ENVIRONMENTAL

SIMULATION

CENTER, LTD.

Visual Simulation Techniques

for Planning & Design

City of Glen Cove
February 1, 2008

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

This document is a graphic review of four common visual simulation methods used in planning and design. They are:

- Verifiable digital **photomontage** (i.e. photosimulation)
- Artistic & architectural **renderings**
- **Animation**
- Real-time **simulation**

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Verifiable Digital Photomontages combine an existing conditions photograph . . .

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

. . . with a 3D CAD model of proposed conditions . . .

(in this case proposed satellite dishes and screening on an existing building)

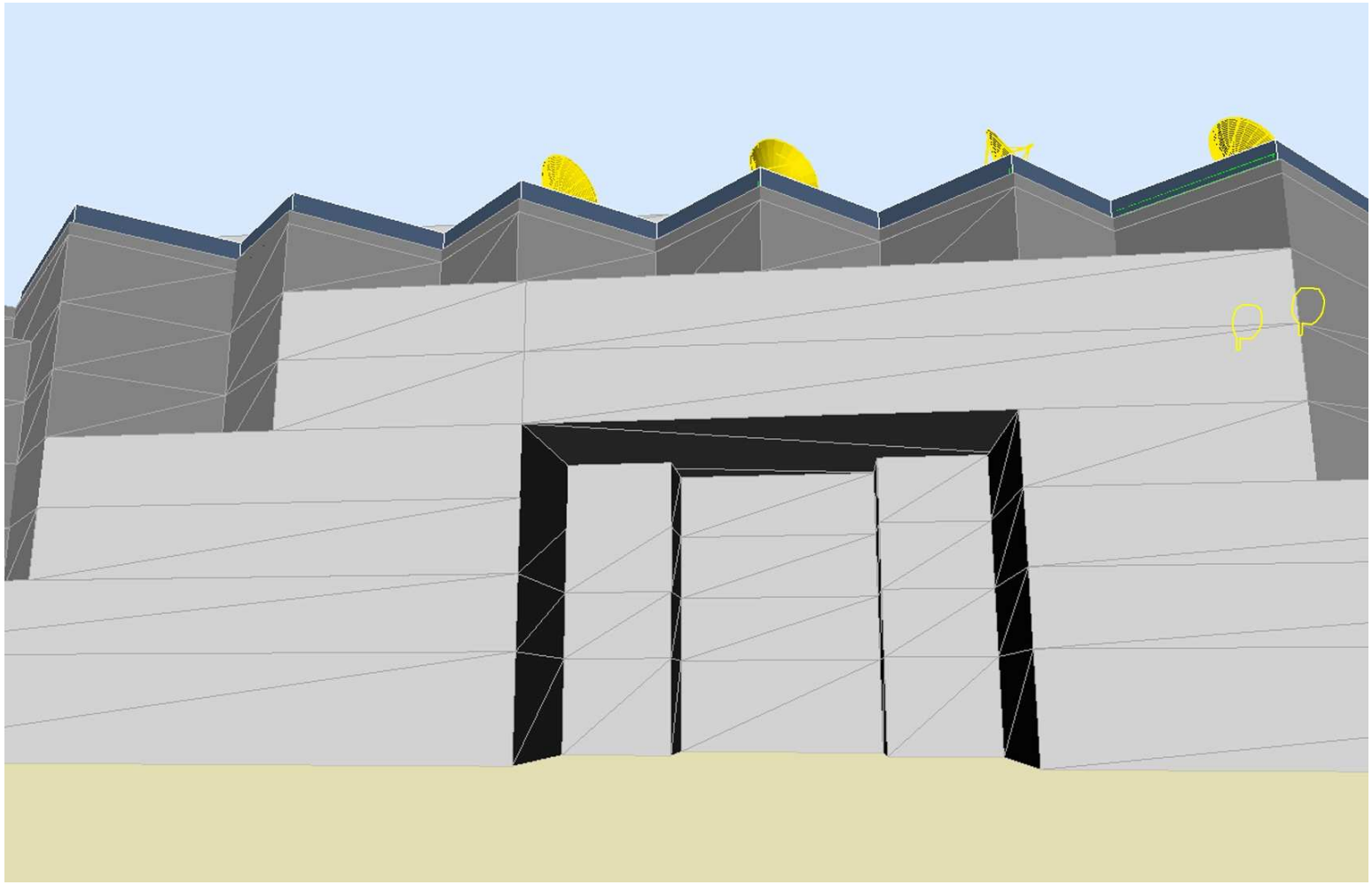


Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

. . . using match points that are common in both the 3D model and the photograph . . .

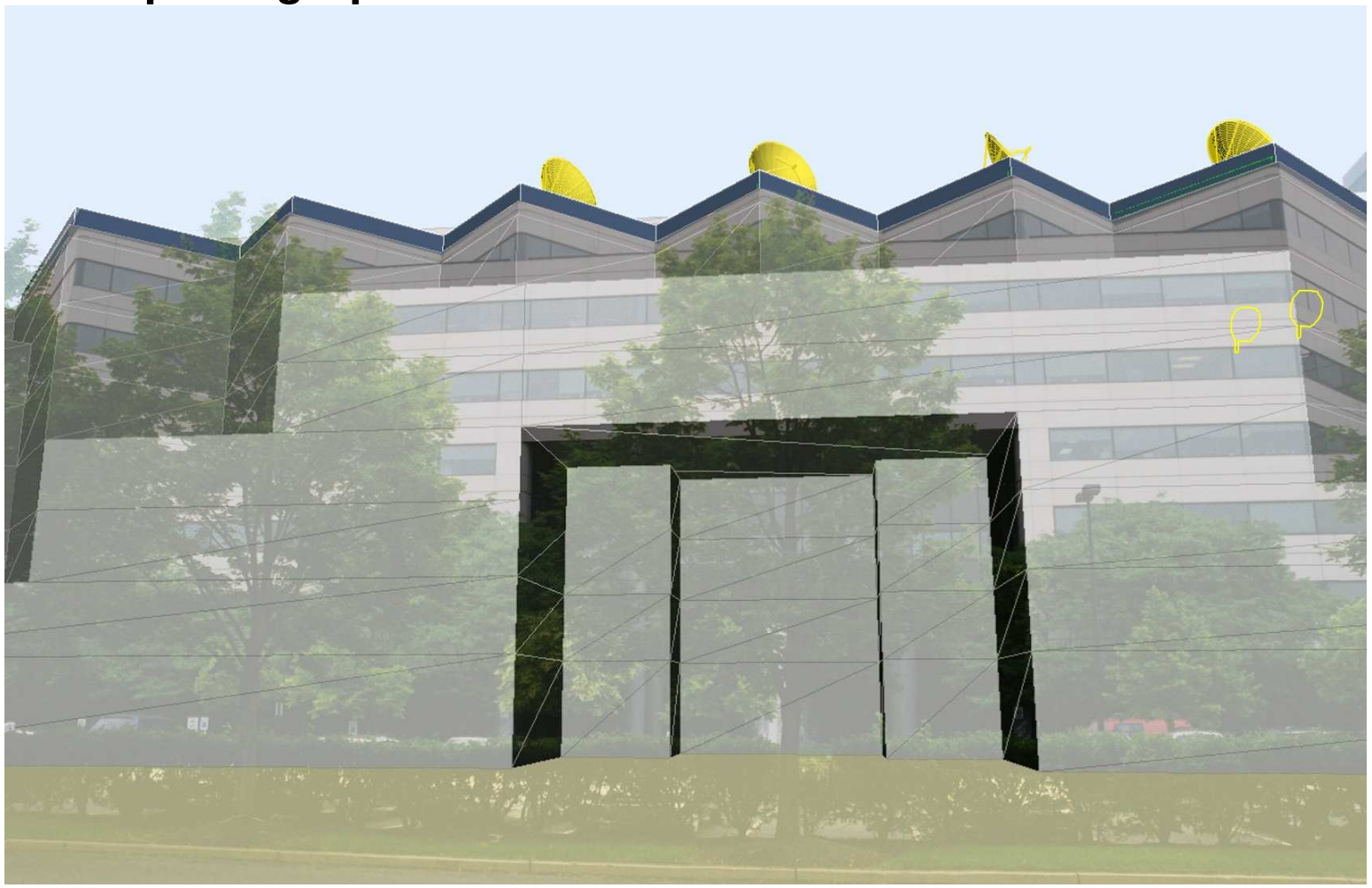


Photo montage

. . . to create a visual simulation of the proposal

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Photosimulation is a common method and the preferred method of simulation in the SEQR process

- When performed correctly, photosimulations are “verifiable,” meaning that their size and relationships can be measured, or verified, to ensure accuracy
- They can be combined with a design review process to show how a project “fits in” an existing neighborhood
- The method of representation of the action can vary, however, depending on the intent

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Photosimulations can be photorealistic . . .

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Photosimulations can be photorealistic . . .

Photo montage

ENVIRONMENTAL

SIMULATION

CENTER, LTD.

Or can be represented as massing models . . .

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Or can be represented as massing models . . .

Photo montage

ENVIRONMENTAL

SIMULATION

CENTER, LTD.

Or, with generic facades

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Photo montage

Or, even at night to show lighting effects in dark places

(Existing condition photograph taken during the day)

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Or, even at night to show lighting effects in dark places

(Proposed conditions simulated during daylight hours)

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Or, even at night to show lighting effects in dark places

(Proposed conditions simulated at night)

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Photo montage

Why has photosimulation become common?

- They are repeatable
  - Precise control over light, shading and shadows (season, time of day, lat/long)
  - Precise control over camera (location, pitch, roll, yaw, lens)
  - Merges the precision of CAD with the resolution of a photograph
- Are the closest we can get to replicating the human perspective of visibility and displacement of an action from a static viewpoint
- They are designed to be printed, which fits in well with the current approval processes
- Can effectively communicate change to both professional and lay-person alike

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

But photosimulations do have drawbacks

- They are labor intensive
- They are not flexible
  - If you want to look from another direction, you've got to produce another photosimulation
- Are typically done as "one-offs" for a specific project and do not build a database of information for future use

Photo montage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Renderings

Conceptually, photosimulations are not dissimilar to artistic **renderings**

- Renderings also show a view of a proposed action from a specific viewpoint
- They can be done with paper and pencil, or watercolors
- Or, they can use information technology in a variety of ways

Many types of software can help the artist or architect produce renderings

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Renderings

Some renderings are even designed to look like verifiable photomontages

Existing

Proposed

Good renderings can communicate design intent like no other method, but . . .

- Like photosimulations:
  - They are labor intensive
  - They are not flexible
  - Are typically done as “one-offs”
- Further, they typically are not verifiable or repeatable
- Are frequently highly stylized and are often used as more of a sales tool, rather than a planning tool

Animation is like a moving rendering

Animations pre-render movement through a 3D scene and are designed to be watched, like a movie

Animations can be very attractive

- They have the detail of a rendering but can be seen from a path instead of a single view
- They are typically verifiable (buildings can be measured, lens and lighting verified, etc.)
- People like them
- Are easily disseminated
- While they are very labor intensive, they can produce data that could be used to build a community database

But animations also have limitations

- They are passive: meant to be watched, not explored
- Viewers only see what they are meant to see and the field of view shown often does not match with reality
- Rendering high resolution animations can be very expensive
- Cannot be printed

Real-time simulation is similar to animation, as the user moves through a 3D scene

(The above animation is a recording of a person using a real-time simulation. A real-time simulation cannot be embedded into a PowerPoint)

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

In real-time simulation the user has control over the movements, what is seen and from where it viewed

- Height above terrain, speed of movement, and field of view are all in control of the user
- The simulation is “experiential,” or closest to how a person would experience the real place
- Distances can be measured and heights confirmed. Simulation can link with GIS data
- Labor intensive, but can produce data that could be used to build a community database
- Perhaps the closest technique to being mainstreamed . . .

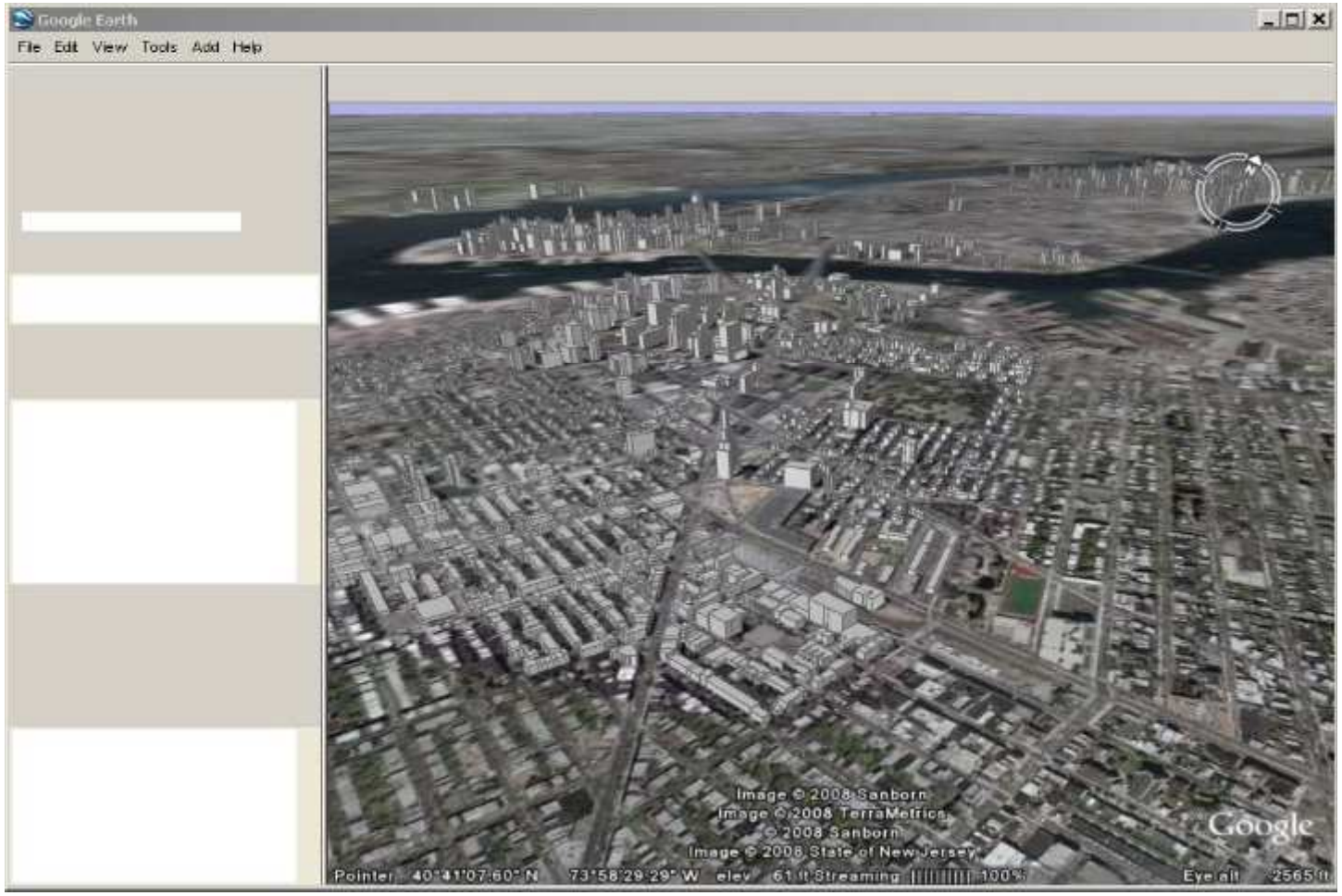
ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Simulation

Google Earth is free real-time simulation environment

- It can be used “as-is” with extensive data provided by Google Earth about the world (aerial photos, topography, and some existing buildings) or can accommodate custom models
- Has a free modeling tool so that users can make their own custom models
- Data constantly updated, streamed off the web
- Currently, people use it for a variety of purposes, many of which are unrelated to planning or design

Google Earth can be used to widely disseminate real-time simulations, as it can be downloaded from anywhere



Recorded simulation showing a user exploring development alternatives using Google Earth

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Simulation

Like the other methods, real-time simulation also has its limitations

- Full functionality cannot be embedded into a PowerPoint, PDF or other typical presentation format
- If disseminated to a wide audience, requires users to be active computer users
- Can be difficult to navigate
- Cannot be printed
- Lighting, shade and shadows are not typically as accurate as can be rendered in animation or photomontage

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

In summary, each method has their own strengths and weaknesses

- There is no single preferred method
  - The method selected depends on the issues involved
- Not all methods involve new information technology, but information technology has expanded the quality, quantity, and the "verifiability" of visual simulations
- Some techniques (animations, simulations) are better suited to integrate and use an existing data environment

ENVIRONMENTAL
SIMULATION
CENTER, LTD.

Visual Simulation Techniques

for Planning & Design

City of Glen Cove
February 1, 2008