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TECHNICAL REQUIREMENTS FOR RAISED FLOOR SYSTEMS-NETWORK EQUIPMENT APPLICATION

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1. GENERAL

A. Reason for reissue

1.01 Reserved for future use.

B. Scope

1.02 This document provides requirements for the design and installation of a raised floor system or access floor system for the support of telecommunications equipment in a central office environment and the planning, engineering and installation of telecommunications equipment and ancillary cabling in a raised floor central office.

C. Application

1.03 The floor system shall be provided in the equipment environment where network equipment is installed elevated above the building floor. The equipment will be installed on a raised floor system with telecommunications, power and alarm cabling routed under the floor system. Interconnecting cable shall enter equipment frames from the base area rather than from overhead facilities as in traditional central office arrangement. ***In this application, the area under the floor is not to be used as an air plenum for providing cooling air to network equipment***.

1.04 Network equipment to be placed in this environment shall be compliant SBC document TP76200MP, Network Equipment Power, Grounding, Environmental, and Physical Design Requirements.

1.05 Network equipment installed to requirements herein will meet earthquake bracing requirements for equipment installed on an elevated floor system if equipment has previously qualified for freestanding installation on building floor. For Pacific Bell/Nevada Bell, all equipment locations are designated “High Seismic Risk” sites. In some portions of Southwestern Bell, equipment locations in the New Madrid fault area are designated “High Seismic Risk” sites.

2 SITE REQUIREMENTS

A. Reason for reissue

2.01 Reserved for future use.

B. Application Of The Raised Floor Architecture

2.02 For current applications of raised floor architecture, SBC will be deploying the raised floor architecture in new buildings and building additions only. New buildings and building additions allow the raised floor system to be integrated into the initial building design thereby reducing costs of construction even further.

2.03 There are opportunities for converting vacant floor space in existing buildings, however, at this time those applications may require additional work that could lengthen the payback period as established in a business case approved by SBC management.

2.04 It is not SBC's plan to deploy the architecture to very small central office applications such as community dial offices, huts, controlled environmental vaults. Those applications do not currently use overhead ceiling supported ironwork to support cables. No offsetting costs for installation of a raised floor system would exist for those offices. The small environments also do not have the heat loads currently seen in larger offices.

2.05 There will be site factors that determine the non-applicability of the raised floor architecture and should be considered when planning the office. Sites where there is a high water table or other special soil conditions may make excavating for a depressed floor more costly. Local building codes or restrictive fire codes may make this architecture more costly to apply. These insurmountable factors may make the architecture not feasible at specific sites.

2.06 Changes required to move from traditional building designs to the raised floor architecture should not be used in determining application of the raised floor for a project. Building additions or new construction will be built to designs varying from previous designs and initially may require architects, facility managers, space planners to adapt new practices in the building construction. These necessary changes are not factors for declining the raised floor architecture.

2.07 Office types that must be considered for the raised floor architecture when planning the construction are shown in Figure 1.

Figure 1
Candidate Offices For Raised Floor Environment By Building Type

Building Type	*Yes*	*No*
Large Multi-Story Office, existing space		**X**
Large Multi-Story Office, new addition	**X**	
Medium Multi-story Office, existing space		**X**
Medium Multi-story Office, new addition	**X**	
Medium Multi-story Office, new construction	**X**	
Medium Single-Story Office, existing space		**X**
Medium single Story Office, new addition	**X**	
Medium Single-story Office, new construction	**X**	
Small single story office, existing space		**X**
Small single story office, new addition	**X**	
Small single story office, new construction	**X**	
Very small single story office, existing space		**X**
Very small single story office, addition		**X**
Very small single story office, new construction		**X**

Definition of office sizes:

Large	Greater than 20,000 square feet each floor
Medium	Greater than 10,000 square feet each floor
Small	Less than 10,000 square feet each floor
Very small	Less than 1,600 square feet

2.08 The equipment space configured with a raised floor will use the underfloor space for cable routing and overhead space for room ventilation ductwork and room lighting fixtures.

2.09 All equipment areas are to configured for equipment to be placed on top of raised floors with the exception for DC Power equipment and Main Distributing Frames taller than 7'-0" in height. Those exception applications would have equipment on building floor and cables routed to overhead cable racks.

C. Floor Preparation

2.10 Building floor must be smooth, level and free of floor protrusions. Floor coverings, such as tiles, linoleum sheeting shall be removed completely when torn, broken or unfit for use. Caution must be taken when removing asbestos floor coverings and adhesives. Use only telephone company approved methods and disposal procedures. All remaining floor covering adhesive shall be stripped to bare concrete.

2.11 Where abandoned anchors obstruct floor system pedestals or anchors, they shall be removed or leveled flush with floor surface. Anchor removal must be accomplished with methods that will not harm concrete integrity, methods such as core drilling may be used. Direct extraction of anchors is permitted only if anchors are embedded less than 2" and are low strength anchors, ie. lead alloy expansion, sleeve or wedge type anchors. Following anchor removal, holes shall be filled with epoxy mortar filler and finished flush to floor surface. For anchors 1/2" diameter or smaller the anchor may be ground flush and left in place if doing so does not interfere with new anchor installation.

2.12 Concrete floors with cracks greater than 1/32" wide shall be filled and leveled with an approved epoxy mortar or crack injection product, such as Hilti RM7OOEP, Epoxy Repair Mortar.

2.13 Seal bare concrete floor surface with plastic base sealant to prevent moisture seepage from floor cracks, joints and drilled holes. Sealant may be sprayed or roller applied. Sealant shall be transparent in color.

D. Building Services

2.14 Identify and relocate electrical power outlets, telephone jacks, electrical switches, pipe valves, etc. to area above floor system level. Service devices are not to be hidden under floor system. Relocate electrical switches or outlets to location above new floor height level.

2.15 Windows, doors or other openings to room shall be moved or resized to new floor height prior to installation of floor system.

2.16 Ventilation ducts, grilles and returns located in existing walls are to be relocated to new floor height. Return air or air discharge shall not circulate to or from area under floor system. Building HVAC ductwork shall not be routed under floor area.

E. Wall Installation

2.17 Prior to floor system installation, all permanent partitioning walls are to be installed and fastened to building floor and ceiling. Partitioning walls shall not be installed with wall materials supported on top of elevated floor system nor secured to floor system.

2.18 Collocation areas requiring partitioning fences or walls shall be erected from top of floor system to height required. See appropriate section of this document for details on partitioning space. Floor system shall be designed with heavy pedestals used for equipment frame mounting when floor system is used to support weight of partitioning walls.

3 FLOOR SYSTEM

A. Reason for reissue

3.01 Reserved for future use.

B. Access Floor

3.02 The equipment area shall be provided with raised floor wherever equipment frames are to be installed and where cables would be run. Heavy duty pedestals designed for support of equipment frames shall be provided where equipment lineups are planned for present and future growth. Floor areas where equipment frames are never to be installed may have light duty conventional pedestals installed and floor tiles not secured.

3.03 Finished floor height shall be 36 inches measured from building floor to top finish surface of floor tile or if specified for a particular site, a floor height other than 36 inches. Other floor heights of 24 inch or 30 inch would require floor understructure components to be revised to appropriate dimensions. Lower floor heights may be appropriate in equipment environments with smaller cable pileups or with limited ceiling clearance in room. Floor is to be level within +/- 1/16 inch across 30 feet over the entire floor area. All tile edges are to be within 1/32 inch between tiles. Tiles shall not rock, squeak or make noise when normal size person walks across floor.

3.04 Floor tiles shall be hollow core formed steel panels equal to Maxcess RWC S4000 floor panel with overall top surface of 24" by 24" dimension. Paint all steel panels with corrosion resistant paint. Top surface to be covered with 1/16" thick high pressure laminate of white with gray swirl pattern. All edges to be trimmed and finished by router cutting. Pressed on edging is not to be used in place of routed edges. Tiles to seat between stringers and flush to adjacent tiles.

3.05 Tile shall be rated for minimum 1250 psi concentrated load and ultimate 3000 pound load applied anywhere without failure. Maximum deflection at these loads shall not exceed 1/300th of span across panel under these loads. Panel must recover to original shape when load is removed.

3.06 Class A fire rating is required for floor tile and floor system. The panels must be non flammable and capable of preventing flame spread between underfloor area and area above floor.

3.07 Ramps and steps are to be provided for transitioning to elevated floor areas if necessary. Ramps are to be designed and installed to building code requirements and in conformance to American with Disabilities Act requirements. Hand rails are to be provided for ramp and step areas. Railings are to be installed where there is a drop in floor height. Railings shall be installed in conformance with building code requirements.

3.08 Perimeter of raised floor areas not covered by building walls, ramps, or steps shall be closed by skirt panels. Panels shall cover opening fully with finished edges free of sharp surfaces. Panels to be removable for access to area under floor. Panels shall be constructed of nonflammable materials.

C. Light Duty Floor Systems

3.09 The conventional access floor system shall be a stringered recessed tile data type floor. Pedestals shall be minimum 1-1/2" diameter tube welded to a steel base. The base shall be minimum 3/16 inch thick, 6 inch by 6 inch dimension. The tube shall be welded to base with a minimum 3/16 inch continuous weld bead all around. Base shall have four 7/16" diameter anchor holes at corners. Pedestal base shall be secured to building floor with two (2) Hilti 3/8" x 2-1/2” Kwik-Con Torx Head anchors (Hilti P/N 224363) embedded 2-1/4 inch into drilled hole (Hilti Drill Bit P/N 205322 TEC+8.5 x 17 bit).

3.10 Install anchors at diagonally opposed corners and with anchors at every other pedestal rotated 90 degrees from adjacent pedestal. Floor adhesive shall not be used in place of masonry anchors. Minimum lateral strength of individual pedestal shall be 250 pounds at no more than 3" inch deflection.

3.11 Leveling head to be provided for pedestal with at least 10 inch threaded stud length. Adjustment nut will be provided to adjust for floor height. Stud diameter to fit into pedestal tube with diameter difference no greater than 3/16". Head shall be formed steel and full bead weld to stud. No resistance or spot welds permitted in joining head piece to stud. Cast aluminum heads are not permitted. Top stringer attachment holes to be tapped for stringer attaching screws. No sharp edges or corners shall be exposed from pedestal head when floor panel is removed.

3.12 Stringers shall be bolted to pedestal heads. Stringer height shall be 1-1/4". Stringer shall be rectangular steel tubing. All stringers shall be provided in 24" lengths between pedestals.

3.13 At floor perimeter, stringers running up to building walls may be longer than 24" with minimal cantilevered length over last field pedestal. Cantilevered section of stringers must support full floor load requirements.

D. Heavy Duty Floor Systems

3.14 Network equipment shall be installed on telephone company approved heavy duty floor system. The heavy duty floor system shall be fabricated and installed as shown on drawings provided with this document. No substitute floor designs shall be provided or equipment service integrity cannot be assured.

3.15 Location of network equipment shall be designated on network equipment layout drawings available from telephone company Equipment Engineers and Detail Engineering. Floor design must be coordinated with location of network equipment so heavy duty floor areas can be provided to support the equipment.

3.16 The equipment floor system shall be fully modular and compatible with conventional access floor systems. The equipment floor system and open space access floor system shall be installed concurrently for common alignment and leveling of both floor systems. Floor installation contractors shall coordinate floor installation schedule with installation contractors of network equipment.

3.17 Pedestals shall be 3-1/2" by 3-1/2" square steel tubing with 1/4" walls welded to steel plate base. Base dimensions 8" by 8" by 3/8" thick steel. Weld tube to base with minimum 1/4" continuous bead all around. Base to have four (4) ¾ inch diameter anchor holes drilled 1" offset from base centerlines. Corners of base rounded to 1" radius and all sharp edges eliminated. Base must be flat within 1/32" across full surface and tube vertical within 3/16" measured at top. Top of tube shall be covered with 3-1/2" by 3-1/2" by 1/4" steel plate with drilled and tapped holes in pattern for stringer bolts. The top plate to be spot welded to tube at centerlines of tube. Spot weld shall not protrude into tube facings. Each face of tubing to have drilled and tapped ½-13 diameter holes for top corner brackets and bolt-on attachments as shown on Figures in this document.

3.18 Clean surface of all dirt, oils and slag. Prime and paint with a final finish coat of gloss white enamel.

3.19 Pedestal base to be anchored to building floor with two (2) Hilti HSLB M12/6 anchors in High Seismic Risk areas or two (2) Hilti ½" HDI anchors in Low Seismic areas. Install anchors in the front to back direction of equipment lineup (narrow dimension of lineup). Anchor embedment in concrete is 3-1/8" minimum depth for the HSL anchors or 2 inches for the HDI anchors. All anchors must be tightened to manufacturer's recommended preload values, for Hilti HSL 12mm. anchors preload equal 65 ft. lbs., for Hilti HDI ½" anchors 22 ft. lbs. It is imperative that all anchor hardware above ground not have sharp edges or threads exposed to cause cable jacket cuts. Hardware covers or smooth capscrew heads on Torque-cap HSL anchors are acceptable.

3.20 Level pedestal base to compensate for floor unevenness. Use steel shims under base with shim surface covering at least 1/4 base dimension. Shims must provide support out to edges of pedestal base. Stacking of shims is acceptable if shim design will not slip under equipment load or floor vibration.

3.21 All fastener hardware used for floor system shall be minimum Grade 5 material. Capscrews must have head markings showing grade. Tighten capscrews to torque values of: (1/2" 25-30 ft. lbs.) (3/8" 20-25 ft. lbs.).

3.22 A reinforcement plate shall be provided under floor tiles where network equipment will be placed. The 23 1/8" by 23 1/8" steel plate shall be 1/4" thick with corner cutouts and sixteen (16) 3/8" drilled and tapped holes and two (2)1/4" holes. Sixteen (16) 3/8" studs are to be provided for insertion into tapped holes with 1 inch of exposed threads. In place of tapping holes and placing studs, welded studs may be provided on plate. Eight (8) additional holes are drilled at plate's outer edge for attaching plate to floor tile. Finish plate with gloss white enamel after cleaning and removing all sharp edges. Attach reinforcement plate to bottom of floor tile with eight (8) #12 self tapping screws.

3.23 Floor tiles and reinforcement plate shall be provided from floor manufacturer with precut cable access holes. Standard dimensioned cutouts as shown on Fig. 3-5 is used with typical unequal flanged frames or network bay frames. Specific cable opening locations may be necessary for other types of equipment placed on the floor system. The telephone company Equipment Engineer shall provide drawings for those cutout dimensions. Cable openings should not be greater than 1/3 of overall floor tile surface area if the tile is expected to support the frame weight. Cable opening cutouts should not be made to within 2 inches of tile edges as shown on Fig. 3-6.

3.24 Floor tiles with equipment frames straddling across more than one floor tile may have larger cable openings or cuts to edge since weight of equipment is supported by an adjacent tile.

3.25 Cable access holes shall be finished with trim to prevent cable cuts and insulation chafing. Trim around cutouts shall be flush or recessed with top surface of tile. Trim shall protect bottom as well as top edges of cutouts. Trim material shall conform to ASTM Standard D 2863-77 fire resistance requirements for mechanical elements.

3.26 Corner brackets to attach floor tile to pedestals shall be 1/4" thick steel wing brackets equal to Unistrut Part Number P2226. Attach one (1) bracket at each corner of the floor tile. Torque 3/8" capscrews to reinforcement plate to 20-25 ft. lbs. and 1/2" capscrews to pedestal tube to 25-30 ft. lbs.

E. FireStop

3.27 All openings through the floor system shall be closed to minimize smoke and flame spread between under floor and above floor areas. The openings shall be closed with minimum 14 gauge sheet metal plate and edges sealed with telephone company approved flame resistant putty. Fire rating is not required for closure, however, measures shall be provided to minimize migration of smoke and flames.

3.28 The floor tile reinforcement plate shall be provided with firestop slideplate fastened to floor tile reinforcement plate with two (2)1/4 pan head screws. Plate shall be painted with white enamel after cleaning and deburring of edges.

3.29 Cable openings for vertical cableracks between area under floor and overhead area shall be protected in accordance with Common Systems Through Penetration Fire Stopping Requirements, BSP 800-005-200MP.

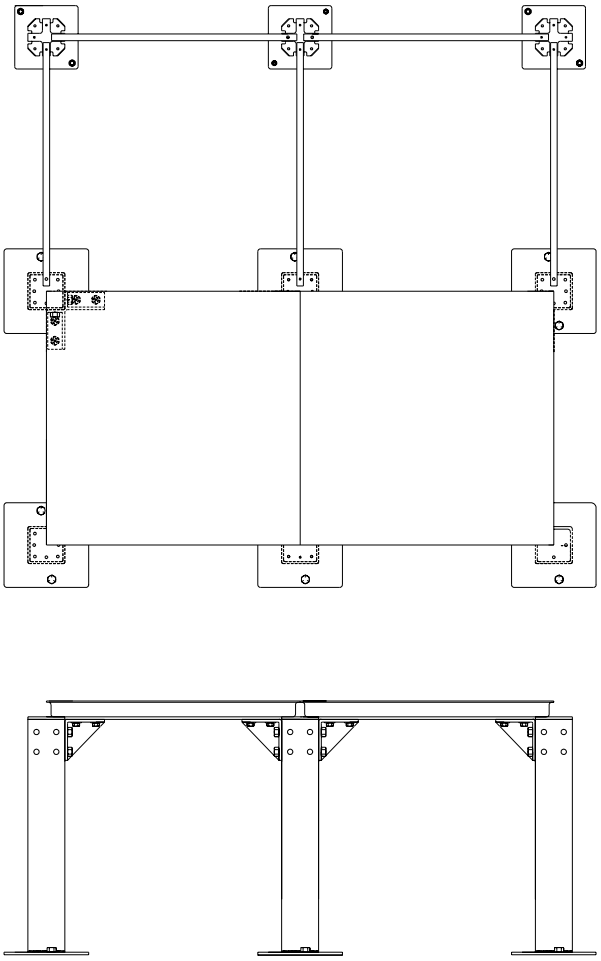


Figure 3-1 – Raised Floor System

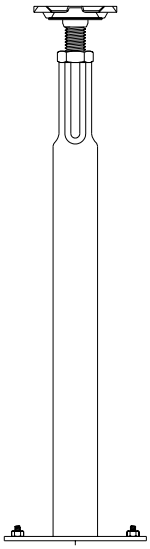


Fig. 3-2 - Light Duty Stanchion

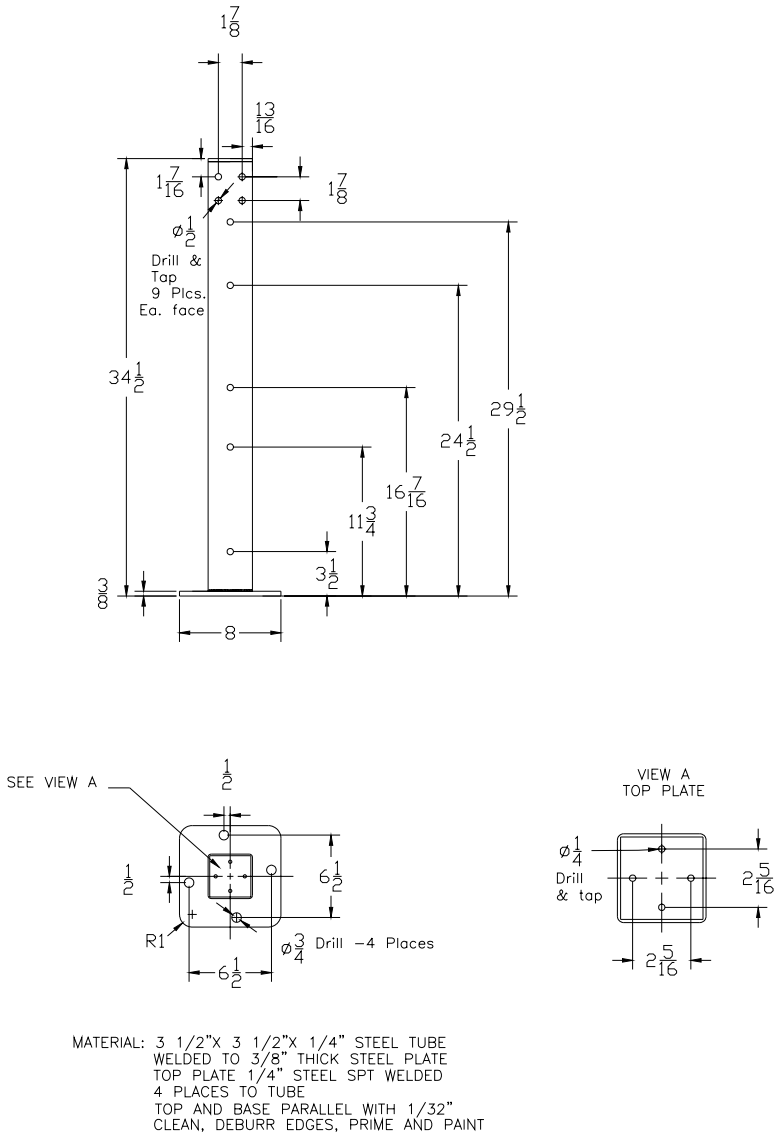
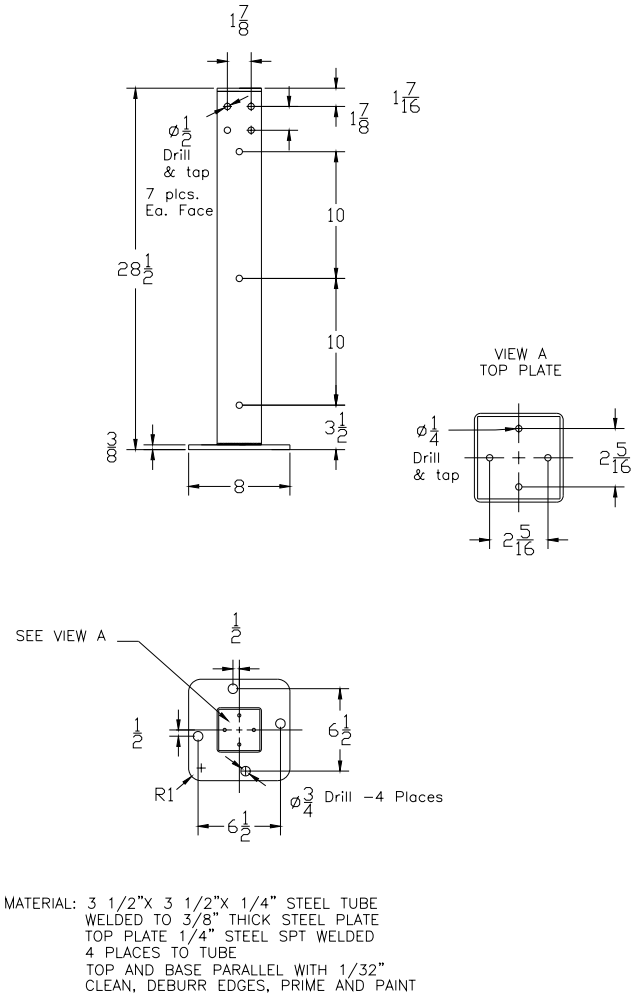


Fig. 3-3A - Heavy Duty Stanchion - 36 Inch Tall Floor



MATERIAL: 3 1/2"X 3 1/2"X 1/4" STEEL TUBE
WELDED TO 3/8" THICK STEEL PLATE
TOP PLATE 1/4" STEEL SPT WELDED
4 PLACES TO TUBE
TOP AND BASE PARALLEL WITH 1/32"
CLEAN, DEBURR EDGES, PRIME AND PAINT

Fig. 3-3B – Heavy Duty Pedestal - 30 Inch Tall Floor

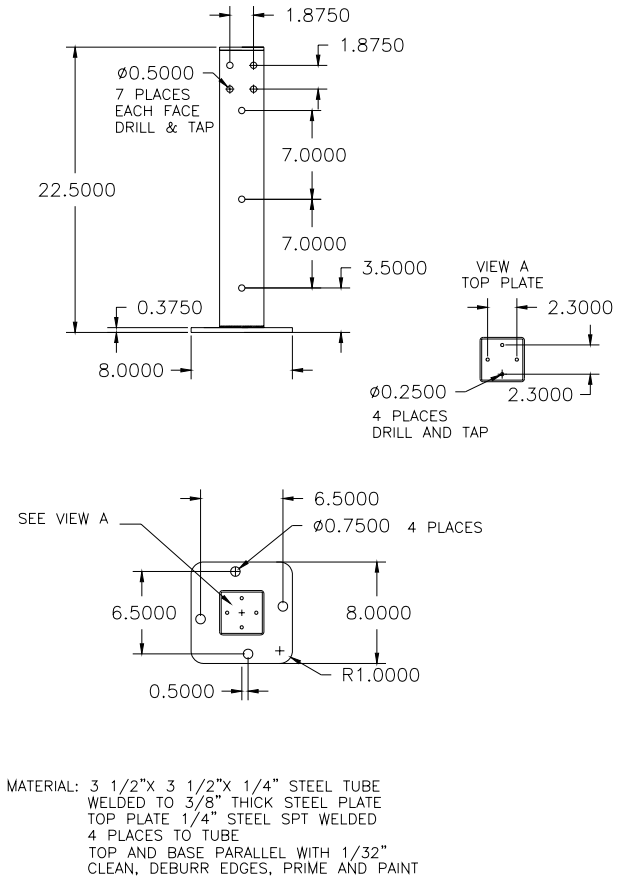


Fig. 3-3C – Heavy Duty Stanchion – 24 Inch Tall Floor

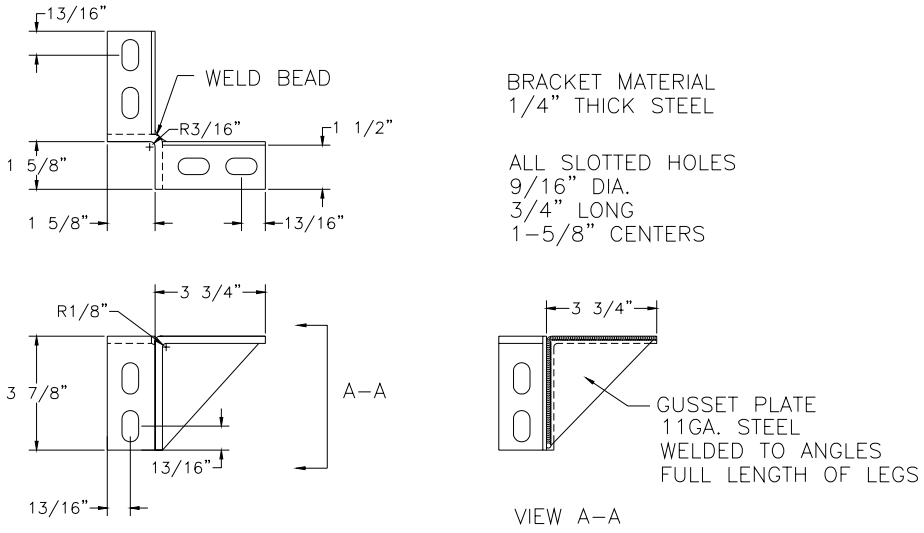


Fig. 3-4 Wing Bracket

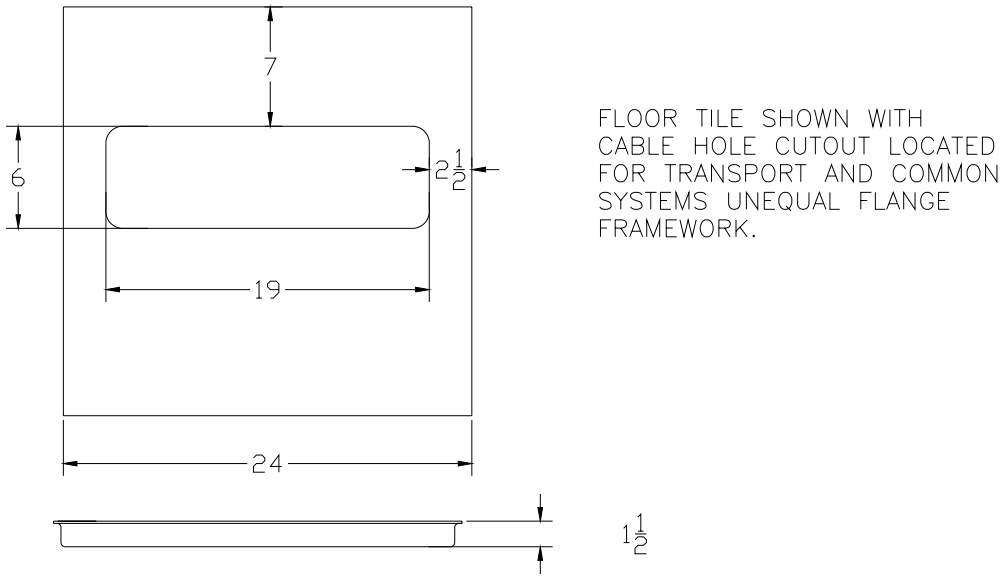


Fig. 3-5 Floor Tile Cable Cutout – Equipment Frames

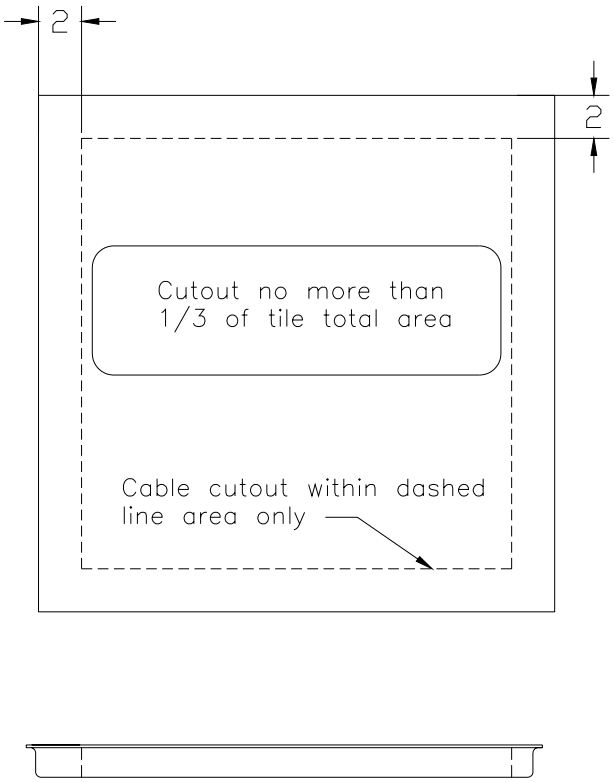


Fig. 3-6 – Cable Cutout Limits

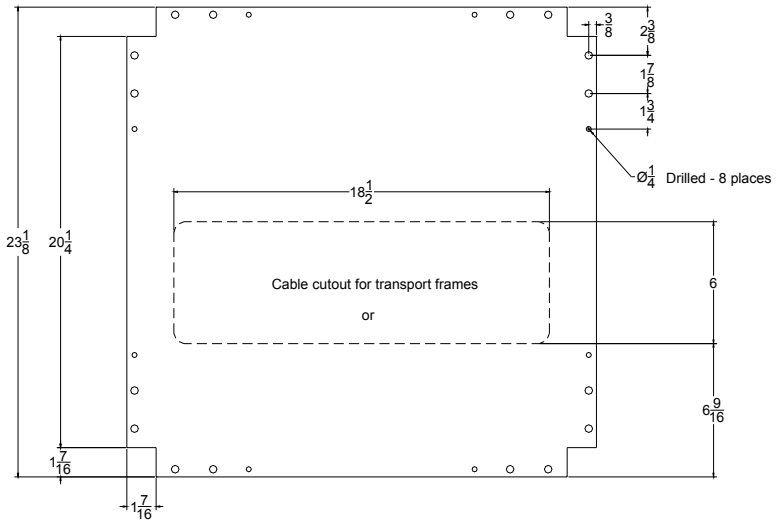


Fig. 3-7 – Reinforcement Plate For Floor Tile

4. FLOOR ACCEPTANCE

A. Reason for reissue

4.01 Reserved for future use.

B. General

4.02 The floor systems shall be installed in accordance to manufacturer's requirements and telephone company requirements stated within this document. Procedures for working within a telecommunications equipment building must be in accordance with the TP76300 Installation Requirements.

4.03 Floor system manufacturer and installer shall provide drawings and installation instruction notes to telephone company for approval prior to production and installation. Telephone Company engineer will designate floor start reference point. Use provided reference point for layout of floor.

4.04 Final acceptance of floor systems will be conducted upon completion of network equipment installation. Floor tiles or stringers that may have been moved, altered or otherwise modified shall be inspected for compliance to floor levelness, adjacent panel fit, rocking or noise. If adjustments are necessary, the floor installation contractor shall correct if determined to be initial floor installation problem or corrected by network equipment installation contractor if floor was modified. Prior to network equipment installation, floor installation contractor shall file a floor condition report and Telephone Company will conduct preliminary acceptance.

4.05 Following the installation of the floor systems, the area under the floor system shall be cleaned of all concrete dust and other debris. Concrete dust is to be removed with equipment that does not introduce concrete dust into room. Top surface of floor tiles is to be cleaned of dust, markings, scuffs and dirt. All extra installation materials are to be removed from under the floor and equipment room and disposed of. Extra pedestals, stringers, tiles and hardware are to be removed from site unless specific spare quantities have been designated for the project.

4.06 All floor systems shall be finished at walls, around columns, ramps and stairs with base coving to color specified by the telephone company Engineer. Coving material shall be installed so there are no exposed floor openings or gaps.

C. Labels and Signs

4.07 Under floor equipment may require labeling or obvious identification on floor tiles to locate devices. Some of these devices include smoke detection heads, water valves, network equipment ground bar or shut off devices. The marking may be lettered sign hung overhead of device or color coded floor tile. The Telephone Company Engineer for the specific project will describe these requirements. The floor installation contractor shall provide the labeling as required.

4.08 Labeling on floor panel shall be with method appropriate for high foot traffic and will not wear using methods such as laser etching and silk screen lettering onto floor panel laminate.

D. Spares and Floor Accessories

4.09 A number of additional floor tiles with high pressure laminate of the same color and pattern of installed tiles shall be provided as spares. The quantity to be provided is ten (10) as a minimum for approximately every 3000 square feet. For larger floor areas the number of tiles shall be increased accordingly.

4.10 Additional numbers of conventional access floor pedestals and adjustment heads for aisle spaces shall also be provided. The quantity to be provided is four (4) for every 3000 square feet.

4.11 Floor tile pullers shall be provided for every site. A minimum of two (2) suction cup pullers shall be provided for every 3000 square feet. The floor tile pullers must be housed in a wall-mounted holder near each main entrance or door to room.

5 EQUIPMENT FRAMEWORK

A. Reason for reissue

5.01 Reserved for future use.

B. Equipment Framework

5.02 Equipment framework installed on a raised floor system shall be similar to frames currently used when mounting to building concrete floor. There are no differences to the frames except where cables are fed into the frameworks. A modified base guard box will be necessary for base cable entry.

5.03 SBC approved Zone 4 unequal flange framework shall be applied for transport and miscellaneous equipment in accordance to PAN #20011016. Earthquake qualified framework manufactured by other vendor sources may be applied where base extension and end cover details have been developed for raised floor environment.

5.03 Equipment frames are to be secured to floor system by four ½ inch diameter through bolts to the floor panels as shown on Fig. 5-1. Securing must be to floor panels that are rigidly bolted to floor pedestals. Floor panels not bolted to floor pedestals could lift and cause equipment to overturn. Floor panels must also have reinforcement plate on bottom of panel.

5.04 For cable access through floor system, a cable extension guard box is mounted to rear of equipment framework for entry of cables into framework per Fig. 5-2. Cable hole in floor panels do not necessarily need to be directly aligned with guard box locations.

5.05 Hendry frameworks are available with the following details for use on raised floor:

Table A
Framework Accessories for Extended Depth Framework

Description	***Hendry P/N***
Guard Box UF, 23" RR 25-15/16" x 6"H x 8"D	02320-1301
13" End Shield 7-0"	02320-1304
13" End Shield 9'-0"	37565-01

5.06 All junction hardware normally used with equipment frameworks shall be applied between adjacent frames.

5.07 For technologies such as digital switches, the equipment frameworks will be the manufacturer's proprietary designs requiring cable access accessories developed by them. These frameworks should be purchased for installation on a raised floor environment and cable entry from below the floor.

5.08 Northern Telecom DMS-100 earthquake framework shall be equipped with 6 inch extension kit, NT0X25BB, and 24 inch deep end panels. Mechanical frames are not required when switch is installed on seismically qualified raised floor system when raised floor system is on ground level of building. ENET and Super Node cabinets do not require frame modification when applied to raised floor environment.

5.09 Lucent technologies 5ESS Switch frames do not require modifications for application on raised floor systems. Secure 5ESS frames to floor panel by through bolting with ½-13 fasteners.

5.10 Refer to DC power section on BDFB framework requirements and installation onto raised floor.

C. Spare Equipment Storage

5.11 Spare equipment storage cabinets shall be installed in PICS Storage Room on concrete floor.Spare equipment storage cabinets placed on raised floor shall be installed on reinforced modular floor and through bolted to floor tile as described for framework in BSP 800-000-103MP. Only ESD and seismically approved cabinets with floor anchoring provisions shall be applied on the raised floor environment.

Table B
Approved Storage Cabinets

Vendor	***Model***	***PID No***
Drake Telephone Products Represented by Silton Cases	Terminator 1115", P/N TS-I 1-15	000 408 229
	Terminator 1118", P/N TS-II-18	000 408 211
Hendry Telephone Products	Item 18117-01+64	000 408 195
	Item 18117-02+64	000 408 203
Electronic Enclosures	Item 29210-15" Deep	000 408 179
	Item 29210-18" Deep	000 408 187

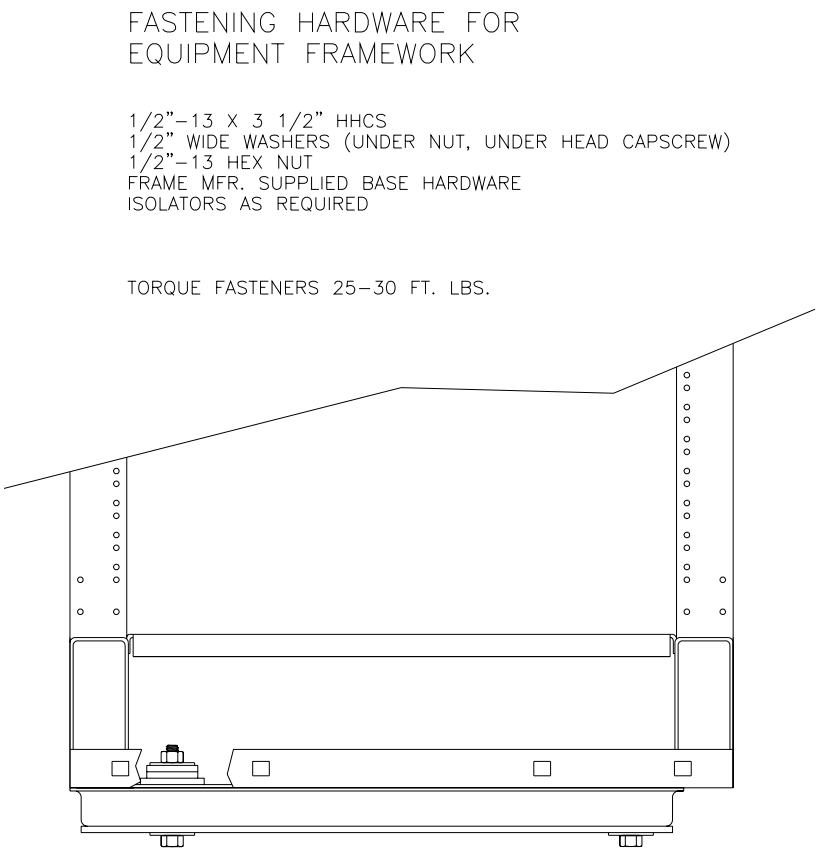


Fig. 5-1 – Framework Securing Detail

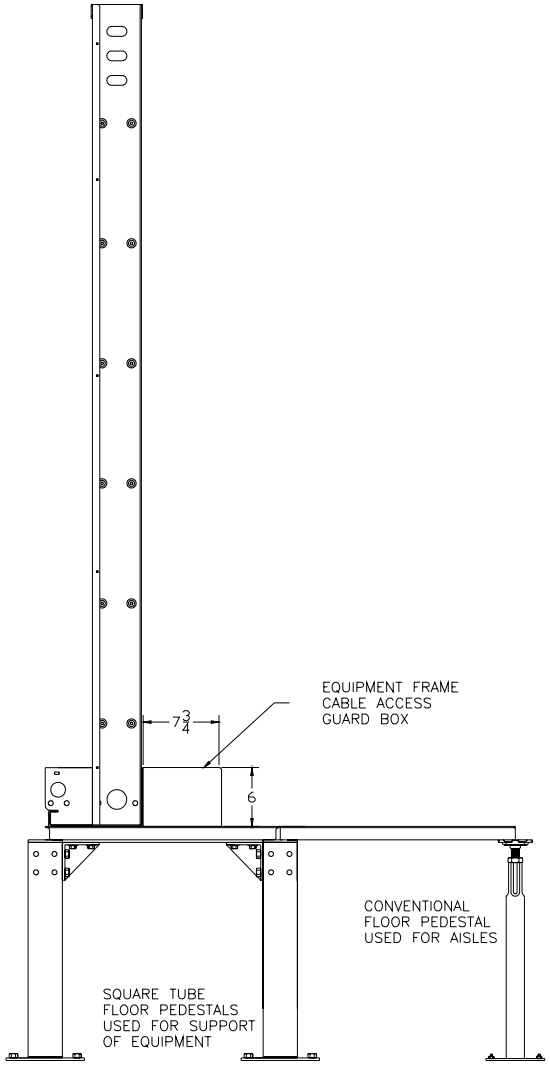


Fig. 5-2 – Cable Access Guard Box Location

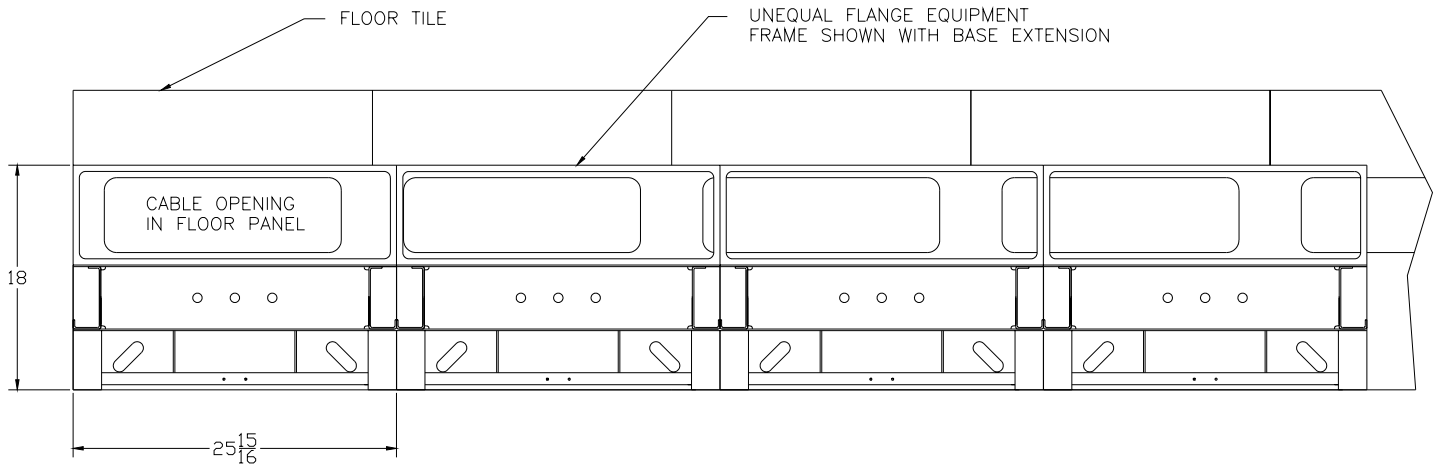


Fig. 5-3 – Location of Cable Openings

6 OFFICE DISTRIBUTING FRAMES

A. Reason for reissue

6.01 Reserved for future use.

B. General

6.02 This topic will be addressed in future issues of this Section.

7 SPACE PLANNING

A. Reason for reissue.

7.01 Reserved for future use.

B. General

7.02 Raised floor systems or access floors are used in the equipment environment for installation of network equipment and peripheral equipment with under-floor cable management.

7.03 It should be noted that raised floor is an approved architecture by the NP&E Leadership Team and Corporate Real Estate. Raised floors architecture must be considered as the first choice when planning a new central office or building addition. *When deployment of the raised floors environment is not possible, the justification for non-compliance should be documented.*

7.04 The physical installation location for all equipment requiring office floor space shall be obtained from the common systems space planners BEFORE the equipment is placed into the building.

7.05 This part contains generic guidelines for developing and managing ideal equipment layouts on raised floor for single and multi-floor equipment environments. To the degree practicable, more detailed office layout information is provided in BSP 800-003-100MP.

C. Space Planning Guidelines

7.06 Recommended Office Layout Development Procedure

- Block Out Major Components of the building and of the network (e.g. Distributing Frame Area, Switching Equipment Area, Transport Equipment Area, Battery Area, Maintenance Area, Equipment Loading Area, Storage Room, Standby Power Room, Air Conditioning Plant, AC switch gear etc.)
- Identify potentially High Heat Release Areas and equipment
- Identify major Cable Path (primary) for power and network interconnection
- Identify Any Physical Special Situations that may impact equipment placement
- Identify primary people Traffic Pattern and work area needs that may affect Aisle Spacing
- Identify possible Collocation Areas
- Establish people Egress and Ingress Paths
- Locate like technologies in a common area; keep in mind that everything *but* switching equipment is installed in the transport equipment area(s) of a network facility
- The office distributing frame function should not be dispersed throughout a building
- Fiber multiplexing equipment shall be located in a common area adjacent to the office fiber optic distributing frame.

7.07 Fiber and copper office distributing frames shall be located at the OSP Cable Entrance Facility of the raised floor area (standard practice for office distributing frames).

7.08 Frame positioning should be ¼ inch from the edge of the tile (end and front) to allow for easy tile removal or replacement.

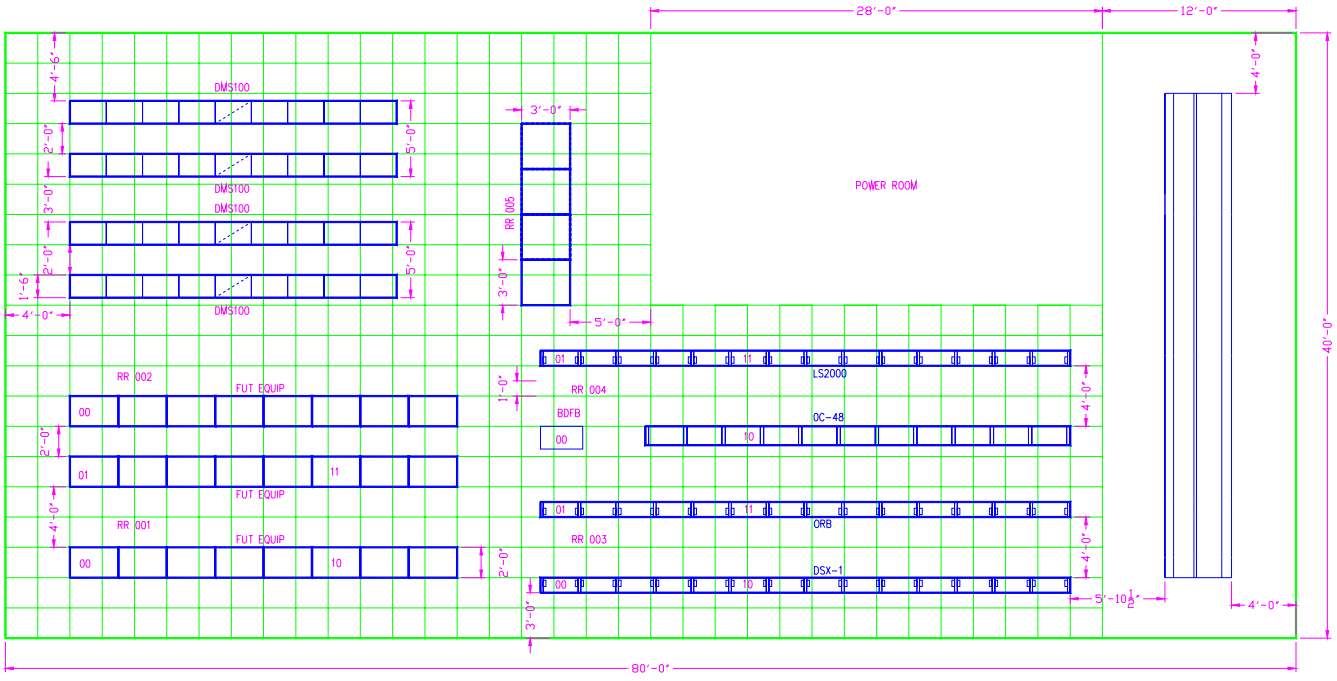
7.09 BDFB will be centrally located among the equipment they serve on main/end aisle closest to the office power plant. BDFB location(s) will generally establish where transport equipment area 4’-0” main cross aisle located.

7.10 The construction techniques used in manufacture of cables cause them to be difficult to bend and work with in a confined underfloor environment. The aisle spacing, therefor, is the pivotal consideration used when developing new floor plans. Aisle spacing may also be related to location of equipment lineups to building features such as perimeter wall, partitioning walls, building columns, cable floor openings, caged partition, etc.

The "objective" for aisle spacing shall be 4'-0" front (two floor tiles) and 2'-0" rear (a minimum of one removable floor tile along rear aisles). The wider aisle spaces enable more efficient equipment heat dissipation, should mitigate equipment floor loading considerations, enables the use of wider lineup cable trough to control cable pileup, maximizes access capabilities to the underfloor work environment, and provides plenty of room for equipment and network management activities.

7.11 For equipment layout purposes, the frame depth to be considered as 2'-0".

7.12 Figure below illustrates the generic office floor plan model provided to assist planners with developing site specific floor plans and managing equipment growth and rearrangements in existing network facilities. The generic models represent the optimum *relative* location of network technologies with regard to each technology's *primary network interface*. The figure below provides equipment layout with preferred aisle spaces where equipment of various depths will be deployed.



7.13 Caged collocation shall be placed where equipment floor tile strength is beefed up to meet the floor loading requirements of 150 #/SF. Floor loading of equipment frames is calculated by dividing the equipment's maximum installed weight by the area of a rectangle bounded by the equipment's sides and the center of the equipment's minimum front and rear aisle space.

7.14 Because the construction techniques used in the raised floor environments, it is important to understand the *amounts* and *types* of cable that are required to place equipment into service when making space planning and equipment location decisions. New equipment should always be placed as close as possible to its primary network interface to minimize the linear footage of interconnection cable required and the cable's resulting impact on the underfloor cabling. For some equipment the primary network interface may be a technician's workspace, but usually it is the network element to which the bulk of the equipment's interconnection cable will be routed to. The volume and type of cable associated with the various equipment technologies is generally what adversely affects underfloor congestion.

7.15 All equipment planning efforts shall include adequate growth considerations for HVAC, AC switchgear, miscellaneous storage space, equipment administration and maintenance space, as well as the network equipment elements themselves. Specific floor plans may vary with specific requirements.

7.16 The interconnection relationship of network elements at their fundamental level is provided in the BSP 800-003-100MP.

8 DC POWER

A. Reason for reissue

8.01 Reserved for future use.

B. DC Power Engineering

8.02 Traditional DC Power Plants (rectifiers, batteries power boards, generators) will continue to be placed on standard concrete floors. Currently this section only applies to power equipment that may be placed within the network element area. This equipment may include BDFB's, ring plants and converter plants.

8.03 If a new power plant is planned for the space included in the building addition, appropriate coordination between NP&E and CRE must occur to insure that the floor space for the power room follows our current guidelines for traditional space build-out.

C. Primary Power Engineering Provisioning

8.04 Floor space planning will dictate equipment orientation and physical placement. Primary power feeds are considered part of the cable backbone network and has priority in a raised floor environment for specific space allocations. With that priority, immediate space restrictions shall be followed to insure that cable blockage and restriction does not occur. Failure to follow these methods will result in blocked or capped cable paths potentially making an area unusable or highly expensive to serve.

8.05 In the Transport and Data equipment arena, current practices of supplying primary power for BDFB's is based on demand management. The current M&P for Power Planning Forecast indicate that in-service BDFB's should reach 80% physical capacity or 50% ampacity capacity before triggering an additional BDFB. With proper cable management, this method shall continue to be used in the raised floor environment.

D. Prime Power Cable Methodology

8.06 Primary cable pathways will be defined and designated in conjunction with the floor space planner. Once established, these pathways will be the primary/exclusive-designated paths for all primary power applications. These primary pathways shall be restricted to the main and cross aisles and not in the equipment aisles. This will provide further assurance for access and growth of future prime power cable. This methodology shall apply to both transport/data and switch environments.

8.07 Current practices recommend that standard CK5482 (or KS equivalent) shall be used for the body of the required power cable. However, due to cabling constraints and bending radius, cable transitions from standard CK5482 to CK20921 flex (or KS equivalent) shall occur at the immediate break off point to BDFB or Network Element. This cable transition should occur on a cable rack so the device can be properly secured to the rack[1]. Cable sizes may also be reduced at this point as well, assuming ampacity requirements will continue to be met.

[1] Section K 4.4.5 All H-Taps, butt splices, and other forms of power cable transitions shall be stitched in a manner that encompasses all the power cables included in the delivery of power to the network element. The stitches shall be from three to six inches from the transition devices. Any bend of any connected cable will be past this stitch with a radius of 7 times the cable diameter or greater. Cable bends shall be formed before crimping the transition device and after the cable is stitched to avoid placing stress on the connection. The completed package will become a self-supported object to insure the security of the cable transition devices.

E. BDFB Methodology

8.08 BDFB's will be centrally located among the equipment they serve on the main/end aisle closest to the office power plant (equal number of lineups to the front and rear of BDFB's). This will enable somewhat even disbursement of secondary power cable along main aisles minimizing congestion at main aisles around BDFB's. BDFB location(s) will generally establish where transport equipment area 4'-0" main cross aisles are located.

8.09 With the demand management methodology of BDFB placement, it is difficult to predict how often BDFB placement will occur. Generally, BDFB's may be approximated at every three aisles. Equipment aisle length and served equipment can easily augment that approximation. The placement of tandem (side by side) BDFB's shall be avoided due to cable congestion issues. The BDFB shall be placed on the end of a serving aisle. This will allow an unblocked serving path (of feeder cable) to the BDFB in the event additional loads must be provisioned within the existing BDFB.

8.10 Modern BDFB's are designed to transform from paired loads to multiple (4 to 6) loads. For example, in the event a 2 load BDFB has reached its capacity limitation but a sizable amount of fuse positions still exist, the internal charge bar can be segregated into multiple loads, allowing the new loads to be fed with additional cable from a new primary fuse at the power board. Having the ability to support additional loads within the existing footprint remains an important condition in retaining a cable pathway to support future growth and to fully utilize the in-place BDFB.

8.11 Within this new environment, all power cable will be placed under the floor. In doing so, any BDFB in the raised environment must be designed for bottom feed/distribution and be equipped with an internal ground return bar. This method applies to raised floor environments only and top fed external bar BDFB's are still considered best practice in traditional environments.

F. BDFB Engineering

8.12 Placement of power cable and racking serving the BDFB will continue to be the responsibility of the Power Equipment Engineer.

8.13 The current BDFB supplier base has provided the following BDFB models that meet the SBC technical requirement for this type application. These BDFB's are for raised floor environments only.

Vendor	Mod. #	Dimension	Cable Slot Size	Loads	Positions
Peco	NA	7'6X16"X30	10.75X23.75	2	120
Peco	NA	7'6X16"X30	10.75X23.75	4	120
Tyco	108774712	7'6X16"26	12X24	2	120
Tyco	108660861	7'6X16"26	12X24	4	120
Marconi[2]					

8.14 To provide access to the bottom of a BDFB, floor tiles must be cut to allow for the flow of power cable. These floor tiles can be modified on site or purchased pre-cut from the manufacturer. In the event that the tiles are cut on site, all cut edges must be rounded to reduce the potential of cable chafing during installation.

[2] Marconi does not currently manufacturer a bottom fed/internal return bar Vortex BDFB. Once the product becomes available, it will be added to the list. In the mean time, alternatively listed vendor products should b e utilized.

G. Switching Equipment Methodology

8.15 Current practices dictate that Switching Engineers provide for power cabling and rack arrangement to the power plant from the switching equipment area for new and growth job applications. That practice will not change in the raised floor environment.

8.16 Switching applications shall also follow the "Prime Power Cabling Method per.8.201" for power cables.

8.17 As with BDFB applications, switching jobs shall also utilize the standard CK5482 (or KS equivalent) cable for the body of the required power cable.[3] However, due to cabling constraints and bending radius, cable transitions from standard to CK20921 flex (or KS equivalent) shall occur at the immediate break off point to designated switch power distribution (PF) frame. Cable sizes may also be reduced at this point as well, assuming ampacity requirements will continue to be met. This cable transition should occur on a cable rack so the device can be properly secured to the rack[1]. Cable sizes may also be reduced at this point as well, assuming ampacity requirements will continue to be met.

H. Secondary Power Provisioning Methodology

8.18 All secondary power cable shall have utilize designated cable rack. Shared rack between switchboard and secondary power is not acceptable in the raised floor environment.

I. Secondary Power Engineering (including BDFB distribution, Ring Plants and Converter Plants)

8.19 Secondary power feeds including cable rack are the responsibility of the Equipment Engineer that has responsibility of the Network Element being installed. Distribution power cable shall be placed on equipment aisle secondary power cable racks. Secondary power cable may run free of cable rack only, in the following situations:

- When leaving the BDFB to serve equipment needs on concurrent and adjacent equipment aisles.[4] Once in the aisle, the power cable shall be placed on the aisle power cable rack. See Figures 8-3, 8-4.

- Transitioning from the serving secondary power cable rack will be a free air transition to the first attachment at the base of the network element.[5] If this free air transition is greater than 36 inches, the power cable shall be supported.

- Secondary power cable shall never be run on primary power cable rack.

The use of transition devices (H-taps, butt splices, barrel taps) is acceptable in the secondary power provision, so long as the transition occurs on the cable rack and can be secured[1].

8.20 Secondary power cable rack is placed based on need and will not be pre-provisioned for an entire aisle. However, the installation vendor shall be responsible for the placement of secondary power cable rack as it applies to the job being performed. Cable rack shall be placed in full-length complements (10'). If secondary power cable rack resides at the specific location the new bay is being placed. No additional rack is required. Exceeding the free-air drop in any manner other than in a perpendicular off the cable rack is not acceptable.

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[3] As contractually stated, Nortel may continue to use the NPS90508-3 power cable. Also see TP76400MP Section 7 par.4.1.
[4] TP76300MP Section J 2.4.10 Cable and wire shall be banded halfway between the cable rack and first support on the frame or bay when distances exceed 3 feet.
[5] TP76300MP Section J 3.2.1 Power cable leaving cable racks, supports, and entering frames, racks or other equipment shall be supported at least every 3 feet.

8.21 The use of banding devices (Velcro, 12 cord) shall be utilized to manage and condense secondary power cable that is transitioning from rack to rack (i.e. free air zones). These banding devices shall be used in applications where 4 or more cables are following that free air pathway. The vendor placing the forth cable (or greater) shall be responsible for securing the cable path with the banding devices. [4]

J. Transitioning from Traditional Floor Space to Raised Floor Space

K. Power Cable Rack

8.22 Power cable racks shall be placed in main cross aisles and around the perimeter of equipment area to minimize number of intersections with general use cable racks. Accordingly, BDFB's shall be at the end aisles around perimeter of the equipment area.

8.23 To insure that adequate space is allowed for primary power cable growth, the floor space planner will provided for an auxiliary path for primary power cable. This auxiliary path will only be utilized after the primary path has been determined to be exhausted.

8.24 Primary power cable racks will utilize traditional 15" ladder rack having 1-1/2 inch by 3/8-inch stringers and 1 inch by ½ inch straps. Primary power cable will continue to be attached and laced to cable rack as defined in TP76300MP Section J, paragraph 3.

8.25 Cable pile-up is a serious concern in primary power cable and cable stack up shall not exceed 7" in height measured from cable the rack rung to the top of the last course of power cable.

8.26 Cable rack intersections shall be minimized to avoid cable crossing and need for bridging cable rack due to restricted vertical clearance.

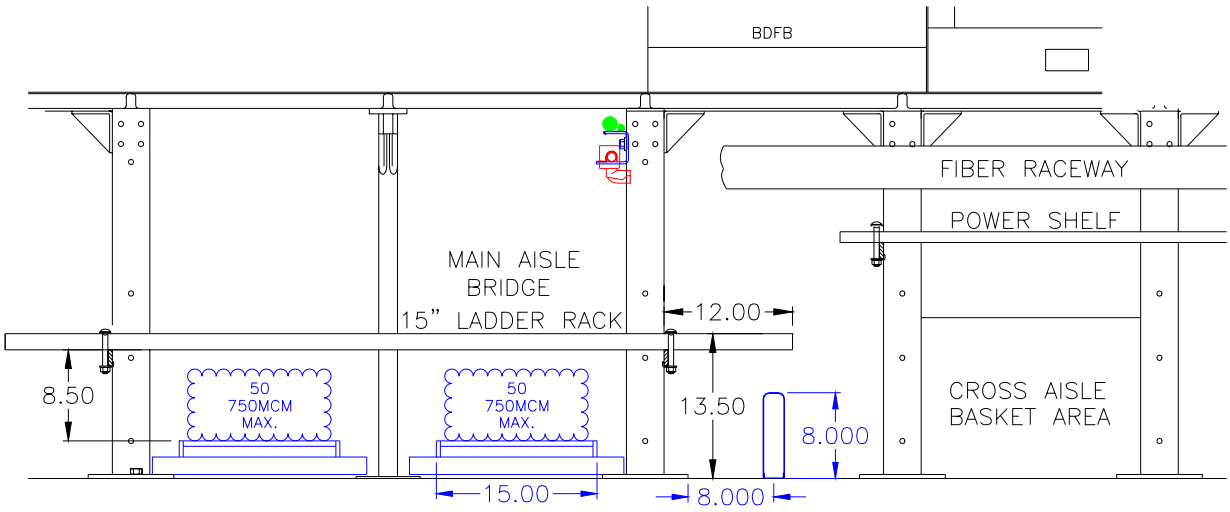


Figure 8-1. Cable Bridge over Primary

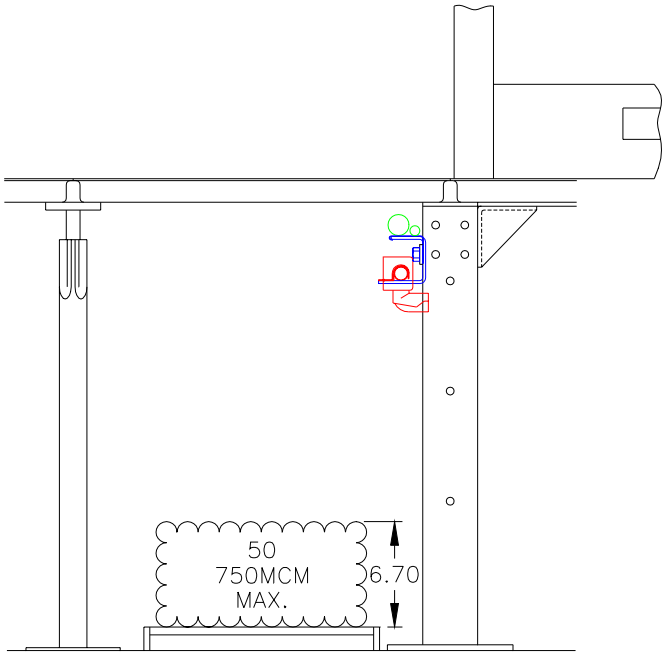


Fig. 8-2 – Main Aisle Primary Power Cable Rack

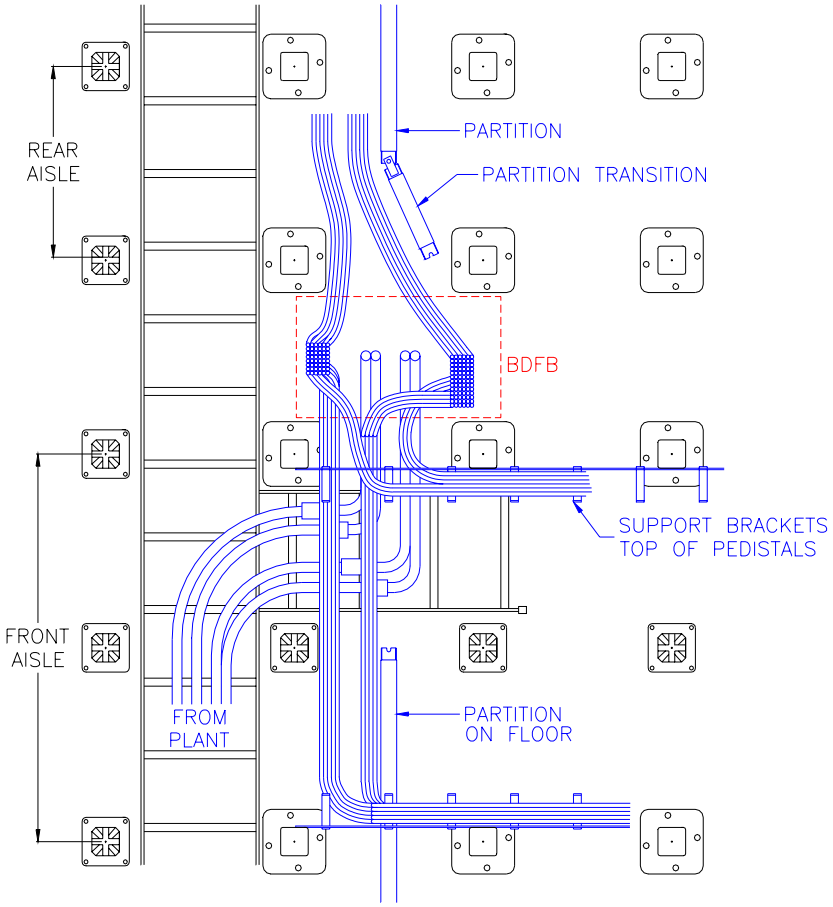


Fig. 8-3 – Top View BDFB Power Cabling Management

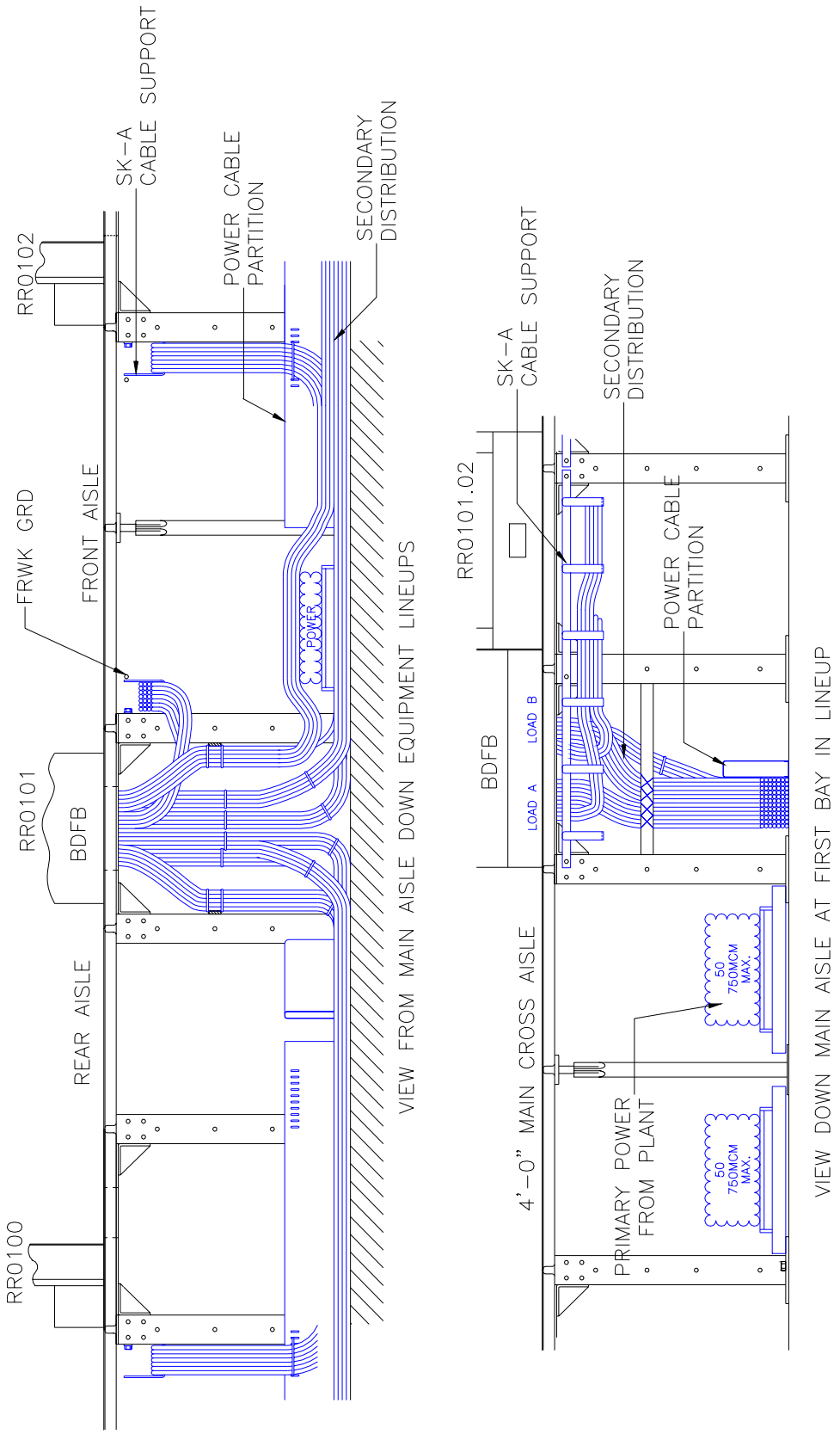


Fig. 8-4 – Side View BDFB Power Cable Management

9 BONDING AND GROUNDING

A. Reason for reissue.

9.01 Reserved for future use.

B. General

9.02 The SBC standard for Grounding and Bonding is BSP 802-001-180MP (Grounding and Bonding Requirements for Telecommunications Equipment, Power Systems, Central Offices and Other Structures). This section is a supplement to that BSP and is intended to address network equipment and infrastructure issues that are specific to raised floor installations. Otherwise all design, installation, material and methods outlined in BSP 802-001-180MP are applicable. Where BSP802-001-180MP and this document conflict, the wording in this document shall prevail.

9.02 The design for the horizontal equalizer serving the transport area in a raised floor environment differs slightly from conventional designs and borrows from the ring architecture that is currently used for CO Grounding Electrode Systems and for radio equipment installations. A sketch of the proposed design is shown in Figure 9-1 for the maximum area (200’ x 200’) served by a single COG. Features of this design include:

- A 350 kcm horizontal equalizer placed around the perimeter of the raised floor area and connected to the COG via two, 350 kcm conductors that are also part of the horizontal equalizer. The location where these two conductors intercept the ring shall be marked above the raised floor. See Figure 9.1.

- The 350 kcm ring negates the need for a separate #6AWG ring for bonding of the raised floor.

- Two parallel paths from any fault location back to the COG.

- The 350 kcm ring horizontal equalizer has approximately twice the resistance of a 750 kcm but the parallel connections result in a resistance equivalent to that of a single 750 kcm. For smaller COs, the 350 kcm horizontal equalizer can be reduced in size as long as the requirements of section 9.3 are met.

- Connections from the COG to the vertical equalizer and MGB remain the same as with a conventional (non raised floor) design.

- The maximum area served by a COG is the same as for a non-raised floor installation (200' x 200').

- In order to facilitate connections to the COG, the COG will be located beneath the raised floor where the COG can be accessed from any direction. The under floor location of the COG shall be marked above the floor.

- The horizontal equalizer cables can be installed at the time the raised floor is installed with no future additions required unless the raised floor area is expanded.

- The pedestal and stringers are bonded to the 350 kcm horizontal equalizer at each corner of the floor and approximately every 20' around the perimeter. The grid formed by the pedestal and stringers provides an effective potential ground reference for frequencies up to 20MHz.

- The physical location of the horizontal equalizer ring will be the same in every office (around the perimeter of the raised floor area) and will be easy to locate by technicians and engineers.

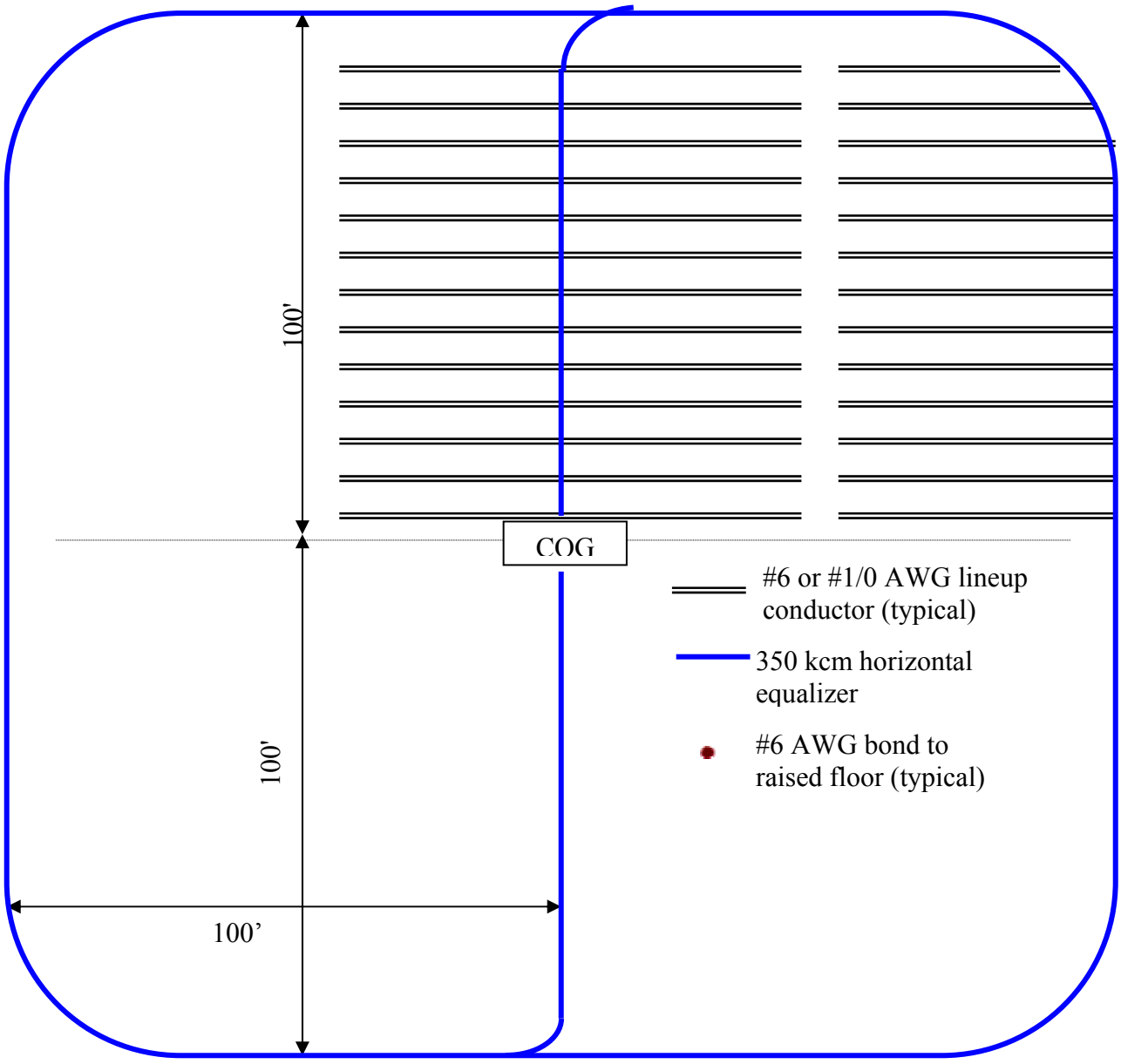


Figure 9-1. Grounding System Layout for a Raised Floor Area

C. Raised Floor Design

9.03 All conductive components of the raised floor system (pedestals, stringers, ladder racks brackets, etc.) are part of the Common Bonding Network (CBN). (See section 11 for various illustrations of raised floor system components).

9.04 Although the bottoms of the floor tiles are conductive, they cannot be considered a reliable component of the grounding system. When tiles are in place, the contact between the floor tiles and pedestal / stringer is uncertain due to the possible intrusion of foreign material between the tile and pedestal / stringer and due to the uneven pressure of the tile on the pedestal / stringer. When tiles are not in place, there is an obvious loss of electrical continuity.

9.05 Within the area of the Isolated Bonding Network (IBN), the raised floor system will be treated as a foreign object and shall be bonded to the CBN side of the MGB with a #6AWG.

9.06 All equipment frames installed within the IBN shall be insulated from the raised floor system and all other CBN conductors or ironwork.

9.07 Grounding conductors connected to IBN equipment frames must not make electrical contact with the raised floor system or other CBN conductors or ironwork.

9.08 Connections from the equipment frames to the lineup grounding conductors will be made in an area approximately 6" below the floor tile.

9.09 The mating surfaces of raised floor bolted connections should be cleaned of paints, finishes, films, grease and dirt.

9.10 All pedestal-to-stringer connections shall have an electrical resistance of less than 0.1 milliohms. (This can be verified with a milliohmeter).

9.11 Although the bottom of the floor tiles are conductive, the floor tile-to-pedestal contact can not be considered to be a reliable electrical path. This is due to the uncertain and uneven pressure of the tile on the pedestal / stringer and due to the possible intrusion of foreign material between the tile and pedestal / stringer.

D. Grounding System Design

9.12 For any ground**ing** conductor that requires insulation, the color of the insulation shall be as follows:

Operating Company	Insulation Color
Ameritech	Green
Pacific Bell/Nevada Bell	Green
SNET	Black
SWBT	Green

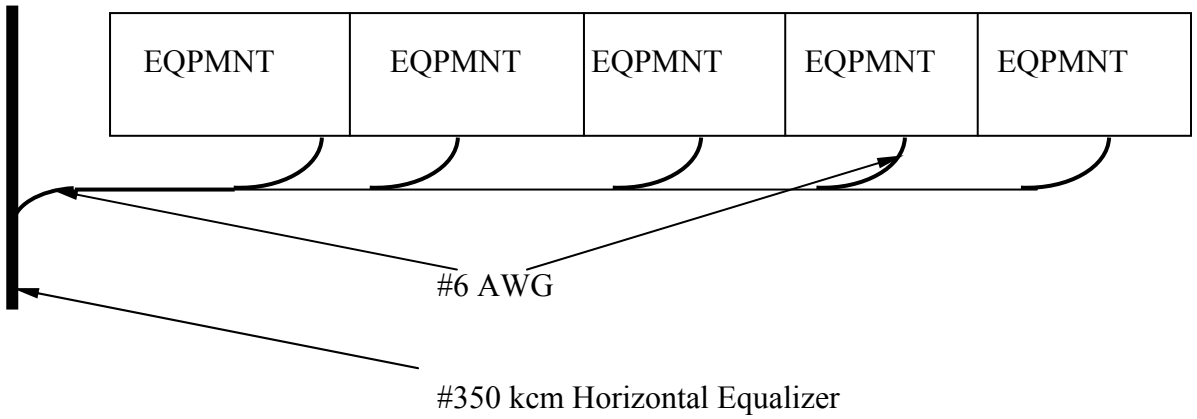
This insulation requirement does not apply to the battery (-48V) or battery return (ground**ed**) conductors.

9.13 A minimum #6AWG shall be used to bond the raised floor infrastructure to the horizontal equalizer. This bond shall be made near each of the extreme corners and every 20' around the perimeter. At the raised floor system, the bond shall be made with a two-hole compression connector to the stringer tile-support that is attached to the wall. At the horizontal equalizer end of the bond, and where this bond is near a lineup conductor, the bond can be made to the lineup conductor. Otherwise the bond shall be made directly to the horizontal equalizer.

9.14 If a bond cannot be made to the stringer support that is attached to the wall, a pipe clamp similar to Burndy type GAR-TC ground connector shall be used to bond the grounding ring to the nearest administrative-type pedestal.

9.15 The minimum size grounding conductor for equipment lineups in the CBN is a #6AWG for lineups that do not have a BDFB. See Figure 9-2. For lineups that do have a BDFB, the minimum size is a #1/0 AWG. These sizes are based on the maximum fault current likely to be present and the requirements of the National Electric Code, Table 250.122 (Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment) of the NEC (2002 Edition).

Figure 9-2. Grounding Conductors in a CBN Equipment Lineup without a BDFB



9.16 Lineups that serve both BDFBs and equipment frames shall have a minimum of a #1/0 AWG grounding conductor from the BDFB frame to the Horizontal Equalizer. The grounding conductor can then taper to a #6 AWG conductor to serve the balance of the equipment frames in the lineup. See Figure 9.3.

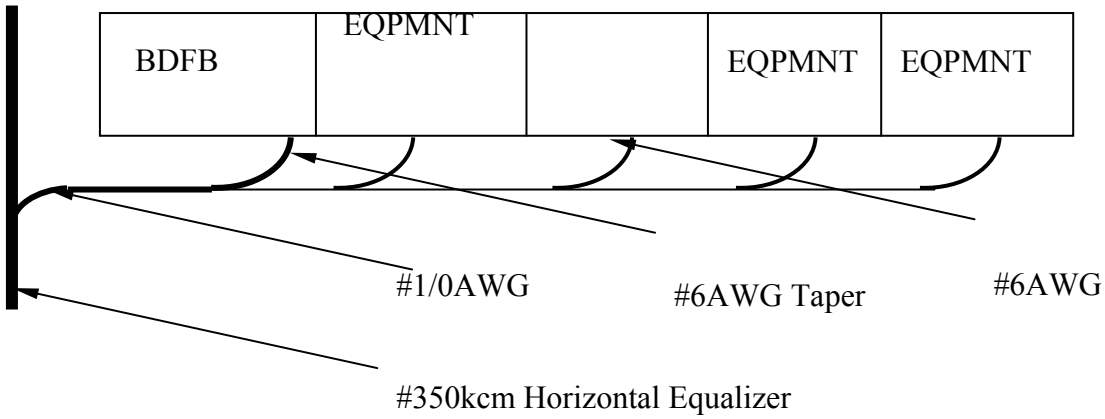


Figure 9.3. Grounding Conductors in a CBN Equipment Lineup with a BDFB

9.17 If a BDFB is added to an existing equipment lineup with an existing #6AWG grounding conductor, a dedicated #1/0 AWG shall be installed from the BDFB frame to the horizontal equalizer.

9.18 All equipment frames (non BDFB) shall have a #6AWG bond between the frame and the lineup grounding conductor.

9.19 All cable racks and other iron work beneath the raised floor shall be bonded to the horizontal equalizer with a minimum #6AWG. Those racks or ironwork in close proximity to primary DC power distribution shall be bonded to the horizontal equalizer with a minimum #1/0 AWG. In this case, “close proximity “ means where the cable racks or ironwork could reasonably come in contact with primary power conductors.

9.20 The maximum length of a grounding conductor serving an equipment lineup is determined from two requirements. First, the grounding conductor resistance and battery feed conductor resistance must have a combined path resistance that is low enough to allow over current fuses to operate in a timely manner if a fault condition should occur. Secondly, a lineup of equipment must not exceed 50’ in order to meet safety requirements for egress. Based on these two requirements, lineup conductors shall be limited to 50’ in length.

10 EQUIPMENT LIGHTING REQUIREMENTS

A. Reason for reissue

10.01 Reserved for future use.

B. General

10.02 This section provides the requirements for engineering equipment lighting arrangements in network equipment areas of raised floor central offices.

10.03 Reserved for future use. (Listing of reasons for reissue)

10.04 Fluorescent lighting shall be used to illuminate CO equipment, and power and maintenance areas. Equipment lighting for network equipment frames and equipment related work areas shall be appropriate for the performance of routine network administration functions. Lighting for the performance of detailed equipment installation and circuit/service management activity shall be provided by the use of portable light fixtures appropriate for the activity being performed. Accordingly, unless otherwise specified for a particular network element or technology, equipment lighting shall be provided above equipment maintenance (front) aisles only.

C. Illumination Levels

10.05 Minimum levels of illumination shall be maintained in COE areas. New lighting systems shall provide initial illumination levels at least 25 percent higher (but no more than 50 percent higher) than the levels listed in Table 10-1. The required higher levels of illumination given in Table 10-1 account for lumen losses due to lamp aging and dirt accumulation in fixtures. Table 10-1 contains the minimum levels of illumination that must be provided for network equipment and equipment administration areas. The values given are relative to measured light on the equipment and work surfaces indicated by fluorescent lamps having at least 100 hours of operation. Illumination measurements of a new lighting system are expected to be higher than those indicated in Table 10-1.

Lighting For	Level – lux (foot candles)
Equipment Frame Area • Maintenance Aisle • Wiring aisle no design level (use portable lighting during maintenance)	 160 lx (15) No design level
Distributing Frame Area • Maintenance Aisle • Wiring Aisle	 215 lx (20) 110 lx (10)
Power and Battery Areas • Aisles and Open Spaces • Ac Switchboards and dc Distribution Bays	 320 lx (30) 220 lx (20)
Cable Entrance Facility • Vaults • Area in Equipment Room	 55 lx (5) 215 lx (20)
Control Test and Maintenance Areas • Shelf at Center of Test Frame • Desk Top Writing Surface	 540 lx (50) 540-750 lx (50-70)

Table 10-1 – Minimum Levels of Equipment and Area Lighting

D. General Building Lighting

10.06 General building lighting for central offices is provided by the building Corporate Real Estate.

10.07 Fluorescent lamps with most color correct rating shall be used.

E. Engineering Requirements

10.08 Single tube fluorescent lighting fixtures comprised of electronic ballasts and energy efficient lamps shall be used as the means of lighting equipment areas in general. Fixtures containing two or more parallel lamps are acceptable for use only above network administration work areas requiring higher levels of light output. All equipment lighting apparatus including wire and electrical raceways shall be listed for its purpose by a nationally recognized testing laboratory.

10.09 Lighting fixtures have been specifically designed for this application to provide equipment aisle lighting and also serve as HVAC air diffusers. Only approved lighting fixtures may be used for equipment aisle lighting.

10.10 Lighting fixtures approved for use will be detailed in a later issue of this document.

10.11 Lighting fixtures shall be installed at 8’ above the top of the raised floor.

10.12 Lighting fixtures shall be installed in the middle of the maintenance aisle, parallel to the equipment line-up.

10.13 Lighting fixtures shall be supported from ceiling or HVAC ductwork, not from equipment frames.

11 CABLE MANAGEMENT

A. Reason for reissue

11.01 Reserved for future use.

B. General

Hardware

11.02 Fig. 11-1A and 11-1B illustrate the general under floor cable management scheme to be used in transport equipment areas. The application of all or part of the cable management scheme to a switching equipment area shall be coordinated with the respective switching equipment supplier for a given office application. The elements of raised floor cable management shown in Fig. 11-1A and 11-1B are:

a) The use of traditional ladder type cable racks placed on the floor along main cross aisles for routing and support of primary power distribution cables.

b) The use of an 8-inch high cable partition placed on the floor perpendicular to BDFBs to provide a 2-inch separation between inter-lineup secondary distribution cable and other equipment cables.

c) The use of ladder type cable racks elevated along the fronts of equipment lineups for routing and support of secondary power distribution cables.

d) The use of 15w x 15h cable troughs placed on the floor along the front of equipment aisles to organize intra-lineup cabling in general (cables not requiring physical protection or separation from other cables).

e) The use of 20w x 15h cable troughs placed on the floor perpendicular to equipment lineups every 6-feet (max.) to organize inter-lineup cabling in general.

f) The use of an elevated cable/conduit support assemblies along main cross aisles and equipment lineups for support of CO ground conductors and AC distribution conduit runs.

g) The use of an elevated fiber raceway system for fiber optic media requiring physical protection and separation from other office cabling.

Cable Routing

11.03 Figures 11-2A and 11-2B illustrate the below described guidelines for installing cable in raised floor environments. TP76300MP workmanship requirements also apply to raised floor environments.

a) Power cable taps should be done on main aisle power cable racks at office BDFBs.

b) Network interconnection cable shall not be routed under BDFBs.

c) Secondary power distribution cable shall be routed on the floor perpendicular to BDFBs to the equipment lineup of termination where they will transition to an elevated support structure for routing along equipment lineups.

d) Interconnection cable in general shall be routed along the frame side of front aisles to provide as much foot traffic space as possible at aisle centers. Cables may be banded together with sewing cord where necessary to organize cables out of way of foot traffic.

e) Where possible, to minimize obstructing cross aisle cable routing, cabling from equipment frames shall not drop directly into a cross aisle trough. Flat bars between equipment pedestals or other means of cable dressing shall be used to direct cable away from troughs as they drop from equipment frames.

f) Cables rising from the floor to equipment frames shall be banded together in orderly bundles approximately mid-span of the cable rise.

g) Cables between equipment lineups shall be routed in lineup and cross aisle cable troughs rather than in diagonal runs between equipment frames or equipment lineups).

11.04 Cabling to/from different floors and parts of the building will be in accordance with standard overhead superstructure engineering practices except that overhead ironwork provisioning shall be limited to only that which is necessary to support required overhead cable racks.

11.04 Refer to ADC Communications' drawing 1124437 for management of cross connect jumpers across aisles at facing DSX lineups.

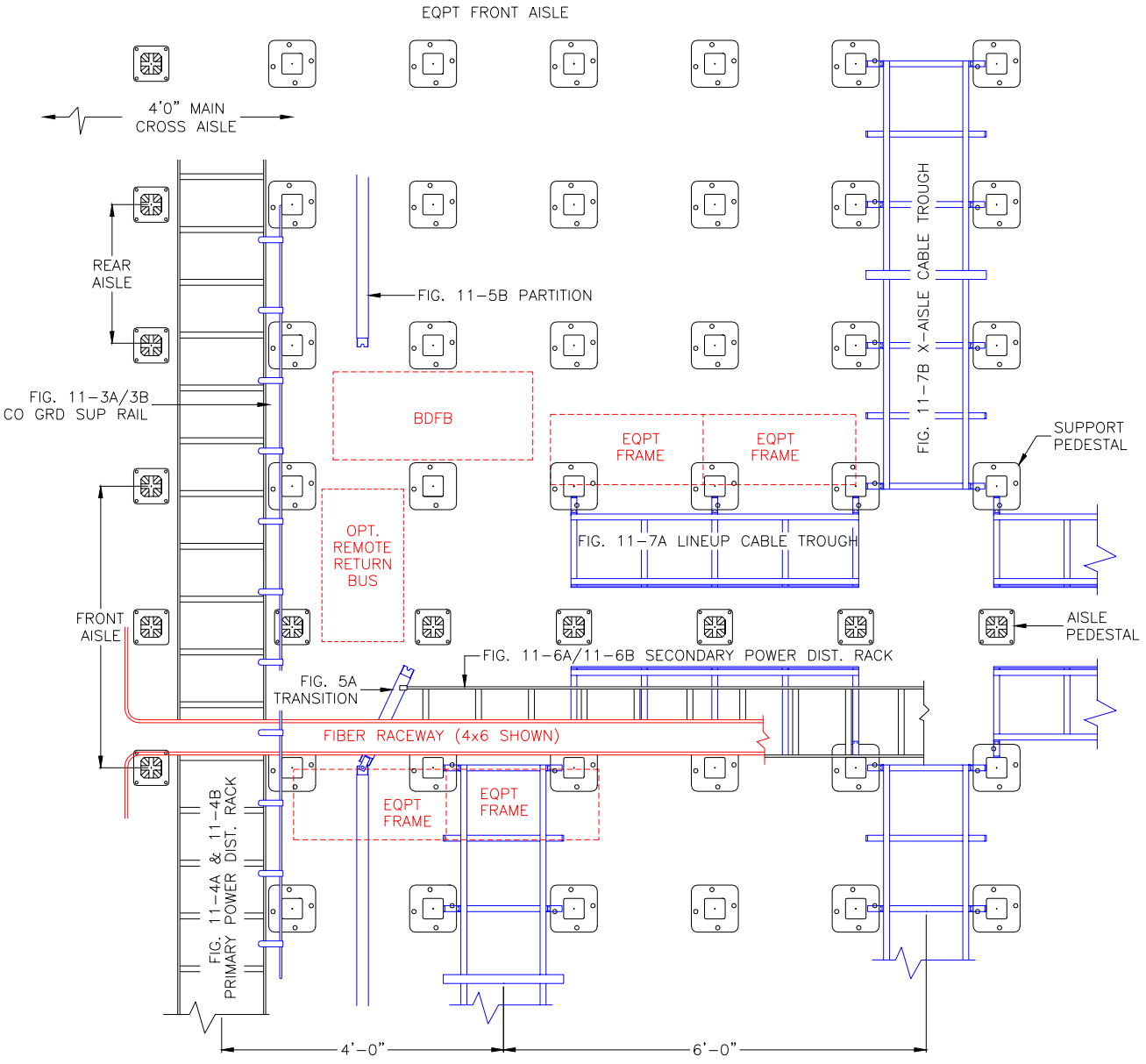


Fig. 11-1A – General Cable Management Scheme – Top View

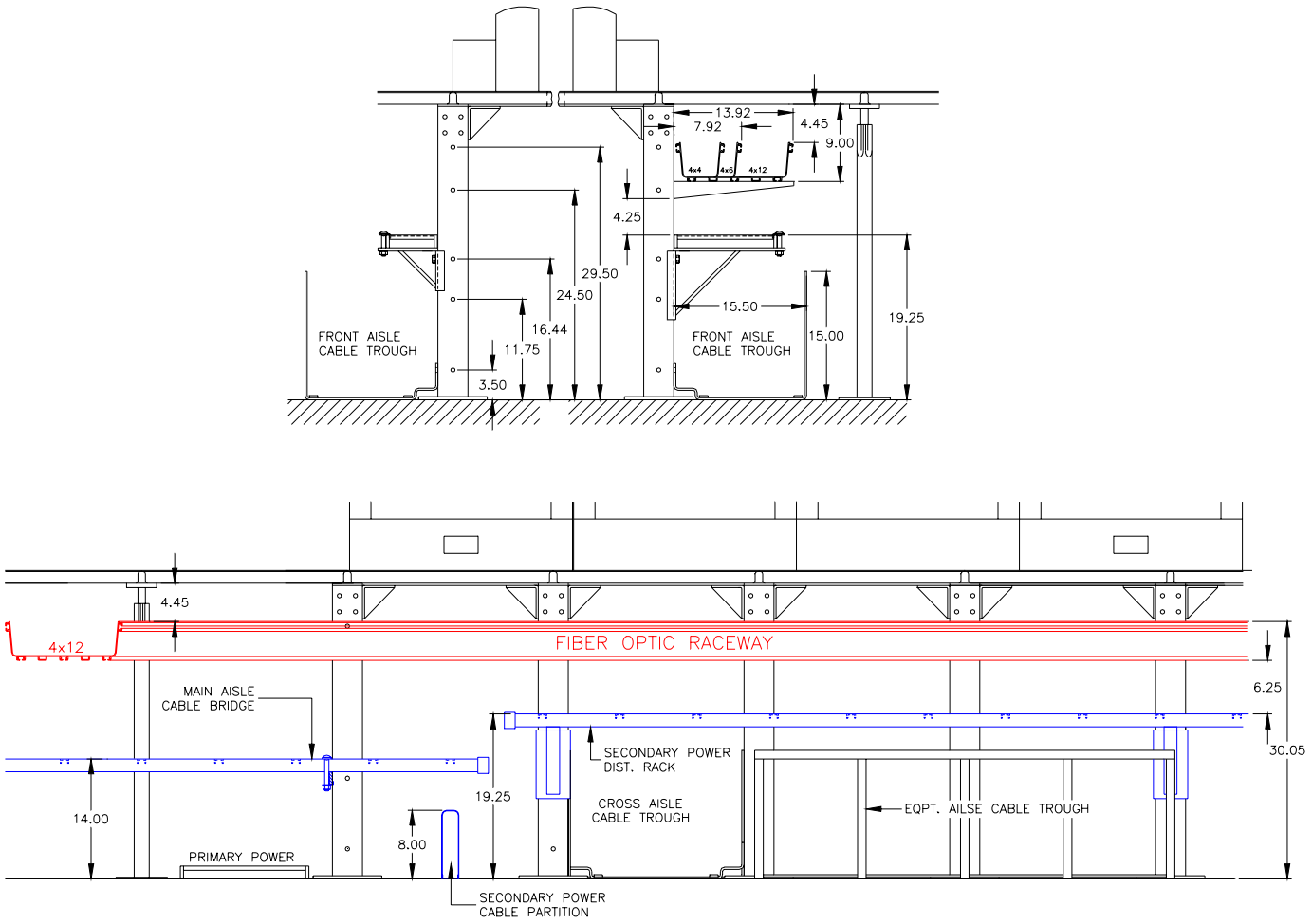


Fig. 11-1B – General Cable Management Scheme – Elevations

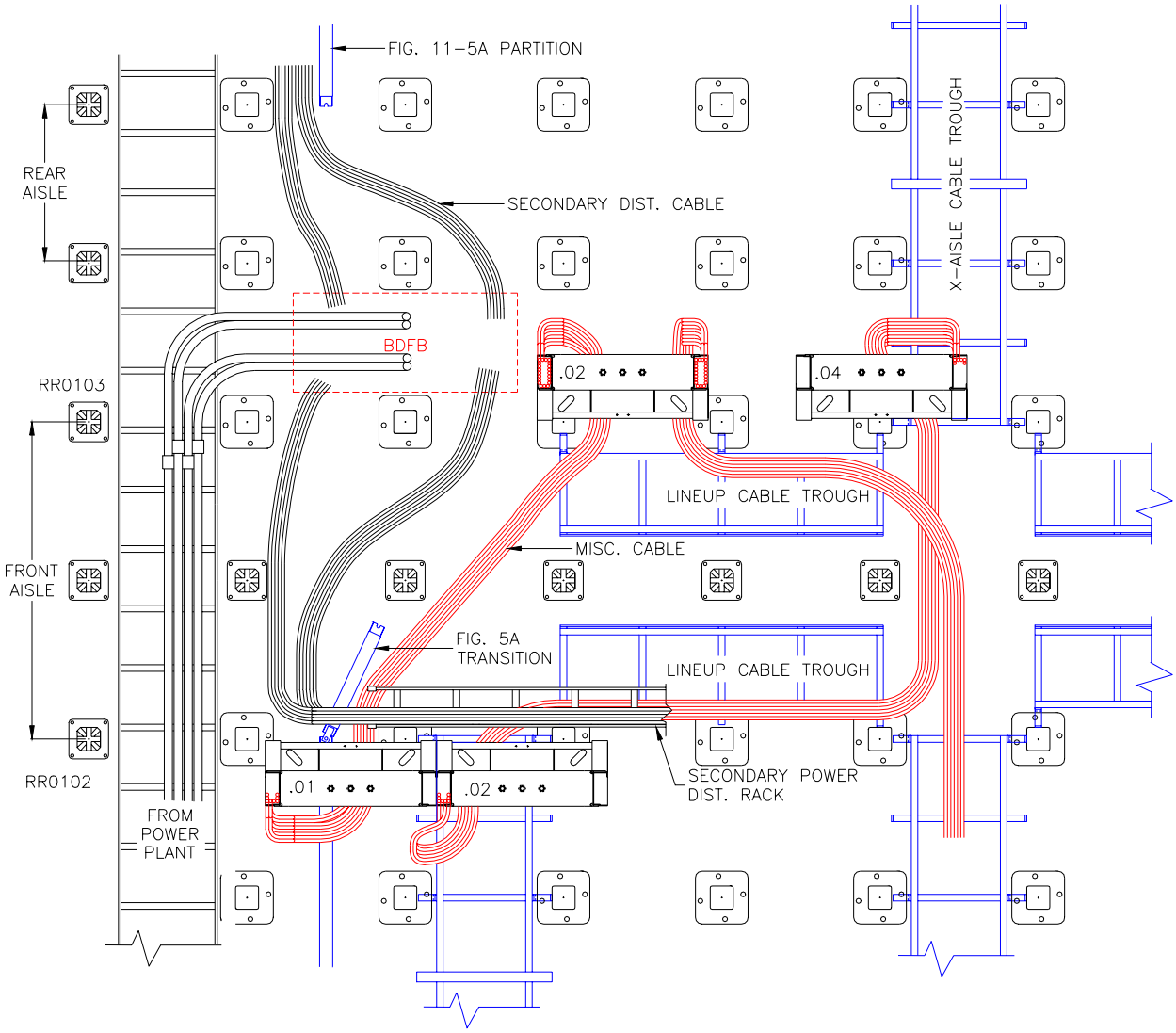


Fig. 11-2A – General Cable Routing – BDFB Internal Return Bus Shown

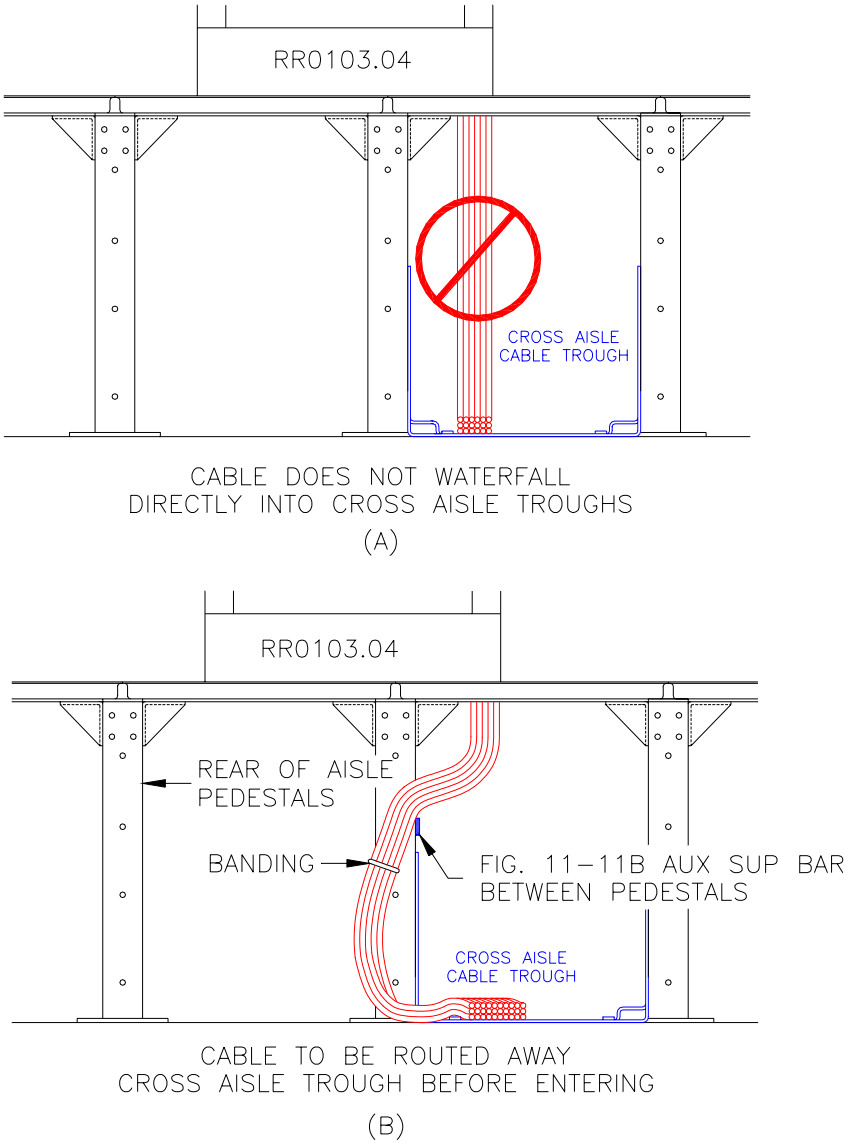


Fig. 11-2B – Relationship Of Cable Risers To Cross Aisle Troughs

C. Below Floor Cable Management

11.05 Under floor cable racks, cable troughs, ac distribution raceway, and CO ground support apparatus shall be engineered and installed initially throughout defined equipment areas. This will minimize the subsequent handling and maneuvering of bulky apparatus through and under equipment areas after equipment frames have been installed. Accordingly, all under floor hardware should be installed before equipment installation so all or the majority of floor tiles can be removed from the area.

11.07 Unless otherwise specified for a particular application, cable racks shall be ladder type constructed of 1-1/2 x 3/8" solid stringers with cross straps located 9-inches on center. Refer to Fig. 11-4B. The ends and right angle junctions of cable rack on floors shall be bolted together similar to Fig. 11-4B. Cable racks on floors shall also be secured with 3/8" hold-down fasteners located on both sides of the rack approximately every 6-feet along the length of cable rack runs.

11.08 Cable racks installed in elevated fashion under raised floors shall be supported as follows:

a) 6 feet maximum spacing of supports (4 pedestals) for 2 inch stringer cable rack, racks 12-inches or less in width, and racks wider than 12-inches having 6 inches or less of available cable pileup.

b) 4 feet maximum spacing of supports (3 pedestals) for racks wider than 12-inches having more than 6 inches of available cable pileup.

D. CO Ground & Equipment AC Distribution

11.09 Refer to figures 11-3A and 11-13. G-3000 Wiremold raceway shall be used to distribute ac branch circuits from building power distribution cabinets to and along equipment main cross aisles as shown in Fig. 11-3A and 11-13. 1/2-inch EMT shall be used for routing branch circuit conductors from main cross aisles to equipment frames and at frame gaps within equipment lineups. Flexible jacketed metal conduit (JMC) shall be used between lineup EMT and equipment frames. Lengths of JMC must be supported within 12-inches of their termination in a junction box.

11.10 120V branch circuit wiring shall type THWN to maximize usage of branch circuit raceways. Commercially available conduit supports and 1/4” fasteners shall be used to secure EMT to lineup ground and AC conduit support rails (see Fig. 11-3C).

11.11 CO ground conductors shall be run secured to the top of Fig. 11-3A and 11-3B support rails. Connections of lineup ground conductors to main aisle ground conductors should be positioned on the back side of the support rail similar to that shown in Fig. 11-3D.

E. Power Distribution

11.12 15-inch wide cable racks as shown in Fig. 11-4A shall be used for support and routing of primary power distribution cable under raised floors. Standard cable pileup restrictions for power cable racks (7-inches) apply in raised floor environments.

11.13 Primary power distribution cable racks shall not be placed on the floor in the front or rear of equipment lineups. This will avoid the need for cable rack bridges along equipment lineups. When it is necessary to route primary power cable parallel to equipment lineups, racking shall be elevated a minimum of 14" above the floor (to top of rack) using Fig. 11-12 auxiliary support bars.

11.14 A 2-inch minimum separation shall be provided between power cable and other cables installed under raised floors. Power cable partitions and transitions per Figures 11-5A and 11-5B and cable routing practices shall be used to provide and maintain the required 2-inch separation between cable types. Power cable partitions are furnished in 6’-0” lengths and may be cut as indicated in Fig. 11-5B to obtain shorter lengths where required.

11.15 6- or 12-inch wide cable racks per Figures 11-6A and 11-6B shall be used for routing and support of secondary distribution cable along equipment lineups. The use of a 6- or 12-inch wide rack is dependant on the expected size and number of conductors required to serve equipment in a particular lineup.

11.16 Secondary power distribution racks shall be furnished and installed in full length increments to minimize cable rack splices and supports mounted to floor pedestals. Secondary power distribution racks shall not extend into end-of-lineup cross aisles unless cable routing is required and being provided to another equipment area or equipment lineup.

11.17 Traditional cable rack assembly hardware is used to junction and make various cable rack fabrications of secondary distribution rack layouts.

F. General Equipment Cabling

11.18 Figure 11-7A and 11-7B cable troughs shall be installed along the front of every equipment lineup and throughout defined equipment areas where equipment support pedestals are installed. Cross aisle troughs shall be equipped with upright caps where they will be exposed when floor tiles are removed. The upright caps may be temporarily removed during cable installation activities.

11.19 As indicated in Fig. 11-1A and 11-7C, cross aisle cable troughs shall generally be located 4 feet from the main cross aisle containing the primary power distribution cable rack, and continue along equipment lineups every 6 feet.

11.20 Cable troughs shall be shortened or omitted as required to accommodate current and future cable hole locations. To the extent possible, the location of cable holes to be used in the future shall be determined and labeled on the floor, on floor tiles and on office floor plan records. Equipment can not be installed on floor tiles above cable holes because of cable hole access and cable congestion reasons.

11.21 The uprights of lineup and cross aisle cable troughs may be removed as needed at cable hole locations to maximize access to cable holes for cable and firestop installation.

G. Bridging Main Aisles and Apparatus

11.22 Cabling across main cross aisles shall be spread along the main aisle to minimize cable pileup at any one main aisle location. To accomplish this, cable shall cross main aisles at the front of equipment lineups using 1-1/2-inch stringer ladder racks as shown in Fig. 11-8A.

11.23 To optimize access to power racks along main cross aisles, only one cable bridge shall be provided at a front aisle. A rear aisle may be used to bridge main cross aisles only when and where necessary due to cable congestion at an adjacent front aisle. Main aisle cable bridges for miscellaneous cable shall not be installed at BDFB locations.

11.24 Main aisle cable bridges may be up to 12-inches in width except for front aisles with a 12-inch wide secondary power distribution rack. Cable bridges at front aisles with 12-inch wide secondary distribution racks shall be limited to 6-inches in width and shall be located towards the center of the front aisle to afford as much room as possible for secondary distribution cable leads rising to the secondary distribution rack (see Fig. 11-8B).

11.25 Fig. 11-8C, or similar, shall be used when it is necessary to bridge low profile apparatus such as conduits placed on floors. The ends of support channels shall rest on pedestal bases. A single length of support channel should be used to support parallel runs of cable rack that are located on both sides of a floor support pedestal. Refer to 11.08 for support placement.

11.26 Shims are required under support channels at aisle support pedestals because their base is thinner than equipment support pedestals. Standard equipment frame shims may be used and shall be placed under support channels before floor anchors are tightened.

H. Miscellaneous Cable Management

11.27 Refer to Figures 11-10 through 11-12A for supporting elevated racks in general under raised floors. Fig. 11-11A auxiliary support bars can not be located in front aisles where Fig. 11-6B 12" cable rack support brackets are located.

11.28 Fig. 11-12A depicts standard attachment of cable racks to auxiliary support bars in high seismic areas. In low seismic areas a single J bolt shall be used at each support bar. J bolts shall be located on alternate sides along runs of cable rack in low seismic areas.

I. Cabling Between Floors

11.29 New and existing holes that will be used for cabling to floors and areas above the raised floor shall be equipped with traditional cable hole sheathing (4”-5.4 lb. channel) and cable racking arrangements.

11.30 New and existing cable holes that will be used for miscellaneous cabling to/from below the raised floor area only shall be equipped with a Fig. 11-9A cable guide. The size of the cable guide allows its use regardless of a cable hole's lateral relationship to floor pedestals. As shown in Fig. 11-9A, a 3/8 by 1-1/2" bar shall be installed at the bottom attachment holes of adjacent pedestals to provide cable support and bend radius maintenance when cable guides are installed on top of traditional cable hole sheathings.

11.31 New and existing cable holes that will be used for power cabling to/from below the raised floor area shall be equipped with a 1-1/2 by 15" wide preformed cable rack turn per Fig. 11-9B or 11-9C. Figures 11-9D and 11-9E illustrate general rack assembly and cable routing for power racks entering the raised floor area from below and within equipment lineups.

11.32 On-site drill and tapping of equipment support pedestals is required when preformed power turns and associated horizontal cable racks need to be installed at levels different than those shown in Figures 11-9B and 11-9C.

11.33 Cabling to/from the raised floor area using existing vertical racks and cable holes within the raised floor area shall be via M&P developed on a site specific basis. Generally, cabling on vertical racks shall transition to the under floor area similar to Fig. 11-9F to avoid cable pileup “balloons” at cable holes and to provide adequate working space for cable installation and securing.

J. Cabling Between Rooms

11.34 Cabling to/from rooms and areas adjacent to raised floor areas shall be via cable rack arrangements similar to Fig. 11-9G. Cable rack stand-offs on building walls are required so vertical racks will bypass wall mounted floor tile supports.

11.35 Fig. 11-9G should also be used as a guide for determining wall cable hole sizes. Transitioning from the horizontal to vertical plane at walls generally require taller than normal cable holes to accommodate preformed cable rack turns.

11.36 Cable hole covers may also be required for firestopping purposes depending on the fire rating of ba wall, cable hole size and wall thickness. When required, the lower portion of cable hole covers should be installed before network cabling to assure access to cover mounting holes on the vertical side of wall openings.

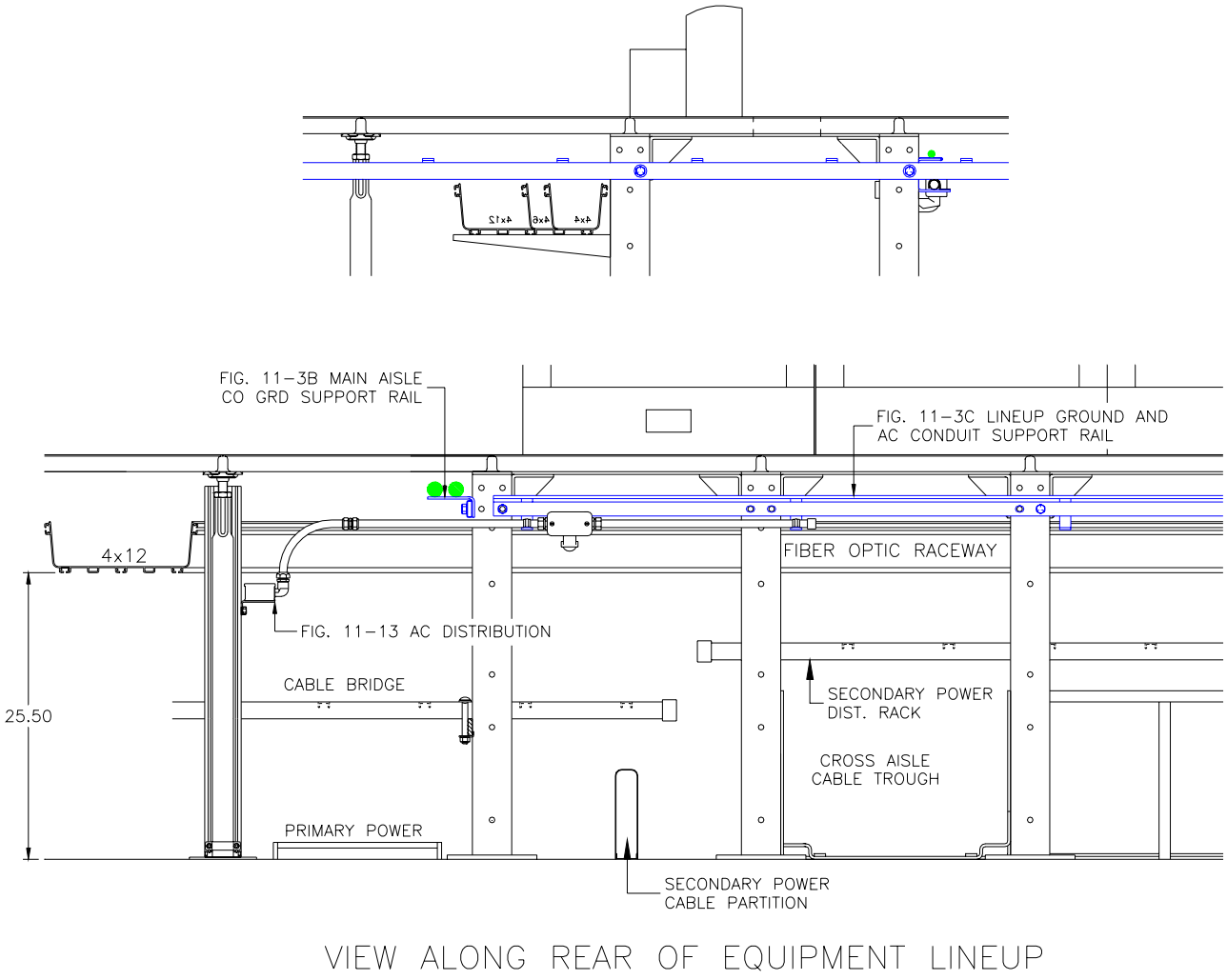


Fig. 11-3A – Support Of AC Conduit and CO Ground Conductors

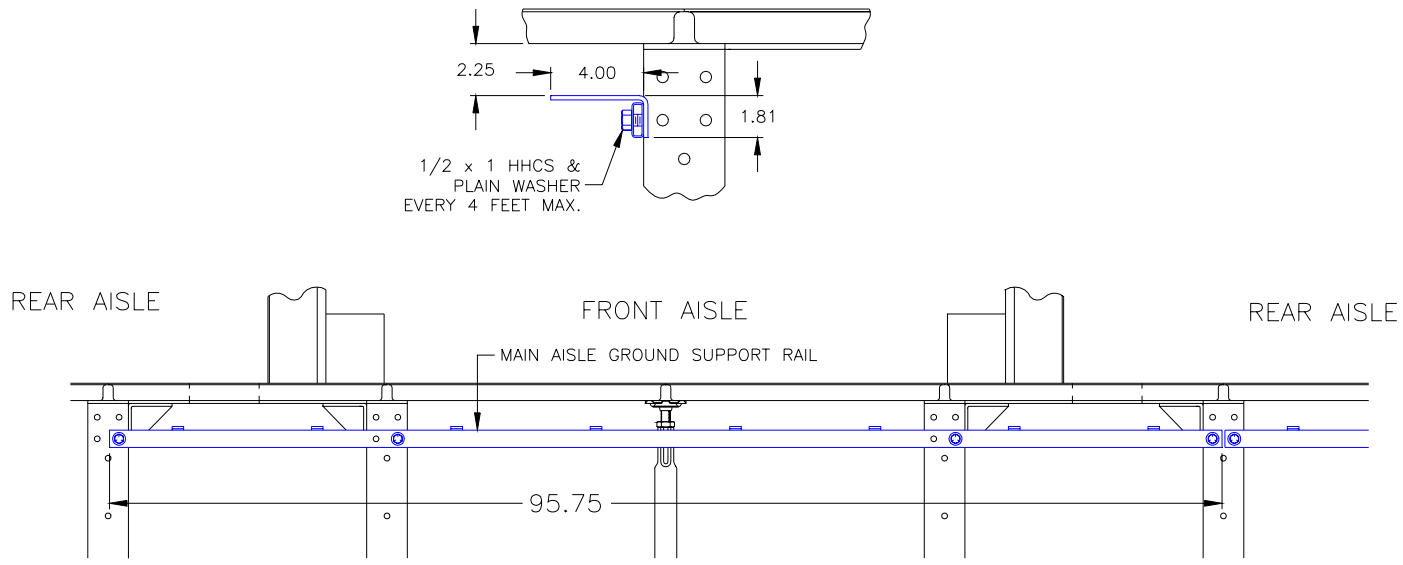


Fig. 11-3B – Main Aisle CO Ground Support Rail

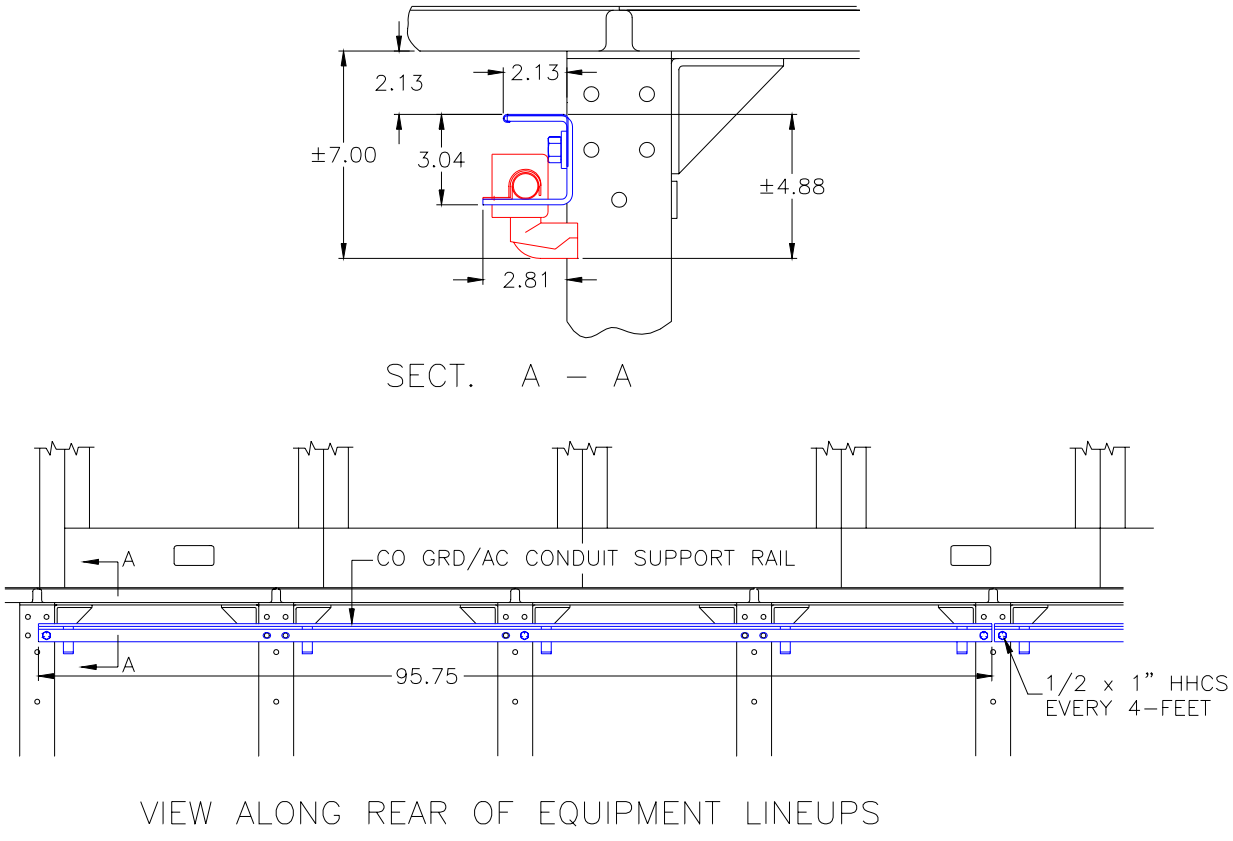


Fig. 11-3C – Lineup Ground and AC Conduit Support Rail

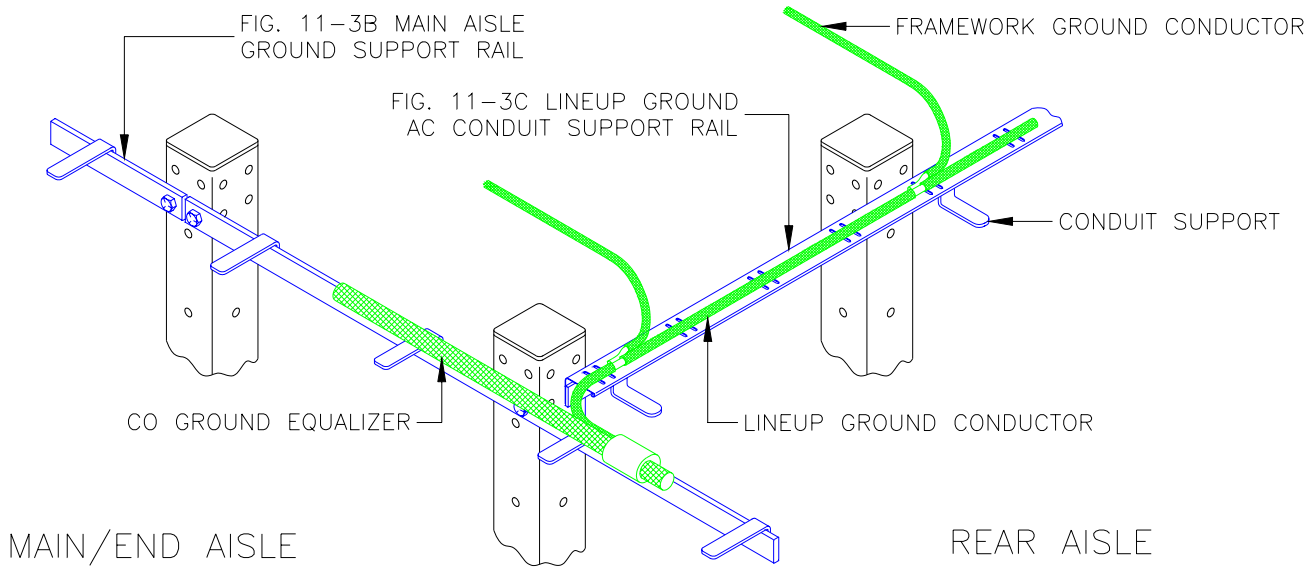


Fig. 11-3D – Typical Routing Of CO Ground Conductors

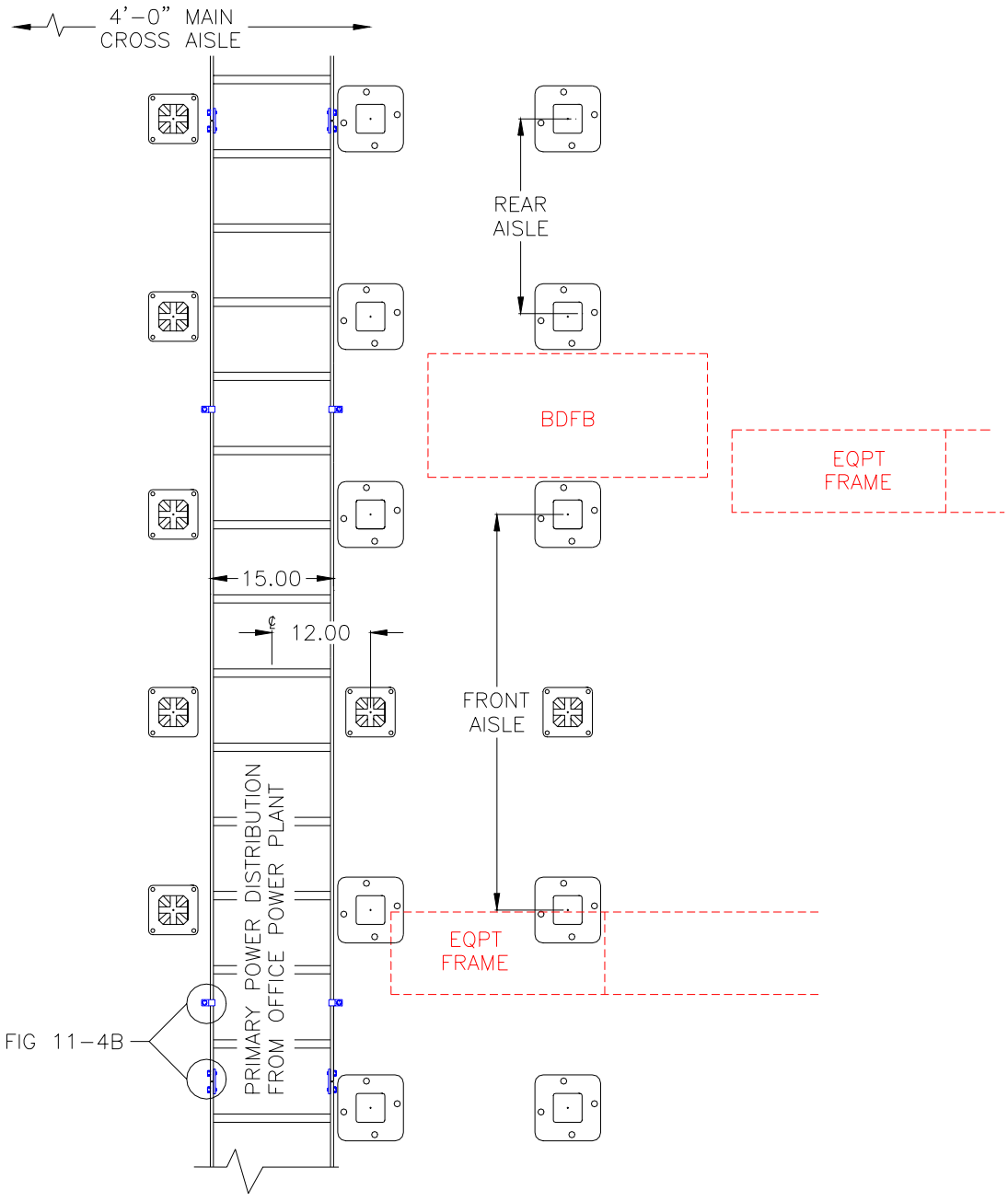


Fig. 11-4A – Location Of Power Distribution Cable Rack And Related Hardware

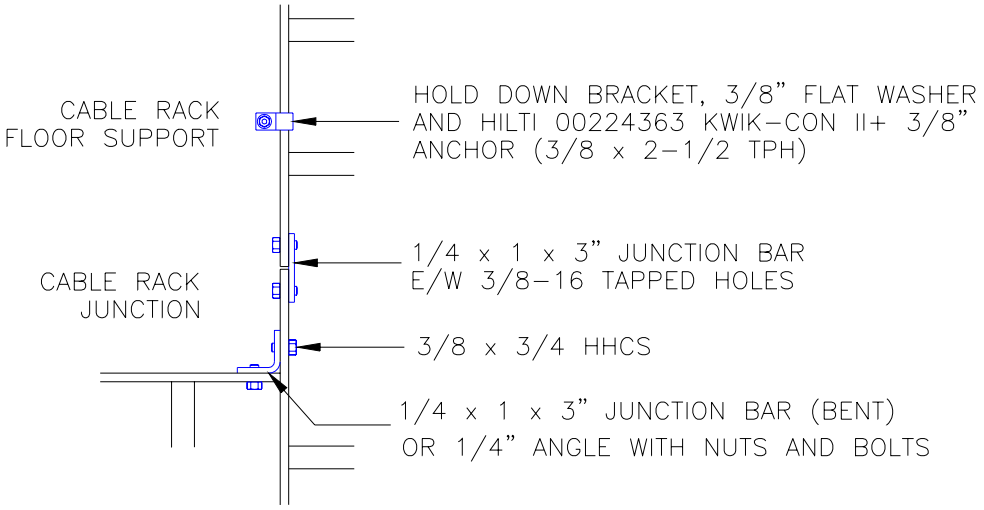


Fig. 11-4B – Support And Junctioning Of Cable Racks On Floors (Required On Both Sides Of Racks)

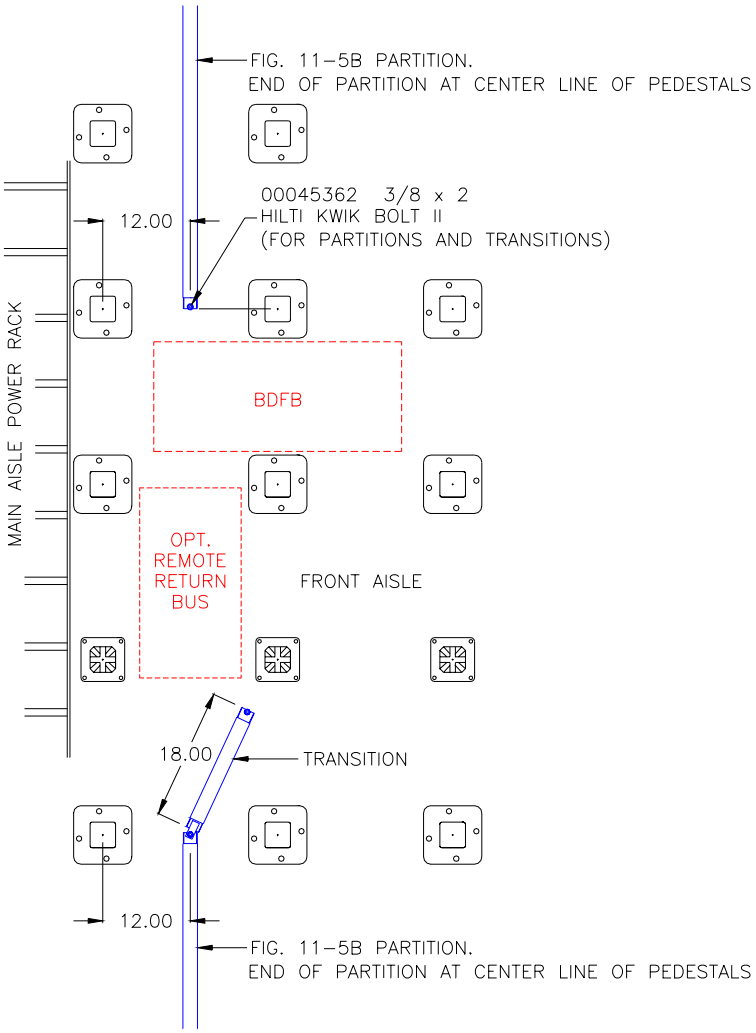


Fig. 11-5A – Power Cable Transition At BDFBs

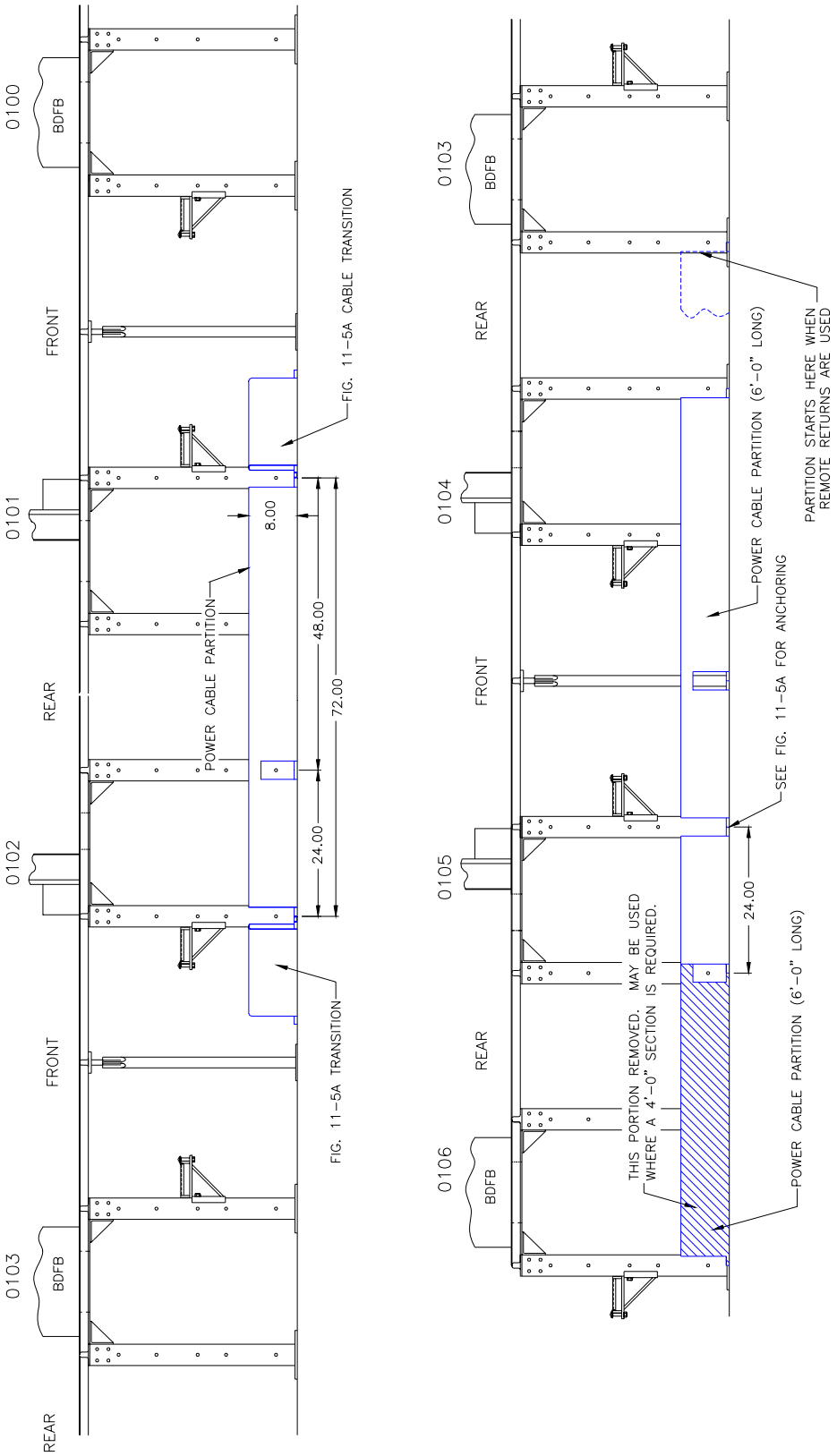


Figure 11-5B – Power Cable Partitions Perpendicular To Equipment Lineups – Internal BDFB Bus Shown

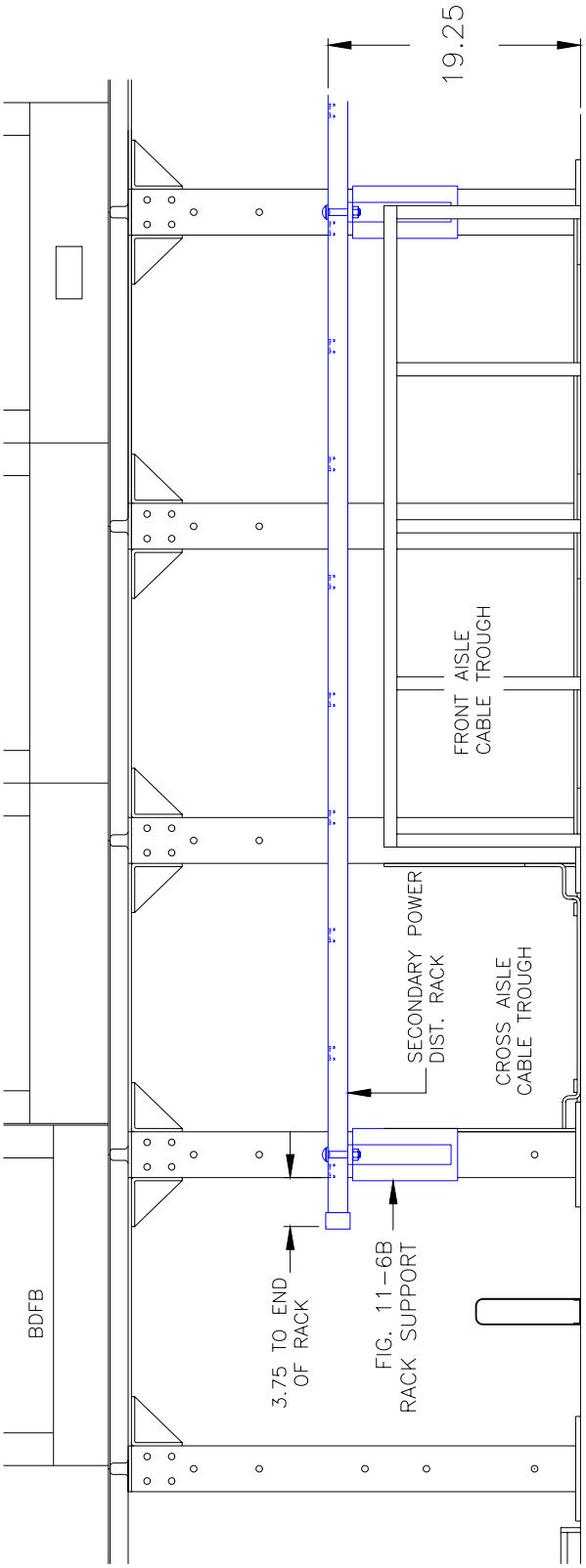


Fig. 11-6A - Secondary Power Distribution Along Equipment Lineups

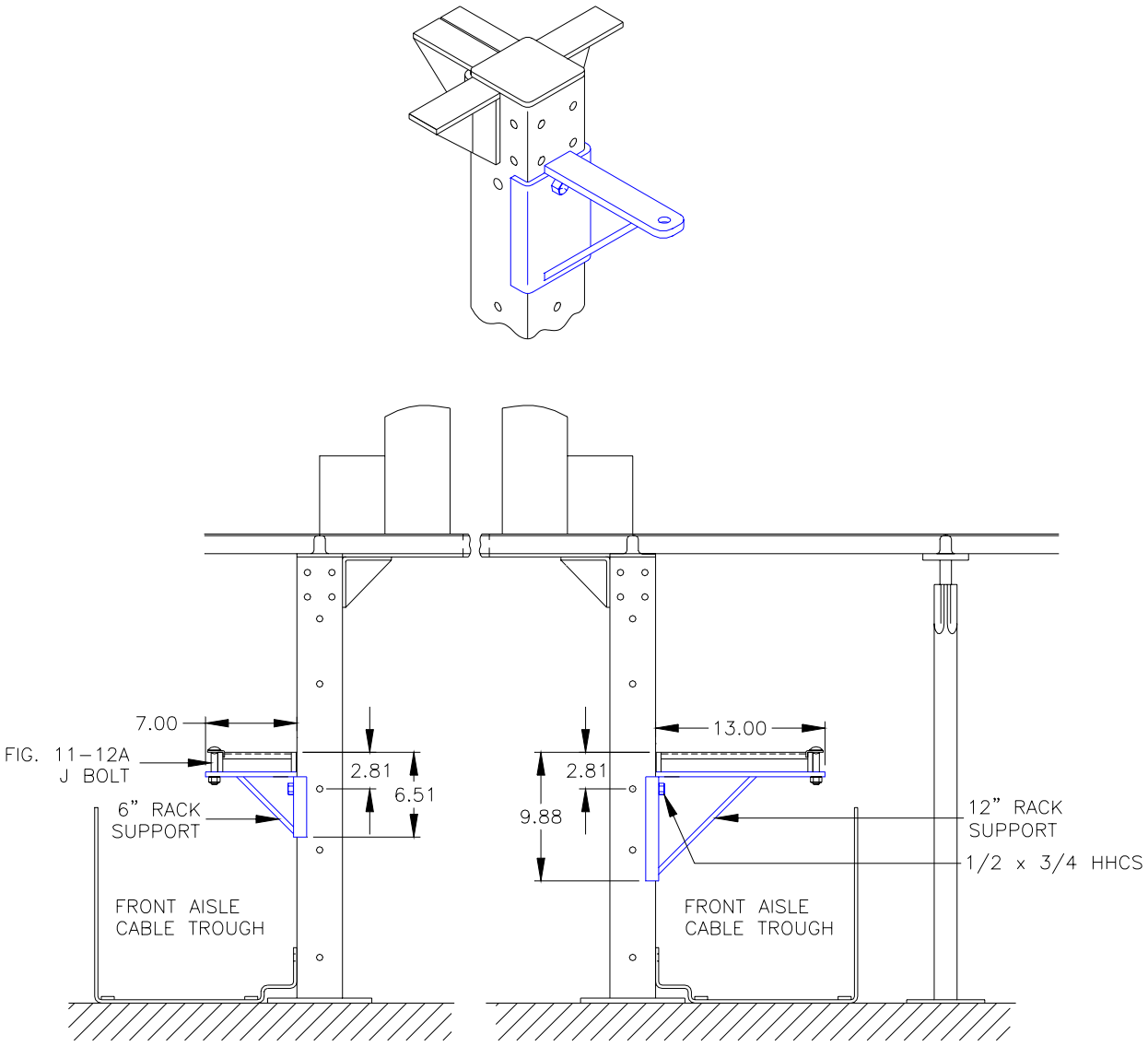


Fig. 11-6B – Supporting Secondary Power Rack From Equipment Pedestals

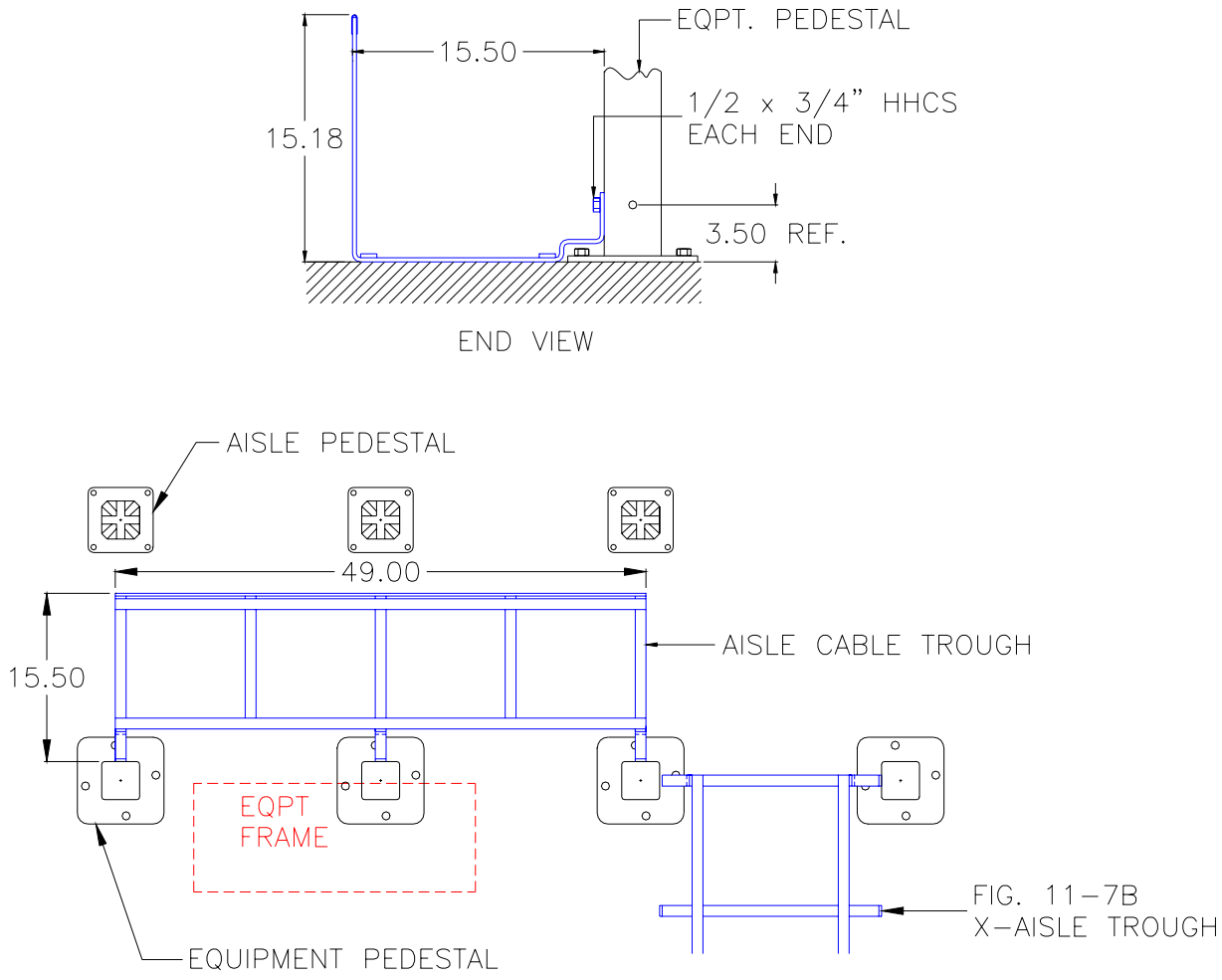
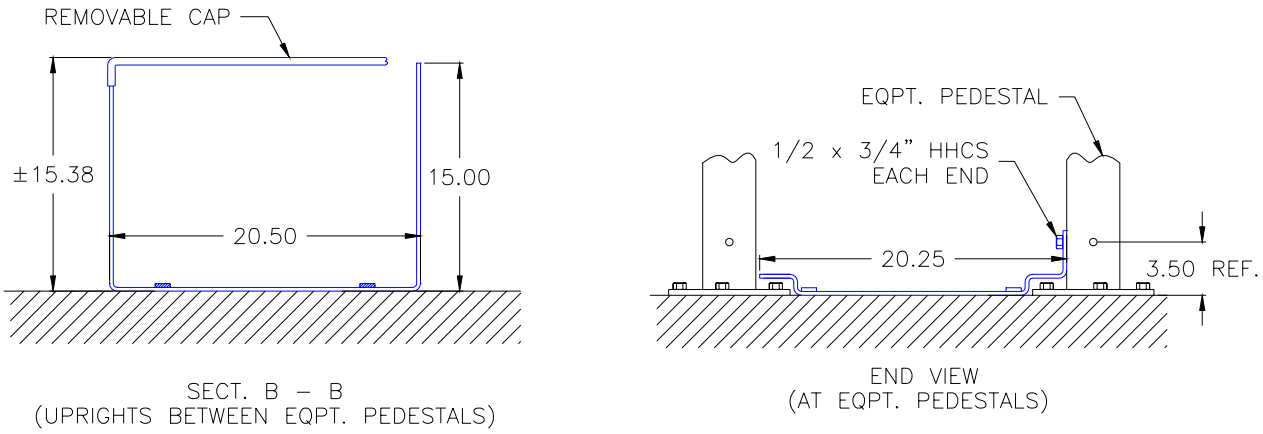


Fig. 11-7A – Equipment Aisle Cable Trough Arrangement



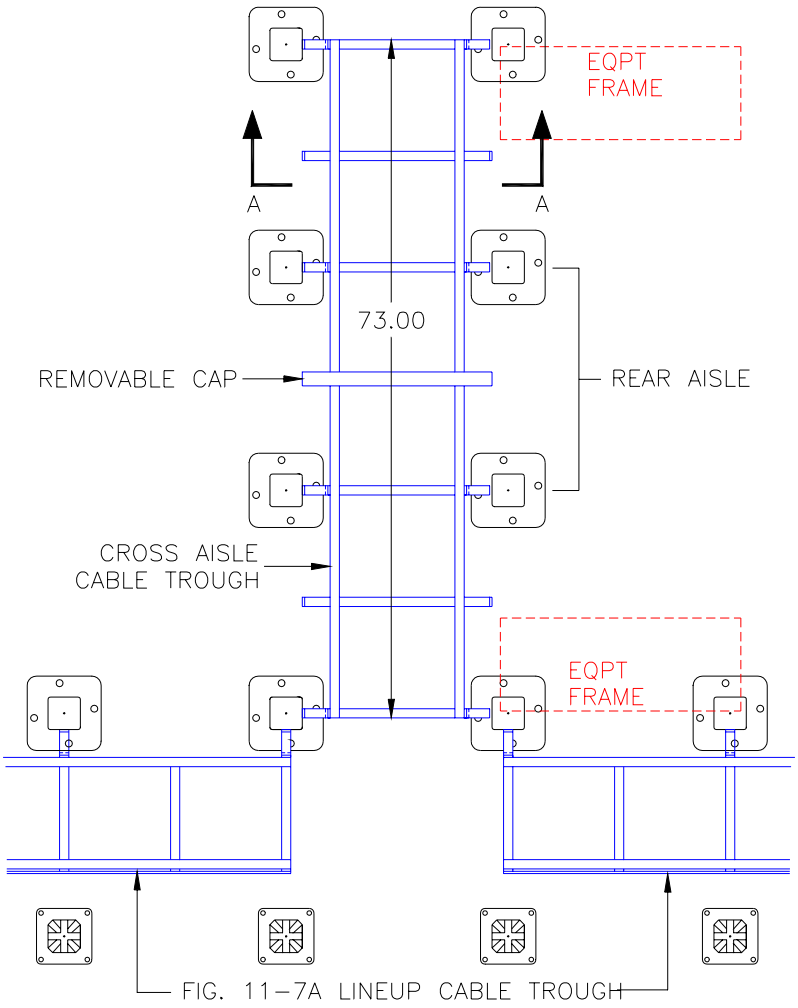


Fig. 11-7B – Cross Aisle Cable Trough Arrangement

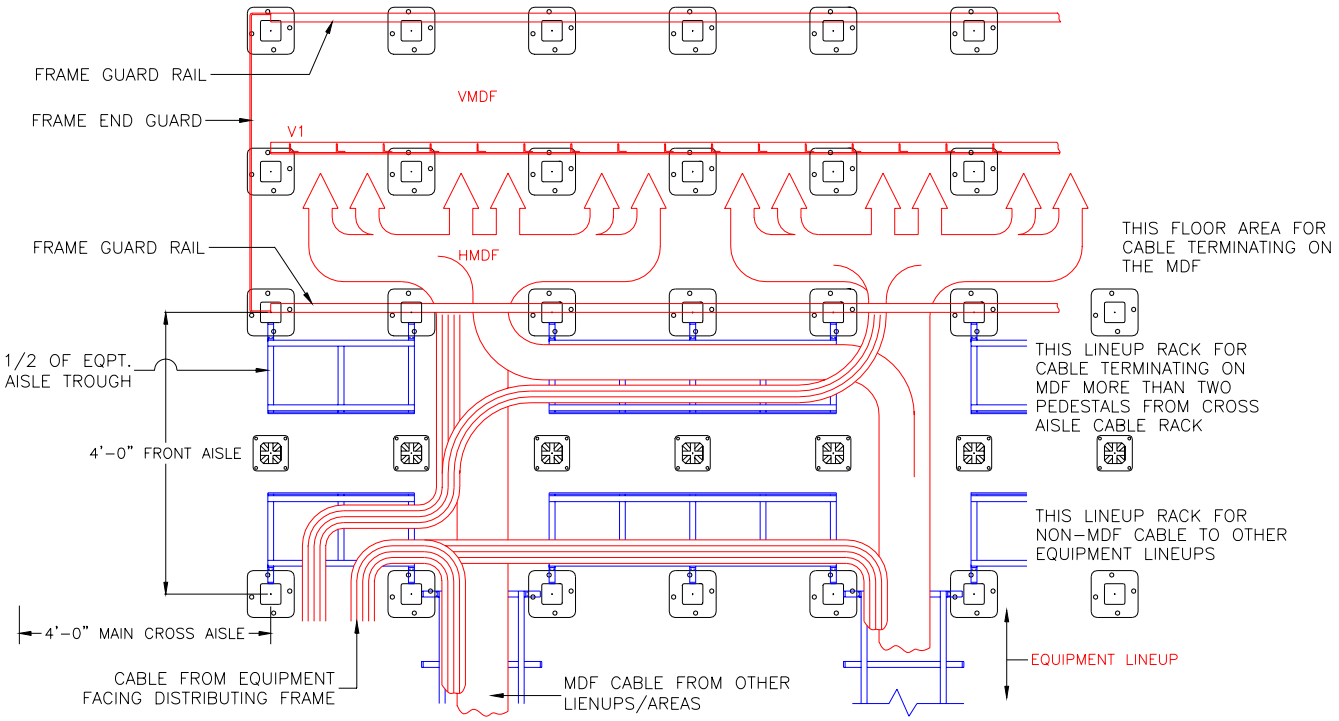


Fig. 11-7C – Cable Trough And Cabling At Conventional Distributing Frames

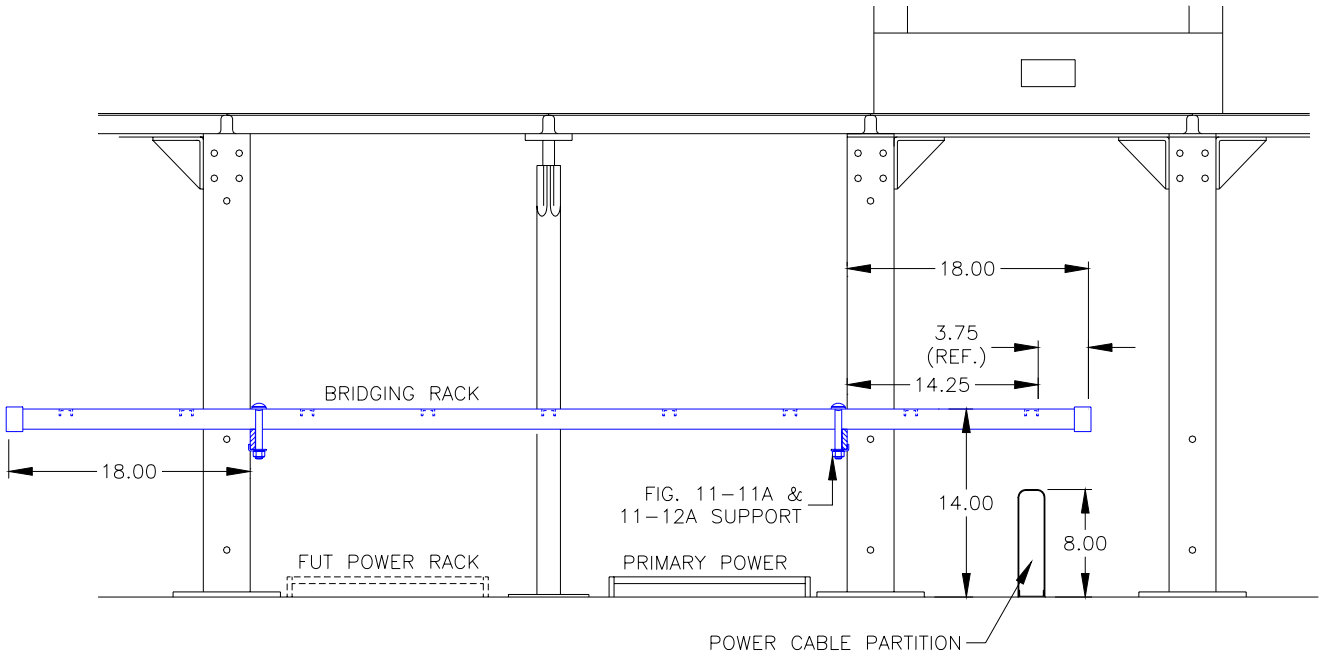


Fig. 11-8A – Bridging Cable Across Main Cross Aisles

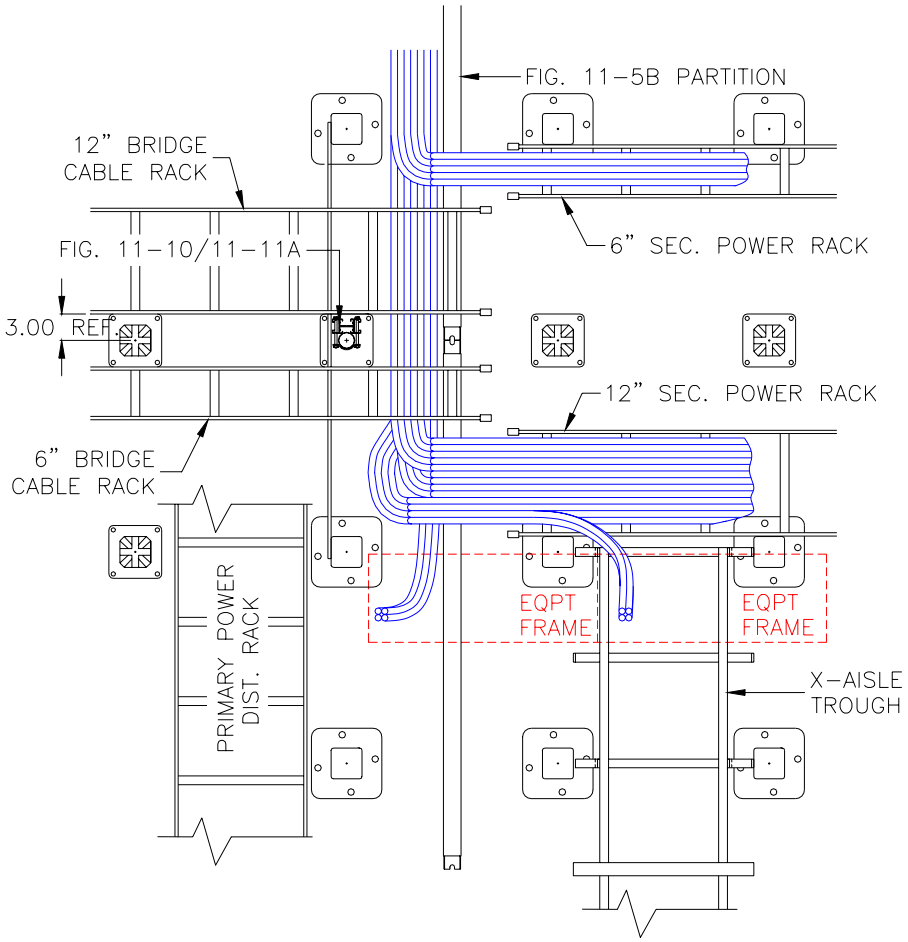


Fig. 11-8B – Relationship Of Cable Bridges And Secondary Power Racks

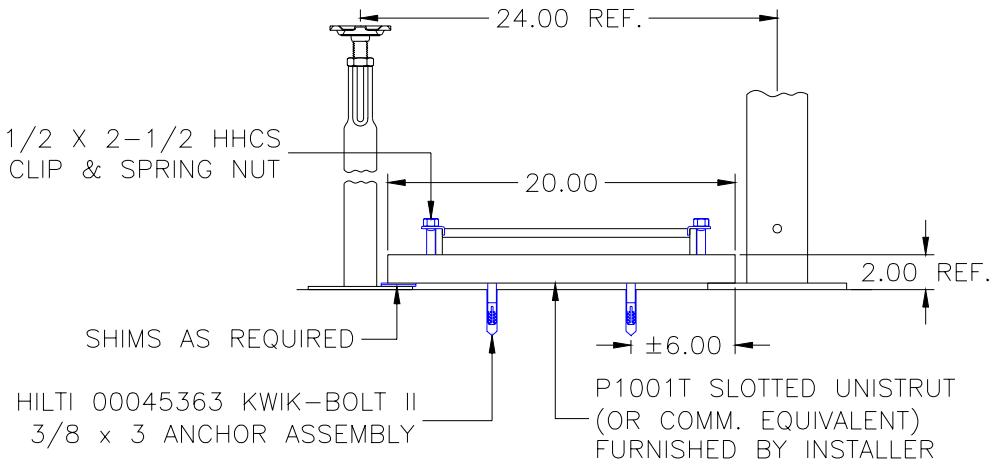


Fig. 11-8C – Bridging Low Profile Apparatus On Floor

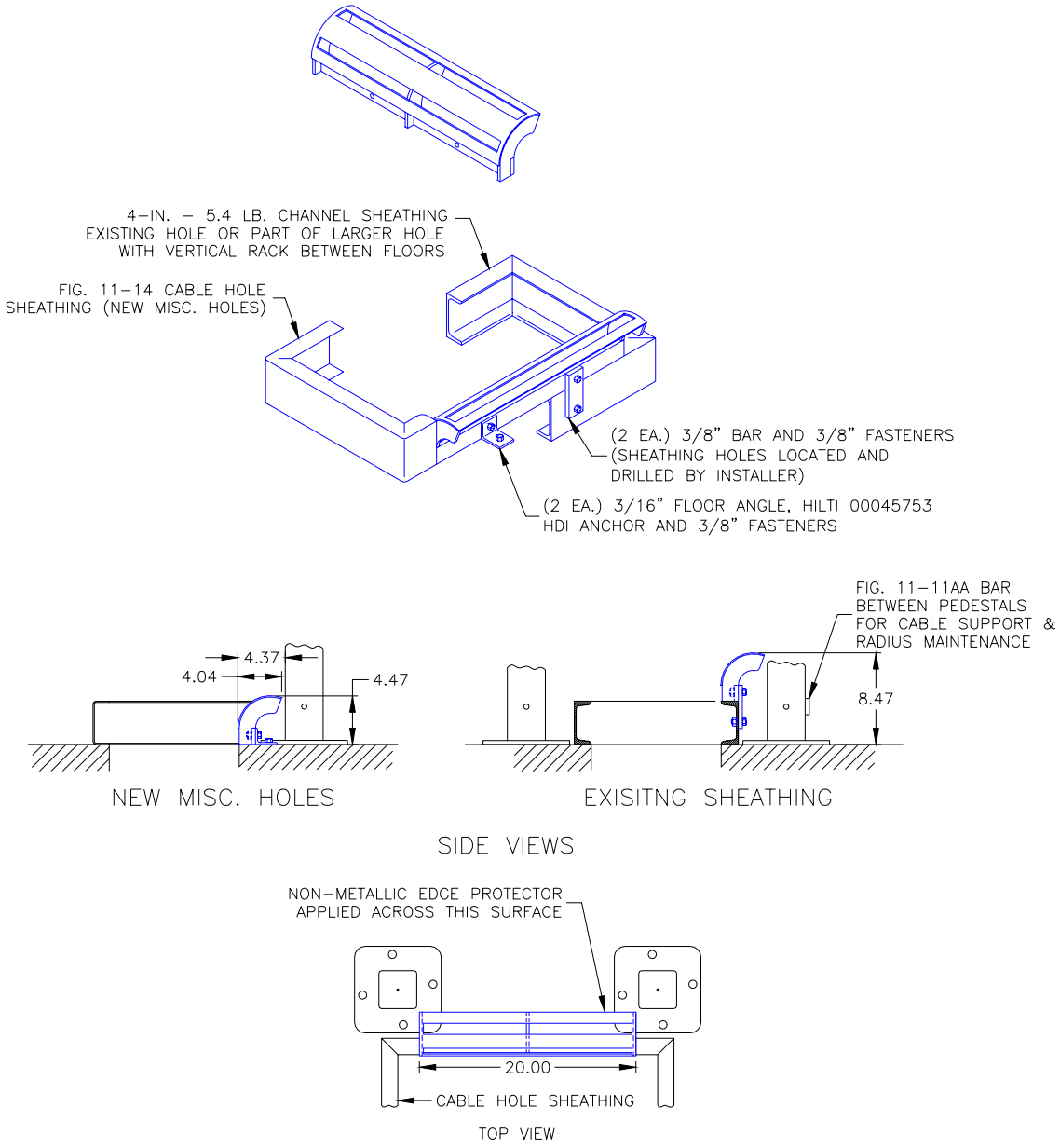


Fig. 11-9A – Cable Guide At Miscellaneous Cable Holes

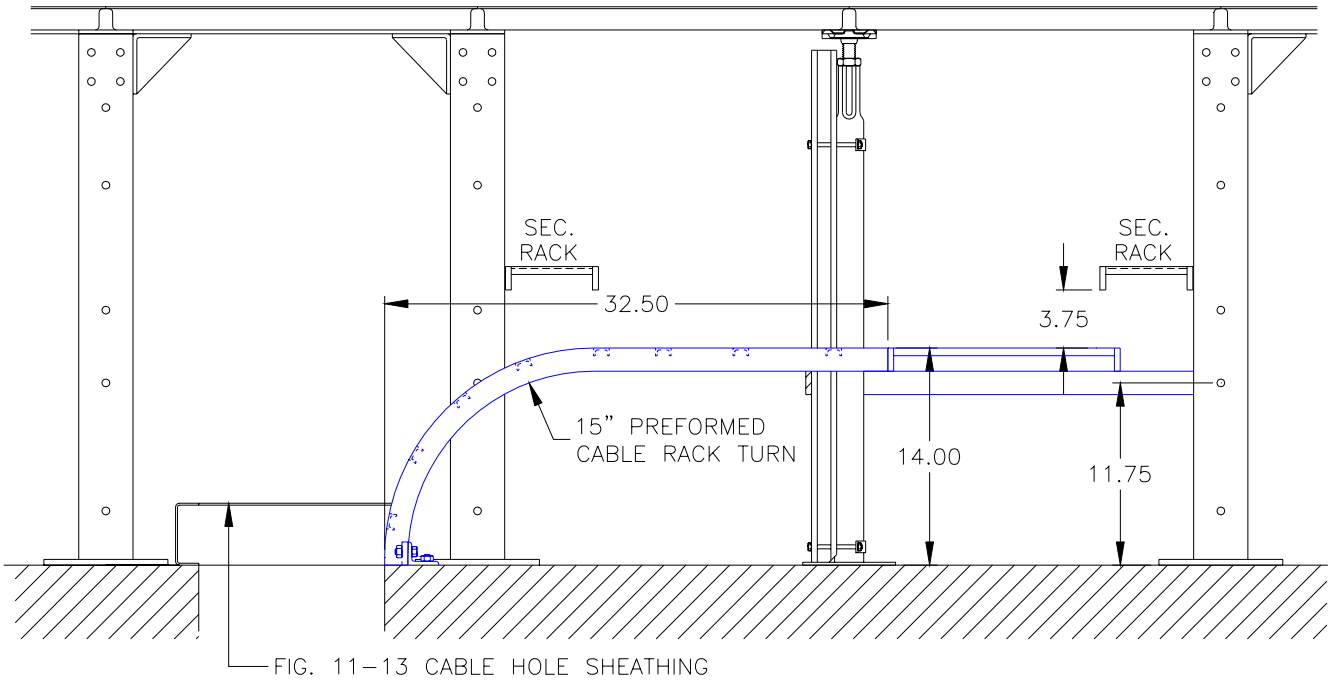


FIG. 11-9D (A) PREFERRED SHOWN

Fig. 11-9B – Power Cable Rack At New Cable Hole (see Fig. 9-9D)

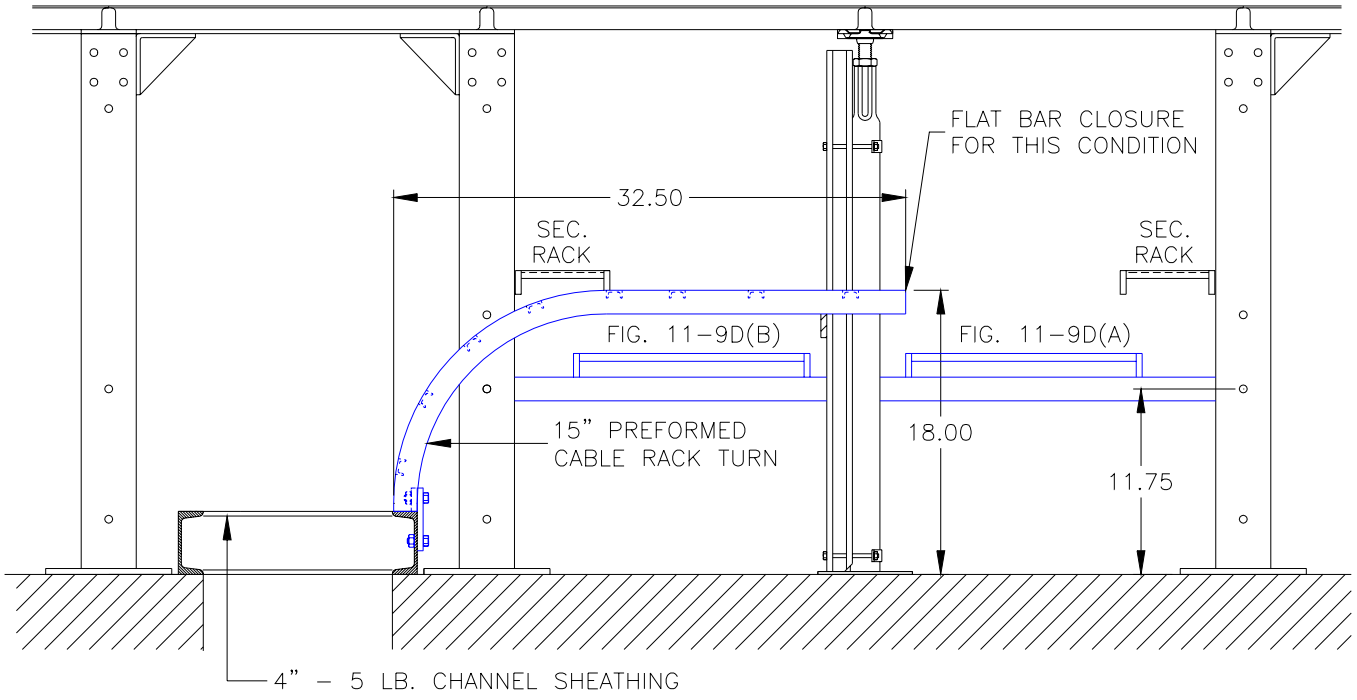
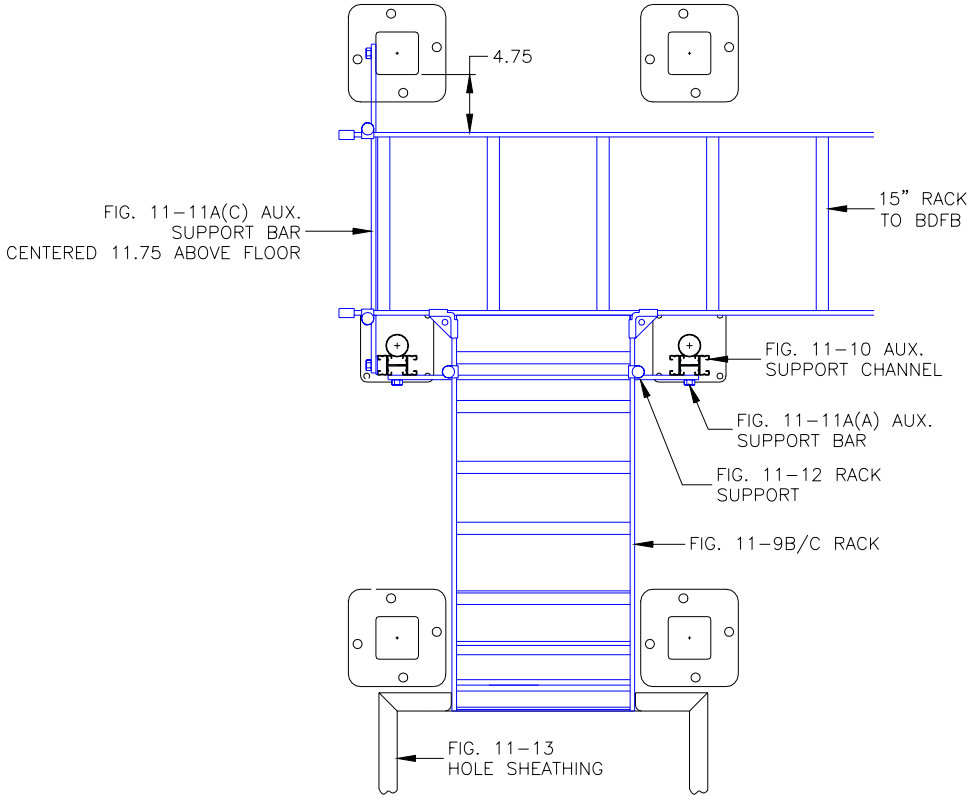
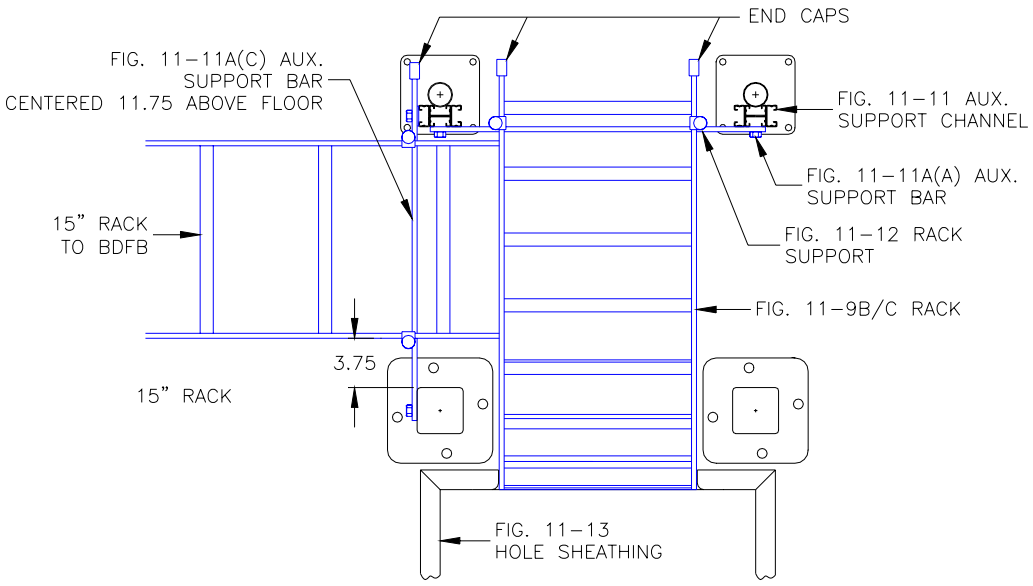


Fig. 11-9C – Power Cable Rack At cable Hole With 4" Channel Sheathing (see Fig. 11-9D)



CABLES TURN AT 2ND AILSE FROM HOLE – PREFERRED

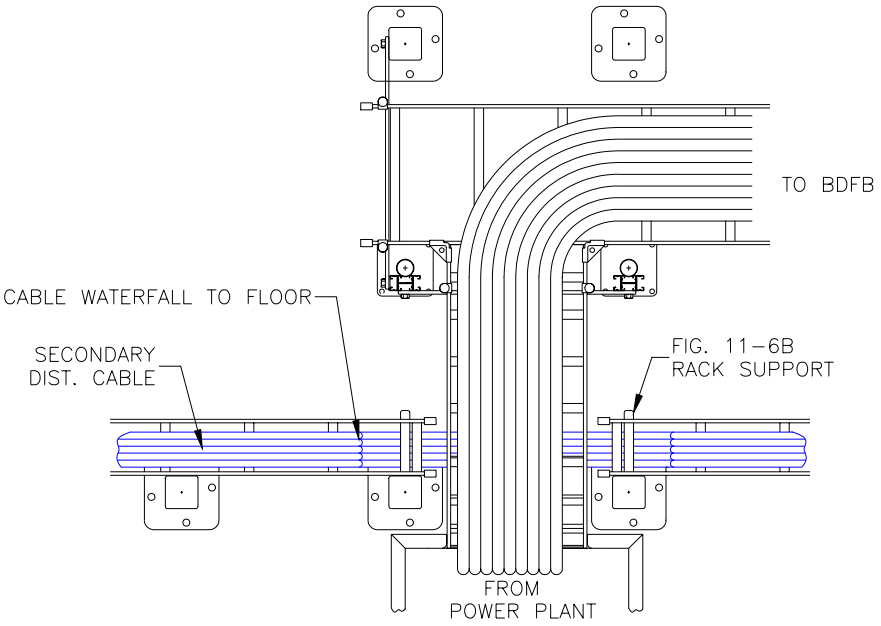
(A)



CABLES TURN AT 1ST AILSE

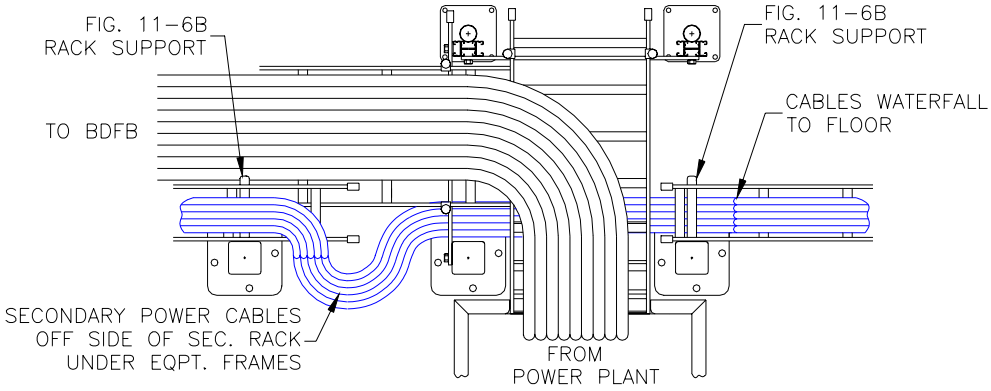
(B)

Fig. 11-9D – Power Rack At Cable Holes – Top View



NOT SHOWN IS A FIG. 11-5B PARTITION ON FLOOR SEPARATING POWER FROM OTHER CABLES.

CABLING FIG. 11-9B RACK ARRANGEMENT
(A)



NOT SHOWN IS A FIG. 11-5B PARTITION ON FLOOR SEPARATING POWER FROM OTHER CABLES.

CABLING FIG. 11-9C RACK ARRANGEMENT
(B)

Fig. 11-9E – General Secondary Power Cabling At Power Cable Holes In Equipment Lineups

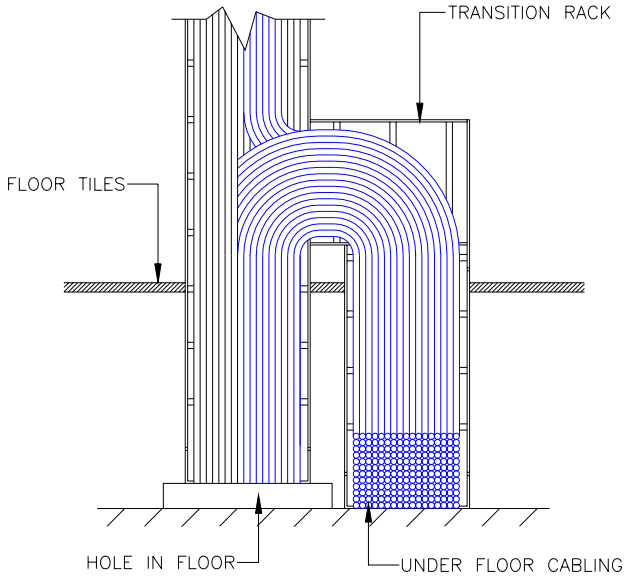


Fig. 11-9F – Cable Transition Arrangement – Existing Cable Holes To Other Floors

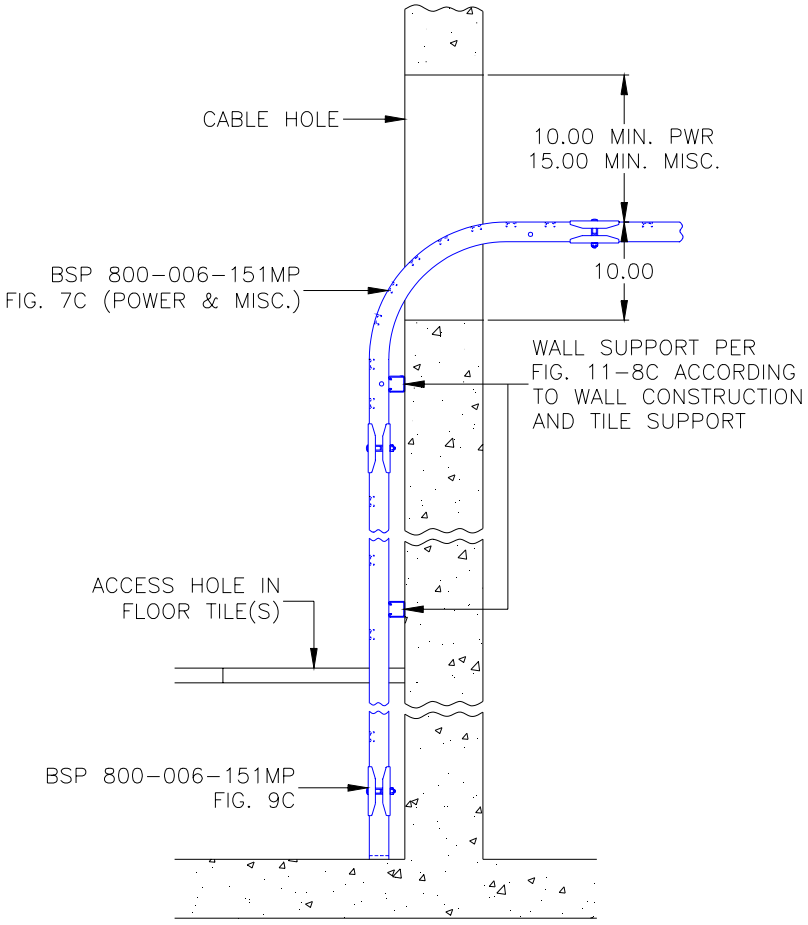


Fig. 11-9G – Cable Transition Arrangement – Between Rooms and Areas

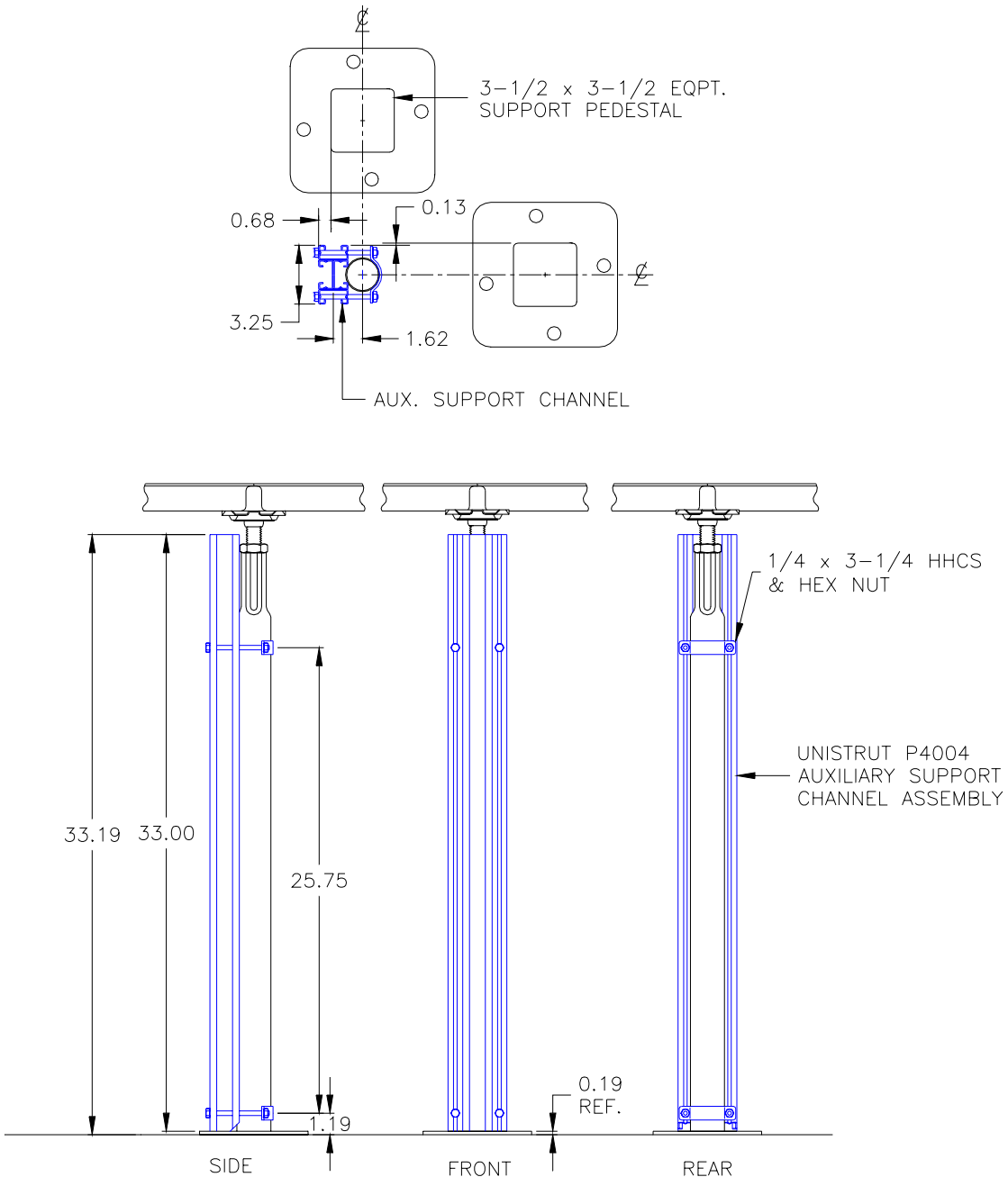


Fig. 11-10 – Auxiliary Support Channel For Misc. Apparatus

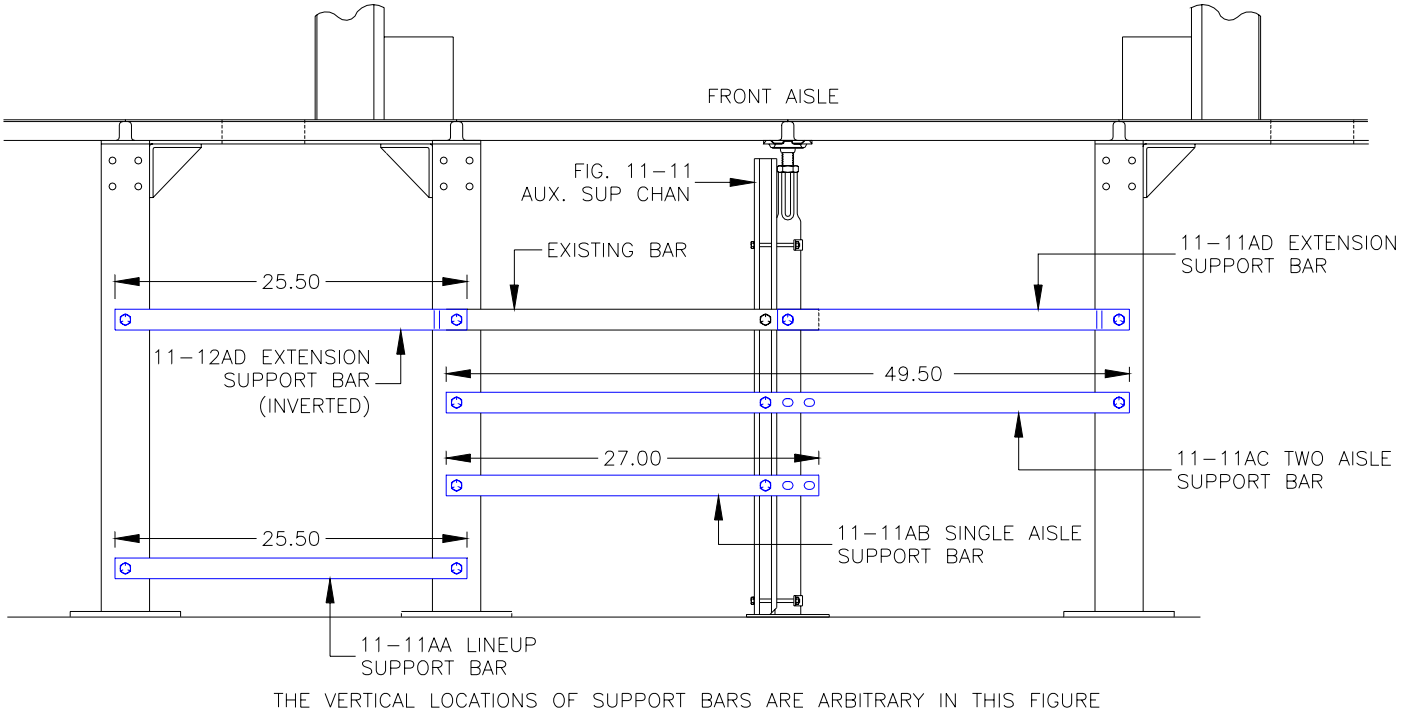


Fig. 11-11A – Auxiliary Support Bars For Misc. Apparatus

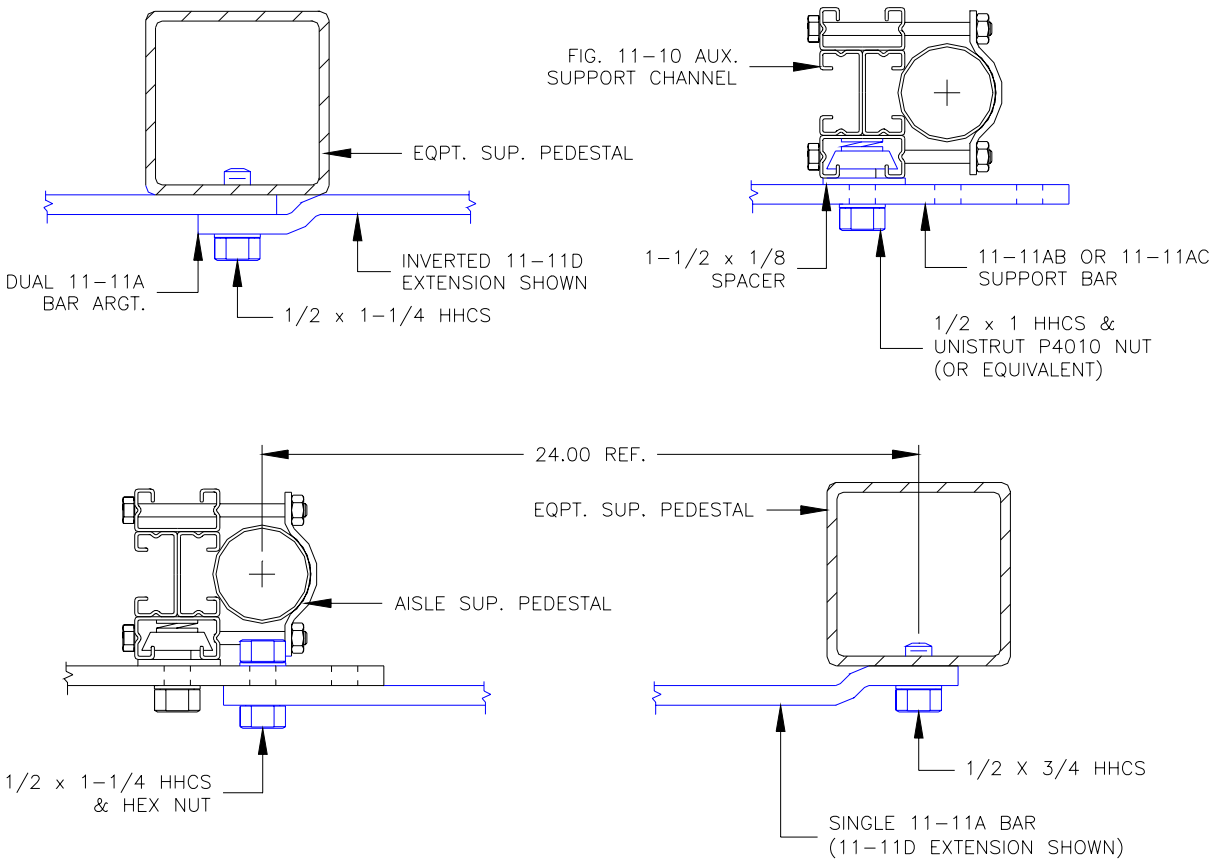


Fig. 11-11B – Assembly Of Fig. 9-12A Auxiliary Support Bars

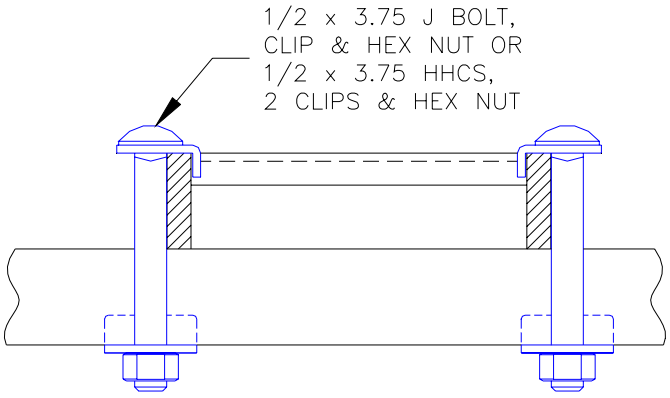


Fig. 11-12A – Cable Rack Support At Auxiliary Support Bars

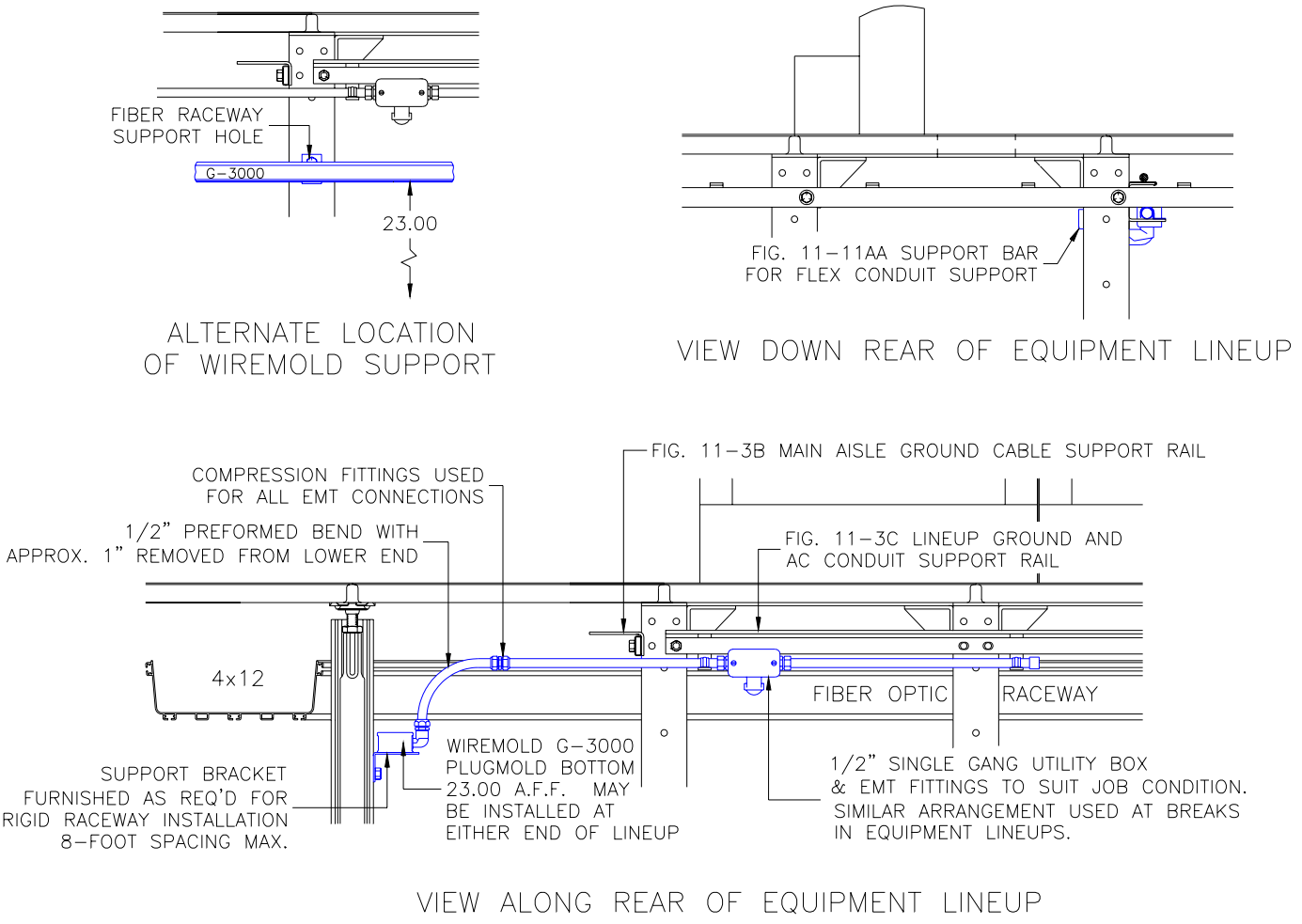


Fig. 11-13 – AC Distribution Arrangements

Fig. 11-14 – Raised Floor Cable Hole Sheathing (place holder)

12 FIBER MANAGEMENT

A. Reason for reissue

12.1 Reserved for future use.

B. General

12.2 This document is the engineering M&P for Fiberguide & Fiber Patch Cord Management in the raised floor environment. The M&P was developed so that FiberGuide can be installed and fiber jumpers can be conveniently managed below the equipment frames in the raised floor environment.

12.3 The following assumptions were used in developing the Fiberguide & Fiber Patch Cord Management M&P:

a) OSP entrance fiber will enter the FDF from the bottom.
b) All Fiberguide shall be located from between 9 and 11.5 inches below the raised floor tile.
c) The standard color for all Fiberguide is yellow.

12.4 The use of Split Corrugated Plastic Tubing i.e. “vacuum hose” type tubing shall be used on a restricted basis within the raised floor environment. The split tube arrangement shall **only** be used when running fiber jumpers from the “turn-up” at the cable hole in the floor tile to the vertical raceway on each side of a network element bay within the footprint of the bay as shown in figures 12-4 & 12-6. This type of arrangement shall be used for MUX line-ups and cageless collocation only. This split tube arrangement must be kept within the footprint of the NE bay and shall not be used in conjunction with FOT bays in an FDF line-up.

C. FDF Line-ups

12.5 Figures 12-1 through 12-3 illustrate placement of fiberguide in typical FDF lineups using ADC’s 12-inch wide raceway system installed at the rear of the FDF below the floor tiles. FDF line-ups require the use of 12” fiberguide and in the case of the raised floor environment the line-up raceway placed and fed from the rear of the line-up. Support for the lineup raceway will be attached to the square pedestals supporting the raised floor using support bracket shown in Figure 12-8. Figure 12-9 illustrates the 12” fiberguide support from round aisle pedestal that would be used when the non-load bearing square tube pedestal is not required. An example of this would be when there is a transition across an office from say an FDF line-up to a MUX line-up and the span in between the two line-ups doesn’t require the load bearing pedestal.

12.6 Figure 12-12 illustrates typical fiberguide layout in raised floor central office environment for both FDF and MUX line-ups. In the case of the FDF line-up each floor tile will be fed off the aisle line-up by a single 12” Tee fitting and 12” trumpet flare feed. This is to accommodate the bay spacing requirements of the FDF line-up itself.

12.7 FDF lineups shall not be placed in a back to back type configuration for raised floor environments. This type of arrangement would not accommodate rear aisle spacing requirements due to the rear placement of the fiber protection system.

D. MUX Line-ups

12.8 Figures 12-4 through 12-6 illustrate placement of fiberguide in typical MUX line-ups using ADC’s 6” raceway at the front of the line-up & 4” vertical slotted raceway at the rear of the MUX bay. MUX lineup raceway will be located at the front of the lineup with the bay feeds running under the bay and transitioning up through the cable slot in the floor tile at the rear of the MUX bay. Support for the lineup raceway will be attached to the square pedestals supporting the raised floor using support brackets shown in Figure 12-10. This figure is for 4” or 6” raceway support to square tube pedestals.

Figure 12-11 illustrates the 4" or 6" fiberguide support from round aisle pedestals that would be used when the non-load bearing square tube pedestal is not required. An example of this would be when there is a transition across an office from say a MUX line-up to an FDF line-up and the span in between the two line-ups doesn't require the load bearing pedestal.

12.9 Figure 12-12 illustrates typical fiberguide layout in raised floor central office environment for both FDF and MUX line-ups. In the case of the MUX line-up each bay will be fed by a single 6" feed off the line-up using a 6" Tee, a straight section, a 90 degree up elbow and 6" end cap with dual 2" flex tubes as illustrated in figures 12-4 and 12-6. This is to accommodate the bay spacing requirements of the MUX bays themselves. Refer to paragraph 12.1.3 for use of split tube or "vacuum hose" type arrangements.

12.10 Figure 12-4 shows how the fiber patch cords come through the floor and are run up the rear of the Bay, on both the left & right upright, and over the top of the bay utilizing 4" slotted fiberguide. Figure 12-5 illustrates the fiber management from the rear to the front of the MUX bay. After a short straight section of 4" fiberguide is placed at the top of the bay, a 4" trumpet flare kit will be added to both ends of the straight section. This will allow for a smooth rear to front transition while maintaining the proper fiber bend radius.

E. Collocation

Caged Environment

12.11 The space between the raised floor tile and the building cement floor slab is considered ILEC space. It shall be utilized by the ILEC for the routing of cable critical to its infrastructure deployment. Therefore, to prevent a potential blockage of ILEC infrastructure, the CLEC will be restricted from placing multiple cable holes within their caged space. As a result, all CLEC cabling, copper as well as fiber will be fed from under the raised floor through one central cable entrance facility (cable hole) located at the front of the cage. See figure 12-13 for specifics on cable hole size and placement.

12.12 Figure 12-14 illustrates the typical layout of the fiber protection system (raceway) in the caged environment. The raceway will be mounted on brackets attached to the floor pedestals and placed just below the bottom of the raised floor tiles. These will be the same brackets illustrated in Figure 12-10. The main aisle raceway will be 6" and placed in front of the collocation cages in the shared common space parallel to the front cage walls approximately 2ft from the cable entrance facility located within the caged area. The x-aisle raceway will also be 6" and will feed to the cage cable entrance facility at the front of the caged area. It will be fitted with a 6" trumpet flair end piece to accommodate the bend radius requirement for fiber jumpers.

Cageless Environment

12.13 Cageless collocation line-ups shall use 6" fiberguide for the entire length of the lineup and the raceway shall be placed at the front of the line-up. No Tee fittings or turn-ups will be added to a cageless line-up until a specific request for fiber is made. At such time as a request is made a Tee fitting and turn-up will be added from the aisle line-up. The fiber protection system will then be extended from the front aisle line-up, underneath the bay to the tile cable hole located at the rear of the bay in the same fashion as illustrated in figures 12-4 through 12-6 for MUX line-ups.

12.14 The use of Split Corrugated Plastic Tubing i.e. "vacuum hose" type tubing shall be used on a restricted basis within the raised floor environment. The split tube arrangement shall **only** be used when running fiber jumpers from the "turn-up" at the cable hole in the floor tile to the vertical raceway on each side of a network element bay within the footprint of the bay as shown in figures 12-4 & 12-6. This type of arrangement shall be used for MUX line-ups and cageless collocation only. This split tube arrangement must be kept within the footprint of the NE bay and shall not be used in conjunction with FOT bays in an FDF line-up.

F. Diverse Routing

12.15 All fiber jumpers, associated with high-speed fiber equipment (OC-192), shall be diverse routed. This does not require two separate fiberguide runs. The fibers can be run in the same trough. However, they have to be run in separate directions, with the working side going to the FDF one way, and the protect side running to the FDF the opposite way. Refer to ERCN 04-01-002A of the TP76400 for details on diverse fiber cable routing.

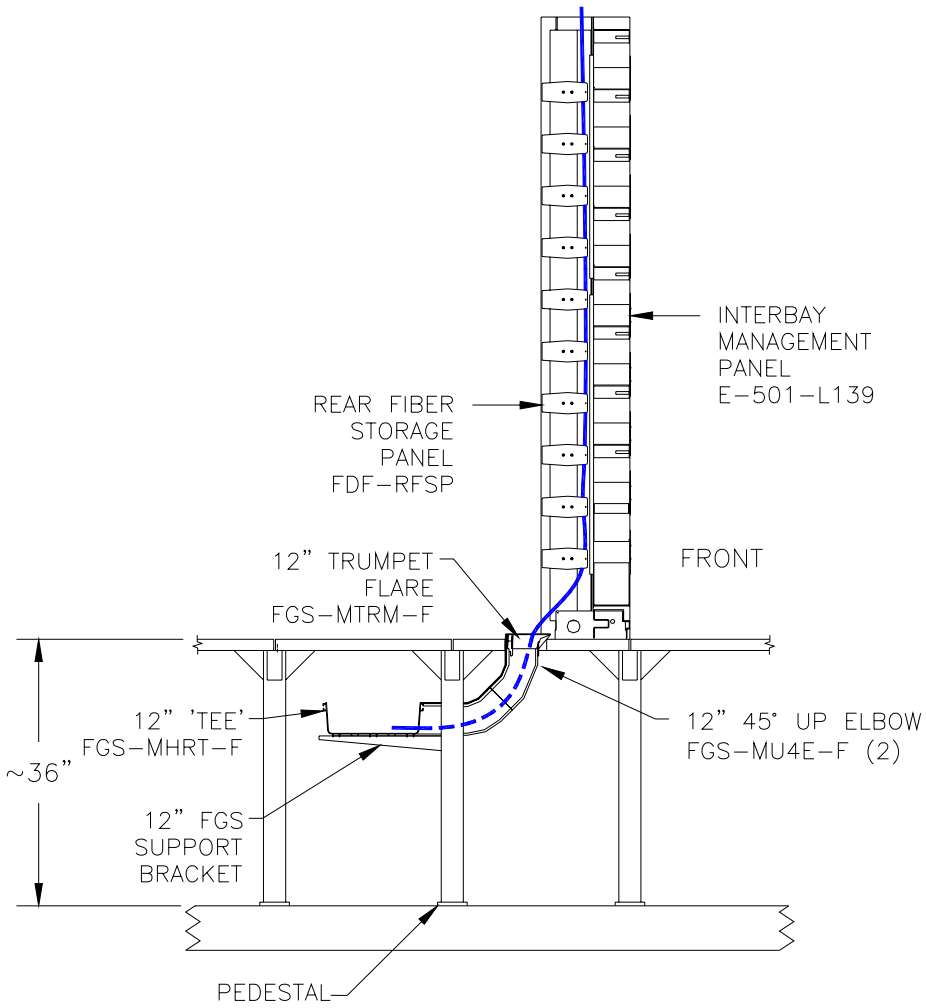


FIGURE 12-1 –
RIGHT SIDE VIEW FIBER DISTRIBUTION FRAME

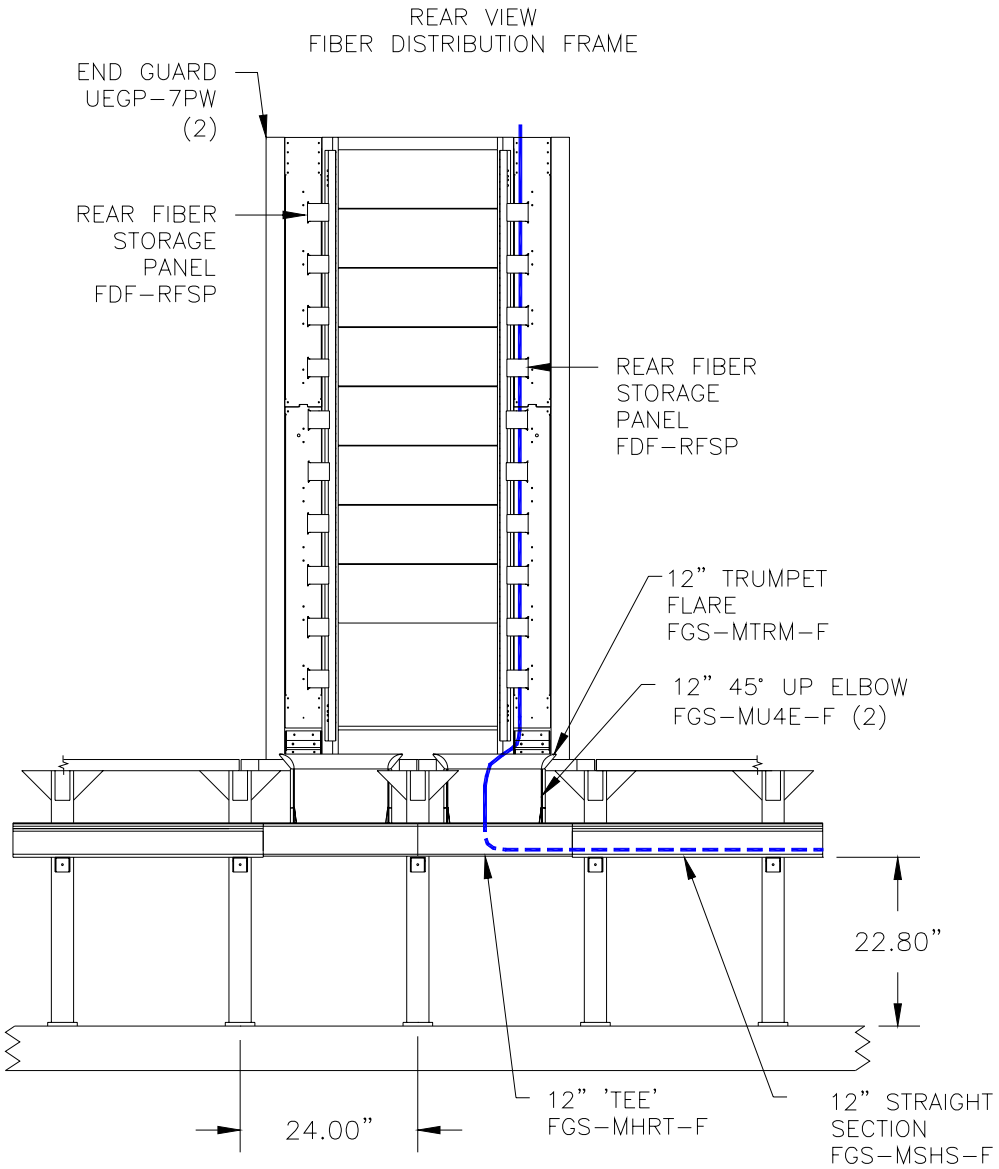


FIGURE 12-2
REAR VIEW FIBER DISTRIBUTION FRAME

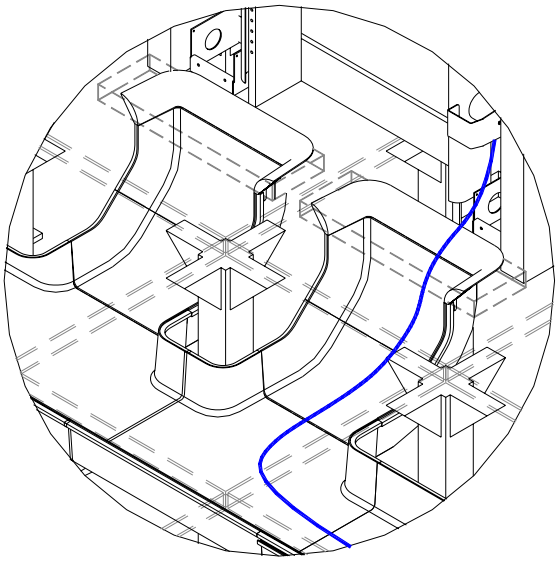


FIGURE 12-3
REAR VIEW CLOSE-UP OF FIBERGUIDE W/TRUMPET FLARE FEEDING FIBER DISTRIBUTION FRAME

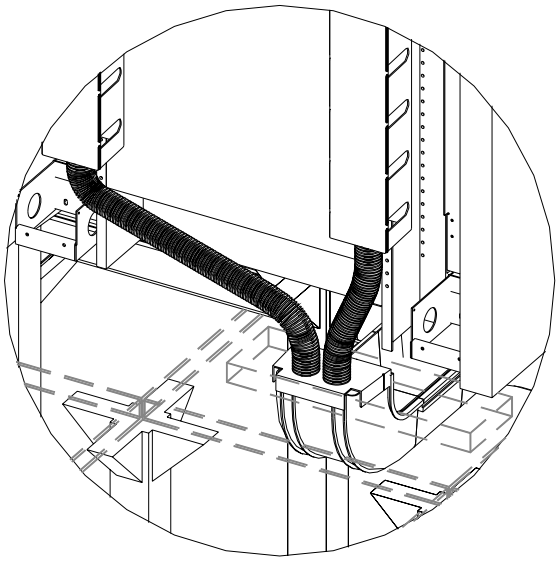


FIGURE 12-4
REAR VIEW CLOSE-UP OF FIBERGUIDE W/FLEX TUBING FEEDING MUX BAY

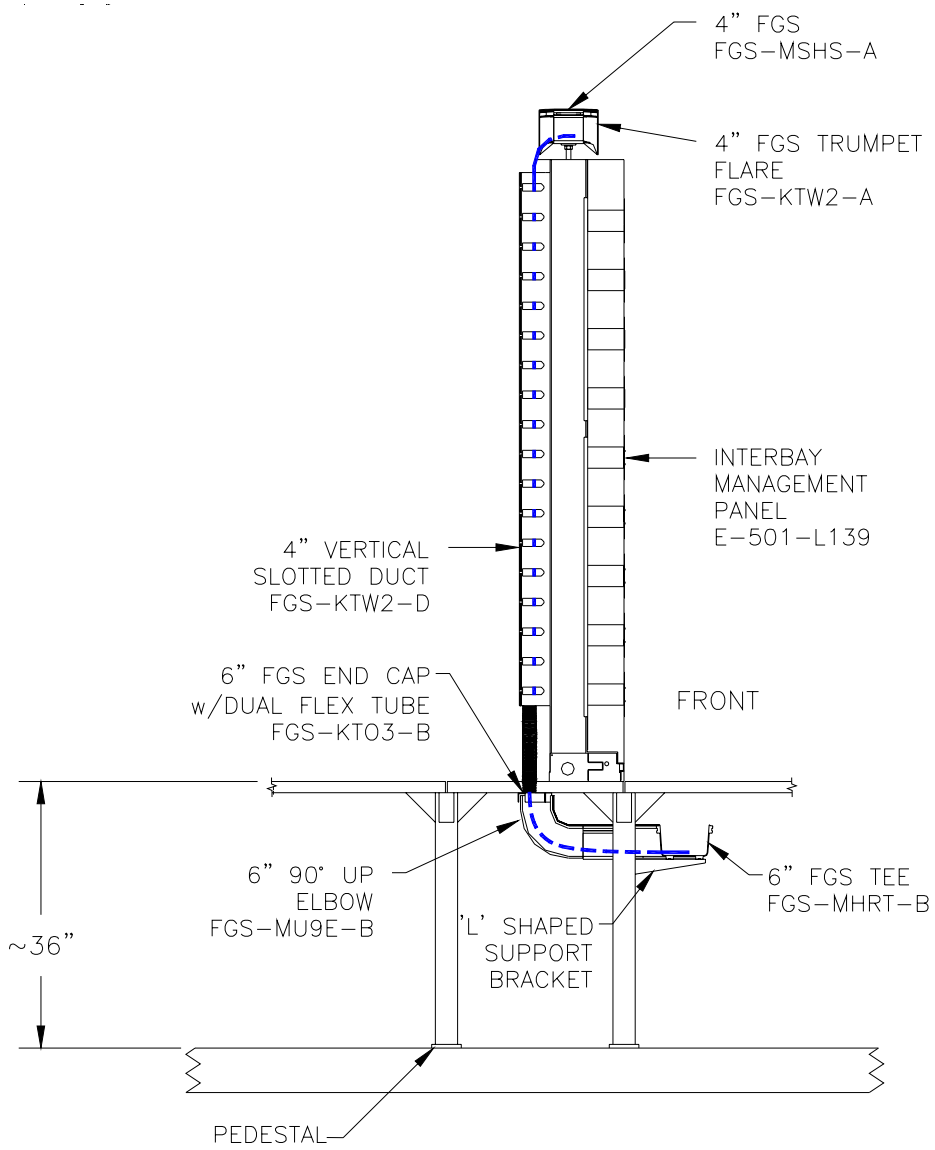


FIGURE 12-5
RIGHT SIDE VIEW MUX LINE-UP

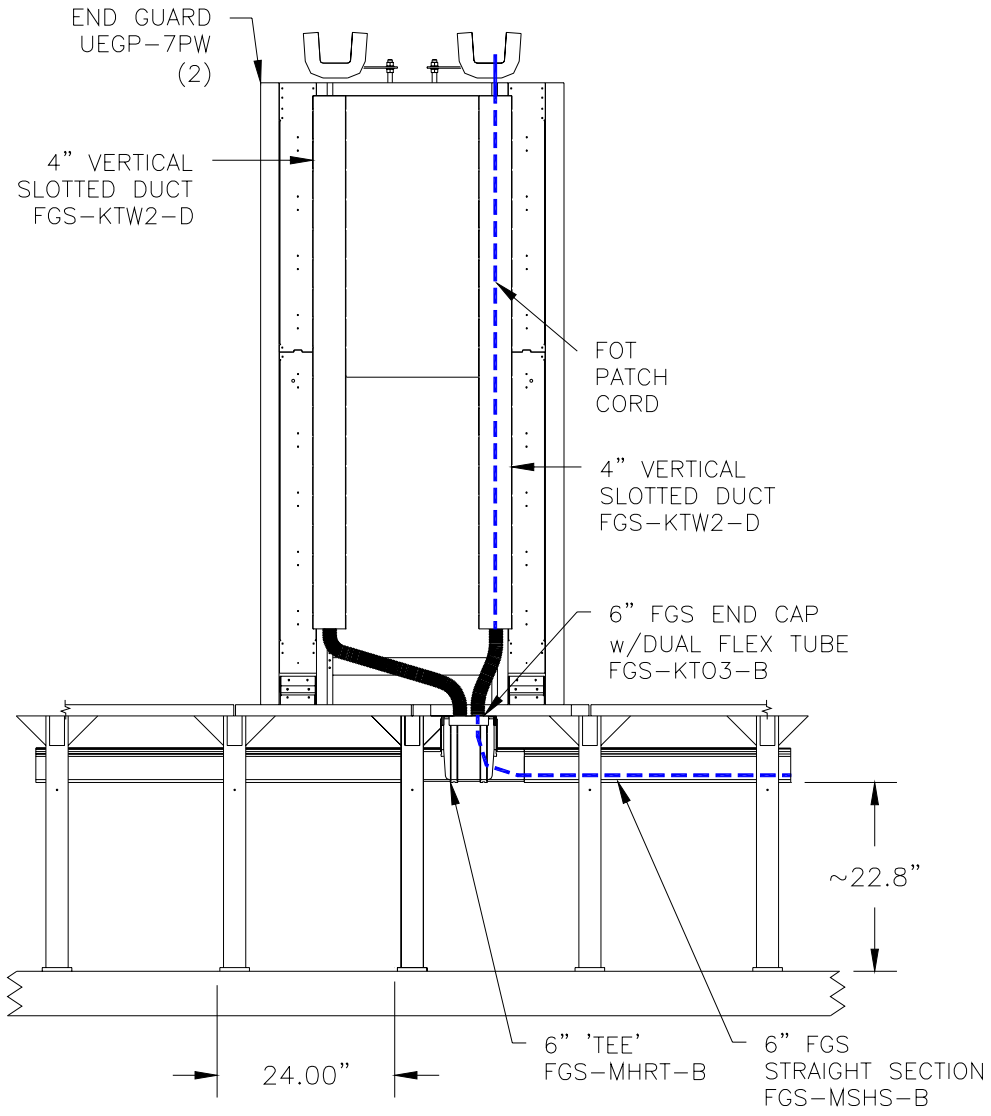


FIGURE 12-6
REAR VIEW MUX LINE-UP

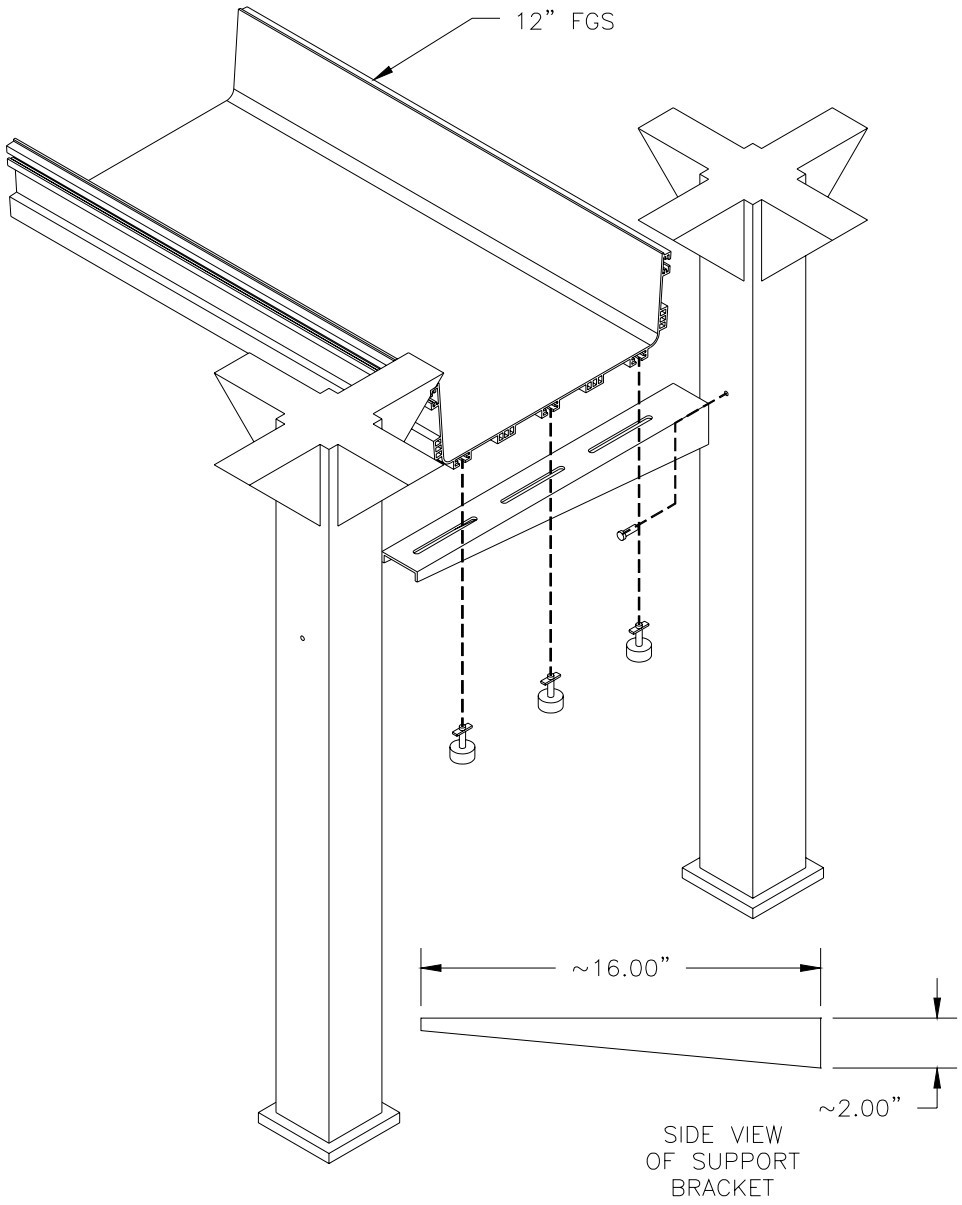


FIGURE 12-8
12" FIBERGUIDE SUPPORTED FROM SQUARE TUBE PEDESTAL

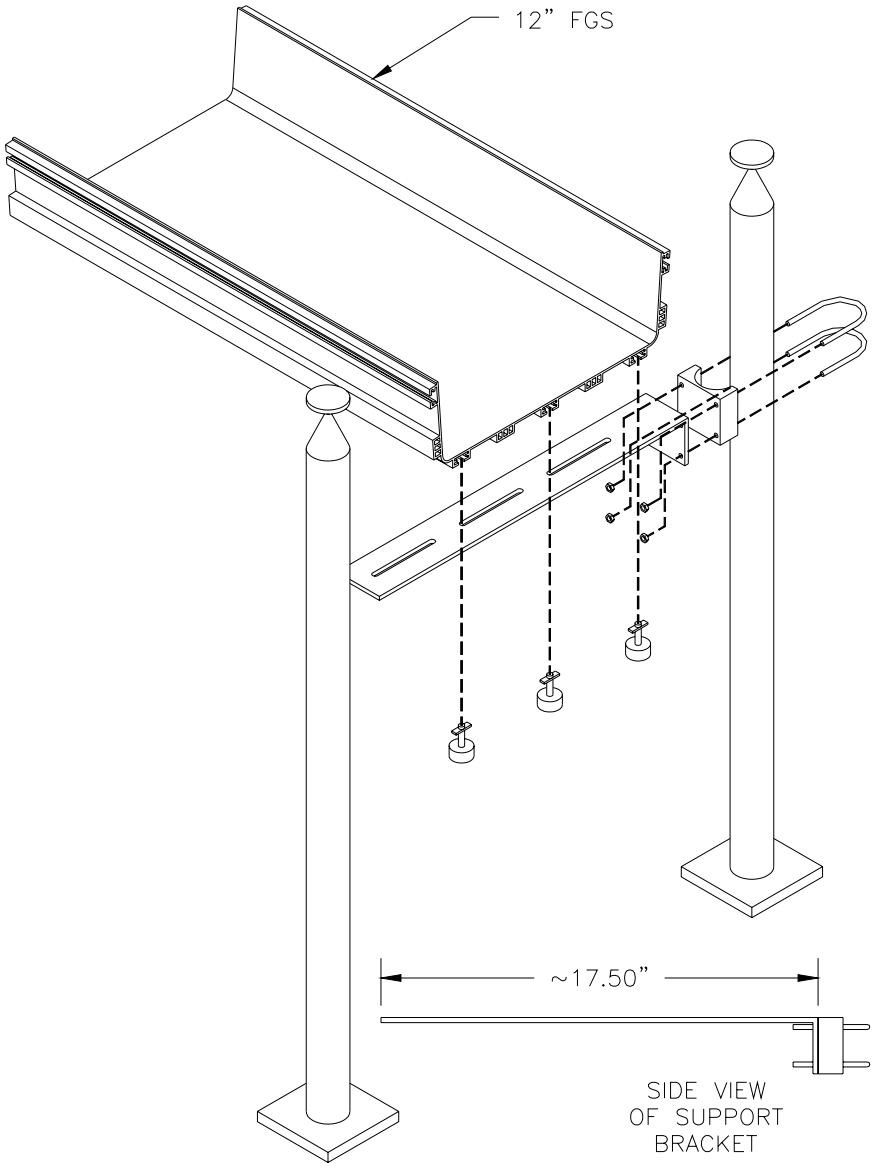


FIGURE 12-9
12" FIBERGUIDE SUPPORTED FROM ROUND AISLE PEDESTAL

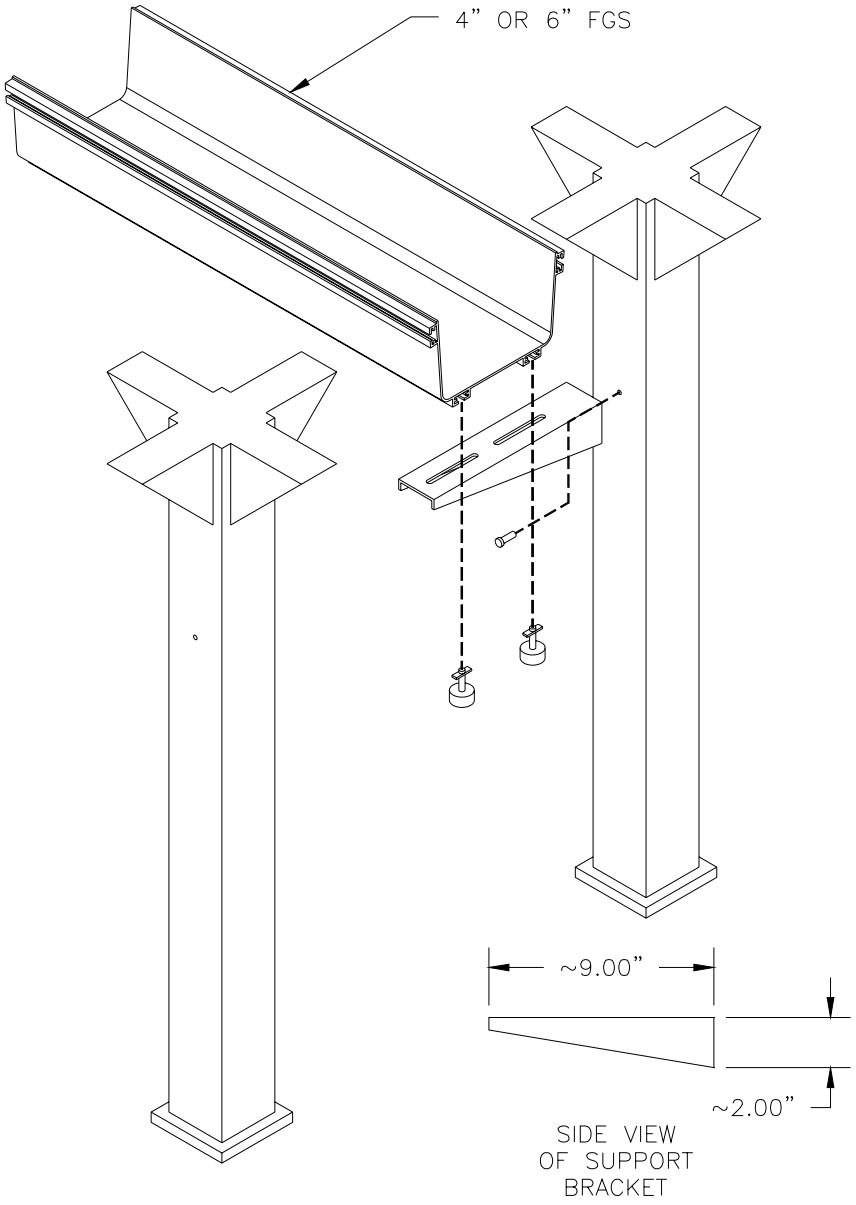


FIGURE 12-10
4" OR 6" FIBERGUIDE SUPPORTED FROM SQUARE TUBE PEDESTAL

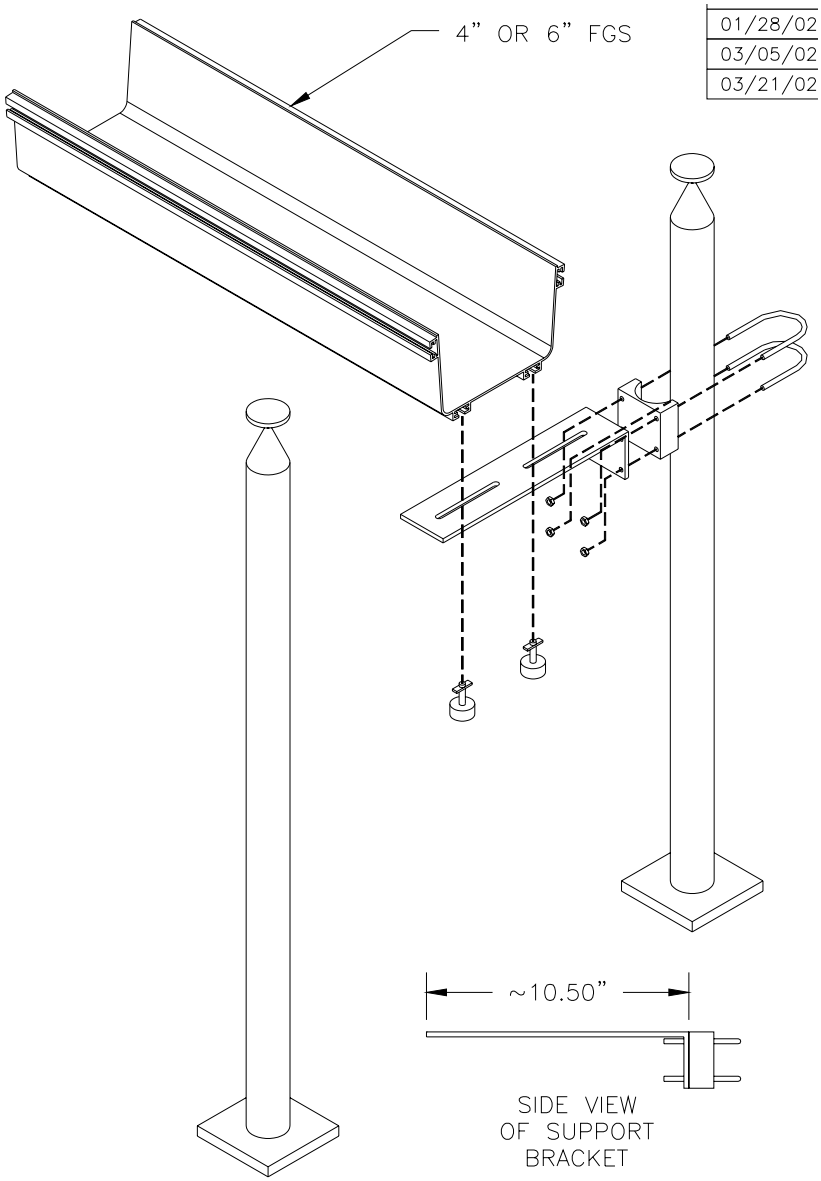


FIGURE 12-11
4" OR 6" FIBERGUIDE SUPPORTED FROM ROUND AISLE PEDESTAL

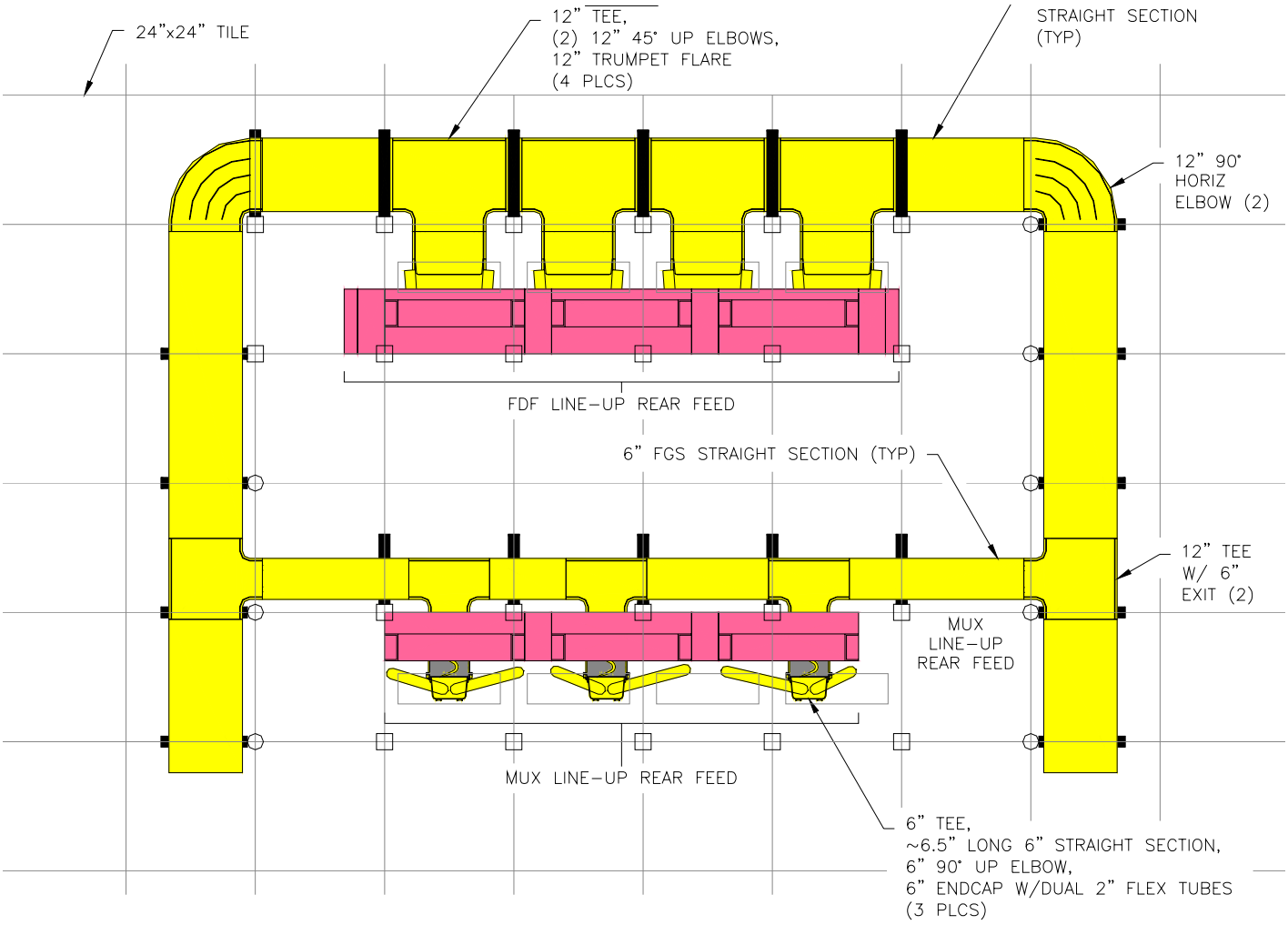


FIGURE 12-12
TYPICAL FIBERGUIDE LAYOUT IN RAISED FLOOR CENTRAL OFFICE ENVIRONMENT

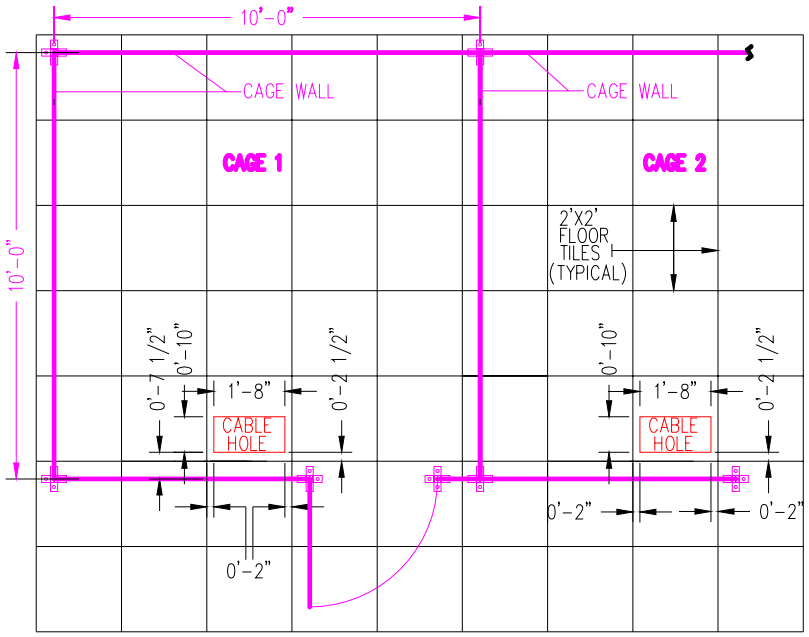


FIGURE 12-13
RAISED FLOOR CAGED COLLOCATION CABLE ENTRANCE FACILITY

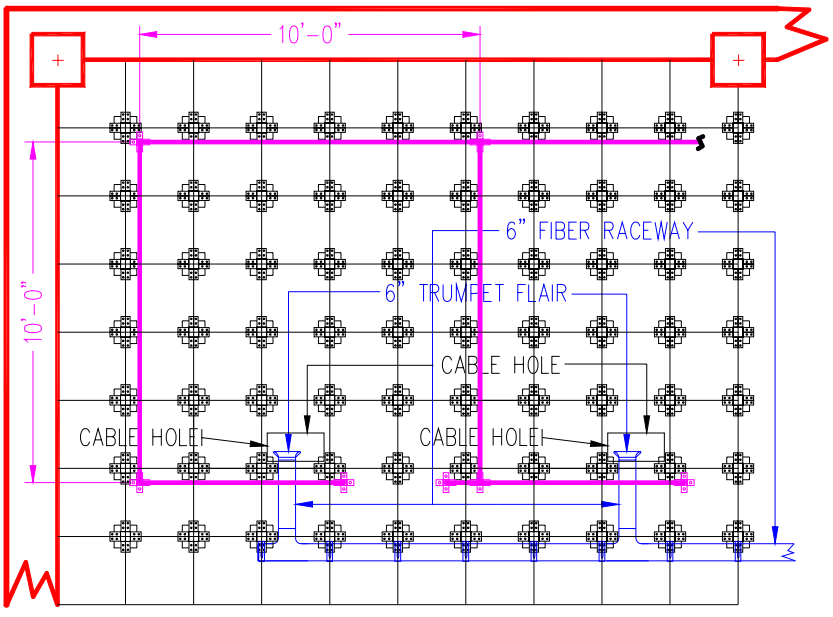


FIGURE 12-14
RAISED FLOOR CAGED COLLOCATION FIBER RACEWAY PLACEMENT

14 COLLOCATION

A. Reason for reissue

14.01 Reserved for future use.

B. Collocation Provisioning

14.02 The Standard Cage will be provisioned in a similar manner throughout the **SBC-13STATE** regions. The Caged Collocation option will be considered as an optional and embedded product.

C. Caged Collocation

Reserved Space, Cage placement and Cable Access Point

14.03 The Caged arrangement will continue to use the principles of a caged area in the Collocation Area which either the ILEC or the CLEC may provide the cage structure walls. The CLEC may order "Caged Space" that they may elect to enclose or request **SBC-13STATE** to provide at their request. The CLEC will be required to place yellow 2-inch demarcation tape around their area in this event, and the ILEC space planner must indicate ownership and dimensions on the floor plans. The CLEC must use this "Caged Space" within either 18 months or within timetables set up by State PUCs, or such space reverts back to unused Switch-room space. See figure 14-1.

14.04 The Cage arrangement will have a standard configuration for the placement of caged walls by either the CLEC or the ILEC without the use of any backboards or special modifications for Power or other connections. The CLEC will be required to provision all AC Power through their equipment and request their external communications access. Typical cage size is 10ft x 10ft(100 Sq. Ft.), however, it should be noted that odd size or non-typical cages may be placed within designated caged collocation areas. Cages shall be arranged to minimize the amount of lost egress space leading from the assigned CLEC cage space and the entrance facility. Cage sides in parallel with floor tiles will be located 5 inches from the edge of any parallel floor tile. The 5 inch spacing requirement for cage walls shall be considered **"critical"** and must be adhered to when placing cages in a raised floor environment. This will apply to the placement of typical size cages (10ft x 10ft) and non-typical size cages e.g. 5ft x 20ft, 4ft x 25ft, etc. See figure 14-1.

14.05 The space between the raised floor tile and the building cement floor slab is considered ILEC space. It shall be utilized by the ILEC for the routing of cable critical to its infrastructure deployment. Therefore, to prevent a potential blockage of ILEC infrastructure, the CLEC will be restricted from placing multiple cable holes within their caged space. As a result, all CLEC cabling, copper as well as fiber will be fed from under the raised floor through one central cable entrance facility (cable hole) located at the front of the cage. See figure 14-2.

14.06 The cable hole will be 10 inches deep by 20 inches wide and placed in the first full 2'x2' floor tile closest to the front cage wall and to the left of the cage door. The location of the cable hole is based on the minimum point of entry to the caged space allowing for cable to be fed to the CLEC's equipment. The front edge of the cable hole will be 7-1/2" from the front cage wall and 2-1/2" from the front edge of the floor tile. The hole will be centered with the front edge of the floor tile thus leaving 2 inches of clearance on both sides of the hole from the tile side edges. See figure 14-2.

14.07 Unless specifically specified with the application request, the CLEC will not receive any Point of Termination panels for DS0, DS1, DS3 or Fiber facilities to interconnect to the ILEC. The ILEC will provide tagged base-end cables with cabled ends to the CLEC's cage location. Pre-provisioned cable, copper or fiber by the ILEC will be coiled and stored under the raised floor tile near the cable entrance facility located at the front on the cage until such time as the CLEC is ready for distribution within their caged space. See figures 14-3 and 14-5A. The buildout of Caged lower level framing and

cable racks between the 7-foot high CLEC bays and the 7'-6" height is performed by the CLEC in the Caged Area. The CLEC will be responsible for bringing the cable from under the floor tile, through the cable hole and distributing it to their equipment located within their cage.

Cable Trough Placement

14.08 Figure 14-4 illustrates the typical layout of ILEC provided cable troughing to the caged environment. There will be one cable trough feeding the common caged area. It will be designated as the main aisle cable trough and will be placed in front of the collocation cages in the shared common space parallel to the front cage walls. See figure 14-4. Feeding each collocation cage will be a separate cable trough designated as the x-aisle cable trough. This cable trough will extend into the collocators caged area below the cable entrance facility (cable hole) illustrated in figure 14-2. Both the main aisle and cross aisle cable troughs will serve as the access path to the collocators cage for switchboard cable, OSP cable and secondary power cable. For more detailed information and illustrations on cable troughing, refer to section 11 of this document.

Fiber Protection System (Raceway) Placement

14.09 Figure 14-5 illustrates the typical layout of ILEC provided fiber protection system (raceway) in the caged environment. The raceway will be mounted on brackets attached to the floor pedestals and placed just below the bottom of the raised floor tiles. The main aisle raceway will be placed in front of the collocation cages in the shared common space parallel to the front cage walls approximately 2ft from the cable entrance facility located within the caged area. The x-aisle raceway will feed to the cage cable entrance facility at the front of the caged area. It will be fitted with a trumpet flair end piece to accommodate the bend radius requirement for fiber jumpers. For details on placement of raceway, refer to sections 11 and 12 of this document.

Grounding Placement

14.010 Figure 14-6 illustrates the typical layout of ILEC provided grounding in the caged environment. The main aisle ground connection serving the caged line-up will be a #6 AWG that feeds off of a larger horizontal riser. The horizontal riser shall be a minimum size of 350KCM that ultimately feeds back to the central office ground (COG). There will be two feeds off the main aisle ground going to the cable entrance facility within the CLEC cage. One will be connected to the cage itself and the other will connect to the CLEC transport equipment. The ground feeds in the main aisle and feeding the cage itself will be attached to a support bracket connected to the floor pedestals in the common area.

DC Secondary Power Placement

14.11 The DC Power requests will be provided in one of two ways. If the ILEC places the CLEC cable it will either be as tagged base-end cables, coiled in the cable trough beneath the raised floor tile. See figure 14-3. It will be located near the cable entrance facility at the front on the cage near the door or it will be terminated in a CLEC bay through the use of a CIPP (Collocation Interconnect Power Panel) as an optional item. The CLEC's **SBC-13STATE** Approved Vendor can also place and terminate power cable and terminate power cable to the BDFB.

AC & Conduit Placement

14.12 Figure 14-7 illustrates the typical layout of ILEC provided AC & Conduit in the caged environment. The ILEC will provide a breaker box for AC power for the geographic portion of the ILEC Building Structure. The CLEC may place AC power for lights and duplex outlet kick panels in the bottom of the bays. The vendor performing the work will be required to provide ¾" conduit into the cage structure area from the breaker box. The conduit shall be placed beneath the raised floor tile until it reaches the CLEC cage structure where it will then be positioned to access the CLEC's caged area via the cable entrance facility located at the front of the cage. See figure 14-2. Lighting for CLEC caged areas will be provided by the ILEC. The conduit from the breaker box for general lighting in the caged area shall be shall be ¾"

in size and run above the raised floor. Lighting switches for caged areas shall be wall or column mounted and will be area specific.

Point of Termination

14.13 If the CLEC requests Point of Terminations (POT) for their equipment, no matter whether it is Caged or Cageless, the POT equipment panels will be terminated in the next assigned standard bay assignment in the Collocation Area, typically in a Physical Cageless Lineup. The only exception to this rule is if the CLEC places the POT in their caged collocation space. This POT placement will be dictated by the size of the bay requested for termination (Standard Bay verses Large Cabinet). The placement of POT bays/cabinets within Common Space is prohibited in order to maintain egress/ingress for all CLECs. The ILEC will place the standard POT panels in the CLEC bay within the Cage at the CLEC's request on the initial installation when provided by SBC. On Augment Requests, the CLEC has the option to purchase the POT panel from SBC but will not be installed or terminated by SBC. Additional terminations to an existing SBC provided POT panel beyond the initial installation date will be terminated by the CLEC and their **SBC-13STATE** Authorized Vendor only.

D. Cageless Collocation

General Layout of Bays/Cabinets

14.14 The ILEC will provide the infrastructure of cable racks and lighting to support bay or cabinet layout architecture. This method of provisioning allows for a more compact placement of telecommunications equipment but requires a significant increase in supporting infrastructure in terms of cost and layout as compared to a caged environment where the CLEC provides the cable rack structure within their cage.

14.15 The Cageless Collocation will be laid out to accommodate two generic sizes. One will be the considered the Standard bay footprint and while the other will be considered the Large bay footprint. Network Planning & Engineering efforts will be geared to maximize the available space at the least cost by placing and assigning like-sized equipment needs in the same lineup.

14.16 The CLEC may not place multiple types of equipment within a specified Bay (10 sq. ft) or Cabinet (18 sq. ft) space assignment lineup. Do not mix standard and large bay layouts in the same lineup. Insure that the aisle spacing for Standard and Large Bay configurations are rigidly adhered to as shown in this document. If aisle spacing is limited and cannot be supported, the ILEC must have the concurrence from the CLEC in writing in advance to use this reduced space and still pay for the expected aisle spacing.

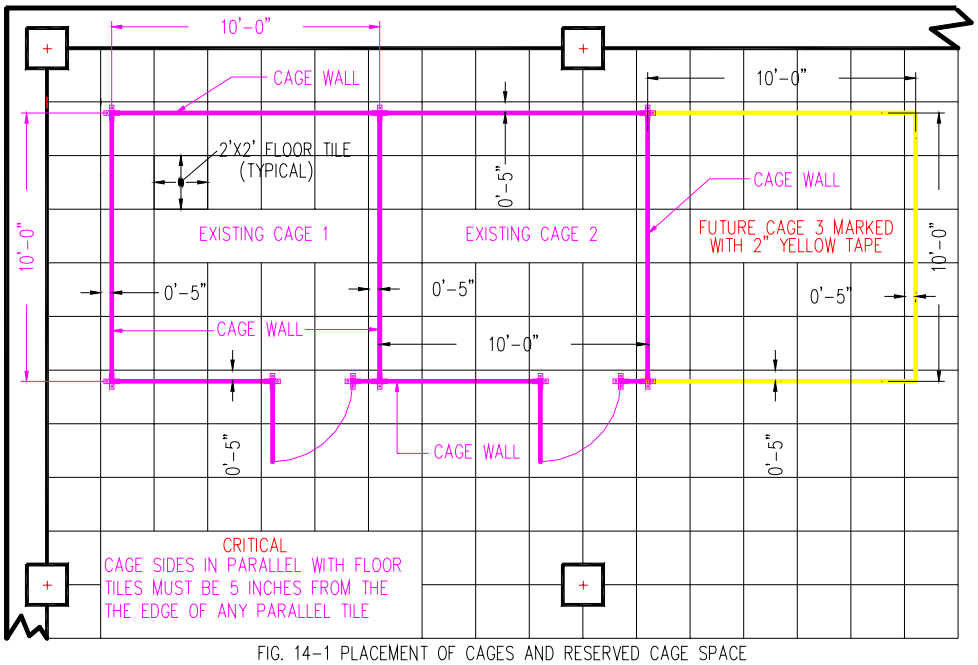


FIG. 14-1 PLACEMENT OF CAGES AND RESERVED CAGE SPACE

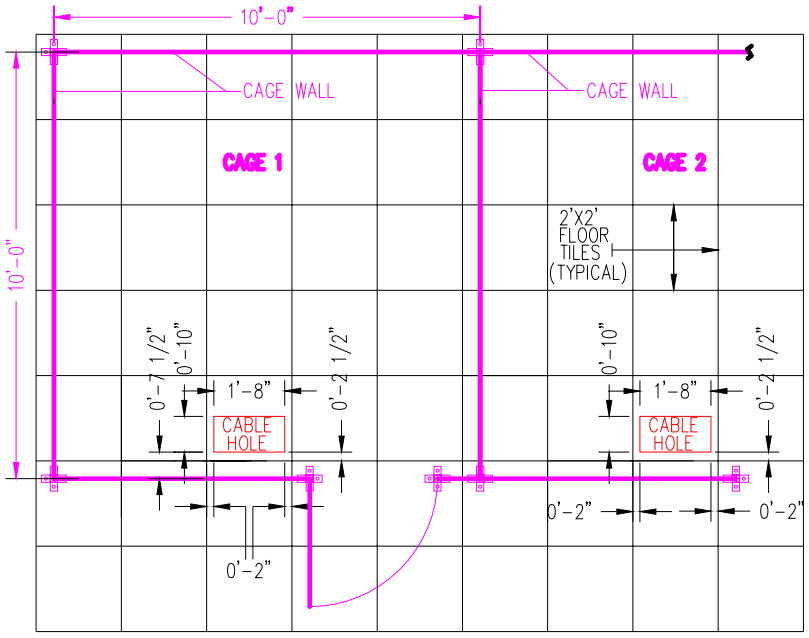


FIG. 14-2 CAGED COLLOCATION CABLE ENTRANCE FACILITY

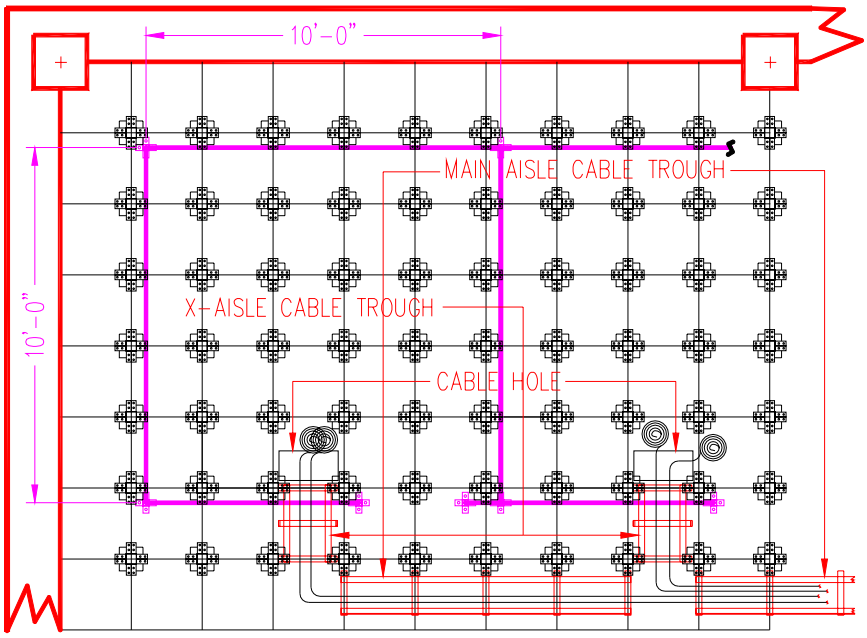


FIG. 14-3 TYPICAL RF CAGED COLLOCATION COILED CABLE BENEATH FLOOR TILE

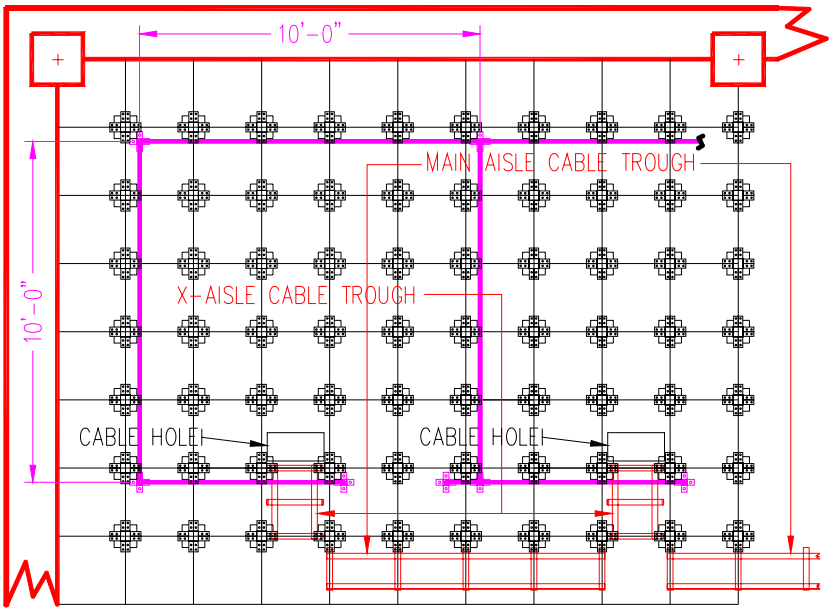


FIG. 14-4 TYPICAL RAISED FLOOR CAGED COLLOCATION
CABLE TROUGH PLACEMENT

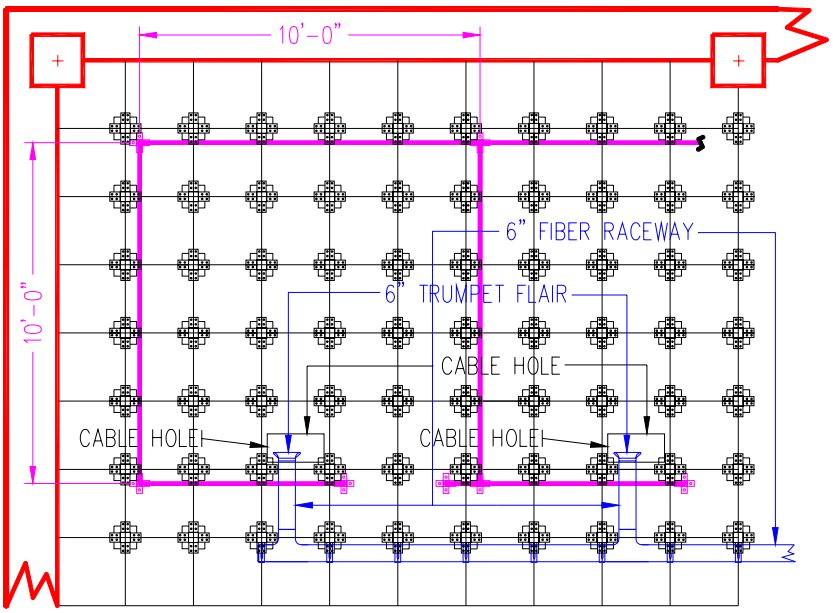


FIG. 14-5 TYPICAL RAISED FLOOR CAGED COLLOCATION
FIBER RACEWAY PLACEMENT

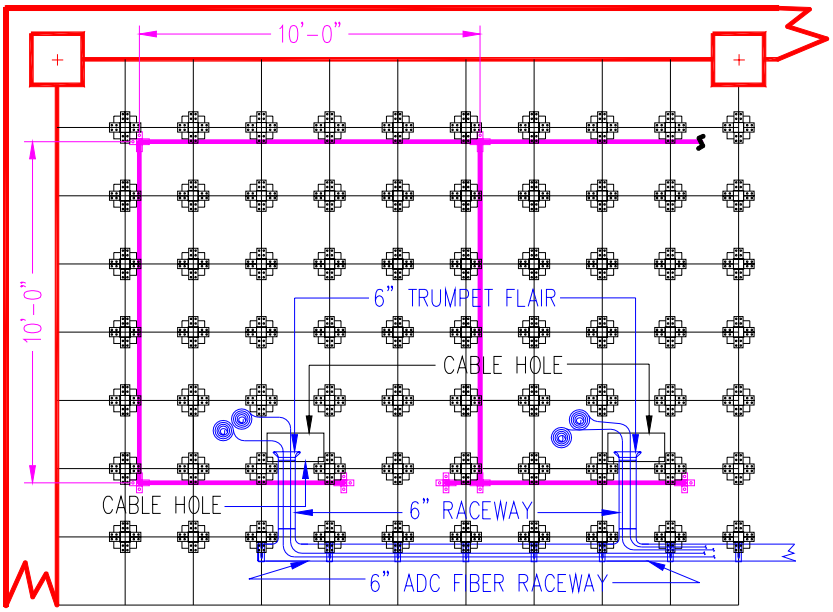


FIG. 14-5A TYPICAL RAISED FLOOR CAGED COLLOCATION
COILED FIBER JUMPERS

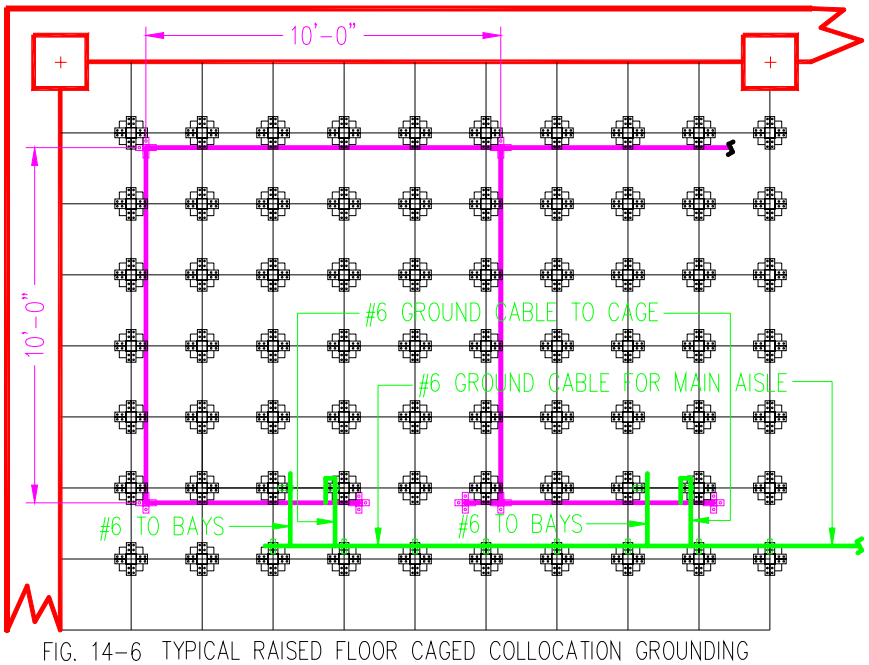


FIG. 14-6 TYPICAL RAISED FLOOR CAGED COLLOCATION GROUNDING

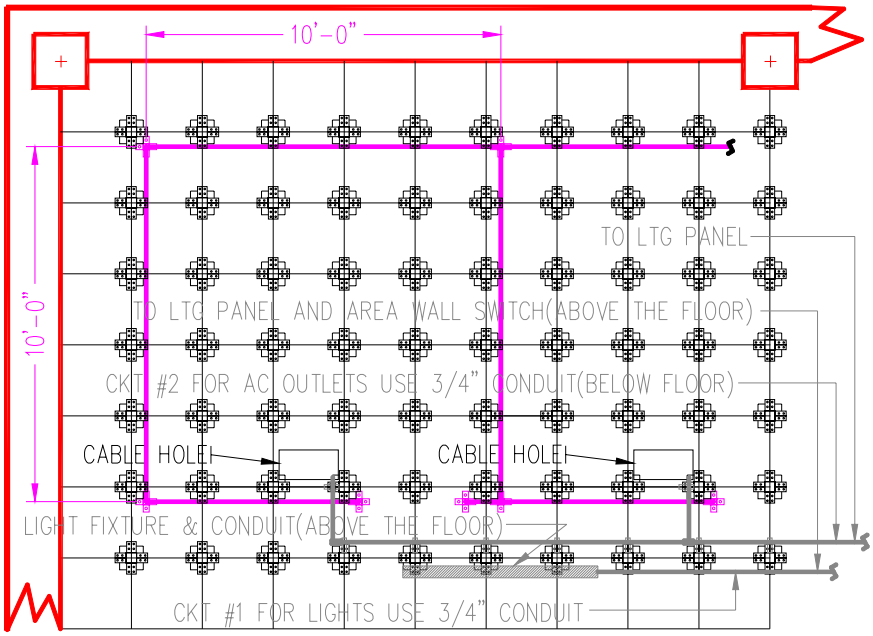


FIG. 14-7 TYPICAL RAISED FLOOR CAGED COLLOCATION AC CONDUIT

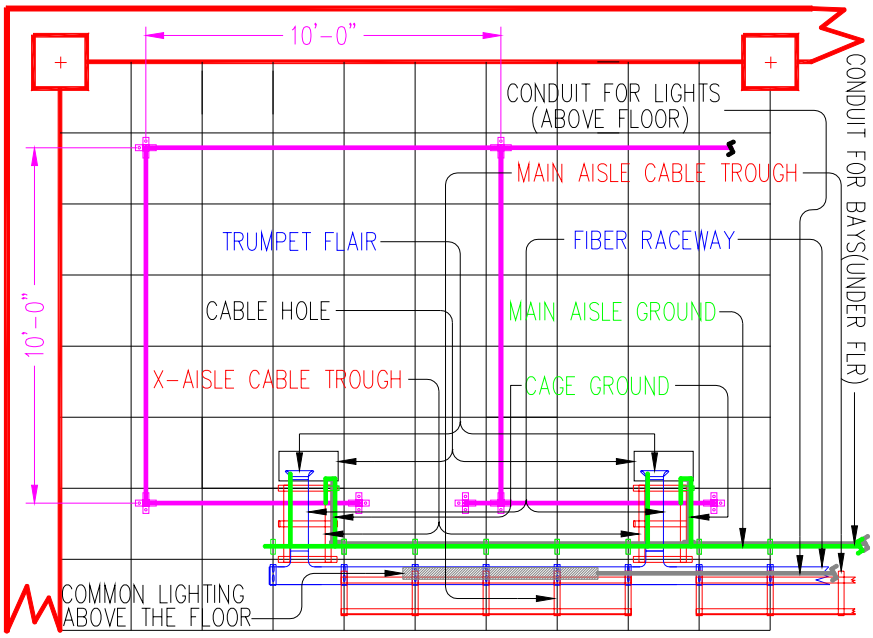


FIG. 14-8 TYPICAL RAISED FLOOR 10 X 10 CAGED COLLOCATION AREA

14 REFERENCES

A. Documents

TP76300MP	Installation Requirements
TP76200MP	Network Equipment Power, Grounding, Environmental and Physical Design Requirements
BSP 802-001-180MP	Grounding and Bonding Requirements
BSP 800-005-200MP	Common Systems-Through Penetration Firestopping Requirements