Creating Box Culvert on IH-10

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Introduction

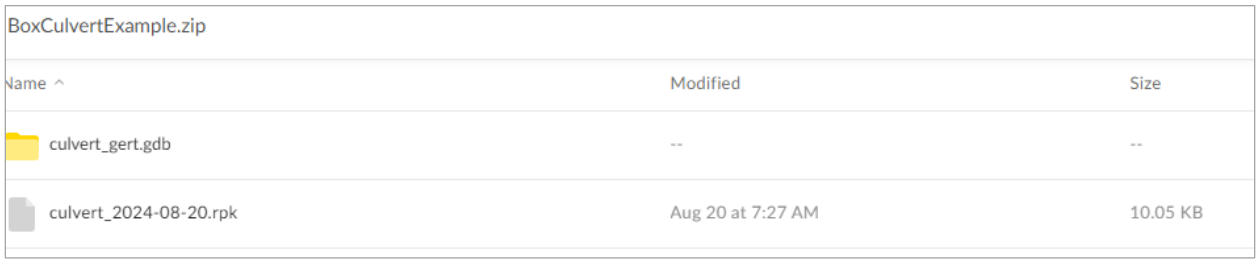
The input file for this exercise can be accessed at:
https://www.caee.utexas.edu/prof/maidment/RoadElevationModel/Culvert/BoxCulvertExample.zip

This file contains an example polygon for a box culvert located on IH-10 southwest of Beaumont, Texas. Using ArcGIS City Engine, a Rule Package has been created that includes the attributes of this box culvert structure.

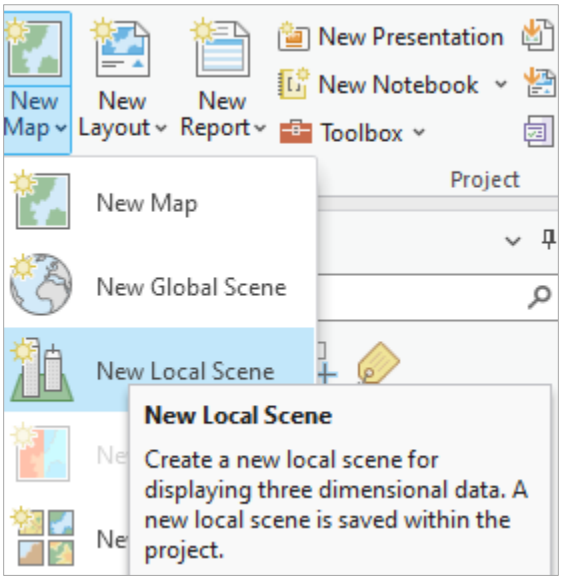
Applying the rule to the polygon in ArcGIS Pro

(1) Create a new folder called **IH10Culvert**, download the input file.

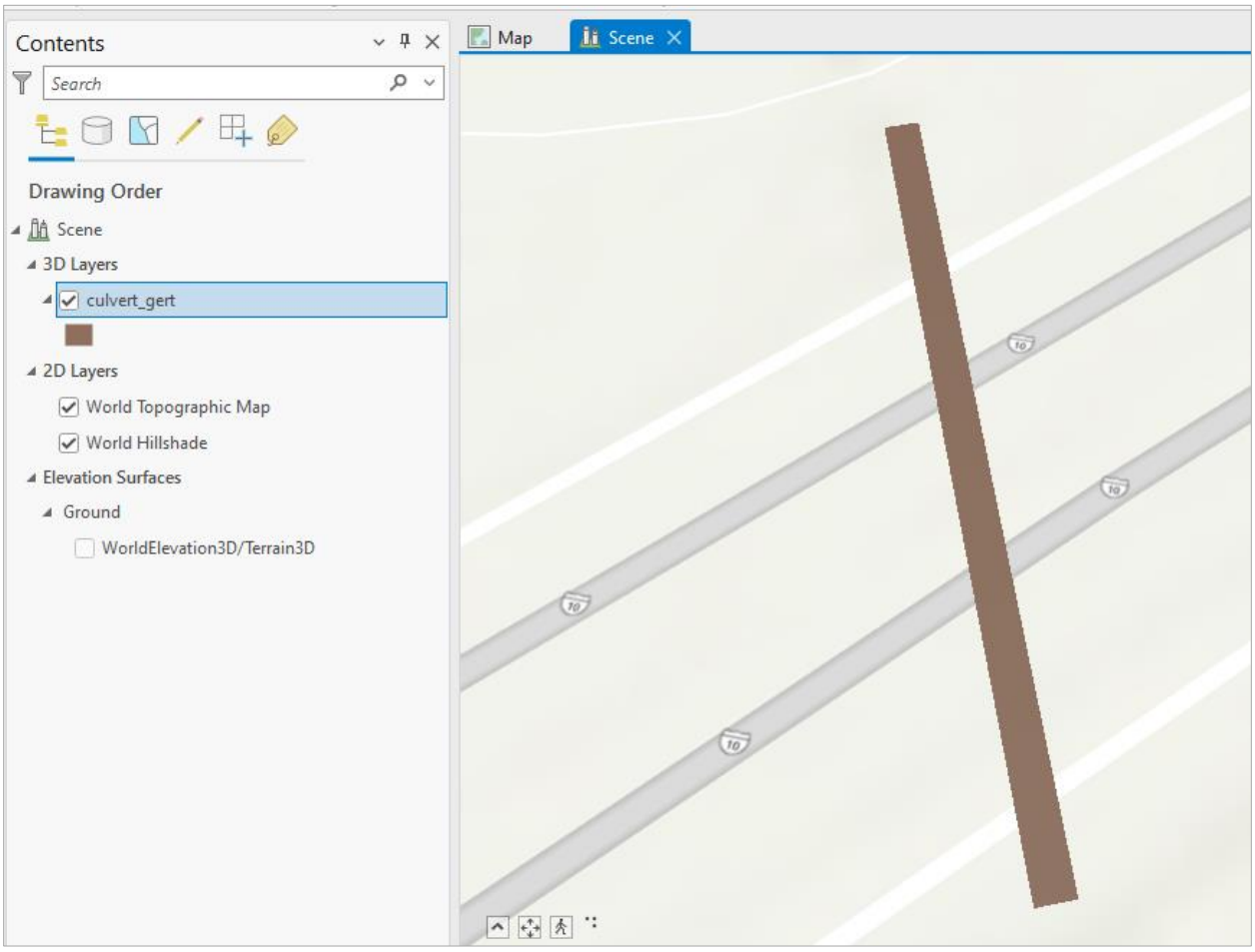
and extract the contents from the zip file:



(2) Open ArcGIS Pro and in this folder, create a new project called **BoxCulvert**. **Insert** a new Local Scene in the Map View



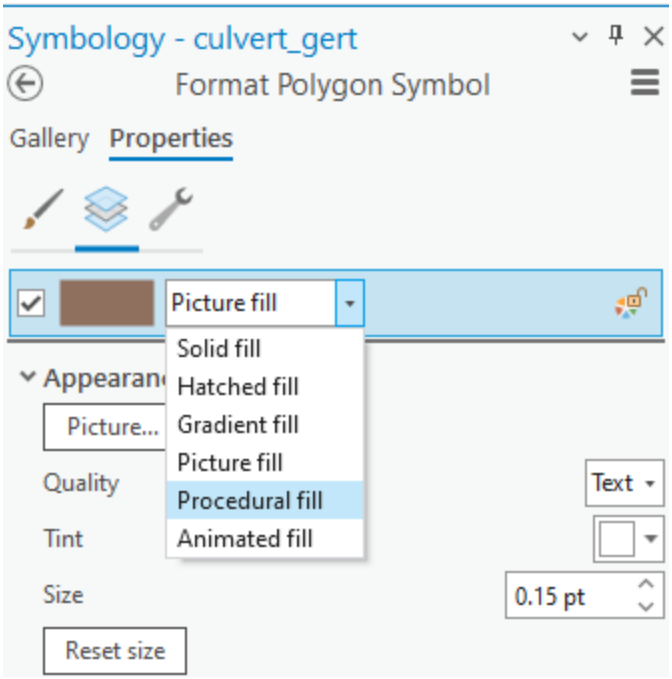
(4) **Add data** to the Scene from the **culvert_gert.gdb** Turn off the **World Elevation3D/Terrain3D** so that your culvert shape doesn't get buried under the IH-10 embankment.



This culvert has the following attributes (in meters)

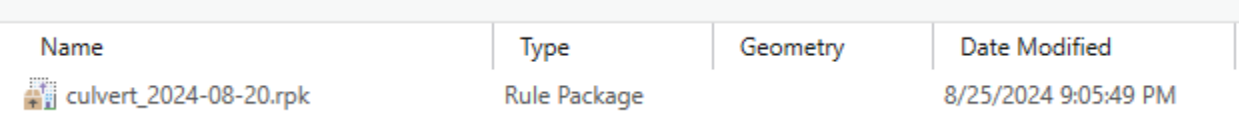
Compass_angle	Num_Culverts	Culvert_Width	Culvert_Height	Low_Member_Offset	Culvert_Bottom_Height
63.46	2	1.83	1.52	0.416	0.416

(5) Double Click on the Symbol for **culvert_gert** in the Contents pane and switch from **Solid Fill** to **Procedural Fill**



(6) Click on Rule … and navigate to select the procedural rule to be applied

And in the folder below the rule package is found. Click Apply to this.



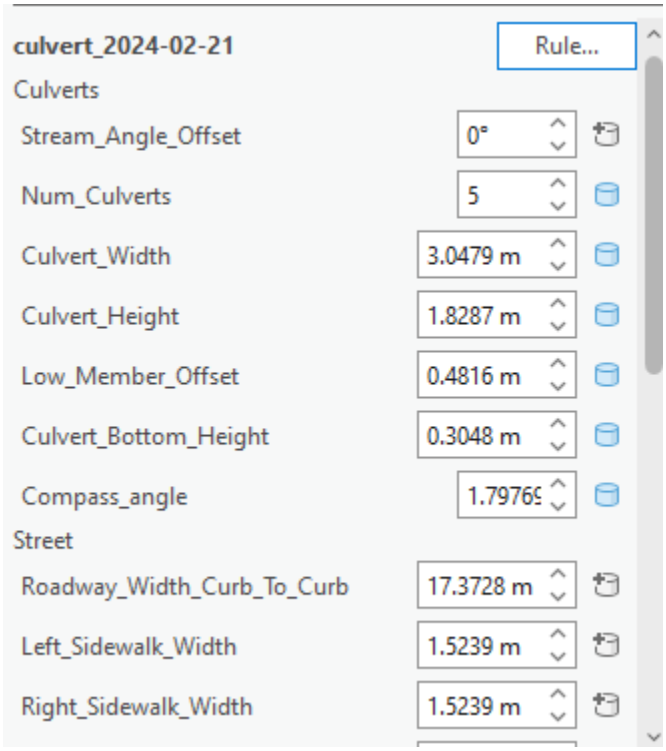
And this produces the required culvert.

Notes:

(1) The default rule parameters still appear in the symbology display, as shown below, but the actual rule parameters from the feature class are the ones that apply.

(2) A railing automatically appears on the culvert surface but can be eliminated by setting the Railing Height = 0 in the Symbology pane.

Default Culvert Parameters:

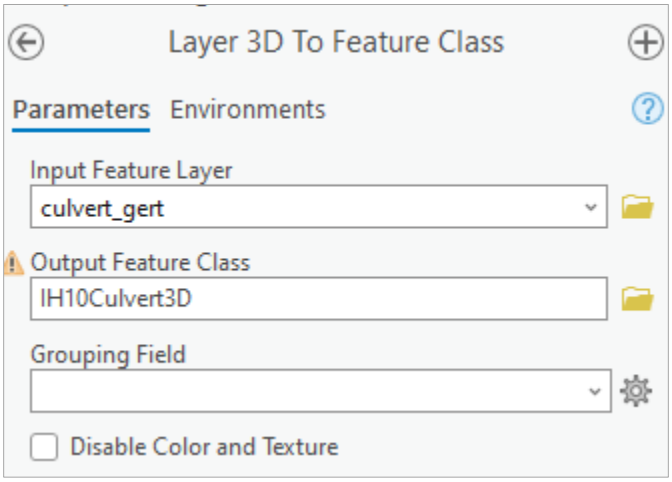


There are two ways to change the attributes:

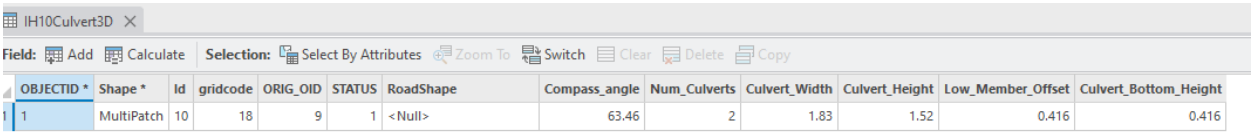
1. Change the attributes of the polygon directly. The geometry will change because those attributes are mapped to the rule
2. Change the rule parameters directly by setting the attribute mapping to None. Then you can play with the parameter values in the symbology pane.

- Once you are happy with the model you can persist the symbology as a multipatch feature with the 'Layer 3D to feature class" gp tool
- Or if you know the rule and polygon attributes are fine, you can create multipatch features directly using the "Features from CityEngine" rules

The culvert feature can be persisted in its 3D format using the **Layer 3D to Feature Class** function



Which produces a new 3D **Multipatch** feature in the IH10Culvert geodatabase.



OBJECTID *	Shape *	Id	gridcode	ORIG_OID	STATUS	RoadShape	Compass_angle	Num_Culverts	Culvert_Width	Culvert_Height	Low_Member_Offset	Culvert_Bottom_Height
1	MultiPatch	10	18	9	1	<Null>	63.46	2	1.83	1.52	0.416	0.416

This area has Elevation-Derived Hydrography, so if the DEM used for that purpose and the 3D Stream flowline from that data collection are added to the display, the result appears as:

If the road surface polygon is digitized and LIDAR elevation points lying within that polygon are obtained, the result appears as: