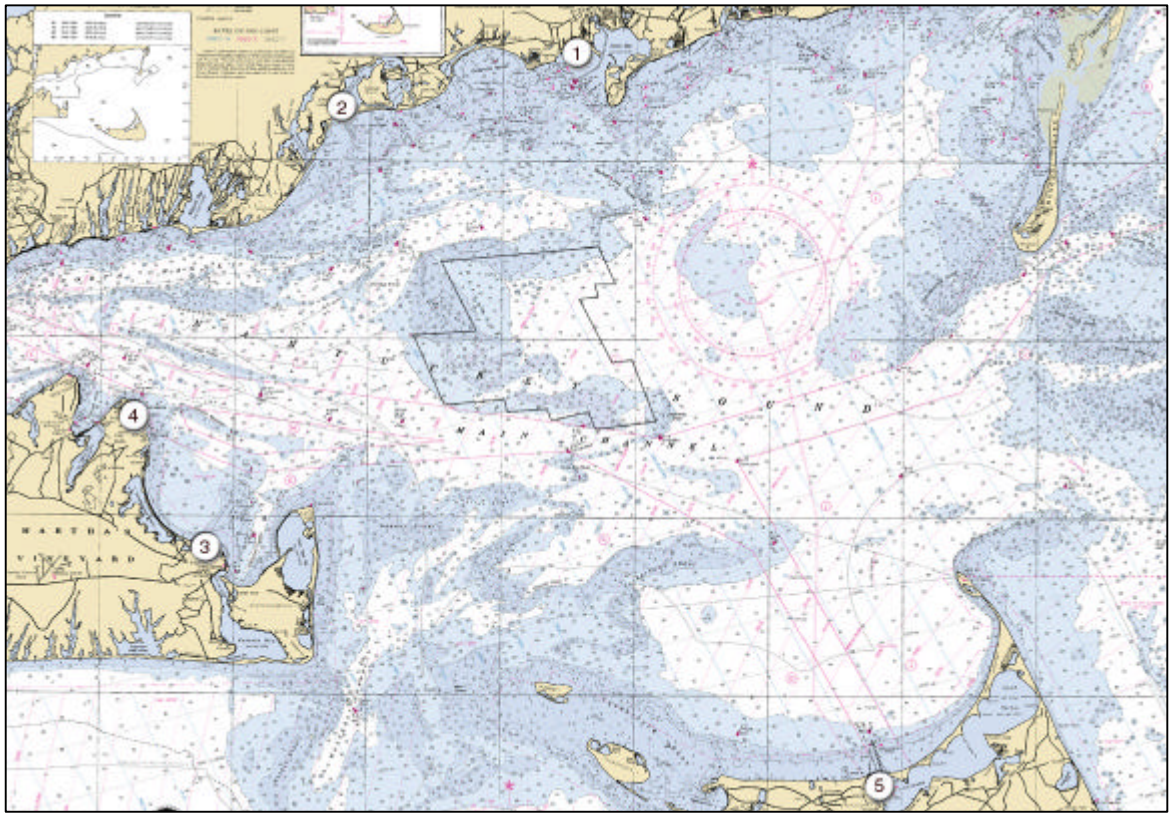
Visual Simulation Process

Data Collection – Computer Generated Simulations

Data Collection

The process of Computer Generated Simulations starts with data collection. We obtained existing photographs of the site from representative viewpoints.



Data Collection

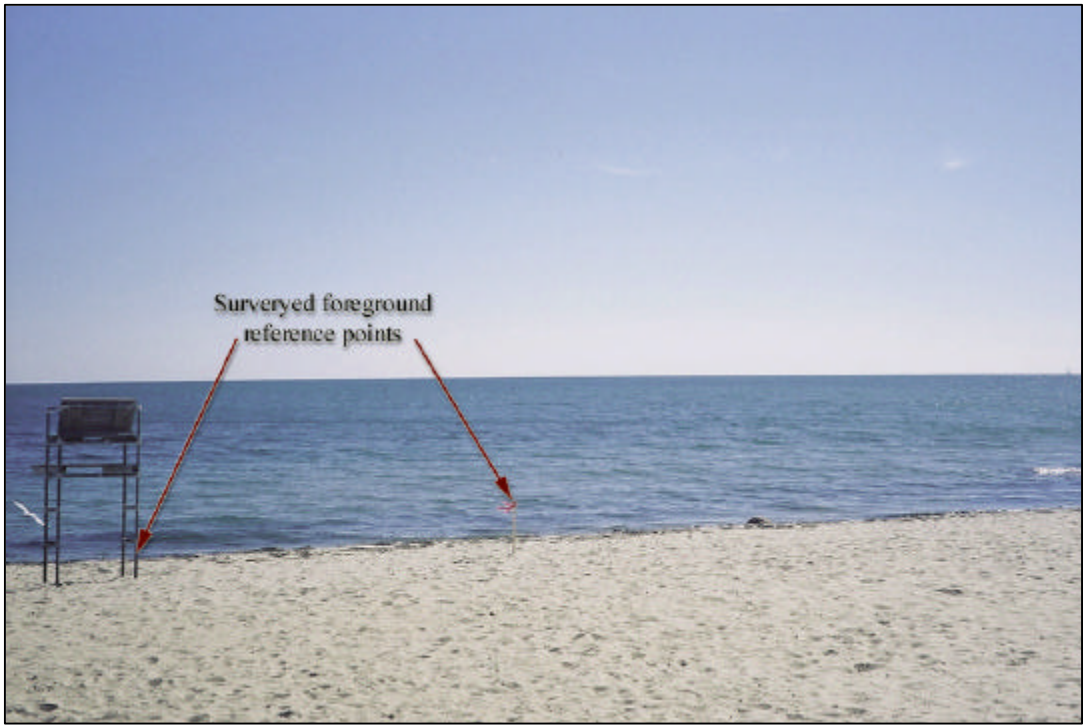
At each viewpoint a camera and tripod were set up and the exact location of the camera was determined using survey equipment.

Data Collection

The location of the proposed wind park was determined based on plans provided by the project developer, and these coordinates were used to determine the appropriate bearing for the photograph.

Data Collection

Once the camera angle was set we also surveyed the exact location of existing foreground reference points or stakes that were placed in each viewpoint for alignment verification.



Data Collection

- All photos were taken with a standard 35 MM film camera with a 50 mm lens to approximate normal human eye sight relative to scale.

- A series of digital photos were also taken from each viewpoint for use in the development of panoramic images.

Hyannis Existing Conditions

Cotuit Existing Conditions

Edgartown Existing Conditions

Nantucket Existing Conditions

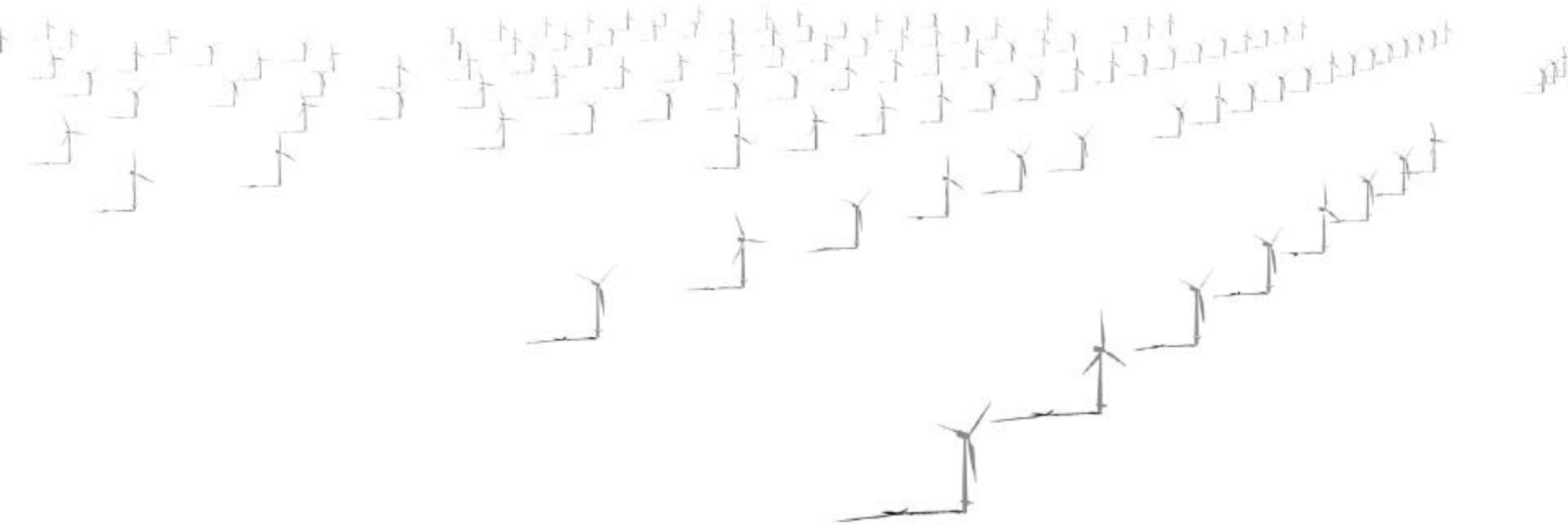
Oak Bluff Existing Conditions

The Modeling Process

Birds-eye view of a modeled wind turbine.

The Modeling Process

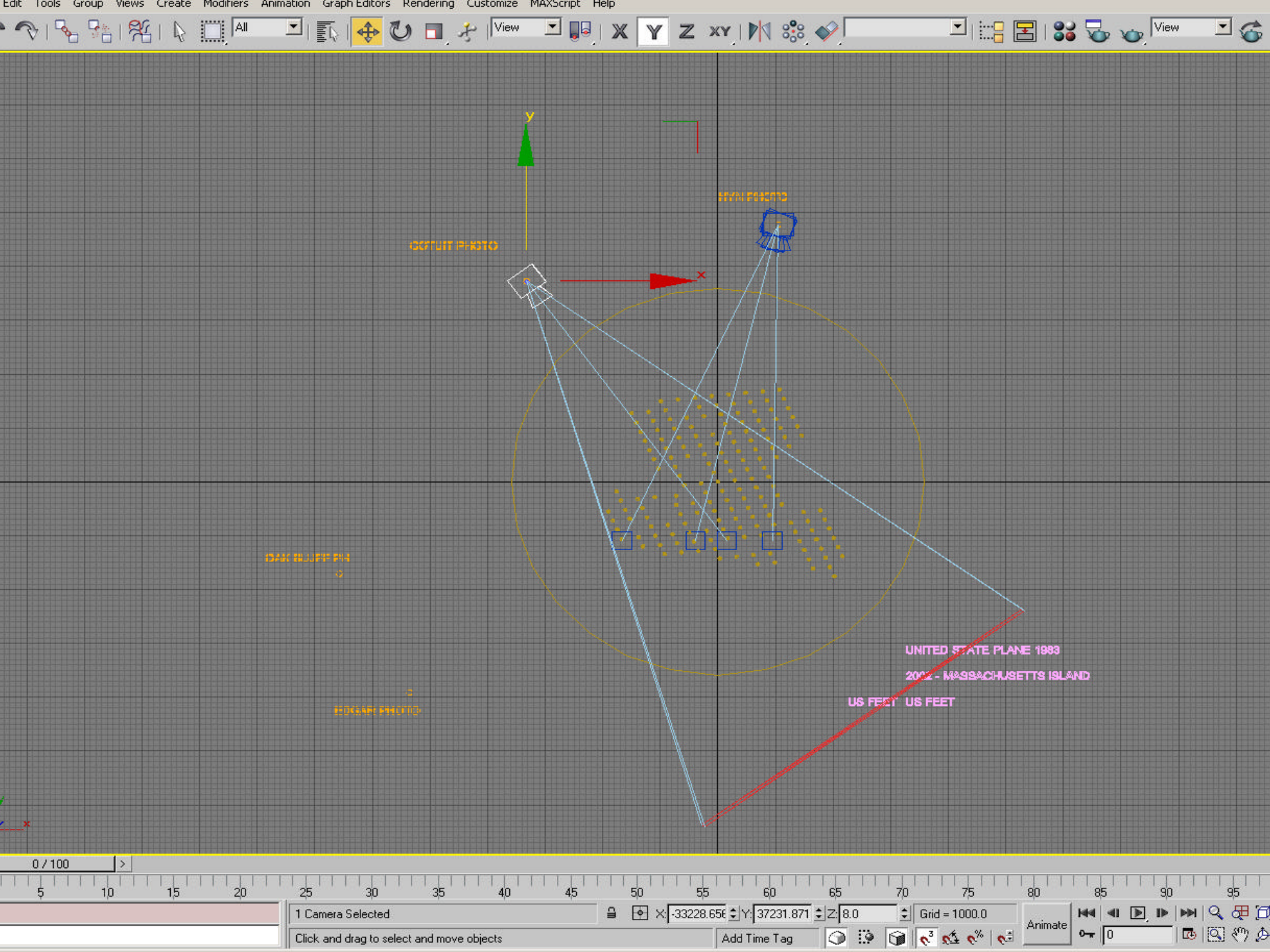
- A computer model of the proposed facility was prepared based on machine and tower specifications and a layout plan provided by Cape Wind.



The Modeling Process

- The survey information collected in the field is translated from the surveyors readings to an AutoCAD2000® drawing.

- The facility layout is also incorporated into the AutoCAD Drawing in a common DATUM.


Edit Tools Group Views Create Modifiers Animation Graph Editors Rendering Customize MAXScript Help
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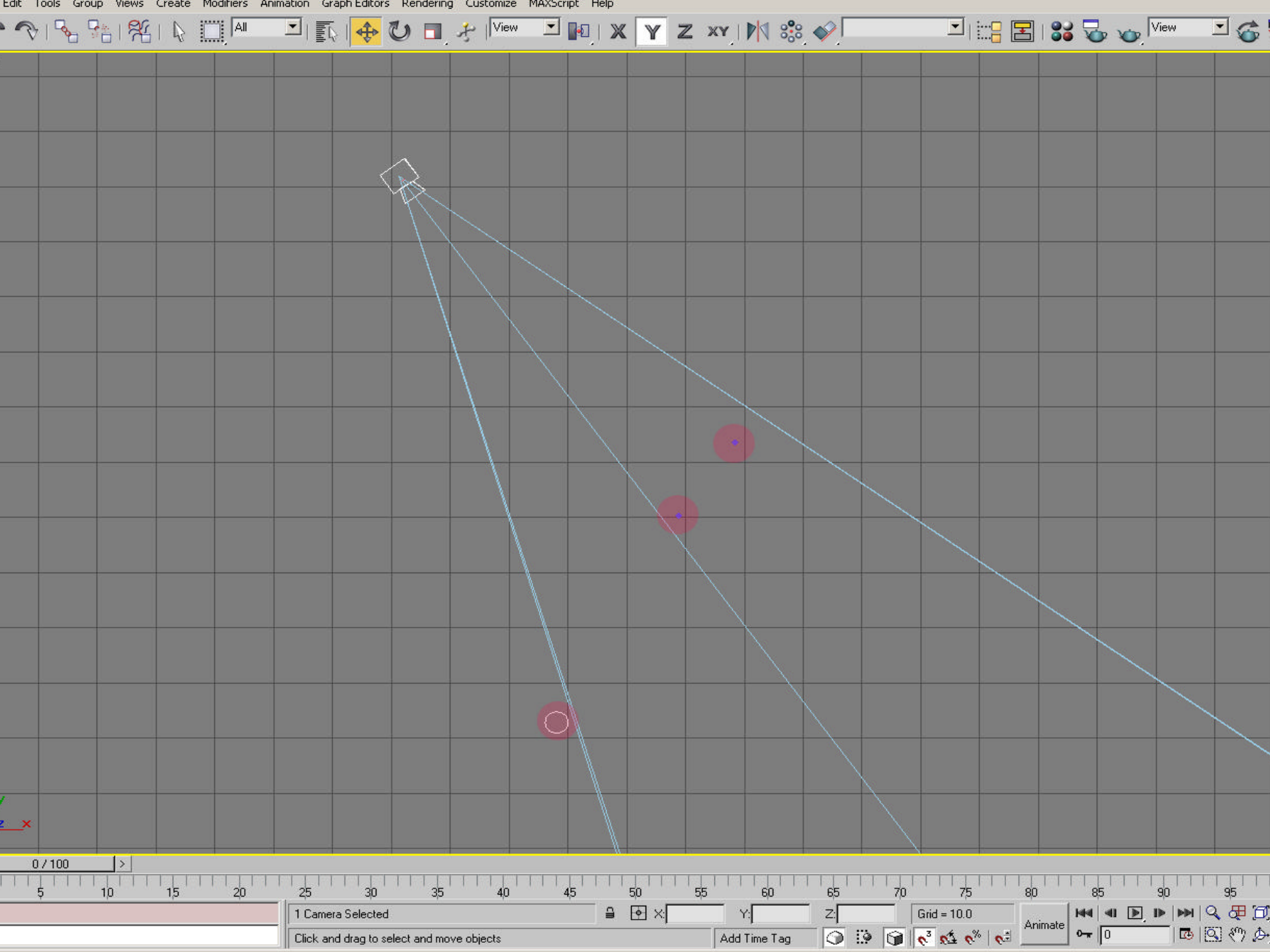
Click and drag to select and move objects
Add Time Tag


Edit Tools Group Views Create Modifiers Animation Graph Editors Rendering Customize MAXScript Help
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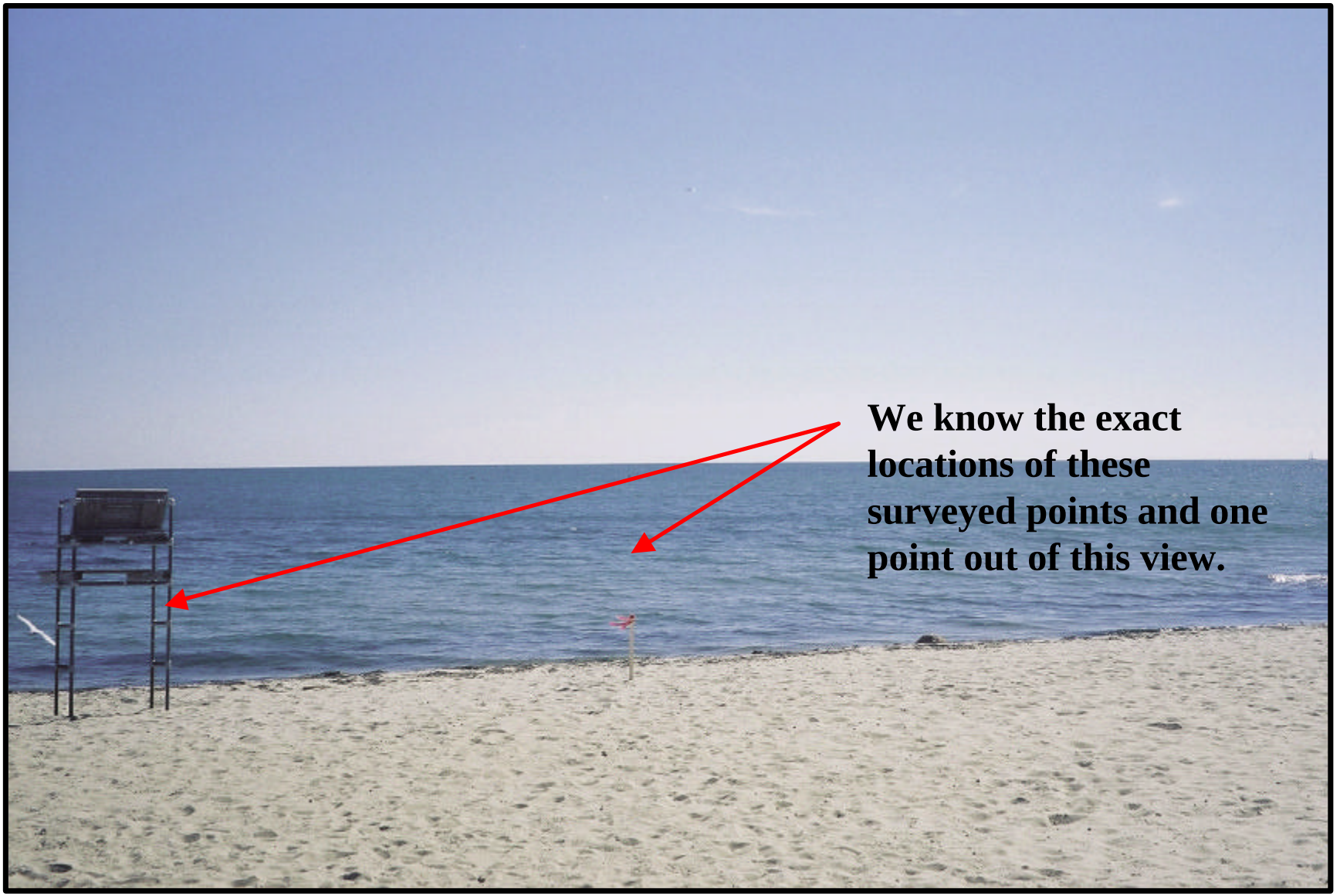
Z:
Grid = 10.0
Animate
Click and drag to select and move objects
Add Time Tag

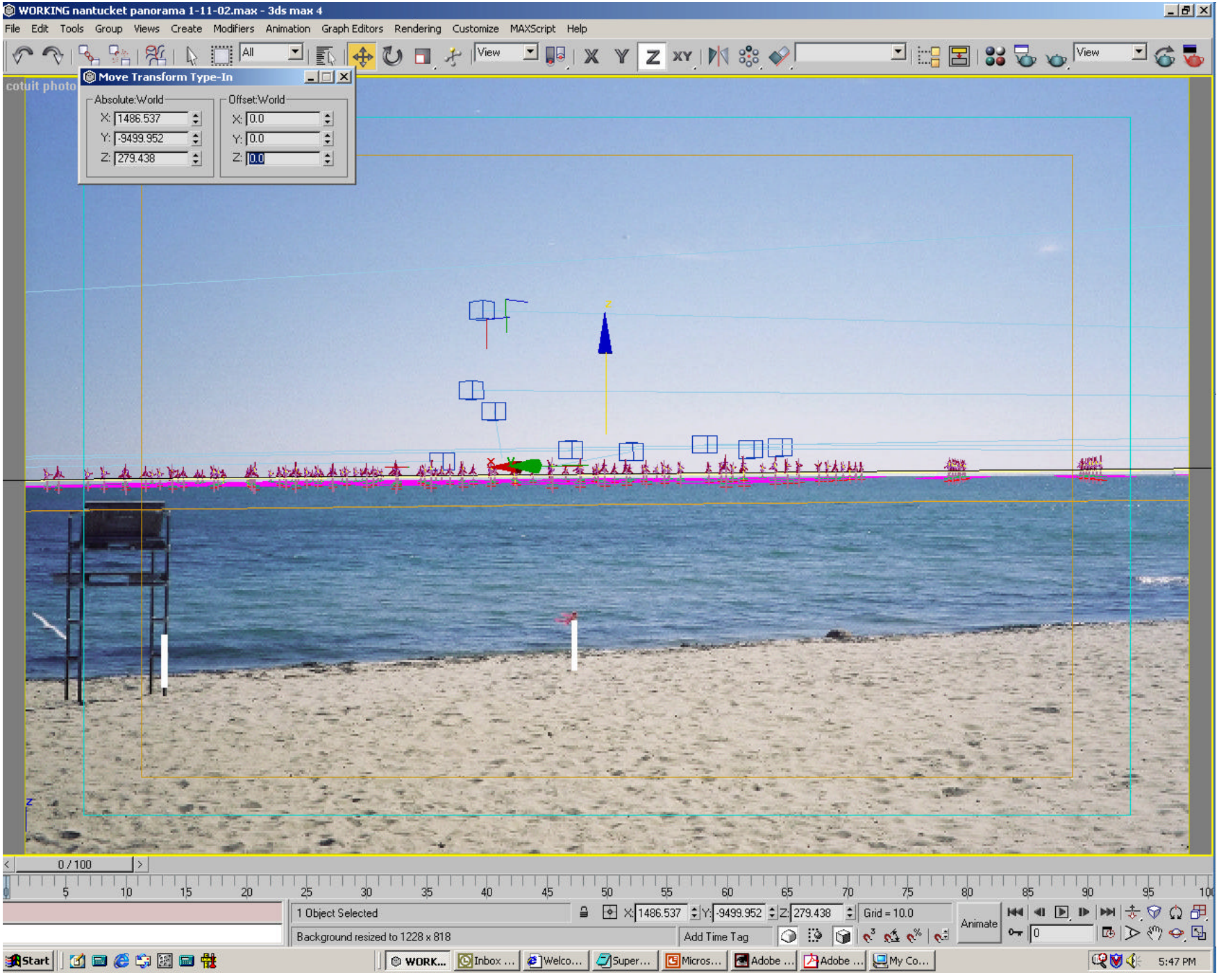
The Modeling Process

•The 2D information is then imported into 3D Studio Max 4.0® and replaced with 3 dimensional information (cameras, modeled turbines, lights, etc.)

•Minor camera changes (camera height, lens, and roll) are made to align all the known points.

The Modeling Process




WORKING nantucket panorama 1-11-02.max - 3ds max 4
File Edit Tools Group Views Create Modifiers Animation Graph Editors Rendering Customize MAXScript Help
Move Transform Type-In
Absolute:World
X: 1486.537
Y: -9499.952
Z: 279.438
Offset:World
X: 0.0
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1 Object Selected
X: 1486.537 Y: -9499.952 Z: 279.438
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Background resized to 1228 x 818
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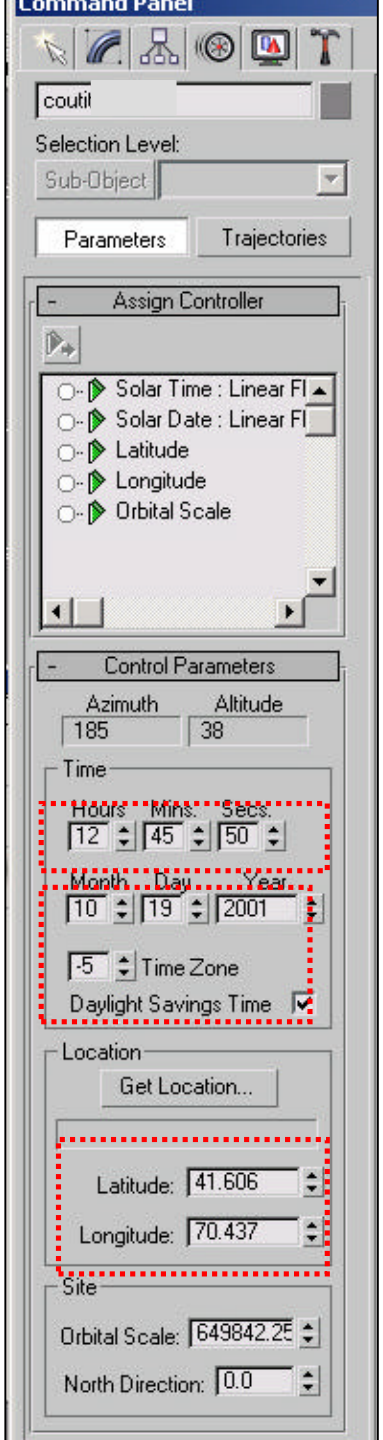
Light Calculations



Lighting is calculated by creating a ‘sun’ for a specific time, date and location.

This information allows the computer to accurately calculate highlights and shadows for each individual turbine in the scene.

Cotuit - 50 mm Simulation of Proposed Wind Farm

Hyannis – 50 mm Simulation

Edgartown - 50 mm Simulation

Nantucket - 50 mm Simulation

Oak Bluff - 50 mm Simulation

Original Existing Conditions

Simulation

Actual Photo of Built Facility

Original Existing Conditions

Simulation

Actual Photo of Built Facility

Original Existing Conditions

FALLS RIDGE
BY URBEN BROTHERS
1-2&3 BEDROOMS
THE BIG CITY CUT
R. NATHAN W. KEEVER FAMILY
NDA KEEVER, N P PRACTICE

Simulation

Actual Photo of Built Facility

Original Existing Conditions

Simulation

Actual Photo of Built Facility

Verification of Accuracy

On this project Cape Wind asked us to use digital panoramic photos to show the full extent of the proposed project. This does lend to some visual distortion.

Verification of Accuracy

To see if this distortion significantly affected simulation accuracy, we overlayed our 50 mm simulation over the panoramic representation.

Verification of Accuracy

Differences with EarthTech Simulations

- In comparing our simulations with those prepared by EarthTech, we did notice some differences. In general, the simulations are similar in terms of turbine location and dimensions.

EarthTech

EDR, P.C.

Differences with EarthTech Simulations

The main differences we noticed were in two areas:

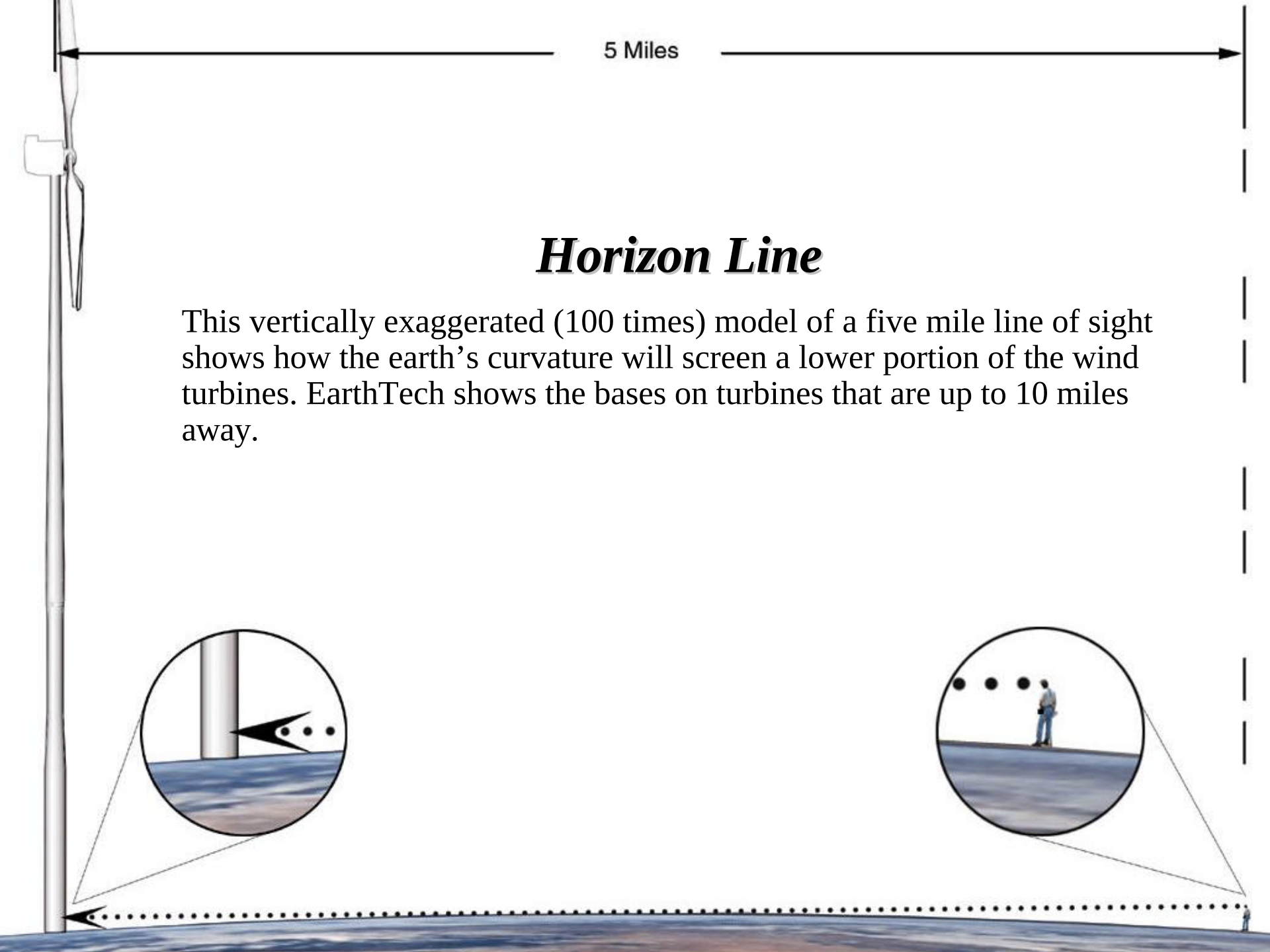
- Lighting
- Horizon Line
- Blade rotational alignment

Facility should be backlit

All turbines should fall behind the horizon.

Lighting

- These insets taken from the EarthTech simulation clearly show foreground objects with backlighting. However, the simulated turbines are front lit, creating more impact (notice the lifeguards hat).



Horizon Line

This vertically exaggerated (100 times) model of a five mile line of sight shows how the earth's curvature will screen a lower portion of the wind turbines. EarthTech shows the bases on turbines that are up to 10 miles away.

Blade Rotational Alignment

- It is very unlikely that 170 wind turbine blades will align at any given time.

Earth Tech – Blades all in the same rotational position

EDR – Blades are all in random positions