Model City-scale Digital Twins in Any GIS Repository

OpenCities Map

Bentley
Advancing Infrastructure

Agenda

- Challenges of cities' geomatic departments
- How OpenCities Map can help
- OpenCities Map (3 products)
- Update 5!!

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Challenges of cities' geomatic departments

- Need GIS data in their engineering projects
- Need better workflows for facilitating project approval
- Need 3D data but only have legacy data is 2D
- Want to work with open standards like CityGML

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How OpenCities Map can help

- By making any GIS assets available for non-GIS applications
- With its LumenRT support, a static project can come alive with realistic visualization
- With its CAD roots, it is ideal for creating and modifying any spatial assets – including linking of 2D assets to a reality meshes
- With many tools to read, create, edit, and write CityGML files

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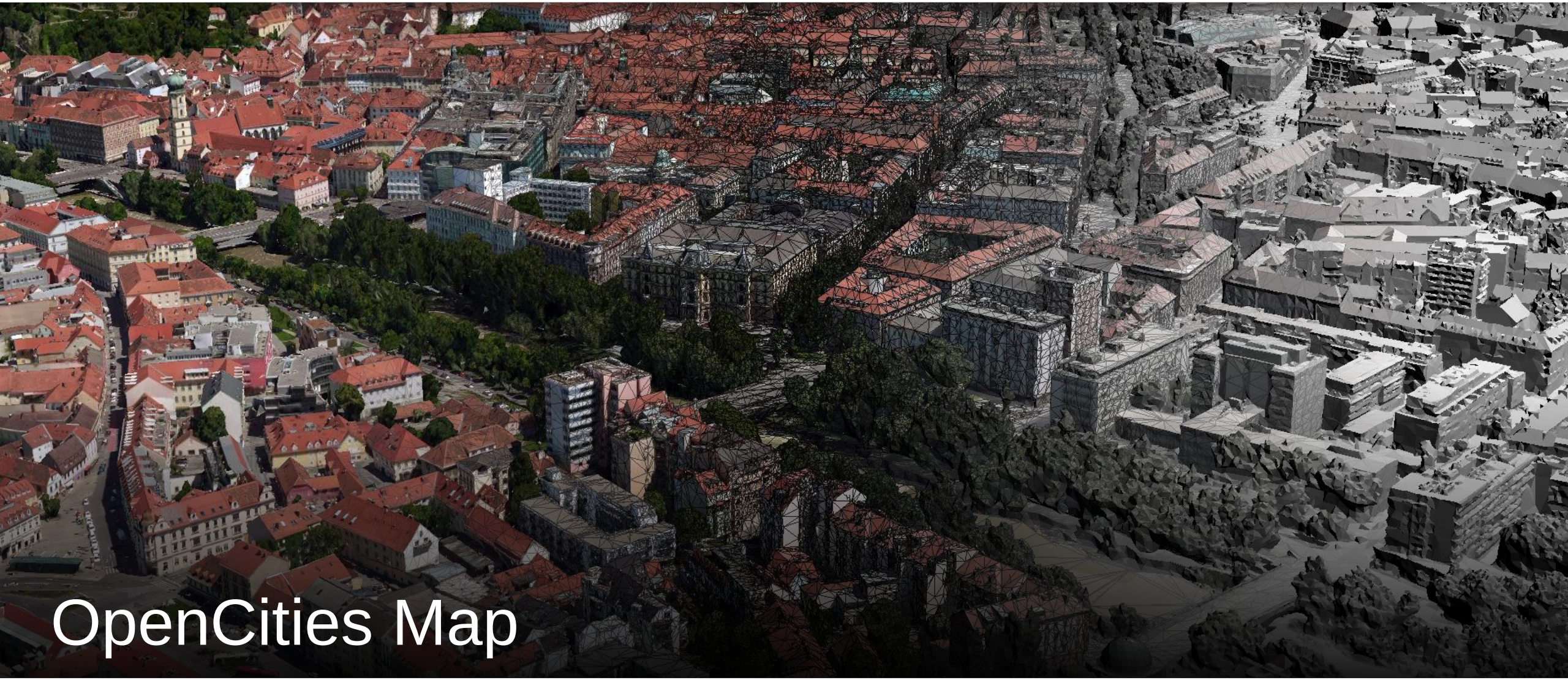

OpenCities Map

Model 2D and 3D assets in any GIS repository

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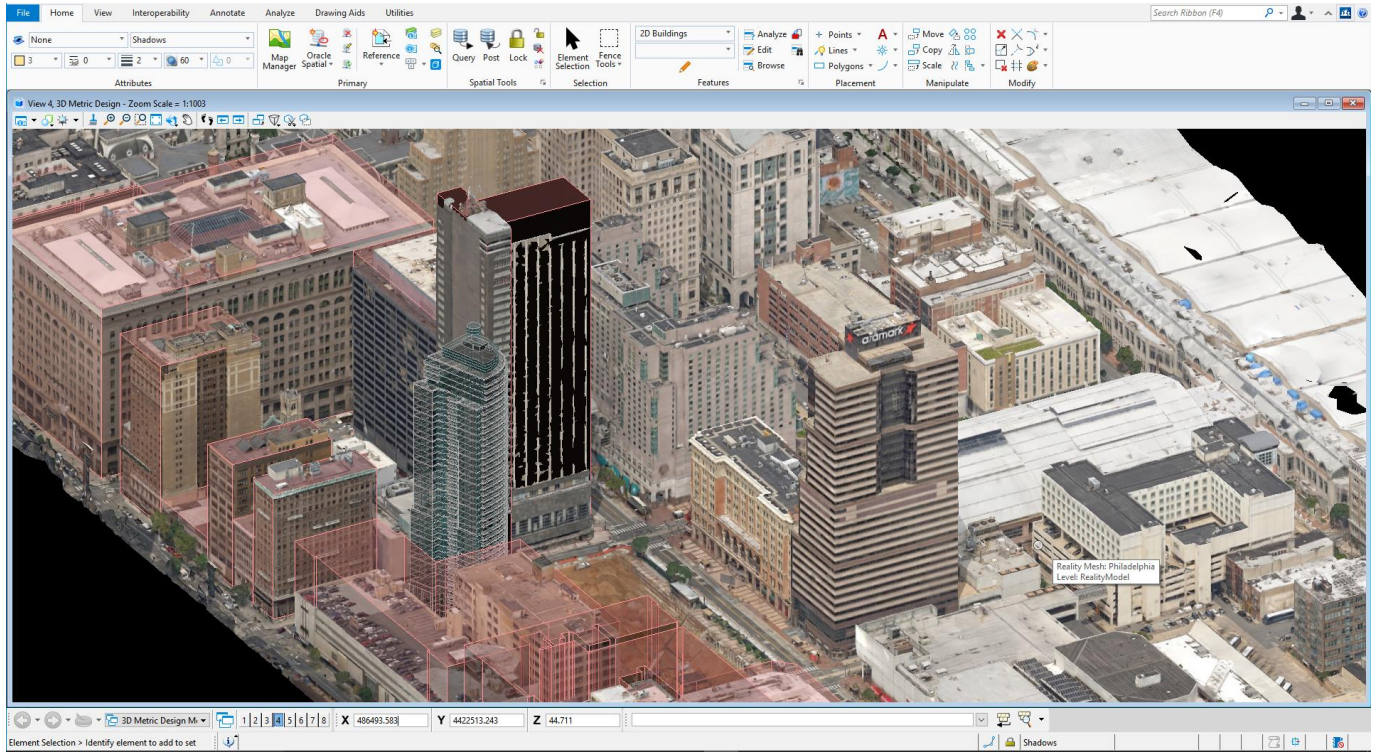
OpenCities Map (3 products)

OpenCities Map PowerView

OpenCities Map

OpenCities Map Enterprise



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OpenCities Map PowerView

For users that primarily need to view and perform 2D feature acquisition and editing

- OpenCities Map PowerView supports GPS and editing capabilities, making it ideal for field-based operations requiring feature editing
- Query leading spatial databases such as Oracle Spatial, Microsoft SQL Server, Esri ArcGIS Server, and PostGIS
- Use a strong yet flexible application program interface (API) for developing custom GIS applications

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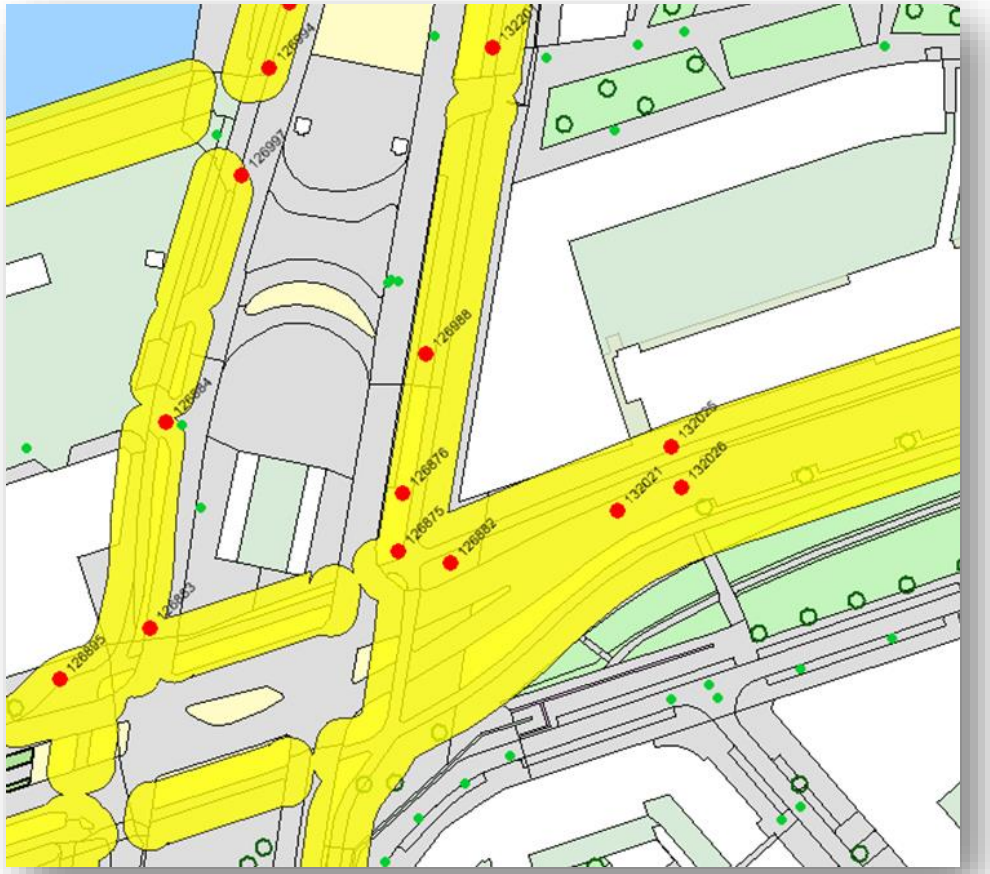
OpenCities Map

Provides efficient tools to model assets in your GIS repository

- Interoperability tools and a collection of thoughtful data standards
- Directly edit features in spatial databases like Oracle Spatial, SQL Server and PostGIS
- A strong yet flexible application program interface (API) with high-level geospatial functionality to increase application performance and reduce development time
- Work with hundreds of additional file formats using optional FME integration



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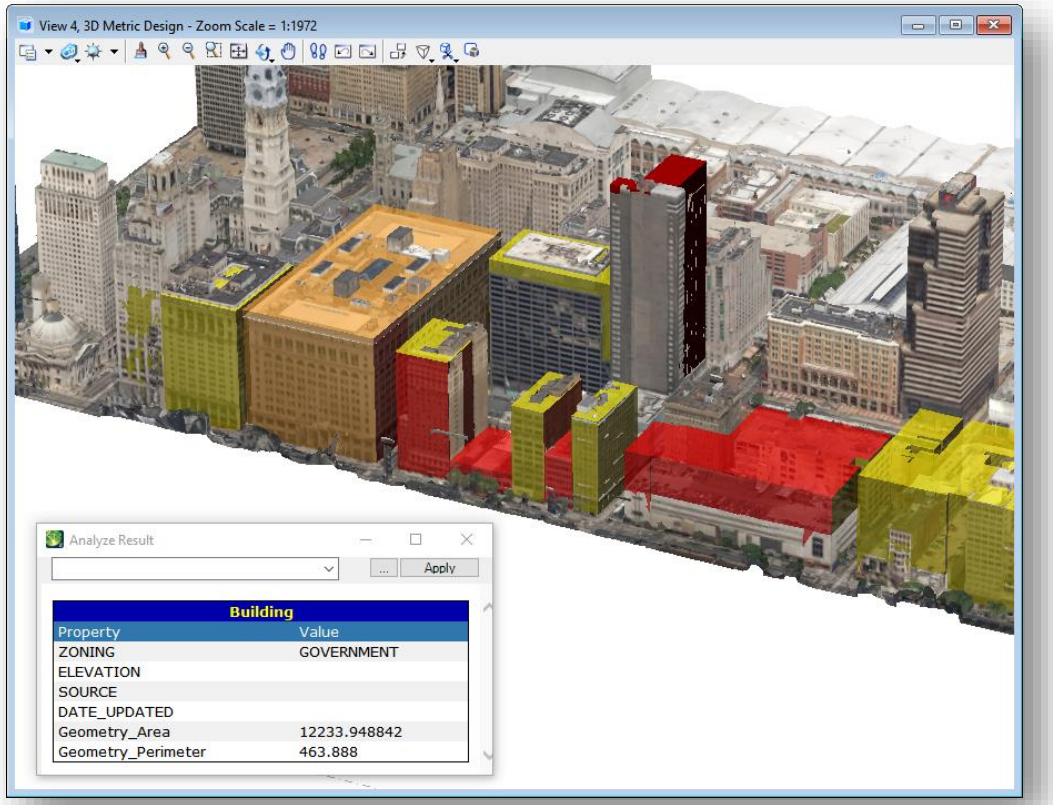
OpenCities Map Enterprise

Helps you create and aggregate a 3D model of assets for all your smart city needs

- Quickly add semantic information to your features in your reality meshes
- Consume information from various design disciplines
- Includes high-level tools to maintain your reality data
- Complete set of 3D tools to model your assets



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TOP 10 REASONS TO MOVE TO OpenCities Map CONNECT Edition

1 Scalability

Manage larger models and datasets than any previous version.

2 Performance

Display reality meshes much faster with redesigned display engine.

3 PostGIS

Access PostGIS as your main feature repository for a spatial extension to PostgreSQL.

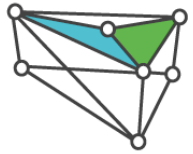
4 Overlay Geospatial Assets on Bing Maps

Align models with aerial backgrounds to convey real-world conditions by adding specific control points.

5 User Interface

Work faster using a redesigned interface of functionalities grouped into workflows and a powerful new search bar.

6 Reality Mesh Improvements

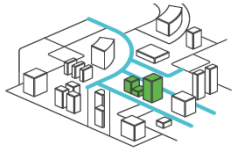


Add semantic information to reality meshes of any size and scale with the new classification tool.

7 Reality Data Processing Tools (Map Enterprise Only)

Integrate reality modeling data such as reality meshes, point clouds, terrain models, and more for information modeling workflows.

8 iModel Improvements



Generate an iModel and publish it directly to ProjectWise Share to stream across project teams and applications.

9 Improve Data Sharing Across Distributed Teams

Improve data sharing across desktop, mobile, server, and cloud using CONNECT Center on the Bentley Cloud Services site.

10 Update to CONNECT Edition to Realize New Savings

Save time and money when you update and take advantage of new CONNECT Edition applications.

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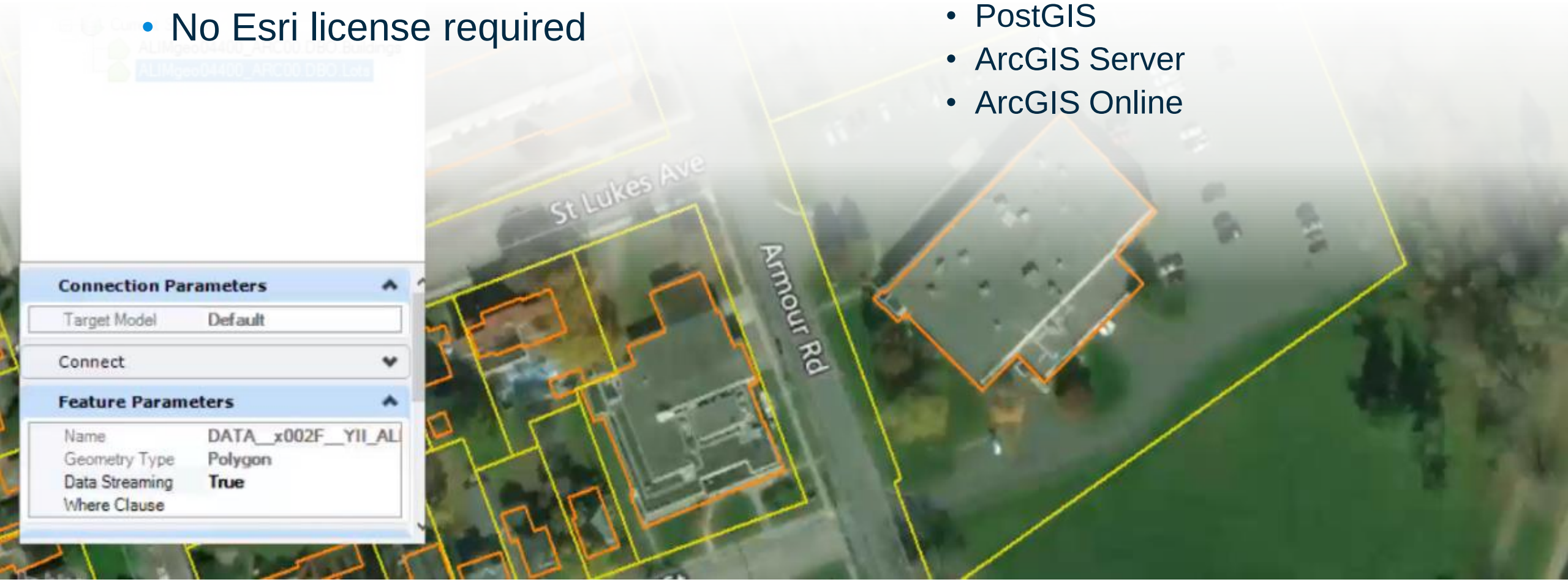
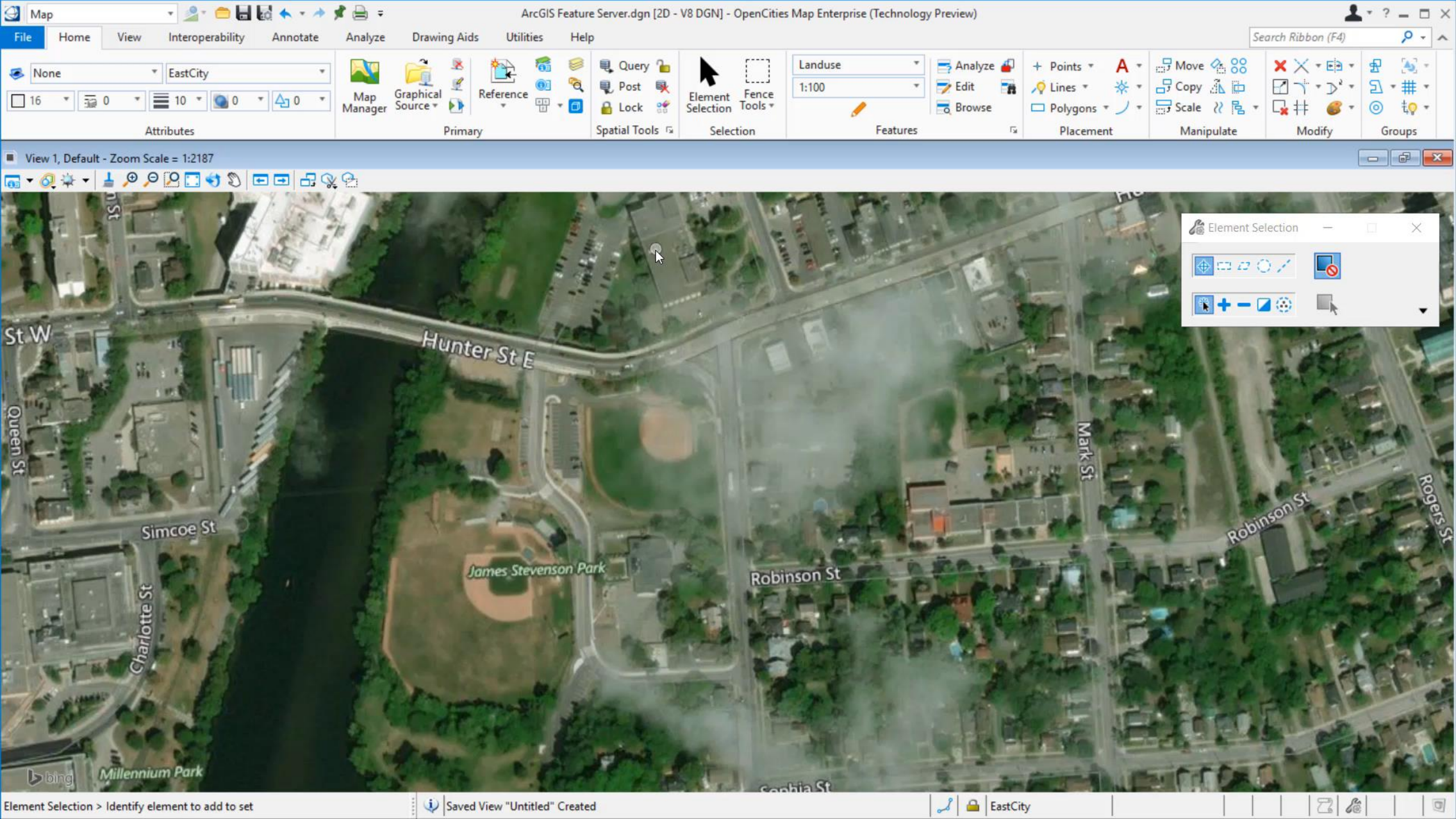
ArcGIS Server and ArcGIS Online

- Read and write support
- No Esri license required

- Only in CONNECT Edition
  - PostGIS
  - ArcGIS Server
  - ArcGIS Online




Map
ArcGIS Feature Server.dgn [2D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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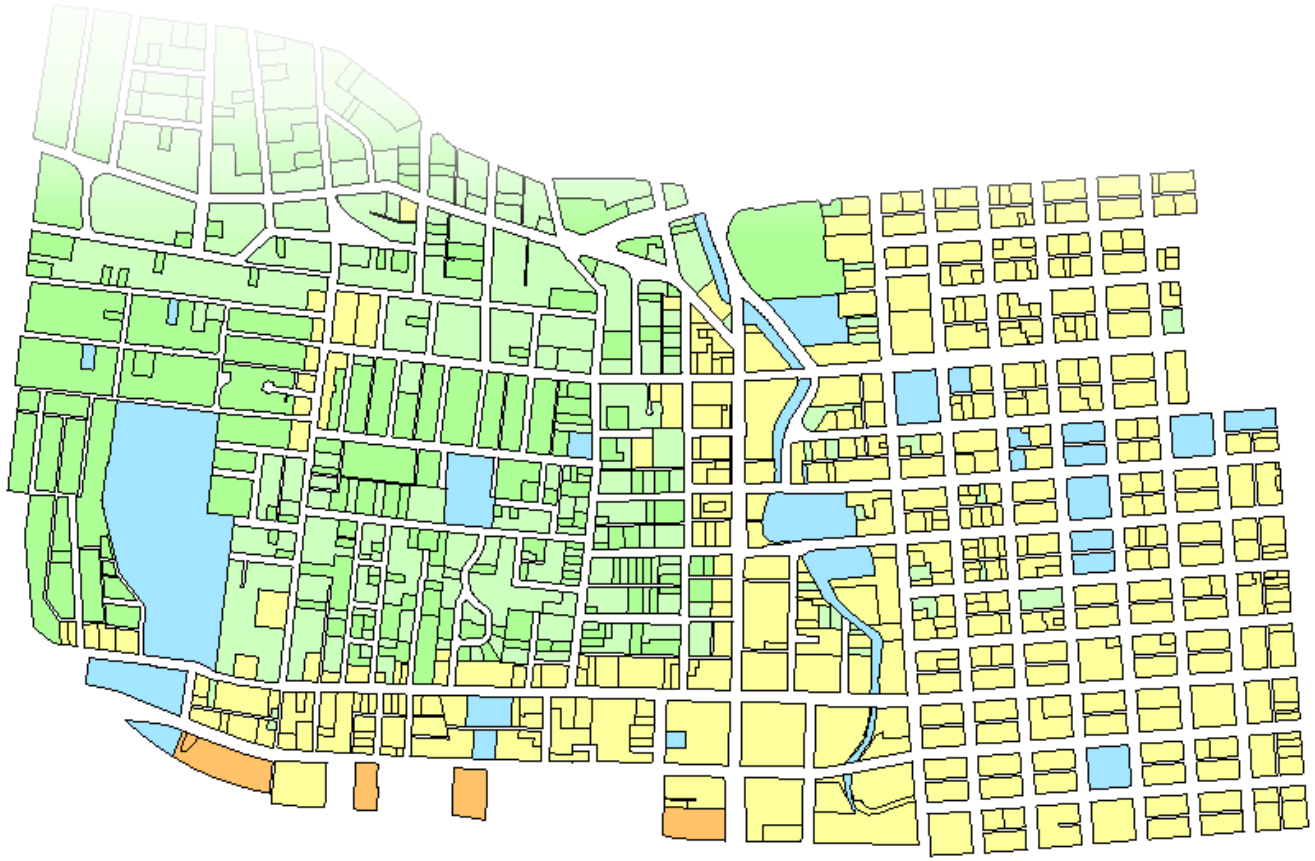
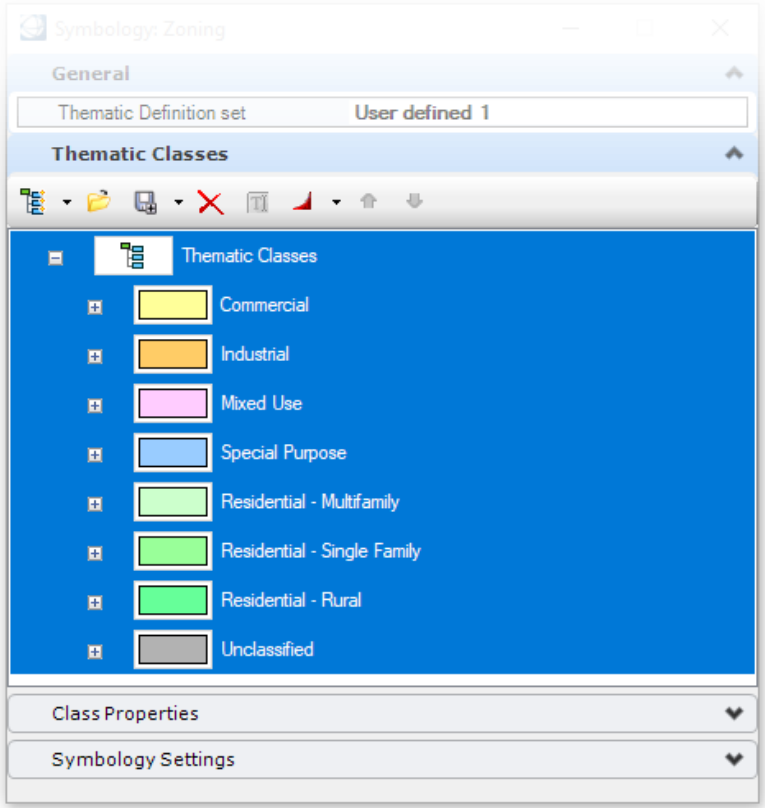
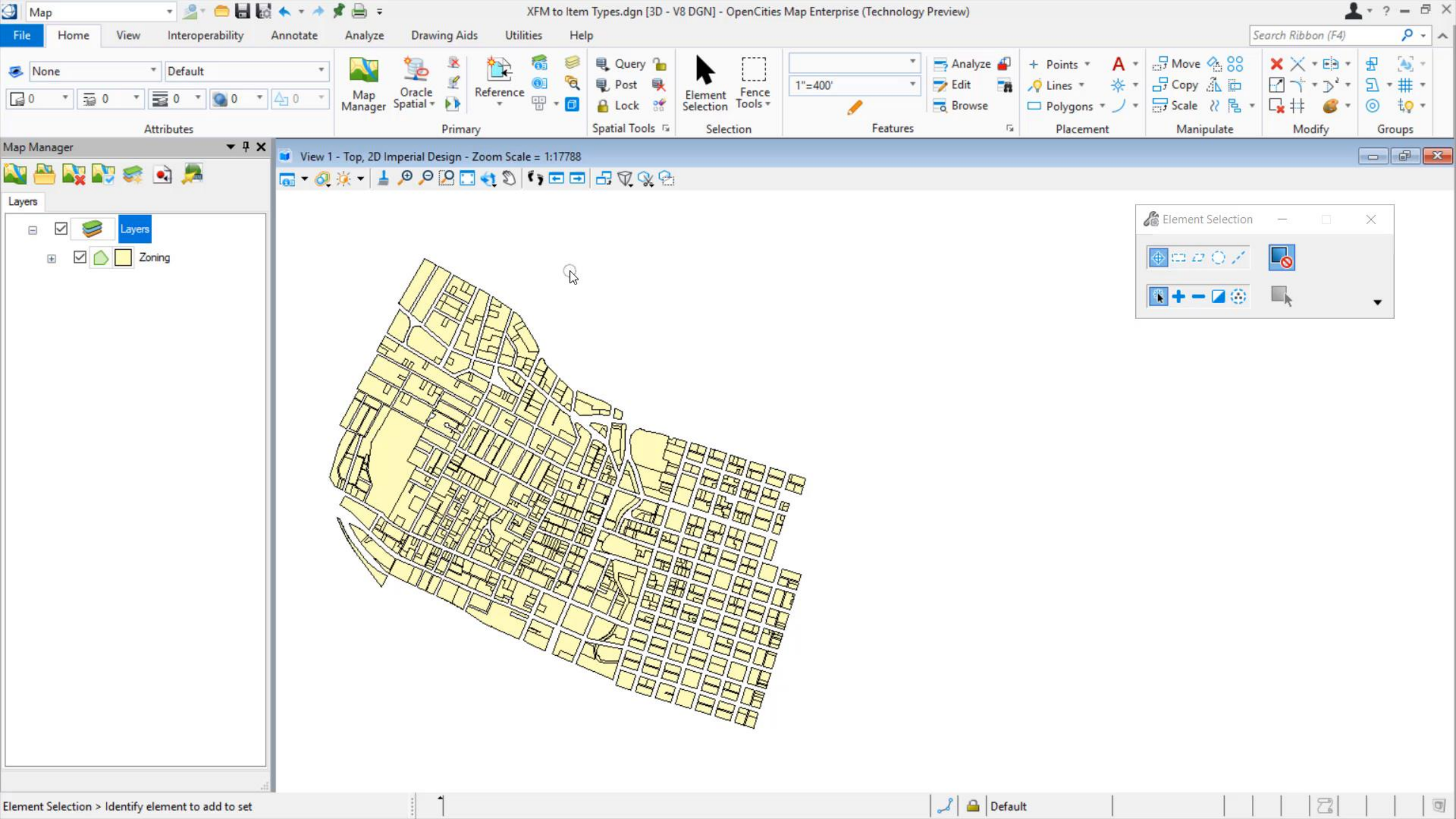
Mark St
Robinson St
Rogers St
Millennium Park
bing
Element Selection > Identify element to add to set
Saved View "Untitled" Created
EastCity

Sharing GIS information

- Convert an XFM DGN to a MicroStation DGN
- Easier to share GIS assets with BIM applications






Map
XFM to Item Types.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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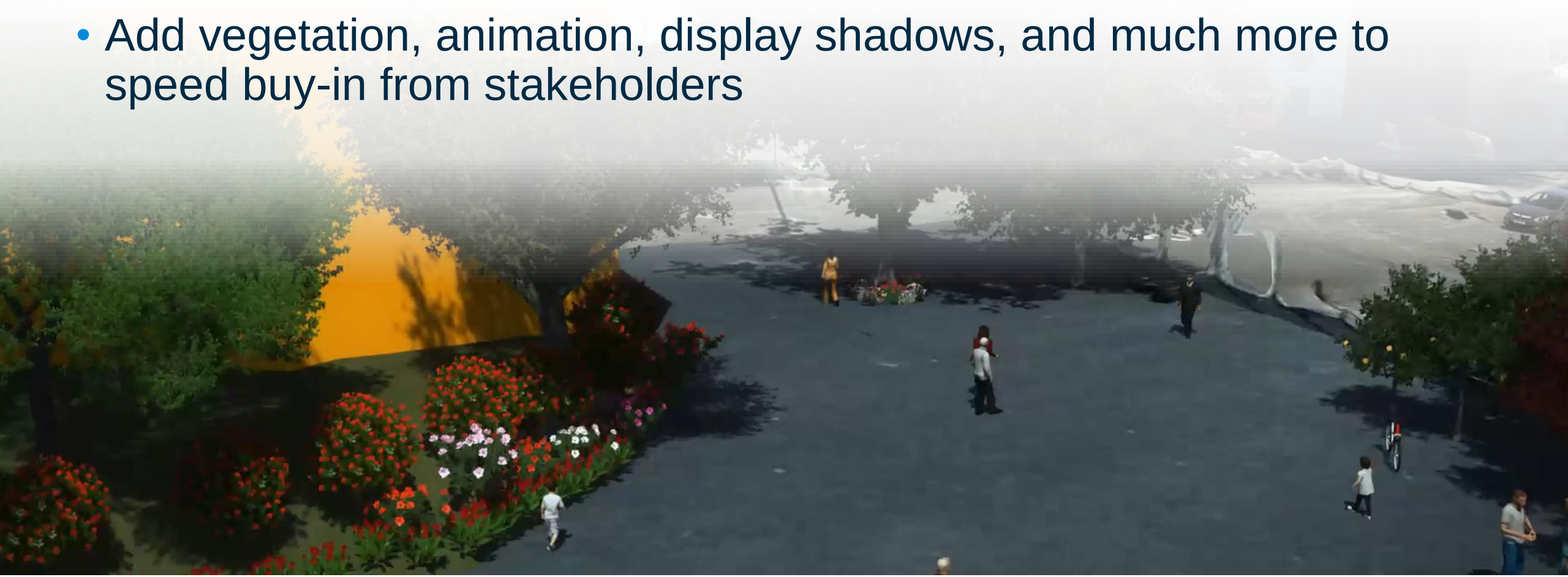
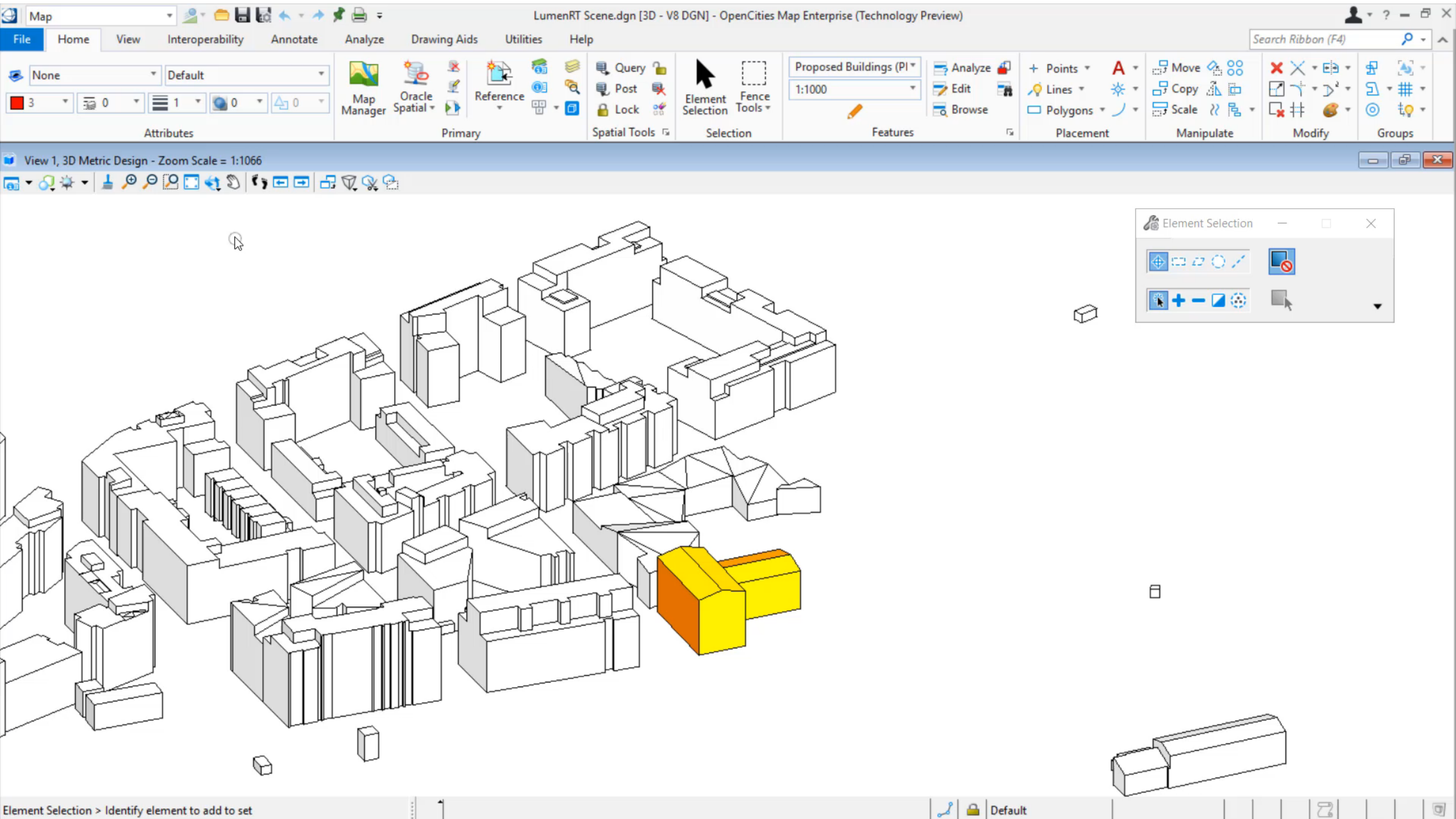
Zoning
View 1 - Top, 2D Imperial Design - Zoom Scale = 1:17788
Element Selection
Element Selection > Identify element to add to set
Default

Dynamic presentation of your project

- Export your GIS project to LumenRT
- Add vegetation, animation, display shadows, and much more to speed buy-in from stakeholders



Bentley


Map
LumenRT Scene.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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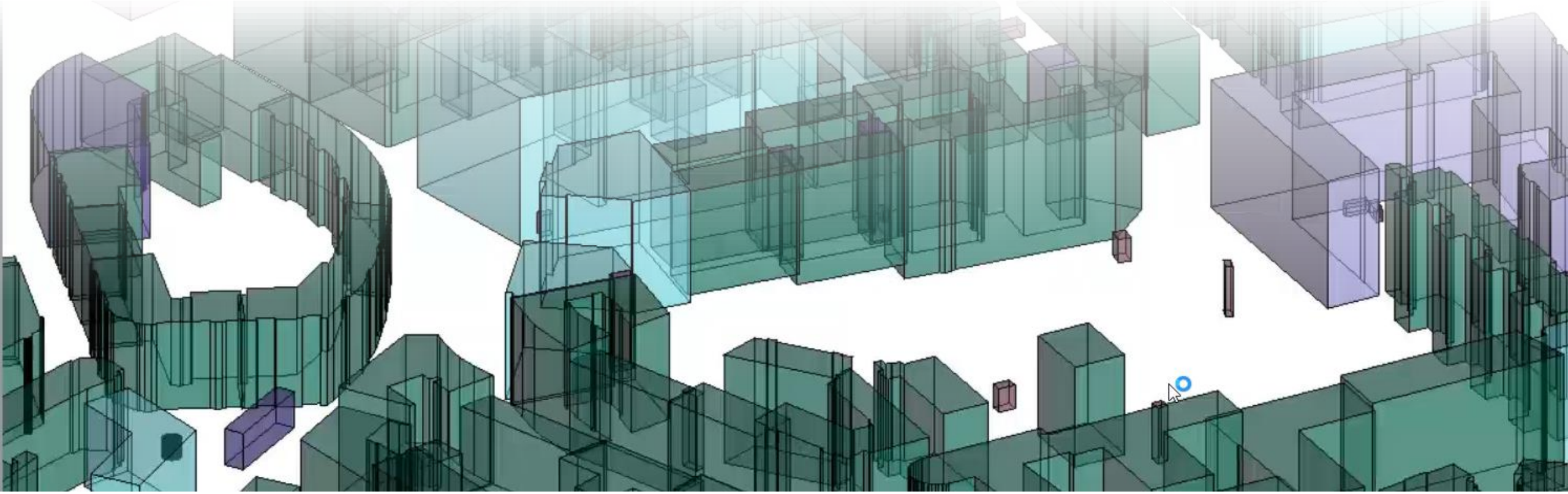
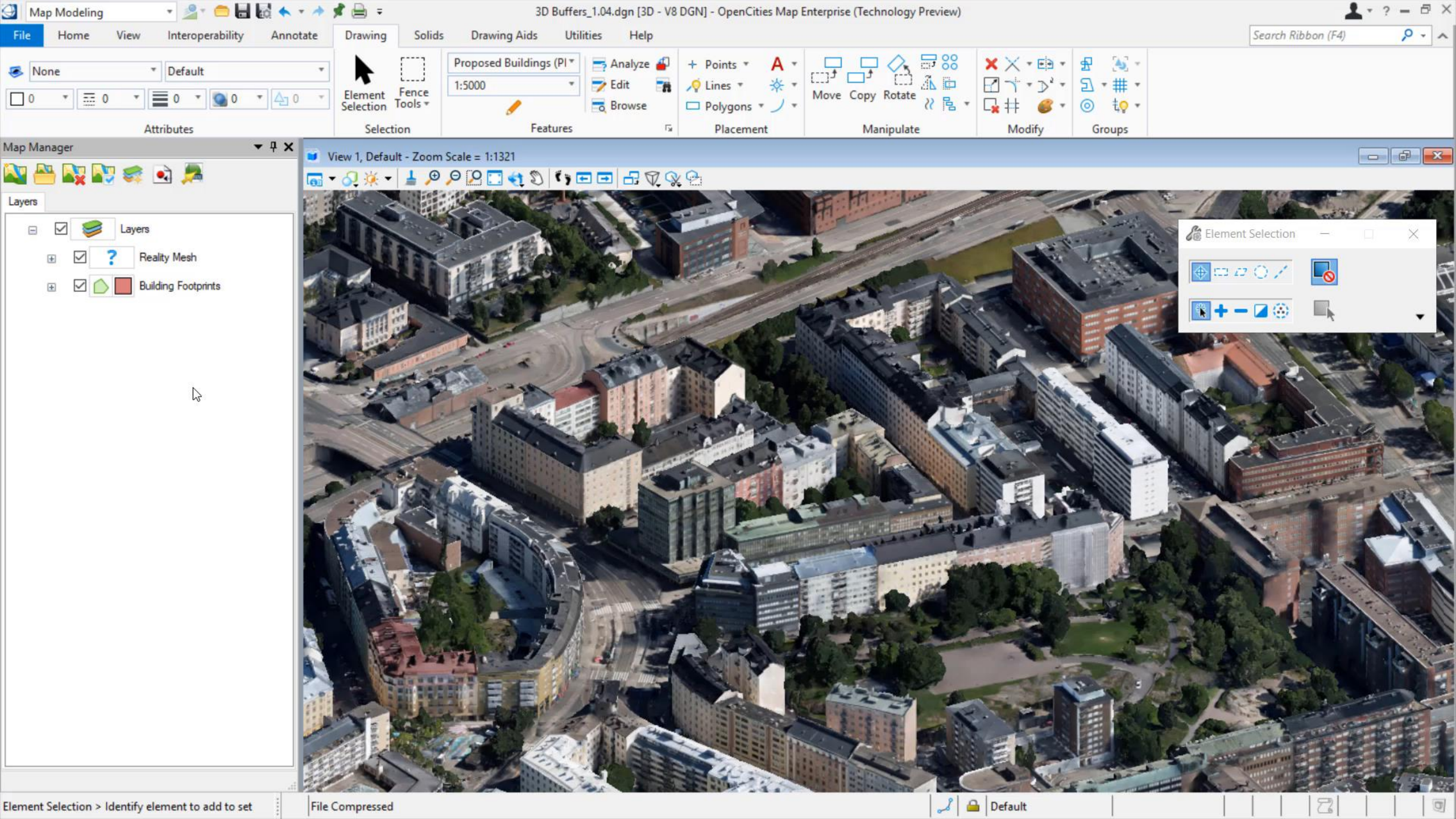
View 1, 3D Metric Design - Zoom Scale = 1:1066
Element Selection
Element Selection > Identify element to add to set
Default

3D buffer creation

- Extrude 2D assets
- Create thematic representation of the assets in a reality mesh
- Promote as CityGML to create a LOD 1



Bentley


Map Modeling
3D Buffers_1.04.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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Placement
Manipulate
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Map Manager
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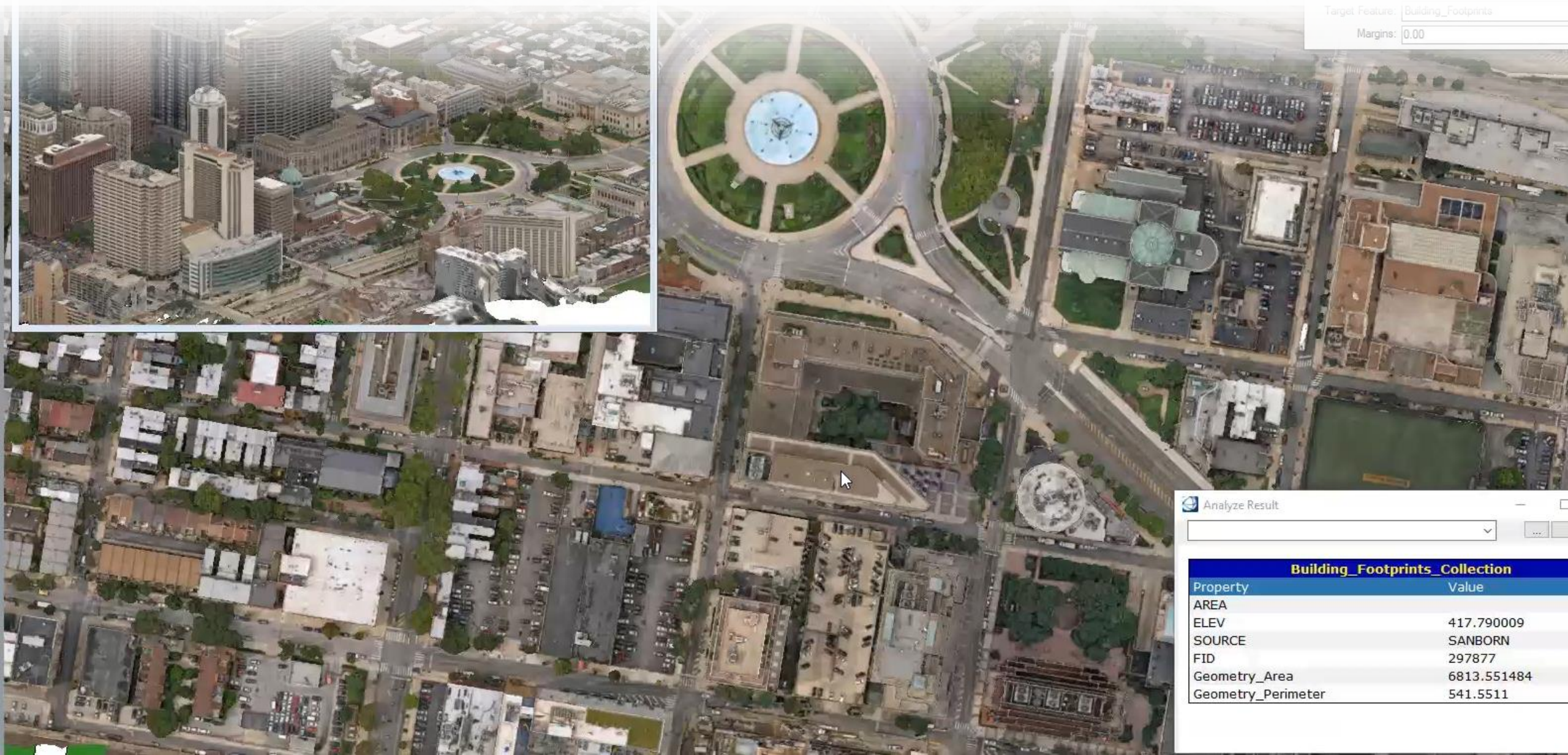
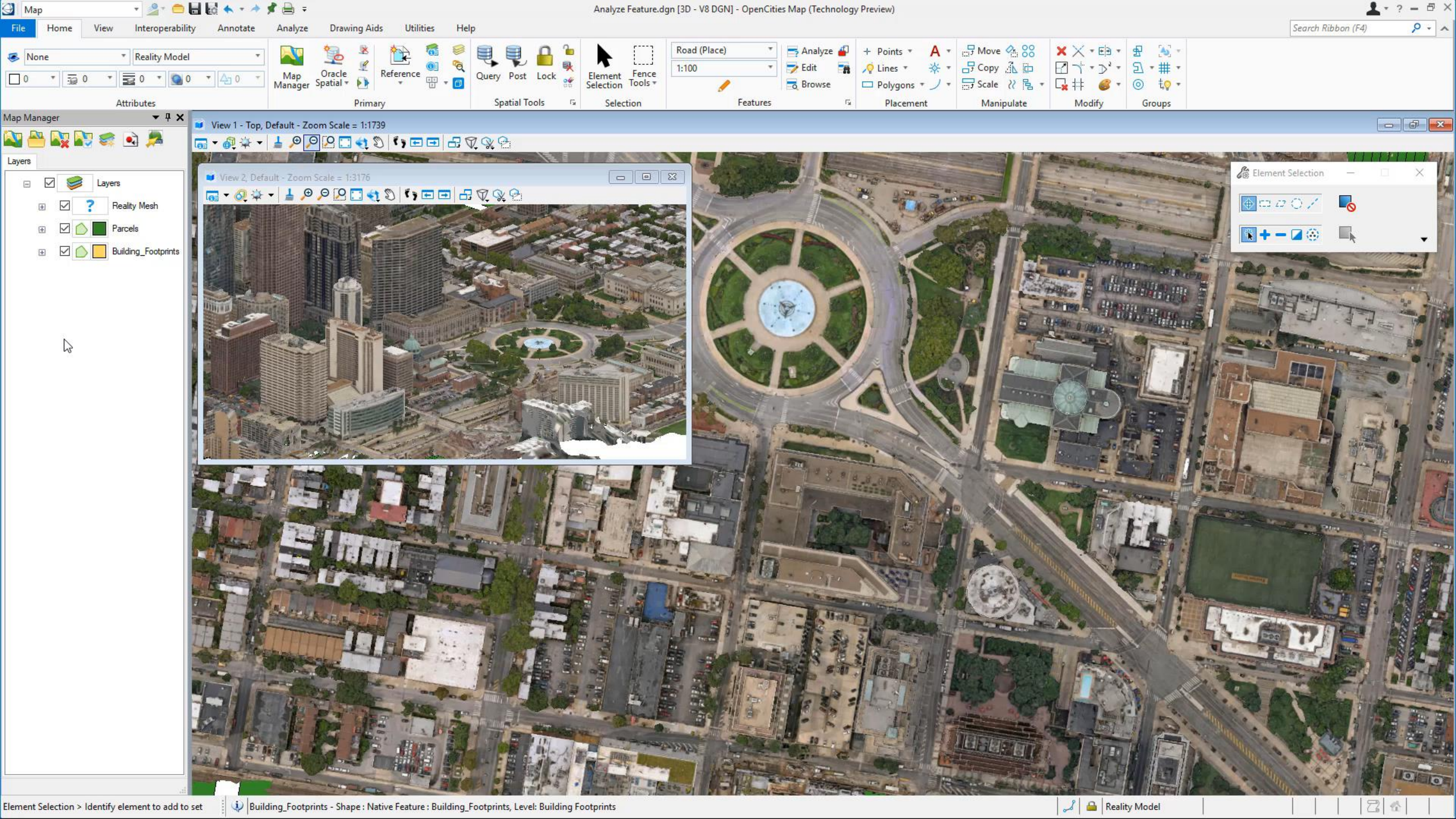
Reality Mesh
Building Footprints
View 1, Default - Zoom Scale = 1:1321
Element Selection
Element Selection > Identify element to add to set
File Compressed
Default

How to link 2D assets to a reality mesh?




Map
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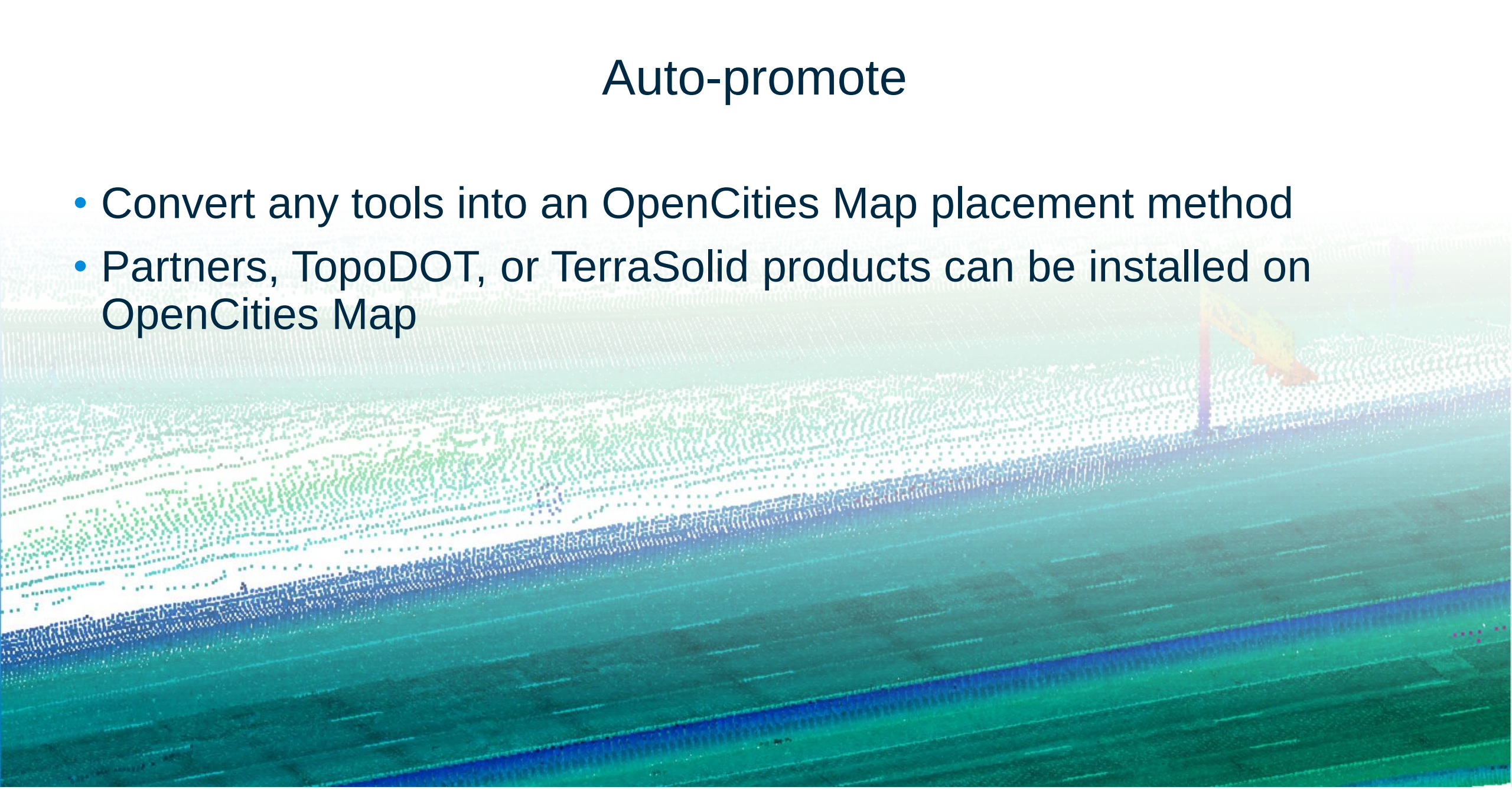
Groups
Map Manager
Layers
Layers
Reality Mesh
Parcels
Building_Footprints
View 1 - Top, Default - Zoom Scale = 1:1739
View 2, Default - Zoom Scale = 1:3176
Element Selection
Element Selection > Identify element to add to set
Building_Footprints - Shape : Native Feature : Building_Footprints, Level: Building Footprints
Reality Model

Auto-promote

- Convert any tools into an OpenCities Map placement method
- Partners, TopoDOT, or TerraSolid products can be installed on OpenCities Map



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OpenCities Geospatial Administrator - Interchange with Promote and AutoPromote.xml

File Edit Tools Help

Back Forward New Open Save Export Undo Redo

Schema Search

- Geospatial Project
  - All Users
    - Features
      - BarrierWall
      - RoadMarkings
      - EdgeofPavement
      - Centerline
      - BridgeDeck
      - BridgeSupport
    - Operation
    - Methods
    - Domains
    - Criteria
    - Categories
    - User Interface
    - Database
  - User Worksets
  - Graphical Sources

Features

Output File: features.xml

Schema Version: http://www.bentley.com/schemas/GeoSpatial/XFM/Interchange/1.0

Workset Features Summary

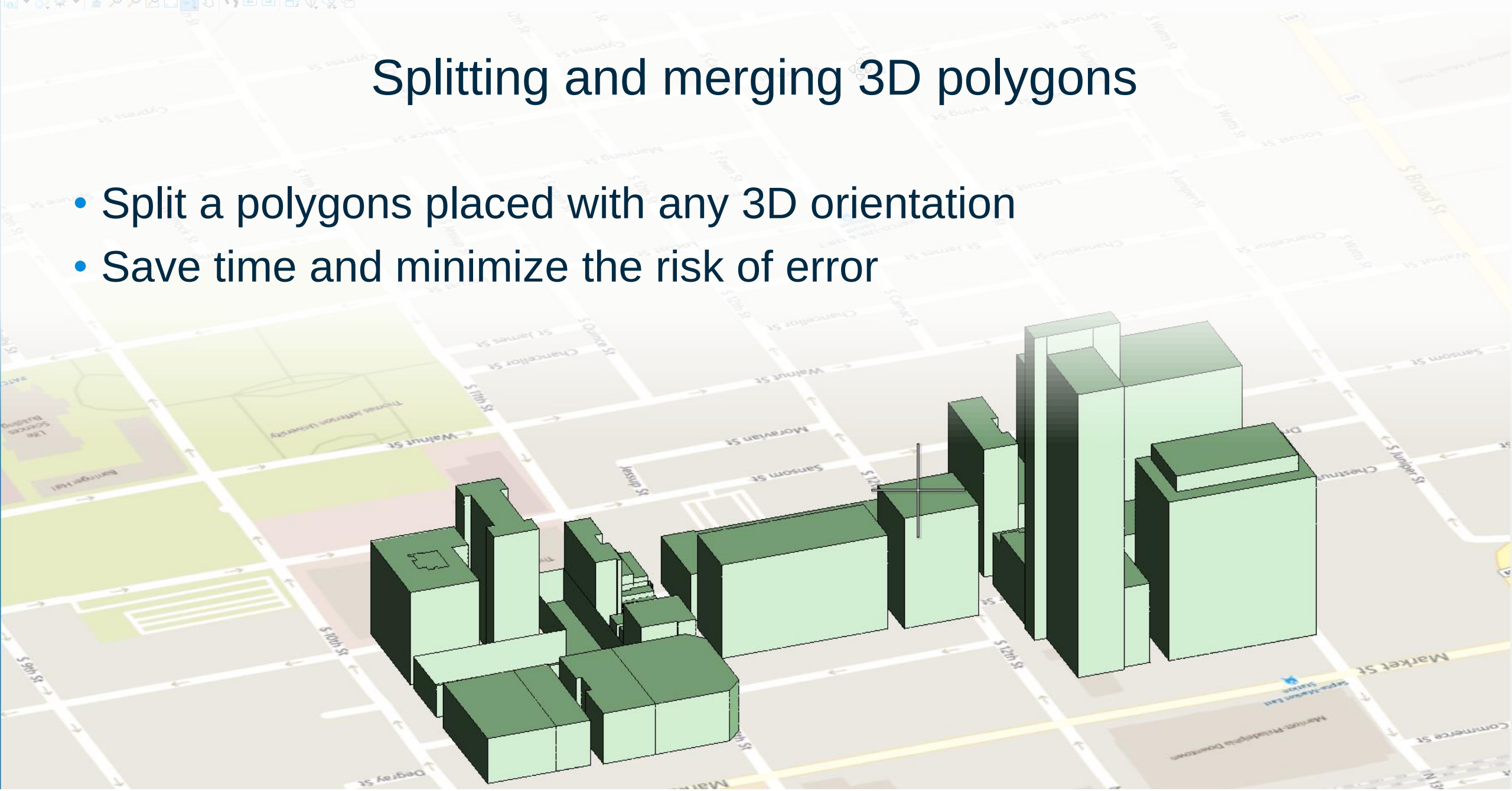
Feature	Display Name	Collection	Type	Category	Min Zoom	Max Zoom	Schema Version
BarrierWall	Barrier Wall	BarrierWall	linestring/curve	Civil			
RoadMarkings	Road Markings	RoadMarkings	linestring/curve	Civil			
EdgeofPavement	Edge of Pavement	EdgeofPavement	linestring/curve	Civil			
Centerline	Centerline	Centerline	linestring/curve	Civil			
BridgeDeck	Bridge Deck	BridgeDeck	linestring/curve	Civil			
BridgeSupport	Bridge Support	BridgeSupport	linestring/curve	Civil			

Apply Reset Help

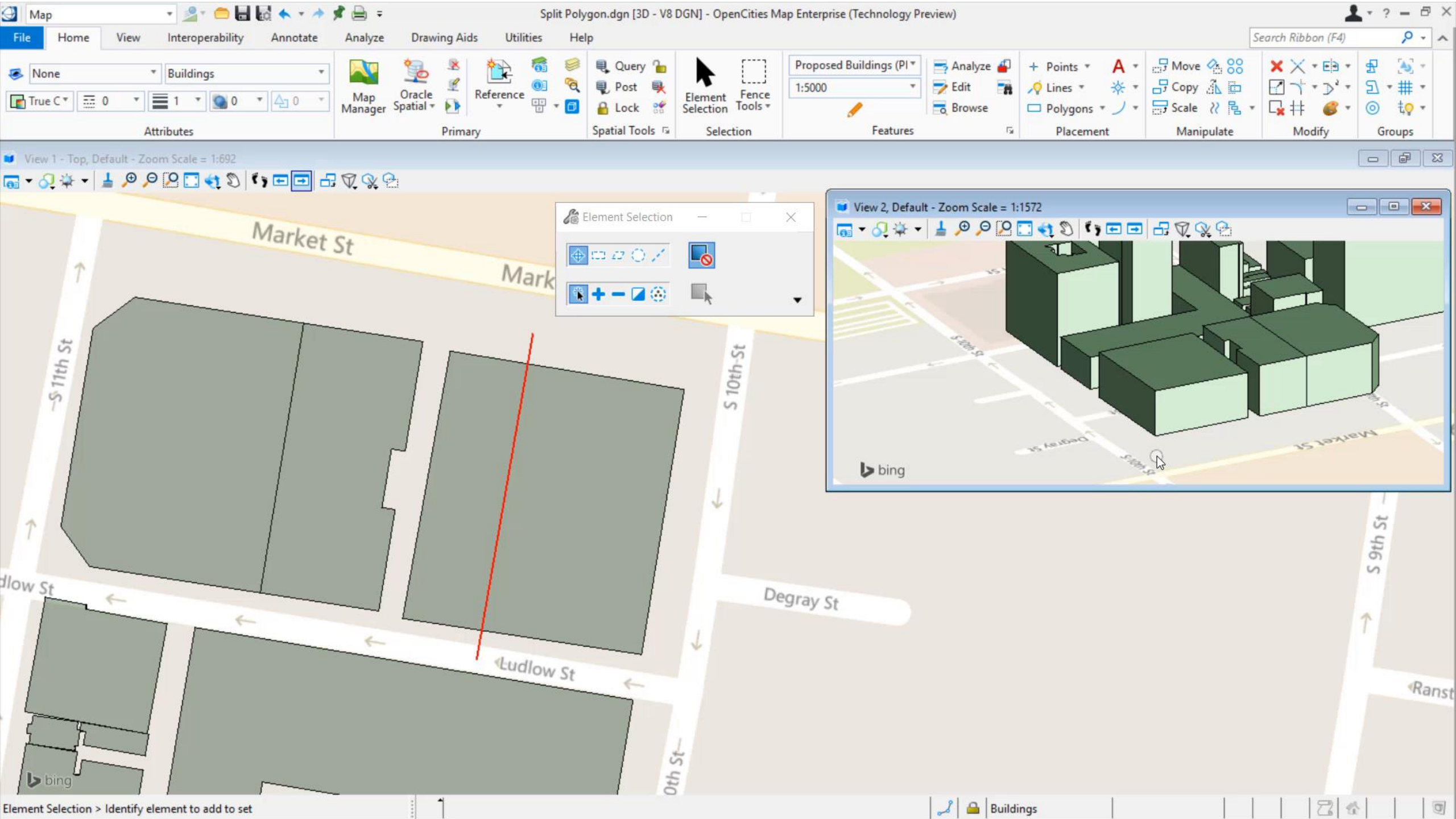
D:\ProgramData\Bentley\Map CONNECT Edition\OpenCitiesMap\Configuration\WorkSpaces\Interchange\Interchange with Promote and AutoPromote.xml loac

Splitting and merging 3D polygons

- Split a polygons placed with any 3D orientation
- Save time and minimize the risk of error



Bentley


Map
Split Polygon.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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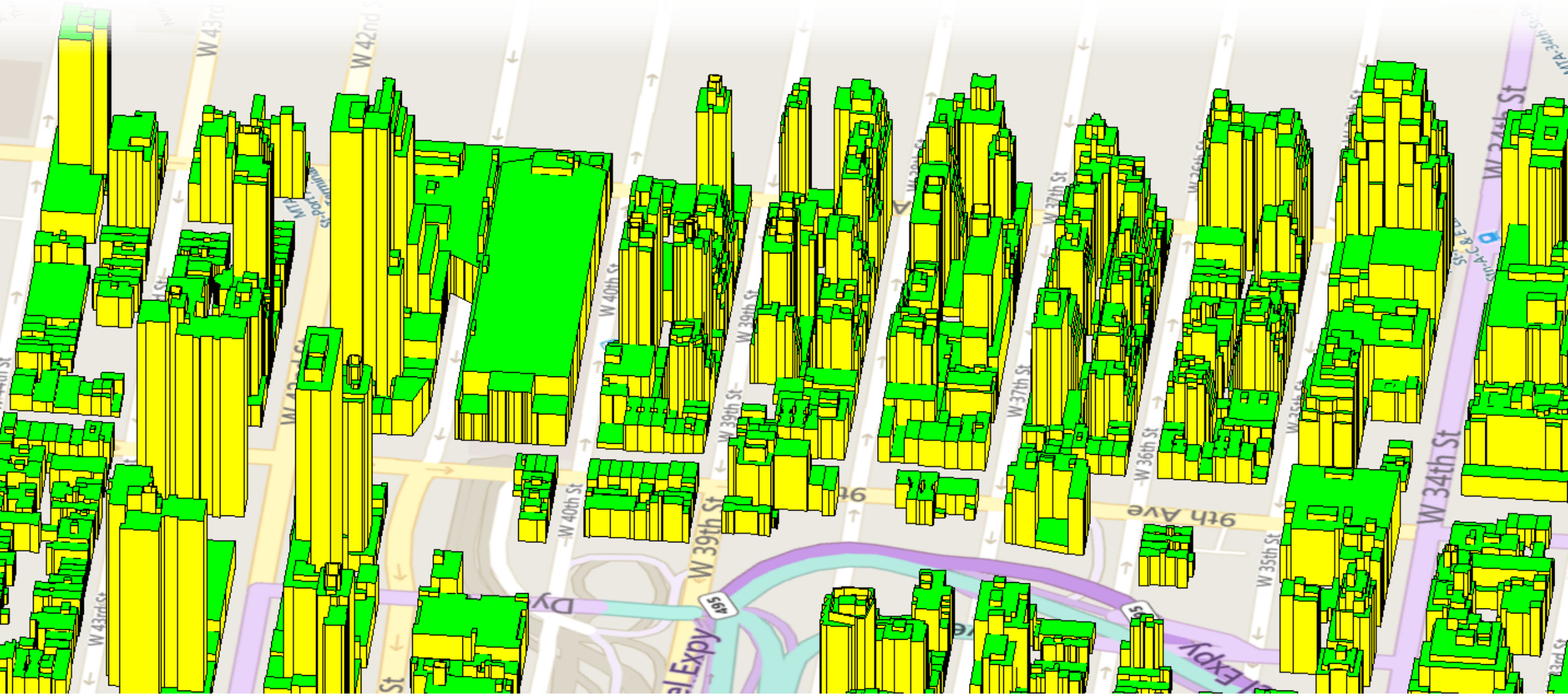
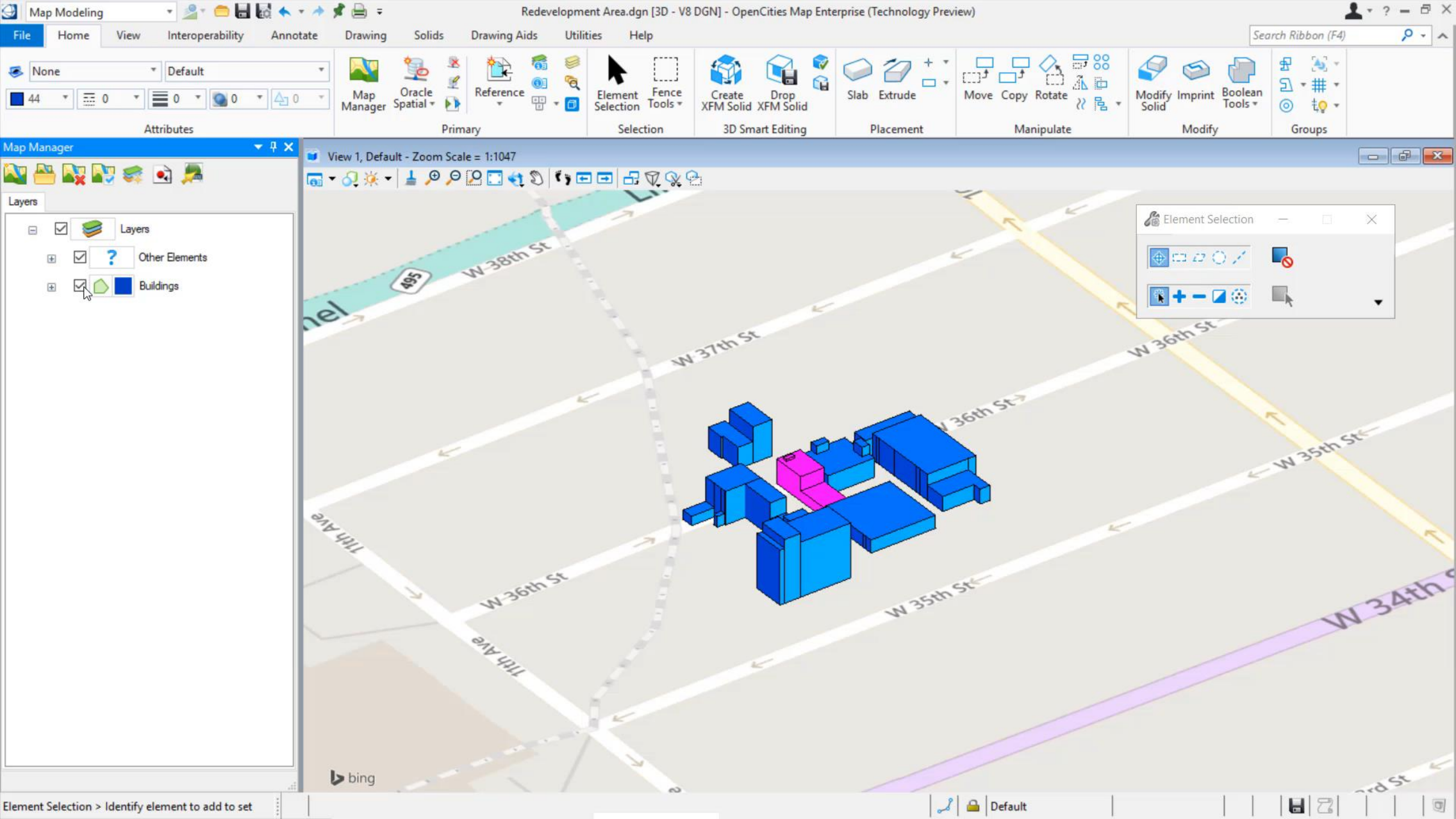
View 1 - Top, Default - Zoom Scale = 1:692
Element Selection
View 2, Default - Zoom Scale = 1:1572
Market St
S 11th St
S 10th St
Degray St
Ludlow St
S 9th St
bing
Element Selection > Identify element to add to set
Buildings

CityGML import / export



Bentley


Map Modeling
Redevelopment Area.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
File
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3D Smart Editing
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Extrude
Placement
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Other Elements
Buildings
View 1, Default - Zoom Scale = 1:1047
Element Selection
W 38th St
W 37th St
W 36th St
W 35th St
W 34th St
11th Ave
495
bing
Element Selection > Identify element to add to set
Default

New design to CityGML

- Convert a solid to a CityGML feature
- Export and share CityGML feature
- Export to OpenCities Planner

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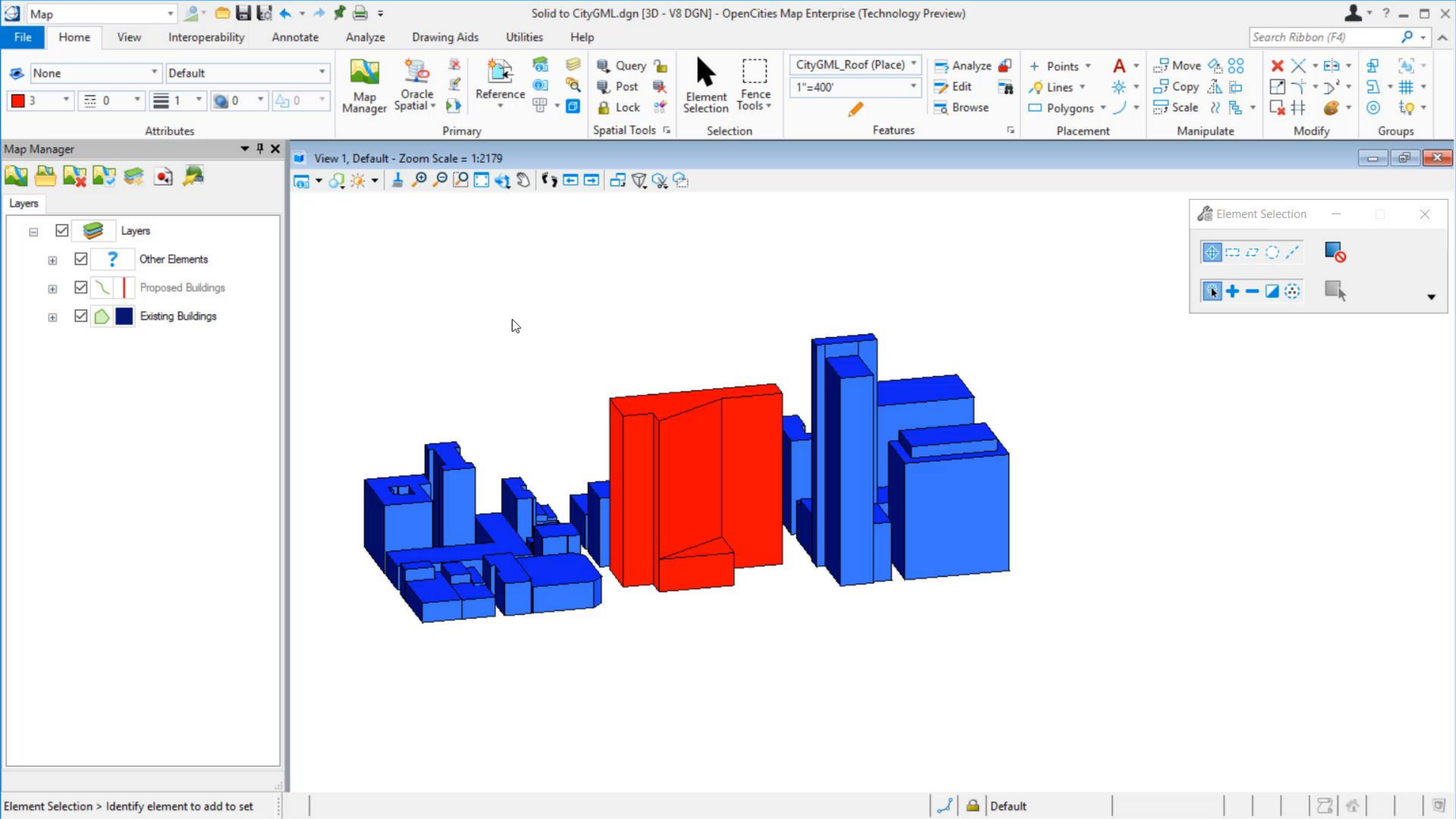
Map
Solid to CityGML.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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Spatial Tools
Element Selection
Fence Tools
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CityGML_Roof (Place)
1"=400'
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Polygons
Placement
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Groups
Map Manager
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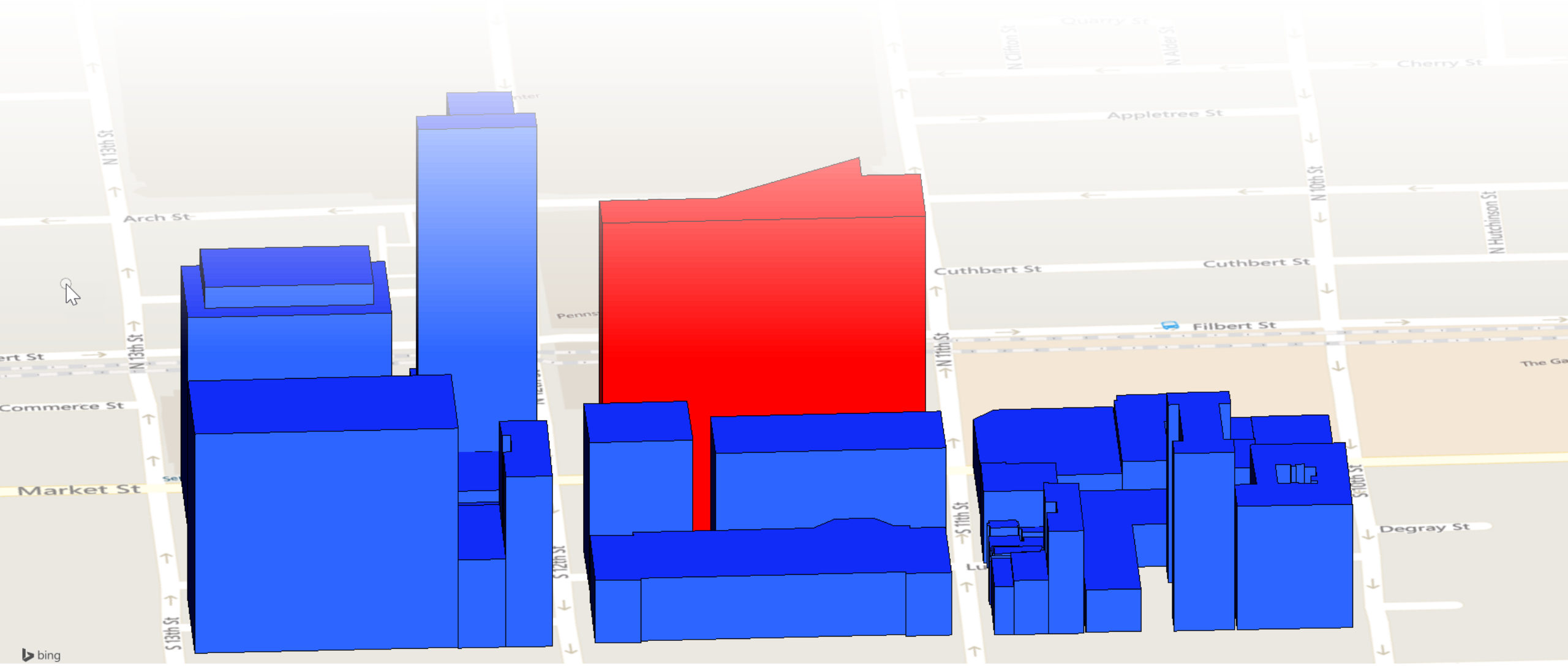
Other Elements
Proposed Buildings
Existing Buildings
View 1, Default - Zoom Scale = 1:2179
Element Selection
Element Selection > Identify element to add to set
Default

Existing XFM to CityGML



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Map

Polygon Collection to CityGML.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)

File | Home | View | Interoperability | Annotate | Analyze | Drawing Aids | Utilities | Help

Search Ribbon (F4)

None | Default | 3 | 0 | 1 | 0 | 0

Attributes

Map Manager | Oracle Spatial | Reference

Primary

Query | Post | Lock

Spatial Tools

Element Selection | Fence Tools

Selection

CityGML_Roof (Place) | 1"=400'

Analyze | Edit | Browse

Features

Points | Lines | Polygons

Placement

Move | Copy | Scale

Manipulate

Modify

Groups

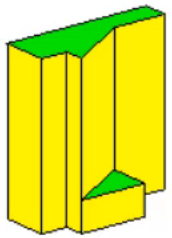
Map Manager

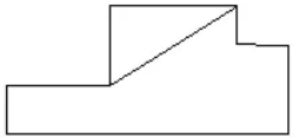
Layers

- Layers
  - CityGML_Ground
  - CityGML_Roof
  - CityGML_Wall
  - CityGML_Building
  - Existing Buildings

View 1, Default - Zoom Scale = 1:2328

View 2, Default - Zoom Scale = 1:3727





Tool Settings

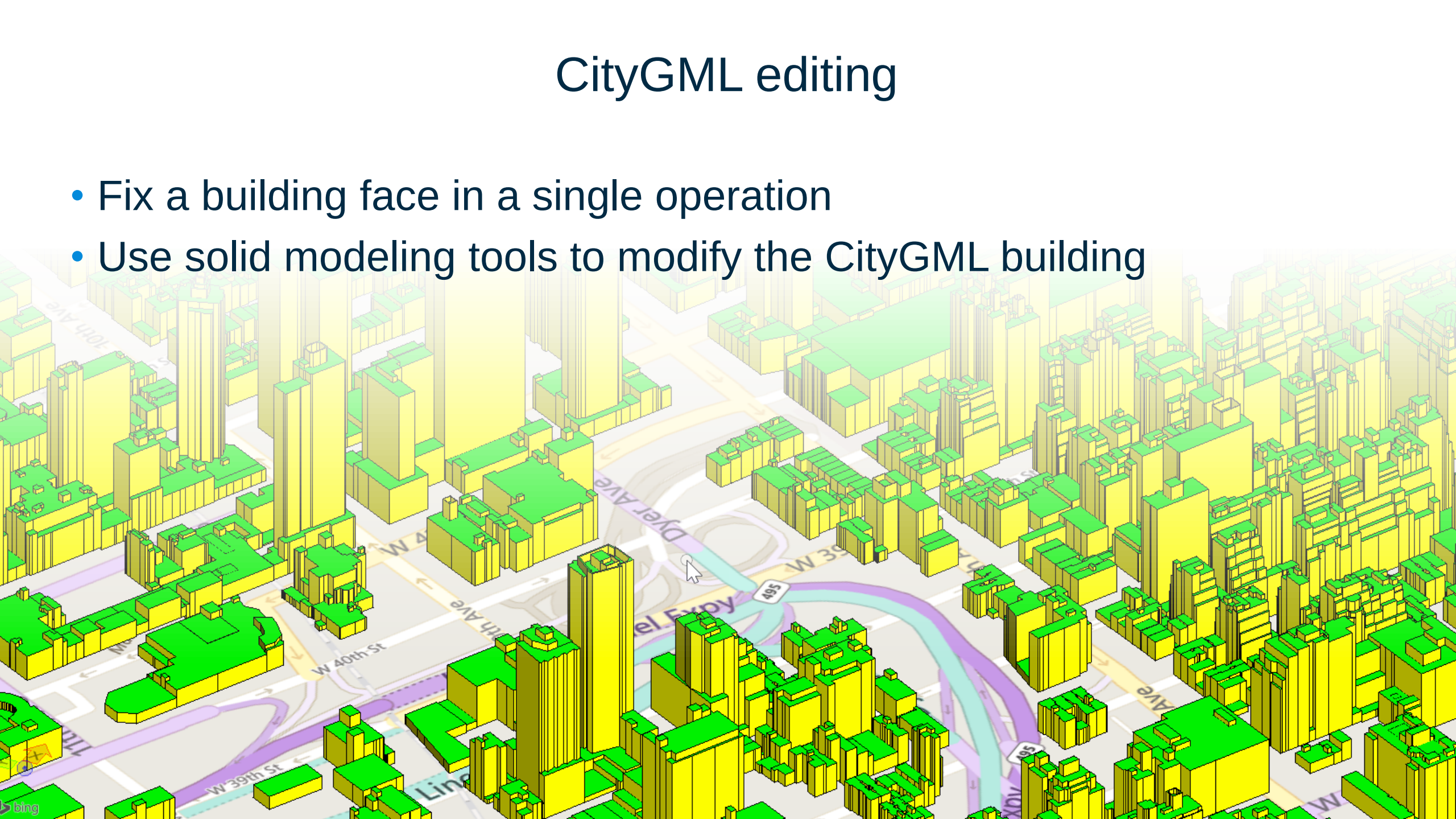
Activate Method > Identify element

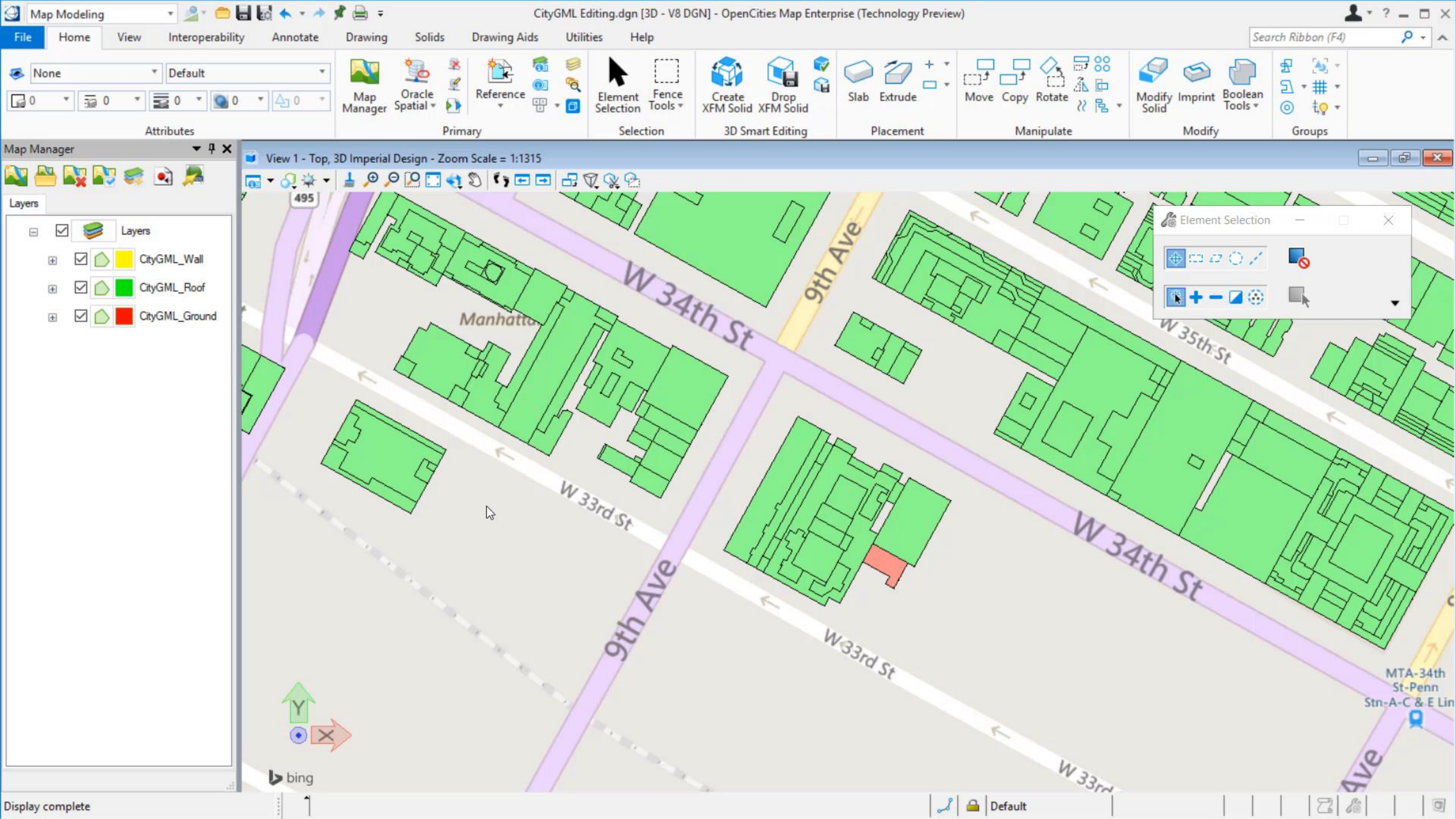
Buildings - Complex Shape : Native Feature : Buildings, Level: Buildings

Default

CityGML editing

- Fix a building face in a single operation
- Use solid modeling tools to modify the CityGML building




Map Modeling
CityGML Editing.dgn [3D - V8 DGN] - OpenCities Map Enterprise (Technology Preview)
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Drop XFM Solid
3D Smart Editing
Slab
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Placement
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Modify Solid
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Map Manager
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CityGML_Wall
CityGML_Roof
CityGML_Ground
View 1 - Top, 3D Imperial Design - Zoom Scale = 1:1315
Element Selection
W 34th St
9th Ave
W 33rd St
W 35th St
MTA-34th St-Penn Stn-A-C & E Lin
bing
Display complete
Default

What to remember!

- OpenCities Map is the solution for 3D cities
- Ideal solution to create and maintain 3D assets
- Best GIS solution for working with reality meshes
- Right solution for your future CityGML needs
- Integrated solution for creating 3D features with third-party applications

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