AUTODESK UNIVERSITY

Optimizing Drainage Design Workflows

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Learning Objectives

1. Learn how to initiate an export of your Civil 3D® pipe network data to InfoDrainage

2. Learn how to create a pipe network and 3D surfaces from an InfoDrainage model

3. Learn how to create smart objects for all the traditional and sustainable drainage elements

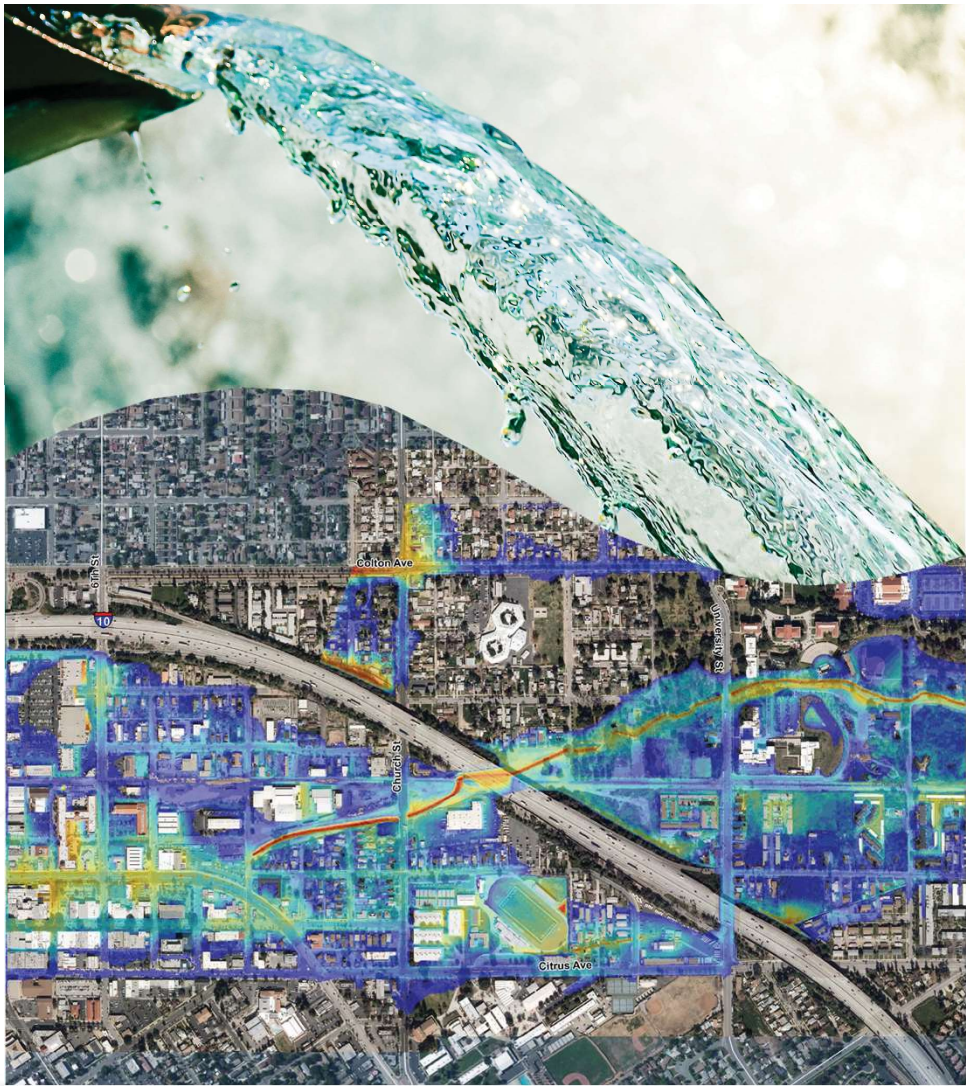
4. Learn how to adopt drainage design iterations through round-trip exchange of data reducing the risk of errors


Introducing Innovyze

Innovyze®

AN AUTODESK® COMPANY

Innovyze empowers water professionals around the world to create, manage, and maintain water services. We are the global leader in water infrastructure data analytics software, providing innovative, decision-making solutions for lasting customer success.



Innovyze®

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Water Distribution and Management

Advanced modelling and analysis solutions to improve water supply network performance and cost-effectiveness.

Stormwater, Sewer, and Flood Modeling

Innovyze provides the industry's largest global offering of stormwater, sewer network, and flood modeling solutions – designed to meet the needs of your project and organisation.

Asset Management

Innovyze's asset management solutions support infrastructure asset management throughout the entire life cycle of the asset, from the tactical needs of daily operations and maintenance to the strategic analytics.

Drainage Design and Analysis

Innovyze drainage design and analysis solutions are used by designers, engineers, consultants, developers, reviewers, approving authorities and water companies working on new and retrofit projects.

Operational Analytics

Solutions to enable better, faster, evidence-based decisions to solve the operational challenges of water networks.

Artificial Intelligence and Machine Learning (AI/ML)

Solutions designed to analyze, predict, and optimize operations and processes across the entire water sector.


Drainage Design
Challenges

Challenges of Drainage Design

Everyday problems:

Need to track different aspects of the drainage design across multiple packages.

Recreating design data from one format into another is time consuming.

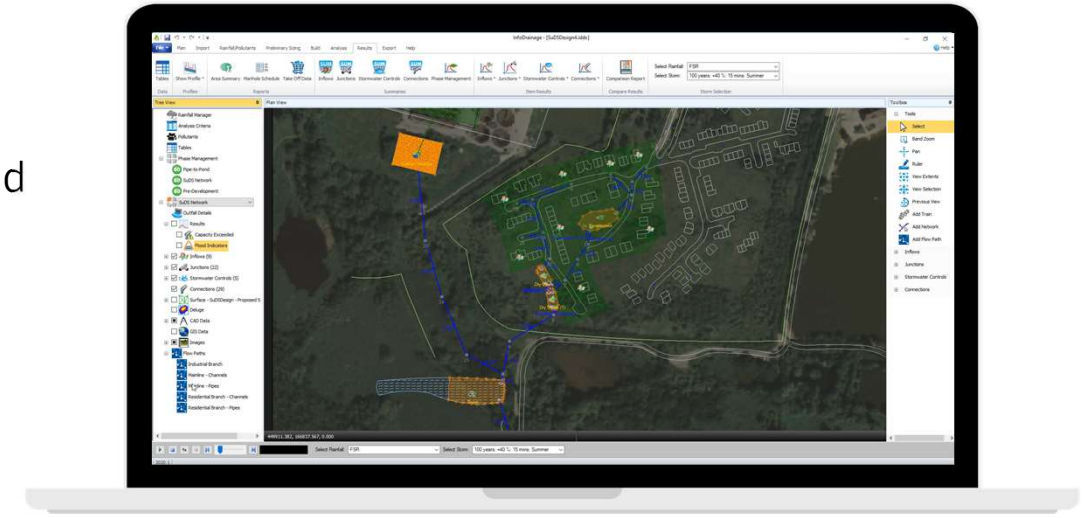
Must demonstrate compliance to local standards.

Difficult to express information to non-technical stakeholders.

Design iterations often means starting all over again.

Dedicated graphical drainage design tool

- Streamlined design workflows
- Detailed, accurate representation and analysis of green infrastructure
- Integration with Civil 3D



InfoDrainage

Achieving BIM compliance in drainage design

Challenges

Data from a range of sources
Need to easily make use of existing data and avoid duplicated effort.

Frequent model updates
Ever changing design data is a significant overhead to manage.

Introduction of data errors
Exchanging data between applications is time consuming and often error prone.

Not a truly collaborative process
Workflow challenges prevent BIM model updates enabling more efficient designs and reducing errors.

Capabilities

- Intuitive data import & export
- Seamless data exchange with AutoCAD Civil 3D ®
- Template parts mapping
- Intelligent workflow to streamline process

Outcome

So that ...
engineers can efficiently represent their design, giving greater confidence in the validity and accuracy of design information.

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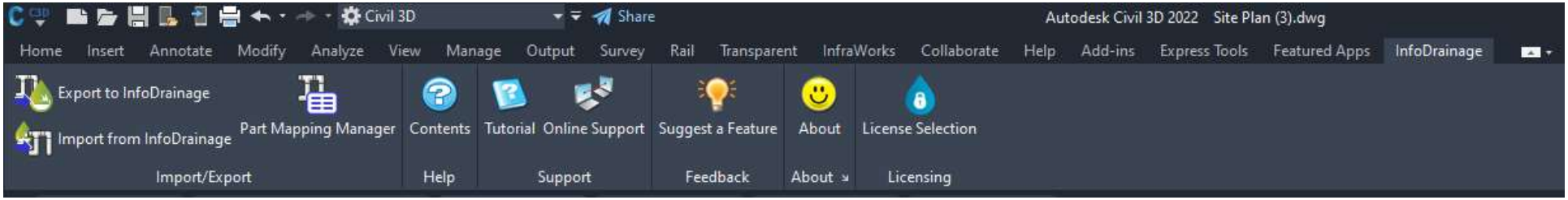
InfoDrainage for Civil 3D ®

InfoDrainage for Civil 3D®

Two Installers:

- InfoDrainage
- InfoDrainage for Civil 3D



InfoDrainage for Civil 3D® Workflows

Two Options

Start in Civil 3D (optimal)

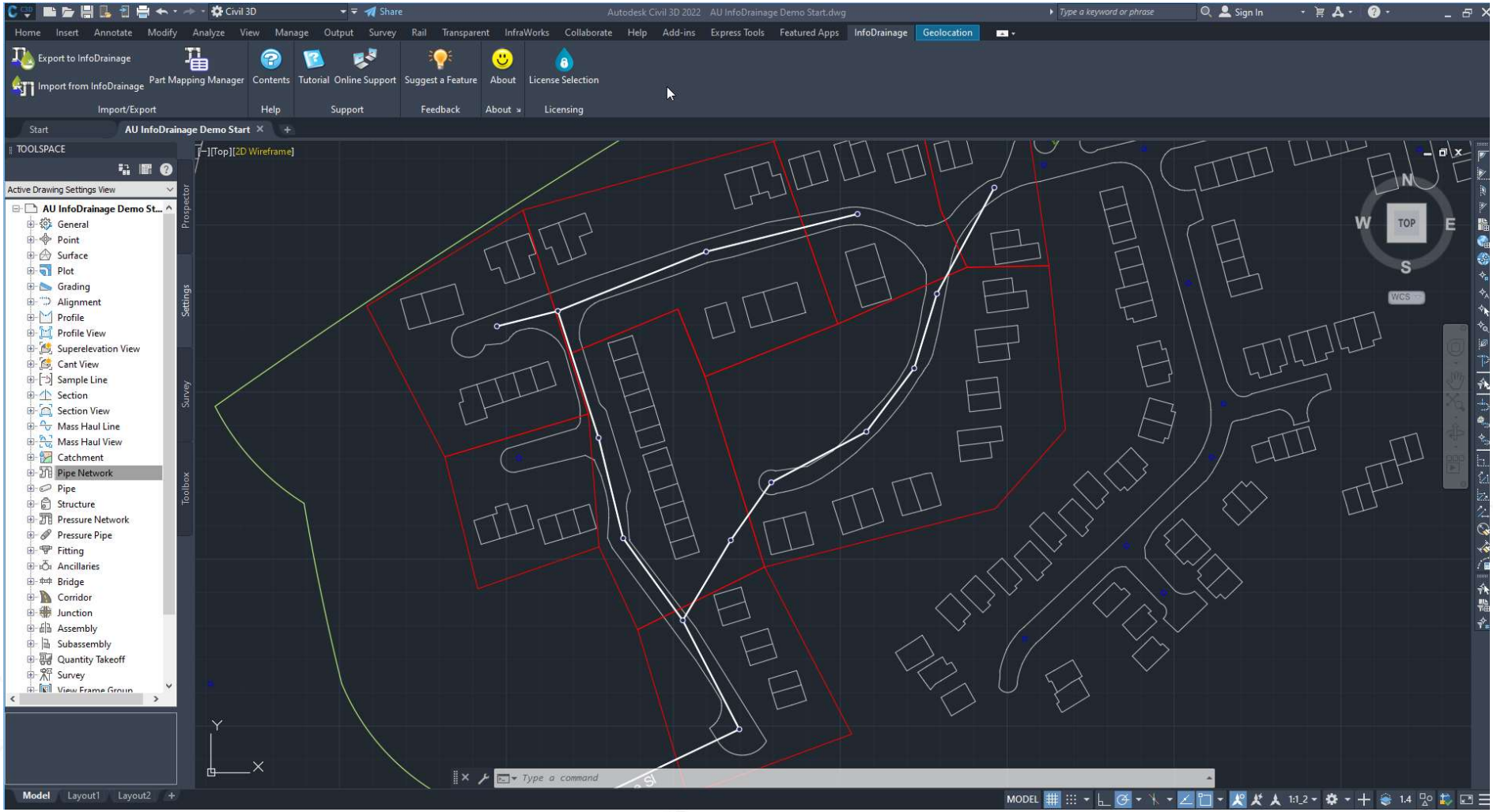
- Layout pipes and manholes in Civil 3D® using Pipe Networks
- Use InfoDrainage for Civil 3D® to export to InfoDrainage
- Within InfoDrainage
    - Design / size pipes and manholes
    - Design / size storage / green infrastructure devices
    - Complete hydraulic analysis

Bring back into Civil 3D for the completed site design in one location

Start in InfoDrainage

- Multiple options to layout network:
    - Manual layout from background data
    - Import from GIS / Text
- Then:
    - Design / size pipes and manholes
    - Design / size storage / green infrastructure devices
    - Complete hydraulic analysis

Bring back into Civil 3D for the completed site design in one location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Section
Section View
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Mass Haul View
Catchment
Pipe Network
Pipe
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Pressure Network
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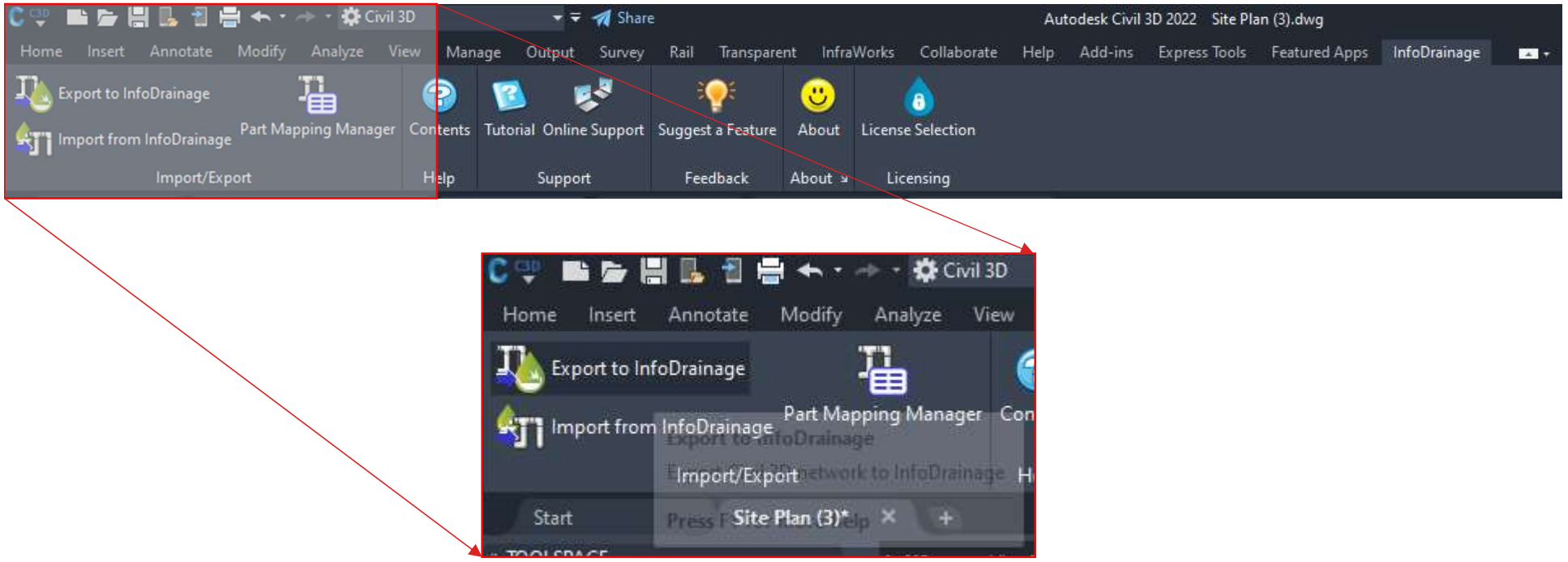
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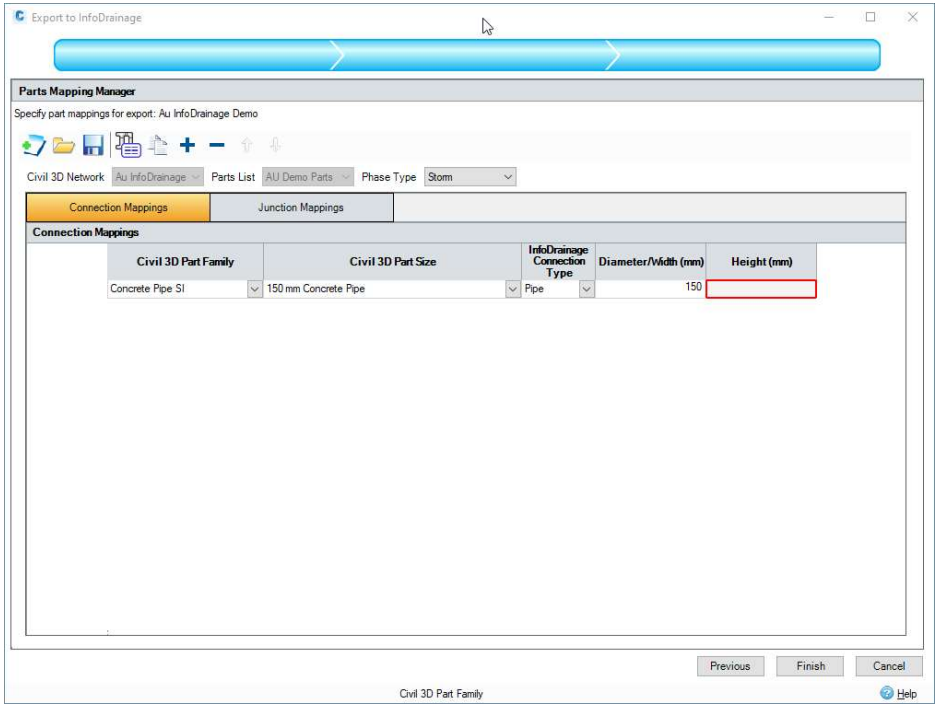
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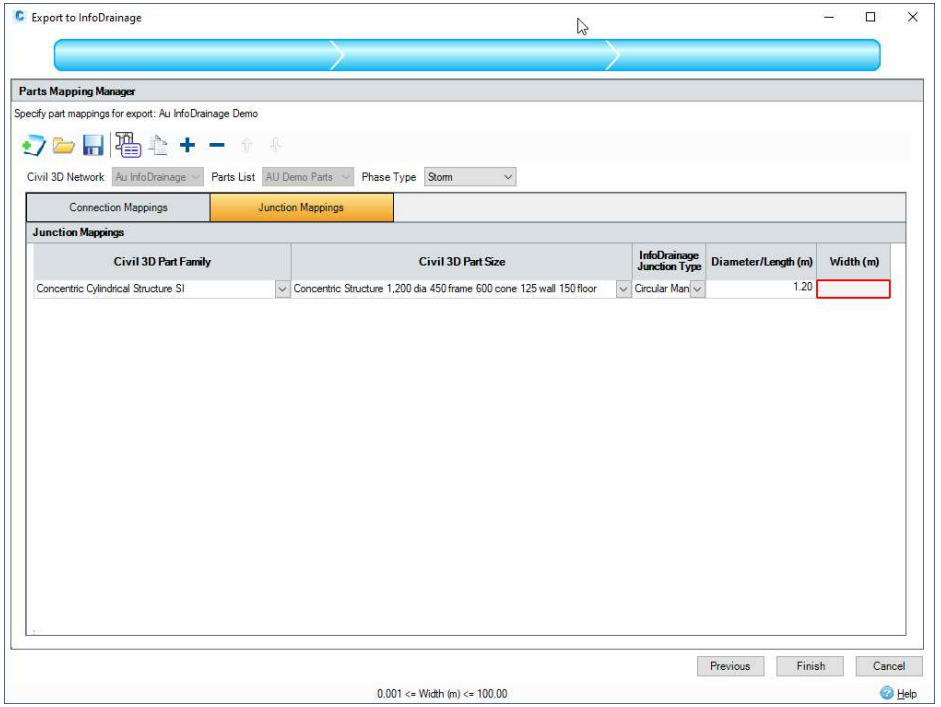
Parts Mapping Manager
Specify part mappings for export: Au InfoDrainage Demo
Civil 3D Network
Au InfoDrainage
Parts List
AU Demo Parts
Phase Type
Storm
Connection Mappings
Junction Mappings
Connection Mappings
Civil 3D Part Family
Civil 3D Part Size
InfoDrainage Connection Type
Diameter/Width (mm)
Height (mm)
Concrete Pipe SI
150 mm Concrete Pipe
Pipe
150
Previous
Finish
Cancel
Civil 3D Part Family
Help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InfoDrainage Junction Type
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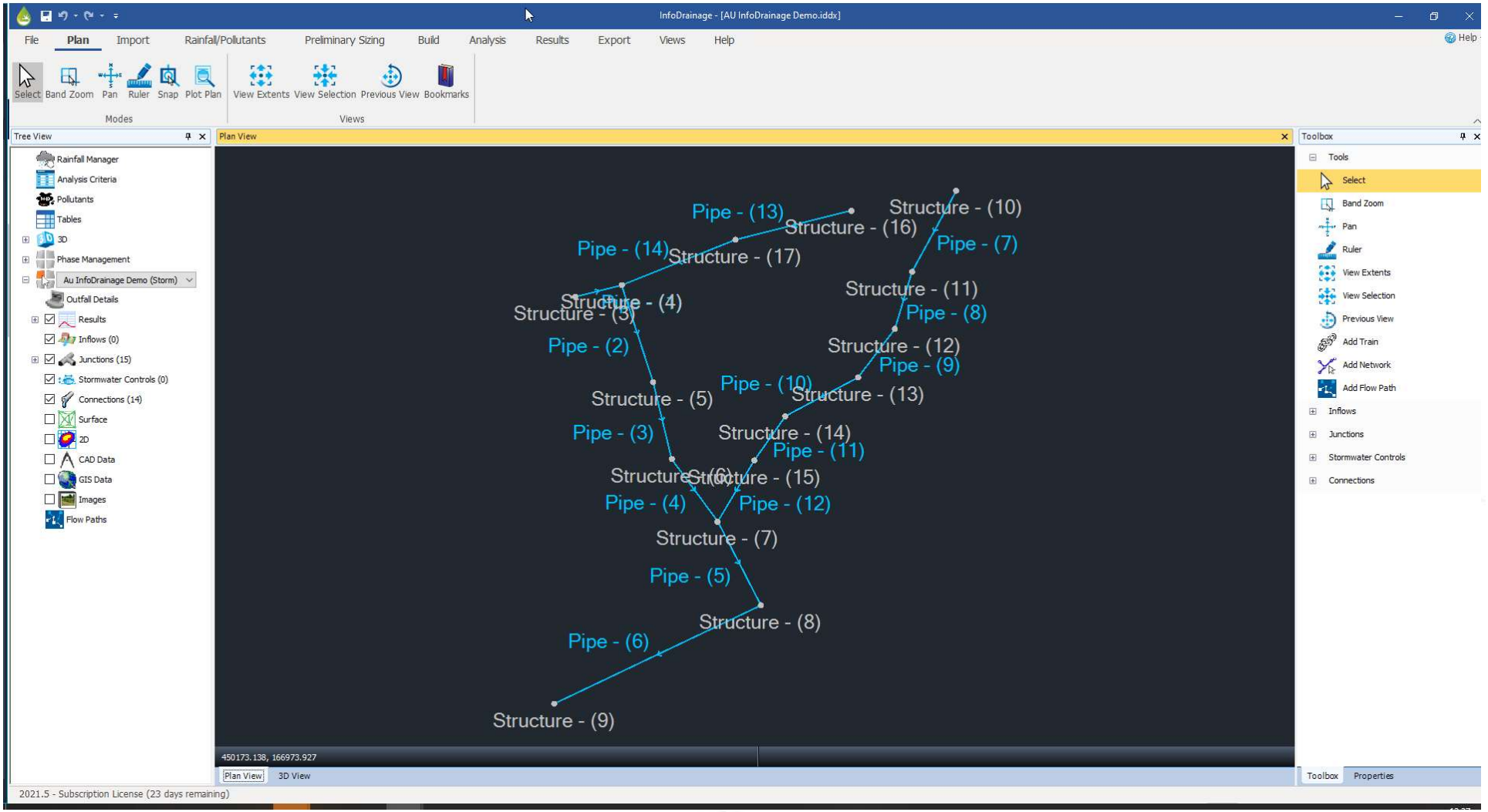
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Add Network
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Junctions
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Connections
Toolbox
Properties
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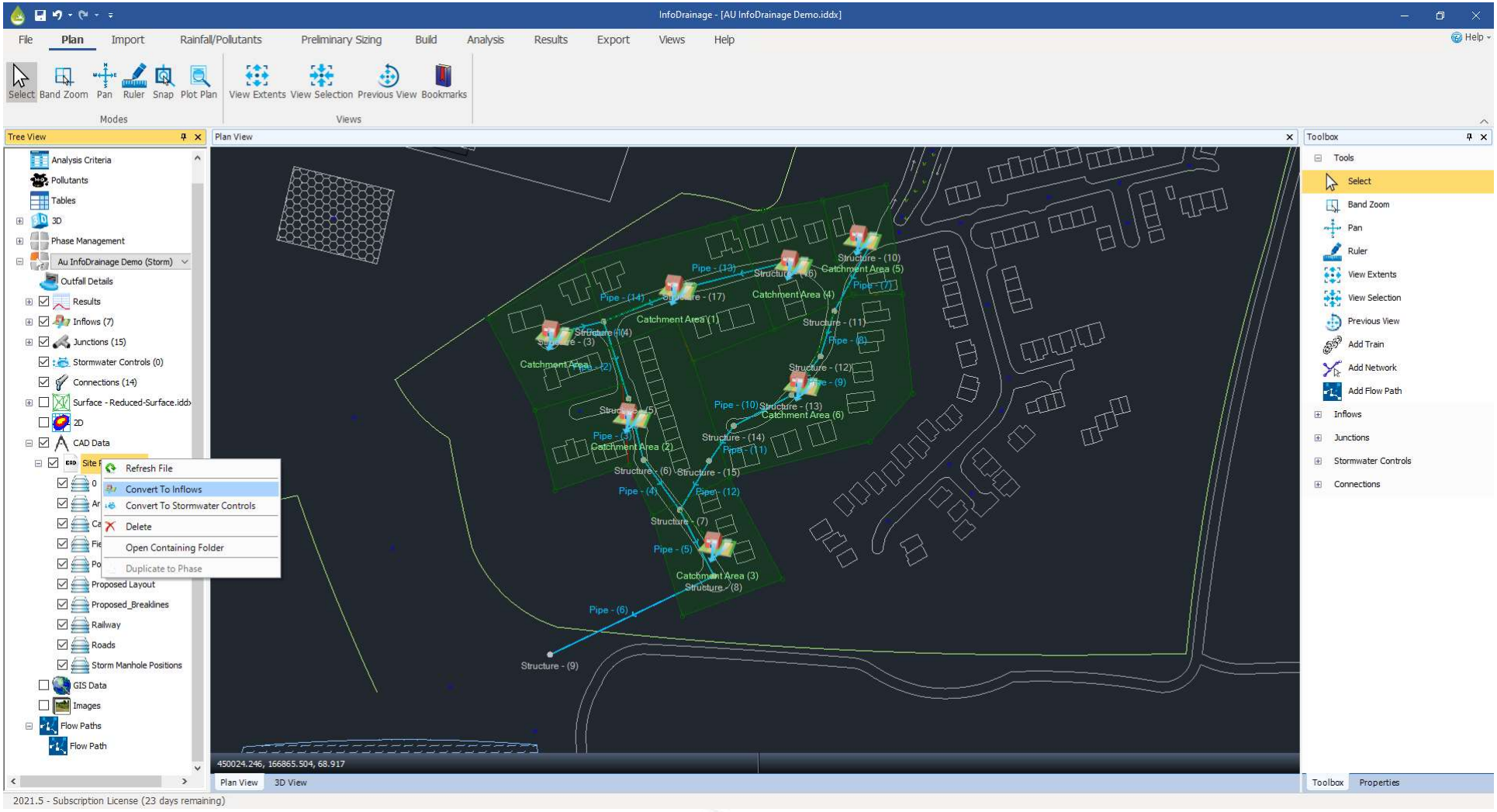
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Preliminary Sizing
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Convert To Stormwater Controls
Delete
Open Containing Folder
Duplicate to Phase
Proposed Layout
Proposed_Breaklines
Railway
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Storm Manhole Positions
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Flow Path
Plan View
Structure - (10)
Catchment Area (5)
Pipe - (13)
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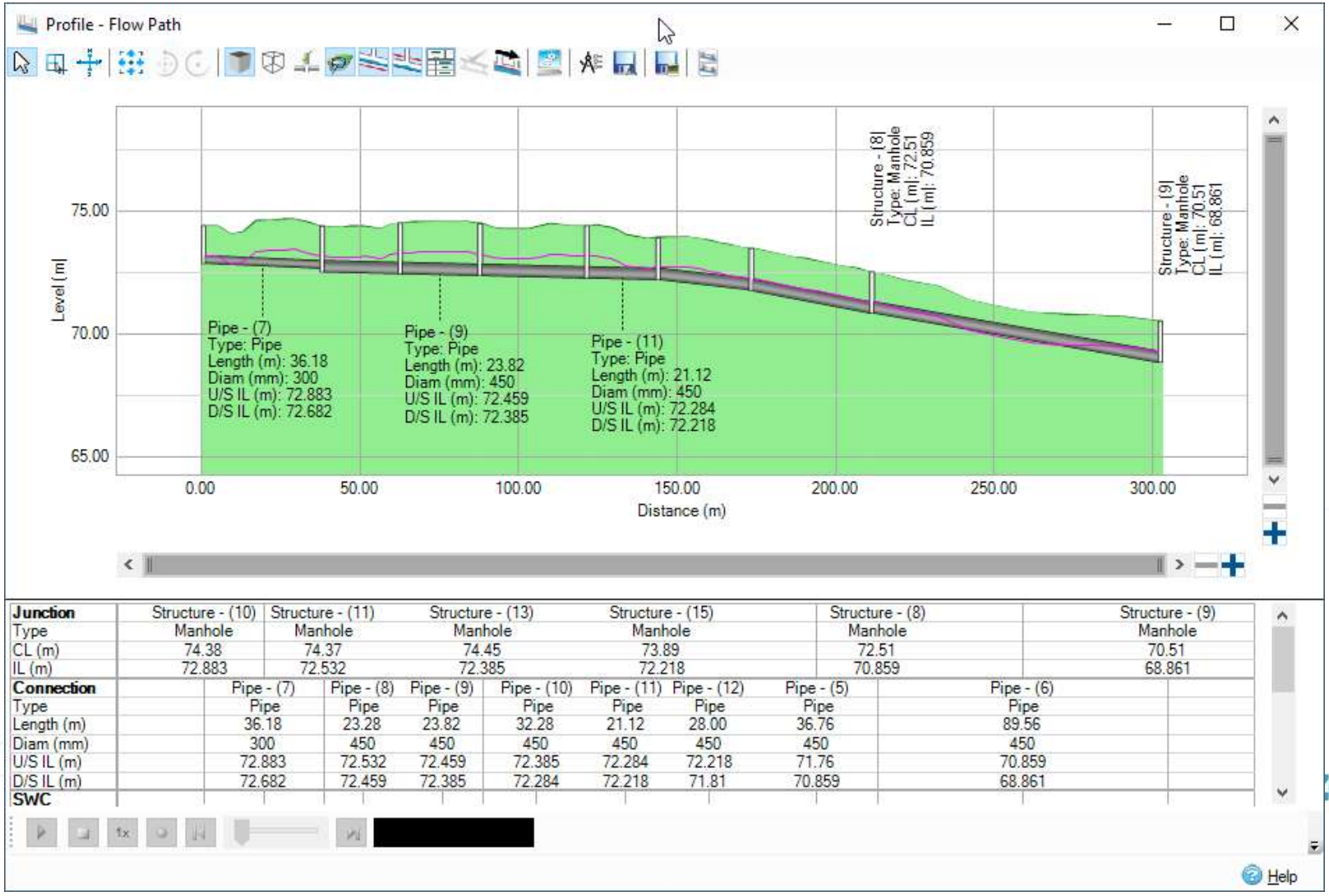
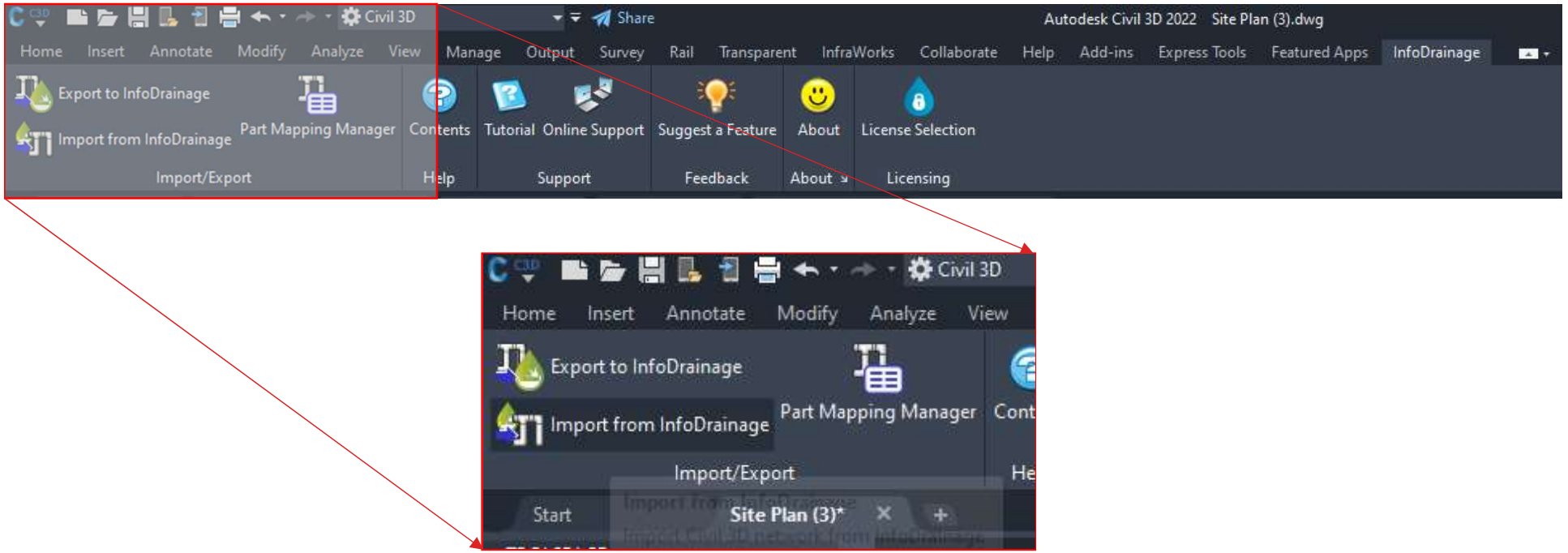


Junction	Structure - (10)	Structure - (11)	Structure - (13)	Structure - (15)	Structure - (8)	Structure - (9)
Type	Manhole	Manhole	Manhole	Manhole	Manhole	Manhole
CL (m)	74.38	74.37	74.45	73.89	72.51	70.51
IL (m)	72.883	72.532	72.385	72.218	70.859	68.861

Connection	Pipe - (7)	Pipe - (8)	Pipe - (9)	Pipe - (10)	Pipe - (11)	Pipe - (12)	Pipe - (5)	Pipe - (6)
Type	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
Length (m)	36.18	23.28	23.82	32.28	21.12	28.00	36.76	89.56
Diam (mm)	300	450	450	450	450	450	450	450
U/S IL (m)	72.883	72.532	72.459	72.385	72.284	72.218	71.76	70.859
D/S IL (m)	72.682	72.459	72.385	72.284	72.218	71.81	70.859	68.861
SWC								

Help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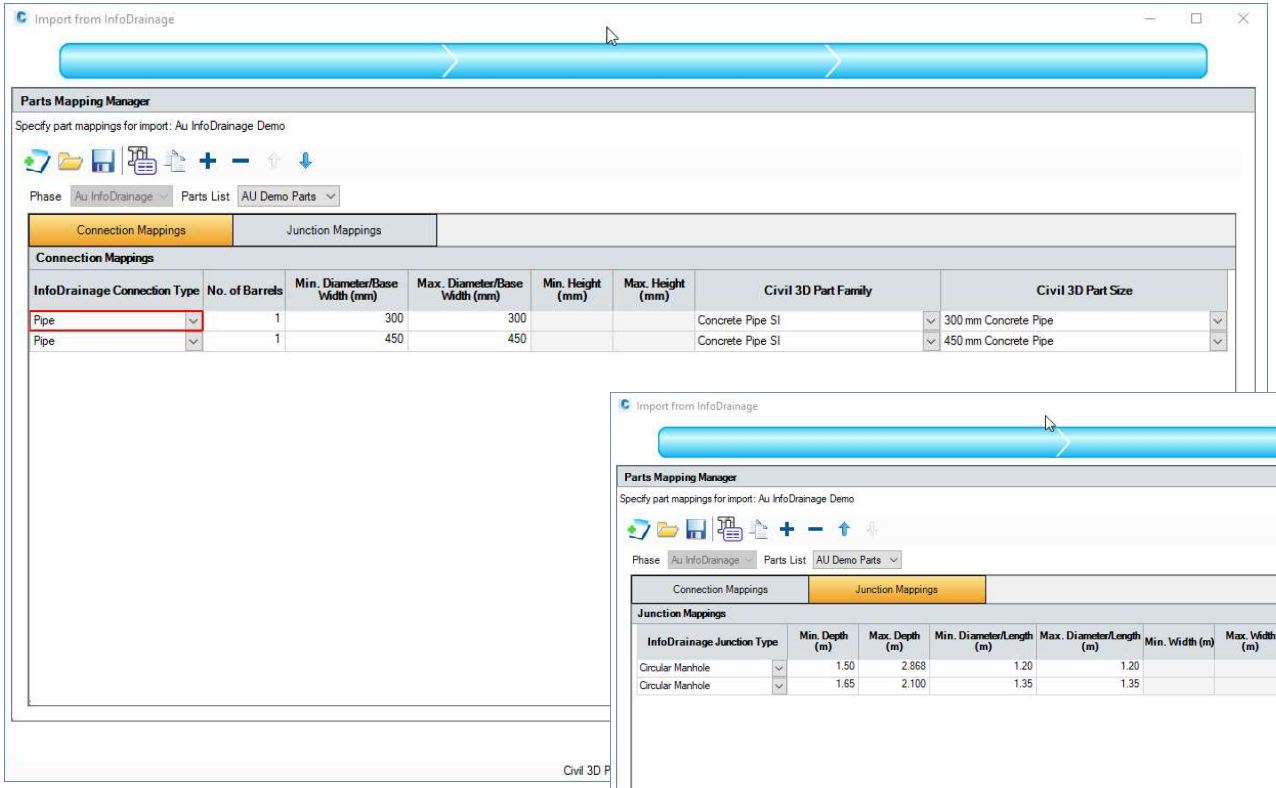
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Parts Mapping Manager
Specify part mappings for import: Au InfoDrainage Demo
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Parts List
AU Demo Parts
Connection Mappings
Junction Mappings
Connection Mappings
InfoDrainage Connection Type
No. of Barrels
Min. Diameter/Base Width (mm)
Max. Diameter/Base Width (mm)
Min. Height (mm)
Max. Height (mm)
Civil 3D Part Family
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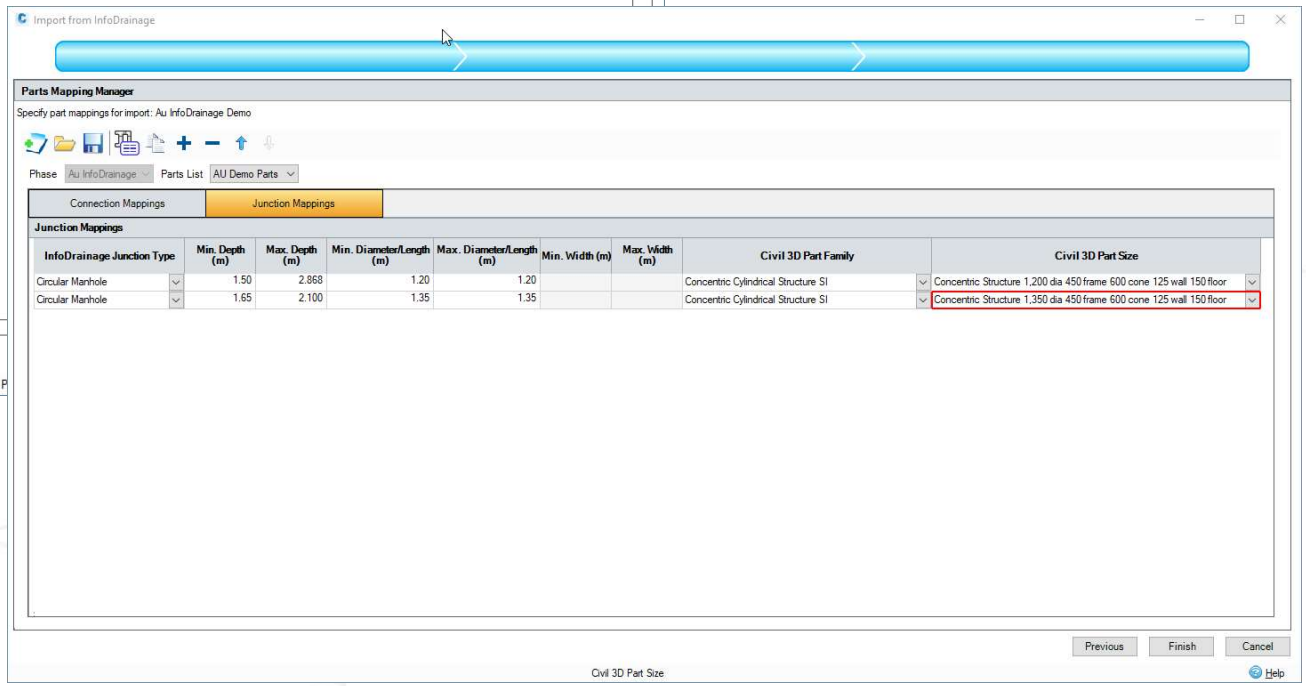
450 mm Concrete Pipe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Junction Mappings
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Max. Diameter/Length (m)
Min. Width (m)
Max. Width (m)
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Civil 3D Part Size
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Circular Manhole
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Civil 3D Part Size
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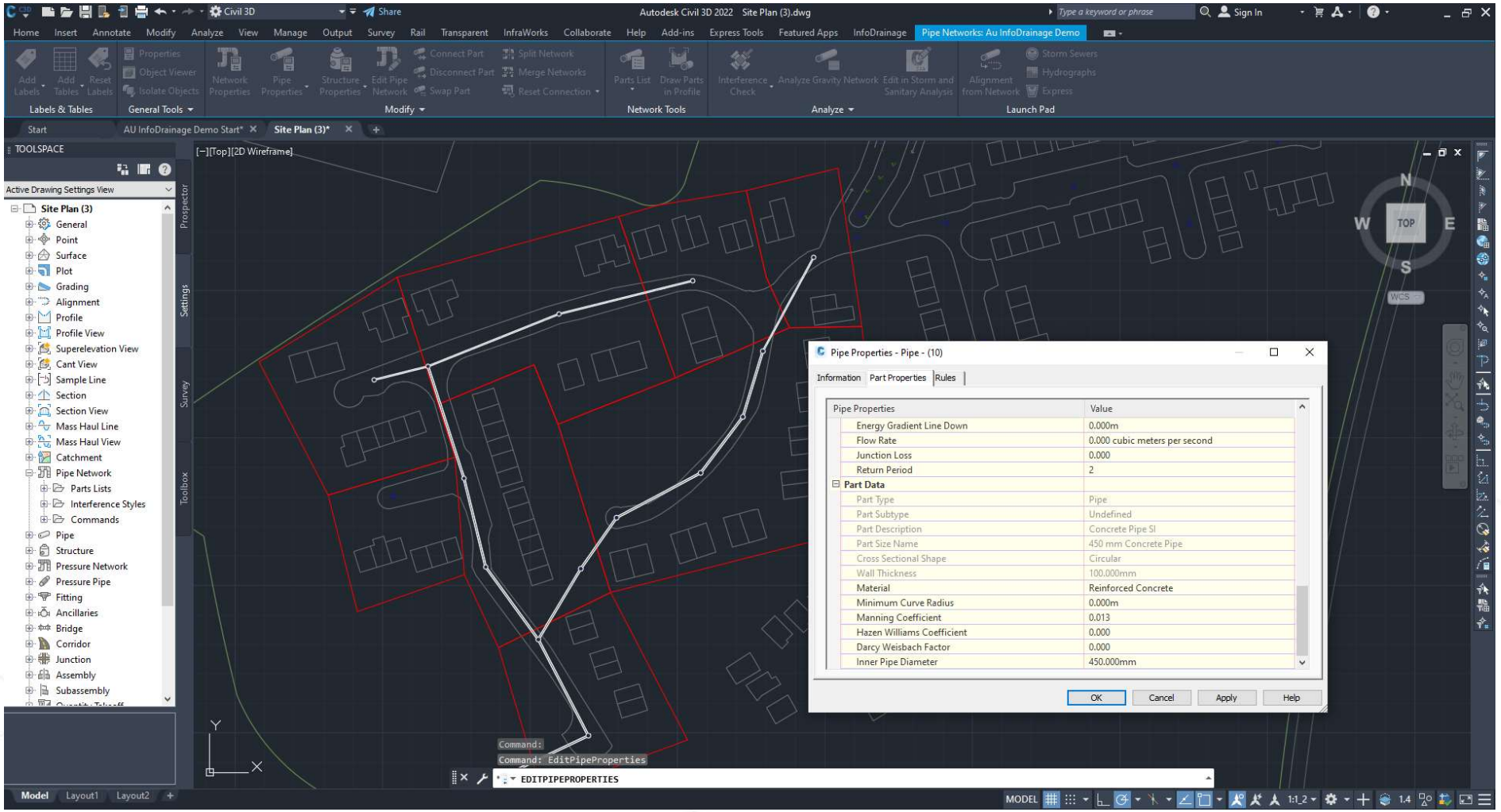
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Rules
Pipe Properties
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Junction Loss
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Part Subtype
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Cross Sectional Shape
Circular
Wall Thickness
100.000mm
Material
Reinforced Concrete
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Manning Coefficient
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Hazen Williams Coefficient
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Darcy Weisbach Factor
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Command: EditPipeProperties
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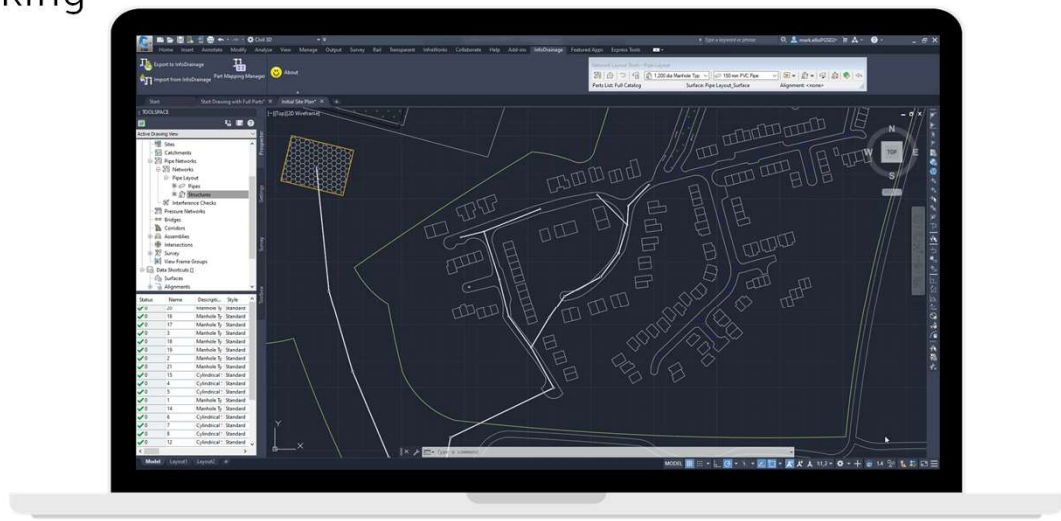
Export from Civil 3D® to InfoDrainage

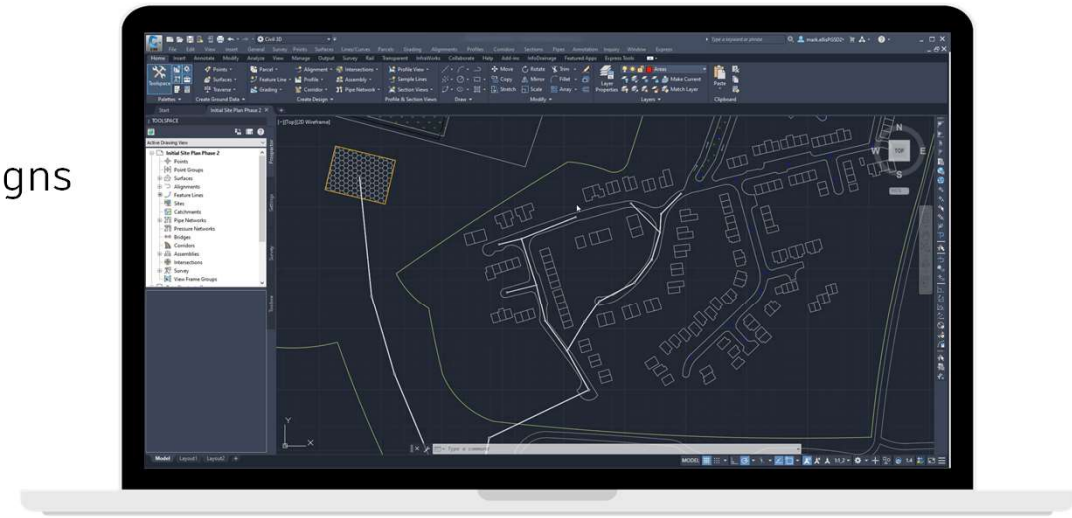
- Simplified and consistent way of working
- Reduces laborious data entry
- Intelligent data exchange



InfoDrainage

Import from InfoDrainage to Civil 3D®

- Seamless data round tripping
- Reduces unnecessary rework of designs
- Minimise risk of design errors



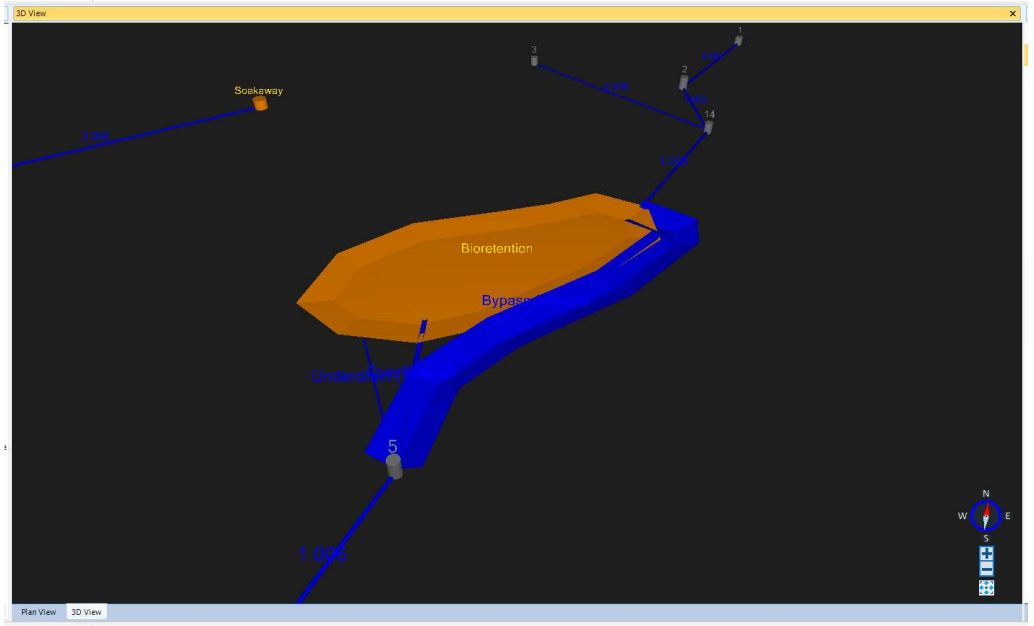
InfoDrainage

Complex Connection Representation

InfoDrainage connections in Civil 3D® Pipe Networks

Complex Connection types

- Rectangular / Trapezoidal / Triangular Channels – represented as corridors
- Lagged Flow / No Delay – polylines
- Multiple barrels – represented as multiple singular pipes, supported for round tripping
- Intermediate points – represented as short sections with null structures, supported for round tripping



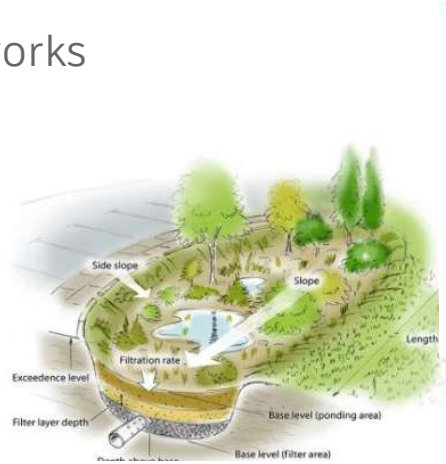
Complex Object Representation

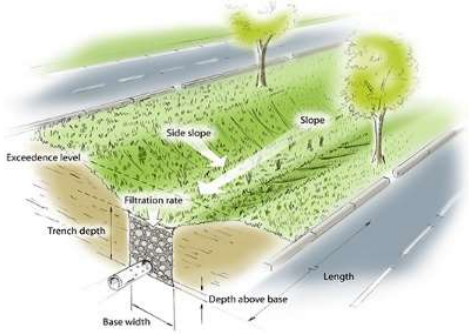
InfoDrainage objects in Civil 3D® Pipe Networks

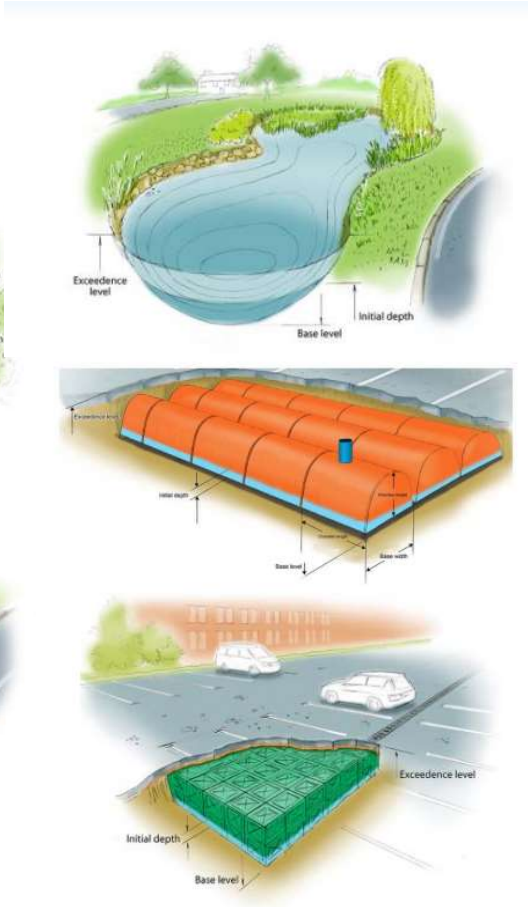
Stormwater Controls (SuDS/GI)

Feature lines with a mesh surface

- Cellular Storage, Chamber, Infiltration trench, Porous Paving, Soakaways – top and bottom features lines
- Ponds and Tanks – features lines per depth / area/ volume entry
- Bioretentions and Swales – feature lines at top and base of ponding area and base of storage





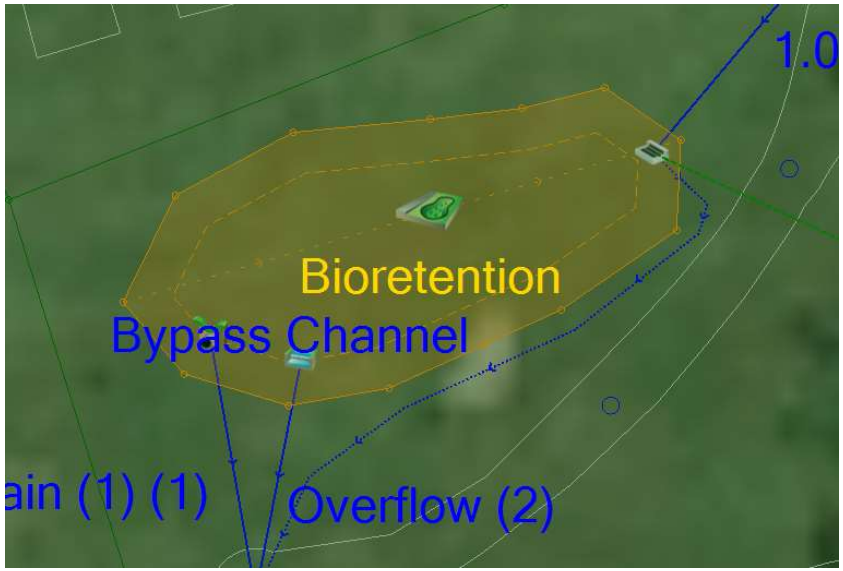


Complex Object Representation

InfoDrainage objects

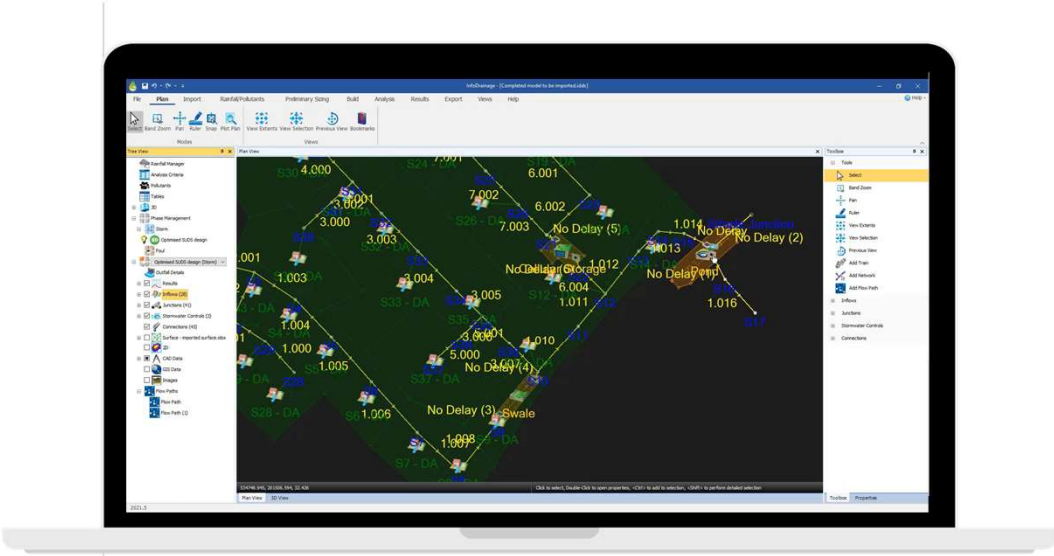
Miscellaneous

- Simple Junctions – Null Structure
- Inlets – Null Structure
- Outlets (including flow controls) – Null Structure



Importing Complex Structures

- Accurate connections to Green Infrastructure
- Improved 3D object representation
- All drainage design represented



Round tripping tips

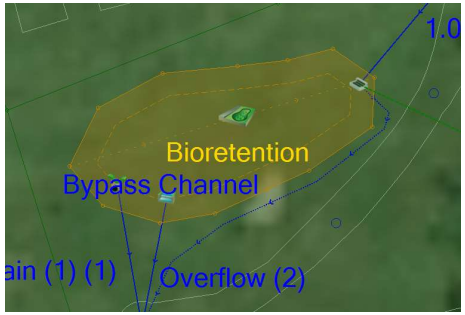
Save InfoDrainage file with the same name – allows the objects to be recognized on the round trip.

If the following objects are moved or deleted in Civil 3D® they will lose their mapping:

- Multiple barrels
- Intermediate points on connections

If the following Null Structure objects are moved outside the outline of a stormwater control, or deleted, InfoDrainage will create a new object on export:

- Inlets
- Outlets



Review Learning Objectives

1. Learn how to initiate an export of your Civil 3D ® pipe network data to InfoDrainage

2. Learn how to create a pipe network and 3D surfaces from an InfoDrainage model

3. Learn how to create smart objects for all the traditional and sustainable drainage elements

4. Learn how to adopt drainage design iterations through round-trip exchange of data reducing the risk of errors