

## **12D MODEL 'ADVANCED CIVIL DESIGN' TRAINING COURSES CONTENT**

**Prerequisites:** Completion of Course C1 - the three day "Basic Civil Design Training" course is required before you attend any of these Advanced Courses

### **Course C2. Visualisation Training (One day)**

Learn how to Read ECW files and manipulate and use Draped Rasters. Also how to create and use Billboards, Clouds, Roadside Furniture, Trees, Forests and Fences. Customise your own extrusions and append them to the extrusions.4d file. Learn use of the textures.4d file and how to plot rasters.

### **Course C3. Super Alignment and Chains Training (One day)**

For experienced 12d Users only. You must be fully familiar with the Alignment Editor capabilities. Super Alignments build on these.

Learn the new Super Alignment interface for both IP method and element based design. How to create and edit horizontal and vertical geometry and all of the new tools available. Learn how to create and grade closed alignments (like racetracks, roundabouts) using combinations of fixed elements and floating elements. Introduction to new concepts in V8 - Speed tables, Computators and the Chains facility that allows user controlled function redesign.

### **Course C4. CAD and Drafting inside 12d (One day)**

Learn how to use of the new V8 CAD Menu, CAD Control bar and CAD Snaps toolbars for construction type activities that create and manipulate superstrings and text. Covers use of the 148 new CAD commands available in V8. Also use of the Drafting menu to label bearing/distances, manipulate Text and Tables. Covers practical examples of how to draw strings in 12d like wetland ponds, complex kerb geometry in shopping centres and basic layout of car parks. Also how to document design elements like complex kerbs, road centrelines. Includes the use of Bubbles with leader lines and Tables.

### **Course C5. Advanced Road & Civil Design Training (One day)**

Learn how to create roads with independently graded carriageways including forced table drains between the carriageways. Benefits of Decisional Templates and Complex batter treatments involving multiple tins. Road widening applications and regrading within envelopes.

MTF Template Modifiers (their application and manipulation in design), Multiple lanes and transitioning, Retaining walls - Fill requirements depending on wall height and width,

Table Drains, Boxing, Grading Roundabouts and Traffic Islands using various techniques involving Kerb Returns and approach roads, Improving the grading of intersections using MTF Modifiers, Generating special chainage files from lot boundaries (user controlled cross section spacing) and labelling complex kerbs with bubbles and tables. Use of VicRoads standard templates in design and section plots. Automated subdivision design using the Roads macro with progressive freezing of completed roads. How to convert simple lines or CAD polylines into services for further processing inside 12d. Calculation of clearances from services.

### **Course C6. Drainage Training Part 1 (One day)**

12d Model has its own Drainage Analysis capabilities using the Rational Method. Complete analysis and design can be performed within the 12d environment.

Alternatively, it also provides an interface with most of the Stormwater design packages available in Australia (PCdrain, Drains and RAT2000). Pits, pipes and catchments can be exported from 12d Model, analysed under different storm conditions, and the resized system brought back into 12d Model for coordination with other services, and production of long section plots.

Triangulate a combination of road design and natural surface data.  
Identify stormwater pit and pipe locations from the contoured tin, and stormwater catchments  
Draw or import the pits, pipes and catchments into 12d Model.  
Use the Drainage Network Editor tools  
Inspect the pipe longsection created by 12d Model. Edit the long section.  
Determine pipe sizing and HGL creation inside 12d to ARR 87 rules.  
Determine pipe sizes and HGL in the Drainage Analysis package within 12d.  
Export the stormwater system to a Hydraulic design package.  
Import the 'designed' stormwater system back into 12d Model.  
Export the stormwater system to a spreadsheet. Add information about special pipe installation requirements to the spreadsheet, and import back into 12d Model.  
Determine overland flow widths from the imported hydraulic data.  
Prepare longsection plots incorporating the HGL, and the special pipe installation requirements from the spreadsheet.

### **Course C7. Drainage Training Part 2 (One day)**

The C7 Drainage Training Part 2 course is a continuation of the C6 Drainage Training Part 1 course. The trainees will learn how to customise the interface to obtain the greatest benefit from 12d Drainage. It is intended for users who want to get 12d Drainage to work exactly as in their preferred manner and to produce drawings to their particular corporate standard.

It is a pre-requisite that you have previously attended the C6 Drainage Training Part 1 Course.

Create and alter pit types to model "on grade" and SAG inlet capacity.  
Analyse flooded width and areas resulting from ponding or surcharge volumes at SAG pits  
Customise pit schedule reports through the spreadsheet interface.  
Customise pipe and pit quantity reports  
Excavation quantity reports  
Drainage plan and long section plotting (creating pit symbols, hatching under roads)  
Customise drainage longsections to fit your clients specific requirements. This includes adding user defined data to the long sections.  
Have a two hour workshop period to customise 12d drainage for your requirements.  
This will enable the attendees to take home tangible results from the training course.

### **Course C8. HEC-RAS Interface Training (One day)**

12d Model provides an interface with HEC RAS which allows the creation of a HEC RAS project from a digital terrain model, and provides powerful tools for presenting the results of the HEC RAS analysis.

Identify the river strings required for the HEC RAS project.  
Create and locate cross sections along the river.  
Export the data from 12d model to HEC RAS.

Open the HEC RAS Project, and analyse the river for a design discharge.  
Use HEC RAS to interpolate cross sections.  
Export the river water levels and channel shape data from HEC RAS  
Import the data from HEC RAS into 12d Model

Create an inundation map using the water levels from HEC RAS  
Create plans and cross sections from the HEC RAS data suitable for use in reports or for tender documentation. This includes multiple water level results and depth contours.  
Create a 'fly down the river' .avi movie file of a rendered 3d perspective view.

### **Course C9. Sewer Design Training (One day)**

Learn how to use the Sewer module to design gravity based waste water reticulation pit/pipe networks including the grading and checking of lot controls and house connections. Also how to manually place and check lot controls whilst maintaining minimum cover and grade requirements. How to generate house connections from Lot controls. Pipes may be curved in plan. Learn how to use Supertins to create a merged surface – a combination of proposed subdivision/road design and natural surface data. Identify sewer manholes, end of line points and pipe locations from the contoured tin Includes how to draw in 12d or import a layout of polylines (from CAD) and interpret these as Sewer lines and lot control locations. Learn how to use the Network Editor tools to grade and regrade the pipes to authority grading rules. Investigate obstructions which pass over, under or parallel to the design line within a user specified corridor about the design line in long and cross section views. Includes generation of sewer long section plots, annotated sewer plan plots, quantity takeoff, trench volumes, reports on house connections and services interference. Includes the export of property controls and sewer annotations to CAD.

### **Course C10. Pipeline Design Training (One day)**

The Pipeline module is for those designing major pipeline networks, typically where lines may be curved in plan and section yet the pipelines are made up of individual straight constant length pipes. Used for both above ground and buried pipelines where joint connection is an issue. Considers each joint connection and calculates deflection angles in 3 dimensions.

Draw in 12d or import a network layout (polylines in CAD)

Conversion of CAD polylines to Pipeline strings

Laying down pipelines with minimum cover requirements

Assigning pipe properties

Quantity takeoff and trench volumes

Report Sag and Crest chainage and heights

Reports on deflection angles at pipe joints (horizontal, vertical and combined angles)

Critical reports on worst case or outside tolerance deflection angles

Services interference

### **Course C11. Road Overlay and Optimal Overlay Design Training (One day)**

This course will be introduced with 12d V9

### **Course C12. Advanced Plotting and Customisation of Plot Parameter PPF Files (One day)**

The systematic steps required to customise your finished cross section, long section and plan plots so that they appear exactly as you would want without touchup in CAD

Automatic generation of multiple plan plotframes  
General PPF concepts and hierarchy of parameters

Cross section PPF development in detail  
Plot sheet regions (boxes, datum and graph areas)  
Centreline vs Boxes type plots  
Processing multiple tins  
Grade labelling  
Labelling points on cross sections  
Labelling services in your cross sections  
Cross hatching cut and fill areas (between Tins)  
Importing lines from CAD and turning them into service pipes

Long Section PPF development in detail  
Labelling horizontal and vertical geometry  
Labelling Chainages and Heights in the graph area  
Labelling services in your long sections  
Processing multiple tins  
Depths on long sections  
Super elevation diagrams  
Volume Cut and Fill values on long sections  
Plotting lip lines and building lines on long sections (offset strings)  
Displaying lip line chainages on long section plots  
Title block file creation  
Use of rasters in title blocks

### **Course C13. Project Administration and Housekeeping (One day)**

This course is aimed at assisting users perform typical but obscure day to day activities with 12d and how to recover when unusual things happen

How to recover corrupt projects that are giving error messages to do with record structure  
How to recover 'missing' models in a project  
Archiving models which you just might need later so deleting is undesirable  
Restoring models from archives  
Copying models from other projects  
Copying tins from other projects  
Translating tins horizontally and vertically  
Extracting points and breakline strings from a tin  
Deleting tins and all traces of their existence  
Adding a tin to a model  
How to zip up projects from within 12d  
Extracting part of a model  
Use of data polygons in Volumetrics and Visualisation  
How to minimise your points e.g. administration of completed tins  
How to filter out duplicate points from strings  
How to filter out extraneous points from strings (within user defined tolerance down a rifle barrel)  
How to filter out extreme Z values from strings  
How to remove 'loops' from strings  
Exploding line and point strings into their component parts  
Converting alignments to 3d strings and associated issues  
Draping alignment strings over a tin  
Translating alignment strings  
Importing polylines (drawn in ACAD) into 12d and using them as horizontal alignments

How to start up new projects with a customised number of predefined views  
Which parts of the 12d project folder can I access, move or copy between projects

### **Course C14. Pads and Site Development (One day)**

This course will be introduced with 12d V9

### **Course C15. Macro Language Training (One day)**

Learn about how to write, compile and run macros within the 12d environment. This Course is only for people with a programming bent. It will be an advantage to know how to write C++ code prior to attending this course.

### **Course C16. Dynamic Drainage Detention Basin Design (One day)**

For experienced 12d Users only. You must be fully familiar with the Drainage Network Editor (DNE) and know how to design drainage networks in 12d.

This “Dynamic Drainage for modelling Basins” course is a logical extension for 12d drainage users who have already attended the C6 Drainage Training Part 1 course and wish to extend their Drainage design skills further.

The course continues on from the rational hydrology method to the ILSAX (method 2) hydrology and dynamic flow in pipes. The course covers

#### **Hydrology**

1. Moving from rational "C" to Soil types and antecedent moist conditions (Horton infiltration)
2. Additions to the 12d rainfall file including Rainfall Temporal Patterns.
3. Reviewing graphical outputs

#### **Hydraulics**

4. Modelling diverging flow conditions
5. Bypass flow using surface flows with section shapes cut from the design tin.
6. Time series for tail water conditions.
7. Modelling natural channels using section shapes cut from the design tin.

#### **Detention Basin Design**

8. Estimating storage to meet the pre development discharges,
9. creating detention basins and extracting elevation area curves from the tin,
10. multiple outlets design (combining spillway, control pipe, orifice)