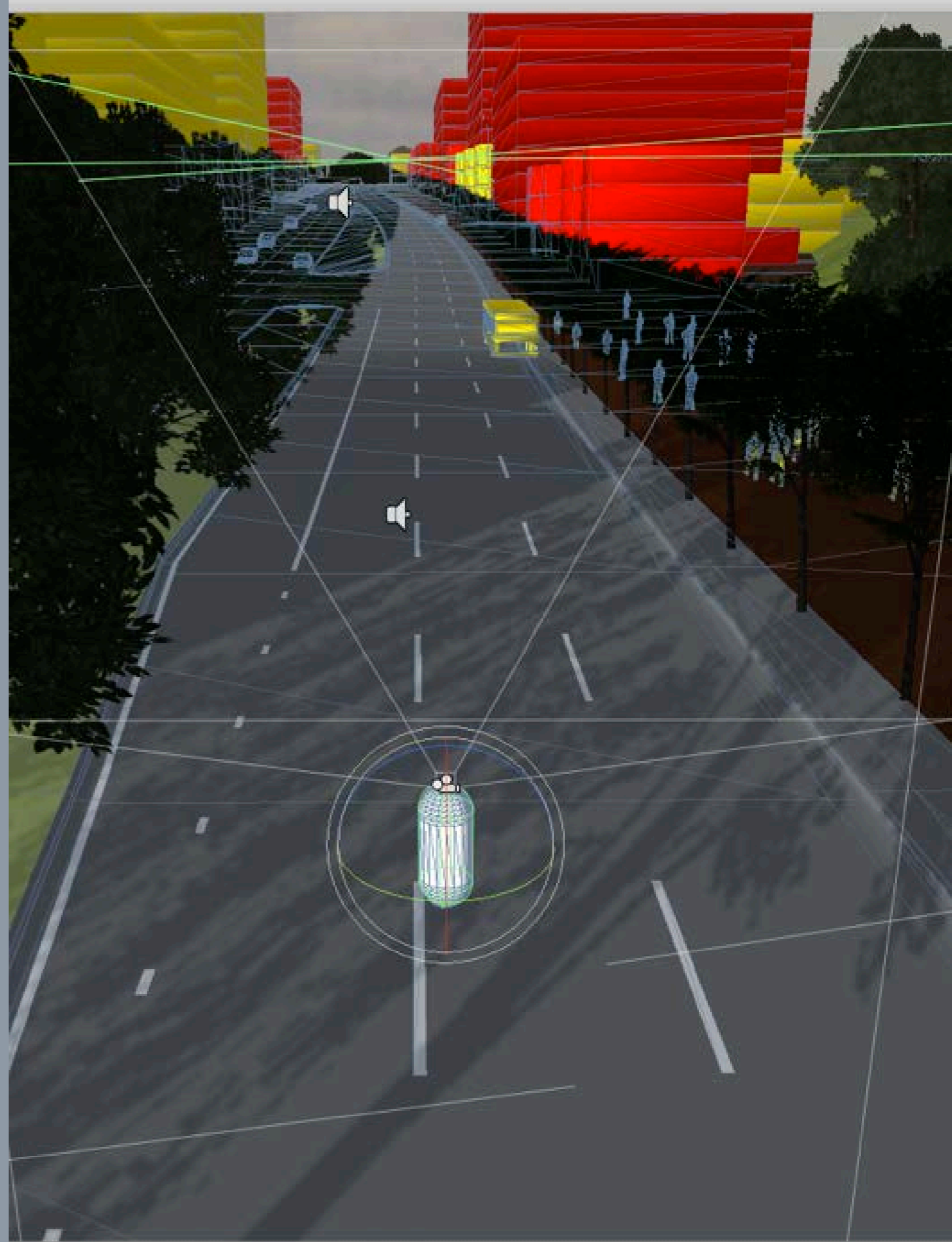# Comparative Analysis of Realtime Game Engines to Traditional Methods of Design Communication

Advanced Interdisciplinary Design Studio
Spring 2009
Joshua Hale

It started with...

Dead Masterplans and Digital
Creativity

Dead Masterplans and Digital Creativity

1.	Abolish 2-dimensional master-planning
2.	Make 3-dimensional design the norm
3.	Encourage 4-dimensional design, by simulating changes through time
4.	Supply designers with a wealth of factual information
5.	Incorporate a full range of values into the design process
6.	Impart post-modern structures to the design process, employing intellectual structures from natural science, social science, the arts and the humanities
7.	Facilitate the environmental assessment of projects from many points of view, including the motorist, the cyclist, the pedestrian, the local resident, the frog, the hedgehog and the buttercup.

Kythryn Gustafson
"words, diagrams, then models"

Johan Huitzinga (1872-1945)
"Let my playing be my learning,
and my learning be my playing."
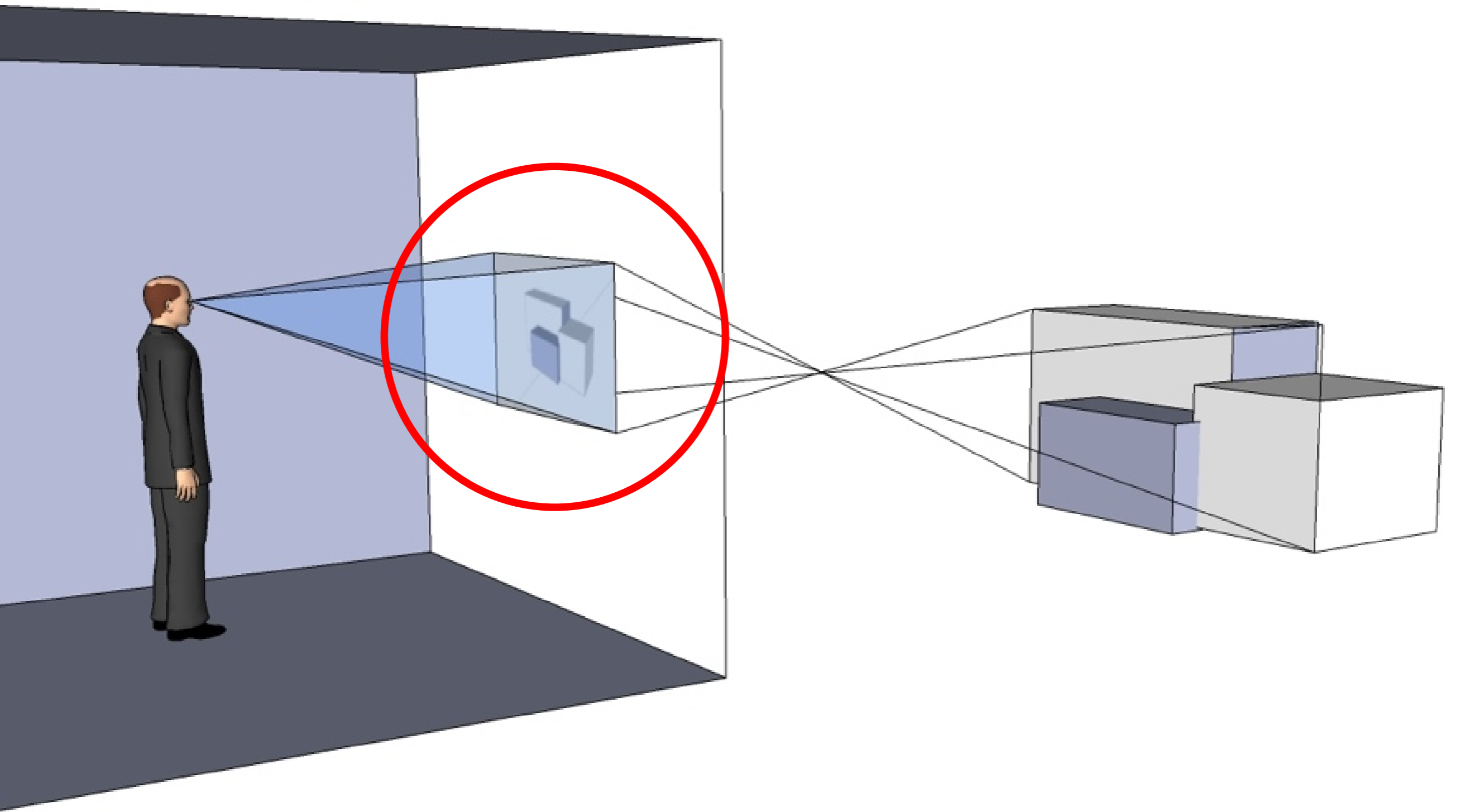
What is a Real Time Game Engine?

- A system of software intended for the creation and development of video games or other realtime content

- Most popular use is the video game industry

- Remarkable ability to render and to respond to input instantaneously

- Ability to incorporate sound, light, physics, and user input

Why Explore Game Engines?

- Plans, sections, and elevations are abstractions and inadequate to fully communicate designs to stakeholders

- Animations are cumbersome and predetermined and do not allow freedom to explore design

- A paradigm shift in how landscape architects design and communicate design is essential for the progression of the profession

- Greater transparency enabling participants to have greater input in the design process
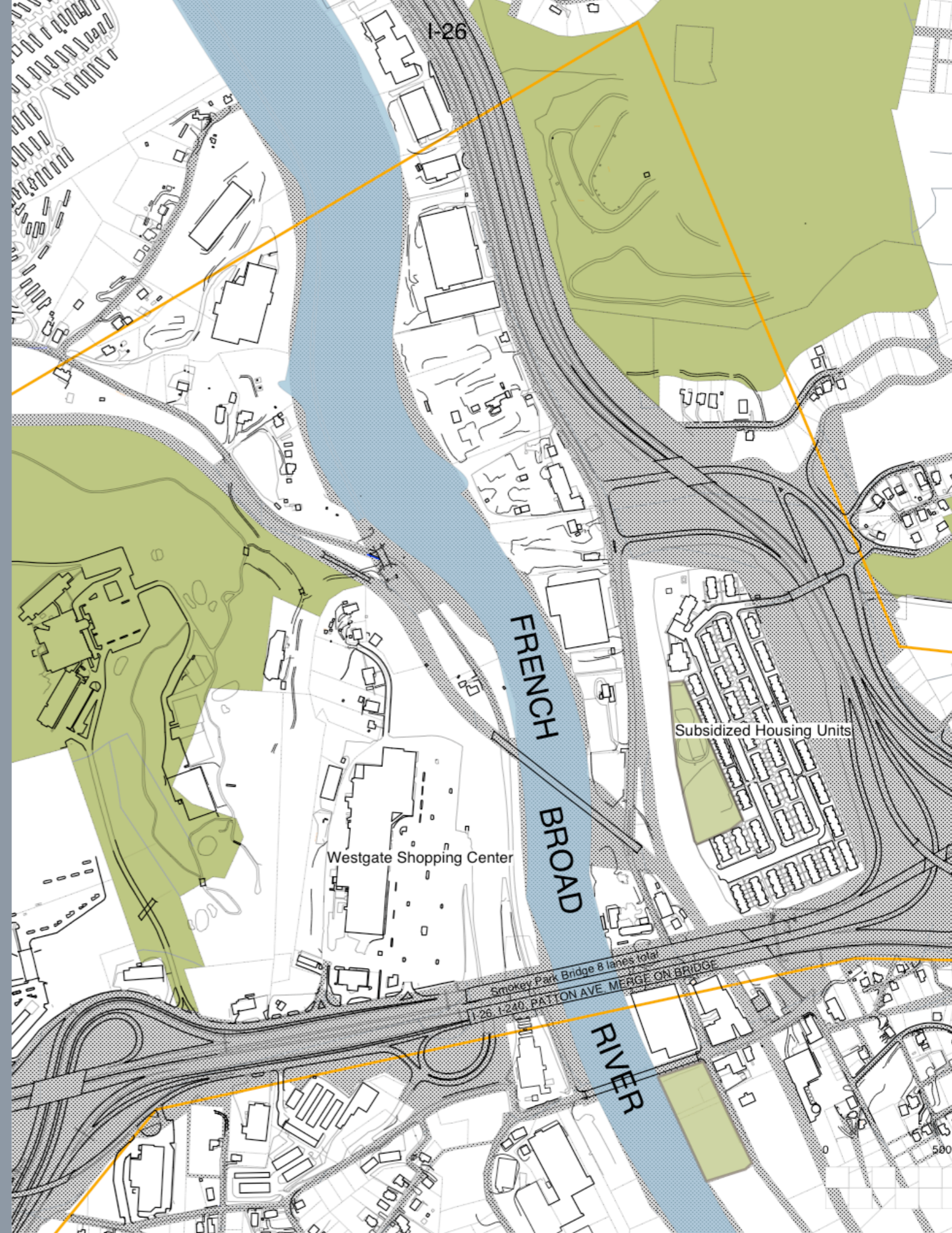
Comparison

	Plans, Sections, Elevations	Perspectives	Scale Models	Animations	Realtime Game
Immersion		+		++	+++
Accuracy	+++	++	+++	+++	+++
Realism		+		+++	++1/2
Comprehension of space		+	++	+1/2	+++
Dimensions	2	2 1/2	3	4	5 1/2
Interaction			++		+++

Why Explore Game Engines?

- A very malleable technology

- Enormous research and development initiative by game engine developers to create photo-realistic, immersive environments.

- Media familiarity: game industry has surpassed the motion picture and music industries

- Easily accessible technology

- Provides superior spacial understanding of the landscape and urban fabric

- Dynamic interaction

- Active engagement versus passive observance

Why Explore Game Engines?

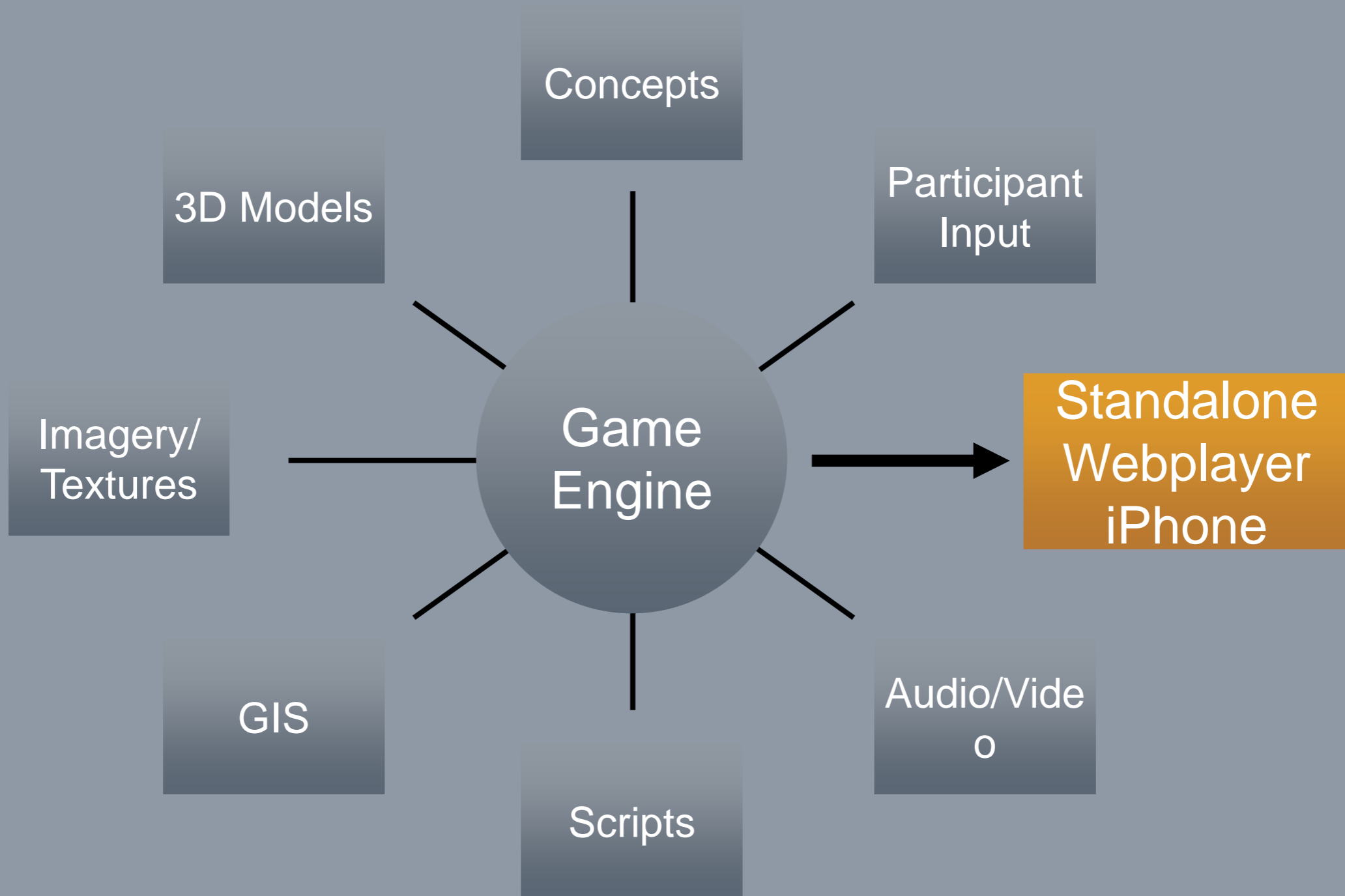# Why Explore Game Engines?

Why Explore Game Engines?

Why Explore Game Engines?

Workflow

Concepts

Participant Input

3D Models

Game Engine

Standalone Webplayer iPhone

Imagery/ Textures

GIS

Scripts

Audio/Video

Project Site
Asheville, NC

- Project strongly suited to test game engine because it incorporates many different facets of urban design, landscape architecture, transportation planning, architecture, ecology

- Major redesign of interstates I-26 and I-240 and Patton Ave. threaten to diminish fabric of Asheville and West Asheville with more bridges and NCDOT right of way acquisition

- 4 design alternatives: B2,B3,B4,B4-B

- For every alternative additional acquired land is imperative to accommodate expanding highway infrastructure

Project Site
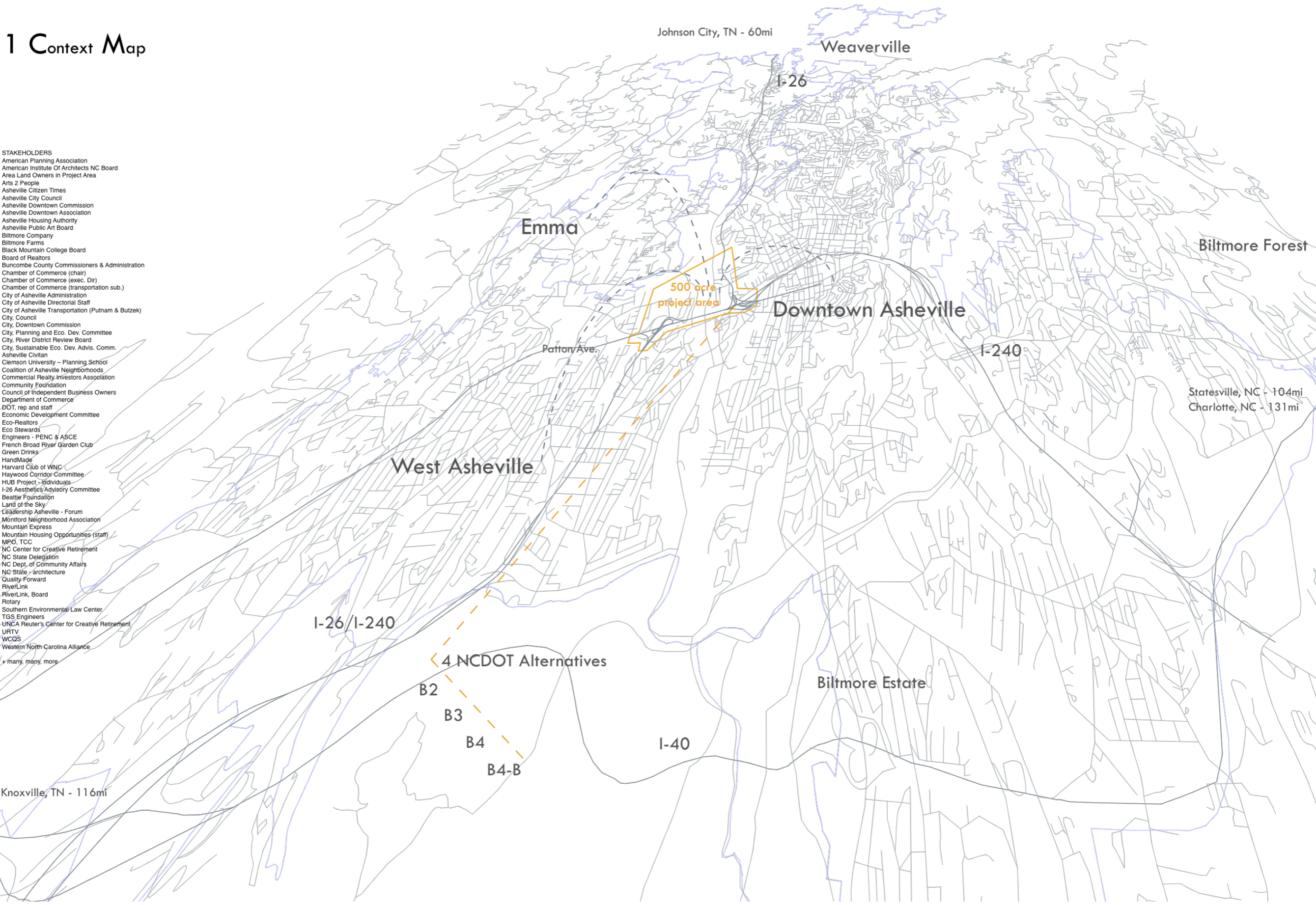## Asheville, NC

- Project site is over 500 acres

- Projected cost: $400-$600 million

- Planning going for over 5 years

- Grassroots effort led by Asheville Design Center to minimize landscape and urban disturbance

- Asheville Design Center created ALT B4-B to minimize land acquisition

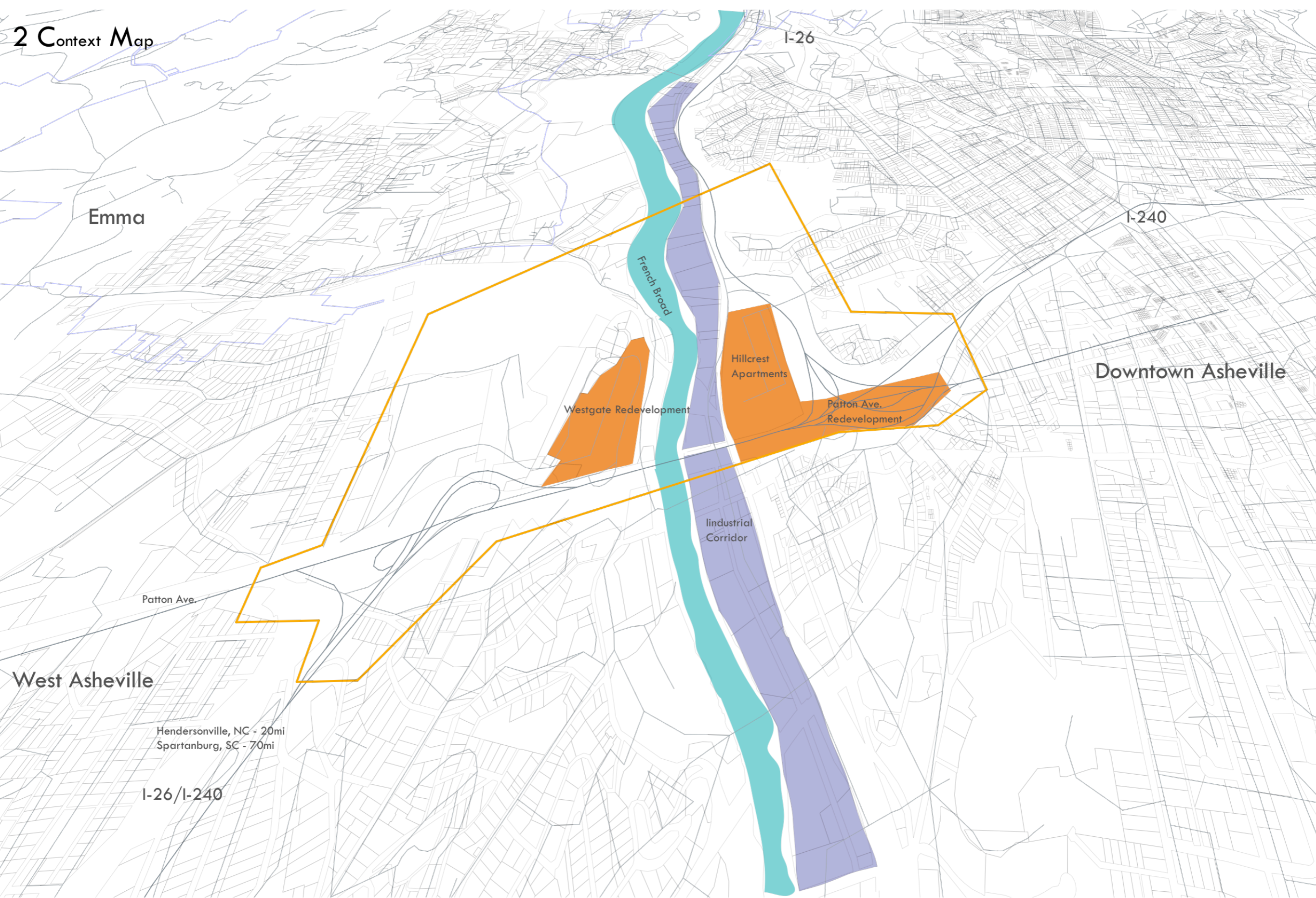- This project is being decided solely on drawings

1 Context Map

Johnson City, TN - 60mi

Weaverville

I-26

Emma

Biltmore Forest

500 acre
project area

Downtown Asheville

Patton Ave.

I-240

Statesville, NC - 104mi
Charlotte, NC - 131mi

West Asheville

I-26/I-240

4 NCDOT Alternatives

B2

B3

Biltmore Estate

B4

I-40

B4-B

Knoxville, TN - 116mi

I-26

Emma

I-240

French Broad

Downtown Asheville

Hillcrest Apartments

Westgate Redevelopment

Patton Ave. Redevelopment

Iindustrial Corridor

West Asheville

Patton Ave.

Hendersonville, NC - 20mi
Spartanburg, SC - 70mi

I-26/I-240

3 Land Acquisition Analysis

ACQUIRED LAND

HIGHWAY

ALT B4

ALT B3

ALT B5

ALT B2

ALT B4-B

86 Acres

73 Acres

65 Acres

63 Acres

35 Acres

TOTAL ACQUISITION:

TOTAL ACQUISITION:

TOTAL ACQUISITION:

TOTAL ACQUISITION:

TOTAL ACQUISITION:
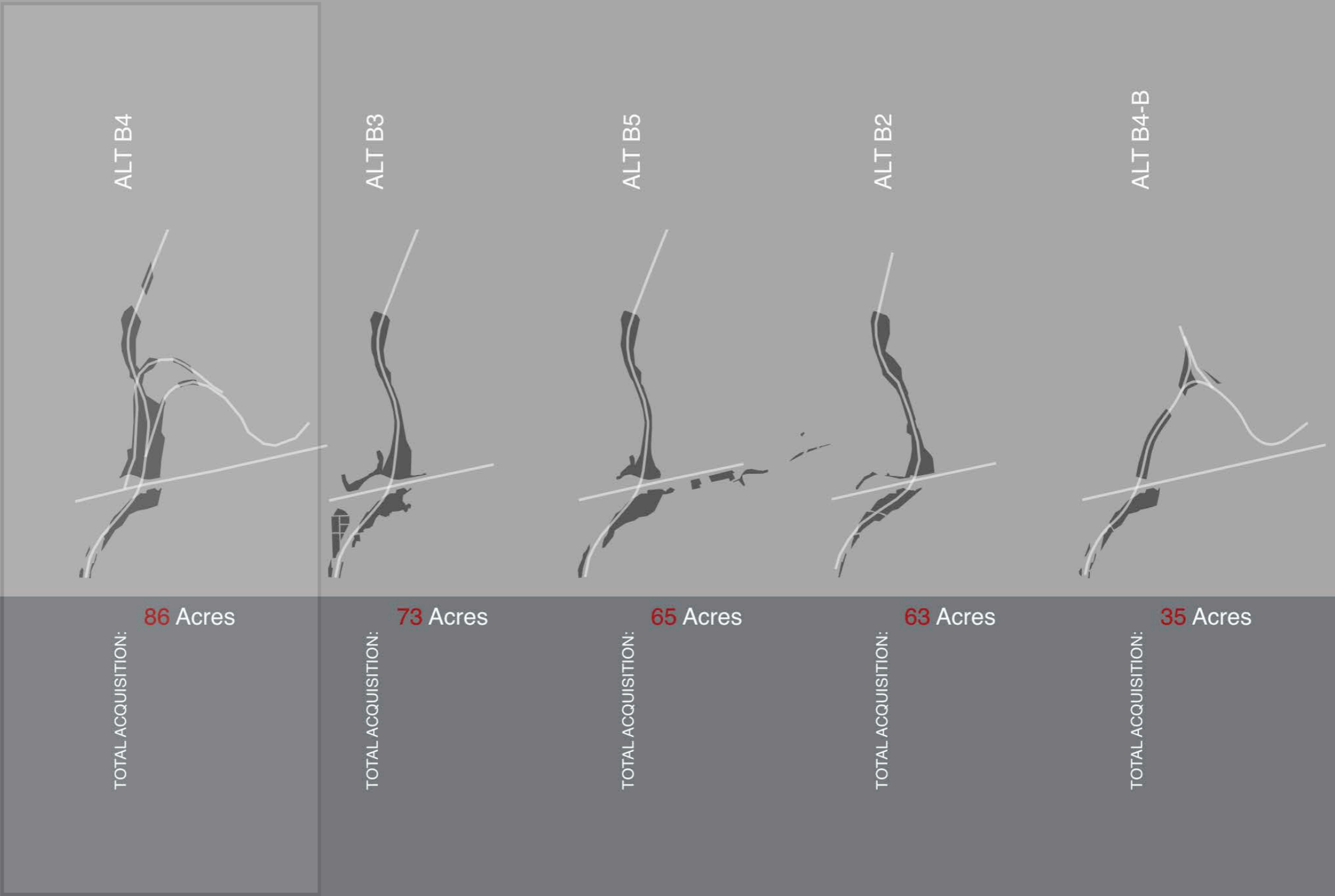
Applications

- Instantaneously test design alternatives

- Provide information dialogues at key places

- Explore the landscape

- Stir greater community interest

- Test scenarios

- Provide a better framework to test future designs
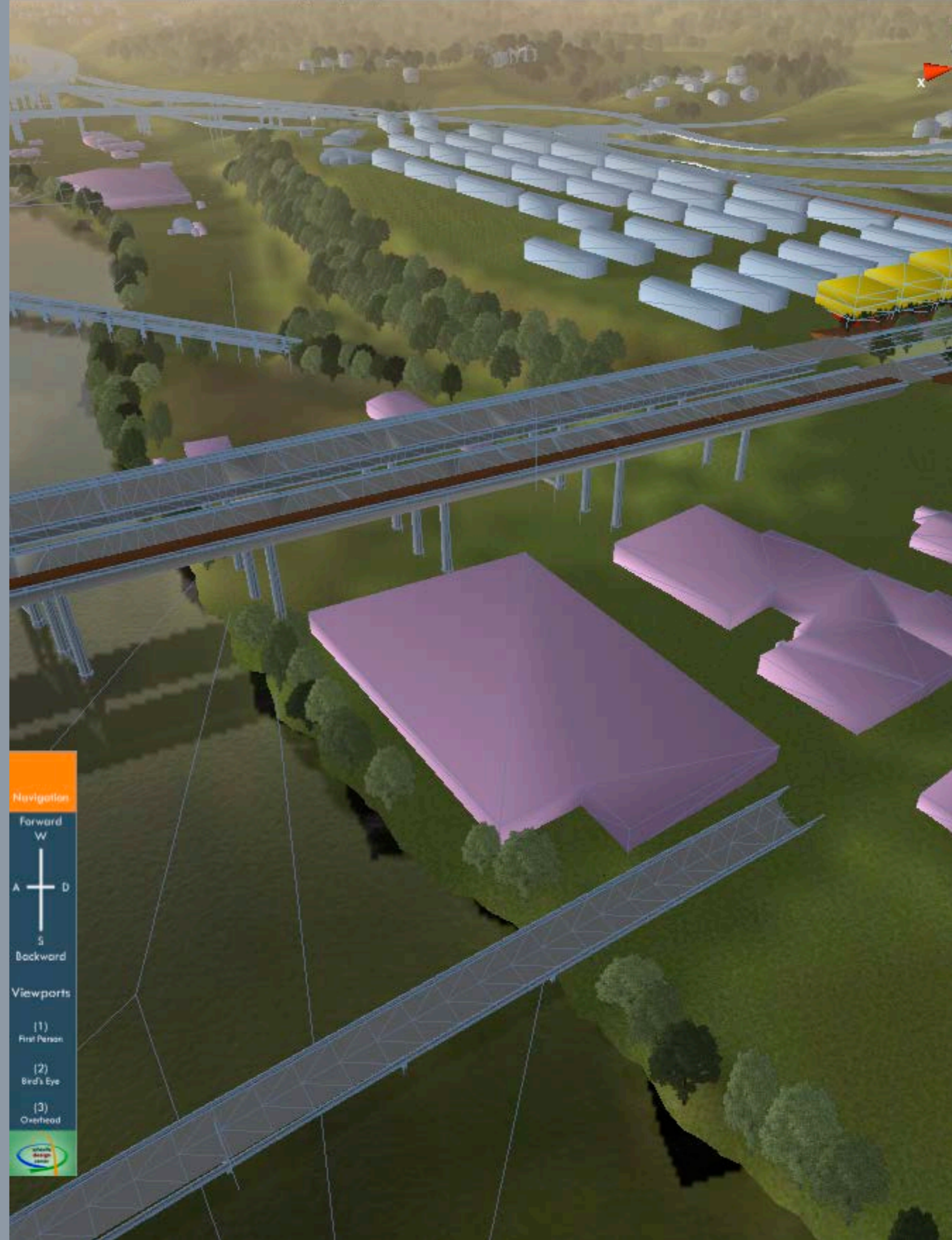
Now to the Demo...

Strengths

- Democratizes the design process by allow greater transparency between designer and participants

- Quick testing of alternatives provides ability to make better decisions

- Encourages curiosity and play

- Promotes spatial literacy in design

- Useful for interacting and creating dialogue with and between the public, government officials, professional experts, and developers

- Minimize errors in the design phase

- Help young design students

Weaknesses

- Can be technically demanding to learn for some, especially when scripting code

- 3D modeling of scenes could slow process

- Level of detail for large spaces constrained by programmer skill and/or computer resources

- Further work needed in vegetation


```
function OnGUI () {
    if (GUI.Button(Rect(210,30,100,20),"Play Movie")) {
        if (renderer.material.mainTexture.isPlaying) {
            renderer.material.mainTexture.Pause();
        }
        else {
            renderer.material.mainTexture.Play();
        }
    }
}
function Update () {
}
```

27
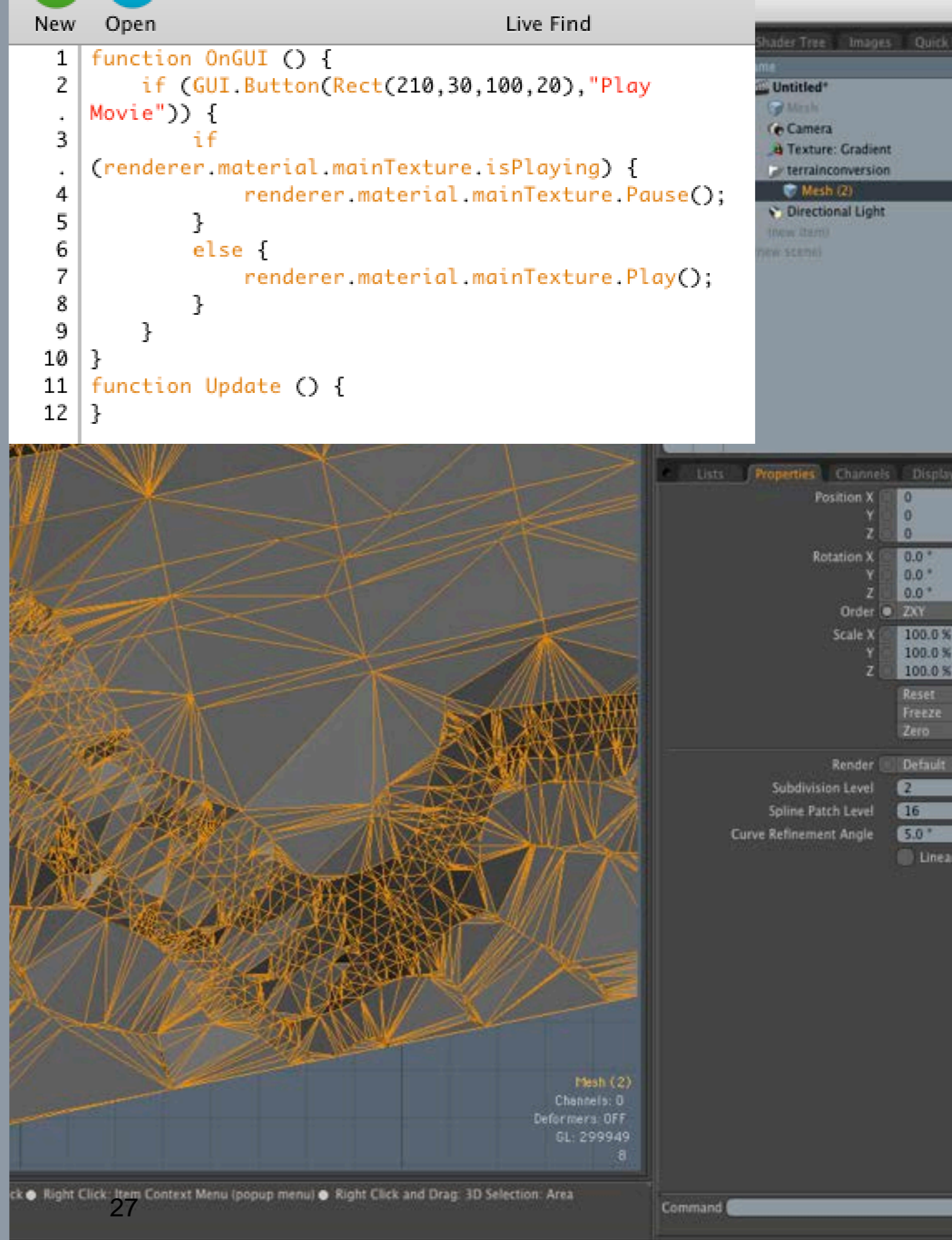
Special Thanks

- My wife

- Asheville Design Center

- Zachariah Inks

- Case Brown

- Dr. Jan Holmevik

- Unity Technologies

- Unity3D Forum

- Unify Community

- Ennanzus Interactive

- URS Creative Imaging

- NCDOT

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