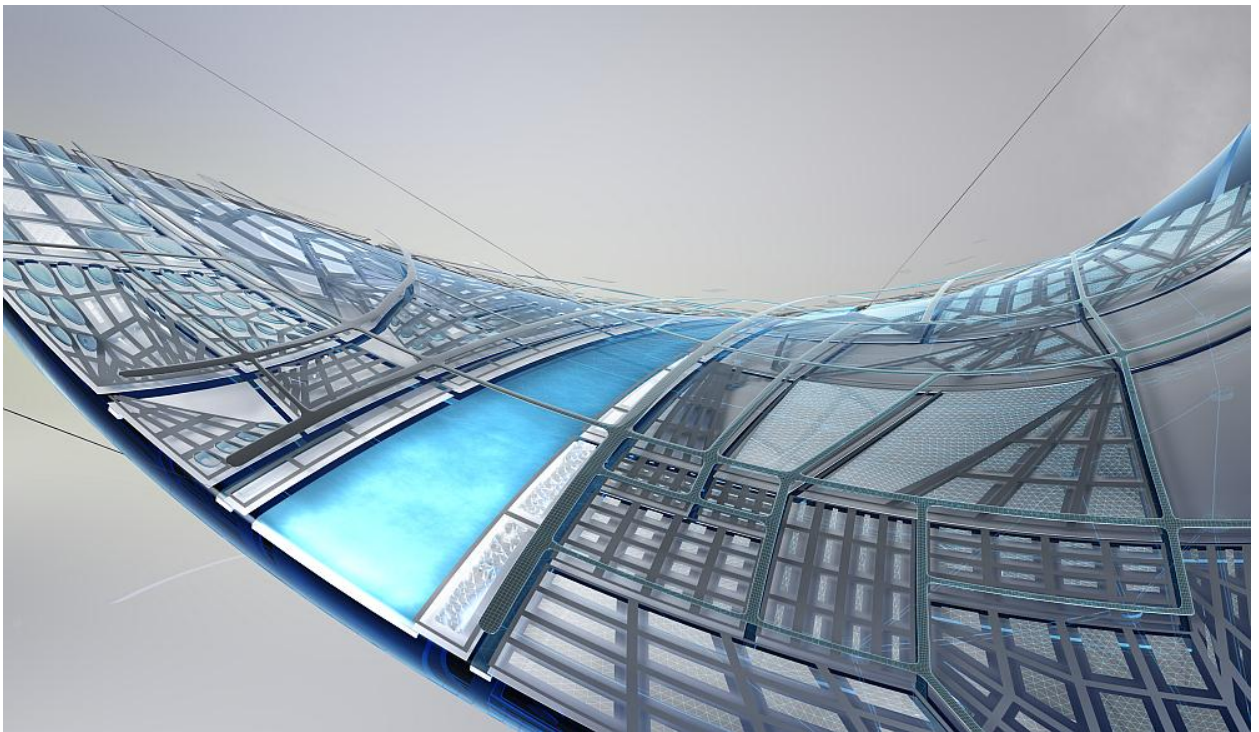


# AutoCAD® Civil 3D® 2015 UK and Ireland Country Kit





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# 1 General

## 1.1 Introduction from the author and creator

The document is an overview of all settings that AutoCAD Civil 3D 2015 Country Kit for the UK and Ireland. Also this is an update to what was provided in 2014 with enhancements and changes based on learning from users over the past year.

As the UK and Ireland has no true drawing standards the styles provided should give results that are familiar to the users and to be similar to other civil design software in some cases.

The content is an example of what is possible and to what a user of AutoCAD Civil 3D should require to start using the product from out of the box.

For any organisation, the templates provided should be used as a base to adjust the content for their own needs where some changes to layer names, colours, linetypes and drawing border frames can be achieved with only AutoCAD knowledge.

The templates then could be located on a network location so to standardise that organisation with consistent results. Any styles created on the fly for specific needs can be always dragged and dropped back into the master template for reuse. In addition the style manager can compare changes and also purge out unnecessary styles and layers.

This year has focused on some corrections to the toolpalette, design criteria checking for 'K' values, point codes being more obvious in assembly view and settings for profile locking

The country kit is an on-going development and is based on user feedback, so please feel free to suggest additions, amendments as needed. These are assisted by an example drawing and user case.

Please email [jack.strongitharm@autodesk.com](mailto:jack.strongitharm@autodesk.com)

Keep up to date by reading the blog site and following the Youtube channel for updates and announcements.



[www.autodesk.com/fromthegroundup](http://www.autodesk.com/fromthegroundup) and also the YouTube Channel [www.youtube.co.uk/CivilFromtheGroundUp](http://www.youtube.co.uk/CivilFromtheGroundUp)

Enjoy

Jack Strongitharm – Autodesk



## 1.2 Overview

---

UKIE Country Kit contains folders mention below:

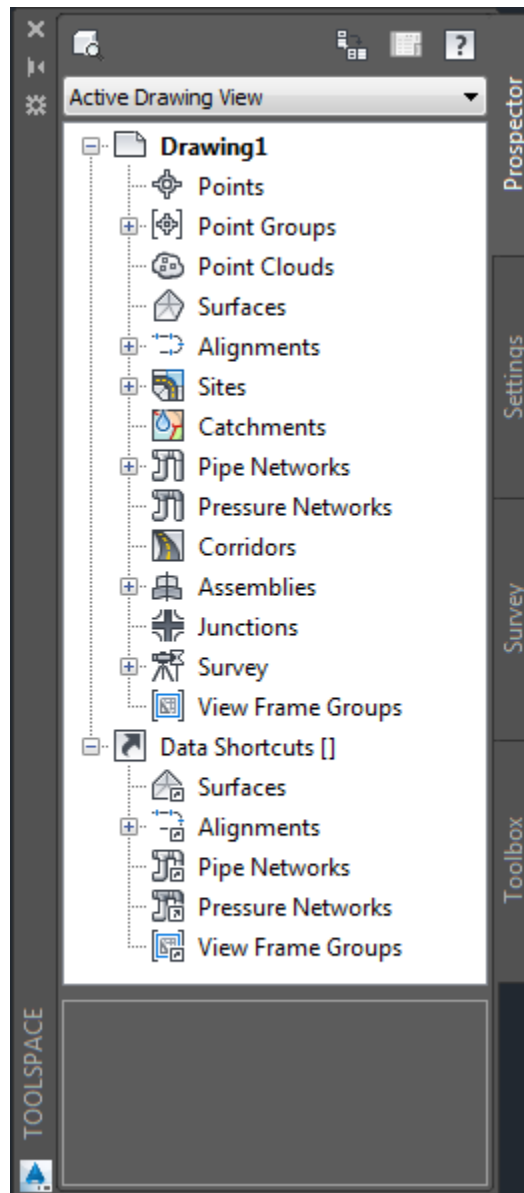
- **\_Autodesk Civil 3D 2015 UKIE.dwt** template for UK and Ireland styles for Civil 3D objects and labels.
- **\_Autodesk Civil 3D 2015 Section.dwt** template sample to produce automated cross section sheets
- **\_Autodesk Civil 3D 2015 UK OS Mastermap** template for importing raw .gz and or .gml files from the Ordnance Survey to theme with suitable colours to create a dwg.
- **UK IE Pipes Catalog**. Folder with pipes files that correspond with Parts Lists (styles) in the template.
- **UK IE Structures Catalog**
- **Plan Production**. Folder with templates that contains settings for Plan Production
- **Corridor Design Standards**. A setup file for Design Criteria and Superelevation for Corridor models based on DMRB standards. Also a file for roundabout design with suggested values.
- **Quantities Reports**. Folder with files containing settings for generating reports of volume for Corridor models or dynamic tables in the current drawing.
- **Toolbox**. containing reports, which can be run from the Toolbox tab in the Toolspace.
- **Assemblies**. Folder containing drawings with predefined assemblies that can be used with the Junction functionality.
- **Rate Item Data**. An example file containing settings for reporting areas and length from objects in the current drawing.

Toolspace is the Primary Civil 3D property window. This window is used for handling Civil 3D objects and settings of all Civil 3D styles for Civil 3D objects and labels. The Toolspace has two important tabs:

- **Prospector**. Use this tab for handling properties and styles for Civil 3D objects and labels.
- **Settings**. Use this tab for general settings of Civil 3D styles.

### 1.2.1 Prospector

Any Civil 3D object contains its own style. This style controls the Civil 3D object appearance (object and label) in the drawing. The Prospector tab in the Toolspace is the Primary window for handling property, styles and commands for all Civil 3D objects.



From the Prospector tab in the Toolspace it is possible to create, copy or edit styles for Civil 3D objects. In addition to this labels are generated as dynamic data mostly annotative.

Note that new styles not automatically will be saved in the template for the CKD. This has to be done manually with Drag and Drop in the 'Master View' settings tab.

### 1.2.2 Settings

Civil 3D objects are generated with their own styles when created in the drawing with a Civil 3D command.

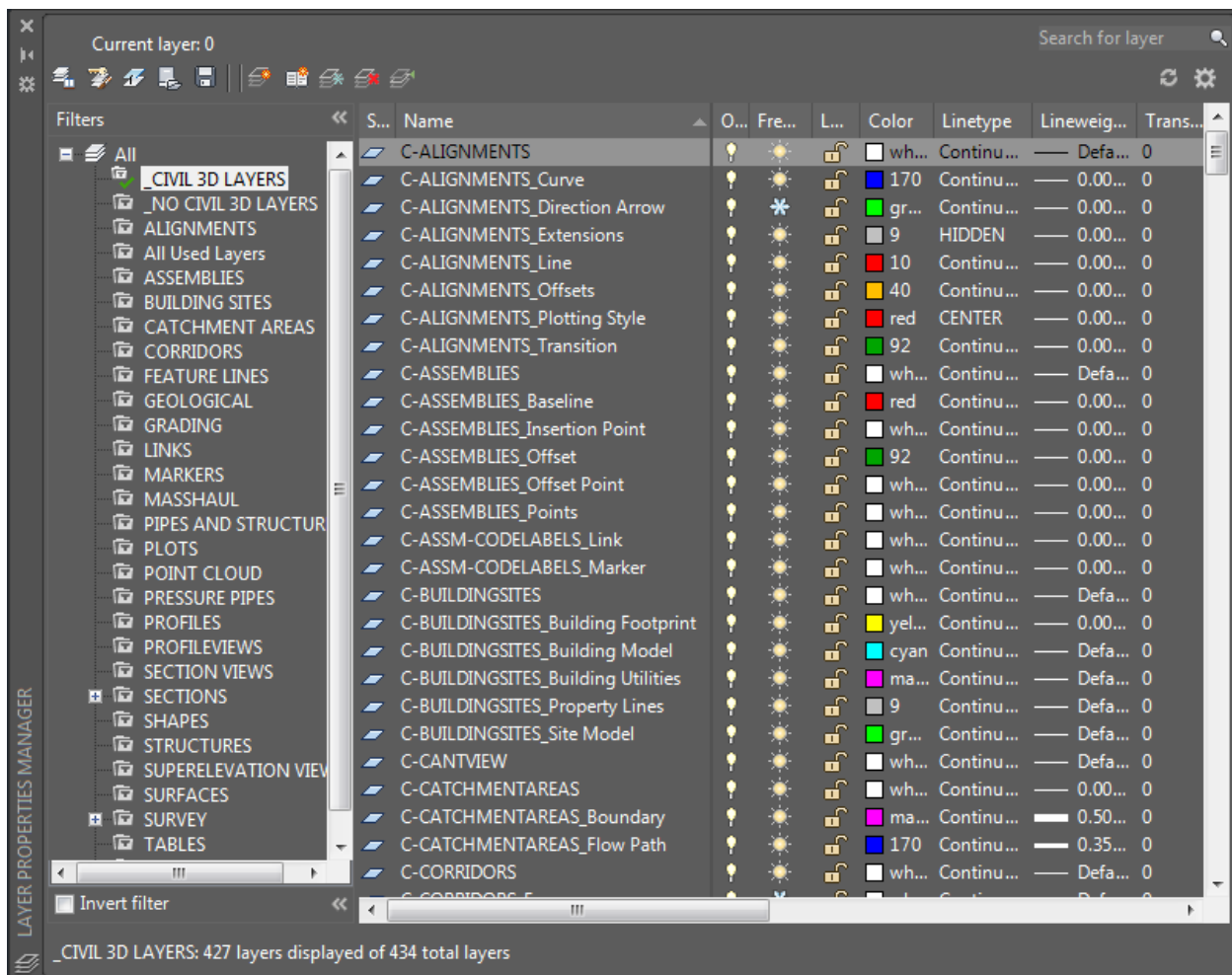
It is recommended to start from the UKIE / or IE template and bring data into that template



Here it is possible create, copy or edit Civil 3D styles. Note that new or edited styles not automatically will be saved in the template. This has to be done manually with Drag and Drop.

All styles are set to Bylayer so that control of colour, linetype, linewidth, on or off etc can be controlled through the layer manager and also enables the use of XREF into plain AutoCAD software.

As there are many layers, filters have been added to make it quick and easy to navigate the layers



### 1.2.3 Colours

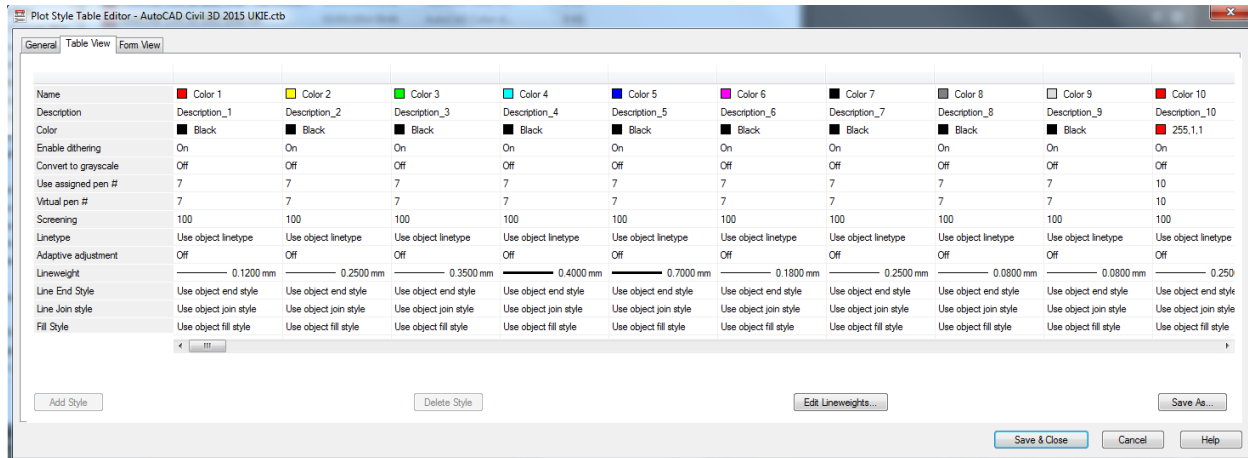
A suggested line colour scheme has been implemented to give suitable results from plotting. Plot styles have been created to accompany the printing from these templates

AutoCAD Civil 3D UKIE 2015.ctb

AutoCAD Civil 3D UKIE 2015 - No Colour.ctb



The primary AutoCAD colours have been reserved for black linework in varying thicknesses and colours from 10 are retained as colour in 2.5mm thickness



**Black/white colour.** Is primary used for labels and tables created in the drawingText  
The table below lists used text styles.

| Text Style               | Description                             | Font    |
|--------------------------|-----------------------------------------|---------|
| Civil 3D Standard Text   |                                         | Arial   |
| Civil 3D IE Section Text | Text for IE template for sections bands | Monotxt |
| Civil 3D IE Text         | Text for IE template                    | Simplex |





## 2 Layers

The table below lists the objects and layers. All sub layers are based on these core names.

| Object                    | Layer             |
|---------------------------|-------------------|
| Alignment                 | C-ALIGNMENTS      |
| Alignment-Labeling        | C-LABELS          |
| Alignment Table           | C-TABLES          |
| Assembly                  | C-ASSEMBLY        |
| Building Site             | C-BUILDINGSITES   |
| Corridor                  | C-CORRIDORS       |
| Corridor Section          | C-CORRIDORSECTION |
| Feature Line              | C-FEATURELINES    |
| General Note Label        | C-LABELS          |
| General Segment Label     | C-LABELS          |
| Grading                   | C-GRADING         |
| Grading-Labeling          | C-TABLES          |
| Grid Surface              | C-SURFACES        |
| Grid Surface-Labeling     | C-LABELS          |
| Interference              | C-INTERFERENCES   |
| Junction                  | C-JUNCTIONS       |
| Junction-Labeling         | C-LABELS          |
| Mass Haul Line            | C-MASSHAULLINE    |
| Mass Haul View            | C-MASSHAULVIEW    |
| Match Line                | C-MATCHLINES      |
| Match Line-Labeling       | C-LABELS          |
| Material Section          | C_MATERIALSECTION |
| Material Table            | C-TABLES          |
| Parcel                    | C-PLOTS           |
| Parcel-Labeling           | C-LABELS          |
| Parcel Segment            | C-LABELS          |
| Parcel Segment-Labeling   | C-LABELS          |
| Parcel Table              | C-TABLES          |
| Pipe                      | C-PIPE            |
| Pipe-Labeling             | C-LABELS          |
| Pipe and Structure Table  | C-TABLES          |
| Pipe Network Section      | C_MATERIALSECTION |
| Pipe or Structure Profile | C-PROFILES        |
| Point Table               | C-TABLES          |

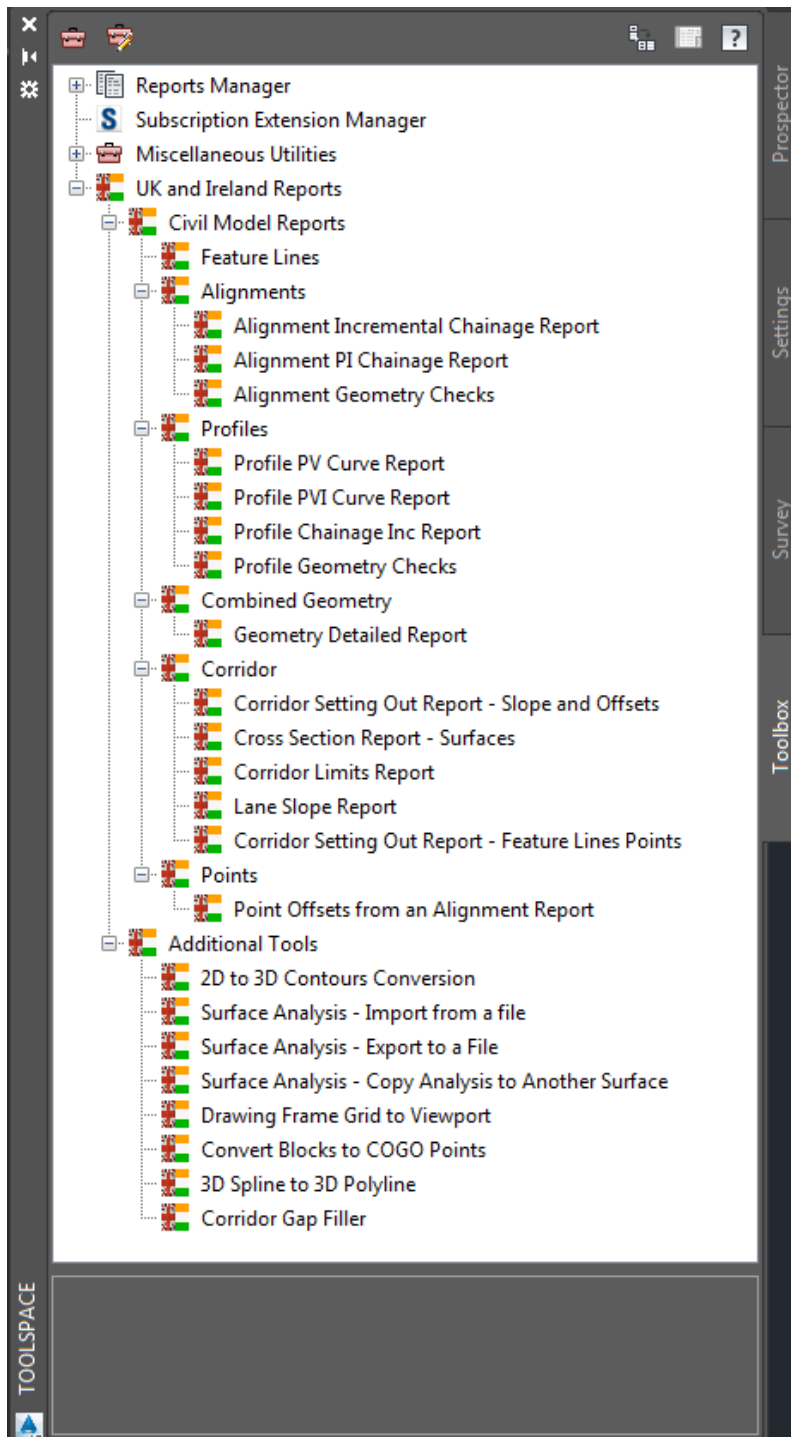


|                                     |                   |
|-------------------------------------|-------------------|
| Profile                             | C-PROFILE         |
| Profile-Labeling                    | C-LABELS          |
| Profile View                        | C-PROFILEVIEWS    |
| Profile View-Labeling               | C-LABELS          |
| Sample Line                         | C-SAMPLE_Lines    |
| Sample Line-Labeling                | C-SAMPLE_Labels   |
| Section                             | C-SECTIONS        |
| Section-Labeling                    | C-LABELS          |
| Section View                        | C-SECTIONVIEW     |
| Section View-Labeling               | C-LABELS          |
| Section View Quantity Takeoff Table | C-TABLES          |
| Sheet                               | C-SHEET           |
| Structure                           | C-STRUCTURES      |
| Structure-Labeling                  | C-LABELS          |
| Subassembly                         | C-SUBASSEMBLIES   |
| Surface Legend Table                | C-TABLES          |
| Survey Figure                       | C-SURVEY_Figures  |
| Survey Network                      | C-SURVEY_Networks |
| Tin Surface                         | C-SURFACES        |
| Tin Surface-Labeling                | C-LABELS          |
| View Frame                          | C-VIEWFRAMES      |
| View Frame-Labeling                 | C-LABELS          |



### 3 Reports

The table below lists all UK and Ireland reports (Toolspace > Toolbox > UK and Ireland Reports)





| Report Name                                | Description                                                                                                                                              |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Civil Model Reports</b>                 |                                                                                                                                                          |
| Alignment Incremental Chainage Report      | Creates a report at chainages specified of the alignment and profile geometry with levels and bearings                                                   |
| Alignment PI Chainage Report               | Reports the intersection points of alignments                                                                                                            |
| Alignment Superelevation Crossfall Report  | Superelevation data from an alignment                                                                                                                    |
| Alignment Geometry Checks                  | Reports the alignment based on the design criteria applied                                                                                               |
| Profile PV Curve Report                    | Reports the vertical profile point information                                                                                                           |
| Profile PVI Curve Report                   | Reports the vertical profile point information                                                                                                           |
| Profile Chainage Inc. Report               | Reports the profile data at a chainage interval                                                                                                          |
| Profile Geometry Checks                    | Reports the profile based on the design criteria applied                                                                                                 |
| Geometry Detailed Report                   | Coordinates, levels, bearings and element types along an alignment and profile                                                                           |
| Geometry Simple Report                     | Coordinates and levels along an alignment and profile                                                                                                    |
| Corridor Setting Out Report                | Reports a corridor for offset and slope                                                                                                                  |
| Points Offsets from an Alignment Report    | Will report the offset and chainage value of COGO points from an Alignment                                                                               |
| Surface Sampling along an Alignment Report | Require sample lines and will read a surface at 5m interval offsets                                                                                      |
|                                            |                                                                                                                                                          |
| <b>Microdrainage WinDES Link</b>           | This is provided by subscription centre after the release of the main product                                                                            |
| Rename Pipes to WinDES coding              | Renames pipes to WinDES codes so to be accepted on import, convention looks like this 1.000, 1.001 for the main line and 2.000, 2.001.. for branches etc |
| Export Pipes to SWS File                   | Exports a SWS/FWS file which transfers coordinates, cover levels, pipes and structures                                                                   |
| Import Pipes from SWS File                 | Imported the analysed file from WinDES and either can update pipes and or create new networks.                                                           |
|                                            |                                                                                                                                                          |
| <b>Additional Tools</b>                    |                                                                                                                                                          |
| 2D to 3D Contour Conversion                | A tool which by specifying a fence line through contour polyline will convert the elevation of the line to the level specified                           |
| Surface Analysis – Import/Export to a file | Export and Import desired settings for reuse                                                                                                             |
| Drawing Frame Grid to Viewport             | Place a grid on a viewport                                                                                                                               |



|                               |                                                                                                                                                                         |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Convert Blocks to COGO Points | As described                                                                                                                                                            |
| 3D Spline to 3D Polyline      | As described                                                                                                                                                            |
| Corridor Gap Filler           | Tool to insert 1mm frequency at the start of each region in a corridor, so when data is exported to 3ds Max Design, Navisworks etc to ensure no gaps occur in the model |



## 4 Drawing Settings

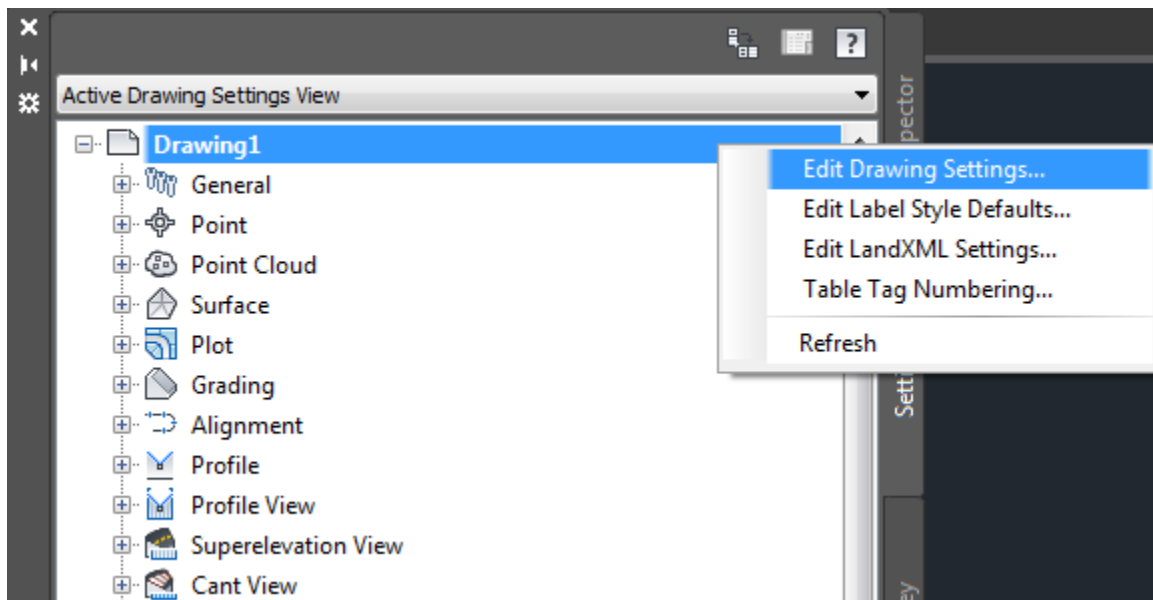
### 4.1 Object Layers

The as mentioned above all the Civil 3D objects are by default placed on layers automatically.

Once placed can be moved to alternative layers if required.

#### 4.1.1 Edit Drawing Settings...

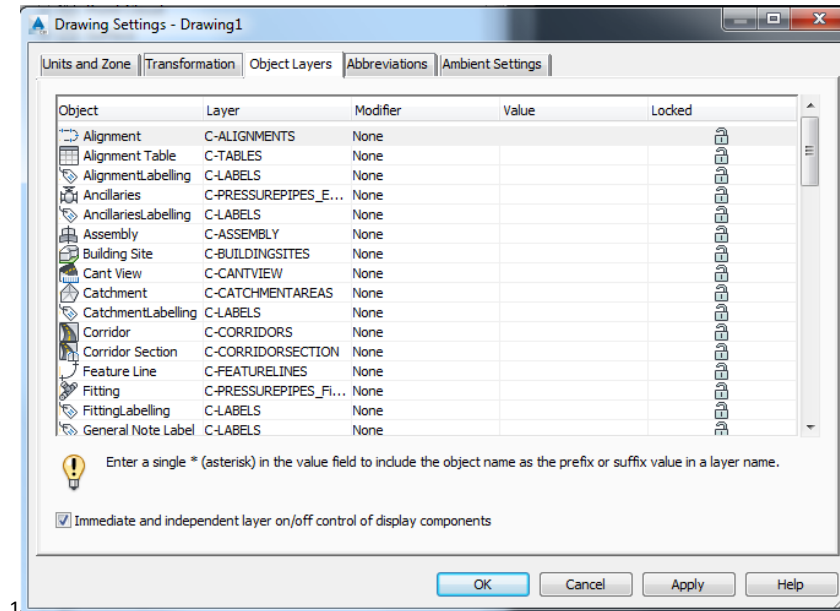
Civil 3D object layers are available from Edit Drawing Settings. The figure below shows from where the command is accessible.





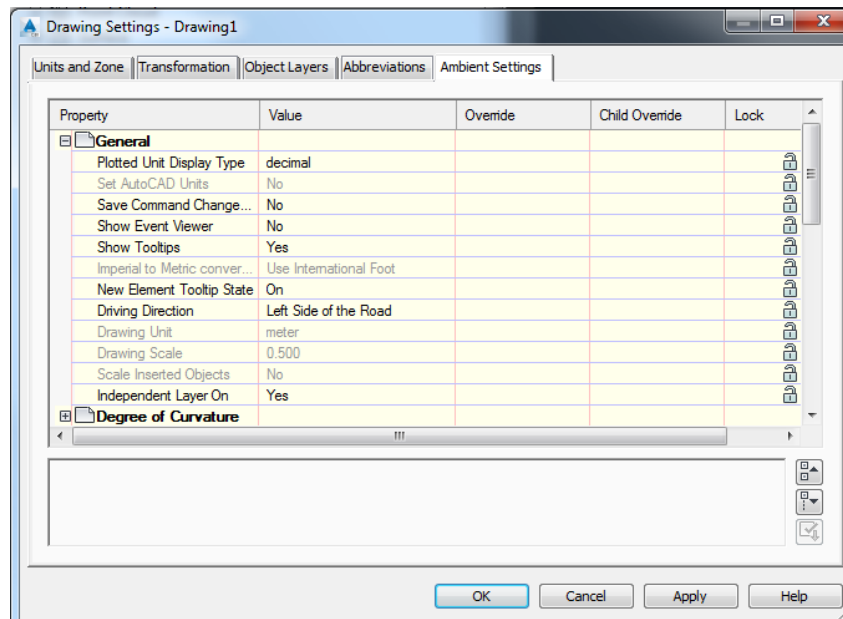
#### 4.1.2 Object Layers...

Figure below show the window and tab with Object Layers.



#### 4.2 Ambient Settings

Table below lists all values for Civil 3D units.





## 5 Object styles

All Civil 3D object styles in the UKIE and IE templates.

### 5.1 Multi-purpose Styles

| Feature Line Styles | Description                                                                                                                                                      | Screen grab / DWF / DWG | Default |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------|
| Various             | An extensive list of line styles which will be created from corridor models and featureline design. Each style has its own layer for colour and linetype control |                         | Yes     |

| Code Set Styles | Description                                                                               | Screen grab / DWF / DWG | Default |
|-----------------|-------------------------------------------------------------------------------------------|-------------------------|---------|
|                 | All code set styles will render the links in the corridor with the realistic visual style |                         |         |
| Plan View       | Style with the links and markers removed for a clean linework drawing                     |                         | Yes     |





|                              |                                                            |  |  |
|------------------------------|------------------------------------------------------------|--|--|
| Plan View (with Links shown) | Simple plan with links shown to understand the model       |  |  |
| Plan View – Hatching         | Style with AutoCAD hatch patterns                          |  |  |
| Assembly Creation            | Style to show the assembly while creating in assembly mode |  |  |
| Cross Section – Hatching     | Style to be used to show the corridor in cross sections    |  |  |

| Marker Styles | Description                                                                                                                                | Screen grab / DWF / DWG | Default |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------|
| Various       | An extensive list of marker styles which will be created from corridor models and featureline design.<br>All are stored in C-Markers layer |                         | Yes     |



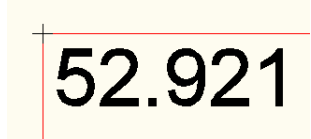
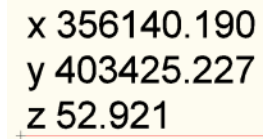
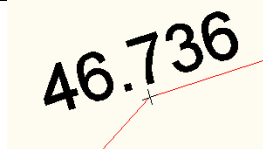
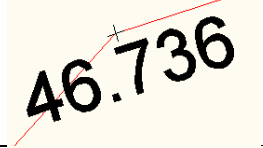
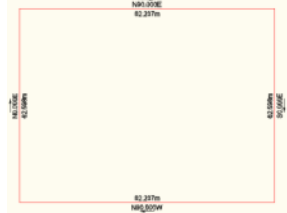
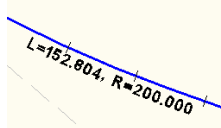
| Link Styles | Description                                                                  | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                       | Default |
|-------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Various     | An extensive list of link styles which will be created from corridor models. | <p>The screenshot shows a list of link styles in AutoCAD. The list includes: Barrier, Base, Channel, Cross Section Views, Datum, Daylight, Daylight_Cut, Daylight_Fill, Footpath, Gravel, Hide, Kerb - Top, Mill, Pave, Pave1, Pave2, Standard, SubBase, Top, Uncoded, and Verge. Each item has a small icon to its left.</p> |         |



| Shape Styles | Description                                                                                                                                                                                                                                                                                                               | Screen grab / DWF / DWG | Default |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------|
| Various      | An extensive list of shape styles which will be created from corridor models and featureline design. Each create either a solid colour as specified or a AutoCAD hatch pattern. These are also used for profile hatching For 2015 a new additional set have been provided to support borehole import and AGS descriptions |                         |         |

| Multi-purpose Label Styles                | Description                                                                                                    | Screen grab / DWF / DWG | Default |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------|---------|
| Note                                      |                                                                                                                |                         |         |
| Simple MTEXT Label                        | A note label where any content can be written, but the label is plan readable and or dragged out with a leader |                         |         |
| General Line Labels                       |                                                                                                                |                         |         |
| Featureline Vertex Level – Above the line |                                                                                                                |                         |         |



|                                                              |  |                                                                                                                                    |  |
|--------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------|--|
| Featureline Vertex Level – Below the line                    |  |                                                  |  |
| Featureline Vertex Level<br>Object Rotation – Above the line |  |                                                  |  |
| Featureline Vertex Level<br>Object Rotation – Above the line |  |                                                  |  |
| Featureline Vertex Level<br>Object Rotation – Below the line |  |                                                  |  |
| Length and Angle                                             |  |                                                 |  |
| Length and Slope                                             |  |                                                |  |
| Line                                                         |  |                                                                                                                                    |  |
| Straight Label                                               |  |  |  |
| Curve                                                        |  |                                                                                                                                    |  |
| Curve Label                                                  |  |                                                |  |
| Marker                                                       |  |                                                                                                                                    |  |
| Level                                                        |  |                                                                                                                                    |  |
| Offset                                                       |  |                                                                                                                                    |  |
| Link                                                         |  |                                                                                                                                    |  |



|                                                |  |  |
|------------------------------------------------|--|--|
| Percent Slopes / IE<br>Percent Slopes          |  |  |
| Percent Slopes with<br>Direction Arrow         |  |  |
| Rise:Run Slopes (1:x)                          |  |  |
| Rise: Run Slopes (1:x) with<br>Direction Arrow |  |  |
| Run:Rise Slopes                                |  |  |
| Shape                                          |  |  |
| Shape Area and Name                            |  |  |
| Shape Code                                     |  |  |

| Projection Styles                                | Description | Screen grab / DWF /<br>DWG | Default |
|--------------------------------------------------|-------------|----------------------------|---------|
| Vertex Markers and Exaggeration<br>to Blocks etc |             |                            |         |



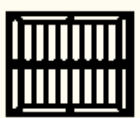
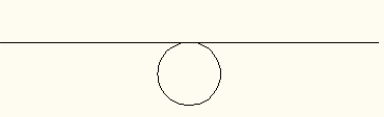
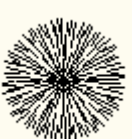
|                                                  |  |                                                                                     |     |
|--------------------------------------------------|--|-------------------------------------------------------------------------------------|-----|
| Vertex Markers and No Exaggeration to Blocks etc |  |  | Yes |
|--------------------------------------------------|--|-------------------------------------------------------------------------------------|-----|



## 5.2 Points

| User Defined Attribute Classifications | Description | Screen grab / DWF / DWG | Default |
|----------------------------------------|-------------|-------------------------|---------|
| <None>                                 |             |                         |         |

| Point Styles     | Description                                           | Screen grab / DWF / DWG                                                              | Default |
|------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| Benchmark        |                                                       |    |         |
| Cross 2D and 3D  |                                                       |    |         |
| Fence Post       | Can be used in cross sections to show boundary fences |     |         |
| Gas Valve        |                                                       |   |         |
| Gully            |                                                       |  |         |
| Pylon            | Can be used in cross sections to show pylons          |   |         |
| Shrub            |                                                       |  |         |
| Sign Single Pole |                                                       |  |         |
| Tree             |                                                       |  |         |



|             |  |  |  |
|-------------|--|--|--|
| Water Valve |  |  |  |
|-------------|--|--|--|

| Point Label Styles                 | Description | Screen grab / DWF / DWG | Default |
|------------------------------------|-------------|-------------------------|---------|
| Description                        |             |                         |         |
| Level Only                         |             |                         |         |
| No Labels                          |             |                         |         |
| Point Coordinates and Level        |             |                         |         |
| Point Number                       |             |                         |         |
| Point Number and Description       |             |                         |         |
| Point Number Description and Level |             |                         |         |

| Description<br>n Key Sets | Description | Screen grab / DWF / DWG | Default |
|---------------------------|-------------|-------------------------|---------|
|---------------------------|-------------|-------------------------|---------|





|                        |                                                                          |  |  |
|------------------------|--------------------------------------------------------------------------|--|--|
| UK and Ireland Example | A set of survey raw point codes to be customised by the user for symbols |  |  |
| DMRB Vol 5             | A set of codes based on the appendix in the DMRB specification           |  |  |

| Point Table Styles                   | Description | Screen grab / DWF / DWG | Default    |            |         |             |
|--------------------------------------|-------------|-------------------------|------------|------------|---------|-------------|
| Point Table – Coordinates and Levels |             | POINT DATA              |            |            |         |             |
|                                      |             | POINT NUMBER            | EASTING    | NORTHING   | LEVEL   | DESCRIPTION |
|                                      |             | 1                       | 356130.638 | 403776.309 | 54.137  | GULLY       |
|                                      |             | 2                       | 356231.229 | 403714.304 | 57.462  | TREE        |
|                                      |             | 3                       | 356439.485 | 403684.851 | 100.000 | TEST        |

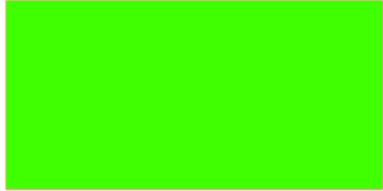
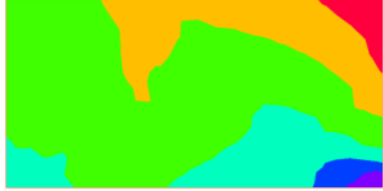
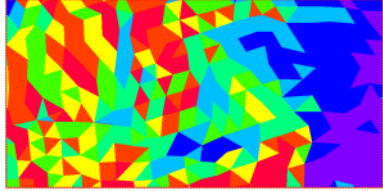
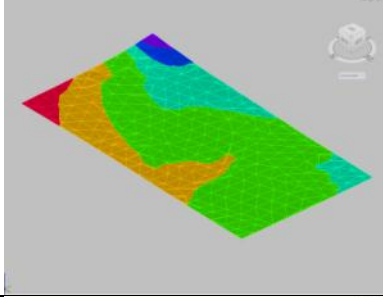
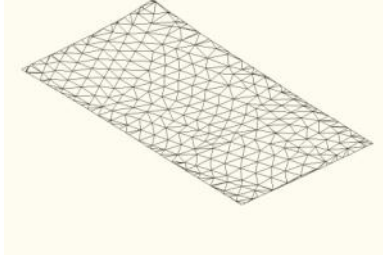
### 5.3 Point Cloud

| Point Cloud Styles      | Description | Screen grab / DWF / DWG | Default |
|-------------------------|-------------|-------------------------|---------|
| No Display              |             |                         |         |
| Greyscale Intensity     |             |                         |         |
| Level Ranges            |             |                         |         |
| Lidar Classification    |             |                         |         |
| Scaled Colour Intensity |             |                         |         |
| Single Colour           |             |                         |         |
| True Colour - RGB       |             |                         |         |

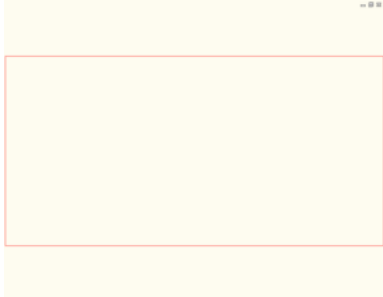
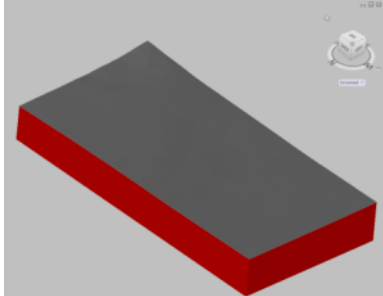
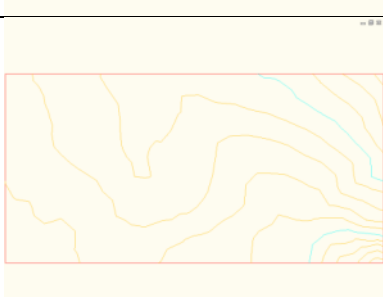
### 5.4 Surfaces

| Surface Styles        | Description                     | Screen grab / DWF / DWG | Default |
|-----------------------|---------------------------------|-------------------------|---------|
| 2D Solid Cut and Fill | To be used with volume surfaces |                         |         |



|                                                 |              |                                                                                      |  |
|-------------------------------------------------|--------------|--------------------------------------------------------------------------------------|--|
| 2D Solid Fill - (Use analysis to change colour) |              |    |  |
| 2D Solid Level Banding                          |              |    |  |
| 2D Solid Slope Banding                          |              |   |  |
| 3D Face Level Banding                           |              |  |  |
| 3D Triangulation                                |              |  |  |
| _No Display                                     | As described |                                                                                      |  |

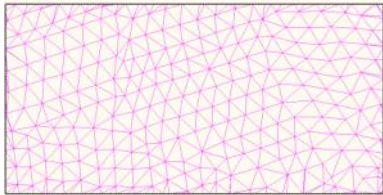
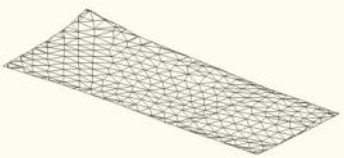
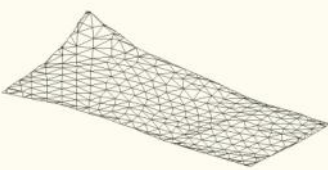
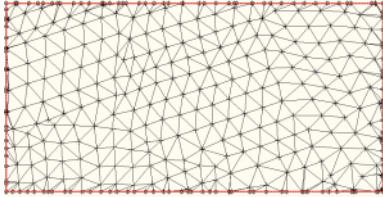


|                                 |  |                                                                                      |  |
|---------------------------------|--|--------------------------------------------------------------------------------------|--|
| Border                          |  |    |  |
| Border Projected to 0           |  |    |  |
| Contours 0.1m and 0.5m          |  |   |  |
| Contours 0.1m and 0.5m - Arrows |  |  |  |
| Contours 1m and 5m              |  |  |  |

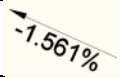
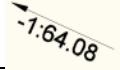
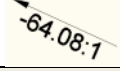


|                                   |  |  |  |
|-----------------------------------|--|--|--|
| Contours 1m and 5m - Arrows       |  |  |  |
| Large Surface Contours 5m and 25m |  |  |  |
| Slope Arrows and Border           |  |  |  |
| Triangulation                     |  |  |  |
| Triangulation Cyan                |  |  |  |



|                                 |                                                               |                                                                                      |  |
|---------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------|--|
| Triangulation – Magenta         |                                                               |    |  |
| Triangulation 3D 2X Exaggerated |                                                               |    |  |
| Triangulation 3D 5X Exaggerated |                                                               |   |  |
| Triangulation and Points        |                                                               |  |  |
| User Contours                   | Using analysis to set a contour/s at a specific surface level |                                                                                      |  |
| Watershed Areas                 |                                                               |  |  |



| Surface Label Styles Name/Type | Description | Screen grab / DWF / DWG                                                             | Default |
|--------------------------------|-------------|-------------------------------------------------------------------------------------|---------|
| Contour                        |             |                                                                                     |         |
| Major and Minor Contours       |             |   |         |
| Slope                          |             |                                                                                     |         |
| Percent Slope                  |             |  |         |
| Rise : Run Slope (1:x)         |             |  |         |
| Run : Rise Slope (x:1)         |             |  |         |
| Spot Level                     |             |                                                                                     |         |
| Spot Level                     |             | × 51.553m                                                                           |         |
| Watershed                      |             |                                                                                     |         |
| ID - Type - Area               |             | ID=75<br>TYPE=DEPRESSION<br>AREA=57570.562m2                                        |         |

| Surface Table Styles Name/Type | Description       | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Default                                                                               |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
|--------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|--|--|--------|-------------------|-------------------|--------|---|-----------------|------------------|---------------------------------------------------------------------------------------|---|------------------|------------------|---------------------------------------------------------------------------------------|---|------------------|------------------|---------------------------------------------------------------------------------------|---|------------------|-----------------|---------------------------------------------------------------------------------------|--|
| Directions                     |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
|                                |                   | <table border="1"> <thead> <tr> <th colspan="4">SURFACE DIRECTION DATA</th> </tr> <tr> <th>NUMBER</th><th>MINIMUM DIRECTION</th><th>MAXIMUM DIRECTION</th><th>COLOUR</th></tr> </thead> <tbody> <tr> <td>1</td><td>N0° 00' 15.06"E</td><td>N44° 59' 09.02"E</td><td></td></tr> <tr> <td>2</td><td>N44° 59' 09.02"E</td><td>N89° 58' 29.18"E</td><td></td></tr> <tr> <td>3</td><td>N89° 58' 29.18"E</td><td>S45° 00' 59.09"E</td><td></td></tr> <tr> <td>4</td><td>S45° 00' 59.09"E</td><td>S0° 01' 51.52"E</td><td></td></tr> </tbody> </table> | SURFACE DIRECTION DATA                                                                |  |  |  | NUMBER | MINIMUM DIRECTION | MAXIMUM DIRECTION | COLOUR | 1 | N0° 00' 15.06"E | N44° 59' 09.02"E |  | 2 | N44° 59' 09.02"E | N89° 58' 29.18"E |  | 3 | N89° 58' 29.18"E | S45° 00' 59.09"E |  | 4 | S45° 00' 59.09"E | S0° 01' 51.52"E |  |  |
| SURFACE DIRECTION DATA         |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
| NUMBER                         | MINIMUM DIRECTION | MAXIMUM DIRECTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | COLOUR                                                                                |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
| 1                              | N0° 00' 15.06"E   | N44° 59' 09.02"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
| 2                              | N44° 59' 09.02"E  | N89° 58' 29.18"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
| 3                              | N89° 58' 29.18"E  | S45° 00' 59.09"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
| 4                              | S45° 00' 59.09"E  | S0° 01' 51.52"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |
| Levels                         |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |  |  |  |        |                   |                   |        |   |                 |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                  |                                                                                       |   |                  |                 |                                                                                       |  |



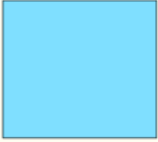
| Areas                          |               | <table><tr><th colspan="5">SURFACE LEVEL DATA</th></tr><tr><th>NUMBER</th><th>MINIMUM LEVEL</th><th>MAXIMUM LEVEL</th><th>COLOUR</th><th>AREA</th></tr><tr><td>1</td><td>46.62</td><td>48.79</td><td></td><td>43572.269m2</td></tr><tr><td>2</td><td>48.79</td><td>50.99</td><td></td><td>55880.203m2</td></tr><tr><td>3</td><td>50.99</td><td>53.17</td><td></td><td>97918.870m2</td></tr></table>                                                                                                      | SURFACE LEVEL DATA                                                                    |             |              |  |        | NUMBER        | MINIMUM LEVEL | MAXIMUM LEVEL | COLOUR        | AREA   | 1        | 46.62                                                                                 | 48.79 |  | 43572.269m2 | 2                                                                                     | 48.79       | 50.99        |  | 55880.203m2                                                                           | 3     | 50.99                                                                               | 53.17       |    | 97918.870m2 |  |
|--------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------|--------------|--|--------|---------------|---------------|---------------|---------------|--------|----------|---------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|-------------|--------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|-------------|--|
| SURFACE LEVEL DATA             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| NUMBER                         | MINIMUM LEVEL | MAXIMUM LEVEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COLOUR                                                                                | AREA        |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 1                              | 46.62         | 48.79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    | 43572.269m2 |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 2                              | 48.79         | 50.99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    | 55880.203m2 |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 3                              | 50.99         | 53.17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    | 97918.870m2 |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| Cut and Fill Volumes           |               | <table><tr><th colspan="6">SURFACE LEVEL DATA</th></tr><tr><th>NUMBER</th><th>MINIMUM LEVEL</th><th>MAXIMUM LEVEL</th><th>COLOUR</th><th>AREA</th><th>VOLUME</th></tr><tr><td>1</td><td>46.62</td><td>48.79</td><td></td><td>43572.269m2</td><td>801161.388m3</td></tr><tr><td>2</td><td>48.79</td><td>50.99</td><td></td><td>55880.203m2</td><td>710502.450m3</td></tr></table>                                                                                                                                                                                                            | SURFACE LEVEL DATA                                                                    |             |              |  |        |               | NUMBER        | MINIMUM LEVEL | MAXIMUM LEVEL | COLOUR | AREA     | VOLUME                                                                                | 1     | 46.62                                                                               | 48.79       |    | 43572.269m2 | 801161.388m3 | 2                                                                                   | 48.79                                                                                 | 50.99 |  | 55880.203m2 | 710502.450m3                                                                          |             |  |
| SURFACE LEVEL DATA             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| NUMBER                         | MINIMUM LEVEL | MAXIMUM LEVEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COLOUR                                                                                | AREA        | VOLUME       |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 1                              | 46.62         | 48.79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    | 43572.269m2 | 801161.388m3 |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 2                              | 48.79         | 50.99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    | 55880.203m2 | 710502.450m3 |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| Minimum and Maximum Levels     |               | <table><tr><th colspan="4">SURFACE LEVEL DATA</th></tr><tr><th>NUMBER</th><th>MINIMUM LEVEL</th><th>MAXIMUM LEVEL</th><th>COLOUR</th></tr><tr><td>1</td><td>46.62</td><td>48.79</td><td></td></tr><tr><td>2</td><td>48.79</td><td>50.99</td><td></td></tr><tr><td>3</td><td>50.99</td><td>53.17</td><td></td></tr><tr><td>4</td><td>53.17</td><td>55.35</td><td></td></tr></table>                                    | SURFACE LEVEL DATA                                                                    |             |              |  | NUMBER | MINIMUM LEVEL | MAXIMUM LEVEL | COLOUR        | 1             | 46.62  | 48.79    |    | 2     | 48.79                                                                               | 50.99       |    | 3           | 50.99        | 53.17                                                                               |    | 4     | 53.17                                                                               | 55.35       |    |             |  |
| SURFACE LEVEL DATA             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| NUMBER                         | MINIMUM LEVEL | MAXIMUM LEVEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COLOUR                                                                                |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 1                              | 46.62         | 48.79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 2                              | 48.79         | 50.99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 3                              | 50.99         | 53.17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 4                              | 53.17         | 55.35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| Slopes                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| Minimum and Maximum Slopes     |               | <table><tr><th colspan="4">SURFACE SLOPE DATA</th></tr><tr><th>NUMBER</th><th>MINIMUM SLOPE</th><th>MAXIMUM SLOPE</th><th>COLOUR</th></tr><tr><td>1</td><td>0.031%</td><td>564.667%</td><td></td></tr><tr><td>2</td><td>564.667%</td><td>1045.974%</td><td></td></tr><tr><td>3</td><td>1045.974%</td><td>1435.180%</td><td></td></tr><tr><td>4</td><td>1435.180%</td><td>2284.514%</td><td></td></tr></table> | SURFACE SLOPE DATA                                                                    |             |              |  | NUMBER | MINIMUM SLOPE | MAXIMUM SLOPE | COLOUR        | 1             | 0.031% | 564.667% |  | 2     | 564.667%                                                                            | 1045.974%   |  | 3           | 1045.974%    | 1435.180%                                                                           |  | 4     | 1435.180%                                                                           | 2284.514%   |  |             |  |
| SURFACE SLOPE DATA             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| NUMBER                         | MINIMUM SLOPE | MAXIMUM SLOPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COLOUR                                                                                |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 1                              | 0.031%        | 564.667%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 2                              | 564.667%      | 1045.974%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 3                              | 1045.974%     | 1435.180%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 4                              | 1435.180%     | 2284.514%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| Slope Arrows                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| Minimum & Maximum Slope Arrows |               | <table><tr><th colspan="4">SURFACE SLOPE ARROW DATA</th></tr><tr><th>NUMBER</th><th>MINIMUM SLOPE</th><th>MAXIMUM SLOPE</th><th>COLOUR</th></tr><tr><td>1</td><td>0.031%</td><td>2.833%</td><td></td></tr><tr><td>2</td><td>2.833%</td><td>5.938%</td><td></td></tr><tr><td>3</td><td>5.938%</td><td>15.978%</td><td></td></tr><tr><td>4</td><td>15.978%</td><td>2284.514%</td><td></td></tr></table>         | SURFACE SLOPE ARROW DATA                                                              |             |              |  | NUMBER | MINIMUM SLOPE | MAXIMUM SLOPE | COLOUR        | 1             | 0.031% | 2.833%   |  | 2     | 2.833%                                                                              | 5.938%      |  | 3           | 5.938%       | 15.978%                                                                             |  | 4     | 15.978%                                                                             | 2284.514%   |  |             |  |
| SURFACE SLOPE ARROW DATA       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| NUMBER                         | MINIMUM SLOPE | MAXIMUM SLOPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COLOUR                                                                                |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 1                              | 0.031%        | 2.833%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 2                              | 2.833%        | 5.938%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 3                              | 5.938%        | 15.978%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
| 4                              | 15.978%       | 2284.514%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |
|                                |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |             |              |  |        |               |               |               |               |        |          |                                                                                       |       |                                                                                     |             |                                                                                       |             |              |                                                                                     |                                                                                       |       |                                                                                     |             |                                                                                       |             |  |



|            |  |                              |                |             |               |                 |              |
|------------|--|------------------------------|----------------|-------------|---------------|-----------------|--------------|
| Watersheds |  | SURFACE WATER CATCHMENT DATA |                |             |               |                 |              |
|            |  | ID                           | TYPE           | DRAINS INTO | DESCRIPTION   | SEGMENT DISPLAY | AREA DISPLAY |
|            |  | 1                            | Boundary point |             | Description 1 | —————           | 420.321 sq.m |
|            |  | 2                            | Boundary point |             | Description 2 | —————           | 748.094sq.m  |
|            |  | 3                            | Boundary point |             | Description 3 | —————           | 5151.211sq.m |
|            |  | 4                            | Boundary point |             | Description 4 | —————           | 5981.319sq.m |
|            |  | 5                            | Boundary point |             | Description 5 | —————           | 27.012sq.m   |
|            |  | 6                            | Boundary point |             | Description 6 | —————           | 2839.903sq.m |
|            |  |                              |                |             |               |                 |              |

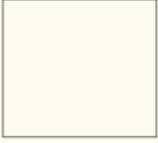
## 5.5 Parcels

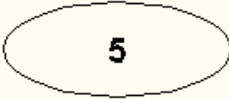
| User-Defined Attributes | Description | Screen grab / DWF / DWG | Default |
|-------------------------|-------------|-------------------------|---------|
| <None>                  |             |                         |         |

| Parcel Styles      | Description | Screen grab / DWF / DWG                                                               | Default |
|--------------------|-------------|---------------------------------------------------------------------------------------|---------|
| Council Owned Land |             |   |         |
| Private            |             |  |         |
| Housing            |             |  |         |
| Proposed Housing   |             |  |         |
| Retail             |             |  |         |
| Proposed Retail    |             |  |         |





|                   |  |                                                                                      |  |
|-------------------|--|--------------------------------------------------------------------------------------|--|
| Protected Ecology |  |   |  |
| Leisure           |  |   |  |
| Roads             |  |   |  |
| Proposed Roads    |  |   |  |
| Unknown           |  |  |  |
|                   |  |                                                                                      |  |

| Parcel Label Styles                           | Description | Screen grab / DWF / DWG                                                              | Default |
|-----------------------------------------------|-------------|--------------------------------------------------------------------------------------|---------|
| Number Area (m2 and acres) & Perimeter (m)    |             | <b>5</b><br><b>Area 16535.45m2 (4.086 acres)</b><br><b>Perimeter 515.16m</b>         |         |
| Number Area (m2 and hectares) & Perimeter (m) |             | <b>5</b><br><b>Area 16535.45m2 (1.654 hectare)</b><br><b>Perimeter 515.16m</b>       |         |
| Number Area (m2) & Perimeter (m)              |             | <b>5</b><br><b>Area 16535.45m2</b><br><b>Perimeter 515.16m</b>                       |         |
| Number only                                   |             |  |         |



| Parcel Table Styles | Description | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Default            |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|---------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----|-------------|------|---|--------------|------|-----------|----------------|----------|---|----------|---------|----------|---|--------|---|--------|---|-------|---|-------|---|--------|---|--------|---|-------|---|-------|---|-------|---|---|-----------|---------|--------|---|------|---|-------|---|--------|---|--------|---|--------|---|--------|---|--------|---|-------|---|-------|---|--|--|--|------|---|--------|---|--------|---|-------|---|-------|---|--------|---|--------|---|-------|---|------|---|-------|---|--|
| Area                |             | <table><tr><th colspan="2">PARCELS/PLOTS</th></tr><tr><th>PARCEL/PLOT</th><th>AREA</th></tr><tr><td>1</td><td>92419.66</td></tr><tr><td>2</td><td>110393.09</td></tr><tr><td>3</td><td>10183.66</td></tr><tr><td>4</td><td>10424.52</td></tr><tr><td>5</td><td>16535.45</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PARCELS/PLOTS      |    | PARCEL/PLOT | AREA | 1 | 92419.66     | 2    | 110393.09 | 3              | 10183.66 | 4 | 10424.52 | 5       | 16535.45 |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| PARCELS/PLOTS       |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| PARCEL/PLOT         | AREA        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 1                   | 92419.66    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 2                   | 110393.09   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 3                   | 10183.66    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 4                   | 10424.52    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 5                   | 16535.45    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| Full descriptions   |             | <table><tr><th colspan="5">PARCELS/PLOTS DATA</th></tr><tr><th>PARCEL/PLOTS</th><th>AREA</th><th>PERIMETER</th><th>SEGMENT LENGTH</th><th>RE</th></tr><tr><td rowspan="10">1</td><td rowspan="10">92419.66</td><td rowspan="10">1348.09</td><td>14.97</td><td>1</td></tr><tr><td>102.46</td><td>1</td></tr><tr><td>102.46</td><td>1</td></tr><tr><td>12.01</td><td>1</td></tr><tr><td>47.80</td><td>1</td></tr><tr><td>119.26</td><td>1</td></tr><tr><td>227.69</td><td>1</td></tr><tr><td>40.54</td><td>1</td></tr><tr><td>65.32</td><td>1</td></tr><tr><td>81.22</td><td>1</td></tr><tr><td rowspan="10">2</td><td rowspan="10">110393.09</td><td rowspan="10">2488.00</td><td>423.90</td><td>1</td></tr><tr><td>9.00</td><td>1</td></tr><tr><td>19.41</td><td>1</td></tr><tr><td>107.72</td><td>1</td></tr><tr><td>411.82</td><td>1</td></tr><tr><td>288.64</td><td>1</td></tr><tr><td>379.89</td><td>1</td></tr><tr><td>186.72</td><td>1</td></tr><tr><td>49.37</td><td>1</td></tr><tr><td>14.86</td><td>1</td></tr><tr><td rowspan="10"></td><td rowspan="10"></td><td rowspan="10"></td><td>9.00</td><td>1</td></tr><tr><td>477.33</td><td>1</td></tr><tr><td>109.24</td><td>1</td></tr><tr><td>65.32</td><td>1</td></tr><tr><td>70.97</td><td>1</td></tr><tr><td>277.69</td><td>1</td></tr><tr><td>107.72</td><td>1</td></tr><tr><td>92.38</td><td>1</td></tr><tr><td>9.00</td><td>1</td></tr><tr><td>14.97</td><td>1</td></tr></table> | PARCELS/PLOTS DATA |    |             |      |   | PARCEL/PLOTS | AREA | PERIMETER | SEGMENT LENGTH | RE       | 1 | 92419.66 | 1348.09 | 14.97    | 1 | 102.46 | 1 | 102.46 | 1 | 12.01 | 1 | 47.80 | 1 | 119.26 | 1 | 227.69 | 1 | 40.54 | 1 | 65.32 | 1 | 81.22 | 1 | 2 | 110393.09 | 2488.00 | 423.90 | 1 | 9.00 | 1 | 19.41 | 1 | 107.72 | 1 | 411.82 | 1 | 288.64 | 1 | 379.89 | 1 | 186.72 | 1 | 49.37 | 1 | 14.86 | 1 |  |  |  | 9.00 | 1 | 477.33 | 1 | 109.24 | 1 | 65.32 | 1 | 70.97 | 1 | 277.69 | 1 | 107.72 | 1 | 92.38 | 1 | 9.00 | 1 | 14.97 | 1 |  |
| PARCELS/PLOTS DATA  |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |    |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| PARCEL/PLOTS        | AREA        | PERIMETER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SEGMENT LENGTH     | RE |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 1                   | 92419.66    | 1348.09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 14.97              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 102.46             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 102.46             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 12.01              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 47.80              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 119.26             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 227.69             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 40.54              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 65.32              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 81.22              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
| 2                   | 110393.09   | 2488.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 423.90             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 9.00               | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 19.41              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 107.72             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 411.82             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 288.64             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 379.89             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 186.72             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 49.37              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 14.86              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 9.00               | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 477.33             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 109.24             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 65.32              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 70.97              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 277.69             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 107.72             | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 92.38              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 9.00               | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |
|                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 14.97              | 1  |             |      |   |              |      |           |                |          |   |          |         |          |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |       |   |       |   |   |           |         |        |   |      |   |       |   |        |   |        |   |        |   |        |   |        |   |       |   |       |   |  |  |  |      |   |        |   |        |   |       |   |       |   |        |   |        |   |       |   |      |   |       |   |  |

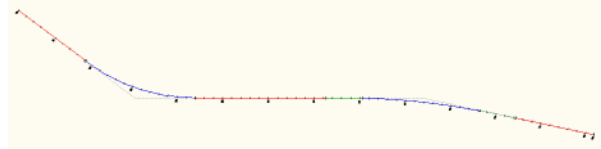
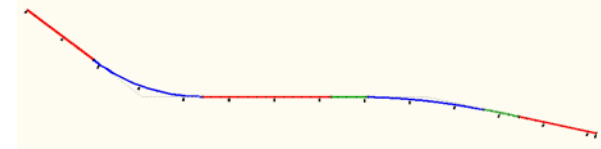
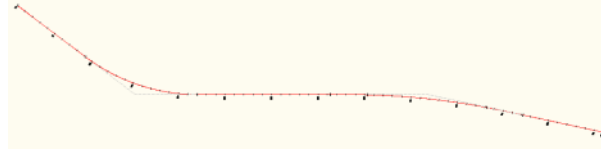
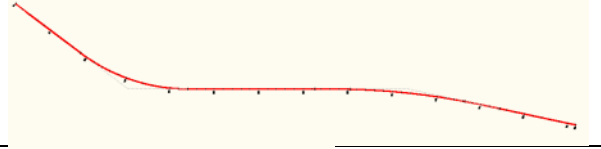
## 5.6 Grading

| Grading Styles | Description | Screen grab / DWF / DWG                                                                                                | Default |
|----------------|-------------|------------------------------------------------------------------------------------------------------------------------|---------|
| Fill           |             | A cross-section diagram showing a ground surface (dashed line) and a proposed fill area (shaded green) above it.       | Yes     |
| Cut            |             | A cross-section diagram showing a ground surface (dashed line) and a proposed cut area (shaded red) below it.          | Yes     |
| Offset         |             | A cross-section diagram showing a ground surface (dashed line) and a proposed offset area (shaded yellow) to the side. | Yes     |

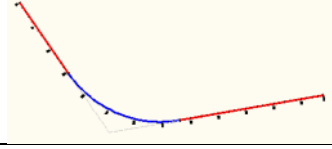
| Grading Criteria Sets | Description                                                                                                                              | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                                                                                                                                                 | Default |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Basic                 | Some examples of offsets and tie in to surfaces with some default values. All values are unlocked so they can be overridden when applied | <ul style="list-style-type: none"> <li>Distance @ Grade (%)</li> <li>Distance @ Slope (1:x)</li> <li>Level @ 1:2 Slope</li> <li>Level @ 1:3 Slope</li> <li>Level @ 1:6 Slope</li> <li>Relative Level @ Distance</li> <li>Relative Level @ Grade (%)</li> <li>Relative Level @ Slope (1:x)</li> <li>Surface @ 1:2 Slope</li> <li>Surface @ 1:3 Slope</li> <li>Surface @ 1:6 Slope</li> <li>Surface @ Grade (%)</li> <li>Surface @ Slope (1:x)</li> </ul> |         |

## 5.7 Alignments

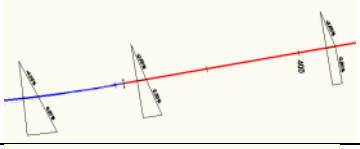
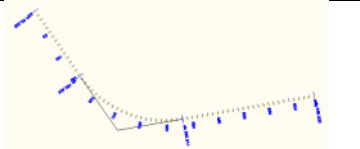
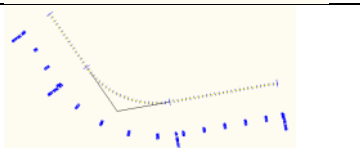


| Alignment Style    | Description                                                                                                                                               | Screen grab / DWF / DWG                                                              | Default |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| Design Style       | Style to give the user and easy understanding of the elements in the alignment. Straights are shown as red, curves as blue and transition curves as green |    |         |
| Design Style LWT   | As above with lineweight applied to thicken the line                                                                                                      |    | Yes     |
| Offsets            | Style to show alignments that are an offset from an alignment baseline                                                                                    |    |         |
| Plotting Style     | Style in one colour and linetype (centerline) for plotting purposes                                                                                       |   |         |
| Plotting Style LWT | As above with lineweight                                                                                                                                  |  |         |
| IE Alignment       | Yellow line colour and solid linetype                                                                                                                     |  |         |

| Alignment Design Checks | Description                      | Screen grab / DWF / DWG | Default |
|-------------------------|----------------------------------|-------------------------|---------|
| TD 93a standards check  | Checks for the transition length |                         |         |

| Alignment Label Type/Name | Description                                                          | Screen grab / DWF / DWG                                                              | Default |
|---------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| Major Minor and Geometry  | Dumbbell type markers at change of element, pip markers at every 10m |  | Yes     |



|                              |                                                                                        |                                                                                    |  |
|------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--|
| Detailed alignment labelling | As above with super Level wedges                                                       |  |  |
| Geometry Points Only         | Dumbbell type markers at change of element                                             |  |  |
| IE Alignments                | Text in blue colour                                                                    |  |  |
| IE Alignments with Corridors | As above but with the text offset to allow for a corridor model inside the text labels |  |  |

| Alignment Table Type/Name                                                 | Description | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Default                      |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
|---------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|----------------------------|--|--------|--------------|---------|----------------------|-------------|---------------|-------------|------------------|------------------|------------------------------|------------------------------|------------------|----------------------------|----------------------------|------------------------------|------------------------------|---------|---------|----------------------------|----------------------------|----------------------------|--------|---------|--|--|
| Line                                                                      |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Line # & Length & Bearing & Start & End                                   |             | <table><tr><th colspan="5">ALIGNMENT LINE DATA</th></tr><tr><th>LINE #</th><th>LENGTH</th><th>BEARING</th><th>START POINT</th><th>END POINT</th></tr><tr><td>L1</td><td>192.654</td><td>S62° 50' 16.72"E</td><td>(355788.4048, 403867.5526)</td><td>(355941.8958, 403751.1752)</td></tr><tr><td>L2</td><td>235.966</td><td>N53° 03' 11.89"E</td><td>(356182.9651, 403750.7217)</td><td>(356371.5477, 403892.6540)</td></tr><tr><td>L3</td><td>227.570</td><td>S73° 10' 39.85"E</td><td>(356549.5428, 403824.1664)</td><td>(356767.4748, 403868.2969)</td></tr></table> | ALIGNMENT LINE DATA          |                              |                            |  |        | LINE #       | LENGTH  | BEARING              | START POINT | END POINT     | L1          | 192.654          | S62° 50' 16.72"E | (355788.4048, 403867.5526)   | (355941.8958, 403751.1752)   | L2               | 235.966                    | N53° 03' 11.89"E           | (356182.9651, 403750.7217)   | (356371.5477, 403892.6540)   | L3      | 227.570 | S73° 10' 39.85"E           | (356549.5428, 403824.1664) | (356767.4748, 403868.2969) |        |         |  |  |
| ALIGNMENT LINE DATA                                                       |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| LINE #                                                                    | LENGTH      | BEARING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | START POINT                  | END POINT                    |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| L1                                                                        | 192.654     | S62° 50' 16.72"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (355788.4048, 403867.5526)   | (355941.8958, 403751.1752)   |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| L2                                                                        | 235.966     | N53° 03' 11.89"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (356182.9651, 403750.7217)   | (356371.5477, 403892.6540)   |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| L3                                                                        | 227.570     | S73° 10' 39.85"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (356549.5428, 403824.1664)   | (356767.4748, 403868.2969)   |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Curve                                                                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Curve # & Radius & Length & Chord Bearing & Start & End                   |             | <table><tr><th colspan="6">ALIGNMENT CURVE DATA</th></tr><tr><th>CURVE #</th><th>RADIUS</th><th>LENGTH</th><th>CHORD BEARING</th><th>START POINT</th><th>END POINT</th></tr><tr><td>C1</td><td>200.000</td><td>258.689</td><td>S89.89E</td><td>(355941.9358, 403751.1752)</td><td>(356182.9651, 403750.7217)</td></tr><tr><td>C2</td><td>200.000</td><td>187.689</td><td>N79.94E</td><td>(356371.5477, 403892.6540)</td><td>(356549.5428, 403824.1664)</td></tr></table>                                                                                               | ALIGNMENT CURVE DATA         |                              |                            |  |        |              | CURVE # | RADIUS               | LENGTH      | CHORD BEARING | START POINT | END POINT        | C1               | 200.000                      | 258.689                      | S89.89E          | (355941.9358, 403751.1752) | (356182.9651, 403750.7217) | C2                           | 200.000                      | 187.689 | N79.94E | (356371.5477, 403892.6540) | (356549.5428, 403824.1664) |                            |        |         |  |  |
| ALIGNMENT CURVE DATA                                                      |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| CURVE #                                                                   | RADIUS      | LENGTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CHORD BEARING                | START POINT                  | END POINT                  |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| C1                                                                        | 200.000     | 258.689                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | S89.89E                      | (355941.9358, 403751.1752)   | (356182.9651, 403750.7217) |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| C2                                                                        | 200.000     | 187.689                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N79.94E                      | (356371.5477, 403892.6540)   | (356549.5428, 403824.1664) |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Transition                                                                |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Transition # & Value & Length & Start Direction & Start Point & End Point |             | <table><tr><th colspan="5">ALIGNMENT TRANSITION DATA</th></tr><tr><th>TRANSITION #</th><th>LENGTH</th><th>START DIRECTION</th><th>START POINT</th><th>END POINT</th></tr><tr><td>S1</td><td>40.000</td><td>S34° 44' 03.19"E</td><td>(356069.6119), (403181.8590)</td><td>(356094.4870), (403150.6331)</td></tr><tr><td>S2</td><td>40.000</td><td>S88° 27' 02.43"E</td><td>(357061.0159), (403122.8377)</td><td>(357100.7194), (403127.0748)</td></tr></table>                                                                                                          | ALIGNMENT TRANSITION DATA    |                              |                            |  |        | TRANSITION # | LENGTH  | START DIRECTION      | START POINT | END POINT     | S1          | 40.000           | S34° 44' 03.19"E | (356069.6119), (403181.8590) | (356094.4870), (403150.6331) | S2               | 40.000                     | S88° 27' 02.43"E           | (357061.0159), (403122.8377) | (357100.7194), (403127.0748) |         |         |                            |                            |                            |        |         |  |  |
| ALIGNMENT TRANSITION DATA                                                 |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| TRANSITION #                                                              | LENGTH      | START DIRECTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | START POINT                  | END POINT                    |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| S1                                                                        | 40.000      | S34° 44' 03.19"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (356069.6119), (403181.8590) | (356094.4870), (403150.6331) |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| S2                                                                        | 40.000      | S88° 27' 02.43"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (357061.0159), (403122.8377) | (357100.7194), (403127.0748) |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Segment                                                                   |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| Length of Line & Curve & Transition                                       |             | <table><tr><th colspan="4">ALIGNMENT - (2)</th></tr><tr><th>NUMBER</th><th>LENGTH</th><th>RADIUS</th><th>LINE / CHORD BEARING</th></tr><tr><td>C3</td><td>73.753</td><td>100.000</td><td>S87° 19' 19.23"E</td></tr><tr><td>L4</td><td>186.929</td><td></td><td>S34° 44' 03.19"E</td></tr><tr><td>L5</td><td>202.952</td><td></td><td>N50° 05' 24.51"E</td></tr><tr><td>S1</td><td>40.000</td><td>INFINITY</td><td></td></tr><tr><td>S2</td><td>40.000</td><td>100.000</td><td></td></tr></table>                                                                       | ALIGNMENT - (2)              |                              |                            |  | NUMBER | LENGTH       | RADIUS  | LINE / CHORD BEARING | C3          | 73.753        | 100.000     | S87° 19' 19.23"E | L4               | 186.929                      |                              | S34° 44' 03.19"E | L5                         | 202.952                    |                              | N50° 05' 24.51"E             | S1      | 40.000  | INFINITY                   |                            | S2                         | 40.000 | 100.000 |  |  |
| ALIGNMENT - (2)                                                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| NUMBER                                                                    | LENGTH      | RADIUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | LINE / CHORD BEARING         |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| C3                                                                        | 73.753      | 100.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | S87° 19' 19.23"E             |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| L4                                                                        | 186.929     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | S34° 44' 03.19"E             |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| L5                                                                        | 202.952     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N50° 05' 24.51"E             |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| S1                                                                        | 40.000      | INFINITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |
| S2                                                                        | 40.000      | 100.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                              |                              |                            |  |        |              |         |                      |             |               |             |                  |                  |                              |                              |                  |                            |                            |                              |                              |         |         |                            |                            |                            |        |         |  |  |

## 5.8 Profiles

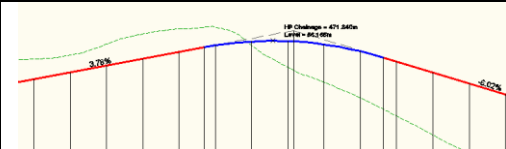


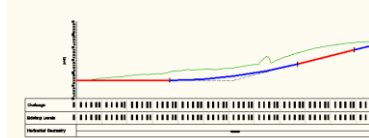
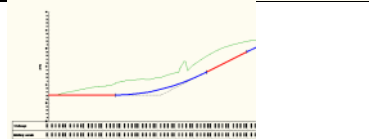
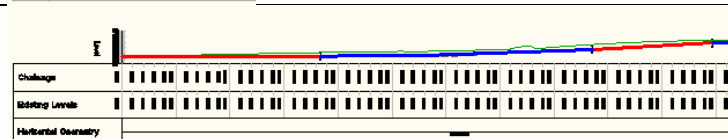
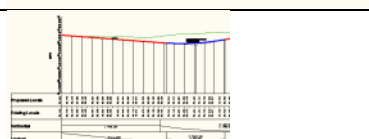
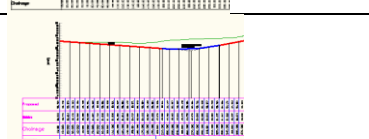
| Profile Style                 | Description                                                                | Screen grab / DWF / DWG | Default |
|-------------------------------|----------------------------------------------------------------------------|-------------------------|---------|
| Existing Ground               | Green dashed line for ground surface profiles                              |                         | Yes     |
| Additional Surface 1, 2, 3, 4 | A profile style to show other surface profiles in a different colour       |                         |         |
| Design Style/ LWT             | Elements drawn in red for straights and blue for vertical parabolic curves |                         | Yes     |
| Plotting Style                | Style to use for plotting purposes                                         |                         |         |
| IE Ground                     |                                                                            |                         |         |
| IE Plotting Style             |                                                                            |                         |         |

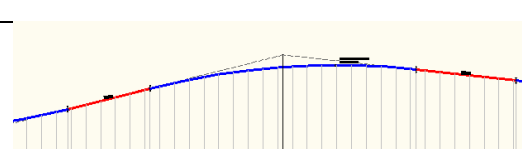
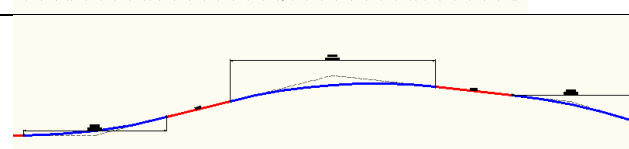
| Profile Design Checks  | Description                                                                                  | Screen grab / DWF / DWG | Default |
|------------------------|----------------------------------------------------------------------------------------------|-------------------------|---------|
| Design Check Sets      |                                                                                              |                         |         |
| TD93a standards check  | Checks for the transition length based on Q value                                            |                         |         |
| CAP 168 Profile Checks | Checks for runway design by CAP 168 standards<br>Checks to 3.3.1, 3.3.2, 3.3.4, 3.3.6, 3.5.1 |                         |         |

| Profile Label Type/Name | Description | Screen grab / DWF / DWG | Default |
|-------------------------|-------------|-------------------------|---------|
| Profile Label Sets      |             |                         |         |
| Basic Label Set         |             |                         |         |
| Annotated Label Set     |             |                         |         |



|                              |  |                                                                                    |     |
|------------------------------|--|------------------------------------------------------------------------------------|-----|
| Detailed Annotated Label Set |  |  | Yes |
| No labels                    |  |                                                                                    |     |

| Profile View Type/Name                                         | Description | Screen grab / DWF / DWG                                                             | Default |
|----------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|---------|
| 5x Exaggeration                                                |             |    | Yes     |
| 10x Exaggeration                                               |             |    |         |
| Natural Scale                                                  |             |   |         |
| Legacy UK Software Emulation                                   |             |   |         |
| IE Profile View / Legacy IE Local Authority Software Emulation |             |  |         |

| Profile View Label Type/Name                   | Description                                            | Screen grab / DWF / DWG                                                              | Default |
|------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| Detailed Designed Profile Labels and Ordinates | Element dumbbells, high and low points and ordinates   |  | Yes     |
| Annotated Label Set                            | Style that adds curve information in a dimension style |  |         |
| Basic label set                                | Element dumbbells only                                 |  |         |



| Profile Band Type/Name                          | Description                                                                                     | Screen grab / DWF / DWG | Default |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------|---------|
| Profile Band Set                                |                                                                                                 |                         |         |
| Chainage and Existing Ground Levels             | Labels the existing ground levels, chainages and horizontal geometry                            |                         |         |
| Levels and Geometry Details                     | Labels the existing ground levels, proposed levels, chainages, horizontal and vertical geometry |                         | Yes     |
| Levels Geometry and Super Level                 |                                                                                                 |                         |         |
| Pipe Network                                    |                                                                                                 |                         |         |
| Legacy UK Software Emulation                    |                                                                                                 |                         |         |
| IE Profile Bands / Legacy IE Software Emulation |                                                                                                 |                         |         |

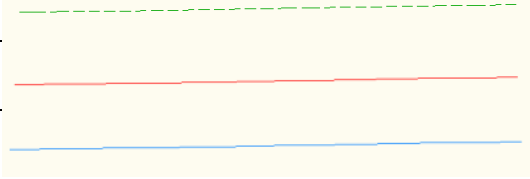
### 5.9 Superelevation View

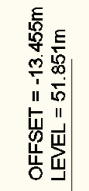
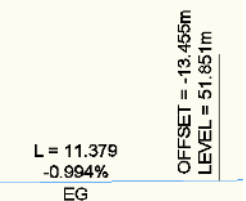
| Superelevation View Styles | Description | Screen grab / DWF / DWG | Default |
|----------------------------|-------------|-------------------------|---------|
| Design View                |             |                         | Yes     |

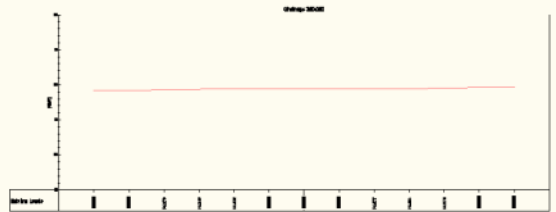
### 5.10 Sections

| Sample Line Styles | Description                                  | Screen grab / DWF / DWG | Default |
|--------------------|----------------------------------------------|-------------------------|---------|
| Sample Lines       | Sample line group number and chainage values |                         | Yes     |



| Section Styles                   | Description                                                          | Screen grab / DWF / DWG                                                            | Default |
|----------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------|---------|
| Existing Ground                  | Dashed green line                                                    |  | Yes     |
| Proposed Ground                  | Solid red line                                                       |                                                                                    |         |
| Additional Surface 1, 2, 3 and 4 | A section style to show other surface sections in a different colour |                                                                                    |         |
| Corridor Presentation            | No visible line shown, but labels are determined from this line      |                                                                                    |         |

| Section Label Styles | Description                                                             | Screen grab / DWF / DWG                                                               | Default |
|----------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------|
| EG Labels            | Offset and level data                                                   |   |         |
| FG Labels            | Offset, level data, surface grade and name for finished ground surfaces |  |         |
| Ordinates            | Ordinate lines from the grade breaks to the top of the bands            |  |         |

| Section View Styles | Description | Screen grab / DWF / DWG                                                              | Default |
|---------------------|-------------|--------------------------------------------------------------------------------------|---------|
| X Section           |             |  | Yes     |





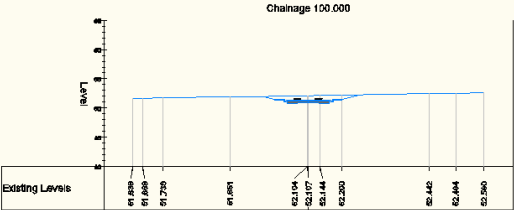
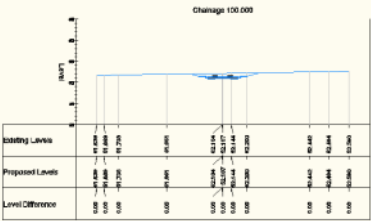
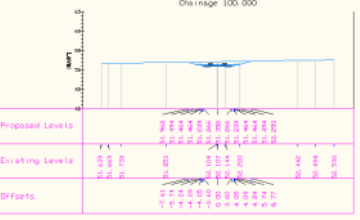
|                             |  |  |  |
|-----------------------------|--|--|--|
| X Section 2x Exaggeration   |  |  |  |
| X Section 2.5x Exaggeration |  |  |  |
| X Section 2.5x Exaggeration |  |  |  |
|                             |  |  |  |

| Label Styles     | Description                                                           | Screen grab / DWF / DWG | Default |
|------------------|-----------------------------------------------------------------------|-------------------------|---------|
| Offset and Level | Specify a location and reports the offset from the baseline and level |                         |         |
| Grade            | Ability to draw a grade freely                                        |                         |         |

Due to the new stagger functionality in 2010, this has been enabled as standard so to stop overlapping text labels at close proximity. The recommended method of creating cross sections for corridor design is to create a surface to the 'TOP' links and using the grade break band styles will annotate the corridor features.

| Section Band Styles               | Description | Screen grab / DWF / DWG | Default |
|-----------------------------------|-------------|-------------------------|---------|
| Surface Levels at Major Intervals |             |                         |         |



| Surface Levels at Grade Intervals                         |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
|-----------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--|----------|-------|---------------|-----------|-------------|------------|----------|------|-------------|---------|--------------|-------|---------|---------|------|------|-------|--------|----------|------|-------|--------|------------------|------|-------|--------|--|
| _Design and Existing Levels with Level Difference/Offsets | Choose Section 1 for proposed and Section 2 for existing |                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| IE Sections                                               | Choose Section 1 for Existing and Section 2 for Proposed |                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Section Table Styles                                      | Description                                              | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Default          |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Total Volume                                              |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Simple                                                    |                                                          | <table><tr><th colspan="4">Volumes 350.000m</th></tr><tr><th>Material Name</th><th>Area (m2)</th><th>Volume (m3)</th><th>C.Vol (m3)</th></tr><tr><td>Surface</td><td>0.15</td><td>7.50</td><td>52.50</td></tr><tr><td>Binder</td><td>0.15</td><td>7.50</td><td>52.50</td></tr><tr><td>Base</td><td>0.60</td><td>30.00</td><td>210.00</td></tr><tr><td>Sub-Base</td><td>1.80</td><td>90.00</td><td>630.00</td></tr><tr><td>Footpath Surface</td><td>0.36</td><td>17.99</td><td>125.93</td></tr></table> | Volumes 350.000m |  |          |       | Material Name | Area (m2) | Volume (m3) | C.Vol (m3) | Surface  | 0.15 | 7.50        | 52.50   | Binder       | 0.15  | 7.50    | 52.50   | Base | 0.60 | 30.00 | 210.00 | Sub-Base | 1.80 | 90.00 | 630.00 | Footpath Surface | 0.36 | 17.99 | 125.93 |  |
| Volumes 350.000m                                          |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Material Name                                             | Area (m2)                                                | Volume (m3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | C.Vol (m3)       |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Surface                                                   | 0.15                                                     | 7.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 52.50            |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Binder                                                    | 0.15                                                     | 7.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 52.50            |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Base                                                      | 0.60                                                     | 30.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 210.00           |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Sub-Base                                                  | 1.80                                                     | 90.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 630.00           |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Footpath Surface                                          | 0.36                                                     | 17.99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 125.93           |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Simple - No Lines                                         |                                                          | <table><tr><th colspan="4">Volumes 350.000m</th></tr><tr><th>Material Name</th><th>Area (m2)</th><th>Volume (m3)</th><th>C.Vol (m3)</th></tr><tr><td>Surface</td><td>0.15</td><td>7.50</td><td>52.50</td></tr><tr><td>Binder</td><td>0.15</td><td>7.50</td><td>52.50</td></tr><tr><td>Base</td><td>0.60</td><td>30.00</td><td>210.00</td></tr><tr><td>Sub-Base</td><td>1.80</td><td>90.00</td><td>630.00</td></tr><tr><td>Footpath Surface</td><td>0.36</td><td>17.99</td><td>125.93</td></tr></table> | Volumes 350.000m |  |          |       | Material Name | Area (m2) | Volume (m3) | C.Vol (m3) | Surface  | 0.15 | 7.50        | 52.50   | Binder       | 0.15  | 7.50    | 52.50   | Base | 0.60 | 30.00 | 210.00 | Sub-Base | 1.80 | 90.00 | 630.00 | Footpath Surface | 0.36 | 17.99 | 125.93 |  |
| Volumes 350.000m                                          |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Material Name                                             | Area (m2)                                                | Volume (m3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | C.Vol (m3)       |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Surface                                                   | 0.15                                                     | 7.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 52.50            |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Binder                                                    | 0.15                                                     | 7.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 52.50            |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Base                                                      | 0.60                                                     | 30.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 210.00           |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Sub-Base                                                  | 1.80                                                     | 90.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 630.00           |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Footpath Surface                                          | 0.36                                                     | 17.99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 125.93           |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Material                                                  |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Simple                                                    |                                                          | <table><tr><th colspan="2">Volume 350.000m</th></tr><tr><td>Cut Area</td><td>52.47</td></tr><tr><td>Fill Area</td><td>0.00</td></tr><tr><td>Cut Vol</td><td>2302.48</td></tr><tr><td>Fill Vol</td><td>0.00</td></tr><tr><td>Cum Cut Vol</td><td>8847.33</td></tr><tr><td>Cum Fill Vol</td><td>53.99</td></tr><tr><td>Net Vol</td><td>8793.34</td></tr></table>                                                                                                                                         | Volume 350.000m  |  | Cut Area | 52.47 | Fill Area     | 0.00      | Cut Vol     | 2302.48    | Fill Vol | 0.00 | Cum Cut Vol | 8847.33 | Cum Fill Vol | 53.99 | Net Vol | 8793.34 |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Volume 350.000m                                           |                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Cut Area                                                  | 52.47                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Fill Area                                                 | 0.00                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Cut Vol                                                   | 2302.48                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Fill Vol                                                  | 0.00                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Cum Cut Vol                                               | 8847.33                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Cum Fill Vol                                              | 53.99                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |
| Net Vol                                                   | 8793.34                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |  |          |       |               |           |             |            |          |      |             |         |              |       |         |         |      |      |       |        |          |      |       |        |                  |      |       |        |  |



|                   |  |                 |         |  |
|-------------------|--|-----------------|---------|--|
| Simple - No Lines |  | Volume 350.000m |         |  |
|                   |  | Cut Area        | 52.47   |  |
|                   |  | Fill Area       | 0.00    |  |
|                   |  | Cut Vol         | 2302.48 |  |
|                   |  | Fill Vol        | 0.00    |  |
|                   |  | Cum Cut Vol     | 8847.33 |  |
|                   |  | Cum Fill Vol    | 53.99   |  |
|                   |  | Net Vol         | 8793.34 |  |

| Group Plot Styles | Description                             | Screen grab / DWF / DWG | Default |
|-------------------|-----------------------------------------|-------------------------|---------|
| Sheet Grouping    | Arrays the sections to fit the viewport |                         |         |
| Plot All          |                                         |                         |         |

| Sheet Styles                              | Description        | Screen grab / DWF / DWG | Default |
|-------------------------------------------|--------------------|-------------------------|---------|
| Current Page Setup to Layout (Paperspace) | Reads the viewport |                         |         |



## 5.11 Pipe Networks

| Parts Lists                | Description                                                 | Screen grab / DWF / DWG | Default |
|----------------------------|-------------------------------------------------------------|-------------------------|---------|
|                            | A selection of lists for drainage and underground utilities |                         |         |
| Interference Styles        | Description                                                 | Screen grab / DWF / DWG | Default |
| Simple Sphere Interference | Shows a green sphere in 3D view                             |                         |         |

| Pipe Styles                | Description                                                    | Screen grab / DWF / DWG | Default |
|----------------------------|----------------------------------------------------------------|-------------------------|---------|
| BT Openreach               |                                                                |                         |         |
| Cable                      |                                                                |                         |         |
| CCTV                       |                                                                |                         |         |
| Double Line                |                                                                |                         |         |
| Electric                   |                                                                |                         |         |
| Foul                       |                                                                |                         |         |
| Motorway Comms             |                                                                |                         |         |
| SFA Combined Sewer         | From the sewers for adoption 6 <sup>th</sup> edition standards |                         |         |
| SFA FW Sewer               |                                                                |                         |         |
| SFA Rising Main - Combined |                                                                |                         |         |
| SFA Rising Main - Foul     |                                                                |                         |         |



|                                    |                                                  |  |  |
|------------------------------------|--------------------------------------------------|--|--|
| SFA Rising Main – Surface Water    |                                                  |  |  |
| SFW SW Water                       |                                                  |  |  |
| SFA Watercourses                   |                                                  |  |  |
| Single Line                        |                                                  |  |  |
| Solid Centreline to Pipe Size      | The width of the line is controlled by pipe size |  |  |
| Solid Centreline to Pipe Schematic |                                                  |  |  |
| Solid Centreline to Pipe Size      | The width of the line is controlled by pipe size |  |  |
| Solid Dashed Line Schematic        |                                                  |  |  |
| Solid Dashed Line to Pipe Size     | The width of the line is controlled by pipe size |  |  |
| Transco Gas                        |                                                  |  |  |
| Virgin Media                       |                                                  |  |  |

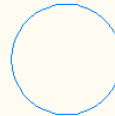
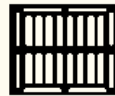
| Pipe Rule Set | Description | Screen grab / DWF / DWG                                                                             | Default  |     |
|---------------|-------------|-----------------------------------------------------------------------------------------------------|----------|-----|
| Basic         |             |  Cover And Slope |          | Yes |
|               |             | Maximum Cover                                                                                       | 7.000m   |     |
|               |             | Maximum Slope                                                                                       | 1.000%   |     |
|               |             | Minimum Cover                                                                                       | 1.200m   |     |
|               |             | Minimum Slope                                                                                       | 0.200%   |     |
|               |             |  Length Check    |          |     |
|               |             | Maximum Length                                                                                      | 100.000m |     |
|               |             | Minimum Length                                                                                      | 1.000m   |     |

| Pipe Label Styles                          | Description | Screen grab / DWF / DWG | Default |
|--------------------------------------------|-------------|-------------------------|---------|
| Name Size and 2D Length (Centre to Centre) |             |                         |         |
| Name Only                                  |             |                         |         |
| Pipe Length and Slope                      |             |                         |         |

| Pipe Table Styles | Description | Screen grab / DWF / DWG | Default |
|-------------------|-------------|-------------------------|---------|
|-------------------|-------------|-------------------------|---------|



| Pipe Setting Out         |           | <table><tr><th colspan="6">Pipe Table</th></tr><tr><th>Pipe Name</th><th>Size (mm)</th><th>Plan Length (m)</th><th>Slope</th><th>Start Invert Level</th><th>End Invert Level</th></tr><tr><td>Pipe - (3)</td><td>375</td><td>140.352</td><td>-1.10%</td><td>34.825</td><td>36.172</td></tr><tr><td>Pipe - (4)</td><td>375</td><td>107.979</td><td>2.24%</td><td>36.152</td><td>33.729</td></tr></table> | Pipe Table |                    |                  |  |           |           | Pipe Name  | Size (mm) | Plan Length (m) | Slope | Start Invert Level | End Invert Level | Pipe - (3) | 375 | 140.352 | -1.10% | 34.825 | 36.172 | Pipe - (4) | 375 | 107.979 | 2.24% | 36.152 | 33.729 |  |
|--------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------|------------------|--|-----------|-----------|------------|-----------|-----------------|-------|--------------------|------------------|------------|-----|---------|--------|--------|--------|------------|-----|---------|-------|--------|--------|--|
| Pipe Table               |           |                                                                                                                                                                                                                                                                                                                                                                                                         |            |                    |                  |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Pipe Name                | Size (mm) | Plan Length (m)                                                                                                                                                                                                                                                                                                                                                                                         | Slope      | Start Invert Level | End Invert Level |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Pipe - (3)               | 375       | 140.352                                                                                                                                                                                                                                                                                                                                                                                                 | -1.10%     | 34.825             | 36.172           |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Pipe - (4)               | 375       | 107.979                                                                                                                                                                                                                                                                                                                                                                                                 | 2.24%      | 36.152             | 33.729           |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Simple Summary Pipe List |           | <table><tr><th colspan="4">Pipe Table</th></tr><tr><th>Pipe Name</th><th>Size (mm)</th><th>Length (m)</th><th>Slope</th></tr><tr><td>Pipe - (3)</td><td>375</td><td>140.352</td><td>-1.10%</td></tr><tr><td>Pipe - (4)</td><td>375</td><td>107.979</td><td>2.24%</td></tr></table>                                                                                                                      | Pipe Table |                    |                  |  | Pipe Name | Size (mm) | Length (m) | Slope     | Pipe - (3)      | 375   | 140.352            | -1.10%           | Pipe - (4) | 375 | 107.979 | 2.24%  |        |        |            |     |         |       |        |        |  |
| Pipe Table               |           |                                                                                                                                                                                                                                                                                                                                                                                                         |            |                    |                  |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Pipe Name                | Size (mm) | Length (m)                                                                                                                                                                                                                                                                                                                                                                                              | Slope      |                    |                  |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Pipe - (3)               | 375       | 140.352                                                                                                                                                                                                                                                                                                                                                                                                 | -1.10%     |                    |                  |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |
| Pipe - (4)               | 375       | 107.979                                                                                                                                                                                                                                                                                                                                                                                                 | 2.24%      |                    |                  |  |           |           |            |           |                 |       |                    |                  |            |     |         |        |        |        |            |     |         |       |        |        |  |

| Structure Styles                | Description | Screen grab / DWF / DWG                                                               | Default |
|---------------------------------|-------------|---------------------------------------------------------------------------------------|---------|
| Adoptable Foul Water Manhole    |             |    |         |
| Adoptable Surface Water Manhole |             |   |         |
| BT Openreach                    |             |  |         |
| CCTV                            |             |  |         |
| Electric Manhole                |             |  |         |
| Generic Circle                  |             |  |         |
| Gully Detailed                  |             |  |         |
| Motorway Comm Box               |             |  |         |



|                     |  |  |  |  |
|---------------------|--|--|--|--|
| Sewer Manhole       |  |  |  |  |
| Sewer Manhole       |  |  |  |  |
| Transco Gas Manhole |  |  |  |  |
| Virgin Manhole      |  |  |  |  |

| Structure Rule Styles | Description | Screen grab / DWF / DWG | Default |
|-----------------------|-------------|-------------------------|---------|
| Basic                 |             |                         |         |

| Structure Label Styles    | Description | Screen grab / DWF / DWG | Default |
|---------------------------|-------------|-------------------------|---------|
| Name Cover and Part Type  |             |                         |         |
| Data with Connected Pipes |             |                         |         |
| Name Only                 |             |                         |         |

| Structure Table Styles | Description | Screen grab / DWF / DWG | Default |
|------------------------|-------------|-------------------------|---------|
|------------------------|-------------|-------------------------|---------|



Simple Summary List

Structure Table

| Structure Name  | Structure Details                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------|
| Structure - (1) | COVER = 43.115<br>SUMP = 40.507<br>Pipe - (1) INV OUT = 42.694<br>Pipe - (2) INV OUT = 42.507 |
| Structure - (3) | COVER = 42.764<br>SUMP = -2.188<br>Pipe - (1) INV IN = -0.188                                 |
| Structure - (2) | COVER = 42.207<br>SUMP = -2.375<br>Pipe - (2) INV IN = -0.375                                 |

Structure Setting Out

Structure Table

| Structure Name  | Easting    | Northing   | Cover Level | Connected Pipes                                  |
|-----------------|------------|------------|-------------|--------------------------------------------------|
| Structure - (1) | 356124.725 | 403493.936 | 43.115      | Pipe - (1) Inv. 42.694<br>Pipe - (2) Inv. 42.507 |
| Structure - (3) | 356101.857 | 403478.643 | 42.764      | Pipe - (1) Inv. -0.188                           |
| Structure - (2) | 356180.071 | 403478.584 | 42.207      | Pipe - (2) Inv. -0.375                           |

## 5.12 Corridors

| Corridor Styles        | Description                                               | Screen grab / DWF / DWG | Default |
|------------------------|-----------------------------------------------------------|-------------------------|---------|
| Edit Regions not Shown |                                                           |                         | Yes     |
| Edit Style             | Shows manual overrides to corridor section to the drawing |                         |         |

| Assembly Styles | Description | Screen grab / DWF / DWG | Default |
|-----------------|-------------|-------------------------|---------|
| Basic           |             |                         |         |

| Mass Haul Line Styles | Description | Screen grab / DWF / DWG | Default |
|-----------------------|-------------|-------------------------|---------|
| Diagonal Hatch        |             |                         |         |
| Solid Hatch           |             |                         |         |

| Mass Haul View Styles | Description | Screen grab / DWF / DWG | Default |
|-----------------------|-------------|-------------------------|---------|
| Clipped Grid          |             |                         | Yes     |

| Quantity Takeoff Criteria  | Description | Screen grab / DWF / DWG | Default |
|----------------------------|-------------|-------------------------|---------|
|                            |             |                         |         |
| Footways                   |             |                         |         |
| Road Construction          |             |                         |         |
| Road Construction Complete |             |                         |         |





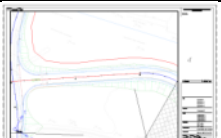
|                      |  |  |  |
|----------------------|--|--|--|
| Road Narrow Widening |  |  |  |
| Road Overlay         |  |  |  |
| Road Planing         |  |  |  |
| Two Surfaces         |  |  |  |

| QTO Table Styles      | Description | Screen grab / DWF / DWG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Default              |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
|-----------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|-------------|--------------|-----------|------|--------|-------------------|----------|----------|-----------|---------|----------|-------------|--------------|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|----------|---------|---------|--------|---------|---------|----------|---------|----------|----------|----------|--------|---------|---------|-----------|---------|-----------|----------|-----------|---------|----------|---------|-----------|---------|-----------|----------|-----------|--|
| Total Volume          |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| Total Volume Table    |             | <table><tr><th colspan="8">Total Volume Table</th></tr><tr><th>Chainage</th><th>Cut Area</th><th>Fill Area</th><th>Cut Vol</th><th>Fill Vol</th><th>Cum Cut Vol</th><th>Cum Fill Vol</th><th>Net Vol</th></tr><tr><td>0.000</td><td>0.419m2</td><td>0.496m2</td><td>0.000m3</td><td>0.000m3</td><td>0.000m3</td><td>0.000m3</td><td>0.000m3</td></tr><tr><td>25.000</td><td>1.045m2</td><td>0.179m2</td><td>16.299m3</td><td>8.428m3</td><td>16.299m3</td><td>8.428m3</td><td>9.872m3</td></tr><tr><td>50.000</td><td>2.950m2</td><td>0.000m2</td><td>49.942m3</td><td>2.242m3</td><td>69.242m3</td><td>10.669m3</td><td>57.572m3</td></tr><tr><td>75.000</td><td>6.399m2</td><td>0.000m2</td><td>116.869m3</td><td>0.000m3</td><td>186.110m3</td><td>10.669m3</td><td>174.441m3</td></tr><tr><td>100.000</td><td>11.475m2</td><td>0.000m2</td><td>223.429m3</td><td>0.000m3</td><td>408.539m3</td><td>10.669m3</td><td>397.870m3</td></tr></table> | Total Volume Table   |          |             |              |           |      |        |                   | Chainage | Cut Area | Fill Area | Cut Vol | Fill Vol | Cum Cut Vol | Cum Fill Vol | Net Vol | 0.000  | 0.419m2 | 0.496m2 | 0.000m3 | 0.000m3 | 0.000m3 | 0.000m3 | 0.000m3 | 25.000  | 1.045m2 | 0.179m2 | 16.299m3 | 8.428m3 | 16.299m3 | 8.428m3 | 9.872m3 | 50.000 | 2.950m2 | 0.000m2 | 49.942m3 | 2.242m3 | 69.242m3 | 10.669m3 | 57.572m3 | 75.000 | 6.399m2 | 0.000m2 | 116.869m3 | 0.000m3 | 186.110m3 | 10.669m3 | 174.441m3 | 100.000 | 11.475m2 | 0.000m2 | 223.429m3 | 0.000m3 | 408.539m3 | 10.669m3 | 397.870m3 |  |
| Total Volume Table    |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| Chainage              | Cut Area    | Fill Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Cut Vol              | Fill Vol | Cum Cut Vol | Cum Fill Vol | Net Vol   |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 0.000                 | 0.419m2     | 0.496m2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.000m3              | 0.000m3  | 0.000m3     | 0.000m3      | 0.000m3   |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 25.000                | 1.045m2     | 0.179m2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 16.299m3             | 8.428m3  | 16.299m3    | 8.428m3      | 9.872m3   |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 50.000                | 2.950m2     | 0.000m2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 49.942m3             | 2.242m3  | 69.242m3    | 10.669m3     | 57.572m3  |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 75.000                | 6.399m2     | 0.000m2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 116.869m3            | 0.000m3  | 186.110m3   | 10.669m3     | 174.441m3 |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 100.000               | 11.475m2    | 0.000m2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 223.429m3            | 0.000m3  | 408.539m3   | 10.669m3     | 397.870m3 |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| Material              |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| Material Volume Table |             | <table><tr><th colspan="4">Surface Volume Table</th></tr><tr><th>Chainage</th><th>Area</th><th>Volume</th><th>Cumulative Volume</th></tr><tr><td>0.000</td><td>0.18</td><td>0.00</td><td>0.00</td></tr><tr><td>25.000</td><td>0.18</td><td>4.50</td><td>4.50</td></tr><tr><td>50.000</td><td>0.18</td><td>4.50</td><td>9.00</td></tr><tr><td>75.000</td><td>0.18</td><td>4.50</td><td>13.50</td></tr><tr><td>100.000</td><td>0.18</td><td>4.50</td><td>18.00</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Surface Volume Table |          |             |              | Chainage  | Area | Volume | Cumulative Volume | 0.000    | 0.18     | 0.00      | 0.00    | 25.000   | 0.18        | 4.50         | 4.50    | 50.000 | 0.18    | 4.50    | 9.00    | 75.000  | 0.18    | 4.50    | 13.50   | 100.000 | 0.18    | 4.50    | 18.00    |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| Surface Volume Table  |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| Chainage              | Area        | Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Cumulative Volume    |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 0.000                 | 0.18        | 0.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.00                 |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 25.000                | 0.18        | 4.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4.50                 |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 50.000                | 0.18        | 4.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 9.00                 |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 75.000                | 0.18        | 4.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 13.50                |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |
| 100.000               | 0.18        | 4.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 18.00                |          |             |              |           |      |        |                   |          |          |           |         |          |             |              |         |        |         |         |         |         |         |         |         |         |         |         |          |         |          |         |         |        |         |         |          |         |          |          |          |        |         |         |           |         |           |          |           |         |          |         |           |         |           |          |           |  |

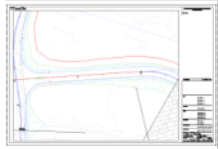
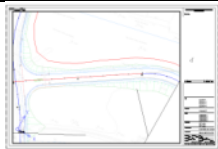
### 5.13 Plan and Profile Sheets

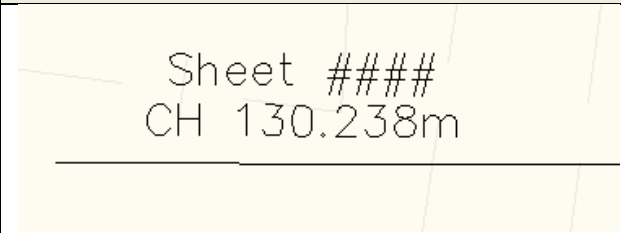
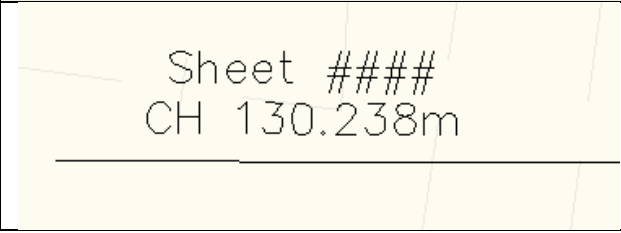
| View Frame Styles | Description | Screen grab / DWF / DWG                                                              | Default |
|-------------------|-------------|--------------------------------------------------------------------------------------|---------|
| Simple            |             |  |         |

| View Frame Label Styles | Description | Screen grab / DWF / DWG | Default |
|-------------------------|-------------|-------------------------|---------|
| Simple                  |             |                         |         |

| Match Line Styles                | Description                                       | Screen grab / DWF / DWG                                                               | Default |
|----------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------|---------|
| Simple – ANSI 37 Hatched Masking | Applies a ANSI 37 fill to mask out the next sheet |  |         |



|                                  |                                                       |                                                                                     |  |
|----------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------|--|
| Simple – ANSI 38 Hatched Masking | Applies a ANSI 38 fill to mask out the next sheet     |  |  |
| Simple – No Masking              | No fill                                               |                                                                                     |  |
| Simple – Solid Masking           | Applies a white solid fill to mask out the next sheet |  |  |

| Match Line Label Styles | Description | Screen grab / DWF / DWG                                                             | Default |
|-------------------------|-------------|-------------------------------------------------------------------------------------|---------|
| Match Line Left         |             |                                                                                     |         |
| Simple                  |             |   |         |
| Match Line Right        |             |                                                                                     |         |
| Simple                  |             |  |         |



## 5.14 Survey

| Network Styles | Description | Screen grab / DWF / DWG | Default |
|----------------|-------------|-------------------------|---------|
| Simple         |             |                         |         |

| Figure Styles | Description                                                                                                           | Screen grab / DWF / DWG | Default |
|---------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------|---------|
| Various       | An example of linework linked to the codes in the figure prefix library. Each line style has its own colour and layer |                         |         |

## 5.15 Catchment Areas

| Catchment Area Styles | Description | Screen grab / DWF / DWG | Default |
|-----------------------|-------------|-------------------------|---------|
| Catchment Area        |             |                         |         |

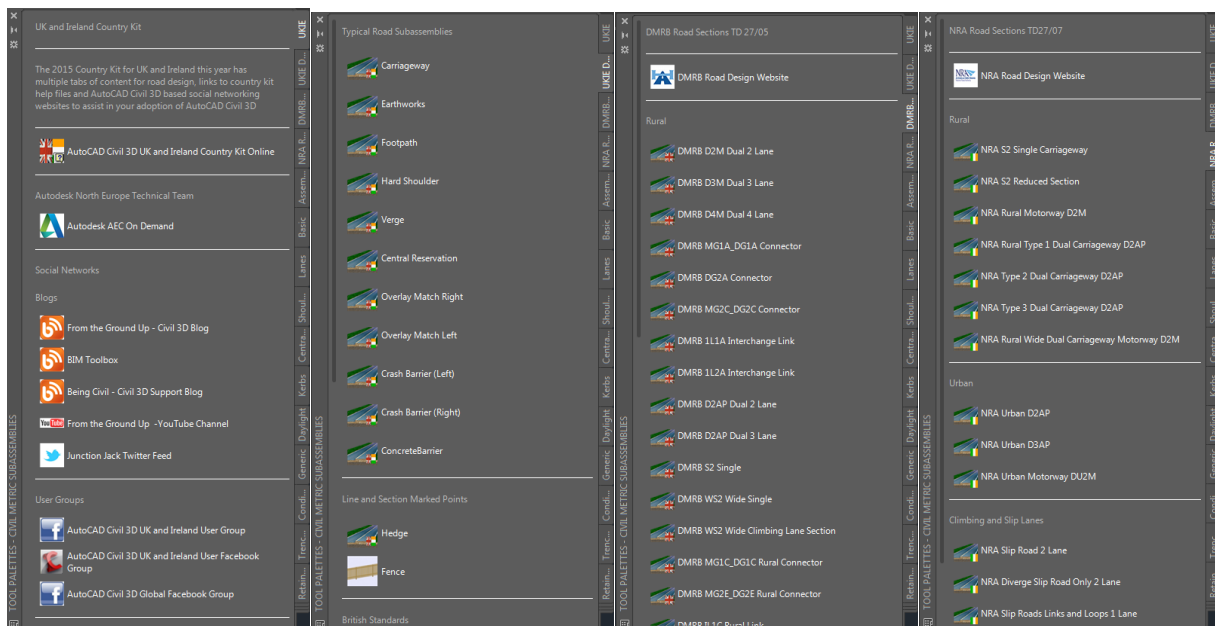
## 6 Tool palette(s)

### 6.1 Content

There are four tabs in the UKIE country kit.

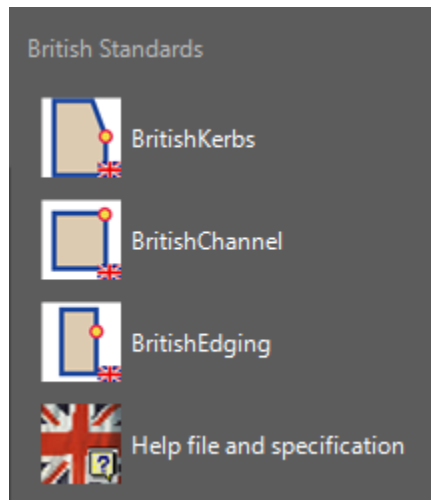
The main UKIE tab has links to this help file, websites, blogs, YouTube, UKIE User Group and facebook.  
NOTE: The User Group and Resource Centre are not Autodesk official sites.

The remaining tabs are for road creation with road sections based on the road standards in UK and Ireland including links to those official websites where the standards can be downloaded.



#### 6.1.1 Subassemblies

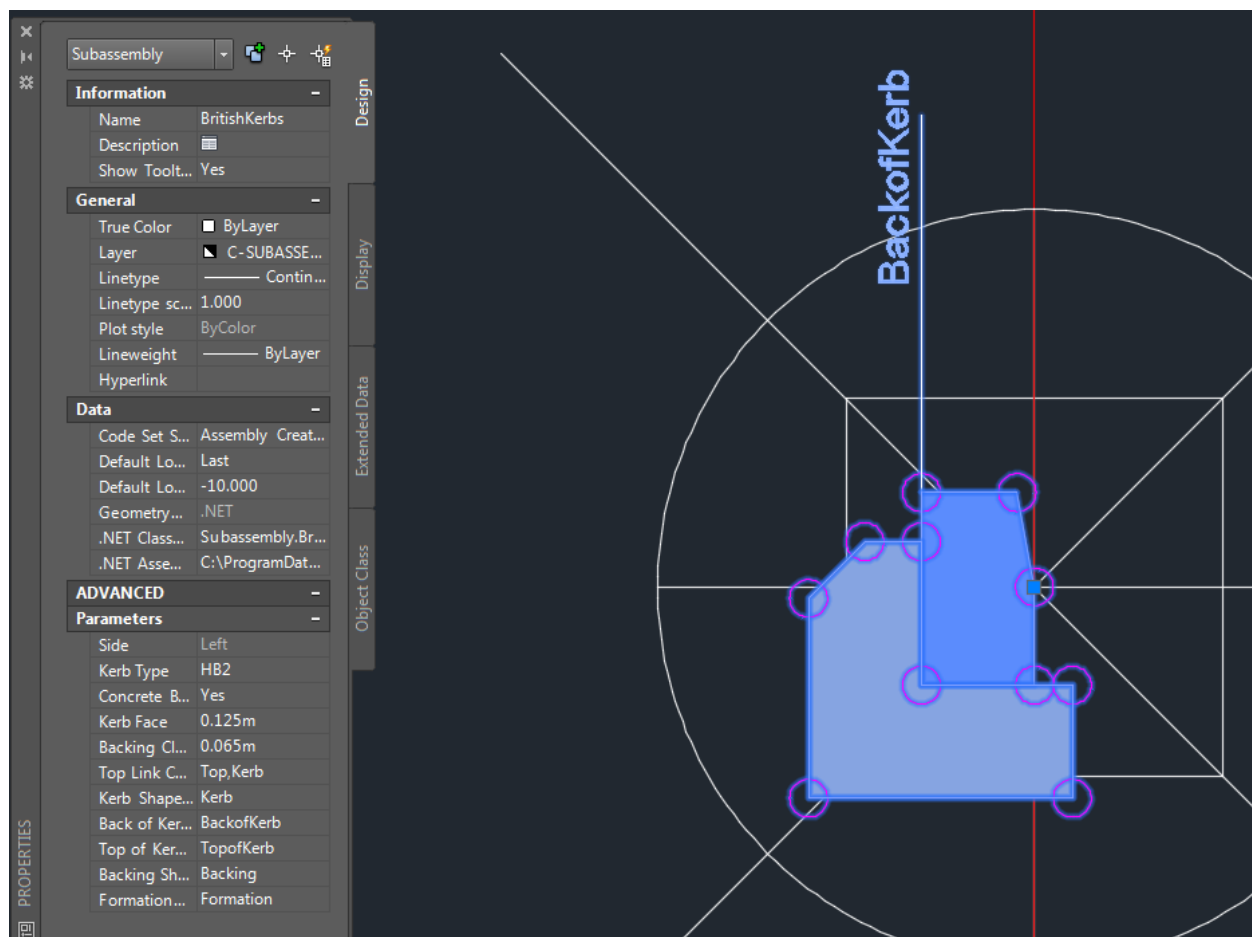
Supplied is a simple extract of the subassembly catalogue for easy access to the most common subassemblies to use which have been preconfigured to suitable values for width and slope etc. Also supplied is a selection of kerb, channel and edging units to British Standards.



The kerbs, edgings and channels have a selection for 'Kerb Type' to toggle the kerb used and can be used to create a dropped kerb at pedestrian crossings.

Also the concrete backing is optional.

The source pkt files are installed at this [location](#) and can be used/modified if required.





### 6.1.2 Dynamic Blocks

Some examples of how civil objects can be combined into AutoCAD dynamic blocks in this case turning heads with one that includes a corridor where you can change the profile to the designed profile in the project.

### 6.1.3 Transition Curve Design Tables

A table of 'A' values has been provided so that the dynamic transition lengths can be utilised using UK and Ireland values.

<C:\ProgramData\Autodesk\C3D 2015\enu\Data\Corridor Design Standards\Metric\UKIE Design Criteria A values.xls>

| q   |          | 0.3    |           |
|-----|----------|--------|-----------|
| V   | L        | A      | RL        |
| 40  | 11.4204  | 67.59  | 4568.17   |
| 50  | 22.3055  | 94.46  | 8922.20   |
| 60  | 38.5439  | 124.17 | 15417.56  |
| 70  | 61.2063  | 156.47 | 24482.51  |
| 80  | 91.3633  | 191.17 | 36545.32  |
| 90  | 130.086  | 228.11 | 52034.26  |
| 100 | 178.444  | 267.17 | 71377.59  |
| 110 | 237.509  | 308.23 | 95003.57  |
| 120 | 308.351  | 351.20 | 123340.47 |
| q   |          | 0.6    |           |
| V   | L        | A      | RL        |
| 40  | 57.10207 | 47.79  | 2284.08   |
| 50  | 89.22198 | 66.79  | 4461.10   |
| 60  | 128.4797 | 87.80  | 7708.78   |
| 70  | 174.8751 | 110.64 | 12241.26  |
| 80  | 228.4083 | 135.18 | 18272.66  |
| 90  | 289.0792 | 161.30 | 26017.13  |
| 100 | 356.8879 | 188.91 | 35688.79  |
| 110 | 431.8344 | 217.95 | 47501.78  |
| 120 | 513.9186 | 248.33 | 61670.24  |

### 6.1.4 Assemblies

In addition as assemblies used for junction creation, the standards for UK and Ireland for Highway Link design have been created.

They have been set with a standard slope value and can react when used with superelevation on the alignment. The pavement depths are set to an overall construction depth of 0.5m which then can be modified to suit the site conditions.

NOTE: If the standards change during the course of the release an updated set will be made available in due course. It is noted on the assemblies to which year of the standards that these assemblies were created from.

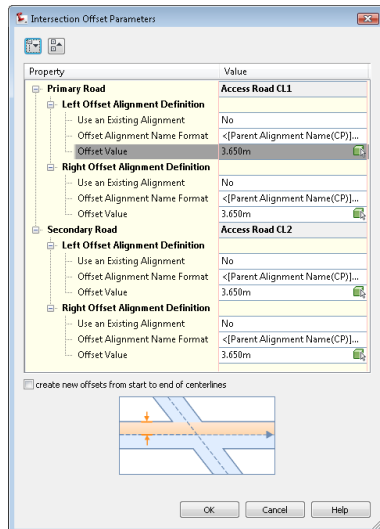
These assembly drawings are stored in the following locations

C:\ProgramData\Autodesk\C3D2015\enu\Assemblies\Metric\UKIE (Windows 7 and 8)

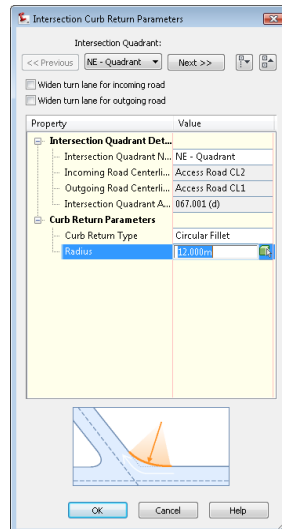


## 7 Junctions (also known as Intersections outside the UK and Ireland)

### 2D Geometry

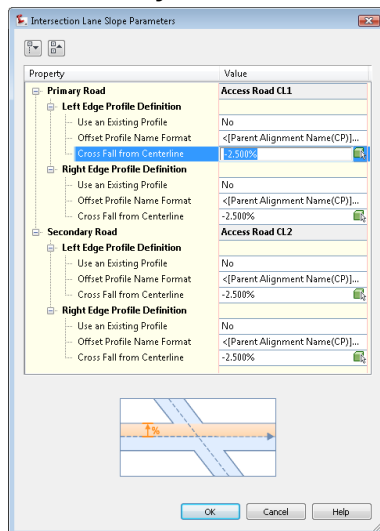


Lane offsets set to 3.65m

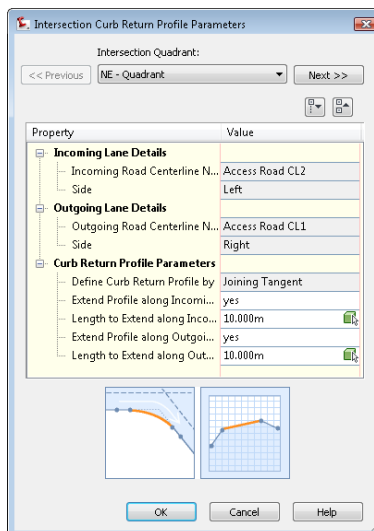


Kerb radius fillets set to 12m circular fillets

### 3D Geometry



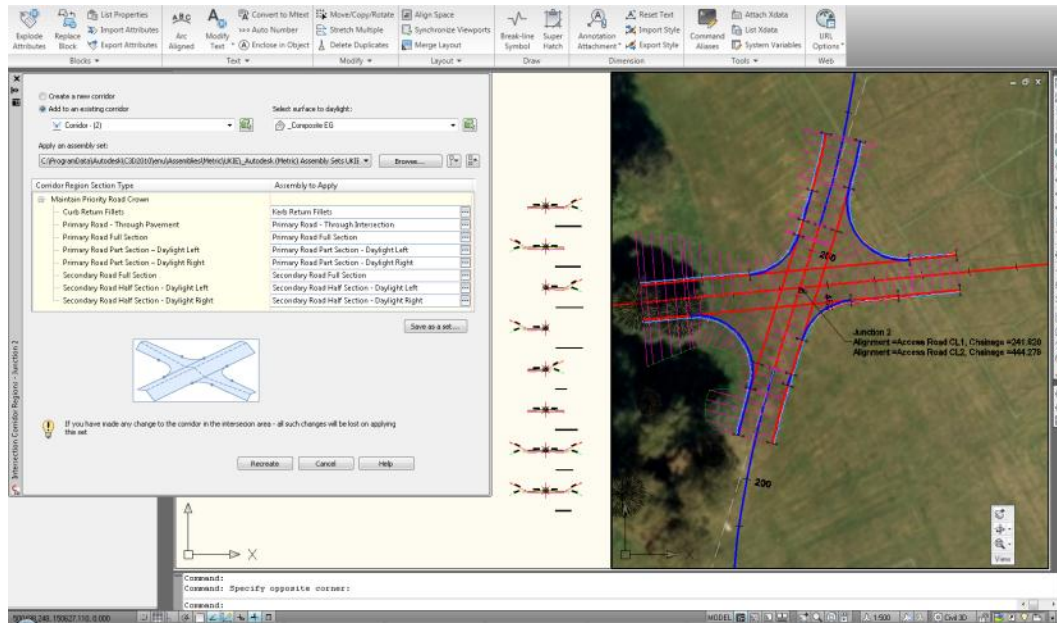
Lane crossfall set to -2.5% (-1:40)



In 2015 the vertical profiles are set to a straight grade, to give an initial vertical profile design. The kerb return radius fillets are extended 10m beyond the tangency with the connecting roads to allow for easy editing in plan but allow to visualise the grade in and out of the junction.



Using the assembly sets and or customised sets mentioned in the previous section these can be used to automatically build the junction corridor model







## 8 Roundabouts

A design standards file has been provided to give some suitable values to produce simple roundabout results. As there are no specific tables for all values these settings are to give an outline of a roundabouts to which can be edited depending on results from roundabout traffic analysis for capacity.

Autodesk Civil 3D 2015 Metric Roundabouts Presets UKIE.xml

**Create Roundabout - Circulatory Road**

Roundabout center point  
X: 356459.689 Y: 403791.12

Roundabout parameters  
Outer radius: 16  
Circulatory road width: 7.2  
Apron width: 1

Markings parameters  
☒ Outer offset: 0.2  
☒ Inner offset: 0.2  
Marker line width: 0.1  
Number of lanes to mark: 1  
Lane marker line width: 0.1  
Lane marker linetype: Continuous

Drawing standard  
Roundabout design standard file: C:\ProgramData\Autodesk\C3D 2011\enu\Data\...  
Select roundabout standard: UKIE

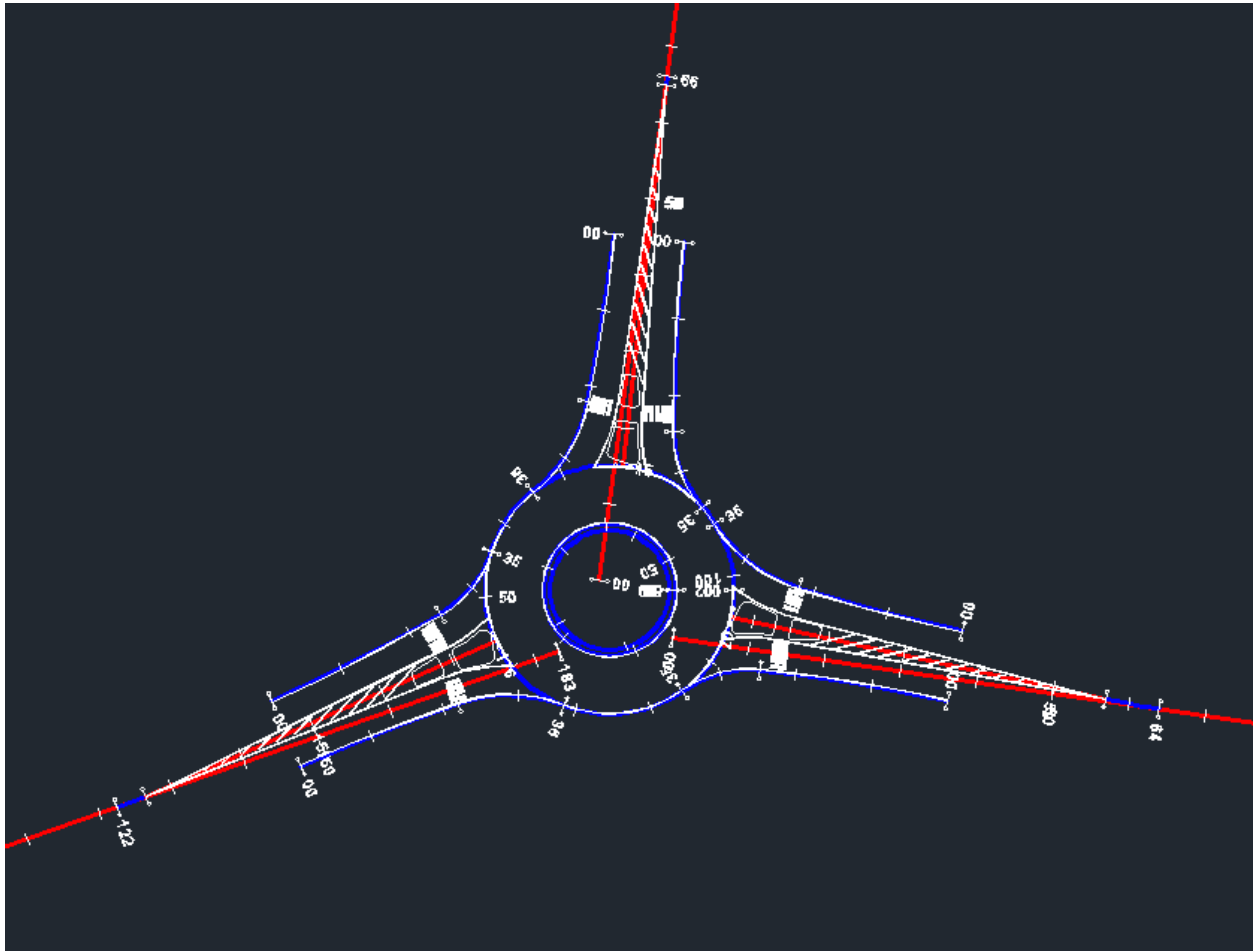
Predefined parameters to import  
UKIE 32m ICD

Site: \*None\*

Alignment style: Design Style LWT  
Alignment layer: 0

Alignment name prefix: Roundabout  
Alignment label set: Major Minor and both horizontal and vertic

< Back Next > Cancel Help

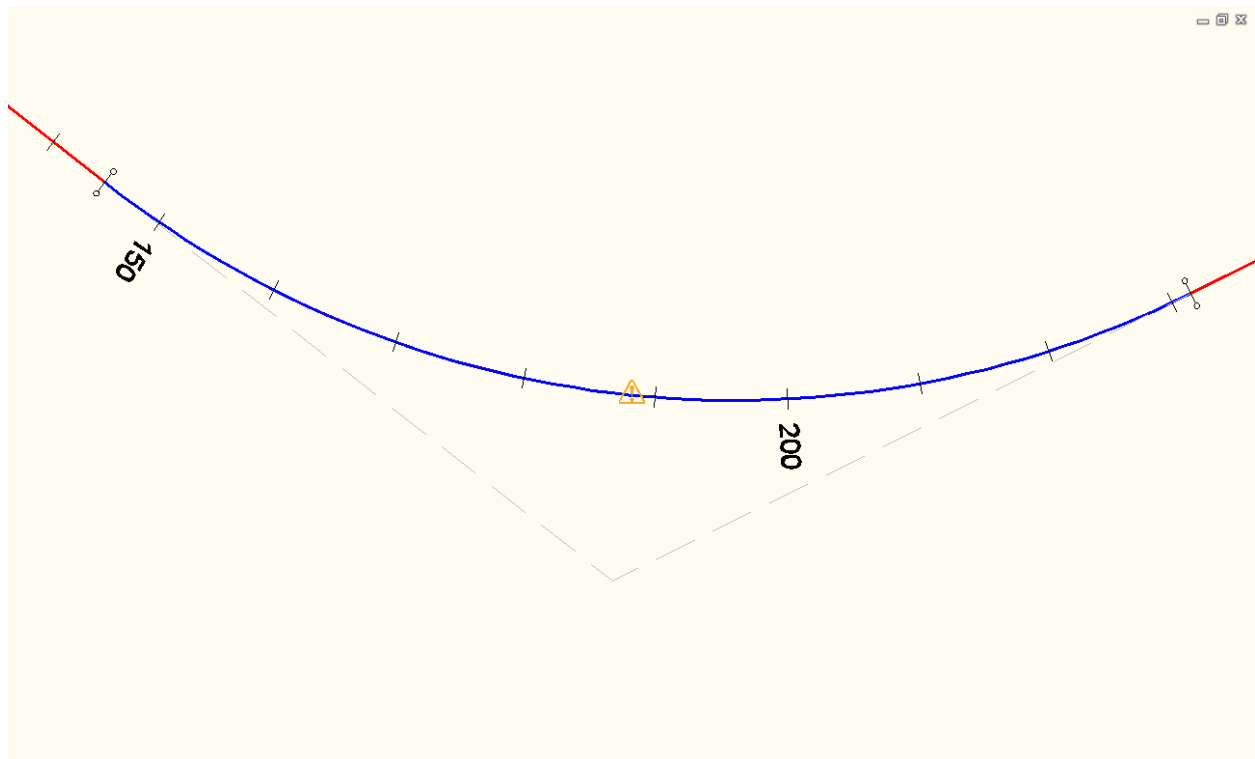




## 9 Design Criteria

Design Criteria is used for alignments and profiles used in corridor models for road design. The design will therefore follow the local standard for road design. The standards supplied in the UKIE Country Kit Content Pack is to the DMRB standards and TD9/93a.

If violate the design criteria Civil 3D gives you a warning in the drawing for curves that are violated. The figure below is an example of violating the design criteria.

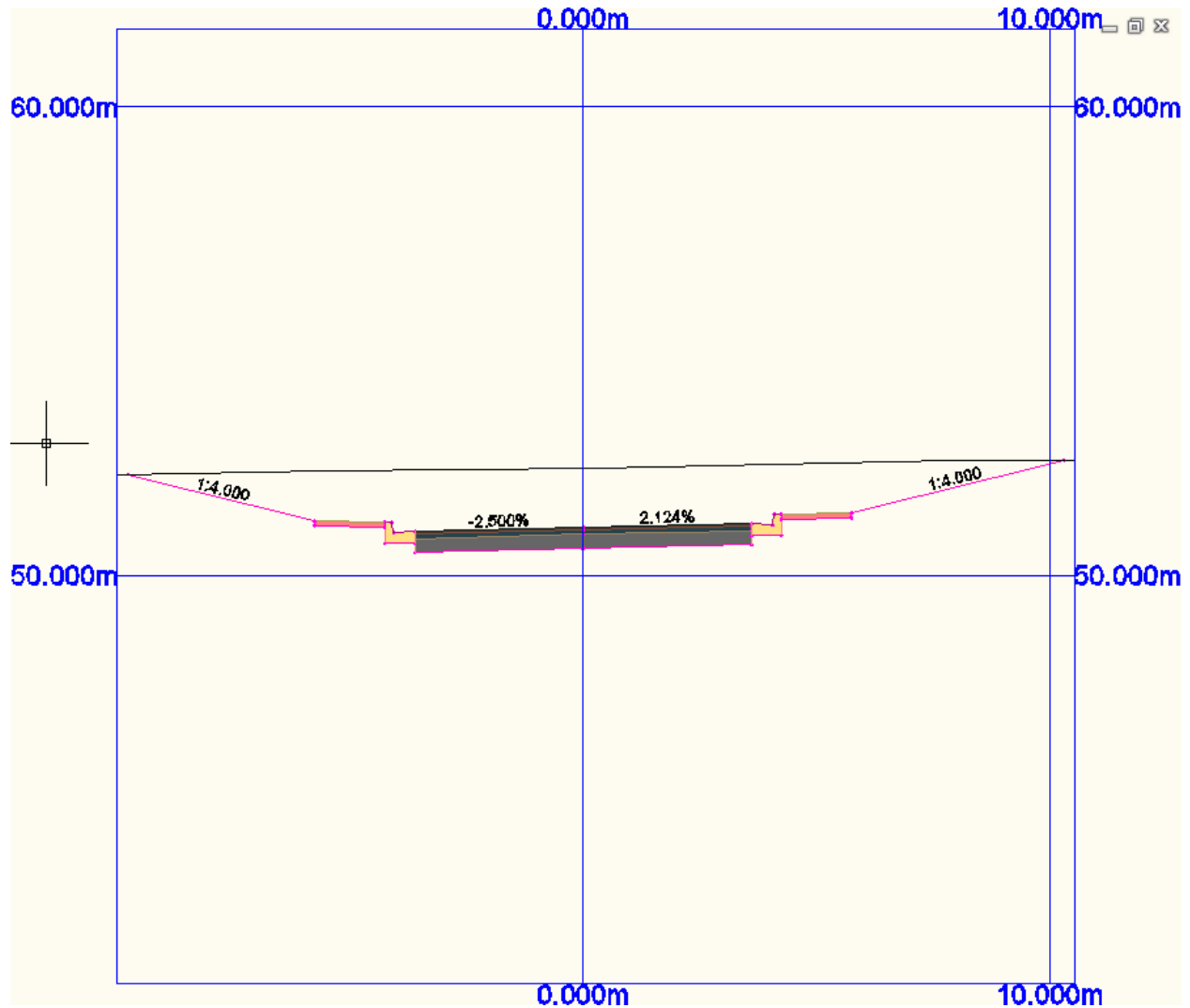


Where a departure in standards is required, this can be achieved by increasing the Superelevation rate within the Alignment Geometry Grid Editor.

| No. | rough Point2       | Minimum Radius | Minimum Radius Table                   | Transition Length Table | Attainment Method     | Radius   | Delta angle | Alignment entities |
|-----|--------------------|----------------|----------------------------------------|-------------------------|-----------------------|----------|-------------|--------------------|
| 1   | .101m, 403500.9... |                |                                        |                         |                       |          |             |                    |
| 2   |                    | 1020.000m      | TD9/93a superelevation 2.5%            | Standard                | TD9/93a Transition... | 76.986m  | 064.483 (d' |                    |
| 3   | .878m, 403666.7... |                | TD9/93a superelevation 2.5%            |                         |                       |          |             |                    |
| 4   |                    | 1020.000m      | TD9/93a superelevation 3.5%            | Standard                | TD9/93a Transition... | 200.000m | 036.918 (d' |                    |
| 5   | .588m, 403634.7... |                | TD9/93a desirable superelevation 5%    |                         |                       |          |             |                    |
|     |                    |                | One step below desirable Min R. at 7%  |                         |                       |          |             |                    |
|     |                    |                | Two steps below desirable Min R. at 7% |                         |                       |          |             |                    |



Design Criteria is also used for calculating super Level for road design where the Superelevation is applied over the transitions curves. Figure below is an example for automatic calculation of super Level in a left hand curve.



The UKIE design criteria are saved in the \_Autodesk Civil 3D 2015 Road Design Standards UKIE.xml

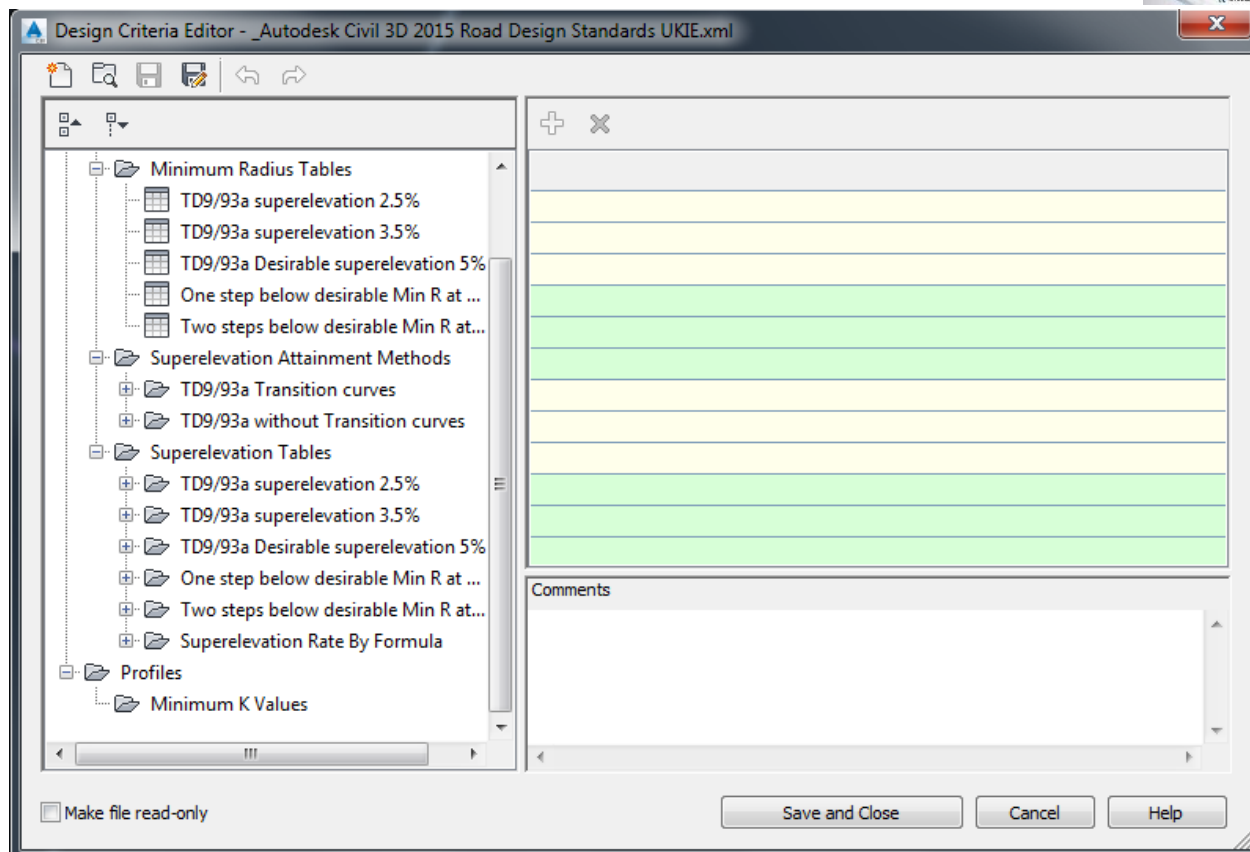
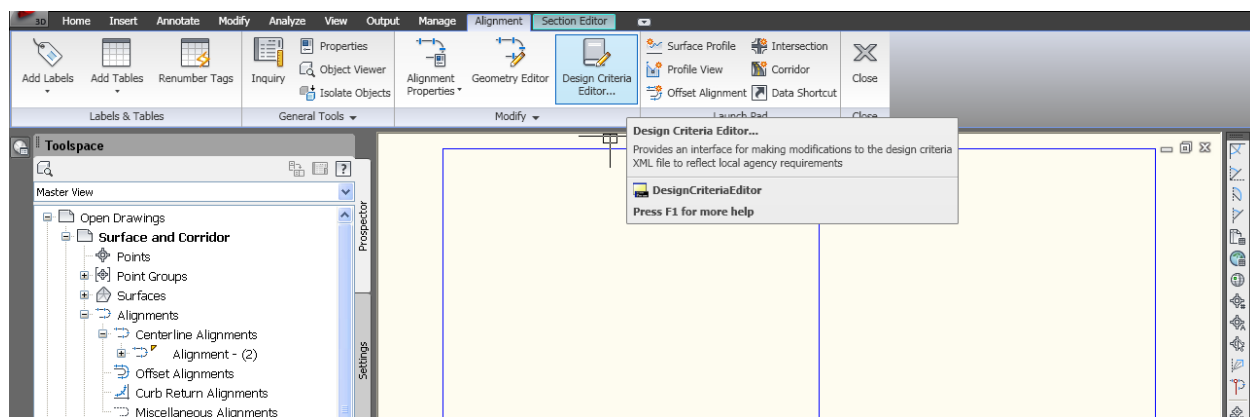


Figure below shows where the internal editor can be found.





## 10 Quantity Take Off

### 10.1 Introduction of QTO

In Civil 3D it is possible to create a link between a Rate Item list (also known as Pay Items outside UK and Ireland) of Civil 3D objects as well as AutoCAD objects. The link is on 2 levels:

1. **Settings in the template.** Corridor (Subassemblies), Pipes and Structures are automatically linked to the Pay Item list.
2. **Select objects.** Select polygon, polylines, lines or Feature Lines by manual select in the Pay item list.

If objects in the Civil 3D drawing are linked to the rate Item list, then it is possible to run a report that prints areas and length for objects, that are linked.

The potential is to link the drawing and object model data to methods of measurement such as MCHW, MHRW (Ireland) and CESSM.

Included is a UKIE Example.csv file which is based on the MCHW, but does only have the main rate item listing at this point

Figure below shows an example report with summary of rate Items.

| Pay Item ID | Description | Quantity | Unit | Baseline | Station |     | Offset |     | Remarks                   |
|-------------|-------------|----------|------|----------|---------|-----|--------|-----|---------------------------|
|             |             |          |      |          | Start   | End | Start  | End |                           |
| 11001       | Kerbs       | 21.978   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 13.974   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 21.977   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 13.896   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 10.001   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 13.364   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 23.204   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 10.001   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 9.675    | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 11.171   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 22.515   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 65.961   | m    |          |         |     |        |     | Corridor Feature Line: EC |
| 11001       | Kerbs       | 32.417   | m    |          |         |     |        |     | Corridor Feature Line: EC |

It is possible to summary different types based on count, area or length.

The rate Items can contain a formula that can multiply the summary with a price.

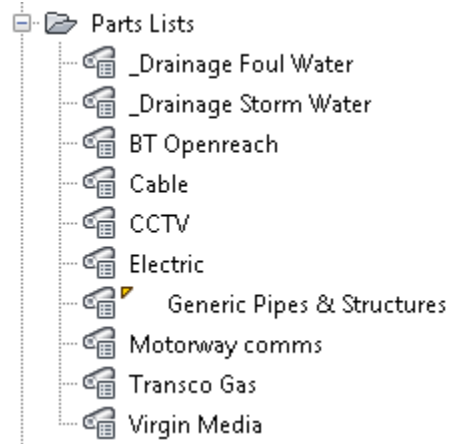
This can be a very easy way to calculate prices on kerbing etc.

Information from QTO can be shown in reports (CSV, HTML or TXT) or be exported to use in third party Bills of Quantity/Estimation application.

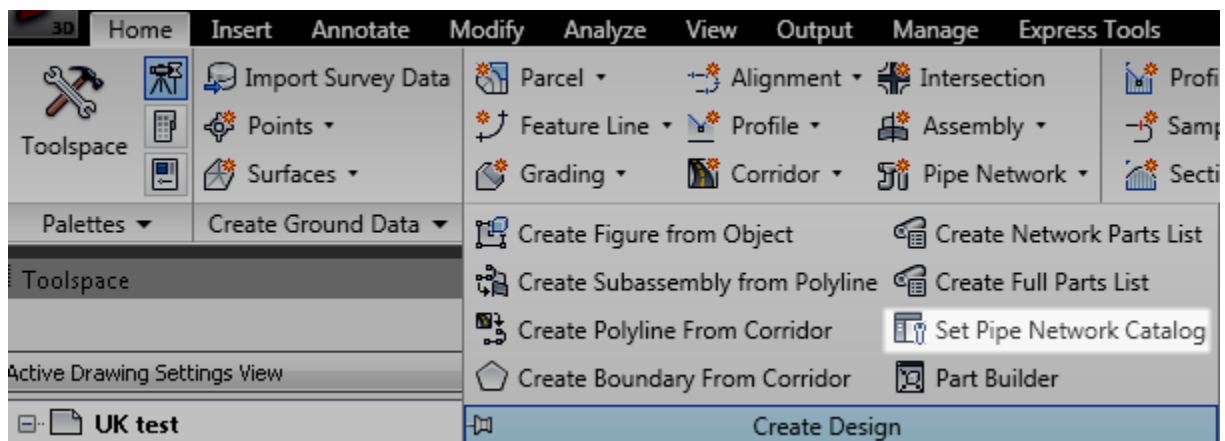


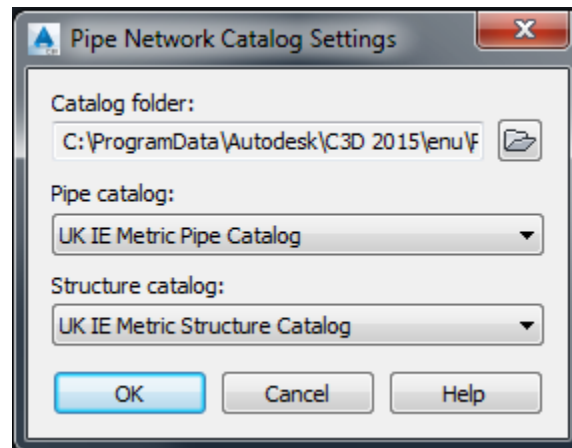
## 11 Pipe and Structure Catalog

The UKIE Country Kit contains a number of parts for drainage and underground utilities.



These are accessed from the UKIE Metric Pipes and UKIE Metric Structures parts catalog, which must be set first to enable their use





## 11.1 Parts Appendix

# Appendix

## Pipes

PE Pipes are specified by external diameter instead of internal dia.  
The Part Size Name takes account of this parameter.

## PE Pipes

### SDR11

| Wall Thickness | Inner Pipe Diameter | Part Size Name       |
|----------------|---------------------|----------------------|
| 2.3000         | 11.4000             | 16 mm PE Pipe SDR11  |
| 2.3000         | 15.4000             | 20 mm PE Pipe SDR11  |
| 2.3000         | 20.4000             | 25 mm PE Pipe SDR11  |
| 3.0000         | 26.0000             | 32 mm PE Pipe SDR11  |
| 3.7000         | 32.6000             | 40 mm PE Pipe SDR11  |
| 4.6000         | 40.8000             | 50 mm PE Pipe SDR11  |
| 5.1000         | 44.8000             | 55 mm PE Pipe SDR11  |
| 5.8000         | 51.4000             | 63 mm PE Pipe SDR11  |
| 6.8000         | 61.4000             | 75 mm PE Pipe SDR11  |
| 8.2000         | 73.6000             | 90 mm PE Pipe SDR11  |
| 10.0000        | 90.0000             | 110 mm PE Pipe SDR11 |
| 11.4000        | 102.2000            | 125 mm PE Pipe SDR11 |





| Wall Thickness | Inner Pipe Diameter | Part Size Name         |
|----------------|---------------------|------------------------|
| 12.7000        | 114.6000            | 140 mm PE Pipe SDR11   |
| 16.4000        | 147.2000            | 180 mm PE Pipe SDR11   |
| 18.2000        | 163.6000            | 200 mm PE Pipe SDR11   |
| 22.7000        | 204.6000            | 250 mm PE Pipe SDR11   |
| 25.4000        | 229.2000            | 280 mm PE Pipe SDR11   |
| 28.6000        | 257.8000            | 315 mm PE Pipe SDR11   |
| 32.3000        | 290.4000            | 355 mm PE Pipe SDR11   |
| 36.4000        | 327.2000            | 400 mm PE Pipe SDR11   |
| 40.9000        | 368.2000            | 450 mm PE Pipe SDR11   |
| 45.5000        | 409.0000            | 500 mm PE Pipe SDR11   |
| 50.8000        | 458.4000            | 560 mm PE Pipe SDR11   |
| 57.2000        | 515.6000            | 630 mm PE Pipe SDR11   |
| 63.6000        | 572.8000            | 700 mm PE Pipe SDR11   |
| 64.5000        | 581.0000            | 710 mm PE Pipe SDR11   |
| 72.7000        | 654.6000            | 800 mm PE Pipe SDR11   |
| 81.8000        | 736.4000            | 900 mm PE Pipe SDR11   |
| 90.0000        | 820.0000            | 1,000 mm PE Pipe SDR11 |

**SDR17**

| Wall Thickness | Part Size Name        | Inner Pipe Diameter |
|----------------|-----------------------|---------------------|
| 5.4000         | 90 mm PE Pipe SDR17   | 79.2000             |
| 6.6000         | 110 mm PE Pipe SDR17  | 96.8000             |
| 7.4000         | 125 mm PE Pipe SDR17  | 110.2000            |
| 9.5000         | 160 mm PE Pipe SDR17  | 141.0000            |
| 10.7000        | 180 mm PE Pipe SDR17  | 158.6000            |
| 13.4000        | 225 mm PE Pipe SDR17  | 198.2000            |
| 14.8000        | 250 mm PE Pipe SDR17  | 220.4000            |
| 16.6000        | 280 mm PE Pipe SDR17  | 246.8000            |
| 18.7000        | 315 mm PE Pipe SDR17  | 277.6000            |
| 21.1000        | 355 mm PE Pipe SDR17  | 312.8000            |
| 23.7000        | 400 mm PE Pipe SDR17  | 352.6000            |
| 26.7000        | 450 mm PE Pipe SDR17  | 396.6000            |
| 29.7000        | 500 mm PE Pipe SDR17  | 440.6000            |
| 32.2000        | 560 mm PE Pipe SDR17  | 495.6000            |
| 37.4000        | 630 mm PE Pipe SDR17  | 555.2000            |
| 39.8000        | 700 mm PE Pipe SDR17  | 620.4000            |
| 42.1000        | 710 mm PE Pipe SDR17  | 625.8000            |
| 47.4000        | 800 mm PE Pipe SDR17  | 705.2000            |
| 53.3000        | 900 mm PE Pipe SDR17  | 793.4000            |
| 59.3000        | 1000 mm PE Pipe SDR17 | 881.4000            |

**SDR21**

| Wall Thickness | Part Size Name       | Inner Pipe Diameter |
|----------------|----------------------|---------------------|
| 7.6000         | 160 mm PE Pipe SDR21 | 144.8000            |
| 8.6000         | 180 mm PE Pipe SDR21 | 162.8000            |
| 10.7000        | 225 mm PE Pipe SDR21 | 203.6000            |
| 11.9000        | 250 mm PE Pipe SDR21 | 226.2000            |
| 13.3000        | 280 mm PE Pipe SDR21 | 253.4000            |
| 15.0000        | 315 mm PE Pipe SDR21 | 285.0000            |
| 16.9000        | 355 mm PE Pipe SDR21 | 321.2000            |
| 19.0000        | 400 mm PE Pipe SDR21 | 362.0000            |
| 21.4000        | 450 mm PE Pipe SDR21 | 407.2000            |
| 23.8000        | 500 mm PE Pipe SDR21 | 452.4000            |
| 26.6000        | 560 mm PE Pipe SDR21 | 506.8000            |



| Wall Thickness | Part Size Name        | Inner Pipe Diameter |
|----------------|-----------------------|---------------------|
| 30.0000        | 630 mm PE Pipe SDR21  | 570.0000            |
| 33.8000        | 710 mm PE Pipe SDR21  | 642.4000            |
| 38.0000        | 800 mm PE Pipe SDR21  | 724.0000            |
| 42.8000        | 900 mm PE Pipe SDR21  | 814.4000            |
| 47.6000        | 1000 mm PE Pipe SDR21 | 904.8000            |

**SDR26**

|         |          |                       |
|---------|----------|-----------------------|
| 6.2000  | 147.6000 | 160 mm PE Pipe SDR26  |
| 6.9000  | 166.2000 | 180 mm PE Pipe SDR26  |
| 8.6000  | 207.8000 | 225 mm PE Pipe SDR26  |
| 9.6000  | 230.8000 | 250 mm PE Pipe SDR26  |
| 10.7000 | 258.6000 | 280 mm PE Pipe SDR26  |
| 12.1000 | 290.8000 | 315 mm PE Pipe SDR26  |
| 13.6000 | 327.8000 | 355 mm PE Pipe SDR26  |
| 15.3000 | 369.4000 | 400 mm PE Pipe SDR26  |
| 17.2000 | 415.6000 | 450 mm PE Pipe SDR26  |
| 19.1000 | 461.8000 | 500 mm PE Pipe SDR26  |
| 21.6000 | 516.8000 | 560 mm PE Pipe SDR26  |
| 24.3000 | 581.4000 | 630 mm PE Pipe SDR26  |
| 27.3000 | 655.4000 | 710 mm PE Pipe SDR26  |
| 30.8000 | 738.4000 | 800 mm PE Pipe SDR26  |
| 34.7000 | 830.6000 | 900 mm PE Pipe SDR26  |
| 38.5000 | 923.0000 | 1000 mm PE Pipe SDR26 |



## PVC-O Pipes (Uponor Mondial)

| Wall Thickness | Part Size Name             | Pressure rating | Inner Pipe Diameter |
|----------------|----------------------------|-----------------|---------------------|
| 3.0000         | 110 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 104.0000            |
| 5.1000         | 140 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 129.8000            |
| 3.7000         | 160 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 152.6000            |
| 4.6000         | 200 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 190.8000            |
| 5.7000         | 250 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 238.6000            |
| 7.2000         | 315 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 300.6000            |
| 9.1000         | 400 mm PVC-O Pipe 12.5 bar | 12.5 bar        | 381.8000            |
| 3.2000         | 110 mm PVC-O Pipe 16 bar   | 16 bar          | 103.6000            |
| 5.1000         | 140 mm PVC-O Pipe 16 bar   | 16 bar          | 129.8000            |
| 4.7000         | 160 mm PVC-O Pipe 16 bar   | 16 bar          | 150.6000            |
| 5.8000         | 200 mm PVC-O Pipe 16 bar   | 16 bar          | 188.4000            |
| 7.3000         | 250 mm PVC-O Pipe 16 bar   | 16 bar          | 235.4000            |
| 9.2000         | 315 mm PVC-O Pipe 16 bar   | 16 bar          | 296.6000            |
| 11.6000        | 400 mm PVC-O Pipe 16 bar   | 16 bar          | 376.8000            |

## PVC-u pipes

| Wall Thickness | Inner Pipe Diameter | Part Size Name   |
|----------------|---------------------|------------------|
| 1.7000         | 19.6000             | 23.00 PVC-u pipe |
| 2.1000         | 20.8000             | 25.00 PVC-u pipe |
| 2.7000         | 21.6000             | 27.00 PVC-u pipe |
| 3.2000         | 23.6000             | 30.00 PVC-u pipe |
| 4.0000         | 27.0000             | 35.00 PVC-u pipe |
| 5.0000         | 30.0000             | 40.00 PVC-u pipe |



## Cast Iron Class AB

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 40.0000   | 7.4500  |
| 50.0000   | 9.5500  |
| 65.0000   | 8.6500  |
| 80.0000   | 7.2500  |
| 100.0000  | 10.9500 |
| 125.0000  | 12.4500 |
| 150.0000  | 13.6500 |
| 175.0000  | 14.8500 |
| 200.0000  | 16.6000 |
| 225.0000  | 17.0500 |
| 250.0000  | 18.0000 |
| 300.0000  | 16.9000 |
| 350.0000  | 18.3000 |
| 375.0000  | 19.0000 |
| 400.0000  | 19.7000 |
| 450.0000  | 21.1500 |
| 500.0000  | 22.5500 |
| 525.0000  | 23.2500 |
| 550.0000  | 23.9500 |
| 600.0000  | 25.1000 |
| 650.0000  | 26.3000 |
| 675.0000  | 26.9500 |
| 700.0000  | 27.4500 |
| 750.0000  | 28.6000 |
| 800.0000  | 29.7500 |
| 825.0000  | 30.5000 |
| 850.0000  | 31.2000 |
| 900.0000  | 32.1000 |
| 1000.0000 | 34.1500 |
| 1050.0000 | 35.3000 |
| 1100.0000 | 36.2500 |
| 1200.0000 | 38.3000 |



## Cast Iron Pipe Class CD

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 40.0000   | 7.4500  |
| 50.0000   | 9.5500  |
| 65.0000   | 8.6500  |
| 80.0000   | 7.2500  |
| 100.0000  | 10.9500 |
| 125.0000  | 12.4500 |
| 150.0000  | 13.6500 |
| 175.0000  | 14.8500 |
| 200.0000  | 16.6000 |
| 225.0000  | 17.0500 |
| 250.0000  | 18.0000 |
| 300.0000  | 22.7000 |
| 350.0000  | 24.6500 |
| 375.0000  | 25.6000 |
| 400.0000  | 26.5500 |
| 450.0000  | 28.4500 |
| 500.0000  | 30.1500 |
| 525.0000  | 31.1000 |
| 550.0000  | 31.8500 |
| 600.0000  | 33.5000 |
| 650.0000  | 35.1500 |
| 675.0000  | 35.9000 |
| 700.0000  | 36.6000 |
| 750.0000  | 38.0000 |
| 800.0000  | 39.6500 |
| 825.0000  | 40.4000 |
| 900.0000  | 42.2500 |
| 1000.0000 | 45.1000 |
| 1050.0000 | 46.5000 |
| 1200.0000 | 50.2500 |



## Clay pipes

plain end 100 mm Vitrified Clay Pipe 11 mm wall thickness  
plain end 150 mm Vitrified Clay Pipe 14 mm wall thickness  
plain end 225 mm Vitrified Clay Pipe 19 mm wall thickness  
plain end 300 mm Vitrified Clay Pipe 29 mm wall thickness  
socketed 225 mm Vitrified Clay Pipe 19 mm wall thickness  
socketed 300 mm Vitrified Clay Pipe 29 mm wall thickness  
rocker 150 mm Vitrified Clay Pipe 11 mm wall thickness  
rocker 225 mm Vitrified Clay Pipe 19 mm wall thickness  
rocker 300 mm Vitrified Clay Pipe 29 mm wall thickness  
400 mm Vitrified Clay Pipe 46 mm wall thickness  
450 mm Vitrified Clay Pipe 46 mm wall thickness  
450 mm Vitrified Clay Pipe 51 mm wall thickness  
500 mm Vitrified Clay Pipe 51 mm wall thickness  
600 mm Vitrified Clay Pipe 58 mm wall thickness  
Unjointed 100 mm Vitrified Clay Pipe 15 mm wall thickness  
Unjointed 150 mm Vitrified Clay Pipe 21 mm wall thickness  
Unjointed 225 mm Vitrified Clay Pipe 23 mm wall thickness  
Unjointed 300 mm Vitrified Clay Pipe 36 mm wall thickness  
300 mm Vitrified Clay Pipe 33 mm wall thickness  
Socketed 400 mm Vitrified Clay Pipe 46 mm wall thickness  
Socketed 450 mm Vitrified Clay Pipe 46 mm wall thickness



## Concrete pipes

### Inner Pipe Diameter Wall Thickness

|           |          |
|-----------|----------|
| 225.0000  | 35.0000  |
| 300.0000  | 55.0000  |
| 375.0000  | 55.0000  |
| 450.0000  | 64.0000  |
| 525.0000  | 72.0000  |
| 600.0000  | 84.0000  |
| 675.0000  | 75.0000  |
| 750.0000  | 80.0000  |
| 825.0000  | 85.0000  |
| 900.0000  | 90.0000  |
| 1050.0000 | 105.0000 |
| 1200.0000 | 120.0000 |
| 1350.0000 | 150.0000 |
| 1500.0000 | 150.0000 |
| 1600.0000 | 115.0000 |
| 1800.0000 | 180.0000 |
| 2000.0000 | 200.0000 |
| 2100.0000 | 280.0000 |
| 2200.0000 | 220.0000 |
| 2400.0000 | 220.0000 |

## Copper Pipes

### Inner Pipe Diameter Wall Thickness

|         |        |
|---------|--------|
| 6.0000  | 0.8000 |
| 8.0000  | 0.8000 |
| 10.0000 | 0.8000 |
| 12.0000 | 0.8000 |
| 15.0000 | 1.0000 |
| 18.0000 | 1.0000 |
| 22.0000 | 1.2000 |
| 28.0000 | 1.2000 |
| 35.0000 | 1.5000 |
| 42.0000 | 1.5000 |
| 54.0000 | 2.0000 |





**Inner Pipe Diameter Wall Thickness**

|          |        |
|----------|--------|
| 66.7000  | 2.0000 |
| 76.1000  | 2.0000 |
| 108.0000 | 2.5000 |



## Ductile Iron Pipes

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 80.0000   | 9.0000  |
| 100.0000  | 9.0000  |
| 150.0000  | 10.0000 |
| 200.0000  | 11.0000 |
| 250.0000  | 12.5000 |
| 300.0000  | 12.5000 |
| 350.0000  | 13.5000 |
| 400.0000  | 14.0000 |
| 450.0000  | 14.5000 |
| 500.0000  | 15.5000 |
| 600.0000  | 17.0000 |
| 700.0000  | 18.5000 |
| 800.0000  | 20.5000 |
| 900.0000  | 22.5000 |
| 1000.0000 | 24.0000 |
| 1200.0000 | 27.5000 |
| 1400.0000 | 31.0000 |
| 1600.0000 | 34.0000 |
| 1800.0000 | 37.5000 |
| 2000.0000 | 41.0000 |

## PVC Pipe

### Inner Pipe Diameter Wall Thickness

|          |         |
|----------|---------|
| 75.0000  | 3.0000  |
| 90.0000  | 4.0000  |
| 100.0000 | 5.0000  |
| 150.0000 | 5.0000  |
| 175.0000 | 6.0000  |
| 225.0000 | 7.0000  |
| 300.0000 | 7.0000  |
| 375.0000 | 8.0000  |
| 450.0000 | 10.0000 |
| 475.0000 | 12.0000 |
| 500.0000 | 15.0000 |



**Inner Pipe Diameter Wall Thickness**

|          |         |
|----------|---------|
| 630.0000 | 17.0000 |
| 650.0000 | 20.0000 |



## Spun Iron pipe

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 80.0000   | 9.0000  |
| 100.0000  | 9.0000  |
| 150.0000  | 10.0000 |
| 200.0000  | 11.0000 |
| 250.0000  | 12.5000 |
| 300.0000  | 12.5000 |
| 350.0000  | 13.5000 |
| 400.0000  | 14.0000 |
| 450.0000  | 14.5000 |
| 500.0000  | 15.5000 |
| 600.0000  | 17.0000 |
| 700.0000  | 18.5000 |
| 800.0000  | 20.5000 |
| 900.0000  | 22.5000 |
| 1000.0000 | 24.0000 |
| 1200.0000 | 27.5000 |
| 1400.0000 | 31.0000 |
| 1600.0000 | 34.0000 |
| 1800.0000 | 37.5000 |
| 2000.0000 | 41.0000 |



## Steel API SL pipes

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 80.0000   | 4.4500  |
| 100.0000  | 7.1500  |
| 150.0000  | 9.1500  |
| 200.0000  | 9.5500  |
| 250.0000  | 11.5000 |
| 300.0000  | 11.9500 |
| 350.0000  | 2.8000  |
| 400.0000  | 3.2000  |
| 450.0000  | 3.5000  |
| 500.0000  | 4.0000  |
| 600.0000  | 5.0000  |
| 700.0000  | 5.5000  |
| 800.0000  | 6.5000  |
| 900.0000  | 7.0000  |
| 1000.0000 | 8.0000  |
| 1200.0000 | 10.0000 |
| 175.0000  | 9.3500  |
| 225.0000  | 9.7500  |
| 550.0000  | 4.5000  |
| 600.0000  | 5.0000  |
| 750.0000  | 6.0000  |
| 850.0000  | 7.0000  |
| 90.0000   | 5.8000  |

## Steel BS1387 Pipes

### Inner Pipe Diameter Wall Thickness

|          |        |
|----------|--------|
| 80.0000  | 4.4500 |
| 100.0000 | 7.1500 |
| 125.0000 | 7.3500 |
| 150.0000 | 7.5500 |



## Steel BS3600 Pipes

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 80.0000   | 4.4500  |
| 100.0000  | 7.1500  |
| 150.0000  | 9.1500  |
| 200.0000  | 9.5500  |
| 250.0000  | 11.5000 |
| 300.0000  | 11.9500 |
| 350.0000  | 2.8000  |
| 400.0000  | 3.2000  |
| 450.0000  | 3.5000  |
| 500.0000  | 4.0000  |
| 600.0000  | 5.0000  |
| 700.0000  | 5.5000  |
| 800.0000  | 6.5000  |
| 900.0000  | 7.0000  |
| 1000.0000 | 8.0000  |
| 1200.0000 | 10.0000 |
| 175.0000  | 9.3500  |
| 225.0000  | 9.7500  |
| 550.0000  | 4.5000  |
| 600.0000  | 5.0000  |
| 750.0000  | 6.0000  |
| 850.0000  | 7.0000  |
| 90.0000   | 5.8000  |



## Steel ISO 4200 Pipes Series 1

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 80.0000   | 4.5000  |
| 90.0000   | 5.8000  |
| 100.0000  | 7.1500  |
| 150.0000  | 9.1500  |
| 200.0000  | 9.5500  |
| 250.0000  | 11.5000 |
| 300.0000  | 11.9500 |
| 350.0000  | 2.8000  |
| 400.0000  | 3.2000  |
| 450.0000  | 3.5000  |
| 500.0000  | 4.0000  |
| 600.0000  | 5.0000  |
| 700.0000  | 5.5000  |
| 800.0000  | 6.5000  |
| 900.0000  | 7.0000  |
| 1000.0000 | 8.0000  |
| 1050.0000 | 8.5000  |
| 1100.0000 | 9.0000  |
| 1200.0000 | 9.5000  |

## Steel ISO4200 Series 2

### Inner Pipe Diameter Wall Thickness

|           |         |
|-----------|---------|
| 90.0000   | 5.8000  |
| 100.0000  | 13.5000 |
| 125.0000  | 4.0000  |
| 750.0000  | 6.0000  |
| 1100.0000 | 34.0000 |

## Steel ISO4200 Series 3

### Inner Pipe Diameter Wall Thickness

|          |        |
|----------|--------|
| 80.0000  | 1.5000 |
| 100.0000 | 4.0000 |
| 125.0000 | 8.1500 |
| 175.0000 | 9.3500 |



**Inner Pipe Diameter Wall Thickness**

|          |        |
|----------|--------|
| 225.0000 | 9.7500 |
| 550.0000 | 4.5000 |
| 650.0000 | 5.0000 |
| 850.0000 | 7.0000 |





## Comms ducting multiway

| Inner Pipe Width | Inner Pipe Height | Part Size Name              |
|------------------|-------------------|-----------------------------|
| 210.0000         | 100.0000          | 2x1 way 100mm dia 210 x 100 |
| 100.0000         | 210.0000          | 1x2 way 100mm dia 100 x 210 |
| 320.0000         | 100.0000          | 3x1 way 100mm dia 320 x 100 |
| 100.0000         | 320.0000          | 1x3 way 100mm dia 100x320   |
| 210.0000         | 210.0000          | 2x2 way 100mm dia 210x210   |
| 210.0000         | 210.0000          | 2x2 way 100mm dia 210x210   |
| 430.0000         | 100.0000          | 4x1 way 100mm dia 430x100   |
| 100.0000         | 430.0000          | 1x4 way 100mm dia 100x430   |
| 320.0000         | 210.0000          | 3x2 way 100mm dia 320x210   |
| 210.0000         | 320.0000          | 2x3 way 100mm dia 210x320   |
| 430.0000         | 210.0000          | 4x2 way 100mm dia 430x210   |
| 210.0000         | 430.0000          | 2x4 way 100mm dia 210x430   |
| 320.0000         | 320.0000          | 3x3 way 100mm dia 320x320   |
| 430.0000         | 320.0000          | 4x3 way 100mm dia 430x320   |
| 320.0000         | 430.0000          | 3x4 way 100mm dia 320x430   |
| 430.0000         | 430.0000          | 4x4 way 100mm dia 430x430   |

## Ovoid Concrete Pipe

| Inner Pipe Width | Inner Pipe Height | Wall Thickness |
|------------------|-------------------|----------------|
| 600.0000         | 900.0000          | 150.0000       |
| 800.0000         | 1200.0000         | 150.0000       |
| 400.0000         | 600.0000          | 185.0000       |



## Generic Circular pipe

| Inner Pipe Diameter | Wall Thickness |
|---------------------|----------------|
| 100.0000            | 11.0000        |
| 150.0000            | 14.0000        |
| 225.0000            | 19.0000        |
| 300.0000            | 29.0000        |
| 450.0000            | 46.0000        |
| 525.0000            | 51.0000        |
| 600.0000            | 58.0000        |
| 675.0000            | 75.0000        |
| 750.0000            | 21.0000        |
| 825.0000            | 85.0000        |
| 900.0000            | 90.0000        |
| 975.0000            | 95.0000        |
| 1050.0000           | 105.0000       |
| 1125.0000           | 110.0000       |
| 1200.0000           | 120.0000       |
| 1275.0000           | 130.0000       |
| 1350.0000           | 150.0000       |
| 1425.0000           | 160.0000       |
| 1500.0000           | 150.0000       |
| 1575.0000           | 115.0000       |



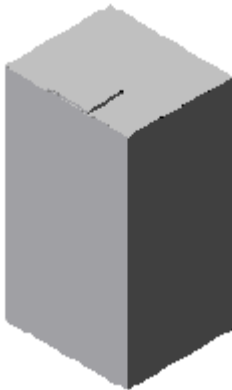
| Inner Pipe Diameter | Wall Thickness |
|---------------------|----------------|
| 1650.0000           | 120.0000       |
| 1725.0000           | 180.0000       |
| 1800.0000           | 180.0000       |
| 1875.0000           | 180.0000       |
| 1950.0000           | 200.0000       |
| 2025.0000           | 200.0000       |
| 2100.0000           | 200.0000       |
| 2175.0000           | 220.0000       |
| 2250.0000           | 220.0000       |



# Structures

## BT Manholes

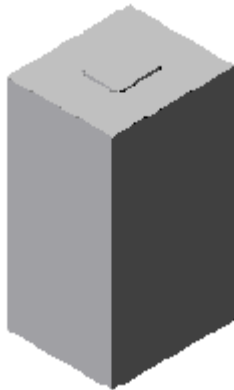
### BT Manhole MRX401



|                        |           |
|------------------------|-----------|
| Inner Structure Width  | 1200.0000 |
| Inner Structure Length | 1800.0000 |
| Rim to Sump Height     | 2000.0000 |



## BT Manholes MRX402,405,410,411,412,413



| Box Width | Box Length | Rim to Sump Height | Part Size Name      |
|-----------|------------|--------------------|---------------------|
| 3500.0000 | 1200.0000  | 2000.0000          | MRX402A 2000 height |
| 3500.0000 | 1200.0000  | 2225.0000          | MRX402B 2225 height |
| 3500.0000 | 1200.0000  | 2450.0000          | MRX402C 2450 height |
| 4000.0000 | 1650.0000  | 2000.0000          | MRX405A 2000 height |
| 4000.0000 | 1650.0000  | 2225.0000          | MRX405B 2225 height |
| 4000.0000 | 1650.0000  | 2450.0000          | MRX405C 2450 height |
| 3100.0000 | 1700.0000  | 2100.0000          | MRX410A 2100 height |
| 3100.0000 | 1700.0000  | 2400.0000          | MRX410B 2400 height |
| 3100.0000 | 1700.0000  | 2700.0000          | MRX410C 2700 height |
| 4900.0000 | 2300.0000  | 2100.0000          | MRX411A 2100 height |
| 4900.0000 | 2300.0000  | 2400.0000          | MRX411B 2400 height |
| 4900.0000 | 2300.0000  | 2700.0000          | MRX411C 2700 height |
| 3700.0000 | 2800.0000  | 2100.0000          | MRX412A 2100 height |
| 3700.0000 | 2800.0000  | 2400.0000          | MRX412B 2400 height |



| Box Width | Box Length | Rim to Sump Height | Part Size Name      |
|-----------|------------|--------------------|---------------------|
| 3700.0000 | 2800.0000  | 2700.0000          | MRX412C 2700 height |
| 3700.0000 | 2000.0000  | 2100.0000          | MRX413A 2100 height |
| 3700.0000 | 2000.0000  | 2400.0000          | MRX413B 2400 height |
| 3700.0000 | 2000.0000  | 2700.0000          | MRX413C 2700 height |

### BT Manhole MRX404 Rectangular edge access 2400x1200 2m height





## BT Manholes MRX507,508,510,511,512,513



| Rim to Sump Height | Part Size Name      |
|--------------------|---------------------|
| 2000.0000          | MRX509 2000 height  |
| 2100.0000          | MRX510A 2100 height |
| 2400.0000          | MRX510B 2400 height |
| 2700.0000          | MRX510C 2700 height |
| 2100.0000          | MRX511A 2100 height |
| 2400.0000          | MRX511B 2400 height |
| 2700.0000          | MRX511C 2700 height |
| 2100.0000          | MRX512A 2100 height |
| 2400.0000          | MRX512B 2400 height |
| 2700.0000          | MRX512C 2700 height |
| 2100.0000          | MRX513A 2100 height |
| 2400.0000          | MRX513B 2400 height |
| 2700.0000          | MRX513C 2700 height |



| Rim to Sump Height | Part Size Name      |
|--------------------|---------------------|
| 2700.0000          | MRX513C 2700 height |

## BT Manholes MRX509-MRX513



| Rim to Sump Height | Part Size Name      |
|--------------------|---------------------|
| 2000.0000          | MRX509 2000 height  |
| 2100.0000          | MRX510A 2100 height |
| 2400.0000          | MRX510B 2400 height |
| 2700.0000          | MRX510C 2700 height |
| 2100.0000          | MRX511A 2100 height |
| 2400.0000          | MRX511B 2400 height |
| 2700.0000          | MRX511C 2700 height |
| 2100.0000          | MRX512A 2100 height |
| 2400.0000          | MRX512B 2400 height |
| 2700.0000          | MRX512C 2700 height |
| 2100.0000          | MRX513A 2100 height |

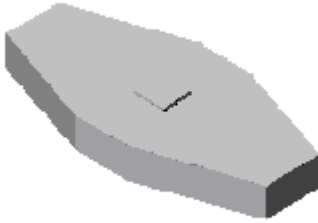




| Rim to Sump Height | Part Size Name      |
|--------------------|---------------------|
| 2400.0000          | MRX513B 2400 height |
| 2700.0000          | MRX513C 2700 height |
| 2700.0000          | MRX513C 2700 height |



## BT Manholes MRX810

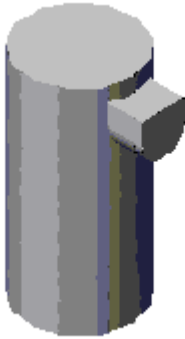


| Rim to Sump Height | Part Size Name      |
|--------------------|---------------------|
| 2100.0000          | MRX810A 2000 height |
| 2400.0000          | MRX810B 2100 height |
| 2700.0000          | MRX810C 2700 height |



## Gullies

### Road Gully 150mm trapped outlet



| Structure Height | Structure Diameter |
|------------------|--------------------|
| 750.0000         | 375.0000           |
| 900.0000         | 375.0000           |
| 750.0000         | 450.0000           |
| 900.0000         | 450.0000           |
| 1050.0000        | 450.0000           |



## Manholes (as per SFA 6<sup>th</sup> Edition)

### Manhole Type A 1200mm access shaft (for ladders/irons)



|                          |           |           |           |          |          |          |
|--------------------------|-----------|-----------|-----------|----------|----------|----------|
| Inner Structure Diameter | 1200.0000 | 1500.0000 | 1800.0000 |          |          |          |
| Cone Height              | 600.0000  |           |           |          |          |          |
| Wall Thickness           | 150.0000  |           |           |          |          |          |
| Floor Thickness          | 225.0000  |           |           |          |          |          |
| Frame Diameter           | 600.0000  | 675.0000  |           |          |          |          |
| Frame Height             | 230.0000  | 280.0000  | 295.0000  | 345.0000 | 360.0000 | 410.0000 |



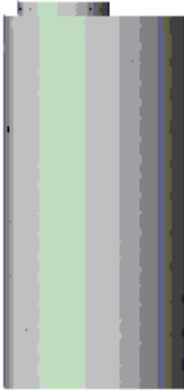
## Manhole Type A 900mm access shaft



|                          |           |           |           |          |          |          |
|--------------------------|-----------|-----------|-----------|----------|----------|----------|
| Inner Structure Diameter | 1200.0000 | 1500.0000 | 1800.0000 |          |          |          |
| Cone Height              | 600.0000  |           |           |          |          |          |
| Wall Thickness           | 150.0000  |           |           |          |          |          |
| Floor Thickness          | 225.0000  |           |           |          |          |          |
| Frame Diameter           | 600.0000  | 675.0000  |           |          |          |          |
| Frame Height             | 230.0000  | 280.0000  | 295.0000  | 345.0000 | 360.0000 | 410.0000 |



## Manhole Type B



|                          |           |           |           |          |          |          |
|--------------------------|-----------|-----------|-----------|----------|----------|----------|
| Inner Structure Diameter | 1200.0000 | 1500.0000 | 1800.0000 |          |          |          |
| Wall Thickness           | 150.0000  |           |           |          |          |          |
| Floor Thickness          | 225.0000  |           |           |          |          |          |
| Frame Diameter           | 600.0000  | 675.0000  |           |          |          |          |
| Frame Height             | 230.0000  | 280.0000  | 295.0000  | 345.0000 | 360.0000 | 410.0000 |

Range Values [Min, Max, Default]

|                    |           |           |           |
|--------------------|-----------|-----------|-----------|
| Rim to Sump Height | 1150.0000 | 3000.0000 | 1150.0000 |
|--------------------|-----------|-----------|-----------|



## Manhole Type C



|                        |           |          |          |          |          |          |
|------------------------|-----------|----------|----------|----------|----------|----------|
| Inner Structure Width  | 1240.0000 |          |          |          |          |          |
| Inner Structure Length | 675.0000  |          |          |          |          |          |
| Frame Width            | 1220.0000 |          |          |          |          |          |
| Frame Length           | 685.0000  |          |          |          |          |          |
| Frame Height           | 100.0000  | 150.0000 | 180.0000 | 210.0000 | 240.0000 | 270.0000 |
| Wall Thickness         | 200.0000  |          |          |          |          |          |
| Floor Thickness        | 225.0000  |          |          |          |          |          |

Range Values [Min, Max, Default]

|                    |          |           |          |
|--------------------|----------|-----------|----------|
| Rim to Sump Height | 300.0000 | 2000.0000 | 500.0000 |
|--------------------|----------|-----------|----------|



## Manhole Type D



|                        |          |          |          |          |          |          |
|------------------------|----------|----------|----------|----------|----------|----------|
| Inner Structure Width  | 900.0000 |          |          |          |          |          |
| Inner Structure Length | 675.0000 |          |          |          |          |          |
| Frame Width            | 675.0000 |          |          |          |          |          |
| Frame Length           | 675.0000 |          |          |          |          |          |
| Frame Height           | 100.0000 | 150.0000 | 180.0000 | 210.0000 | 240.0000 | 270.0000 |
| Wall Thickness         | 200.0000 |          |          |          |          |          |
| Floor Thickness        | 225.0000 |          |          |          |          |          |

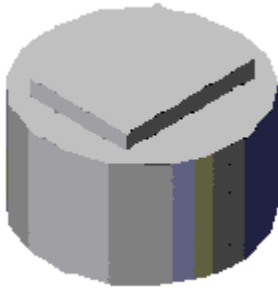
Range Values [Min, Max, Default]

|                    |          |           |          |
|--------------------|----------|-----------|----------|
| Rim to Sump Height | 100.0000 | 1800.0000 | 150.0000 |
|--------------------|----------|-----------|----------|





## Manhole Type E



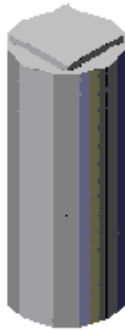
|                 |          |          |          |          |          |
|-----------------|----------|----------|----------|----------|----------|
| Frame Width     | 675.0000 |          |          |          |          |
| Frame Length    | 675.0000 |          |          |          |          |
| Frame Height    | 100.0000 | 150.0000 | 200.0000 | 250.0000 | 300.0000 |
| Wall Thickness  | 150.0000 |          |          |          |          |
| Floor Thickness | 225.0000 |          |          |          |          |

Range Values [Min, Max, Default]

|                    |          |           |          |
|--------------------|----------|-----------|----------|
| Rim to Sump Height | 300.0000 | 2000.0000 | 500.0000 |
|--------------------|----------|-----------|----------|



## Demarcation Chamber 350x350 max cover size

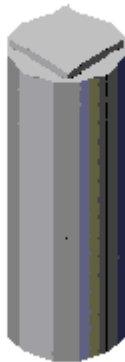


|                       |          |          |  |          |          |          |          |          |          |          |  |
|-----------------------|----------|----------|--|----------|----------|----------|----------|----------|----------|----------|--|
| <b>Frame Height</b>   | 100.0000 | 150.0000 |  |          |          |          |          |          |          |          |  |
| <b>Wall Thickness</b> | 75.0000  | 100.0000 |  | 125.0000 | 150.0000 | 175.0000 | 200.0000 | 225.0000 | 250.0000 | 300.0000 |  |

Range Values [Min, Max, Default]

|                              |           |           |           |
|------------------------------|-----------|-----------|-----------|
| <b>Barrel Pipe Clearance</b> | 850.0000  | 3000.0000 | 1200.0000 |
| <b>Rim to Sump Height</b>    | 1200.0000 | 4000.0000 | 1400.0000 |

## Demarcation Chamber 450x450 max cover size



|                       |          |          |  |          |          |          |          |          |          |          |          |
|-----------------------|----------|----------|--|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Frame Height</b>   | 100.0000 | 150.0000 |  |          |          |          |          |          |          |          |          |
| <b>Wall Thickness</b> | 75.0000  | 100.0000 |  | 125.0000 | 150.0000 | 175.0000 | 200.0000 | 225.0000 | 250.0000 | 300.0000 | 350.0000 |

Range Values [Min, Max, Default]



|                              |          |           |           |
|------------------------------|----------|-----------|-----------|
| <b>Barrel Pipe Clearance</b> | 850.0000 | 3000.0000 | 1200.0000 |
| <b>Rim to Sump Height</b>    | 300.0000 | 1300.0000 | 1400.0000 |

## Rectangular Manhole with Rectangular cover

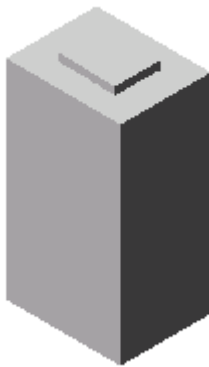


Table Values

| Inner Structure Width | Inner Structure Length | Frame Width | Frame Length |
|-----------------------|------------------------|-------------|--------------|
| 675.0000              | 750.0000               | 675.0000    | 750.0000     |
| 600.0000              | 1200.0000              | 750.0000    | 1350.0000    |
| 675.0000              | 1200.0000              | 675.0000    | 1200.0000    |
| 750.0000              | 1200.0000              | 900.0000    | 1350.0000    |
| 900.0000              | 1200.0000              | 1050.0000   | 1350.0000    |
| 1000.0000             | 1200.0000              | 600.0000    | 600.0000     |
| 1075.0000             | 1200.0000              | 600.0000    | 600.0000     |
| 1225.0000             | 1350.0000              | 600.0000    | 600.0000     |
| 350.0000              | 1375.0000              | 600.0000    | 600.0000     |
| 600.0000              | 1500.0000              | 750.0000    | 1650.0000    |



| Inner Structure Width | Inner Structure Length | Frame Width | Frame Length |
|-----------------------|------------------------|-------------|--------------|
| 750.0000              | 1500.0000              | 900.0000    | 1650.0000    |
| 900.0000              | 1500.0000              | 1050.0000   | 1650.0000    |
| 600.0000              | 1800.0000              | 750.0000    | 1950.0000    |
| 750.0000              | 1800.0000              | 900.0000    | 1950.0000    |
| 900.0000              | 1800.0000              | 1050.0000   | 1950.0000    |

## Simple Cylinder



Table Values

| Structure Diameter | 1050.0000 | 1350.0000 | 1500.0000 | 1800.0000 | 1200.0000 |
|--------------------|-----------|-----------|-----------|-----------|-----------|
|--------------------|-----------|-----------|-----------|-----------|-----------|