



12d[®] Model
Civil and Surveying Software

12d Model Training

12d Model Training Courses
12d NZ Ltd

Version 15

28 November 2023

12d[®] Model

Do More With Your Software.



ROADS AND
HIGHWAYS



LAND
DEVELOPMENT



RAIL



DRAINAGE,
SEWER AND
SERVICES



AIRPORT
INFRASTRUCTURE



PORTS AND
DREDGING



MINING
INFRASTRUCTURE



SURVEYING



OIL AND GAS



RIVERS,
DAMS AND
HYDROLOGY



CONSTRUCTION



ENVIRONMENTAL



Disclaimer

12d Model V15.0 12d Model Training Courses Manual

V15.0 November 23

Disclaimer

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No warranty of fitness for a particular purpose is offered.

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1.0 TRAINING OVERVIEW

12d Model has been training users for over 30 years, and as such are committed to refining our training methods, not only as the product develops, but also from the feedback that we receive after every training session, from both trainers and users.

The training course modules and content described in this document are trained internationally by all 12d Model trainers and distributors. The dataset and workflow are the same no matter where you train for 12d Model in the world, with small regional specific differences and course timing. For example, in New Zealand the formal courses are generally one day in duration, with complimentary follow-on courses. In Australia the introduction and complimentary course may be held back-to-back as two, or even three days duration.

All our trainers have vast industry experience and are experts in the use of 12d Model. All training is conducted hands-on with the trainer projecting onto a screen while each attendee operates 12d Model on a laptop.

It is important to note that even though the trainers have vast industry knowledge, and may pass on anecdotal examples, the sole purpose of the training provided is to teach users the workflow and features of 12d Model software, **not** to teach the attendees best practice or give advice on Engineering or Survey specific disciplines. As such we in no way will claim to teach Users to be Engineers or Surveyors, just how to use the tools inside 12d Model to become more efficient in their chosen fields.

Our training sessions are intensive with a steep learning curve, which means that you can become a productive user within a matter of days. Some modules have prerequisites to ensure that all attendees are at the right learning stage to absorb advanced course information.

All 12d Training attendees are issued with comprehensive course notes in a PDF format, ensuring they get the most out of the experience on the day, and afterwards have useful reference material.

Should the training fall into a transition period between the release of new 12d Model Versions, the individual training providers will determine which Version is to be trained from a given period.

If you have questions about any of our training courses, or about in-house training, please contact us at office@12d.co.nz.



2.0 OFFERED COURSES

2.1 Online or In-Person

Both the Formal or In-house courses can be done online via the Teams application or in-person.

The online courses are generally split into half-day sessions as we have found that trainees get better retention from not having to spend an entire day following a screen as opposed to having a trainer on-site to make sure they are up to speed and following adequately.

2.2 Formal Courses

12d NZ Ltd offers a suite of formal training courses which are offered nationwide on a regular basis. A list of the formal training courses and content available in New Zealand is shown in at the end of this document.

Depending on the level of complexity that the Users are undertaking, we feel that a User who has attended training and is undertaking a project of medium complexity will be productive with the software in a matter of weeks.

For Users who are just using the software to import survey or design data and creating a surface model to view or created contours etc., this uptake time will be even less.

Formal courses are those organized and run by 12d NZ Ltd at a regional location across New Zealand. 12d NZ Ltd organizes and secures the training location, provides the necessary computers and training documentation.

Invitations for these courses are sent via a training email notification by 12d NZ Ltd and email confirmations are sent to course attendees at a suitable period before the course is to take place.

All catering of morning tea, lunch and afternoon tea is organized and paid for by 12d NZ Ltd.

2.3 In-house Courses

In addition to the 12d NZ formal training courses, in house training is also available on request. This training is generally tailored specifically for the organisation and their standard work practices. 12d NZ Ltd will work closely with the organisation involved to ensure the most appropriate curriculum which are generally to follow the standard training modules.

Should the trainers be requested to use the non-standard data-set, this may involve more preparation time if adequate lead-in notice is given. This also may involve additional time and costs.

The company that has requested the in-house organizes and secures the training location, and 12d NZ provides the computers and hardware. Soft copies of the training notes are generally emailed to the in-house course organizer who arranges for the hard copies to be available at the course.

All invites and confirmations are handled by the Company holding the training.

All catering of morning tea, lunch and afternoon tea is the responsibility of the Company holding the training.

The provided room should be adequate for training, a wall to project on to, a white board would be preferred, and we train to a maximum of 8 trainees, each with approximate 900mm seated desk width.



2.4 Course Requirements

Basic Courses Pre-requisite

For the introduction or Basic courses, trainees are required to self-learn the 12d Model absolute basics such as navigating the interface and be able to understand the general mouse control procedures before attending the training.

An online video for them to follow is provided.

<https://www.youtube.com/watch?v=glSiyG-sOzs>

General Notes

As stated in Section 1.0, the courses are for showing how to **use 12d Model** when doing civil design or surveying. They **do not** teach civil design or surveying principles.

Cancellation Policy:

1 Week Prior to the Course – No Refund.

2 Weeks Prior to the Course – 20% Fee Applies.

In-person Trainer Hosted

Limited numbers, one computer per person, Lunch provided for full day courses, Certificates for full day courses.

In-person User Hosted

Limited numbers, one computer per person. Certificates provided for full day courses.

User to provide.

- Laptop computer over and above the number able to be provided by 12d NZ Ltd.
- A three button mouse
- User supplied laptops to have the required 12d Model and dongle drivers installed (links will be provided) prior to the course.
- A room with a screen or projector for the trainer to connect into.
- Enough desk space for each trainee and their laptop (typically 90cm)
- Catering to be provided by the User (if desired)
- Internet connection for online licensing (see below).



12d Model Training

12d NZ Ltd Training Courses

Online Training

Online training sessions are run over the Teams application. All training data, download links for applications and licensing are provided to attendees prior to the course.

Users will need.

- 12d Model installed on their computer
If 12d Model is not already installed on the computer then installation notes are included in set-up instructions provided to attendees a minimum of 7 days before the course.
- A three button mouse
- A connection to the Internet with firewall access for licensing (Port 22350)
- Two monitors
- Microphone and speakers
Headsets are preferred as this prevents unwanted feedback and background noise.

2.5 Licenses for 12d Model Training

12d NZ Ltd will provide trainees with a nodes file and access to online training licenses with module applicable for the course to be trained.

Companies with strict firewall protocols will need to ensure that communication with online licensing then communication to the 12d Internet Licence uses the specific IP port **22350**.

Access through this port will be required to be done before the day of the training.

Training licenses generally will be active to 3 months to enable the trainees to potentially continue their learning after the course has finished.



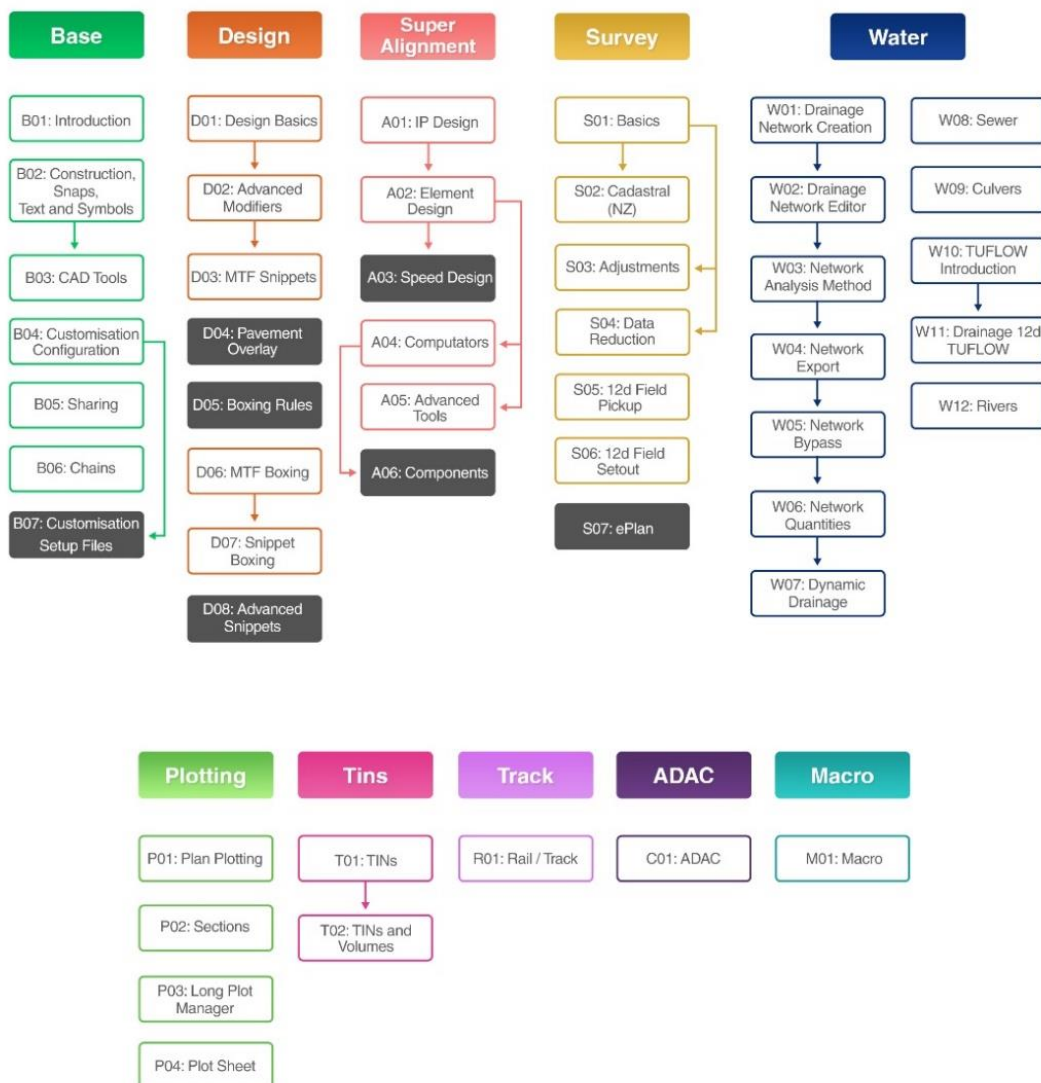
3.0 TRAINING MODULES

Each 12d Model training course is made up of smaller training modules and these modules can be customised for clients requesting in-house training sessions.

The diagram below provides a handy summary of the training modules offered, with the full module outlines included in further detail throughout the rest of the document. The arrows indicate modules which are prerequisites to other modules.

These courses have been made modular, so for clients requesting in-house training, we are able to customise a course to suit your needs.

12d Model Training





SURVEY



DESIGN



WATER



BIM



RAIL



OTHER



4.0 FORMAL COURSES SURVEY

The following course information is a breakdown of the 12d NZ Ltd standard one-day formal courses.



4.1 Survey Basic Topographical

Course Modules: B01, T01& S01

These course Modules are designed for someone wanting to understand survey reduction, editing and tin creation within 12d Model.

Course prerequisite:

For the introduction or Basic courses, trainees are required to self-learn the 12d Model absolute basics such as navigating the interface and be able to understand the general mouse control procedures before attending the training.

An online video for them to follow is provided.

<https://www.youtube.com/watch?v=glSiyG-sOzs>

Aim: To read in, reduce and edit a field data recorder file, create tins prepare data for uploading and setout.

Content:

- Create and edit mapping files for field coding.
- Setting and understanding Projections in 12d Model.
- Survey Reduction
- Downloading of survey instrument data
- Survey reduction
- Edit survey field data

- Creating, editing and tin functions
- Draping strings
- Upload of Points/Strings
- Labelling data functions
- Super String Tools
- Plotting Sections
- Set out, Creating set-out files, off set points, reports title file
- Importing/Exporting of setout data (excel).
-

4.2 Survey Construction

Course Modules: S03 & G05

These course Modules are relevant for Surveyors of all descriptions who would benefit from understanding 12d Model processes for preparing and creating digital construction data and also managing and working with point cloud data

Course prerequisite: B01

The participant should be proficient in navigating around the menus and be familiar with the 12d Model interface and operations.

Aim: To read in and prepare 3d digital construction information for survey processes including set out and conformance. Import an point cloud LAS file and manipulate and use the point cloud data for 12d operations.

Content:

Read in external data for processing

Detailed Inquiry on external data

Process/clean up provided design information

Create best fit super alignment and geometry for surveyed data

Calculate best fit elements with regression options

Create design subgrade and pavement layers from design top surface levels

Prepare design data for setout

Volumetrics and reporting

Import LAS point cloud

Point Clouds

- Working with point clouds in views
- Categorize point cloud via tins
- Delete high points in point cloud
- Drape string data onto point clouds
- Thinning of point clouds
-

4.3 Survey Cadastral

Course Modules: B01 & S02

These course Modules are designed for someone wanting to understand survey traverse spreadsheets and LINZ LandXML import / export within 12d Model.

Course prerequisite:

For the introduction or Basic courses, trainees are required to self-learn the 12d Model absolute basics such as navigating the interface and be able to understand the general mouse control procedures before attending the training.

An online video for them to follow is provided.

<https://www.youtube.com/watch?v=gISiyG-sOzs>

Aim: To read in LINZ LandXML data, create traverse spreadsheet and export a LINZ LandXML file.

Content:

- Setup and edit a 12d model XML mapping file
- GVR (GNSS Vector Reporting)
- Importing of Landonline XML data.
- Configure and understand TSS parameters
- Create a traverse spreadsheet
- Edit traverse spreadsheet
- Traverse,
- Radiation,
- Parcel blocks
- Split and Join observations
- Boundary intersection splitting
- Create TSS arcs and natural boundaries
- Pick and populate XML data into the TSS
- Point Information and naming for Landonline
- Report Traverse spreadsheet and parcels
- Plan drafting and plotting of the Traverse Spreadsheet
- Creating and edit an XML file.
- Multi Page Plot Sheets (MPS)

4.4 MetaConnex (Digital Asset Management)

Course prerequisite: B01

This course outlines the 12d Model workflow and procedures for creating, attributing and preparing digital information (both survey and design) to Digital Asset Standards.

There will be variations to the training data to be relevant for both discipline specific and to New Zealand published standards. The current variations are.

- MetaConnex for Designers
- MetaConnex for Surveyors
- National Three Waters Code of Practice Standards
- AMDS (Asset Management Data Standards, Waka Kotahi NZTA)
- Christchurch City Council IDS Part 12, As-built Standards

This course uses a standard Metaconnex workflow and tools to map and create a digital asset file (including the creation of spatial PDF plans) from field survey or design data. The use of an XSD of the metadata standards gives Users the ability to validate data integrity before export data to GIS systems.

Aim: From survey or design data, create, attribute and pre-validate the required as-built 12d XML file to be imported GIS systems.

Content:

Develop an understanding Attributes/Metadata requirements and Standards.

MetaConnex application

- Preparation of the Design or survey data for processing
- Review of the example MetaConnex files to apply to the data.
- Attribute creation and calculations.
- Mapping for required Discipline and Standards.
- Review Workflow and Data Processing chains.

Raw data preparation

- Minimum data requirements
- Data and attribute mapping to produce consistent plan creation
- Converting existing design or survey field attributes to produce data deliverables
- Creation of attributed BIM/3d Model information

Validation

- Validation of data against the business rules defined within the XSD
- Editing the produced data
- Creation of 12dXML data file for GIS upload via FME

PDF plan creation

- Creating/Editing a Title block file.
- Automated Attribute Label Creation for plan presentation
- View Favourite for swift data presentation
- Producing constant PDF plans using MPS plotting required for Council 224 Sign off

4.5 Pavements

Course Modules: D07

This course is a comprehensive investigation of creating, producing and attributing pavements within 12d Model. These functions are increasingly used by both designers and surveyors who are required to model subsurface layers for quantities and Digital Engineering data transfer.

Course prerequisite: Modules B01, A01 & D01

Should be experienced with creating and editing Super Alignments and understand the MTF and Apply Many functions in 12d Model.

Aim: To provide a comprehensive knowledge of the 12d Model Pavement Manager and Pavement modelling and the functions within 12d that utilise this function

Content:

- Data preparation for pavement creation
- Preparing tins and strings for pavement functions
- Apply MTF recreate function
- Design Quick Start tools
- Pavement Manager including
- Reading and writing pavement manager files
- Pavement layer
- Kerb layers
- Verge layer
- Pavement description file
- Using MetaConnex for pavement attributes
-

Create pavements from Snippets

Snippet locator Models

Create pavements from tins

Edge treatments for pavements from tin

Creating subgrade tins

5.0 FORMAL COURSES DESIGN

The following course information is a breakdown of the 12d NZ Ltd standard one-day formal courses.



5.1 Design Basic

Course Modules: B01, T01, A01 & D01

Course prerequisite:

For the introduction or Basic courses, trainees are required to self-learn the 12d Model absolute basics such as navigating the interface and be able to understand the general mouse control procedures before attending the training.

An online video for them to follow is provided.

<https://www.youtube.com/watch?v=glSiyG-sOzs>

Aim: To create two road designs and an intersection and plot the long and cross sections of the designed road.

Content:

- Create and edit mapping files
- Creating and Editing Tins
- Tin Functions
- Horizontal and vertical alignments creation using the alignments (IP method only)
- Investigate the tools available for accurately locating alignment geometry both horizontally and vertically
- Create design shapes via templates for roads (fixed, cut, fill and final)
- Creating and editing MTF files
- Apply and create the Road designs
- Design modifiers
 - road widening
 - super elevation
 - more
- Create intersection via computator kerb returns



- Design Quick Start functions

5.2 Design Features

Course Modules: A05, D02, D03 & D07

These course Modules are designed for intermediate to advanced 12d Users who have design experience and will be introduced to extended design features. These features are mainly from Super Alignments, MTF modifiers and are created to improve efficiency in all aspects of design modelling.

Course prerequisite: Modules: B01, A01 & D01

Should be experienced with creating and editing Super Alignments and understand the MTF and Apply MTF functions in 12d Model.

Aim: To introduce and train designers for intermediate to advanced design functions in 12d Model which will assist in design decisions, documenting and BIM collaboration

Content:

- Super alignment tools including;
- Named parts and named positions
- Design Standards (speed tables)
- Reporting
- Creating, Editing and using Label Styles
- Creating, Placing and Editing Components (parametric objects)
- Cul-de-sac
- Intersections
- Bus Bay
- Apply MTF Manager
- Design Quick Start functions
- Advanced MTF tools including
- Chainage Alias
- Regions
- Dynamic Start and End modes
- Multiple shape design
- Intervals
- String grading
- Attribute creation
- Layers
- Editing Snippets and the Snippet Library
- Designing with Snippets
- Pavement Manager creation and editing
- Creating Snippet Trimesh boxing
- MTF seed file creation and application



5.3 Design Master Class

Course Modules: A03, A06, D04, D07, D08

Should be an experienced 12d Model User with knowledge and confidence working with MTF files and Apply functions.

Course prerequisite: B01, A01, D01 and D02

Aim: To introduce and reinforce advanced design capabilities of 12d Model design.

Content:

Super Alignment Design standards (speed tables)

Applying and overriding standards

Super Alignment Computators (Roundabout)

Creating, Placing and Editing Components (parametric objects)

- Roundabout
- Intersections
- Cul-de-sac
- Bus Bay

Pavement Overlay

- Design Quick Start functions

Snippet Creation and editing including

- User defined Parameters
- Auto Parameters
- Tokens and flow control

Decisional Templates

MTF Decisions including.

- Flow Control
- Tin decisions
- Goto and labels
- Slope Decisions
- If exist decisions
- Named grade and swap decisions

Pavement Manager and snippet pavement creation

5.4 Design Alignments

Course Modules: A01, A02, A05 & A06

This course progresses from the use of IP design for Super Alignments and covers the IP Speed and element design (fixed and floating) functionality in 12d Model Super Alignments.

Course prerequisite: Modules B01, A01 & D01

Should be experienced with creating and editing Super Alignments and understand the MTF and Apply Many functions in 12d Model.

Aim: To introduce element Super Alignment design in 12d Model, including the use of Computators to link design elements together which is commonly used in complex intersection design and construction

Content:

- Super alignment named parts and named positions
- Super alignment IP speed standards design
- Super Alignment element design
- Super Alignment element computators
- Creating, Placing and Editing Components (parametric objects)
- Cul-de-sac
- Intersections
- Bus Bay
- Apply MTF Manager
- Design Quick Start functions
- Chains
-

5.5 Pavements

Course Modules: D07

This course is a comprehensive investigation of creating, producing and attributing pavements within 12d Model. These functions are increasingly used by both designers and surveyors who are required to model subsurface layers for quantities and Digital Engineering data transfer.

Course prerequisite: Modules B01, A01 & D01

Should be experienced with creating and editing Super Alignments and understand the MTF and Apply Many functions in 12d Model.

Aim: To provide a comprehensive knowledge of the 12d Model Pavement Manager and Pavement modelling and the functions within 12d that utilise this function

Content:

- Data preparation for pavement creation
- Preparing tins and strings for pavement functions
- Apply MTF recreate function
- Design Quick Start tools
- Pavement Manager including
- Reading and writing pavement manager files
- Pavement layer



- Kerb layers
- Verge layer
- Pavement description file
- Using MetaConnex for pavement attributes
-

Create pavements from Snippets

Snippet locator Models

Create pavements from tins

Edge treatments for pavements from tin

Creating subgrade tins

5.6 Utilities

Course Modules: D10

This course is a course for Surveyors and Designers whose role is the modelling and attribution of Utility Services such as water, electricity etc. Attendees will be shown many tools within 12d Model to create and prepare utility models to a high BIM standard.

Course prerequisite: Modules B01

Should be experienced with the 12d Model interface.

Aim: To provide a thorough understanding of the functions and object types in 12d Model to create a high accuracy, information rich model of utilities.

Content:

- Modelling utility strings via
- Super strings
- Super Alignments
- MTF functions and Layers
- Water strings
- BIM Objects
-
- Using Map files to enhance utility models
- Creating models from survey and csv files
- Attribute manipulator for utility properties and attribution
- Utility models using BIM Objects
- Editing and using global attribute tools
- Attribution via MetaConnex files
- Modelling utility trenches
- Reporting utilities and trench volumes
- 3d Clash Detection
- Labelling and plotting utility models
- Plotting longsections and crossing corridors
- Exporting BIM IFC files

5.7 MetaConnex (Digital Asset Management)

Course prerequisite: B01

This course outlines the 12d Model workflow and procedures for creating, attributing and preparing digital information (both survey and design) to Digital Asset Standards.

There will be variations to the training data to be relevant for both discipline specific and to New Zealand published standards. The current variations are.

- MetaConnex for Designers
- MetaConnex for Surveyors
- National Three Waters Code of Practice Standards
- AMDS (Asset Management Data Standards, Waka Kotahi NZTA)
- Christchurch City Council IDS Part 12, As-built Standards

This course uses a standard Metaconnex workflow and tools to map and create a digital asset file (including the creation of spatial PDF plans) from field survey or design data. The use of an XSD of the metadata standards gives Users the ability to validate data integrity before export data to GIS systems.

Aim: From survey or design data, create, attribute and pre-validate the required as-built 12d XML file to be imported GIS systems.

Content:

Develop an understanding Attributes/Metadata requirements and Standards.

MetaConnex application

- Preparation of the Design or survey data for processing
- Review of the example MetaConnex files to apply to the data.
- Attribute creation and calculations.
- Mapping for required Discipline and Standards.
- Review Workflow and Data Processing chains.

Raw data preparation

- Minimum data requirements
- Data and attribute mapping to produce consistent plan creation
- Converting existing design or survey field attributes to produce data deliverables
- Creation of attributed BIM/3d Model information

Validation

- Validation of data against the business rules defined within the XSD
- Editing the produced data
- Creation of 12dXML data file for GIS upload via FME

PDF plan creation

- Creating/Editing a Title block file.
- Automated Attribute Label Creation for plan presentation
- View Favourite for swift data presentation
- Producing constant PDF plans using MPS plotting required for Council 224 Sign off

6.0 FORMAL COURSES WATER

The following course information is a breakdown of the 12d NZ Ltd standard one-day formal courses.



6.1 Drainage Part 1 (Basic)

Course Modules: B01, W01, W02 & W03

Course prerequisite:

For the introduction or Basic courses, trainees are required to self-learn the 12d Model absolute basics such as navigating the interface and be able to understand the general mouse control procedures before attending the training.

An online video for them to follow is provided.

<https://www.youtube.com/watch?v=glSiyG-sOzs>

Aim: To create and modify a stormwater water network. Assign catchments to the network and run a rational analysis to calculate peak flows and size the stormwater network.

Content:

- Supertins
- Identify stormwater pit and pipe locations from design strings
- Create water strings
- Applying risers to nodes
- Import water layouts from CAD Strings
- Network Editor
- Link invert alignment
- Set water network defaults
- Link structures to the roadway design for alignment and construction levels/setout
- Label water network and produce longsections
- Apply and label catchment areas.
- Hydrology methods for determining C and tc

- Set multiple catchment areas per inlet structure
- Direct input and catchment polygons
- Saving network settings
- Determine time of concentrations from length – slope strings
- Avoid service clashes.
- Determine pipe sizes and HGL in the drainage analysis module via the Rational Method analysis

6.2 Drainage Part 2 (Advanced)

Course Modules: W03, W04, W05 & W06

Course prerequisite: W01, W02, W03

Have attended Drainage Part One or be a competent 12d user.

Aim: To identify overland stormwater flow paths and calculate and control both pipe and overland (bypass) flows for a water network. Plot network design, export and calculate pipe quantities.

Content:

Design with bypass flows and inlet capacities

Apply and label catchment areas per pit

Review default hydrology methods for determining C and tc

Drainage.4d editing including

- Capacity configurations
- Create and alter pit types to model “on grade” and “SAG” inlet capacity.

Spreadsheet Editing

- Export the stormwater system to a spreadsheet
- Edit spreadsheet, and import to changes 12d Model

Create custom network reports

Water quantity reports (By type and depths)

Use 12d templates to calculate trench volumes

Creating trimesh trenches and volumes

Overland Flow Analysis

- Flooded width, section capacity and velocity*depth calculations for roadway and channels
- Bypass nodes for combining flow paths
- Alter n values, max flooded width and proportion catchment flows along bypass flow paths
- Analyse flooded areas resulting from ponding at SAG pits
- Bypass flow with detailed inlet capacity for SAG and on grade inlets

Surcharging flows during major flow event analysis

6.3 Drainage Part 3 (Dynamic)

Course Modules: W05 & W07

Course prerequisite: W01-W03

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

Aim: To assist experienced 12d Model designer to extend their Water design skills further. The course continues from the rational hydrology method to the dynamic hydrology methods and dynamic flow in pipes.

Content:

Dynamic Modelling tools including

- Water Network Editor
- Concept Stormwater Designer

Dynamic Drainage Hydrology

- Rainfall runoff methods discussed (will vary with regions SCS, ILSAX or EPA SWMM)
- Moving from rational "C" to Soil types
- Additions to the 12d rainfall file including
- Rainfall fixed time and variable temporal patterns.
- Reviewing graphical outputs

Hydraulics

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

Detention Basin Design

- Estimating storage to meet the pre-development discharges,
- Creating detention basins and extracting elevation area curves from the tin
- Creating Basin links and link types
- Analysis of basin storage and elevation
- Multiple outlets design (combining spillway, control pipe, orifice)

Storage Tank Design

- Estimating storage to meet the pre-development discharges via discharge control pipes, orifice and weirs

Natural Channels and Pumps

6.4 Drainage Features

Course Modules: W15

Course prerequisite: W01-W03

Should be proficient around the menus within 12d Model. View control, model management, basic CAD drawing skills.

Aim: To introduce 12d users to existing and new drainage options that enhance the creation, positioning and 3D modelling of water networks.

Content:

Downhill strings advanced

Culvert and channel creation

Water Model Templates

Network Creation via GIS

Water plan edit tools

- Water Network Editor including;
- Apply and label catchment areas.
- Hydrology methods for determining C and tc
-
- Drainage.4d Edits including;
- Nodes and Link creation
- Applying thickness values for nodes and links
- Node dimensions
- Creating and referencing 3d trimesh to nodes
- Extended base and riser shapes
- User defined house connections
- Determine time of concentrations from length – slope strings
- Determine pipe sizes and HGL in the water analysis module.

3D Headwall creation

3d HGL creation

Node diagram production

Water Network Conversion including

- Convert to GIS
- Attribute Manipulation

BIM Tools including;

- Global Attributes Editing
- BIM Objects
- Clash Detection and reporting

6.5 Drainage 2D Introduction (Road Flow)

Course Modules: W10

Course prerequisite: W01-W03, W05

Should be proficient around the menus within 12d Model. View control, model management, basic CAD drawing skills.

Completion of Dynamic Drainage Training is highly recommended.

Aim: To introduce 12d users to modelling overland flows using the 2D Roadflow functionality. This can be used by experienced water modelers, water designers or anyone who requires overland flow analysis and modelling.

Content:

Creating a rainfall on grid 2d model

- Create and run a TUFLOW model using the Roadflow quick start panel
- Add ridges, gullies to enhance the 2D grid
- Add roughness polygons for a second roughness
- Link a 12d water model to the 2d grid

Review check files and results

- Review the grid z pts, ridges/gully, 1d-2d link and boundary control check files
- Create and display tin varying grid tin results for water depths, velocity and hazard
- Create Legends and customise result colour bands.

Time Results

- Create time plots of results of velocity, depth, water level and hazard.
- Create flow measurement lines to total the flow over the line

Coupled 1D/2D modelling

- Prepare 1D dynamic water network for analysis
- Running a coupled model
- Adjusting 1D connection modes
- Bypass nodes for 2D model input
- Refining the connection zones and catchment distribution

Visualisation and Fly Overs

- Create time lines viewing flooding from a stationary perspective



6.6 Drainage 2D (TUFLOW)

Course Modules: W11

Course prerequisite: W01-W03, W05

Should be proficient around the menus within 12d Model. View control, model management, basic CAD drawing skills.

Completion of Drainage 2D – Introduction and Dynamic Drainage Training is highly recommended.

A basic understanding of TUFLOW modelling using the TUFLOW control file commands would be an asset but not required.

Aim: To utilise both the full power of 12d Model water tools together with the capabilities of the TUFLOW 2D engine to produce both 2D and couple 1D/2D hydrological and hydraulic models.

Content:

TCF Editor

- Use the 12d model (tcf) editor to review and update the tcf, tbc and tgc files created by the Roadflow quick start panel.
- Modify active area polygons and boundary conditions.
- Use the String attribute editor for advance attribute manipulation and the attribute to spreadsheet tool for bulk changes

TUFLOW String Editor (TSE)

- Use the TSE to create and update string attributes and csv database files.

Hydrology Options

- Create strings for inflow hydrographs (SA & QT),
- Rainfall hyetograph regions (RF)

Boundary Conditions

- Tidal boundaries.
- Head discharge (HQ)
- Initial water levels

Soil Types

- Soils file
- Infiltration methods

Structures

- Storage Reduction factors
- Form Loss Coefficients
- Variable Form Loss Coeff

Variable Dam Options (Dam Break)

- Adding a culvert connecting to multiple 2D cells
- Distributing 1D hydrology results onto a 2D grid

7.0 FORMAL COURSES BIM AND ASSETS



7.1 BIM and Attribute Management

Course Modules: G04, T03, B07

Course prerequisite: B01

Should be proficient around the menus within 12d Model.

Aim: For a surveyor, engineer or information manager that wants utilize the functionality inside 12d Model to collaborate and coordinate models from different project disciplines. Being able to import and share BIM model data, access, manipulate and coordinate attribute/meta-data information, create and report trimesh models.

Content:

Import and manage open BIM IFC files

3d Helmert transformation of models

12d Model Data Management including;

- Manual attribution
- Mapping survey and design data with attributes
- Mapping data with Visualisation
- Creating and using the attribute manipulator
- Global Attributing library editing and application

Utilizing attribute data including;

- Labelling via Map Files
- Custom Exporting and reporting

BIM model creation and editing tools including;

- Trimesh creation from tins and strings
- Trimesh Chambers

- Trimesh from typical sections
- Trimesh Pavement Manager
- Creating tins from Trimesh objects
- BIM Object creation and management

Trimesh reporting and volumes

Clash Detection and reporting

Export open BIM IFC files

7.2 MetaConnex (Digital Asset Management)

Course prerequisite: B01

This course outlines the 12d Model workflow and procedures for creating, attributing and preparing digital information (both survey and design) to Digital Asset Standards.

There will be variations to the training data to be relevant for both discipline specific and to New Zealand published standards. The current variations are.

- MetaConnex for Designers
- MetaConnex for Surveyors
- National Three Waters Code of Practice Standards
- AMDS (Asset Management Data Standards, Waka Kotahi NZTA)
- Christchurch City Council IDS Part 12, As-built Standards

This course uses a standard Metaconnex workflow and tools to map and create a digital asset file (including the creation of spatial PDF plans) from field survey or design data. The use of an XSD of the metadata standards gives Users the ability to validate data integrity before export data to GIS systems.

Aim: From survey or design data, create, attribute and pre-validate the required as-built 12d XML file to be imported GIS systems.

Content:

Develop an understanding Attributes/Metadata requirements and Standards.

MetaConnex application

- Preparation of the Design or survey data for processing
- Review of the example MetaConnex files to apply to the data.
- Attribute creation and calculations.
- Mapping for required Discipline and Standards.
- Review Workflow and Data Processing chains.

Raw data preparation

- Minimum data requirements
- Data and attribute mapping to produce consistent plan creation
- Converting existing design or survey field attributes to produce data deliverables
- Creation of attributed BIM/3d Model information

Validation

- Validation of data against the business rules defined within the XSD
- Editing the produced data
- Creation of 12dXML data file for GIS upload via FME

PDF plan creation

- Creating/Editing a Title block file.
- Automated Attribute Label Creation for plan presentation
- View Favourite for swift data presentation
- Producing constant PDF plans using MPS plotting required for Council 224 Sign off

7.3 Utilities

Course Modules: D10

This course is a course for Surveyors and Designers whose role is the modelling and attribution of Utility Services such as water, electricity etc. Attendees will be shown many tools within 12d Model to create and prepare utility models to a high BIM standard.

Course prerequisite: Modules B01

Should be experienced with the 12d Model interface.

Aim: To provide a thorough understanding of the functions and object types in 12d Model to create a high accuracy, information rich model of utilities.

Content:

- Modelling utility strings via
- Super strings
- Super Alignments
- MTF functions and Layers
- Water strings
- BIM Objects
- Using Map files to enhance utility models
- Creating models from survey and csv files
- Attribute manipulator for utility properties and attribution
- Utility models using BIM Objects
- Editing and using global attribute tools
- Attribution via MetaConnex files
- Modelling utility trenches
- Reporting utilities and trench volumes
- 3d Clash Detection
- Labelling and plotting utility models
- Plotting longsections and crossing corridors
- Exporting BIM IFC files

7.4 Pavements

Course Modules: D07



This course is a comprehensive investigation of creating, producing and attributing pavements within 12d Model. These functions are increasingly used by both designers and surveyors who are required to model subsurface layers for quantities and Digital Engineering data transfer.

Course prerequisite: Modules B01, A01 & D01

Should be experienced with creating and editing Super Alignments and understand the MTF and Apply Many functions in 12d Model.

Aim: To provide a comprehensive knowledge of the 12d Model Pavement Manager and Pavement modelling and the functions within 12d that utilise this function

Content:

- Data preparation for pavement creation
- Preparing tins and strings for pavement functions
- Apply MTF recreate function
- Design Quick Start tools
- Pavement Manager including
- Reading and writing pavement manager files
- Pavement layer
- Kerb layers
- Verge layer
- Pavement description file
- Using MetaConnex for pavement attributes
-

Create pavements from Snippets

Snippet locator Models

Create pavements from tins

Edge treatments for pavements from tin

Creating subgrade tins

8.0 FORMAL COURSES RAIL



8.1 Rail

Course Modules: R01

Course prerequisite: B01, A01 & A02

Should be proficient around the menus within 12d Model. Completion of the Design Basics Course and some experience/use after the course is essential plus a reasonable knowledge of Element Based Super Alignments.

Experience in Rail Design & Rail Terminology is strongly recommended.

Aim: To train and familiarize 12d Designers and Rail designers with the comprehensive Rail design capabilities of 12d Model.

Content:

Calculate the Track Centreline (3D) from the Surveyed Rails

Use of Linear & Arc Regression (Though not actually part of the Track Tools, Regression is essential for developing a CL off Surveyed Data when no Design Data is available).

Track Slew. Creating Reports, Spreadsheets & Diagrams & Plotting the Slew.

Rail Profiles. Producing &/or Extracting a Rail Profile.

Turnouts. Creating & Editing Turnouts & then Placing Turnouts

Chainage Equalities. Equality Types & Definitions. Their use + Inquiring on Equality Chainages

Rail Cant. Cant design, Virtual Cant, Altering Speeds to Adjust Cant, Spreadsheets & Graphs & applying the Cant to the Rails.

Plotting the Rails, Ballast & Sleepers. A quick look at producing a Circular (Bored) Tunnel.

Setting and running structure gauge

Some Long Section Plot Settings/Tweaks.

9.0 OTHER FORMAL COURSES



9.1 Cad & Plotting

Course Modules: B02, B03, P01, P02 & P04

These course modules are designed for someone wanting to understand cad string construction, management and plotting within 12d Model.

Course prerequisite: Nil

The participant should be proficient in navigating around the menus within 12d Model. Any knowledge of 12d Model will be of an advantage for this beginners 12d Model Cad training course.

Aim: To introduce new and existing users to cad construction and plotting techniques within 12d Model.

Content:

Creation of 12d Model Projects

Navigate in the 12d Models graphical interface

Drawing and CAD snaps

CAD Modification tools

String Properties

Symbols, Text

Toolbars

Super String Tools

Measuring

Rasters

Tin functions and Labelling

CAD elements including



- Dimensions
- Leaders
- Tables

Labelling data

Editing Title Block Files

Plotting long sections

Plotting Cross sections

Multi Page Plot Sheets

9.2 Plotting A-Z

Course Modules: B02, B03, P01, P02 & P04

This course is designed for Users in 12d Model to understand the mechanisms and functions in the background of 12d Model which are used for CAD and plotting.

Course prerequisite: Nil

The participant should be proficient in navigating around the menus within 12d Model. Any knowledge of 12d Model will be of an advantage for this beginners 12d Model Cad training course.

Aim: To introduce existing users to cad and plotting setup functions in 12d Model.

Content:

Creating and editing Titleblock (tbf) files

Title block variables

Creating and editing symbols and line styles

Creating and editing text styles

Automatic labelling options in 12d Model

Creating and plotting Multi Plots (MPS) files in 12d Model including.

- Title Blocks
- Symbol sub-nodes
- Model sub-nodes
- Plan Frames
- Section Frames
- 3d and PDF frames
- Special Chapters
- Using drawing registers

Longsection and cross section plotting



9.3 General Course

Course Modules: B03, B04, T02 & P02

Course prerequisite: B01 and T01

Should be able to create a tin and be proficient around the menus within 12d Model.

Aim: For a surveyor or engineer that wants to do many different tasks within 12d. This course is not aimed at a basic or an advanced user but will cover some of the day to day tasks in detail looking at some of the other options available.

Content:

Customisation

- Environment configurations
- Name mapping
- Workspaces
- Text
- Symbols
- Default dialogs

String Properties

Symbols, Text

Toolbars

Super String Tools

Measuring

Rasters

Create and edit mapping files

Creating and Editing Tins

Tin Functions

Tin Analysis via Range Files

Pads - Basic pad creation

Volumes – Exact and End Area

Depth Range Files

Stock piles and Volumes

Plotting Plans

Plotting long sections

Plotting Cross sections

Multi Page Plot Sheets





10.0 COURSE MODULES

10.1 Base Modules

B01 - Introduction

1 hour 50 min

Unit prerequisite: Nil

Modules Used: Base

Content:

- Start-up
- Interface navigation
- String Concepts
- Picking Concepts
- Snaps and Cad snaps
- Typed Entry
- Importing Data
- View toggles/settings
- View Control
- View Favourites
- View Positions
- Model Management

B02 - Cad and Construction

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base

Content:

Drawing and CAD snaps

Modification tools including:

- Move, Rotate and Copy
- Clip
- Parallel
- Trim, Extend and extend by length

String Properties

Symbols

Text

Cad Snaps

Cad and Construction

Cad Text and Symbols

Filtering Points



B03 – Cad Tools

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base

Content:

Sharing

Toolbars

String Properties

Changing and Editing

View Settings

Super String Tools

Tinability

String Symbols

Pipe / Culvert properties

Measuring

Raster

Importing

Cad Holes

Creating a TIN

Contouring and Labelling

B04 – Customisation Configuration

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base

Content:

Create a Project

Environment Configuration File

Custom Files

User and Customer User Folders

User and Customer Libraries

Folder Structure

Environment Files

Setup Files

Project Details

Workspace

Project Tree

Saving setup files



Defaults

User defined function keys

B05 – Sharing

1 hour 50 min

Unit prerequisite: B01

Modules Used: **Base**

Content:

Making Models and TINs shared

Sharing in or Removing Models and TINs

Synchronising Data

Sharing Map Files

Share Master Files

Sharing Variables

B06 – Chains

1 hour 50 min

Unit prerequisite: B01

Modules Used: **Base**

Content:

Creating Chains

Conditionals

Interactive modes

Recording

Parameters

B07 – Attribute Management

1 hour 50 min

Unit prerequisite: B01

Modules Used: **Base**

Content:

12d Model Data Management

Project Attributes

Model Attributes

Tin Attributes

String, vertex and segment attributes

Mapping data with attributes via;

Manually

Map File attribute creation



Attribute manipulator application
Global Attribute Editor
Create and apply attribute label map files
Labelling and exporting attributed data

B08 – Trimesh Management

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base

Content:

Creating Trimesh objects
BIM object creation and management
BIM object application
Utilities design from super alignments
Trimesh pavements
Converting trimeshes

10.2 Alignments

A01 – Super Alignment – IP Design

1 hour 50 min

Unit prerequisite: B01, T01

Modules Used: Base & Alignments

Content:

Create Super Alignment
Create and edit horizontal alignment using IPs
Create and edit vertical alignment using IPs
IP calculation tools
IP modification tools
Convert strings to super alignments
Edit IPs via tree and table
Super Alignment Information

A02 – Super Alignment – Element Design

1 hour 50 min

Unit prerequisite: A01

Modules Used: Base & Alignments

Content:

Create Super Alignment



Horizontal element geometry
Vertical element geometry
Named parts
Named positions
Introduction to Computators

A03 – Super Alignments - Computator Roundabout

1 hour 50 min

Unit prerequisite: A02

Modules Used: Base & Alignments

Content:

Fixed, floating and free design elements for;

- Roundabout
- Intersections

Using computator elements

Computator kerb return tool

Modifiers with computators

Components

A04 – Super Alignment – Computators and Kerb Return

1 hour 50 min

Unit prerequisite: A01

Modules Used: Base & Alignments

Content:

Fixed, floating and free design elements for;

Intersections

Bus Bay

Cul-de-sacs

Fixed Compound

Fixed points tins and offset grade

Fixed arcs

Fixed lines

Fixed String

Widening function

A05 – Super Alignments – Advanced Tools

1 hour 50 min

Unit prerequisite: A01

Modules Used: Base & Alignments

Content:

Super Alignment Toolbars

Super Alignment Tools

Information

Styles

Editing Design Standards

Applying Design (speed) templates

Named Parts

Named Positions

Super Alignment Settings

Components including;

- Roundabout Intersections, standard and high entry
- Cul-de-sac
- Bus Bay
- Chain creation for components
- Component library and setup

Vehicle Path Tracking Super Alignment validation and graphing

Super Alignment Pipeline

Super alignment options and backups

10.3 Design Modules**D01 – Design**

1 hour 50 min

Unit prerequisite: A01

Modules Used: Base & Alignments

Content:

Template Creation and Editing

MTF File – Inserting design templates

Apply MTF Function

MTF Modifiers

Computator Kerb Return

Design Quick Start

Apply Many Manager

D02 – Advanced Modifiers

1 hour 50 min

Unit prerequisite: D01

Modules Used: Base & Alignments

Content:

Import templates

Apply MTF defaults

Apply MTF Manager

Modifiers using smart chainages

Advance Modify features, Alias, Regions, Create, Remove

Modifiers using layers

Trimesh shape creation

D03 – Design with Snippets

2 hour 50 min

Unit prerequisite: D01

Modules Used: Base & Alignments

Content:

What are Snippets

Snippet Editor

Basic Snippet edits

Applying Snippets

Creating MTF Seed Files

D04 – Pavement Overlay

1 hour 50 min

Unit prerequisite: D01

Modules Used: Base & Alignments

Content:

Apply MTF Manager

Pavement Overlay function including;

- Minimum overlay depth calculation
- Sampling existing and design super elevation
- Depth range colouring
- Scarification

D05 – Boxing Rules N/A

1 hour 50 min

Unit prerequisite: D01

Modules Used: Base & Alignments

Content:

Boxing Files and Rules

D06 – MTF Boxing

1 hour 50 min

Unit prerequisite: D01

Modules Used: Base & Alignments

Content:

Modifier boxing with layers

Named grades

Asphalt surface, Kerb shapes and Subgrade layers

Overlay and Widening

Corrector Infill Layers

D07 – Pavements

1 hour 50 min

Unit prerequisite: D01

Modules Used: Base & Alignments

Content:

Data preparation for pavement creation

Preparing tins and strings for pavement functions

Apply MTF recreate function

Design Quick Start tools

Pavement Manager including

Reading and writing pavement manager files

Pavement layer

Kerb layers

Verge layer

Pavement description file

Using MetaConnex for pavement attributes

Create pavements from Snippets

Snippet locator Models

Create pavements from tins

Edge treatments for pavements from tin

Creating subgrade tins

D08 – Snippet Creation

1 hour 50 min

Unit prerequisite: D01, D03

Modules Used: Base & Alignments

Content:

Apply MTF Manager

Creating a snippet from MTF commands

Saving and applying snippets

Parameters in snippets including

- REAL
- TEXT
- CHOICE
- OPTIONAL
- Auto snippet parameters
- Tokens (def_tok)
- AUTO_LR
- If_val
- Maths in snippets
- Snippet Start/End Modes and extensions
-

D09 – MTF Decisions

1 hour 50 min

Unit prerequisite: D01,

Modules Used: Base & Alignments

Content:

Apply MTF Manager

Decisional Templates

MTF decisions including;

- Flow Controls
- Tin decisions
- Link decisions
- Goto
- Label
- Conditionals

D10 – Utilities

1 hour 50 min

Unit prerequisite: D01,

Modules Used: Base & Alignments

Content:

Modelling utility strings via

- Super strings
- Super Alignments
- MTF functions and Layers
- Water strings
- BIM Objects

Using Map files to enhance utility models

Creating models from survey and csv files

Attribute manipulator for utility properties and attribution

Utility models using BIM Objects

Editing and using global attribute tools

Attribution via MetaConnex files

Modelling utility trenches

Reporting utilities and trench volumes

3d Clash Detection

Labelling and plotting utility models

Plotting longsections and crossing corridors

Exporting BIM IFC files

10.4 Tin Modules**T01 – Tin Creation**

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base

Content:

Importing data

Map files

Triangulation

Creating TIN

Nulling

Boundary creation and application

Editing a TIN



Tin information and Inquiry
Contouring and labelling
Importing a Raster

T02 – Tins and Volumes

1 hour 50 min

Unit prerequisite: T01

Modules Used: Base & Volumes

Content:

Advanced TIN Edits
Importing data and Checking Breaklines
Create a TIN
Quick TIN
TIN Analysis
Height Colouring
Range Files
Label Lines
Edit a TIN
Pad Platform Design
Volume of Pad
Updating with a chain
Super TIN
Depth Contours
Depth Range Tabulation





T03 – BIM Object analysis

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base & Volumes

Content:

Trimesh from tins

Trimesh from polygons

Trimesh from planar polygons

Trimesh from string profile

Trimesh from 12d objects

Contour and label trimesh objects

Trimesh volume and reporting

Editing Trimesh objects

3D clash detection

10.5 Survey Modules

S01 – Topographical Survey

3 hour 50 min

Unit prerequisite: B01 & T01

Modules Used: Base & Survey

Content:

Mapping Files

Create Field File

SDR Function (Survey Data Reduction)

Editing Field Book

SDR Tools

Label Map File

Cad Edits and Drafting

Plan Plotting

Import and export text/upload files

Helmert Adjustment



S02 – Cadastral Survey

5 hour 50 min

Unit prerequisite: B01

Modules Used: Base, Survey & LINZ XML

Content:

LINZ XML Input

Traverse Spreadsheet

XML Creation

TSS Reporting

TSS Draughting

S03 – Survey Construction

5 hour 50 min

Unit prerequisite: B01

Modules Used: Base, Survey

Content:

Read in external data for processing

Detailed Inquiry on external data

Process/clean up provided design information

Create best fit super alignment and geometry for surveyed data

Calculate best fit elements with regression options

Create design subgrade and pavement layers from design top surface levels

Prepare design data for setout

Volumetrics and reporting

10.6 Plotting Modules**P01 – Plan Label Plotting**

1 hour 50 min

Unit prerequisite: B01

Modules Used: Base

Content:

Data Label Including;

- Information Leader
- Label Map File
- Bearing Distance Label

Text

Quick Sheet Plot

Plot Frames Creation and Plotting



P02 – Sections and Plotting

1 hour 50 min

Unit prerequisite: B01

Modules Used: **Base**

Content:

Creating sections

Plotting Long Sections

Plotting Cross Sections

Cut definition and labelling

Paired Cuts

P04 – Multi Page Plot Sheets

1 hour 00 min

Unit prerequisite: B01

Modules Used: **Base**

Content:

Linked Tables

Dimensions and Leaders including

- Styles
- Associated Dimensions
- Leaders
- Information Leaders
- Overriding Styles
- Changing Styles

Multi Page Plot Sheet create

Plot and Manage multi page plot sheets including

- Creating Sheets
- Creating and editing frames
- Inserting Symbols
- Inserting Text



10.7 Water Modules

W01 – Network Creation

1 hour 50 min

Unit prerequisite: B01 & T01

Modules Used: Base & Drainage

Content:

Super tin to use with the drainage design

Locate and label design crest/sag locations

Set drainage defaults

Viewing the drainage.4d file

Drainage string create options

Create and edit a 12d drainage strings

- From scratch
- From CAD layouts

Preparing for Drainage Network Editor

W02 – Network Editor

1 hour 50 min

Unit prerequisite: W01

Modules Used: Base & Drainage

Content:

Drainage Network Editor

Manage and grade drainage network

Specific Pit and Pipe overrides

Label and plot drainage network

Link structures to the roadway design

Calculate structure coordinates with grate and cover elevations

Parameters for determining energy losses in pipes

Pit pressure loss Coefficients (K) in 12d Storm analysis

Culvert design with inlet control calcs



W03 – Network Analysis

1 hour 50 min

Unit prerequisite: W01 & W02

Modules Used: Base, Drainage & Analysis

Content:

Review default hydrology methods for determining C and tc
Set multiple catchment areas per inlet structure via direct input and catchment polygons
Determine time of concentrations from length – slope strings
Analyse and size drainage pipes with Rational Analysis
Size and grade pipes for design flows
Check for service clearances

W04 – Network Export

1 hours 50 min

Unit prerequisite: W01-W03

Modules Used: Base, Drainage & Analysis

Content:

Export the stormwater system to a spreadsheet
Edit spreadsheet, and import to changes 12d Model
Customise network reports through spreadsheet interface
Drainage quantity reports (By type and depths)
Produce detailed reports for

- Hydrology
- Hydraulic
- Construction setout reports

W05 – Network Bypass

1 hours 50 min

Unit prerequisite: W01-W03

Modules Used: Base, Drainage & Analysis

Content:

Review W03 module settings
Flooded width, section capacity and velocity*depth calculations for roadway and channels
Bypass nodes for combining flow paths
Alter n values, max flooded width and proportion catchment flows along bypass flow paths
Analyse flooded areas resulting from ponding at SAG pits
Bypass flow with detailed inlet capacity for SAG and on grade inlets
Surcharging flows during major flow event analysis

W06 – Network Quantities

1 hours 50 min

Unit prerequisite: W01-W03

Modules Used: Base, Drainage & Analysis

Content:

Customise pipe and pit quantity reports by type and depths

Use 12d templates to calculate trench volumes

Import/export to spreadsheets

Customise pit schedule reports through spreadsheet interfaces

Customised drainage long sections with hatching under roads and adding of user defined data

Customised plan drawings with user defined pit symbols and data

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-

W07 – Dynamic Drainage

6 hours 50 min

Unit prerequisite: W01-W03, W05

Modules Used: Base, Drainage, Analysis, Dynamic Drainage

Content:

Water Network Editor and Stormwater Concept Designer

Rainfall runoff methods discussed (will vary with regions SCS, ILSAX or EPA SWMM)

Moving from rational "C" to Soil types

Additions to the 12d rainfall file including

- Rainfall fixed time and variable temporal patterns.
- Soil loss types and values
- Time series tailwater settings

Reviewing graphical outputs via time series graphs

Modelling diverging flow conditions

Bypass flow using surface flows with section shapes cut from the design tin.

Time series for tail water conditions.

Modelling natural channels using section shapes cut from the design tin.

Estimating storage to meet the pre-development discharges,

Creating detention basins and extracting elevation area curves from the tin,

Multiple outlets design (combining spillway, control pipe, orifice)

Estimating storage to meet the pre-development discharges via discharge control pipes, orifice and weirs

Running dynamic hydrology and hydraulics and evaluating storage parameters.

W08 –Sewer

1 hours 50 min

Unit prerequisite: W01-W02

Modules Used: Base, Drainage, Sewer

Content:

Sewer Design based on Christchurch City Council IDS standards for Tractive Force
Sewer Design

W09 – Culverts (To Come)

6 hours 50 min

Unit prerequisite: W01-W03, W05

Modules Used: Base, Drainage, Analysis, Dynamic
Drainage**W10 – Drainage 2D - Introduction**

6 hours 50 min

Unit prerequisite: W01-W03, W05

Modules Used: Base, Drainage, Analysis, Dynamic
Drainage, Roadflow, Visualisation

Create and run a TUFLOW model using the Roadflow quick start panel

Add ridges, gullies to enhance the 2D grid

Add roughness polygons for a second roughness

Link a 12d drainage model to the 2d grid

Review the grid z pts, ridges/gully, 1d-2d link and boundary control check files

Create and display tin varying grid tin results for water depths, velocity and hazard Create results

Create Legends and customise result colour bands.

Create time plots of results of velocity, depth, water level and hazard.

Create flow measurement lines to total the flow over the line

Create time lines viewing flooding from a stationary perspective

Create flight and target paths for project flyovers of flood results

W11 – Drainage 2D - TUFLOW

6hours 50 min

Unit prerequisite: W01-W03, W05

Modules Used: Base, Drainage, Analysis, Dynamic
Drainage, Roadflow, Visualisation

TUFLOW control file (TCF) editor

Use the 12d model (tcf) editor to review and update the tcf, tbc and tgc files created by the Roadflow quick start panel.

Modify active area polygons and boundary conditions.

Use the String attribute editor for advance attribute manipulation and the attribute to spreadsheet tool for bulk changes.

TUFLOW string editor (TSE)

Use the TSE to create and update string attributes and csv database files.

Hydrology Options

Create strings for inflow hydrographs (SA & QT),

Rainfall hyetograph regions (RF)

Boundary Conditions

- Tidal boundaries.
- Head discharge (HQ)

Initial water levels

Soil Types

- Soils file.
- Infiltration methods.

Structures

Storage Reduction factors.

Form Loss Coefficients

Variable Form Loss Coeff.

Variable Z Options (Dam break)

Adding a culvert connecting to multiple 2D cells.

Distributing 1D hydrology results onto a 2D grid.



12d Model Training

12d NZ Ltd Training Courses

W12 – Rivers

6hours 50 min

Unit prerequisite: W01-W03, W05

Modules Used: Base, Drainage, HEC-RAS

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. This includes multiple water level results and depth

Contours.

Create a 'fly down the river' .avi movie file of a rendered 3d perspective view.

W14 – Dynamic Water Supply (To Come)

6hours 50 min

Unit prerequisite: W01-W03, W07

Modules Used: Base, Drainage, Analysis, Dynamic
Drainage

W15 – Drainage Features

6hours 50 min

Unit prerequisite: W01-W03

Modules Used: Base, Drainage, Analysis, Dynamic
Drainage

Downhill strings advanced

Culvert and channel creation

Water Model Templates

Network Creation via GIS

Water plan edit tools

Water Network Editor including;

- Apply and label catchment areas.
- Hydrology methods for determining C and tc

Drainage.4d Edits including;

- Nodes and Link creation
- Applying thickness values for nodes and links

- Node dimensions
- Creating and referencing 3d trimesh to nodes
- Extended base and riser shapes
- User defined house connections

Determine time of concentrations from length – slope strings

Determine pipe sizes and HGL in the drainage analysis module.

3D Headwall creation

3d HGL creation

Node diagram production

Water Network Conversion including

- Convert to GIS
- Attribute Manipulation

BIM Tools including;

- Global Attributes Editing
- BIM Objects
- Clash Detection and reporting



10.8 General Modules

G04 – BIM Digital Data

1 hours 00 min

Unit prerequisite: B01

Modules Used: Base

Import and manage open BIM IFC files
3d Helmert transformation of models
Export open BIM IFC files

G05 – Point Cloud

1 hours 50 min

Unit prerequisite: B01

Modules Used: Base

Import LAS point cloud
Working with point clouds in views
Categorize point cloud via tins
Delete high points in point cloud
Drape string data onto point clouds
Thinning of point clouds