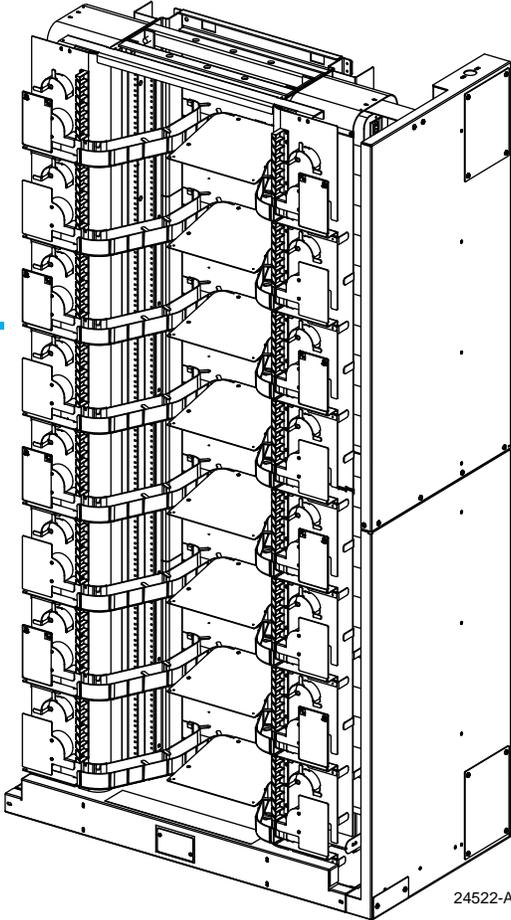


Quareo Cross-Connect Solution

User Manual



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REVISION HISTORY

ISSUE	DATE	REASON FOR CHANGE
1	6/2011	Original.
2	9/2011	Add trunk cable tie information.
3	1/2012	Update kit list and transition trough installation
4	July 2016	Reformatted for CommScope.

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TABLE OF CONTENTS

Content	Page
ABOUT THIS MANUAL	v
RELATED PUBLICATIONS	v
ADMONISHMENTS	v
GENERAL SAFETY PRECAUTIONS	v
1 INTRODUCTION	1
1.1 Specifications	1
1.2 Accessories	3
2 PLANNING	3
2.1 Required Tools and Materials	4
3 INSTALLATION OVERVIEW	4
3.1 Unpacking and Inspection	5
3.2 Positioning Overhead or Underfloor Guideway System	7
4 INSTALLATION	7
4.1 Rack Installation	8
4.2 Tower Installation	11
4.2.1 Top Front and Rear Support Installation	13
4.2.2 Optional Ground Bar Installation	13
4.2.3 Front Guard Box Frame Installation	14
4.2.4 Rear Guard Box Frame Installation	14
4.2.5 Rear Cable Trough Installation	15
4.2.6 Ramp Installation	17
4.2.7 Front Guard Box Cover Installation	18
4.2.8 Rear Trough Splice Installation	18
4.2.9 Rear Guard Box Cover Installation	19
4.3 End Guard Installation	20
4.4 Grounding	24
5 TRUNK CABLE ROUTING	24
5.1 Overhead Trunk Cable Routing Procedure	25
5.2 Underfloor Trunk Cable Routing Procedure	26
6 FIBER CABLE INSTALLATION	28
6.1 Cable Routing Rules	28
6.2 Connecting Cross-Connect Fiber Cable to Network Chassis	28
7 TECHNICAL ASSISTANCE	32

TABLE OF CONTENTS

Content	Page
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ABOUT THIS MANUAL

This manual describes the Quareo Cross-Connect Solution installation process. The cross-connect solution consists of a left and right towers, isolation pads, transition troughs, cable troughs, end guards, and guard boxes.

RELATED PUBLICATIONS

Listed below are related manuals and their publication numbers. Copies of these publications can be ordered by contacting the CommScope Technical Assistance Center at 1.800.830.5056, or by e-mail to TAC.Americas@commscope.com.

Title/Description	Publication Number
Optical Fiber Connector Wet and Dry Cleaning Instructions	ADCP-92-159
Multifiber-Push On (MPO) Assembly Connector Cleaning Instructions	ADCP-96-150

ADMONISHMENTS

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.



Danger: *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Warning: *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Caution: *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

GENERAL SAFETY PRECAUTIONS



Warning: *To prevent electrical shock, never install panel in a wet location or during a lightning storm. When installing or modifying telephone lines, disconnect lines at the network interface before working with uninsulated lines or terminals. Disconnect both input power feeds before working with uninsulated lines or terminals.*



Warning: *Before making any connections to the panels/chassis, verify that both input power sources are off (fuse removed at the fuse and alarm panel or plug removed).*



Danger: *Infrared radiation is invisible and can seriously damage the retina of the eye. Do not look into the optical connector of an operational transmitter, or into the end of an active fiber. A clean, protective cap or hood **MUST** be immediately placed over any radiating connector or optical fiber to avoid exposure to potentially dangerous amounts of radiation. This practice also helps prevent contamination of connectors and adapters. Do not assume laser power is turned off or the fiber is disconnected at the other end.*



Caution: *A tower weighs approximately 90 lbs. (41 kilos.). Do not attempt to lift or move the towers without using appropriate equipment.*

1 INTRODUCTION

Management of data center cables has a direct impact on network reliability, performance and cost. It impacts network maintenance and operations, as well as the ability to reconfigure, expand the network and implement new services.

A Quareo Cross-Connect Solution delivers the crucial elements of fiber cable management: connector and cable accessibility, bend radius protection, cable routing paths and physical protection. If these elements are executed correctly, the network can deliver its full competitive advantages.

- **Connector and Cable Access:** Allowing easy access to connectors and installed fibers is critical in maintaining proper bend radius protection. Cross-connect solutions ensure that any fiber can be installed or removed without inducing a macrobend on an adjacent fiber. Accessibility is most critical during network reconfiguration operations and directly impacts operation costs and network reliability.
- **Bend Radius Protection:** Simply put, optimal signal flow ensures network performance and reliability. The Quareo Cross-Connect Solution ensures that the proper bend radius is maintained to prevent attenuation and deliver the highest possible performance as well as long-term reliability.
- **Physical Protection:** All fibers should be protected throughout the network from accidental damage by technicians and equipment. Fibers routed between pieces of equipment without proper protection are susceptible to damage, which can critically impact network reliability. TE's robust fiber cable management technology ensures that every fiber is well protected and designed to withstand daily wear and tear.
- **Intuitive Cable Routing:** It is essential to be proactive when it comes to cable handling. Vague routing paths create congestion that reduces density, confuses the next technician and strands capacity with haphazard use of precious space.

1.1 Specifications

Specifications for the Quareo Cross-Connect Solution are shown in [Table 1](#).

Table 1. Quareo Cross-Connect Solution Specifications

PARAMETER	SPECIFICATION	REMARKS
Physical		
Tower Dimensions (H × W × D)	2132 mm × 1034 mm × 608 mm (84 in. × 40.7 in. × 23.9 in.)	With 19-inch rack, see Figure 1 .
Weight (each tower)	41 kg (90 lb.)	
End Guard Dimensions (H × W × D)	2132 mm × 82.6 mm × 608 mm (84 in. × 3.25 in. × 23.9 in.)	
Weight (end guard assembly)	17 kg (37 lb.)	

Table 1. Quareo Cross-Connect Solution Specifications, continued

Environmental		
Temperature Operating	- 10° C to 60° C (14° F to 140° F)	
Relative humidity Operating	5% to 95%	No condensation

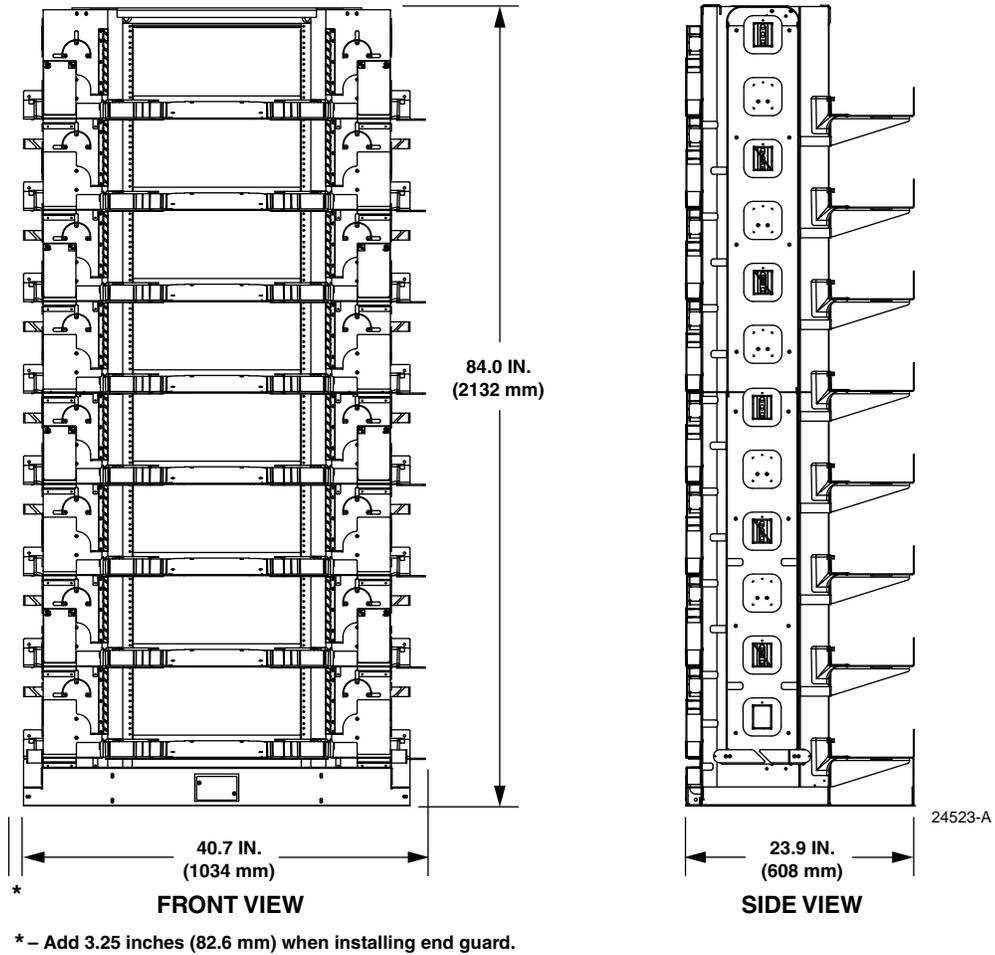


Figure 1. Quareo Cross-Connect Solutions Dimensions (with 19-inch rack)

1.2 Accessories

Following is a list of accessory items available for use when installing the Quareo Cross-Connect Solution:

RECOMMENDED CROSS-CONNECT FIBER CABLE LENGTHS FOR CONTINUOUS LINE-UPS	
TOTAL NUMBER OF 19-INCH RACKS*	LENGTH (METERS)**
1	6
2	7
3	8
4	9
5	10
6	11
*– Up to a maximum of ten racks. **– Add one meter for each additional rack.	

- **Managed Fiber Cables** – Available with specified connectors in standard lengths.
- **Fiber Cables** – Available with specified connectors in standard lengths.
- **Fiber Connector/Adapter Cleaning Kit** – Contains all the items required to adequately clean fiber connectors and adapters.
- **Cable Clamp Kit** – Provides components required for securing the end of an OSP cable to the frame.
- **Rack Installation Kit** – Provides components required to secure rack assembly to floor. Available for concrete floors or raised floors.
- **End Guard Kit** – Provides protection for the fibers entering and exiting frames at the end of a lineup.
- **AC Outlet Kit** – Provides an ac electrical outlet at the base of the rack assembly.
- **Chassis Ground Kit** – Lug and screws are shipped with the chassis. Grounding process must follow local practices.
- **Rack Ground Kit** – Grounding process must follow local practices.
- **Floor Isolation Pad/Template** – Provides protection for concrete floors and acts as a template for cutting/drilling mounting holes.

2 PLANNING

The Quareo cross-connect solution is designed to be installed on 7-foot equal flange (channel) equipment racks. An isolation pad is used to locate the rack and cross-connect solution on the floor. An end guard on the first rack in the lineup should be positioned at the edge of the aisle. If installing on a raised floor and cables are entering from below the floor, use isolation pad or template to mark rack mounting holes and cable entry locations. Always move tiles to another location away from equipment before drilling or cutting.

2.1 Required Tools and Materials

Tool requirements are listed in [Table 2](#).

Table 2. Installation Tools and Hardware Needs

CONSIDERATION	DESCRIPTION
Tools Needed	Adjustable Wrenches (2) 0.25 to 1.0–inches (8mm to 25.4mm) Drill: with Metal and Concrete Drill Bits 0.25 to 1.0–inches (8mm to 25.4mm) Flat Tip (–) and Phillip (+) Screwdrivers (#1, #2, and #3) Pry bar Ruler Utility Knife Flat file Hacksaw Hammer Jigsaw: Blades for Cutting Floor Tile and Metal Level Set of Open End/Box Wrenches 0.25 to 1.0–inches (8mm to 25.4mm) Set of Sockets 0.25 to 1.0–inches (8mm to 25.4mm) Torque wrench Vacuum Cleaner

Additional material requirements are listed in [Table 3](#).

Table 3. Additional Material Needs

CONSIDERATION	DESCRIPTION
Material	Ground Cable 6 AWG (4.1mm) Green with Yellow Stripe Ground Lug Crimping Tool GBA-19, 19–inch ground bar kit

3 INSTALLATION OVERVIEW

Installing the Quareo Cross-Connect Solution consists of completing the following procedures:

- Obtaining the required installation tools
- Selecting the mounting location
- Unpacking towers from the shipping crate
- Securing the base of the rack to the floor (raised tile or concrete)
- Connecting a grounding cable to the ground bar or equipment rack
- Installing optional accessories

3.1 Unpacking and Inspection

This section provides instructions for opening the shipping boxes, verifying that all parts have been received, see [Table 4](#) and [Table 5](#). Tower and end guard components are shown in [Figure 2](#). Verify that no shipping damage has occurred.

Use the following procedure to unpack and inspect the towers and all accessories:

1. Open the shipping carton(s) and carefully unpack the towers and any accessories from the protective packing material.
2. Remove packing material from towers and remove ship along items.



Caution: Each tower weighs approximately 41 kilos. (90 Lbs). Do not attempt to lift or move the towers without using appropriate equipment.

3. A second person or lifting equipment may be required to lift towers out of the shipping box.



Caution: Do not use cable rings to lift towers, damage to cable rings may occur.

4. If there are damages, contact TE (see [Technical Assistance](#)) for an RMA (Return Material Authorization) and to reorder if replacement is required.

Table 4. Tower Kit List

QTY.	DESCRIPTION	QTY.	DESCRIPTION
1	Right tower	8	Right pass through trough
1	Left tower	8	Left pass through trough
8	Rear cable cross over trough	8	Rear trough splice
8	Cable ramp	1	Outlet box cover with two screws (8–32 x 1/4)
1	Top rear support	100	12–24 x 3/8 roundhead machine screw
1	Top front support	16	#6 x12 mm roundhead machine screw
1	Guard box frame	80	#12 external tooth washer
1	Guard box cover (front)	16	#6 external tooth washer
1	Rear frame (panel)	16	12–24 cage nut
1	Rear cover (panel)	32	10–32 x 5/16 panhead machine screw (black)

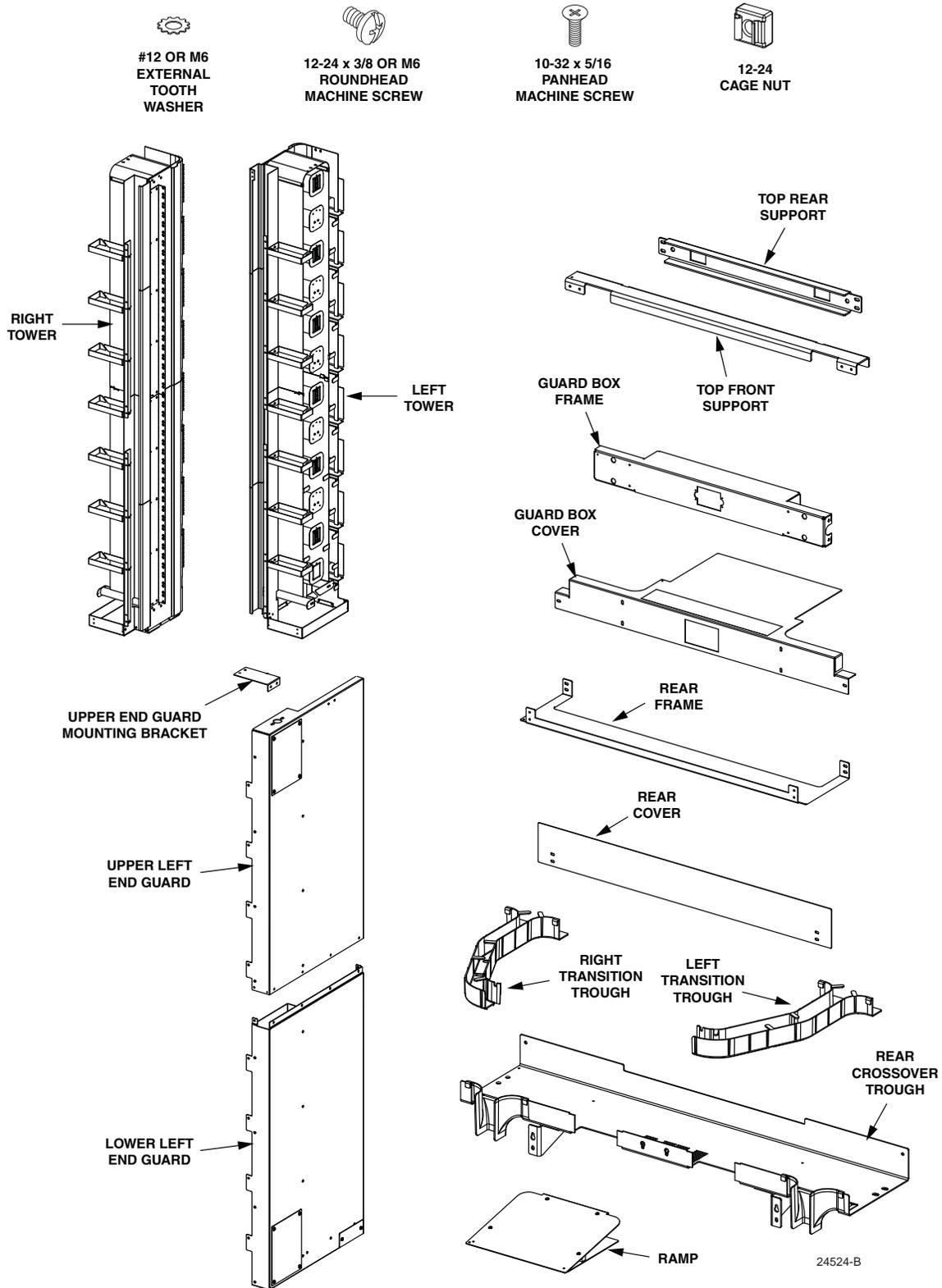


Figure 2. Kit Components

Table 5. End Guard Kit List

QTY.	DESCRIPTION
1	Upper end guard
1	Lower end guard
1	Upper mounting bracket
19	12–24 x 3/8 machine screw
15	#12 external tooth lockwasher

3.2 Positioning Overhead or Underfloor Guideway System

In a typical installation, fiber cables may be routed to the frame through an overhead or underfloor horizontal fiber management system. For overhead systems, the downspout must face toward the rear of the rack and be positioned over the cable drop at the edge of the towers.

4 INSTALLATION

Determine rack location, end guard on the first rack in the lineup should be positioned at the edge of the aisle. When installing on a raised floor make certain that any cutouts for cables entering from the bottom are not located at the tile supports.

If installation is on a raised floor and cables are entering from below the floor, use isolation pad or template to mark rack mounting holes and cable entry locations.

4.1 Rack Installation

Determine rack location on tiles. If this is the first rack in the line up use end guard isolation pad as a template, allow 3.25-inches (82.6 mm) at the end of the line up for the end guard installation. See [Figure 3](#). If this is not an end rack in the line up do not leave 3.25-inches (82.6 mm) for the end guard installation.

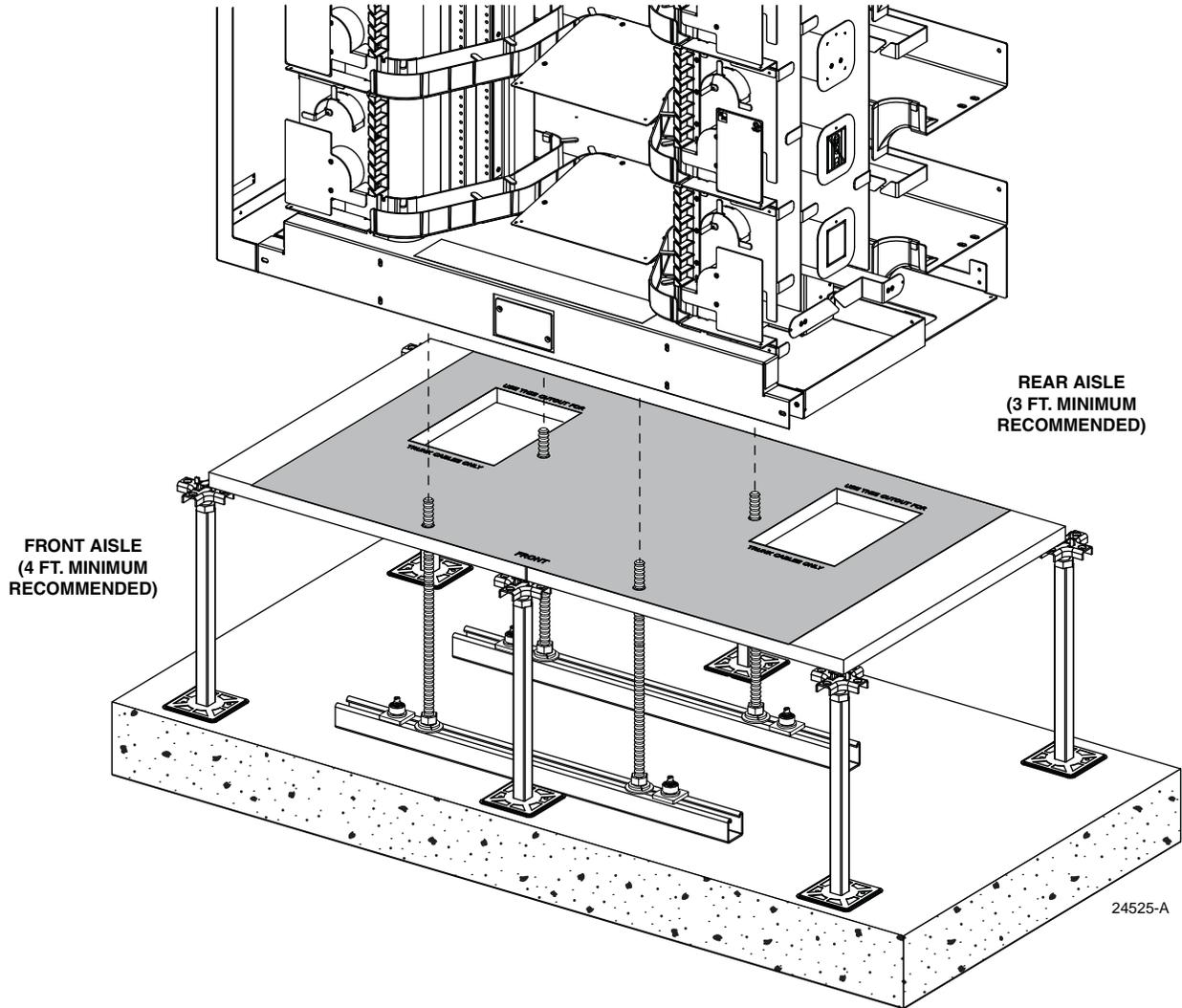


Figure 3. Determine Rack Location

Place isolation pad on floor tiles and mark hole locations. See [Figure 4](#). On raised floor installations cutouts for cables entering from below should be marked. If rack is to be cabled from above do not mark cable entrance holes. If rack is to be installed on concrete floor do not mark cable entrance holes.

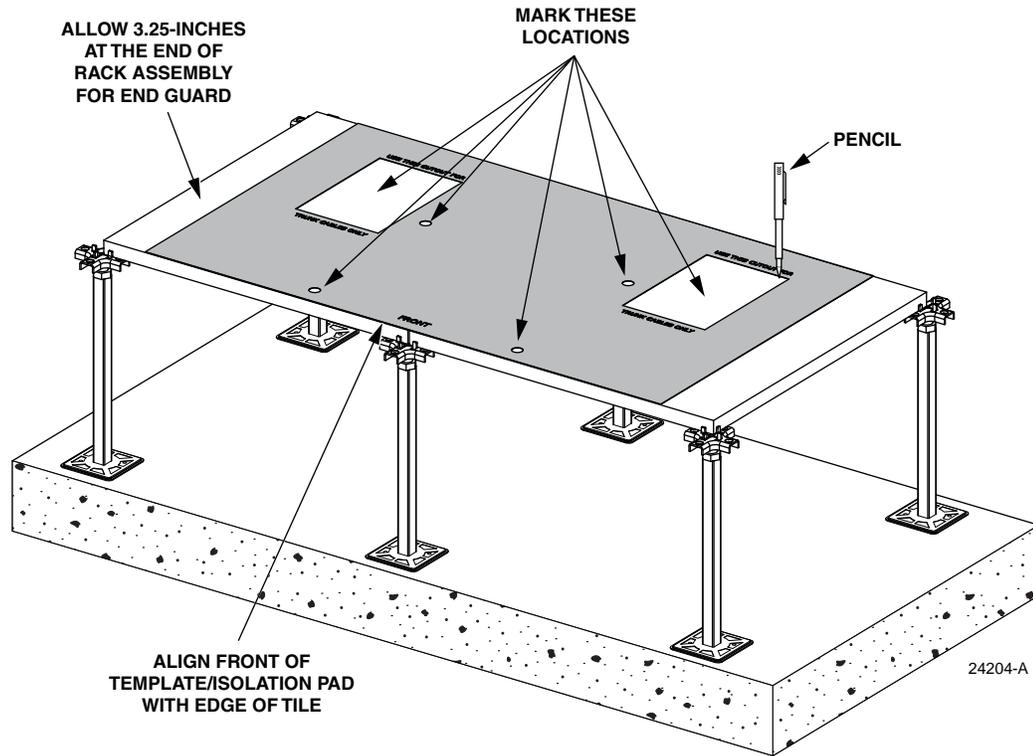


Figure 4. Mark Hole Locations

Always move tiles to another location away from equipment before drilling or cutting. If installation is on a concrete floor, use isolation pad or template to mark rack mounting holes.

Install equipment rack following rack installation instructions provided with rack or follow local practices.

A typical unistrut raised floor installation is shown in [Figure 5](#).

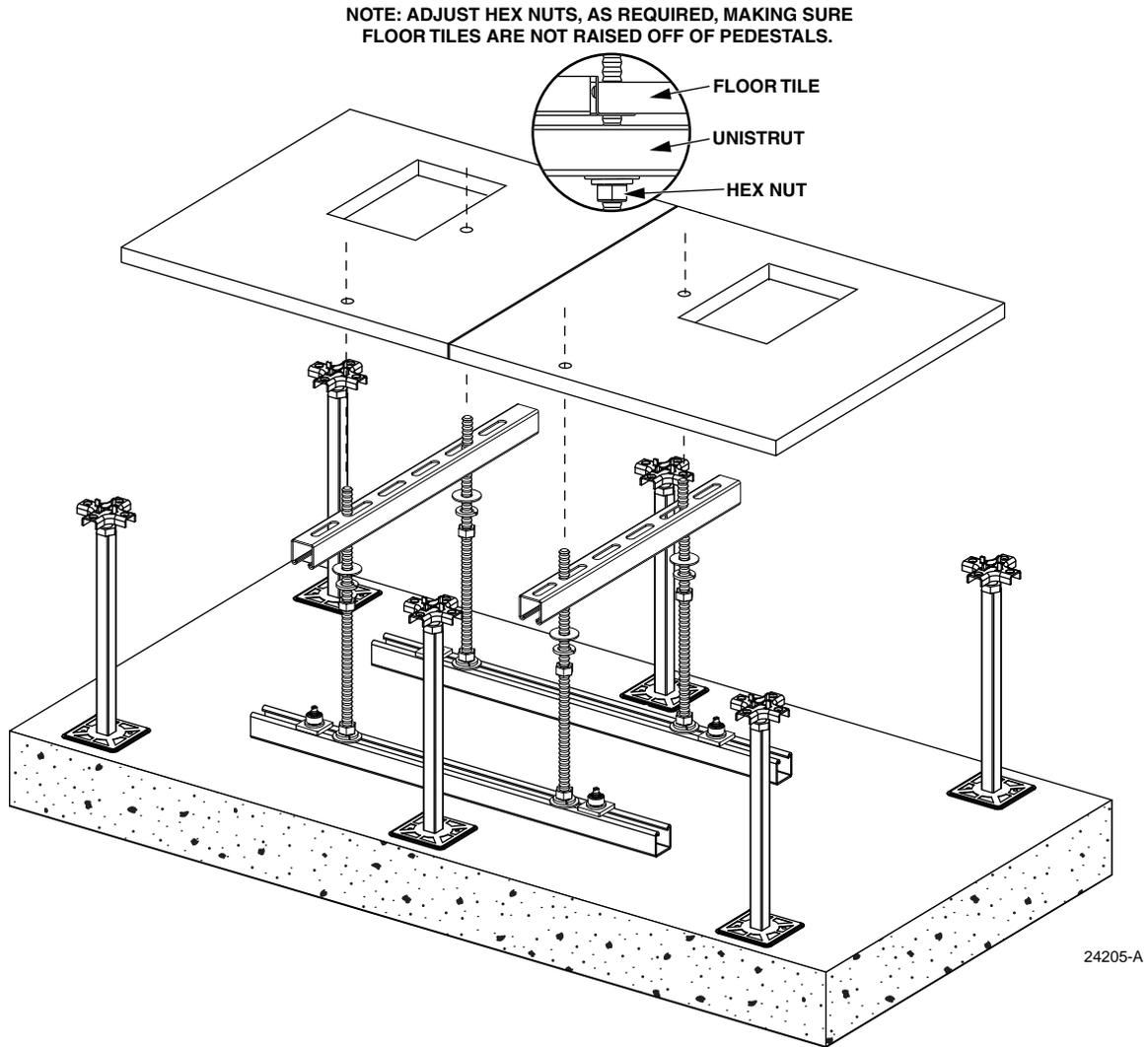


Figure 5. Typical Raised Floor Unistrut Installation

4.2 Tower Installation

Remove right and left towers from shipping crate. A second person or lifting equipment may be required to lift towers out of the shipping box. Stand upright and use a hand cart (two wheeler) to move towers into position along side the rack.



Caution: Do not use cable rings to lift towers, damage to cable rings may occur.



Caution: Each tower weighs approximately 41 kilos. (90 Lbs). Do not attempt to lift or move the towers without using appropriate equipment.

1. Locate box containing installation hardware.
2. Place tower mounting rail at the back of the rack with the slack storage spools facing away from the rack. See [Figure 6](#).

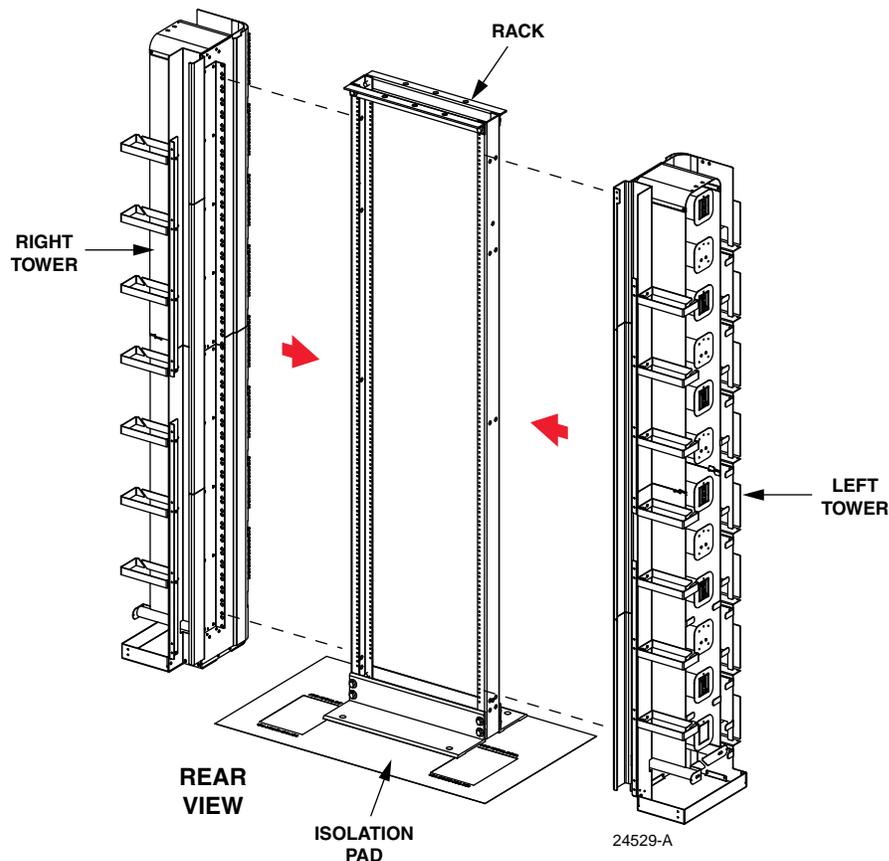


Figure 6. Align Tower

3. Secure each tower to rack with eight of the appropriate screws and washers. See [Figure 7](#). Starting near the top place screws at approximately 10 to 11-inch (254 to 279mm) intervals.
4. Repeat process for the remaining tower. Torque these screws to approximately 27 pound-inches (3.1 Newton meters).

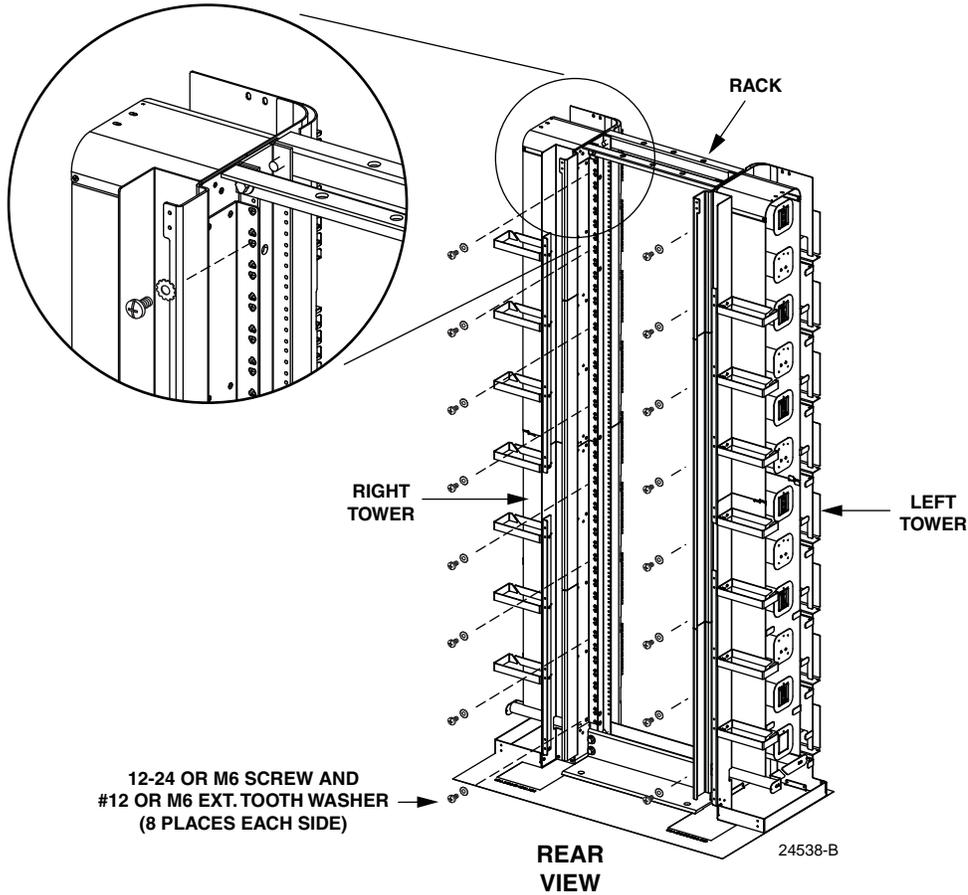


Figure 7. Install Tower Mounting Screws

4.2.1 Top Front and Rear Support Installation

Install front and rear top support, see [Figure 8](#). Secure with #12 screws and washers.

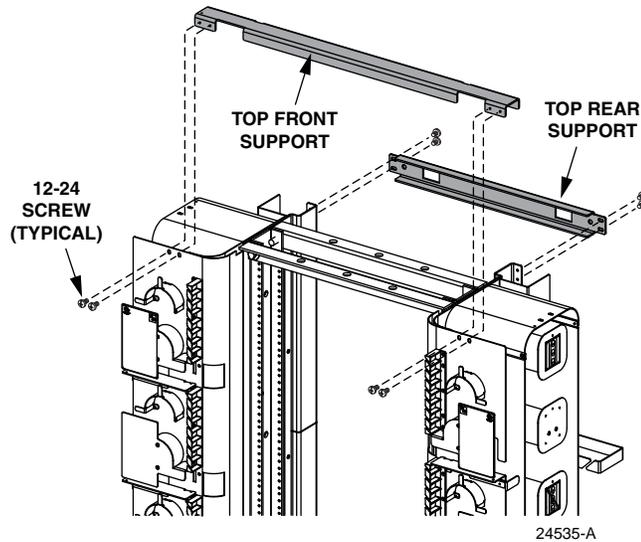


Figure 8. Install Top Front and Rear Supports

4.2.2 Optional Ground Bar Installation

Install optional Ground Bar Kit (GBA-19), by placing it on the top rear support and securing with two #12 screws and washers, see [Figure 9](#).

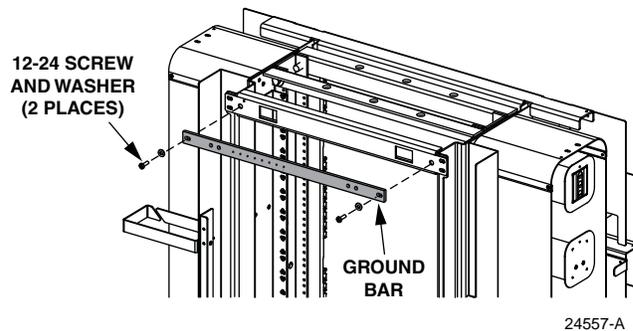


Figure 9. Optional Ground Bar Installation

4.2.3 Front Guard Box Frame Installation

Start two #12 screws with washers in each tower. Slide front guard box frame over screws. Tighten screws. See [Figure 10](#).

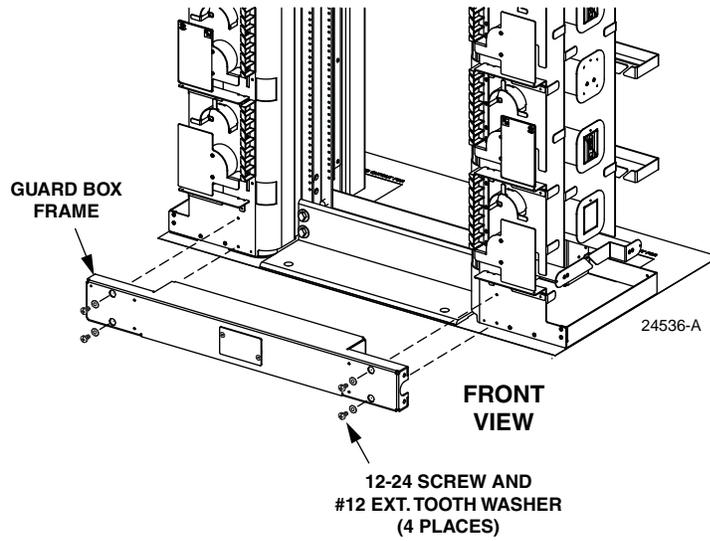


Figure 10. Installing Front Guard Box Frame

4.2.4 Rear Guard Box Frame Installation

Install rear frame, see [Figure 11](#). Secure with #12 screws and washers.

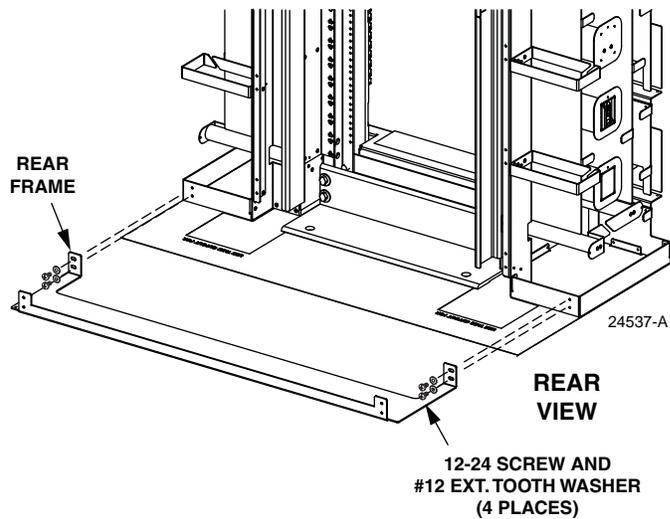


Figure 11. Installing Rear Frame

4.2.5 Rear Cable Trough Installation

1. At each rear cable trough location, start a 12–24 screw (no washer) into the top hole of each tower at the back. Do not tighten these screws.
2. Starting at the top or bottom, hang rear cable trough on the screws. See [Figure 12](#).
3. Install a 12–24 screw with washer into the lower mounting hole at each side of the rear cable troughs.
4. Tighten all screws.

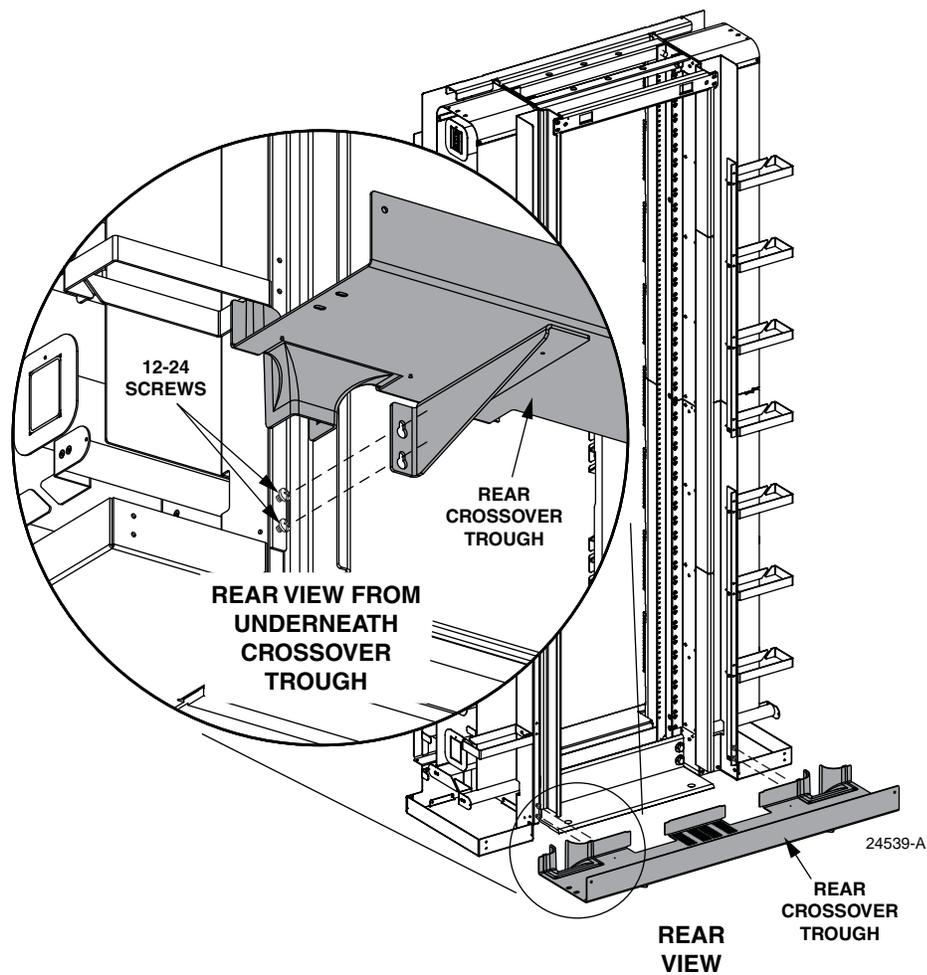


Figure 12. Rear Cable Trough

5. Install (8) left and (8) right transition troughs (These go from the front to the rear). From the front slide each transition trough on to the rear cable troughs.

- Slide one side of transition trough into notch in rear cable trough while hooking the other side over the rear cable trough. Secure each transition trough at the front with one screw (no lockwasher). See [Figure 13](#).

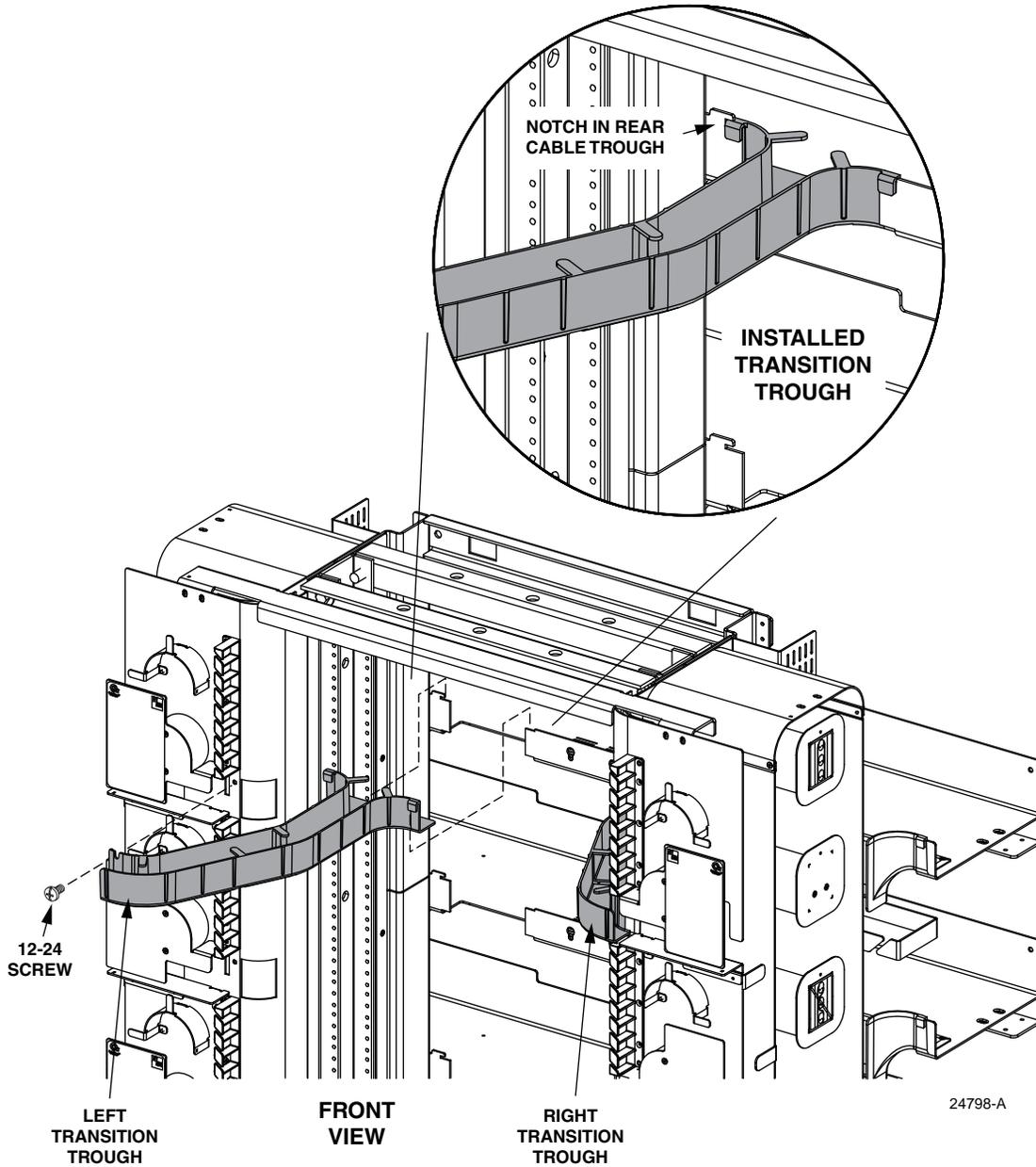


Figure 13. Transition Trough

4.2.6 Ramp Installation

1. Start two 12–24 screws (no washers) into the two threaded holes in the cable ramp. Do not tighten these screws.
2. Locate the two tear-drop holes located at the front in the center of the rear cable trough.
3. Starting at the top or bottom, hang each cable ramp on the rear cable trough while inserting the screw heads into the tear-drop holes. See [Figure 14](#).
4. Make certain that the ramp rests on top of the transition troughs at the rear cable trough.
5. Tighten all screws.

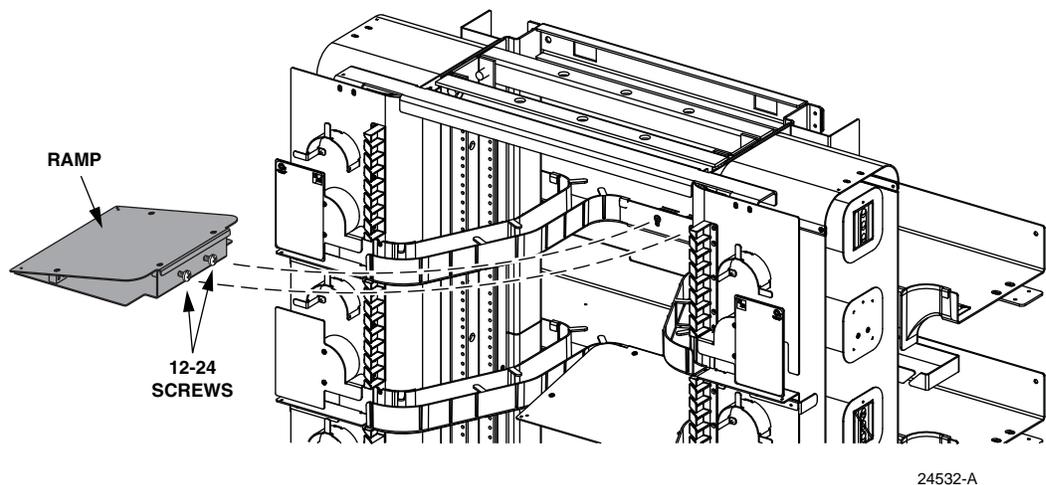


Figure 14. Install Cable Ramp

4.2.7 Front Guard Box Cover Installation

Install front guard box cover, see [Figure 15](#). Secure with #12 screws and washers. If no AC outlet is required install outlet box cover using screws provided.

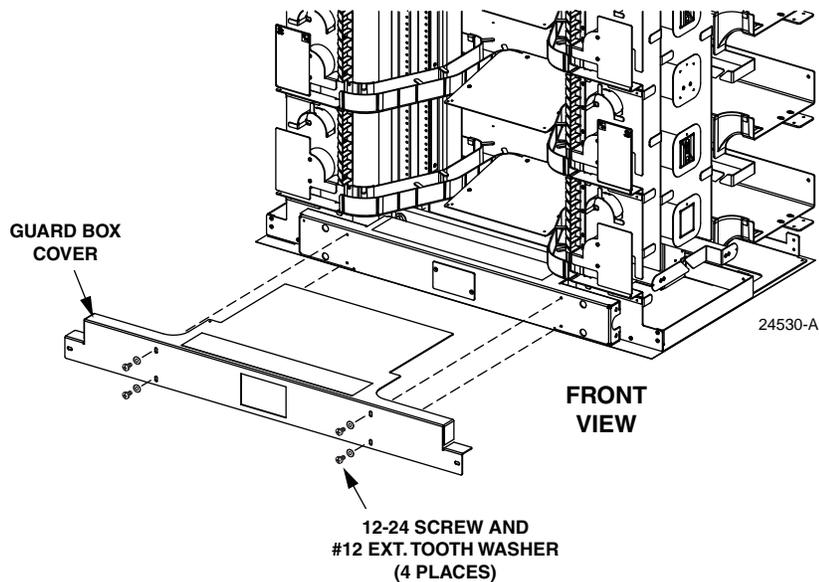


Figure 15. Installing Front Guard Box Cover

4.2.8 Rear Trough Splice Installation

When installing multiple tower assemblies rear trough splices are installed between adjoining rear troughs. See [Figure 16](#).

1. Starting at the top place splice between adjoining rear cable troughs align mounting holes.
2. Start 10–32 x 5/16 black machine screws in holes. Do not tighten at this time.
3. Repeat previous two steps for remaining rear cable troughs. If this tower assembly is located between two other tower assemblies repeat this process on each end of the rear cable trough.
4. Starting at either the top or bottom align adjoining rear cable troughs and tighten 10–32 x 5/16 black machine screws.

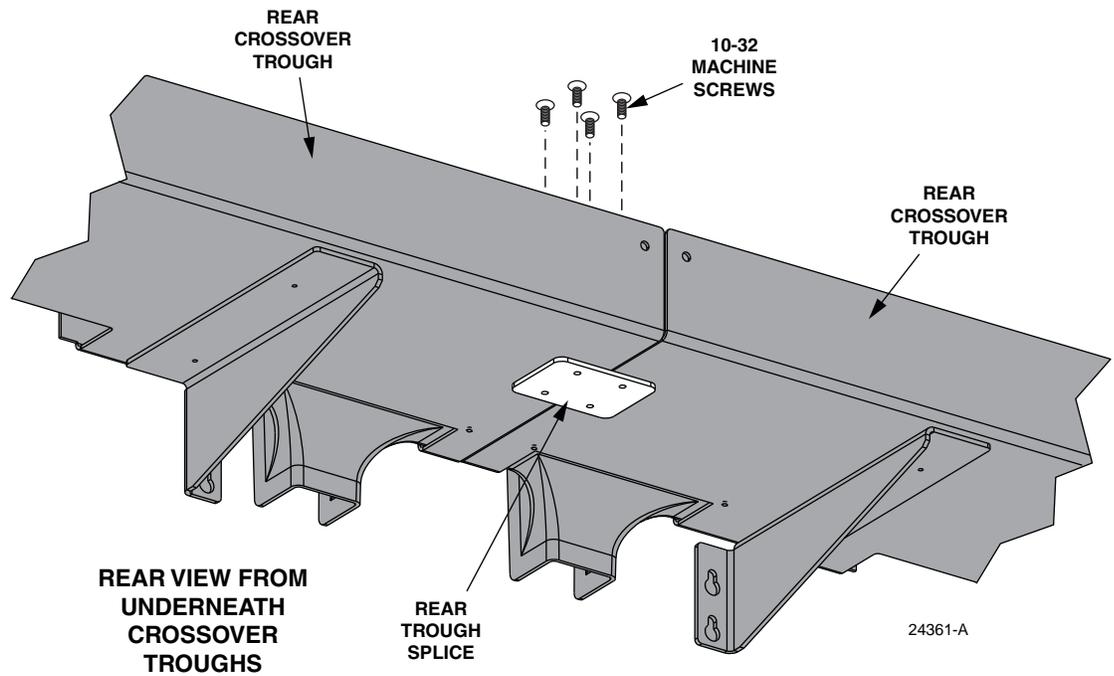


Figure 16. Rear Trough Splice Installation

4.2.9 Rear Guard Box Cover Installation

Install rear cover, see [Figure 17](#). Secure with #12 screws and washers.

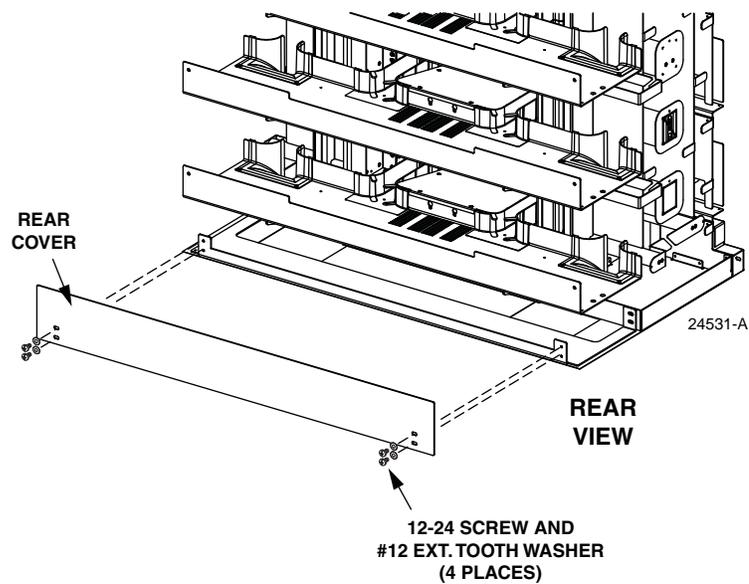


Figure 17. Installing Rear Cover

4.3 End Guard Installation

Each end guard consists of three pieces; upper end guard, lower end guard, and upper mounting bracket.

▶ **Note:** End guard assembly attaches to the tower. If end guard mounting holes do not align with the rear cable troughs, adjust the height of rear cable troughs until the holes align. Do not secure end guard to the floor.

1. Place end guard isolation pad at the end of the rack.
2. Position lower end guard against the tower. See [Figure 18](#).
3. Start #12 screws with washers into the rear cable troughs.
4. Position upper end guard over lower end guard against the tower. See [Figure 19](#).
5. Start #12 screws with washers into the rear cable troughs.
6. Secure upper end guard mounting bracket to top of tower with #12 screws with washers.
7. Secure upper end guard to lower end guard with #12 screws with washers (four places).
8. Start #12 screws with washers into the rear cable troughs.

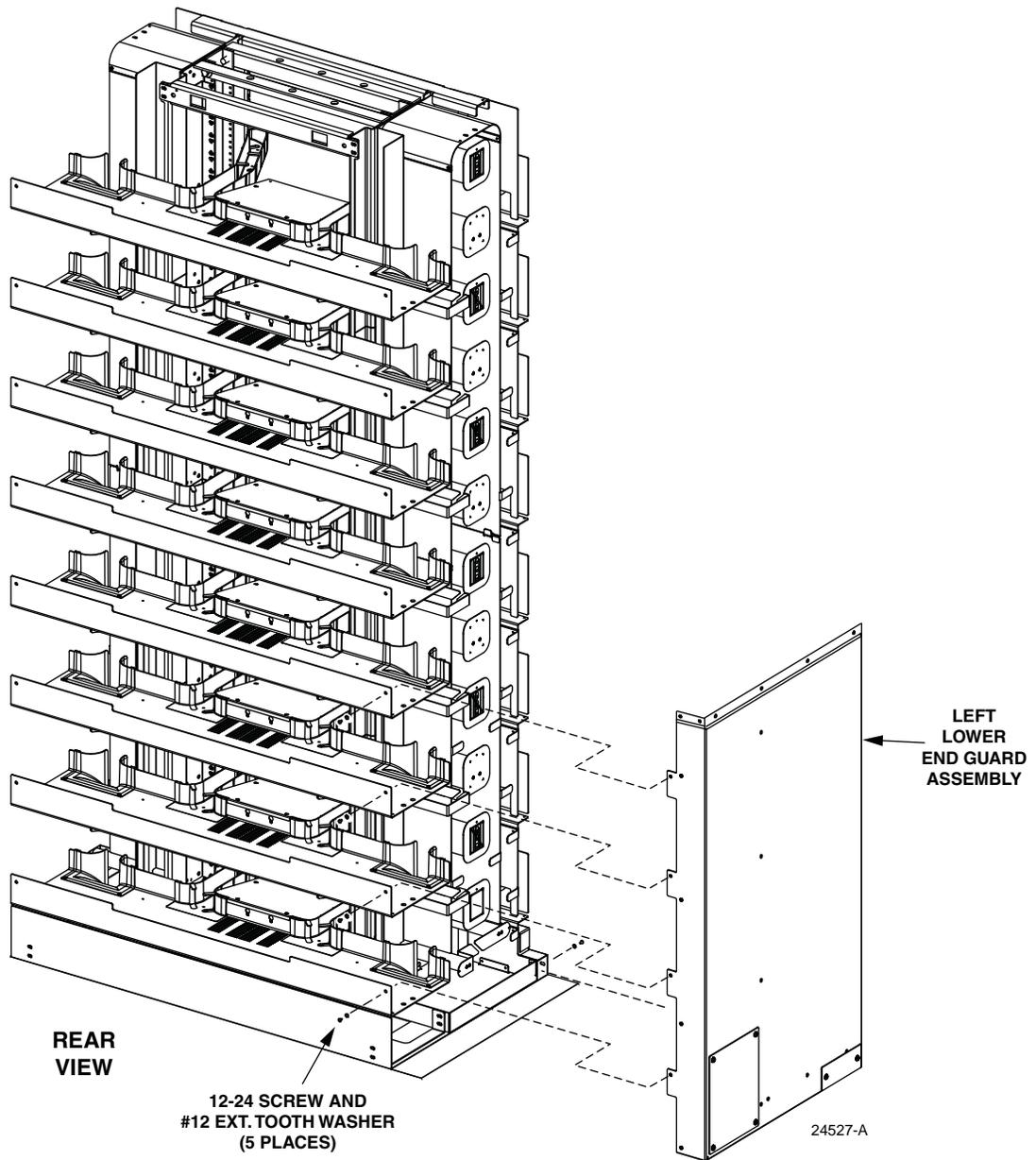


Figure 18. Lower End Guard Installation

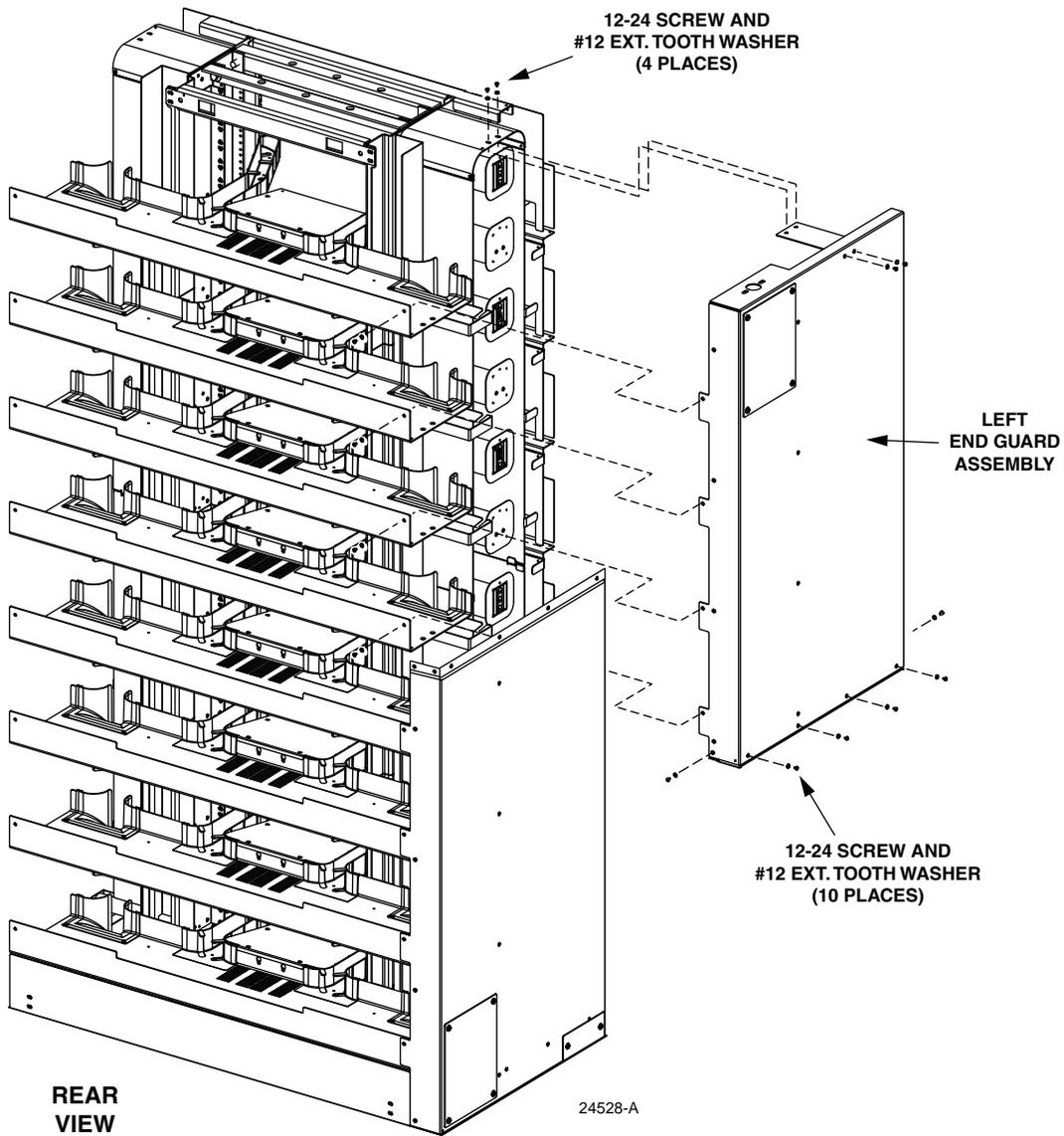


Figure 19. Upper End Guard Installation

9. Start #12 screws with washers into the front and rear guard boxes, see [Figure 20](#). Make certain each end guard mounting hole has a screw with washer in it.
10. Tighten all screws.

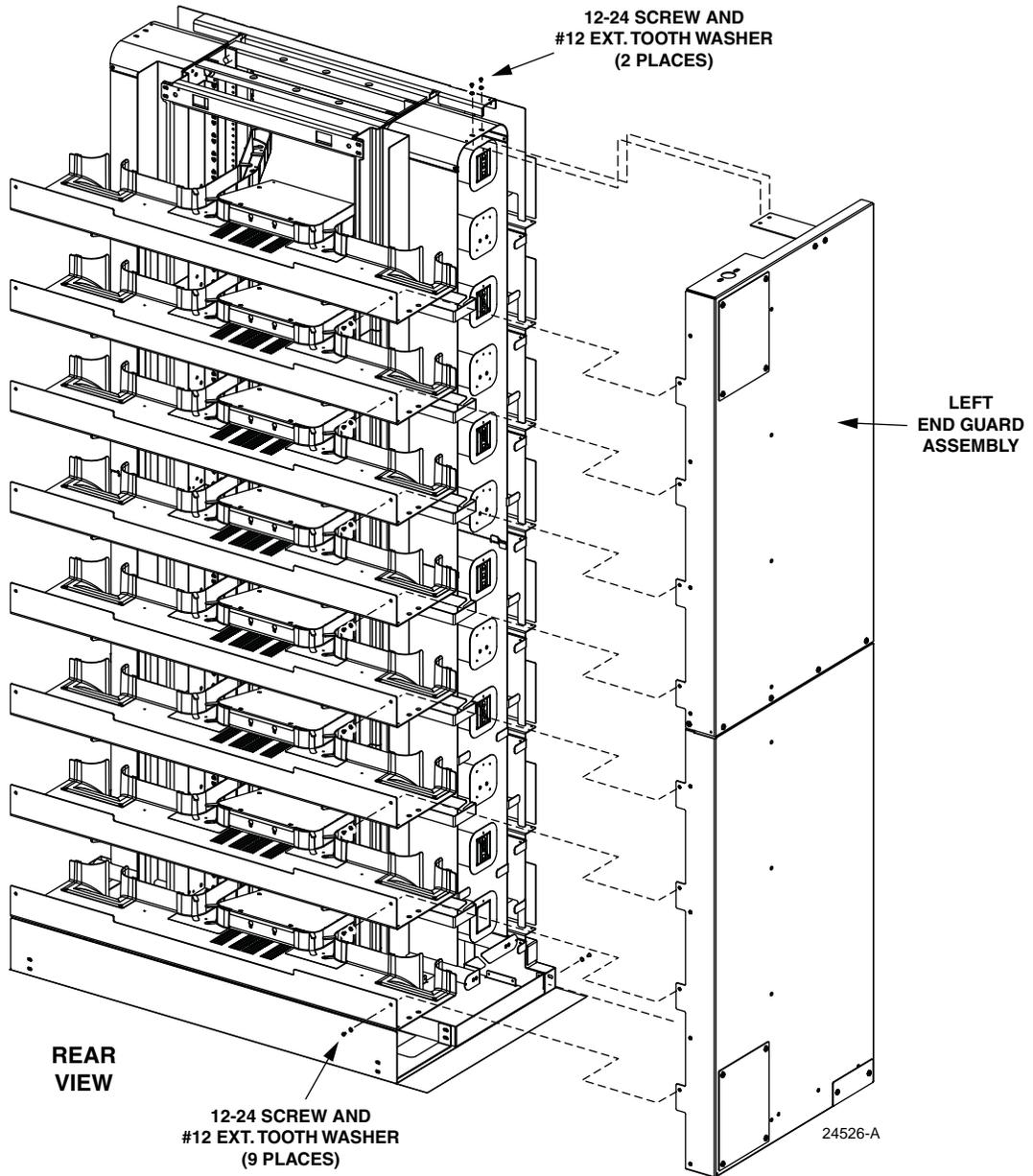


Figure 20. Mounting End Guard

4.4 Grounding

This procedure establishes a ground connection between the rack and the earth ground connection. This connection must be made in accordance with all local and national electrical codes.

Ground rack (frame) to office ground buss:

1. Determine Rack Ground Location.
2. Remove tape to expose bare metal at rack grounding location. Apply bonding compound to bare metal.
3. Complete rack grounding process following local practices.
4. Each chassis ground should be routed up or down the rack through the small channel located on the left when viewed from the front, see [Figure 21](#). Secure each chassis ground to the ground bar or office ground. See chassis installation instructions for detailed chassis grounding procedure.

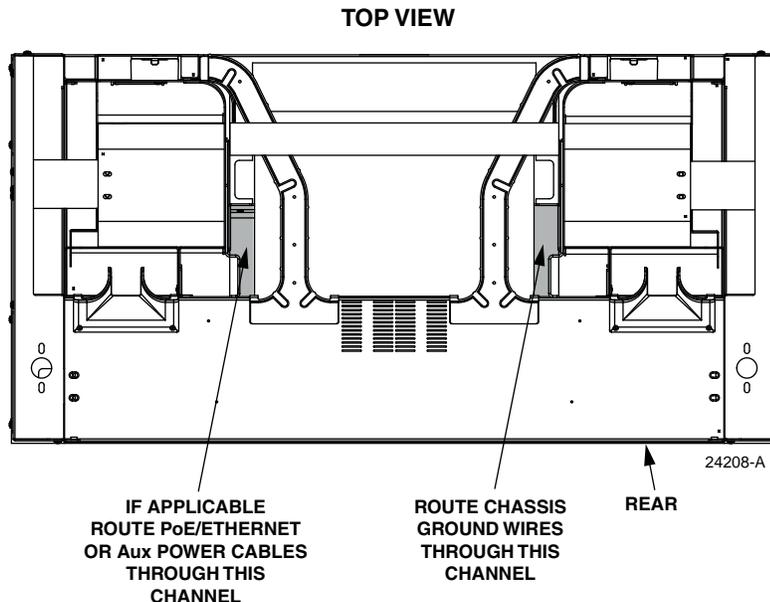


Figure 21. Ground Wire Channel

5 TRUNK CABLE ROUTING

This section provides procedures for routing the trunk cables to the rack. Trunk cables are routed to the rear side of the rack for connection to the rear side of each Network Chassis.

5.1 Overhead Trunk Cable Routing Procedure

Use the following procedure for routing trunk cables to the rack through an overhead horizontal pathway system:

1. Route cable to the top of the rack through the overhead guideway system.
2. Route cable into the rear vertical cable guide on the left or right side of the rack, when viewed from the rear (see [Figure 23](#)).
3. Locate the terminating Network Chassis within the rack.
4. Route trunk cables through the left or right rear vertical cable guide to the terminating Network Chassis.
5. Cable tie locations are provided on each vertical cable guide, see [Figure 22](#). Dress and secure trunk cables to vertical cable guide as necessary.

► **Note:** Remove the dust cap, inspect, and clean MPO connector per ADCP-96-150 instructions before terminating. Remove the ferrule dust cap from one of the LC cable connectors and then clean the connector as specified in the Optical Fiber Connector Wet and Dry Cleaning Instructions (ADCP-90-159) or by locally approved procedures.

6. Terminate and secure trunk cables at the Network Chassis following the procedures found in Network Chassis Installation Instructions.

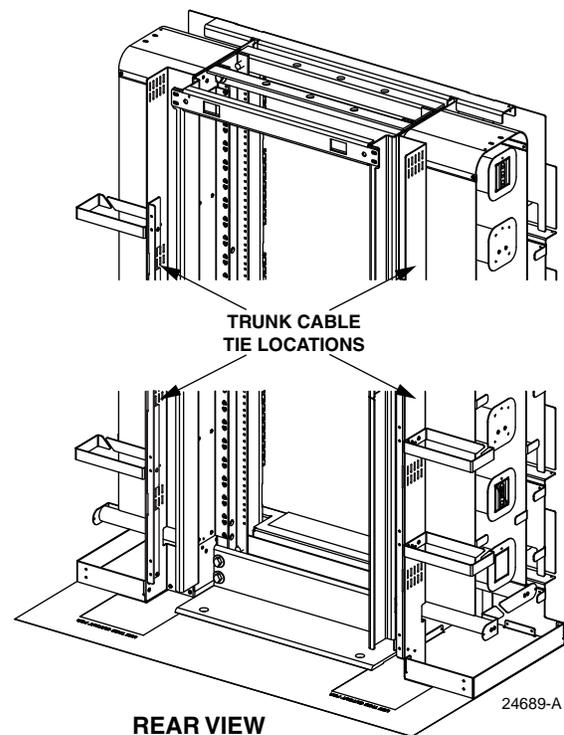


Figure 22. Trunk Cable Tie Locations

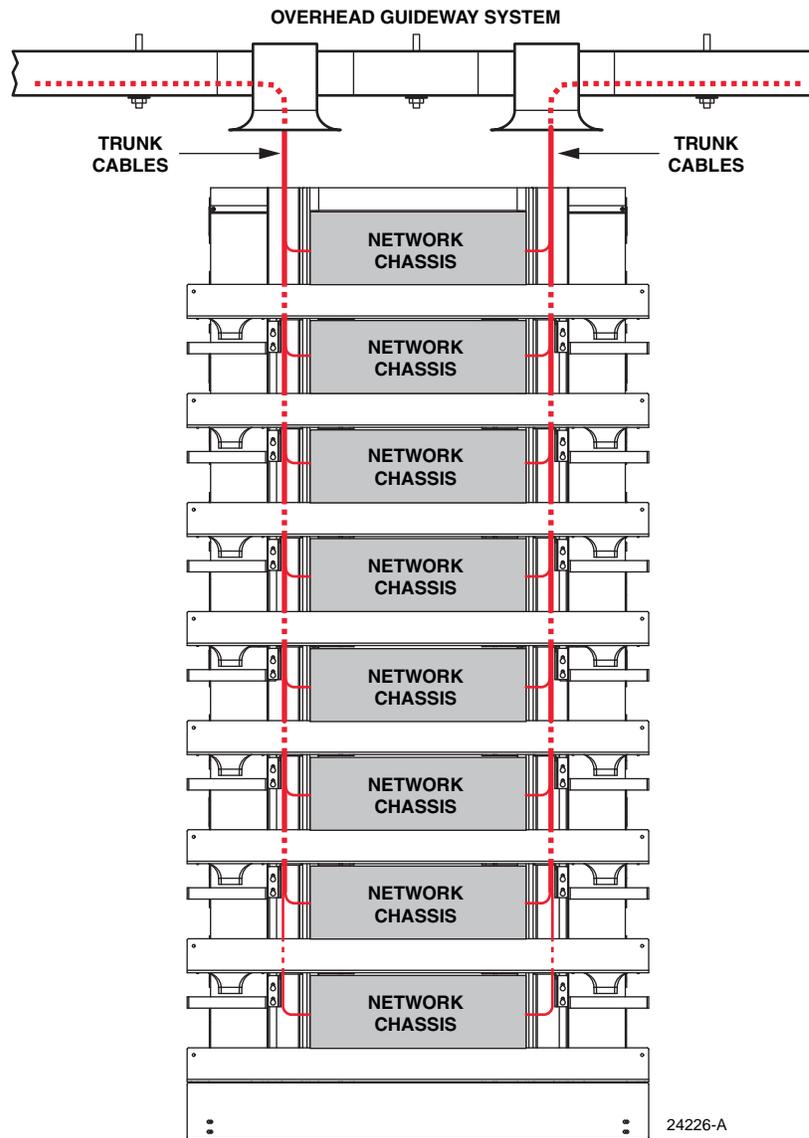


Figure 23. Overhead Trunk Cable Routing

5.2 Underfloor Trunk Cable Routing Procedure

Use the following procedure for routing trunk cables to the rack through an underfloor horizontal pathway system:

1. Route cables to the bottom of the rack through the underfloor guideway system.
2. Route cable into the rear vertical cable guide on the left or right side of the rack, when viewed from the rear (see [Figure 24](#)).
3. Locate the terminating Network Chassis within the rack.
4. Route trunk cables through the left or right rear vertical cable guide to the terminating Network Chassis.

5. Cable tie locations are provided on each vertical cable guide, see [Figure 22](#). Dress and secure trunk cables to vertical cable guide as necessary.
- **Note:** Remove the dust cap, inspect, and clean MPO connector per ADCP-96-150 instructions before terminating. Remove the ferrule dust cap from one of the LC cable connectors and then clean the connector as specified in the Optical Fiber Connector Wet and Dry Cleaning Instructions (ADCP-90-159) or by locally approved procedures.
6. Terminate and secure trunk cables at the Network Chassis following the procedures found in Network Chassis Installation Instructions.

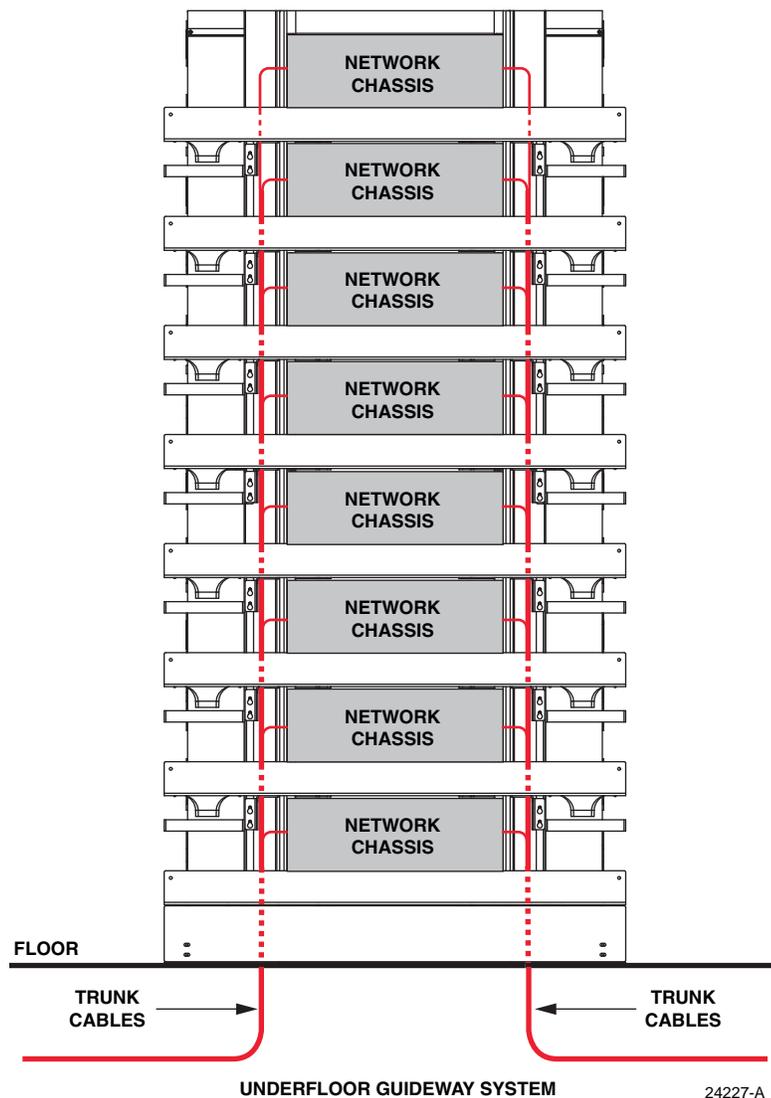


Figure 24. Underfloor Trunk Cable Routing Procedure

6 FIBER CABLE INSTALLATION

Installation consists of connecting the cable to the appropriate adapter on the front side of Network Chassis #1, routing the cable to the rear and then to the bottom of the vertical tower that supports network chassis. Routing cable up the vertical tower at the front and connecting the cable to the appropriate adapter on the front side of Network Chassis #2, and then storing the excess cable slack. Fiber cables may be routed within the same rack, routed to adjacent racks, or routed to non-adjacent racks.

Begin cross-connect fiber cable installation process by connecting the fiber cable to the front side of Network Chassis #1 as described in [Connecting Cross-Connect Fiber Cable to Network Chassis](#).

6.1 Cable Routing Rules

- Use Slack Storage.
- Enter/exit slack storage from opposite sides.
- Move all cable slack with you for storage at the last step.
- After making the first connection, immediately move cable to the rear trough.

6.2 Connecting Cross-Connect Fiber Cable to Network Chassis

Use the following procedure whenever connecting a cross-connect fiber cable to the front side of a Network Chassis:

1. Locate Network Chassis #1 and the port for the 1st connection.
2. Remove dust caps from the terminating adapter and cable. Connect the fiber cable to adapter in the chassis.

▶ **Note:** Remove the dust cap, inspect, and clean MPO connector per ADCP-96-150 instructions before terminating. Remove the ferrule dust cap from one of the LC cable connectors and then clean the connector as specified in the Optical Fiber Connector Wet and Dry Cleaning Instructions (ADCP-90-159) or by locally approved procedures.
3. Make sure to route the fiber cables right or left as determined by the side of the chassis the cables are entering from. Route fiber cables through cable management system (fingers) at the front of the chassis and attach to proper adapters.



Caution: *If blades are in one of the detent positions when fiber connections are made, make certain that there is enough slack in the cable so that when blade is pushed in fiber bend radius is not compromised.*

4. Route the fiber cable through the cable fingers on the blade through the cable guides at the side of the chassis. See [Figure 25](#).

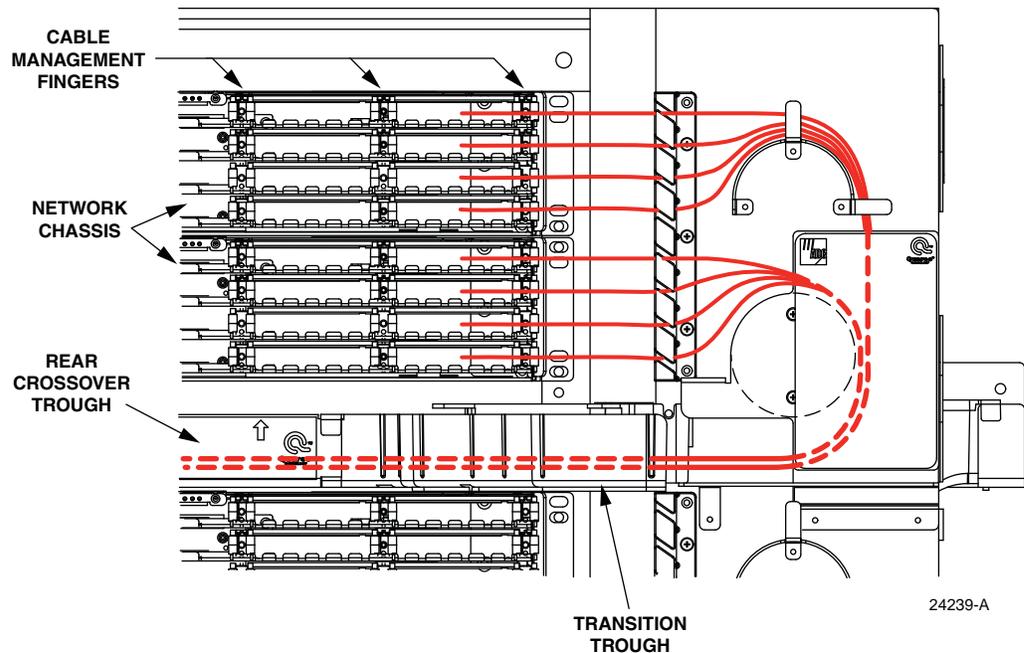


Figure 25. Cable Routing Exiting Network Chassis

5. Continue routing fiber cable over the appropriate front radius limiter and around the next lower radius limiter to the transition trough.



Caution: Always allow sufficient fiber length to permit routing without severe bends. Non bend-optimized fibers may be permanently damaged if bent/curved to a radius of less than 1.5 in. (3.81 cm).

- ▶ **Note:** Make certain that all fiber cable slack is moved through the transition trough to the rear cable trough.
6. Route the fiber cable through the transition trough to the rear cable trough.
 7. Route fiber cable across rear cable trough to the back and correct side of the network chassis that it is to be terminated at. Use closest trumpet to exit rear trough stopping at bottom entrance to vertical slack storage/manager.

8. At the front of the tower connect remaining end of cable into desired adapter on blade. See [Figure 26](#).

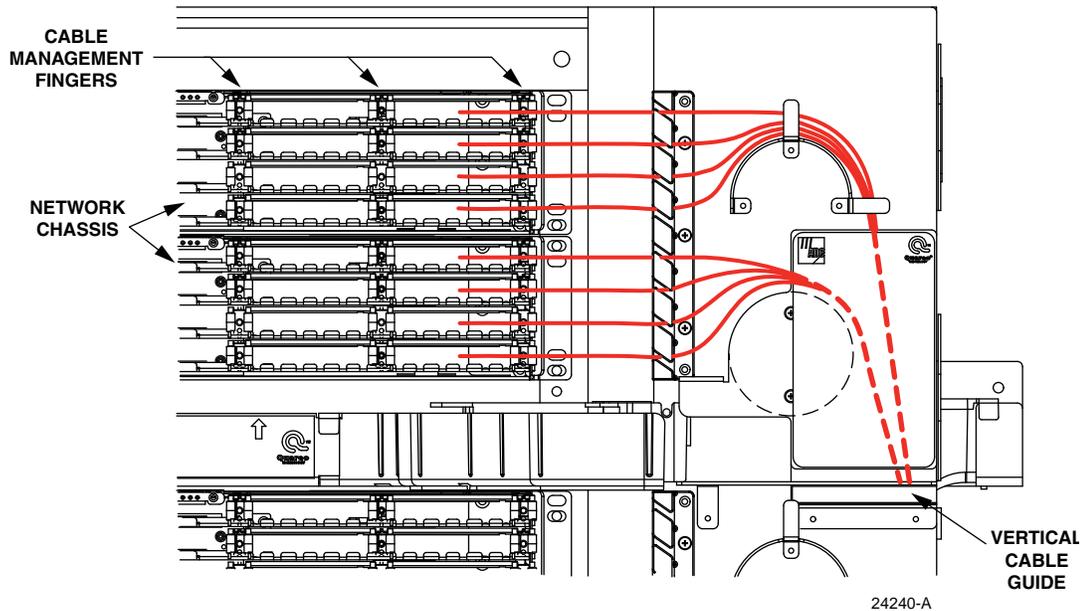


Figure 26. Cable Routing Entering Network Chassis

- ▶ **Note:** Remove the dust cap, inspect, and clean MPO connector per ADCP-96-150 instructions before terminating. Remove the ferrule dust cap from one of the LC cable connectors and then clean the connector as specified in the Optical Fiber Connector Wet and Dry Cleaning Instructions (ADCP-90-159) or by locally approved procedures.
9. Route fiber cable through cable management system (fingers) at the front of the chassis into vertical cable guide stopping at the bottom entrance to vertical slack storage manager.
 10. Locate center of cable (slack) and place over appropriate spool in vertical cable manager. See [Figure 27](#). Slide cable slack to the back of each spool.
- ▶ **Note:** Cable should hang loose in the vertical cable manager.
Do not pull cable taught.
Slide cable slack to the back of each spool.
11. Repeat procedure for remaining fiber cables.

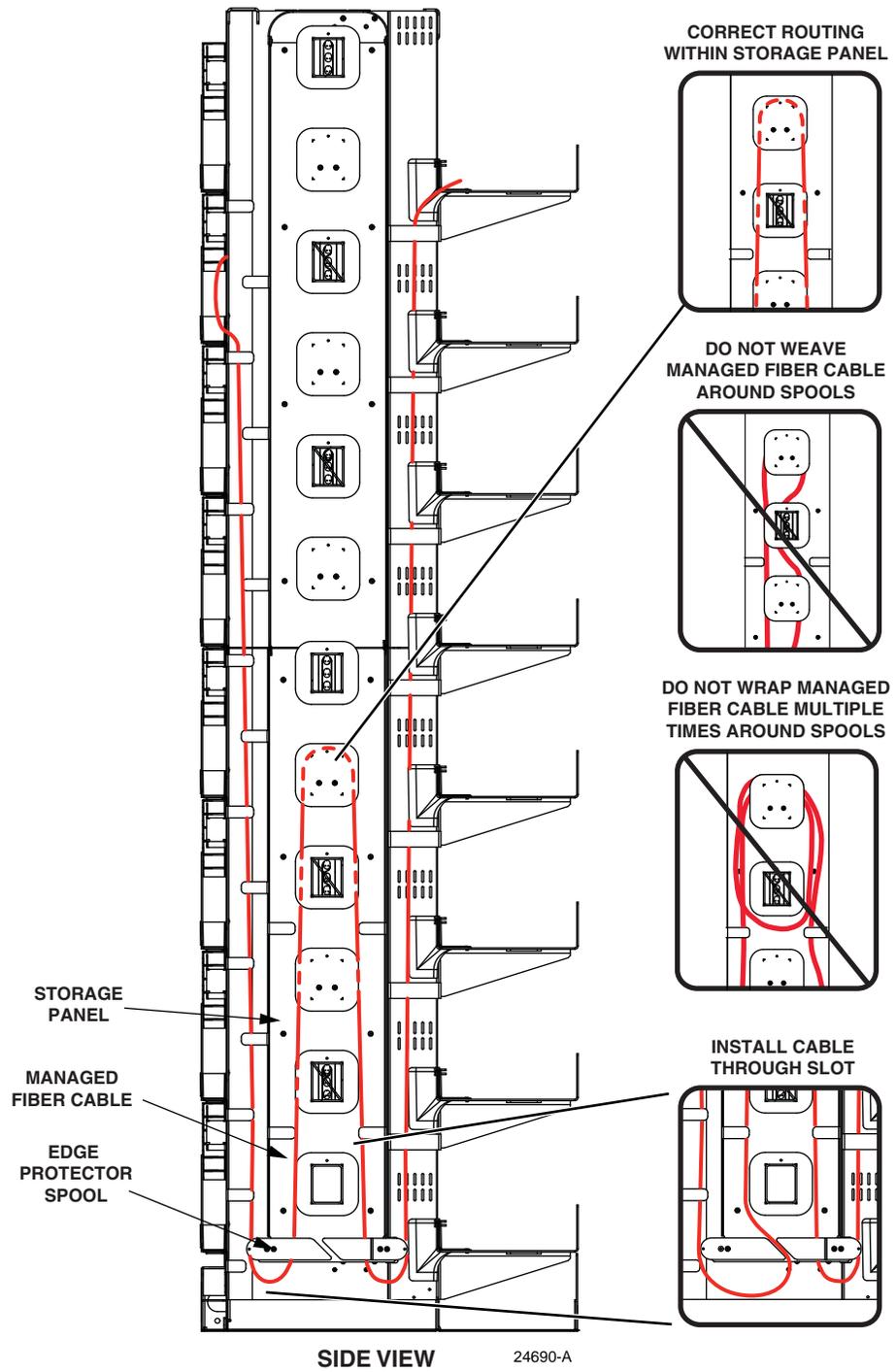


Figure 27. Slack Cable Storage

7 TECHNICAL ASSISTANCE

Contact the Technical Assistance Center (TAC) for technical question. Call 800.830.5056 or send an email to TAC.Americas@commscope.com.

