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Civil and Surveying Software



12d Model Training

Training Courses

December 2024

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12d Model Training Courses

December 2024

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Table of Contents

1.0	12D MODEL TRAINING OVERVIEW	6
	Instructor-Led Online Training	6
	Self-Paced Online Training (SPOT)	6
	In-House Training	6
2.0	TRAINING PROGRESSION	7
3.0	SPOT – FUNDAMENTALS V15	8
	Summary:	8
	Prerequisites:	8
	Course Content:	8
4.0	SPOT - GETTING STARTED FOR SURVEYING V14	9
	Summary:	9
	Prerequisites:	9
	Course Content:	9
5.0	SPOT – GETTING STARTED FOR DESIGN V15	10
	Summary:	10
	Prerequisites:	10
	Course Content:	10
6.0	SPOT – GETTING STARTED FOR UTILITY MODELLING V15	11
	Summary:	11
	Prerequisites:	11
	Course Content:	11
7.0	SPOT – GETTING STARTED FOR 12D FIELD V15	12
	Summary:	12
	Prerequisites:	12
	Course Content:	12
8.0	SPOT – ALDE INTRODUCTION TO LAND DEVELOPMENT DESIGN V15	13
	Summary:	13
	Prerequisites:	13
	Course Content:	13
9.0	CIVIL DESIGN BASICS	16
	Summary:	16
	Prerequisites:	16
	Course Content:	16



10.0 CIVIL DESIGN FEATURES	17
Summary:	17
Prerequisites:	17
Course Content:	17
11.0 STORMWATER BASICS	18
Summary:	18
Prerequisites:	18
Course Content:	18
12.0 STORMWATER DYNAMIC	20
Summary:	20
Prerequisites:	20
Course Content:	20
13.0 STORMWATER 2D INTRODUCTION	21
Summary:	21
Prerequisites:	21
Course Content:	21
14.0 ADAC	22
Summary:	22
Prerequisites:	22
Course Content:	22
15.0 SURVEY BASICS	23
Summary:	23
Prerequisites:	23
Course Content:	23
16.0 SURVEY TOPOGRAPHICAL PROCEDURES	24
Prerequisites:	24
Course Content:	24
17.0 SURVEY CONSTRUCTION PROCEDURES	25
Prerequisites:	25
Course Content:	25
18.0 SURVEY CONVERSIONS AND ADJUSTMENTS	26
Prerequisites:	26
Course Content:	26
19.0 12D FIELD PICKUP	27
Prerequisites:	27
Course Content:	27
20.0 12D FIELD SETOUT	28
Prerequisites:	28
Course Content:	28



21.0	SETUPS AND CONFIGURATION	29
	Summary:	29
	Prerequisites:	29
	Course Content:	29
22.0	MACROS	30
	Summary:	30
	Prerequisites:	30
	Course Content:	30
23.0	RAIL/TRACK DESIGN	31
	Summary:	31
	Prerequisites:	31
	Course Content:	31
24.0	CAD AND PLOTTING	32
	Summary:	32
	Prerequisites:	32
	Course Content:	32
25.0	BIM	33
	Summary:	33
	Prerequisites:	33
	Course Content:	33
26.0	PAVEMENTS	34
	Summary:	34
	Prerequisites:	34
	Course Content:	34
27.0	SNIPPETS	35
	Summary:	35
	Prerequisites:	35
	Course Content:	35
28.0	UTILITY MODELLING AND DESIGN	36
	Summary:	36
	Prerequisites:	36
	Course Content:	36



1.0 12D MODEL TRAINING OVERVIEW

The Civil and Surveying Institute has been training 12d Model users for over 30 years, and we've been refining our courses not only as the software is developed, but also from feedback we receive from training attendees and industry. We offer training in three different formats:

Instructor-Led Online Training

Instructor-Led Online Training courses are live courses run online, using Microsoft Teams, which are led by one of our 12d Model training instructors. We typically limit the training group size to 8 attendees to ensure quality of training and that all questions can be answered within the scheduled time.

Registration in each Instructor-Led course includes access to a 12d Model licence tailored to each course.

Due to privacy reasons, we do not record the training; however, all course attendees are issued with comprehensive course notes which can be used as reference material for reviewing the training content once the training has finished.

For Instructor-Led courses which are also offered as Self-Paced Online Training (SPOT) courses, access to the SPOT course is included in the registration to the Instructor-Led course.

You can view available Instructor-Led courses and register via this link: [Civil and Surveying Institute](#)

Self-Paced Online Training (SPOT)

A range of free and paid Self-Paced Online Training (SPOT) courses is offered by the Civil and Surveying Institute. SPOT courses offer the same content as Instructor-Led courses, but in a self-paced format which you can organise around your schedule.

Registration in each SPOT course includes access to a 12d Model licence tailored to each course as well as training videos, resources, and knowledge-check quizzes.

You can view available SPOT courses and register via this link: [Self-Paced Online Training](#)

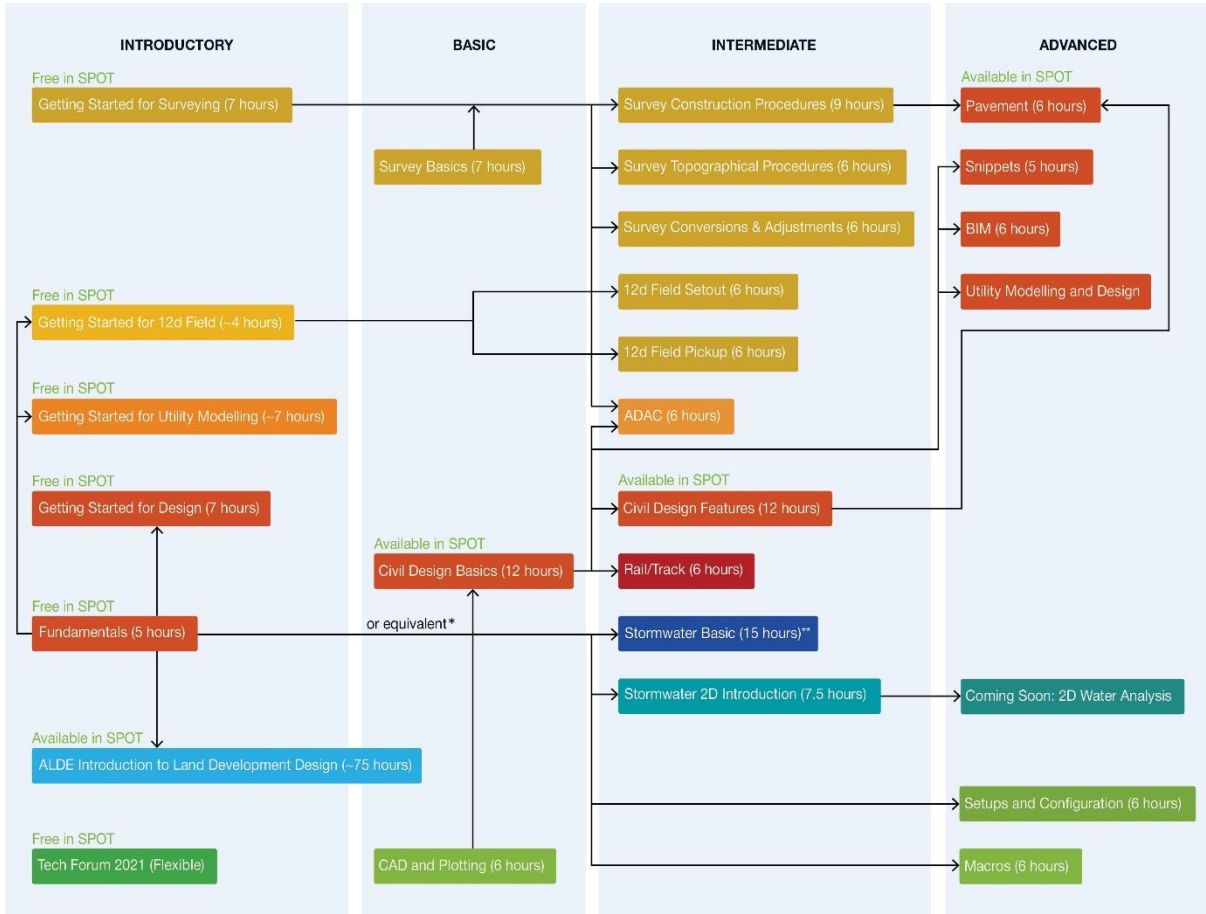
In-House Training

If your company has multiple individuals requiring training in one or more of our courses, we can deliver In-House training.

If you would like a quote for In-House Training, or if you would like more information, please contact training@iscdt.com.au.

2.0 TRAINING PROGRESSION

The image below provides a summary of the training courses offered by the Civil & Surveying Institute. The complexity of course increases from left to right, and arrows indicate pre-requisite courses that are required to be completed before attending a more advanced course.



Note * - The Fundamentals course can be completed as a standalone SPOT course, or is included in the Civil Design Basics, Survey Basics, Getting Started for Surveying, Design, Utility Modelling and 12d Field courses.

Note ** - The Stormwater Basics course, previously offered in two parts, has now been consolidated into a single standalone course. Consequently, the courses will no longer be available separately as before.

In-house Training courses are typically conducted in full day increments, whereas Instructor-Led courses are conducted in 3 to 4-hour increments, depending on the course, spread over multiple sessions and days.

Full course outlines are detailed further throughout this document.



3.0 SPOT – FUNDAMENTALS V15

Duration: Self-paced (~5 hours)

Self-Paced Registration Link: [Fundamentals V15](#)

Summary:

This course is for those that are new to 12d Model. Its aim is to teach you how to navigate the 12d Model workspace and use the Plan, Section and Perspective views, as well as create and import data for the purpose of creating surfaces, also known as TINs.

Prerequisites:

Basic computer skills are required, however experience with 12d Model is not necessary.

Course Content:

- Navigating 12d Model
 - The Workspace
 - Creating CAD Data and Picking
 - CAD Exercise
 - Training Folder Structure
- Creating a Surface
 - Importing Data
 - Plan View Operations
 - Triangulation
 - Section View Operations



4.0 SPOT - GETTING STARTED FOR SURVEYING V14

Duration: Self-paced (~7 hours)

Self-Paced Registration Link: [GSFS V14](#)

Summary:

This course is aimed at teaching you how to use 12d Model effectively, key terminology, and fundamental surveying practices.

Prerequisites:

Basic computer skills are required, however experience with 12d Model is not necessary.

Course Content:

- View and Toolbar Menus
 - Introduction to Views
 - Toolbars and Controls
- Importing and Managing Data
 - Importing Data and Analysis
 - Plan View Operations
 - Re-importing and Saving Model List
 - Triangulation and Analysis
 - String Inquire and Snaps
 - Creating Strings with CAD
- Survey Data Management
 - Survey Control Station Entry
 - Instrument Setup and Downloading
 - Survey Reduction
 - Field File Editing
 - Field File Graphical Editing
 - Triangulation
 - Plotting
- Volume Calculations
 - Stockpile Volumes
 - Multiple Stockpile Volumes
 - Dam Capacity
 - Surface Comparison
 - Progressive Volumes
- Setout Functionality
 - Building Setout
 - CAD House Setout
 - Setout Evenly Graded
 - Polyline Cul-de-sac String Setout
 - Triangulation Setout
 - Road Setout
 - Setout Report
- Subdivision Lots
 - Creating Road Boundaries
 - Creating Lot Boundaries
 - Lot Numbering
 - Lot Labelling
 - Lot Reporting



5.0 SPOT – GETTING STARTED FOR DESIGN V15

Duration: Self-paced (~7 hours)

Self-Paced Registration Link: [GSFD V15](#)

Summary:

This course continues on from the Fundamentals course and is aimed at teaching you how to use 12d Model effectively, key terminology, and the fundamentals of design through the lens of a simple road design project.

Prerequisites:

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. Registration in the **Fundamentals** course is included when registering for this course.

Course Content:

- The Road Design Process
 - Horizontal Geometry
 - Vertical Geometry
 - Templates
 - Apply Template
 - Assessing the Design
- Design Showcase
 - Kerb Returns
 - Components
 - Design Quick Start
 - BIM Objects
 - Chains, Leaders and Dimensions
- Plotting
 - Quick Sheet Plots
 - Cross Section and Long Section Plots
 - Plan Plot Frames
 - Multipage Plots



6.0 SPOT – GETTING STARTED FOR UTILITY MODELLING V15

Duration: Self-paced (7~ hours)

Self-Paced Registration Link: [GSfUM V15](#)

Summary:

This course is designed for those who wish to use 12d Model 15 to work with utility and attributed data. We show how to flexibly use the 12d Model tools to process attributed utility data so that you can reliably export and quantify utility information regardless of how surveyed data has been provided to you.

Prerequisites:

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. Registration in the **Fundamentals** course is included when registering for this course.

Course Content:

- Cover the basics of using a 'super string' to model utility data, by adding a diameter and justification to individual strings, to multiple strings, and with the use of map files. Survey Control entry
- Import utility data and discuss the use of attributes to store information on the data, then use those attributes to create Trimesh service chambers. Errors in coding, target heights and stringing
- Use MetaConnex and the Attribute Manipulator to structure attributes on data so that when the utilities are exported to IFC, they are in a suitable format
- Create a Chain to automate the workflow of import, processing and exporting utility data to IFC, so that future data can be processed rapidly.
- Showcase some more advanced attribute tools; those being translating using attribute values, replacing attribute values, de-concatenating attributes, and BIM object creation.



7.0 SPOT – GETTING STARTED FOR 12D FIELD V15

Duration: Self-paced (4~ hours)

Self-Paced Registration Link: [GSf12dF V15](#)

Summary:

This course is designed as an introduction for Surveyors familiar with the use of 12d Model to utilise 12d in the Field for Setout and Pickup purposes. We show tools to link your Surveying equipment and managing the 12d Field interface. A number of Setout and Pickup options are demonstrated. A Total Station is simulated for this course.

Prerequisites:

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. Registration in the **Fundamentals** course is included when registering for this course.

Course Content:

- Field techniques: Feature coding, control coding for enhancements including pipes, image attachments and attributes
- Survey Control entry
- Total Station and GNSS survey reductions: Dynamic editing of data with full auditing
- Errors in coding, target heights and stringing
- Manual edits: Joining strings, point edits, tinability
- Triangulation: Creation, analysis, Section views, Perspective views, Raster draping
- Plotting: Contours, Text labelling, Grids, Plotter mapping files, ACAD map files,
- Quick plots, Plot frames, Plot to PDF file and AutoCAD.



8.0 SPOT – ALDE INTRODUCTION TO LAND DEVELOPMENT DESIGN V15

Duration: Self-paced (~75 hours)

Self-Paced Registration Link: [ALDE V15](#)

Summary:

In partnership with the Association of Land Development Engineers (ALDE), this Self-Paced Online Training (SPOT) course has been created for those starting out, transitioning to, or upskilling within, the Land Development industry. The course follows a typical subdivision project, giving trainees an understanding of the processes and procedures involved, as well as the most up-to-date 12d Model tools used to efficiently complete the subdivision design.

Prerequisites:

Basic computer skills are required, however experience with 12d Model is not necessary.

Course Content:

The ALDE Introduction to Land Development Design Course includes:

- The ALDE Introduction Land Development Design guidelines – A 108 page document created specifically for this course, it provides a detailed overview and discussion of typical Land Development procedures, processes and requirements including:
 - The Land Development Process
 - Due Diligence, Cost Estimates, Planning Permits, Functional Design, Detailed Design, Tender, Construction, Titles
 - Functional Layout Plans
 - Key input documents, reports, standards and submission requirements
 - Water Design
 - Review completed plans, standards and water design requirements
 - Scheduling
 - Review a completed schedule, extraction of quantities and discussion of key components including provisional items, extra over etc.
 - Advanced Design
 - Principles of lot grading, drainage pipe cover calcs, electrical design, saw tooth grading, efficient earthworks and private property works
- Access to over 100 industry-tailored 12d Model training videos:
 - Consistent with authority requirements (e.g. EDCM, Melbourne Water etc.)
- The 12d Model 'Road and Finished Surface Design' Unit has chapters and lessons including:
 - Survey Data Preparation
 - Import Survey Data
 - Create TINs, Boundaries and Nulling
 - Contouring and Labelling
 - ELVIS Survey Data
 - Sharing
 - Import Plan of Subdivision
 - Functional and Detailed Design Review
 - Super Alignment Design
 - Creating a Super Alignment
 - Horizontal Geometry
 - Emberwood Road Vertical Geometry (VG)
 - Farrugia Street VG
 - Fleming Road VG
 - Pellew Way VG
 - Kerb Return Creation
 - IP Editors

- The MTF
 - Templates
 - MTF Creation
 - Apply MTF
 - Apply MTF Manager
 - Removing Links
 - Chainage Aliases
 - Seed MTF Files
 - Parking Bay Creation
 - Parking Bay Transitions
 - Widened Bend Kerb Returns
 - Special Chainage Files
 - Intersection Pavement Grading
 - Splay Design
 - Splay Grading
 - Preliminary Lot Grading
- Stormwater Co-ordination & Lot Grading
 - Nature Strip Crossfall
 - Batter for Freeboard
 - Lot Super Alignments
 - Lot Batter to Existing
 - Lot Decisional Modifiers
- The Element Method
 - Horizontal Geometry (HG)
 - Vertical Geometry (VG)
 - Computators
 - Kerb Returns
 - Construction Strings
 - Fleming Road VG
 - Widened Bend Kerb Returns
 - Chains for VG Amendments
 - Chains for HG Amendments
 - Parking Bay Transitions
- Pavement Design
 - Pavement Manager
 - Roads
 - Footpaths
 - Trimesh Volume Reports
 - Kerbs
 - Emberwood Road
 - Pavement from TINs
 - TINs from Trimeshes
 - Subgrade SuperTIN
 - Volumetric Analysis
 - Trenching Trimeshes
 - Type B Fill
 - Expansive Subgrade
- Outputs & Plotting
 - Pavement Contour Creation
 - Fill Boundaries
 - Lot Surface Levels
 - Chainage Labelling
 - Quick Sheet Plots
 - Cross Section Plots
 - Long Section Plots
 - Kerb Return Setout
- The 12d Model 'Stormwater Design' Unit has chapters and lessons including:
 - Stormwater Plan Layout
 - Preparing for SW Design
 - Lot Drainage to Rear of Property
 - Farrugia Street Drainage
 - Fleming Road Drainage
 - Emberwood and Pellew Drainage
 - Street Drainage Checks
 - Outlet Channels
 - Catchment Areas
 - Creating Street Catchments
 - Drawing Street Catchments
 - Inlet Linking and Checking Catchments
 - Creating Catchment Lots
 - Final Catchment Comments



- Rational Method Hydrology
 - Rainfall Data
 - Coefficient of Runoff and Time of Concentration
 - Hydrology Reports
 - Hydraulic Reports
- Pipe Grading and Sizing
 - Pipe Cover, Grades and Drop Through Pits
 - Pipe Friction Losses
 - Pit Losses
 - Pipe Sizing
- Services
 - Services in Plan
 - Creating 3D Service Strings
 - Grading SW Network against Services
 - 3D Clash Detection
- Outputs
 - Plan Drawings
 - Long Section Drawings
 - Quantity Reports
 - Pit Schedules & Detail Drawings
- Flooded Widths and Gap Flows
 - Flooded Width 20AEP
 - Overland Overrides
 - Flooded Widths 1AEP GAP Flow
 - Flooded Widths Roads Prep GAP Flow
 - Flooded Widths Lots Prep GAP Flow
 - Flooded Widths Calculations for GAP Flow
 - Backwater Flooded Width Setup
 - Grate Levels and Intersection Overtopping
 - Backwater Run 1
 - Fleming and Emberwood Roads
 - Pellew Way and Flooded Width Reporting



9.0 CIVIL DESIGN BASICS

Duration: 12 hours

Instructor-Led Registration Link: [Design](#)

Self-Paced Registration Link: [CDB V15](#)

Course by EXDS: [EXDS](#)

Course by 12d NZ: [New Zealand](#)

Summary:

This course introduces the Fundamentals of 12d Model, and the use of 12d Model for introductory civil design tasks.

Prerequisites:

Basic computer skills are required, however experience with 12d Model is not necessary. Registration in the **Fundamentals** course is included when registering for this course.

Course Content:

B01: Introduction

- String Picking Concepts
- Creating and Editing Strings
- View Types
- Typical Project & Folder Structure

T01 & T02: Tins and Volumes

- Importing Data & Map Files
- TIN Triangulation
- TIN Information and Inquiry
- Contouring and Labelling
- Importing a Raster
- Pad Grading & Design
- Interface Design
- Cut & Fill Volume Calculations

B05: Sharing

- Share Out Models and TINs
- Share In Models and TINs

B06: Chains

- Screen Layout Files
- Create a Basic Chain

A01: Super Alignment, IP Method

- Create Super Alignments
- Create and edit horizontal alignments using IPs
- Create and edit vertical alignments using IPs

D01: Design Basics

- Create & Edit Templates
- MTF Creation
- Apply MTF Function
- MTF Modifiers

P02: Sections and Plotting

- Plotting Long Sections
- Plotting Cross Sections
- Customising Section Plots



Important Note:

This course teaches how to use 12d Model for civil design. It **does not** teach civil design principles.



10.0 CIVIL DESIGN FEATURES

Duration: 12 hours

Instructor-Led Registration Link: [Design](#)

Self-Paced Registration Link: [CDF V15](#)

Course by EXDS: [EXDS](#)

Course by 12d NZ: [New Zealand](#)

Summary:

This course introduces tools used for advanced road design.

Prerequisites:

Experience in 12d Model, with completion of the **Civil Design Basics** course.

Course Content:

T02 & T01: TINs and Volumes

- Importing data – Map files
- TIN contours and range files
- Import raster

B05: Sharing

- Sharing Models and TINs In & Out

A02: Super Alignment, Element Design

- Create Super Alignment
- Horizontal element geometry
- Vertical element geometry
- Named parts

A04: Super Alignment, Computators

- Using computator elements
- Computator kerb return tool
- Widening function
- Modifiers with computators

D02: Design, Advanced Modifiers

- Import templates
- Apply MTF defaults
- Apply MTF Manager
- MTF Seed Files
- Modifiers using smart chainages

- Modifiers using layers
- MTF features, Alias, Regions
- View Favourites and Positions
- BIM Apply object introduction

D03: Design, MTF Snippets

- What are Snippets?
- Basic Snippet edits
- Applying Snippets
- Design TIN and SuperTIN

B06: Chains

- Design Chain
- Panel Record Options

D06: Design, MTF Boxing

- Modifier boxing with layers for Asphalt surface, Kerb shapes and Subgrade layers

D07: Design, Tri-mesh Boxing

- Pavement Manager
- Boxing with Snippets
- Named grades
- Asphalt surface, Kerb shapes and Subgrade layers
- Pavement Widening and Overlay



Important Note:

This course shows how to use 12d Model for intermediate and advanced design. It **does not** teach civil design principles.



11.0 STORMWATER BASICS

Duration: 15 hours

Instructor-Led Registration Link: [Drainage](#)

Course by EXDS: [EXDS](#)

Course by 12d NZ: [New Zealand](#)

Summary:

The Stormwater Basics course covers the skills required to create *Water* strings and turn them into models of stormwater networks comprising nodes, links, catchments and overland flow paths. A construction-ready design will be completed for specified minor and major storm events, using the Rational Method. This course also covers the customisation of node and link types and the production of deliverables (drawings, tables, BIM, etc).

Prerequisites:

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. This can be completed as a standalone SPOT course, or is included in the **Civil Design Basics**, **Survey Basics**, or various **Getting Started** SPOT courses.

Course Content:

W01: Project Setup and Network Creation

- Review survey data, geometric design and supertin of finished surface
- Identify locations of crests/sags, critical inlets and overland flow channels
- Create new *Water* models from Water Model Templates
- Create *Water* strings with the Water String Editor
- Convert *Super* strings to *Water* strings

W02: Introduction to the Water Network Editor

- Using the top (navigation), middle (tabbed) and bottom (control) sections of WNE panel
- Assigning string names and node/link types
- Set Node Names button
- Set Node Details button
- Regrade Links button
- Plot button

- Global, Default and Explicit settings
- Road design file: setout and centre strings
- Adjusting node locations laterally from setout strings
- Moving junction nodes and node connection points
- Cover levels vs Grate levels
- Details at network outlets
- Service clash file: grading to avoid crossing services
- Culverts & Channels vs Pits & Pipes

W03: Catchments, Rainfall and Introduction to Rational Method

- The Rational Method
- Turing IFD tables into 12d Model Rainfall files
- Assigning direct flow rates to nodes (Qdg) and links (Qdp)
- Catchment file: catchment polygons and Tc strings
- Set Catchments button



- Analysis button: introductory Rational Method analysis

W04: Network Import and Export

- Import/Export button
- Custom reports/tables
- Importing data from spreadsheet
- Attribute groups for minor and major results

W05: Rational Method Analysis with Overland Flow, Inlet Capacity and Flood Extents

- Overland flow model: downhill strings and utility string editor
- Inlet capacity factors affecting bypass flow
- The drainage.4d file editor
- Thorough review of WNE settings
- Analysis button: Rational Method analysis with bypass/overland flow and flood extents
- Checking major storm events
- Drawings: stormwater plans, long-sections and structure details
- Calculation tables: standard and custom

- Review preliminary link sizes

W06: Network Quantities

- Pit schedules
- Excavation quantities
- Network quantities
- BIM: trimeshes (of nodes, links, surface structures, headwalls, HGLs) and IFC export
- Visualisation in 3D views



Important Note:

This course shows how to use 12d Model for stormwater design. It **does not** teach stormwater or drainage principles.



12.0 STORMWATER DYNAMIC

Duration: 7.5 hours

Instructor-Led Registration Link: [Drainage](#)

Course by EXDS: [EXDS](#)

Course by 12d NZ: [New Zealand](#)

Summary:

This course continues on from the **Stormwater Basics** course, to consider rainfall runoff models and dynamic flow in pipes (St Venant unsteady flow equations).

Prerequisites:

Experience in 12d Model, with completion of the **Stormwater Basics** course.

Course Content:

W07: Dynamic Drainage

Hydrology

- Rainfall runoff methods discussed will vary with regions (SCS, ILSAX or Laurenson)
- Moving from rational "C" to Soil types
- Additions to the 12d rainfall file including Rainfall fixed time and variable temporal patterns.
- Reviewing graphical outputs
- ARR 2019

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

- Creating detention basins and extracting elevation area curves from the tin,
- Multiple outlets design (combining spillway, control pipe, orifice)

Storage Tank Design

- Estimating storage to meet the pre-development discharges via discharge control pipes and orifice plates.

Infiltration Basin Design

- Using Green-Ampt to model infiltration in basins/nodes.



Important Note:

This course shows how to use 12d Model for dynamic stormwater design. It **does not** teach stormwater or drainage principles.



13.0 STORMWATER 2D INTRODUCTION

Duration: 7.5 hours

Instructor-Led Registration Link: [Drainage Course by 12d NZ: New Zealand](#)

Summary:

This course introduces 2d surface flood modelling.

Prerequisites:

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. This can be completed as a standalone SPOT course, or is included in the **Civil Design Basics, Survey Basics**, or various **Getting Started** SPOT courses.

No previous flood modelling experience is required. The 2D quick start panel handles the management of all TUFLOW input files and results. Experience with the water network editor is helpful but not required.

Course Content:

W10: Creating a rainfall on grid 2d model

- Create and run a TUFLOW model using the 2D 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.

- Create results 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.

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. This is done in plan, section and 3d perspective views.

Visualisation and Fly Overs

- Create timelines viewing flooding from a stationary perspective
- Create flight and target paths for project flyovers of flood results.



Important Note:

This course introduces the use of 12d Model and TUFLOW. It **does not** teach stormwater or drainage principles.



14.0 ADAC

Duration: 6 hours

Instructor-Led Registration Link: [General](#)

Summary:

This course covers the use of 12d Model for production of an ADAC XML file ('ADAC' refers to 'Asset Design and As Constructed'). The creation of assets and their validation are in accordance with IPWEA (Institute of Public Works Engineering Australasia).

Prerequisites:

Experience in 12d Model, with completion of either the **Civil Design Basics** course or the **Survey Basics** course.

Course Content:

C01: ADAC

- Examining the ADAC schema as provided by the IPWEA
- Looking at what is an ADAC Asset in **12d Model** is
- Assigning ADAC Assets to points, lines and polygons
- Explaining and running the 12d-ADAC chains and MetaConnex
- Validating the ADAC Assets
- Creating an ADAC Header
- Generating an ADAC Report
- Generating an ADAC.XML file
- Reading in an ADAC.XML file
- Label map files
- ADAC tools (MetaConnex) for data preparation



15.0 SURVEY BASICS

Duration: 6 hours

Instructor-Led Registration Link: [Survey](#)

Summary:

This course introduces the use of 12d Model and its concepts for surveying work.

Prerequisites:

Basic computer skills are required, however experience with 12d Model is not necessary.

Course Content:

- Overview of 12d concepts: File structure, Online Help, Mouse configuration
- Screen Layout: Pull down menus, Icons, Views Models (Layers), Strings, String picking CAD Concepts
- Importing / Exporting data
- Editing String data
- Triangulation and analysis
- The completion of this course or the 'Getting Started for Surveying' manual is required before attending other survey courses
- Create and produce setout data
- Volume exercises



Important Note:

This course shows how to use 12d Model for surveying. It **does not** teach surveying principles.



16.0 SURVEY TOPOGRAPHICAL PROCEDURES

Duration: 6 hours

Instructor-Led Registration Link: [Survey Course by 12d NZ: New Zealand](#)

Prerequisites:

Experience in 12d Model, with completion of the **Survey Basics** course or **Getting Started for Surveying** course.

Course Content:

- Field techniques: Feature coding, control coding for enhancements including pipes, image attachments and attributes
- Survey Control entry
- Total Station and GNSS survey reductions: Dynamic editing of data with full auditing
- Errors in coding, target heights and stringing
- Manual edits: Joining strings, point edits, tinability
- Triangulation: Creation, analysis, Section views, Perspective views, Raster draping
- Plotting: Contours, Text labelling, Grids, Plotter mapping files, ACAD map files,
- Quick plots, Plot frames, Plot to PDF file and AutoCAD.



Important Note:

This course shows how to use 12d Model for surveying. It **does not** teach surveying principles.



17.0 SURVEY CONSTRUCTION PROCEDURES

Duration: 9 hours

Instructor-Led Registration Link: [Survey](#)

Course by EXDS: [EXDS](#)

Course by 12d NZ: [New Zealand](#)

Prerequisites:

Experience in 12d Model, with completion of the **Survey Basics** course or **Getting Started for Surveying** course.

Course Content:

- Importing Road design
 - 12d Archive
- Analysis and checking
- Cross section creation and checking
- Boxing Many Function
 - Boxing Volumes
 - Boxing layer surfaces
- Building setout
- Point cloud
 - Import
 - Thinning
 - Tinning
- Volumes
 - Stockpile volumes
 - Progressive volumes
 - Isopachs and shading
- Plotting
 - House setout
 - Road Construction
 - Long & Cross sections
 - Volume reports



Important Note:

This course shows how to use 12d Model for surveying. It **does not** teach surveying principles.



18.0 SURVEY CONVERSIONS AND ADJUSTMENTS

Duration: 6 hours

Instructor-Led Registration Link: [Survey](#)

Prerequisites:

Experience in 12d Model, with completion of the **Survey Basics** course or **Getting Started for Surveying** course.

Course Content:

- Helmert Transformations
 - 2d, 3d and 2.5d (12d Field Localisation)
- Linear Regression
- Centroid of 3d shape
- Copy to points (Copy template of strings to points)
- String filtering
 - String Filter
 - Vertex Filter
 - Regular distance filter
- Grid intersection points generator
- Traverse adjustments
 - Bowditch
 - Height adjustment
- Least Squares Adjustment
 - Total Station and Digital network
- Building Face survey
- Scale, rotate and translate chain
- Height Adjustments
- Geodetic Conversions
 - Australian Conversions
 - Cartographic
 - Different Datums
 - Projection and Geoid file creation
 - Geodetic Reporting



Important Note:

This course shows how to use 12d Model for surveying. It **does not** teach surveying principles.



19.0 12D FIELD PICKUP

Duration: 6 hours

Instructor-Led Registration Link: [Survey](#)
Course by EXDS: [EXDS](#)

Prerequisites:

Experience in 12d Model, with completion of the **Survey Basics** course or **Getting Started for Surveying** course.

Course Content:

- Tablet setup
- Coding and map files
- Instrument connection
 - Total Station
 - GNSS
- User Settings and Menus
- Total Station Control Bar
- Total Station Options
 - Station setup
 - Checks
- Coding
 - 12d Pickup editor
 - Mapfile
 - Favorites
 - Create Binary styles
 - Mapfile to pickup codes
- Total Station Pickup Menus
 - SDR
 - SDR Function
 - Reading and Coding
 - Favourites and Template
- Survey edits SDR
- GNSS Control Bar
- GNSS Options
 - Pickup



Important Note:

This course shows how to use 12d Model with 12d Field for surveying. It **does not** teach surveying principles.



20.0 12D FIELD SETOUT

Duration: 6 hours

Instructor-Led Registration Link: [Survey](#)
Course by EXDS: [EXDS](#)

Prerequisites:

Experience in 12d Model, with completion of the **Survey Basics** course or **Getting Started for Surveying** course.

Course Content:

- Tablet setup
- Menus and Settings
- Coding and map files
- Instrument connection
 - Total Station
 - GNSS
- User Settings and Menus
- Total Station Control Bar
- Total Station Options
 - Station setup
 - Checks
- Setout options
 - point
 - basic String
 - Basic Segment
- Batter
- Surface
- Crossfall
- Grid
- Total Station Pickup Menu
 - Basic
- TPS Offset menu
- GNSS Control Bar
- GNSS Options
 - Localisation
 - Utilities
 - Checks
 - Setout
 - Pickup



Important Note:

This course shows how to use 12d Model with 12d Field for surveying. It **does not** teach surveying principles.



21.0 SETUPS AND CONFIGURATION

Duration: 6 hours

Instructor-Led Registration Link: [General](#)

Summary:

This course introduces the setup and configuration process for a company's 12d Model environment and includes the customisation of setup files and other key file types required to operate 12d Model efficiently.

Prerequisites:

No previous programming experience required.

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. This can be completed as a standalone SPOT course, or is included in the **Civil Design Basics**, **Survey Basics**, or various **Getting Started** SPOT courses.

Course Content:

B04: Setup and Configuration

- CodeMeters
 - Standalone USB
 - Network
 - Cloud
- Configurations file
 - Environments
 - Dongles
 - Workspaces
- Setup Files
 - Search path hierarchy
 - New and existing projects
 - New projects only
 - Existing projects only
- Library Files
 - Library
 - User library
 - Customer library
- Other File Types
 - Chains
 - Themes
 - Screen layout files
 - Dialog default files
 - Help files
- #Includes setup files
 - User_toolbars.4d
 - Usermenu.4d
 - Plotters.4d
 - Linestyles.4d
 - Symbols.4d
- Logging
- Title Blocks
- Plotting
 - Cross Section
 - Long Section



Important Note:

This course shows how to perform setup and configuration of 12d Model. It **does not** teach surveying or design principles, or integration with 12d Synergy.



22.0 MACROS

Duration: 6 hours

Instructor-Led Registration Link: [General](#)

Summary:

This course starts users writing, compiling and running 12d Model Macros.

Prerequisites:

No previous programming experience required.

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. This can be completed as a standalone SPOT course, or is included in the **Civil Design Basics, Survey Basics**, or various **Getting Started** SPOT courses.

Course Content:

- The 12d Programming Language (12dPL) is a powerful programming language designed to run from within 12d Model.
 - Its main purpose is to allow users to enhance the existing 12d Model by writing their own programs (macros).
 - 12dPL is based on a subset of the C++ language with special extensions to allow easy manipulation of 12d Model data. A large number of intrinsic functions are supplied which cover most aspects of civil modelling.
 - 12dPL has been designed to fit in with the ability of 12d Model to "stack" an incomplete operation.
 - This training course does not try to teach programming techniques but takes attendees through the basics steps to start writing and running 12dPL programs (macros).
- This course covers
 1. Using the 12d Model Programming Language manual.
 2. 12dPL syntax and flow control.
 3. The basic 12dPL variable types and "handles" to 12d elements (strings *etc.*).
 4. How to create, compile and run 12dPL code.
 5. How to retrieve and change basic element properties.
 6. Creating 12d Model panels.
 7. (Time permitting) Reading and writing files (creating reports).
 8. (Time permitting) Including your 12dPL programs in the User Defined menus, function keys and toolbars.



Important Note:

This course is for showing how to use macros in 12d Model. It **does not** teach surveying/design principles.



23.0 RAIL/TRACK DESIGN

Duration: 6 hours

Instructor-Led Registration Link: [Design Course by 12d NZ](#): [New Zealand](#)

Summary:

This course introduces users to the 12d Track Design Tools for rail design.

Prerequisites:

Experience in 12d Model, with completion of the **Civil Design Basics** course.

Knowledge and application of element-based Super Alignments, and previous experience in rail design and rail terminology is recommended.

Course Content:

R01: Track

- Generation of a track centreline from surveyed rails.
- Use of super alignment regression. Regression is used to develop existing geometry from a survey when the original design data is unavailable.
- Use of Super Alignment parts, Computators, and the IP method within the HIP/VIP editor, part editor and edit parts panels.
- Design of a mainline and passing loop.
- Version control and revision of horizontal and vertical alignment geometry with centreline options.
- Assessment of track slew and various reporting methods.
- Application of chainage equalities and inquiries between raw chainages and chainage equalities.
- Generation of a rail formation, and a sub-ballast capping layer using snippets.
- Generation of a rail profile for 3D rail visualisation.
- Creation and placement of turnouts.
- Calculation of rail cant to speed limits and various design constraints. Reporting methods for rail cant.
- Creation of rails, ballast strings, sleepers and a circular bored tunnel.
- Generation of a structural clearance envelope.
- Generation of a longitudinal profile, labelling of an alignment with geometry boxes, and plotting a plan profile using the multipage plot.



Important Note:

This course shows the use of 12d's Track Tools, it **does not** teach Track Design or cover any of the Basis of Design Rules for Rail work.



24.0 CAD AND PLOTTING

Duration: 6 hours

Instructor-Led Registration Link: [General Course by 12d NZ:](#) [New Zealand](#)

Summary:

This course covers the tools required for producing CAD drawings and plotting from 12d Model.

Prerequisites:

A basic understanding of 12d Model is required, with completion of the **Fundamentals** course. This can be completed as a standalone SPOT course, or is included in the **Civil Design Basics**, **Survey Basics**, or various **Getting Started** SPOT courses.

Course Content:

B02: CAD

- Creating a Project
- Drawing and CAD snaps
- Modification tools including:
 - Move, Rotate and Copy
 - Clip
 - Parallel
 - Trim, Extend and extend by length
- Properties
- Symbols
- Text

- Creating a TIN

- Contouring and Labelling

P01: Plan Plot and Label

- Labelling data
- Plan plotting

P02: Sections and Plotting

- Plotting long sections
- Plotting Cross sections

P04: Plot Sheets

- CAD dimensions, leaders and tables
- Plot sheet

B03: CAD Tools

- Sharing
- Toolbars
- String Properties
 - Changing and Editing
 - View Settings
- Super String Tools
 - Tinability
 - String Symbols
 - Pipe / Culvert properties
- Measuring
- Raster
 - Importing
 - CAD Holes



25.0 BIM

Duration: 6 hours

Instructor-Led Registration Link: [BIM](#)
Course by 12d NZ: [New Zealand](#)

Summary:

For a surveyor, engineer or information manager who wants to utilise the functionality inside 12d Model to collaborate and coordinate models from different project disciplines. Being able to import and share BIM (Building Information Modelling) model data, access and coordinate attribute/metadata information and trimesh models.

Prerequisites:

Experience in 12d Model, with completion of the **Civil Design Basics** course.

Course Content:

- Import and manage BIM data including open BIM IFC files
- 12d Model Data Management
- Mapping data with attributes
- Create and edit an attribute manipulator file
- Create and edit Global attributes with choices (BIM)
- Create and edit Project attributes (BIM)
- Create and apply attribute label map files
- Trimesh creation and editing tools
- Trimesh service chambers and BIM objects
- Trimesh services (conduits and trenching)
- Creating trimesh objects from 12d objects
- Recreate MTF files from design strings
- Pavement Manager and Snippets for trimesh BIM creation
- Trimesh reporting and volumes
- Export open BIM IFC files
- Investigate 3D clash detection rules; apply and report on 3D object clashes.



26.0 PAVEMENTS

Duration: 6 hours

Instructor-Led Registration Link: [Design](#)
Self-Paced Registration Link: [Pavements V15](#)
Course by 12d NZ: [New Zealand](#)

Summary:

For designers and construction surveyors looking to utilise the Pavement functionality within 12d Model.

Prerequisites:

Experience with the MTF and Snippets in 12d Model, with completion of the **Civil Design Features** course or the **Survey Construction Procedures** course.

Course Content:

D07: Design, Tri-mesh Pavement

- Pavement Manager
 - Creation of a Pavement Manager, that includes pavement definitions, kerb profiles and verge details.
 - Creation of attributes for each layer in the pavement definition
 - Explanations of pavement layer offsets and end slopes.
 - Model and tin naming conventions
- Pavement (Trimesh) Snippets
 - Detailed explanation and use of MTF snippets pertaining to design features
 - Pavement design with kerb and channel
 - Pavement design for freeway/arterial roads
 - Footpath/landscape design
 - Pavement design for kerb returns and cul-de-sacs
- Overlay & Widening
 - Cutback treatment and corrector
- Construction Pavement Preparation
 - Re-creation of Design from strings
 - Analysis and editing of supplied data strings
 - Understanding what good and bad data is
 - Identifying crossing and duplicated strings
- Pavement from tins
 - Preparation of tin surfaces, including surface colouring for Roundabouts and Intersections
 - Applying pavement definitions to the coloured areas of the tin
 - The extension of pavement using strings selected as “Edge Treatments”
- Creation of Tin surfaces from trimesh pavement
 - Use of the Pavement Manager and snippets to set and create the tins
 - Use of other options outside of the Apply MTF to create the tin



27.0 SNIPPETS

Duration: 5 hours

Instructor-Led Registration Link: [General](#)

Summary:

This course introduces users to writing and running snippets for design. A snippet is a collection of MTF modifiers that can be inserted as a single modifier into an MTF file. Unlike templates or MTF inserts, parameters can be used to customise snippet instances, and readability is enhanced, therefore snippets are superior to other methods for creating designs in the apply MTF function.

Prerequisites:

Experience in 12d Model, with completion of the **Civil Design Basics** course.

No previous programming experience is required.

Course Content:

D08: MTF Snippets

- What are snippets?
- Creating a snippet.
- Running a snippet.
- Snippet parameters. Customising a snippet instance by changing an element colour, width, height, crossfall etc.
- Automatic parameters. In-built parameters to help build powerful snippets e.g. get the tin name used from the apply MTF function.
- Snippet syntax and flow control. If, else statements.
- The creation of variables.
- How to apply mathematics.
- Creation of a road and a parking bay snippet.
- Snippet starting and ending position options.
- Debugging and error handling. Options that are available to fix errors.
- Snippet helper functions. Matching an existing crossfall value.



Important Note:

This course shows the use of snippets tools in 12d Model. It **does not** teach design principles.



28.0 UTILITY MODELLING AND DESIGN

Duration: 9 hours

Instructor-Led Registration Link: [General](#)

Summary:

This course introduces users to importing, mapping and visualising surveyed utility data, using attributes for modelling and manipulation of data, then exporting the data with attributes to IFC. The course then progresses to designing new utilities showcasing several different options to give the user an understanding of the options available, as well as their pros and cons.

Prerequisites:

Experience in 12d Model, with completion of the **Civil Design Basics** course.

Course Content:

B07: Attribute Management

- Attributes
- Map files
- Importing utility data
- Chains for data import
- Translating by attribute depth
- Replacing attribute values
- The Attribute Manipulator
- Quantity reports
- Exporting Water string attributes
- Labelling
- Clash detection

D10: Utility Design

- Designing utilities using Super Alignments (IP and Element methods)
- BIM objects create/edit/apply
 - Conduits
 - Super string trenching
 - Water string trenching
- BIM objects map files
- Utilities within the MTF
- Create/edit service conduit/water main
- Plotting



Important Note:

This course shows the use of design tools for utilities in 12d Model. It **does not** teach design principles.