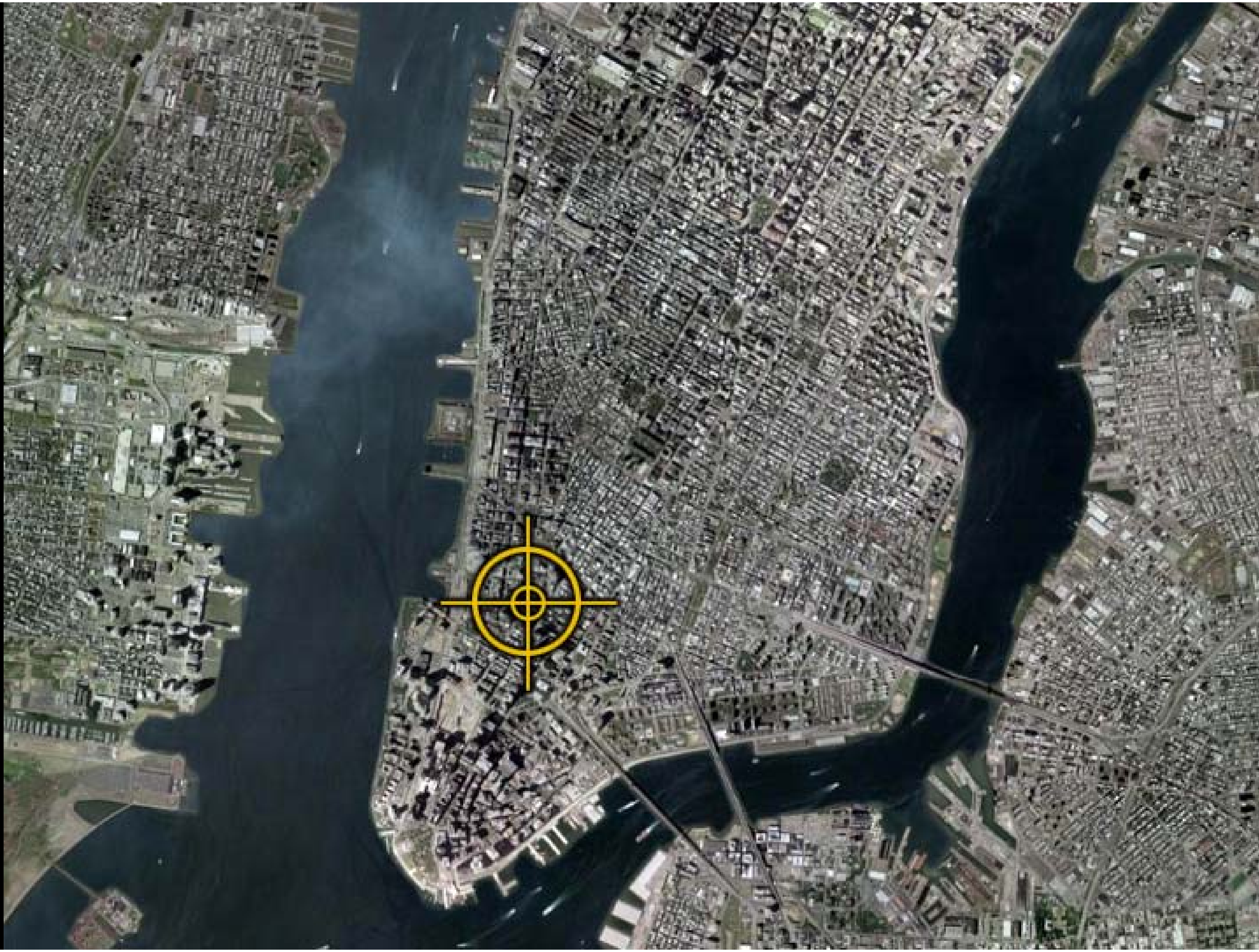
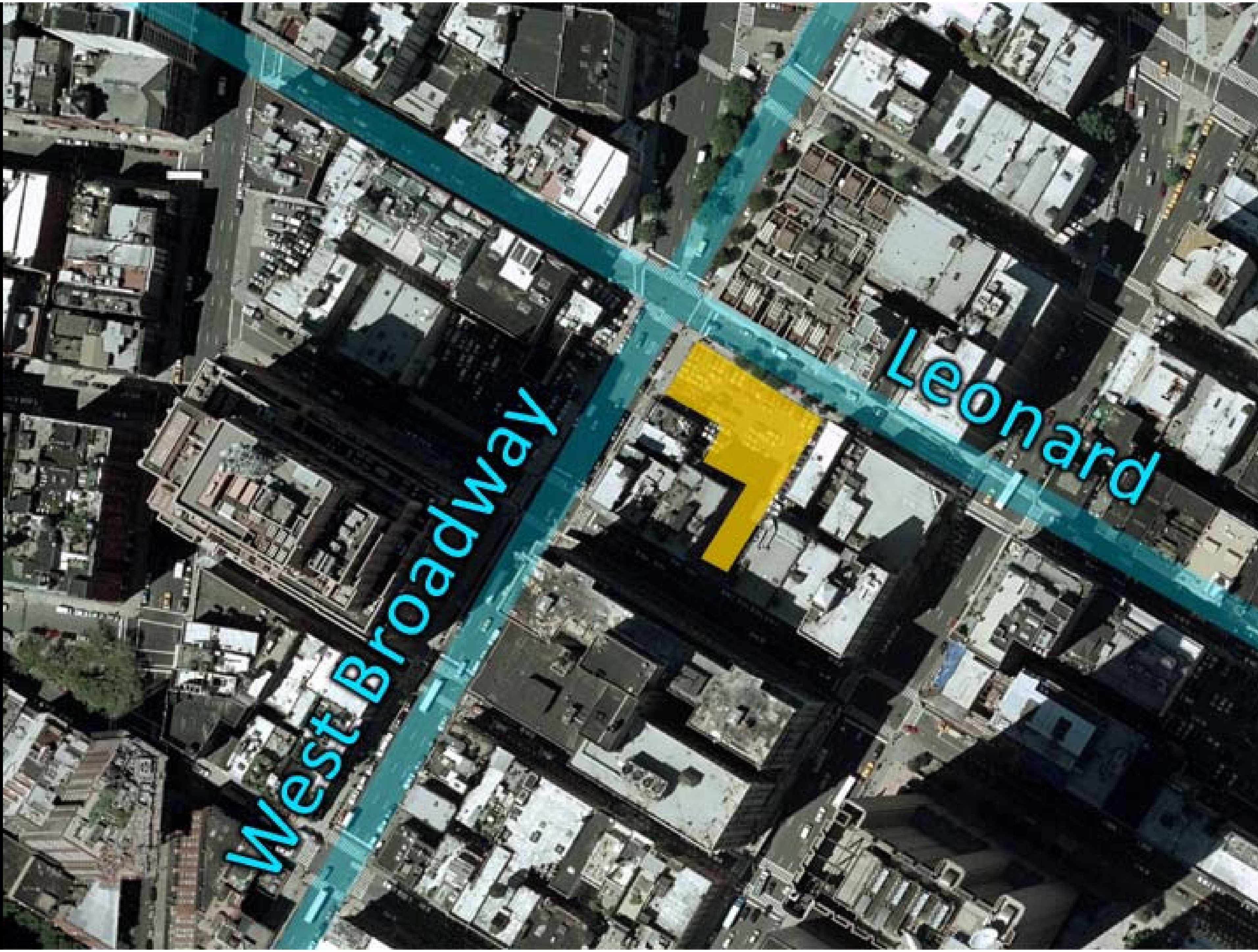
NEW YORK LAW SCHOOL

NEW COMMUNITY FACILITY




West Broadway
Leonard


West Broadway
Leonard

General Building Information

185 West Broadway, New York, NY

207,192 ft^2

6 floors above grade, 4 floors below grade

$80 million total cost estimate

Construction: 2006 to 2010

Delivery: CM Agency hires subcontractors

Companies Involved

Client: New York Law School

Management: Studley, Inc

Project Manager: VVA

Architect / Lighting Designer: Smithgroup

MEP / Lighting Designer: Jaros, Baum & Bolles (JBB)

Structural Engineers: Thornton Tomasetti

Architectural Features

Transparent glass façade on northwest side

Deep basement with slurry wall

- 4 Levels, 60 ft below grade
- Classrooms, library – not just service space

Architectural themes

- Modern
- Professional
- Linear elements
- Transparency


N
E
W
S

Main Entry Lobby: Design Goals

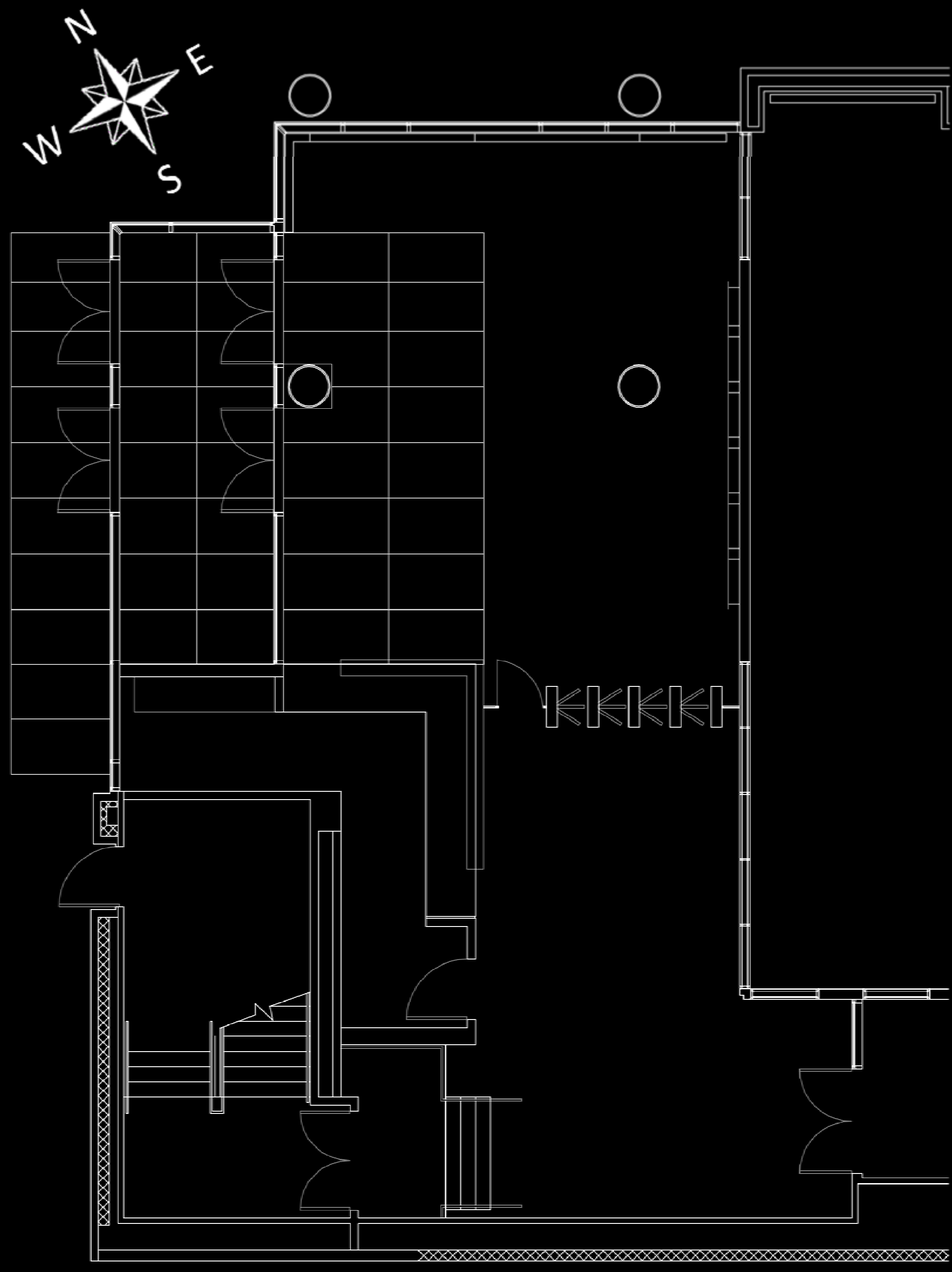
High-quality first impression
- The first space that visitors see

Connect interior and exterior
- Architectural theme of transparency

Use light to guide flow

Set a strong, consistent theme for the rest of the building

Meet ASHRAE 90.1-2004 energy code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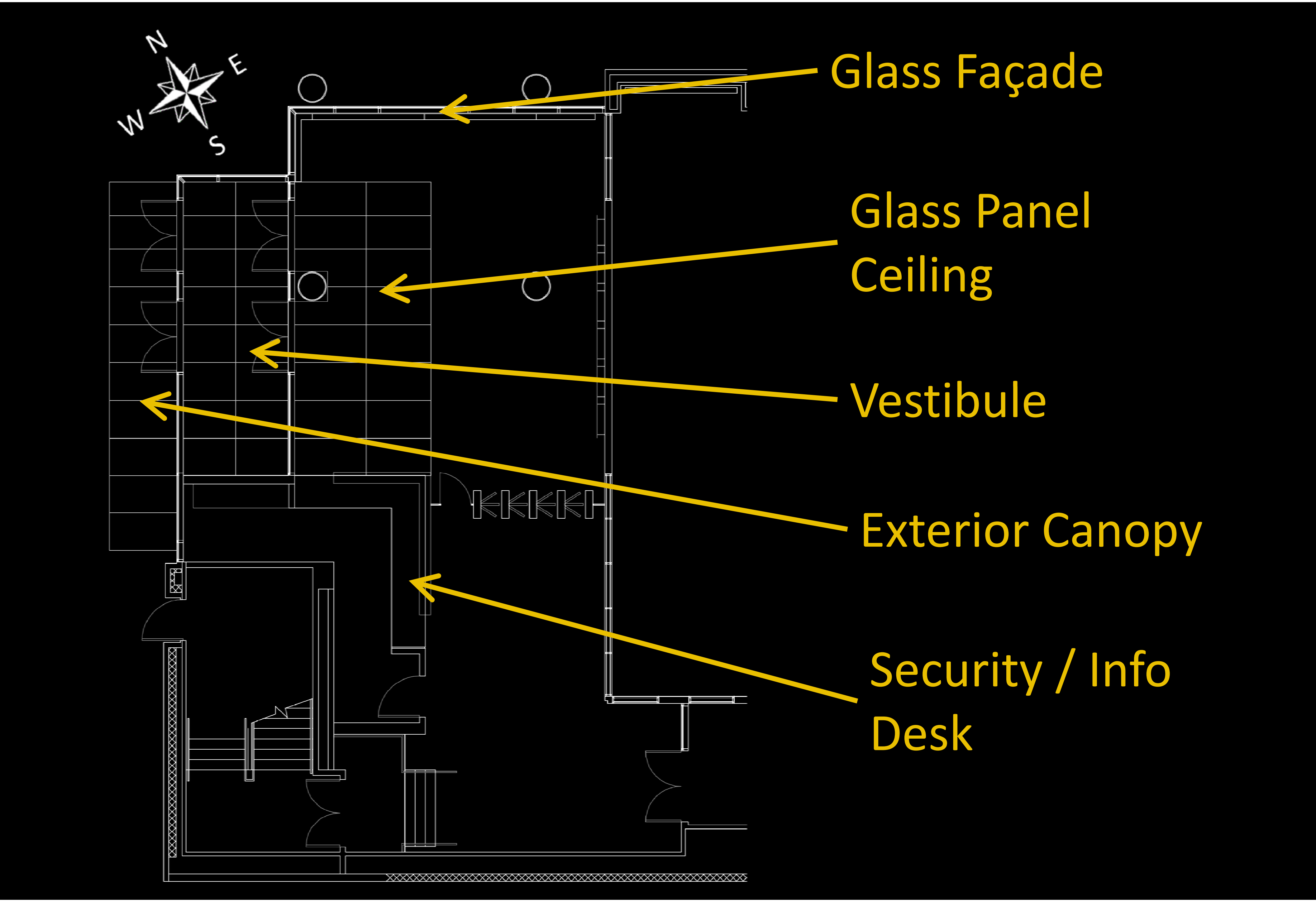
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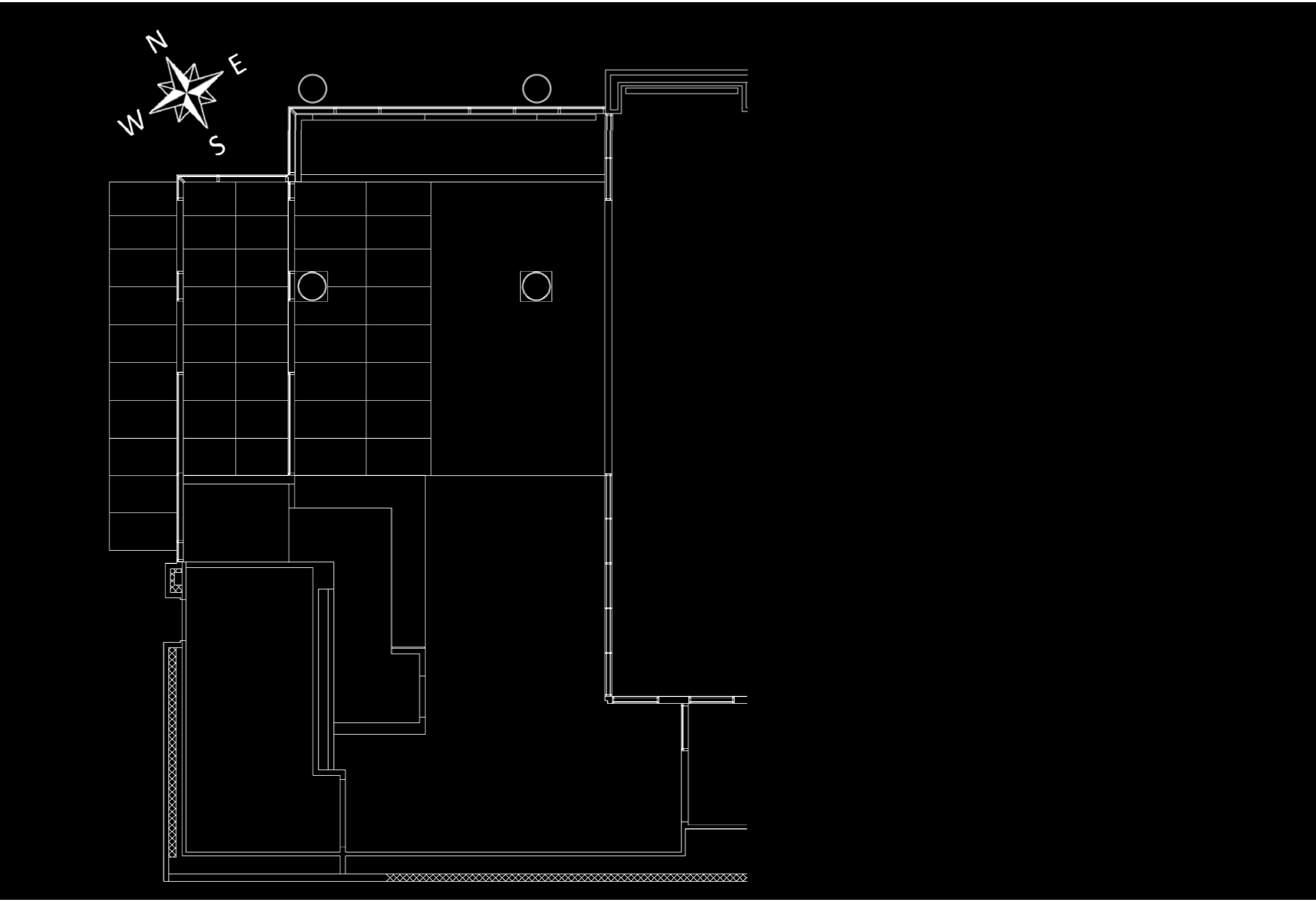
Glass Façade
Glass Panel Ceiling
Vestibule
Exterior Canopy
Security / Info Desk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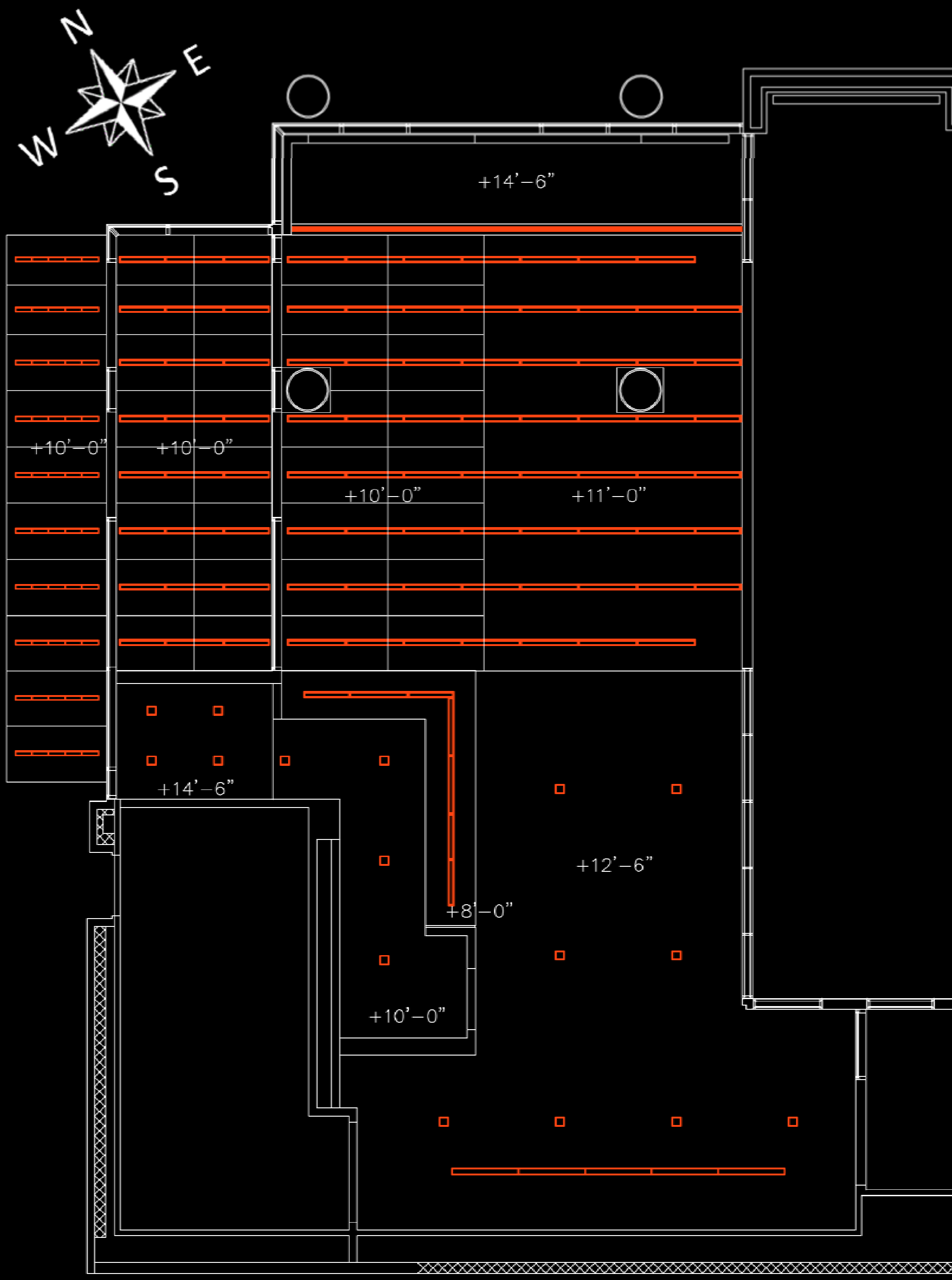
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+14'–6"
+10'–0"
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+14'–6"
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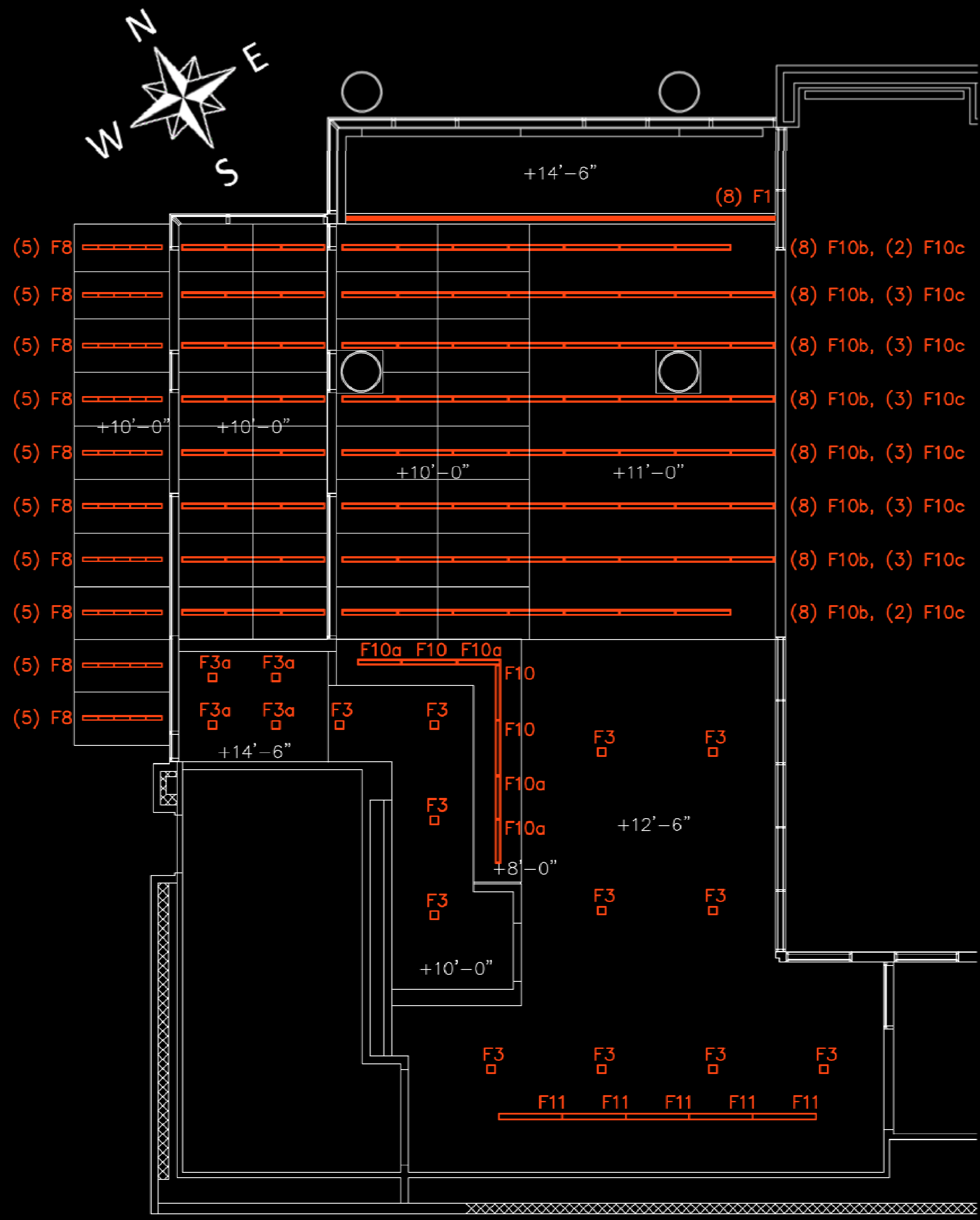
+8'–0"
+10'–0"



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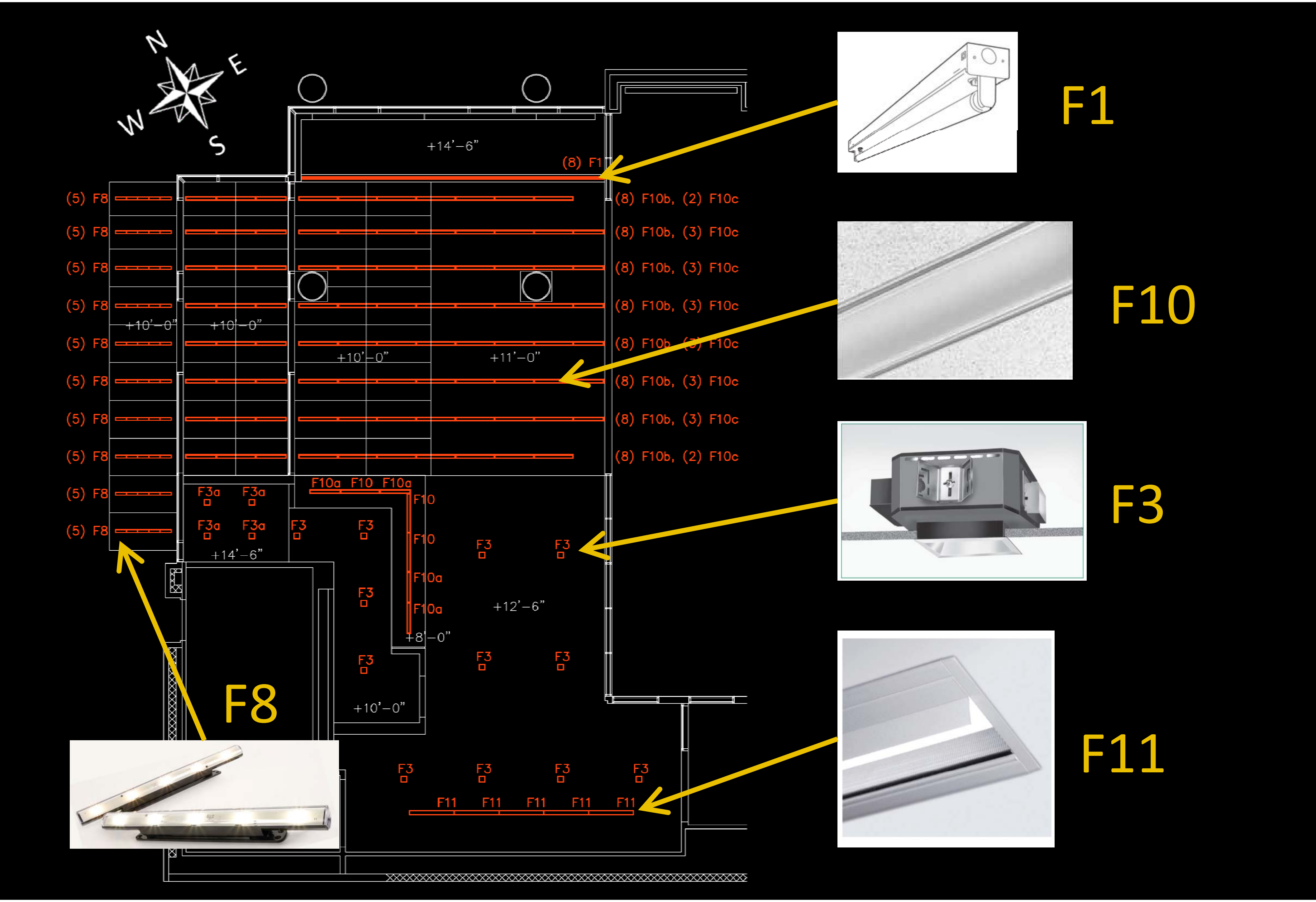
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+14'–6"
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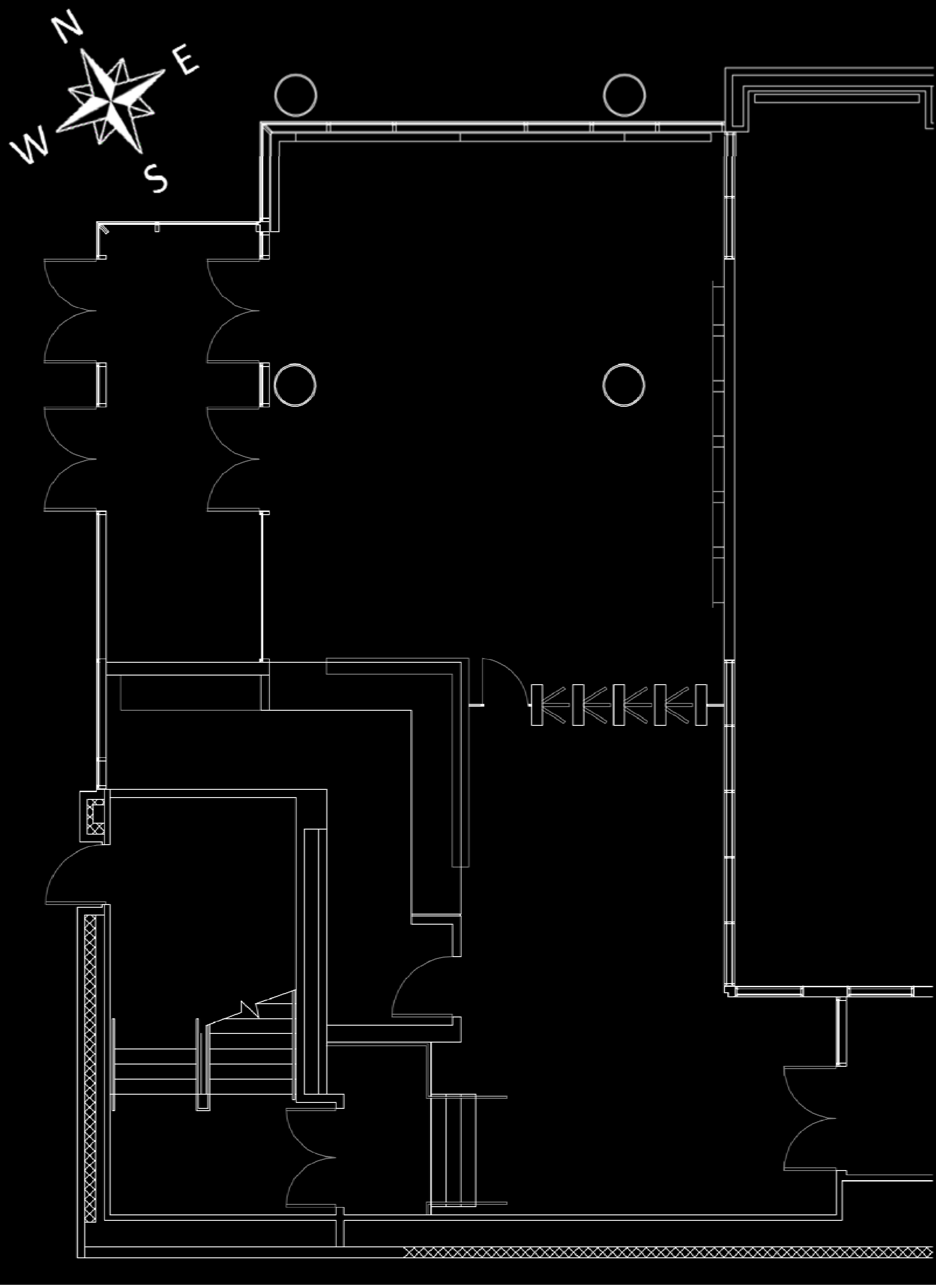
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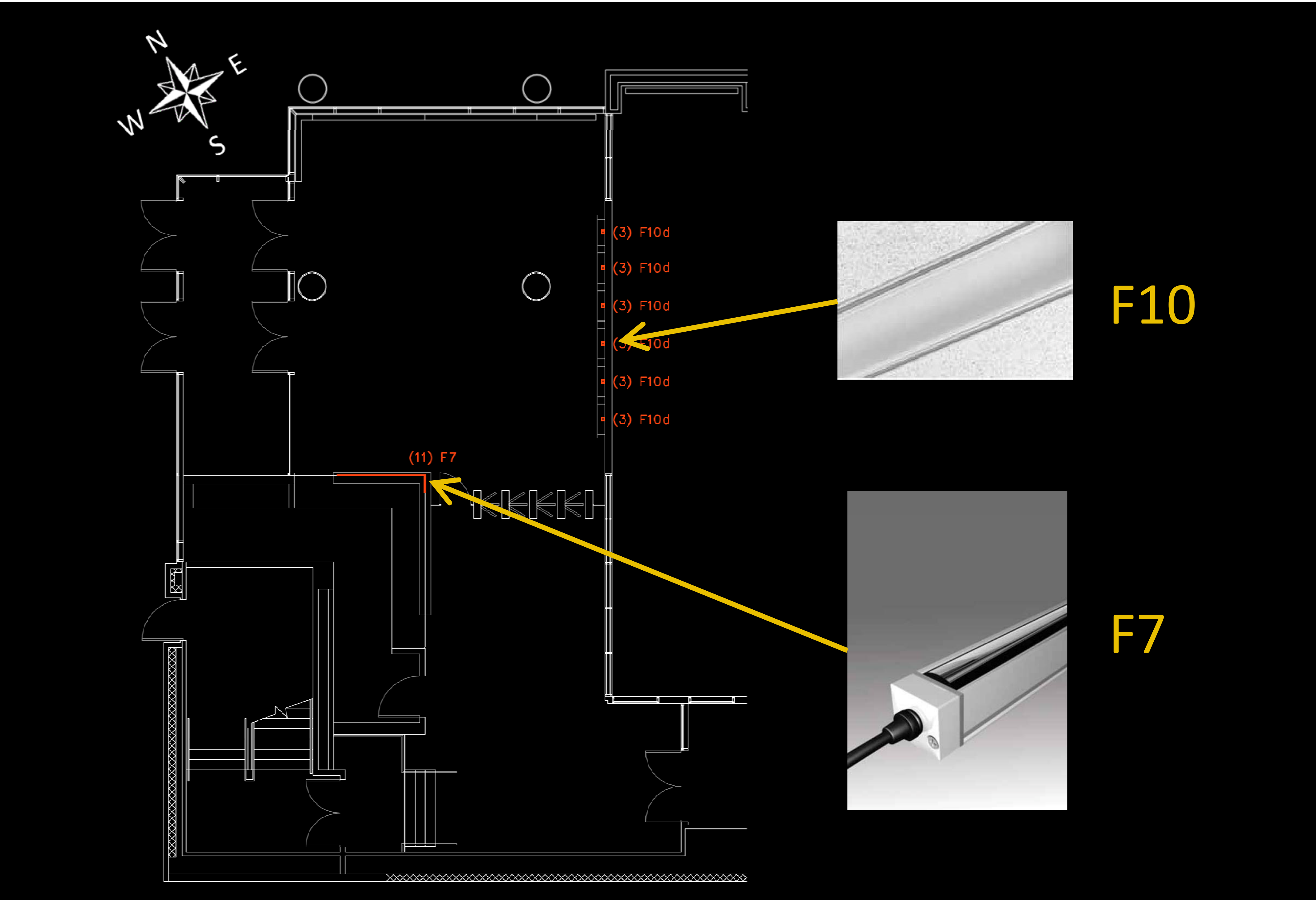

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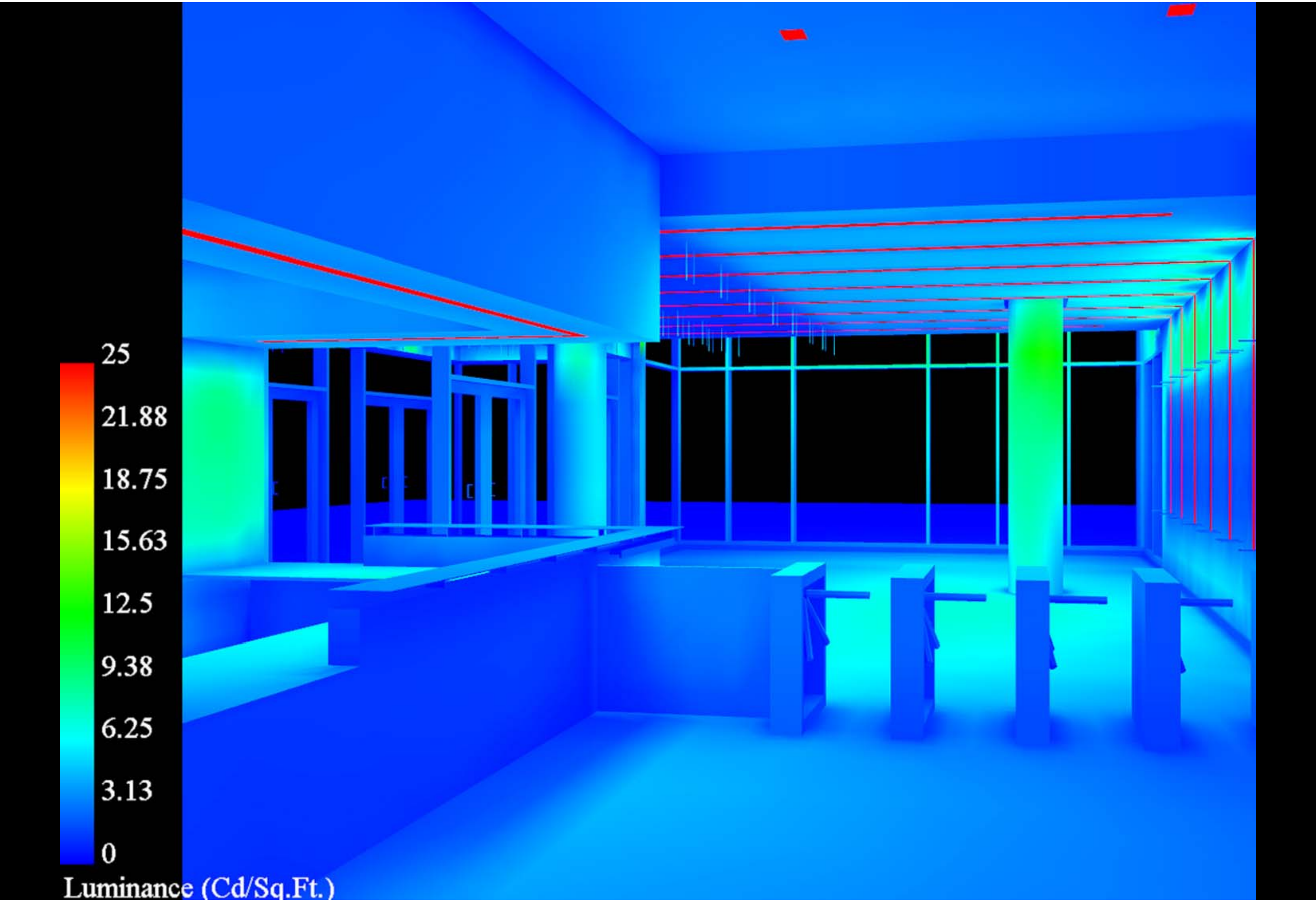
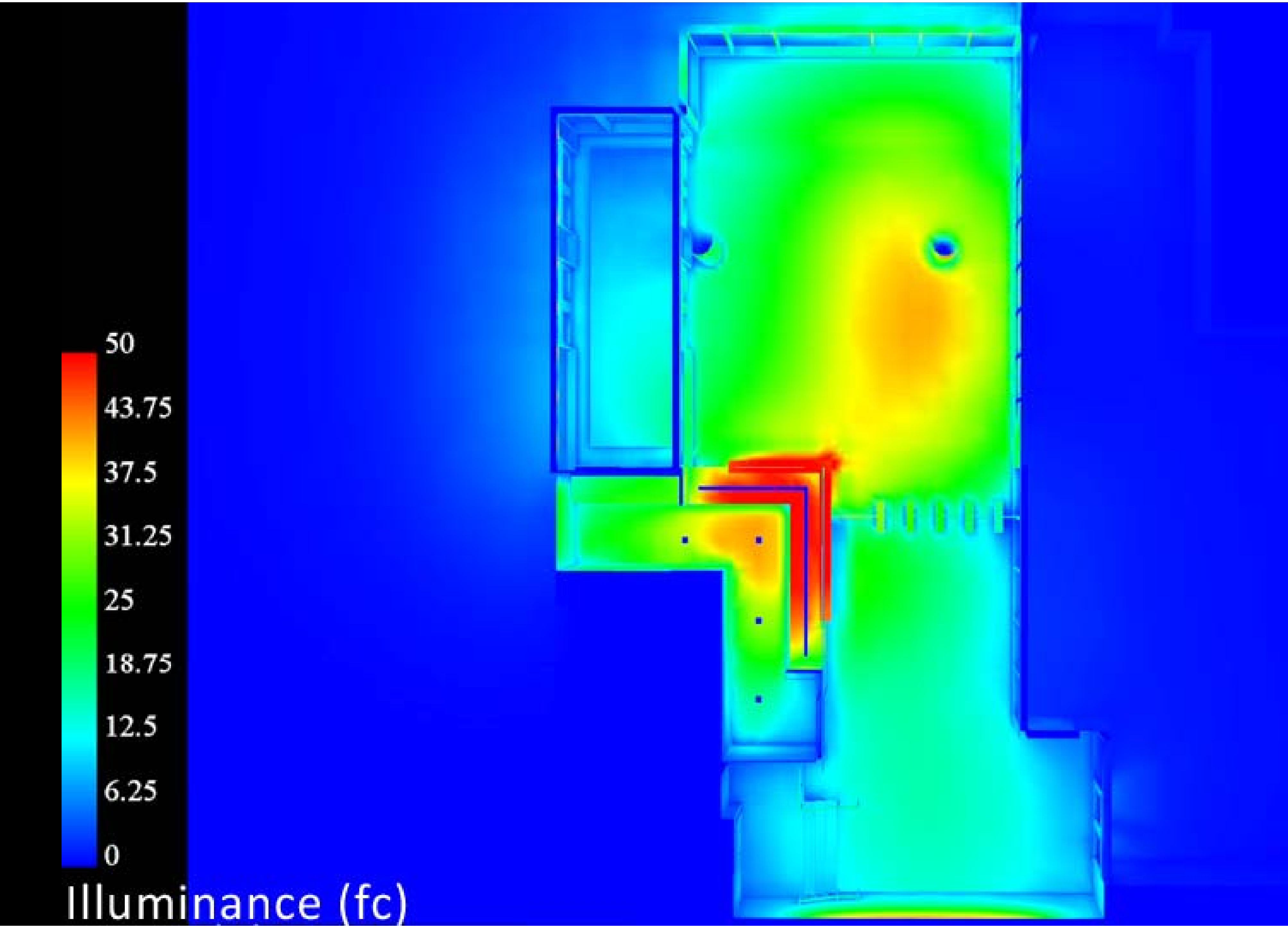
(11) F7
F10
F7


25
21.88
18.75
15.63
12.5
9.38
6.25
3.13
0
Luminance (Cd/Sq.Ft.)

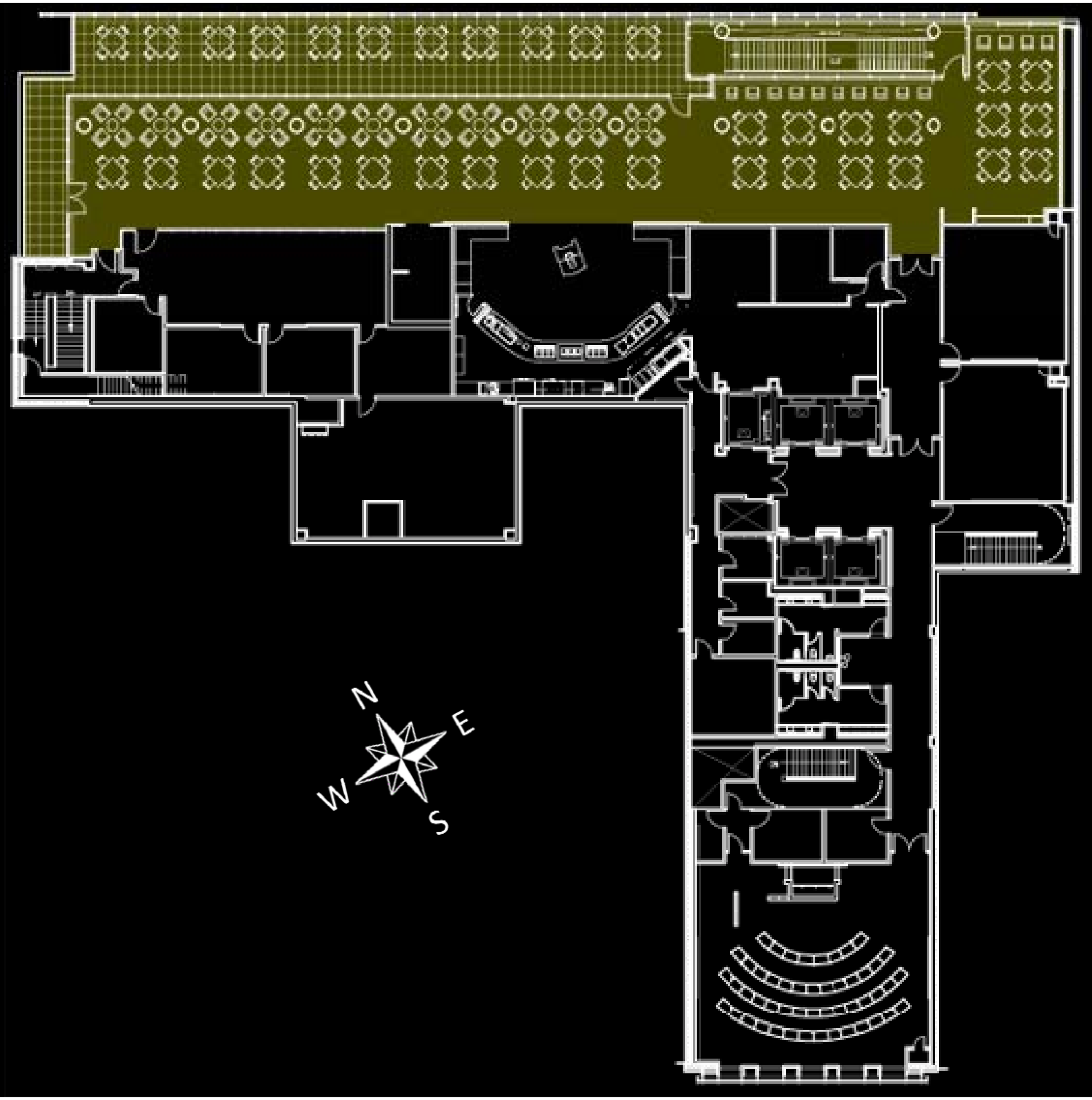

50
43.75
37.5
31.25
25
18.75
12.5
6.25
0
Illuminance (fc)

Main Entry Lobby: Summary

Connect interior and exterior
- o Linear sources start outside, continue inside, wrap around wall

Use light to guide flow
- o Information desk highlighted

Meet ASHRAE 90.1-2004 energy code
- o Low-power ballasts
- o Allowable: 1.3 w/ft^2 (plus 1.0 w/ft^2 decorative)
- o Existing design: 4.1 w/ft^2
- o New design: 1.29 w/ft^2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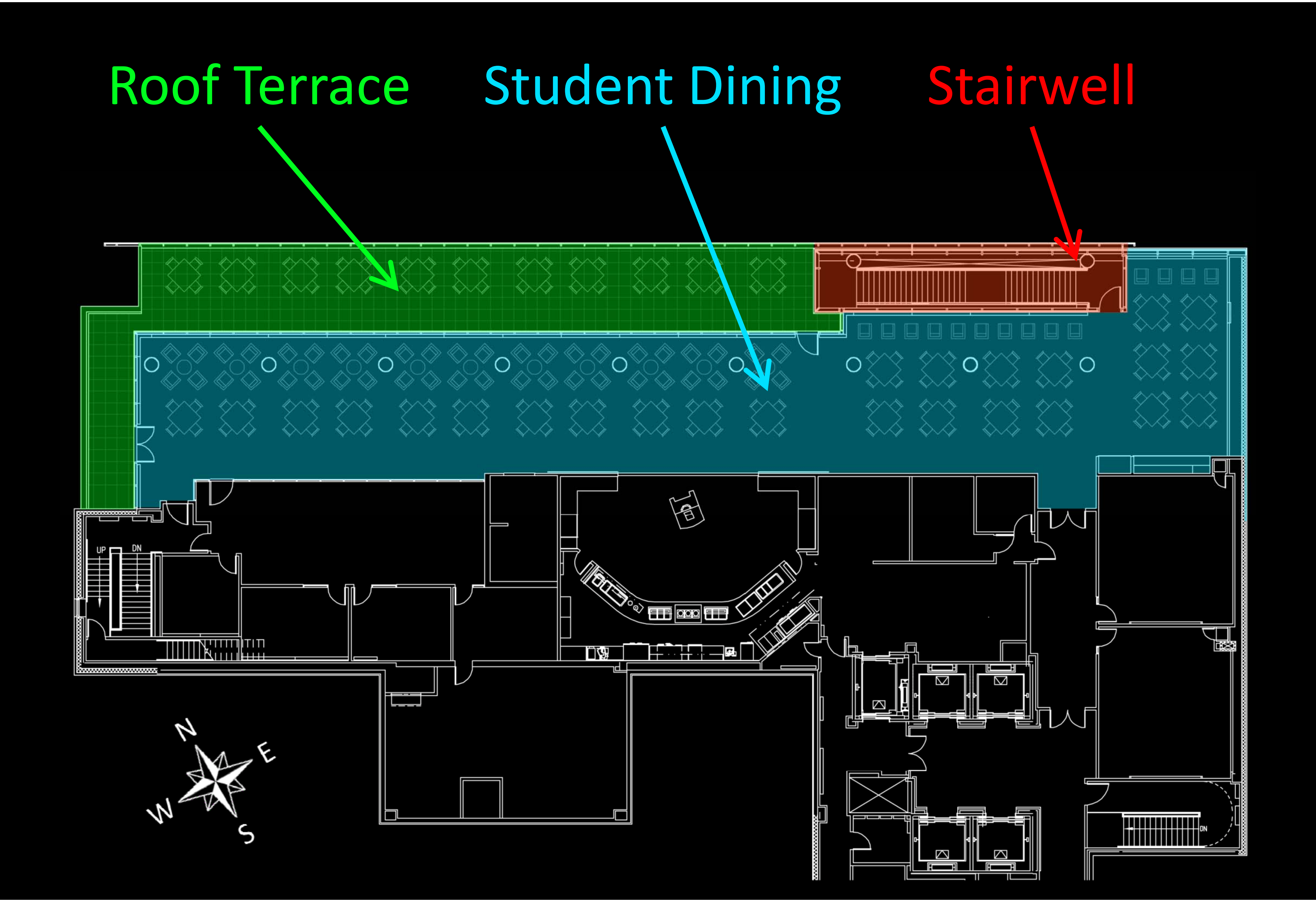


Roof Terrace
Student Dining
Stairwell
UP
DN
DN
N
E
W
S


NEW YORK
LAW SCHOOL

Daylighting Potential

North-facing glass façade

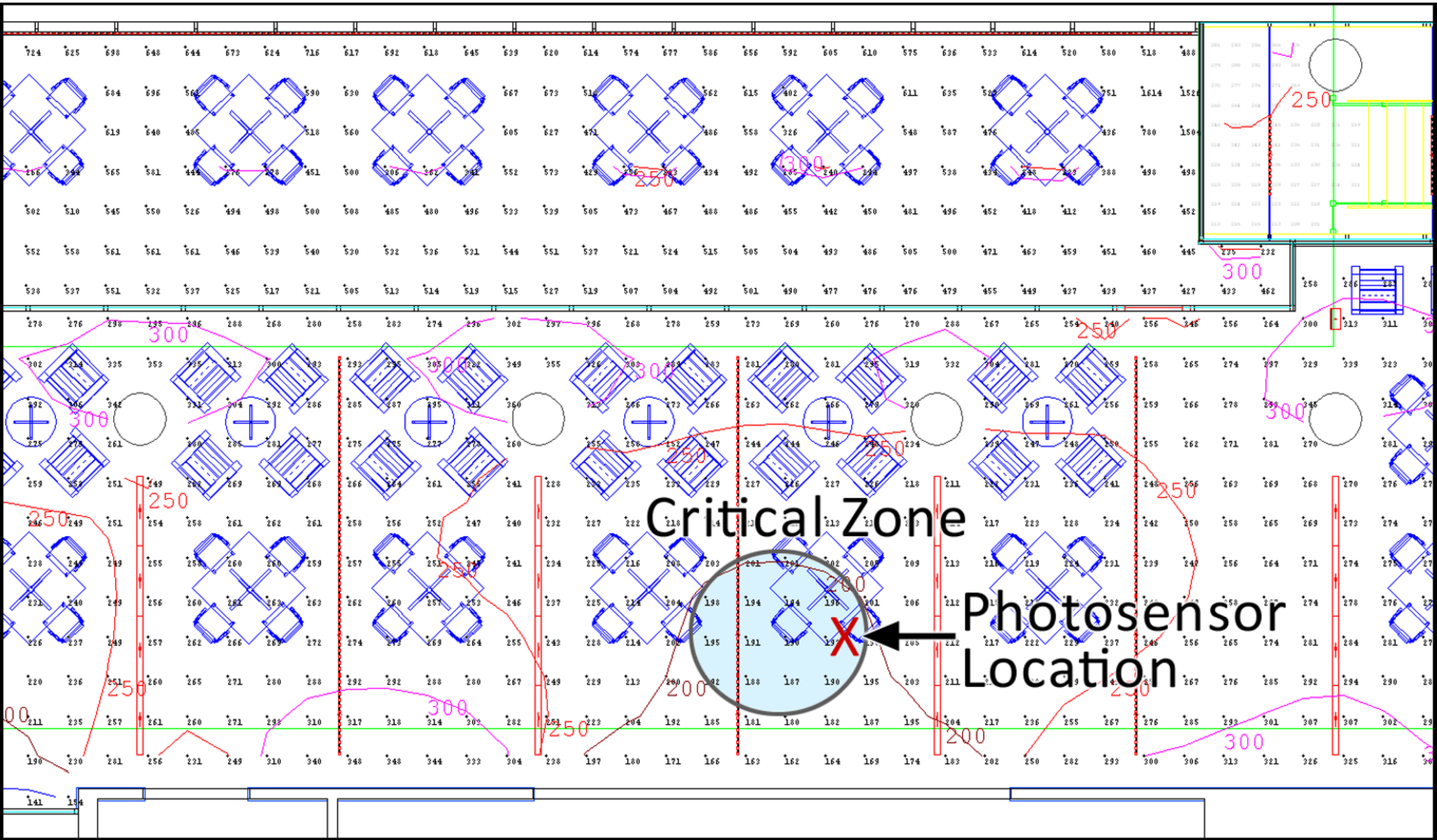
Long, narrow space along the glass façade

No critical tasks being performed (dining area)

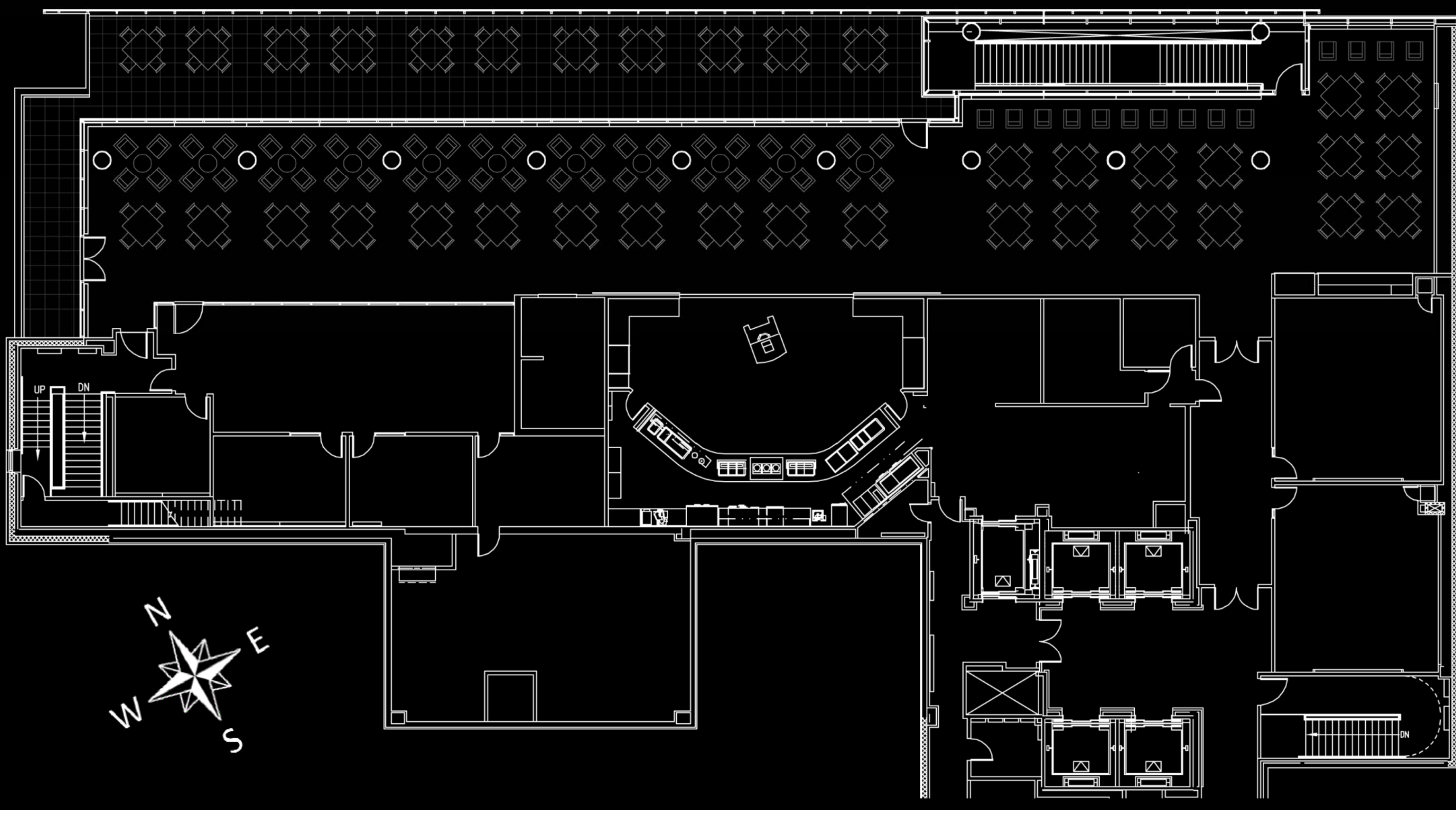
Space is ideal for a switched daylight control

Choose closed-loop photosensor
(located inside on ceiling)

Daylight Study: Summer Solstice (Video)



Critical zone: Area of lowest illuminance when taking into account daylight and light from un-switched electric lights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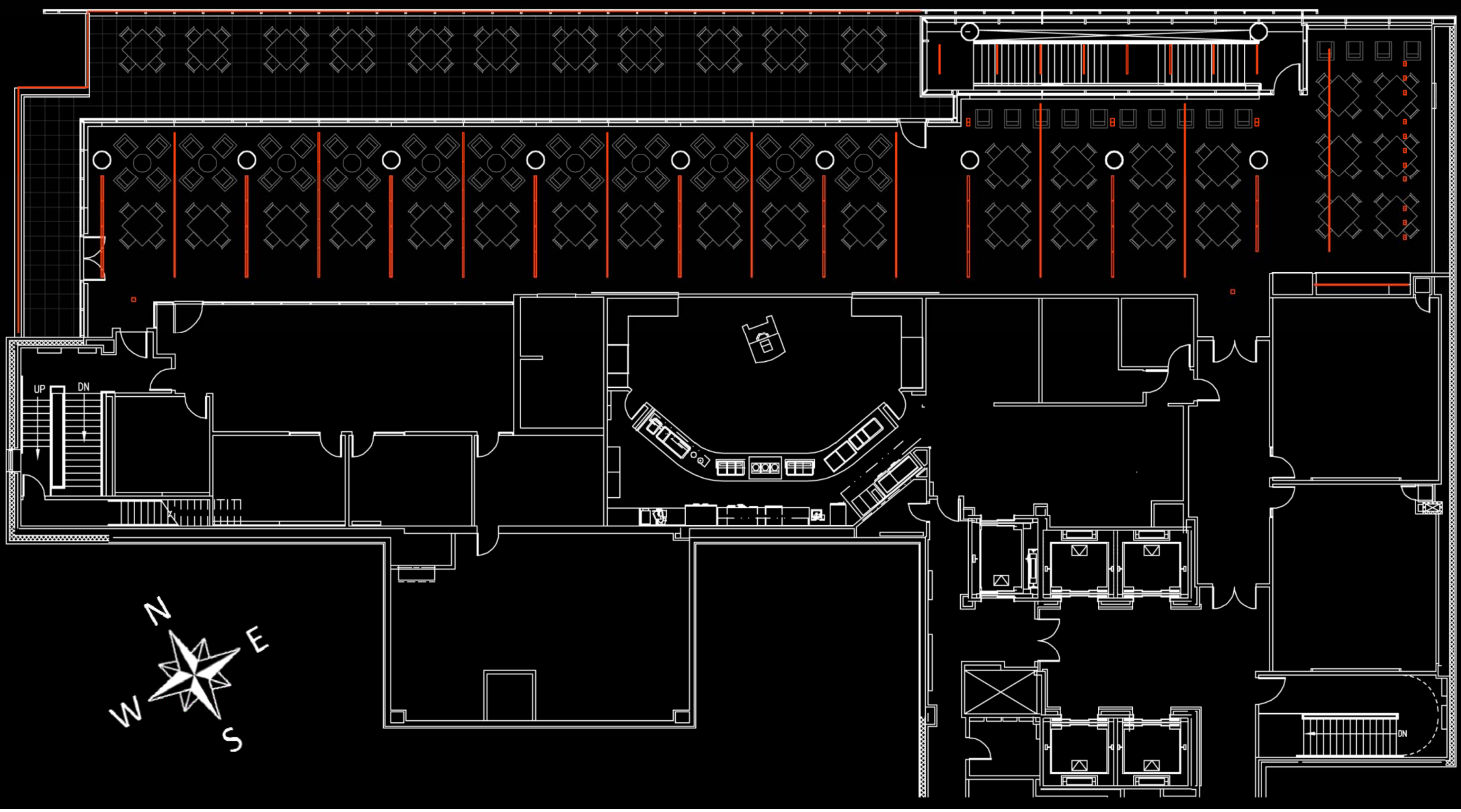
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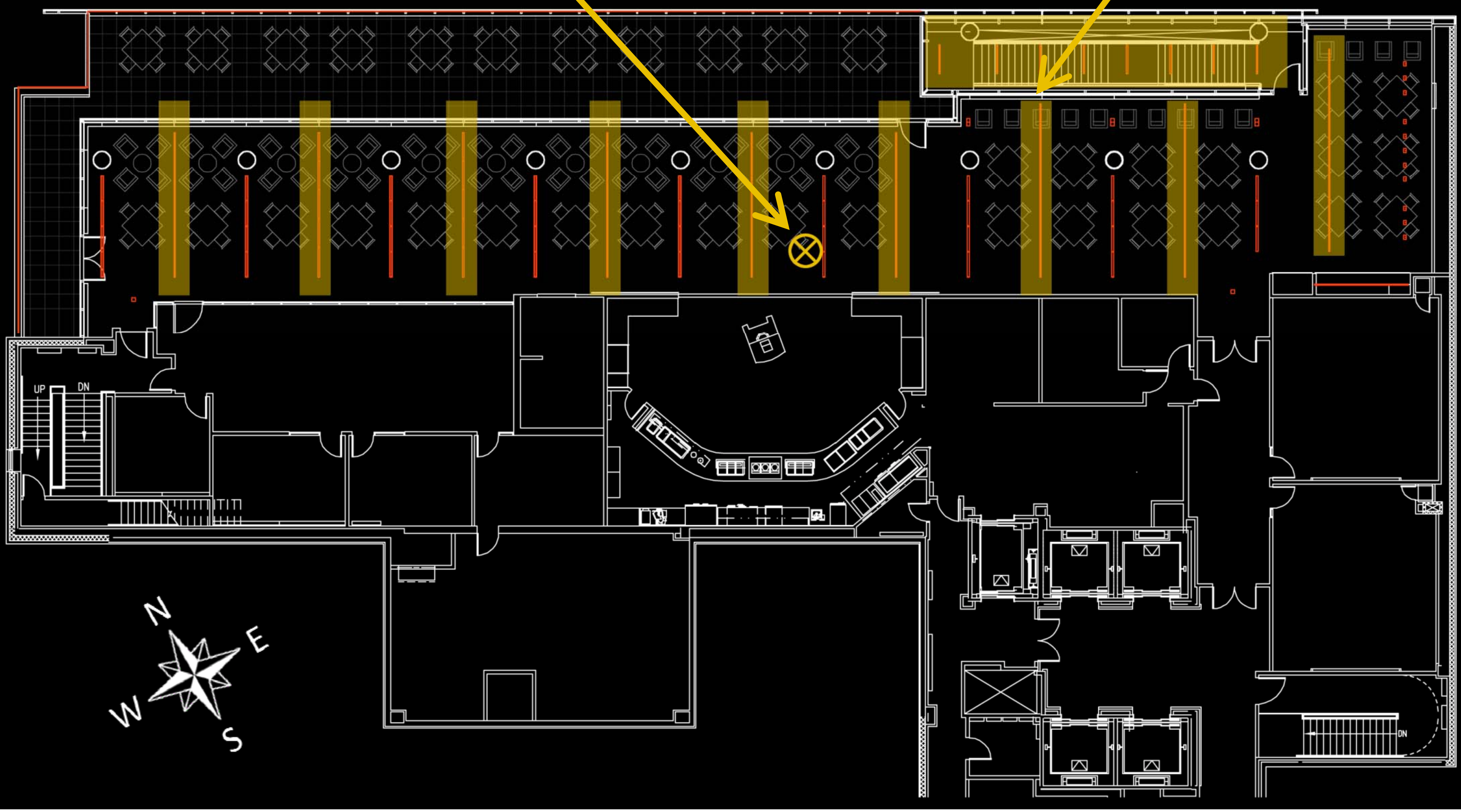
DN
N
E
W
S

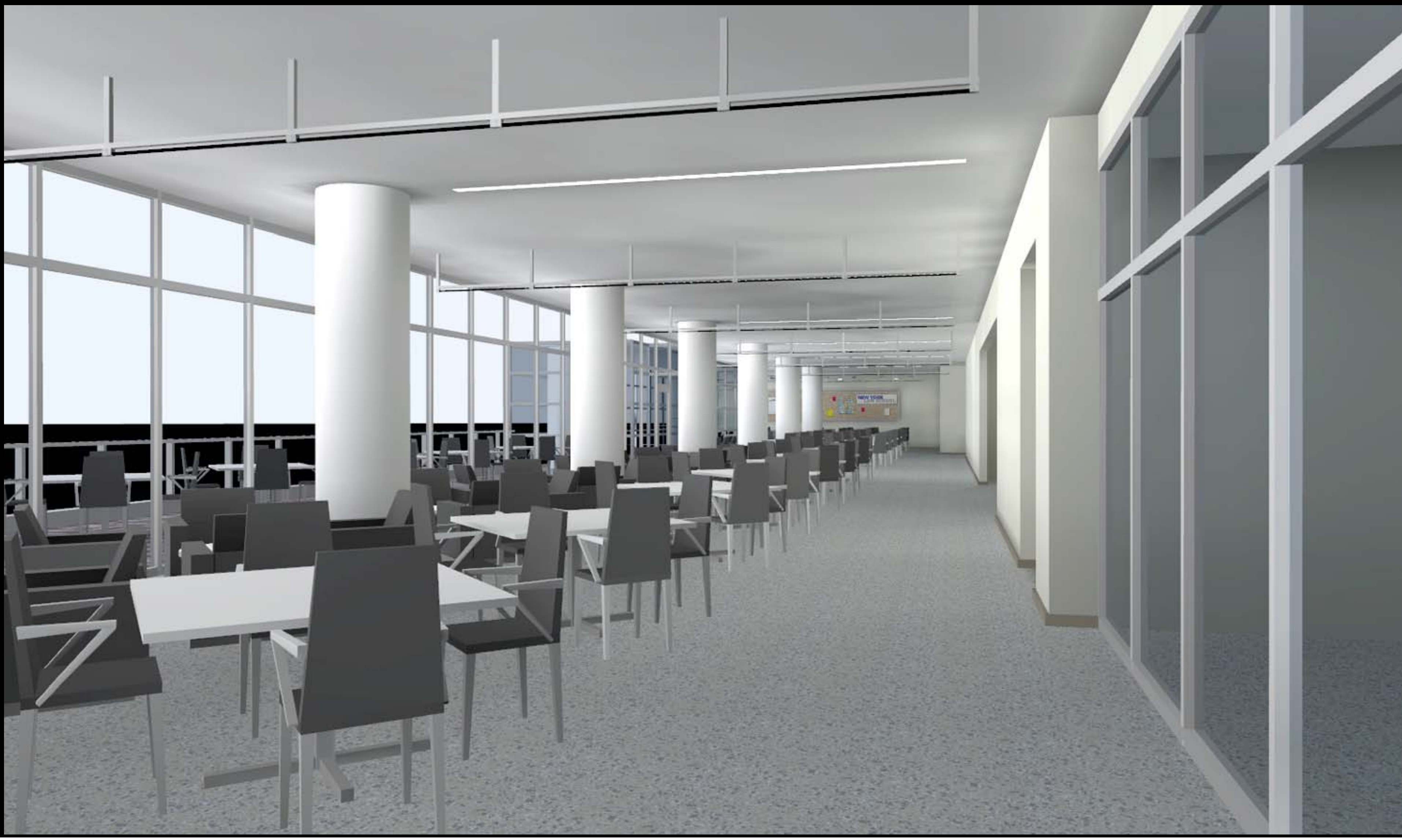
Photosensor

F2
Switched



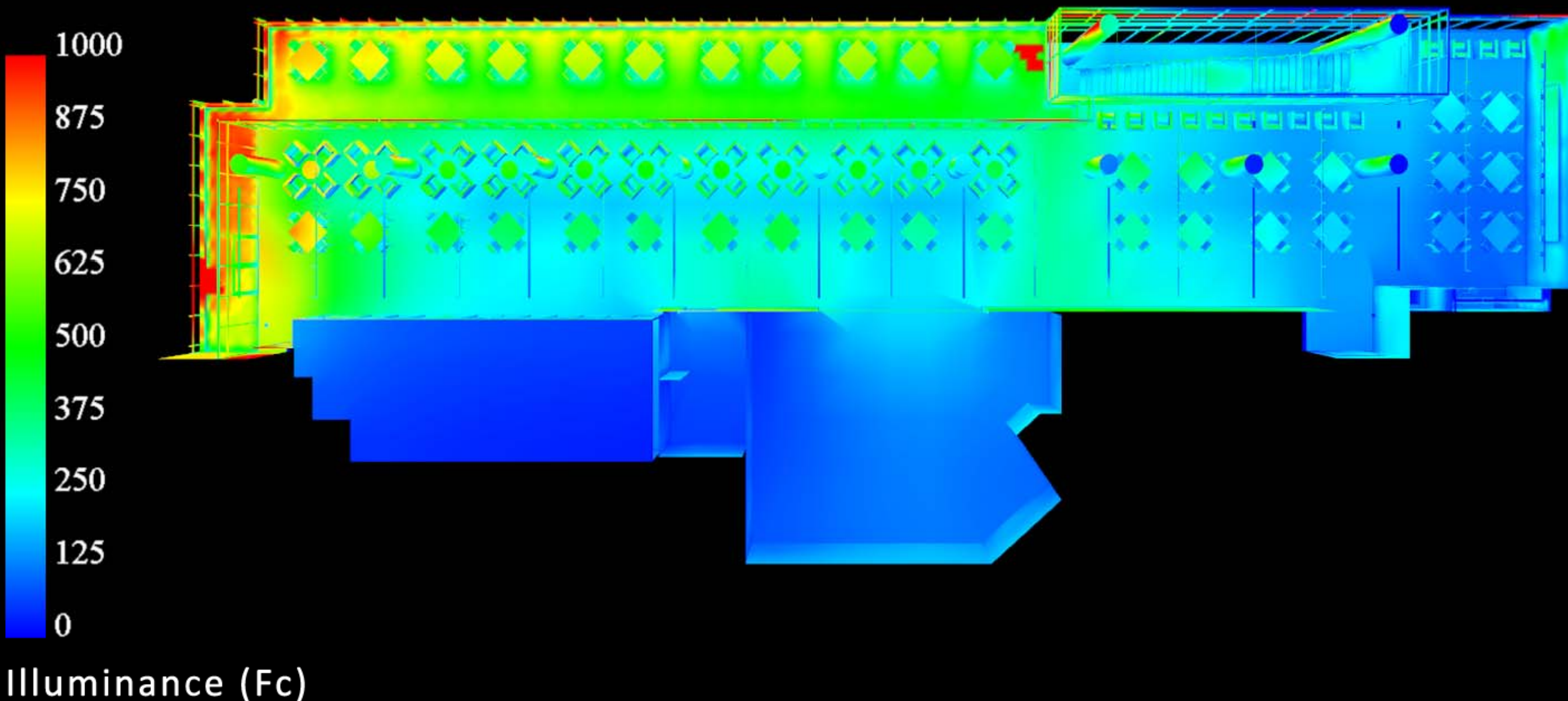
Daylight & Electric Light

Summer Solstice, 12 Noon, Clear Sky



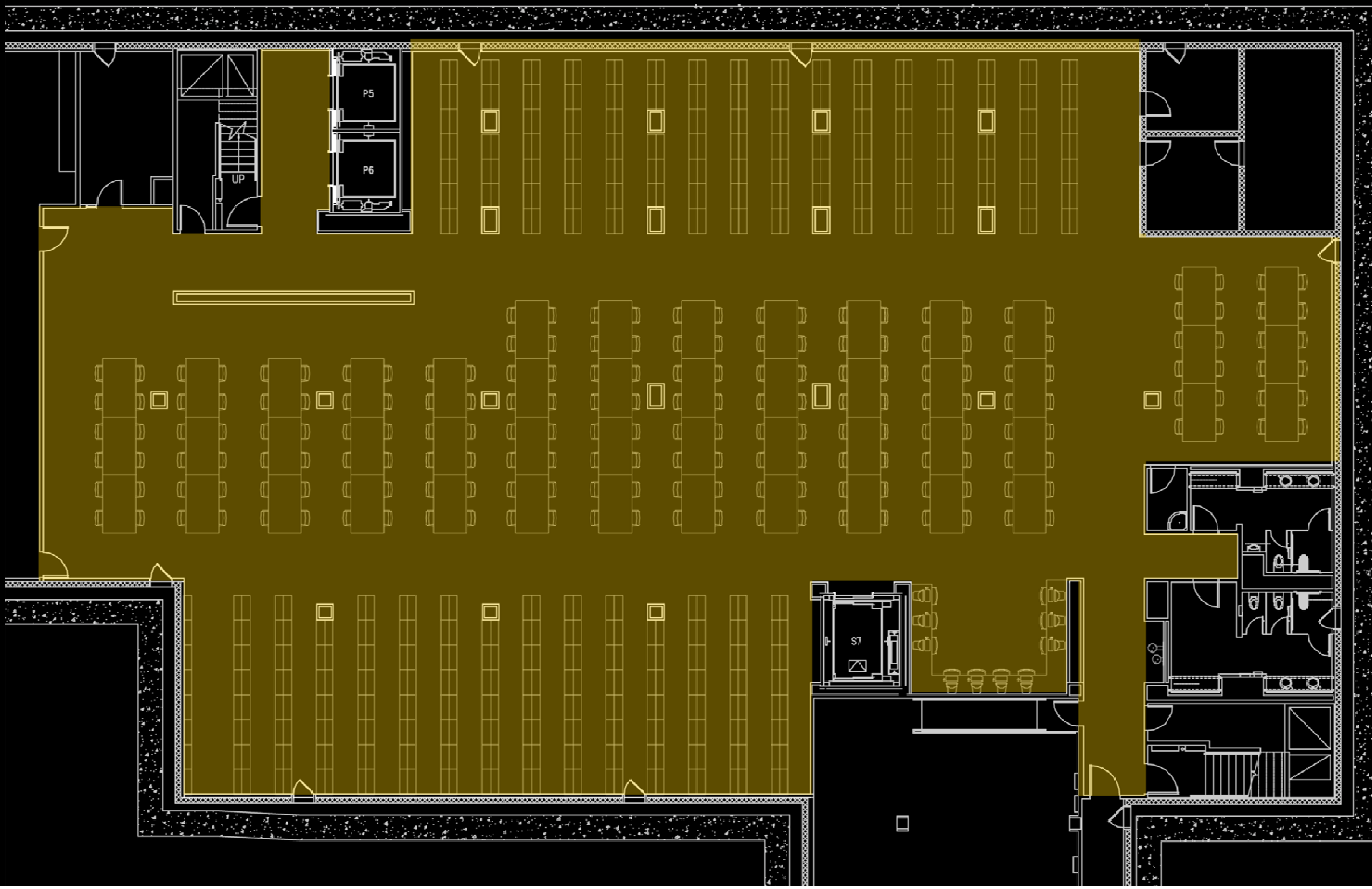
Daylight & Electric Light

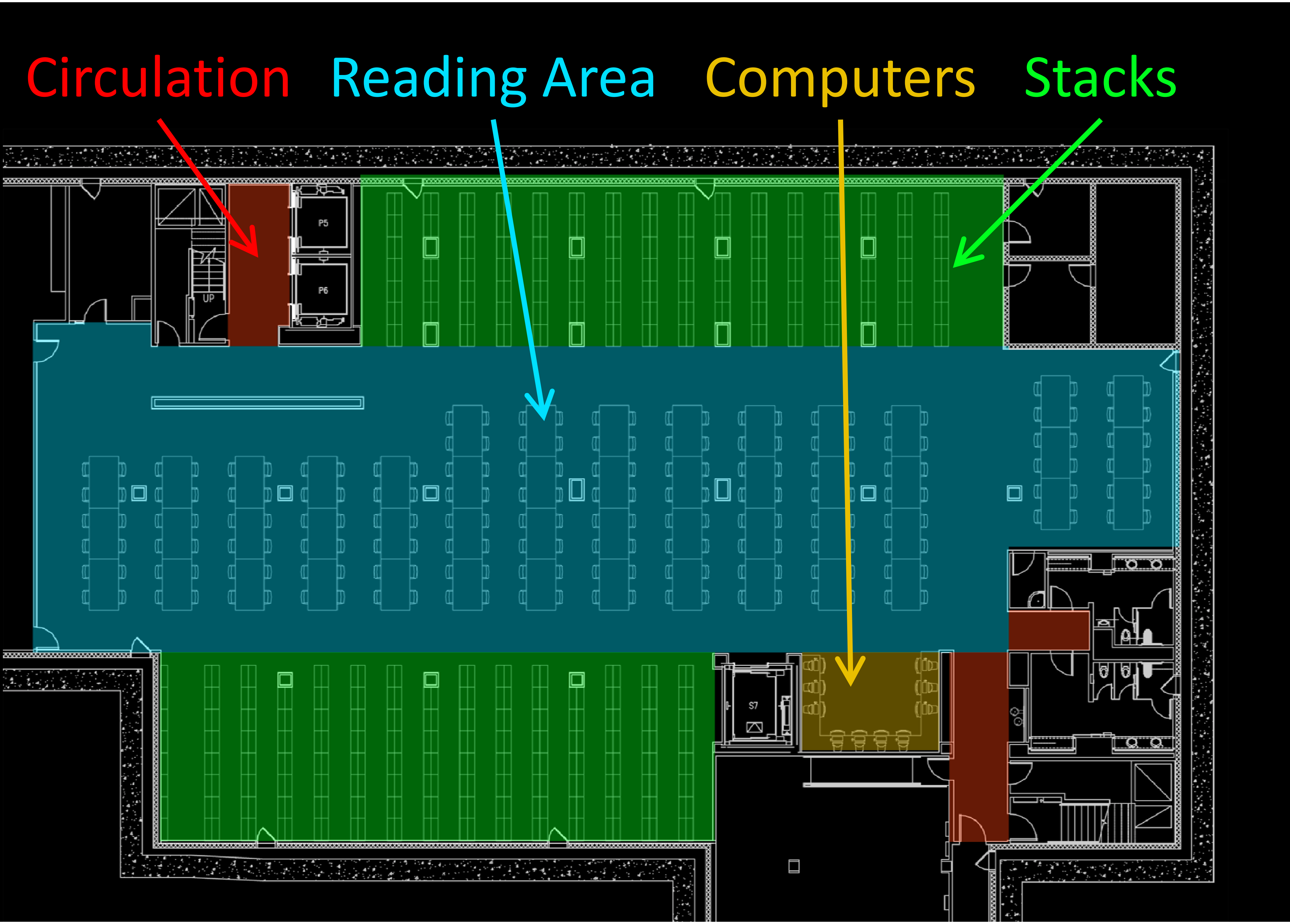
Equinox, 12 Noon, Clear Sky



Environment	Avg (Fc)	Max (Fc)	Min (Fc)	Max/Min
March 21, 12:00, Clear	249	612	129	4.75
March 21, 12:00, Overcast	208	543	54	10

P5
P6
UP
S7


P5
P6
UP
S7


Circulation
Reading Area
Computers
Stacks
P5
P6
UP
S7

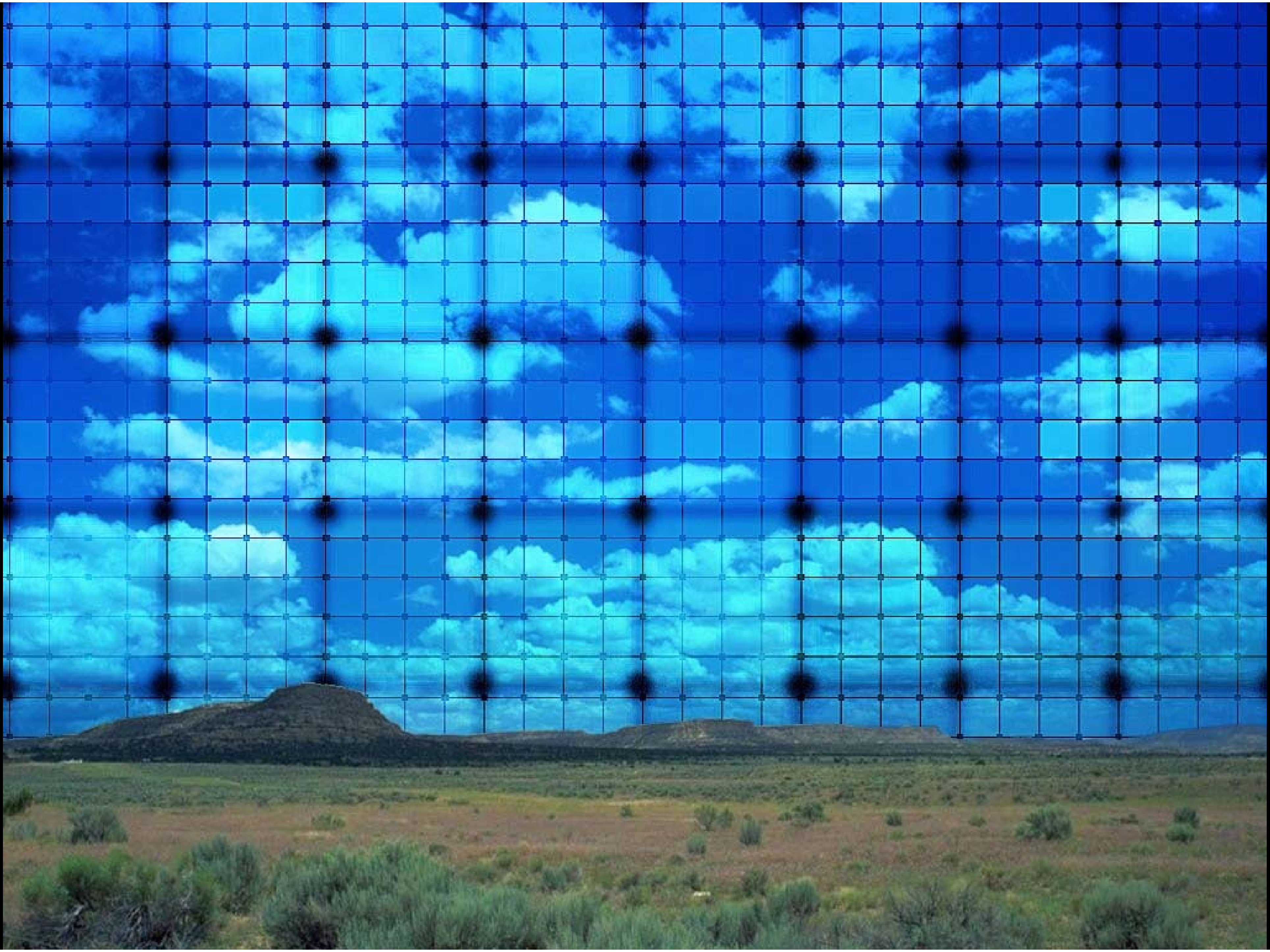
Basement Library: Design Goals

Bring life into space
- o Basement level 4 – No daylight

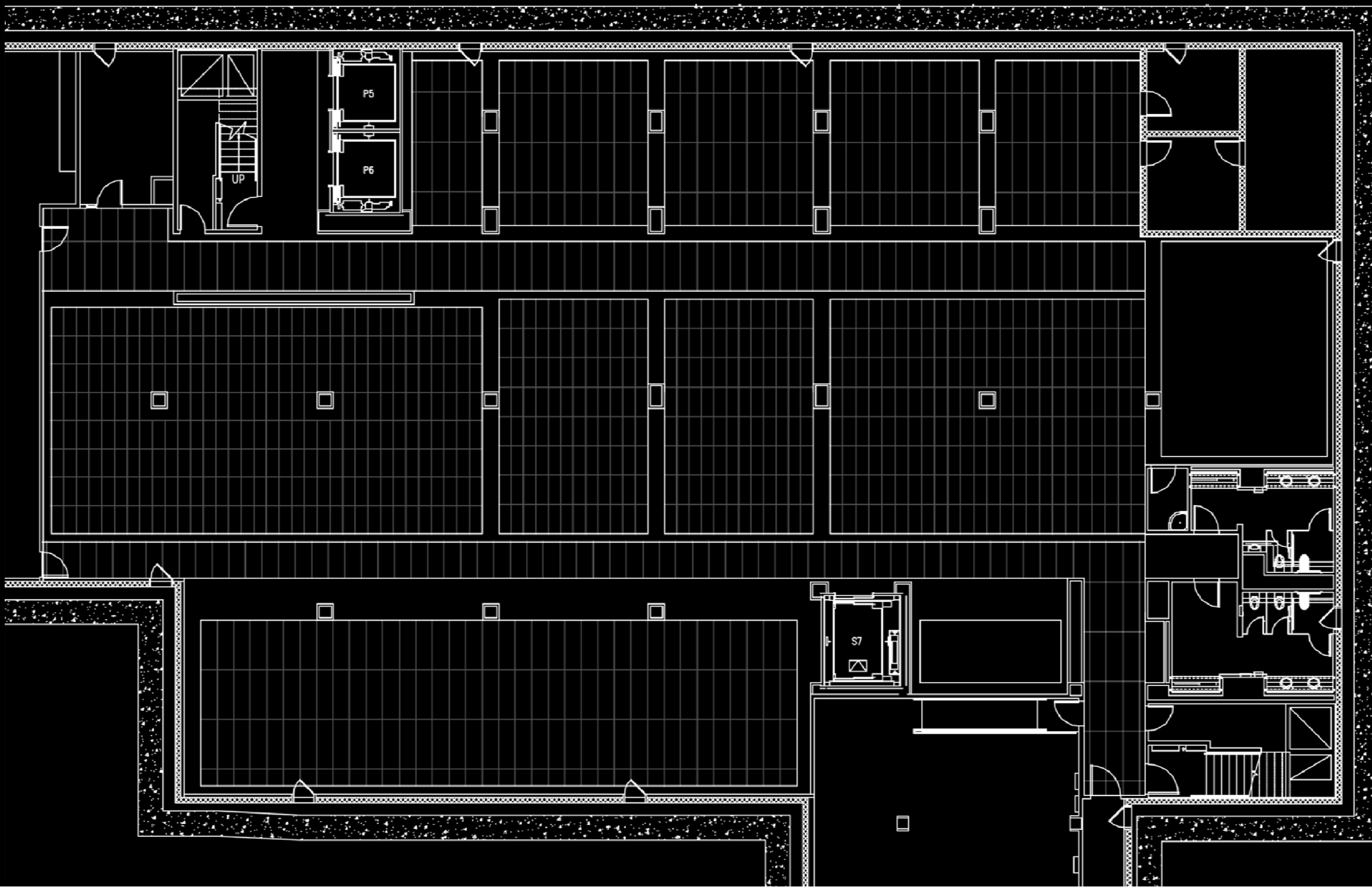
Illuminate workplane sufficiently
- o 50 fc horizontal illuminance
- o 30 fc vertical illuminance for stacks

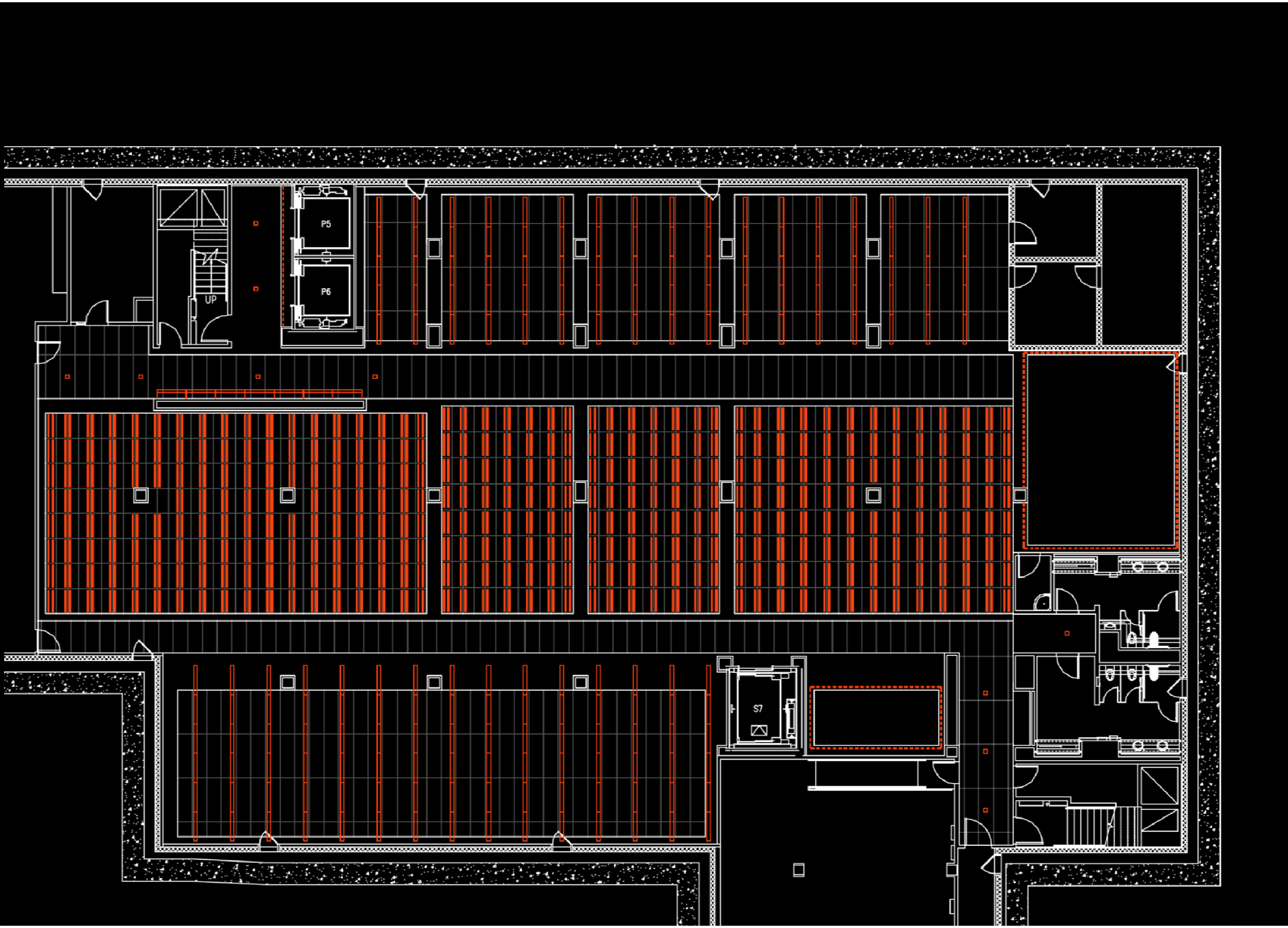
Save energy through controls

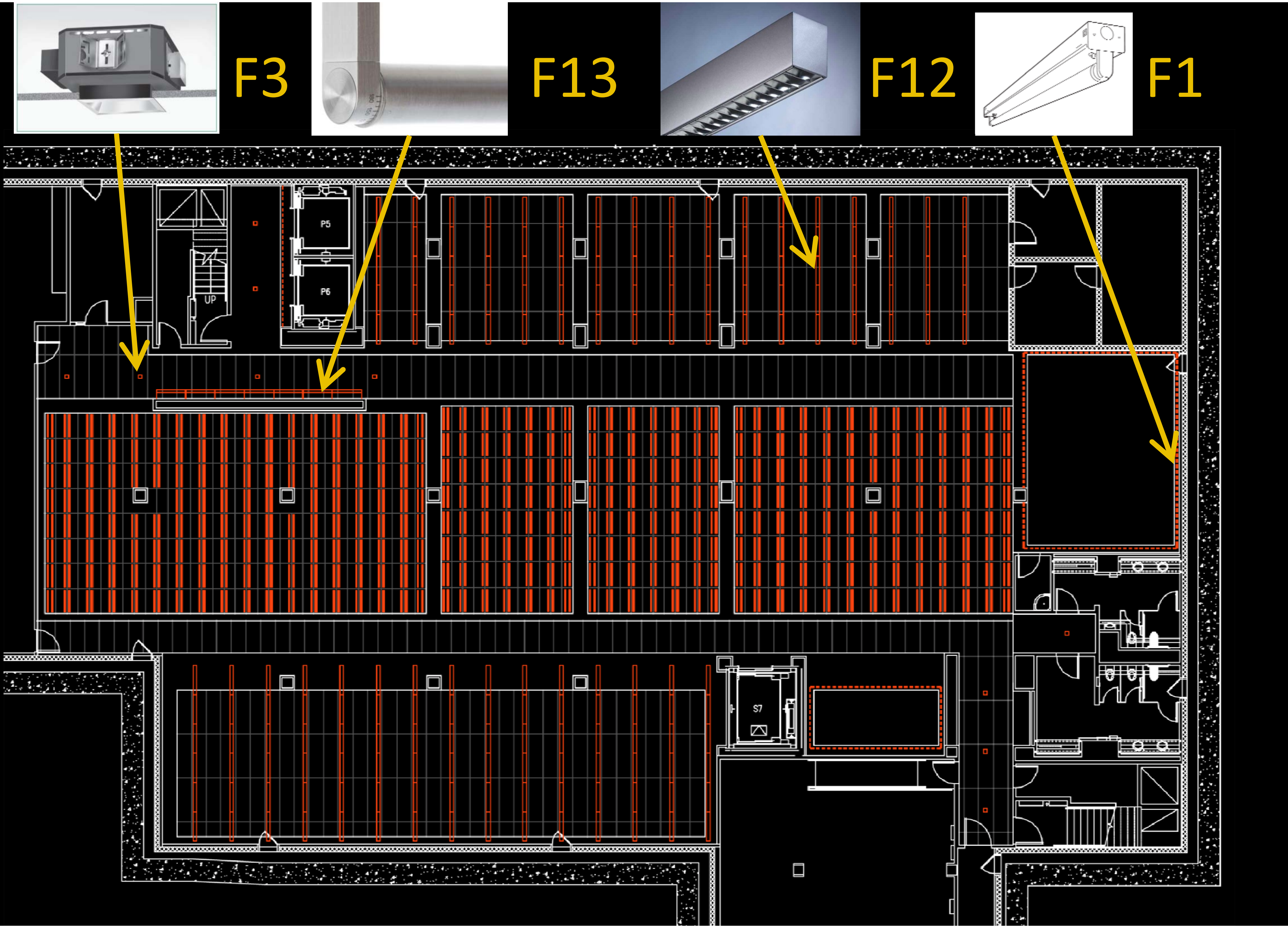
Meet ASHRAE 90.1-2004 energy code

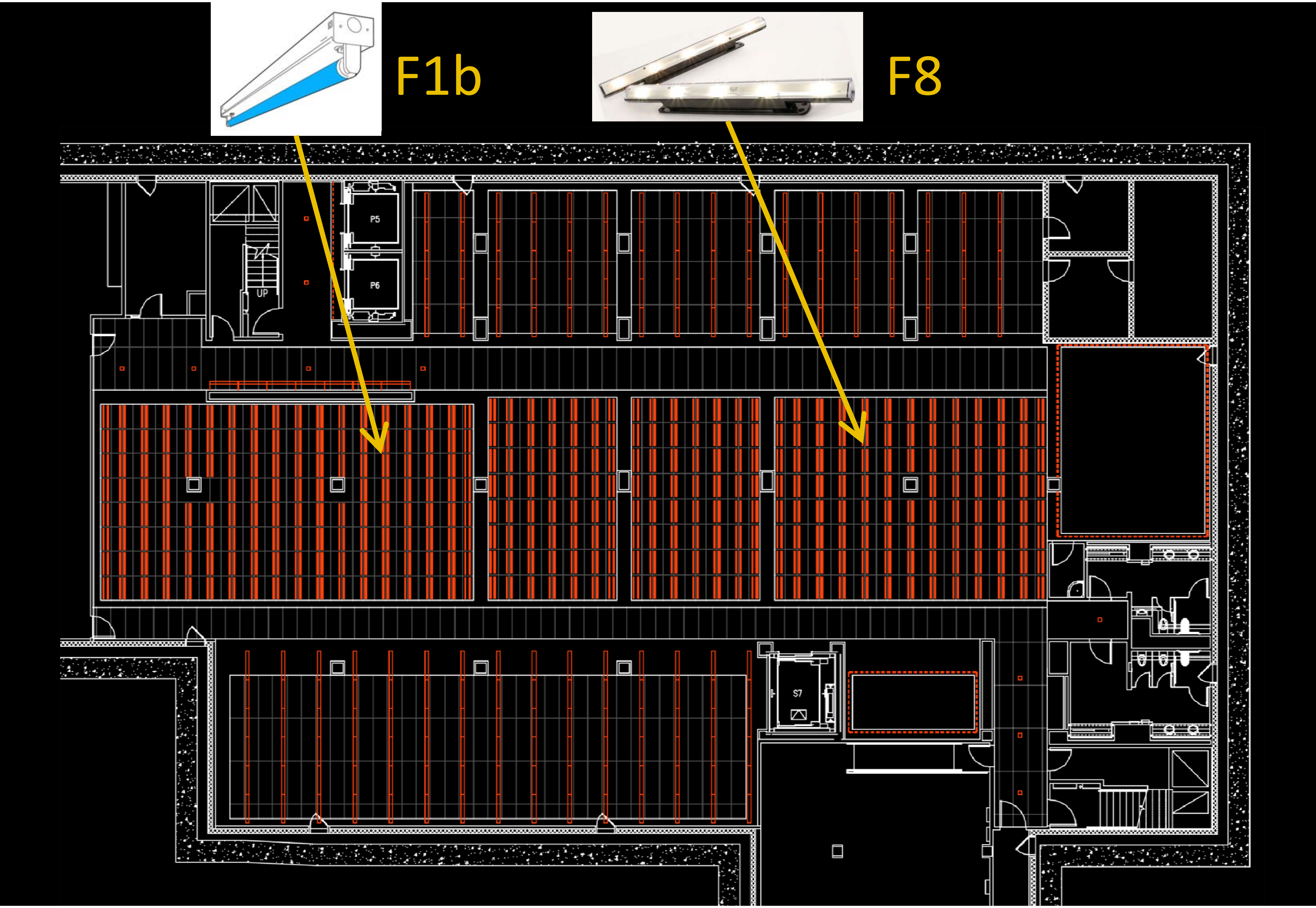


Library Ceiling: Video


P5
P6
UP
S7


P5
P6
UP
S7


F3
F13
F12
F1
P5
P6
UP
S7


F1b
F8
P5
P6
UP
S7

Basement Library: Luminous Ceiling

White component

- White LEDs, constant output
- Low-maintenance
- Relatively high efficacy (40 lumens/watt)

Blue component

- T8s with blue gel, dimming
- Low cost
- High efficacy
  - 92 lum/watt * 35% transmission = 32 lum/watt
  - Best blue LEDs: Below 10 lumens/watt

Basement Library: Controls

Blue T8s in luminous ceiling

- DALI system

Stack lights

- Passive IR Occupancy sensor – each row

Task lights

- Manual switches

Basement Library: Summary

Bring life into space
- o Dynamic, luminous ceiling

Illuminate workplanes sufficiently
- o 50 fc horizontal illuminance
- o 30 fc vertical illuminance for stacks

Location	Avg (Fc)	Max (Fc)	Min (Fc)	Max/Min
Reading Area Workplane	63	96	29	3.32
Stacks (Vertical)	21	49	6	7.87

Basement Library: Summary

Save energy with controls

- Occupancy sensors in stack rows
- Manual switches on task lights

Meet ASHRAE 90.1-2004 energy code

Environment	Allowed (W/ft^2)	Existing (W/ft^2)	New (W/ft^2)
Stacks	1.7	1.39	1.37
Reading Area	1.2	1.88	2.83

Energy code not met

- Power saved in other spaces

Acoustics Breadth

Library's luminous ceiling replaces acoustical tile

What effect does have on the library's acoustics?

Acoustics Breadth

Target reverberation time: 0.6 seconds

- o No American codes for library acoustics
- o Based on building codes and guidelines in England, Switzerland, New Zealand

	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
Target (s)	0.60	0.60	0.60	0.60	0.60	0.60
Existing Design (s)	0.45	0.50	0.55	0.41	0.35	0.35
New Design (s)	0.56	0.79	0.87	0.66	0.52	0.52

Acoustics Breadth

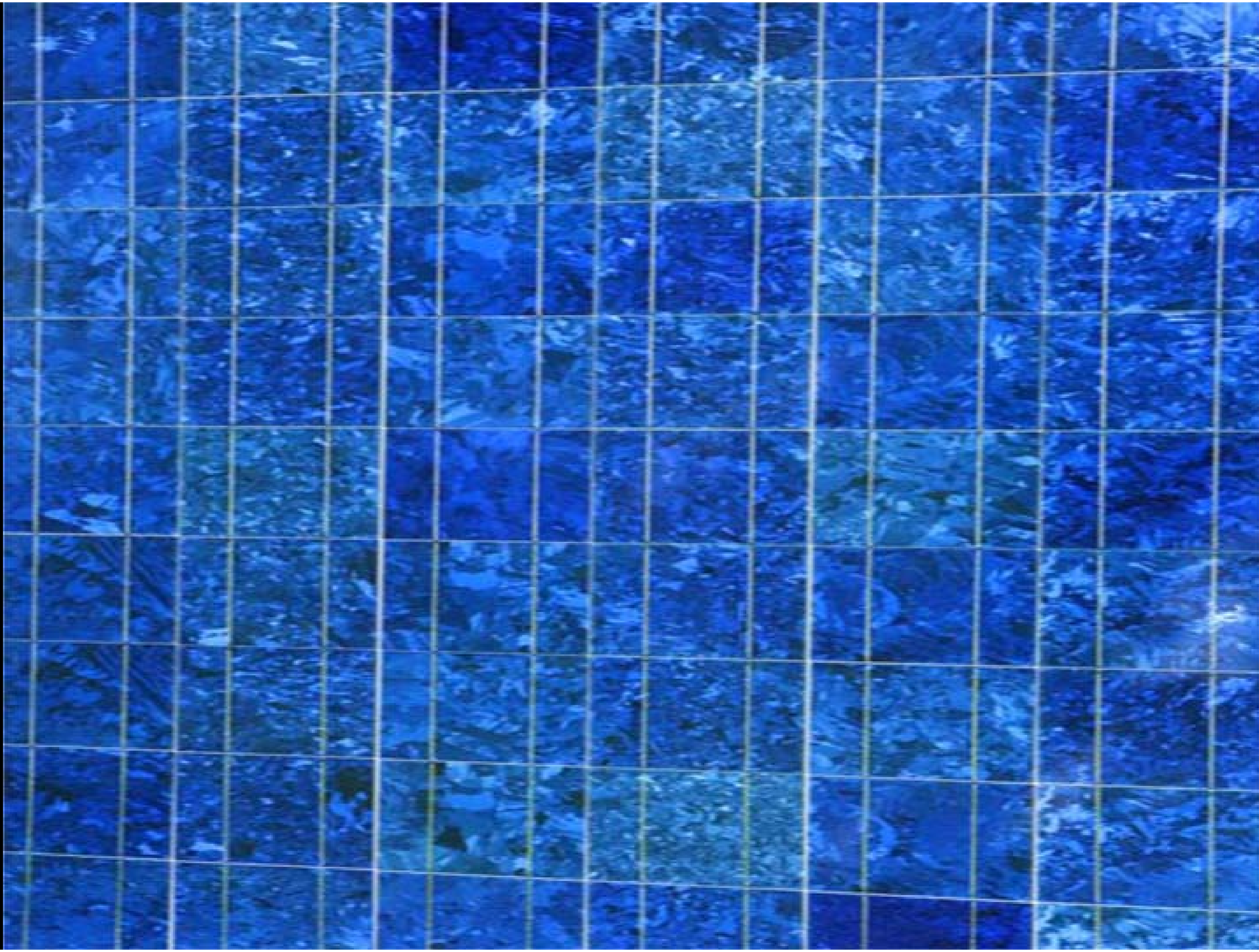
Design change causes reverberation time to increase

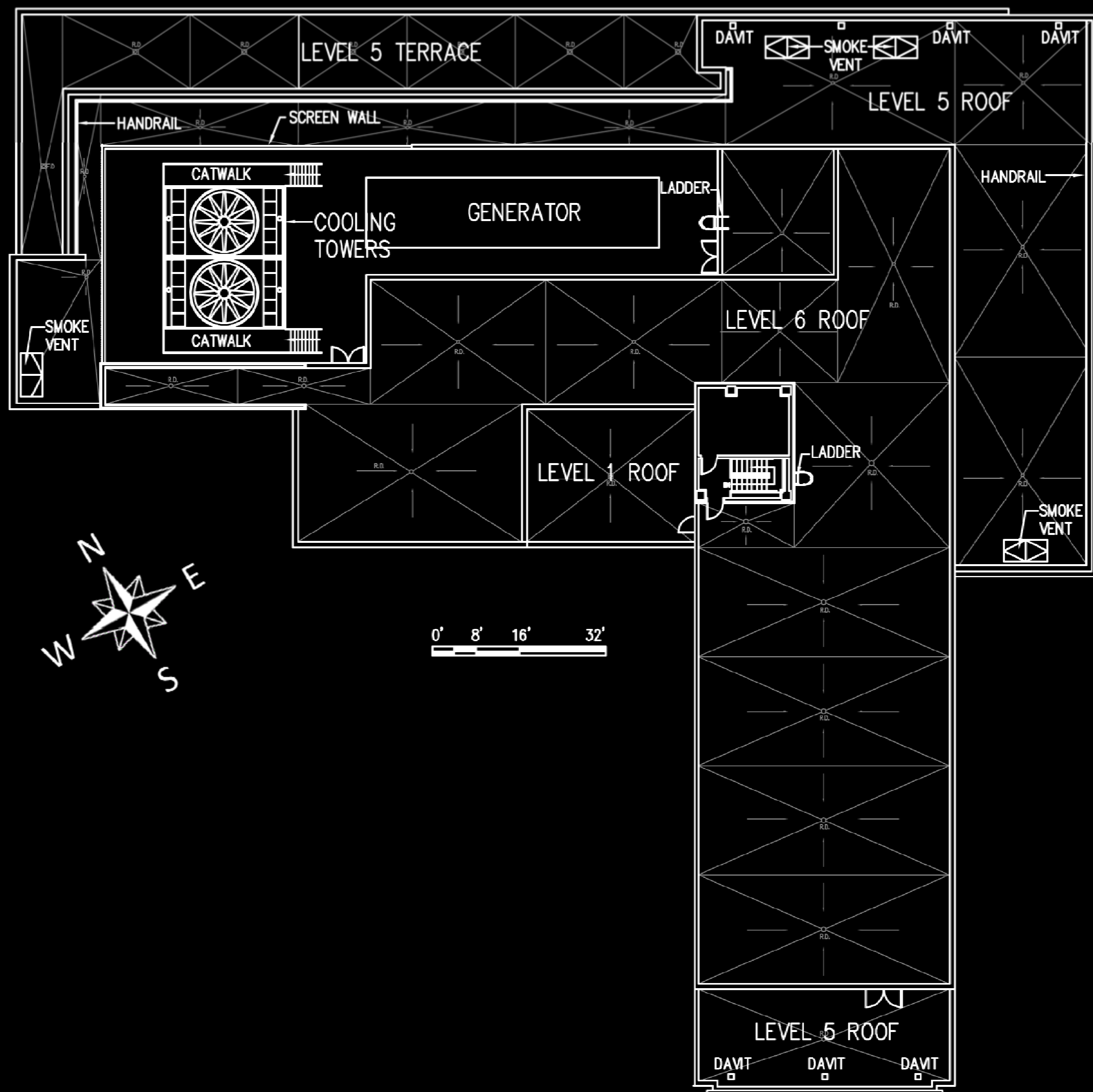
Unwanted sounds may travel further and resonate longer

Probably not a serious problem since loud noises will not be generated normally

Possible solution: increase background noise

- Reduce mechanical equipment sound isolation
- Increase air flow rate from diffusers




LEVEL 5 TERRACE
DAVIT
SMOKE VENT
DAVIT
DAVIT
LEVEL 5 ROOF
HANDRAIL
SCREEN WALL
CATWALK
COOLING TOWERS
GENERATOR
LADDER
HANDRAIL
SMOKE VENT
CATWALK
LEVEL 6 ROOF
LADDER
LEVEL 1 ROOF
SMOKE VENT
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0'
8'
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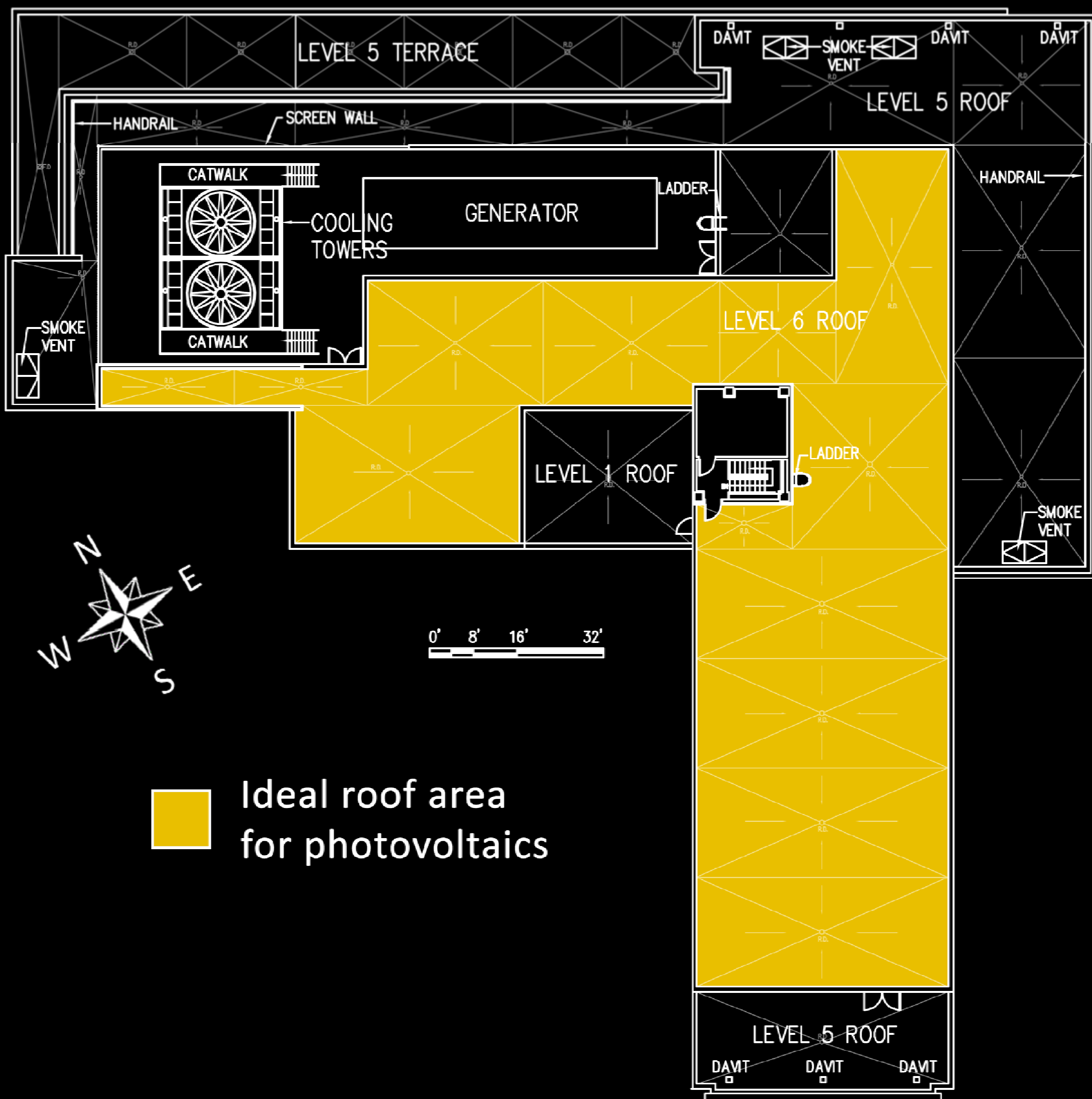
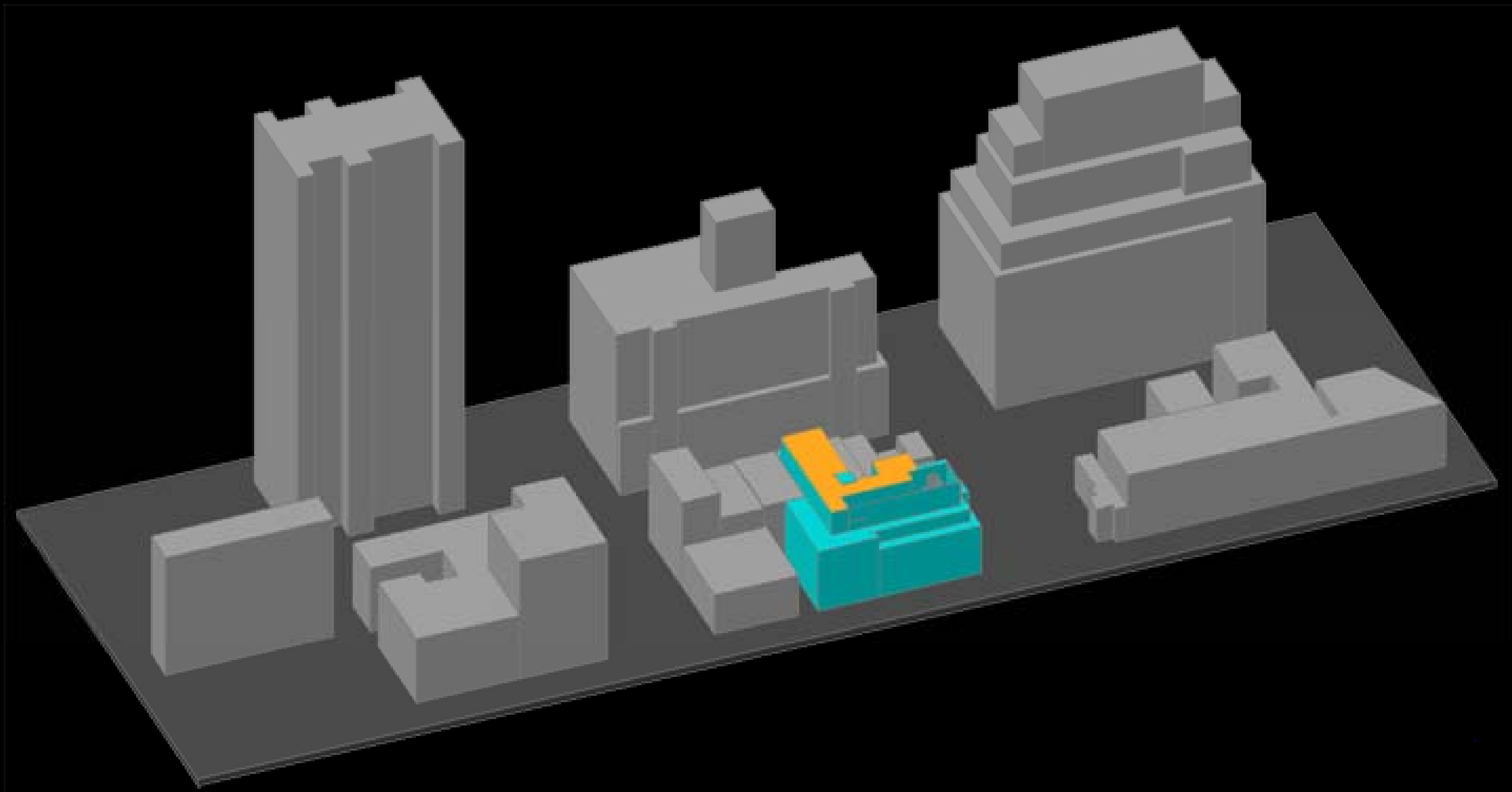
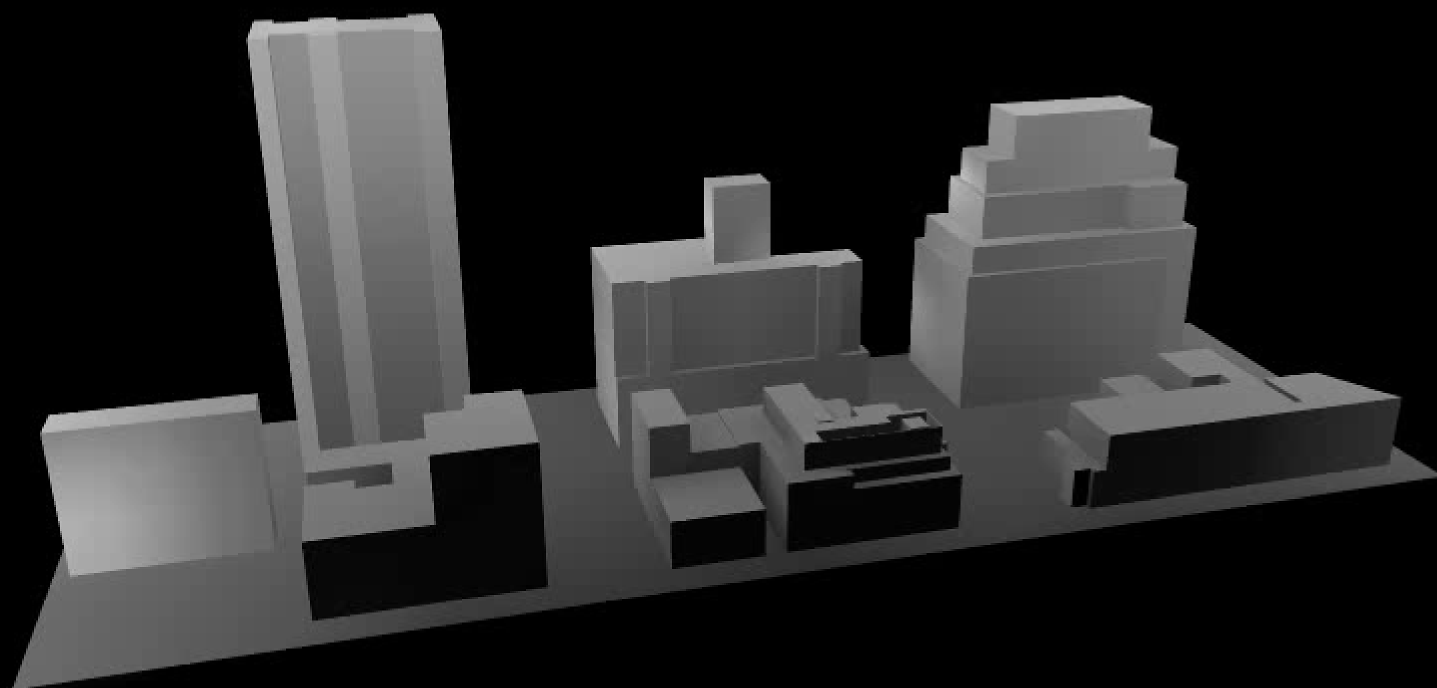
LEVEL 5 ROOF
DAVIT
DAVIT
DAVIT



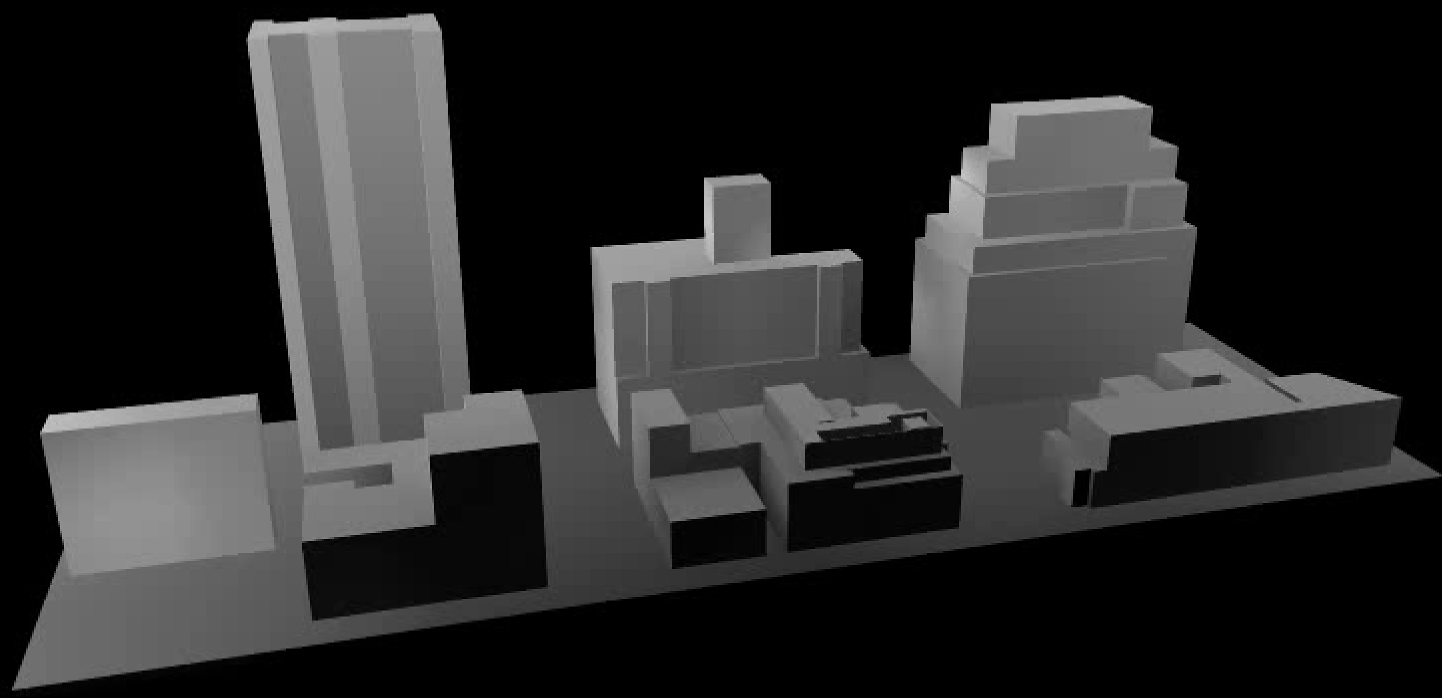
Ideal roof area for photovoltaics



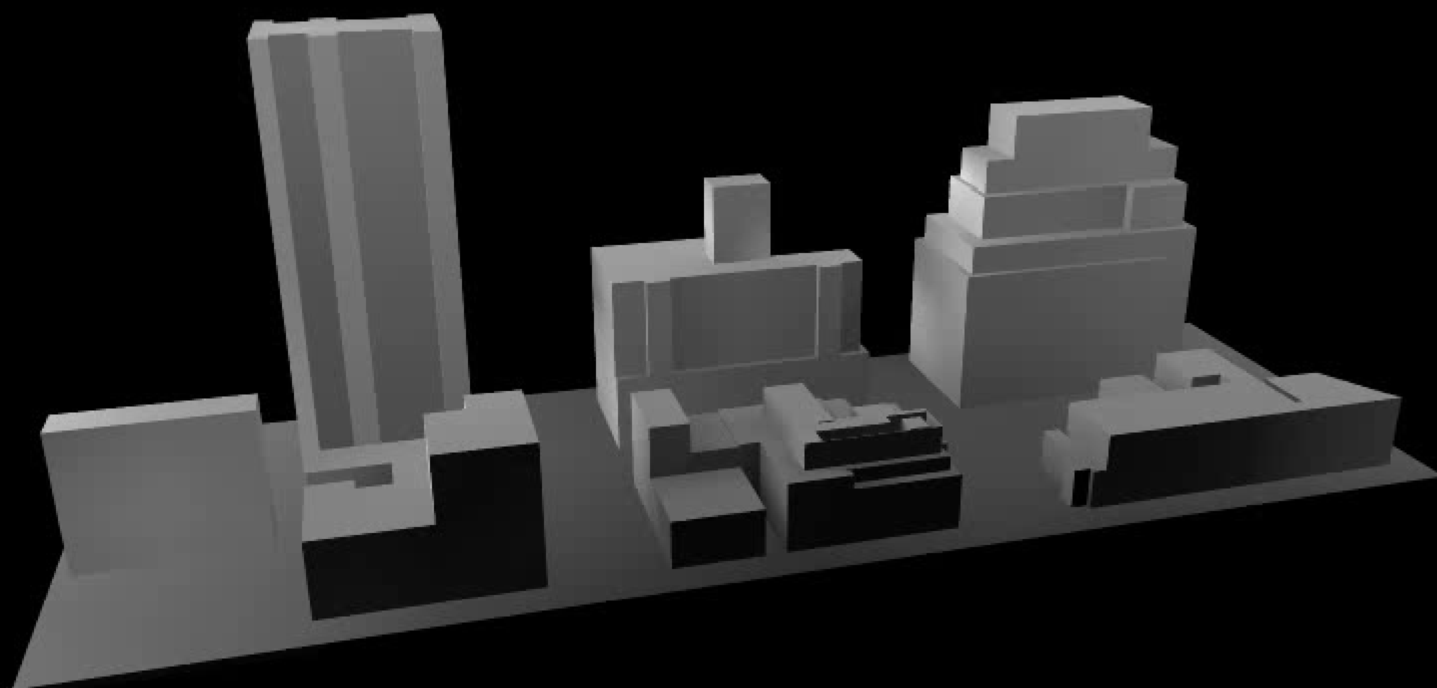
Sunlight Study: Summer Solstice Video



Sunlight Study: Equinox Video

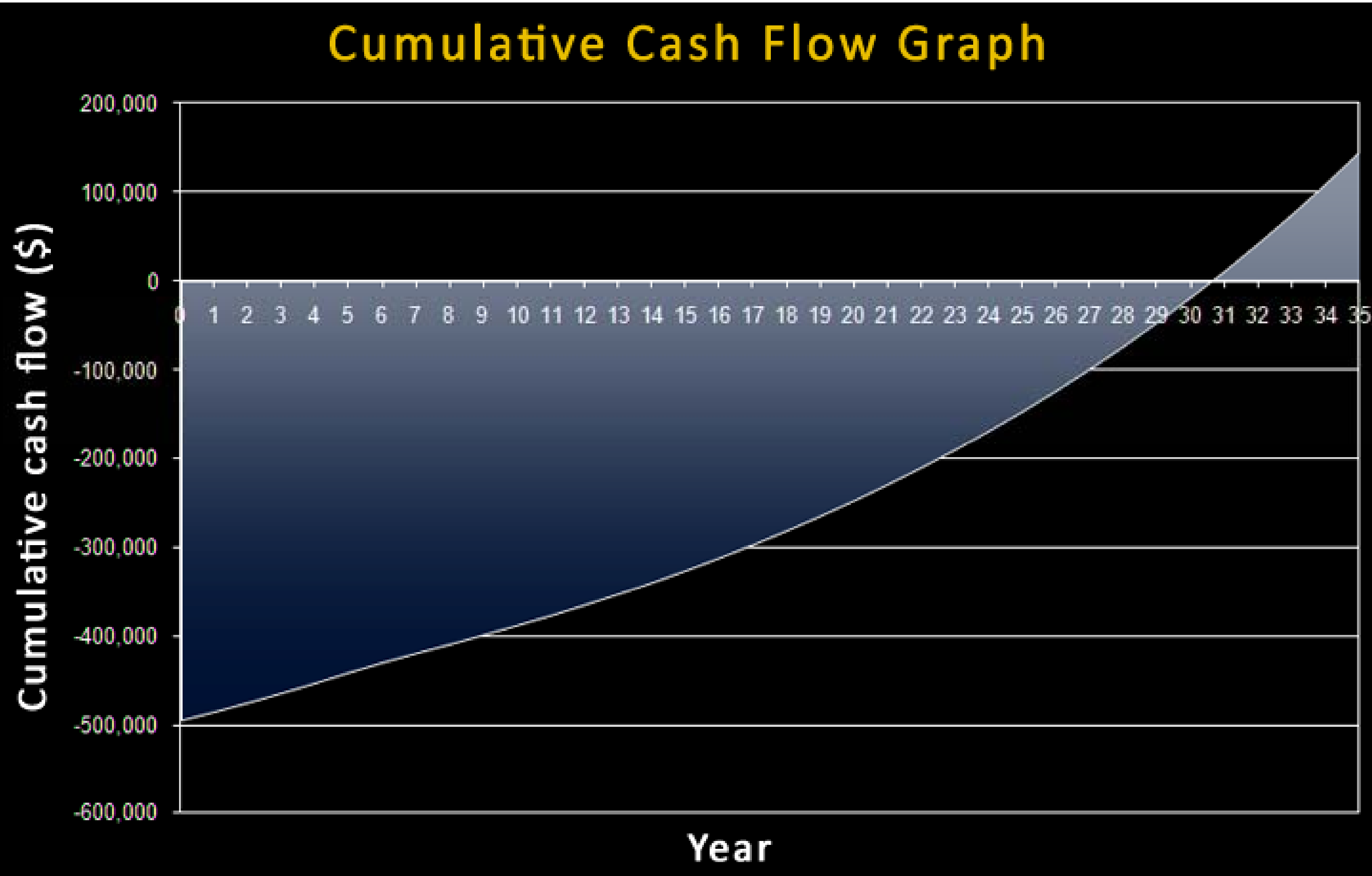


Sunlight Study: Winter Solstice Video



Photovoltaic System Data & Performance	
Analysis tool	RETScreen
Climate location	LaGuardia Airport, New York City
Solar tracking mode	Fixed
PV panel slope	30° from horizontal
Annual solar radiation	1.64 MWh/m^2
PV efficiency	13.9%
Solar collector area	618 m^2
Maximum power output	86 KW
Inverter efficiency	90%
Miscellaneous losses	5%
Annual electricity generated	116 MWh

Photovoltaic System Cost Data	
Cost information source	RS Means Electrical 2008
Total estimated materials cost	$738,000
Location factor – materials	1.080
Total estimated labor cost	$109,000
Location factor – labor	1.782
Total adjusted cost	$992,000
Financial incentive: NY State Grant	$200,000
Financial incentive: Federal	30% tax credit
Federal incentive: Depreciation	5-year accelerated depreciation
Electricity provider	Consolidated Edison
Estimated electricity cost	8.05 cents per KWH



31 year payback time (Not taking into account effects of shade)
Photovoltaic panels not recommended

System Voltage Change

Existing electrical distribution system:

208Y/120V 3PH 4W

Potential reason for changing to higher voltage:

- Lower cost due to smaller equipment size

$P = V * I$

More power delivered per ampere

System Voltage Change

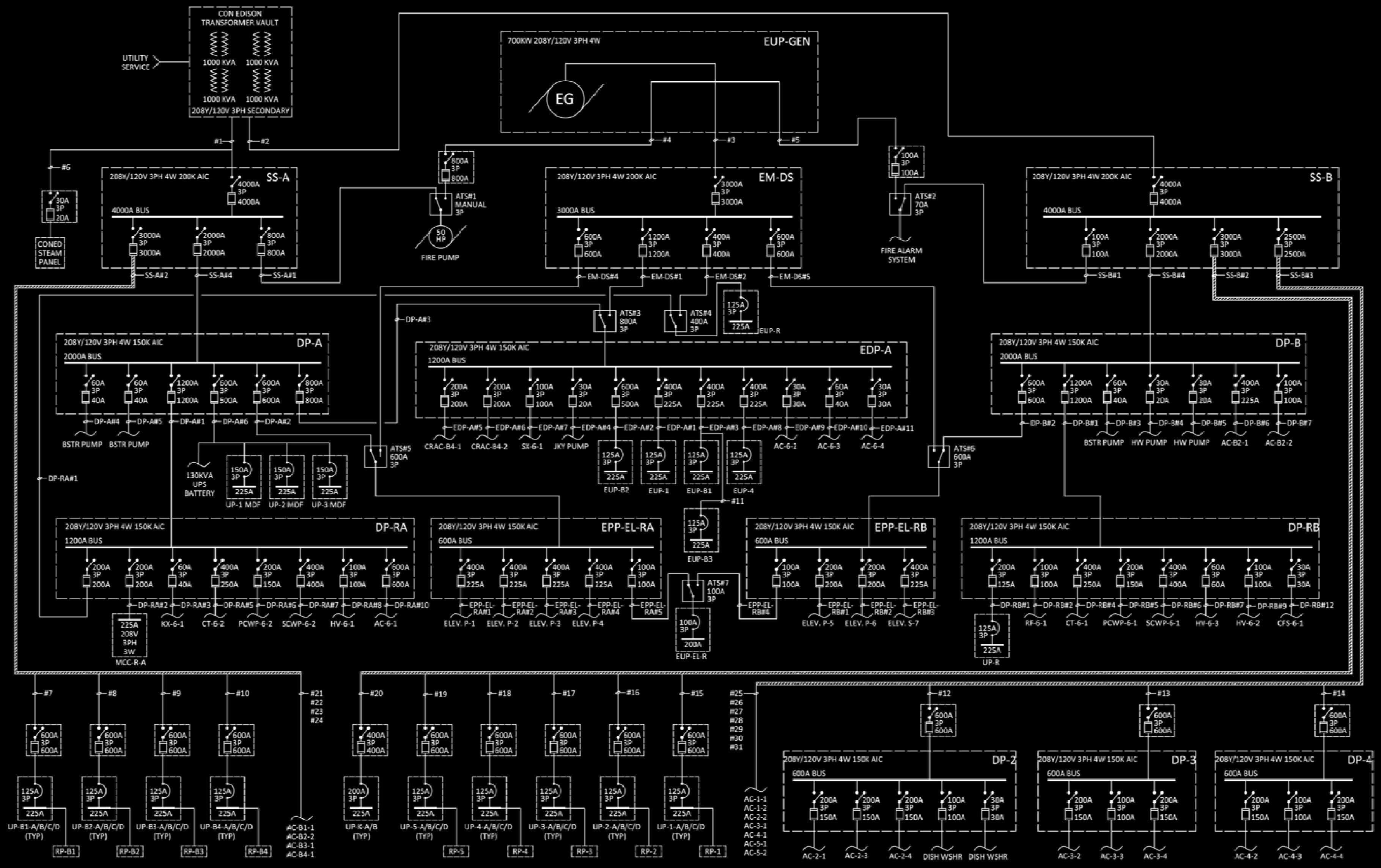
Potential drawbacks associated with increasing the voltage:

- Step-down transformers needed for equipment that needs to operate at 208V or 120V

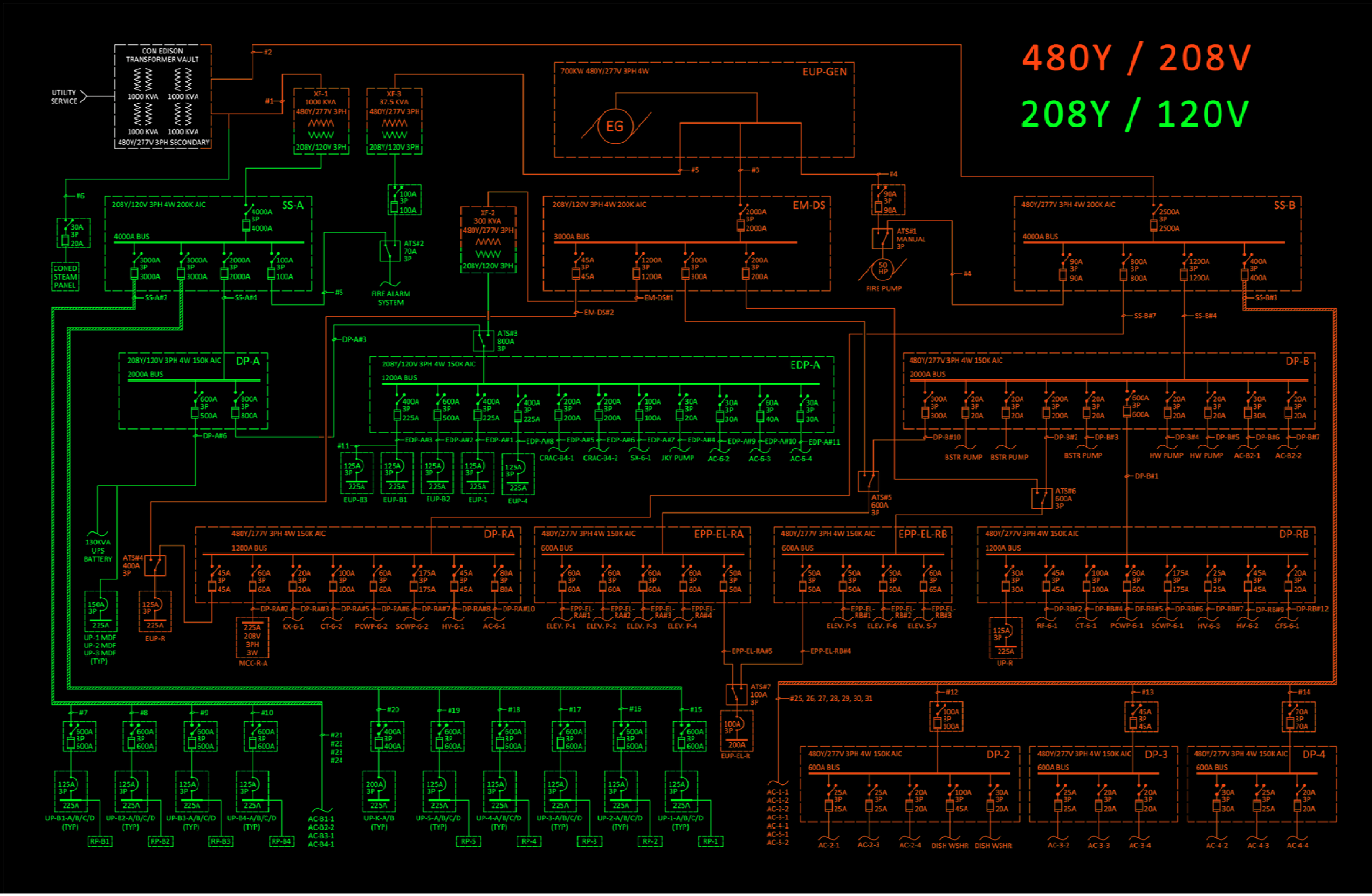
If the savings from reduced equipment size outweigh the cost of the transformers, the system should be changed to:

480Y/277V 3PH 4W

Single Line Diagram – Existing System



Single Line Diagram – New System



Summary of Changes

Added three step-down transformers:

1) 1000 KVA (for 208V switchboard)
2) 300 KVA (for emergency system)
3) 45 KVA (for fire alarm system)

Equipment changed to 480Y/277V:

- 1 out of 2 switchboards
- 9 out of 12 distribution panels
- 1 out of 3 bus ducts
- Emergency generator
- Most large mechanical loads
- Elevators

Panelboard	Existing Size	New Size
SS-A	4000A	4000A
SS-B	4000A	2500A
DP-2, DP-3, DP-4	600A	225A
MCC-R-A	225A	225A
DP-RA	1200A	800A
DP-RB	1200A	600A
EPP-EL-RA	600A	300A
EPP-EL-RB	600A	200A
DP-A	2000A	1600A
DP-B	2000A	1200A
EM-DS	3000A	2000A

Cost Analysis	
Cost information source	RS Means Electrical 2008
1000 KVA transformer	$44,000
300 KVA transformer	$15,000
45 KVA transformer	$4000
Total transformer cost	$63,000
Minimum savings from reduced size of switchgear, panelboards, bus ducts, feeders, overcurrent protection	$150,000

Recommendation: change the system's voltage to 480Y/277V

Summary & Conclusion

Lighting Depth

- Potential for daylighting in some spaces
- Different solutions to the same problem
- Subjective judgment

Acoustics Breadth

- Luminous ceiling decreases acoustical quality of library, but not seriously

Electrical Depth

- Photovoltaics in New York not a good idea
- Higher system voltage saved money

Thank You!