The New York Times

620 8th Avenue, New York, New York 10018

Craig Casey, Dan Cox, Casey Leman

Tech Report 1

Dr. Kevin Houser
October 5th, 2009
Lighting/Electrical

This Report was created during the pilot of BIM Thesis. This pilot program is focused on Building Information Modeling and Integrated Project Delivery. Due to the nuances of piloting a new program, certain information has been withheld as of the date of this submission. As information comes in, the report will be updated accordingly.

Executive Summary

The following report is an analysis of the lighting design for The New York Times Building in New York City. This project does not follow the typical Tech Report 1 outline, because it is part of a pilot thesis program. This program is taking a look at using Integrated Project Delivery with Building Information Modeling to complete the 5th Year Capstone Project. There were minor problems in attempting to obtain information about the project; therefore, some parts of this project will contain assumed data.

The building is 52 stories, with an occupied height of 766 feet. The building is 1.6 million square feet in total area. There were three major lighting design firms on the project, as well as an engineering firm for back of house spaces.

This report takes a look at the following four key spaces: the Lobby, the Façade, the Café, and a typical Open Office. The design considerations for each of the four spaces were researched, and the most important concepts were described in the body of the report. An in depth analysis was completed for the Lobby and Façade. The analysis includes modeling of the two spaces as well as calculating illuminance values within AGI. The building uses a sophisticated controls system. Each luminaire contains a Digitally Addressable Lighting Interface (DALI) ballast. Along with a Quantum lighting control system, the building is able to maintain a low Lighting Power Density. This system takes input from an array of sensors including open loop photosensors, closed loop photosensors, and occupancy sensors.

Through the analysis of the Lobby, it was found that the space was illuminated adequately. A few of the areas in the lobby were slightly lower than the design criteria, but the main concepts of orientation and guidance were met. The Lobby also met the Lighting Power Density (LPD) requirement of ASHRAE Standard 90.1. The Façade, with the design criteria determined in this report, was not adequately illuminated. The Façade was illuminated to 60% of the recommended level by Illuminating Engineering Society of North America. The Façade came in at 50% of the required LPD from ASHRAE Standard 90.1.

Table of Contents

System Description

The design concept for the New York Times Building (NYT) was to set a new standard for high rise development. The architect, Renzo Piano, was focused on establishing an archetypal beacon in the New York skyline. The ideas that are apparent throughout the design are lightness and transparency. To keep consistency with those concepts, the lighting design needed to highlight the exterior façade and also give spectators a view of the interior spaces. For individuals inside the building, the architecture was aimed at providing unimpeded views to the exterior from any location on any floor. Daylighting was an important factor that guided much of the architecture. The building is able to reduce most of the lighting load during the day due to proper daylighting. This was further confirmed by the day to day data collection by NYT.

Upon entering the building, one is immediately pulled from the crowded urban streets and plunged into the colorful and spacious lobby. The space is filled with rich colors and instantly instills a sense of comfort and relaxation. The lighting is very subtle but provides a bright and warm atmosphere. Daylight also fills the space from the curtain walls surrounding the exterior, as well as the courtyard in the center of the podium. (See Figure 6: View of Courtyard)

Continuing through the building to the office spaces, the ideas of lightness and transparency are kept intact. The office floors are lit to promote activity but still have a comfortable feeling similar to the main lobby. Each floor continues to please individuals with warm, vibrant colors. Every floor offers daylight and views to the exterior from any location.

The lighting system is comprised of around 18,000 luminaires. This large quantity is simplified by the use of only 20 different luminaire styles. This manner of product selection helps reduce the complexity of the design and also provides a sense of consistency through each space. The entire building utilizes a digitally addressable lighting interface (DALI) system with dimmable ballasts to harvest the benefits of daylight. The system provides energy savings above 50 percent. There are 15 zones per floor, each with their own photosensor. Every luminaire within a zone takes input from the respective photosensor and dims accordingly. The system also allows for the programming of individual luminaires to accommodate to varying lighting needs.

The overall design is impeccable. The lighting strategy utilizes the most advanced lighting solutions to provide complete control over each space. This report takes an in depth look at the lighting systems and daylight integration controls.

Electrical Lighting System

Though the building harnesses as much daylight as it can, while maintaining a balance with the mechanical system, it must be supplemented by an electric lighting system. The lighting system varies depending on the occupant use in the space. The spaces researched include the lobby, café, open office, and façade.

Lobby

The lobby is the first interior space of the building all occupants enter. The space contains a reception desk, security desks, elevator lobbies, as well as multiple special features. The lobby consists of a combination of uplight and downlight. Due to the lack of information obtained for the BIM Thesis several assumptions were made for this particular space. The luminaires in the lobby are assumed to be supplied by ERCO. The system consists of three different types of downlights and two similar uplights. This space is explained in further detail in the analysis section of the report. Results from an AGI 32 model are presented and compared to IESNA and ASHRAE requirements.

Space: Lobby	Reflectance (%)	Area (ft^2)
Ceiling	80*	13,000
Wood Walls	50*	
Glass Walls	10*	
Painted Walls	45*	7,800
Floor	30*	13,000

*values assumed

(See Figure 13: "Moveable Type" feature wall in lobby)

(See Figure 14: Lobby Reflected Ceiling Plan)

Cafe

The café serves as a combination restaurant/lounge for all employees of The New York Times. The café is a two story space on the north facing side of the building. (See Figure 7: Cafe Dining Area) The lighting system uses four different luminaires that provide both uplight and downlight. The design for the café allows for different settings to accommodate to the time of day or varying events. The dining space can be illuminated by either surface mounted downlights or suspended uplights. The surrounding areas are illuminated with either recessed downlights or recessed wallwashers.

Space: Cafe	Reflectance	Area (N/A for Tech 1)
Ceiling	80*	
Glass Walls	10*	
Painted Walls	40*	
Carpeted Floor	20*	
Tile Floor	30*	

*values assumed

Furniture Surface: Cafe	Reflectance
Table	40*
Chairs	40*
Food Displays	35*

*values assumed

(See Figure 16: Fourteenth Floor Reflected Ceiling Plan and Figure 17: Fifteenth Floor Reflected Ceiling Plan)

Open Office

The Open Offices use 2' linear fluorescent fixtures running continuously from the east side of the building to the west side of the building. Each of the fixtures contain a DALI two lamp, 14w ballast with a dimming range of 100% to 10% with power factor greater then 0.98, and capable of starting at any dimmed level without first flashing to full light. When dimmed to 10% the luminaire will use no more than 30% of the maximum input wattage. The perimeter of the office space is illuminated with 4' linear fluorescents located in a cove and centered on 5' curtain wall modules.

Space: Open Office	Reflectance	Area (N/A for Tech 1)
Ceiling	80*	
Glass Walls	1*	
Painted Walls	40*	
Carpeted Floor	20*	

*value assumed

Furniture Surface: Open Office	Reflectance
Desk	40*
Partitions	50*
Filing Cabinets	30*

*value assumed

(See Figure 15: Eighth Floor Reflected Ceiling Plan)

Facade

The particular façade focused upon was the west façade. This façade uses multiple ERCO metal halide fixtures. Besides illuminating the building signage with fixtures projected from the first story, the rest of the façade is illuminated from across the street. The fixtures are atop the Port Authority building across 8th Avenue. The façade is composed of two main components; the ceramic tubes as a shading device and the curtain wall system. The lighting equipment consists of a combination of floodlights and narrow spots. The narrow spots are critical to minimizing sky glow. The building reaches a maximum height of 766' to the top of the occupied space and 1,046' to the top of the mast. The façade lights are mounted at a height of 119'above grade and 176' away from the west facade. When lighting the facade, It is crucial to minimize all stray light. The building stretches out 197'-5" along 8th Avenue. (See Figure 4: Exterior West Façade Elevation)

Daylighting Description

Lobby

The lobby has a unique feature that aids in the daylight collection. The center courtyard allows ample daylight into the main lobby space, while the east facing façade allows daylight into the main entrance area. The curtain wall system uses a glazing called SGG Vision Lite. The glazing contains two main components; Diamant which is the glass itself, and Planitherm which is a low-e coating applied to the glass. Renzo Piano Building Workshop, the architecture firm, wanted a glazing that was as clear as possible. They wanted the glass to virtually disappear. The SGG Vision Lite glazing has a transmittance of 96% of visible light.

Cafe

The café receives ample amounts of daylight from the east facing two story curtain wall. This daylight is controlled by use of solar shades. The luminaires in the space dim accordingly to the input from the photosensor.

Open Office

The open offices have a sophisticated daylight harvesting system. On each floor, the north, east, south and west walls each contain 3 photosensors. These sensors are mounted within the curtain wall system facing the exterior of the building. The purpose of this set of sensors is to control the position of the motorized shades on the interior of the curtain wall. The shades have five set points that they move to depending on the input from the sensors. Each blind can be manually overridden by visual interfaces at the corners of the building. There are also photosensors mounted to the ceiling across the open office. These sensors adjust the light output of each fixture individually.

Facade

The façade is one of the most important features of the building. It is the first thing that is seen as a viewer approaches the building and is the primary shading device for the building. The building is prominent in the New York City skyline, as such; it was an important design factor. The intent was for the building to disappear into the sky.

Design Criteria and Considerations

The design criterion for each space is listed in the table below, further explanation of the criteria can be found in subsequent paragraphs. The design considerations pertaining to each particular space can also be found in the relevant subsequent paragraphs.

Space	Horizontal Illuminance (lux)	Vertical Illuminance (lux)
Lobby (office)	100	30
Café		
Cashier	300	30
Dining	100	30
Food Display	500	
Food Courts	300	30
Open Office		
Intensive VDT	300	50
Façade		
Bright Surrounding		
Medium Light Surface		50

Space	Lighting Power Density (W/ft^2)
Lobby (office)	1.3
Cafe	.9
Open Office	1.1
Conference	1.3
Mech./Elec. Room	1.5
Restrooms	.9
Stairways	.6
Active Storage	.8
Façade	
Façade	.2
Building Entrance	30W/ft of door
Building Grounds	.2

Lobby

The lobby was designed by the Office for Visual Interaction (OVI). Jean Sundin, founder and Principal of OVI, described their design process "We are composing an entire view and the challenging thing about that is, based on the transparency of this project, everywhere you look you have views. It has to look good from every vantage point." (ERCO Lichtbericht, 2008)

Design Considerations

Psychological Impression

Impression of Spaciousness

- Uniform, peripheral (wall) lighting
- Brightness is a reinforcing factor, but not a decisive one

Appearance of Space and Luminaires (Very Important)

Upon entering the building, an individual should immediately experience the change from the crowded streets into the open lobby. The luminaires should be of high quality to reflect the characteristics of the rest of the facility. The idea of lightness should be expressed through the use of concealed fixtures that do not impede the architectural design. The fixtures should also be barely noticeable yet provide bright, vibrant light.

Color Appearance (Important)

Daylight is a major component in the design of the lobby. The lighting should accommodate to this aspect of the space to create an active and exciting environment. Lamps with high CRI values should be used to emphasize the bright colors used on the various surfaces.

Daylight integration and Control (Somewhat Important)

A major theme for the lobby is the idea of transparency. The space is surrounded by a full height, glass wall that provides uninterrupted views to the exterior. Daylight fills the space from every angle. The lighting design should accommodate various daylighting situations and provide ample dimming capabilities.

Direct Glare (Important)

Luminaires shall have no direct glare to allow for a comfortable use of the space. Luminaires should be concealed within architecture or fixed with glare accessories.

Flicker (Somewhat Important)

Flicker should not be visible within the space. The lighting design should express high quality and reflect the characteristics of the building.

Light Distribution on Surfaces (Important)

Uniform lighting should be used along the periphery to emphasize the expanse of the lobby. The ceiling and floor should also receive uniform lighting to create the sense of a larger space.

Luminance of Room Surfaces (Important)

Wall washing should be present across all the walls. The colors and materials used in the space should be emphasized through the lighting design. The floor should also express its bright color and reflective quality. Daylight will create a visually pleasing display that continuously changes throughout the day.

Modeling of Faces or Objects (Important)

The space should promote constant interaction between people. The lighting system should provide good color tone and detail on occupants. Facial Expressions and hand motions should be easily seen.

Reflected Glare (Somewhat Important)
Reflected glare should be avoided from the windows and floor. The large amount of glass suggests that luminaires should not be placed close to or aimed at windows. Luminaires should be located at a reasonable height above the floor to reduce harsh reflections. Choose fixtures that can control glare with the use of accessories.

Shadows (Somewhat Important)
Shadows should be avoided around the information and security desks. However, shadows across the ceiling or walls could create an interesting atmosphere. Daylight could also provide shadows from the exterior structure and create visually interesting designs.

Surface Characteristics (Important)
All surfaces should fully express their materials. Due to the material types in the space, the walls should be washed. The space contains no textured surfaces, so grazing should not be used. The ceiling should be illuminated in a way that appears different from the floor. Any texture or detail on the floor should be revealed through the lighting design.

Maintenance
The high ceiling suggests that maintenance could be difficult and tedious. Luminaires should use lamps with long life to reduce the time between relamping. Lamp color consistency should also be a key factor in the lighting design. The time it takes to replace a lamp should also be considered when selecting a light fixture.

Café

Design Considerations

(The following considerations are for the main dining area only.)

Psychological Impression

Impression of Relaxation

- Non-uniform lighting mode
- Peripheral (wall) emphasis, rather than overhead lighting

Appearance of Space and Luminaires (Important)
The idea of transparency and lightness should be present in the lighting design. Luminaires should be concealed in the architecture to promote a clean smooth surface across the ceiling and walls. The fixtures should also be of higher quality. The lighting design should express a calm atmosphere with pleasing visual displays

Color Appearance **(Very Important)**
The design of the cafeteria should promote the feelings of comfort and relaxation. The vibrant color tones used for the space should be further emphasized through the lighting design. Lamps should provide warm color temperatures and a high CRI value.

Daylight integration and Control (Somewhat Important)
Daylighting should be a key consideration for the space. The lighting design should allow for maximum daylight illumination Controls should dim luminaires accordingly to provide energy savings for the owner. This particular space has a two story curtain wall on the east side of the building. This allows for ample amounts of daylight to enter the space.

***Direct Glare* (Important)**
No direct glare from luminaires or daylight should be visible. This will guarantee a feeling of comfort throughout the space. Luminaires should be concealed within the ceiling or walls. Glare controlling accessories could also be used to reduce disturbances.

Light distribution on Surfaces (Somewhat Important)
The lighting design should provide uniform illuminance across the periphery of the space. This should also change from a high to low vertical illuminance. The ceiling should be uniformly illuminated to emphasize the height and size of the space.

Light Distribution on task plane (Somewhat Important)
The task plane should be illuminated to draw attention to the dining tables. Higher lighting levels should be focused near the center of table tops and then gradually decrease around the edges. Food displays should receive uniform illumination to clearly exhibit what's available. A uniform light level should also exist on and around the serving area to allow for easy reading and writing. At the cashier's register, there should be a higher illuminance level due to the speed and necessity for accuracy of the task.

Modeling of Faces or Objects (Somewhat Important)
The lighting design should illuminate faces and promote socialization. Individuals should feel comfortable while speaking to one another. Faces should show clear detail and expressions. Direct downlighting could be utilized in this space.

Point(s) of Interest (Important)
The peripheral of the space should be highlighted to create a sense of comfort and relaxation. This will also aid in creating a larger more open space. Tables and food displays should also receive highlight to provide direction. The serving area should be properly illuminated to exchange money, read or write.

Sparkle/Desirable Reflected Highlights (Somewhat Important)
The lighting design should cause sparkle across the tables when entrees are present. Direct lighting should be focused to create sparkle from dishes and silverware. This will create a visually interesting atmosphere. Luminaires could also be focused to create sparkle with window mullions and the various metallic surfaces throughout the space.

System Control and Flexibility (Important)
The lighting system should be able to respond to changing daylight conditions. The design should also be able to accommodate different events and uses for the space. As the environment changes throughout the day, the lighting should be able to react and provide appropriate illuminance levels. The space should always feel warm and comforting.

Maintenance
The tall ceilings require that the lighting systems use lamps with long life. The fixtures should also be easy to relamp or replace since maintenance could be difficult. Color consistency should be a key factor in luminaire selection.

Open Office

Design Considerations

Psychological Impression

Impression of Visual Clarity

- Bright, uniform lighting mode
- Some peripheral emphasis, such as with high reflectance walls or wall lighting

Appearance of Space and Luminaires (Important)

The office space should appear active and lively. The design should focus on providing bright, uniform, area lighting. The architectural design provides views of the exterior from any location in the space. The luminaires should be flush with the ceiling to create a smooth, flat surface. The fixtures should also be of similar color to the finished ceiling.

Color Appearance (Important)

Lamps should have a high CRI to pull out the rich color of the desks. Luminaires should provide a cooler color temperature to promote an active environment. The ceiling and walls should appear very bright.

Daylight integration and Control (Important)

Daylight is a major component of the office design. Dimming controls should be used to properly harvest the benefits of daylight. Luminaires should individually respond to the changing exterior environment and provide appropriate lighting levels. In addition to controlling the lumianires, the daylight also needs to be controlled. Solar shades are used across each of the facades. The ultra clear glazing necessitates absolute control of the daylight entering the space.

Direct Glare (Very Important)

All forms of direct glare from daylight or luminaires should be avoided. Glare accessories should be incorporated into the lighting design to remove any glaring sources. This will provide a comfortable workplace for all individuals in the space.

Flicker (Important)

The tasks of computer use and reading or writing require that light sources do not flicker. Any luminaires that caused this occurrence would create an uncomfortable situation and reduce productivity.

Light Distribution on Surfaces (Important)

All surfaces should receive uniform, area lighting. This will provide appropriate illuminance for individuals working in the space. This uniform design should be present throughout the floor with little to no deviations. The design should create a lively environment.

Light Distribution on Task Plane (Important)

The task plane should receive a uniform distribution to create a comfortable work setting. Individuals working at their desks will want to be able to easily focus on tasks without being distracted with varying lighting levels.

Luminance of Room Surfaces (Very Important)

Room surfaces should appear bright to promote an active atmosphere. The ceiling and walls should have a uniform luminance. This will help in creating a completely uniform environment to work in.

Modeling of Faces or Objects (Important)
Social interaction is important in this workspace. Facial expressions and hand or body motions should be easily seen. The use of area lighting should illuminate the entire space so that these factors will be of no issue. To properly model faces, there must be some contribution of vertical illuminance.

Reflected Glare (Very Important)
Reflected glare should be complete removed from the space. Glare can effect an individual's ability to work and feel comfortable. Avoid luminaires that create glaring conditions from windows or desktops.
Glaring controls should also be utilized.

Shadows (Important)
No shadows should be present in this space. Fluorescent sources should be used to create a diffuse lighting solution. Shadows can create uncomfortable working conditions and reduce productivity. Shadows from daylight should also be addressed in this space.

Source/Task/Eye Geometry (Very Important)
Furniture should be spaced out so that luminaires are not directly in front of or behind individuals. Veiling reflections can occur on computer screens or glossy papers if luminaires are located in inappropriate spots.

Maintenance
Luminaires should have lamps with long life to reduce the time between replacement. Proper color temperatures should always be provided to keep the lighting design consistent and uniform. The average height ceiling provides easy access to the fixtures. Luminaires should be able to be relamped or replaced easily to reduce office distractions.

Façade

Design Considerations

Psychological Impression

Impression of Visual Clarity

- Bright, uniform lighting mode

Appearance of Space and Luminaires (Very Important)
The architect's concept for the New York Times Building was to create a beacon in the New York skyline. The lighting design should highlight the architecture of the building and promote the unique design. The interior spaces of the building should also be visible from the outside to reinforce the transparent theme.

Color Appearance (Important)
Another design concept implemented by the architect was the idea of a constantly changing building appearance. The building should reflect the concept of lightness as the façade reacts to the changing daylight and night conditions. The lighting design should create a glowing structure that seems to disappear into the night sky. The colors of the horizontal rods should be brought out at night to create a different look for the building.

Direct Glare (Important)
All luminaires shall have no direct glare to create a safe environment in the streets surrounding the perimeter. Fixture accessories should be used to completely remove glaring effects.

Light Distribution on Surfaces (Very Important)
The lighting design should highlight the entire building to promote the architect's concepts. The facade should be washed horizontally with uniform light gradually fading vertically as the building progresses into the sky. The focus of the uniform wash should be on the horizontal ceramic rods. This will create depth and detail across the buildings face. The interior spaces should be visible from the street.

Light Pollution/Trespass (Very Important)
Avoid light pollution into the night sky by utilizing cutoff fixtures. This will reduce interference with air traffic and keep the light directly on the building. Spill light should not hit the surfaces surrounding buildings. Fixtures should be kept close to building with medium to narrow distribution.

Point(s) of Interest (Important)
The text across the front of the facade should be emphasized. The ceramic rod design should also be displayed as a highlight of the structure. To emphasize the height of the structure, the entire facade should be illuminated. The spire at the top of the building should also receive illuminance, creating the effect of a structure disappearing into the sky. To promote direction, the main lobby should be clearly visible from the street with luminaires accenting the entry.

Shadows (Important)
Shadows should be present across the building facade to create a visually interesting structure. The building should have dark and light areas to create depth and detail and promote the unique design.

Source/Task/Eye Geometry (Important)
The expansive curtain wall requires that luminaires are not placed too close or aimed directly at the glass. This can prevent irritation to individuals inside the building. Persons walking along the sidewalk or in vehicles should also be taken into consideration. Luminaires should not provide any disturbances to these individuals.

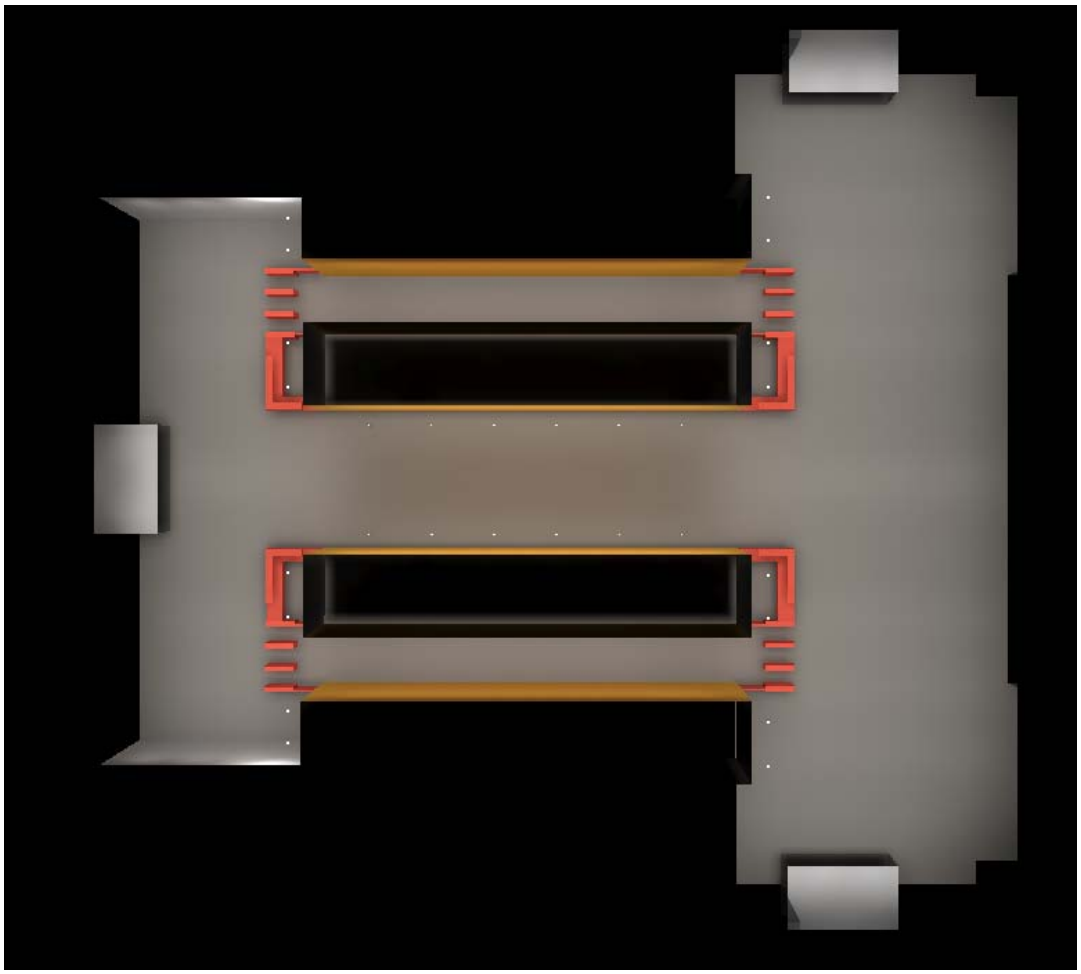
Sparkle/Desirable Reflected Highlights (Somewhat Important)
The interior spaces can provide sparkle and highlight. The different colors of the interior should be visible from the street. The floodlighting across the facade can also cause reflections from parts of the building structure and create a changing visual display.

Surface Characteristics (Important)
The ceramic rods will reflect the light very well. The steel structure of the building will reflect less light and create an interesting contrast. The interior spaces should also provide additional detail to the exterior view.

Maintenance
Luminaires should not be easily accessed by individuals in the street or along the sidewalk. The chosen fixtures and lamps should have a long life to reduce required upkeep. The fixtures should also be rated to withstand the varying weather conditions in New York, NY. Fixtures should also have easy relamping capabilities.

AGI32 Analysis

Lobby



The lobby was analyzed using AGI32 to determine if the design met IESNA and ASHRAE standards. Since the reflected ceiling plan was the only information attained for the project, several assumptions needed to be made. The drawing revealed six different luminaires used throughout the space (See Figure 14: Lobby Reflected Ceiling Plan). These consisted of three separate downlights (L3, L5, L6), two sets of similar wall mounted uplights (L1, L2), and one wallwasher (L4). All luminaires were known to be supplied by ERCO; however, no schedules or specifications were provided. Each luminaire was selected by referencing pictures and deciding which fixture and lamp combination would provide the best results.

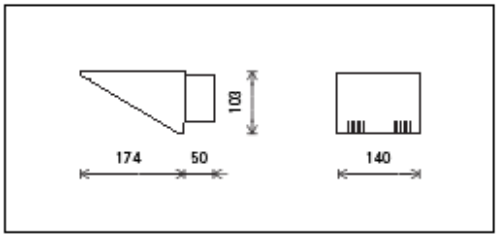
The final decision was to use five separate luminaires. A 20W metal halide downlight was selected for L3 and L5. This satisfied the need for a high lumen output with low energy consumption. These specific luminaires were located in the open areas of the lobby which was surrounded by a glass curtain wall. The metal halide lamps provided light that could blend with the incoming daylight and compliment the off-white color of the floor and ceiling. To accommodate the warm colors of the interior hallways, the remaining luminaires utilized tungsten halogen lamps. L6 was designated as a 100W downlight with L4 being the wallwash version of the same luminaire. L1 and L2 were designated as identical uplight luminaires with varying wattages of 150W and 230W respectively.

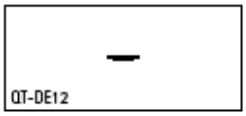
L-1

ERCO

Trion Uplight

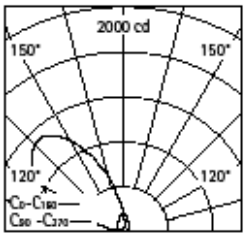
for tungsten halogen lamps





33440.000 White (RAL9002)
QT-DE12 150W 230V R7s L75mm
2550lm

Product description
Housing: cast aluminium, powder-coated. Wall plate: cast aluminium, plastic.
2-pole terminal block.
Reflector: aluminium, silver anodised. Towards the wall: adjustable cut-off shield.
Cover frame: cast aluminium, black powder-coated. Safety glass.
With max. wattage, the safety distance to the surface above must not be less than 0.4m.
Weight 1.20kg



QT-DE12 150W 230V R7s L75mm
2550lm

LOR 0.44
DLOR 0.00
ULOR 0.44

ERCO GmbH
Postfach 2460
58505 Lüdenscheid
Germany
Tel.: +49 2351 551 0
Fax: +49 2351 551 300
info@erco.com

Technical Region: 230V/50Hz
We reserve the right to make technical and design changes.
Edition: 05.12.2008
Please download the current version from
www.erco.com/33440.000

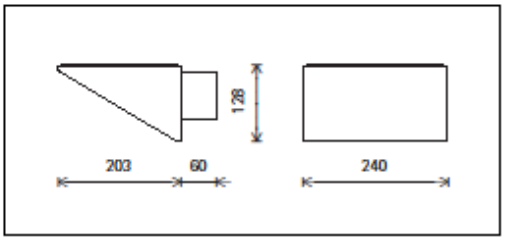
1/3

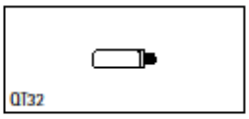
L-2

ERCO

Trion Ceiling washlight

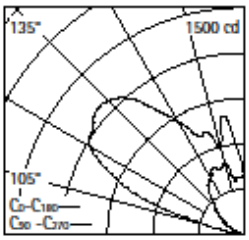
for tungsten halogen lamps





33499.000 White (RAL9002)
QT32 230W/c 230V E27 4350lm

Product description
Housing and wall plate: cast aluminium, powder-coated.
2-pole terminal block.
Reflector: aluminium, silver anodised.
2 cut-off shields: metal, black powder-coated.
With max. wattage, the safety distance to the surface above must not be less than 0.4m.
Weight 1.85kg



QT32 230W/c 230V E27 4350lm

ERCO GmbH
Postfach 2460
58505 Lüdenscheid
Germany
Tel.: +49 2351 551 0
Fax: +49 2351 551 300
info@erco.com

Technical Region: 230V/50Hz
We reserve the right to make technical and design changes.
Edition: 05.12.2008
Please download the current version from
www.erco.com/33499.000

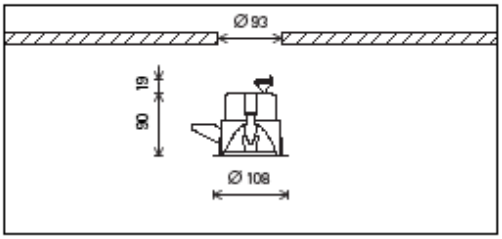
1/3

L-3 and L-5

ERCO

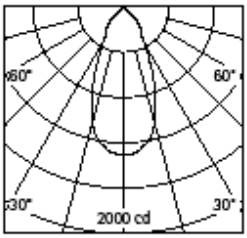
Compact HIT Downlight

for metal halide lamps



83266.000 Reflector silver
HIT-TC-CE 20W PGJ5 1650lm

Product description
Size 3
Housing and mounting ring: plastic, white (RAL9002), with fixing springs for ceiling thickness up to 25mm.
Connection cable with plug, L 500mm.
Spherolit reflector, wide-flood: aluminium, silver, mirror-finish anodised. Cut-off angle 30°. Anti-dazzle cap: aluminium, silver anodised, mirror-finish, fixed to non-reflecting safety glass.
Control gear to be ordered separately.
Weight 0.29kg



HIT-TC-CE 20W PGJ5 1650lm

LOR 0.56
UGR 19.0
75° < 200 cd/m²

ERCO GmbH
Postfach 2460
58505 Lüdenscheid
Germany
Tel.: +49 2351 551 0
Fax: +49 2351 551 300
info@erco.com

Technical Region: 230V/50Hz
We reserve the right to make technical and design changes.
Edition: 05.12.2008
Please download the current version from
www.erco.com/83266.000

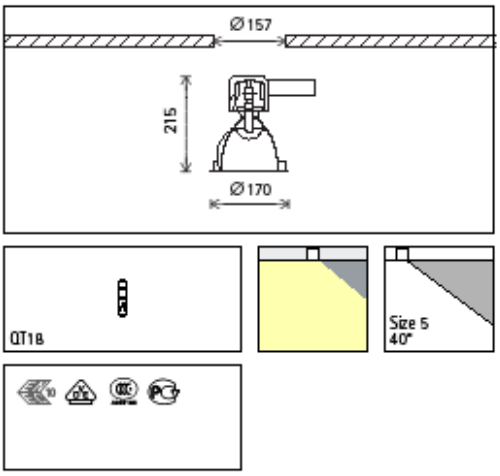
1/3

L-4

ERCO

Lightcast Washlight

for tungsten halogen lamps



81631.000 Reflector silver
QT18 100W/c 230V B15d L86mm
1500lm

Product description
Housing: cast aluminium, designed as heat sink.
Mounting ring: cast aluminium, white (RAL9002) powder-coated.
Fitting without tools with 4-point support and screw fixing, for ceiling thicknesses of 1-30mm.
Junction box for through-wiring, 5-pole terminal block, integrated cable clamp.
Darklight reflector: aluminium, bright anodised. Cut-off angle 40°.
Diffuser as lamp cover: glass, frosted.
Weight 1.00kg

ERCO GmbH
Postfach 2460
58505 Lüdenscheid
Germany
Tel.: +49 2351 551 0
Fax: +49 2351 551 300
info@erco.com

Technical Region: 230V/50Hz
We reserve the right to make technical and design changes.
Edition: 05.12.2008
Please download the current version from
www.erco.com/81631.000

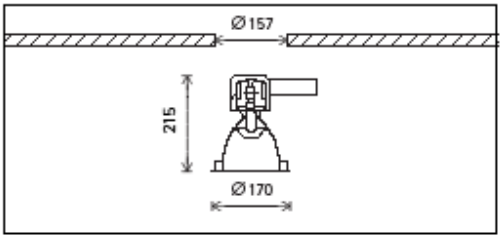
1/3

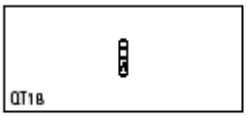
L-6

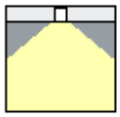
ERCO

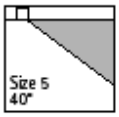
Lightcast Downlight

for tungsten halogen lamps









81630.000 Reflector silver
QT18 100W/c 230V B15d L86mm
1500lm

Product description
Housing: cast aluminium, designed as heat sink.
Mounting ring: cast aluminium, white (RAL9002) powder-coated.
Fitting without tools with 4-point support and screw fixing, for ceiling thicknesses of 1-30mm.
Junction box for through-wiring, 5-pole terminal block, integrated cable clamp.
Darklight reflector: aluminium, bright anodised. Cut-off angle 40°.
Diffuser as lamp cover: glass, frosted.
A wide light distribution is possible by adjusting the lampholder position on-site.
Weight 1.00kg

ERCO GmbH
Postfach 2460
58505 Lüdenscheid
Germany
Tel.: +49 2351 551 0
Fax: +49 2351 551 300
info@erco.com

Technical Region: 230V/50Hz
We reserve the right to make technical and design changes.
Edition: 05.12.2008
Please download the current version from
www.erco.com/81630.000

1/4

AGI 32 Design Conditions for the Lobby

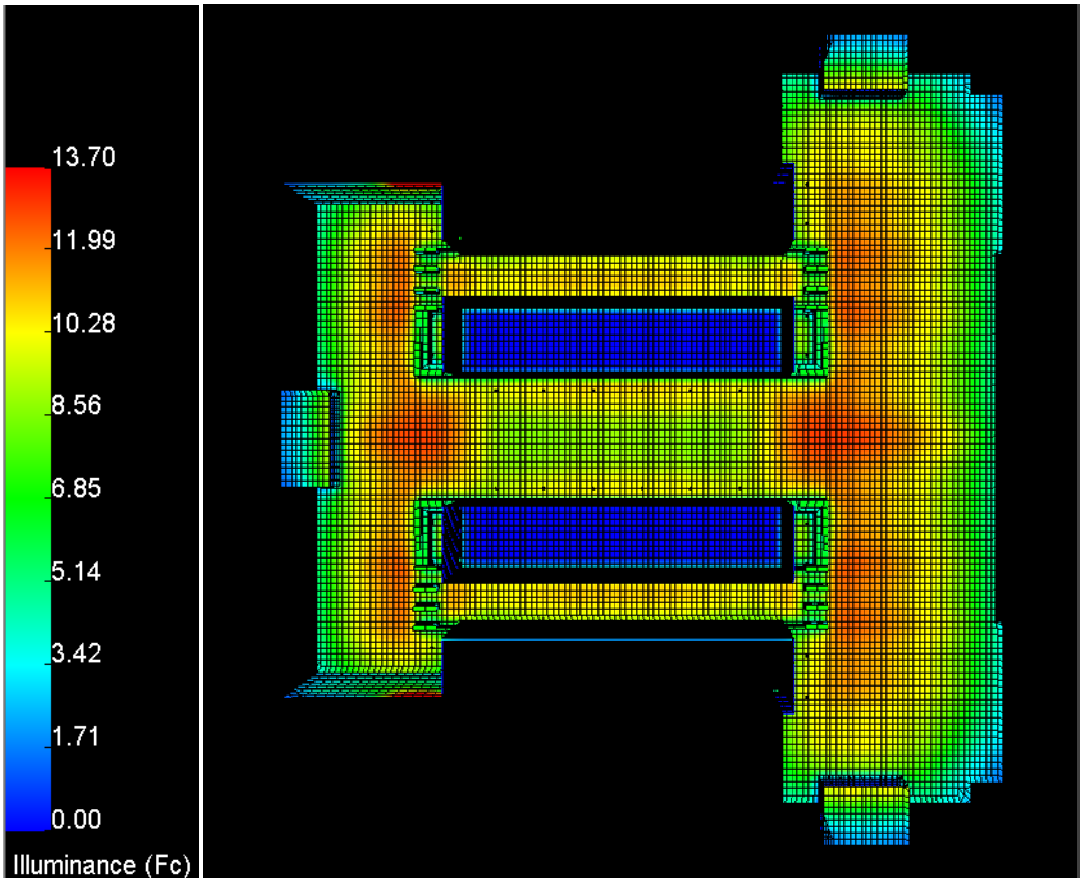
- 10 x 10 Calculation Grid - located on floor
- Patch and Mesh Data

Light Loss Factors

12 Month Cycle and Clean Environment

Type	Lamp	Mean Lumens	BF	LDD		RSDD	Total LLF
L1	Tungsten Halogen	2550	1.0	Category VI	0.85	0.925(i)	0.79
L2	Tungsten Halogen	4350	1.0	Category VI	0.85	0.925(i)	0.79
L3 & L5	Metal Halide	1650	1.0	Category I	0.92	0.95(ii)	0.87
L4	Tungsten Halogen	1500	1.0	Category I	0.92	0.925(i)	0.85
L6	Tungsten Halogen	1500	1.0	Category I	0.92	0.925(i)	0.85

i - RCR = 5.6
ii - RCR = 2.2

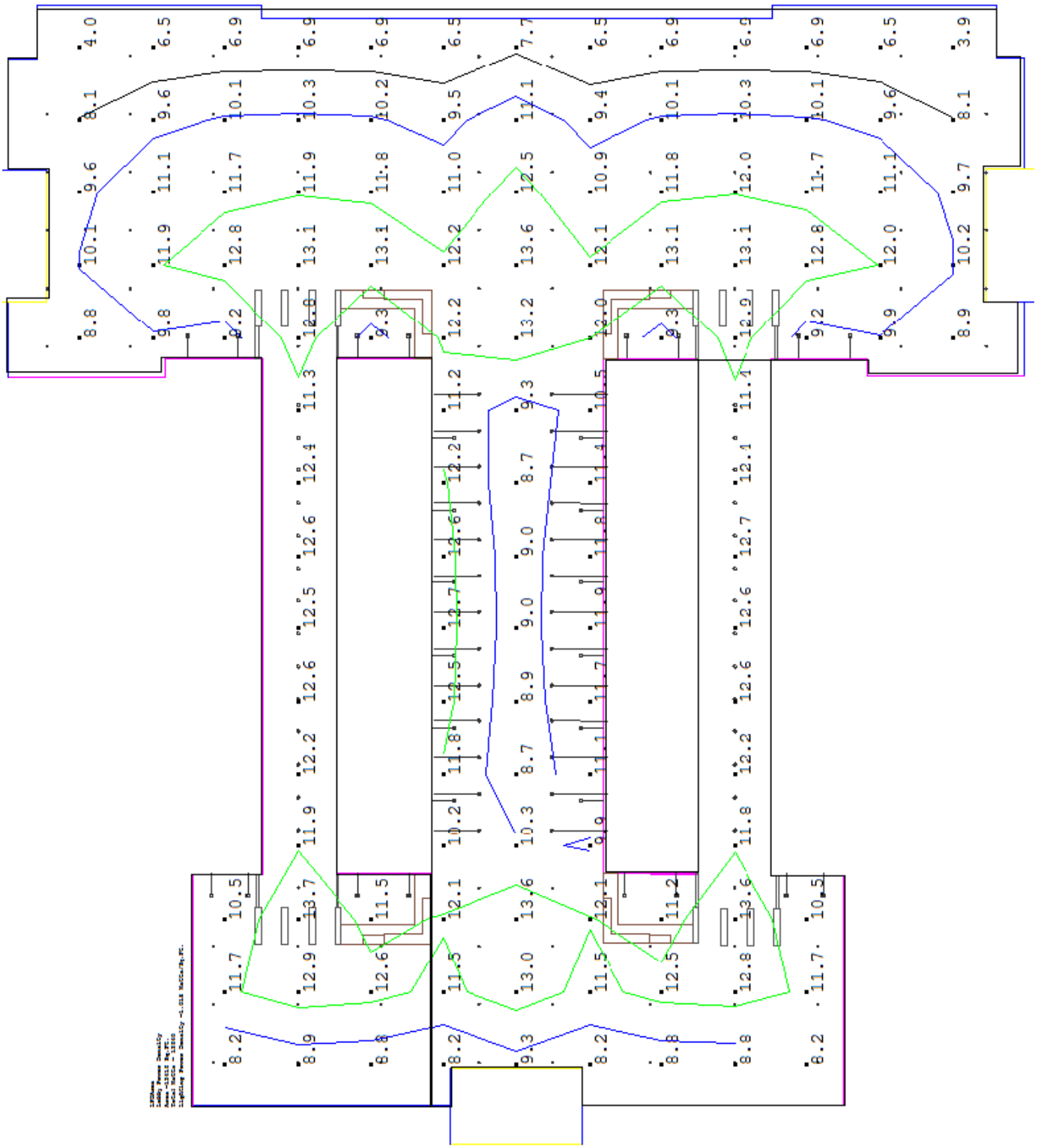


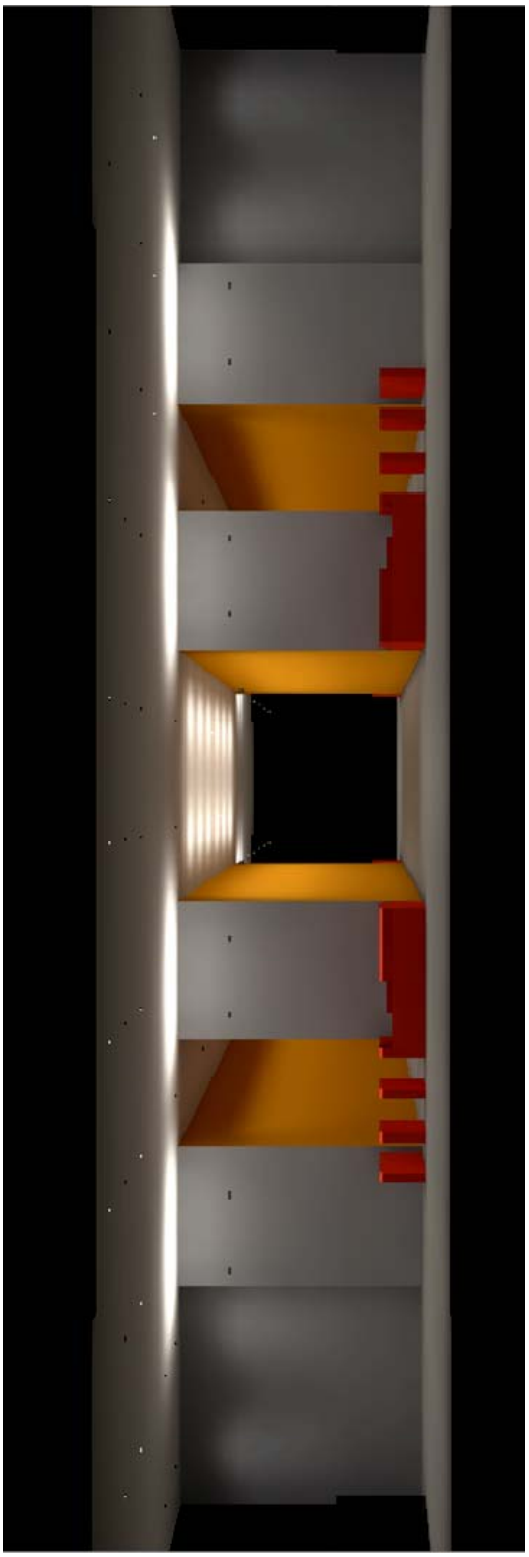
Evaluation of AGI 32 Model

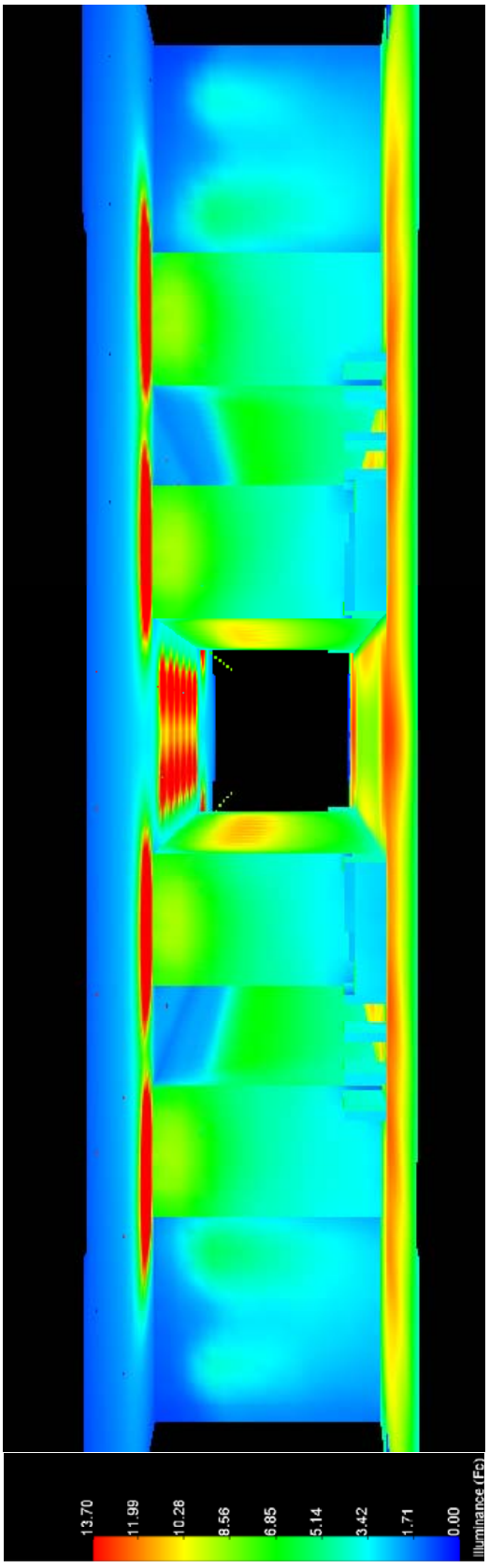
The results of the AGI analysis show that the assumed design meets IESNA standards. The average illuminance across the floor is 10.61fc. The maximum value is 13.7fc with a minimum of 3.9fc. Even though the appropriate illuminance average is met, the resulting design does express flaws. The edges of the space experience a severe drop in illuminance. One explanation for this could be the fact that the lighting design continues through the space on the east side. This portion of the Lobby extends into the podium section of the building along with the lighting system. If this portion of the lobby was added into the analysis, the illuminance in the east lobby space would increase to acceptable levels.

The AGI model expresses a result that could be the actual design created by OVI. The design provides guidance while also creating a visually interesting environment. The non-uniform lighting emphasizes the entrances to the elevator hallways. Highlight is provided for the "movable type" feature located on the walls of the center walkway. The design also meets ASHRAE requirements. With a total area of 12416SqFt, the space uses a total of 12640W. This results in a power distribution of 1.018W/SqFt., which is 0.2823W/SqFt. less than the recommended 1.3W/SqFt. This solution provides a lighting system that is consistent with the theme of energy efficiency expressed throughout the building. The luminaires chosen provide a design that compliments the interior surfaces while being practical and efficient.

AGI 32 Calculation Grid



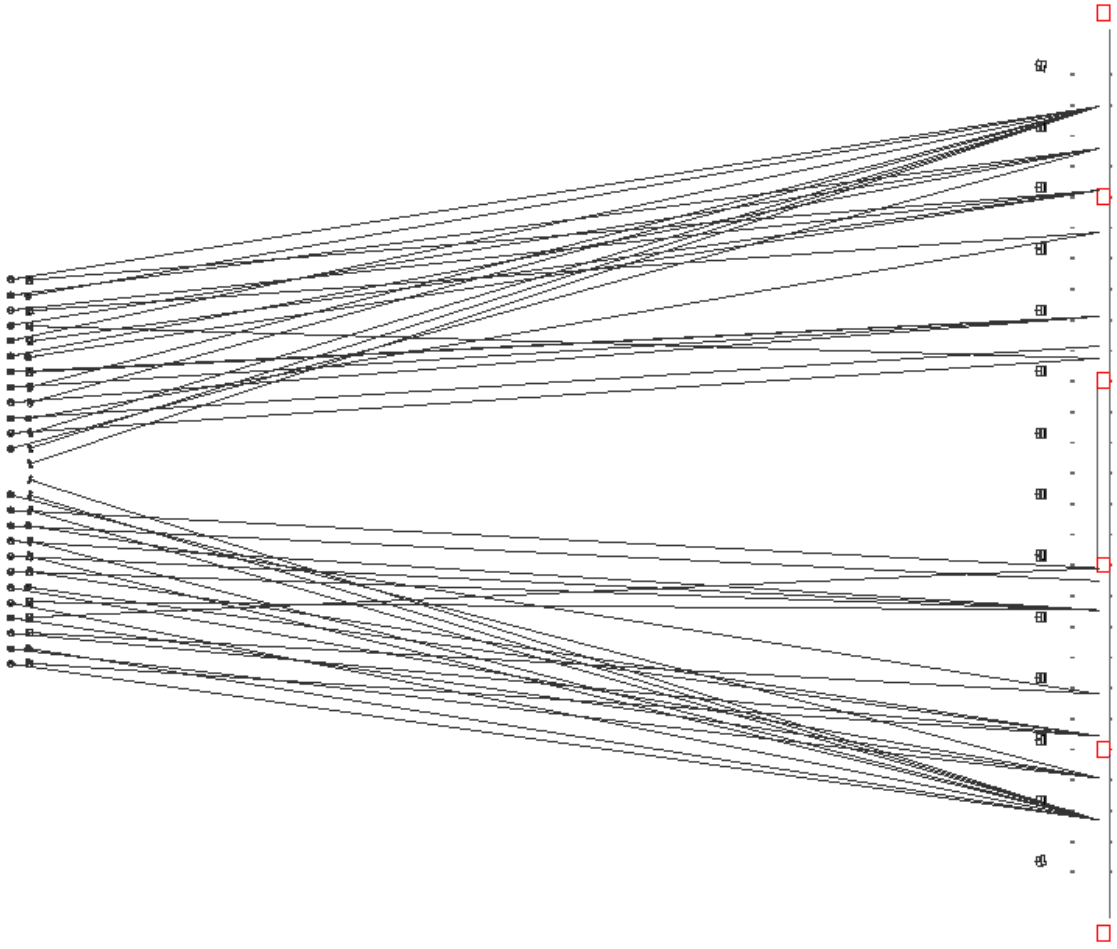



13.70
11.99
10.28
8.56
6.85
5.14
3.42
1.71
0.00
Illuminance (Fc)

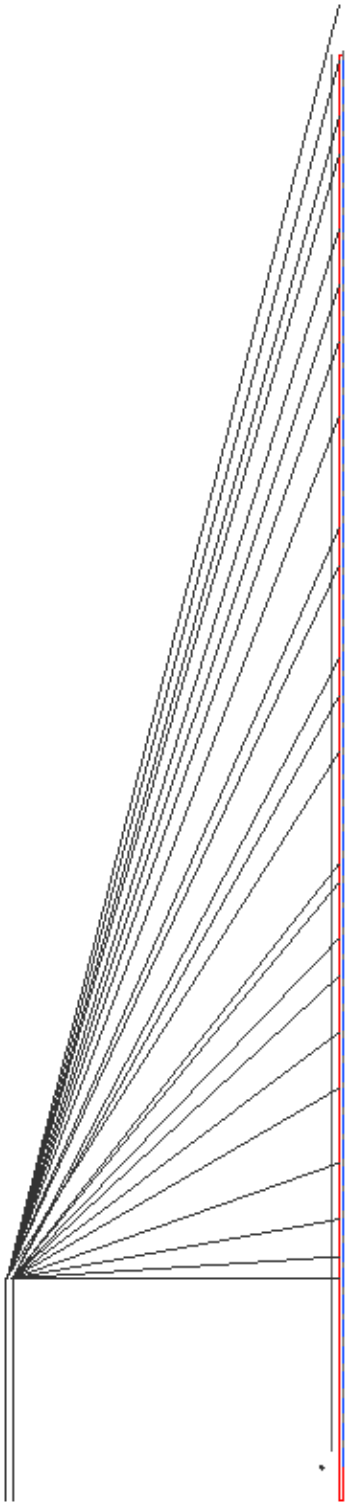
Façade

The facade was analyzed using AGI32 to determine if the design met IESNA and ASHRAE standards (see Figure 4: Exterior West Façade Elevation, Figure 8: Exterior Facade from atop the Port Authority). Since the fixture location was the only obtainable information, several assumptions needed to be made. The fixtures were not specified in any of the drawings obtained by the BIM group. In addition to this, AGI files were obtained with IES files integral to the model. All luminaires were known to be supplied by ERCO. Some initial issues were in regards to Light Loss Factors (LLF). After discussing the issue with a representative, it was determined that the LLFs were integral to the IES file due to them being custom fixtures. Based on this information, the LLFs were left alone in the simulation.

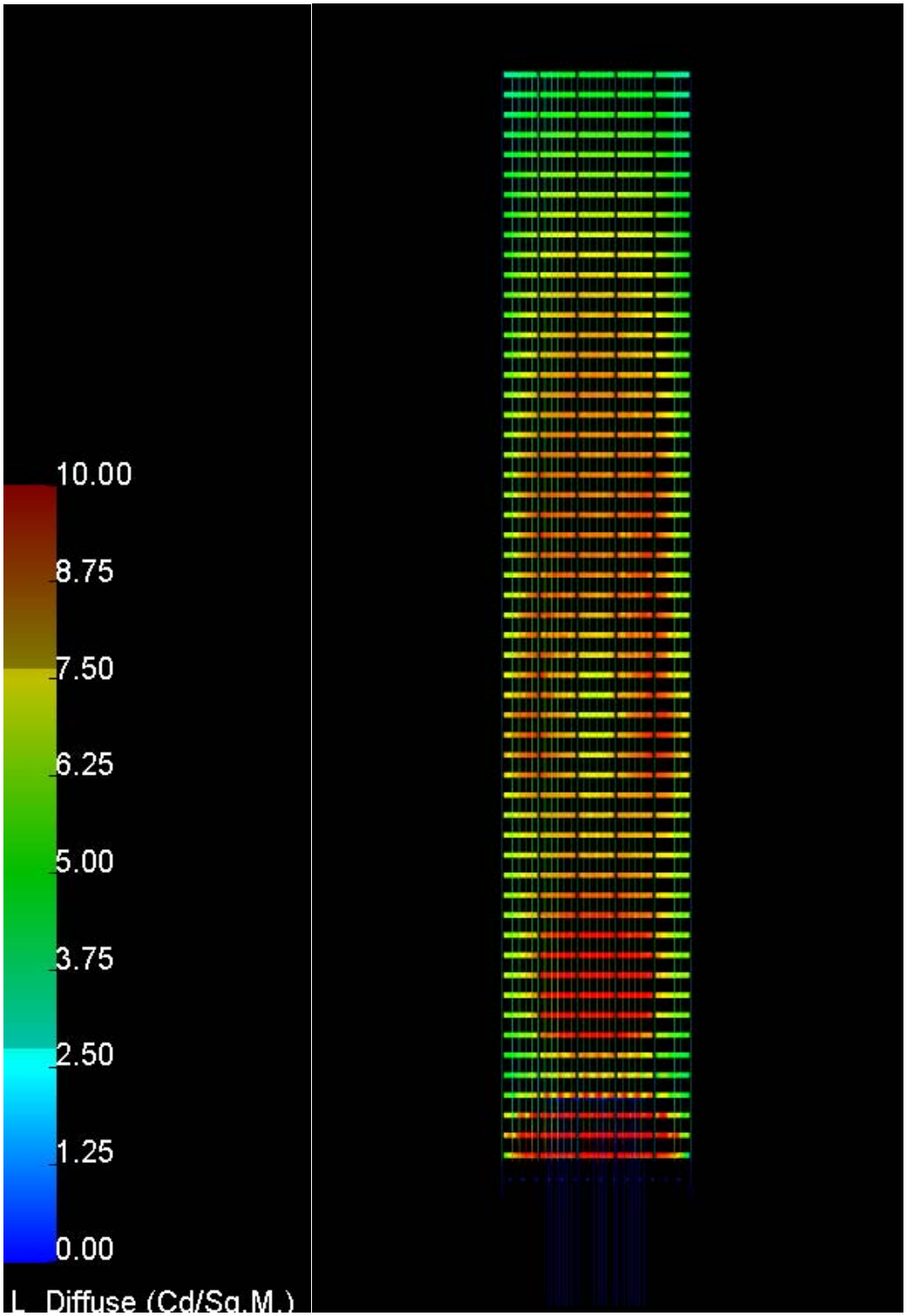
For the purpose of academics, the LLFs that are important to the design of the façade are Luminaire Dirt Depreciation, Room Surface Dirt Depreciation, Ballast Factor and Lamp Lumen Depreciation.



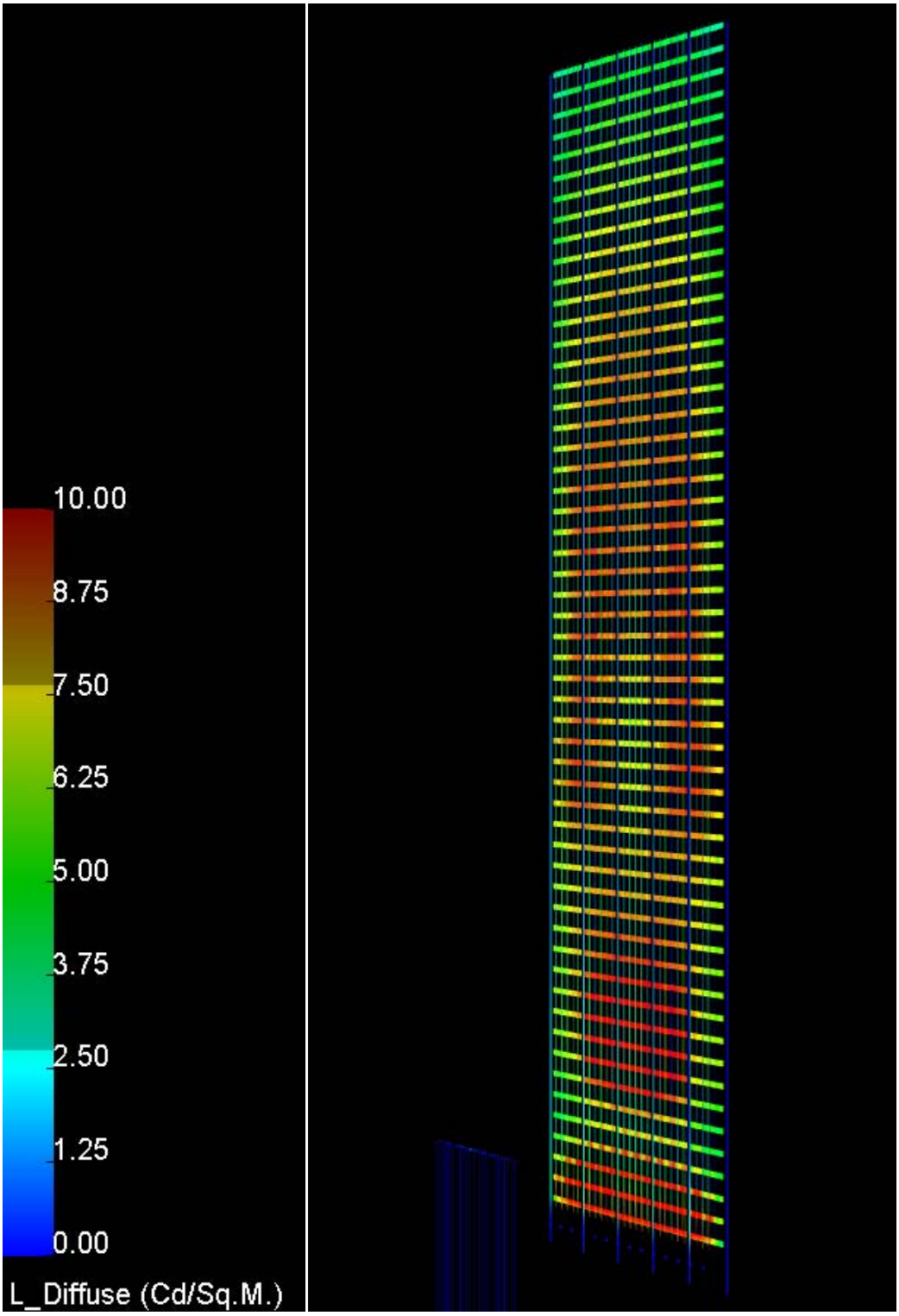
View of the fixture location in plan. Not To Scale



View of the fixture location in section. Not To Scale



Elevation view of the façade with luminance in pseudo color



Isometric View of the façade with luminance in pseudo color.

Luminaire Schedule

Type	Lamp	Mean Lumens	BF	Wattage	Quantity	Total Wattage
34066 024 Beamer	Metal Halide	20,000	1.0	275	18	4,950
34066 024 + 77493 Beamer	Metal Halide	20,000	1.0	275	12	3,300
34163 024 Focal Flood	Metal Halide	20,000	1.0	275	20	5,500
33821 ParScoop	Metal Halide	6,300	1.0	140	14	1,960
					Total Wattage	15,710

Note: Catalog Cuts can be found in the appendix

Lighting Power Density

The allowable lighting power density is .2 watts per square foot. With an area of 151,285 square feet just for the west façade, that correlates to a total wattage of 30,257 watts allowed. The total wattage used was 15,710 watts. This correlates to .10 watts per square foot. This is a 50% reduction in the power density from the allowable per ASHRAE Standard 90.1.

Calculation Results

Illuminance (fc)	
Average	3.00
Maximum	5.2
Minimum	.7
Average/Minimum	4.29
Maximum/Minimum	7.43

Analysis of AGI32 Model

The model was completed in AutoCAD and imported in AGI32. The Façade was modeled with all of the existing components. The façade includes ceramic rods, glazing, steel, and wall between floors. The model with the rods contained 100,000 surfaces. When the rods were removed, the model contained 27,000 surfaces. Both models were loaded into AGI32, but the simplified model, without the rods, was the only one that worked.

The simulated illuminances differed from those of the design criteria. The criteria stated that the façade shall meet an average of 50 lux (5 fc), while the model calculated an average of 30 lux (3 fc). This difference could be from the category selected. The determined for this report was from the category “Bright Surroundings” with “Medium Light Surface.” When this project was originally designed, a different category could have been chosen.

Works Cited

ASHRAE Standard 90.1-2007. (2007). Atlanta: ASHRAE.

ERCO Lichtbericht. (2008). New York Times Building. (M. Krautter, Ed.) *ERCO Lichtbericht 87* , pp. 6-15.

IESNA LIGHTING HANDBOOK, Ninth Edition. (2000). New York: IESNA.