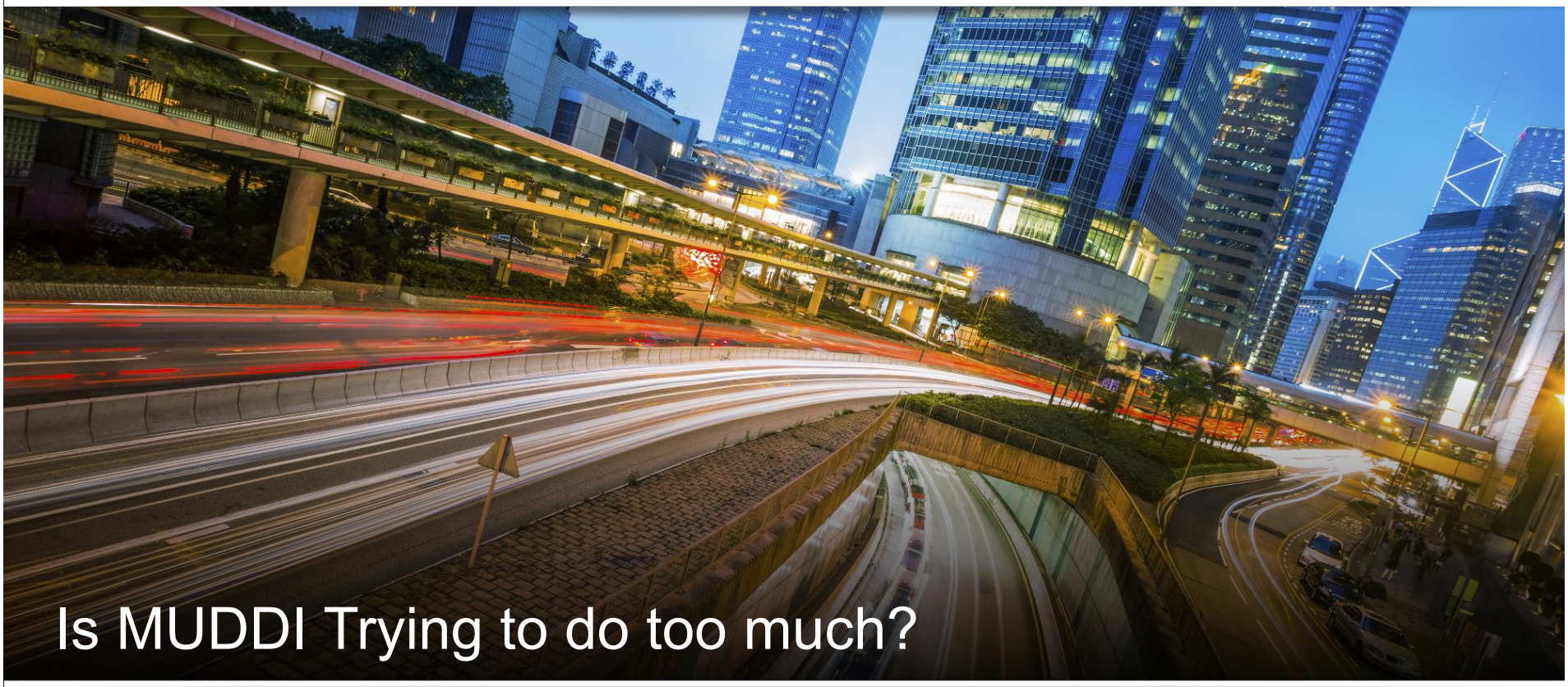


Is MUDDI Trying to do too much?

Robert Mankowski, Bentley Systems

Bentley
Advancing Infrastructure

© 2017 Bentley Systems, Incorporated

Bentley's mission is to provide ***innovative software and services*** for the enterprises and professionals who ***design, build, and operate*** the world's infrastructure – sustaining the global economy and environment for ***improved quality of life***.

 © 2017 Bentley Systems, Incorporated

Bentley

NAVIGATOR | MOBILE APPS: Bentley Map Mobile | ProjectWise WorkSite | Field Supervisor | Navigator Mobile | InspectTech Collector Mobile | ProjectWise Explorer Mobile | ...
BENTLEY'S PROJECT PLAYBOOKS
CAMPUSES
Bentley Map
AECOsim
Descartes
RAM
STAAD
GEOPAK
InRoads
MXROAD
gINT
SITEOPS
MINING
MineCycle
OpenPlant
AssetWise APM
Amulet
STAAD
Promis.e
Bentley Map
Descartes
Acute3D
InRoads
GEOPAK
gINT
ROADS
InRoads
GEOPAK
MXROAD
LEAP Bridge Steel
RM Bridge
gINT
InspectTech
SUPERLOAD
Exor
Descartes
SITEOPS
WATER & WASTEWATER
WaterGEMS
SewerGEMS
OpenPlant
AutoPLANT
STAAD
RAM
OpenPlant Support Engineering
gINT
OpenUtilities
Subsurface Utilities Engineering
BUILDINGS
AECOsim
RAM
STAAD
ProStructures
Hevacomp
speedikon
gINT
Subsurface Utilities Engineering
SITEOPS
CONSTRUCTION
Navigator
ConstructSim
PW Construction Work Package Server
ProStructures
Field Supervisor App
AECOsim
Descartes
InRoads
UTILITY NETWORKS
OpenUtilities
Substation
WaterGEMS
SewerGEMS
STAAD
Descartes
AssetWise APM
Amulet
Acute3D
RAIL & TRANSIT
Bentley Rail Track
Optram
GEOPAK
InRoads
MXROAD
RM Bridge
LEAP Bridge Steel
gINT
Promis.e
CITIES
Bentley Map
Descartes
InRoads
AECOsim
GEOPAK
Subsurface Utilities Engineering
SITEOPS
Acute3D
COMMUNICATIONS NETWORKS
OpenUtilities
Bentley Fiber
Bentley Coax
Bentley Map Mobile
Bentley Inside Plant
NUCLEAR POWER
AutoPIPE
OpenPlant
STAAD
AssetWise APM
Acute3D
BRIDGES
RM Bridge
LEAP Bridge Steel
InspectTech
SUPERLOAD
GEOPAK
InRoads
MXROAD
gINT
ProStructures
SUBSURFACE UTILITIES
OpenUtilities
WaterGEMS
SewerGEMS
Exor
GEOPAK
InRoads
MXROAD
gINT
Subsurface Utilities Engineering
POWER PLANTS
OpenPlant
AutoPLANT
AutoPIPE
Promis.e
STAAD
ProStructures
OpenPlant Support Engineering
AECOsim
AssetWise APM
gINT
Descartes
Acute3D
GEOPAK
InRoads
Amulet
PROCESS PLANTS
OpenPlant
AutoPLANT
AutoPIPE
OpenPlant Support Engineering
Promis.e
ProStructures
STAAD
AssetWise APM
Amulet
gINT
GEOPAK
InRoads
SITEOPS
Acute3D
WIND FARMS
SACS
MOSES
MAXSURF
ProSteel
OpenPlant
gINT
AssetWise APM
Amulet
Acute3D
OFFSHORE STRUCTURES
SACS
MOSES
MAXSURF
AutoPIPE
ProSteel
ConstructSim
OpenPlant
AssetWise APM
Acute3D
Amulet
BENTLEY'S COMMON PLATFORM: MICROSTATION | PROJECTWISE | ASSETWISE
Bentley

MUDDI Use Cases

Cross Owner Collaboration

1. Routine street excavations (EX)
2. Planning, design and construction of large scale projects (AE)
3. Disaster planning and response (DP)
6. Smart Cities, Future Cities (SC)

Single Owner Business Process

3. Disaster planning and response (DP)
4. Utility Related Emergency Response (ER)
5. Private and public utility operations, maintenance, repair and replacement programs (OM)

 © 2017 Bentley Systems, Incorporated

Bentley

5. Private and public utility operations, maintenance, repair and replacement programs (OM)

Bentley
Advancing Infrastructure

© 2017 Bentley Systems, Incorporated

Challenges Facing Owner-Operators Today

Safety

Operating Costs

Regulatory Compliance

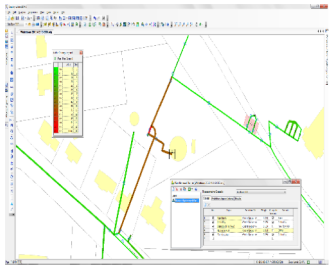
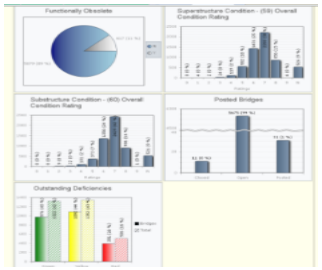
Managing Information Across Multiple Systems

Optimizing Asset Performance

 © 2018 Bentley Systems, Incorporated

Bentley

Life Cycle Management Activities

Asset Inventory	Condition Assessment	Maintenance	Planning & Prioritization	Management
				
Know your assets and their location	*Perform and manage inspections*	*Assign/Track maintenance needs*	*Use data-driven decisions on capital plans*	*Apply full reports/trends for performance metrics*

 © 2017 Bentley Systems, Incorporated

Bentley

Data Challenge Facing Owner-Operators Today

Lifecycle of Change: Plan, Design, Build, Operate

Managing Information/Data Across Multiple Systems, Databases, Departments, Formats, People, etc.

Safety

Regulatory Compliance

Optimizing Asset Performance

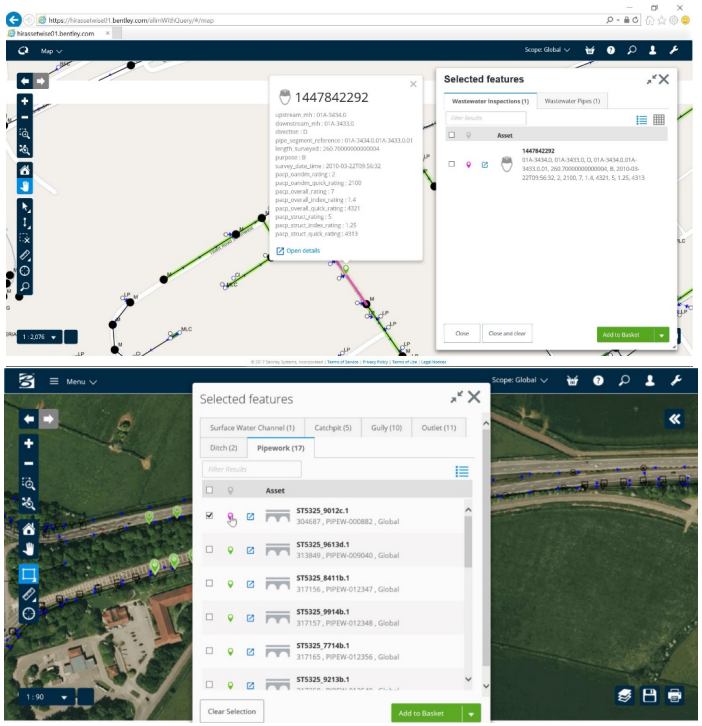
Operating Costs

 © 2017 Bentley Systems, Incorporated

Bentley

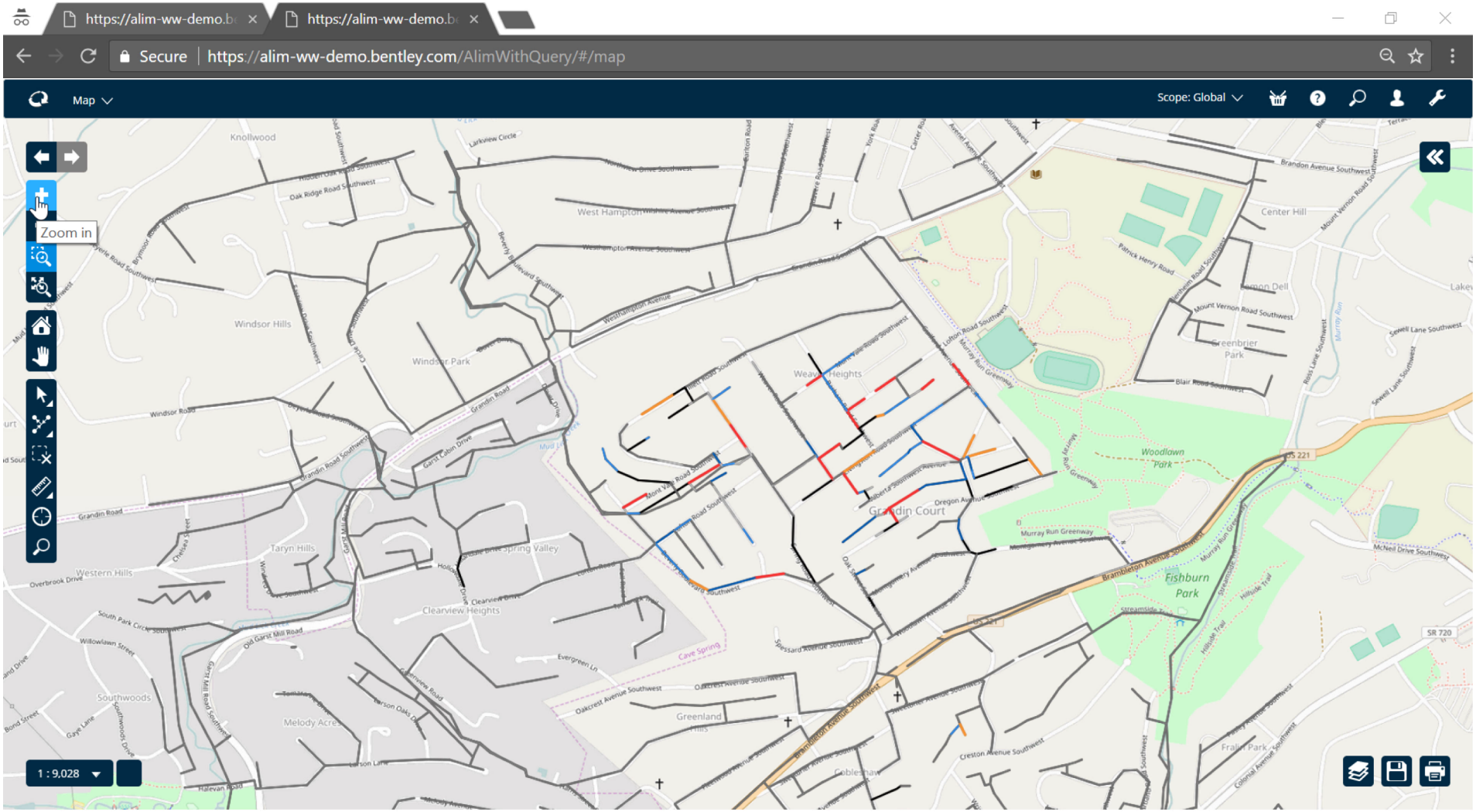
AssetWise Water and Wastewater Asset Performance

- Capabilities:
  - An water and wastewater asset inventory
  - Development of a systematic and systemic condition assessment and rating system for all asset types
  - Providing the historic record of asset information, the physical infrastructure, and events
  - Assess the remaining useful life by establishing condition and performance decay curves
  - Determining asset value and replacement costs

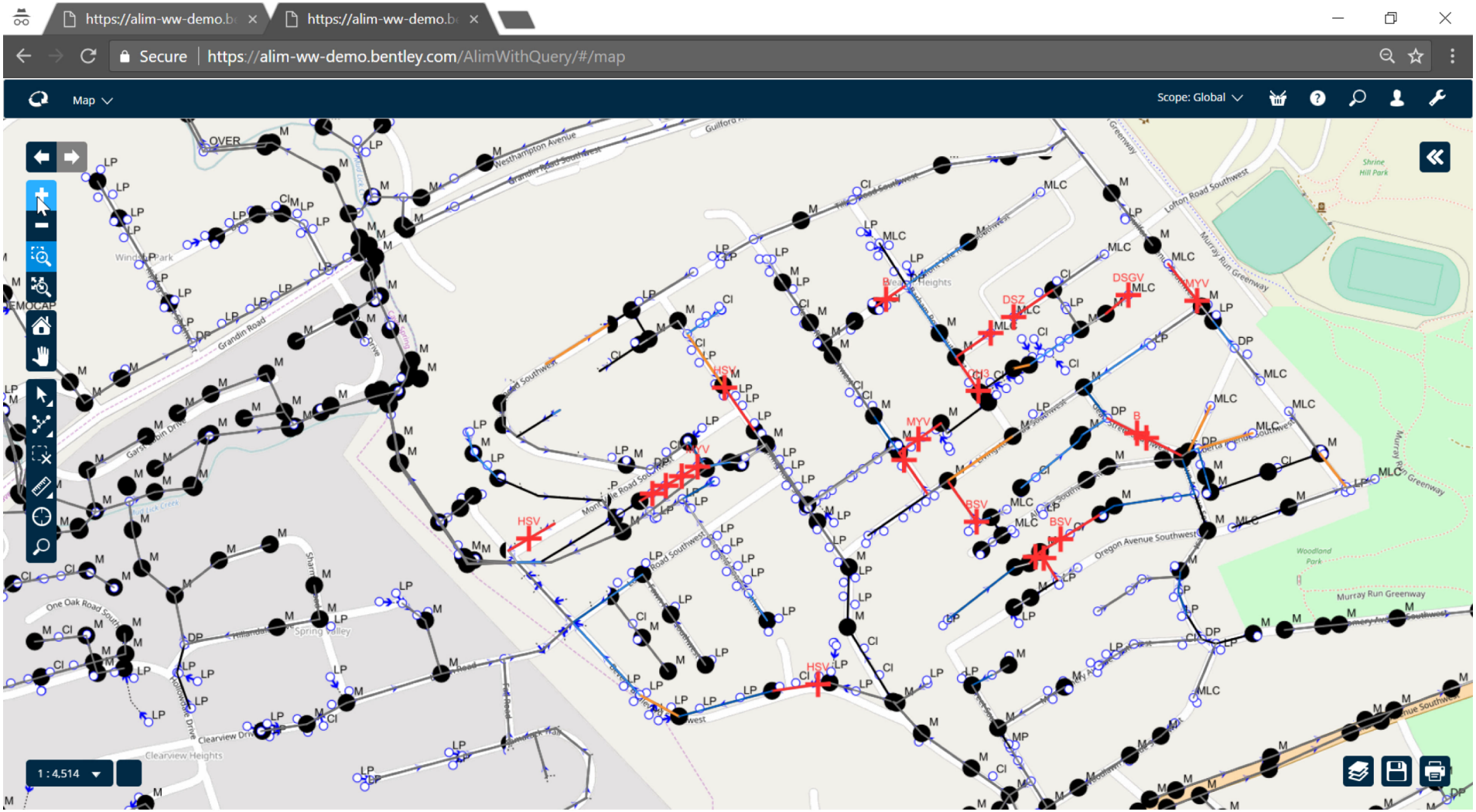


 © 2017 Bentley Systems, Incorporated

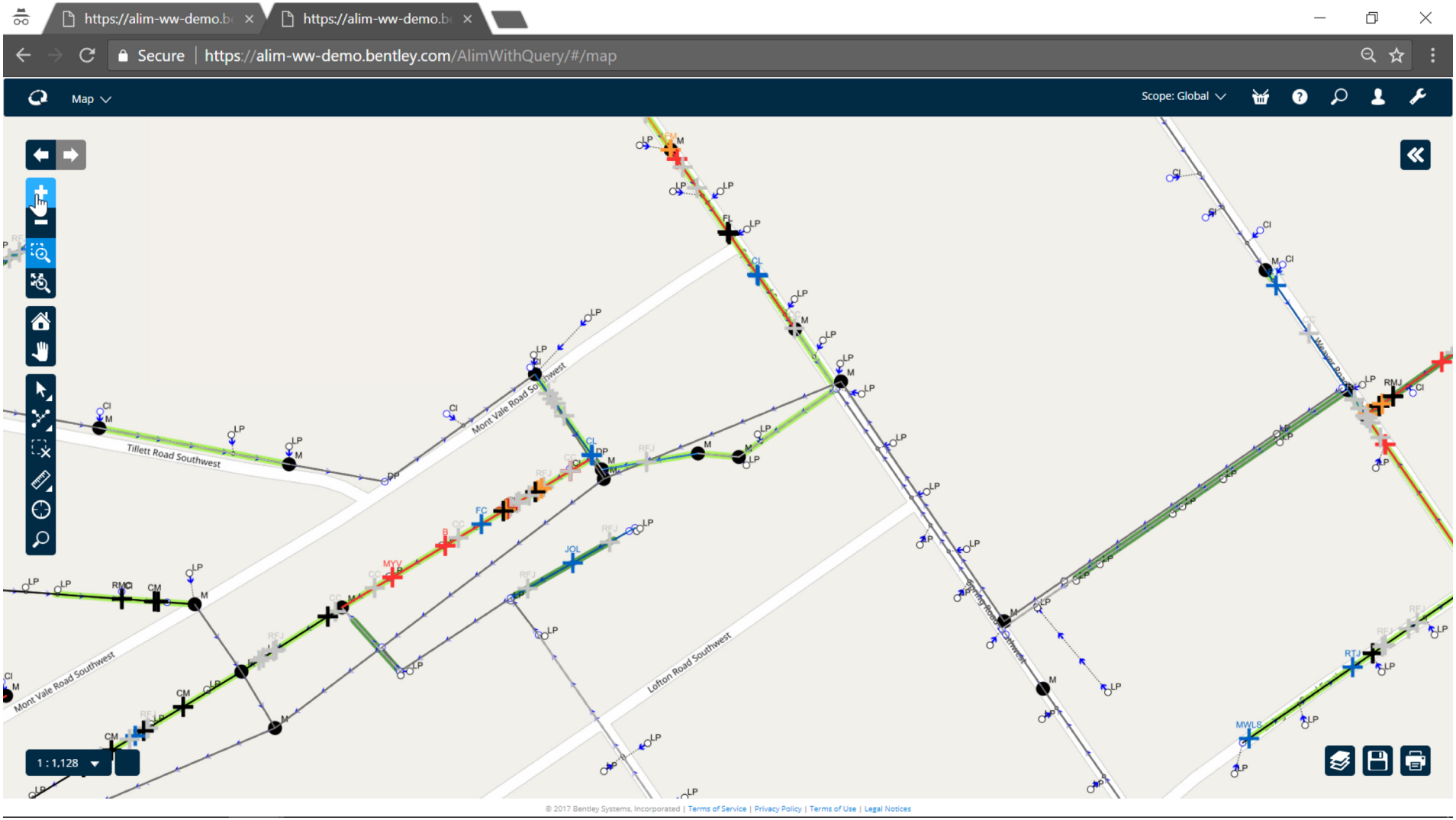
Bentley

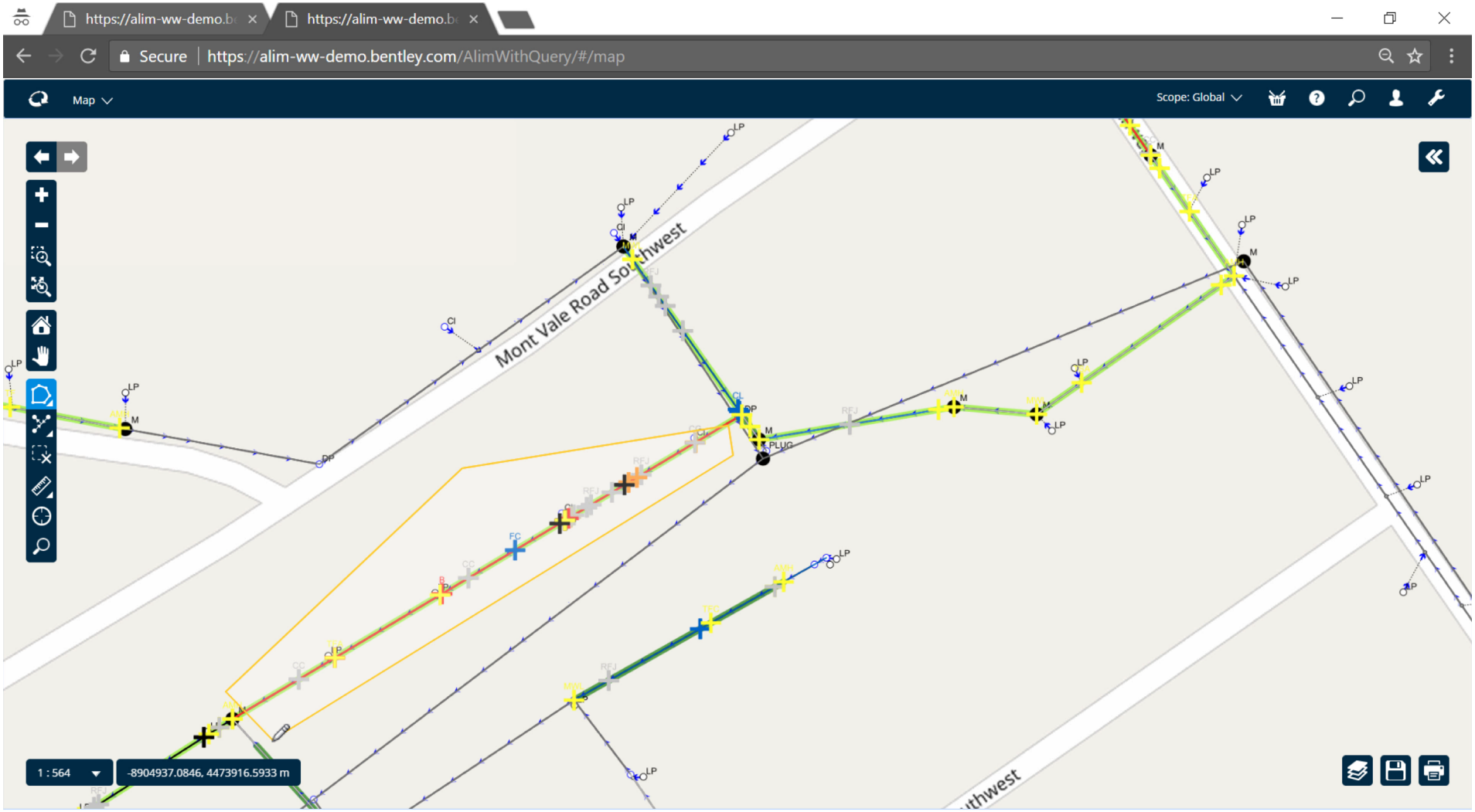


© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices

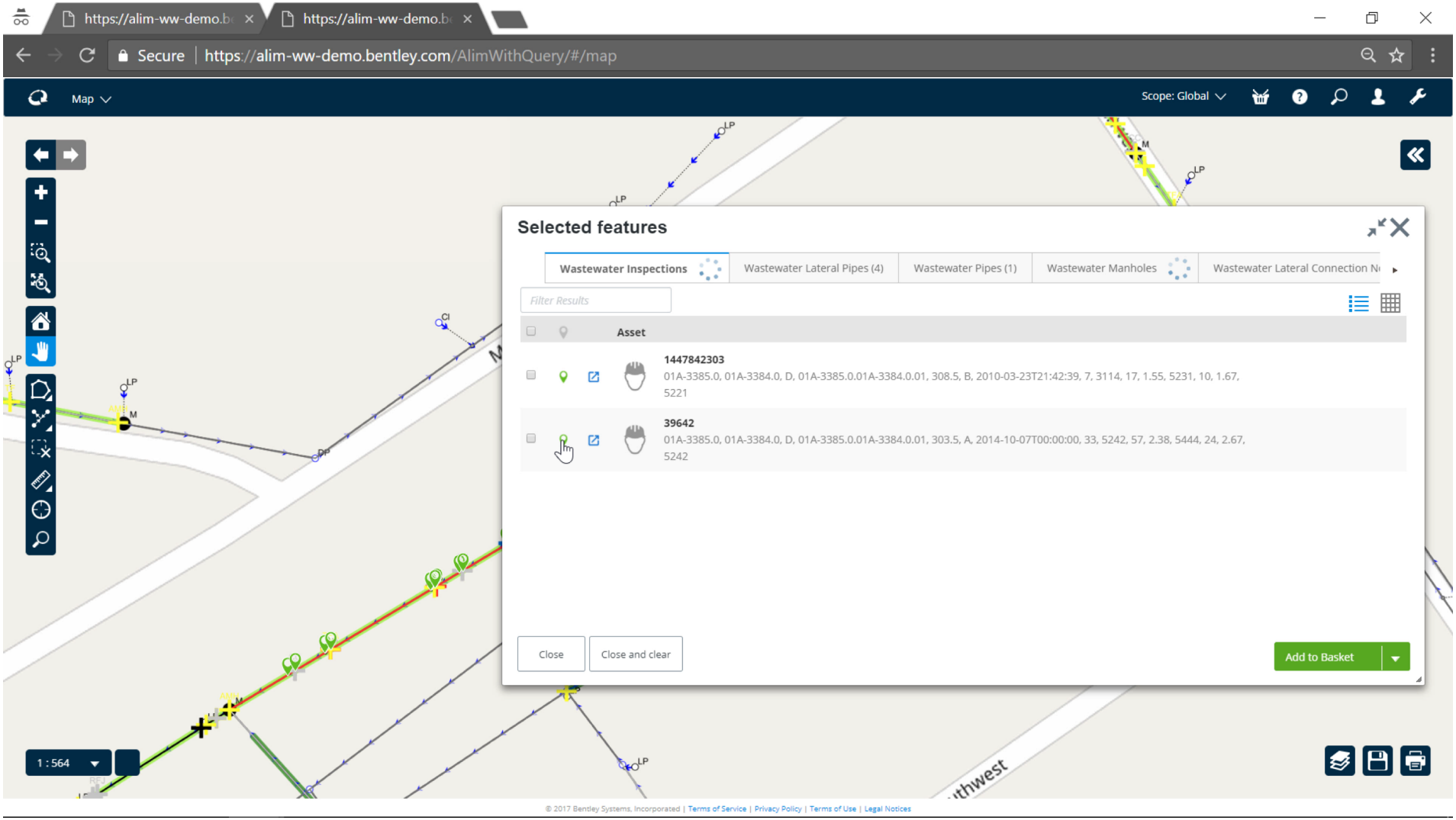


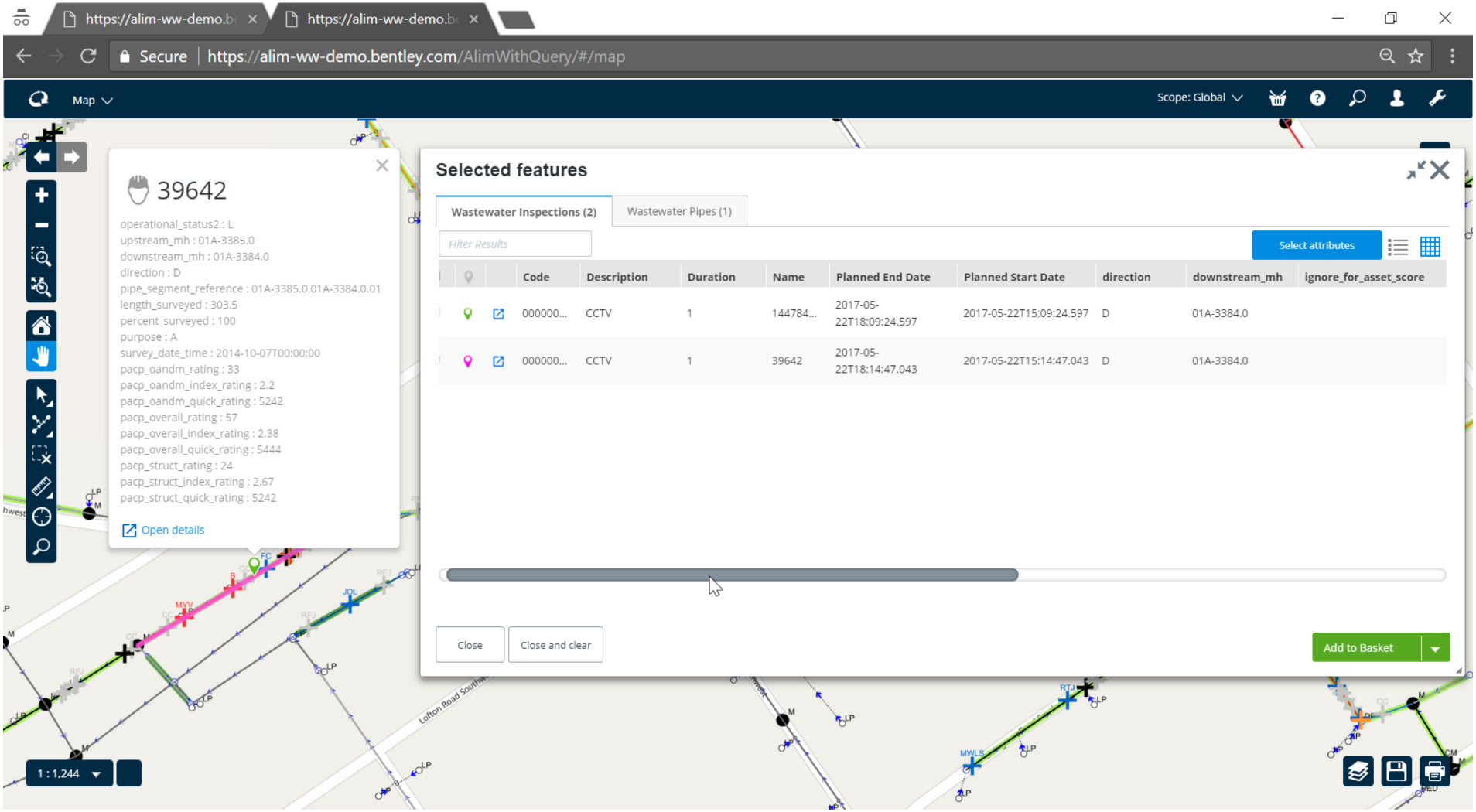
© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices


https://alim-ww-demo.b
https://alim-ww-demo.b
Secure
https://alim-ww-demo.bentley.com/AlimWithQuery/#/map
Map
Scope: Global
Tillett Road Southwest
Mont Vale Road Southwest
Lofton Road Southwest
Springfield Road Southwest
Weaver Road
1 : 1,128
© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices



© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices


https://alim-ww-demo.b
https://alim-ww-demo.b
Secure
https://alim-ww-demo.bentley.com/AlimWithQuery/#/map
Map
Scope: Global
Selected features
Wastewater Inspections
Wastewater Lateral Pipes (4)
Wastewater Pipes (1)
Wastewater Manholes
Wastewater Lateral Connection N
Filter Results
Asset
1447842303
01A-3385.0, 01A-3384.0, D, 01A-3385.0.01A-3384.0.01, 308.5, B, 2010-03-23T21:42:39, 7, 3114, 17, 1.55, 5231, 10, 1.67, 5221
39642
01A-3385.0, 01A-3384.0, D, 01A-3385.0.01A-3384.0.01, 303.5, A, 2014-10-07T00:00:00, 33, 5242, 57, 2.38, 5444, 24, 2.67, 5242
Close
Close and clear
Add to Basket
1 : 564
© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices


https://alim-ww-demo.b
https://alim-ww-demo.b
Secure | https://alim-ww-demo.bentley.com/AlimWithQuery/#/map
Map
Scope: Global
39642
operational_status2 : L
upstream_mh : 01A-3385.0
downstream_mh : 01A-3384.0
direction : D
pipe_segment_reference : 01A-3385.0.01A-3384.0.01
length_surveyed : 303.5
percent_surveyed : 100
purpose : A
survey_date_time : 2014-10-07T00:00:00
pacp_oandm_rating : 33
pacp_oandm_index_rating : 2.2
pacp_oandm_quick_rating : 5242
pacp_overall_rating : 57
pacp_overall_index_rating : 2.38
pacp_overall_quick_rating : 5444
pacp_struct_rating : 24
pacp_struct_index_rating : 2.67
pacp_struct_quick_rating : 5242
Open details
Selected features
Wastewater Inspections (2)
Wastewater Pipes (1)
Filter Results
Select attributes
Code | Description | Duration | Name | Planned End Date | Planned Start Date | direction | downstream_mh | ignore_for_asset_score
000000... | CCTV | 1 | 144784... | 2017-05-22T18:09:24.597 | 2017-05-22T15:09:24.597 | D | 01A-3384.0
000000... | CCTV | 1 | 39642 | 2017-05-22T18:14:47.043 | 2017-05-22T15:14:47.043 | D | 01A-3384.0
Close
Close and clear
Add to Basket
1 : 1,244
© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices

https://alim-ww-demo.b | https://alim-ww-demo.b | PACP Inspection: 000000

Secure | https://alim-ww-demo.bentley.com/AlimWithQuery/#/eB/activities/Global_Task_PACP_INSP/2028

Menu | Scope: Global

Inspection 31778 on 01A-3395-01A-3391, NASSCO_PACKAGE_000006 > Task: 39642 > PACP Inspection: 00000000000000000000136

PACP Inspection: 00000000000000000000136

For Wastewater Pipes, 01A-3385.0.01A-3384.0.01

Attributes | Defects

Attributes

PACP Survey Details

Survey Date	Date Cleaned	Survey Length	Percent Surveyed	Total Length	Direction
10/7/2014		303.50	100	302.00	Downstream (camera pointing with flow)

Surveyed By	Category	Certificate Number	PO Number	Project Reference	Purpose
Larry Hale		123-4569		Rat Investigation	Maintenance Related

Reverse Setup	Preesure Value	Pre-Cleaning	Weather
0.00	0.00	No Pre-Cleaning	Dry Weather/Wet Ground

Ignore for Asset Score?	Operational Status
	Latest

PACP Asset Data

PACP Condition Details

PACP Location Details

PACP Supplementary Details

© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices

https://alim-ww-demo.b | https://alim-ww-demo.b | PACP Inspection: 000000

Secure | https://alim-ww-demo.bentley.com/AlimWithQuery/#/eB/activities/Global_Task_PACP_INSP/2028

Menu | Scope: Global

Inspection 31778 on 01A-3395-01A-3391, NASSCO_PACKAGE_000006 > Task: 39642 > PACP Inspection: 00000000000000000000136

PACP Inspection: 00000000000000000000136

For Wastewater Pipes, 01A-3385.0.01A-3384.0.01

Attributes | **Defects**

Actions

Estimated count: 35

Code	Operational Status	PACP code	Grade	Distance	Continuous	Counter	VCR Time	Remarks
00000000000000000000...	A	RFJ	1	77.10		400	640	
00000000000000000000...	A	RFJ		89.50		434	714	
00000000000000000000...	A	CC	1	92.00		446	726	
00000000000000000000...	A	RFJ	1	92.00		452	732	
00000000000000000000...	A	RFJ	1	99.70		478	758	
00000000000000000000...	A	B	4	101.60		508.99999999999994	829	
00000000000000000000...	A	RPP	0	101.60		530	850	OBJECT OVER HOLE
00000000000000000000...	A	RFJ	1	101.60		537	857	
00000000000000000000...	A	B	5	102.90		553	913	
00000000000000000000...	A	TBD	3	104.60		595	955	FACTURE IN/SIDE SC
00000000000000000000...	A	TBA	0	104.70		649	1049	2726 MONTVALE RD SW
00000000000000000000...	A	RMJ	3	105.10	S01	678	1118	
00000000000000000000...	A	FM	4	105.10		688	1128	
00000000000000000000...	A	RPP	0	105.10		708	1148	OBJECT OVER HOLE

© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices

https://alim-ww-demo.b | https://alim-ww-demo.b | Asset: 01A-3385.0.01A-3

Secure | https://alim-ww-demo.bentley.com/AlimWithQuery/#/eB/tag/Global_Tag_WW_PIPE/2480?loadTab=FrameworkGrid

Menu | Scope: Global

PACP Inspection: 00000000000000000000136 > PACP Observation: 00000000000000000000000001600 (Rev. 1) > Asset: 01A-3385.0.01A-3384.0.01

Asset: 01A-3385.0.01A-3384.0.01

Wastewater Pipes, 01A-3385.0.01A-3384.0.01

Attributes | Map | Inspections | Defects | Contextual Reports

Attributes

Condition Details

Survey Date
10/7/2014

O&M Rating	Structural Rating	Overall Rating
33.00	24.00	57.00

O&M Index Rating	Structural Index Rating	Overall Index Rating	Tony
2.20	2.67	2.38	INUSE

O&M Quick Rating	Structural Quick Rating	Overall Quick Rating
5242	5242	5444

O&M Condition Score	Structural Condition Score	Internal Pipe Score
2.00	2.00	

Location Details

Supplementary Details

Asset Details

Wastewater Pipe

© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices

https://alim-ww-demo.b | https://alim-ww-demo.b | PACP Inspection: 000000 | PACP Observation: 0000

Secure | https://alim-ww-demo.bentley.com/AlimWithQuery/#/eB/condition/Global_Condition_PACP_OBSERVATION/23346

Menu | Scope: Global

Task: 31778 > PACP Inspection: 00000000000000000000165 > PACP Observation: 00000000000000000000000001999 (Rev. 1)

PACP Observation: 00000000000000000000000001999 (Rev. 1)

For Wastewater Pipes, 01A-3395.0.01A-3391.0.01, PACP Inspection, 00000000000000000000165

Attributes | Files

Actions

Name	Size	Uploaded On
01A-3395.001A-3391.0_6_10172013__125813004.jpg	266.69 KB	9/11/2017

© 2017 Bentley Systems, Incorporated | Terms of Service | Privacy Policy | Terms of Use | Legal Notices

iModel 2.0 Platform

Bentley
Advancing Infrastructure

© 2017 Bentley Systems, Incorporated

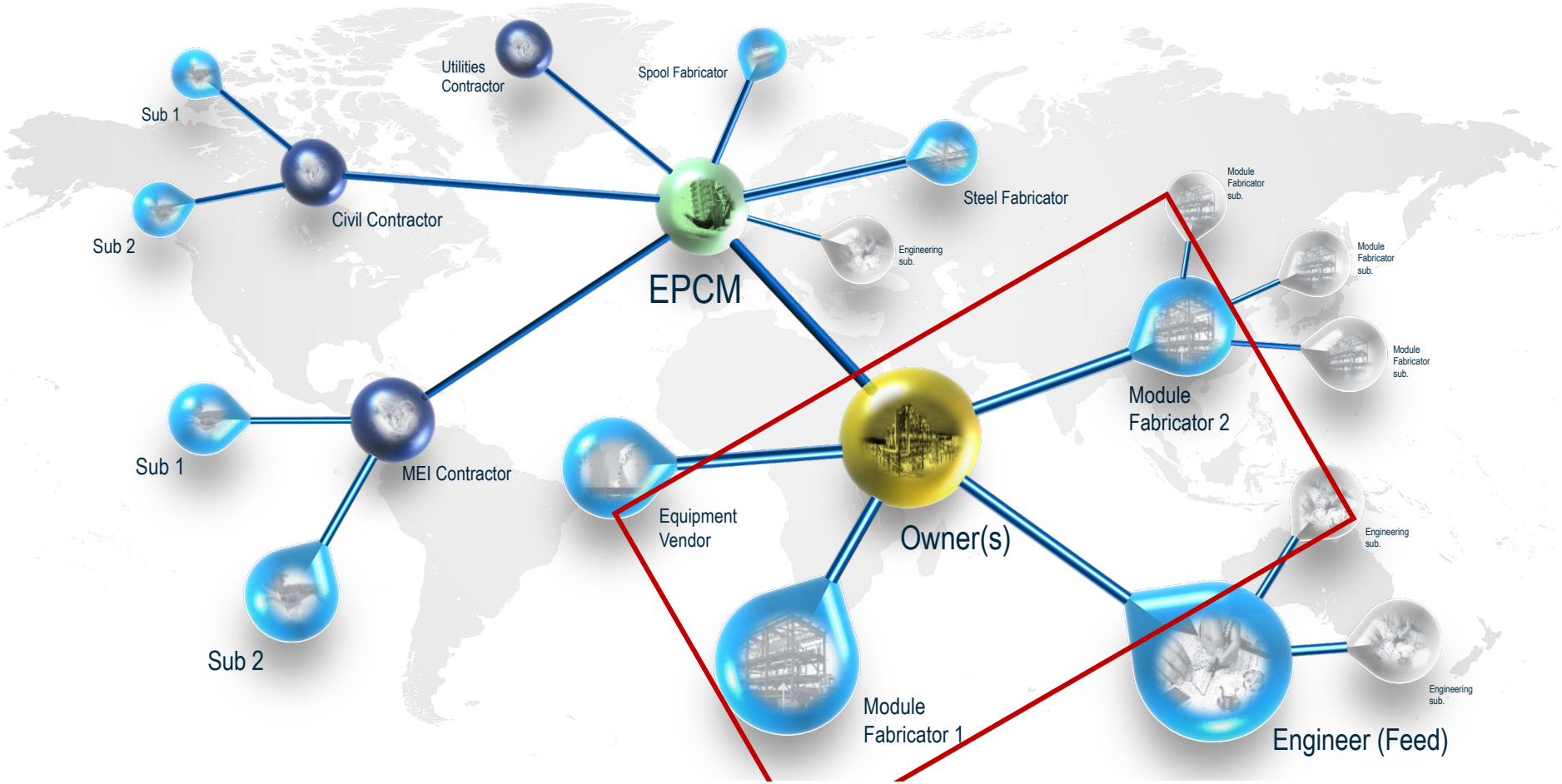
Engineering Firm/Owner-operator CIO's Problem

- Dark Engineering Data
  - Locked in files
  - Siloed in proprietary databases
  - Of limited value
- Difficulty Tracking Change
  - What changed?
  - Who changed it?
  - Why was it changed?
  - What does this change affect?

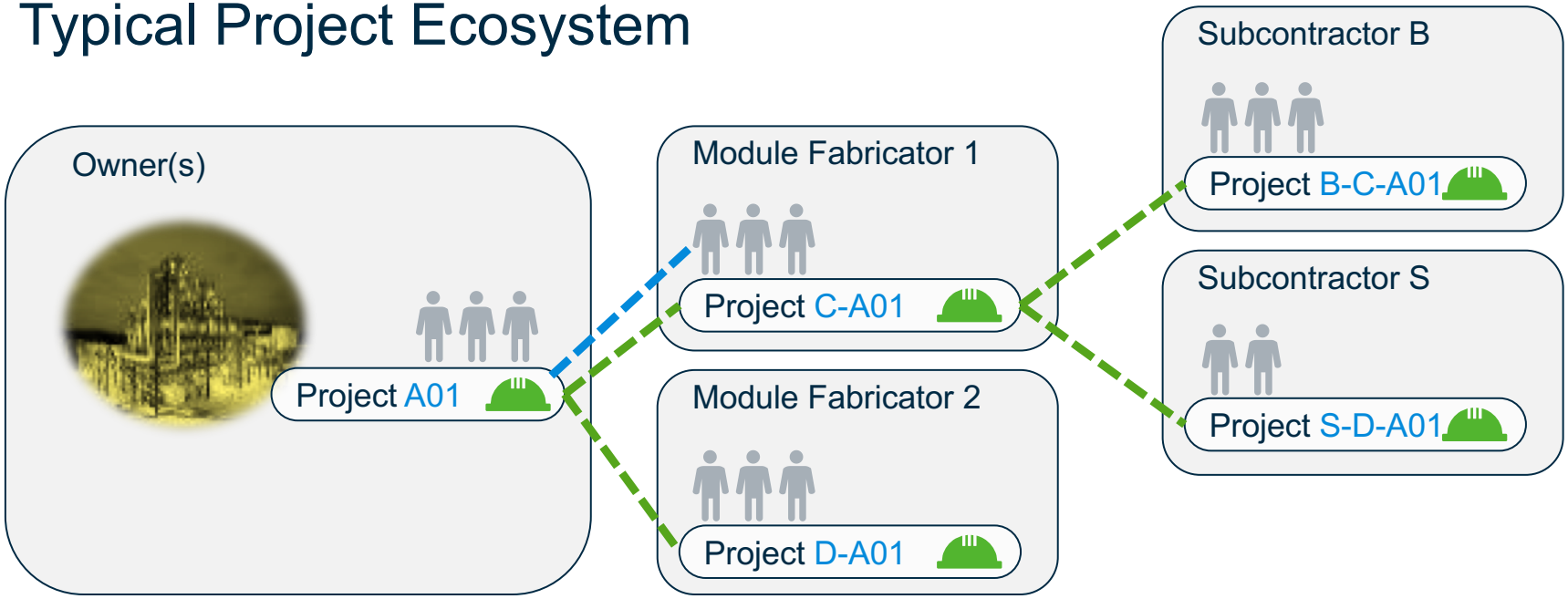
 © 2017 Bentley Systems, Incorporated

Bentley

Typical Project Ecosystem



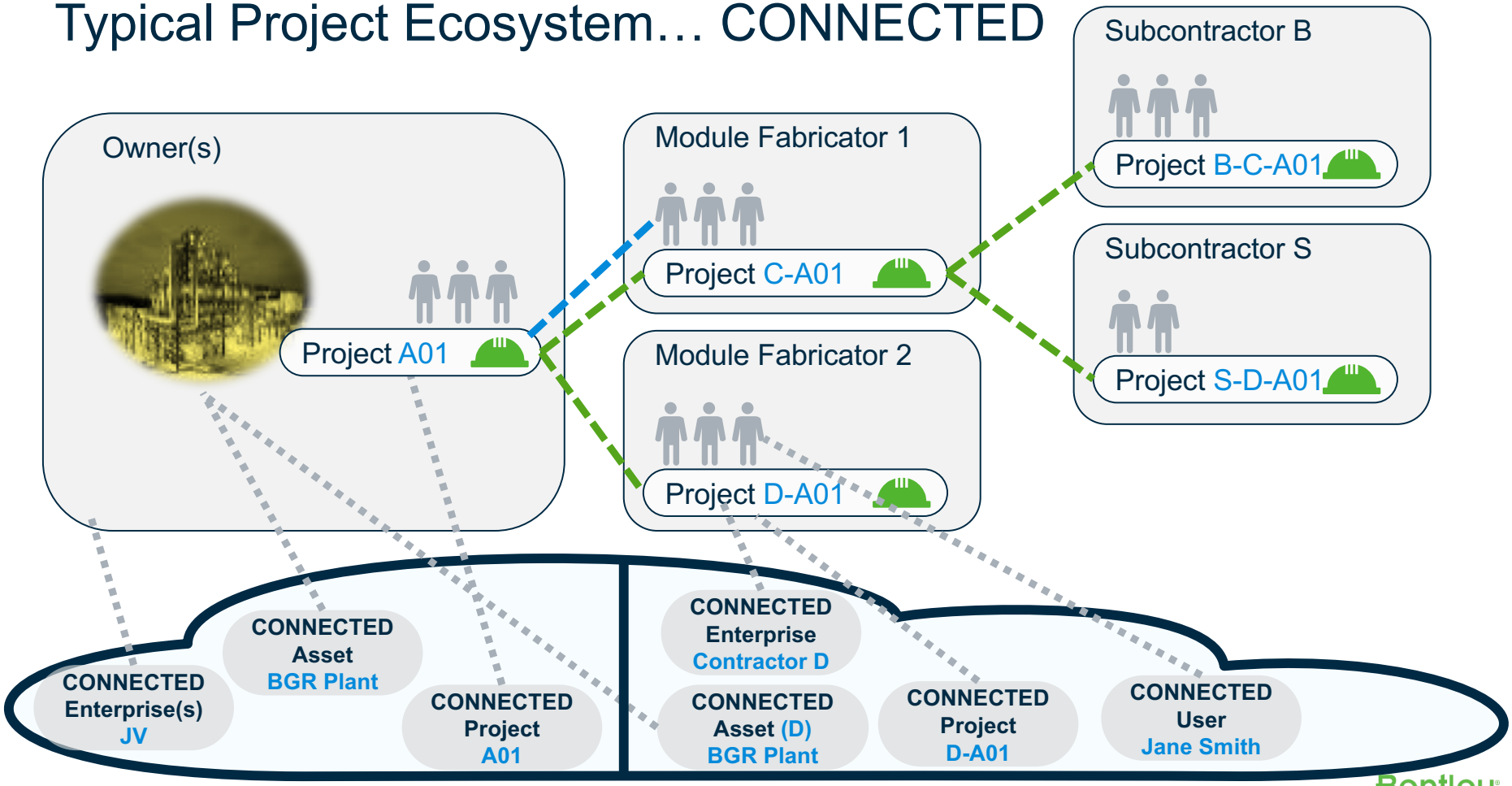
Typical Project Ecosystem



 © 2017 Bentley Systems, Incorporated

Bentley

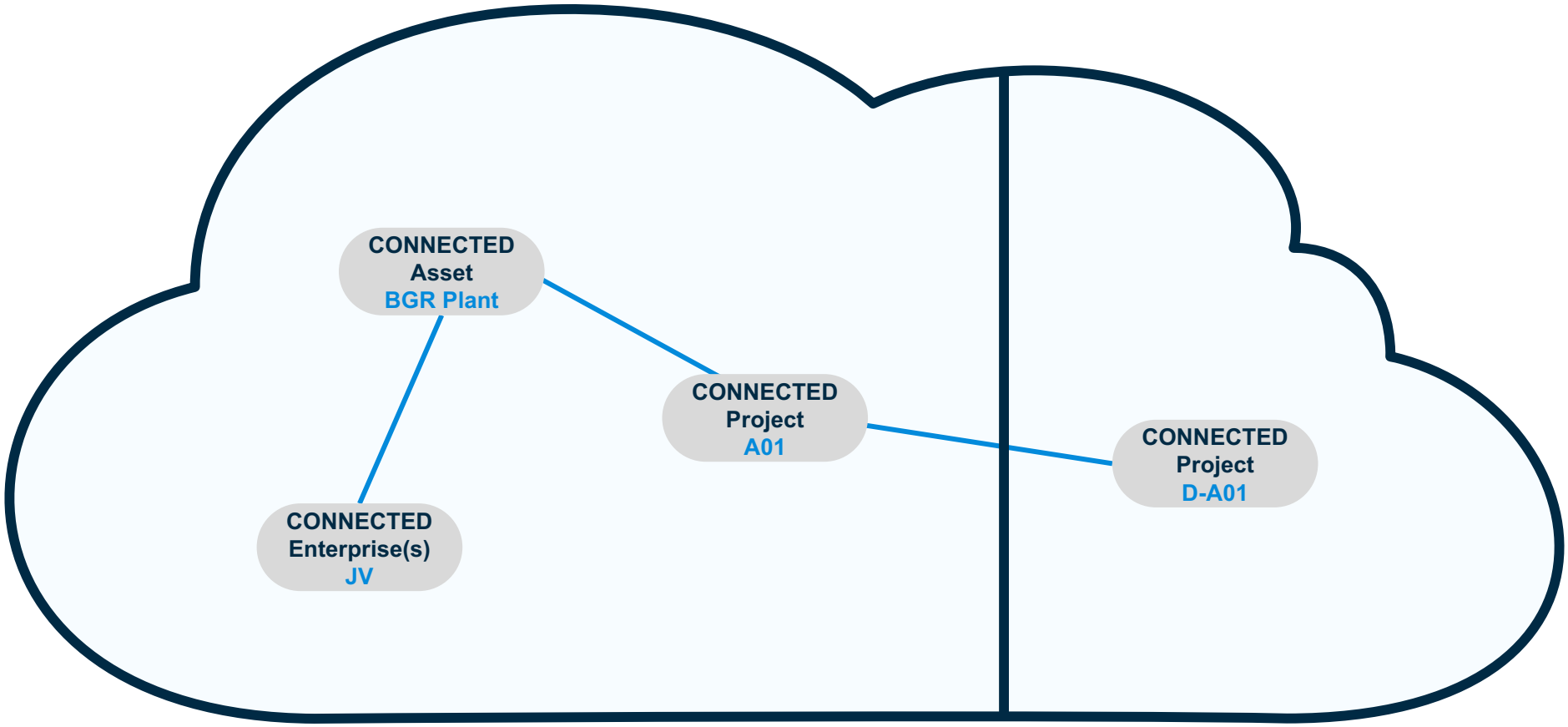
Typical Project Ecosystem… CONNECTED



 © 2017 Bentley Systems, Incorporated

Bentley

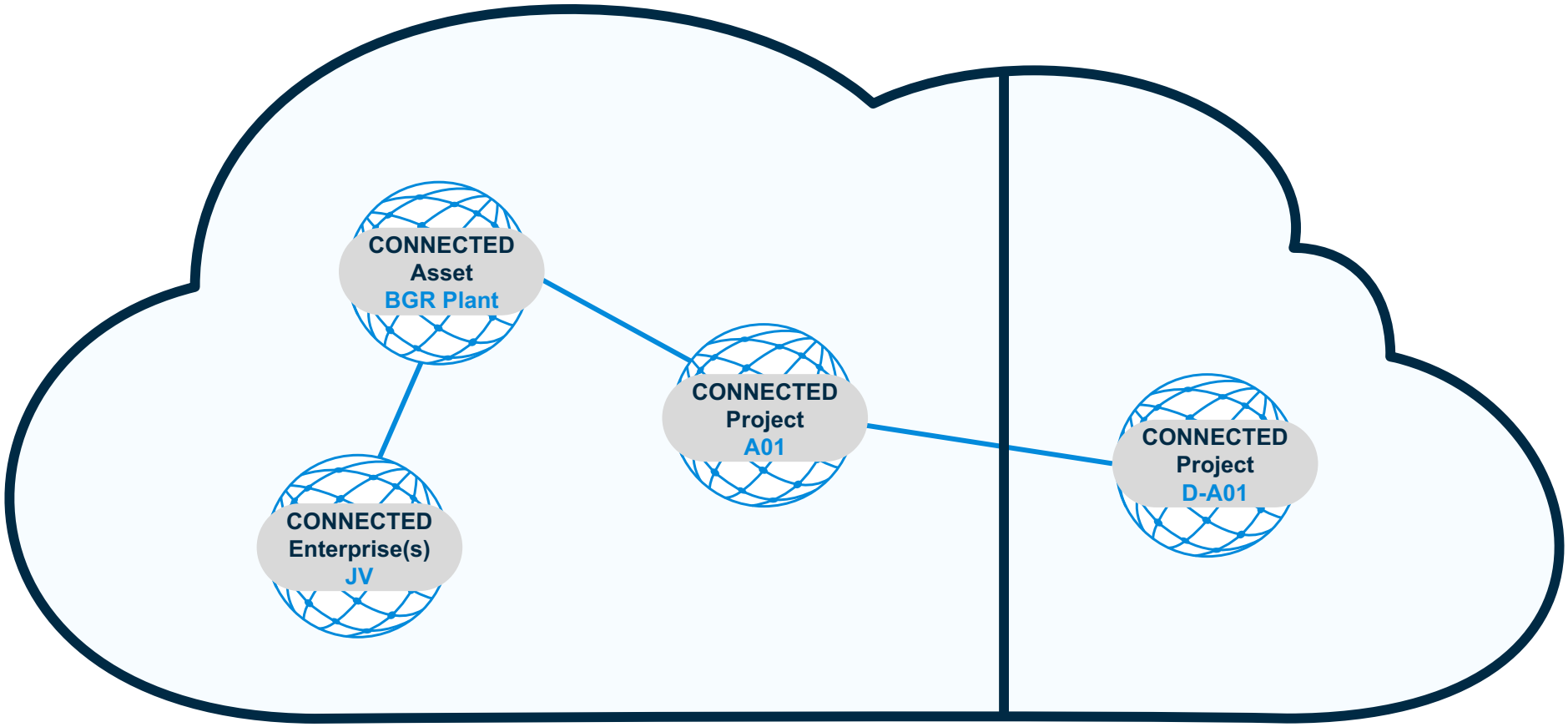
CONNECTED Data Environment – Modeling the supply chain



 © 2017 Bentley Systems, Incorporated

Bentley

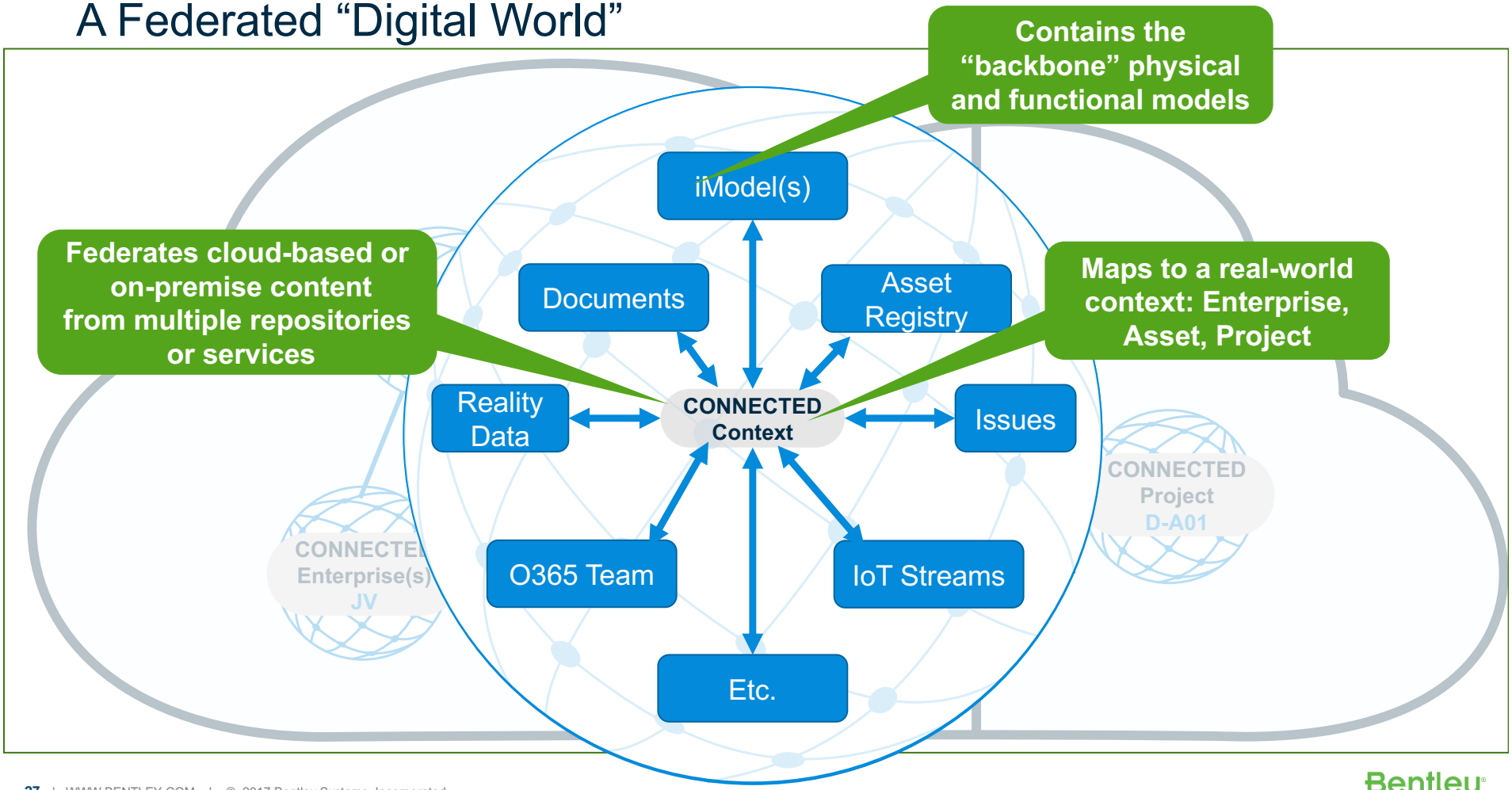
CONNECTED Data Environment – a platform for “Digital Worlds”



 © 2017 Bentley Systems, Incorporated

Bentley

A Federated “Digital World”



 © 2017 Bentley Systems, Incorporated

Bentley

iModel 2.0 Platform Themes

- **Alignment** of opaque data… to make it usable by services
- **Accountability** by gaining insights into data and change
- **Accessibility** of data and change for diverse digital workflows

 © 2017 Bentley Systems, Incorporated

Bentley

iModel Schemas

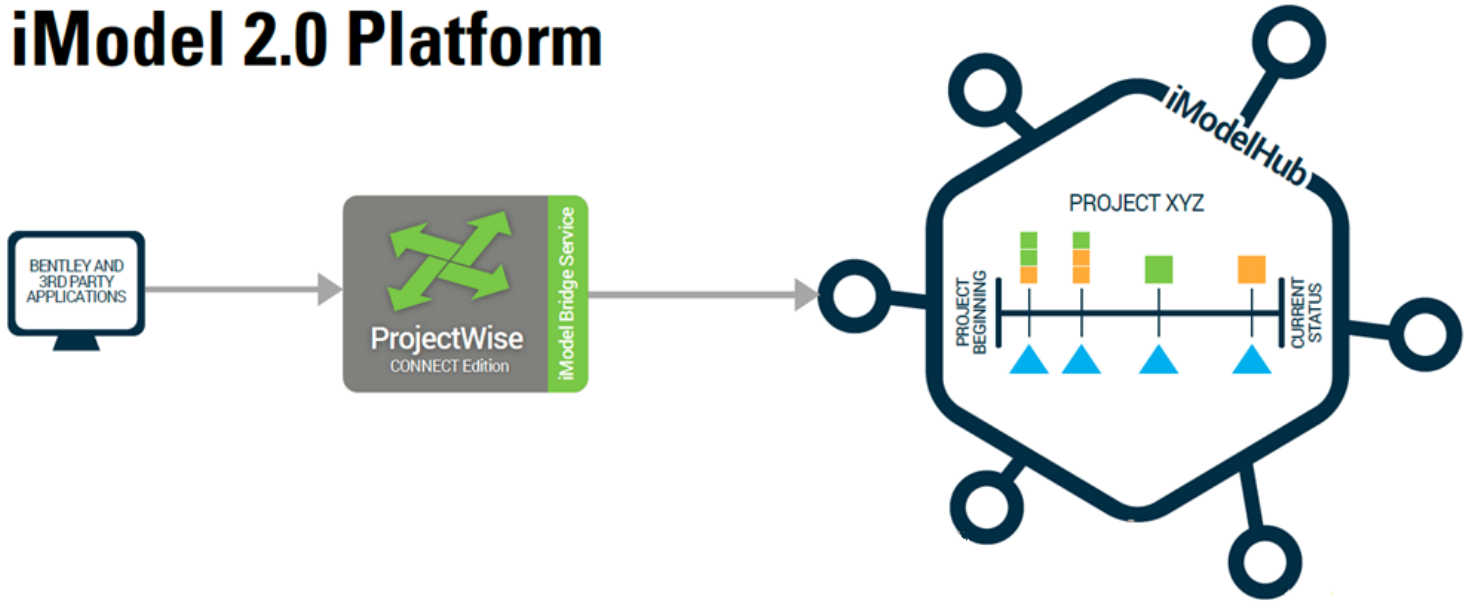
- A set of cohesive, comprehensive schemas for engineering data in the Connected Data Environment and iModels
  - All disciplines
  - All lifecycle phases
  - Modularized into “domains”
  - Map to industry standards
  - Evolving…
- Describe information in a way that our services can understand… for insights and automation of high-level digital workflows

 © 2017 Bentley Systems, Incorporated

Bentley

iModel 2.0 Platform

iModel 2.0 Platform

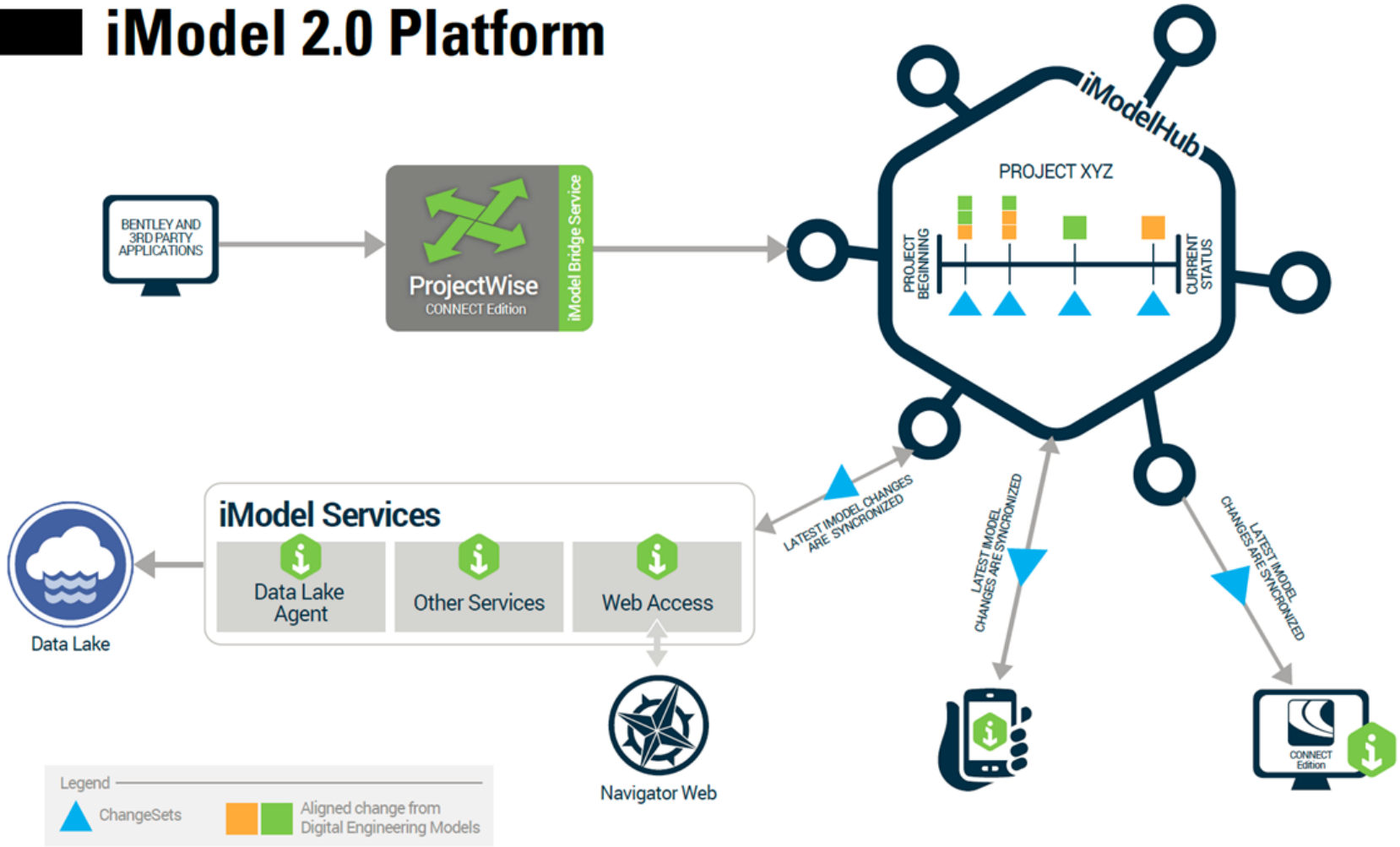


Legend

ChangeSets

Aligned change from Digital Engineering Models

iModel 2.0 Platform



The Big Picture…

- CIO's Problem:
  - Engineering data locked in files and proprietary databases, limiting its value
  - Difficulty tracking change in the engineering data
- Solution: Align it into a form that our services understand:
  iModel 2.0

  Alignment
- Immediate Benefits:
  - Data Insights
  - Change Insights

  Accountability
  - Web access (Browser and APIs)
  - Occasionally-connected mobile access
  - Automated high-level digital workflows

  Accessibility

 © 2017 Bentley Systems, Incorporated

Bentley

/perspectives-and-viewpoints/topics/campaign/imodelhub | inside.bentley.com | iModel 2.0 - Next Generatio...

SIGN IN | CONTACT US | EVENTS | LEARNING | SUPPORT | STORE

Bentley

Solutions Products Services Subscriptions User Projects

Home > imodelHub

The Next Generation Cloud Platform for Digital Workflows

Infrastructure projects involve many collaborating disciplines where work is very interconnected, with distributed teams and thousands of asynchronous decisions and changes for design, material choices, aesthetics, structural integrity, safety, and more. If constant and unrelenting change characterizes infrastructure projects, then it would seem self-evident that our systems

Download White Paper

Hear from Keith Bentley,

Bentley

Questions?

Bentley
Advancing Infrastructure

© 2017 Bentley Systems, Incorporated