

# InfraWorks Schema Editor Lab

Matt Wunch

sUAS Pilot/Owner @ SkyViz.io







# About the speaker

## Matt Wunch

- Owner of [SkyViz.io](https://www.skyviz.io)
- FAA Part 107 certified pilot (2+ years)
- Autodesk Expert Elite
- 25 years in the AEC industry
- AUGI Board of Directors



# Learning Objectives

## OBJECTIVE 1

Learn what the Schema Editor is, and how to create new attributes for the object classes

## OBJECTIVE 2

Learn how to update the attributes using JavaScript inside of InfraWorks

## OBJECTIVE 3

Learn how to create Feature Themes to graphically display your extended data

## OBJECTIVE 4

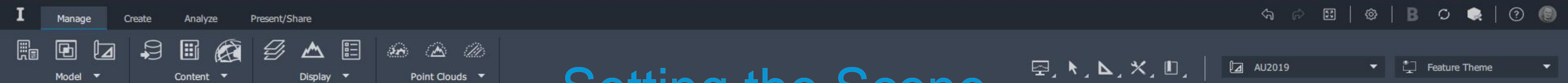
Learn how to reuse your custom attribute information in new projects

# Datasets

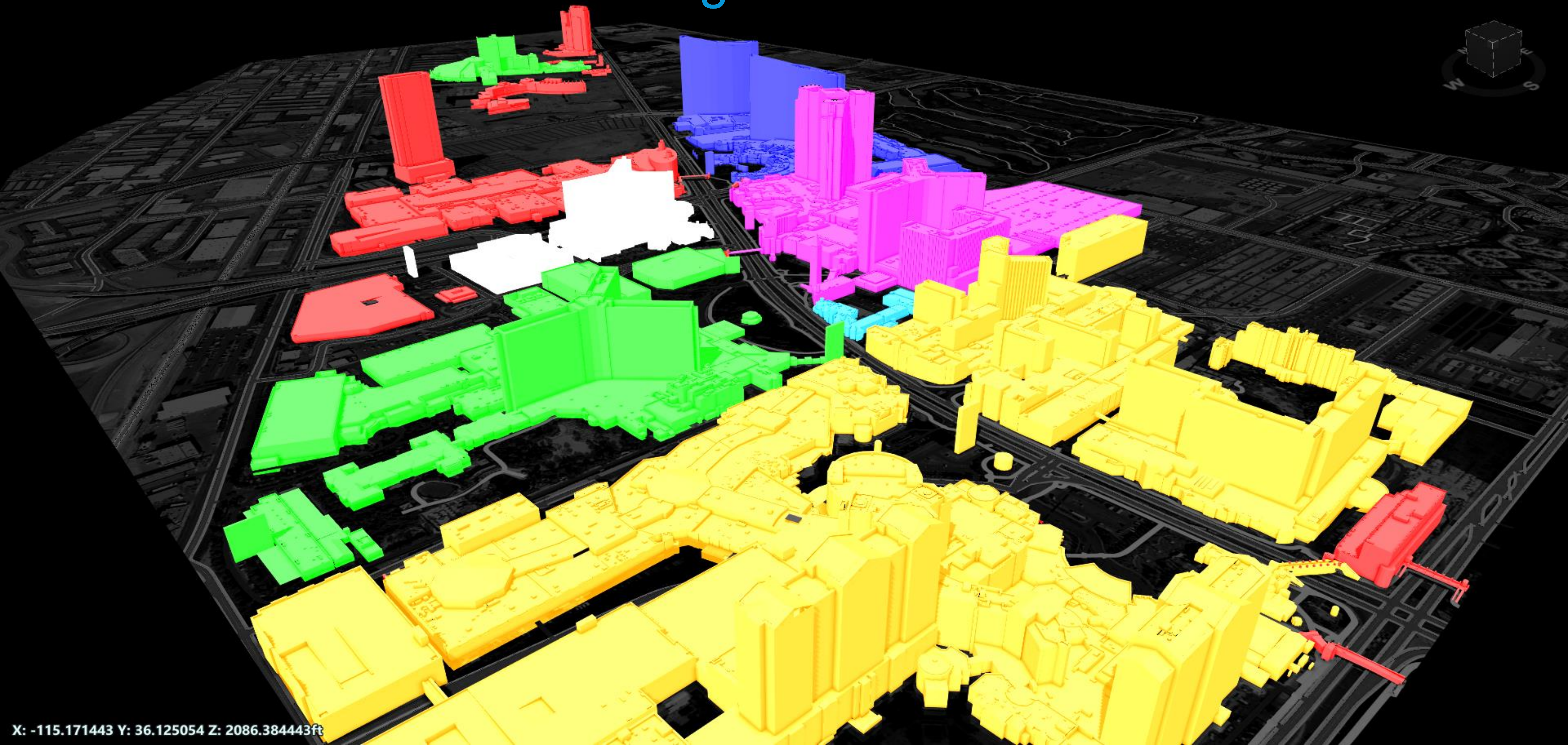
Files are located in C:\DATASETS\CES320023-L InfraWorks Schema Editor\

- 1\_Learning Objective 1
  - 1\_CES320023-L - Schema Editor.sqlite
- 2\_Learning Objective 2
  - 2\_CES320023-L - Vegas Import.sqlite
  - 2\_CES320023-L - Attribute Update.sqlite
- 3\_Learning Objective 3
  - 3\_CES320023-L - Feature Themes.sqlite
- 4\_Bonus Scripts
  - 4\_CES320023-L - Bonus Scripts.sqlite



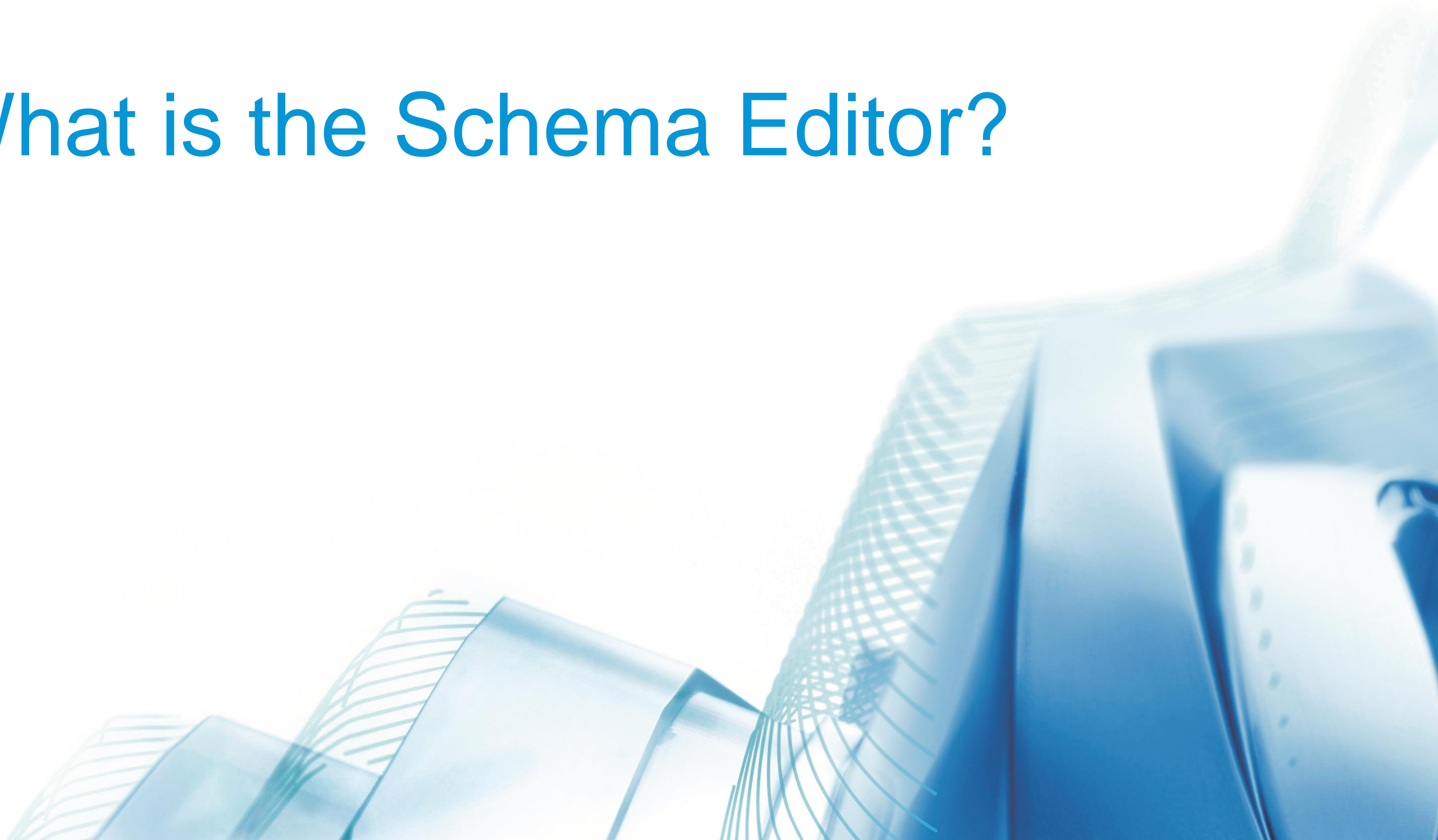


# Setting the Scene





# What is the Schema Editor?



# Schema Editor

*“Allows users to add new properties and information to the elements of their project. Customize data for objects in a model through the extended schema transfer tool. The data can be expanded with multiple fields and each element can be documented as needed. The schema tool can be applied to buildings, parcels, roadways, utilities, and a host of other InfraWorks elements.”*

<http://www.infrastructure-reimagined.com/infracivil3d-2020/>

# Schema Editor

## Data Types

BOOLEAN – YES / NO

DATETIME – DATE

DOUBLE – 00.00 (FRACTION/WHOLE)

INTEGER – 0

STRING – ANY CHARACTERS

UNDER CONSTRUCTION

YEAR OPENED

ROOM COST / NIGHT

NUMBER OF ROOMS

OWNER



# Schema Editor

Extend Schema Tool

Clear All

Barriers

▼ Buildings

AU2019

City Furniture

Coverage Areas

Culverts

Drainage End Structures

Easements

Parcels

Pipeline Connectors

Pipelines

Points of Interest

Railways

Right of Ways

Roads

Traffic Study Areas

Trees

Water Areas

Watersheds

Feature Class ...

AU2019

Display Name

AU2019

Category

Structures

Attributes

▲

Name:

Owner

Display:

Owner

Type:

String

▼

▲

Name:

Date\_Opened

Display:

Date Opened

Type:

DateTime

▼

▲

Name:

No\_of\_Rooms

Display:

Number of Rooms

Type:

Integer

▼

▲

Name:

Avg\_Cost

Display:

Avg Cost / Night

Type:

Double

▼

▲

Name:

Under\_Construction

Display:

Under Construction

Type:

Boolean

▼

Apply Schema



# Model Builder created model

Files are located in C:\DATASETS\CES320023-L InfraWorks Schema Editor\

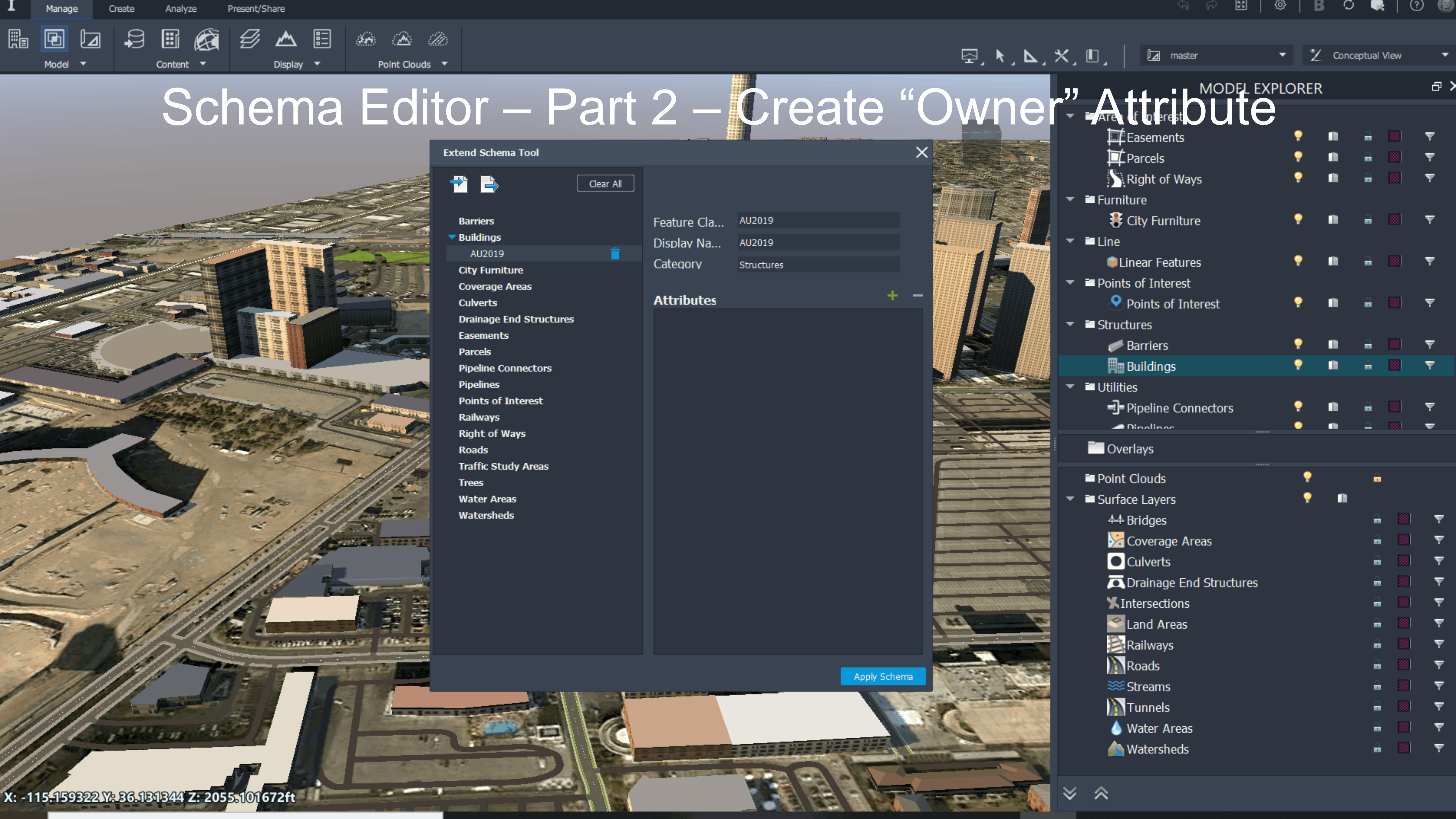
- 1\_Learning Objective 1
  - 1\_CES320023-L - Schema Editor.sqlite



# Schema Editor – Part 1 – Create a New Category







# Schema Editor – Part 2 – Create “Owner” Attribute

Extend Schema Tool

Clear All

Barriers

Buildings

AU2019

City Furniture

Coverage Areas

Culverts

Drainage End Structures

Easements

Parcels

Pipeline Connectors

Pipelines

Points of Interest

Railways

Right of Ways

Roads

Traffic Study Areas

Trees

Water Areas

Watersheds

Feature Class: AU2019

Display Name: AU2019

Category: Structures

Attributes

Apply Schema

MODEL EXPLORER

- Area of Interest
  - Easements
  - Parcels
  - Right of Ways
- Furniture
  - City Furniture
- Line
  - Linear Features
- Points of Interest
  - Points of Interest
- Structures
  - Barriers
  - Buildings
  - Pipeline Connectors
  - Pipelines
- Utilities
  - Pipeline Connectors
  - Pipelines
- Overlays
- Point Clouds
- Surface Layers
  - Bridges
  - Coverage Areas
  - Culverts
  - Drainage End Structures
  - Intersections
  - Land Areas
  - Railways
  - Roads
  - Streams
  - Tunnels
  - Water Areas
  - Watersheds

X: -115.159322 Y: 36.131344 Z: 2055.101672ft



# Schema Editor – Part 3 – Create “Date\_Opened” Attribute

Extend Schema Tool

Barriers

Buildings

AU2019

City Furniture

Coverage Areas

Culverts

Drainage End Structures

Easements

Parcels

Pipeline Connectors

Pipelines

Points of Interest

Railways

Right of Ways

Roads

Traffic Study Areas

Trees

Water Areas

Watersheds

Feature Cla... AU2019

Display Na... AU2019

Category Structures

Attributes

Name: Owner

Display: Owner

Type: String

Apply Schema

MODEL EXPLORER

Area of Interest

Easements

Parcels

Right of Ways

Furniture

City Furniture

Line

Linear Features

Points of Interest

Points of Interest

Structures

Barriers

Buildings

Utilities

Pipeline Connectors

Pipelines

Overlays

Point Clouds

Surface Layers

Bridges

Coverage Areas

Culverts

Drainage End Structures

Intersections

Land Areas

Railways

Roads

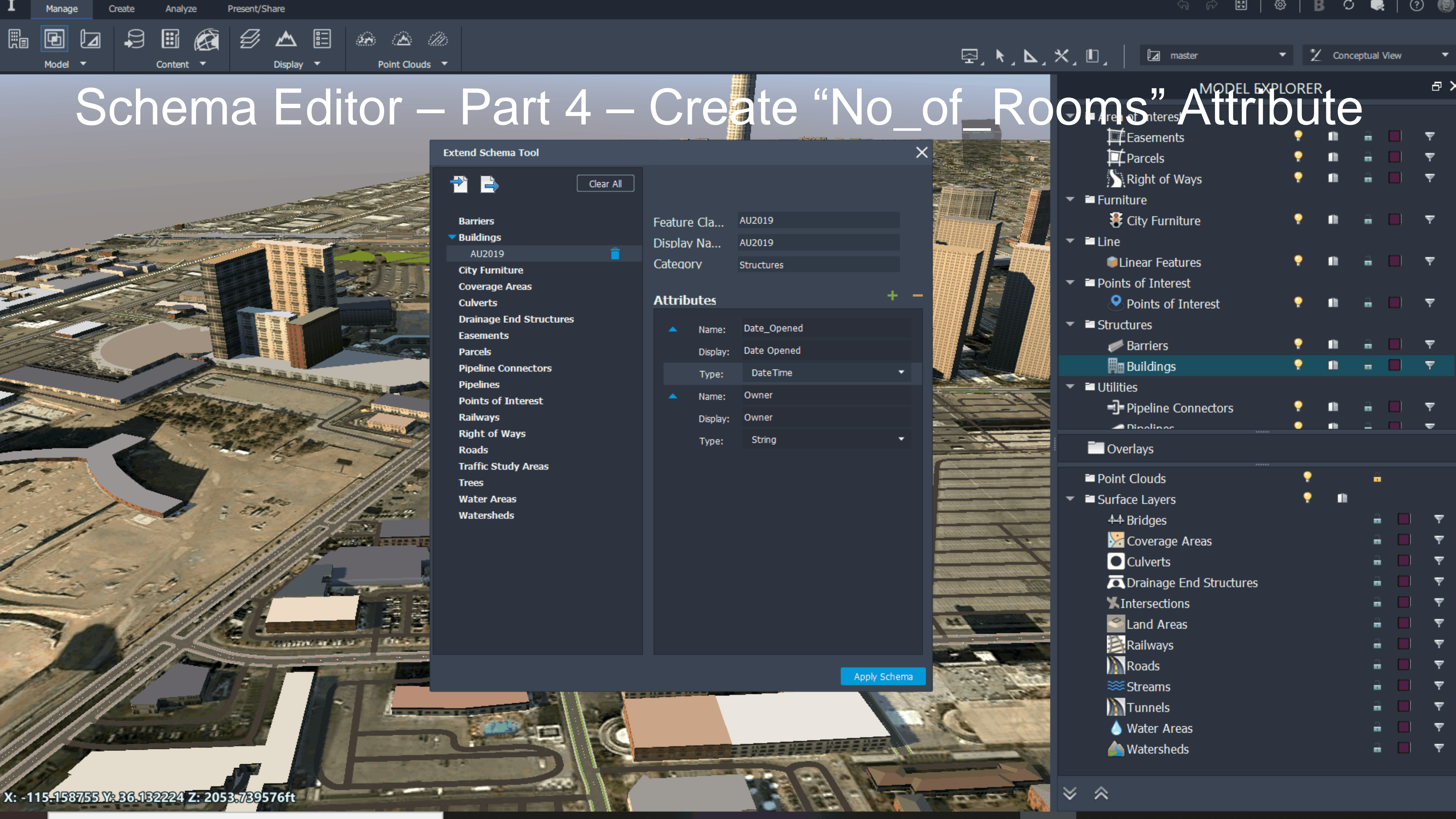
Streams

Tunnels

Water Areas

Watersheds





# Schema Editor – Part 4 – Create “No\_of\_Rooms” Attribute

Clear All

Barriers

Buildings

AU2019

City Furniture

Coverage Areas

Culverts

Drainage End Structures

Easements

Parcels

Pipeline Connectors

Pipelines

Points of Interest

Railways

Right of Ways

Roads

Traffic Study Areas

Trees

Water Areas

Watersheds

Feature Cla...

AU2019

Display Na...

AU2019

Category

Structures

Attributes

▲

Name:

Date\_Opened

Display:

Date Opened

Type:

DateTime

▲

Name:

Owner

Display:

Owner

Type:

String

Apply Schema

MODEL EXPLORER

Area of Interest

Easements

Parcels

Right of Ways

Furniture

City Furniture

Line

Linear Features

Points of Interest

Points of Interest

Structures

Barriers

Buildings

Utilities

Pipeline Connectors

Disinfectant

Overlays

Point Clouds

Surface Layers

Bridges

Coverage Areas

Culverts

Drainage End Structures

Intersections

Land Areas

Railways

Roads

Streams

Tunnels

Water Areas

Watersheds

X: -115.158755 Y: 36.132224 Z: 2053.739576ft



# Schema Editor – Part 5 – Create “Avg\_Cost” Attribute

Extend Schema Tool

Barriers

Buildings

AU2019

City Furniture

Coverage Areas

Culverts

Drainage End Structures

Easements

Parcels

Pipeline Connectors

Pipelines

Points of Interest

Railways

Right of Ways

Roads

Traffic Study Areas

Trees

Water Areas

Watersheds

Feature Cla... AU2019

Display Na... AU2019

Category Structures

Attributes

Name: No\_of\_Rooms

Display: Number of Rooms

Type: Integer

Name: Date\_Opened

Display: Date Opened

Type: DateTime

Name: Owner

Display: Owner

Type: String

Apply Schema

MODEL EXPLORER

Area of Interest

Easements

Parcels

Right of Ways

Furniture

City Furniture

Line

Linear Features

Points of Interest

Points of Interest

Structures

Barriers

Buildings

Utilities

Pipeline Connectors

Overlays

Point Clouds

Surface Layers

Bridges

Coverage Areas

Culverts

Drainage End Structures

Intersections

Land Areas

Railways

Roads

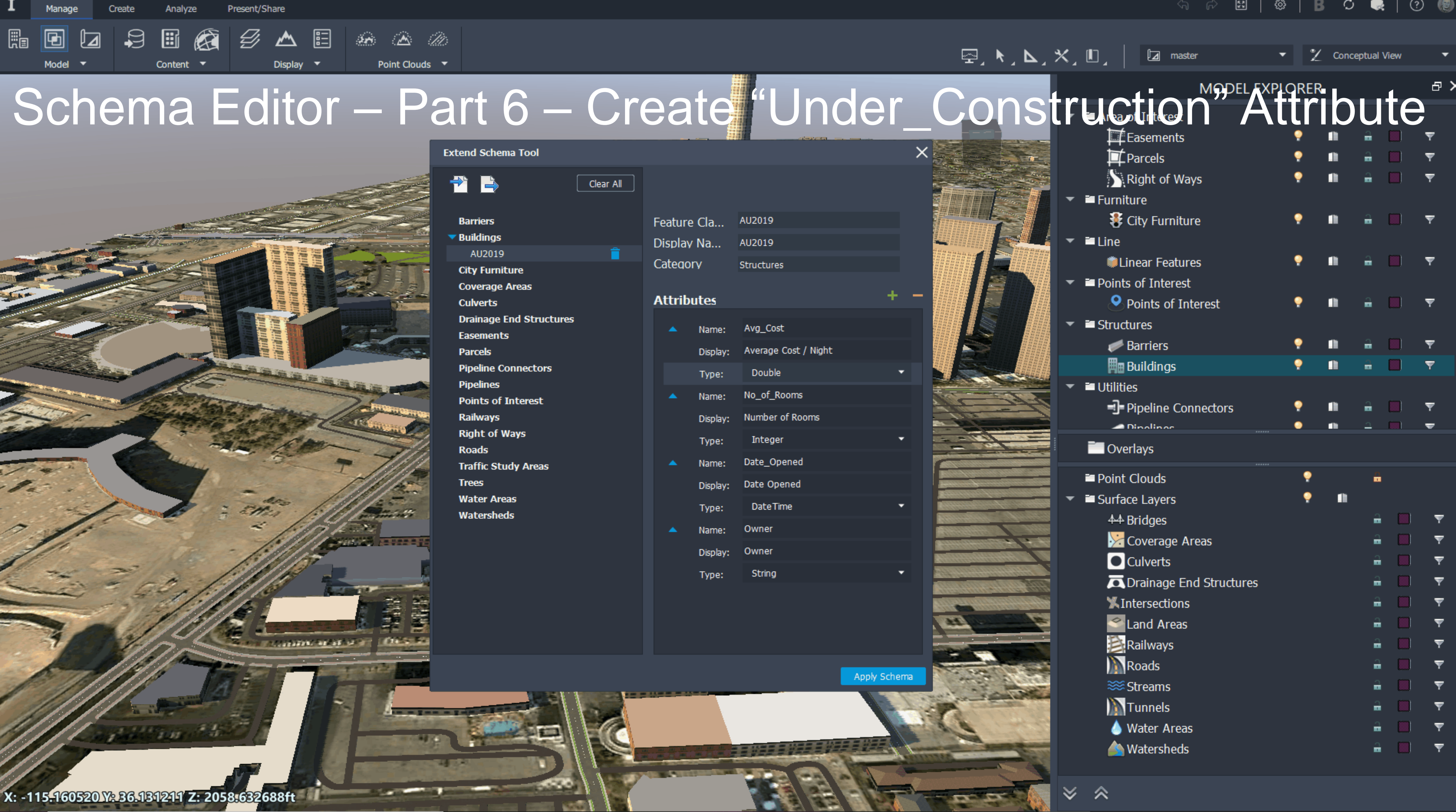
Streams

Tunnels

Water Areas

Watersheds





# Schema Editor – Part 6 – Create “Under\_Construction” Attribute



# Schema Editor – Part 7 – Apply Schema

Extend Schema Tool

Barriers

Buildings

AU2019

City Furniture

Coverage Areas

Culverts

Drainage End Structures

Easements

Parcels

Pipeline Connectors

Pipelines

Points of Interest

Railways

Right of Ways

Roads

Traffic Study Areas

Trees

Water Areas

Watersheds

Clear All

Feature Cla... AU2019

Display Na... AU2019

Category Structures

Attributes

Name: Under\_Construction

Display: Under Construction

Type: Boolean

Name: Avg\_Cost

Display: Average Cost / Night

Type: Double

Name: No\_of\_Rooms

Display: Number of Rooms

Type: Integer

Name: Date\_Opened

Display: Date Opened

Type: DateTime

Name: Owner

Display: Owner

Type: String

Apply Schema

MODEL EXPLORER

Area of Interest

Easements

Parcels

Right of Ways

Furniture

City Furniture

Line

Linear Features

Points of Interest

Points of Interest

Structures

Barriers

Buildings

Utilities

Pipeline Connectors

Pipelines

Overlays

Point Clouds

Surface Layers

Bridges

Coverage Areas

Culverts

Drainage End Structures

Intersections

Land Areas

Railways

Roads

Streams

Tunnels

Water Areas

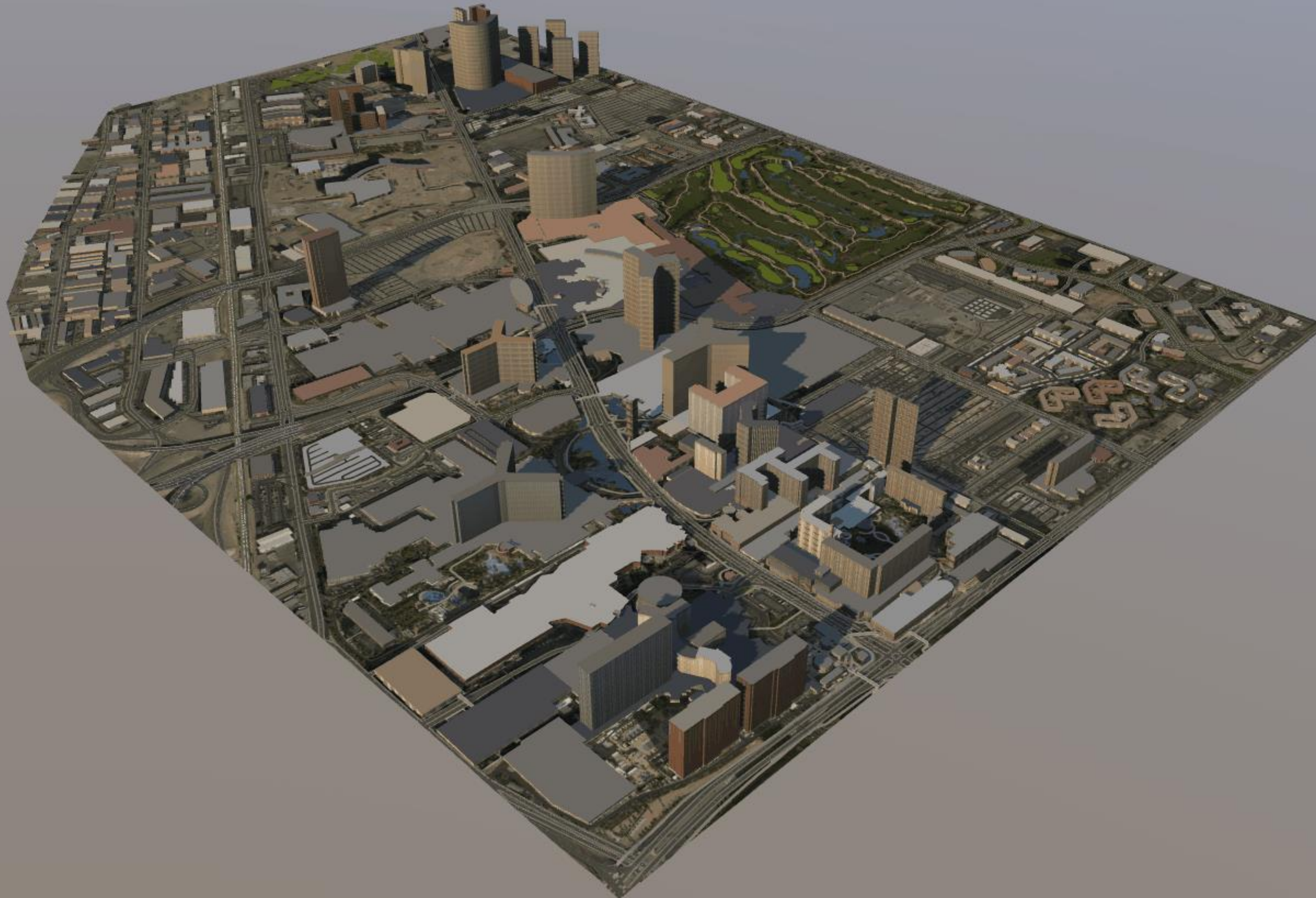
Watersheds







# Create a new Proposal – AU2019





# Delete Existing Buildings



## PROPOSALS






















AU2019

Select All

### Filter Selection

☐ Add to Model Explore

Comparing 'master' to 'AU2019'  
Differences since initial branch from 'master' or last merge of 'master'  
into 'AU2019'  
18-Oct-2019 at 10:53 am

Type	Quantity
 Barriers	
 Bridges	
 Buildings	
 City Furniture	
 Coverages	
 Culverts	
 Drainage End Structures	
 Easements	
 Land Areas	
 Linear Feature	
 Parcels	
 Pipe Connectors	
 Pipelines	
 Railways	
 Right of Ways	
 Roads	
 Streams	
 Trees	
 Tunnels	
 Water	
 Watersheds	



# Import Vegas models

Files are located in C:\DATASETS\CES320023-L InfraWorks Schema Editor\

- 2\_Learning Objective 2
  - 2\_CES320023-L - Vegas Import.sqlite
  - 2\_CES320023-L - Attribute Update.sqlite





# Import CyberCity 3D Building Models

Proposals Model Explorer

MODEL EXPLORER

- ▼ Furniture
  - City Furniture
- ▼ Line
  - Linear Features
- ▼ Points of Interest
  - Points of Interest
- ▼ Structures
  - AU2019
  - Barriers
  - Buildings**
- ▼ Utilities
  - Pipeline Connectors
  - Pipelines
- ▼ Vegetation
- Overlays
- Point Clouds
- ▼ Surface Layers
  - Bridges
  - Coverage Areas
  - Culverts
  - Drainage End Structures
  - Intersections
  - Land Areas
  - Railways
  - Roads
  - Streams
  - Tunnels
  - Water Areas
  - Watersheds

X: -115.155590 Y: 36.114586 Z: 2058.691400ft



# Configure Data Sources

Data Source Configuration

×

NamepropertySourceVector

Description<Empty>TypeAU2019

Common

Geo Location

Source

Tooltip

Table

Script

General

Name

<Empty>

External ID

FeatId

Description

<Empty>

Lifespan

Creation Date

<Empt...>

Termination Date

<Empt...>

Roof Height

33 ft

Roof Height Above Sea Level

☐

Roof Slope

<Em...>

Style

Rule Style

...

Base Color

Color()

Roof Material

or()

Close & Refresh

OK

Cancel

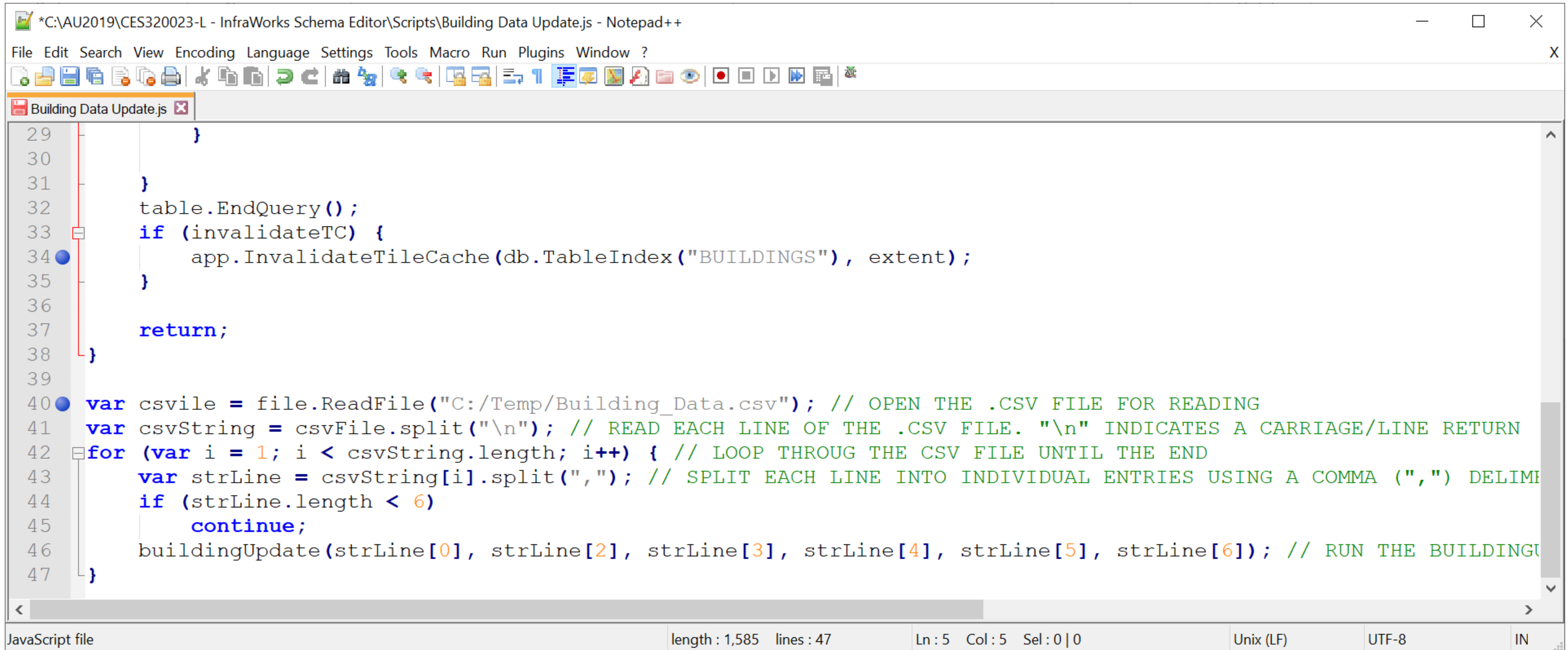


# Update Attributes w/JavaScript





# JavaScript



The screenshot shows a Notepad++ window with the title bar: \*C:\AU2019\CES320023-L - InfraWorks Schema Editor\Scripts\Building Data Update.js - Notepad++. The menu bar includes File, Edit, Search, View, Encoding, Language, Settings, Tools, Macro, Run, Plugins, and Window. The toolbar contains various icons for file operations, editing, and development. The active tab is Building Data Update.js. The code is as follows:

```
29     }
30
31     }
32     table.EndQuery();
33     if (invalidateTC) {
34         app.InvalidateTileCache(db.TableIndex("BUILDINGS"), extent);
35     }
36
37     return;
38 }
39
40 var csvile = file.ReadFile("C:/Temp/Building_Data.csv"); // OPEN THE .CSV FILE FOR READING
41 var csvString = csvFile.split("\n"); // READ EACH LINE OF THE .CSV FILE. "\n" INDICATES A CARRIAGE/LINE RETURN
42 for (var i = 1; i < csvString.length; i++) { // LOOP THROUG THE CSV FILE UNTIL THE END
43     var strLine = csvString[i].split(","); // SPLIT EACH LINE INTO INDIVIDUAL ENTRIES USING A COMMA (",") DELIME
44     if (strLine.length < 6)
45         continue;
46     buildingUpdate(strLine[0], strLine[2], strLine[3], strLine[4], strLine[5], strLine[6]); // RUN THE BUILDINGU
47 }
```

The status bar at the bottom displays: JavaScript file, length : 1,585 lines : 47, Ln : 5 Col : 5 Sel : 0 | 0, Unix (LF), UTF-8, and IN.



# Create Feature Themes





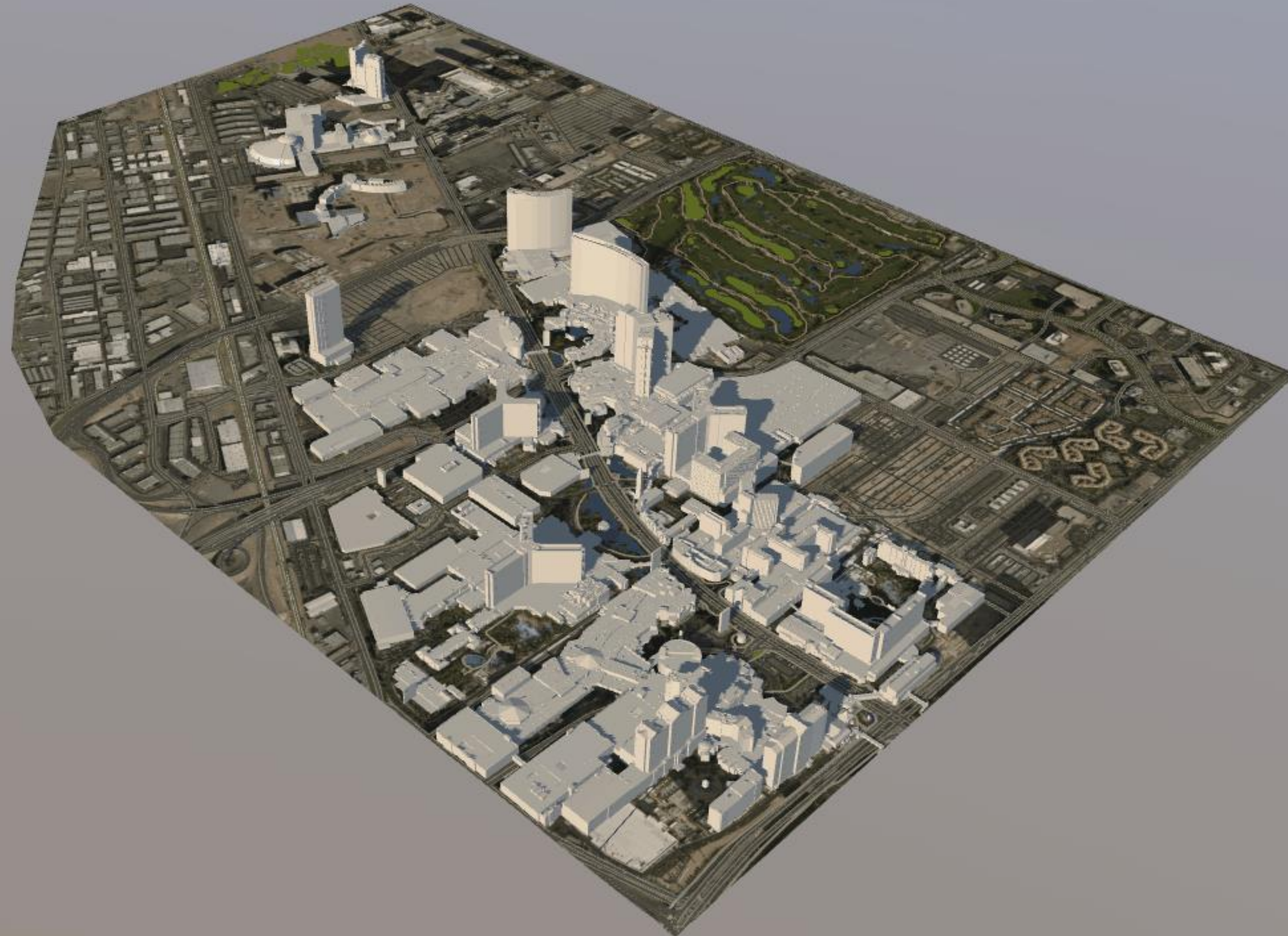
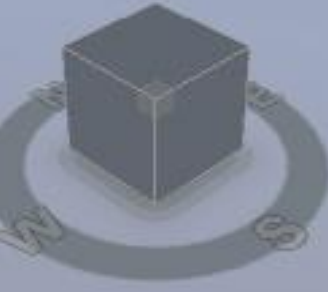
# What Are Feature Themes?

ALLOW YOU TO VISUALLY CLASSIFY ASSESTS ACCORDING TO THEIR ATTRIBUTES.

IN OTHER WORDS... YOU CAN **COLOR**-CODE YOUR DATA.



# How Do We Create A Feature Theme?





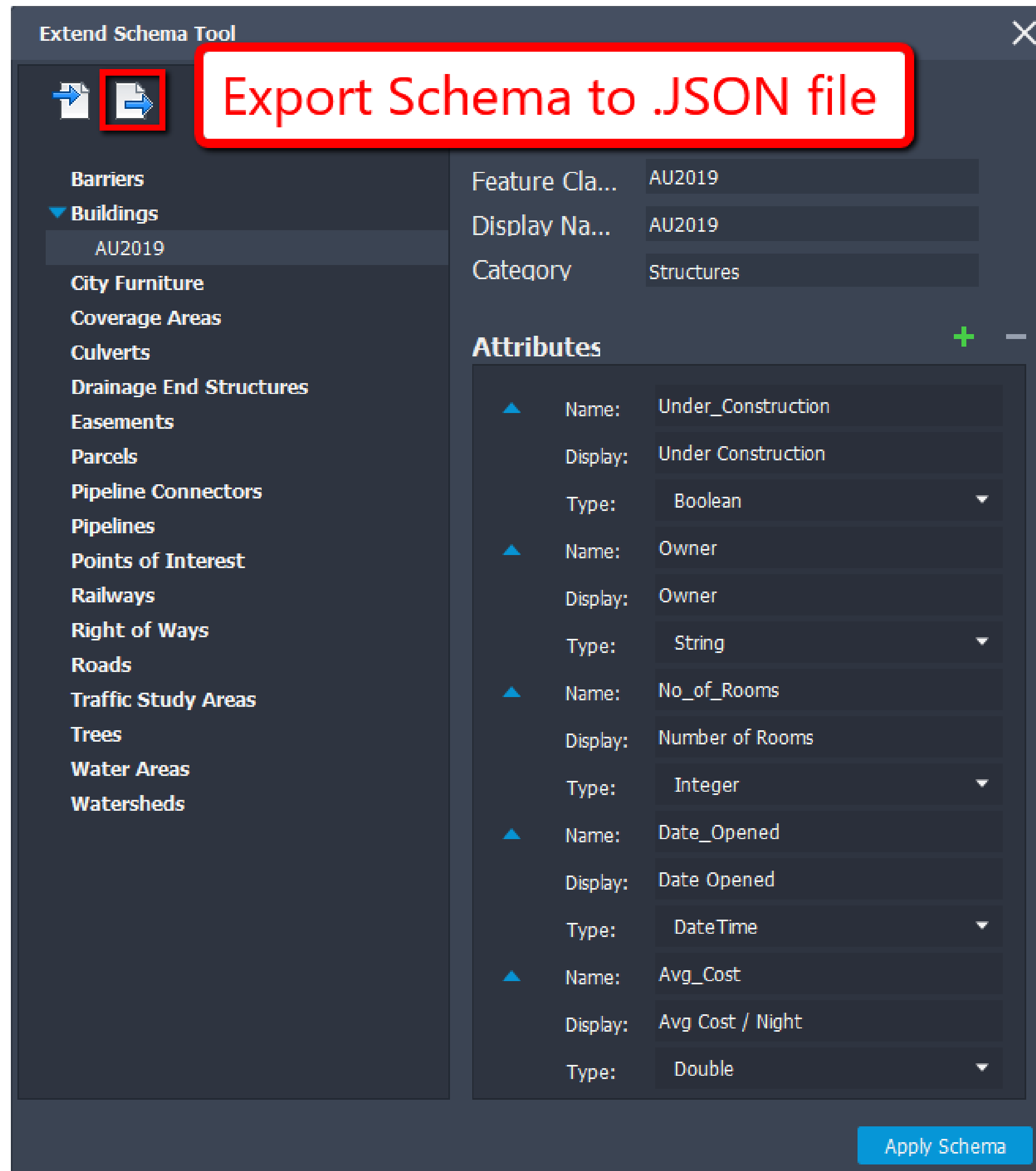
# How to Reuse Custom Attributes





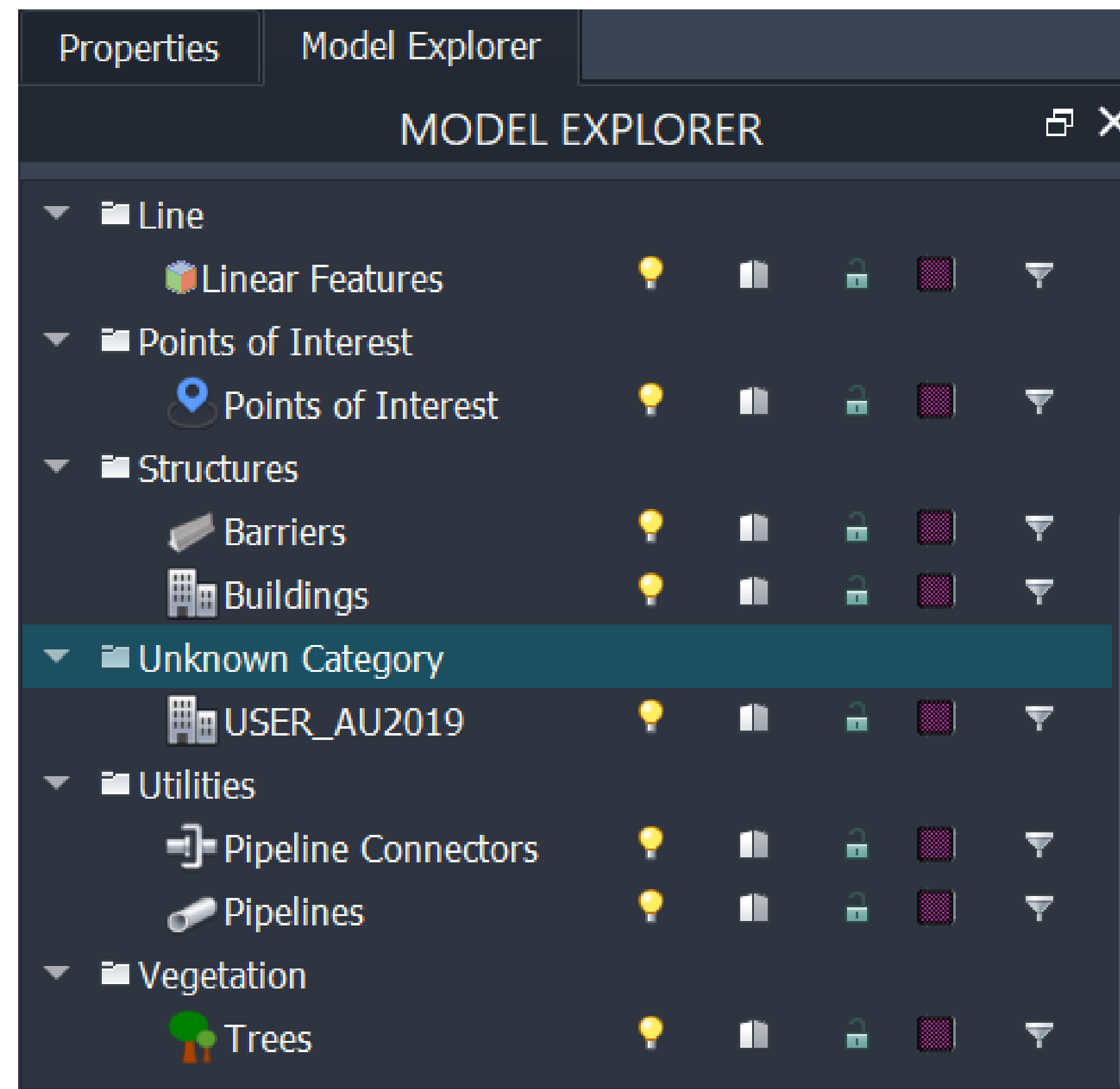
# Re-use Custom Attributes

## .JSON file





# Do NOT Delete the .JSON File





# BONUS – JavaScript Tools

## RANDOMIZE OBJECTS

Trees – *4\_Randomize Objects - Trees.js*

City Furniture – *4\_Randomize Objects - City Furniture.js*

City Furniture (Parked Cars) –

*4\_Randomize Objects - City Furniture PARKED CARS.js*

## SNAPSHOTS

Batch Snapshots – *4\_Batch Snapshot.js*





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