Integrate CityEngine and Unreal Engine

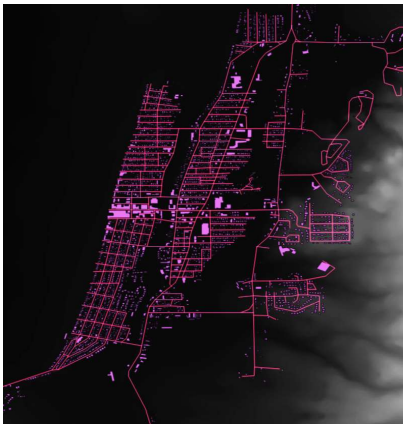
City Generation Workflow:

1. Gather geographical datasets (street and building)
2. Import into CityEngine and generate models
3. Import generated models into UE4

Geographic Data (Seaside, Oregon):

Datasets were provided by OSU Civil Engineering Professor, Daniel Cox.

- Building footprints (.shp)
- Road network (.shp)

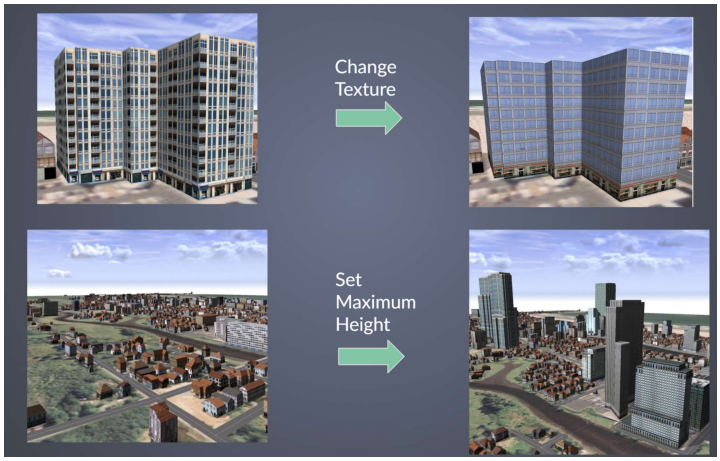


CityEngine:

1. Import datasets into CityEngine

Simply by dragging and dropping data files into CityEngine's view window.

2. Apply CityEngine rule .cga files to generate models



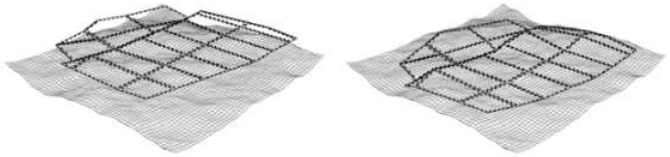
3. Align Graph to the terrain: (Street)

Align streets to terrain

CityEngine 2019.1 | Other versions

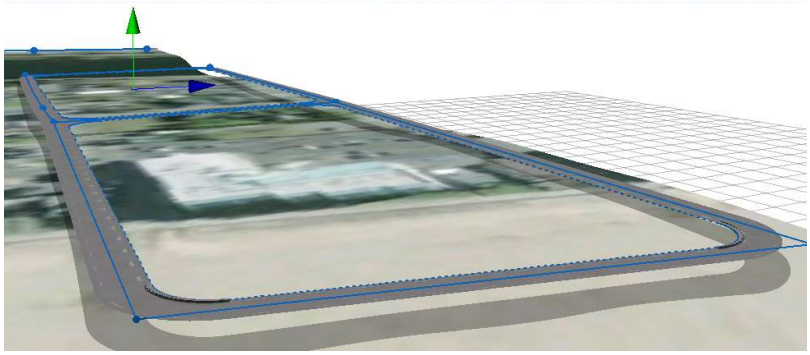
You can use the **Align streets to terrain** tool to align graph networks to a terrain (map layers with attribute `elevation` defined) or to the y=0 level. You can access the tool in the following ways:

- Click the **Align streets to terrain** tool in the main toolbar.
- Click **Graph > Align streets to terrain** in the main menu.

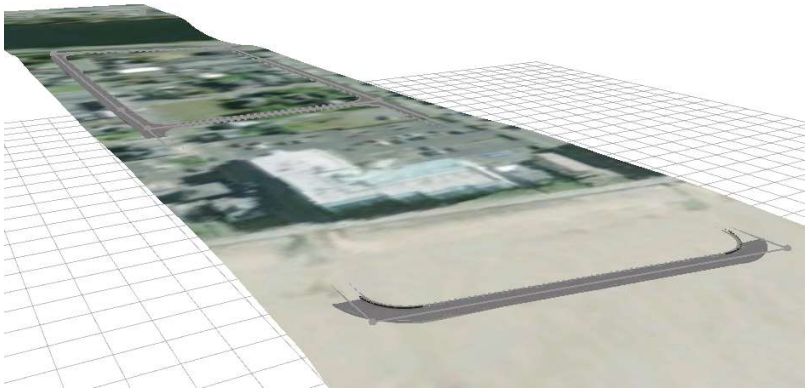


Non-aligned graph network *graph network aligned to a terrain*

Before the alignment:



After the alignment:



**4. [Align Terrain to Graph](): **

Align terrain to shapes

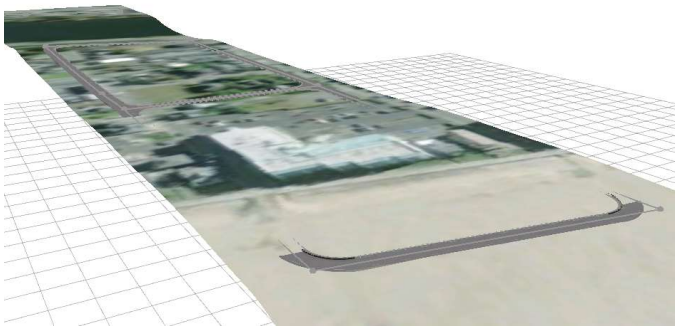
CityEngine 2020.1 | Other versions

Terrains can be aligned to shapes by using the **Align Terrain** tool . You can select shapes and access the tool the following ways:

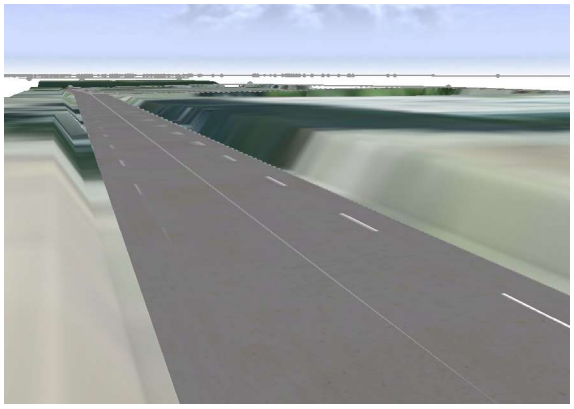
- Click the **Align Terrain** tool .
- Click **Layer > Align Terrain** in the main menu.

Note:
The **Align Terrain** tool aligns one or all terrains to the shapes currently selected.

Before:



After (changed the terrain, which is not what we want):



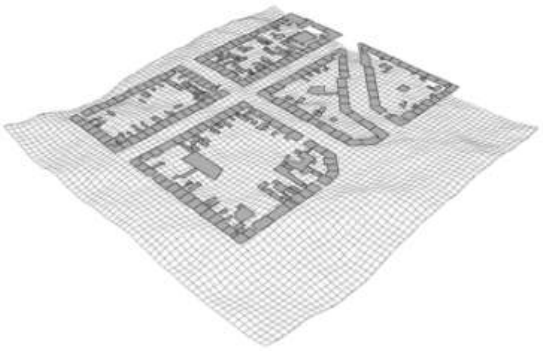
5.Align shapes to terrain (Buildings):

Align shapes to terrain

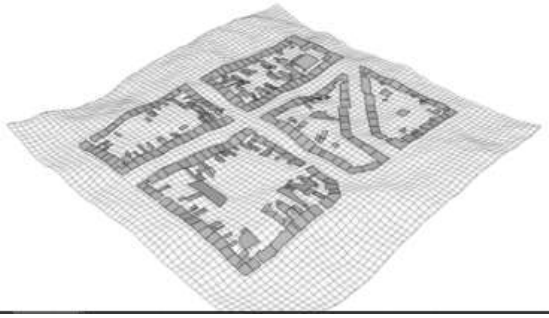
CityEngine 2020.0 | Other versions

The **Align shapes to terrain** tool aligns shapes to arbitrary terrains (map layers with attribute "elevation" defined) or to the y=0 level. All currently selected shapes and all shapes of the selected layers are aligned. The shapes are aligned to a terrain, using an alignment function and an optional offset. You can access the **Align shapes to terrain** tool the following ways:

- Click the **Align shapes to terrain** tool in the toolbar.
- Click **Shapes > Align shapes to terrain...** in the main menu.



Shapes not aligned to terrain



Integrate CityEngine and Unreal Engine:

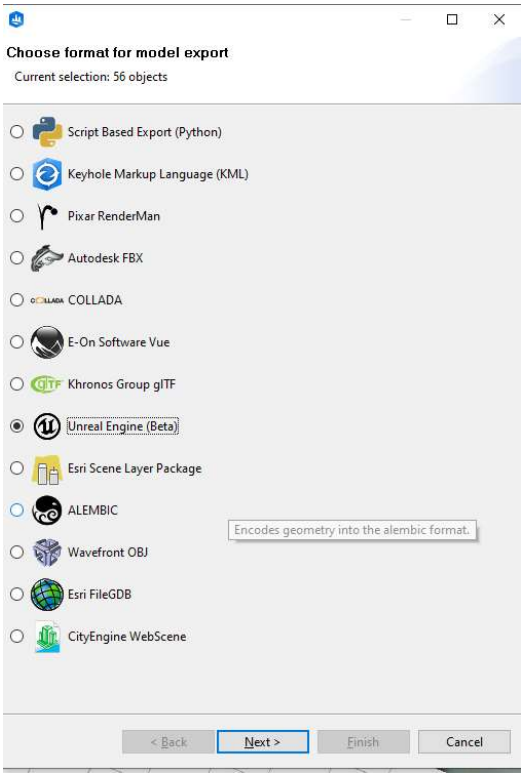
1. Export model from CityEngine in .udatasmath format
2. Enable Datasmith Importer in Unreal Engine
3. Import .udatasmith file into UE4w

Export:

1. Export model from CityEngine in .udatasmath format
2. Enable Datasmith Importer in Unreal Engine
3. Import .udatasmith file into UE4

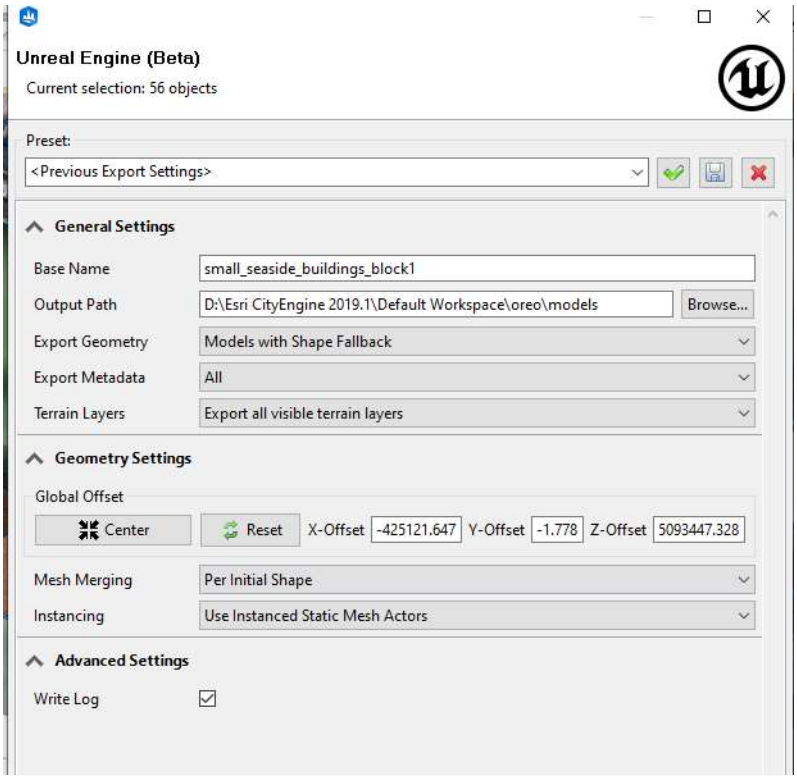
Walkthrough:

1. File -> Export Models -> Choose “Unreal Engine (Beta)” -> Next



2.

Base Name: “MyCity”
Global Offsets -> Click “**Center”**
Mesh Merging -> “**Per Initial Shape**”
Instancing -> “**Use Instanced Static Mesh Actors**”
Click “Finish”



3. In Unreal Engine:
   - Enable “**Datasmith Importer**”
   - Restart the project
   - 

Other UE4 Plugins:

- Dataprep plugin to
  - substitute materials
  - Delete objects
  - Learning Material
  - https://www.youtube.com/watch?v=oSRZ1ipQ19o
- Vitruvio plugin (Procedural Runtime Tool(PRT) in UE4
  - Generate models in UE4
  - https://github.com/Esri/vitruvio/blob/master/doc/usage.md

Conclusion

There are many pros for using CityEngine since it helps speed up the modeling process, which is way faster than modeling each building individually. Additionally, we had free access to the software as OSU engineering students. However,the integration between CityEngine and Unreal Engine4 is still in beta state, so we could barely find any recent documentation. As users, since UE4 is updated frequently, we hope to find more of the latest technical documentations.