

Smart Building Technology and Hybrid Work Solutions

Cisco Talent and Collaboration Centers

OT Network Design for Spaces

Not for Construction - Sample

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Introduction

OT Network Design for Spaces

Overview and Intent

As companies evaluate their real estate portfolio and redefine the value of the office, it is important that organizations understand the role technology can play to not only ensure the best user experience; but also reduce their capex and opex. However, it will require both a cross-functional team made up of Real Estate, IT, and HR, as well as decisions early in the design process to realize the available cost savings. This is why we are providing our OT (operational technology) design guide to help facilitate and support the design and construction process.

In a pre-pandemic world, occupancy and utilization were fairly predictable. Given this consistency, building subsystems were scheduled to go on early in the morning and go off later in the evening. But today, with dynamic occupancy, that being unpredictable space utilization during the week, it is important that your building understand how to use occupancy as a proxy to automate your building subsystems. Not only to ensure the optimal user experience but also to help support your net zero journey and energy reduction.

The average building today has 30+ building subsystems (i.e., lighting, HVAC, security, audiovisual, and shades). And more than half of those require some level of IP (i.e., internet protocol) connectivity. However, the traditional approach to design and construction would be to specify, procure and deploy discrete systems that do not speak to each other. Not only is this a more expensive approach due to redundancy, but these discrete systems are often proprietary in nature and cannot interact with other systems.

At Cisco, we know that technology offers a better way to design and construct. With the right decisions made early in the design process, a customer can deploy a converged OT (operational technology) network with open API data that allows for dynamic operations. This enables building systems that communicate and automate based on real-time occupancy input. With that in mind, we are pleased to share out OT design guide.

Guiding Principles – Real Estate Optimization Strategy

OT Network Design for Spaces

Philosophy of Design

Integrate who we are as a company into how the space is designed; seamless integration of technology into the design.

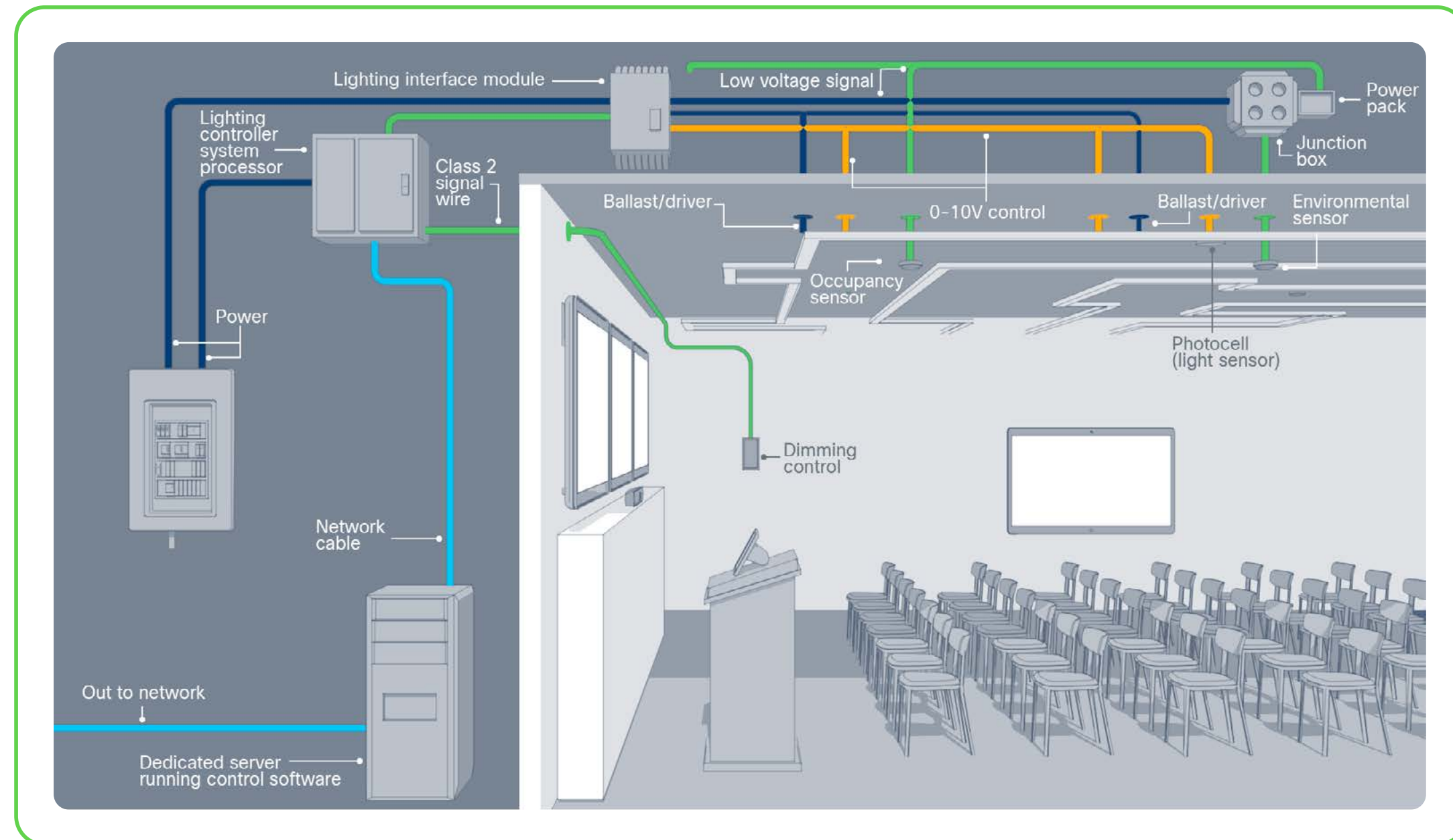


One Zone of Lighting

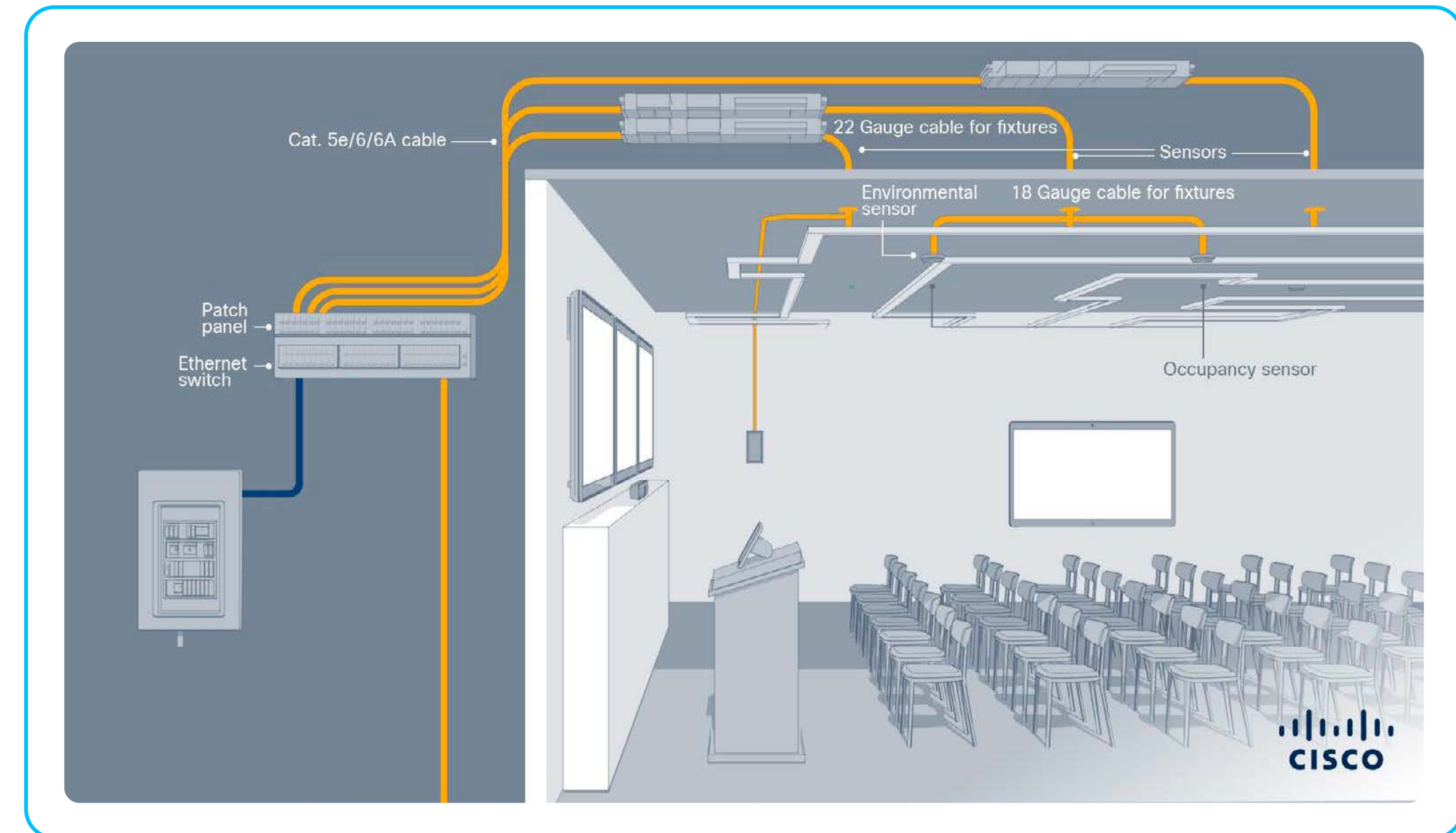
OT Network Design for Spaces

Through a PoE (Power over Ethernet) infrastructure, customers can reduce cabling needs throughout the built environment. It will enhance sustainability goals while simultaneously providing power and data connectivity to OT devices

AC



DC



Design Principles

OT Network Design for Spaces

A Physical Shift

In this example, a greater proportion of the space is shared offering more choice in where occupants work.

Everything about Cisco's OT / Hybrid workspace – from its design to its amenities – will help you leverage the power of your organization, connect with colleagues worldwide, and deliver on your mission of enabling progress for your clients.

Our global hybrid workspace concept is a commitment to invest in people and the spaces they inhabit, providing world-class spaces for world-class talent across the bridge to possibilities.

This concept is supported by a careful design of the OT infrastructure that is discussed in detail in this document.



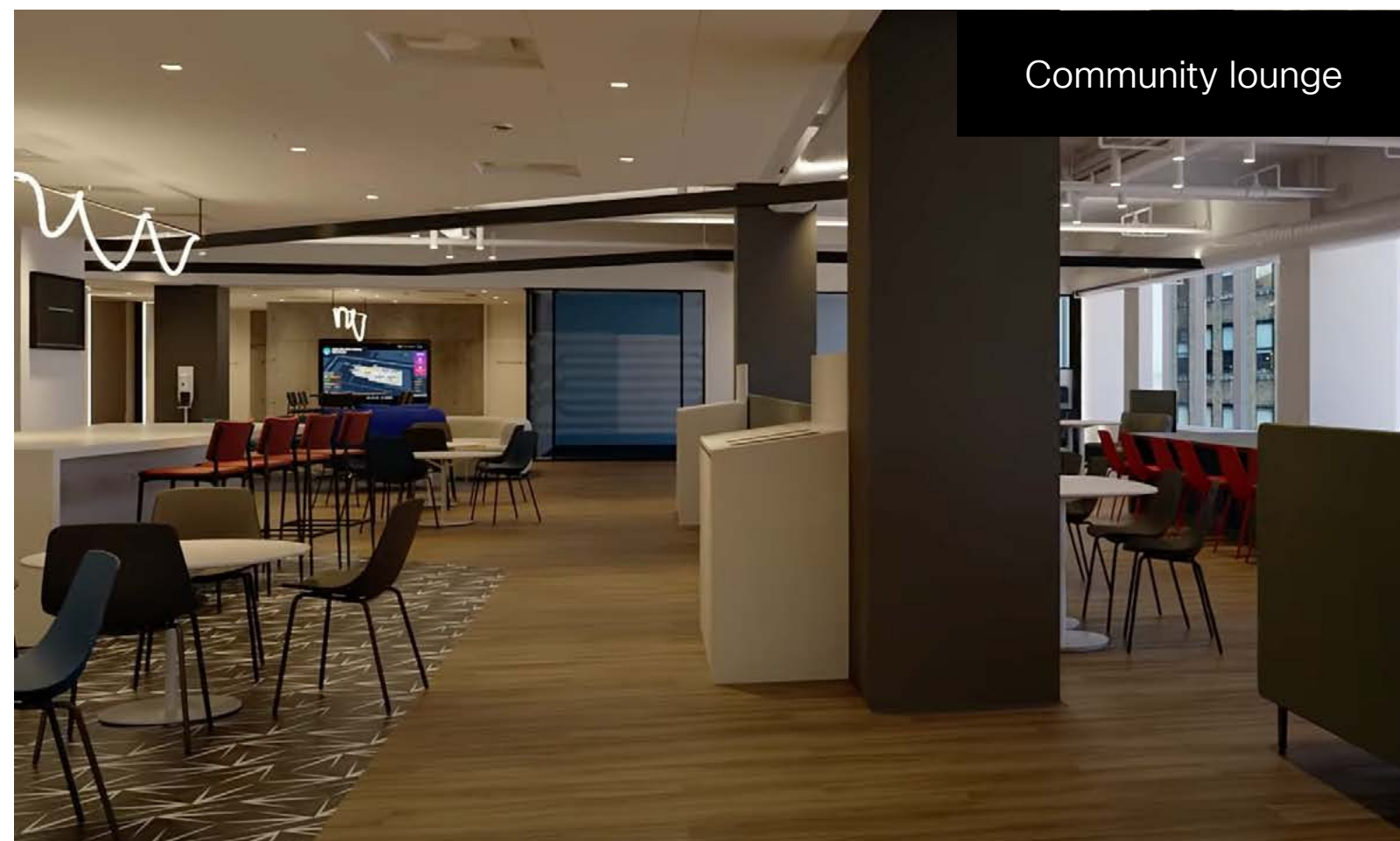
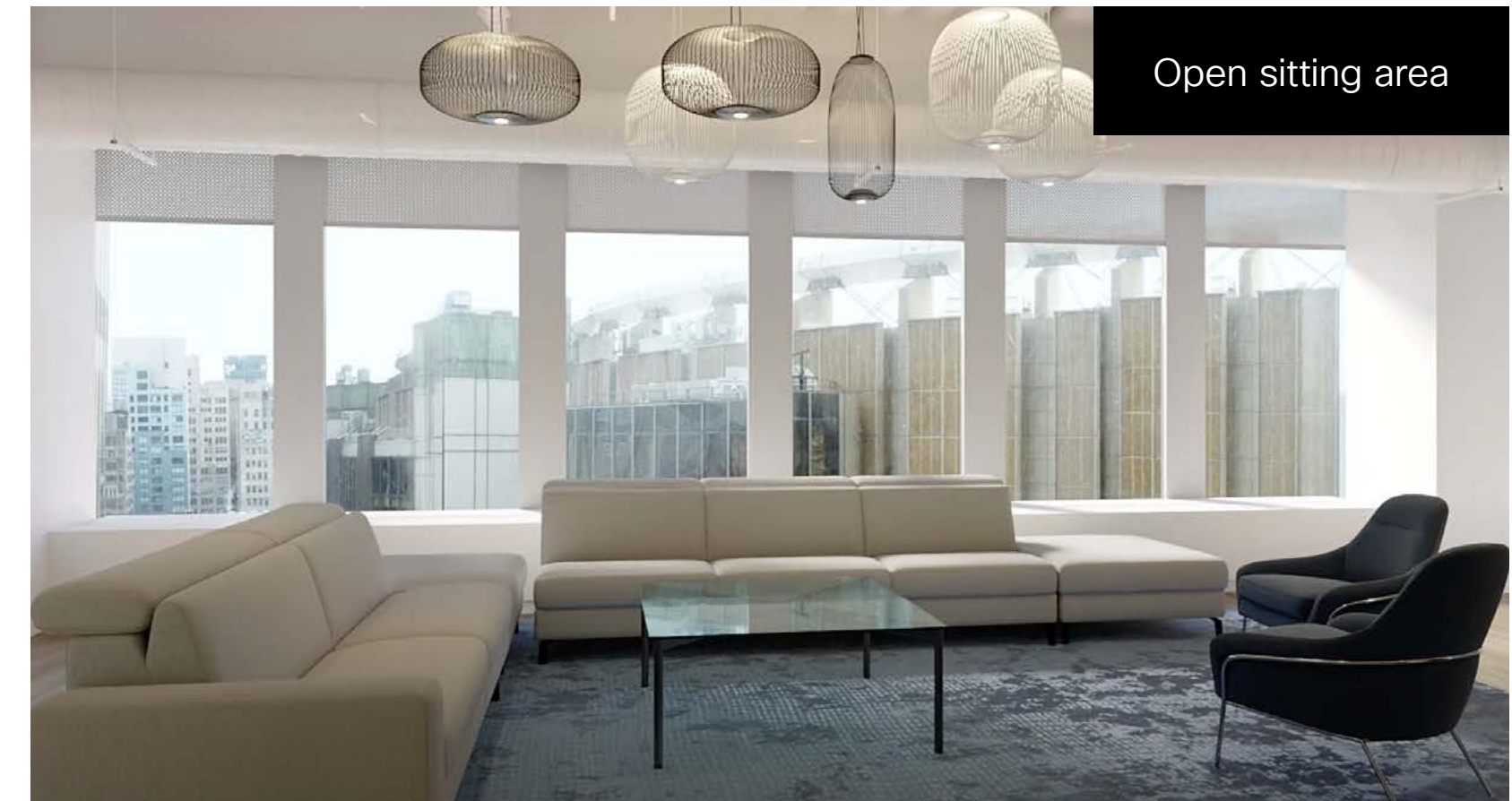
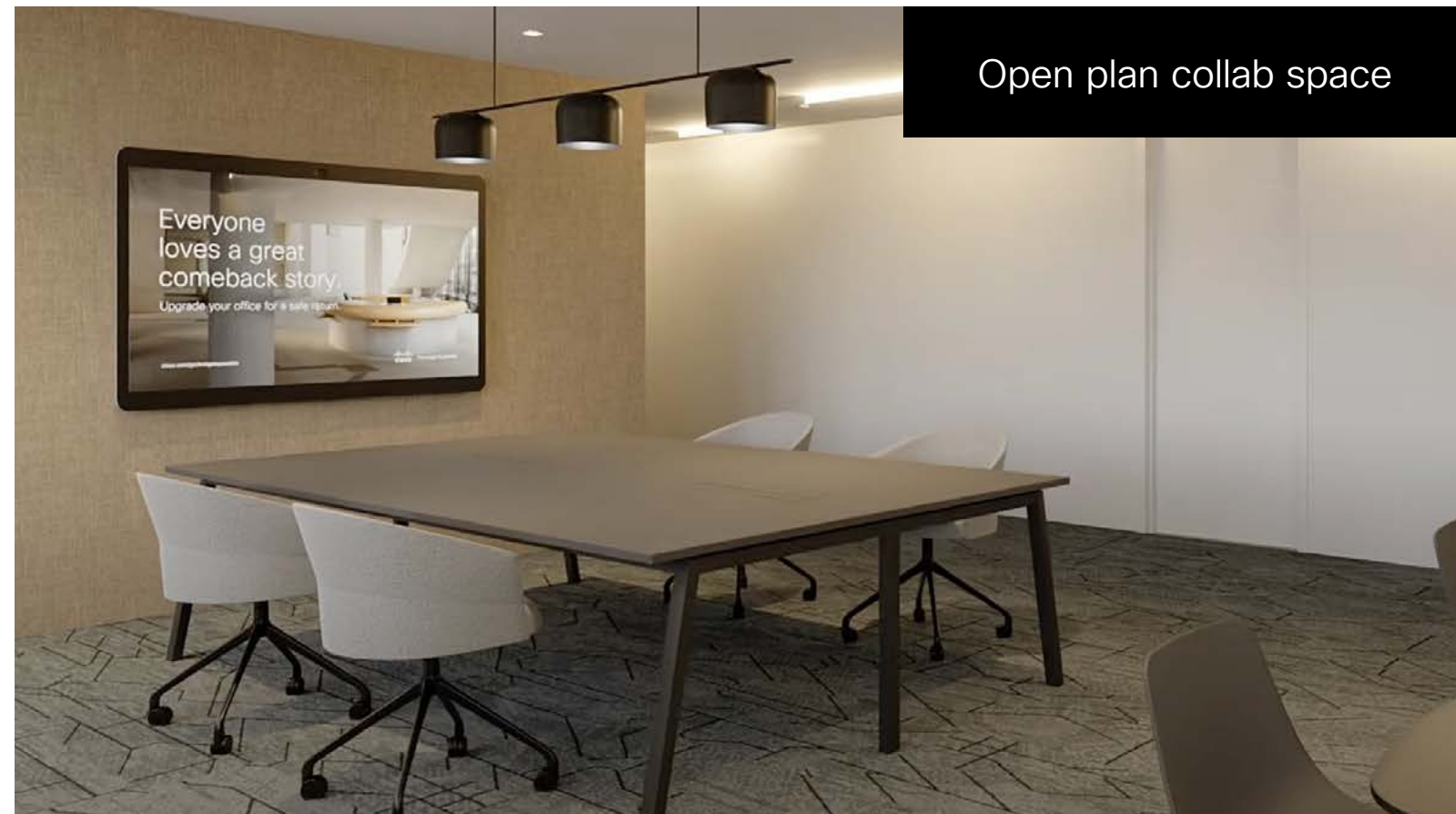
Cisco's 7,500 Sq. Ft. OT / Hybrid Workspace

This layout is shown as a generic example. Spaces may be reconfigured to suit client and site specific base building situations.

- Huddle and Quiet Rooms/Open Plan Collab Spaces
- Customer Conference Center
- Community Lounge
- Breakout
- Workplace Hot Desks/Open Seating
- Non-occupied/Circulation Space

Visualization of the Space Elements

OT Network Design for Spaces



Enabling Technology

OT Network Design for Spaces

These Smart Building components are all POE powered



molex

Low Voltage 90W PoE Lighting (employee zone), air quality / CO2, Temp, Humidity, VOC



Mecho

Intelligent automated shading platform



Delta
CONTROLS
A Delta Group Company

Intelligent PoE VAV controls for individual collaboration rooms



igor

Low Voltage 90W PoE (Lighting for customer zone), Temp, Humidity



USAI
Lighting

POWER OVER ETHERNET LIGHTING

Luminaries



BOSCH

Individual heat pumps in customer zone meeting rooms, providing customized climate control and thermal comfort

Deployment Considerations

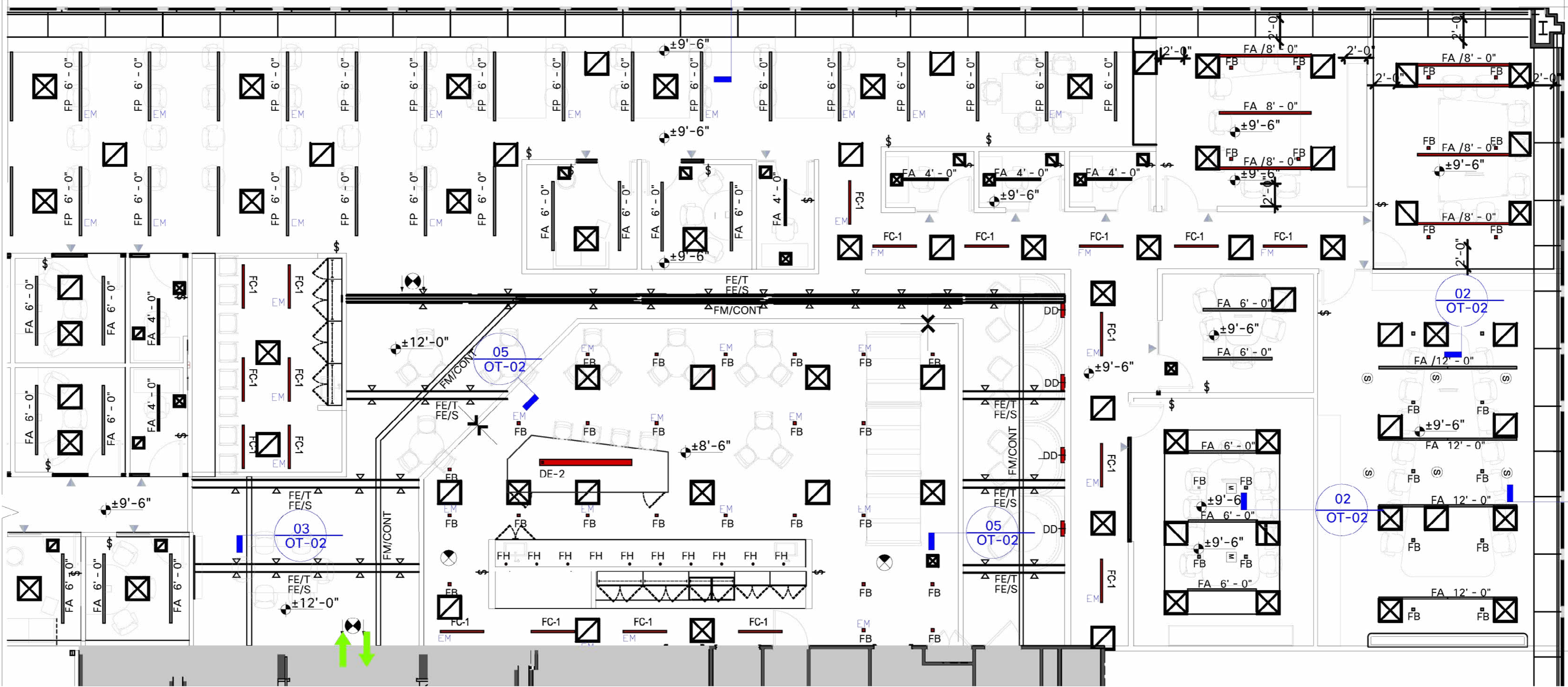
OT Network Design for Spaces

Since space is unique to each customer, this list is a sample of typical devices throughout an IT/OT environment. It should account for traditional things like lighting, shading and HVAC, but also other things like security cameras, environmental sensors, sit-stand desks, etc.

Device / Room	Deployment Considerations
AP's	One AP per 1200 sq ft (111sm)
Light	One luminaire per 100 sq ft (9.3sm)
Thermostats	One thermostat/VAV per 500 sq ft (46.5sm)
Ventilation / Airflow Dampers	One per 500 sq ft (46.5sm)
Door Locks	Secured doors require 4 ports
Cameras	One camera per 2000 sq ft (186sm)
Digital signage	Locations defined by occupants' foot traffic
Motion Sensors	One occupancy sensor per 500 sq ft (46.5sm)
Phones	One phone per person depending on design considerations
Video Endpoints (each require 2-3 ports)	One video endpoint per six people
Printer Station	5X5000 sq ft (5x465sm)
Directional Speakers	One per 25 sq ft (2.3sm), depends on ceiling height
White noise generator	One generator per 2000 sq ft (186sm)
Blinds	One port per four linear feet
Electrical Meter Sensors	3xfloor
Washroom Sensors	4xfloor
Huddle rooms	4 Ethernet ports per room
Medium conference	8 Ethernet ports per room
Large conference	10 ports per room
Hot desking	50 sq ft per desk (4.6sm)

Ceiling Plan

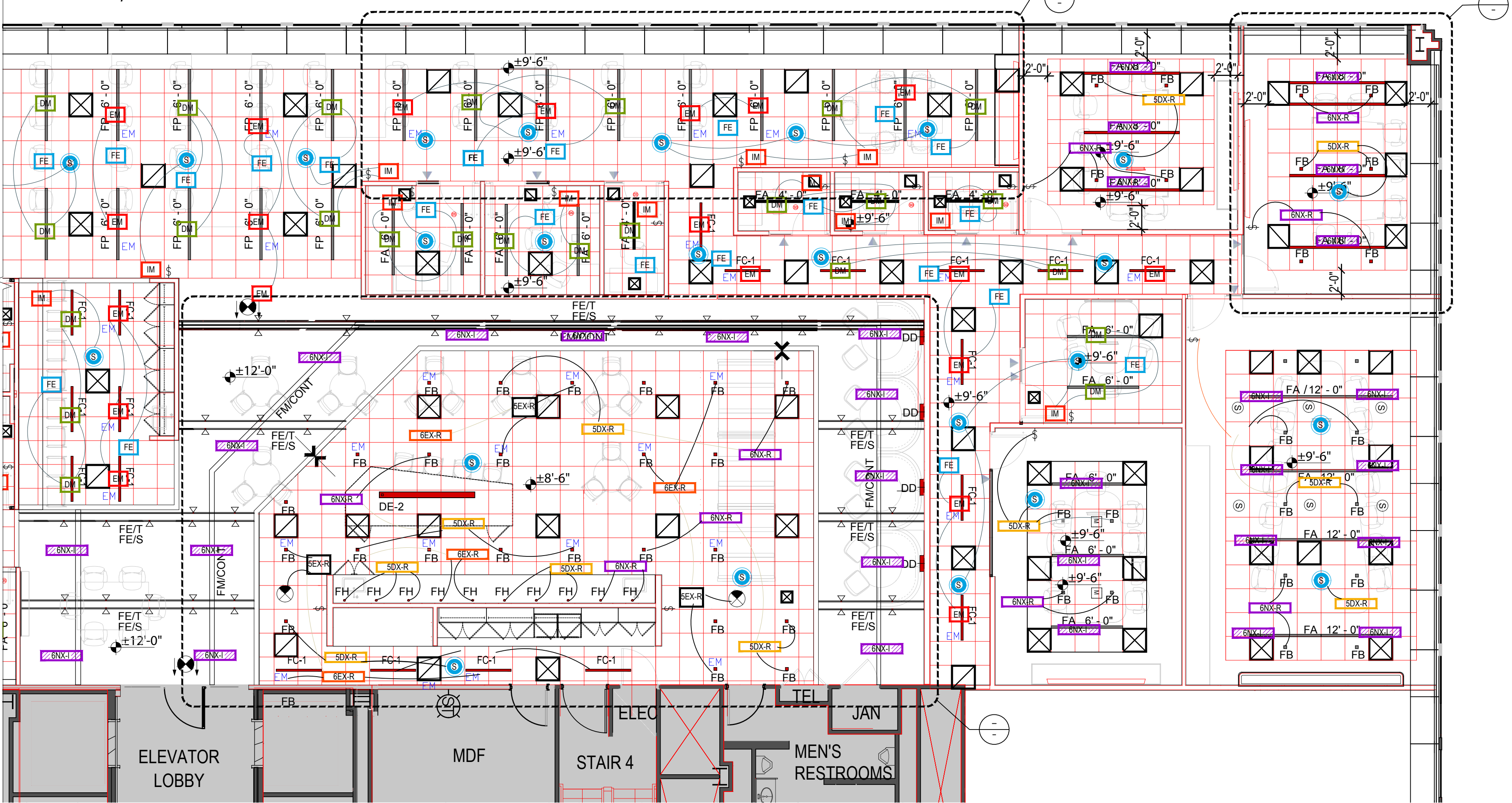
OT Network Design for Spaces




















Lighting Components

OT Network Design for Spaces

ELECTRICAL / CABLING REFLECTED CEILING PLAN



Graphics Symbols

-  INTERFACE MODULE
-  EMERGENCY MODULE
-  DRIVER INTERFACE
-  GATEWAY
-  MULTI SENSOR OCCUPANCY / AMBIENT LIGHT/TEMP/HUMIDITY
-  LINEAR 90W REMOTE
-  LINEAR 90W INTEGRATED
-  STANDARD DEVICE NODE REMOTE
-  LINEAR 90W EMERGENCY REMOTE
-  EMERGENCY DEVICE NODE
-  CAT 5E CABLE
MOLEX LOW VOLTAGE CABLE
USB CABLE
LOW VOLTAGE CABLE
-  ACOUSTICAL CEILING AND GRID
-  HVAC DIFFUSERS (CLG. T.B.D.) - SEE RCP
-  CAMERA (CLG. MTD.) - SEE RCP
-  IT ACCESS POINT (CLG. MTD.) - SEE RCP
- LIGHT FIXTURES**
-  LIGHT FIXTURES
-  CEILING MOUNTED EXIT SIGN



Lighting Fixtures

OT Network Design for Spaces



Lighting Fixture Legend

- FXTX — FIXTURE SYMBOL (VARIES)
- ← FXX ← FIXTURE TYPE REFERENCE
- DD DECORATIVE WALL SCONCE
MANUFACTURER: MARSET
"GINGER" CAT #LED-GINGER 60C
120 VOLT
- DE-2 SUSPENDED FROM CEILING DESK
(MOUNTED HORIZONTALLY)
MANUFACTURER: LUKE LAMP CAT #
8FT-TBI-SR 96IN. POE 0-10V 1%
REMOTE DIMMABLE DRIVER
- FA/# RECESSED TEGULAR IN ACT CEILING
MANUFACTURER: FOCAL POINT "SEEM" #
FSM2L-FL-600LF-935-1C - UNV-LVN.
LENGTH PER PLANS. 6 WATTS/FT. MAX.
- FA-1/CONT. RECESSED PERIMETER MOUNT IN GWB
CEILING - RECESSED LENS
MANUFACTURER: FOCAL POINT "SEEM" #
FSM2PR-ALH-FL2-600LF-935 - 1C - UNV-LVN
XF-FNYX-WH-LENGTH PER PLANS
6 WATTS/FT. MAX.
- FB RECESSED 3" SQUARE LED DOWNLIGHT
- FLANGED
MANUFACTURER: AMERLUX "HORNET"
HDL-HP-S-NC-A17-T-23-120/277 - POE
HDL-HP-SLD-A17-T-SLVW-75SAT-359
25 WATTS MAX.
- FC-1 1.5" WIDE LINEAR - SURFACE LINEAR
MANUFACTURER: VODE "ZOPTWO" WITH
CUSTOM SHEILD. POE-SO-359-S9 WITH
CUSTOM WHITE SHEILD-WH
6 WATTS/FT. MAX.
- FE TRACK LIGHTING
SURFACE MOUNTED TRACK (FE/T) AND
SUSPENDED TRACK (FE/T1)
MANUFACTURER: AMERLUX SINGLE
CIRCUIT TRACK
FE/T CAT# GES2 (LENGTH PER PLANS),
FE/T1 CAT# TEK (LENGTH PER PLANS),
FE/S CAT# SPEQ-S-A17-15
FE/S1 CAT# SPEQ-S-A17-15
120 VOLT ONLY
- FP# RECESSED 2" PIN HOLE LED DOWNLIGHT
MANUFACTURER: ZANIBONI, "ALBA 2
D2-ALBA2P - 13W-35-B-2-F-CUSTOM FINISH
POE - B0-D
14 WATTS MAX.
- FP# 4" WIDE LINEAR - RECESSED LINEAR
MANUFACTURER: FOCAL POINT "SEEM" #
FSML4-FL-4-5W-430LF-935 - 1C - UNV-LVN
LENGTH PER PLANS
4.5 WATTS/FT. MAX.

Graphics Symbols

- ACOUSTICAL CEILING AND GRID
- HVAC DIFFUSERS (CLG. T.B.D.) - SEE RCP
- CAMERA (CLG. MTD.) - SEE RCP
- IT ACCESS POINT (CLG. MTD.) - SEE RCP
- LIGHT FIXTURES**
- LIGHT FIXTURES
- CEILING MOUNTED EXIT SIGN
- FURNITURE SYSTEMS MOUNTED DEVICES**
- DUPLEX RECEPTACLE
- DATA RECEPTACLE
- FLUSH FLOOR MOUNTED DEVICES**
- DUPLEX RECEPTACLE
- DATA RECEPTACLE

Power and Communication

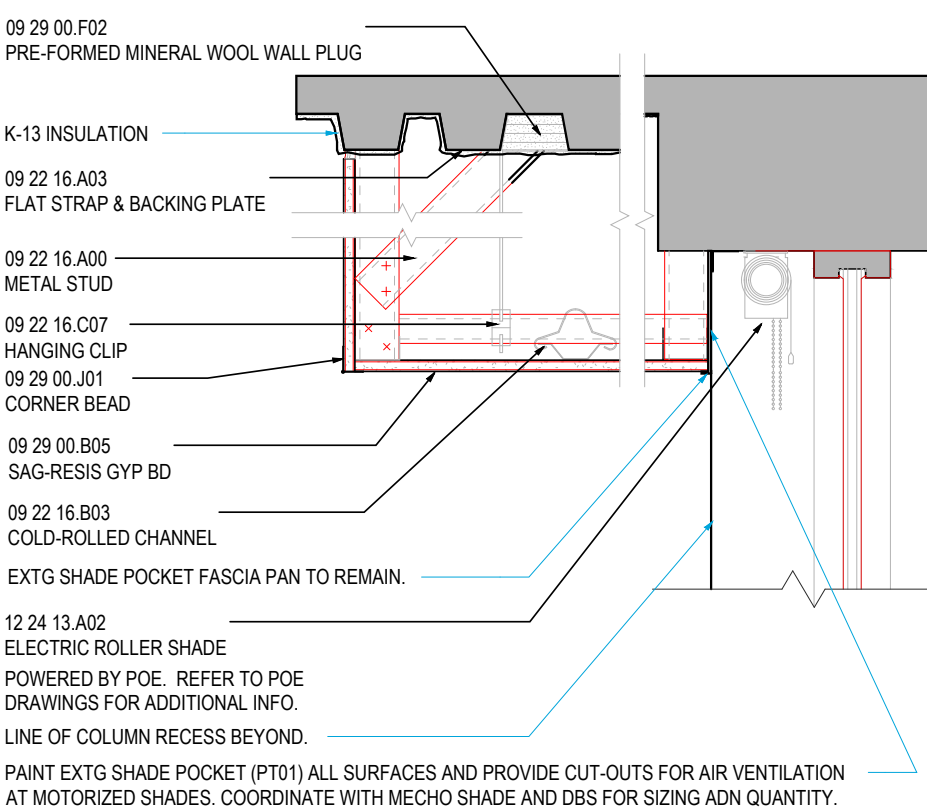
- WALL / CEILING / FLOOR MOUNTED DEVICES**
- DUPLEX RECEPTACLE
- DATA RECEPTACLE
- SWITCH DEVICE
- SWITCH TYPE (D=DIMMER, 3=3 WAY, S=SHADE)
- AV RECEPTACLE
- CEILING MOUNTED MICROPHONE - SEE RCP
- COMBINATION POWER & VOICE / DATA INFEEED
- CEILING MOUNTED SPEAKER - SEE RCP
- (1) Cat 6 Cable – Room Scheduler/Navigator - BD/FD



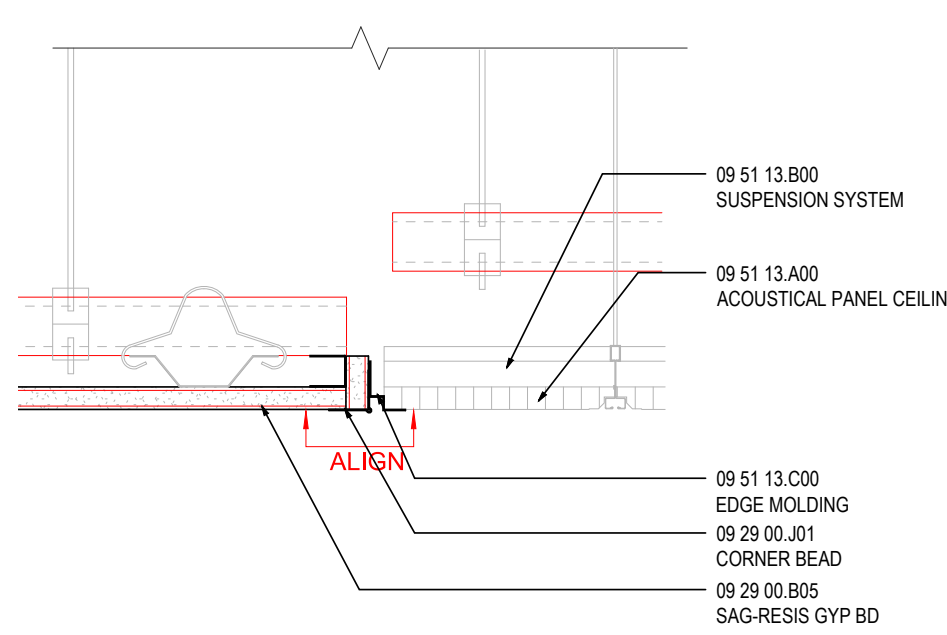
Lighting Fixtures (Continued)

OT Network Design for Spaces

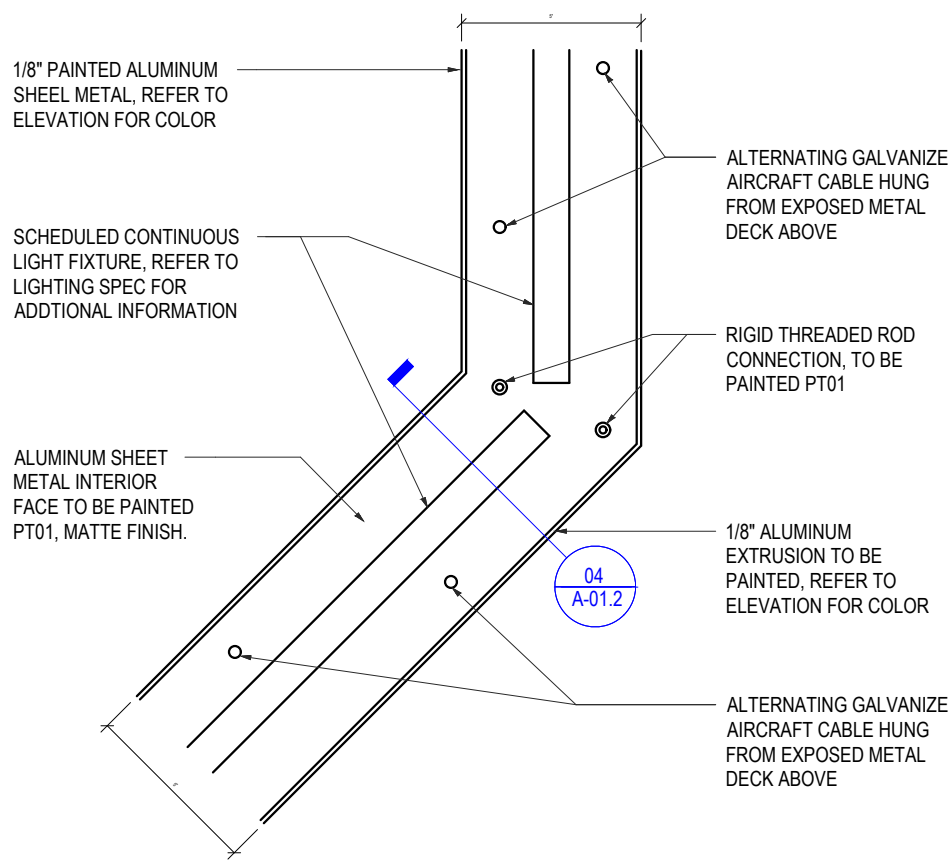
Shade Pocket @ GWB Soffit



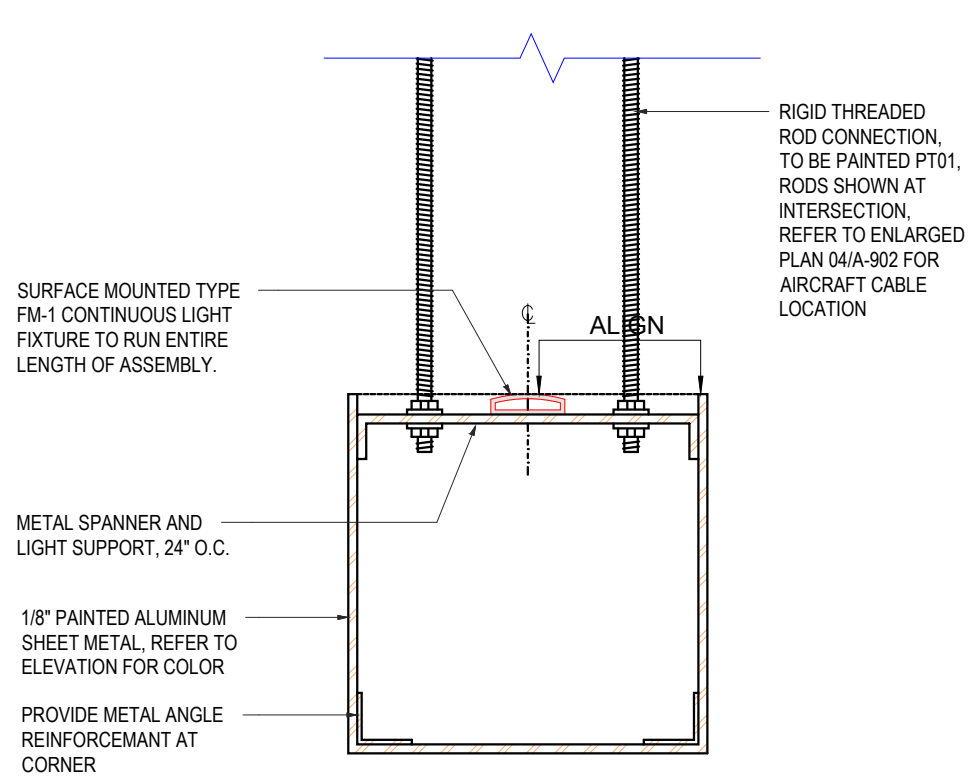
Flush GYP-ACT Transition



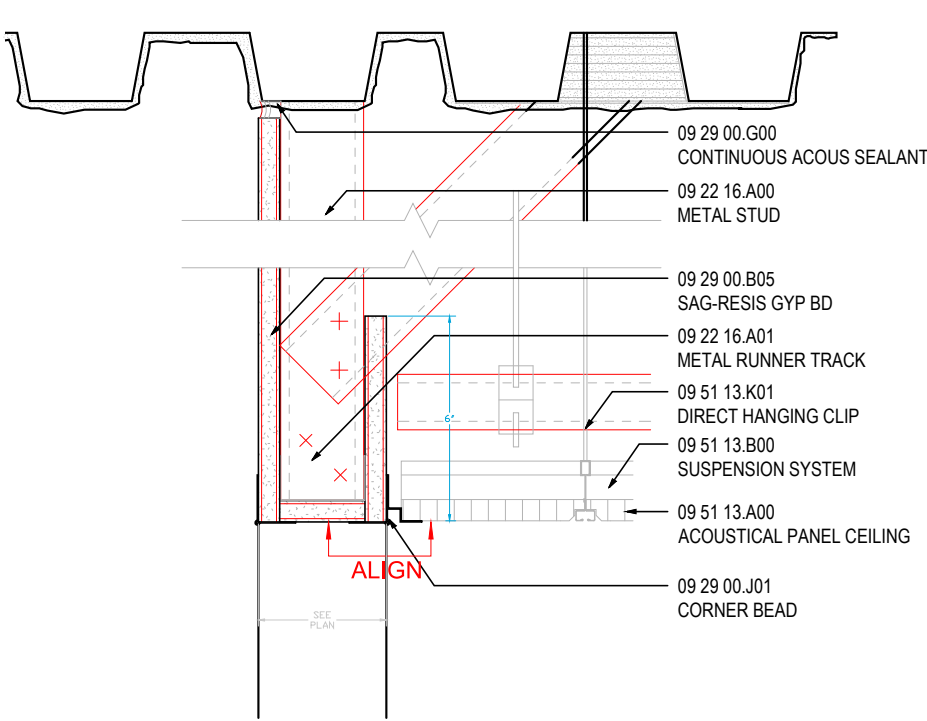
Plan Detail - Suspended Filament



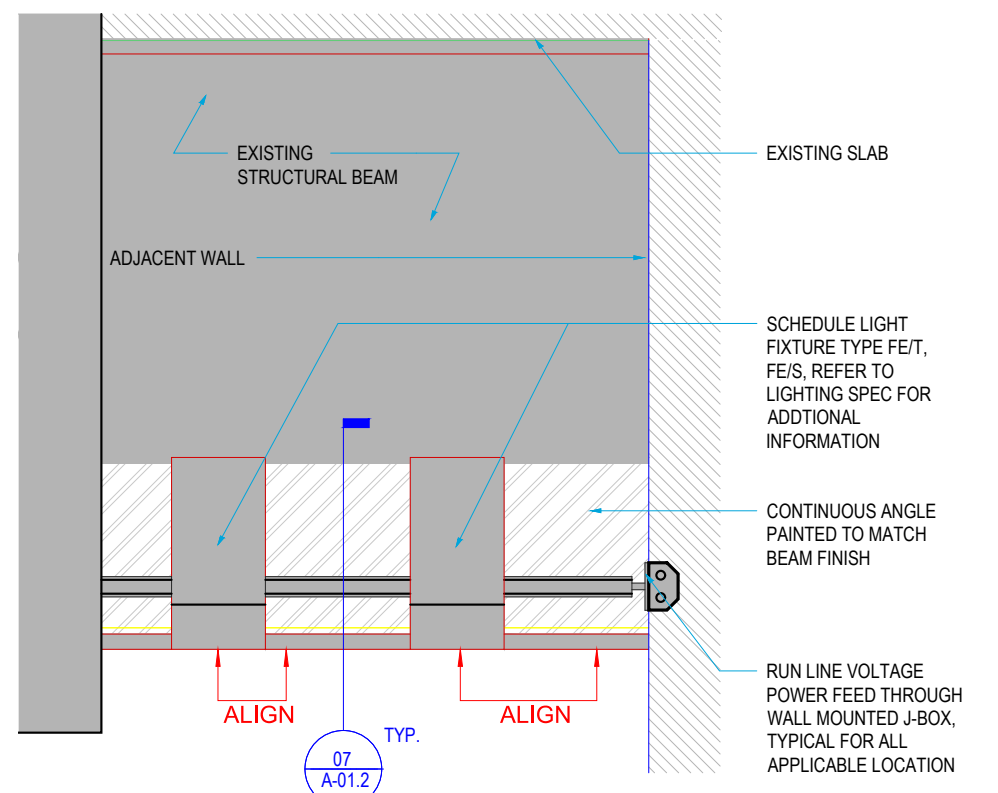
Section Detail - Suspended Filament



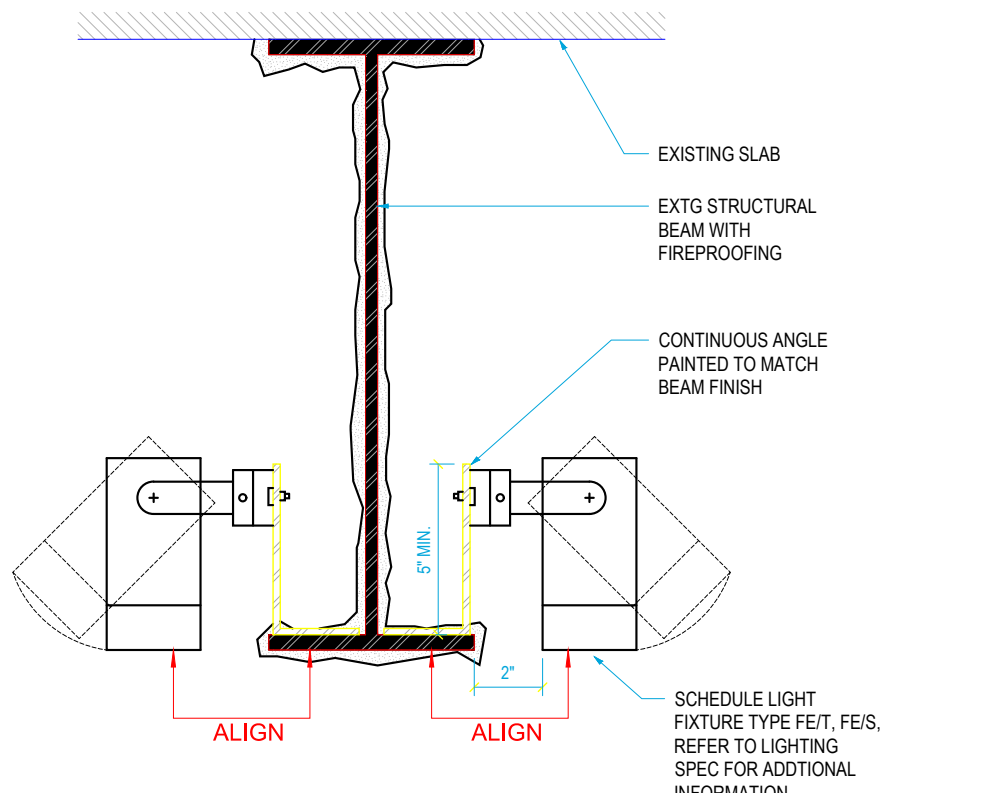
Flush Header @ Open Ceiling



Section Detail - FE Fixture at Beam



Section Detail - FE Fixture at Beam



Automated Shade Control

OT Network Design for Spaces

Mecho SolarTrac – Zones, Motors, and Sensors



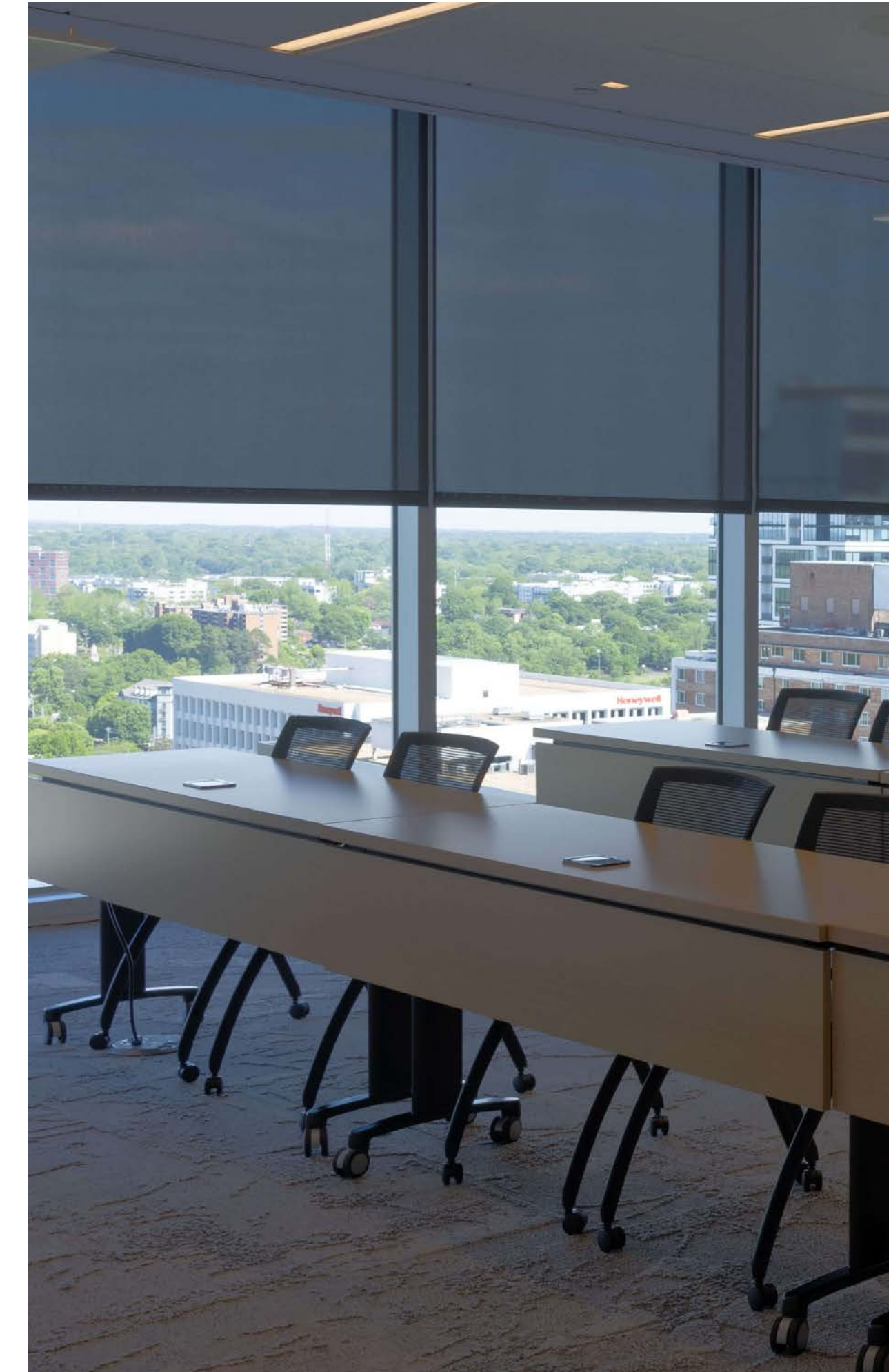
PoE (Power over Ethernet) controlled automated blinds throughout the floor plate provide energy savings by reducing the temperature on the envelope of the space.



molex

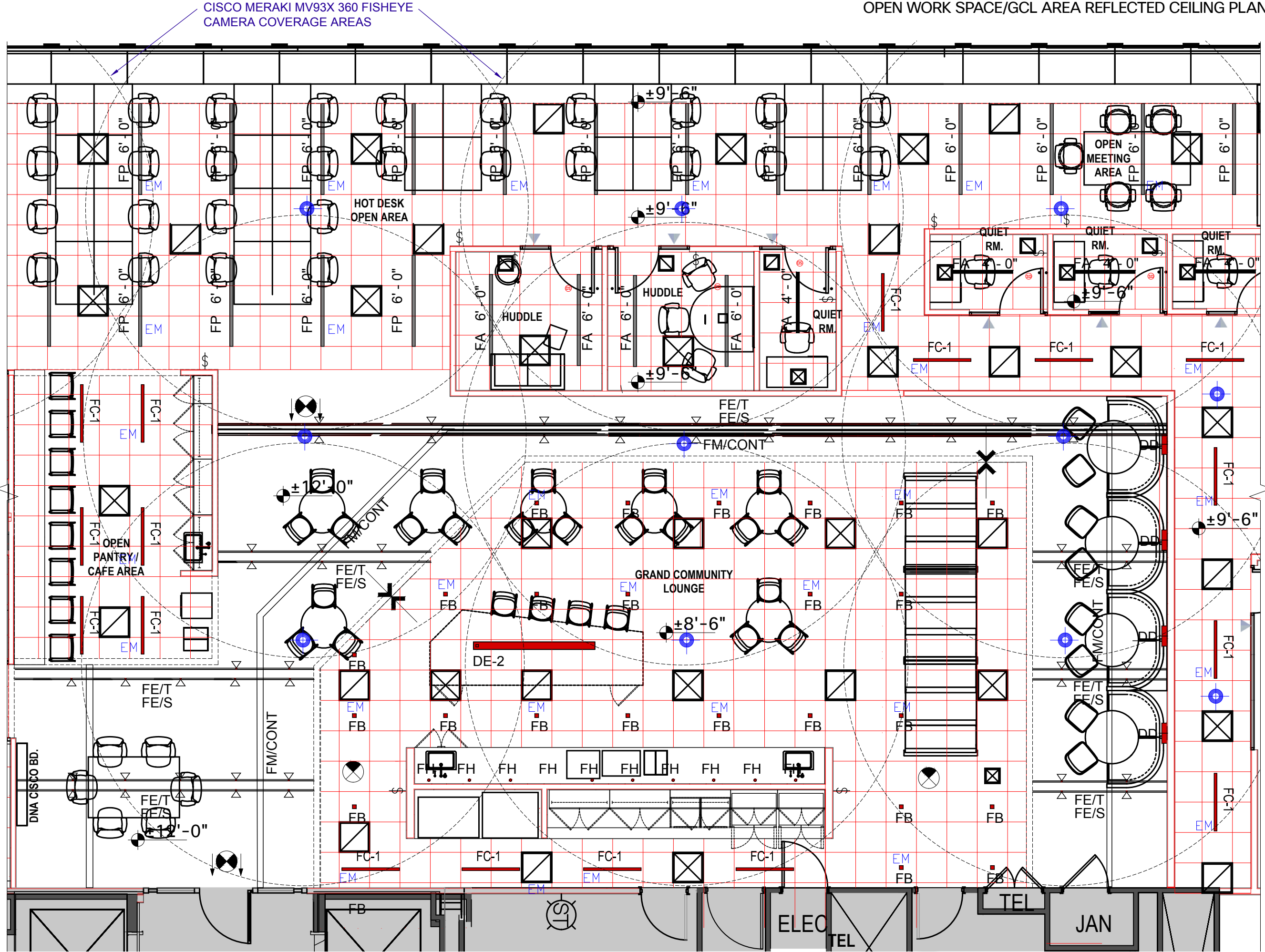


Mecho



IoT / PoE Power Data Flow

OT Network Design for Spaces



Graphics Symbols

- ACOUSTICAL CEILING AND GRID
- HVAC DIFFUSERS (CLG. T.B.D.) - SEE RCP
- CAMERA (CLG. MTD.) - SEE RCP
- IT ACCESS POINT (CLG. MTD.) - SEE RCP
- LIGHT FIXTURES**
- LIGHT FIXTURES
- CEILING MOUNTED EXIT SIGN
- FURNITURE SYSTEMS MOUNTED DEVICES**
- DUPLEX RECEPTACLE
- DATA RECEPTACLE
- FLUSH FLOOR MOUNTED DEVICES**
- DUPLEX RECEPTACLE
- DATA RECEPTACLE

Power and Communication

- WALL / CEILING / FLOOR MOUNTED DEVICES**
- DUPLEX RECEPTACLE
- DATA RECEPTACLE
- SWITCH DEVICE
- SWITCH TYPE (D=DIMMER, 3=3 WAY, S=SHADE)
- AV RECEPTACLE
- CEILING MOUNTED MICROPHONE - SEE RCP
- COMBINATION POWER & VOICE / DATA INFEEED
- CEILING MOUNTED SPEAKER - SEE RCP
- (1) Cat 6 Cable - Room Scheduler/Navigator - BD/FD
- MERAKI MV 93 CAMERA
- DIRECTIONAL AUDIO SPEAKER

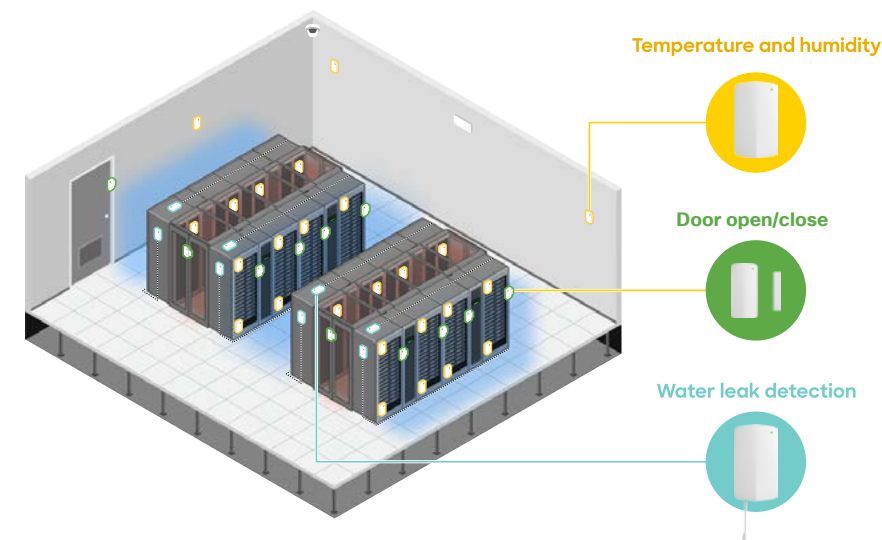


IoT / PoE Power Data Flow (Continued)

OT Network Design for Spaces

Monitor and automate energy savings with environmental sensors.

Organizations require a way to monitor and automate the data center environment so that all processes are optimized for energy efficiency and maximum equipment reliability. Meraki temperature, humidity, water leakage, and door sensors provide rich contextual environmental data to help technicians proactively identify problems or automate cooling based on IT loads.



Outcomes

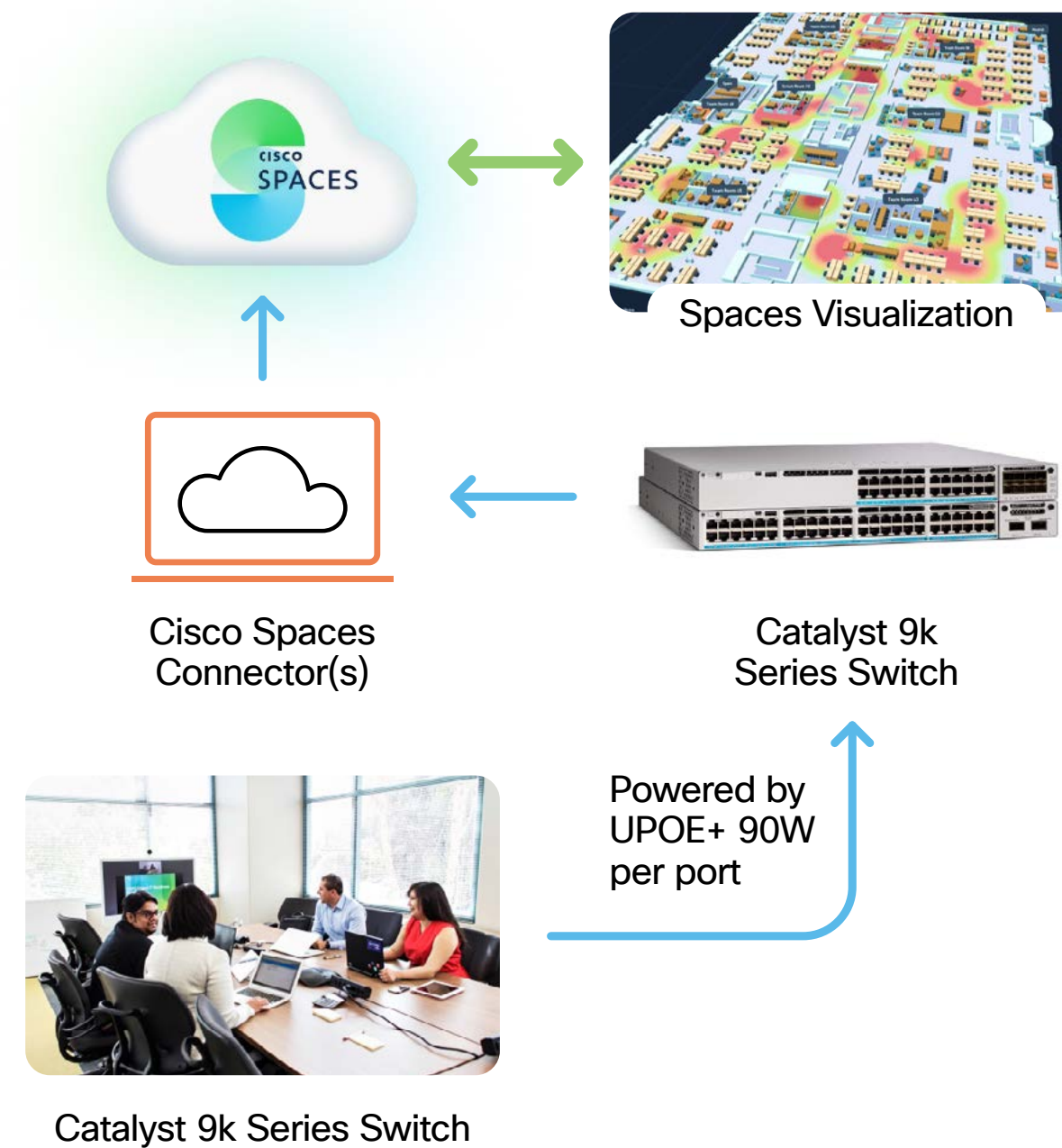
- Act fast before major issues arise with automated and customized alerts from Meraki MT sensors and MV cameras
- Prevent open doors welcoming potential intruders by pairing an app with MTs or MVs to send intrusion protection alarms



Features



Indoor IoT Services with Wired End Points Room Occupancy Workflow



Tech at the Desk



Motorized Height Adjustable Workstation



Monitor



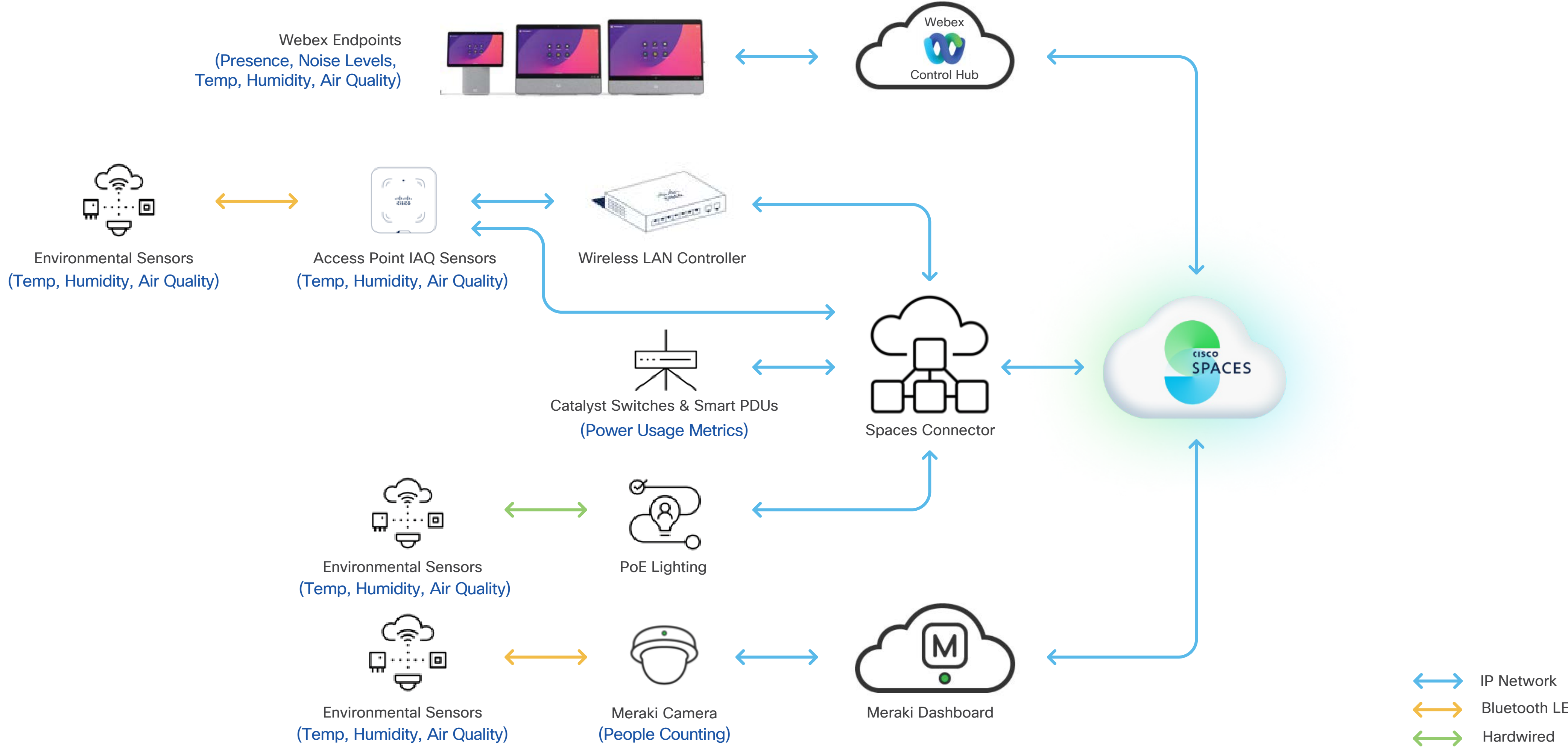
Video Camera



Power Charge w/USB

Sensor Data Flow

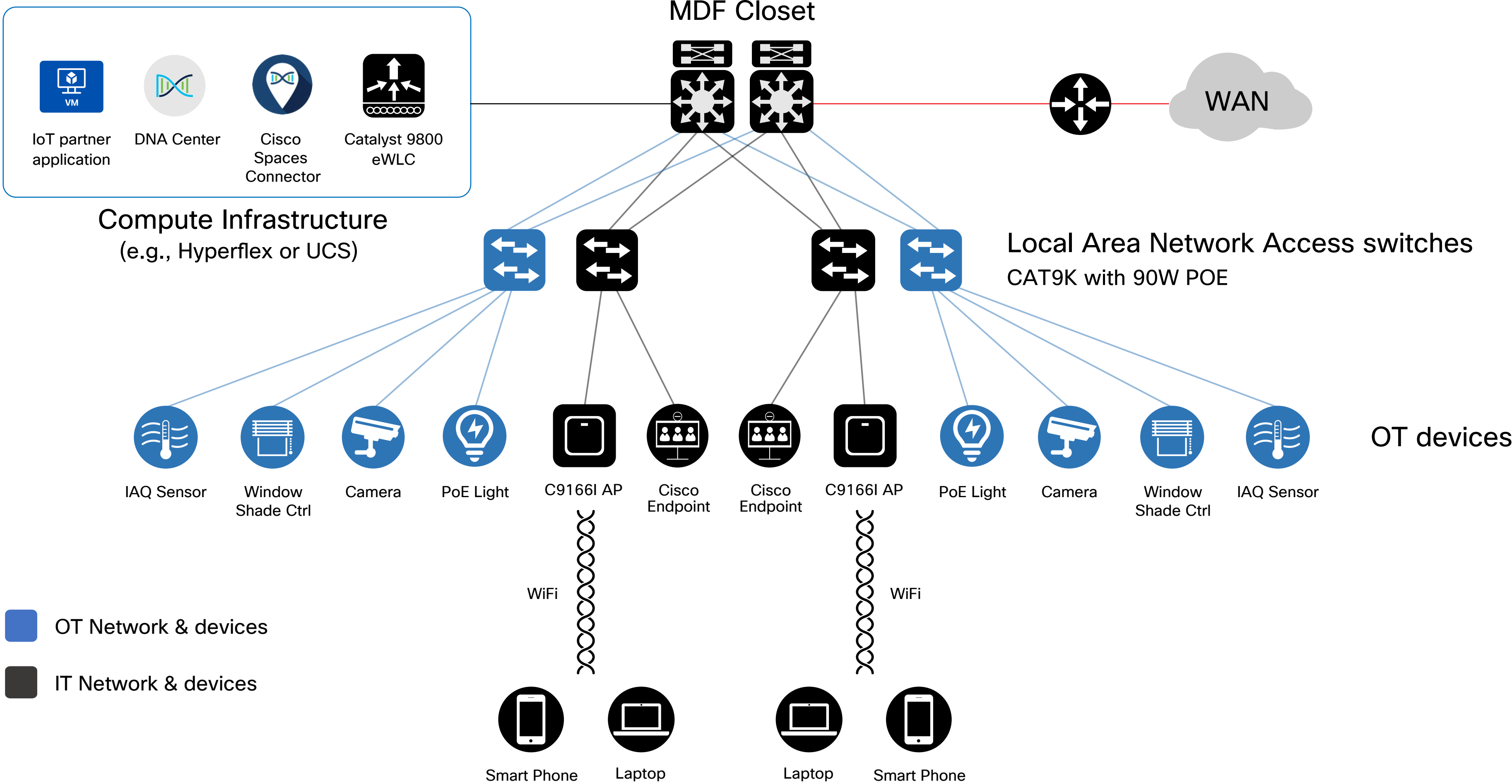
OT Network Design for Spaces



IT/OT Reference Architecture

OT Network Design for Spaces

- Separate IT and OT network layout
- Port based DHCP allocation
- This Architecture depicts separate IT/OT Access layer. It is possible to have IT/OT Access layer combined, based on design preferences.



OT Network & devices
 IT Network & devices

IT/OT Bill of Material

OT Network Design for Spaces

Function	Product	Notes
Access Switch	C9300X-24HX-A	UPoE+ (90W) on all ports
WiFi	CW9166i	Wi-Fi 6E with environmental sensor built-in. Can be managed by Meraki or DNAC.
AP license	AIR-DNA*	License for AP
Wireless LAN controller	C9800-40-K9	For on prem controller deployments
Smart Workspaces insights	SPACES-UL	Cisco Spaces License
Smart Video Cameras (optional)	MV22	Smart cameras for people counting, presence, security and other analytics
IoT sensors (optional)	MT10, MT12, MT14	IoT sensors for Temp, IAQ and water leak.

IOT Devices

- IAQ derived from the Cisco Collaboration Devices, C9166 APs, Wall mount navigators and non-Cisco sensors in POE lighting drivers.
- Occupancy sensing is coming from the Cisco Endpoints as well as Non-Cisco sensors.
- Lights being powered by POE
- Traditional DC Wall Switch

This list shows some major components from the BOM. For the full sample list see Appendix "A."

* Additional licenses needed.

Commissioning – User Acceptance Test (UAT)

OT Network Design for Spaces

OT/Space Testing

- Verify control of lights, shades and environmentals from wall plate (if available)
- Verify automated on/off status of lighting and shades based upon occupancy status
- Verify the Smart Workspaces display indicates proper occupancy
- Verify sensor data supplied by APs, cameras and IoT sensors is viewable from Cisco Spaces Smart Workspaces dashboard
- Verify that density-rules and all other configured rules trigger the defined/expected action(s)
- Check tabletop power and data functionality

Sequence of Operations

OT Network Design for Spaces

Occupancy Triggers

Ceiling Occupancy Sensor

- Motion is detected and lights set to on
- Daylighting sequence active (if applicable)
- Lights set to off, and scenes are set to defaults upon no-activity detected

Access Point

- Client is seen by access point and people count updated in Cisco Spaces
- Density rules trigger configured action(s) Camera
- Person is seen by Meraki camera and near real-time people count updated in Cisco Spaces
- Density rules trigger configured action(s)

Manual Override Control

- Wall switch (if available) will provide override functionality for on/off and dimming and scenes for individual areas
- Cisco Navigator touch screen (if available) will provide override functionality for on/off dimming, allow for setting scenes and will provide override for shade control. The above functionality is available via using optional docker application.
- The above functionality is available via using optional docker application.

Environmental Monitoring / Energy Utilization

- Where supported by device, air quality, humidity and temperature will be collected in Cisco WLC and Meraki dashboards. This information will be aggregated into and displayed within Cisco Spaces Smart Workspaces dashboard.

Commissioning Plan

OT Network Design for Spaces

Test and verify the following occupancy rule sets are properly executed upon the receipt of an occupancy event:

- Lights are set to the occupied scene and physically come on
- Light levels are set to default state
- Daylight sequences are active while in an occupied state (if applicable)
- Smart Workspaces system and displays are accurate
- Navigator system and displays are accurate (if available)

Test that the following vacancy events are delivered and that vacancy rule sets are executed for the following:

- 5 minutes after the last occupancy event a vacancy event is created within the lighting control system and that all lights are physically set to off
- 5 minutes after the last occupancy event the room status will be set to vacant within the Smart Workspaces system and the status within the system and all displays will be adjusted to show the room as vacant
- 5 minutes after the last occupancy event the room status will be set to vacant within the Navigator system and the status within the system (if available) and all displays will be adjusted to show the room as vacant
- Test that a vacancy event clears all manual overrides

Test that the following scheduled and automated events are working as programmed:

- Test that smart shade system is moving shades as programmed

Additional Testing

- Test that all occupancy/vacancy data is being collected within the appropriate systems and that space utilization reports are accurate
- Test that all indoor air quality events are displaying properly and all required data is being collected for compliance to applicable standards
- Test that cyber security and roles -based authentication is active and working for the network and IoT/OT devices
- Test the configured vacancy trigger is properly functioning in the Navigator system (if available)

Test all manual override functions:
Wall Switch

- Test that by physically utilizing the wall switch that on/off, dimming and scene functions are working properly
- Test that when the wall switch is set to “OFF” manually that all vacancy rule sets are executed after 1 minute
- Test that a manual override by a wall switch to implement a scene in a room that has been scheduled, remains in effect until the next vacancy event

Navigator (if available within open space)

- Test that by physically utilizing the tabletop Navigator that on/off dimming functions are working properly
- Test that a manual overrides by a tabletop Navigator to implement a scene remain in effect until the next vacancy event
- Test that when the tabletop Navigator “OFF” button is pressed manually that all vacancy rule sets are executed after 1 minute
- Test that a manual override by a tabletop Navigator to the “ON” state or an adjustment to a dimming level remains in effect until the next vacancy event
- Test that all scene settings are physically working in the tabletop Navigator
- Test that all shade controls are physically working in the tabletop Navigator

Open Work Areas

Hot Desks & Community Lounge



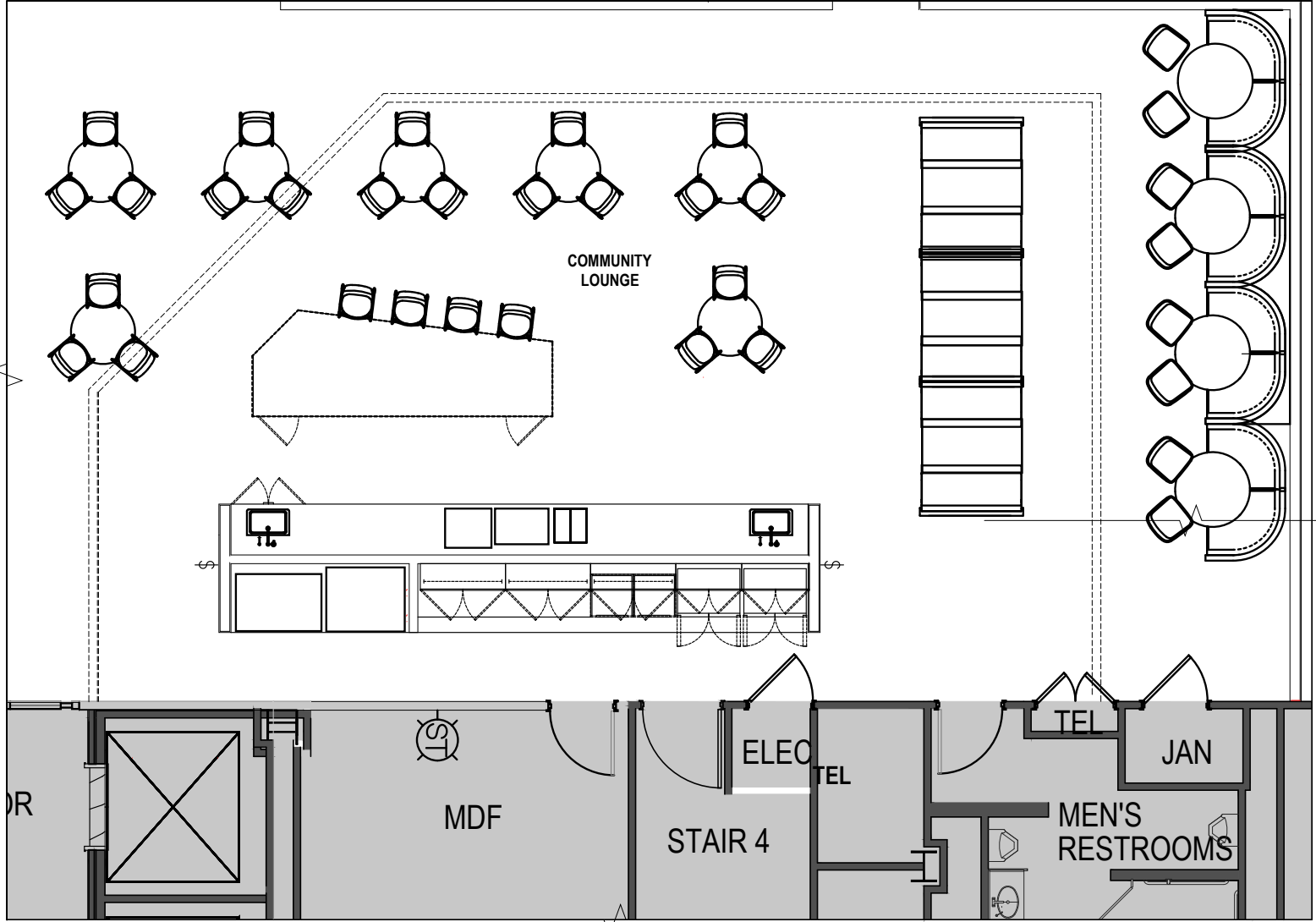
Community Lounge

Hot Desk and Community Lounge

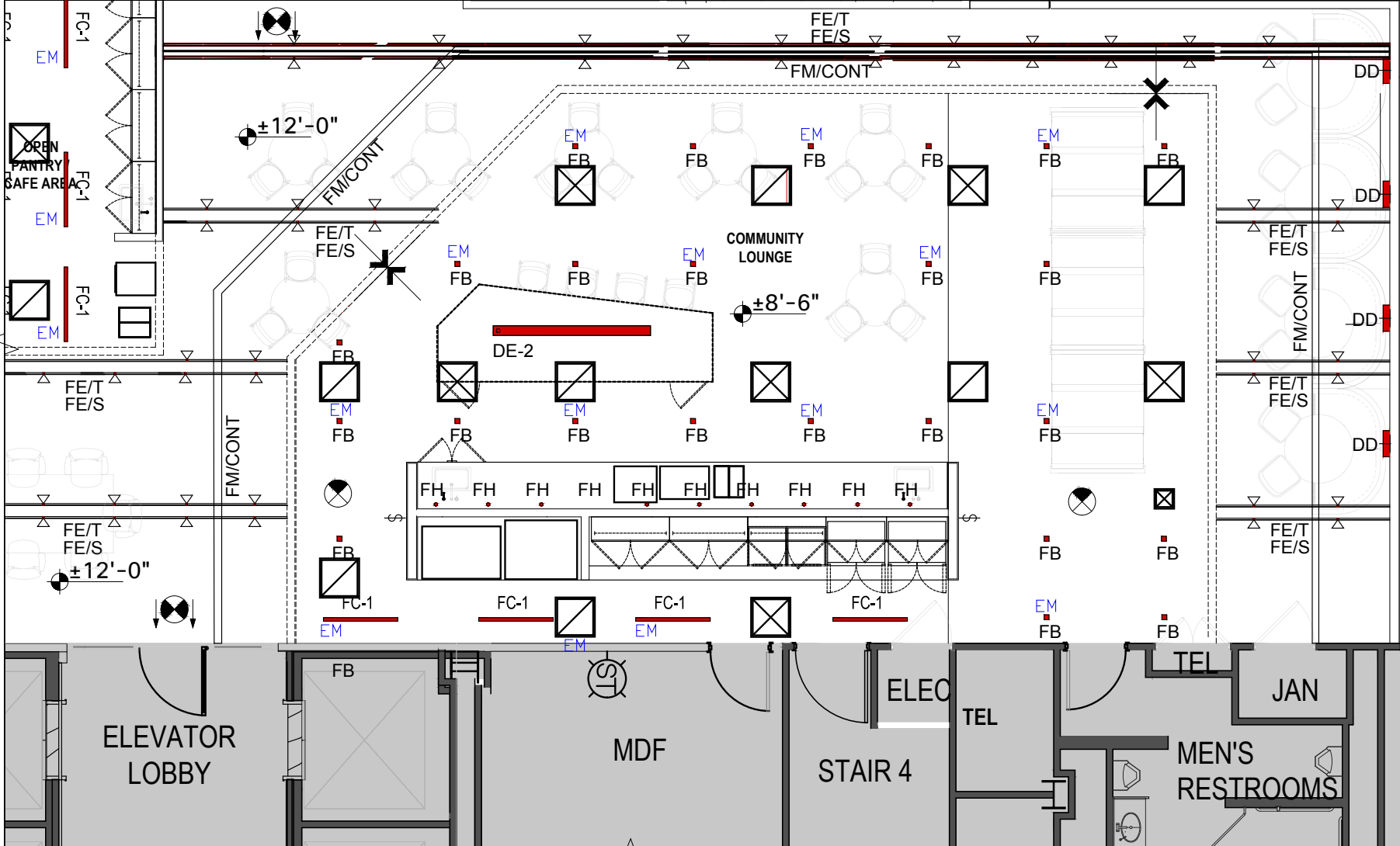
Keep it Casual

Working and socializing in the Community Lounge can be a great way to get away from your desk for a few minutes or connect with your team in a more relaxed setting. Of course, this is also an ideal place to grab coffee, consume food or have a lunch meeting.

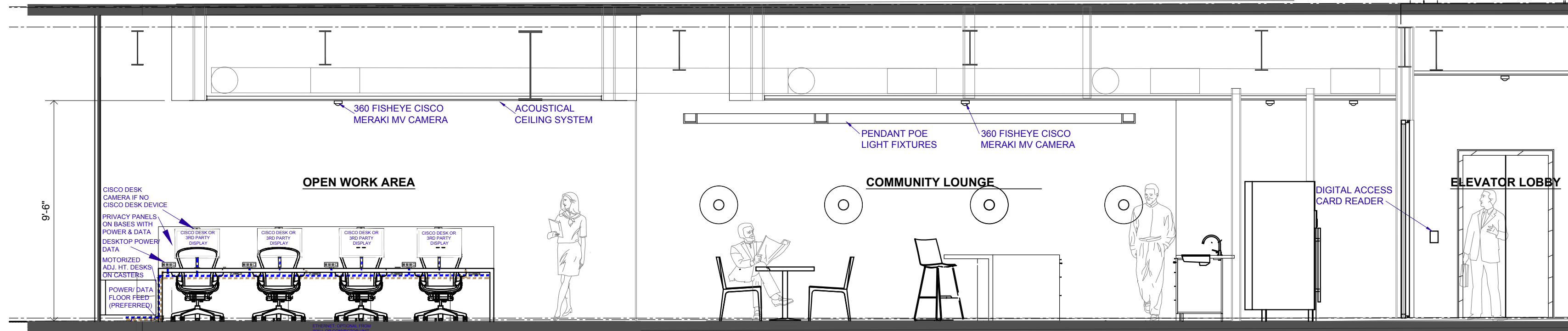
COMMUNITY LOUNGE FLOOR PLAN



COMMUNITY LOUNGE REFLECTED CEILING PLAN



OPEN WORK AREA / COMMUNITY LOUNGE SECTION / CONNECTIVITY DIAGRAM

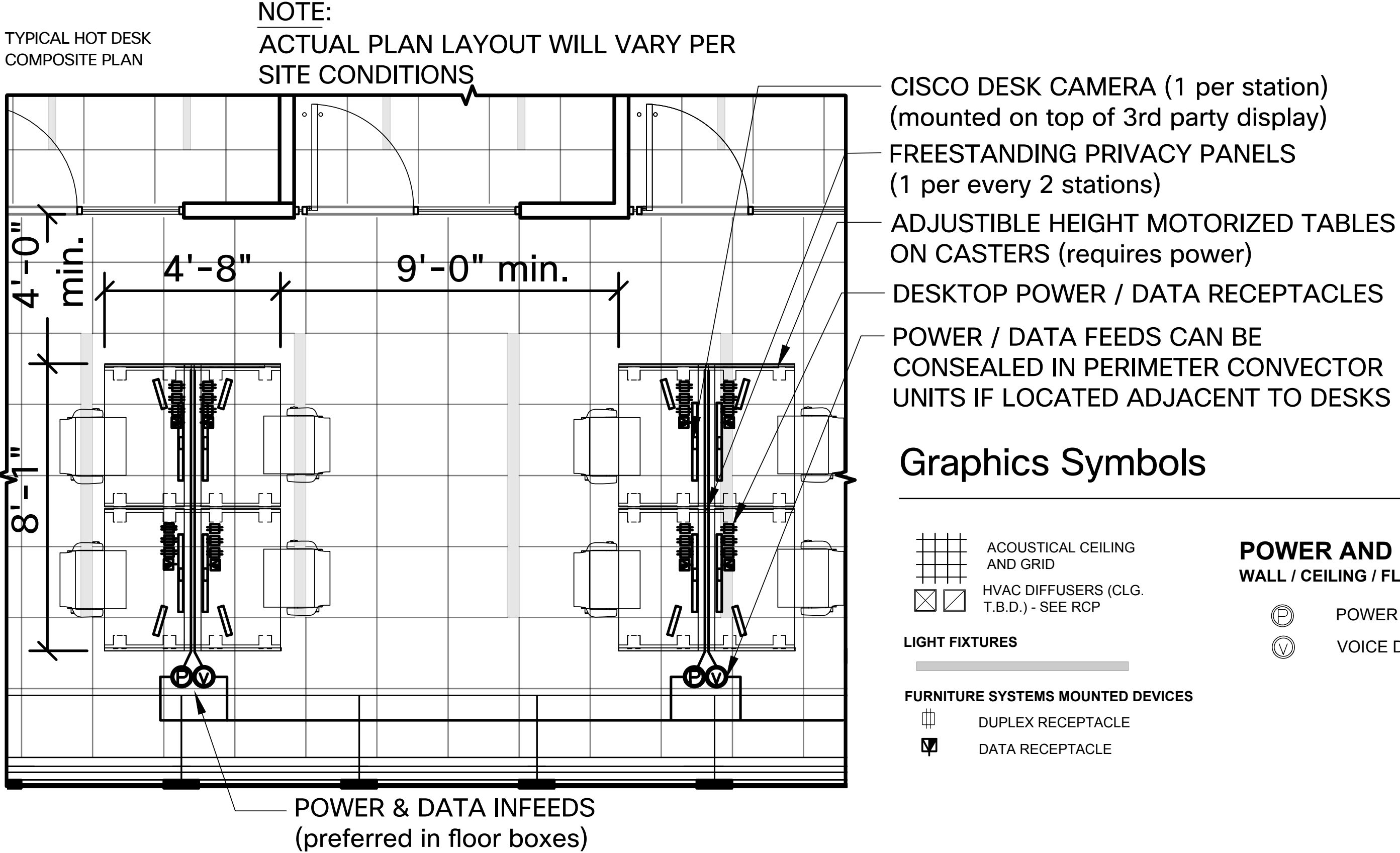


Design Principles

Hot Desk

Providing areas for people to do focus work or passively participate in a remote meeting is critical in the hybrid work environment, and the hot desk is the perfect space for these activities.

Space Purpose	Primary	Secondary
Information Sharing		✓
Concentrating	✓	
Brainstorming		
Team Building		
Decision Making		✓

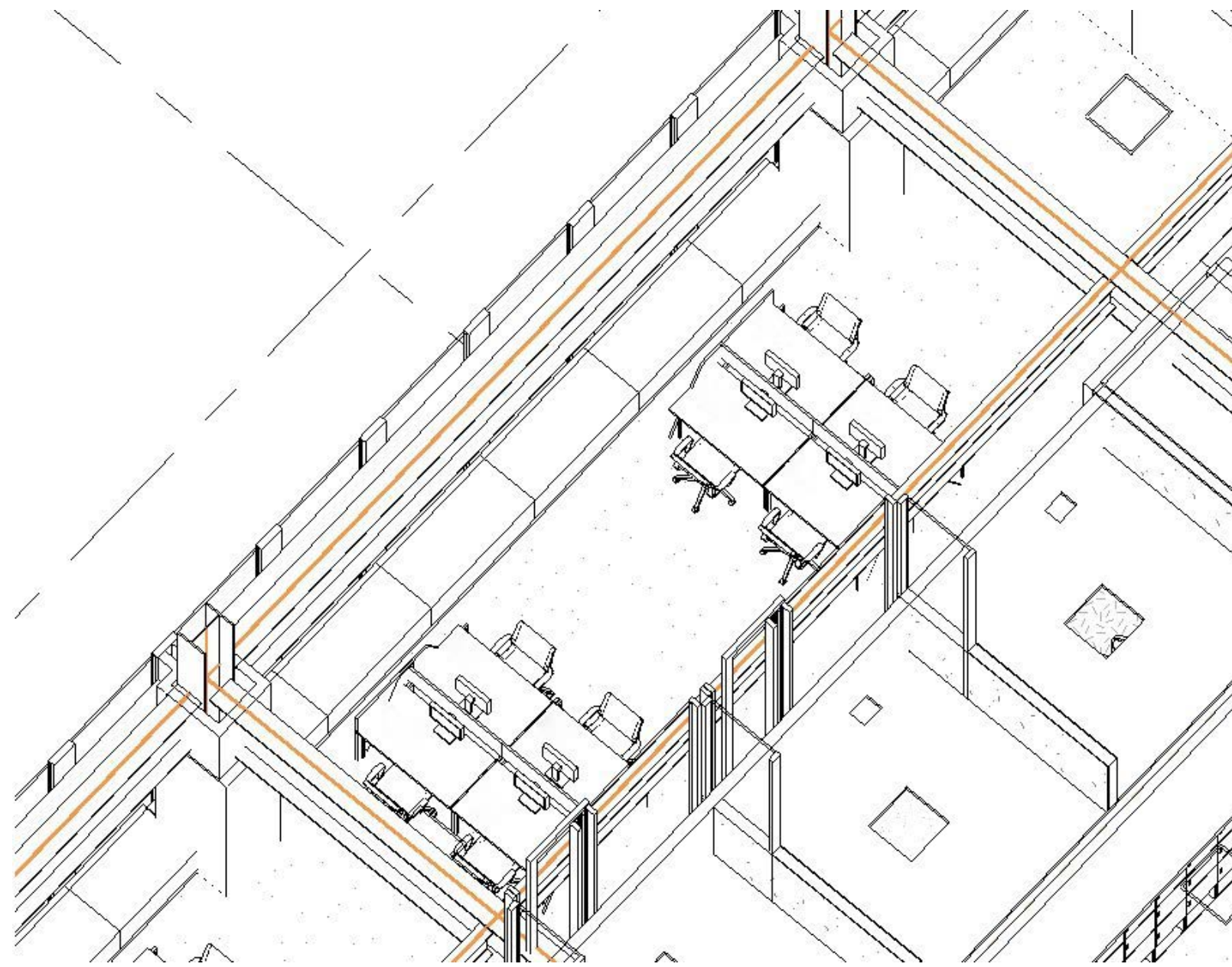


Type of Space **Collaboration** Considerations **Short-term usage; how occupants work will determine how many are needed**

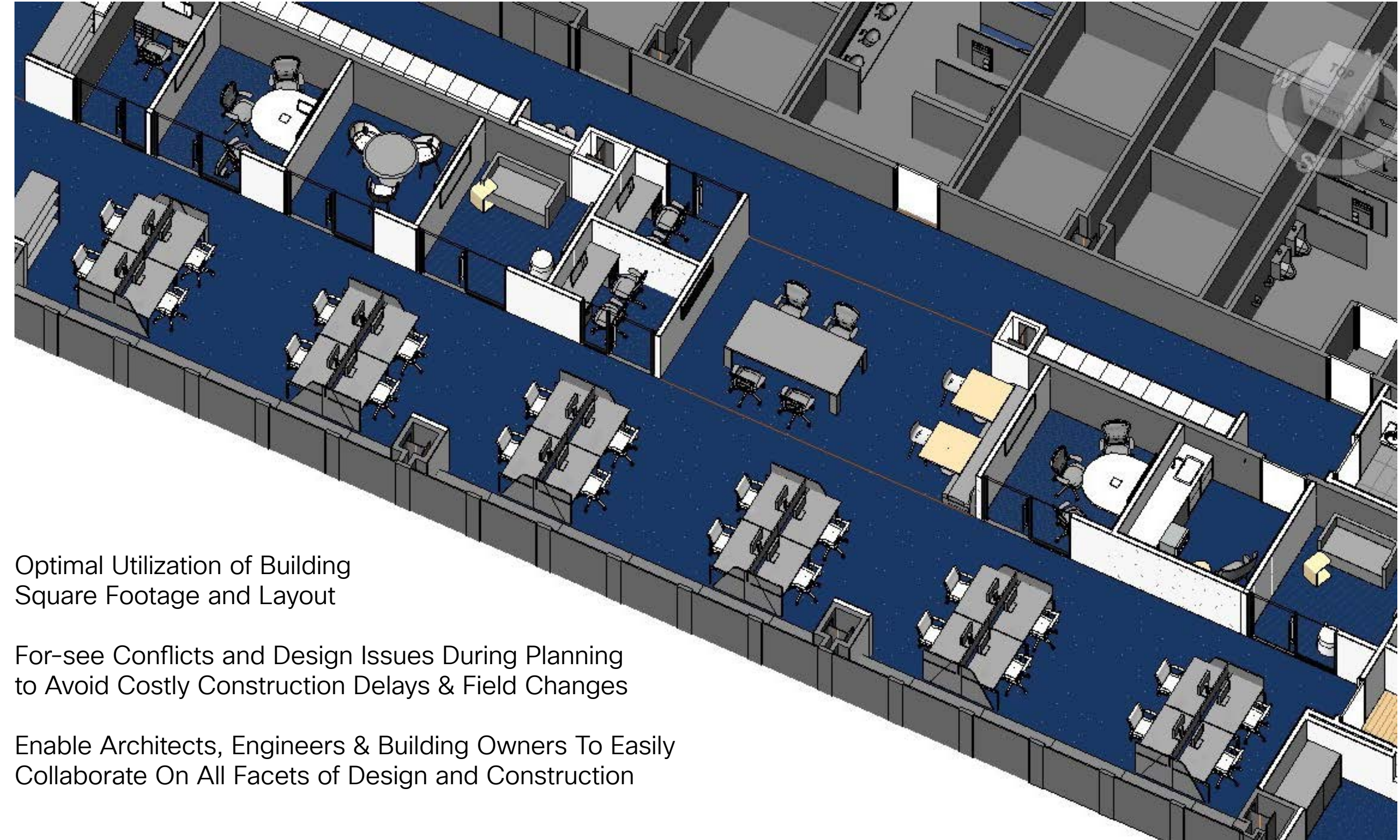
Outcomes & Benefits

Hot Desk

Low Voltage PoE deployed height adjustable desks provide both power and data connectivity to hot desking spaces.



Note: All energy conservation devices and design criteria shall be as per local codes.



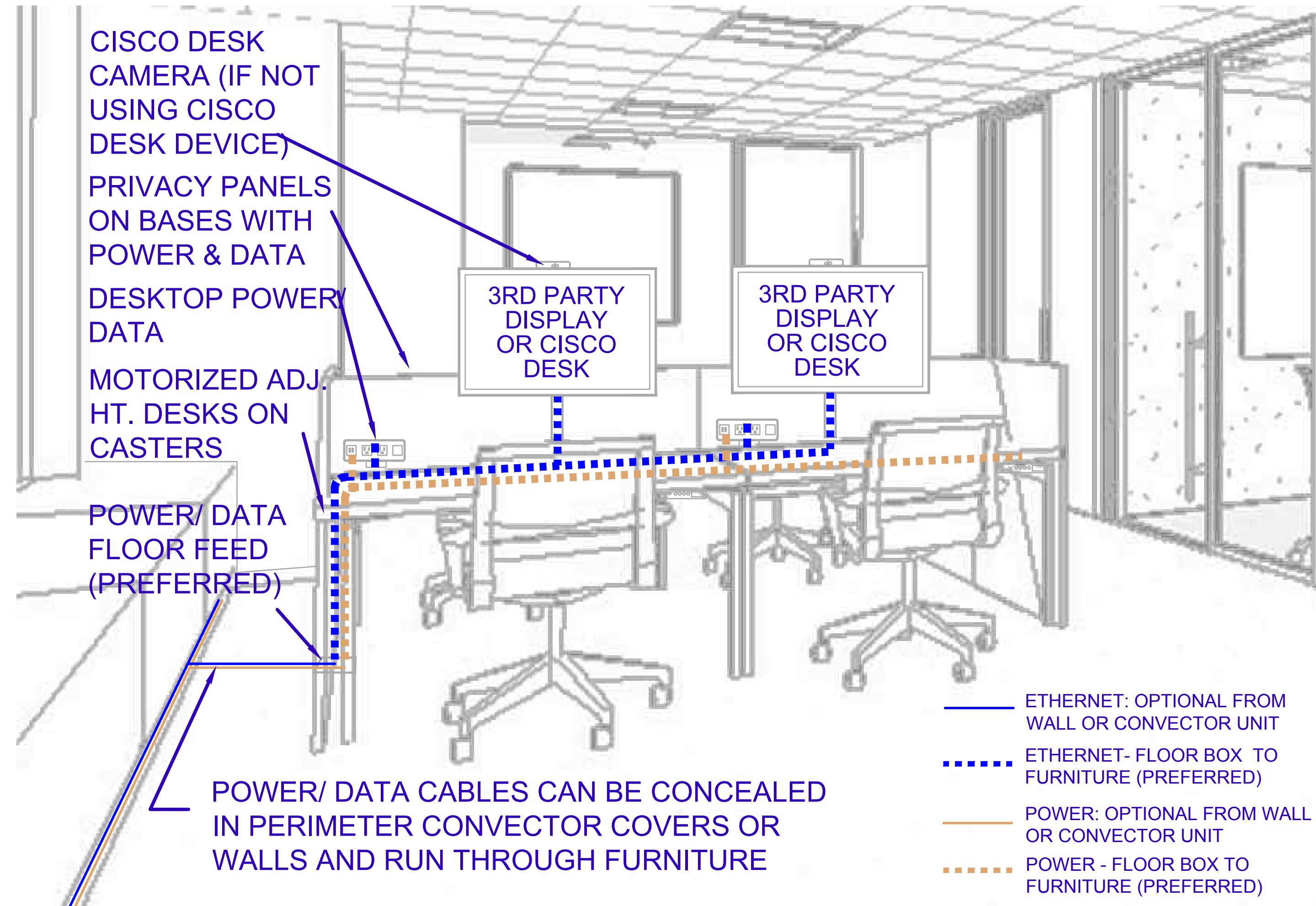
Optimal Utilization of Building
Square Footage and Layout

For-see Conflicts and Design Issues During Planning
to Avoid Costly Construction Delays & Field Changes

Enable Architects, Engineers & Building Owners To Easily
Collaborate On All Facets of Design and Construction

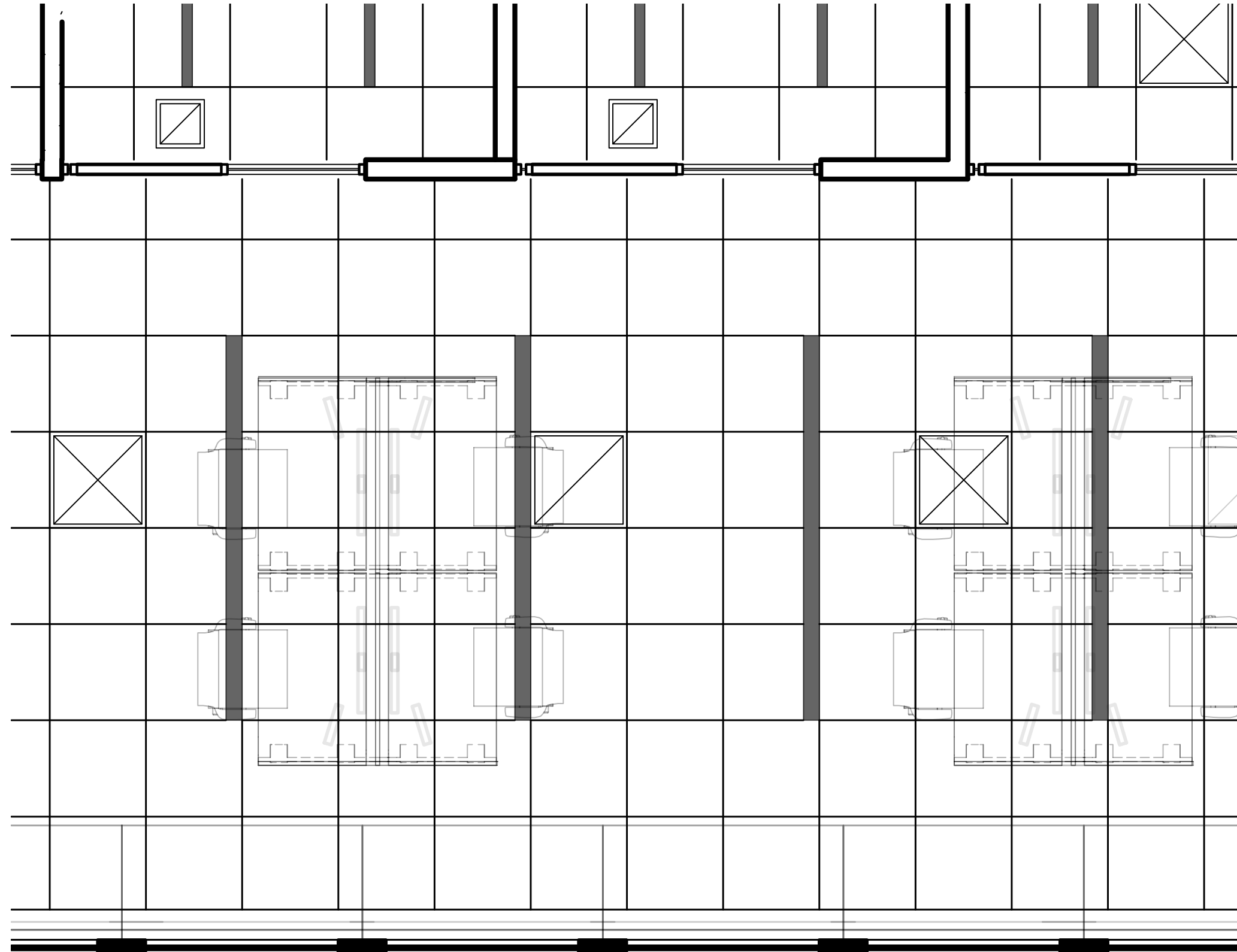
Connectivity View

Hot Desk



Room Ceiling Plan

Hot Desk



Note: Actual ceiling plan
& lighting layout will vary
per site conditions.

IT/OT Bill of Material

Hot Desk

Cisco Kit

Video Endpoint Hot Desk

- Cisco Desk Series
 - CS-DESKMINI-K9 Cisco Desk Mini
 - CS-DESK-K9 Cisco Desk
 - CS-DESKPRO-K9 Cisco Desk Pro
 - CP-8875-K9 IP Phone 8875
 - CD-DSKCAMD-C-US Cisco Desk Camera 1080p
 - HS-WL-730-BUNA-C Cisco Wireless Headset 730 (Optional)
-

IT Devices

- IAQ coming from Cisco Collaboration Devices.
-

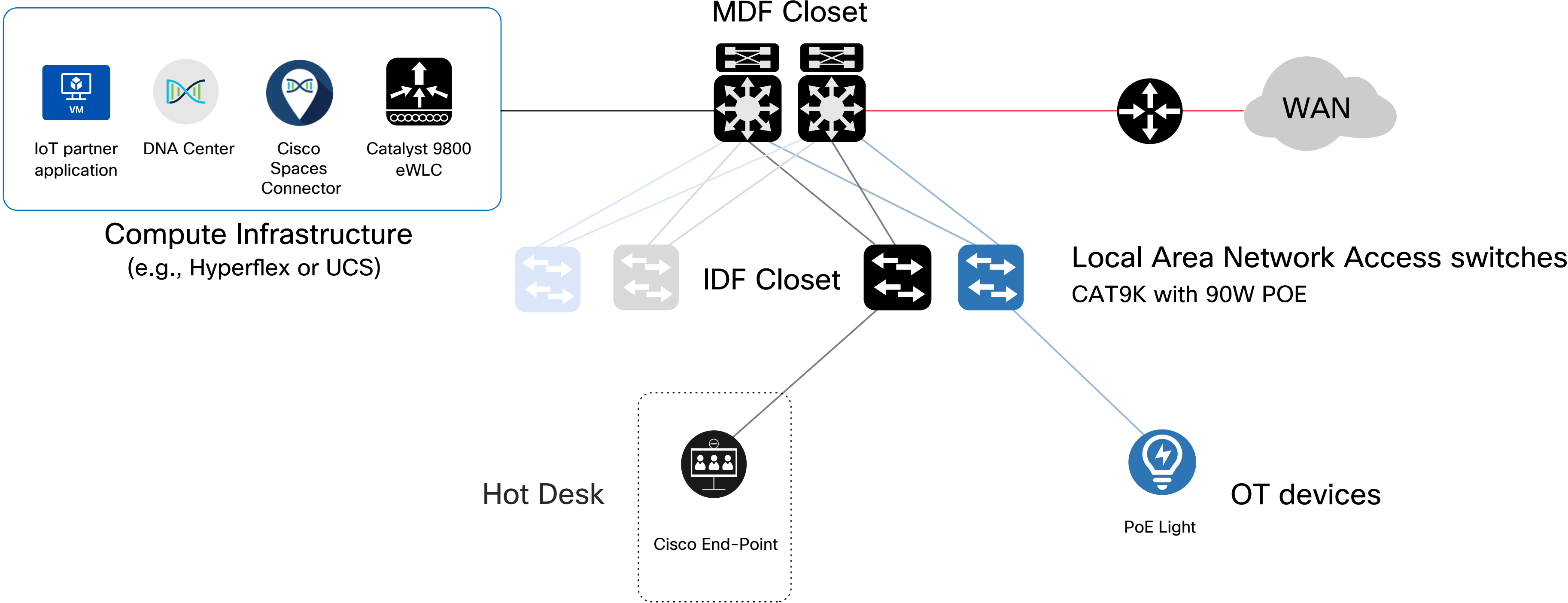
Non-Cisco Devices

- Desk monitors
-

IT/OT Reference Architecture

Hot Desk

- Separate IT and OT network layout
- Port based DHCP allocation
- This Architecture depicts separate IT/OT Access layer. It is possible to have IT/OT Access layer combined, based on design preferences.



- OT Network & devices
- IT Network & devices

Commissioning – User Acceptance Test (UAT)

Hot Desk

OT/Space Testing

- Check any tabletop power and data functionality. Connect USB-C cable from device to laptop.
- Verify hot-desk mode is operational and local booking is functional
- Verify that user's schedule/meeting information is reflected on device after signing-in/booking device
- Verify that user can sign-out of device and device reverts to default/not reserved state.
- Verify Webex Assistant feature works by issuing voice commands to device (if configured)
- Verify internet connectivity of Cisco device
- Initiate test calls to/from Cisco device
- Check for proper facial illumination
- Verify that the device collects accurate presence and people count metrics (where supported)
- Verify the Smart Workspaces display indicates proper occupancy and sensor data collected by device

Sequence of Operations

Hot Desk

Occupancy Triggers

Cisco Collaboration Device in Hot Desk Area

Cisco Desk / Desk Pro / Desk Mini

- Hot desk mode is enabled on device. User connects USB-C cable from device to laptop and then follows prompts to book device.
- Person is detected, presence and people count metrics updated
- Occupancy & vacancy events collected in the Cisco Smart Workspaces dashboard. Currently based on presence detection only, not “booked” state. (*roadmap – desk level presence & people detection requires CAD labels)
- Density rules trigger configured action(s)

Cisco 8875

- Hot desk mode is enabled on device. User books device locally.

Environmental Monitoring / Energy Utilization

- Air quality, humidity, temperature and ambient noise will be updated and displayed properly on communication device where supported, informational only
- Where supported by device, air quality, humidity, temperature and ambient noise will be collected in Cisco Control Hub. This information will be aggregated into and displayed within Cisco Spaces Smart Workspaces dashboard.

* Cisco Desk Camera 4K / third-party monitor option not included here

Commissioning Plan

Hot Desk

Cisco Collaboration Devices

Test and verify the following occupancy rule sets are properly executed:

- Upon user sign-in on device (requires USB-C connected laptop with Webex app installed), device screen will reflect user's personal meeting information and Webex identity
- Smart Workspaces system and displays accurately reflect occupancy data supplied by Cisco devices (where supported) – based on PeopleCount and PeoplePresence metrics

Test that the following vacancy events and actions are executed for the following:

- 15 minutes before a booking ends, user receives expiration notification on screen and option to extend stay if desired.
- System becomes available for booking after previous booking expiration has occurred.
- If device does not detect people presence, Cisco Spaces Smart Workspace interface should accurately reflect updated people metrics for given space within 5 minutes of last occupancy reporting event. As noted, please be aware that desk level presence & people detection requires CAD labels for map data used in Cisco Spaces.

Additional Testing

- Test that density and environment rules trigger configured action(s), such as sending alerts, modifying on/off/up/down values, etc
- Test that Webex Assistant voice commands function properly by issuing command understood by the system such as “OK Webex, join my meeting.”
- Verify that the device sends updates related to changes in air quality, temperature, humidity and noise (if available). Verify those changes are accurately reflected in Cisco Spaces Smart Workspaces dashboard. Note that sensor data is not currently supported by the Cisco 8875.
- Test that the motorized desk receives UPOE-supplied power and that the up/down functions work as expected.

Sample Bill of Material

Appendix A

Part Number	Description	Qty	Service Duration (Months)
OT Switches			
C9300X-24HX-A	Catalyst 9300 24-port mGig UPoE+, Network Advantage	5	---
C9300-NW-A-24	C9300 Network Advantage, 24-port license	5	---
SC9300UK9-179	Cisco Catalyst 9300 XE 17.9 UNIVERSAL UNIVERSAL	5	---
PWR-C1-1900WAC-UP	Upgrade option 1900W AC 80+ platinum Config 1 Power Supply	5	---
PWR-C1-1900WAC-P/2	1900W AC 80+ platinum Config 1 Secondary Power Supply	5	---
C9K-PWR-CAB-AC-US	Power Cord for AC 1900W Power Supply for Cat9K (USA)	10	---
SSD-240G	Cisco pluggable USB3.0 SSD storage	5	---
STACK-T1-50CM	50CM Type 1 Stacking Cable	5	---
CAB-SPWR-30CM	Catalyst Stack Power Cable 30 CM	5	---
TE-C9K-SW	TE agent for IOSXE on C9K	5	---
C9000-HSEC	U.S. Export Restriction Compliance license for Catalyst 9000	5	---
C9300-DNA-A-24	C9300 DNA Advantage, 24-port Term Licenses	5	---
C9300-DNA-A-24-5Y	C9300 DNA Advantage, 24-Port, 5 Year Term License	5	60
TE-EMBEDDED-T	Cisco ThousandEyes Enterprise Agent IBN Embedded	5	---
TE-EMBEDDED-T-5Y	ThousandEyes - Enterprise Agents	5	60
D-DNAS-EXT-S-T	Cisco Spaces Extend Term License for Catalyst Switches	5	---
D-DNAS-EXT-S-5Y	Cisco Spaces Extend for Catalyst Switching - 5Year	5	60
PI-LFAS-T	Prime Infrastructure Lifecycle & Assurance Term - Smart Lic	5	---
PI-LFAS-AP-T-5Y	PI Dev Lic for Lifecycle & Assurance Term 5Y	5	60
C9300X-NM-2C	Catalyst 9300 2 x 40G/100G Network Module QSFP+/QSFP28	5	---
NETWORK-PNP-LIC	Network Plug-n-Play Connect for zero-touch device deployment	5	---
Aggregation / Core Switches			
C9500-24Q-A	Catalyst 9500 24-port 40G switch, Network Advantage	2	---
CAB-TA-NA	North America AC Type A Power Cable	4	---
PWR-C4-950WAC-R	950W AC Config 4 Power Supply front to back cooling	2	---
PWR-C4-950WAC-R/2	950W AC Config 4 Power Supply front to back cooling	2	---
C9500-NW-A	C9500 Network Stack, Advantage	2	---
S9500UK9-176	Cisco Catalyst 9500 XE 17.6 UNIVERSAL	2	---
C9500-DNA-24Q-A	C9500 DNA Advantage, Term licenses	2	---
C9500-DNA-A-5Y	DNA Advantage 5 Year License	2	60
PI-LFAS-T	Prime Infrastructure Lifecycle & Assurance Term - Smart Lic	6	---
PI-LFAS-AP-T-5Y	PI Dev Lic for Lifecycle & Assurance Term 5Y	6	60
QSFP-40G-SR4-S	40GBASE-SR4 QSFP Trnscvr Module, MPO Conn, Enterprise-Class	48	---
NETWORK-PNP-LIC	Network Plug-n-Play Connect for zero-touch device deployment	2	---

Part Number	Description	Qty	Service Duration (Months)
IT Switches			
C9300X-48HX-A	Catalyst 9300 48-port mGig UPoE+, Network Advantage	3	---
C9300-NW-A-48	C9300 Network Advantage, 48-port license	3	---
SC9300UK9-179	Cisco Catalyst 9300 XE 17.9 UNIVERSAL UNIVERSAL	3	---
PWR-C1-1900WAC-UP	Upgrade option 1900W AC 80+ platinum Config 1 Power Supply	3	---
PWR-C1-1900WAC-P/2	1900W AC 80+ platinum Config 1 Secondary Power Supply	3	---
C9K-PWR-CAB-AC-US	Power Cord for AC 1900W Power Supply for Cat9K (USA)	6	---
SSD-240G	Cisco pluggable USB3.0 SSD storage	3	---
STACK-T1-50CM	50CM Type 1 Stacking Cable	3	---
CAB-SPWR-30CM	Catalyst Stack Power Cable 30 CM	3	---
TE-C9K-SW	TE agent for IOSXE on C9K	3	---
C9000-HSEC	U.S. Export Restriction Compliance license for Catalyst 9000	3	---
C9300-DNA-A-48	C9300 DNA Advantage, 48-Port Term Licenses	3	---
C9300-DNA-A-48-5Y	C9300 DNA Advantage, 48-Port, 5 Year Term License	3	60
TE-EMBEDDED-T	Cisco ThousandEyes Enterprise Agent IBN Embedded	3	---
TE-EMBEDDED-T-5Y	ThousandEyes - Enterprise Agents	3	60
D-DNAS-EXT-S-T	Cisco Spaces Extend Term License for Catalyst Switches	3	---
D-DNAS-EXT-S-5Y	Cisco Spaces Extend for Catalyst Switching - 5Year	3	60
PI-LFAS-T	Prime Infrastructure Lifecycle & Assurance Term - Smart Lic	3	---
PI-LFAS-AP-T-5Y	PI Dev Lic for Lifecycle & Assurance Term 5Y	3	60
C9300X-NM-2C	Catalyst 9300 2 x 40G/100G Network Module QSFP+/QSFP28	3	---
NETWORK-PNP-LIC	Network Plug-n-Play Connect for zero-touch device deployment	3	---
Wireless Access Points			
CW9166I-B	Catalyst 9166I AP (W6E, tri-band 4x4, XOR) w/Reg-B	25	---
SW9166-CAPWAP-K9	Capwap software for Catalyst 9166I	25	---
AIR-AP-T-RAIL-R	Ceiling Grid Clip for APs & Cellular Gateways-Recessed	25	---
AIR-AP-BRACKET-1	802.11 AP Low Profile Mounting Bracket (Default)	25	---
CDNA-A-C9166	Wireless Cisco DNA On-Prem Advantage, 9166 Tracking	25	---
DNA-A-5Y-C9166	C9166I Cisco DNA On-Prem Advantage, 5Y Term, Trk Lic	25	---
AIR-DNA-A	Wireless Cisco DNA On-Prem Advantage, Term Lic	25	---
AIR-DNA-A-5Y	Wireless Cisco DNA On-Prem Advantage, 5Y Term Lic	25	---
PI-LFAS-AP-T	Prime AP Term Licenses	25	---
PI-LFAS-AP-T-5Y	PI Dev Lic for Lifecycle & Assurance Term 5Y	25	---
AIR-DNA-A-T	Wireless Cisco DNA On-Prem Advantage, Term, Tracker Lic	25	---
AIR-DNA-A-T-5Y	Wireless Cisco DNA On-Prem Advantage, 5Y Term, Tracker Lic	25	---
AIR-DNA-NWSTACK-A	Wireless DNA Perpetual Network Stack - Advantage	25	---
D-DNAS-EXT-BUN-T	Cisco Spaces Extend Term License for Cisco DNA	25	---
D-DNAS-EXT-BUN-5Y	Cisco Spaces Extend for Cisco DNA - 5Year	25	---
NETWORK-PNP-LIC	Network Plug-n-Play Connect for zero-touch device deployment	25	---
CW9166I-MULTI	MULTI PACK OPTION	25	---
CW9166I-OVER	C9166I OVER OPTION	25	---

Sample Bill of Material (Continued)

Appendix A

Part Number	Description	Qty	Service Duration (Months)
Wireless LAN Controllers			
C9800-40-K9	Cisco Catalyst 9800-40 Wireless Controller	2	---
LIC-C9800-DTLS-K9	Cisco Catalyst 9800 Series Wireless Controller DTLS License	2	---
SC980040K9-173	Cisco Catalyst 9800-40 Wireless Controller	2	---
C9800-AC-750W-R	Cisco Catalyst 9800-40 750W AC Power Supply	2	---
CAB-AC	AC Power Cord (North America), C13, NEMA 5-15P, 2.1m	4	---
C9800-AC-750W-RED	Cisco Catalyst 9800-40 750W AC Power Supply	2	---
NETWORK-PNP-LIC	Network Plug-n-Play Connect for zero-touch device deployment	2	---
Cisco Spaces			
DNAS	Cisco Spaces is a location platform offered as a XaaS	1	---
SVS-DNAS-SUP	Cisco Spaces Software Subscription bundle Support	1	---
SPACES-UL	Cisco Spaces Unlimited License (10,000 Sq Ft)	1	60
Room Bar (Huddle / Small Conference)			
CS-BAR-T-K9	Cisco Webex Room Bar w/Table Stand Navigator	7	---
PWR-CORD-USA-B	Power Cord for United States of America 2m 10A	7	---
CAB-2HDMI-1.5M-GR-	1.5m GREY HDMI 2.0	7	---
CAB-ETH-5M-GR-	CAB (16,4 feet / 5m) GREY ETHERNET	7	---
PSU-12VDC-86W-	Powersupply - AC/DC, 12.3V, 86W, 7A, Gray	7	---
CS-KITMIN-CAM-COV-	Camera cover for Room Kit Mini	7	---
CS-BAR-MOUNT-KIT-	Mounting Kit for Cisco Room Bar	7	---
CS-T10-TS-G-	Cisco Room Navigator-Table Stand, First Light (White)	7	---
CAB-DV10-8M-	8 meter flat grey Ethernet cable for Touch 10	7	---
Desk Pro (Quiet Rooms)			
CS-DESKPRO-K9	Cisco Desk Pro	6	---
PWR-CORD-USA-B	Power Cord for United States of America 2m 10A	6	---
CS-PWR-CUBE-7-	Power transformer for the Desk Pro series	6	---
CAB-USBC-1.8M-	USB C - USB C Cable, 1.8 meters long	6	---
CAB-2HDMI-1.5M-GR-	1.5m GREY HDMI 2.0	6	---
CS-DESKPRO-STYLUS-	Cisco Desk Pro Stylus	6	---
CAB-ETH-3M-GR-	CAB 3m GREY ETHERNET	6	---
CS-DESKPRO-STAND-	Desk Stand & Connector Cover for Desk Pro Series	6	---
CS-DESKPRO-FG-	Fabric Speaker Grille for Desk Pro Series	6	---

Part Number	Description	Qty	Service Duration (Months)
Hyperflex Compute			
HX-M6-MLB	HX/HXAF/EDG M6 MLB	1	---
DC-MGT-SAAS	Cisco Intersight SaaS	1	---
DC-MGT-IS-SAAS-AD	Infrastructure Services SaaS/CVA - Advantage	2	---
SVS-DCM-SUPT-BAS	Basic Support for DCM	1	---
DC-MGT-UCSC-1S	UCS Central Per Server - 1 Server License	2	---
HXAF-E-240-M6SX	Cisco HyperFlex All Flash Edge 240 Full Capacity M6 system	2	---
HX-SAS-240M6	Cisco 12G SAS HBA for(16 Drives) w/2U Brkt	4	---
HX-SD960G6S1X-EV	960GB 2.5 inch Enterprise Value 6G SATA SSD	16	---
HX-SD800GK3X-EP	800GB 2.5in Enterprise Performance 12G SAS SSD(3X endurance)	2	---
HX-SD240GM1X-EV	240GB 2.5 inch Enterprise Value 6G SATA SSD	2	---
HX-M2-240GB	240GB SATA M.2	4	---
HX-M2-HWRAID	Cisco Boot optimized M.2 Raid controller	2	---
HX-RAIL-M6	Ball Bearing Rail Kit for C220 & C240 M6 rack servers	2	---
UCSX-TPM-OPT-OUT	OPT OUT, TPM 2.0, TCG, FIPS140-2, CC EAL4+ Certified	2	---
UCSC-HSHP-240M6	Heatsink for 2U SFF M6 PCIe SKU	2	---
UCS-DIMM-BLK	UCS DIMM Blanks	56	---
UCSC-BBLKD-S2	UCS C-Series M5 SFF drive blanking panel	28	---
UCSC-M2EXT-240M6	C240M6 / C245M6 2U M.2 Extender board	2	---
CBL-SAS24-240M6	C240M6 SAS cable 24 (2U); (Zumba HBA)	2	---
CBL-SAS12-240M6	C240M6 SAS cable (2U); (Pismo HBA)	2	---
UCSC-FBRS2-C240M6	C240 / C245 M6 2U Riser2 Filler Blank	2	---
UCSC-FBRS3-C240M6	C240 / C245 M6 2U Riser3 Filler Blank	2	---
HXAF240C-BZL-M5SX	HXAF240C M5 Security Bezel	2	---
HX-CPU-I8351N	Intel 8351N 2.4GHz/225W 36C/54MB DDR4 2933MHz	2	---
HX-MR-X64G2RW	64GB RDIMM DRx4 3200 (16Gb)	8	---
HX-RIS1A-240M6	C240 M6 Riser1A; (x8;x16x, x8); StBkt; (CPU1)	2	---
HX-E-TOPO4	10GbE Single or Dual Switch (2, 3, or 4 node)	2	---
HX-M-V25-04	Cisco UCS VIC 1467 quad port 25G SFP28 mLOM	2	---
HX-P-I8D25GF	Cisco-Intel E810XXVDA2 2x25/10 GbE SFP28 PCIe NIC	2	---
HX-PSU1-1050W	Cisco UCS 1050W AC Power Supply for Rack Server Platinum	4	---
CAB-9K12A-NA	Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	4	---
HX-VSP-7-0-FND-D	Factory Installed -vSphere SW 7.0 1-CPU Enduser provides Lic	2	---
HX-VSP-7-0-FND-DL	Factory Installed - VMware vSphere 7.0 Fnd SW Download	2	---

Sample Bill of Material (Continued)

Appendix A

Part Number	Description	Qty	Service Duration (Months)
Desk / Desk Mini (Hot Desks)			
CS-DESKMINI-K9	Cisco Desk Mini	15	---
PWR-CORD-USA-B	Power Cord for United States of America 2m 10A	15	---
CAB-USBC-1.8M-	USB C - USB C Cable, 1.8 meters long	15	---
CS-DESK-K9	Cisco Desk - First Light (White)	15	---
PWR-CORD-USA-B	Power Cord for United States of America 2m 10A	15	---
CAB-USBC-1.8M-	USB C - USB C Cable, 1.8 meters long	15	---
CAB-ETH-3M-GR-	CAB 3m GREY ETHERNET	15	---
CS-DESK-FG-	Fabric Speaker Grille for Desk Series	15	---
CS-DESK-STAND-	Desk Stand for Desk Series	15	---
PSU-12VDC-70W-GR-	Powersupply - AC/DC, 12V, 6.25A, grey	15	---
Wall-Mount Room Navigators (Outside each conference room)			
CS-T10-WM-K9=	Cisco Room Navigator - Wall mount version - Spare	18	---
Board Pro 55" (Spaces Maps)			
CS-BRD55P-K9	Cisco Board Pro 55	1	---
CS-BRD55P-WMK	Cisco Board Pro 55 Wall Mount Kit	1	---
PWR-CORD-USA-F	Power Cord for United States of America 4.5m 10A	1	---
CS-BRDP-ACTSTYL+	Cisco Board Pro Active Stylus	1	---
CS-BRDP-LFTHNDL-	Cisco Board Pro Lifting Handles	1	---
Board Pro 75" (Brainstorming / Open Meeting Area)			
CS-BRD75P-K9	Cisco Board Pro 75	2	---
CS-BRD75P-WMK	Cisco Board Pro 75 Wall Mount Kit	2	---
PWR-CORD-USA-F	Power Cord for United States of America 4.5m 10A	2	---
CS-BRDP-ACTSTYL+	Cisco Board Pro Active Stylus	2	---
CS-BRDP-LFTHNDL-	Cisco Board Pro Lifting Handles	2	---

Part Number	Description	Qty	Service Duration (Months)
Room Kit EQ (Large Conference Room)			
CS-KIT-EQ-K9	Room Kit EQ w/Codec EQ, Quad Cam (White)	1	---
PWR-CORD-USA-B	Power Cord for United States of America 2m 10A	2	---
CS-T10-TS-L+	Cisco Room Navigator-Table Stand, First Light (White)	1	---
CS-T10-TS-L-K9	Cisco Room Navigator-Table Stand, First Light (White)	1	---
CS-MIC-TABLE-J	Cisco Table Microphone with Jack Plug	2	---
CS-CODEC-EQ-WMK	Wall Mount Kit for Codec EQ	1	---
CS-CODEC-EQ-K9+	Cisco Codec EQ unit	1	---
CS-QUADCAM2+	Cisco Quad Camera, First Light (White)	1	---
PSU-12VDC-70W-GR+	Powersupply - AC/DC, 12V, 6.25A, grey	1	---
CS-CODEC-EQ-ANT+	Codec EQ Antennas - for auto expand only	1	---
BRKT-QCAM2-WMK-	Wall Mount Bracket (Carbon Black) for Quad Camera	1	---
40G Optics (Access to Aggregation)			
QSFP-40G-SR4-S=	40GBASE-SR4 QSFP Trnscvr Module, MPO Conn, Enterprise-Class	4	---
Cameras			
MV22-HW	Meraki Varifocal MV22 Indoor HD Dome Camera - 256GB Storage	10	---
LIC-MV-5YR	Meraki MV Enterprise License and Support, 5YR	10	---



Resources

Guide: Best Practices for Creating Effective Video-enabled Rooms

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