The AstroPower Headquarters Newark, Delaware

Steven A. Neimeister

The Pennsylvania State University

Architectural Engineering Senior Thesis Presentation

13 April 2004

Presentation Outline

- Building Information
- Lighting Design
  - Design Concept
  - Conference Room
  - Lunch Room
- Telecommunications Design
- Conclusions

Presentation Outline

Omitted from Presentation:

Lighting Design
- Lobby Atrium
- Open Office Area
- Front Entranceway

Electrical Design

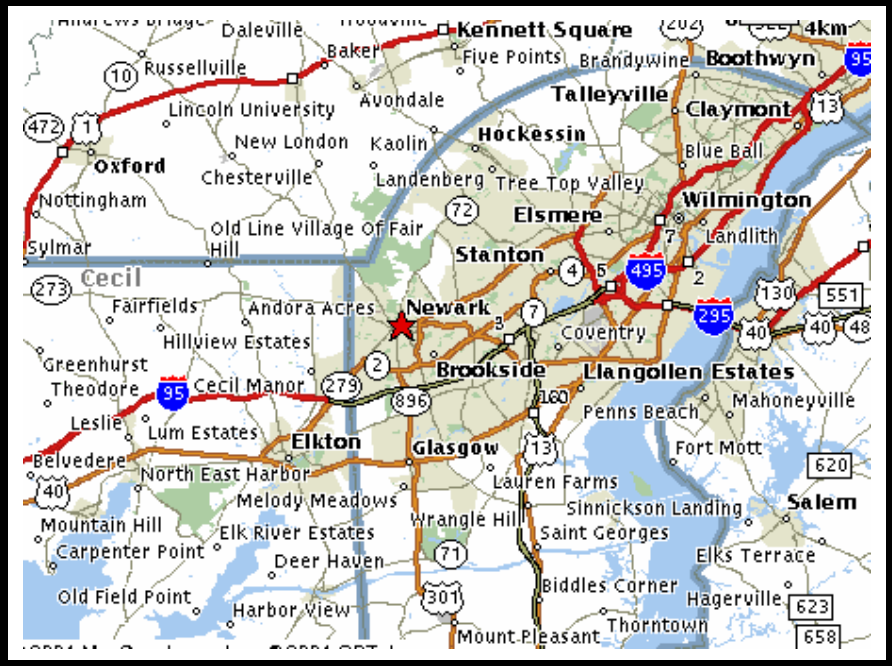
LEED Building Analysis

Building Information

Building Information

AstroPower is one of the world's fastest-growing solar electric power companies involved in many innovative new solar projects. Their headquarters in Newark, Delaware, was constructed to creatively demonstrate AstroPower's commitment to bringing the benefits of clean renewable energy to the environment.

Building Information



Newark, Delaware is located in the North East region of the United States. Surrounded by major cities such as Wilmington, Philadelphia, Baltimore, Washington D.C., and New York, along with the fact that it lies close to the Chesapeake Bay, the location is optimum for easy accessibility by all clients or customers that would like to visit the Headquarters.

Building Information

Project Team

Architect
Bernardon, Haber, Halloway Architects PC

Owner/Developer
McConnell Development, Inc.

Structural Engineer
O'Donnell, Naccarato, & MacIntosh

Mechanical/Electrical Engineer
Bruce E. Brooks & Associates

Fire Protection
Bear Industries, Inc.

Interior Designer
Bernardon, Haber, Halloway Architects PC

General Contractor
Commonwealth Constructive Company

Design Concept

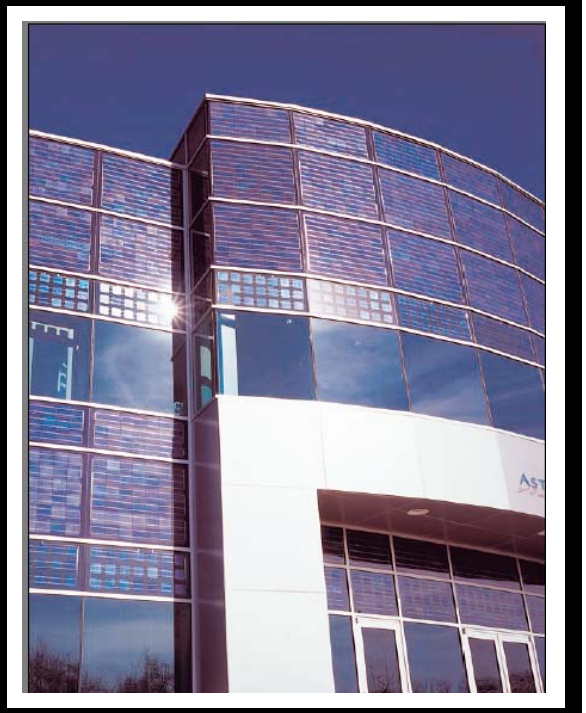
Design Concept

~Building used to manufacture, sell, and represent the solar panels.

~Situated to face the southeast, a Green Design guideline.

~Exterior covered in the blue/green solar panels that are manufactured inside.

~Interior has an abundance of daylight.



Design Concept

Project Design Goals

~To keep the idea of solar panels constant throughout the interior of the building

~To incorporate the color blue to mimic the sky, or natural elements

~Have a new lighting design that works with the building's daylighting influence

~To provide an energy efficient design

~To maintain the same goals in all spaces of redesign

Design Concept

Project Design Criteria

~To satisfy the minimum illuminance levels recommended by the IESNA.

~To maintain lighting power densities at or lower than the required ASHRAE/IESNA Standard 90.1-1999 values.

~To consider glare, illuminance distribution, and color appearance.

Conference Room

Conference Room

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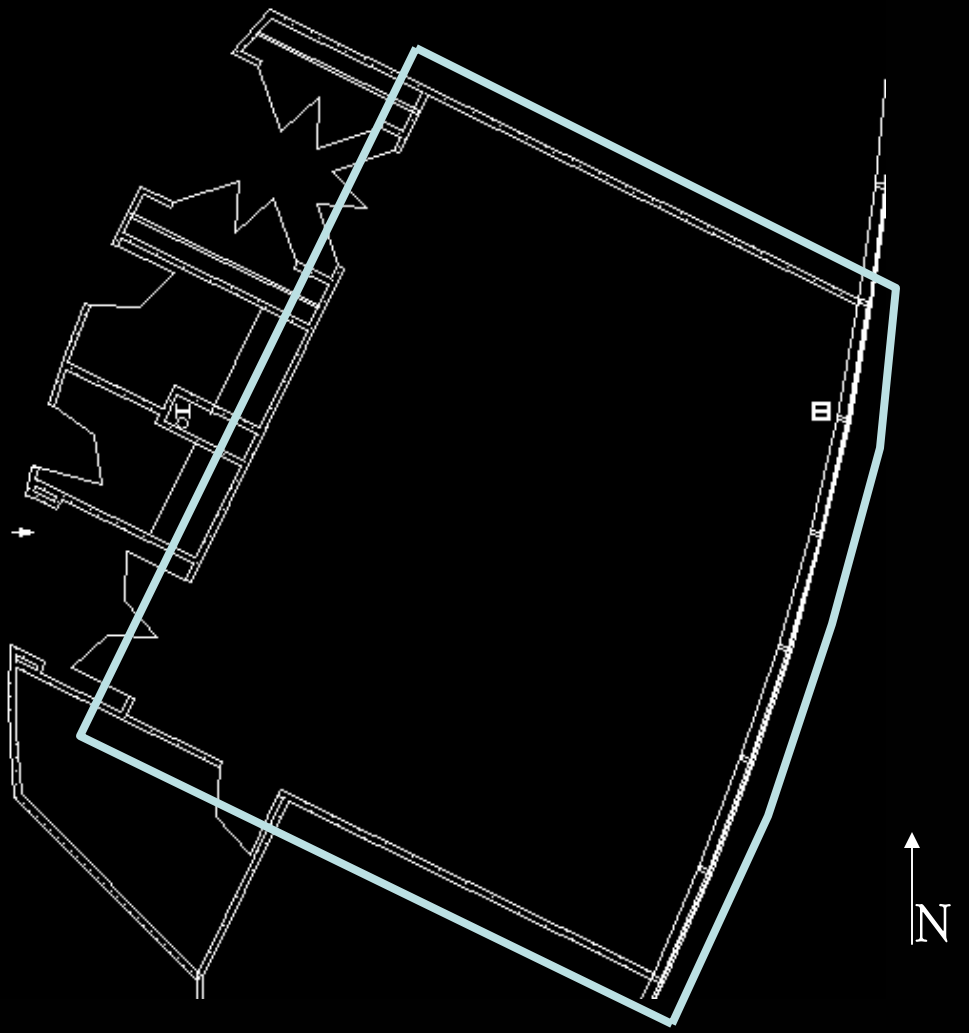

Conference Room

Existing Conditions

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Conference Room

Design Goals

~To accentuate the architectural cove above the table.
~To provide an even wallwash over solar panels hung on the interior walls, with a blue tint.
~To create a visually interesting space.

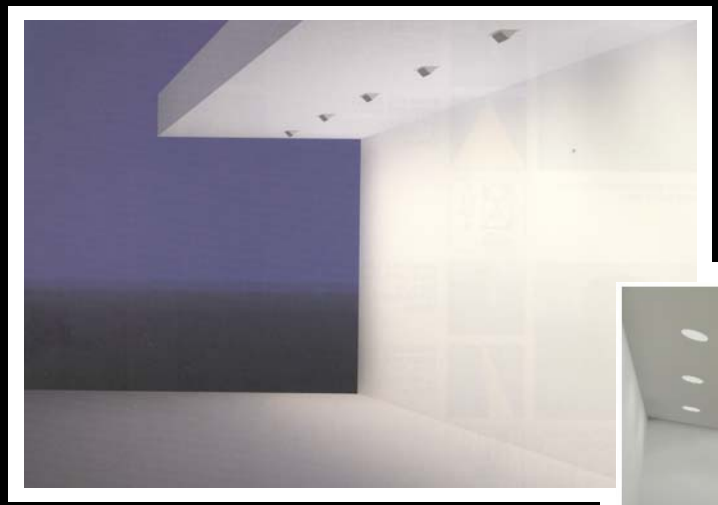
Design Criteria

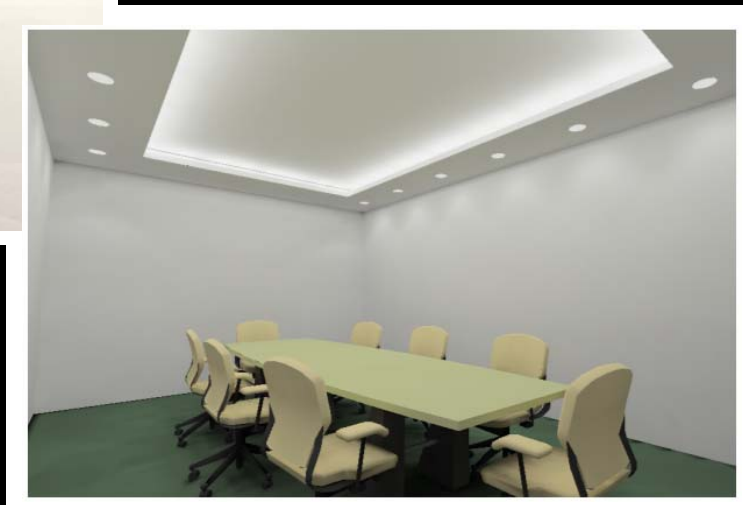
~To have an evenly lit table surface for writing and reading.
~Illuminance values of 50 fc horizontal, 5 fc vertical.
~Power allowance of 1.5 watts/ft^2.
~To allow for flexibility of lighting control system.

Conference Room

Design Concept

~Cove Lighting
~Fluorescent downlights over table surface
~Wallwashers around room perimeter





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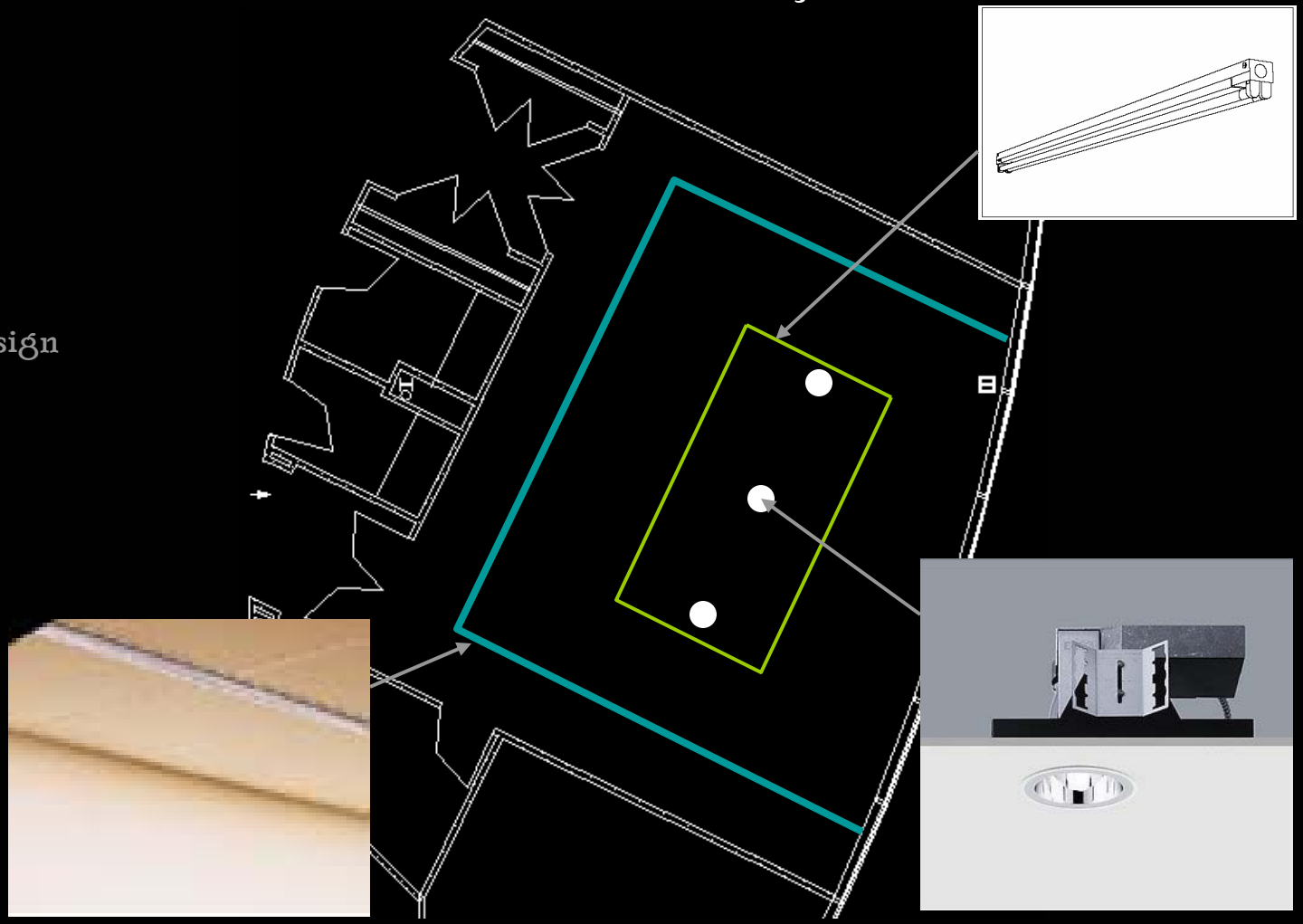
Luminaire Layout



Conference Room

System Controls

A control system will be implemented for three different user controlled settings:

-General Meeting environment

-Audio/Visual Presentation environment

-Midday Meeting environment (for use with high daylight)

Conference Room

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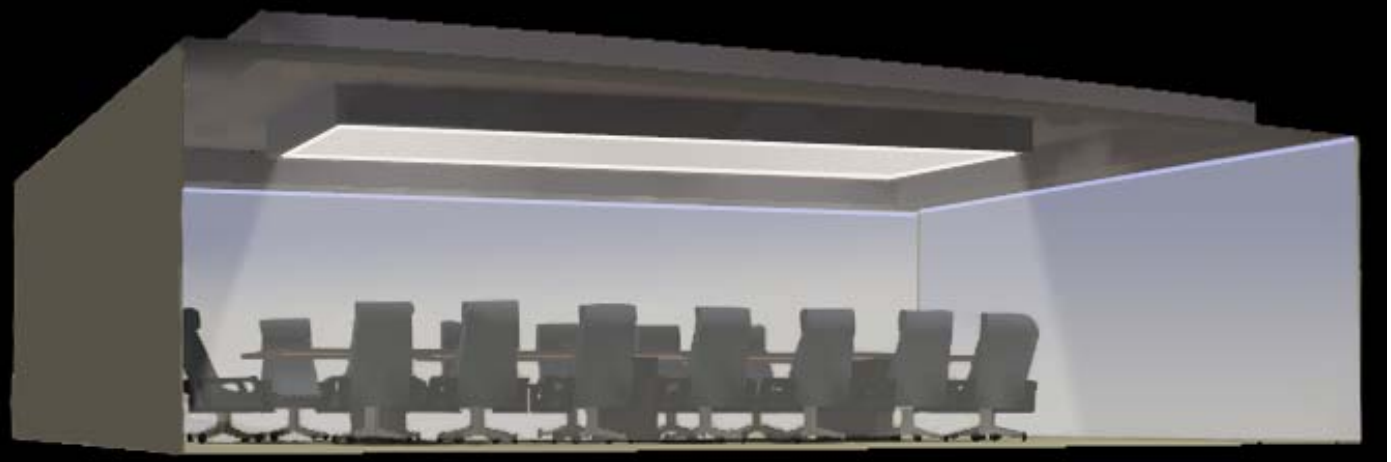
Conference Room



Photoshop rendering of blue tinted wallwashers (solar panels not shown)

Conference Room

Power Analysis

Conference Room Lighting System					
Fixture	Lamp Watts	# of Lamps	Input Watts	# Used	Total Wattage
A	28	1	28	18	504
B	24	2	24	12	288
C	20	1	20	3	60
			Total Wattage (W)		852
			Total Area (ft^2)		648.8
			Power Density (W/ft^2)		1.313

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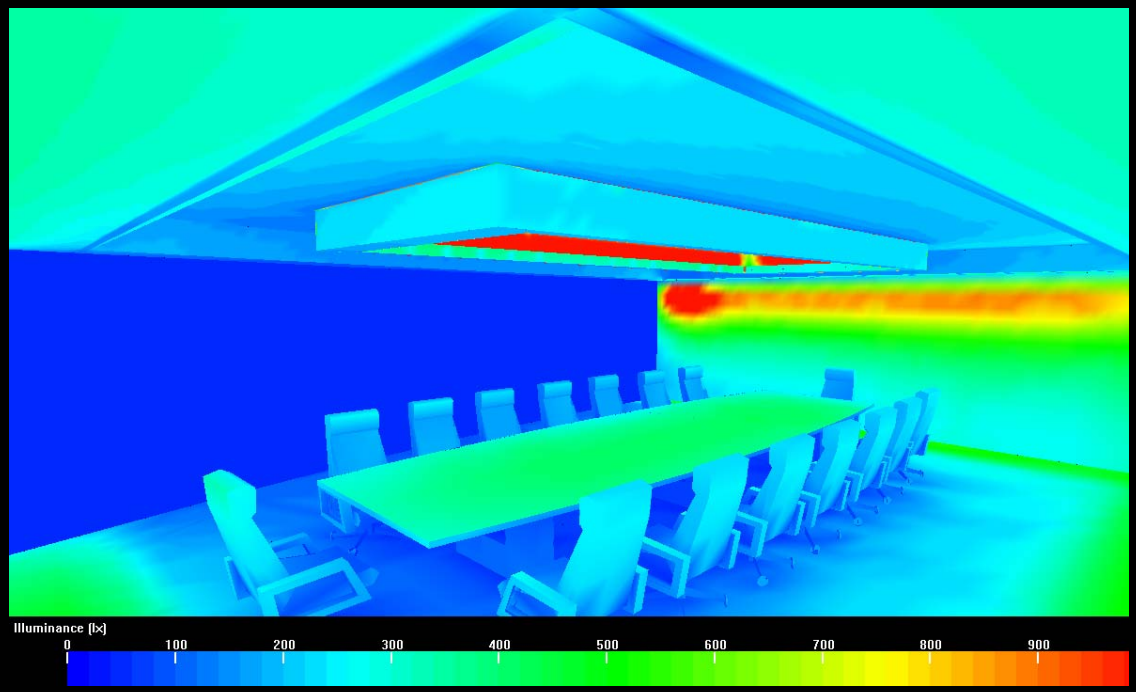
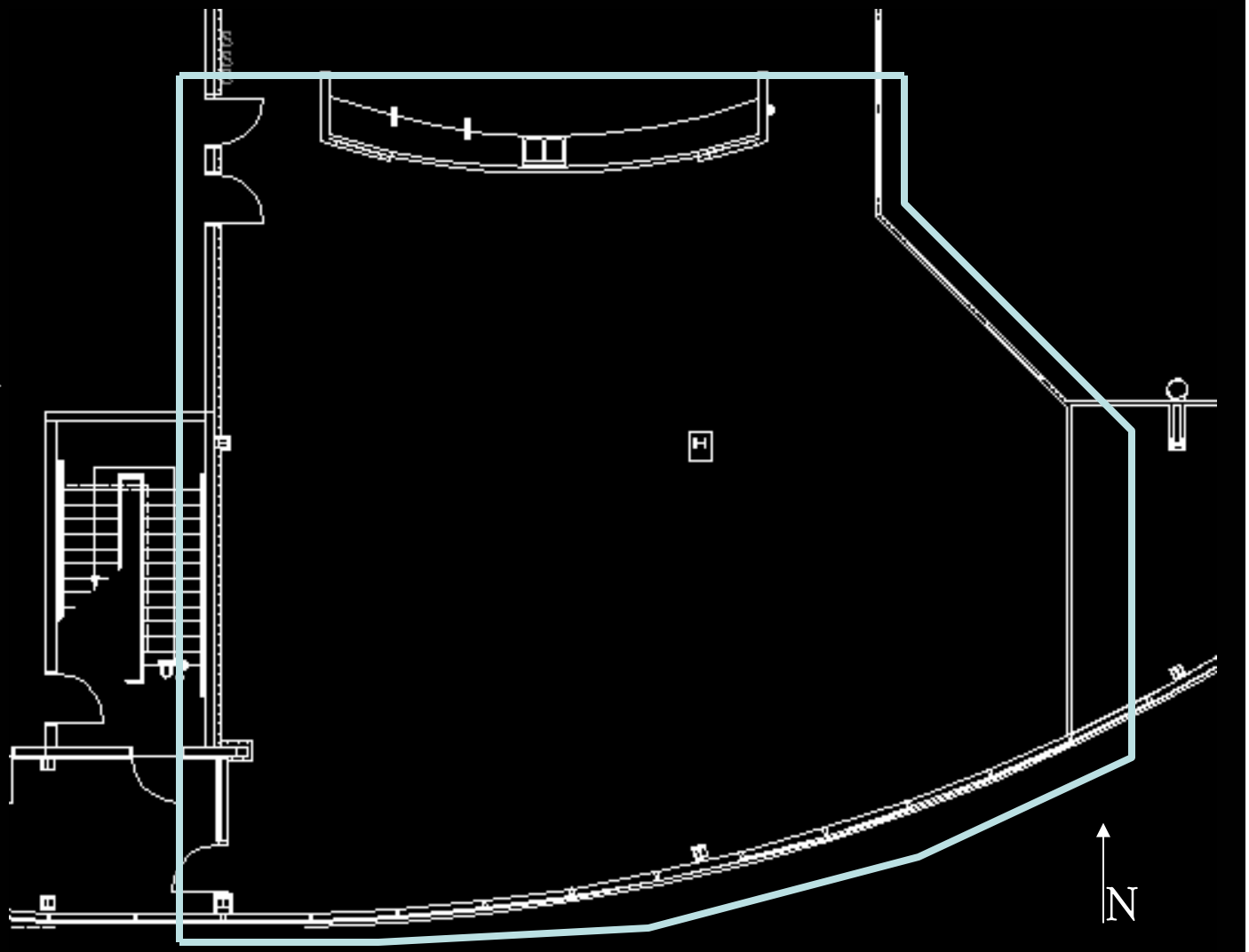
Illuminance Rendering



Lunch Room

Lunch Room



Lunch Room

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Existing Conditions

Lunch Room

Design Goals

~To take advantage of the architectural pieces, such as the curved wall at the north end of the room.
~To provide adequate light over the table surfaces, without too much glare or reflectance on faces.
~To create a visually interesting space by incorporating color to the space.
~To make the space more of a romantic place people would like to gather.

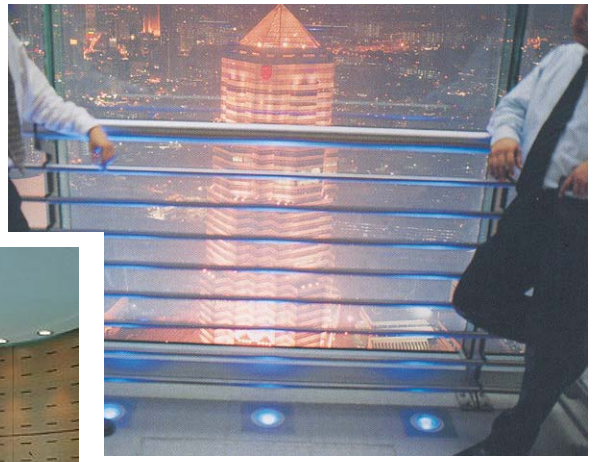
Design Criteria

~To have an adequately lit area for walking as well as ample light on table surfaces.
~Illuminance values of 20~30 fc horizontal.
~Power allowance of 1.4 watts/ft^2
~To allow for flexibility of lighting control system.

Lunch Room

Design Concept

~Wallwashers around the room perimeter
~Blue L.E.D.s around the curved walls and by columns
~Fixed fluorescent pendant downlights on table surfaces



Lunch Room

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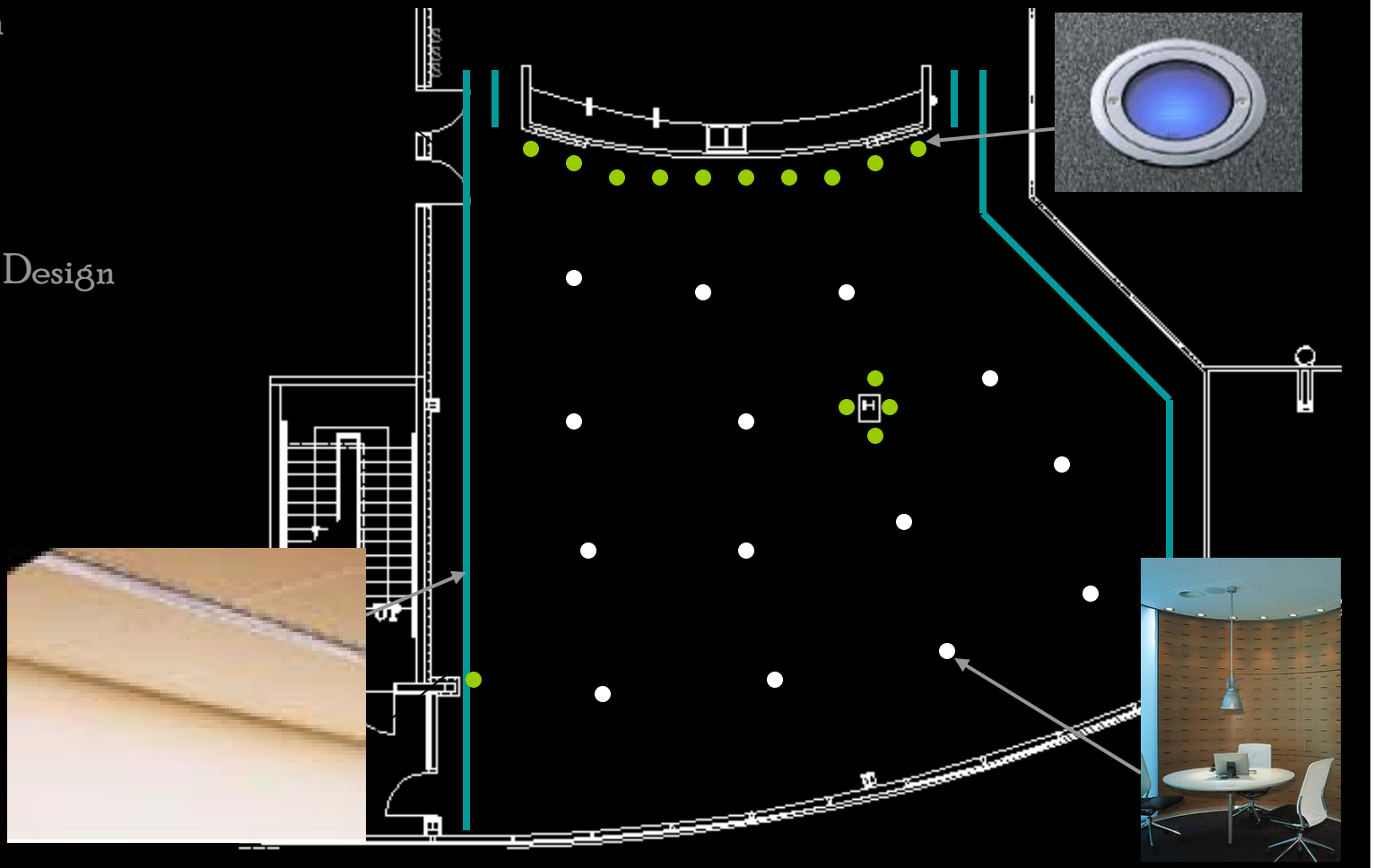
Luminaire Layout



Lunch Room

System Controls

A control system will be implemented for three different user controlled settings:

~Morning/Afternoon Dining (for use with high daylight)

~Evening/Reception Environment (for a more romantic setting with low daylight)

~Unoccupied/Night light

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Lunch Room

Lunch Room

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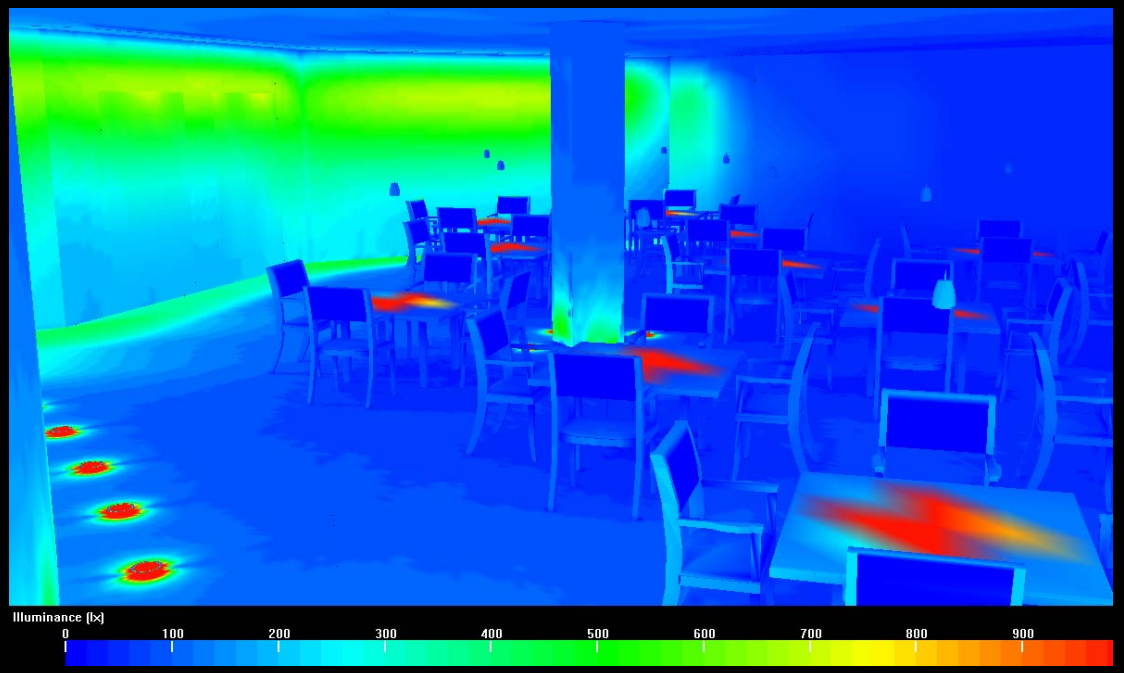
Lunch Room

Power Analysis

Lunch Room Lighting System					
Fixture	Lamp Watts	# of Lamps	Input Watts	# Used	Total Wattage
A	28	1	28	26	728
D	39	1	39	14	546
E	26	1	26	14	364
				Total Wattage (W)	1638
				Total Area (ft^2)	1900
				Power Density (W/ft^2)	0.862

Lunch Room

Illuminance Rendering



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Telecommunications Design

Telecommunications Design

Design Goals

With rapidly changing technology, an up-to-date telecommunications network infrastructure is needed for a company to keep up with their competitors.

Two new telecommunications rooms will be added to the AstroPower Headquarters. Each will be equipped with a data rack and risers to link to the new Cabinets and Equipment in the Second Floor room. Using Category 6 plenum-rated cable, with a copper and multi-mode fiber backbone, a new network will be developed for the AstroPower Office.

Telecommunications Design

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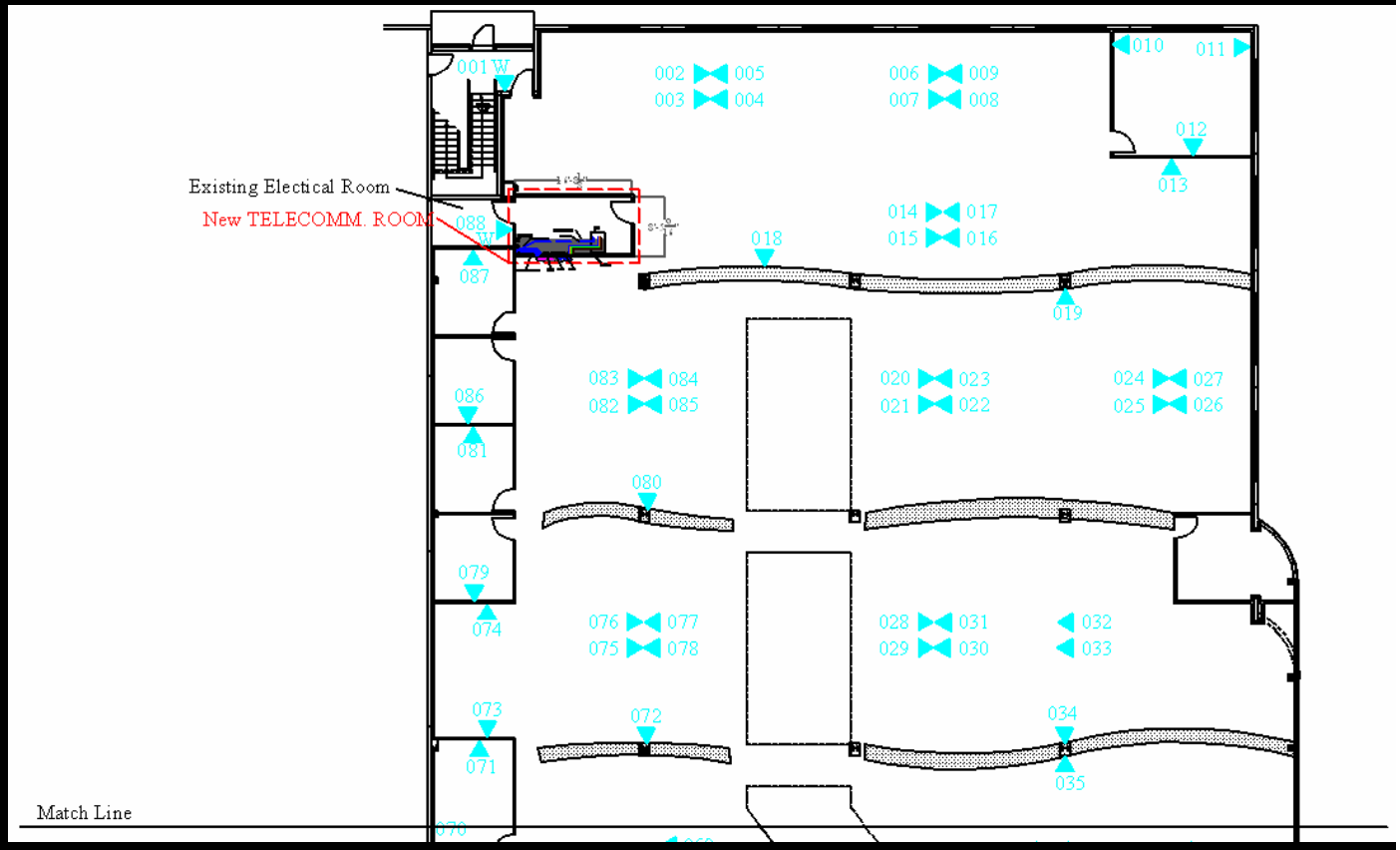
First Floor Plan I – Network Infrastructure



Telecommunications Design

First Floor Plan II – Network Infrastructure

- Building Information
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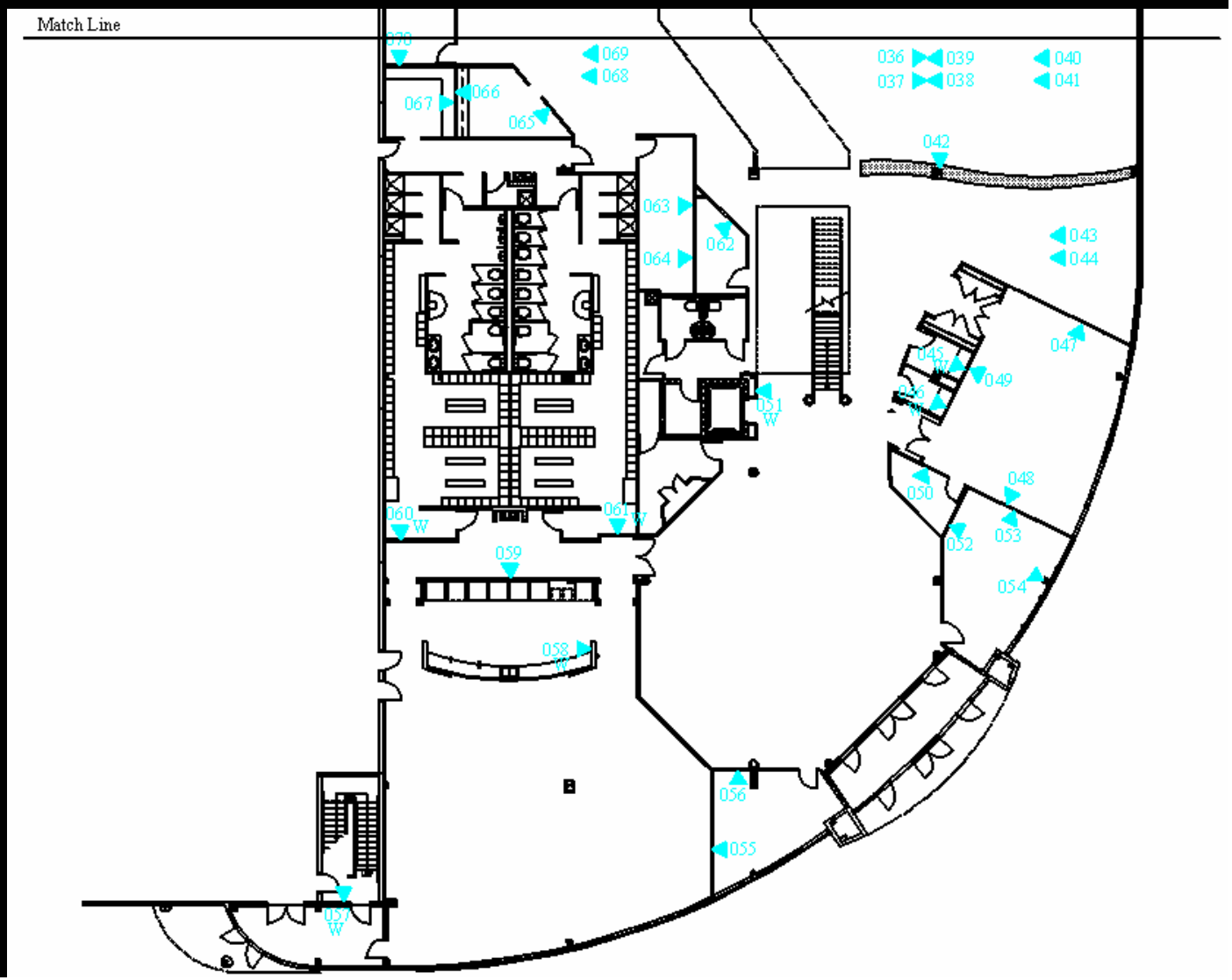

Telecommunications Design

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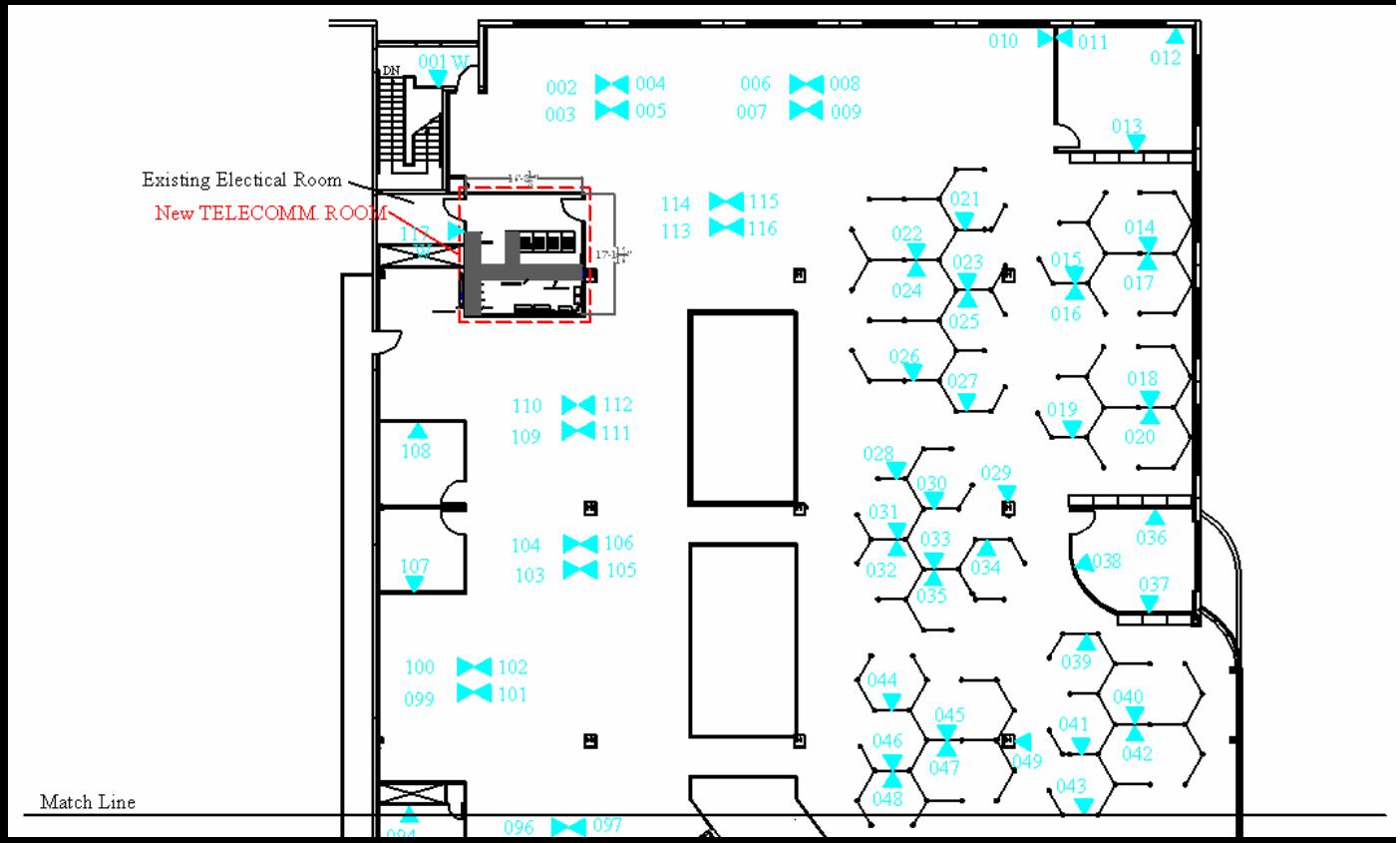
Second Floor Plan I – Network Infrastructure



Telecommunications Design

Second Floor Plan II – Network Infrastructure

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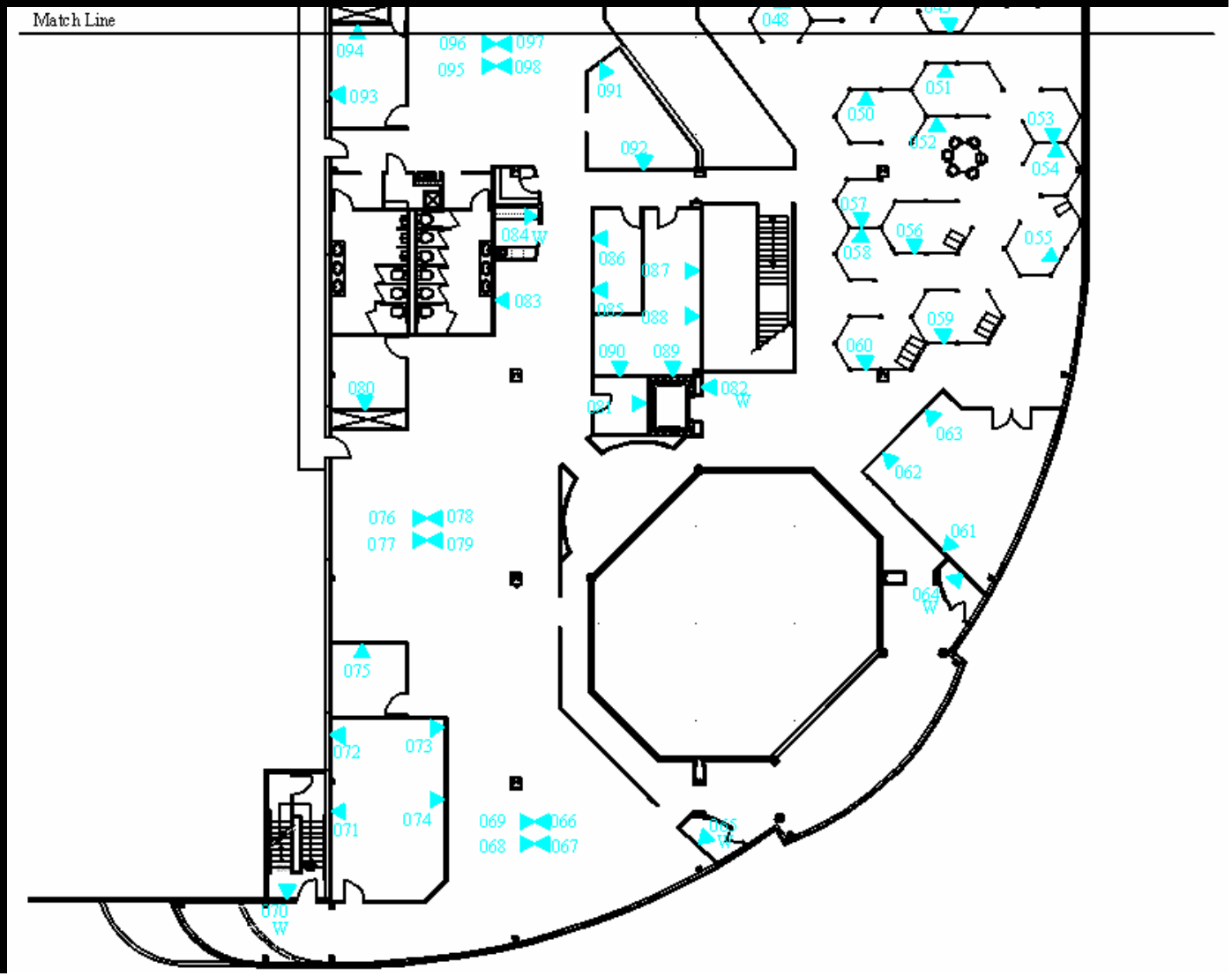

Telecommunications Design

First Floor Telecommunications Closet Plan

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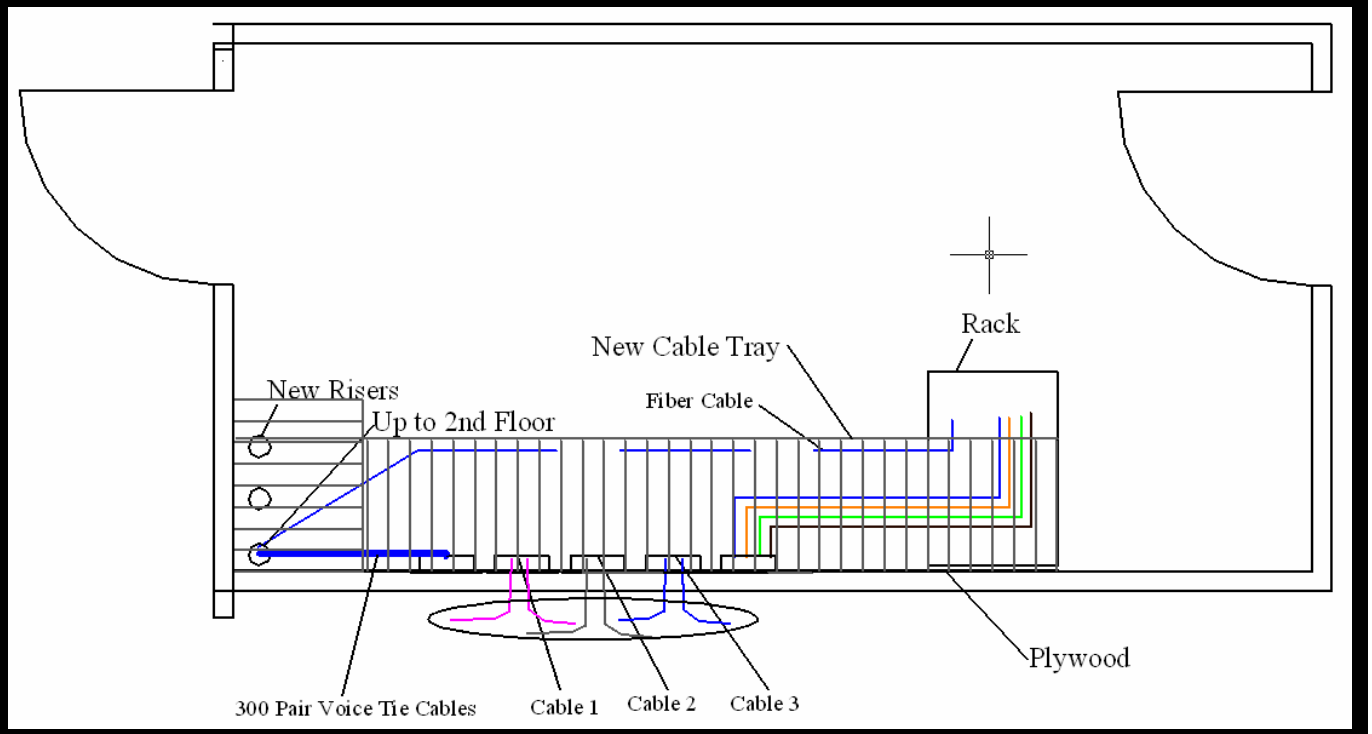

Telecommunications Design

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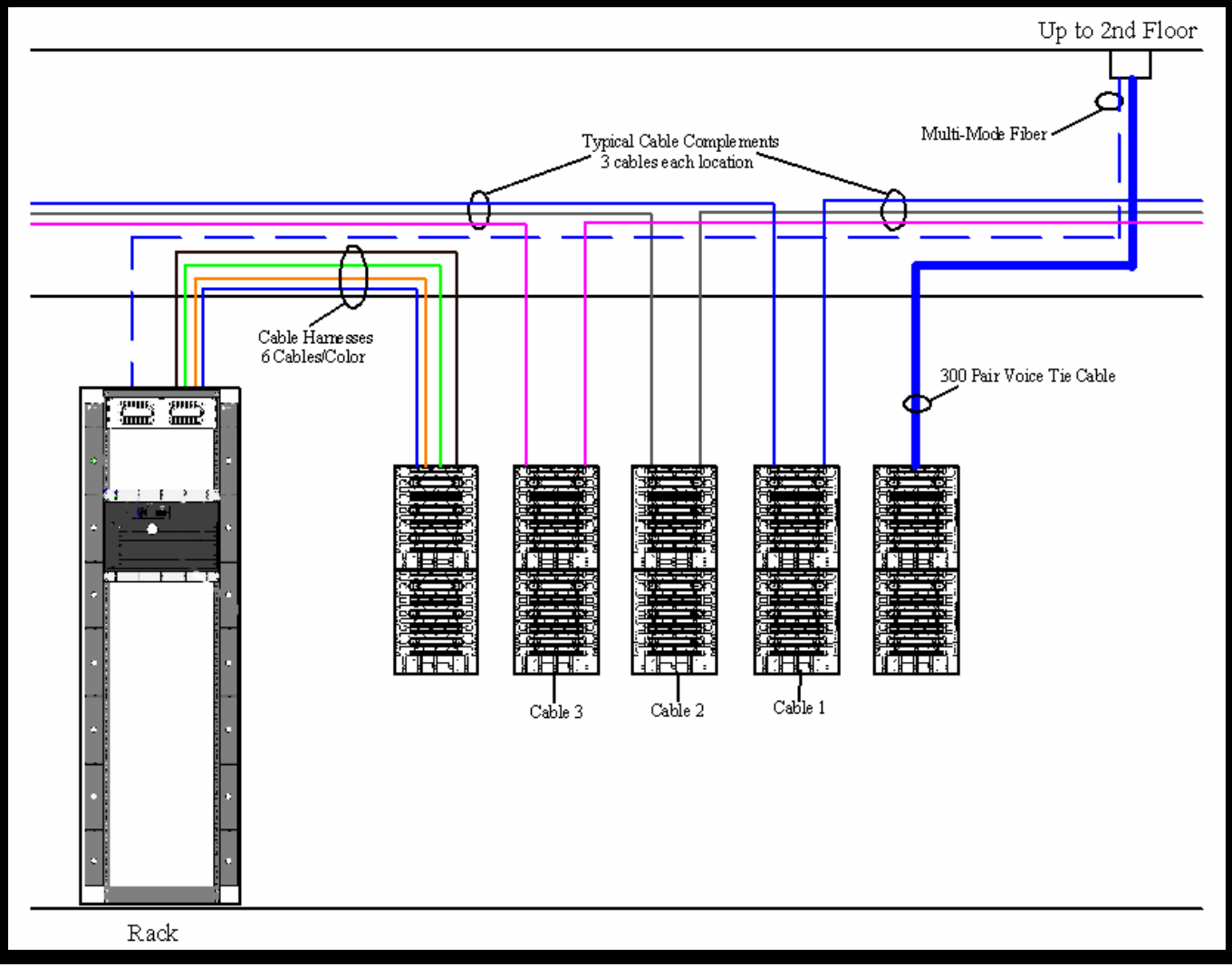
First Floor Telecommunications Closet Elevation



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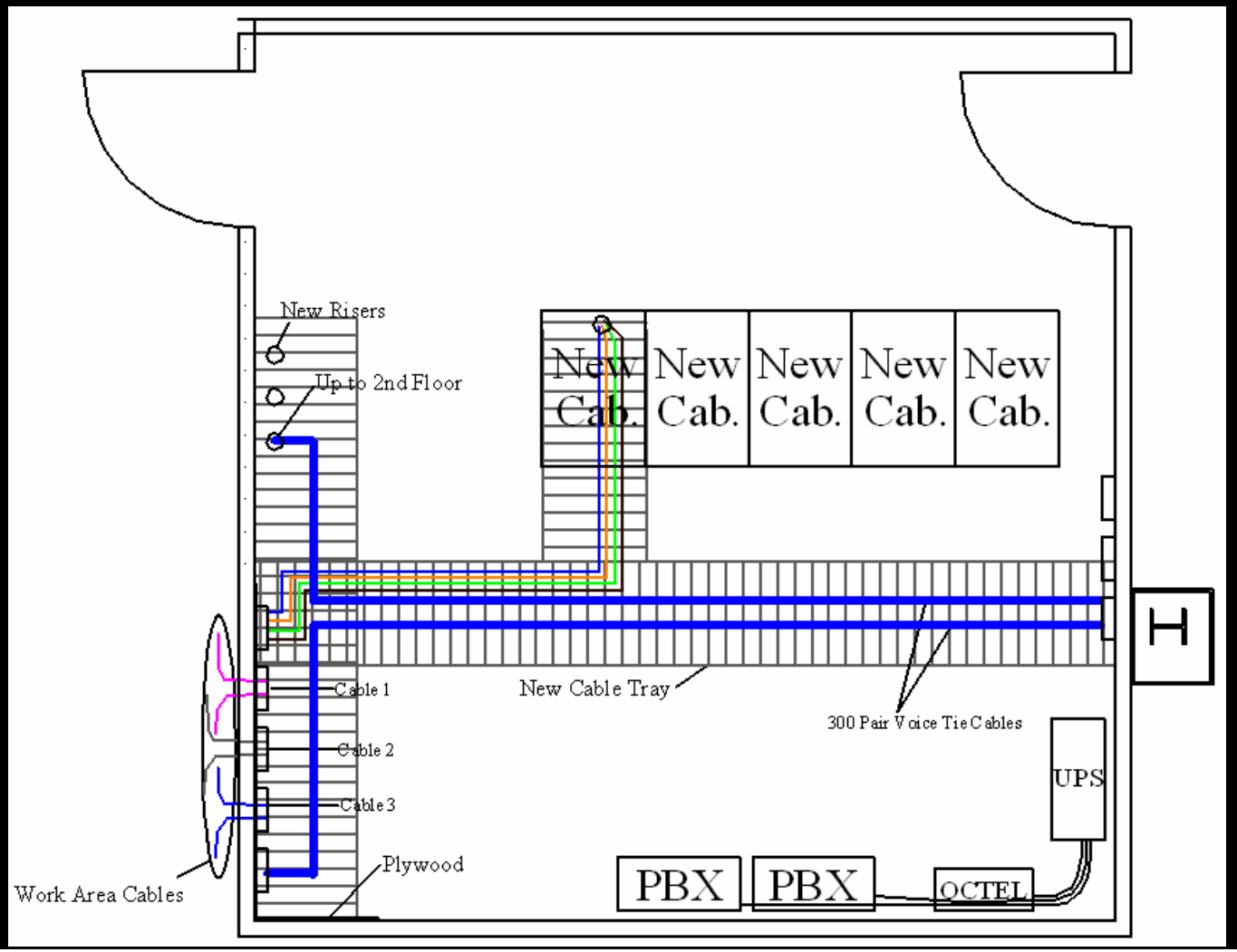
Second Floor Telecommunications Closet Plan



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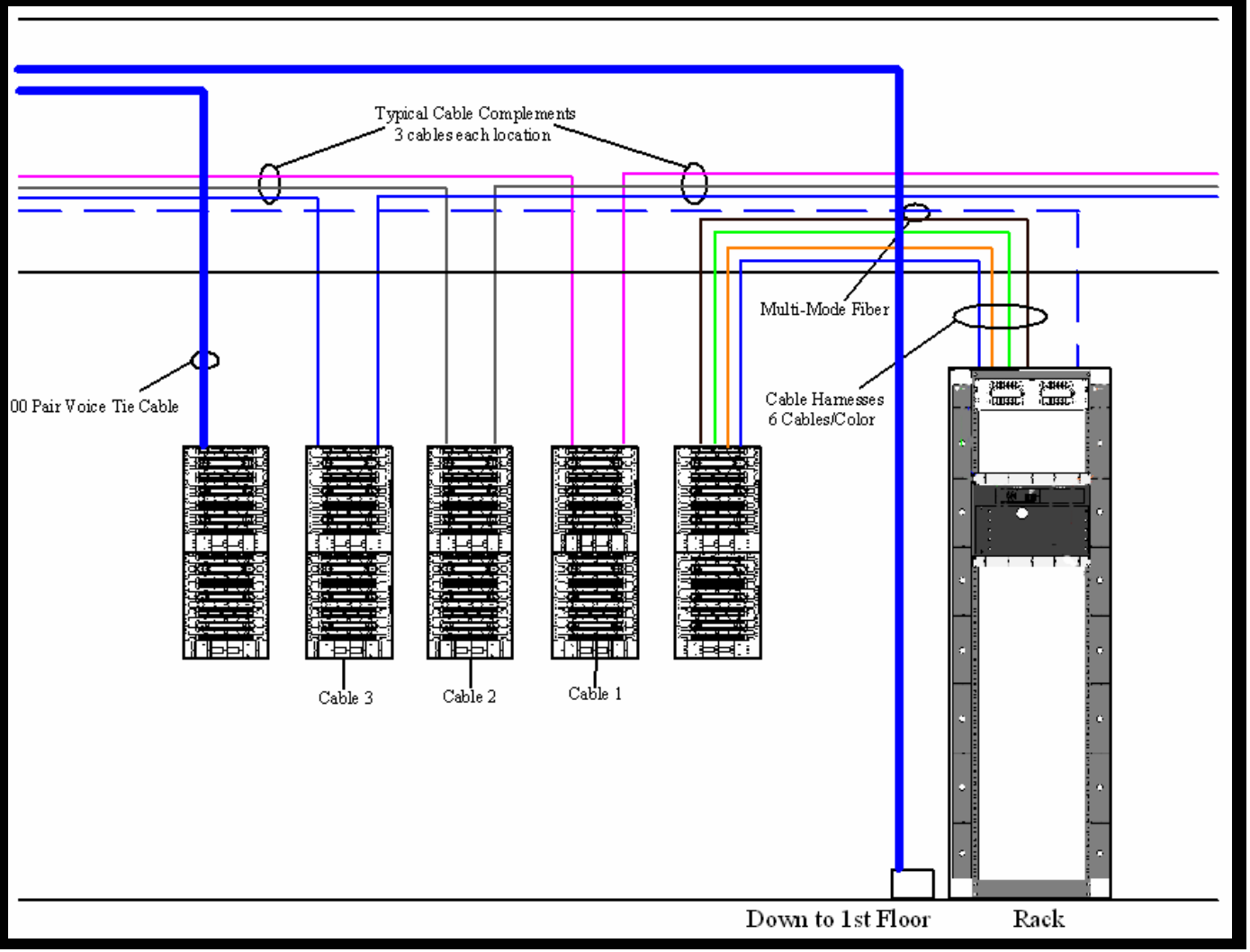
Second Floor Telecommunications Closet Elevation



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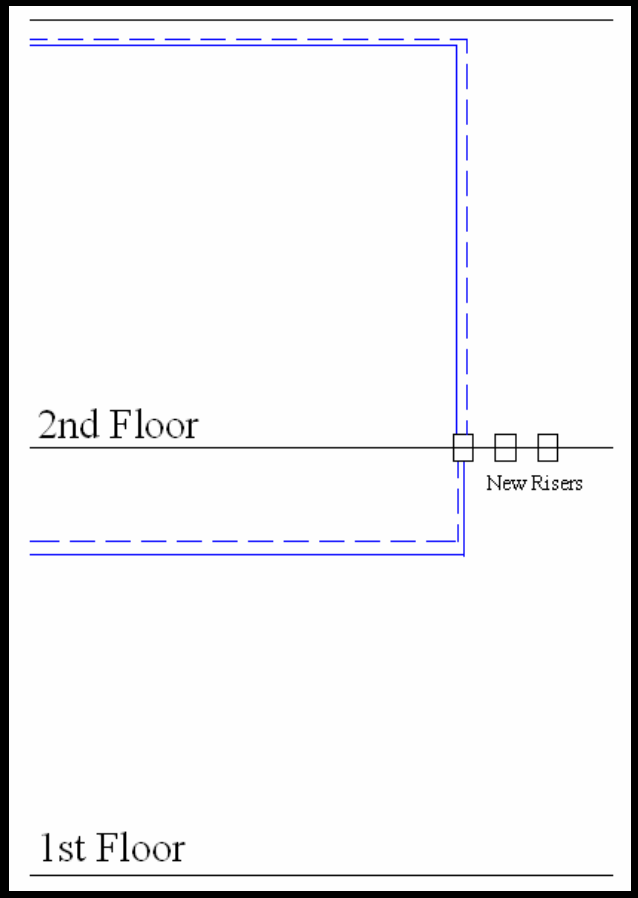
System Riser Diagram



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Lighting Design

All of the lighting redesign goals have been achieved:
~To keep the idea of solar panels constant throughout the interior of the building
~To incorporate the color blue to mimic the sky
~To have a new lighting design that works with the building's daylighting influence
~To provide an energy efficient design
~To maintain the same goals in all spaces of redesign

Telecommunications Design

An up-to-date telecommunications network infrastructure has been designed and is ready to be implemented into the building's current design.

Special Thanks

~Bernardon, Haber, Halloway Architects PC

~The Architectural Engineering Faculty at the Pennsylvania State University

~AstroPower North America

...and everyone who took the time to be here today!

Thanks!

Questions?