

# Lighting Visualization

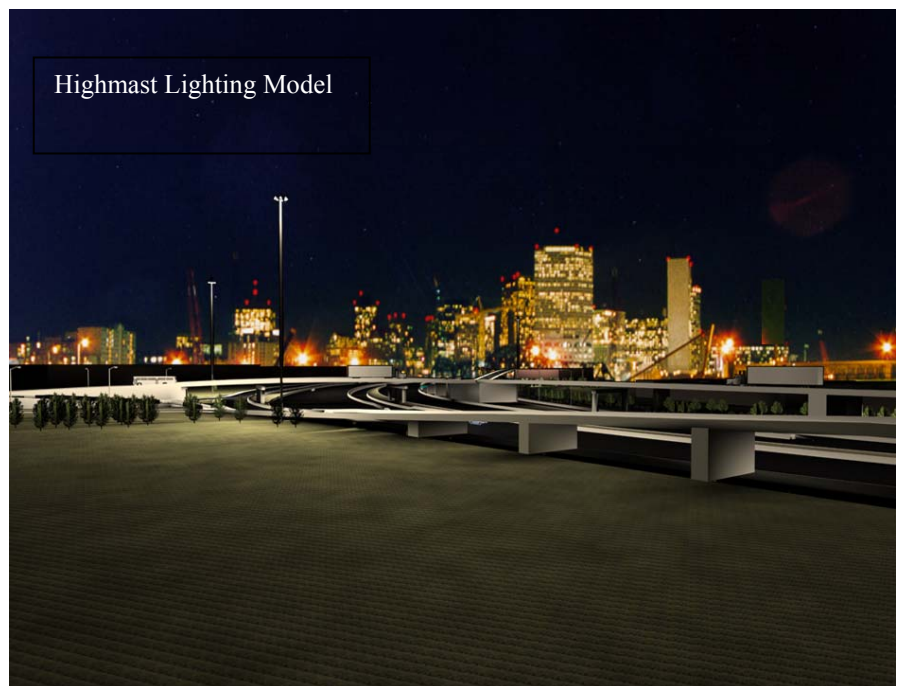
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*Getting the proper effect from a lighting system has always been a challenge. Explaining it to your client and seeing if it's what they want can often provide the greatest of those challenges. The best way to explain has always been with pictures.*

Lighting is often a very subjective art. Even when the designer knows how a lighting system will interact with an environment it often remains difficult to explain to a client how the shadowing will effect the structural surfaces, how bright the system will appear, or how one area will look relative to another. Even if the effects could be explained completely another person may not be able to fully visualize the end product and whether it is in line with their expectations. In the past we have built physical models of structures and sites to see how the lighting will look in context. These models were often incomplete and lacked the ability to fully explain both the visual and luminous design intent. We are now working with computer generated lighting models and find them both a great presentation tool, and a powerful and critical part of the design process.

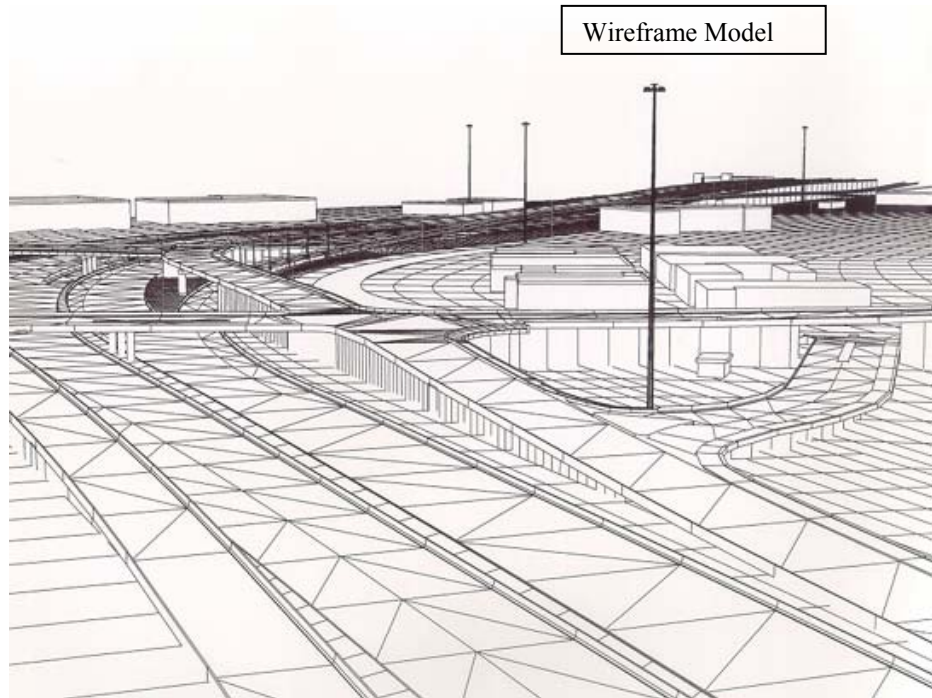
## ***The Process***

Most projects we are working on, whether an interior or exterior, are at least partially built in 3D. This type of modelling is becoming the norm with the development of new design software facilitates the construction of these virtual project environments. It is a natural extension that the lighting design also be integrated into these models. Using 3D *AutoCAD* files and a visualization software called *Lightscape* we are performing this integration with promising results. *Lightscape* allows fixture specific photometric files to be added to a CAD model and then will calculate their impact on varying surfaces and textures. Since the entire space is calculated in the process we are able to check both luminance and



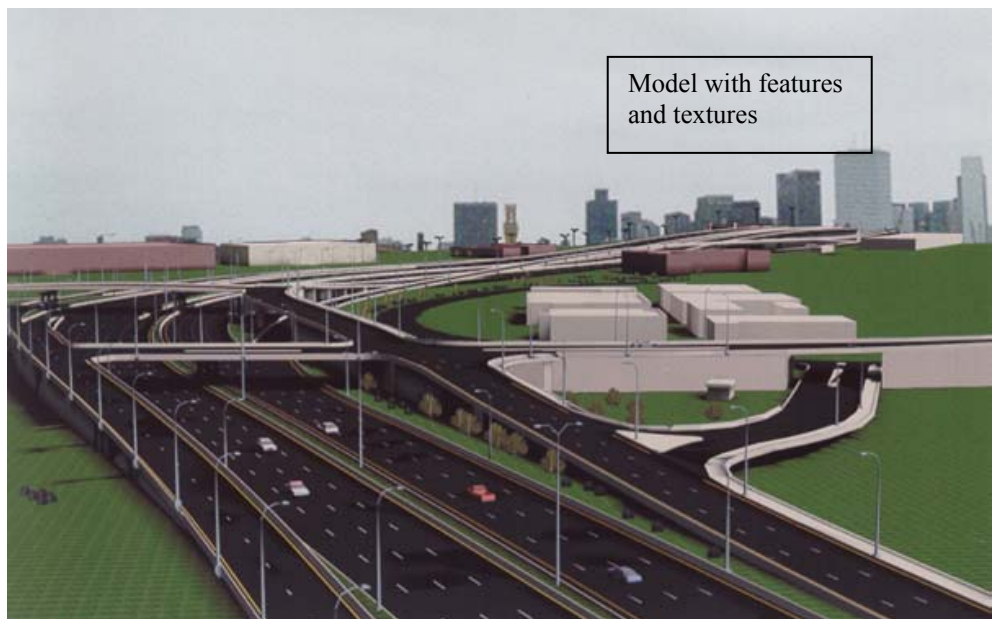
illuminance values throughout the model, yielding both contract required calculations and good presentation materials.

Even when no 3D model exists one can be developed relatively simply. For an example of a roadway the process begins with the 2D design files. Using Autodesk's Land Development Desktop software (formerly known as Softdesk Civil) one begins by defining the horizontal and vertical alignments. Combining the two will give you a 3D roadway alignment.



For the roadway surface generation one can utilize the typical roadway sections defining them as templates which when extruded along your 3D alignment will place points at critical locations (roadway centerline, edge of pavement, superelevations) in the model. This point data base is then used to create the roadway surface by connecting the points

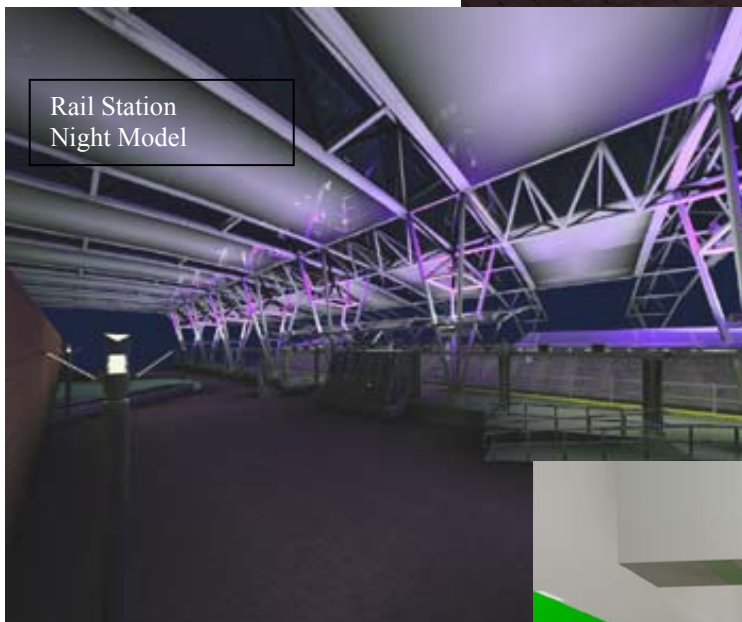
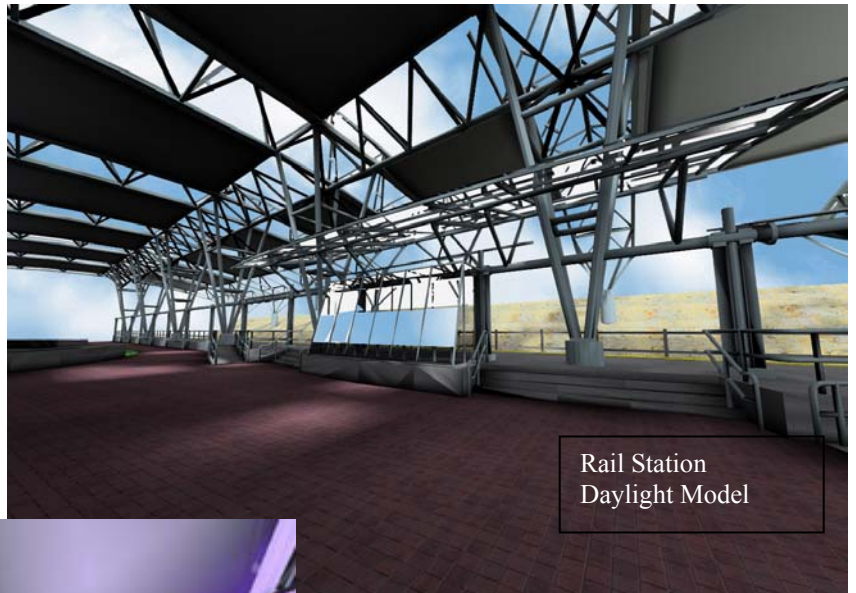
with a network of triangulated 3D faces. Existing ground surfaces can be created in a similar procedure using electronic survey point files. Combining the two surfaces will give you a three dimensional wire frame model of the anticipated project. Additional features such as buildings, barriers, bridges, light poles,



vehicles, etc. are created using AutoCAD's solid modeling applications.

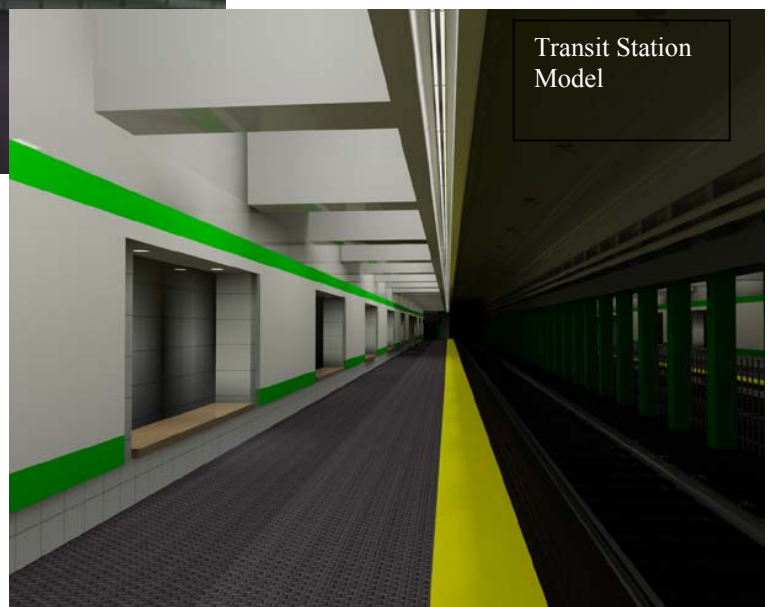
## *The Interior*

The design of interior spaces, particularly those with a significant areas of glass can benefit from modeling. *Lightscape* can provide both the daylighting calculations that are critical to developing appropriate energy management strategies and the nighttime calculations when the artificial lighting is turned on. Another benefit of modeling the lighting system is



the ability to readily try options. Fixture elements like lamps and colored filters can easily be changed and visually evaluated. Custom built lighting elements integrated into the architecture can also be evaluated. For an underground transit station in

Boston we evaluated the use of bare fluorescent strips built into various coves and recesses of the structure and could calculate the resultant light levels as well as see the shadow patterns on elements in the station.



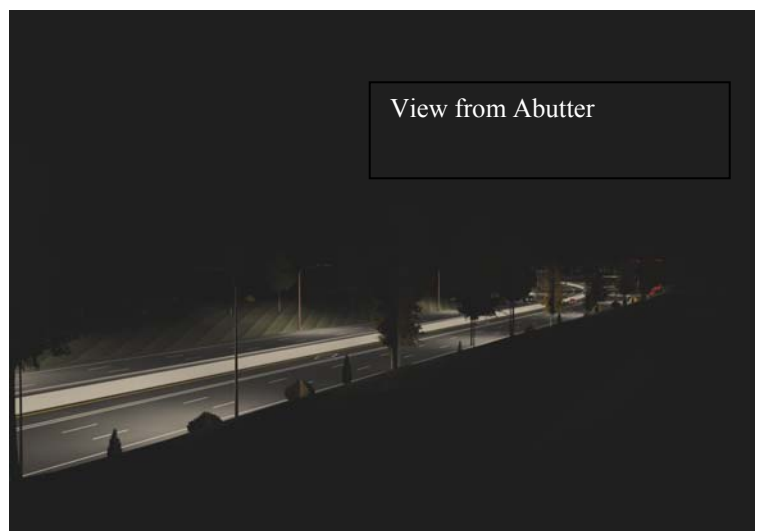
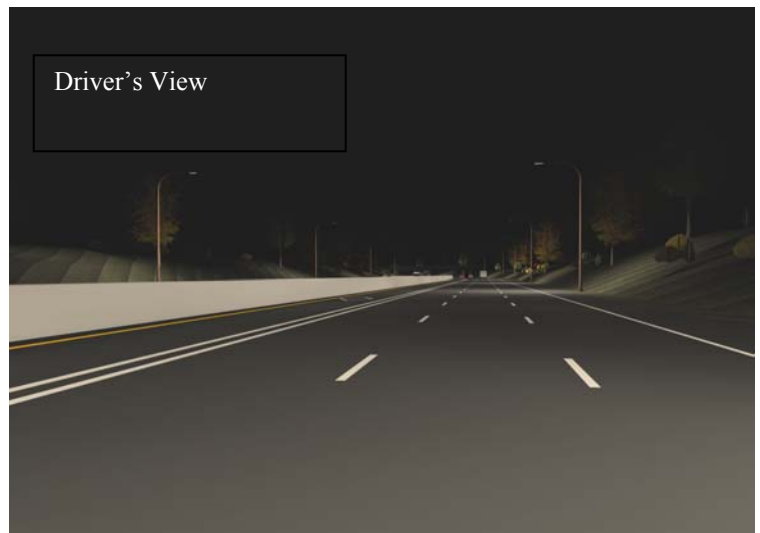
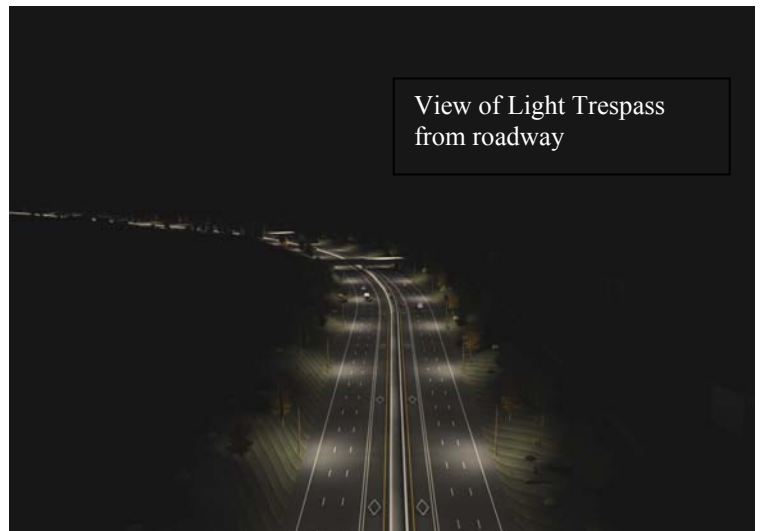
### *The Exterior*

Exterior spaces have often been ignored when it comes to modeling and visualization. With the increased concern about light trespass and the general public opinion that poor lighting can ruin the nighttime visual environment we need better means to evaluate and represent proposed lighting designs.

We have always had numerical criteria to evaluate designs and assess the overall performance of a system. Horizontal calculation grids can be placed on a road or plaza to determine the adequacy of visual performance and vertical grids can be placed along the edge of a project to calculate the amount of light trespass. Unfortunately these numbers are confusing to most members of community groups and seldom answer the question of what will the project look like. Modeling of a project, whether a road or a site, helps answer these questions for both designers and the general public. A typical design would include images of the project from an observer's position within the illuminated area, an image showing relative light trespass, and a view from points of concern (possibly an adjacent property).

### *Summary*

Lighting visualization is a useful and powerful design tool which should be considered for any project where lighting is an important issue or where bad lighting can create other issues.



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*Brian DiStasio is the Lead 3D Designer for PB's Boston Office. He has over 12 years experience in AutoCAD 3D and Softdesk. He has worked on small to large scale interior and exterior models, some as large as a square kilometer.*