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The magazine for civil & structural engineers

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Transform Community Planning and Development with Engaging 3D GIS Solutions

June 6, 2022

Introduction



Robert Kain
Principal
Houseal Lavigne



Marc Goldman
Director AEC Industry Solutions
Esri

HOUSEAL LAVIGNE

GEOSPATIAL SERVICES

We are an innovation-based planning and geospatial firm. We pride ourselves on creativity, collaboration, and delivery of high-quality plans and high-fidelity visualizations. Our team approach is built on strong relationships, the exchange of ideas, and a commitment to the integration of technology. Our priorities are to do good, have fun, work hard, and provide responsive, visionary, and viable solutions to our clients and partners.



ALL SCALES

We provide master planning, GIS, and visualization services for study areas of **all sizes and scales**, including entire regions, entire cities, downtowns, neighborhoods and special districts, and individual sites and buildings.



RENOWNED EXPERTS

We are the recognized leaders in creating GIS-enabled smart cities in digital twins. For more than a decade **our work has been showcased by industry software companies** to demonstrate the capabilities and potential of their programs.



HIGH SPEED & HIGH QUALITY

We pride ourselves in the quality of work and the speed in which we can deliver. We **understand the importance of deadlines** and meet or exceed the challenges without compromising the quality of our design and fidelity of our graphics.





We are an **Esri Business Partner** with an ArcGIS Urban Specialty. This gives Houseal Lavigne the opportunity to work with Esri in shaping best practices and defining how their services can be better integrated within the planning profession.



ArcGIS Urban Specialty



ArcGIS Online Specialty



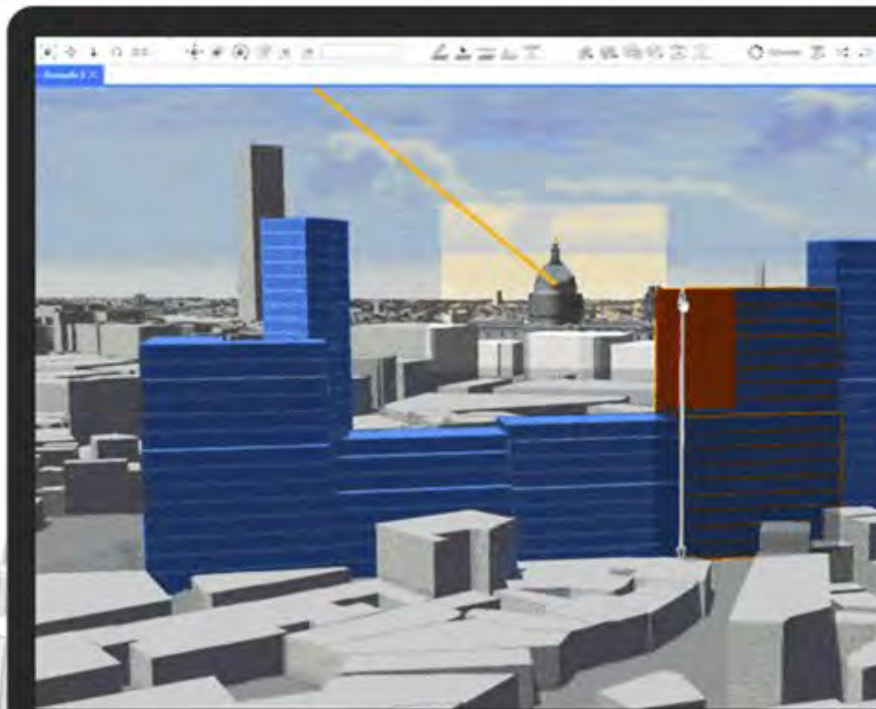
Release Ready Specialty





ArcGIS CityEngine

Advanced 3D city design software




CityEngine is advanced 3D modeling software for creating huge, interactive and immersive urban environments in less time than traditional modeling techniques. The cities you create using CityEngine can be based on real-world GIS data or showcase a fictional city of the past, present, or future.



 Special Achievement in GIS
2018 Award Winner

OSHKOSH, WI
OSHKOSH CORPORATION HQ



 Special Achievement in GIS
2020 Award Winner

MORRISVILLE, NC MORRISVILLE TOWN CENTER



CHICAGO, IL
HLA OFFICES & DOWNTOWN THEATRE DISTRICT



CHICAGO, IL

HLA OFFICES & DOWNTOWN THEATRE DISTRICT



SketchUp



CityEngine



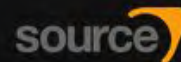
Photoshop



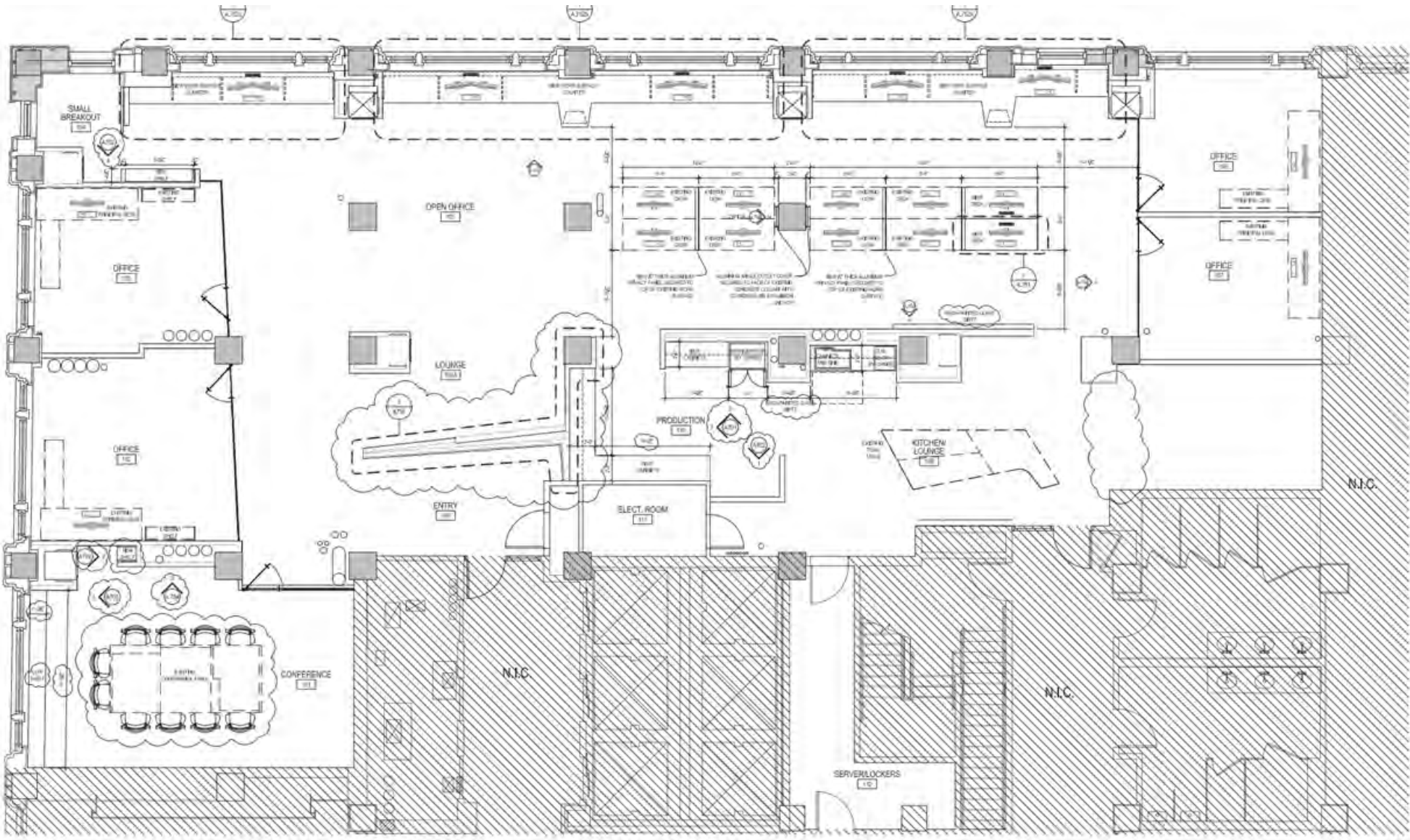
ArcGIS Pro



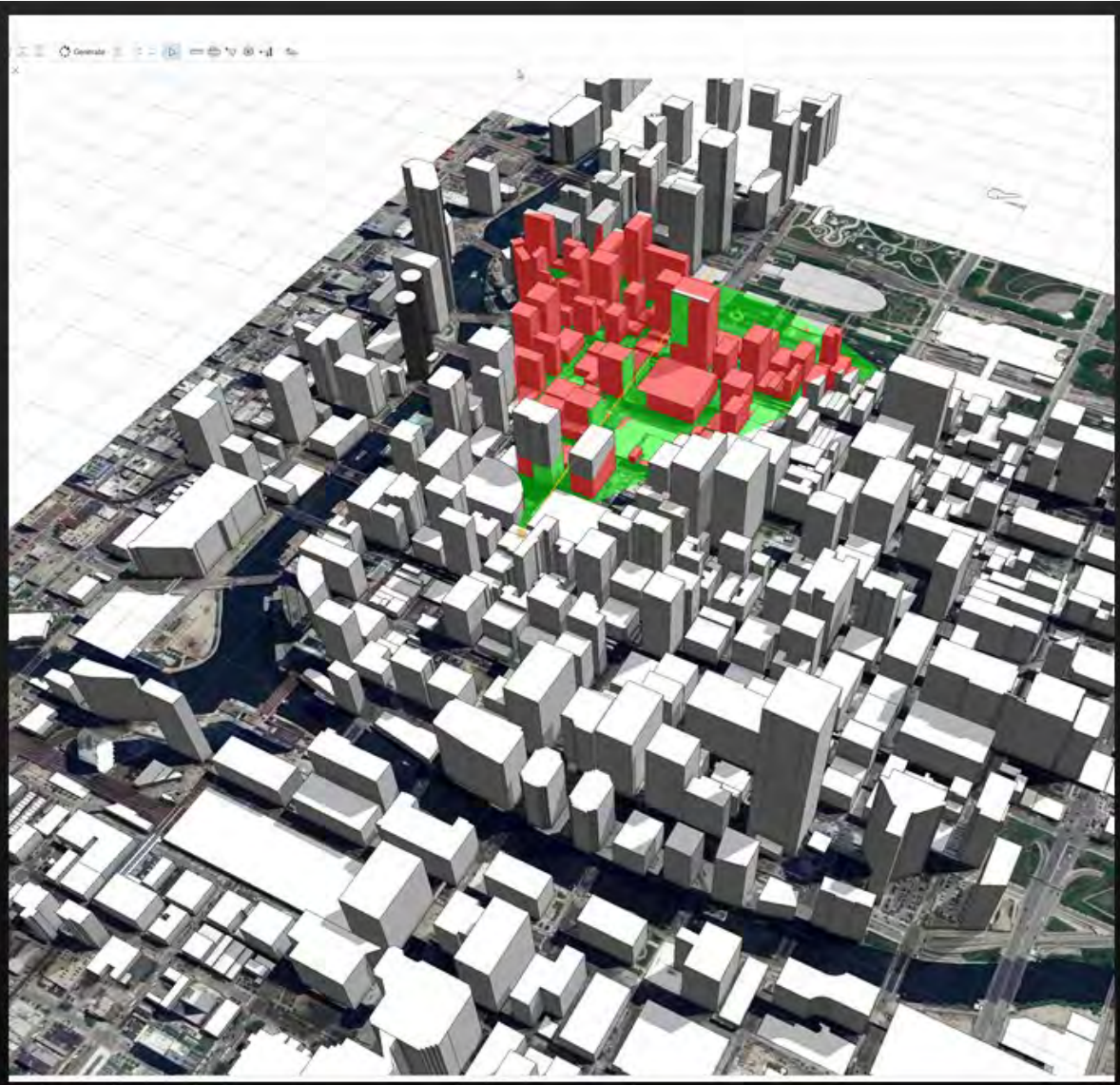
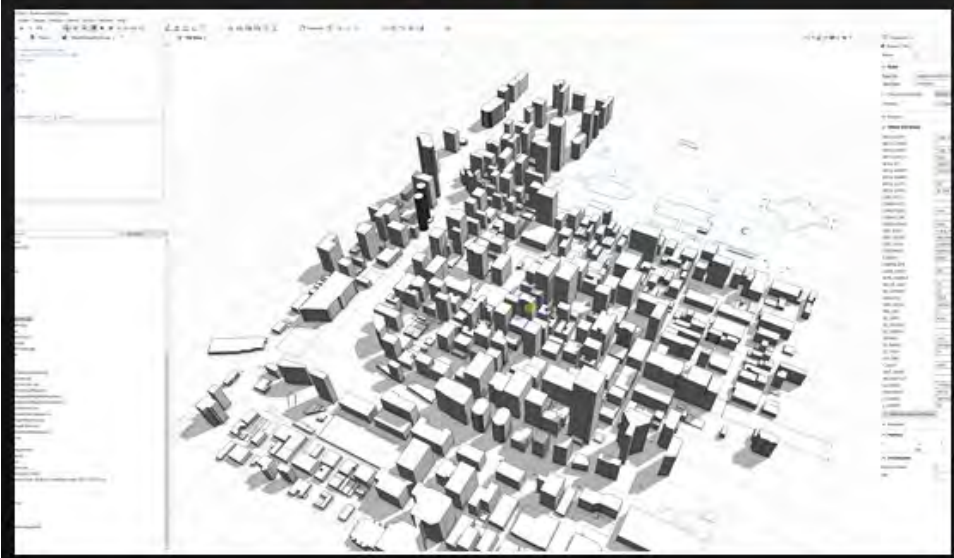
Rhino 3D

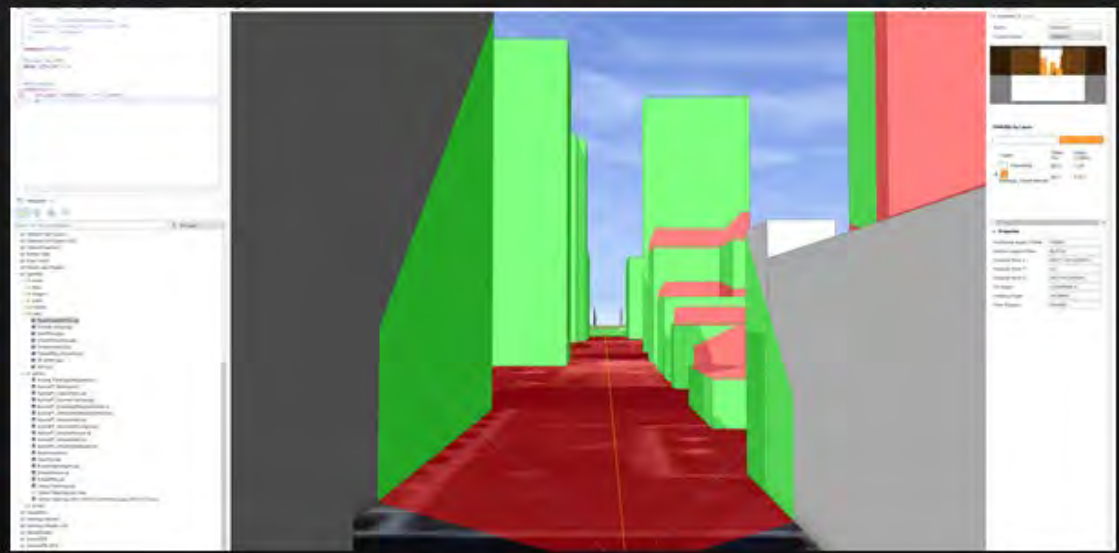
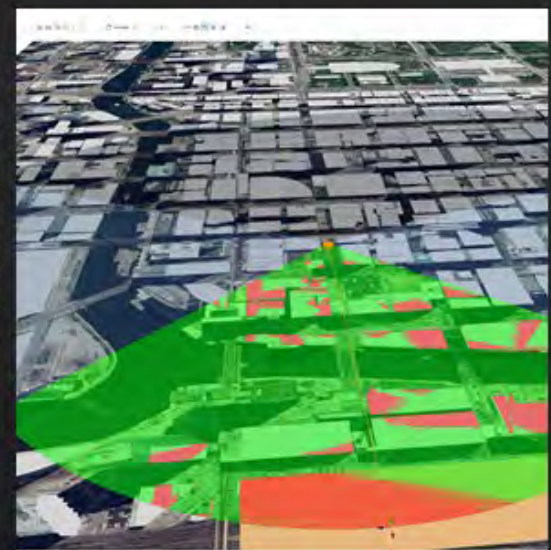
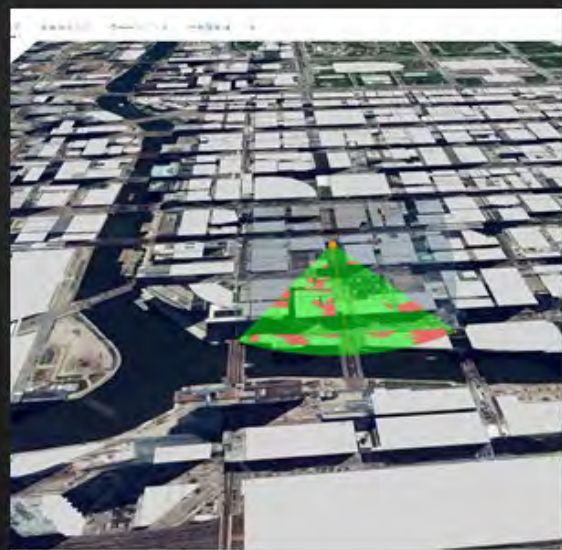
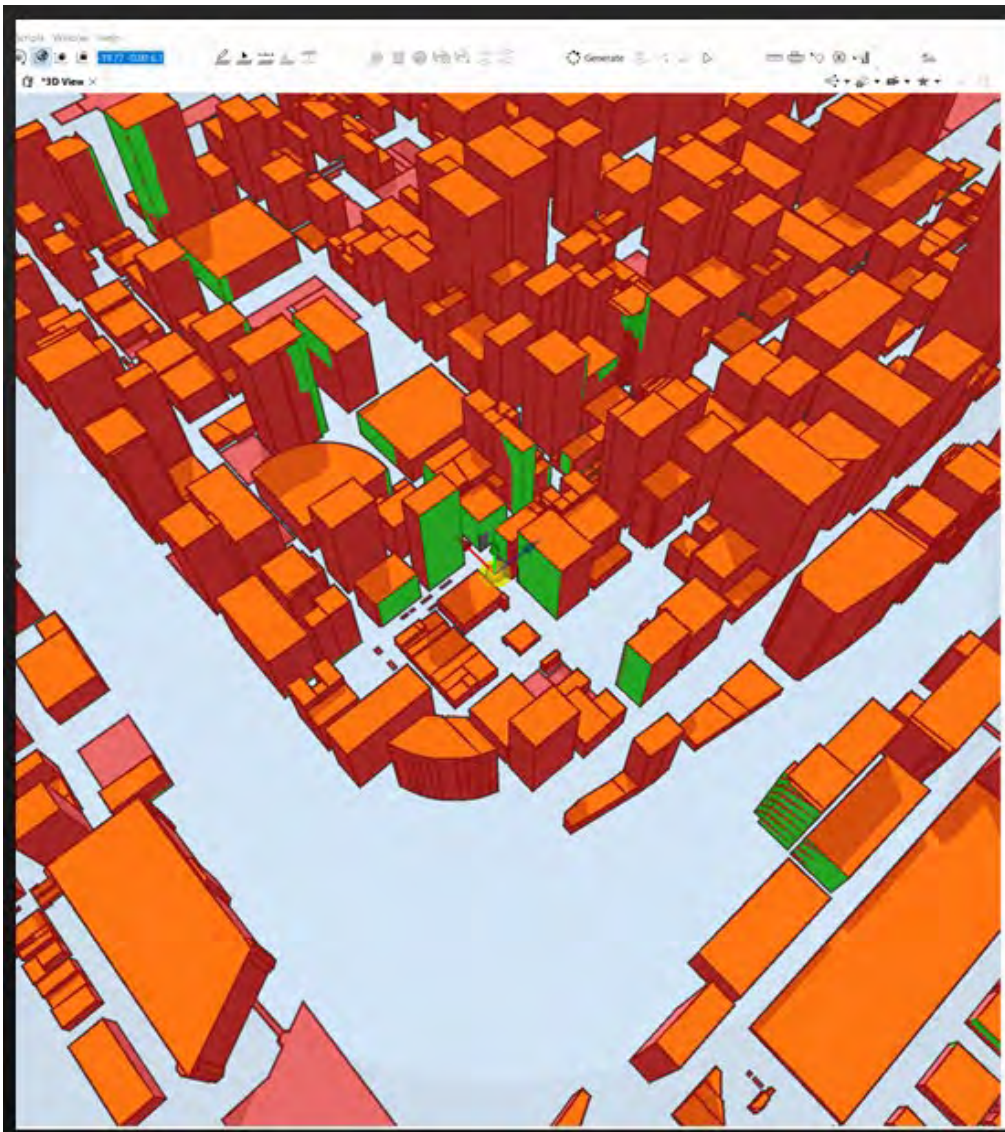


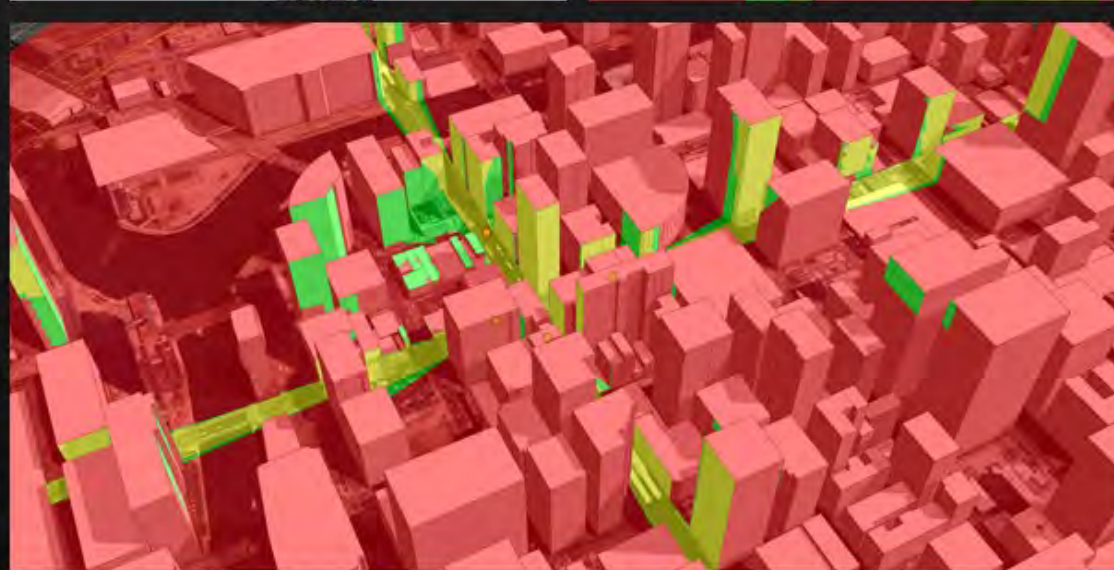
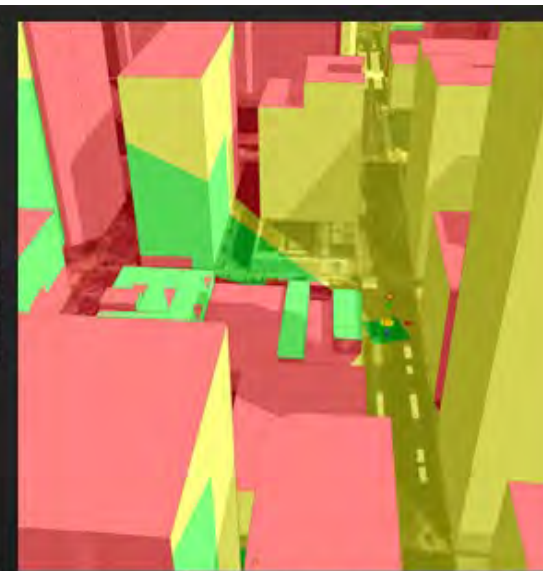
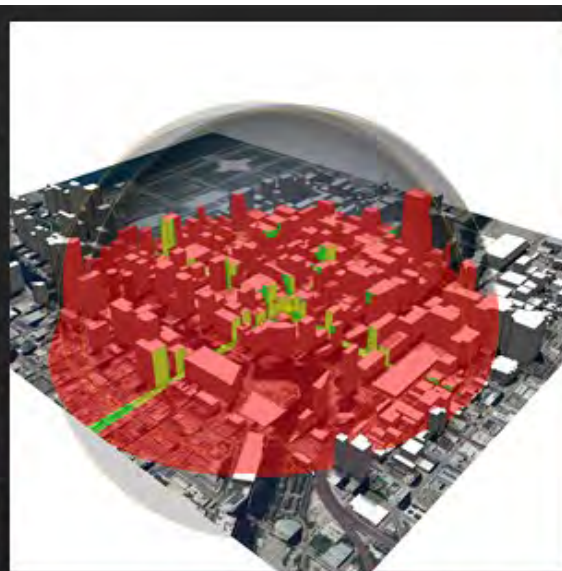
Source Engine

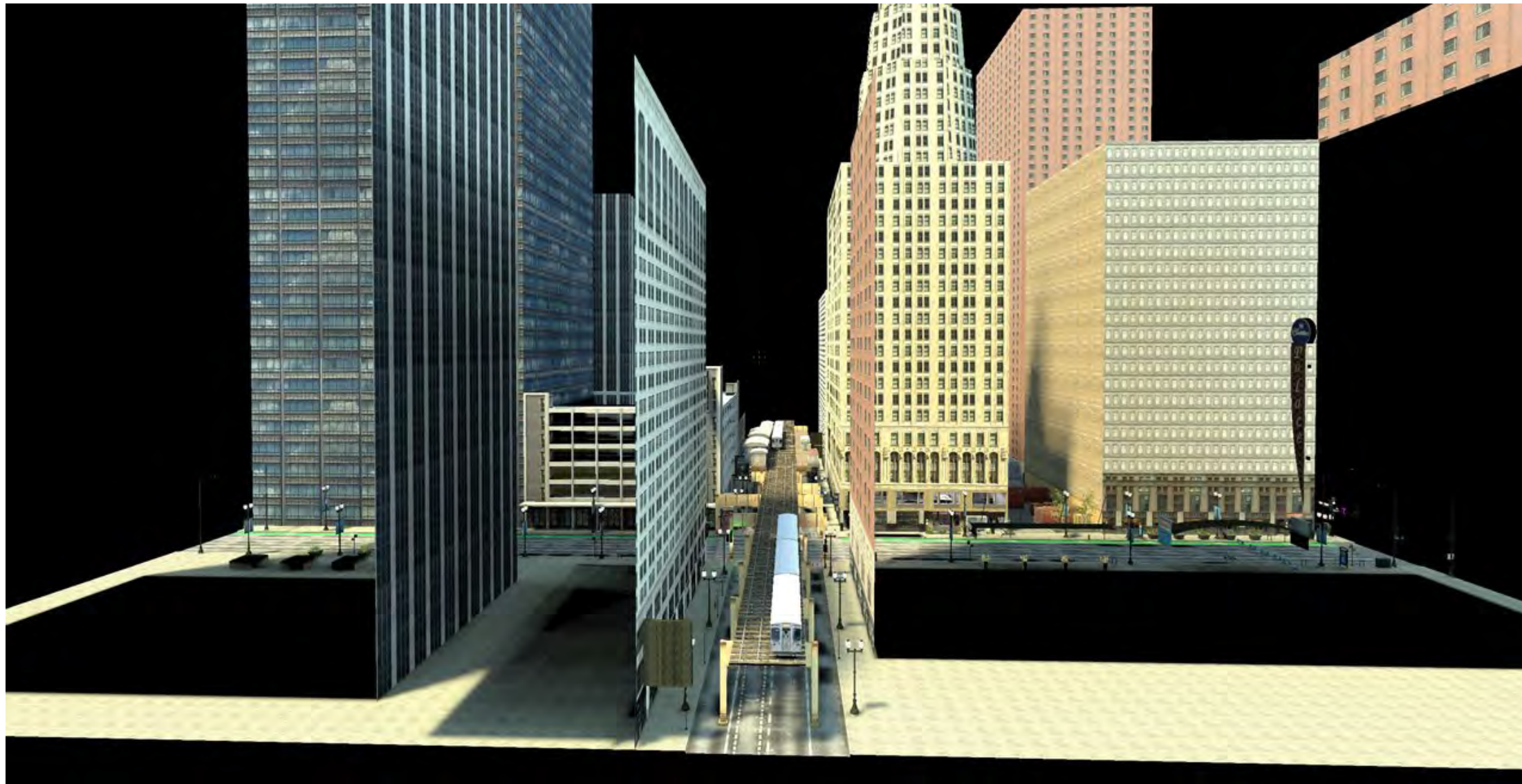


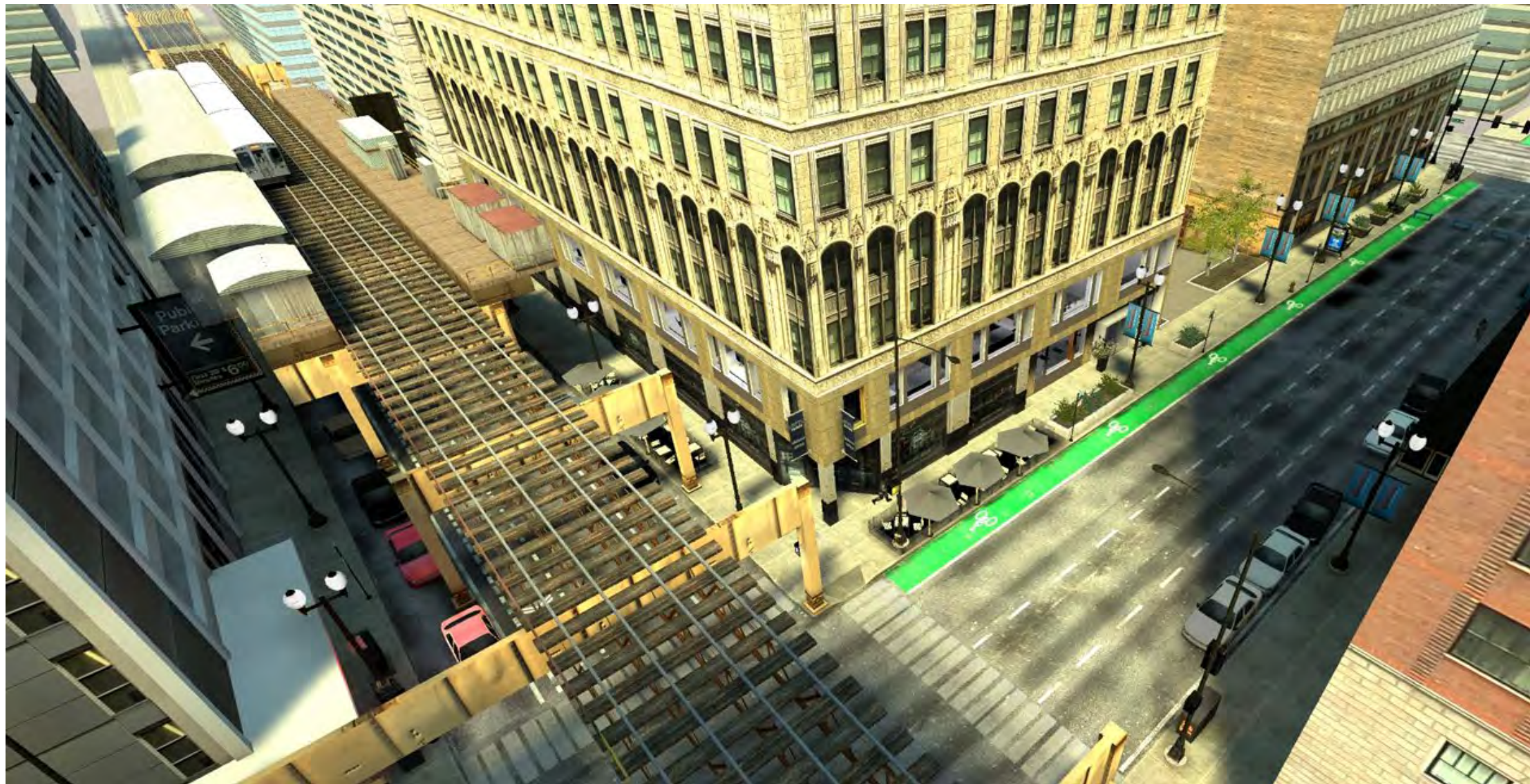


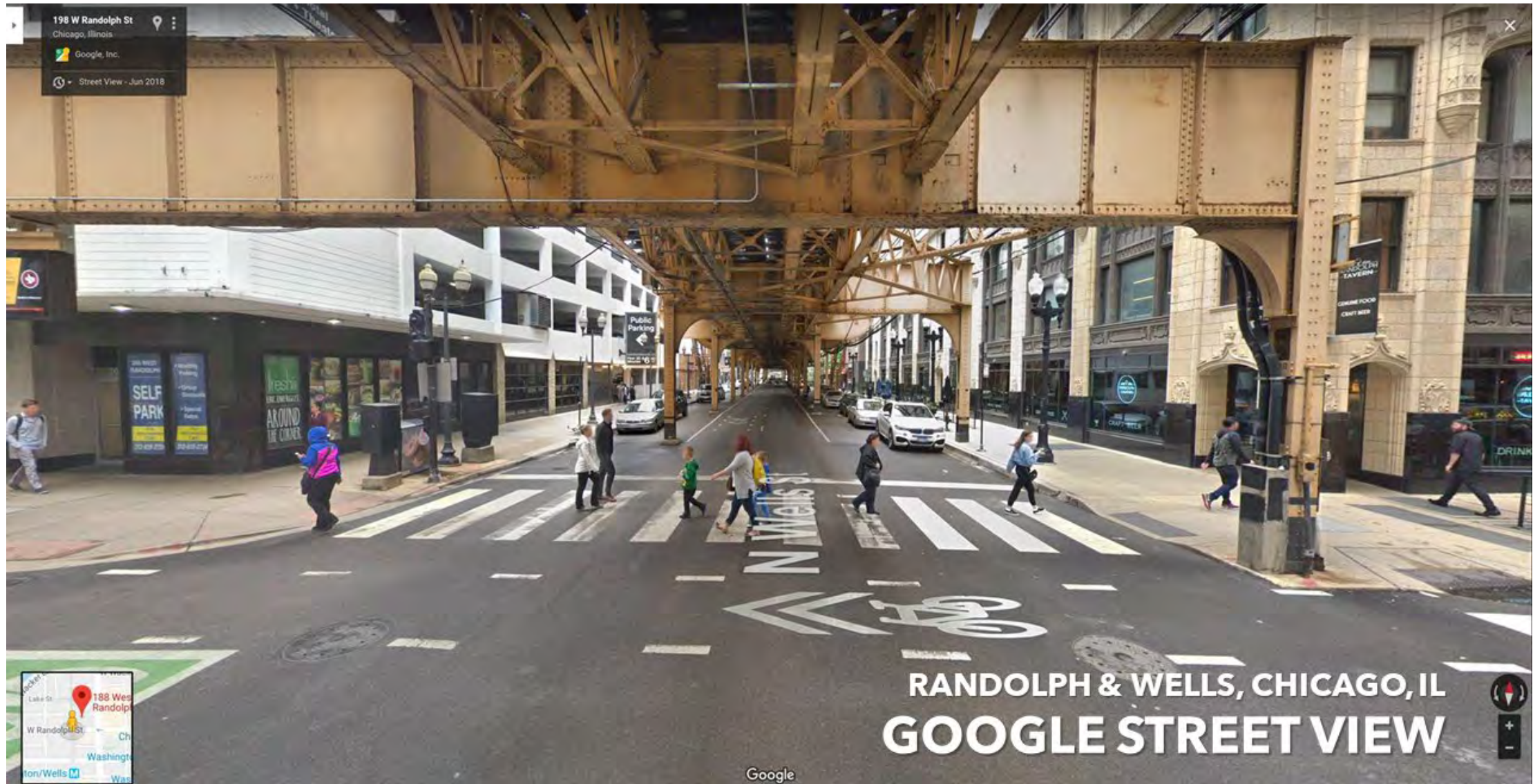












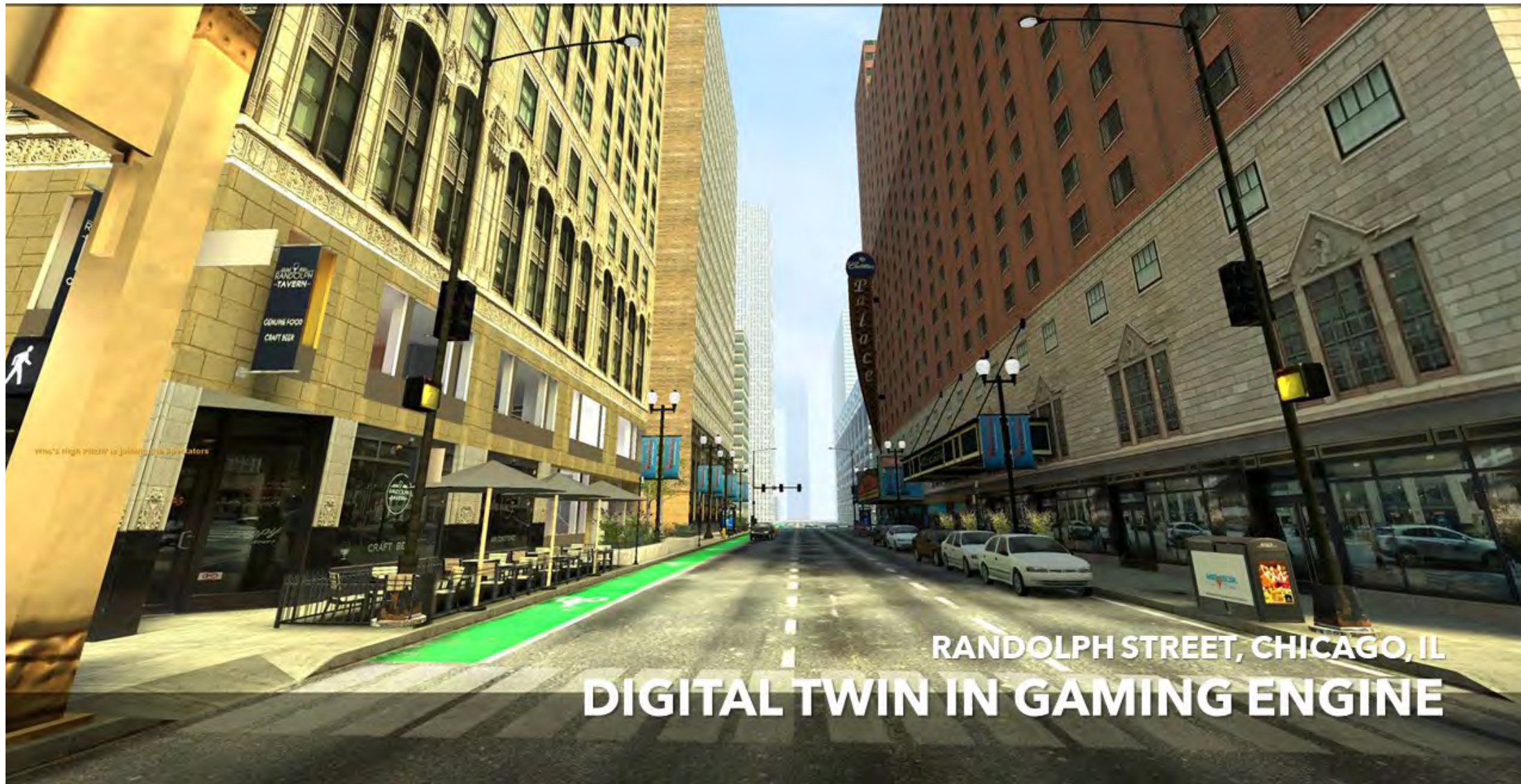
RANDOLPH & WELLS, CHICAGO, IL
GOOGLE STREET VIEW

Google

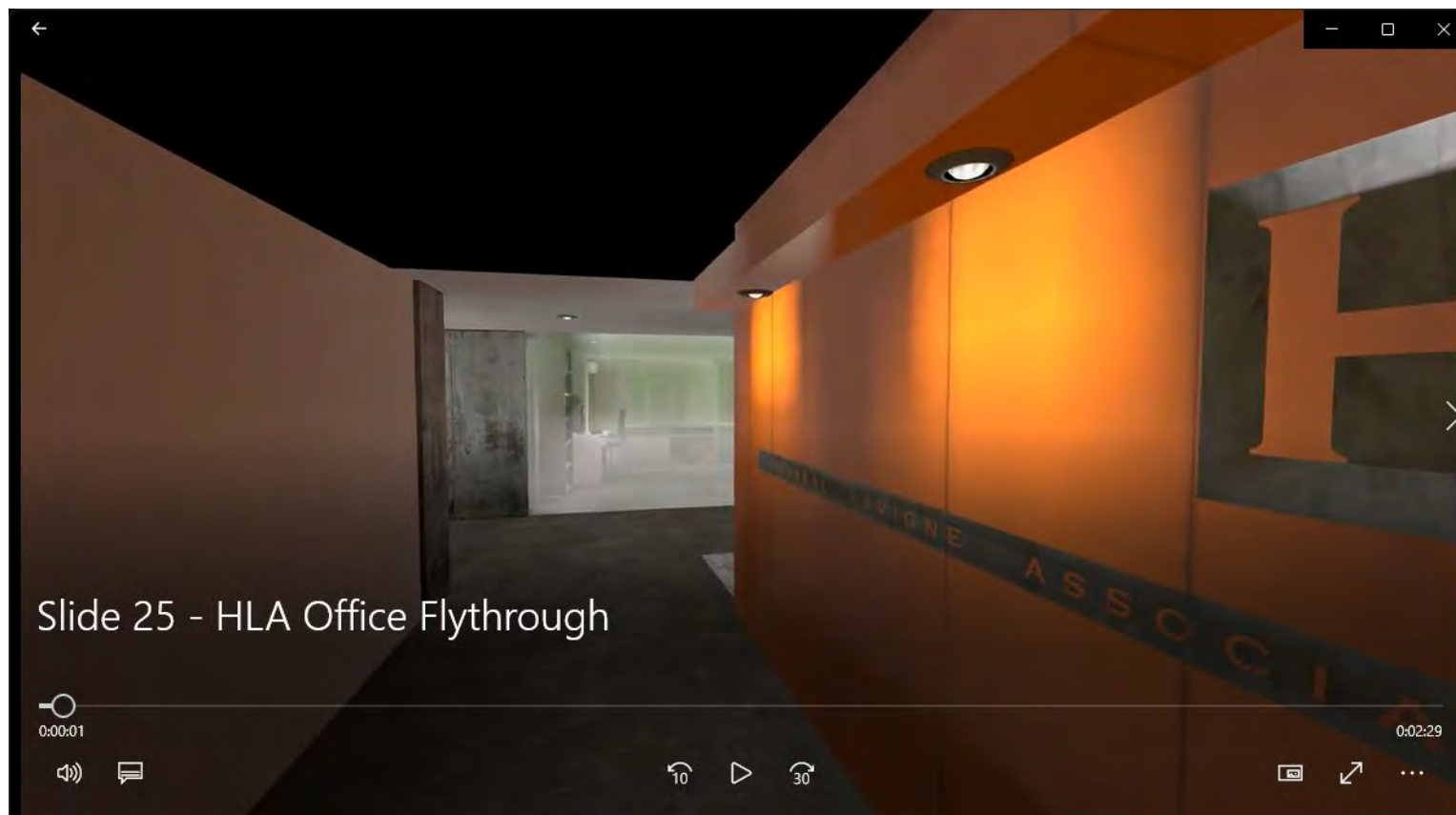


RANDOLPH & WELLS, CHICAGO, IL
DIGITAL TWIN IN GAMING ENGINE





RANDOLPH STREET, CHICAGO, IL
DIGITAL TWIN IN GAMING ENGINE



IN-GAME FLYTHROUGH ANIMATION



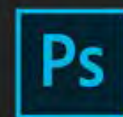
MORRISVILLE, NC

MORRISVILLE TOWN CENTER

TOOLS USED



CityEngine



Photoshop



Rhinoceros 3D



SketchUp



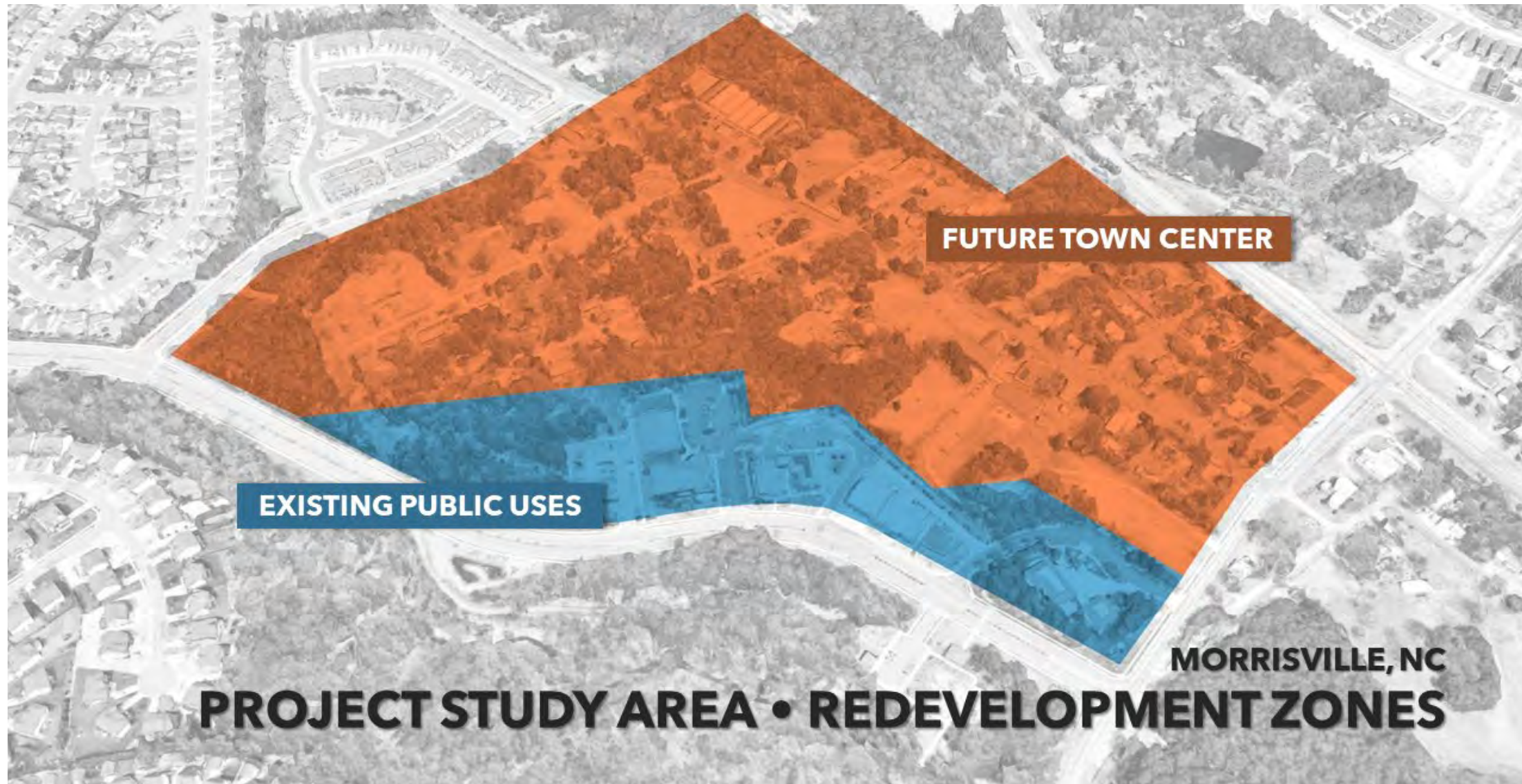
Unreal Engine

Morrisville Immersive 3D Town Center Plan

For the Town of Morrisville, a community in North Carolina's Research Triangle, the development of a town center had been a major point of contention for nearly 15 years. The Town did not have a traditional "downtown" and despite the community's desire to create a one, local officials were reluctant to approve any development within the identified bounds of the Town Center for fear of making a mistake that would impact Morrisville for generations.

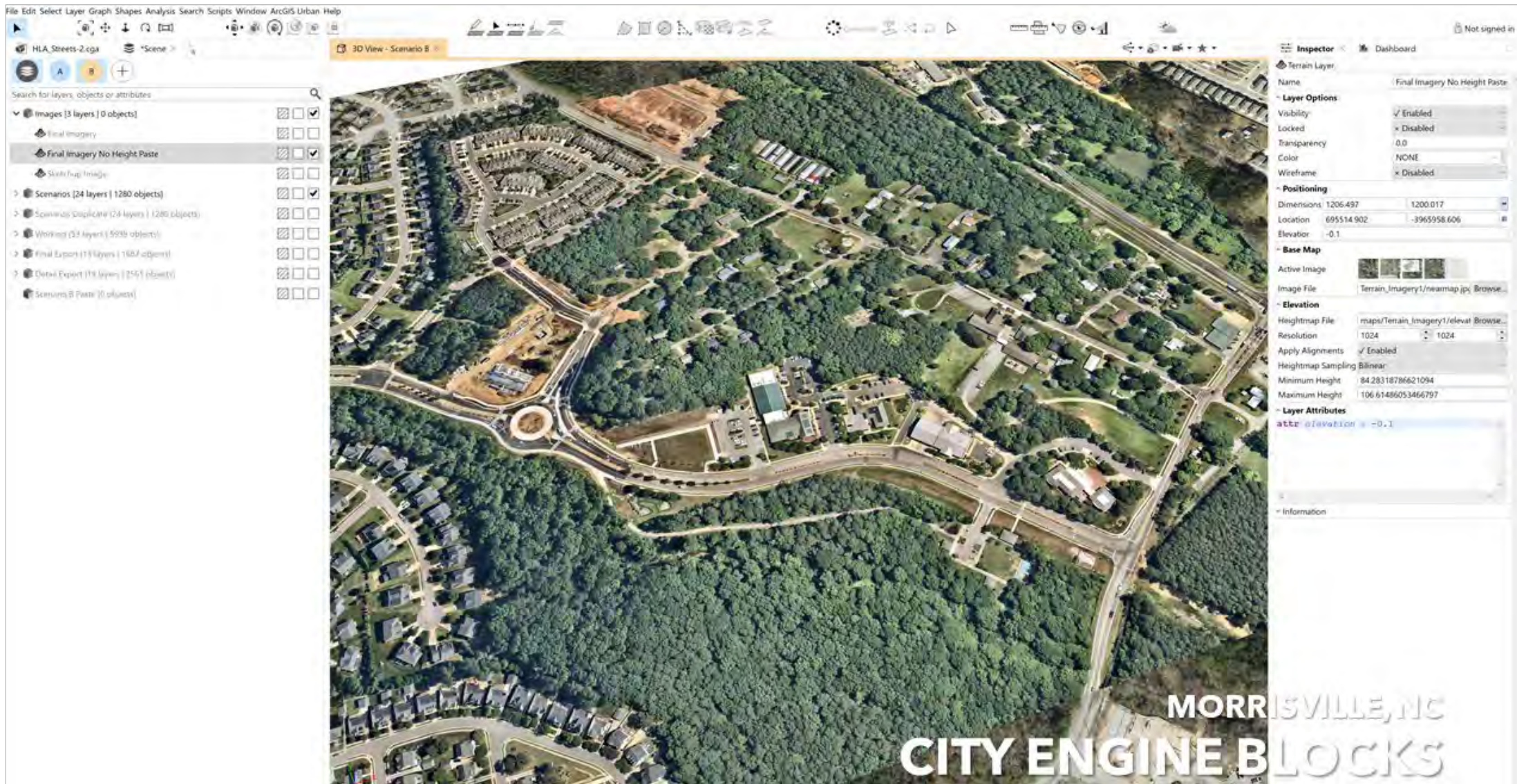


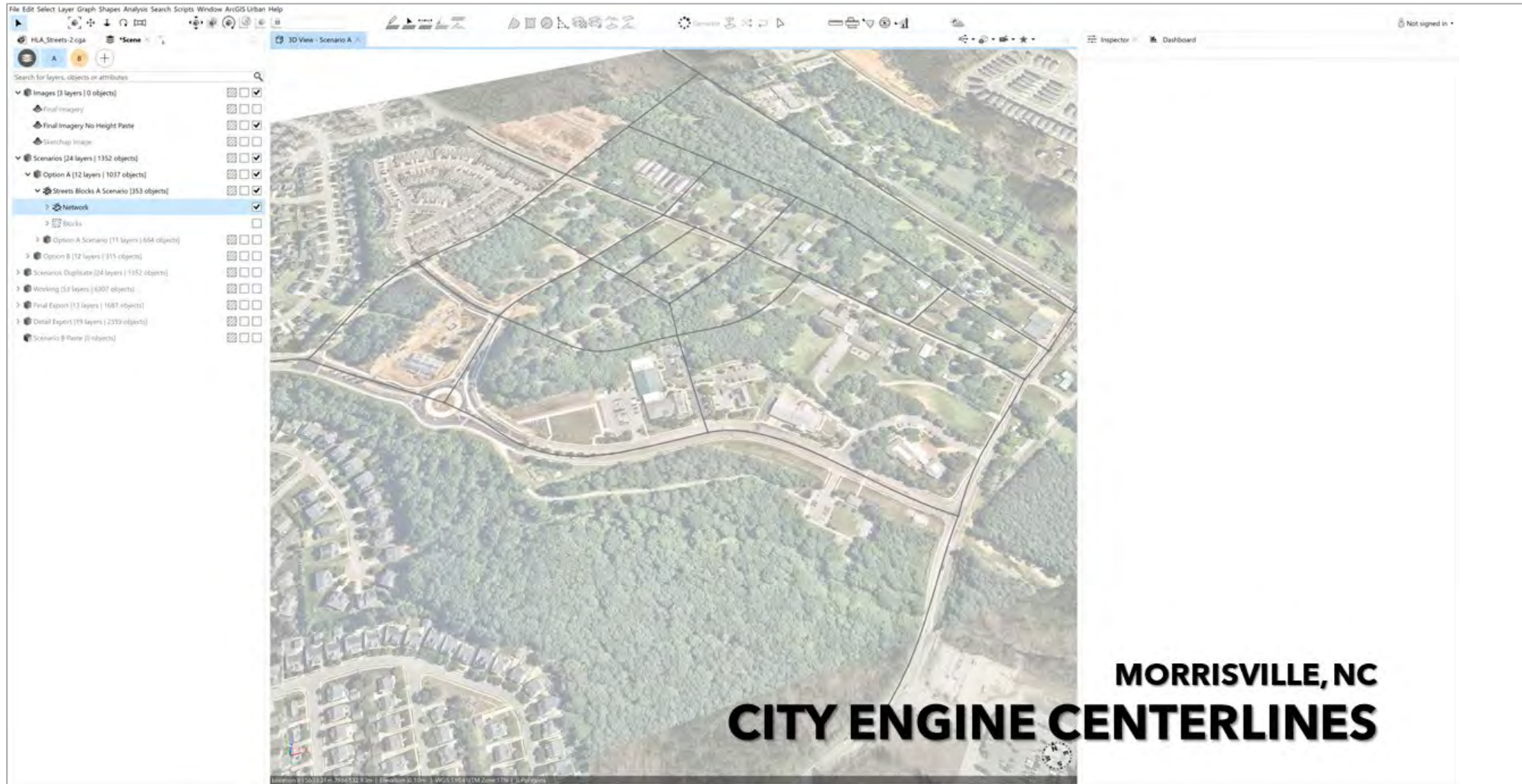
MORRISVILLE, NC
PROJECT STUDY AREA • SITE AERIAL IMAGE





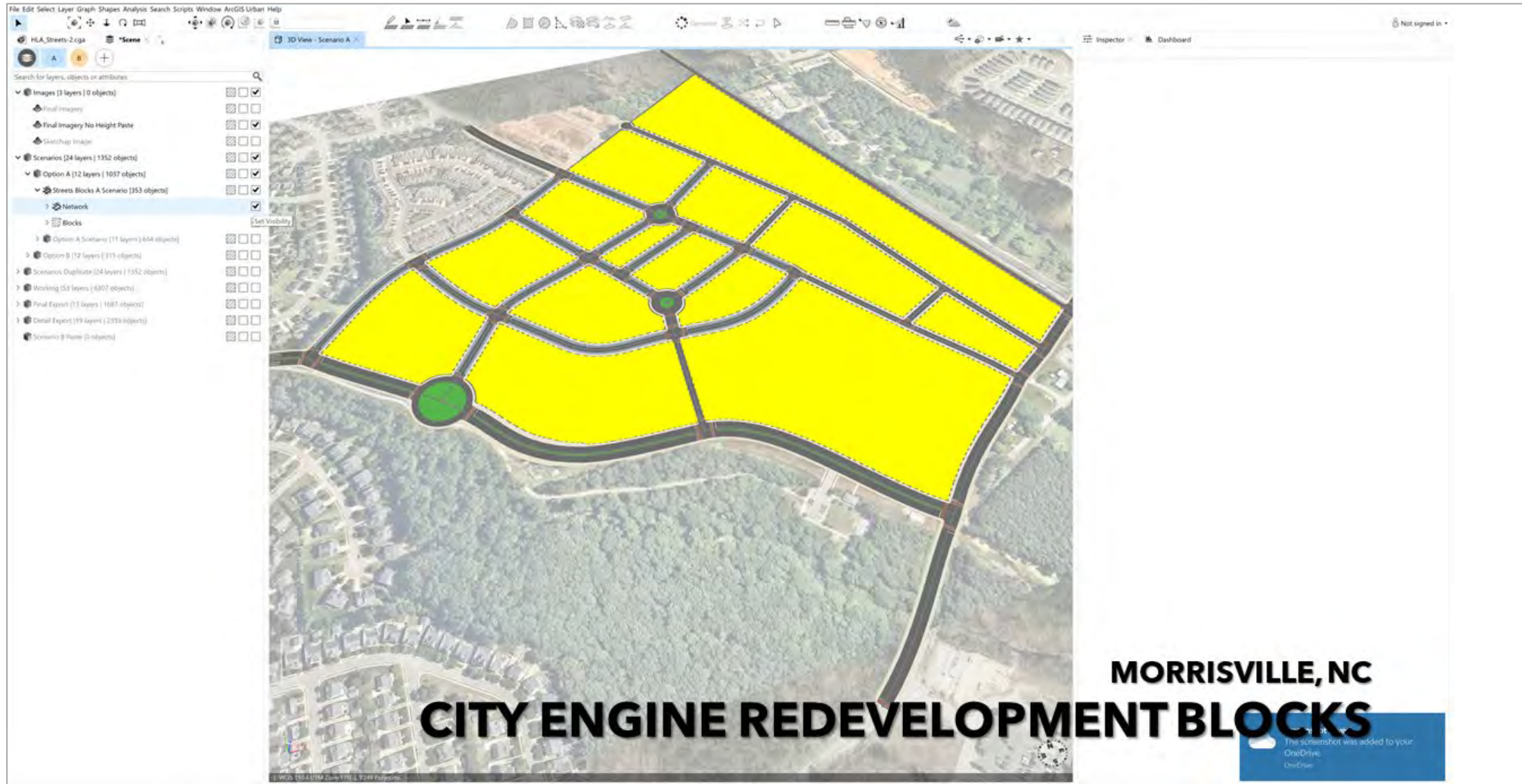
MORRISVILLE, NC
REFERENCE PHOTOS FROM CLIENT





MORRISVILLE, NC CITY ENGINE CENTERLINES





MORRISVILLE, NC CITY ENGINE REDEVELOPMENT BLOCKS

File Edit View Curve Surface SubD Solid Mesh Dimension Transform Tools Analyze Render Panels Help

Press Control to extrude, tap Alt to make a duplicate
1 open mesh added to selection

Command:
Standard CPlanes Set View Display Select Viewport Layout Visibility Transform Curve Tools Surface Tools Solid Tools SubD Tools Mesh Tools Render Tools Drafting New in VT



Layer	Material	Linetype	Print Width
Default		Continuous	◆ Default
Layer 01		Continuous	◆ Default
Layer 02		Continuous	◆ Default
Layer 03		Continuous	◆ Default
Layer 04		Continuous	◆ Default
Layer 05		Continuous	◆ Default
SPL-Placed Images			
Layer0		Continuous	◆ Default
02 - STRC-EX Building		Continuous	◆ Default
06 - SF-Farmers Market		Continuous	◆ Default
06 - SF-Monument Sign		Continuous	◆ Default
06 - SF-MidBlock Crossing		Continuous	◆ Default
06 - SF-Raised Planter		Continuous	◆ Default
01 - BLOCKS			
SPL-NPLT			
05 - VEG-1 Roundabout		Continuous	◆ Default
SPL-Export to EPS RD		Continuous	◆ Default
SPL-Export to EPS RD		Continuous	◆ Default
05 - VEG-4 ROW Parkway		Continuous	◆ Default
05 - All 3d Components		Continuous	◆ Default
05 - VEG-2 Understorey		Continuous	◆ Default
05 - VEG-3 Existing		Continuous	◆ Default
05 - VEG-3 Parking and Res		Continuous	◆ Default
FINAL STREETS			
06 - SF-Pedestrian Light		Continuous	◆ Default
06 - SF-Street Light		Continuous	◆ Default
06 - SF-Trash		Continuous	◆ Default
06 - SF-Bench		Continuous	◆ Default
06 - SF-Bike Rack		Continuous	◆ Default
06 - SF-Sculpture		Continuous	◆ Default
06 - SF-WaterFountain		Continuous	◆ Default
00 - Streetnames		Continuous	◆ Default

MORRISVILLE, NC RHINO MASSING & SITE PLANNING

Perspective Top Perspective Right
 End Near Point Mid Cen Int Perp Tan Quad Knot Vertex Project Disable
 CPlane x: -1455.78 y: 600.66 z: 0.00 Feet Layer 02 Grid Snap Ortho Planar Onsnap SmartTrack Gumball Record History Filter CPU use: 2.9 %

**MORRISVILLE, NC
CITYENGINE DASHBOARDS & METRICS**

Land Use

Land Use By Square Foot

957'485 sf

Attached Single-Family	Retail	211'399 sf
Lodging	Parking	232'117 sf
Multi-Family	Office	126'228 sf
Office	Lodging	43'913 sf
Parking	Public	12'604 sf
Public	Attached SF	53'001 sf
Peanut	Multi-Family	204'024 sf
Single-Family		

Parking

Total Parking By Type

Below-Grade	~1000
On-Street	~1000
Surface	~1000

Parking Provided

1'543 Spaces

Parking Required

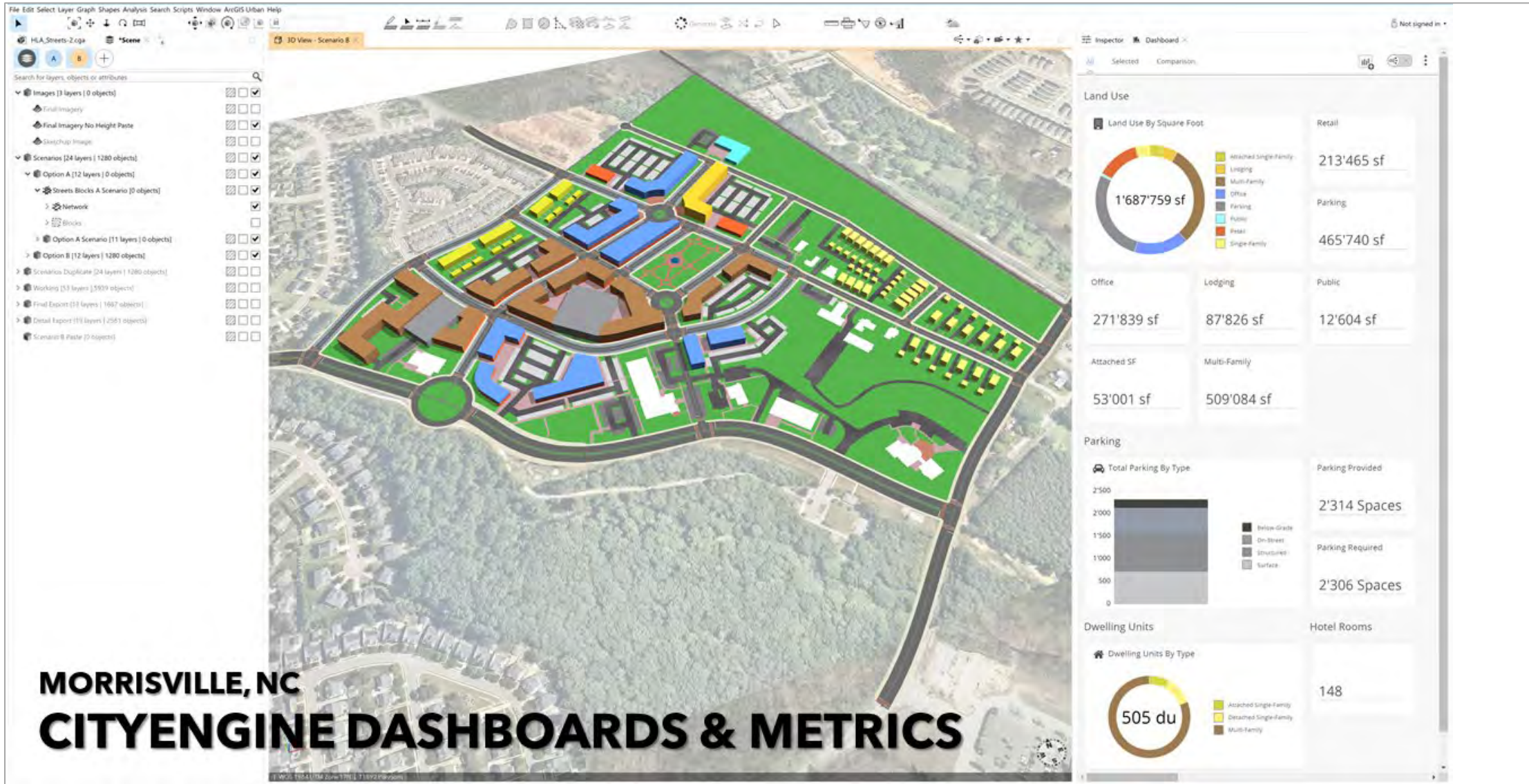
1'523 Spaces

Dwelling Units

Dwelling Units By Type

281 du

Attached Single-Family	Hotel Rooms	74
Detached Single-Family		
Multi-Family		



**MORRISVILLE, NC
 CITYENGINE DASHBOARDS & METRICS**

Land Use

Land Use By Square Foot

1'687'759 sf

Attached Single-Family	213'465 sf
Lodging	
Multi-Family	
Office	
Parking	465'740 sf
Public	
Peak	
Single-Family	

Office: 271'839 sf
 Lodging: 87'826 sf
 Public: 12'604 sf

Attached SF: 53'001 sf
 Multi-Family: 509'084 sf

Parking

Total Parking By Type

2'500

Below-Grade	
On-Street	
Structures	
Surface	

Parking Provided: 2'314 Spaces
 Parking Required: 2'306 Spaces

Dwelling Units

Dwelling Units By Type

505 du

Attached Single-Family	
Detached Single-Family	
Multi-Family	148

Slide 39 - Morrisville Building Rules NoAudio

Category	Value
Land Use By Square Foot	1'412'675 sf
Retail	213'465 sf
Parking	162'116 sf
Office	331'570 sf
Lodging	87'826 sf
Public	12'604 sf
Attached SF	53'002 sf
Multi-Family	477'892 sf
Total Parking By Type	826 Spaces
Parking Provided	2'569 Spaces
Dwelling Units	148

MORRISVILLE, NC CITYENGINE BUILDING RULES

Morrisville Town Center Redevelopment Scenarios

Overview



A comparison of two development scenarios for Morrisville's Town Center.

CityEngine Web Scene by devlavigne

Created: Jul 24, 2019 Updated: Oct 22, 2019 Number of Downloads: 218

View Application

Download

Description

A comparison of two development scenarios for Morrisville's Town Center.

Option A limits most parking to surface lots (one larger multi-family building in the western corner is partially serviced by below-grade parking). Option B provides 2 parking garages which allow for greater density through the Town Center.

Details

Size: 15 MB

★★★★★



Owner

devlavigne

Tags

3D, Houseal Lavigne, CityEngine Webscene, Morrisville, CityEngine, HLA, Houseal Lavigne Associates

Credits (Attribution)

Devlin Lavigne, Nik Davis, Houseal Lavigne Associates, LLC.

Town Center Scenario Comparison

Option A

Land Use



Option B

Land Use



MORRISVILLE, NC CITYENGINE INTERACTIVE WEBSCENE

Morrisville Town Center Redevelopment Scenarios

SHARE HELP SIGN IN HOUSEAL LAVIGNE...



Information

Shape

Reports	
Dwelling Units	28
Dwelling Units, Multi-Family	28
Dwelling Units, Multi-Family,color	0
LandUse	57078.31
LandUse, Multi-Family	28539.15
LandUse, Multi-Family,color	0
LandUse, Retail	28539.15
LandUse, Retail,color	0
Parking Required	171
Parking Required, Multi-Family	57
Parking Required, Retail	114



MORRISVILLE, NC

CITYENGINE INTERACTIVE WEBSCENE



Morrisville Town Center Redevelopment Scenarios

SHARE HELP SIGN IN HOUSEAL LAVIGNE...



Information

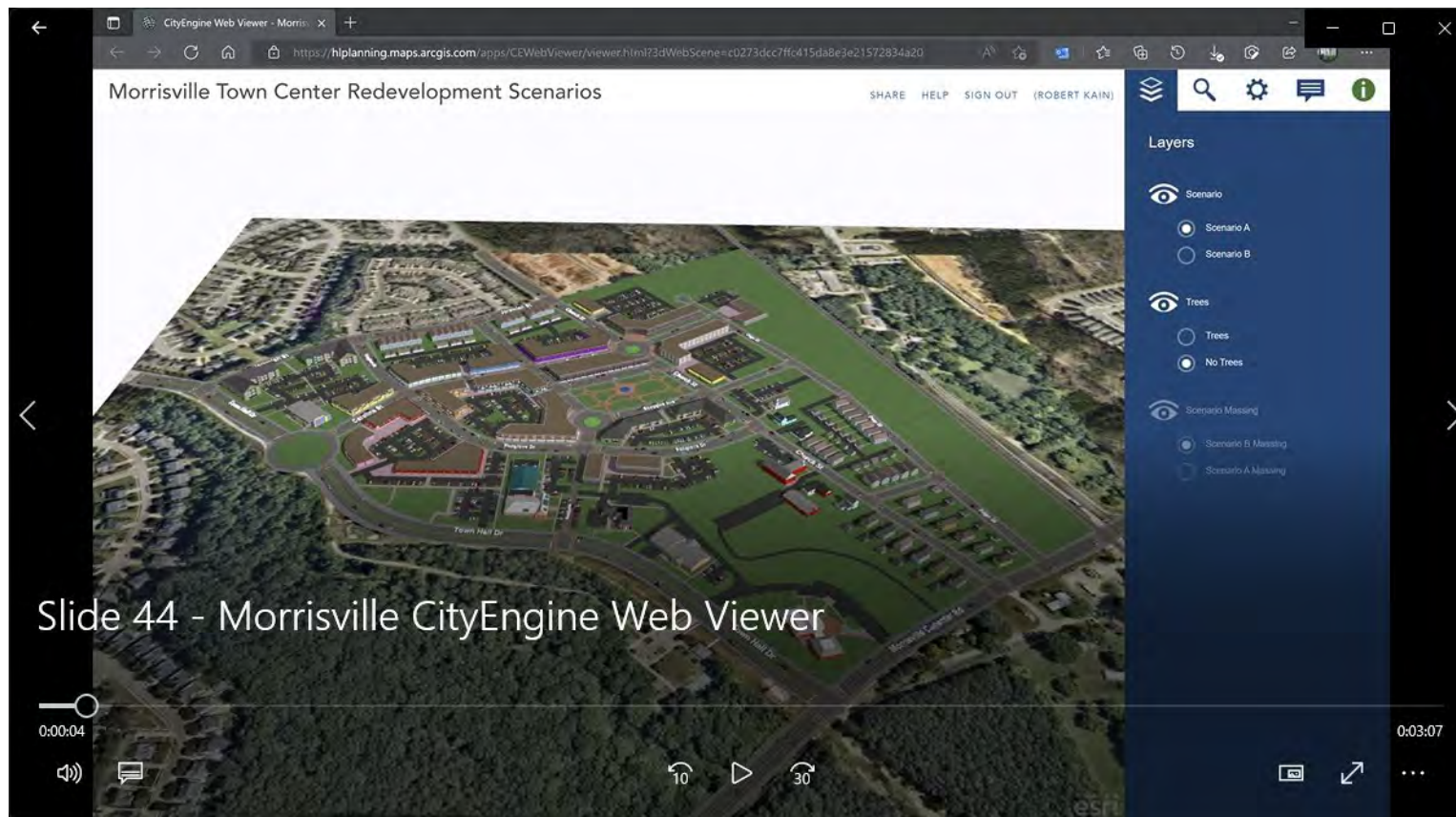
Shape

Reports	
Dwelling Units	84
Dwelling Units, Multi-Family	84
Dwelling Units, Multi-Family#color	0
LandUse	114156.31
LandUse, Multi-Family	85617.23
LandUse, Multi-Family#color	0
LandUse, Retail	28539.07
LandUse, Retail#color	0
Parking Required	285
Parking Required, Multi-Family	171
Parking Required, Retail	114



MORRISVILLE, NC

CITYENGINE INTERACTIVE WEBSCENE



Slide 44 - Morrisville CityEngine Web Viewer

MORRISVILLE, NC CITYENGINE WEB VIEWER









Scenario A – Less Dense Unreal Engine Export



Scenario B – More Dense Unreal Engine Export



Scenario A – Less Dense Unreal Engine Export



Scenario B – More Dense Unreal Engine Export

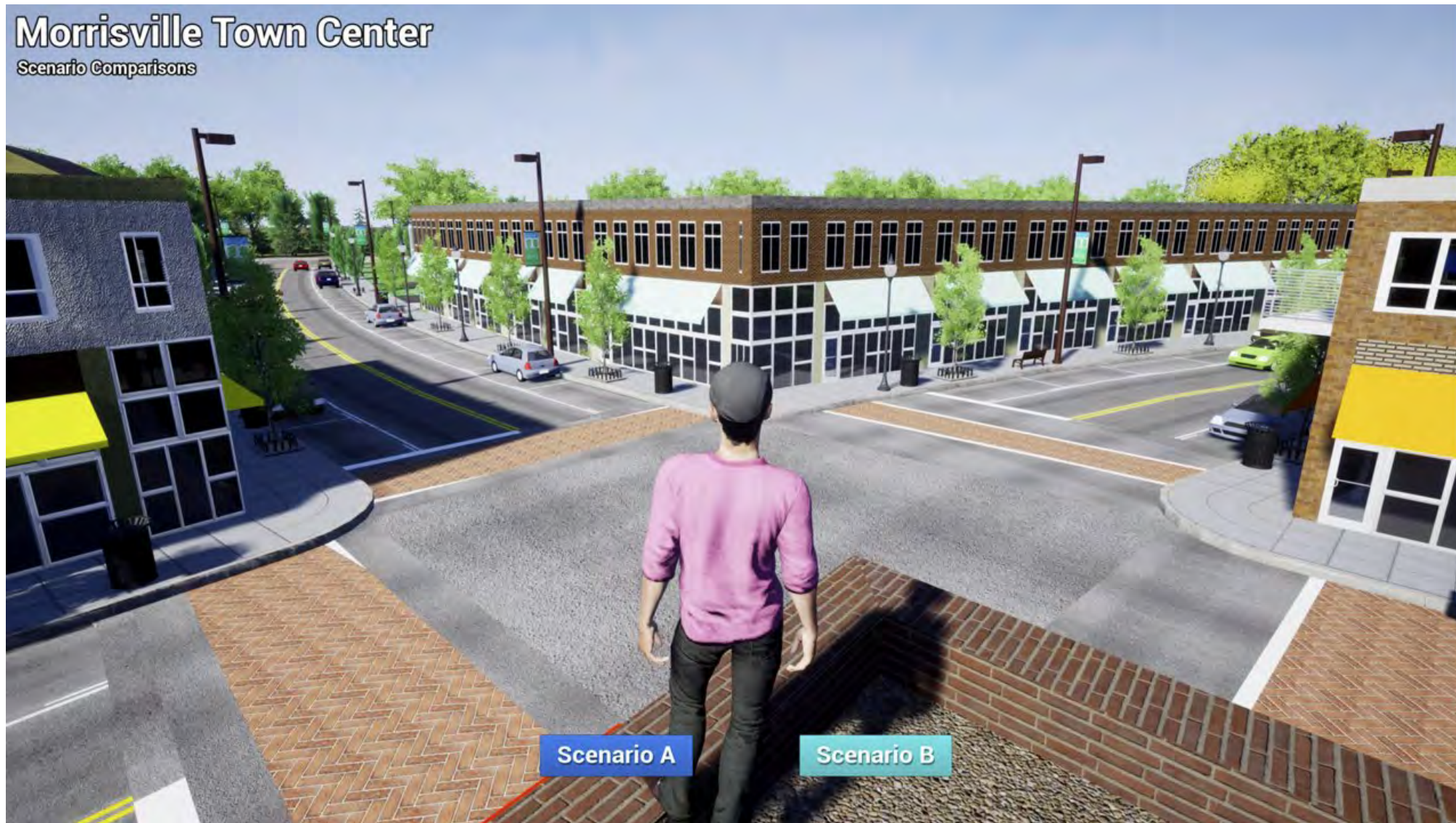


Slide 53 - Unreal Game Engine Development

MORRISVILLE, NC UNREAL ENGINE GAME DEVELOPMENT

Morrisville Town Center

Scenario Comparisons



Morrisville Town Center

Scenario Comparisons



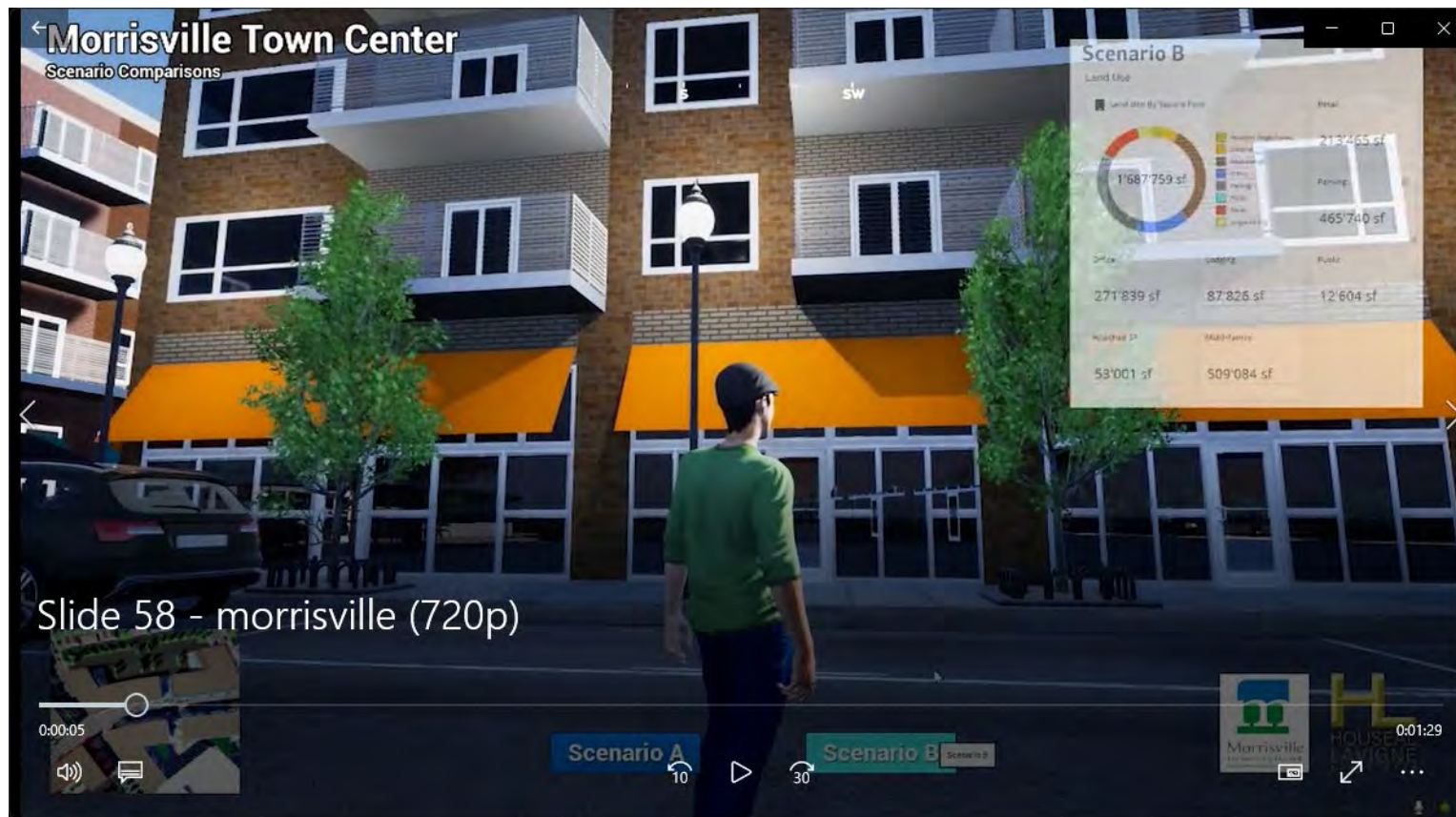
Morrisville Town Center

Scenario Comparisons



Scenario A

Scenario B



MORRISVILLE, NC UNREAL ENGINE GAME DEVELOPMENT

Slide 60 - Chicago 1

The screenshot displays the Unreal Engine 4 interface for a project named 'r016_SDK_Blueprint'. The central viewport shows a 3D architectural rendering of a city street scene in Chicago, featuring tall buildings and a central green space. The interface is divided into several panels:

- Top Toolbar:** Contains icons for Save Current, Source Control, Modes, Content, Marketplace, Settings, Datastudio, ArcGIS Maps, Blueprints, Cinematics, Build, Pause, Stop, and Eject.
- Left Panel (Place Actors):** A 'Search Classes' field is at the top. Below it, a 'Recently Placed' list includes items like Empty Actor, Empty Character, Empty Pawn, Point Light, Player Start, Cube, Sphere, Cylinder, Cone, Plane, Box Trigger, and Sphere Trigger.
- Right Panel (Data Locations):** This panel is titled 'DATA LOCATIONS' and features three ArcGIS Online logos. Below each logo is a button: 'Load 3D Buildings', 'Load Streets', and 'Load Entourage'. At the bottom of this panel is the 'HOUSE OF LAVIGNE' logo.
- World Outliner (Right):** A search field is at the top. Below it is a list of actors with columns for 'Label' and 'Type'. The list includes various ArcGIS-related actors and game engine components. A '25 actors' summary is shown at the bottom of the list.
- Details Panel (Bottom Right):** Shows 'World Settings' and 'Precomputed Visibility' options. The 'Game Mode' is set to 'None'. A 'Lightmass' section is also visible.
- Bottom Panel:** A video player overlay is present, showing a timestamp of '0:00:03' and playback controls (play, stop, 10s, 30s).

ChicagoApp - OneDrive x Twinit MMV Demo x +

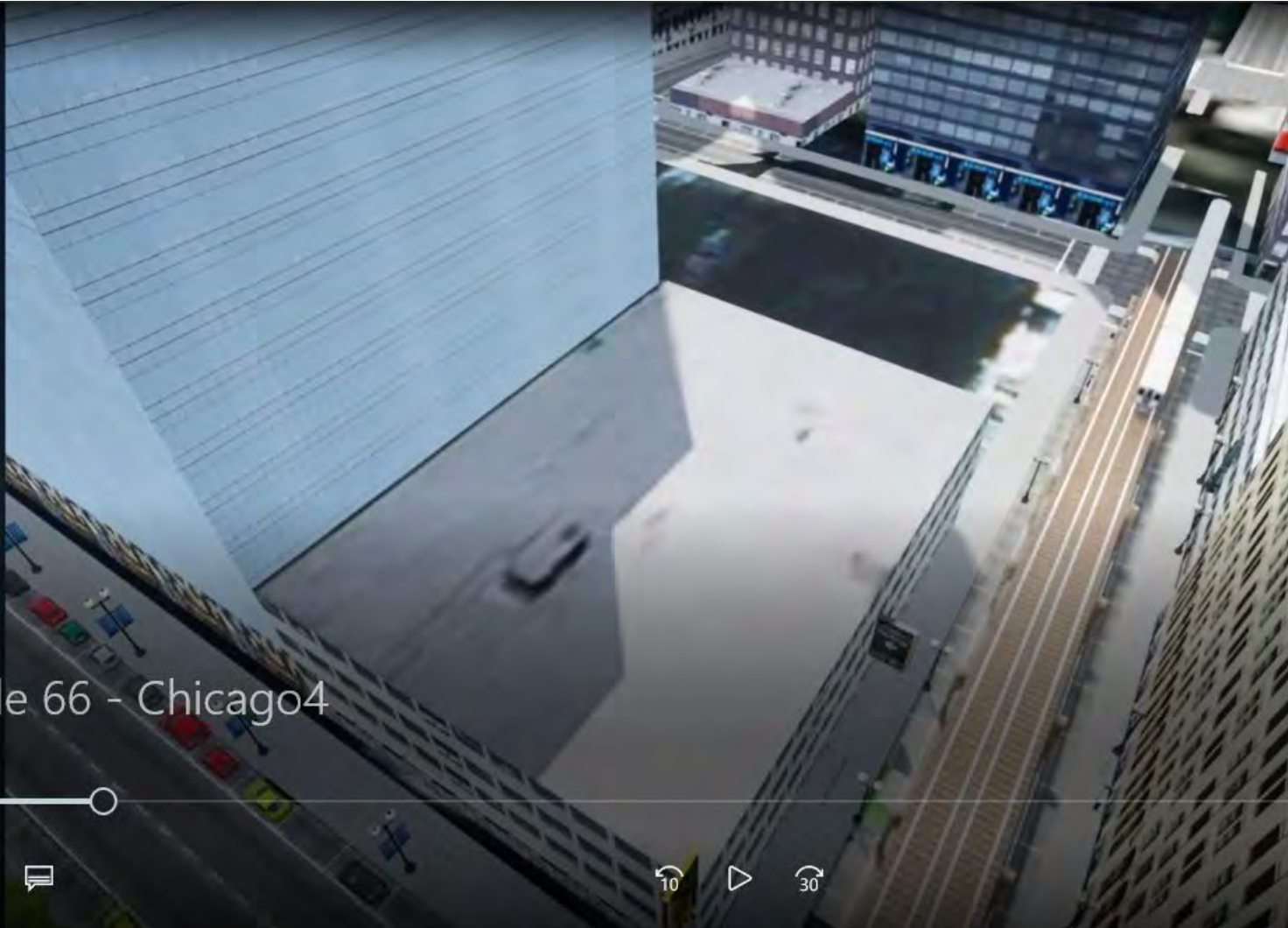
https://mmv-tourism-poc.twinit.io/tourism/street?d=Theatre%20District&b=Randolph%20Tower

Slide 64 - Chicago3

Start > Chicago > Theatre District > Street View

0:00:02 0:00:35

10 30 360



Slide 66 - Chicago4

0:00:03

10 30

DATA LOCATIONS

- ArcGIS Online
Load 3D Buildings
- ArcGIS Online
Load Streets
- ArcGIS Online
Load Chicago "L"
- SketchUp
UNREAL
Load Entourage

0:00:34

HOUSEAL VIGNET

Questions and Answers with:



Robert Kain
Principal
Houseal Lavigne



Marc Goldman
Director
AEC Industry Solutions
Esri



Todd Danielson
Editorial Director
Informed Infrastructure

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