SBC-812-000-030

Common Systems **Network Facility Auxiliary Framing and Bracing Requirements**

This practice provides the guidelines and requirements for engineering auxiliary framing in network equipment environments.

To:	All Network Employees
Effective Date:	07/01/03
Issue Date:	Issue 1, 07/01/03
Expires On:	NA
Related Documents:	SBC-812-000-031
Canceled Documents:	BSP 800-006-150MP
Issuing Department:	Enterprise Technology Support
Business Unit:	SBC Services, Inc.

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INTRODUCTION

This practice shall be used when providing auxiliary framing for new and for growth to existing network equipment environments, and when all or part of a network facility's equipment is removed and the auxiliary framing above the removed equipment will remain in place.

The following is a list of terms and their meanings as used in this practice:

Customer Premises	An equipment area or building owned and managed by an SBC customer.
High Seismic Risk	Seismic zone 3 & 4 geographic areas, and other high risk places considered to be prone to events capable of exerting excessive forces on a network facility.
Network Facility	An area, room or building containing the telecommunications equipment of an SBC local exchange carrier.
Low Seismic Risk	Seismic zone 0, 1 and 2 geographic areas.

1. REASON FOR REISSUE

Issue Number	Date Modified	Brief Description of Changes	Author
1	-	Renumbered from BSP 800-006-150MP Iss. B.; minor text editing; 4.1.1 was 4.04; add clip splice to Fig.3; change 4.06 ref. in Fig.1 & 2; align bolt in Fig.17A; remove TTLKWHR in Fig.25; change tech. ref. in Fig.30.	bm1924

2. GENERAL

2.1. Description

Auxiliary framing is light gray colored 2 x 9/16 x 3/16 inch bar size channels. The channels are paired with their flat side to the outside. Fig. 1 and Fig. 2 illustrate the major components of office auxiliary framing arrangements in low and high seismic risk equipment environments, and how they are generally represented on office records.

2.2. Types Of Auxiliary Framing

Low Type: Low type auxiliary framing is the level or layer of framing installed closest to the floor in an equipment area. In equipment areas using an integral cable racking system such as those used with electronic and digital switching systems, the low type auxiliary framing is the first level of framing above the equipment's integral cable racking system.

High Type: High type auxiliary framing is the level(s) of framing installed above low type auxiliary framing. When used for the support of apparatus passing over a future equipment area, it may be the lowest level of framing in that area at a given time, but may eventually be above low type framing added when equipment frames are installed.

Primary: Primary auxiliary framing is the rows of framing installed perpendicular to present or planned equipment frame lineups. This auxiliary framing serves as the primary means of support for office cable racks, equipment lighting and equipment frames within the equipment area.

Secondary: Secondary auxiliary framing (sometimes referred to as supplemental framing) is the rows of framing installed above and perpendicular to the primary framing for seismic stiffening and supplemental cable rack support purposes. Secondary framing is generally a permanent component of the office auxiliary framing (superstructure) arrangement.

Temporary: Temporary auxiliary framing is the row(s) of secondary auxiliary framing installed below primary framing and parallel to omitted frames in an equipment lineup. This type of framing is used in earthquake environments where equipment frameworks provide the primary means of support for low type framing. Temporary framing provides a means of support and stiffening for primary framing which is not attached directly to the top of an equipment frame. Temporary framing shall be removed as equipment frames are added and the framing's purpose is no longer needed.

3. LAYOUT

3.1. General

Auxiliary framing shall be located under rows of ceiling inserts where possible to facilitate the installation of support and bracing hardware. The horizontal spacing of auxiliary framing across an equipment area in the primary and secondary directions shall be on approximate 5-foot

centers with a maximum spacing not to exceed 6 feet. This is to complement the safe loading and support requirements of office cable distribution systems.

Auxiliary framing should be provided in 20-foot x 20-foot building bay increments to minimize the use of framing splices, on site cutting operations, and the need for repeated engineering and installation of additional framing to accommodate incremental growth of new equipment. Lengths of auxiliary framing shall be spliced as shown in Fig. 3. Only one clip-type splice shall be used between any two adjacent auxiliary framing supports. Refer to Fig. 4, 5 and 6 when it is necessary for to splice auxiliary framing of different heights together.

3.1.1. Primary Auxiliary Framing

A minimum of one level (layer) of primary auxiliary framing shall be provided above network equipment areas to serve as a structural grid for the support of office cable racks, equipment frameworks, and other network related apparatus. The number of levels of primary auxiliary framing required above a particular equipment area is determined by the building ceiling height and the interconnection cabling requirements of the office and equipment being provided for.

3.1.2. Secondary Auxiliary Framing

Secondary auxiliary framing shall be installed above primary auxiliary framing at support rod locations where possible. This practice provides the preferred support structure for equipment cross aisle cable racks and minimizes the framing's interference with AC distribution apparatus and cable pileup capacities of cable rack that may be installed below it. Where it is necessary that secondary framing be installed at the same level as primary framing or offset from a support rod location, the intersections of framing shall be made as shown in Fig. 7, 8, or 9.

Low Seismic Risk Areas: Except as covered in 3.1.5, secondary framing need only be installed in lengths and locations necessary for the proper support of office cable racks and other network related apparatus. To minimize on site cutting operations, continuous lengths of secondary framing should be used for supporting adjacent parallel runs of cable rack when possible.

High Seismic Risk Areas: Secondary auxiliary framing in conjunction with the special bracing practices covered in part 5 shall be used to stiffen each level of primary framing in high risk areas. Accordingly, secondary framing should be located at the same support rods used for supporting primary framing to facilitate the installation of earthquake bracing. Secondary auxiliary framing may be omitted in high seismic risk areas at:

A. Low type primary framing locations above equipment lineups provided the equipment frames in the lineup are rigidly bolted together and are integrally attached to the low type framing, and at

B. Locations where it is more practical to use office ladder type cable racks for stiffening purposes (refer to 5.3.3).

3.1.3. Distance Between Levels

The minimum distance between any two levels of auxiliary framing in a given equipment environment is determined by the cable pileup capacity of cable rack(s) installed on any lower level framing and/or the need for ample working space for craft people. Upper level auxiliary framing should never restrict the normal cable pileup capacity of cable rack installed on or planned for lower level auxiliary framing.

The distance between levels of auxiliary framing and between the ceiling and the first level of auxiliary framing below the ceiling shall not exceed 5 feet (4’-10” brace distance) as indicated in Fig. 20A.

3.1.4. Ends Of Auxiliary Framing

The ends of auxiliary framing shall extend a minimum of 3 inches beyond their last point of support. When it is required that the ends of auxiliary framing extend more than 3 inches beyond their last point of support, the required distance will be shown on the office auxiliary framing plan. A minimum of 5 inches shall be maintained between the ends of auxiliary framing and any building surface or apparatus such as HVAC ducting when possible except where framing extends to walls or columns for support or bracing purposes.

Fig. 10 neoprene rubber finishing caps shall be installed on the ends of all auxiliary framing that may present a safety hazard to routine equipment maintenance and work activities. Finishing caps are generally required on the ends of all auxiliary framing installed below the low type primary framing and at the ends of primary framing that are within 2’-6” of rolling ladders that are taller than the height of the auxiliary framing (new 7’-0" areas adjacent to 9’-0" and 11’-6" areas).

3.1.5. Vibration Dampening

Vibration dampening is used in low seismic risk areas to enhance the auxiliary framing arrangement’s resistance to incidental lateral movement and office vibrations that may over time cause a loosening of fastened assemblies. The major sources of incidental movement and office vibrations are low amplitude seismic events, strong winds against taller buildings, equipment installation, and exterior activities such as heavy traffic and construction/demolition work.

Secondary auxiliary framing shall be used to dampen induced office vibrations in non-high seismic risk areas when the vertical distance between low type primary framing and the ceiling or a higher level of auxiliary framing is more than 4 feet and:

A. The horizontal distance between the last point of support of the row of primary framing and a perpendicular run of cable rack or another run of secondary auxiliary framing is 10 feet or greater, or

B. The horizontal distance between parallel runs of office cable rack, secondary auxiliary framing, or a combination thereof is greater than 15 feet

Secondary auxiliary framing added for office vibration dampening purposes shall be located at the last support locations for the condition described in item (A) above, and approximately mid span between the parallel member conditions described in item (B) above.

3.2. Low Type Framing

Low type auxiliary framing shall be used as the primary means of support for equipment lighting, cable rack and other apparatus installed immediately above network equipment. Low type auxiliary framing shall also be used as the primary means of support for:

- Equipment frames taller than 7 feet
- Equipment frames 7 feet or less in height that have not demonstrated compliance with seismic performance requirements and will be installed in high seismic risk areas , and for
- Floor supported (seismic) equipment frames when the structural integrity of a frame's floor anchoring system is compromised by the construction of building floors. Generally such compromises are encountered when frames are installed on weak concrete, directly over a cable hole, or with less than the required number of anchors.

Unless otherwise specified in the site conditioning information for a specific equipment system or equipment area, the bottom of low type auxiliary framing shall be installed at a height that is 3-1/2 inches above the equipment frames to facilitate movement of frames into and out of the equipment area, and to allow spill over of font aisle equipment lighting into the rear aisles.

The first run of primary low type auxiliary above the start of an equipment lineup should be approximately 8 inches in from the side of the frame nearest the main cross aisle of the equipment area. The 8-inch dimension complements the 6-foot maximum spacing requirement for auxiliary framing and it provides adequate horizontal space above the start of equipment lineups for electrical apparatus and power feeder support hardware. Locating primary framing over main cross aisles should be avoided where possible to facilitate installer access to the overhead superstructure arrangement.

NOTE: The 8-inch inset of auxiliary framing mentioned above complements the 6-foot maximum spacing of auxiliary framing as follows:

0 - 8"	+	0 - 4"	+	4’ - 0"	+	0 - 4"	+	0 - 8"	=	6’ - 0"
Inset		End Gd.		Min. Main Aisle		End Gd.		Inset		

3.3. High Type Framing

High type auxiliary framing shall be used above network equipment environments as necessary to:

- Effectively lower a building’s ceiling height for bracing purposes,
- To provide a means of support for multilevel cable rack arrangements, and
- As a means of offsetting low type framing support rods from ceiling inserts to avoid obstructions such as HVAC ducting, low level cable racks, or other apparatus.

3.4. At Customer Premises

The engineering and installation of auxiliary framing at customer premises locations shall be in accordance with the customer’s guidelines and requirements for those equipment environments managed by the customer. In the absence of customer documented guidelines, the subject of auxiliary framing shall be negotiated with the customer and documented using this practice as reference when possible. The negotiated customer requirements, with regard to auxiliary framing ownership, seismic protection, support methods, and other matters that directly impact auxiliary framing engineering and installation shall be appropriately documented on the office records created for the equipment area.

4. SUPPORT

4.1. General

Generally, auxiliary framing shall be supported via 5/8-inch diameter threaded rods attached to building ceilings or a higher level of auxiliary framing as shown in Fig. 11 through 15. Equipment areas are usually provided with ceiling inserts, ceiling channel, or other devices for supporting office auxiliary framing and other network related apparatus as described below.

Ceiling Inserts: Individual 5/8-11 threaded apparatus embedded in ceiling slabs at specified intervals during the construction of a building. The ceiling insert pattern of an equipment area is usually recorded on the office floor plan drawing.

Ceiling Channel: Continuous lengths of "U" shaped channel such as the P-1000 channel manufactured by the Unistrut Corp. which is attached to or embedded in ceiling slabs in parallel row fashion during the construction of a building. The ceiling channel type and pattern of an equipment area is also usually recorded on the office floor plan drawing. Installation of surface mounted Unistrut channels shall conform to the anchoring requirements contained in BSP 800-000-101MP.

Drop-In Anchors: Drop-in anchors are concrete inserts placed into drilled holes in building ceiling which are used for hanger rods, braces and similar occasional ceiling attachments in areas not equipped with ceiling inserts or ceiling channels. Refer to BSP 800-000-101MP for a list of approved anchors.

The bearing surface of nuts used with hanger rods shall not be in direct contact with building attachment surfaces. A minimum of one flat washer shall be installed between nuts and ceiling inserts and drop-in anchors located in building surfaces. A minimum of 2 flat washers or other apparatus having a minimum thickness of 3/16 of an inch shall be installed between nuts and the open side of "U" shaped channels.

Auxiliary framing shall be supported on approximately 5-foot centers with a maximum spacing between supports not to exceed 6 feet. Auxiliary framing supporting cable rack, ladder track, equipment frames, or other auxiliary framing shall have a minimum of two supports. A splice at the end of auxiliary framing is not considered a point of support.

An auxiliary framing support shall be located no more than 2-feet 6-inches from the end of the framing. Where the horizontal distance will exceed 2-feet 6-inches, the auxiliary framing shall be extended to the next support structure or hanger rod support.

NOTE: The exception to the above is auxiliary framing used for the support of mezzanine platforms, which shall be extended to the next support structure or hanger rod support, if the horizontal distance from the last point of support exceeds 1 foot.

Auxiliary framing attached to the underside of a cable rack and used for the support of equipment frames or other office apparatus is considered adequately supported if the cable rack is supported independently of the framing in question (see Fig. 1 and 2). However, office cable racks shall not be used as the supporting structure for the auxiliary framing arrangement(s) of an equipment area.

4.1.1. Hanger Rod Splices

Splicing of hanger rods used for the support of auxiliary framing shall be avoided whenever possible. When the splicing of hanger rods can not be avoided, splices shall be made as shown in Fig. 14. Single piece threaded rods shall be used for auxiliary framing braces and for the support of mezzanine platforms.

4.1.2. Floor Stanchions

In areas where the use of 5/8-inch support rods are not possible due to ceiling construction or overhead obstructions, pipe stanchions as shown in Fig. 16A (preferred), or equipment framework assemblies (when appropriate) may be used for supporting auxiliary framing. Where possible, pipe stanchions shall be located at future frame locations so their floor attachment holes will be covered when future frames are installed.

A. Fig. 16A pipe stanchions offer little or no resistance to lateral loading forces. In high seismic risk areas , auxiliary framing supported by Fig. 16A pipe stanchions must be otherwise braced for resistance to lateral movement (see part 5).

B. In low seismic risk areas , auxiliary framing may be supported by direct attachment to load bearing building surfaces as shown in Fig. 16B when necessary

4.2. Temporary Framing

Temporary framing located under a row of ceiling inserts should be used for support and stiffening of low type framing when one or more rows of primary framing are located above future frame locations and 1) the equipment lineup(s) serve as the means of supporting the primary framing, and 2) the row(s) of primary auxiliary framing can not otherwise be supported by direct attachment to ceiling inserts or high type auxiliary framing.

5. BRACING

5.1. General

The potential for lateral movement of entire auxiliary framing arrangements installed above network equipment areas shall be minimized according to how a building is constructed and the seismic risk area a building is located in. Resistance to lateral movement shall be achieved by:

A. Threaded rod and/or angle braces attached to threaded inserts in building ceilings that are capable of providing significant resistance to lateral loading, or

B. Attachment of auxiliary framing to load bearing walls and columns in buildings whose ceiling construction is not designed for resistance to significant lateral loading, or by

C. Attachment of auxiliary framing to load bearing floor mounted stanchion systems capable of providing significant resistance to lateral loading

Vertical distances from 6- to 18-inches between framing levels shall be braced via 5/8 inch diameter threaded rods as shown in Fig. 17, 18 and 19. Vertical distances greater than 1’-6" shall be braced via 2 x 2 x 3/16” angles as shown in Fig. 20A through 20G. The angle of slope of braces may be changed slightly to avoid obstructions, however, the angle of slope of an installed brace shall not be less than 30 degrees or more than 60 degrees.

Braces located at the ends of auxiliary framing runs should be attached to the ceiling as near building walls as possible. When it is necessary to use ceiling attachments other than those closest to building walls, the braces may be slanted in either or both directions as required.

Braces shall slope in opposite directions from a common ceiling or upper level point of attachment when possible. Braces should slope from a common point at the auxiliary framing level only when necessary.

Angle braces attached to continuous structural members such as auxiliary framing and parallel ceiling channel shall be fastened with a minimum of two 1/2-13 fasteners as shown in Fig. 20A, 20D, 20E, 20F and 20G. Braces installed at a right angle to structural members shall be fastened with a single 5/8-11 fastening as shown in Fig. 20 and 20C. It is acceptable to brace from ceiling inserts and perpendicular ceiling channel using a 3-hole brace foot as long as the center 11/16 inch diameter hole and 5/8" fasteners are used for fastening the brace.

In buildings with ceilings not suitable for the attachment of braces, the auxiliary framing shall be continuous between building load bearing walls and secured at the ends as shown in Fig. 23. Wall anchors shall be located at wall studs for other than concrete/masonry wall constructions.

5.2. Low Seismic Risk Areas

The general rigidity of auxiliary framing suspended from building ceilings in low seismic risk areas shall be achieved by boxing-in installed arrangements with 5/8" rod and/or angle braces. As illustrated in Fig. 1, all levels of primary auxiliary framing shall be braced approximately every 20 feet in both directions across equipment areas. Lineup cable racks (bar or ladder type) should be used when possible and convenient to achieve auxiliary framing rigidity in the direction parallel to equipment lineups. This practice takes advantage of the mechanical interconnections provided by lineup cable racks being attached to consecutive rows of primary framing.

Secondary framing located under ceiling inserts or a higher level of auxiliary framing shall be used where it is not practical to use lineup cable racks for bracing purposes.

Auxiliary framing may be braced by attachment to building columns as shown in Fig. 24 where attachment of braces to ceilings inserts or other overhead structural members is physically obstructed. The use of column bracing is not desired because of the differential movement of buildings and installed equipment to auxiliary framing attachments.

5.3. High Seismic Risk Areas

5.3.1. General Rigidity

Supplemental auxiliary framing clips and through-bolts are used in high seismic risk areas to increase the rigidity (stiffness) of auxiliary framing comprising the structural grid(s) above equipment areas. This supplemental rigidity serves to minimize the lateral deflection characteristics of paired channels and the dislodging of support rods in close proximity to the ends of framing during severe motion events. To accomplish this, Fig. 25 stiffening clips shall be installed throughout auxiliary framing arrangements no more than 2 feet apart between support rod locations, and at the ends of framing runs extending 3 inches or more beyond their last point of support. Stiffening clips may be omitted where there is an earthquake brace, cable rack, or other bolted fastening *1/2 inch in diameter located where the Fig. 25 stiffening clips would normally be installed.

Where the distance from the last point of support to the end of a row of auxiliary framing is for some reason less than 3 inches a 3/8 inch or larger bolt shall be installed through the auxiliary framing as shown in SK-25A of Fig. 25.

Except for the A & B conditions listed below, Fig. 25 stiffening clips and through-bolts are not required at the ends of short lengths of framing channels used randomly to meet the supporting requirements of cable rack ends and turns or other apparatus. Stiffening clips or through-bolts are required when short lengths of auxiliary framing are used:

A. Under suspended cable rack except where a 3-hole brace foot is attached to the short channels.

B. With rod or angle braces for the top support of equipment frames. For these office conditions Fig. 25 clips or through-bolts are required at both ends of the short channels, and if used, both ends of short channels used overhead for the attachment of the upper end of the earthquake brace.

5.3.2. Resistance To Lateral Movement

A substantially greater density of braces is used in high seismic risk areas to enhance the resistance to lateral movement of auxiliary framing arrangements and the mass of cable and apparatus it supports. As illustrated in Fig. 2, each run and each level of auxiliary framing shall be braced at each end as near the ends as practicable and intermediately at intervals of approximately 20 feet. The slant of installed braces shall be in the opposite direction of the next brace installed on the same run of framing.

A. Where high type auxiliary framing is not located directly under a row of ceiling inserts or parallel ceiling channel, a section of 3”-5 lb. channel should be used for fastening the upper end of braces as shown in Fig. 20B, 20D, 20F and Fig. 20G. Where it is necessary to brace a lower level of framing from an upper level of framing, and the lower level is not directly under the upper level, secondary framing equipped with Fig. 25 stiffening clips may be used for fastening the upper end of braces as shown in Fig. 20C.

B. 5/8-11 drop-in anchors shall be used where it is necessary to fasten a brace directly to the ceiling at a location other than a ceiling insert or embedded channel. Drop-in anchors shall not be located closer than 5 inches to an existing ceiling insert or embedded fastener.

5.3.3. Stiffening With Cable Racks

Ladder type cable racks may be used to laterally stiffen perpendicular runs of auxiliary framing provided the cable racks are suitably supported and braced as covered in the network facility cable rack requirements practice. Using ladder type cable racks to stiffen runs of auxiliary framing is generally desirable at the low type auxiliary framing level where the omission of secondary auxiliary framing will enhance cable routing to equipment frames and human access to office cable racks.

NOTE: The use of bar type cable racks as a means of stiffening auxiliary framing is not permitted in high seismic risk areas.

5.4. Overhead Braced Equipment

In general, equipment framework shall be installed in a free standing configuration without supplemental bracing to overhead superstructure. Freestanding equipment framework is primarily secured by appropriate floor anchoring methods. For some equipment system designs it may be necessary to brace equipment framework assemblies to the office overhead superstructure to meet seismic performance or general stability requirements imposed by the supplier. For such equipment frame bracing applications the auxiliary framing shall be additionally braced to accommodate the additional loading forces as follows:

A. All levels of primary framing above the equipment system shall be braced to form a Warren Truss or saw tooth configuration as shown in Fig. 26. Where obstructions make it impossible to install a brace between adjacent support rods, two braces forming an "X" MUST be installed between a pair of support rods on either side of the obstruction as shown in Fig. 26 and 27.

NOTE: The secondary auxiliary framing provided for the attachment of the upper end of frame braces does not require special bracing, but it does require Fig. 25 stiffening clips.

5.5. Self-locking Nuts

Generally, lock washers or other "anti-rotation" methods used with the nuts of bolted assemblies are not required in the construction of equipment overhead environments. Self-Locking nuts or liquid anti-vibration compounds shall be used with bolted superstructure arrangements when there is a concern for fastener loosening over time due to continuous vibrations within a building.

6. RETROFIT OF EXISTING ENVIRONMENTS

6.1. Above Removed Equipment

When equipment is removed from an equipment area and all or part of the overhead auxiliary framing and cable rack arrangement(s) will remain in place, the auxiliary framing shall be retrofitted with supports and bracing in accordance with the requirements of this practice except as indicated below.

A. The 5 foot vertical spacing requirement for auxiliary framing installed in high seismic risk areas shall be changed to agree with this practice only if a Warren Truss and 5.4 frame bracing application is required for new equipment to be added in the same area.

B. Clip type auxiliary framing splices need not be replaced with Fig. 3 splices, however, they shall not be reapplied at other locations.

C. Non-conforming auxiliary framing brace assemblies need not be changed to agree with this practice, however, they shall not be reapplied

6.2. Above Working Equipment

Generally, new levels of auxiliary framing shall be added to existing auxiliary framing arrangements by removing existing support rods and adding new support and bracing hardware as required. This is usually accomplished by the use of temporary framing support apparatus.

When the addition of auxiliary framing and/or bracing is required above working equipment, the auxiliary framing support rods shall be left in place where possible. New braces having slotted top members shall be used to brace a new level of framing from an existing level of framing above working equipment as shown in Fig. 21 and Fig. 22.

NOTE: Slotted braces shall not be used for cable rack or auxiliary framing bracing in general. The use of slotted braces is permitted only above working equipment and when existing support rods can not be safely removed or replaced.

Some auxiliary framing brace arrangements may have braces that were manufactured prior to 1978 which have a 1-1/2 inch leg at the ceiling line of the brace. Fig. 22B spacers must be used between new and pre 1978 braces that will be placed at right angle to each other.

7. SUPPORT OF CABLE AND WIRE

The cable support brackets shown in Fig. 28 and 29 should be used for supporting runs of copper conductor cable and wire to auxiliary framing when a need for physical separation from other office cabling is required and the addition of cable rack is not appropriate. Unless otherwise directed by the supporting requirements for a specific cable type, miscellaneous cable support brackets shall be located on approximate 12-inch centers along their supporting structures. The 12 inch distance between supports shall be reduced if necessary to prevent cables from sagging more than a distance equal to the diameter of the cable or bundle of cable installed on the brackets.

Fig. 30 illustrates how Fig. 28 cable brackets can be used with similar brackets attached to office cable racks to provide a relatively flat and continuous cable path throughout an equipment area.

8. FIGURE REFERENCES

The figures contained in this practice and their related discussion text are listed below for quick reference.

Figure	Paragraph	Figure	Paragraph
1	2.1, 4.1, 5.2	20A	3.1.3
2	2.1, 4.1, 5.3.2	20A - G	5.1, 5.3.2
3	3.1, 6.1(B)	21A, B	6.2
4, 5, 6	3.1	22A, B	6.2
7, 8, 9	3.1.2	23	5.1
10	3.1.4	24	5.2
11, 12, 13	4.1	25	5.3.1, 5.3.2, 5.4
14	4.1.1	26,27	5.4
15	4.1	28 - 30	7.1
16A, B	4.1.2		
17, 18, 19	5.1		

9. FIGURES AND SKETCHES

Figure 1. Typical Auxiliary Framing Arrangement - Low Seismic Risk Areas

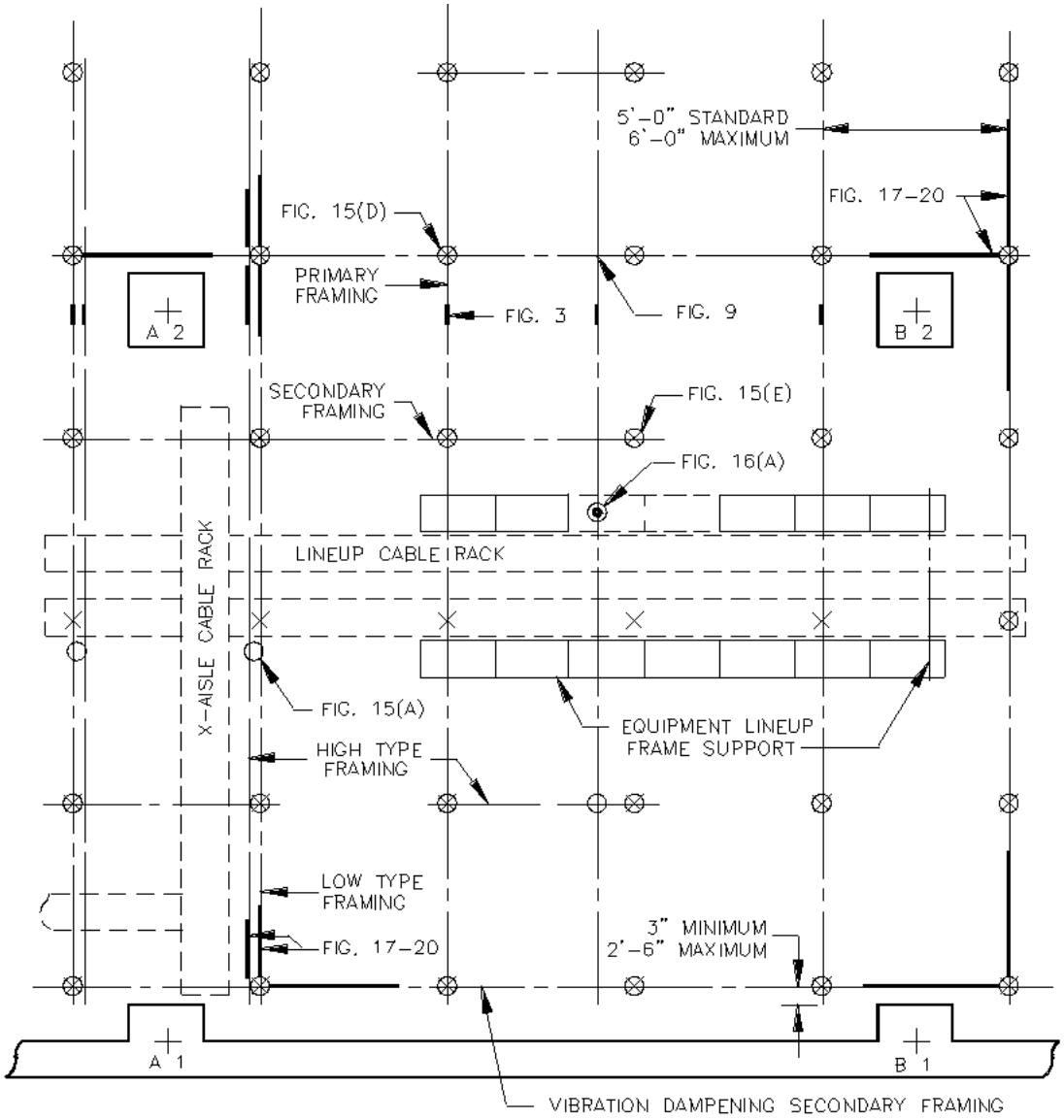


Figure 2. Typical Auxiliary Framing Arrangement - High Seismic Risk Areas

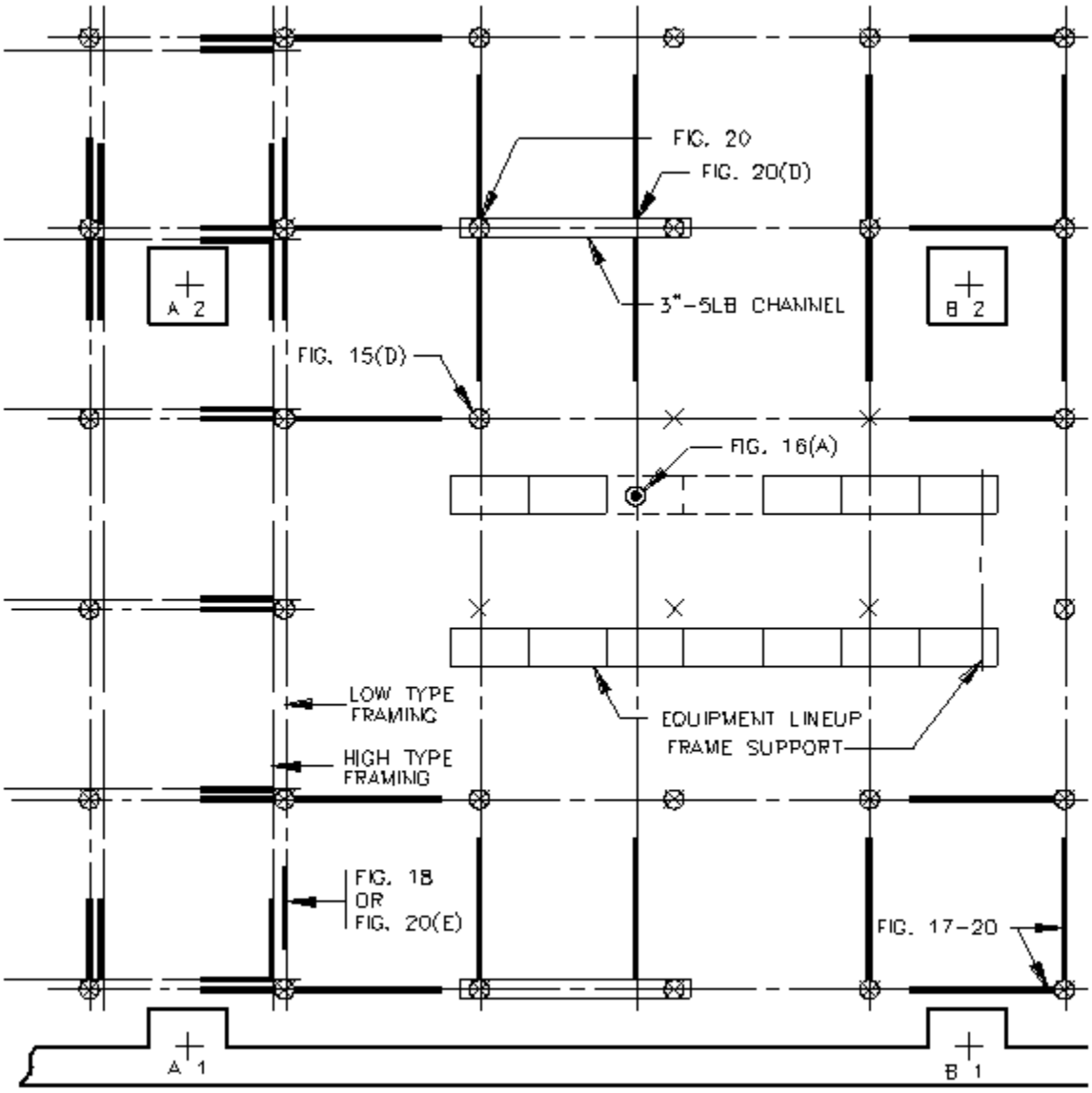


Figure 3. Auxiliary Framing Splices - Same Level

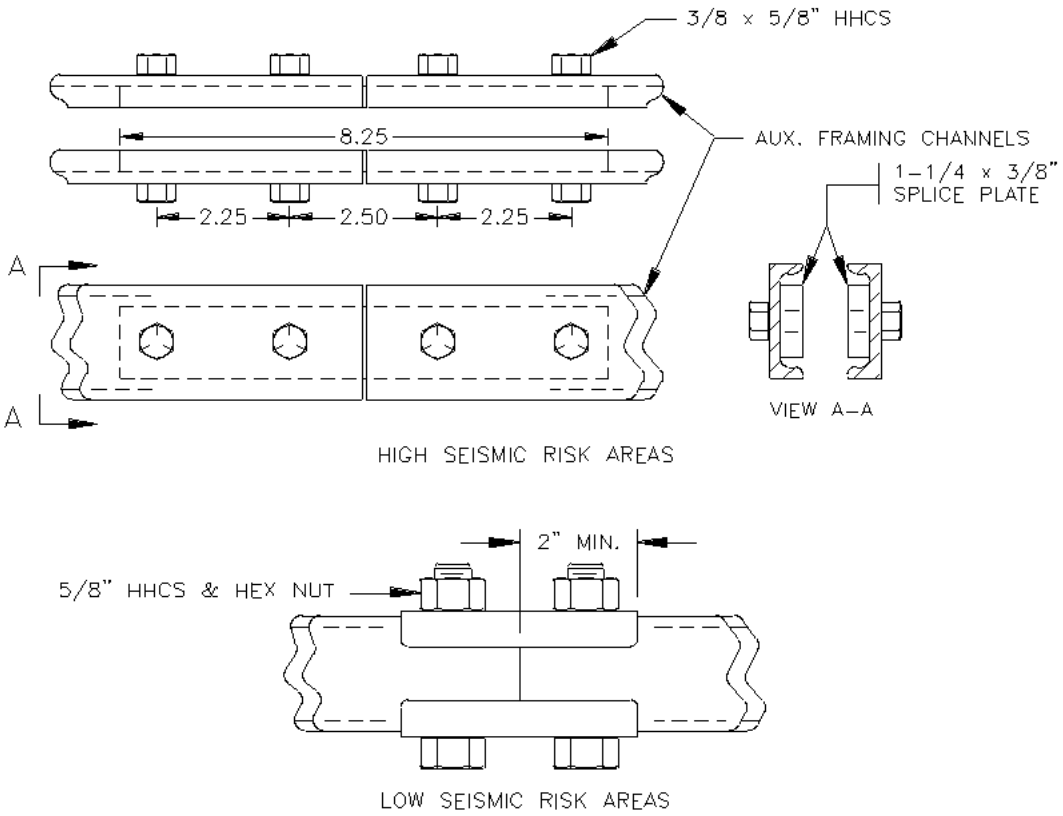


Figure 4. Auxiliary Framing Splice - 1 Inch Difference In Framing Levels

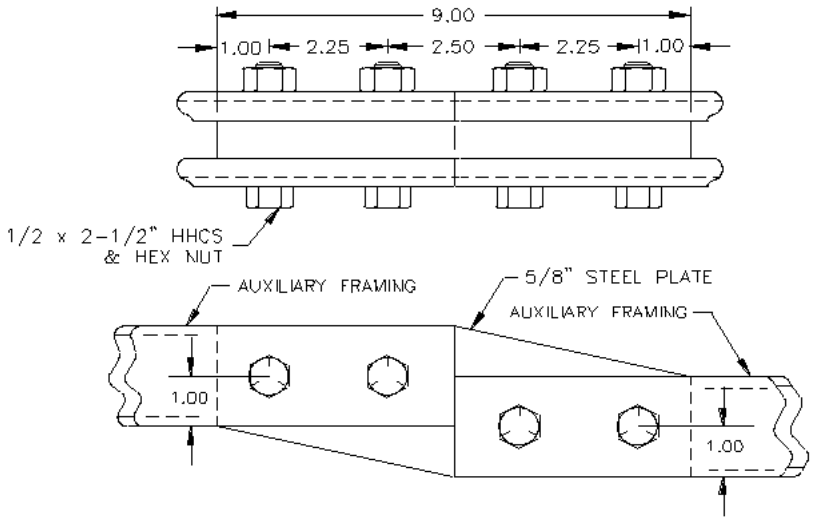


Figure 5. Auxiliary Framing Splice - 1-1/2 Inch Difference In Framing Levels

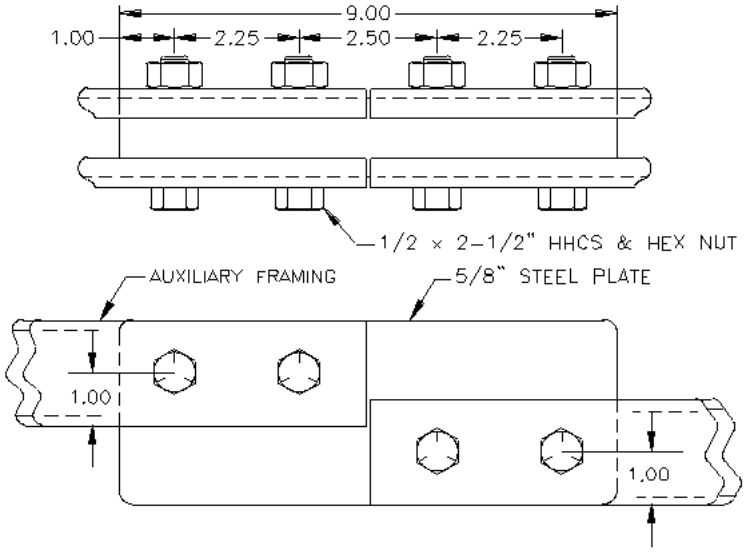


Figure 6. Auxiliary Framing Splice - 2 Inch Difference In Framing Levels

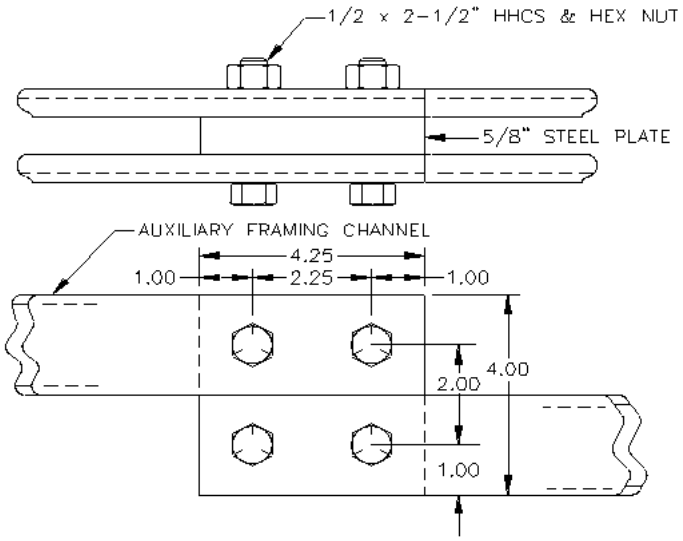


Figure 7. Auxiliary Framing Intersection - Single Level Framing

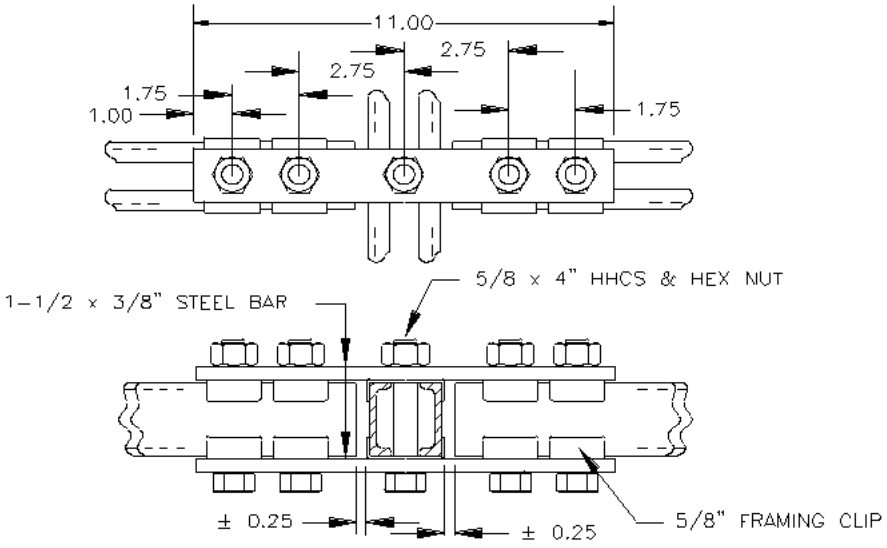


Figure 8. Auxiliary Framing Junction - Single Level Framing

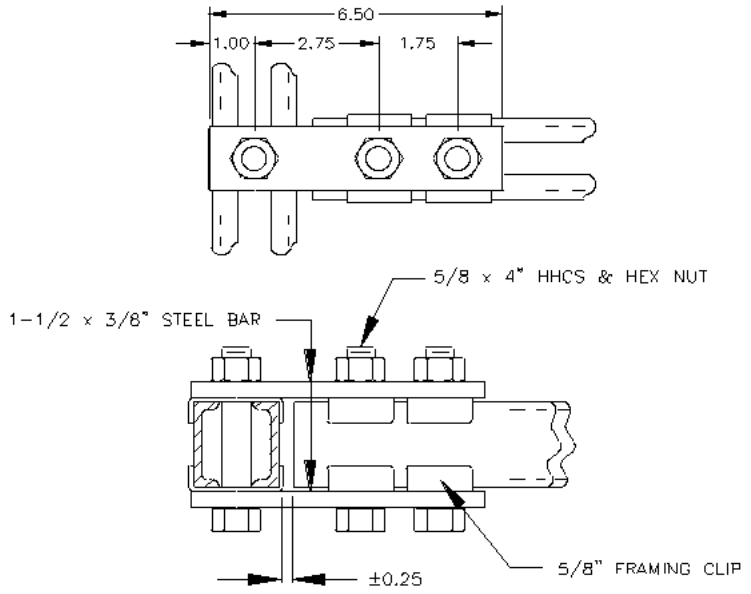


Figure 9. Auxiliary Framing Intersection - Double Level Framing

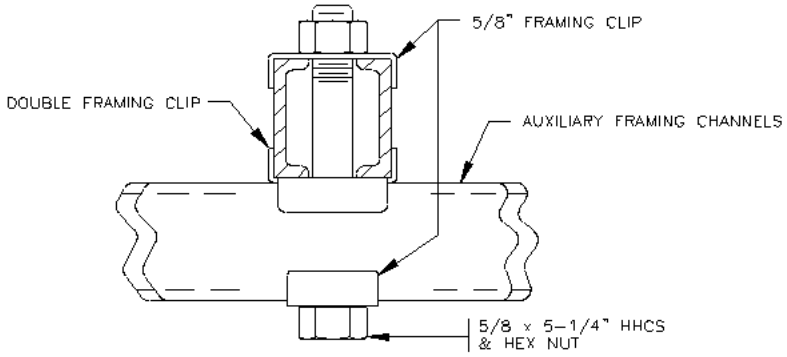


Figure 10. Auxiliary Framing Finishing Caps

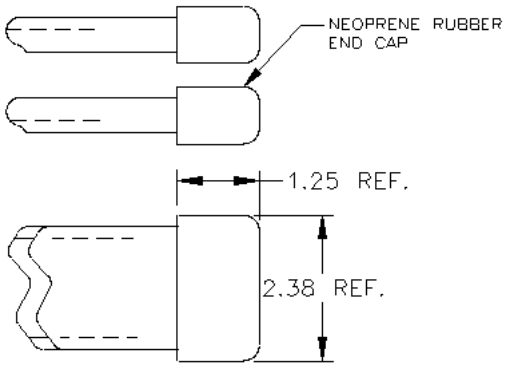


Figure 11. Hanger Rod Attachment At Ceiling Insert

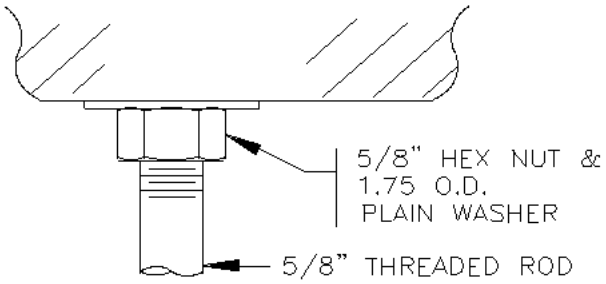


Figure 12. Hanger Rod Attachment At Ceiling Insert With 3'-5lb. Channel

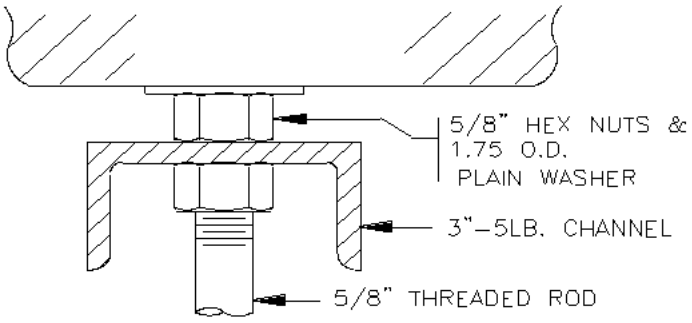


Figure 13. Hanger Rod Attachment At Ceiling Channel - Embedded Shown

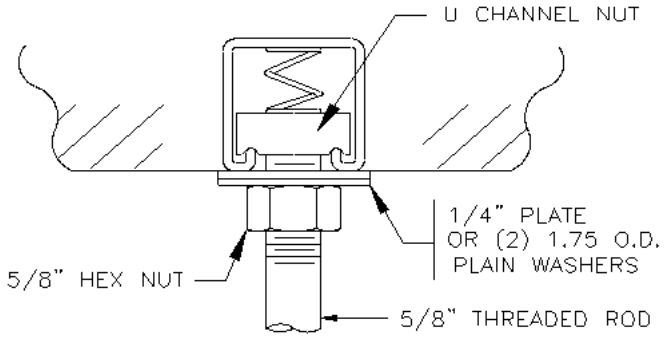


Figure 14. Hanger Rod Splice

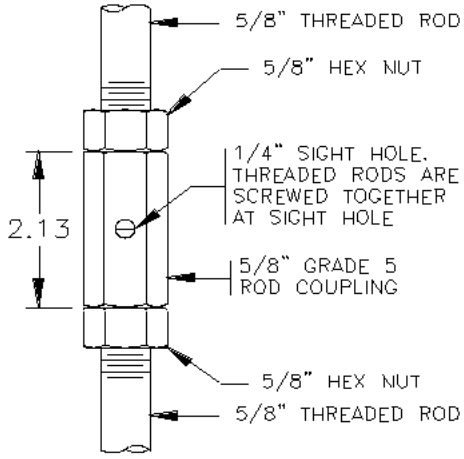


Figure 15. Typical Auxiliary Framing Support Arrangements

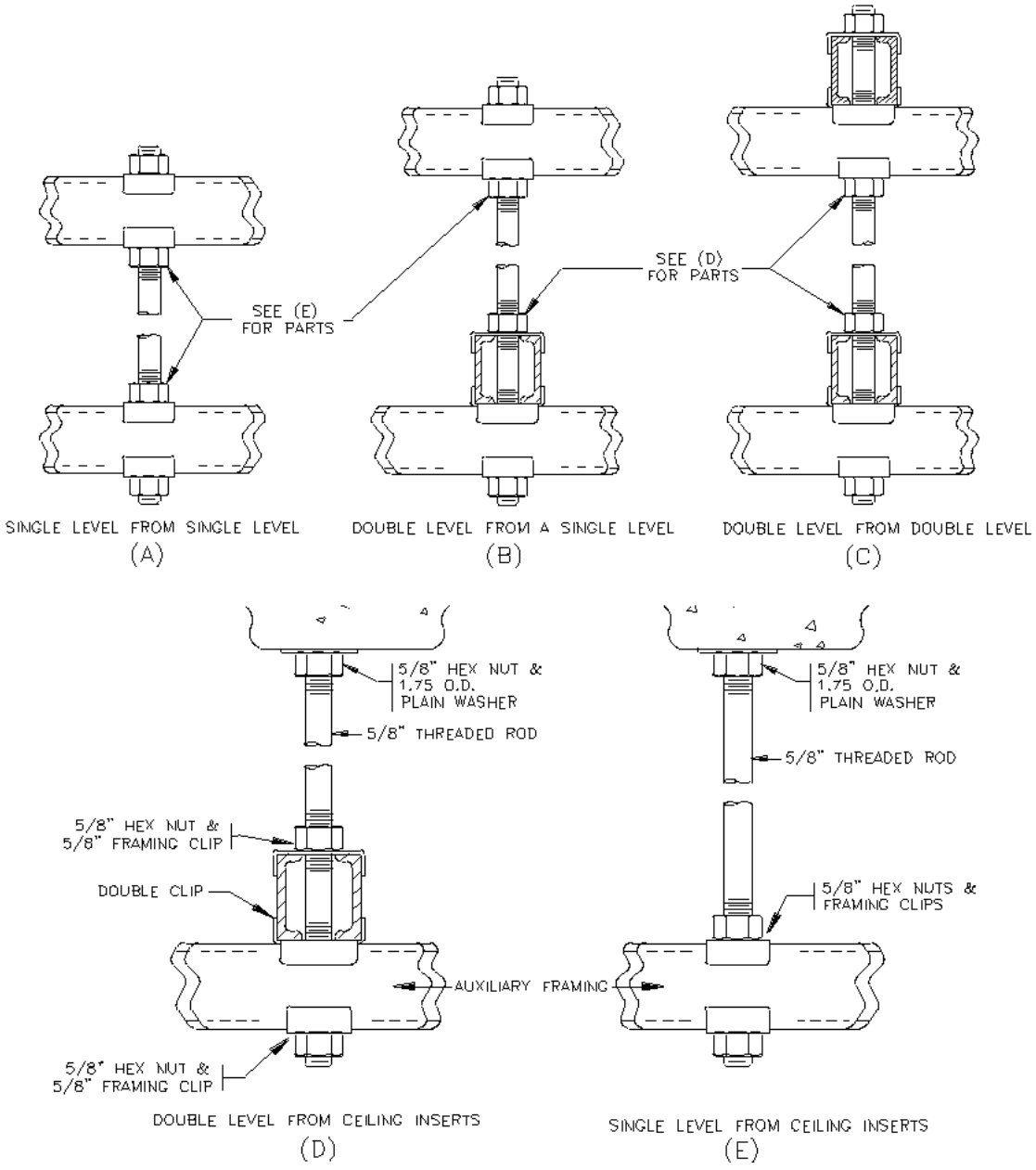


Figure 16. Alternative Auxiliary Framing Support Arrangements

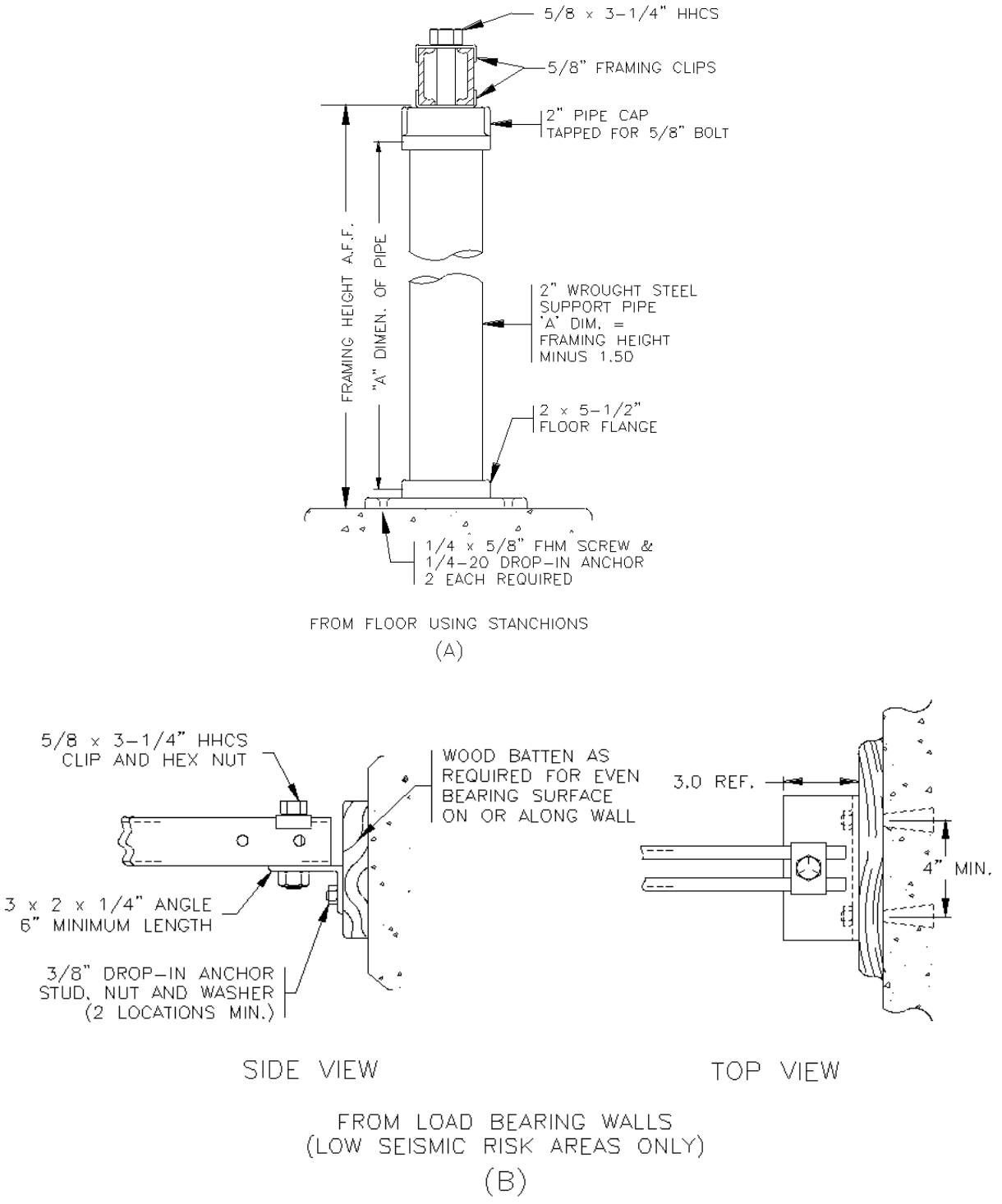


Figure 17. Threaded Rod Brace From Support Rod/Ceiling Insert

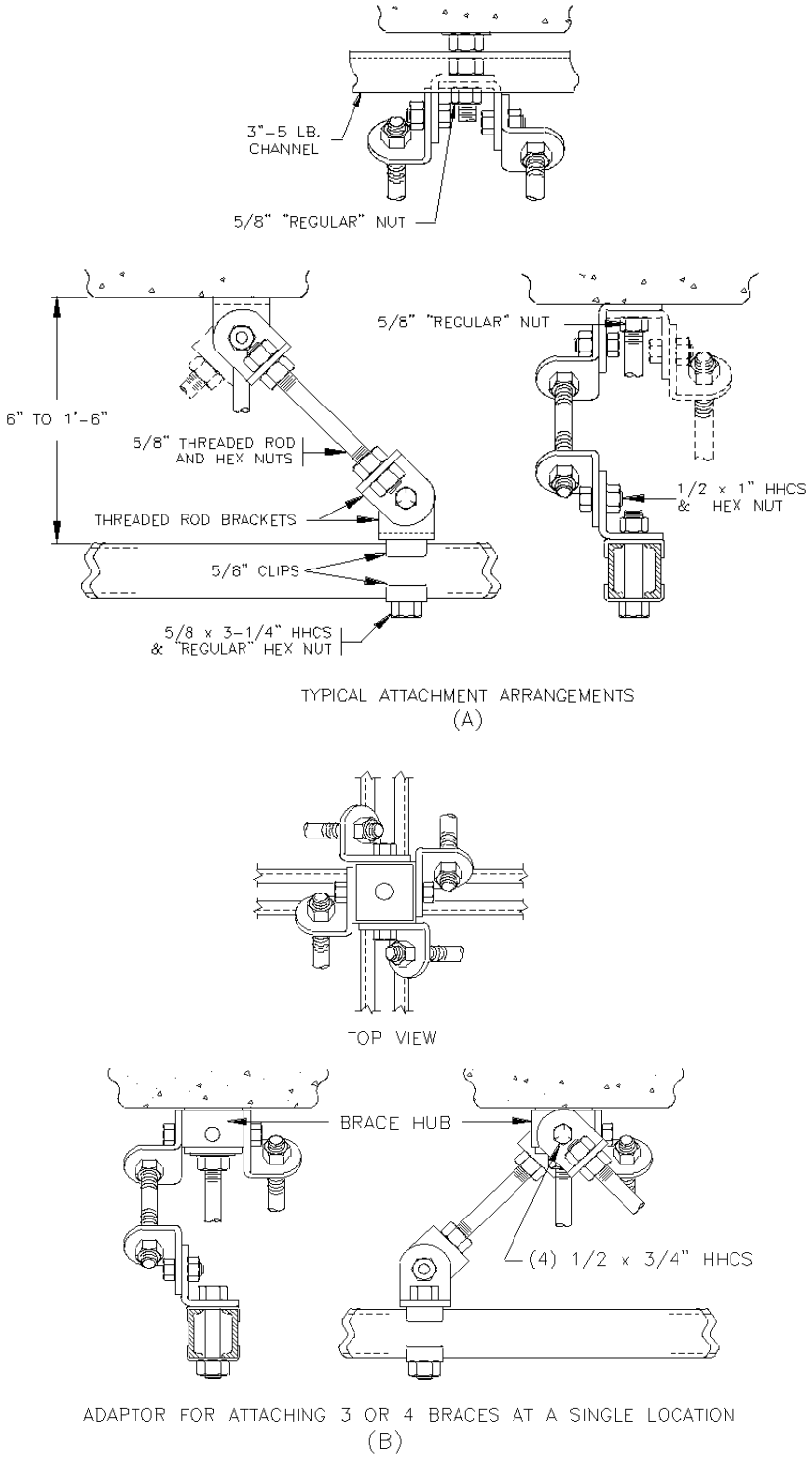


Figure 18. Threaded Rod Brace From Auxiliary Framing

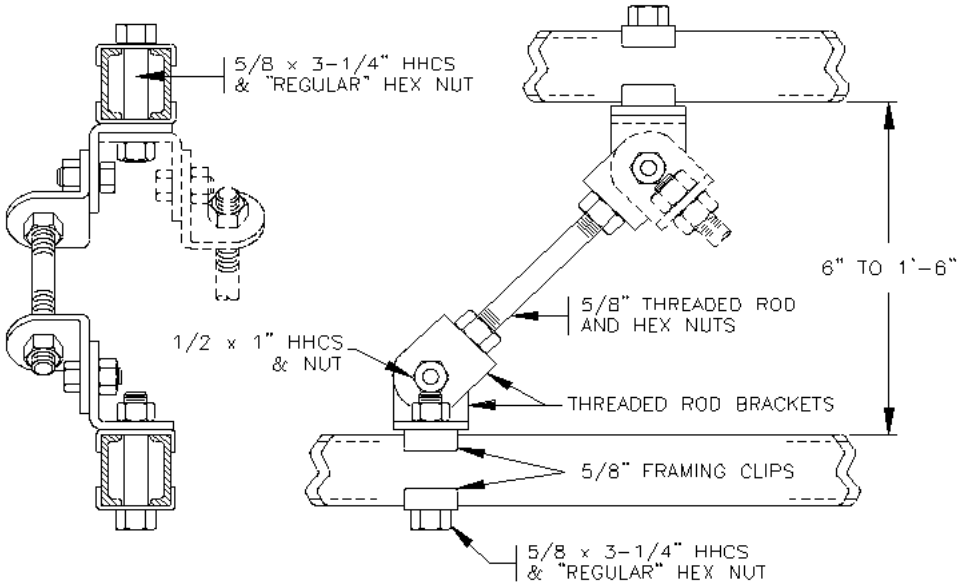


Figure 19. Attachment Of Threaded Rod Braces To 3”-5lb. Channel

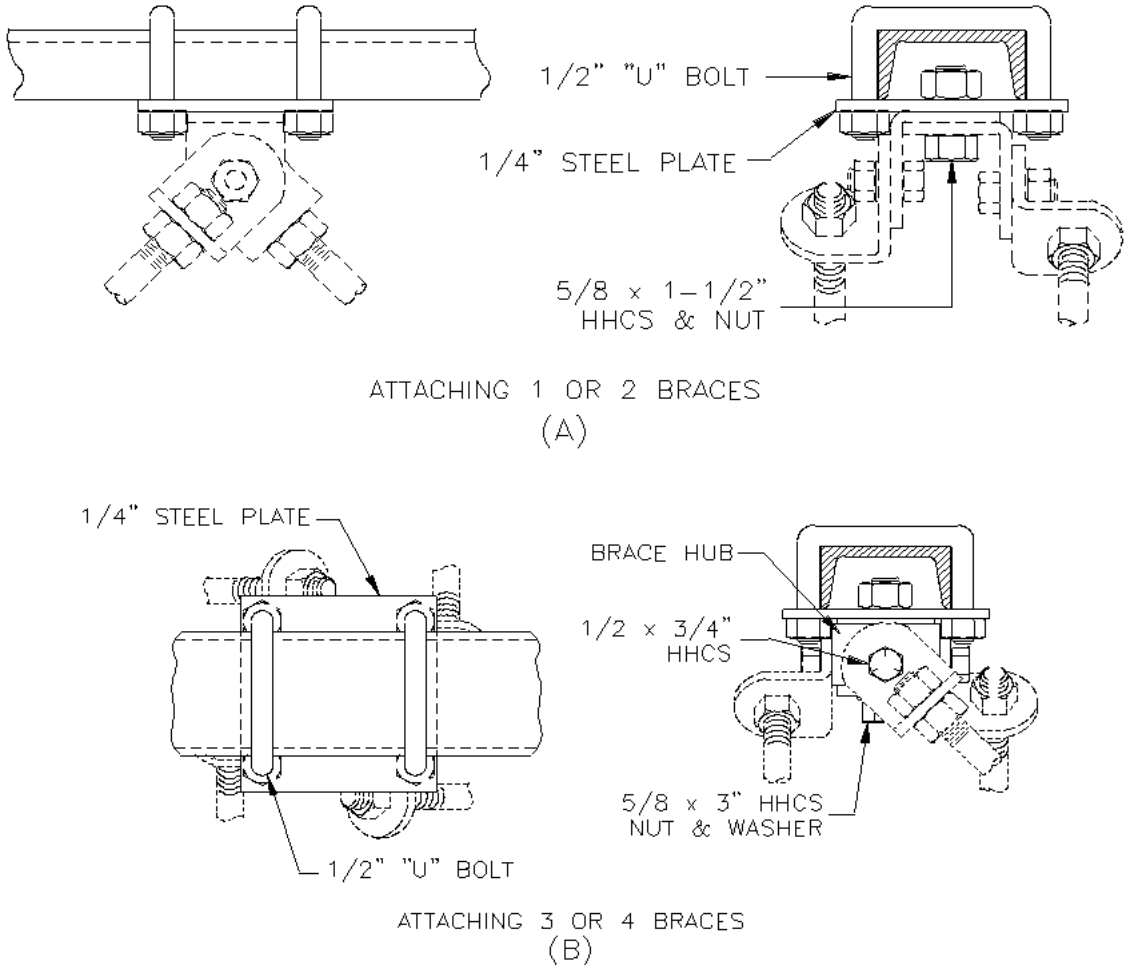
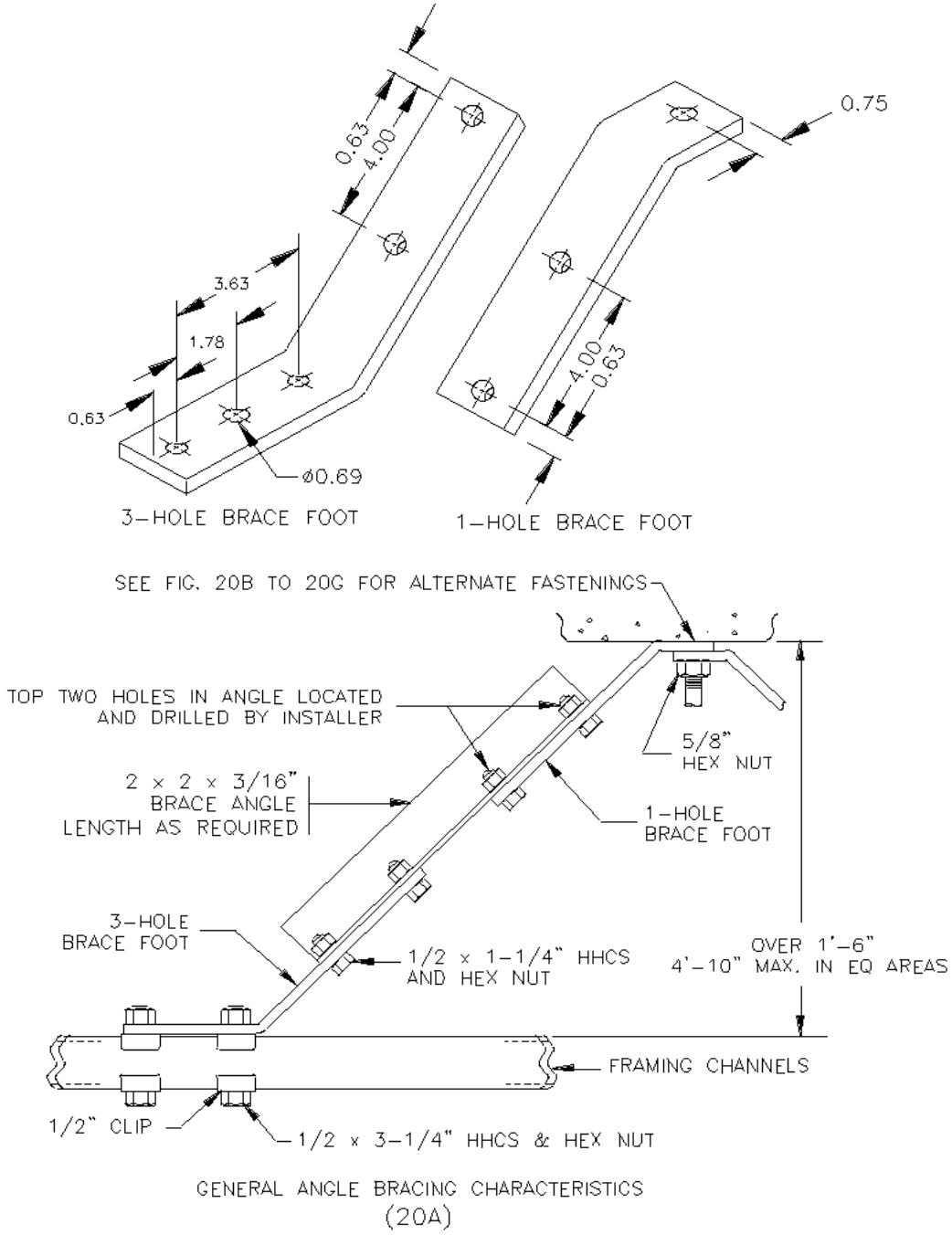
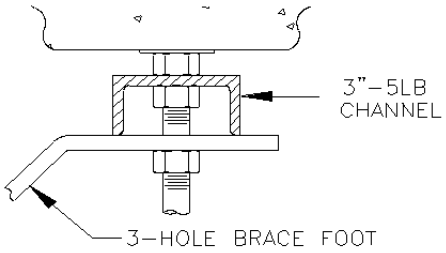
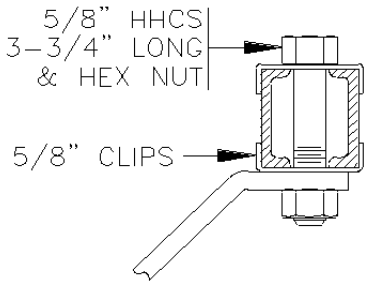


Figure 20. Angle Brace And Bracing Arrangements

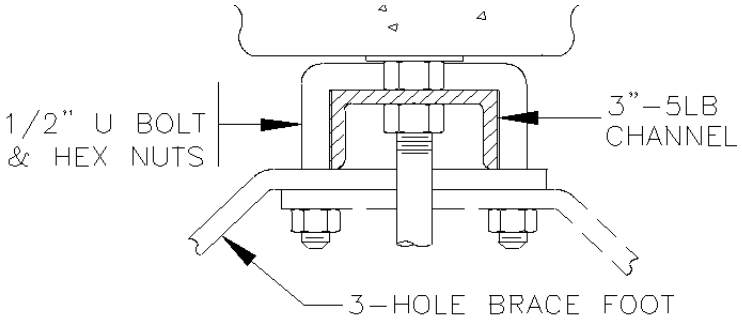




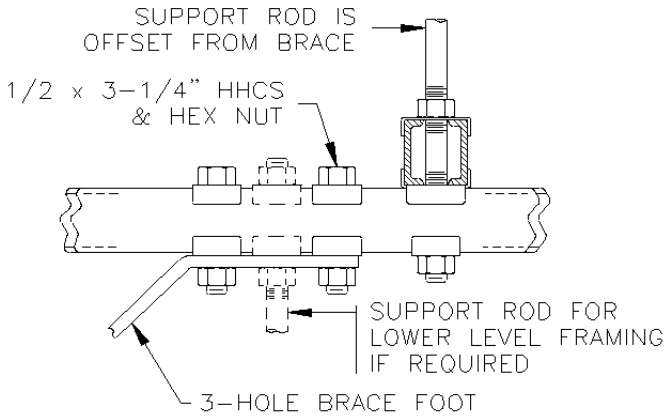
FROM PERPENDICULAR 3"–5 LB. CHANNEL AT SUPPORT ROD
(20B)



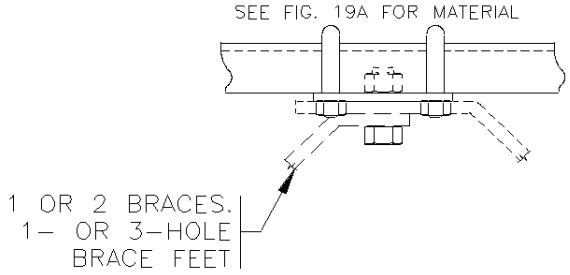
FROM PERPENDICULAR FRAMING
(20C)



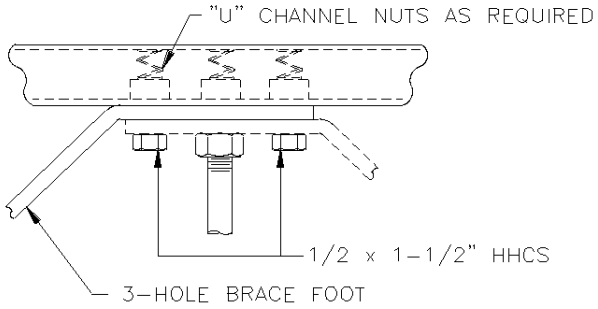
FROM PERPENDICULAR 3"–5LB. CHANNEL
BRACE OFFSET FROM SUPPORT ROD
(20D)



FROM PARALLEL AUXILIARY FRAMING
(20E)

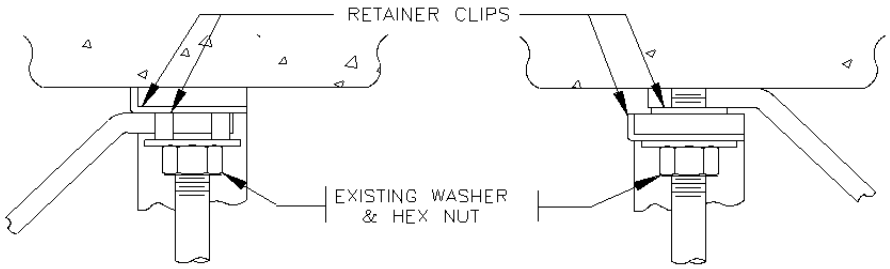


FROM PARALLEL 3"–5LB. CHANNEL
(20F)

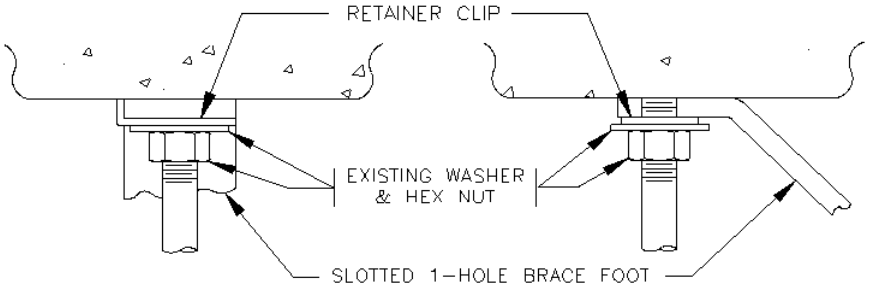


FROM PARALLEL "U" CHANNEL
(20G)

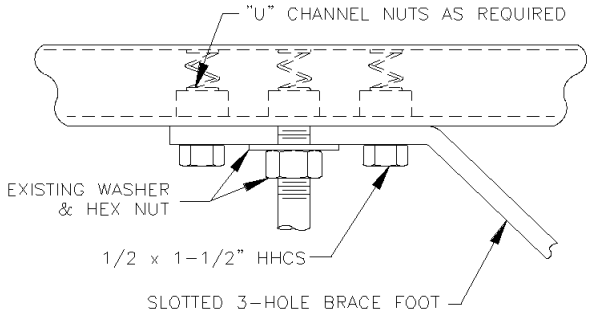
Figure 21. Angle Bracing From Existing Support Rods That Can Not Be Temporarily Removed (otherwise same as Figure 20A)



MULTIPLE BRACES AT CEILING INSERT
SK–21A



SINGLE BRACE ARRANGEMENT AT CEILING INSERT
(21A)



FROM PARALLEL CEILING "U" CHANNEL AT SUPPORT ROD
(21B)

Figure 22. Method Of Installing New 1-Hole Brace Feet At Right Angle To Old Style Braces

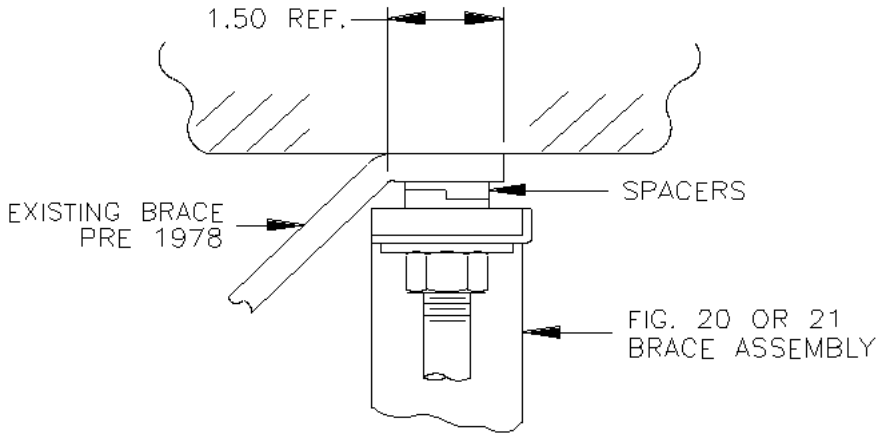


Figure 23. Auxiliary Framing Brace At Load Bearing Building Surfaces - High Seismic Risk Areas

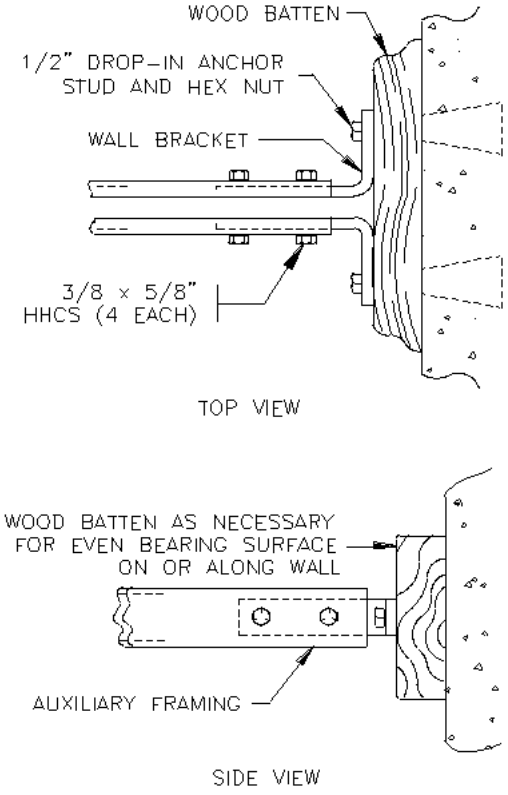


Figure 24. Auxiliary Framing Brace At Building Column

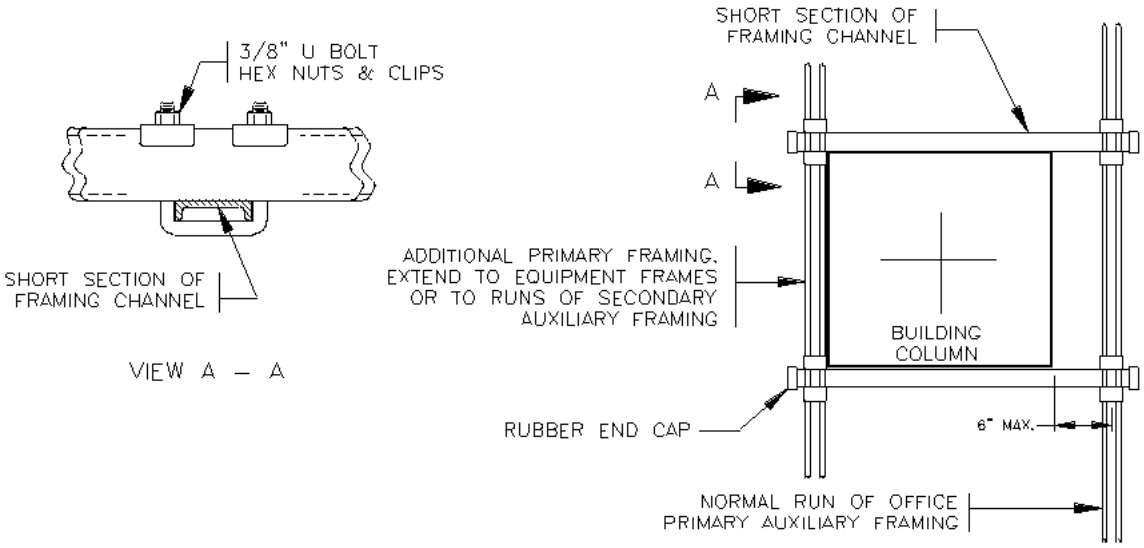
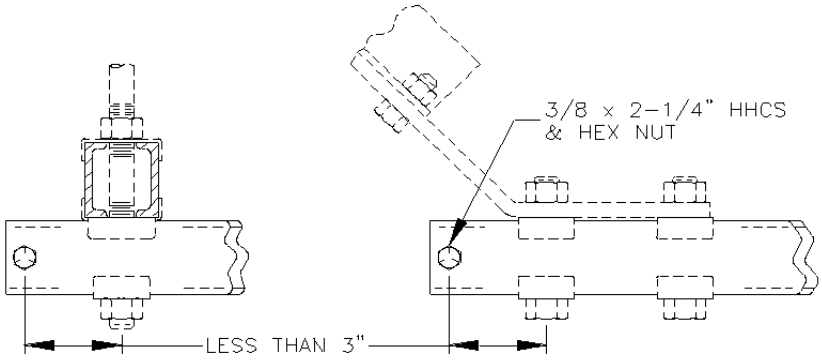


Figure 25. Arrangement Of Auxiliary Framing Stiffening Clips And Through Bolts



ALTERNATIVE TO FIG. 25 AT SHORT FRAMING EXTENSIONS
SK-25A

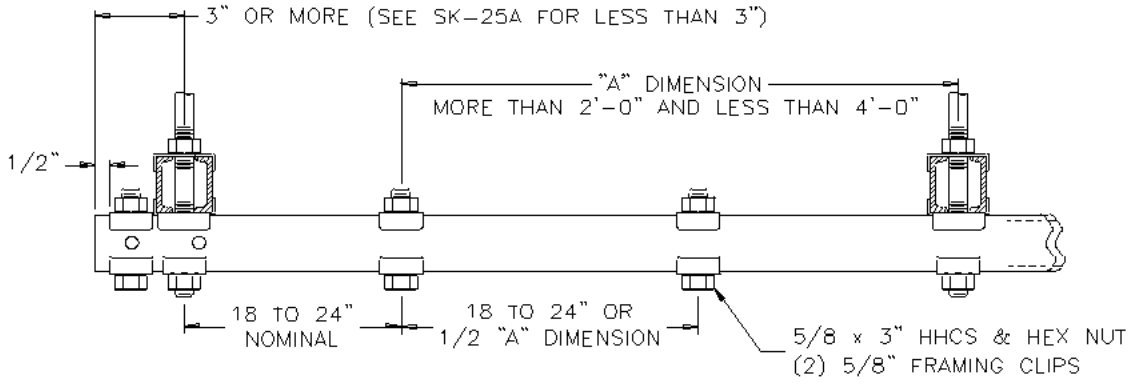


Figure 26. Typical Warren Truss Type Bracing Arrangement For Floor Supported Equipment Systems That Require Direct Attachment To Office Superstructure Via Framework Braces

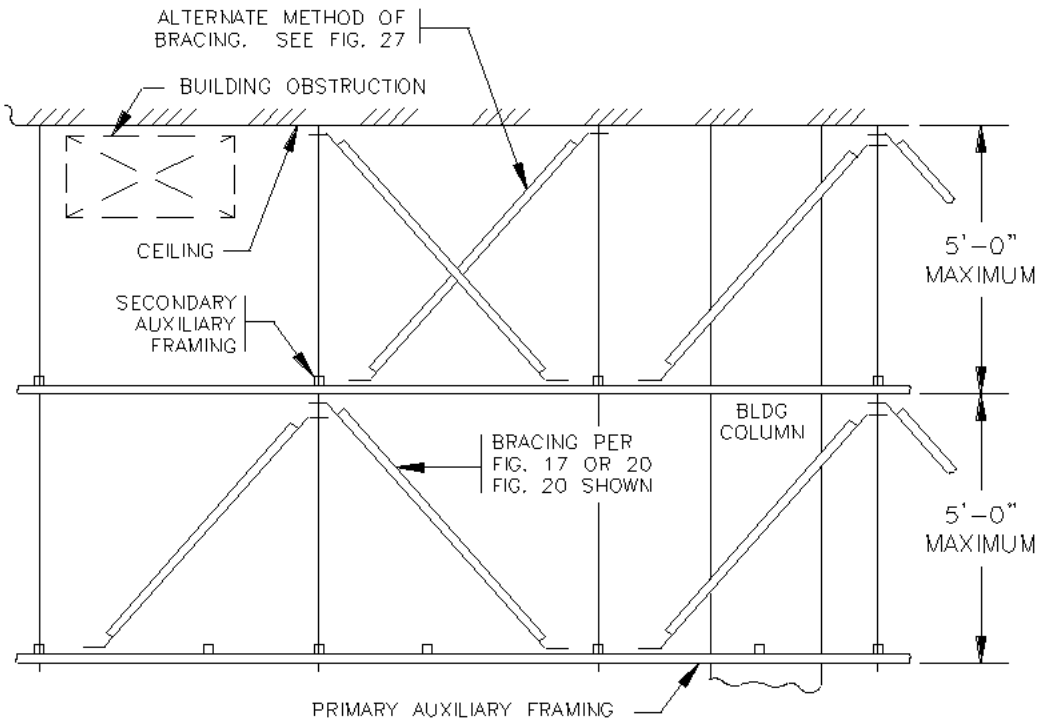


Figure 27. Method Of Installing Auxiliary Framing Braces At Same Location

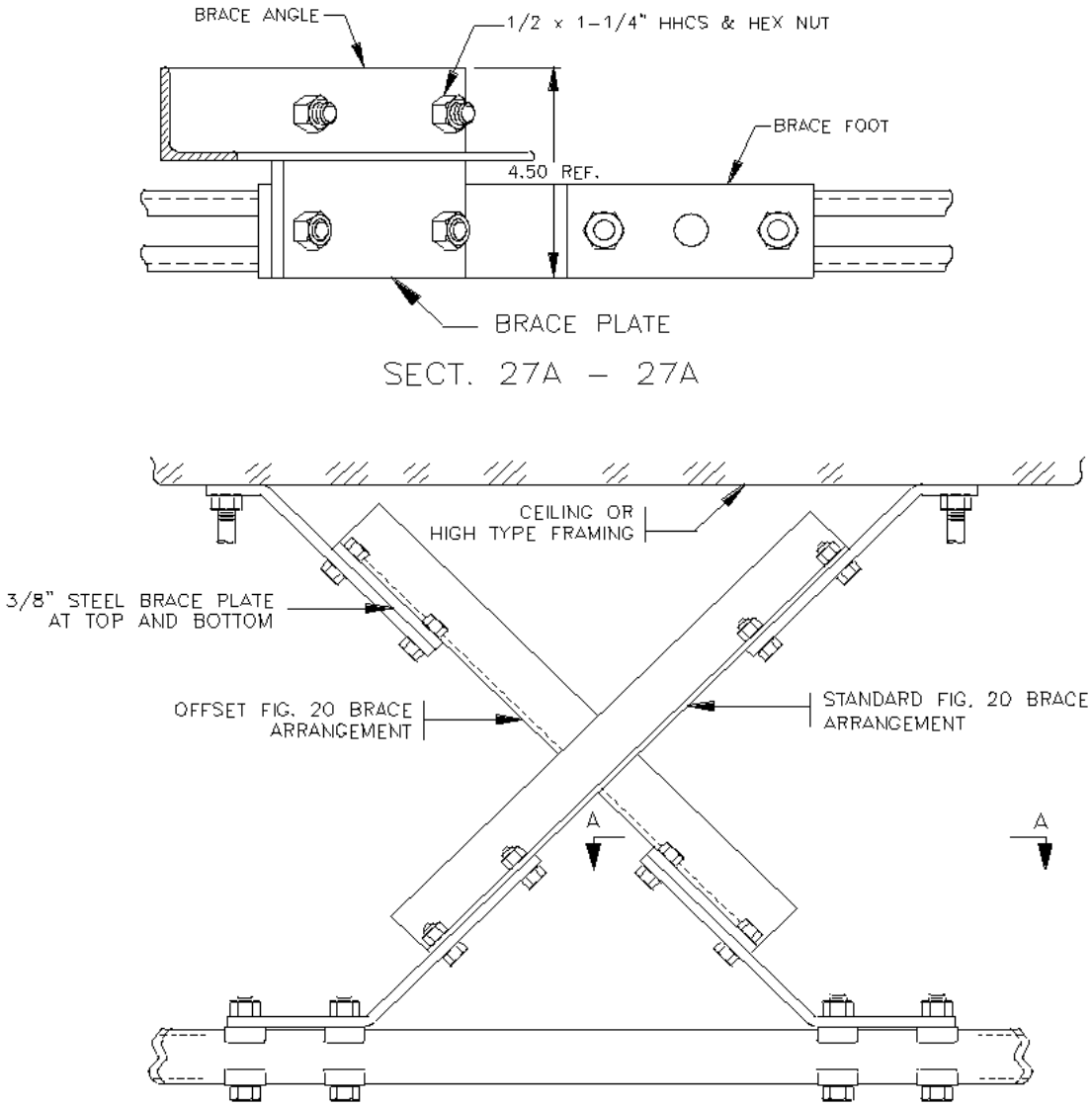


Figure 28. Miscellaneous Cable Supports For Auxiliary Framing

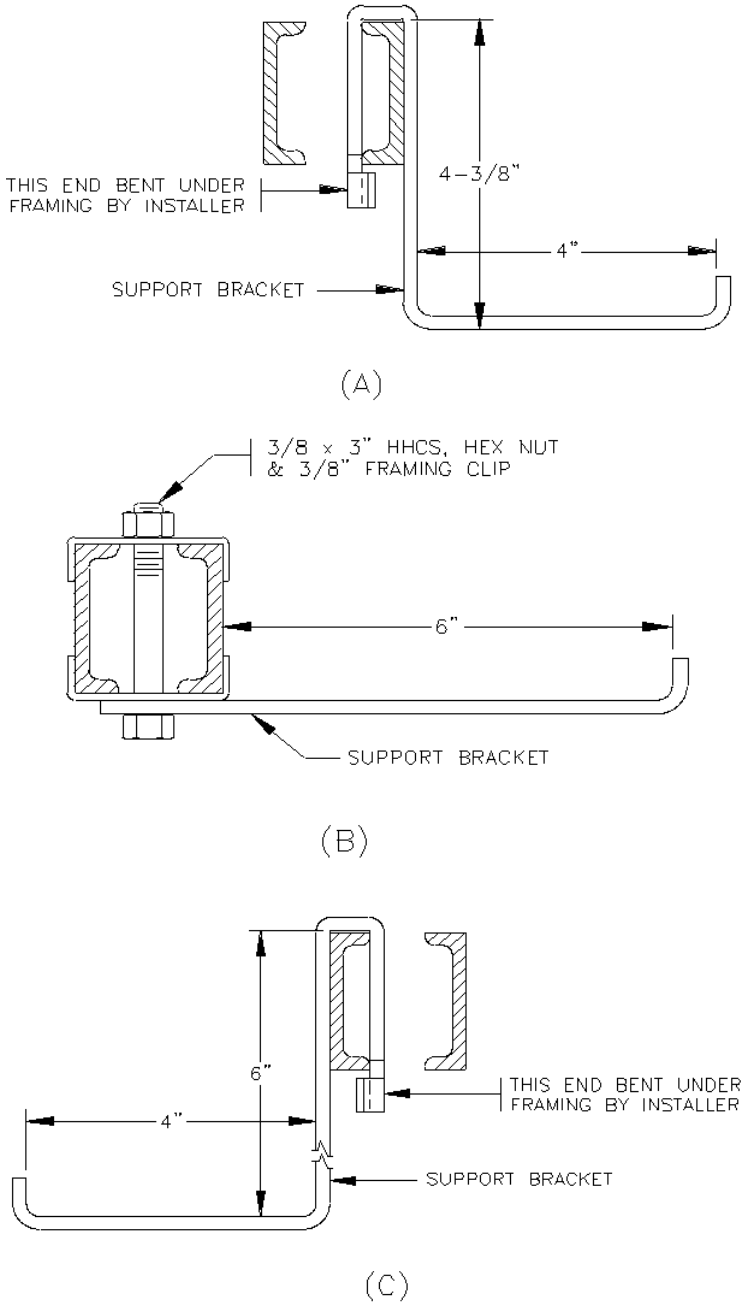


Figure 29. Auxiliary Cable Support From Auxiliary Framing

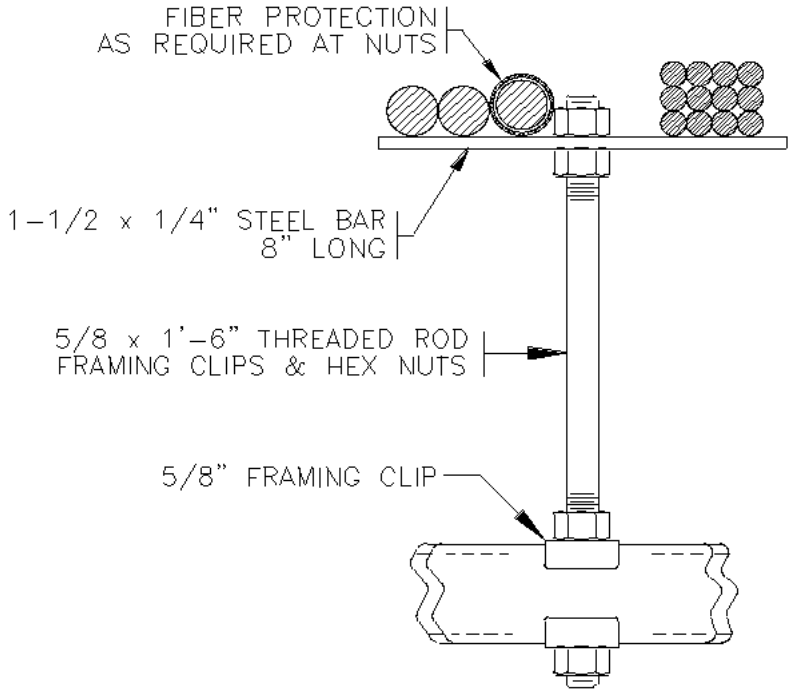
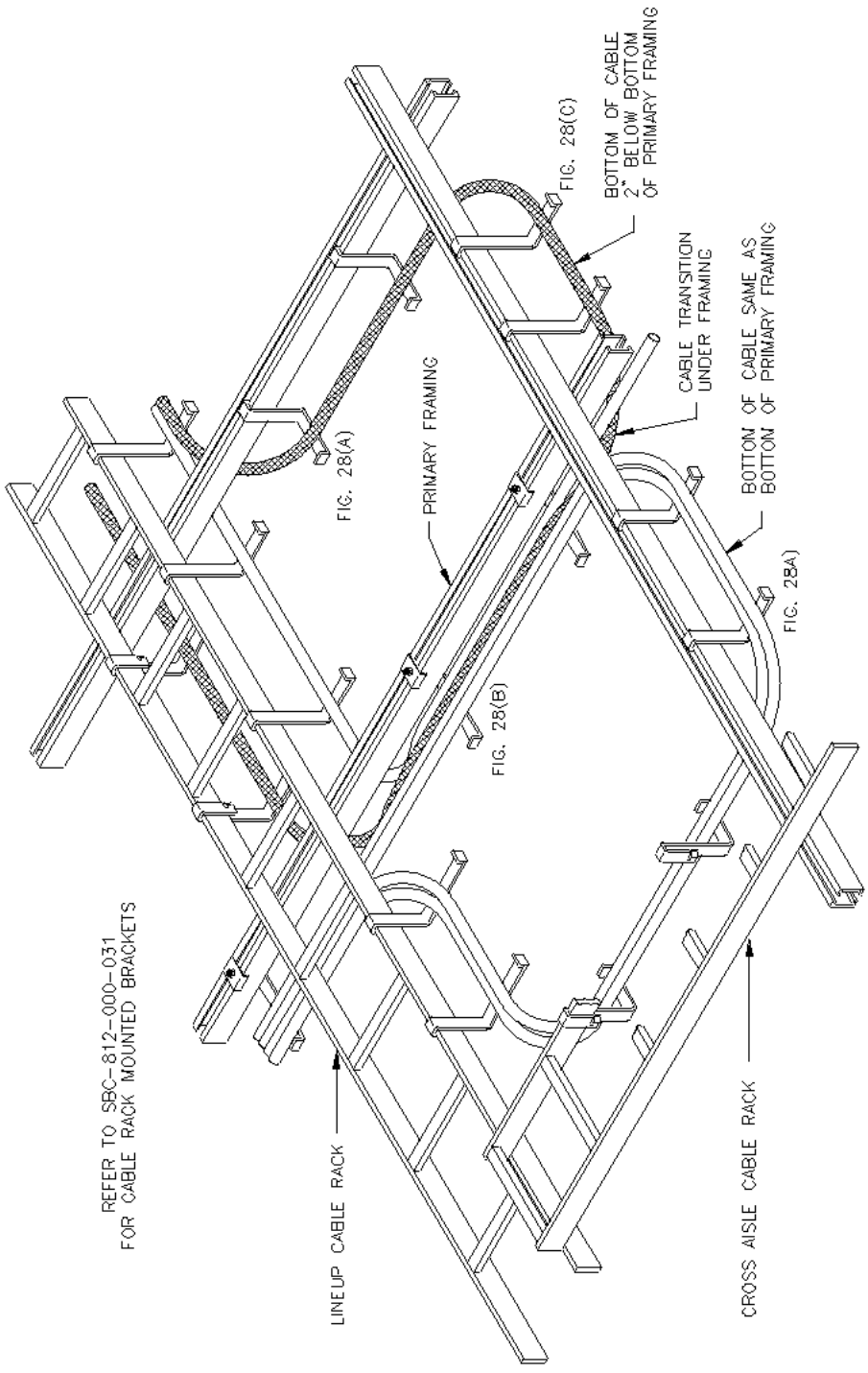


Figure 30. Typical Applications Of Miscellaneous Cable Support Brackets



10. RELATED DOCUMENTS

11. ACKNOWLEDGEMENTS

12. CONTACT LIST

ACRONYMS

A.1 DOCUMENT SPECIFIC ACRONYMS

A.2 NETWORK ACRONYMS DICTIONARY

Refer to SBC-000-000-020, Network Acronyms Dictionary.