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Trade Show and Conference

Designers Lighting Forum

PERFECT FIT!

Attila Uysal – LumenArch
Graham Whittaker - Zumtobel Lighting

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Learning Objectives -1
Energy efficiency and Controls and maintenance -how the LED upgrade reduced energy costs, low maintenance and long service life thanks to high-quality technology.

Learning Objectives -2
UPGRADE v COMPLETE REPLACEMENT What are the advantages of a completely new LED installation compared to a new installation? How does this help promote sustainability?

Learning Objectives -3
LIGHTING QUALITY Understand how the upgraded lighting solution improved architectural impact through lighting quality and visual appearance

Learning Objectives -4
CIRCULAR DESIGN Understand the following: -Design for disassembly -Design for longer lifetime -Design for maintenance & upgrade

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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The era of corporate Modernism

New York Times Building

ARCHITECT:
RENZO PIANO
YEAR:
2003-2007
LOCATION:
OCTAVA AVENIDA 620, NEW YORK, NEW YORK, UNITED STATES

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The era of corporate Modernism

(Words taken from an article published by the NY times on the opening of the building)

“The new 52-story building between 40th and 41st Streets, designed by the Italian architect Renzo Piano, is a paradise by comparison. A towering composition of glass and steel clad in a veil of ceramic rods, it delivers on Modernism’s age-old promise to drag us — in this case, The Times — out of the Dark Ages”.

The era of corporate Modernism

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The era of corporate Modernism

Interiors by Gensler

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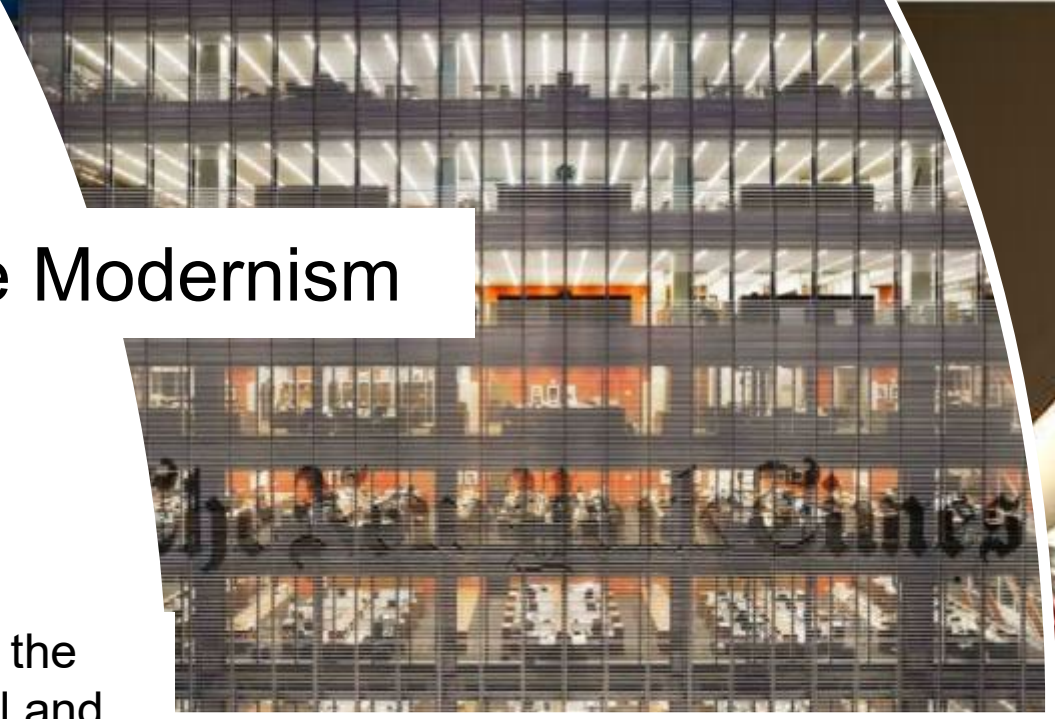
The era of corporate Modernism

Right from the very beginning the quality of the light both natural and artificial lighting was important



“The New York Times understood that the ‘quality’ of the lighting mattered as much as anything”

Lighting Design by SBLD

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Energy efficiency and Controls and maintenance

Understand how the LED upgrade reduced energy costs, low maintenance and long service life thanks to high-quality technology

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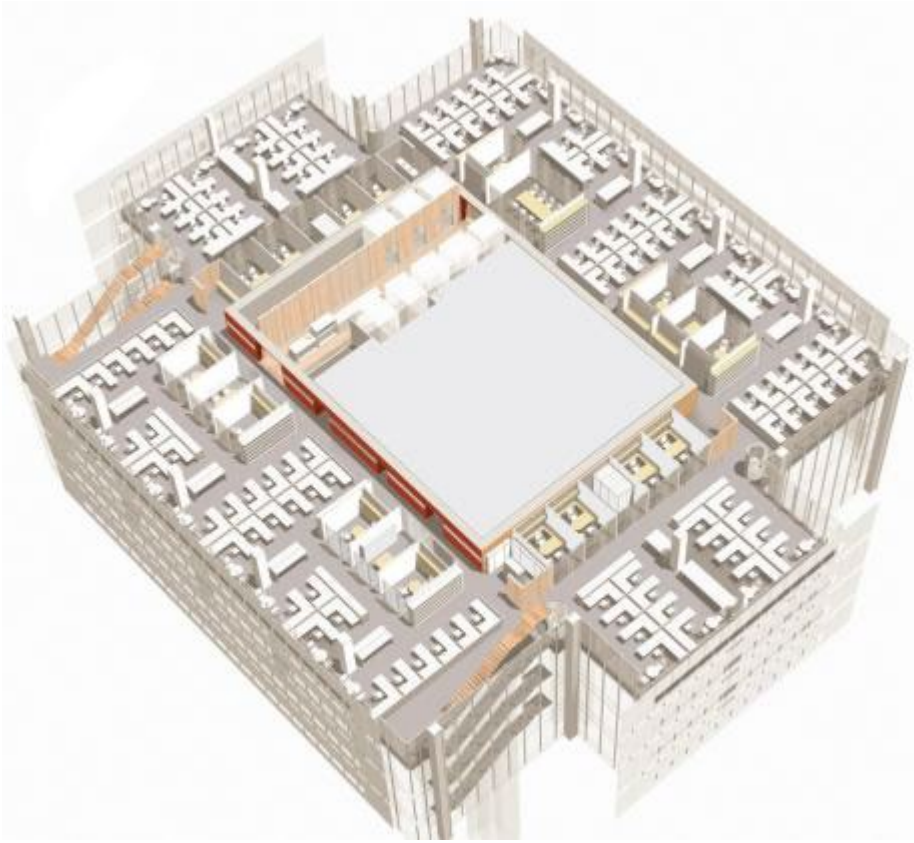
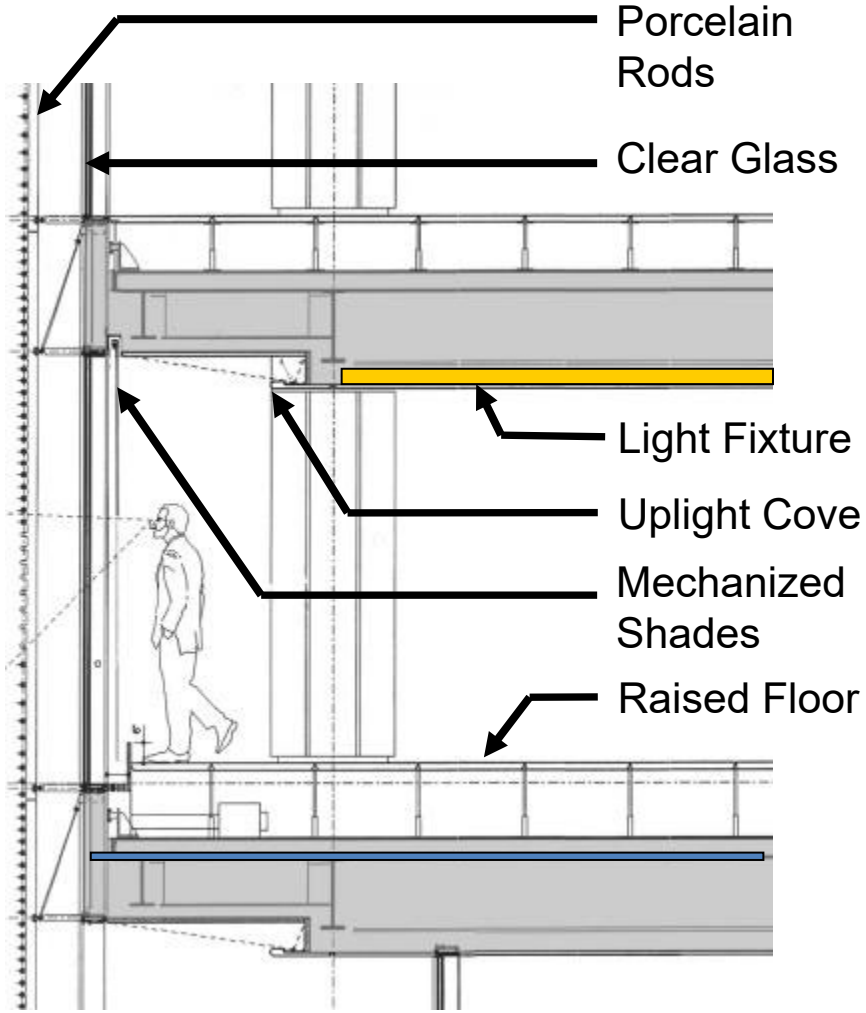
Lighting Overview



Furniture Plan Courtesy of GENSLER



Typical Curtain Wall Section

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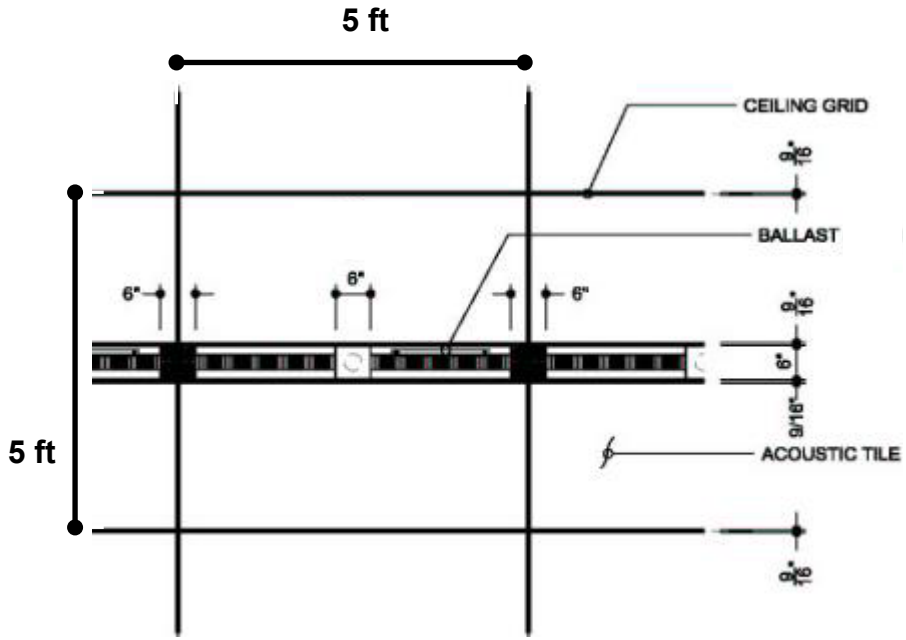
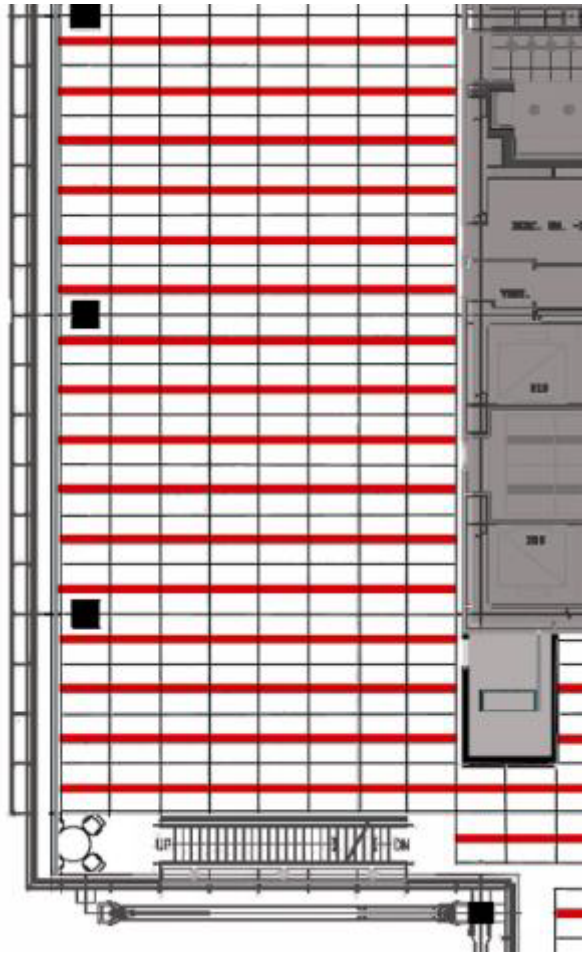
Lighting Overview



Custom Ceiling Detail



Partial Lighting Plan

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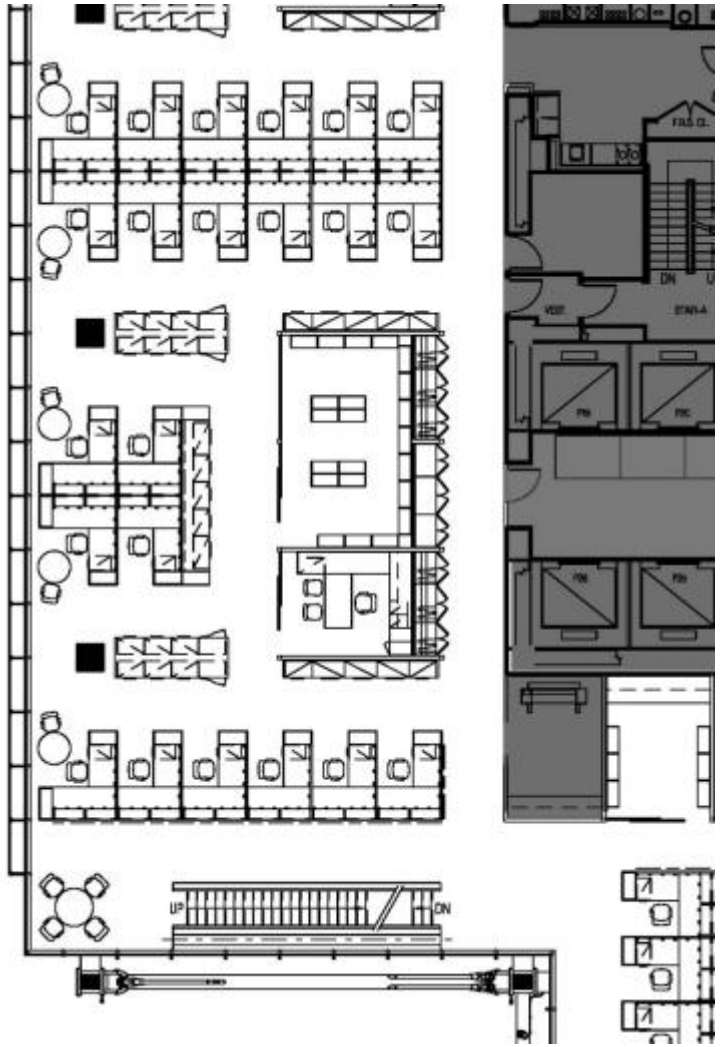
Lighting Overview



Partial Furniture Plan

Partial Lighting Plan

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Lighting Overview

Recessed down light housing have:

1. Two (2) 14W T5 (2’-0”L) fluorescent lamps (one lamp in cross section) with 3500K color temperature with 36Watt system energy consumption.
2. Electronic digital (DALI) dimming ballast
3. Continuous wire-way (for power and control)
4. 6” square removable center plate for mounting ceiling devices
5. Fixture have total of 8 sq-in return air diffuser slots (two 4 sq-in at ends).

Lighting Overview

Removable diffuser assembly have:

1. Minimum 60% efficiency
2. Extruded acrylic lightly frosted finish.
3. Shall not exceed a yellowness factor of 3 after 2,000 hrs. exposure.
4. Louver assembly with vertical metal fins (mechanically mounted to the diffuser)
5. Direct source luminance shall not exceed 2000 cd/m2 when viewed at 55° degrees.

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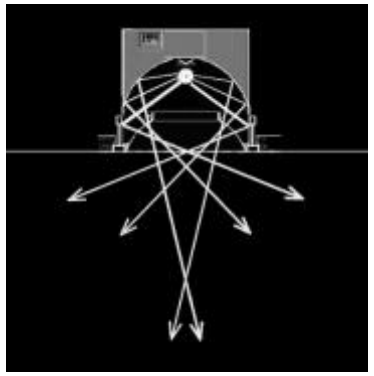
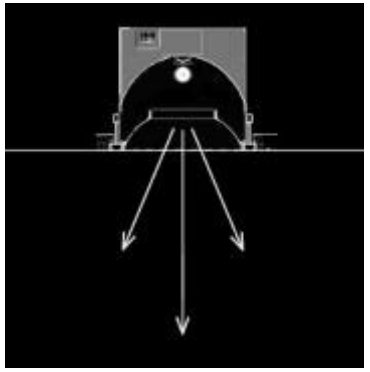
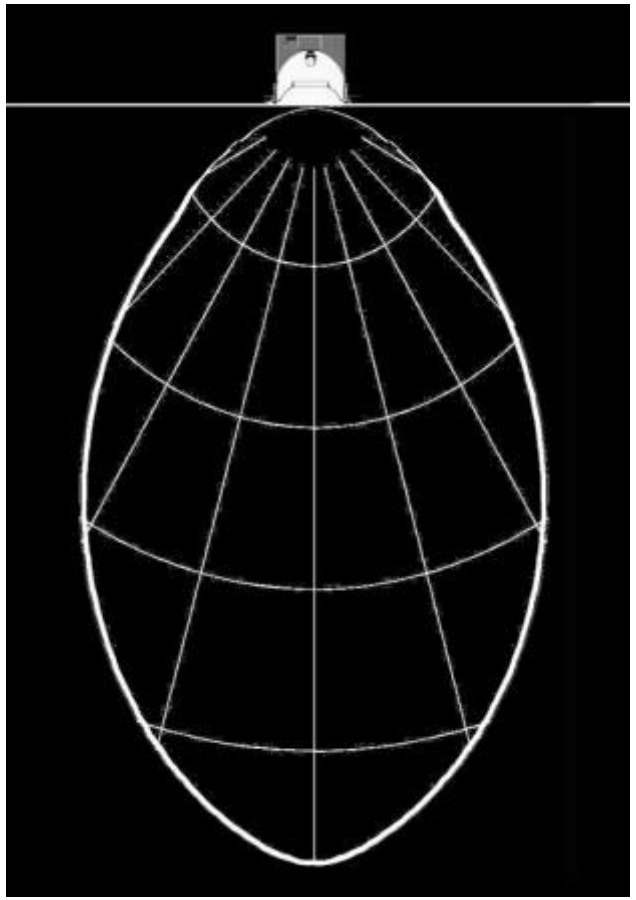
Lighting Overview



AMBIENT COMPONENT



DIRECT COMPONENT



PHOTOMETRIC CURVE

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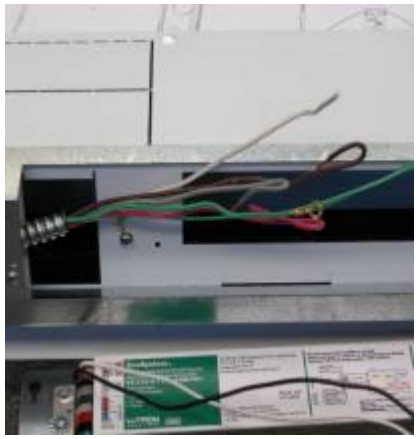
Lighting Controls Upgrade



Daylighting control system has four (4) common components.

1. Photocell / daylight sensor
2. LED Board and Driver
3. Control communication
4. Control zones and algorithm.

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Lighting Controls Upgrade

- Digital Lighting Control
  - Lighting controls software
  - Controls components
    - Hard wired DALI driver
    - Wireless Sensors
  - Database management system
  - Diagnostic and commissioning tools
- DALI (Digital Addressable Lighting Interface)
- Individual control by ballast
- Flexible zoning
  - Daylighting
  - Program layouts
- Target setpoints

Lighting Controls Upgrade

DALI Dimming Driver

A. Utilize standard open communication protocol
- Light fixture status (on/off)
- Total Driver output (14Watt)
- LED Module condition (failure status)
- Driver condition (failure status)

B. Parameters required to be reported and/or configured within the ballast are:
- Programmable minimum and maximum dimming levels
- Programmable 64 addresses, 16 groups and 16 scenes
- Driver status – on, off, failed
- LED Module status – on, off, failed
- Programmable fade time and fade rate

C- Each drive shall be energy efficient and
- Have typical High-End Power 15 Watts two 24” long LED boards

D- Each ballast shall have memory module; a EEPROM or flash card and
- Have unique address
- Be able to recover from loss of power
- Turn on to a predetermined level, upon recovery from a power loss
- Have reliability and address stability

Fixture Requirement	
	Specification
Type	LED
Base	LED Board/ module
Dimension(Inch)	22"L
Wattage(W)	11W Max.
Lumen(Lm)	1200Lm
CRI	90
CCT	3500
Dimming	L Systems Dim to 1%
Target Light Level	50FC

Fixture Comparison

Fixture Comparison						
	T5	T5 LED Tube		LED Bar	LED Board	LED Board
Type	Fluorescent	LED		LED	LED	LED
Asambly Manufacturer	NA	NA	NA	NA	Company S	Company Z
Brand/Manufacturer	Company P	Company G	Company C	Company C	Company S	Company Z
Wattage(W)	14	14	13	12	11	9.5
Lumen(Lm)	1200	Initial lumen-1500	Initial lumen-1544	Initial lumen-1476	Initial lumen-1496 Delivered lumen- 1200lm (with acrylic diffuser)	
CRI	82	82	83	83	90	90+
Dimming	0-10V Dim to 3%	0-10V	L Systems Dim to 10%	L Systems Dim to 1%	L Systems Dim to 1%	L Systems Dim to 1%
Target Light Level	50FC	28FC	28FC		50FC	50FC (Dim to 30FC)
Installation Cost						

Interior Connected Lighting Load & Lighting Power Density Studies

Full dimming condition based on 16th Floor (62.5% Open Office/floor) (23.5% Enclosed Office and Workspaces)

	Space	Area (sqft)	Allowed ASHRAE 90.1 2001 (W/sqft)	Allowed Total Wattage (Watts)	Fixture Type	Number of Fixtures	Fixture Wattage (ANSI)	Actual Total Wattage (Watts)	Actual Lighting Power Density (W/sqft)	Comments
FLUORESCENT	Open offices Private offices - Team Rooms Conference Rooms - Library	17,981	1.30	23375	F-1 with T5 lamp DALI ballast	562	36	20232	1.125	Without perimeter fluorescent cove
	Rest of the areas	2,936	Various	5,093	Various	Various		6955		
	TOTAL	20,917		28,469				27187	1.2998	
LED	Open offices Private offices - Team Rooms Conference Rooms - Library	17,981	1.30	23375	F-1 with LED source and DALI driver	562	15	8430	0.469	Without perimeter fluorescent cove
	Rest of the areas	2,936	Various	5,093	Various	Various		6955		
	TOTAL	20,917		28,469				15385	0.736	

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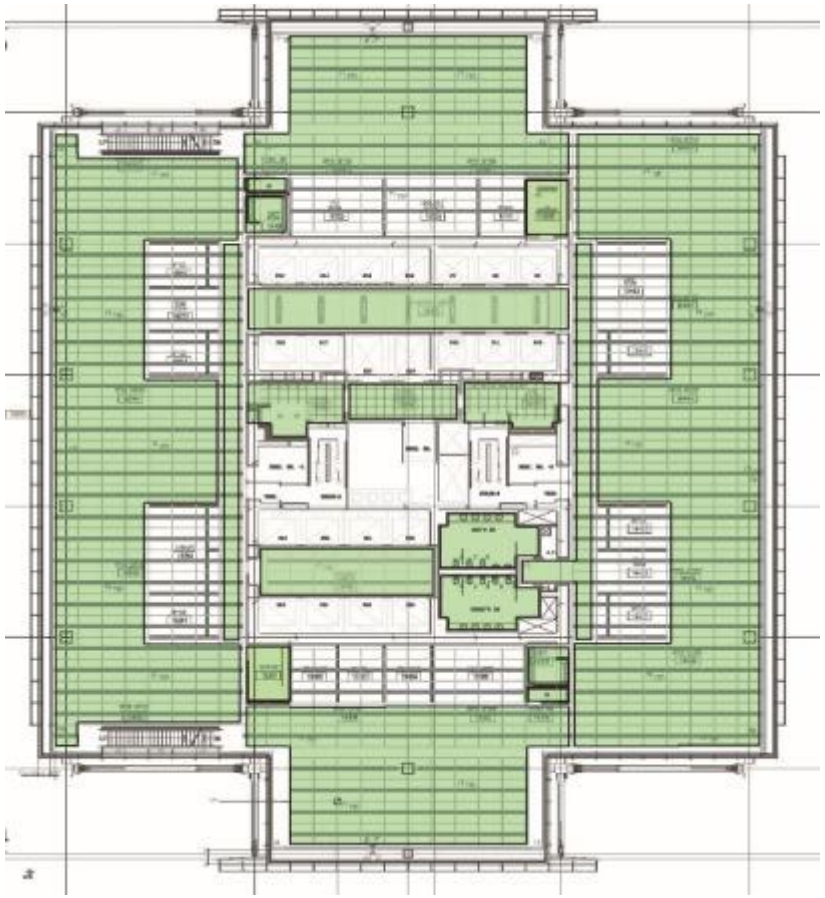
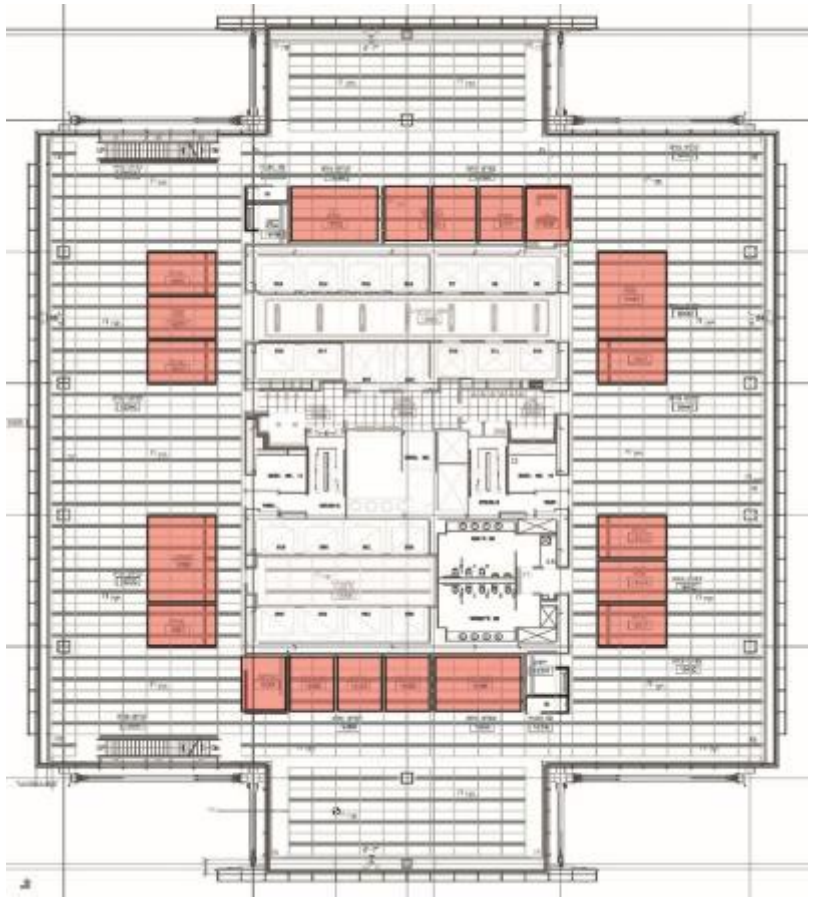
Control Intent Diagrams



Occupancy Control Zones



Preset Wall-Station Control Zones

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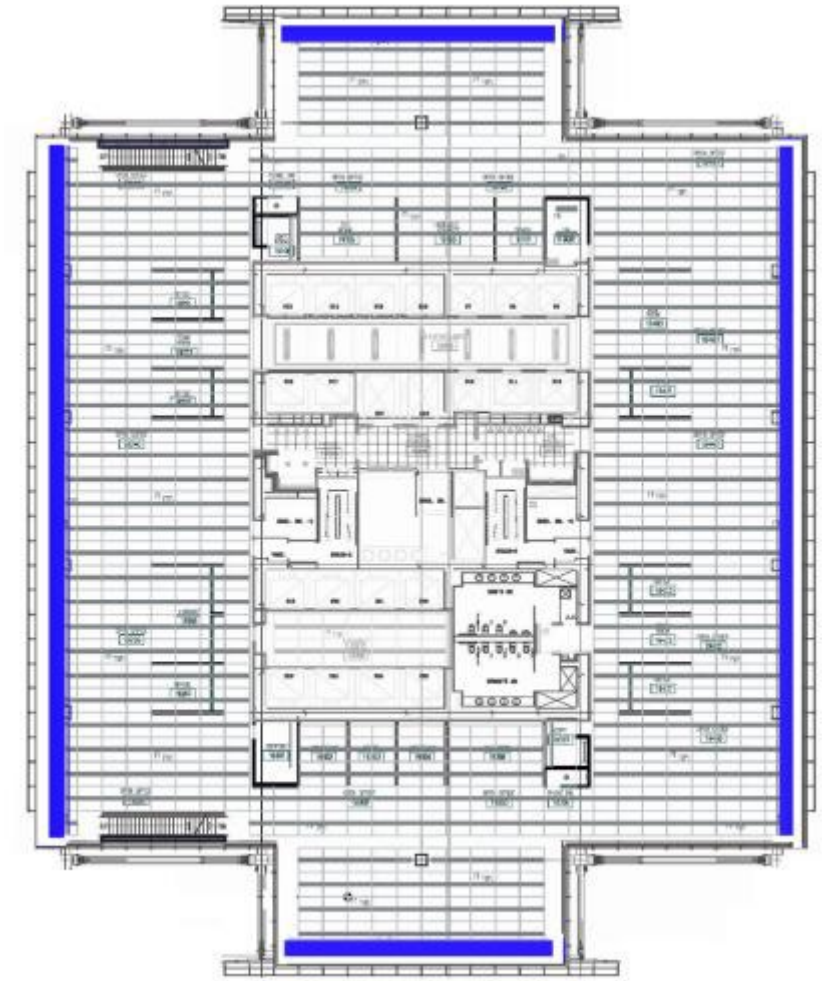
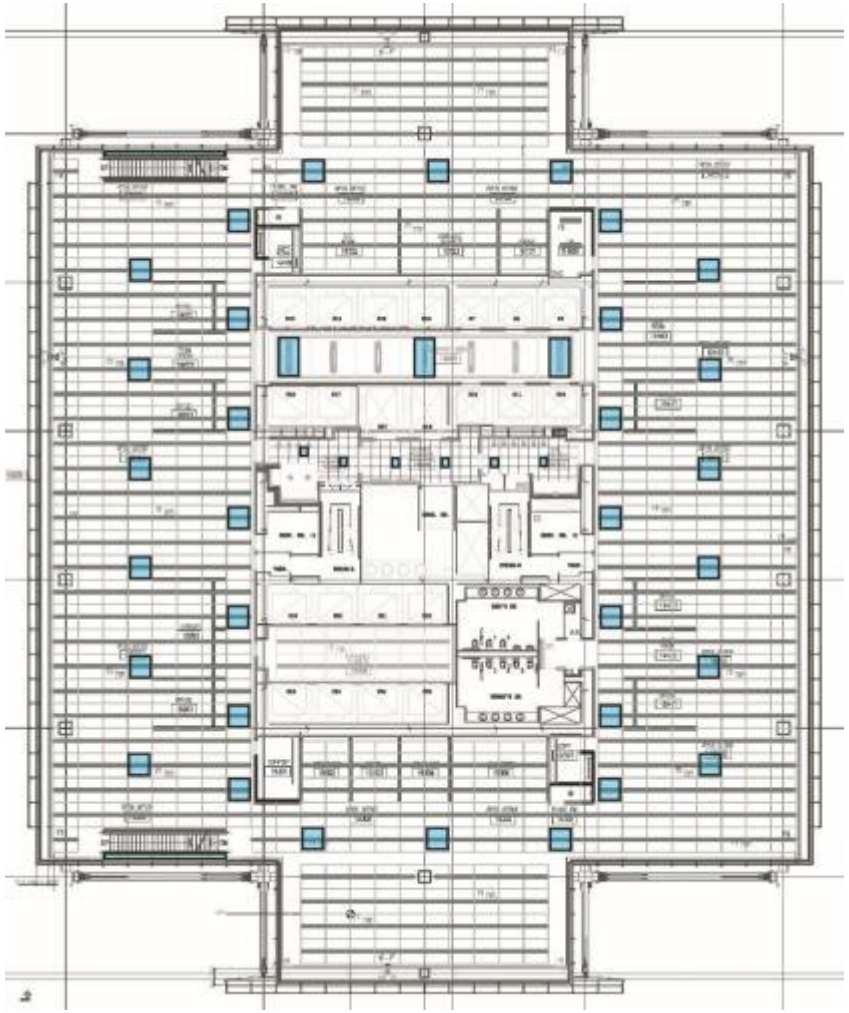
Control Intent Diagrams



Time Clock Control Zones



Emergency Control Zones

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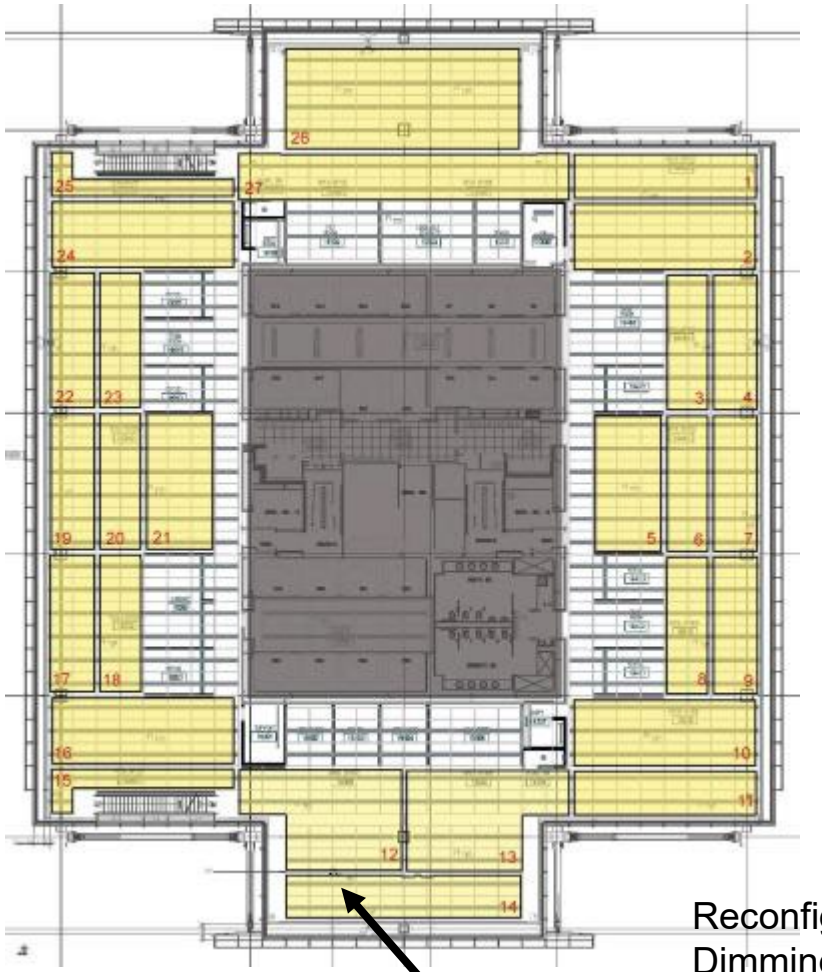
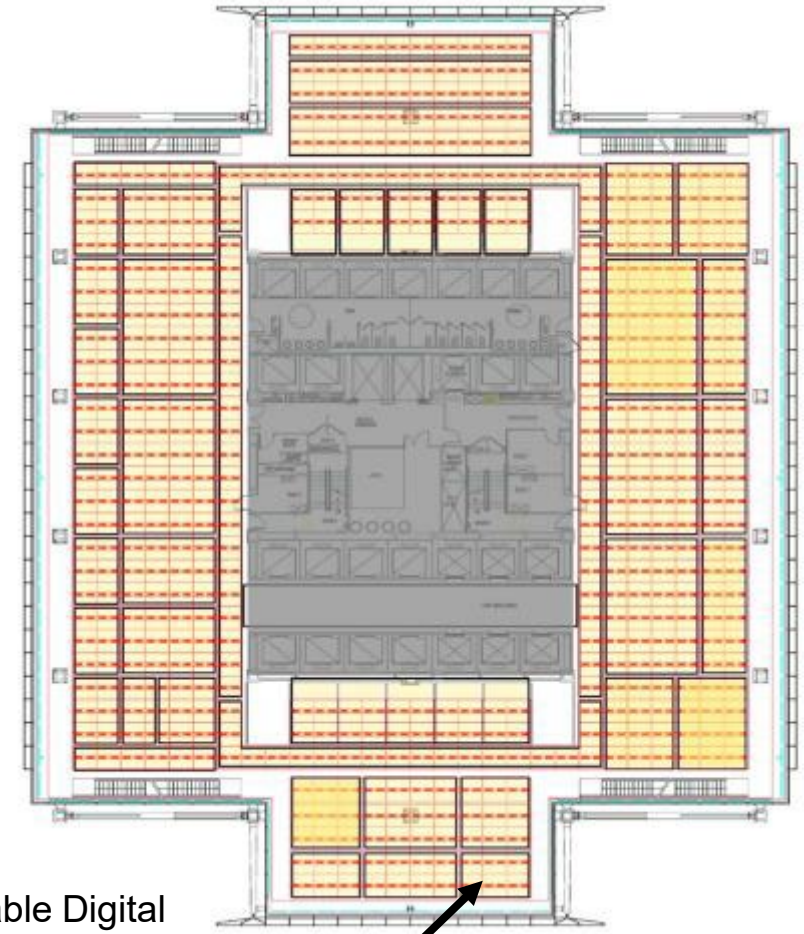
Control Intent Diagrams





Reconfigurable Digital Dimming Zones Responding to Daylight Photocell

Typical Office Floor Daylighting Control Zones

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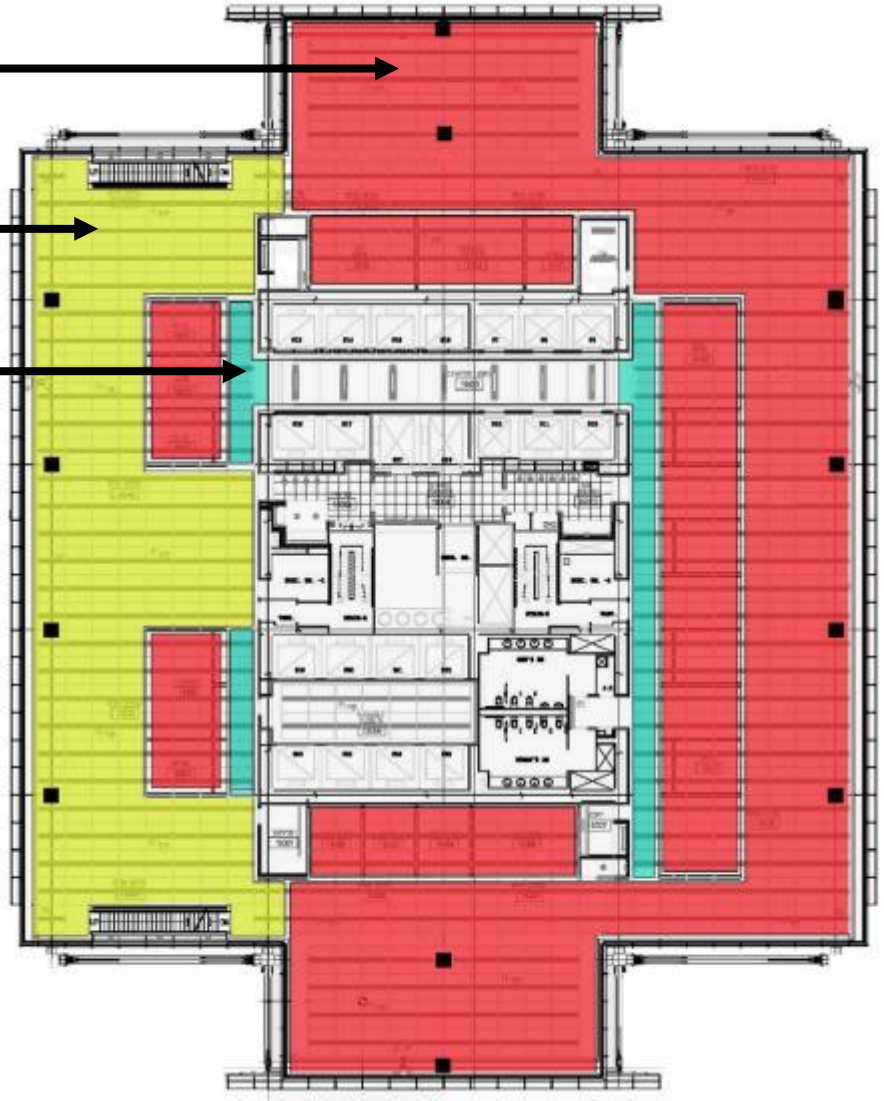
Light level target setpoints

40 fc

30 fc

15 fc



The illuminance level at the work plane (29.5” above finished floor) is maintained as a minimum by adding electric light output to whatever daylight is available.

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Control Intent Diagrams

Lighting sequence #4.

Dimming with automatic daylight control,

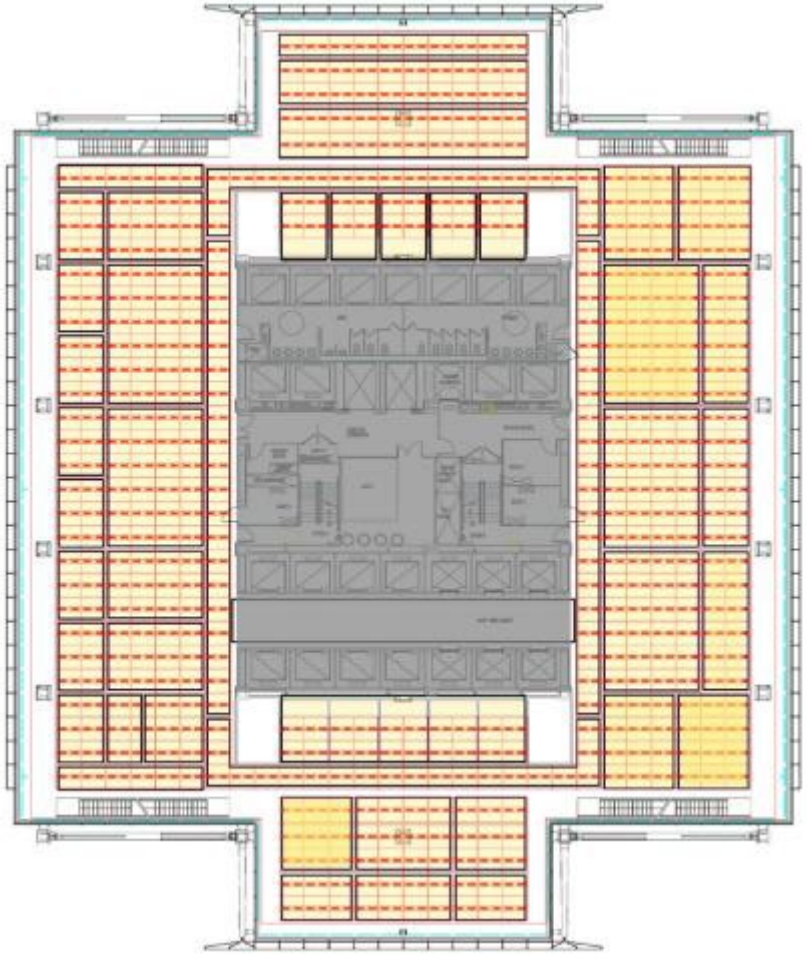
with out dimming or manual override switches

1- As occupancy is registered the lights turn on in all daylight zones within the occupancy zone based upon daylight available.

2- The light fixtures in daylight zone(s) shall be off, when sufficient daylight is available to achieve the target set point.

3- When no occupancy is detected, the lights go out after a pre-specified delay.

4- At night the light fixture shall provide the target set point illuminance level at the work plane.



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Control Intent Diagrams

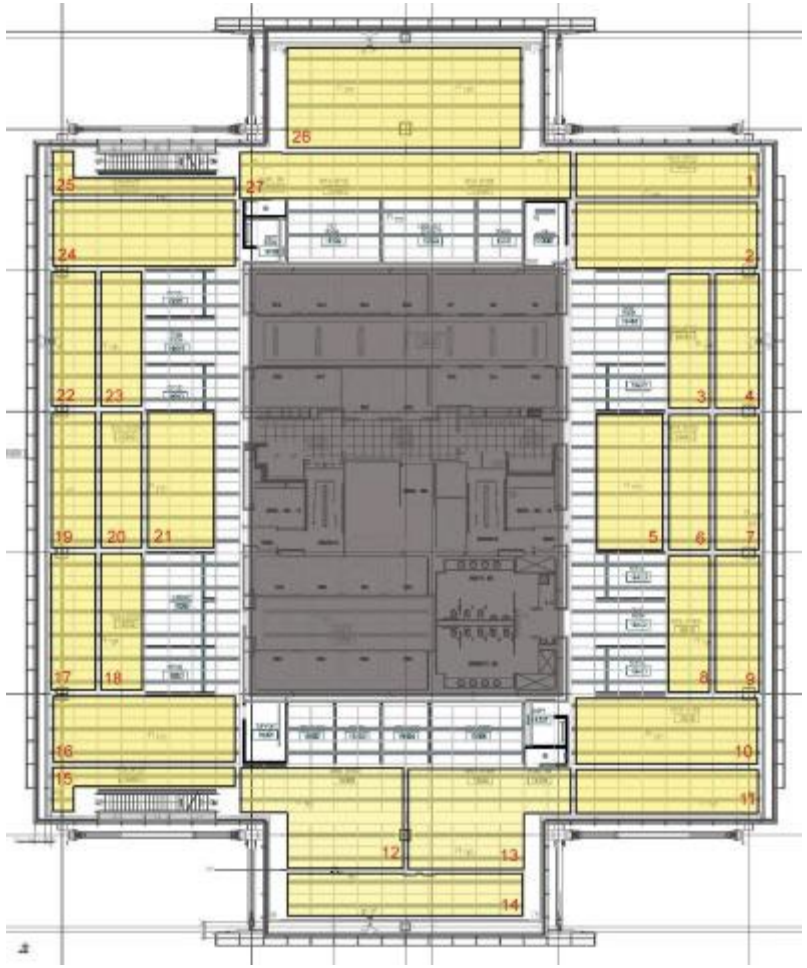
Lighting sequence #3.

Dimming, automatic daylight control with manual override switches,

In addition to Sequeance #4 daylighting control logic:

5- The occupant(s) may control the light levels at any time by use of the wall mounted dimming switch.

6- One of the presets is a return to auto daylight mode.



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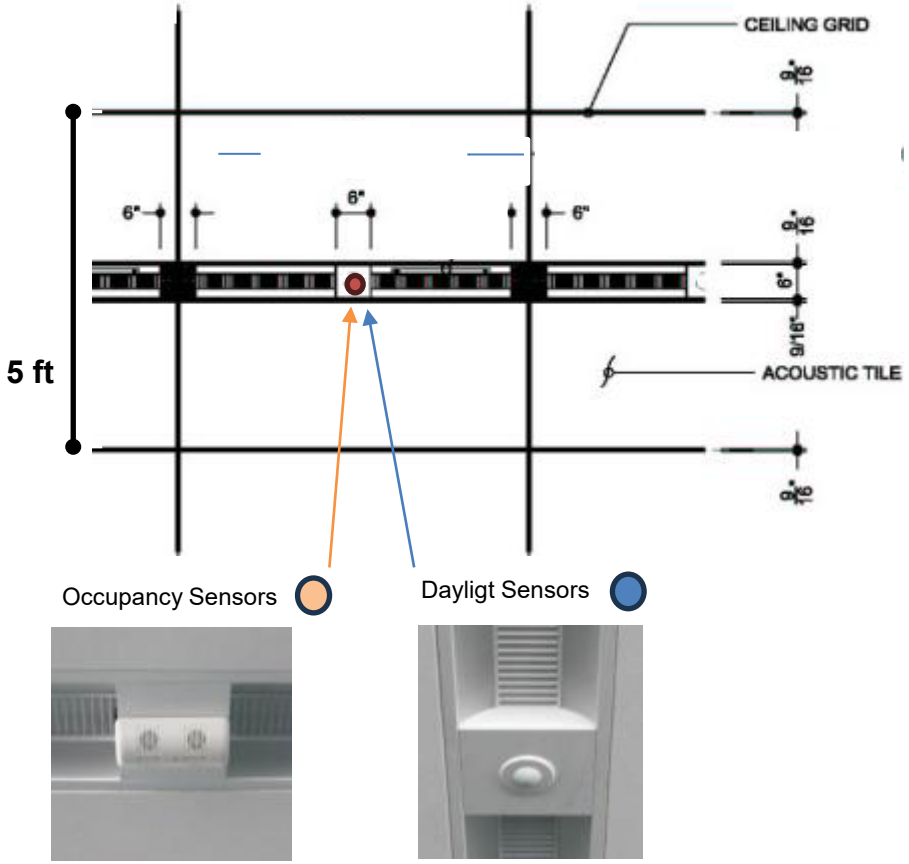
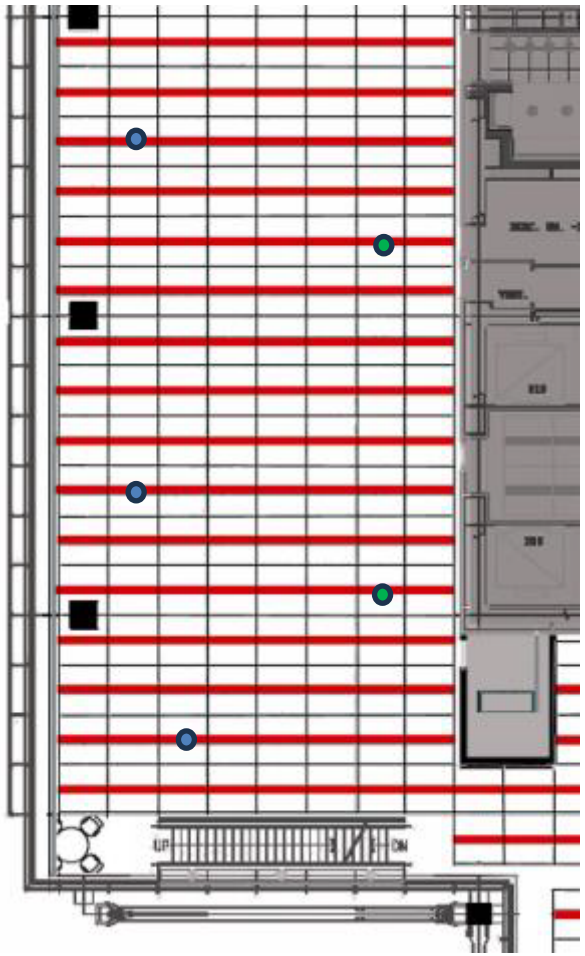
Lighting Control Components





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UPGRADE
V
COMPLETE REPLACEMENT

What are the advantages of a completely new LED installation compared to a new installation? How does this help promote sustainability?

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Upgrade v Complete Replacement

What are the advantages of a completely new LED installation compared to a new installation? How does this help promote sustainability?

The intention was never to replace the fixtures

Hard to maintain the fluorescent installation

T5 LED Lamps a Band Aid solution to the problem

DEMO

T5 LED Lamps alter the optics of the original design

LIGHTING QUALITY

Understand how the upgraded lighting solution improved architectural impact through lighting quality and visual appearance

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Lighting Quality

Lighting quality… from the Cave effect to Brightness Management

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Lighting Quality

Brightness Management -Since 1992 BM has been at the centre of Lighting manufactures thinking on lighting quality

1. High lamp brightness when viewed from underneath

2. Low luminaire brighness when viewed across room

3. High Contasts caused by luminaire cut-off angles

4. High contrasts on illuminated objects, caused by directional ligting

light from many directions (from unobstructed fittings) gives low contrasts and good modelling

light from one direction (from louvred fittings) gives high contrasts and poor modelling

CONTINUING EDUCATION AIA

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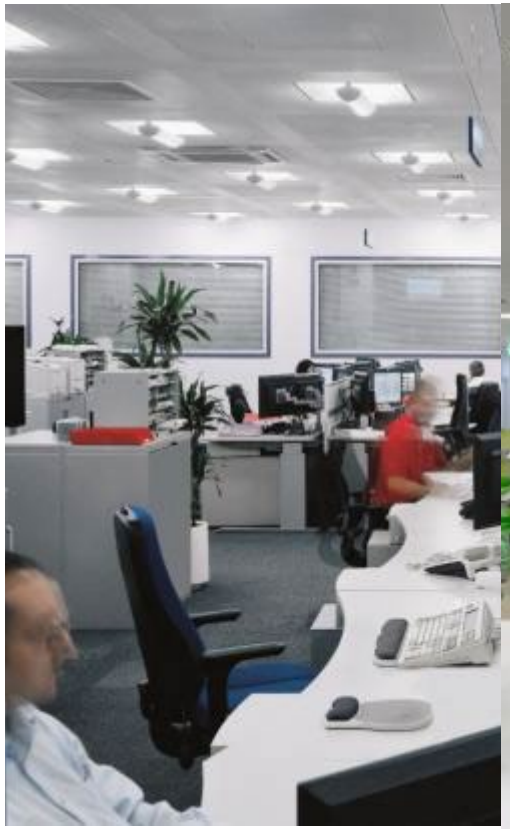
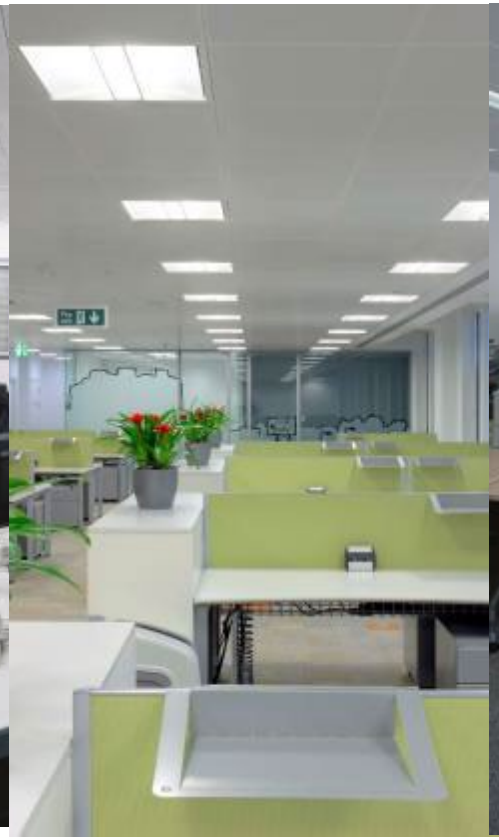
Lighting Quality

The New York Times roots come from a luminaire design guidelines developed by the manufacture over 30 years



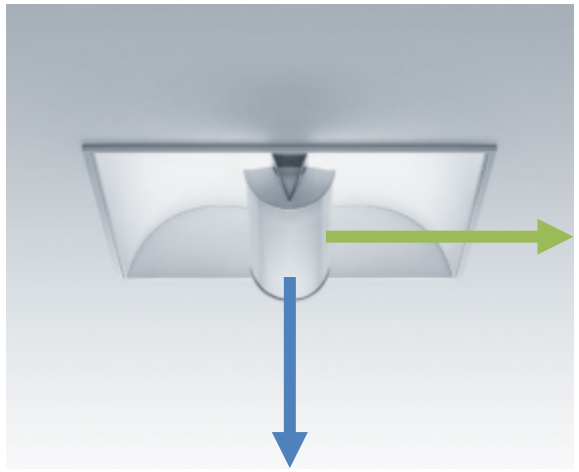
Version 3



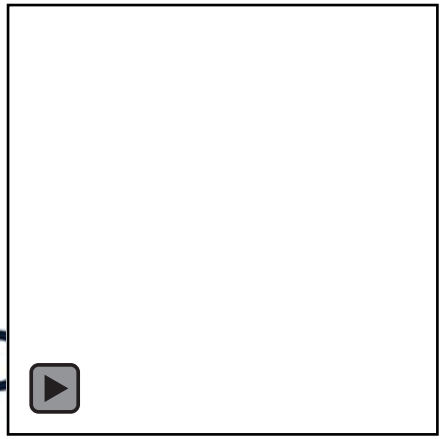
Version IV

Version IV -Synto

1988 – the birth of the Volumetric series



Ambient Component



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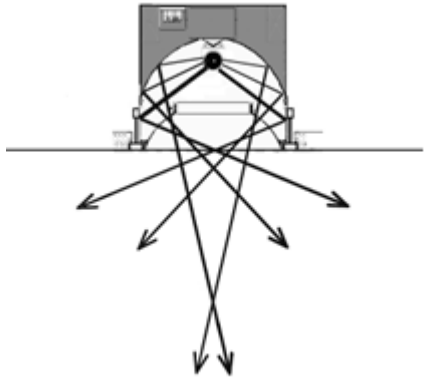
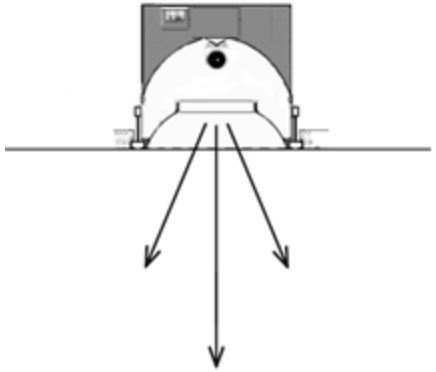
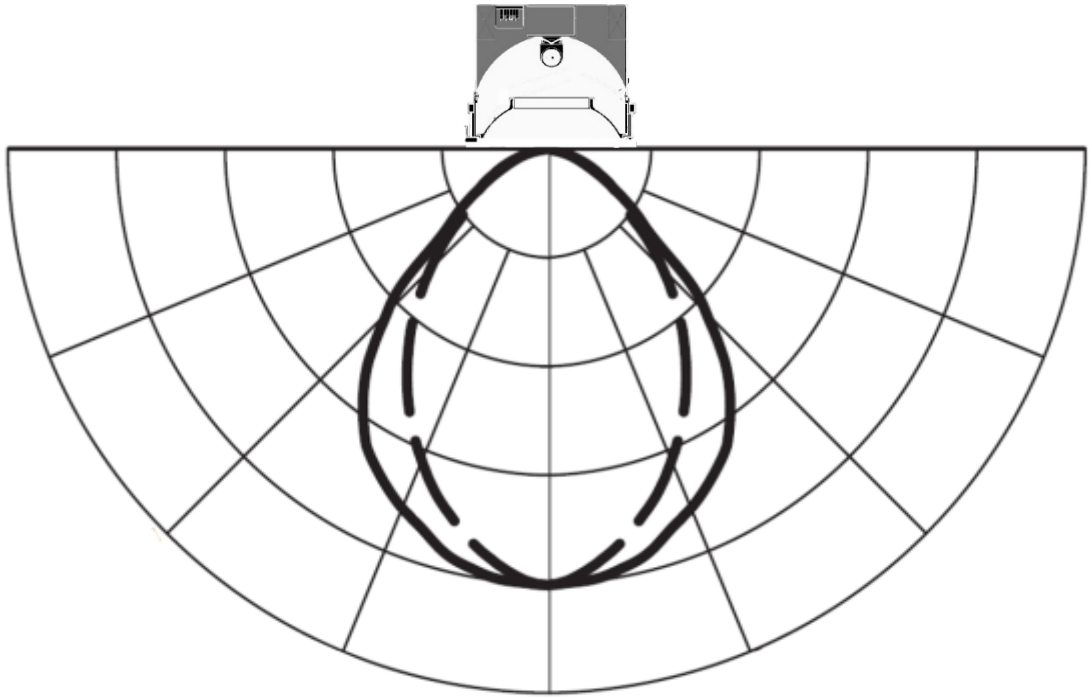
Lighting Quality



Ambient
Component



Direct
Component



Photometric
Curve

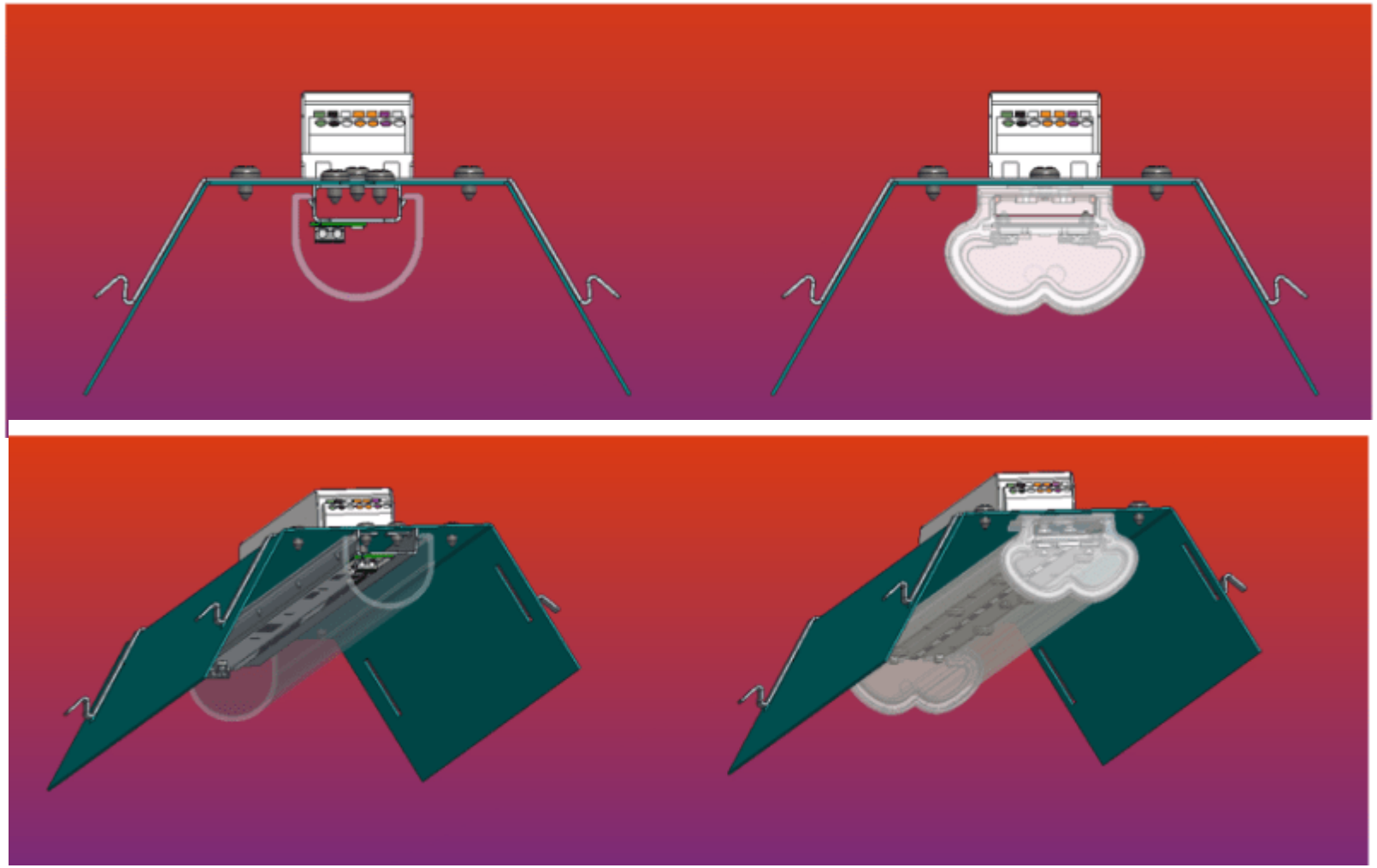
Original Fluorescent Recessed Fixtures

1. Two (2) 14W T5 (2'-0"L) fluorescent lamps (one lamp in cross section) with 3500K color temperature
2. Electronic digital (DALI) dimming ballast
3. Continuous wire-way
4. 6" square removable center plate for mounting ceiling devices
5. Fixture shall have total of 8 sq-in return air diffuser slots (two 4 sq-in at ends).
6. Direct source shall not exceed 2000 cd/m2 when viewed at 55° degree

Lighting Quality

Off the shelf optic

Custom optic



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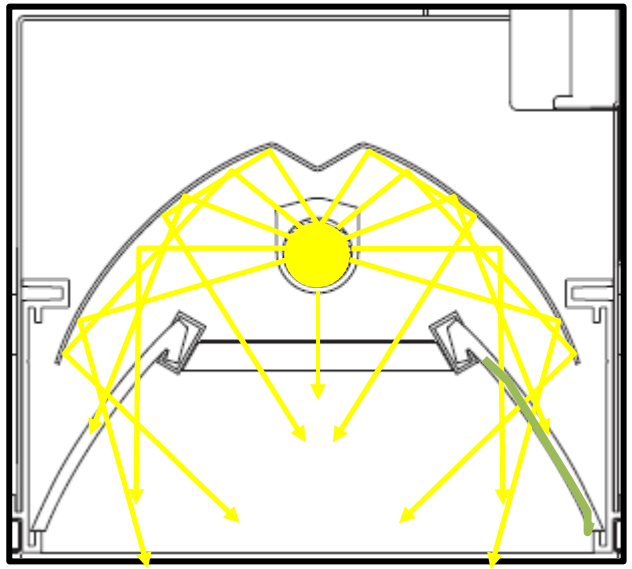
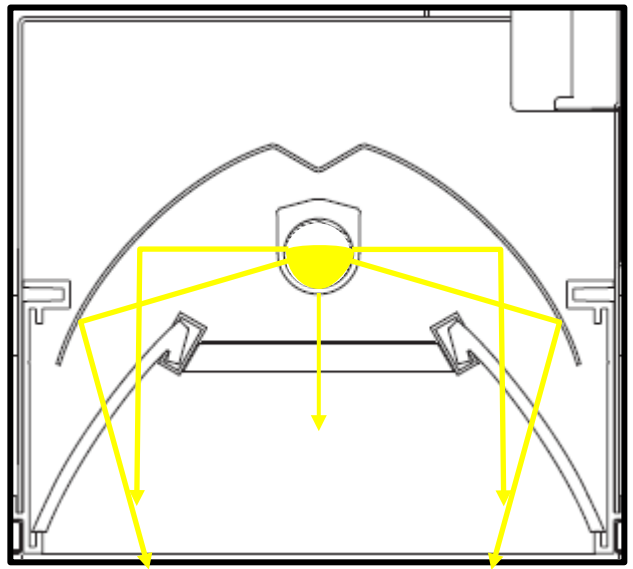
Lighting Quality

T5 Lamp



T5 LED Lamp



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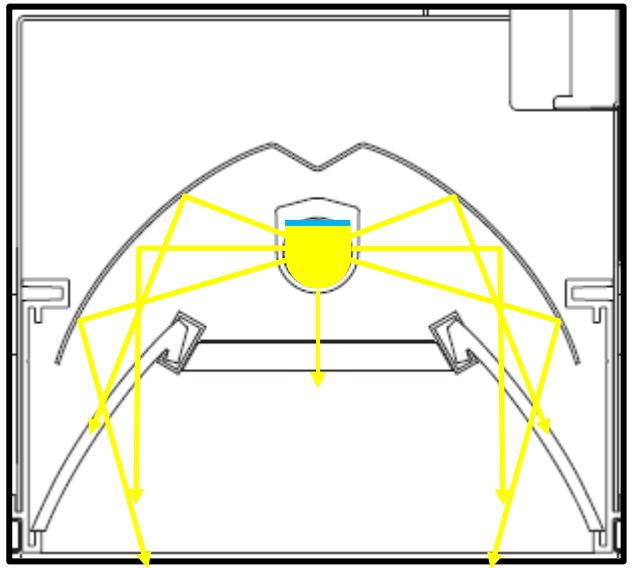
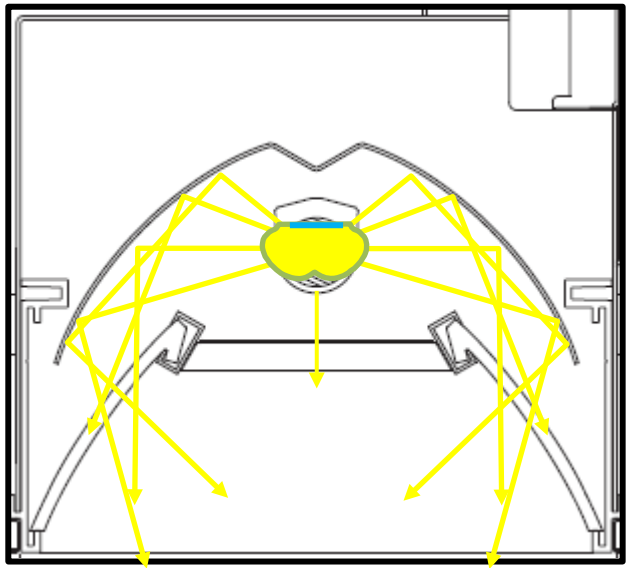
Lighting Quality

Off the shelf optic

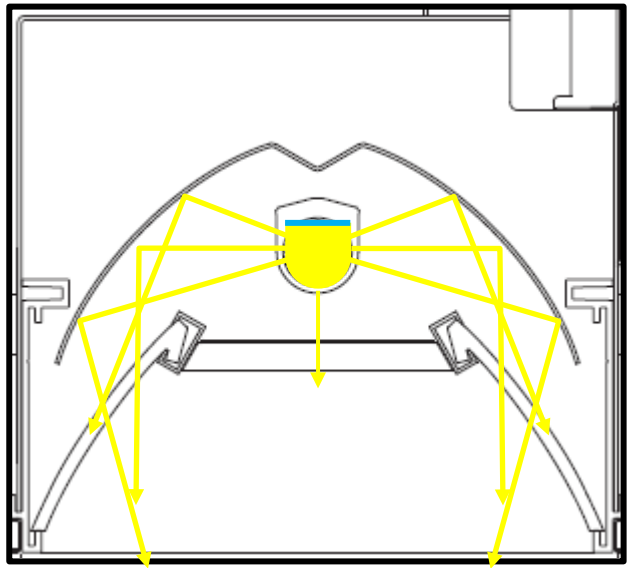


Custom optic

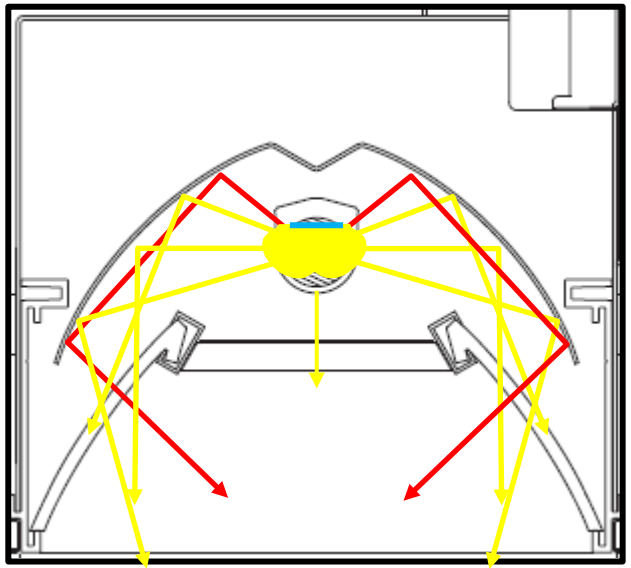


Lighting Quality

Off the shelf optic



Custom optic



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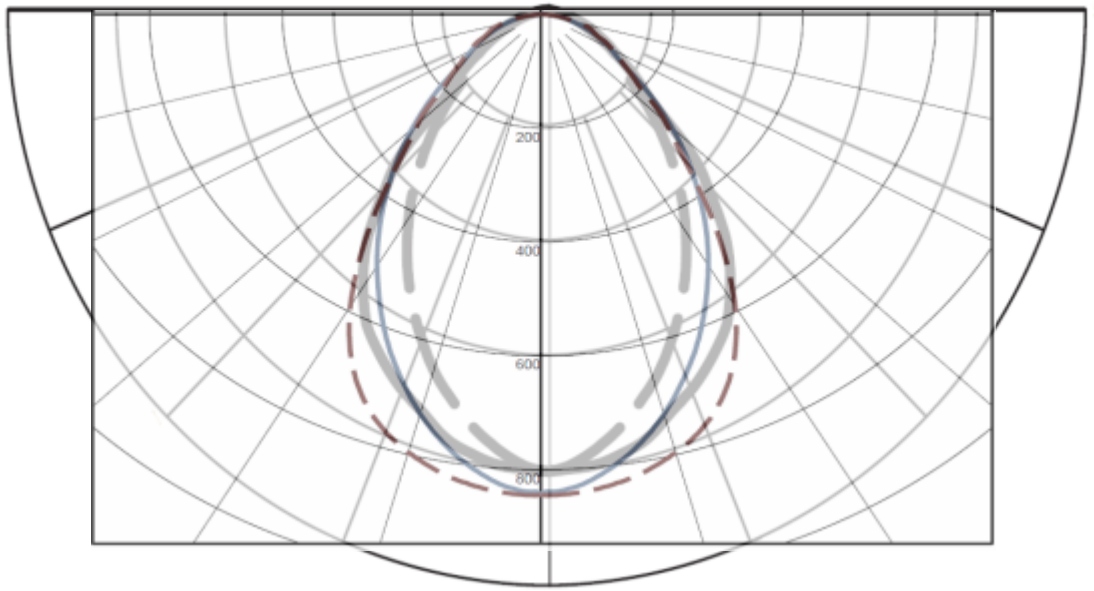
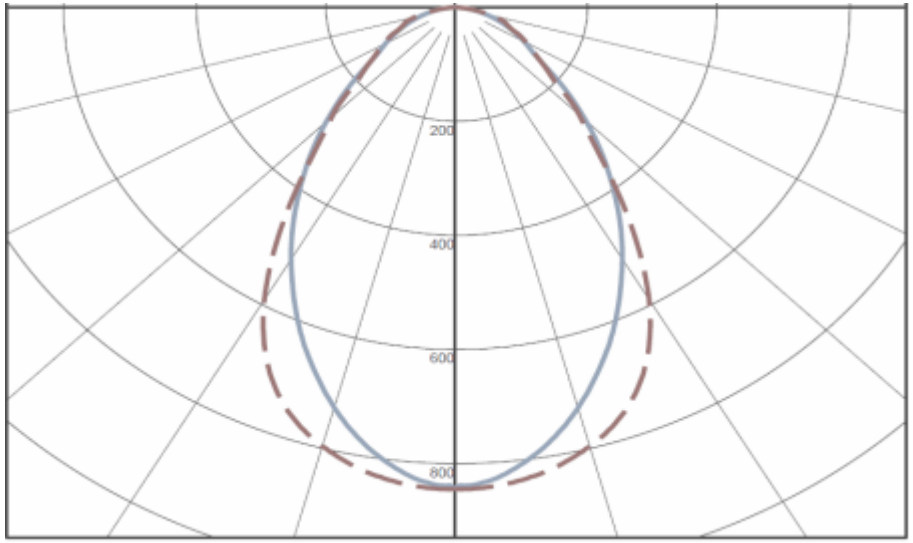
Lighting Quality

Original Fluorescent Polar Diagram



New LED kit Polar Diagram



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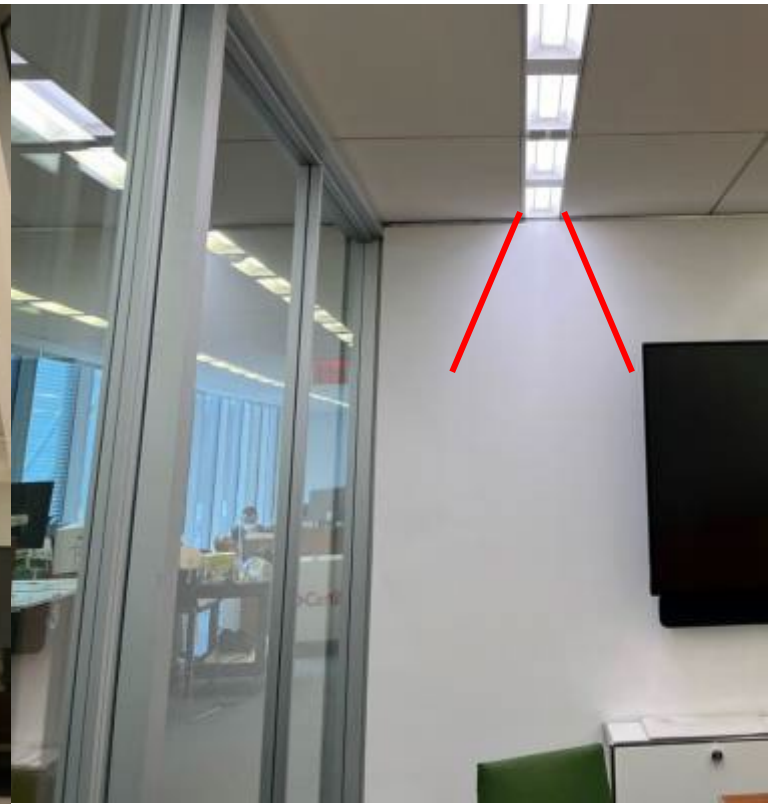
Lighting Quality

Optimized optic (developed by Manufacture) for batwing distribution creates an extra wide distribution for improved uniformity compered to other solution

Other solutions with of the standard off the shelf optic with narrower distribution



The New York Times – Lighting Proposal

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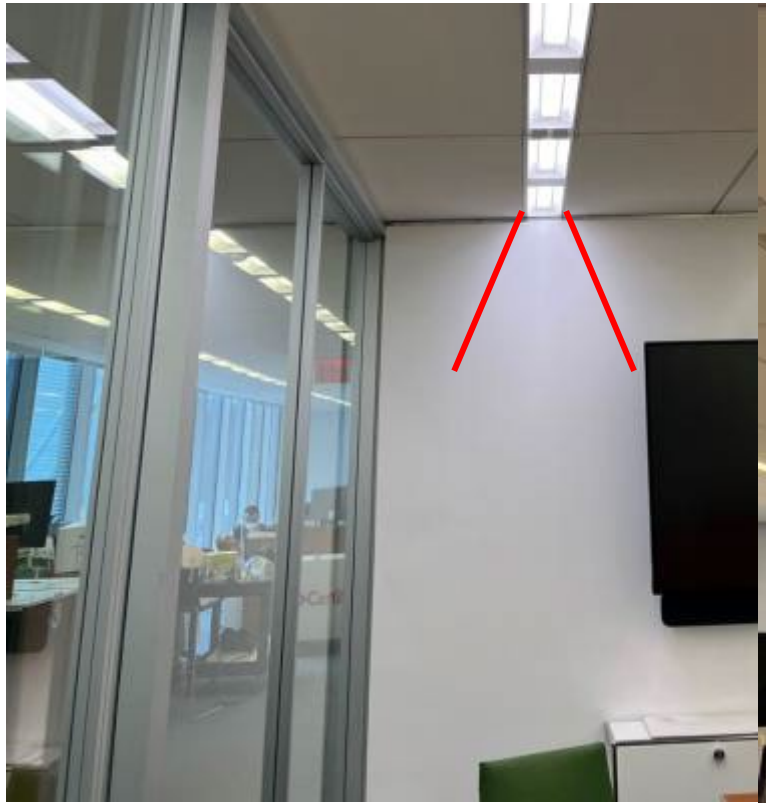

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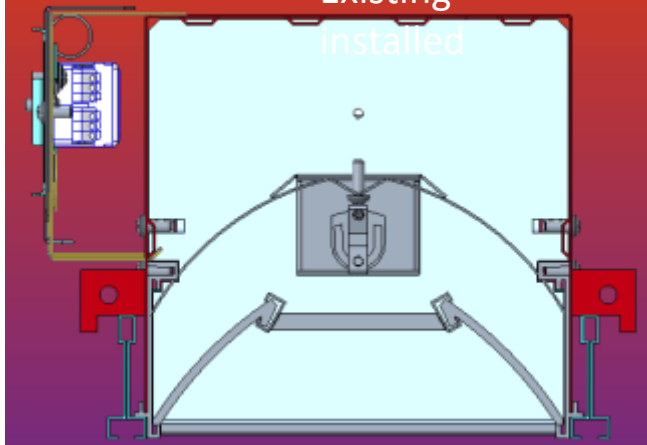
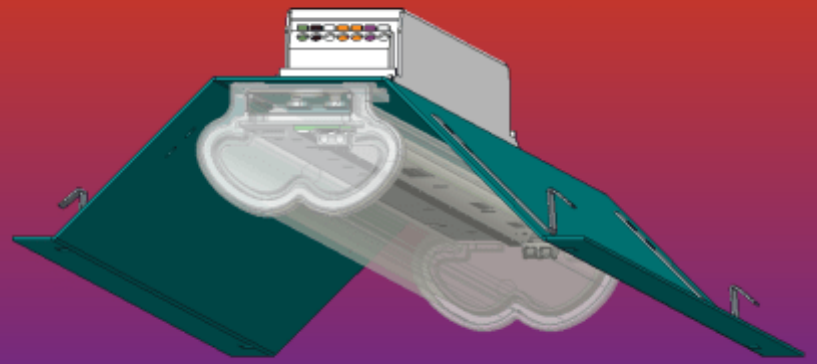
Lighting Quality

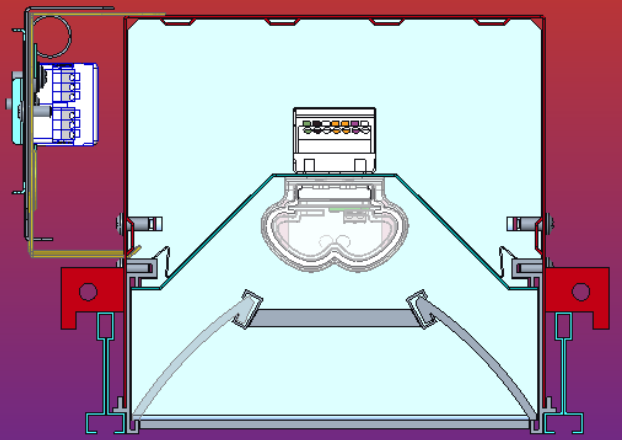
Existing installed



Manufacturer RFB Kit



Manufacturer RFB Kit



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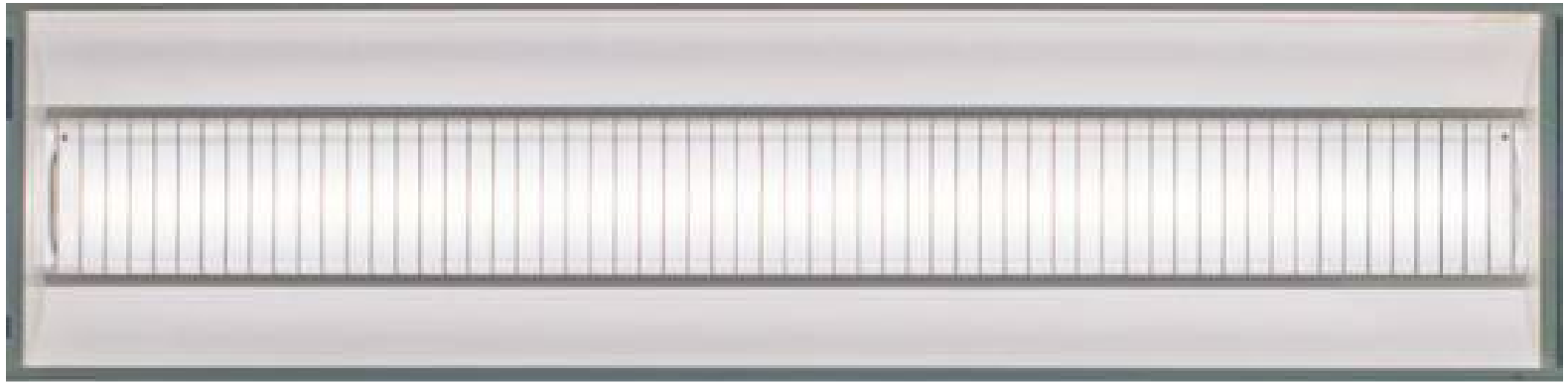

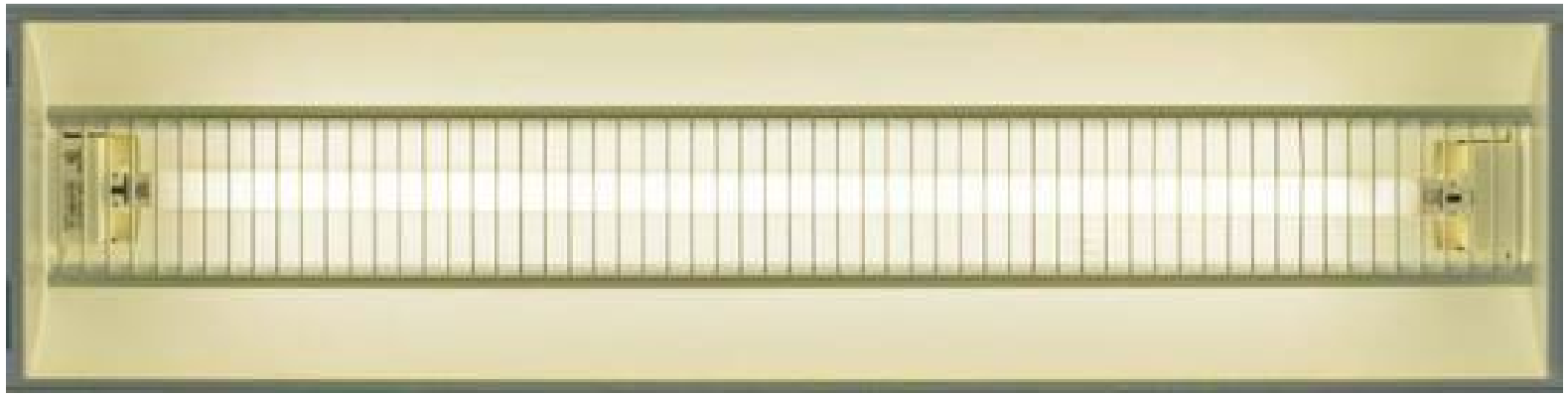

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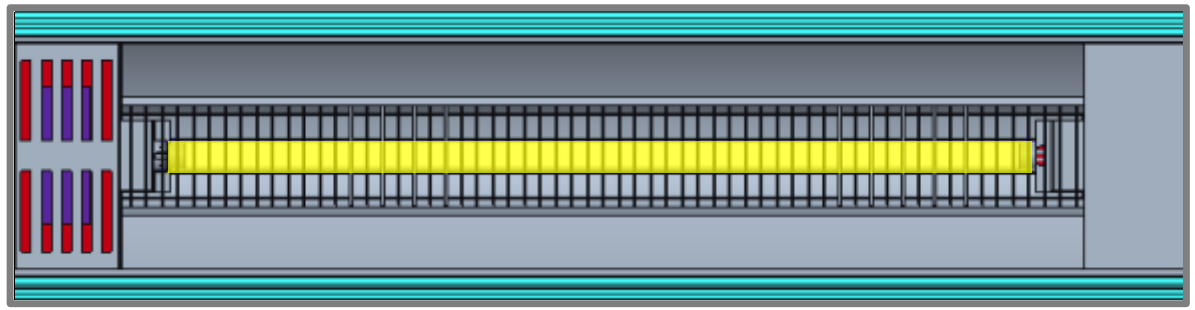
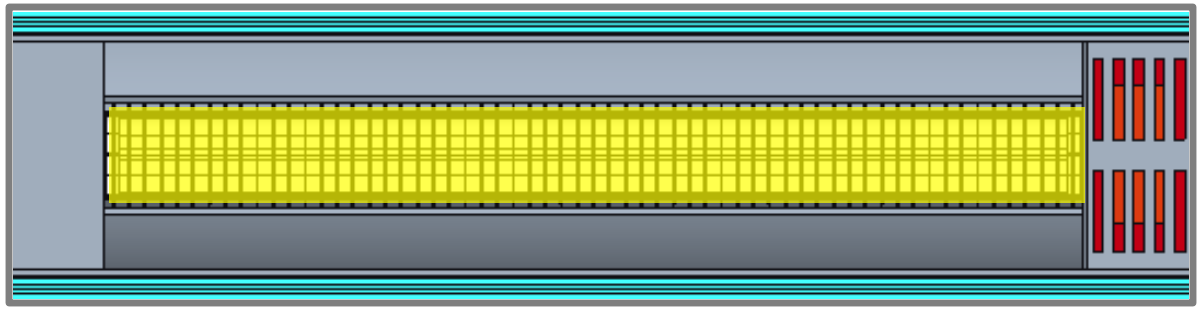
Lighting Quality

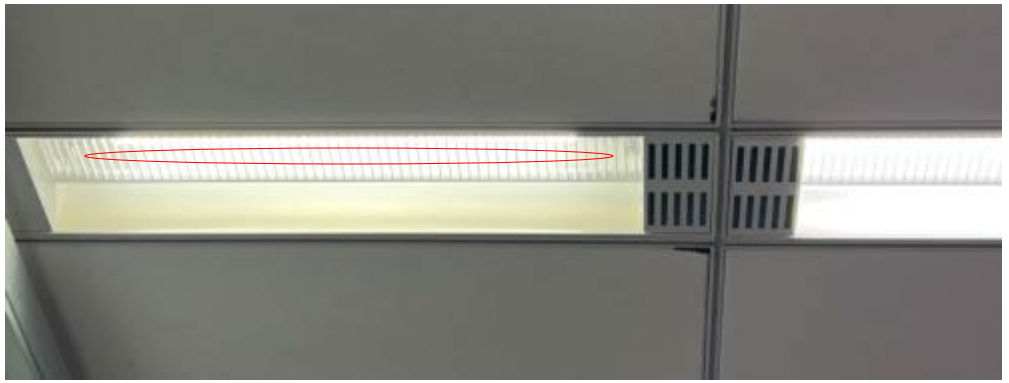
Lit effect in luminaire

Old



New





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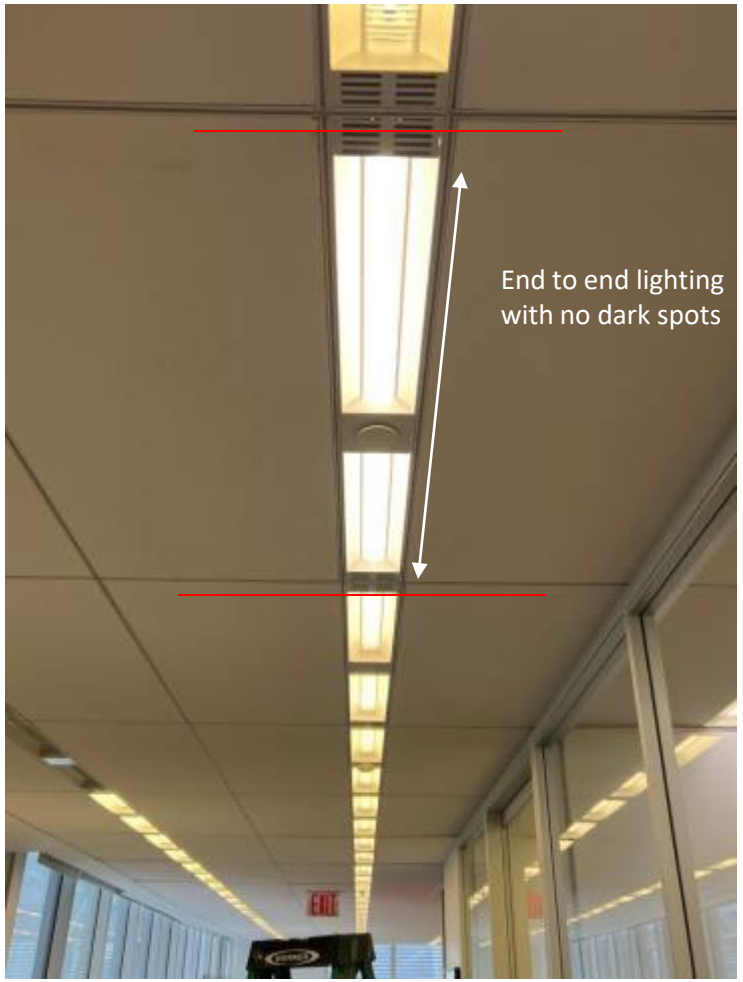
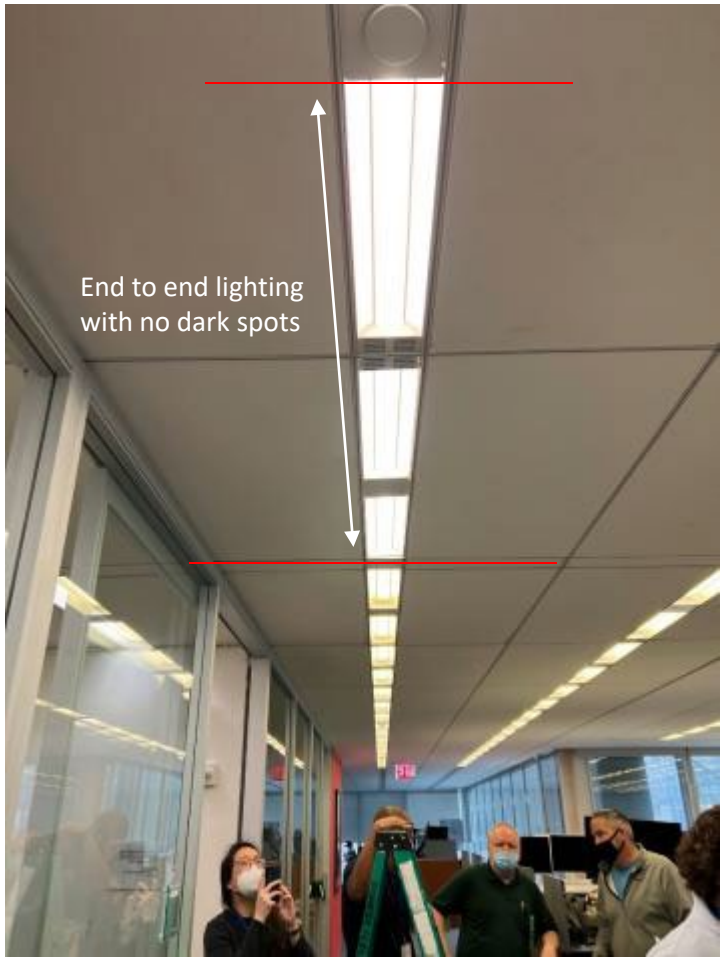


Higher color rendering



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CIRCULAR DESIGN

Understand the following: -Design for disassembly -Design for longer lifetime -Design for maintenance & upgrade

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Circular Design

Circular Design guidlines Repair/ Design for Disassembly

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Circular Design

Circular design guidelines

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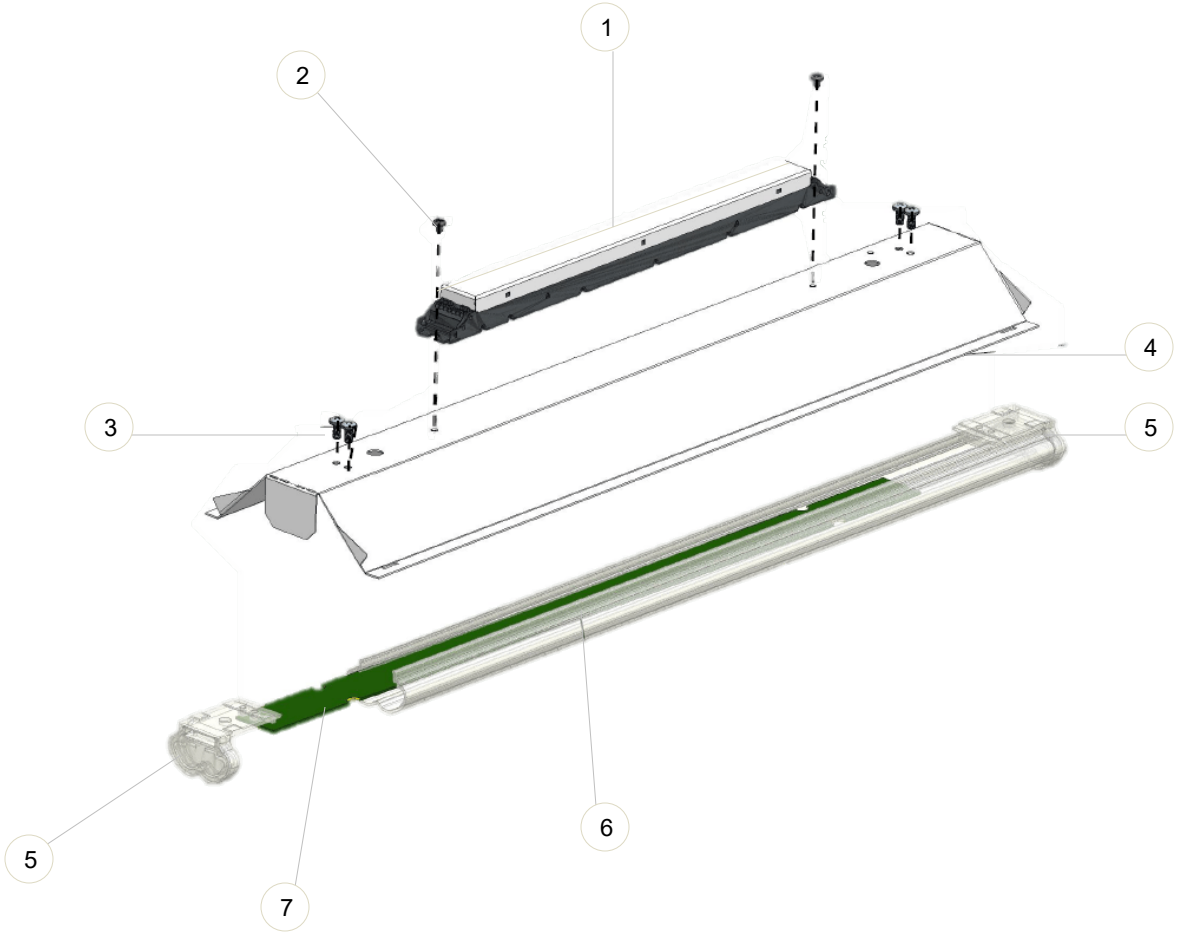
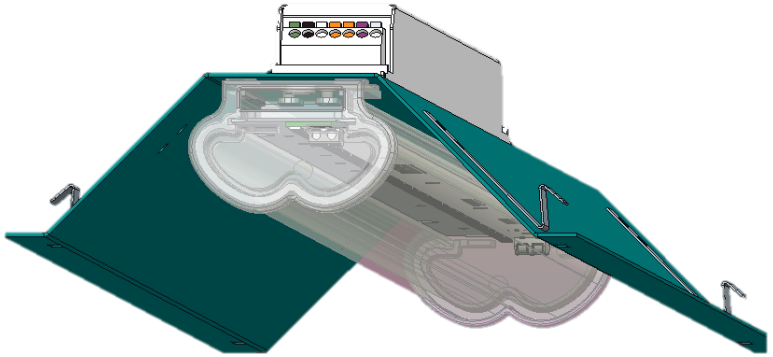
Circular Design

Circular design guidelines





1. Driver
2. Driver retaining screws
3. Optic retaining screws
4. Reflector
5. Optic end caps
6. Optic
7. LED board

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A Holistic approach to sustainability

Sustainable packaging solution for reducing packaging waste:

V

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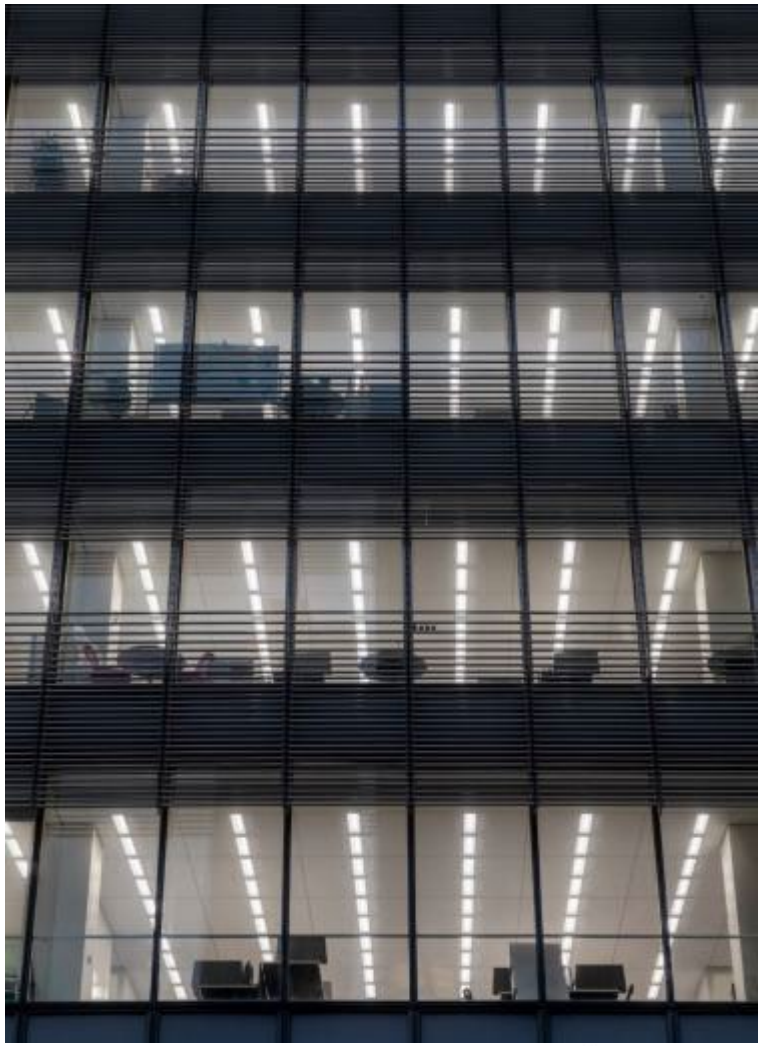

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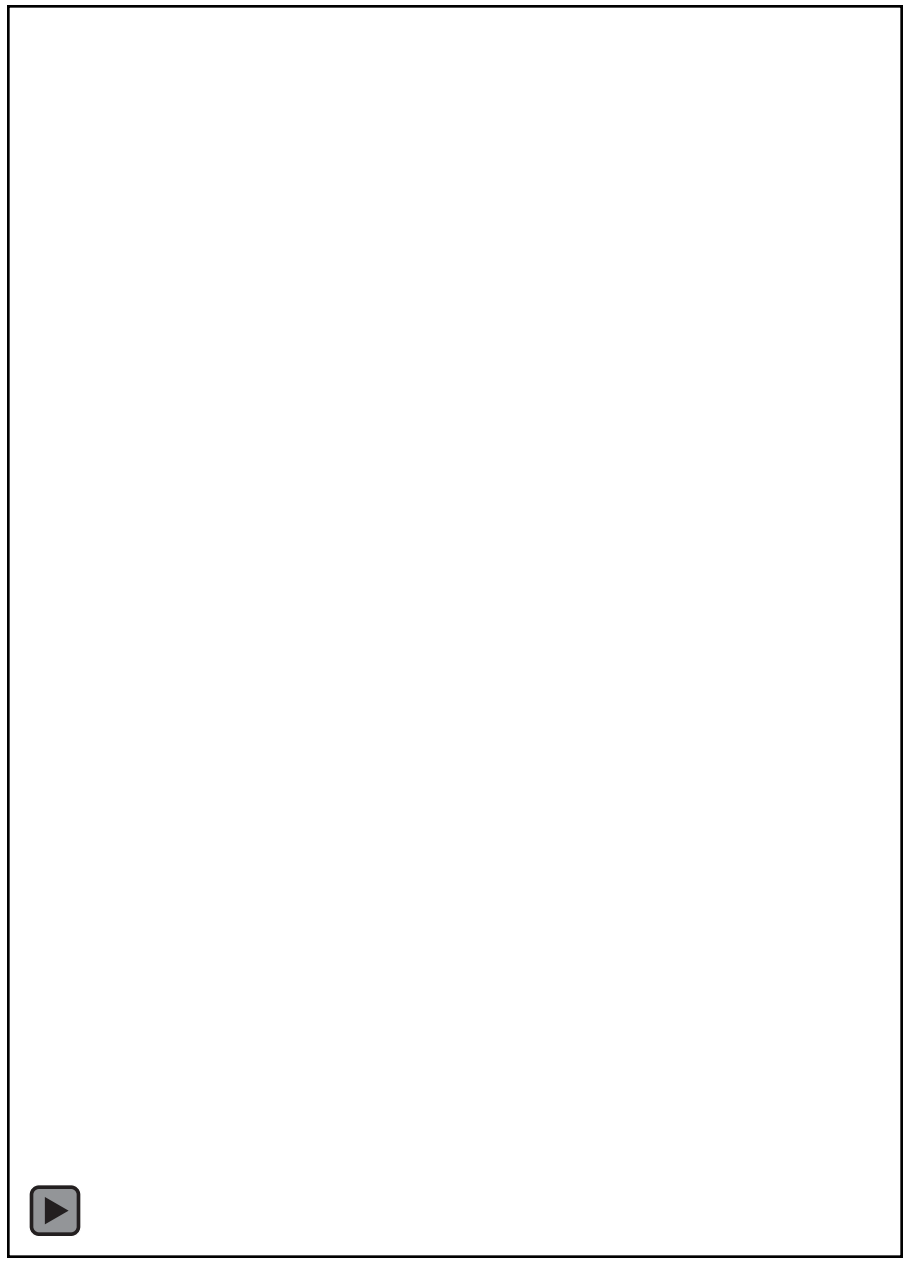

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EXIT


Times

Summary

- 80 – 90% of original luminaire reused in the solution
- 50% energy reduction changing the source from fluorescent to LED
- DLC Qualified luminaire
- No plastic packaging
- Less cardboard used for lighter, smaller shipping footprint

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This concludes The American Institute of Architects Continuing Education Systems Course

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