CENTRAL OFFICE
EQUIPMENT FRAMEWORK SUPPORT REQUIREMENTS

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1. GENERAL

1.01 This section provides the support requirements for general use equipment framework installed on equipment room floors in Nevada Bell, Pacific Bell and Southwestern Bell network equipment environments. This section does not apply to framework assemblies whose installation requirements are otherwise documented in product specific support/installation documentation. Refer to material ordering drawing S068-150 for the provisioning of support hardware depicted in the illustrations contained in this section.

1.02 This document has been completely revised. A thorough review of this document is recommended. This document has been reissued from its former document, PBS-068-150PT, to the current BSP 800-068-150MP to incorporate installation requirements for equipment framework in Nevada Bell, Pacific Bell and Southwestern Bell central offices.

A. Definitions

1.03 For the purposes of this section, the terms framework and frame are considered synonymous and are defined as "the metal structure used for the support of electronic network equipment and/or apparatus". The term “general use” refers to application of various equipment types from various manufacturers configured in a non-proprietary framework unlike products from a single manufacturer configured in a specific frame designed for those products.

B. Framework Application Criteria

1.04 The following general criteria shall be followed when selecting and providing general use equipment framework and for support hardware used with equipment frameworks. Product specific or specialized framework used for one equipment manufacturer’s products are expected to be in compliance to these criteria’s as well.

a) Equipment framework used for installation of network equipment in central offices, remote sites and customer premises shall at minimum conform to performance requirements of BSP 800-000-102MP. All framework installed in Nevada Bell, Pacific Bell and Southwestern Bell facilities shall be designed and constructed for service in Seismic Zone 4 locations to provide opportunities for future redeployment of equipment to any SBC sites.

b) Framework and installation details used for seismically qualifying the framework design for Zone 4 service shall be equal to frames used to install equipment in Nevada Bell/Pacific Bell/Southwestern Bell equipment areas.

c) Adjacent frameworks that are not junctioned together because of a difference in framework design or upright alignment shall be treated as isolated frames.

d) As of September 1998, general use frameworks that are commercially available conforming to Seismic Zone 4 are listed in Table A. These manufacturers have voluntarily tested their frames to Bellcore GR-63 earthquake requirements.

Table A
List Of Manufacturers For General Use
Seismically Tested Equipment Framework

Frame Type	**A&R**	**B-Line**	**Hendry**	**Lucent**	**Newton**	**Reltec**
Unequal Flange Frame 7”-0”, 9”-0, 9”-6”, 11’-6”	-	SB-5578 series	12300 series	-	4700 series	-
Network Bay Frame 7’-0, 9’-0”, 11’-6”	-	-	-	ED8C800-50 series	12391 series	-
Channel Frame 7’-0”	WRAR-102381-1	-	-	-	-	377331900 or 377331700
Frame Extender	-	-	-	ED8C804-50	-	-

1.05 A variety of frame types for general use are available for mounting telecommunications equipment. Channel frames as shown in Fig. 1 are commonly used with power equipment, microwave radio and data equipment. Network Bay frames and unequal flange frames as shown in Fig. 2, 3 are the most common types used for installation of transmission and common equipment. A variety of specialized frames for specific products or for a specific equipment manufacturer may be used. The application of these specialized frames are acceptable if approved for Zone 4 service. Duct type frames such as crossbar style frames may be used with older technologies in existing lineups of like frames. A small number of redeployed duct frames may be added each year.

1.06 Formed steel base assemblies are commonly incorporated into unequal flange frames and channel frames of switching equipment. Steel angles are used as the base with channel frames for radio, power and common equipment. Various base styles are acceptable if the frame meet performance guidelines as described in BSP 800-000-102MP and equipment application.

1.07 All equipment frames shall be welded steel construction, i.e. vertical uprights joined to base and top crossmember assemblies by welded joints. Frames assembled with bolted joints may not perform as consistently as welded frames, especially if fasteners of bolted joints should loosen over service life. Accessories for frames may be fastened by threaded fasteners, i.e. kick guard covers, side covers, junctioning plates.

2. FLOOR FASTENINGS

A. Anchor Requirements

2.01 The requirements specified in BSP 800-000-101MP, Network Equipment Anchoring Requirements, apply to floor fastening arrangements of frames installed in isolated or integrated ground environments. Anchor requirements for the appropriate seismic risk of site shall be applied to assure equipment frames have been properly secured. As a minimum, the following anchoring methods shall apply:

Anchor Types:

(a) ***Low Seismic Risk Locations***

Hilti HDI drop in anchors or Hilti Kwik Bolt II anchors shall be used to secure equipment frames to equipment room floor. Refer to BSP 800-000-101MP, **Table 5.1**, for a complete listing of approved anchors which may be used for installing equipment frames. After the hold down nut is tightened there shall be a minimum of 1-1/2 threads showing above the nut but not to exceed 5 threads.

(b) ***High Seismic Risk Locations***

Hilti HSL anchors shall be used to secure equipment frames to equipment room floor. Refer to BSP 800-000-101MP, **Table 5.1**, for a listing of approved anchors which may be used for installing equipment frames. M12/6 and larger HSLB (bolt type) anchors are equipped with torque caps and should be used where installation and building conditions allow. Hilti HSLG (stud type) anchors can be used interchangeably with HSLB anchors when required. When HSLG anchors are used, their studs shall be installed to the full thread depth of the embedded anchor. After the hold down nut is tightened there shall be a minimum of 1-1/2 threads above the nut but not exceeding 5 threads.

B. 7'-0" Equipment Environments

2.02 The 7’-0” equipment configuration is the preferred height for all network equipment areas. Older equipment areas with frames other than 7’-0” height should transition to the 7’-0” height when old equipment is replaced with new technologies. The transition effort should incorporate at least half a lineup rather than a single frame at a time.

2.03 Equipment framework assemblies that are 7'-0" or less in height shall be installed in a free standing configuration (without overhead attachment to auxiliary framing or to side walls). All frames shall be secured to building floor with four anchors. Anchor style and size shall be chosen in accordance to seismic risks of location and as recommended in BSP 800-000-101MP, Anchoring Requirements.

2.04 Floor anchor placement for common frame types shall be as shown in Fig. 4A. in the primary location. A frame's alternate anchor location shall be used when the primary location cannot be used such as when embedded rebar is encountered.

2.05 Frames 7'-0" or less in height that are installed with framework extensions to 9’-0” or 11’-6” height shall be secured to the same requirements as taller framework. Frames above 7’-0” height shall always be installed with supplemental overhead bracing and floor secured as directed for taller frames. The following requirements apply when frame extensions are used:

- Network equipment shall not be installed in extension portion of extended framework assembly.
- A 7.5 inch tall blank plate shall be provided at mid-height of extension uprights to laterally stiffen extension in high seismic risk locations.

2.06 Multi-bay frames (single framework assemblies constructed to mount equipment units in a side by side fashion) shall be fastened to the floor for freestanding configurations with four anchors located at the primary position of each anchor hole slot for each single framework section of the multi-bay frame, for double bay - 8 anchors, triple bay - 12 anchors.

2.07 Equipment cabinets designed for Zone 4 service and under 7’-0” height shall be secured to the building floor with four anchors (one anchor located in each corner of the cabinet). Overhead securing is not required.

C. Equipment Environments Taller Than 7'-0"

2.08 Unequal flange and network bay equipment frames taller than 7'-0" are secured by bracing to overhead auxiliary framing and floor anchored. Two floor anchors shall be placed as close as possible along centerline of uprights as shown in Fig. 4B. Secondary location placement to avoid floor obstructions moves anchors away from the upright centerline resulting in greater risk of anchor pullout with frame movement. The two anchors should never be installed in diagonal pattern. Locating anchors at frame anchor slots away from upright centers is permitted if floor obstructions require it and if framework is not junctioned to adjacent frames that have anchors located in primary anchor position.

2.09 Equipment frames other than unequal flange frames, channel frames, network bay frames may require other than two anchors and securing to overhead auxiliary framing.

(a) **Distributing Frames**: Conventional distributing frames such as those constructed of angles and bars and having a floor angle running the length of the framework shall be fastened to the floor with appropriate style of anchors as shown in Fig. 5. An anchor shall be located between the first pair of verticals and on approximately 16 to 24-inch centers along the floor angle with the last anchor being located between the last pair of verticals of the framework. In no case shall the spacing of floor anchors along the floor angle exceed three verticals (24 inches).

Note: Some conventional distributing frame designs (usually not taller than 8'-0") have been seismically qualified as floor supported assemblies and do not require overhead attachments. The floor anchoring of such framework assemblies shall be in accordance with the engineering/installation documentation associated with the particular framework design.

(b) **Relay Racks**: Open-rack type equipment frameworks other than unequal flange frames shall be fastened to concrete floors with appropriate anchors per Fig. 6, 7 as follows:

- Isolated frames (not rigidly junctioned to an adjacent frame) and the initial frame in a lineup or grouping of frames shall be fastened to the floor with two anchors at primary location along upright centerline.
- Frames having floor angles shall be fastened to the floor with two anchors in low seismic risk locations and four anchors in high seismic risk locations as in Fig. 6A. Frame styles without floor angle base assemblies may be available and is recommended for frames taller than 7’-0”. Anchors should be installed inline with uprights of bottom crossmember for frames without angle base.

(c) **Duct Type Frames**: Duct type frames taller than 7'-0" shall be fastened to the floor with one anchor as shown in Fig. 7B.

D. Weak Floor Installations

2.10 Frames installed on problem floors shall be installed in conformance to methods described in BSP 800-000-101MP, Anchoring Requirements. Floor conditions such as poor quality concrete, wood floors, thin floor slabs, cracks in concrete, embedded ducts or pipes are described with appropriate installation alternatives. Where site specific conditions are not covered in the referenced document, call Pacific Bell's Seismic Protection engineer for recommendations.

E. Framework Junctioning

2.11 All frameworks installed in a continuous line shall be bolted together to complement framework spacing and alignment efforts regardless of the equipment environment height. Frameworks of a different design that are located adjacent to or in close proximity to each other (within 1 inch), should also be junctioned together with suitable hardware or if hardware is not available, frames shall be installed separated by minimum of 5 inches.

(a) In "High Seismic Risk" areas, adjacent frames shall in all cases be junctioned together or where incompatible frames cannot be junctioned, the frames shall be spaced at minimum 5 inches apart to prevent pounding of uprights.

(b) In "High Seismic Risk" areas, equipment frames located adjacent to building columns or structural walls shall be placed a minimum of 5 inches away from column or wall to prevent pounding.

(c) The junctioning of adjacent miscellaneous duct type frames taller than 7'-0" shall consist of upright and frame base fastenings as illustrated in Fig. 8. Frame base junctioning of adjacent 7'-0" or less in height is not required.

Note: Frame junctioning hardware shall not be used as a means of achieving basic frame plumb and alignment. Plumb and alignment of equipment frames shall be achieved by the use of shims placed under equipment framework assemblies at floor anchor locations.

2.12 Frameworks taller than 7'-0" and non-seismically qualified frames that are not rigidly bolted to an adjacent frame of the same design at the top, base, and along the frame uprights are considered isolated frames and shall be equipped with additional floor and top fastenings as covered elsewhere in this section.

F. Framework Stiffening Plates

2.13 In "High Seismic Risk" areas frames having more than 3 vertical feet of unequipped equipment space shall be equipped with framework stiffening plates similar to that shown in Fig. 9. Stiffener plates shall be located in the approximate center of a frame's unequipped space. It is not necessary to relocate framework-stiffening plates as equipment units are added unless the stiffening plates interfere with the addition of the new equipment units.

2.14 See paragraph 2.05 for requirements on frame extension stiffeners.

3. OVERHEAD ATTACHMENTS

3.01 This part covers the requirements for fastening the tops of equipment frames to overhead auxiliary framing (paired channels or their functional equivalent) and/or cable rack when it is necessary. This part is divided into two subparts according to traditional central office equipment environments. Subpart A *7'-0" Equipment Environment* addresses new technology equipment areas

established for equipment frameworks 7'-0" or less in height where the structural integrity of the equipment is provided by the equipment framework design and its associated floor anchoring hardware. Subpart B *Equipment Environments Taller Than 7'-0"* addresses equipment environments taller than 7'-0" where the structural integrity of installed equipment is generally provided by direct attachment to an office superstructure arrangement, in addition to framework floor anchoring hardware.

3.02 General use equipment frames should be furnished in heights appropriate to the environment in which they will be installed. Refer to 2.05 for floor anchoring requirements of 7'-0" frames equipped with framework extensions.

A. 7'-0" Equipment Environments

3.03 Generally, equipment frames and equipment systems 7'-0" or less in height are free standing and shall not be attached to the office overhead superstructure.

(a) Equipment frames not approved for Zone 4 service shall not be installed in a freestanding configuration
(b) Free standing frames shall be secured with minimum of four floor anchors using appropriate style of anchors for the seismic risk.

3.04 Equipment frames installed under compartmentalized sheet metal cable racks in 7'-0" equipment environments, such as ESS cableway systems, shall be attached to the cable rack for cable rack support purposes. Attachments of equipment frameworks to compartmentalized cable racks shall be in accordance with the technical documentation associated with the particular cable distribution system or, when necessary, as dictated by the equipment framework's design.

3.05 Unless otherwise specified in the engineering information for a specific product/technology, free standing equipment framework for general use shall not support equipment and cable weight exceeding 400 pounds and overall frame/equipment weight shall not exceed 500 pounds. Product specific frames may exceed these weights when frames are designed and tested to higher weights.

(a) The average equipment and cable weight is defined as the weight of all equipment, framework assemblies, cable, and cable rack divided by the total number of 2'-2" framework modules in the equipment system. If the cable weight center of gravity is above the 4' level, the 400 lb. weight consideration shall be reduced to 300 pounds.

3.06 Freestanding equipment framework that may be difficult to align, where front face of frame top crossmembers are flush, may require a supplemental top alignment member. A length of channel, Unistrut P3300T, shall be used across top of frames secured with two (2) ½ x 13 capscrews, washers, and hex nuts to each frame top crossmember. Length of channel shall span across all frameworks in lineup that require supplemental alignment.

3.07 For existing equipment areas with 7’-0” frames floor anchored and secured to overhead superstructure, it is recommended that new frames when added to the lineup be installed as freestanding frames with a 5 inch space separation between existing and new frames. However, for lineups where compatibility concerns exist and frames similar to existing frames are added, the new frames may be installed in conformance to existing frame arrangement, i.e. secured overhead to auxiliary framing.

B. Equipment Environments Taller Than 7'-0"

3.08 All older equipment frames not seismically qualified for Zone 4 service and all frames taller than 7'-0" shall be top supported by attachment to the office superstructure. Top supports shall be provided along equipment lineups at each location where a primary run of office superstructure crosses the equipment lineup.

(a) A minimum of two top supports are required for each group of frames that do not span two runs of primary office superstructure. A frame group, or group of frames is defined as any number of individual frames that are rigidly bolted or otherwise junctioned together to form a structurally continuous unit of frames.

(b) Reused/relocated Crossbar 5 and bulb angle type frames shall be fastened to the office auxiliary framing grid in accordance with AT&T practice BSP 800-610-155.

C. Isolated Frames

3.09 A frame installed as an individual frame, not junctioned to any adjacent frames, shall have at least two points of support to the overhead superstructure. Short lengths of auxiliary framing or Unistrut® type channel placed at right angles to the isolated frame may be used for the support of frames. These supplemental frame support members shall be fastened to the underside of suitably supported cable rack, or extended between two runs of secondary auxiliary framing.

D. End Of Line Frames

3.10 Where the end frame of a lineup or group of frames is not located under a row of primary auxiliary framing, or the frame extends more than 2'-6" beyond its last point of attachment to the primary auxiliary framing, an additional top support shall be added above the frame. In the case of unequal flange or network bay frames, short channels are required when the frame junction pipe does not extend to the next row of primary framing, or the pipe is not rigidly fastened to an adjacent frame which is properly supported per this section.

3.11 Short auxiliary framing channels used to support frames shall be attached to cable racks as shown in Fig. 10.. Anti-slip fastenings shall be located on the short channels, and on the primary auxiliary framing to each side of the short channels. The purpose of the anti-slip material is to minimize slippage of the office cable rack fastenings. In those cases where the office cable rack is located above frame uprights similar to BSP 800-006-151MP Fig. 10B (only one cable rack "J" bolt fastening), the short channels shall be extended to an adjacent cable rack or run of secondary framing channels.

4. FRAME TOP SUPPORT METHODS

A. Frames With Top Angles

4.01 Equipment frameworks having a single top angle shall be fastened to auxiliary framing as shown in Figures 11A through 11D, 11F & 11G.

(a) Where the auxiliary framing occurs directly above a frame upright, the top supports may be arranged as shown in Fig. 11E.

(b) Top supports shall be arranged as shown in Fig. 11F or 11G, or a combination thereof, when the auxiliary framing height is less than 2" above frames.

B. Frames Without Top Angles

4.02 Figures 12, 13A and 13B or a combination thereof shall be used with framework assemblies that do not have top angles but require overhead top supports. Fig. 12 should be used in equipment environments where the office auxiliary framing is at least 3-1/2 inches higher than the equipment frames. Fig. 13A and 13B should only be used above radio equipment lineups where office auxiliary framing is installed 3 inches (Fig. 13A) or 4 inches (Fig. 13B) above equipment frames, and the equipment frames require very little network cabling. Fig. 10 anti-slip fastenings shall be applied to primary runs of auxiliary framing on both sides of Fig. 12 top supports.

C. Supports For 1" Junction Pipes

4.03 9'-0" and taller frames use a 1" galvanized pipe to supplement adjacent frame junctioning requirements and for alignment and grounding purposes. 1" pipes shall be clamped to the underside of each frame's top angle at two locations as shown in Fig. 14. The V bolts should be located to the left and right of frame center approximately 13 inches apart. Any attachments to overhead framing shall be in addition to the pipe supports shown in Fig. 14.

(a) 1" galvanized pipes shall be furnished in 20-foot lengths whenever possible. Extra length not used for current fastening of frames shall be left for future frames. A minimum of 15 inches of pipe shall always extend beyond the last frame installed for future growth unless that last frame is at end of lineup. The unused length of pipe shall be fastened to the auxiliary framing with frame support hardware above future frames. Where the pipe extends beyond the end of an existing or planned group of frames it shall be fastened to the auxiliary framing with U bolts as shown in Fig. 15A or 15B. A rubber cap shall be placed over the exposed ends of frame junction pipes.

(b) For CO ground reasons, the 1" pipe shall be shown on the office ground schematic records. The length of the pipe shall be indicated when other than 20-foot lengths are installed. Frame junction pipes shall be cut on the job site to meet the following conditions:

(1) To provide for the end-to-end butting of pipes in the middle of bays in a lineup.

(2) The pipes shall not extend into a cross aisle beyond the planned ultimate end of a lineup.

(3) The pipe shall not extend beyond end frames where frames may be interrupted by a building column or an intended break in lineup.

(4) In lineups where all frame top angles are not in alignment, the pipe for each group of frames should extend and be fastened to the next run of primary auxiliary framing channels where practical.

D. High Type Framing Environments

4.04 In some cases it may be necessary to provide frame supports from auxiliary framing that is more than 8" above a frame. In those cases frame top supports should be provided per Fig. 16 or Fig. 17.

4.05 Single rod brace supports per Fig. 16 are used when the distance between the auxiliary framing and the top of frames is between 8" and 1'-6". Double rod brace supports per Fig. 17 are used when the distance between the auxiliary framing and the frame top of frames is between 1'-6" and 2'-6", and when the angle of a single rod brace support per Fig. 16 will be more than 60° from the horizontal.

4.06 Except as noted in Fig. 17, the angle of rod brace supports shall not be less than 30° nor more than 60° from the horizontal. Single rod brace supports should be sloped in the same direction when possible. It is acceptable to stagger the direction of slope of the threaded rods when necessary to avoid overhead obstructions.

4.07 Two Fig. 16 or 17 frame supports installed perpendicular to the frame, and one Fig. 18 end brace installed in-line with the frame are required per isolated frame. The distance between perpendicular brace supports of an isolated frame shall be approximately 12 inches. For multi-frame arrangements where adjacent frames are fastened together in a rigid manner, provide one Fig. 16 or 17 at the approximate center of every other frame in the lineup.

4.08 Additional auxiliary framing shall be provided in accordance with BSP 800-006-150MP so standard frame supporting details can be applied between the top of equipment frameworks and the existing overhead auxiliary framing when that distance is greater than 2'-6".

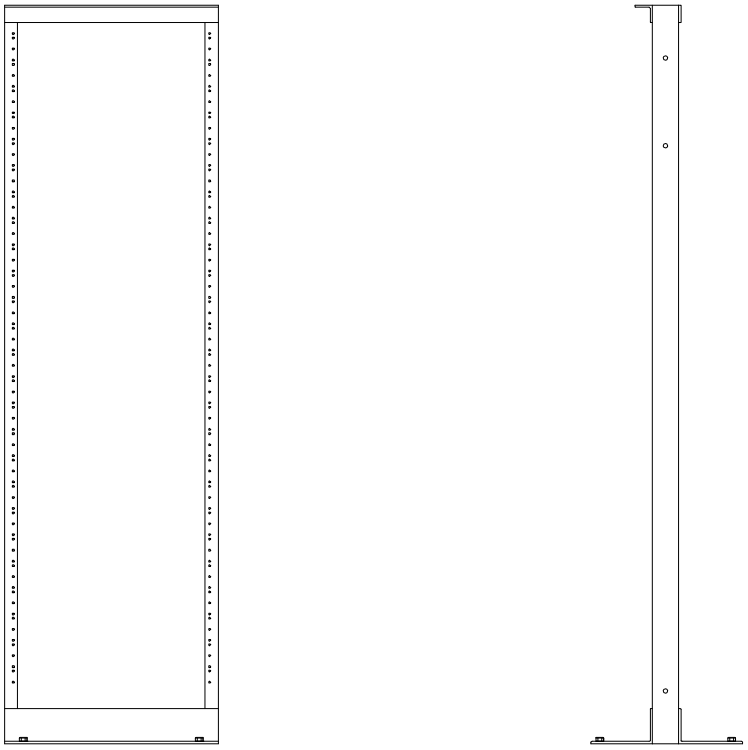
5. FRAMES SUPPORTING CABLERACK

A. Offices Without Overhead Superstructure

5.01 In central offices where no overhead superstructure is provided for support of cablerack, the equipment frames typically would be used to support these racks and cables. Cable rack securing procedures in BSP 800-006-151MP, Network Facility Cable Rack Requirements, under Paragraph 5, CDO Equipment Bracing shall be followed.

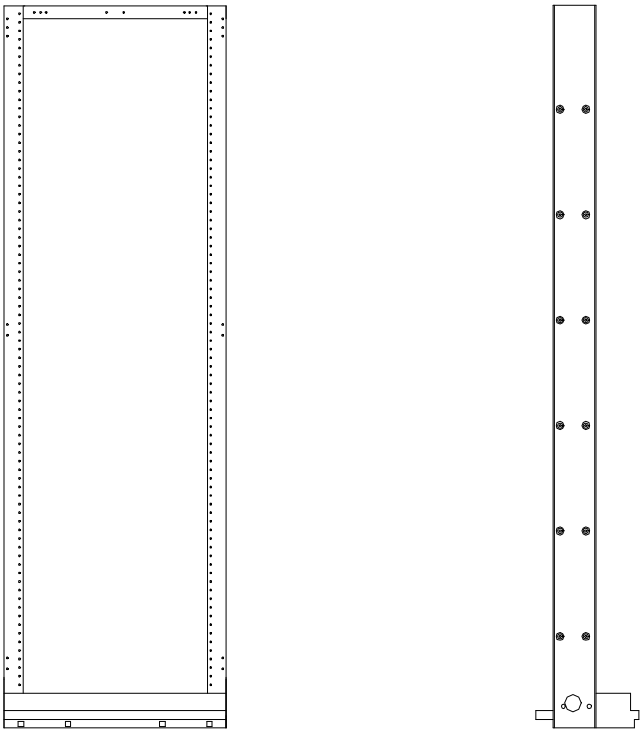
5.02 Cable rack and cable loads supported by the top of equipment frames shall be limited to avoid frame upright overload. Pileup on cable racks supported by equipment frames shall not exceed 4 inches or total load not to exceed values stated in paragraph 3.05.

5.03 Equipment frames with little or no equipment mounted between frame uprights may require stiffening plate to prevent uprights from bowing under heavy top loads. Provide stiffening plate as shown in Fig. 9 at mid height between frame uprights. The stiffening plate should be provided when empty vertical space of frame exceeds 3 feet.



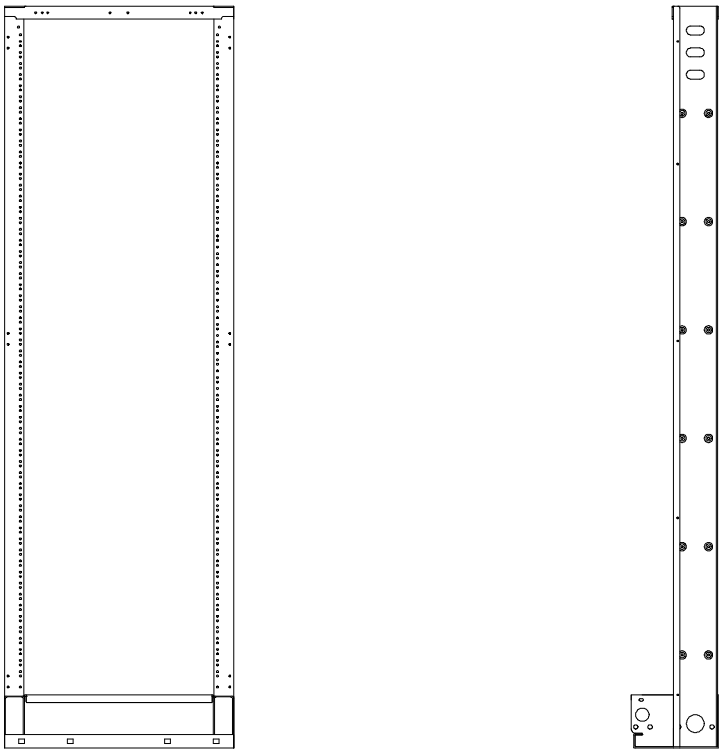
Channel Framework

Fig. 1

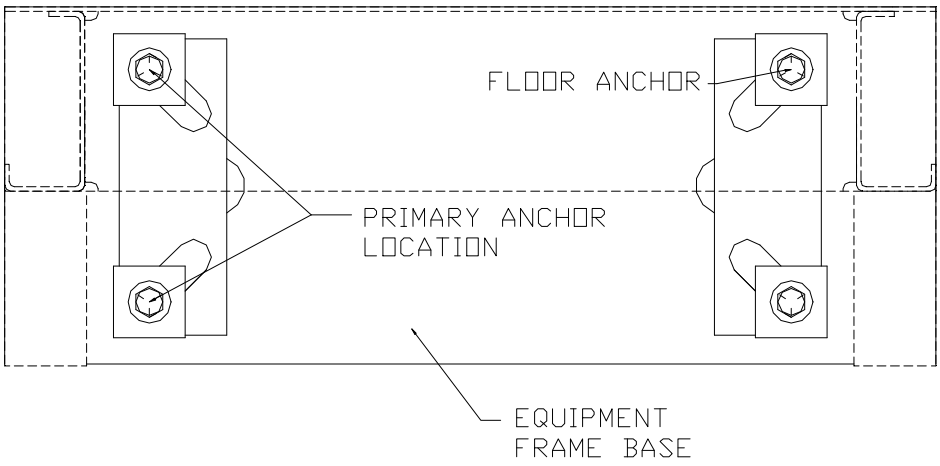


Network Bay Framework

Fig. 2

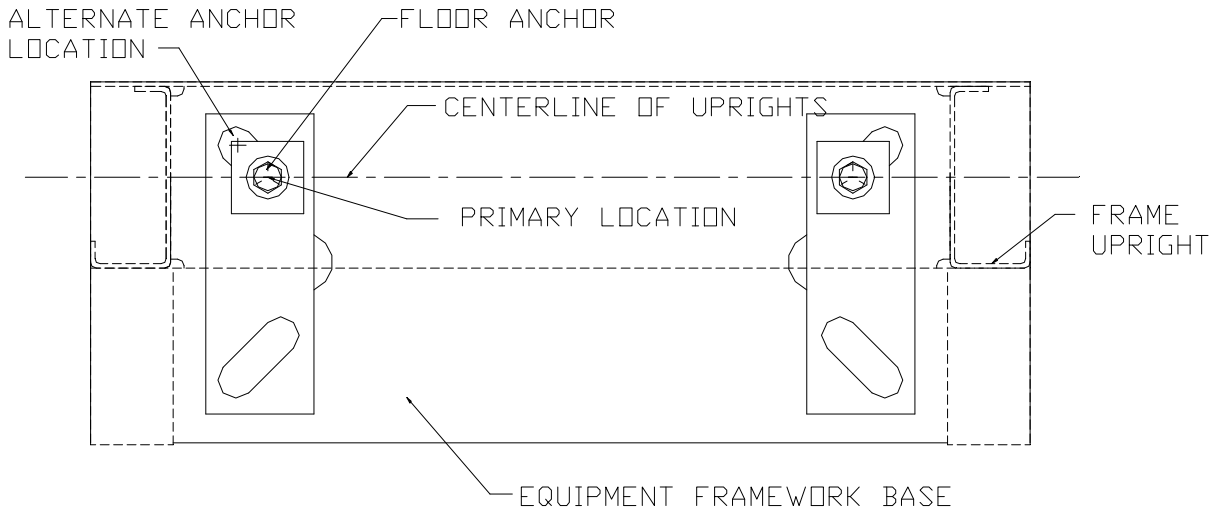


Unequal Flange Framework
Fig. 3



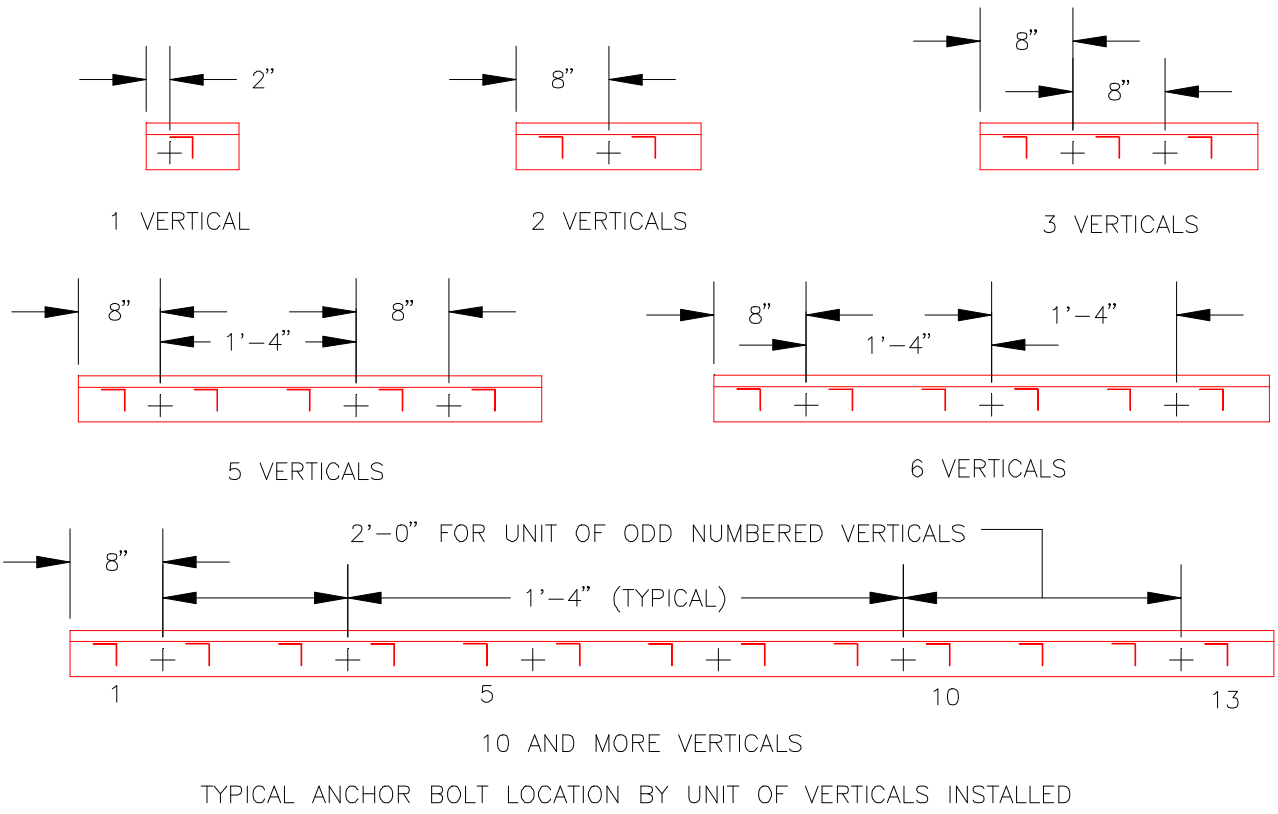
Typical Floor Fastening Layout Of 7'-0" (Freestanding Configuration) Equipment Frames
(Unequal Flange Type Framework Shown)

Fig. 4A



Typical Floor Fastening Layout Of Equipment Frames Overhead Secured
(Unequal Flange Type Framework Shown)

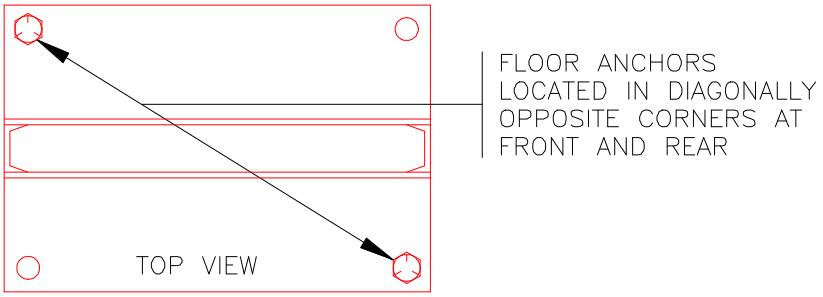
Fig. 4B



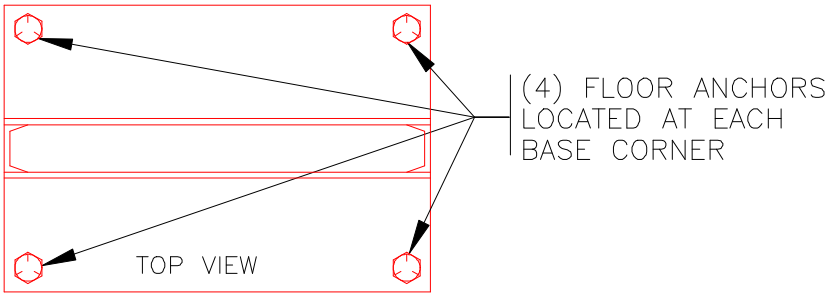
Typical Floor Fastening Layout Of Conventional Distributing Frames

Fig. 5

(FOR LOW SEISMIC RISK AREAS ONLY)

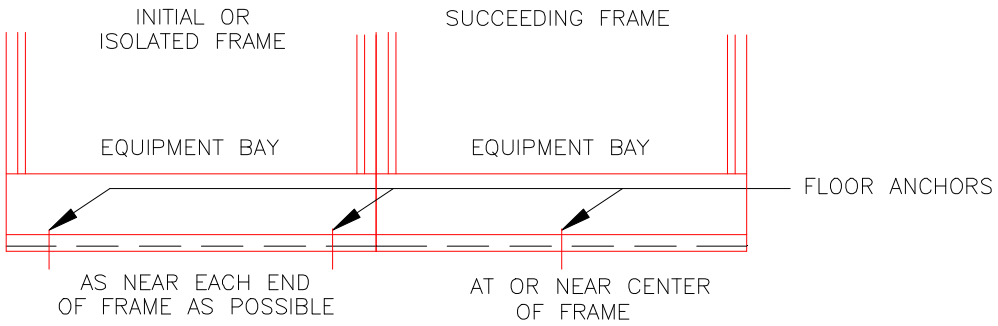


(FOR HIGH SEISMIC RISK AREAS)



FRAMES HAVING WIDE FLOOR ANGLES

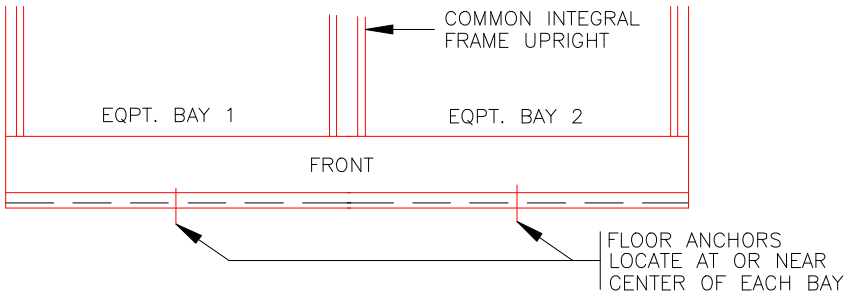
Fig. 6A



ISOLATED SHEET METAL BASED FRAMES
HAVING A SINGLE EQUIPMENT BAY

(Low Seismic Risk Areas)

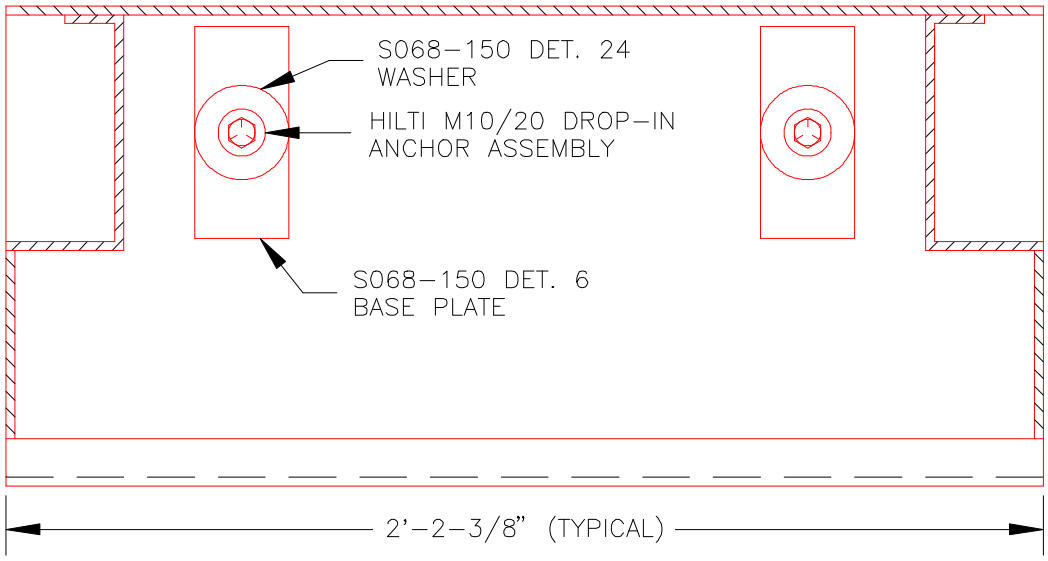
Fig. 6B



SHEET METAL BASED FRAMES HAVING MULTIPLE EQUIPMENT BAYS

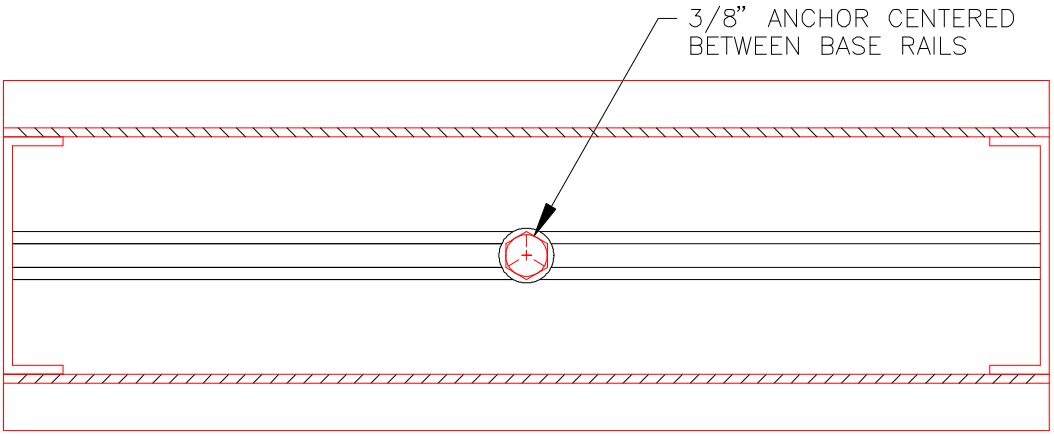
(Low Seismic Risk Areas)

Fig. 6C



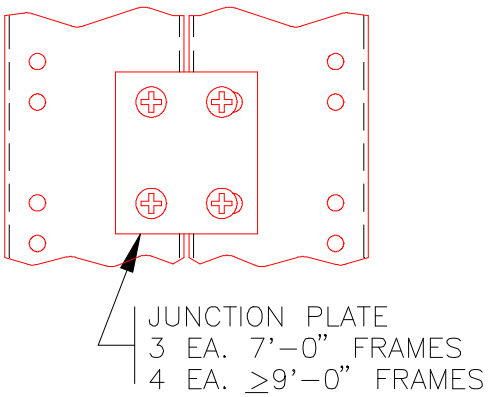
NON-SEISMIC FRAMEWORK CONSTRUCTION
(FRAME BASE HAS FIXED LOCATIONS FOR 3/8" ANCHORS)

Fig. 7A



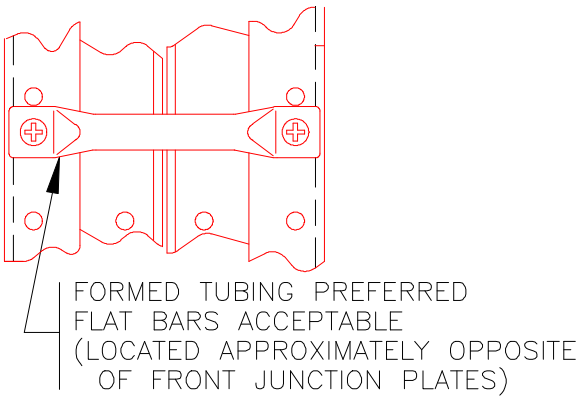
CROSSBAR OR DUCT TYPE FRAMES

Fig. 7B



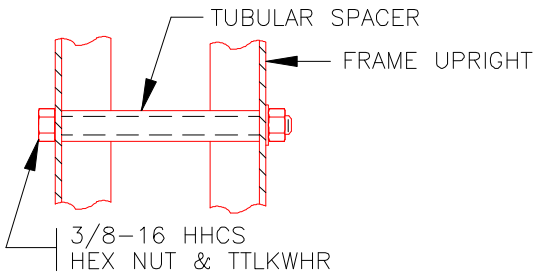
JUNCTIONING FRONT
OF FRAME UPRIGHTS

(A)

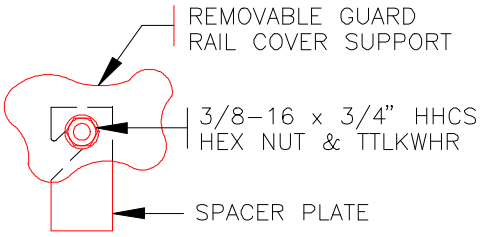


JUNCTIONING REAR
OF FRAME UPRIGHTS

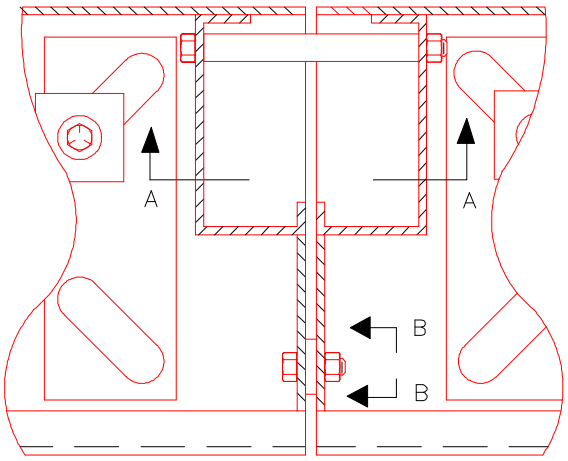
(B)



SECT. A – A



VIEW B – B

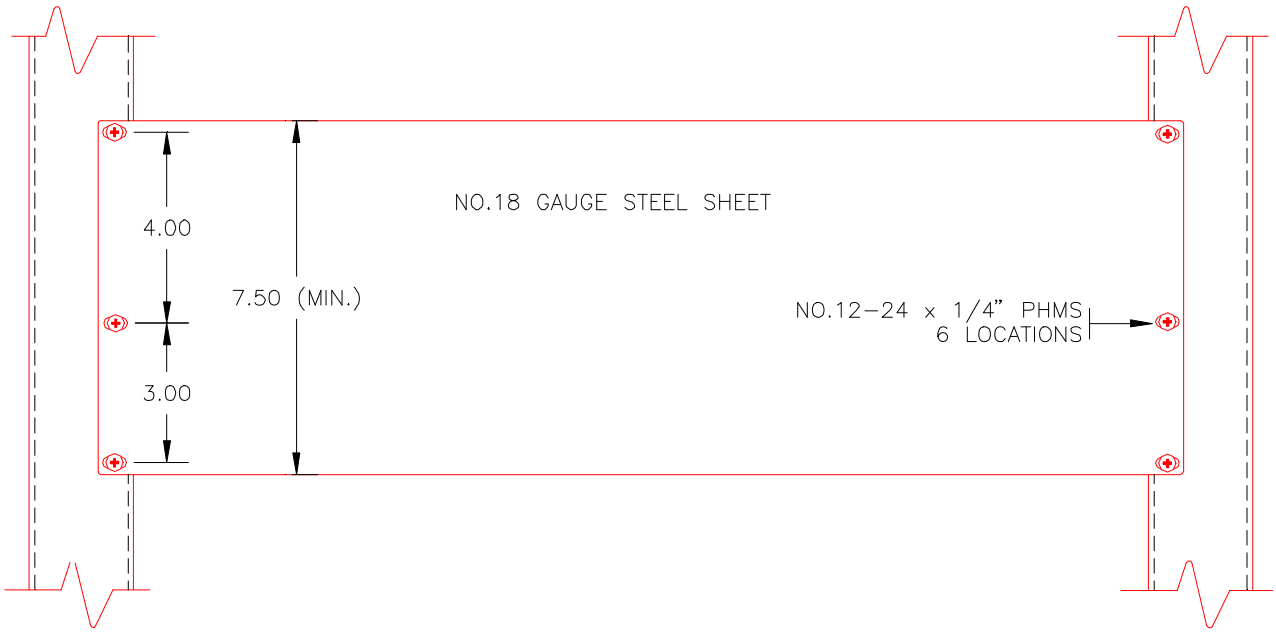


JUNCTIONING FRAME BASES (PLAN VIEW)
(FRAMES TALLER THAN 7'–0")

(C)

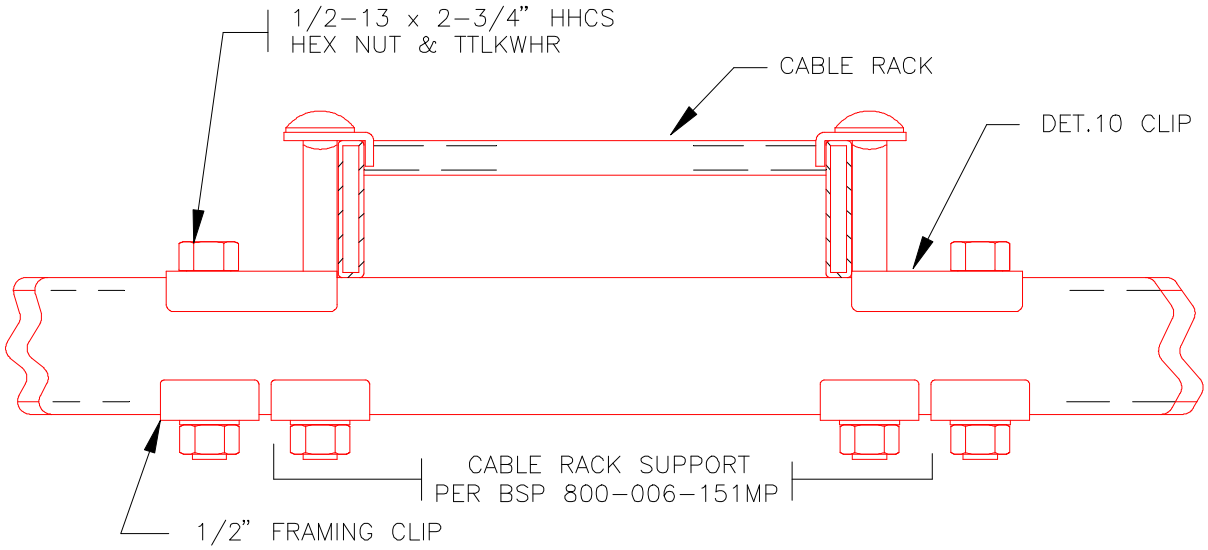
Typical Junctioning Of Framework Assemblies

Fig. 8



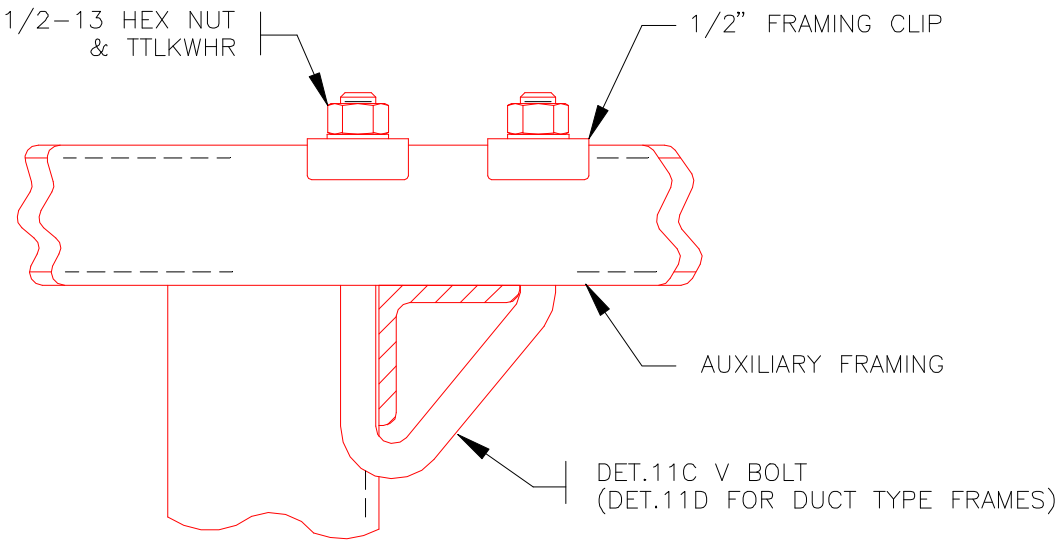
Application Of Stiffening Plates To Unequipped Space
In Equipment Frameworks and Frame Extenders

Fig. 9



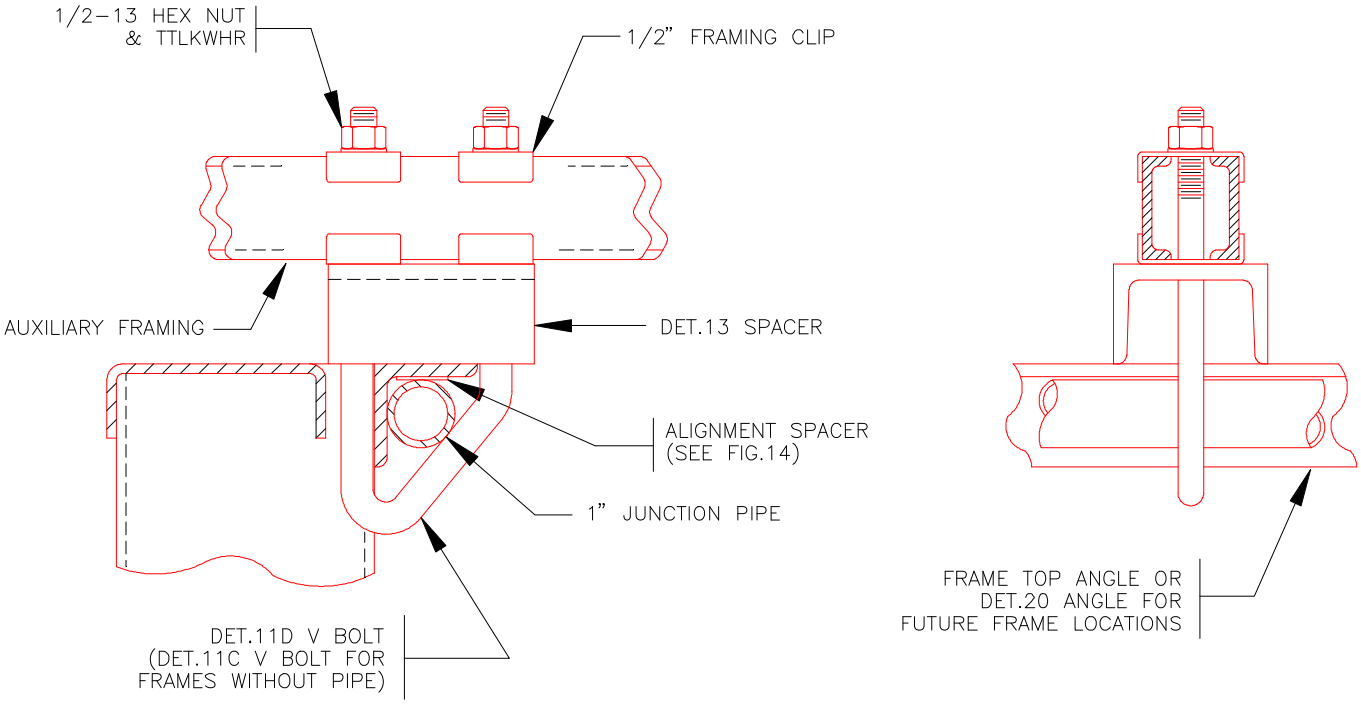
Anti-Slip Fastening For Cable Racks When
Short Channels Are Used For Frame Top Supports

Fig. 10



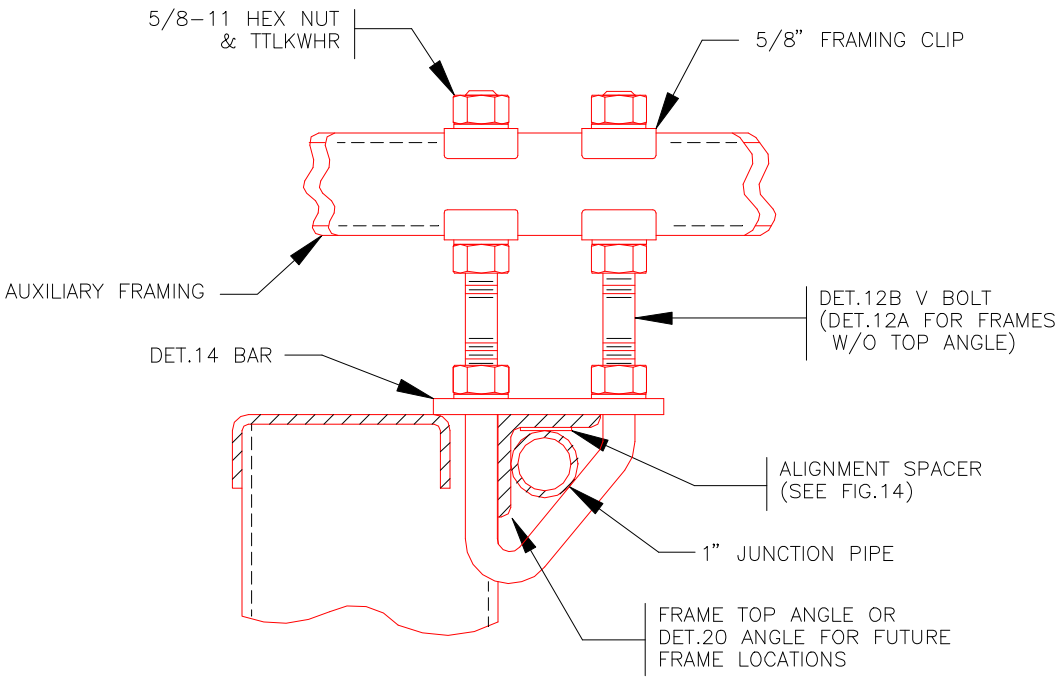
Top Support Of Frame With Single Top Angle
Auxiliary Framing At Frame Height

Fig. 11A



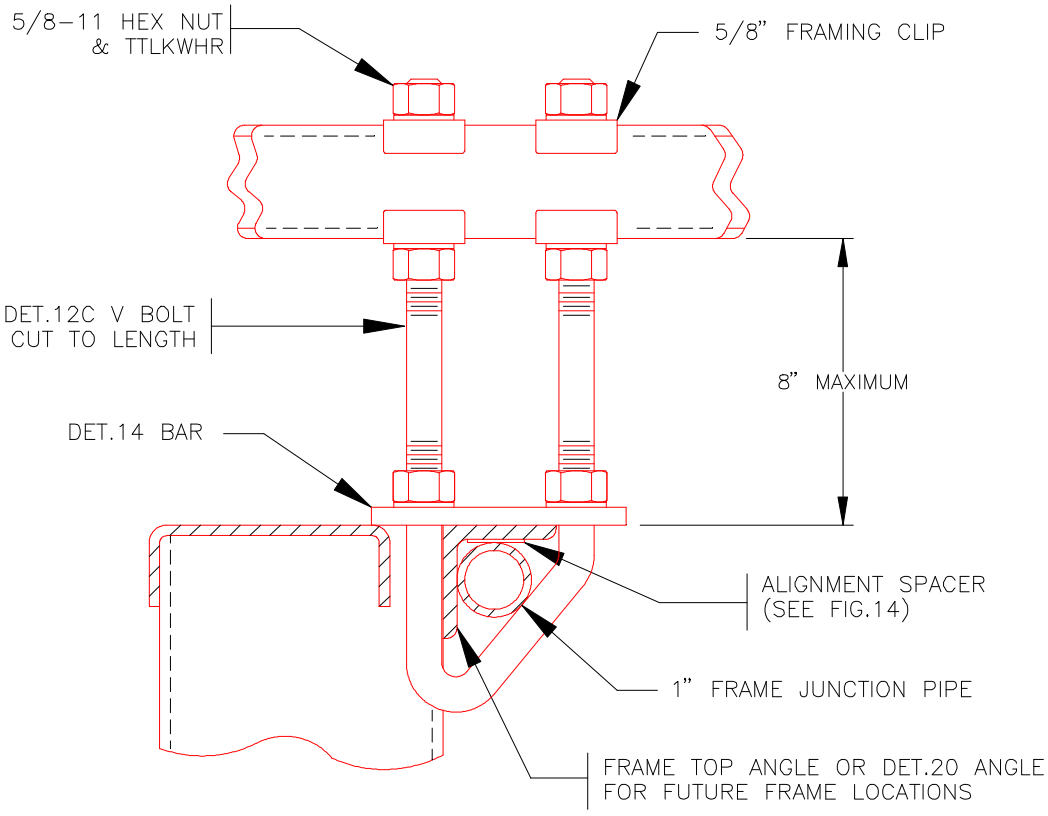
Top Support Of Frames With Single Top Angle
Auxiliary Framing Raised 2 Inches Above Frame

Fig. 11B



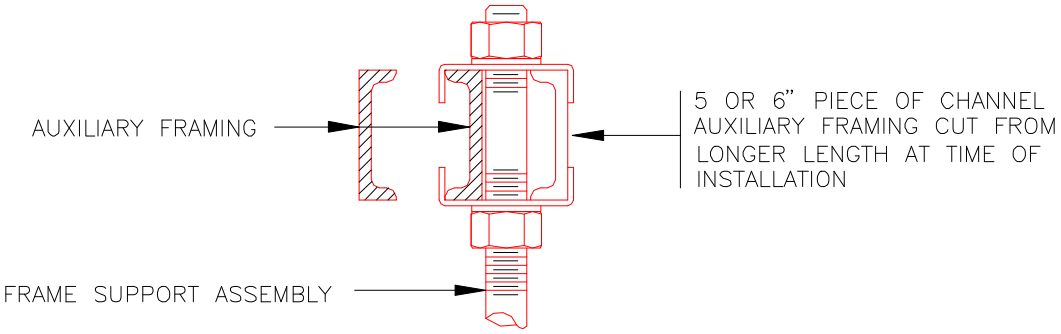
Top Support Of Frames With Single Top Angle
Auxiliary Framing Raised 3-1/2 inches Above Frame

Fig. 11C



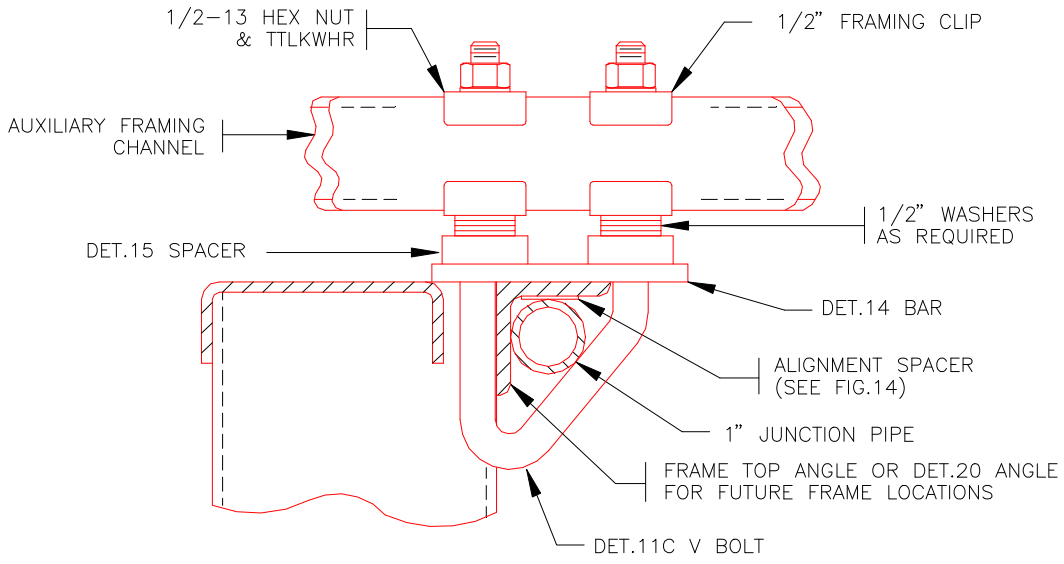
Top Support Of Frames With Single Top Angle
Auxiliary Framing Raised Between 3-1/2 and 8 Inches Above Frame

Fig. 11D



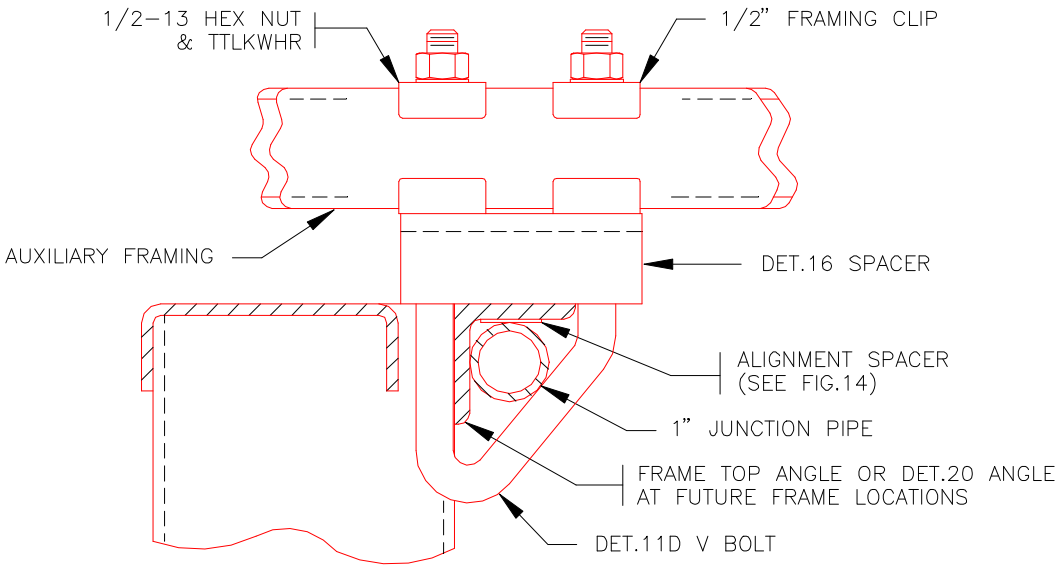
Arrangement Of Offset Top Support Assembly
Top Support Offset To Clear Frame Upright

Fig. 11E



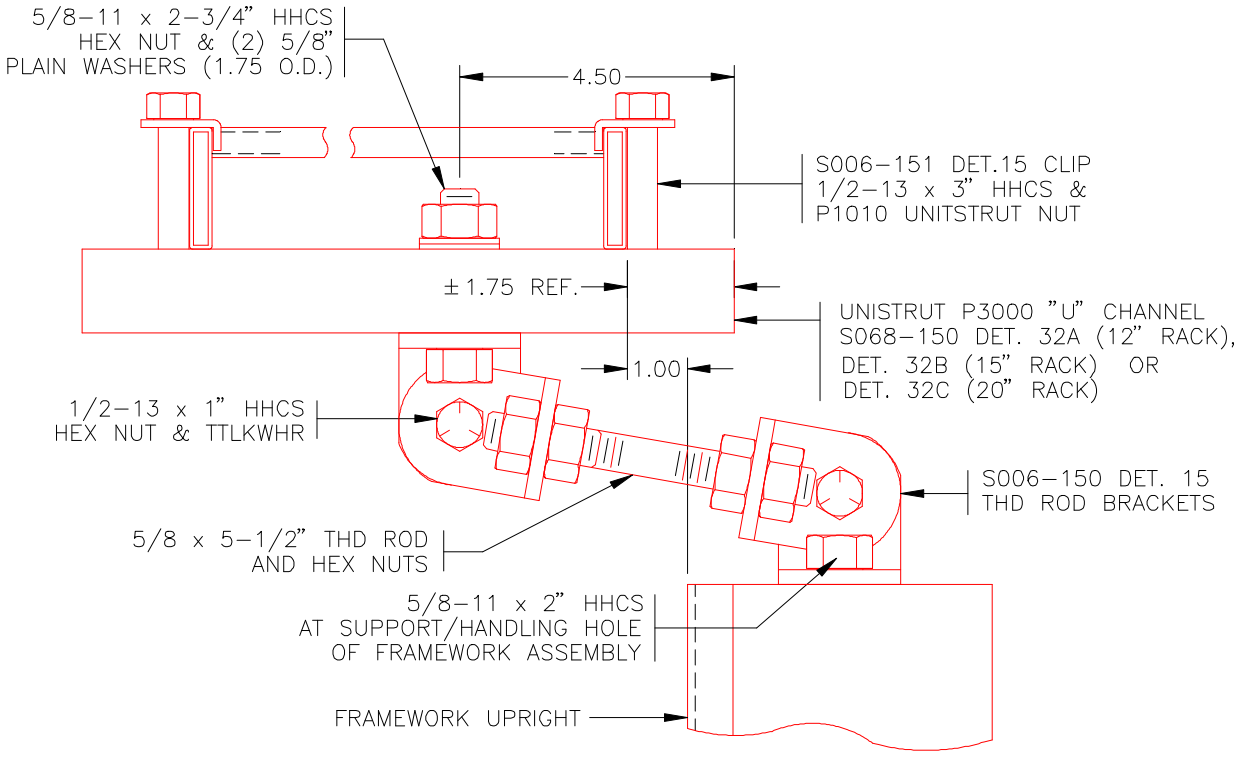
Top Support Of Frames With Single Top Angle
Auxiliary Framing Raised Less Than 1-1/2 Inches Above Frame

Fig. 11F



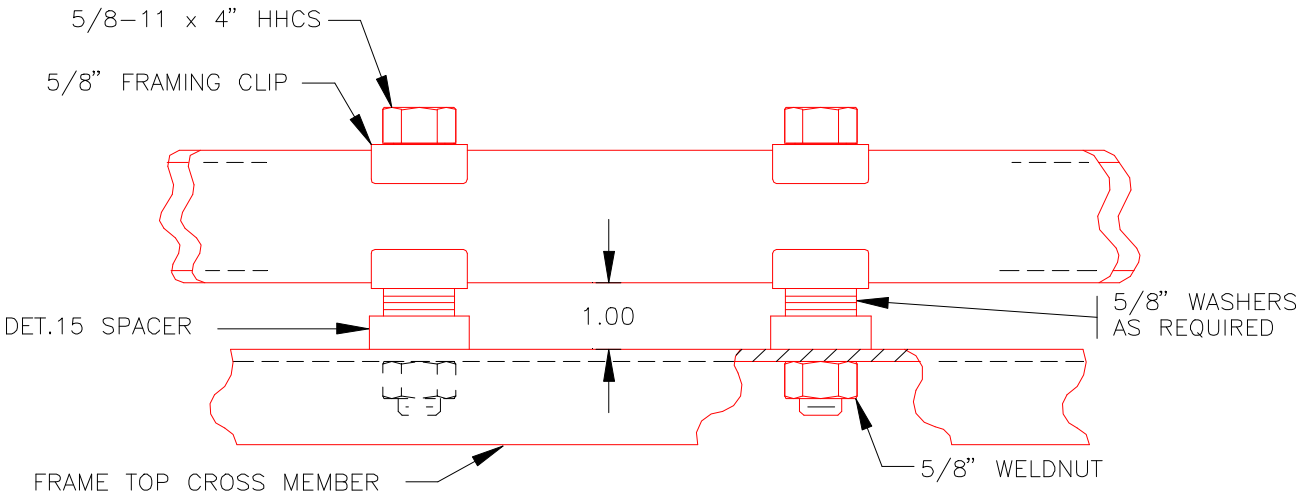
Top Support Of Frames With Single Top Angle
Auxiliary Framing Raised 1-1/2 Inches Above Frame

Fig. 11G



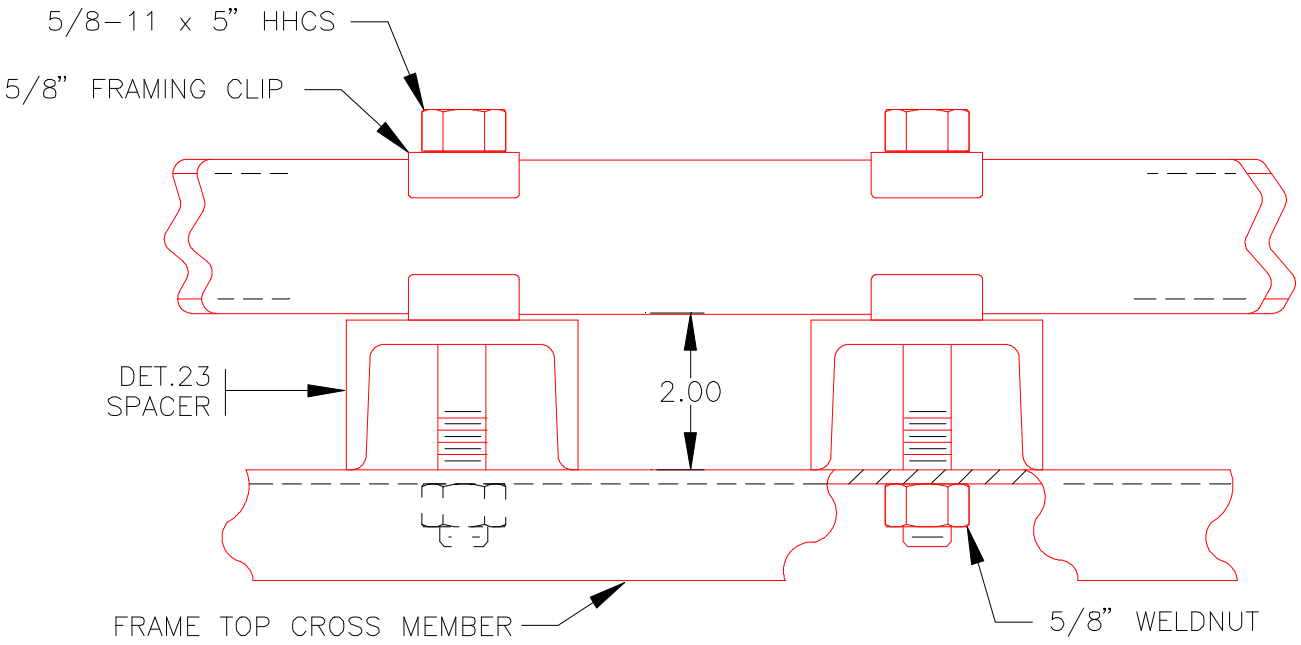
Generic Top Support Of Floor Supported Equipment Frames Without Top Angle

Fig. 12



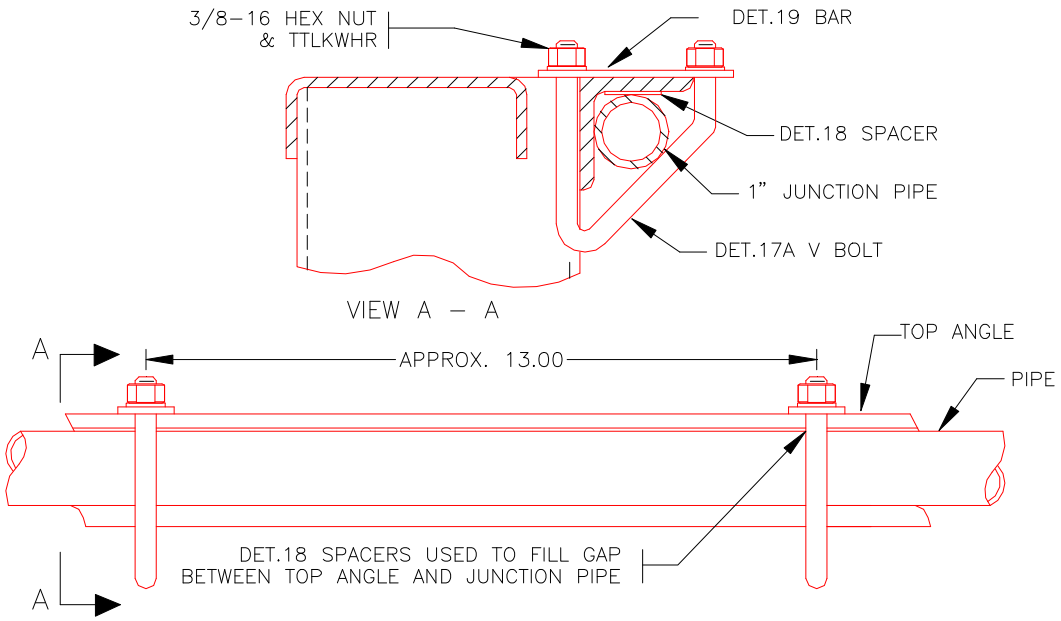
Top Support Of Radio Equipment Frameworks Without Top Angle
Primary Auxiliary Framing Raised 3 Inches Above Frame

Fig. 13A



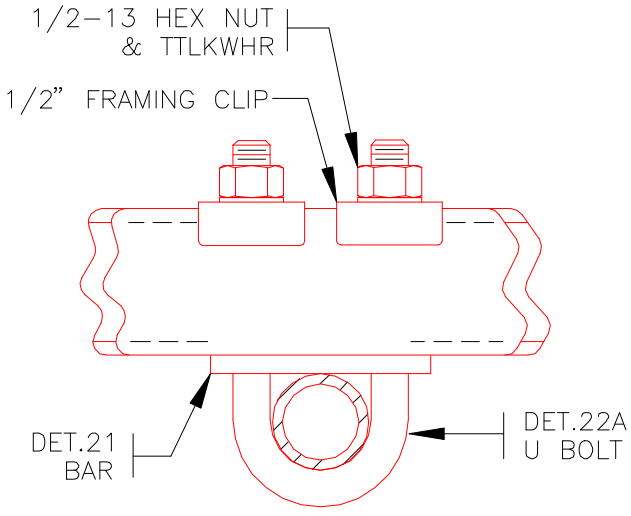
Top Support Of Radio Equipment Frames Without Top Angle
Primary Auxiliary Framing Raised 4 Inches Above Frame

Fig. 13B



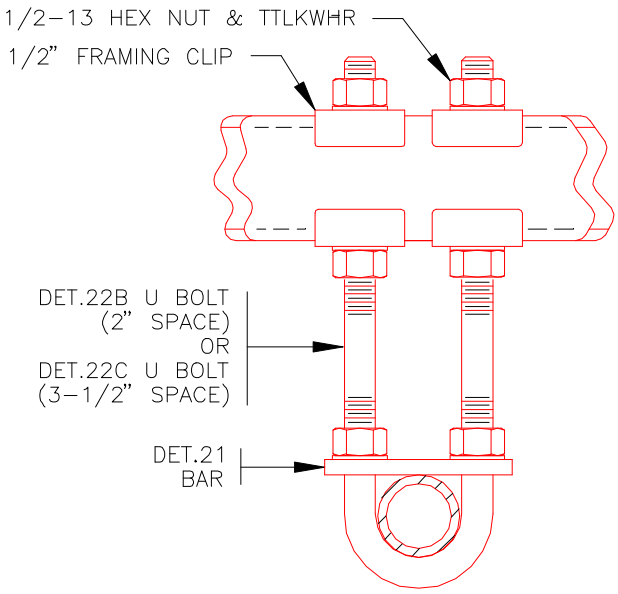
Fastening Of 1" Junction Pipes To Frame Top Angles

Fig. 14



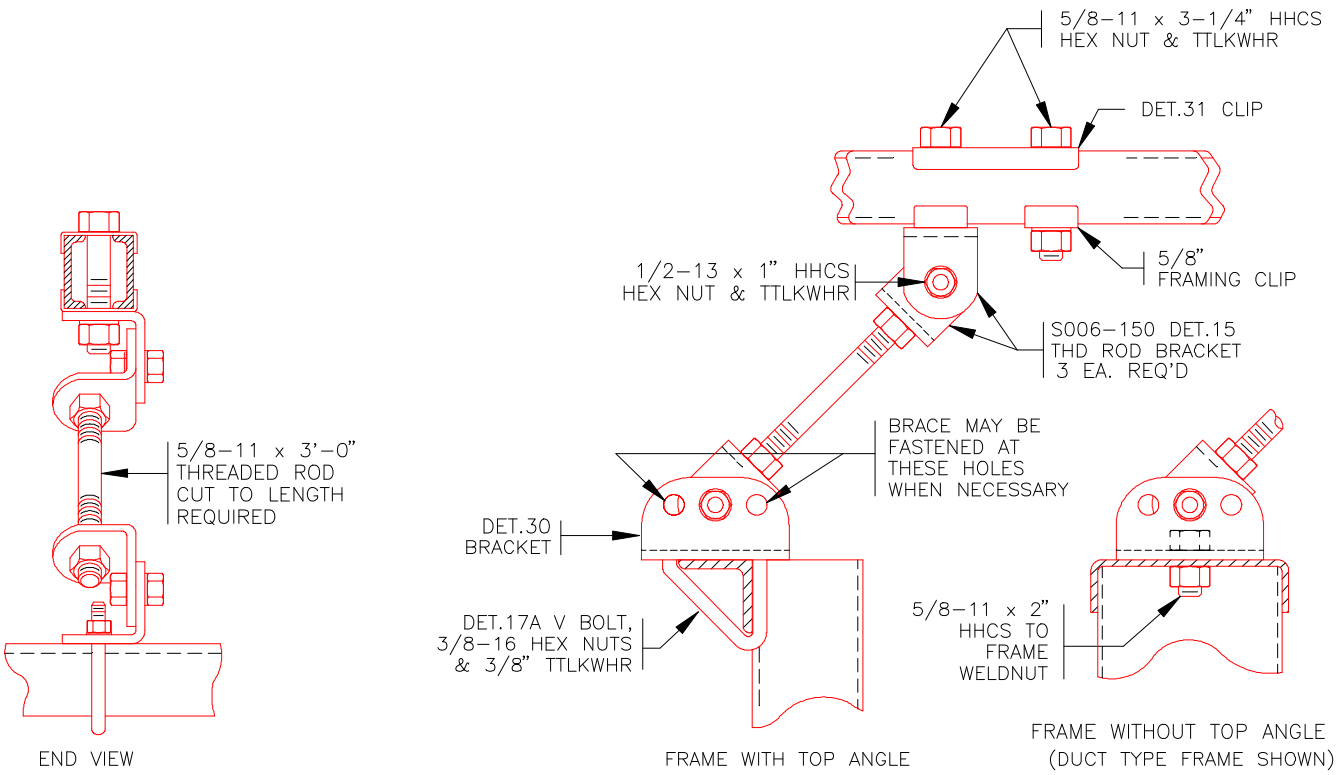
1" Pipe Support - Auxiliary Framing
Installed At Frame Height

Fig. 15A

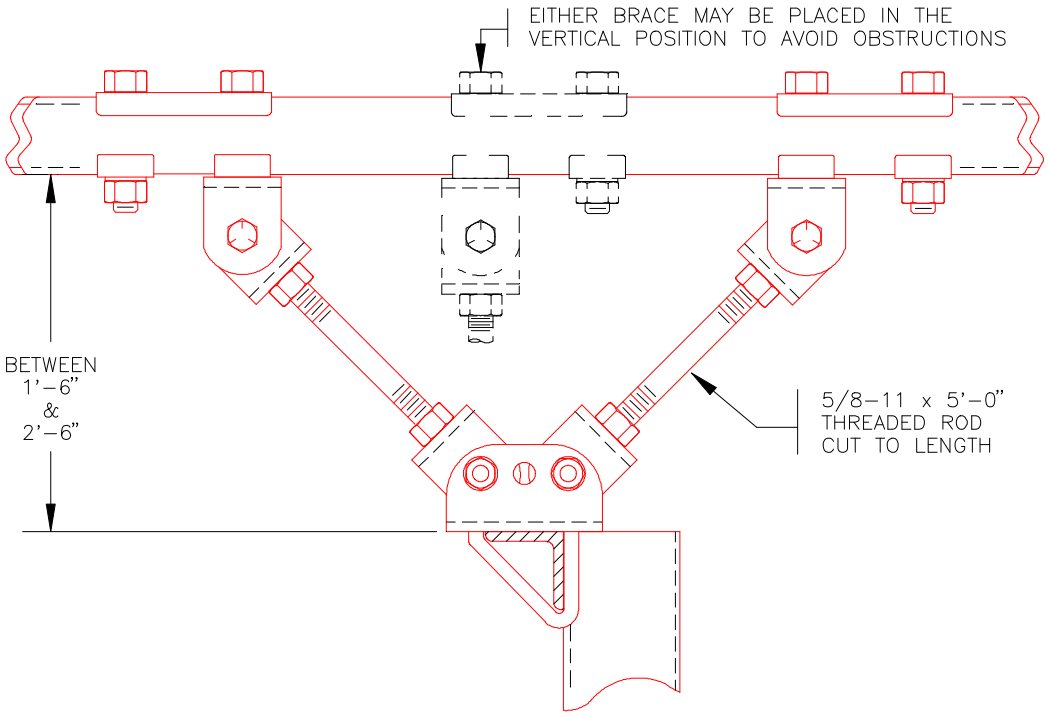


1" Pipe Support - Auxiliary Framing
Installed 2 To 3-1/2" Above Frame Height

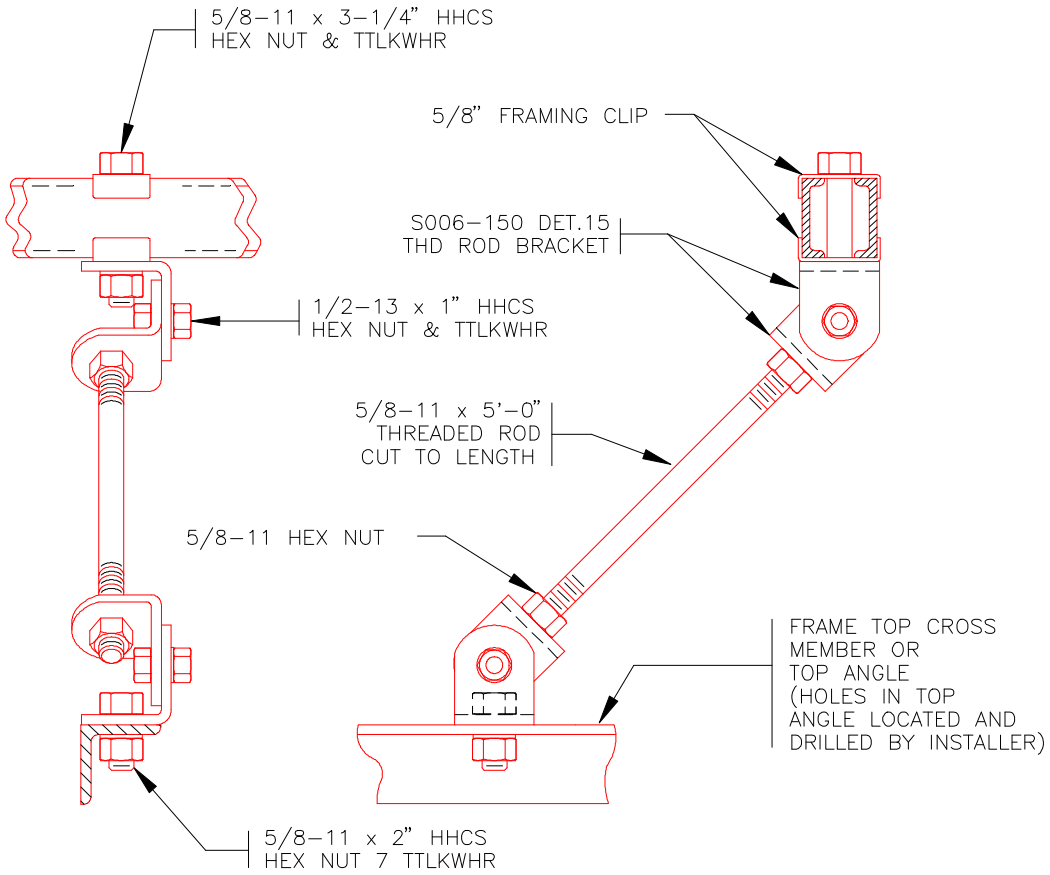
Fig. 15B



Frame Brace Support Of Equipment Frames
Auxiliary Framing 8" To 1'-6" Above Frame
Fig. 16



Frame Brace Support Of Equipment Frames
Auxiliary Framing Between 1'-6" And 2'-6" Above Frame
Fig. 17



End Brace Of Equipment Frames
Auxiliary Framing More Than 8" Above Frame

Fig. 18