SBC-812-000-017

Common Systems **Cable Installation, Removal and Mining Requirements - Cable Racks and Raceways**

This practice provides the benchmark cable installation and removal requirements for SBC local exchange carrier network facilities.

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INTRODUCTION

This practice provides the guidelines for placing, supporting, removing, and mining cable within SBC local exchange carrier network facilities. This practice should be used in conjunction with TP76300MP which provides detailed installation workmanship requirements.

1. REASON FOR REISSUE

Issue Number	Date Modified	Brief Description of Changes	Author
1	5/23/03	Merge BSPs 800-003-150MP Iss. C & 800-003-200MP Iss. B	bm1924

2. ROUTING AND PLACEMENT

2.1. Miscellaneous Copper Cable

Cable shall be installed on or in cable racks and raceways designated for the type of cable being installed, and shall follow the cable routing paths provided in the associated job engineering or installation documentation. Except as discussed below, cable routes shall be engineered using the most direct path possible between points of termination.

Cable congestion in office cable racks shall be avoided. When large amounts of cable are to be installed, cable shall be routed using more than one cable rack path to avoid unnecessary cable pileup or blockage of any single cable path. For new cable rack runs, additional or alternate cable routes should be used when approximately 75% of the cable rack's available cable capacity is consumed. The following guidelines shall be used to determine when additional cable paths should be used when determining cable routes for existing cable rack runs:

A. When the cable pileup has been increased by 2 inches.

B. When approximately 225 cables having an approximate 3/8" diameter have been run.

C. When approximately 20% of the available cable space has been used.

Cable terminating on office distributing frames shall be routed to the distributing frame using cross aisle cable racks located nearest the apparatus on which the cable will terminate.

Cable pileup on vertical racks other than power racks shall be limited so that it is not closer than 3 inches to the interior face of cable holes. Cable pileup on vertical power cable racks shall be limited to 7 inches regardless of cable hole size.

Cable routes should be engineered to minimize the number of cable holes to be opened when appropriate. Generally, it is more economical (appropriate) to increase the total amount of miscellaneous cable by 75 feet (30 feet for power cable) to avoid opening another cable hole.

NOTE: For a switchboard cable run consisting of 5 cables, it is more economical to increase the length of each cable being run by 15 feet to avoid opening an additional cable hole. (15 cable feet x 5 cables = 75 feet

Excess cable shall not be stored on or in office cable racks. Except for the reasons provided below excess cable shall be removed from individual cable runs, or the excessively long cable runs shall be replaced with cable runs of the appropriate length. For the purposes of this requirement a cable is considered excessively long if more than 6 feet of its length will have to be placed or otherwise stored on or in office cable racks. Excessively long cable runs are acceptable:

A. When the excess cable is required for proper equipment operation such as signal balancing or equipment sequencing. The excess cable shall be distributed in a back and forth fashion along cable racks so the resulting pileup is not concentrated at a single location.

B. When the excess cable is associated with equipment that is located in a temporary location, and the cable will be used when the equipment is moved to its ultimate location. The cable shall be coiled, banded, identified, and securely attached to overhead cable racks in a manner that will prevent it from becoming buried by subsequent cable installation activity.

C. When the excess cable is placed in cable storage apparatus located in other than the equipment overhead environment.

Cables should be run from connectorized equipment to non-connectorized equipment. Double ended connector cables shall be run from non switching equipment network elements to switching equipment frames. This is to insure that cable pileups caused by permissible excess cable lengths will be located in the lineup cable troughs of switching equipment where less cable installation activity is anticipated.

2.2. Entrance Cable

Entrance cable is that portion of the "loop" that is installed between a building's cable entrance facility and the office distribution frames. Entrance cable shall be installed on or in dedicated cable racks or raceways to prevent burial by other cable. Beyond the cable entrance facility, entrance cable that is listed or otherwise rated as being resistant to the spread of fire may be run secured on ladder type cable rack.

Entrance cable that is not listed as being resistive to the spread of fire shall be installed in rigid conduit or intermediate metal conduit in accordance with the National Electrical Code according to the type of cable being installed.

NOTE: The National Electrical Code permits unlisted cable if its run length is 50-feet or less, measured from the cable entrance facility, and the cable terminates in a terminal box.

2.3. Through Circular Openings

Table A provides the guidelines for the number of cables permitted in circular and small rectangular openings that will be fire stopped with intumescent putty fire stopping products. The maximum number of cables listed represents a 28% maximum fill rate for PVC jacketed cables.

Table A

Permissible Penetrating Items In Circular and Small Rectangular Openings For Intumescent Fire Stopping Applications

Hole Size	**Maximum Number Of Cables In Opening**							
	Cable Diameter (In.)							
	1/4	1/2	3/4	1	1-1/2	2	2-1/2	3
2" dia.	17	4	1	1				
3" dia.	40	10	4	2	1			
4" dia.	71	17	8	4	2	1		
5" dia.	112	28	12	7	3	2	1	
6" dia.	161	40	18	10	4	2	1	1
4" x 6"	137	34	15	8	3	2	1	1

3. SUPPORTING

3.1. General

All cable shall be placed and securely supported so there is no appreciable sag in the cabling, or undue strain on skinners, connectors, or terminating apparatus. In general, cable shall not be unsupported for a distance greater than 3 feet when measured along the shortest cable between the last point of support on a cable rack and the first point of support on an equipment frame or other apparatus except as follows:

A. Where a cable to a distributing frame passes through a floor opening immediately below the frame an supported length of 4 feet is permissible.

B. Cable entering a distributing frame from a cable rack at the top of the frame may be unsupported for a distance of 4 feet

C. Vertical cables in floor openings do not require support within the opening.

Cables that are unsupported for a distance greater than 2 feet between office cable racks and the first point of support within an equipment frame shall be banded together at a minimum of three locations to keep the cables organized. For cable lengths less than 2 feet banding shall be applied only if necessary to keep the cables grouped together in an orderly fashion.

Cable leaving office cable racks shall transition to the vertical plane at the cable pileup level as opposed to a diagonal line between the office cable rack and the equipment frame. Cable transitions (cabling between cable racks and equipment frames) shall be in the form of an arc according to the minimum bending radius requirements of the cable(s) being installed. The weight of cable transitions shall be supported by the equipment frame's cable support apparatus rather than the horizontal cable and cable racks above the equipment frames. This may be accomplished by applying an upward force to the transition cables before securing them to framework cable support apparatus.

At turns and junctions of horizontal cable racks where the turn of the cable is such that proper support for the cable is not provided by the cable rack straps, a 1/8 x 1-inch bar shall be placed diagonally across the rack similar to the method shown in Fig. 1. These bars shall be held in place by sewing with twine.

3.1.1. Supplemental Cable Supports

Supplemental cable supports as shown in Fig. 2 shall be provided when it is necessary to support cable from inverted cable racks. Supplemental supports shall clamp the cables firmly without excessive distortion of the cable's basic shape. Space supplemental supports at approximate 10-foot intervals when the ultimate amount of cable is expected to be less than 100 square inches, and at approximate 6-foot intervals for ultimate cable amounts of 100 square inches or more.

Vertical cable runs 15 inches and wider extending through more than 2 floors shall be equipped with supplemental supports as shown in Fig. 3 or Fig. 4. Clamps shall be initially furnished and installed to accommodate the maximum cable pileup of the cable rack.

3.2. Straight Vertical Runs

A. Where the vertical runs are in exposed locations, one set of clamps shall be installed per floor located near the ceiling as shown in Fig. 3

B. Where the vertical runs are located in shafts or other enclosures, two sets of clamps shall be installed per building floor, one just above the floor cable hole sheathing and the other about half the distance to the ceiling as shown in Fig. 4. The upper clamp shall not be less than 7 feet from the floor. Cables shall be sewn to cable racks immediately above each clamp, and banded as necessary between clamps to keep cables in an orderly fashion.

C. Clamps are not required if straight vertical cable runs are sewn at every cable rack cross strap.

3.3. Cable Rack Spirals

A. If the vertical run turns to a horizontal plane near the ceiling of the floor below the spiral, a clamp shall be installed immediately above the spiral as shown in Fig. 10(A).

B. If the vertical run turns to a horizontal plane immediately above the spiral, the clamp shall be installed below the spiral as shown in Fig. 10(B).

C. If the spiral is in a straight vertical run that continues the distance between two or more floor lines in both directions, a clamp shall be installed directly above and below the spiral as shown in Fig. 10(C).

3.4. Power Cable

Power cable No. 00 and larger turning upward from a horizontal to a vertical rack shall be installed on cable racks having a 45-degree incline at the turn. If the uninterrupted cable rise exceeds two floors the cross strap(s) in the inclined portion of the cable rack turn, and the first strap before the turn on the horizontal rack shall be covered with at least two layers of fiber protection.

Vertical power cable runs should be limited to three floors. If a power cable run is to exceed three floors, a horizontal cable run of at least 20 feet shall be introduced into the vertical cable run at intervals not exceeding three floors. This may be accomplished by using vertically offset cable paths in the general direction of any horizontal travel, or by the introduction of a horizontal cable loop if the same vertical path (in-line cable holes) must be used.

4. UNSECURED CABLE

Cable on horizontal racks (including inclines up to 45 degrees) equipped with cable retaining apparatus need not be otherwise secured except where cables exit the racks. Where cables turn off of a cable rack they shall be sewn to other cables so they are held securely in place. Cables placed on ladder type horizontal racks shall be provided with approved pans to provide cable support across rack straps. Pans shall be installed so no space exists between pan sections.

Unsecured cable shall be placed in an orderly manner and lie reasonably flat across the entire width of cable racks. To minimize the height of cable pileups at cable rack intersections, unsecured cable shall not be installed in bundles or concentrated groupings.

5. SECURED CABLE

Secured cable shall be placed on office cable racks in a layered fashion across the cable rack's width. The overall width of all cable installed on a cable rack shall be at least 1 inch less than the width of the supporting cable rack to allow room for attachment hardware along the sides of the cable rack stringers.

Cables on vertical and spiral cable racks shall be secured at every cross strap. Cable installed on inverted cable racks shall be secured at every strap with 4 strands of sewing cord and the cable rack shall be equipped with supplemental cable supports as covered in 3.1.1. Cable on vertical racks equipped with supplemental supports per 3.1.1 may be secured at alternate cable rack straps.

6. CABLE REMOVAL

Cable is removed or mined from office cable racks. This part covers the requirements for removing cable that is made inoperative as a result of equipment or circuit retirement. The term "cut-dead cable" is used to reference all cable and wire made inoperative on a given work order. Cable mining is an extensive disturbance of in-service cabling to gain access to buried cut-dead cable for removal purposes.

Cut-dead cable shall be removed from office cable racks as far as possible without mining. Ordinary cable removal activity includes the minor disturbance of unsecured cable runs, and the removal and replacement of cable stitching for the top two layers of secured cable runs to access cut-dead cables. Cable removal activity applies to cable passing through cable holes and cable installed under raised floors.

The ends of cut-dead cables shall lie relatively flat and shall be sufficiently protected so they are not a hazard to people or in-service cables.

7. CABLE MINING

This part provides guidelines and requirements to be followed before, during, and after cable mining projects. Cable mining is the deliberate and generally extensive disturbance of in-service cabling to gain access to buried cut-dead cable for removal purposes. The objective of cable mining is generally to remove all non-working cable and wire from an equipment area.

For the purposes of this part the term SBC is used to reference the SBC local exchange carrier employee in charge of the cable mining project, and/or the SBC employee responsible for various aspects of the project or office in which cable mining will be performed.

7.1. Associated Work Prior To Cable Mining

The following activities shall take place prior to the start of cable mining activity:

A. The appropriate Site Manager, Switching Control Center (SCC) and T-Carrier Restoration Control Center (TRCC) shall be notified of the project. The operational condition of the office alarm and smoke detection systems shall be verified. Any defects in the smoke detection and fire alarm reporting equipment shall be corrected prior to the actual start of cable mining.

B. On site emergency response equipment such as portable fire extinguishers, fire shutters, fire doors, and exhaust fans shall be inspected and determined to be in sufficient quantity and in good working order.

C. In the areas where cable mining will occur, unique identifiers shall be affixed to all building columns and cable holes not having them. This will facilitate referencing building locations during the course of the cable mining job. The unique identifiers used shall be those appearing on the office floor plan drawing.

D. A complete set of office floor and cable plan records shall be provided to the cable mining contractor so the contractor can develop a job Method Of Procedure (MOP) and track job progress.

E. A walk-through of the office shall be conducted to determine if there are any matters that need to be taken care of before cable mining begins. This walk-through shall include the building site manager, and representatives of any other SBC organization that may be affected by the project. Particular attention shall be given to:

1. Dust, sound, or work barrier requirements. It shall be determined in advance where protective barriers will be required, and who will provide them. Barriers shall be constructed using fire retardant materials, or materials treated with a fire retardant agent.

2. Identifying cable that is connected to out-of-service equipment and apparatus (such as distributing frame terminal blocks) that will be a part of the cable mining project. Such equipment or apparatus and cabling to be removed shall be conspicuously identified with colored labels or tape.

3. The need for a single line diagram of the office DC power distribution system if one is not currently available and posted. These diagrams (one for each floor on which cable mining will occur) will be used to identify power source locations should an arcing fault or cable rack fire occur during the course of the cable mining job. Refer to SBC-812-000-029 for single line diagram information.

4. The logistics for managing removed cable during the cable mining project. Interim cable staging areas shall be established and appropriately identified for scrap cable collection containers. Cable staging areas shall be as remote as possible from equipment and overhead power cable racks. Cable collection containers shall not be placed in building egress passageways. Staged cable shall be removed from the office at the end of the day a cable collection container becomes full.

5. Any office conditions that may influence job sequencing such as areas that must or should be mined first, and any time-of-day working restrictions.

6. Emergency response procedures shall be reviewed, and rehearsed if appropriate, with cable mining vendor employees and with SBC employees that may be asked to assist should an emergency arise. This review shall cover in detail the responsibilities and expectations of the cable mining vendor should an emergency condition arise. The review will include emergency fuse removal procedures, equipment restorations, and the emergency phone numbers of the local fire department, Wire Chief, Central Office Equipment Engineer, Maintenance Engineer, Power Maintenance Supervisor, and the NOC.

7. An office cable rack survey shall be performed to eliminate as many potentially hazardous cable conditions as possible. The power sources of any in-service power cable that is intermixed with cable to be mined shall be identified to the extent possible.

8. The NOC shall be notified at job start and instructed to summons the fire department if any fire or smoke alarms are received after that date.

7.2. Office Cable And Power Plant Surveys

Office cable racks shall be comprehensively surveyed to identify and correct potentially hazardous cable conditions before cable mining begins. Potentially hazardous cable conditions are considered to be:

A. The presence of cable rack horns interior to cable pileups, especially at cable rack intersections,

B. Cables having damaged outer coverings (jackets),

C. The presence of armored cable, flexible metal conduit or ac distribution cable on cable racks with other types of cable,

D. Actual and potential contact of working cable to exposed metal surfaces that could damage working cable. These types of conditions include contact or near contact with unprotected threaded rods, edges of ironwork and cable rack fabrication hardware, metallic cable rack horn extensions, and other metal surfaces that are relatively sharp in nature.

For the purposes of an office cable survey sharp is defined as any metal edge that has the potential of piercing or damaging the outer covering of a cable. Surveys shall include the inspection of cable located next to the support feet of vertical cable racks.

The DC power plant equipment to be surveyed is the power board frames that are supplying primary DC power to BDFBs and the power distribution frames (PDF) of switch entities. The fuses of the dc power boards shall be visually checked for the presence of BDFB and PDF load assignment information. The cable survey vendor shall provide a written record indicating by equipment lineup and frame number where fuse assignment information is missing or is not legible. This information shall be given to SBC for disposition. SBC will determine if fuse assignment information will be corrected as part of the survey, or as part of another effort.

7.3. Correction of Hazardous Cable Conditions

Potentially hazardous cable conditions shall be corrected according to the following:

7.3.1. Cable Rack Horns Interior To Cable Pileups

Cable rack horns should be removed from cable pileups at cable rack intersections if their removal can be accomplished without damaging working cable. Cable rack horns may be removed from cable pileups by the downward bending (preferred) with a blunt surfaced tool so the top of the horn is below existing cable similar to Fig. 11. The exposed ends of horns shall be wrapped with tape, heat shrink or covered with a cap if they can be considered a safety hazard in their relocated position.

Horns may also be removed from cable pileups by cutting the horn at the horizontal to vertical bend illustrated in Fig. 12. Horns shall not be cut unless the methods and precautions to be used are explicitly approved in writing by SBC. SBC shall verify by vendor demonstration or experience that the methods to be used are appropriate for the office condition.

Cable rack horns that cannot be safely removed from cable pileups shall be identified with red "Danger" or yellow "Caution" barrier tape (red for personal injury conditions and yellow for service interruption conditions). The tape shall be applied above and below the potentially hazardous condition so it is readily visible from the floor and when working above the condition.

Accessible horns that cannot be removed from the interior of cable pileups shall be equipped with cable protection. Cable protection shall consist of a length of 1-inch inside diameter schedule 40 (thick wall) PVC pipe equipped with a round PVC pipe cap, or 6 layers of fiber sheeting tightly sewn to the cable rack horn. Lengths of PVC pipe shall be a minimum of 1/2-inch taller than

the cable rack horn. Fiber insulation shall extend a minimum of 2 inches beyond the top of the cable rack horns.

Two 3-inch long pieces of green or orange fluorescent tape shall be applied in an "X" fashion over the top of PVC pipe and sheet fiber insulators. The purpose of the tape is to make the presence of these horns readily apparent during subsequent cable installation activities.

7.3.2. Damaged Cable Jacket/Insulation

All cable having a damaged outer covering or jacket shall be considered "in service" unless it has a disconnected end that can be seen and identified. Damaged cables are those whose outer covering has been torn to the extent internal conductors can be seen and power cables whose outer covering has been pierced or compressed to the point the cable's insulating properties MAY have been compromised. Damaged cable shall be repaired in accordance with TP76300MP (SBC-TP-76300).

7.3.3. The Presence of Armored Cable or Flexible Metal Conduit

The presence of ac power distribution cable, flexible metal conduit or armored type cable on cable racks containing other type(s) of cable shall be brought to the attention of SBC. This information shall be provided to SBC in written form, and shall include the location(s) of affected office cable racks. Cable racks should be referenced by the cable routing designations appearing on office cable plan drawings. SBC will determine the corrective action or precautions to be taken according to office and equipment conditions. Mitigation of flexible metal conduit conditions is not addressed in this document because such mitigation usually involves EF&I activity that is beyond the scope of the cable survey.

7.3.4. Actual and Potential Contact of Cable With Metallic Objects

All cable shall be considered "in service" unless it has a disconnected end that can be seen and identified. Cable that is in direct contact, or in the immediate vicinity of metallic objects having relatively sharp edges shall be protected from abrasion by those objects. Cable protection shall be applied to the metallic objects (preferred) or to the cable itself, depending on the hazardous condition encountered.

3/4-inch I.D. tubing shall be placed over threaded rods where possible. The tubing may be of PVC or fibrous construction and shall be equal to the length of the exposed threaded rod or 18 inches which ever is the shorter. Sheet fiber may be used in place of tubing where necessary or more practical.

Two layers of sheet fiber having a minimum thickness of 1/64-inch shall be applied to metallic objects to achieve adequate abrasion protection.

7.4. Cable Mining Execution

Danger: Cable mining may require exposure to and movement of energized power cables. All power conductors to be mined shall be verified to be de-energized before being cut or disconnected. Extreme caution shall be exercised during all phases of cable mining in network facilities.

A daily log tracking by building-bay where cable mining has been performed shall be kept with the approved job MOP. SBC shall be immediately notified of any damage to working cable and of its method of repair. This information will be used to mitigate alarm reporting and equipment malfunction incidents.

The following conditions shall be immediately brought to the attention of SBC for mitigation during the course of cable mining:

A. Observation of sparks, ashes or other signs of arcing,

B. Encounters with cables that are warm to the touch,

C. Subsequent discoveries of ac distribution cable on cable racks with other cable.

An integral part of the cable mining operation is the redressing and protection of in-service cable and wire on office cable racks after dead cables have been removed. All cables that are disturbed during the cable mining process shall be redressed to office cable racks and protected from subsequent abrasion in accordance with TP76300MP (SBC-TP-76300). All damaged cables encountered during cable mining shall be repaired prior to restoration to office cable racks.

The physical relationship of power cables to one another shall be maintained during the cable mining process so that the pairing of battery and battery returns is not compromised.

The required type and amount of cable hole fire stopping materials, cable hole covers and firestop labels shall be on site before mining cable from cable holes.

A sufficient amount of cable insulating and repair materials shall be readily available in the area where cable mining is taking place. The amount of insulating and repair material required shall be a mutually agreed upon between the cable mining vendor and SBC according to the office conditions.

All office cable racks that are empty at the end of the cable mining job shall be removed as part of the cable mining project unless there is a specific and immediate need for their reapplication

as and where installed. To the extent possible and practical, bar type cable racks (racks with integral horns) containing working power cable at the end of the cable mining job shall be replaced, with ladder type cable racks.

The cable rack removal requirements provided above are intended to ensure future office cable racking layouts are based on the cabling needs of new equipment, rather than equipment that has been removed. Removal and/or replacement of bar type cable racks is intended to prevent recurring cable rack horn problems inherent to the cable rack's design and construction.

All tools and physical activities shall be in compliance with TP76300MP (SBC-TP-76300). Tools shall never be left or stored in the overhead superstructure.

Cable mining shall be performed on a building-bay by building-bay basis to the extent possible and practicable. A building bay is an approximate 400 ft.² area bordered by building columns and/or walls. Cable mining should begin at low cable pileup areas and proceed towards heavy pileup areas.

Cable mining shall begin with switchboard and other miscellaneous cable racks. Cable racks containing only power cable shall be mined last unless otherwise instructed by SBC. For multistory buildings, cable racks containing only power cable shall be the last type of cable rack to be mined on a given floor.

Cable mining in multistory buildings should begin on the upper most floors and proceed towards office power plants. Cable shall be mined from all horizontal cable racks before it is mined from vertical racks leading to another floor.

Danger: Cable shall never be mined from cable racks at cable holes unless the cable hole covers have been completely removed.

All covers and fire stopping material shall be removed from cable holes before mining cable from between building floors. Cable holes shall be vacuumed free of dust and debris before the their bottom cover plate is removed.

Mining vertical cable racks shall be accomplished incrementally to avoid entire runs of cable being unsupported simultaneously. To accomplish this, no more than one-half of the supports for vertical cable runs shall be removed at a time. For cable support reasons the top portion of a cable rack shall be mined and remaining working cables redressed to the cable rack before the lower portion of the cable rack is mined.

7.5. Temporary Cable Supports

All in-service cable shall be adequately supported during the cable mining process. To minimize the introduction of stress to the conductors of working cable, horizontal runs of cable shall not be allowed to sag more than 4 inches between cable supports.

The cable strap sizes and maximum cable pileup requirements shown in Table B shall be followed when supporting in-service cable to or from support structures.

Table B

Minimum Strap Width	Bundled Cable Diameter	Layered Or Secured Cable		
		Power Cable	<1'-8" Racks	1'-8" + Racks
1"	<3"	-	-	-
2"	3" to<6"	-	-	-
3"	6" to <10"	-	-	-
4"	10" +	2 Layers Or 2-1/2" Pileup	3" Pileup	2" Pileup

NOTE: 2 and 3-inch strap widths may be a combination of adjacent I-inch wide straps. 4-inch strap widths may be a combination of adjacent 2-inch wide straps. Rope and lacing cord shall not be used as a temporary cable support.

7.6. Elevating Cable

Danger: Cable mining contractors shall make absolutely certain elevated cable will not come in contact with any metallic object while it is being returned to its cable rack.

All cable elevating/hoisting activity shall be accomplished according to the cable support requirements specified in Table B. Cable shall never be elevated more than is necessary to access the cable to be removed.

Elevated cable shall be returned to the cable rack immediately after buried cable is mined and during prolonged periods of work stoppage such as during week ends. For this reason, cable

mining involving elevated cable should be planned and accomplished by a single and continuous work effort.

Depending on the methods used, hoisting or elevating cable from their cable racks may introduce undesirable horizontal stress to the office auxiliary framing arrangement. For this reason temporary grids of auxiliary framing or other structurally appropriate apparatus should be temporarily installed for hoisting or elevating cable.

When office auxiliary framing will be used for hoisting or elevating cable runs, it shall be stiffened by the addition of temporary structural members so that it does not deflect inwards towards the cable load. Hoisting apparatus shall never be attached to office cable racks.

Attachment of hoisting apparatus to auxiliary framing support rods shall be avoided whenever possible. When necessary, attachment of hoisting apparatus to hanger rods shall only be done at the rod's point of attachment to the ceiling or auxiliary framing. Auxiliary framing support rods shall not be used for the temporary support of cable bundles larger than 9 inches, or layered type power cable runs.

Vertical to horizontal cable rack fabrications at the underside of cable holes in building floors shall be temporarily supported by auxiliary framing or other structurally appropriate apparatus when cable mining will occur on the vertical rack on the floor above. These cable rack supports shall be in place before cable supports (stitching and/or clips) are removed from vertical racks on the floor above.

8. CABLE MINING JOB METHOD AND PROCEDURES (MOP)

A detailed MOP shall be prepared by the cable mining contractor in accordance with TP76300MP (SBC-TP-76300) for both, the office cable rack survey and cable mining portions of a job. The MOPs shall include:

A. The working hours the contractor will normally be in the office,

B. A description of work barriers the contractor is responsible for providing,

C. A general description of how the cable mining project will be sequenced, including specific requests or restrictions imposed by SBC,

D. An expected schedule of when and where work activity will occur throughout the building,

E. A description of methods to be used to provide temporary cable support structures, and

F. A description of the methods to be used to hoist or elevate working cable.

NOTE: Items C and D above are intended to help associate office alarms generated during cable mining activities.

9. RELATED DOCUMENTS

SBC-812-000-029 48V dc Power Distribution Single Line Diagrams

10. FIGURES and SKETCHES

Figure 1. Additional Cable Support To Prevent Cable Sag

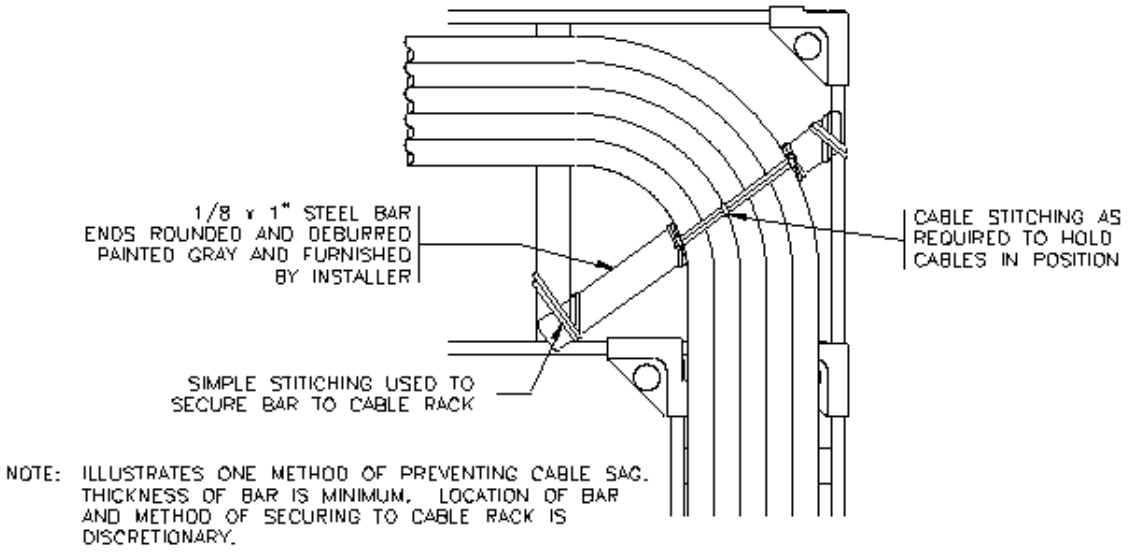
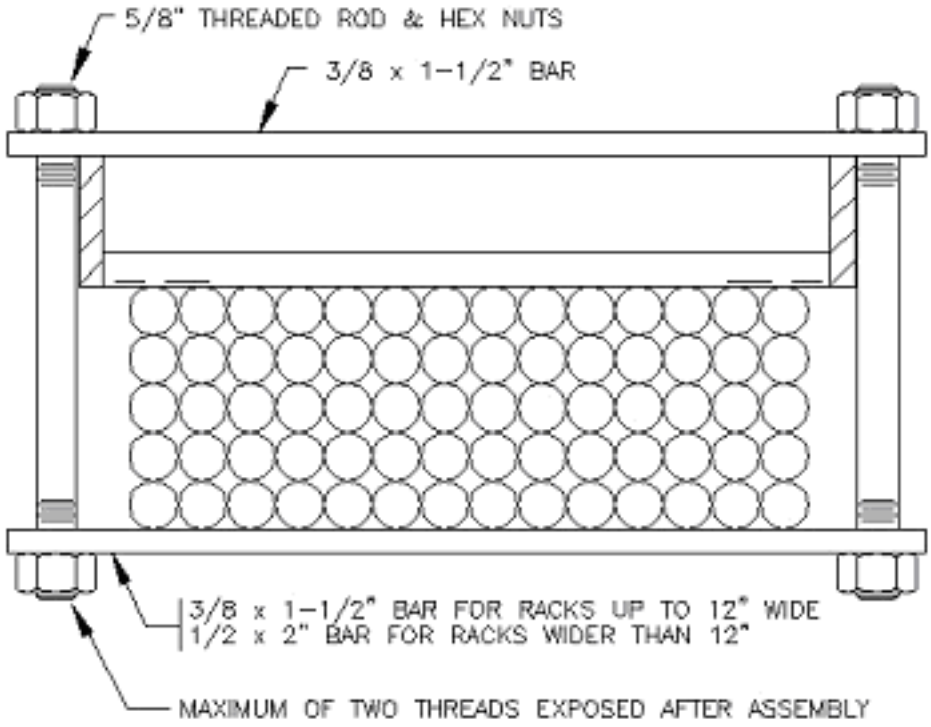


Figure 2. Auxiliary Support For Inverted Horizontal Cable Runs



NOTE: THREADED RODS TO BE REPLACED WITH LONGER RODS WHEN ADDITIONAL CABLE IS INSTALLED, OR RODS WHICH WILL ACCOMMODATE THE ULTIMATE CABLE PILEUP MAY BE PROVIDED INITIALLY IF THEY ARE EQUIPPED WITH GUARDS AS SHOWN IN FIG.5.

Figure 3. Location Of Supplemental Cable Supports For Vertical Runs In Exposed Locations

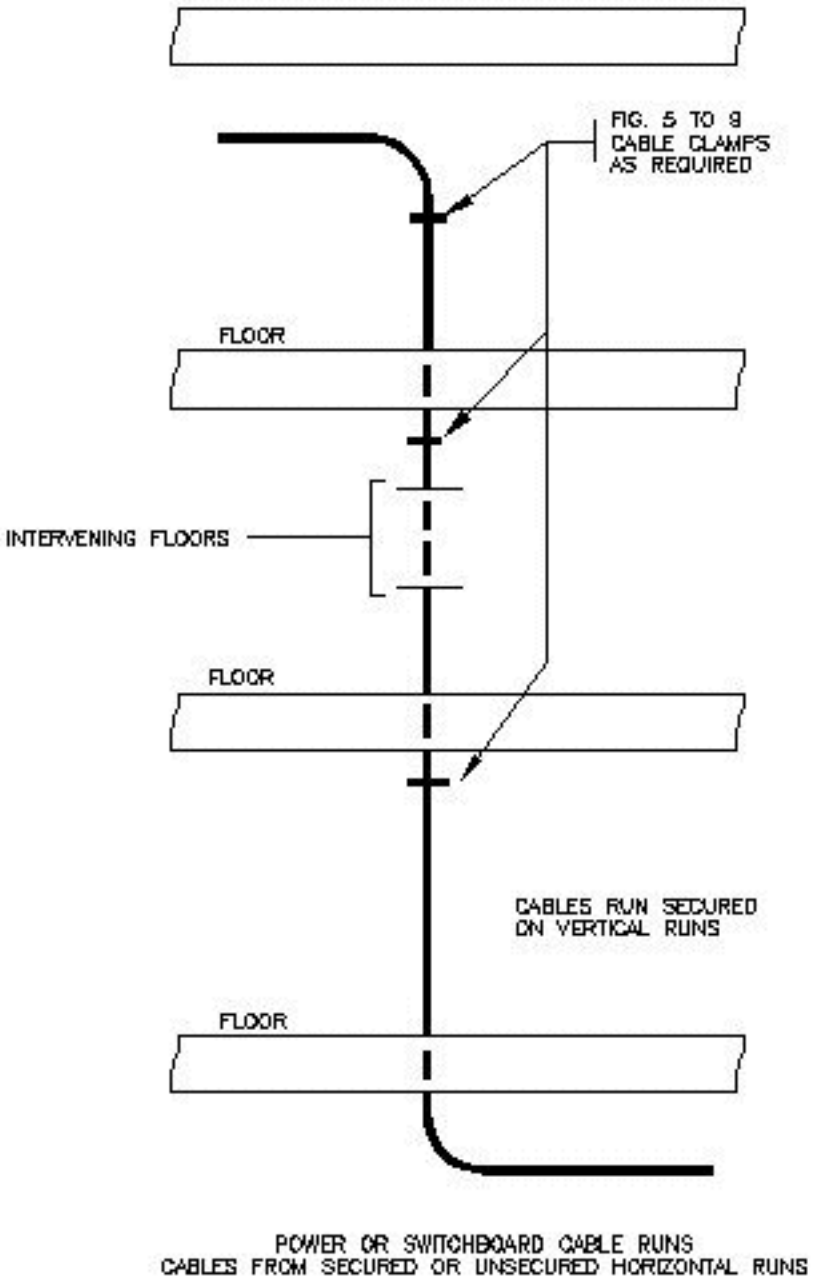
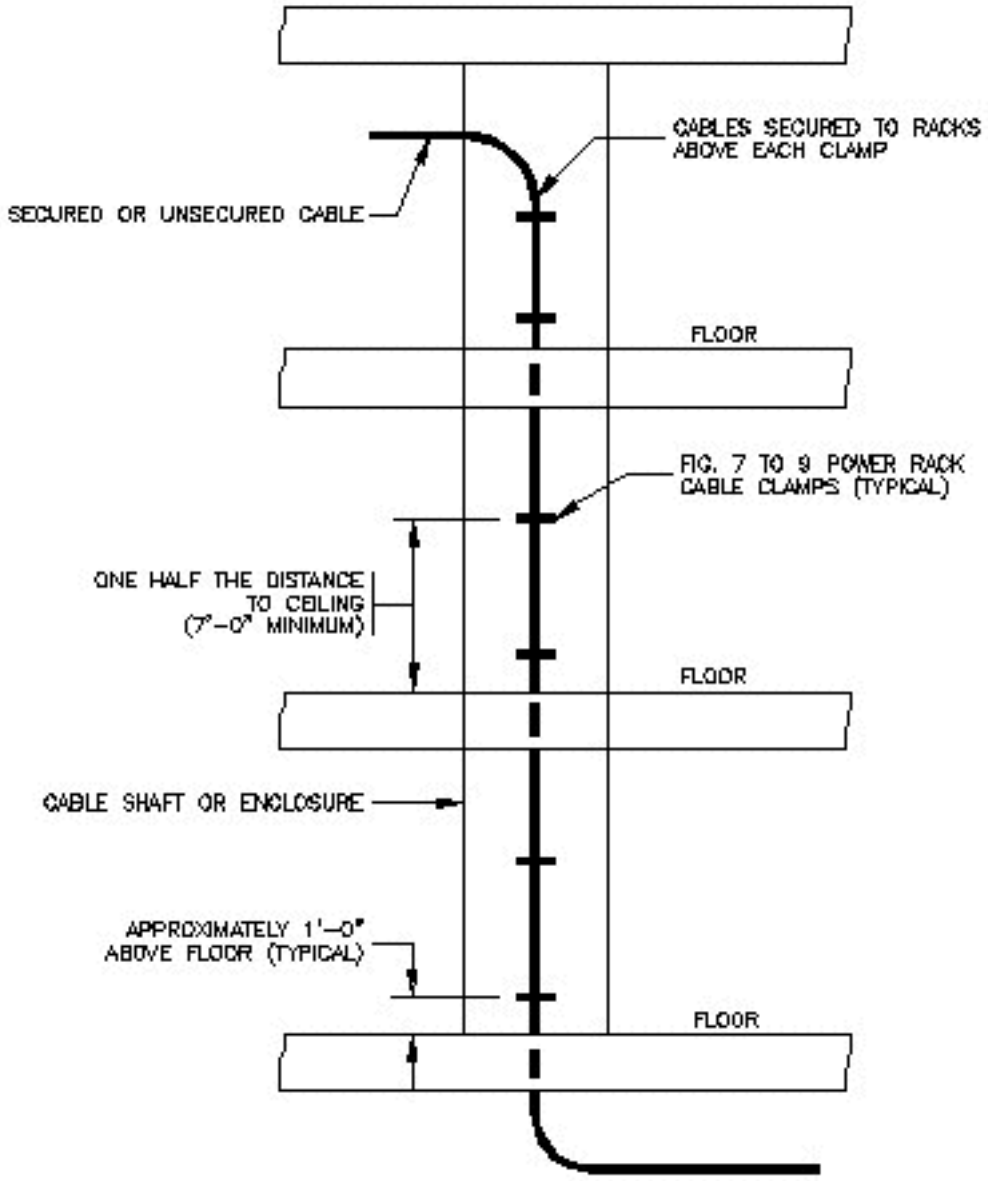
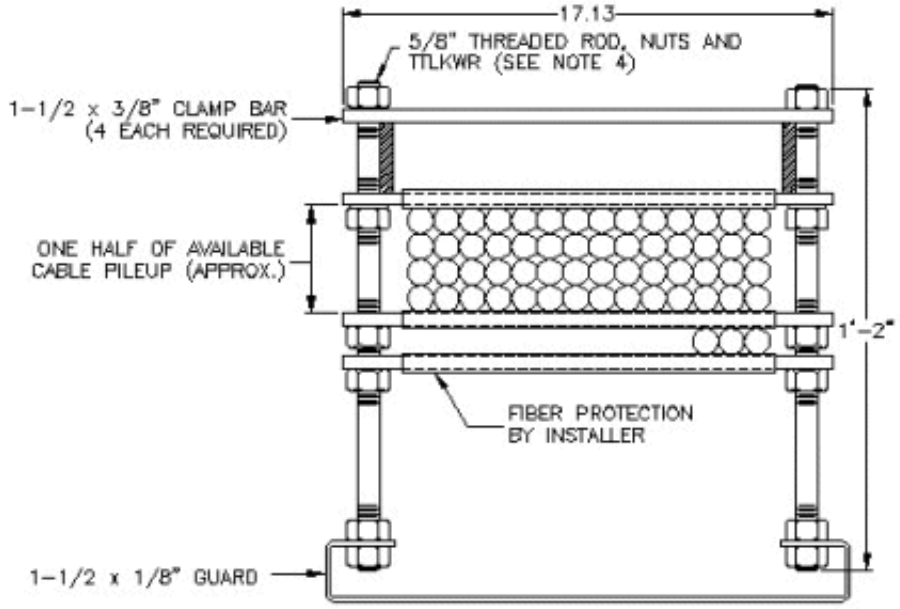


Figure 4. Location Of Supplemental Cable Supports For Vertical Runs In Cable Shafts And Other Enclosures



NOTE: CABLE CLAMPS ARE NOT REQUIRED ON VERTICAL RUNS WHICH ARE SECURED TO CABLE RACKS AT EVERY CROSS STRAP

Figure 5. Supplemental Vertical Cable Support For 1'-3" Misc. Cable Racks



NOTES

1. UNUSED CLAMP BARS AND HEX NUTS SHALL BE ASSEMBLED ON THREADED RODS FOR USE WITH FUTURE LAYERS OF CABLE
2. FIBER PROTECTION SHALL BE APPLIED TO CABLES WHERE CONTACT WITH NUTS OR THREADED RODS CAN NOT BE AVOIDED.
3. LOCATE CLAMPS 1 TO 1-1/2 INCHES FROM CABLE RACK CROSS STRAPS.
4. THREADED RODS SHALL BE APPROXIMATELY FLUSH WITH NUTS AT THE BACK
5. CLAMP BARS SHALL HOLD CABLES FIRM WITHOUT EXCESSIVE DEFORMATION OF CABLES.

Figure 6. Supplemental Vertical Cable Support For 1'-8" Misc. Cable Racks

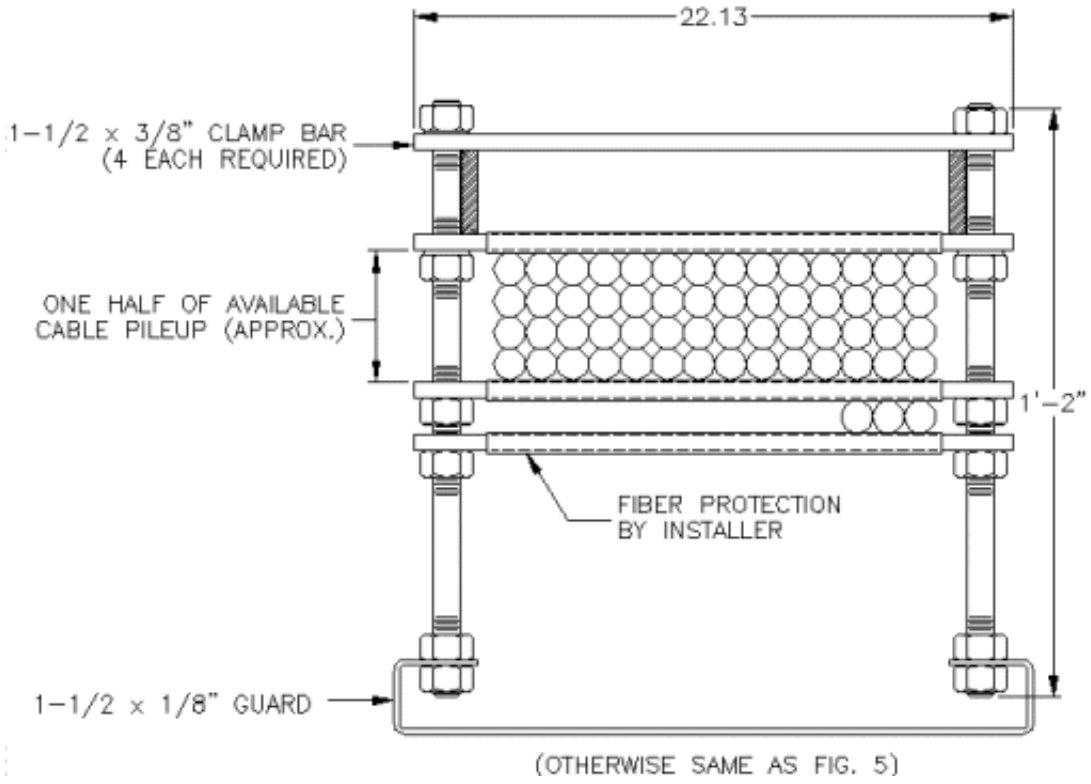


Figure 7. Supplemental Vertical Cable Support For 1’-3” Power Cable Racks

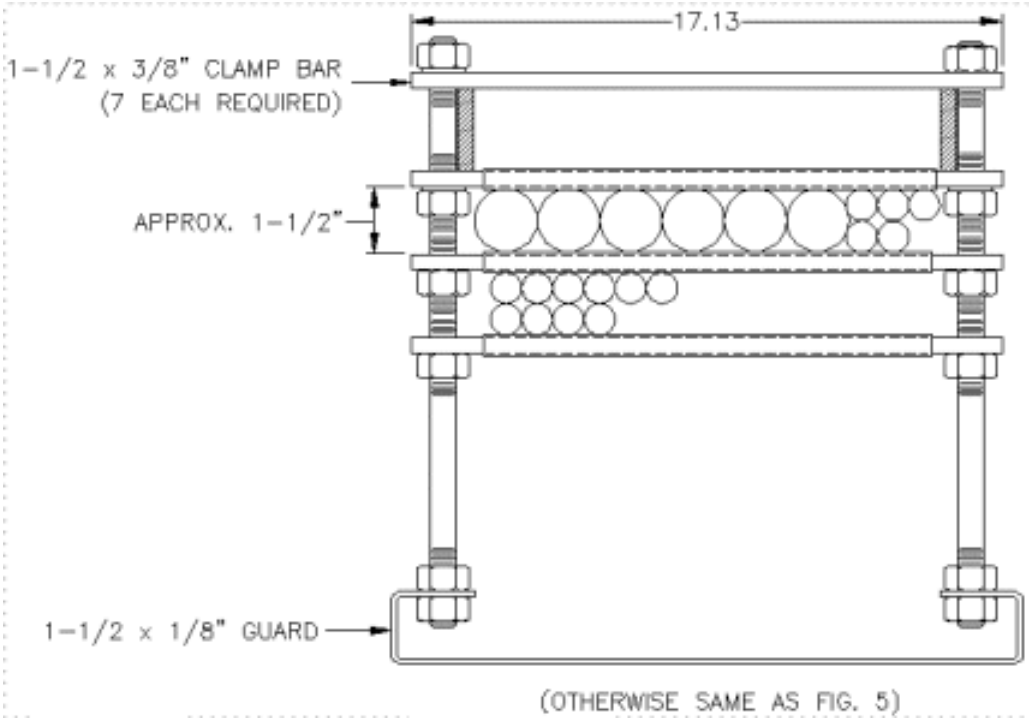


Figure 8. Supplemental Vertical Cable Support For 1'-8" Power Racks

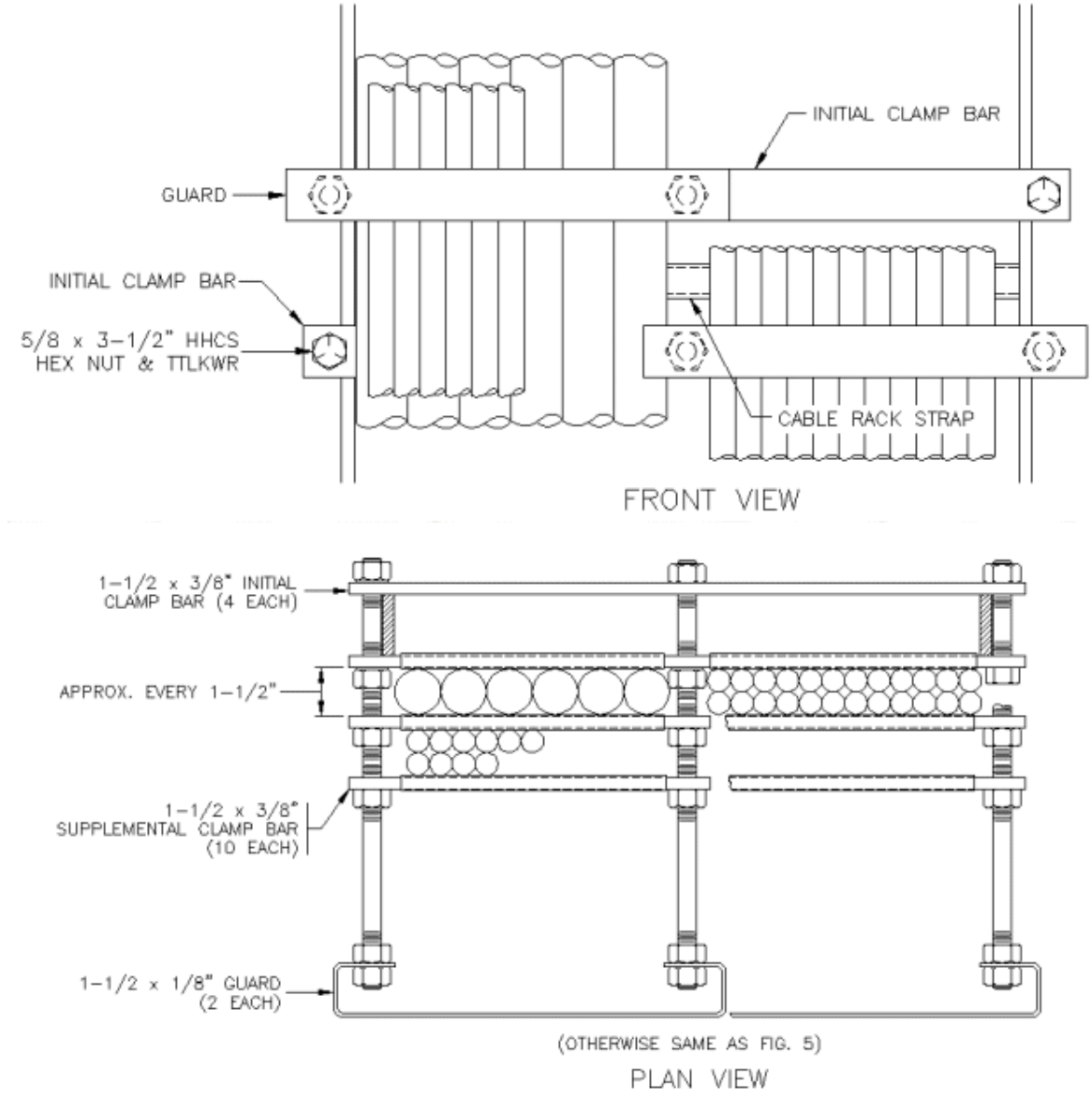


Figure 9. Supplemental Vertical Cable Support For 2'-1" Misc. Cable Racks

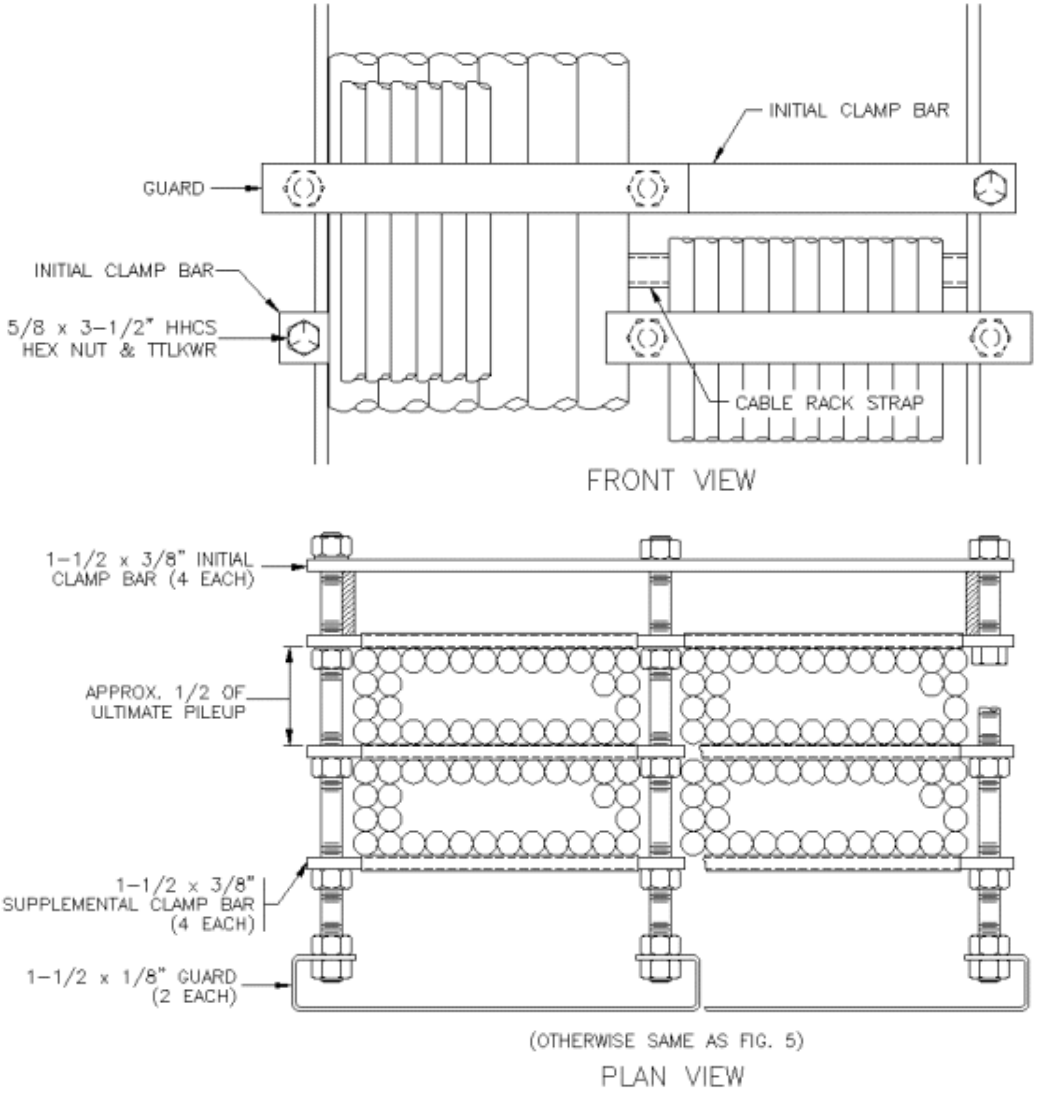


Figure 10. Location Of Supplemental Cable Supports For Spiral Cable Runs

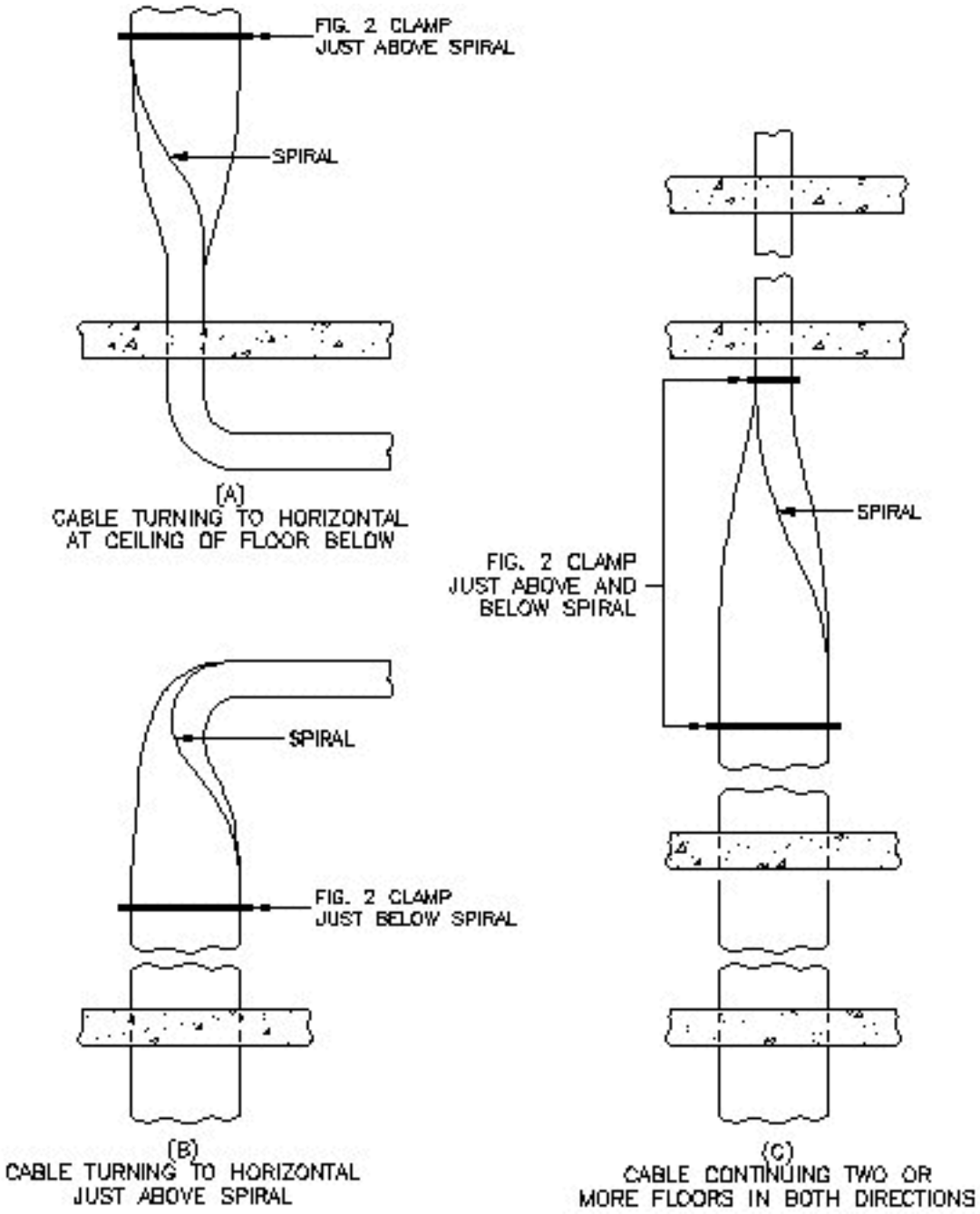


Figure 11. Cable Rack Horn Removal By Bending

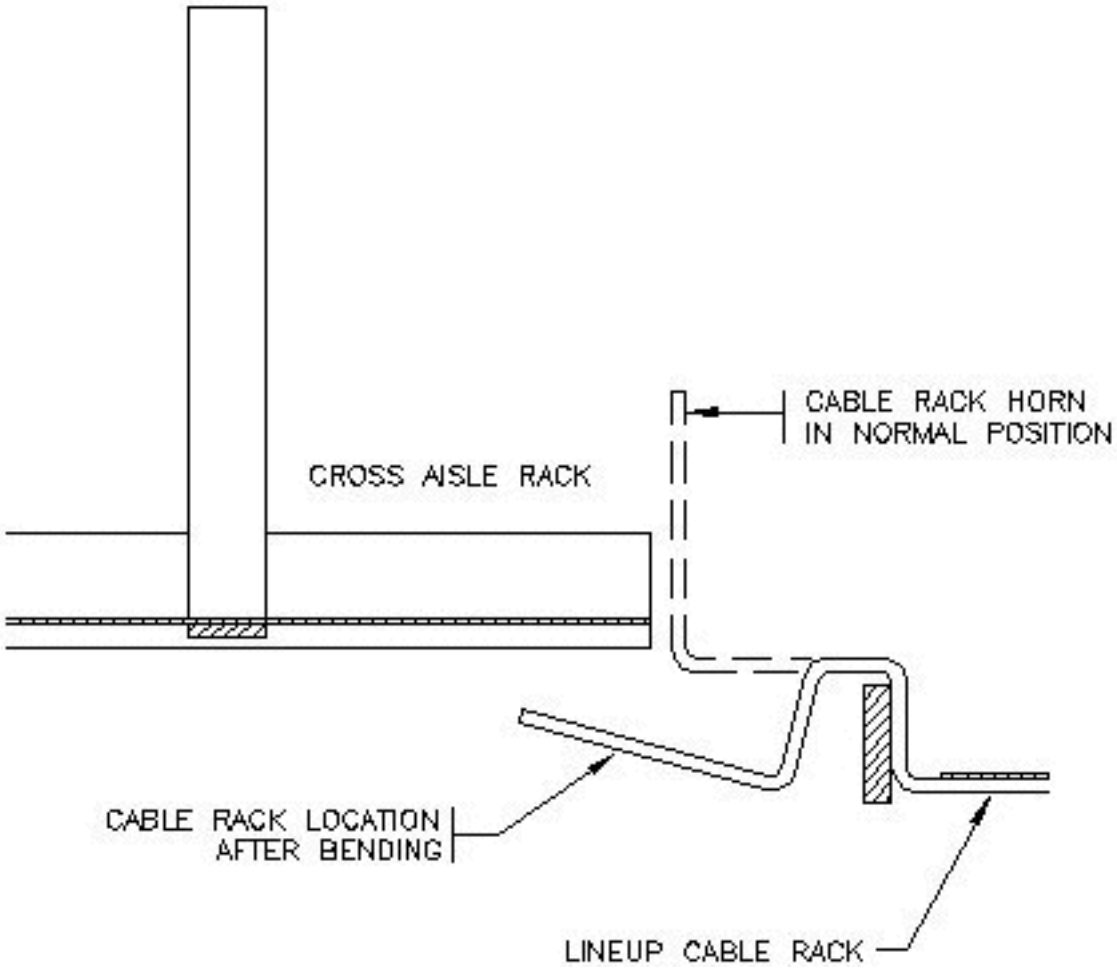


Figure 12. Cable Rack Horn Removal By Cutting