in 9.075 , 6°17'16.93" , x
```

Once all three panels are on the screen, move the cursor anywhere over the TIN and observe what happens. When the cursor is positioned over any one triangle, the three point coordinates of the triangle are being used to linearly interpolate 'on the fly' to calculate the exact x,y,z coordinates of the cursor. Also the aspect and slope of the triangle is shown in the respective panels.


Plan 1
Tin Aspect Inquire
Finish
Help
Depth From Height to Tin Inquire
Finish
Help
Tin Slope Inquire
Finish
Help

Tin: GROUND
aspect=213°59'1.28" x=42798.077 y=37327.2

Tin: GROUND
Height: 0
depth=-64.685 x=42798.077 y=37327.210 tin=GROUND

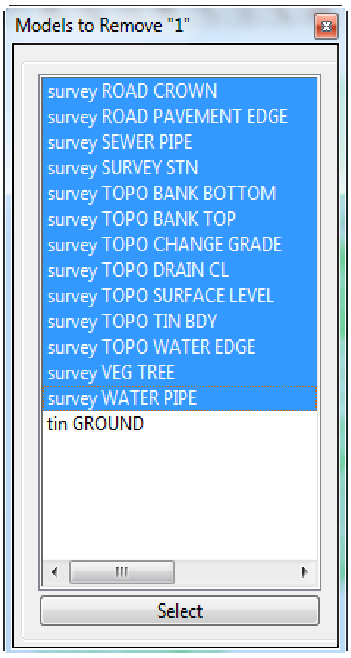
Tin: GROUND
slope=14.357% , 1v in 6.965 , 8°10'13.00" ,

Click LB on **Finish** on all three panels to put them away. Also click LB on **'X'** on the Tin Inquire menu to shut it down.

We will now look at the various ways information in TINs can be viewed.

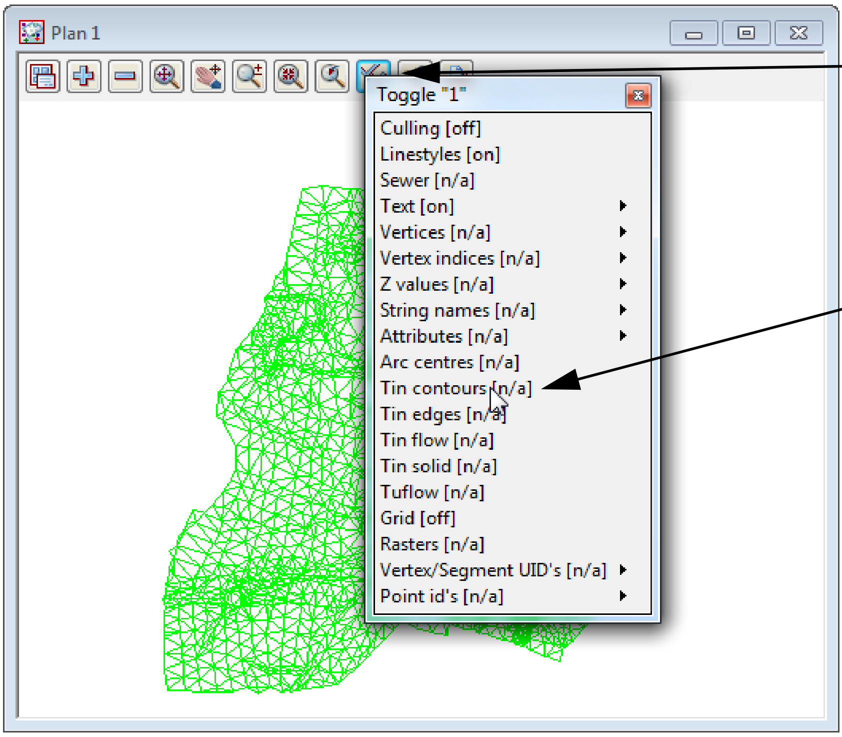
6.5 'Fast' Contours

We now want to remove all of the models from the View except 'tin GROUND'. From the View menu (in the View Button area), click LB on the '**-**' sign to pop up the Models to Remove panel.


Models to Remove "1"
survey ROAD CROWN
survey ROAD PAVEMENT EDGE
survey SEWER PIPE
survey SURVEY STN
survey TOPO BANK BOTTOM
survey TOPO BANK TOP
survey TOPO CHANGE GRADE
survey TOPO DRAIN CL
survey TOPO SURFACE LEVEL
survey TOPO TIN BDY
survey TOPO WATER EDGE
survey VEG TREE
survey WATER PIPE
tin GROUND
Select

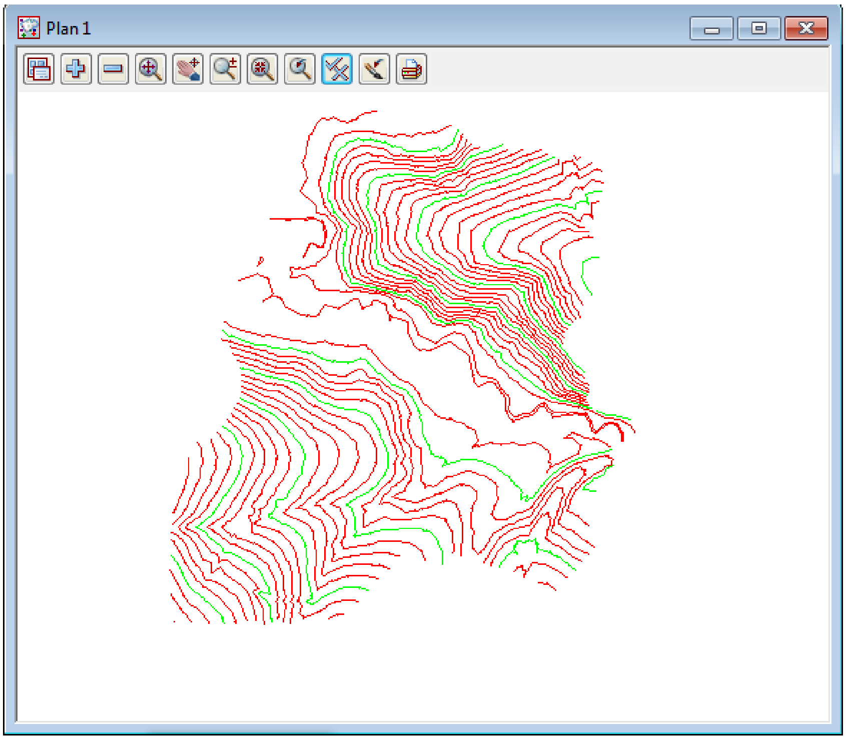
Click LB in the panel title area (over the words Models to Remove), move the panel and repin it with LB so that it doesn't collapse after each selection.

Now click the LB on the first survey model. Drag the mouse down the list to highlight all the survey models and click on 'Select'. Alternatively, you could double click LB on each model in turn ***except*** 'tin GROUND'. Click LB on **'X'** to shut down the panel.


Plan 1
Toggle "1"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [n/a]

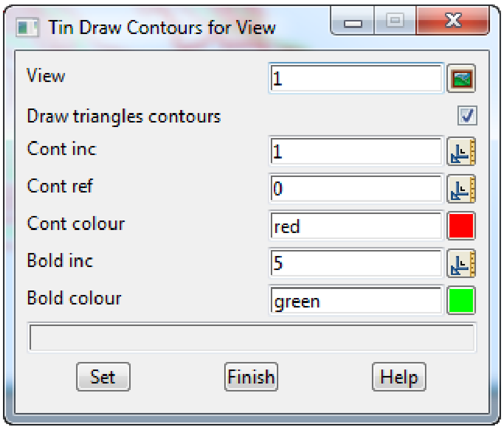
Now from the View buttons, click LB on the **Toggle** button to bring up the Toggle menu.

Then click LB on **Tin contours**. You should see the following red and green contour lines appear.



If you click **Toggle=>Tin contours** again, the View will revert to the ‘green triangle’ display.

The appearance of the contours can be changed by clicking LB on the Menu button in the View Button Area. Click LB on **Settings=>Tins=>Contours** and the following panel will pop up.



View: 1

Draw triangles contours ☑

Cont inc: 1

Cont ref: 0

Cont colour: red 🟥

Bold inc: 5

Bold colour: green 🟩

You can change any of the settings in the panel including colour. Click LB on the colour icon at the right end of the contour colour field to see a popup list of available colours. Select one by double clicking LB.

Try changing the contour increment (spacing) from 1 to 5 and the bold increment from 5 to 25. Click LB on **Set** to activate the changes**.** You will notice that the ‘Fast’ contours can be turned on and off from either the ‘Draw triangles contours’ tick box setting in the panel or the **Toggle=>Tin Contours** switch.

At the completion of experimenting it is suggested that you put the settings back to their default values (as above) at this time.

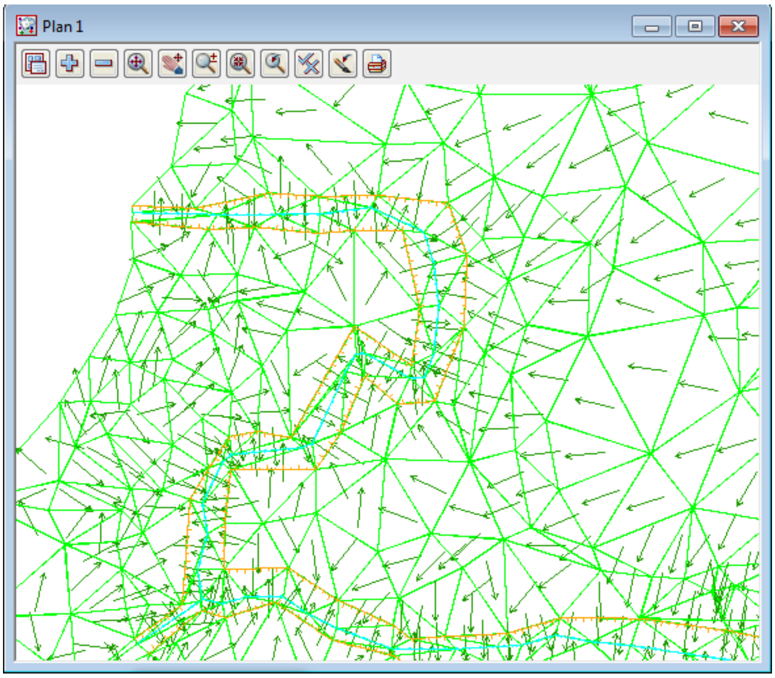
Click LB on **Finish** to terminate the panel. Your new settings will remain in effect indefinitely until changed.

6.6 ‘Fast’ Flow Arrows

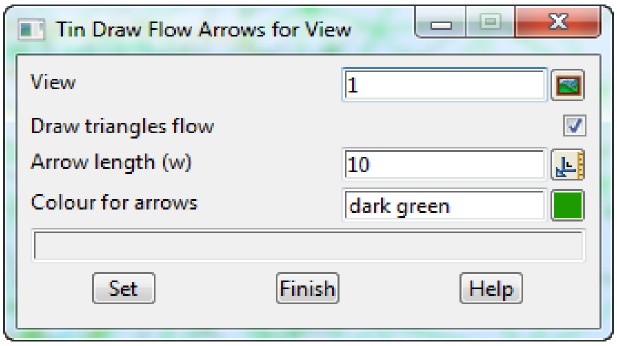
It is recommended that you turn on the drainage models for this exercise. From the View menu (in the View Button area), click LB on the ‘+‘ sign button and double click LB on ‘survey TOPO BANK BOTTOM’, ‘survey TOPO BANK TOP’ and ‘survey TOPO DRAIN CL’. Make sure that the ‘tin GROUND’ model is also still turned on. The easiest way to confirm this is click LB on the ‘**-**‘ sign button in the View Button Area and look at the list of the models that could be turned off. Click LB on the **‘X’** button to terminate the list.

Now from the View menu, click LB on **Toggle=>Tin contours** then **Toggle=>Tin edges**. The purpose of this is to outline each triangle. Then click LB on **Toggle=>Tin flow**. You should now see an arrow appear at the centre of each triangle representing the direction of water flow.

Try zooming in on a section of the model for a closer look. When you have finished zooming, click on **Fit** to again fill the View window.



The appearance of the flow arrows can be changed by clicking LB on the Menu button in the View Button Area. Click LB on **Settings=>Tins=>Flow Arrows** and the following panel will pop up.


Tin Draw Flow Arrows for View

View: 1

Draw triangles flow: ☑

Arrow length (w): 10

Colour for arrows: dark green

You can change the size of the arrow heads and their colour. Click LB on the colour icon for the ‘Colour for arrows’ field to popup a list of available colours. Select one by double clicking LB.

Try changing the arrow length from 10 to 5 world coordinates (in this case metres).

Click LB on **Set** to activate the changes**.** You will notice that the Flow arrows can be turned on and off from either the ‘Draw triangles flow’ tick box setting in the panel or the **Toggle=>Tin Flow** switch.

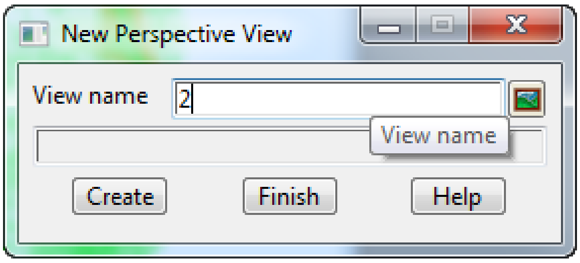
Click LB on **Finish** to terminate the panel. Your new settings will remain in effect indefinitely until changed (for this project only).

Click both **Toggle=>Tin edges** and **Toggle=>Tin flow** again and the View will revert to the ‘green triangle’ display.

6.7 Perspective View

We will now look at the perspective view facilities in 12d to examine the surface we created above.

Create a new perspective view. Click LB on **Views=>New=>Perspective OpenGL** from the Main menu and a new view pops up. Alternatively by selecting **Views=>Create=>Perspective OpenGL view** from the Main menu, a panel pops up.


New Perspective View
Create
Finish
Help

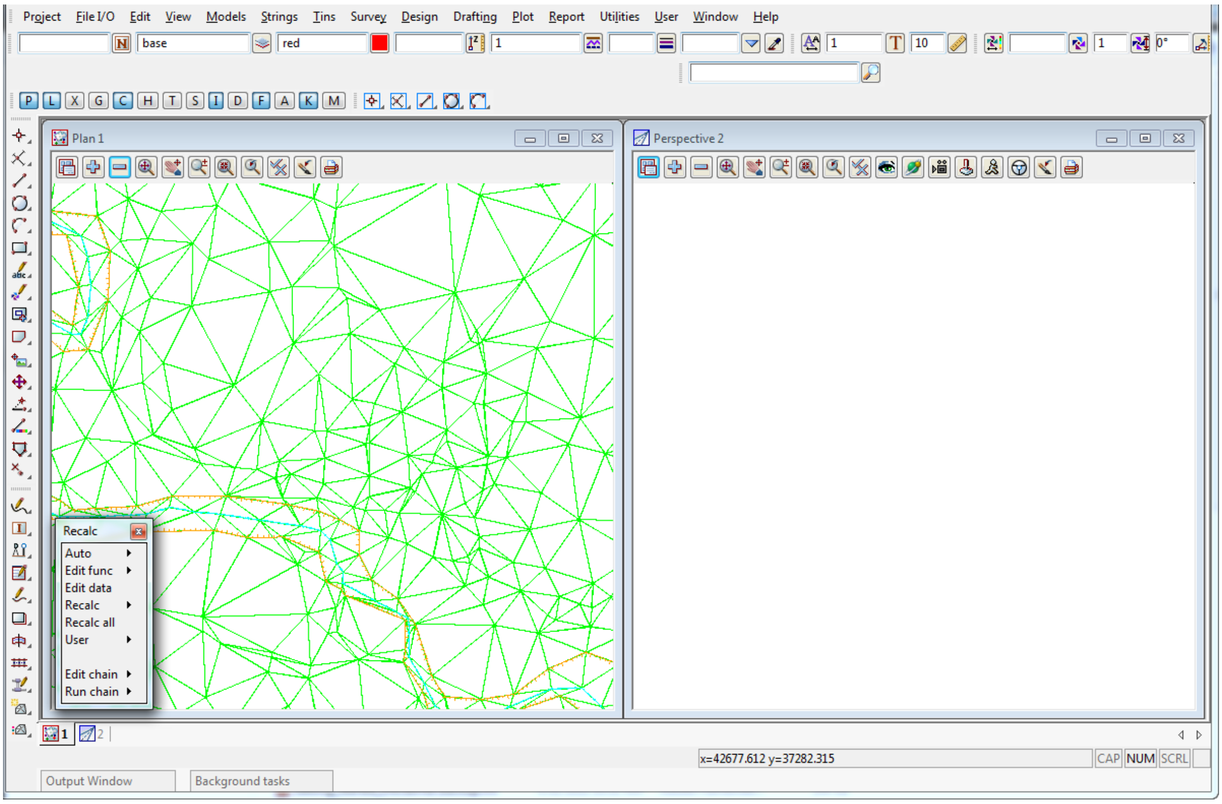
View name 2

If necessary, put the cursor in the View name field, backspace over the existing entry (or use the Delete key) and type ‘2’.

Click LB on **Create.**

Note the new view is created immediately and is placed over the top of your existing windows.

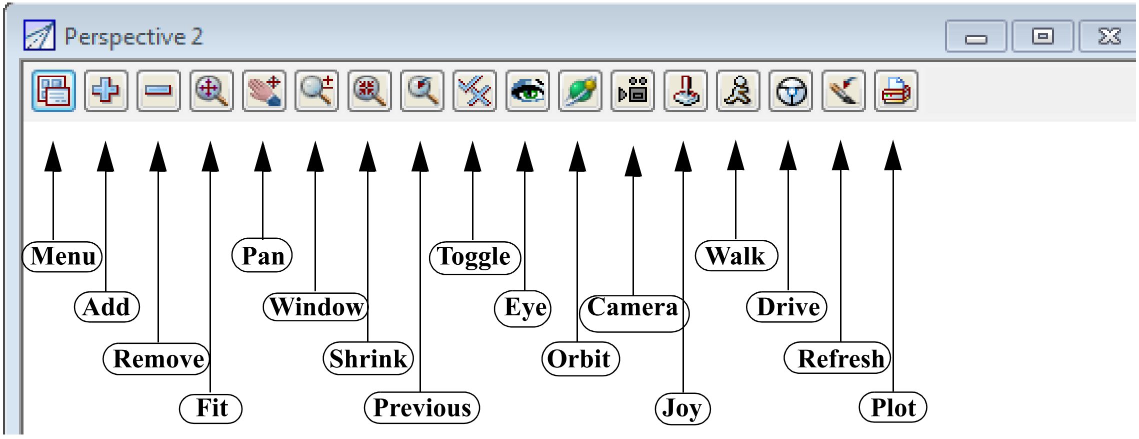
You should use the standard windows features to ‘Tile’ the views. Click in the view title area for plan view ’1’ then select **Windows=>Tile Vertical**


Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Drafting
Plot
Report
Utilities
User
Window
Help
Plan 1
Perspective 2
Recalc
Auto
Edit func
Edit data
Recalc
Recalc all
User
Edit chain
Run chain
Output Window
Background tasks
CAP
NUM
SCRL

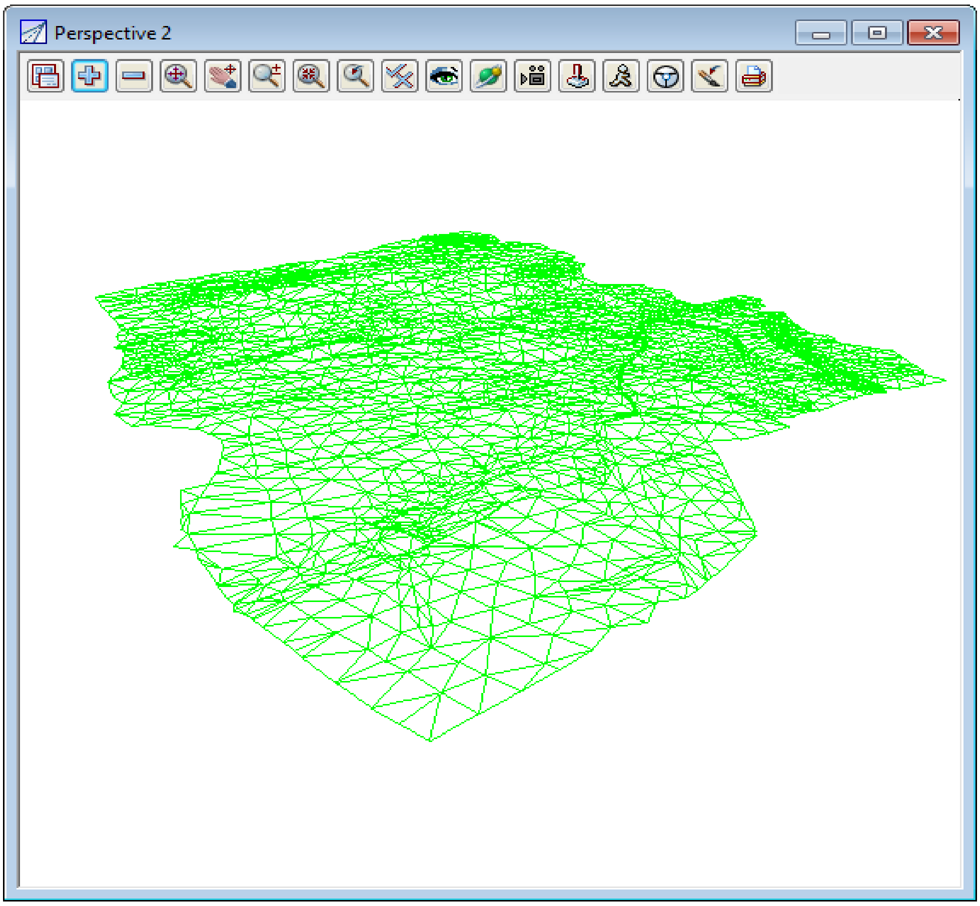
x=42677.612 y=37282.315

Your overall screen layout should now look something like this.

The view buttons on the Perspective view are:


Perspective 2
Menu
Add
Remove
Fit
Pan
Window
Shrink
Previous
Toggle
Eye
Orbit
Camera
Joy
Walk
Drive
Refresh
Plot

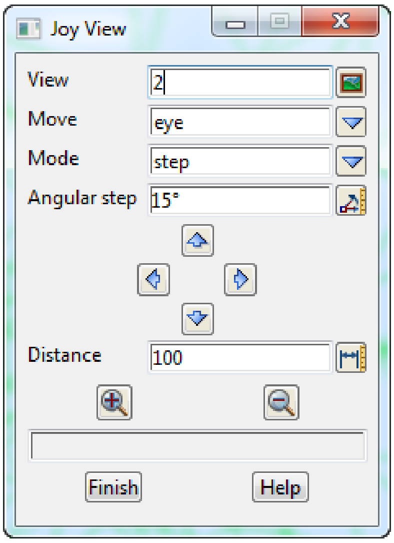
We now need to add the TIN to the perspective view. In the View Button Area of Perspective OpenGL 2, click LB on the '+' sign button and double click LB on **tin GROUND.** Click LB on the **Fit** icon. Your Perspective view should now look as follows


Perspective 2

6.8 Joy Panel

The Joy (short for Joystick) provides a quick way of orientating your eye in relation to your data when manipulating a Perspective view.

The Joy panel is accessed from the View Buttons Area. Click LB on the *Joy* button in the View Button Area of ‘Perspective OpenGL 2’ and the **Joy View** panel appears.



View 2
Move eye
Mode step
Angular step 15°
Distance 100

Try clicking LB on **In** and **Out** icons

and observe what is happening. You eye is moving inwards or outwards from the data.

Also try **Up, Down, Left** and **Right**. icons

If you get lost or zoom in too far, you can always start again by clicking LB on **Fit** in the View Button Area.

The angular step between each up or down step defaults to 15 degrees. You can change this if you want smaller increments by entering a new value in the Angular Step field.

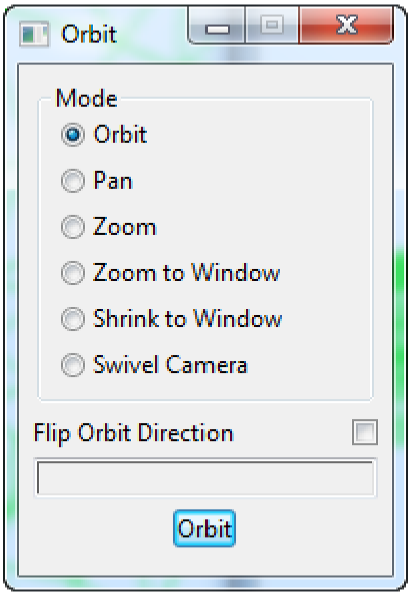
Similarly, the Distance changed on each In/Out movement defaults to 100 (metres in our case as all data is in metres).

The easiest way to reset a view so that you can see all of the data is to click LB on **Fit** from the View Button Area.

6.9 Orbit Panel

The Orbit is another way to orient your eye in relation to your data when manipulating a Perspective view.

The Orbit panel is accessed from the View Buttons Area. Click LB on the *Orbit* button in the View Button Area of ‘Perspective OpenGL 2’w.


Orbit

Mode
● Orbit
○ Pan
○ Zoom
○ Zoom to Window
○ Shrink to Window
○ Swivel Camera

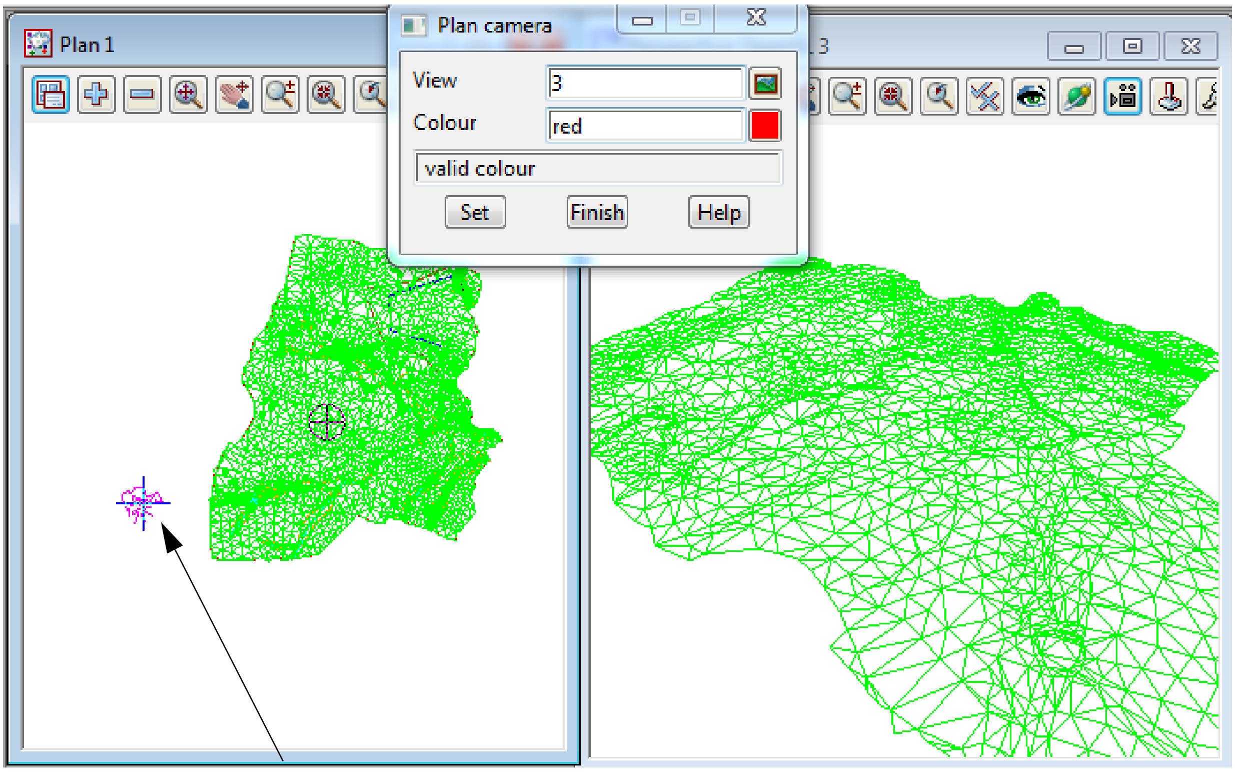
Flip Orbit Direction ☐

6.10 Camera

The Camera icon links the perspective view to a plan view.

Once the plan view is nominated in the panel the user can zoom in and out based on the orientation of the camera position in the plan view

The Camera panel is accessed from the View Buttons Area. Click LB on the *Camera* button in the View Button Area of 'Perspective OpenGL 2' and the **Plan Camera** panel appears.



View: 3

Colour: red

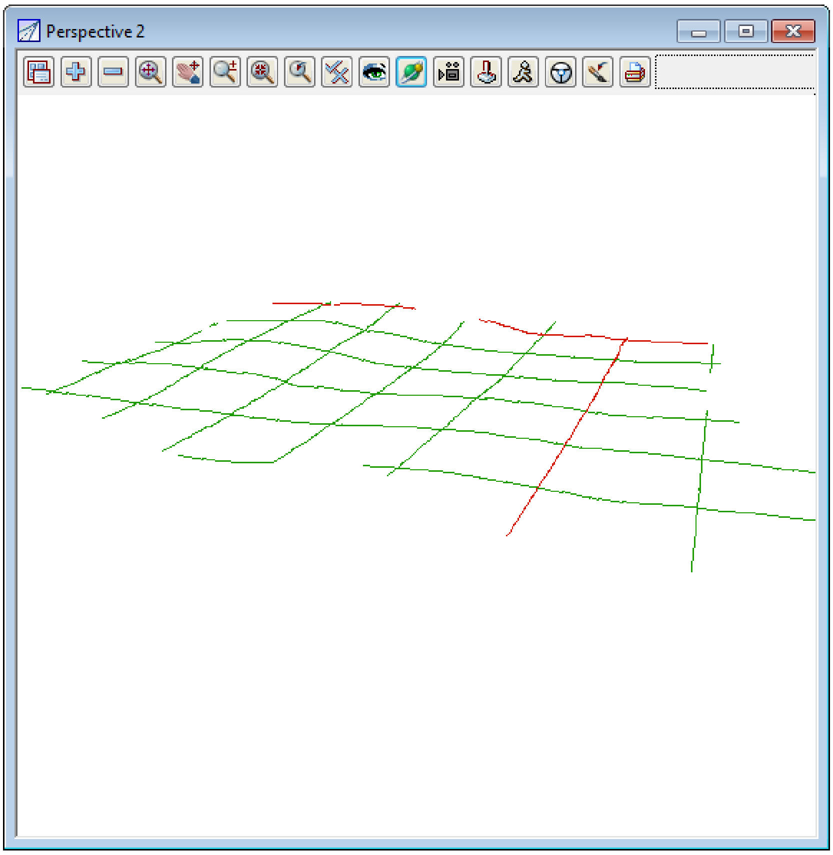
valid colour

Holding the LB over the camera icon in the plan view we can zoom in and around a fixed point in the perspective view

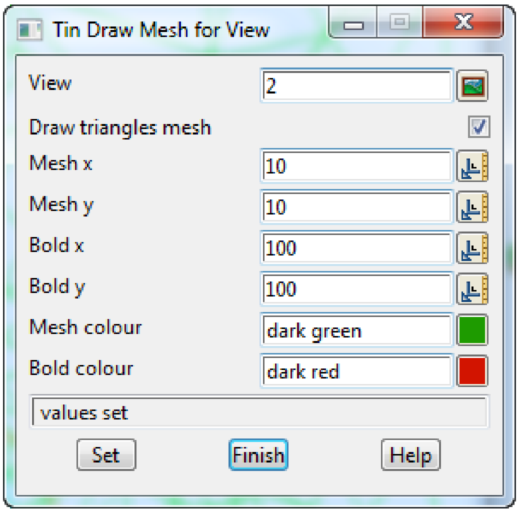
6.11 ‘Fast’ Meshes in Perspective view

We will now see how to quickly display the TIN in mesh form.

From the Perspective View menu, click LB on **Toggle=>Tin mesh**. You should see a coarse rectangular grid of red and green mesh lines appear.



The appearance of the mesh can be improved by reducing the mesh spacing. Click LB on the Menu button in the View Button Area of the ‘Perspective OpenGL 2’ view and then click LB on **Settings=> Tins=>Mesh.** The following panel will pop up.



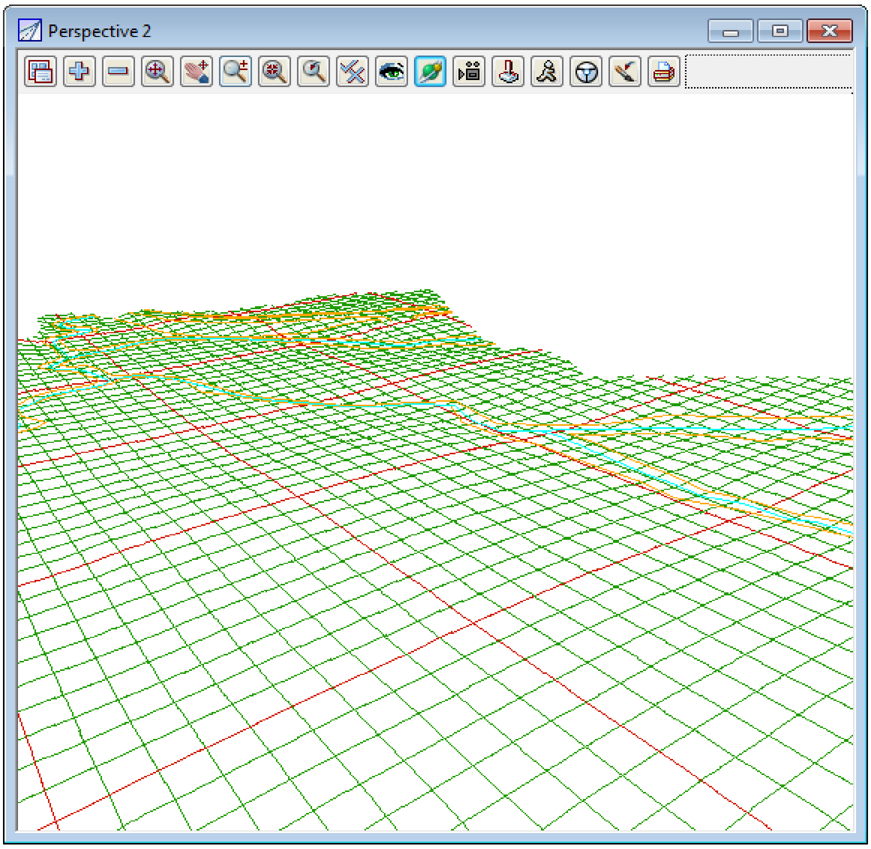
View	2
Draw triangles mesh	☑
Mesh x	10
Mesh y	10
Bold x	100
Bold y	100
Mesh colour	dark green
Bold colour	dark red

values set

Change the settings to those shown in the panel. Change the mesh spacing from 100 to 10 in both x and y directions and bold x and y spacing from 1000 to 100. Click LB on **Set** to activate the settings.

You will notice that the Mesh can be turned ON and OFF from either the ‘Draw triangles mesh’ tick box in the panel or from the View menu via the **Toggle=>Tin Mesh** switch.

Click LB on **Finish** to terminate the Mesh settings panel.



The effect of the creeks superimposed on the TIN (shown above) is created by turning on the Drainage models. Click LB on the '+' sign button in the View Button Area and double click LB on 'survey TOPO BANK BOTTOM', 'survey TOPO BANK TOP' and 'survey TOPO DRAIN CL'.

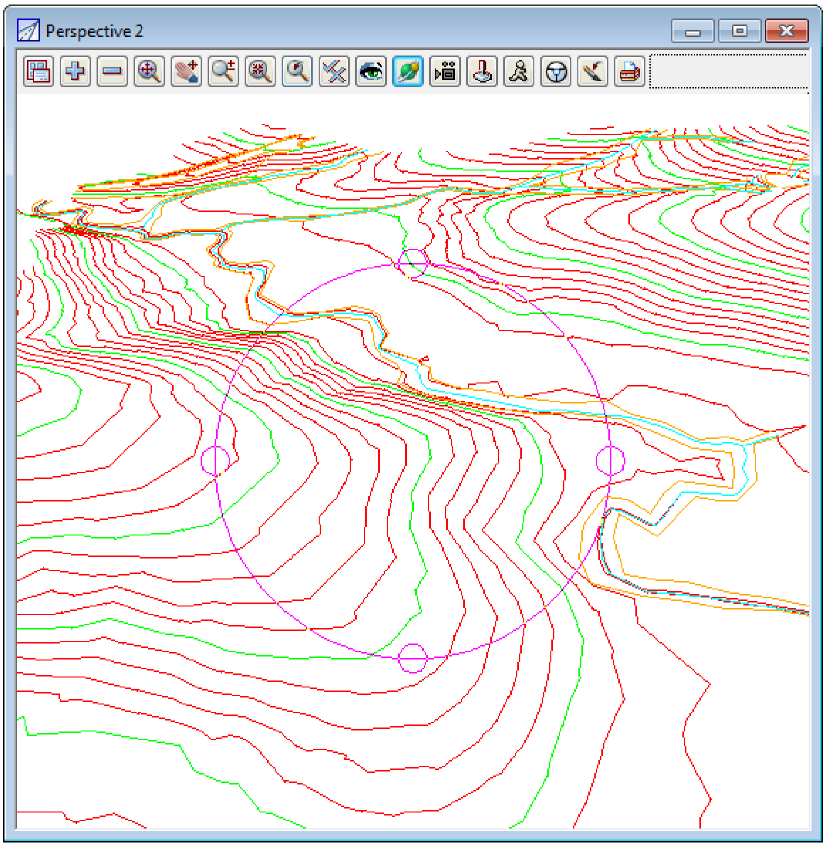
Note that 12d always displays the models in the order that they are turned on with the '+' and '-' buttons. Thus to get the effect of survey DRAIN CL (and any other models) superimposed on your TIN, you first turn all models off, then turn the TIN on first and then any other models to be superimposed last. Note that clicking LB on the Menu button in the View Button Area for 'Perspective OpenGL 2' and selecting **Models=>Remove all models** is a fast way to turn all models off.

The above perspective view orientation will stay as set indefinitely unless changed by further Joy or equivalent perspective view operations.

Toggle off the tin mesh from the View menu via the **Toggle=>Tin Mesh** switch.

6.12 Contours in Perspective Views

Sometimes it is useful to display contours in perspective views. You do this from the Toggle button. Simply click LB on **Toggle=>Tin Contours** as before.



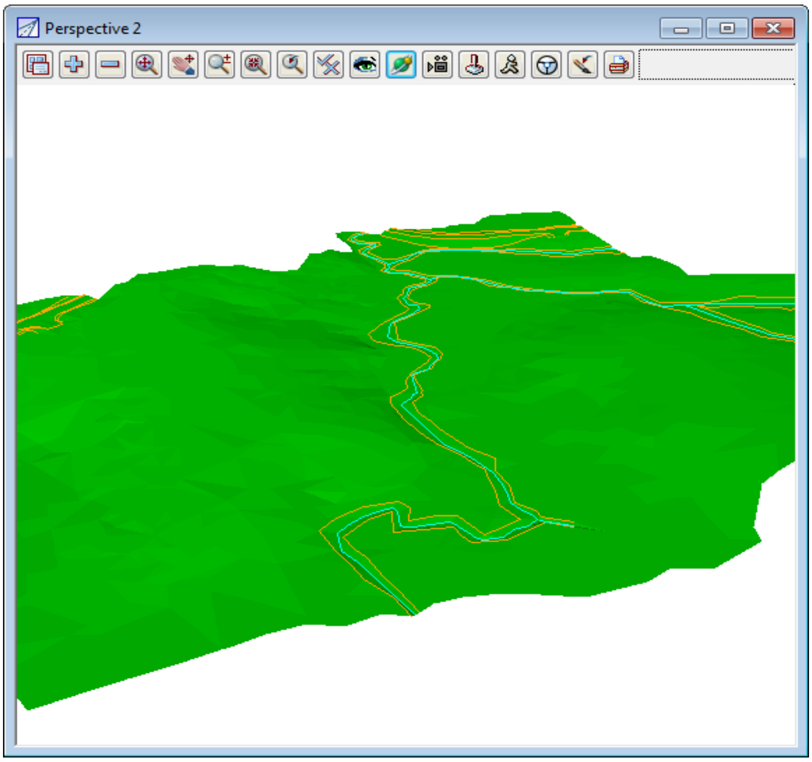
The contour spacing and colours of the Perspective view can be changed just as we did before in the Plan view. This time however you would click LB on the Menu button in the View Button Area of the ‘Perspective Open GL 2’ view. As before then click LB on **Settings=>Tins=>Contours.** See Chapter 6.5 for more details.

Click **Toggle=>Tin contours** again to revert to the ‘green triangles’ display.

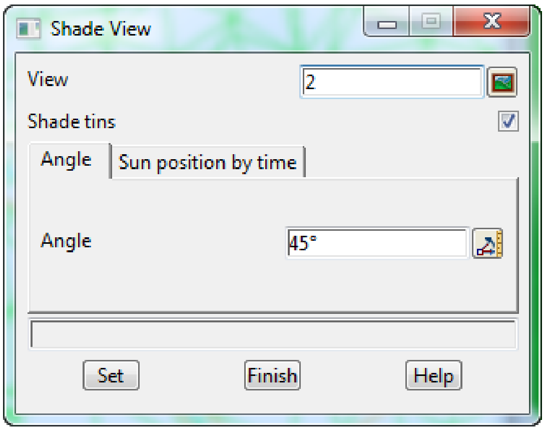
6.13 Shaded Views

It is also useful to view a perspective as a colour shaded view. 12d has the ability to define up to 10,000 colours and use these to create a flat shaded view. During the shade, 12d will find and use the 'colours.12d' file supplied with the tutorial. The angle that each triangle makes with the sun (a point light source at infinity) is used to click LB on a different shade of green. The angle of the Sun can be varied but 45 degrees (the default) gives the maximum contrast.

To quickly shade all the TINs on the perspective view, simply click LB on **Toggle=>Shade**.



To access the Shade View panel to modify the shade settings, click LB on the Menu button in the View Button Area of 'Perspective OpenGL 2 and then click LB on **Settings=>Shade.**



View: 2
Shade tins ☑

Angle: 45°

Clicking LB in the 'Shade tins' field tick box will toggle on and off the shading. A tick indicates the shade is activated.

Click LB on Set to create the shaded view. All TINs in the view will be shaded using the faces in order furthest to nearest the viewer. This has the effect of removing faces that are hidden from view.

Click LB on **Finish** to terminate the panel.

Now every time the view is refreshed or the view changed, the shaded view will reappear.

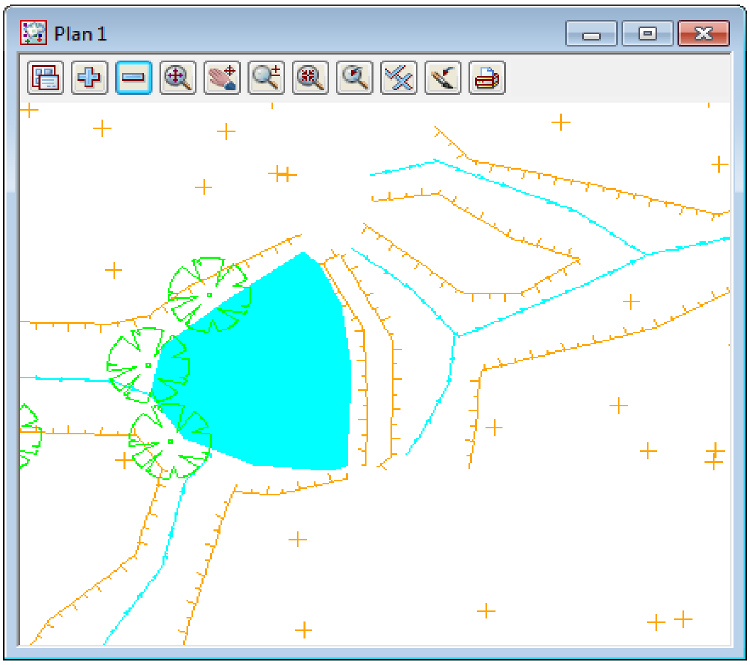
To get back to a 'green triangles' rather than a shaded view, click LB on **Toggle=>Shade** to toggle the shade off.

7 String Picking Concepts

We will now investigate picking concepts and how the mouse is used to interact with 12d when pointing to and selecting items on your screen. Initially, do all picking (i.e. mouse clicking) with the LB. This uses the 12d Model Tentative pick. Later we will look at Fast picking using MB.

In plan view ‘1’ turn on all the models except the triangulation (tin GROUND).

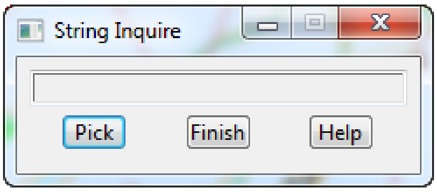
Zoom in to the left dam. Your overall screen layout including the ‘Plan 1’ view should now look as shown below.



Whilst the ‘string picking’ concepts are used throughout 12d, especially during construction of design features where we want to connect into existing geometry, we will learn about them by example through the relatively simple ‘String Inquire’ feature.

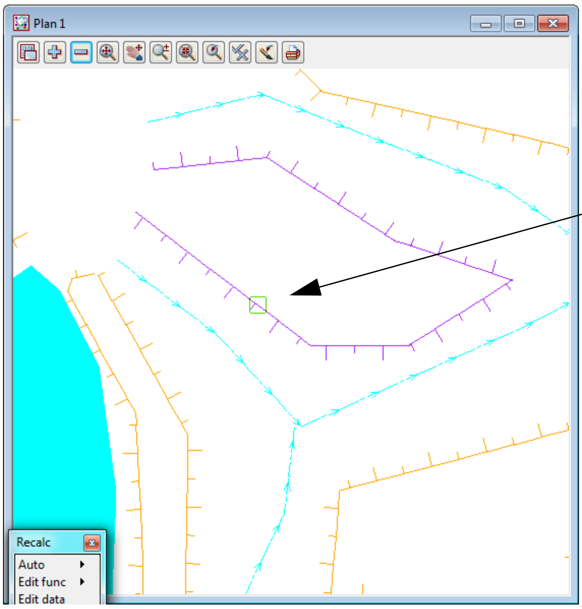
7.1 String Inquire

String Inquire is used to inquire and view the details of a typical line (i.e. string) that is already present in the View. From the Main menu, click LB on **Strings=>Inquire** to bring up the following panel.



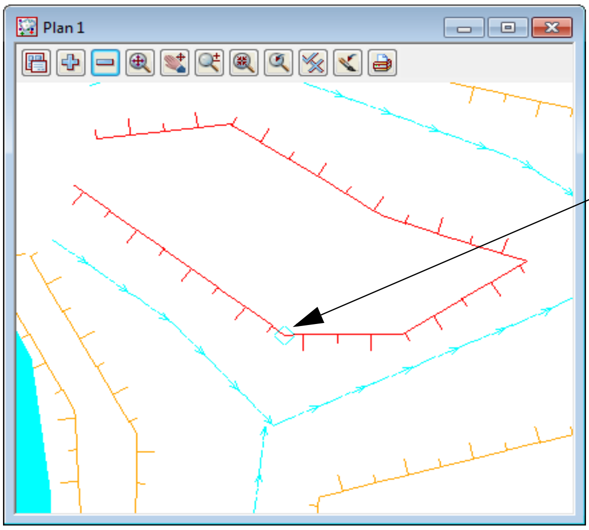
Click LB on **Pick** and then move the cursor anywhere over one of the bank strings and click LB.

NOTE: the *String Inquire* panel can also be brought up by pressing the F2 key. This has been defined in the standard 12d Model function key short cuts (userkeys.4d).



If you placed the cursor over a line:

If your Snap settings are still set to their default values, you should see the line go white (shown here as red) and a yellow (shown magenta) square box appear at the last location of your cursor when you clicked LB.



If you placed the cursor over a point connecting the line segments:

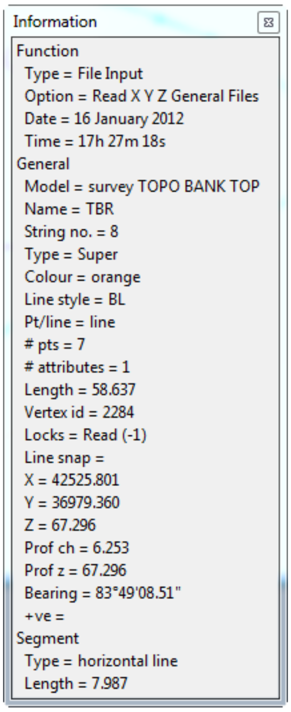
If you happened to snap to a point on the line rather than the line itself, you will see the line go white (shown red) and a yellow (shown magenta) diamond appear at the last location of the cursor when you clicked LB.

In either case, an Information panel will pop up as shown at right (provided the Info tickbox is set ON - see Chapter 7.4 ’Snap Settings’). It advises such information as the name of the Model which contains the selected string (survey TOPO BANK TOP), the string name (TBR), the type of string (Super). The colour, line style and number of points in the line are also returned along with it’s length.

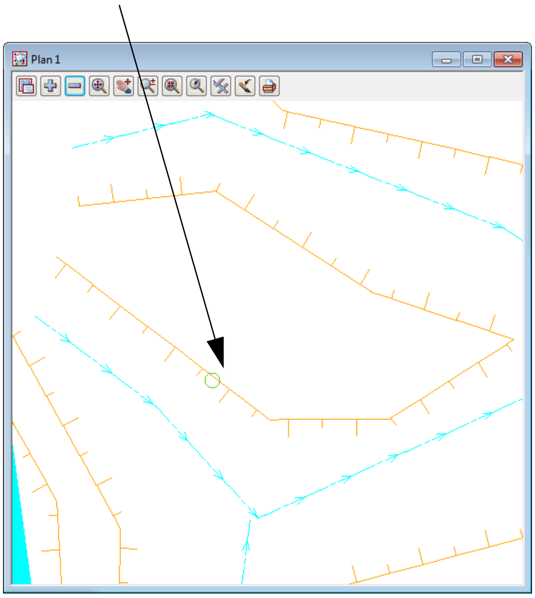
The x and y coordinates are those of the cursor at the time of the string ‘pick’.

In this case the panel shows that the string was accessed via a ‘Line snap’.

If you haven’t moved the cursor very far and now pick with the LB again, you will notice that the Information panel changes, the string goes back to its original orange colour and the cursor is now replaced with a yellow (shown green) circle.


Information

Function
Type = File Input
Option = Read X Y Z General Files
Date = 16 January 2012
Time = 17h 27m 18s
General
Model = survey TOPO BANK TOP
Name = TBR
String no. = 8
Type = Super
Colour = orange
Line style = BL
Pt/line = line
# pts = 7
# attributes = 1
Length = 58.637
Vertex id = 2284
Locks = Read (-1)
Line snap =
X = 42525.801
Y = 36979.360
Z = 67.296
Prof ch = 6.253
Prof z = 67.296
Bearing = 83°49'08.51"
+ve =
Segment
Type = horizontal line
Length = 7.987



This sequence may seem strange at first. What has happened is that the first pick located a string within snapping distance of the cursor so the string ‘highlighted’ in yellow and the Information panel for this string popped up. The pick location showed a diamond to indicate that a ‘snap to the nearest point’ had occurred. 12d is in effect asking you ‘Is this the string you want?’. To reject the currently highlighted string, without moving your mouse, simply pick with LB again.

The second pick couldn’t find any more strings to snap to (adjacent strings were outside snapping distance) and so no more information panels popped up. Instead, a circle showed at the pick location to indicate that a ‘snap to the cursor’ location had occurred i.e. the only thing that 12d could find at the pick location was the cursor.

The above sequence will only happen this way if the snap settings are in their default setting i.e. points, line and cursor ON. See below for more about snap settings.

Now if you try to click LB again on the same string, you will only get the yellow circle indicating a cursor snap. This happens even if you try to pick it multiple times.

The reason for this is that 12d only ever gives you one chance to snap to a string in any one picking sequence. Any strings already rejected during the pick sequence will be ignored. The purpose of this behaviour is so that if there are (say) three lines one on top of the other, it is possible to sequentially snap to each one in turn by looking at the Information panel details as you perform each LB mouse click. The fact that we could only snap to one string confirms that there is only one string present at this location.

A quick method of restarting a pick sequence when a string is highlighted, is to move the mouse (i.e. cursor) a short distance from the last pick point. All strings can then be picked again. The next section shows how the mouse buttons can also be used to restart a pick sequence.

To terminate the String Inquire i.e. this pick sequence, click LB on **Finish** in the String Inquire panel.

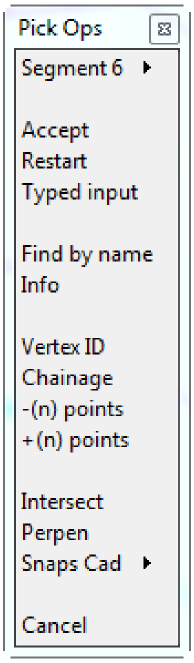
7.2 Use of Mouse Buttons and Enter Key when using Tentative Picking

The three mouse buttons and the Enter key all have a function when picking strings. Those functions are

LB - Left Button	Select the nearest string
MB - Middle button	Accept the current 'highlighted' string. This will also terminate the current pick sequence.
RB - Right button	Bring up the Pick Ops menu
Enter key	Accept the current 'highlighted' string. This will also terminate the current pick sequence. This is the same as MB and is very useful if you only have a two-button mouse (not advisable).

7.3 Pick Operations Menu via the Right Mouse Button

We will now focus on the use of the RB. Repeat the above picking sequence but now after getting the yellow square cursor (i.e. picking the string), click the RB and the Pick Ops menu will pop up



Click with LB on **Restart**. This resets the pick sequence to start over as if the previous pick sequence had never occurred.

If you now try to click on the string with LB, you will notice that the string can now be picked again with the LB. The lesson here is that if you ever get confused during a picking sequence, the safest way to get operational again is to bring up the Pick Ops menu, select **Restart** and start over from the beginning.

The **Accept** menu item needs special mention. During a picking sequence, once you have located the string you are after, you normally terminate the sequence by clicking the MB. This accepts the current string and terminates the pick sequence.

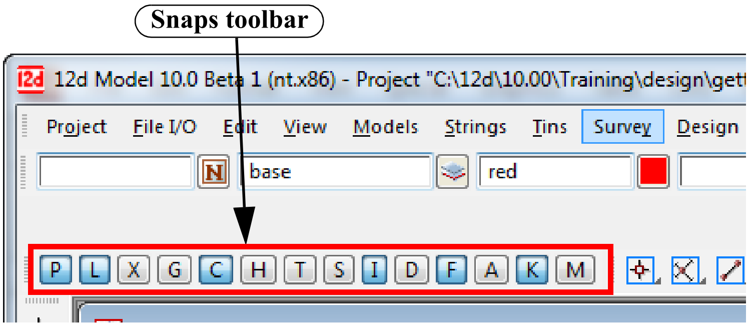
The **Accept** menu item has the same function as clicking the MB during the pick sequence i.e. it is used to indicate to 12d that the string found is the one that you wanted. If you are using a 2-button mouse, this is another way around the lack of the middle button (using the Enter key for accepting was described in the previous section). You can accept a string by using the RB to bring up the Pick Ops menu and click LB on **Accept**. If you have a 3-button mouse, it is easier to use the MB to accept the string directly.

The **Info** menu item also has a special function. The Information panel that pops up when a string highlights is displayed temporarily. If you move the mouse cursor out of the panel, the information panel will disappear. This occurs even of you don't click any mouse buttons. The **Info** menu item is used to pop up the Information panel (again) of the currently highlighted string.

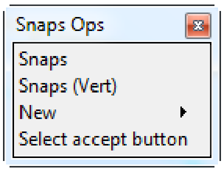
The **Cancel** menu item is used to terminate many of the operations that are recursive. For instance when creating a string, 12d assumes that it will involve multiple line segments so it stays in create mode after each segment is placed. After the last point on the string is placed, use the RB to pop up the Pick Ops menu and click LB on **Cancel** to terminate the creation.

7.4 Snap Settings

In the context of String Inquire, the snap settings are used to selectively choose from 12d data sets when inquiring on existing items. The snap settings can be toggled on and off from the snaps toolbar.


Snaps toolbar
12d Model 10.0 Beta 1 (nt.x86) - Project "C:\12d\10.00\Training\design\get
Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
base
red
P L X G C H T S I D F A K M

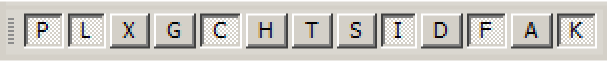
The snap settings can also be set from the Snaps menu under **Utilities** on the Main menu. Click with LB on **[Snaps Ops]** to pin up the Snaps Ops menu


Snaps Ops
Snaps
Snaps (Vert)
New
Select accept button

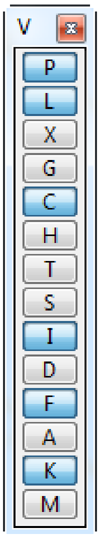
You can select either *Snaps* or *Snaps (Vert)*.

As you use 12d you need to access the snap settings frequently, so it is convenient to leave the snaps menu on display at all times. To minimise menu clutter, the Snaps toolbar and Snaps (Vertical) are merely abbreviated forms of the full Snaps menu. They take up less room on your screen and hence are useful to the experienced user.

Snaps toolbar


P L X G C H T S I D F A K

Vertical snaps toolbar


V
P
L
X
G
C
H
T
S
I
D
F
A
K
M

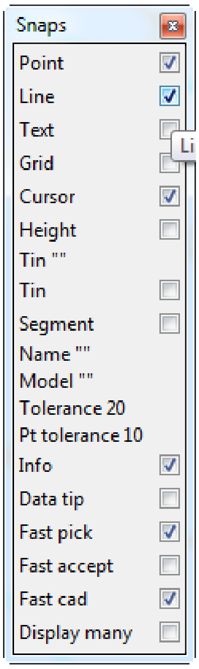
Point
Line
Te**x**t
Grid
Cursor
Height
Tin
Segment
Info
Data tip
Fast pick
Fast **a**ccept
Fast snaps cad accept
Lists all strings within snap

At any one time each snap setting is toggled either ON or OFF. For the Snaps toolbar and the Vertical snaps menu, the snap setting is ON when the button is depressed or appears clear and OFF when the button appears raised or blue. The settings shown are the default settings when starting 12d.

If you are new to 12d, it is easiest to use the full snaps menu until you get used to the abbreviations in the Snaps toolbar.

From the Main menu, click with LB on **Utilities=>Snaps=>Snaps**. Move the Snaps menu to the bottom left corner of your screen to get it out of the way.

On the Snaps menu, at any one time each snap setting is toggled either ON or OFF. If a tick appears, the snap setting is toggled ON. The settings shown are the default settings when starting 12d.



Point ☑
Line ☑
Text ☐
Grid ☐
Cursor ☑
Height ☐
Tin ""
Tin ☐
Segment ☐
Name ""
Model ""
Tolerance 20
Pt tolerance 10
Info ☑
Data tip ☐
Fast pick ☑
Fast accept ☐
Fast cad ☑
Display many ☐

At this stage we will focus on 4 of the first 5 boxes: Point, Line, Grid and Cursor. Upon a successful snap, each snap type returns a unique appearance.

Point Snap - diamond
Snaps to the nearest point or end of line

Line Snap - square
Snaps to the nearest line

Grid Snap - circle
Snaps to the nearest grid intersection point

Cursor Snap – circle
Snaps to the mouse cursor (x,y) position. This is used when drawing freehand.

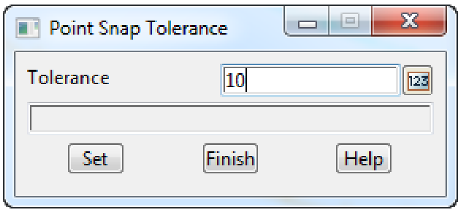
To change a snap setting, click LB in the snap setting box or on the text describing the snap (e.g. P). The setting will toggle ON or OFF.

As shown above, it is possible to have multiple snap settings on simultaneously. For instance, if you want to be able to select a line on either 'the line' or it's 'end points', you need both Point and Line snap ON.

You can generally leave Cursor snap ON. Most times, if all other snaps fail or are not set, you want the mouse cursor position returned. This is useful when freehanding into 12d strings that are not connected to existing features e.g. the centreline of a new road. If you don't have Cursor Snap ON, you will get a 'Failed Snap' error message whenever all other snap settings fail.

Near the bottom of the Snaps menu is an 'Information' tickbox labelled **Info**. If this box is NOT ticked, the Information panel will NOT pop up as each string is selected.

Above the 'Information' tickbox is the menu item **Pt tolerance 10**. This figure indicates the current point snap tolerance setting is 10. To change the snap setting, click on **Pt tolerance 10** with LB and the following panel pops up



Tolerance 10

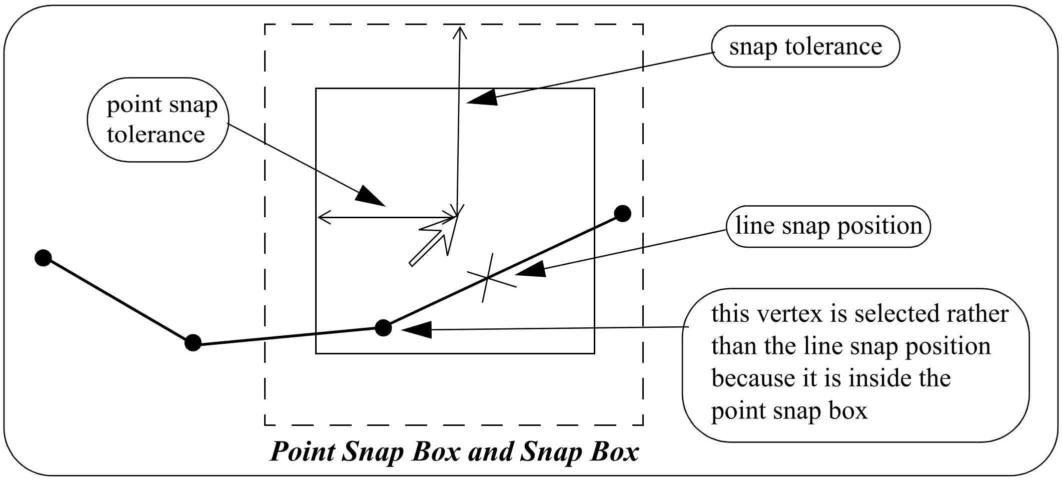
The point snap tolerance is measured in screen pixels. In 1024 resolution, a point snap tolerance of 10 represents about one hundredth of your screen width. If point snap is set, then the closest vertex within this distance of the cursor will be selected.

To change the tolerance, lock the cursor in the *Tolerance* field by highlighting (double clicking on) the existing text, press the Delete key and type a new Tolerance value. Click LB on **Set** to activate the new setting. Click on **Finish** to terminate the panel.

Similarly for the **Tolerance** menu item - click on **Tolerance** and the *Snap Tolerance* panel pops up

NOTE - When *Point* snap is set on, any vertex of a string within the point snap tolerance box around the cursor when LB is clicked, is considered for selection ***before any other type of snap is considered***. Centres of circles, centres of arcs and arc end points are considered to be vertices.

When *Line* snap is set on, the cursor only needs to be within the snap tolerance distance of any visible segment of a string when LB is clicked, and that string is considered for selection. Also arcs and circles are considered for selection.


snap tolerance
point snap tolerance
line snap position
this vertex is selected rather than the line snap position because it is inside the point snap box

Point Snap Box and Snap Box

In the area between the point snap box and the snap box, vertices and line snap positions are treated equally and the closest one to the cursor is selected.

To practice this further, do a **Fit** on your current View. Pick a feature in the view where lots of lines meet and without moving the mouse, do a series of ‘String Inquires’ by repeated use of the LB and observe how 12d will snap to adjacent items near to the mouse cursor. Note the cursor shapes returned that indicate that sometimes you are getting a ‘Point snap’ and sometimes a ‘Line snap’.

Remember points are just a special type of string.

7.5 Models and Snap Settings

Whilst it may appear obvious, it is important to remember that you can only snap to data that is currently on display. Models that are currently turned off will not participate in the selection process during snapping. If you find that you are snapping to unwanted items, consider turning off models that are irrelevant to your current operations

7.6 Fast Picking

To **Fast pick** a string, simply move the cursor near the string and **click MB** or type <enter>. The nearest string to the cursor satisfying the snap conditions is selected.

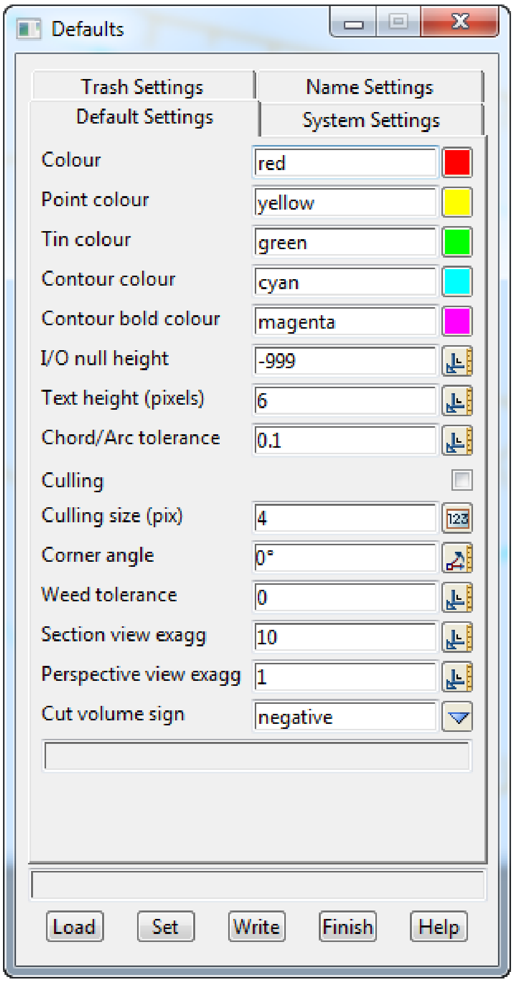
Hence using **MB** alone replaces a LB followed by an MB.

7.7 Modifying the String Highlighting Colour

12d has various default parameters for the display of data including the string highlighting colour. This is the colour a string is changed to whilst it is selected.

The default highlight colour is *white* but this is not be very useful if you want to draw strings in white, or if you use a white background colour. In either case, it is important to change the highlight colour to a colour other than the white.

To check the highlight colour for the project, we select from the main menu **Project => Management => Defaults** and the **Defaults** panel pops up.

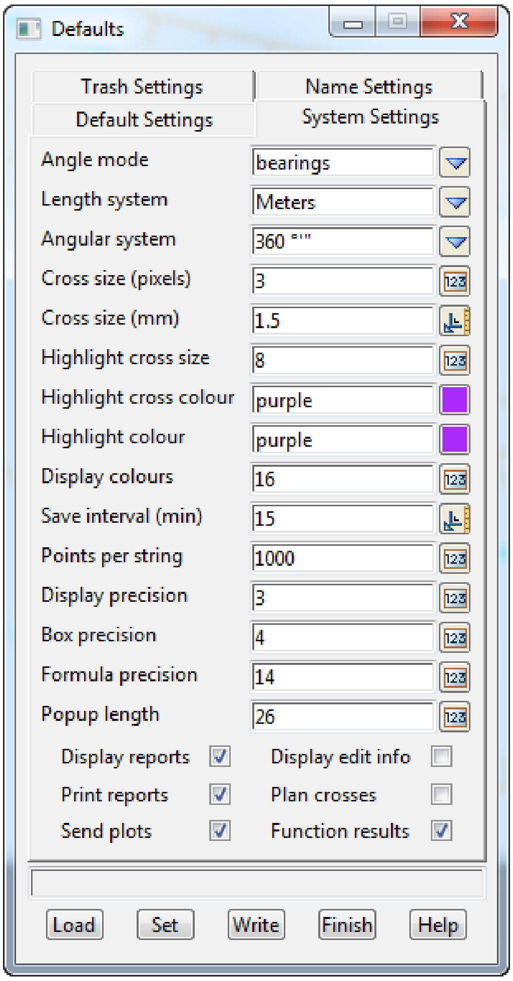


Colour	red	🟥
Point colour	yellow	🟨
Tin colour	green	🟩
Contour colour	cyan	🟦
Contour bold colour	magenta	🟪
I/O null height	-999	
Text height (pixels)	6	
Chord/Arc tolerance	0.1	
Culling		☐
Culling size (pix)	4	
Corner angle	0°	
Weed tolerance	0	
Section view exagg	10	
Perspective view exagg	1	
Cut volume sign	negative	

From this panel, the user can change various parameters for this project that 12d uses for calculations, display and data handling.

To change the default highlight colour, select the *Systems Settings* tab by clicking LB on the ’Systems Settings’ tab.

The following panel should appear:



Angle mode	bearings
Length system	Meters
Angular system	360 °'"
Cross size (pixels)	3
Cross size (mm)	1.5
Highlight cross size	8
Highlight cross colour	purple
Highlight colour	purple
Display colours	16
Save interval (min)	15
Points per string	1000
Display precision	3
Box precision	4
Formula precision	14
Popup length	26

Display reports ☑ Display edit info ☐
Print reports ☑ Plan crosses ☐
Send plots ☑ Function results ☑

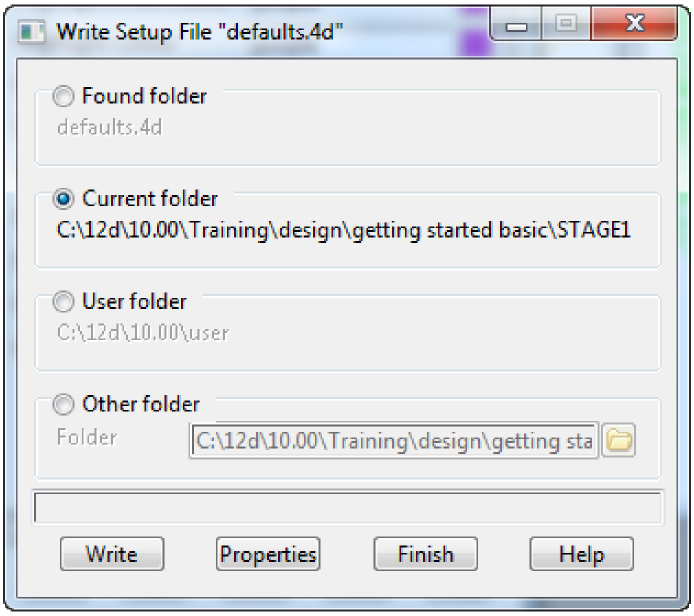
Note that the Highlight colour is set to white (shown purple).

To change this, LB click on the colour icon adjacent to the Highlight colour input box and select another colour such as cyan from the colour choice box. Then press **Select** on the colour choice box panel. Colours can more quickly be selected from the choice box by double clicking LB on the desired colour - the Select button is not required.

To set the current values for the defaults press the **Set** button.

NOTE: When a new project is created, the values in the **Defaults** panel are loaded from the set-ups file *defaults.4d* which 12d Model looks for on start up in the standard 12d location (for more information on the search order, see Defaults in Appendix Set Upsin the context sensitive Reference manual). For an existing project, all the values in the **Defaults** panel are saved with the project so if any have been changed in the project after the project was first created, then the defaults for the project will differ from those in the *defaults.4d* file.

If you wish to keep the current defaults for a project to use as the initial defaults for future new projects, you can save the file **defaults.4d** to a suitable location by clicking on the **Write** button to bring up the **Write Setup File "defaults.4d"**panel.


Write Setup File "defaults.4d"
○ Found folder
defaults.4d
● Current folder
C:\12d\10.00\Training\design\getting started basic\STAGE1
○ User folder
C:\12d\10.00\user
○ Other folder
Folder
C:\12d\10.00\Training\design\getting sta
Write
Properties
Finish
Help

Specify where you wish the *defaults.4d* file to be saved and then click on **Write**.

In this example select the Current folder. If you wanted the changes to apply to any new project you create then you would save the changes to the **'User folder'** as shown above

Click on **Finish** to close the **Save Setup File** panel, and then **Finish** on the **Defaults** panel.

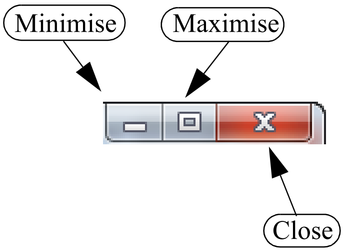
8 Creating Strings with CAD

We will now investigate creating strings using the CAD options. We will create points (one point strings), a 2 point line (single segment string) and a line string (multiple segments in the string).

First we will create a new plan view to work in.

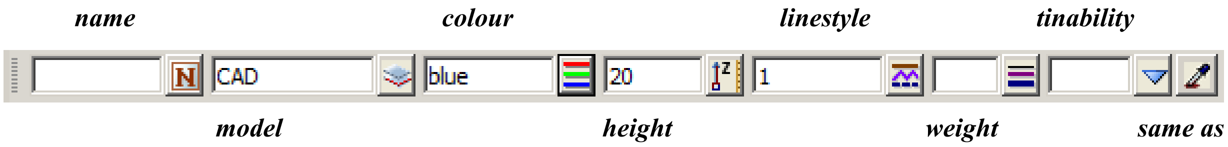
From the main menu, click LB on **Views=>New=>Plan**. This will create View ’Plan 3’.

Maximise the view by clicking on the *Maximise* icon on the top right hand corner of the view or by double clicking on the plan view title area.



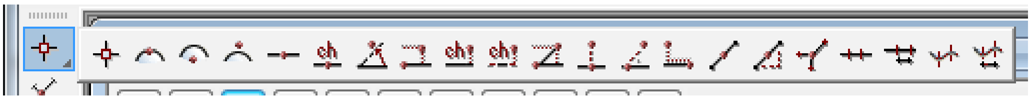
8.1 Creating Points

The CAD options to create points, lines etc. can be done by using the main menu system or by the use of the CAD **toolbar**, which is displayed on the left of the screen at start-up. Regardless of the method used to activate the CAD commands, the CAD **controlbar** as outlined on in Chapter 4.5 will be used to define the characteristics of the created elements. We will change the values in the **controlbar** as follows.



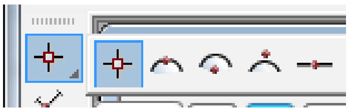
Click LB in the model field and type in ‘CAD’. Click LB on the colour icon and choose the colour *blue* from the choice box by double clicking on *blue* in the pop-up list of colours. Enter ’20’ into the height box and leave the linestyle type as 1.

To create a point string (i.e. one vertex string) we will use the CAD **toolbar** flyout. Pick the points section of the toolbar by clicking LB over the create point symbol and keep LB depressed.

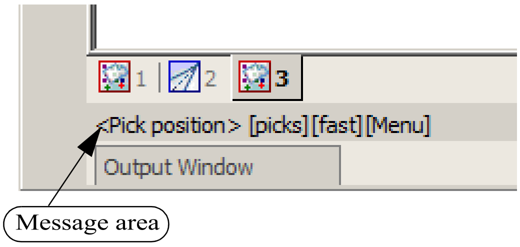


The points **flyout** menu is displayed which has all the options in the points section of the CAD creation tools. This is displayed as a horizontal bar consisting of all the icons that make up all the options in the points section of the CAD tools. Whilst holding down LB move the cursor over each of the icons and the **tooltip** function tells what each of the options does.

To select an option, keep the LB depressed until the cursor is placed over the specific option you want and then release the LB. We will select the **'Point'** option which is the first icon in the **flyout**.



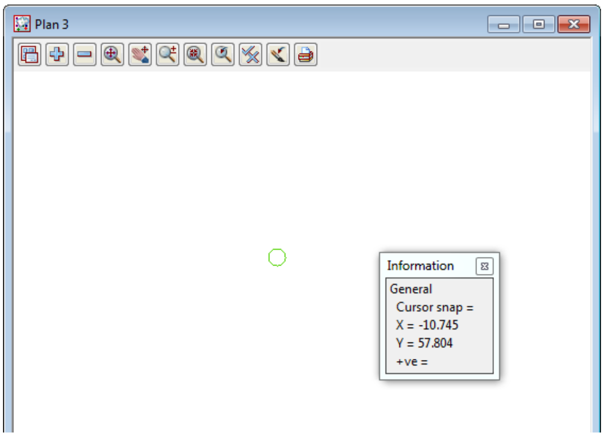
On selecting the **Point** option, or any other CAD option, the user is prompted for the relevant data in the screen message box located on the bottom left hand corner of the 12d Model application window



<Pick position> [picks] [fast] [Menu]

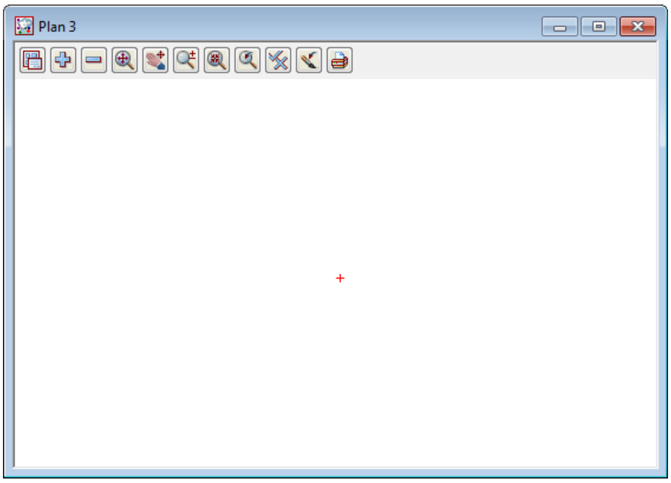
The user can select a position with the mouse and on accepting that point (Middle mouse button or enter) the point is created at the selected position. The model, colour, height etc. are defined in the **Cad Controlbar**.

The snap mode will influence the mouse selection. For example if cursor snap is on, the user can choose a position not yet defined. If point snap is on and the selection snaps to an existing point, the option will place another point at that location. Ensure that the cursor snap is activated in the snaps **toolbar**. Click LB at a position roughly in the middle of the view.

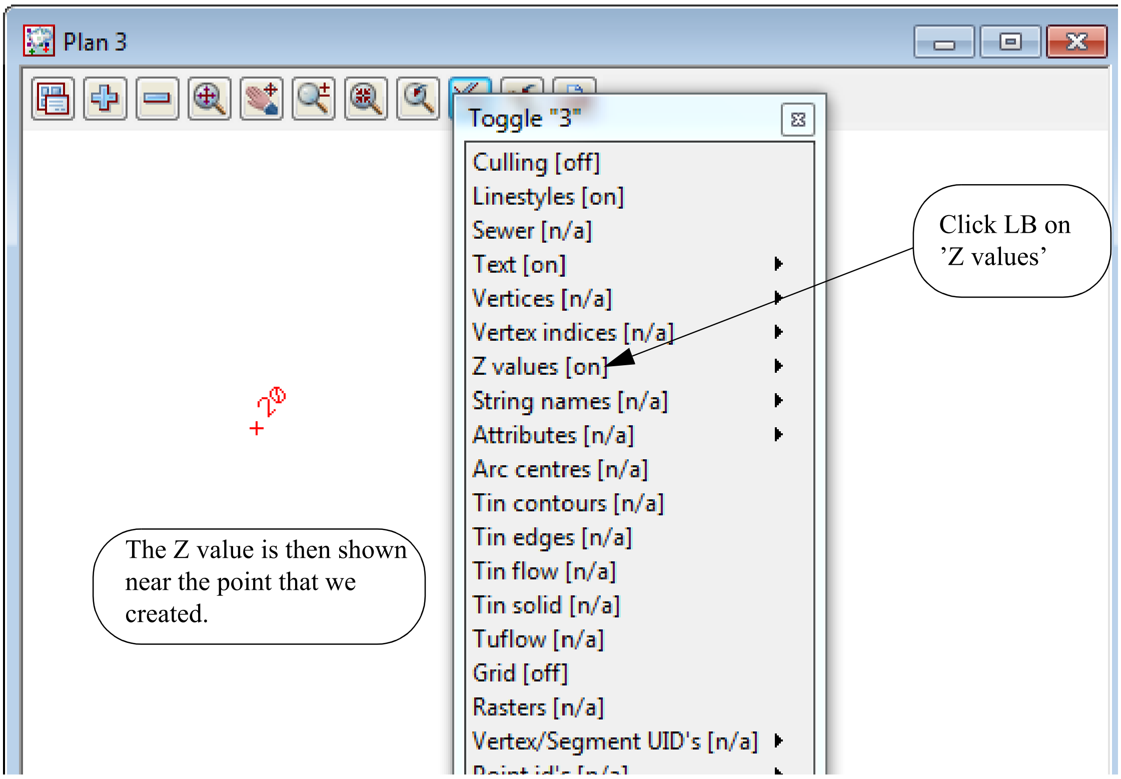


Information
General
Cursor snap =
X = -10.745
Y = 57.804
+ve =

Click MB. The point is then created with the model 'CAD' being added to the view automatically.



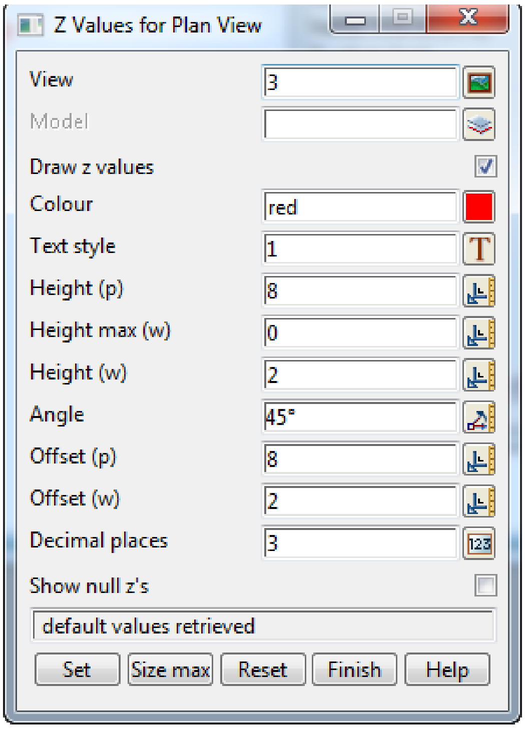
To see the height of the point we must toggle on the Z values. To do this click LB on the toggle button on the view menu to bring up the toggle menu. Then click LB on the ’Z values [n/a]’ position. Don’t walk right on the arrow near this position. This is to specify individual models to turn the Z values on or off. By clicking LB on the Toggle menu, you turn on (or off) all Z values in that view for all models.


Plan 3
Toggle "3"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [on]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
2.0

Click LB on ’Z values’

The Z value is then shown near the point that we created.

The default colour for the height text is yellow. To change the colour of the height text so it is clearer we can click LB on the menu icon from the view menu to bring up the plan view menu. From that menu we can click LB on **Settings=>Z values=>Single** to bring up the **Z values For Plan View** panel. From this panel, select the colour icon and then select the colour red by double clicking LB on the red colour. It should like as shown below:


Z Values for Plan View
Set
Size max
Reset
Finish
Help

View	3
Model	
Draw z values	☑
Colour	red 🟥
Text style	1
Height (p)	8
Height max (w)	0
Height (w)	2
Angle	45°
Offset (p)	8
Offset (w)	2
Decimal places	3
Show null z's	☐

default values retrieved

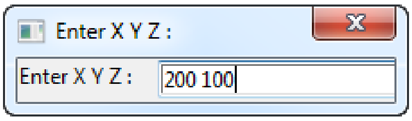
Then press **Set** on the panel to set that colour. Finally press **Finish** to close the panel.

The change is made only for view 3. Any other points added to the view will now have their height text shown in the red colour.

There are various ways of selecting a position when creating a point. Specification of a position can also be done by the direct input of the xyz coordinate of the point by pressing the space bar to bring up the enter XYZ panel or by typing of the value to bring up the XYZ panel. The user then enters the X, Y and Z value into the box separated by a space. e.g. 200 150 40. As we have already set a Z value in the CAD **controlbar,** you only have to specify a X and Y value into the box. **NOTE:** The Z value will default to the value entered into the CAD **controlbar** whether or not it is specified in the XYZ box. If no height value exists in the CAD **controlbar** or the XYZ box, then a value will be interpolated if possible, otherwise a 0 value will be assigned.

We will again create a point by using the CAD **toolbar**.

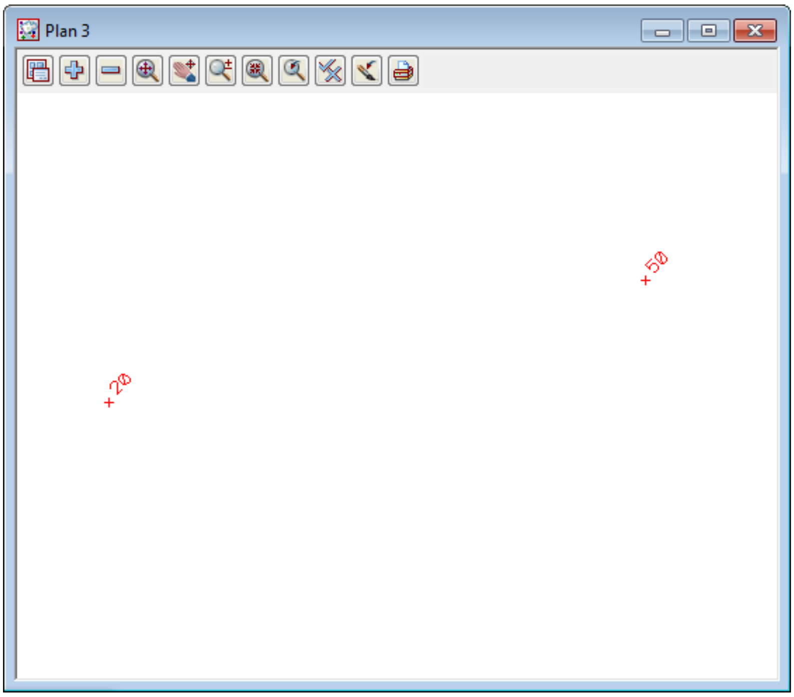
Firstly, change the Z value in the CAD **controlbar** to '50'. Then repeat the steps outlined above to choose the Create Point option. Instead of selecting a point with the mouse we will type in the coordinate values. To pop up the XYZ box, press the spacebar. Then type into the box, 200 100 and then press the enter key. We did not have to specify a Z value in XYZ box as it was already defined in the CAD **controlbar**. **NOTE:** A space must be placed between the X and Y values.



Enter X Y Z : 200 100

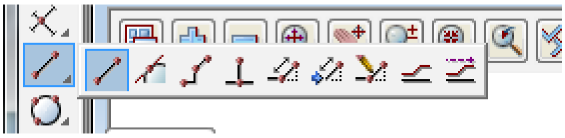
A new point is created. Click LB on the Fit icon on the view menu 🔍 to fit the data in the view.

It should now look like as shown below:



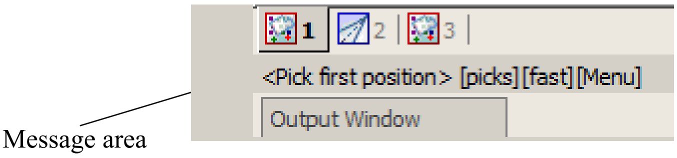
8.2 Creating Two Point Lines

We will now create a simple one segment line. To do this we will use the CAD **toolbar** flyout. Pick the Cad line section of the toolbar by clicking LB over the create line symbol and keep LB depressed.



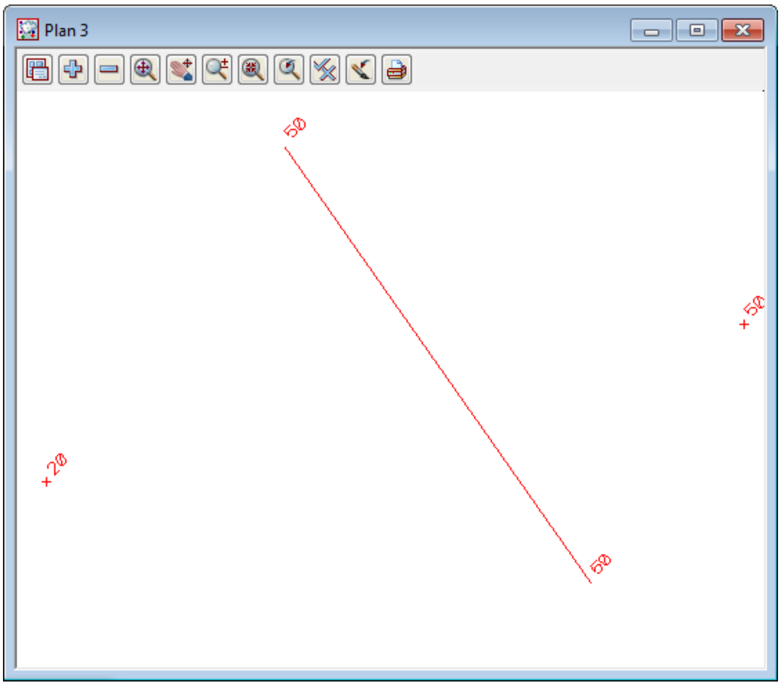
The Cad line **flyout** menu is displayed which has all the options in the lines section of the CAD creation tool. Select the **’2 points’** option which is the first icon in the **flyout**.

On selecting the **2 points** option, the user is prompted for the relevant data in the screen message box located on the bottom left hand corner of the 12d Model application window



<Pick first position> [picks] [fast] [Menu]

We will pick a position with the mouse to define the start of the line. Pick a position with LB about halfway between the two existing points and then MB to accept. After accepting the start point, the user is told in the message area to pick the end of the line. You will also notice when you move the mouse around that a line is drawn ’rubber banding’ to the cursor position. We now select a point going south east to define the end of the string with LB and MB to accept. The created string will be shown given the parameters given in the CAD **controlbar** at the time of construction.



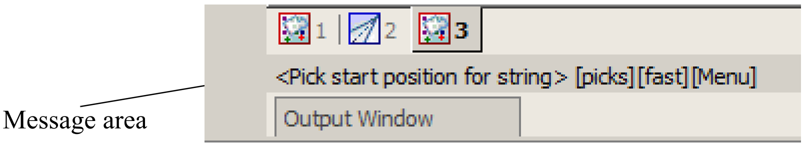
8.3 Creating Line Strings

We will now create a multi-segment string. To do this, we will use the CAD menu from the main menu system rather than from the CAD toolbar

From the main menu, click LB on **Strings=>Cad=>Line=>Line string**. The **Line String** option will now be running. **NOTE:** These options have no panel assigned to them.

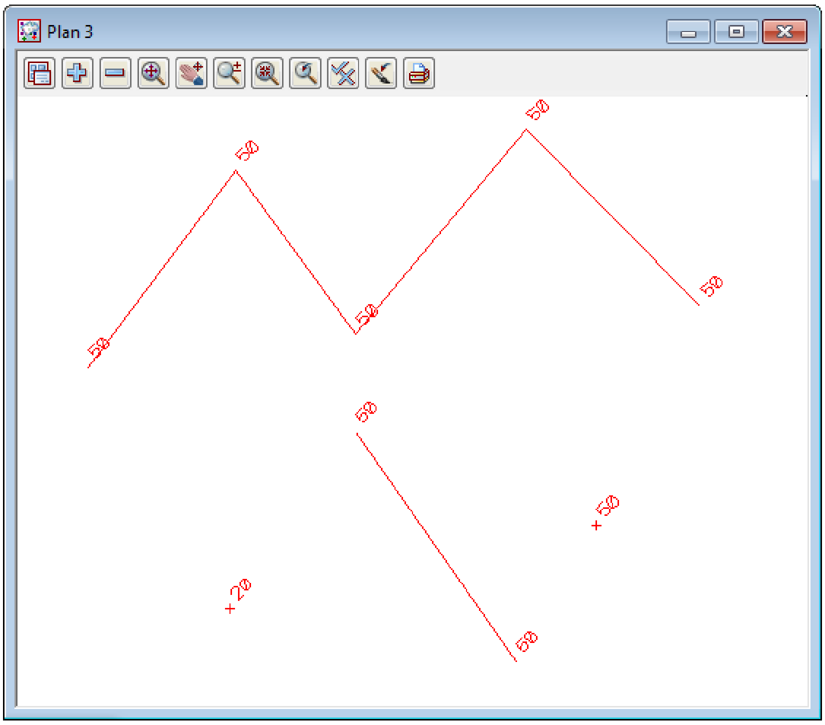
The same option can be started from the CAD toolbar as we did for the **2 points** option except we choose the **Line String** icon from the flyout.

On selecting the **Line String** the user is prompted for the relevant data in the screen message box located on the bottom left hand corner of the 12d Model application window



<Pick start position for string> [picks] [fast] [Menu]

We will pick a position with the mouse to define the start of the line. Pick a position with LB any where on the view and accept with MB. Then move the cursor to a new position and pick and accept a second point. Pick and accept a third point and so on. To finish the string simply press the Esc Key on the keyboard or alternatively RB and then select cancel from the **Pick Ops** menu. The string will be created using the parameters given in the CAD **controlbar** at the time of construction.



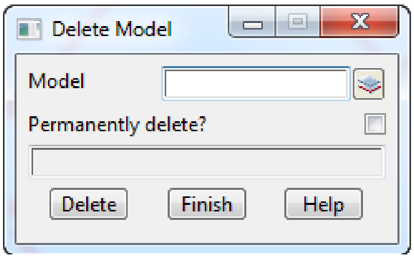
This has given a small introduction to the use of the CAD options. For a more detailed explanation of these tools see Chapter 15 'Strings' in the on-line reference manual and follow the links to the CAD options.

We will now finish this section by deleting the current view. As the view is maximised, select **View => Delete** and select view '3'. Alternatively, we could have restored the view and click LB on the '**X**' icon at the top right of the view. This should then leave two views, Plan 1 and Perspective 2. If either Plan 1 or Perspective 2 are left maximised, select the restore button on the top right hand side of that view to leave two views as at the start of this chapter.

Clear the value for the default height in the Cad Controlbar. Leaving the height there may create problems when creating strings at a later stage. Also change the default model to one of the existing survey models as deleting the current model is not recommended.

Finally, we will delete the CAD model. To do this we click LB on the *delete model* option from the main menu **Models=>Delete=>Delete a Model**. This brings up the **Delete Model** panel

.


Delete Model
Model
Permanently delete?
☐
Delete
Finish
Help

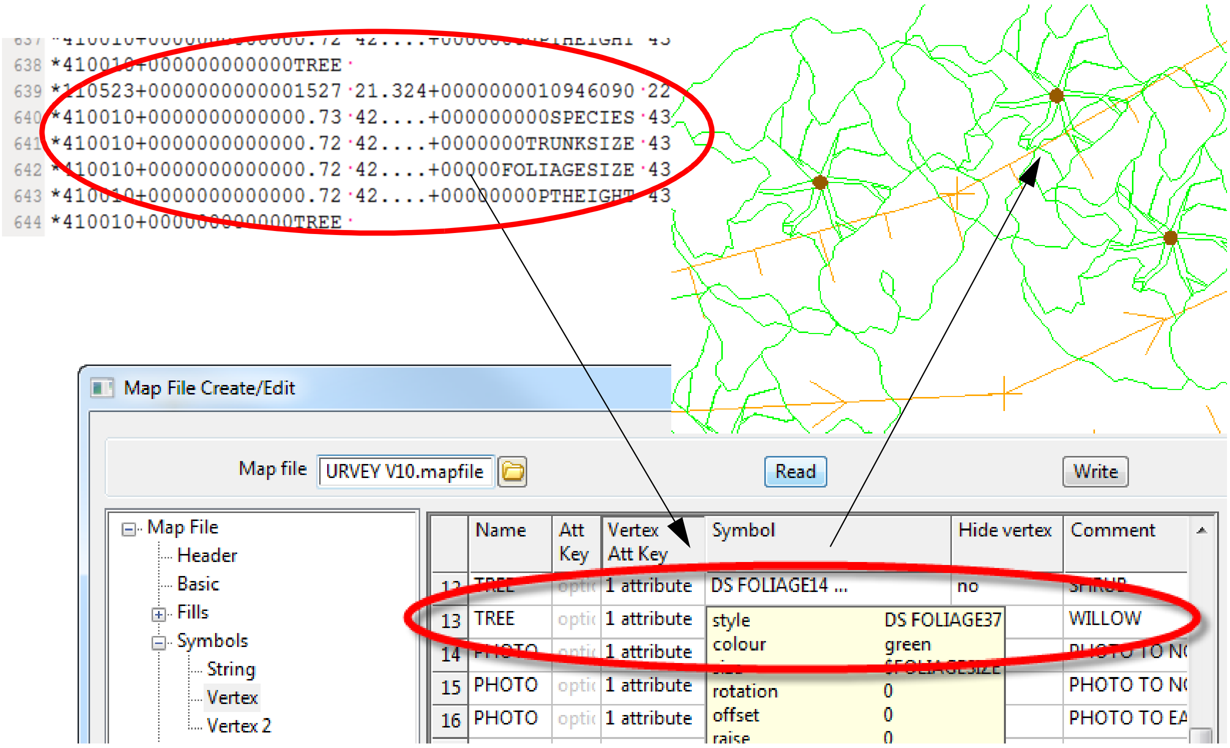
Select the model icon with LB and then double click LB on ’CAD’. Then click on the **Delete** button, and answer yes to any warnings (after reading them). This then deletes the model from the project.

9 Survey Data Reduction

9.1 Coding

9.1.1 Feature Codes

Feature codes and attributes are used to define surveyed points in the field. The code and attribute will be used to assign properties such as model name, colour, symbol and linestyle via a mapping file.



```
*410010+00000000000000TREE
*110523+0000000000001527 21.324+0000000010946090 22
*410010+000000000000.73 42....+000000000SPECIES 43
*410010+000000000000.72 42....+0000000TRUNKSIZE 43
*410010+000000000000.72 42....+00000FOLIAGESIZE 43
*410010+000000000000.72 42....+00000000PTHEIGHT 43
*410010+00000000000000TREE
```

Map File Create/Edit
Read
Write
Map File
Header
Basic
Fills
Symbols
String
Vertex
Vertex 2

Map file: URVEY V10.mapfile

	Name	Att Key	Vertex Att Key	Symbol	Hide vertex	Comment
12	TREE	optic	1 attribute	DS FOLIAGE14 ...	no	SHRUB
13	TREE	optic	1 attribute			WILLOW
14	PHOTO	optic	1 attribute			PHOTO TO N
15	PHOTO	optic	1 attribute			PHOTO TO N
16	PHOTO	optic	1 attribute			PHOTO TO EA

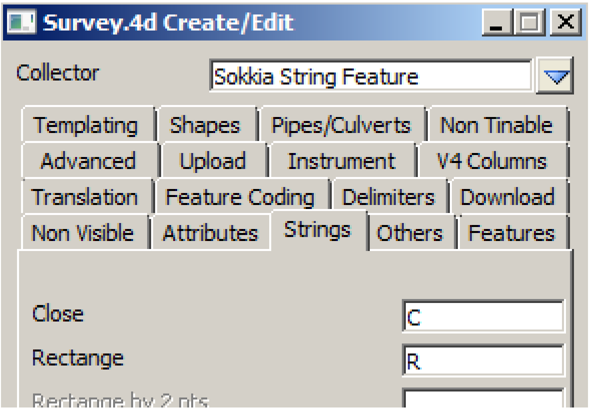
style DS FOLIAGE37
colour green
size $FOLIAGESIZE
rotation 0
offset 0
raise 0

9.1.2 Field Codes

Field codes are used to enhance the effect of feature codes.

Field codes are defined for each data collector and are set up in the **Survey.4d Create/Edit** panel.

We will look at how to bring up this panel later (**see "Creating/Checking/Modifying a 12d Data Collector Definition" later in this chapter**)



Survey.4d Create/Edit
Templating
Shapes
Pipes/Culverts
Non Tinable
Advanced
Upload
Instrument
V4 Columns
Translation
Feature Coding
Delimiters
Download
Non Visible
Attributes
Strings
Others
Features

Collector: Sokkia String Feature
Close: C
Rectange: R
Rectange by 2 pts:

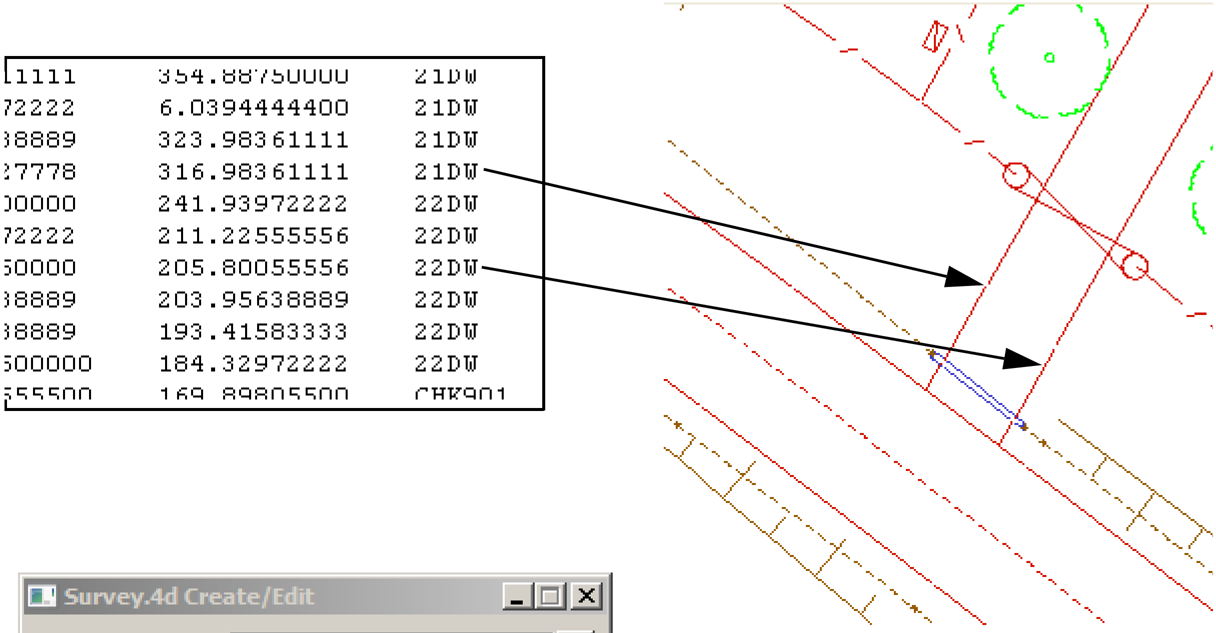
In the *Survey.4d Create/Edit* panel, Field Coding is set up under the panel tabs: **Templating, Shapes, Pipes/Culverts, Non Tinable, Feature Coding, Non Visible, Strings, Others and Features**

The Field codes are user definable and can be any letters. It is advisable to ensure that the codes used are not the same as feature codes.

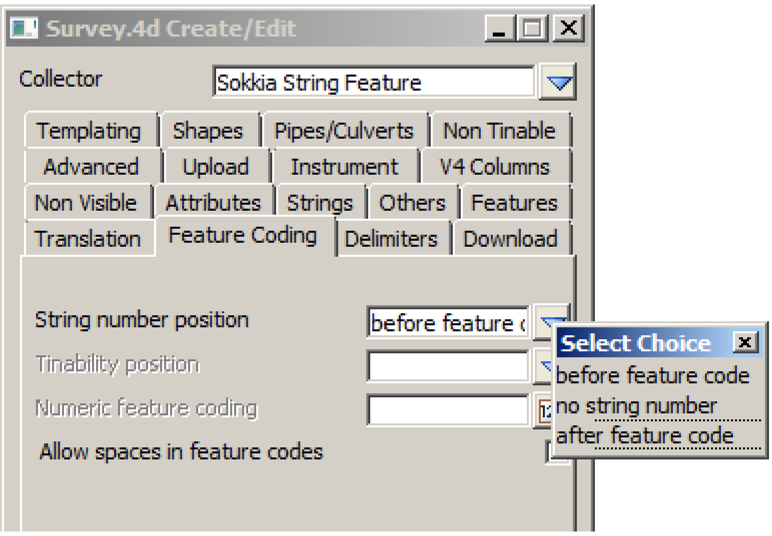
A list of Field codes can be found in the Reference manual.

9.1.3 String numbers

Numbers can be used to differentiate separate strings using the same code.



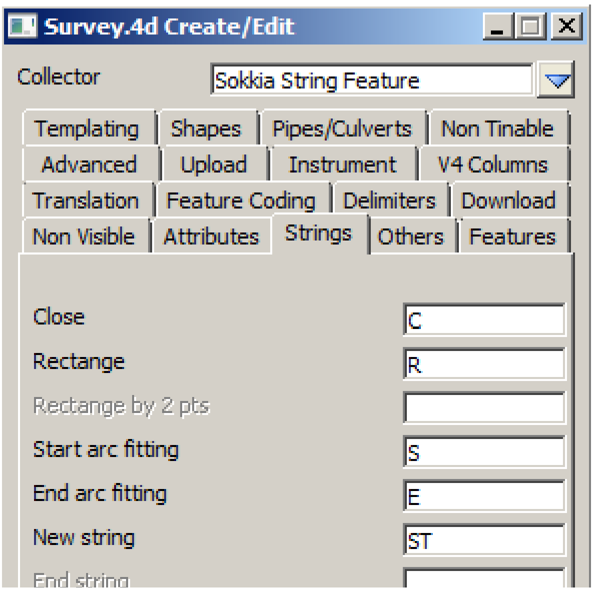
```
l1111      354.88750000    21DW
72222      6.0394444400    21DW
38889      323.98361111    21DW
27778      316.98361111    21DW
30000      241.93972222    22DW
72222      211.22555556    22DW
50000      205.80055556    22DW
38889      203.95638889    22DW
38889      193.41583333    22DW
500000     184.32972222    22DW
555500     169.89805500    CHK901
```


Survey.4d Create/Edit
Templating
Shapes
Pipes/Culverts
Non Tinable
Advanced
Upload
Instrument
V4 Columns
Non Visible
Attributes
Strings
Others
Features
Translation
Feature Coding
Delimiters
Download
Tinability position
Numeric feature coding
Allow spaces in feature codes
Select Choice
before feature code
no string number
after feature code

Collector: Sokkia String Feature

String number position: before feature c

The string number position is specified under the **Survey Data Setup** menu under the **Feature Coding** tab


Survey.4d Create/Edit
Templating
Shapes
Pipes/Culverts
Non Tinable
Advanced
Upload
Instrument
V4 Columns
Translation
Feature Coding
Delimiters
Download
Non Visible
Attributes
Strings
Others
Features
Rectange by 2 pts
End string

Collector: Sokkia String Feature

Close: C

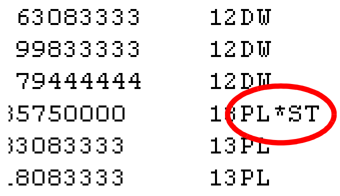
Rectange: R

Start arc fitting: S

End arc fitting: E

New string: ST

String numbers may be omitted and a **New String** command can be included after the code. This is set up under the **Strings** tab



```
63083333     12DW
99833333     12DW
79444444     12DW
35750000     13PL*ST
33083333     13PL
.8083333     13PL
```

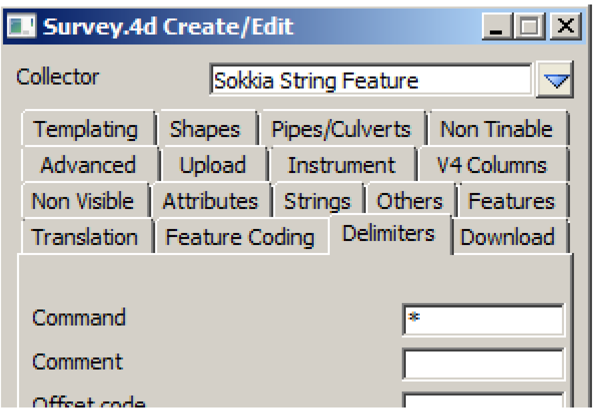
9.1.4 Delimiters

There are a number of delimiters used in 12d. Two commonly used ones are the code delimiter and the comment delimiter.

```
27770       108.94333300      TR0309 WATTLE
13888       81.141111100      TR0306 GUM
02777       292.79027700      TR0608 GUM
11111       350.24777700      25FE
55555       5.8144444000      25FE*XN
00000       60.870277800      25FE
13888       74.994166700      25FE*27BU
88888       78.408333300      25FE

47222       80.721111100      25FE
```

A Comment delimiter (space) is used to separate a feature code from a text description

A code delimiter (*) is used to separate multiple feature codes and/or feature codes and field codes


Survey.4d Create/Edit
Templating
Shapes
Pipes/Culverts
Non Tinable
Advanced
Upload
Instrument
V4 Columns
Non Visible
Attributes
Strings
Others
Features
Translation
Feature Coding
Delimiters
Download

Collector: Sokkia String Feature

Command: *

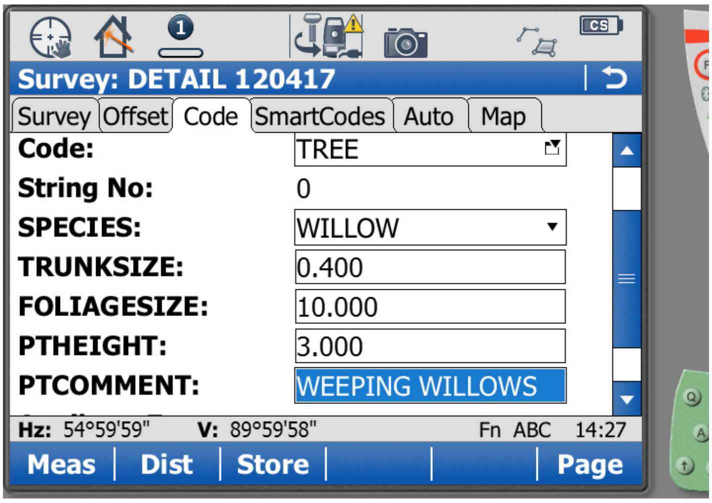
Comment:

Offset code

The Delimiters can be defined under the **delimiters** tab of the **Survey Data Setup** menu

9.1.5 Attributes

Attributes are used to minimise the number of codes. For example a single code TREE can use attributes to define the species, trunk diameter and foliage size



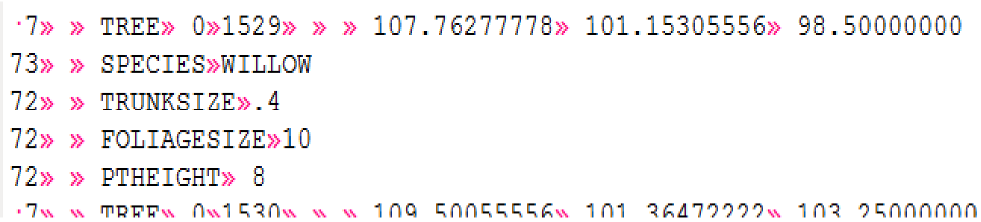
Survey: DETAIL 120417

Code:	TREE
String No:	0
SPECIES:	WILLOW
TRUNKSIZE:	0.400
FOLIAGESIZE:	10.000
PTHEIGHT:	3.000
PTCOMMENT:	WEEPING WILLOWS

Hz: 54°59'59" V: 89°59'58" Fn ABC 14:27

In the example Data collector screen shown above the attributes defining the species and size of a tree are entered in the field

The resulting field file (shown below) is then processed to create a unique symbol

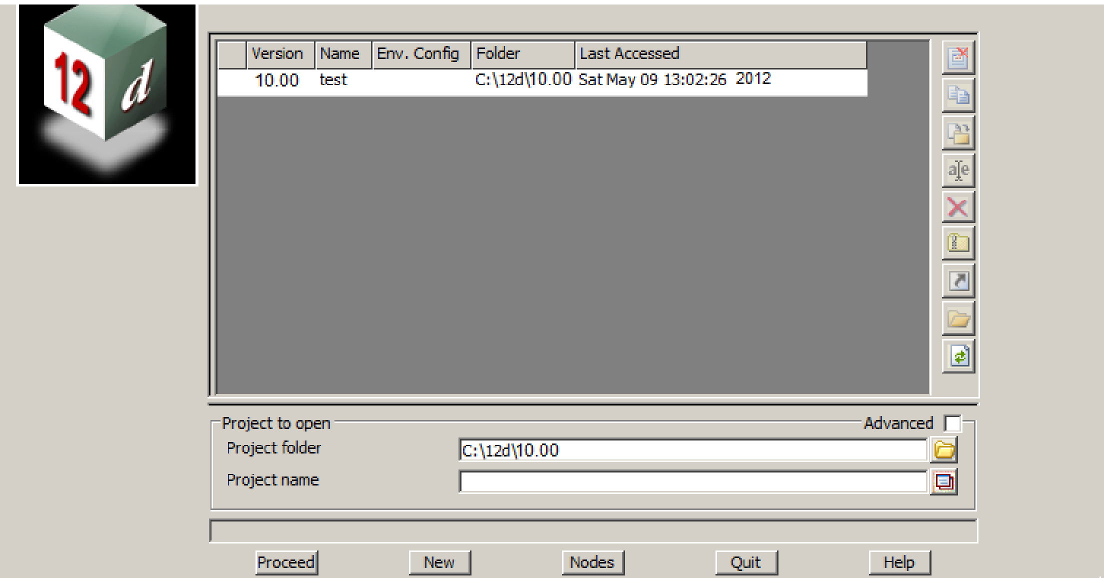


```
·7» » TREE» 0»1529» » » 107.76277778» 101.15305556» 98.50000000
73» » SPECIES»WILLOW
72» » TRUNKSIZE».4
72» » FOLIAGESIZE»10
72» » PTHEIGHT» 8
·7» » TREE» 0»1530» » » 109.50055556» 101.36472222» 103.25000000
```

9.2 Setting up a New Project

Before we can reduce the survey data, we first we need to create a project to read the survey data into. We will create a new project called ’DETAIL SURVEY’ in the Survey Getting Started training area.

First, double click on the *12d Model 10* icon to bring up the **Project Selection** panel.



Version	Name	Env. Config	Folder	Last Accessed
10.00	test		C:\12d\10.00	Sat May 09 13:02:26 2012

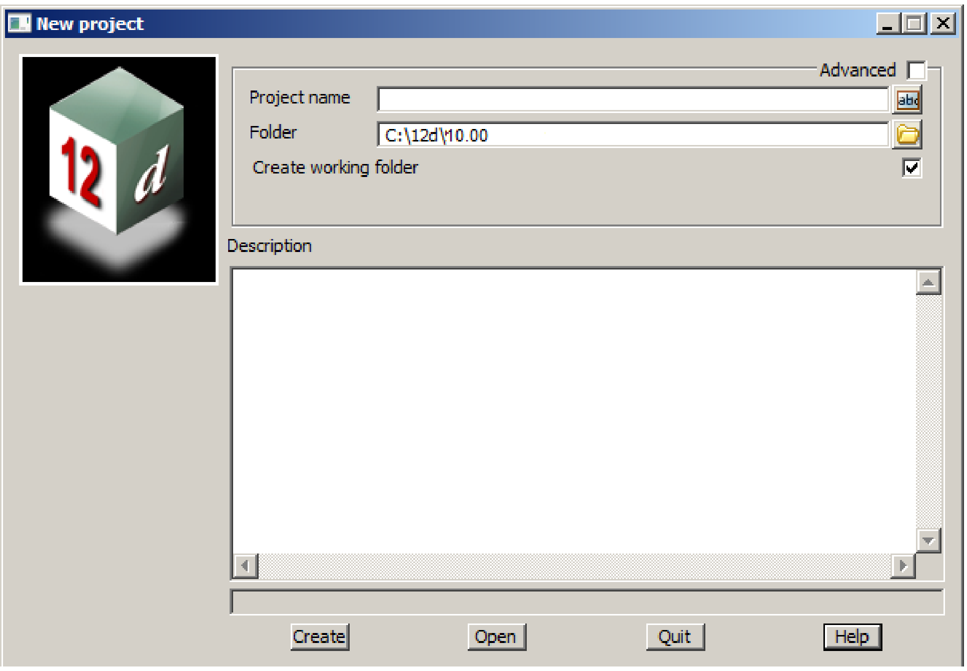
Project to open

Project folder C:\12d\10.00

Project name

Advanced ☐
Proceed
New
Nodes
Quit
Help

Select **New** button to bring up the **New project** panel.



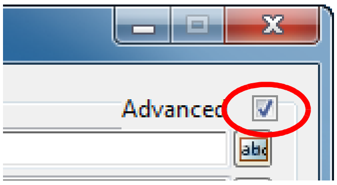
Project name

Folder C:\12d\10.00

Create working folder ☑

Description

New project
Advanced ☐
Create
Open
Quit
Help

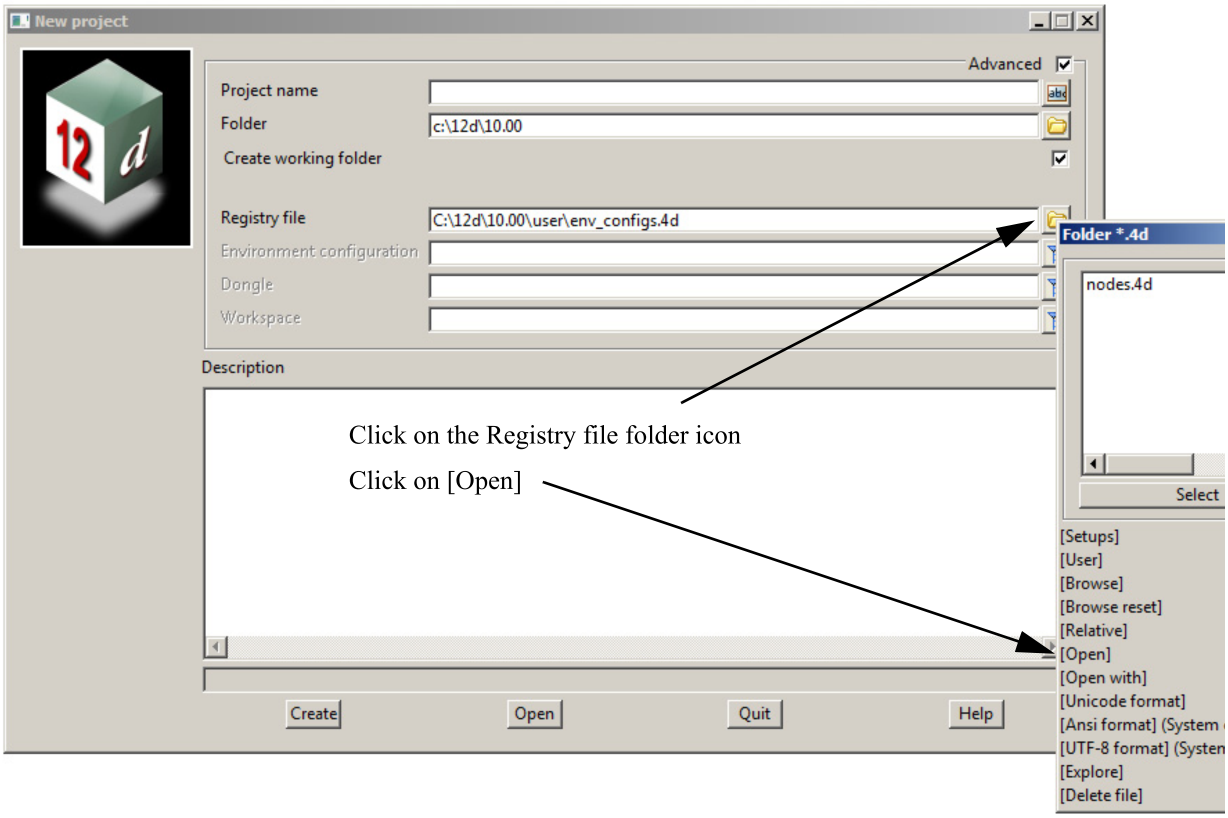


Click on the Advanced tick box

This will allow us to edit the registry file.

Inside the registry file we can then create a link to the environment file that nominates the setup files for this project

Once this is done the setup files remained linked to the project


New project
Advanced ☑
Create working folder ☑
Environment configuration
Dongle
Workspace
Description
Create
Open
Quit
Help
Folder *.4d
nodes.4d
Select
[Setups]
[User]
[Browse]
[Browse reset]
[Relative]
[Open]
[Open with]
[Unicode format]
[Ansi format] (System
[UTF-8 format] (Systen
[Explore]
[Delete file]

Project name

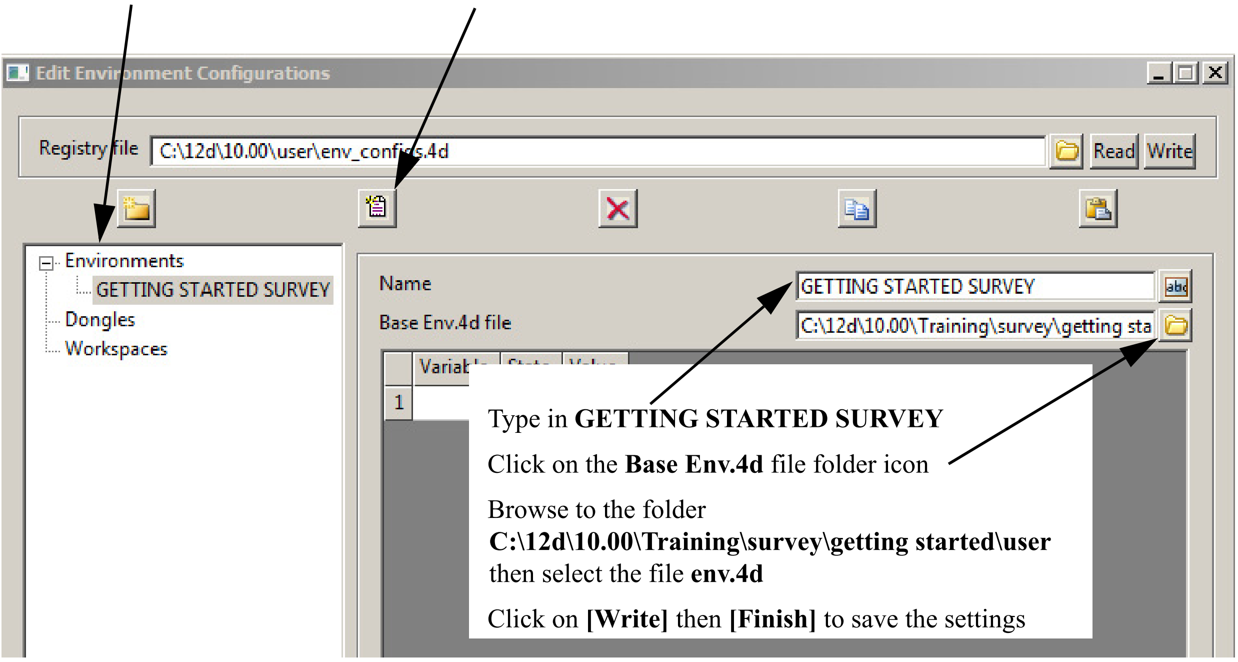
Folder c:\12d\10.00

Registry file C:\12d\10.00\user\env_configs.4d

Click on the Registry file folder icon

Click on [Open]

Click on Environments and then click on the insert icon


Edit Environment Configurations
Read
Write
Environments
Dongles
Workspaces
Variab
1

Registry file C:\12d\10.00\user\env_configs.4d

GETTING STARTED SURVEY

Name GETTING STARTED SURVEY

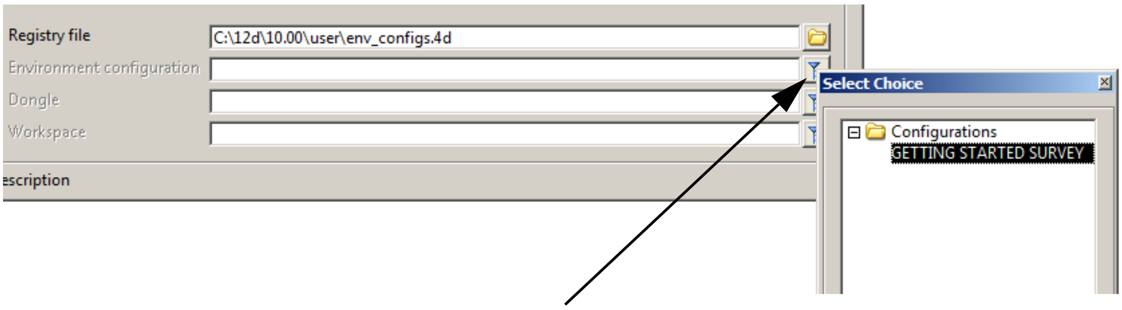
Base Env.4d file C:\12d\10.00\Training\survey\getting sta

Type in **GETTING STARTED SURVEY**

Click on the **Base Env.4d** file folder icon

Browse to the folder **C:\12d\10.00\Training\survey\getting started\user** then select the file **env.4d**

Click on **[Write]** then **[Finish]** to save the settings



Registry file C:\12d\10.00\user\env_configs.4d
Environment configuration
Dongle
Workspace
escription

Select Choice
⊟ Configurations
GETTING STARTED SURVEY

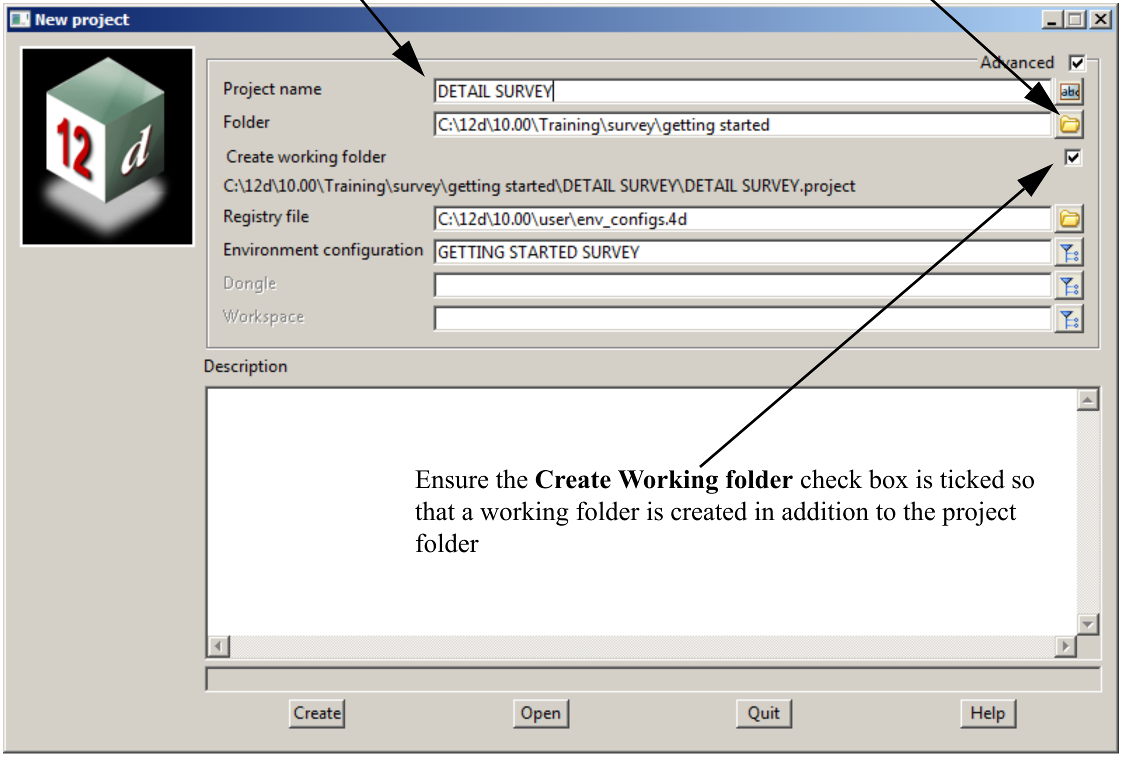
To now use the Config file name just set up we click on the Environment configuration choice icon

Expand the Configurations by clicking on the [+] icon then double click on **GETTING STARTED SURVEY**

Once the Configuration name has been created any new project can be started by firstly selecting this name in the above manner

For the project name type in **DETAIL SURVEY**

Select the Folder icon then browse to folder **C:\12d\10.00\Training\survey\getting started**

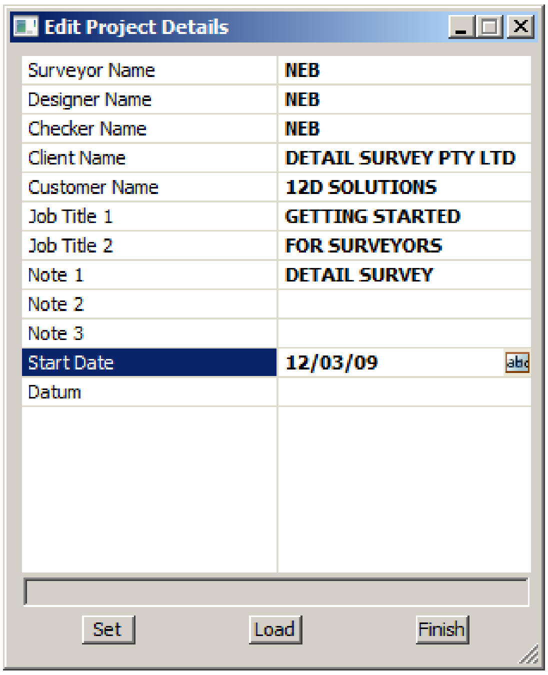


Advanced ☑
Project name DETAIL SURVEY
Folder C:\12d\10.00\Training\survey\getting started
Create working folder ☑
C:\12d\10.00\Training\survey\getting started\DETAIL SURVEY\DETAIL SURVEY.project
Registry file C:\12d\10.00\user\env_configs.4d
Environment configuration GETTING STARTED SURVEY
Dongle
Workspace
Description

Ensure the **Create Working folder** check box is ticked so that a working folder is created in addition to the project folder

Click on **[Create]** to open the new project

9.2.1 Screen Setup


Edit Project Details
Set
Load
Finish

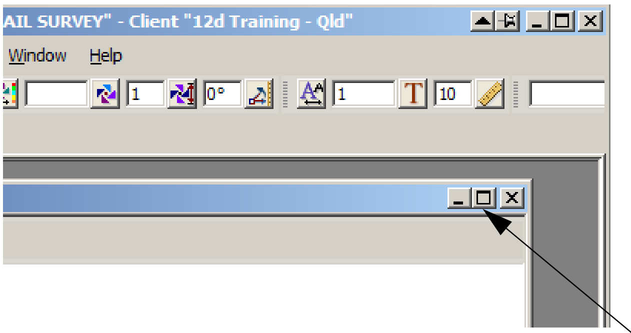
Surveyor Name	NEB
Designer Name	NEB
Checker Name	NEB
Client Name	DETAIL SURVEY PTY LTD
Customer Name	12D SOLUTIONS
Job Title 1	GETTING STARTED
Job Title 2	FOR SURVEYORS
Note 1	DETAIL SURVEY
Note 2	
Note 3	
Start Date	12/03/09
Datum	

When the project starts up for the first time the **Project Details** panel appears

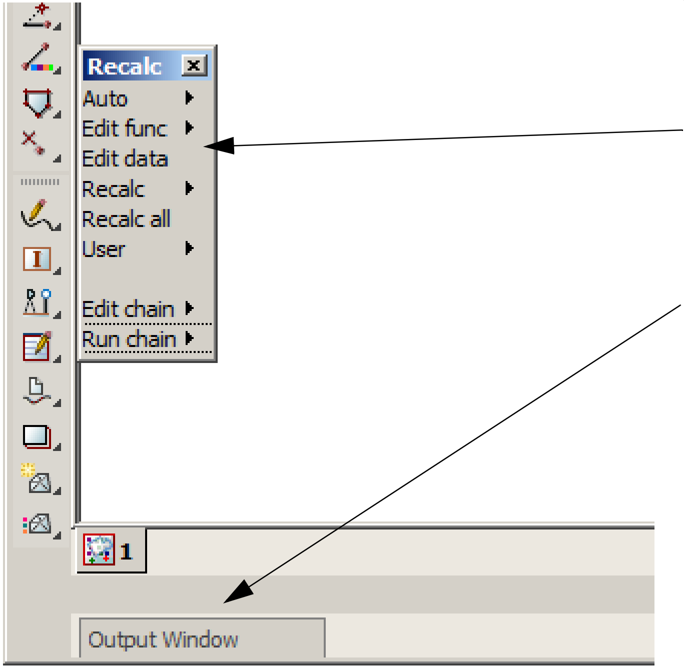
The information typed in here can be used when plotting from this project

Fill in the various prompts if necessary

Select **Set** then **Finish** to save the settings and continue


AIL SURVEY" - Client "12d Training - Qld"
Window
Help
1
0°
1
10

Maximise the plan view


Recalc
Auto
Edit func
Edit data
Recalc
Recalc all
User
Edit chain
Run chain
1
Output Window

Move the **Recalc** panel to the bottom left

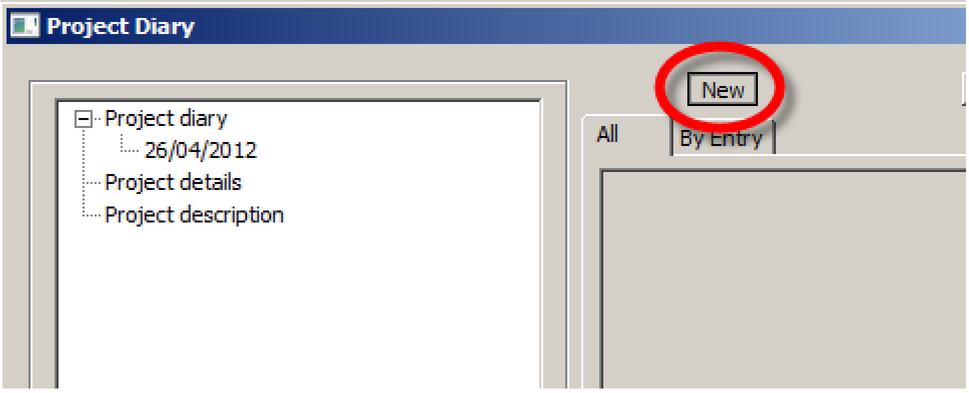
If the **Output window** tab is highlighted blue you can move the cursor over the tab to display the error message if any. Normally when creating a new project there are optional file that are not found.

9.2.2 Project diary

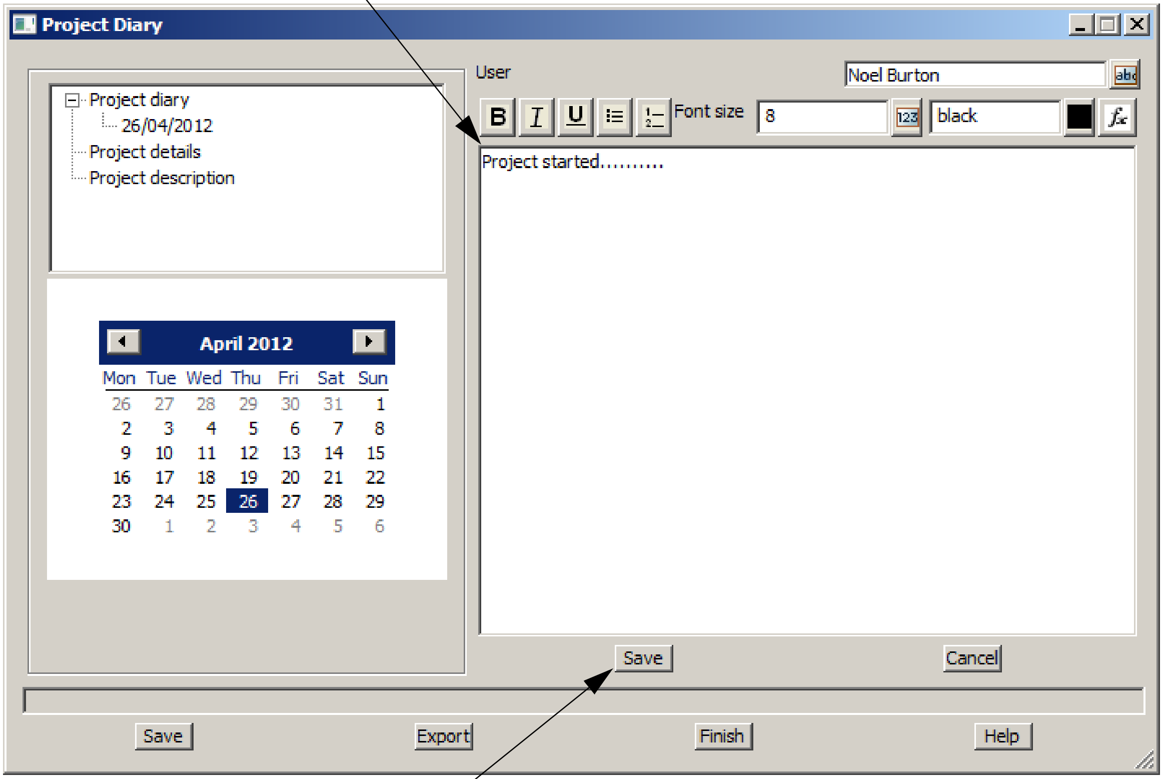
It is useful to keep a record of operations performed in the project.

Select option ***Project=>Details=>Diary***

Click no ***New***


Project Diary
New
All
By Entry
Project diary
26/04/2012
Project details
Project description

Type the details into the panel


Project Diary
Project diary
26/04/2012
Project details
Project description
April 2012
Mon Tue Wed Thu Fri Sat Sun
User
Font size
B
I
U
Save
Cancel
Save
Export
Finish
Help

User: Noel Burton

Font size: 8

black

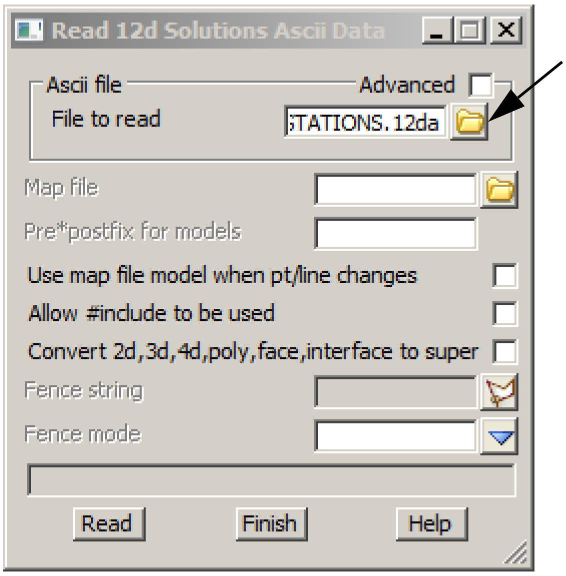
Project started..........

Click on **[Save]** to save the typed input

9.3 Survey Station Coordinate entry

Co-ordinates for the survey stations can be stored in the data collector file or created in the project by a number of methods. For this example we will read in an ascii file with the station co-ordinates.

Select the option ***File I/O=>Data Input=>12da / 4da data***


Read 12d Solutions Ascii Data
Ascii file
Advanced ☐
Map file
Pre*postfix for models
Use map file model when pt/line changes ☐
Allow #include to be used ☐
Convert 2d,3d,4d,poly,face,interface to super ☐
Fence string
Fence mode
Read
Finish
Help

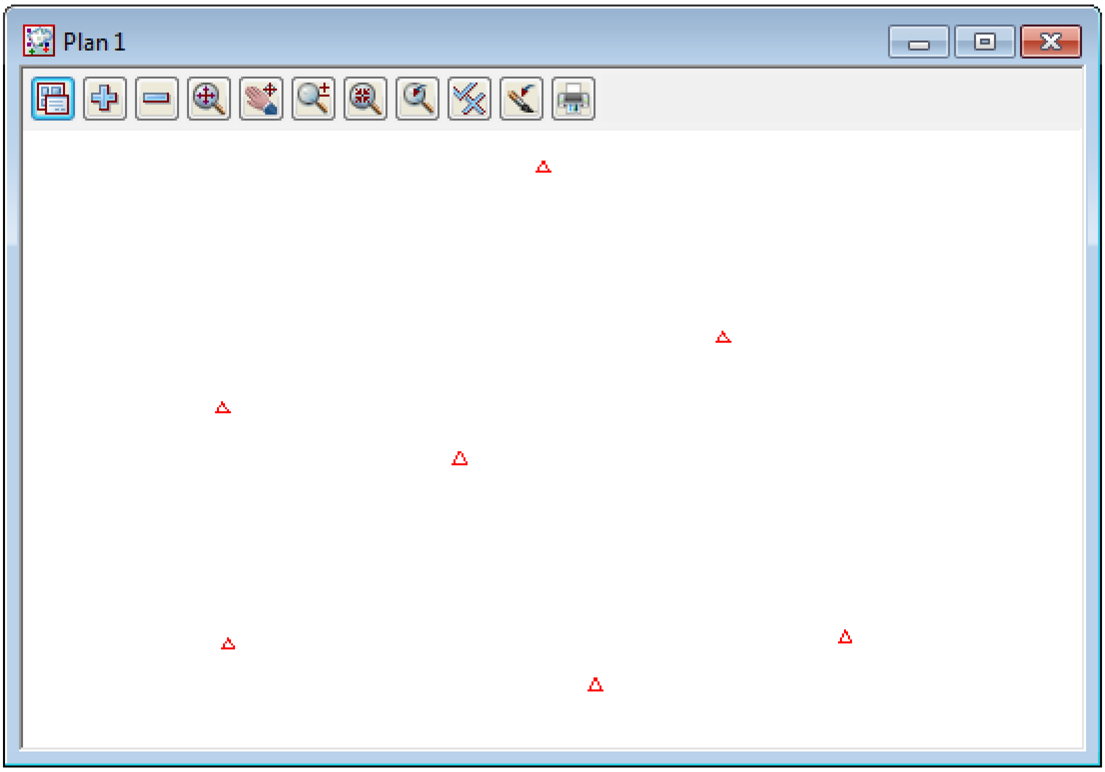
File to read STATIONS.12da

Select the **File to read** folder icon

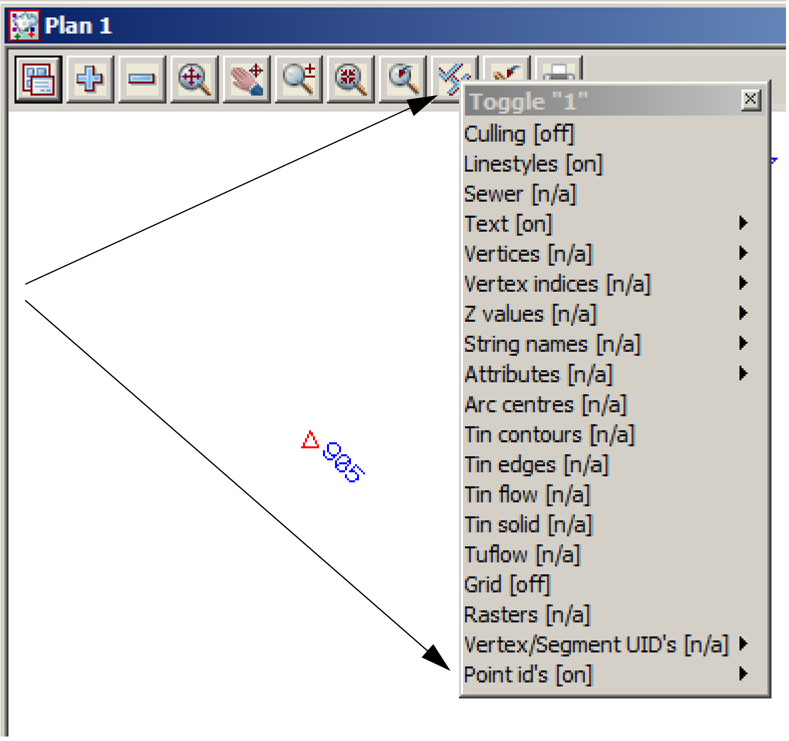
Browse up one level to the folder **C:\12d\10.00\Training\survey\getting started**

Select the file **SURVEY STATIONS.12da**

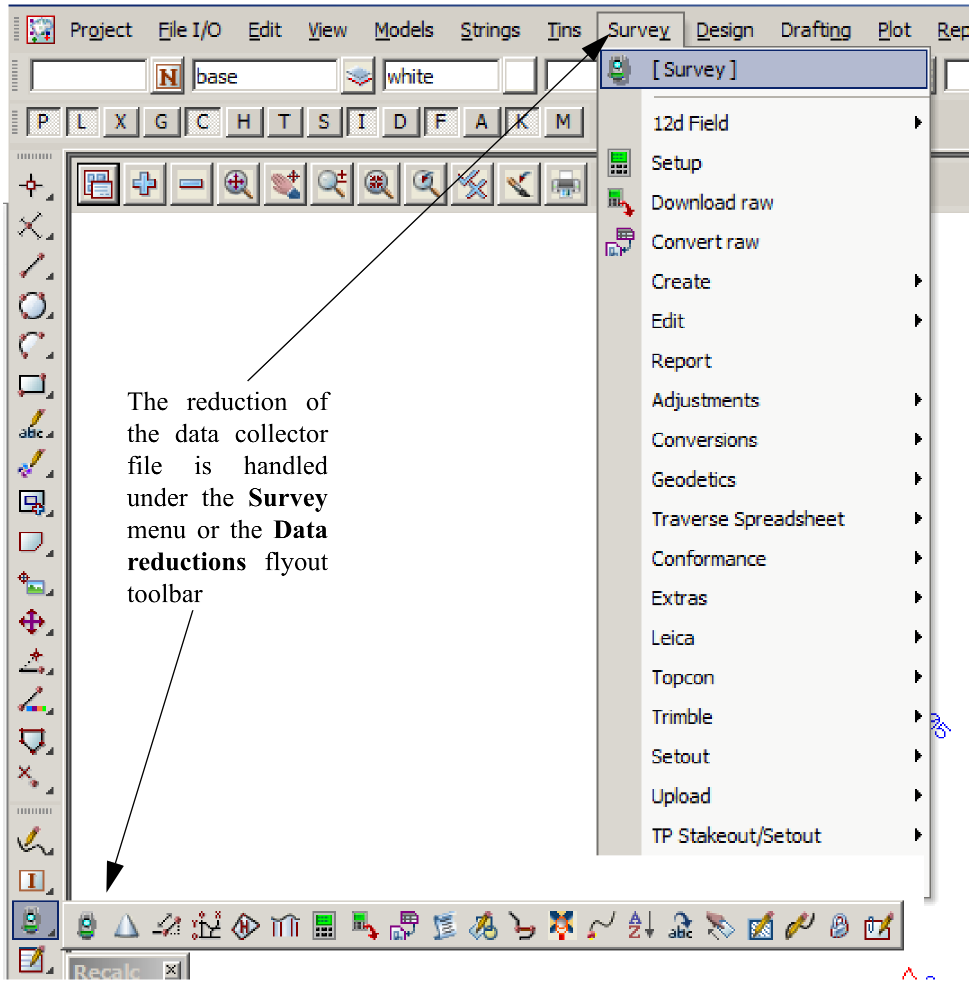
Click **Read** and the station points will appear on the screen



To display point id's select the **Toggle** icon then select **Point id's**


Plan 1
905
Toggle "1"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [on]

9.4 Data collection reduction



The reduction of the data collector file is handled under the **Survey** menu or the **Data reductions** flyout toolbar

Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Drafting
Plot
Rep
base
white
P L X G C H T S I D F A K M
[Survey]
12d Field
Setup
Download raw
Convert raw
Create
Edit
Report
Adjustments
Conversions
Geodetics
Traverse Spreadsheet
Conformance
Extras
Leica
Topcon
Trimble
Setout
Upload
TP Stakeout/Setout
Recalc

The raw survey data is either

(a) downloaded from an instrument

or

(b) copied to the working folder via a Memory storage device

(c) To allow for a variety of data collectors and coding methodologies, 12d Model allows you to save a user-specified set of data collector parameters away under a user supplied name.

9.4.1 Creating/Checking/Modifying a 12d Data Collector Definition

The data collectors defined within 12d Model include such information as:

(a) Instrument name, extension for the raw file and vertical circle information.

(b) Position of the feature code, tinability code and number of digits in the numeric code.

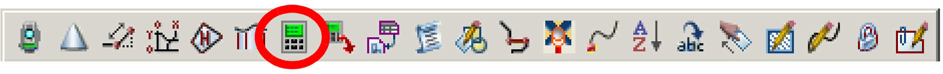
(c) Delimiters for commands, comments, offset codes, backsight and foresights, check measurements

(d) Field template codes.

(e) Communication settings for uploading and downloading.

(f) Coding for arcs, rectangles, closing strings, pipes and culverts.

Creating new or modifying existing 12d data collectors can be done using option ***Project*** => ***Tree, Survey***=>***Setup*** or by picking the **Survey Setup Data** icon



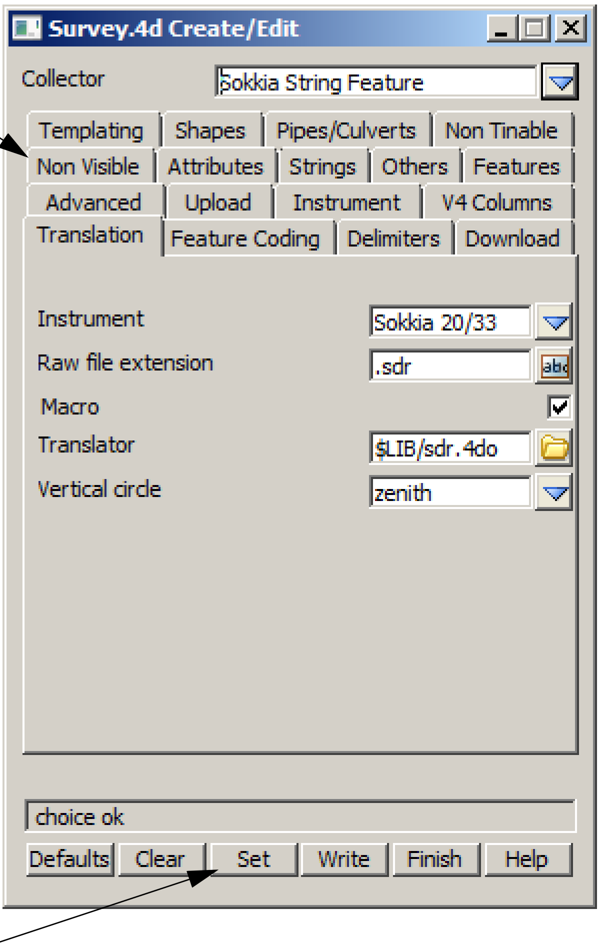
We will use the option ***Project*** => ***Tree*** for this example

Select the + beside ***Survey data collectors*** to see the list of existing data collectors.

Double click on **Create data collector** to create a new 12d data collector definition, or double click on an existing data collector in the list to examine or modify it. The **Survey.4d Create/Edit** panel will then appear.

The example below is shown when selecting the **Sokkia String Feature** data collector type

To edit any of the parameters in the **Survey.4d** file select the relevant tab and change the values.


Survey.4d Create/Edit
Templating
Shapes
Pipes/Culverts
Non Tinable
Non Visible
Attributes
Strings
Others
Features
Advanced
Upload
Instrument
V4 Columns
Translation
Feature Coding
Delimiters
Download
Defaults
Clear
Set
Write
Finish
Help

Collector: Sokkia String Feature

Instrument: Sokkia 20/33

Raw file extension: .sdr

Macro ☑

Translator: $LIB/sdr.4do

Vertical circle: zenith

choice ok

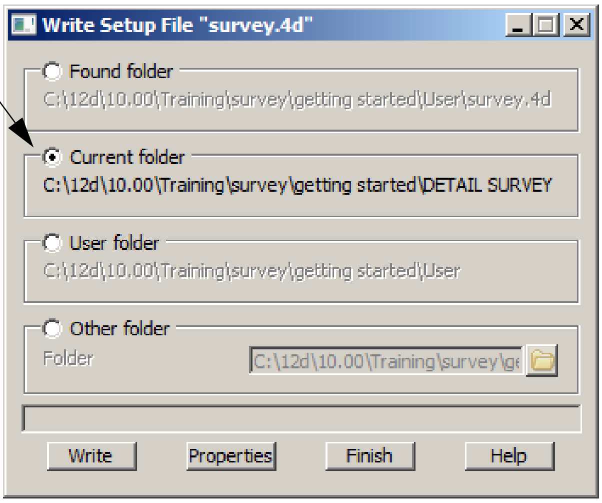
To save the edited file select **Set** then select **Write**

Select **Current folder** to store the file ***survey.4d*** in the local working folder for use in this project only

Select **Write** then **Finish**

Select **Finish** back in the **Survey.4d Create /Edit** panel

Select **Finish** back in the “**Project Tree**” panel


Write Setup File "survey.4d"
Write
Properties
Finish
Help

○ Found folder
C:\12d\10.00\Training\survey\getting started\User\survey.4d

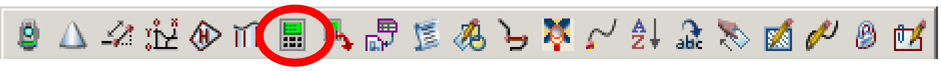
● Current folder
C:\12d\10.00\Training\survey\getting started\DETAIL SURVEY

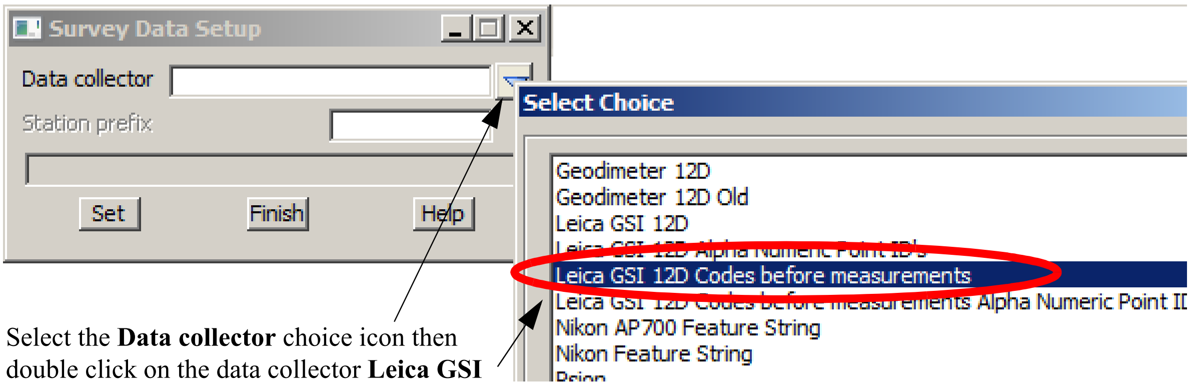
○ User folder
C:\12d\10.00\Training\survey\getting started\User

○ Other folder
Folder: C:\12d\10.00\Training\survey\ge

9.4.2 Selecting the Data Recorder type

Select ***Survey=>Setup*** or **Survey Data Setup** icon

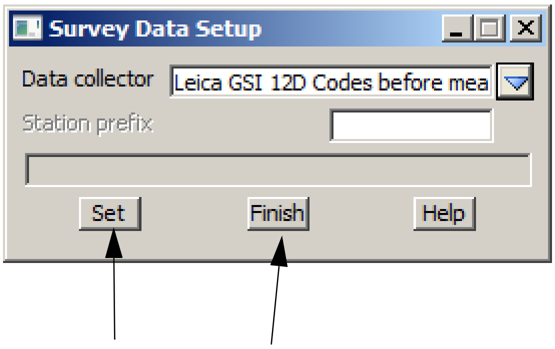




Survey Data Setup
Data collector
Station prefix
Set
Finish
Help
Select Choice

Geodimeter 12D
Geodimeter 12D Old
Leica GSI 12D
Leica GSI 12D Alpha Numeric Point ID's
Leica GSI 12D Codes before measurements
Leica GSI 12D Codes before measurements Alpha Numeric Point ID
Nikon AP700 Feature String
Nikon Feature String
Psion

Select the **Data collector** choice icon then double click on the data collector **Leica GSI 12D Codes before measurements**



Survey Data Setup
Station prefix
Set
Finish
Help

Data collector: Leica GSI 12D Codes before mea

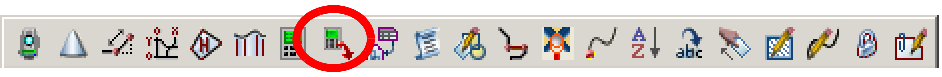
Select ***Set*** and then ***Finish***.

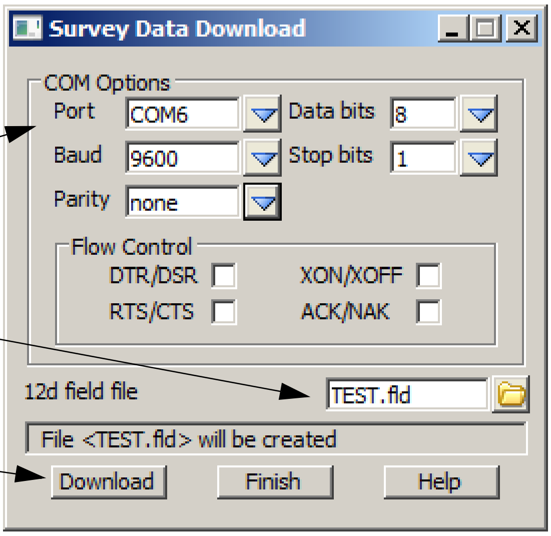
9.4.3 Downloading a Raw Survey File from an Instrument

The raw survey file we require is already on the computer and does not have to be downloaded from a survey instrument.

NOTE - after doing a typical survey job, the raw file for the survey would still be in the data collector and would need to be downloaded using the following procedure:

Select ***Survey=>Download Raw*** or **Survey Data Download** icon





Survey Data Download

COM Options

Port: COM6

Data bits: 8

Baud: 9600

Stop bits: 1

Parity: none

Flow Control

DTR/DSR ☐ XON/XOFF ☐

RTS/CTS ☐ ACK/NAK ☐

12d field file: TEST.fld

File <TEST.fld> will be created

The values for the communication parameters have come from the data collector definition **Sokkia String Feature**.

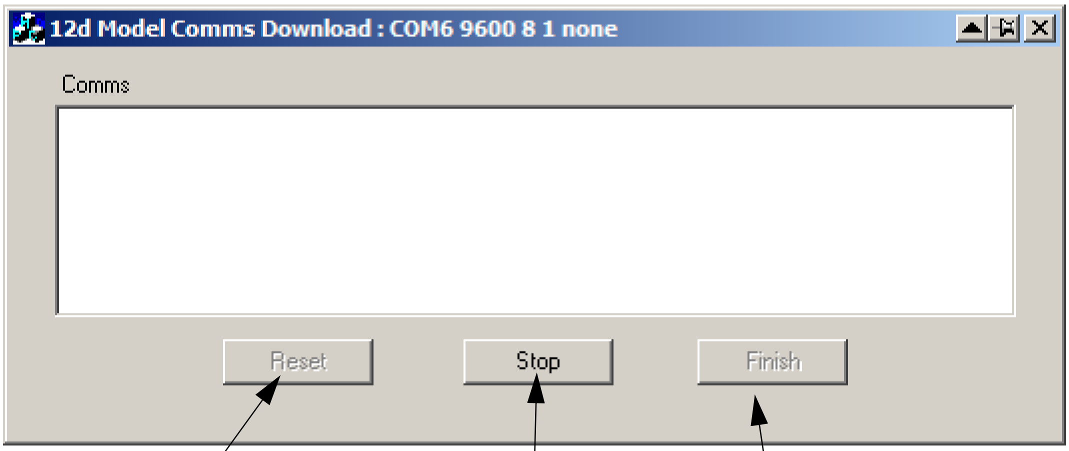
If required, the communication parameters can be modified in the panel before commencing the download. For example, the ***Port*** is the port that you have the data collector connected to.

Type in a name to give the created Field file.

Select **Download** to commence downloading.

NOTE - you must have a data collector attached to the nominated COM port to be able to download data

The **Comms Capture** panel is automatically placed on the screen to display messages for the download.



12d Model Comms Download : COM6 9600 8 1 none

To stop the download press **Stop**

To restart the download press **Reset**

To finish the download select **Finish**

The raw file is downloaded and the field file is created. Both the raw file and the 12d field file are stored in the working folder. In this project the working folder is

C:\12d\10.00\Training\survey\getting started\DETAIL SURVEY

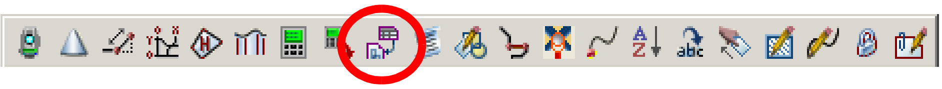
9.4.4 Converting a Raw File to a 12d Field File

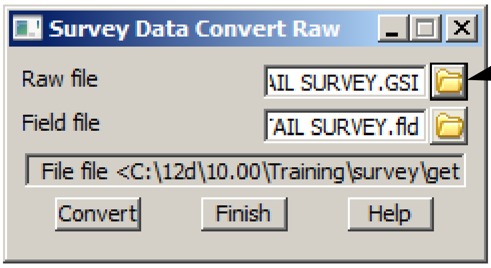
If the field data was not downloaded from a data collector then the raw survey data needs to be converted to a 12d Field File before reduction.

For this training example a raw survey data file **DETAIL SURVEY.GSI** is already in the **getting started** folder, ready for converting.

However, in real situations, the raw survey data file may have been copied from a Memory card.

To convert a raw file, select ***Survey=>Convert Raw*** or **Survey Data Convert raw** icon





Survey Data Convert Raw

Raw file AIL SURVEY.GSI

Field file AIL SURVEY.fld

File file <C:\12d\10.00\Training\survey\get

Click on the **Raw file** folder icon

Browse up a level to folder **C:\12d\10.00\Training\survey\getting started**

and select the file **DETAIL SURVEY.gsi**

The field file name **DETAIL SURVEY.fld** will automatically be filled in or can be user defined.

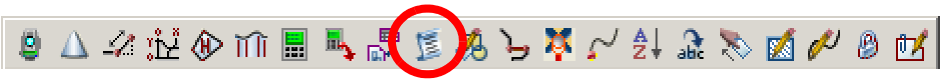
To create the field file select **Convert** then **Finish**

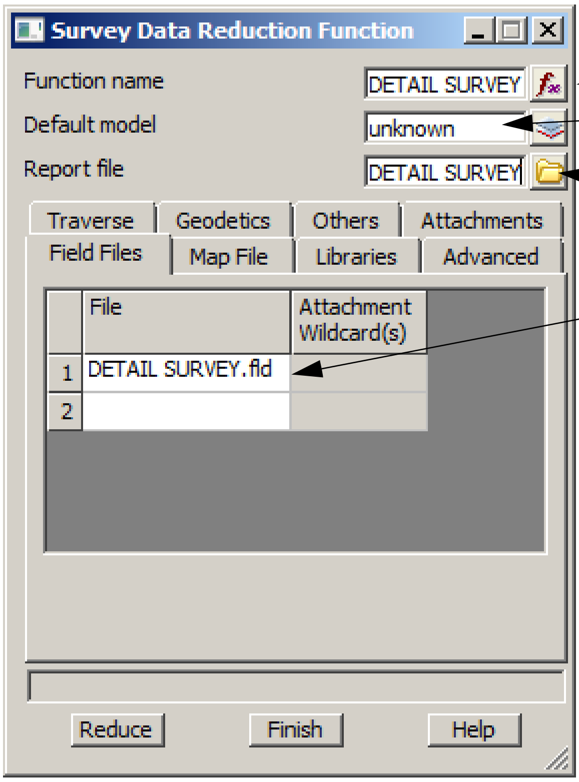
This will convert the raw Leica GSI file to the 12d Field File format ready for reduction.

Note: The list of raw survey files are expected to have the extension ***".gsi"*** as specified in the data collector definition ***Leica GSI 12D Codes before measurements***. It is recommended that any files manually copied to the working folder have the correct extension.

9.4.5 Running the Survey Data Reduction Function

Select ***Survey*** => ***Create*** => ***Field File*** or select **Survey Data Reduction Function** icon




Survey Data Reduction Function
Traverse
Geodetics
Others
Attachments
Field Files
Map File
Libraries
Advanced
Reduce
Finish
Help

Function name: DETAIL SURVEY

Default model: unknown

Report file: DETAIL SURVEY

	File	Attachment Wildcard(s)
1	DETAIL SURVEY.fld	
2		

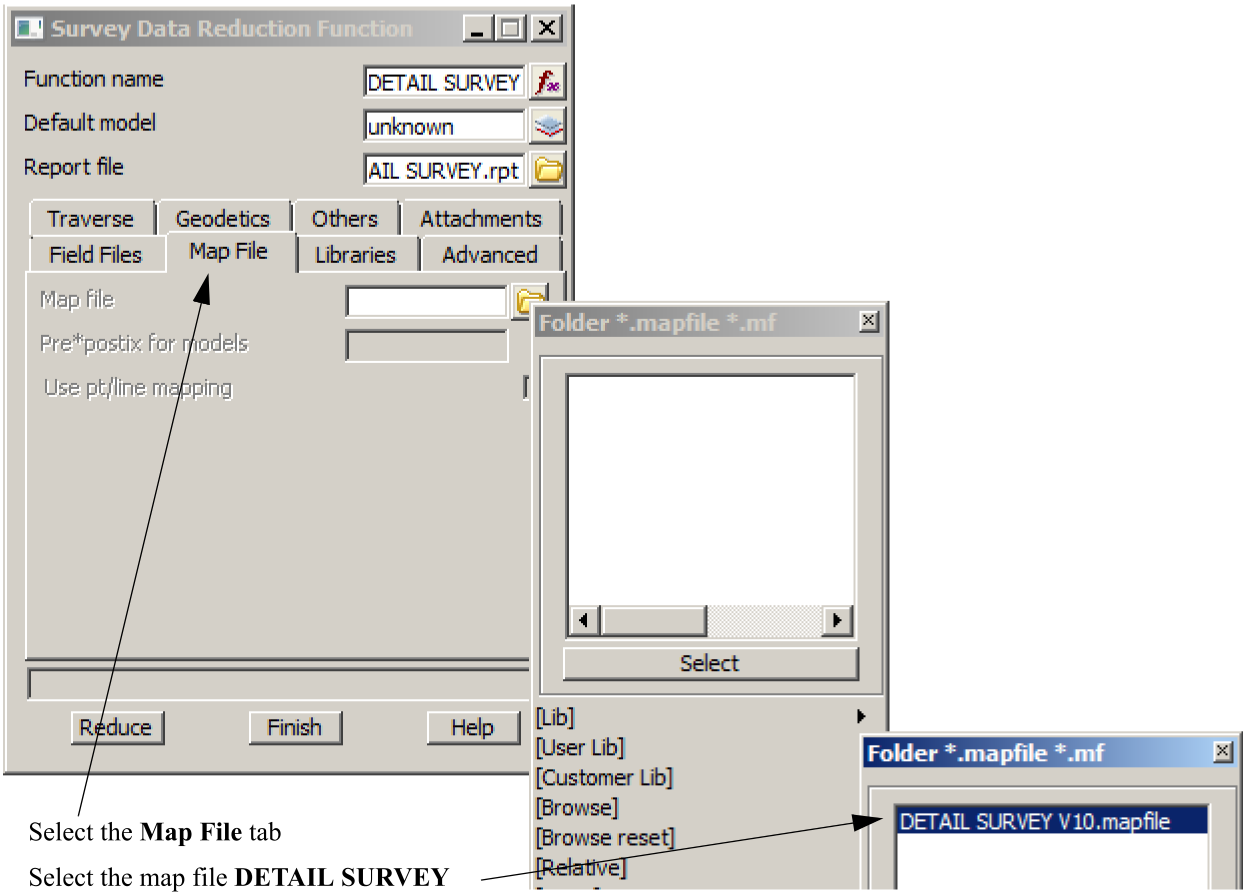
Type in the Function name **DETAIL SURVEY**

Type in **unknown** for the model name for strings that have unrecognised feature codes.

Type in report file name **DETAIL SURVEY** (when pressing [Enter] the file is given the extension**.rpt**).

Under the **Field Files** tab the newly created field file **DETAIL SURVEY.fld** is displayed as the default

Map file tab



Survey Data Reduction Function

Function name DETAIL SURVEY

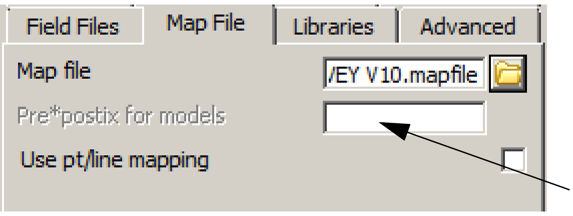
Default model unknown

Report file AIL SURVEY.rpt

Traverse
Geodetics
Others
Attachments
Field Files
Map File
Libraries
Advanced
Map file
Pre*postix for models
Use pt/line mapping
Reduce
Finish
Help
Folder *.mapfile *.mf
Select
[Lib]
[User Lib]
[Customer Lib]
[Browse]
[Browse reset]
[Relative]
Folder *.mapfile *.mf
DETAIL SURVEY V10.mapfile

Select the **Map File** tab

Select the map file **DETAIL SURVEY V10.mapfile** from the User_lib folder. This will be used to map the survey readings to their correct model and other features.



Map file /EY V10.mapfile

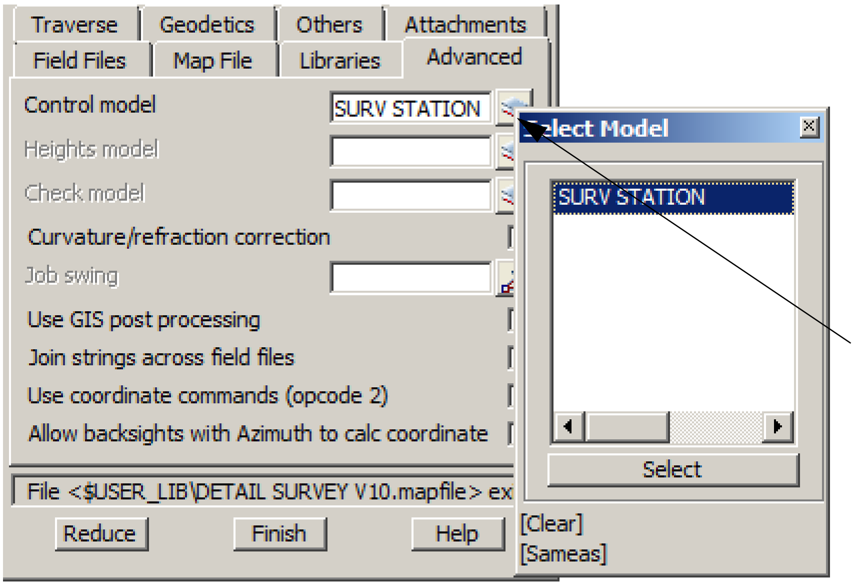
Pre*postix for models

Use pt/line mapping ☐

Field Files
Map File
Libraries
Advanced

The reduced data can be separated from other surveyed data by using a prefix which goes in front of any model name created using the mapping file.

Advanced tab


Traverse
Geodetics
Others
Attachments
Field Files
Map File
Libraries
Advanced
Select Model
Select
Reduce
Finish
Help
[Clear]
[Sameas]

Control model SURV STATION
Heights model
Check model
Curvature/refraction correction
Job swing
Use GIS post processing
Join strings across field files
Use coordinate commands (opcode 2)
Allow backsights with Azimuth to calc coordinate
File <$USER_LIB\DETAIL SURVEY V10.mapfile> ex

Select the **Advanced** tab

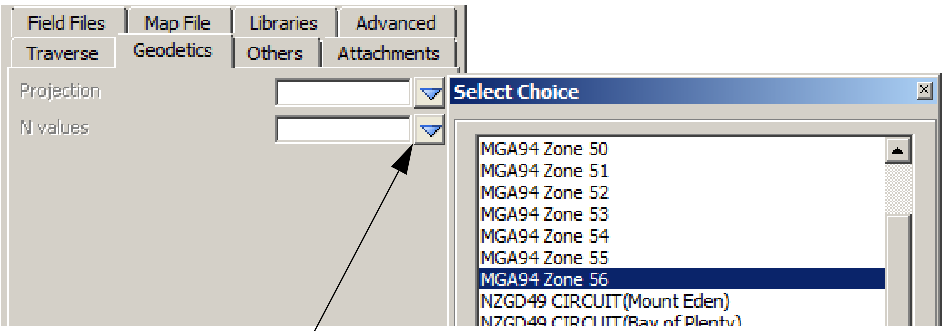
12d can either reduce the survey readings from station information within the field file or by specifying the model containing the survey station points. In this case we have read survey points existing in the project.

Select the **Control model** choice icon

Double click on the model name

SURV STATION

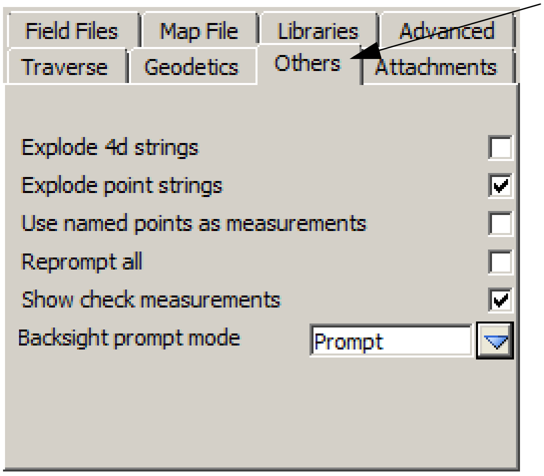
Geodetics tab


Field Files
Map File
Libraries
Advanced
Traverse
Geodetics
Others
Attachments
Projection
N values
Select Choice
MGA94 Zone 50
MGA94 Zone 51
MGA94 Zone 52
MGA94 Zone 53
MGA94 Zone 54
MGA94 Zone 55
MGA94 Zone 56
NZGD49 CIRCUIT(Mount Eden)

Select the **Geodetics** tab

Select the **Projection** choice icon and then pick **MGA94 Zone 56**

Others tab


Field Files
Map File
Libraries
Advanced
Traverse
Geodetics
Others
Attachments

Explode 4d strings ☐
Explode point strings ☑
Use named points as measurements ☐
Reprompt all ☐
Show check measurements ☑
Backsight prompt mode Prompt

Select the **Others** tab

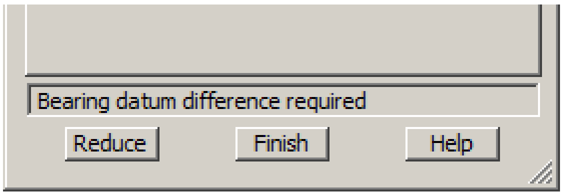
Tick **Explode point strings** check box to ensure individual survey points are kept separate from other points with the same code

Tick **Show check measurements** check box to display check measurements during the reduction

Select the **Backsight prompt mode** choice icon and select **Prompt** to pause the reductions as each backsight reading is reduced

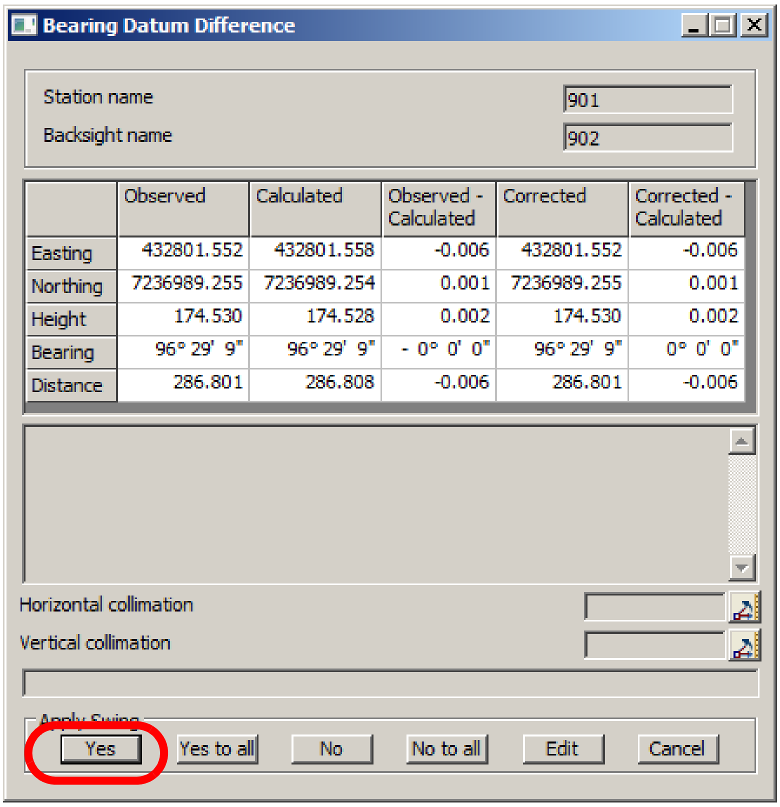
Reduce the function

Select **Reduce** to reduce the field file



Bearing datum difference required

Each time a Backsight measurement appears in the reduction a **Bearing Datum Difference** panel is displayed.



Station name 901

Backsight name 902

	Observed	Calculated	Observed - Calculated	Corrected	Corrected - Calculated
Easting	432801.552	432801.558	-0.006	432801.552	-0.006
Northing	7236989.255	7236989.254	0.001	7236989.255	0.001
Height	174.530	174.528	0.002	174.530	0.002
Bearing	96° 29' 9"	96° 29' 9"	- 0° 0' 0"	96° 29' 9"	0° 0' 0"
Distance	286.801	286.808	-0.006	286.801	-0.006

The user has a number of possible responses

Yes will apply the swing to the following readings until the next bearing difference panel appears

Yes to all will apply the swing to the following readings and bypass all following panels using yes as the default.

This is not a good idea unless the file is being re-reduced

No will apply no swing to the following readings until the next bearing difference panel appears

No to all will apply no swing to the following readings and bypass all following panels using no as the default.

This is not a good idea unless the file is being re-reduced

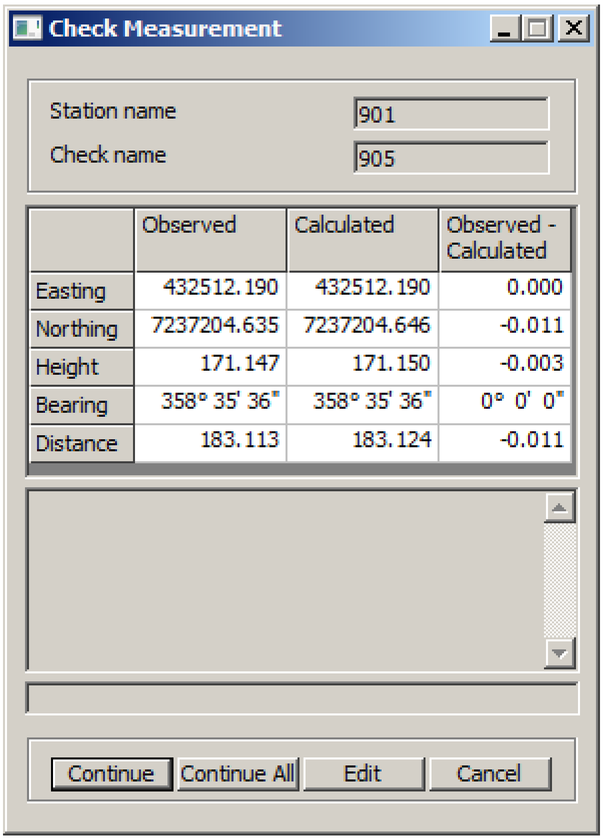
Edit is used to activate the field file to view the reading to the backsight point. This is useful if the wrong backsight point ID is entered. The new ID can be edited and the reduction continued

Cancel is used if there is a major problem with the reductions and the process has to be terminated in order to fix the error.

Note: By pressing Cancel the process stops at that point in the reduction and an incomplete survey may appear in the graphics

You have to rereduce the survey after pressing Cancel

For this exercise select **Yes**



Station name 901

Check name 905

	Observed	Calculated	Observed - Calculated
Easting	432512.190	432512.190	0.000
Northing	7237204.635	7237204.646	-0.011
Height	171.147	171.150	-0.003
Bearing	358° 35' 36"	358° 35' 36"	0° 0' 0"
Distance	183.113	183.124	-0.011

If check readings are taken to known points a **Check Measurement** panel is displayed

Again the user has a number of possible responses

Continue will close the panel and the processing continues until the next check reading is encountered

Continue all will close the panel and the processing continues with all following check measurement panels not displayed

This is not a good idea unless the file is being rereduced

Edit is used to activate the field file to view the check reading to the point. This is useful if the wrong check point ID is entered. The new ID can be edited and the reduction continued

Cancel is used if there is a major problem with the reductions and the process has to be terminated in order to fix the error.

Note: By pressing Cancel the process stops at that point in the reduction and an incomplete survey may appear in the graphics

You have to rereduce the survey after pressing Cancel

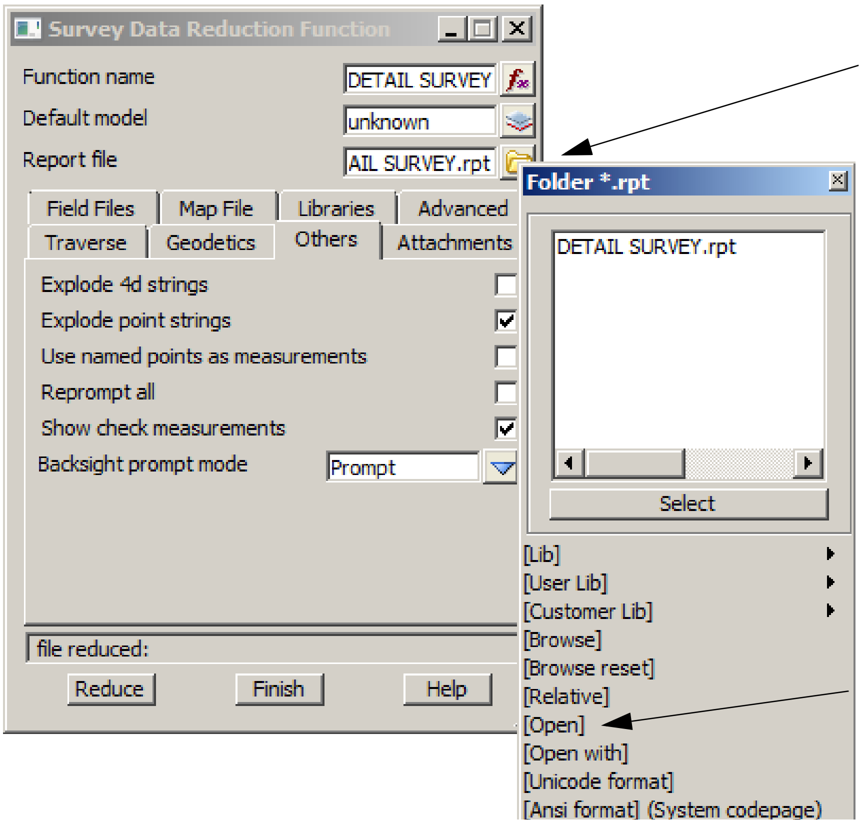
For this exercise select **Continue** each time the panel appears.

NOTE - When the survey data is being reduced, the **Bearing Datum Difference** panel and **Check Measurement** panels come up a number of times.

When the reduction is finished **don't** press Finish until the report file has been checked for errors

9.4.6 Checking the Report File for Reduction Errors

We will now check the report for any errors found by the reduction process. This should be done prior to any other editing


Survey Data Reduction Function
Field Files
Map File
Libraries
Advanced
Traverse
Geodetics
Others
Attachments
Reduce
Finish
Help
Folder *.rpt
Select
[Lib]
[User Lib]
[Customer Lib]
[Browse]
[Browse reset]
[Relative]
[Open]
[Open with]
[Unicode format]
[Ansi format] (System codepage)

Function name DETAIL SURVEY
Default model unknown
Report file AIL SURVEY.rpt

Explode 4d strings ☐
Explode point strings ☑
Use named points as measurements ☐
Reprompt all ☐
Show check measurements ☑
Backsight prompt mode Prompt

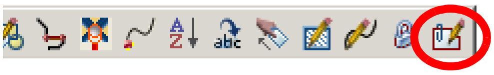
file reduced:

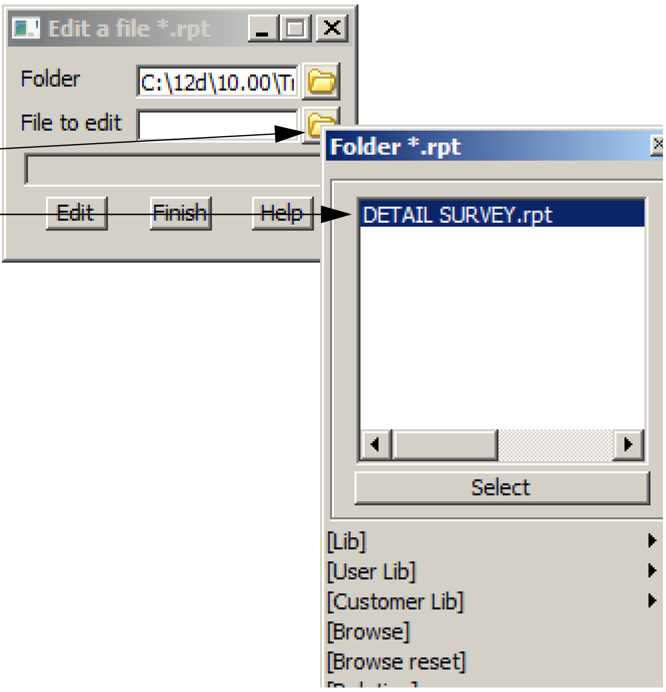
DETAIL SURVEY.rpt

Select the **Report file** choice icon

Select **Open** to display the report file in the default text editor.

If the Survey Data Reduction Function panel has accidentally been closed the file can be loaded into the text editor by selecting option ***Reports*** => ***Edit*** or **Edit a file *.rpt** icon




Edit a file *.rpt
Edit
Finish
Help
Folder *.rpt
Select
[Lib]
[User Lib]
[Customer Lib]
[Browse]
[Browse reset]

Folder C:\12d\10.00\T

File to edit

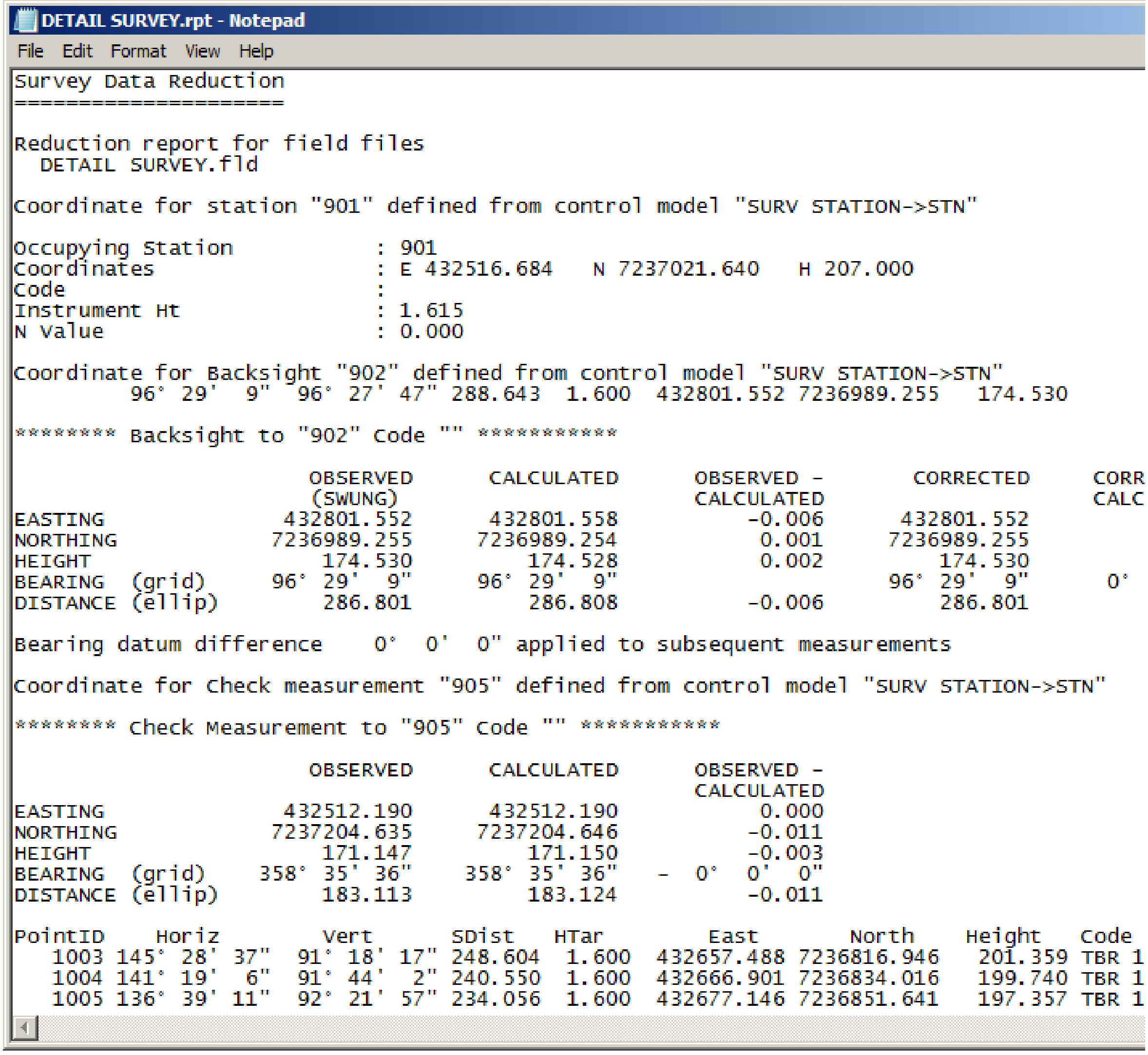
DETAIL SURVEY.rpt

Select **File to edit** icon

Double click on **DETAIL SURVEY.rpt**.

Select **Edit**

The file **DETAIL SURVEY.rpt** will then displayed in the default text editor.



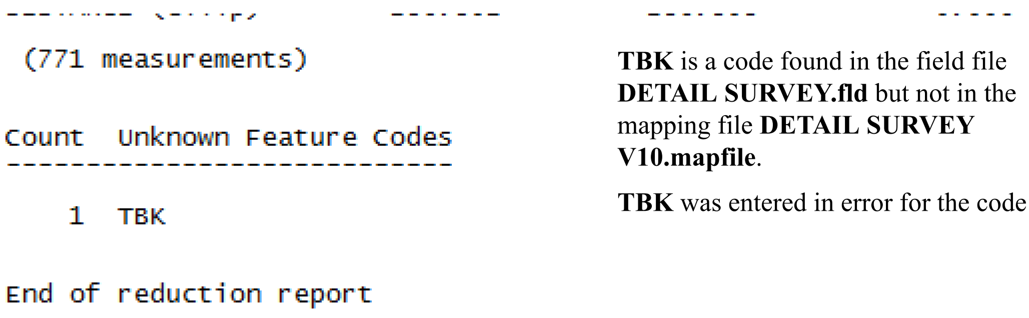
```
Survey Data Reduction
=====================

Reduction report for field files
  DETAIL SURVEY.fld

Coordinate for station "901" defined from control model "SURV STATION->STN"

Occupying Station            : 901
Coordinates                  : E 432516.684   N 7237021.640   H 207.000
Code                         :
Instrument Ht                : 1.615
N Value                      : 0.000

Coordinate for Backsight "902" defined from control model "SURV STATION->STN"
         96° 29'  9"  96° 27' 47" 288.643  1.600  432801.552 7236989.255   174.530

******** Backsight to "902" Code "" ***********

                       OBSERVED      CALCULATED      OBSERVED -      CORRECTED     CORR
                        (SWUNG)                      CALCULATED                    CALC
EASTING                 432801.552    432801.558      -0.006        432801.552
NORTHING               7236989.255   7236989.254       0.001       7236989.255
HEIGHT                     174.530       174.528       0.002           174.530
BEARING  (grid)        96° 29'  9"   96° 29'  9"                   96° 29'  9"      0°
DISTANCE (ellip)           286.801       286.808      -0.006           286.801

Bearing datum difference    0°  0'  0" applied to subsequent measurements

Coordinate for Check measurement "905" defined from control model "SURV STATION->STN"

******** Check Measurement to "905" Code "" ***********

                       OBSERVED      CALCULATED      OBSERVED -
                                                     CALCULATED
EASTING                 432512.190    432512.190       0.000
NORTHING               7237204.635   7237204.646      -0.011
HEIGHT                     171.147       171.150      -0.003
BEARING  (grid)       358° 35' 36"  358° 35' 36"  -  0°  0'  0"
DISTANCE (ellip)           183.113       183.124      -0.011

PointID    Horiz         Vert        SDist   HTar      East        North      Height   Code
   1003 145° 28' 37"  91° 18' 17" 248.604  1.600  432657.488 7236816.946   201.359 TBR 1
   1004 141° 19'  6"  91° 44'  2" 240.550  1.600  432666.901 7236834.016   199.740 TBR 1
   1005 136° 39' 11"  92° 21' 57" 234.056  1.600  432677.146 7236851.641   197.357 TBR 1
```

Scroll down through the report file checking for any problems or errors.

At the end of the file is the list of **Unknown Feature Codes**.

These are the feature codes that appeared in the field file **DETAIL SURVEY.fld** but were not in the mapping file

.



```
 (771 measurements)


Count   Unknown Feature Codes
----------------------------

    1   TBK


End of reduction report
```

TBK is a code found in the field file **DETAIL SURVEY.fld** but not in the mapping file **DETAIL SURVEY V10.mapfile**.

TBK was entered in error for the code **TBL**

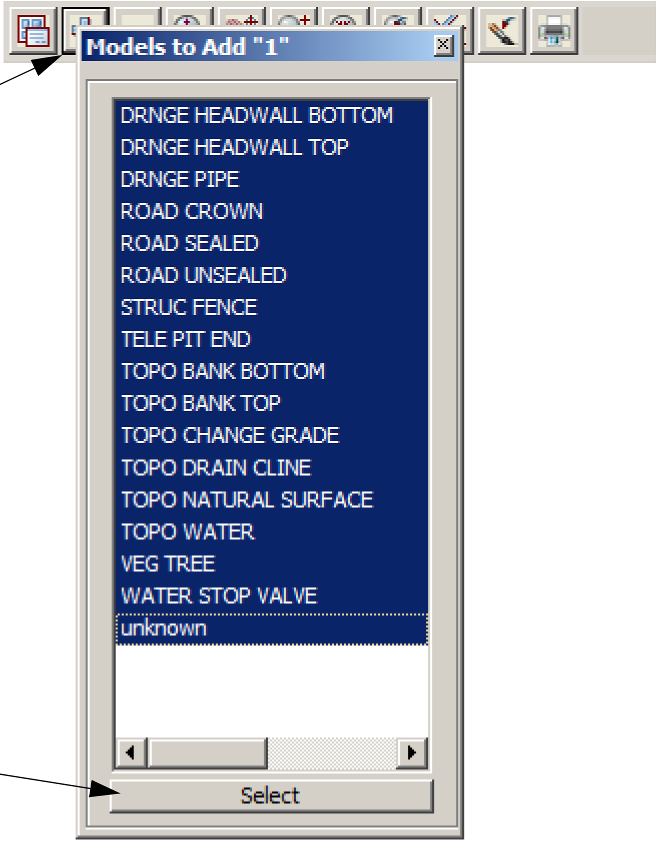
Quit from the text editor. After the report file has been closed, the **Survey Data Reduction Function** panel can be **Finished**

9.5 Graphically Editing the Field File Data

The detail survey can be edited graphically whilst maintaining a dynamic link to the field file and the resulting report file. This ensures that if the field file is re-reduced any changes will be maintained.

As the manuals are produced with the view background colour as white string colours may appear different to those one your screen

9.5.1 View the Survey Data

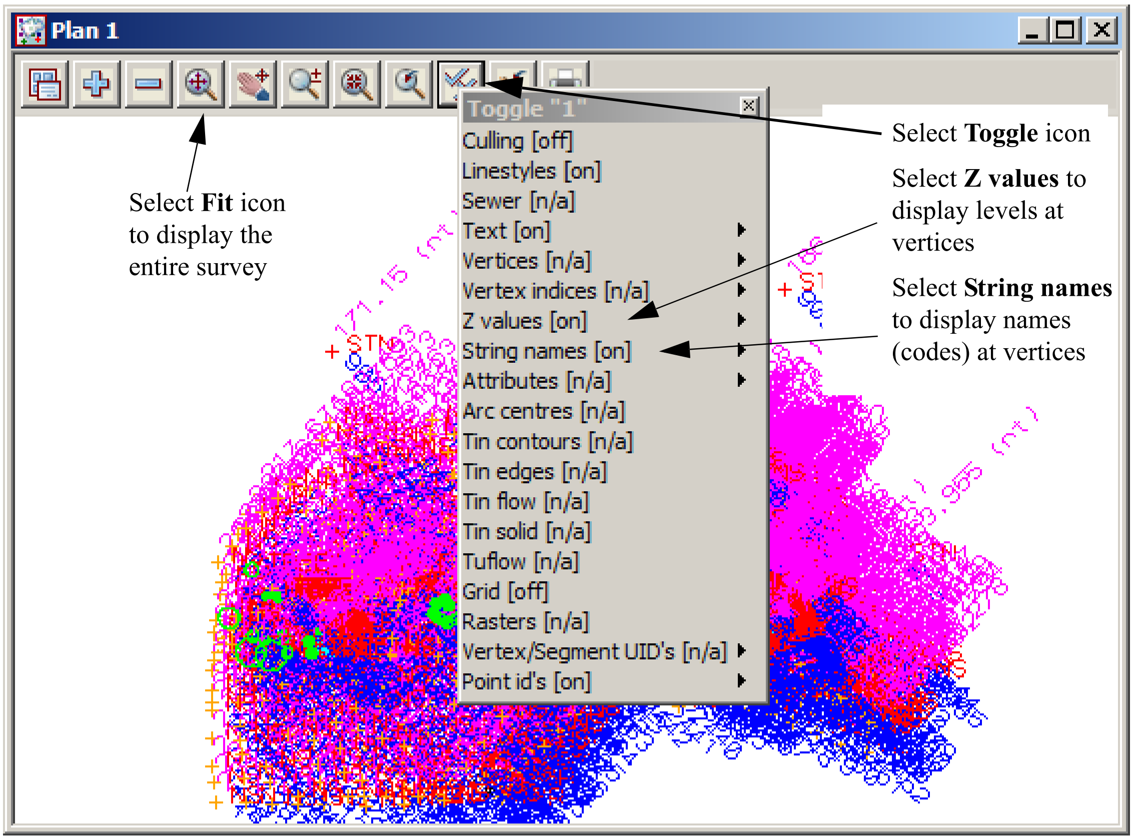


DRNGE HEADWALL BOTTOM
DRNGE HEADWALL TOP
DRNGE PIPE
ROAD CROWN
ROAD SEALED
ROAD UNSEALED
STRUC FENCE
TELE PIT END
TOPO BANK BOTTOM
TOPO BANK TOP
TOPO CHANGE GRADE
TOPO DRAIN CLINE
TOPO NATURAL SURFACE
TOPO WATER
VEG TREE
WATER STOP VALVE
unknown

Turn on all models featured in the survey by selecting **Models to add** icon

Highlight all of the models

Press **Select**


Plan 1
Toggle "1"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [on]
String names [on]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [on]
STN

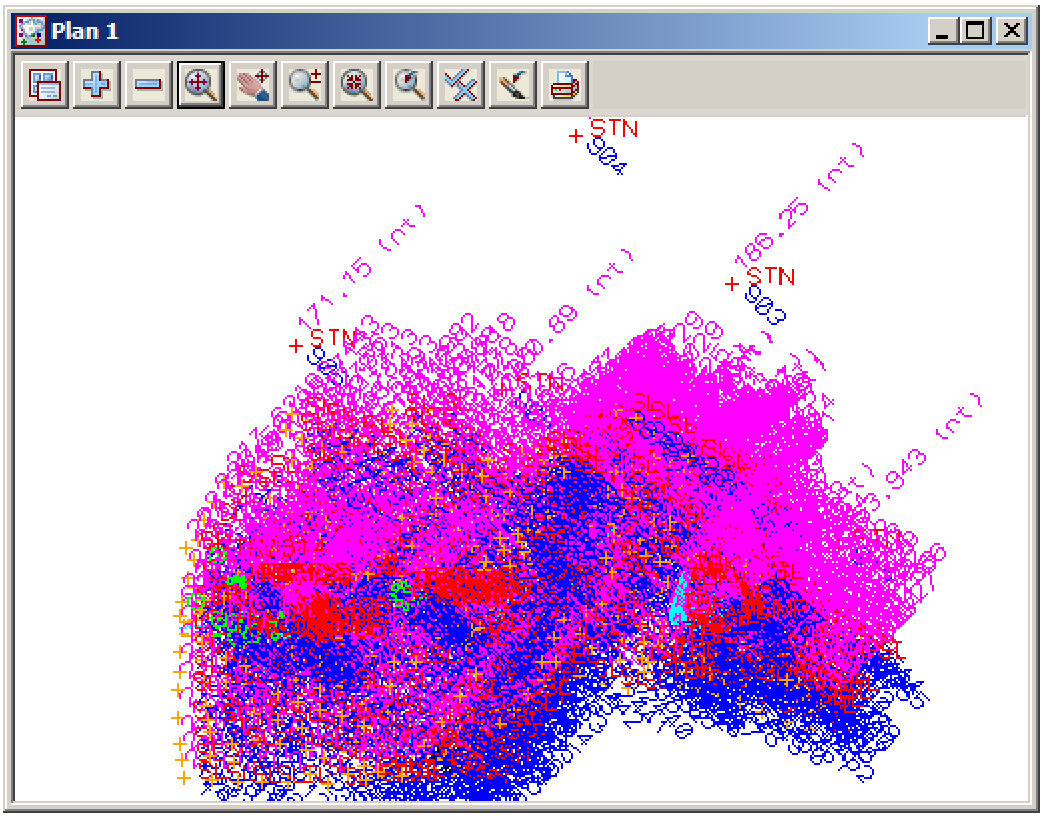
Select **Fit** icon to display the entire survey

Select **Toggle** icon

Select **Z values** to display levels at vertices

Select **String names** to display names (codes) at vertices

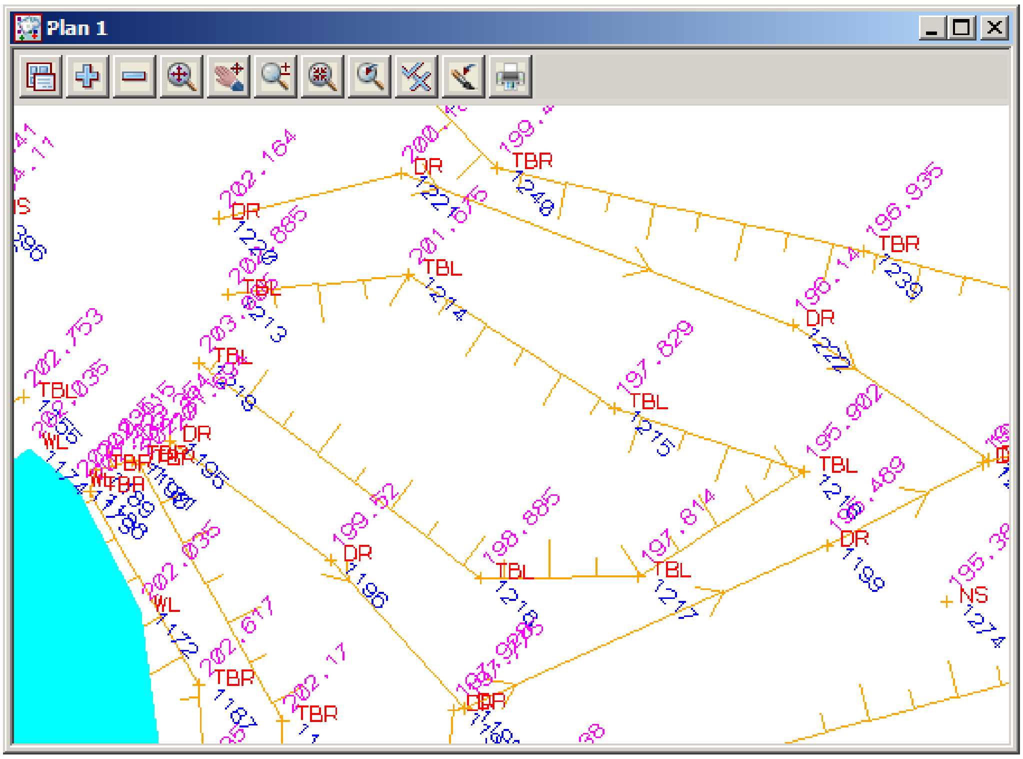
With all the text turned on, the survey is hard to read



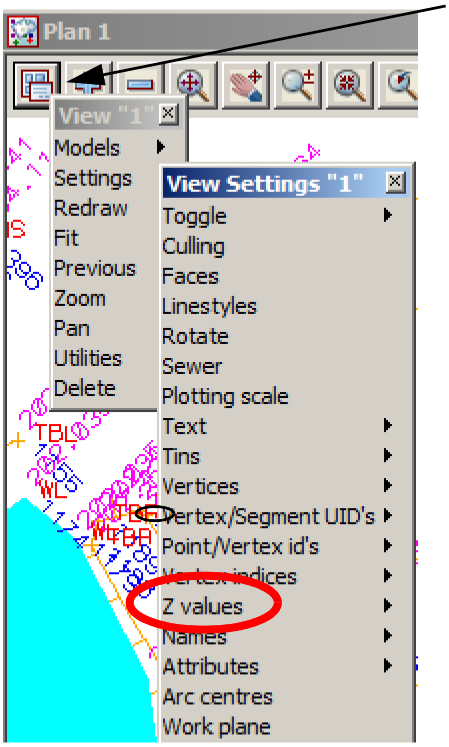
The toggled text can be given user defined settings to allow the text to be viewed only when zoomed in to a preset scale.

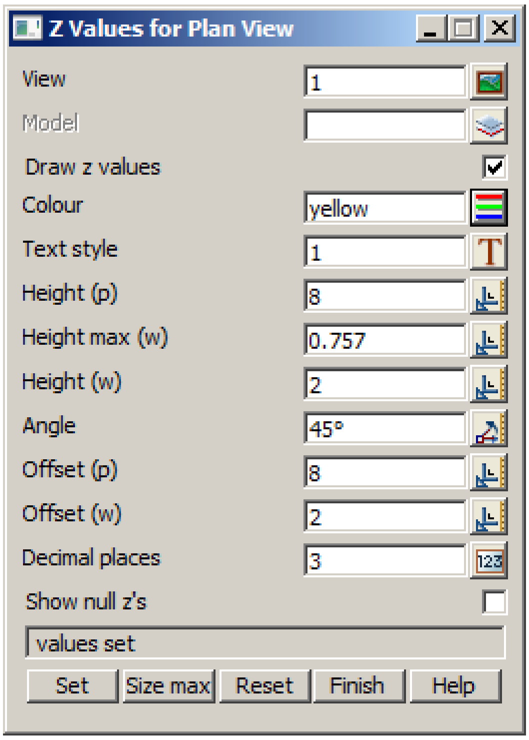
9.5.2 Setup your text screen settings

Zoom into an area with a lot of text displayed



Walk right on **Menu=>Settings=>Z Values**


Plan 1
View "1"
Models
Settings
Redraw
Fit
Previous
Zoom
Pan
Utilities
Delete
View Settings "1"
Toggle
Culling
Faces
Linestyles
Rotate
Sewer
Plotting scale
Text
Tins
Vertices
Vertex/Segment UID's
Point/Vertex id's
Vertex indices
Z values
Names
Attributes
Arc centres
Work plane


Z Values for Plan View

View: 1
Model:
Draw z values ☑
Colour: yellow
Text style: 1
Height (p): 8
Height max (w): 0.757
Height (w): 2
Angle: 45°
Offset (p): 8
Offset (w): 2
Decimal places: 3
Show null z's ☐
values set

Set
Size max
Reset
Finish
Help

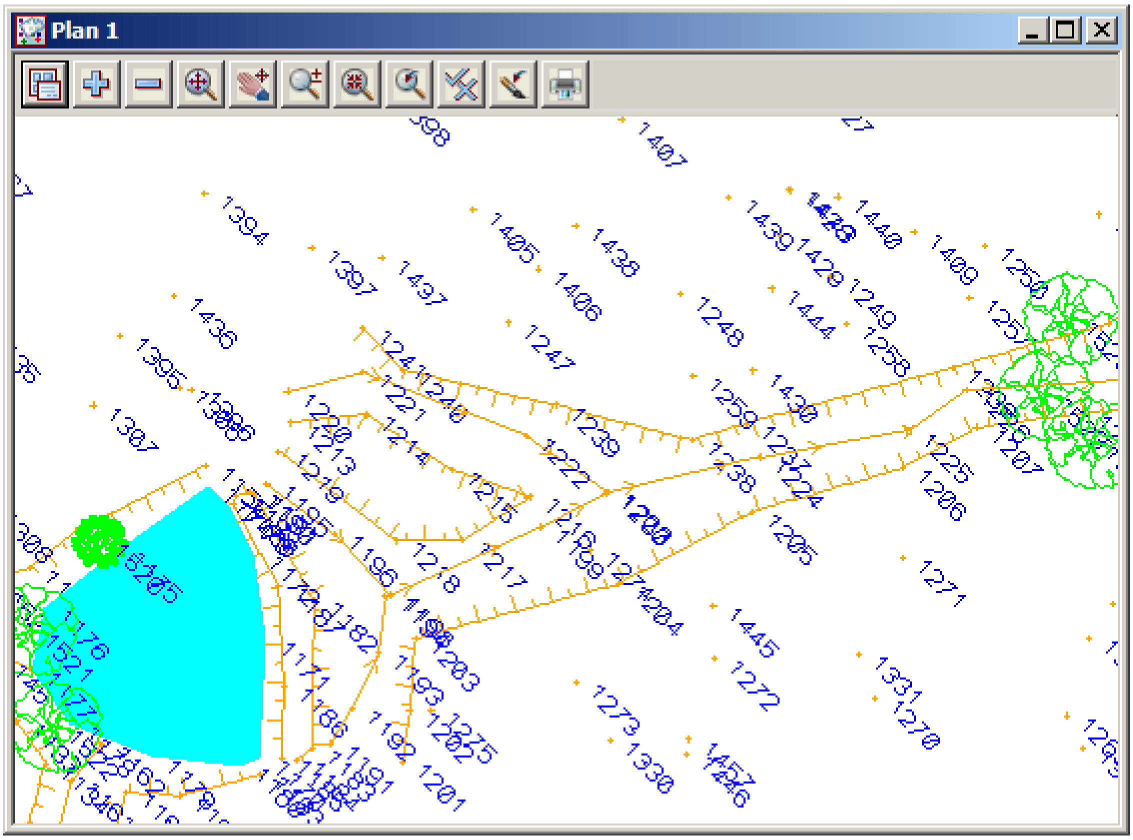
Select **Size max, Set** and then **Finish** to set default Z value height to that shown on the current screen

Roll the wheel in and out to see the effect

Repeat this process for Names using option ***Menu***=> ***Settings =>Names => Single***

Now zoom out to a scale to define the point number display

Select ***Menu=> Settings =>Point/Vertex Id's=>Single***



Set the point id scales

Now zoom all of the survey for an easily readable screen

9.5.3 Graphically Editing the Field File Data

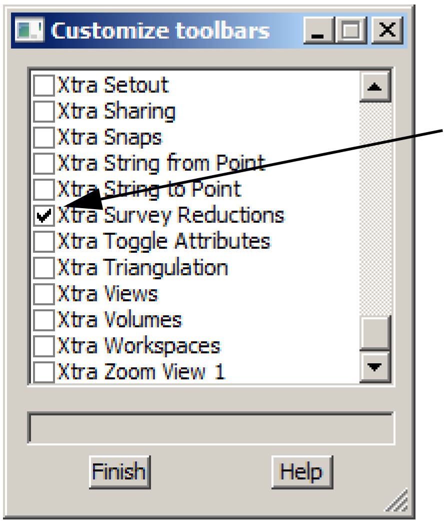
As we move along the survey, errors are detected and need to be changed in the field file if possible.

There are options that can edit both the graphics and the field file but update the field file reduction after these edit

The Graphical edits are selected from the ***Survey=>Edit*** menu or the **Detail Survey reductions** flyout toolbar on the cad toolbar

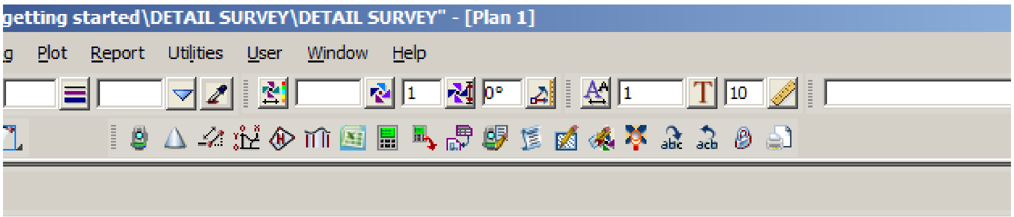
The toolbar will be pinned up at the top of the main menu

Select ***View=>Toolbars***


Customize toolbars
Finish
Help

☐ Xtra Setout
☐ Xtra Sharing
☐ Xtra Snaps
☐ Xtra String from Point
☐ Xtra String to Point
☑ Xtra Survey Reductions
☐ Xtra Toggle Attributes
☐ Xtra Triangulation
☐ Xtra Views
☐ Xtra Volumes
☐ Xtra Workspaces
☐ Xtra Zoom View 1

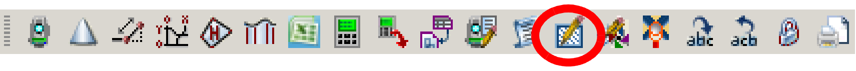
Tick the check box for **Xtra Survey Reductions**


getting started\DETAIL SURVEY\DETAIL SURVEY" - [Plan 1]
g
Plot
Report
Utilities
User
Window
Help
1
0°
1
10

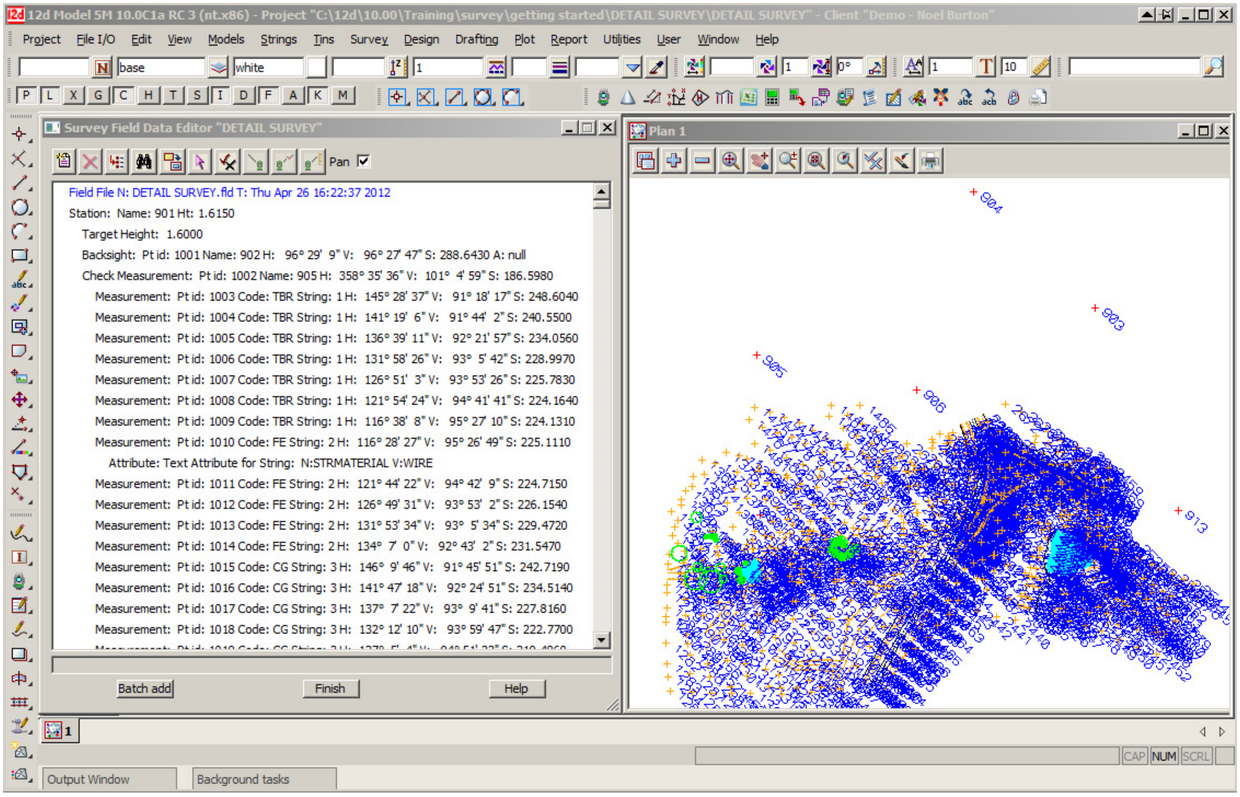
Pin the Toolbar up next to the Snaps toolbar

Tiling field file editor with plan view

Open the field file editor using option ***Survey=>Edit=>Field data*** or select **Open field file Editor** icon



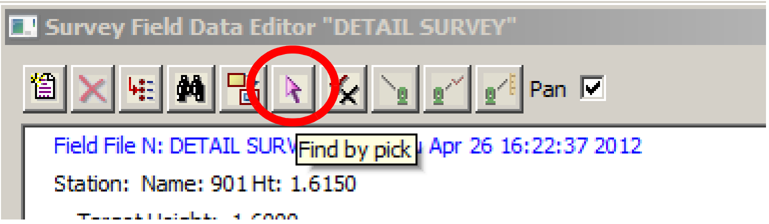
Place the field file editor on the left side of the screen with the plan view 1 on the right


12d Model 5M 10.0C1a RC 3 (nt.x86) - Project "C:\12d\10.00\Training\survey\getting started\DETAIL SURVEY\DETAIL SURVEY" - Client "Demo - Noel Burton"
Project File I/O Edit View Models Strings Tins Survey Design Drafting Plot Report Utilities User Window Help
base
white
Survey Field Data Editor "DETAIL SURVEY"
Pan ☑
Batch add
Finish
Help
Plan 1
904
903
905
906
913
Output Window
Background tasks
CAP NUM SCRL

```
Field File N: DETAIL SURVEY.fld T: Thu Apr 26 16:22:37 2012
Station:  Name: 901 Ht: 1.6150
   Target Height:  1.6000
   Backsight:  Pt id: 1001 Name: 902 H:   96° 29'  9" V:   96° 27' 47" S: 288.6430 A: null
   Check Measurement:  Pt id: 1002 Name: 905 H:  358° 35' 36" V:  101°  4' 59" S: 186.5980
      Measurement:  Pt id: 1003 Code: TBR String: 1 H:  145° 28' 37" V:   91° 18' 17" S: 248.6040
      Measurement:  Pt id: 1004 Code: TBR String: 1 H:  141° 19'  6" V:   91° 44'  2" S: 240.5500
      Measurement:  Pt id: 1005 Code: TBR String: 1 H:  136° 39' 11" V:   92° 21' 57" S: 234.0560
      Measurement:  Pt id: 1006 Code: TBR String: 1 H:  131° 58' 26" V:   93°  5' 42" S: 228.9970
      Measurement:  Pt id: 1007 Code: TBR String: 1 H:  126° 51'  3" V:   93° 53' 26" S: 225.7830
      Measurement:  Pt id: 1008 Code: TBR String: 1 H:  121° 54' 24" V:   94° 41' 41" S: 224.1640
      Measurement:  Pt id: 1009 Code: TBR String: 1 H:  116° 38'  8" V:   95° 27' 10" S: 224.1310
      Measurement:  Pt id: 1010 Code: FE String: 2 H:  116° 28' 27" V:   95° 26' 49" S: 225.1110
         Attribute: Text Attribute for String:  N:STRMATERIAL V:WIRE
      Measurement:  Pt id: 1011 Code: FE String: 2 H:  121° 44' 22" V:   94° 42'  9" S: 224.7150
      Measurement:  Pt id: 1012 Code: FE String: 2 H:  126° 49' 31" V:   93° 53'  2" S: 226.1540
      Measurement:  Pt id: 1013 Code: FE String: 2 H:  131° 53' 34" V:   93°  5' 34" S: 229.4720
      Measurement:  Pt id: 1014 Code: FE String: 2 H:  134°  7'  0" V:   92° 43'  2" S: 231.5470
      Measurement:  Pt id: 1015 Code: CG String: 3 H:  146°  9' 46" V:   91° 45' 51" S: 242.7190
      Measurement:  Pt id: 1016 Code: CG String: 3 H:  141° 47' 18" V:   92° 24' 51" S: 234.5140
      Measurement:  Pt id: 1017 Code: CG String: 3 H:  137°  7' 22" V:   93°  9' 41" S: 227.8160
      Measurement:  Pt id: 1018 Code: CG String: 3 H:  132° 12' 10" V:   93° 59' 47" S: 222.7700
```

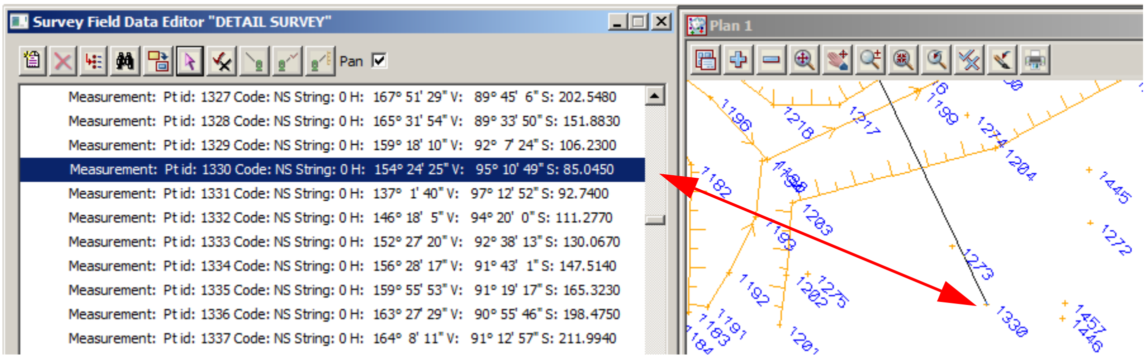
The advantage of having the field file editor active when editing the survey is the ability to reset any edits that are performed either graphically of directly into the field file editor.

Field file editor link to graphics



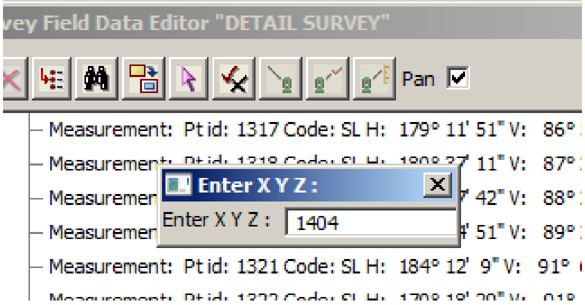
```
Field File N: DETAIL SURV                Apr 26 16:22:37 2012
Station:  Name: 901 Ht: 1.6150
```

The pick icon shown above can be used to select a point in the graphics and if the point is associated with the field file function being edited then the relevant measurement line will be highlighted



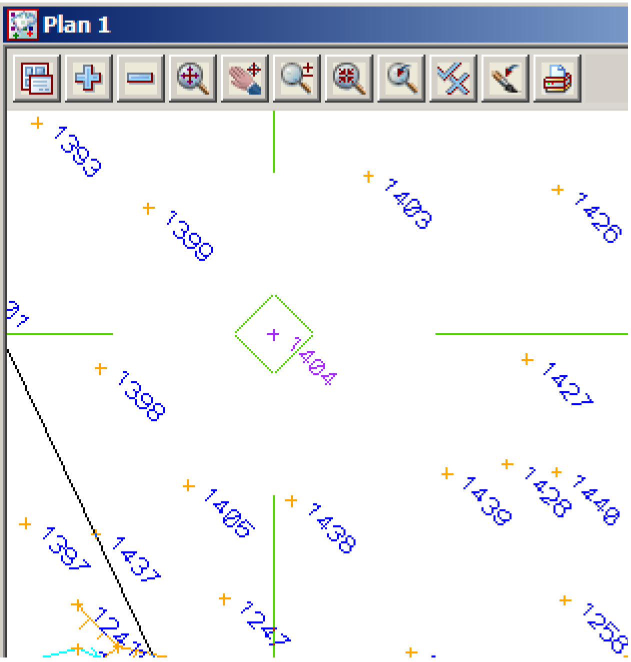
```
Measurement:  Pt id: 1327 Code: NS String: 0 H:  167° 51' 29" V:   89° 45'  6" S: 202.5480
Measurement:  Pt id: 1328 Code: NS String: 0 H:  165° 31' 54" V:   89° 33' 50" S: 151.8830
Measurement:  Pt id: 1329 Code: NS String: 0 H:  159° 18' 10" V:   92°  7' 24" S: 106.2300
Measurement:  Pt id: 1330 Code: NS String: 0 H:  154° 24' 25" V:   95° 10' 49" S: 85.0450
Measurement:  Pt id: 1331 Code: NS String: 0 H:  137°  1' 40" V:   97° 12' 52" S: 92.7400
Measurement:  Pt id: 1332 Code: NS String: 0 H:  146° 18'  5" V:   94° 20'  0" S: 111.2770
Measurement:  Pt id: 1333 Code: NS String: 0 H:  152° 27' 20" V:   92° 38' 13" S: 130.0670
Measurement:  Pt id: 1334 Code: NS String: 0 H:  156° 28' 17" V:   91° 43'  1" S: 147.5140
Measurement:  Pt id: 1335 Code: NS String: 0 H:  159° 55' 53" V:   91° 19' 17" S: 165.3230
Measurement:  Pt id: 1336 Code: NS String: 0 H:  163° 27' 29" V:   90° 55' 46" S: 198.4750
Measurement:  Pt id: 1337 Code: NS String: 0 H:  164°  8' 11" V:   91° 12' 57" S: 211.9940
```

Alternatively once the Pick icon has been selected the point number can be typed in manually. This can be done by either typing in the point number or pressing [space] bar to activate the input panel then typing in the point number.



```
Measurement:  Pt id:  1317 Code: SL H:  179° 11' 51" V:   86°
Measurement                                 ' 11" V:   87°
Measuremen                                  ' 42" V:   88°
Measuremen                                  ' 51" V:   89°
Measurement:  Pt id:  1321 Code: SL H:  184° 12'  9" V:   91°
```

Enter X Y Z : 1404



The point number will be highlighted.

If the point was not in the initial window then 12d pans to the point centring it in the view

If the point was in the initial view then the point is highlighted only

Once the point is confirmed the point is shown in the field file editor

NOTE. Always confirm the point selection as the string is "locked" until confirmation. An error will occur if the reduction is run with a locked string

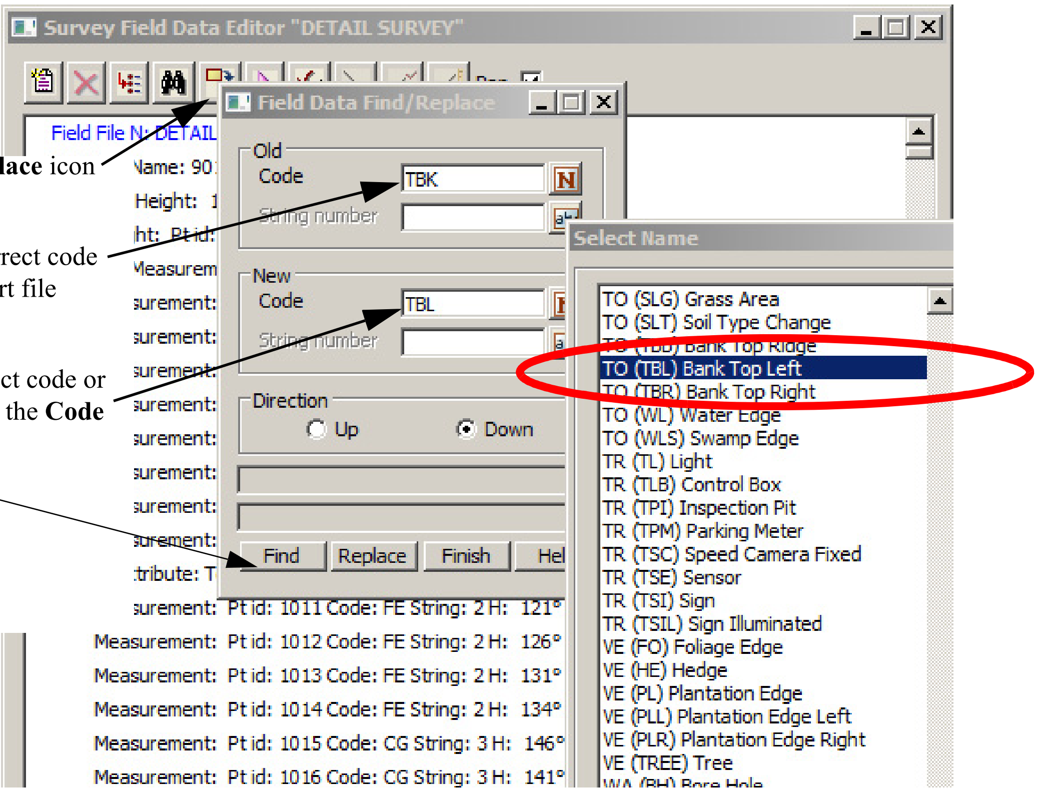
The **Pan** check box can be ticked so that any point highlighted in the field file will be the centre of the plan view

WARNING. Field file edits are different from manual cad edits and you must not edit the survey data with cad edits while performing field file edits. The reason for this is that after each field file edit the function is rerun and the edits are remembered by the function. Manual cad edits are not linked to the function and will be lost if the function is re-reduced. Duplicate data can also result in the incorrect use of cad edits while the field file reduction is running

Find and Replace

When reducing the field file the code **TBK** was listed as incorrect in the report file

We will use the **Find / Replace** option in the field file editor to fix the error


Survey Field Data Editor "DETAIL SURVEY"
Field Data Find/Replace
Select Name
Find
Replace
Finish
Hel

Select **Find/Replace** icon

Type in the incorrect code listed in the report file

Type in the correct code or select **TBL** from the **Code** choice icon

Select **Find**

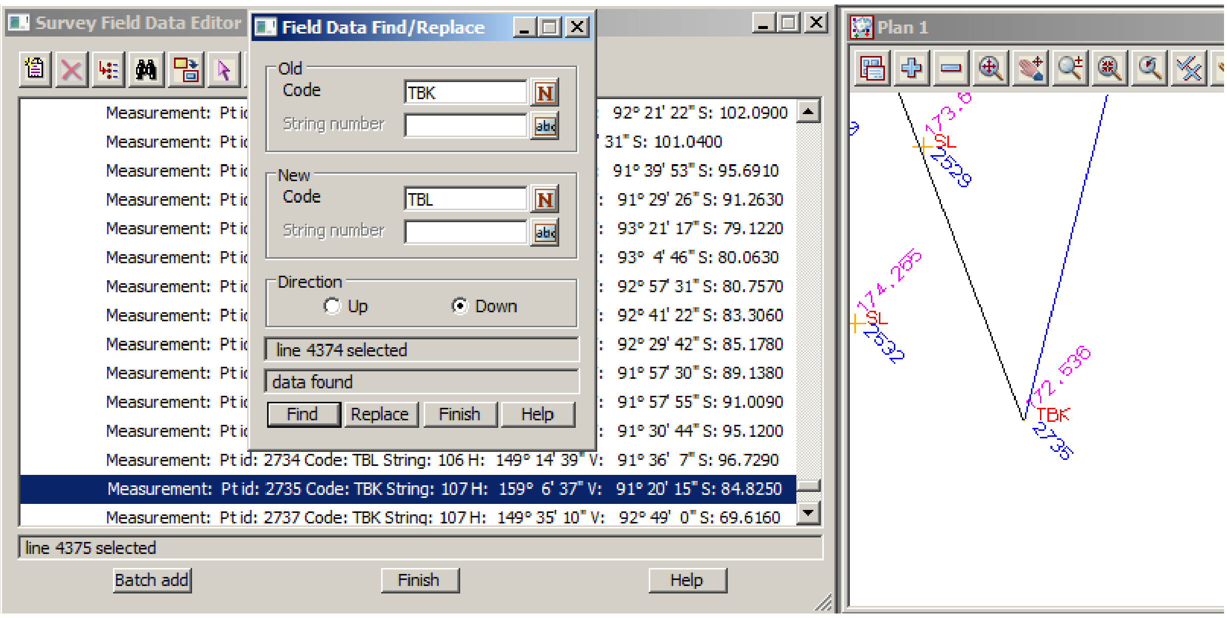
Old
Code: TBK

New
Code: TBL

Direction: ○ Up ● Down

TO (SLG) Grass Area
TO (SLT) Soil Type Change
TO (TBD) Bank Top Ridge
TO (TBL) Bank Top Left
TO (TBR) Bank Top Right
TO (WL) Water Edge
TO (WLS) Swamp Edge
TR (TL) Light
TR (TLB) Control Box
TR (TPI) Inspection Pit
TR (TPM) Parking Meter
TR (TSC) Speed Camera Fixed
TR (TSE) Sensor
TR (TSI) Sign
TR (TSIL) Sign Illuminated
VE (FO) Foliage Edge
VE (HE) Hedge
VE (PL) Plantation Edge
VE (PLL) Plantation Edge Left
VE (PLR) Plantation Edge Right
VE (TREE) Tree

```
surement:  Pt id: 1011 Code: FE String: 2 H:  121°
Measurement:  Pt id: 1012 Code: FE String: 2 H:  126°
Measurement:  Pt id: 1013 Code: FE String: 2 H:  131°
Measurement:  Pt id: 1014 Code: FE String: 2 H:  134°
Measurement:  Pt id: 1015 Code: CG String: 3 H:  146°
Measurement:  Pt id: 1016 Code: CG String: 3 H:  141°
```


Survey Field Data Editor
Field Data Find/Replace
Plan 1
Find
Replace
Finish
Help
Batch add
173.6
SL
2529
174.255
SL
2532
72.536
TBK
2735

Old
Code: TBK

New
Code: TBL

Direction: ○ Up ● Down

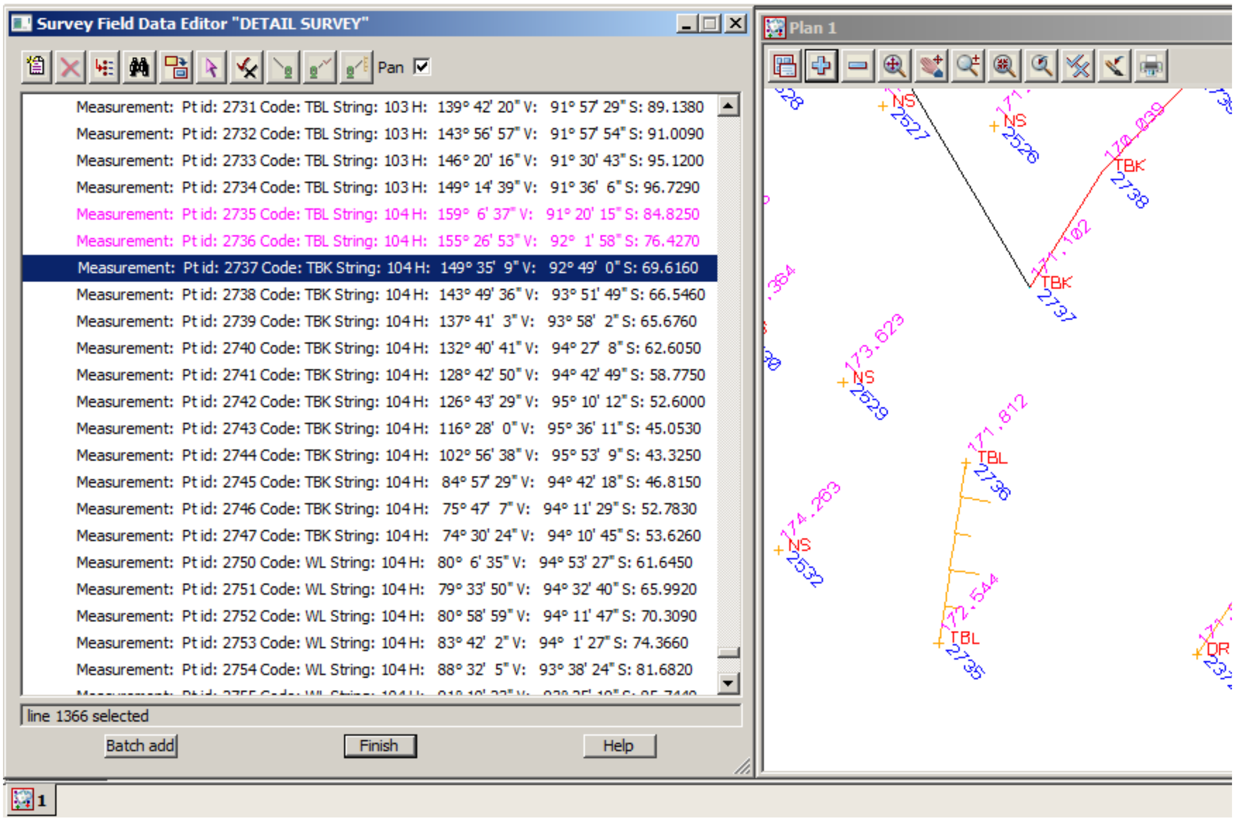
line 4374 selected

data found

```
Measurement:  Pt id: 2734 Code: TBL String: 106 H:  149° 14' 39" V:  91° 36'  7" S: 96.7290
Measurement:  Pt id: 2735 Code: TBK String: 107 H:  159°  6' 37" V:  91° 20' 15" S: 84.8250
Measurement:  Pt id: 2737 Code: TBK String: 107 H:  149° 35' 10" V:  92° 49'  0" S: 69.6160
```

line 4375 selected

The first occurrence of the incorrect code is found and highlighted. If you have the **Pan** check box ticked the view will move to that point. To replace the code select **Replace**. Select **Replace** once again. The rest of the string will be fixed with the next option



```
Measurement:  Pt id: 2731 Code: TBL String: 103 H:  139° 42' 20" V:   91° 57' 29" S: 89.1380
Measurement:  Pt id: 2732 Code: TBL String: 103 H:  143° 56' 57" V:   91° 57' 54" S: 91.0090
Measurement:  Pt id: 2733 Code: TBL String: 103 H:  146° 20' 16" V:   91° 30' 43" S: 95.1200
Measurement:  Pt id: 2734 Code: TBL String: 103 H:  149° 14' 39" V:   91° 36'  6" S: 96.7290
Measurement:  Pt id: 2735 Code: TBL String: 104 H:  159°  6' 37" V:  91° 20' 15" S: 84.8250
Measurement:  Pt id: 2736 Code: TBL String: 104 H:  155° 26' 53" V:   92°  1' 58" S: 76.4270
Measurement:  Pt id: 2737 Code: TBK String: 104 H:  149° 35'  9" V:  92° 49'  0" S: 69.6160
Measurement:  Pt id: 2738 Code: TBK String: 104 H:  143° 49' 36" V:   93° 51' 49" S: 66.5460
Measurement:  Pt id: 2739 Code: TBK String: 104 H:  137° 41'  3" V:  93° 58'  2" S: 65.6760
Measurement:  Pt id: 2740 Code: TBK String: 104 H:  132° 40' 41" V:   94° 27'  8" S: 62.6050
Measurement:  Pt id: 2741 Code: TBK String: 104 H:  128° 42' 50" V:   94° 42' 49" S: 58.7750
Measurement:  Pt id: 2742 Code: TBK String: 104 H:  126° 43' 29" V:   95° 10' 12" S: 52.6000
Measurement:  Pt id: 2743 Code: TBK String: 104 H:  116° 28'  0" V:  95° 36' 11" S: 45.0530
Measurement:  Pt id: 2744 Code: TBK String: 104 H:  102° 56' 38" V:   95° 53'  9" S: 43.3250
Measurement:  Pt id: 2745 Code: TBK String: 104 H:   84° 57' 29" V:  94° 42' 18" S: 46.8150
Measurement:  Pt id: 2746 Code: TBK String: 104 H:   75° 47'  7" V:  94° 11' 29" S: 52.7830
Measurement:  Pt id: 2747 Code: TBK String: 104 H:   74° 30' 24" V:  94° 10' 45" S: 53.6260
Measurement:  Pt id: 2750 Code: WL String: 104 H:   80°  6' 35" V:  94° 53' 27" S: 61.6450
Measurement:  Pt id: 2751 Code: WL String: 104 H:   79° 33' 50" V:  94° 32' 40" S: 65.9920
Measurement:  Pt id: 2752 Code: WL String: 104 H:   80° 58' 59" V:  94° 11' 47" S: 70.3090
Measurement:  Pt id: 2753 Code: WL String: 104 H:   83° 42'  2" V:  94°  1' 27" S: 74.3660
Measurement:  Pt id: 2754 Code: WL String: 104 H:   88° 32'  5" V:  93° 38' 24" S: 81.6820

line 1366 selected
```

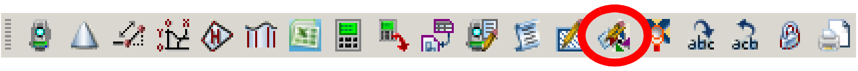
When the code is corrected the line in the field file is coloured magenta indicating that the reading has been changed.

We will look at the audit trail options in more detail later in this chapter

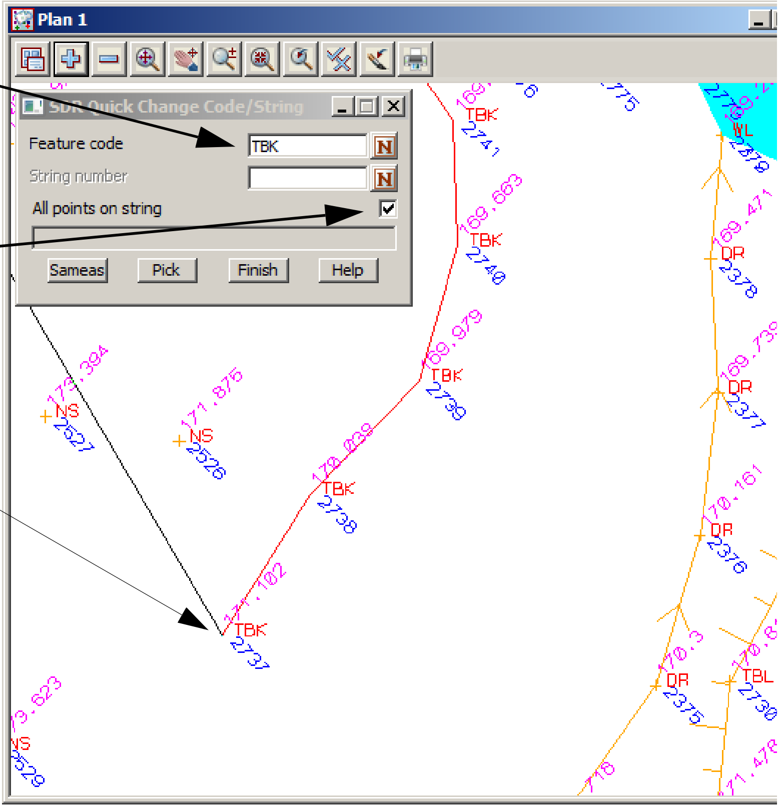
Changing codes

In addition to the Find/Replace option we can change a point’s code by simply locating the measurement in the field file editor and editing the point. We will go through the individual point edits later. In the mean time we will use a menu option to change the code from pick list or by matching another point with the required code

Select the option ***Survey=>Edit=>Coding=>Quick change*** or select **Change code** icon



Locate point 2737 (the next point on the TBK string)



Feature code TBK

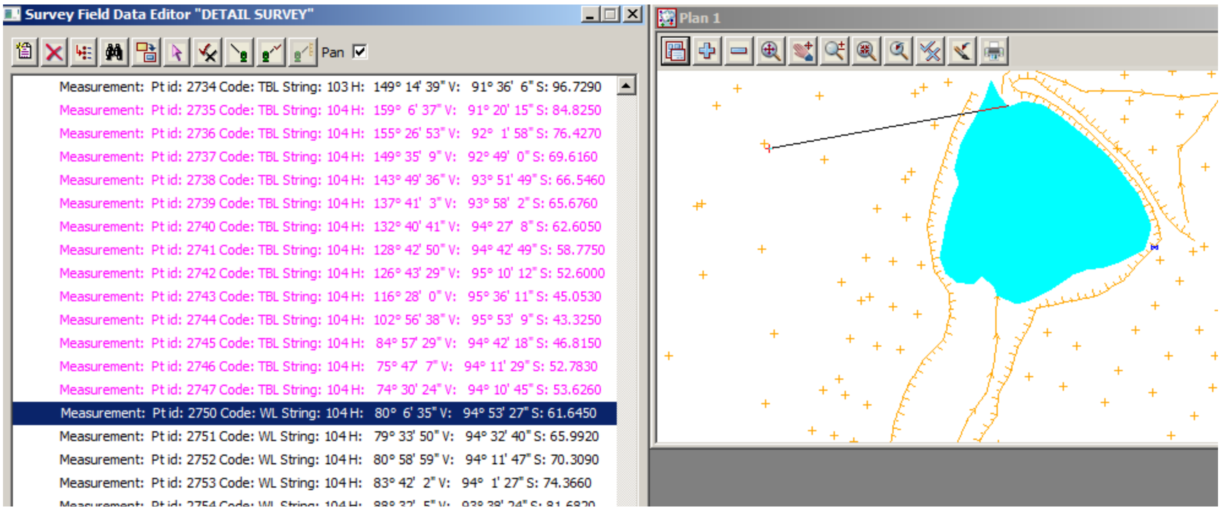
All points on string ☑

Select the correct code using the **Feature code** choice icon or by selecting **Sameas** button and selecting a point with the required code

Tick on **All points on string**

Select **Pick** button then select the point to change

The function is rerun and the point now displays the properties of the new code.The relevant line in the field file will also be highlighted magenta



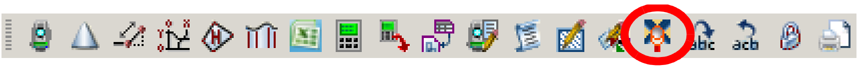
```
Measurement:  Pt id: 2734 Code: TBL String: 103 H:  149° 14' 39" V:   91° 36'  6" S: 96.7290
Measurement:  Pt id: 2735 Code: TBL String: 104 H:  159°  6' 37" V:   91° 20' 15" S: 84.8250
Measurement:  Pt id: 2736 Code: TBL String: 104 H:  155° 26' 53" V:   92°  1' 58" S: 76.4270
Measurement:  Pt id: 2737 Code: TBL String: 104 H:  149° 35'  9" V:   92° 49'  0" S: 69.6160
Measurement:  Pt id: 2738 Code: TBL String: 104 H:  143° 49' 36" V:   93° 51' 49" S: 66.5460
Measurement:  Pt id: 2739 Code: TBL String: 104 H:  137° 41'  3" V:   93° 58'  2" S: 65.6760
Measurement:  Pt id: 2740 Code: TBL String: 104 H:  132° 40' 41" V:   94° 27'  8" S: 62.6050
Measurement:  Pt id: 2741 Code: TBL String: 104 H:  128° 42' 50" V:   94° 42' 49" S: 58.7750
Measurement:  Pt id: 2742 Code: TBL String: 104 H:  126° 43' 29" V:   95° 10' 12" S: 52.6000
Measurement:  Pt id: 2743 Code: TBL String: 104 H:  116° 28'  0" V:   95° 36' 11" S: 45.0530
Measurement:  Pt id: 2744 Code: TBL String: 104 H:  102° 56' 38" V:   95° 53'  9" S: 43.3250
Measurement:  Pt id: 2745 Code: TBL String: 104 H:   84° 57' 29" V:   94° 42' 18" S: 46.8150
Measurement:  Pt id: 2746 Code: TBL String: 104 H:   75° 47'  7" V:   94° 11' 29" S: 52.7830
Measurement:  Pt id: 2747 Code: TBL String: 104 H:   74° 30' 24" V:   94° 10' 45" S: 53.6260
Measurement:  Pt id: 2750 Code: WL String: 104 H:   80°  6' 35" V:   94° 53' 27" S: 61.6450
Measurement:  Pt id: 2751 Code: WL String: 104 H:   79° 33' 50" V:   94° 32' 40" S: 65.9920
Measurement:  Pt id: 2752 Code: WL String: 104 H:   80° 58' 59" V:   94° 11' 47" S: 70.3090
Measurement:  Pt id: 2753 Code: WL String: 104 H:   83° 42'  2" V:   94°  1' 27" S: 74.3660
```

Target heights

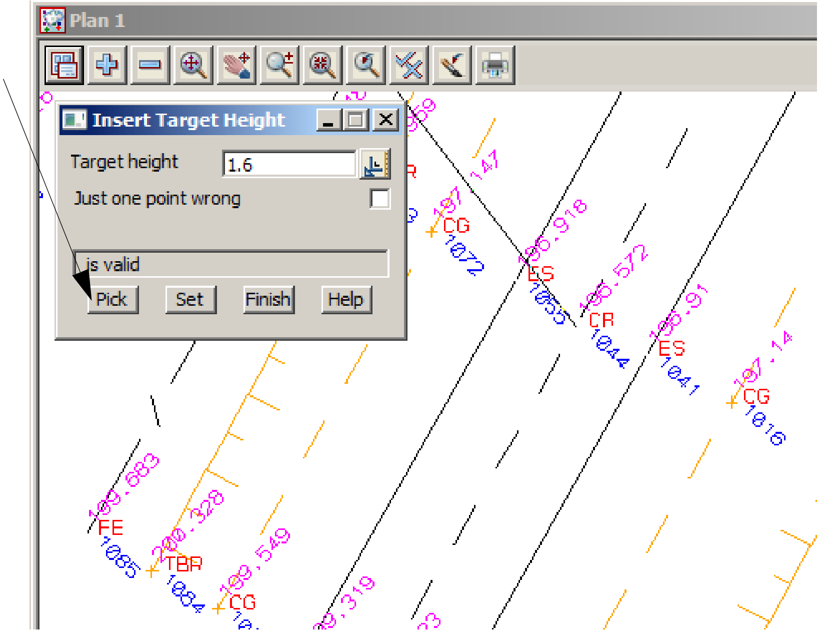
Another common error made during a detail survey is to incorrectly record the target height.

Instead of amending the level of the reduced point, a new target height can be entered into the field file reduction either manually or graphically

Select the option ***Survey=>Edit=>Target height=>Insert*** or select **Insert target height** icon



Locate point 1044 by using the **Pick** icon in the field file editor



Insert Target Height

Target height: 1.6

Just one point wrong ☐

is valid

Select **Pick** button then select the first point with the incorrect target

The target height is displayed at the bottom of the panel.

Type in the correct target height

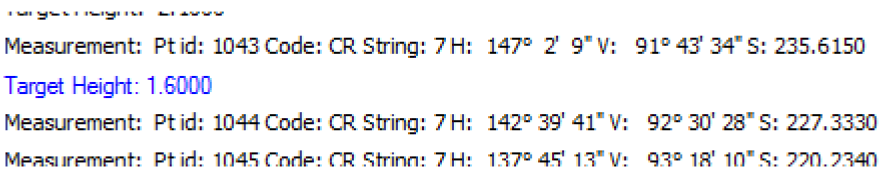
If only one point has an incorrect target height then tick the **Just one point wrong** check box prior to selecting **Set**

Otherwise select **Set**

The function is rerun and the point now has the correct height. All subsequent points will also be updated until the next height of target line occurs

In the field file a new line appears stating the target height.

The line will be highlighted blue

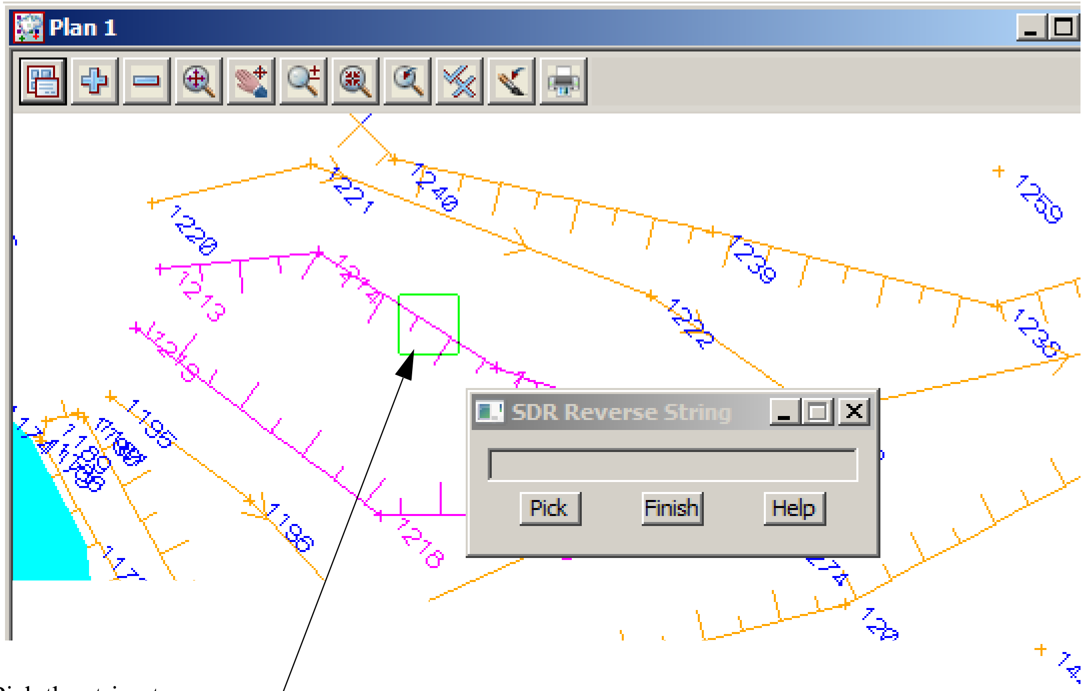


```
Measurement:  Pt id:  1043 Code:  CR String:  7 H:   147°  2'  9" V:   91° 43' 34" S: 235.6150
Target Height: 1.6000
Measurement:  Pt id:  1044 Code:  CR String:  7 H:   142° 39' 41" V:   92° 30' 28" S: 227.3330
Measurement:  Pt id:  1045 Code:  CR String:  7 H:   137° 45' 13" V:   93° 18' 10" S: 220.2340
```

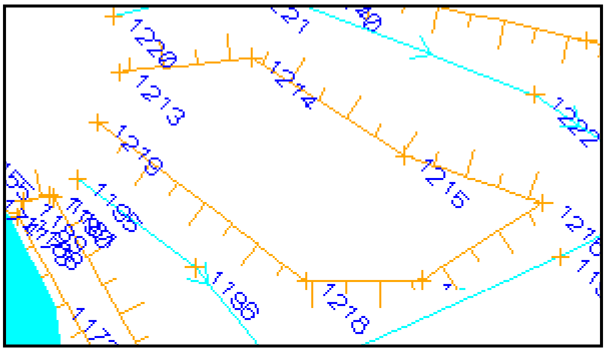
Reversing strings

If a string is surveyed in the wrong direction it can be reversed using the following option.

Select the option ***Survey=>Edit=>Stringing=>Reverse***

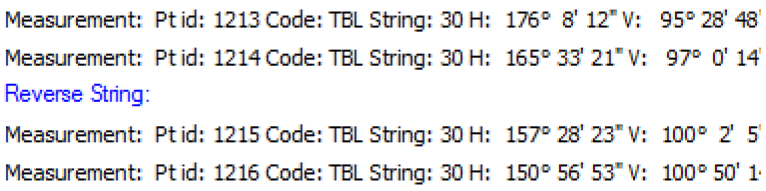

Plan 1
SDR Reverse String
Pick
Finish
Help
1220
1221
1240
1259
1213
1214
1239
1222
1235
1219
1195
1196
1218

Pick the string to reverse


1220
1213
1214
1222
1219
1195
1215
1196
1218

The function is rerun and the string is appended to the selected point.

A Reverse string command will be inserted at the measurement line and this will be highlighted in blue



```
Measurement:  Pt id:  1213 Code: TBL String: 30 H:   176°  8' 12" V:    95° 28' 48'
Measurement:  Pt id:  1214 Code: TBL String: 30 H:   165° 33' 21" V:    97°  0' 14'
Reverse String:
Measurement:  Pt id:  1215 Code: TBL String: 30 H:   157° 28' 23" V:   100°  2'  5'
Measurement:  Pt id:  1216 Code: TBL String: 30 H:   150° 56' 53" V:   100° 50' 1
```

Re-order string

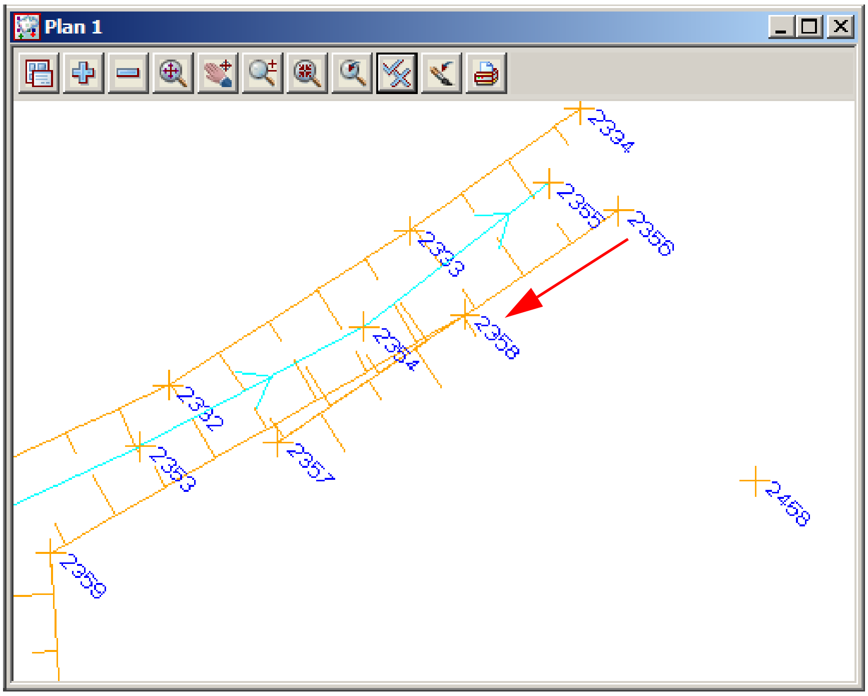
If a string has been surveyed incorrectly the string can be re-ordered using a number of options including **Order by points**

Zoom in to point 2357

In the example here the point 2357 has been surveyed in the wrong order. Rather than stopping the string to take a single reading at point 2358 we simply string to point 2358 and then 2359 and so on.

To re-order the string by points use the option ***Survey=>Edit=>Order=>by points***

or **Order string** icon


Plan 1
2334
2355
2356
2333
2358
2354
2332
2353
2357
2458
2359

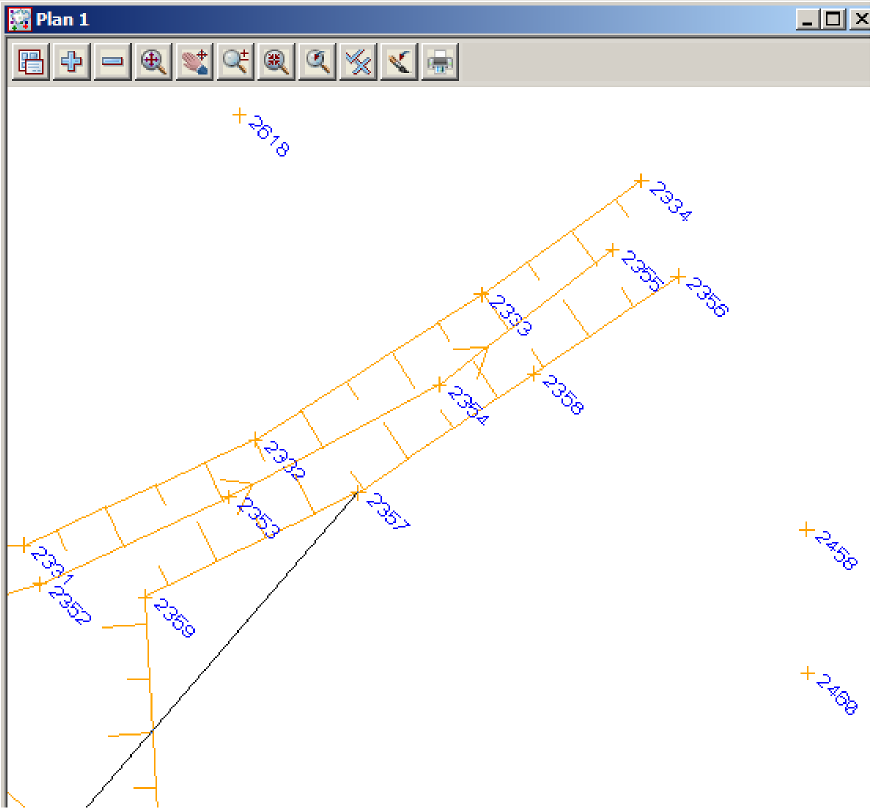
Select point 2356. Then pick point 2358. At this point the string order is correct when reprocessed.

If the string order is done incorrectly the original order can be reinstated using the option

Survey=>Edit=>Order=>Remove

or **Remove order** icon

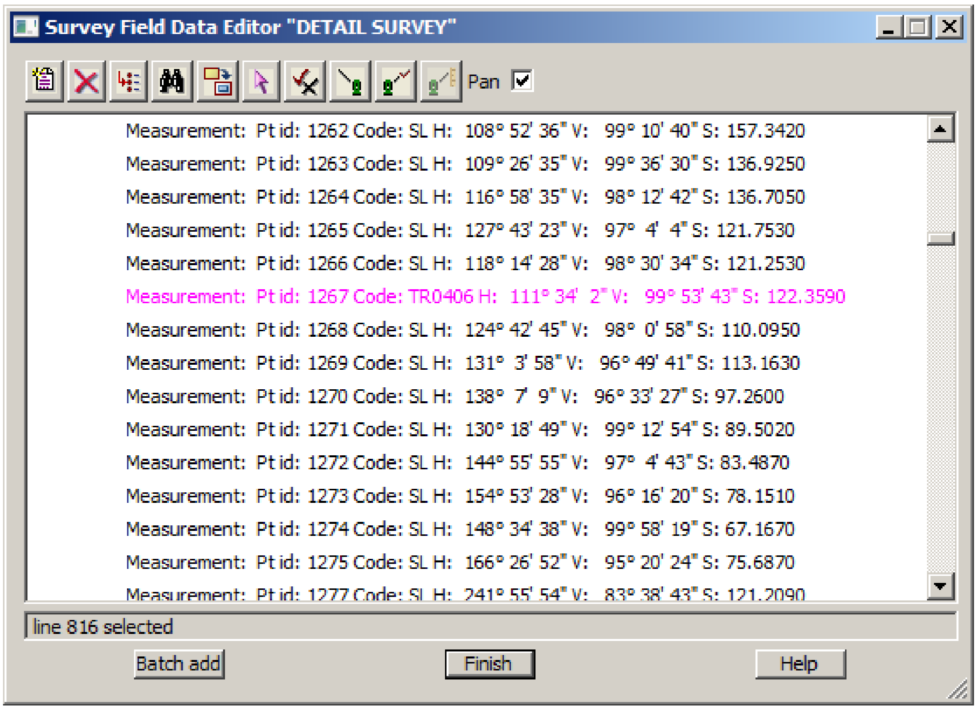
Pick on the string to restore the order and retry the ordering


Plan 1
2618
2334
2355
2356
2333
2358
2354
2332
2353
2357
2458
2331
2352
2359
2468

9.6 Direct Editing of the Field File

Although the previous options were graphical, each change has been recorded in the field file reduction.

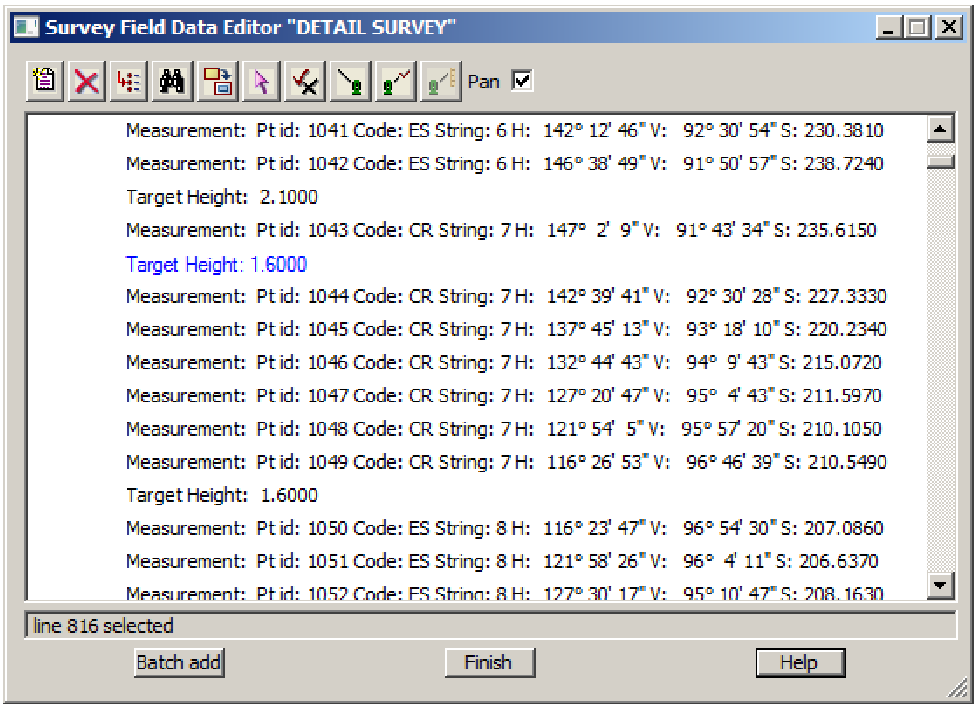
Data in the field file that has been changed in any way is coloured magenta.



```
Measurement:  Pt id:  1262 Code: SL H:   108° 52' 36" V:   99° 10' 40" S: 157.3420
Measurement:  Pt id:  1263 Code: SL H:   109° 26' 35" V:   99° 36' 30" S: 136.9250
Measurement:  Pt id:  1264 Code: SL H:   116° 58' 35" V:   98° 12' 42" S: 136.7050
Measurement:  Pt id:  1265 Code: SL H:   127° 43' 23" V:   97°  4'  4" S: 121.7530
Measurement:  Pt id:  1266 Code: SL H:   118° 14' 28" V:   98° 30' 34" S: 121.2530
Measurement:  Pt id:  1267 Code: TR0406 H:  111° 34'  2" V:   99° 53' 43" S: 122.3590
Measurement:  Pt id:  1268 Code: SL H:   124° 42' 45" V:   98°  0' 58" S: 110.0950
Measurement:  Pt id:  1269 Code: SL H:   131°  3' 58" V:  96° 49' 41" S: 113.1630
Measurement:  Pt id:  1270 Code: SL H:   138°  7'  9" V:  96° 33' 27" S: 97.2600
Measurement:  Pt id:  1271 Code: SL H:   130° 18' 49" V:   99° 12' 54" S: 89.5020
Measurement:  Pt id:  1272 Code: SL H:   144° 55' 55" V:   97°  4' 43" S: 83.4870
Measurement:  Pt id:  1273 Code: SL H:   154° 53' 28" V:   96° 16' 20" S: 78.1510
Measurement:  Pt id:  1274 Code: SL H:   148° 34' 38" V:   99° 58' 19" S: 67.1670
Measurement:  Pt id:  1275 Code: SL H:   166° 26' 52" V:   95° 20' 24" S: 75.6870
Measurement:  Pt id:  1277 Code: SL H:   241° 55' 54" V:   83° 38' 43" S: 121.2090
line 816 selected
```

Data which has been entered directly into the field file or added via a command such as the *Target Height* option is coloured blue

This colour coding gives an audit trail of any field file editing

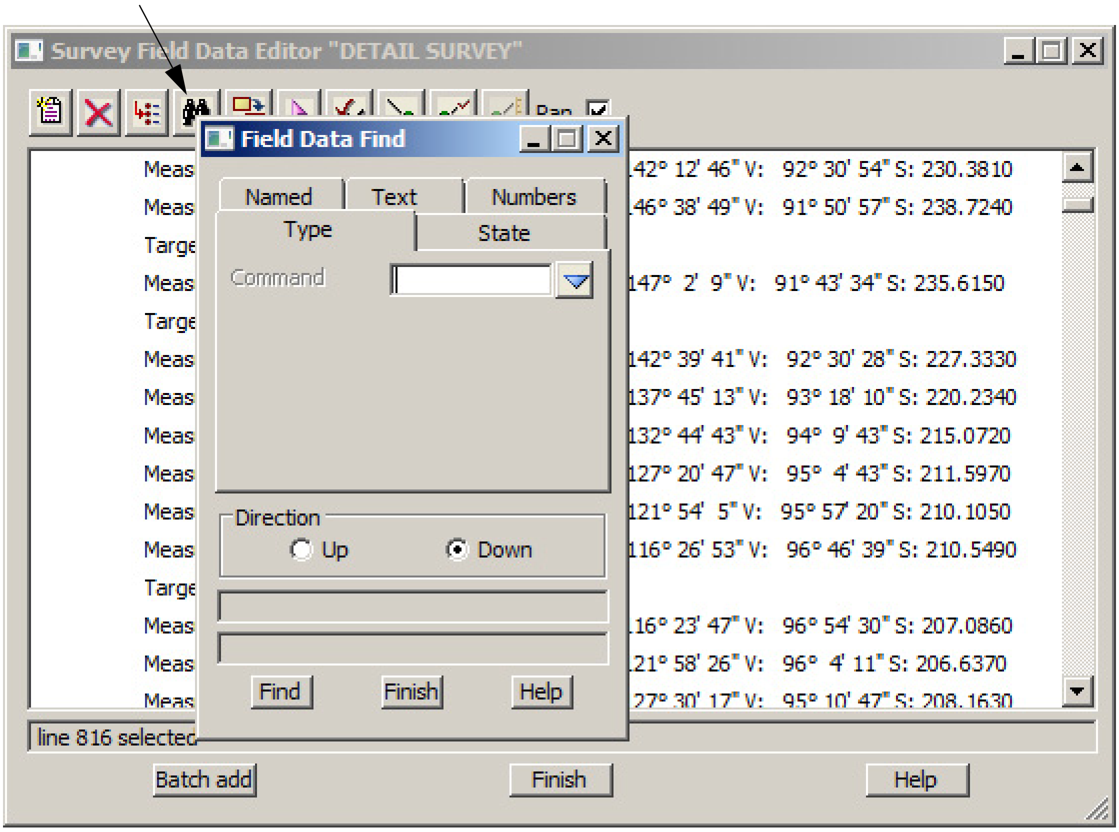


```
Measurement:  Pt id:  1041 Code: ES String: 6 H:  142° 12' 46" V:   92° 30' 54" S: 230.3810
Measurement:  Pt id:  1042 Code: ES String: 6 H:  146° 38' 49" V:   91° 50' 57" S: 238.7240
Target Height:  2.1000
Measurement:  Pt id:  1043 Code: CR String: 7 H:  147°  2'  9" V:   91° 43' 34" S: 235.6150
Target Height: 1.6000
Measurement:  Pt id:  1044 Code: CR String: 7 H:  142° 39' 41" V:   92° 30' 28" S: 227.3330
Measurement:  Pt id:  1045 Code: CR String: 7 H:  137° 45' 13" V:   93° 18' 10" S: 220.2340
Measurement:  Pt id:  1046 Code: CR String: 7 H:  132° 44' 43" V:   94°  9' 43" S: 215.0720
Measurement:  Pt id:  1047 Code: CR String: 7 H:  127° 20' 47" V:   95°  4' 43" S: 211.5970
Measurement:  Pt id:  1048 Code: CR String: 7 H:  121° 54'  5" V:   95° 57' 20" S: 210.1050
Measurement:  Pt id:  1049 Code: CR String: 7 H:  116° 26' 53" V:   96° 46' 39" S: 210.5490
Target Height:  1.6000
Measurement:  Pt id:  1050 Code: ES String: 8 H:  116° 23' 47" V:   96° 54' 30" S: 207.0860
Measurement:  Pt id:  1051 Code: ES String: 8 H:  121° 58' 26" V:   96°  4' 11" S: 206.6370
Measurement:  Pt id:  1052 Code: ES String: 8 H:  127° 30' 17" V:   95° 10' 47" S: 208.1630
line 816 selected
```

9.6.1 To Find data in the Field File

The find option gives the user a number of methods to find data in the field file

Select the *Find* icon


Survey Field Data Editor "DETAIL SURVEY"
Pan
Field Data Find
Named
Text
Numbers
Type
State
Command
Direction
Find
Finish
Help
Batch add
Finish
Help

```
Meas    42° 12' 46" V:  92° 30' 54" S: 230.3810
Meas    46° 38' 49" V:  91° 50' 57" S: 238.7240
Targe
Meas   147°  2'  9" V:  91° 43' 34" S: 235.6150
Targe
Meas   142° 39' 41" V:  92° 30' 28" S: 227.3330
Meas   137° 45' 13" V:  93° 18' 10" S: 220.2340
Meas   132° 44' 43" V:  94°  9' 43" S: 215.0720
Meas   127° 20' 47" V:  95°  4' 43" S: 211.5970
Meas   121° 54'  5" V:  95° 57' 20" S: 210.1050
Meas   116° 26' 53" V:  96° 46' 39" S: 210.5490
Targe
Meas    16° 23' 47" V:  96° 54' 30" S: 207.0860
Meas    21° 58' 26" V:  96°  4' 11" S: 206.6370
Meas    27° 30' 17" V:  95° 10' 47" S: 208.1630
line 816 selected
```

Direction: ○ Up ● Down

NOTE: You have to clear the current Find values before commencing a new search.

Named

A search can be performed on data in the field file using filters **Code, String number, Named point, Point number or attribute.**

To search for point number 2375

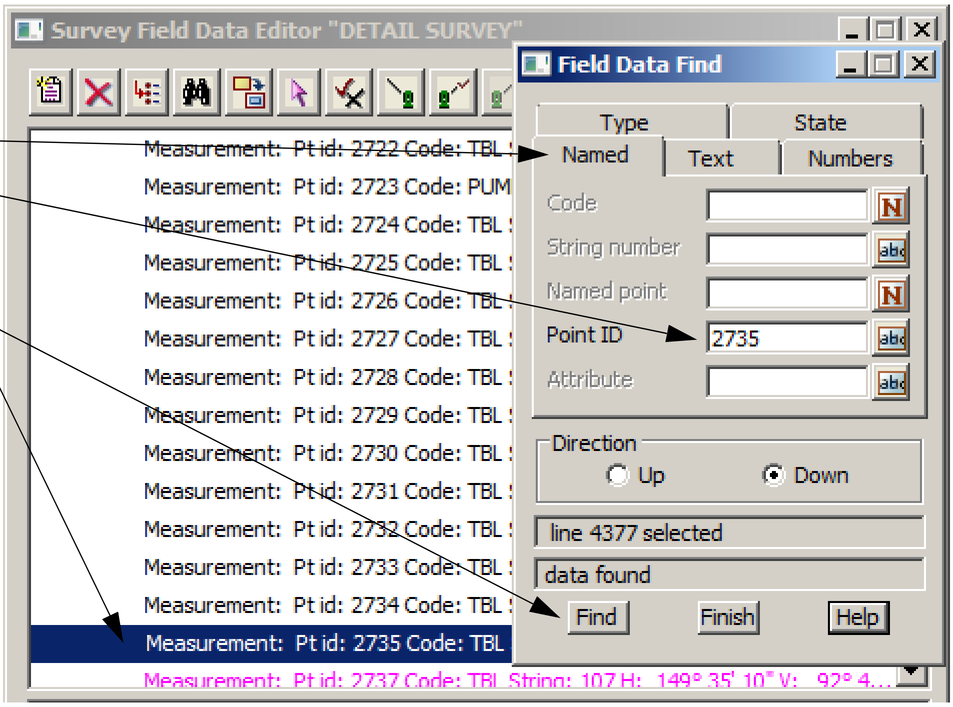
Select **Named** tab

Type in point number **2735**

Select **Find**

The line in highlighted

This example is generally not used as the user can locate a point by simply clicking on the **Find by Pick** icon at the top of the panel and typing in the point number


Survey Field Data Editor "DETAIL SURVEY"
Field Data Find
Type
State
Named
Text
Numbers
Code
String number
Named point
Point ID
Attribute
Direction
Up
Down
Find
Finish
Help

```
Measurement:  Pt id: 2722 Code: TBL :
Measurement:  Pt id: 2723 Code: PUM
Measurement:  Pt id: 2724 Code: TBL :
Measurement:  Pt id: 2725 Code: TBL :
Measurement:  Pt id: 2726 Code: TBL :
Measurement:  Pt id: 2727 Code: TBL :
Measurement:  Pt id: 2728 Code: TBL :
Measurement:  Pt id: 2729 Code: TBL :
Measurement:  Pt id: 2730 Code: TBL :
Measurement:  Pt id: 2731 Code: TBL :
Measurement:  Pt id: 2732 Code: TBL :
Measurement:  Pt id: 2733 Code: TBL :
Measurement:  Pt id: 2734 Code: TBL :
Measurement:  Pt id: 2735 Code: TBL
Measurement:  Pt id: 2737 Code: TBL  String: 107 H:  149° 35' 10" V:  92° 4...
```

Point ID: 2735

Direction: ○ Up ● Down

line 4377 selected

data found

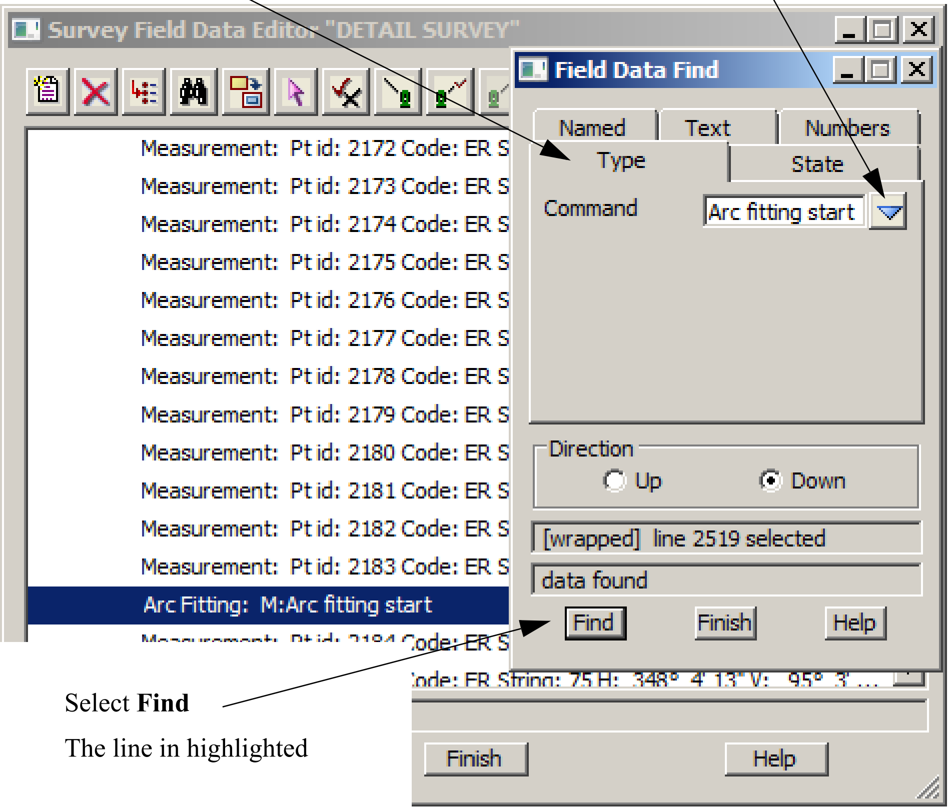
Type

A search can be performed on data in the field file given a particular command type.

To search for an *Arc Fitting Start* command

Select **Type** icon

Select Command choice **Arc fitting start**


Survey Field Data Editor "DETAIL SURVEY"
Field Data Find
Named
Text
Numbers
Type
State
Command
Direction
Up
Down
Find
Finish
Help
Finish
Help

```
Measurement:  Pt id: 2172 Code: ER S
Measurement:  Pt id: 2173 Code: ER S
Measurement:  Pt id: 2174 Code: ER S
Measurement:  Pt id: 2175 Code: ER S
Measurement:  Pt id: 2176 Code: ER S
Measurement:  Pt id: 2177 Code: ER S
Measurement:  Pt id: 2178 Code: ER S
Measurement:  Pt id: 2179 Code: ER S
Measurement:  Pt id: 2180 Code: ER S
Measurement:  Pt id: 2181 Code: ER S
Measurement:  Pt id: 2182 Code: ER S
Measurement:  Pt id: 2183 Code: ER S
Arc Fitting:  M:Arc fitting start
Measurement:  Pt id: 2184 Code: ER S
Code: ER String: 75 H:  348° 4' 13" V:  95° 3' ...
```

Command: Arc fitting start

Direction: ○ Up ● Down

[wrapped] line 2519 selected

data found

Select **Find**

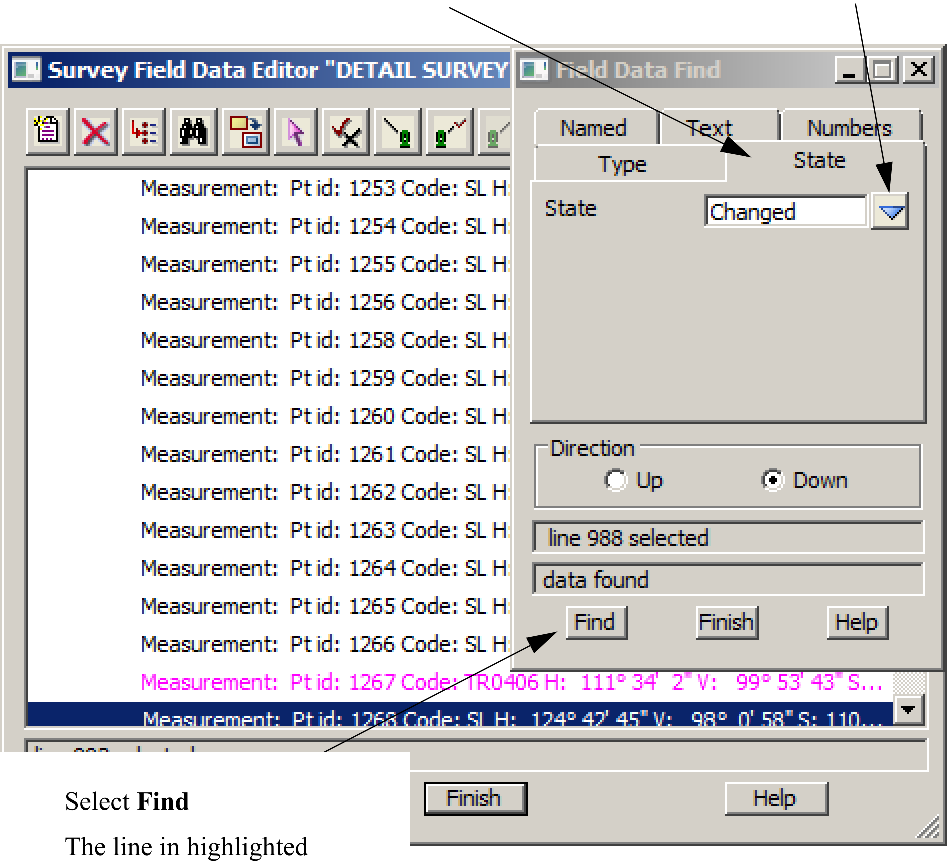
The line in highlighted

State

A search can be performed on data in the field file given a change of state including **added, changed, deleted or field**. To search for a **changed** state

Select **State** icon

Select Command choice **Changed**



Survey Field Data Editor "DETAIL SURVEY
Field Data Find
Named
Text
Numbers
Type
State
Direction
○ Up
● Down
Find
Finish
Help
Finish
Help

State: Changed

```
Measurement:  Pt id:  1253 Code: SL H
Measurement:  Pt id:  1254 Code: SL H
Measurement:  Pt id:  1255 Code: SL H
Measurement:  Pt id:  1256 Code: SL H
Measurement:  Pt id:  1258 Code: SL H
Measurement:  Pt id:  1259 Code: SL H
Measurement:  Pt id:  1260 Code: SL H
Measurement:  Pt id:  1261 Code: SL H
Measurement:  Pt id:  1262 Code: SL H
Measurement:  Pt id:  1263 Code: SL H
Measurement:  Pt id:  1264 Code: SL H
Measurement:  Pt id:  1265 Code: SL H
Measurement:  Pt id:  1266 Code: SL H
Measurement:  Pt id:  1267 Code: TR0406 H:  111° 34'  2" V:  99° 53' 43" S...
Measurement:  Pt id:  1268 Code: SL H:  124° 42' 45" V:  98° 0' 58" S: 110...
```

line 988 selected

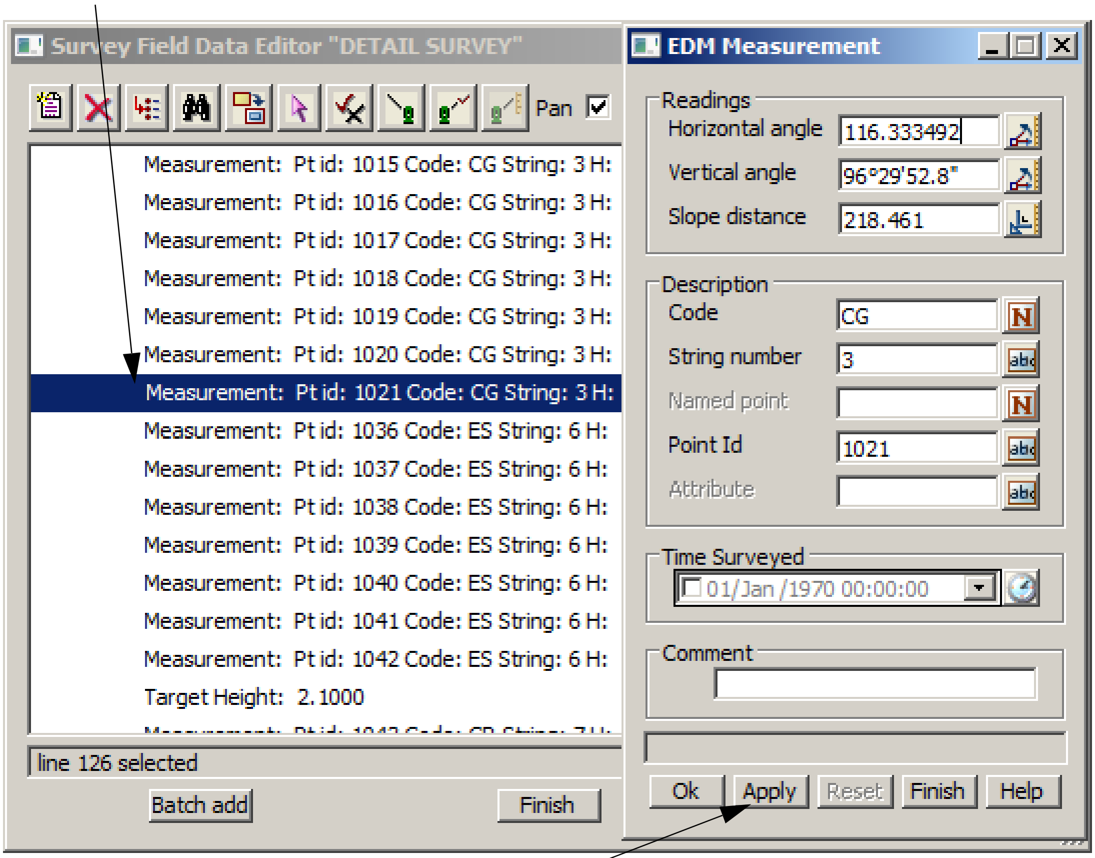
data found

Select **Find**

The line in highlighted

To Edit a Field File Line

Double click on the line in the Field File to edit.



Survey Field Data Editor "DETAIL SURVEY"

```
Measurement:  Pt id:  1015 Code: CG String: 3 H:
Measurement:  Pt id:  1016 Code: CG String: 3 H:
Measurement:  Pt id:  1017 Code: CG String: 3 H:
Measurement:  Pt id:  1018 Code: CG String: 3 H:
Measurement:  Pt id:  1019 Code: CG String: 3 H:
Measurement:  Pt id:  1020 Code: CG String: 3 H:
Measurement:  Pt id:  1021 Code: CG String: 3 H:
Measurement:  Pt id:  1036 Code: ES String: 6 H:
Measurement:  Pt id:  1037 Code: ES String: 6 H:
Measurement:  Pt id:  1038 Code: ES String: 6 H:
Measurement:  Pt id:  1039 Code: ES String: 6 H:
Measurement:  Pt id:  1040 Code: ES String: 6 H:
Measurement:  Pt id:  1041 Code: ES String: 6 H:
Measurement:  Pt id:  1042 Code: ES String: 6 H:
Target Height:  2.1000
```

line 126 selected

EDM Measurement

Readings
Horizontal angle: 116.333492
Vertical angle: 96°29'52.8"
Slope distance: 218.461

Description
Code: CG
String number: 3
Named point:
Point Id: 1021
Attribute:

Time Surveyed: ☐ 01/Jan/1970 00:00:00

Comment:

A panel appears with editable fields

Any data can be changed

To set the changes press **Apply**. The field file reduction will rerun updating the graphics and the field file line will appear in a magenta colour.

Select **Finish** to save the change or select **Reset** to cancel the change and then **Finish**.

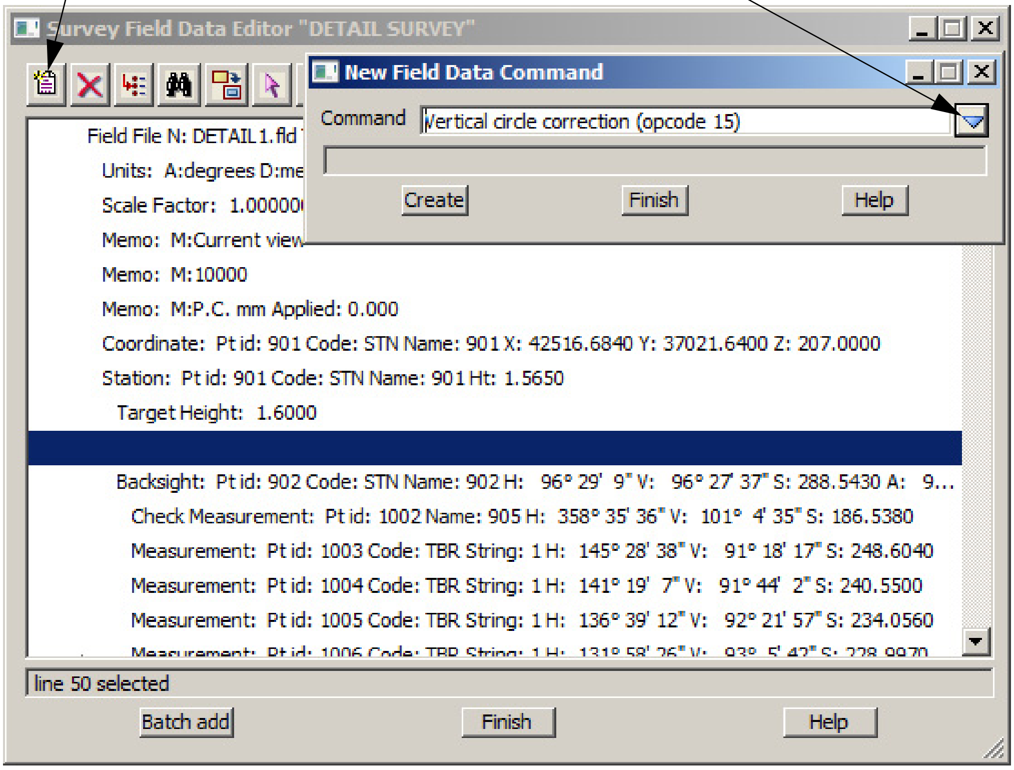
To Insert a command

A command can be placed in the field file. Often any graphical field file edit can be substituted with an Insert command.

To insert a **Vertical circle correction** put the cursor on line where entry is to be made

Press **Insert** icon

Select the Command choice and select the Command **Vertical circle correction**. Select **Create**



Survey Field Data Editor "DETAIL SURVEY"
New Field Data Command
Create
Finish
Help
Batch add
Finish
Help

Command: Vertical circle correction (opcode 15)

Field File N: DETAIL1.fld

Units: A:degrees D:me

Scale Factor: 1.00000

Memo: M:Current view

Memo: M:10000

Memo: M:P.C. mm Applied: 0.000

Coordinate: Pt id: 901 Code: STN Name: 901 X: 42516.6840 Y: 37021.6400 Z: 207.0000

Station: Pt id: 901 Code: STN Name: 901 Ht: 1.5650

Target Height: 1.6000

Backsight: Pt id: 902 Code: STN Name: 902 H: 96° 29' 9" V: 96° 27' 37" S: 288.5430 A: 9...

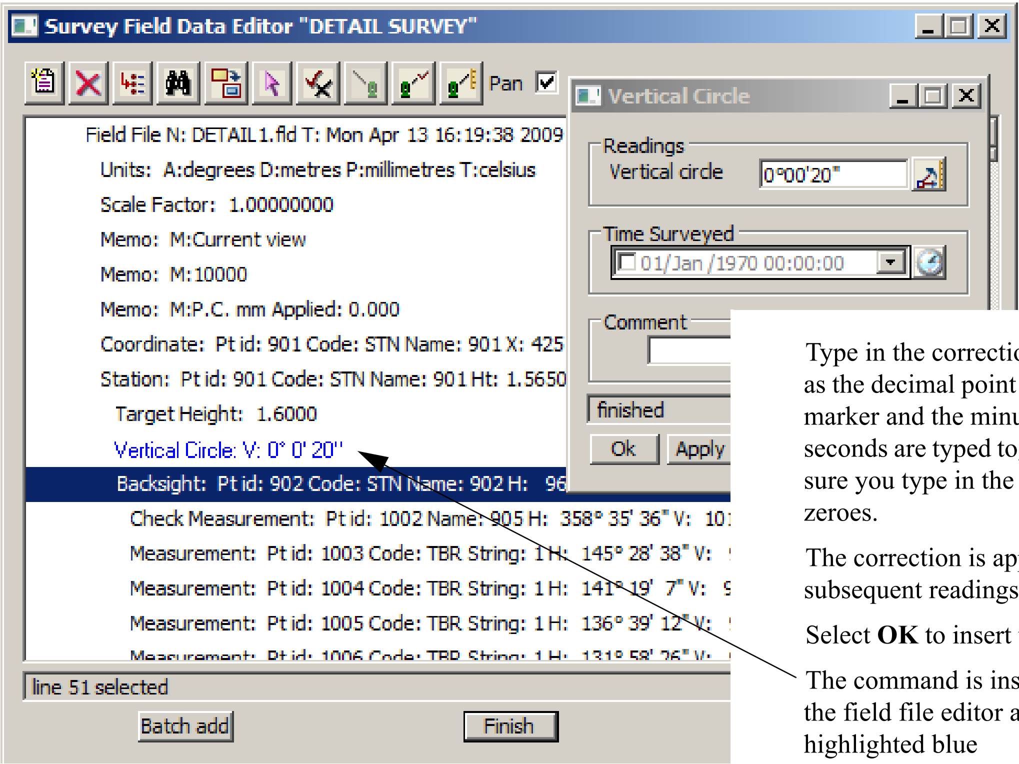
Check Measurement: Pt id: 1002 Name: 905 H: 358° 35' 36" V: 101° 4' 35" S: 186.5380

Measurement: Pt id: 1003 Code: TBR String: 1 H: 145° 28' 38" V: 91° 18' 17" S: 248.6040

Measurement: Pt id: 1004 Code: TBR String: 1 H: 141° 19' 7" V: 91° 44' 2" S: 240.5500

Measurement: Pt id: 1005 Code: TBR String: 1 H: 136° 39' 12" V: 92° 21' 57" S: 234.0560

line 50 selected



Survey Field Data Editor "DETAIL SURVEY"
Pan ☑
Vertical Circle
Readings
Time Surveyed
Comment
Ok
Apply
Batch add
Finish

Vertical circle: 0°00'20"

☐ 01/Jan /1970 00:00:00

finished

Field File N: DETAIL1.fld T: Mon Apr 13 16:19:38 2009

Units: A:degrees D:metres P:millimetres T:celsius

Scale Factor: 1.00000000

Memo: M:Current view

Memo: M:10000

Memo: M:P.C. mm Applied: 0.000

Coordinate: Pt id: 901 Code: STN Name: 901 X: 425

Station: Pt id: 901 Code: STN Name: 901 Ht: 1.5650

Target Height: 1.6000

Vertical Circle: V: 0° 0' 20"

Backsight: Pt id: 902 Code: STN Name: 902 H: 96

Check Measurement: Pt id: 1002 Name: 905 H: 358° 35' 36" V: 10

Measurement: Pt id: 1003 Code: TBR String: 1 H: 145° 28' 38" V:

Measurement: Pt id: 1004 Code: TBR String: 1 H: 141° 19' 7" V:

Measurement: Pt id: 1005 Code: TBR String: 1 H: 136° 39' 12" V:

line 51 selected

Type in the correction as **0.0020** as the decimal point is the degree marker and the minutes and seconds are typed together. Make sure you type in the trailing zeroes.

The correction is applied to all subsequent readings

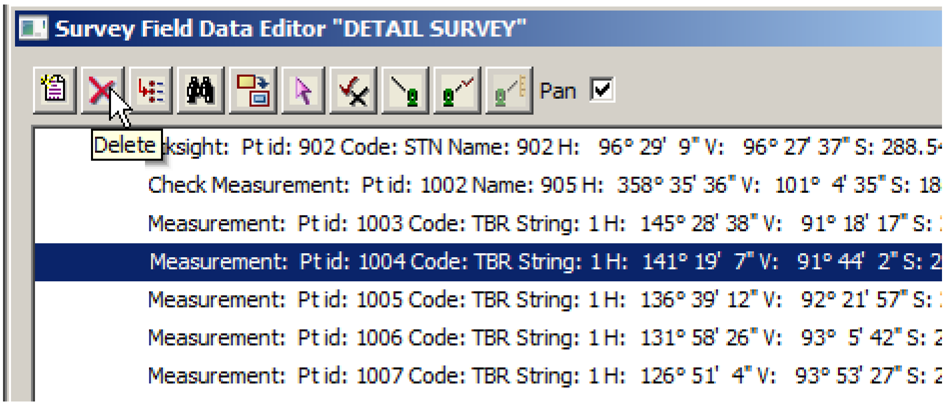
Select **OK** to insert the command

The command is inserted in to the field file editor and is highlighted blue

Deleting a Line

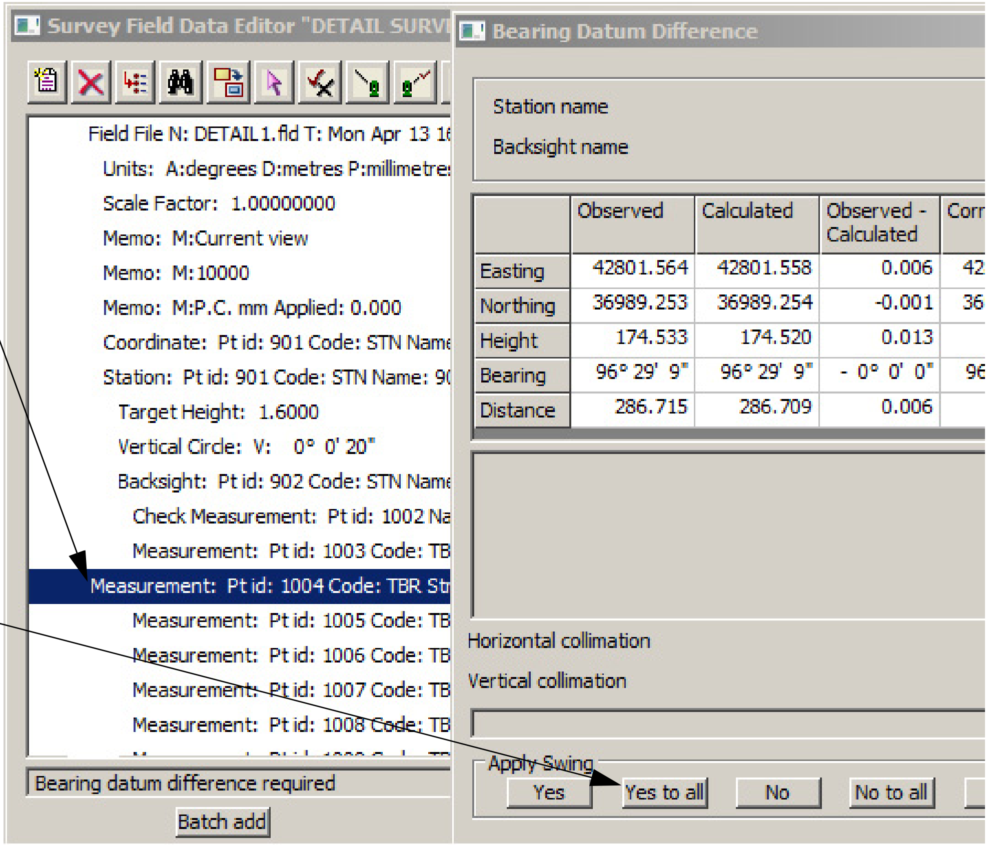
To delete a line in the field file put the cursor on the line to be deleted

Select the **Delete** icon



Survey Field Data Editor "DETAIL SURVEY"

ksight: Pt id: 902 Code: STN Name: 902 H: 96° 29' 9" V: 96° 27' 37" S: 288.5
Check Measurement: Pt id: 1002 Name: 905 H: 358° 35' 36" V: 101° 4' 35" S: 18
Measurement: Pt id: 1003 Code: TBR String: 1 H: 145° 28' 38" V: 91° 18' 17" S:
Measurement: Pt id: 1004 Code: TBR String: 1 H: 141° 19' 7" V: 91° 44' 2" S: 2
Measurement: Pt id: 1005 Code: TBR String: 1 H: 136° 39' 12" V: 92° 21' 57" S:
Measurement: Pt id: 1006 Code: TBR String: 1 H: 131° 58' 26" V: 93° 5' 42" S: 2
Measurement: Pt id: 1007 Code: TBR String: 1 H: 126° 51' 4" V: 93° 53' 27" S: 2



Survey Field Data Editor "DETAIL SURV

Field File N: DETAIL1.fld T: Mon Apr 13 1
Units: A:degrees D:metres P:millimetre
Scale Factor: 1.00000000
Memo: M:Current view
Memo: M:10000
Memo: M:P.C. mm Applied: 0.000
Coordinate: Pt id: 901 Code: STN Name
Station: Pt id: 901 Code: STN Name: 9
Target Height: 1.6000
Vertical Circle: V: 0° 0' 20"
Backsight: Pt id: 902 Code: STN Name
Check Measurement: Pt id: 1002 Na
Measurement: Pt id: 1003 Code: TB
Measurement: Pt id: 1004 Code: TBR St
Measurement: Pt id: 1005 Code: TB
Measurement: Pt id: 1006 Code: TB
Measurement: Pt id: 1007 Code: TB
Measurement: Pt id: 1008 Code: TB

Bearing datum difference required

Bearing Datum Difference

Station name
Backsight name

	Observed	Calculated	Observed - Calculated	Corr
Easting	42801.564	42801.558	0.006	42
Northing	36989.253	36989.254	-0.001	36
Height	174.533	174.520	0.013	
Bearing	96° 29' 9"	96° 29' 9"	- 0° 0' 0"	96
Distance	286.715	286.709	0.006	

Horizontal collimation
Vertical collimation

When a line of data is deleted a red cross is placed at the start of the line.

When the function is rerun, Backsight and Check measurement prompts will redisplay. Select **Yes to all** and **Continue all** to accept the default settings on the panels

To **undelete** a line simply highlight the deleted line and select **Delete** again

We can now finish editing the field file. Click on **[Finish]** to exit the editor

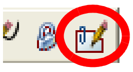
9.7 Printing the Report File

When the field file edits are complete print the Report file

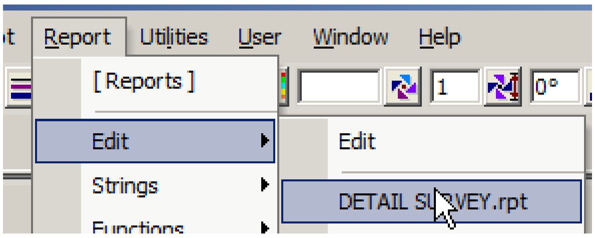
.

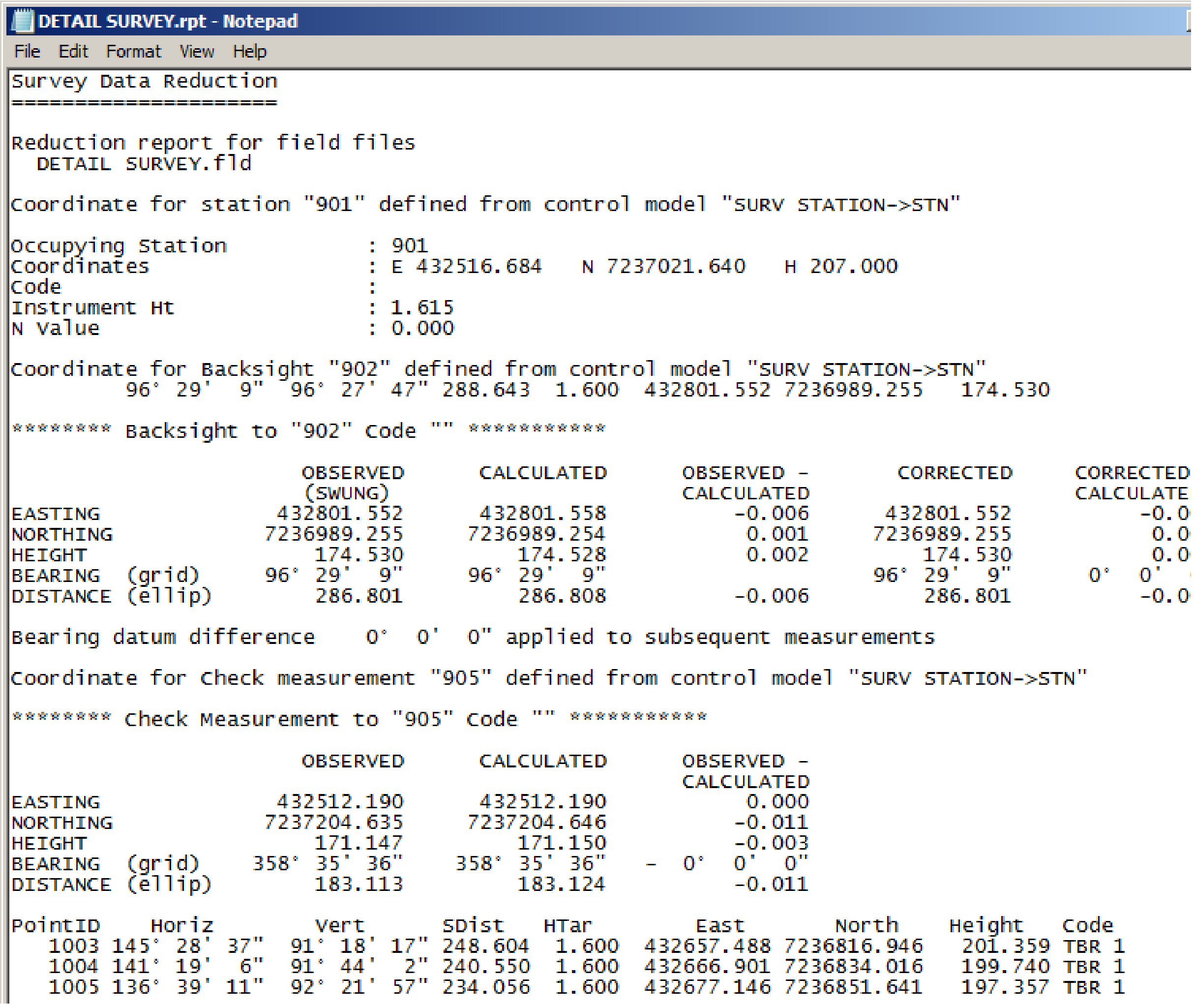
Select ***Report*** => ***Edit***

or **Edit a file *.rpt** icon



and select the relevant file





```
Survey Data Reduction
=====================

Reduction report for field files
  DETAIL SURVEY.fld

Coordinate for station "901" defined from control model "SURV STATION->STN"

Occupying Station            : 901
Coordinates                  : E 432516.684    N 7237021.640    H 207.000
Code                         :
Instrument Ht                : 1.615
N Value                      : 0.000

Coordinate for Backsight "902" defined from control model "SURV STATION->STN"
         96° 29'  9"  96° 27' 47" 288.643  1.600  432801.552 7236989.255   174.530

******** Backsight to "902" Code "" ***********

                       OBSERVED      CALCULATED      OBSERVED -       CORRECTED     CORRECTED
                       (SWUNG)                       CALCULATED                     CALCULATE
EASTING              432801.552      432801.558          -0.006        432801.552          -0.0
NORTHING            7236989.255     7236989.254           0.001       7236989.255           0.0
HEIGHT                  174.530         174.528           0.002           174.530           0.0
BEARING  (grid)     96° 29'  9"     96° 29'  9"                       96° 29'  9"     0°  0'  
DISTANCE (ellip)        286.801         286.808          -0.006           286.801          -0.0

Bearing datum difference    0°  0'  0" applied to subsequent measurements

Coordinate for Check measurement "905" defined from control model "SURV STATION->STN"

******** Check Measurement to "905" Code "" ***********

                       OBSERVED      CALCULATED      OBSERVED -
                                                     CALCULATED
EASTING              432512.190      432512.190           0.000
NORTHING            7237204.635     7237204.646          -0.011
HEIGHT                  171.147         171.150          -0.003
BEARING  (grid)    358° 35' 36"    358° 35' 36"   -  0°  0'  0"
DISTANCE (ellip)        183.113         183.124          -0.011

PointID     Horiz         Vert      SDist    HTar       East        North     Height   Code
   1003 145° 28' 37"  91° 18' 17" 248.604  1.600  432657.488 7236816.946   201.359 TBR 1
   1004 141° 19'  6"  91° 44'  2" 240.550  1.600  432666.901 7236834.016   199.740 TBR 1
   1005 136° 39' 11"  92° 21' 57" 234.056  1.600  432677.146 7236851.641   197.357 TBR 1
```

The report file is displayed in your default text editor and can be printed to keep a record of the survey reductions

9.7.1 Locking the Data Reduction Function

After all field file edits have been made it is important to ensure that the data reduction function can not be rerun.

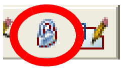
This is because if any non-field file operations are performed on the reduced data and then the reduction is rerun, the non-field file operations may be lost

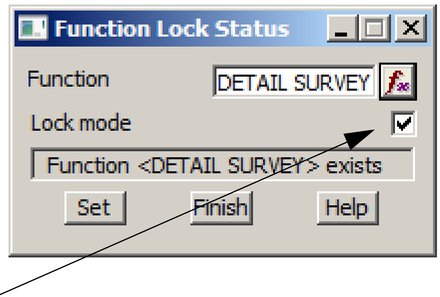
Once the function has been locked it can’t be rerun by mistake resulting in data integrity problems

To lock the Data reduction function

Select **Utilities=>Functions=>Lock**

or **Function lock status** icon





Function Lock Status
Set
Finish
Help

Function DETAIL SURVEY

Lock mode ☑

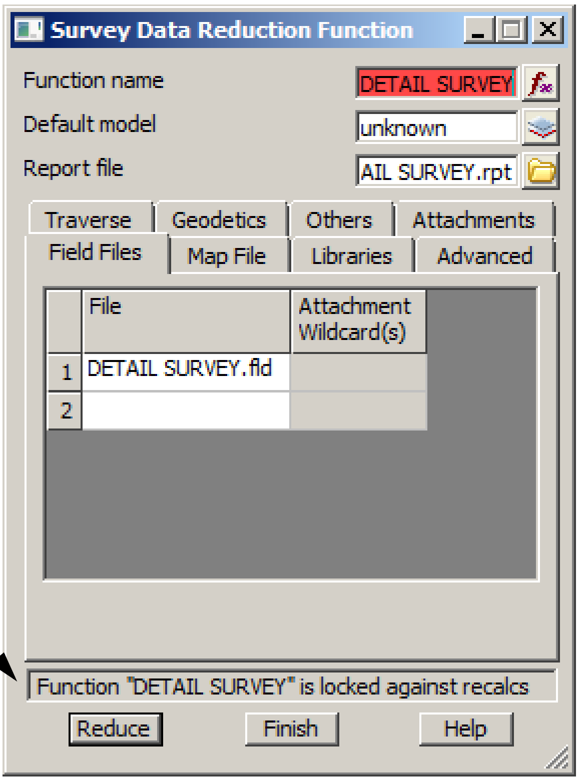
Function <DETAIL SURVEY> exists

Select the **Function** choice icon and select the function name **DETAIL SURVEY**

Tick the **Lock mode** check box

Select **Set** and **Finish**

If the function is rerun, the following error message occurs



Survey Data Reduction Function
Traverse
Geodetics
Others
Attachments
Field Files
Map File
Libraries
Advanced
Reduce
Finish
Help

Function name DETAIL SURVEY

Default model unknown

Report file AIL SURVEY.rpt

	File	Attachment Wildcard(s)
1	DETAIL SURVEY.fld	
2		

Function "DETAIL SURVEY" is locked against recalcs

9.8 Graphical Edits

We now edit the survey graphically to perform tasks either not available in the field file editor or in some case easier to do graphically.

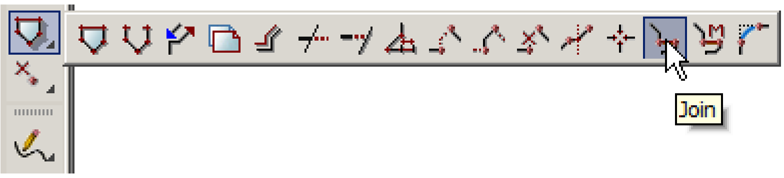
Most of the options used in the following examples are duplicated under the ***Strings*=>*Cad*** menu

9.8.1 Joining strings

Join

Select *Strings=>Strings Edit=>Join*

or cad option **Join**



Points can be joined in a number of ways. The first type of join will result in two strings of the same type being combined into one string. If the two strings are different, then the resulting string uses the properties of the first string selected

Zoom in to point number 1232

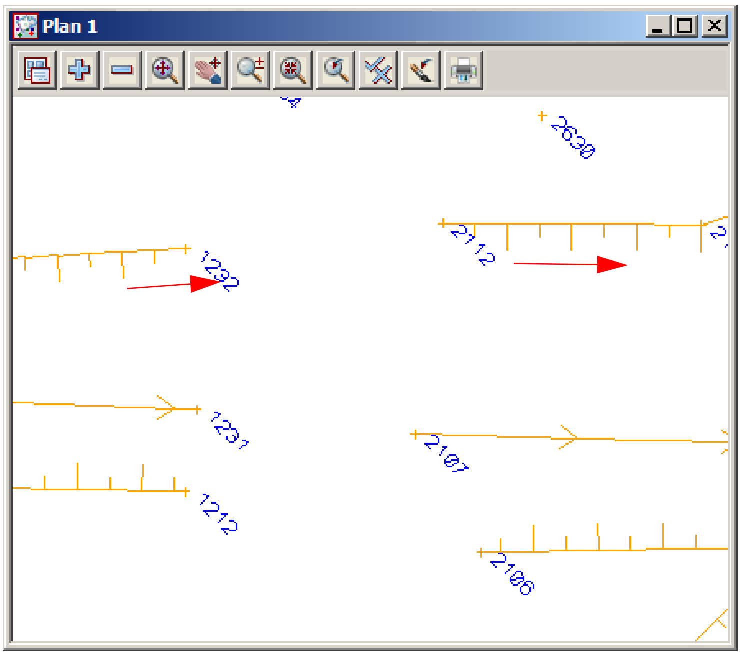
This string will be joined to the string starting at point 2112

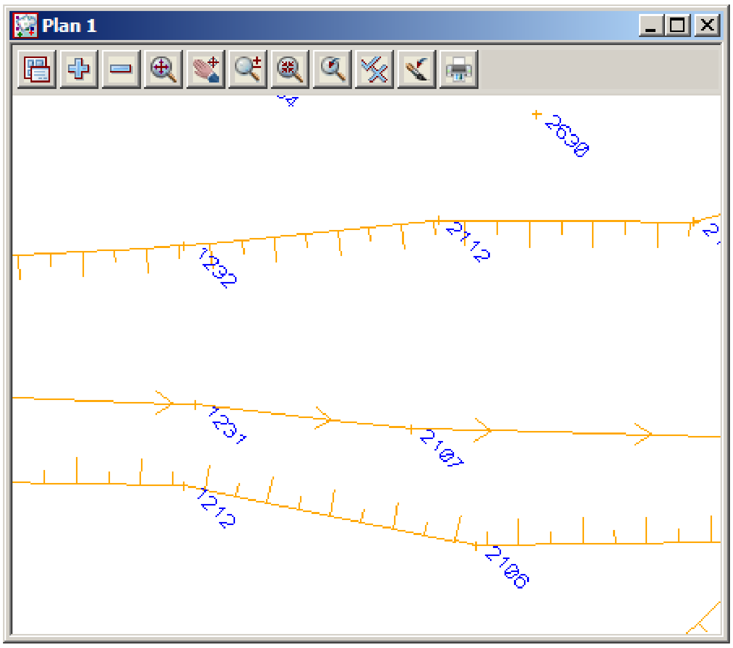
Hold down the left button and drag a short distance along the left string with direction ***towards*** point number 1232. Release the left button then select middle button to accept

Select the right string in the same way with direction ***away*** from point 2112 and accept

The strings are joined to make one string. In this case the string will require reversing which is explained later

Repeat for all of the other gaps in the survey where the two strings have the same properties and you are joining the ends (not joining from an end to a corner of a string)

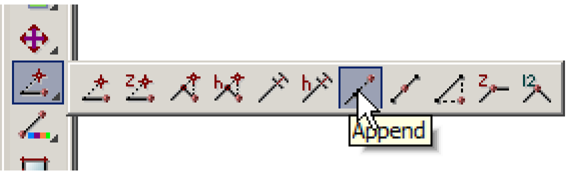




Append

Select *Strings=>Points Edit=>Append*

or cad option **Append**



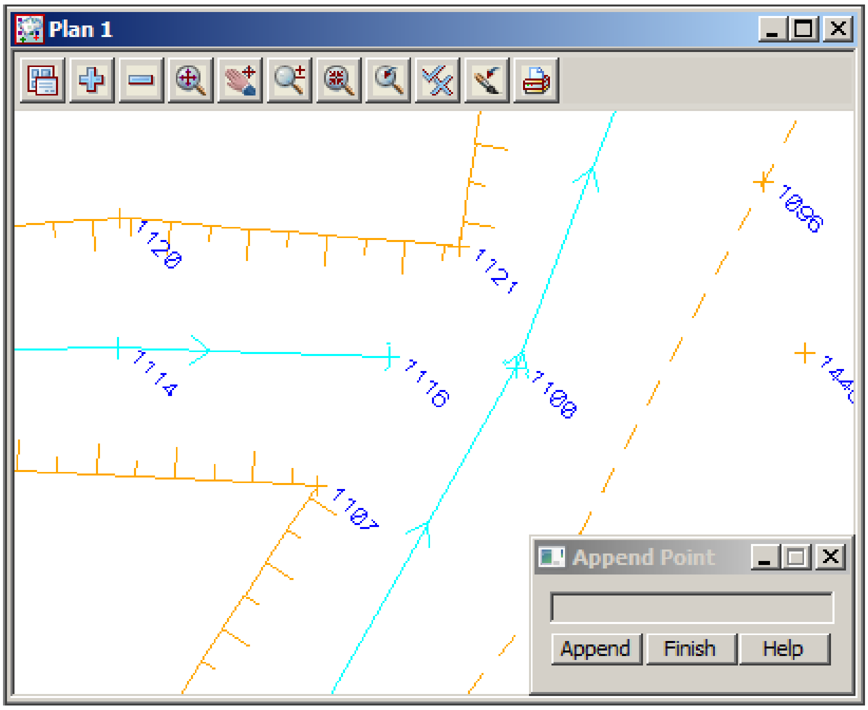
This option is used to append the end of a string on to another point on a string

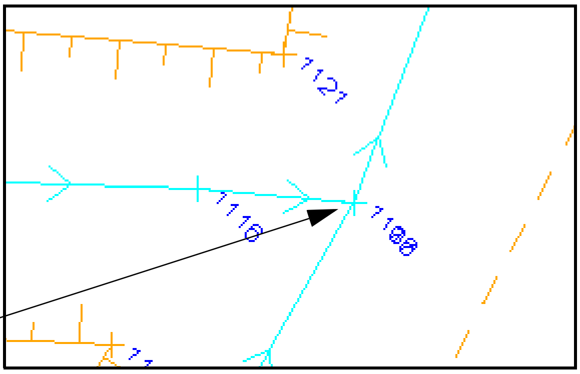
Zoom in to point number 1100

Select point 1116 and accept

Select point 1100 and accept

Press [Escape] to finish picking

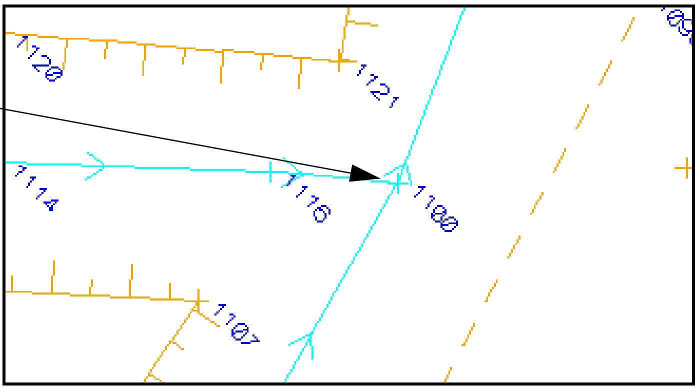

Plan 1
1120
1121
1096
1114
1116
1100
1144
1107
Append Point
Append
Finish
Help


1121
1116
1100

The first strings is appended to point 1100

If the point id’s are turned on the appended string will duplicate the last point id.

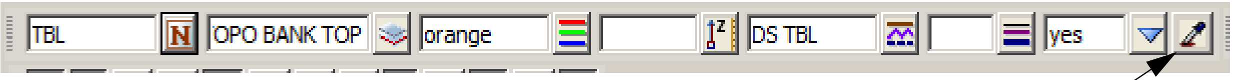
If you use the cad option no point id will appear on the appended point


1120
1121
1114
1116
1100
1107

Cad Create Line

A line string taking its default properties from the **Cad Controlbar** can be created. This will create a single line string independent of the two points selected.

Firstly select the properties for the new string by manually changing options in the **Cad Controlbar**

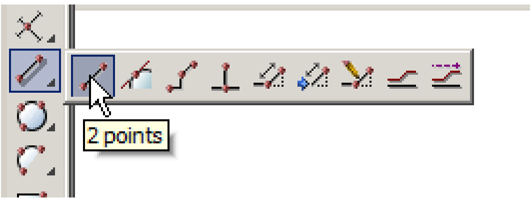

TBL
N
OPO BANK TOP
orange
DS TBL
yes

When editing a survey you should be using the **Name** icon to select the relevant code. Once the code is selected (in this case **TBL**) the rest of the cad control bar is filled in. The file names.4d is used to set up this process. It is very similar to a mapping file used to read in the survey initially

The other method of presetting the cad control car is to use the **Sameas** icon to pick a point on the string with the properties required.

Zoom in to point 1185

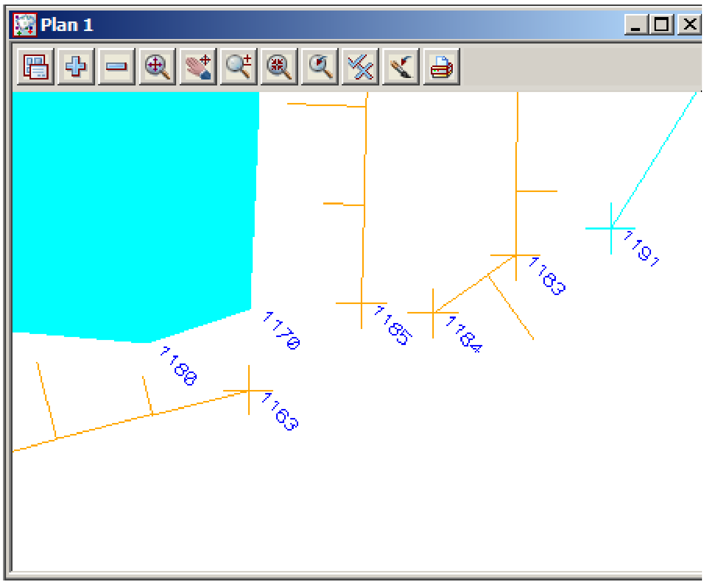
Select option ***Strings=>Cad=>Lines=>2 points*** or select **2 points** icon

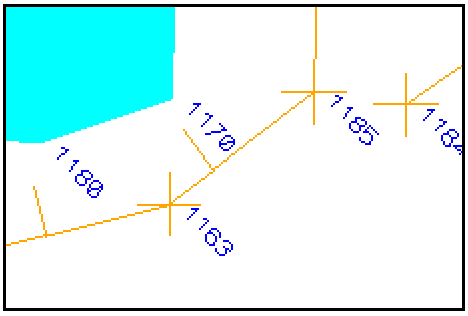


Select point1185 and accept

Select point 1163 and accept

A new string is created between the two points


Plan 1
1191
1183
1170
1185
1184
1188
1163


1170
1185
1184
1188
1163

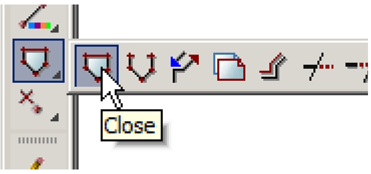
Close

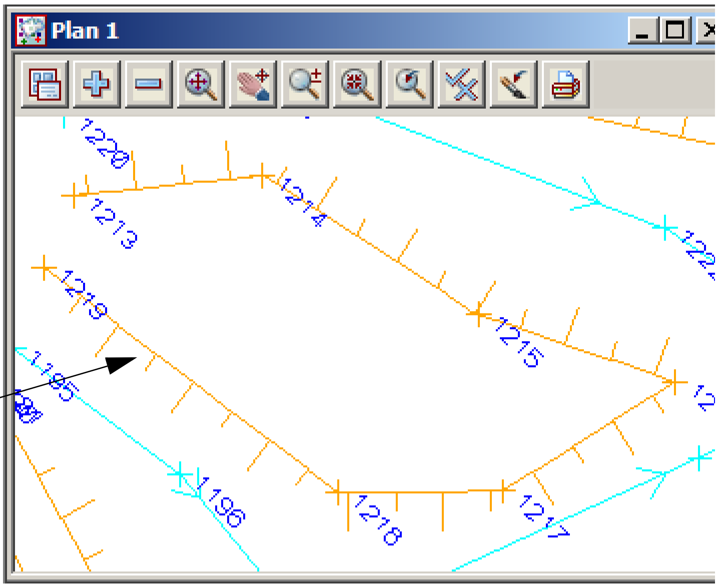
If a gap appears between the end and the start point of a string then we join these points together (or close the string) to form a polygon. This option is also available in the field file editor. It should be noted that as many field file edits as possible should be used instead of manual edits as there is no audit trail in manual edits

Zoom in to point 1213

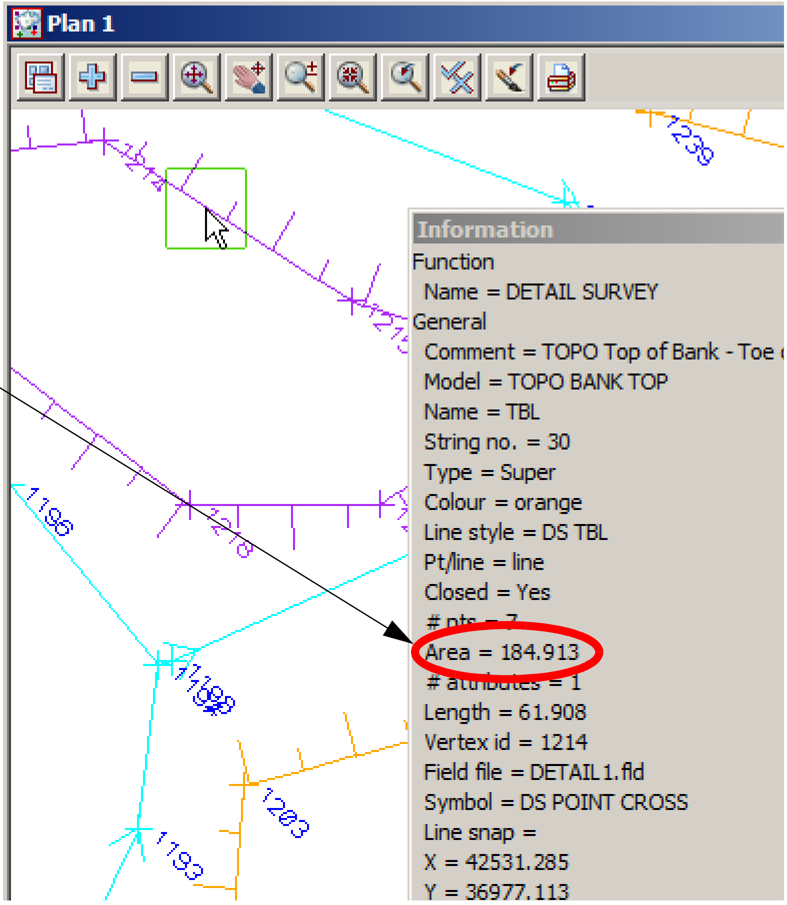
To close the string select option ***Strings=>Strings Edit=>Close***

or the **Close** icon




Plan 1
1220
1213
1214
1219
1195
1215
1196
1218
1217

Select any where along the string and accept.


Plan 1
1238
1214
1215
1196
1218
1199
1203
1193
Information

Function
Name = DETAIL SURVEY
General
Comment = TOPO Top of Bank - Toe
Model = TOPO BANK TOP
Name = TBL
String no. = 30
Type = Super
Colour = orange
Line style = DS TBL
Pt/line = line
Closed = Yes
# pts = 7
Area = 184.913
# attributes = 1
Length = 61.908
Vertex id = 1214
Field file = DETAIL1.fld
Symbol = DS POINT CROSS
Line snap =
X = 42531.285
Y = 36977.113

When inquiring on a closed string, the area is displayed in the information panel

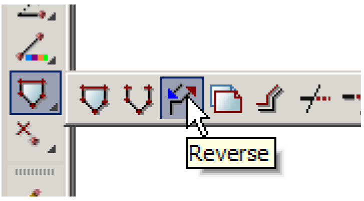
9.8.2 Reverse String

If strings are created with the linestyle shown on the wrong side then the string can be reversed.

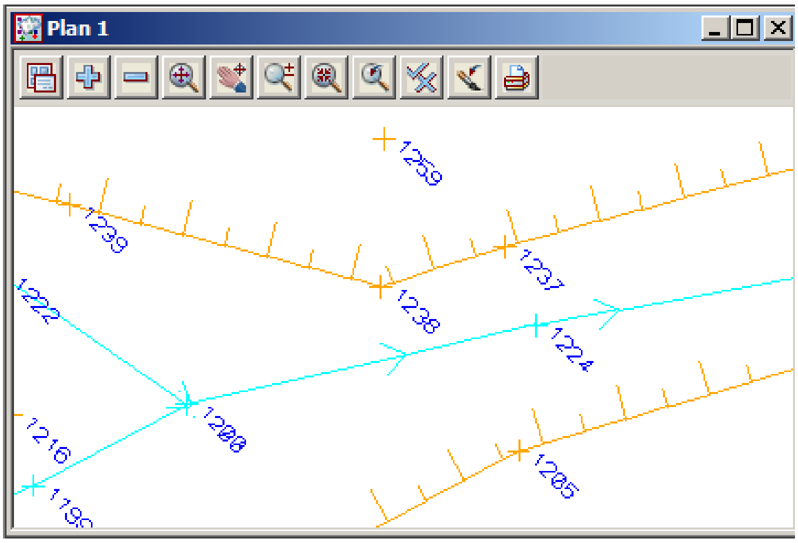
Zoom in to point 1238

Select option ***Strings=>String Edit=>Reverse***

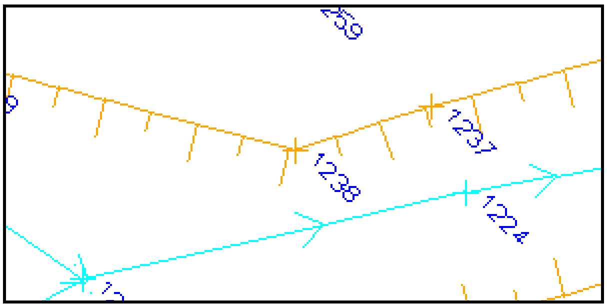
or **Reverse** icon



Select the string and accept


Plan 1
1259
1239
1222
1238
1237
1224
1208
1216
1205
1199

The string direction is reversed


1259
1237
1238
1224

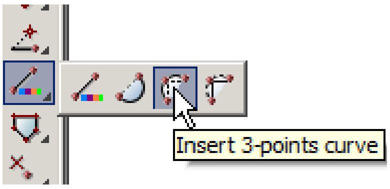
9.8.3 Add arc to curve

An arc can be placed in to a string by selecting the middle point of the curve.

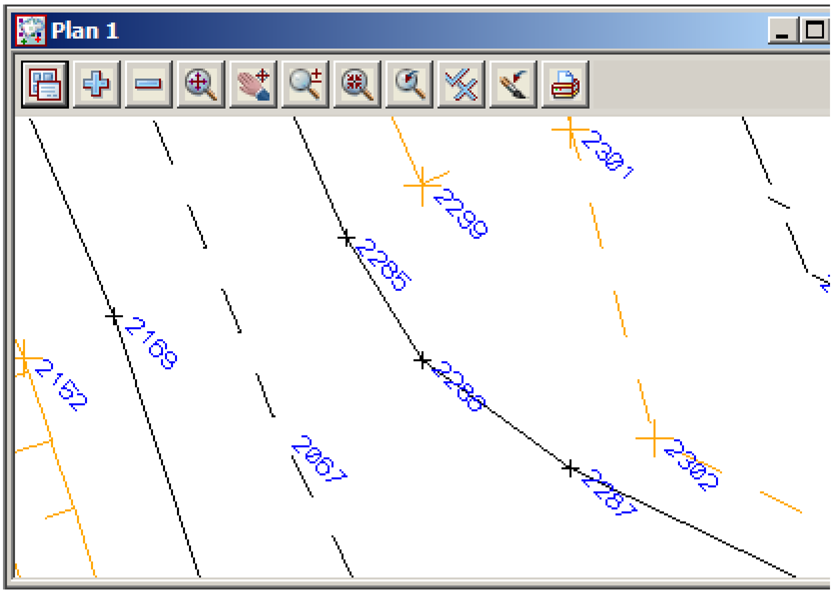
Zoom in to point number 2286

Select option ***Strings=>Points Edit=>Add 3 Pt curve***

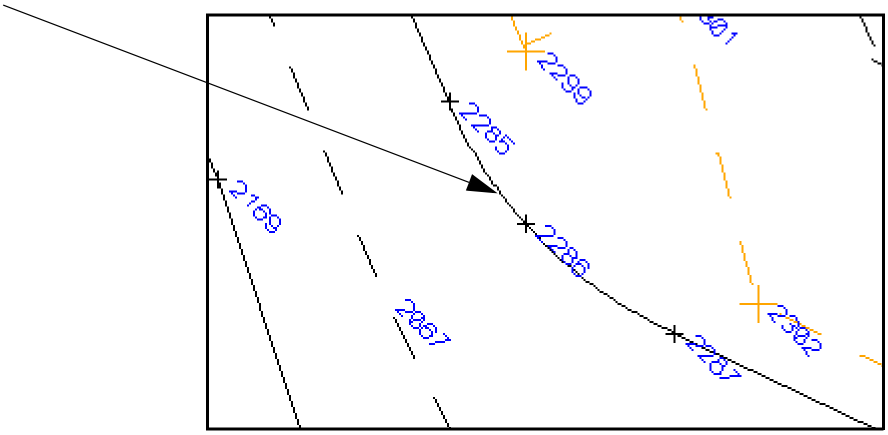
or **Insert 3-points Curve** icon


Insert 3-points curve

Select point 2286 and accept


Plan 1
2301
2299
2285
2169
2152
2286
2067
2302
2287

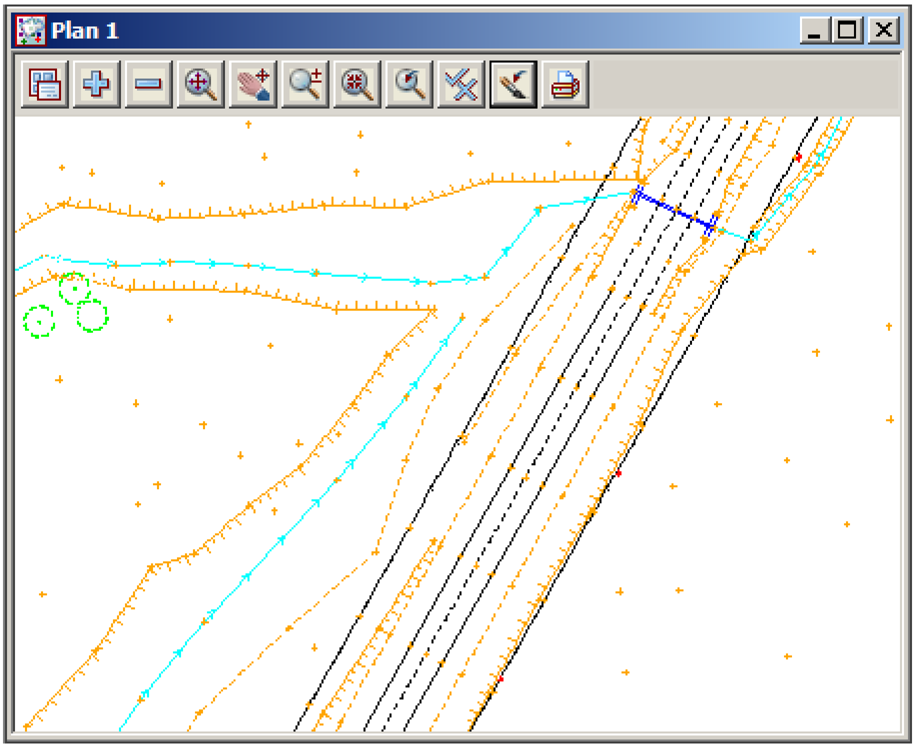
A curve is created


01
2299
2285
2169
2286
2067
2302
2287

9.9 Triangulation

The survey is ready to form a triangulation from the tinable data that is displayed in the view.

Ensure that all models are turned on in view 1.



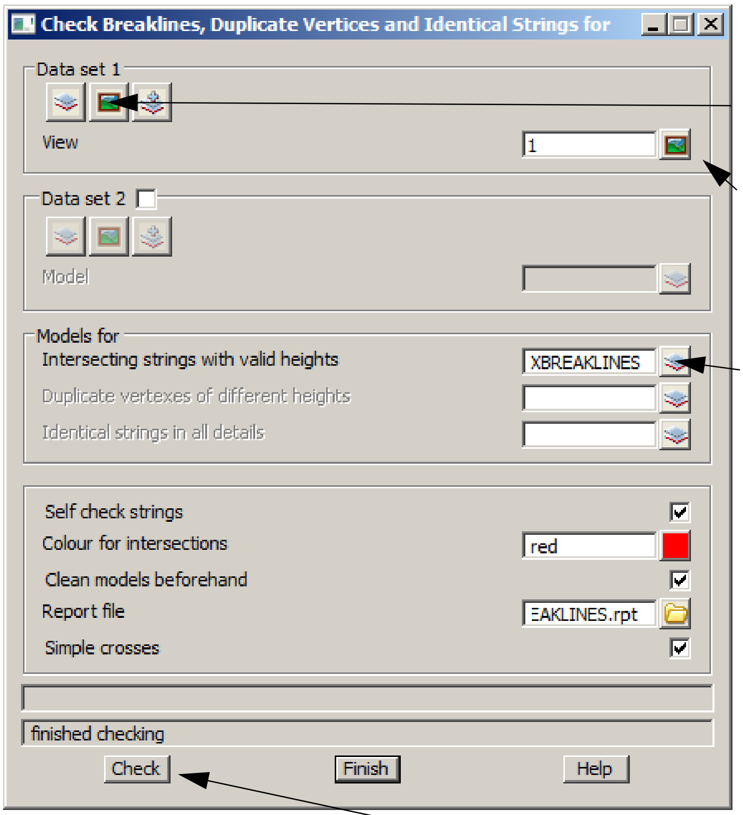
9.9.1 Check for Crossing Breaklines

Prior to forming the triangulation we need to check for any overlapping breaklines.

If not corrected these will cause errors in the triangulation.

Coloured diamond shapes can be created around the errors along with a report file

Select option ***Tins=>Check Breaklines***


Check Breaklines, Duplicate Vertices and Identical Strings for
Data set 1
Data set 2 ☐
Model
Models for
Duplicate vertexes of different heights
Identical strings in all details
Check
Finish
Help

View: 1

Intersecting strings with valid heights: XBREAKLINES

Self check strings ☑

Colour for intersections: red

Clean models beforehand ☑

Report file: EAKLINES.rpt

Simple crosses ☑

finished checking

We want to check all data in View 1 so select **View** icon

Select view number **1**

Type in model name **XBREAKLINES** to create strings around the errors

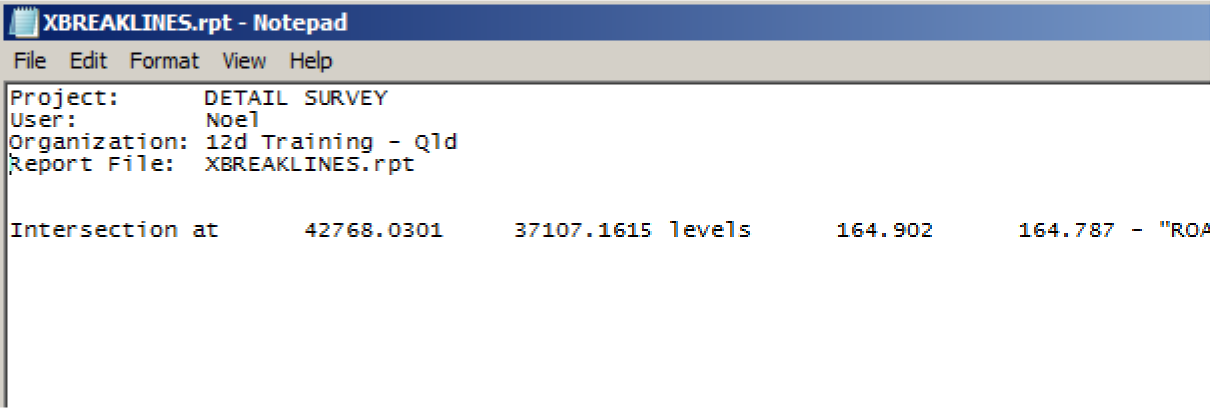
Select the colour **red** for the strings

Tick check box to **Clean models beforehand**

The report file name **XBREAKLINES** is typed in. Press [Enter] after entering the text and the extension **.rpt** is added

NOTE - report files are not available in the12d Model Practise Version

Select **Check**


XBREAKLINES.rpt - Notepad
File Edit Format View Help

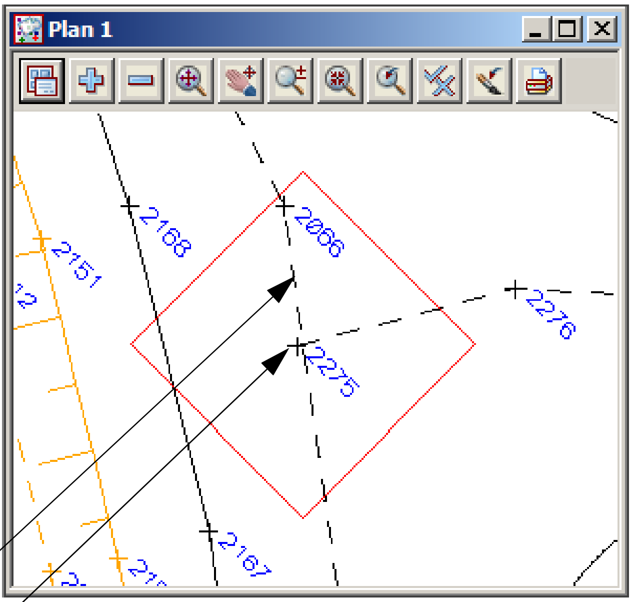
```
Project:       DETAIL SURVEY
User:          Noel
Organization:  12d Training - Qld
Report File:   XBREAKLINES.rpt


Intersection at       42768.0301      37107.1615 levels       164.902       164.787 - "ROA
```

The report is generated and displayed in the default text editor.

At the bottom of the report the intersections are listed giving the model names, co-ordinates and codes of the intersection strings

Exit the text editor

Drag the **Check breakline** panel over to the bottom edge of the screen as we will rerun the option later



Turn on the model **XBREAKLINES**

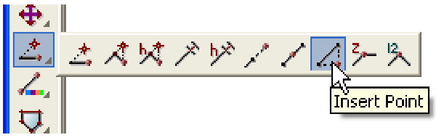
Zoom in to the red diamond at point 2275

A red diamond appears centred at the intersection of the two strings

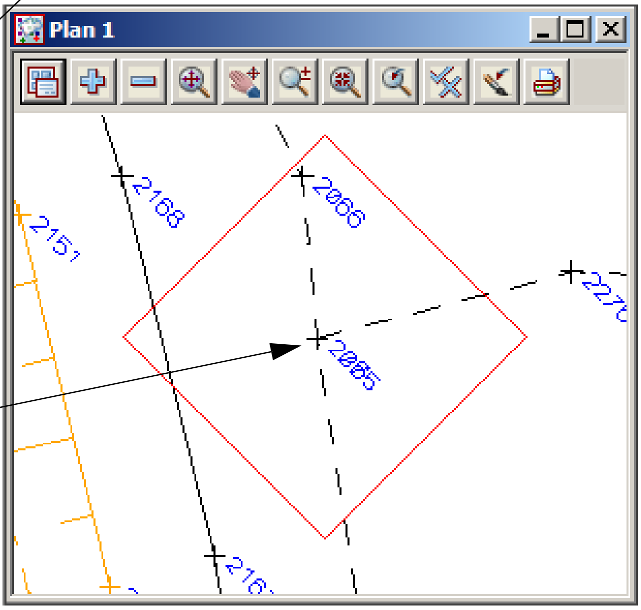
To correct we will insert point 2275 into segment from point 2065 to point 2066

Select option ***Strings=>Points edit=>Insert***

or **Insert point** icon



Pick and accept the string between point 2065 and 2066

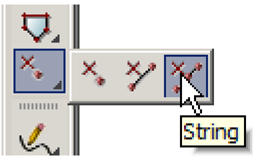


Pick and accept point 2275

The string now has a vertex at point 2275

Lastly delete the diamond string surrounding the crossing breakline. We delete the diamond string as it has levels at the vertices and if the ***Check Breakline*** option is rerun without the **Clean models** option ticked, more crossing breaklines would result

Select ***Strings=>Delete*** or **String** icon



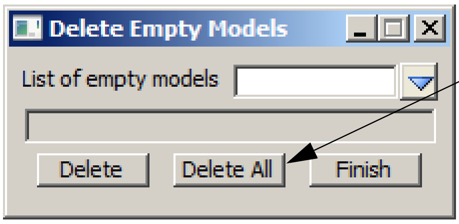
Pick the diamond and accept

As the **Crossing Breakline** panel is still active rerun the option to confirm all crossing breakline have been fixed

9.9.2 Delete empty models

Prior to creating the triangulation it is important to delete any empty models.

Select option ***Models=>Delete=>Delete empty models***



Delete Empty Models

List of empty models

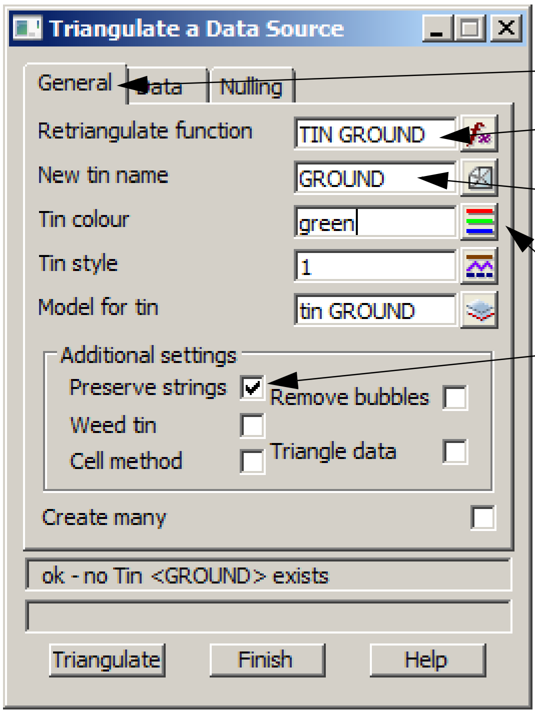
Select **Delete All**

This will delete the model **XBREAKLINES** and **unknown** which was created during the field file reduction

9.9.3 Triangulate data

All tinable data will now be triangulated. In this example we will triangulate a view of data. Turn off the model name **Trash model** if it exists. This model may have been created as a result of certain string edits. The edit panels may have given the user the option to send the affected string to the ***Trash model***

Select option ***Tins=>Create=>Triangulate data***



Triangulate a Data Source

Retriangulate function: TIN GROUND

New tin name: GROUND

Tin colour: green

Tin style: 1

Model for tin: tin GROUND

Additional settings

Preserve strings ☑ Remove bubbles ☐

Weed tin ☐

Cell method ☐ Triangle data ☐

Create many ☐

ok - no Tin <GROUND> exists

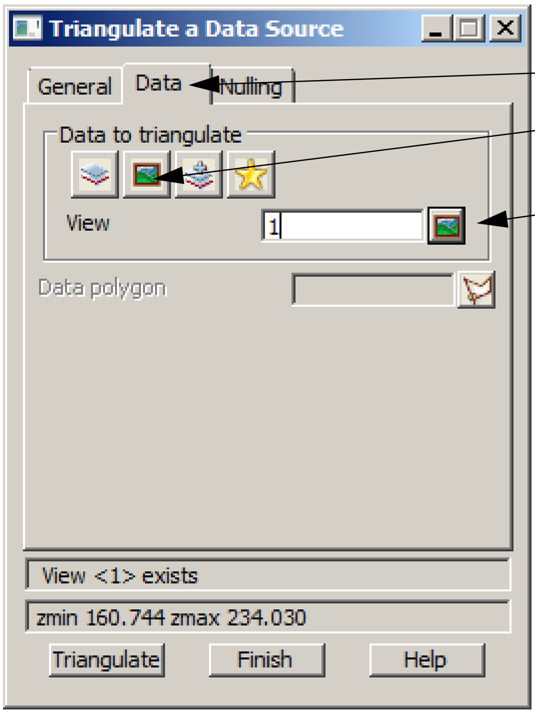
Select the **General** tab

Type in the function name **TIN GROUND**

Type in **GROUND** as the tin name. Press [Enter] and the **Model for tin** will use the same name prefixed with the word **tin**

Select a tin colour **green**

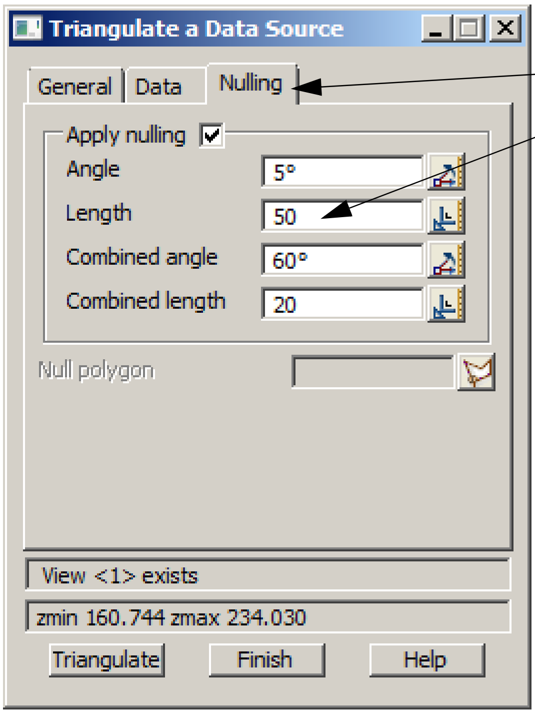
Tick the check box to **Preserve strings**. This will ensure that the triangles run along the edge of the breaklines


Triangulate a Data Source
General
Data
Nulling
Data to triangulate
View
1
Data polygon
View <1> exists
zmin 160.744 zmax 234.030
Triangulate
Finish
Help

Select the **Data** tab

Select the view icon

Select view 1


Triangulate a Data Source
General
Data
Nulling
Apply nulling ☑
Angle
5°
Length
50
Combined angle
60°
Combined length
20
Null polygon
View <1> exists
zmin 160.744 zmax 234.030
Triangulate
Finish
Help

Select the **Nulling** tab

Type in a length of 50. This will delete any triangle with a side longer than 50

The angle and combined length / angles are explained by pressing **Help**

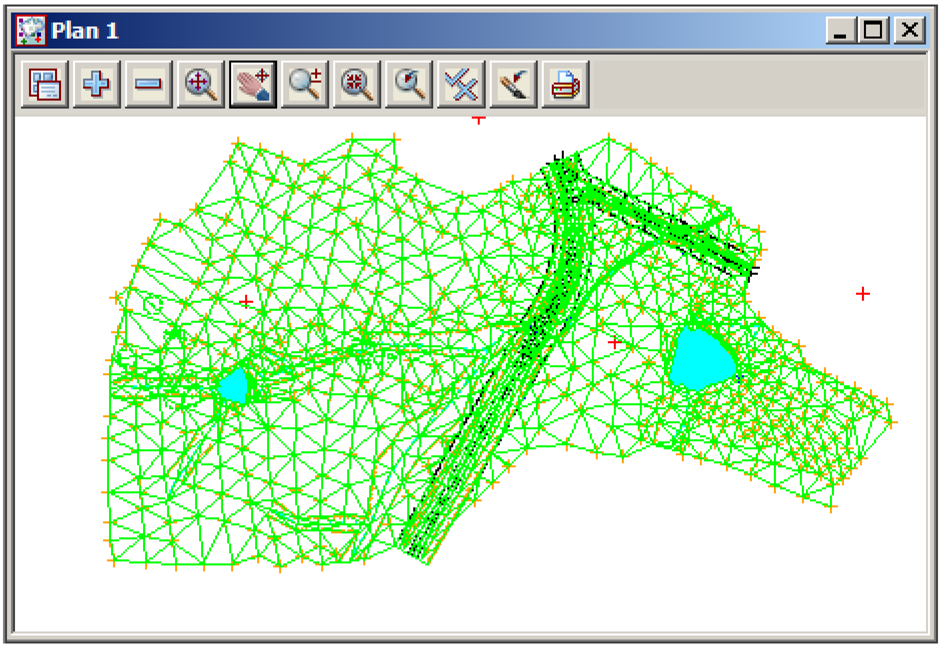
We are going to manually create a boundary at a later stage so there is no **Null polygon**

Select **Triangulate**

The panel changes to a **Retriangulate Tin** panel.

We will use this panel again later to select the tin boundary, so it can be moved over to the edge of the screen

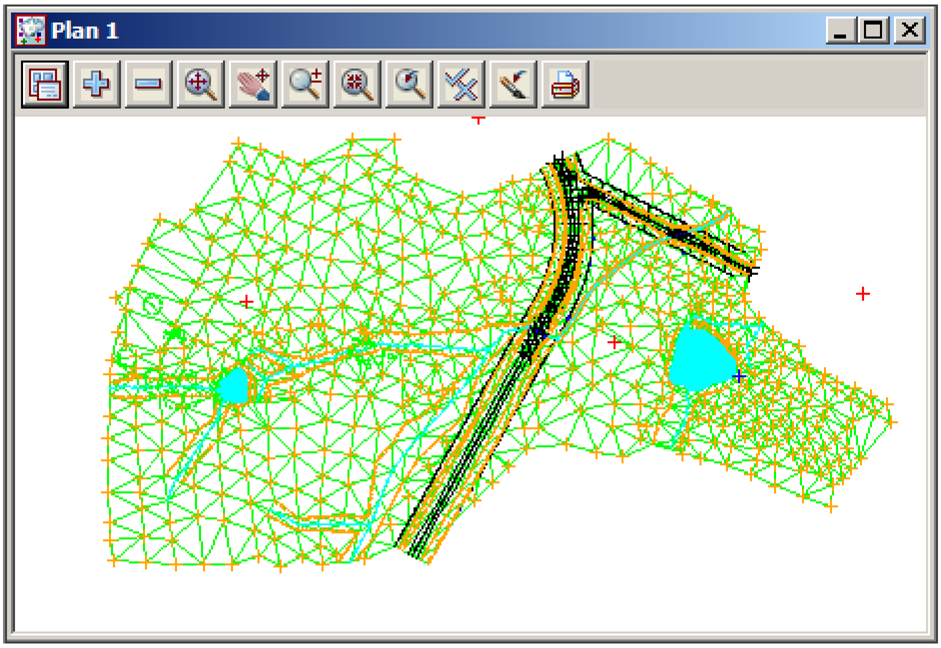
Turn on the model **tin GROUND**



The triangulation is shown with preliminary nulling around the edge

9.9.4 Nulling Triangles

When deleting triangles it is import to be able to see the survey strings. As the tin was the last model turned on the green triangle lines cover the survey strings. We can put the green tin strings to the back by selecting ***Menu*** button on the plan view. Walk right on ***Models=>Models to back*** then select **tin GROUND**. This can also be done by walking right on ***Models=>Models Order*** and moving the tin model to the bottom of the list



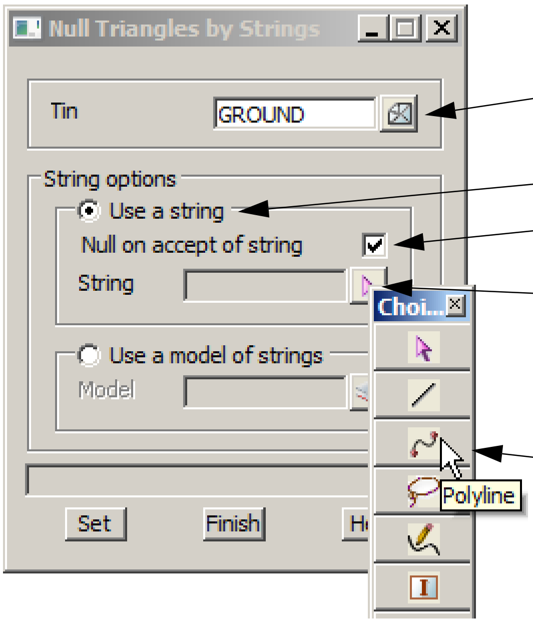
The triangles around the edge of the data have been partially nulled by the Triangulation function but we need to trim the triangles even further to be able to create a boundary around the edge of the survey.

There are a number of ways to null triangles including ***By points and by strings***

Null by strings

Triangles can also be deleted by dragging a line, polyline or lasso through the ones that are incorrect.

Select option ***Tins=>Null=>By strings***


Null Triangles by Strings
String options
String
Model
Choi...
Polyline
Set
Finish
H

Tin GROUND

● Use a string

Null on accept of string ☑

○ Use a model of strings

Select the **Tin** icon

Select tin **existing**

Select **Use a string**

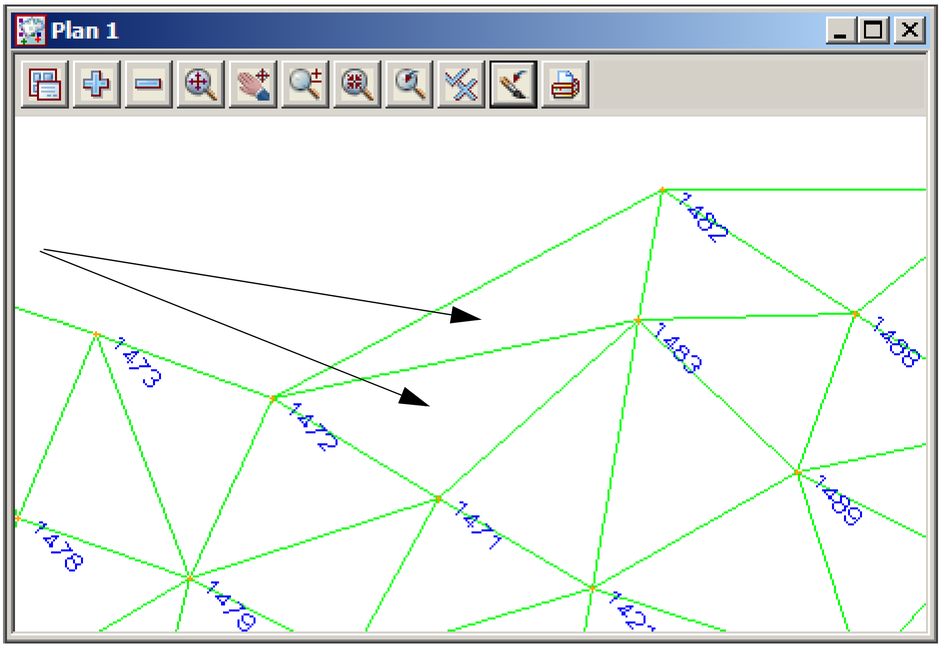
Tick **Null on accept of string**

Right click on the **String** choice icon

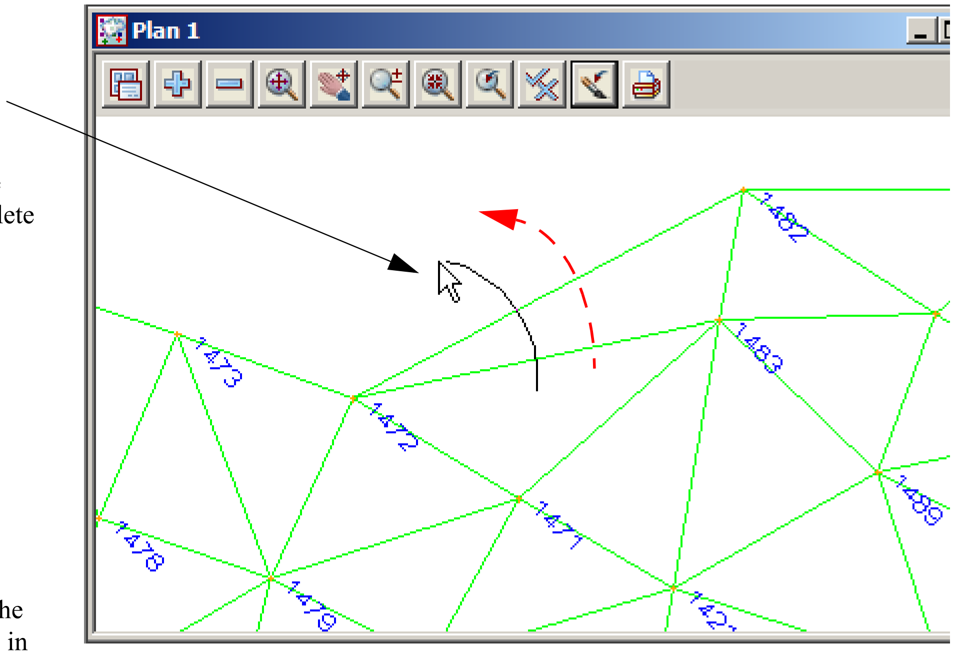
Select **Polyline** icon

Zoom in to point 1482

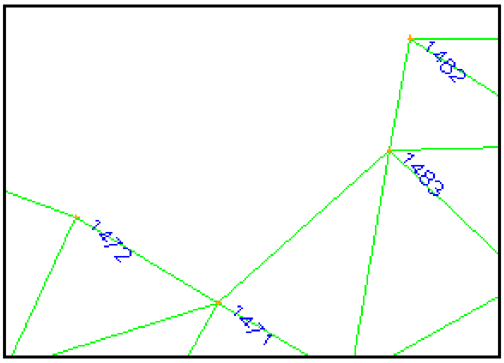
These two triangles need to be nulled


Plan 1
1482
1473
1483
1488
1472
1471
1489
1478
1479
1421

Holding down the left button, drag a polyline through the triangles as shown. Release the left button then press middle button to confirm the delete


Plan 1
1482
1483
1473
1472
1471
1489
1478
1479
142

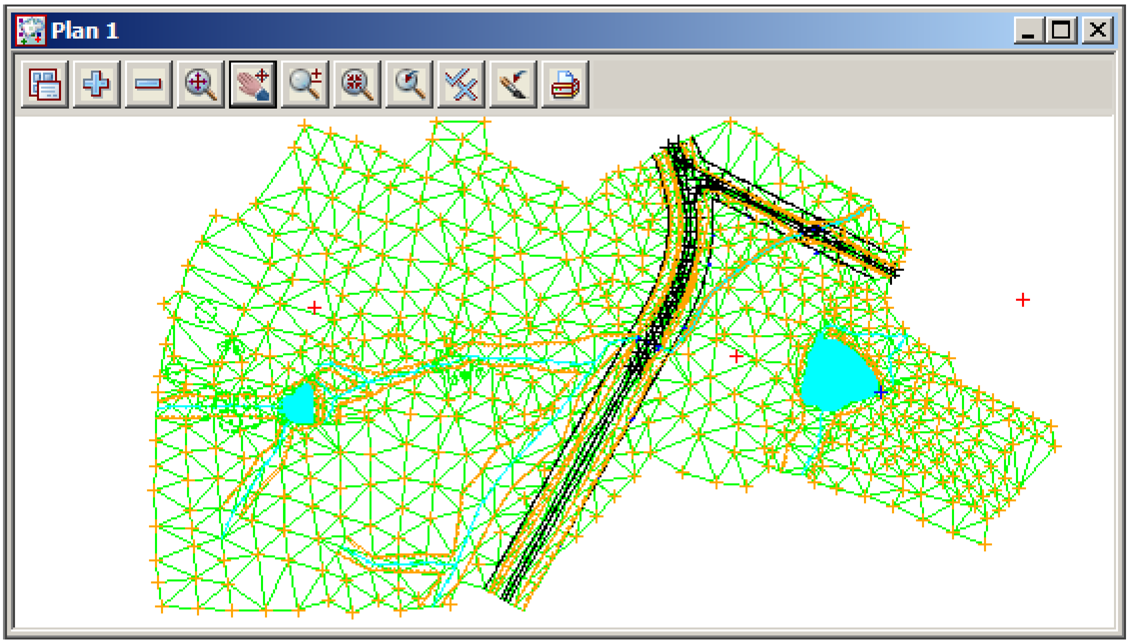
The triangles will be deleted


1482
1483
1472
1471

Pan around the edge of the survey deleting triangles in this manner

Pay particular attention to the triangles where the creek beds meet the boundary. The triangles often cross from one top of bank to the other.

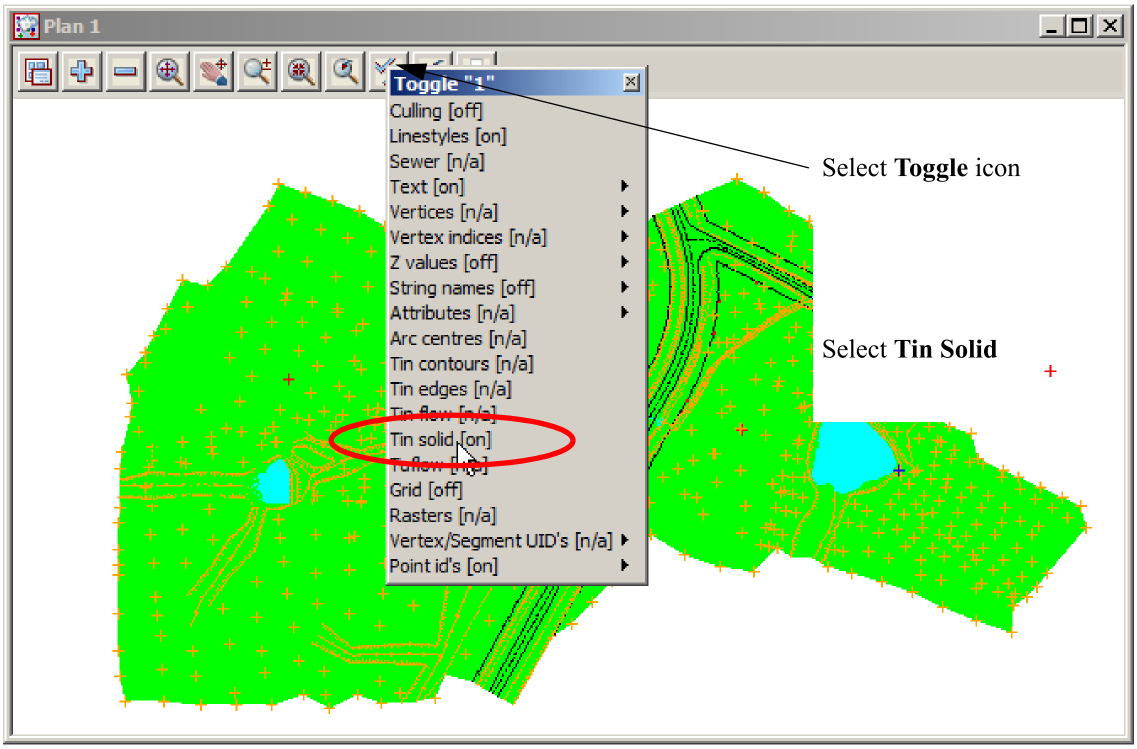
The final trimmed triangles should look like the example below



Tin Solid

To ensure there have been no errors while deleting the triangles, the surface can be coloured with a solid fill. This enables any errors to be easily seen

Zoom to the extents of the survey data

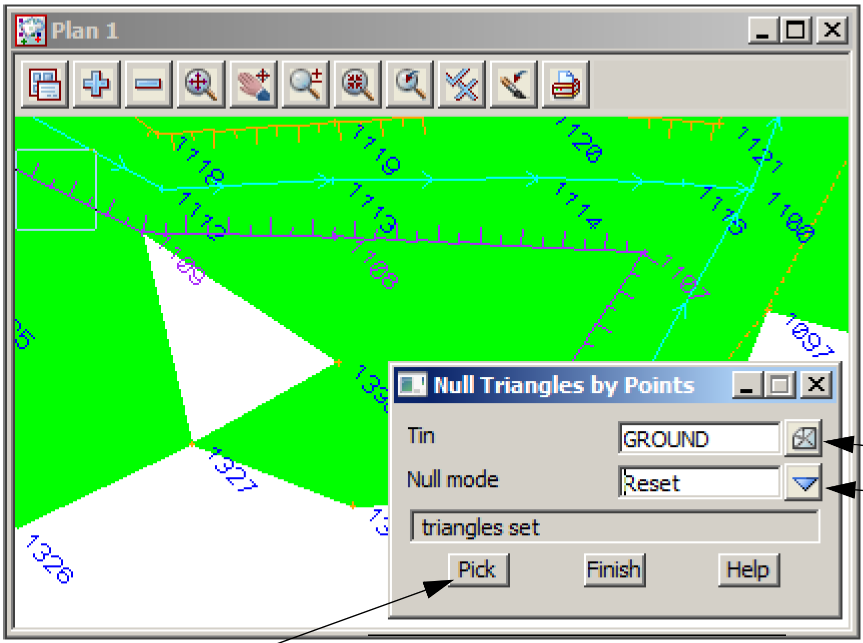

Plan 1
Toggle "1"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [off]
String names [off]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [on]
Tinflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [on]

Select **Toggle** icon

Select **Tin Solid**

Reset triangles

To “Undo” a wrongly deleted triangle select the option ***Tins=>Null=>By Points***


Plan 1
Null Triangles by Points
Pick
Finish
Help

Tin GROUND

Null mode Reset

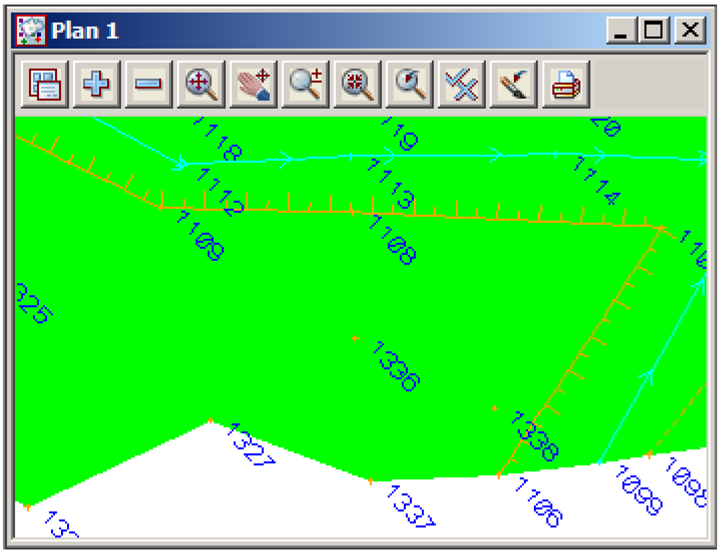
triangles set

Select tin **ground**

Change the **Null** mode to **Reset**

Select **Pick**

Select and accept the centre of the triangle to reinstate



The triangle will be restored as seen by the solid fill

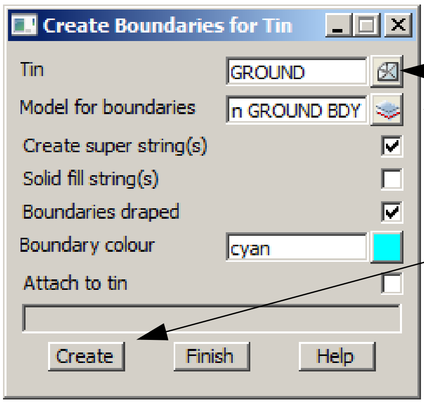
9.9.5 Tin Boundary

Once the triangles have been trimmed around the edge of the survey a string can be created along the extent of the triangulation. This is then used to nominate a Null polygon for the triangulation.

Turn on both point and line snaps

Turn off **Tin Solid**

Select the option ***Tins=>Boundary***



Tin: GROUND

Model for boundaries: n GROUND BDY

Create super string(s) ☑

Solid fill string(s) ☐

Boundaries draped ☑

Boundary colour: cyan

Attach to tin ☐

Select the tin **ground**

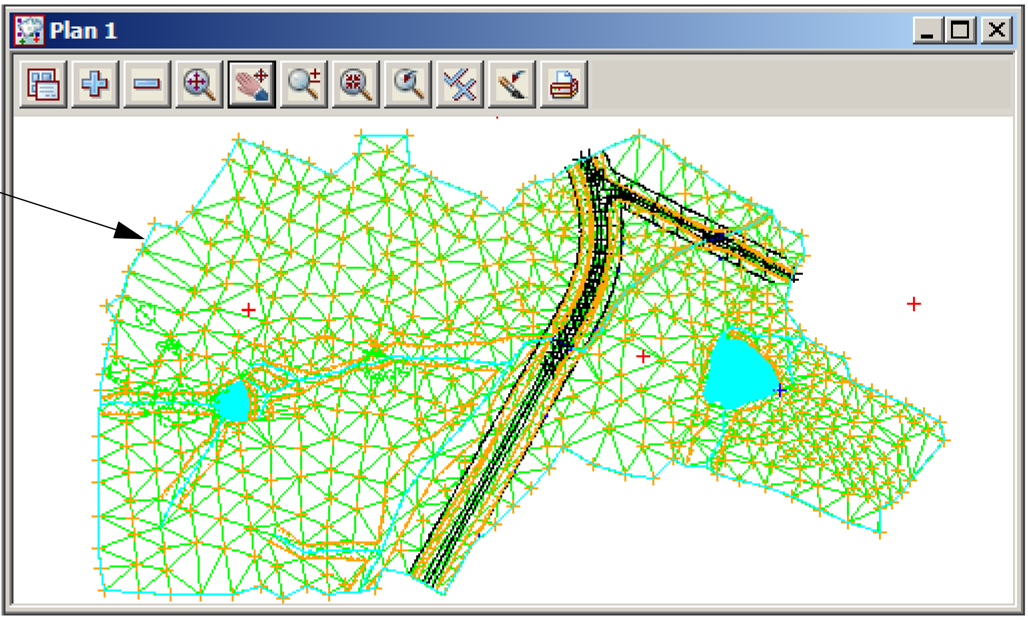
Select tin model **tin ground** then add **BDY** to the model name

Leave check boxes ticked

Select **Create**

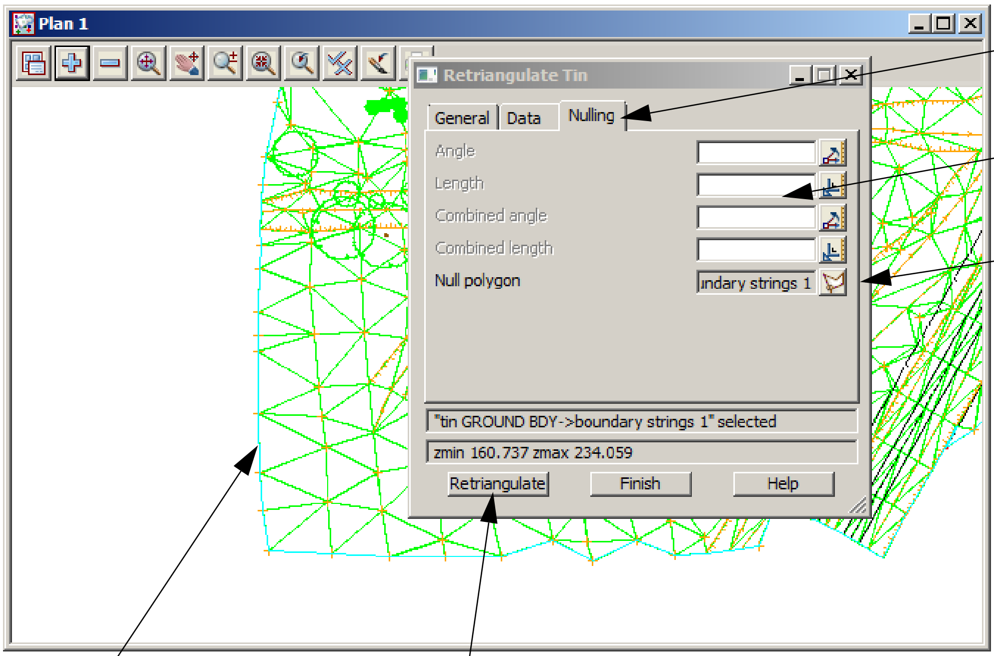
Turn on the model **tin GROUND BDY**

A cyan string is created around the extent of the triangulation



Now we need to include the boundary string in the triangulation

Return to the **Retriangulate Tin** panel


Plan 1
Retriangulate Tin
General
Data
Nulling
Angle
Length
Combined angle
Combined length
Null polygon
Retriangulate
Finish
Help

Null polygon: ındary strings 1

"tin GROUND BDY->boundary strings 1" selected

zmin 160.737 zmax 234.059

Select the **Nulling** tab

Clear out the previous nulling values

Select **Null Polygon** pick icon

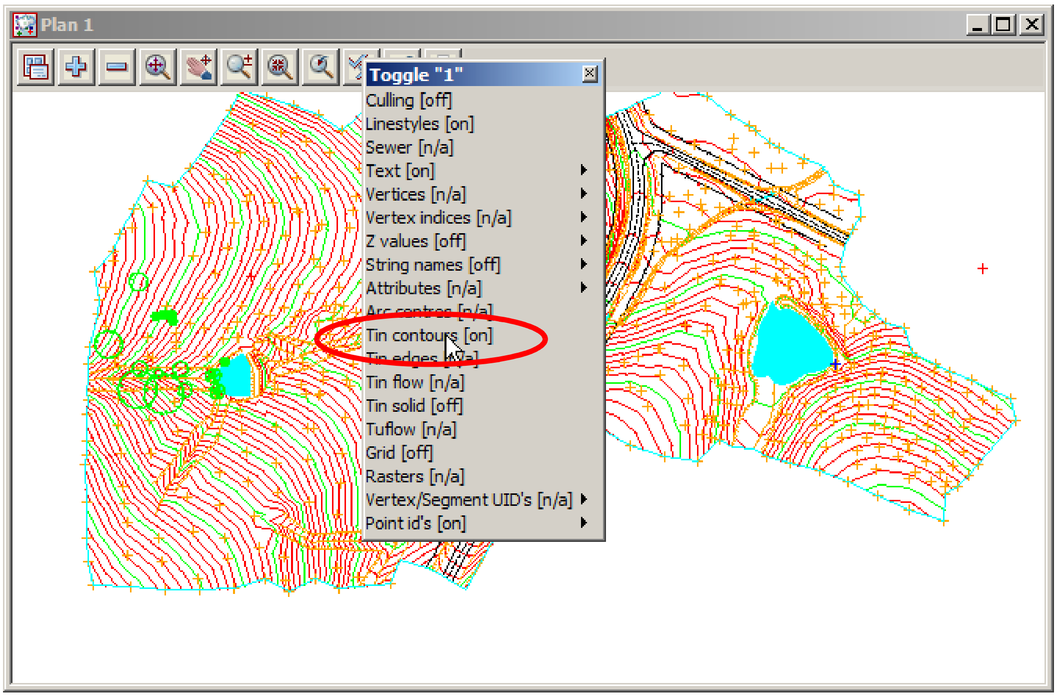
Pick and accept the boundary string

Select **Retriangulate** then **Finish**

9.9.6 Viewing fast contours

We will now turn on the fast contours to analyse the triangulation.

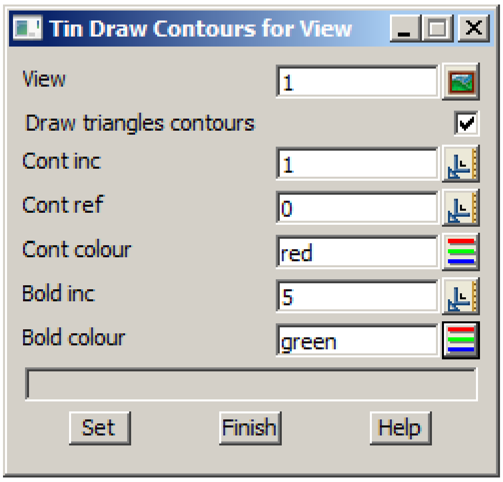
Select ***Toggle=>Tin Contours***


Plan 1
Toggle "1"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [off]
String names [off]
Attributes [n/a]
Arc centres [n/a]
Tin contours [on]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [off]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [on]

The contours should be checked for any errors

The contour increment can be changed for the view. Select the **Menu** icon

Walk right on ***Settings =>Tins =>Contours*** to bring up **Tin Draw Contours** panel


Tin Draw Contours for View

View 1

Draw triangles contours ☑

Cont inc 1

Cont ref 0

Cont colour red

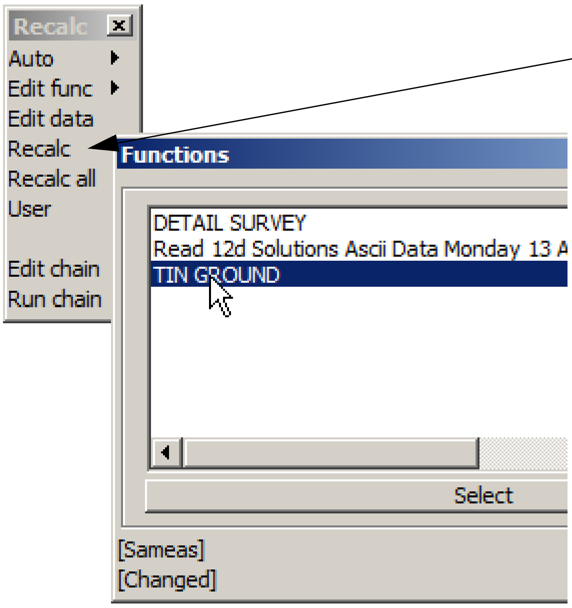
Bold inc 5

Bold colour green

Set
Finish
Help

All features of the contours can be changed, To update the triangulation select ***Tins=>Edit=>Retriangulate=>GROUND***

Or recalc the function using the recalc panel


Recalc
Auto
Edit func
Edit data
Recalc
Recalc all
User
Edit chain
Run chain
Functions
Select
[Sameas]
[Changed]

DETAIL SURVEY
Read 12d Solutions Ascii Data Monday 13 A
TIN GROUND

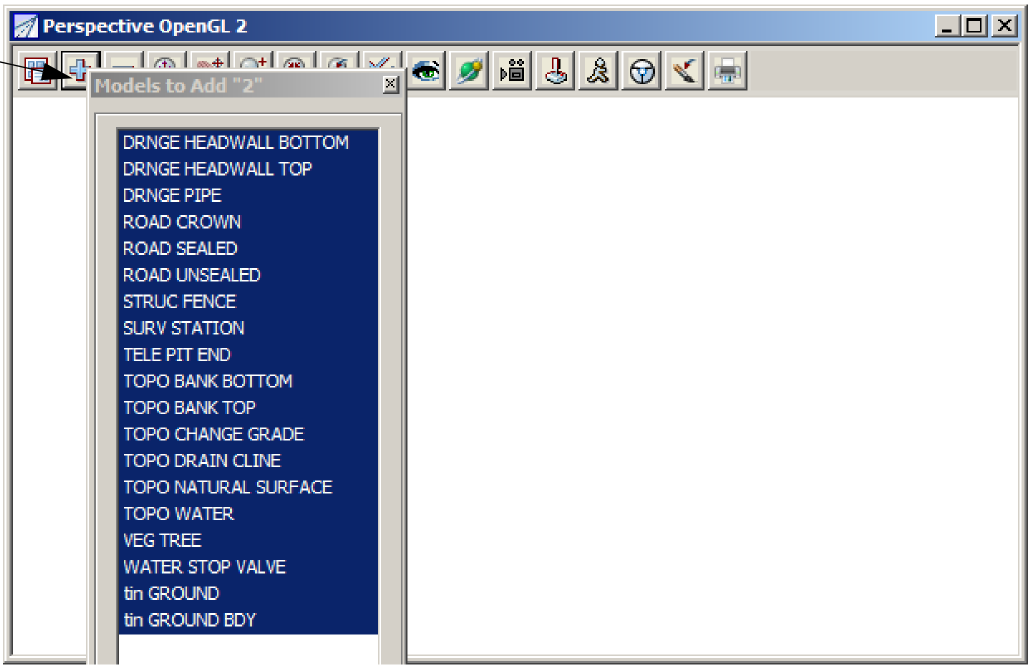
Walk right on **Recalc** then double click on **TIN GROUND**

9.9.7 Perspective Views

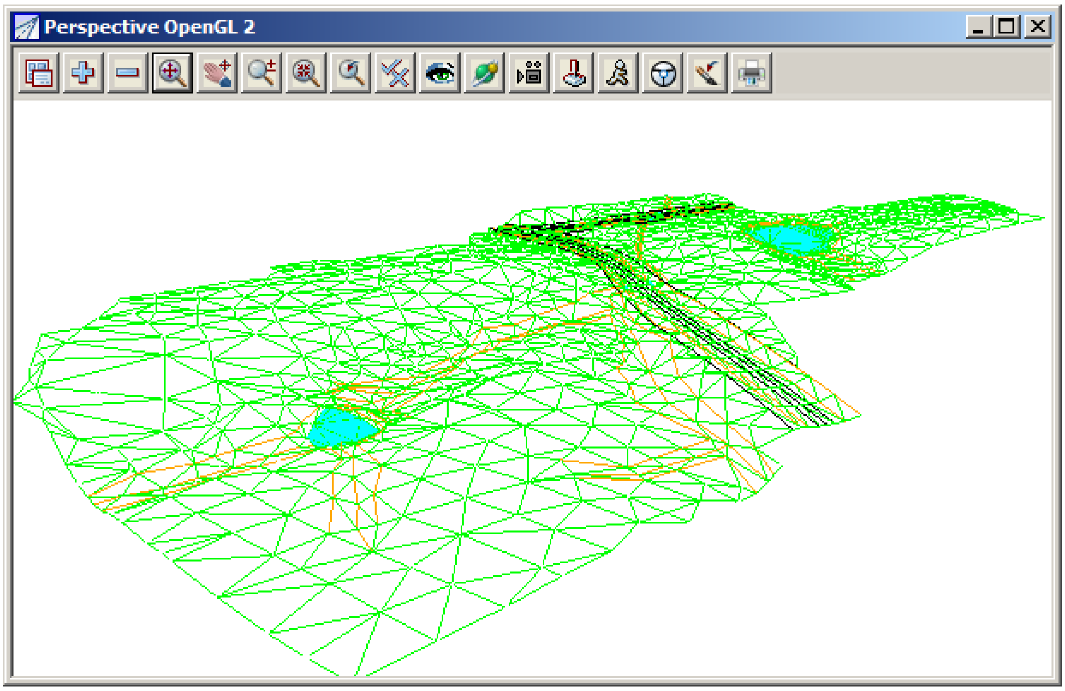
To help analyse the triangulation a perspective view can be created. The surface can be shaded and viewed from any angle

To create a perspective view select ***View=>New=>Perspective OpenGL***

Turn on all the models to be viewed

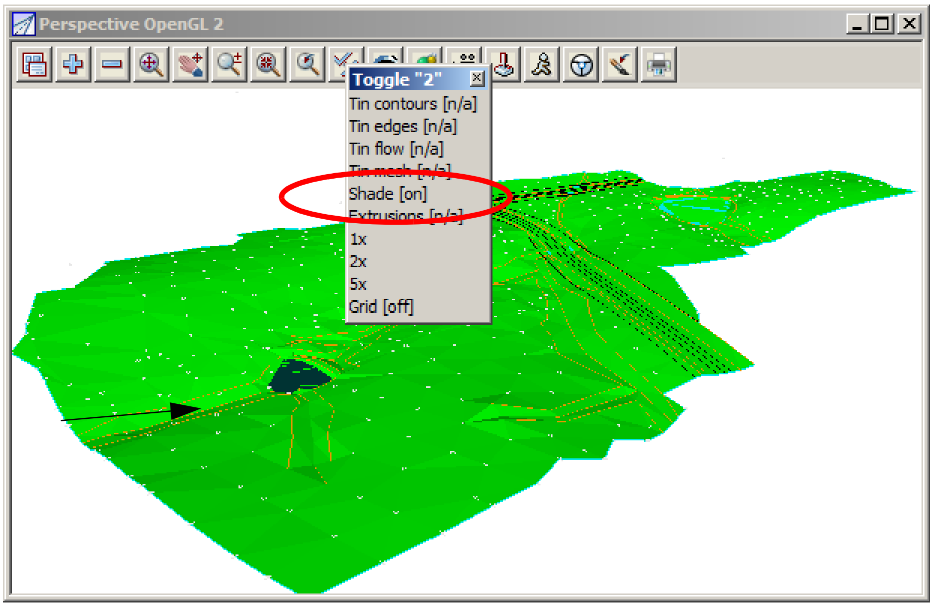


DRNGE HEADWALL BOTTOM
DRNGE HEADWALL TOP
DRNGE PIPE
ROAD CROWN
ROAD SEALED
ROAD UNSEALED
STRUC FENCE
SURV STATION
TELE PIT END
TOPO BANK BOTTOM
TOPO BANK TOP
TOPO CHANGE GRADE
TOPO DRAIN CLINE
TOPO NATURAL SURFACE
TOPO WATER
VEG TREE
WATER STOP VALVE
tin GROUND
tin GROUND BDY

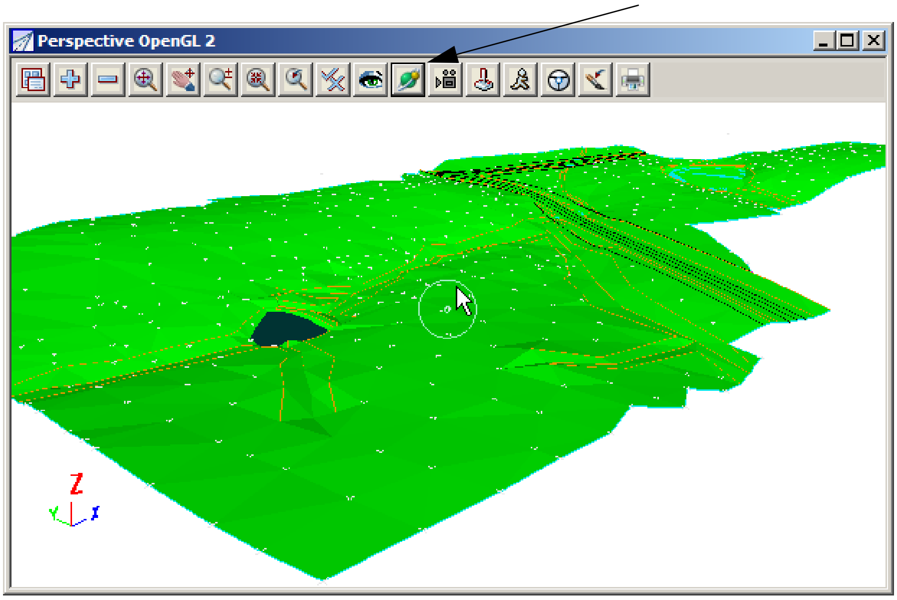


Shade the triangulation

Select ***Toggle=>Shade***


Perspective OpenGL 2
Toggle "2"
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin mesh [n/a]
Shade [on]
Extrusions [n/a]
1x
2x
5x
Grid [off]

To move around the view select the ***Orbit*** icon


Perspective OpenGL 2
Z
Y
X

Hold the left button down while moving the mouse to move around the view

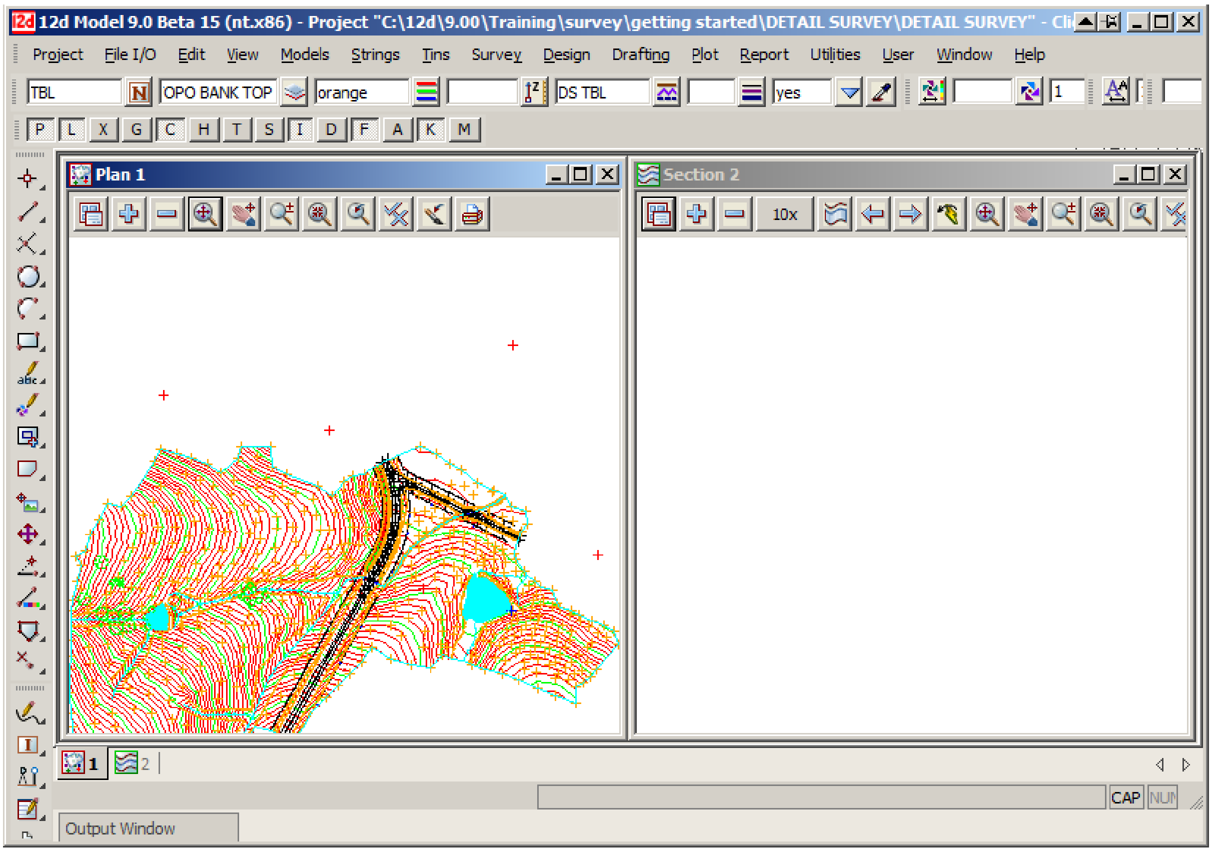
Close the perspective view

9.9.8 Section views

A section view can be created to view profiles along existing strings or to create dynamic sections through the survey

Select ***View=>New=>Section***

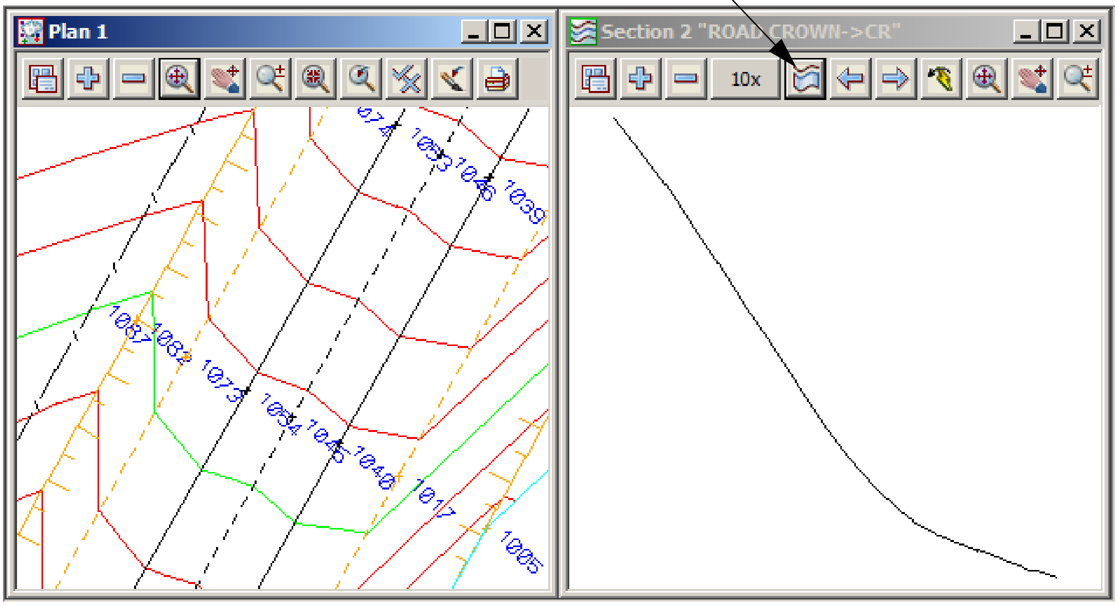
Place the section view beside the plan view by selecting ***Window=>Tile Vertical***


12d Model 9.0 Beta 15 (nt.x86) - Project "C:\12d\9.00\Training\survey\getting started\DETAIL SURVEY\DETAIL SURVEY" - Cli
Project File I/O Edit View Models Strings Tins Survey Design Drafting Plot Report Utilities User Window Help
TBL
OPO BANK TOP
orange
DS TBL
yes
1
P L X G C H T S I D F A K M
Plan 1
Section 2
10x
1
2
CAP
NUM
Output Window

In the section view turn on model **tin GROUND**

Select ***Profile*** icon

Select and accept the crown of the road string
The profile of the string is displayed

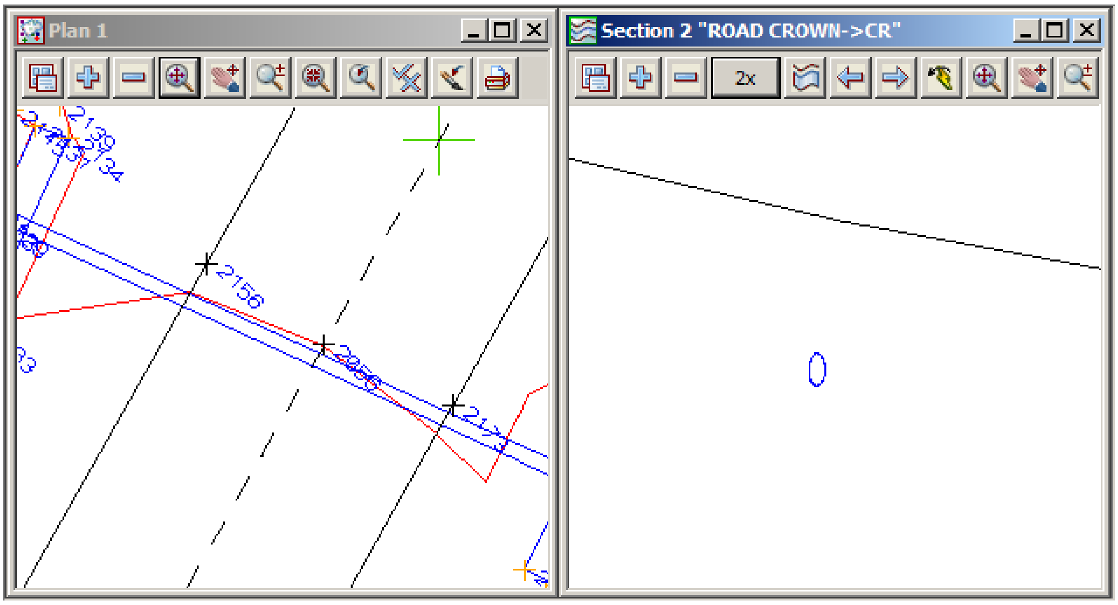

Plan 1
Section 2 "ROAD CROWN->CR"
10x
1053
1046
1039
1087
1082
1073
1054
1045
1040
1017
1005

Now turn on the model **DRNGE PIPE** in the section view

Zoom in to point 2056 where the drainage pipe crosses the road

Select the **Vertical exaggeration** icon and set the vertical exaggeration to **2**

Zoom into the part of the section view to see the pipe under the ground


Plan 1
Section 2 "ROAD CROWN->CR"
2x
2156
2056
2134

Close the section view

9.10 Plotting

9.10.1 Create New Plan View

We will firstly create a new plan view on which the data will be set up for plotting.

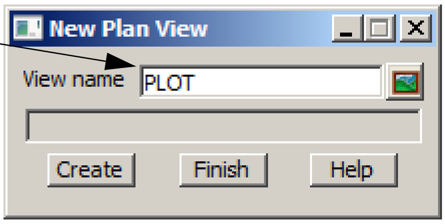
Select option ***View=>Create=>Plan View***

Type in the name **Plot**

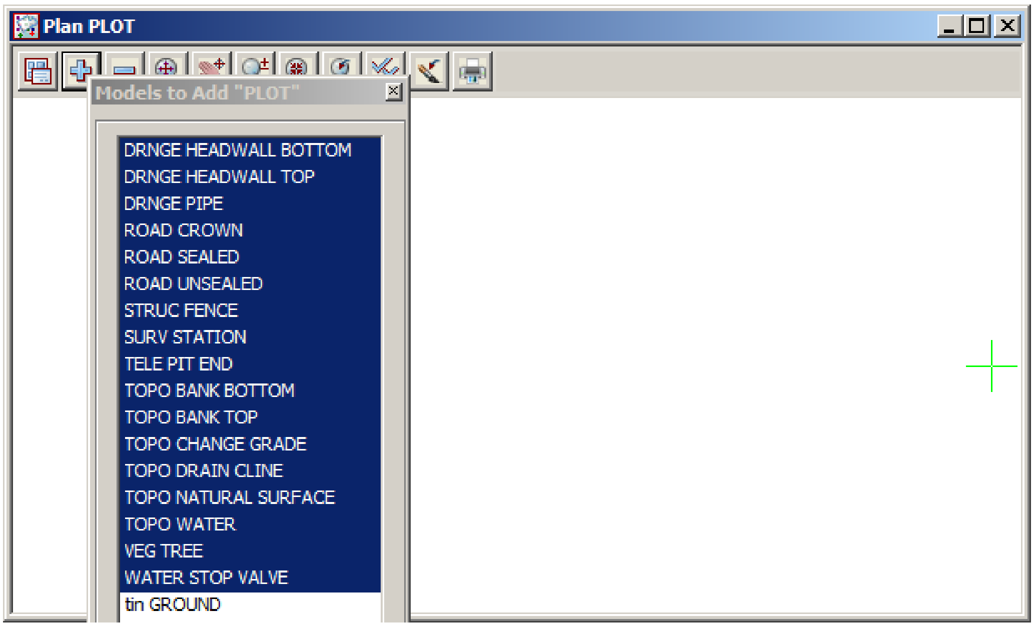
Select **Create**

Maximise the view

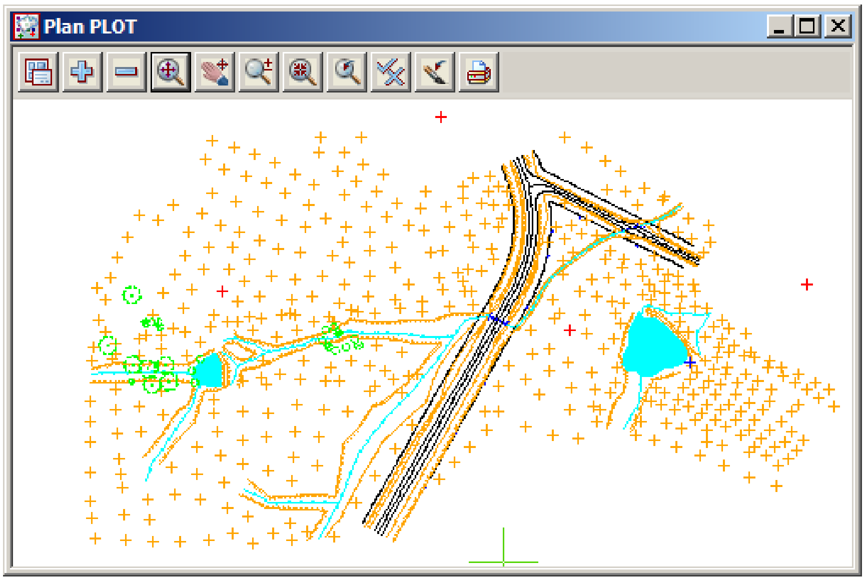
Turn on all models to be plotted


New Plan View
Create
Finish
Help

View name PLOT


Plan PLOT
Models to Add "PLOT"
DRNGE HEADWALL BOTTOM
DRNGE HEADWALL TOP
DRNGE PIPE
ROAD CROWN
ROAD SEALED
ROAD UNSEALED
STRUC FENCE
SURV STATION
TELE PIT END
TOPO BANK BOTTOM
TOPO BANK TOP
TOPO CHANGE GRADE
TOPO DRAIN CLINE
TOPO NATURAL SURFACE
TOPO WATER
VEG TREE
WATER STOP VALVE
tin GROUND

Zoom to the extents of the survey data



9.10.2 Feature labelling

The points in the survey can be labelled according to their names (codes). Labelling can be text such as **heights, codes and point numbers**

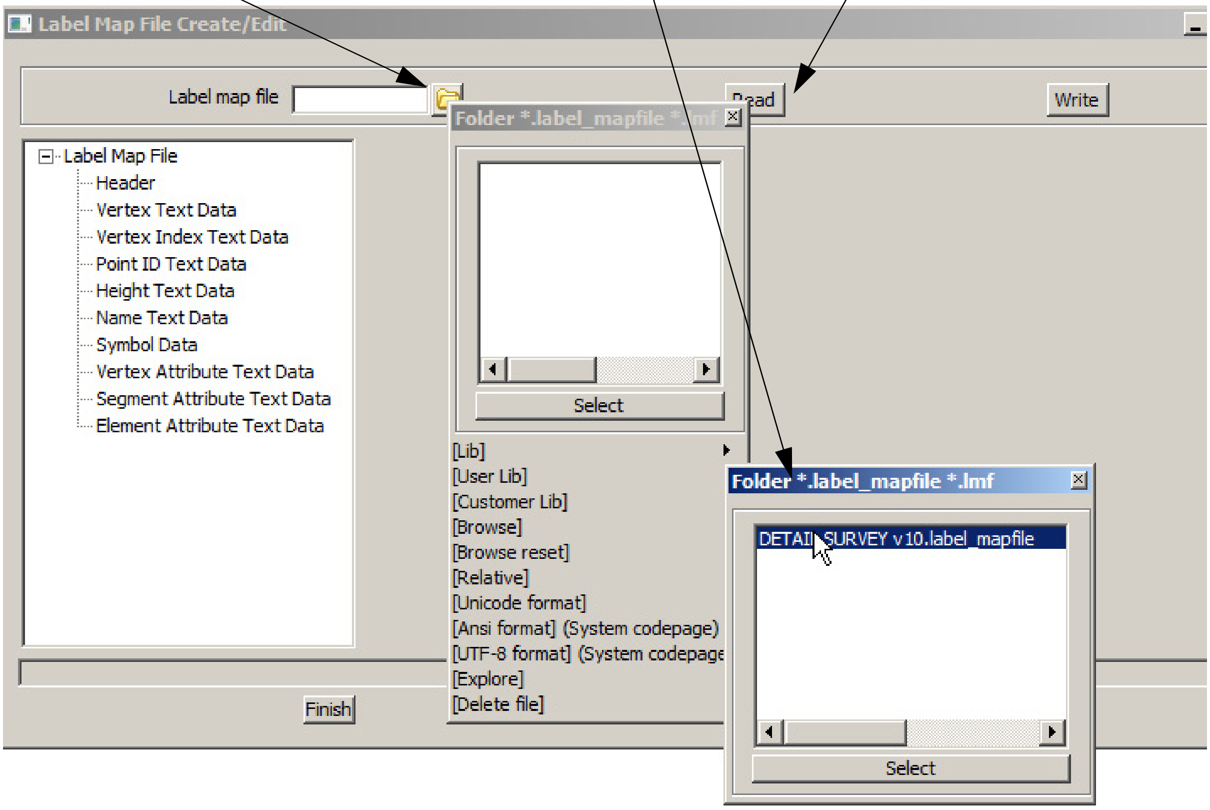
Firstly we will look at the label map file

Select option ***File I/O=>Label Map Files=>Create/Edit***

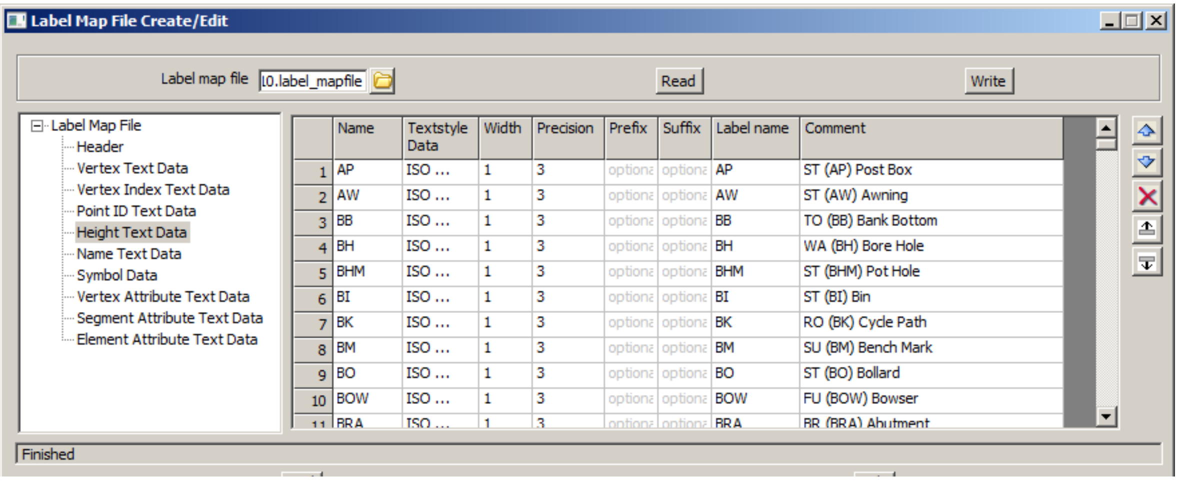
Select the Label map file folder icon

Select the file **DETAIL SURVEY v10.label_mapfile** from the User_lib folder

Select **Read**


Label Map File Create/Edit
Label map file
Read
Write
Folder *.label_mapfile *.lmf
Label Map File
Header
Vertex Text Data
Vertex Index Text Data
Point ID Text Data
Height Text Data
Name Text Data
Symbol Data
Vertex Attribute Text Data
Segment Attribute Text Data
Element Attribute Text Data
Select
[Lib]
[User Lib]
[Customer Lib]
[Browse]
[Browse reset]
[Relative]
[Unicode format]
[Ansi format] (System codepage)
[UTF-8 format] (System codepage
[Explore]
[Delete file]
Finish
Folder *.label_mapfile *.lmf
DETAIL SURVEY v10.label_mapfile
Select

Select the **Height Text Data** branch


Label Map File Create/Edit
Read
Write
Label Map File
Header
Vertex Text Data
Vertex Index Text Data
Point ID Text Data
Height Text Data
Name Text Data
Symbol Data
Vertex Attribute Text Data
Segment Attribute Text Data
Element Attribute Text Data

Label map file 10.label_mapfile

	Name	Textstyle Data	Width	Precision	Prefix	Suffix	Label name	Comment
1	AP	ISO ...	1	3	optiona	optiona	AP	ST (AP) Post Box
2	AW	ISO ...	1	3	optiona	optiona	AW	ST (AW) Awning
3	BB	ISO ...	1	3	optiona	optiona	BB	TO (BB) Bank Bottom
4	BH	ISO ...	1	3	optiona	optiona	BH	WA (BH) Bore Hole
5	BHM	ISO ...	1	3	optiona	optiona	BHM	ST (BHM) Pot Hole
6	BI	ISO ...	1	3	optiona	optiona	BI	ST (BI) Bin
7	BK	ISO ...	1	3	optiona	optiona	BK	RO (BK) Cycle Path
8	BM	ISO ...	1	3	optiona	optiona	BM	SU (BM) Bench Mark
9	BO	ISO ...	1	3	optiona	optiona	BO	ST (BO) Bollard
10	BOW	ISO ...	1	3	optiona	optiona	BOW	FU (BOW) Bowser
11	BRA	ISO ...	1	3	optiona	optiona	BRA	BR (BRA) Abutment

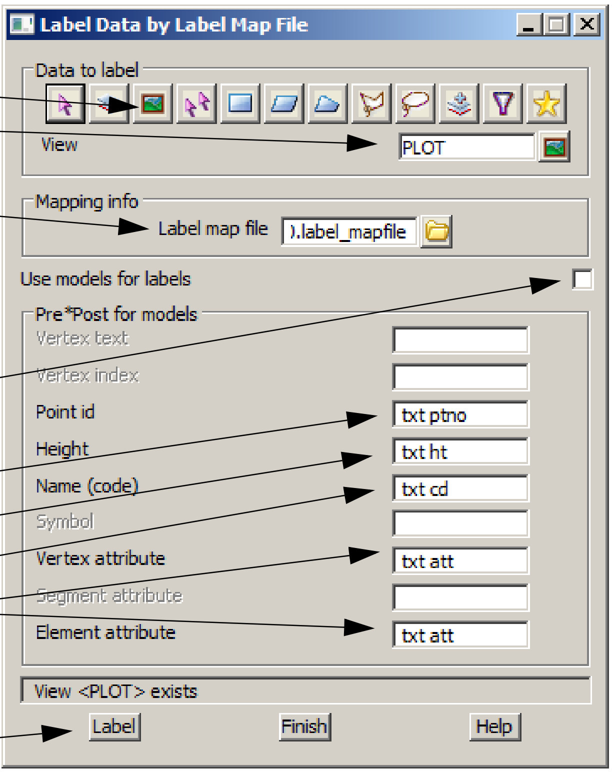
Finished

For each code the feature can have user defined text parameters including **text style data, width, precision (number of decimal places) and prefix or suffix text.**

The other lines can be filled in in a similar manner

Select **Finish** to exit the editor

To label the data select ***File I/O=>Label Map Files=>Apply***


Label Data by Label Map File
Data to label
Mapping info
Pre*Post for models
Label
Finish
Help

View PLOT

Label map file).label_mapfile

Use models for labels ☐

Vertex text

Vertex index

Point id txt ptno

Height txt ht

Name (code) txt cd

Symbol

Vertex attribute txt att

Segment attribute

Element attribute txt att

View <PLOT> exists

Select the **View** icon

Select the View **Plot**

Select the Label map file

DETAIL SURVEY v10.label_mapfile from the User_lib folder

If the **Use models for labels** check box is clear then the user is prompted for a model prefix so that each label is placed in a separate model

Clear the check box

Type in **txt ptno** as prefix for height models

Type in **txt ht** as prefix for height models

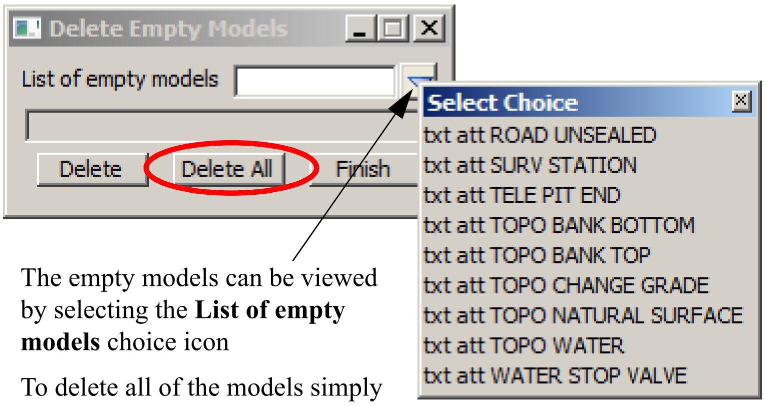
Type in **txt cd** as prefix for code models

Type in **txt att** for both the Vertex and Element attributes

Note that a space was placed after the prefixes above

Select **Label**

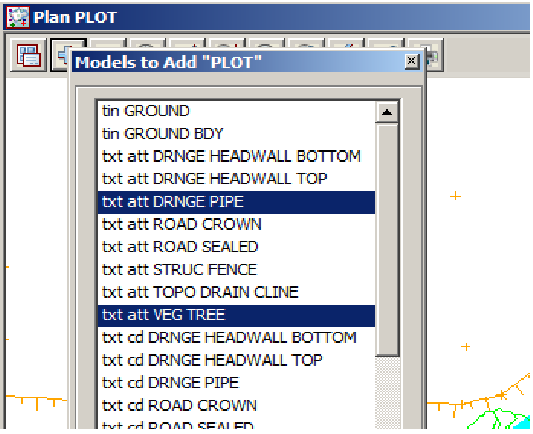
Prior to turning on the label models we need to delete any empty models (models with no data) created with this option. This is done by selecting option ***Models=>Delete=>Delete Empty Models***

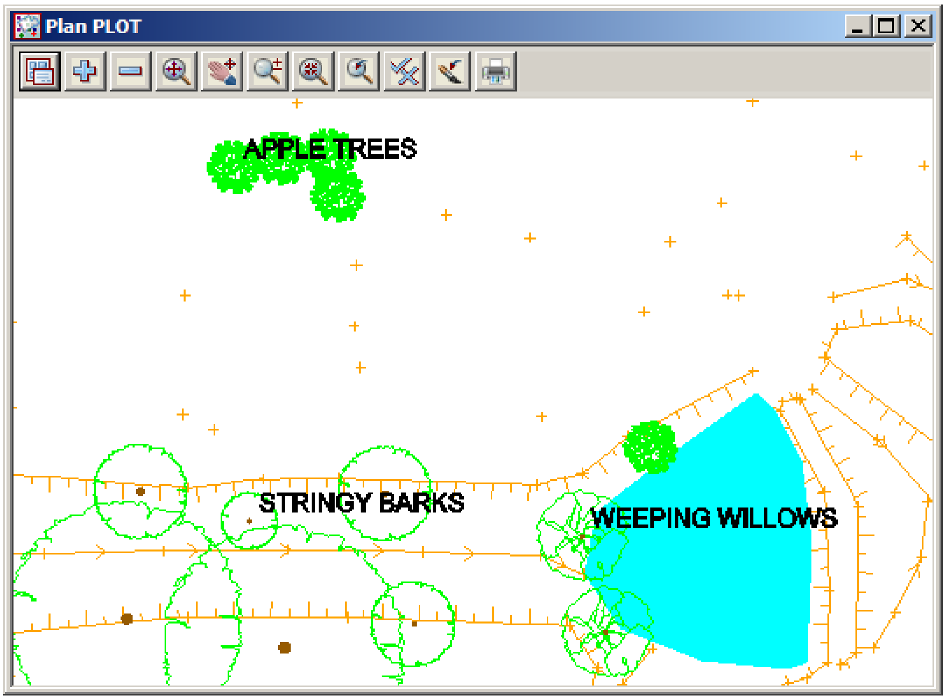

Delete Empty Models
List of empty models
Delete
Delete All
Finish
Select Choice
txt att ROAD UNSEALED
txt att SURV STATION
txt att TELE PIT END
txt att TOPO BANK BOTTOM
txt att TOPO BANK TOP
txt att TOPO CHANGE GRADE
txt att TOPO NATURAL SURFACE
txt att TOPO WATER
txt att WATER STOP VALVE

The empty models can be viewed by selecting the **List of empty models** choice icon

To delete all of the models simply select **Delete All**

Turn on the models **txt att DRNGE PIPE** and **txt att VEG TREE**

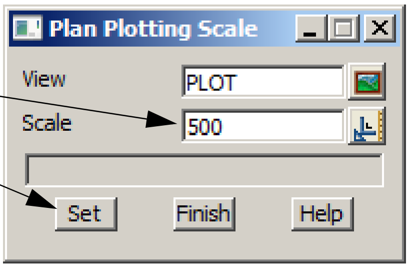

Plan PLOT
Models to Add "PLOT"
tin GROUND
tin GROUND BDY
txt att DRNGE HEADWALL BOTTOM
txt att DRNGE HEADWALL TOP
txt att DRNGE PIPE
txt att ROAD CROWN
txt att ROAD SEALED
txt att STRUC FENCE
txt att TOPO DRAIN CLINE
txt att VEG TREE
txt cd DRNGE HEADWALL BOTTOM
txt cd DRNGE HEADWALL TOP
txt cd DRNGE PIPE
txt cd ROAD CROWN
txt cd ROAD SEALED


Plan PLOT
APPLE TREES
STRINGY BARKS
WEEPING WILLOWS

9.10.3 Setting the correct plot scale for the view

The plot is to be done at a scale of 1:500 so to view the paper unit text in the correct scale we need to set the view plot scale

Select the ***Menu*** icon**.** Walk right on ***Settings=>Plotting Scale***



View: PLOT

Scale: 500

Type in scale **500**

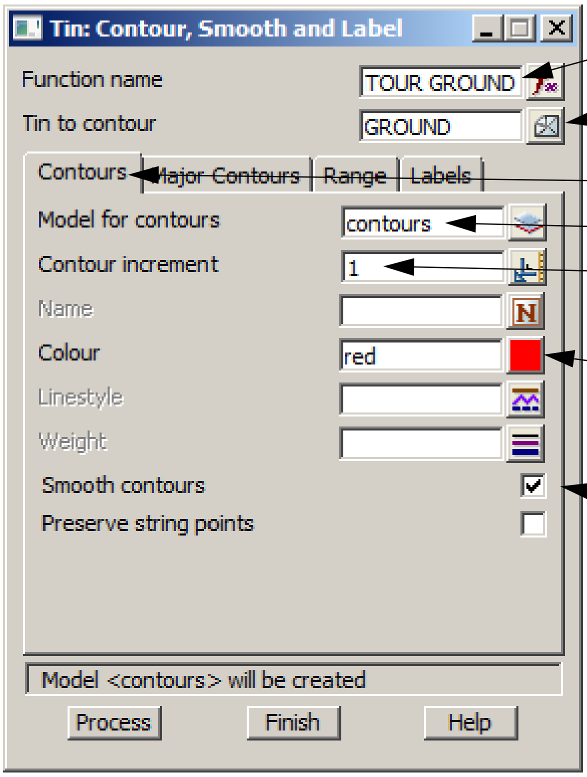
Select **Set** then **Finish**

9.10.4 Creating Contours

The contour lines displayed in plan view 1 are “fast contours”.

The fast contours are not editable features and don’t have labels

To create contours select ***Tins=>Contour=>Contour, Smooth and Label***


Tin: Contour, Smooth and Label
Contours
Major Contours
Range
Labels
Process
Finish
Help

Function name: TOUR GROUND
Tin to contour: GROUND
Model for contours: contours
Contour increment: 1
Name:
Colour: red
Linestyle:
Weight:
Smooth contours ☑
Preserve string points ☐
Model <contours> will be created

Type in function name **CONTOUR GROUND**

Select **Tin to contour** choice icon then select tin **ground**

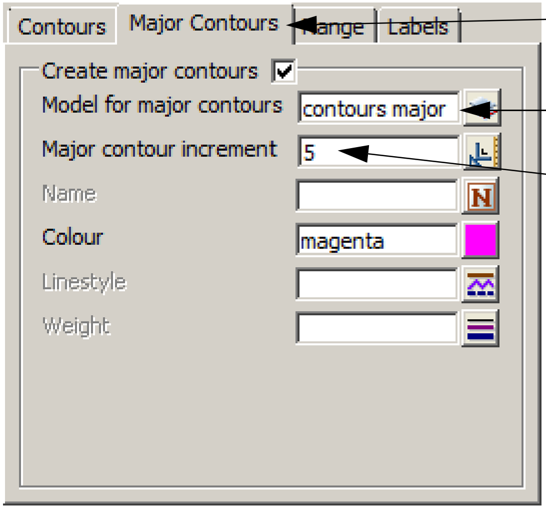
Select the **Contours** tab

Type in **contours** for Model name

Type in contour interval **1**

Select colour **red**

Tick the **Smooth contours** box

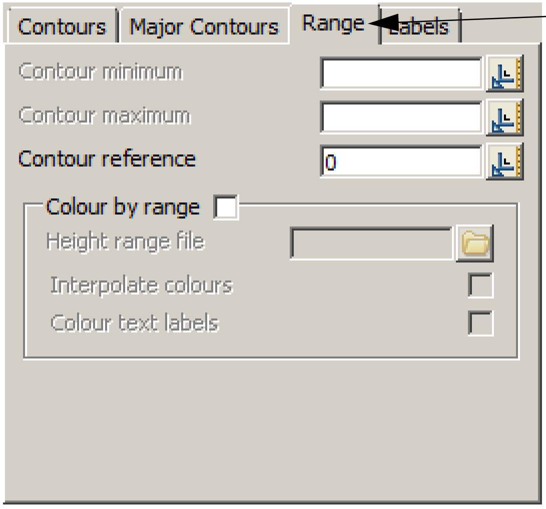

Contours
Major Contours
Range
Labels

Create major contours ☑
Model for major contours: contours major
Major contour increment: 5
Name:
Colour: magenta
Linestyle:
Weight:

Select the **Major Contours** tab

Type in **contours major** for Model name

Type in contour interval **5**


Contours
Major Contours
Range
Labels

Contour minimum

Contour maximum

Contour reference 0

Colour by range ☐

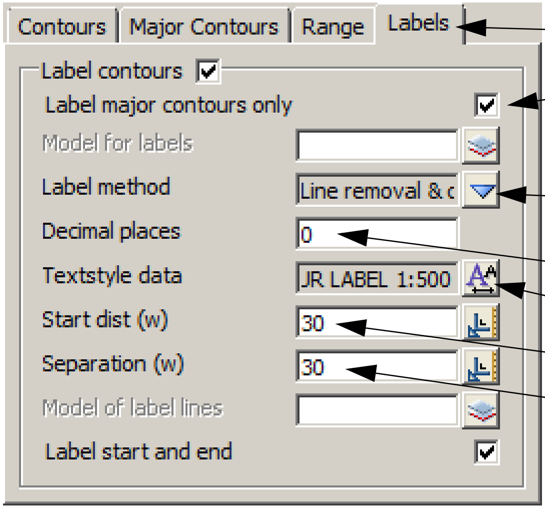
Height range file

Interpolate colours ☐

Colour text labels ☐

Select the **Range** tab

Leave this panel unaltered


Contours
Major Contours
Range
Labels

Label contours ☑

Label major contours only ☑

Model for labels

Label method Line removal & c

Decimal places 0

Textstyle data JR LABEL 1:500

Start dist (w) 30

Separation (w) 30

Model of label lines

Label start and end ☑

Select the **Labels** tab

Tick check box to **Label major contours only**

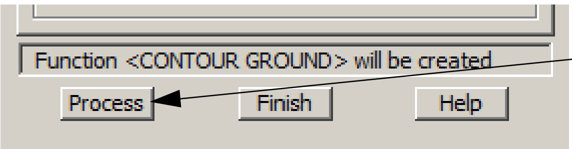
Select label method **Line removal and centred line facing uphill**

Type in **0** for number of decimal places

Select textstyle **Contour label 1:500**

Type in start distance of **30**

Type in separation of **30**

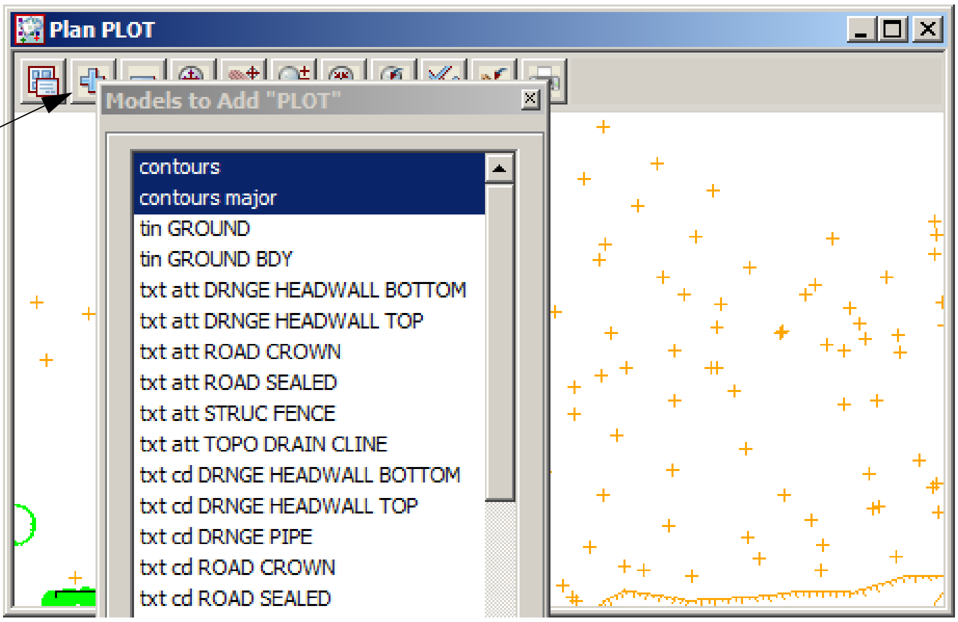

Function <CONTOUR GROUND> will be created

Process
Finish
Help

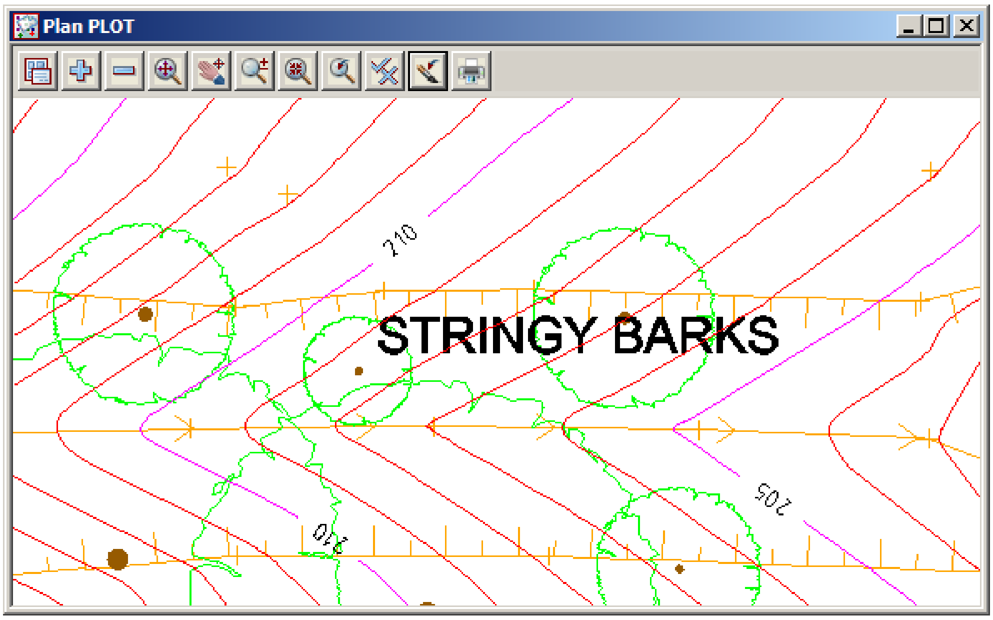
Select **Process**

Don't press Finish until you have verified the contour labelling

Turn on the newly created models **contours and contours major**


Plan PLOT
Models to Add "PLOT"

contours
contours major
tin GROUND
tin GROUND BDY
txt att DRNGE HEADWALL BOTTOM
txt att DRNGE HEADWALL TOP
txt att ROAD CROWN
txt att ROAD SEALED
txt att STRUC FENCE
txt att TOPO DRAIN CLINE
txt cd DRNGE HEADWALL BOTTOM
txt cd DRNGE HEADWALL TOP
txt cd DRNGE PIPE
txt cd ROAD CROWN
txt cd ROAD SEALED


Plan PLOT
210
STRINGY BARKS
205
210

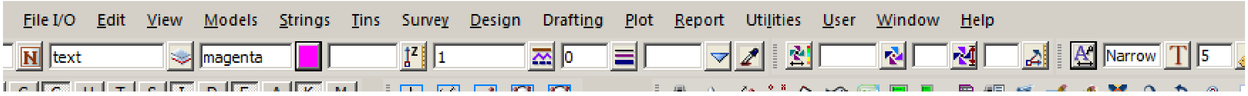
9.10.5 Text Editing

In this section we will add new text and edit existing text

Adding text

Text can be added to the view to describe features.

Firstly we need to set the default text properties including the model, colour and font.


File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Drafting
Plot
Report
Utilities
User
Window
Help

text

magenta

1

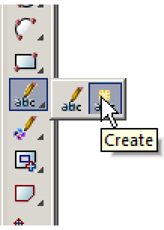
0

Narrow

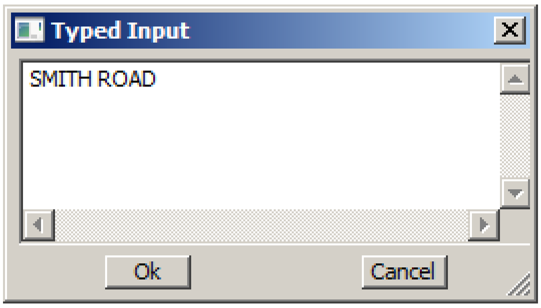
5

Type in model name **text**, colour **magenta**, Font favourite **Arial Narrow 5 paper**

Select the **Create** icon

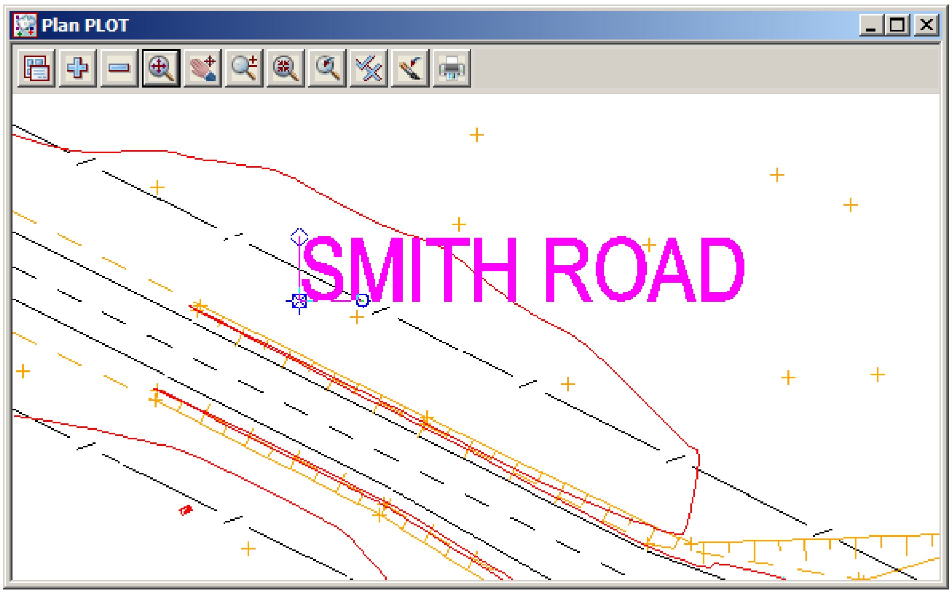


Select and accept the insertion point of the text


Typed Input
Ok
Cancel

SMITH ROAD

Type in the required text **SMITH ROAD** then press [OK]


Plan PLOT
SMITH ROAD

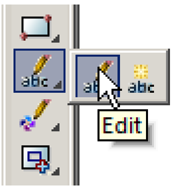
The text appears on the screen with three nodes at the start of the text. These are used to move, rotate and scale the text

Press [Escape] to finish the text placement

Editing text

We will now look at editing the text using the nodes

Select the **Edit** icon

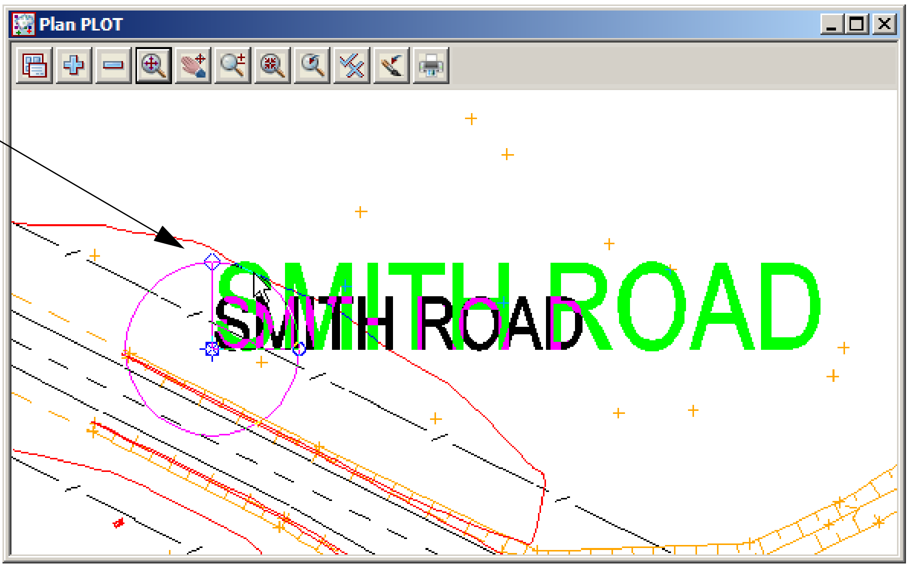


Select the piece of text to edit.

Scaling text

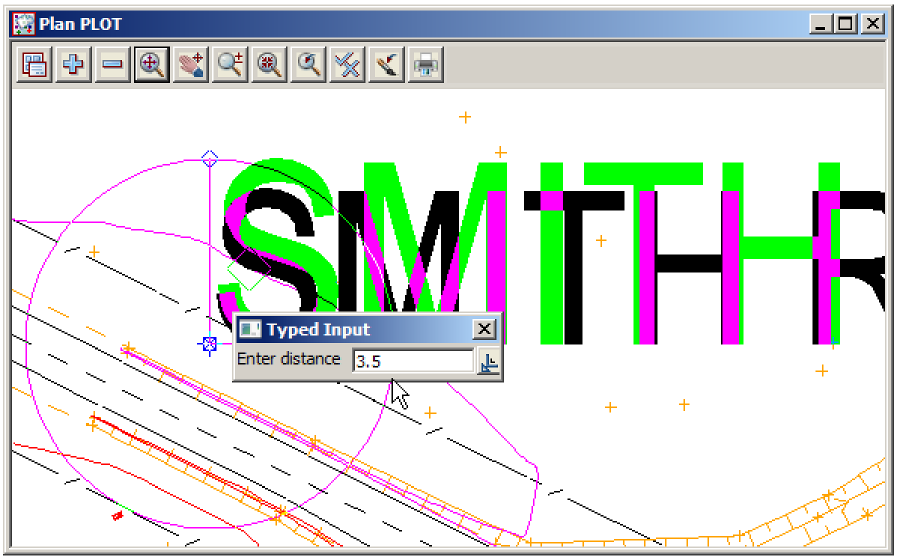
.

Pick and accept the top left node


Plan PLOT
SMITH ROAD

As you move the cursor the text is resized. Accept with middle button

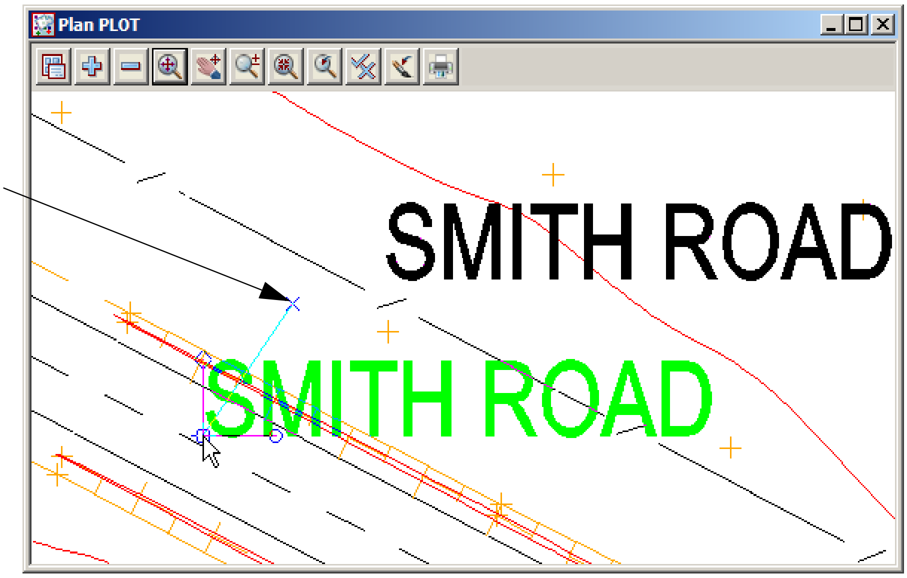
To type in a text size simply type in the value and press [Enter]


Plan PLOT
SMITH
Typed Input

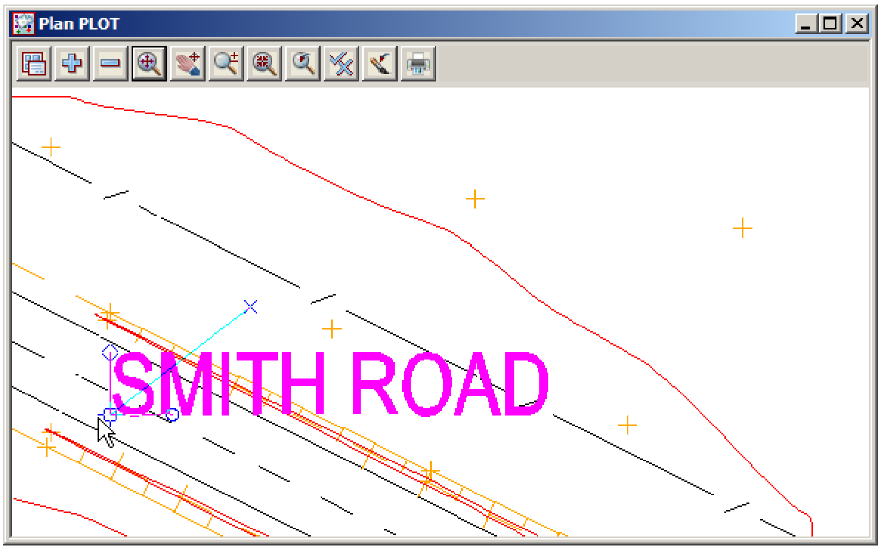
Enter distance 3.5

Moving text

.


Plan PLOT
SMITH ROAD
SMITH ROAD

Pick and accept the bottom left node


Plan PLOT
SMITH ROAD

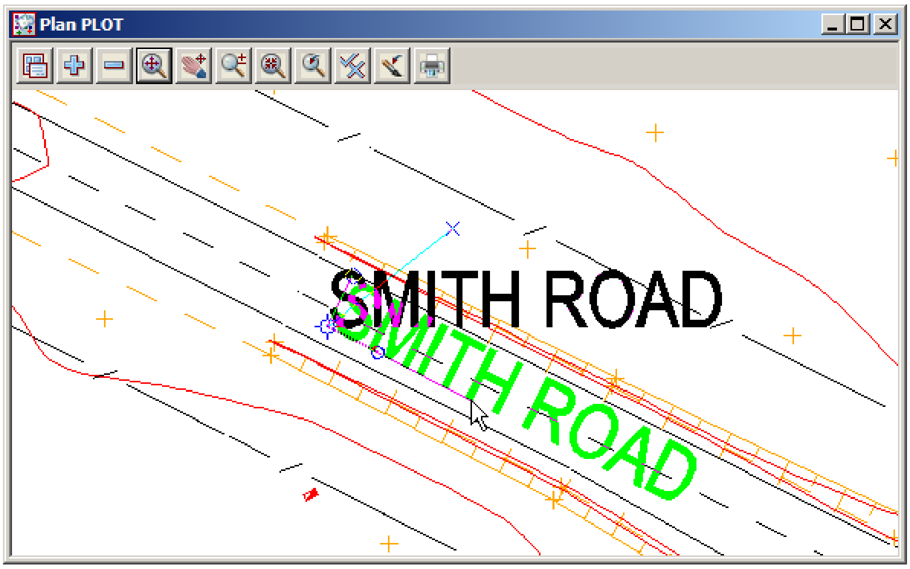
As you move the cursor the text moves. Pick and accept the new position

Rotating text

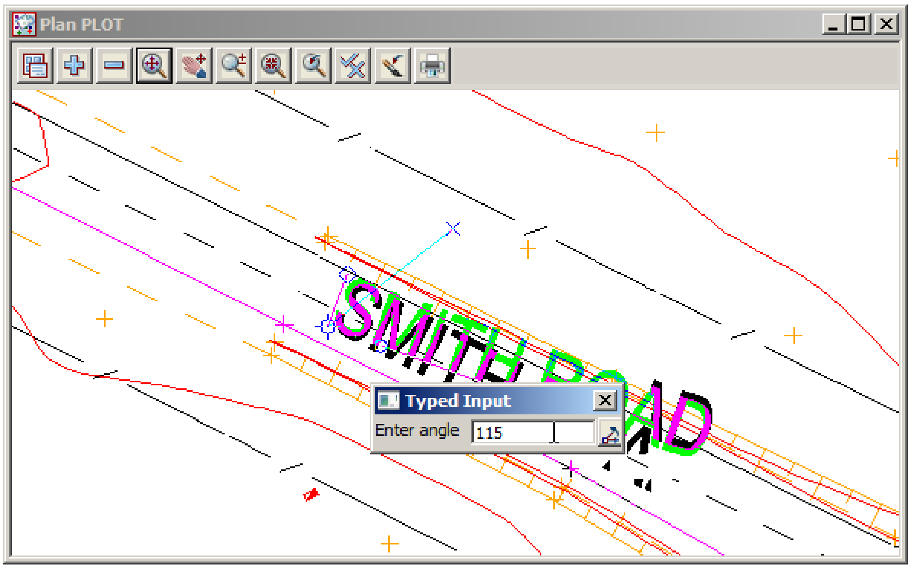
.

Pick the bottom right node

As you move the cursor the text rotates. Accept with middle button

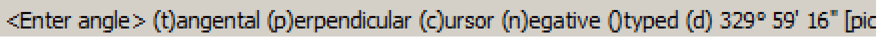

Plan PLOT
SMITH ROAD
SMITH ROAD

To rotate to a set angle simply type in the value and press [Enter]


Plan PLOT
SMITH ROAD
Typed Input

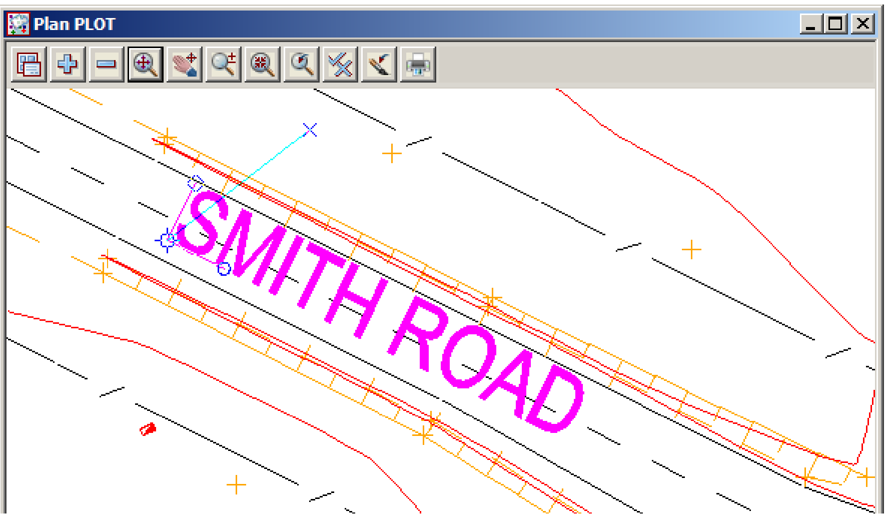
Enter angle 115

Additional keystrokes displayed at the bottom of the screen can be used to rotate tangential or perpendicular to a selected string



<Enter angle> (t)angental (p)erpendicular (c)ursor (n)egative ()typed (d) 329° 59' 16" [pic

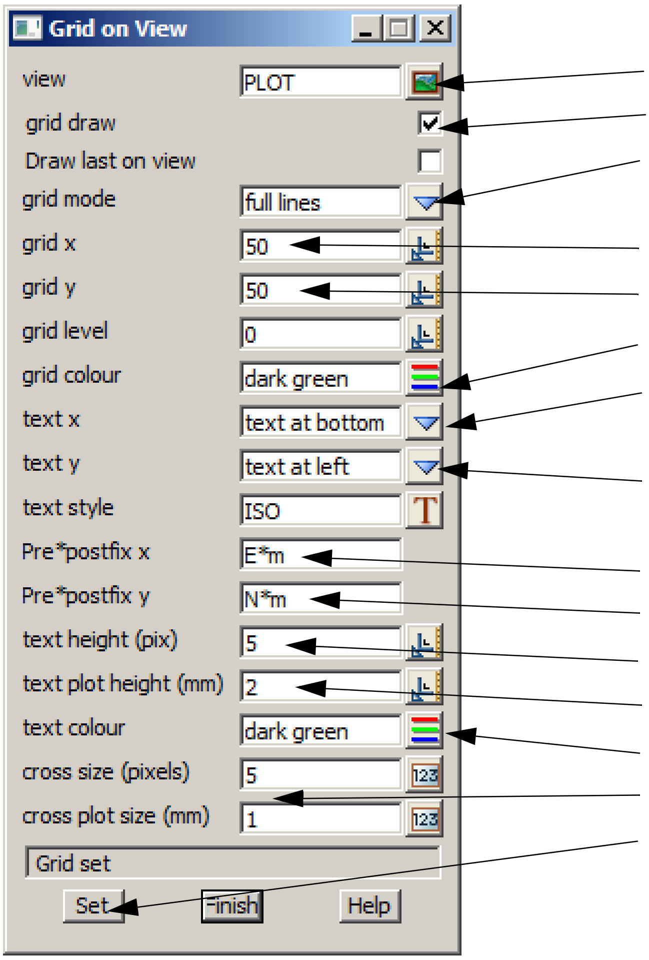
In the example here the key **T** was pressed and the fence string was picked to align the text to the fence line


Plan PLOT
SMITH ROAD

9.10.6 Grid display

A grid can be displayed and plotted with user defined attributes such as grid type, spacing, text placement and prefix / postfix additions to values

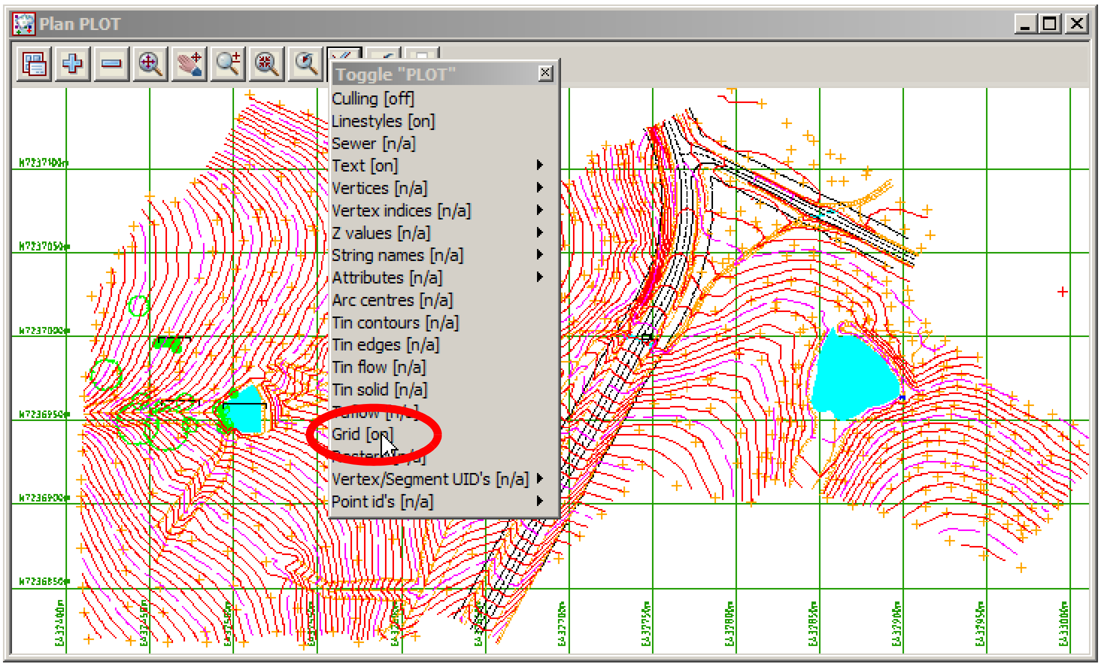
Select *Menu* icon then walk right on *Settings=>Grid*


Grid on View
Grid set
Set
Finish
Help

view PLOT
grid draw ☑
Draw last on view ☐
grid mode full lines
grid x 50
grid y 50
grid level 0
grid colour dark green
text x text at bottom
text y text at left
text style ISO
Pre*postfix x E*m
Pre*postfix y N*m
text height (pix) 5
text plot height (mm) 2
text colour dark green
cross size (pixels) 5
cross plot size (mm) 1

Select view **PLOT**
Tick the **grid draw** check box
Select **grid mode** choice icon
Select **full lines**
Type in the **grid x** (width) value
Type in the **grid y** (height) value
Select **grid colour**
Select **text x** choice icon
Select **text at bottom**
Select **text y** choice icon
Select **text at left**
Type in text to prefix/suffix the x values
Type in text to prefix/suffix the x values
Type in **text height** in pixels
Type in **text plot height** in mm
Select **text colour**
Type in **cross size** in pixels and mm
Select **Set**

The grid can be turned on and off using the **Toggle** icon then selecting **Grid**

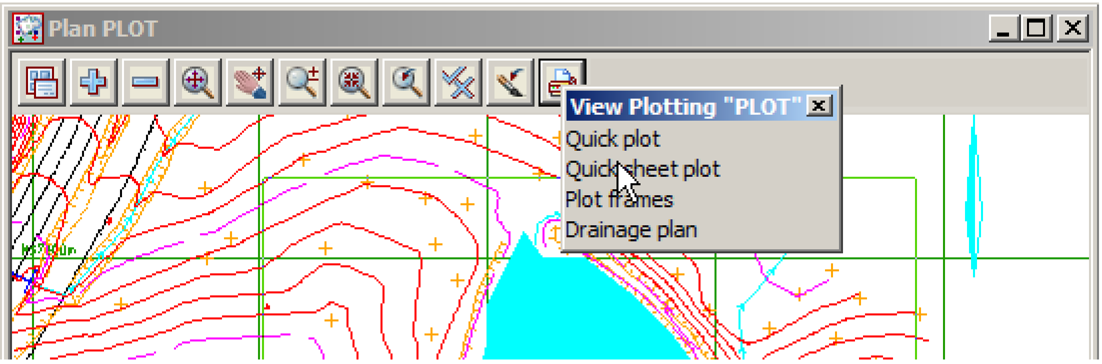

Plan PLOT
Toggle "PLOT"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Grid [on]
Vertex/Segment UID's [n/a]
Point id's [n/a]

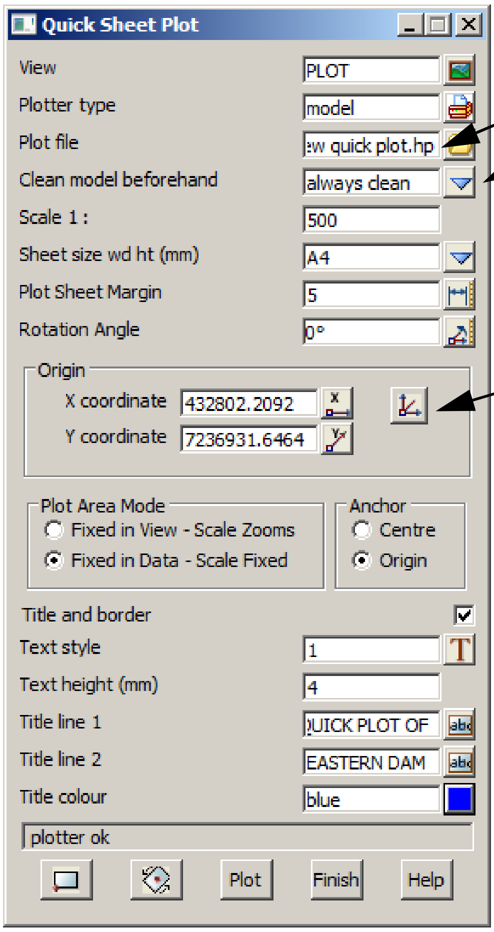
9.10.7 Quick sheet plot

A section of the survey can be easily plotted without the need to set up a plot frame.

Zoom in to point 2722

Select **Print** icon then select **Quick sheet plot**





View	PLOT
Plotter type	model
Plot file	w quick plot.hp
Clean model beforehand	always clean
Scale 1 :	500
Sheet size wd ht (mm)	A4
Plot Sheet Margin	5
Rotation Angle	0°

Origin

X coordinate	432802.2092
Y coordinate	7236931.6464

Plot Area Mode
○ Fixed in View - Scale Zooms
● Fixed in Data - Scale Fixed

Anchor
○ Centre
● Origin

Title and border	☑
Text style	1
Text height (mm)	4
Title line 1	UICK PLOT OF
Title line 2	EASTERN DAM
Title colour	blue

plotter ok

Fill in the panel as shown. Make sure that the plotter type is **model** so that we can preview the plot.

Type in **preview quick plot** for the model name

Select **always clean** as clean model mode

Select the location of the lower left corner of the plot sheet

There are two types of plotting methods. The first is ***Fixed in View***

Using this option the view can be zoomed in or out and the plot frame size stays linked to the view edge

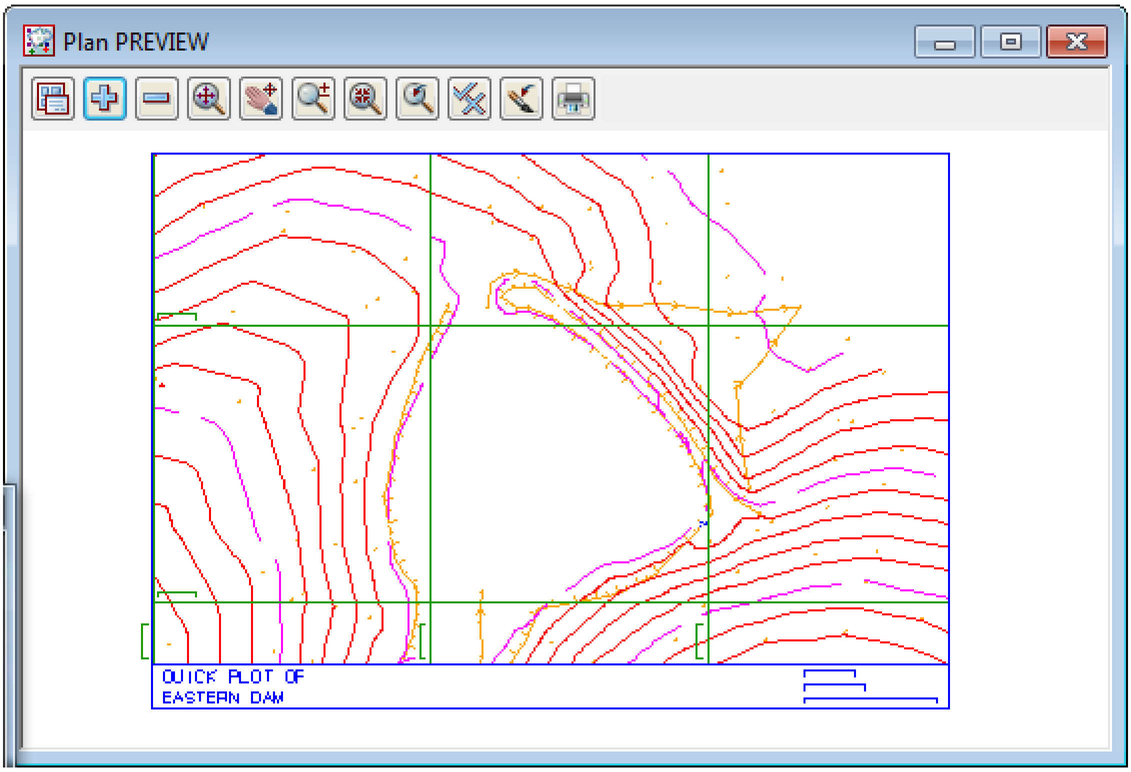
Fixed in Data uses the parameters in the panel such as Scale and origin coordinates

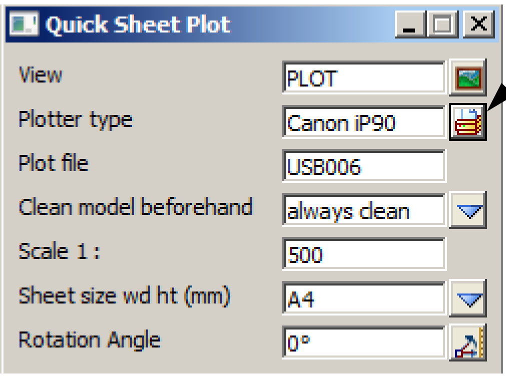
We are using ***Fixed in Data*** for the following plot

Fill in the rest of the panel as shown

Click on **Plot**

Create a new view called **PREVIEW** and turn on the model of the plot


Plan PREVIEW
QUICK PLOT OF
EASTERN DAM


Quick Sheet Plot

View PLOT
Plotter type Canon iP90
Plot file USB006
Clean model beforehand always clean
Scale 1 : 500
Sheet size wd ht (mm) A4
Rotation Angle 0°

Once the plot model has been checked the plotter type can be changed for output to a printer

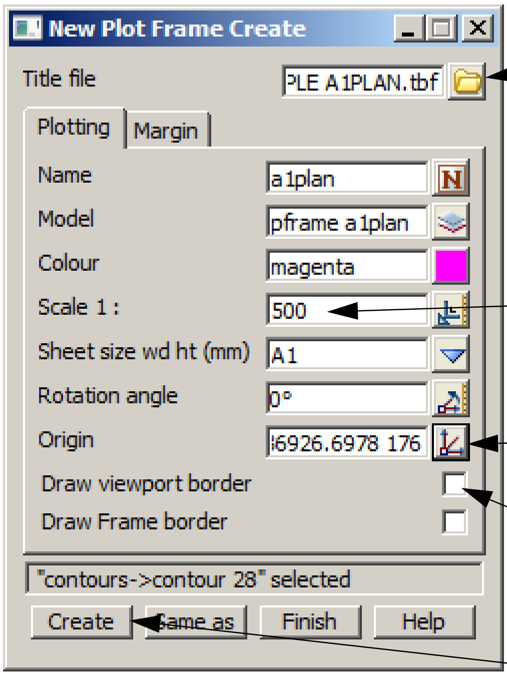
Once the printer has been configured select Plot to send the plot to the printer

9.10.8 Plotting Using Plot Frame

Create Plot Frame

User defined plot frames can be placed over the survey. These frames show both the sheet size and plot area borders.

Select option ***Plot=>Plot frames=>Create***.


New Plot Frame Create
Plotting
Margin
Create
Same as
Finish
Help

Title file PLE A1PLAN.tbf

Name a1plan

Model pframe a1plan

Colour magenta

Scale 1 : 500

Sheet size wd ht (mm) A1

Rotation angle 0°

Origin 6926.6978 176

Draw viewport border ☐

Draw Frame border ☐

"contours->contour 28" selected

Select title file **SAMPLE A1PLAN.tbf** from the User_lib folder

The panel is filled with data read from the title block file

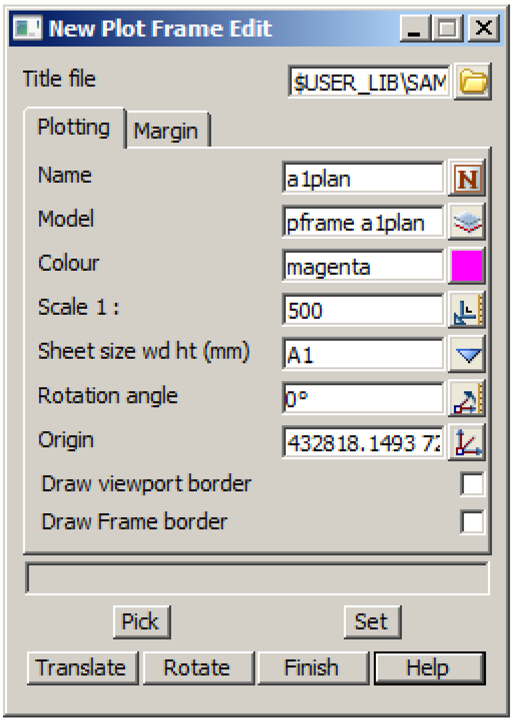
Type in the proposed plot scale

Select the **Origin** selection icon then select and accept a point at the lower left of the survey

Untick the **Draw viewport border** check box

Select **Create**

The panel is converted to an **Edit** panel


New Plot Frame Edit
Plotting
Margin
Pick
Set
Translate
Rotate
Finish
Help

Title file $USER_LIB\SAM

Name a1plan

Model pframe a1plan

Colour magenta

Scale 1 : 500

Sheet size wd ht (mm) A1

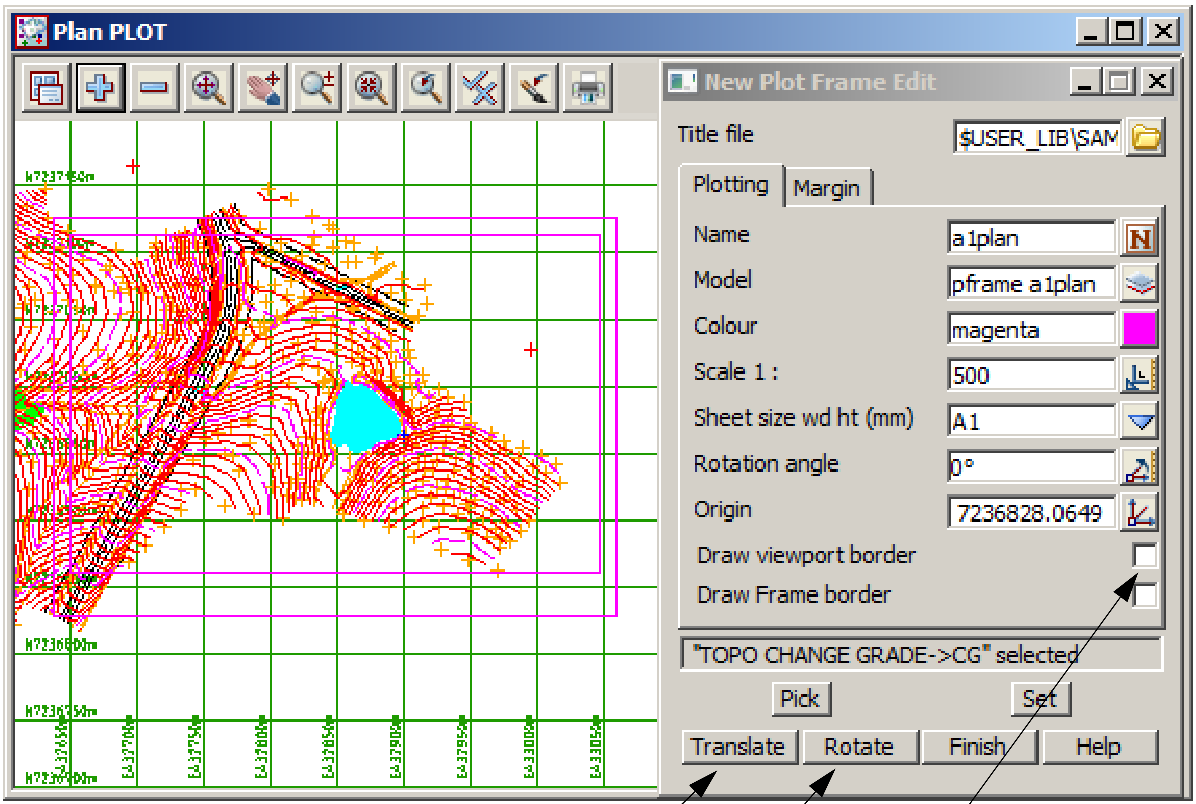
Rotation angle 0°

Origin 432818.1493 7

Draw viewport border ☐

Draw Frame border ☐

Turn on the model **pframe a1plan**


Plan PLOT
New Plot Frame Edit
Plotting
Margin
Pick
Set
Translate
Rotate
Finish
Help

Title file $USER_LIB\SAM

Name a1plan

Model pframe a1plan

Colour magenta

Scale 1 : 500

Sheet size wd ht (mm) A1

Rotation angle 0°

Origin 7236828.0649

Draw viewport border ☐

Draw Frame border ☐

"TOPO CHANGE GRADE->CG" selected

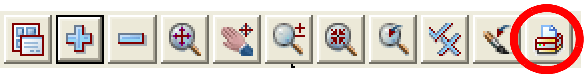
To move the plot frame over the survey select **Translate** and move the plot frame manually to the required position. Select and accept that position

To rotate the plot frame type in a rotation angle or select **Rotate** and use the cursor to change the rotation. Select and accept the position.

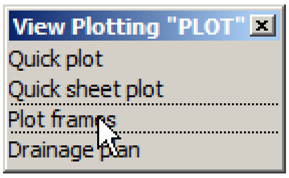
Untick the **Draw viewport border** check box then select **Set** then **Finish**

Create Plot Using Plot frame PPF Editor

Select option ***Plot=>Plot frames=>Plot*** or select the plan view plotting icon

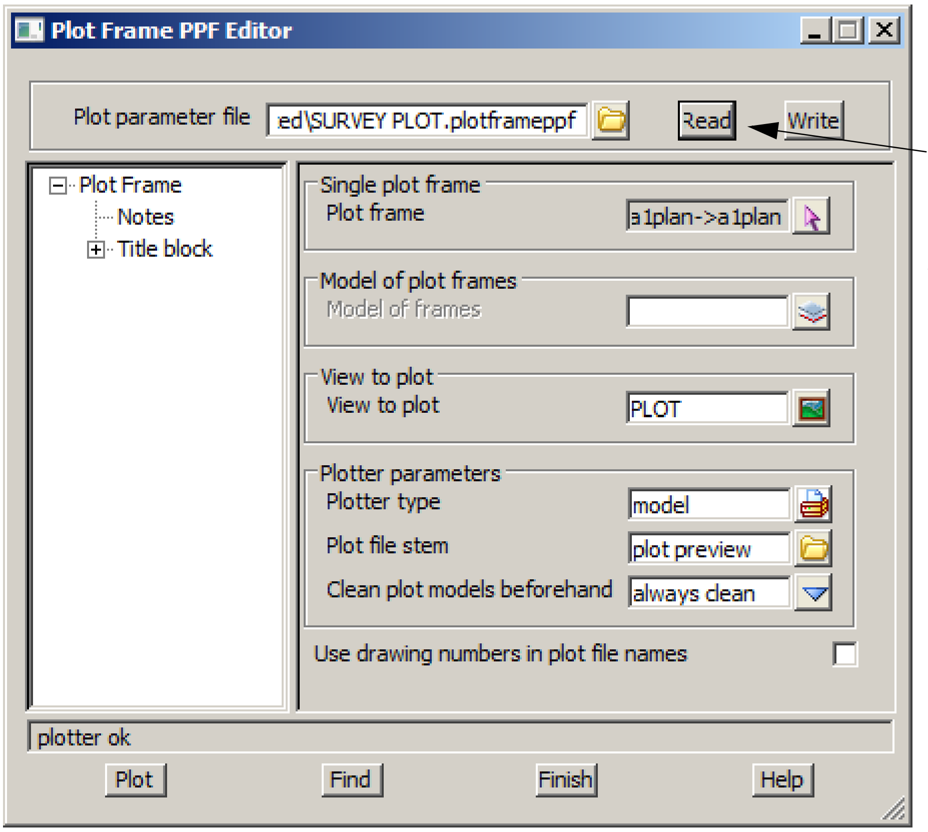


Select the option **Plot frames**


View Plotting "PLOT"
Quick plot
Quick sheet plot
Plot frames
Drainage plan

This brings up the **Plot frame PPF Editor** panel

Read in the sample plot parameter file from the User_lib folder called **SURVEY PLOT.plotframeppf**


Plot Frame PPF Editor
Read
Write
Plot Frame
Notes
Title block
Single plot frame
Model of plot frames
View to plot
Plotter parameters
Plot
Find
Finish
Help

Plot parameter file: ed\SURVEY PLOT.plotframeppf

Plot frame: a1plan->a1plan

Model of frames:

View to plot: PLOT

Plotter type: model

Plot file stem: plot preview

Clean plot models beforehand: always clean

Use drawing numbers in plot file names ☐

plotter ok

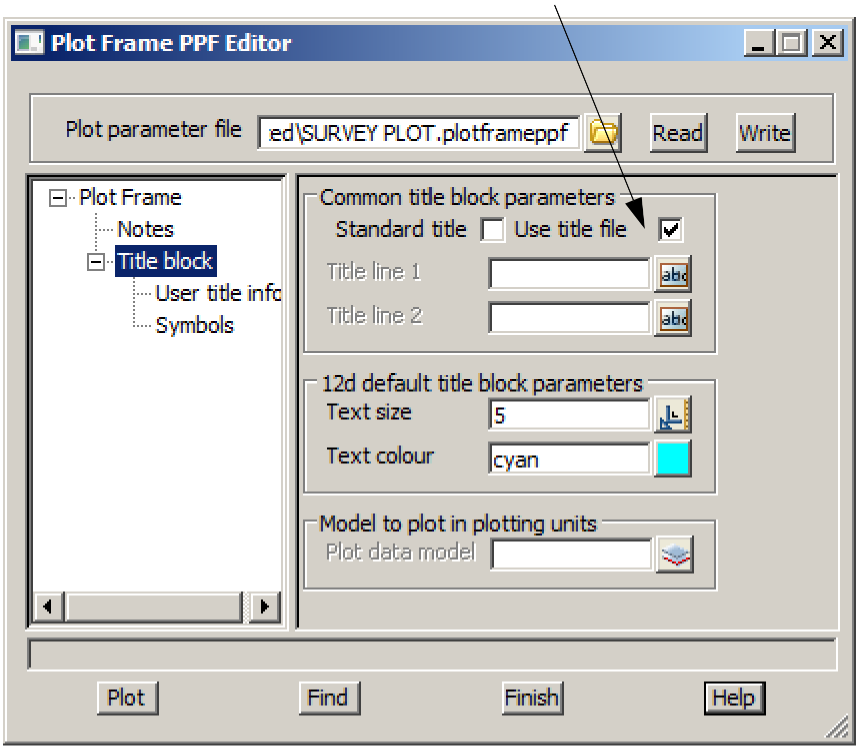
Select **Read**

The Plot Frame screen is filled in from the parameter file

The plot will be sent to a model called **plot preview**

Select **Title block**

We are using a title file so the **Use title file** check box is ticked


Plot Frame PPF Editor
Plot Frame
Notes
Title block
User title info
Symbols
Common title block parameters
Title line 1
Title line 2
12d default title block parameters
Model to plot in plotting units
Plot data model
Read
Write
Plot
Find
Finish
Help

Plot parameter file: ed\SURVEY PLOT.plotframeppf

Standard title ☐ Use title file ☑

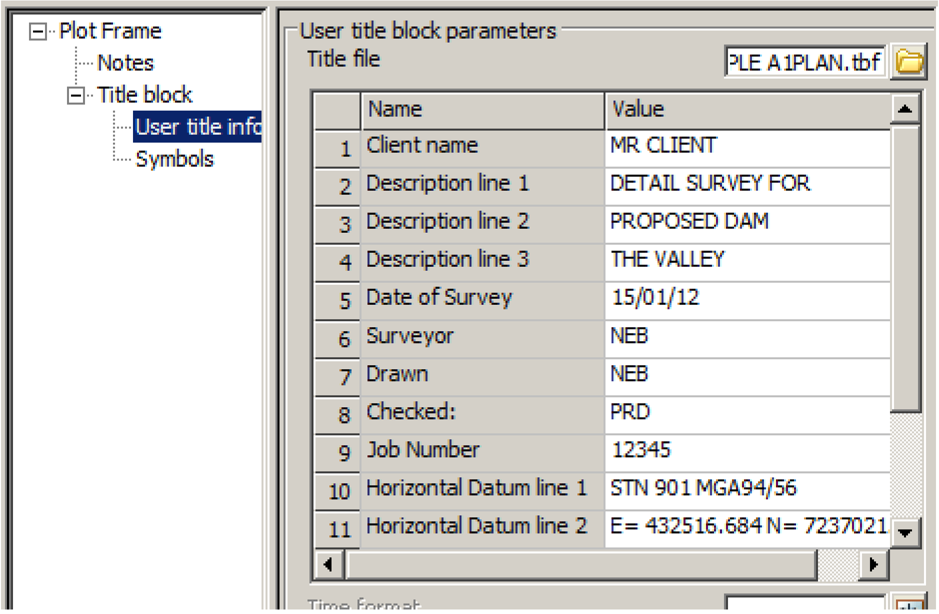
Text size: 5

Text colour: cyan

Select the [+] symbol to expand the next option

Select **User title info** to specify title file and title block text

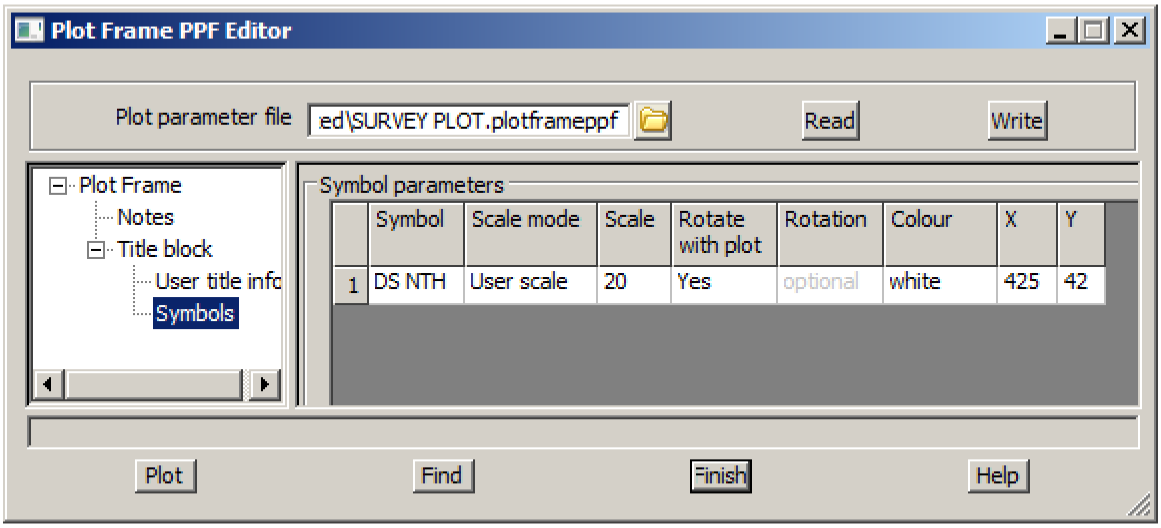
The values for the title file **SAMPLE A1PLAN** prompted data are filled in. To change any of the data eg date simply type over the top of the existing value


Plot Frame
Notes
Title block
User title info
Symbols
User title block parameters
Time format

Title file: PLE A1PLAN.tbf

	Name	Value
1	Client name	MR CLIENT
2	Description line 1	DETAIL SURVEY FOR
3	Description line 2	PROPOSED DAM
4	Description line 3	THE VALLEY
5	Date of Survey	15/01/12
6	Surveyor	NEB
7	Drawn	NEB
8	Checked:	PRD
9	Job Number	12345
10	Horizontal Datum line 1	STN 901 MGA94/56
11	Horizontal Datum line 2	E= 432516.684 N= 7237021

Select **Symbols**

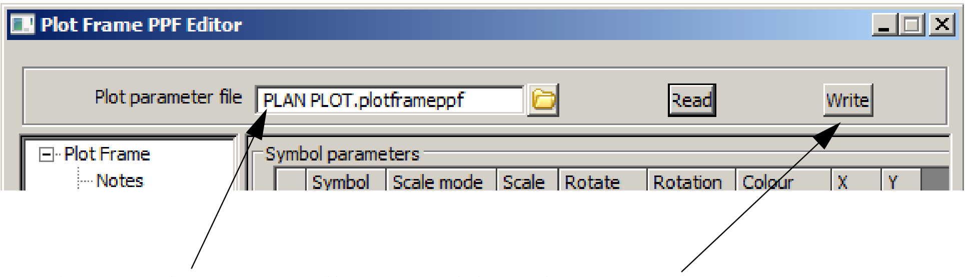

Plot Frame PPF Editor
Read
Write
Plot Frame
Notes
Title block
User title info
Symbols
Symbol parameters
Plot
Find
Finish
Help

Plot parameter file: ed\SURVEY PLOT.plotframeppf

	Symbol	Scale mode	Scale	Rotate with plot	Rotation	Colour	X	Y
1	DS NTH	User scale	20	Yes	optional	white	425	42

A rotating North point symbol called **DS NTH** has ben selected to sit just left of the title file logo. This symbol will automatically rotate with the plot frame

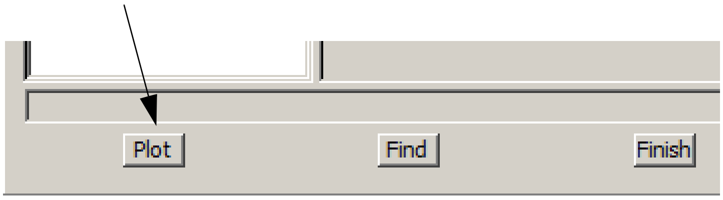
Prior to creating the plot we need to create a new Plot parameter file that sits locally in the project. We don’t ever update one we have read in as it may be a template for other users


Plot Frame PPF Editor
Read
Write
Plot Frame
Notes
Symbol parameters
Symbol
Scale mode
Scale
Rotate
Rotation
Colour
X
Y

Plot parameter file: PLAN PLOT.plotframeppf

Type in a new plot parameter file name and then select **Write**

Once the parameter file is created sleect plot to create the plot preview model


Plot
Find
Finish

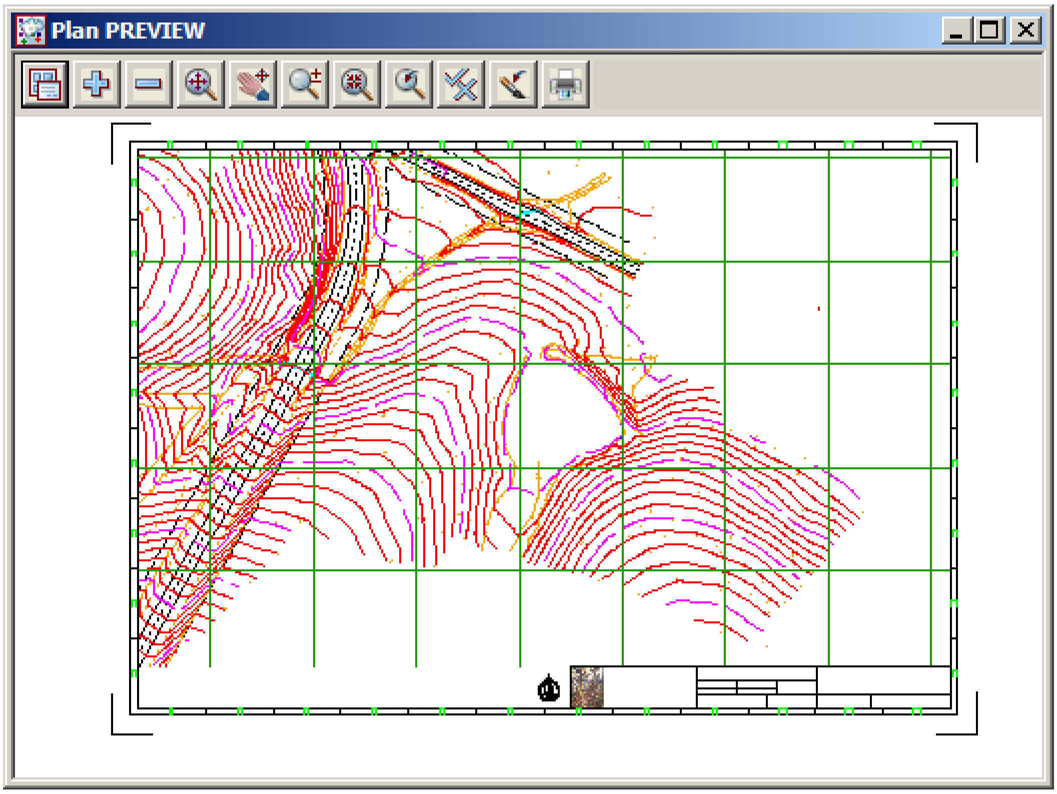
Display and check the plot

Move the panel to the bottom of the screen

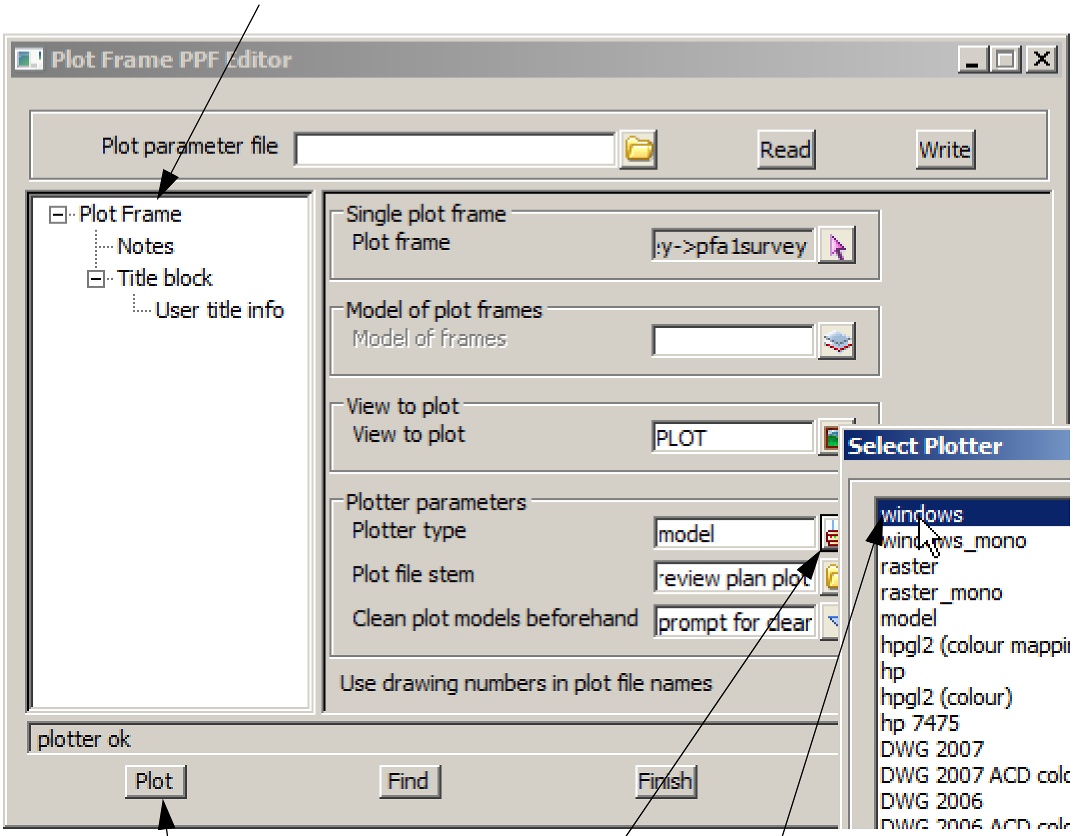
The plot has been created in the model called **plot preview1**

In the view **PREVIEW** turn off all models and then turn on model **plot preview1**

The preview can be checked for errors prior to plotting to the plotter.



Once the preview model has been checked, bring up the **Plot Frame PPF Editor** panel and select Plot Frame



Plot parameter file

Single plot frame

Plot frame: :y->pfa1survey

Model of plot frames

Model of frames

View to plot

View to plot: PLOT

Plotter parameters

Plotter type: model

Plot file stem: review plan plot

Clean plot models beforehand: prompt for clear

Use drawing numbers in plot file names

plotter ok

Plot Frame PPF Editor
Read
Write
Plot Frame
Notes
Title block
User title info
Plot
Find
Finish
Select Plotter
windows
windows_mono
raster
raster_mono
model
hpgl2 (colour mappi
hp
hpgl2 (colour)
hp 7475
DWG 2007
DWG 2007 ACD colo
DWG 2006
DWG 2006 ACD colo

Select the **Plotter type** icon

Select the required plot device as shown previously

Select **Plot** to send the plot to the selected device

10 Volumes

In this chapter we will look at various types of volume calculations including:

Stockpile volumes

Dam Capacity

Surface comparisons

Progressive quarry volumes

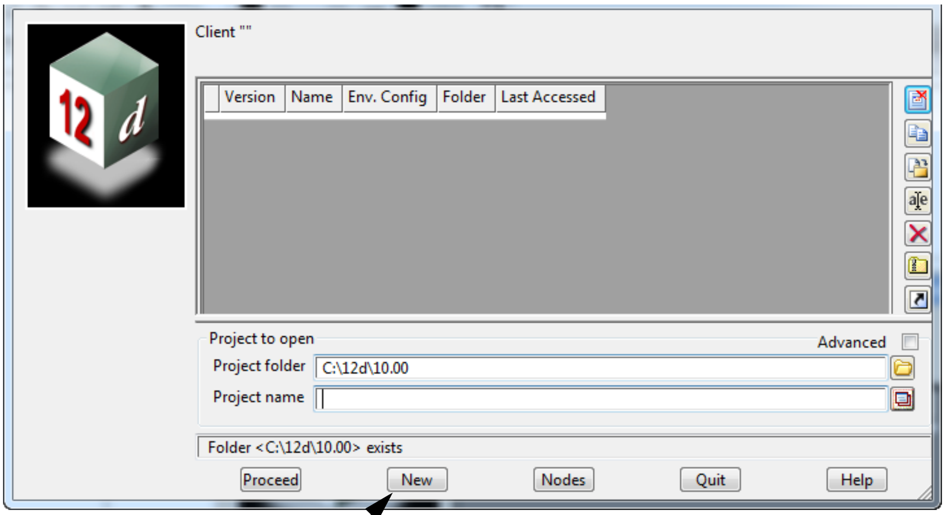
10.1 Stockpile volume

This topic deals with calculating the volume of a stockpile given data for both the existing surface prior to the stockpiles creation and the surface of the stockpile

A volume will be calculated between the triangulations (tin) of the two surfaces

To begin create a new project called **STOCKPILE** in the Survey training area

First, double click on the *12d Model 10* icon to bring up the **Project Selection** panel.

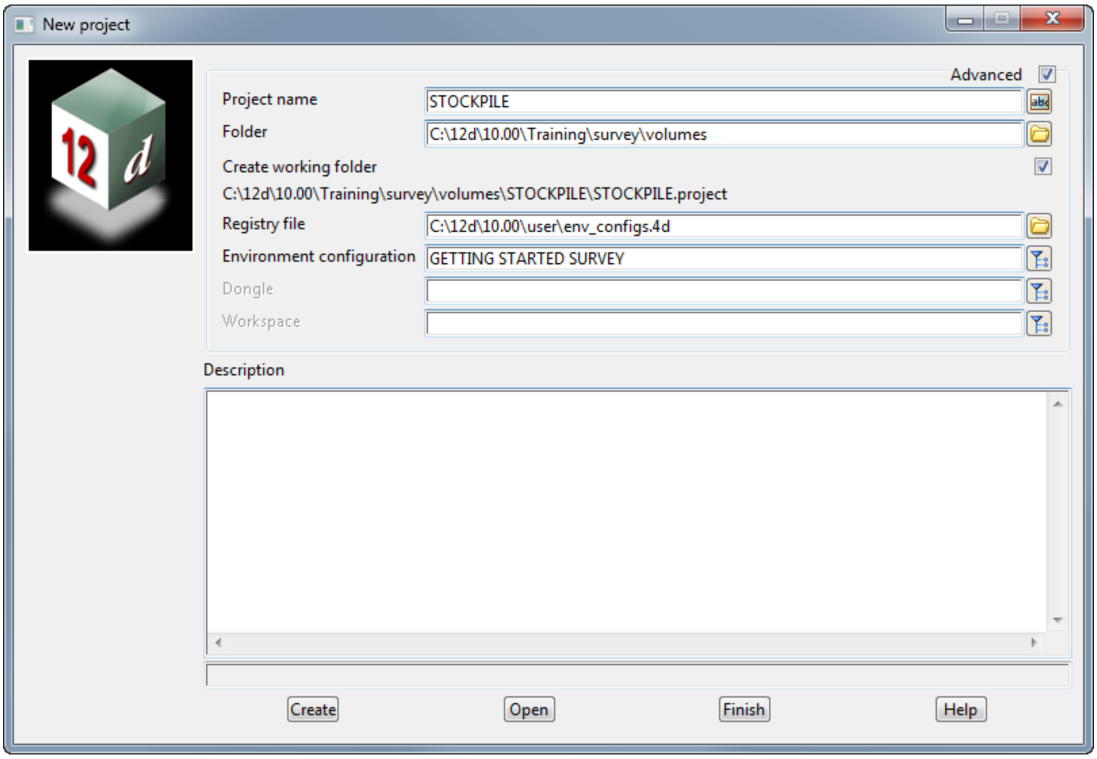

Client ""
Version
Name
Env. Config
Folder
Last Accessed
Project to open
Advanced
Proceed
New
Nodes
Quit
Help

Project folder C:\12d\10.00

Project name

Folder <C:\12d\10.00> exists

Select **New** button to bring up the **New project** panel.



Advanced ☑
Project name: STOCKPILE
Folder: C:\12d\10.00\Training\survey\volumes
Create working folder ☑
C:\12d\10.00\Training\survey\volumes\STOCKPILE\STOCKPILE.project
Registry file: C:\12d\10.00\user\env_configs.4d
Environment configuration: GETTING STARTED SURVEY
Dongle:
Workspace:
Description:

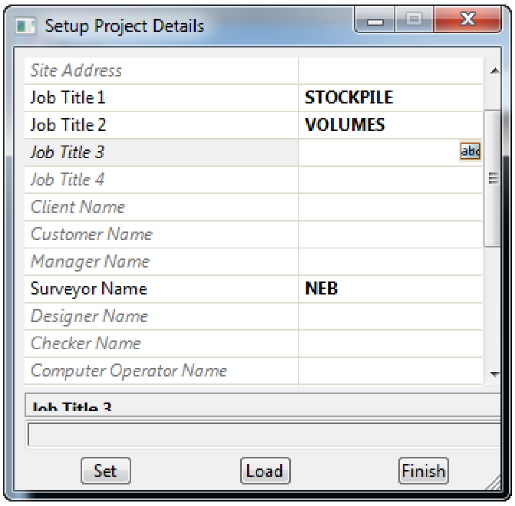
Create a project under the folder **C:\12d\10.00\Training\survey\volumes** called **STOCKPILE**

With the ***Create working folder*** check box ticked a working folder with the same name as the project will be also created

Select the Environment configuration **Configurations=>GETTING STARTED SURVEY** which is the one we set up in the previous chapters.

Select **[Create]** to create and open the project

Screen Setup



Site Address	
Job Title 1	STOCKPILE
Job Title 2	VOLUMES
Job Title 3	
Job Title 4	
Client Name	
Customer Name	
Manager Name	
Surveyor Name	NEB
Designer Name	
Checker Name	
Computer Operator Name	

Job Title 3

When the project starts up for the first time the **Project Details** panel appears

The information typed in here can be used when plotting from this project

Fill in the various prompts if necessary

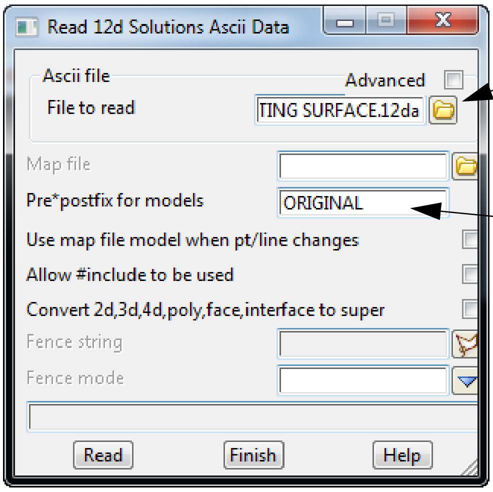
Select **Set** then **Finish** to save the settings and continue

10.1.1 Existing surface

We will read in the data for the existing surface. The data is in the form of a 12d ascii file

Read in data

Select option ***File I/O=>Data Input=>12da/4da data***



Read 12d Solutions Ascii Data
Ascii file
Advanced ☐
Map file
Use map file model when pt/line changes ☐
Allow #include to be used ☐
Convert 2d,3d,4d,poly,face,interface to super ☐
Fence string
Fence mode
Read
Finish
Help

File to read: TING SURFACE.12da

Pre*postfix for models: ORIGINAL

Browse up one level to the folder **C:\12d\10.00\Training\survey\volumes**

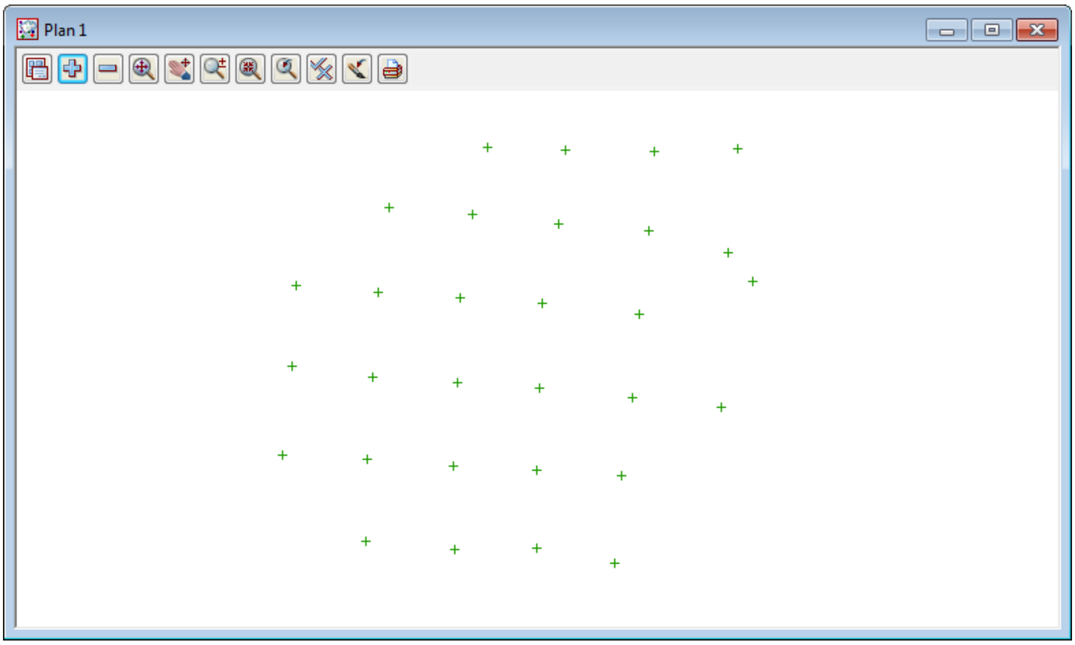
and select the file **STOCKPILE EXISTING SURFACE.12da**

Type in **ORIGINAL** for model prefix

This will help separate data from multiple files

Select **Read**

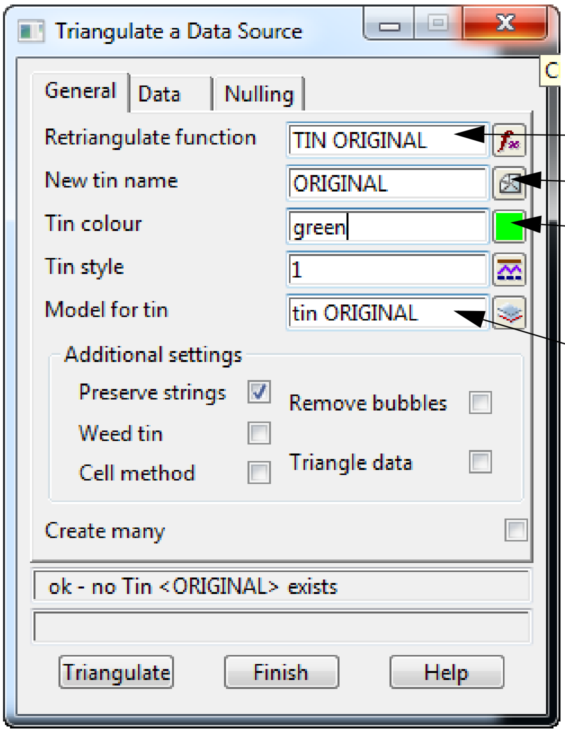
The survey points in model **ORIGINAL TOPO SURFACE LEVEL** appear



Triangulate the existing surface

We now form a tin using the points from the original surface.

Select ***Tins=>Create=>Triangulate data***


Triangulate a Data Source
General
Data
Nulling
Additional settings
Triangulate
Finish
Help

Retriangulate function: TIN ORIGINAL

New tin name: ORIGINAL

Tin colour: green

Tin style: 1

Model for tin: tin ORIGINAL

Preserve strings ☑ Remove bubbles ☐

Weed tin ☐

Cell method ☐ Triangle data ☐

Create many ☐

ok - no Tin <ORIGINAL> exists

Type in the function name **TIN ORIGINAL**

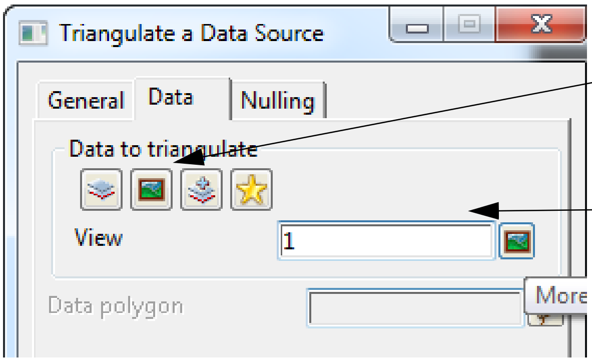
Type in the tin name **ORIGINAL [Enter]**

Select colour **green** for tin

When selecting **[Enter]** key after entering tin name the model name is automatically created with **tin** as the prefix

The only check box needed to be ticked is **Preserve strings** which will ensure breaklines are inserted at the time of triangulation

Select the **Data** tab


Triangulate a Data Source
General
Data
Nulling
Data to triangulate
More

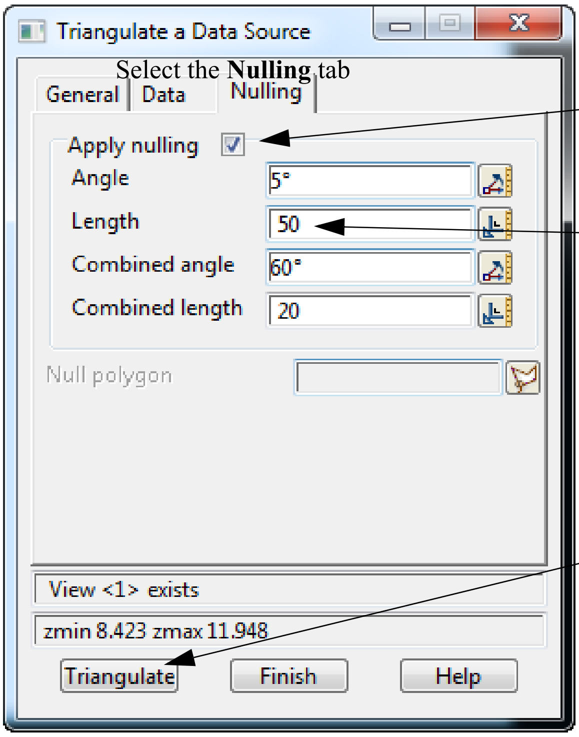
View 1

Data polygon

Select the view icon

Select view **1**

Select the **Nulling** tab


Triangulate a Data Source
General
Data
Nulling
Null polygon
Triangulate
Finish
Help

Apply nulling ☑

Angle 5°

Length 50

Combined angle 60°

Combined length 20

View <1> exists

zmin 8.423 zmax 11.948

Tick on **Apply nulling**

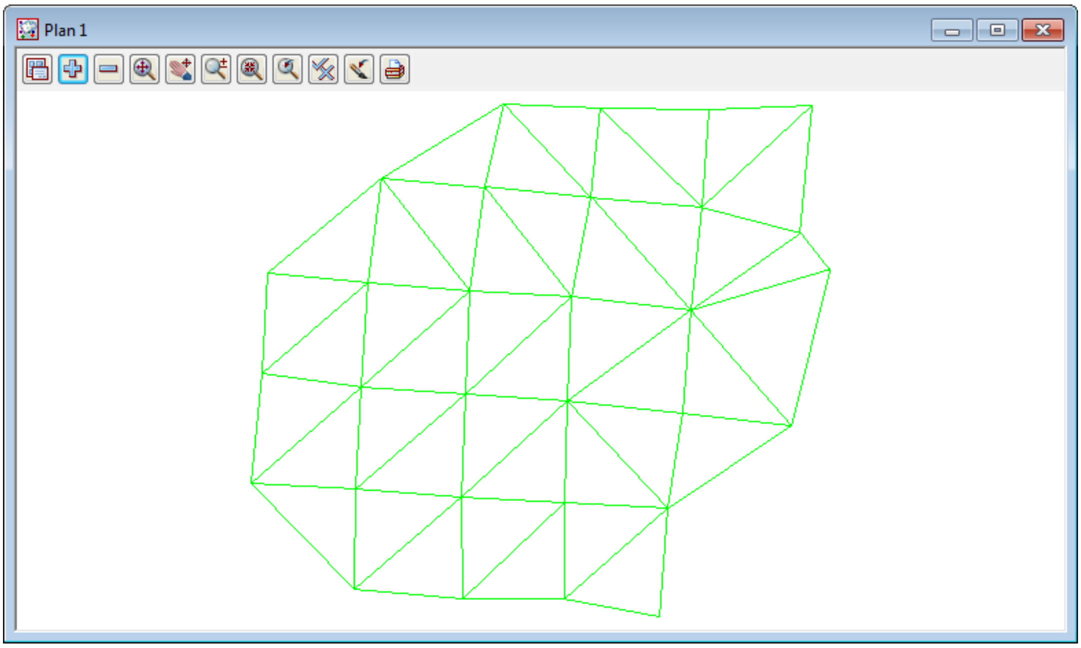
Change the length to **50**

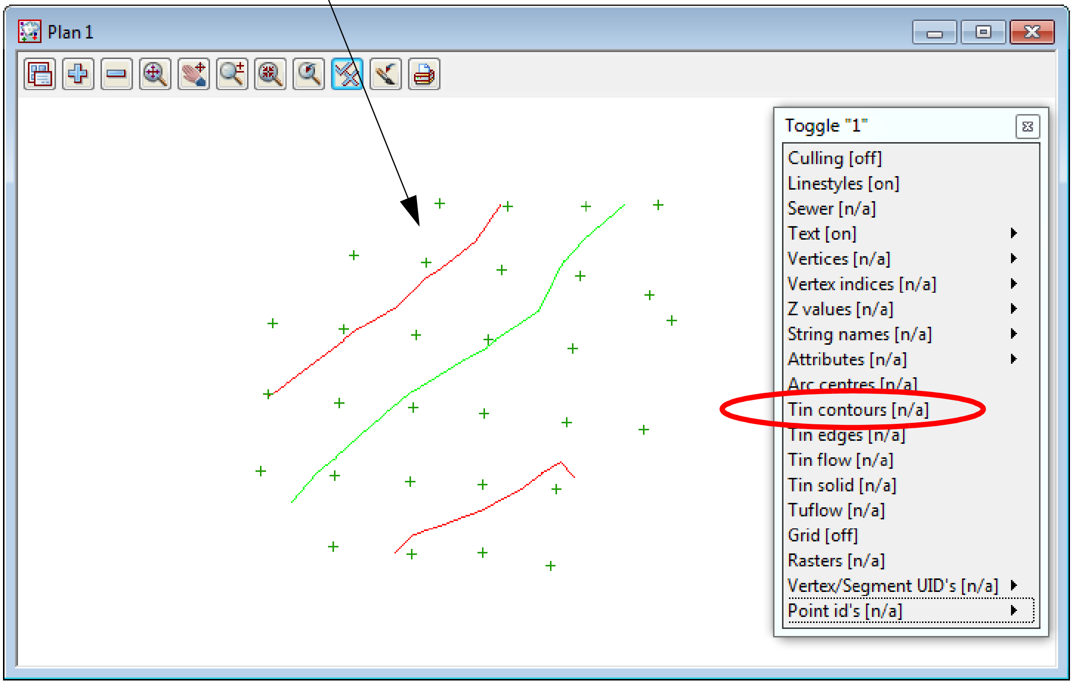
Select **Triangulate**

The panel changes to **Retriangulate tin**.

Select **Finish**

Turn on the model **tin ORIGINAL** to view the triangulation




Plan 1
Toggle "1"
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [n/a]

Toggle on the contours

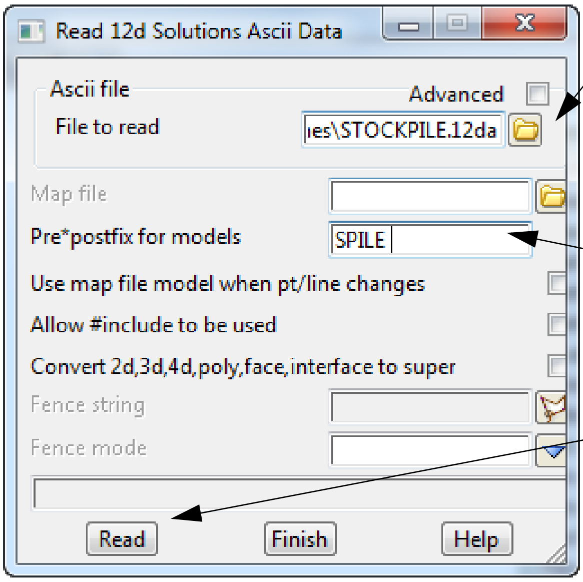
10.1.2 Stockpile surface

We will now read in the data for the stockpile surface. The data is again in the form of a 12d ascii file but this file also includes the tin of the stockpile surface

Firstly turn off all existing models

Read in data

Select option ***File I/O=>Data Input=>12da/4da data***


Read 12d Solutions Ascii Data
Ascii file
Advanced ☐
Map file
Use map file model when pt/line changes ☐
Allow #include to be used ☐
Convert 2d,3d,4d,poly,face,interface to super ☐
Fence string
Fence mode
Read
Finish
Help

File to read: ıes\STOCKPILE.12da

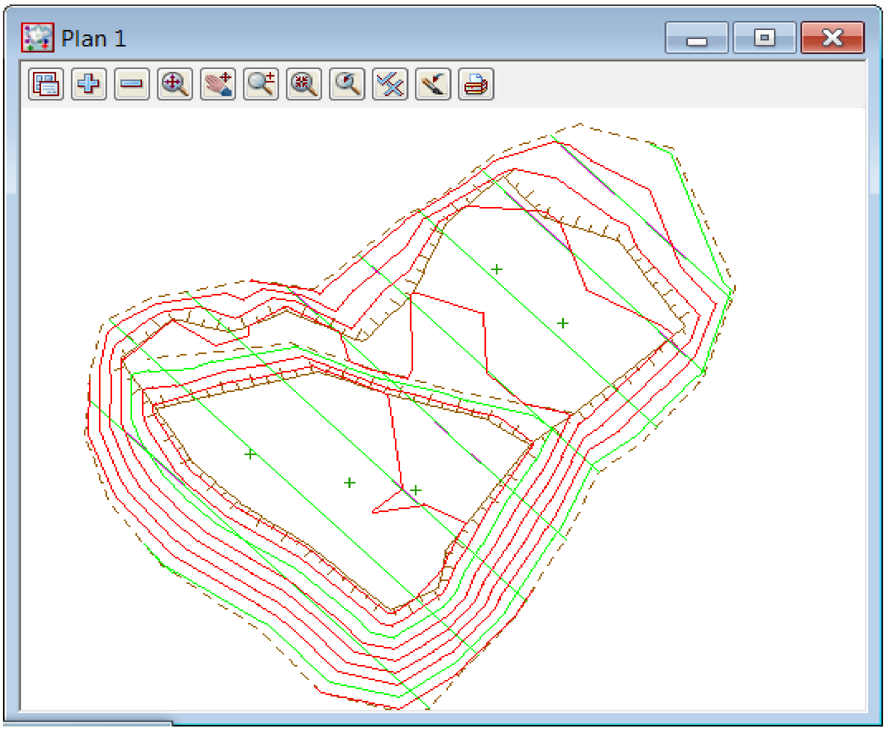
Pre*postfix for models: SPILE

Browse up one level to the folder **C:\12d\10.00\Training\survey\volumes** and select the file **STOCKPILE.12da**

Type in "**SPILE** " for model prefix

Select **Read**

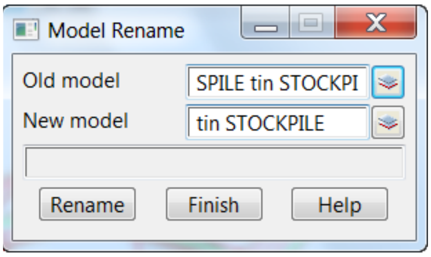
The survey points of the stockpile will appear along with the tin. The contours are displayed



The only issue with importing tins inside ascii files is that if the you tried to retriangulate the tin it will not work as the model names have changed due to the prefixing. Also the tin function name is not held in the 12d ascii file. So remember not to retin the data.

Also the tin model shouldn't really have a prefix as it is preferable to keep them all in the same area in the model list.

We can rename the tin model using the option ***Models=>Rename***



Old model SPILE tin STOCKPI

New model tin STOCKPILE

Select the model **SPILE tin STOCKPILE**

and rename to **tin STOCKPILE**

10.1.3 Check stockpile tin lies within existing tin

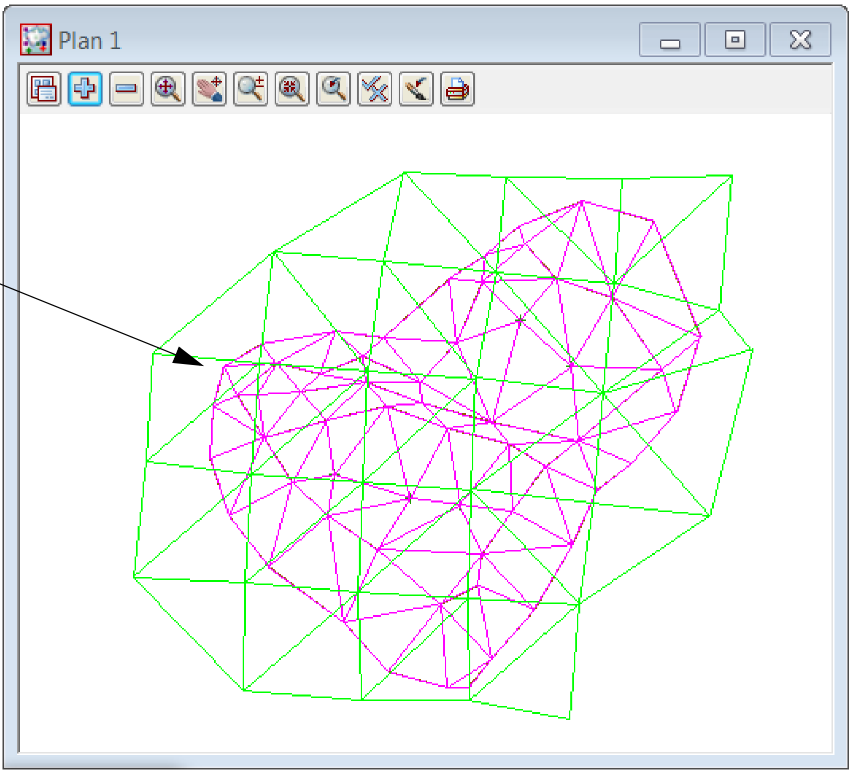
We will now turn on both triangle models to check that the stockpile tin sits inside the tin created from the existing surface points.

If this is not the case then the volume calculation will only cover the area where the two tins coincide.

Turn on model **tin ORIGINAL**

Toggle off the contours.

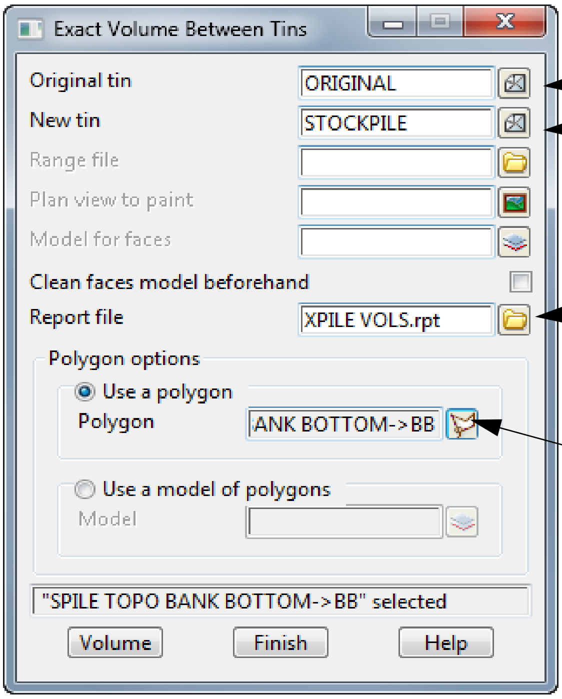
Ensure the outline of the stockpile triangulation lies completely inside the original surface triangulation



10.1.4 Calculate volumes by exact method

The volume between the two tins can now be calculated and written to a report file

Select ***Design=>Volumes=>Exact=>Tin to tin***



Original tin: ORIGINAL
New tin: STOCKPILE
Range file:
Plan view to paint:
Model for faces:
Clean faces model beforehand ☐
Report file: XPILE VOLS.rpt

Polygon options
● Use a polygon
Polygon: ANK BOTTOM->BB
○ Use a model of polygons
Model:

"SPILE TOPO BANK BOTTOM->BB" selected

Select **ORIGINAL** for original tin model

Select **STOCKPILE** for new tin model

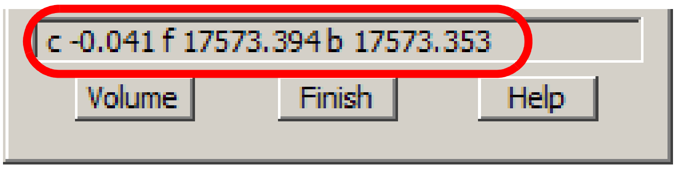
Type in **STOCKPILE VOLS** for report file name

NOTE - report files are not available in the 12d Model Practise Version

Select **Polygon** choice icon and then pick and accept the string around the edge of the stockpile

Select **Volume** to calculate the volume between the two surfaces

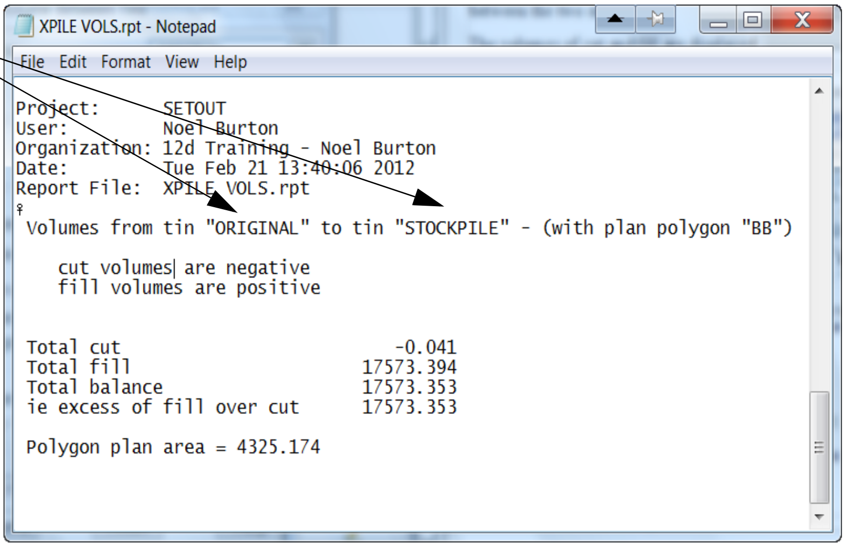
The volumes of cut and fill are displayed the bottom of the panel



c -0.041 f 17573.394 b 17573.353

The report is activated in the default text editor (*Notepad* is the default)

The two surfaces used are listed in the report header



```
Project:      SETOUT
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Tue Feb 21 13:40:06 2012
Report File:  XPILE VOLS.rpt

 Volumes from tin "ORIGINAL" to tin "STOCKPILE" - (with plan polygon "BB")

    cut volumes are negative
    fill volumes are positive


 Total cut                         -0.041
 Total fill                     17573.394
 Total balance                  17573.353
 ie excess of fill over cut     17573.353

 Polygon plan area = 4325.174
```

The volume of cut is listed along with the fill volume and the balance (Fill - Cut)

The polygon plan area is the horizontal area of the outline of the stockpile

Exit the text editor and select **Finish** on the Volume panel

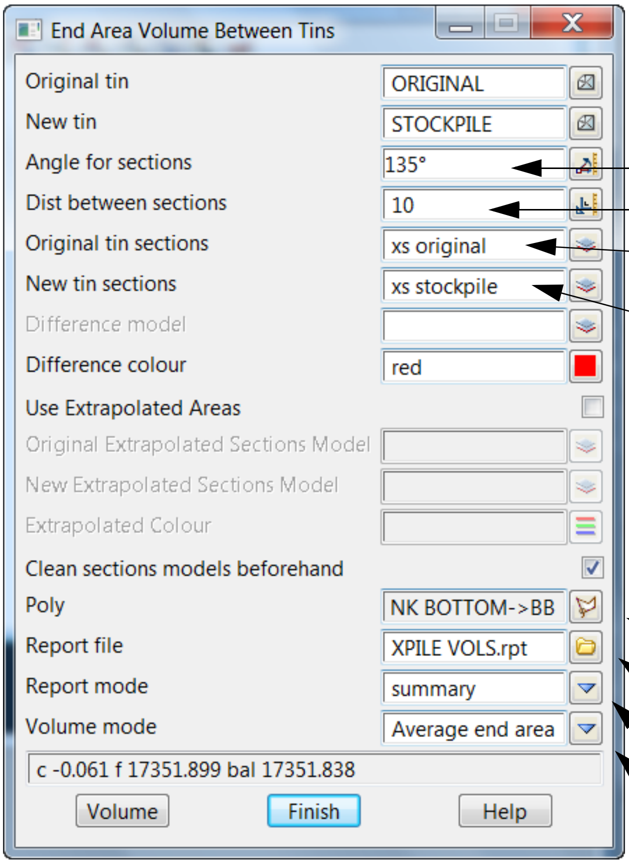
10.1.5 Calculate volumes by End area

Another type of volume calculation is the end area method. Volumes are calculated between cross sections generated through the stockpile. An alignment is not necessary to produce the sections.

Strings will be created at each cross section for viewing in the section view

It important to note that the smaller the separation of the sections the more accurate the volume

Select option ***Design=>Volumes=>End area=>Tin to tin***



End Area Volume Between Tins

Original tin	ORIGINAL
New tin	STOCKPILE
Angle for sections	135°
Dist between sections	10
Original tin sections	xs original
New tin sections	xs stockpile
Difference model	
Difference colour	red
Use Extrapolated Areas	☐
Original Extrapolated Sections Model	
New Extrapolated Sections Model	
Extrapolated Colour	
Clean sections models beforehand	☑
Poly	NK BOTTOM->BB
Report file	XPILE VOLS.rpt
Report mode	summary
Volume mode	Average end area

c -0.061 f 17351.899 bal 17351.838

Select **ORIGINAL** for original tin name

Select **STOCKPILE** for new tin name

Type in the angle **135** for the cross sections

Typed in **10** for the distance between sections

Type in **xs original** as existing section model name

Type in **xs stockpile** as stockpile section model name

Tick check box to clean section models

Select the **Poly** icon. Select the **String pick** icon then pick and accept the string around the edge of the stockpile

Select **Report mode** icon then pick **STOCKPILE VOLS.rpt**

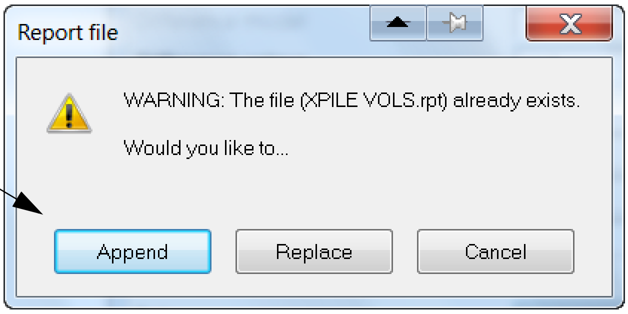
Select **Summary**

Select **Volume mode** choice icon then select **Average end area**

Select **Volume**

Select **Append** to append the volume results to the end of the previous report

NOTE - report files are not available in the 12d Model Practise Version

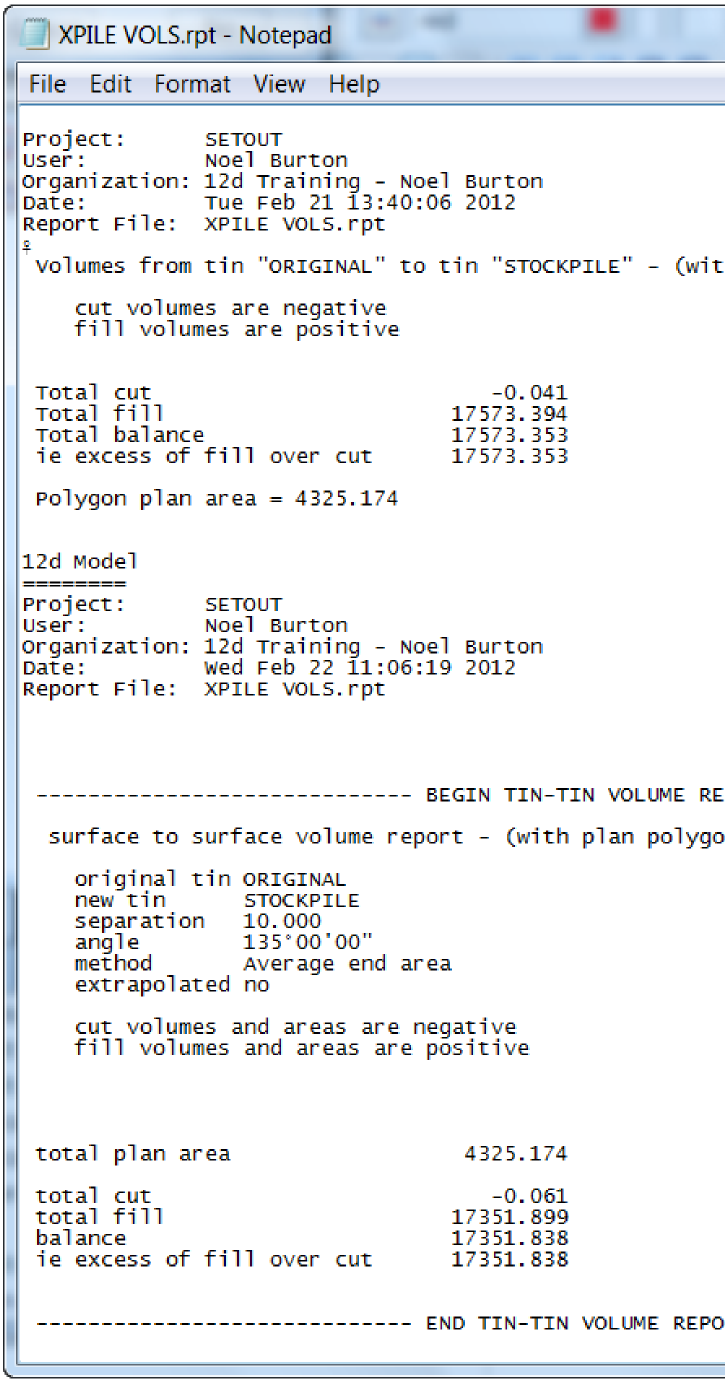


Report file

WARNING: The file (XPILE VOLS.rpt) already exists.

Would you like to...

As per the previous option the report is displayed



```
Project:      SETOUT
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Tue Feb 21 13:40:06 2012
Report File:  XPILE VOLS.rpt

 Volumes from tin "ORIGINAL" to tin "STOCKPILE" - (wit

    cut volumes are negative
    fill volumes are positive


 Total cut                          -0.041
 Total fill                      17573.394
 Total balance                   17573.353
 ie excess of fill over cut      17573.353

 Polygon plan area = 4325.174


12d Model
========
Project:      SETOUT
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Wed Feb 22 11:06:19 2012
Report File:  XPILE VOLS.rpt



 ----------------------------- BEGIN TIN-TIN VOLUME RE

  surface to surface volume report - (with plan polygo

    original tin ORIGINAL
    new tin      STOCKPILE
    separation   10.000
    angle        135°00'00"
    method       Average end area
    extrapolated no

    cut volumes and areas are negative
    fill volumes and areas are positive



 total plan area                  4325.174

 total cut                          -0.061
 total fill                      17351.899
 balance                         17351.838
 ie excess of fill over cut      17351.838


 ----------------------------- END TIN-TIN VOLUME REPO
```

The original report is amended with the volume by end area placed at the end of the report

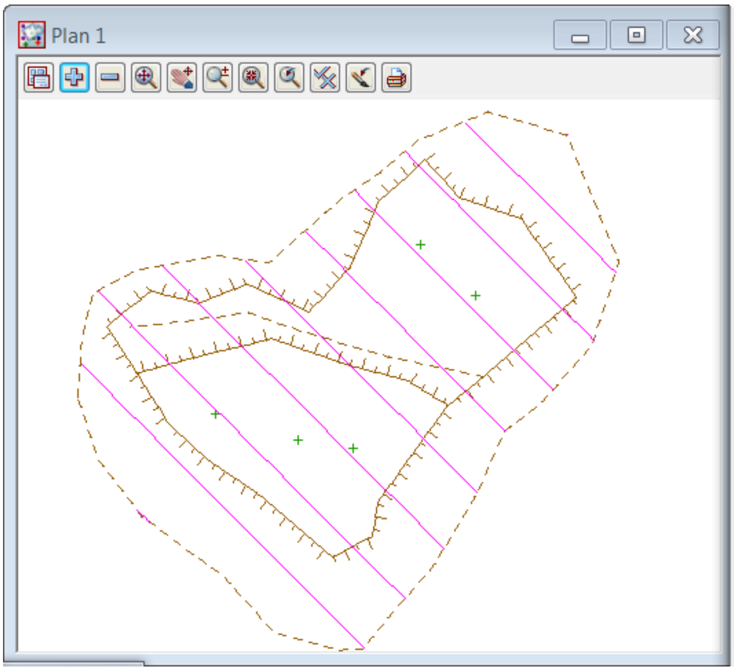
The distance between the sections is displayed

The direction of the section strings is displayed

The polygon plan area is the horizontal area of the outline of the stockpile

The volume of cut, fill and balance is listed

Turn on the cross section model **xs stockpile** and turn off the tins

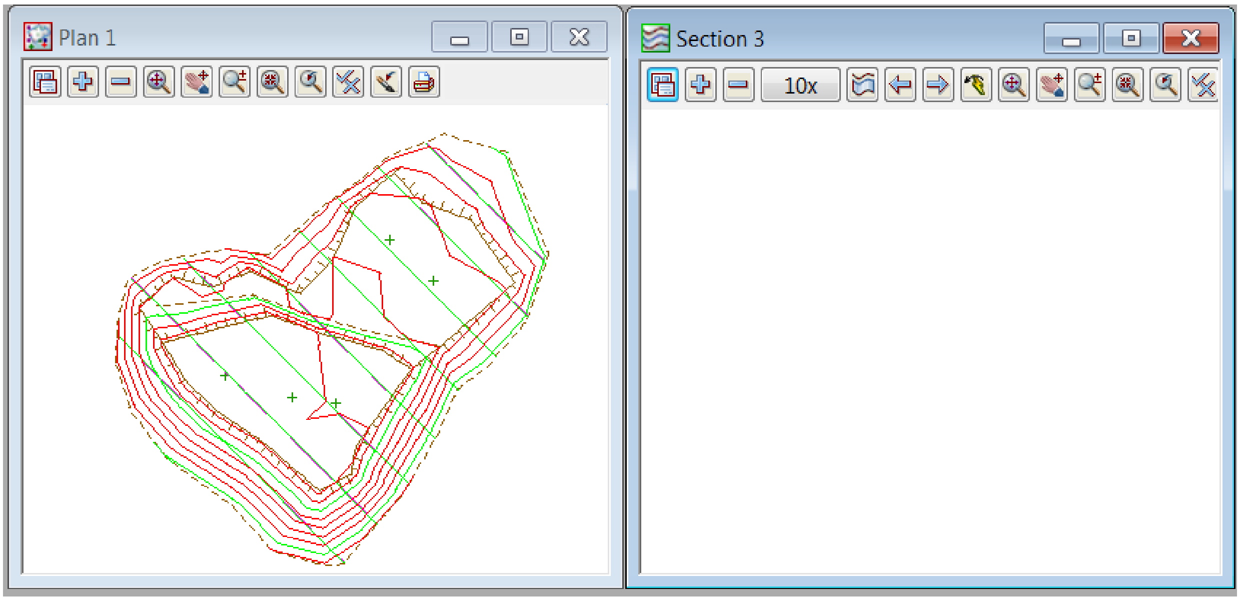


View stockpile sections

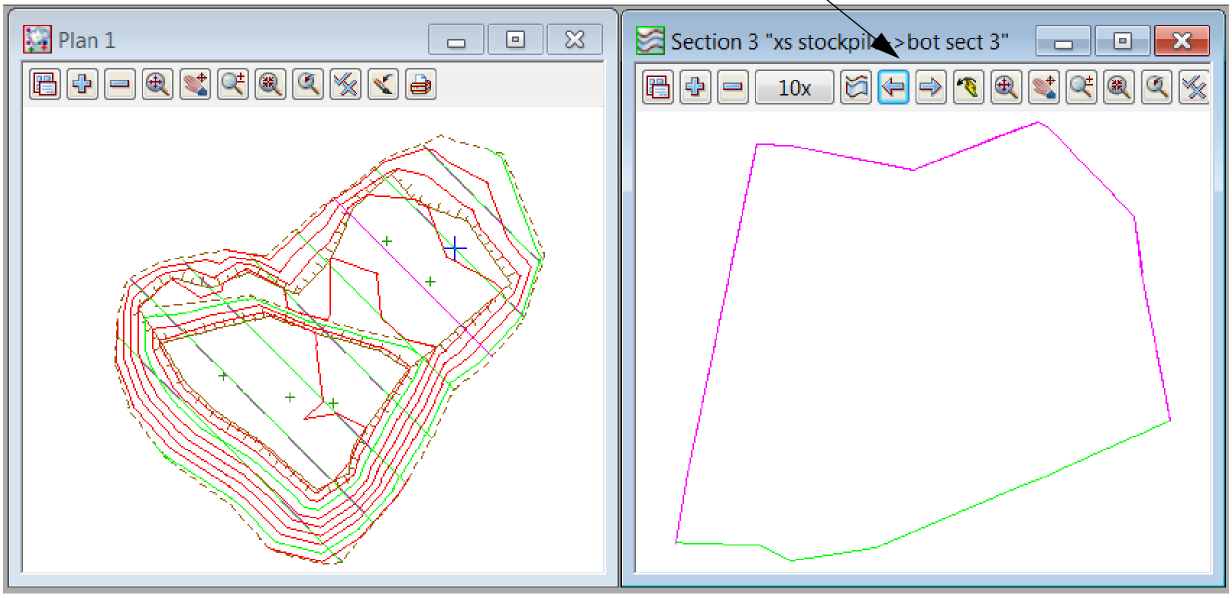
The cross sections can be viewed in a section view

To create a new section view select ***View=>New=>Section***

To place the section view beside the plan view select ***Window=>Tile Vertical***



Turn on the two tin models in the section view
To view the cross sections select the profile icon then pick and accept one of the section strings
To move along the sections use the **Prev** and **Next** icons


Plan 1
Section 3 "xs stockpi >bot sect 3"
10x

10.2 Multiple stockpiles

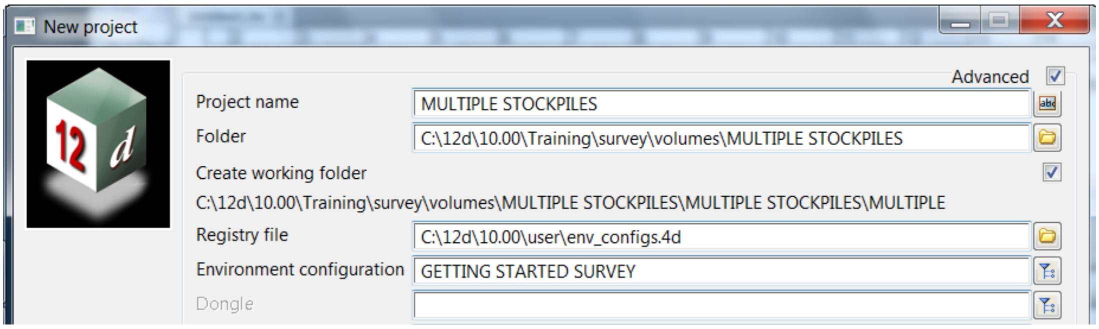
In this example multiple stockpile volumes can be calculated with one option. This macro will automatically create all necessary tins of the bases and tops of the stockpiles.

A Volume report will be created for each stockpile and volume text will be placed over each pile

Create a new project as shown previously called **MULTIPLE STOCKPILES** in the folder

C:\12d\10.00\Training\Survey\Volumes\MULTIPLE STOCKPILES

Remember to select the configuration GETTING STARTED SURVEY



Advanced ☑

Project name: MULTIPLE STOCKPILES

Folder: C:\12d\10.00\Training\survey\volumes\MULTIPLE STOCKPILES

Create working folder ☑

C:\12d\10.00\Training\survey\volumes\MULTIPLE STOCKPILES\MULTIPLE STOCKPILES\MULTIPLE

Registry file: C:\12d\10.00\user\env_configs.4d

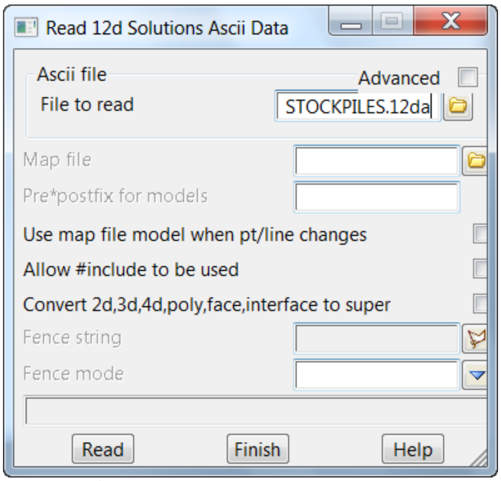
Environment configuration: GETTING STARTED SURVEY

Dongle:

10.2.1 Read in Stockpile surface data

The surface data is in the form of a 12d ascii file

Select ***File I/O=>Data Input=>12da/4da data***



Ascii file

Advanced ☐

File to read: STOCKPILES.12da

Map file:

Pre*postfix for models:

Use map file model when pt/line changes ☐

Allow #include to be used ☐

Convert 2d,3d,4d,poly,face,interface to super ☐

Fence string:

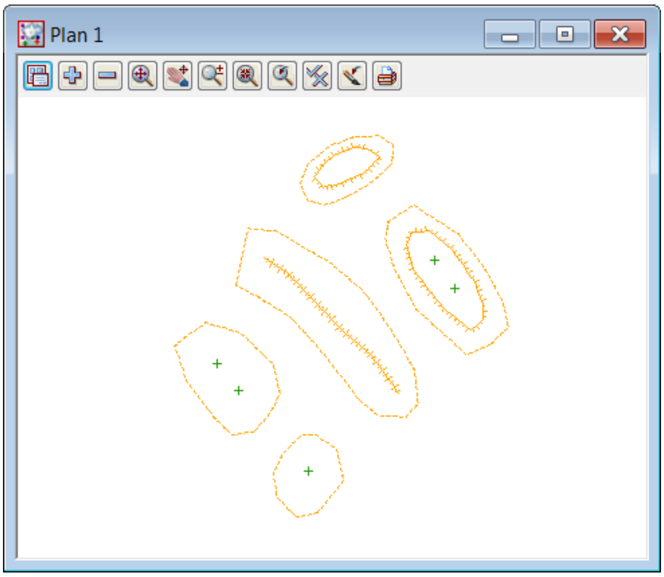
Fence mode:

Select **Ascii file** icon

Browse to the folder **C:\12d\10.00\Training\survey\volumes**

and select **MULTIPLE STOCKPILES.12da**

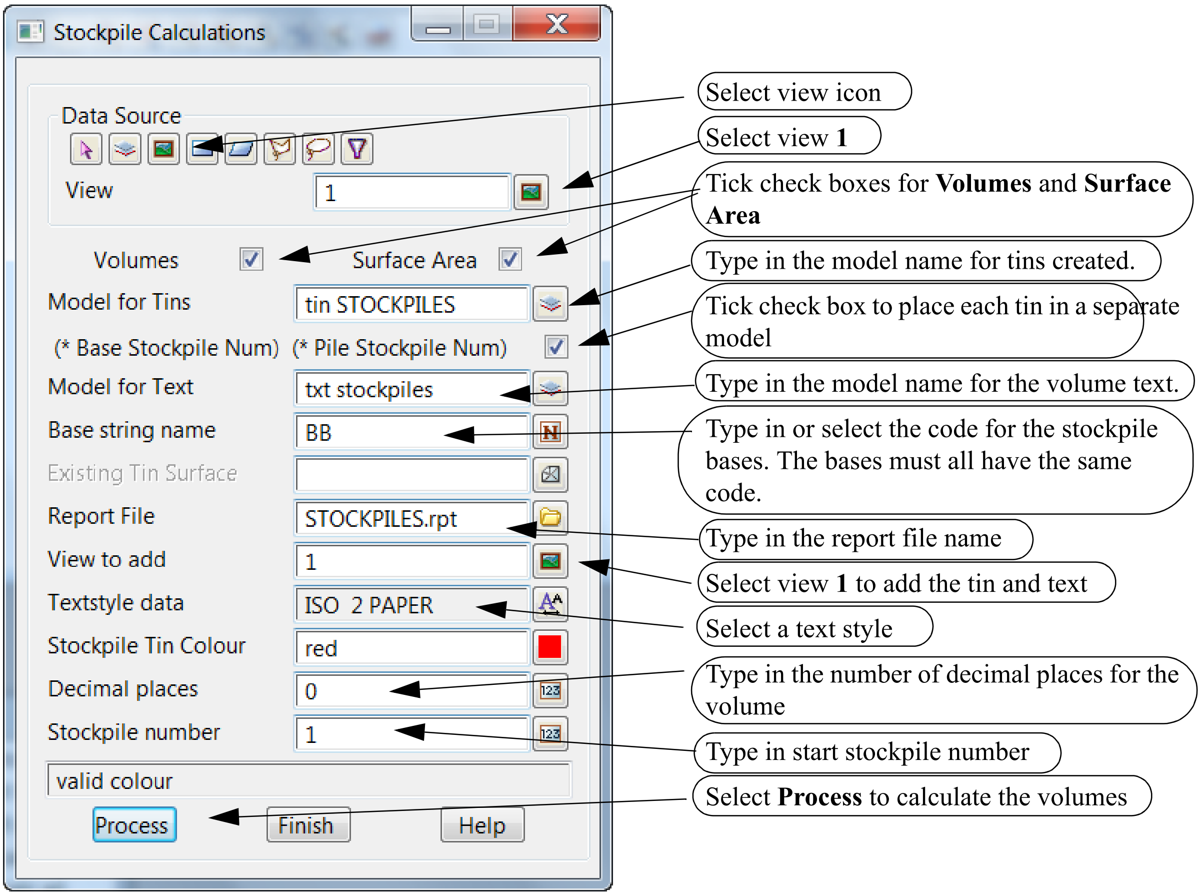
Select **Read** then **Finish**



10.2.2 Run Stockpile macro

For this program to work, the strings around the bases of the stockpiles MUST share a unique code. This code should not be used within the stockpile as it is used to determine the extent of each pile.

Select option ***Design=>Volumes=>Stockpile***



View	1
Volumes	☑
Surface Area	☑
Model for Tins	tin STOCKPILES
(* Base Stockpile Num) (* Pile Stockpile Num)	☑
Model for Text	txt stockpiles
Base string name	BB
Existing Tin Surface	
Report File	STOCKPILES.rpt
View to add	1
Textstyle data	ISO 2 PAPER
Stockpile Tin Colour	red
Decimal places	0
Stockpile number	1

valid colour

Select view icon

Select view **1**

Tick check boxes for **Volumes** and **Surface Area**

Type in the model name for tins created.

Tick check box to place each tin in a separate model

Type in the model name for the volume text.

Type in or select the code for the stockpile bases. The bases must all have the same code.

Type in the report file name

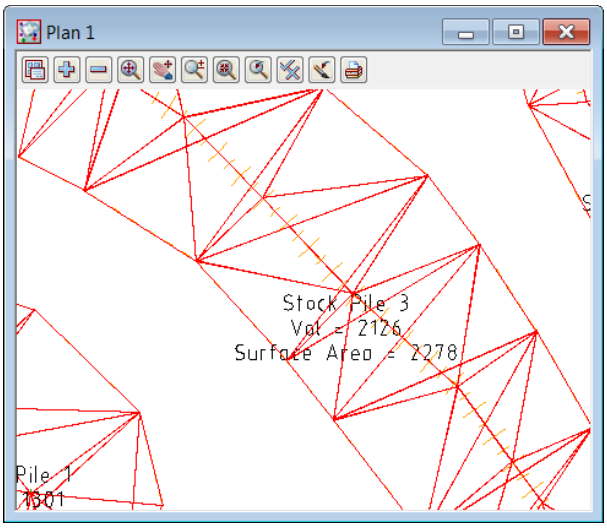
Select view **1** to add the tin and text

Select a text style

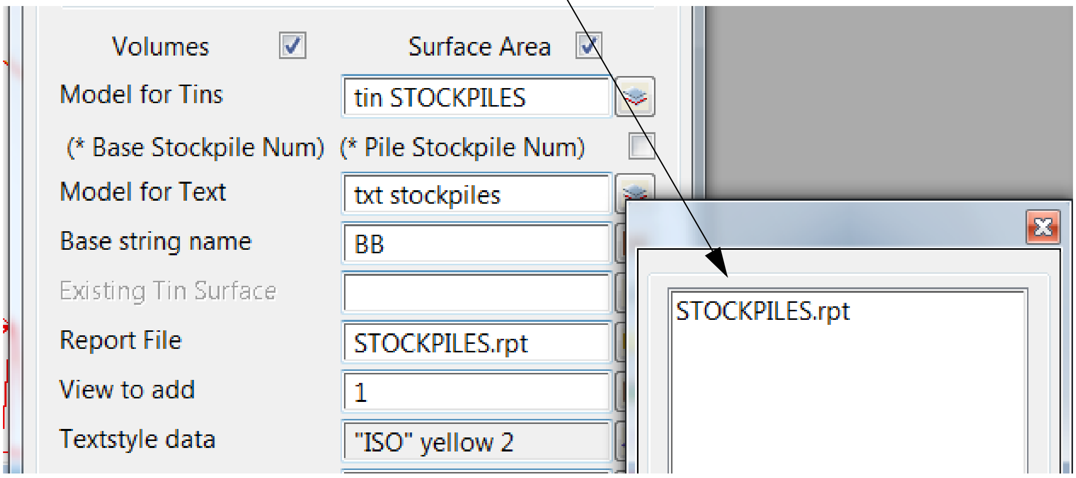
Type in the number of decimal places for the volume

Type in start stockpile number

Select **Process** to calculate the volumes



To read the volume report select the report file icon then select **Open**



Volumes ☑ Surface Area ☑

Model for Tins: tin STOCKPILES

(* Base Stockpile Num) (* Pile Stockpile Num) ☐

Model for Text: txt stockpiles

Base string name: BB

Existing Tin Surface:

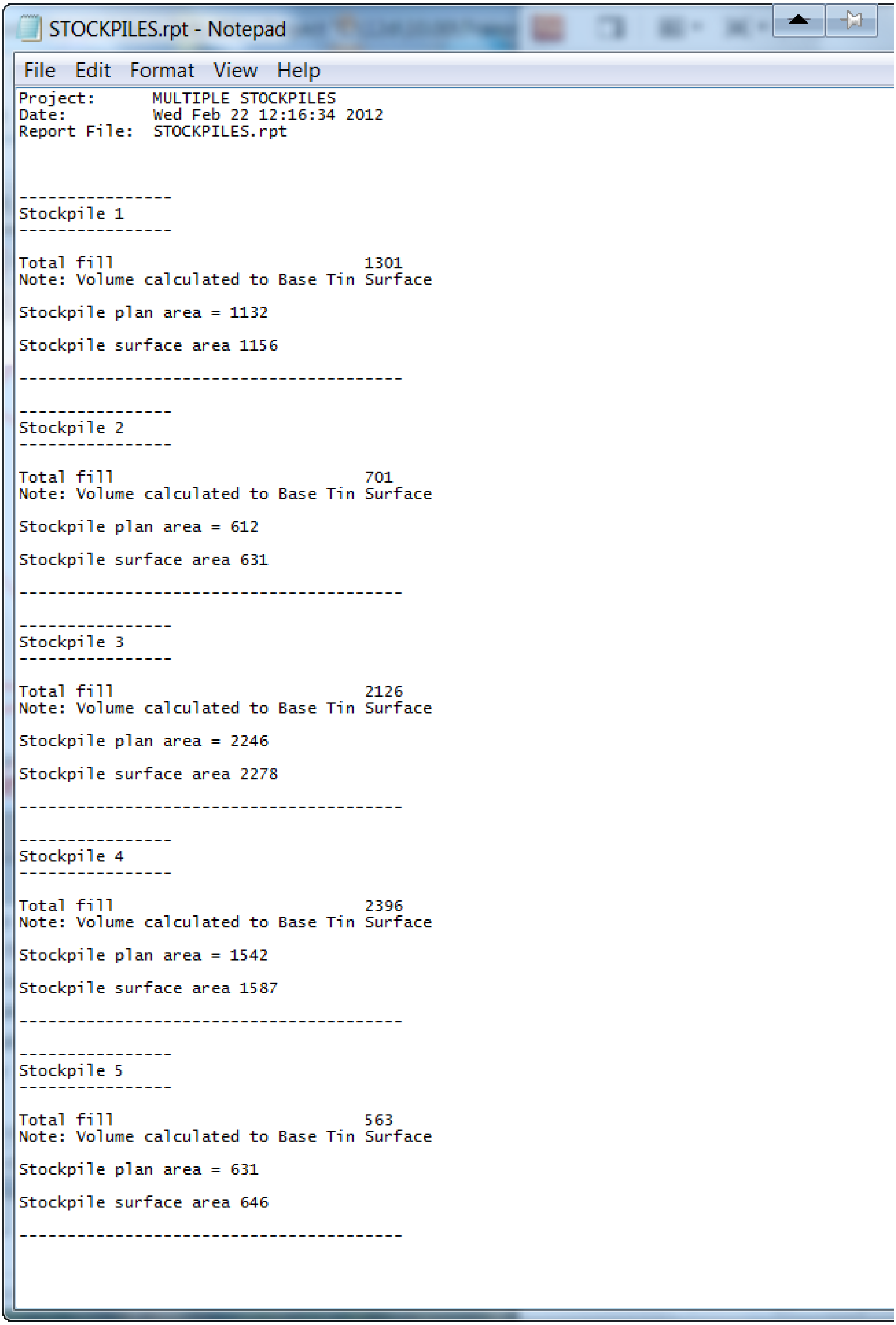
Report File: STOCKPILES.rpt

View to add: 1

Textstyle data: "ISO" yellow 2

STOCKPILES.rpt

NOTE - report files are not available in the 12d Model Practise Version



```
Project:      MULTIPLE STOCKPILES
Date:         Wed Feb 22 12:16:34 2012
Report File:  STOCKPILES.rpt



----------------
Stockpile 1
----------------

Total fill                            1301
Note: Volume calculated to Base Tin Surface

Stockpile plan area = 1132

Stockpile surface area 1156

----------------------------------------

----------------
Stockpile 2
----------------

Total fill                            701
Note: Volume calculated to Base Tin Surface

Stockpile plan area = 612

Stockpile surface area 631

----------------------------------------

----------------
Stockpile 3
----------------

Total fill                            2126
Note: Volume calculated to Base Tin Surface

Stockpile plan area = 2246

Stockpile surface area 2278

----------------------------------------

----------------
Stockpile 4
----------------

Total fill                            2396
Note: Volume calculated to Base Tin Surface

Stockpile plan area = 1542

Stockpile surface area 1587

----------------------------------------

----------------
Stockpile 5
----------------

Total fill                            563
Note: Volume calculated to Base Tin Surface

Stockpile plan area = 631

Stockpile surface area 646

----------------------------------------
```

After the final stockpile volume has been reported select **Finish** on the volumes report panel

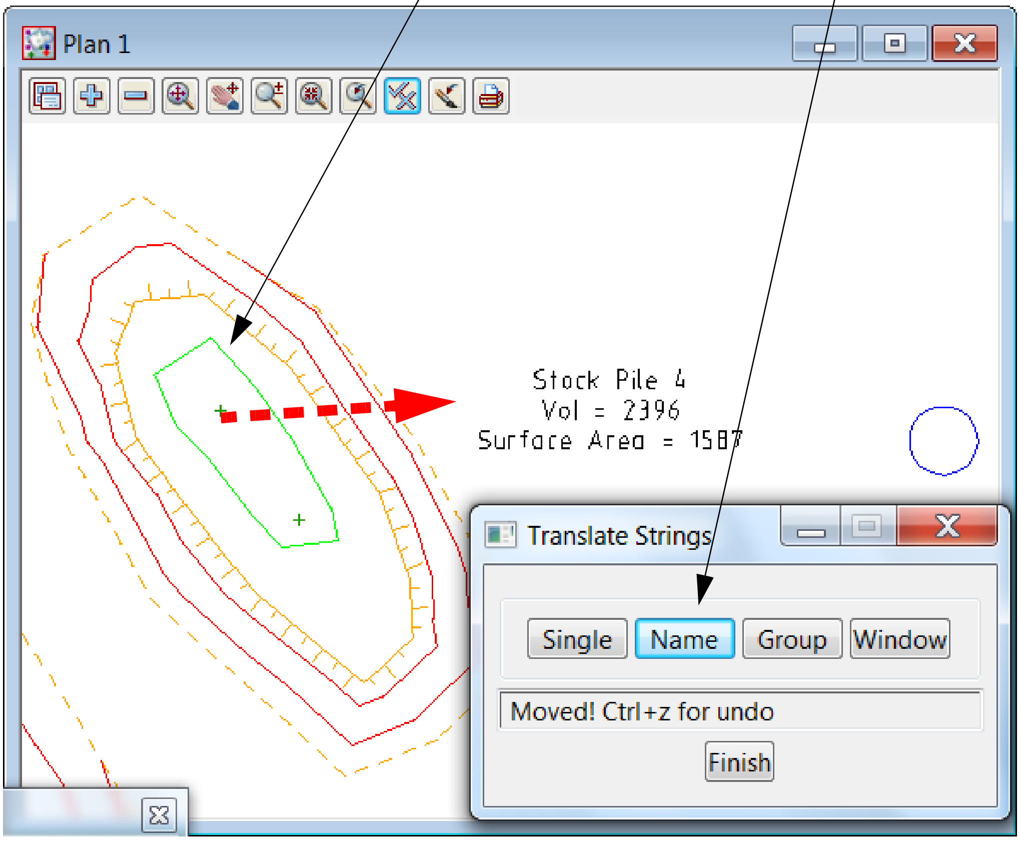
Turn off all of the Stockpile base models and then toggle on the contours

To move the volume text outside each stockpile select option ***Drafting=>Multi string translate***

Select **Name**

Pick and accept the text to move

Drag the text to the new position and accept


Plan 1
Stock Pile 4
Vol = 2396
Surface Area = 1587
Translate Strings
Single
Name
Group
Window
Finish

Moved! Ctrl+z for undo

Select **Name** before moving each block of text

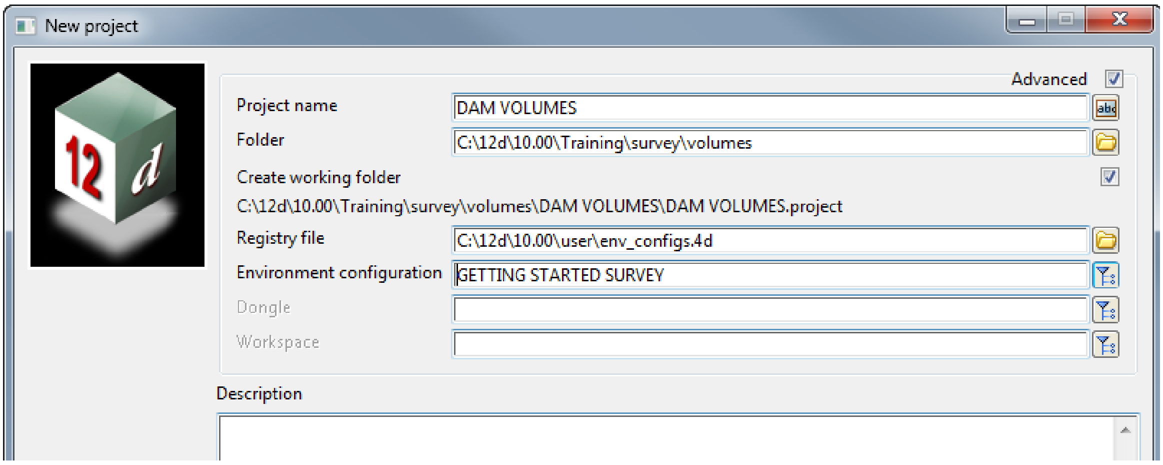
10.3 Dam Capacity

In this example the storage capacity of a dam will be calculated

Create a new project as shown previously called **DAM VOLUMES** in the folder

C:\12d\10.00\Training\Survey\Volumes\DAM VOLUMES

Remember to select the configuration GETTING STARTED SURVEY



Advanced ☑

Project name: DAM VOLUMES

Folder: C:\12d\10.00\Training\survey\volumes

Create working folder ☑

C:\12d\10.00\Training\survey\volumes\DAM VOLUMES\DAM VOLUMES.project

Registry file: C:\12d\10.00\user\env_configs.4d

Environment configuration: GETTING STARTED SURVEY

Dongle:

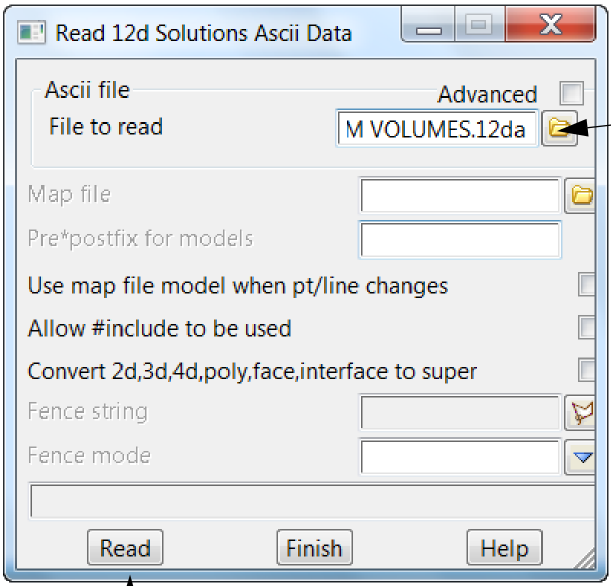
Workspace:

Description:

10.3.1 Read in Dam surface data

The surface data is in the form of a 12d ascii file

Select ***File I/O=>Data Input=>12da/4da data***



Ascii file

Advanced ☐

File to read: M VOLUMES.12da

Map file:

Pre*postfix for models:

Use map file model when pt/line changes ☐

Allow #include to be used ☐

Convert 2d,3d,4d,poly,face,interface to super ☐

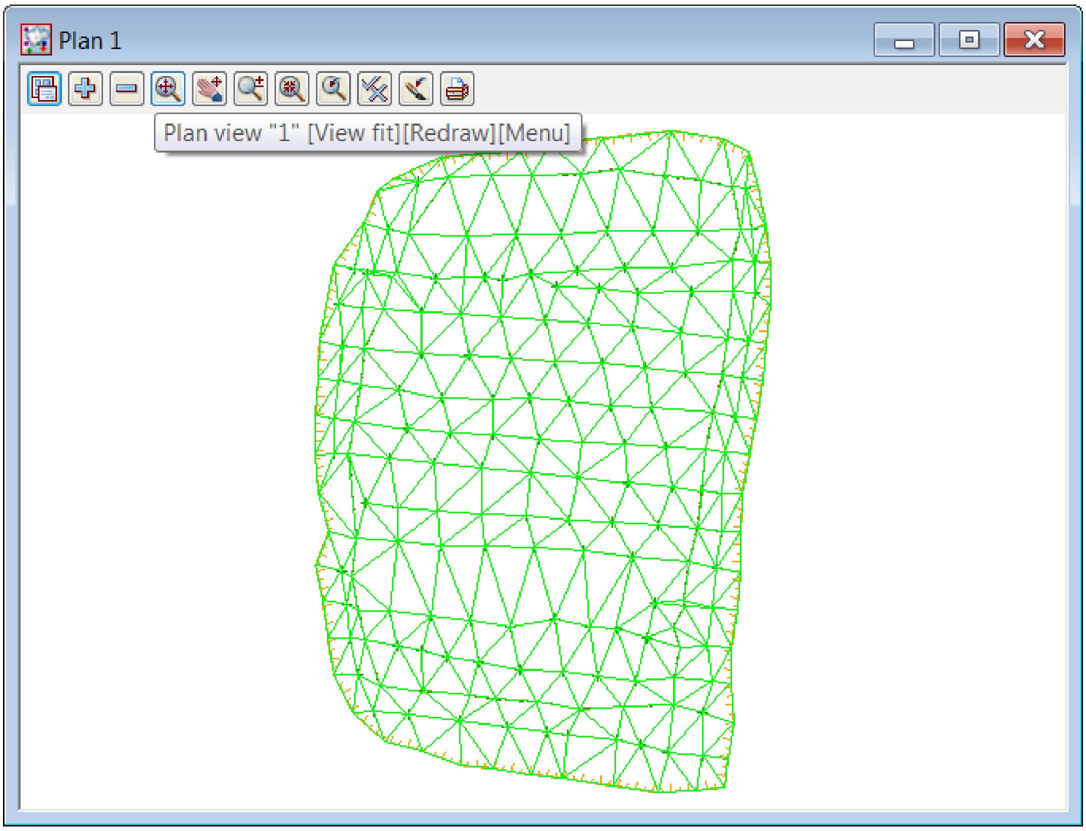
Fence string:

Fence mode:

Select the **Ascii file** icon

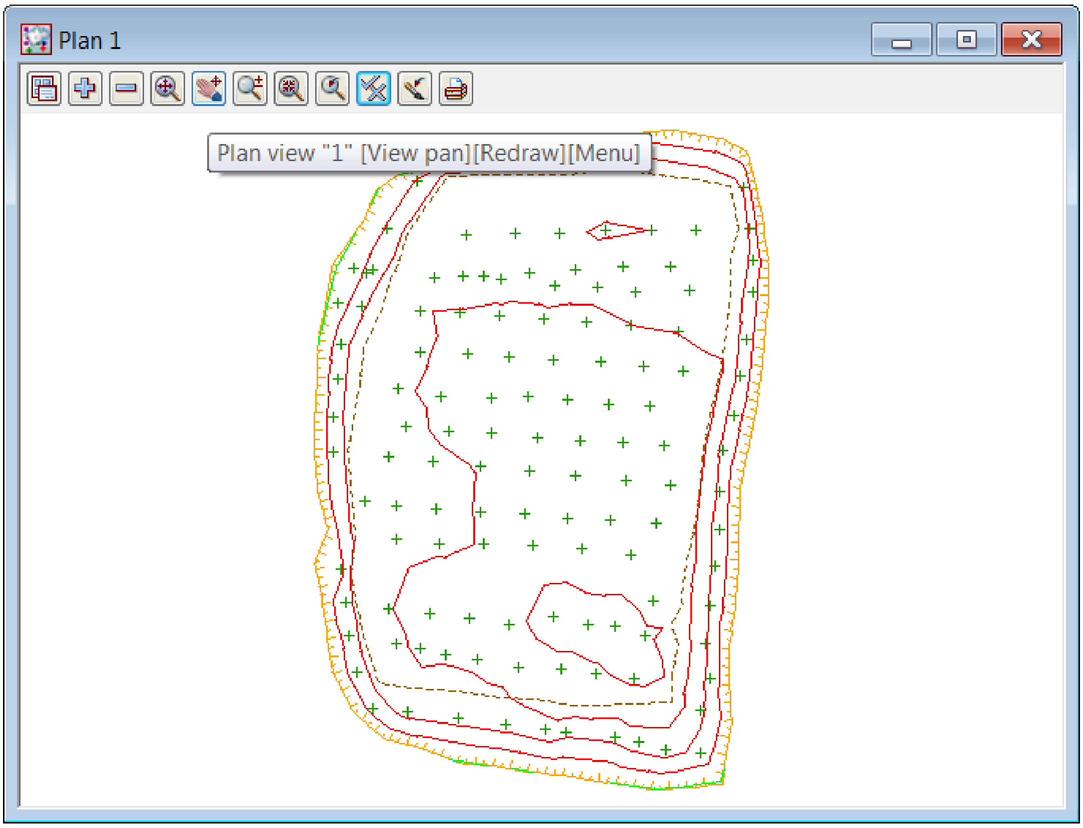
Browse to the folder
C:\12d\10.00\Training\survey\volumes
and select **DAM VOLUMES.12da**

Select **Read** then **Finish**



Plan view "1" [View fit][Redraw][Menu]

Turn on the contours

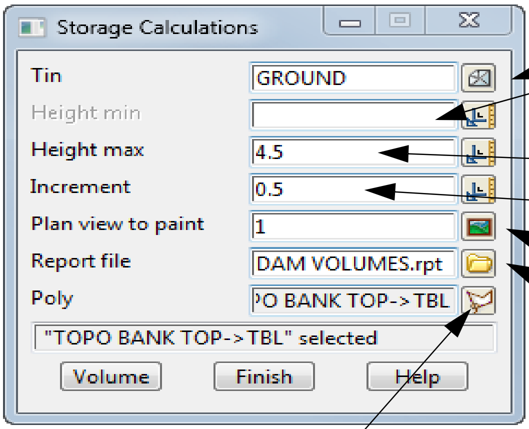


Plan view "1" [View pan][Redraw][Menu]

10.3.2 Calculate volumes by Storage Calcs method

The volume from the dam bottom surface up to a height can now be calculated

Select ***Design=>Volumes=>Exact=>Storage Calcs***



Storage Calculations

Tin: GROUND

Height min:

Height max: 4.5

Increment: 0.5

Plan view to paint: 1

Report file: DAM VOLUMES.rpt

Poly: PO BANK TOP->TBL

"TOPO BANK TOP->TBL" selected

Select **GROUND** for tin

Leave the minimum height unaltered. This will calculate the volume from the lowest point of the tin

Type in **4.5** as the maximum height

Type in **0.5** for the height increment. The volume will be broken into 0.5 metre slices

Select view **1** to shade the extent of the volume area

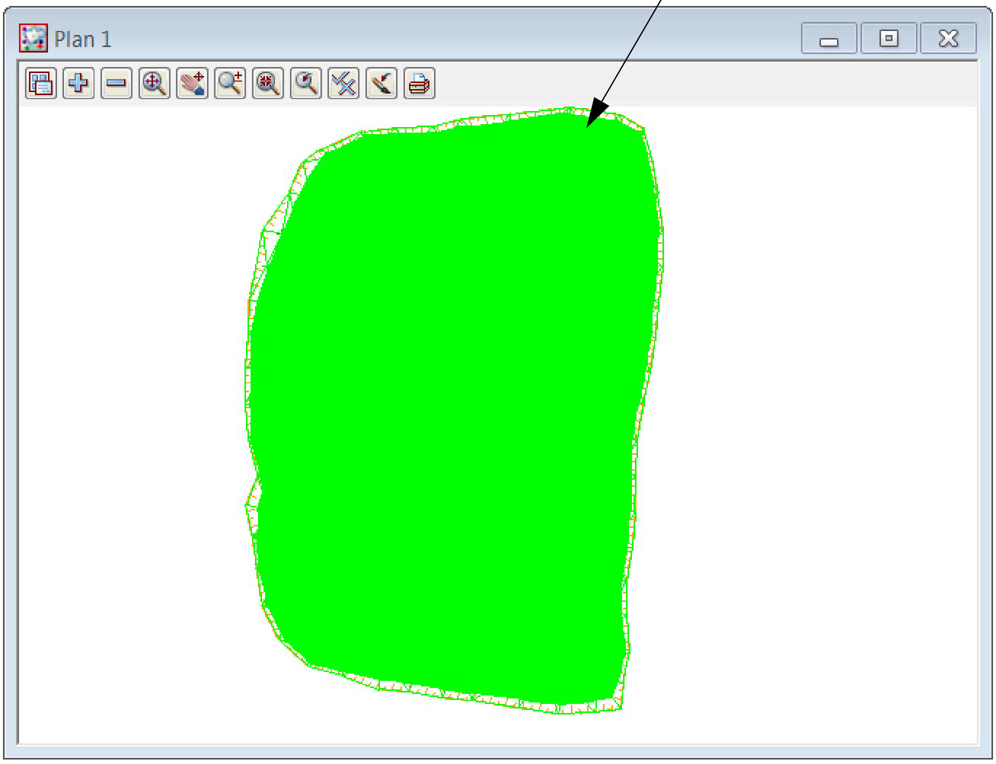
Type in the report file **DAM VOLUMES**.

NOTE - report files are not available in the 12d Model Practise Version

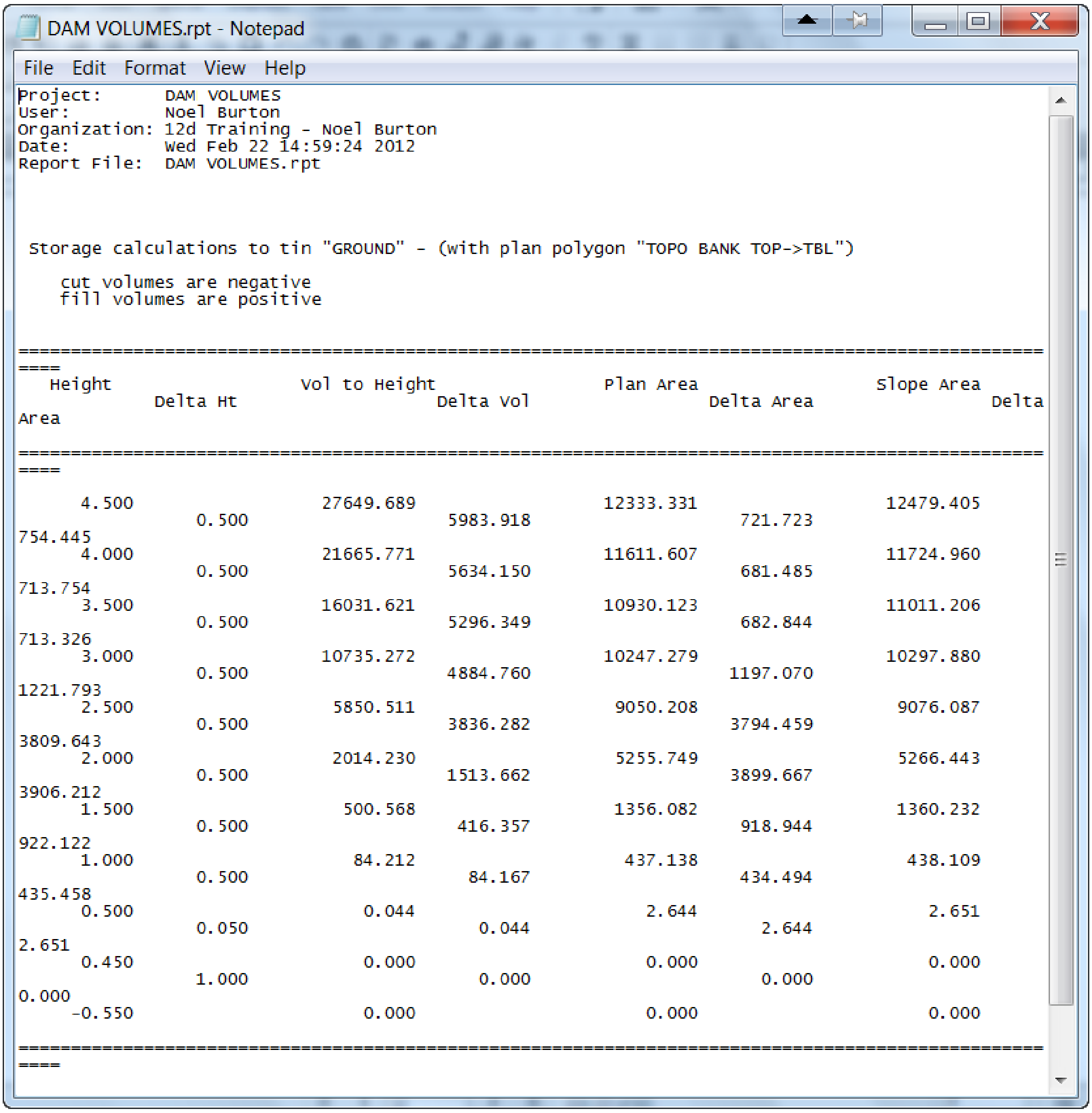
Select the **Poly** icon then pick and accept the string around the edge of the top of the dam wall

Select **Volume**

The extent of the tin up to the maximum height value is coloured



The report file is opened in the default text editor and the volumes are listed in the specified slices



```
Project:      DAM VOLUMES
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Wed Feb 22 14:59:24 2012
Report File:  DAM VOLUMES.rpt



 Storage calculations to tin "GROUND" - (with plan polygon "TOPO BANK TOP->TBL")

    cut volumes are negative
    fill volumes are positive


===================================================================================================
====
   Height                          Vol to Height                Plan Area                 Slope Area
             Delta Ht                           Delta Vol                Delta Area                 Delta
Area

===================================================================================================
====

      4.500                    27649.689                 12333.331                 12479.405
              0.500                         5983.918                   721.723
754.445
      4.000                    21665.771                 11611.607                 11724.960
              0.500                         5634.150                   681.485
713.754
      3.500                    16031.621                 10930.123                 11011.206
              0.500                         5296.349                   682.844
713.326
      3.000                    10735.272                 10247.279                 10297.880
              0.500                         4884.760                  1197.070
1221.793
      2.500                     5850.511                  9050.208                  9076.087
              0.500                         3836.282                  3794.459
3809.643
      2.000                     2014.230                  5255.749                  5266.443
              0.500                         1513.662                  3899.667
3906.212
      1.500                      500.568                  1356.082                  1360.232
              0.500                          416.357                   918.944
922.122
      1.000                       84.212                   437.138                   438.109
              0.500                           84.167                   434.494
435.458
      0.500                        0.044                     2.644                     2.651
              0.050                            0.044                     2.644
2.651
      0.450                        0.000                     0.000                     0.000
              1.000                            0.000                     0.000
0.000
     -0.550                        0.000                     0.000                     0.000

===================================================================================================
====
```

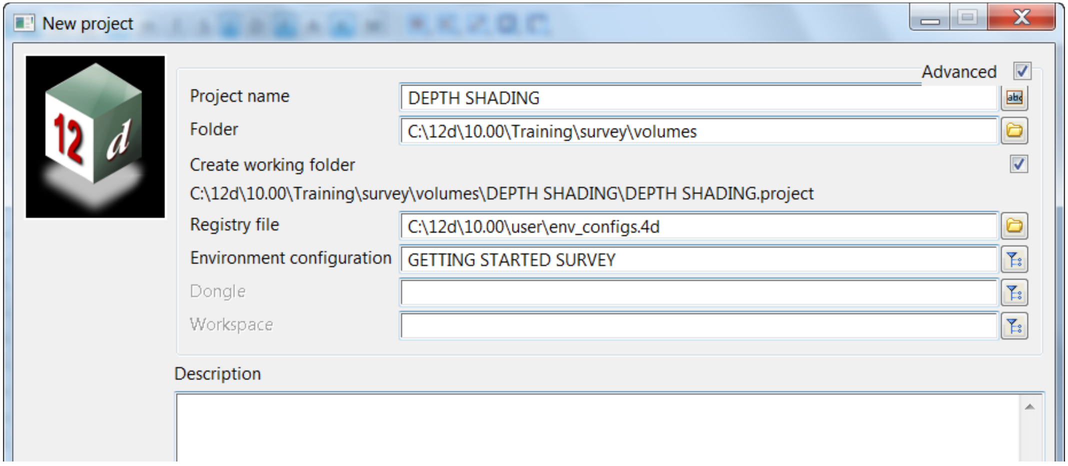
10.4 Surface Comparison

This topic deals with not only calculating the volume between two surfaces but also comparing the surfaces by depth shading

Create a new project as shown previously called **DEPTH SHADING** in the folder

C:\12d\10.00\Training\Survey\Volumes\DEPTH SHADING

Remember to select the configuration GETTING STARTED SURVEY



Advanced ☑

Project name: DEPTH SHADING

Folder: C:\12d\10.00\Training\survey\volumes

Create working folder ☑

C:\12d\10.00\Training\survey\volumes\DEPTH SHADING\DEPTH SHADING.project

Registry file: C:\12d\10.00\user\env_configs.4d

Environment configuration: GETTING STARTED SURVEY

Dongle:

Workspace:

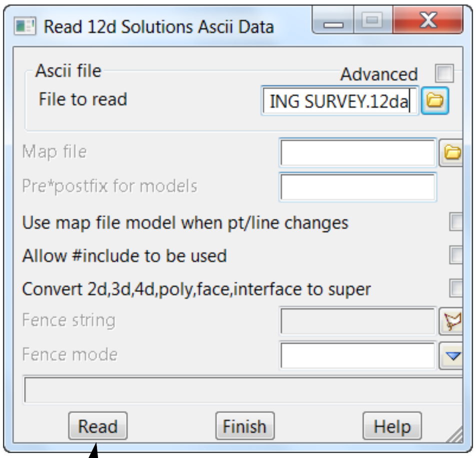
Description:

10.4.1 Read in Surfaces

We will read in the combined surface data for both surveys. The data is in the form of a 12d ascii file

Read in data

Select option ***File I/O=>Data Input=>12da/4da data***



Ascii file

Advanced ☐

File to read: ING SURVEY.12da

Map file:

Pre*postfix for models:

Use map file model when pt/line changes ☐

Allow #include to be used ☐

Convert 2d,3d,4d,poly,face,interface to super ☐

Fence string:

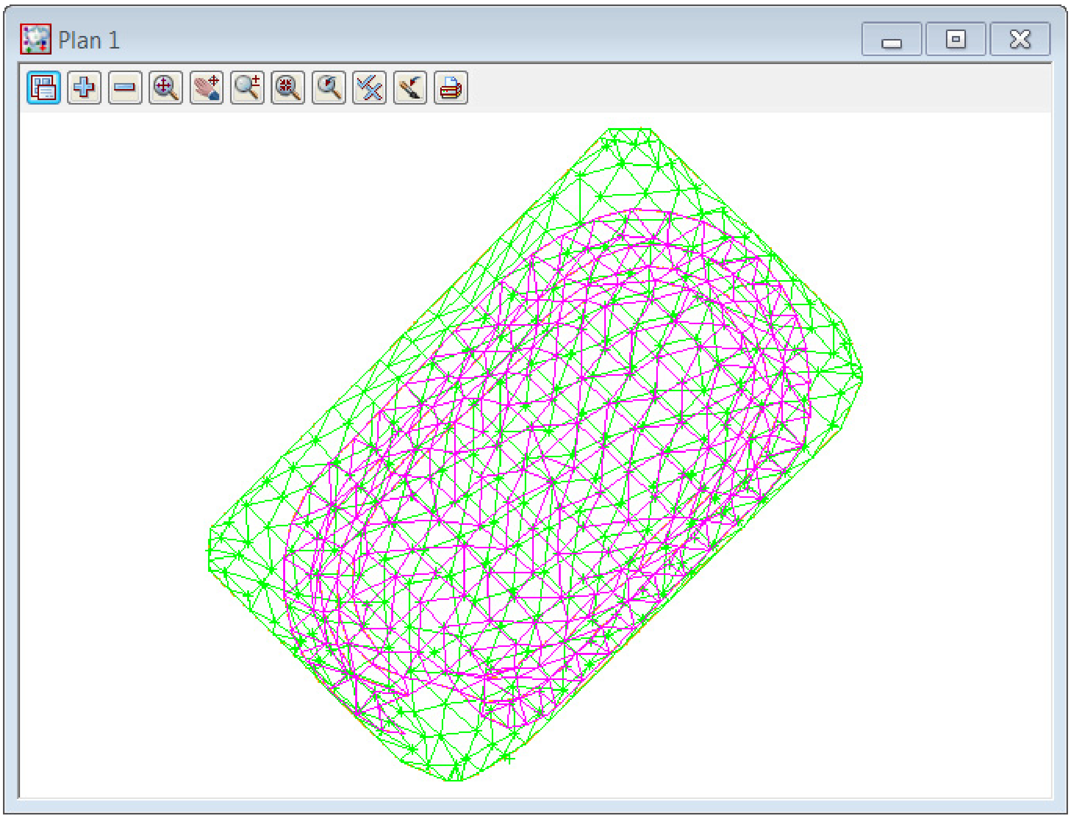
Fence mode:

Select the **Ascii file** icon

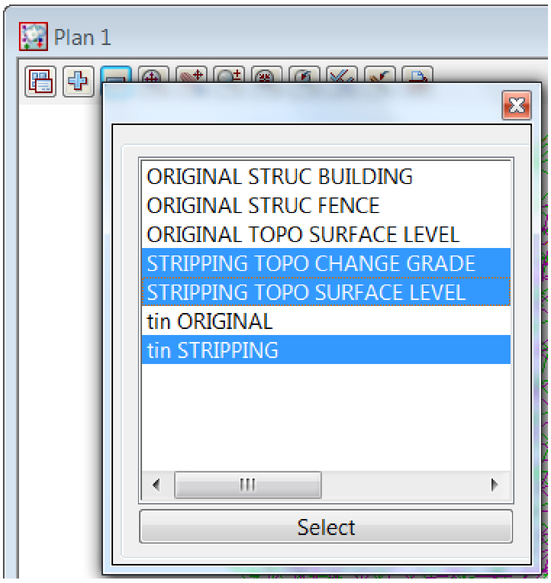
Browse to the folder
C:\12d\10.00\Training\survey\volumes

and select **DEPTH SHADING SURVEY.12da**

Select **Read** then **Finish**



Turn off the Stripping survey models



ORIGINAL STRUC BUILDING
ORIGINAL STRUC FENCE
ORIGINAL TOPO SURFACE LEVEL
STRIPPING TOPO CHANGE GRADE
STRIPPING TOPO SURFACE LEVEL
tin ORIGINAL
tin STRIPPING

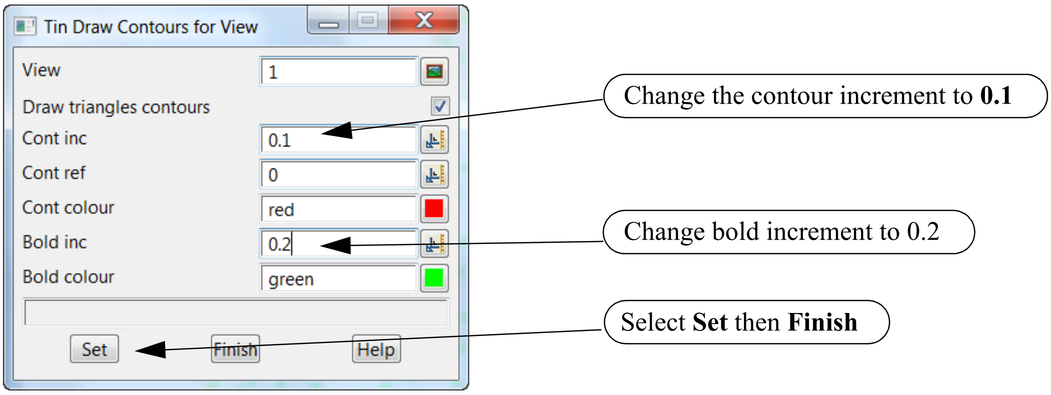
Check original data

Toggle on the contours. The contours are not visible as the surface is very flat. We need to change the contour interval to a smaller increment

Change the contour interval to 0.1

Select ***Menu***. Walk right and select ***Settings=>Tins=>Contours***

This menu will allow the user to change the appearance of the fast contours displayed on the view



Tin Draw Contours for View

View: 1

Draw triangles contours: ☑

Cont inc: 0.1

Cont ref: 0

Cont colour: red

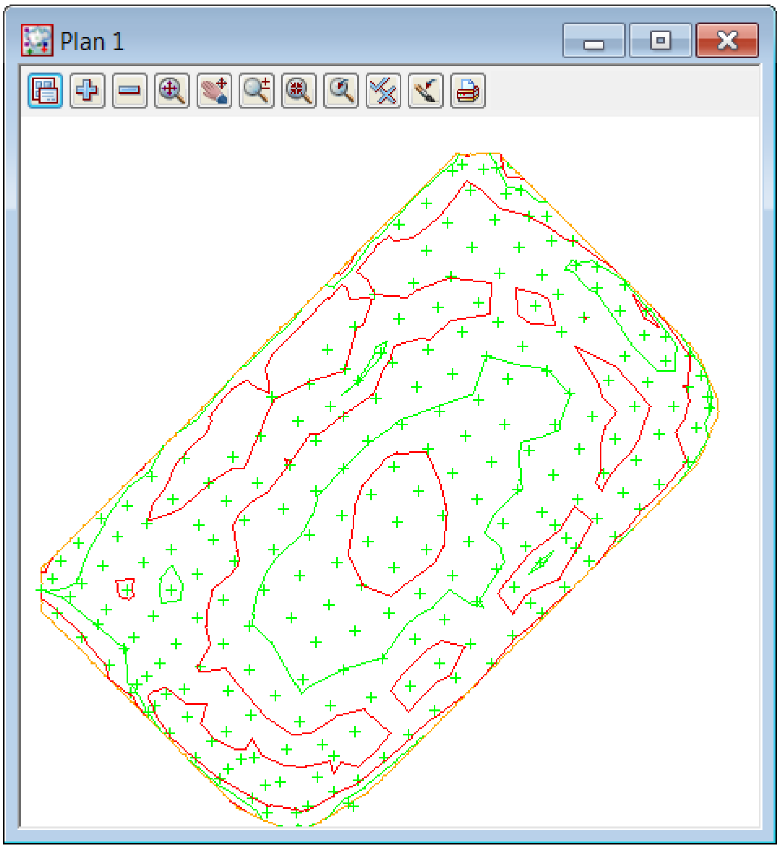
Bold inc: 0.2

Bold colour: green

Change the contour increment to **0.1**

Change bold increment to 0.2

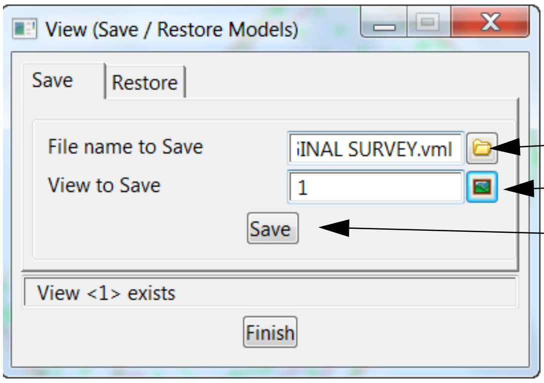
Select **Set** then **Finish**



Save model list

The original models can be saved away to a model listing file

Select ***View=>Models Save/Restore***


View (Save / Restore Models)
Save
Restore
Save
Finish

File name to Save: iNAL SURVEY.vml

View to Save: 1

View <1> exists

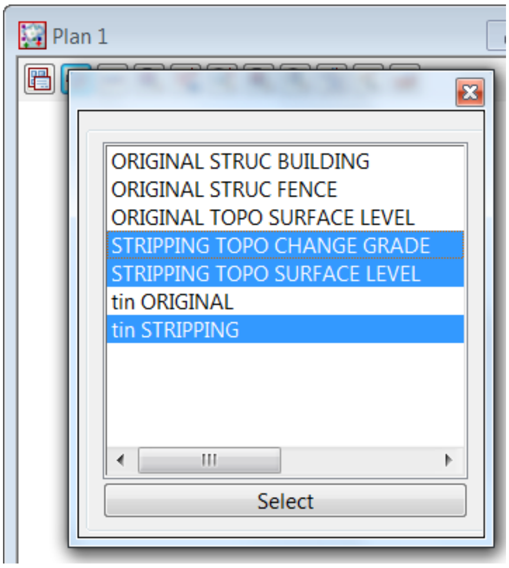
Type in file name **ORIGINAL SURVEY**

Select view **1**

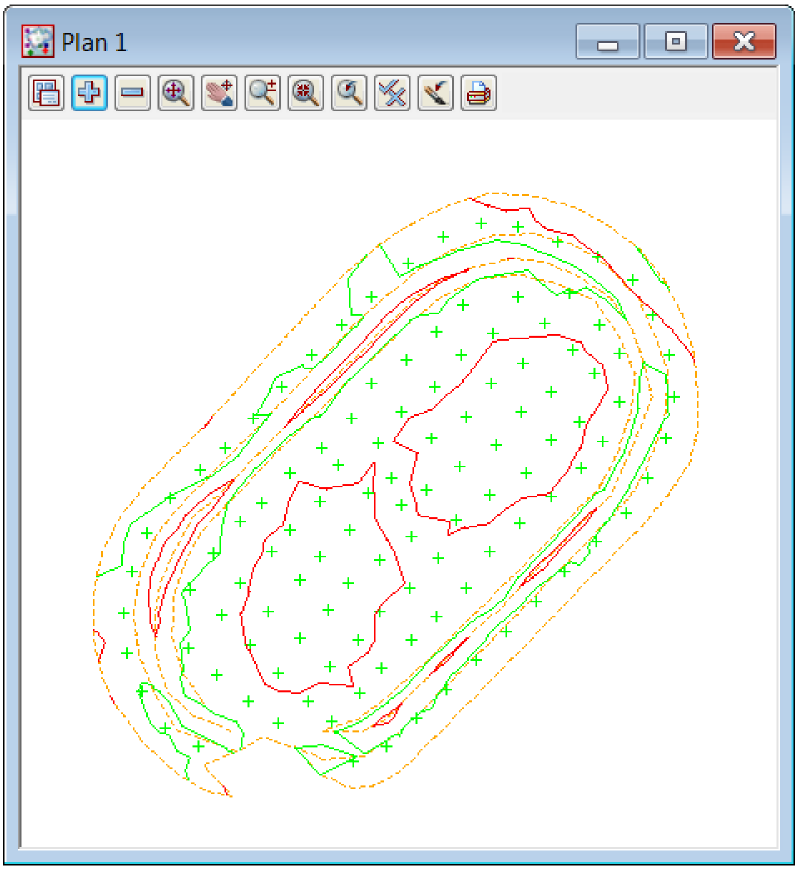
Select **Save** then **Finish**

Check stripped survey data

Turn off all models then turn on the Stripping model and tin


Plan 1
Select

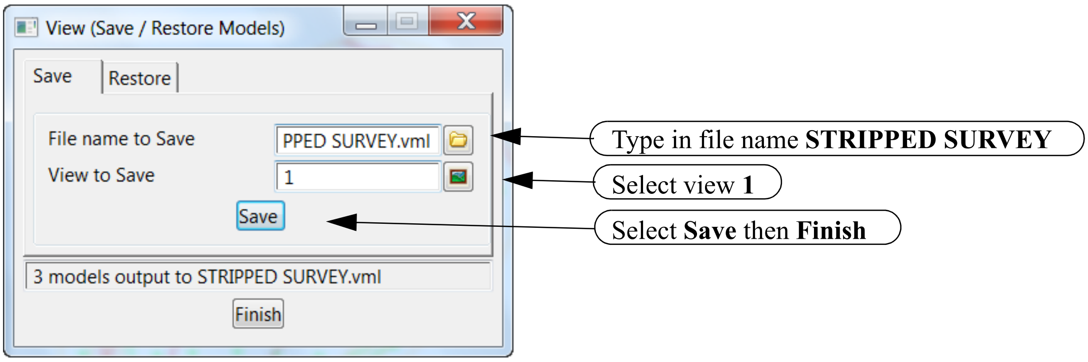
ORIGINAL STRUC BUILDING
ORIGINAL STRUC FENCE
ORIGINAL TOPO SURFACE LEVEL
STRIPPING TOPO CHANGE GRADE
STRIPPING TOPO SURFACE LEVEL
tin ORIGINAL
tin STRIPPING



Save model list

The stripping models can be saved away to a model listing file

Select ***View=>Models Save/Restore***


View (Save / Restore Models)
Save
Restore
Save
Finish

File name to Save: PPED SURVEY.vml

View to Save: 1

3 models output to STRIPPED SURVEY.vml

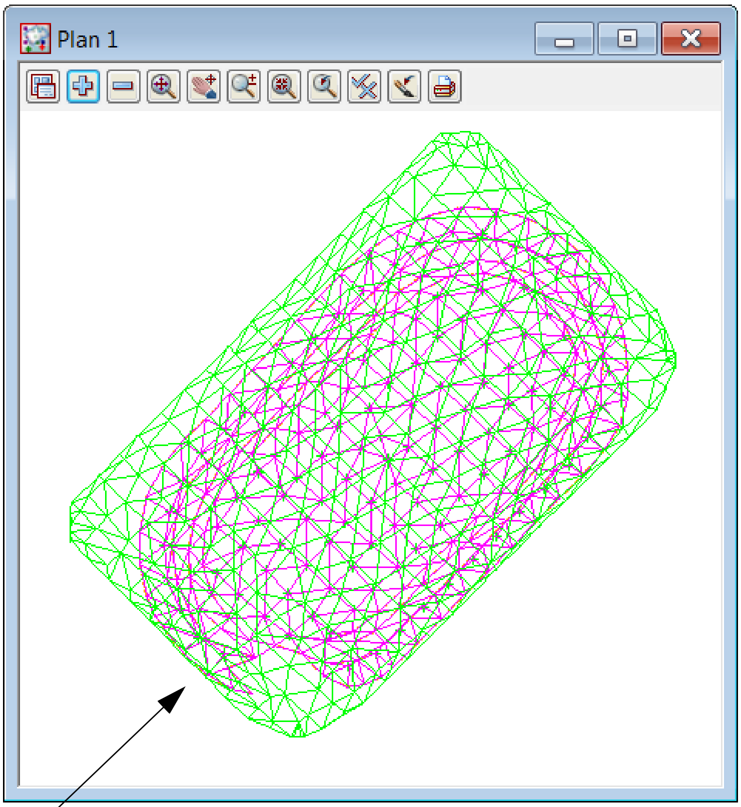
Type in file name **STRIPPED SURVEY**

Select view **1**

Select **Save** then **Finish**

10.4.2 Check Stripped tin lies within existing tin

We will now turn on both triangle models to check that the Stripped tin sits inside the tin created from the existing surface points. If this is not the case then the volume calculation will only cover the area where the two tins coincide.

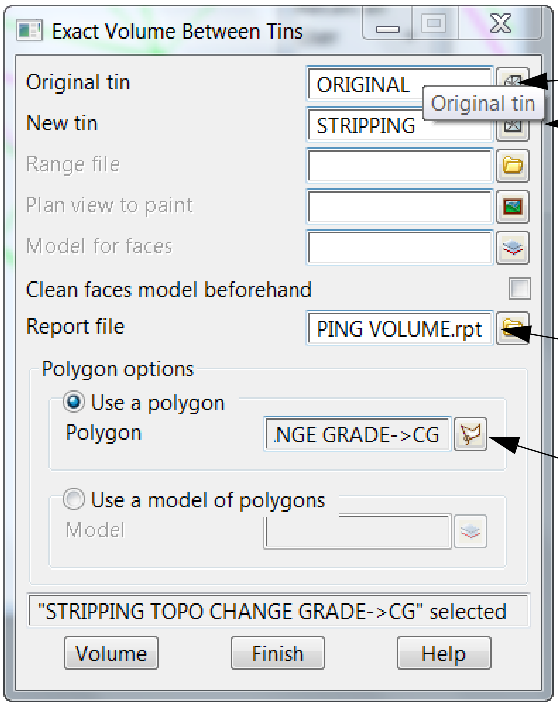


Ensure the outline of the stripping triangulation lies completely inside the original surface triangulation

10.4.3 Calculate volumes by exact method

The volume between the two tins can now be calculated and written to a report file

Select ***Design=>Volumes=>Exact=>Tin to tin***



Exact Volume Between Tins

Original tin: ORIGINAL

New tin: STRIPPING

Range file:

Plan view to paint:

Model for faces:

Clean faces model beforehand ☐

Report file: PING VOLUME.rpt

Polygon options

● Use a polygon

Polygon: NGE GRADE->CG

○ Use a model of polygons

Model:

"STRIPPING TOPO CHANGE GRADE->CG" selected

Select **ORIGINAL** for original tin model

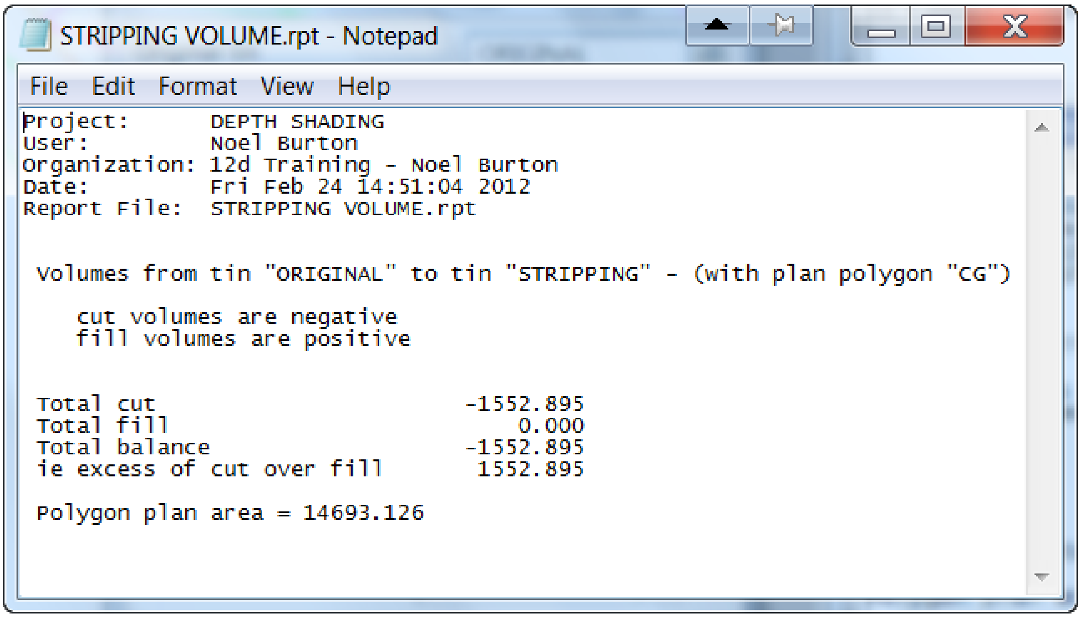
Select **STRIPPING** for new tin model

Type in **STRIPPING VOLUME** for report file name

NOTE - report files are not available in the 12d Model Practise Version

Select **Polygon** icon Pick and accept the string around the edge of the stripping survey

Select **Volume** to calculate the volume between the two surfaces

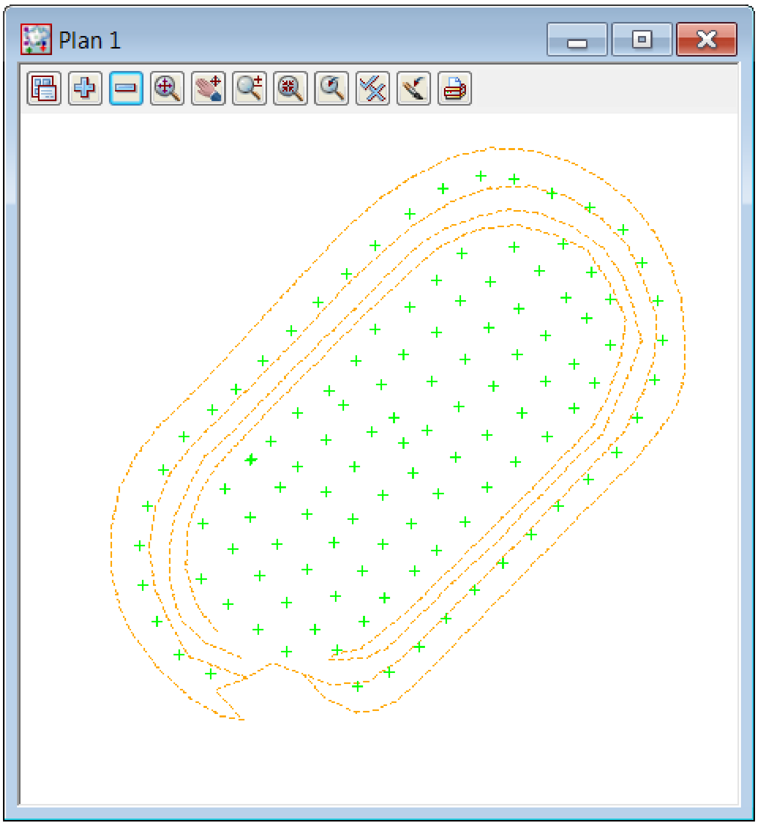


```
Project:      DEPTH SHADING
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Fri Feb 24 14:51:04 2012
Report File:  STRIPPING VOLUME.rpt


 Volumes from tin "ORIGINAL" to tin "STRIPPING" - (with plan polygon "CG")

    cut volumes are negative
    fill volumes are positive


 Total cut                        -1552.895
 Total fill                           0.000
 Total balance                    -1552.895
 ie excess of cut over fill        1552.895

 Polygon plan area = 14693.126
```

10.4.4 Create depth shading

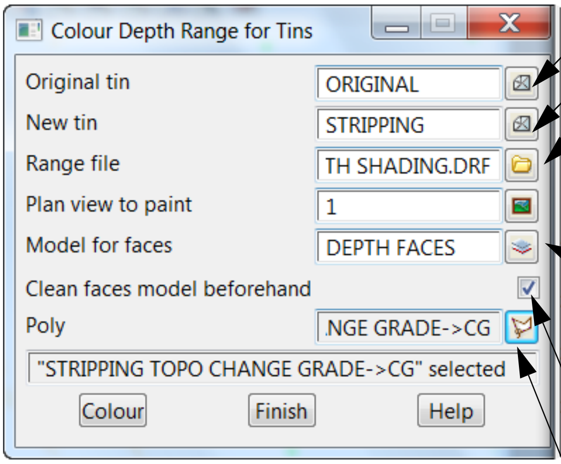
The two surfaces can be compared by colouring the height differences

Turn off the tin models



Select option ***Tins=>Colour=>Tins depths colours***

Move the panel to the side of the survey



Original tin: ORIGINAL
New tin: STRIPPING
Range file: TH SHADING.DRF
Plan view to paint: 1
Model for faces: DEPTH FACES
Clean faces model beforehand ☑
Poly: NGE GRADE->CG
"STRIPPING TOPO CHANGE GRADE->CG" selected

Select **ORIGINAL** for original tin

Select **STRIPPING** for new tin

Select Range file icon then browse to the folder **C:\12d\9.00\Training\survey\volumes** then select the file **DEPTH SHADING.drf**

Select view **1** to paint

Type in model **DEPTH FACES** for the colouring model.

DO NOT ENTER A MODEL NAME IF USING PRACTICE VERSION AS A LARGE NUMBER OF STRINGS ARE CREATED

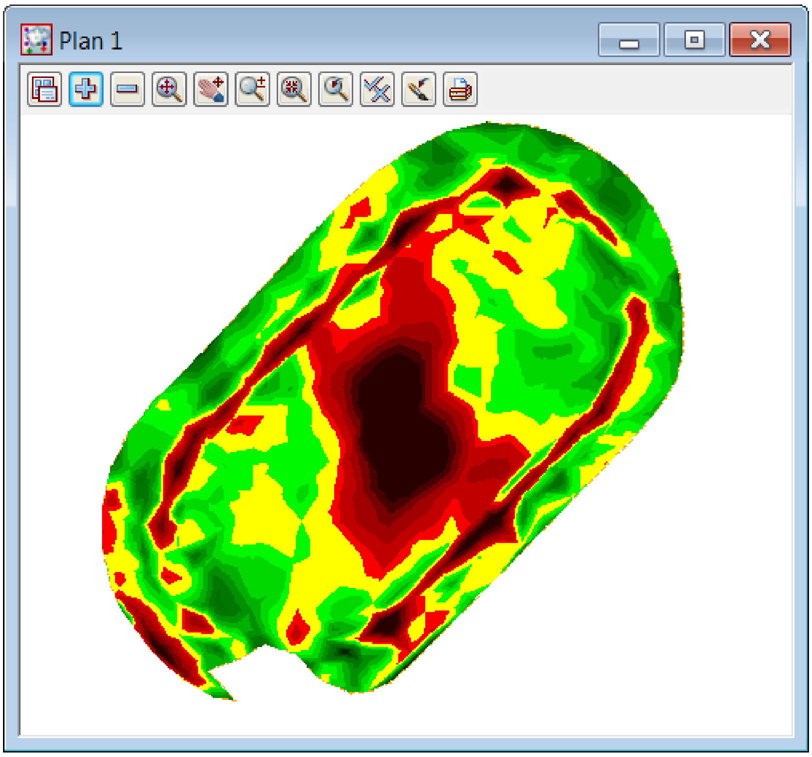
Tick check box to clean faces model beforehand

Select Poly choice icon and then pick and accept the edge of the stripped surface

Select **Colour**

A preview of the colouring appears temporarily.

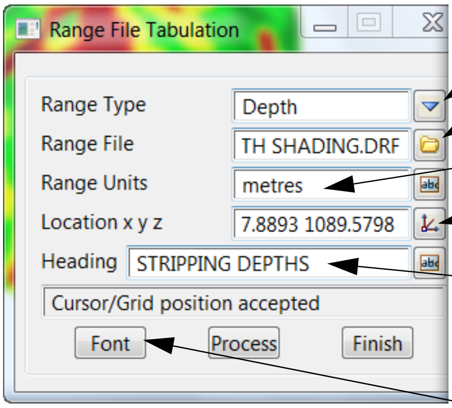
Turn on the model **DEPTH FACES**



10.4.5 Create tabulation of range file

A table will be created to tabulate the depth colours

Select ***Drafting=>Text and tables=>Tabulate range file***



Range Type: Depth
Range File: TH SHADING.DRF
Range Units: metres
Location x y z: 7.8893 1089.5798
Heading: STRIPPING DEPTHS
Cursor/Grid position accepted

Select **Range Type** icon and select **Depth**

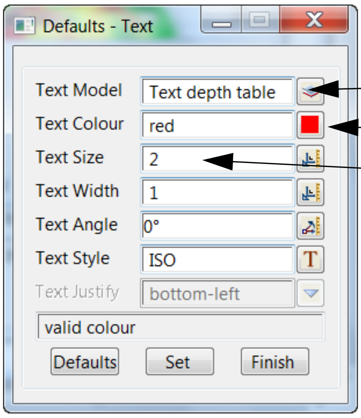
Select file **DEPTH SHADING.drf** from the folder **C:\12d\9.00\Training\survey\volumes**

Type in **metres** for the range units

Select Position icon. Pick and accept a point for the upper left corner of the propose table

Type in **Stripping depths**

Select **Font**



Text Model: Text depth table
Text Colour: red
Text Size: 2
Text Width: 1
Text Angle: 0°
Text Style: ISO
Text Justify: bottom-left
valid colour

Type in model name for table **txt depth table**

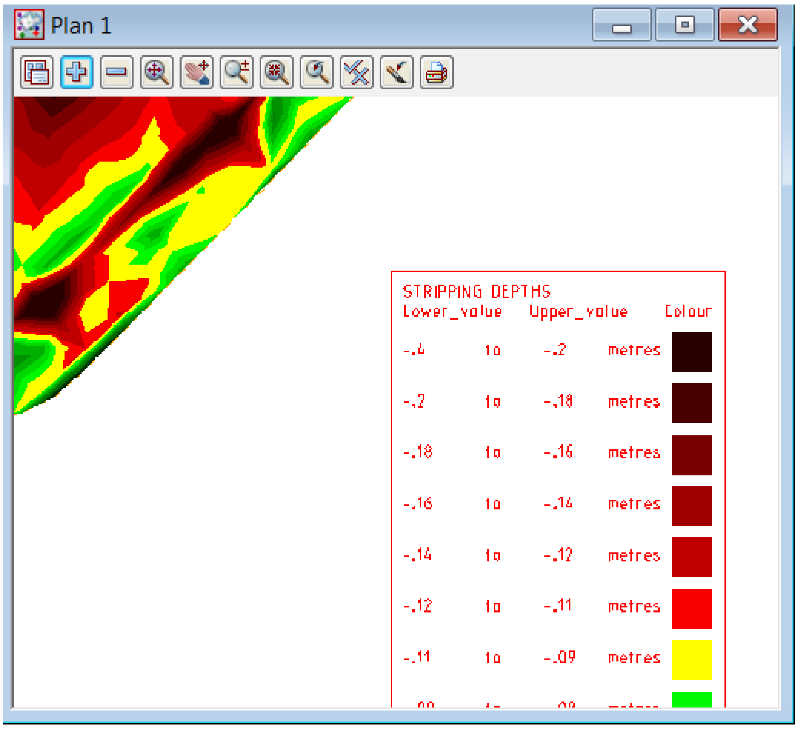
Select the colour for the table

Type in an appropriate size for the text. Note that the text size is in world units

Select **Set** then **Finish** to return to the previous panel

Select **Process**

Turn on the model **txt depth table**



STRIPPING DEPTHS

Lower_value		Upper_value		Colour
-.4	to	-.2	metres	■
-.2	to	-.18	metres	■
-.18	to	-.16	metres	■
-.16	to	-.14	metres	■
-.14	to	-.12	metres	■
-.12	to	-.11	metres	■
-.11	to	-.09	metres	■

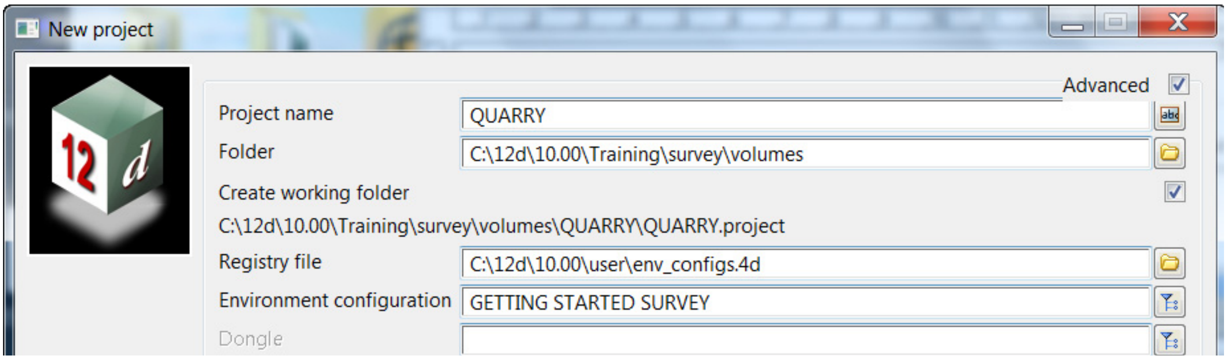
10.5 Progressive volumes

In this topic we will look at the use of fencing to update surfaces after each survey of an excavation. We will start with an existing surface and progressively update a combined surface after each survey

Create a new project as shown previously called **QUARRY** in the folder

C:\12d\10.00\Training\Survey\Volumes\QUARRY

Remember to select the configuration GETTING STARTED SURVEY



New project

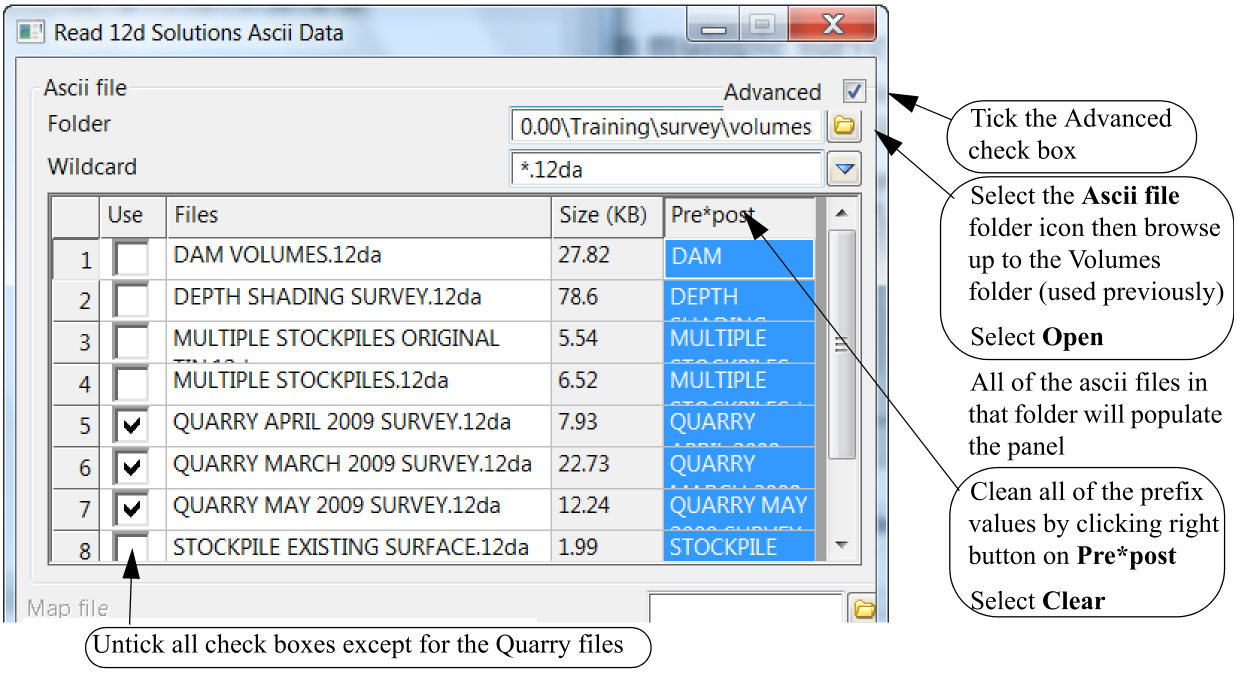
Advanced ☑

Project name	QUARRY
Folder	C:\12d\10.00\Training\survey\volumes
Create working folder	☑
C:\12d\10.00\Training\survey\volumes\QUARRY\QUARRY.project	
Registry file	C:\12d\10.00\user\env_configs.4d
Environment configuration	GETTING STARTED SURVEY
Dongle	

10.5.1 Read in multiple surveys

We will read in the data for the three surveys of a quarry as the excavation develops. The data has been given in the form of 3 12d ascii files. This time we will read the files in together in one option

Select option ***File I/O=>Data Input=>12da/4da data***



Read 12d Solutions Ascii Data

Ascii file

Advanced ☑

Folder	0.00\Training\survey\volumes
Wildcard	*.12da

	Use	Files	Size (KB)	Pre*post
1	☐	DAM VOLUMES.12da	27.82	DAM
2	☐	DEPTH SHADING SURVEY.12da	78.6	DEPTH
3	☐	MULTIPLE STOCKPILES ORIGINAL	5.54	MULTIPLE
4	☐	MULTIPLE STOCKPILES.12da	6.52	MULTIPLE
5	☑	QUARRY APRIL 2009 SURVEY.12da	7.93	QUARRY
6	☑	QUARRY MARCH 2009 SURVEY.12da	22.73	QUARRY
7	☑	QUARRY MAY 2009 SURVEY.12da	12.24	QUARRY MAY
8	☐	STOCKPILE EXISTING SURFACE.12da	1.99	STOCKPILE

Map file

Tick the Advanced check box

Select the **Ascii file** folder icon then browse up to the Volumes folder (used previously)

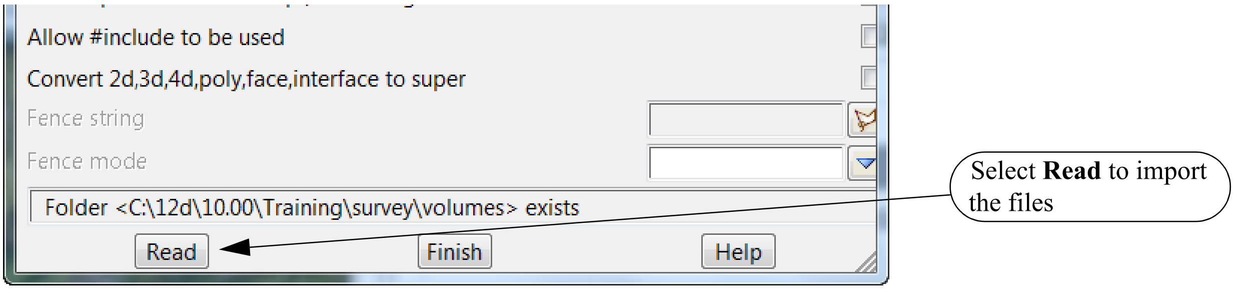
Select **Open**

All of the ascii files in that folder will populate the panel

Clean all of the prefix values by clicking right button on **Pre*post**

Select **Clear**

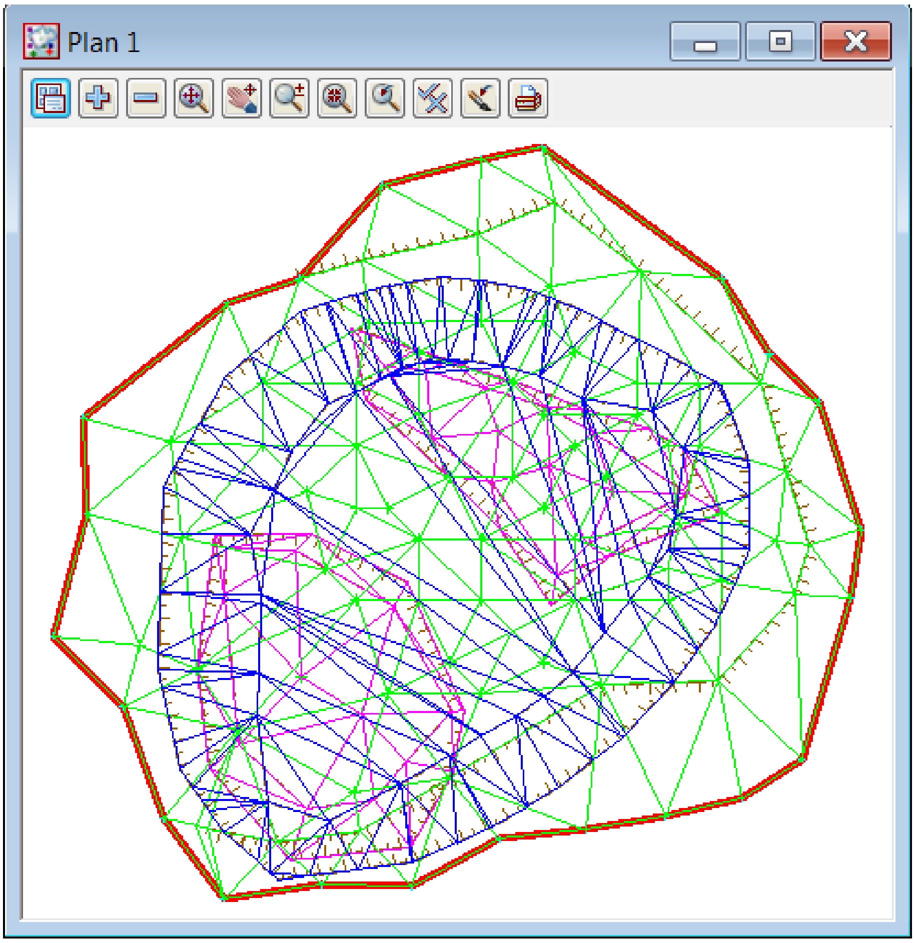
Untick all check boxes except for the Quarry files



Allow #include to be used	☐
Convert 2d,3d,4d,poly,face,interface to super	☐
Fence string	
Fence mode	

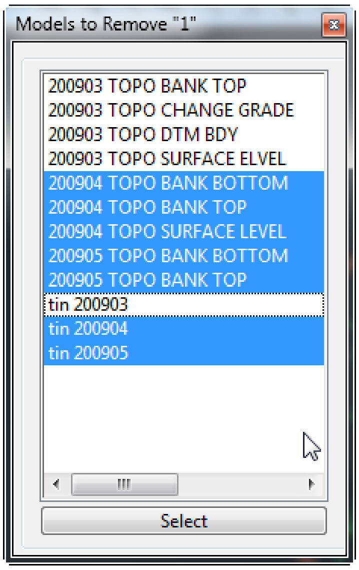
Folder <C:\12d\10.00\Training\survey\volumes> exists

Select **Read** to import the files


Plan 1

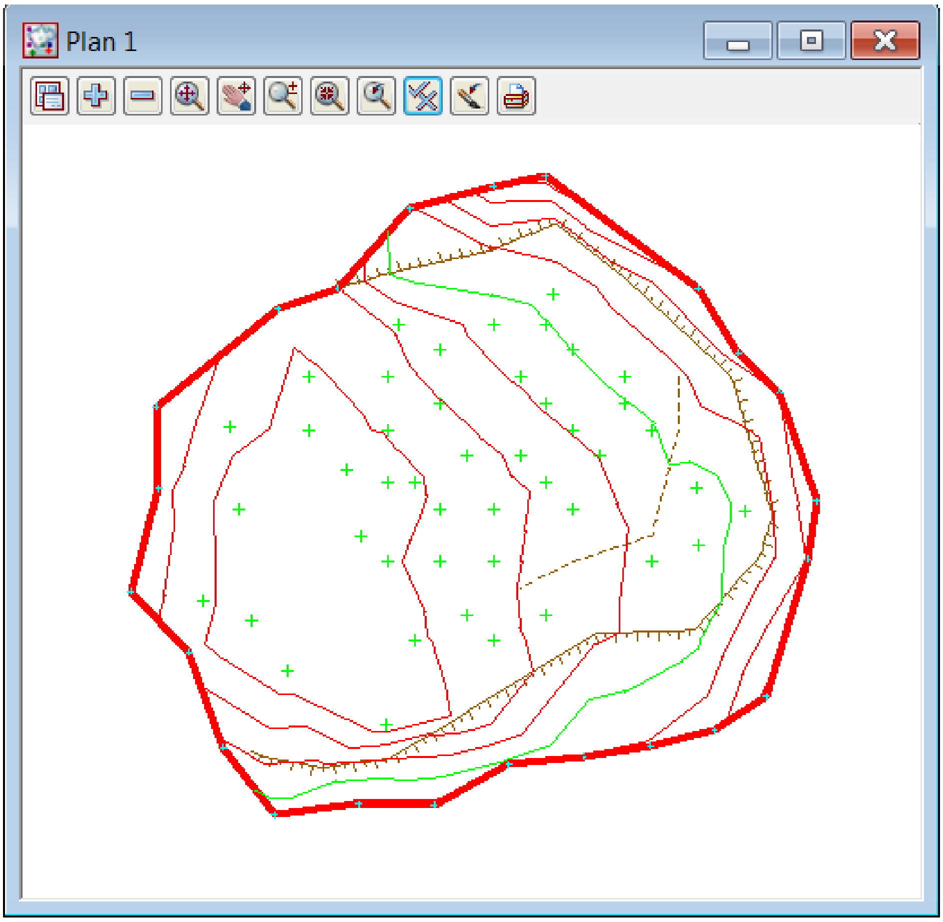
View March survey

Turn off all models except for the 200903 models and toggle on the contours



Models to Remove "1"

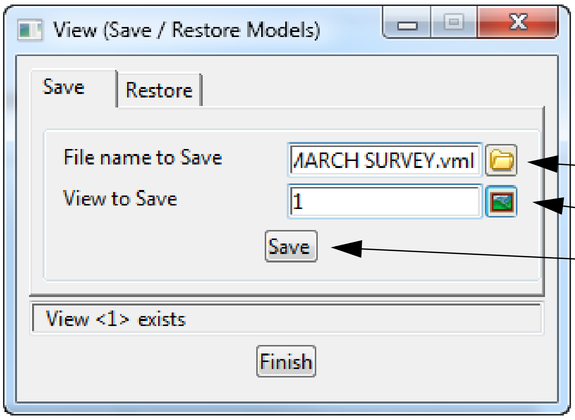
200903 TOPO BANK TOP
200903 TOPO CHANGE GRADE
200903 TOPO DTM BDY
200903 TOPO SURFACE ELVEL
200904 TOPO BANK BOTTOM
200904 TOPO BANK TOP
200904 TOPO SURFACE LEVEL
200905 TOPO BANK BOTTOM
200905 TOPO BANK TOP
tin 200903
tin 200904
tin 200905



Save the March model list

The march survey models can be saved away to a model listing file

Select ***View=>Models Save/Restore***


View (Save / Restore Models)
Save
Restore
Save
Finish

File name to Save: MARCH SURVEY.vml

View to Save: 1

View <1> exists

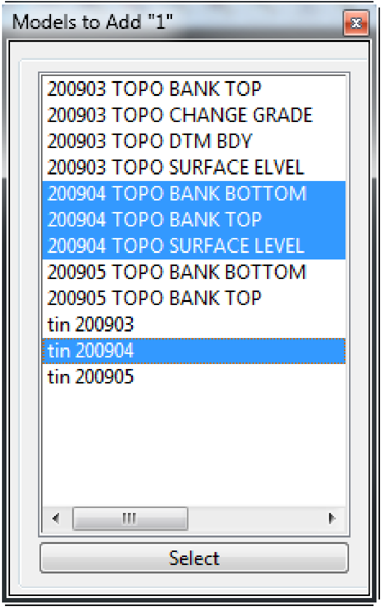
Type in file name **MARCH SURVEY**

Select view **1**

Select **Save** then **Finish**

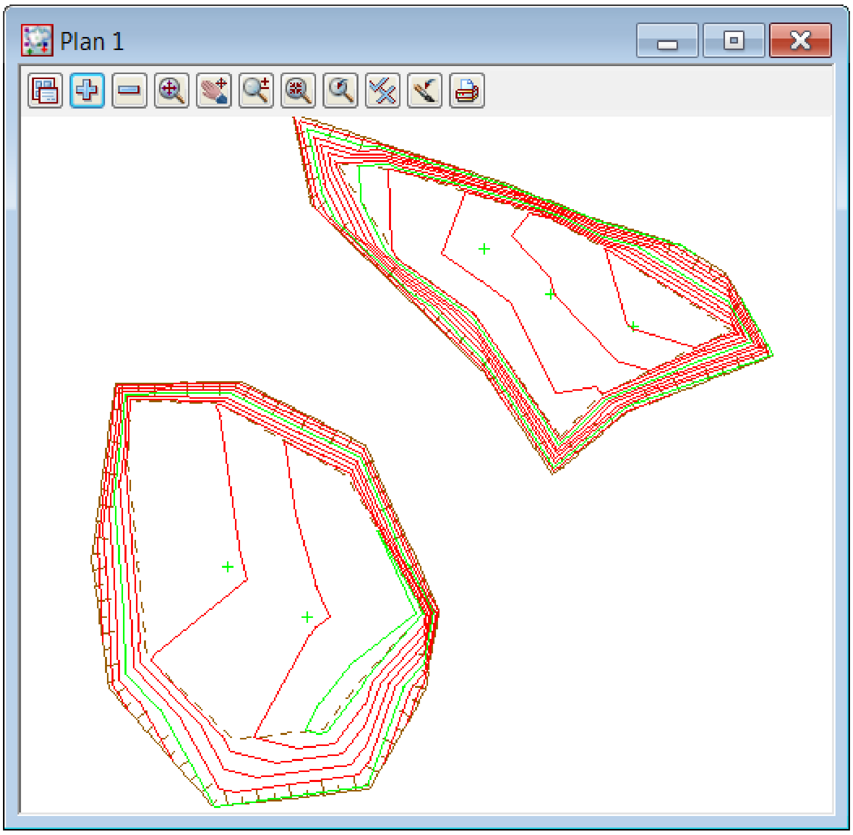
View April survey

Turn off all models then add the 200904 models



Models to Add "1"

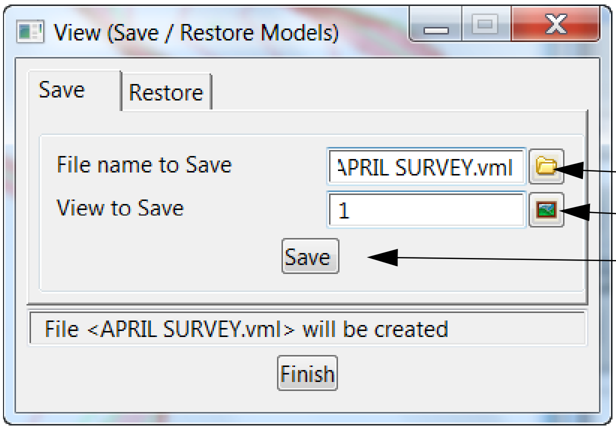
- 200903 TOPO BANK TOP
- 200903 TOPO CHANGE GRADE
- 200903 TOPO DTM BDY
- 200903 TOPO SURFACE ELVEL
- 200904 TOPO BANK BOTTOM
- 200904 TOPO BANK TOP
- 200904 TOPO SURFACE LEVEL
- 200905 TOPO BANK BOTTOM
- 200905 TOPO BANK TOP
- tin 200903
- tin 200904
- tin 200905



Save the April model list

The April survey models can be saved away to a model listing file

Select ***View=>Models Save/Restore***



View (Save / Restore Models)
Save
Restore
Save
Finish

File name to Save: APRIL SURVEY.vml

View to Save: 1

File <APRIL SURVEY.vml> will be created

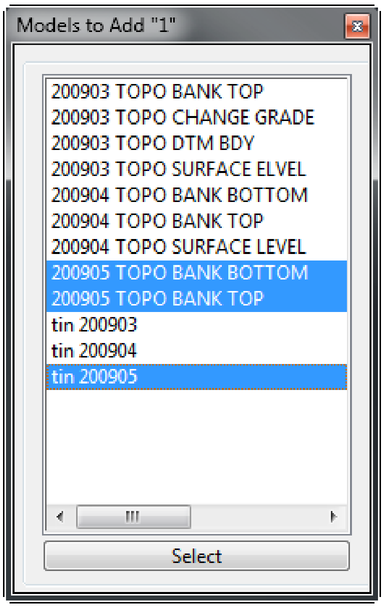
Type in file name **APRIL SURVEY**

Select view **1**

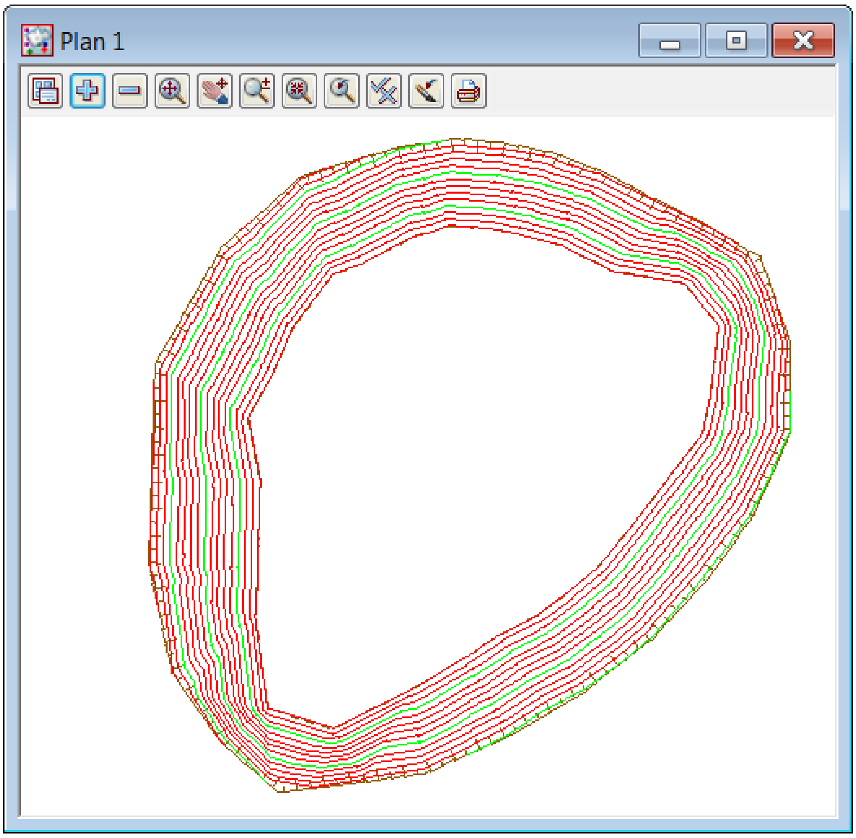
Select **Save** then **Finish**

View May survey

Turn off all models then add the 200905 models



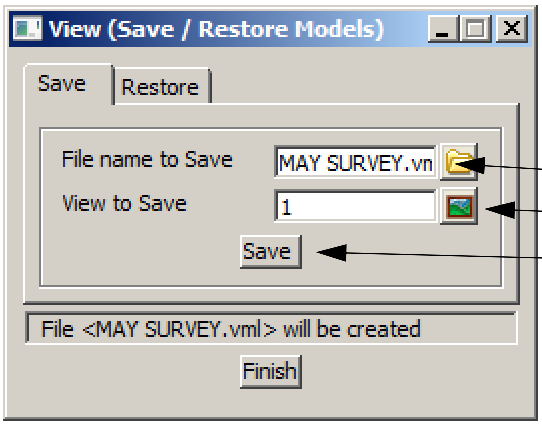
200903 TOPO BANK TOP
200903 TOPO CHANGE GRADE
200903 TOPO DTM BDY
200903 TOPO SURFACE ELVEL
200904 TOPO BANK BOTTOM
200904 TOPO BANK TOP
200904 TOPO SURFACE LEVEL
200905 TOPO BANK BOTTOM
200905 TOPO BANK TOP
tin 200903
tin 200904
tin 200905



Save the May model list

The May survey models can be saved away to a model listing file

Select ***View=>Models Save/Restore***



View (Save / Restore Models)
Save
Restore
File name to Save
View to Save
Save
Finish

File name to Save: MAY SURVEY.vn

View to Save: 1

File <MAY SURVEY.vml> will be created

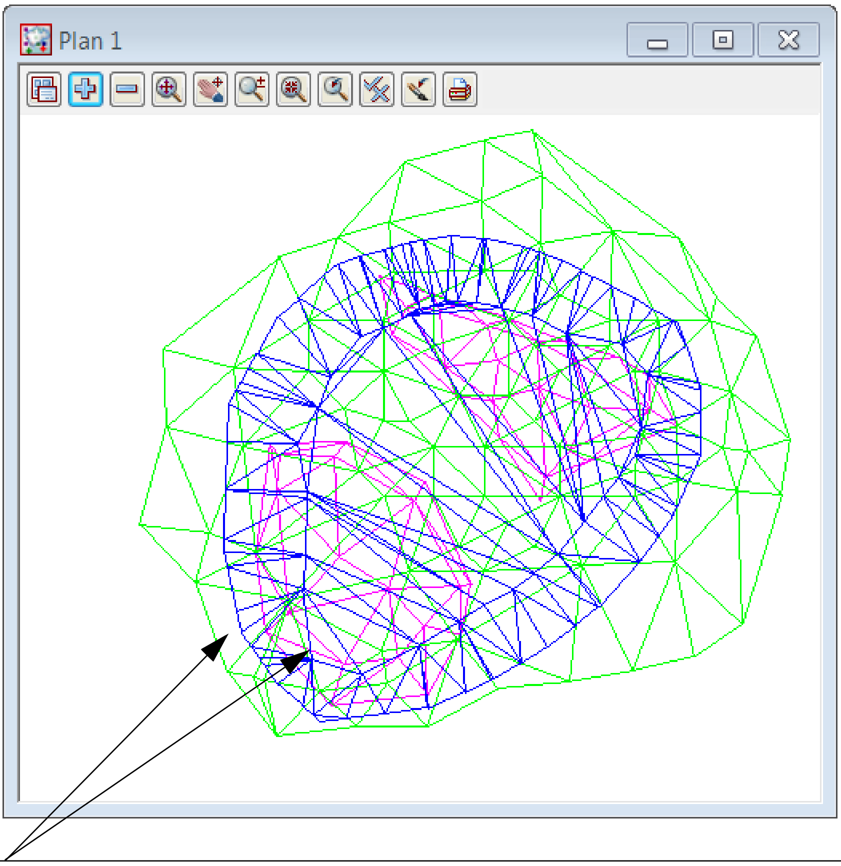
Type in file name **MAY SURVEY**

Select view **1**

Select **Save** then **Finish**

10.5.2 Check April and May tin lies within March tin

Turn off all models then turn on all of the tins

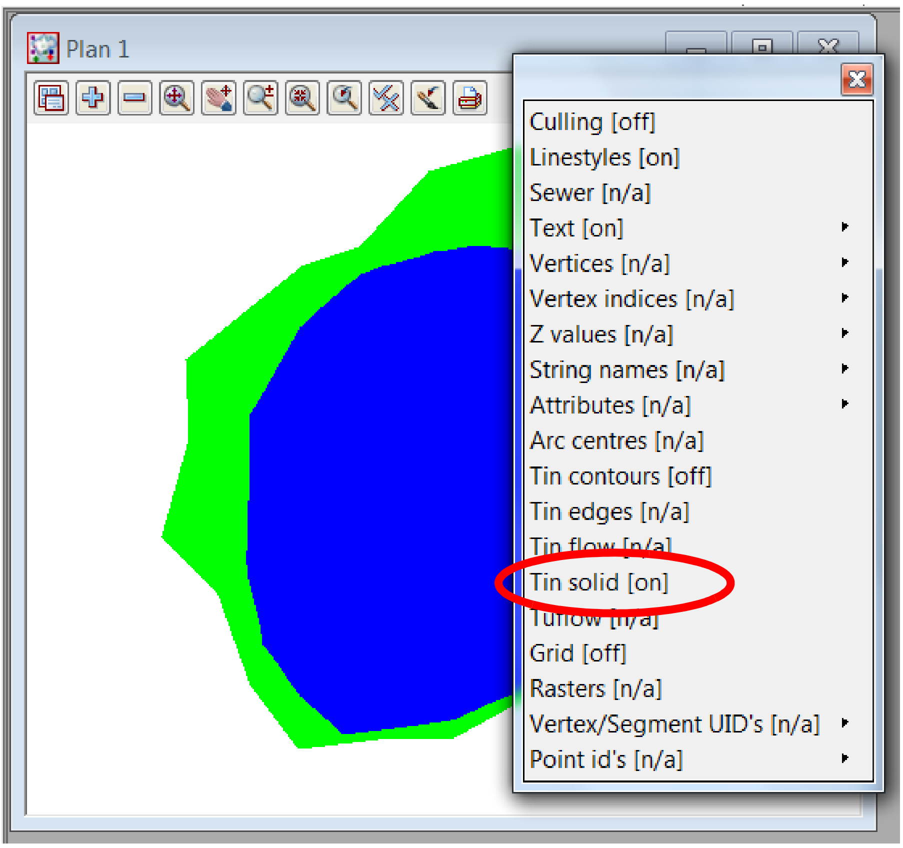


Ensure the outline of the April and May triangulations lies completely inside the March triangulation

Shade tins

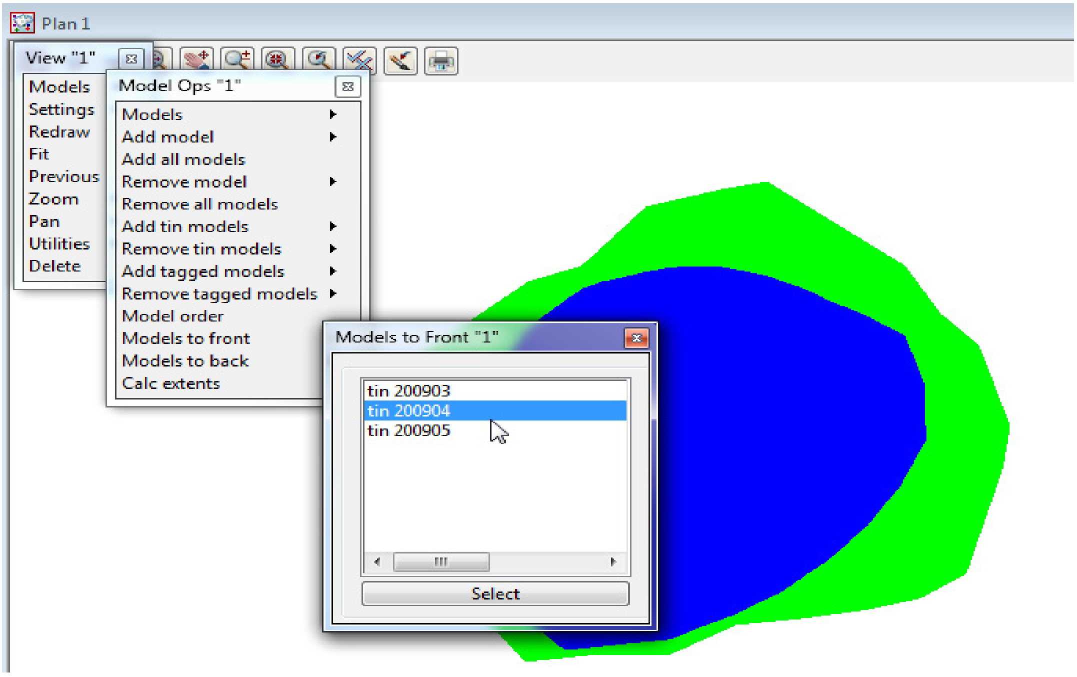
Shading the tins can help with the checking of the overlapping

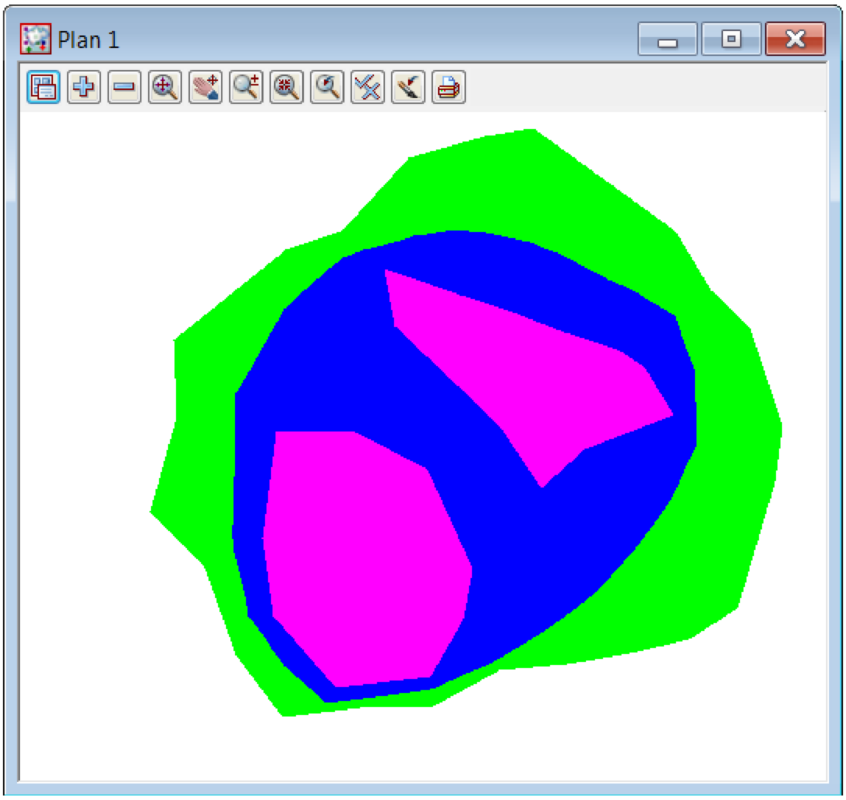
Toggle on **Tin solid**


Plan 1
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [n/a]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [off]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [on]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [n/a]

As the April tin is smaller in area than the May tin it is hidden by the May tin colouring. To make the April tin visible we can move the April tin model to the front of the display

Select ***Menu***. Walk right and select ***Models=>Models to front***. Select **tin 200904**


Plan 1
View "1"
Models
Settings
Redraw
Fit
Previous
Zoom
Pan
Utilities
Delete
Model Ops "1"
Models
Add model
Add all models
Remove model
Remove all models
Add tin models
Remove tin models
Add tagged models
Remove tagged models
Model order
Models to front
Models to back
Calc extents
Models to Front "1"
tin 200903
tin 200904
tin 200905
Select



Toggle off the **Tin solid**

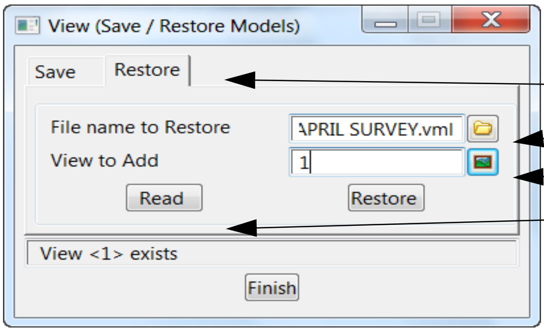
10.5.3 Calculate volumes from March to April survey

We will now calculate the volumes between the March and April survey

Firstly turn off all models then read back in the April survey. We will do this by reading in the model list previously created

Restore the April model list

Select ***View=>Models Save/Restore***


View (Save / Restore Models)
Save
Restore
Read
Restore
Finish

File name to Restore: APRIL SURVEY.vml

View to Add: 1

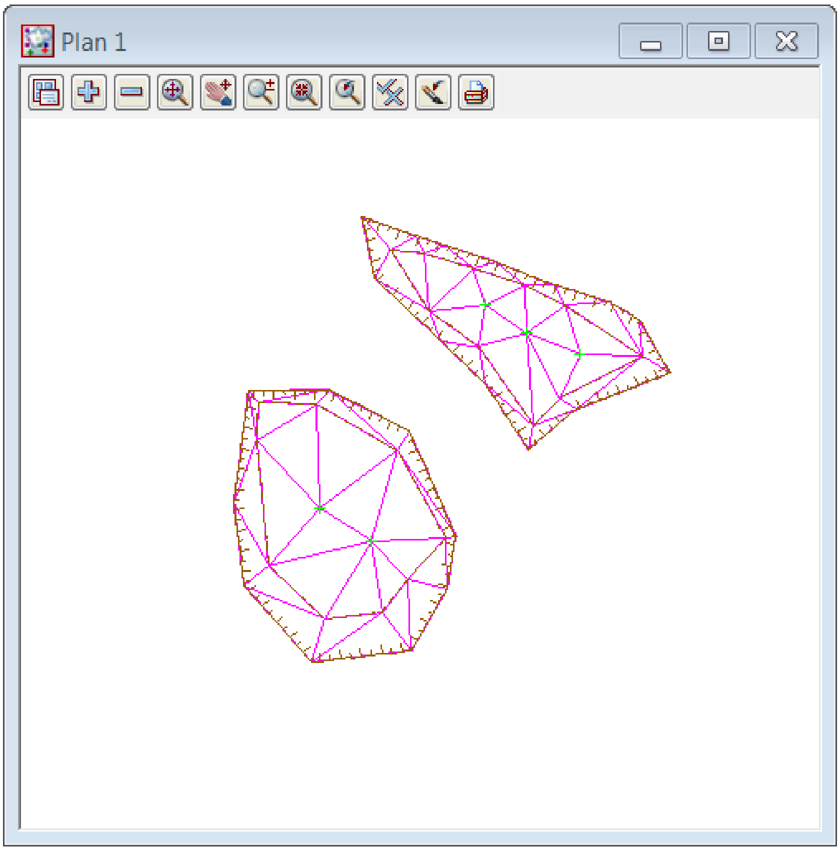
View <1> exists

Select the **Restore** tab

Select the file **APRIL SURVEY**

Select view **1**

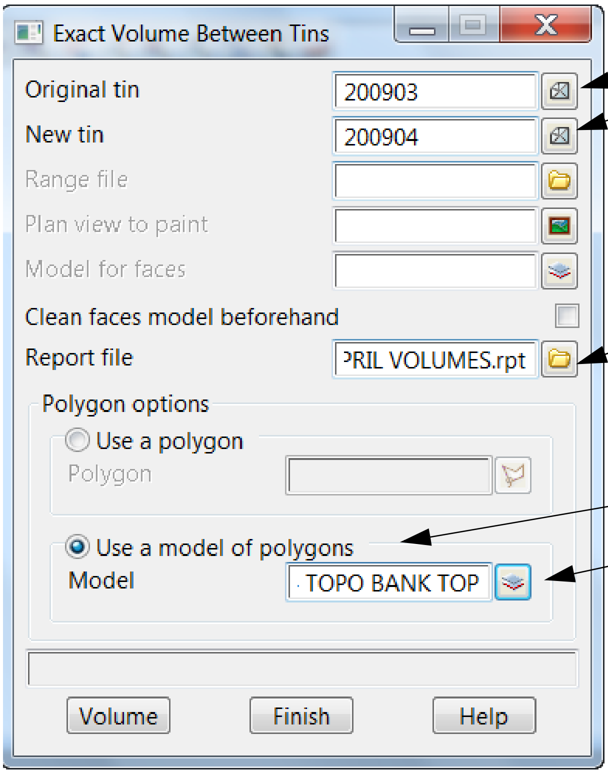
Select **Read** then **Restore**



Calculate EXACT TIN TO TIN volumes

The volume between the two tins can now be calculated and written to a report file. We will use two methods for the volumes. Firstly we will calculate using the tin to tin exact method. Next we will use a height range file to break the volumes up into horizontal slices at user defined heights

Select ***Design=>Volumes=>Exact=>Tin to tin***



Original tin: 200903
New tin: 200904
Range file:
Plan view to paint:
Model for faces:
Clean faces model beforehand ☐
Report file: PRIL VOLUMES.rpt
○ Use a polygon
Polygon:
● Use a model of polygons
Model: TOPO BANK TOP

Select **200903** for original tin model

Select **200904** for new tin model

Type in **APRIL VOLUMES** for report file name

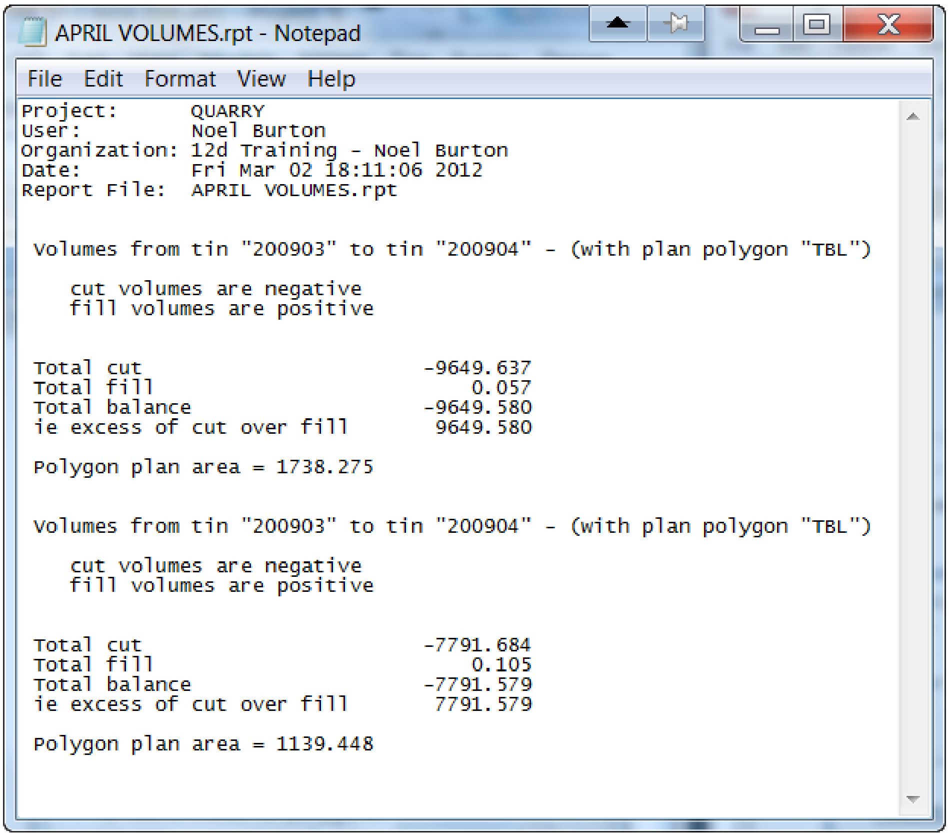
NOTE - report files are not available in the 12d Model Practise Version

Select **Use a model of polygons**

Select model **200904 TOPO BANK TOP** for the edge of the excavations

Select **Volume** to calculate the volume between the two surfaces

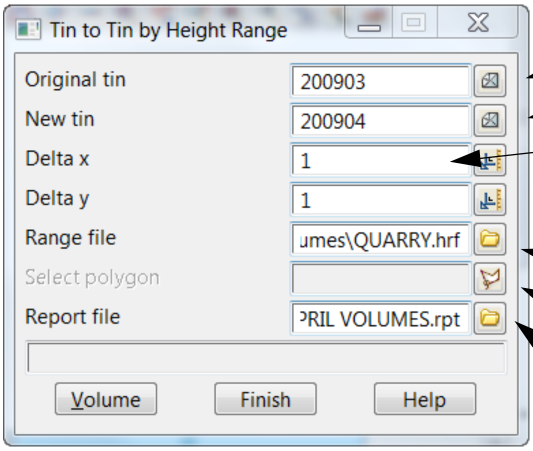
The volume report is opened in the default text editor with separate volumes for each pit



```
Project:      QUARRY
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Fri Mar 02 18:11:06 2012
Report File:  APRIL VOLUMES.rpt

 Volumes from tin "200903" to tin "200904" - (with plan polygon "TBL")

    cut volumes are negative
    fill volumes are positive


 Total cut                        -9649.637
 Total fill                           0.057
 Total balance                    -9649.580
 ie excess of cut over fill        9649.580

 Polygon plan area = 1738.275


 Volumes from tin "200903" to tin "200904" - (with plan polygon "TBL")

    cut volumes are negative
    fill volumes are positive


 Total cut                        -7791.684
 Total fill                           0.105
 Total balance                    -7791.579
 ie excess of cut over fill        7791.579

 Polygon plan area = 1139.448
```

Calculate TIN TO TIN BY HEIGHT RANGE volumes

Select ***Design=>Volumes=>Tin to tin ht range***



Original tin 200903
New tin 200904
Delta x 1
Delta y 1
Range file umes\QUARRY.hrf
Report file PRIL VOLUMES.rpt

Select **200903** for original tin model

Select **200904** for new tin model

Type in 1 for the delta x and delta y spacing

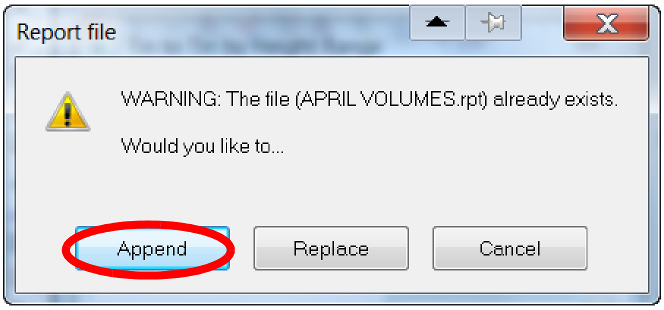
This will calculate the volumes based on a 1 metre grid

Browse up to the Volumes folder and select the height range file **quarry.hrf**

As there are two excavations **do not** pick a polygon

Select the previous report file APRIL VOLUMES to append to

Select **Volume** to calculate the volume between the two surfaces

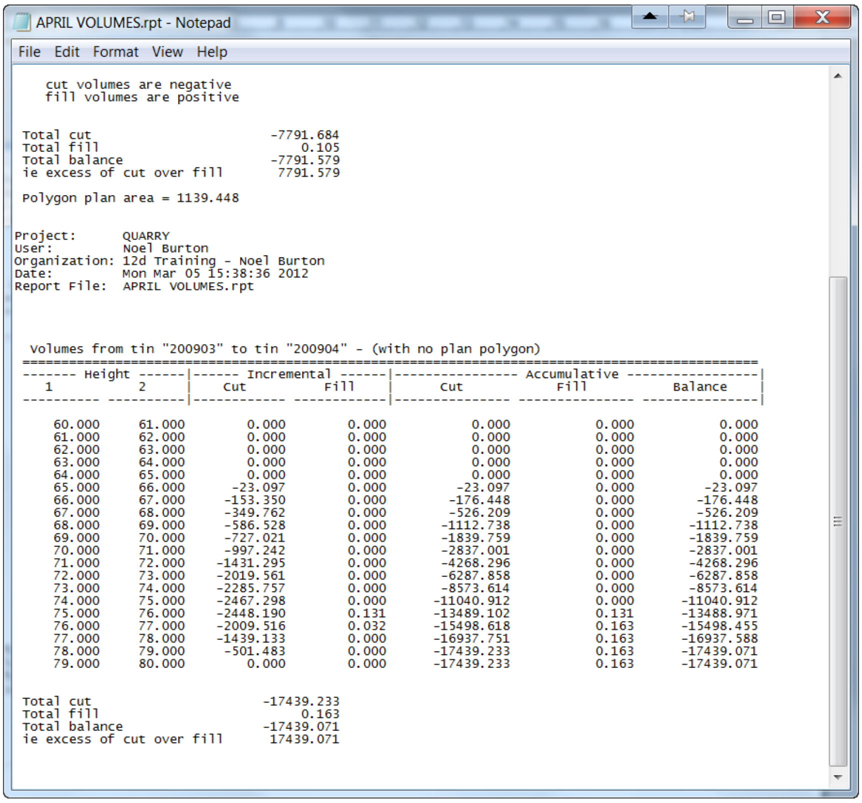


WARNING: The file (APRIL VOLUMES.rpt) already exists.

Would you like to...

Select Append to add to the bottom of the previous report file

The volume report is opened in the default text editor with a total volume of the two pits. Adding the two pit volumes from the tin to tin method gives a close comparison to this volume.



```
    cut volumes are negative
    fill volumes are positive


 Total cut                       -7791.684
 Total fill                          0.105
 Total balance                   -7791.579
 ie excess of cut over fill       7791.579

 Polygon plan area = 1139.448


Project:      QUARRY
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Mon Mar 05 15:38:36 2012
Report File:  APRIL VOLUMES.rpt




  Volumes from tin "200903" to tin "200904" - (with no plan polygon)
 ===============================================================================================
 ------- Height ------|------ Incremental ------|---------------- Accumulative -----------------|
    1           2     |    Cut          Fill    |      Cut            Fill           Balance    |
 ---------- ----------|------------ ------------|--------------- --------------- ---------------|

     60.000     61.000        0.000        0.000           0.000           0.000           0.000
     61.000     62.000        0.000        0.000           0.000           0.000           0.000
     62.000     63.000        0.000        0.000           0.000           0.000           0.000
     63.000     64.000        0.000        0.000           0.000           0.000           0.000
     64.000     65.000        0.000        0.000           0.000           0.000           0.000
     65.000     66.000      -23.097        0.000         -23.097           0.000         -23.097
     66.000     67.000     -153.350        0.000        -176.448           0.000        -176.448
     67.000     68.000     -349.762        0.000        -526.209           0.000        -526.209
     68.000     69.000     -586.528        0.000       -1112.738           0.000       -1112.738
     69.000     70.000     -727.021        0.000       -1839.759           0.000       -1839.759
     70.000     71.000     -997.242        0.000       -2837.001           0.000       -2837.001
     71.000     72.000    -1431.295        0.000       -4268.296           0.000       -4268.296
     72.000     73.000    -2019.561        0.000       -6287.858           0.000       -6287.858
     73.000     74.000    -2285.757        0.000       -8573.614           0.000       -8573.614
     74.000     75.000    -2467.298        0.000      -11040.912           0.000      -11040.912
     75.000     76.000    -2448.190        0.131      -13489.102           0.131      -13488.971
     76.000     77.000    -2009.516        0.032      -15498.618           0.163      -15498.455
     77.000     78.000    -1439.133        0.000      -16937.751           0.163      -16937.588
     78.000     79.000     -501.483        0.000      -17439.233           0.163      -17439.071
     79.000     80.000        0.000        0.000      -17439.233           0.163      -17439.071


 Total cut                      -17439.233
 Total fill                          0.163
 Total balance                  -17439.071
 ie excess of cut over fill      17439.071
```

10.5.4 Combine the March and April surfaces

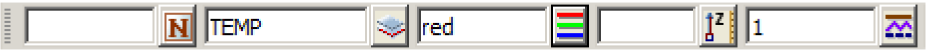
We need to make a copy of the March survey that falls outside the edge of the April survey.

Parallel top of banks

Prior to fencing the data we will parallel the top of batters out 10 millimetres so that the end of the cut strings don't sit right on top of the batters. This would create crossing breaklines and could create errors at the fencing edge

We will add a new model for the parallel lines

Set up the cad control bar as shown below

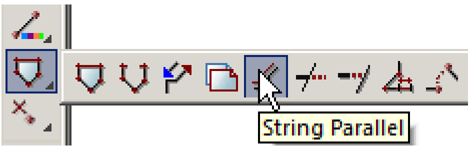


TEMP

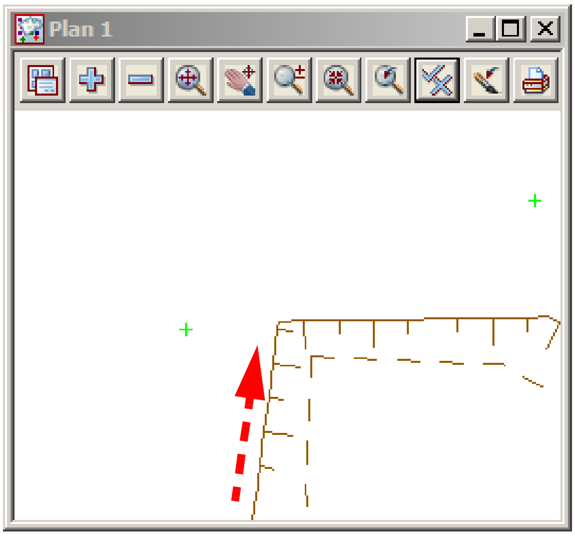
red

1

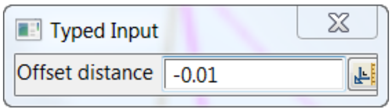
Parallel the two strings using the option ***Cad Strings=>Strings Parallel***



Pick with direction along the edge of the first top of bank string



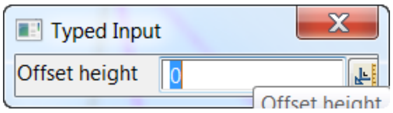
For the offset type in **-0.01 [Enter]**



Typed Input

Offset distance -0.01

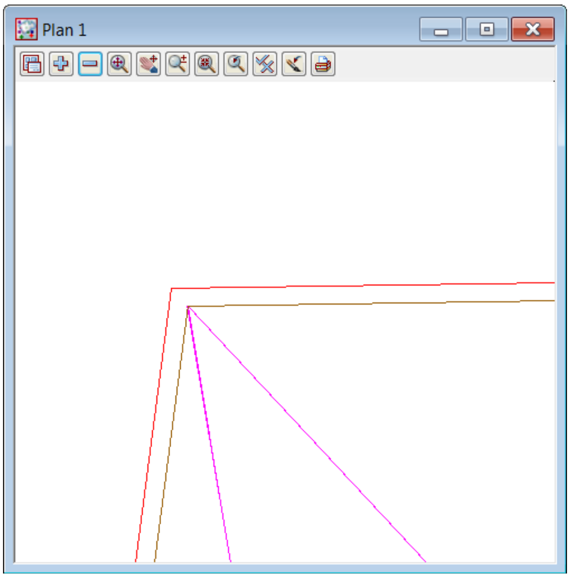
Press **[Enter]** to accept the offset



Typed Input

Offset height 0

Offset height



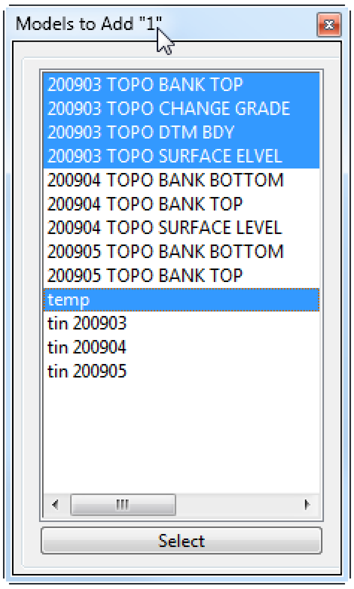
Repeat for the second top of bank

Fence the March survey

We will use the fencing routine to save the data outside the limit of the April survey excavations to a new model.

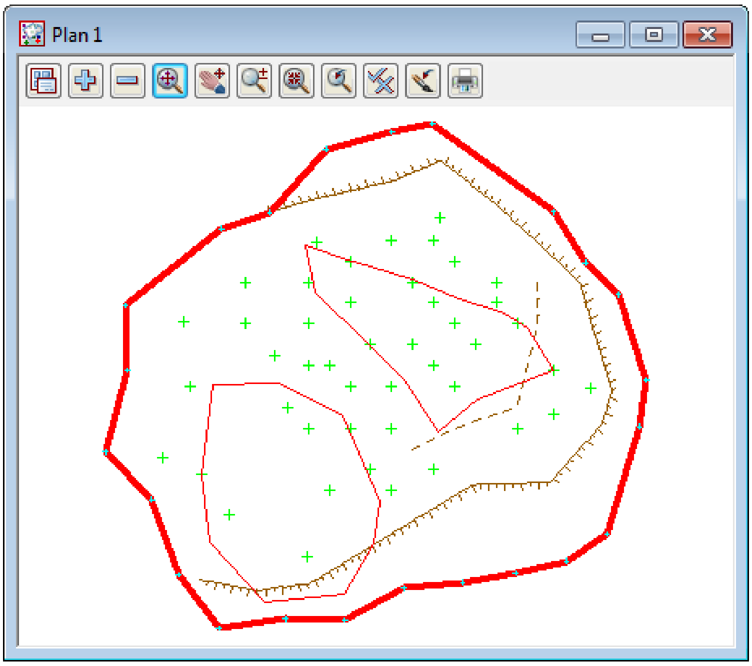
Turn off all models

Turn on the **20903** models along with the **TEMP** top of excavations

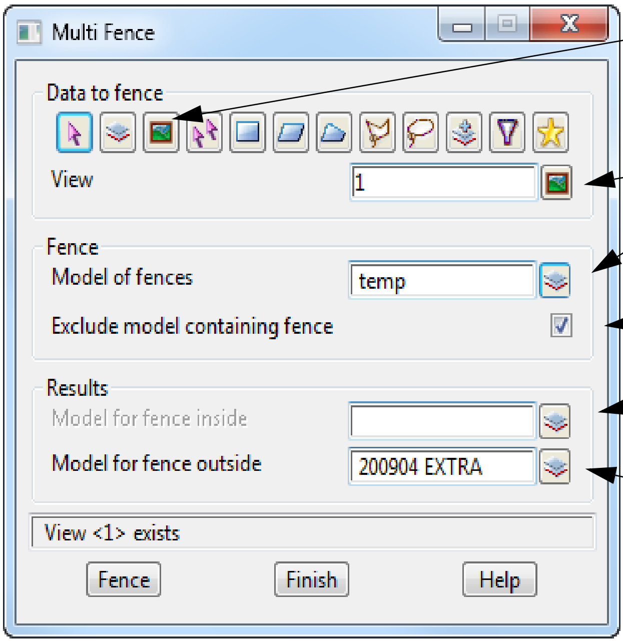


Models to Add "1"

200903 TOPO BANK TOP
200903 TOPO CHANGE GRADE
200903 TOPO DTM BDY
200903 TOPO SURFACE ELVEL
200904 TOPO BANK BOTTOM
200904 TOPO BANK TOP
200904 TOPO SURFACE LEVEL
200905 TOPO BANK BOTTOM
200905 TOPO BANK TOP
temp
tin 200903
tin 200904
tin 200905



Select ***Utilities=>Fence=>Multi Fence***



View: 1

Model of fences: temp

Exclude model containing fence ☑

Model for fence inside:

Model for fence outside: 200904 EXTRA

View <1> exists

Select **view** icon

Select view **1**

Select the model **temp** as the model name for the paralleled excavation edges

Tick check box to **Exclude model containing fence**

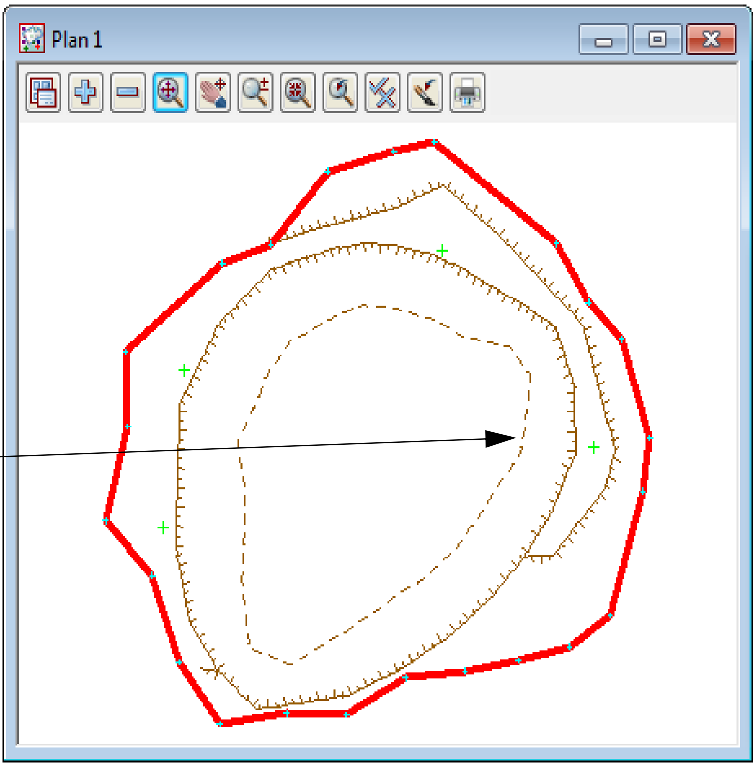
We only want to combine the data outside the excavation edges so leave **Models for fence inside** blank

Type in new model name **200904 EXTRA** for data outside the excavations

Select **Fence** then **Finish** to create the data

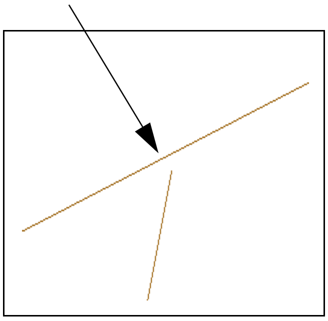
Turn off all **200903** models

Turn on all **200904** models including the newly created model **200904 EXTRA**



Zoom in to where one of the 200903 strings is trimmed against the fence boundary

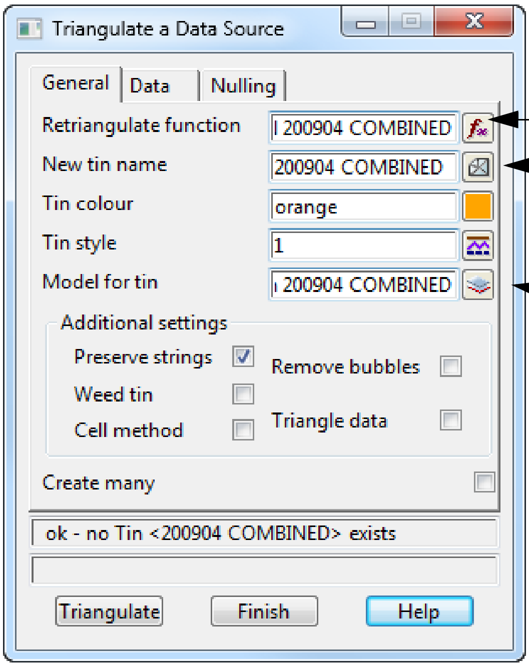
The string is cut at the parallel string and not the top of bank ensuring there are no crossing breaklines in the subsequent tin



Triangulate the 200904 combined surface

Firstly turn off the model **TEMP** as it is not to be used in the tin

Select ***Tins=>Create=>Triangulate data***


Triangulate a Data Source
General
Data
Nulling
Triangulate
Finish
Help

Retriangulate function: 200904 COMBINED

New tin name: 200904 COMBINED

Tin colour: orange

Tin style: 1

Model for tin: 200904 COMBINED

Additional settings

Preserve strings ☑ Remove bubbles ☐

Weed tin ☐

Cell method ☐ Triangle data ☐

Create many ☐

ok - no Tin <200904 COMBINED> exists

Type in the function name **TIN 200904 COMBINED**

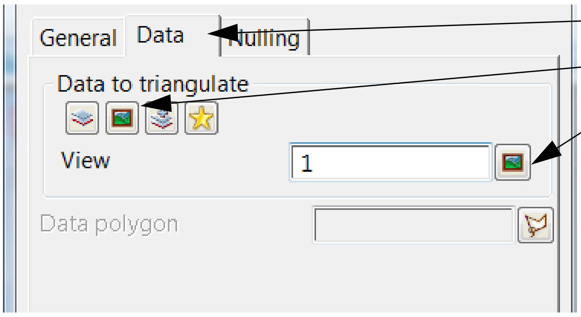
Type in the tin name **200904 COMBINED[Enter]**

Select colour **orange** for tin

Select tin style (line type) **1**. This is a continuous line

When selecting **[Enter]** key after entering tin name the model name is automatically created with **tin** as the prefix

The only check box needed to be ticked is **Preserve strings** which will ensure breaklines are inserted at the time of triangulation

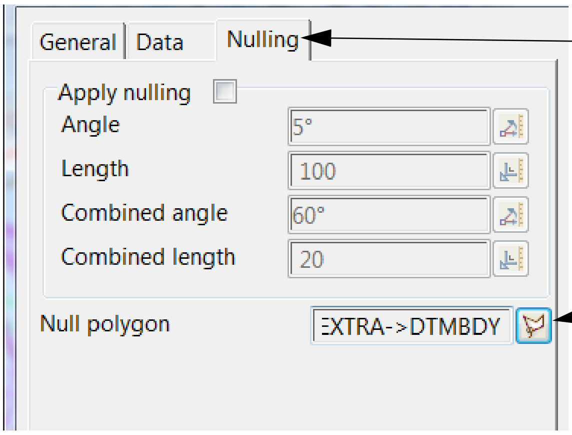

General
Data
Nulling
Data to triangulate
Data polygon

View: 1

Select the **Data** tab

Select the view icon

Select view **1**


General
Data
Nulling

Apply nulling ☐

Angle: 5°

Length: 100

Combined angle: 60°

Combined length: 20

Null polygon: EXTRA->DTMBDY

Select the **Nulling** tab

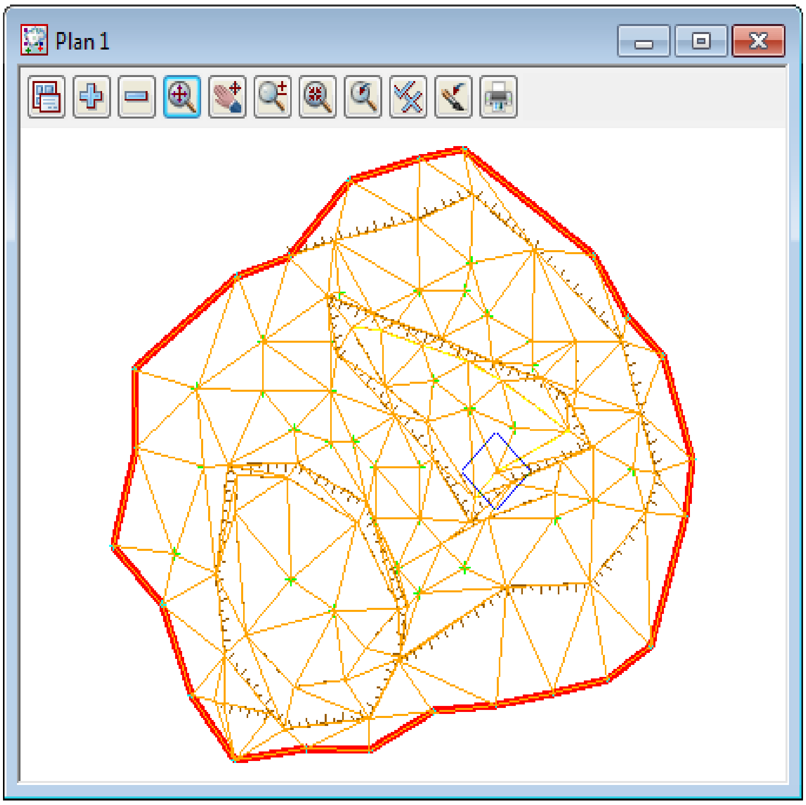
Select the **Null polygon** choice icon

Pick and accept the old boundary string

Select **Triangulate**

Select **Finish**

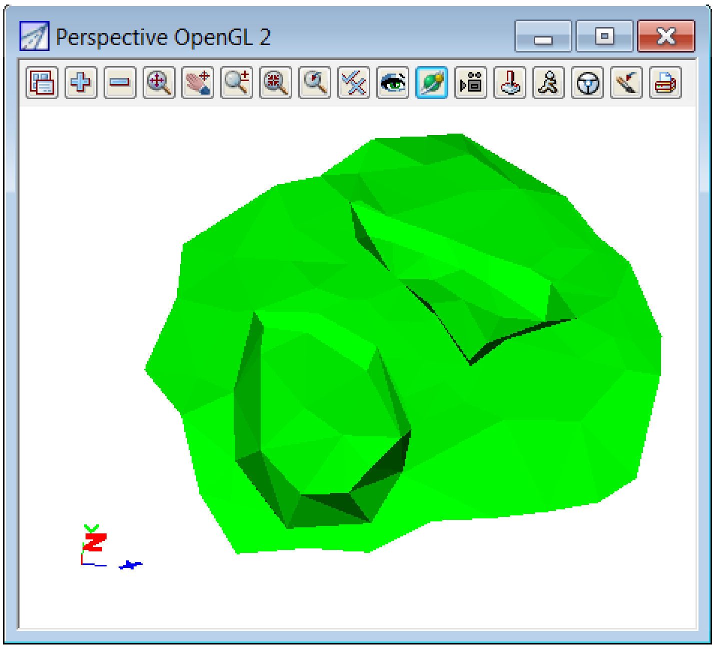
Turn on the model **tin 200904 COMBINED** to view the triangulation


Plan 1

At any time we can view the updated surface in a perspective view.

Select option ***View=>New=>Perspective Open GL***

Turn on the tin model **tin 200904 COMBINED** then toggle on the tin shading



As the volumes are calculated monthly the procedure for importing and reducing the subsequent surveys is the same

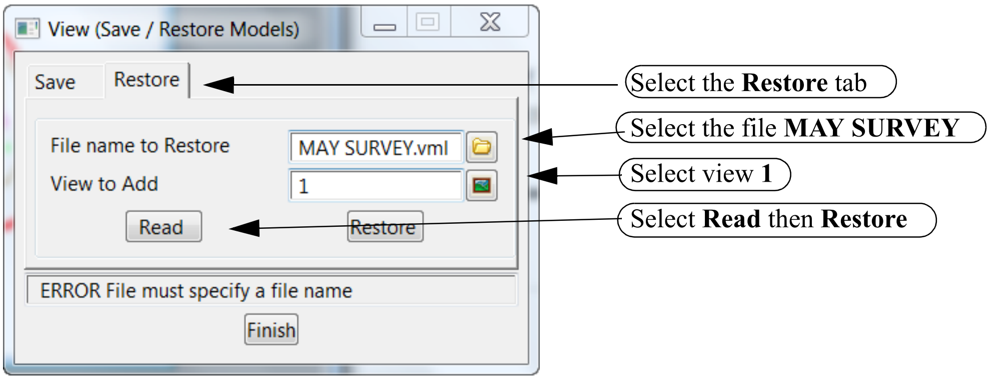
10.5.5 Calculate volumes from April to May survey

We will now calculate the volumes between the combined April surface to the May survey

Firstly turn off all models then read back in the May survey. We will do this by reading in the model list previously created

Restore the May model list

Select ***View=>Models Save/Restore***


View (Save / Restore Models)
Save
Restore
File name to Restore
View to Add
Read
Restore
Finish

MAY SURVEY.vml

1

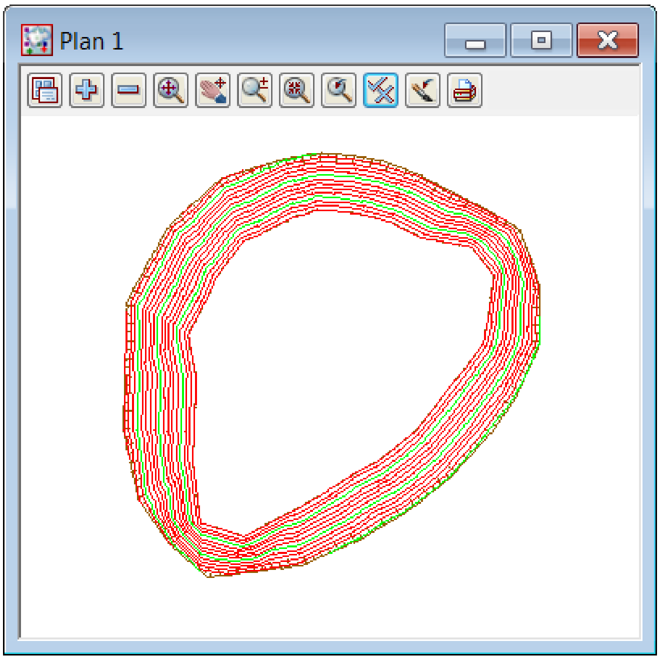
ERROR File must specify a file name

Select the **Restore** tab

Select the file **MAY SURVEY**

Select view **1**

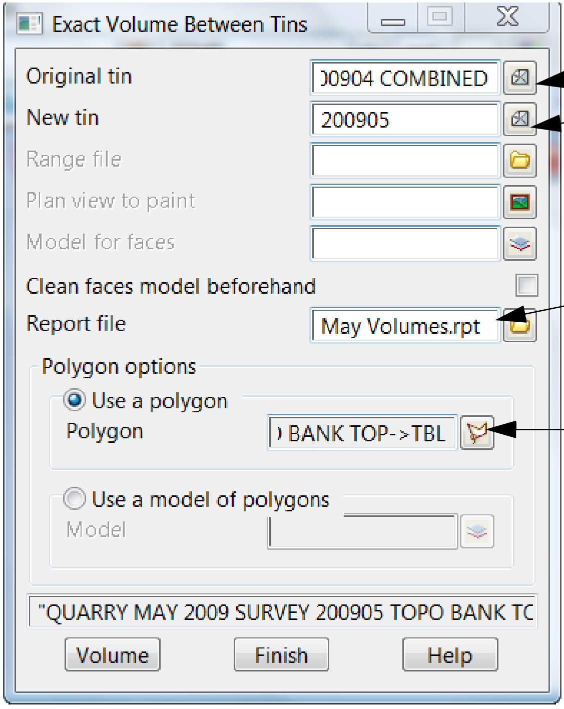
Select **Read** then **Restore**



Calculate EXACT TIN TO TIN volumes

The volumes will again be done using the two methods

Select ***Design=>Volumes=>Exact=>Tin to tin***


Exact Volume Between Tins

Original tin:)0904 COMBINED

New tin: 200905

Range file:

Plan view to paint:

Model for faces:

Clean faces model beforehand ☐

Report file: May Volumes.rpt

Polygon options

● Use a polygon

Polygon:) BANK TOP->TBL

○ Use a model of polygons

Model:

"QUARRY MAY 2009 SURVEY 200905 TOPO BANK TC

Select **200904 COMBINED** for original tin model

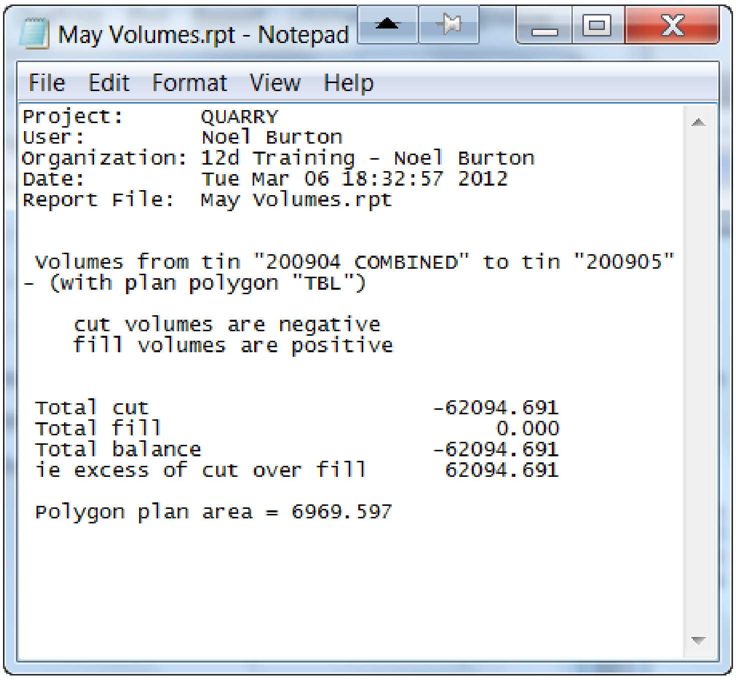
Select **200905** for new tin model

Type in **MAY VOLUMES** for report file name

NOTE - report files are not available in the 12d Model Practise Version

Select **Use a polygon** and then pick the top of bank string

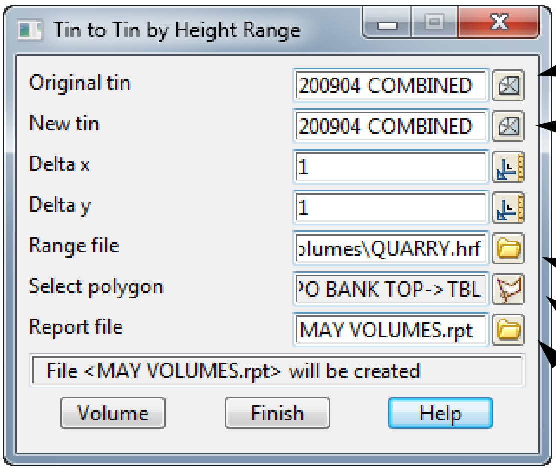
Select **Volume** to calculate the volume between the two surfaces



```
Project:      QUARRY
User:         Noel Burton
Organization: 12d Training - Noel Burton
Date:         Tue Mar 06 18:32:57 2012
Report File:  May Volumes.rpt


 Volumes from tin "200904 COMBINED" to tin "200905"
- (with plan polygon "TBL")

    cut volumes are negative
    fill volumes are positive


 Total cut                        -62094.691
 Total fill                            0.000
 Total balance                    -62094.691
 ie excess of cut over fill        62094.691

 Polygon plan area = 6969.597
```

Calculate TIN TO TIN BY HEIGHT RANGE volumes

Select ***Design=>Volumes=>Tin to tin ht range***



Tin to Tin by Height Range

Original tin: 200904 COMBINED

New tin: 200904 COMBINED

Delta x: 1

Delta y: 1

Range file: olumes\QUARRY.hrf

Select polygon: 'O BANK TOP->TBL

Report file: MAY VOLUMES.rpt

File <MAY VOLUMES.rpt> will be created

Select **200904 COMBINED** for original tin model

Select **200905** for new tin model

Type in 1 for the delta x and delta y spacing

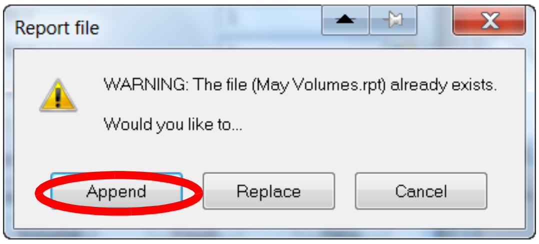
This will calculate the volumes based on a 1 metre grid

Browse up to the Volumes folder and select the height range file **quarry.hrf**

Select **Use a polygon** and then pick the top of bank string

Select the previous report file **MAY VOLUMES** to append to

Select **Volume** to calculate the volume between the two surfaces



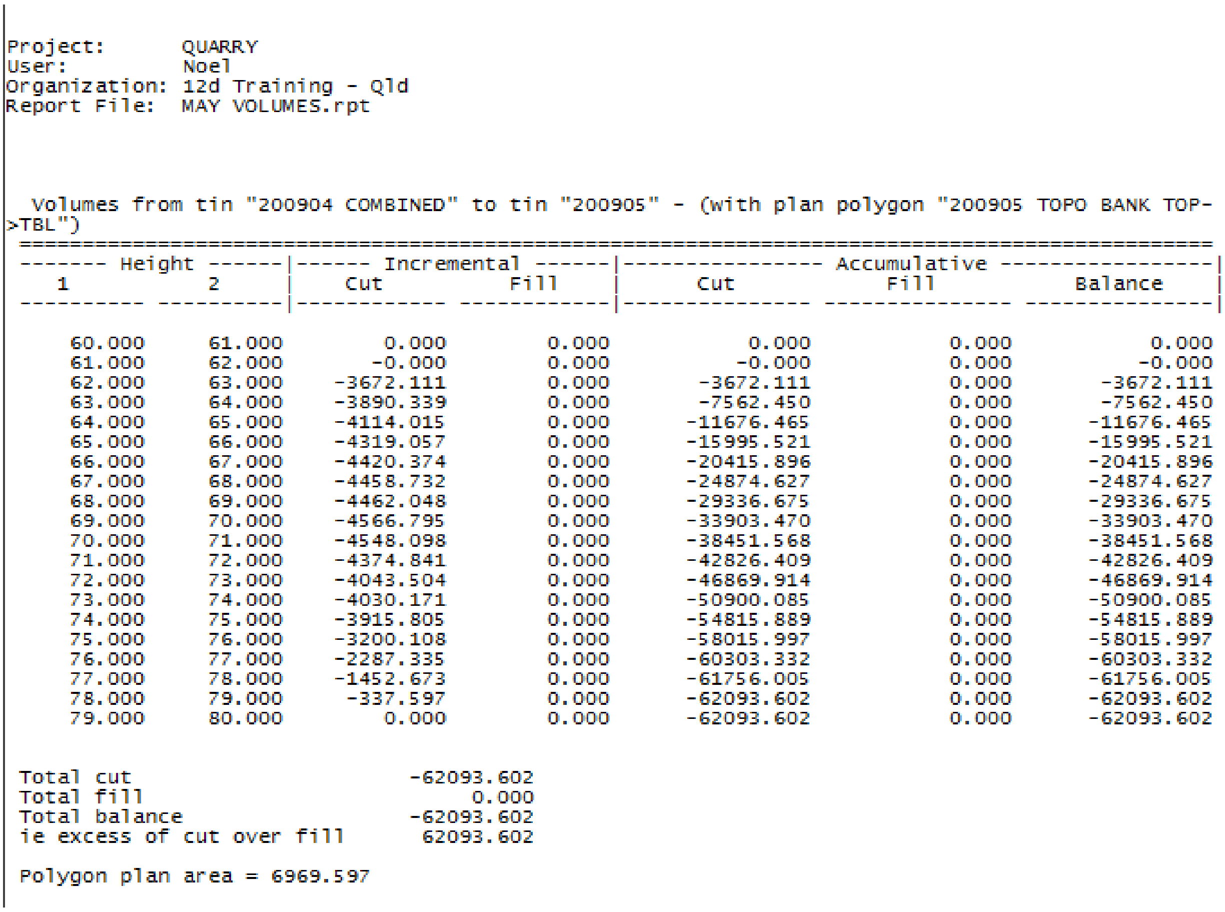
Report file

WARNING: The file (May Volumes.rpt) already exists.

Would you like to...

Select Append to add to the bottom of the previous report file

The volume report is opened in the default text editor



```
Project:      QUARRY
User:         Noel
Organization: 12d Training - Qld
Report File:  MAY VOLUMES.rpt



  Volumes from tin "200904 COMBINED" to tin "200905" - (with plan polygon "200905 TOPO BANK TOP-
>TBL")
 ===========================================================================================
 ------- Height ------|------ Incremental ------|---------------- Accumulative ----------------|
    1          2      |      Cut          Fill  |       Cut            Fill           Balance  |
 ---------- ----------|----------- -----------|-------------- -------------- ---------------|

     60.000     61.000       0.000       0.000        0.000          0.000          0.000
     61.000     62.000      -0.000       0.000       -0.000          0.000         -0.000
     62.000     63.000   -3672.111       0.000    -3672.111          0.000      -3672.111
     63.000     64.000   -3890.339       0.000    -7562.450          0.000      -7562.450
     64.000     65.000   -4114.015       0.000   -11676.465          0.000     -11676.465
     65.000     66.000   -4319.057       0.000   -15995.521          0.000     -15995.521
     66.000     67.000   -4420.374       0.000   -20415.896          0.000     -20415.896
     67.000     68.000   -4458.732       0.000   -24874.627          0.000     -24874.627
     68.000     69.000   -4462.048       0.000   -29336.675          0.000     -29336.675
     69.000     70.000   -4566.795       0.000   -33903.470          0.000     -33903.470
     70.000     71.000   -4548.098       0.000   -38451.568          0.000     -38451.568
     71.000     72.000   -4374.841       0.000   -42826.409          0.000     -42826.409
     72.000     73.000   -4043.504       0.000   -46869.914          0.000     -46869.914
     73.000     74.000   -4030.171       0.000   -50900.085          0.000     -50900.085
     74.000     75.000   -3915.805       0.000   -54815.889          0.000     -54815.889
     75.000     76.000   -3200.108       0.000   -58015.997          0.000     -58015.997
     76.000     77.000   -2287.335       0.000   -60303.332          0.000     -60303.332
     77.000     78.000   -1452.673       0.000   -61756.005          0.000     -61756.005
     78.000     79.000    -337.597       0.000   -62093.602          0.000     -62093.602
     79.000     80.000       0.000       0.000   -62093.602          0.000     -62093.602


 Total cut                       -62093.602
 Total fill                           0.000
 Total balance                   -62093.602
 ie excess of cut over fill       62093.602

 Polygon plan area = 6969.597
```

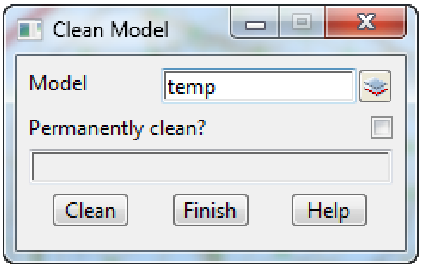
10.5.6 Combine the April combined surface and May surfaces

We need to make a copy of the April survey that falls outside the edge of the May survey.

Parallel top of bank

Prior to creating a new parallel string we will delete the strings previously created in the temp model. The easiest way to do this is to clean out the model

Select option ***Models=>Clean***


Clean Model
Model
Permanently clean?
Clean
Finish
Help

Model: temp

Permanently clean? ☐

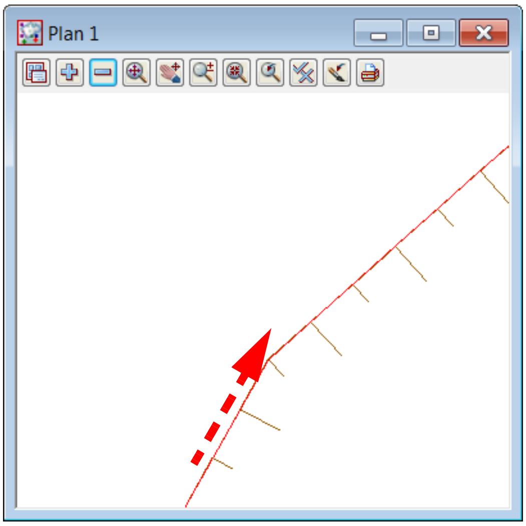
Select the model **temp**

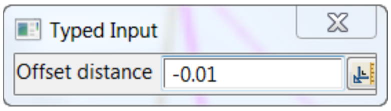
Select **Clean**

Select **Yes** to confirm

Ensure the current model in the cad control is still **temp** then parallel the string using the option ***Cad Strings=>Strings Parallel***

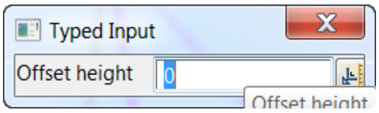
Pick with direction along the edge of the top of bank string




Typed Input

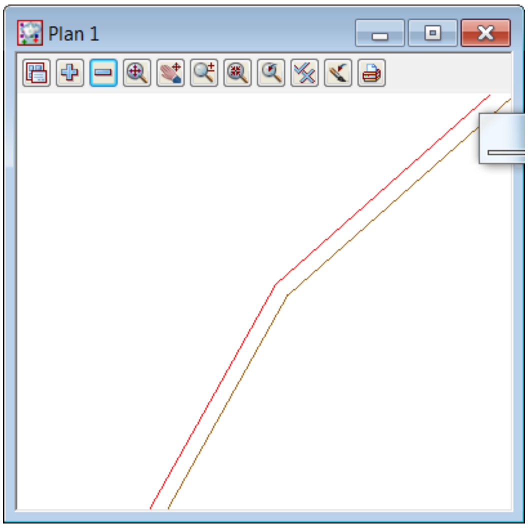
Offset distance: -0.01

Type in **-0.01 [Enter]**


Typed Input
Offset height

Offset height: 0

Press **[Enter]** to accept the offset

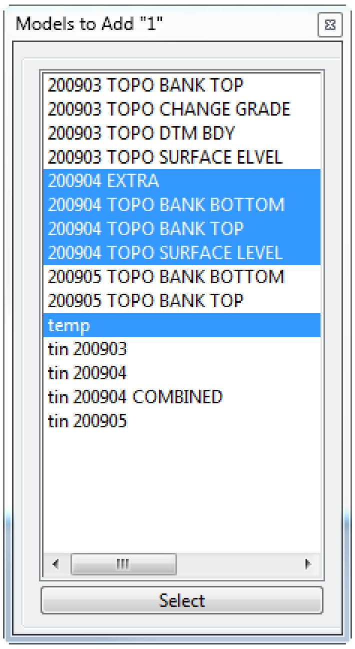


Fence the April combined survey

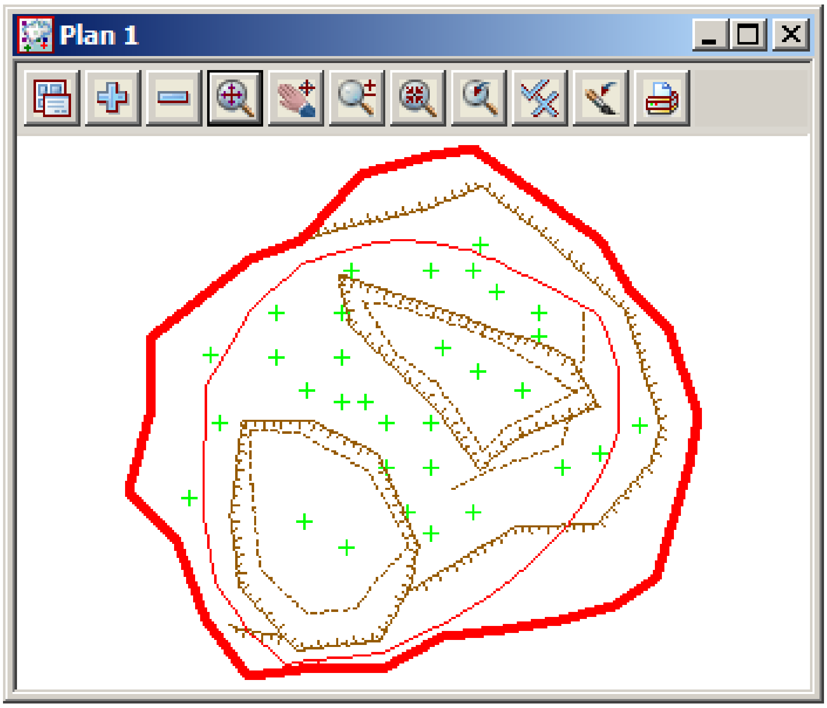
We will use the fencing routine to save the data outside the limit of the May survey excavations to a new model.

Turn off all models

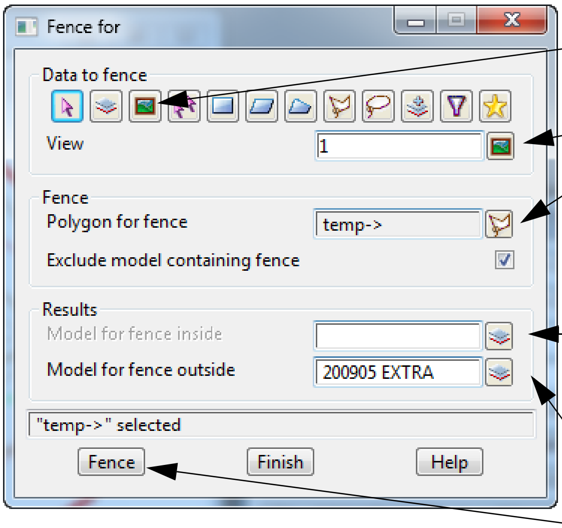
Turn on the **20904** models along with the **temp** top of excavations


Models to Add "1"

200903 TOPO BANK TOP
200903 TOPO CHANGE GRADE
200903 TOPO DTM BDY
200903 TOPO SURFACE ELVEL
200904 EXTRA
200904 TOPO BANK BOTTOM
200904 TOPO BANK TOP
200904 TOPO SURFACE LEVEL
200905 TOPO BANK BOTTOM
200905 TOPO BANK TOP
temp
tin 200903
tin 200904
tin 200904 COMBINED
tin 200905



Select ***Utilities=>Fence=>Fence***



Data to fence

View: 1

Fence

Polygon for fence: temp->

Exclude model containing fence ☑

Results

Model for fence inside:

Model for fence outside: 200905 EXTRA

"temp->" selected

Select **view** icon

Select view **1**

Select the polygon icon then select the **temp** string

Tick check box to **Exclude model containing fence**

We only want to combine the data outside the excavation edge so leave **Models for fence inside** blank

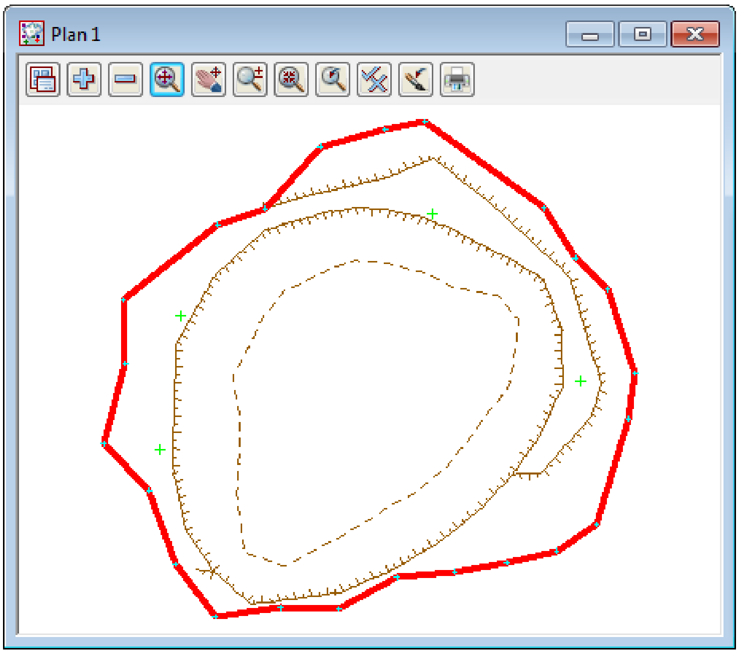
Type in new model name **200905 EXTRA** for data outside the excavations

Select **Fence** then **Finish** to create the data

Turn off all **200904** models

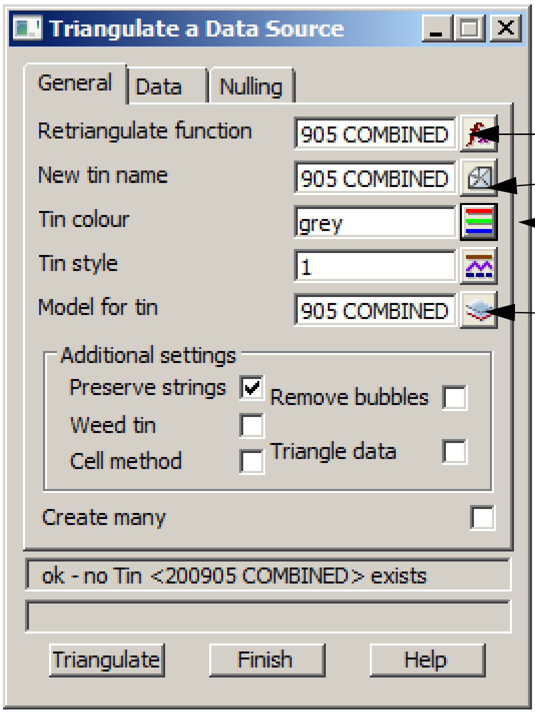
Turn on all **200905** models including the newly created model **200905 EXTRA**

Also turn off the model **temp**



Triangulate the 200905 combined surface

Select ***Tins=>Create=>Triangulate data***



Triangulate a Data Source

Retriangulate function: 905 COMBINED
New tin name: 905 COMBINED
Tin colour: grey
Tin style: 1
Model for tin: 905 COMBINED

Additional settings
Preserve strings ☑ Remove bubbles ☐
Weed tin ☐
Cell method ☐ Triangle data ☐

Create many ☐

ok - no Tin <200905 COMBINED> exists

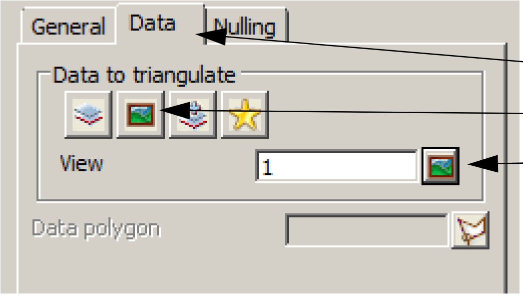
Type in the function name **TIN 200905 COMBINED**

Type in the tin name **200905 COMBINED[Enter]**

Select colour **grey** for tin

When selecting **[Enter]** key after entering tin name the model name is automatically created with **tin** as the prefix

The only check box needed to be ticked is **Preserve strings** which will ensure breaklines are inserted at the time of triangulation

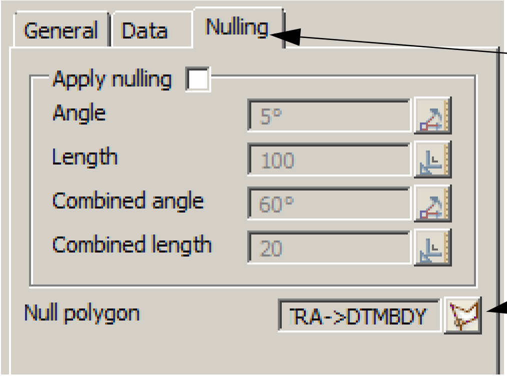

General
Data
Nulling
Data to triangulate
Data polygon

View: 1

Select the **Data** tab

Select the view icon

Select view **1**


General
Data
Nulling

Apply nulling ☐

Angle: 5°

Length: 100

Combined angle: 60°

Combined length: 20

Null polygon: RA->DTMBDY

Select the **Nulling** tab

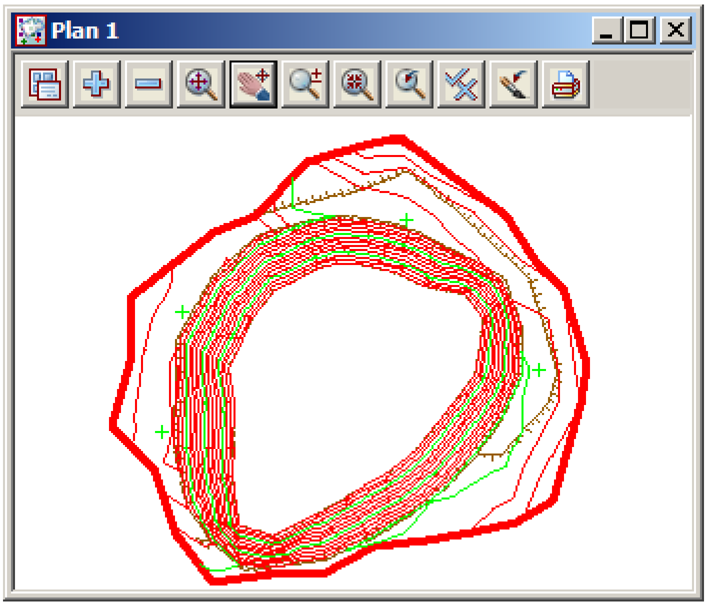
Select the **Null polygon** choice icon

Pick and accept old boundary string

Select **Triangulate**

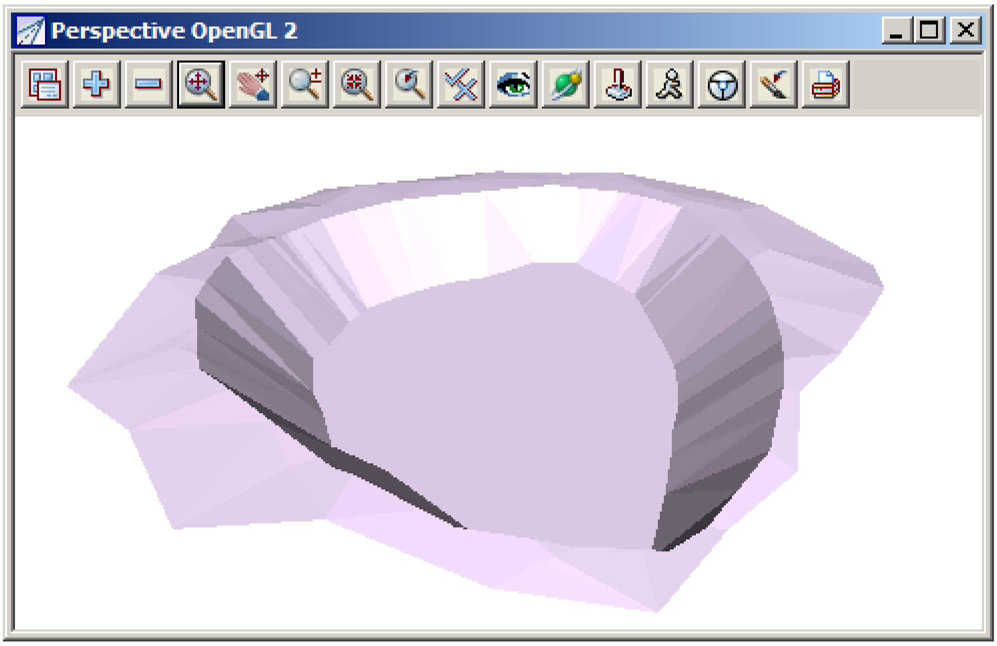
Select **Finish**

Turn on the model **tin 200905 COMBINED** to view the triangulation



Again view the updated surface in a perspective view.

Turn off all models then turn on the tin model **tin 200905 COMBINED** then toggle on the tin shading



11 Setout

In this chapter we will look at various types of setout calculations where the feature is constructed in the graphics and a setout file is created for upload to a data collector. The types of setout include:

Building creation and setout

Imported building from cad file

Setout for evenly graded string

Creating 3d setout for imported 2d cad strings

Road setout from imported strings

Triangulation setout

QA Reporting of point, string and tin setout

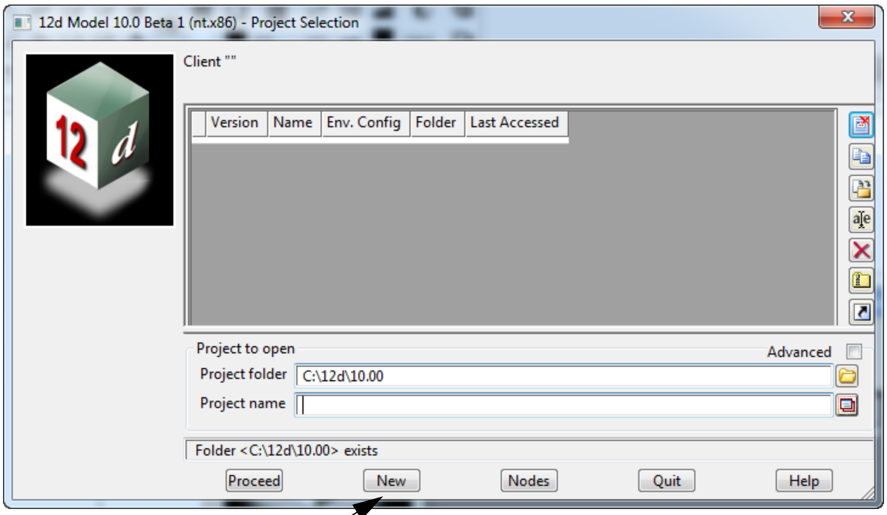
11.1 Building setout

In this topic we will create a lot outline and position a building on the lot for setout.

To begin create a new project called **HOUSE SETOUT** in the Survey training area

First, double click on the *12d Model 10* icon to bring up the **Project Selection** panel.

12d Model 10 - 32 bit


12d Model 10.0 Beta 1 (nt.x86) - Project Selection

Client ""

Version	Name	Env. Config	Folder	Last Accessed

Project to open

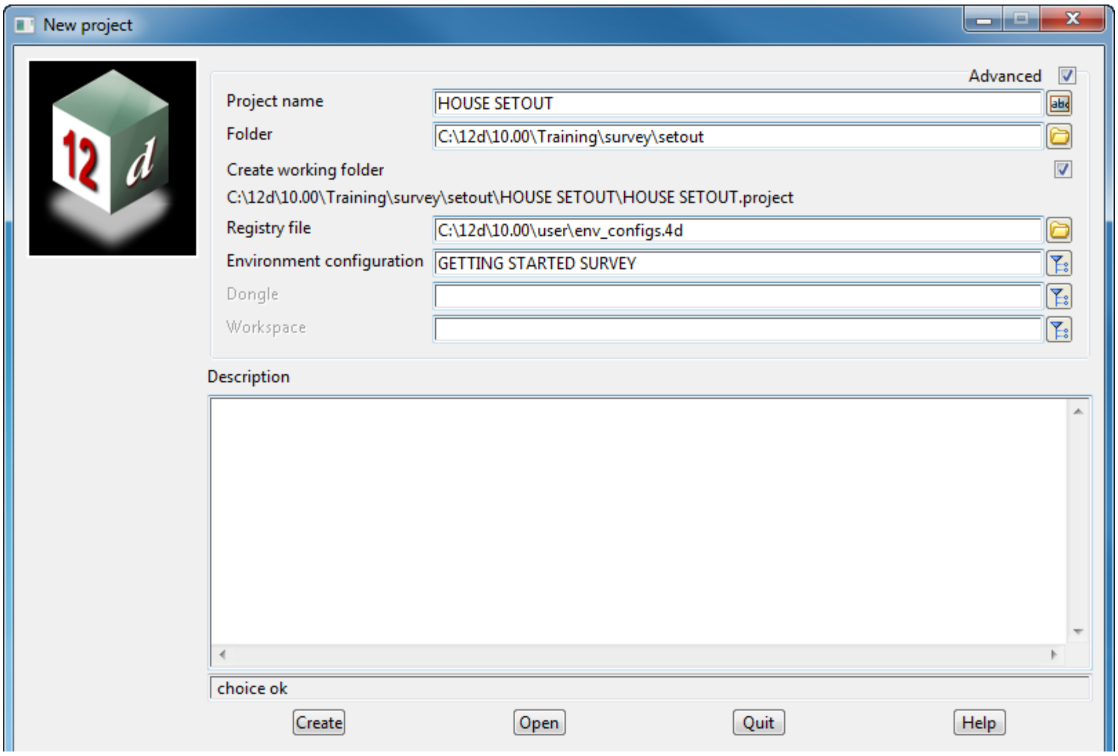
Advanced ☐

Project folder C:\12d\10.00

Project name

Folder <C:\12d\10.00> exists

Select **New** button to bring up the **New project** panel.



New project

Advanced ☑

Project name HOUSE SETOUT

Folder C:\12d\10.00\Training\survey\setout

Create working folder ☑

C:\12d\10.00\Training\survey\setout\HOUSE SETOUT\HOUSE SETOUT.project

Registry file C:\12d\10.00\user\env_configs.4d

Environment configuration GETTING STARTED SURVEY

Dongle

Workspace

Description

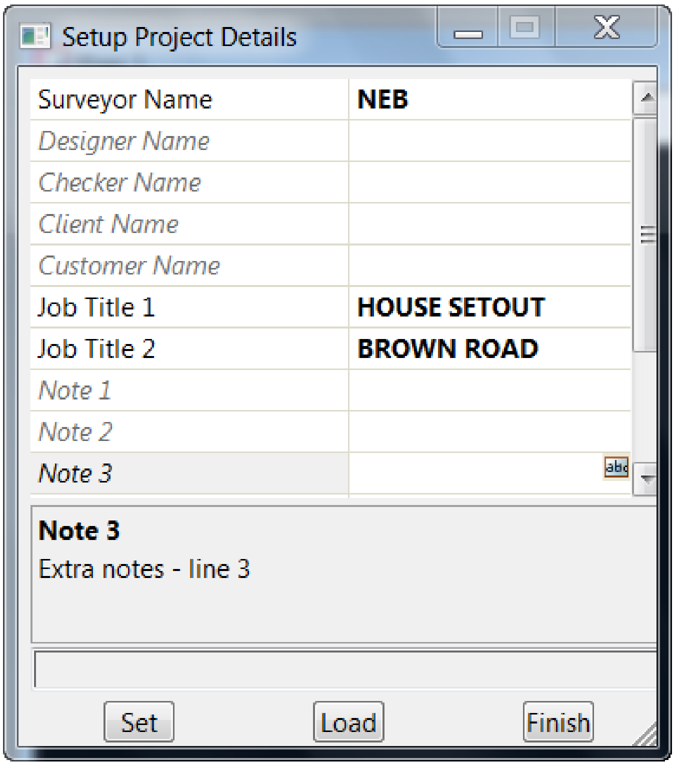
choice ok

Create a project under the folder **C:\12d\10.00\Training\survey\setout** called **HOUSE SETOUT**

With the ***Create working folder*** check box ticked a working folder with the same name as the project will be also created

Select the Environment configuration **Configurations=>GETTING STARTED SURVEY** which is the one we set up in the previous chapters.

Select **[Create]** to create and open the project



Setup Project Details

Surveyor Name	NEB
Designer Name	
Checker Name	
Client Name	
Customer Name	
Job Title 1	HOUSE SETOUT
Job Title 2	BROWN ROAD
Note 1	
Note 2	
Note 3	

Note 3
Extra notes - line 3

When the project starts up for the first time the **Project Details** panel appears

The information typed in here can be used when plotting from this project

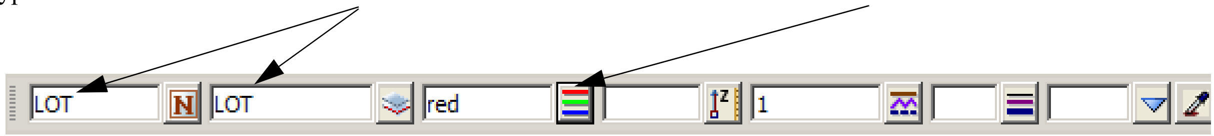
Fill in the various prompts if necessary

Select **Set** then **Finish** to save the settings and continue

11.1.1 Create the lot outline

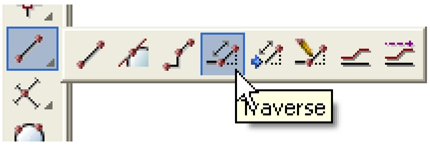
The lot outline will be created in a model called **LOT**

Type in the name and model name **LOT** in the **CAD controlbar.** Select the colour **Red**

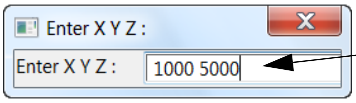


Select option ***Strings=>Cad=>Lines=>Traverse Create***

or **Traverse** icon



Press the **Space** bar to activate the **coordinate entry** panel

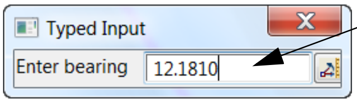


Enter X Y Z :

Enter X Y Z : 1000 5000

Type in the coordinates **1000 5000 [Enter]**

Press the **Space** bar to activate the **bearing input** panel



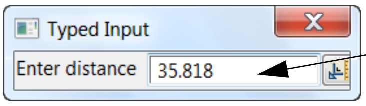
Typed Input

Enter bearing 12.1810

Type in the bearing **12.1810 [Enter]**

NOTE - This is the dms method for entering the bearing 12°18’10".

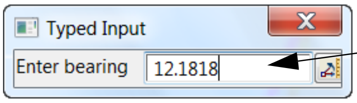
Press the **Space** bar to activate the **distance input** panel



Typed Input

Enter distance 35.818

Type in the distance **35.818 [Enter]**

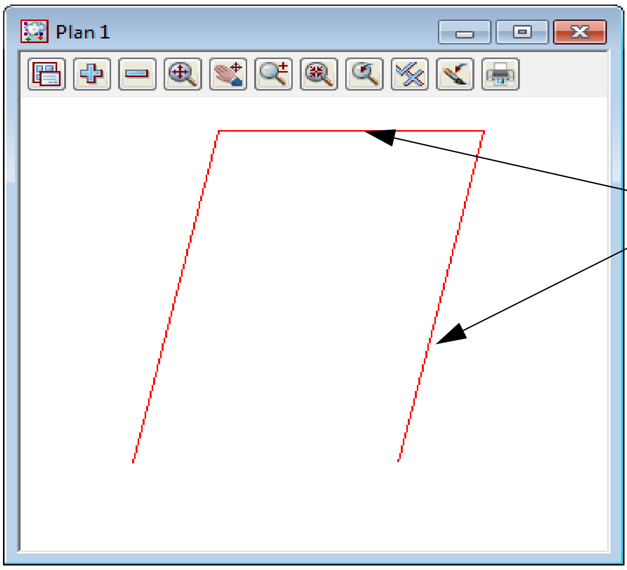


Typed Input

Enter bearing 12.1818

When pressing the space key for the next bearing input the previous bearing is shown highlighted in the panel. Type over the previous bearing to input the new bearing**.**

Other options to amend the previous bearing will be discussed when entering the house outline



Repeat the entry of bearing and distance using the following dimensions

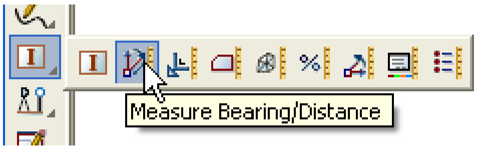
90°00’00" 23.870

192°18’10" 35.818

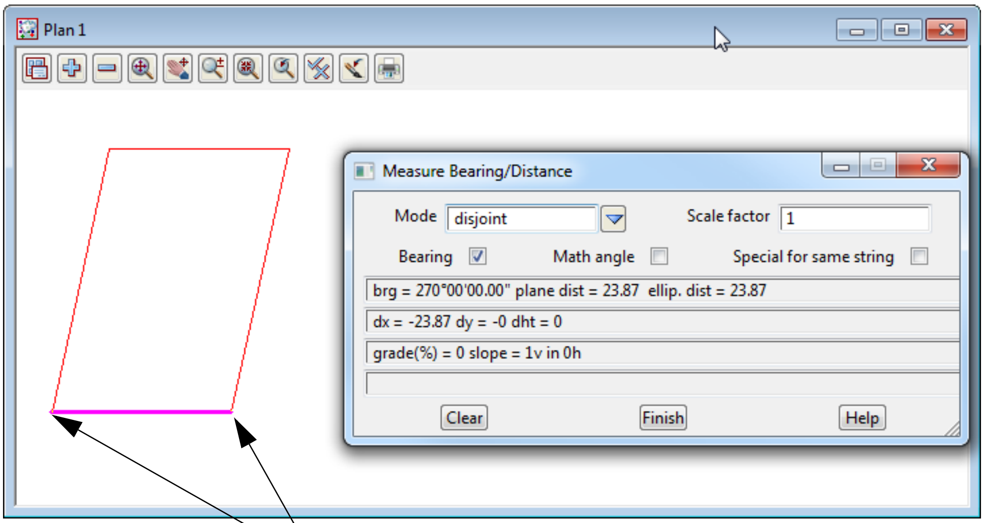
192°18’10" is entered as 192.1810. Remember to input the trailing zeroes.

After typing this line press [Esc] to exit option

Check the misclose of the last line by selecting option ***Utilities=>Measure=>Bearing/Distance*** or **Measure Bearing/Distance** icon


Measure Bearing/Distance

Select and accept the start and end points of the lot traverse


Plan 1
Measure Bearing/Distance
Clear
Finish
Help

Mode disjoint

Scale factor 1

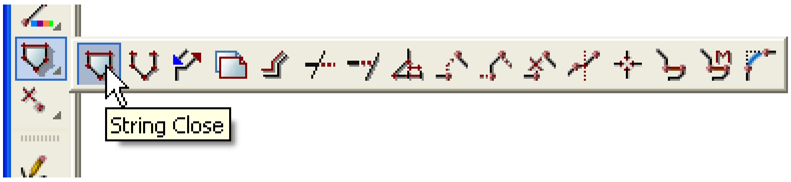
Bearing ☑ Math angle ☐ Special for same string ☐

```
brg = 270°00'00.00" plane dist = 23.87  ellip. dist = 23.87
dx = -23.87 dy = -0 dht = 0
grade(%) = 0 slope = 1v in 0h
```

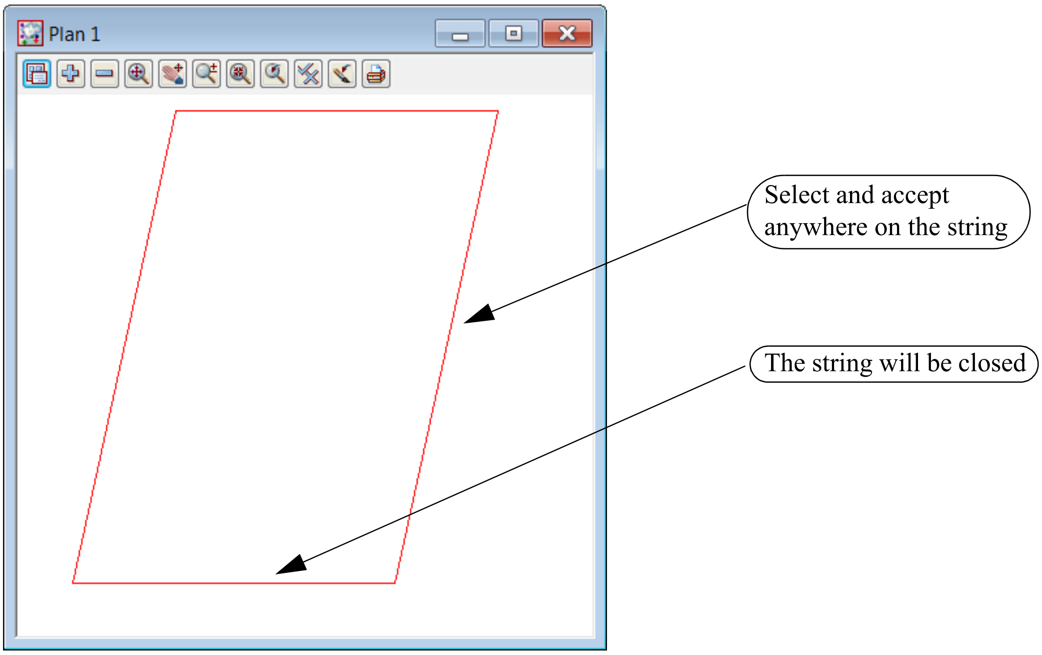
The bearing and distance between the two points is displayed

If correct, close the string by using option ***Strings=>Cad=>Change strings=>Close***

or select **String Close** icon


String Close

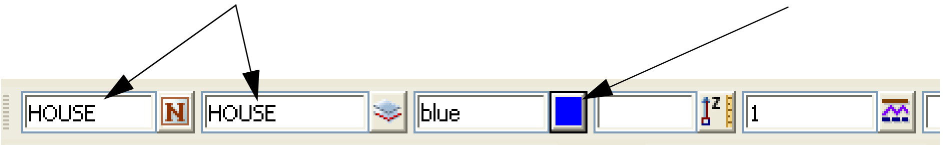
From this point in the manual we will be using the cad icons only. The menu options are available under the option ***Strings=>Cad***


Plan 1
Select and accept anywhere on the string
The string will be closed

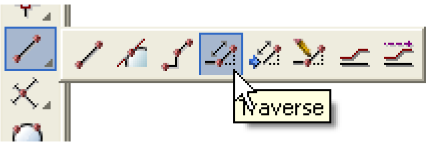
11.1.2 Create building outline

In this option we will create the outline of the building using the previous traverse routine and explore some other traverse editing features

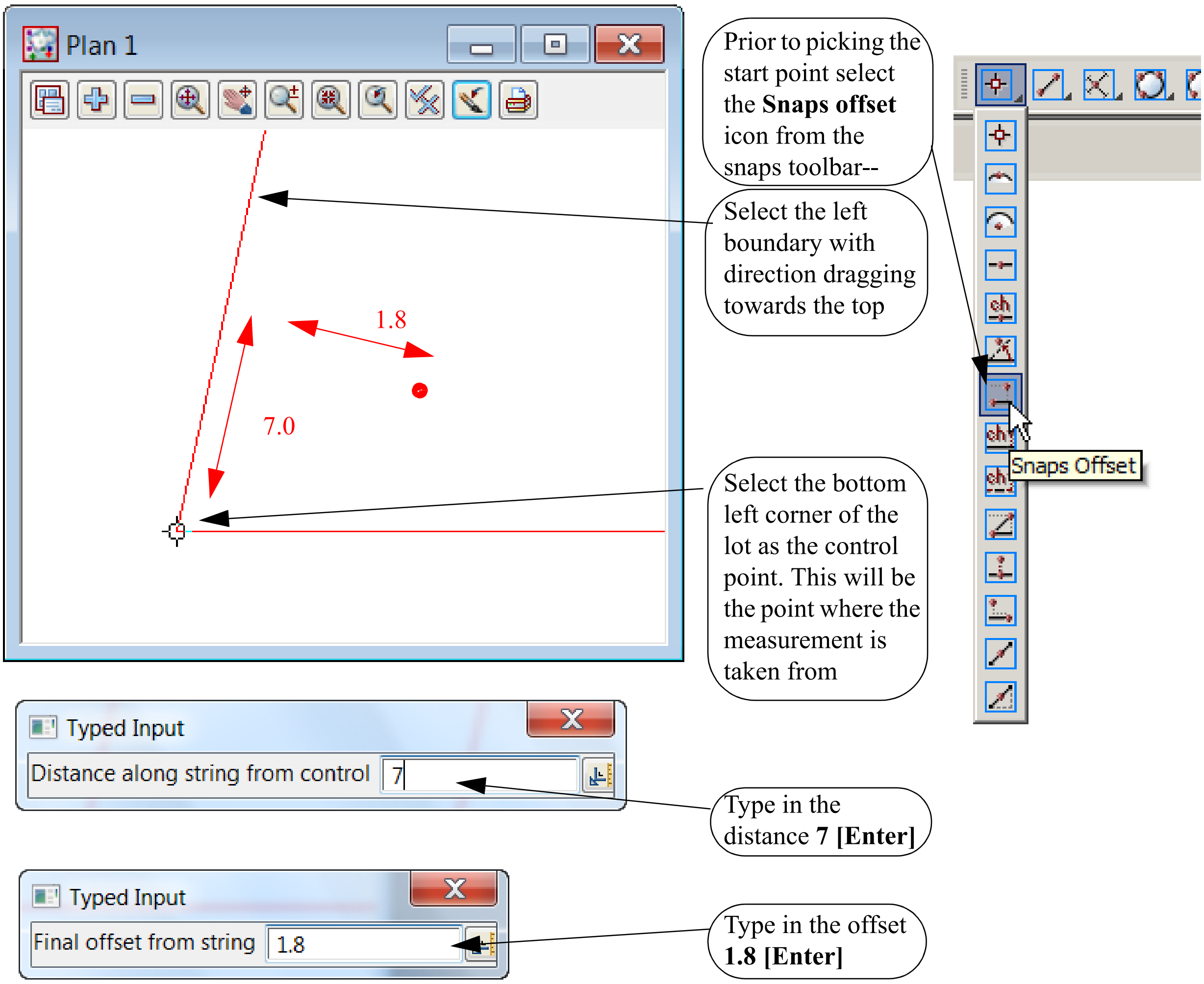
Type in the name and model name as **HOUSE** in the **CAD controlbar.** Select the colour **blue**



Select option **Traverse** icon



We are going to start the house corner 7.0 metres up from the lower left corner of the lot and offset 1.8 metres in from the side boundary



Prior to picking the start point select the **Snaps offset** icon from the snaps toolbar--

Select the left boundary with direction dragging towards the top

Select the bottom left corner of the lot as the control point. This will be the point where the measurement is taken from

Typed Input

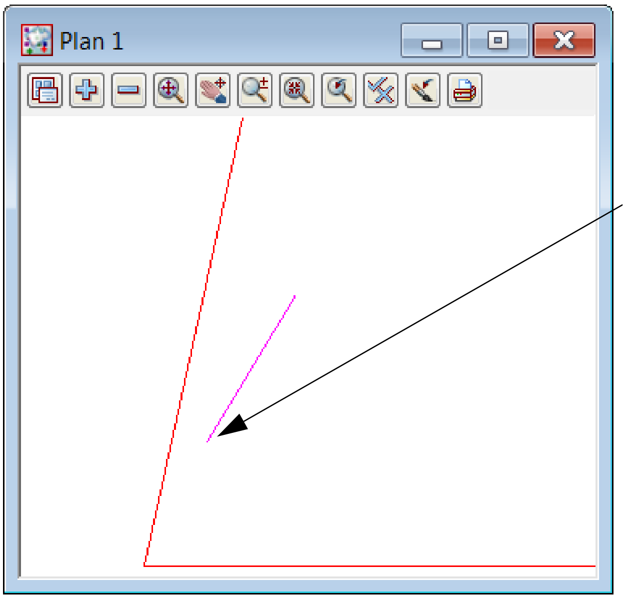
Distance along string from control 7

Type in the distance **7 [Enter]**

Typed Input

Final offset from string 1.8

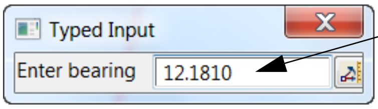
Type in the offset **1.8 [Enter]**



The point is created in a model called **constructions snap data** and automatically turned off.

The end of the string now locks to the cursor position

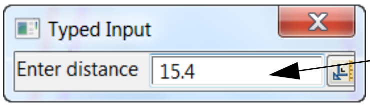
Press the **Space** bar to activate the **bearing input** panel


Typed Input

Enter bearing 12.1810

Type in the bearing **12.1810 [Enter]**

Press the **Space** bar to activate the **distance input** panel


Typed Input

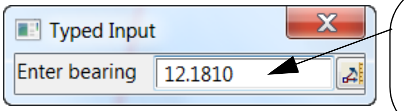
Enter distance 15.4

Type in the distance **15.40 [Enter]**

We will now look at some options to speed up the traversing process.

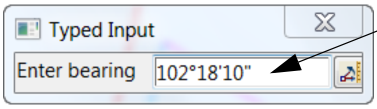
For the next bearing we are going to traverse at right angle to the previous bearing

Press the **Space** bar to activate the **bearing input** panel


Typed Input

Enter bearing 12.1810

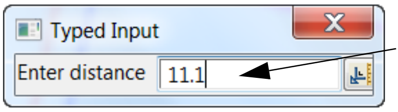
The previous bearing appears. Press **[Page Up]** to add 90 degrees to the bearing (We could have pressed [Page Down] to subtract 90 degrees.


Typed Input

Enter bearing 102°18'10"

Press [Enter] to confirm the bearing

Press the **Space** bar to activate the **distance input** panel

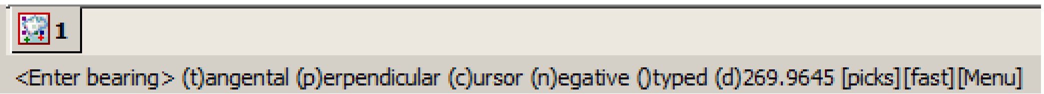

Typed Input

Enter distance 11.1

Type in the distance **11.1 [Enter]**

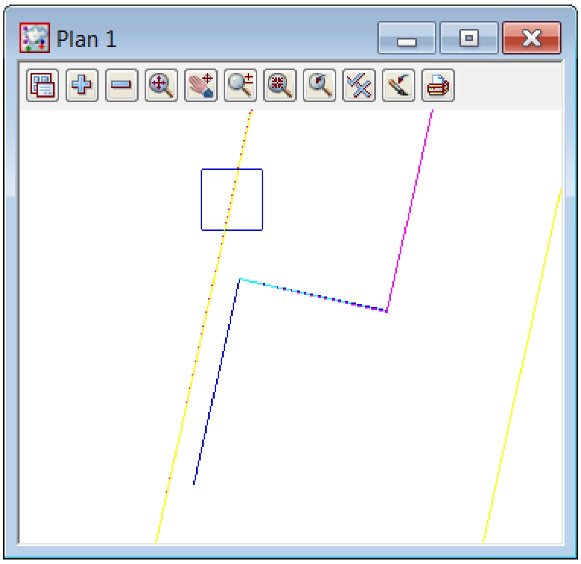
For the next bearing we will traverse tangential to the left boundary line

At the bottom of the screen there are a number of options that can be activated by selecting the letter following the option

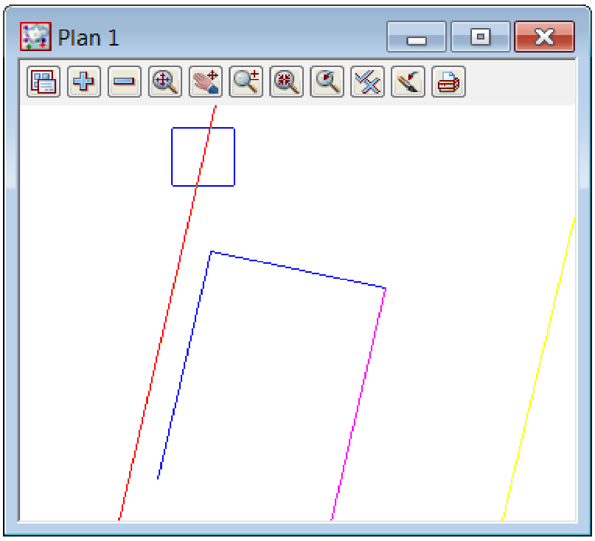


<Enter bearing> (t)angental (p)erpendicular (c)ursor (n)egative ()typed (d)269.9645 [picks][fast][Menu]

To traverse tangtential select **[T] from the keyboard** then pick the left boundary line



The proposed direction is highlighted. This may be in the opposite direction to that required so simply select **[N]** to reverse the direction line if necessary.

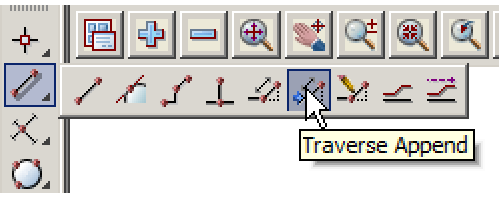


Press middle button or select [Enter] to confirm the direction

Sometimes an error occurs when entering the traverse so the traverse has to be stopped and restarted.

Press **[Escape]** to exit the traverse or click right button then select Cancel from panel

Select option **Traverse Append** icon



Pick and accept the end of the house string

The traverse can continue

The remaining lines are:

Bearing **192.1810** (or tangential to left bo3 undary) Distance **3.0**

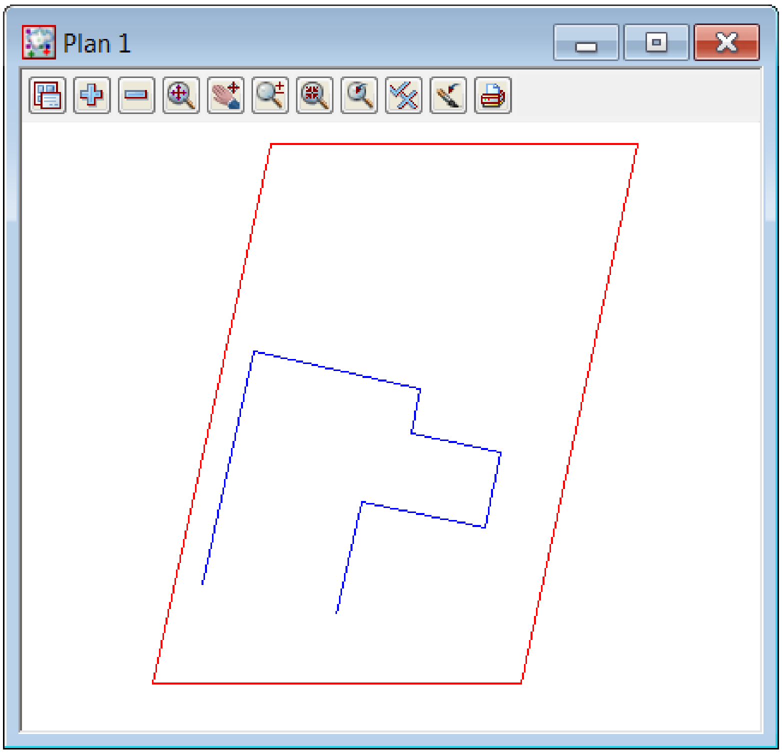
Bearing **102.1810** (or [Page Down] after last bearing) Distance **6.0**

Bearing **192.1810** (or [Page Up] after last bearing) Distance **5.0**

Bearing **282.1810** (or [Page Up] after last bearing) Distance **8.2**

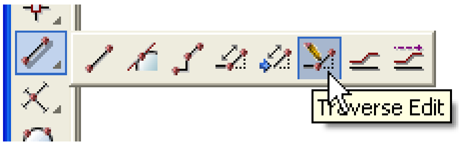
Bearing **192.1810** (or [Page Down] after last bearing) Distance **7.6**

Press [Escape]

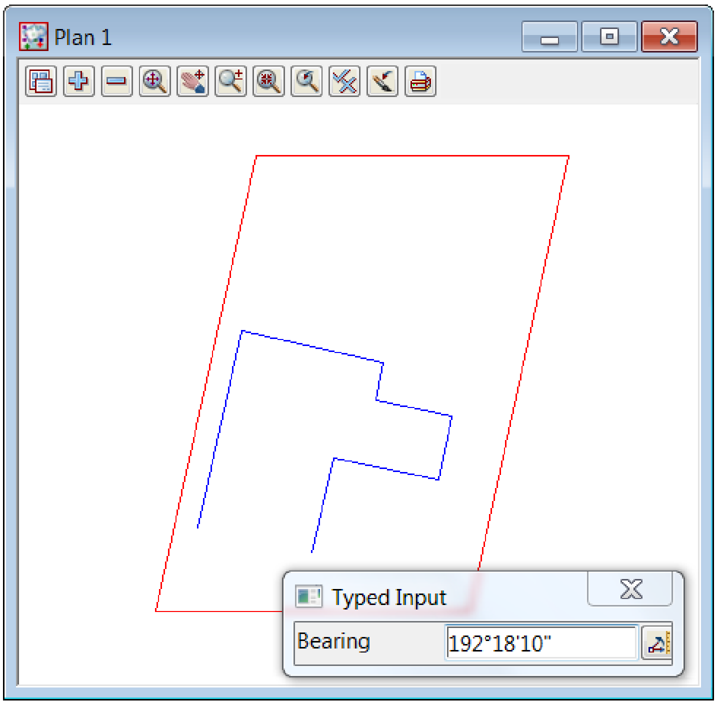


The last line has an incorrect distance and this can be edited using the following

Select option **Traverse Edit** icon

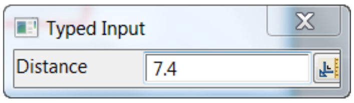

Traverse Edit

Pick and accept the last traverse line


Plan 1
Typed Input

Bearing 192°18'10"

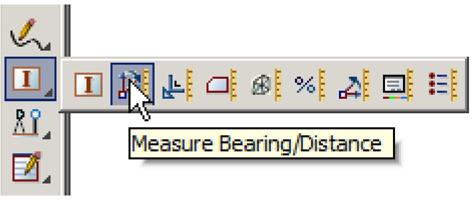
The bearing is displayed. As the error is in the distance press **[Enter]** to accept the bearing


Typed Input

Distance 7.4

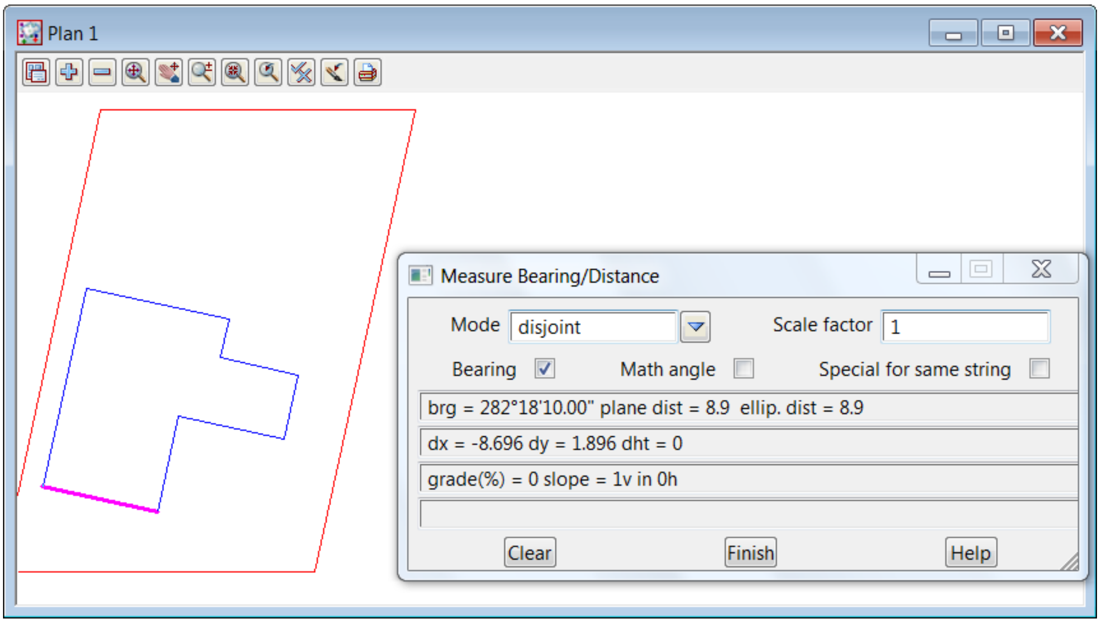
Type in **7.4 [Enter]** for the corrected distance

We can now check the misclose of the house by selecting **Measure Bearing/Distance** icon


Measure Bearing/Distance

Select and accept the start and end points of the house traverse

The bearing and distance are displayed


Plan 1
Measure Bearing/Distance

Mode disjoint

Scale factor 1

Bearing ☑ Math angle ☐ Special for same string ☐

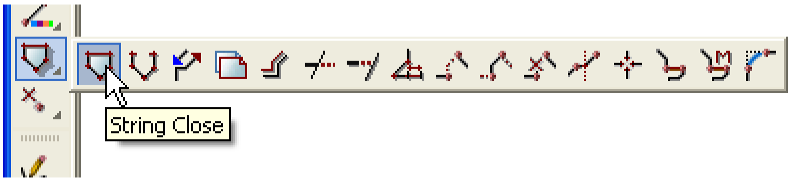
brg = 282°18'10.00" plane dist = 8.9 ellip. dist = 8.9

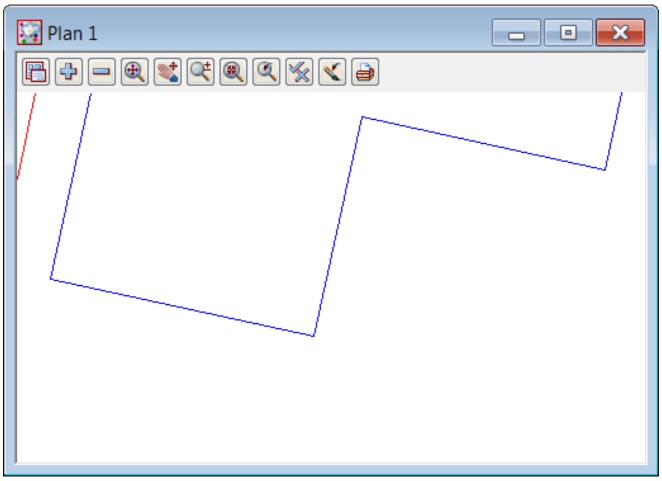
dx = -8.696 dy = 1.896 dht = 0

grade(%) = 0 slope = 1v in 0h

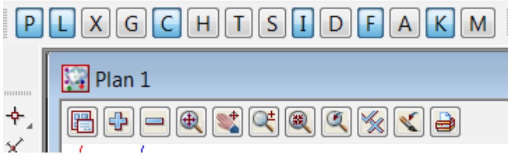
Clear
Finish
Help

If correct, close the string by using the **String Close** icon as done previously on the lot string


String Close



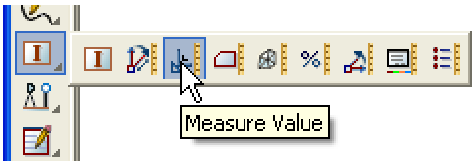
We can now check offsets from the boundaries to the building corners. To ensure the offsets are from the selected segment only, we turn on the segment snap

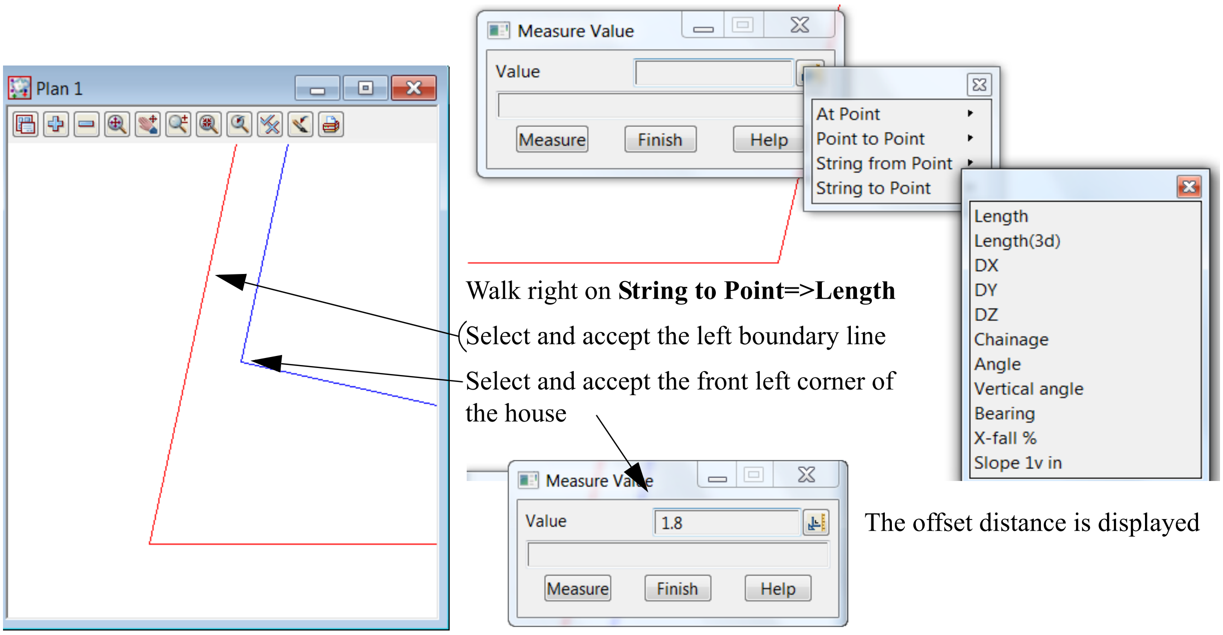

P L X G C H T S I D F A K M
Plan 1

Turn on the segment snap

Zoom in to the left side of the building

Select the **Measure Value** icon


Measure Value


Plan 1
Measure Value
Value
Measure
Finish
Help
At Point
Point to Point
String from Point
String to Point
Length
Length(3d)
DX
DY
DZ
Chainage
Angle
Vertical angle
Bearing
X-fall %
Slope 1v in

Walk right on **String to Point=>Length**

Select and accept the left boundary line

Select and accept the front left corner of the house

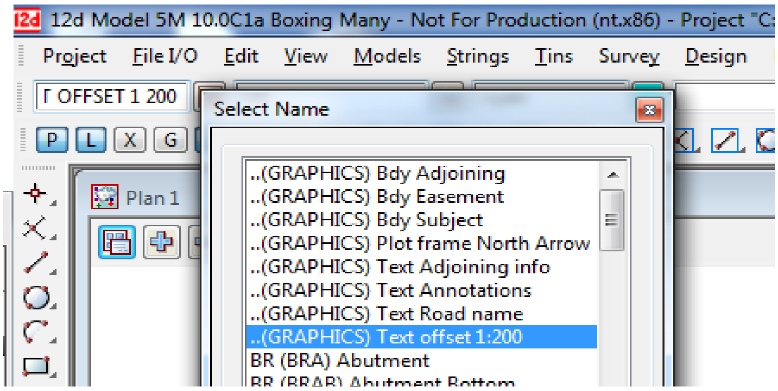
Value 1.8

The offset distance is displayed

11.1.3 Create dimensioned offset lines from house corners to boundaries

In this topic we will use an option to create the offset line and annotate the lines

Firstly we will use a name in the cad control bar to set the model, colour, linestyle and text for the offset lines and dimension text

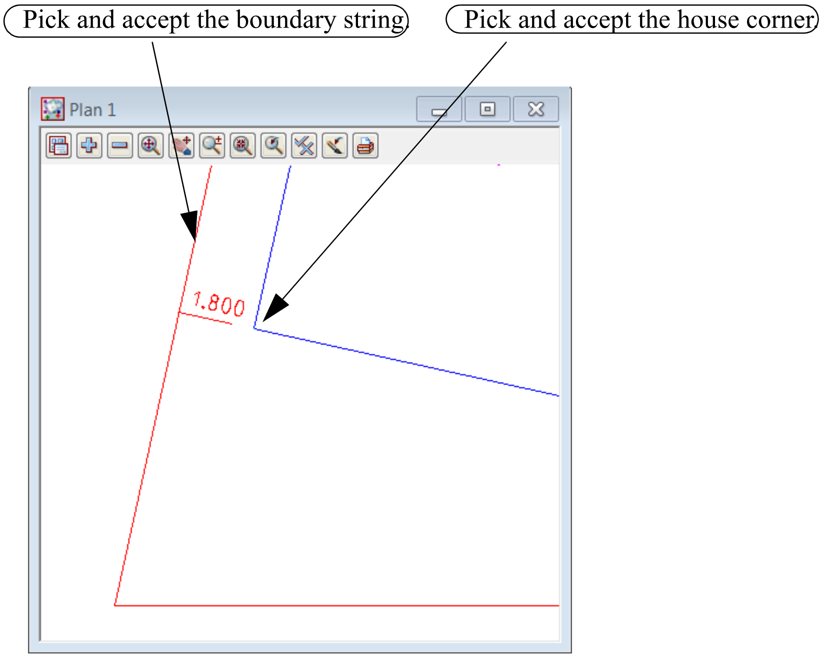

12d Model 5M 10.0C1a Boxing Many - Not For Production (nt.x86) - Project "C:
Project File I/O Edit View Models Strings Tins Survey Design
T OFFSET 1 200
P L X G
Plan 1
Select Name
..(GRAPHICS) Bdy Adjoining
..(GRAPHICS) Bdy Easement
..(GRAPHICS) Bdy Subject
..(GRAPHICS) Plot frame North Arrow
..(GRAPHICS) Text Adjoining info
..(GRAPHICS) Text Annotations
..(GRAPHICS) Text Road name
..(GRAPHICS) Text offset 1:200
BR (BRA) Abutment
BR (BRAB) Abutment Bottom

Select the **Name** icon then select **..(GRAPHICS) TEXT OFFSET 1 200**

The rest of the cad control bar is populated from the settings associated with the name

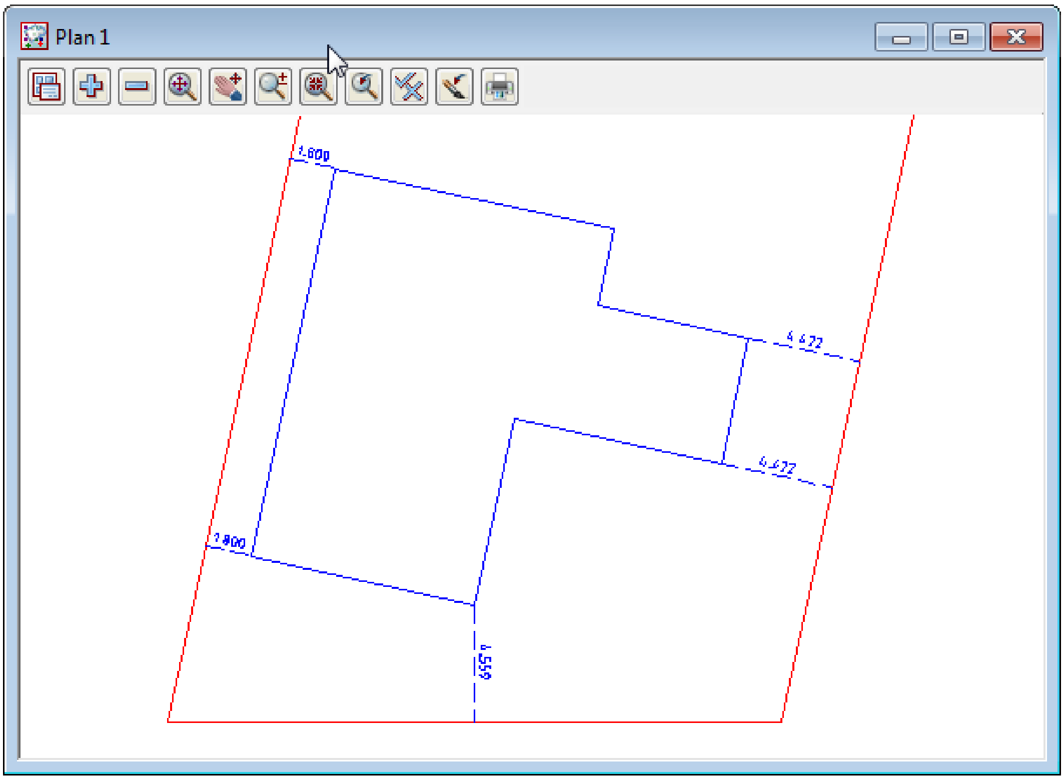
We will now create the dimensioned offset lines

Select the option ***Strings=>Cad=>Text=>Label Perp.offset***


Pick and accept the boundary string

Pick and accept the house corner

Repeat for all corners

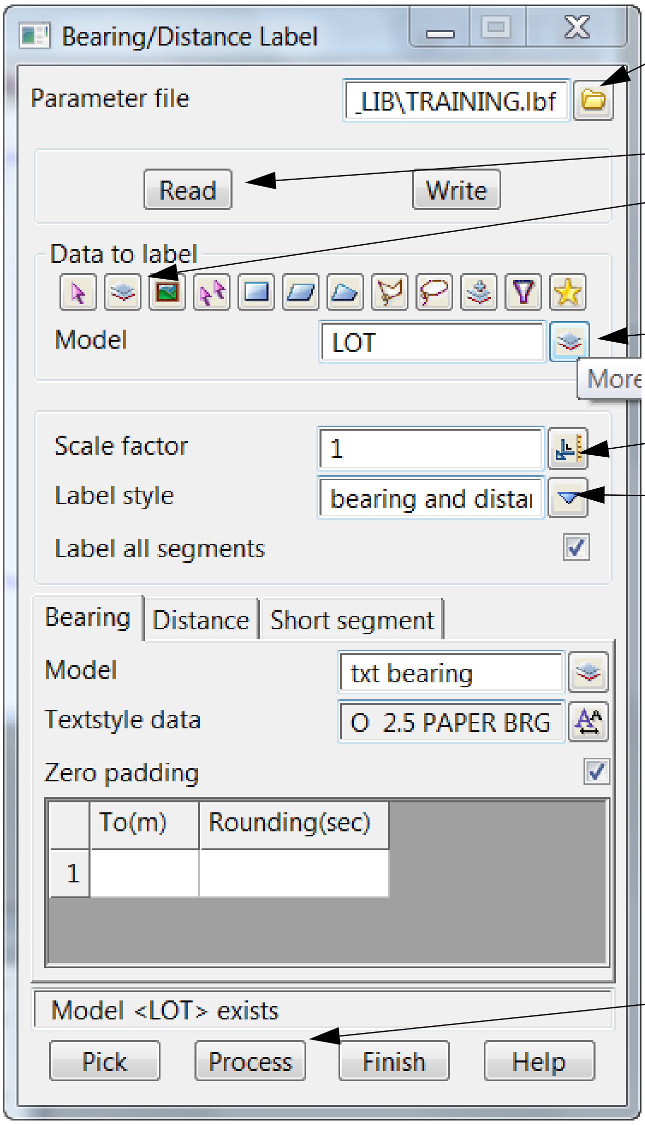

Plan 1
1.600
4.472
4.472
1.800
4.559

11.1.4 Create dimensions for lot and building lines

We will add bearing and distances to the lot edges and distances only to the building edges

Lot dimensions

Select option ***Drafting=>Bearing/Distance labelling (2)***


Bearing/Distance Label
Data to label
More
Read
Write
Pick
Process
Finish
Help

Parameter file: _LIB\TRAINING.lbf

Model: LOT

Scale factor: 1

Label style: bearing and distai

Label all segments ☑

Bearing | Distance | Short segment

Model: txt bearing

Textstyle data: O 2.5 PAPER BRG

Zero padding ☑

	To(m)	Rounding(sec)
1		

Model <LOT> exists

Select **Parameter file** icon

Select file **TRAINING.lbf** from the User_lib folder

Select **Read**

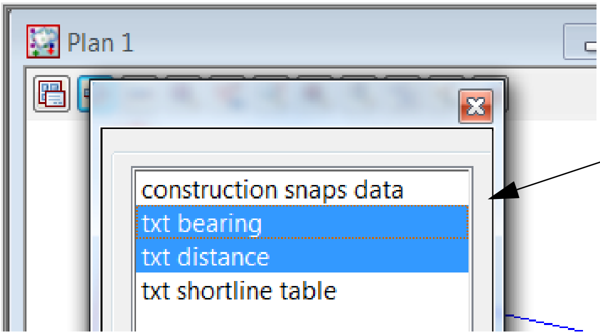
Select the **Model** icon

Select model **LOT**

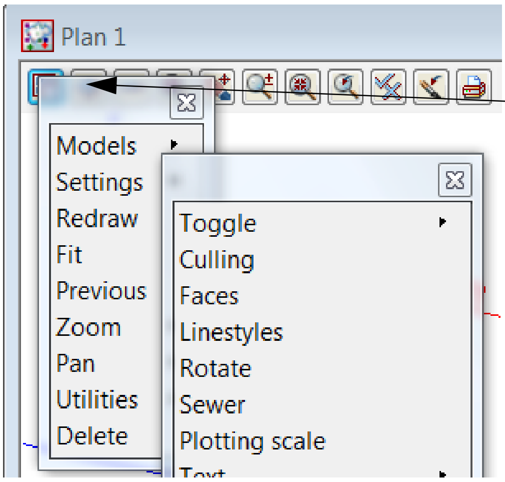
Change Label style to **bearing and distance**

Tick check box to label all segments

Select **Process**


Plan 1
construction snaps data
txt bearing
txt distance
txt shortline table

Turn on the bearing and distance models

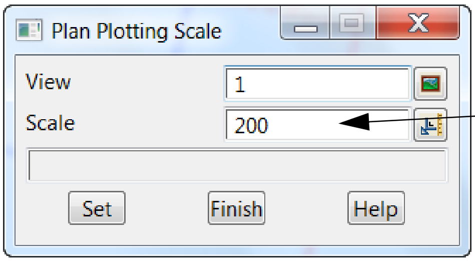

Plan 1
Models
Settings
Redraw
Fit
Previous
Zoom
Pan
Utilities
Delete
Toggle
Culling
Faces
Linestyles
Rotate
Sewer
Plotting scale
Text

The text is displayed at a default scale of **1:1000**.

To change the scale to **1:200**

Select **Menu** icon

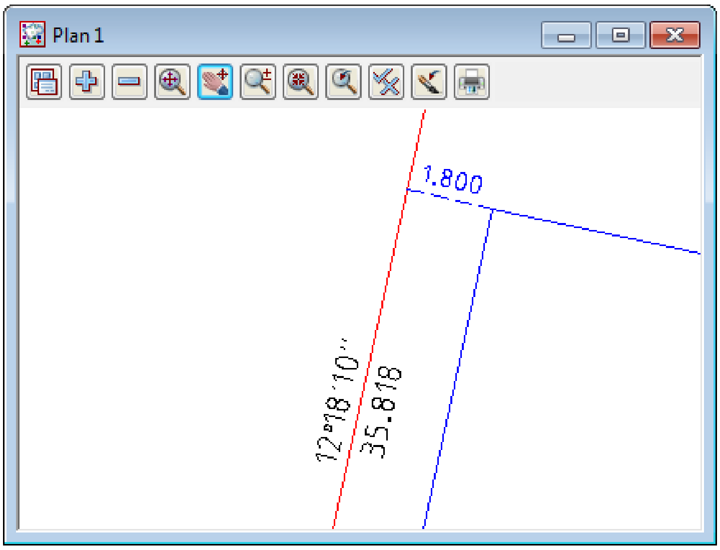
Walk right on **Settings** then select **Plotting scale**


Plan Plotting Scale
Set
Finish
Help

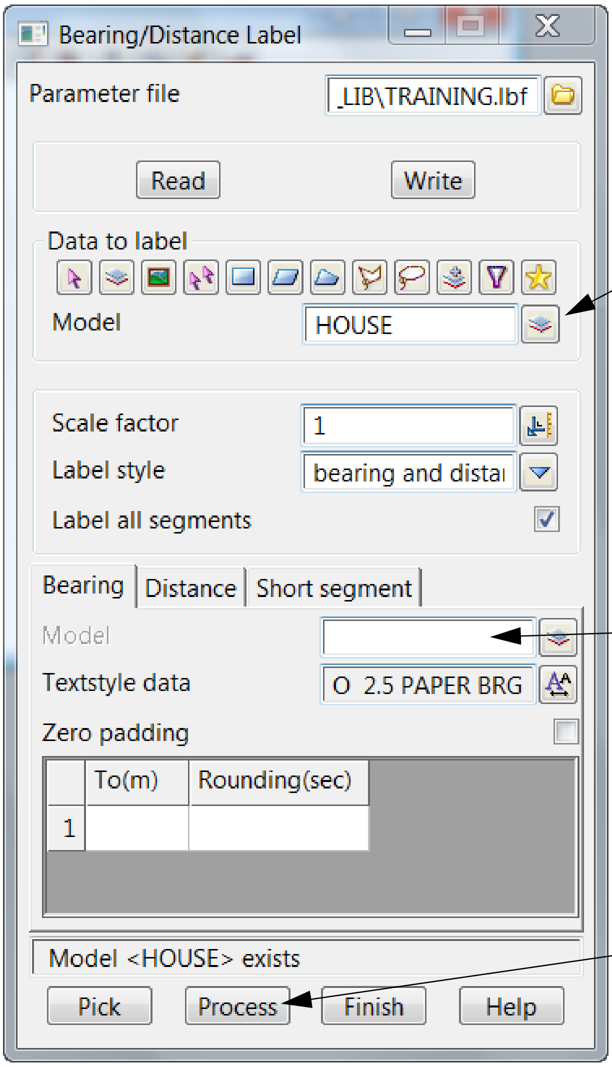
View 1

Scale 200

Type in scale **200** then select **Set**


Plan 1
1.800
12°18'10''
35.818

The bearing and distances which were in paper units are now at the same scale as the offset text which are in world units



Bearing/Distance Label

Parameter file: _LIB\TRAINING.lbf

Read
Write

Data to label

Model: HOUSE

Scale factor: 1

Label style: bearing and distar

Label all segments ☑

Bearing
Distance
Short segment

Model:

Textstyle data: O 2.5 PAPER BRG

Zero padding ☐

	To(m)	Rounding(sec)
1		

Model <HOUSE> exists

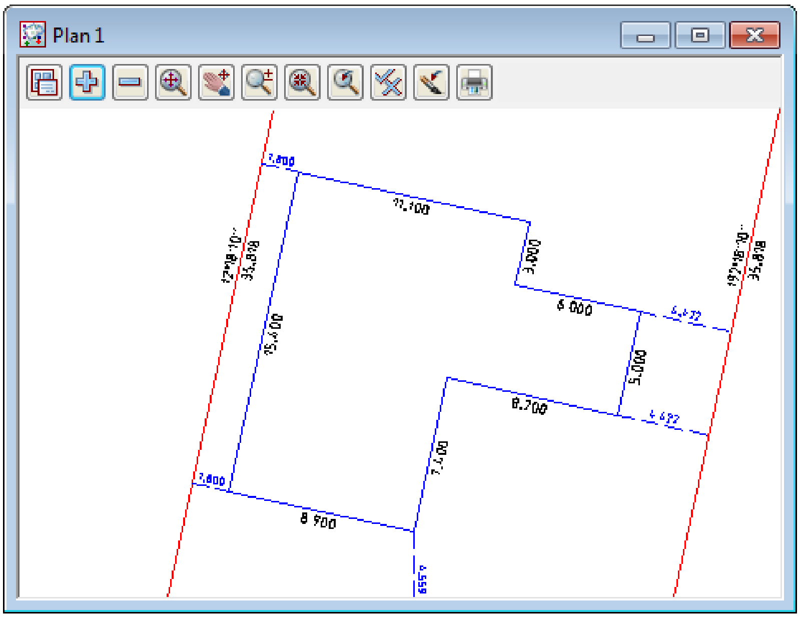
Pick
Process
Finish
Help

To annotate the house outline

Change the model to **HOUSE**

Delete the Bearing model name in the **Bearing** tab

Select **Process**



Plan 1
1.800
11.100
3.000
6.000
6.672
17°18'10"
35.898
25.400
5.000
8.700
6.692
197°18'10"
35.898
7.400
1.800
8.900
4.559

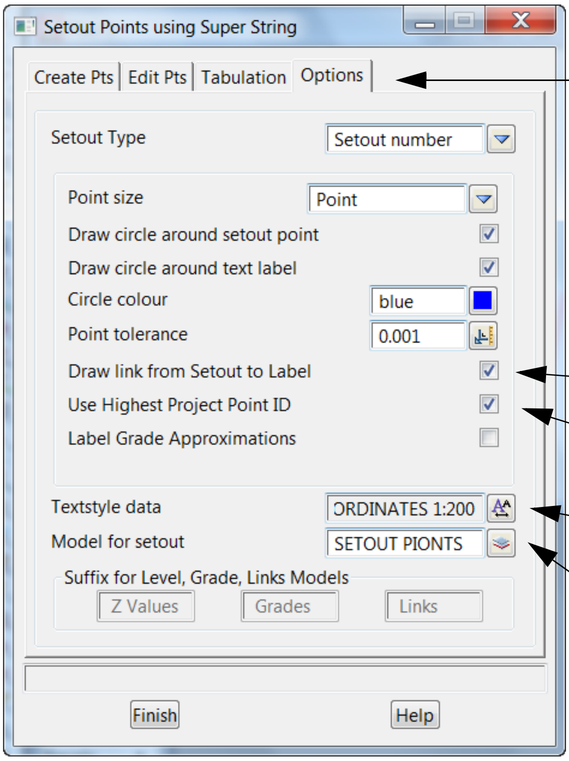
11.1.5 Setout points

Up until now the strings created around the lot boundary and building do not have point numbers

We will now generate point numbers for the vertices for the building and lot boundaries

Turn off all models except for **HOUSE** and **LOT**

Select option ***Survey=>Setout=>Setout point using super string***


Setout Points using Super String
Create Pts
Edit Pts
Tabulation
Options
Suffix for Level, Grade, Links Models
Z Values
Grades
Links
Finish
Help

Setout Type: Setout number

Point size: Point

Draw circle around setout point ☑

Draw circle around text label ☑

Circle colour: blue

Point tolerance: 0.001

Draw link from Setout to Label ☑

Use Highest Project Point ID ☑

Label Grade Approximations ☐

Textstyle data: ORDINATES 1:200

Model for setout: SETOUT PIONTS

Select the **Options** tab

Prior to running the option we will set up some parameters

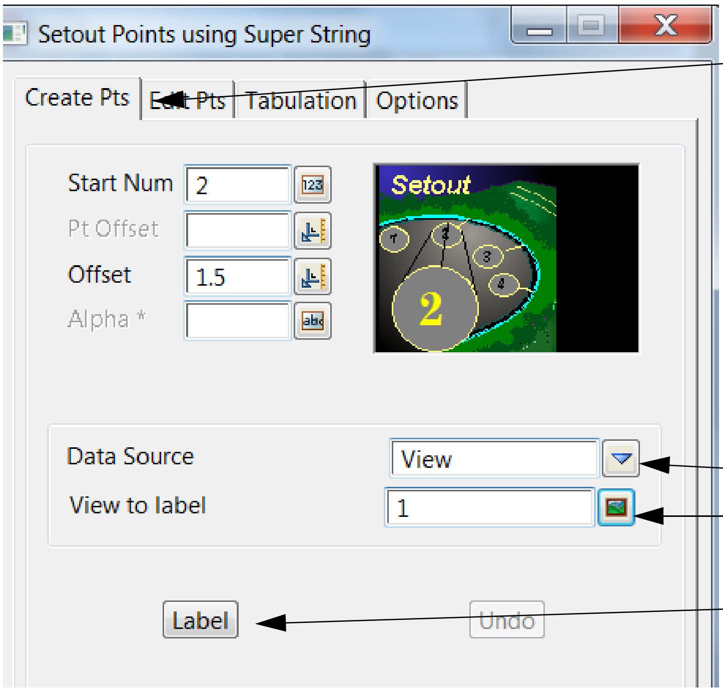
Tick the check box to **Draw link from Setout to label**

Tick the check box to **Use Highest Project Vertex ID**

Select the **Textstyle data** icon and select

CO-ORDINATES 1:200. This will ensure the text is the right height for a 1:200 plot

Type in model **SETOUT POINTS**


Setout Points using Super String
Create Pts
Edit Pts
Tabulation
Options
Setout
1
2
3
4
2
Label
Undo

Start Num: 2

Pt Offset:

Offset: 1.5

Alpha *:

Data Source: View

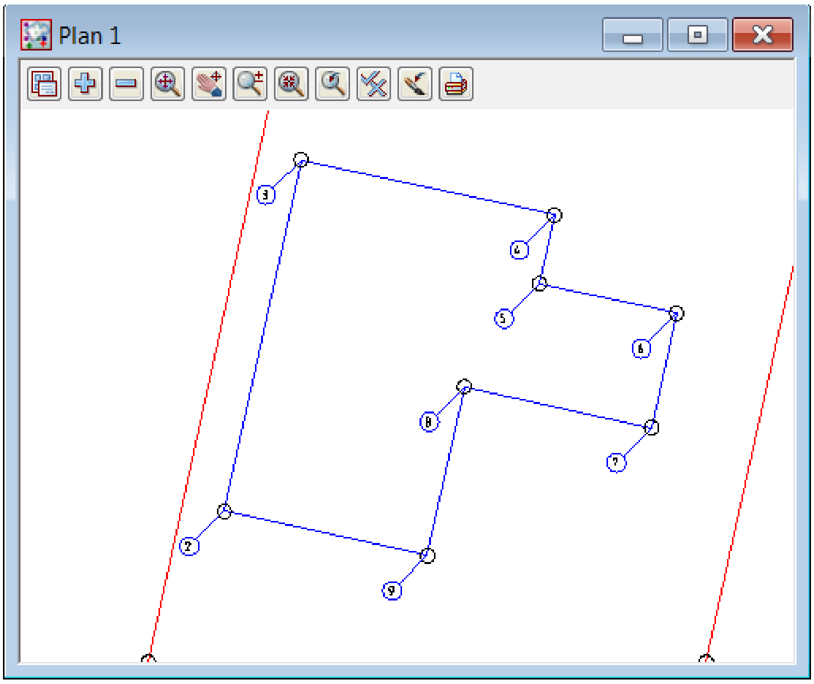
View to label: 1

Select the **Create Pts** tab

Set **Data source** to **View**

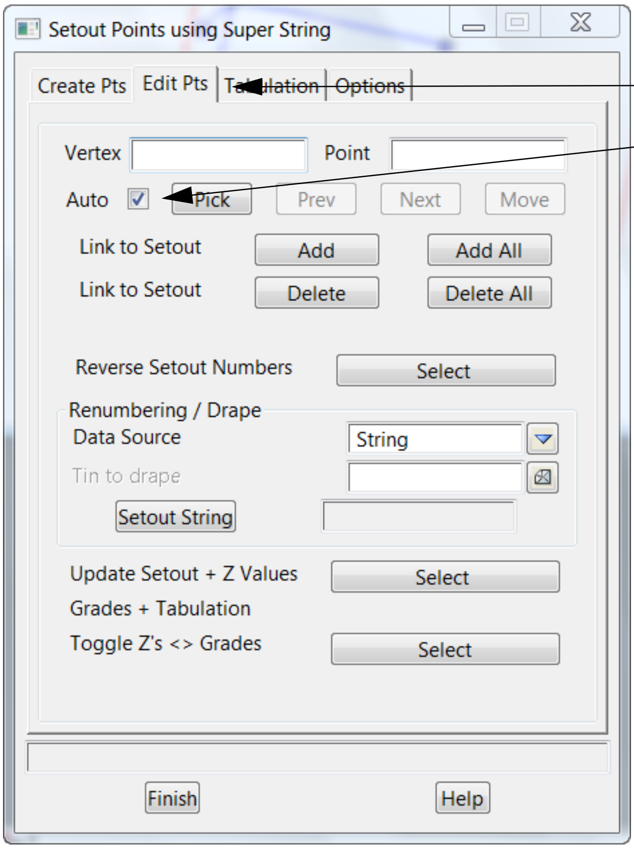
Select view **1**

Select **Label**


Plan 1
3
4
5
6
7
8
2
9

Turn on all of the models except for **construction snaps data**

To move the point numbers from overlapping other text


Setout Points using Super String
Create Pts
Edit Pts
Tabulation
Options
Pick
Prev
Next
Move
Link to Setout
Add
Add All
Link to Setout
Delete
Delete All
Reverse Setout Numbers
Select
Renumbering / Drape
Setout String
Update Setout + Z Values
Select
Grades + Tabulation
Toggle Z's <> Grades
Select
Finish
Help

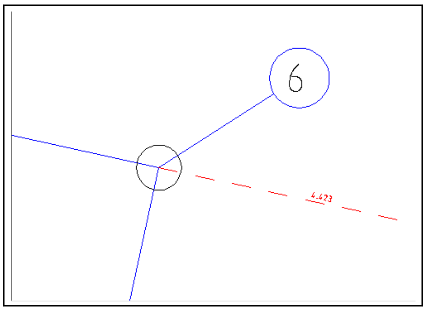
Vertex
Point
Auto ☑
Data Source String
Tin to drape

Select the **Edit Pts** tab

Tick the Auto check box

Pick and accept the circle at the corner point where the point number text is linked. Usually it requires two picks to highlight the circle.

The circled text along with the leader moves with the cursor. Select a new position

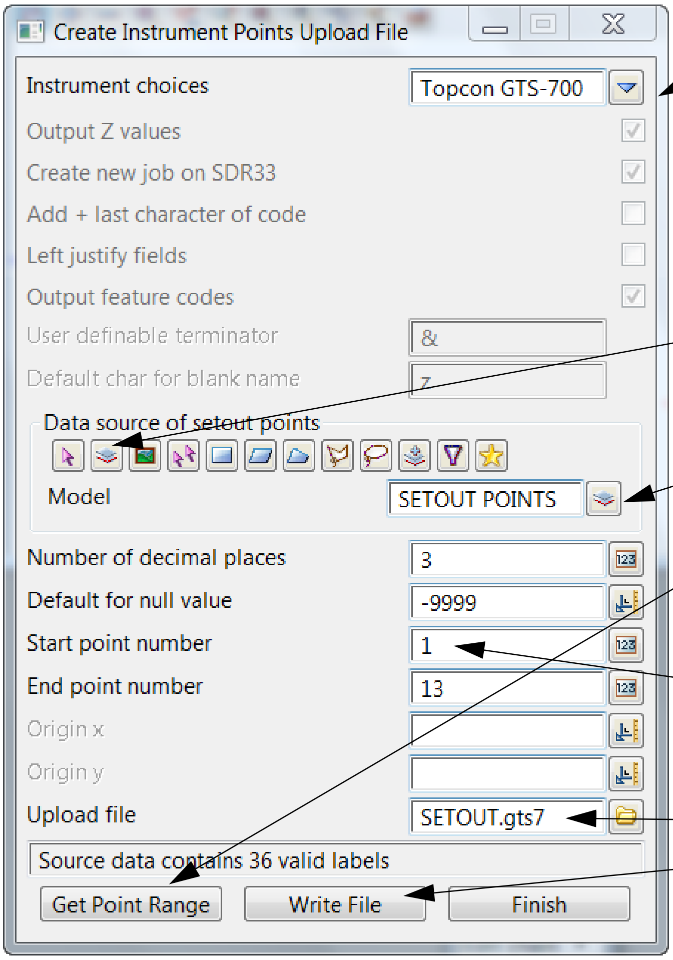


Any or all of the numbers can be moved in this to make the text readable

11.1.6 Create upload file

To create the upload file

Select option ***Survey=>Upload=>Create points upload file***



Create Instrument Points Upload File

Instrument choices: Topcon GTS-700

Output Z values ☑

Create new job on SDR33 ☑

Add + last character of code ☐

Left justify fields ☐

Output feature codes ☑

User definable terminator: &

Default char for blank name: z

Data source of setout points

Model: SETOUT POINTS

Number of decimal places: 3

Default for null value: -9999

Start point number: 1

End point number: 13

Origin x:

Origin y:

Upload file: SETOUT.gts7

Source data contains 36 valid labels

Select the data collector type

Select the **Model** icon

Select model **SETOUT POINTS**

Select **Get Point Range** to calculate point range

The start and end point are displayed

Change the start point to a number other than **0.** Zero was calculated as the end of the leaders are in the model **SETOUT POINTS**

Type in the file name **SETOUT**

Select **Write File** to create file

Select **Finish**

11.1.7 Uploading file to data collector

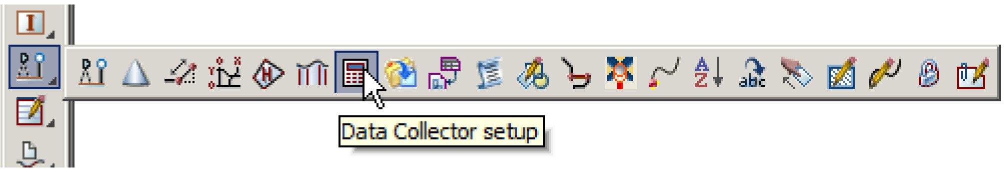
The upload file can now be transferred to the data collector in a number of ways

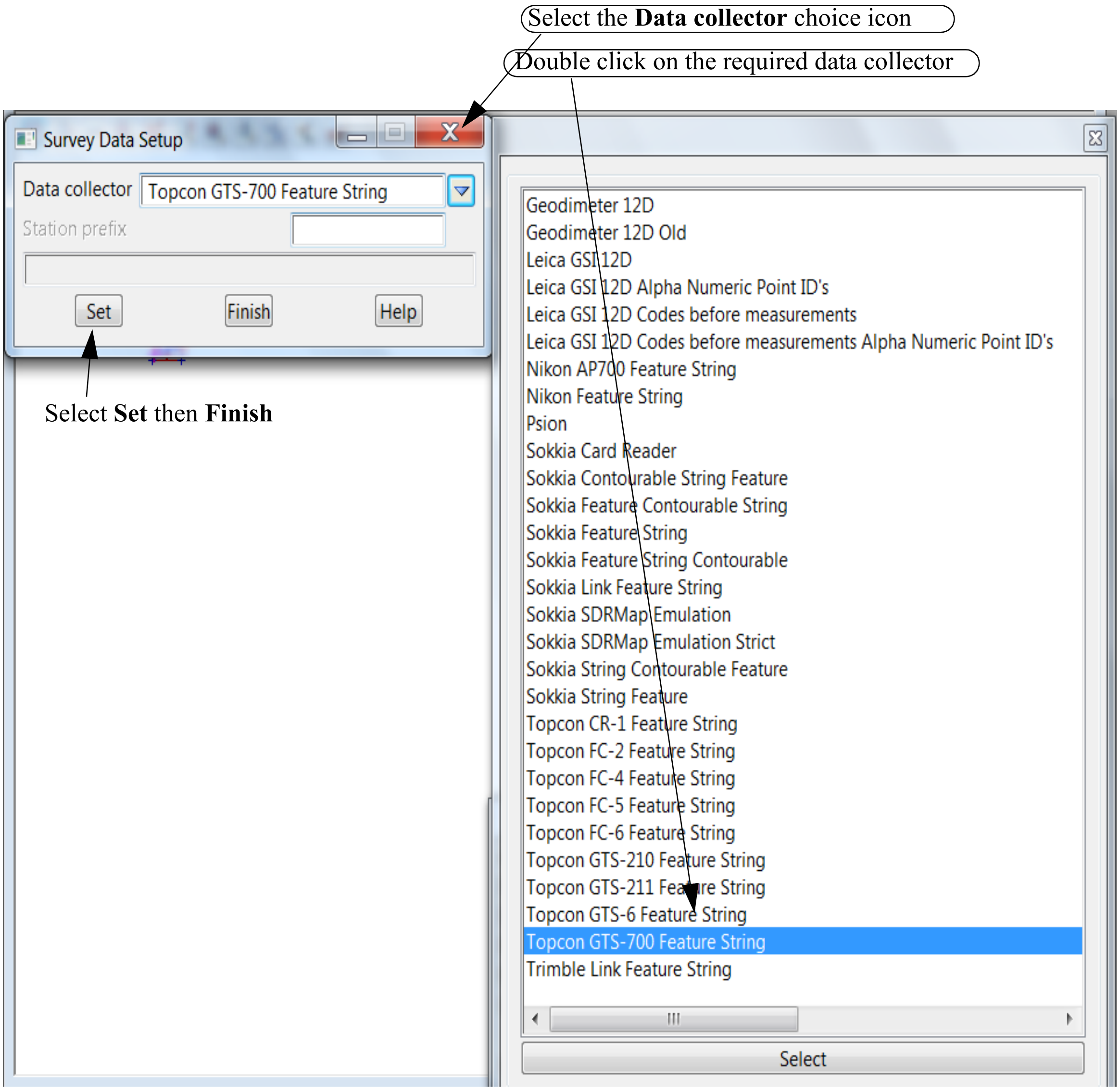
We will look at uploading a file to the Leica Data collector

To upload to a data collector firstly select the data collector type

Select ***Survey=>Setup***

or **Data Collector setup** icon




Select the **Data collector** choice icon

Double click on the required data collector

Select **Set** then **Finish**

Survey Data Setup

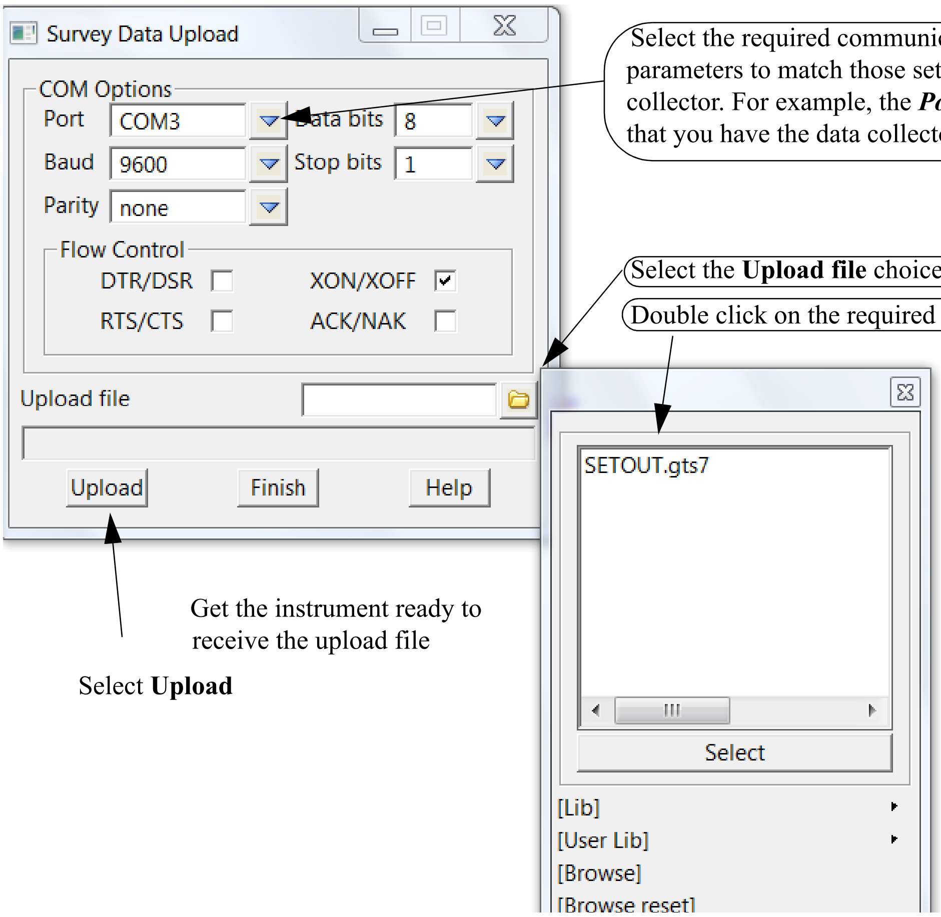
Data collector: Topcon GTS-700 Feature String

Station prefix

Geodimeter 12D
Geodimeter 12D Old
Leica GSI 12D
Leica GSI 12D Alpha Numeric Point ID's
Leica GSI 12D Codes before measurements
Leica GSI 12D Codes before measurements Alpha Numeric Point ID's
Nikon AP700 Feature String
Nikon Feature String
Psion
Sokkia Card Reader
Sokkia Contourable String Feature
Sokkia Feature Contourable String
Sokkia Feature String
Sokkia Feature String Contourable
Sokkia Link Feature String
Sokkia SDRMap Emulation
Sokkia SDRMap Emulation Strict
Sokkia String Contourable Feature
Sokkia String Feature
Topcon CR-1 Feature String
Topcon FC-2 Feature String
Topcon FC-4 Feature String
Topcon FC-5 Feature String
Topcon FC-6 Feature String
Topcon GTS-210 Feature String
Topcon GTS-211 Feature String
Topcon GTS-6 Feature String
Topcon GTS-700 Feature String
Trimble Link Feature String

To upload the file select ***Survey=>Upload=>Upload***

NOTE - You need a data collector connected to proceed.



Survey Data Upload

COM Options

Port: COM3

Data bits: 8

Baud: 9600

Stop bits: 1

Parity: none

Flow Control

DTR/DSR ☐

XON/XOFF ☑

RTS/CTS ☐

ACK/NAK ☐

Upload file

SETOUT.gts7

Select the required communication parameters to match those set on the data collector. For example, the ***Port*** is the port that you have the data collector connected to.

Select the **Upload file** choice icon

Double click on the required file to upload

Get the instrument ready to receive the upload file

Select **Upload**

The data being uploaded will be displayed on the screen

When all data has been transferred select **Finish**

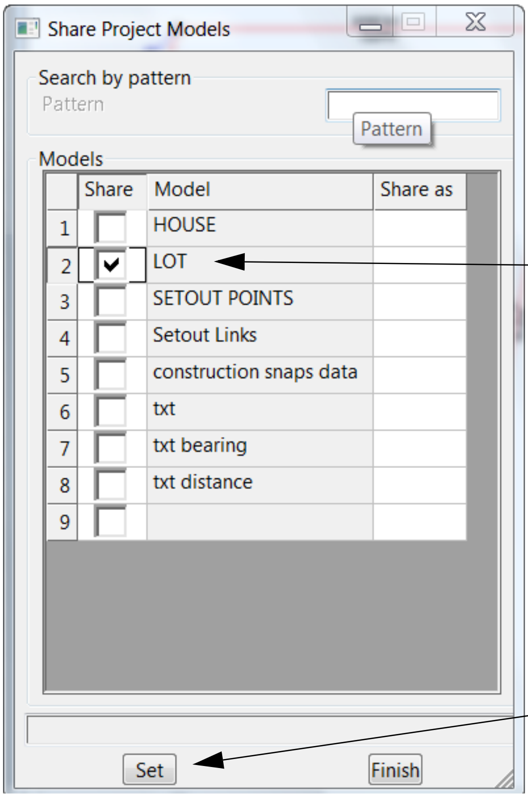
11.2 Importing house file

Share lot from previous project

In this example we will import a house file created in a cad package and saved as a dwg file.

We will use the previous project to share the **LOT** model. Prior to creating a new project the relevant model has to be flagged as being available for sharing in the source project.

In the source project select ***Models=>Sharing=>Share***


Share Project Models
Search by pattern
Pattern
Pattern
Models
Set
Finish

	Share	Model	Share as
1	☐	HOUSE	
2	☑	LOT	
3	☐	SETOUT POINTS	
4	☐	Setout Links	
5	☐	construction snaps data	
6	☐	txt	
7	☐	txt bearing	
8	☐	txt distance	
9	☐		

Tick the **Share** check box for model **LOT**

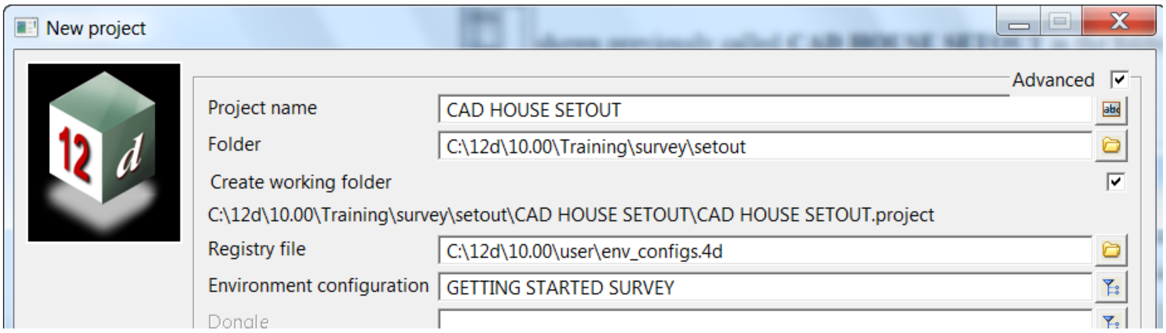
Select **Set** then **Finish**

Create new project

Create a new project as shown previously called **CAD HOUSE SETOUT** in the folder

C:\12djobs\10.00\Training\Survey\Setout\CAD HOUSE SETOUT

Remember to select the configuration GETTING STARTED SURVEY



Project name: CAD HOUSE SETOUT

Folder: C:\12d\10.00\Training\survey\setout

Create working folder ☑

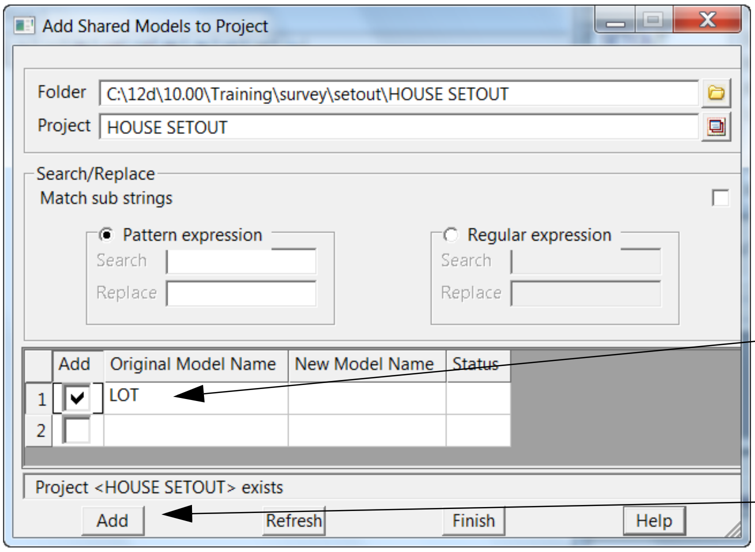
C:\12d\10.00\Training\survey\setout\CAD HOUSE SETOUT\CAD HOUSE SETOUT.project

Registry file: C:\12d\10.00\user\env_configs.4d

Environment configuration: GETTING STARTED SURVEY

11.2.1 Share the lot outline from the previous project

Select option ***Models=>Sharing=>Add***



Add Shared Models to Project

Folder C:\12d\10.00\Training\survey\setout\HOUSE SETOUT

Project HOUSE SETOUT

Search/Replace

Match sub strings ☐

● Pattern expression

Search

Replace

○ Regular expression

Search

Replace

	Add	Original Model Name	New Model Name	Status
1	☑	LOT		
2	☐			

Project <HOUSE SETOUT> exists

Browse to the folder **C:\12d\9.00\Training\survey\setout\HOUSE SETOUT**

Select **HOUSE SETOUT**

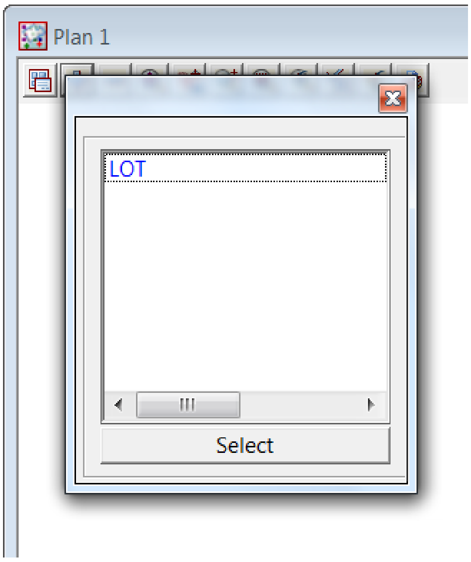
Tick under **Add** column next to model LOT

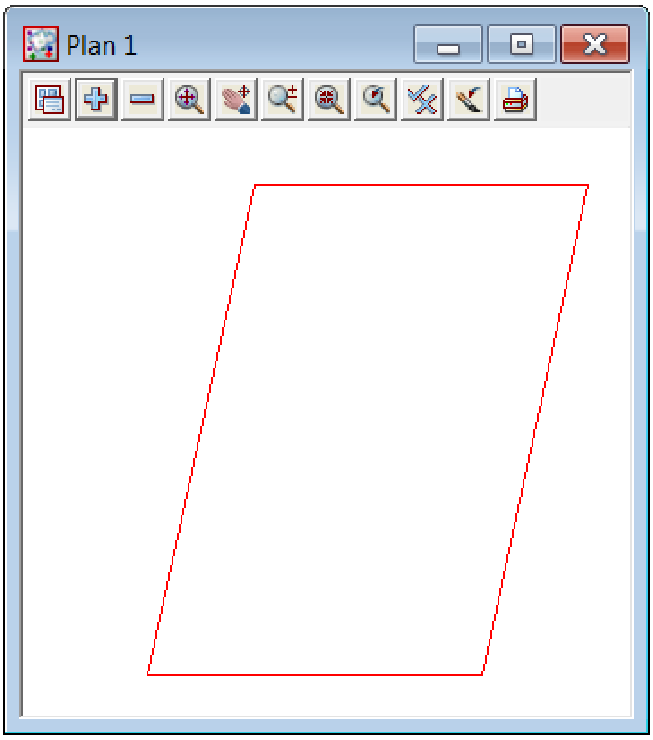
Select **Add** to share the LOT model

The model is referenced to the project

Turn on the model **LOT**

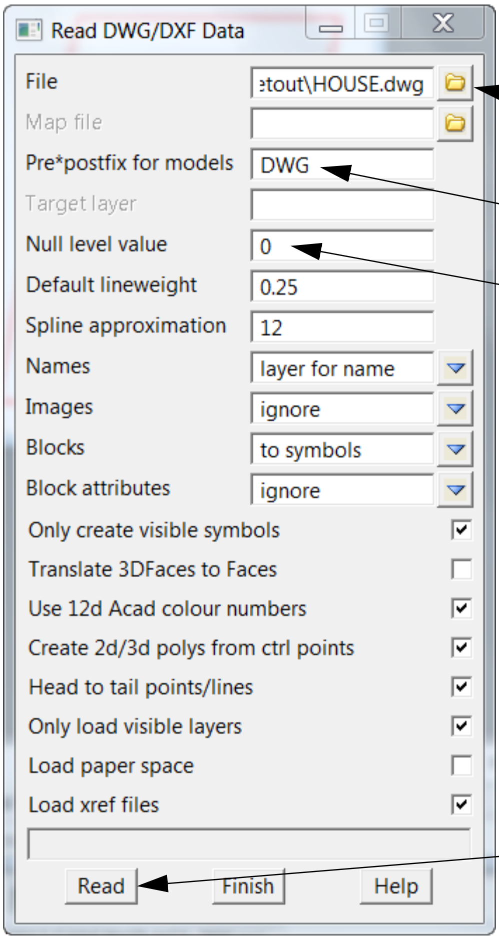
Note that shared models have blue model names





11.2.2 Read in the CAD file

Select option ***File I/O=>Data Input=>DWG/DXF/DXB***



Read DWG/DXF Data

File: ɜtout\HOUSE.dwg
Map file:
Pre*postfix for models: DWG
Target layer:
Null level value: 0
Default lineweight: 0.25
Spline approximation: 12
Names: layer for name
Images: ignore
Blocks: to symbols
Block attributes: ignore

☑ Only create visible symbols
☐ Translate 3DFaces to Faces
☑ Use 12d Acad colour numbers
☑ Create 2d/3d polys from ctrl points
☑ Head to tail points/lines
☑ Only load visible layers
☐ Load paper space
☑ Load xref files

Read
Finish
Help

Browse to the folder **C:\12d\10.00\Training\survey\setout** and select the file **HOUSE.DWG**

Type in **DWG**<space> as the prefix for the loaded models

Type in **0** to ensure any 2d data is nulled

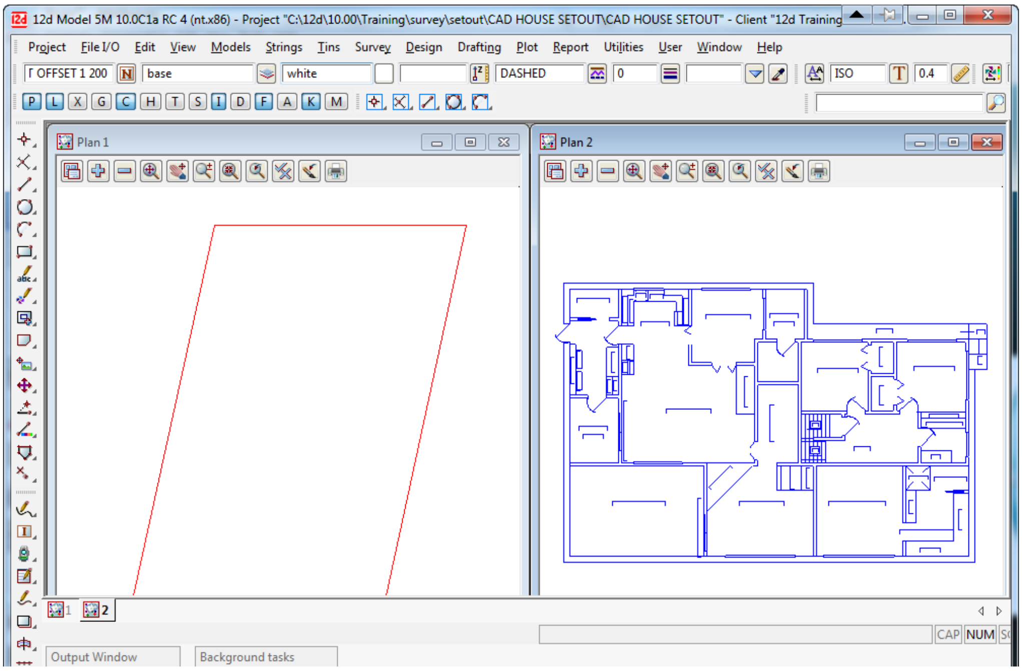
The rest of the panel can remain unchanged

Select **Read** then **Finish**

The house outline has been created in plan millimetres and will result in the house being scaled by 1000 if opened in the same view as the lot.

We will therefore rename view DATA INPUT to view 2 using option ***View=>Rename***

In view 1 turn on the model BDY and in view 2 turn on all of the other models. Tile the two views



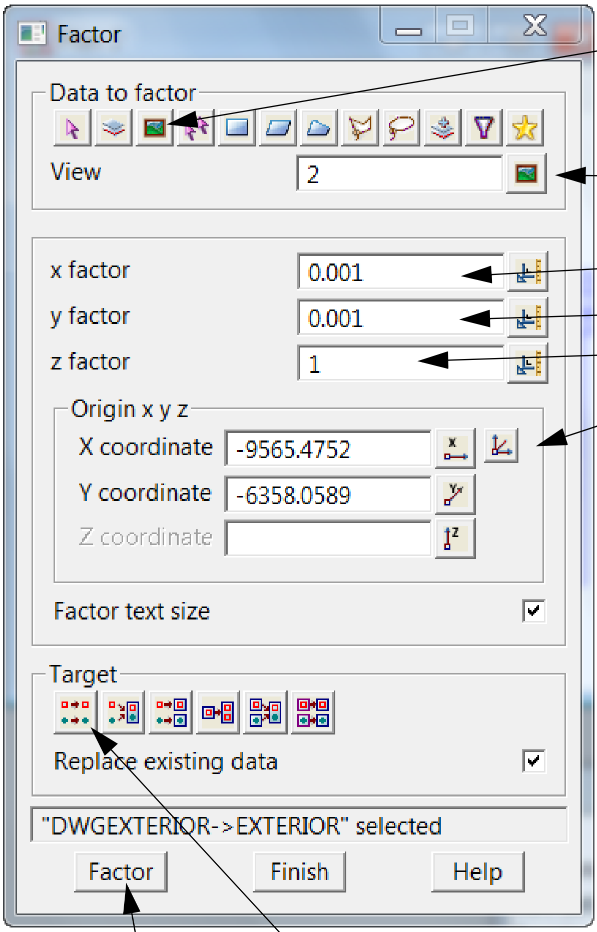
12d Model 5M 10.0C1a RC 4 (nt.x86) - Project "C:\12d\10.00\Training\survey\setout\CAD HOUSE SETOUT\CAD HOUSE SETOUT" - Client "12d Training

Project
File I/O
Edit
View
Models
Strings
Tins
Survey
Design
Drafting
Plot
Report
Utilities
User
Window
Help
OFFSET 1 200
base
white
DASHED
0
ISO
0.4
Plan 1
Plan 2
1
2
CAP
NUM
Output Window
Background tasks

11.2.3 Scale the house models

The imported building has its base units in millimetres rather than metres and is located a large distance from the lot. We will firstly scale the building from millimetres to metres

Select option ***Utilities=>A-G=>Factor***



View 2

x factor 0.001

y factor 0.001

z factor 1

Origin x y z

X coordinate -9565.4752

Y coordinate -6358.0589

Z coordinate

Factor text size ☑

Replace existing data ☑

"DWGEXTERIOR->EXTERIOR" selected

Select **View** icon

Select view **2**

Type in an **x factor** of **0.001**

Type in a **y factor** of **0.001**

Leave the **z factor** as **1**

Select origin icon then pick and accept any point on the building outline.

Note that the Origin centre point is not necessary as the house will be shifted to the correct position in the next option

Tick check box to **Factor text size**

Select **Move to original model** icon

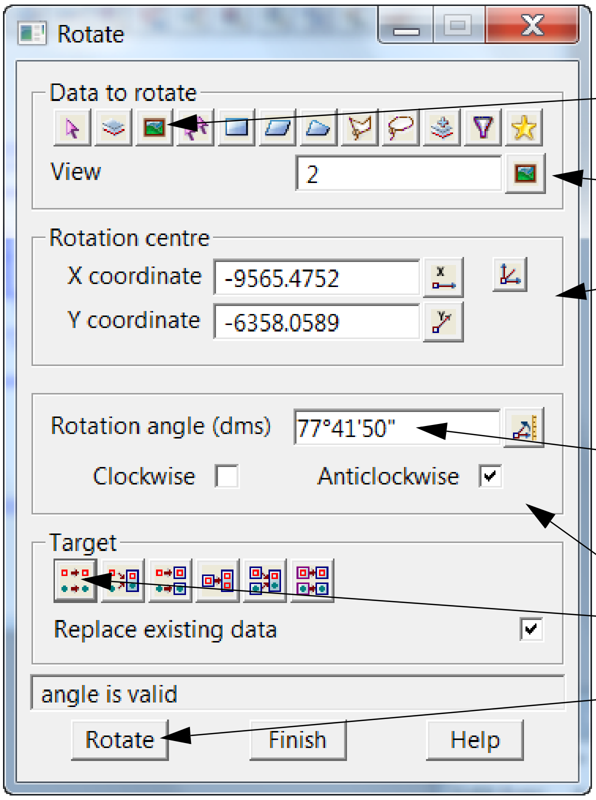
Select **Factor** then **Finish**

Zoom all of the house models

11.2.4 Rotate the building

We will now rotate the house.

Select the option ***Utilities=>H-Z=>Rotate***



View: 2

Rotation centre

X coordinate: -9565.4752

Y coordinate: -6358.0589

Rotation angle (dms): 77°41'50"

Clockwise ☐ Anticlockwise ☑

Replace existing data ☑

angle is valid

Select **View** icon

Select view **2**

Select Rotation centre icon then pick and accept any point on the building outline.

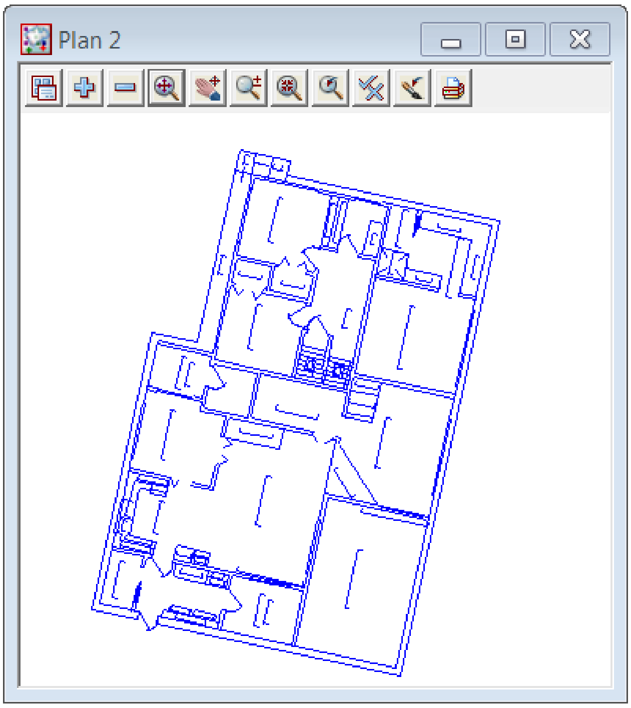
Note that the rotation centre point is not necessary as the house will be shifted to the correct position in the next option

Type in the rotation. In this example we have typed in the bearing of the house edge and subtracted the bearing of the left side boundary line

Tick **Anticlockwise** check box

Select **Move to original model** icon

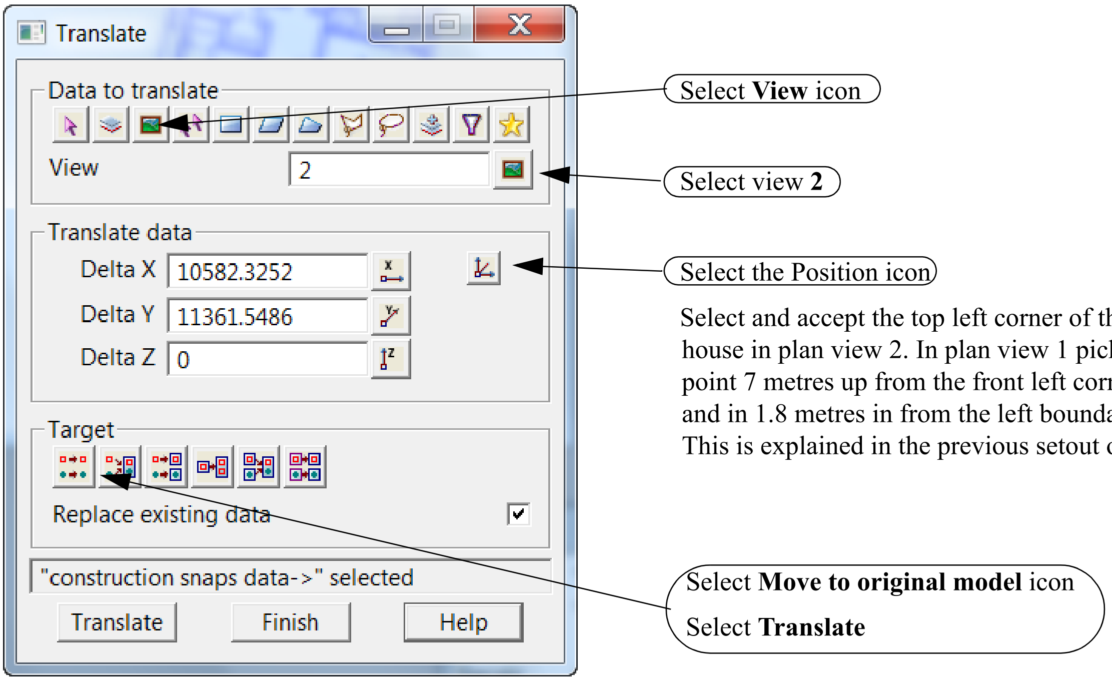
Select **Rotate**



11.2.5 Translate the house

We will now position the house into the lot and place the corner at a predefined position

Select the option ***Utilities=>H-Z=>Translate***


Translate
Data to translate
Translate data
Target
Translate
Finish
Help

View: 2

Delta X: 10582.3252

Delta Y: 11361.5486

Delta Z: 0

Replace existing data ☑

"construction snaps data->" selected

Select **View** icon

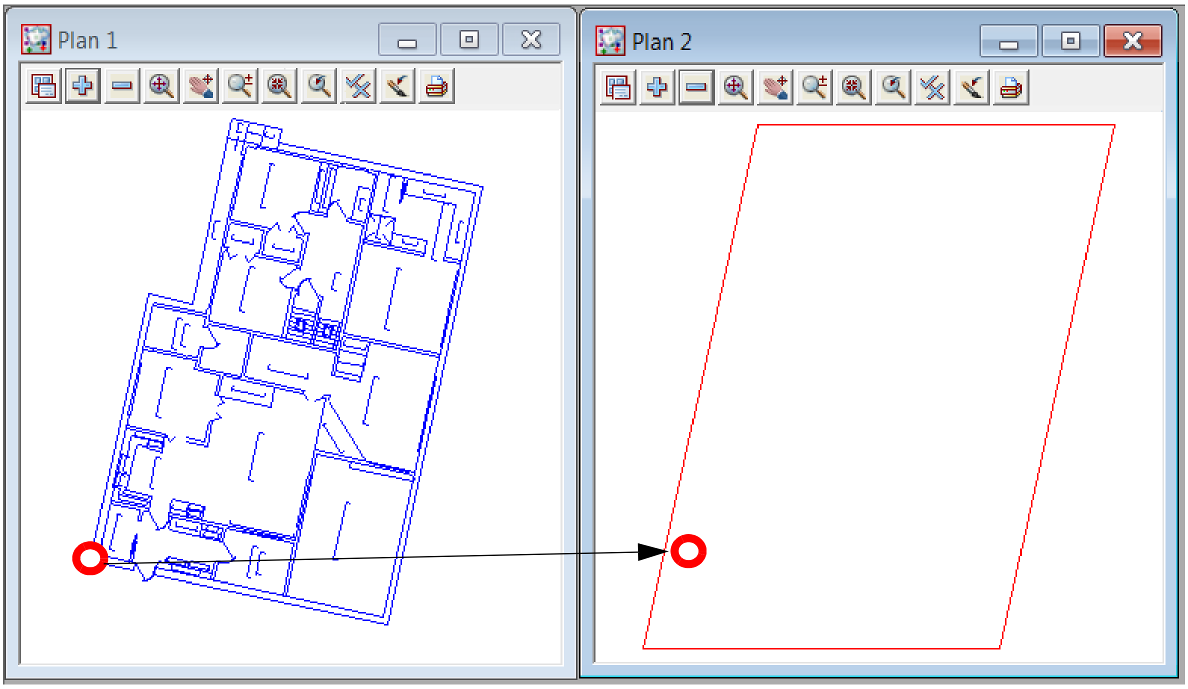
Select view **2**

Select the Position icon

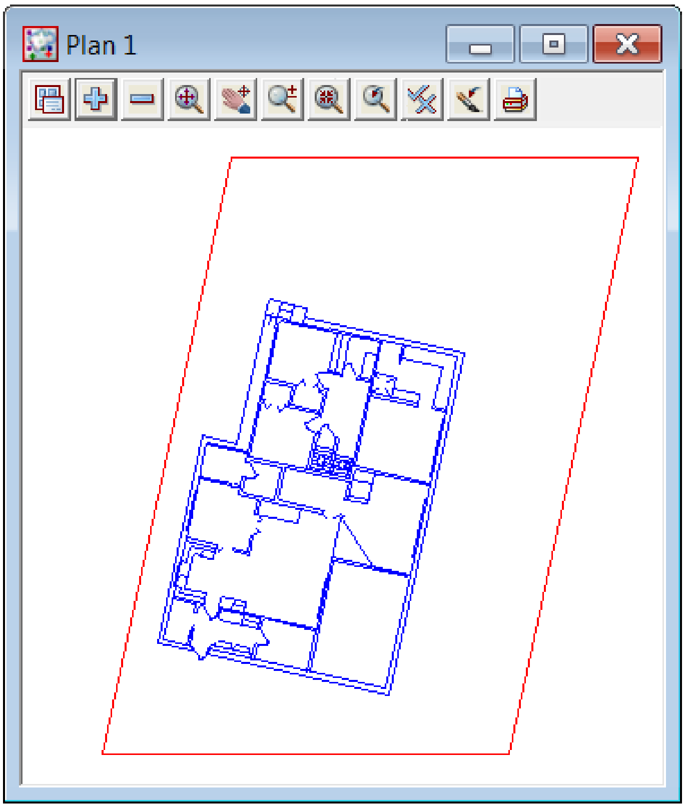
Select and accept the top left corner of the house in plan view 2. In plan view 1 pick a point 7 metres up from the front left corner and in 1.8 metres in from the left boundary. This is explained in the previous setout option

Select **Move to original model** icon

Select **Translate**


Plan 1
Plan 2

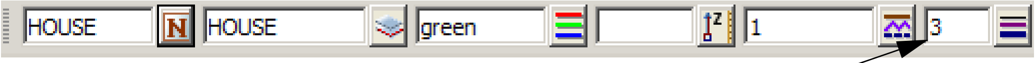
In plan view 1 turn on the house models



11.2.6 Create outline of house for setout

We will now create a string around the outside edge of the cad house. This is done in a model called **HOUSE**

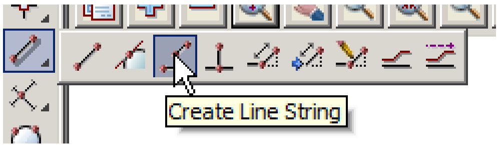
Type in the name and model name **HOUSE** in the **CAD controlbar.** Select the colour **Green** and linestyle **1**

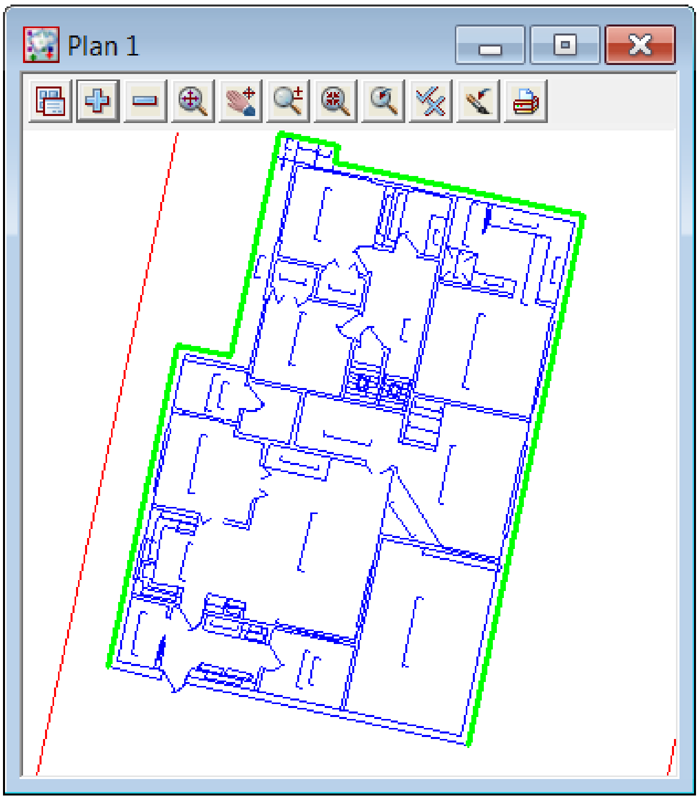


A weight of **3** will help identify the string from the underlying string

Select option ***Strings=>Cad=>Lines=>Line string***

or **Create Line String** icon



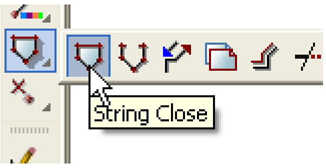


Pick and accept the corner points of the cad house

Don't create the string back onto the start point. Press **[Escape]** to exit the string option

To close the string select ***Strings=>Strings edit=>Close***

or **String Close** icon



The dimensioning and setout numbers can be created as per the previous chapter

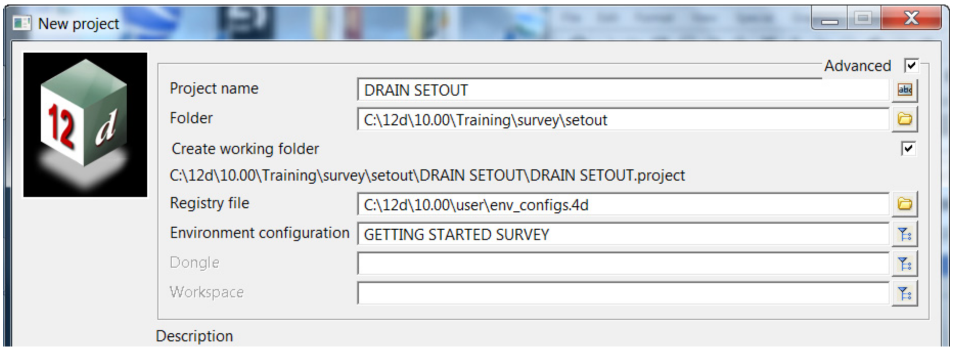
11.3 Setout for evenly graded string

In this exercise we will manually import a polyline from cad, regrade the string and create manual setout points for uploading.

Create a new project as shown previously called **DRAIN SETOUT** in the folder

C:\12d\10.00\Training\survey\setout\DRAIN SETOUT

Remember to select the configuration GETTING STARTED SURVEY

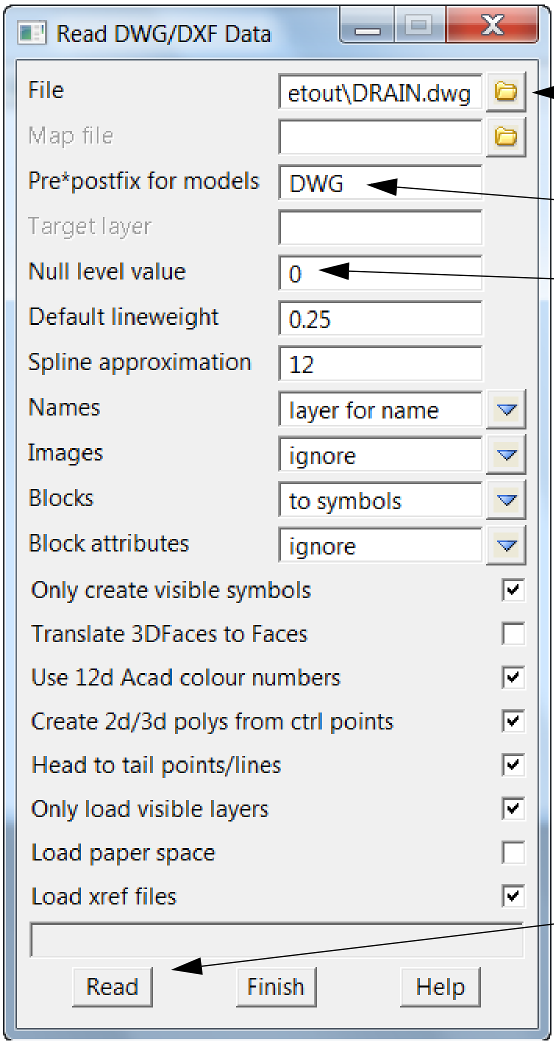


Advanced ☑

Project name	DRAIN SETOUT
Folder	C:\12d\10.00\Training\survey\setout
Create working folder	☑
C:\12d\10.00\Training\survey\setout\DRAIN SETOUT\DRAIN SETOUT.project	
Registry file	C:\12d\10.00\user\env_configs.4d
Environment configuration	GETTING STARTED SURVEY
Dongle	
Workspace	
Description	

11.3.1 Read in the polyline from cad

Select option ***File I/O=>Data Input=>DWG/DXF/DXB***



File	etout\DRAIN.dwg
Map file	
Pre*postfix for models	DWG
Target layer	
Null level value	0
Default lineweight	0.25
Spline approximation	12
Names	layer for name
Images	ignore
Blocks	to symbols
Block attributes	ignore
Only create visible symbols	☑
Translate 3DFaces to Faces	☐
Use 12d Acad colour numbers	☑
Create 2d/3d polys from ctrl points	☑
Head to tail points/lines	☑
Only load visible layers	☑
Load paper space	☐
Load xref files	☑

Browse to the folder **C:\12d\10.00\Training\survey\setout** and select the file **DRAIN.DWG**

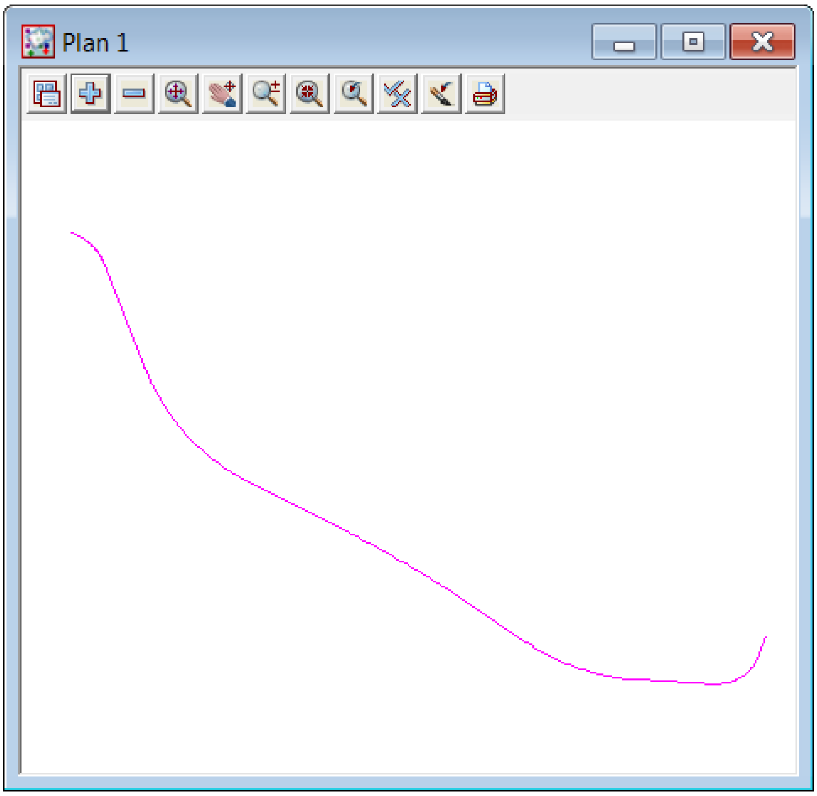
Type in **DWG**<space> as the prefix for the loaded models

Type in **0** to ensure any 2d data is nulled

The rest of the panel can remain unchanged

Select **Read** then **Finish**

Turn on the model **DWG DRAIN**



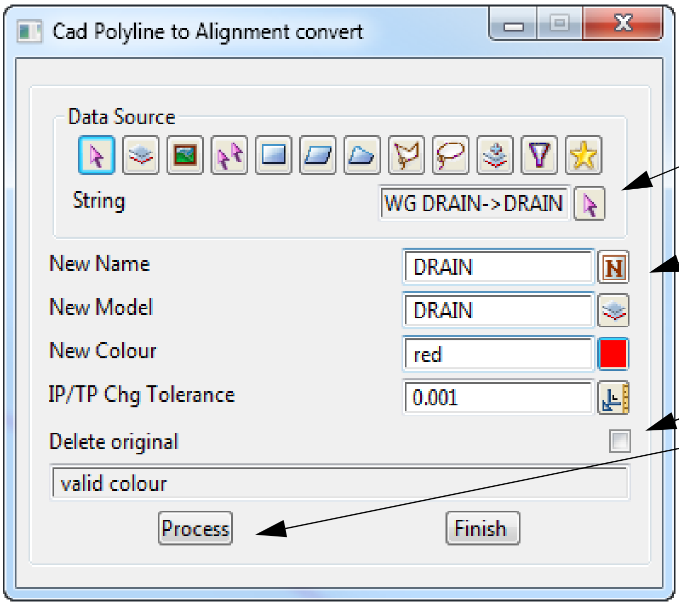
11.3.2 Convert the polyline to a super alignment string

The imported polyline has no height but the string is to be evenly graded from level 20.0 to level 25.0

We will convert the polyline to an super alignment to grade the string. The option to be used will filter any duplicate points normally created at tangent points due to rounding errors. This is done in two stages

Poly to alignment

Select ***Utilities=>A-G=>Convert=>Poly to alignment***



Cad Polyline to Alignment convert

Data Source

String: WG DRAIN->DRAIN

New Name: DRAIN

New Model: DRAIN

New Colour: red

IP/TP Chg Tolerance: 0.001

Delete original ☐

valid colour

Select the **String** pick icon

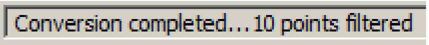
Pick and accept the polyline

Type in a new name and model name for the alignment

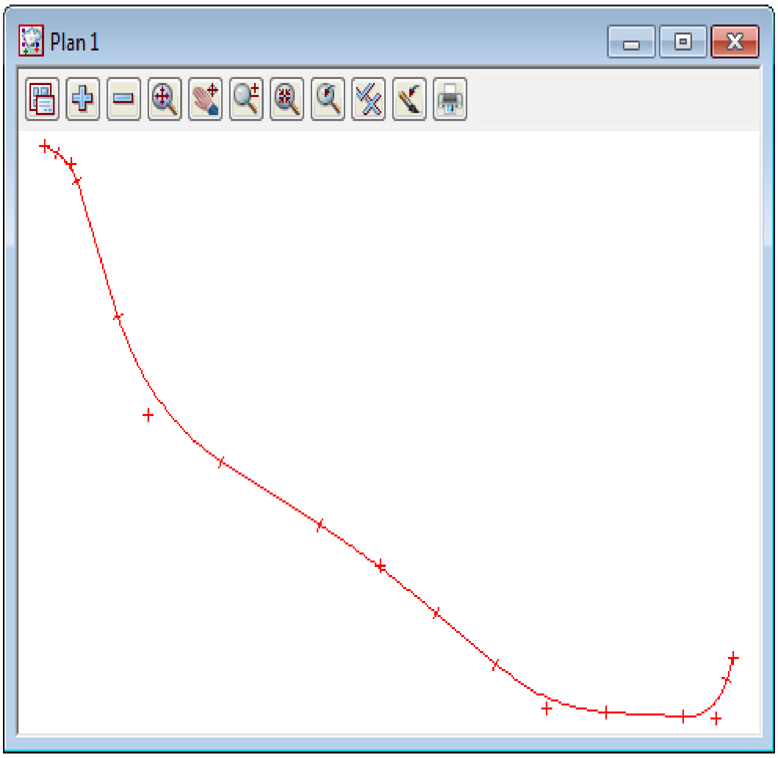
Untick the **Delete original** check box

Select **Process**

This option removes duplicate IPs and TPs in the string that would cause errors when uploading



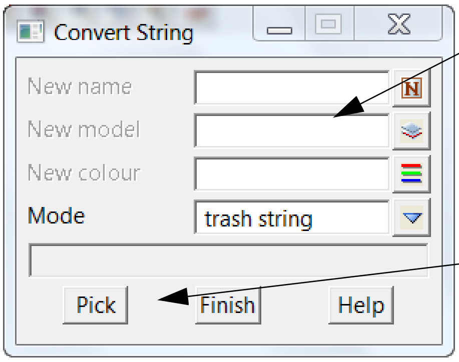
Conversion completed...10 points filtered



Turn off the original string model then turn on the new **DRAIN** model

Alignment to super alignment

Select ***Strings=>Convert***

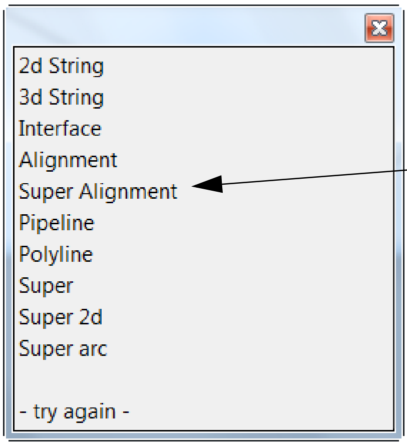

Convert String
New name
New model
New colour
Pick
Finish
Help

Mode: trash string

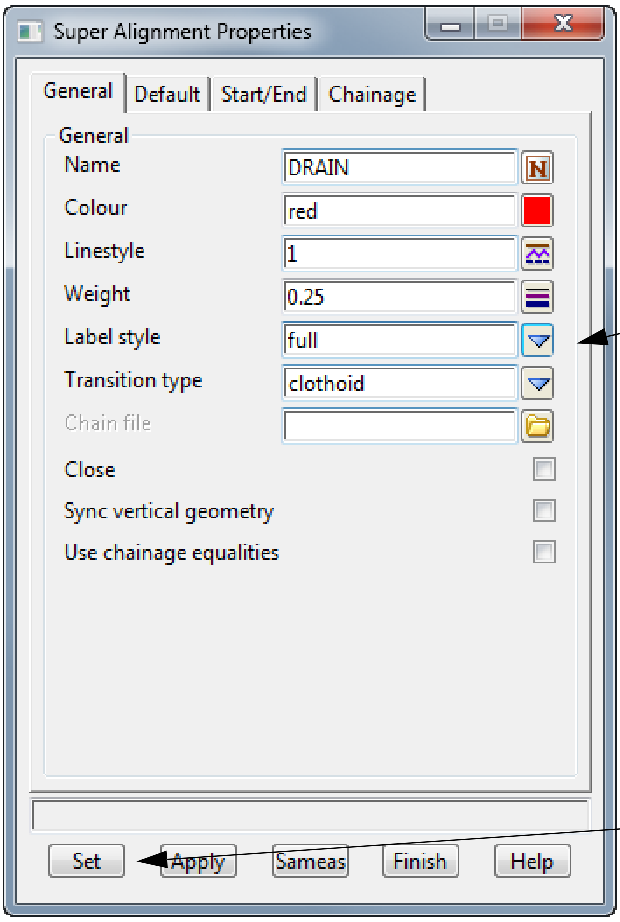
Leave the panel unaltered

Select **Pick**

Select the newly created alignment string


2d String
3d String
Interface
Alignment
Super Alignment
Pipeline
Polyline
Super
Super 2d
Super arc
- try again -

Select **Super Alignment**


Super Alignment Properties
General
Default
Start/End
Chainage
Set
Apply
Sameas
Finish
Help

General

Name DRAIN

Colour red

Linestyle 1

Weight 0.25

Label style full

Transition type clothoid

Chain file

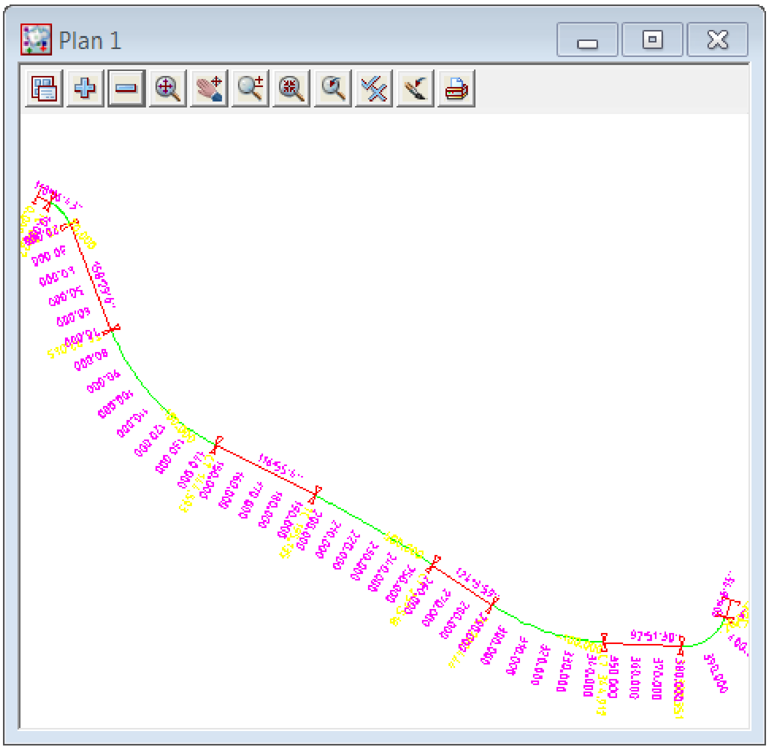
Close ☐

Sync vertical geometry ☐

Use chainage equalities ☐

Select **full** for the label style

Select **Set** then **Finish**

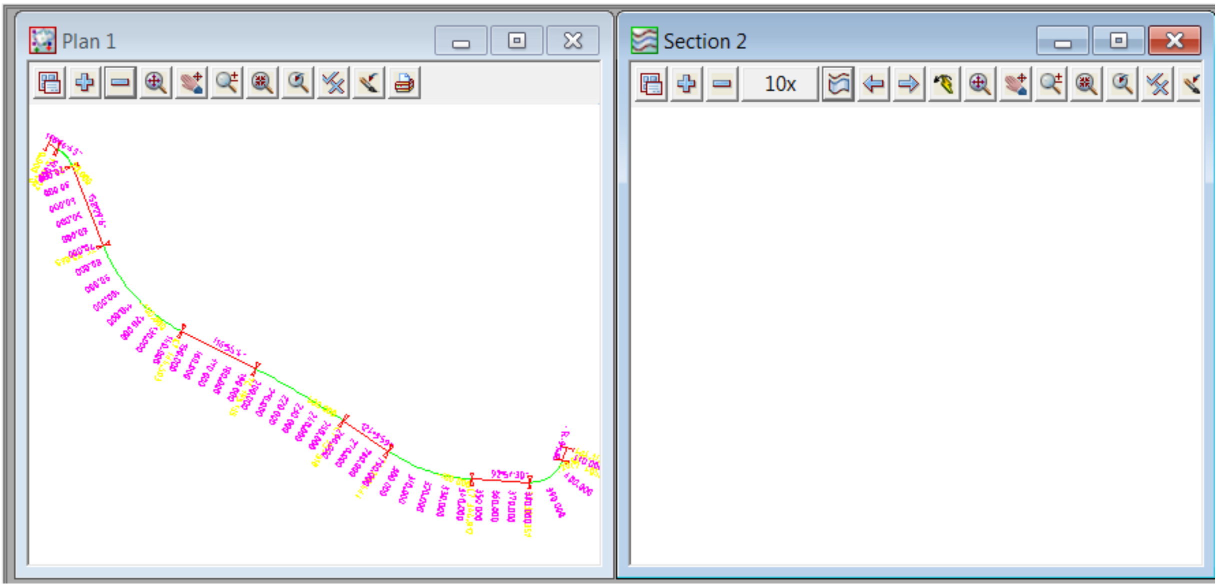


11.3.3 Create heights for each end of the alignment

We need to firstly create a section view to profile the alignment

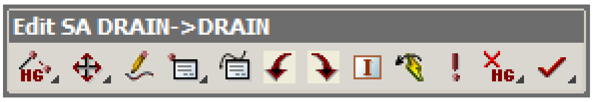
Select **View=>New=>Section**

Select the profile icon then pick and accept the alignment string in the plan view

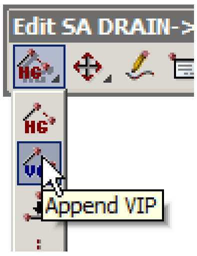


To edit the alignment string select **Strings=>Editor** or **[F6]**

Pick and accept the alignment string

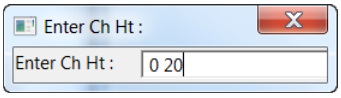

Edit SA DRAIN->DRAIN

The alignment editor appears


Edit SA DRAIN->
Append VIP

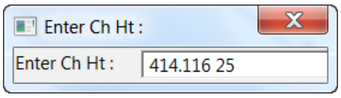
To add vertical geometry hold the left button down over the **Add/Remove IPs** icon then select **Append VIP**

Keeping the cursor in the section view and start typing to bring up the input panel



Enter Ch Ht : 0 20

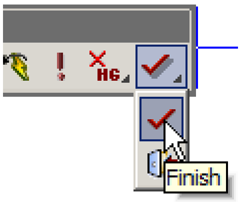
Type in **0** (space) **20 [Enter]**



Enter Ch Ht : 414.116 25

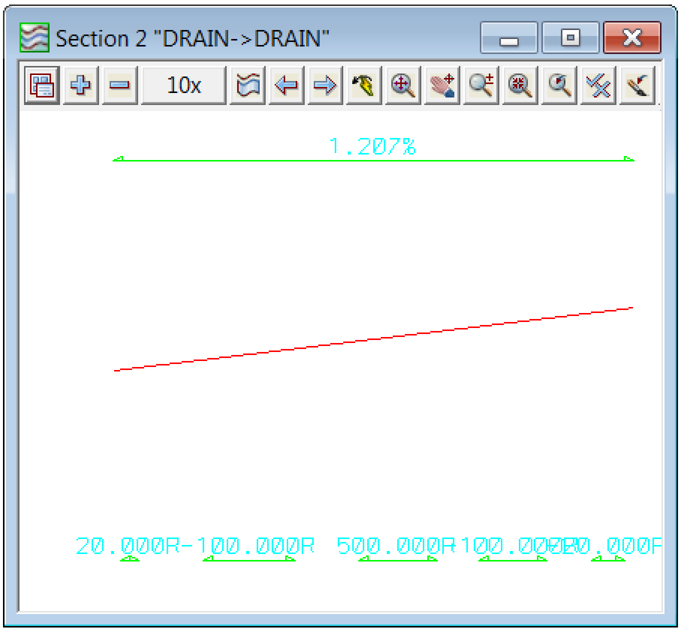
For the end height type in **414.116** (space) **25 [Enter]**

Press **Escape** key to exit the option



To exit the alignment editor hold the left button down over the **Finish** icon then select **Finish**

Select **Yes** to confirm finishing

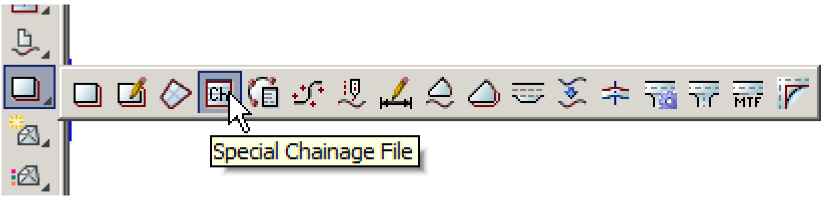

Section 2 "DRAIN->DRAIN"
10x
1.207%
20.000R-100.000R
500.000R

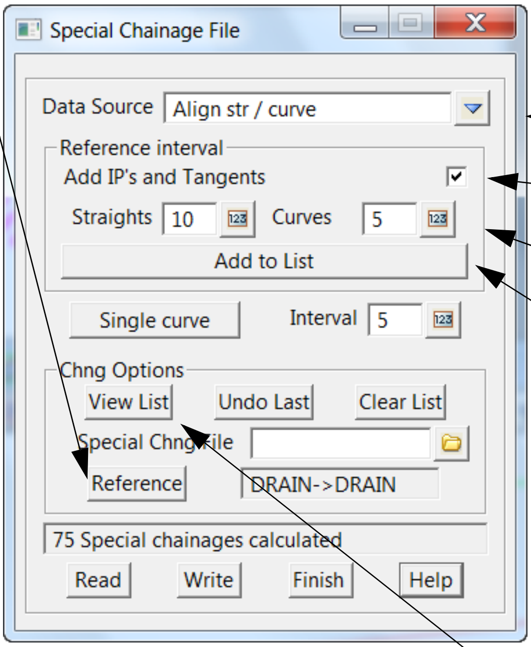
11.3.4 Create special chainage file for setout points

The string is to be setout every 10 metres with tangent points included so we need to create a file of chainages that will be used in the setout option

Select **Design=>Roads=>More=>Special chainage file**

or **Special Chainage File** icon


Special Chainage File


Special Chainage File
Add to List
Single curve
View List
Undo Last
Clear List
Reference
Read
Write
Finish
Help

Data Source: Align str / curve

Reference interval

Add IP's and Tangents ☑

Straights 10 Curves 5

Interval 5

Chng Options

Special Chng File

Reference: DRAIN->DRAIN

75 Special chainages calculated

Press **Reference** and pick the alignment string

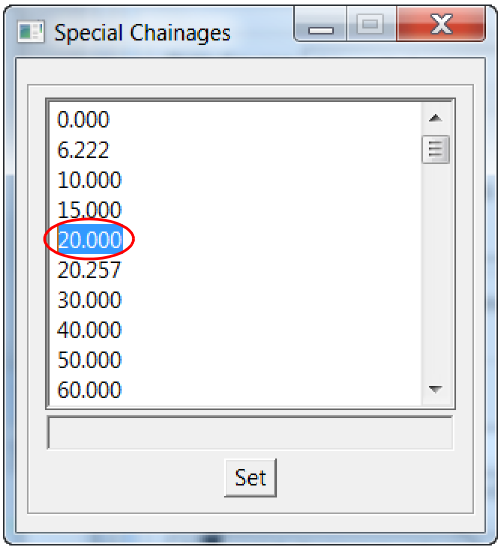
Change the **Data Source** option to **Align str / curve**

Tick check box to **Add IP's and Tangents**

Type in the straight spacing **10** and the Curve spacing as **5**

Select **Add to List**

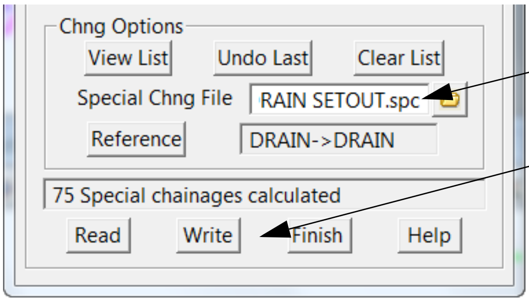
Select **View List**


Special Chainages
Set

0.000
6.222
10.000
15.000
20.000
20.257
30.000
40.000
50.000
60.000

The chainages are listed. Duplicate and very close chainages can be deleted in this list

Select **Set** to close the file


Chng Options
View List
Undo Last
Clear List
Reference
Read
Write
Finish
Help

Special Chng File: RAIN SETOUT.spc

Reference: DRAIN->DRAIN

75 Special chainages calculated

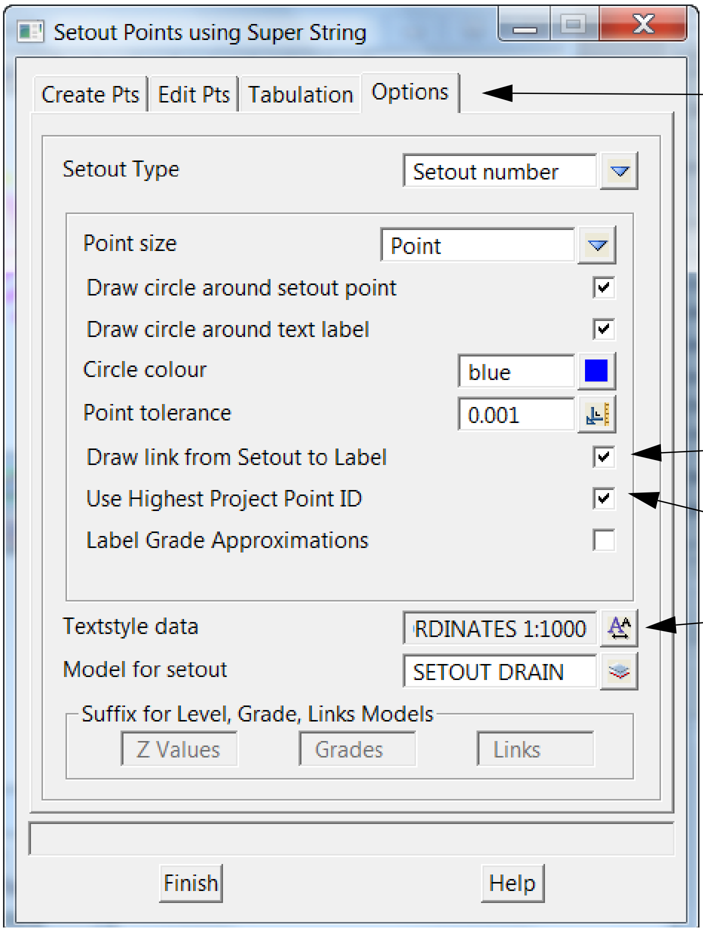
Type in the file name **DRAIN SETOUT**

Select **Write** then **Finish**

11.3.5 Create setout points

We will now generate point numbers for the alignment

Select option ***Survey=>Setout=>Setout point using super string***


Setout Points using Super String
Create Pts
Edit Pts
Tabulation
Options
Suffix for Level, Grade, Links Models
Z Values
Grades
Links
Finish
Help

Setout Type: Setout number

Point size: Point

Draw circle around setout point ☑

Draw circle around text label ☑

Circle colour: blue

Point tolerance: 0.001

Draw link from Setout to Label ☑

Use Highest Project Point ID ☑

Label Grade Approximations ☐

Textstyle data: RDINATES 1:1000

Model for setout: SETOUT DRAIN

Select the **Options** tab

Prior to running the option we will set up some parameters

Tick the check box to **Draw link from Setout to label**

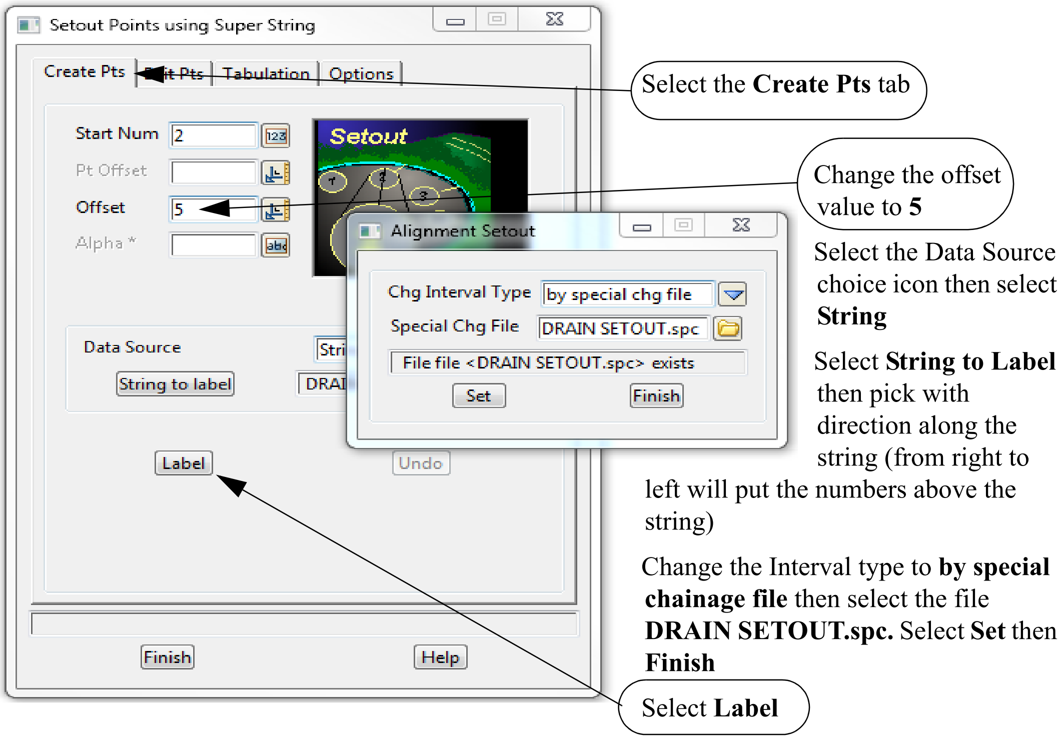
Tick the check box to **Use Highest Project Vertex ID**

Select the **Textstyle data** icon and select

CO-ORDINATES 1:1000.

This will ensure the text is the right height for a 1:1000 plot

Type in model **SETOUT DRAIN**


Setout Points using Super String
Create Pts
Edit Pts
Tabulation
Options
Setout
Pt Offset
Alpha *
Data Source
String to label
Label
Undo
Finish
Help
Alignment Setout
Set
Finish

Start Num 2

Offset 5

Chg Interval Type by special chg file

Special Chg File DRAIN SETOUT.spc

File file <DRAIN SETOUT.spc> exists

Select the **Create Pts** tab

Change the offset value to **5**

Select the Data Source choice icon then select **String**

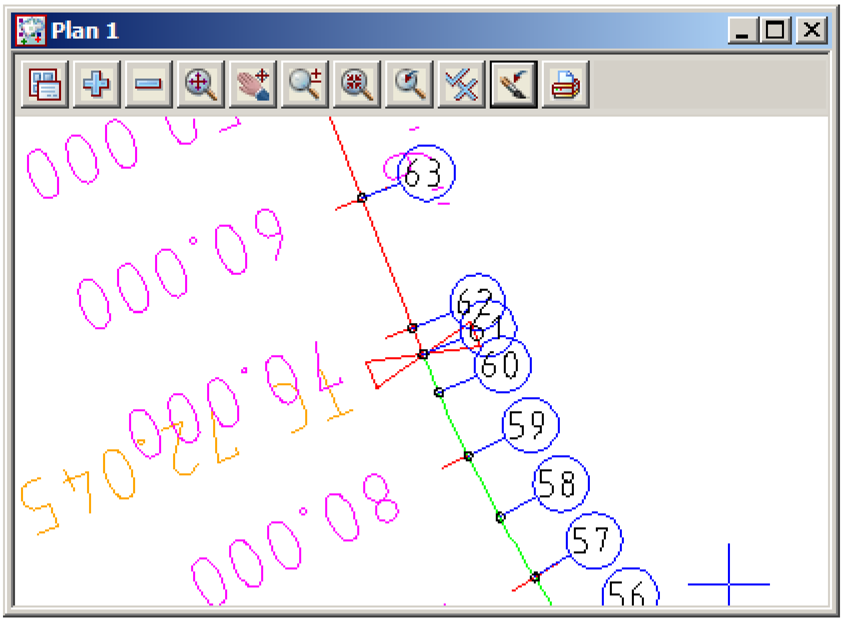
Select **String to Label** then pick with direction along the string (from right to left will put the numbers above the string)

Change the Interval type to **by special chainage file** then select the file **DRAIN SETOUT.spc.** Select **Set** then **Finish**

Select **Label**

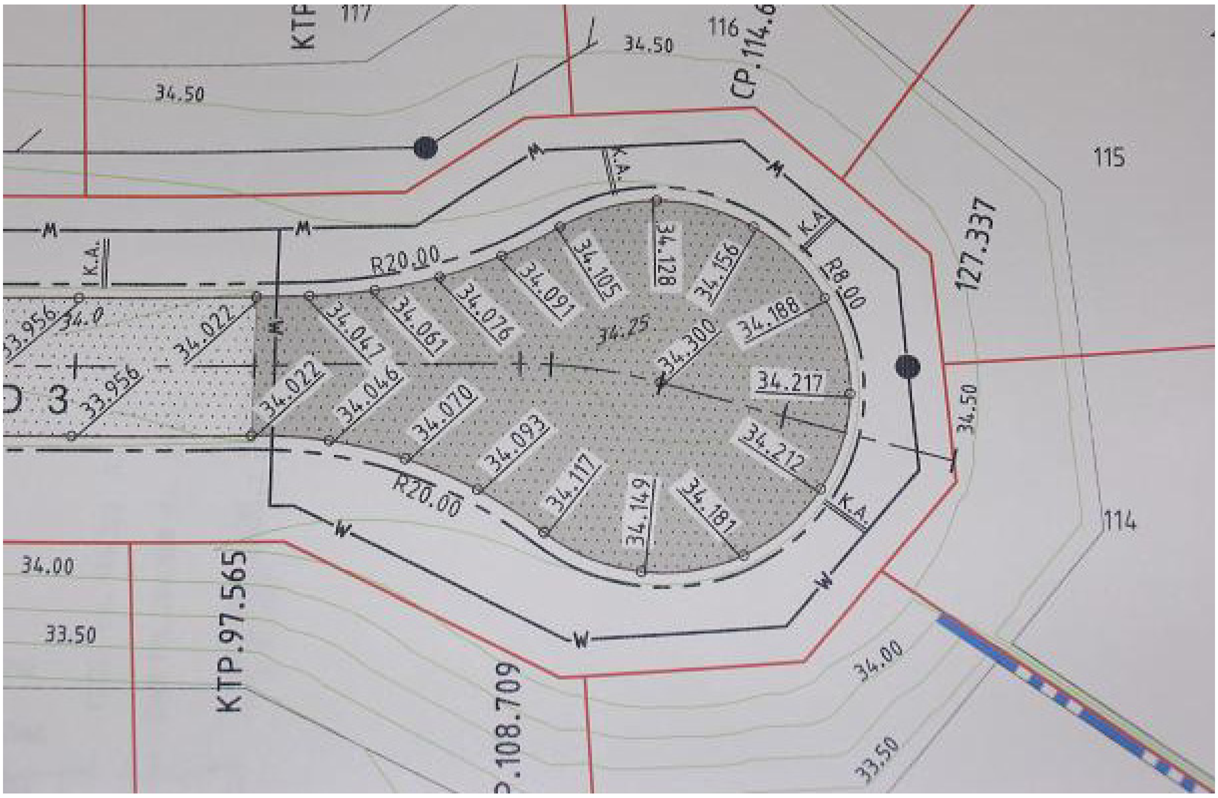
Any overlapping numbers can be moved as shown previously

The points can now be uploaded to an instrument as shown previously


Plan 1
63
000°09
62
61
60
57000°94
59
58
000°08
57
56

11.4 Setout for polyline culdesac string

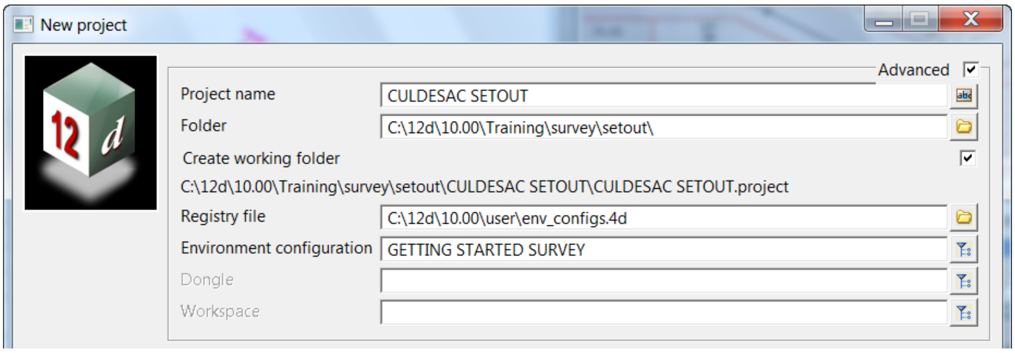
In this exercise we will import a 2d lip of kerb polyline from cad and create heights from a provided layout drawing


117
116
115
114
34.50
34.50
CP.114.6
127.337
K.A.
R20.00
R8.00
33.956
34.0
34.022
33.956
34.022
34.047
34.061
34.076
34.091
34.105
34.128
34.156
34.188
34.25
34.300
34.217
34.212
34.181
34.149
34.117
34.093
34.070
34.046
R20.00
34.50
34.00
33.50
KTP.97.565
P.108.709
34.00
33.50

Create a new project as shown previously called **CULDESAC SETOUT** in the folder

C:\12d\10.00\Training\survey\setout\CULDESAC SETOUT

Remember to select the configuration GETTING STARTED SURVEY


New project

Advanced ☑

Project name: CULDESAC SETOUT

Folder: C:\12d\10.00\Training\survey\setout\

Create working folder ☑

C:\12d\10.00\Training\survey\setout\CULDESAC SETOUT\CULDESAC SETOUT.project

Registry file: C:\12d\10.00\user\env_configs.4d

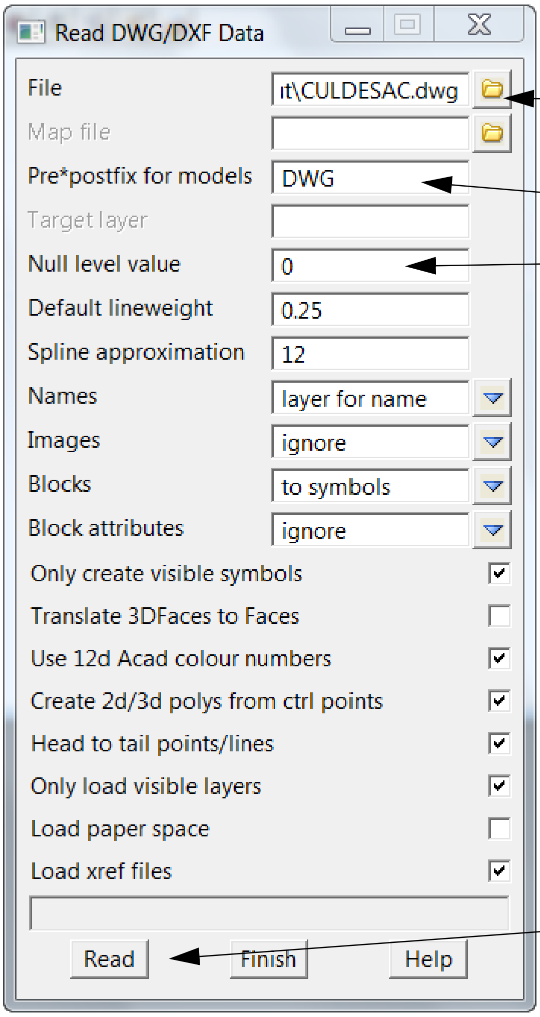
Environment configuration: GETTING STARTED SURVEY

Dongle:

Workspace:

11.4.1 Read in the polyline from cad

Select option ***File I/O=>Data Input=>DWG/DXF/DXB***



Read DWG/DXF Data

File	ıt\CULDESAC.dwg
Map file	
Pre*postfix for models	DWG
Target layer	
Null level value	0
Default lineweight	0.25
Spline approximation	12
Names	layer for name
Images	ignore
Blocks	to symbols
Block attributes	ignore
Only create visible symbols	☑
Translate 3DFaces to Faces	☐
Use 12d Acad colour numbers	☑
Create 2d/3d polys from ctrl points	☑
Head to tail points/lines	☑
Only load visible layers	☑
Load paper space	☐
Load xref files	☑

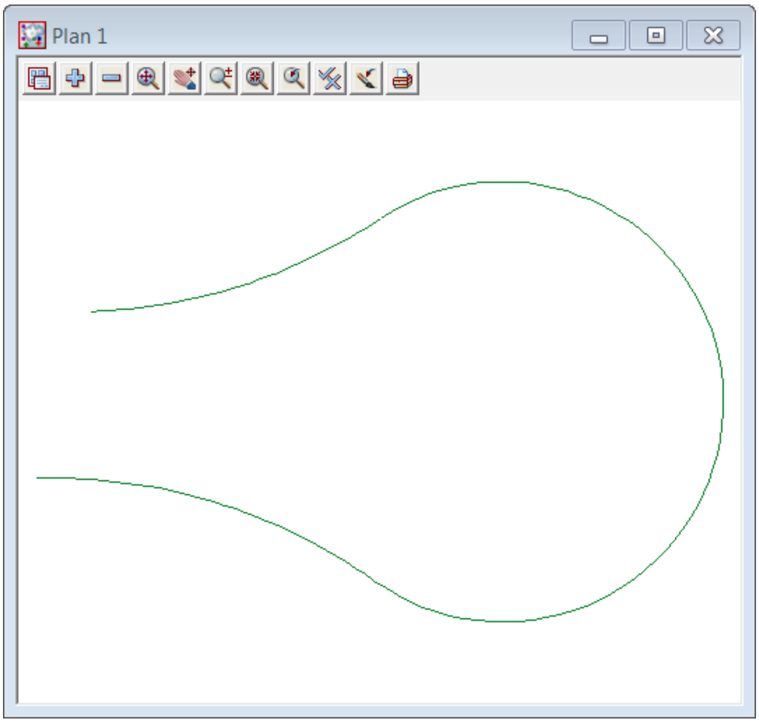
Browse to the folder **C:\12d\10.00\Training\survey\setout** and select the file **CULDESAC.DWG**

Type in **DWG**<space> as the prefix for the loaded models

Type in **0** to ensure any 2d data is nulled

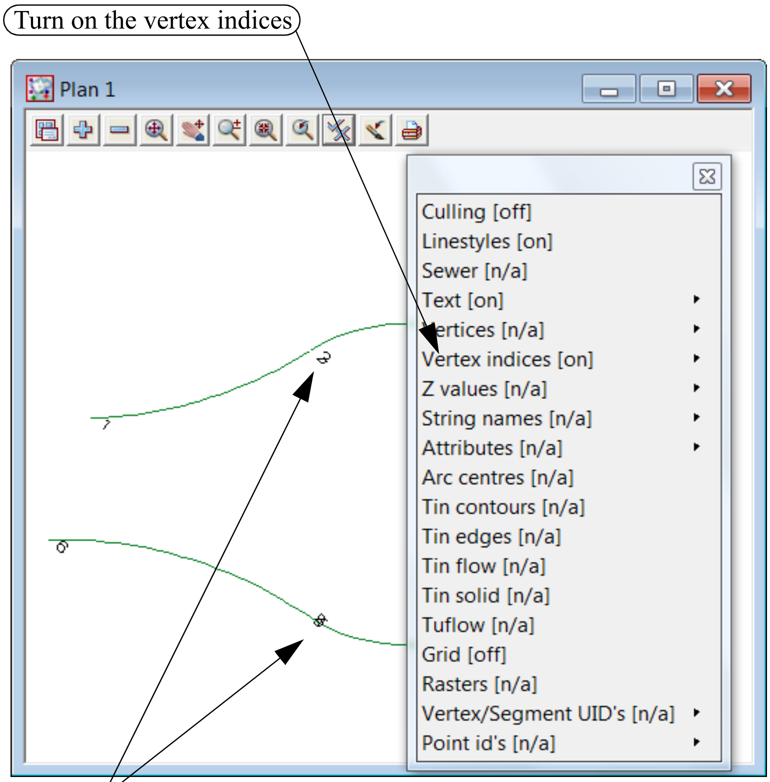
The rest of the panel can remain unchanged

Select **Read** then **Finish**



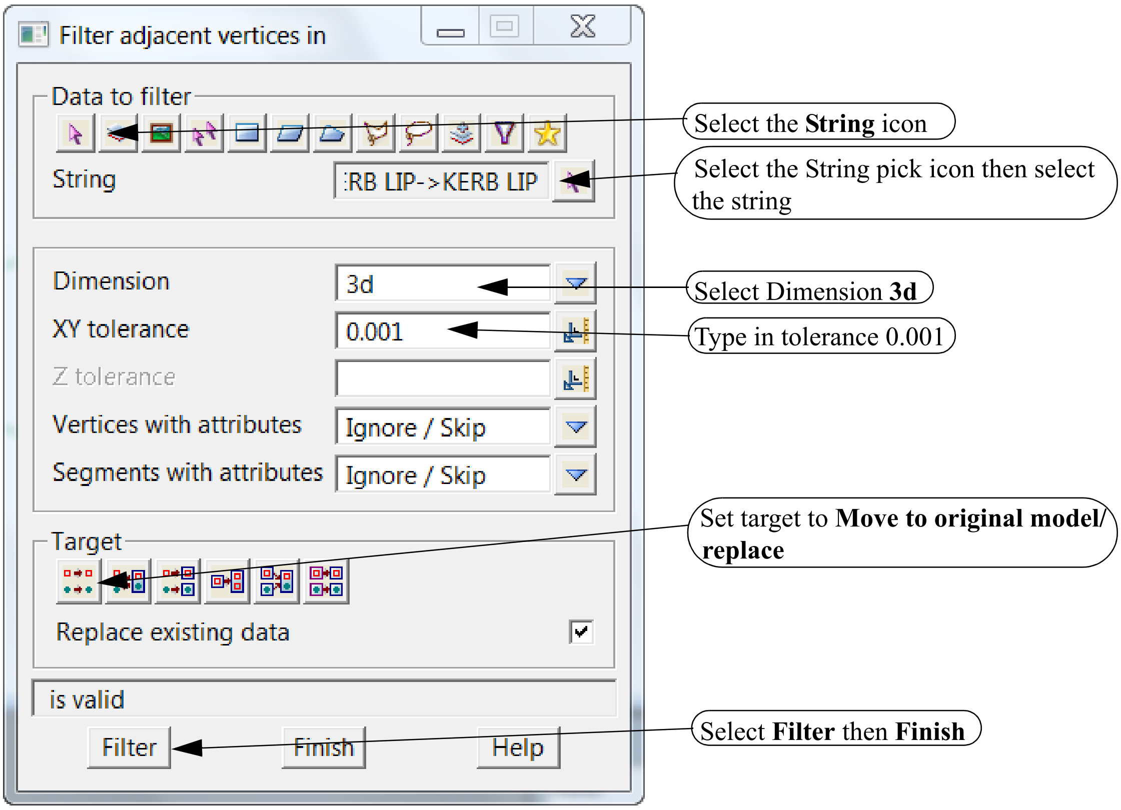
11.4.2 Filter the imported string to ensure there are no duplicate vertices at the tangent points

Turn on the vertex indices


Plan 1
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [n/a]
Vertex indices [on]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [n/a]
1
2
8
9

Occasionally duplicate vertices will occur. These are highlighted by the overlapping numbers

Select option ***Utilities=>A=G=>Filter=>Vertex filter***


Filter adjacent vertices in
Data to filter
String
:RB LIP->KERB LIP
Dimension
3d
XY tolerance
0.001
Z tolerance
Vertices with attributes
Ignore / Skip
Segments with attributes
Ignore / Skip
Target
Replace existing data ☑
is valid
Filter
Finish
Help

Select the **String** icon

Select the String pick icon then select the string

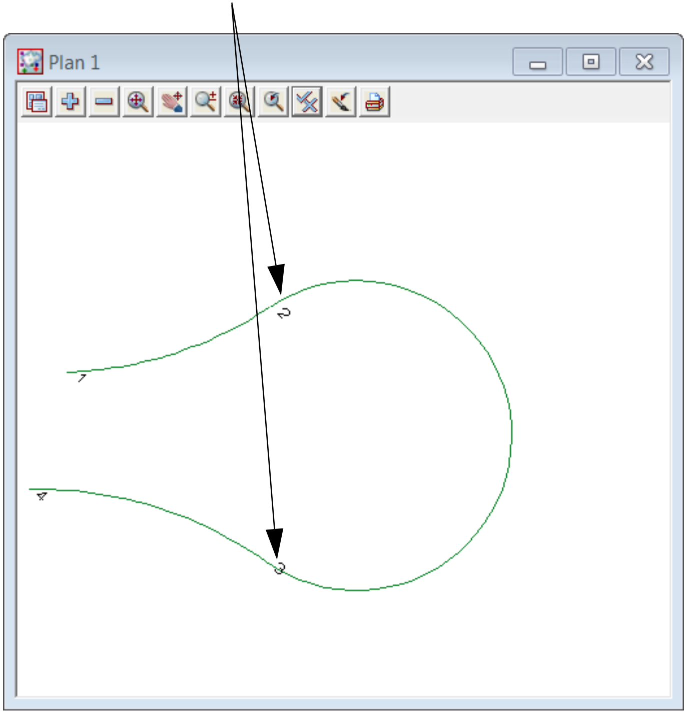
Select Dimension **3d**

Type in tolerance 0.001

Set target to **Move to original model/ replace**

Select **Filter** then **Finish**

The duplicate vertices are removed. Now remove the vertex indices

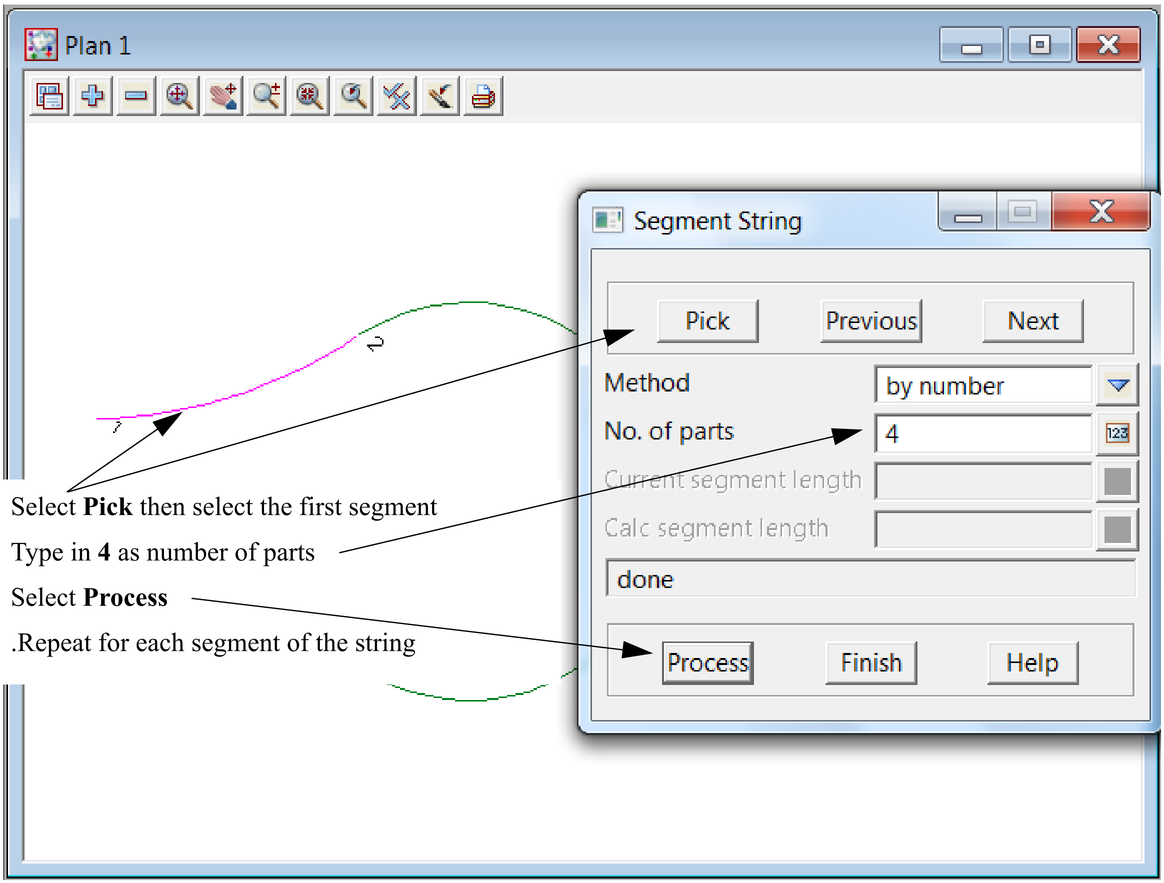


11.4.3 Segment the string

We now segment the string into the equal parts shown in the diagram at the start of this topic.

Firstly toggle on the vertices and toggle off the vertex indices.

Select option ***Strings=>Strings edit=>Segment strings***


Plan 1
Segment String
Pick
Previous
Next
Current segment length
Calc segment length
Process
Finish
Help
1
2

Method: by number

No. of parts: 4

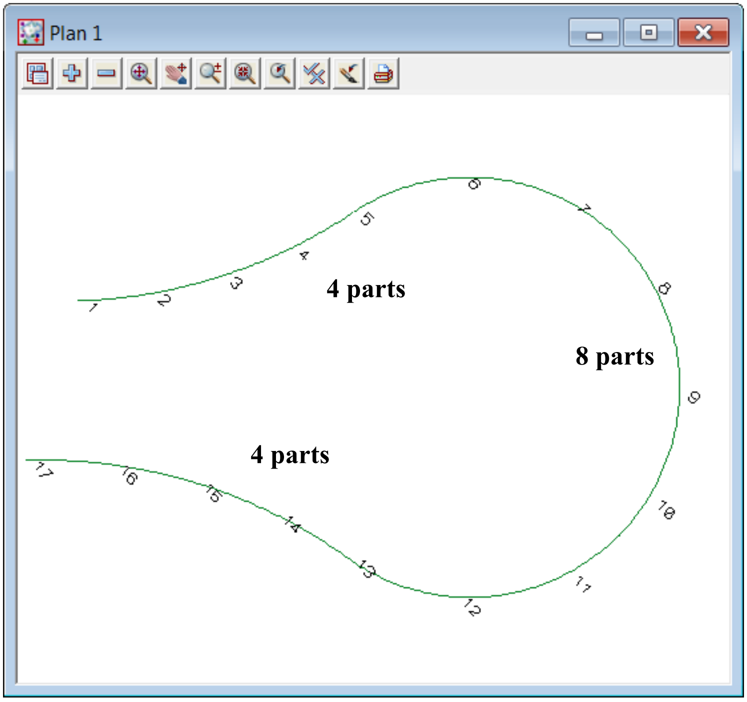
done

Select **Pick** then select the first segment

Type in **4** as number of parts

Select **Process**

.Repeat for each segment of the string

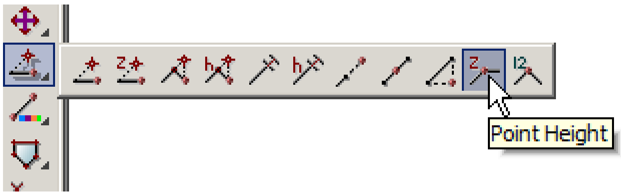

Plan 1
4 parts
8 parts
4 parts
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

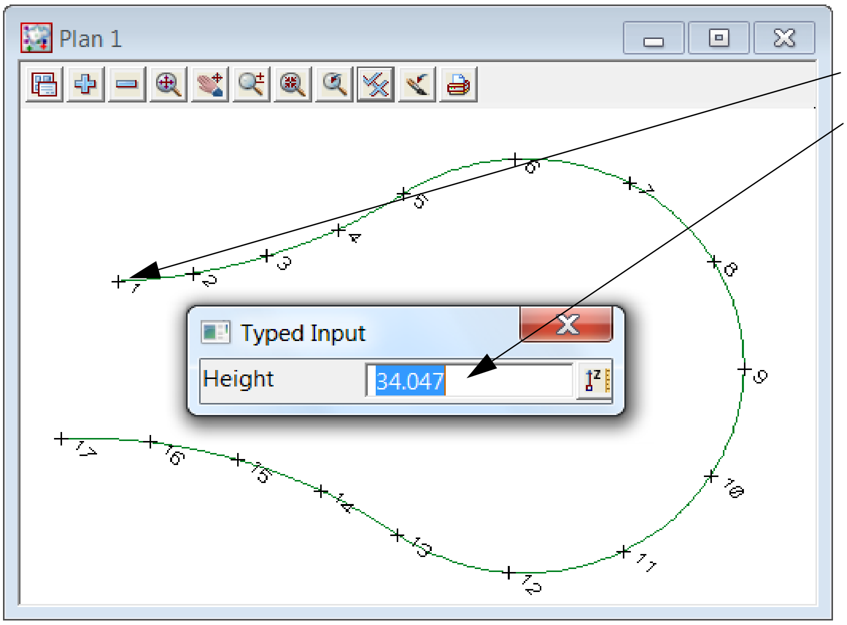
11.4.4 Add heights to string

Heights will be added from the diagram

Toggle on the Z values (No levels appear yet)

To edit the string select **Point height** icon


Point Height


Plan 1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

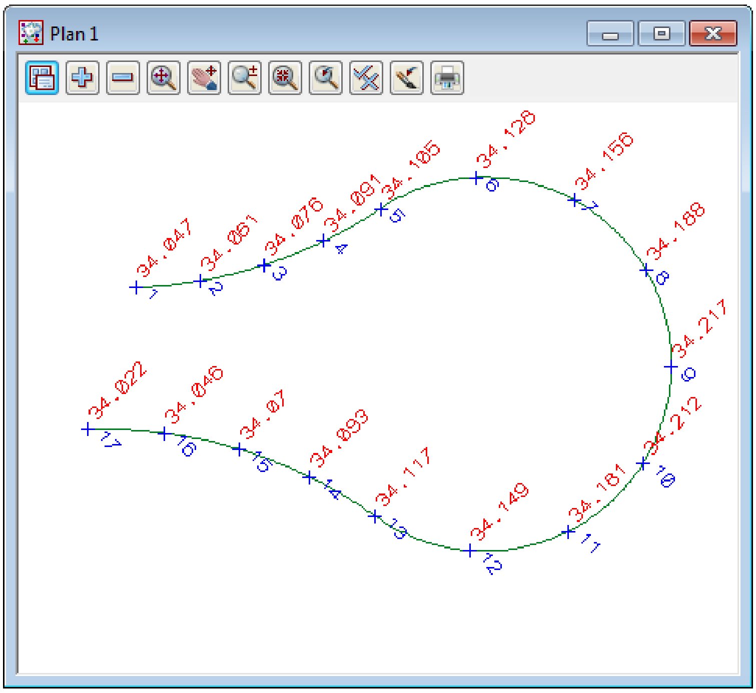
Typed Input

Height 34.047

Select the first vertex

Type in the height **34.047** [Enter]

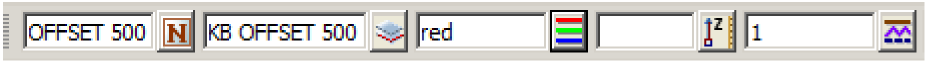
Repeat for each of the points


Plan 1
34.047
34.061
34.076
34.091
34.105
34.128
34.156
34.188
34.217
34.212
34.181
34.149
34.117
34.093
34.07
34.046
34.022
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

11.4.5 Parallel the lip string for setout

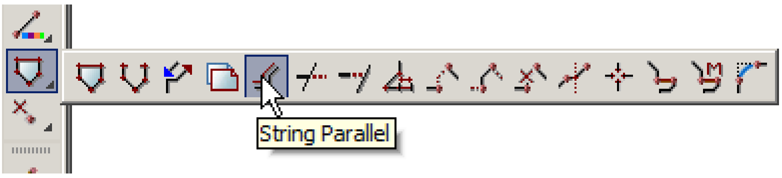
The lip will be paralleled to create setout points. The heights will be raised 0.11 to relate to the kerb level and the offset will be 0.5 behind the back of kerb

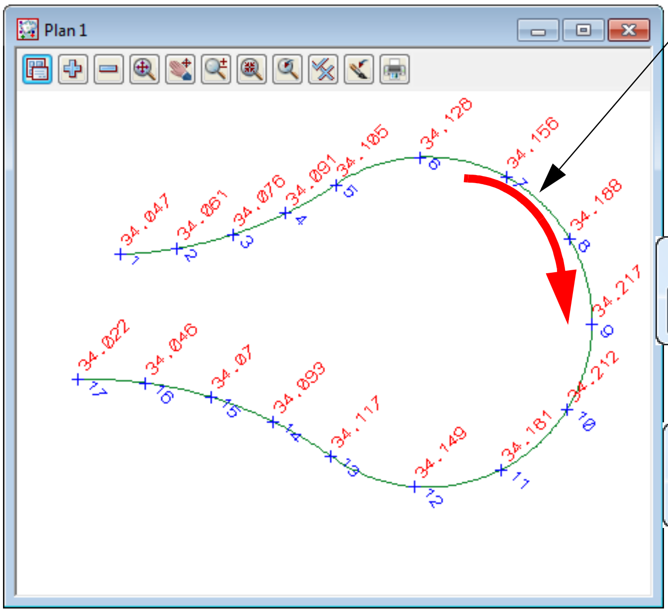
Add a new name and model **KB OFFSET 500** to the cad control bar



OFFSET 500 | KB OFFSET 500 | red | | 1

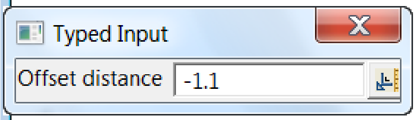
Select **String Parallel** icon


String Parallel


Plan 1
34.047
34.061
34.076
34.091
34.105
34.128
34.156
34.188
34.217
34.212
34.181
34.149
34.117
34.093
34.07
34.046
34.022
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

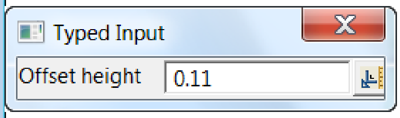
Select and accept with direction the kerb in a clockwise direction

Type in offset **-1.1 [Enter]**

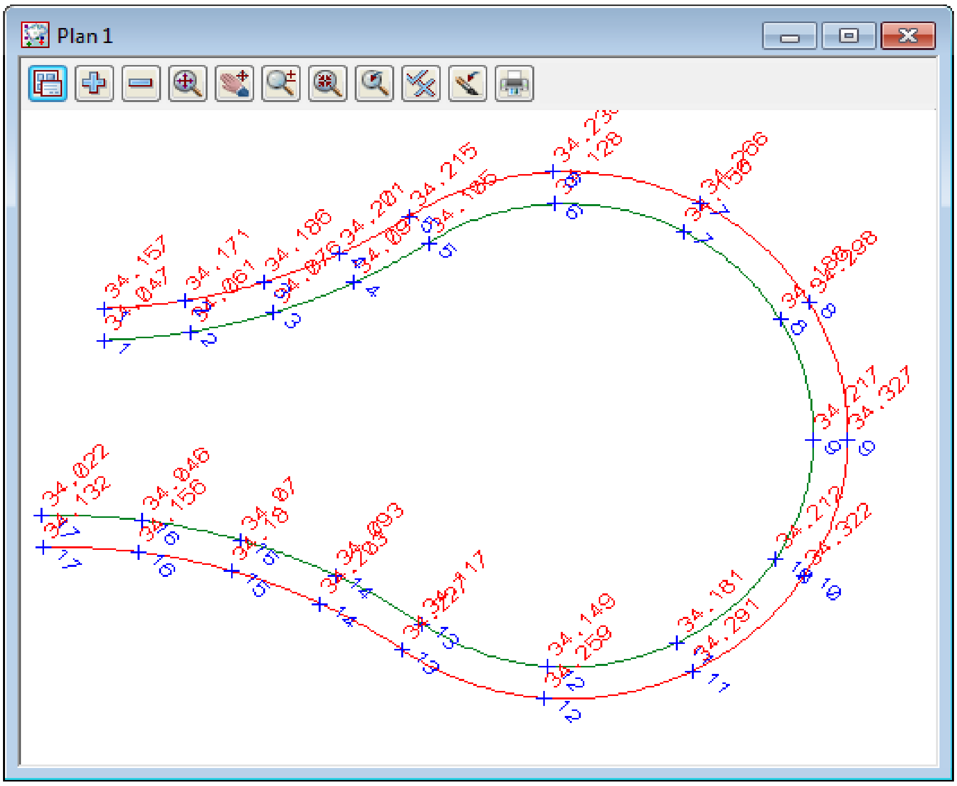

Typed Input

Offset distance -1.1

Type in offset height **0.11 [Enter]**


Typed Input

Offset height 0.11


Plan 1
34.157
34.047
34.171
34.061
34.186
34.076
34.201
34.215
34.128
34.298
34.217
34.327
34.212
34.322
34.181
34.291
34.149
259
34.022
132
34.046
156
1
2
3
4
5
6
7
8
9
10
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12
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14
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16
17

The creation of the point numbers for upload is discussed in the previous chapters

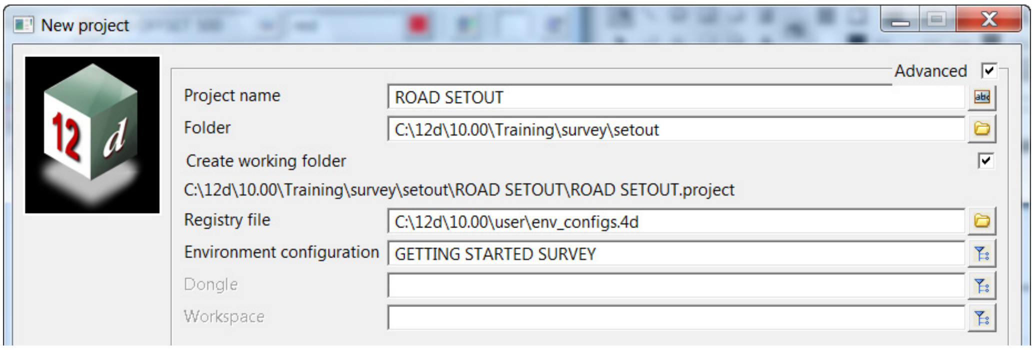
11.5 Triangulation setout

In this topic we will use a triangulation of a surface to create an upload file to be used in a data collector

Create a new project as shown previously called **ROAD SETOUT** in the folder

C:\12d\10.00\Training\survey\setout\ROAD SETOUT

Remember to select the configuration GETTING STARTED SURVEY



Advanced ☑

Project name: ROAD SETOUT

Folder: C:\12d\10.00\Training\survey\setout

Create working folder ☑

C:\12d\10.00\Training\survey\setout\ROAD SETOUT\ROAD SETOUT.project

Registry file: C:\12d\10.00\user\env_configs.4d

Environment configuration: GETTING STARTED SURVEY

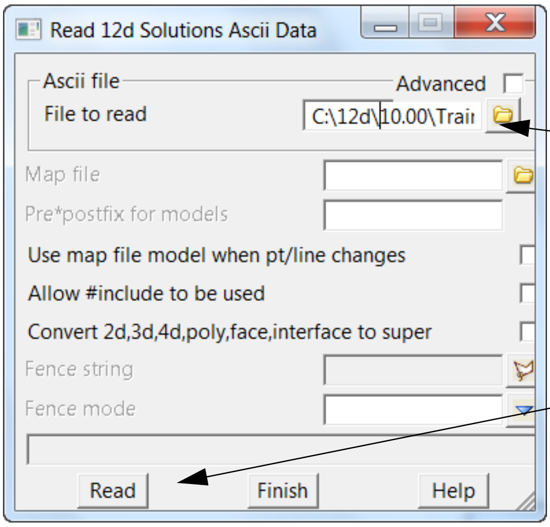
Dongle

Workspace

11.5.1 Import file

We will read road surface and strings from a 12d ascii file

Select option ***File I/O=>Data Input=>12da/4da data***



Ascii file

Advanced ☐

File to read: C:\12d\10.00\Trai

Map file

Pre*postfix for models

Use map file model when pt/line changes ☐

Allow #include to be used ☐

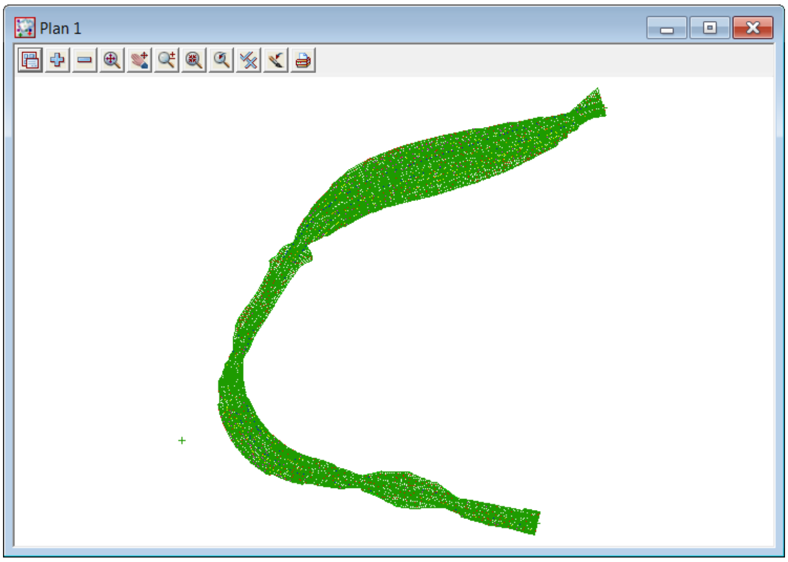
Convert 2d,3d,4d,poly,face,interface to super ☐

Fence string

Fence mode

Browse to the folder **C:\12d\10.00\Training\survey\setout** and select the file **ROAD SETOUT.12da**

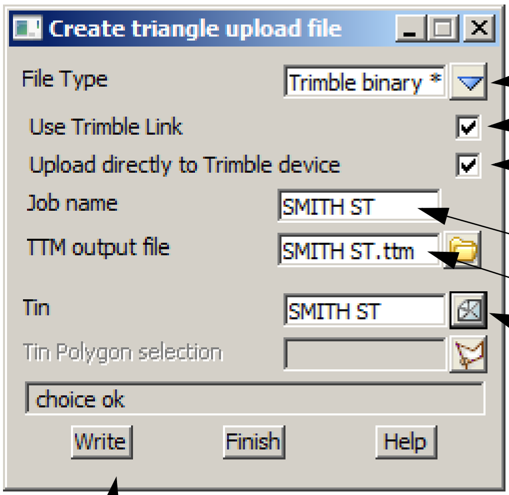
Select **Read**



11.5.2 Create upload file of the triangles

The triangles can be written to an upload file. We will use the option to upload the triangles to the Trimble instrument

Select option ***Survey=>Upload=>Create triangle upload file***



File Type: Trimble binary *

Use Trimble Link ☑

Upload directly to Trimble device ☑

Job name: SMITH ST

TTM output file: SMITH ST.ttm

Tin: SMITH ST

Tin Polygon selection:

choice ok

Select **File Type** choice icon

Select **Trimble binary *.ttm**

Tick the check box to **Use Trimble Link**

Tick the check box to **Upload direct to Trimble Device**

Note: Trimble Link has to be installed to use this option

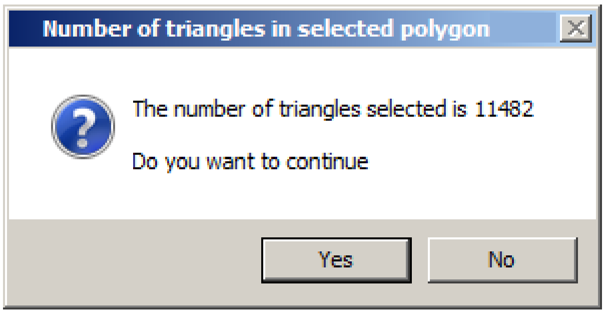
Type in a job name for the tin

Type in a file name

Select the tin **SMITH ST**

Select **Write** to create the file

The number of triangles selected are displayed

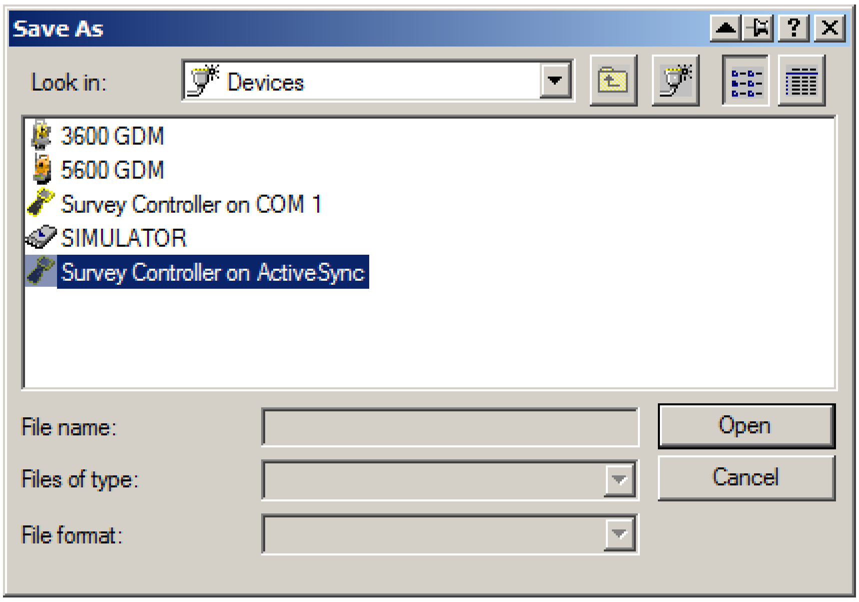


The number of triangles selected is 11482

Do you want to continue

Select **Yes** to continue

The file is created


Save As
Open
Cancel

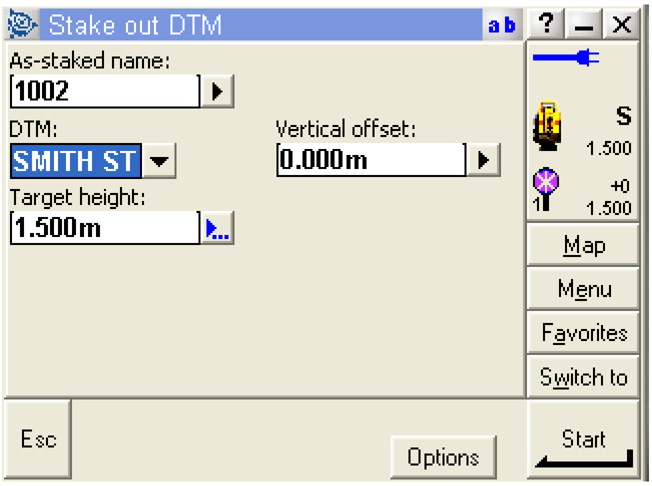
Look in: Devices

3600 GDM
5600 GDM
Survey Controller on COM 1
SIMULATOR
Survey Controller on ActiveSync

File name:
Files of type:
File format:

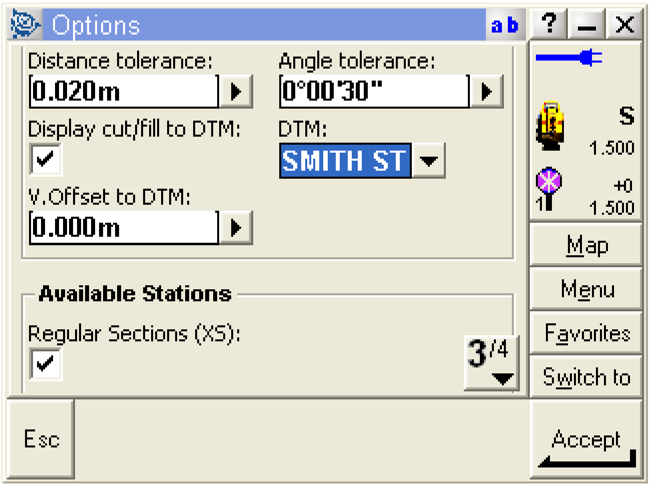
The device can be selected for uploading

Once uploaded to the instrument the tin can be used in setout options


Stake out DTM
S
1.500
+0
1.500
Map
Menu
Favorites
Switch to
Esc
Options
Start

As-staked name: 1002
DTM: SMITH ST
Vertical offset: 0.000m
Target height: 1.500m

Triangulation setout


Options
S
1.500
+0
1.500
Map
Menu
Favorites
Switch to
Available Stations
3/4
Esc
Accept

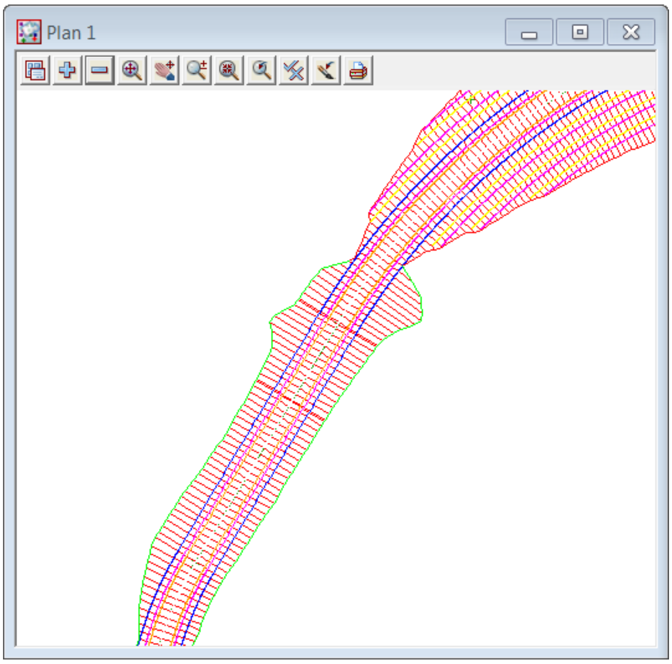
Distance tolerance: 0.020m
Angle tolerance: 0°00'30"
Display cut/fill to DTM: ☑
DTM: SMITH ST
V.Offset to DTM: 0.000m
Regular Sections (XS): ☑

Road setout with tin used for heights

11.6 Road Setout

In this topic we will create an upload file of the horizontal and vertical alignment along with the strings or cross sections. We will use the previous Project otherwise create a new project and read in the ascii file described in the previous chapter

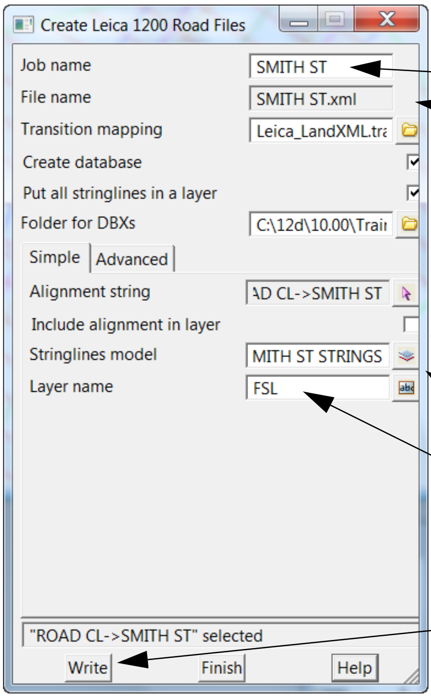
Turn off the model **tin SMITH ST**
then turn on models **SMITH ST SECTIONS** and **SMITH STRINGS** on the road models



11.6.1 Create upload file of road alignment for Leica 1200

The Leica 1200 Road Runner program can accept the alignment and strings for a road setout

Select option ***Survey=>Leica=>1200=>Roads***



Job name SMITH ST
File name SMITH ST.xml
Transition mapping Leica_LandXML.tra
Create database ☑
Put all stringlines in a layer ☑
Folder for DBXs C:\12d\10.00\Trair

Alignment string \D CL->SMITH ST
Include alignment in layer ☐
Stringlines model MITH ST STRINGS
Layer name FSL

"ROAD CL->SMITH ST" selected

Type in **SMITH ST** as job name

The file **SMITH ST.xml** will be created along with the database files

Tick the check box to **Create database**

The road will be a simple one with only the finished surface layer to be uploaded

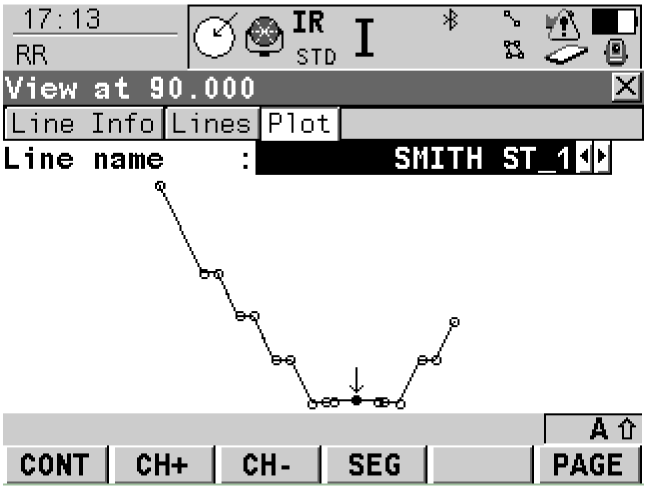
Pick the Alignment string icon then select the alignment string.

There is a string at the crown so the alignment won't be used in the layer

Select the model of the strings

Type in layer name FSL

Select **Write**



View at 90.000

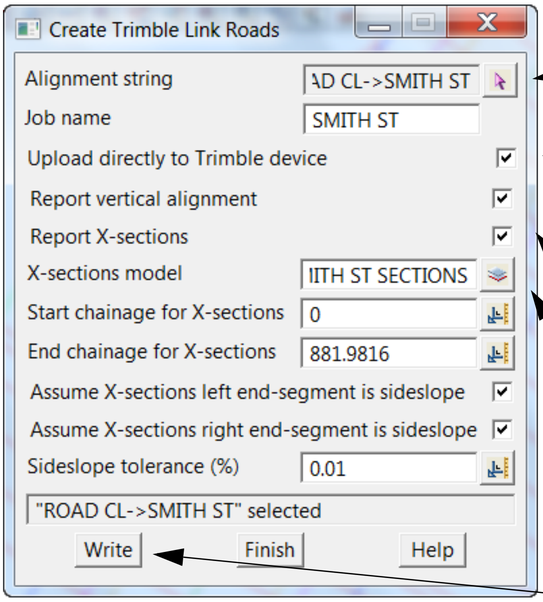
Line name : SMITH ST_1

On board the Leica the strings are cut at the required chainage and a section can be viewed

11.6.2 Create upload file of road alignment for Trimble

The Trimble instruments can accept the alignment and sections for a road setout

Select option ***Survey=>Trimble=> Trimble link road***



Alignment string: ᐱD CL->SMITH ST
Job name: SMITH ST
Upload directly to Trimble device ☑
Report vertical alignment ☑
Report X-sections ☑
X-sections model: IITH ST SECTIONS
Start chainage for X-sections: 0
End chainage for X-sections: 881.9816
Assume X-sections left end-segment is sideslope ☑
Assume X-sections right end-segment is sideslope ☑
Sideslope tolerance (%): 0.01
"ROAD CL->SMITH ST" selected

Select the **Alignment** pick icon then select the alignment string

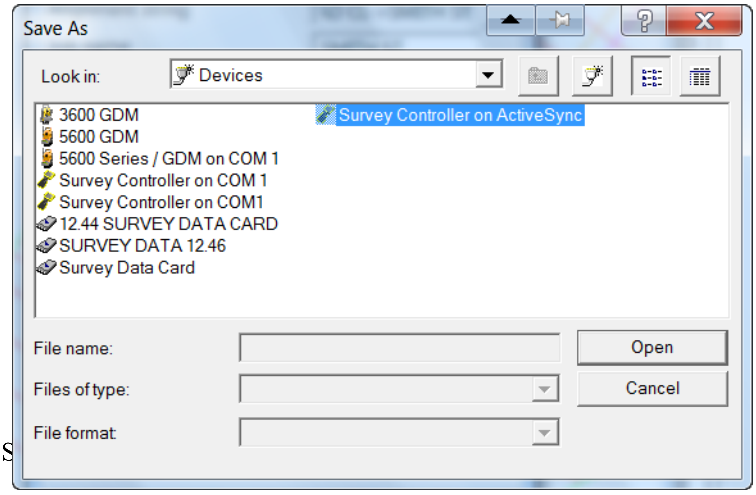
Tick the check box to **Upload direct to Trimble Device**

Note: Trimble Link has to be installed to use this option

Tick the check box to **Report vertical alignment** and to **Report X-sections**

Select **SMITH ST SECTIONS** for the section model

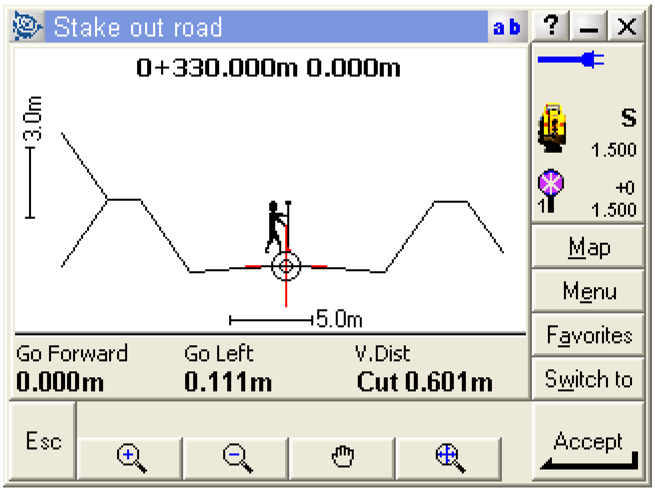
Select **Write**


Save As
Look in:
Devices
File name:
Files of type:
File format
Open
Cancel

3600 GDM
5600 GDM
5600 Series / GDM on COM 1
Survey Controller on COM 1
Survey Controller on COM1
12.44 SURVEY DATA CARD
SURVEY DATA 12.46
Survey Data Card
Survey Controller on ActiveSync

S

The device can be selected for uploading


Stake out road
a b
3.0m
5.0m
S
1.500
+0
1.500
Map
Menu
Favorites
Switch to
Esc
Accept

0+330.000m 0.000m

Go Forward 0.000m
Go Left 0.111m
V.Dist Cut 0.601m

On board the Trimble the road sections can be setout

11.7 Setout reports

The final position of the Setout points can be checked against the design in a number of ways

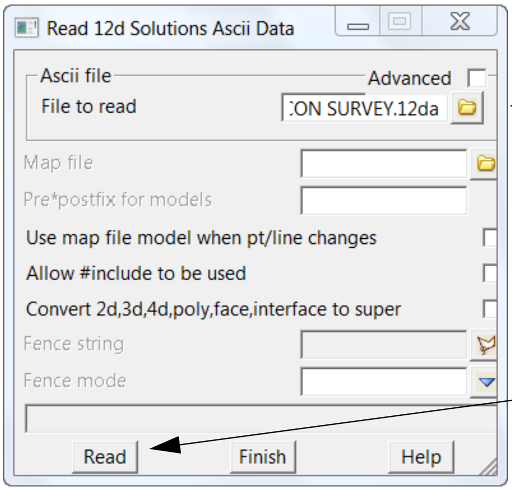
We will look at three ways

11.7.1 Read in Ascon survey

We will read in an ascii file of the ascon survey. The file also contains some design positions of light poles

Turn off all of the models in plan view 1 prior loading in the file

Select option ***File I/O=>Data Input=>12da/4da data***



Read 12d Solutions Ascii Data

Ascii file

Advanced ☐

File to read :ON SURVEY.12da

Map file

Pre*postfix for models

Use map file model when pt/line changes ☐

Allow #include to be used ☐

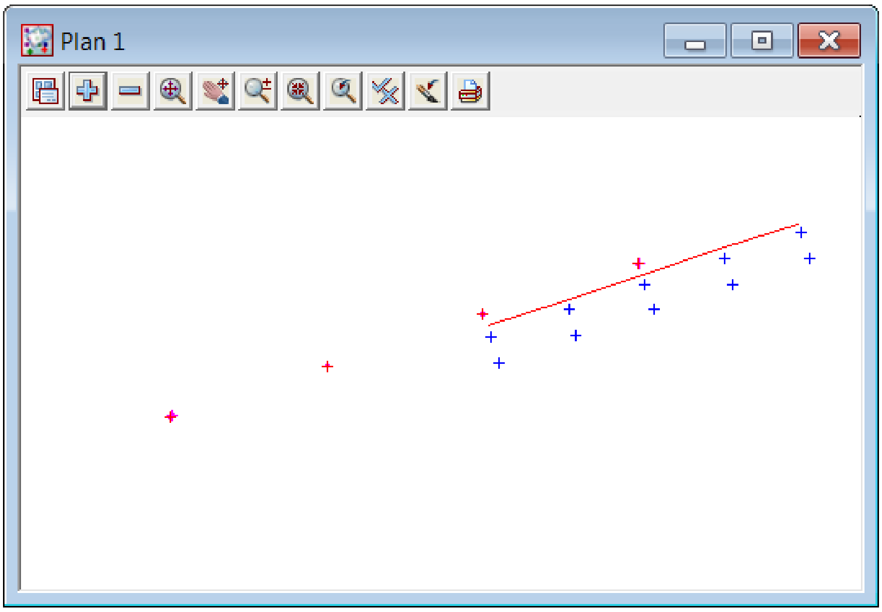
Convert 2d,3d,4d,poly,face,interface to super ☐

Fence string

Fence mode

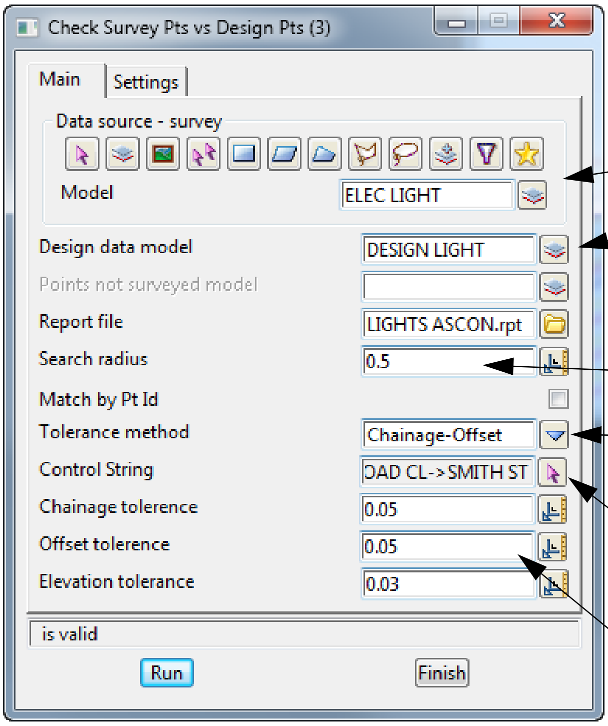
Browse to the folder **C:\12d\10.00\Training\survey\setout** and select the file **ROAD ASCON SURVEY.12da**

Select **Read**



11.7.2 Calculate the differences between the design and as constructed data

Select option ***Report=>QA Reports=>Check survey points vs design points***



Model	ELEC LIGHT
Design data model	DESIGN LIGHT
Points not surveyed model	
Report file	LIGHTS ASCON.rpt
Search radius	0.5
Match by Pt Id	☐
Tolerance method	Chainage-Offset
Control String	OAD CL->SMITH ST
Chainage tolerence	0.05
Offset tolerence	0.05
Elevation tolerance	0.03

is valid

Select the model **ELEC LIGHT** for the survey model

Select the model **DESIGN LIGHT** for the design data

Type in report name **LIGHTS ASCON**

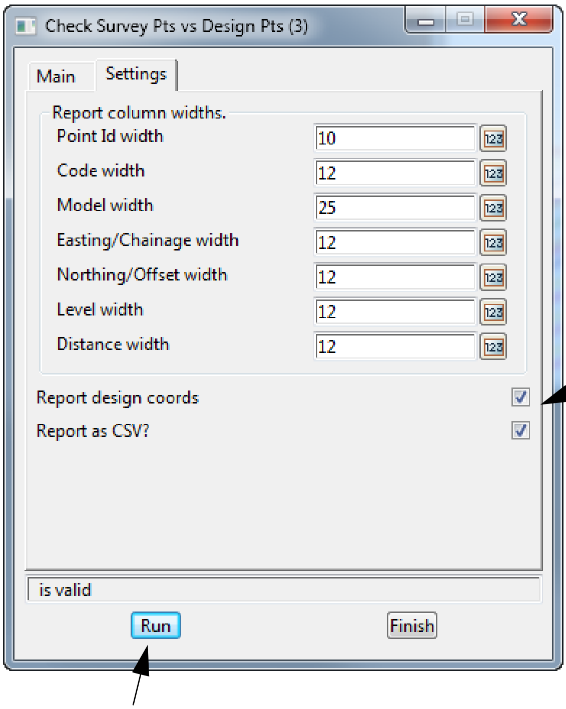
Type in distance from the design point to look for a corresponding as-constructed point

Select **Chainage-Offset** as the tolerance method

Select the **Chainage String** button then select the alignment string to report the chainages and offsets from

Type in the tolerances in chainage, offset and elevation

Select the **Settings** tab



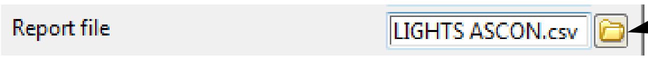
Report column widths.

Point Id width	10
Code width	12
Model width	25
Easting/Chainage width	12
Northing/Offset width	12
Level width	12
Distance width	12
Report design coords	☑
Report as CSV?	☑

is valid

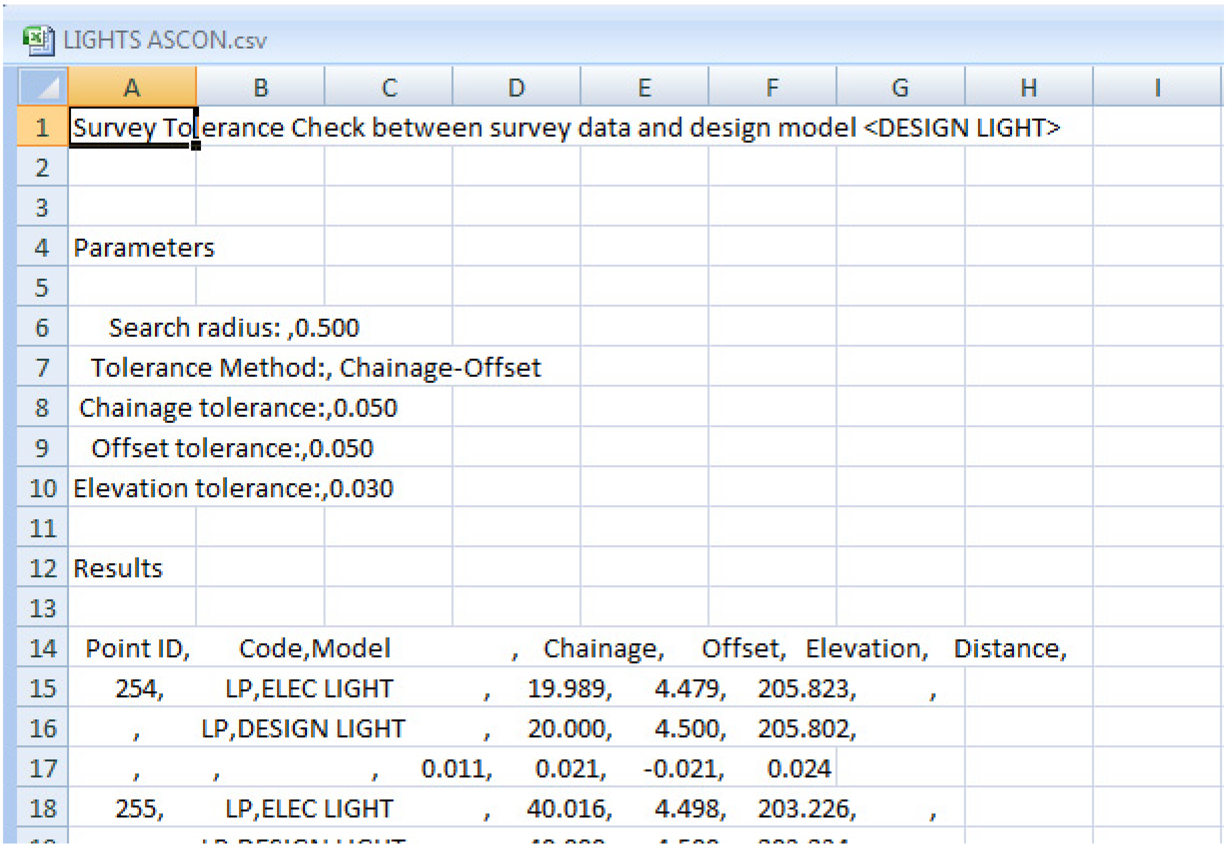
Tick both boxes to Report design coords and report as csv file

Select **Run**



Report file LIGHTS ASCON.csv

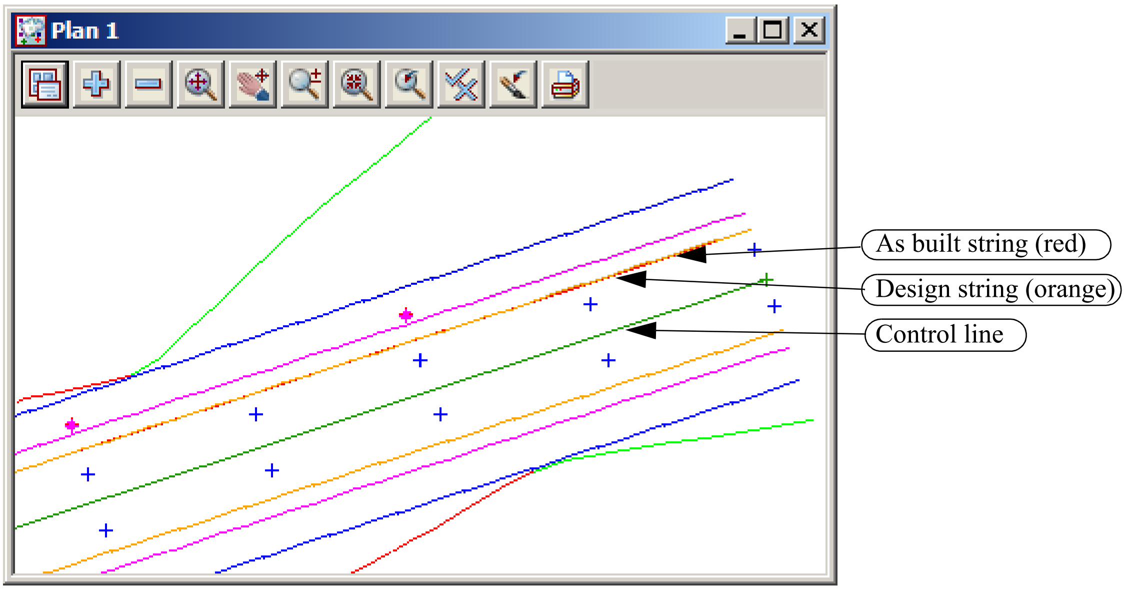
Return to the Main tab and open the report file



LIGHTS ASCON.csv

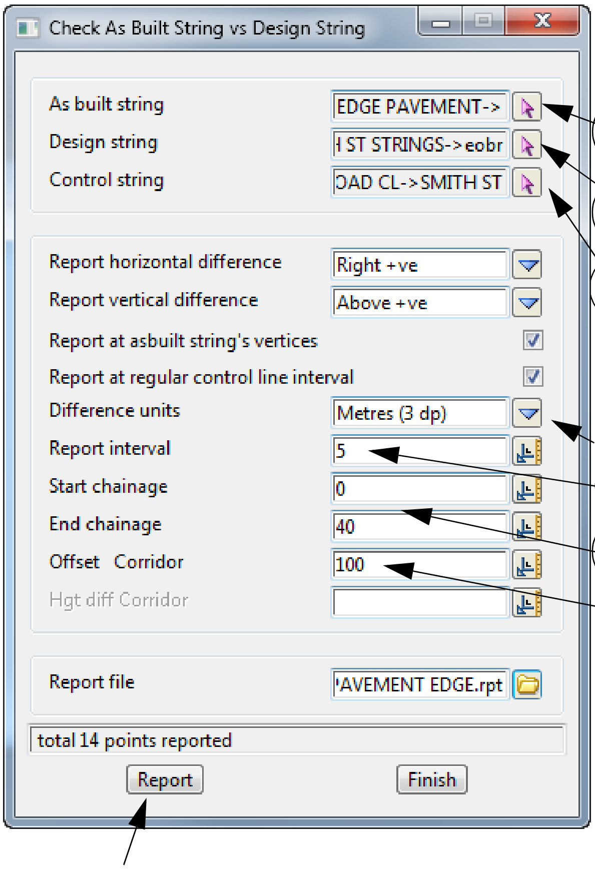
	A
1	Survey Tolerance Check between survey data and design model <DESIGN LIGHT>
2	
3	
4	Parameters
5	
6	Search radius: ,0.500
7	Tolerance Method:, Chainage-Offset
8	Chainage tolerance:,0.050
9	Offset tolerance:,0.050
10	Elevation tolerance:,0.030
11	
12	Results
13	
14	Point ID, Code,Model , Chainage, Offset, Elevation, Distance,
15	254, LP,ELEC LIGHT , 19.989, 4.479, 205.823, ,
16	, LP,DESIGN LIGHT , 20.000, 4.500, 205.802,
17	, , , 0.011, 0.021, -0.021, 0.024
18	255, LP,ELEC LIGHT , 40.016, 4.498, 203.226, ,

11.7.3 Check asbuilt strings against design strings



Calculate the difference between the ascon string and the design string

Select option ***Report=>QA Reports=>Check asbuilt string vs design string***



Check As Built String vs Design String

As built string: EDGE PAVEMENT->

Design string: H ST STRINGS->eobr

Control string: OAD CL->SMITH ST

Report horizontal difference: Right +ve

Report vertical difference: Above +ve

Report at asbuilt string's vertices ☑

Report at regular control line interval ☑

Difference units: Metres (3 dp)

Report interval: 5

Start chainage: 0

End chainage: 40

Offset Corridor: 100

Hgt diff Corridor:

Report file: 'AVEMENT EDGE.rpt

total 14 points reported

Select **As built string** button then pick and accept the red ascon string

Select **Design string** button then pick and accept the design orange string

Select **Control string** button then pick and accept the alignment string

Leave the reporting differences as shown

Tick all of the check boxes

Set the difference units to **Metres (3dp)**

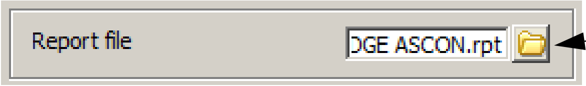
Type in **5** for the report interval

The start chainage is kept as **0** but the end chainage is changed to **40**

Type in 100 (mm) for the range to check

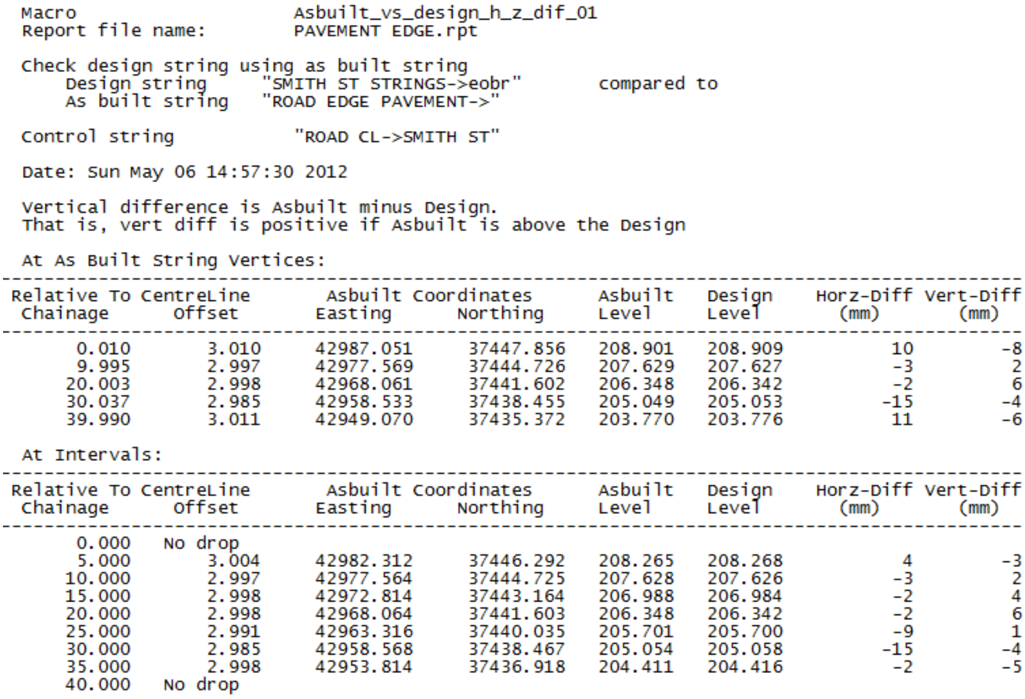
Type in report name **PAVEMENT EDGE ASCON**

Select **Report**



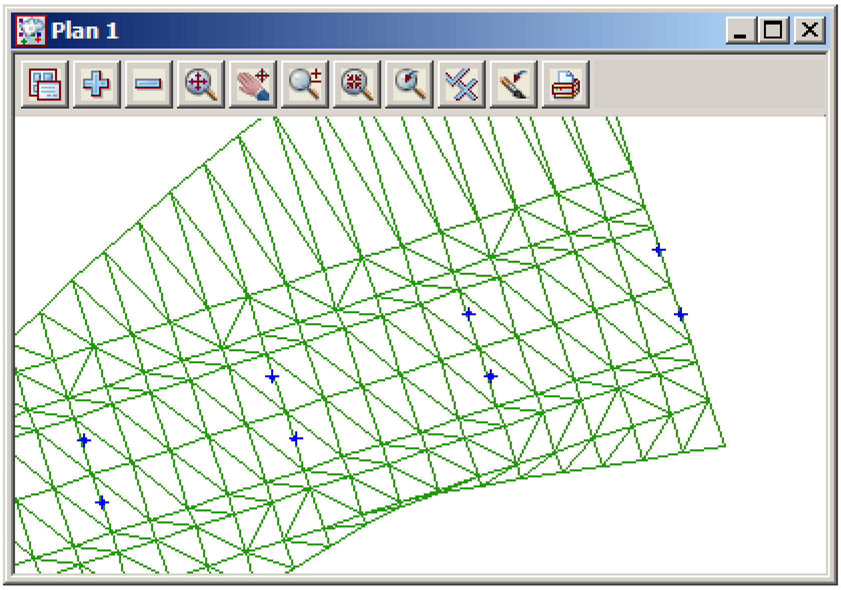
Report file: DGE ASCON.rpt

Open the report file



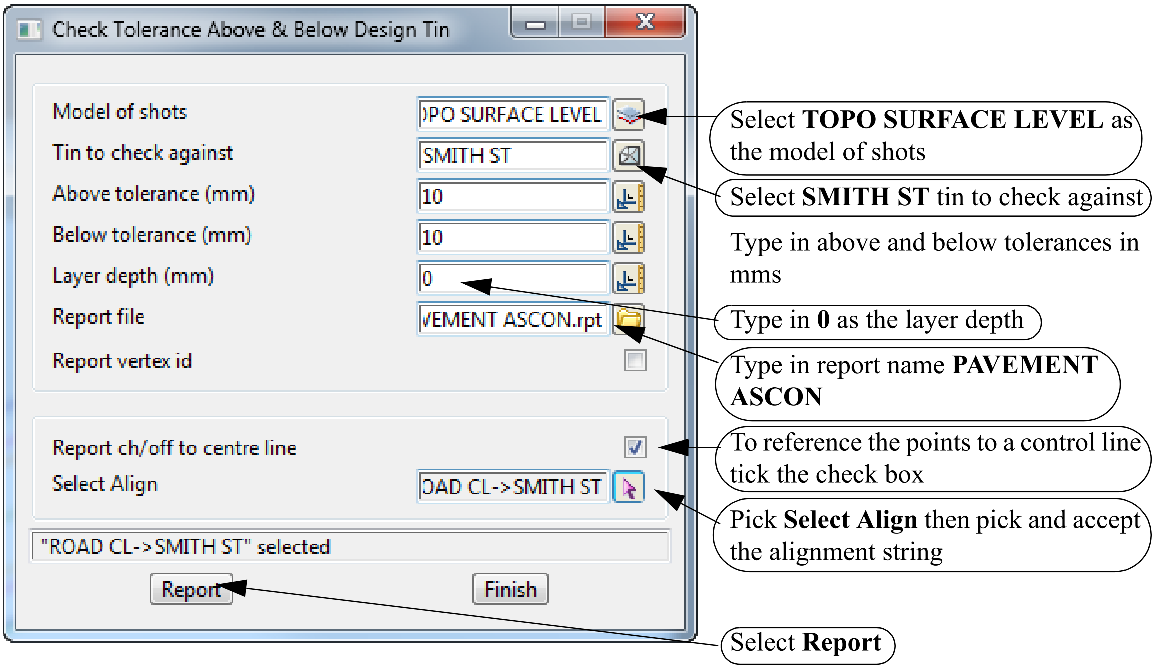
```
Macro                       Asbuilt_vs_design_h_z_dif_01
Report file name:           PAVEMENT EDGE.rpt

Check design string using as built string
    Design string      "SMITH ST STRINGS->eobr"      compared to
    As built string    "ROAD EDGE PAVEMENT->"

Control string              "ROAD CL->SMITH ST"

Date: Sun May 06 14:57:30 2012

Vertical difference is Asbuilt minus Design.
That is, vert diff is positive if Asbuilt is above the Design

At As Built String Vertices:
-----------------------------------------------------------------------------------------------
 Relative To CentreLine       Asbuilt Coordinates       Asbuilt    Design     Horz-Diff Vert-Diff
  Chainage       Offset      Easting        Northing    Level      Level        (mm)       (mm)
-----------------------------------------------------------------------------------------------
      0.010        3.010     42987.051     37447.856   208.901    208.909          10         -8
      9.995        2.997     42977.569     37444.726   207.629    207.627          -3          2
     20.003        2.998     42968.061     37441.602   206.348    206.342          -2          6
     30.037        2.985     42958.533     37438.455   205.049    205.053         -15         -4
     39.990        3.011     42949.070     37435.372   203.770    203.776          11         -6

At Intervals:
-----------------------------------------------------------------------------------------------
 Relative To CentreLine       Asbuilt Coordinates       Asbuilt    Design     Horz-Diff Vert-Diff
  Chainage       Offset      Easting        Northing    Level      Level        (mm)       (mm)
-----------------------------------------------------------------------------------------------
      0.000    No drop
      5.000        3.004     42982.312     37446.292   208.265    208.268           4         -3
     10.000        2.997     42977.564     37444.725   207.628    207.626          -3          2
     15.000        2.998     42972.814     37443.164   206.988    206.984          -2          4
     20.000        2.998     42968.064     37441.603   206.348    206.342          -2          6
     25.000        2.991     42963.316     37440.035   205.701    205.700          -9          1
     30.000        2.985     42958.568     37438.467   205.054    205.058         -15         -4
     35.000        2.998     42953.814     37436.918   204.411    204.416          -2         -5
     40.000    No drop
```

11.7.4 Check as constructed points against the design tin



Calculate the difference between the ascon points and the design tin

Select option ***Report=>QA Reports=>Check points vs tin***



Model of shots:)PO SURFACE LEVEL
Tin to check against: SMITH ST
Above tolerance (mm): 10
Below tolerance (mm): 10
Layer depth (mm): 0
Report file: VEMENT ASCON.rpt
Report vertex id ☐
Report ch/off to centre line ☑
Select Align: OAD CL->SMITH ST
"ROAD CL->SMITH ST" selected

Select **TOPO SURFACE LEVEL** as the model of shots

Select **SMITH ST** tin to check against

Type in above and below tolerances in mms

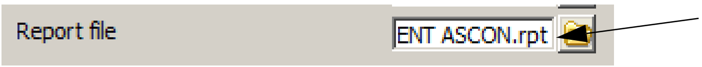
Type in **0** as the layer depth

Type in report name **PAVEMENT ASCON**

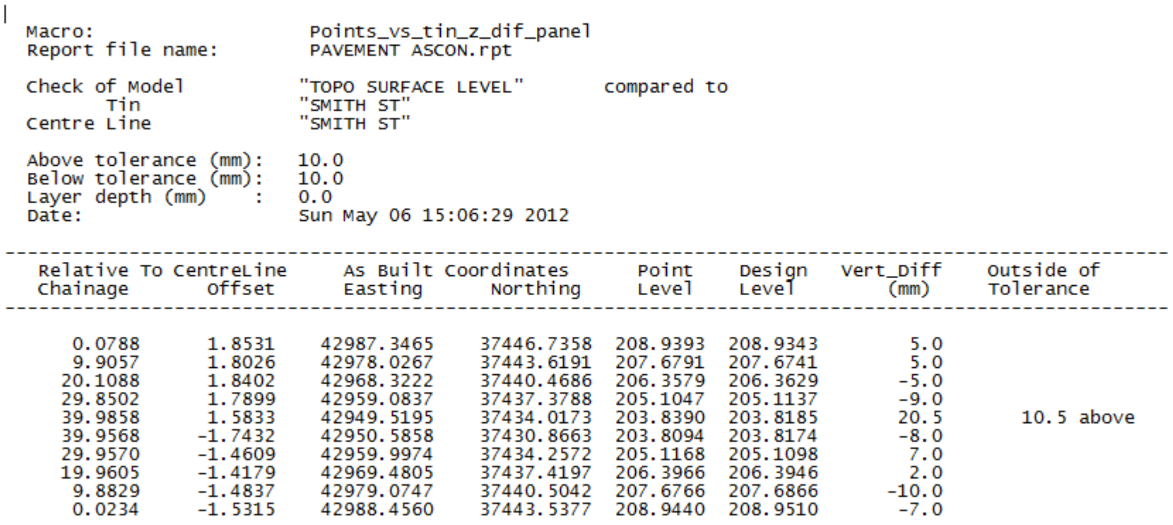
To reference the points to a control line tick the check box

Pick **Select Align** then pick and accept the alignment string

Select **Report**


Report file: ENT ASCON.rpt

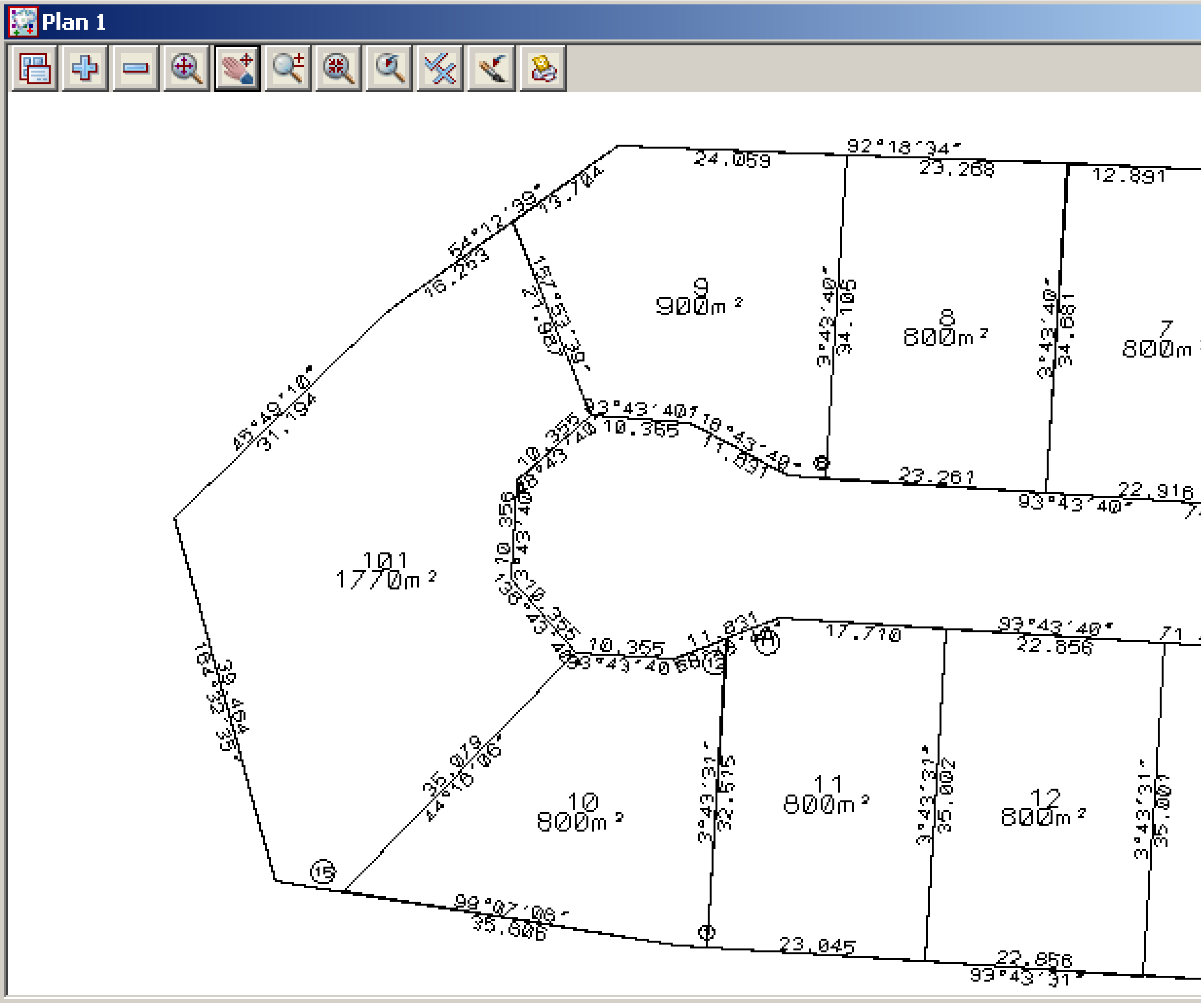
Open the report file



```
Macro:                      Points_vs_tin_z_dif_panel
Report file name:           PAVEMENT ASCON.rpt

Check of Model             "TOPO SURFACE LEVEL"       compared to
       Tin                 "SMITH ST"
Centre Line                "SMITH ST"

Above tolerance (mm):      10.0
Below tolerance (mm):      10.0
Layer depth (mm)     :     0.0
Date:                      Sun May 06 15:06:29 2012

---------------------------------------------------------------------------------------------------------
   Relative To CentreLine      As Built Coordinates       Point     Design    Vert_Diff    Outside of
   Chainage        Offset      Easting      Northing      Level     Level         (mm)     Tolerance
---------------------------------------------------------------------------------------------------------

      0.0788       1.8531    42987.3465    37446.7358  208.9393  208.9343          5.0
      9.9057       1.8026    42978.0267    37443.6191  207.6791  207.6741          5.0
     20.1088       1.8402    42968.3222    37440.4686  206.3579  206.3629         -5.0
     29.8502       1.7899    42959.0837    37437.3788  205.1047  205.1137         -9.0
     39.9858       1.5833    42949.5195    37434.0173  203.8390  203.8185         20.5         10.5 above
     39.9568      -1.7432    42950.5858    37430.8663  203.8094  203.8174         -8.0
     29.9570      -1.4609    42959.9974    37434.2572  205.1168  205.1098          7.0
     19.9605      -1.4179    42969.4805    37437.4197  206.3966  206.3946          2.0
      9.8829      -1.4837    42979.0747    37440.5042  207.6766  207.6866        -10.0
      0.0234      -1.5315    42988.4560    37443.5377  208.9440  208.9510         -7.0
```

12 Subdivision Design

In this exercise we will create a subdivision using a defined outline and explore the various options involved in creating and reporting lot layouts

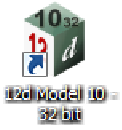

Plan 1
24.059
92°18'34"
23.268
12.891
54°12'39"
13.704
16.253
9
900m²
3°43'40"
34.105
8
800m²
3°43'40"
34.681
7
800m
45°49'10"
31.194
10.365
11.831
23.261
22.916
93°43'40"
101
1770m²
10.356
17.710
93°43'40"
22.856
10.355
11.831
184°32'35"
30.464
35.079
44°16'06"
10
800m²
3°43'31"
32.515
11
800m²
3°43'31"
35.002
12
800m²
3°43'31"
35.001
99°07'08"
35.806
23.045
22.856
93°43'31"

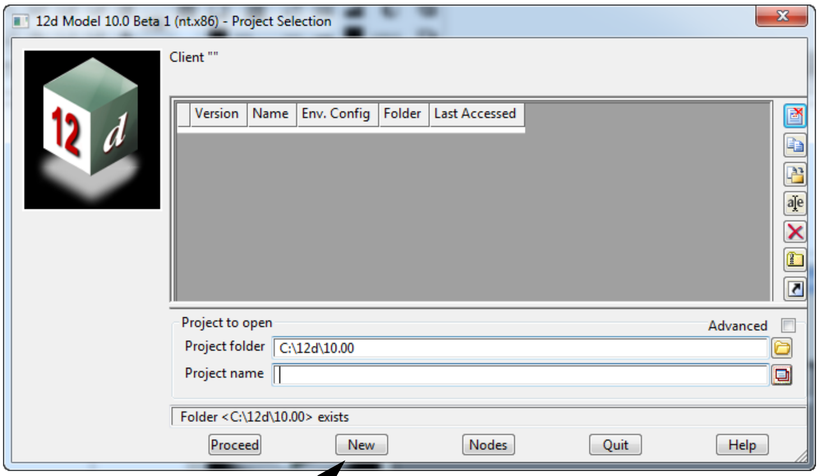
12.1 Setting up a New Project

In this topic we will create a lot outline and position a building on the lot for setout.

To begin create a new project called **SUBDIVISION** in the Survey training area

First, double click on the *12d Model 10* icon to bring up the **Project Selection** panel.




12d Model 10.0 Beta 1 (nt.x86) - Project Selection

Client ""

Version	Name	Env. Config	Folder	Last Accessed

Project to open

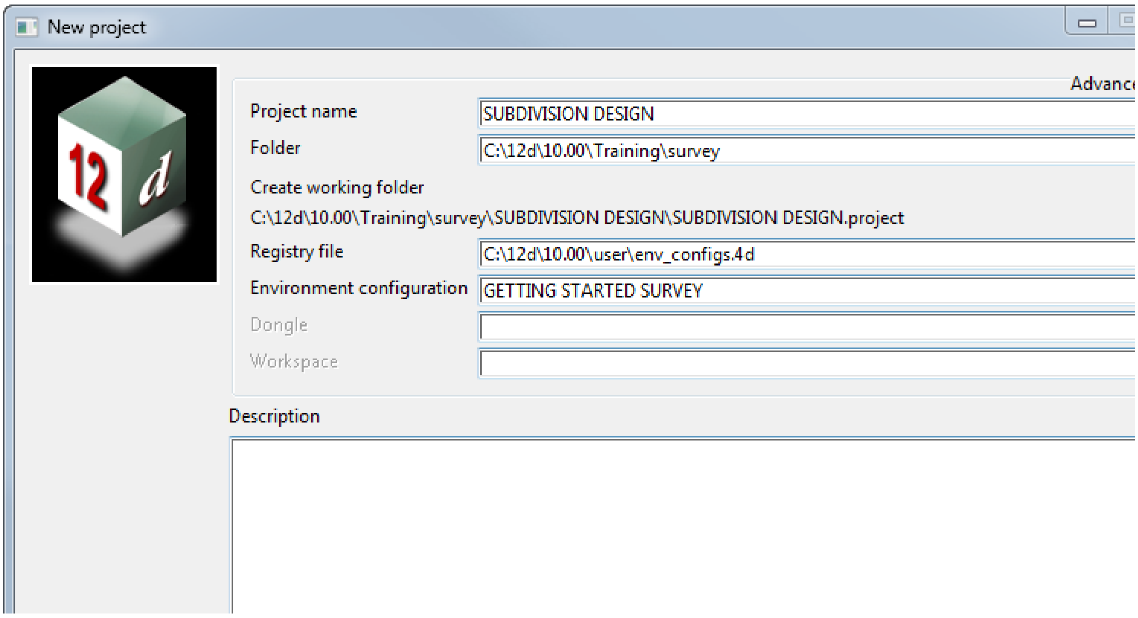
Advanced ☐

Project folder: C:\12d\10.00

Project name:

Folder <C:\12d\10.00> exists

Select **New** button to bring up the **New project** panel.


New project

Advance

Project name: SUBDIVISION DESIGN

Folder: C:\12d\10.00\Training\survey

Create working folder

C:\12d\10.00\Training\survey\SUBDIVISION DESIGN\SUBDIVISION DESIGN.project

Registry file: C:\12d\10.00\user\env_configs.4d

Environment configuration: GETTING STARTED SURVEY

Dongle:

Workspace:

Description

Create a project under the folder **C:\12d\10.00\Training\survey\** called **SUBDIVISION DESIGN**

With the ***Create working folder*** check box ticked a working folder with the same name as the project will be also created

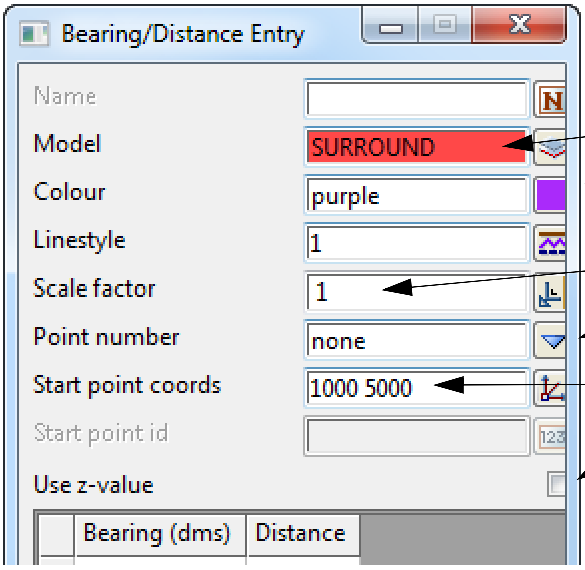
Select the Environment configuration **Configurations=>GETTING STARTED SURVEY** which is the one we set up in the previous chapters. If you have gone straight to this chapter you will have to follow the steps in chapter 9.2 to edit the Registry file

Select **[Create]** to create and open the project

12.2 Create the surrounding boundary

We will firstly create the string around the edge of the subdivision

Select option ***Survey=>Extras=>Bearing/Distance Entry***



Name	
Model	SURROUND
Colour	purple
Linestyle	1
Scale factor	1
Point number	none
Start point coords	1000 5000
Start point id	
Use z-value	☐

	Bearing (dms)	Distance

Type in a model name **SURROUND**

Select the colour **purple**

Select linestyle **1**

Type in Scale Factor **1**

We will not be using point numbers so select **none**

Type in start co-ordinates **1000 5000**

We will not be using heights so untick the check box

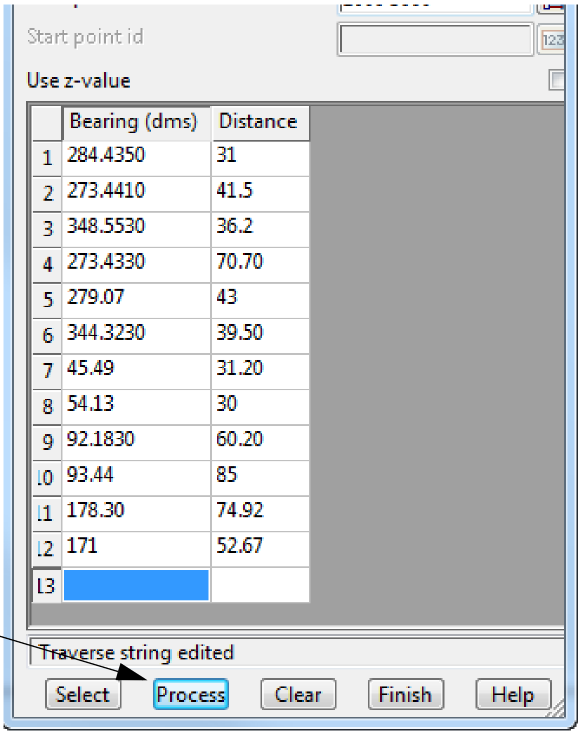
We are now able to type in the bearing and distances around the edge of the boundary

Type in the bearing and distance of the string around the surround boundary

Select the **Enter** or **Tab** key to move between cells.

After typing in the distance press **Enter** to create the next line

Use the bearing and distances as shown in the example on the right

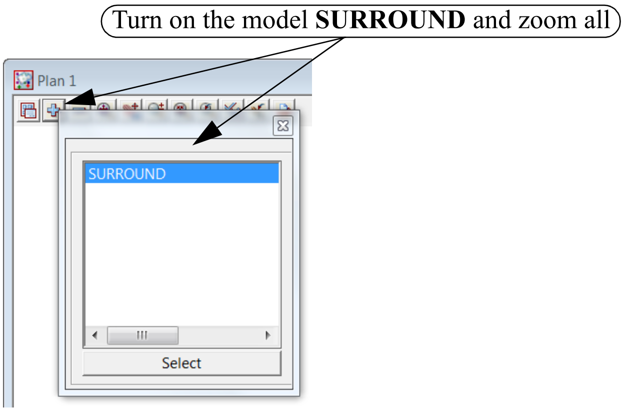


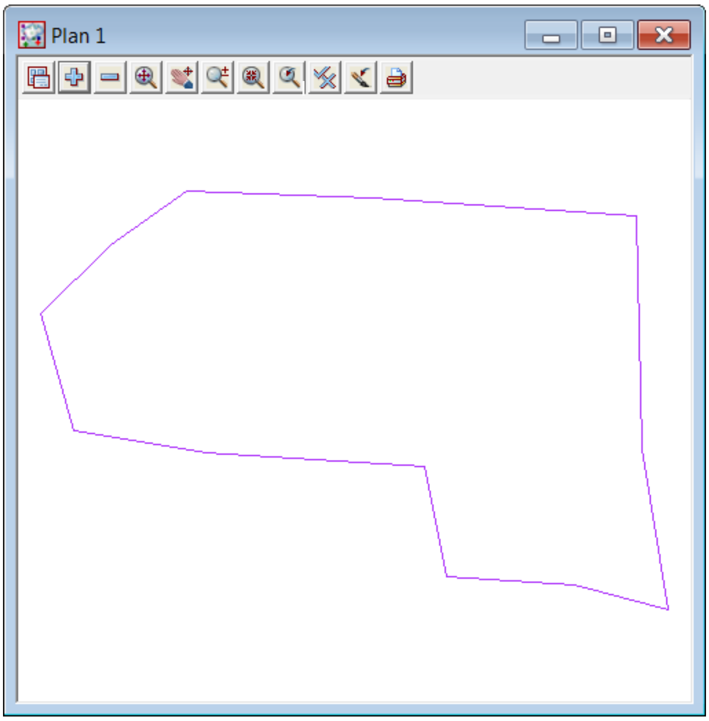
Start point id	
Use z-value	☐

	Bearing (dms)	Distance
1	284.4350	31
2	273.4410	41.5
3	348.5530	36.2
4	273.4330	70.70
5	279.07	43
6	344.3230	39.50
7	45.49	31.20
8	54.13	30
9	92.1830	60.20
10	93.44	85
11	178.30	74.92
12	171	52.67
13		

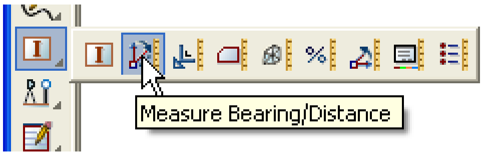
Traverse string edited

When all lines have been entered select **Process** then **Finish**

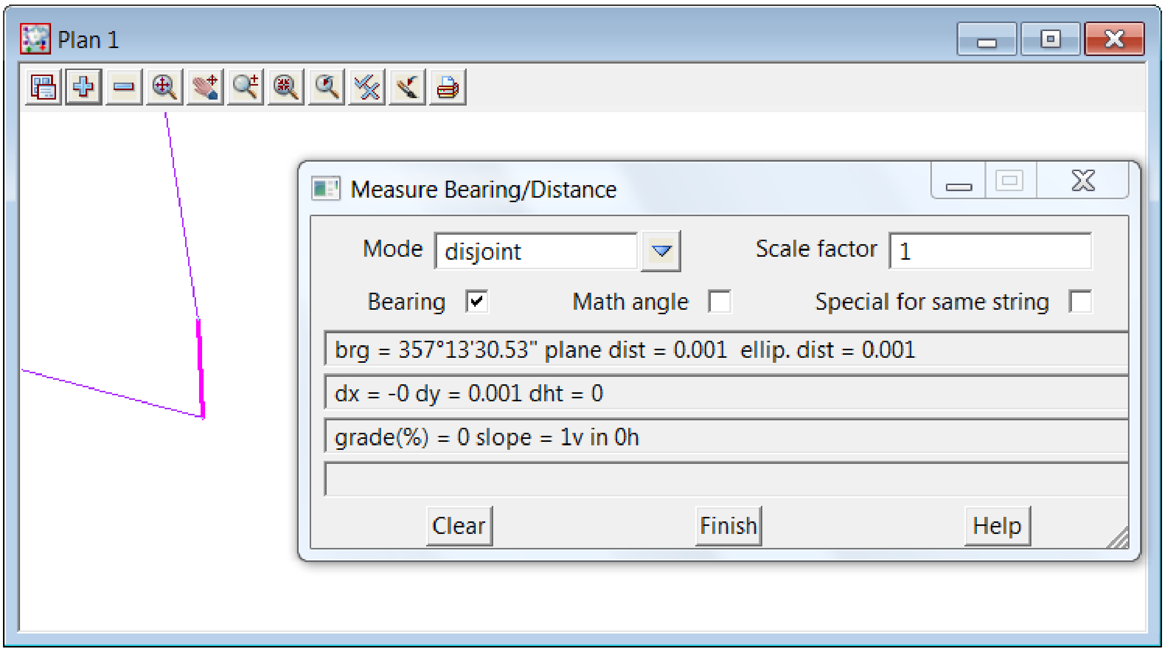

Turn on the model **SURROUND** and zoom all
Plan 1
SURROUND
Select



To check the distance between the start and end point select ***Utility=>Measure=>Bearing/Distance*** or **Measure Bearing/Distance** icon


Measure Bearing/Distance

Zoom in to the start point then select and accept the start and end point



Plan 1
Measure Bearing/Distance
Clear
Finish
Help

Mode disjoint

Scale factor 1

Bearing ☑ Math angle ☐ Special for same string ☐

brg = 357°13'30.53" plane dist = 0.001 ellip. dist = 0.001

dx = -0 dy = 0.001 dht = 0

grade(%) = 0 slope = 1v in 0h

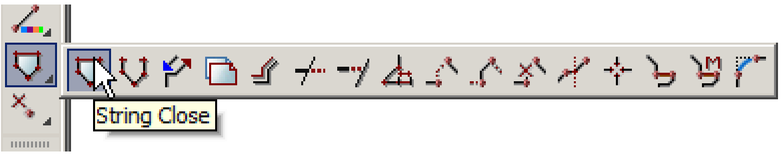
If an error is found the relevant line can be corrected in the **Bearing/Distance Entry** panel and re-processed

Select **Finish** to exit the panel

The string now needs to be closed to form a polygon

Select the option ***Strings=>Cad=>Change strings=>Close***

or **String Close** icon



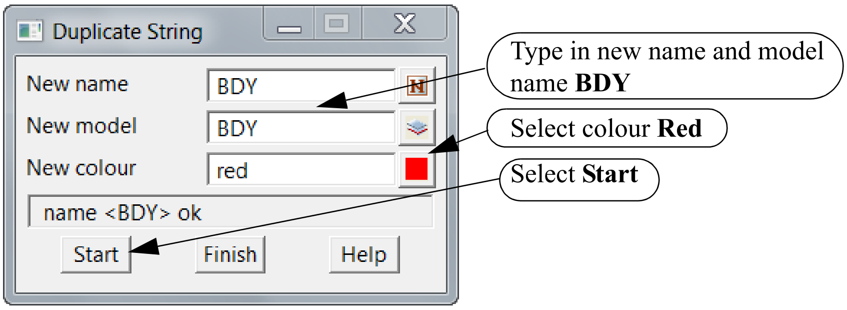
String Close

Select and accept the surround string

12.3 Duplicate the surround

The surround string is to be duplicated in a new model called **BDY**. This new model will be used in the subsequent lot calculations

Select ***Strings=>Strings Edit=>Duplicate***



Duplicate String
Start
Finish
Help

New name BDY

New model BDY

New colour red

name <BDY> ok

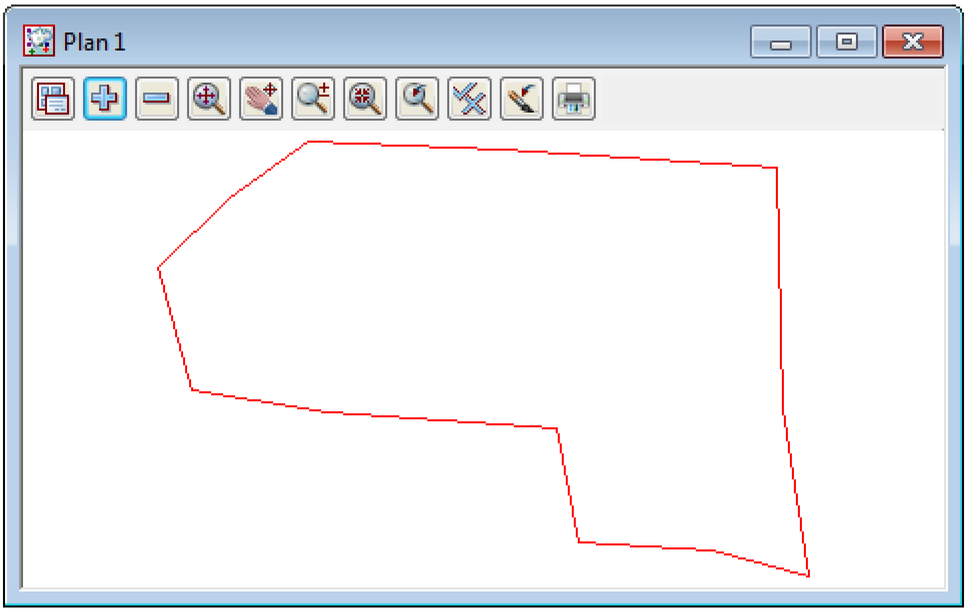
Type in new name and model name **BDY**

Select colour **Red**

Select **Start**

Select and accept anywhere on the surround string

Now turn off the model **SURROUND** and turn on model **BDY**

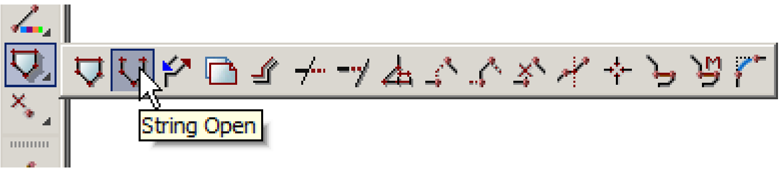


12.4 Open the Boundary string

To help with future calculations using the boundary string we open the string at this point.

Select option ***Strings=>Cad=>Change Strings=>Open***

or **Cad string open** icon

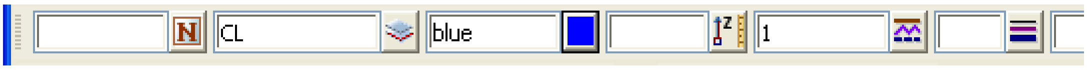


then pick and accept the boundary string

12.5 Create Road Centreline

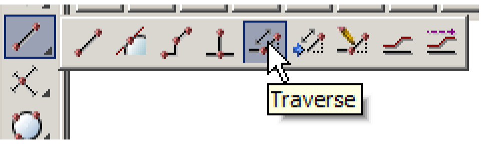
The centreline of the road reserve will now be created

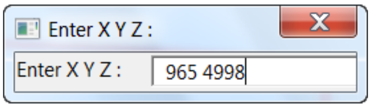
Type a new model name CL in the cad control bar and change the colour to **blue**



Select the option **Strings=>Cad=>Lines=>Traverse create**

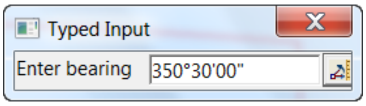
or **Traverse** icon





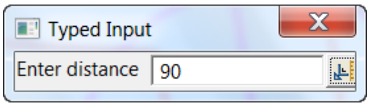
Enter X Y Z : 965 4998

Press the space bar then type in **965 (space) 4998 [Enter]**



Enter bearing 350°30'00"

Press the space bar then type in **350.30000 [Enter]**

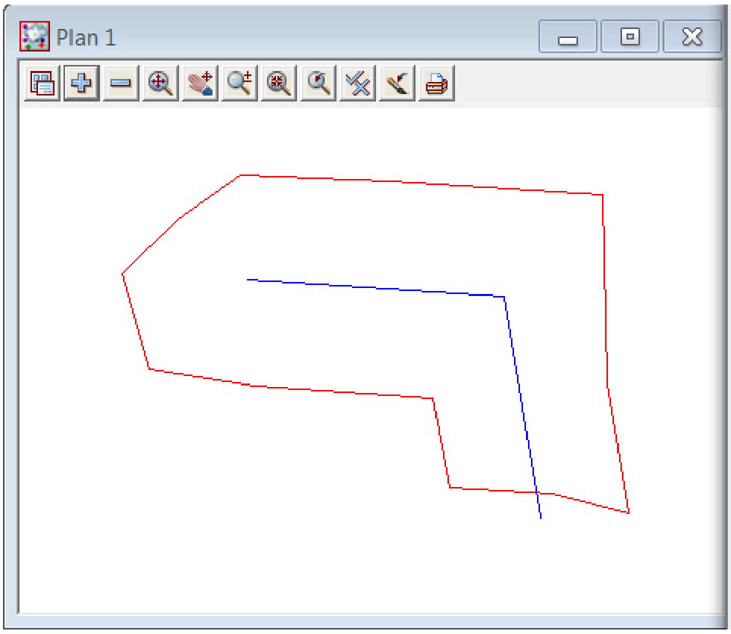


Enter distance 90

Press the space bar then type in distance **90 [Enter]**

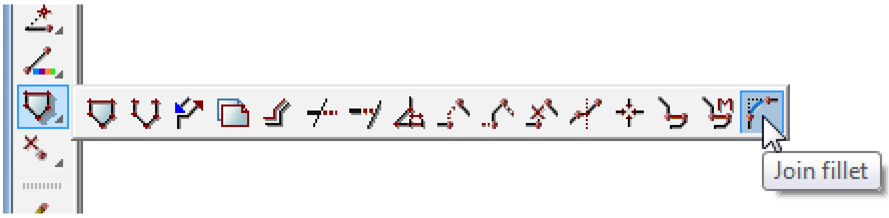
Type in the next bearing as **273.45 [Enter]** and the distance as **103 [Enter]**

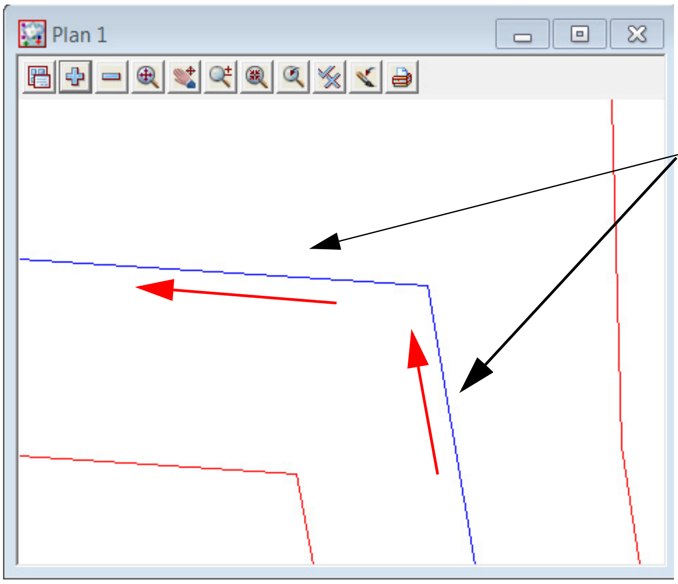
Press **[Esc]** key to exit the traverse entry



To insert a curve into the centreline string select option ***Strings=>Cad=>String=>Join fillet***

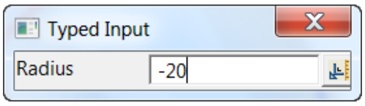
or select the **String Join fillet** icon



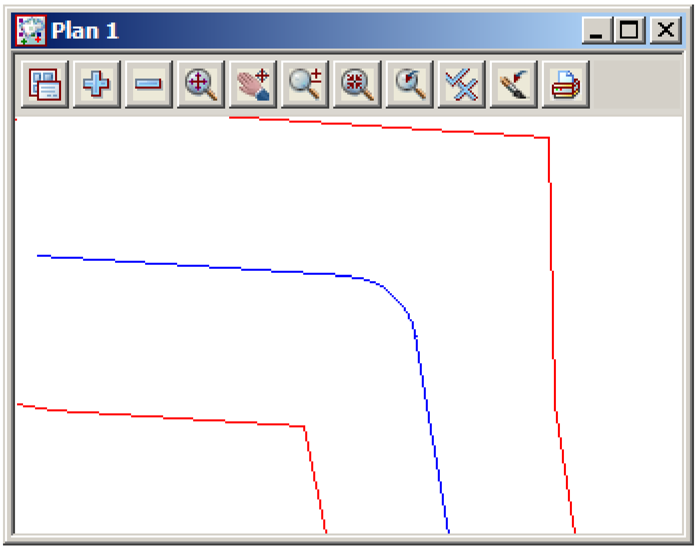


Select up the first straight with direction and accept. Pick along the second straight with direction and accept

Type in the radius **-20 [Enter]**


Typed Input

Radius -20



The curve is inserted

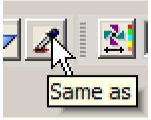
12.6 Create Road boundaries

12.6.1 Parallel centreline string

The road boundaries will be created parallel to the road centreline

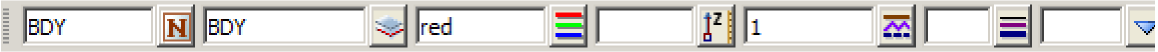
Set the name and model to **BDY** by matching an existing BDY **string**

Select the ***Same as*** icon

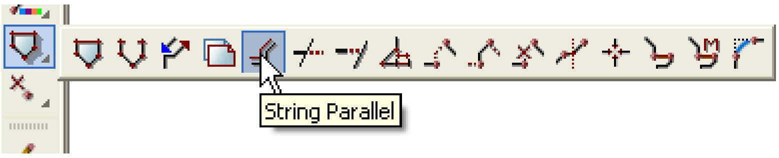


Pick and accept one of the boundary strings

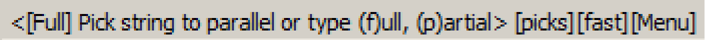
The cad control bar will self populate


BDY
BDY
red
1

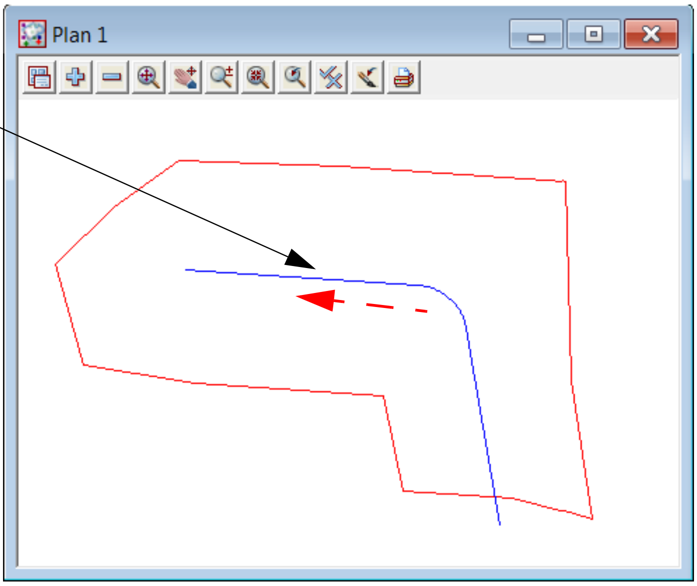
Select the **String parallel** icon

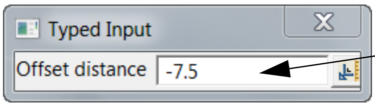


The default parallel type is full (f) parallel

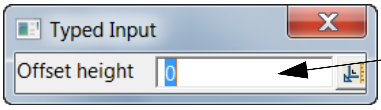

<[Full] Pick string to parallel or type (f)ull, (p)artial> [picks][fast][Menu]

Select the string with direction and accept




Typed Input
Offset distance -7.5

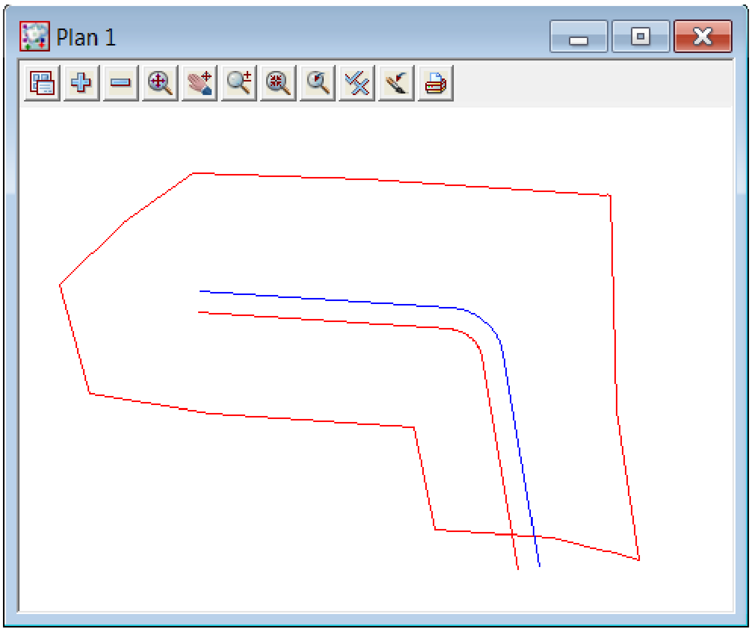
Type in the offset for the left as **-7.5 [Enter]**


Typed Input
Offset height 0

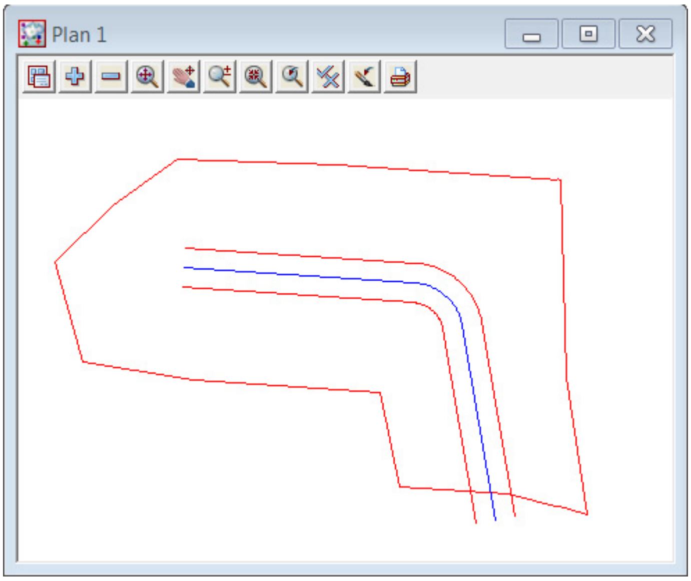
Type in the offset for the height as **0 [Enter]**

The centreline string is paralleled

Repeat this for the other side of the road using offset **7.5**

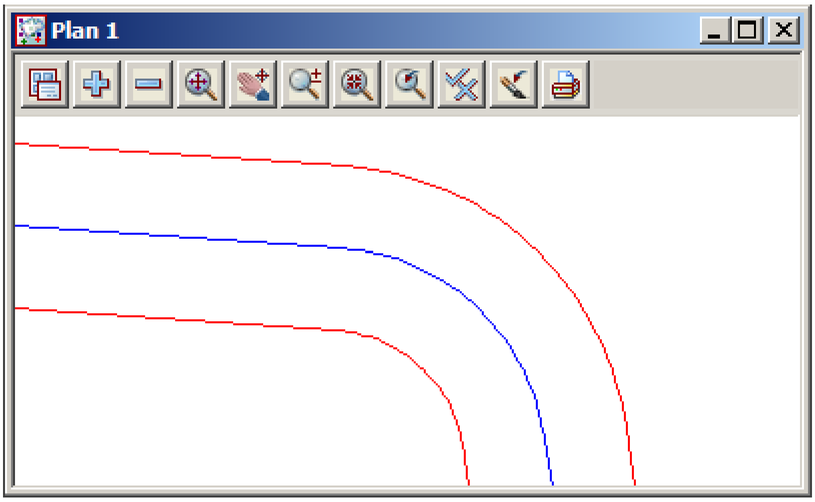


Both sides are paralleled

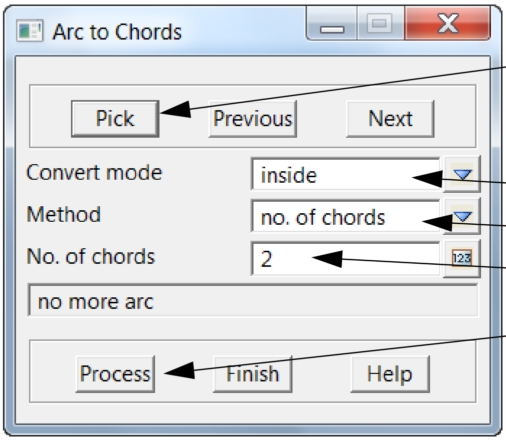


12.6.2 Convert arcs to chords

The arcs along the road boundary are to be converted to chords. These are created on the outside of the right hand curve and inside the left hand curve



Select the option ***Strings=>Strings Edit=>Arc to chords***



Convert mode: inside

Method: no. of chords

No. of chords: 2

no more arc

Select **Pick**

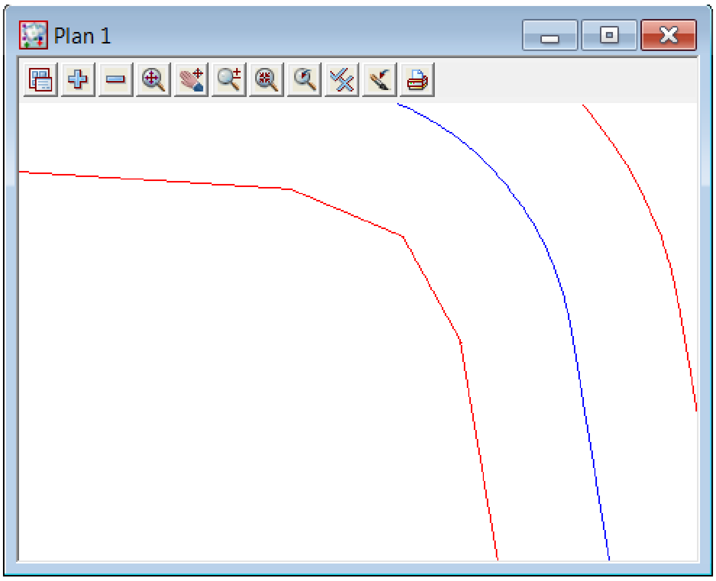
Select and accept the inside curve

Set the **Convert Method** to **inside**

Set the **Method** to **no. of chords**

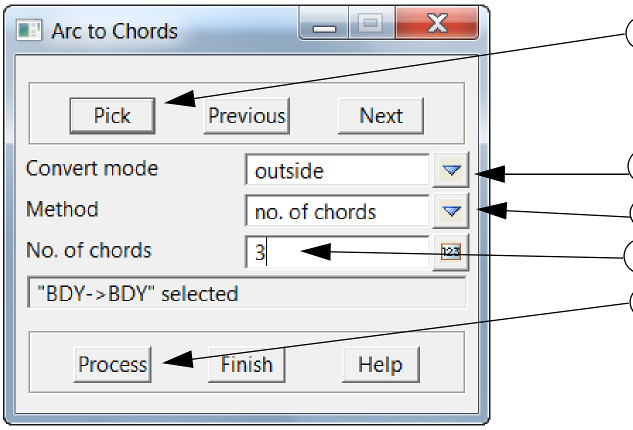
Type in **2** for **No. of chords**

Select **Process**



The arc is converted to two chords

Repeat the process for the outside arc **creating three chords on the outside**


Arc to Chords
Pick
Previous
Next
Process
Finish
Help

Convert mode: outside
Method: no. of chords
No. of chords: 3
"BDY->BDY" selected

Select **Pick**

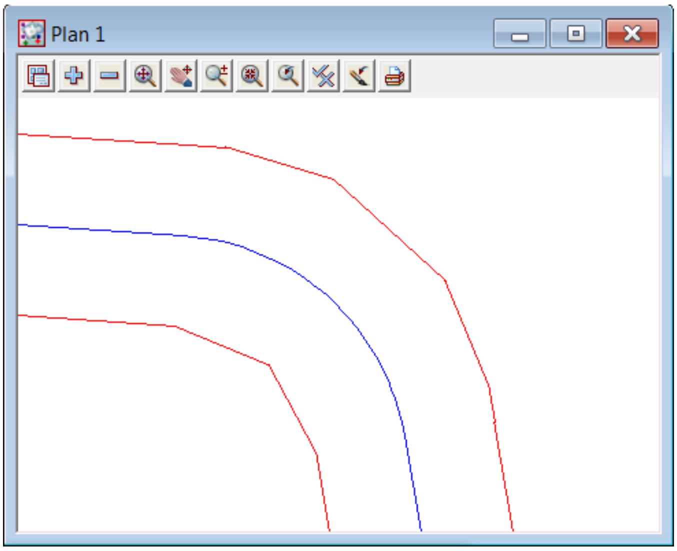
Select and accept the outside curve

Set the **Convert Method** to **outside**

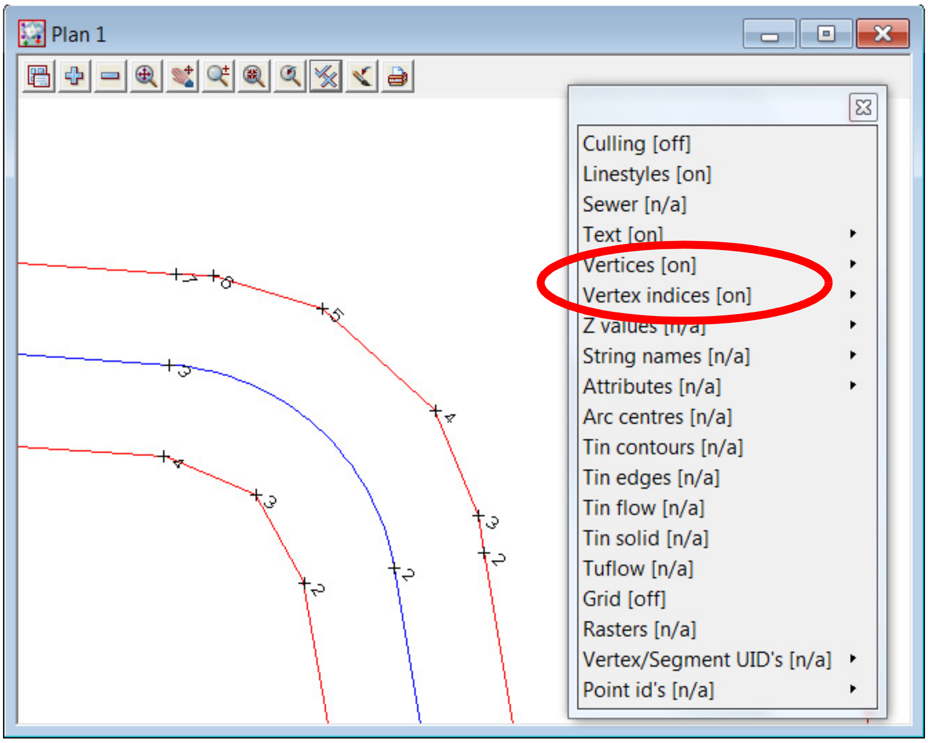
Set the **Method** to **no. of chords**

Type in **3** for **No. of chords**

Select **Process**



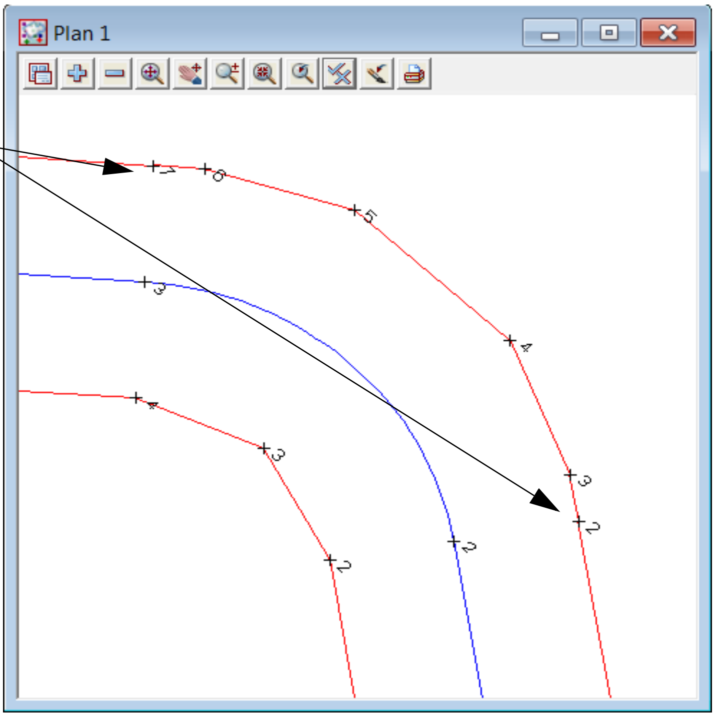
Toggle on the vertices and vertex indices

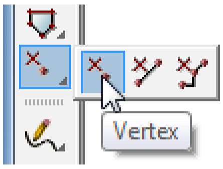

Plan 1
7
6
5
4
3
2
3
2
4
3
2
Culling [off]
Linestyles [on]
Sewer [n/a]
Text [on]
Vertices [on]
Vertex indices [on]
Z values [n/a]
String names [n/a]
Attributes [n/a]
Arc centres [n/a]
Tin contours [n/a]
Tin edges [n/a]
Tin flow [n/a]
Tin solid [n/a]
Tuflow [n/a]
Grid [off]
Rasters [n/a]
Vertex/Segment UID's [n/a]
Point id's [n/a]

Two vertices are now redundant

To delete these points select
Strings=>Cad=>Delete=>Vertex

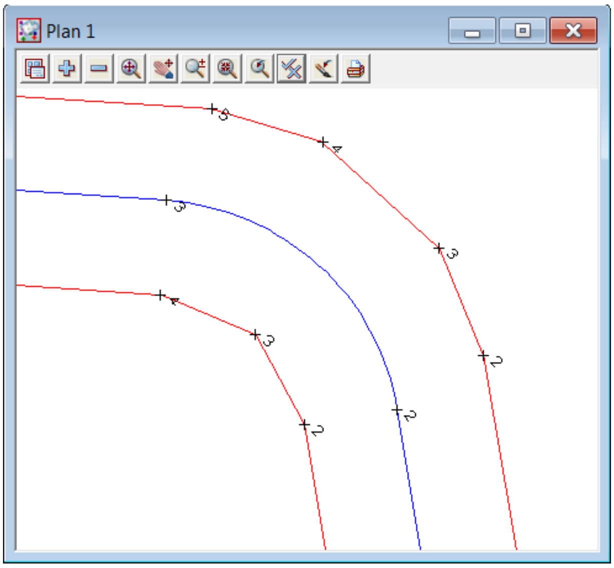
or **Vertex Delete** icon


Plan 1
7
6
5
4
3
2
3
4
3
2
2



Select and accept the two points

The points are now
deleted


Plan 1
5
4
3
2
3
2
4
3
2

12.6.3 Splay the road intersection boundaries

The road intersection boundaries have to be splayed using 3 chord truncations.

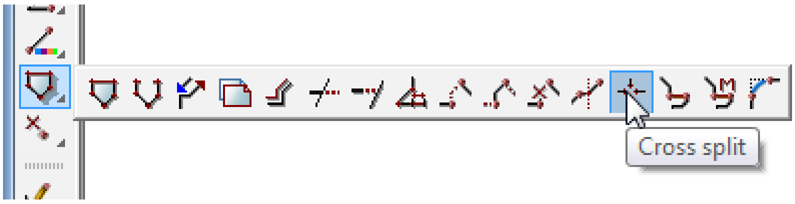
Zoom in to the road intersection

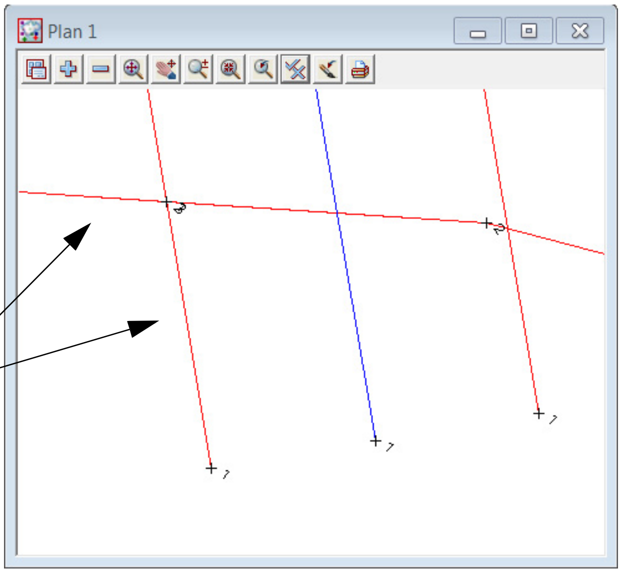
Trim and delete boundary lines

We will use an option to split the strings at the intersection points

Select option ***Strings=>Cad=>String=>Cross Split***

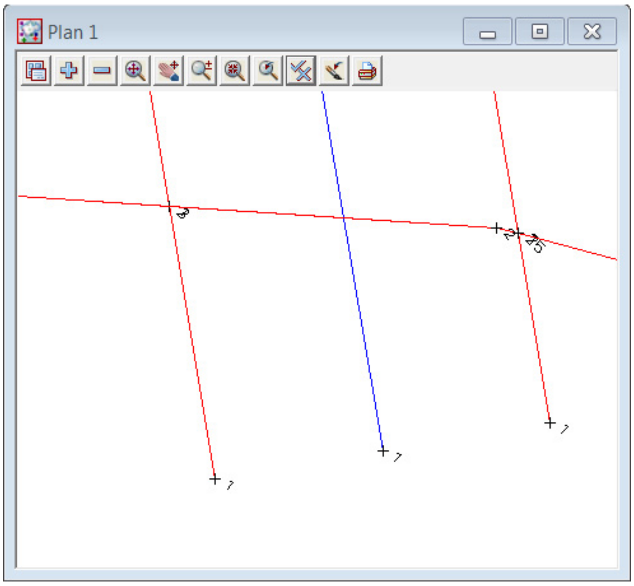
or **Cross Split** icon





Select and accept the two intersecting lines

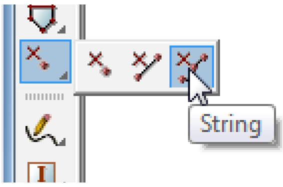
Repeat for the other side of the road

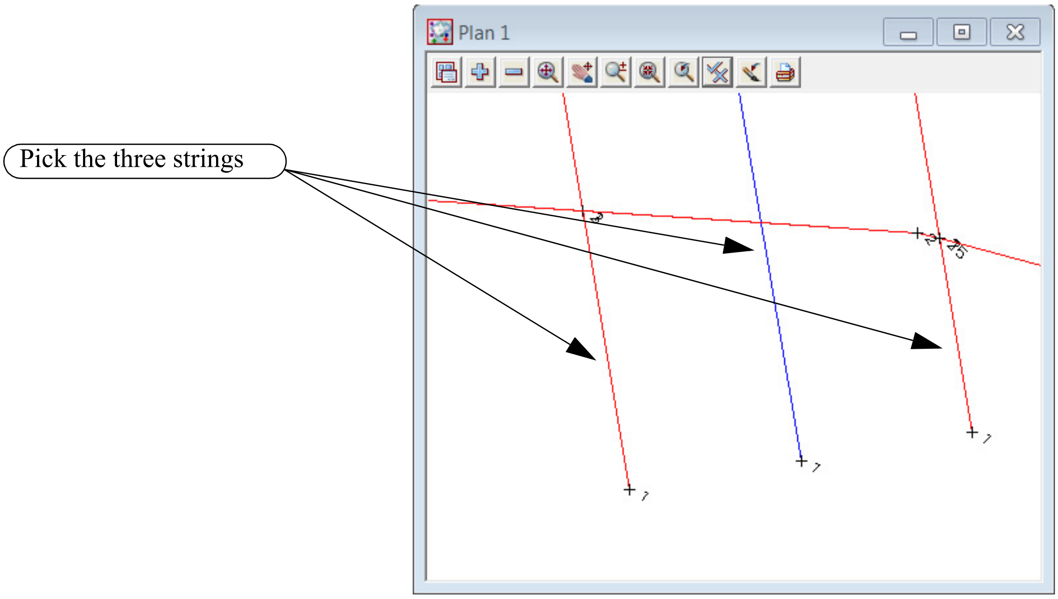


The strings are split at the intersections

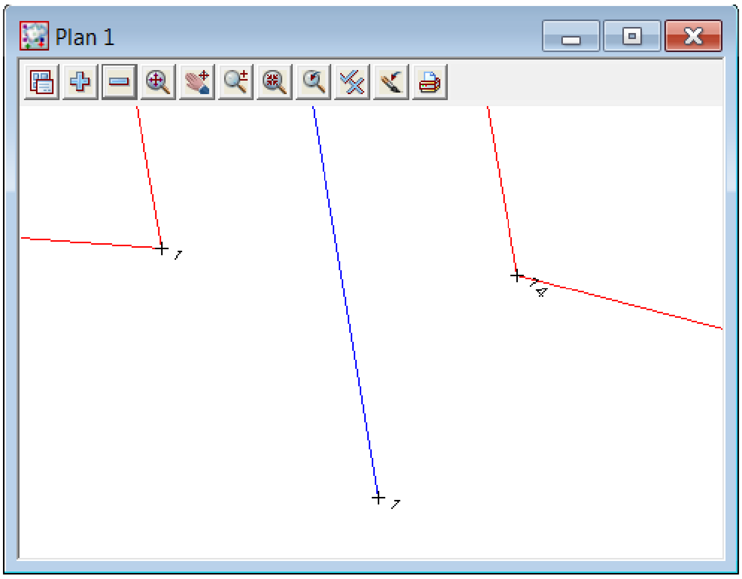
We will now delete the redundant strings

Select option ***Strings=>Cad=>Delete=>String*** or **String Delete** icon





Pick the three strings

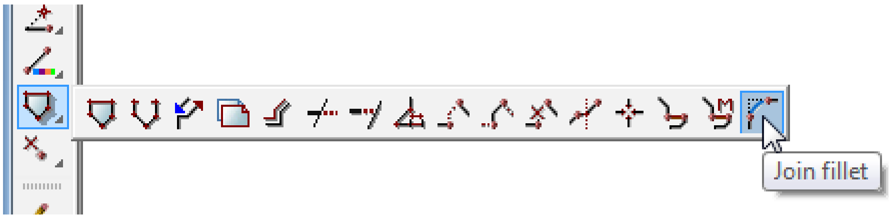


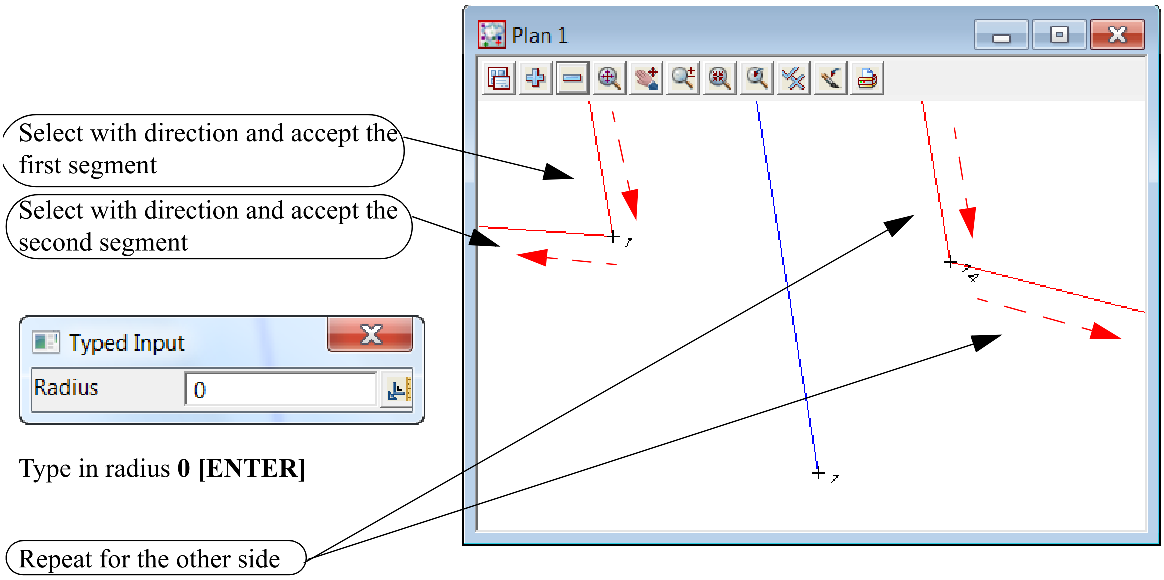
Fillet corners

Before splaying the corners the segments have to be joined to create one string. Filleting the strings with a zero radius will join the strings and remove any duplicate points

Select option ***Strings=>Cad=>String=>Join fillet***

or select the **Join fillet** icon





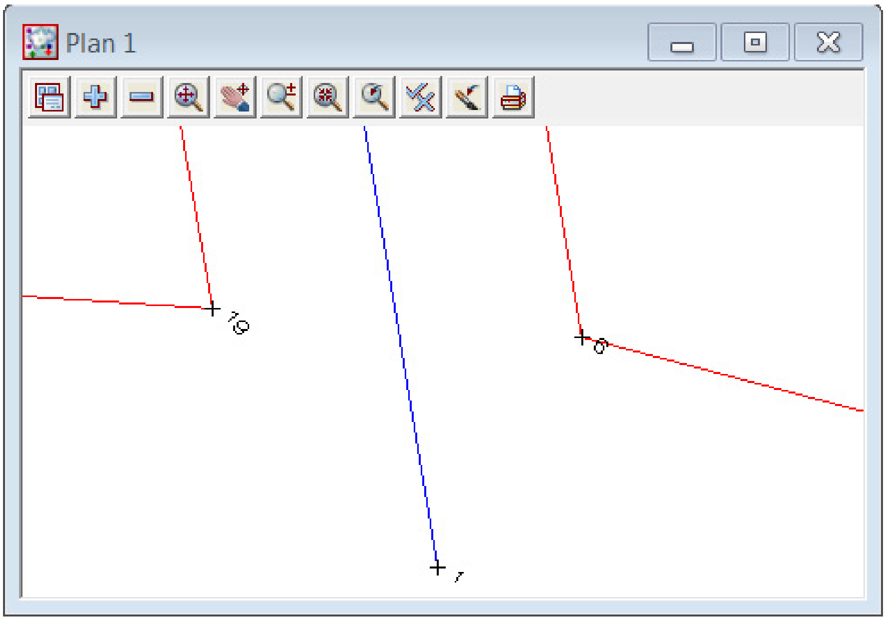
Select with direction and accept the first segment

Select with direction and accept the second segment

Radius 0

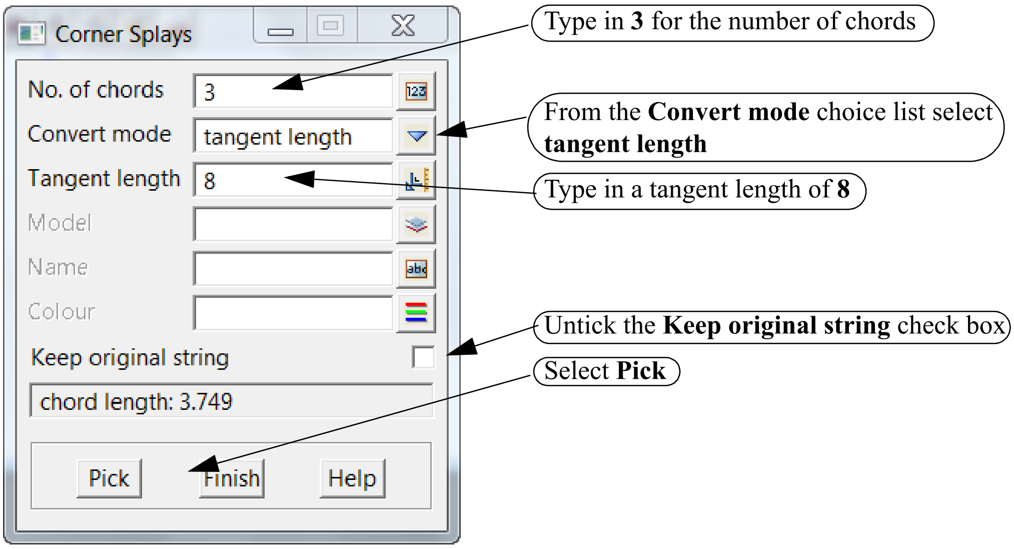
Type in radius **0 [ENTER]**

Repeat for the other side



Create corner splays

Select the option ***Strings=>String Edit=>Corner Splays***



Corner Splays

No. of chords: 3

Convert mode: tangent length

Tangent length: 8

Model:

Name:

Colour:

Keep original string ☐

chord length: 3.749

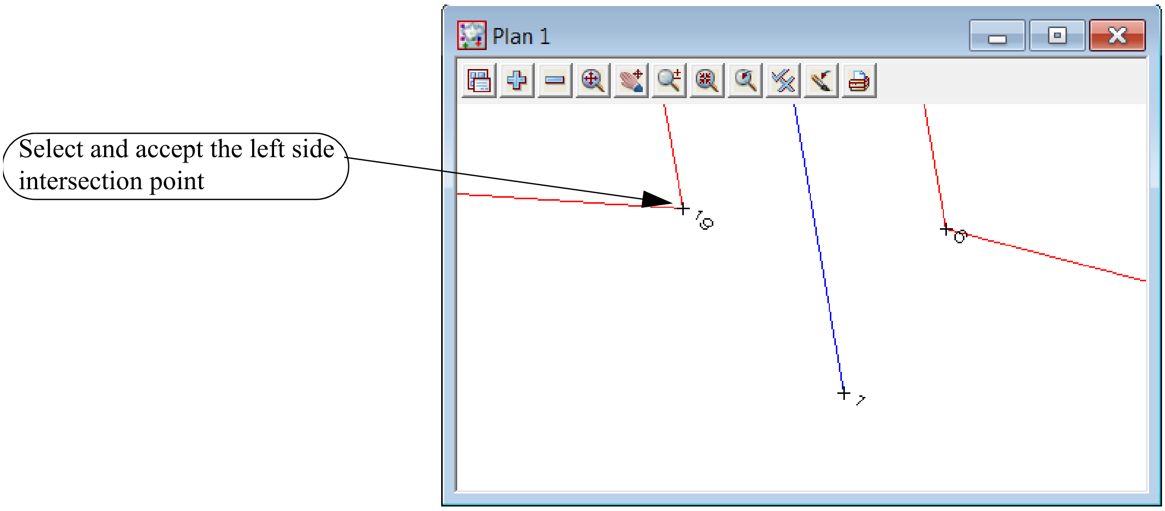
Type in **3** for the number of chords

From the **Convert mode** choice list select **tangent length**

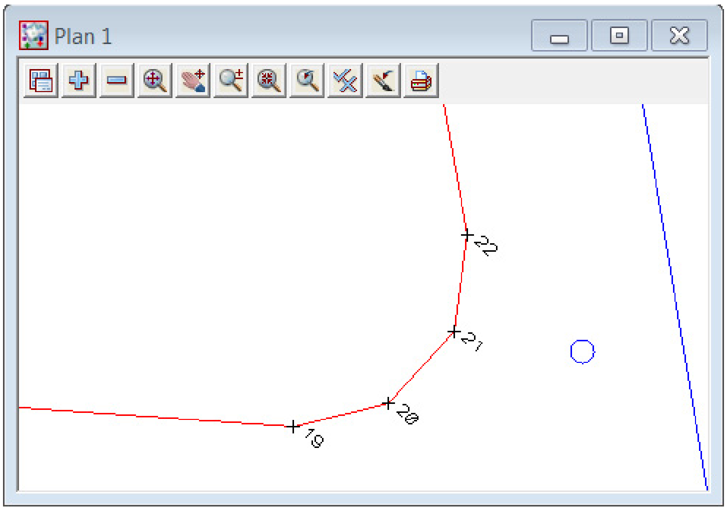
Type in a tangent length of **8**

Untick the **Keep original string** check box

Select **Pick**



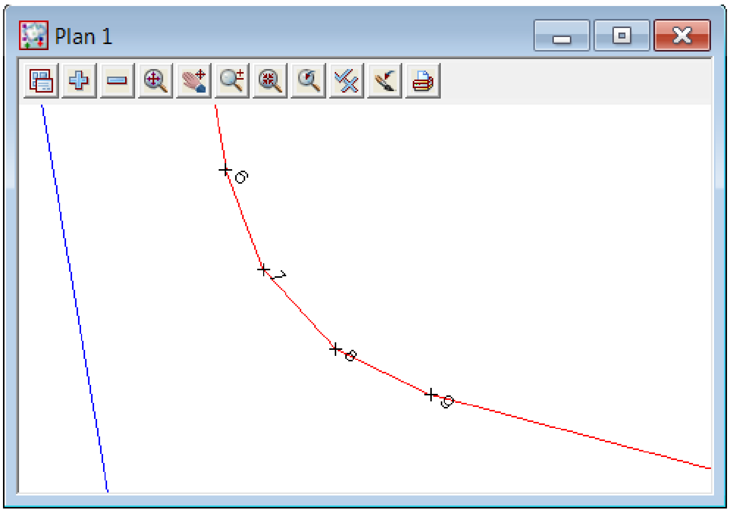
Select and accept the left side intersection point



The truncations are created

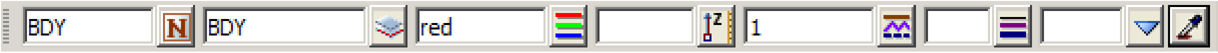
Repeat for the other side of the road

Select **Finish**



12.6.4 Create Cul de sac head

We will now create a cul de sac head manually. Before continuing ensure the current model is **BDY** and set the default colour in the **Cad Control bar** to **red**

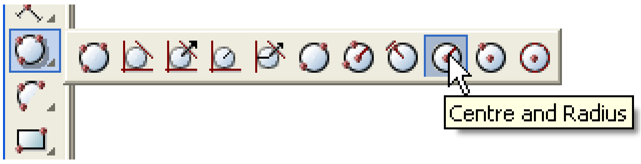

BDY
BDY
red
1

Create Circle

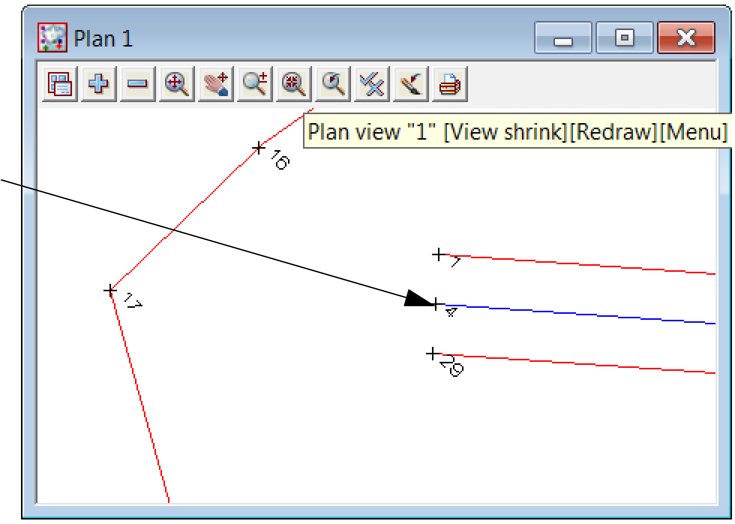
Zoom in to the end of the subdivision road

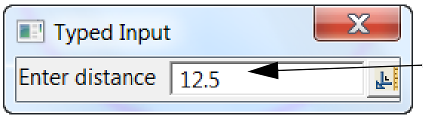
Select option ***Strings=>Cad=>Circle=>Centre and Radius***

or **Centre and Radius** icon


Centre and Radius

Select and accept the point at the end of the road

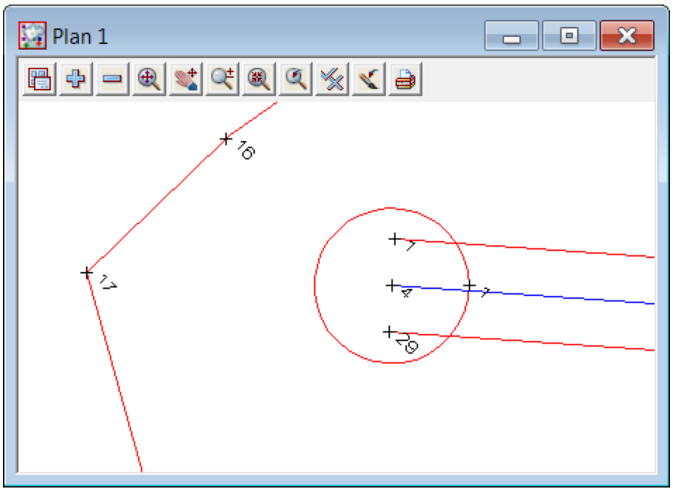

Plan 1
Plan view "1" [View shrink][Redraw][Menu]
16
17
7
4
29


Typed Input

Enter distance 12.5

Press the space bar and type in the radius of **12.5 [Enter]**

The circle is created

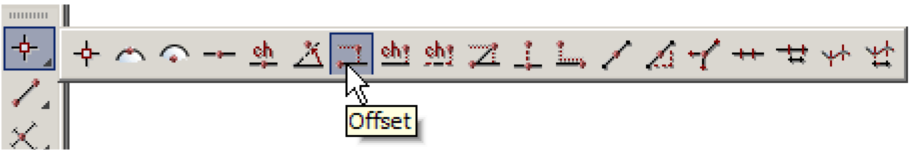

Plan 1
16
17
7
4
7
29

Create boundary lines around cul de sac head

Prior to creating the trapezoid around the circle we need to create an offset point for the orientation of the trapezoid

Select option ***Strings=>Cad=>Points=>Offset***

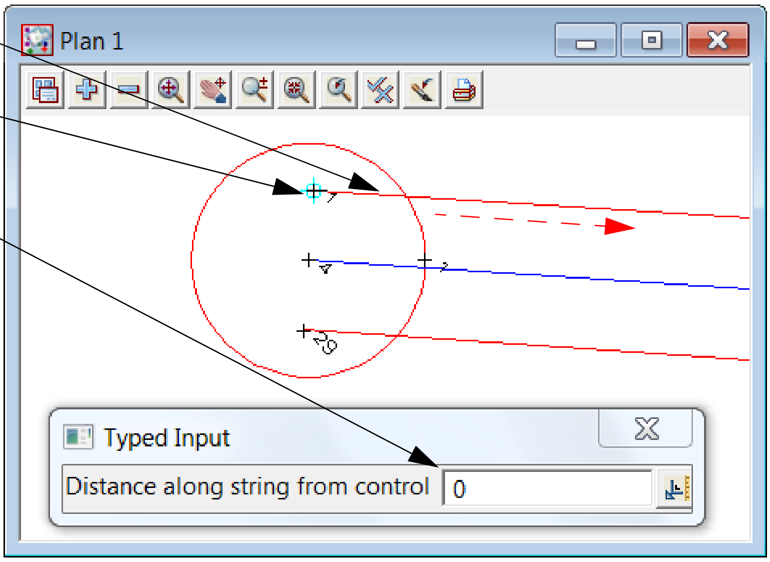
or **Offset** icon



Select top edge of the road boundary string with direction

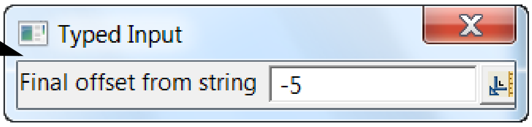
Select and accept the end point of the string

Type in the distance **0 [Enter]**



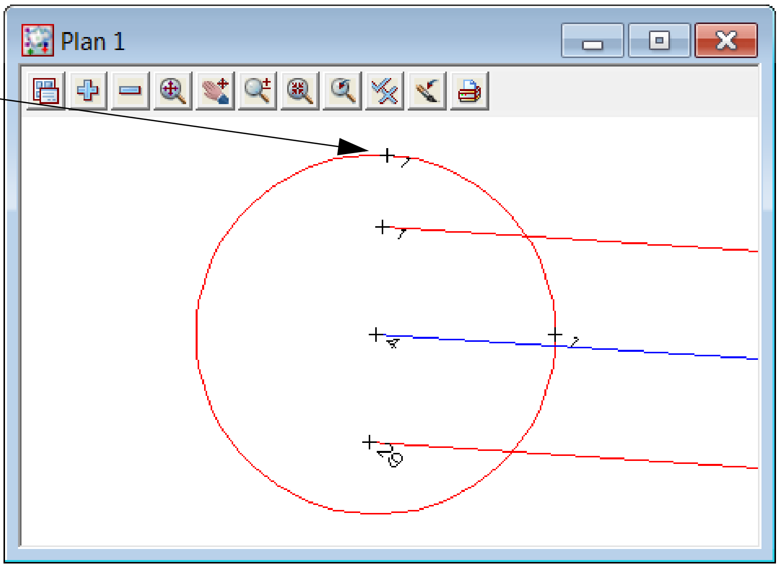
Distance along string from control 0

Type in the offset **-5 [Enter]**



Final offset from string -5

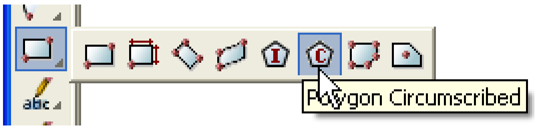
The offset point is created at the edge of the circle



We now create an 8 sided trapezoid about the circle

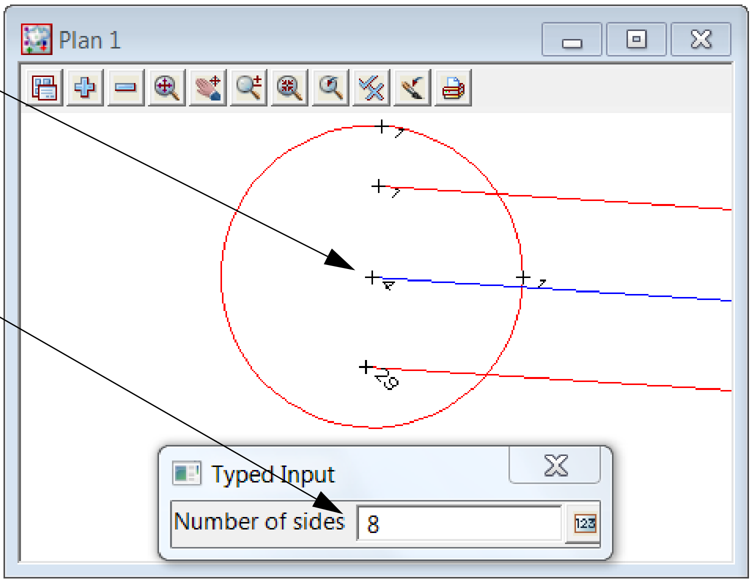
Select option ***Strings=>Cad=>Polygons=>Polygon Circumscribed***

or **Polygon Circumscribed** icon


Polygon Circumscribed

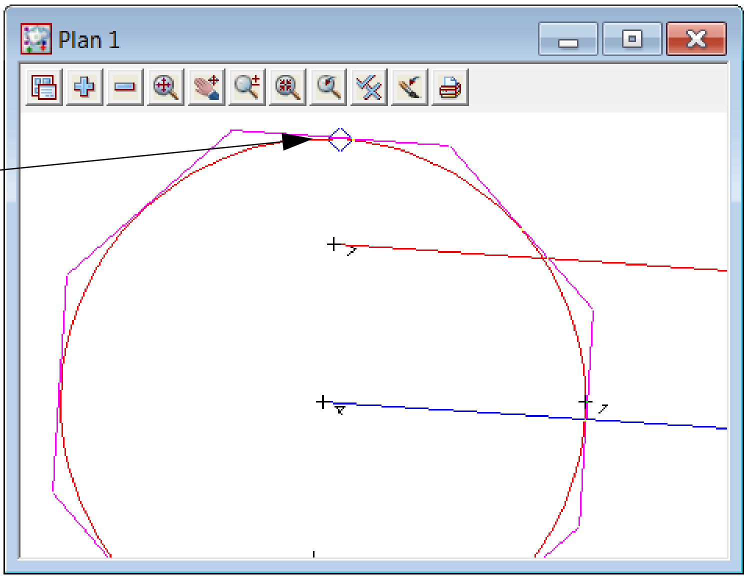
Select and accept the point at the centre of the circle

Type in the number of sides as **8 [Enter]**


Plan 1
Typed Input

Number of sides 8

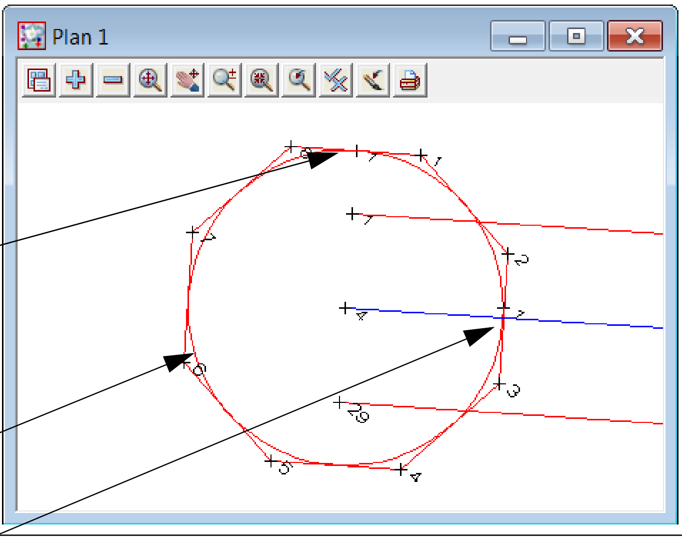
Select and accept the offset point to position the shape

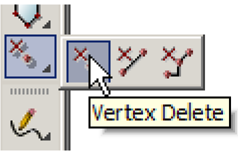


The trapezoid is created around the outside of the circle

Delete the offset point used to create the trapezoid

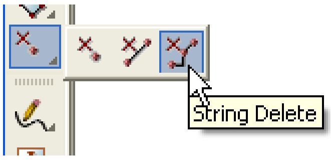
Select **Vertex delete** icon

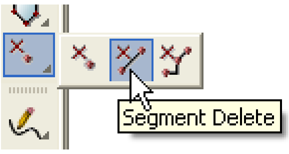


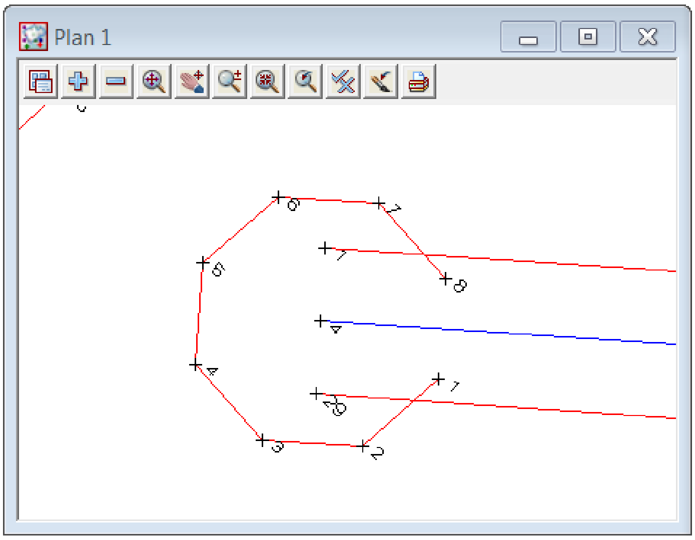

Vertex Delete

Delete the circle and right segment of the trapezoid using delete options ***Strings=>Cad=>Delete Strings*** and ***Strings=>Cad=>Delete=>Segments***

or **String Delete** icon and **Segment Delete** icon


String Delete

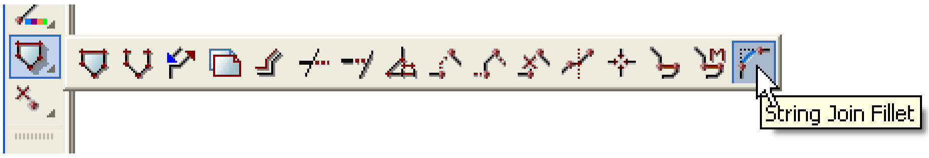

Segment Delete



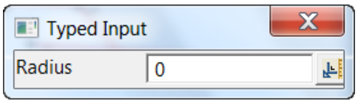
Fillet the trapezoid to the road boundary strings

Select option ***Strings=>Cad=>Change strings=Join fillet***

or **String Join Fillet** icon


String Join Fillet

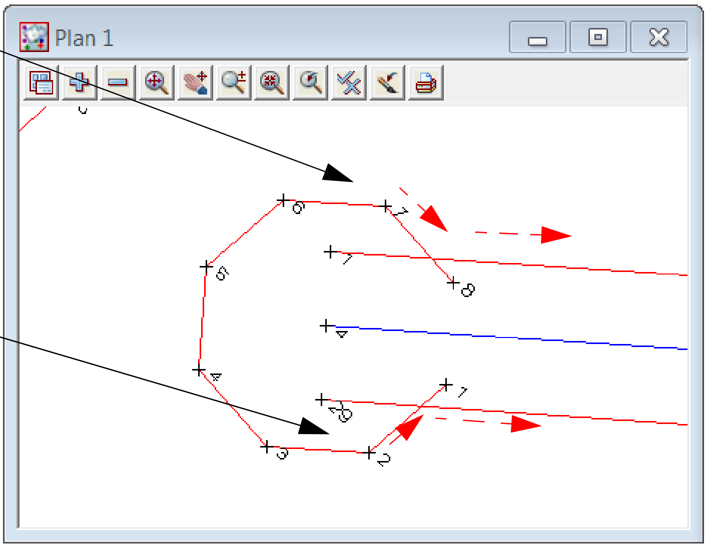
Pick and accept the two strings with direction

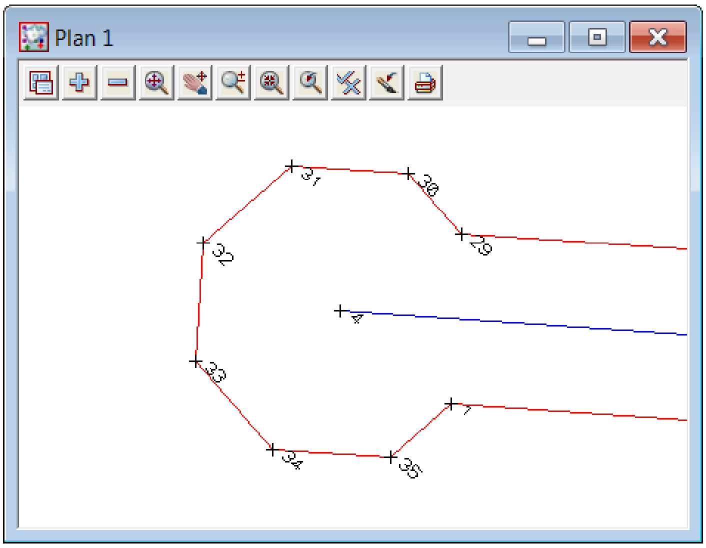

Typed Input

Radius 0

Type in the radius **0 [Enter]**

Repeat for the lower edge


Plan 1
6
7
7
8
5
4
4
29
1
3
2


Plan 1
31
30
29
32
4
33
1
34
35

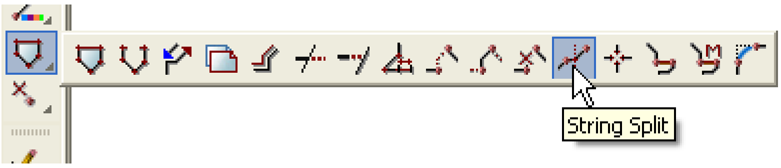
12.7 Create lots

12.7.1 Split string at starting edge

Before we start creating lots the front and rear boundaries should be separated. This is achieved by splitting the string either end of the start and end edges of the lots

Select ***Strings=>Cad=>Change Strings=>Split***

or **String Split** icon



Zoom in to bottom right of the subdivision

We will split the string at vertex 20 and 24

Select and accept string from 20 to 21

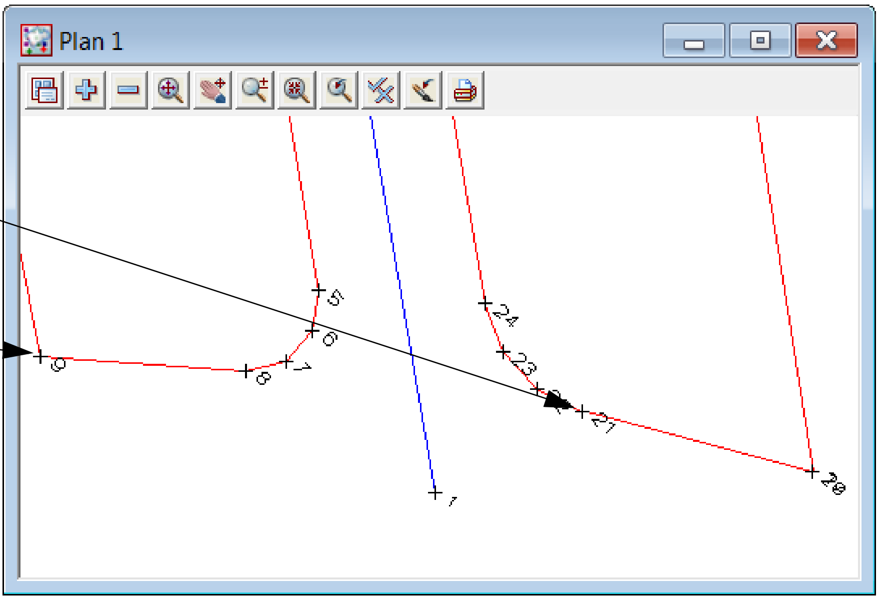
Select vertex 21

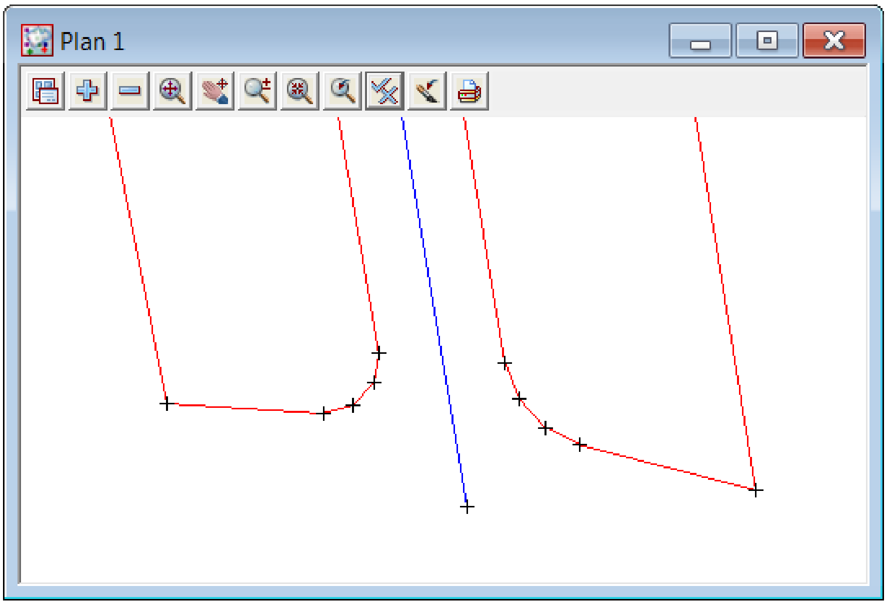
Select and accept string from 9 to 8

Select and accept point at vertex 9

Select **Finish** on panel

Toggle off the vertex numbers

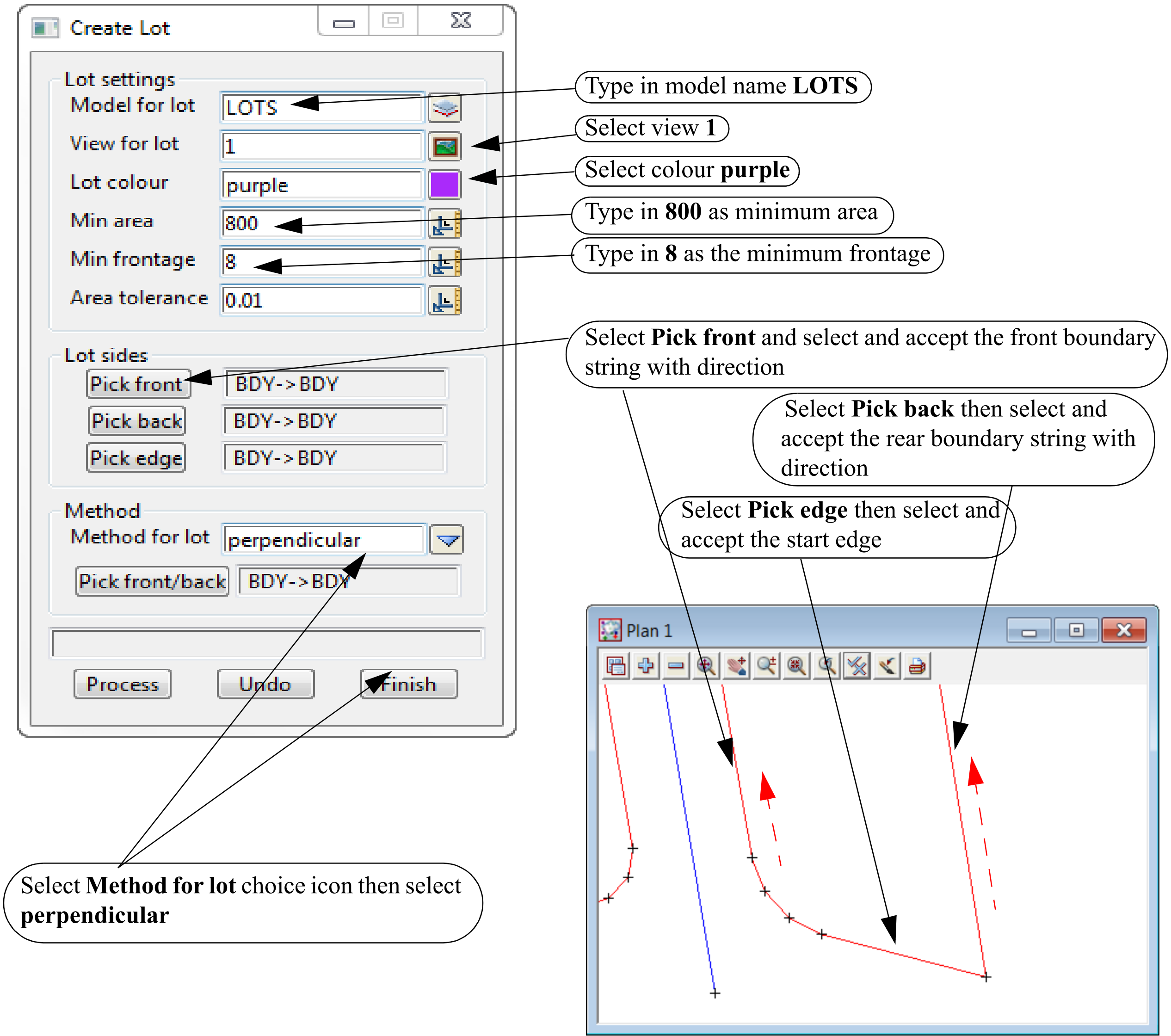




12.7.2 Create lots by different methods

The first three lots will be created by specifying a minimum area for the new lots

Select option ***Design=>Estate/Lots=>Create lots=>Create lots***



Create Lot

Lot settings

Model for lot: LOTS

View for lot: 1

Lot colour: purple

Min area: 800

Min frontage: 8

Area tolerance: 0.01

Lot sides

Pick front: BDY->BDY

Pick back: BDY->BDY

Pick edge: BDY->BDY

Method

Method for lot: perpendicular

Pick front/back: BDY->BDY

Type in model name **LOTS**

Select view **1**

Select colour **purple**

Type in **800** as minimum area

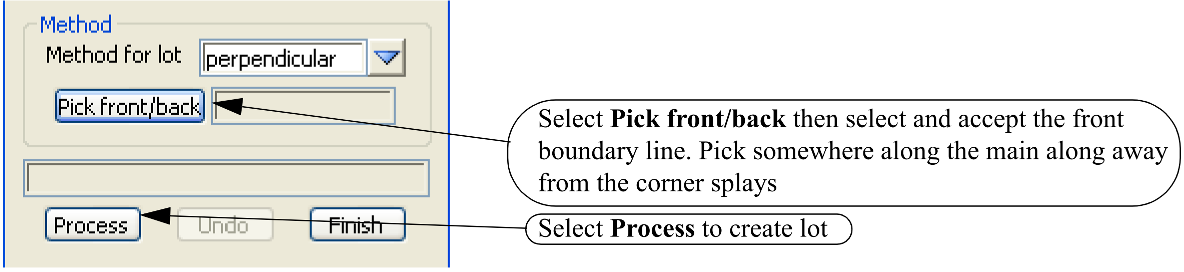
Type in **8** as the minimum frontage

Select **Pick front** and select and accept the front boundary string with direction

Select **Pick back** then select and accept the rear boundary string with direction

Select **Pick edge** then select and accept the start edge

Select **Method for lot** choice icon then select **perpendicular**



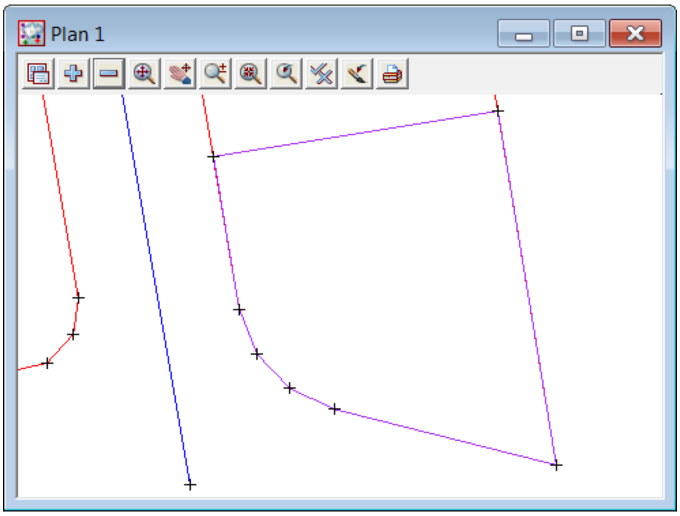
Method

Method for lot: perpendicular

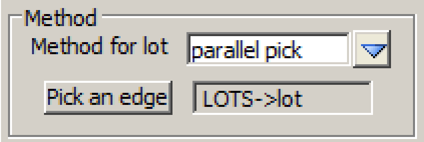
Select **Pick front/back** then select and accept the front boundary line. Pick somewhere along the main along away from the corner splays

Select **Process** to create lot

The first lot is created with the new edge perpendicular to the road frontage



Now change the **Method for lot** to **parallel pick**

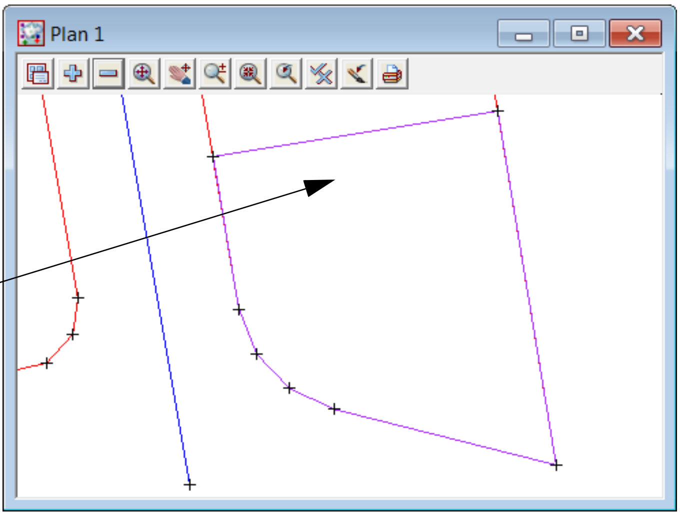

Method

Method for lot: parallel pick

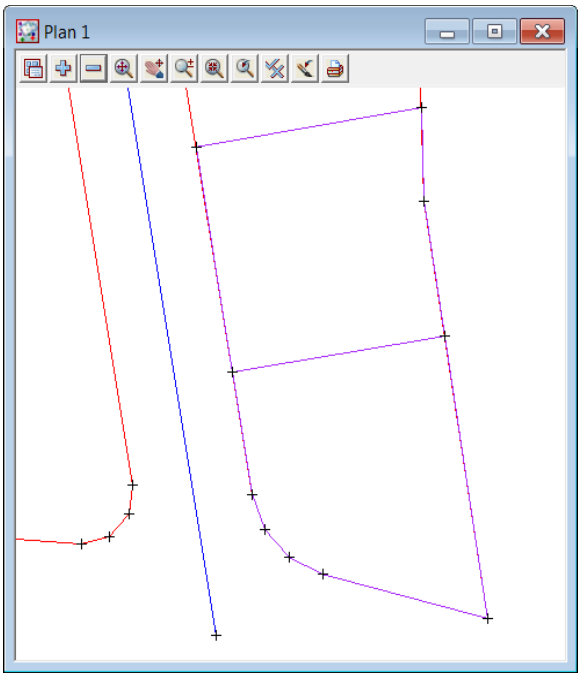
Pick an edge: LOTS->lot

Select **Pick an edge** and select the previously created lot edge

Process again

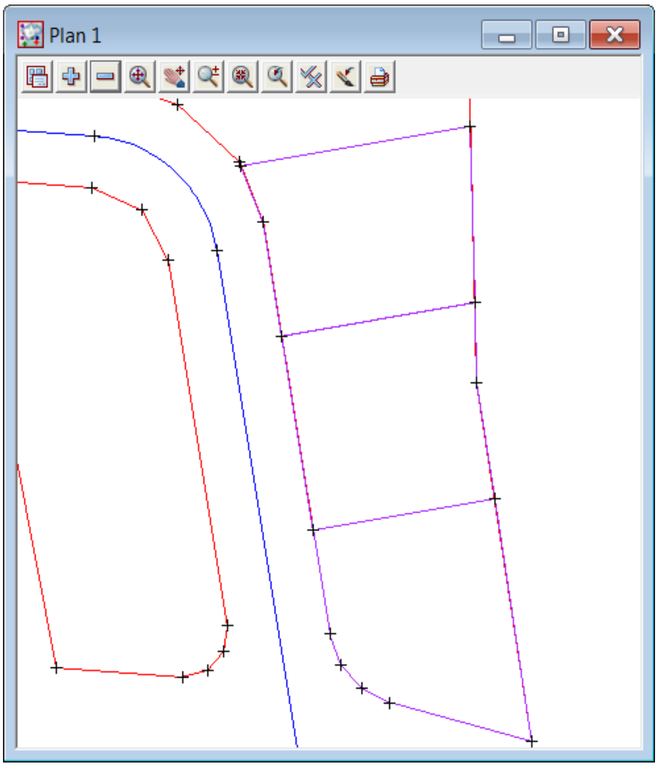


A second lot is created



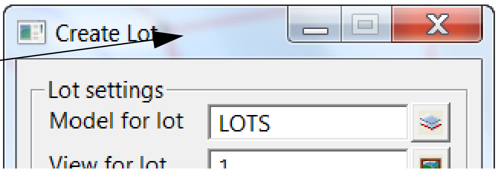
Select **Process** again

The third lot is created



The next lot to be created will not have a minimum area but will have a new edge bound by two existing vertices on the front and rear boundaries. We will use a new option to create this lot.

Move the **Create Lot** panel to the bottom on the screen by holding down the left button at the top of the panel and dragging down to the required position

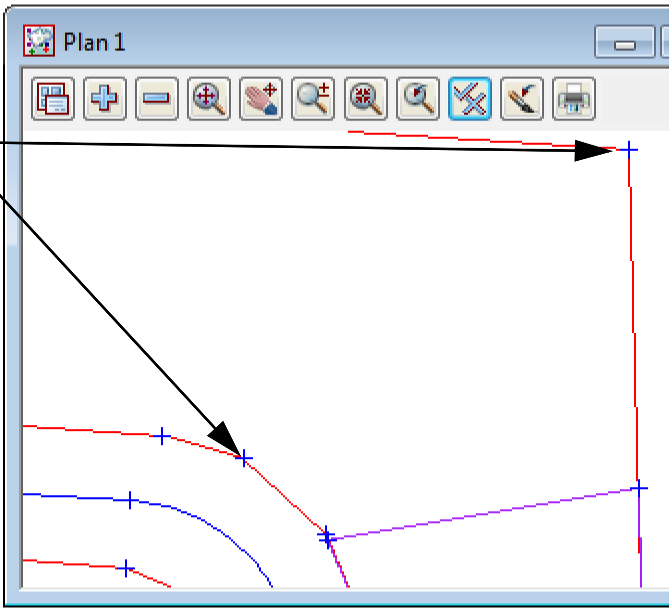


Model for lot LOTS

View for lot 1

Pan up to the top right of the subdivision

The new boundary edge will be created from the shown vertices



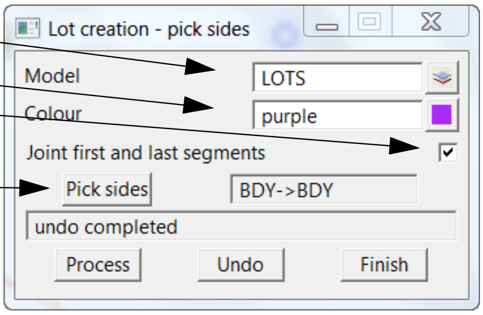
Select option ***Design=>Estate/Lots=>Create lots=>Create lots by picking segments***

Select model **LOTS**

Select colour **purple**

Tick the check box to **Join first and last segment**

Select **Pick sides**


Lot creation - pick sides

Model LOTS

Colour purple

Joint first and last segments ☑

Pick sides BDY->BDY

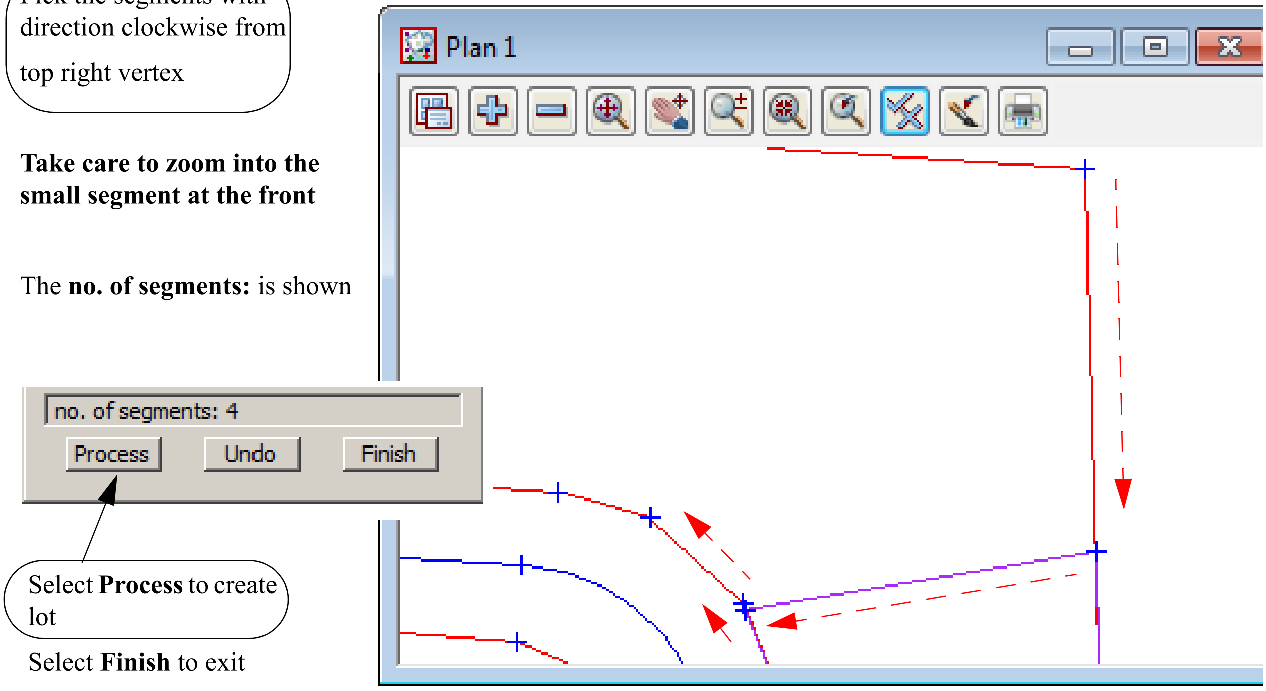
undo completed

Process
Undo
Finish

Pick the segments with direction clockwise from top right vertex

Take care to zoom into the small segment at the front

The **no. of segments:** is shown

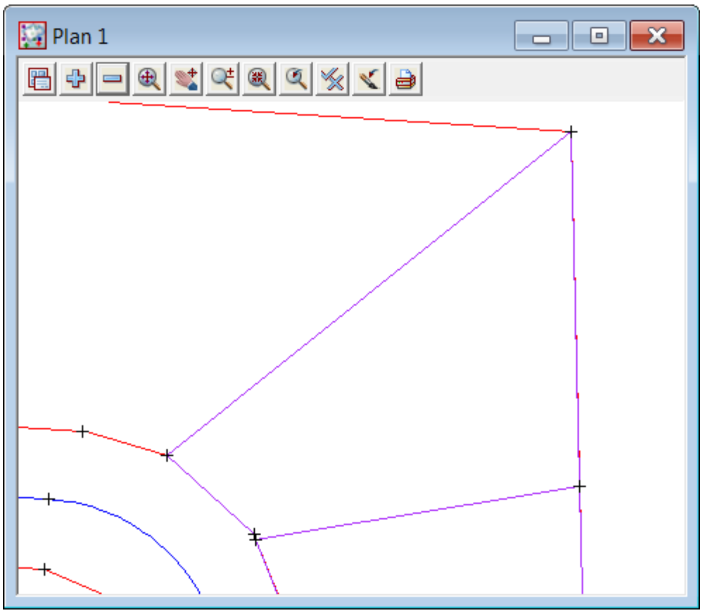

Plan 1
Process
Undo
Finish

no. of segments: 4

Select **Process** to create lot

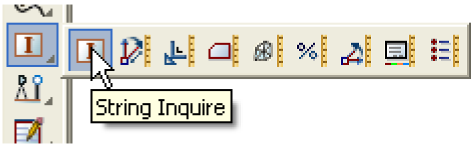
Select **Finish** to exit

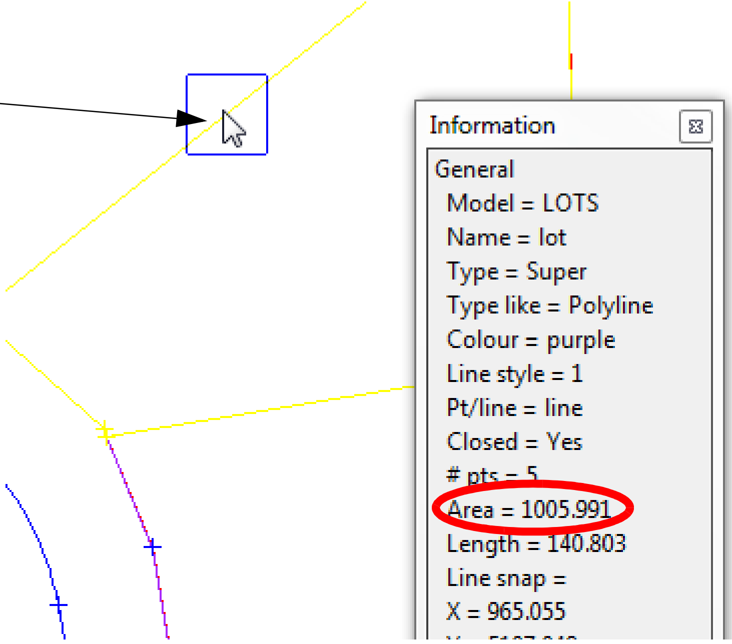
The new lot is created



To inquire on the area select ***Strings=>Inquire***

or **String Inquire** icon





Select anywhere on the lot edge but do not confirm

If the lot polygon is highlighted the area is displayed in the **Information panel**

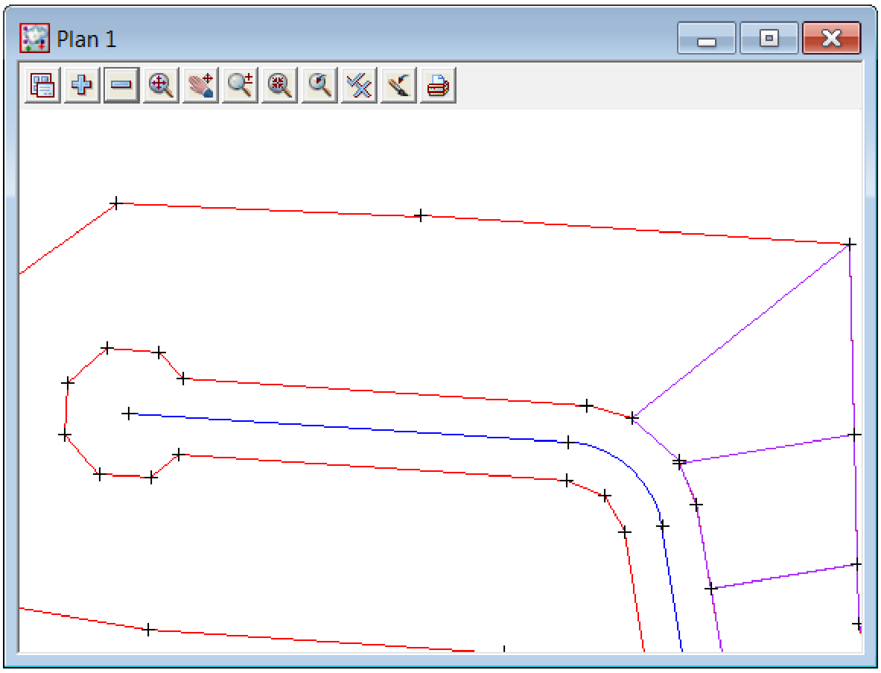
Press **Escape** key to exit the Inquire option

Information

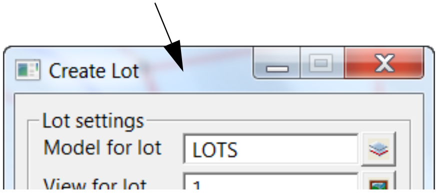
General
Model = LOTS
Name = lot
Type = Super
Type like = Polyline
Colour = purple
Line style = 1
Pt/line = line
Closed = Yes
# pts = 5
Area = 1005.991
Length = 140.803
Line snap =
X = 965.055

The next lots will be created using the minimum area panel again

Pan left from the last created lot



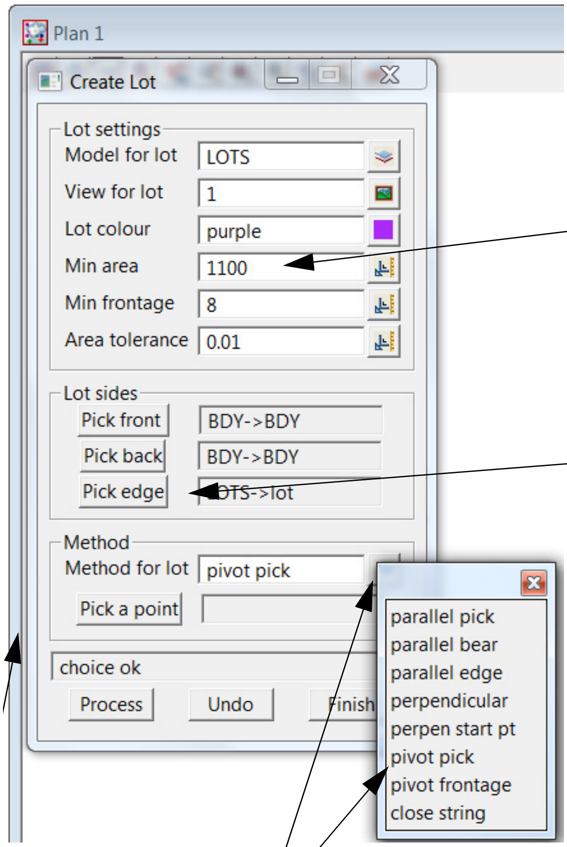
Move the **Create Lot** panel back up



Lot settings

Model for lot: LOTS

View for lot: 1


Plan 1
Create Lot

Lot settings

Model for lot: LOTS

View for lot: 1

Lot colour: purple

Min area: 1100

Min frontage: 8

Area tolerance: 0.01

Lot sides

Pick front: BDY->BDY

Pick back: BDY->BDY

Pick edge: OTS->lot

Method

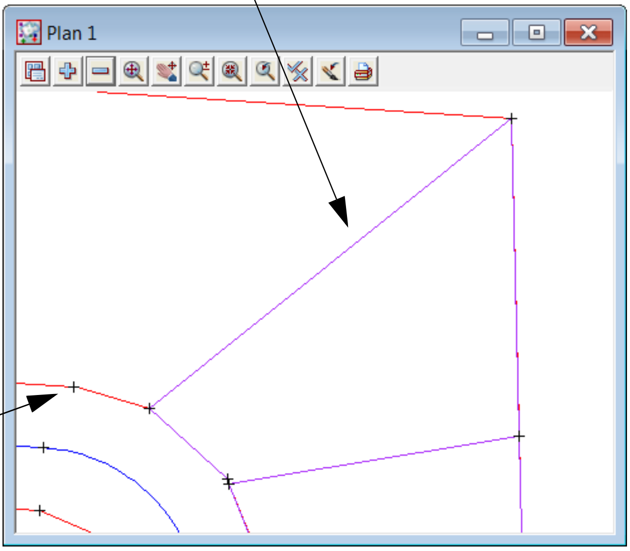
Method for lot: pivot pick

choice ok

Pick a point
Process
Undo
Finish
parallel pick
parallel bear
parallel edge
perpendicular
perpen start pt
pivot pick
pivot frontage
close string

Change the **Min area** to **1100**

Select **Pick edge** then select and accept the last side boundary line

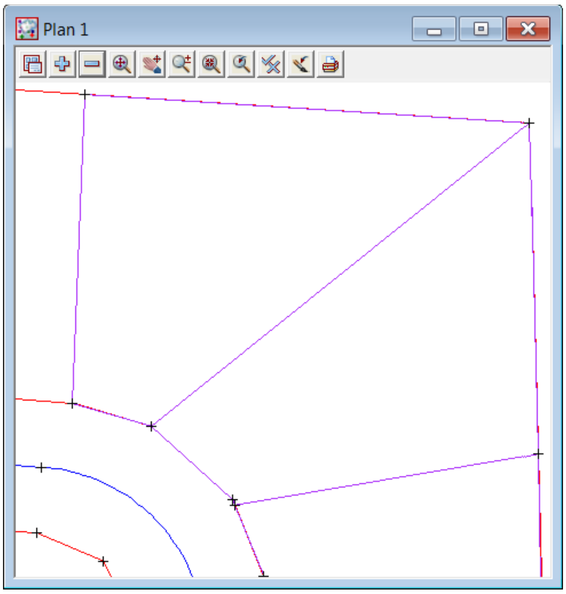


Select **Method for lot** choice icon then select **pivot pick**

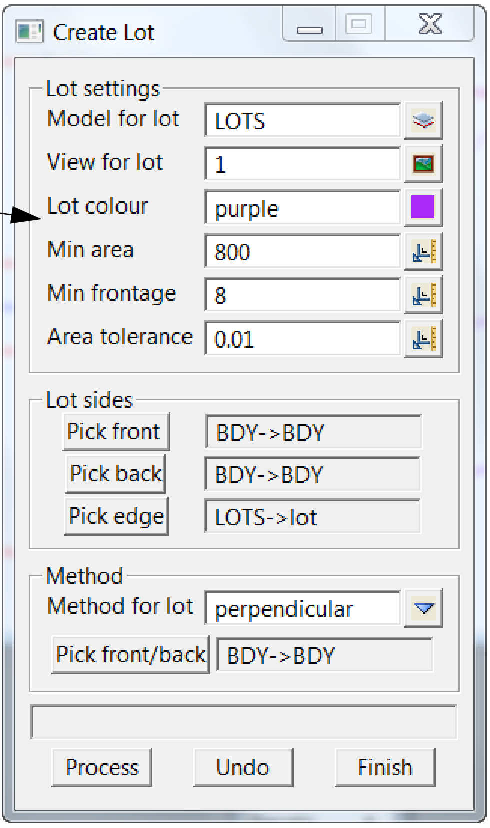
Select **Pick a point** then select and accept the next vertex

Select **Process**

The new lot is created with the new edge pivoting about the selected vertex



Now change the minimum area back to **800**



Lot settings

Model for lot: LOTS

View for lot: 1

Lot colour: purple

Min area: 800

Min frontage: 8

Area tolerance: 0.01

Lot sides

Pick front: BDY->BDY

Pick back: BDY->BDY

Pick edge: LOTS->lot

Method

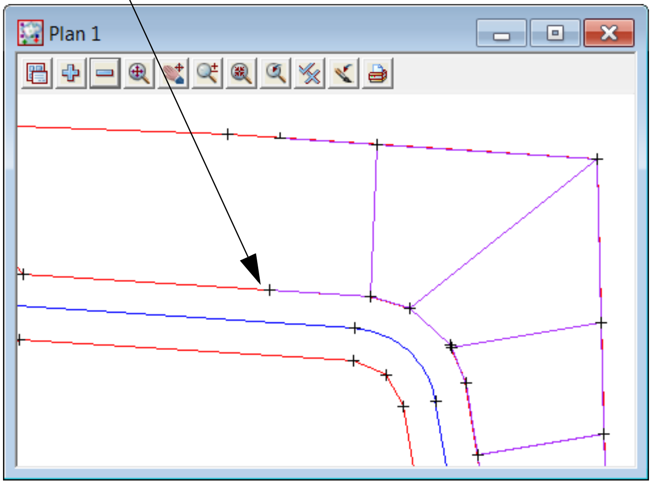
Method for lot: perpendicular

Pick front/back: BDY->BDY

Set the **Method for lot** to **perpendicular**

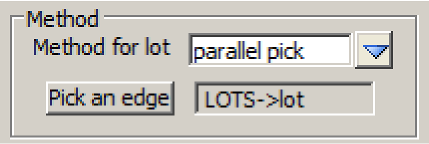
Select **Pick front/back**

Select and accept the front boundary line



Select **Process** to create the lot

Now change the **Method for lot** to **parallel pick**



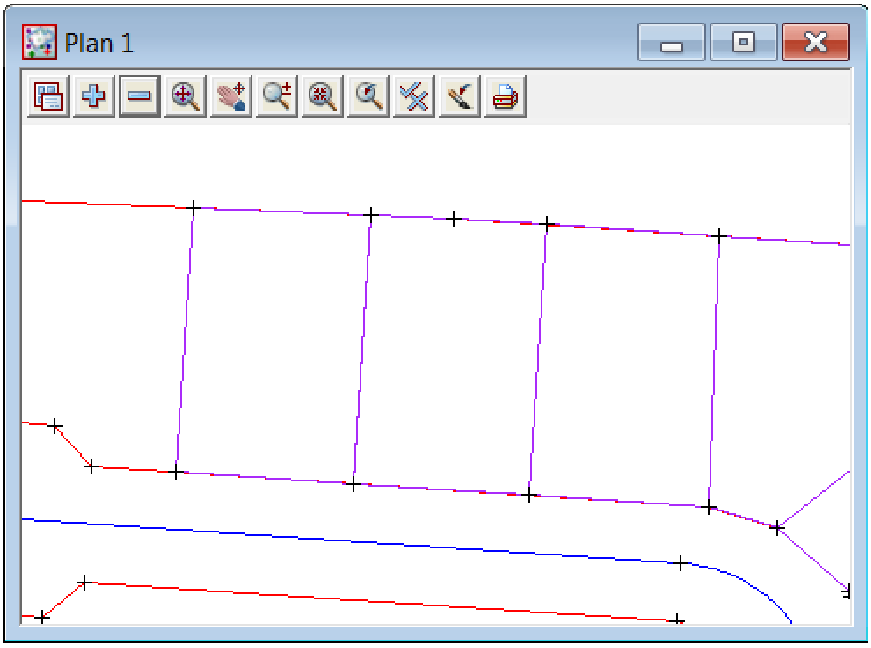
Method

Method for lot: parallel pick

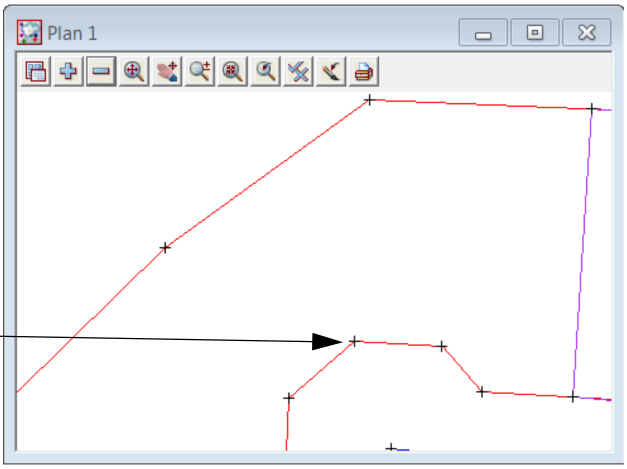
Pick an edge: LOTS->lot

Select **Pick an edge** and select the previously created lot edge

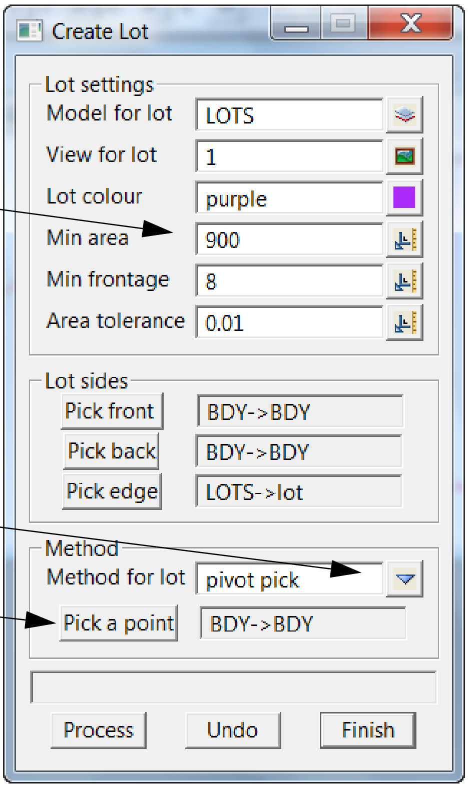
Select **Process** again twice



Zoom in to the end of the cul de sac



The next lot will be created with area of **900** and the new boundary edge to pivot from this vertex


Create Lot

Lot settings

Model for lot: LOTS

View for lot: 1

Lot colour: purple

Min area: 900

Min frontage: 8

Area tolerance: 0.01

Lot sides

Pick front: BDY->BDY

Pick back: BDY->BDY

Pick edge: LOTS->lot

Method

Method for lot: pivot pick

Pick a point: BDY->BDY

Change the minimum area to **900**

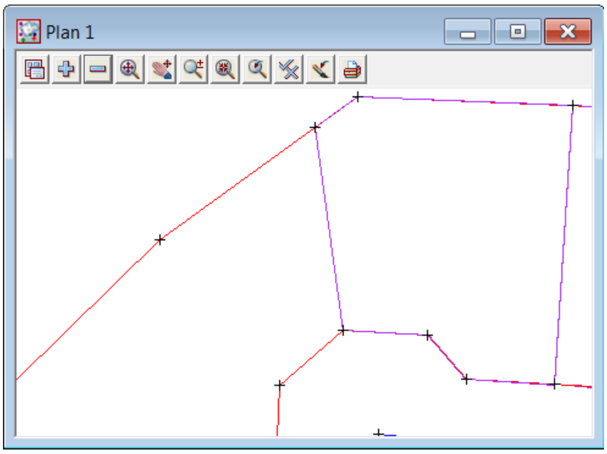
Set the **Method for lot** to **pivot pick**

Select **Pick a point**

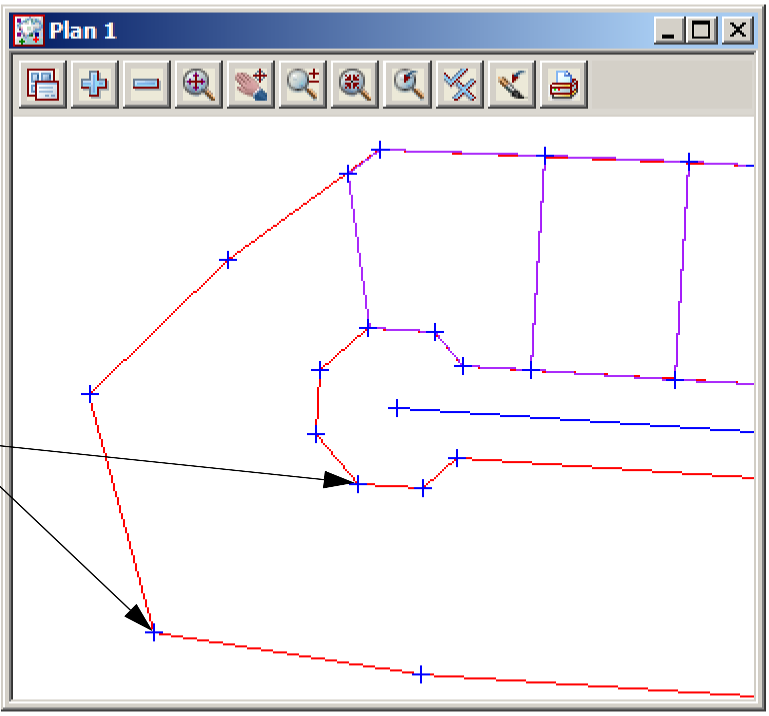
Select and accept the pivot point

Select **Process** then **Finish**

A new lot is created



Pan around to the bottom of the cul de sac



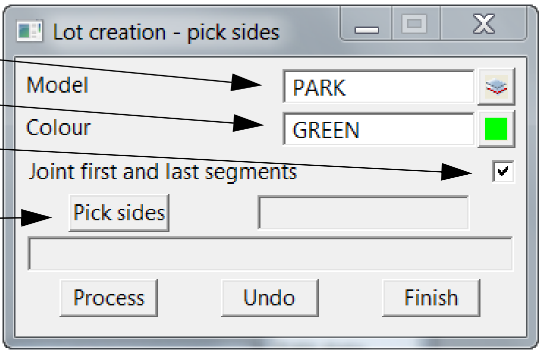
The next lot will be a park lot.

We will use the option to create lot by selecting the sides.

The final edge will lie between these vertices

Minimise the **Create Lot** panel again

Select option ***Design=>Estate/Lots=>Create lots=>Create lots by picking segments***



Lot creation - pick sides

Model PARK

Colour GREEN

Joint first and last segments ☑

Select model **PARK**

Select colour **green**

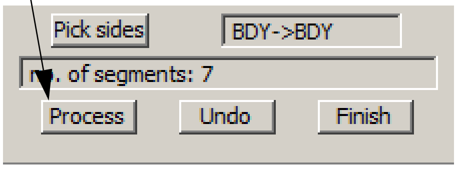
Tick the check box to **Join first and last segment**

Select **Pick sides**

Select and accept the sides with direction in a clockwise direction from this vertex

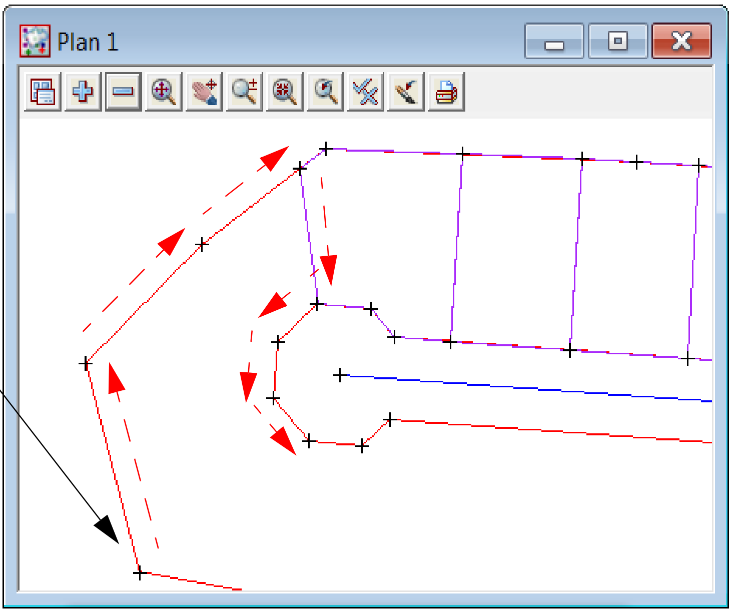
After accepting last line select **Process** then **Finish**

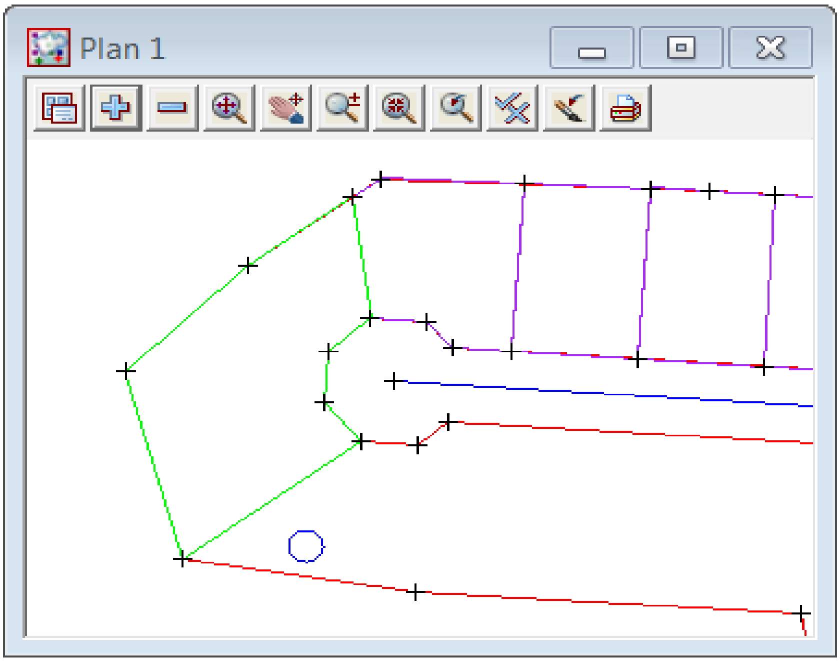
Turn on the model **PARK**



Pick sides BDY->BDY

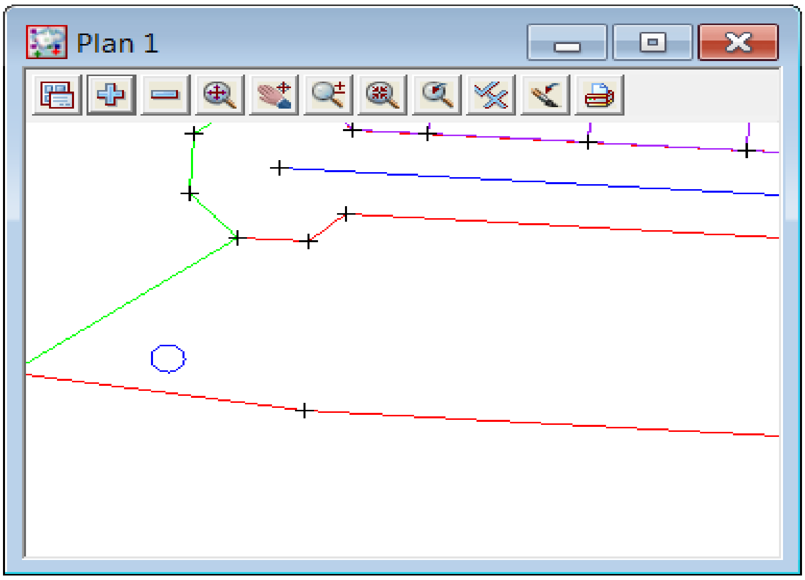
no. of segments: 7

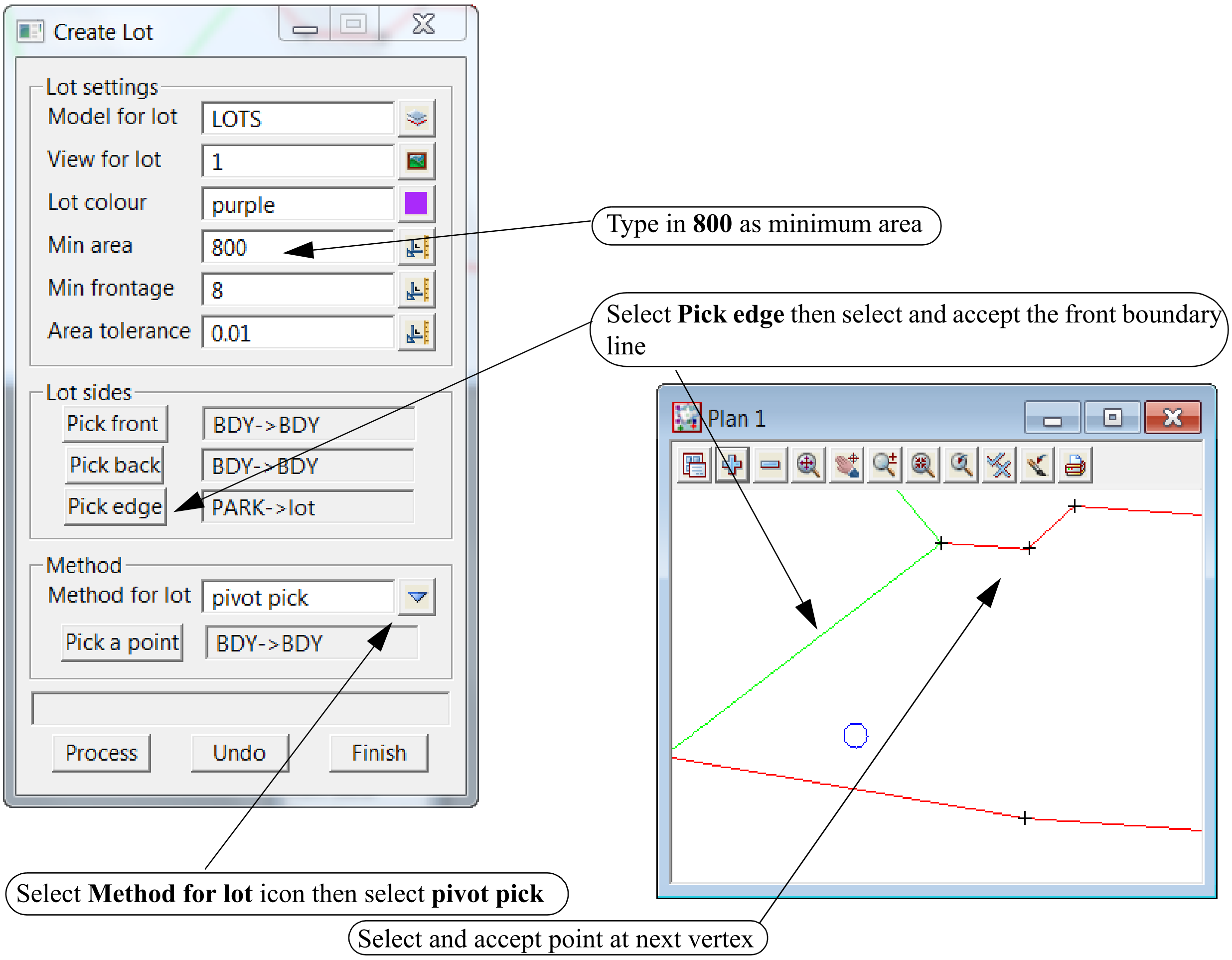




For the next six lots we will use the previous **Create lots** option

Pan along the right as per the example below





Create Lot

Lot settings

Model for lot: LOTS

View for lot: 1

Lot colour: purple

Min area: 800

Min frontage: 8

Area tolerance: 0.01

Lot sides

Pick front: BDY->BDY

Pick back: BDY->BDY

Pick edge: PARK->lot

Method

Method for lot: pivot pick

Pick a point: BDY->BDY

Type in **800** as minimum area

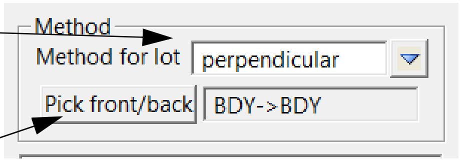
Select **Pick edge** then select and accept the front boundary line

Select **Method for lot** icon then select **pivot pick**

Select and accept point at next vertex

Select **Process**

The new lot is created



Method

Method for lot: perpendicular

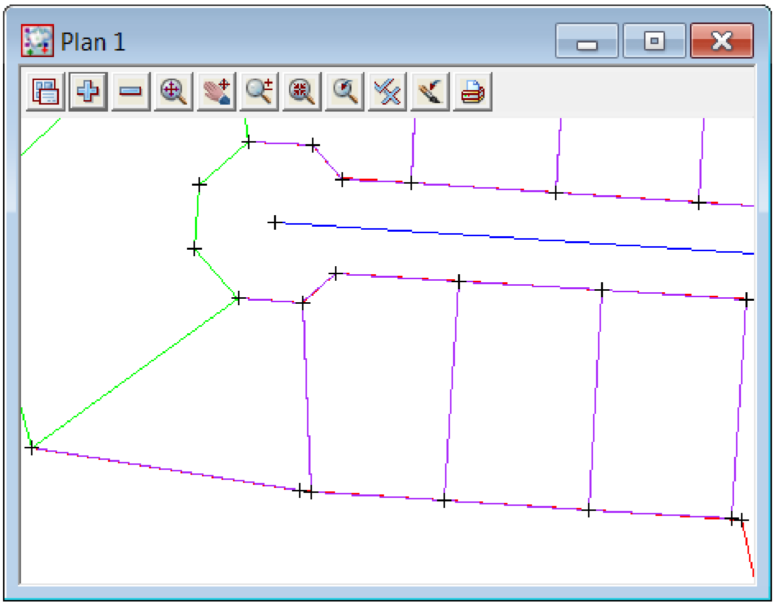
Pick front/back: BDY->BDY

For the next three lots we change the **Method for lot** to **Perpendicular**

Select rear boundary

Select **Process three times**

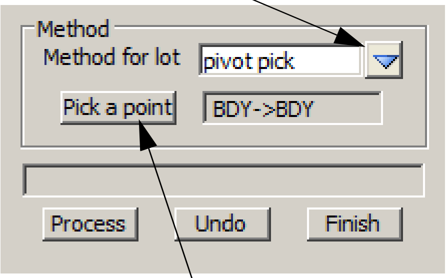
The three new lots are created with the new side at bearing 3°45’



Pan down to the last section of the subdivision

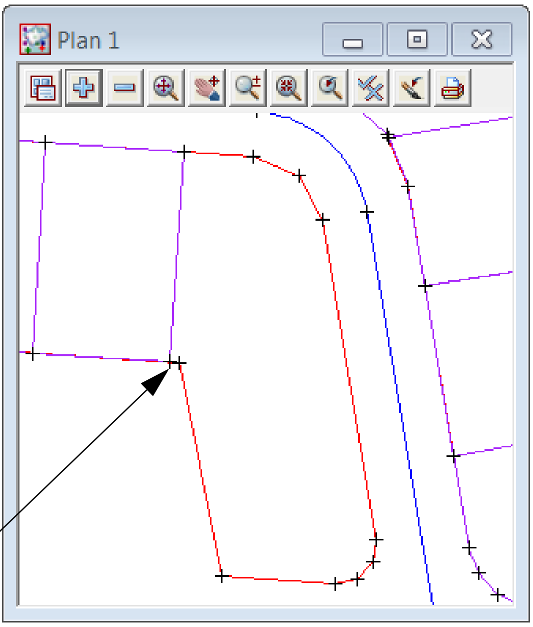
The next lot will have its new edge pivot from a rear vertex

Change **Method for lot** to **pivot pick**


Method

Method for lot: pivot pick

Pick a point: BDY->BDY

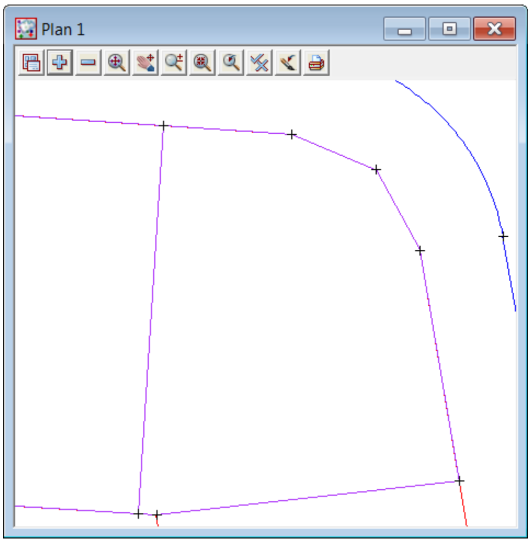


Select **Pick a point** then select and accept the next vertex on the rear boundary

Select **Process** to create new lot

The new lot is created

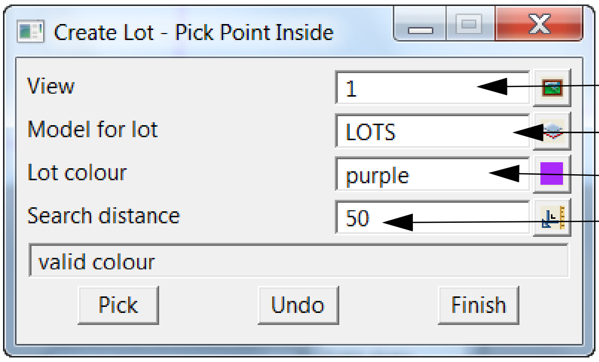
Select **Finish** on **Create Lot** panel



To create the last lot we will use an option to form a lot polygon from picking the centre of a series of strings. A search distance is entered to find all strings within the search distance radius

Pan down to the last lot

Select ***Design=>Estate/lots=>Create lots=>Create lots by picking point inside***



View: 1

Model for lot: LOTS

Lot colour: purple

Search distance: 50

valid colour

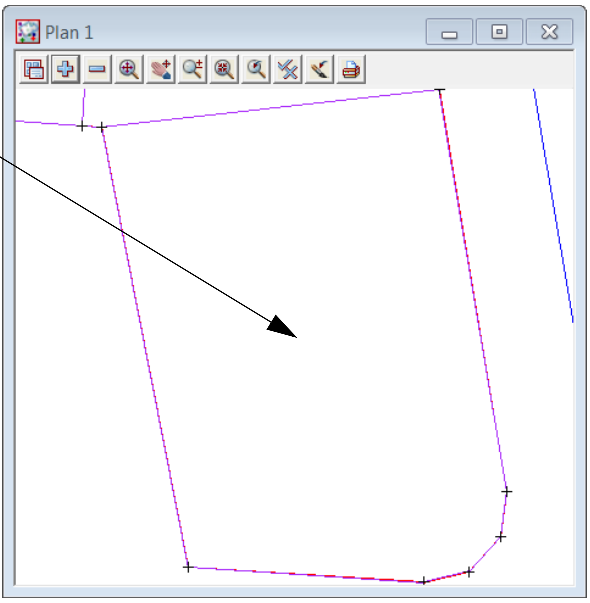
Select view **1**

Select model name **LOTS**

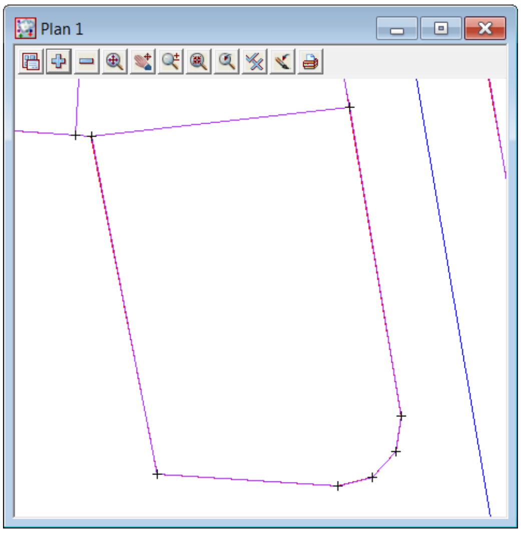
Select colour **purple**

Type in search distance **50**

Select **Pick** and select and accept a point inside the area to create the lot. Ensure the position you pick can see to each vertex of the lot



The new lot is created



This completes the house lots

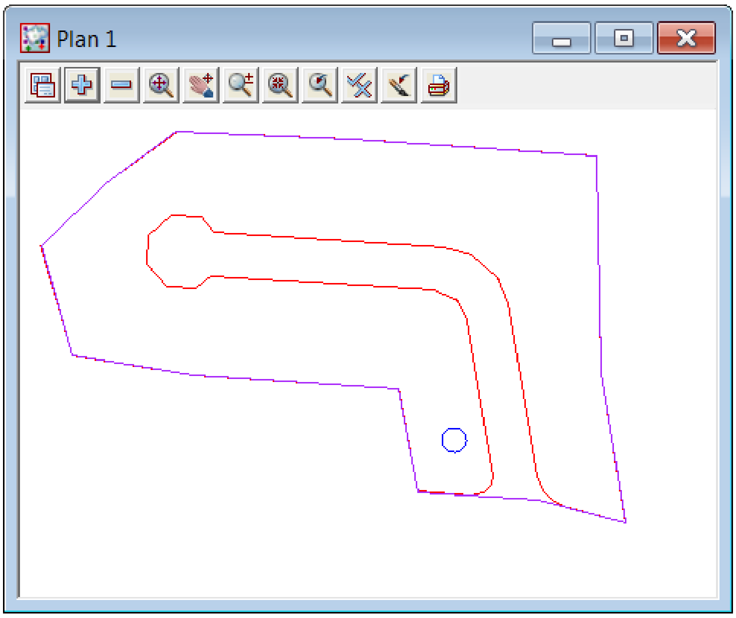
We now create a lot for the road.

Zoom the whole of the subdivision

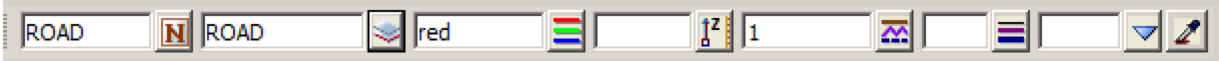
Turn off models **LOTS** and **PARK** and **CENTRELINE**

Turn on the model **SURROUND** mode

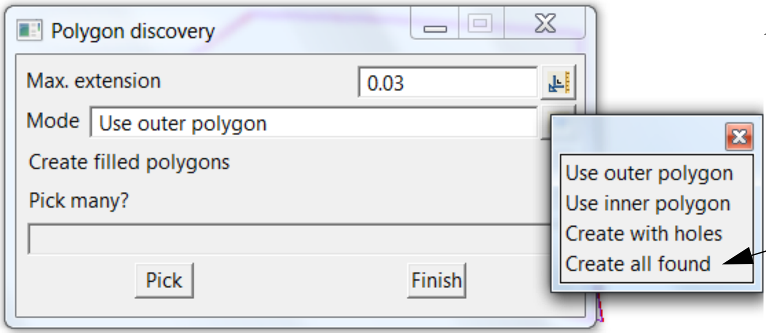
Turn off the vertices



Set the cad control parameters as shown below



ROAD | ROAD | red | 1


Polygon discovery
Create filled polygons
Pick many?
Pick
Finish
Use outer polygon
Use inner polygon
Create with holes
Create all found

Max. extension 0.03

Mode Use outer polygon

To create a polygon bound by the boundaries and the surround edge select ***Design=>Estate/lots=>Create lots=>Create lots from picking points inside (experimental)***

Select the Mode icon

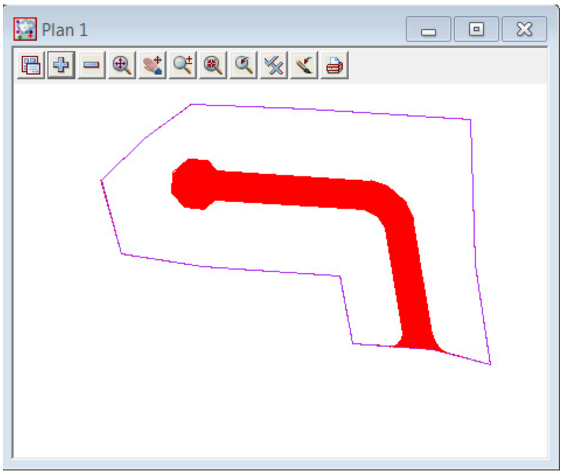
Select **Create all found**

Create filled polygons ☐

Tick check box to create a solid fill of the polygon

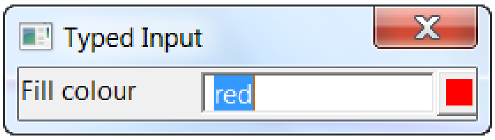
Select **Pick** then pick inside the road area

A polygon is created in the ROAD model



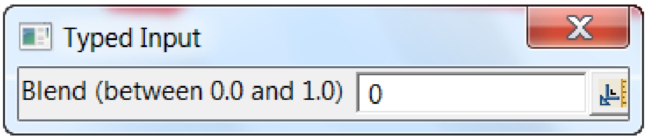
The fill will now be removed
Select ***Strings*** =>***Cad*** => ***Fill***=> ***Solid***
Select the edge of the road polygon

Press **[Enter]** to accept the current colour

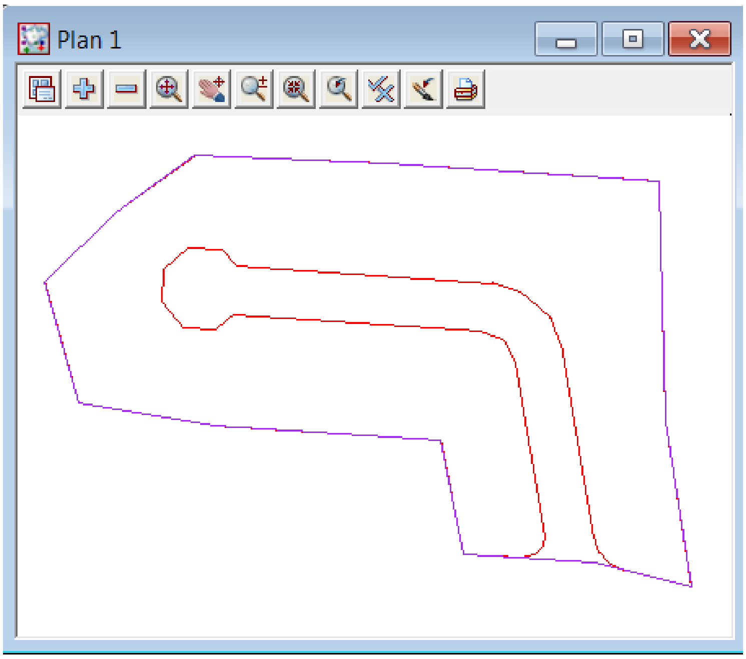

Typed Input

Fill colour red

Type in **0** for Blend and press **[Enter]**


Typed Input

Blend (between 0.0 and 1.0) 0

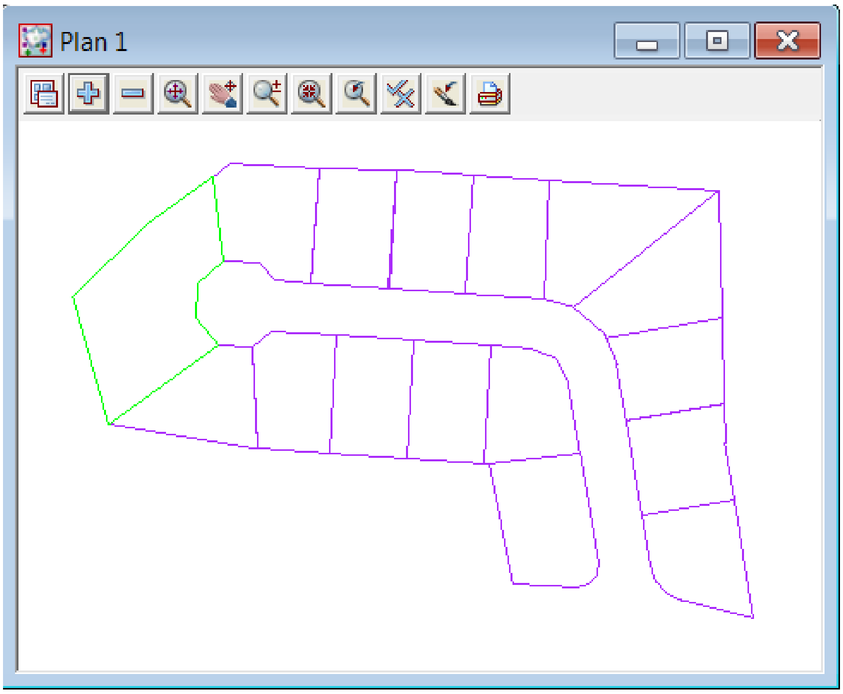


12.8 Lot numbering

The lots can now be numbered according to the type of lot.

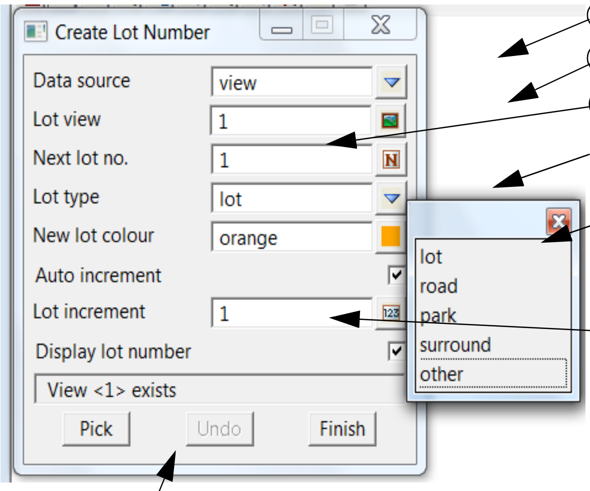
Lots, parks and roads will be numbered separately

Zoom all of the subdivision and ensure that only models **LOTS, PARK** and **ROAD** are turned on



12.8.1 Create lot numbers

Select option ***Design=>Estate/Lots=>Number Lots=>Create lot numbers***



Create Lot Number

Data source: view

Lot view: 1

Next lot no.: 1

Lot type: lot

New lot colour: orange

Auto increment ☑

Lot increment: 1

Display lot number ☑

View <1> exists

Pick
Undo
Finish
lot
road
park
surround
other

Select the **Data source** icon then select **view**

Select view **1**

Type in **1** for **Next lot no.**

Select **Lot type** choice icon

Select **lot**

Select colour **purple**

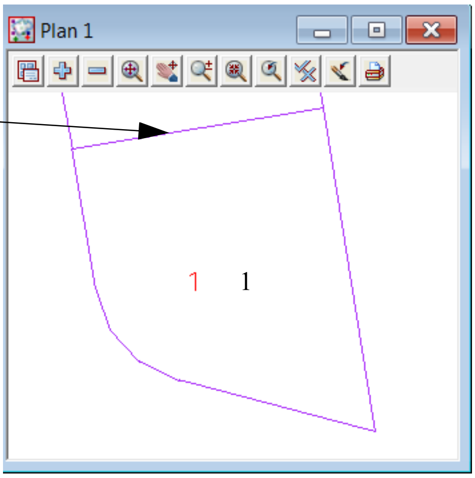
Tick **Auto increment** check box

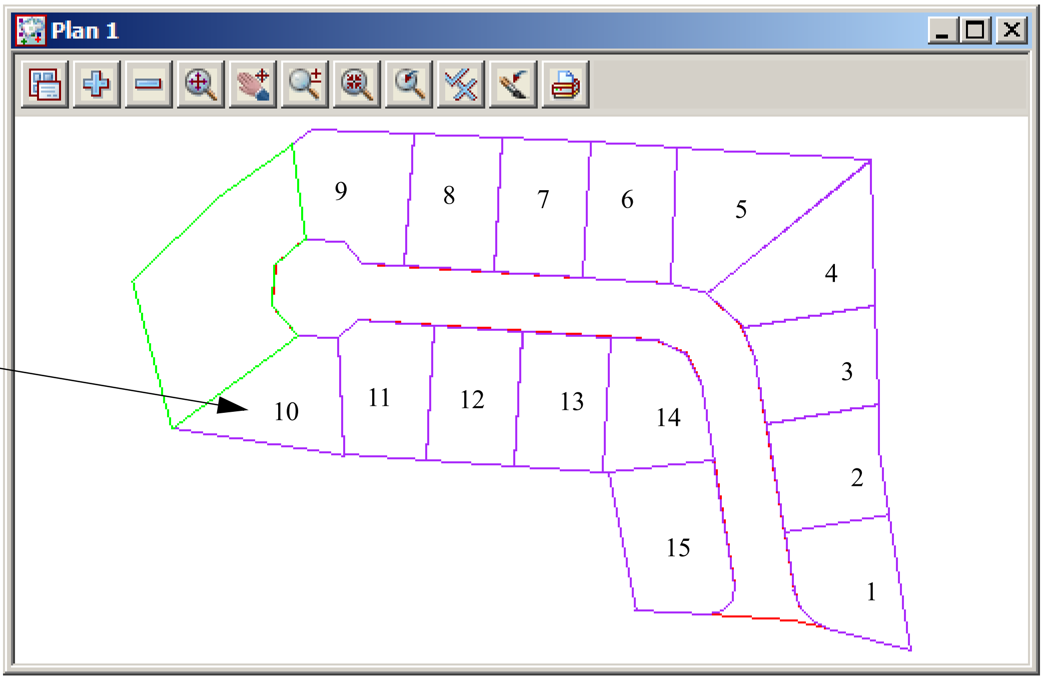
Type in **1** as **Lot increment**

Tick **Display lot number** check box

Select **Pick**

Select and accept a segment of the first lot



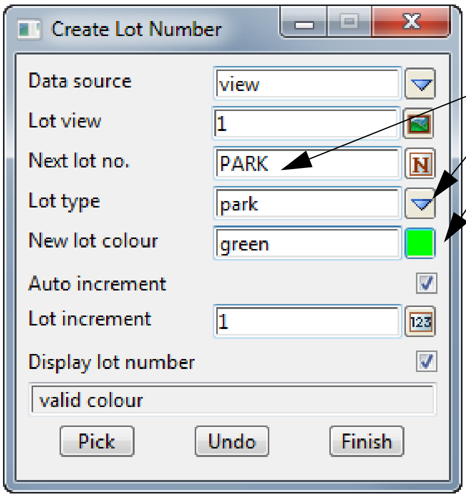


Plan 1
9
8
7
6
5
4
3
2
1
10
11
12
13
14
15

Repeat numbering lots until reaching the park

Continue numbering the lots from the other side of the park

To create the description for the park change the following settings

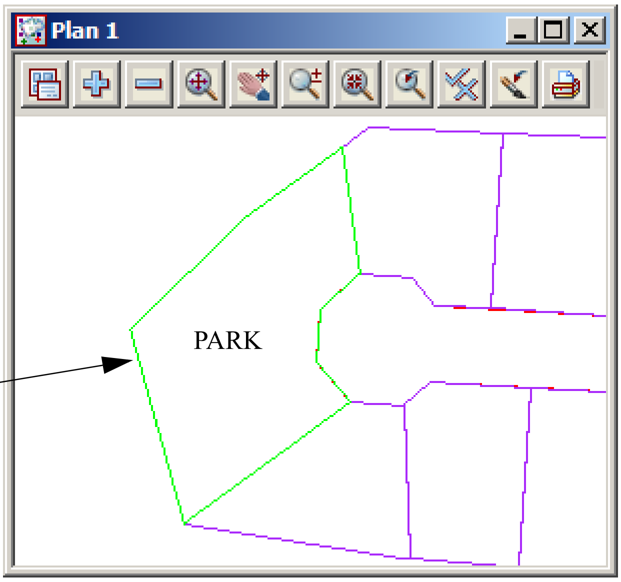

Create Lot Number

Data source: view
Lot view: 1
Next lot no.: PARK
Lot type: park
New lot colour: green
Auto increment ☑
Lot increment: 1
Display lot number ☑
valid colour

Type in **PARK** as Next lot number

Select **Lot type** choice icon and select **park**

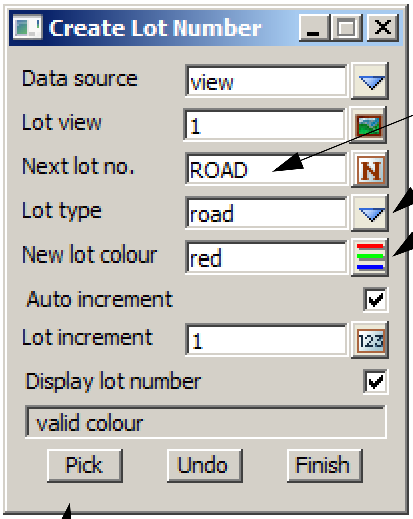
Change the colour to **green**



Select **Pick**

Pick and accept the park string

To number the road change the following settings

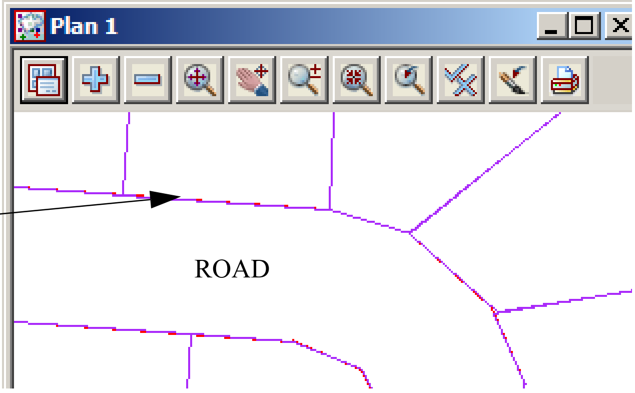

Create Lot Number

Data source: view
Lot view: 1
Next lot no.: ROAD
Lot type: road
New lot colour: red
Auto increment ☑
Lot increment: 1
Display lot number ☑
valid colour

Type in **ROAD** as Next lot number

Select **Lot type** choice icon and select **road**

Change the colour to **red**



Select **Pick**

Pick and accept the road string

Select **Finish** to exit the panel. The temporary numbers will disappear

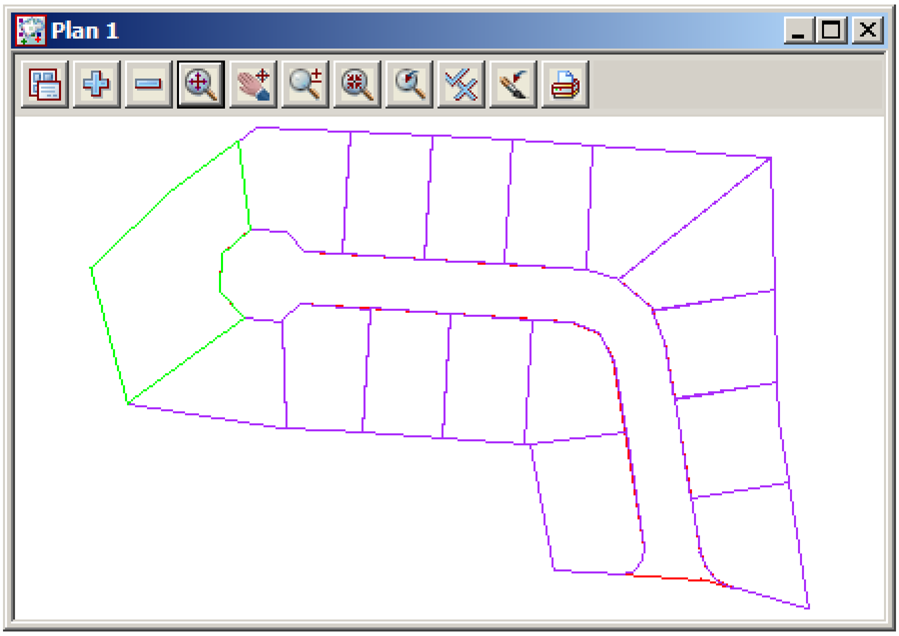
12.9 Lot labelling

The lot annotation can now be created. Features such as bearings, distances, lot numbers and areas are created for each lot

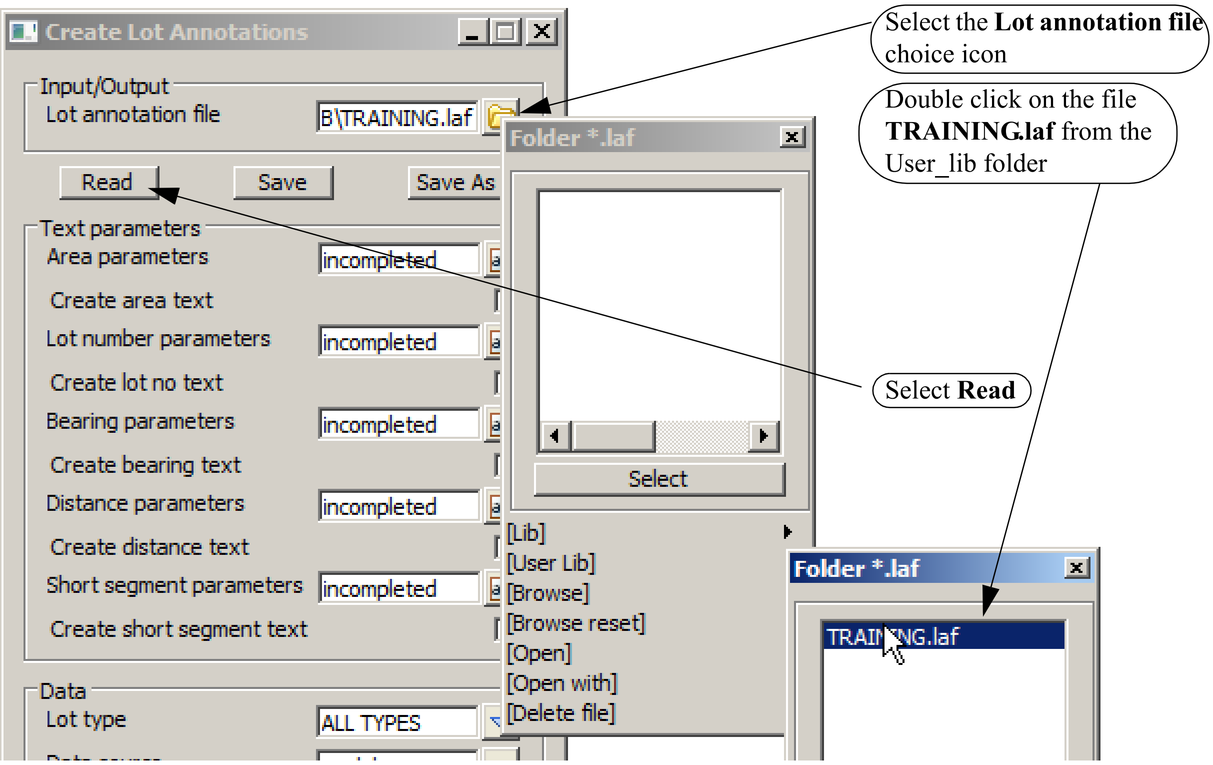
The annotation settings can be stored in a Lot annotation file which is loaded prior to creating the annotation

Ensure that the models **LOTS, PARK** and **ROAD** are the only models active

Zoom all of the subdivision



Select option ***Design=>Estate/Lots=>Label Lots=>Lot labelling***

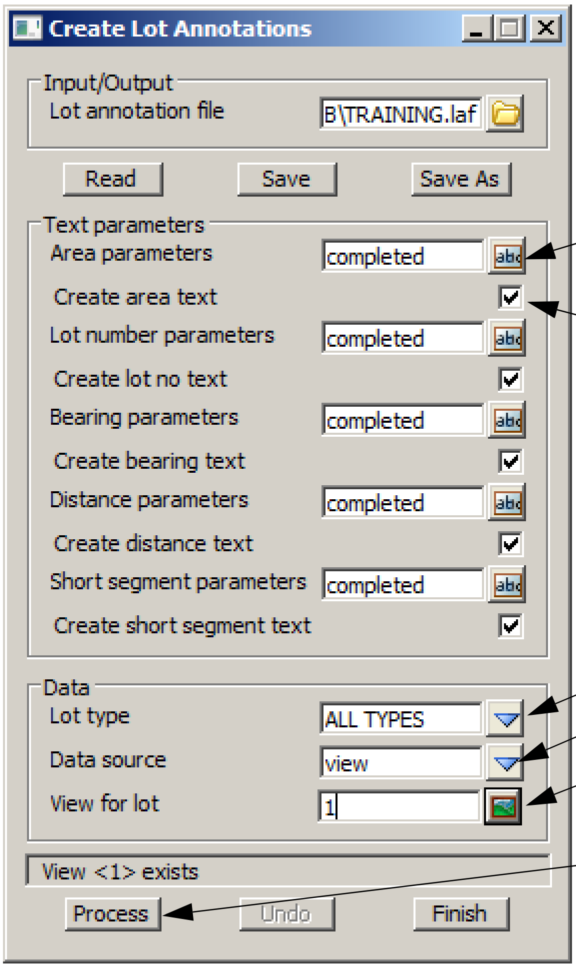

Create Lot Annotations
Input/Output
Read
Save
Save As
Text parameters
Create area text
Create lot no text
Create bearing text
Create distance text
Create short segment text
Data
Folder *.laf
Select
[Lib]
[User Lib]
[Browse]
[Browse reset]
[Open]
[Open with]
[Delete file]
Folder *.laf
TRAINING.laf

Lot annotation file B\TRAINING.laf
Area parameters incompleted
Lot number parameters incompleted
Bearing parameters incompleted
Distance parameters incompleted
Short segment parameters incompleted
Lot type ALL TYPES

Select the **Lot annotation file** choice icon

Double click on the file **TRAINING.laf** from the User_lib folder

Select **Read**



Create Lot Annotations

Input/Output
Lot annotation file: B\TRAINING.laf

Text parameters
Area parameters: completed
Create area text ☑
Lot number parameters: completed
Create lot no text ☑
Bearing parameters: completed
Create bearing text ☑
Distance parameters: completed
Create distance text ☑
Short segment parameters: completed
Create short segment text ☑

Data
Lot type: ALL TYPES
Data source: view
View for lot: 1

View <1> exists

Each type of annotation can be edited by selecting the edit icon

To create the different text types tick the relevant check boxes

A short line table can be created which will tabulate any line where the distance of the line is less than a user defined value

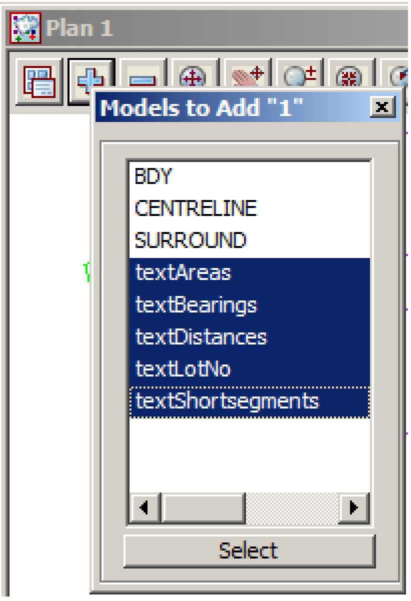
Select **Lot type** choice icon and select **ALL TYPES**

Select **Data source** icon and select **view**

Select view **1**

Select **Process**

Turn on the annotation models



Plan 1

Models to Add "1"

BDY
CENTRELINE
SURROUND
textAreas
textBearings
textDistances
textLotNo
textShortsegments

Set the plot scale to 1:500

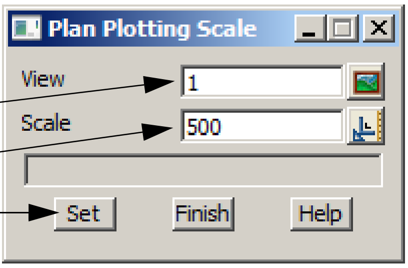
Select ***Menu*** icon

Walk right on ***Settings=>Ploting scale***

Select view **1**

Type in scale **500**

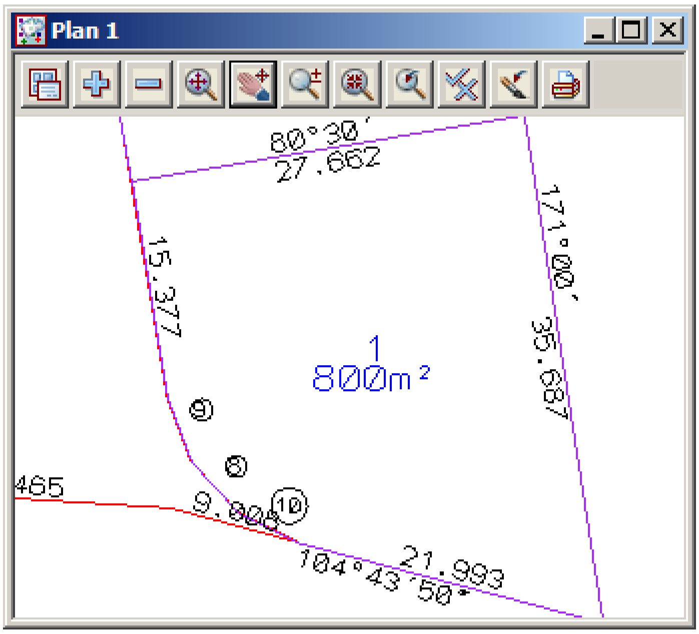
Select **Set** then **Finish**



Plan Plotting Scale
View
Scale
Set
Finish
Help

View: 1

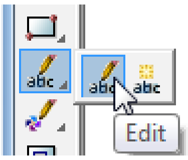
Scale: 500



Plan 1
80°30'
27.662
15.377
171°00'
35.687
1
800m²
9
8
10
465
9.808
21.993
104°43'50"

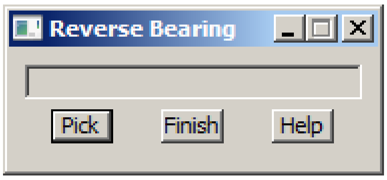
12.9.1 Edit the annotation

The annotation text can now be edited by using options on the text flyout toolbar

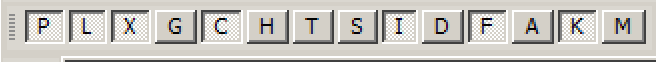


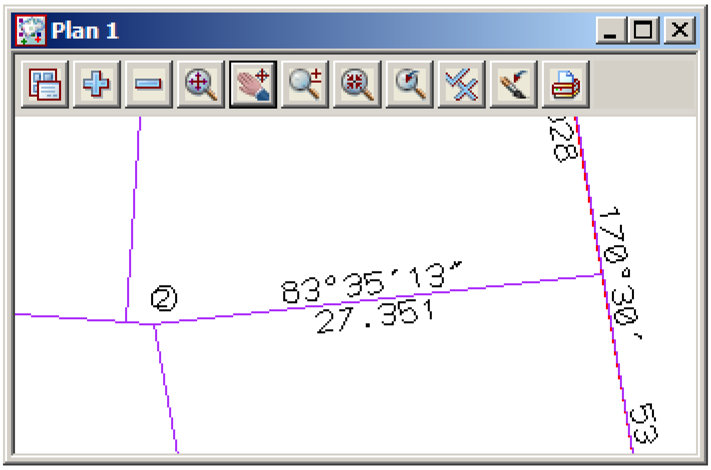
Reverse Bearing

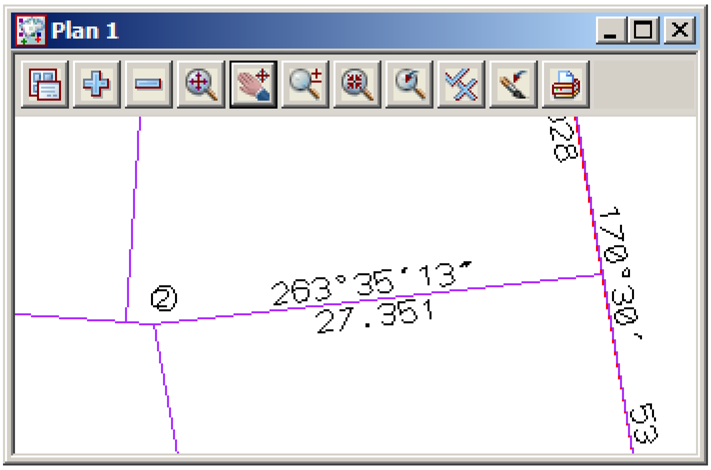
To reverse the direction of a bearing label select option ***Design=>Estate/Lots=>Lot Utilities=>Reverse Bearing***


Reverse Bearing
Pick
Finish
Help

Select and accept the bearing to be reversed. You may need to turn on the vertices to see the insertion point of the text or you can turn on the text snap [X] from the snaps toolbar to click anywhere in the text

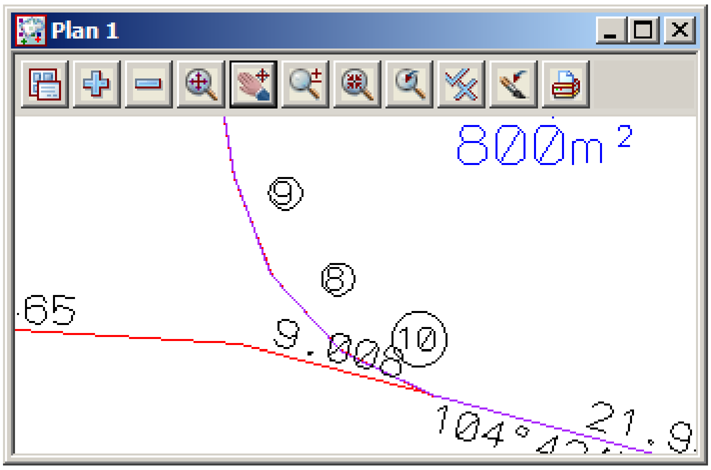

P
L
X
G
C
H
T
S
I
D
F
A
K
M


Plan 1
28
170°30'
83°35'13"
27.351
②
53


Plan 1
28
170°30'
263°35'13"
27.351
②
53

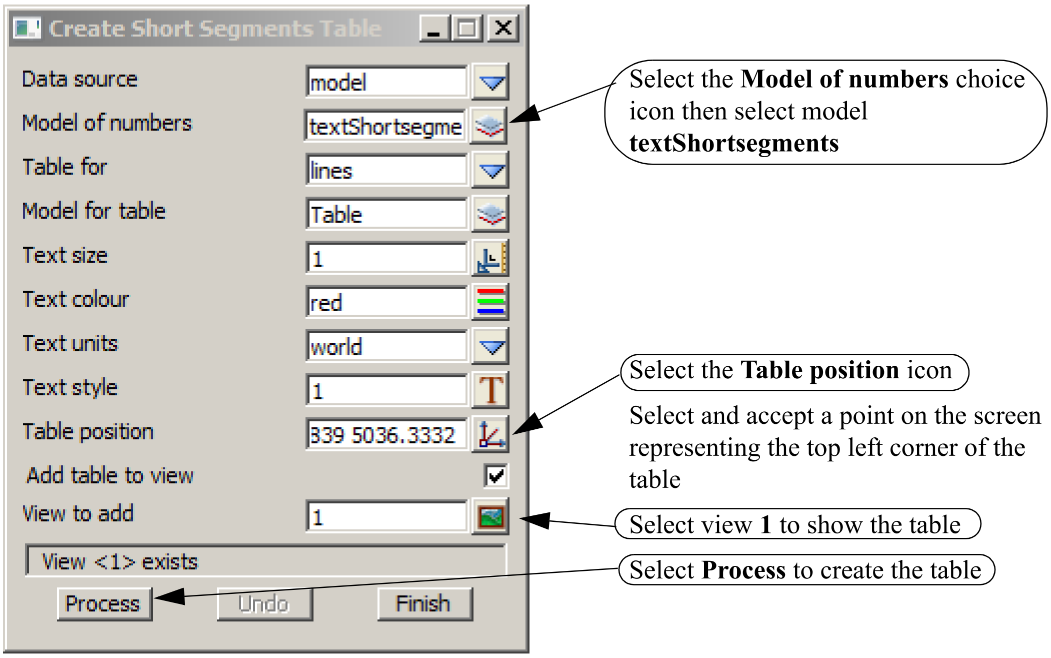
12.9.2 Create Short Line table

The short lines have been identified with a circled number



We now need to create the short line table

Select option ***Design=>Estate/Lots=>Lot Utilities=>Short line/arc table***



Data source: model
Model of numbers: textShortsegme
Table for: lines
Model for table: Table
Text size: 1
Text colour: red
Text units: world
Text style: 1
Table position: 339 5036.3332
Add table to view ☑
View to add: 1
View <1> exists

Select the **Model of numbers** choice icon then select model **textShortsegments**

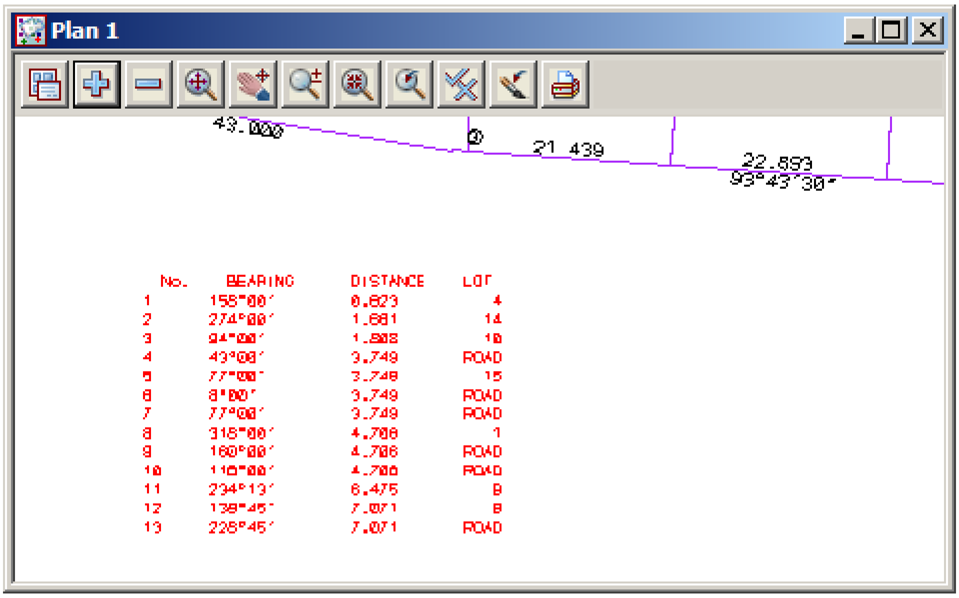
Select the **Table position** icon

Select and accept a point on the screen representing the top left corner of the table

Select view **1** to show the table

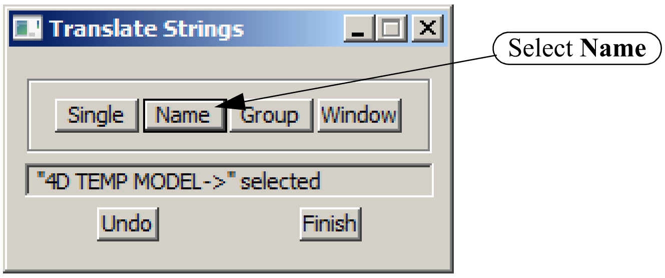
Select **Process** to create the table

The bearing and distances of the short lines are displayed along with the relevant lot number


Plan 1
43.000
21.439
22.893
93°43'30"

No.	BEARING	DISTANCE	LOT
1	158°00'	0.823	4
2	274°00'	1.681	14
3	94°00'	1.808	10
4	43°00'	3.749	ROAD
5	77°00'	3.748	15
6	8°00'	3.749	ROAD
7	77°00'	3.749	ROAD
8	318°00'	4.708	1
9	180°00'	4.706	ROAD
10	118°00'	4.708	ROAD
11	234°13'	6.475	8
12	139°45'	7.071	8
13	228°45'	7.071	ROAD

To move the table select option ***Drafting=>Multi strings translate***


Translate Strings
Single
Name
Group
Window
Undo
Finish

"4D TEMP MODEL->" selected

Select **Name**

Select and accept a piece of text in the table

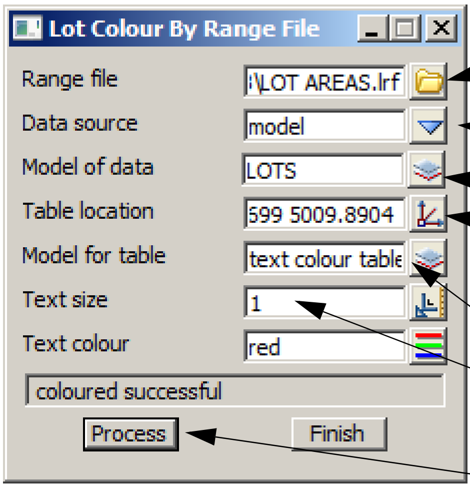
Move the table to a new location and accept the position

Select **Finish** to exit the option

12.10 Create colour table of lot areas

Lots can be coloured and a table created based on the size of the lot.

Select option ***Design=>Estate/Lots=>Lot Utilities=>Colour lots by range file***



Lot Colour By Range File

Range file :\LOT AREAS.lrf

Data source model

Model of data LOTS

Table location 599 5009.8904

Model for table text colour tabl

Text size 1

Text colour red

coloured successful

Select **Range file** icon
Select range file **LOT AREA.lrf** from the User_lib folder.

Set the **Data source** to **model**

Select **LOTS** as the **Model of lots**

Select the **Table location** icon and select **Pick xyz**

Select and accept a point on the screen representing the top left corner of the table

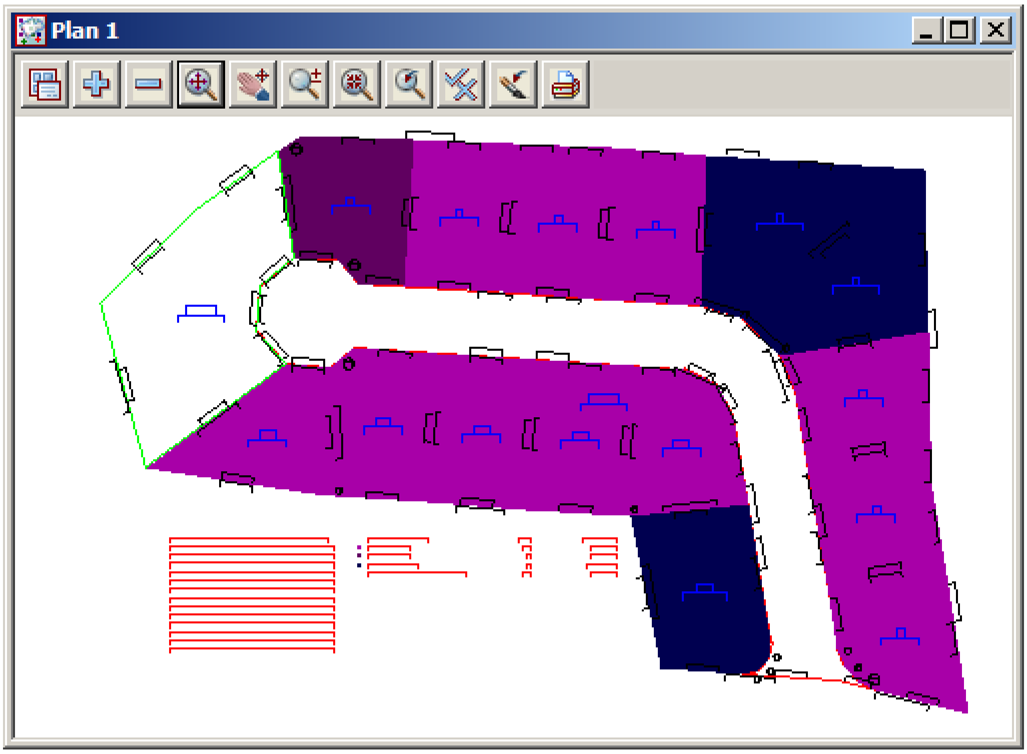
Type in **text colour table** as model name

Type in **1** as the text size

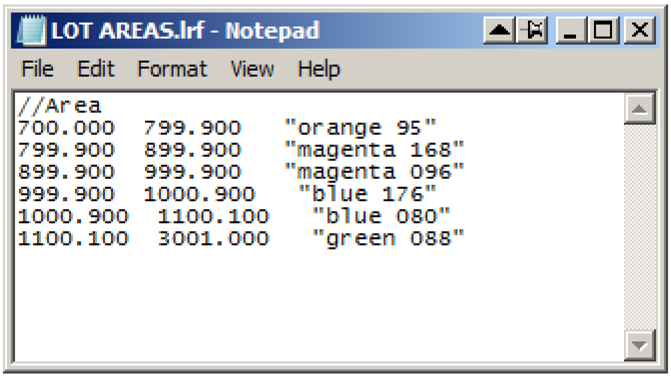
Select **Red** as text colour

Select **Process** then **Finish** to colour the lots and create the table

Turn on the model text colour table



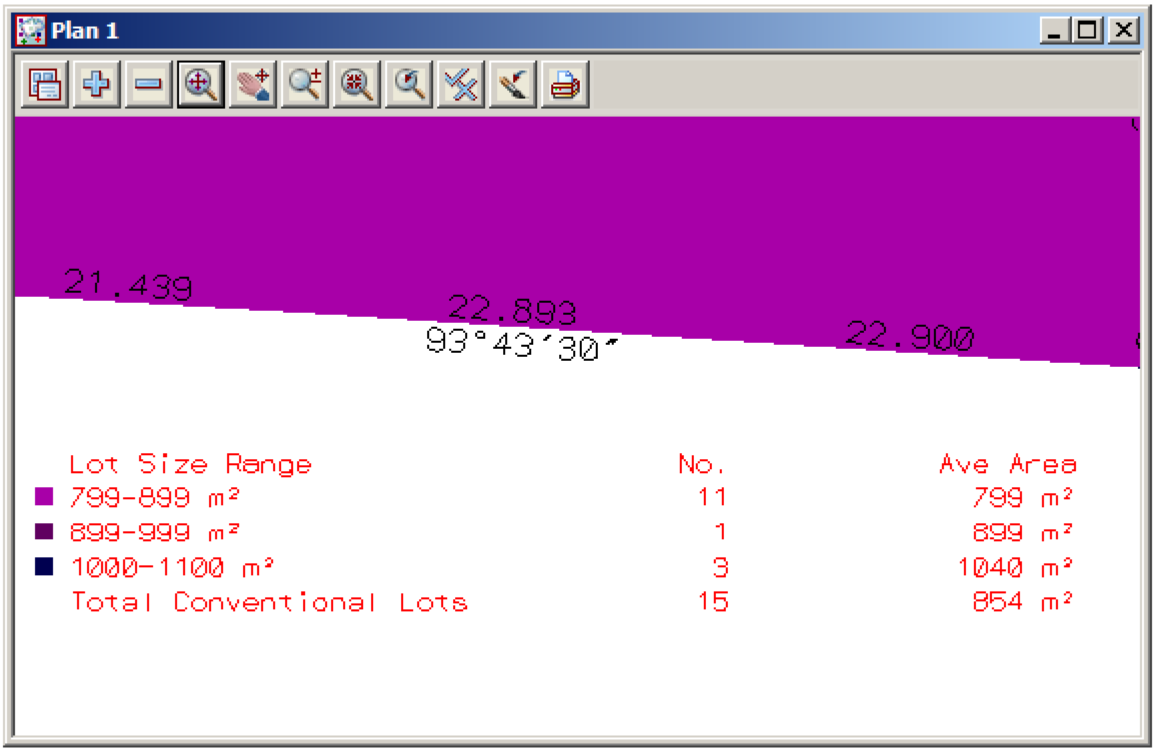
The lots are coloured based on the mapping file


LOT AREAS.lrf - Notepad
File Edit Format View Help

```
//Area
700.000  799.900   "orange 95"
799.900  899.900   "magenta 168"
899.900  999.900   "magenta 096"
999.900  1000.900   "blue 176"
1000.900  1100.100   "blue 080"
1100.100  3001.000   "green 088"
```

Zoom in to the colour table

The lot sizes are listed along with the number of lots in each category and the average area

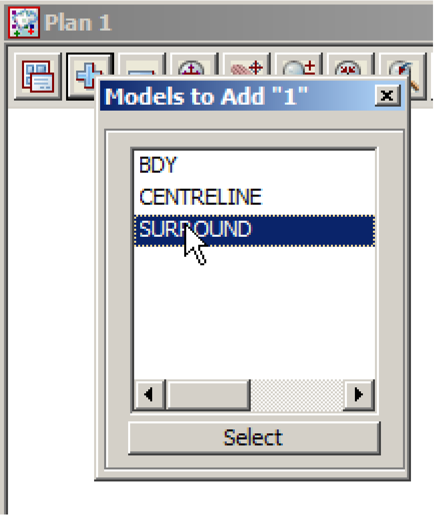

Plan 1
21.439
22.893
93°43´30"
22.900

Lot Size Range	No.	Ave Area
🟪 799-899 m²	11	799 m²
🟪 899-999 m²	1	899 m²
🟦 1000-1100 m²	3	1040 m²
Total Conventional Lots	15	854 m²

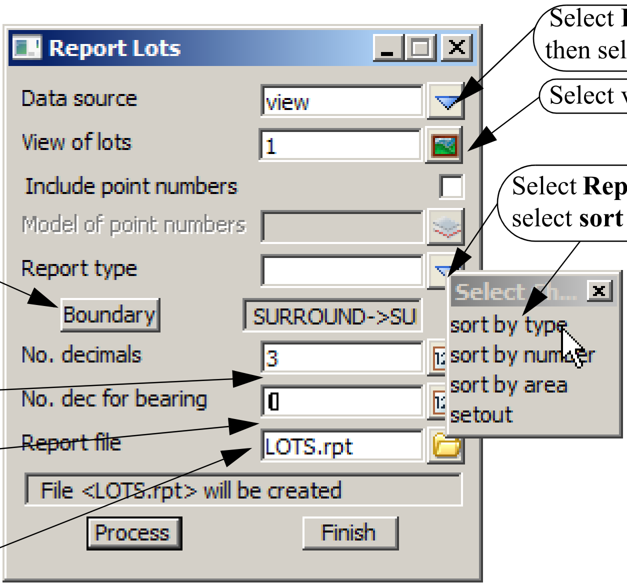
12.11 Lot Reporting

We will now generate a report on the subdivision

Turn on the **SURROUND** models to use as the Boundary


Plan 1
Models to Add "1"
BDY
CENTRELINE
SURROUND
Select

Select option ***Design=>Estate/Lots=>Report Lots***


Report Lots
Include point numbers
Model of point numbers
sort by type
sort by number
sort by area
setout
Process
Finish

Data source: view

View of lots: 1

Report type:

Boundary: SURROUND->SU

No. decimals: 3

No. dec for bearing: 0

Report file: LOTS.rpt

File <LOTS.rpt> will be created

Select **Data source** icon then select **view**

Select view **1**

Select **Report type** icon then select **sort by type**

Select **Boundary** then select and accept part of the **SURROUND** string

Type in **3** for number of decimal places

Type in **0** for number of decimals for the seconds in the bearing

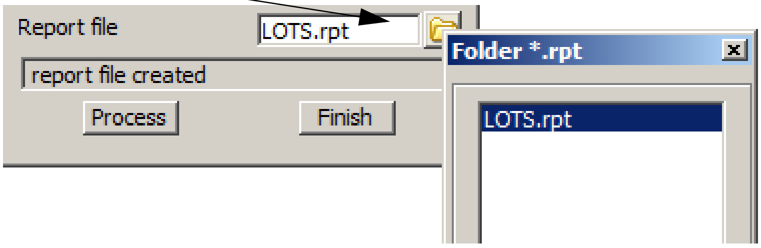
Type in report file name **LOTS**

Select **Process**

Select **Report file** folder icon

Select **LOTS.rpt**

Select **Open**

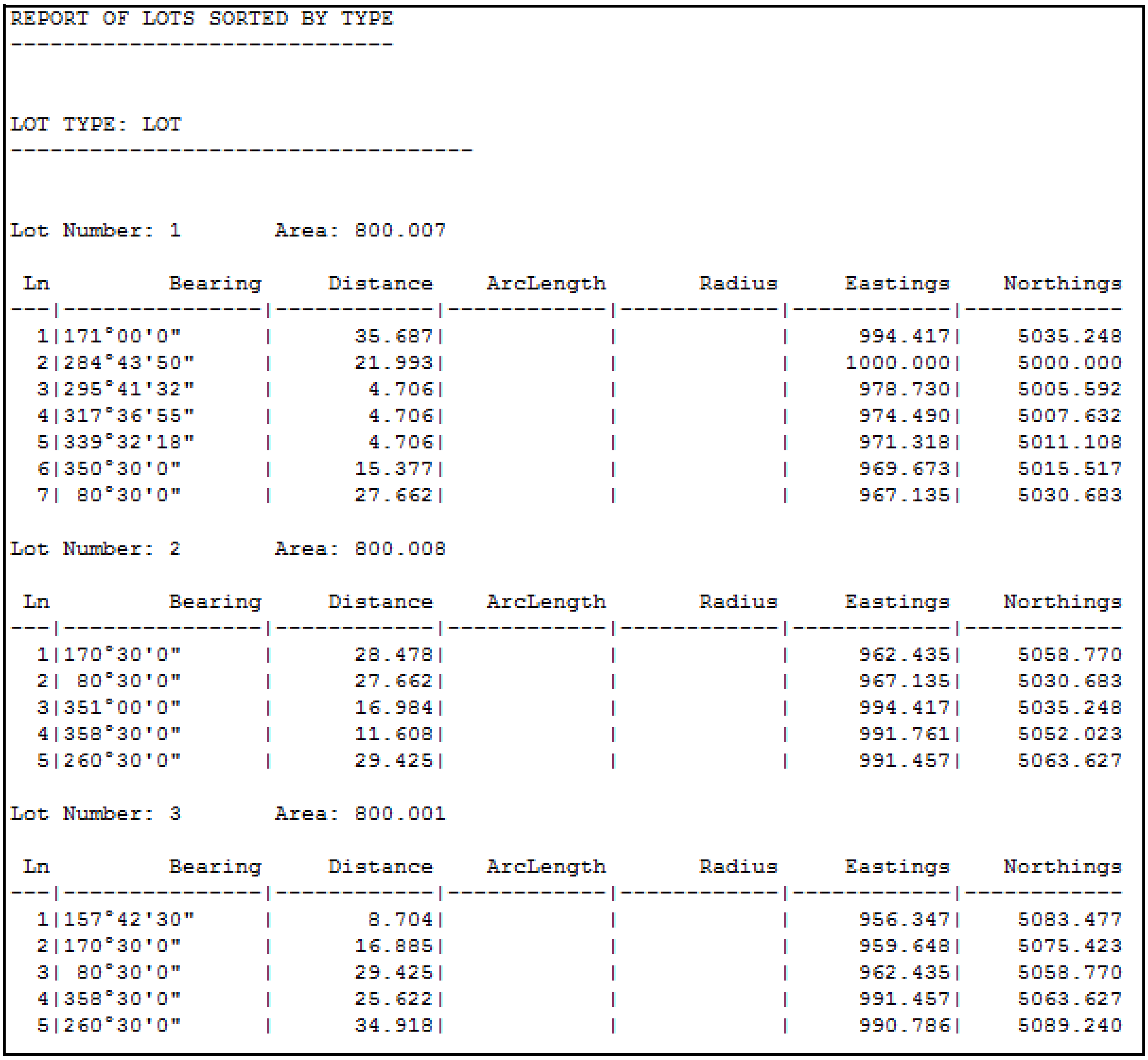

Folder *.rpt
LOTS.rpt
Process
Finish

Report file: LOTS.rpt

report file created

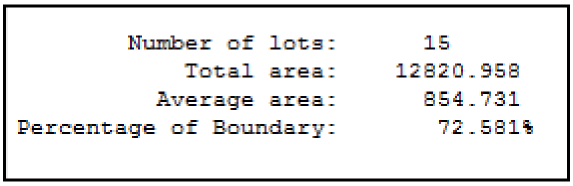
The first section of the report deals with the lots

The number, area and dimensions are displayed along with the vertex co-ordinates



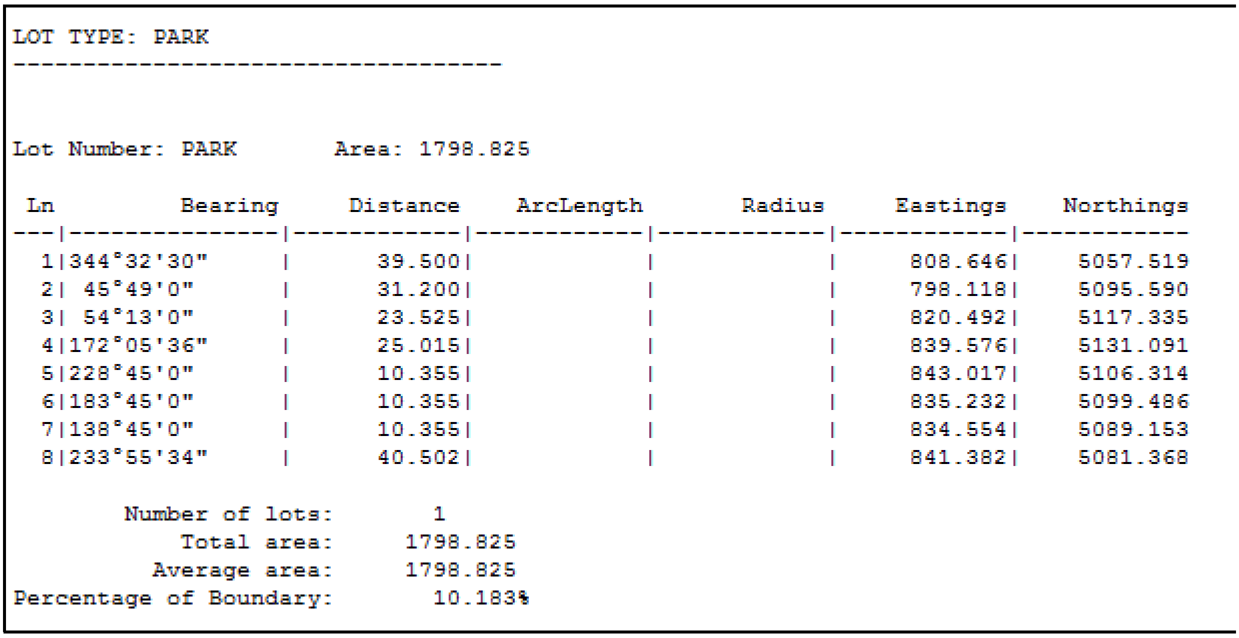
```
REPORT OF LOTS SORTED BY TYPE
-----------------------------


LOT TYPE: LOT
-----------------------------------


Lot Number: 1       Area: 800.007

 Ln          Bearing     Distance    ArcLength       Radius     Eastings    Northings
---|---------------|------------|------------|------------|------------|------------
  1|171°00'0"      |      35.687|            |            |     994.417|    5035.248
  2|284°43'50"     |      21.993|            |            |    1000.000|    5000.000
  3|295°41'32"     |       4.706|            |            |     978.730|    5005.592
  4|317°36'55"     |       4.706|            |            |     974.490|    5007.632
  5|339°32'18"     |       4.706|            |            |     971.318|    5011.108
  6|350°30'0"      |      15.377|            |            |     969.673|    5015.517
  7| 80°30'0"      |      27.662|            |            |     967.135|    5030.683

Lot Number: 2       Area: 800.008

 Ln          Bearing     Distance    ArcLength       Radius     Eastings    Northings
---|---------------|------------|------------|------------|------------|------------
  1|170°30'0"      |      28.478|            |            |     962.435|    5058.770
  2| 80°30'0"      |      27.662|            |            |     967.135|    5030.683
  3|351°00'0"      |      16.984|            |            |     994.417|    5035.248
  4|358°30'0"      |      11.608|            |            |     991.761|    5052.023
  5|260°30'0"      |      29.425|            |            |     991.457|    5063.627

Lot Number: 3       Area: 800.001

 Ln          Bearing     Distance    ArcLength       Radius     Eastings    Northings
---|---------------|------------|------------|------------|------------|------------
  1|157°42'30"     |       8.704|            |            |     956.347|    5083.477
  2|170°30'0"      |      16.885|            |            |     959.648|    5075.423
  3| 80°30'0"      |      29.425|            |            |     962.435|    5058.770
  4|358°30'0"      |      25.622|            |            |     991.457|    5063.627
  5|260°30'0"      |      34.918|            |            |     990.786|    5089.240
```

After the last lot is displayed, the number of lots along with the total area, average area and percentage of the boundary (SURROUND) are listed



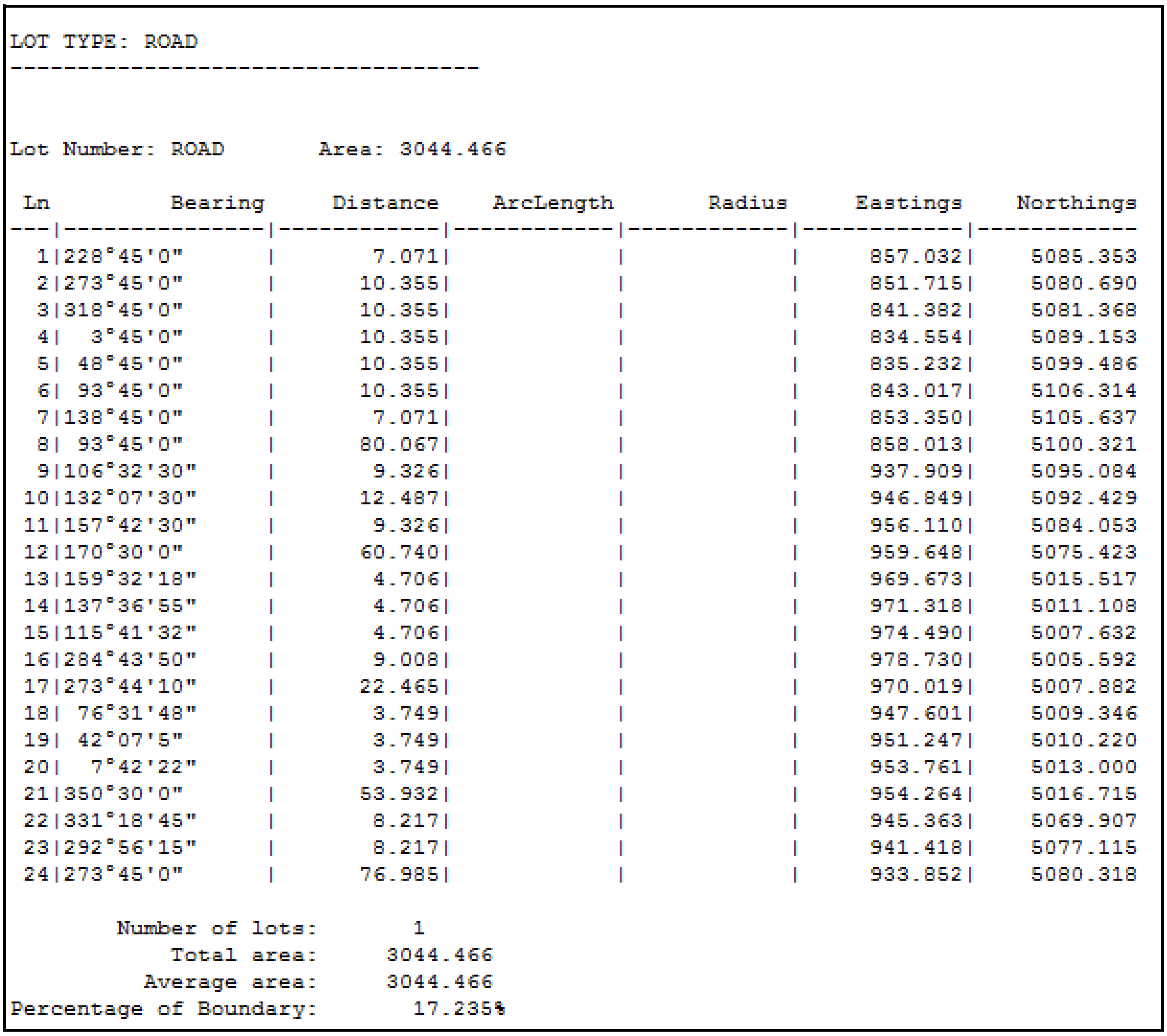
```
        Number of lots:      15
            Total area:   12820.958
          Average area:     854.731
Percentage of Boundary:      72.581%
```

The park is listed



```
LOT TYPE: PARK
-----------------------------------


Lot Number: PARK       Area: 1798.825

 Ln          Bearing      Distance     ArcLength       Radius      Eastings     Northings
---|---------------|------------|------------|------------|------------|------------
  1|344°32'30"     |      39.500|            |            |     808.646|    5057.519
  2| 45°49'0"      |      31.200|            |            |     798.118|    5095.590
  3| 54°13'0"      |      23.525|            |            |     820.492|    5117.335
  4|172°05'36"     |      25.015|            |            |     839.576|    5131.091
  5|228°45'0"      |      10.355|            |            |     843.017|    5106.314
  6|183°45'0"      |      10.355|            |            |     835.232|    5099.486
  7|138°45'0"      |      10.355|            |            |     834.554|    5089.153
  8|233°55'34"     |      40.502|            |            |     841.382|    5081.368

        Number of lots:        1
            Total area:     1798.825
          Average area:     1798.825
Percentage of Boundary:       10.183%
```

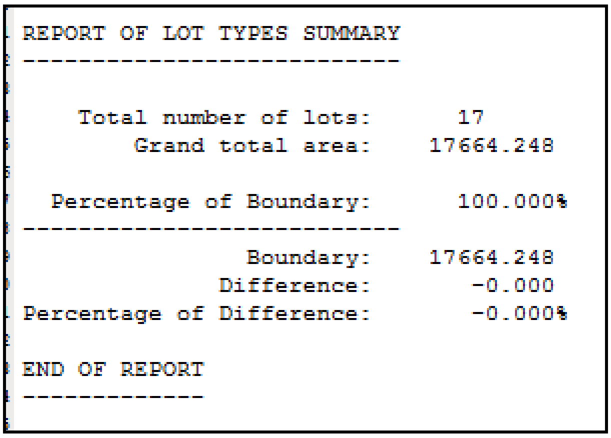
The road is listed



```
LOT TYPE: ROAD
-----------------------------------


Lot Number: ROAD       Area: 3044.466

 Ln          Bearing      Distance     ArcLength       Radius      Eastings     Northings
---|---------------|------------|------------|------------|------------|------------
  1|228°45'0"      |       7.071|            |            |     857.032|    5085.353
  2|273°45'0"      |      10.355|            |            |     851.715|    5080.690
  3|318°45'0"      |      10.355|            |            |     841.382|    5081.368
  4|  3°45'0"      |      10.355|            |            |     834.554|    5089.153
  5| 48°45'0"      |      10.355|            |            |     835.232|    5099.486
  6| 93°45'0"      |      10.355|            |            |     843.017|    5106.314
  7|138°45'0"      |       7.071|            |            |     853.350|    5105.637
  8| 93°45'0"      |      80.067|            |            |     858.013|    5100.321
  9|106°32'30"     |       9.326|            |            |     937.909|    5095.084
 10|132°07'30"     |      12.487|            |            |     946.849|    5092.429
 11|157°42'30"     |       9.326|            |            |     956.110|    5084.053
 12|170°30'0"      |      60.740|            |            |     959.648|    5075.423
 13|159°32'18"     |       4.706|            |            |     969.673|    5015.517
 14|137°36'55"     |       4.706|            |            |     971.318|    5011.108
 15|115°41'32"     |       4.706|            |            |     974.490|    5007.632
 16|284°43'50"     |       9.008|            |            |     978.730|    5005.592
 17|273°44'10"     |      22.465|            |            |     970.019|    5007.882
 18| 76°31'48"     |       3.749|            |            |     947.601|    5009.346
 19| 42°07'5"      |       3.749|            |            |     951.247|    5010.220
 20|  7°42'22"     |       3.749|            |            |     953.761|    5013.000
 21|350°30'0"      |      53.932|            |            |     954.264|    5016.715
 22|331°18'45"     |       8.217|            |            |     945.363|    5069.907
 23|292°56'15"     |       8.217|            |            |     941.418|    5077.115
 24|273°45'0"      |      76.985|            |            |     933.852|    5080.318

        Number of lots:        1
            Total area:     3044.466
          Average area:     3044.466
Percentage of Boundary:       17.235%
```

At the end of the report the total number of lots are listed along with the area

Any errors in the lot creations should yield a percentage difference to the boundary



```
REPORT OF LOT TYPES SUMMARY
---------------------------

    Total number of lots:      17
        Grand total area:    17664.248

  Percentage of Boundary:      100.000%
---------------------------
                Boundary:    17664.248
              Difference:       -0.000
Percentage of Difference:       -0.000%

END OF REPORT
-------------
```

Exit the report file