Technology update for Utilities Management

Frederik Boersma, Utilities Solutions Director, Bentley Systems
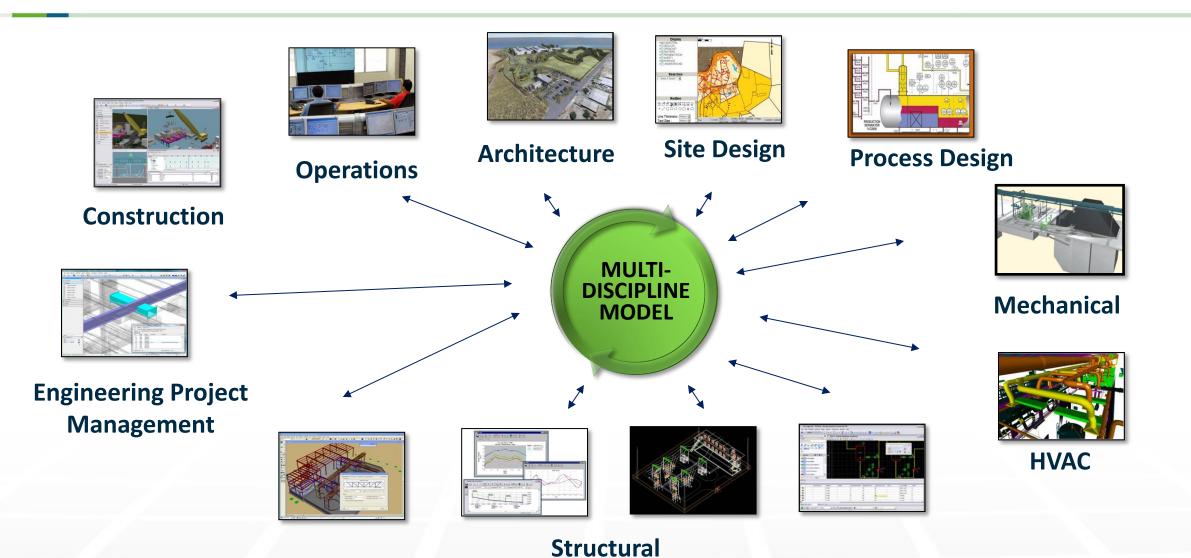Tomas Stanek, Channel Sales Manager, Bentley Systems

Disciplines within Water & Wastewater

- Project Management
- GIS
- Hydraulic Modeling
- Civil Design
- Plant Design
- Field Inspection
- Field Service
- Operations Engineering
- Maintenance Engineering
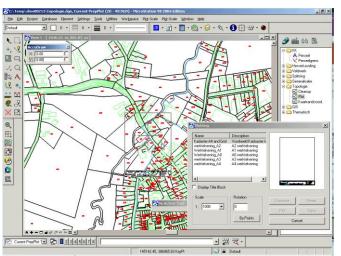
Bentley

Multi-Disciplinary Workflow Support

Operations

Architecture

Site Design

Process Design

Construction

Mechanical

MULTI-DISCIPLINE MODEL

Engineering Project Management

HVAC

Structural
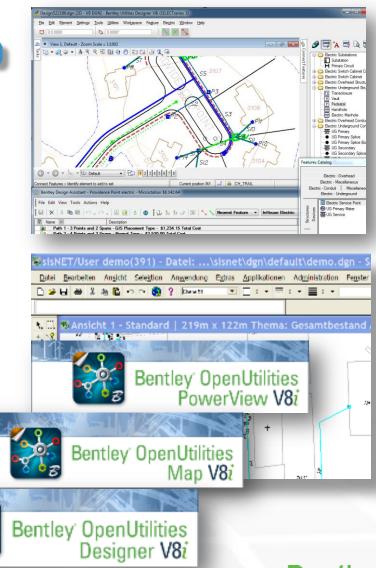
Bentley

Bentey OpenUtilities

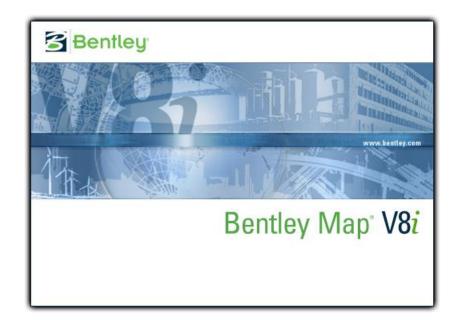# Bentley OpenUtilities

Bentley Map V8*i*

- Powerful, Extensible

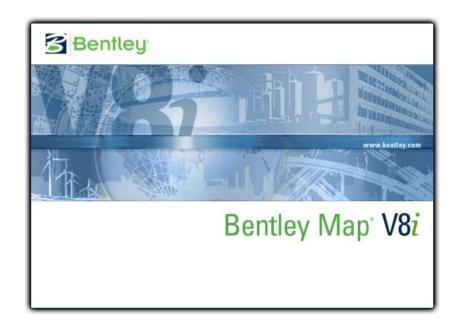 3D GIS and Mapping Software

  for the World's Infrastructure

Bentley Map V8*i*

- Powerful, Extensible

  3D GIS and Mapping Software

  for the World's Infrastructure

- GIS with the Power of MicroStation

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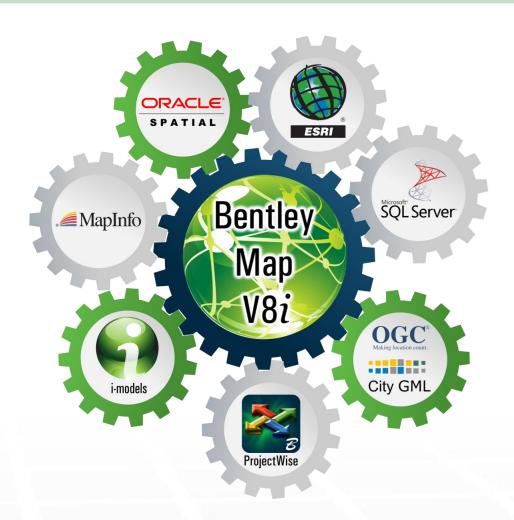
Interoperability…

- Integrate & reuse various types of data

- Leverage advanced interoperability
  - Import/Export + Reference
    - ‣ wide list of formats…
  - SHP, MapInfo, GML, CSV, ODBC, Esri FGDB…
  - Spatial DB, WFS…

- Remap feature and property names
  - …and assign symbology
  - Save settings for reuse and bulk operations

- Interface to FME for many more formats

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Spatial Database Support

- Oracle Spatial
- MS SQL Server Spatial
- WFS
  - Web Feature Services
- ESRI File Geodatabase
- For all
  - Data Streaming
  - Direct Data Access
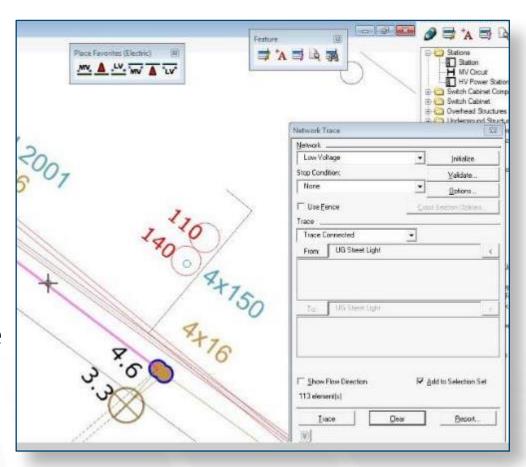
OpenUtilities aspects
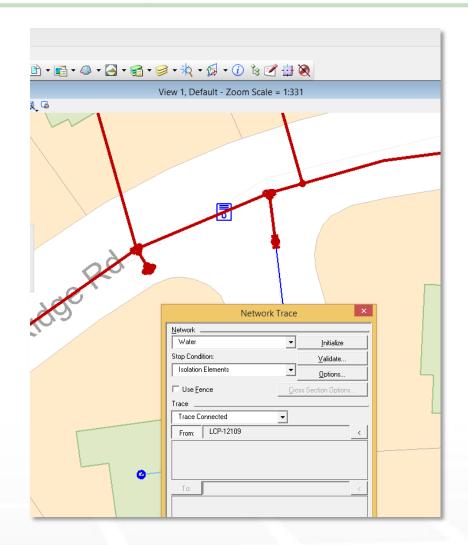
- Multi-Utilities: Manage GIS data of different networks
  - Electric, Gas, Water and Wastewater
  - District Energy
  - Integration with Hydraulic Modeling

- Design and Network Information Management

- Multiple Persistence Models
  - File-based (DGN/XFM)
  - Database-based (Oracle, SQL Server)

- Standalone, scalable from single seat to enterprise

- Offered on Multiple User Levels ('small-medium-large')

- 3D

Utility Asset Analysis and Reporting

- Seamlessly deploy GIS Tools inherited from Bentley Map
  - Buffers, overlays, joins, thematic maps, dynamic labels, reports, and queries

- Analyze based on network relationships
  - Network Trace, Leak Analysis, Profile Tool

Map Interoperability

Connections | Imports | Exports

Connection Tools
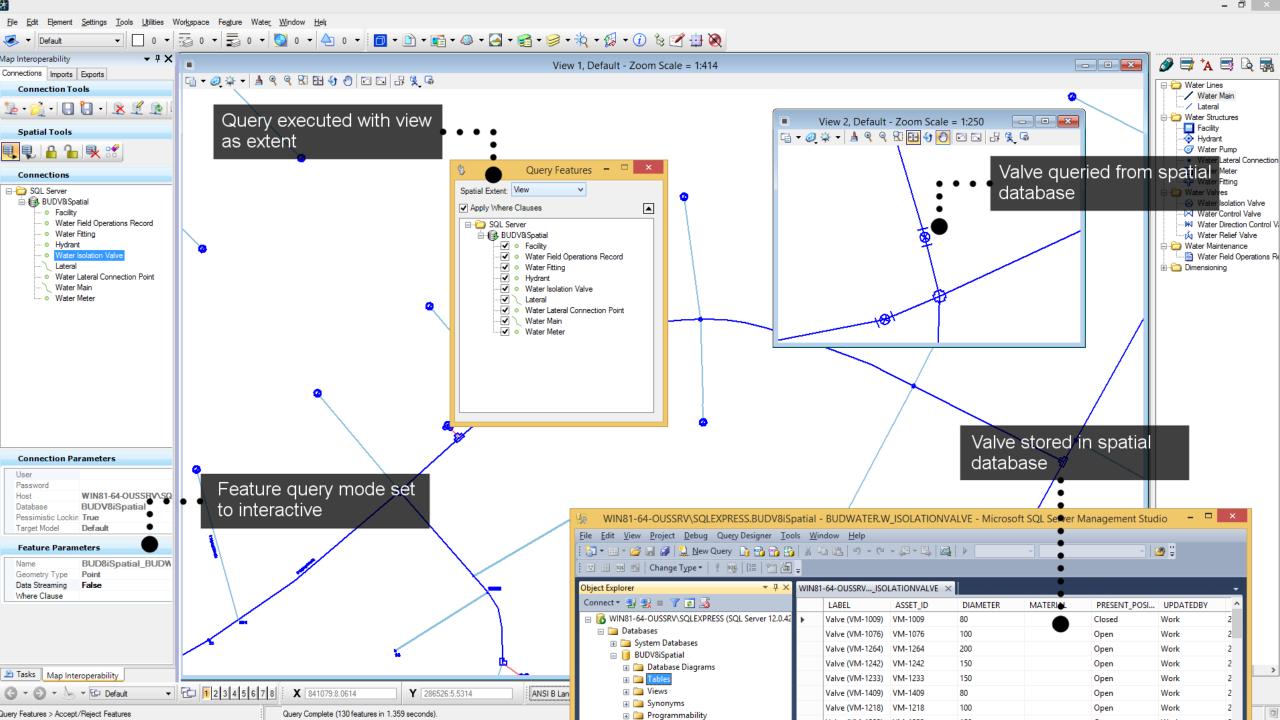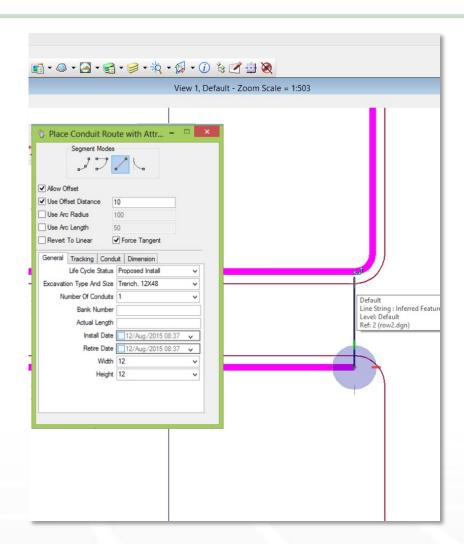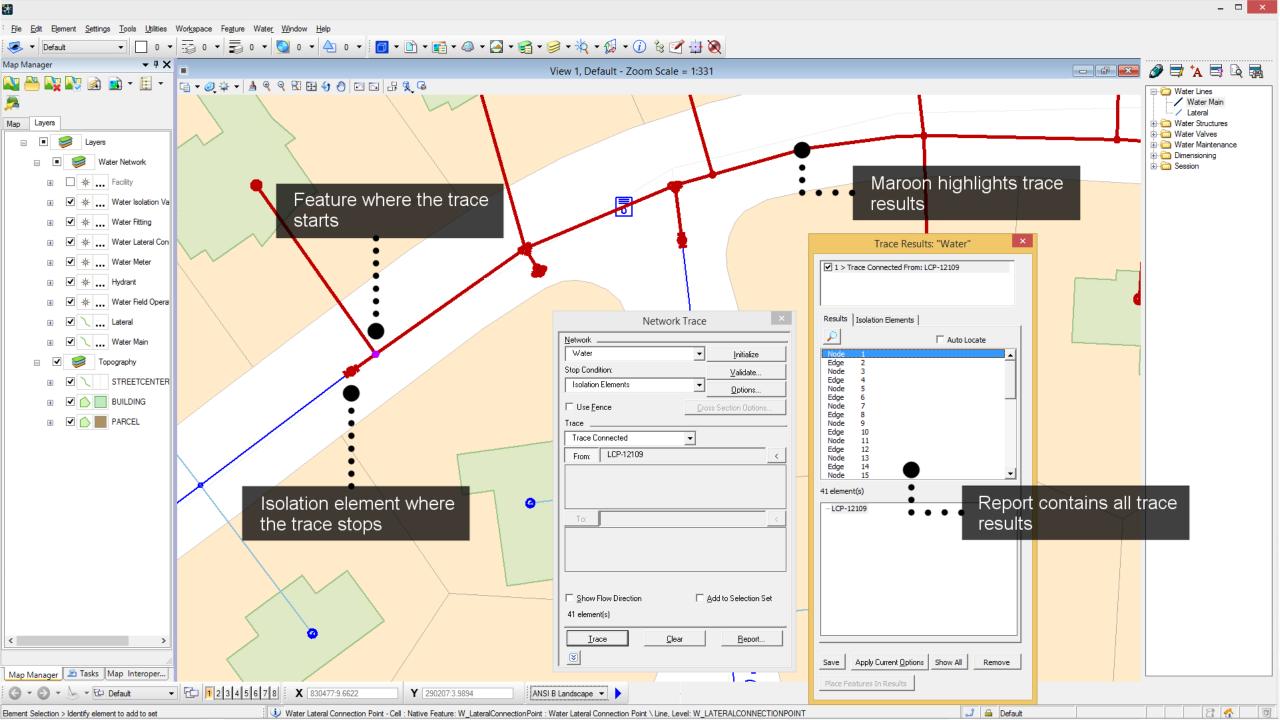
Spatial Tools

Connections

SQL Server
- BUDV8iSpatial
  - Facility
  - Water Field Operations Record
  - Water Fitting
  - Hydrant
  - Water Isolation Valve
  - Lateral
  - Water Lateral Connection Point
  - Water Main
  - Water Meter

Connection Parameters

User	
Password	
Host	WIN81-64-OUSSRV\SQ
Database	BUDV8iSpatial
Pessimistic Lockin	True
Target Model	Default

Feature Parameters

Name	BUD8iSpatial_BUDW
Geometry Type	Point
Data Streaming	False
Where Clause	

Tasks | Map Interoperability

View 1, Default - Zoom Scale = 1:414

Query executed with view as extent

Query Features

Spatial Extent: View

☑ Apply Where Clauses

SQL Server
- BUDV8iSpatial
  - ☑ Facility
  - ☑ Water Field Operations Record
  - ☑ Water Fitting
  - ☑ Hydrant
  - ☑ Water Isolation Valve
  - ☑ Lateral
  - ☑ Water Lateral Connection Point
  - ☑ Water Main
  - ☑ Water Meter

View 2, Default - Zoom Scale = 1:250

Valve queried from spatial database

Valve stored in spatial database

Feature query mode set to interactive

Water Lines
- Water Main
- Lateral
Water Structures
- Facility
- Hydrant
- Water Pump
- Water Lateral Connection
- Water Meter
- Water Fitting
Water Valves
- Water Isolation Valve
- Water Control Valve
- Water Direction Control V
- Water Relief Valve
Water Maintenance
- Water Field Operations R
Dimensioning

WIN81-64-OUSSRV\SQLEXPRESS.BUDV8iSpatial - BUDWATER.W_ISOLATIONVALVE - Microsoft SQL Server Management Studio

File Edit View Project Debug Query Designer Tools Window Help

Object Explorer

Connect

WIN81-64-OUSSRV\SQLEXPRESS (SQL Server 12.0.42
- Databases
  - System Databases
  - BUDV8iSpatial
    - Database Diagrams
    - Tables
    - Views
    - Synonyms
    - Programmability

WIN81-64-OUSSRV...ISOLATIONVALVE

LABEL	ASSET_ID	DIAMETER	MATERIAL	PRESENT_POSI...	UPDATEDBY	
Valve (VM-1009)	VM-1009	80		Closed	Work	2
Valve (VM-1076)	VM-1076	100		Open	Work	2
Valve (VM-1264)	VM-1264	200		Open	Work	2
Valve (VM-1242)	VM-1242	150		Open	Work	2
Valve (VM-1233)	VM-1233	150		Open	Work	2
Valve (VM-1409)	VM-1409	80		Open	Work	2
Valve (VM-1218)	VM-1218	100		Open	Work	2

Query Features > Accept/Reject Features

Query Complete (130 features in 1.359 seconds).

X 841079:8.0614   Y 286526:5.5314
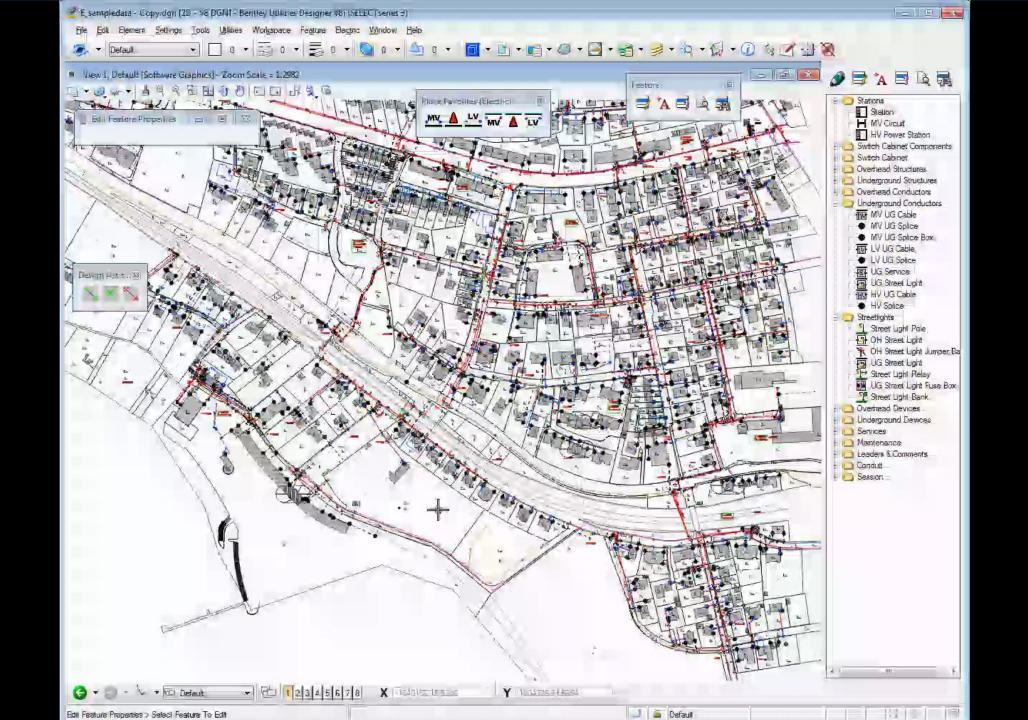
Utility Asset Layout and Edit Tools

- Smart tools for high-quality designs
  - MicroStation-based design tools
  - Bentley Map-based design editor
  - High-precision placement and editing

- Maintain utilities network models and maps
  - Speed edits with intelligent GIS features
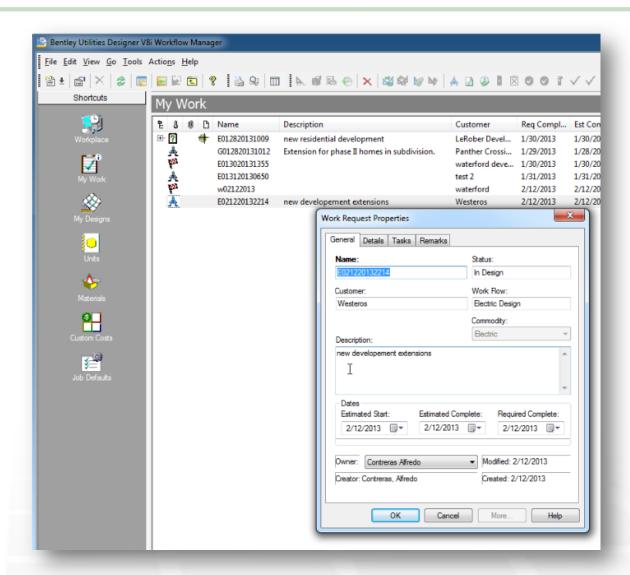 - Apply standards and business rules

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Smart Layout Editing

Callout labels on the map/screenshot:

- Feature where the trace starts
- Maroon highlights trace results
- Isolation element where the trace stops
- Report contains all trace results

Menu bar: File Edit Element Settings Tools Utilities Workspace Feature Water Window Help

Map Manager panel — Layers tree:
- Layers
  - Water Network
    - Facility
    - Water Isolation Va...
    - Water Fitting
    - Water Lateral Con...
    - Water Meter
    - Hydrant
    - Water Field Opera...
    - Lateral
    - Water Main
  - Topography
    - STREETCENTER...
    - BUILDING
    - PARCEL

Right panel tree:
- Water Lines
  - Water Main
  - Lateral
- Water Structures
- Water Valves
- Water Maintenance
- Dimensioning
- Session

View 1, Default - Zoom Scale = 1:331

Network Trace dialog:

Network
Water   Initialize
Stop Condition:
Isolation Elements   Validate...
                      Options...
☐ Use Fence   Cross Section Options...
Trace
Trace Connected
From: LCP-12109   <
To: <
☐ Show Flow Direction   ☐ Add to Selection Set
41 element(s)
Trace   Clear   Report...

Trace Results: "Water" dialog:

☑ 1 > Trace Connected From: LCP-12109

Results | Isolation Elements

☐ Auto Locate

Node   1
Edge   2
Node   3
Edge   4
Node   5
Edge   6
Node   7
Edge   8
Node   9
Edge   10
Node   11
Edge   12
Node   13
Edge   14
Node   15

41 element(s)

LCP-12109

Save   Apply Current Options   Show All   Remove
Place Features In Results

Status bar:
Element Selection > Identify element to add to set
Water Lateral Connection Point - Cell : Native Feature: W_LateralConnectionPoint : Water Lateral Connection Point \ Line, Level: W_LATERALCONNECTIONPOINT

X 830477:9.6622   Y 290207:3.9894   ANSI B Landscape   Default

Control workflows and users (Job and Workflow Management)
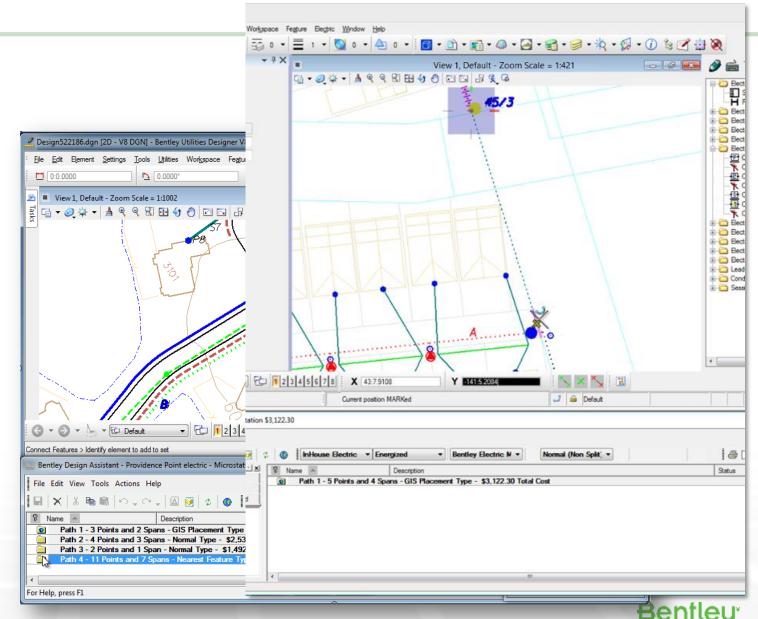
- Manages multiple, branching workflows

- Manages workflow order status and states

- Maintains work order history

- Markup and approval

- Tailors capabilities by user roles

- Integrates with ERP or external WMS

Integrate cost-based design (Assisted Design Support)

- Real-time cost feedback

- Detailed cost breakdowns
  - Labor, material, and equipment costs
  - At work location or for the entire design

- Find least-cost compliant designs
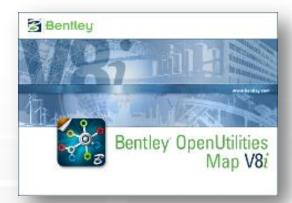
Bentley OpenUtilities versions

- Bentley OpenUtilities Designer
  - Enterprise GIS for design and management of utility networks
- Bentley OpenUtilities Map
  - Utilities-specific GIS for network mapping and decision support
- Bentley OpenUtilities PowerView
  - Streamlined, cost-effective application to review, explore, and markup utility network designs and maps

Water and Wastewater (Haestad) Products
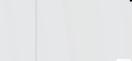
Water and Wastewater Assets Lifecycle

Bentley provides applications across the entire lifecycle
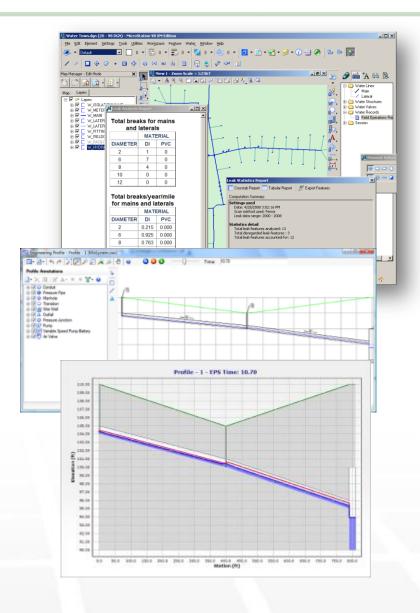
Water Distribution Network Solution

Mapping, Design and Operations:

- Bentley Open Utility – Water

Analysis – Networks:

- WaterGEMS
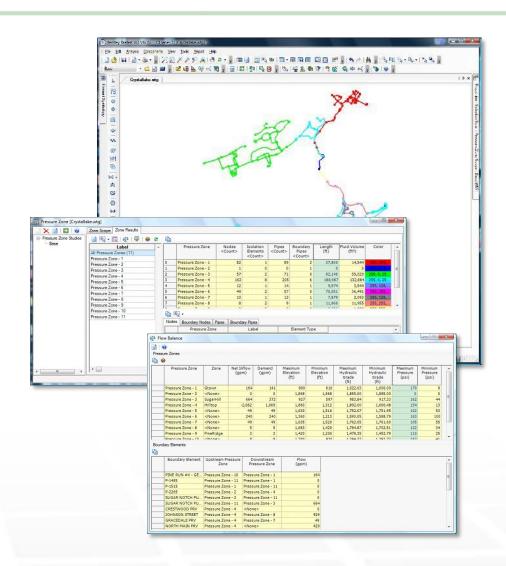
- WaterCAD

- HAMMER

- SCADAConnect

Bentley Water Modeling & Analysis

- **WaterGEMS** – Advanced water distribution modeling with geospatial integration. Superset of WaterCAD

- **WaterCAD** – Basic water distribution modeling

- **SCADAConnect** – Integrates SCADA into WaterCAD/WaterGEMS

- **HAMMER** – Transient flow analysis and modeling

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Storm & Sewer Network Solution
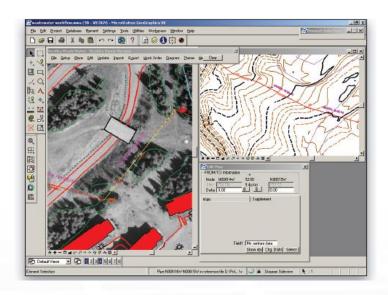
- **Hydrology & Hydraulics**
  - SewerGEMS
  - SewerCAD
  - CivilStorm
  - StormCAD
  - PondPack
  - CulvertMaster
  - FlowMaster
  - SCADAConnect

- **Mapping, Design & Operations**
  - Bentley Open Utility - Wastewater
  - Bentley OpenRoads Products – SUE and SUDA
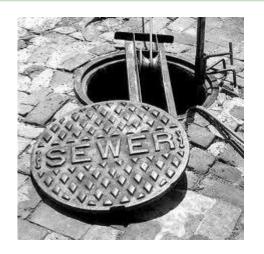
Storm & Sewer Modeling & Analysis

- **SewerGEMS** – Complete storm and sanitary sewer modeling analysis and design package with geospatial integration. Superset of SewerCAD, CivilStorm and StormCAD.

- **SewerCAD** – Gradually varied flow sanitary sewer design and analysis package

- **CivilStorm** – Stormwater management and dynamic modeling. Superset of StormCAD

- **StormCAD** – Rational Method storm water design and analysis

- **PondPack** – Detention pond design and analysis

- **CulvertMaster** – Culvert design and analysis

- **FlowMaster** – Non-network hydraulics calculator

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4 Platforms – One Shared Data Source

Quality: Performance

SQLite replaces old database backend

- Performance is the same or better

- Files are more compact, by about 50% (and open in half the time)

- Maximum possible file size increases by x70,000!
  - MDB format maxed out at 2 *giga*bytes
  - SQLite allows up to 140 *terabytes*

- Available now in WaterGEMS, WaterCAD, SewerGEMS, SewerCAD, CivilStorm, StormCAD

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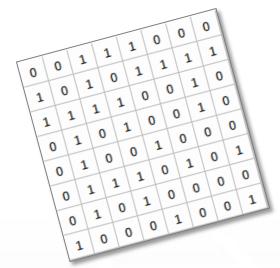
Sustainability: 64-bit Support

- Why 64-bit?
  - Can address much more memory
  - Can run on 64-bit platforms (e.g. AutoCAD 2015+, 64 bit)

- 64 bit versions available **now** for
  - WaterGEMS
  - WaterCAD
  - HAMMER
  - SewerGEMS
  - SewerCAD
  - CivilStorm
  - StormCAD

- <u>Note that 32-bit is also available with the installation</u>.

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Another enhancements in latest release

- Bentley Map Mobile

- Digital Terrain Models (Microstation/Standalone)

- Enhanced Hydrology Tools and Infiltration (Loss) Methods

- SCADAConnect new intrf

- Platform and OS Support

- CONNECT Compatibility

- Adsk ribbon

Bentley®
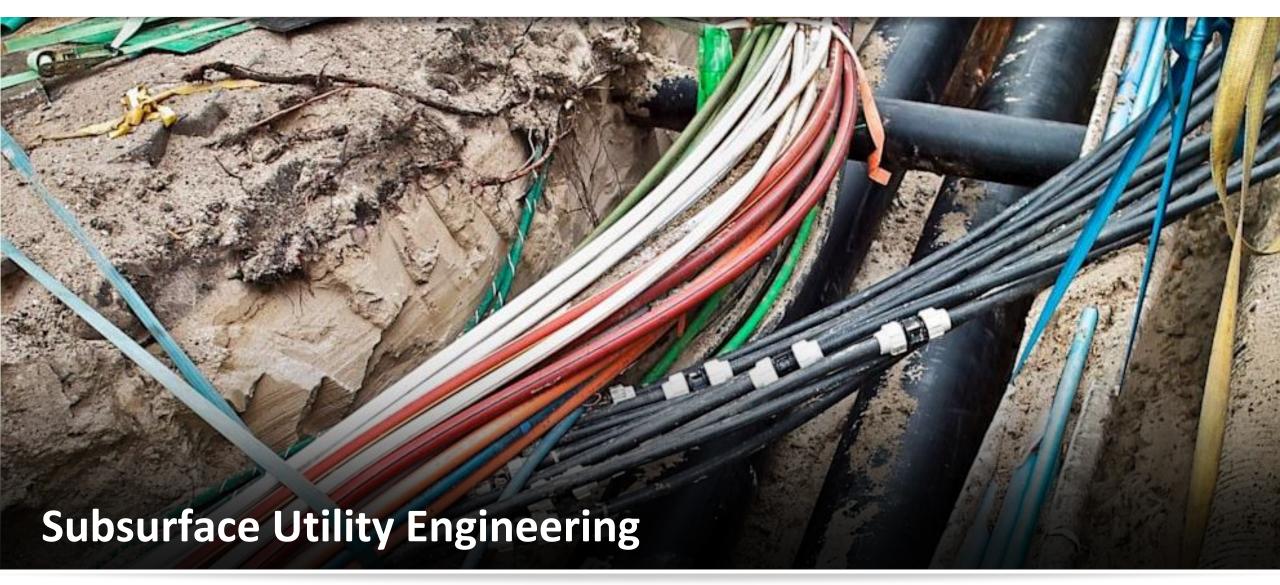
Bentley Water and Wastewater Advantages

- Full design/modeling and analysis tools set
- Connecting disciplines and departments
- Well rationalized GIS asset mapping and modeling information workflows
- Powerful set of network analysis products that go to work right out of the box
- Single vendor support and training across the technical spectrum
- Unmatched interoperability with your existing and supported technologies

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Subsurface Utility Engineering

Subsurface Utility – Challenges

- High potential for utility conflicts and relocations on projects

- Limited, narrow, and congested right-of-ways

- Deeper utility installation using less detectible materials

- Multiple owner entities with inaccurate documentation

- Increasingly tight project schedules

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Bentley Subsurface Utility Engineering

- ## Advanced 3D Physical Design Modeling

  - Construct, place, update, visualize, plot underground

  - Maintains relationship between CAD and GIS utility source and targets civil features to ensure data is always synced.
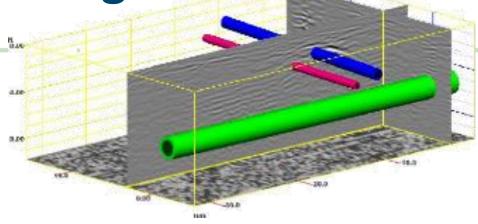
- ## Plan, Profile, Section
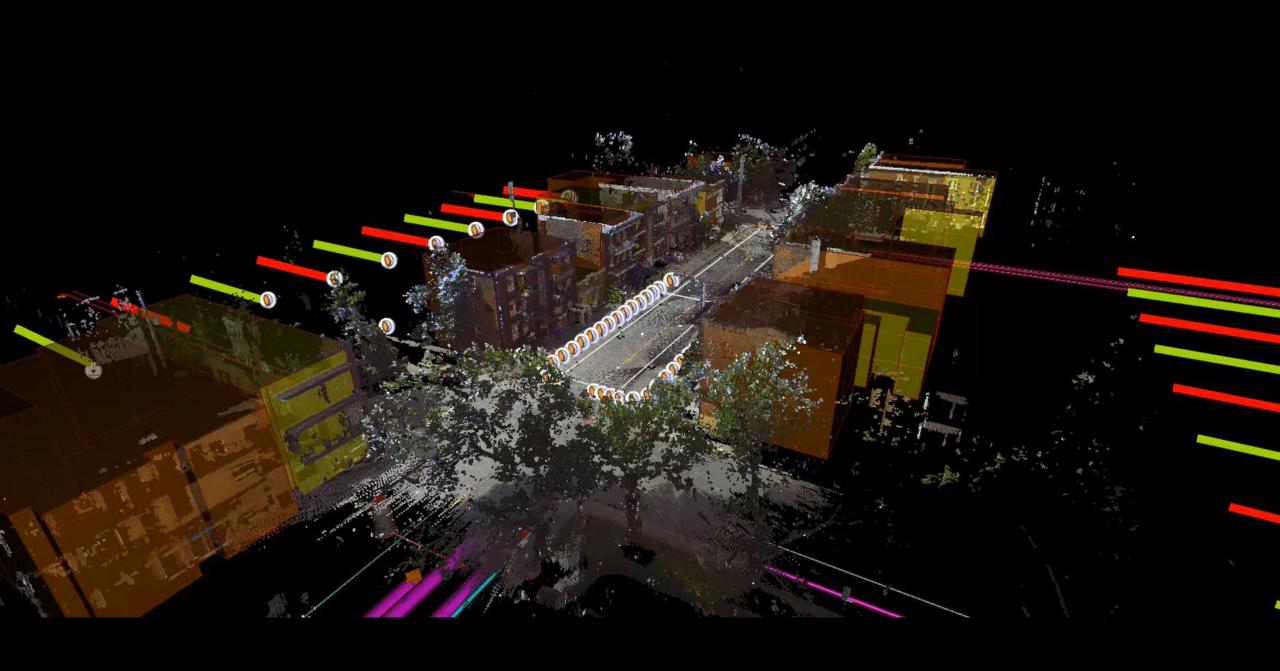
  - Pipe & Structure Connection Details

  - Creates 3D models automatically from
    survey information, CAD artifacts, GIS, Oracle databases, and more
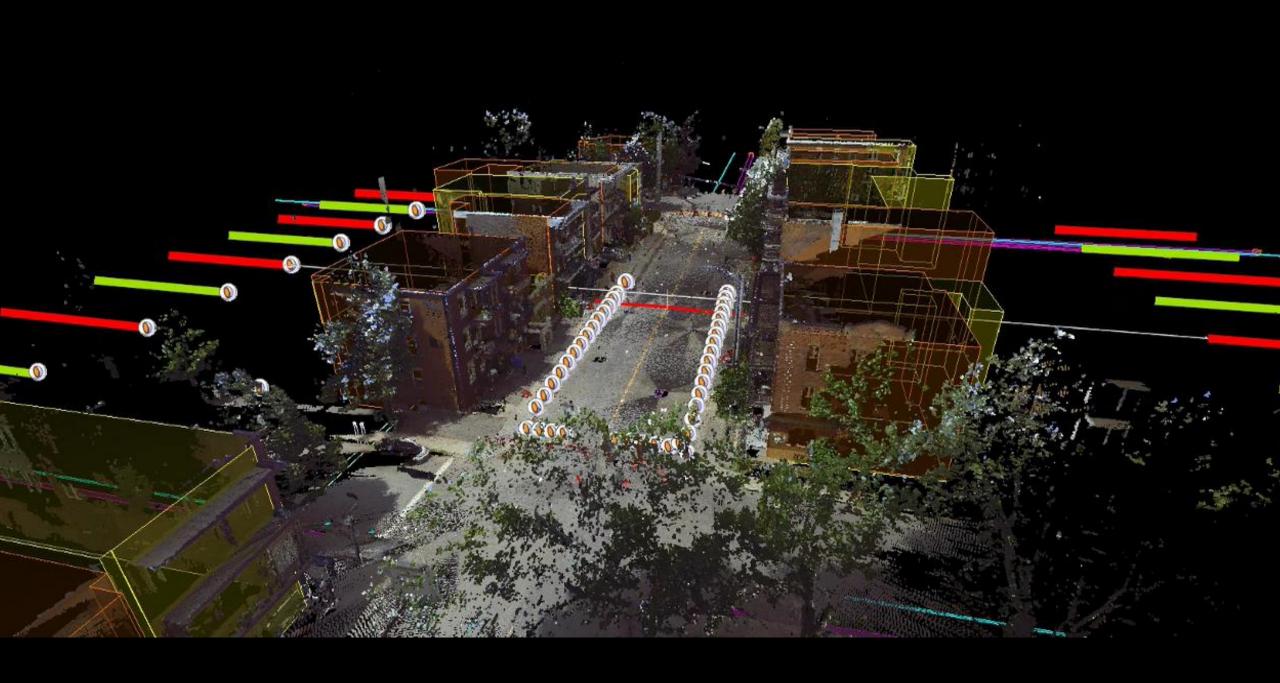
- ## Multi-user workflows within federated environment

  - Support for design and analysis of multiple utilities within single managed project (e.g. water, sanitary, storm, gas, electric, and other buried utilities)

  - Design collaboration within a shared project repository - ProjectWise

- ## Interoperability with other Bentley products including HH

Bentley
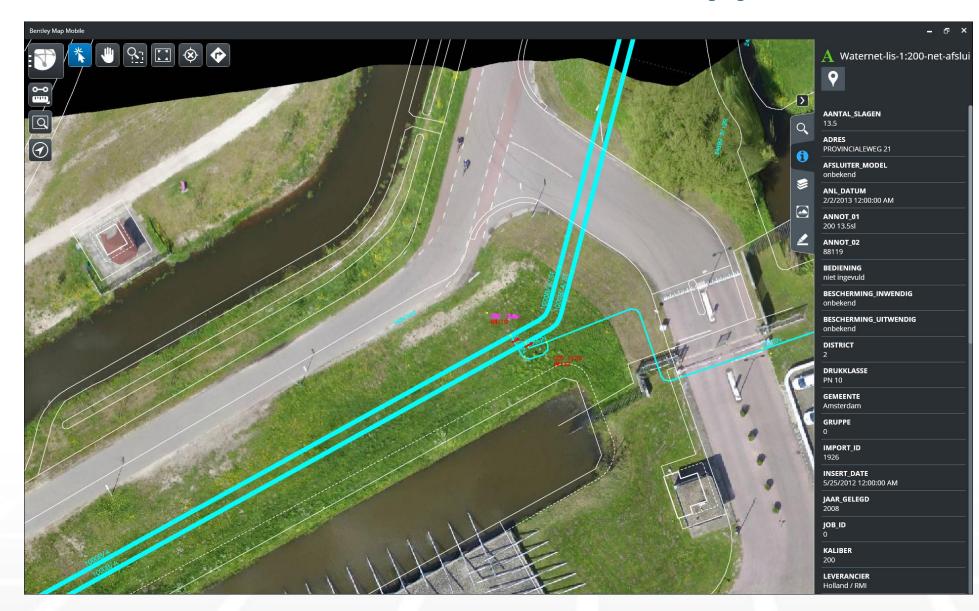
Mobile
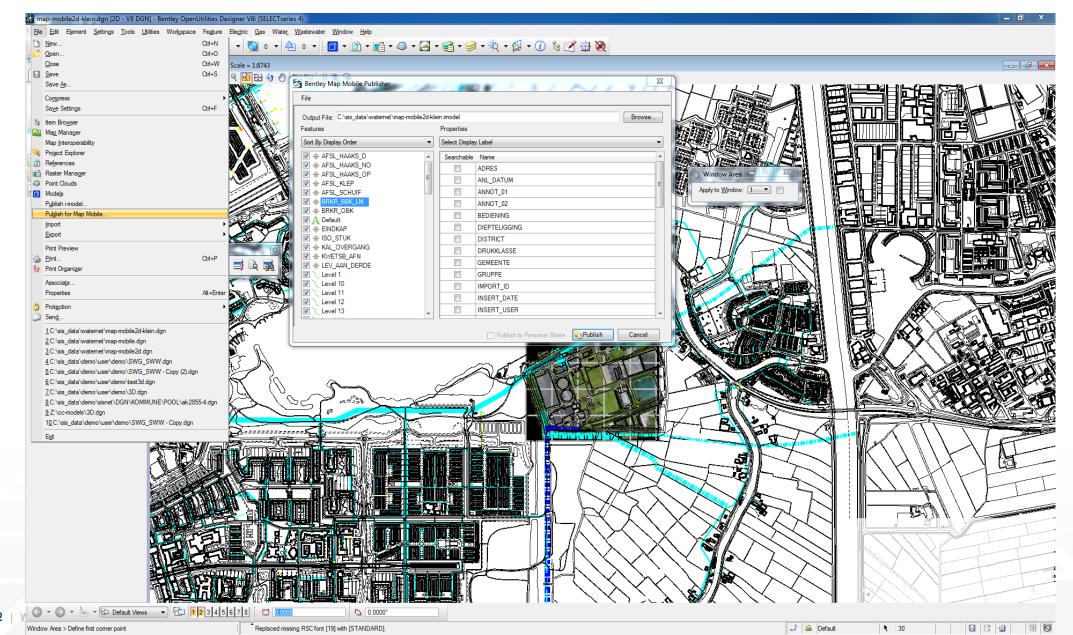
MapMobile Mobile Mapping App for Tablets
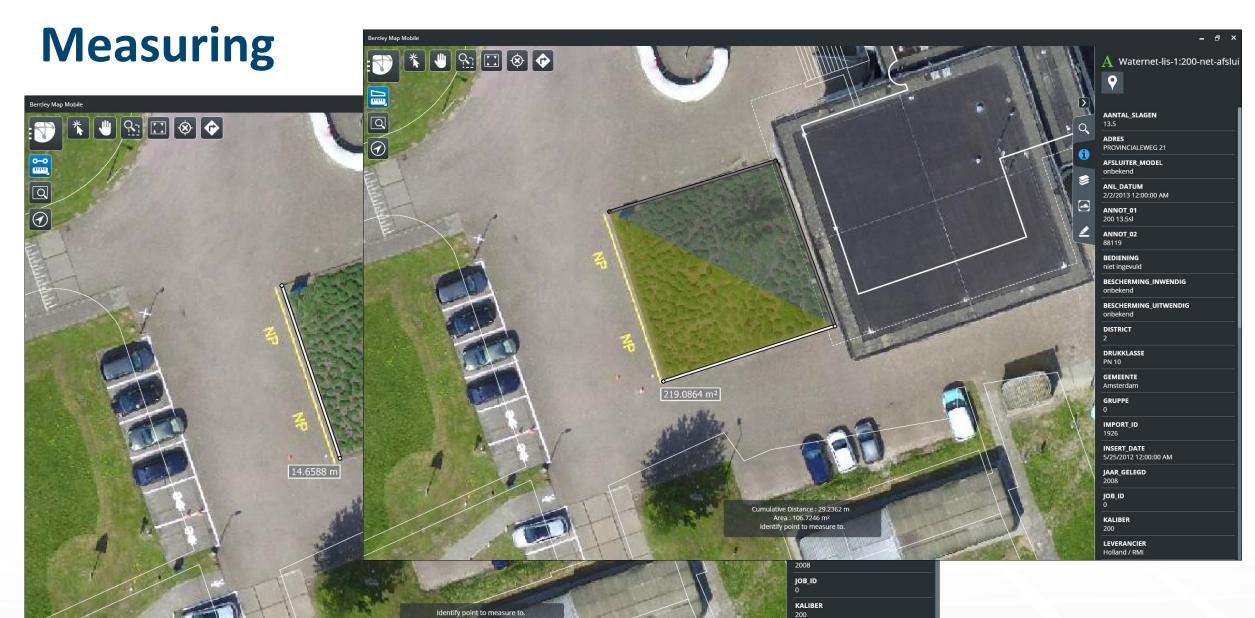
Export Data into an .imodel

Water network in a Mobile Application

Raster, Vector and Data

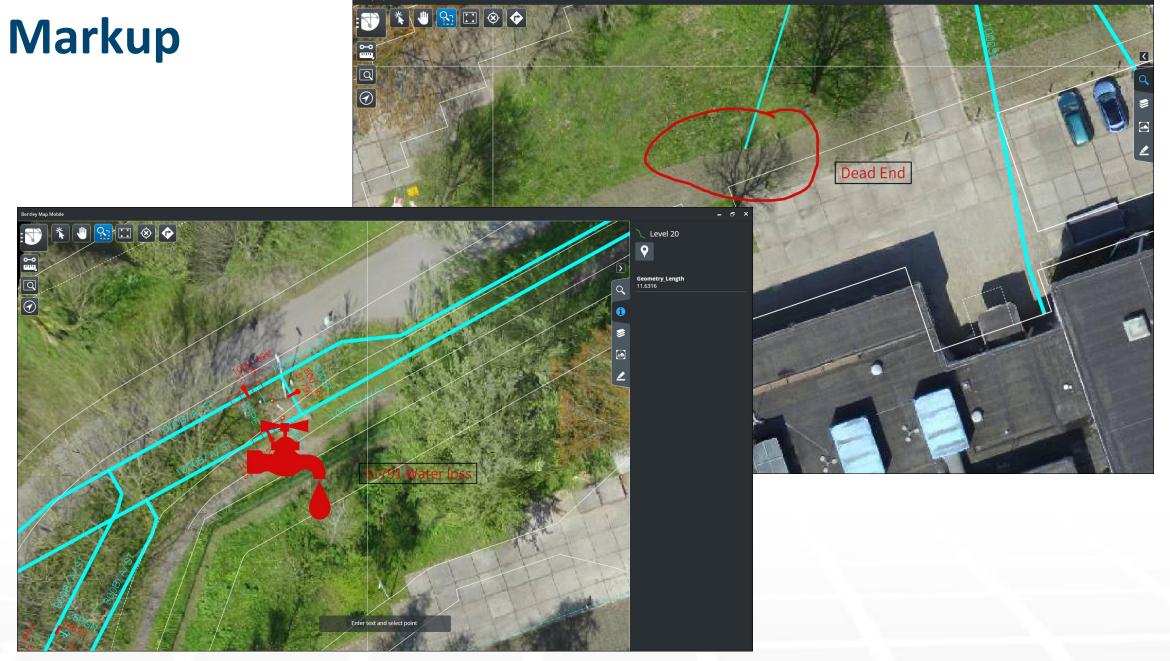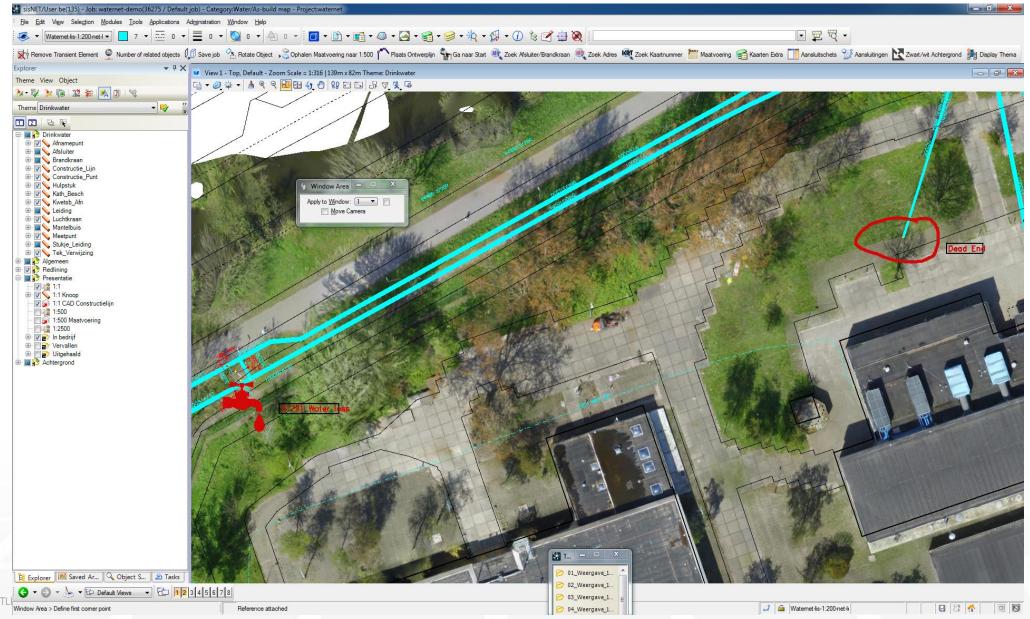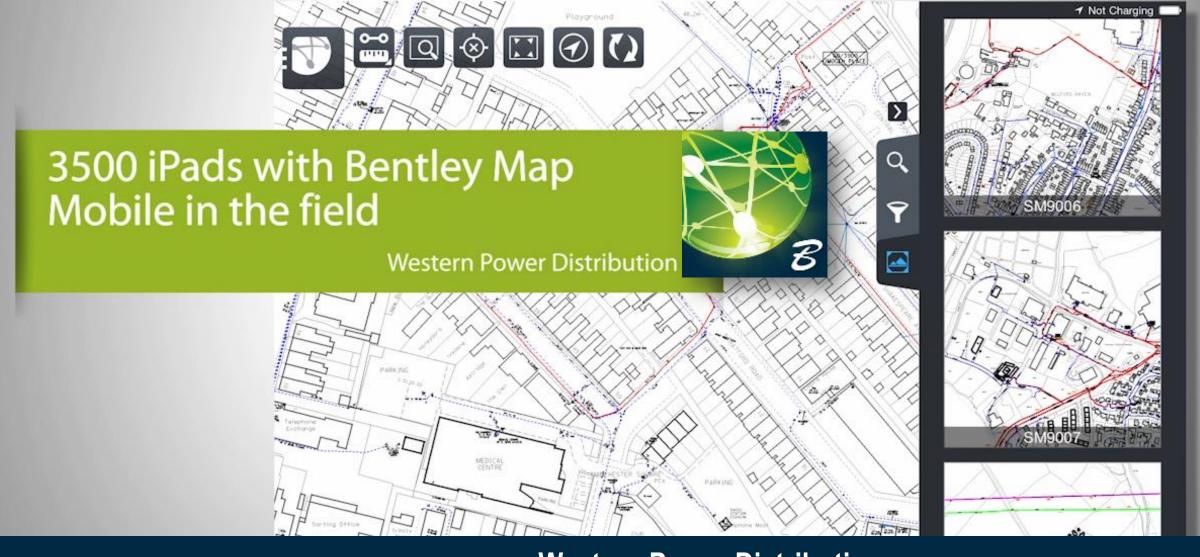# Measuring

Length and Area

Markup

Markup in BentleyOpenUtilities

Paldies!