U. S. Department of Veterans Affairs

Office of Information and Technology

Infrastructure Operations (IO)

OIT Design Guide Templates for Critical Infrastructure in Telecommunications Spaces (Clinical and Non-Clinical Environments)

DEVELOPED BY:
DATA CENTER AND INFRASTRUCTURE ENGINEERING

Department of Veterans Affairs

Office of Information and Technology

Infrastructure Operations - Application Hosting, Cloud and Edge Solutions

Enterprise Data Center and Infrastructure Engineering

EDICT

Enterprise Data Center Infrastructure Collaboration Team

PROJECT:

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SHEET TITLE

Cover

SHEET: 1 OF 57

LEGEND

ELECTRICAL

- # — Detail Number
- # TYP — Detail number typical throughout this sheet
- Bonding busbar
- Wire mesh cable tray size commensurate with requirements
- Electrical service panel
- Overhead power drop cord with L21-20 receptacle
- Overhead power drop cord with L21-30 receptacle
- J — Power junction box for 60 A connection
- Power busway tap with single breaker 3 ft drop cord with L21-20R for standard-density cabinets
- Power busway tap with dual breakers and qty two 3 ft drop cords with L21-20R for high-density cabinets
- Typical unswitched 110 V, 20 A duplex convenience outlet
- Motion sensor light switch
- M — Ceiling mounted motion sensor (locations as required for full room coverage)
- PIV enabled two-factor authentication keypad
- Fixed camera, pan/tilt/zoom, passive infrared camera - dual technology
- LED lighting
- Power busway with metered headend for A-side power distribution
- Power busway with metered headend for B-side power distribution
- UPS — Modular UPS cabinet (power modules, batteries, power panels)

TELECOMMUNICATIONS

- # — Detail number
- # TYP — Detail number typical throughout this sheet
- Wire mesh cable tray size commensurate with requirements
- Conduit with bushing firestop and innerduct for fiber
- Sleeve with bushing firestop and innerduct for fiber
- Sleeve or conduit with bushing firestop and innerduct for fiber
- Telecommunications channel rack, 19 in. rails, #12-24 tapped EIA hole pattern, 30 in. deep channel minimum, 7 ft high, 45 RU, white
- Vertical cable manager with door, 6 in. wide minimum (sized to meet requirement)
- Server cabinet, 45 RU, 24 in. x 48 in. (nominal), square punched rail, single perforated front door, solid rear door (vertical exhaust duct [VED] implementation), double perforated rear door (no VED), two-point keyed locks, white, solid side panels
- Telecommunications cabinet, 84 in. high, 44 RU, 24 in. x 42 in. (nominal), square punched rail, single perforated front door, solid rear door (vertical exhaust duct [VED] implementation), double perforated rear door (no VED), white, solid side panels, shown with two 12 in. vertical cable management sidecars (6 in. versions available)

ARCHITECTURAL

- 4 ft by 8 ft AC grade ¾ in. trade size plywood backboard painted high-gloss white with two coats of fire resistant paint for service provider / security / video / et cetera
- 3 ft wide, 8 ft high door, fire resistant to ¾ hour or more per authority having jurisdiction (AHJ); door swing representative only
- 3 ft wide, 8 ft high door, no center mullion or removable mullion, fire resistant to ¾ hour or more per AHJ; door swing representative only
- 30 in. wide by 36 in. front clearance required around electrical panel boards
- 36 in. clearance required around front, back, and sides of racks and cabinets

MECHANICAL

- Standard 25% open perforated floor tile
- Grate floor tile
- Cold aisle containment PVC curtain
- Cold aisle containment area
- CRAC — Computer Room Air Conditioner (CRAC) (see computational fluid dynamics required for sizing)
- Required clearance around CRACs (size varies depending upon CRAC manufacturer)
- AC — Split package air conditioner or equivalent 24/7 supply air to reject 17,000 BTU/H (5 kW) per telecommunications rack
- T — Air conditioner thermostat

NOTES

ELECTRICAL

1. Minimum QTY two 120 V 20 A convenience power outlets per wall; placement determined by others
2. Primary bonding busbar; placement determined by others
3. Secondary bonding busbar; placement determined by others
4. Service panel for A-side power, generator backed if the facility has generation capabilities. Shall be equipped with power meter; placement per others
5. Service panel for B-side power, generator backed if possible. Shall be equipped with power meter; placement per others
6. 20 A 208 V three-phase twist lock receptacle (L21-20R); 8.5 ft AFF {WYE (5-wire)} coordinate installation location with telecommunications contractor
7. 30 A 208 V three-phase twist lock receptacle (L21-30R); 8.5 ft AFF {WYE (5-wire)} coordinate installation location with telecommunications contractor
8. Power busway (voltage and amperage To support adequate single & double breaker 208 V, 20 A, L21-20R busway taps per server row) fed from A-side source
9. Power busway (voltage and amperage to support adequate single & double breaker 208 V, 20 A, L21-20R busway taps per server row) fed from B-side source
10. Power busway (voltage and amperage sufficient to support adequate single breaker 208 V, 20 A, L21-20R busway taps per network row) fed from A-side source
11. Power busway (voltage and amperage sufficient to support adequate 208 V, 20 A, L21-20R busway taps per network row) fed from B-side source
12. Blue cable patch for A-side UPS
13. Yellow cable path for B-side UPS

LIGHTING:
1. LED lighting placed in aisles directly in front of and behind cabinet rows
2. Lighting operated by motion sensor per cabinet row or section
3. 500 lumens in the horizontal plane and 200 lumens in the vertical plane required measured at 3 ft AFF in front of and behind equipment cabinets

TELECOMMUNICATIONS

1. Service provider entrance point
2. Service backbone – entrance room-Main Computer Room (MCR) with dual redundant pathways
3. Main cross connect (campus/building distributor) – backbone cabling (MCR-telecommunications rooms)
4. Entrance room interconnect
5. Horizontal distribution to Work Area Outlets (WAO)
6. Additional cabinets or telecommunications racks to meet requirements
7. Horizontal Distribution Area (HDA) – side A
8. Horizontal Distribution Area – side B
9. Main Distribution Area (MDA) – side A
10. Main Distribution Area – side B
11. Standard Density (SD) cabinet supporting 5 kW redundant
12. High Density (HD) cabinet supporting 10 kW redundant
13. Network cabinet with vertical cable management sidecars, supporting 5 kW redundant
14. Wire mesh cable tray minimum of 4 in. x 12 in. with second level of fiber channel pathway (4 in. x 4 in.)
15. Blue cable tray path for cables to the A-side MDA/HDA
16. Yellow cable tray path for cables to the B-side MDA/HDA
17. Network channel rack

ARCHITECTURAL

Floor to ceiling height:
1. Telecommunication rooms including network support centers: Maximum extent possible
2. Data centers excluding extra small network support centers: Minimum 16 ft slab to deck above

Floor composition:
1. Electrostatic Discharge (ESD) coating for raised floor systems Static dissipative coating or material for slab floors
2. Concrete slab 5 in. thickness at ground
3. Steel deck and fill for floors above ground
4. Avoid access floor plenums for air distribution purposes

Walls: full height to deck above for all telecommunication spaces

Ceilings: no suspended ceilings allowed

Data center size allocation per chart below:

Data Center Size	Square Footage	Form Factor
Extra Small	775 (785)	24 ft X 32.5 ft (20 ft X 39.25 ft)
Small	1152	24 ft X 48 ft
Medium	1760	40 ft X 44 ft

Contact data center and infrastructure engineering (VAITESEDatacenterEngineering2@va.gov) to determine what size data center is required for your facility

Floorplans are not to scale (NTS)
Documents are not to be used for construction

MECHANICAL

Changes to design will require a new Computational Fluid Dynamics (CFD) analysis to be performed

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TELECOMMUNICATIONS SPACES (ARCHITECTURAL)

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INFRASTRUCTURE OPERATIONS - APPLICATION HOSTING, CLOUD AND EDGE SOLUTIONS

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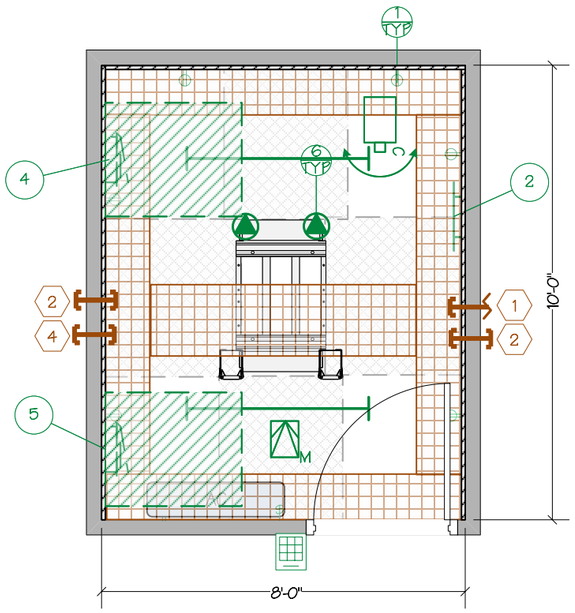
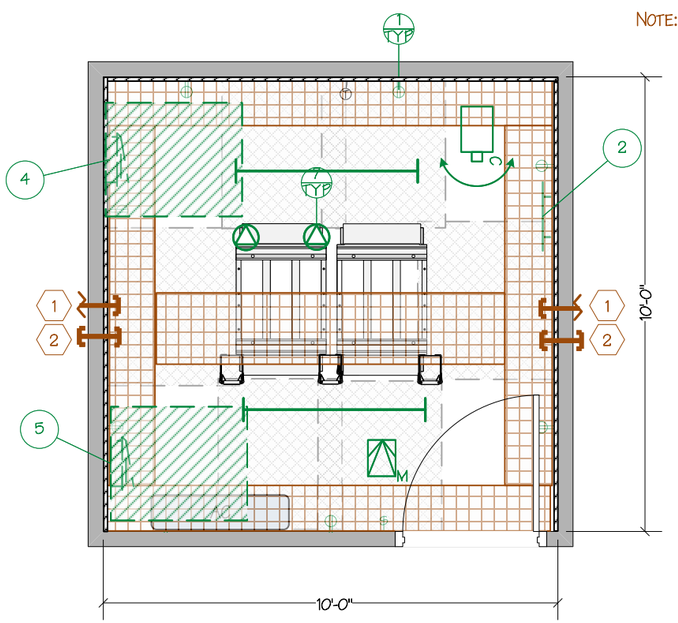
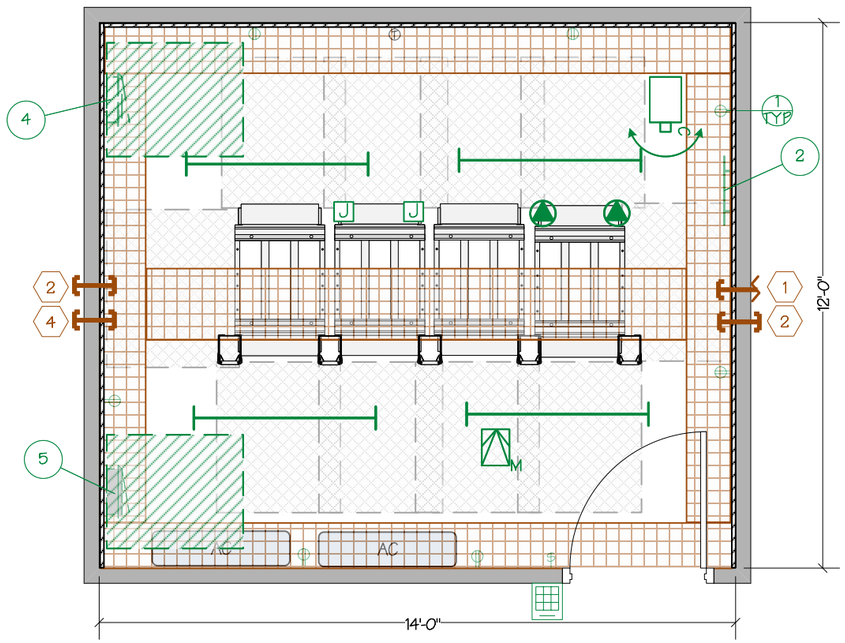


3 GENERIC FLOOR PLAN FOR ENTRANCE ROOM (ONE SERVICE PROVIDER)
NOT FOR HEALTHCARE ENVIRONMENTS



NOTE: TWO ENTRANCE ROOMS ARE REQUIRED FOR EACH VA CAMPUS SUPPORTED BY A CDC OR CSC

4 GENERIC FLOOR PLAN FOR ENTRANCE ROOM (TWO SERVICE PROVIDERS)
NOT FOR HEALTHCARE ENVIRONMENTS



2 GENERIC FLOOR PLAN FOR HEALTHCARE ENTRANCE ROOM
TWO REQUIRED PER CAMPUS (CAN ALSO ACT AS A TR FOR A SERVING ZONE)

NOTE:

THREE FT CLEARANCE FROM WALL MOUNTED EQUIPMENT MUST BE MAINTAINED.

30 IN. WIDE BY 36 IN. FRONT CLEARANCE REQUIRED AROUND ELECTRICAL PANEL BOARDS

36 IN. CLEARANCE REQUIRED AROUND FRONT, BACK, AND SIDES OF RACKS AND CABINETS

TWO L21-20 BRANCH CIRCUITS PER RACK CAN BE USED FOR ALL RACKS ELIMINATING THE NEED FOR ZONE PDUS IF BREAKER SPACE IS NO AN ISSUE (ALTERNATIVELY, ZPDUS CAN SUPPORT EITHER TWO OR THREE RACKS EACH)

1 TELECOMMUNICATION ENTRANCE ROOM NOTES

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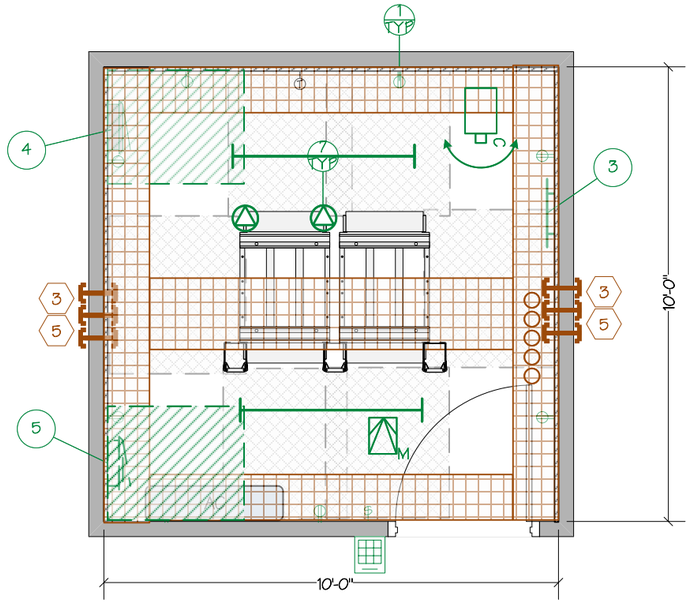
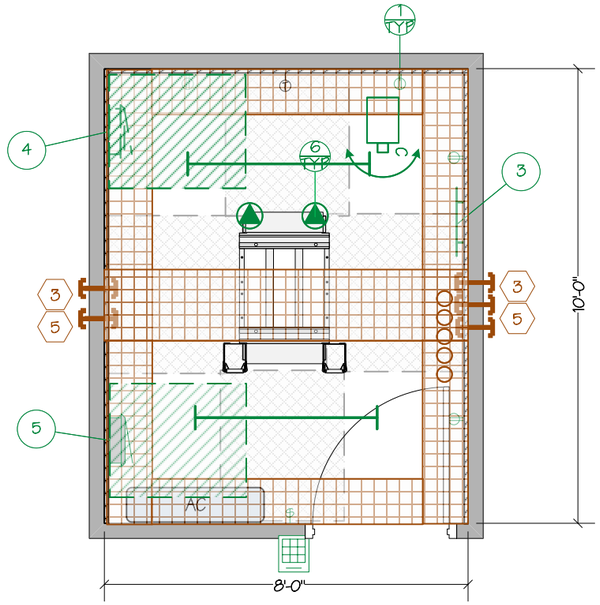


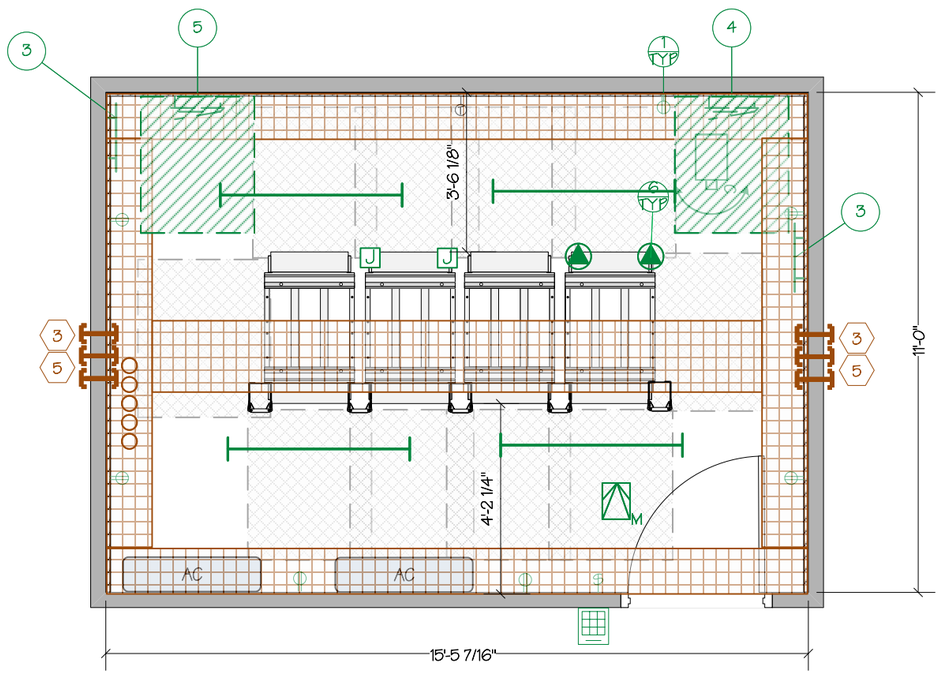
GENERIC FLOOR PLAN FOR TELECOMMUNICATIONS ROOMS (TWO RACK REQUIREMENT)
(TELECOMMUNICATIONS SPACE SUPPORTING NETWORK DISTRIBUTION TO WORK AREA OUTLETS)
MINIMUM REQUIREMENT FOR HEALTHCARE FACILITY REMODELS

3



GENERIC FLOOR PLAN FOR TELECOMMUNICATIONS ROOMS (ONE RACK REQUIREMENT)
(TELECOMMUNICATIONS SPACE SUPPORTING NETWORK DISTRIBUTION TO WORK AREA OUTLETS)

4



GENERIC FLOOR PLAN FOR HEALTH CARE FACILITY TELECOMMUNICATIONS ROOMS

2

NOTE:

- THERE SHALL BE A MINIMUM OF ONE TELECOMMUNICATIONS ROOM (TR) PER FLOOR.
- ADDITIONAL ROOMS SHOULD BE PROVIDED WHEN THE HORIZONTAL DISTRIBUTION DISTANCE TO THE WORK AREA EXCEEDS 90 M (295 FT) OR THE ROOM SIZE CAN'T SUPPORT ALL WORK AREA OUTLETS.

FLOOR SPACE REQUIREMENT:

1. MINIMUM OF 80 FT^2 FOR A ONE RACK TR
2. ADD AN ADDITIONAL 20 FT^2 PER ADDITIONAL RACK
3. MINIMUM OF 170 FT^2 FOR A HEALTH CARE FACILITY TR
4. TWO L21-20 BRANCH CIRCUITS PER RACK CAN BE USED FOR ALL RACKS ELIMINATING THE NEED FOR ZPDUS IF BREAKER SPACE IS NOT AN ISSUE (ALTERNATIVELY, ZPDUS CAN SUPPORT EITHER TWO OR THREE RACKS EACH)
5. 3 FT OF CLEARANCE ON THREE SIDES OF THE RACKS MUST BE MAINTAINED
6. THE FOURTH SIDE AT THE END OF A ROW MUST BE AT LEAST 12 IN FROM THE WALL
7. 3 FT OF CLEARANCE MUST BE MAINTAINED FROM ANY WALL-MOUNTED EQUIPMENT TO THE RACKS AS WELL
8. 30 IN. WIDE BY 36 IN. FRONT CLEARANCE REQUIRED AROUND ELECTRICAL PANEL BOARDS

A MINIMUM OF FIVE METRIC DESIGNATOR 103 (TRADE SIZE 4) CONDUITS OR SLEEVES SHOULD BE PROVIDED TO SERVICE UP TO 40,000 FT^2 OF USABLE FLOOR SPACE. ONE ADDITIONAL CONDUIT OR SLEEVE SHOULD BE PROVIDED FOR EACH ADDITIONAL 40,000 FT^2 OF USABLE FLOOR SPACE

EACH RACK MUST BE CAPABLE OF SUPPORTING 5 KW OF LOAD. HOWEVER, IN AGGREGATE FOR TRS WITH MORE THAN ONE RACK, THE FULL 5 KW OF HEAT REJECTION PER RACK IS NOT REQUIRED. SEE BELOW:

- 1 RACK TR = 5 KW COOLING
- 2 RACK TR = 7 KW COOLING
- 3 RACK TR = 8.5 KW COOLING
- 4 RACK TR = 10 KW COOLING

TELECOMMUNICATION ROOM NOTES

1

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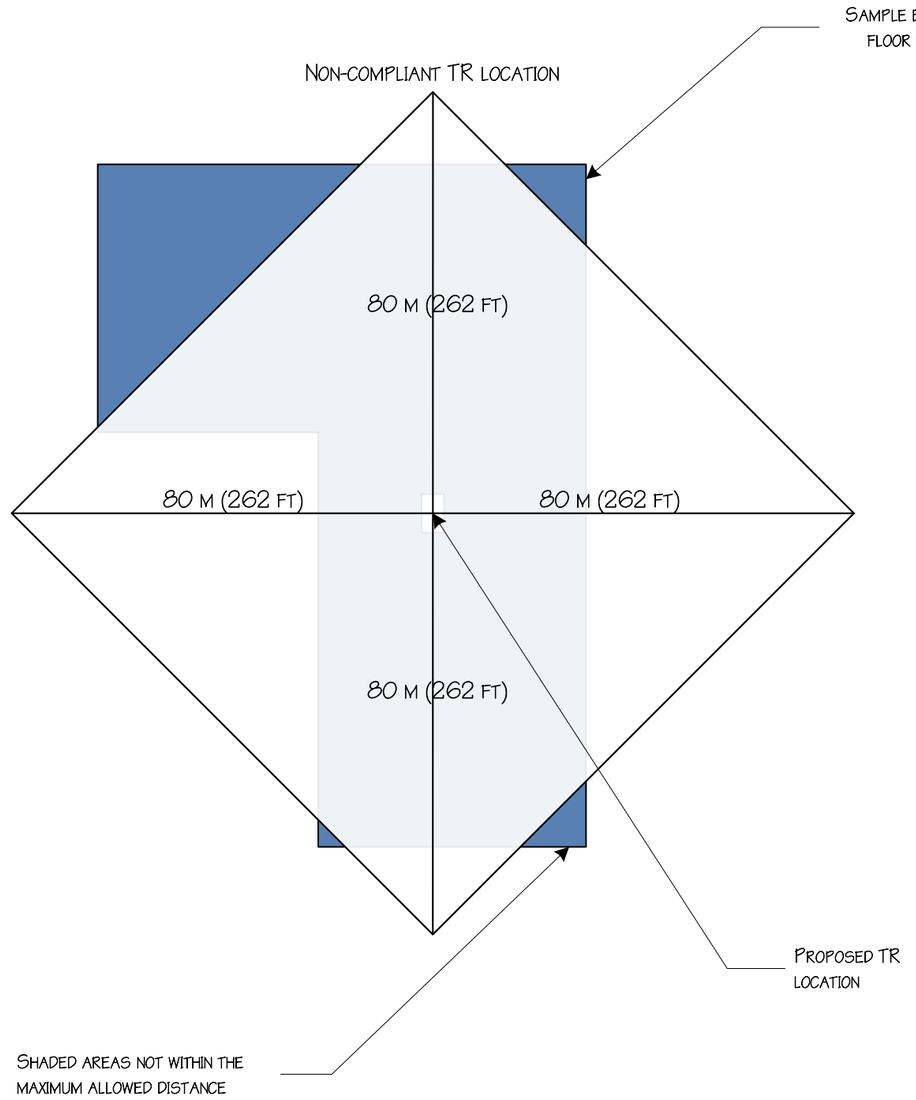
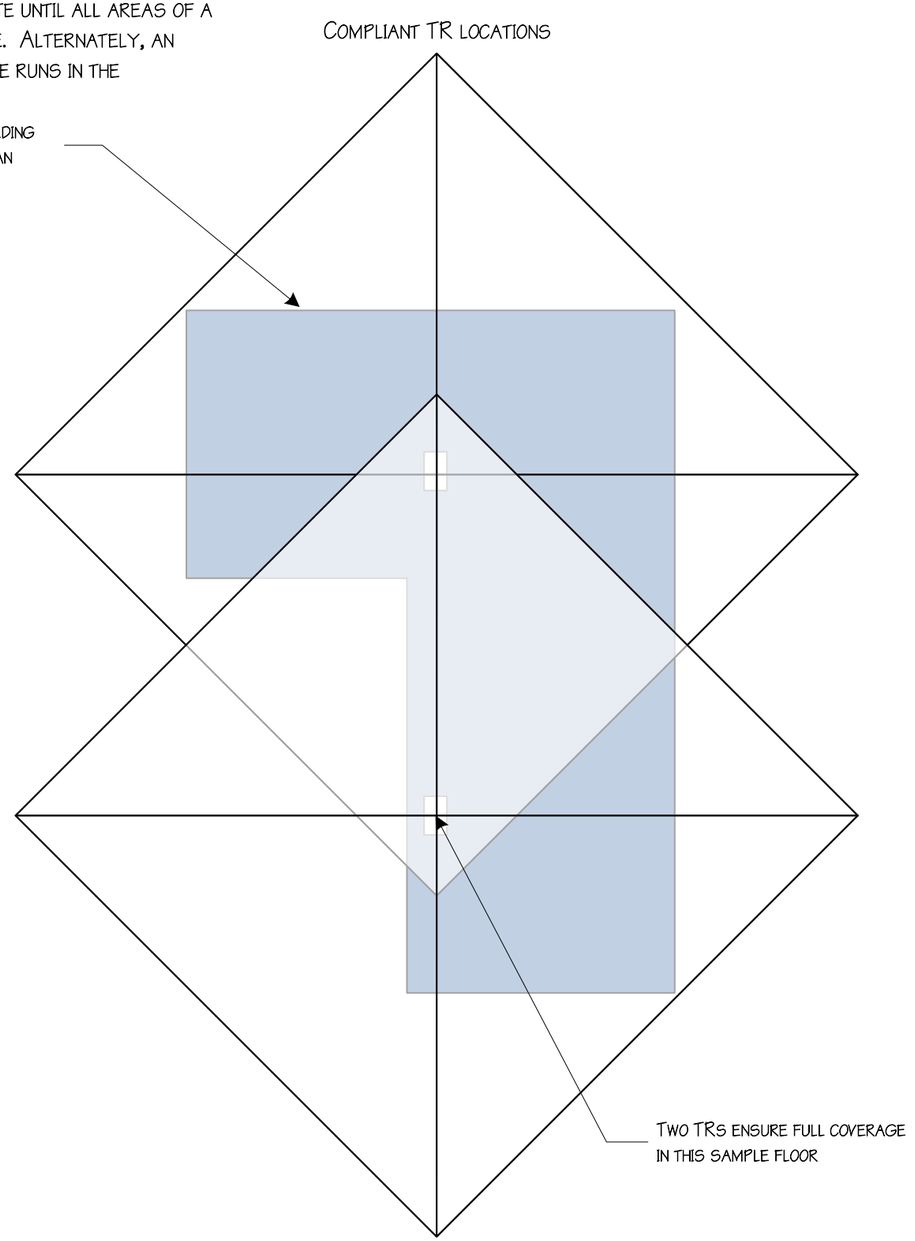
TELECOMMUNICATIONS ROOMS

A HORIZONTAL CABLE DISTANCE STUDY IS ONE APPROACH TO DEFINE TELECOMMUNICATIONS ROOM (TR) LOCATIONS. THE STUDY LOCATES THE TR IN THE PROPOSED LOCATION AND DRAWS FOUR STRAIGHT 262 FOOT (80 M) LINES ORIGINATING AT THE CENTER OF THE ROOM, TO THE NORTH, SOUTH, EAST AND WEST, AND THEN CONNECTS THE ENDS OF THE FOUR LINES TOGETHER, CREATING A "DIAMOND," WITH THE PROPOSED TR LOCATION AT THE CENTER. THE PROPOSED TR LOCATION AND RESULTING DIAMOND COVERAGE AREA IS THEN MOVED AROUND THE FLOOR PLATE UNTIL ALL AREAS OF A GIVEN FLOOR ARE WITHIN A DIAMOND. THIS ENSURES THAT ALL AREAS ARE WITHIN THE MAXIMUM ALLOTTED CABLE DISTANCE. ALTERNATELY, AN ACTUAL DISTANCE STUDY CAN BE USED TO ENSURE THAT PERMANENT LINK DISTANCES ARE 90M OR LESS INCLUDING CABLE RUNS IN THE HORIZONTAL AND VERTICAL PLANES.





1 HORIZONTAL CABLE DISTANCE STUDY (DIAMOND ANALYSIS) FOR TELECOMMUNICATION ROOM LOCATION PLANNING
NTS

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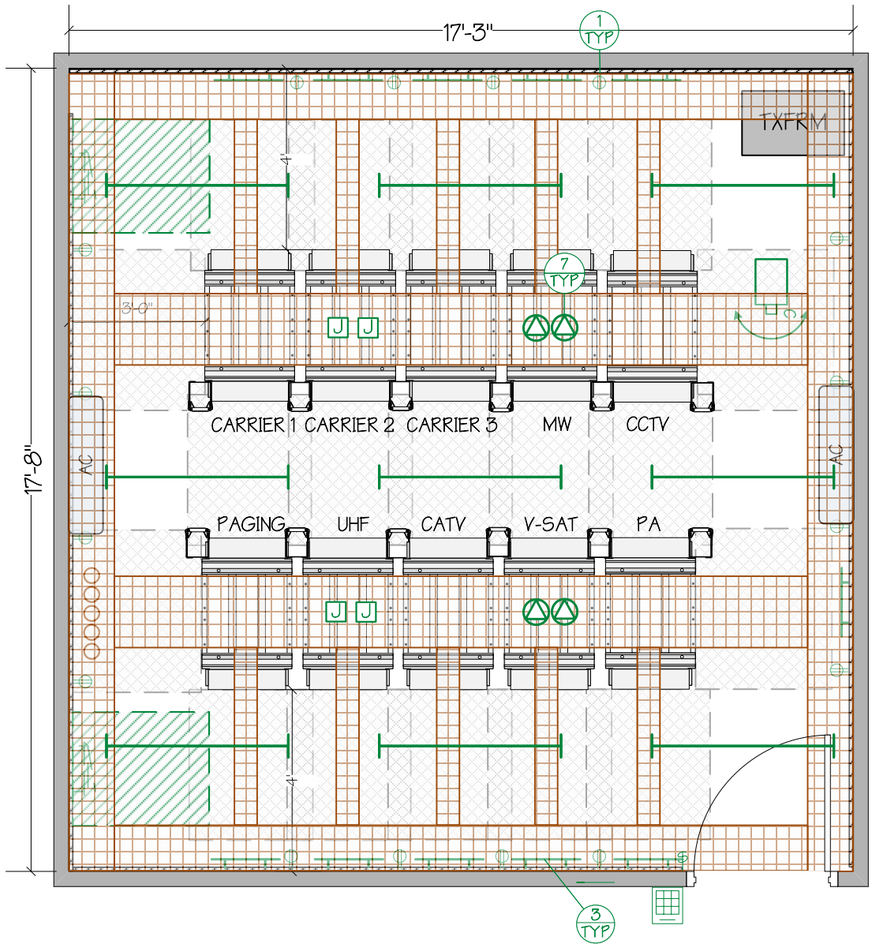
HORIZONTAL CABLE DISTANCE STUDY (DIAMOND ANALYSIS)



1 ANTENNA ENTRANCE ROOM

NOTE:

THE ANTENNA ENTRANCE ROOM (AKA ANTENNA HEADEND EQUIPMENT ROOM) SHALL BE LOCATED IN THE MECHANICAL PENTHOUSE OR OTHER AREA DICTATED BY SYSTEM DESIGN AND AS CLOSE TO THE ANTENNA FARM AS POSSIBLE. THE ROOM SHALL ACCOMMODATE ALL PROVIDED AND PLANNED FMS RADIO FREQUENCY BASED (RF) SPECIAL SYSTEMS AND HEADEND EQUIPMENT CABINETS (I.E., DAS, MATV, M/W, HF, V-SAT, TVRO, SSV, RED, PA, TWO-WAY RADIO, RPS, ETC.)

THE ROOM SHALL BE DESIGNED TO SUPPORT RF HEADEND EQUIPMENT FOR A MINIMUM OF SIX SEPARATE SYSTEMS, FOUR FUTURE SYSTEMS, OVERHEAD AND WALL WIRE MANAGEMENT SYSTEMS, WEATHERPROOF WALL/CEILING CABLE FEEDTHROUGHS, AND CONDUITS

SYSTEM LAYOUT IS NOTIONAL AND DEPENDS UPON SITE REQUIREMENTS

30 IN. WIDE BY 36 IN. FRONT CLEARANCE REQUIRED AROUND 120/208 V ELECTRICAL PANEL BOARDS

FOUR FOOT CLEARANCE REQUIRED BEHIND RACKS TO ALLOW FOR 12 IN. OF WALL-MOUNTED EQUIPMENT

TWO L21-20 BRANCH CIRCUITS PER RACK CAN BE USED FOR ALL RACKS ELIMINATING THE NEED FOR ZONE PDUS IF BREAKER SPACE IS NOT AN ISSUE (ALTERNATELY, ZPDUS CAN SUPPORT EITHER TWO OR THREE RACKS EACH)

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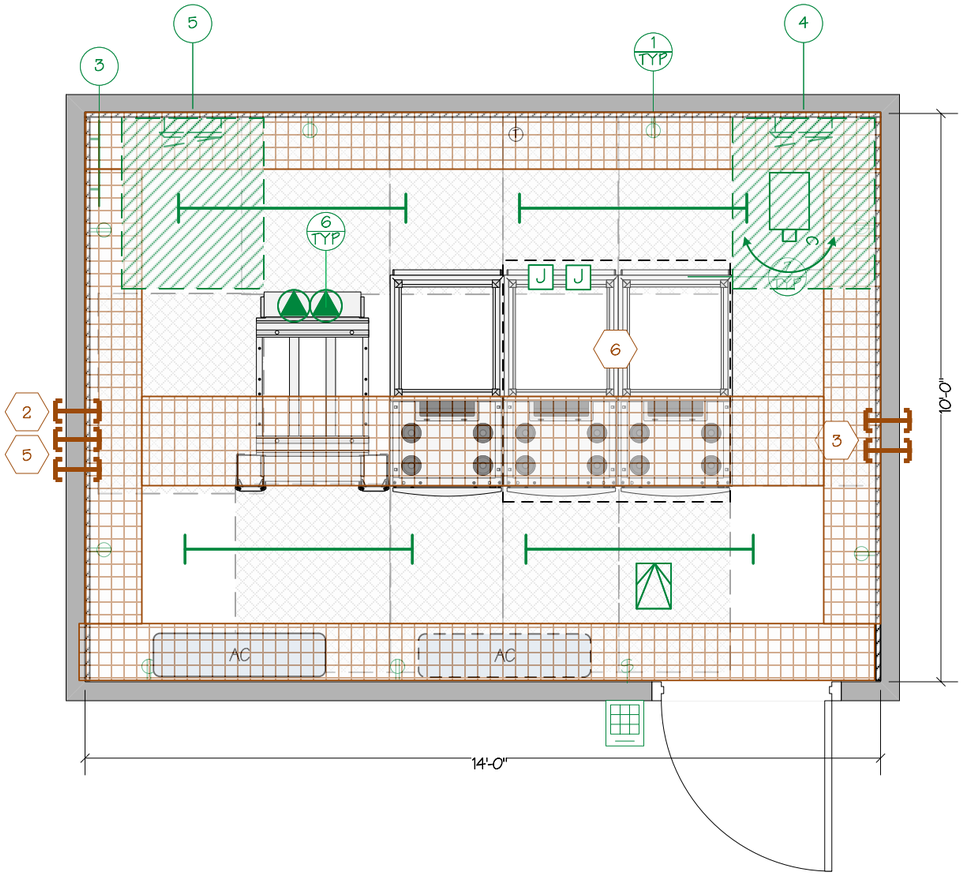
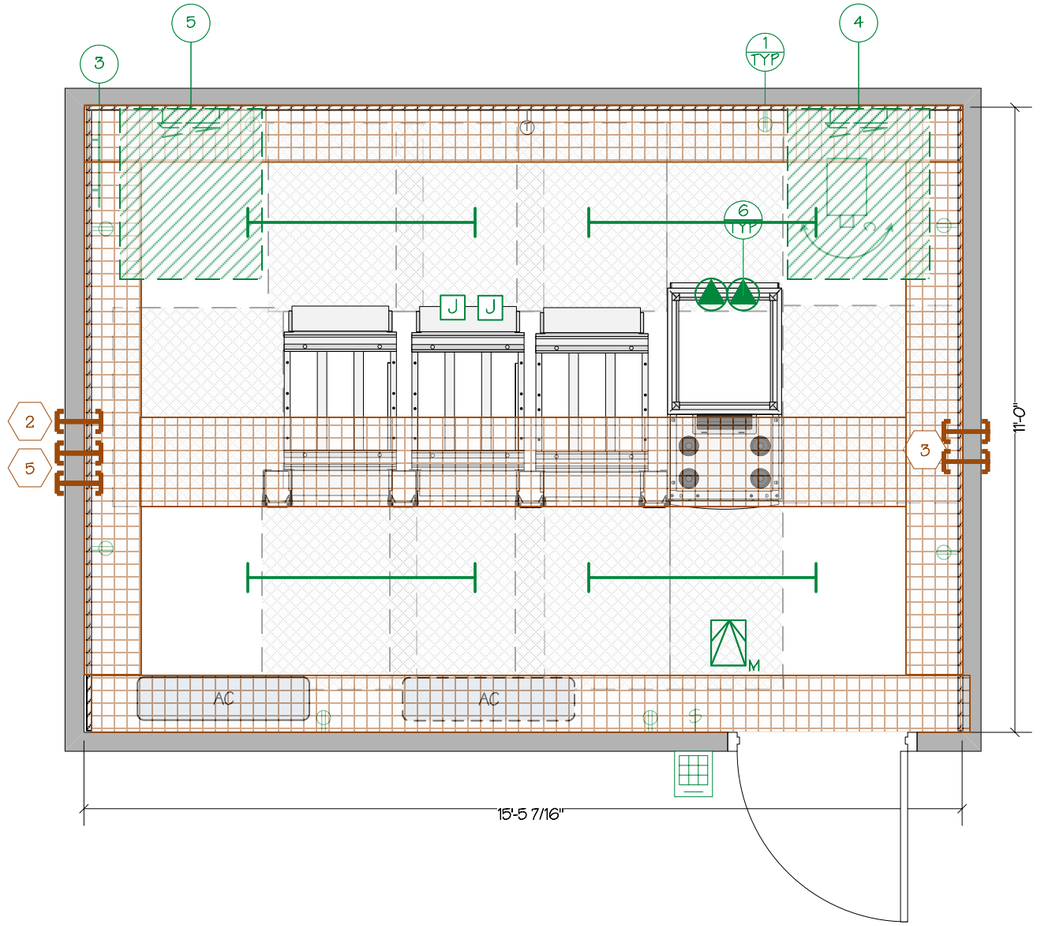
ANTENNA ENTRANCE ROOM



2 GENERIC FLOOR PLAN FOR NETWORK SUPPORT CENTERS
COMPOSITION OF SERVER CABINETS AND NETWORK RACKS DEPENDENT UPON SITE REQUIREMENT



1 GENERIC FLOOR PLAN FOR HEALTH CARE FACILITY EQUIPMENT ROOM (NETWORK SUPPORT CENTER)
COMPOSITION OF SERVER CABINETS AND NETWORK RACKS DEPENDENT UPON SITE REQUIREMENT

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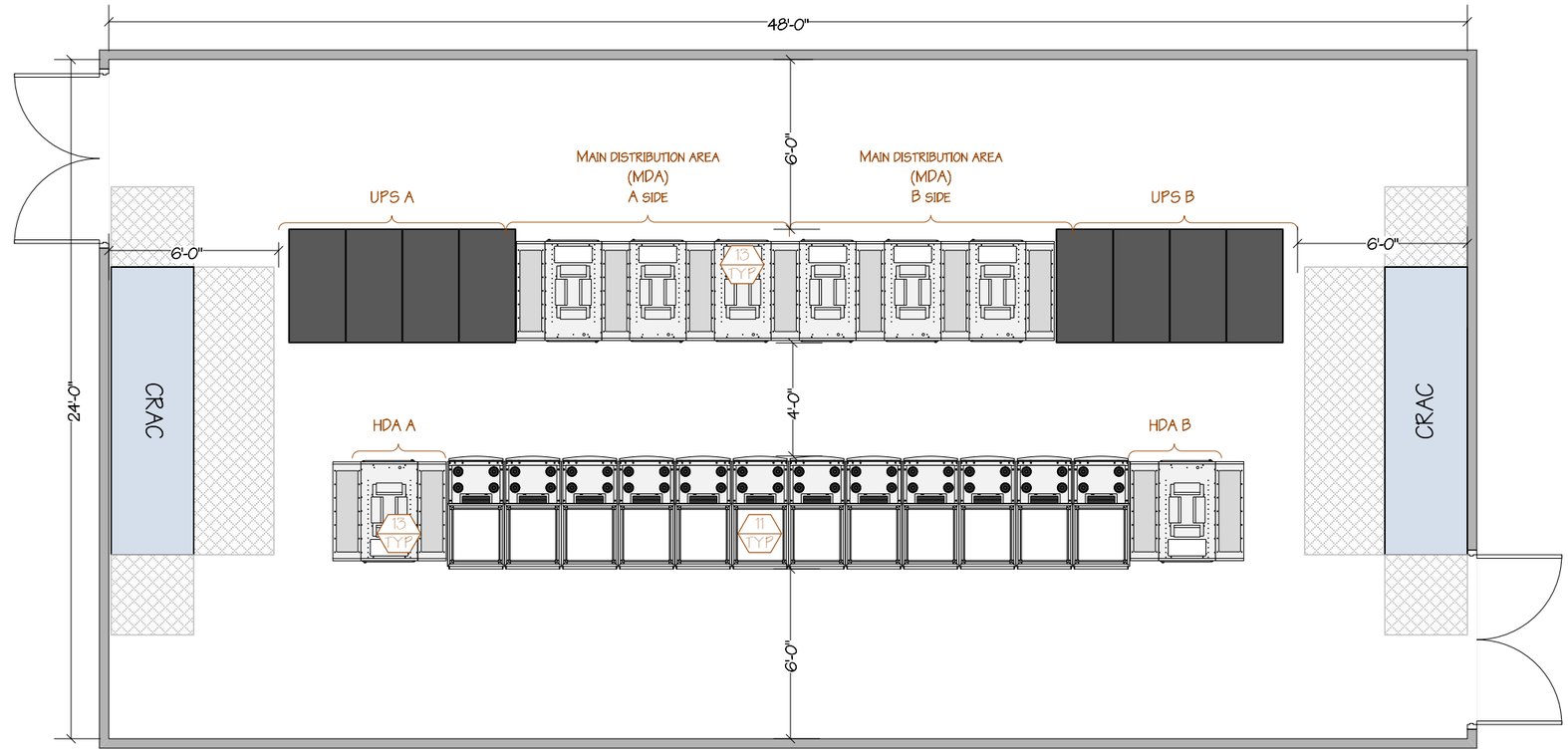
NETWORK SUPPORT CENTER



NOTE: SEE THE GENERIC SMALL CAMPUS SUPPORT CENTER (DATA CENTER) DESIGN PORTFOLIO PACKAGE FOR DETAILED IMPLEMENTATION INSTRUCTIONS

1 GENERIC FLOOR PLAN FOR SMALL DATA CENTERS (1,152 FT^2)

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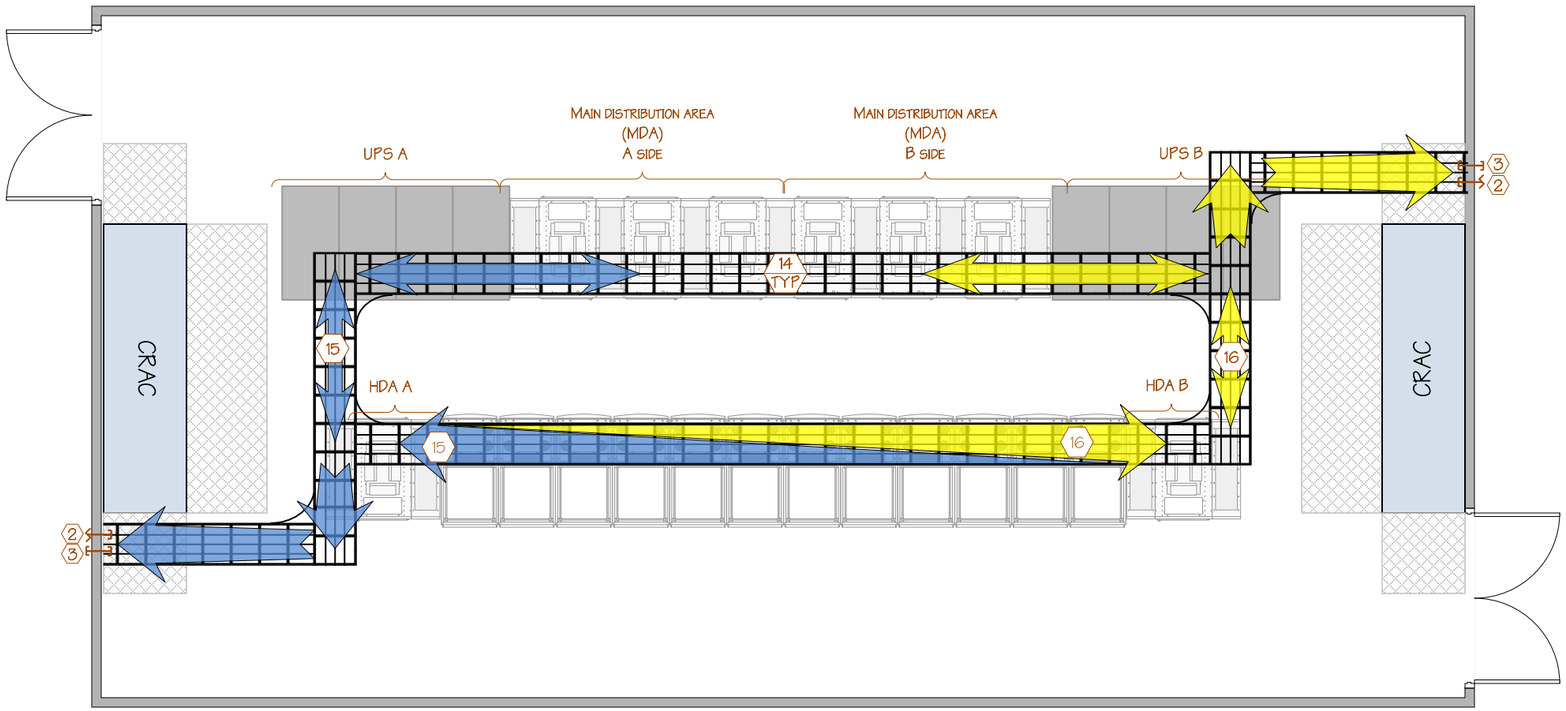
SMALL DATA CENTER



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1 SMALL DATA CENTER - DATA CABLE TRAY LAYOUT

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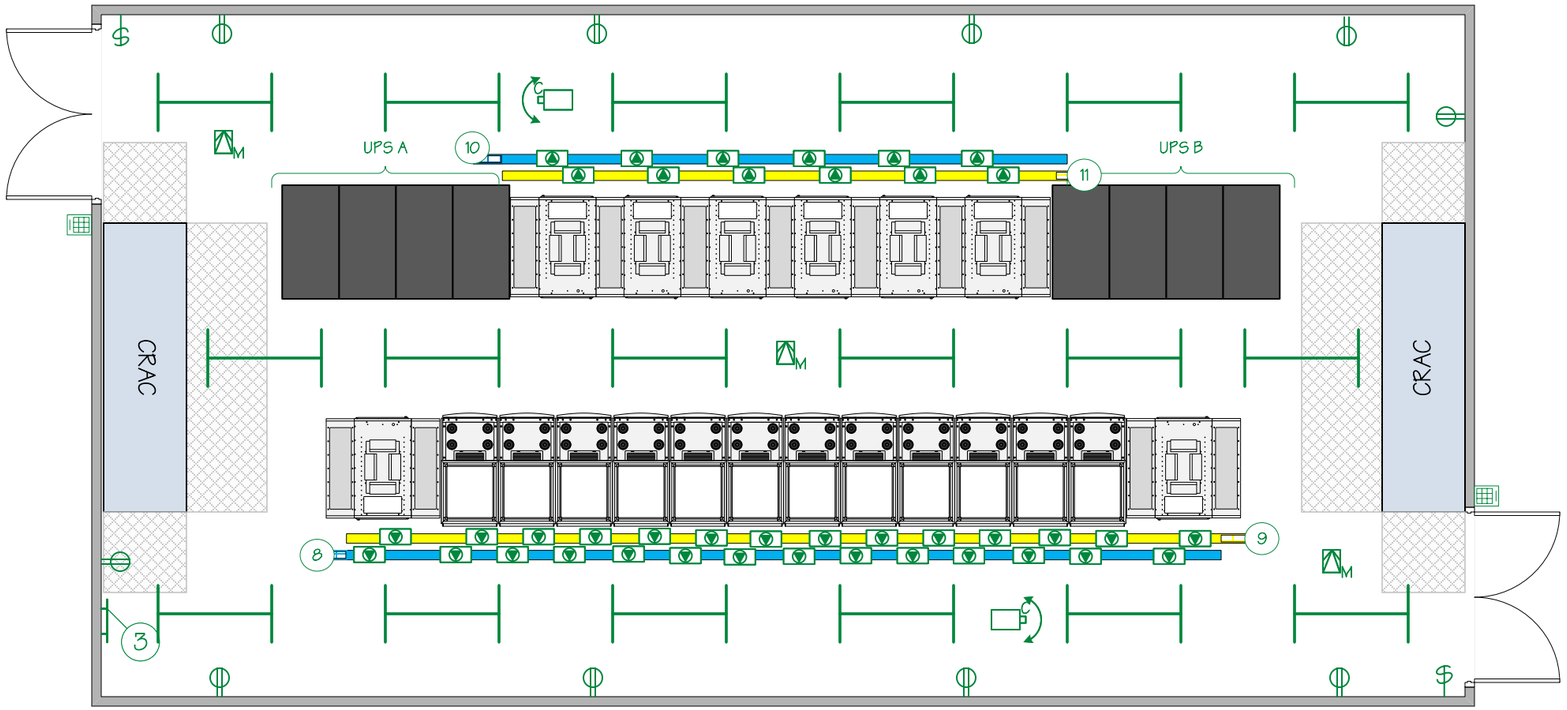
SMALL DATA CENTER - PATHWAY DETAILS

SHEET: 10 OF 57



NOTE: SEE THE GENERIC SMALL CAMPUS SUPPORT CENTER (DATA CENTER) DESIGN PORTFOLIO PACKAGE FOR DETAILED IMPLEMENTATION INSTRUCTIONS

1 GENERIC FLOOR PLAN FOR SMALL DATA CENTERS – POWER PLAN (72.9 W/FT^2)

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SHEET TITLE

SMALL DATA CENTER - POWER

SHEET: 11 OF 57

TELECOMMUNICATIONS ENCLOSURES

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TELECOMMUNICATIONS ENCLOSURE

ID	Primary Attribute	Secondary Attribute	Specification
1	Construction of TEs	Shell	• NEMA-12 or equivalent • Tempered glass front door • Dust seals and replaceable inlet/outlet vents/airflow openings/fans
		Access	• Cabinet swings open to access rear of installed equipment • Swinging front door to access front of installed equipment • Both sections able to be physically locked
		Racking Rails	EIA-310-D 19 in. front and rear adjustable rails
		Height	• 12 RU for up to 48 Work Area Outlets (WAOs) • 26 RU for up to 96 WAOs
		Width	24 in. minimum
		Depth	30 in. minimum
		Mounting	16 in. on-center for standard stud construction
		Heat dissipation	120 V fans
2	Outfitting of TEs	Input Power	A/B redundant L5-30 120 V 30 A circuits
		UPS	• Rack-mounted 2880VA metered L5-30 input/output • Dual/delta conversion not required • Connected to A-side input power circuit
		Rack Power Distribution	• A/B redundant 1 RU horizontal rack-mounted PDUs • L5-30 input, minimum 8 each 5-15R or 5-20R outlets
		Fiber Backbone	• 1 RU fiber distribution cabinet • Flat cabinet authorized
		Horizontal Distribution	• 1 RU UTP patch panels • Flat patch panels authorized • Maximum 1 patch panel for 12 RU TE, two patch panels for 26 RU TE
		Network Switches	• Standard 1 RU 48-port network switches • Maximum 1 switch for 12 RU TE, two switches for 26 RU TE
		IT Equipment Power Cord Color Code	• A-side: Black • B-side: A distinctly different color (white or gray preferred) • Differentiated by source bus (jacket or other marking) • Comply with any established local color schema
		IT Equipment Power Cord Type	• 120 V 15 A • C13 at IT equipment power supply and NEMA 5-15 at Rack PDU
		Bonding	Standard equipment and interconnections as per a TR and network channel rack

(1) Attributes and salient characteristics for Telecommunications Enclosures (TEs)
NTS

Wall-mount TE Salient Characteristics

- NEMA-12 or equivalent construction. Dust seals and replaceable inlet/outlet filters for vents/airflow openings/fans provided. This is required regardless of planned installation environment.
- Filters shall be commercially widely available and initially provided with the TE.
- Environmentally controlled enclosures are acceptable; consider when the conditions where the TE is to be installed are outside of allowable TR environmental limits.
- 24 in. minimum width to allow for power and telecommunications cabling management to the sides of rack-mounted equipment.
- 30 in. minimum depth to allow for structured cabling and power distribution at the rear of the rack.
- Full-height TEs shall be 26 RU in height or larger as needed to meet the specific implementation requirements. Half-height TEs shall be a minimum of 12 RU in height (24 in.).
- Unit mounts to ¾ in. plywood backboard via 16 in. on center (OC) mounting for standard stud construction.
- Unit opens in rear (swings open) for access to rear of installed equipment. Unit opens in front (swinging front door) for access to front of installed equipment. Both sections are able to be physically locked.
- Adjustable 19 in. EIA/TIA rack rails. Rear rail kits are required.
- Top and bottom knockouts for cable/conduit entry. All knockouts must be sealable and sealed for liquid and dust entry resistance. The use of a knockout kit to create larger penetrations is acceptable.
- 120 V fans to remove heat generated in TE are required. Whether these are used as exhaust, intake, or both is not specified.
- Provide TEs with fiber distribution cabinets, fiber cassettes, UTP patch panels, horizontal cable management units, and shelves as required for the specific implementation.

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Office of Information and Technology
Infrastructure Operations - Application Hosting, Cloud and Edge Solutions
Enterprise Data Center and Infrastructure Engineering
EDICT
Enterprise Data Center Infrastructure Collaboration Team

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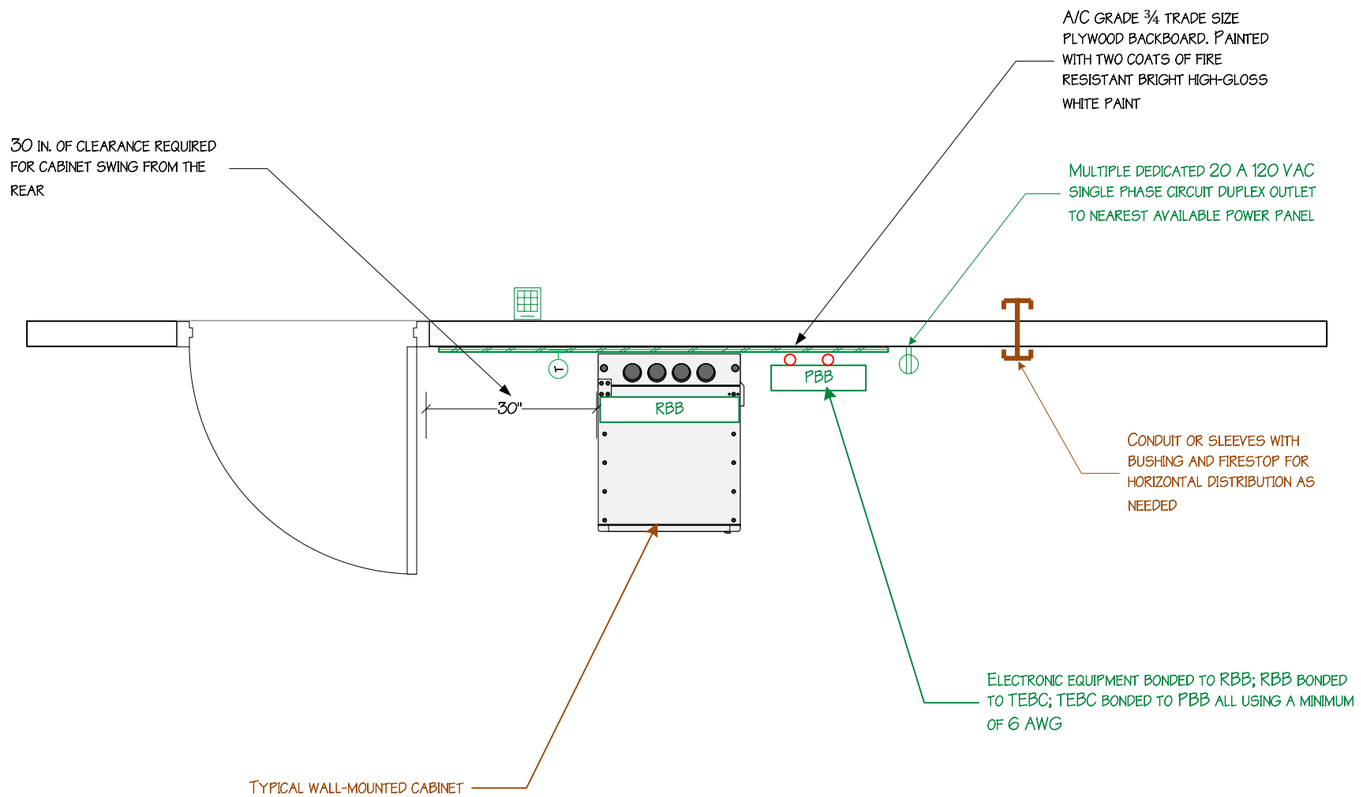
Telecommunications Enclosure Attributes



1 TYPICAL TOP-DOWN VIEW
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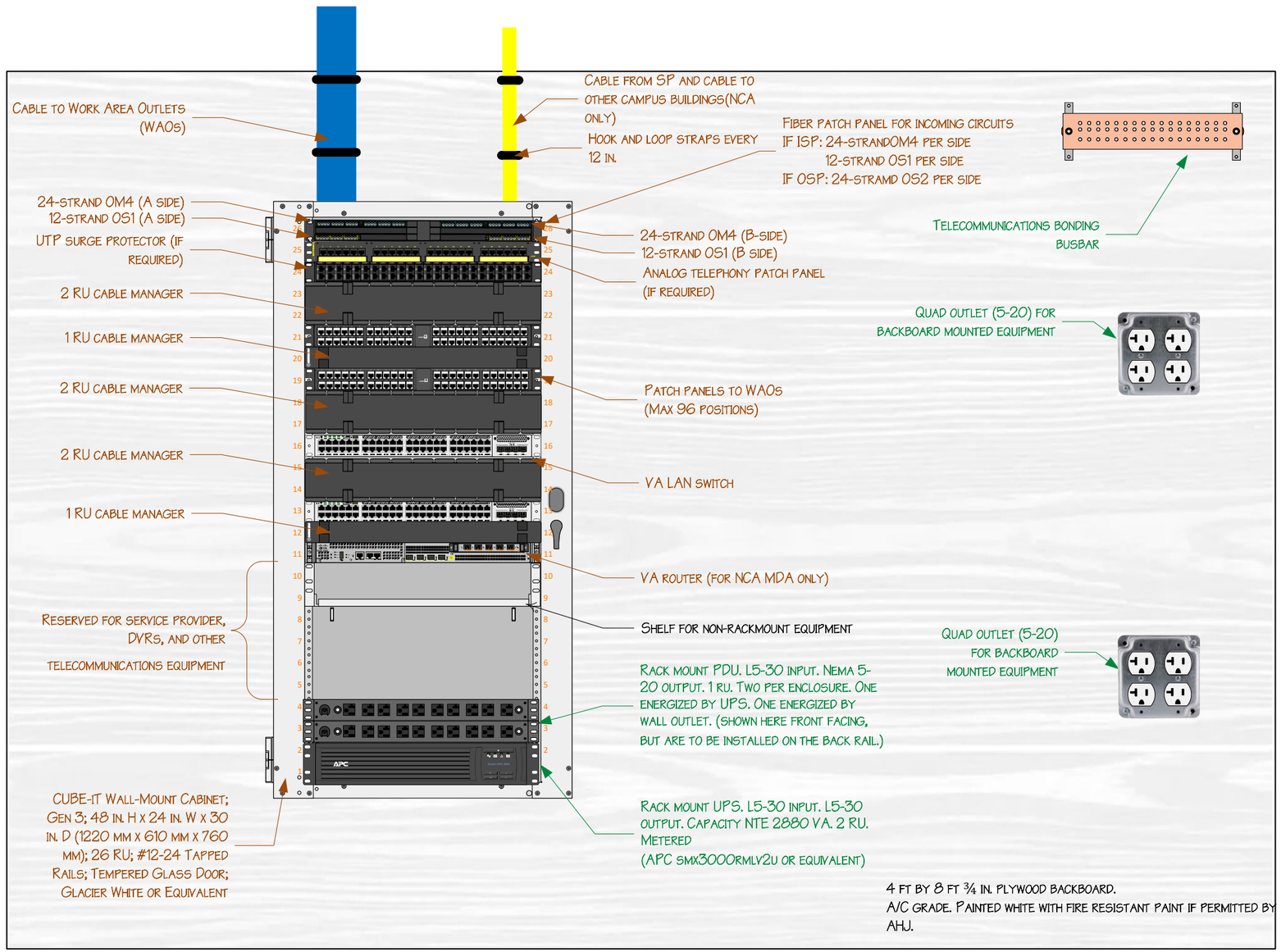
TELECOMMUNICATIONS ENCLOSURE TOP VIEW



LOCKING 120 V 30 A OUTLETS (L5-30) ON THE WALL BEHIND THE RACK ALIGNED WITH THE CUTOUT ON THE ENCLOSURE. ONE OUTLET ASSIGNED TO PDU. ONE OUTLET ASSIGNED TO UPS. EACH ENERGIZED BY SEPARATE ONE-POLE 30 A BREAKERS.

1 ELEVATION FOR 26 RU ENCLOSURE
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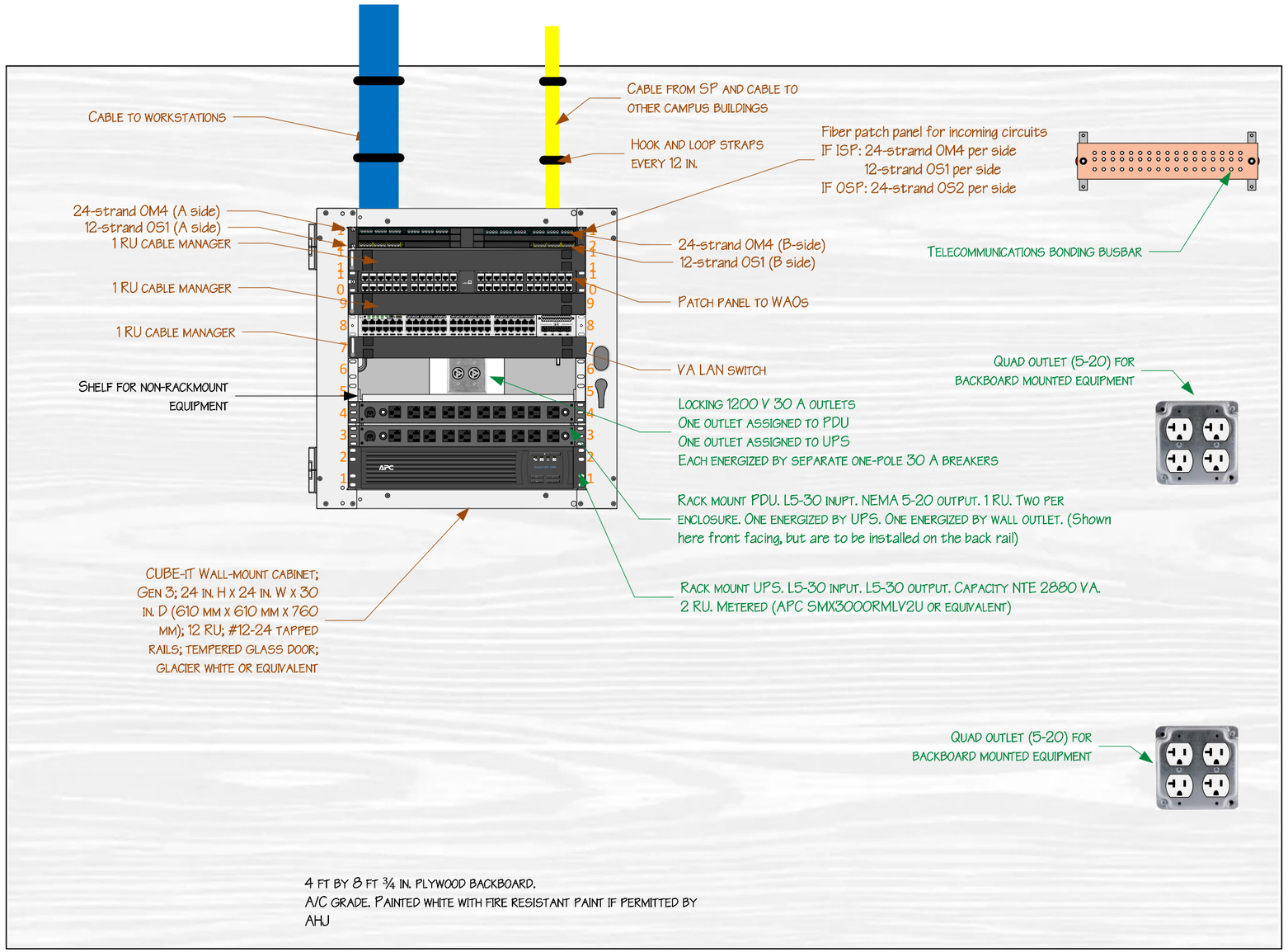
SHEET TITLE
TE 26RU ELEVATION



1 ELEVATION FOR 12 RU ENCLOSURE
NTS

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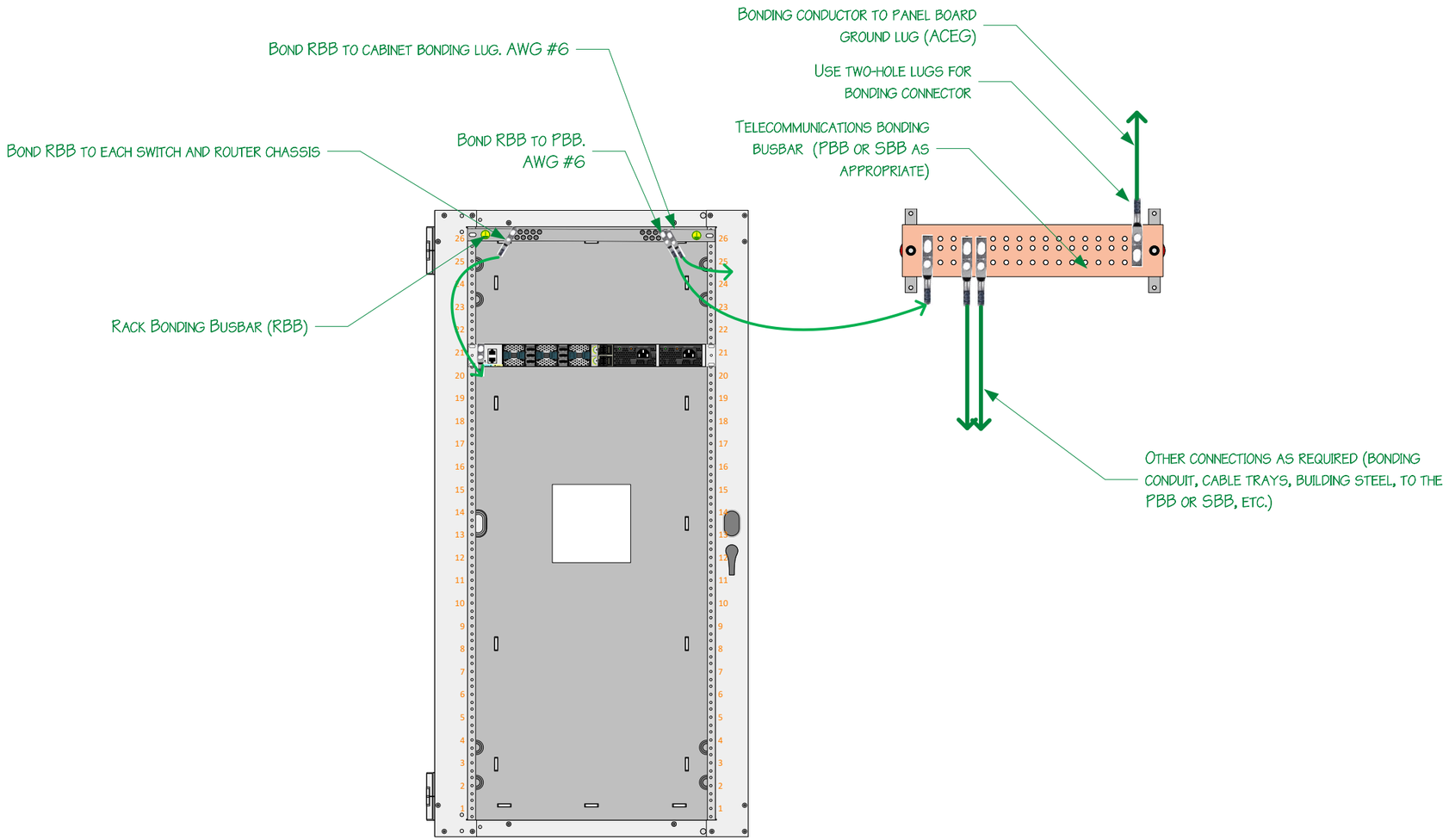
TE 12RU ELEVATION



1 BONDING TOPOLOGY FOR TELECOMMUNICATIONS ENCLOSURES
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SHEET TITLE
TE BONDING

ELECTRICAL DISTRIBUTION AND BONDING

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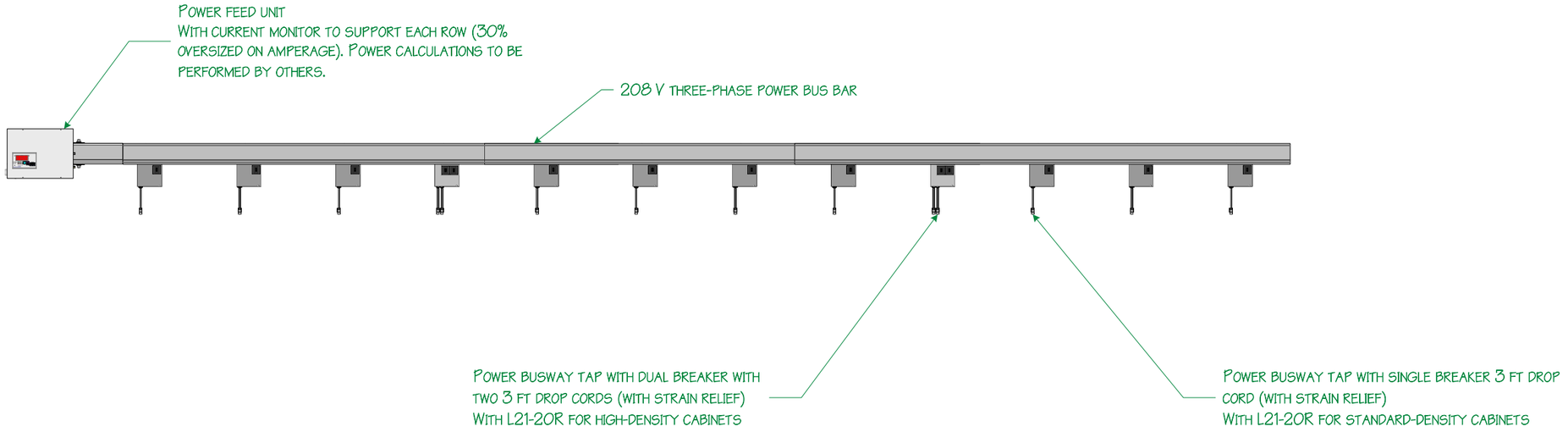
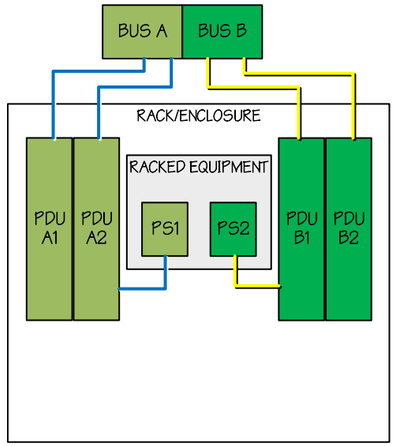
ELECTRICAL DISTRIBUTION AND BONDING

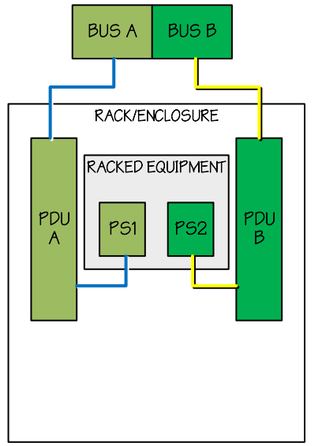


2 TYPICAL POWER BUSWAY COMPONENTS FOR SERVER ROWS

THIS DESIGN PROVIDES DIVERSE POWER INPUTS FOR ACTIVE EQUIPMENT BY SPLITTING THE SOURCE POWER ACROSS TWO BUSWAYS. EACH SERVER CABINET WILL CONTAIN A MINIMUM OF TWO EQUIPMENT-FACING ZERO U VERTICAL RACK PDUS – EACH WILL BE ENERGIZED BY SEPARATE BUSWAY TAP INPUTS ON DISPARATE BUSWAYS.



HIGH DENSITY – TWO L21-20 DROPS PER BUSWAY



STANDARD DENSITY – ONE L21-20 DROP PER BUSWAY

1 POWER SCHEMATIC FOR POWER RACK- LEVEL REDUNDANCY

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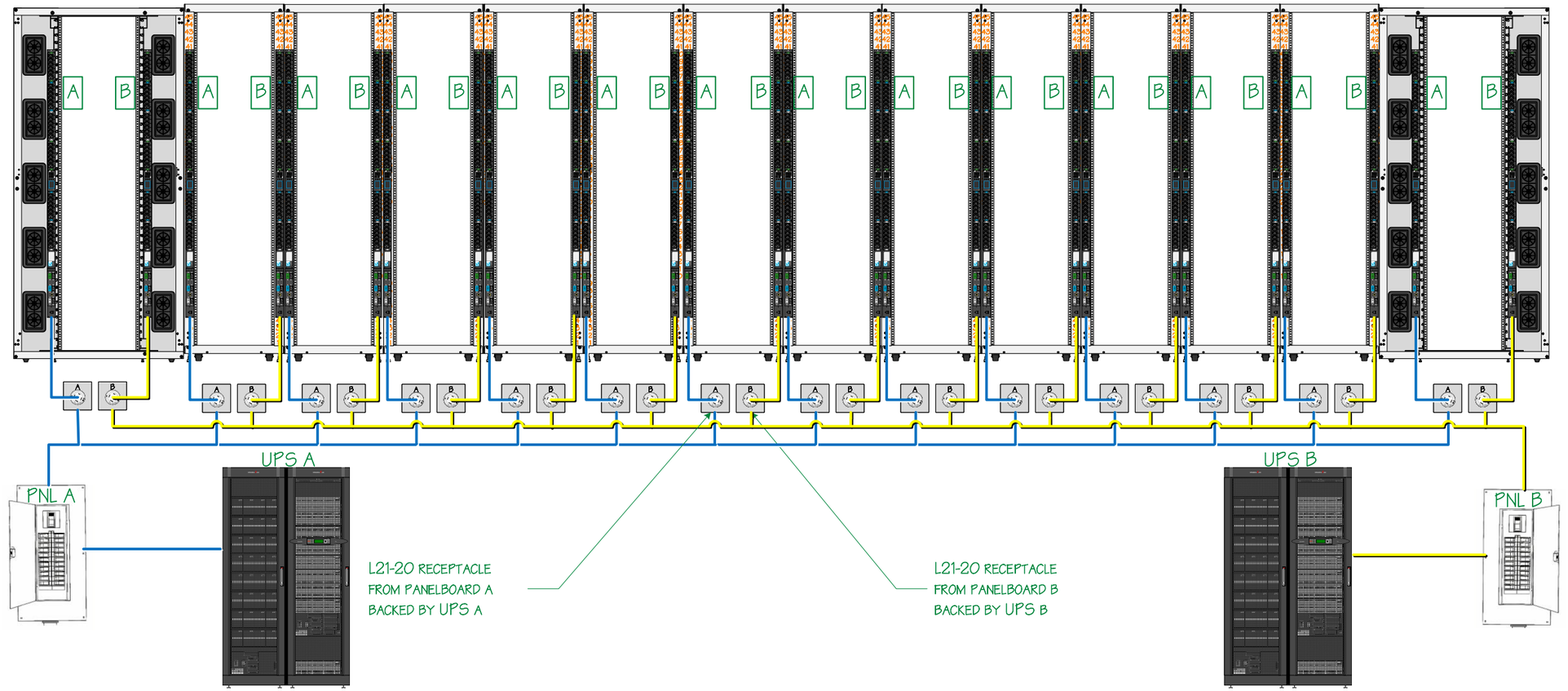
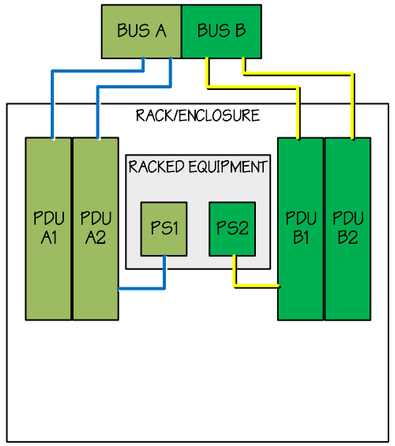
BUSWAY POWER DISTRIBUTION

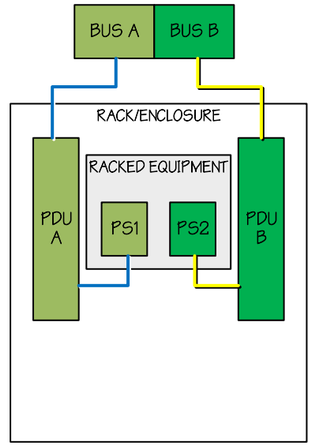


2 TYPICAL BRANCH CIRCUIT COMPONENTS FOR SERVER ROWS

THIS DESIGN PROVIDES DIVERSE POWER INPUTS FOR ACTIVE EQUIPMENT BY SPLITTING THE SOURCE POWER ACROSS TWO BRANCH CIRCUITS. EACH SERVER CABINET WILL CONTAIN A MINIMUM OF TWO EQUIPMENT-FACING ZERO U VERTICAL RACK PDUs – EACH WILL BE ENERGIZED BY SEPARATE BRANCH CIRCUIT INPUTS ON DISPARATE PANELBOARDS BACKED BY SEPARATE UPS



HIGH DENSITY – TWO L21-20 DROPS PER BUSWAY



STANDARD DENSITY – ONE L21-20 DROP PER BUSWAY

1 POWER SCHEMATIC FOR POWER RACK- LEVEL REDUNDANCY

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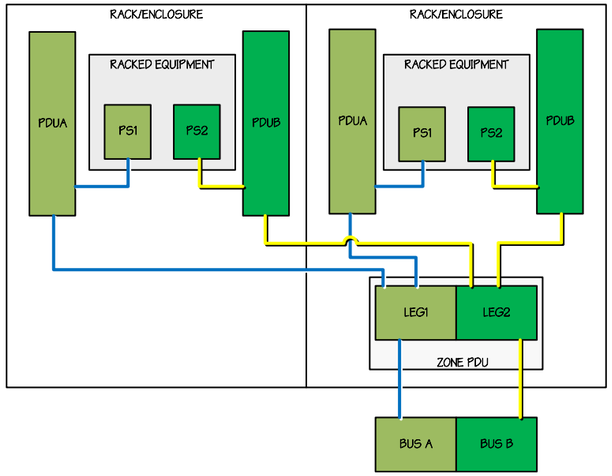
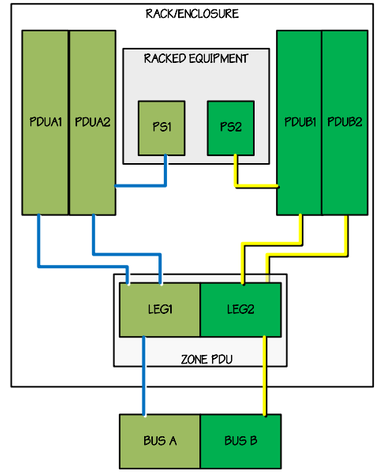
BRANCH CIRCUIT POWER DISTRIBUTION

THIS DESIGN PROVIDES DIVERSE POWER INPUTS FOR ACTIVE EQUIPMENT BY SPLITTING THE SOURCE POWER ACROSS TWO ZONE PDU INPUTS. EACH SERVER CABINET WILL CONTAIN A MINIMUM OF TWO EQUIPMENT-FACING ZERO U VERTICAL RACK PDUS – EACH WILL BE ENERGIZED BY SEPARATE ZONE PDU INPUTS.

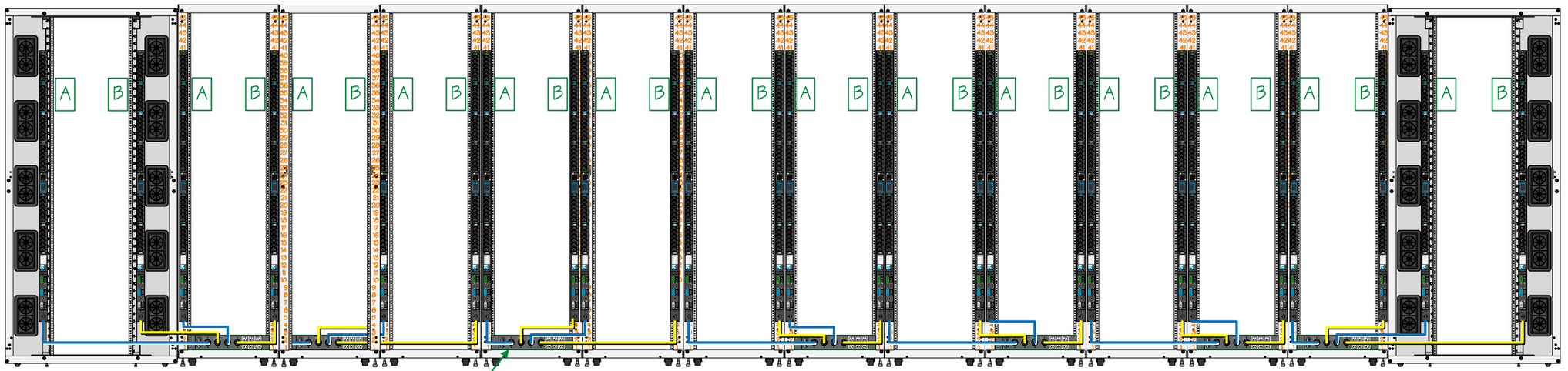


STANDARD DENSITY – ONE ZONE PDU PER TWO RACKS



HIGH DENSITY – ONE ZONE PDU PER RACK

2 POWER SCHEMATIC FOR POWER RACK- LEVEL REDUNDANCY



SEVEN ZONE PDUS PER SERVER ROW

NOTE: MDA ROWS FOLLOW THE SAME SCHEMA WITH ONE ZONE PDU PER TWO STANDARD RACKS/CABINETS AND ONE FOR EACH HIGH DENSITY CABINET.

NOTE: 30 A ZONE POWER DISTRIBUTION IS TYPICALLY USED IN LEGACY COMPUTER ROOMS WITH A RAISED ACCESS FLOOR USED FOR COOLING AIR DISTRIBUTION. ENCLOSURE DENSITIES ARE LIMITED TO 3.5 KW (SD) AND 7 KW (HD) IN THESE TYPES OF ENVIRONMENTS.

1 SUBZONE TO 30A ZONE PDU CONNECTION MAP FOR TYPICAL (14 RACK) SERVER ROWS

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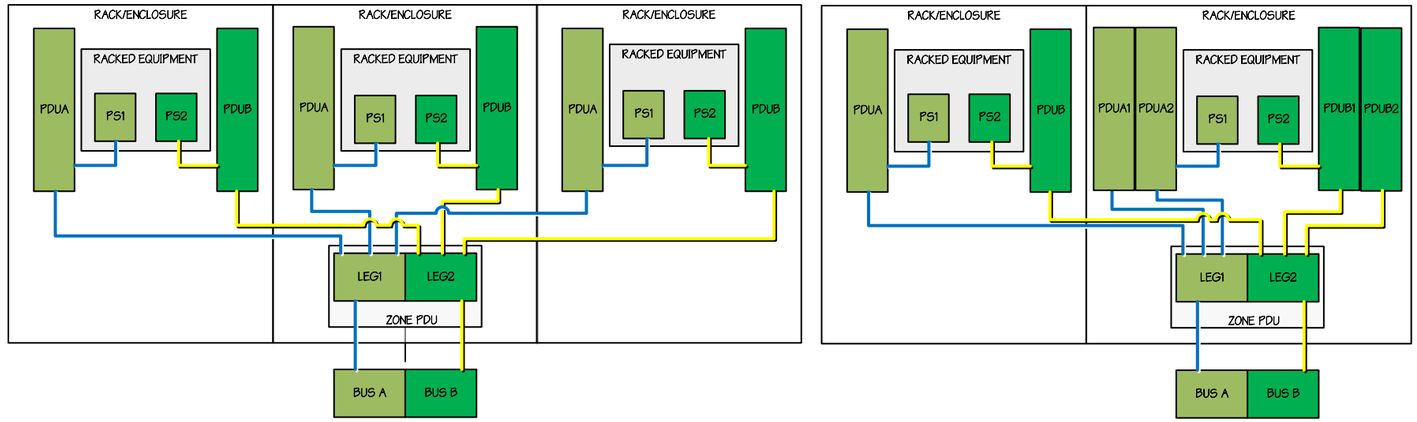
30A ZONE PDU POWER DISTRIBUTION



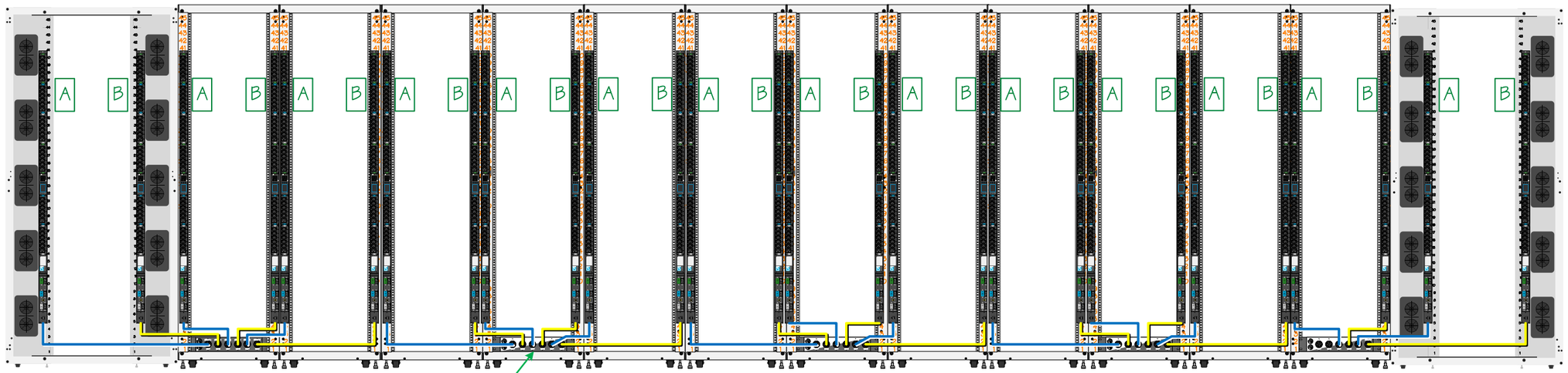
ONE ZONE PDU FOR THREE STANDARD DENSITY SERVER CABINETS/NETWORK RACKS

ONE ZONE PDU FOR ONE STANDARD DENSITY SERVER CABINET AND ONE HIGH DENSITY SERVER CABINET

NOTE:

THIS DESIGN PROVIDES DIVERSE POWER INPUTS FOR ACTIVE EQUIPMENT BY SPLITTING THE SOURCE POWER ACROSS TWO INPUTS ON THE ZONE PDU. EACH INPUT WILL SUPPORT THREE EQUIPMENT-FACING RACK PDUS. EACH SERVER CABINET WILL CONTAIN A MINIMUM OF TWO EQUIPMENT-FACING PDUS – EACH WILL BE ENERGIZED BY SEPARATE ZONE PDU INPUTS.

(2) POWER SCHEMATIC FOR POWER RACK- LEVEL REDUNDANCY



FIVE ZONE PDUS PER ROW

NOTE: MDA ROWS FOLLOW THE SAME SCHEMA WITH ONE ZONE PDU PER THREE STANDARD RACKS/CABINETS AND ONE FOR EACH SET OF ONE HIGH DENSITY CABINET AND ONE STANDARD DENSITY CABINET

(1) SUBZONE TO 60A ZONE PDU CONNECTION MAP FOR TYPICAL (14 RACK) SERVER ROWS

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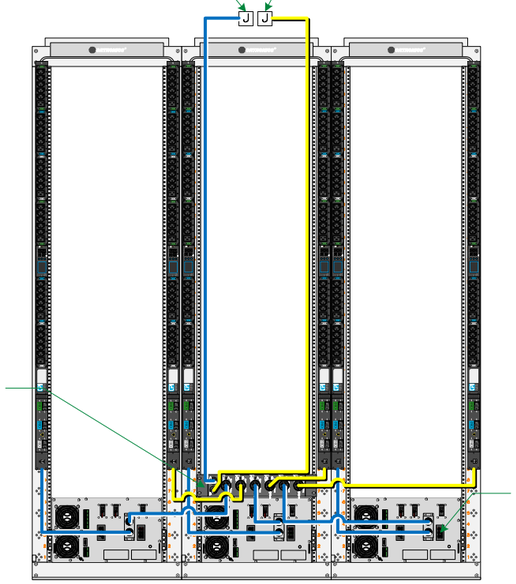
60A ZONE PDU POWER DISTRIBUTION

SHEET: 22 OF 57

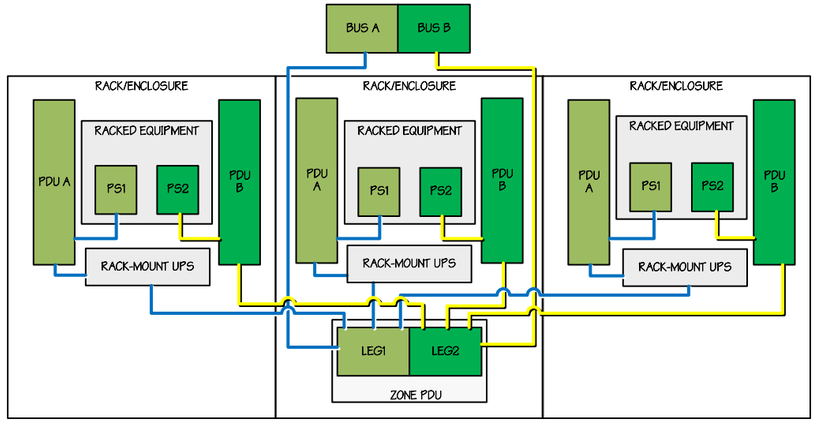
SIDE A
REQUIRES A 208 V, 60 A, THREE-PHASE CIRCUIT, TERMINATING IN A HARD-WIRED JUNCTION BOX

SIDE B
REQUIRES A 208 V, 60 A, THREE-PHASE CIRCUIT, TERMINATING IN A HARD-WIRED JUNCTION BOX



ZONE PDU
60 A 3-PHASE ZONE PDU BASE UNIT – REQUIRES TWO 60 A 3-PHASE (WYE) CIRCUITS HARD-WIRED IN JUNCTION BOX; OPTIONALLY, UPSS AND B-SIDE RPDUS MAY BE POWERED DIRECTLY WITH L21-20 OUTLETS

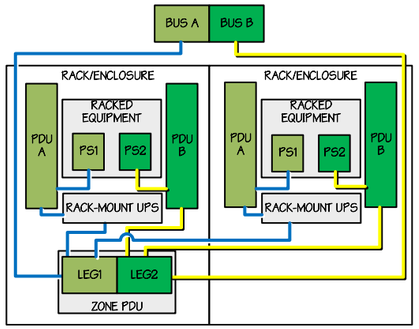
RACK-MOUNTED 5 KW, 208 V UNINTERRUPTIBLE POWER SUPPLY (UPS) WITH NEMA 20A L21-20P INPUT AND L21-20R OUTPUT



3 POWER ELEVATION AND SCHEMATIC FOR A THREE RACK TR

L21-30P SIDE A
REQUIRES A 208 V, 30 A, THREE-PHASE CIRCUIT, TERMINATING IN A NEMA L21-30R LOCKING RECEPTACLE

L21-30P SIDE B
REQUIRES A 208 V, 30 A, THREE-PHASE CIRCUIT, TERMINATING IN A NEMA L21-30R LOCKING RECEPTACLE



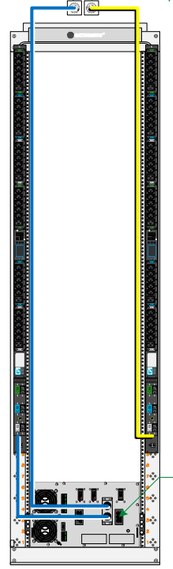
ZONE PDU
30 A THREE-PHASE ZONE PDU BASE UNIT – REQUIRES TWO 30 A THREE-PHASE (WYE) CIRCUITS WITH L21-30R RECEPTACLES; OPTIONALLY, UPSS AND B-SIDE RPDUS MAY BE POWERED DIRECTLY WITH L21-20 OUTLETS

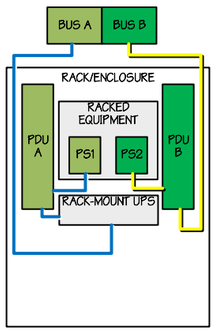
RACK-MOUNTED 5 KW, 208 V UPS WITH NEMA 20 A L21-20P INPUT AND L21-20R OUTPUT

2 POWER ELEVATION AND SCHEMATIC FOR A TWO RACK TR

L21-20P SIDE A
REQUIRES A 208 V, 20 A, THREE-PHASE CIRCUIT, TERMINATING IN A NEMA L21-20R LOCKING RECEPTACLE

L21-20P SIDE B
REQUIRES A 208 V, 20 A, THREE-PHASE CIRCUIT, TERMINATING IN A NEMA L21-20R LOCKING RECEPTACLE





RACK-MOUNTED 5 KW, 208 V UPS WITH NEMA 20A L21-20P INPUT AND L21-20R OUTPUT

1 POWER ELEVATION AND SCHEMATIC FOR A ONE RACK TR

DEPARTMENT OF VETERANS AFFAIRS

OFFICE OF INFORMATION AND TECHNOLOGY

INFRASTRUCTURE OPERATIONS - APPLICATION HOSTING, CLOUD AND EDGE SOLUTIONS

ENTERPRISE DATA CENTER AND INFRASTRUCTURE ENGINEERING

EDICT
ENTERPRISE DATA CENTER INFRASTRUCTURE COLLABORATION TEAM

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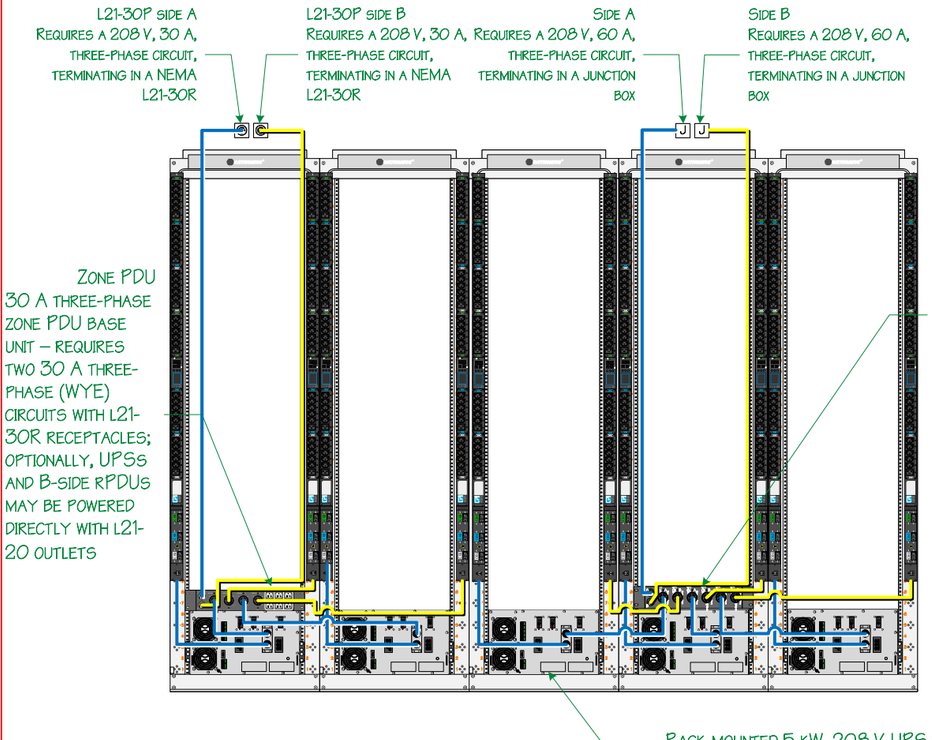
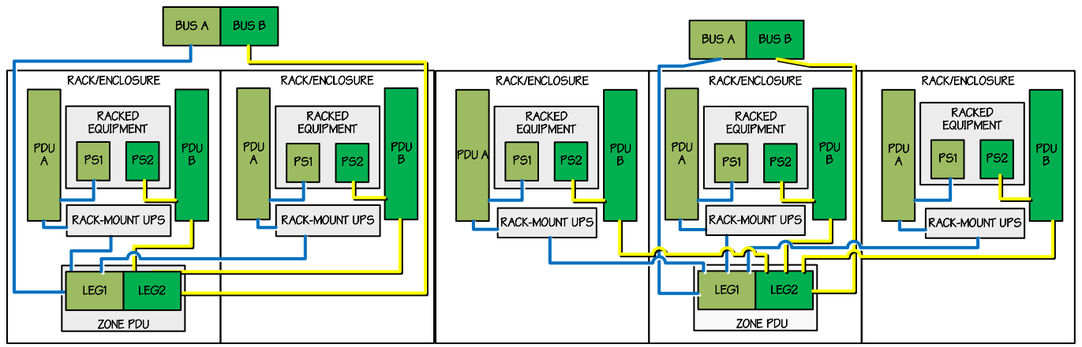
SHEET TITLE
ZONE PDU POWER DISTRIBUTION IN TRS

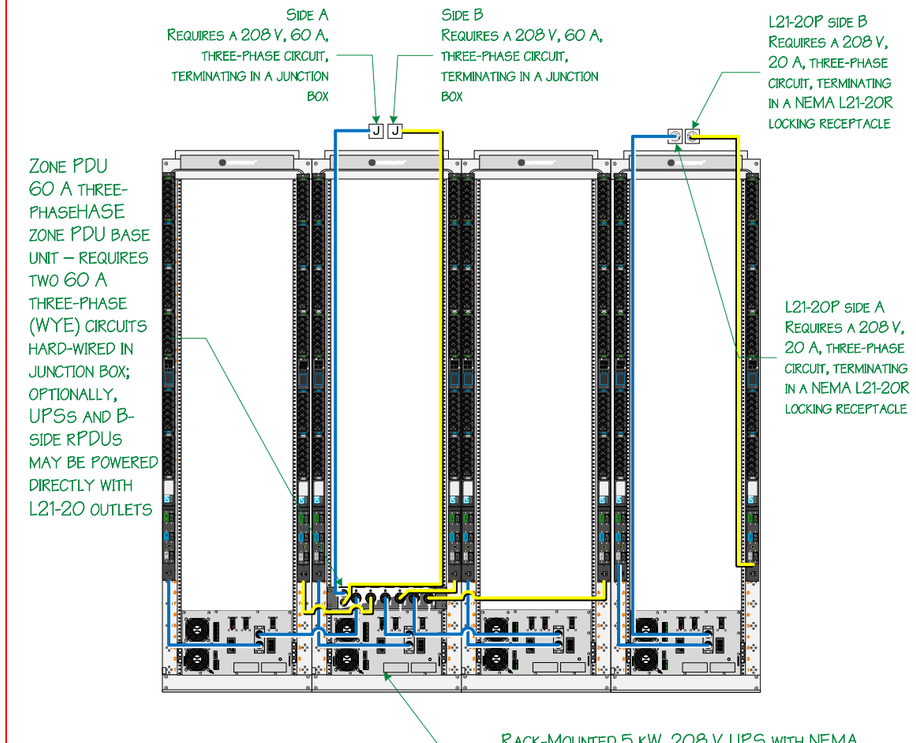


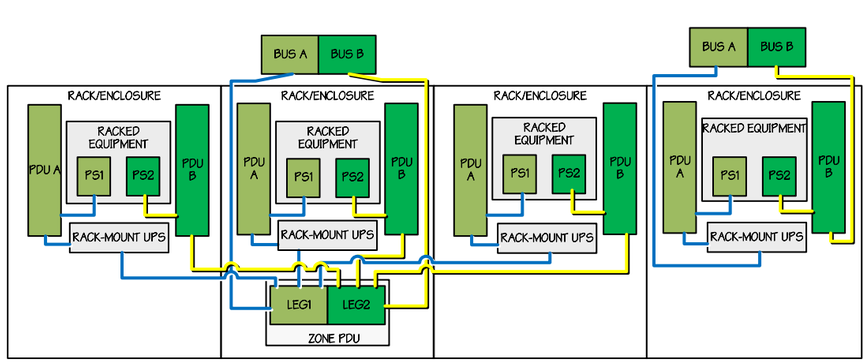


One zone PDU
30 A three-phase zone PDU base unit – requires two 30 A three-phase (WYE) circuits with L21-30R receptacles to support two racks

One zone PDU
60 A three-phase zone PDU base unit – requires two 60 A three-phase (WYE) circuits hard-wired in junction box to support three racks

2 Power elevation and schematic for a five rack TR





One zone PDU
60 A three-phase zone PDU base unit – requires two 60 A three-phase (WYE) circuits hard-wired in junction box to support three racks

Requires two 20 A three-phase (WYE) circuits terminating in L21-20Rs

1 Power elevation and schematic for a four rack TR

Department of Veterans Affairs

Office of Information and Technology

Infrastructure Operations - Application Hosting, Cloud and Edge Solutions

Enterprise Data Center and Infrastructure Engineering

EDICT

Enterprise Data Center Infrastructure Collaboration Team

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SHEET TITLE

Zone PDU Power Distribution in Four and Five Rack TRs

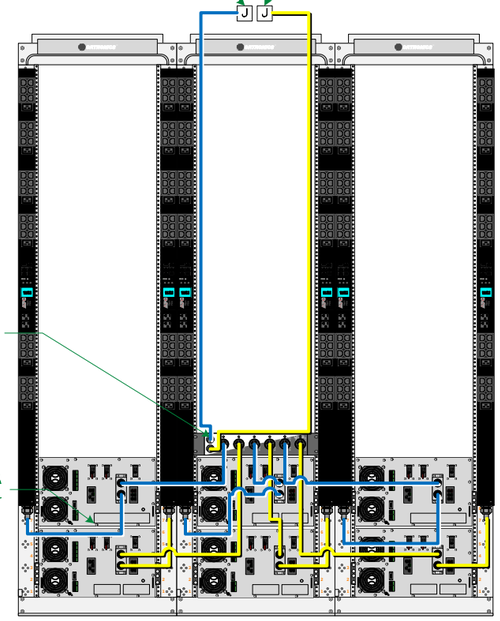
SHEET: 24 OF 57

SIDE A
REQUIRES A 208 V, 60 A, THREE-PHASE CIRCUIT, TERMINATING IN A HARD-WIRED JUNCTION BOX

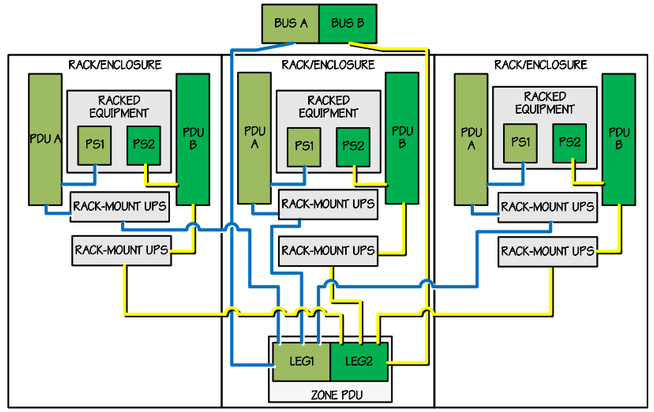
SIDE B
REQUIRES A 208 V, 60 A, THREE-PHASE CIRCUIT, TERMINATING IN A HARD-WIRED JUNCTION BOX

ZONE PDU
60 A THREE-PHASE ZONE PDU BASE UNIT – REQUIRES TWO 60 A THREE-PHASE (WYE) CIRCUITS HARD-WIRED IN JUNCTION BOX; OPTIONALLY, UPSS MAY BE POWERED DIRECTLY WITH L21-20 OUTLETS

RACK-MOUNTED 5 kW, 208 V UPS WITH NEMA 20 A L21-20P INPUT AND L21-20R OUTPUT



2 POWER ELEVATION FOR A HEALTH CARE FACILITY ENTRANCE ROOM



ONE ZONE PDU
60 A THREE-PHASE ZONE PDU BASE UNIT – REQUIRES TWO 60 A THREE-PHASE (WYE) CIRCUITS HARD-WIRED IN JUNCTION BOX TO SUPPORT THREE RACKS

1 POWER SCHEMATIC FOR A HEALTH CARE FACILITY ENTRANCE ROOM

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SHEET TITLE

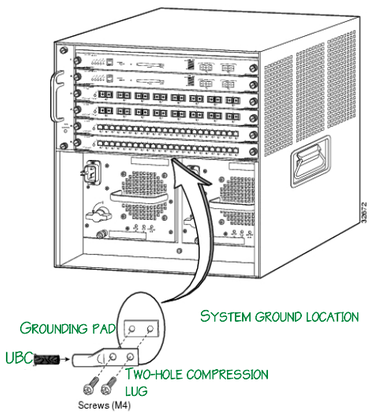
ZONE PDU POWER DISTRIBUTION IN A HEALTH CARE FACILITY ENTRANCE ROOM

NOTE: ALL GROUNDING SHALL BE DONE IN ACCORDANCE WITH ANSI/TIA -607-D "COMMERCIAL BUILDING GROUNDING (EARTHING) AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS", NFPA 70, AND IN COMPLIANCE WITH LOCAL CODES.

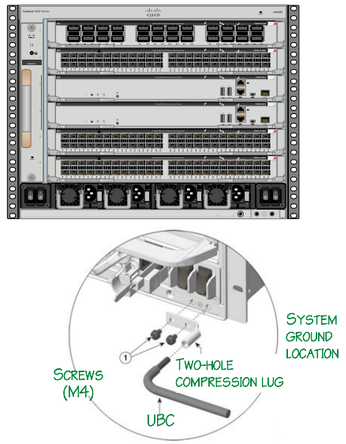
ALL EQUIPMENT SHALL BE GROUNDED PER MANUFACTURER'S INSTRUCTIONS.

NETWORK EQUIPMENT MUST BE GROUNDED. NEVER DEFEAT THE GROUND CONDUCTOR OR OPERATE THE EQUIPMENT IN THE ABSENCE OF A SUITABLY INSTALLED GROUND CONDUCTOR. THESE DEVICES WILL BE BONDED TO THE RACK BONDING BUSBAR (RBB) IN THE SAME RACK. EACH DEVICE WILL HAVE A DEDICATED UNIT BONDING CONDUCTOR (UBC). THE UBC WILL NOT BE SHARED.

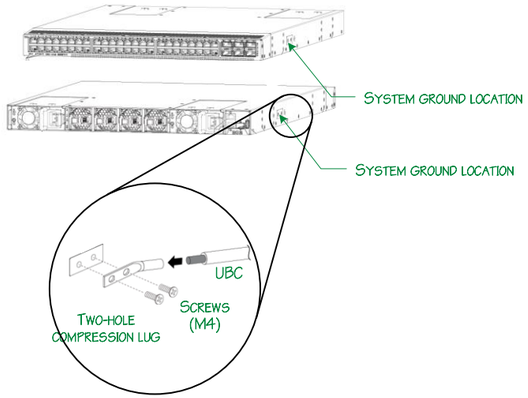
CISCO 6509



CISCO 9606

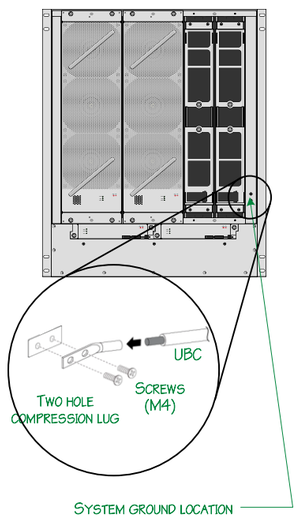


CISCO NEXUS 95108/95180

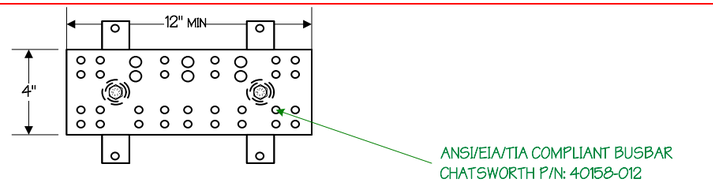


PER MANUFACTURER'S INSTRUCTIONS, WHEN ATTACHING A GROUNDING CABLE TO THE CHASSIS, YOU WILL NEED TO BEND ONE OF THE RACK-MOUNT RAILS SLIGHTLY TO ALLOW THE GROUNDING LUG TO GO BEHIND THE RAIL. ONLY ONE SIDE OF THE CHASSIS NEEDS TO BE BONDED.

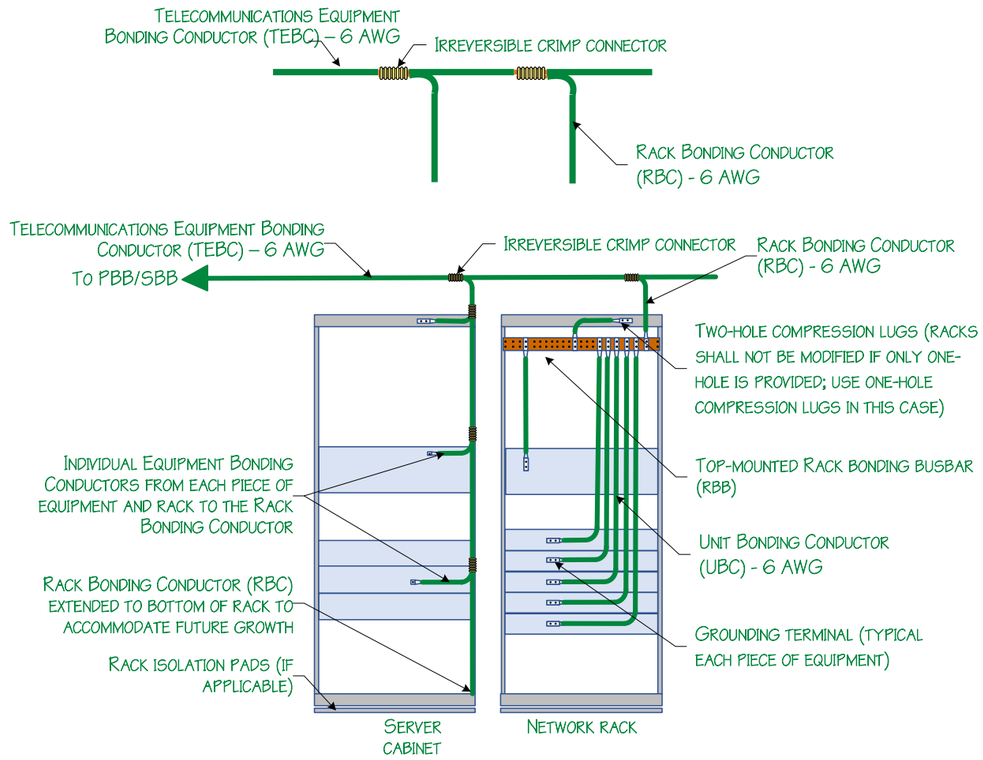
CISCO NEXUS 9508

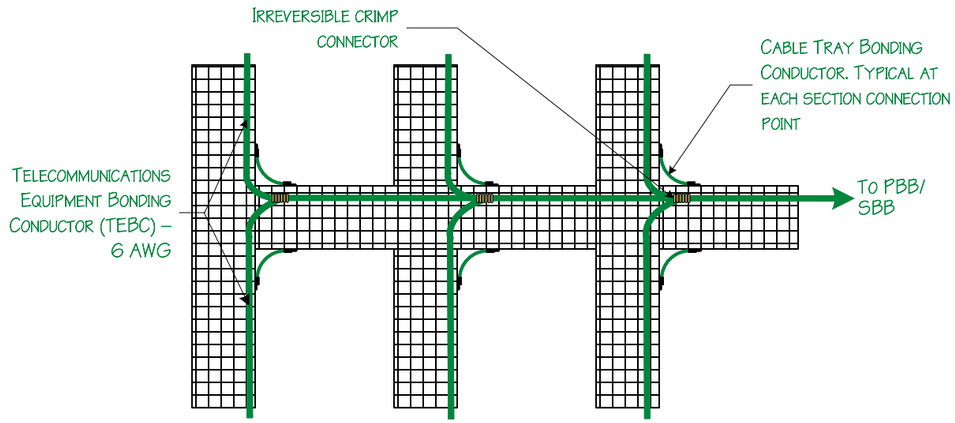


2 EARTHING EXAMPLES
REF: CISCO PRODUCT INSTALLATION GUIDE



3 TELECOMMUNICATIONS SECONDARY BONDING BUSBAR (SBB)





1 PATHWAY, RACK, BONDING CONDUCTOR JOIN REQUIREMENTS

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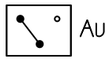
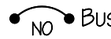
BONDING



AUTOMATIC TRANSFER SWITCH (ATS)

AUTOMATIC TRANSFER SWITCH (DELAYED)



BUSWAY TIE (NORMALLY OPEN)

BUSWAY TIE (NORMALLY CLOSED)

DISTRIBUTION PANEL

SWITCH (OPEN)

SWITCH (CLOSED)

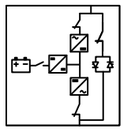
RECTIFIER

INVERTER

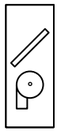
BATTERY CONVERTER

BATTERY

STATIC SWITCH



UNINTERRUPTABLE POWER SUPPLY (UPS)



COMPUTER ROOM AIR CONDITIONER (CRAC)

OVERHEAD BUSWAY

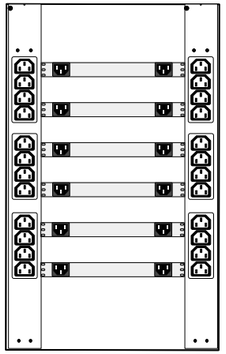
BUSWAY METERED HEADEND

L21-20 BUSWAY TAP

L21-20 RECEPTACLE

RACK PDU (RPDU)

DUAL-POWERED IT/NETWORKING EQUIPMENT



SERVER CABINET WITH RPDUS AND EQUIPMENT

UPS (RACK-MOUNTED)

1 LEGEND FOR ELECTRICAL ONE-LINE DRAWINGS

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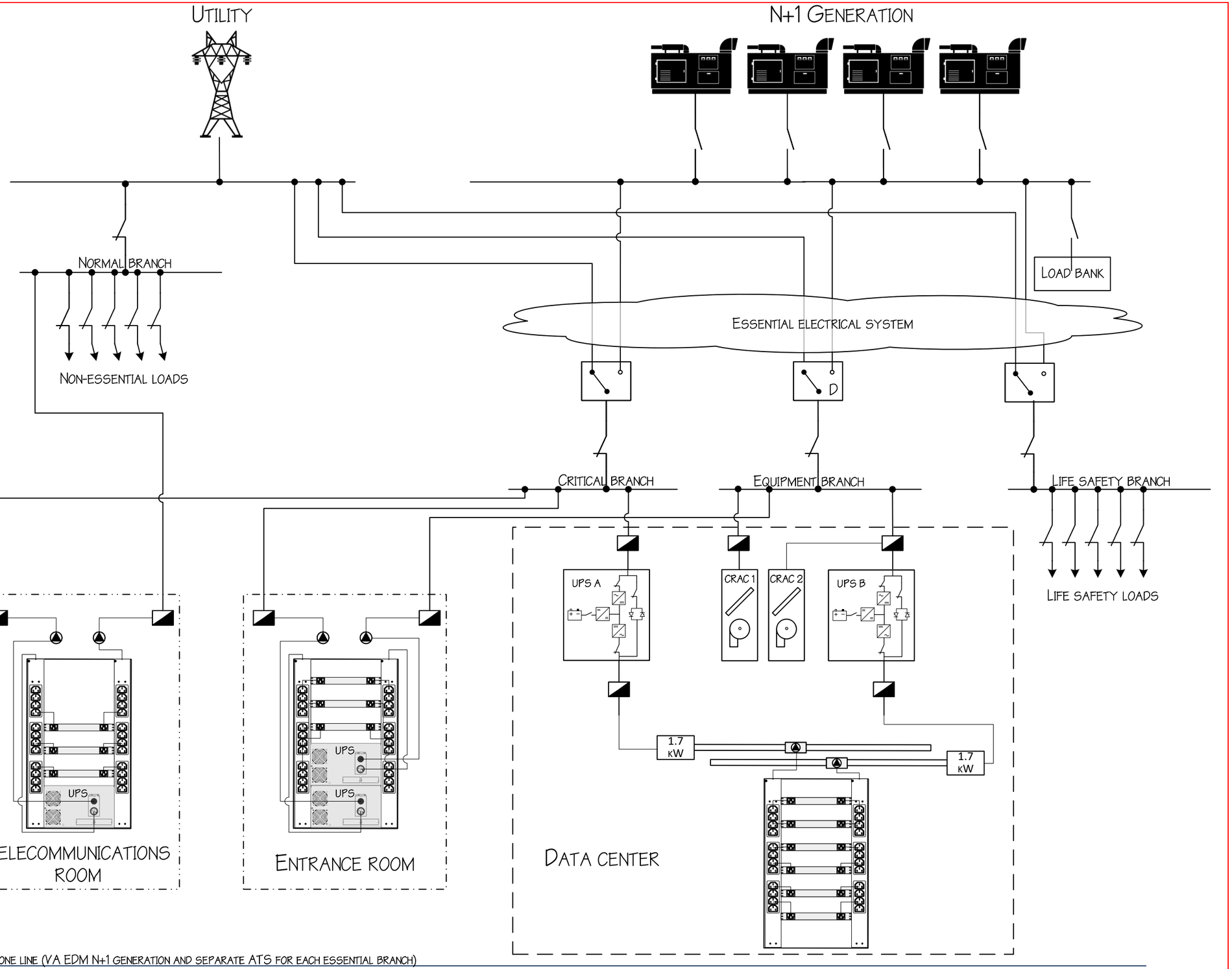
LEGEND FOR ELECTRICAL ONE-LINE DRAWINGS



1 DATA CENTER ONE LINE (VA EDM N+1 GENERATION AND SEPARATE ATS FOR EACH ESSENTIAL BRANCH)
NOT FOR CONSTRUCTION

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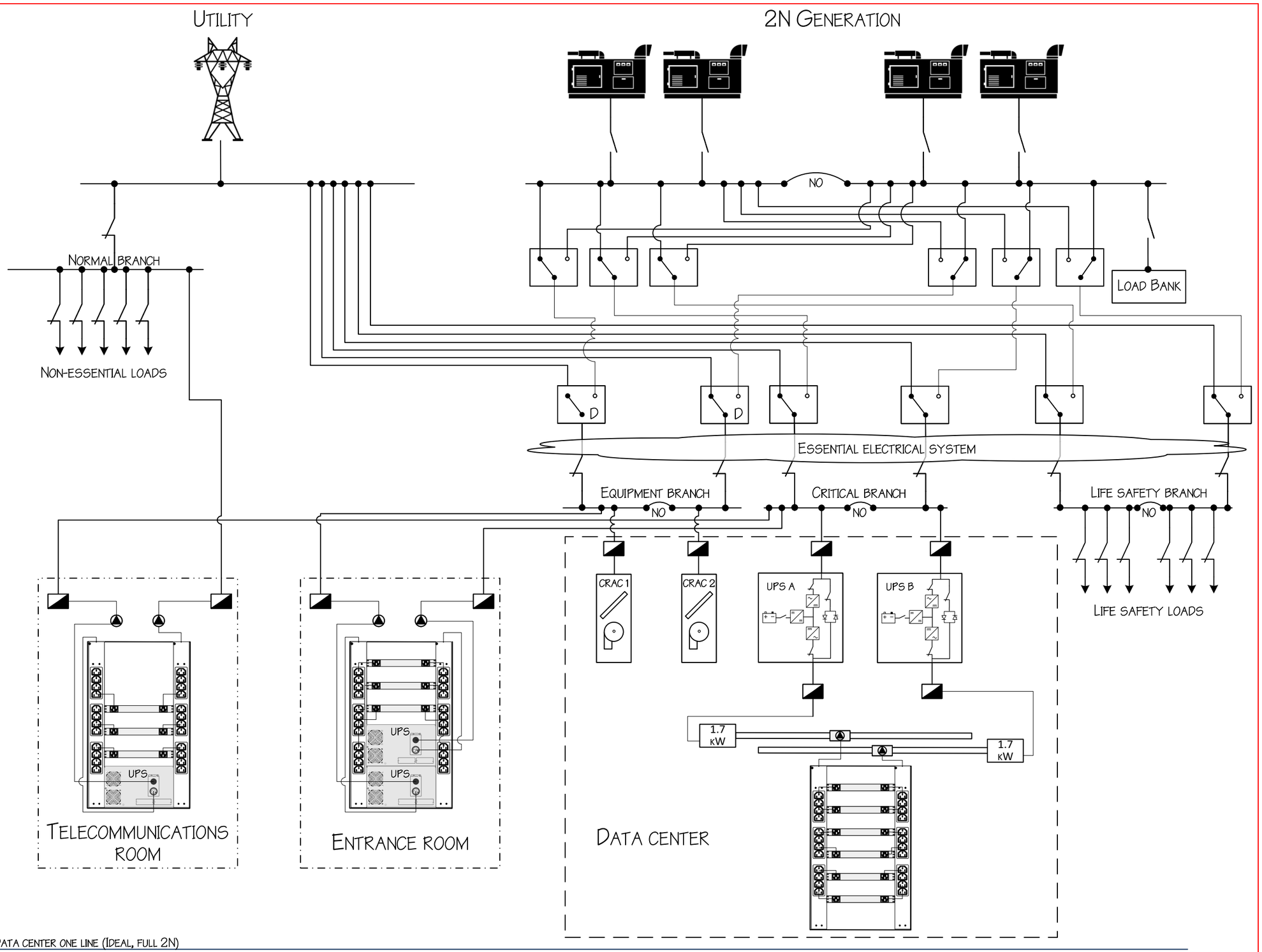
SHEET TITLE

ELECTRICAL ONE-LINE (MINIMUM VA REQUIREMENT)

SHEET: 28 OF 57



1 DATA CENTER ONE LINE (IDEAL, FULL 2N)
NOT FOR CONSTRUCTION

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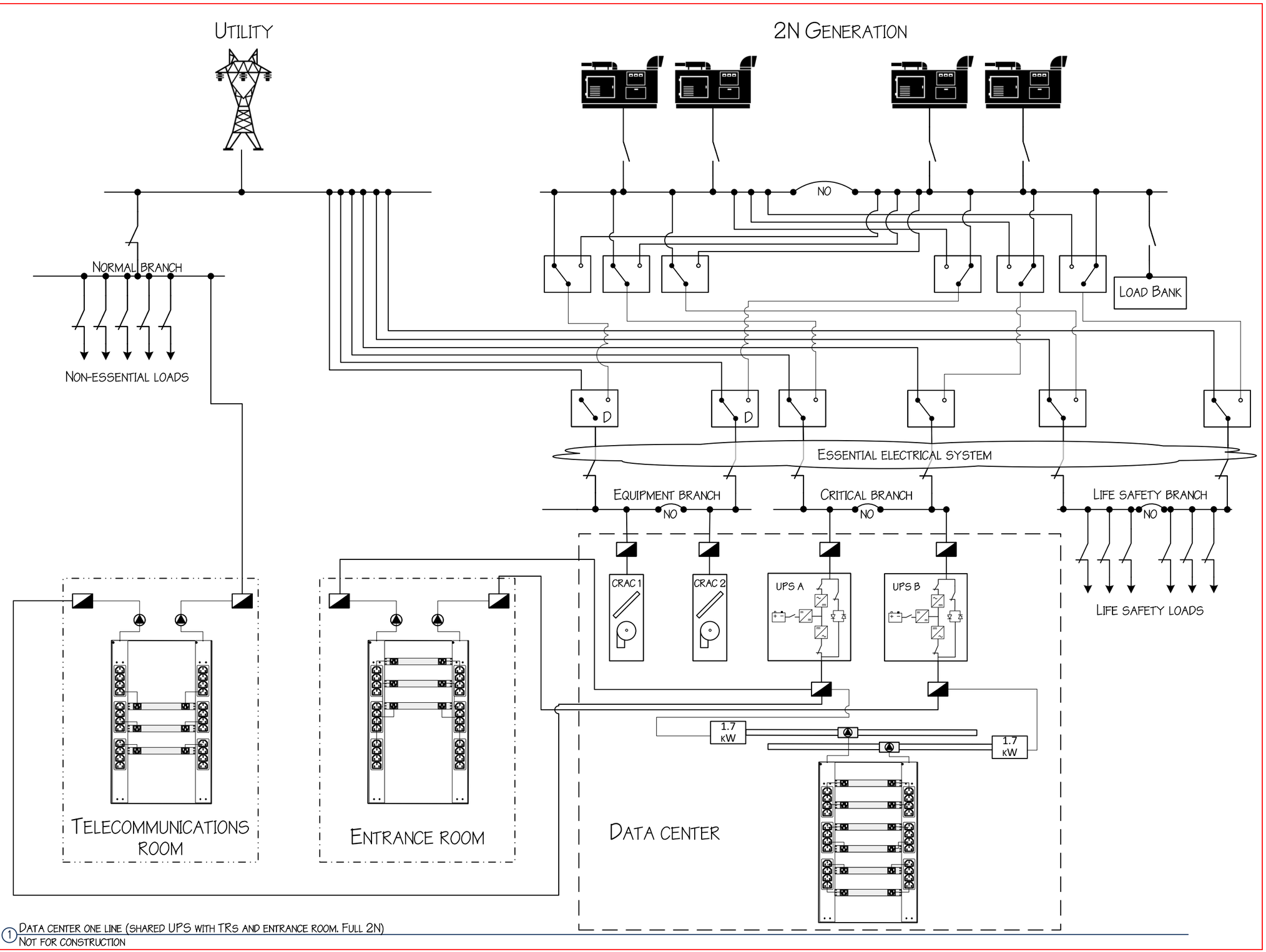
SHEET TITLE

ELECTRICAL ONE-LINE (IDEAL REDUNDANCY)



1 DATA CENTER ONE LINE (SHARED UPS WITH TRS AND ENTRANCE ROOM. FULL 2N)
NOT FOR CONSTRUCTION

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SHEET TITLE

ELECTRICAL ONE-LINE (SHARED UPS)

TELECOMMUNICATIONS DISTRIBUTION (ELEVATIONS, CABLING, AND ROUTING)

DEPARTMENT OF VETERANS AFFAIRS

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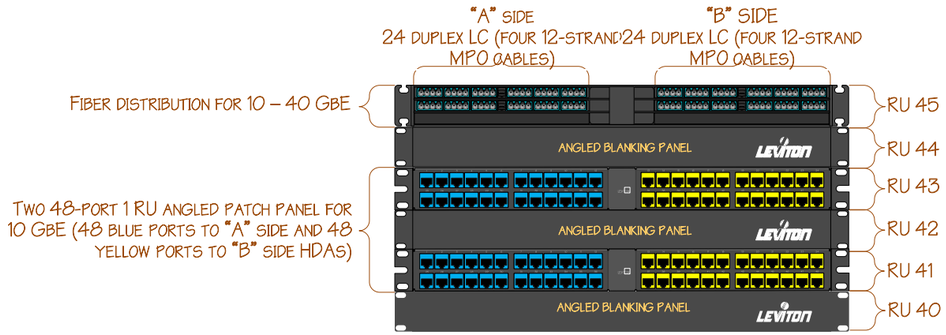
SHEET TITLE

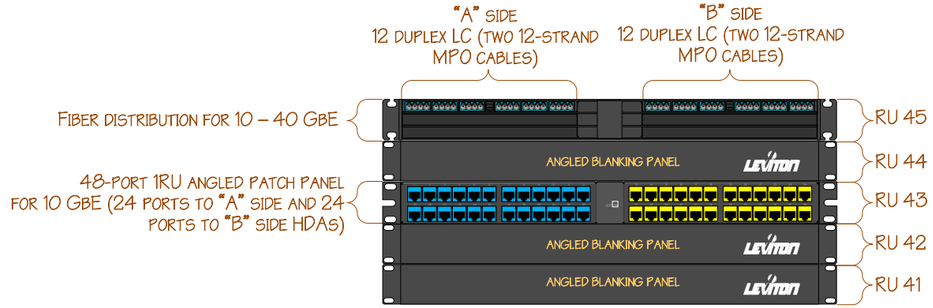
TELECOMMUNICATIONS DISTRIBUTION (ELEVATIONS, CABLING, AND ROUTING)

DATA CENTER SERVER CABINETS (REAR TOP 5 RU OF EACH CABINET)



QUANTITIES OF HD EQUIPMENT DISTRIBUTORS AND FIBER AND UTP AMOUNT PER SITE REQUIREMENTS

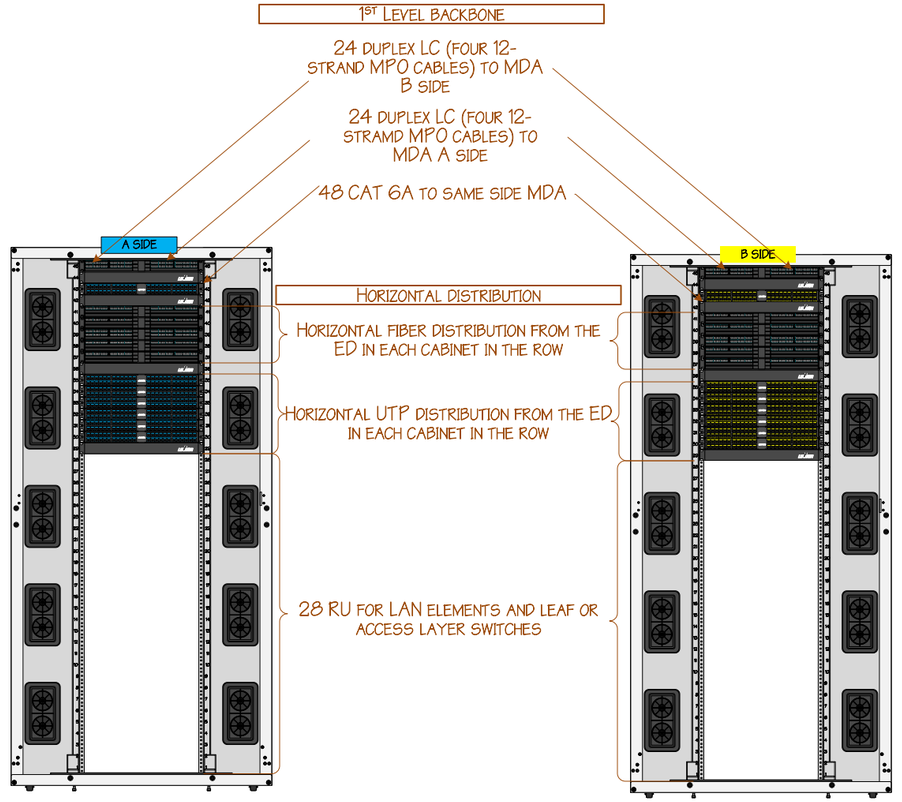
3 HIGH DENSITY EQUIPMENT DISTRIBUTOR ELEVATION FOR CABINETS



QUANTITIES OF FIBER AND UTP ARE MINIMUM AMOUNT; ACTUAL QUANTITIES PER SITE REQUIREMENTS

2 STANDARD DENSITY EQUIPMENT DISTRIBUTOR ELEVATION FOR CABINETS

DATA CENTER NETWORK CABINETS (END OF EACH ROW: A-SIDE ONE END, B-SIDE ON THE OTHER END)



1 TYPICAL END OF ROW HORIZONTAL DISTRIBUTION AREA

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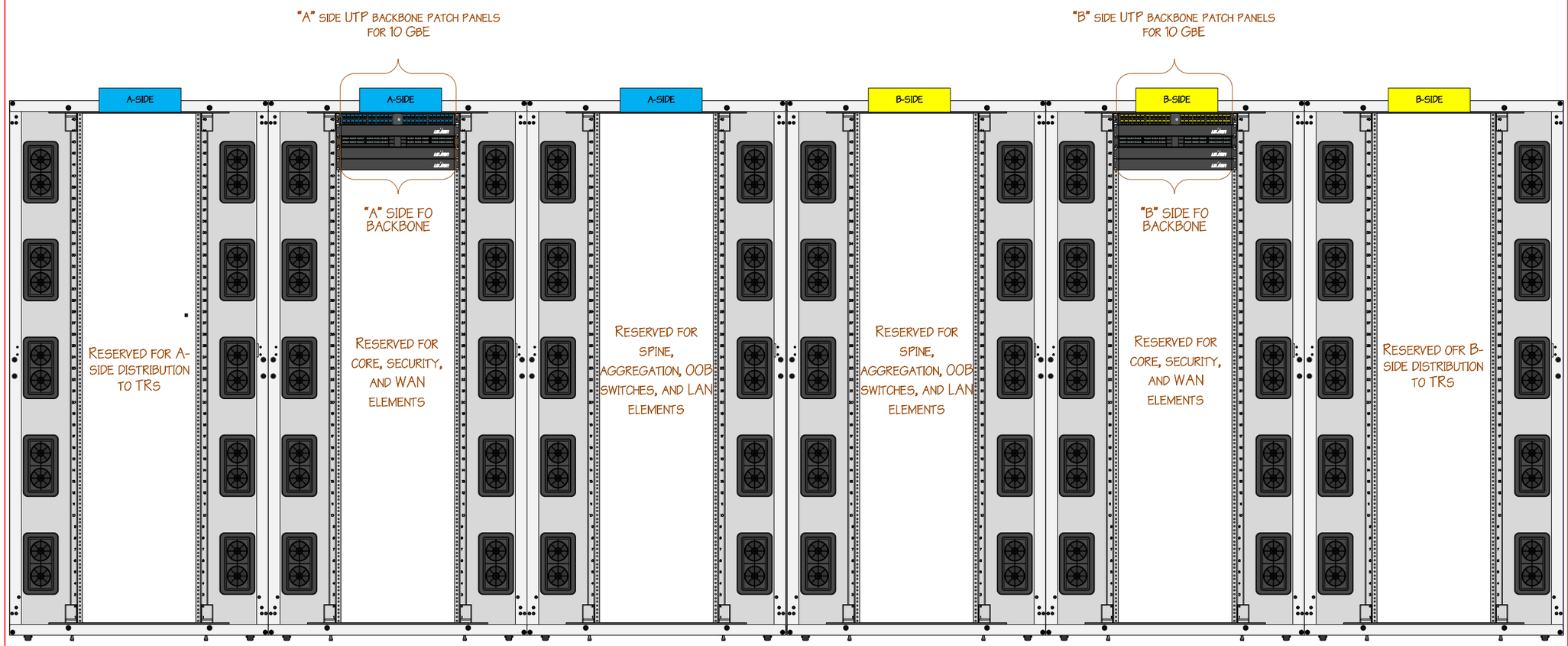
SHEET TITLE

ED & HD (L, M, S)

NETWORK CABINETS CREATING ONE ROW IN THE DATA CENTER ESTABLISHING THE MAIN DISTRIBUTION AREA



1 SMALL DATA CENTER MAIN DISTRIBUTION AREA (A & B SIDES)

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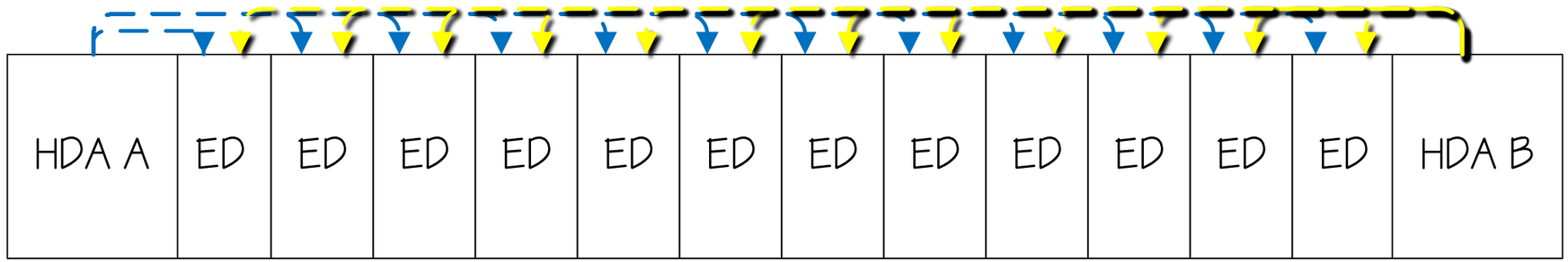
SHEET TITLE

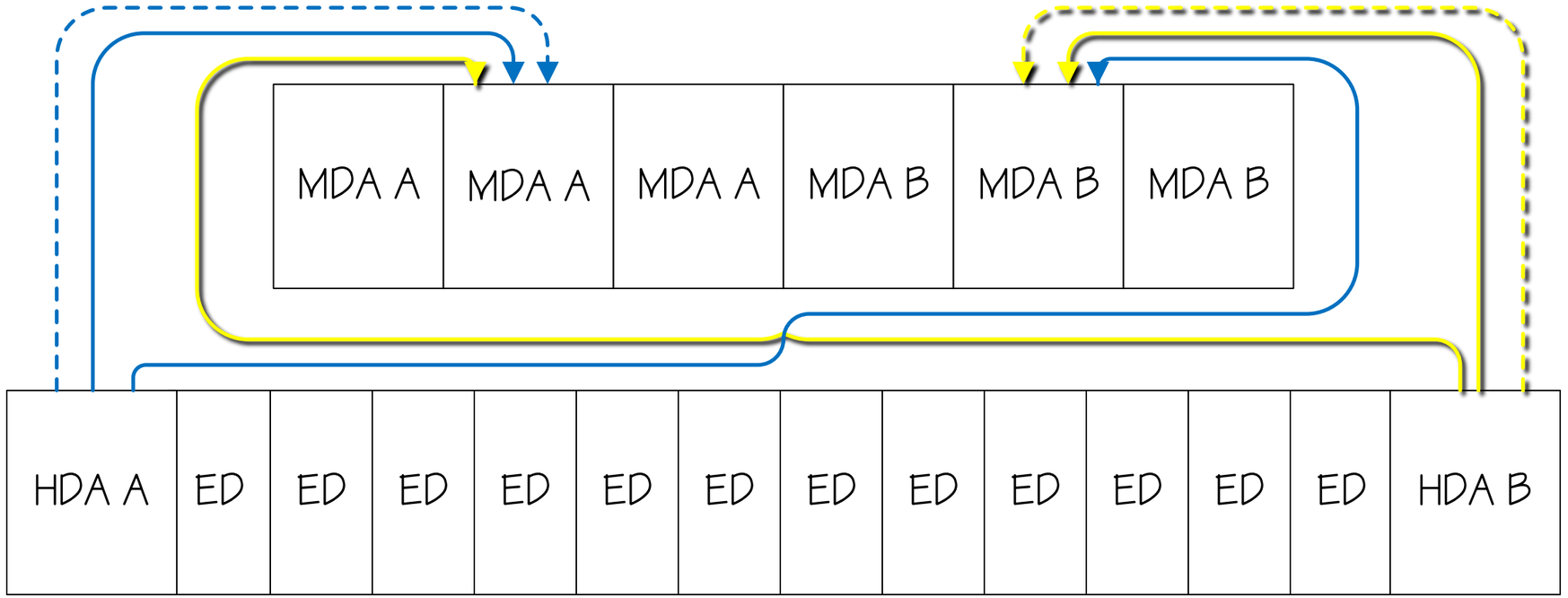
MDA (S)

Data center diverse path distribution



(2) MPO-12 to MPO-12 OM4 trunk cables [(4) MPO-12/Duplex LC cassettes]/24 CAT 6A – A-side
(2) MPO-12 to MPO-12 OM4 trunk Cables [(4) MPO-12/Duplex LC cassettes]/24 CAT 6A – B-side

② Diverse routing cabinets (equipment distributor) to horizontal distribution area



(4) MPO-12 to MPO-12 OM4 trunk cables [(8) MPO-12/Duplex LC cassettes] – A-side
(4) MPO-12 to MPO-12 OM4 trunk cables [(8) MPO-12/Duplex LC cassettes] – B-side
48 CAT 6A – A-side
48 CAT 6A – B-side

① Diverse routing horizontal distribution area to main distribution area

Department of Veterans Affairs

Office of Information and Technology

Infrastructure Operations - Application Hosting, Cloud and Edge Solutions

Enterprise Data Center and Infrastructure Engineering

EDICT

Enterprise Data Center Infrastructure Collaboration Team

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John Wernau, Kelly Bates

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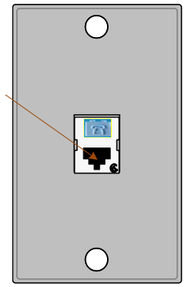
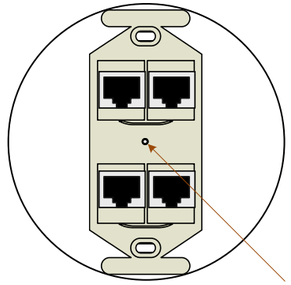
Small Data Center (MCR) Network Diversity

SHEET: 34 OF 57



4 TYPICAL WALL MOUNT PHONE VOIP OUTLET



5 TYPICAL WORK FLOOR MOUNT OUTLET

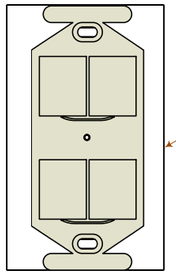
Note:

TYPICAL WORK AREA OUTLET FACEPLATE WILL BE INSTALLED WITH CATEGORY 6A COMPONENT-COMPLIANT 8P8C MEDIA INTERFACE CONNECTORS (RJ45). EACH CONNECTOR WILL BE TERMINATED TO HIGH QUALITY CATEGORY 6A HORIZONTAL CABLING WHICH WILL TERMINATE IN THE TELECOMMUNICATIONS ROOM AS SPECIFIED ELSEWHERE IN THIS DESIGN PACKAGE.
ALL HORIZONTAL UTP SHALL BE CATEGORY 6A AND TERMINATED TO T568B.

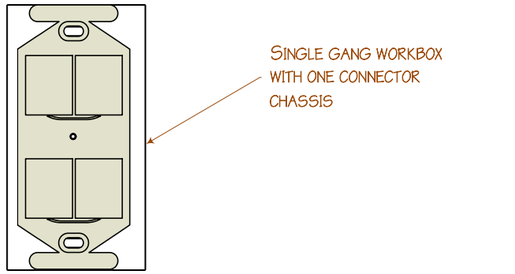
TYPICAL FACEPLATE WILL BE INSTALLED WITH TWO RJ45S. HIGH DENSITY FACEPLATES WILL BE INSTALLED WITH FOUR RJ45S.

FACEPLATE MATERIAL AND COLOR DETERMINED BY OTHERS.

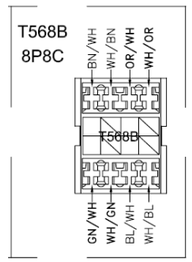
ALL LABELING SHALL BE ANSI/TIA-606-D COMPLIANT AS MODIFIED FOR SOME ELEMENTS IN SECTION 5 OF THE ISTS. MACHINE PRINTED. FURTHER GUIDANCE ON ADMINISTRATION MAY BE SPECIFIED IN OTHER SECTIONS OF THIS DESIGN PACKAGE.



3 TYPICAL HIGH DENSITY WALL MOUNTED WORK AREA OUTLET CONFIGURATION



2 STANDARD DENSITY WALL MOUNTED WORK AREA OUTLET CONFIGURATION



1 ANSI/TIA T568B 8P8C WIRING STANDARD

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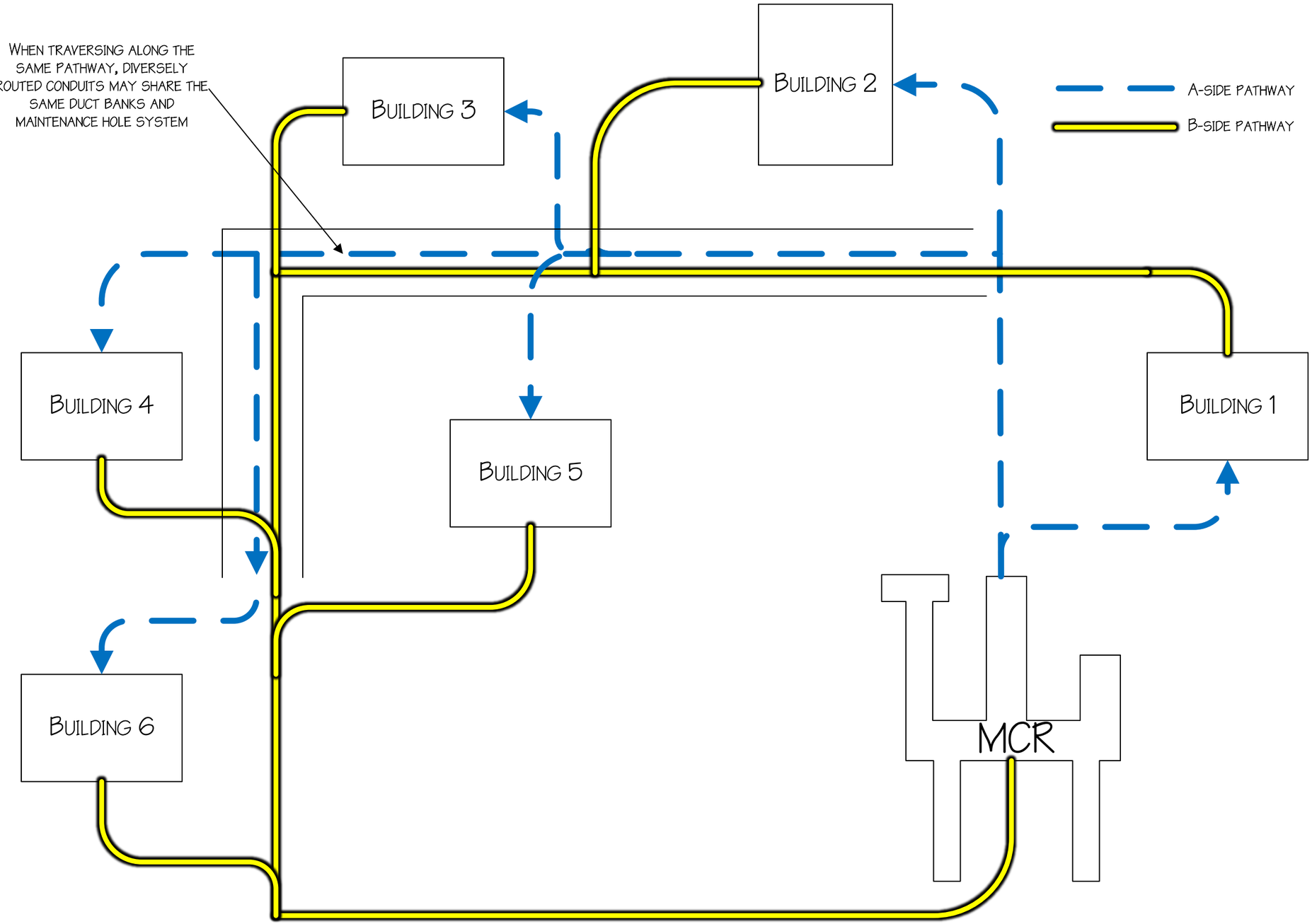
WORK AREA OUTLETS



1 SIMPLIFIED OUTSIDE PLANT DIVERSE TELECOMMUNICATIONS BACKBONE PATHWAYS

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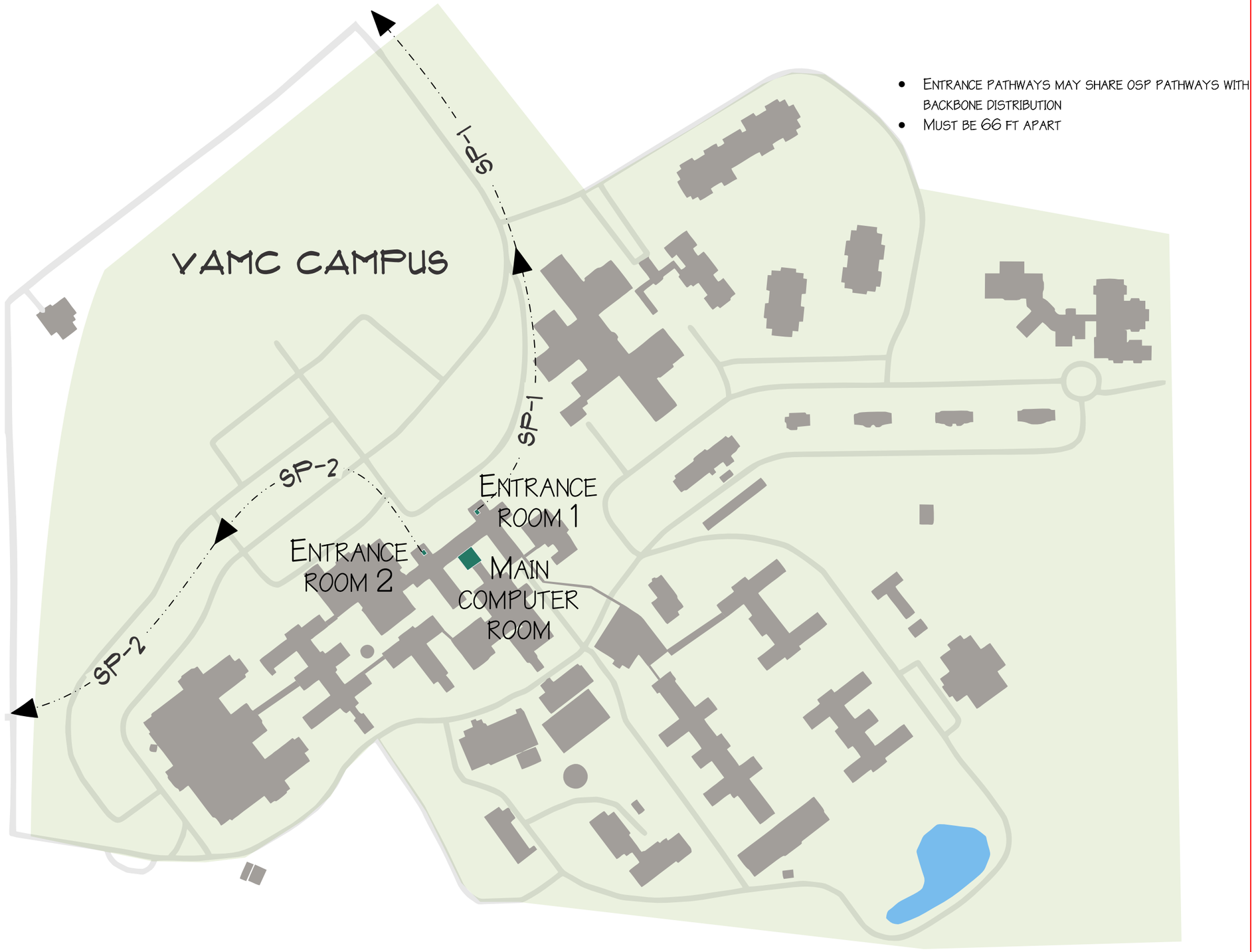
SIMPLIFIED OSP DIVERSE ROUTING



- ENTRANCE PATHWAYS MAY SHARE OSP PATHWAYS WITH BACKBONE DISTRIBUTION
- MUST BE 66 FT APART

(1) SAMPLE OUTSIDE PLANT TELECOMMUNICATIONS SERVICE PROVIDER ENTRANCE DIVERSE PATHWAYS

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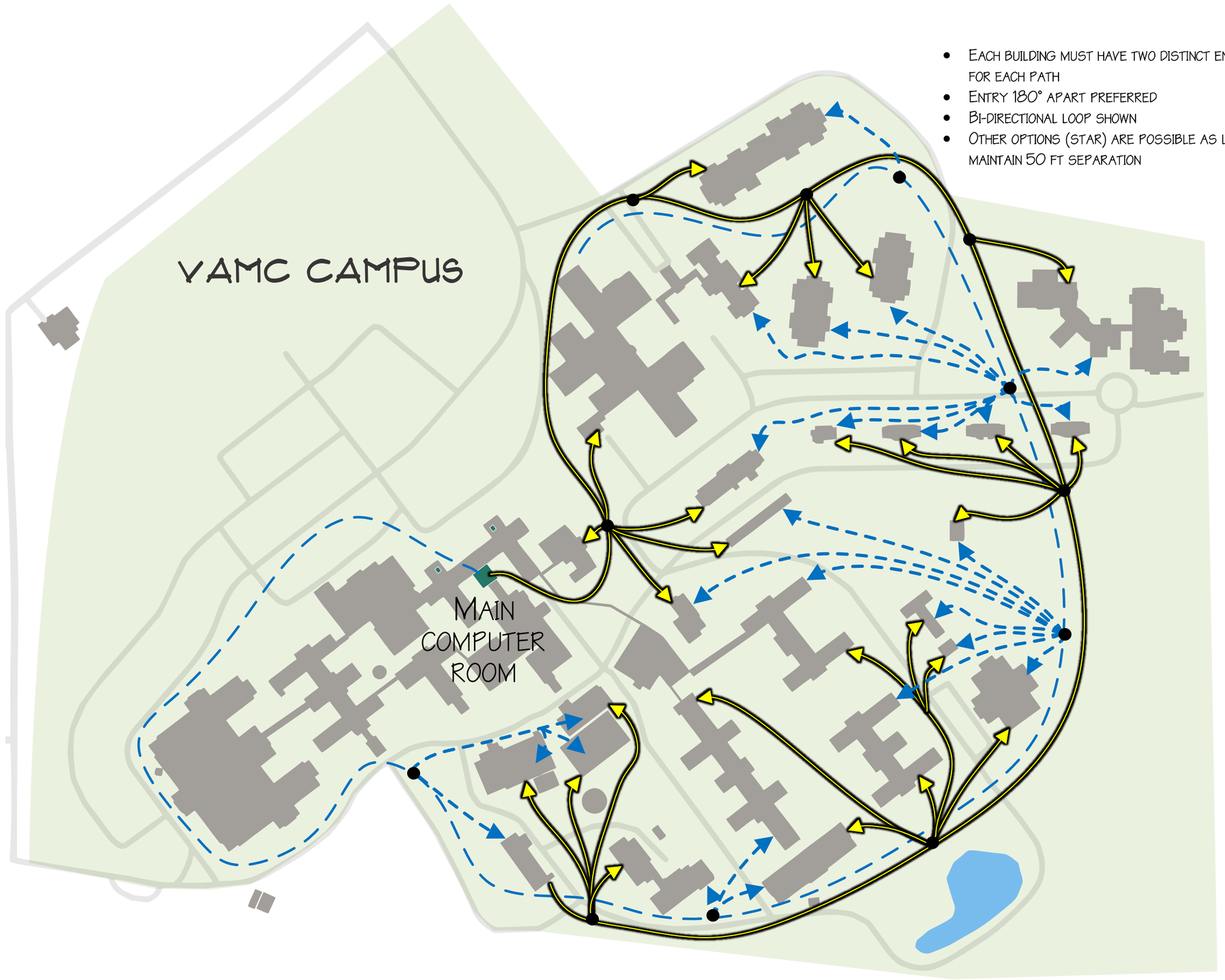
SERVICE PROVIDER PATHWAY ROUTING EXAMPLE



- EACH BUILDING MUST HAVE TWO DISTINCT ENTRY POINTS, ONE FOR EACH PATH
- ENTRY 180° APART PREFERRED
- BI-DIRECTIONAL LOOP SHOWN
- OTHER OPTIONS (STAR) ARE POSSIBLE AS LONG AS PATHS MAINTAIN 50 FT SEPARATION

1 SAMPLE OUTSIDE PLANT CAMPUS TELECOMMUNICATIONS BACKBONE ROUTING - DIVERSE PATHWAYS

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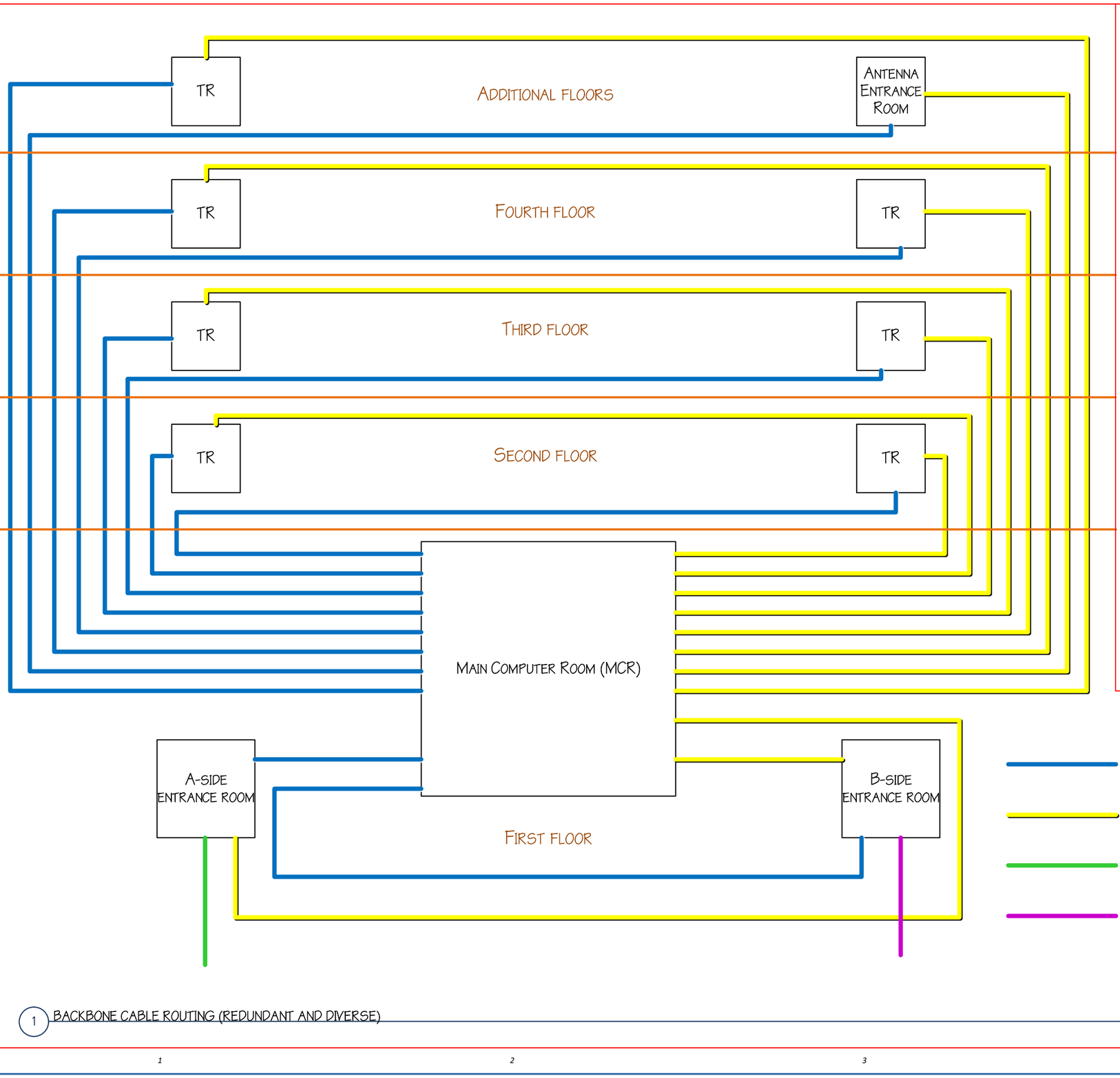
CAMPUS BACKBONE PATHWAY ROUTING EXAMPLE



1 BACKBONE CABLE ROUTING (REDUNDANT AND DIVERSE)

NOTE:

- DIAGRAM DEPICTS TYPICAL REDUNDANT AND DIVERSE CABLE ROUTING
- ADDITIONAL TRS PER FLOOR FOLLOW THE SAME DIVERSE ROUTING SCHEMA

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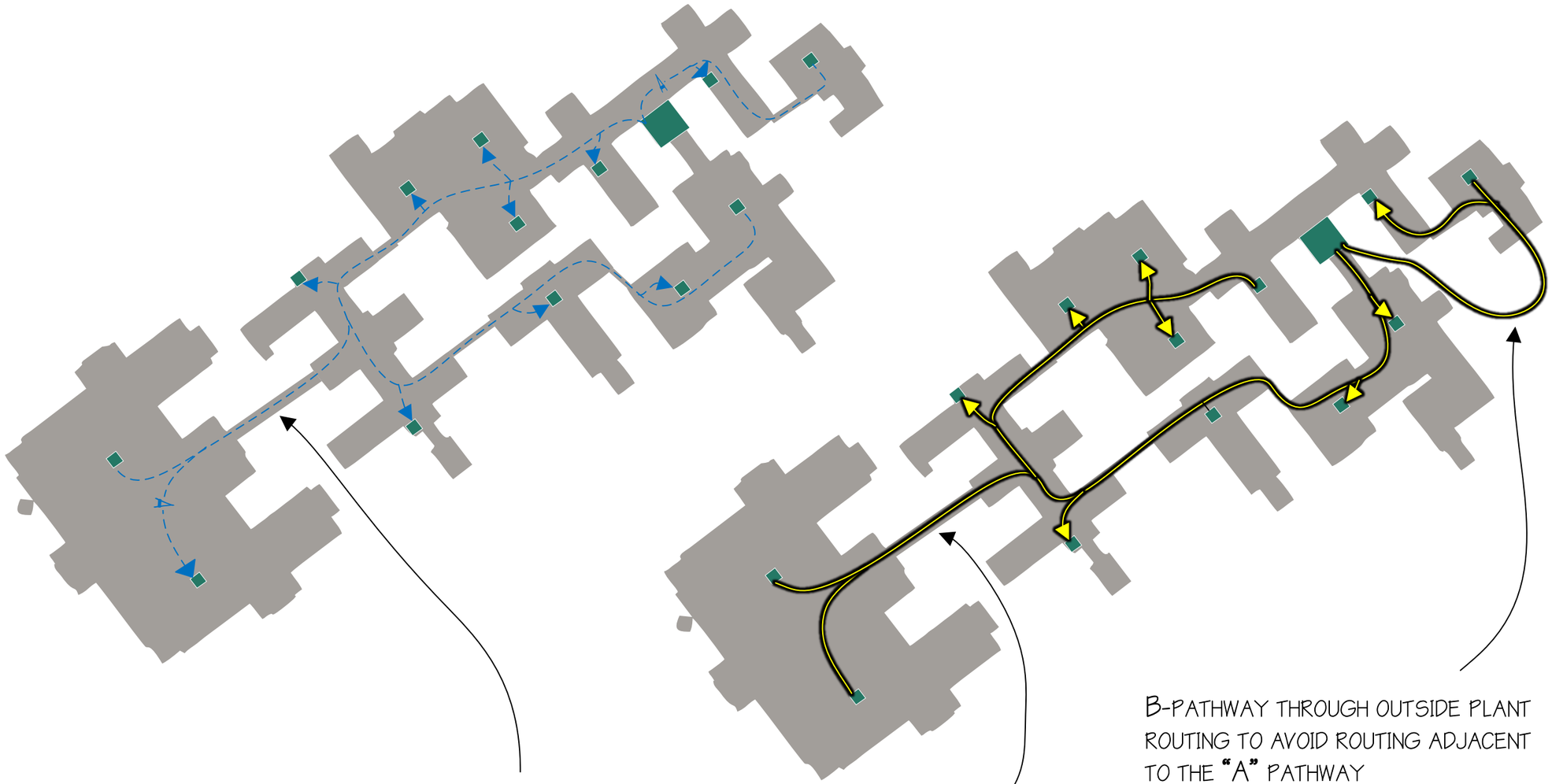
SIMPLIFIED INSIDE PLANT BACKBONE PATHWAY ROUTING



SINCE ONLY A SINGLE PATHWAY EXISTS TO THE SW PORTION OF THE BUILDING CLUSTER, THE PATHWAYS FOR A AND B ROUTING WILL NEED TO MAINTAIN DIVERSITY BY ROUTING ON DIFFERENT FLOORS. (E.G. "A" PATHWAY ON FIRST FLOOR, "B" PATHWAY ON THIRD FLOOR. IF ONLY A SINGLE FLOOR INDOOR PATHWAY EXISTS, MINIMALLY SEPARATE PATHWAYS TO OPPOSITE SIDES OF THE HALLWAY)

B-PATHWAY THROUGH OUTSIDE PLANT ROUTING TO AVOID ROUTING ADJACENT TO THE "A" PATHWAY

1 SAMPLE INSIDE PLANT DIVERSE TELECOMMUNICATIONS BACKBONE PATHWAYS

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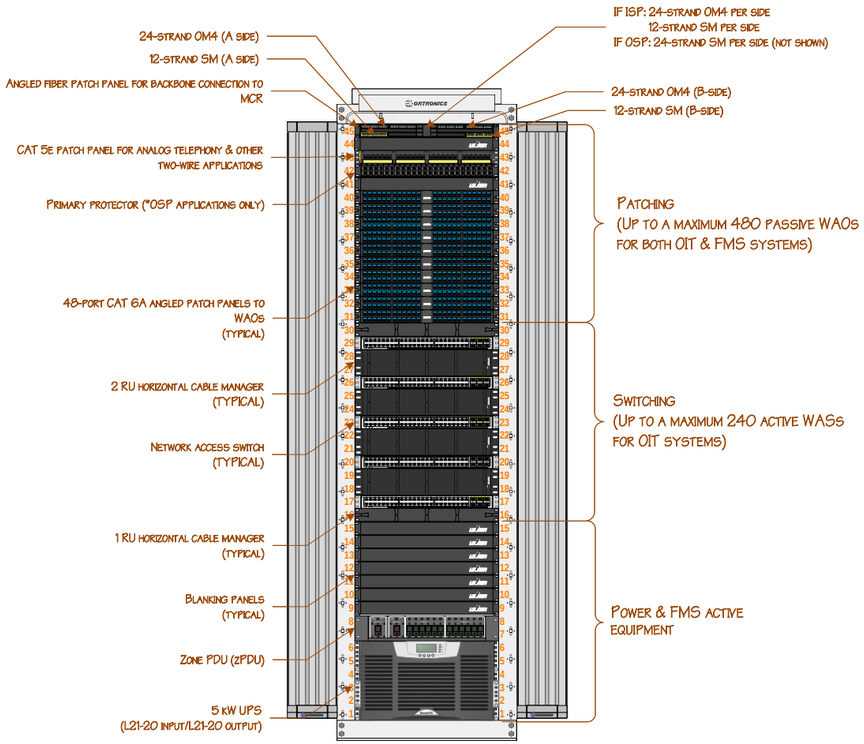
INSIDE PLANT BACKBONE PATHWAY ROUTING EXAMPLE

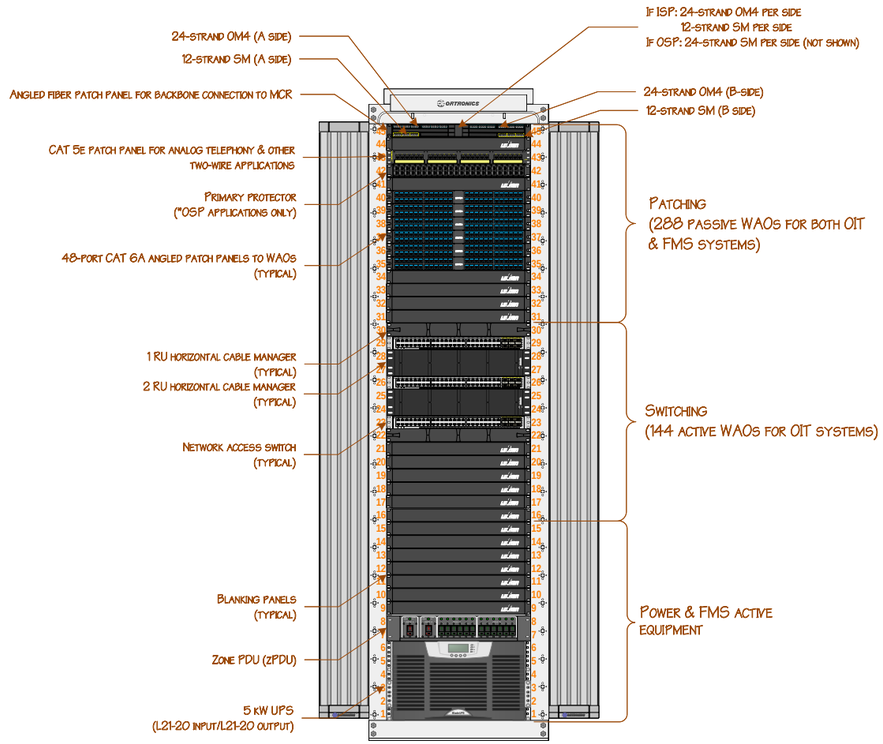
RULE OF THIRDS FOR TR RACKS

- INDIVIDUAL RACK CAPACITIES REMAIN THE SAME REGARDLESS OF THE NUMBER OF RACKS IN THE TR
- HEALTHCARE TR SIZING REMAINS 170 FT^2 EXCEPT DURING REMODELS WHERE THE MINIMUM IS 100 FT^2

TR SIZING (NON-HEALTHCARE)		
1 RACK	1-144 WAOs	80 FT^2
2 RACKS	145-240 WAOs	100 FT^2
3 RACKS	241-480 WAOs	120 FT^2
4 RACKS	>480 WAOs	140 FT^2



2 ULTIMATE FUTURE CAPACITY – TELECOMMUNICATION ROOM RACKS



1 INITIAL PLANNING CAPACITY – TELECOMMUNICATION ROOM RACKS

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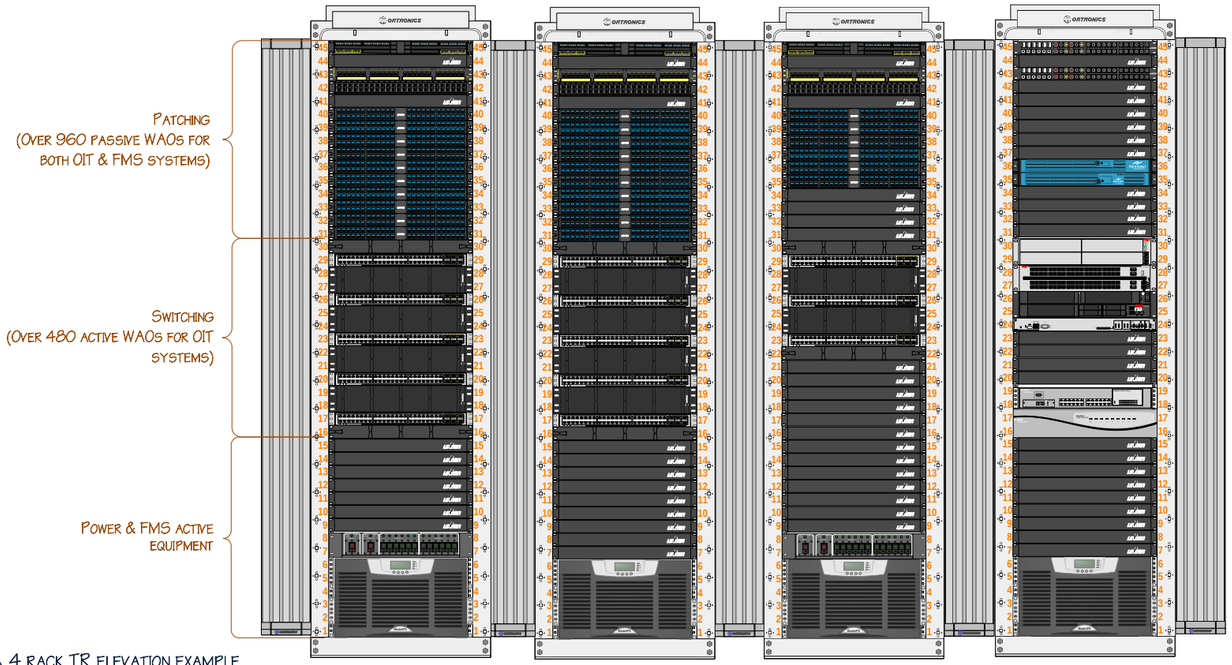
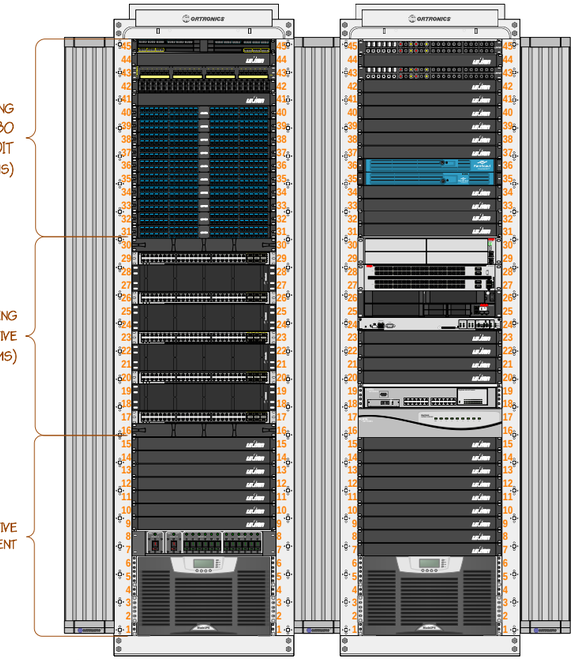
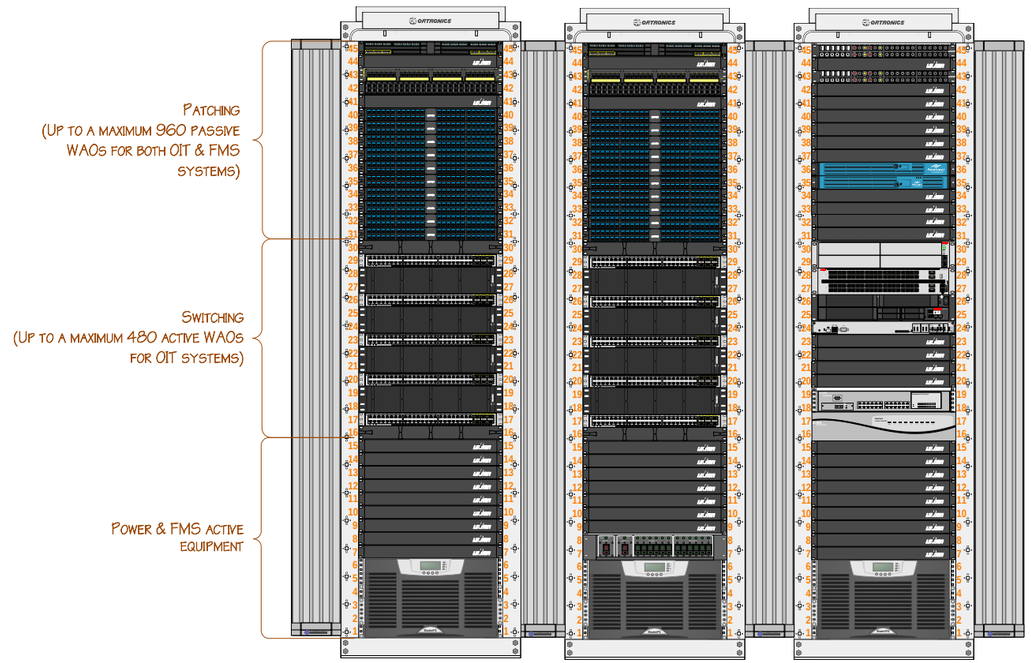
RULE OF THIRDS FOR TR RACKS



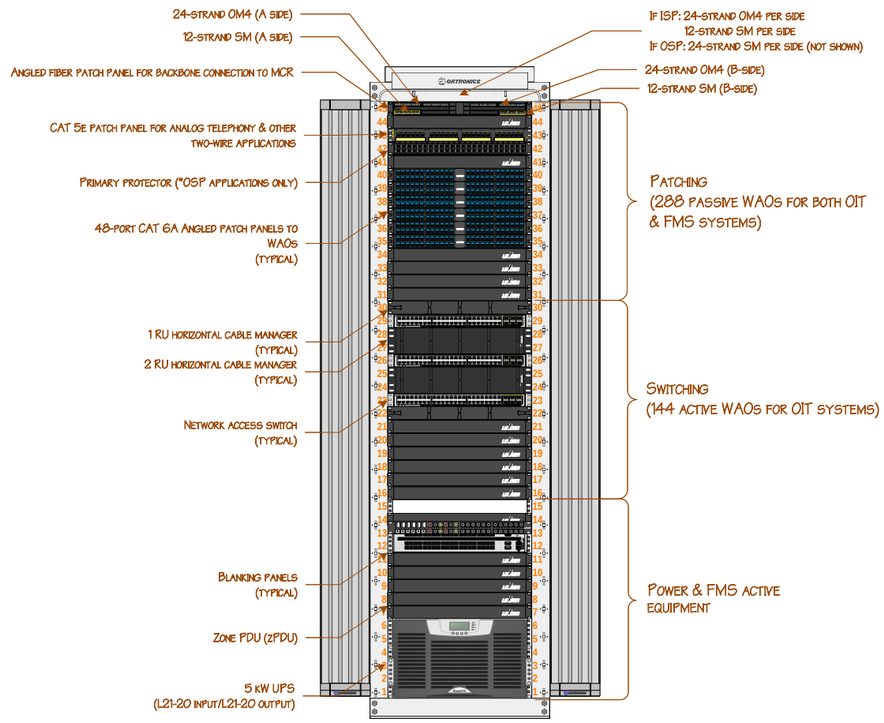
3 4 RACK TR ELEVATION EXAMPLE



4 2 RACK TR ELEVATION EXAMPLE



2 3 RACK TR ELEVATION EXAMPLE



1 1 RACK TR ELEVATION EXAMPLE

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TR ELEVATIONS

SHEET: 42 OF 57

BASIS OF DESIGN EQUIPMENT

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BASIS OF DESIGN EQUIPMENT

GENREIC TELECOMMUNICATIONS MEDIA AND INTERFACE SPECIFICATIONS FOR TELECOMMUNICATIONS SPACES			
ID	PRIMARY ATTRIBUTE	SECONDARY ATTRIBUTE	SPECIFICATION
1	COPPER PATCH PANELS	PERFORMANCE CATEGORY	CATEGORY 6A (10 GBE)
		POSITION COUNT	48
		FORM FACTOR	ANGLED
		SIZE	ONE RACK UNIT (RU)
		JACK COLOR CODING	A-SIDE BLUE / B-SIDE YELLOW FOR DUAL PATH DISTRO WITHIN COMPUTER ROOMS (DATA CENTERS); UTP DISTRO TO WAOs IS EXCLUDED
2	FIBER DISTRIBUTION PANNELS	CASSETTE CAPACITY	12 CASSETTES OR 6 DOUBLE CASSETTES
		CASSETTE USER INTERFACES	LC DUPLEX CONNECTORS / MPO-8
		CASSETTE BACKBONE INTERFACES	MPO-24/MPO-12
		PERFORMANCE CHARACTERISTICS	OM4 LASER OPTIMIZED 50/125 MULTIMODE (MM) / OS1(OS2) 9/125 SINGLE MODE (SM)
		FORM FACTOR	ONE RU
3	UNSHIELDED TWISTED PAIR (UTP) (HORIZONTALAND FIRST LEVEL BACKBONE)	PERFORMANCE CATEGORY	CATEGORY 6A (10 GbE); 24-26 GAUGE
		PERFORMANCE SPECIFICATIONS	MEETS OR EXCEEDS TIA-EIA-568-C.2-10, TSB-155.
4	IBER (HORIZONTAL AND FIRST LEVEL BACKBONE	PERFORMANCE CATEGORY	OM4 LASER OPTIMIZED / OS1 / OS2
		PERFORMANCE SPECIFICATIONS	LASER OPTIMIZED 50/125 MM FIBERS WITH AT LEAST 4,700 MHZ·KM AT 850 NM / OS1 9/125 SM FIBERS (INTRA-BUILDING) / OS2 9/125 SM (INTER-BUILDING)
		MODE	MULTIMODE/SINGLE MODE
		JACK COLOR	AQUA (OM4) / LIME (OM5) / YELLOW (SM) / BLACK (OSP)
		MEDIA CONNECTOR	PRE-TERMINATE WITH MULTI-FIBER PUSH ON (MPO), (FIELD TERMINATION AUTHORIZED FOR DISTRIBUTION LEAVING THE COMPUTER ROOM)
		STRAND COUNT	12 or 24
		BUNDLING	LOOSE TUBE (OUTDOOR)/TIGHT BUFFERED (INDOOR)
5	UTP PATCH CORDS	PERFORMANCE CATEGORY	CATEGORY 6A, 26-28 GAUGE, STRANDED
		PERFORMANCE SPECIFICATIONS	CENTER TUNED TO HORIZONTAL MEDIA
		TERMINATION METHOD	FACTORY PRE-TERMINATED
6	FIBER PATCH CORDS	PERFORMANCE CATEGORY	OM5/ OM4 / OS1 / OS2
		PERFORMANCE SPECIFICATIONS	LASER OPTIMIZED 50/125 MM FIBERS WITH AT LEAST 4,700 MHZ·KM AT 850 NM / OS1 9/125 SM FIBERS (INTRA-BUILDING) / OS2 9/125 SM (INTER-BUILDING)
		MODE	MULTIMODE/SINGLE MODE
		JACKET COLOR	AQUA (OM4) / LIME (OM5) / YELLOW (SM)
		MEDIA CONNECTOR	PRE-TERMINATED WITH DUPLEX LC / MPO-8

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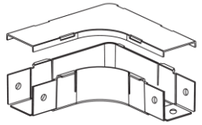
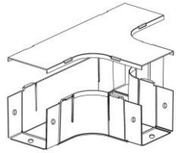
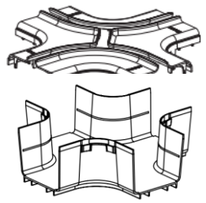
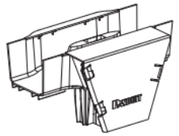






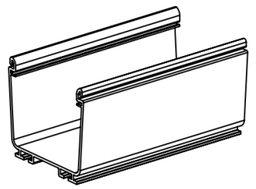
Fiber pathway channel corners (panduit fr4x4/frhc4/frshc4 or equivalent):

- Right angle corner
- Tee coner
- Tour way crossing
- Split or solid covers



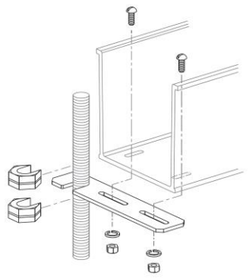
Fiber pathway bend radius spillways (panduit frvt4x4/frtr4x4 or equivalent):

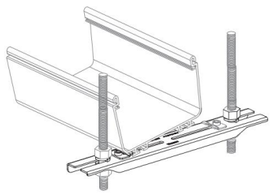
- Vertical tee
- Trumpet spillway
- Bend radius spillways required at every rack location



Fiber pathway channel and covers (panduit fr4x4/frhc4/frshc4 or equivalent):

- 4 in. x 4 in. channel runner
- Solid cover
- Split hinged cover

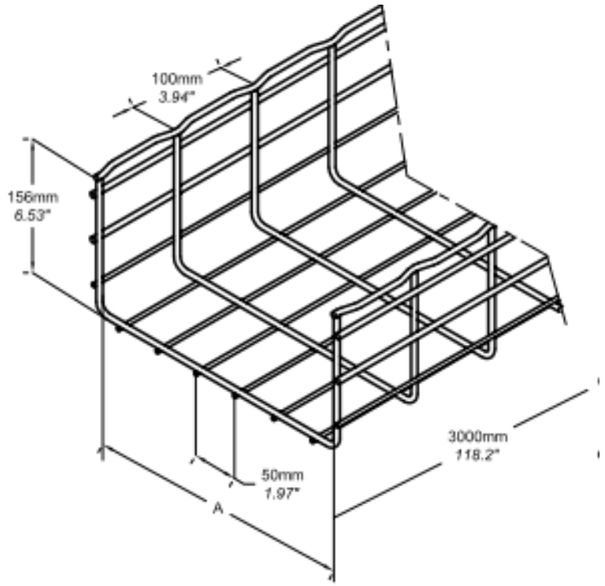




Fiber pathway mounting bracket (panduit fr6trbe/fr6trbn or equivalent):

- Bracket to mount to existing threaded rod or
- Bracket to mount to new threaded rod

2 Proposed fiber pathway and Details



Recommended cable tray:

- Cablofil
- 4 in. Deep x 12 in. Wide minimum (size commensurate with Distribution requirement)
- White powercoat
- Tray insert

CAT. NO	DEPTH (IN)	WIDTH (IN)	CAT 6a 4-pr PLENUM (0.35 in.)
CF105/300	4	12	248
CF105/450	4	18	373
CF105/500	4	20	414
CF105/600	4	24	497
CF150/150	6	6	186
CF150/200	6	8	238
CF150/300	6	12	357
CF150/450	6	18	536
CF150/500	6	20	596
CF150/600	6	24	715
CF150/900	6	36	1078

1 Cable tray capacity planning

Department of Veterans Affairs

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Infrastructure Operations - Application Hosting, Cloud and Edge Solutions

Enterprise Data Center and Infrastructure Engineering

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Enterprise Data Center Infrastructure Collaboration Team

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VERIFIED BY: Michael Julian, RCDD; John Wernau, Kelly Bates

DOC VERSION No: 4.0

ISSUE DATE: June 1, 2023

SHEET TITLE

Pathway Details

SHEET: 45 OF 57

B-SIDE JACK COLOR: YELLOW

RECOMMENDED UTP MEDIA: ATLAS-X1 COPPER TRUNKS

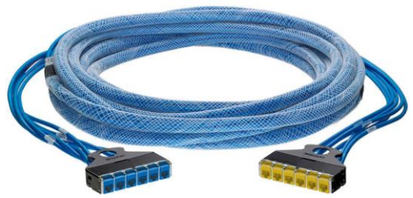
PART NUMBER: CTA-U6AP06LxxxF-CYNXA24N-CYNXA24N-CB01E WHERE XXX IS THE LENGTH IN FT

DESCRIPTION:
CAT 6A UTP CMP CABLE ASSEMBLY; BUNDLE OF 6 BLUE CABLES
BERK-TEK - LANMARK-10G2 (UTP) BRANDED CABLE USED, TIA/EIA WIRING T568B
TESTED TO ANSI/TIA 568.2-D
CUSTOM LABELING, NO PULLING EYE
FIRST END TERMINATION: ATLAS-X1 E2XHD CONNECTOR WITH YELLOW JACK 24 IN. BREAKOUT LENGTH. SECOND END TERMINATION: ATLAS-X1 E2XHD CONNECTOR WITH YELLOW JACK 24 IN. BREAKOUT LENGTH

3 B-SIDE UTP TRUNK CABLES

A-SIDE JACK COLOR: BLUE

B-SIDE JACK COLOR: YELLOW



RECOMMENDED UTP MEDIA: ATLAS-X1 COPPER TRUNKS

PART NUMBER: CTA-U6AP06LxxxF-CLNXA24N-CYNXA24N-CB01E WHERE XXX IS THE LENGTH IN FT

DESCRIPTION:
CAT 6A UTP CMP CABLE ASSEMBLY; BUNDLE OF 6 BLUE CABLES
BERK-TEK - LANMARK-10G2 (UTP) BRANDED CABLE USED, TIA/EIA WIRING T568B
TESTED TO ANSI/TIA 568.2-D
CUSTOM LABELING, NO PULLING EYE
FIRST END TERMINATION: ATLAS-X1 E2XHD CONNECTOR WITH BLUE JACK 24 IN. BREAKOUT LENGTH. SECOND END TERMINATION: ATLAS-X1 E2XHD CONNECTOR WITH YELLOW JACK 24 IN. BREAKOUT LENGTH

4 A-SIDE TO B-SIDE CROSS CONNECT UTP TRUNK CABLES

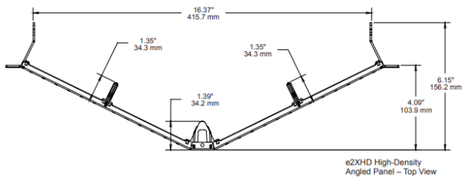
A-SIDE JACK COLOR: BLUE

RECOMMENDED UTP MEDIA: ATLAS-X1 COPPER TRUNKS

PART NUMBER: CTA-U6AP06LxxxF-CLNXA24N-CLNXA24N-CB01E WHERE XXX IS THE LENGTH IN FT

DESCRIPTION:
CAT 6A UTP CMP CABLE ASSEMBLY; BUNDLE OF 6 BLUE CABLES
BERK-TEK - LANMARK-10G2 (UTP) BRANDED CABLE USED, TIA/EIA WIRING T568B
TESTED TO ANSI/TIA 568.2-D
CUSTOM LABELING, NO PULLING EYE
FIRST END TERMINATION: ATLAS-X1 E2XHD CONNECTOR WITH BLUE JACK 24 IN. BREAKOUT LENGTH. SECOND END TERMINATION: ATLAS-X1 E2XHD CONNECTOR WITH BLUE JACK 24 IN. BREAKOUT LENGTH

2 A-SIDE UTP TRUNK CABLES



Angled Panel Cover

e2XHD Angled Panel - 1RU

Rear Cable Manager

RECOMMENDED UTP PATCH PANEL
LEVITON E2XHD-BLK HIGH-DENSITY ANGLED
48 POSITION
ONE RU PER PANEL
WITH REAR CABLE MANAGER
ANGLED PANEL COVERS

1 UTP PATCH PANEL

DEPARTMENT OF VETERANS AFFAIRS

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JOHN WERNAU, KELLY BATES

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SHEET TITLE

UTP MEDIA DETAILS

Recommended MPO-8 standard density fiber cassette: Leviton HDX2 Unity MTP®

Part number: 42NM2-S5C
Description:
HDX Unity MTP® cassette, (0.75 dB) 24-fiber OM4, 3x8-fiber MTP®(male) to 1x24-fiber MTP®(male), 120G to 40G, black latch
universal polarity cassettes

Recommended MPO-24 trunk cable: Opt-X™ unity ultra low loss MTP® trunk cables
Part Number: FTU-FW4024JJxxxF36C36CY-NNBS Where xxx is the length in ft
Description: Fiber trunk unity; 24 fibers, multimode OM4; 24F Sub-Units Opt-X SJP; First end with pulling eye, custom label; Polarity MTP® method B; First end connector: 24F LLMTP 0.35 dB female connector, breakout length of 36 in. into 3.6 mm jacketed fiber, no sstagger; SecondeEndcConnector: 24F LLMTP 0.35 dB female connector,BBreakout length of 36 in. into 3.6 mm jacketed fiber,NNo sStagger;

4 Fiber cassettes and trunk cables (SD MPO-8 breakout)

Recommended LC fiber cassette: Leviton HDX2 Unity MTP®

Part Number: 41LSM4-UNN
Description:
HDX Unity MTP® cassette, (0.35 dB), 12-Fiber OM4, LC Shuttered (Aqua) to 1x12-fiber MTP®, universal polarity, black latch universal polarity cassettes

Recommended MPO-12 trunk cable: Opt-X™ Unity ultra low loss MTP® trunk cables
Part Number: FTU-FW2012LLxxxF36B36BY-NNBC where xxx is the length in ft
Description: fiber trunk unity; 12 fibers, multimode OM4; 12F Sub-Units Opt-X SJP; Overall cable length of 100 ft; First end with pulling eye, custom label; Polarity MTP method B; First end connector: 12F ULMTP 0.20 dB female connector, breakout length of 36 in. into 2 mm jacketed fiber, no stagger; Second end connector: 12F ULMTP 0.20 dB female connector, breakout length of 36 in. into 2 mm jacketed fiber, no stagger;

3 Fiber cassettes and trunk cables (LC MPO-12 breakout)

Recommended LC fiber cassette: Leviton HDX2 Unity MTP®

Part Number: 42LSM2-21C
Description:
HDX2 Unity MTP® cassette, (0.50 dB) 24-fiber OM4, LC shuttered to 1x24-fiber MTP®(male), 120G to 10G, black latch universal polarity cassettes

Recommended MPO-24 trunk cable: Opt-X™ Unity ultra low loss MTP® trunk cables
Part Number: FTU-FW4024JJxxxF36C36CY-NNBS Where xxx is the length in ft
Description: Fiber trunk unity; 24 fibers, multimode OM4; 24F sub-units Opt-X SJP; First end with pulling eye, custom label; Polarity MTP method B; first end connector: 24F LLMTP 0.35 dB female connector, breakout length of 36 in. into 3.6 mm jacketed fiber, no stagger; Second end connector: 24F LLMTP 0.35 dB female connector, breakout length of 36 in. into 3.6 mm jacketed fiber, no stagger;

2 Fiber cassettes and trunk cables (LC MPO-24 breakout)

Recommended LC fiber splice cassette:
Leviton HDX

Part number: SPLCH-12AQ (OM4) / SPLCH-12GN (OS2)
Description:
HDX OM4 LC cassette, (0.15 dB) 12-fiber OM4 to 12x1-fiber LC(UPC)
HDX OS2 LC cassette, (0.24 dB) 12-fiber OS2 to 12x1-fiber LC(APC)

5 Fiber splice cassettes (LC breakout)

Recommended MPO-8 to MPO-8 patch cords:

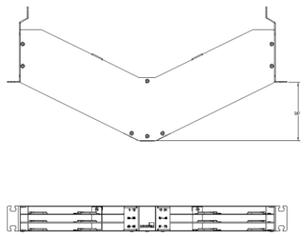
Leviton Opt-X™ Unity ultra low loss array cords
Part number: UL548MM-BxxxF where xxx is the length in ft
Description: Opt-X® Unity 40-100G MTP® array cord (3 mm round cable), multimode (OM4), 8 fibers, ULMTP 8 fiber female to ULMTP 8 fiber female, method B polarity

Recommended LC to LC patch cords:

Leviton premium plus fiber patch cords

- OM4: Part number: PCF-M4PD1RR-xxxxF where xxxx is the length in ft to 0.5 ft. (Example: For 5 ft xxxx=0050, for 3.5 ft xxxx=0035)
  Description: premium plus fiber patch cord, OM4 aqua, plenum, DUP-ZIP 1.6 mm, LC, LC, Ultra Polished Connectors (UPC)
- OS2: Part number: PCF-S2PD1FF-xxxxFAB where xxxx is the length in ft to 0.5 ft. (Example: For 5 ft xxxx=0050, for 3.5 ft xxxx=0035)
  Description: Premium plus fiber patch cord, OS2 yellow, plenum, DUP-ZIP 1.6 mm, LC/APC, LC/APC, A-B polarity (Part number PCF-S2PD1FF-xxxxFAA for A-A polarity)

6 Fiber patch cords



Recommended fiber distribution panel:
Leviton angled Opt-X™ UHDX
144 fiber
One RU

1 Fiber distribution panel

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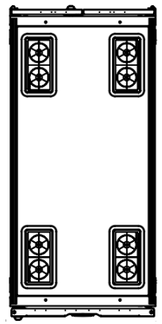
SHEET TITLE

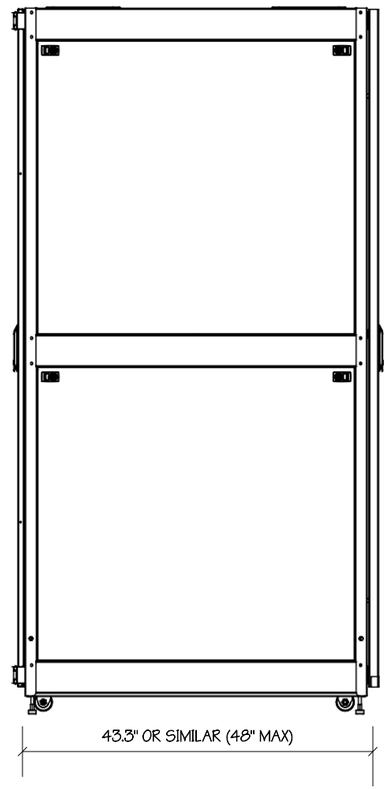
Fiber Media Details

SHEET: 47 OF 57



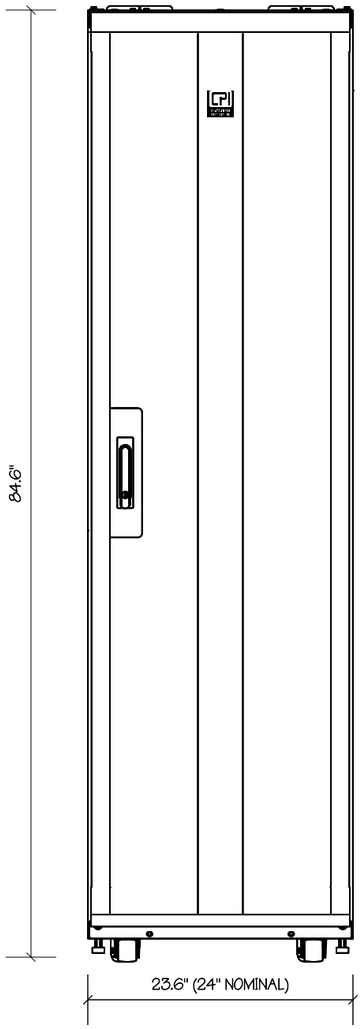
TYPICAL SERVER CABINET TOP VIEW WITH FOUR BRUSHED GROMMET CABLE OPENINGS

4



3 TYPICAL SERVER CABINET SIDE VIEW

Note: SERVER CABINETS MAY ONLY HOUSE SERVER AND STORAGE EQUIPMENT AND SUPPORTING PATCH PANELS. SERVER CABINETS MAY NOT HOUSE TELECOMMUNICATIONS (NETWORK) EQUIPMENT.



2 TYPICAL SERVER CABINET FRONT

CHATSWORTH ZETAFRAME™ CABINET (PN:ZB14-A222A-E1) OR EQUIVALENT

23.6 IN. (600 MM) W X 43.3 IN. (1100 MM)D X 45RMU;GLACIER WHITE;(1) CASTER ONLY KIT;(1) LEVELER ONLY KIT;(4) SQUARE PUNCHED RAILS WITH NO CABLE OPENINGS;(2) SOLID SIDE PANEL;(1) ZETAFRAME PERFORATED METAL DOOR, GLACIER WHITE;(1) SINGLE-POINT KEYED LOCK;(1) DOUBLE PERFORATED METAL DOOR;(1) THREE-POINT KEYED LOCK;(1) TOP PANEL WITH FOUR (4) BRUSH-SEALED CABLE OPENINGS;(1) BOTTOM PANEL WITH TWO (2) BRUSHED-SEALED CABLE OPENINGS ;(1) AIR DAM KIT;(1) STANDARD DUAL 2-PIECE PDU BRACKET KIT;(1) COMMON PARTS KIT, ZF, UL;(1) PACKAGING KIT

Z	1	2	3	-	4	5	6	7	8	-	9	10

1. Height

U	in	mm	
42	79.4	2017	A
45	84.6	2149	B
48	89.9	2283	C
52	96.9	2461	D

Height includes casters.

2. Width

in	mm	
23.6	600	1
27.6	700	2
29.5	750	3
31.5	800	4

3. Depth

in	mm	
31.5	800	1
39.4	1000	2
41.3	1050	3
43.3	1100	4
47.2	1200	5

Frame depth does not include doors. See detailed dimensions on page 6.

4. Doors

None	0
Single Perforated Front/ Double Perforated Rear	A
No Front/ Double Perforated Rear	B

5. Top Panel

0	None
1	Grommet-Sealed
2	Brush-Sealed

6. Side Panel

0	None
1	1 Side
2	2 Sides

7. Bottom Panel

0	None
1	Grommet-Sealed
2	Brush-Sealed

8. Thermal Management

0	None
A	Air Dam
B	Air Dam, Brushed-Sealed Rail

Brush-Sealed Front Rails are not available for 23.6"W (600 mm) cabinets.

9. Color

7	Black
E	Glacier White

10. Shipping

1	Standard Pallet
2	Shock Pallet

Shock Pallet is available for 42U, 45U, 48U cabinet heights and 43.3"D (1100 mm) and 47.2"D (1200 mm) cabinet depths.

1 TYPICAL SERVER CABINET SPECIFICATION

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VERIFIED BY: MICHAEL JULIAN, RCDD; JOHN WERNAU, KELLY BATES

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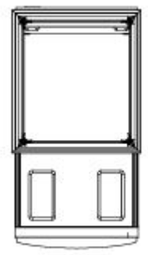
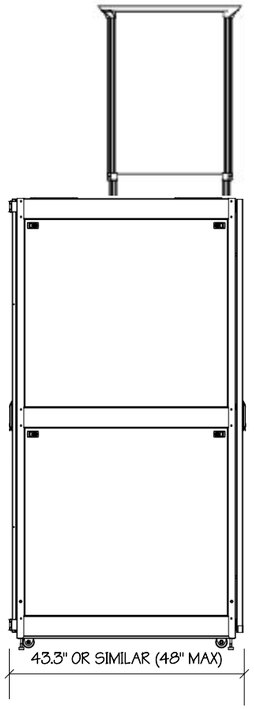
SHEET TITLE

TYPICAL SERVER CABINET

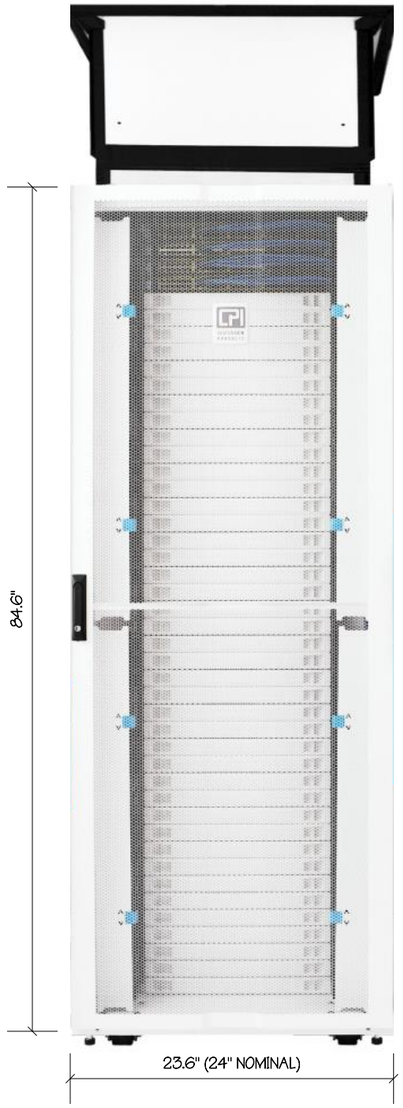


4 TYPICAL ENCLOSURE TOP VIEW WITH VERTICAL EXHAUST DUCT (VED)
NTS



3 TYPICAL ENCLOSURE SIDE VIEW WITH VERTICAL EXHAUST DUCT (VED)
NTS

NOTE: SERVER CABINETS MAY ONLY HOUSE SERVER AND STORAGE EQUIPMENT AND SUPPORTING PATCH PANELS. SERVER CABINETS MAY NOT HOUSE TELECOMMUNICATIONS (NETWORK) EQUIPMENT



2 TYPICAL ENCLOSURE FRONT WITH VERTICAL EXHAUST DUCT (VED)
NTS

CHATSWORTH ZETAFRAME™ CABINET (PN:ZB14-DX22A-E1) OR EQUIVALENT

ZETAFRAME CABINET; 84.6 IN. H X 23.6 IN. W X 43.3 IN. D (2149 MM X 600 MM X 1100 MM); 45 RU; 2 PAIR SQUARE PUNCHED RAILS; PERF FRONT DOOR; SOLID REAR DOOR; VED 20 IN. H-34 IN. H (508 MM – 863 MM); 2 SIDE PANELS; BRUSH BOTTOM PANEL; AIR DAM; STANDARD PALLET; GLACIER WHITE

VED SIZE DEPENDS UPON FINAL ELEVATION DRAWINGS

Z	1	2	3	-	4	5	6	7	8	-	9	10

1. Height

U	in	mm	
42	79.4	2017	A
45	84.6	2149	B
48	89.9	2283	C
52	96.9	2461	D

Height includes casters.

2. Width

in	mm	
23.6	600	1
27.6	700	2
29.5	750	3
31.5	800	4

3. Depth

in	mm	
41.3	1050	3
43.3	1100	4
47.2	1200	5

Frame depth does not include doors. See detailed dimensions on page 6.

4. Doors

Single Perforated Front/ Single Solid Rear	D
No Front/ Single Solid Rear	E

5. Top Panel

A	15-20" H (381 - 508 mm) Vertical Exhaust Duct
B	20-34" H (508 - 863 mm) Vertical Exhaust Duct
C	34-60" H (863 - 1524 mm) Vertical Exhaust Duct
D	15-20" H (381 - 508 mm) Vertical Exhaust Duct, Air Director
E	20-34" H (508 - 863 mm) Vertical Exhaust Duct, Air Director
F	34-60" H (863 - 1524 mm) Vertical Exhaust Duct, Air Director

A half brush seal is included at the lower rear of the duct.

6. Side Panel

0	None
1	1 Side
2	2 Sides

At least one side panel between adjacent cabinets and bottom panel are recommended for optimal thermal performance.

7. Bottom Panel

0	None
1	Grommet-Sealed
2	Brush-Sealed

8. Thermal Management

A	Air Dam
B	Air Dam, Brushed-Sealed Front Rail

Brush-Sealed Front Rails are not available for 23.6"W (600 mm) cabinets.

9. Color

7	Black
E	Glacier White

10. Shipping

1	Standard Pallet

1 TYPICAL ENCLOSURE SPECIFICATION
NTS

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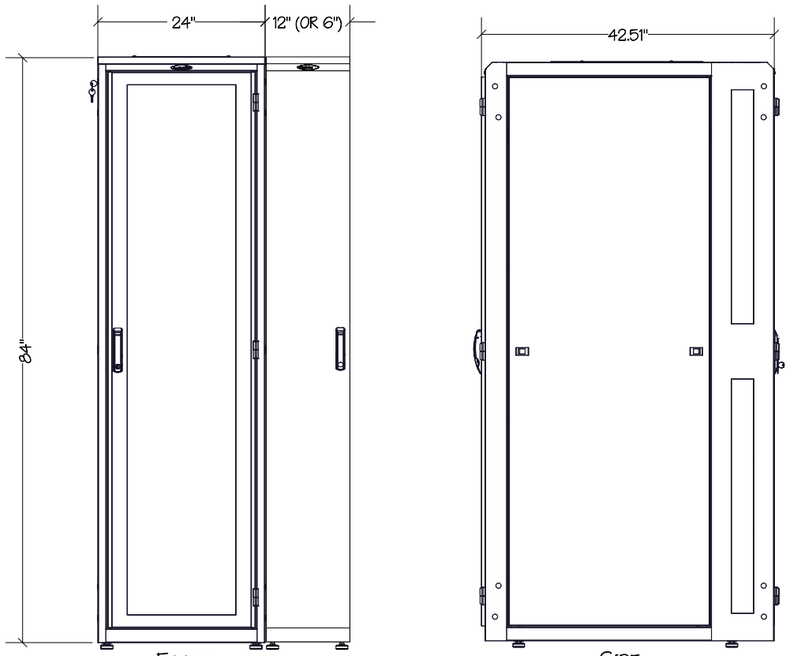
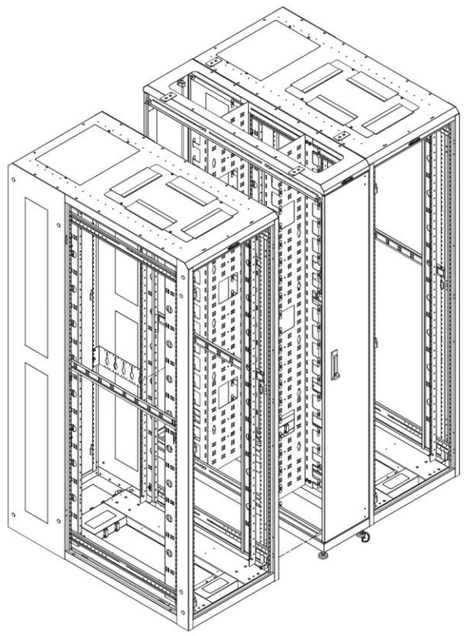
SHEET TITLE

TYPICAL SERVER CABINET WITH VERTICAL EXHAUST DUCT

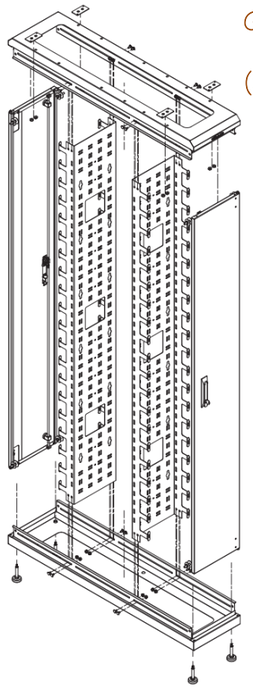


4 TYPICAL NETWORK CABINET (WITH SIDECAR) FRONT AND SIDE VIEW DIMENSIONS



3 TYPICAL NETWORK CABINET ISOMETRIC VIEW

5 PHOTOGRAPHIC ISOMETRIC VIEW OF CABINET WITH SIDECARS



GREAT LAKES CASE AND CABINET CABLE MANAGEMENT SIDECAR (SC128442 OR SC68442) OR EQUIVALENT

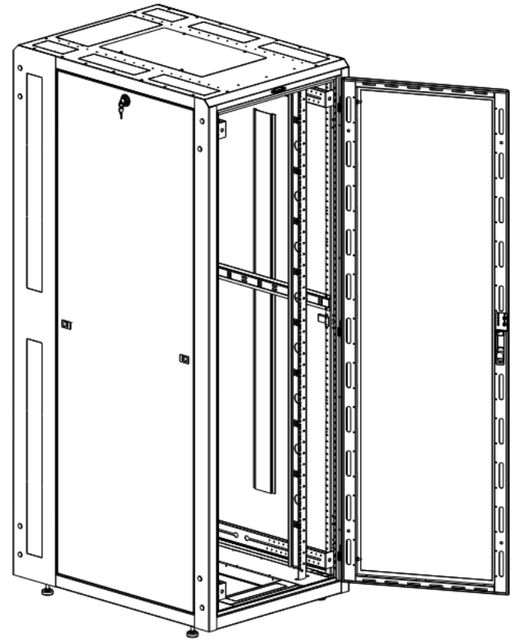
- 84 IN. H X 6 IN. W (OR 12 IN. W) X 42 IN. D
- INCLUDES DEPTH ADJUSTABLE TROUGHS
- DUAL-HINGE FRONT AND REAR DOORS
- USE WITH ES CABINETS

2 TYPICAL CABLE MANAGEMENT SIDECAR

NOTE: NETWORK CABINETS ARE PURPOSE BUILT TO PROVIDE AMPLE ROOM FOR CABLING NEEDS OF THE HORIZONTAL DISTRIBUTION AREA AND THE MAIN DISTRIBUTION AREA AND MAY BE USED IN LIEU OF TELECOMMUNICATION CHANNEL RACKS FOR THIS PURPOSE. TELECOMMUNICATION CABINETS MAY NOT BE USED IN TELECOMMUNICATIONS ROOMS.

GREAT LAKES CASE AND CABINET ES CABINET (GL840ES-2442-W-MSS) OR EQUIVALENT

- 84 IN. H x 24 IN. W x 42 IN. D
- 44 RU
- 40 IN. USABLE DEPTH
- 35 IN. MAX. RAIL SPACING
- 3300 LB. WEIGHT CAPACITY
- WINTER CHITE
- INCLUDES: FRAME WITH LEVELERS (2.5 IN. H) AND TWO PAIRS OF PDU BRACKETS; MESH CONTOUR FRONT DOOR; SPLIT MESH REAR DOOR; SOLID (2) SIDE PANEL; 3/8 IN. SQ. (M6) MOUNTING RAILS WITH RACK MOUNT HARDWARE; SOLID TOP PANEL
- UL2416
- SHIPPING DIMS: 89 IN. H x 32 IN. W x 45 IN. D; 416 LB.



1 TYPICAL NETWORK CABINET SPECIFICATION

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VERIFIED BY:	MICHAEL JULIAN, RCDD JOHN WERNAU, KELLY BATES
DOC VERSION No:	4.0
ISSUE DATE:	June 1, 2023

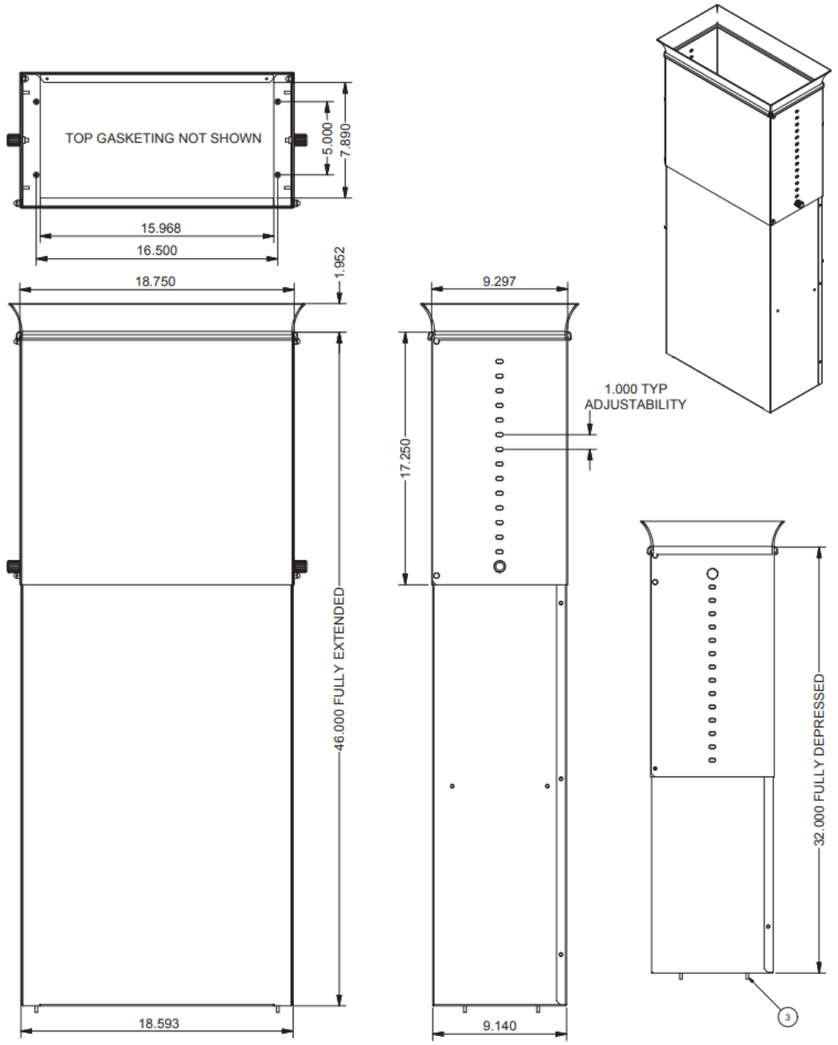
SHEET TITLE

TYPICAL NETWORK CABINET

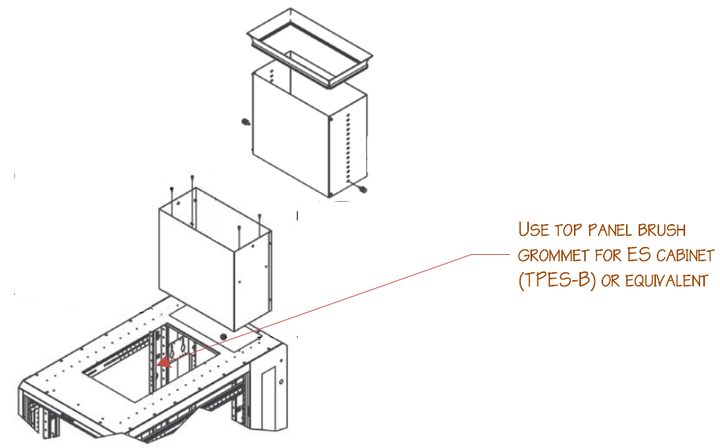
NOTE: NETWORK CABINETS ARE PURPOSE BUILT TO PROVIDE AMPLE ROOM FOR CABLING NEEDS OF THE HORIZONTAL DISTRIBUTION AREA AND THE MAIN DISTRIBUTION AREA AND MAY BE USED IN LIEU OF TELECOMMUNICATION CHANNEL RACKS FOR THIS PURPOSE. TELECOMMUNICATION CABINETS MAY NOT BE USED IN TELECOMMUNICATION ROOMS.

GREAT LAKES CASE AND CABINETS EXHAUST CHIMNEY OR EQUIVALENT

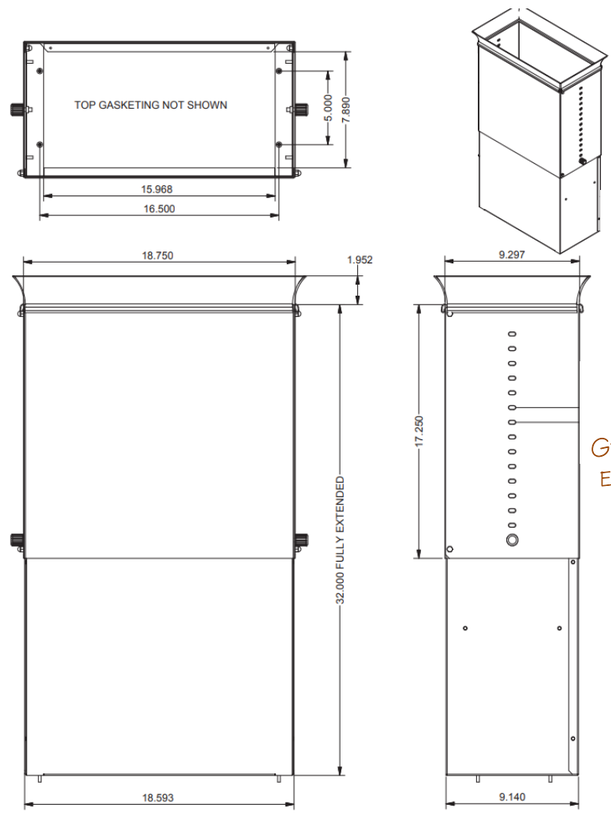
GL-EC-42-3246 CHIMNEY, 32-46 IN. 42 IN. D ES SIZES



2 TYPICAL RACK WITH VERTICAL EXHAUST DUCT FRONT AND SIDE VIEW DIMENSIONS



3 TYPICAL RACK WITH VERTICAL EXHAUST DUCT ISOMETRIC VIEW



GREAT LAKES CASE AND CABINETS EXHAUST CHIMNEY PR EQUIVALENT

GL-EC-42-1832 CHIMNEY, 18-32 IN. 42 IN. D ES SIZES

1 TYPICAL RACK WITH VERTICAL EXHAUST DUCT FRONT AND SIDE VIEW DIMENSIONS

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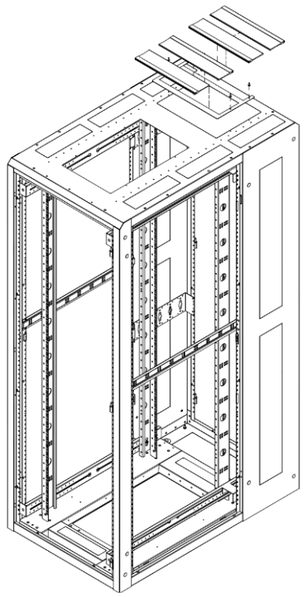
SHEET TITLE

TYPICAL NETWORK CABINET WITH VERTICAL EXHAUST DUCT

BRUSH GROMMET CHIMNEY KNOCKOUT



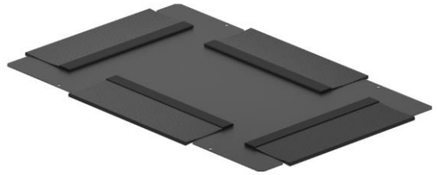
BRUSH GROMMET (AND EDGE GROMMET) TO COVER CABLE PASS-THRU KNOCKOUTS

USE FOR TOP CHIMNEY KNOCKOUT ON 42 IN. D ES CABINETS WHEN VERTICAL EXHAUST DUCT IS NOT USED

4 TYPICAL BRUSH GROMETS – CHIMNEY KNOCKOUT

TOP PANEL BRUSH GROMMET FOR ES CABINETS (TPES-B)

OR EQUIVALENT

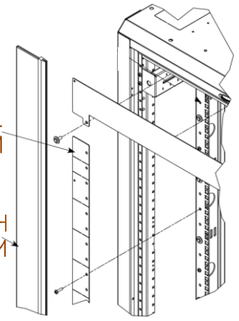


6 TYPICAL TOP PANEL COVER WITH BRUSH GROMMETS

BRUSH GROMMET RAIL KIT

BGRK-84-24
OR EQUIVALENT

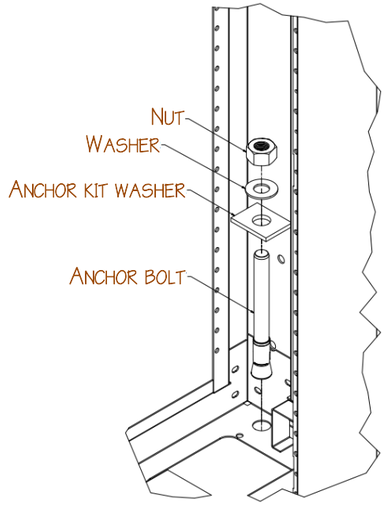
84 IN. H x 24 IN. W ES SIZES



5 TYPICAL BRUSH GROMMETS – FRONT RAILS

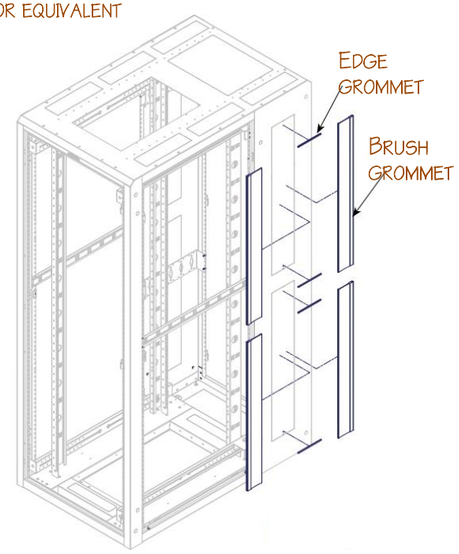
SEISMIC ANCHOR KIT INCLUDES 4 TORQUE CONTROLLED EXPANSION ANCHORS

AK101
OR EQUIVALENT



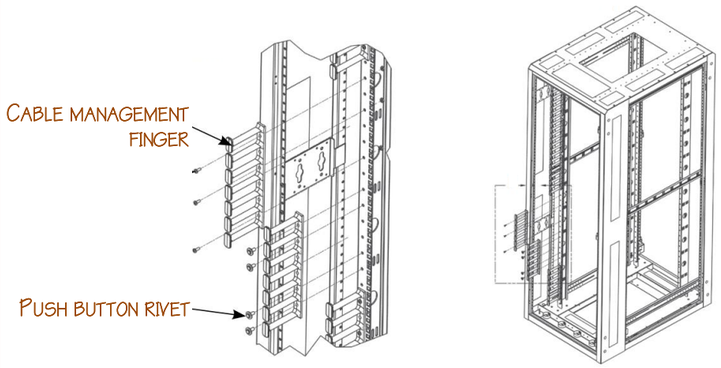
7 TYPICAL SEISMIC ANCHOR KIT

BRUSH GROMMET FOR CABLE PASS THRU (BGS-84) OR EQUIVALENT



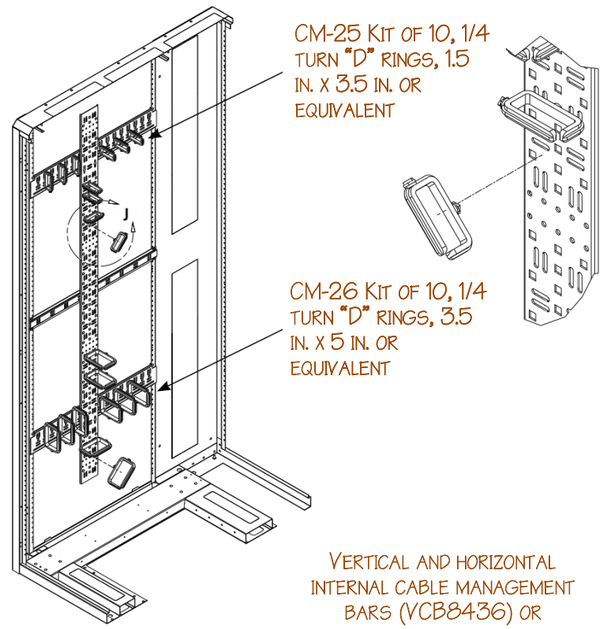
3 TYPICAL BRUSH GROMMETS – SIDE WALL PASS THRU

CABLE MANAGEMENT FINGERS



CM-47 4 IN. X 7 RMU, SINGLE FINGER SECTION
ESC-K12 4 IN. x 7 RMU, SET OF 12 FINGER SECTIONS
CM-77 7 IN. X 7 RMU, SINGLE FINGER SECTION
ESC-K12-7 7 IN. x 7 RMU, SET OF 12 FINGER SECTIONS
OR EQUIVALENT

2 TYPICAL CABLE MANAGEMENT FINGERS



VERTICAL AND HORIZONTAL INTERNAL CABLE MANAGEMENT BARS (VCB8436) OR EQUIVALENT

1 TYPICAL CABLE MANAGEMENT BARS

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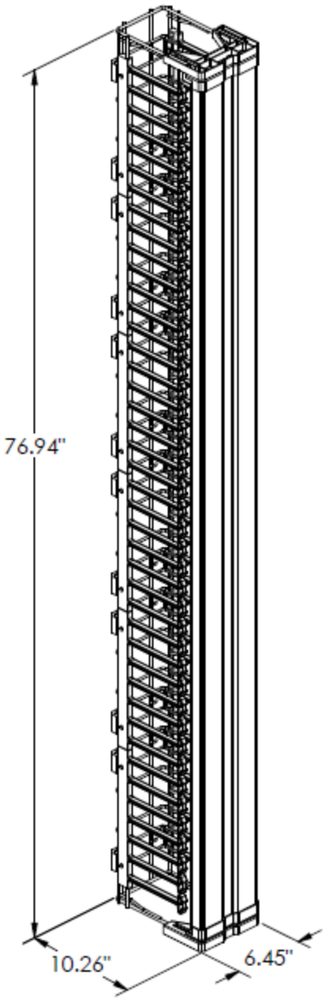
SHEET TITLE

TYPICAL NETWORK CABINET ACCESSORIES



P/N: OR-MM20VMD706 (OR EQUIVALENT)

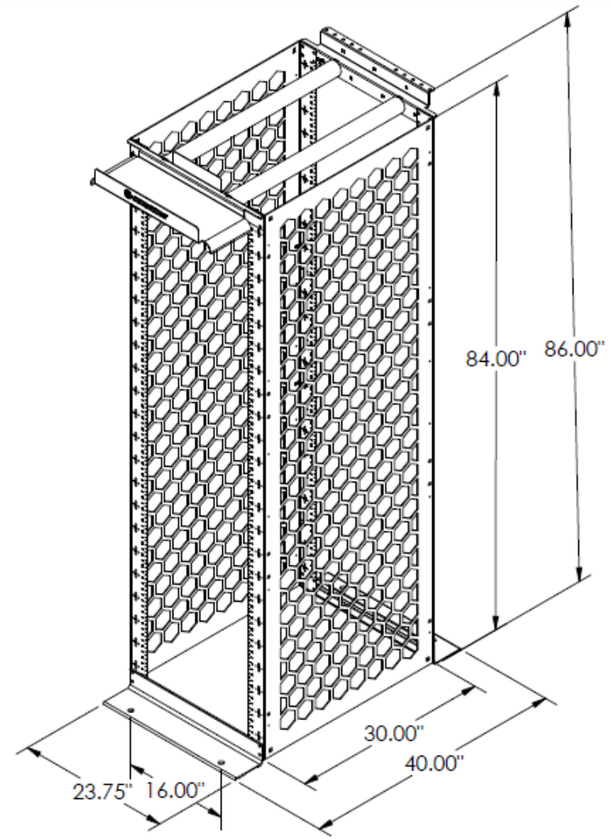
MM20 VERTICAL CABLE MANAGEMENT "CAGE", WITH DOOR, 6.45 IN. X 10.26 IN. X 76.94 IN. WHITE

CAPACITY: 350 CATEGORY 6A PATCH CORDS OR 245 CATEGORY 6A PATCH CORDS

LARGER VCM AUTHORIZED IN ACCORDANCE WITH CABLING REQUIREMENT

3 6 IN. WIDE VERTICAL CABLE MANAGEMENT

NOTE: TELECOMMUNICATION CHANNEL RACKS ARE REQUIRED IN ALL TELECOMMUNICATION ROOMS. TELECOMMUNICATION CHANNEL RACKS OR TELECOMMUNICATION CABINETS MAY BE USED IN THE HORIZONTAL AND MAIN DISTRIBUTION AREAS.

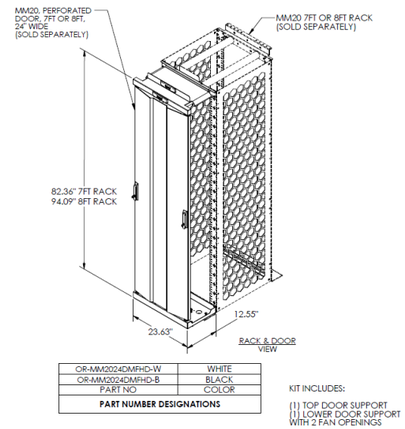


P/N: OR-MM2073038-W (OR EQUIVALENT)

MIGHTY MO 20 CABLE MANAGEMENT RACK
30 IN. CHANNEL DEPTH, 7 FT HIGH, WHITE FINISH OR EQUIVALENT

DIMENSIONS:
USABLE HEIGHT: 45 RU
DEPTH (US): 30 IN.
HEIGHT (US): 7 FT
WIDTH (US): 23.75 IN.
STATIC LOAD CAPACITY: 2000 LB
SQUARE HOLE

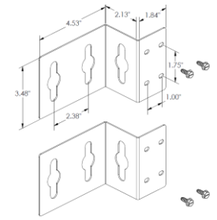
2 TYPICAL RACK DIMENSIONS AND SPECIFICATIONS



OR-MM2024DMFHD-W	WHITE
OR-MM2024DMFHD-B	BLACK
PART NO	COLOR
PART NUMBER DESIGNATIONS	

KIT INCLUDES:
(1) TOP DOOR SUPPORT
(1) LOWER DOOR SUPPORT WITH 2 FAN OPENINGS

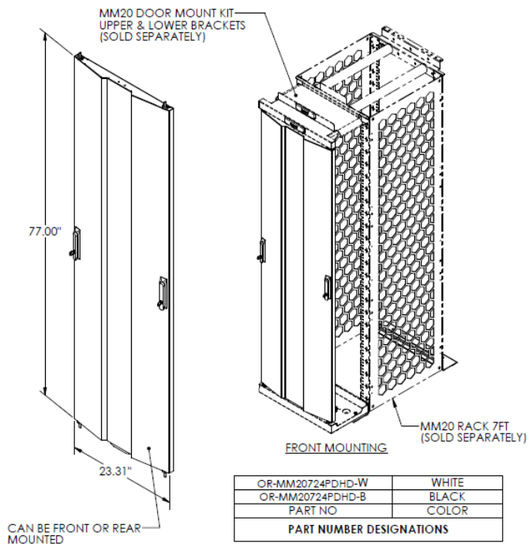
4 SECURITY DOOR FRONT MOUNTAING HARDWARE (OR-MM2024DMFHD-W)



PDU MOUNTING BRAACKET KIT (TWO KITS PER RACK)
P/N: OR-MM20PDUMB1D2W-W

6

5 SECURITY DOOR REAR MOUNTING HARDWARE (OR-MM2024DMRHD-W)



OR-MM20724PDHD-W	WHITE
OR-MM20724PDHD-B	BLACK
PART NO	COLOR
PART NUMBER DESIGNATIONS	

1 FRONT AND REAR HEAVY DUTY PERFORATED SECURITY DOOR (OR-MM20724PDHD-W) (OPTIONAL)

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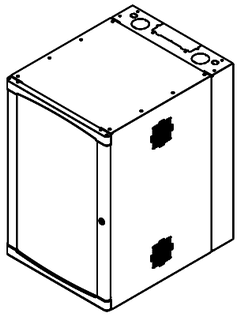
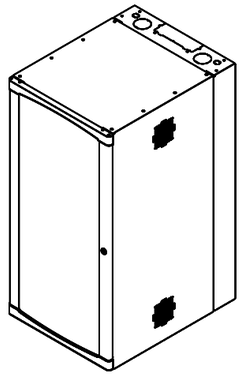
TYPICAL NETWORK RACK





SPECIFICATIONS

DESCRIPTION:
WALL-MOUNT ENCLOSURE WITH LOCKABLE FRONT DOOR AND SWING-OUT REAR ACCESS TO EQUIPMENT. TEMPERED GLASS FRONT DOOR

26 RU:
CUBE-IT WALL-MOUNT CABINET; GEN 3; 48 IN. H X 24 IN. W X 30 IN. D (1220 MM X 610 MM X 760 MM); 26 RU; #12-24 TAPPED RAILS; TEMPERED GLASS ROOR; GLACIER QHITE. 12419-E48 CUBE-IT OR EQUIVALENT

12 RU:
CUBE-IT WALL-MOUNT CABINET; GEN 3; 24 IN. H X 24 IN. W X 30 IN. D (610 MM X 610 MM X 760 MM); 12 RU; #12-24 TAPPED RAILS; TEMPERED GLASS DOOR; GLACIER WHITE. 12419-E24 CUBE-IT OR EQUIVALENT

USE:
FOR INDOOR USE ONLY, IN ENVIRONMENTALLY CONTROLLED AREAS; MAY NOT BE USED OUTDOORS, IN HARSH ENVIRONMENTS, OR IN AIR-HANDLING SPACES
SIZE:
HEIGHT: 48 IN. (1220 MM)
WIDTH: 24 IN. (610 MM); 19 IN. EIA RACK-MOUNT
DEPTH: 30 IN. (760 MM)
INTERIOR:
HEIGHT: 26 RU
WIDTH: 19 IN. EIA RACK-MOUNT
THREADED #12-24 EQUIPMENT MOUNTING HOLES
19 IN. W, EIA-310-D COMPLIANT
FAN ASSEMBLIES WITH FILTER KITS

4 SPECIFICATIONS

Cable Port Brush Kit for CUBE-iT Wall-Mount Cabinet

- Optional cover when rectangular knockout on the rear panel is removed
- Seals opening around cables with brush seal
- Sold in pairs

Part Number	Description	Shipping Weight lb (kg)
25190-000	0.8"H x 10.6"W x 2.9"D (20 mm x 268 mm x 74 mm)	2 (0.9)

3 BRUSH KIT (ONE PER CABINET)

Equipment Mounting Rail Kit for CUBE-iT Wall-Mount Cabinet

- Use with equipment that needs front and rear support
- Sold in pairs
- Aluminum material

Part Number	Description	Shipping Weight lb (kg)
12787-524	12U; For 24"H (610 mm) cabinet	4 (1.8)
12787-536	19U; For 36"H (910 mm) cabinet	6 (2.7)
12787-548	26U; For 48"H (1220 mm) cabinet	8 (3.6)

9 FRONT AND REAR RAIL KIT

Low-Decibel Dual-Fan and Filter Kit for CUBE-iT Wall-Mount Cabinet

- Pressurizes interior of the cabinet, forcing warm air out of open vents
- Assembly includes 2 fans and 2 filters
- Noise Level: 31 dB (measured at 3' (1 m) distance)
- Recommended placement on bottom right and left sides of the cabinet
- Airflow: 120 CFM (204 CMH)
- 50/16 Hz
- 6'L (1.8 m) NEMA 5-15P/6-15P Power Cord

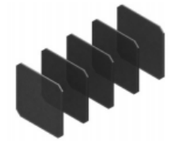
Part Number	Description	Shipping Weight lb (kg)
40975-001	115 Volt, 5-15P power cord	4 (1.8)
40975-002	230 Volt, 6-15P Power cord	4 (1.8)

7 FAN KIT QTY 1 PER CABINET

Replacement Filter Kit for CUBE-iT Wall-Mount Cabinet

- Compatible with Low-Decibel Dual-Fan and Standard Fan kits

Part Number	Description	Shipping Weight lb (kg)
40973-001	Pack of 5	2 (0.9)



LED Light Kit for CUBE-iT Cabinets

- Attaches to the bottom, top or side of CUBE-iT Cabinets
- Toggle switch, 4W LED light
- Detachable, 120 VAC with NEMA 1-15P Power Cord

Part Number	Description	Shipping Weight lb (kg)
12803-701	LED Light Kit, 4W, 120 Vac	2 (0.9)

8 FAN FILTER KIT AND LIGHT KIT(ONE PER CABINET).

- FOR USE WITH SMALL EQUIPMENT SUCH AS MODEMS, ROUTERS AND FIBER MODULES IN 19 IN. EIA RACKS
- 1 RU; INCLUDES MULTIPLES TIE-DOWN POINTS
- SUPPORTS UP TO 20 LB (9.1 KG) OF EQUIPMENT

5 SHELF (TWO PER CABINET)

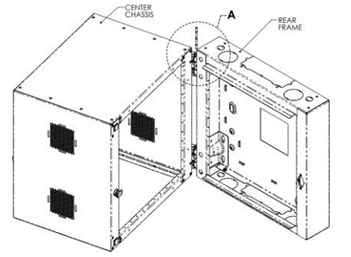
Vertical Cabling Section for CUBE-iT Wall-Mount Cabinet

- Attaches to the outside edge of equipment mounting rails
- 4U height; openings align with rack-mount unit spaces on equipment mounting rails
- Sold in pairs
- Order additional kits as-needed per cable management requirements

Part Number	Description	Shipping Weight lb (kg)
40970-704	4U, 7"H x 0.5"D (178 mm x 13 mm)	3 (1.4)
40970-707	7U, 12.3"H x 0.5"D (311 mm x 13 mm)	3 (1.4)
40970-711	11U, 19.3"H x 0.5"D (489 mm x 13 mm)	4 (1.8)

Color is black.

2 VERTICAL CABLE MANAGEMENT. TWO KITS FOR 26 RU TE. ONE KIT FOR 12 RU TE



LOAD CAPACITY (per UL2416): 300 lb (163kg)

6 REAR HINGE AND PANEL

Ground Jumpers

- Provide common bonding from equipment rack or cabinet to halo conductor
- Available individually or in packages of 10
- Constructed of UL Listed components

Part Number	Description	Shipping Weight lb (kg)
40159-009	9' (2.7 m) Ground Jumper, 1 Each	2 (0.9)
40159-019	9' (2.7 m) Ground Jumper, 10 Each	20 (1.9)

1 REQUIRED GROUND JUMPERS

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SHEET TITLE
TYPICAL TE CABINET

30 A THREE-PHASE ZONE PDU BASE UNIT – REAR CIRCUITS WITH FOUR L21-20R AND SIX NEMA 5-20 OUTLETS AND TWO 10 FT POWER CORDS TERMINATING IN L21-30P
ZONIT ZPDS-208V30A-L21-4L21-20R-CR OR EQUIVALENT

ZONE PDU INPUTS
REQUIRE TWO L21-30RS

NOTE: THE CORRECT SPECIFICATION FOR THE ZONE PDU IS TO ENERGIZE IT FROM TWO INDEPENDENT POWER SOURCES. EACH INPUT WILL USE IDENTICAL SPECS: WYE (5-WIRE), 208 V, 30 A, THREE-PHASE, TERMINATING IN A NEMA L21-30R LOCKING RECEPTACLE. THE NEUTRAL CONDUCTOR SHOULD BE UPSIZED ONE GAUGE TO MATCH THE UPSIZED NEUTRAL CONDUCTORS IN THE ZONE PDU UNITS. THE NEUTRAL "UPSIZING" SHOULD IDEALLY BE CONTINUED IN THE POWER DISTRIBUTION SYSTEM BACK TO THE UPS OR TRANSFORMER WINDING POLE. THIS INCREASES THE EFFICIENCY OF THE POWER DISTRIBUTION SYSTEM AND SUPPRESSES HARMONICS IN THE SYSTEM.

4 TYPICAL 30A ZONE PDU

60 A THREE-PHASE ZONE PDU BASE UNIT - REAR SIX L21-20R OUTPUT RECEPTACLES WITH 10 FT POWER CORDS TERMINATING IN HARDWIRE BOX
ZONIT ZPDS-208V60A-HW-6L21-20R OR EQUIVALENT

SPECIFICATIONS:
RATED INPUT VOLTAGE: 208 V THREE-PHASE; AMPERAGE: 60 A
INPUT CORD TERMINATION: HARDWIRE BOX
OUTPUT RECEPTACLES: SIX L21-20R
OUTPUT BRANCH CIRCUIT PROTECTION:
INDIVIDUAL 20 A CIRCUIT BREAKERS PROTECT EACH OUTPUT PHASE OF EACH OUTPUT RECEPTACLE

NOTE: THE CORRECT SPECIFICATION FOR THE ZONE PDU IS TO ENERGIZE IT FROM TWO INDEPENDENT POWER SOURCES. EACH INPUT WILL USE IDENTICAL SPECS: WYE (5-WIRE), 208 V, 60 A, THREE-PHASE, TERMINATING IN A JUNCTION BOX TO BE HARDWIRED INTO THE ZONE PDU. THE NEUTRAL CONDUCTOR SHOULD BE UPSIZED ONE GAUGE TO MATCH THE UPSIZED NEUTRAL CONDUCTORS IN THE ZONE PDU UNITS. THE NEUTRAL "UPSIZING" SHOULD IDEALLY BE CONTINUED IN THE POWER DISTRIBUTION SYSTEM BACK TO THE UPS OR TRANSFORMER WINDING POLE. THIS INCREASES THE EFFICIENCY OF THE POWER DISTRIBUTION SYSTEM AND SUPPRESSES HARMONICS IN THE SYSTEM.

5 TYPICAL 60A ZONE PDU

APC AP9560 OR EQUIVALENT RACK MOUNT PDU; L5-30 PLUG; (10) NEMA 5-20 OUTLETS; 1 RU; TWO PER ENCLOSURE; ONE ENERGIZED BY UPS; ONE ENERGIZED BY WALL OUTLET

REQUIRES ONE L5-30R

NOTE: USED IN TELECOMMUNICATIONS ENCLOSURES ONLY

3 120V RACK PDU FOR TEs

APC AP8861 RPDU OR EQUIVALENT; RACK PDU 2G, METERED; L21-20 PLUG; THREE-PHASE; 120/208 V INPUT; 20 A; ZERO U; 5.7 KW, 208V, (36) C13 & (6) C19 & (2) 5-20 OUTLETS; FOR USE IN TELECOMMUNICATIONS ROOMS AND LOCATIONS WITH LEGACY 110 V ONLY EQUIPMENT

REQUIRES ONE L21-20R

NOTE: USED IN TELECOMMUNICATIONS ROOMS AND ENTRANCE ROOMS WHERE 110 V DISTRIBUTION USING NEMA 5-15 OR NEMA 5-20 RECEPTACLES ARE REQUIRED IN ADDITION TO THE STANDARD 208 V

2 208V RACK PDU FOR TRS AND ENTRANCE ROOMS

CHATSWORTH ECONNECT PDU OR EQUIVALENT; VERTICAL; MONITORED; L21-20 PLUG; THREE-PHASE; 120/208 V INPUT; 20 A; (30) C13 (6) C19 OUTLETS; 208 V OUTPUT; 3 X 2P 20 A; LCD; ETHERNET, USB, AND ENVIRONMENTAL SENSOR PORTS; IP AND SERIAL MONITORING; IP CONSOLIDATION (PDU LINKING); TOOL-LESS MOUNTING; 70.5 IN. H (1791 MM) X 2.2 IN. W (56 MM) X 2.2 IN. D (56 MM)

REQUIRES ONE L21-20R

1 208V RACK PDU FOR COMPUTER ROOMS

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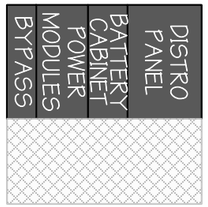
SHEET TITLE

TYPICAL RACK AND ZONE PDUS

SHEET: 55 OF 57

EATON 93PM (93PM-L FOR 208 V MODEL)



- CLEARANCE
  - FRONT: 36 IN.
  - BACK (TOP EXHAUST): 0 IN.
  - BACK (REAR EXHAUST): 10 IN.
- BATTERY CABINET
  - 16.7 IN. FOR SMALL
  - 34.2 IN. FOR LARGE
- DISTRIBUTION PANEL

31.3 IN.

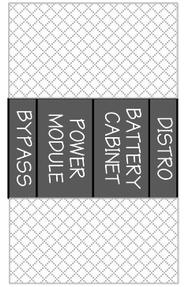
- BYPASS
  - 14.69 IN. FOR 480 V
  - 12.45 IN. FOR 208 V
- POWER MODULES
  - 480 V
    - 30-150 KW – 22 IN.
    - 160-200 KW – 32 IN.
  - 208 V
    - 10-120 KW – 22 IN.
    - 10-160 KW – 34.4 IN.

10-200 KW – 43.3 IN

10-200 KW MODULAR UPS
FRAME COMMENSURATE WITH COMPUTER ROOM ULTIMATE CAPACITY; POWER MODULES BUILT OUT TO N+1 INTERNAL REDUNDANCY BASED ON CRITICAL LOAD
ONLY REQUIRES FRONT CLEARANCE

3 MODULAR UPS OPTION FOR COMPUTER ROOMS

APC SYMMETRA PX 10-100



- CLEARANCE
  - FRONT: 36 IN.
  - REAR: 40 IN.
- BATTERY CABINET
  - 23.62 IN.
- DISTRIBUTION PANEL
  - 11.8 IN.
- BYPASS
  - 11.8 IN.
- POWER MODULES

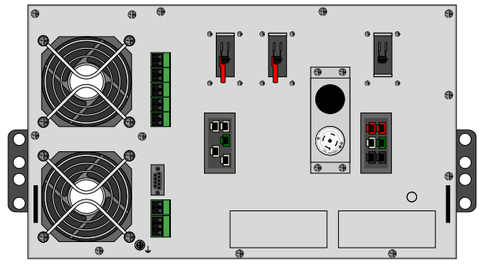
23.62 IN.

10-100 KW MODULAR UPS
FRAME COMMENSURATE WITH COMPUTER ROOM ULTIMATE CAPACITY; POWER MODULES BUILT OUT TO N+1 INTERNAL REDUNDANCY BASED ON CRITICAL LOAD
REQUIRES FRONT AND REAR CLEARANCE

4 MODULAR UPS OPTION SFOR COMPUTER ROOMS

RACK MOUNT UPS. L5-30 INPUT. L5-30 OUTPUT.
CAPACITY NTE 2880 VA. 2 RU. METERED
(APC SMX3000RMLV2U OR EQUIVALENT)

2 RACK-MOUNT 2.88 KW UPS FOR TES



RACK MOUNT UPS.
CAPACITY: 5 KW (EXTERNAL BATTERY MODULES AVAILABLE)
INPUT VOLTAGE: 208 V
INPUT CONNECTION: L21-20P, THREE-PHASE, FOUR-WIRE + GROUND
OUTPUT CONNECTION: L21-20R
SIZE: 6 RU, 19 IN. RACK-MOUNTABLE
RUNTIME: 16.5 MINUTES AT 50% LOAD
(EATON BLADEUPS ZC0517700110000
OR EQUIVALENT)

1 RACK-MOUNT 5 KW UPS FOR TRS AND ENTRANCE ROOMS

DEPARTMENT OF VETERANS AFFAIRS

OFFICE OF INFORMATION AND TECHNOLOGY

INFRASTRUCTURE OPERATIONS - APPLICATION HOSTING, CLOUD AND EDGE SOLUTIONS

ENTERPRISE DATA CENTER AND INFRASTRUCTURE ENGINEERING

EDICT
ENTERPRISE DATA CENTER INFRASTRUCTURE COLLABORATION TEAM

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OIT DESIGN GUIDE TEMPLATES

PROJECT NO:
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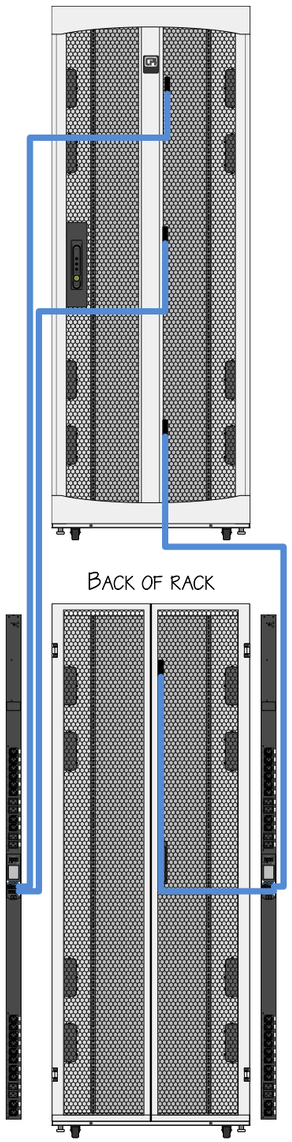
TYPICAL UPSS



2 TEMPERATURE AND HUMIDITY SENSOR LOCATIONS AND CONNECTIONS

CHATSWORTH 14665-001
USB TEMPERATURE AND
HUMIDITY SENSOR (OR
EQUIVALENT)

1 TEMPERATURE AND HUMIDITY SENSOR

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SHEET TITLE

TYPICAL TEMPERATURE AND HUMIDITY MONITORING

SHEET: 57 OF 57