



Submittal Review Response

Project Name: Hilo WWTP Rehabilitation and Replacement Project Phase 1
Submittal No.: 13120-001.0
Date: [Publish Date]

Client: County of Hawai'i Carollo Project No.: 203975
Contractor: Nan, Inc.
Submittal Name: Pre-Engineered Structures
Reviewed By: Engineering Partners

SUBMITTAL REVIEW

Review is for general compliance with contract documents. No responsibility is assumed by Carollo for correctness of quantities, dimensions, and details. No deviation or variation is approved unless specifically addressed in these review comments. Refer to Section 01330 for additional requirements. The Contractor shall assume full responsibility for coordination with all other trades and deviations from contract requirements.

Approved	<input type="checkbox"/> No Exceptions
	<input type="checkbox"/> Make Corrections Noted - See Comments
	<input type="checkbox"/> Make Corrections Noted - Confirm
Not Approved	<input checked="" type="checkbox"/> Correct and Resubmit
	<input type="checkbox"/> Rejected - See Remarks
Receipt Acknowledged	<input type="checkbox"/> Filed for Record
	<input type="checkbox"/> With Comments - Resubmit

Review Comments:

1. Refrain from using red for contractor mark ups. Red will be used by the Engineer to allow easier identification of contractor vs. Engineer comments.
2. Engineer's Review Stamp: Welding certificates shall comply with American Weld Society (AWS)
3. Page 5/110, Section 1.05.D: Shall comply with American Weld Society (AWS)
4. Page 22/110, Primary Framing and Bracing to be Hot-Dip Galvanized.
5. Page 24/110, G90 Will be provided for all Secondary Girts and Purlins
6. **Note:** Page 28/110, Owner to select Bronze or White frame



CONTRACTOR SUBMITTAL TRANSMITTAL FORM REV. A

Owner: County of Hawaii
Contractor: Nan, Inc.
Project Name: Hilo WWTP Phase 1
Submittal Title: PRE-ENGINEERED STRUCTURES
TO: County of Hawaii, DEM
From: Nan Inc.

Project No.: WW-4705R **Submittal Number:** 13120-001.0

Specification No. and Subject of Submittal / Equipment Supplier	
Spec: 13120	Paragraph: 1.05A, 1.05D, 1.05E, 1.05F, 1.06, 1.11
Authored By: ALEXANDER PACIFIC, Inc	Date Submitted: 07/30/2025

Submittal Certification	
Check Either (A) or (B): <p> <input checked="" type="checkbox"/> (A) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings with no exceptions. </p> <p> <input type="checkbox"/> (B) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings except for the deviations listed. </p>	
Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.	
General Contractor's Reviewer's Signature: Krishna Dubbudu	
Printed Name and Title: Krishna Dubbudu, Project Engineer	
In the event, Contractor believes the Submittal response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order.	
Firm:	Signature:
	Date Returned:

PM/CM Office Use	
Date Received GC to PM/CM: Date Received PM/CM to Reviewer: Date Received Reviewer to PM/CM: Date Sent PM/CM to GC:	

Nan, Inc

PROJECT: HILO WWTP REHABILITATION
AND REPLACEMENT PROJECT - PHASE 1

JOB NO. WW-4705R

THIS SUBMITTAL HAS BEEN CHECKED BY
THIS CONTRACTOR. IT IS CERTIFIED
CORRECT, COMPLETE, AND IN
COMPLIANCE WITH CONTRACT
DRAWINGS AND SPECIFICATIONS. ALL
AFFECTED CONTRACTORS AND
SUPPLIERS ARE AWARE OF, AND WILL
INTEGRATE THIS SUBMITTAL (UPON
APPROVAL) INTO THEIR OWN WORK.

DATE RECEIVED 7/31/2025
SPECIFICATION SECTION # 13120
SPECIFICATION PRE-ENGINEERED STRUCTURES
PARAGRAPH 1.05A, 1.05D, 1.05E, 1.05F, 1.06
DRAWING n/a
SUBCONTRACTOR n/a
SUPPLIER BlueScope Buildings
MANUFACTURER VP Buildings

CERTIFIED BY CQCM or Designee : 

NEW SECTION

SECTION 13120^{AD3}

PRE-ENGINEERED STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

This Section includes metal building systems that consist of integrated sets of mutually dependent components including structural steel main building frames and secondary framing including purlins and girts, columns, bracing, engineered and fabricated by the building system supplier.

1.02 RELATED SECTIONS

The work specified herein shall be coordinated with all other required work and their respective trades. The following Sections cover work specifically related to this Section:

- A. 03300 - CAST-IN- PLACE CONCRETE
- B. 07410 – PREFORMED METAL ROOFING
- C. 09910 - PAINTING (EXTERIOR & INTERIOR)

1.03 REFERENCES

- A. ASTM A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
- B. ASTM A36 – Specification for Carbon Structural Steel. ASTM A53 –Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- C. ASTM A53 – Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. ASTM A123 - ASTM A123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A153 – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- F. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- G. ASTM A490- Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- H. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- I. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- J. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.

- K. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- L. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- M. ASTM A992 - Standard Specification for Structural Steel Shapes.
- N. ASTM F594 - Standard Specification for Stainless Steel Nuts.
- O. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- P. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- Q. AWS D1.1 – Structural Welding Code – Steel.
- R. AWS D1.8 – Structural Welding Code – Seismic Supplement.
- S. AWS A2.0 - Standard Welding Symbols.
- T. AISI - Specification for the Design of Cold-Formed Steel Structural Members - 1986 Edition with 1989 Addendum.
- U. “Specification for Design, Fabrication, and Erection of Structural Steel for Buildings” of the American Institute of Steel Construction.
- V. ASTM A570-92 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
- W. ASTM E1514-93 - Specification for Structural Standing Seam Steel Roof Panel Systems.
- X. MBMA Low Rise Building Systems Manual - 1996 Edition.
- Y. SSPC (Steel Structures Painting Council) - SP-2-89 - Specification for Hand Tool Cleaning.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity and all other loads and forces prescribed by the 2018 International Building Code, and as described in the Contract Documents. Members shall withstand:
 - 1. Building System dead loads (in addition to self weight of building components and roofing/siding):
 - a. Roof: 3 psf for ceiling, 2 psf for MEP (5 psf total)
 - 2. Roof Live load of 20-psf without tributary area load reduction.
 - 3. Mezzanine Floor Live load of 50-psf without tributary area load reduction.

4. Exterior stairs Live load of 100-psf.
5. Collateral load, in addition to self weight of building materials, of 3-psf.
6. Basic Wind load of 120 mph, B Exposure, enclosed building.
 - a. Effective Windspeed (ASD) 93 mph, Kzt = 1.0
 - b. Kzt = 1.0
7. Framing:
 - a. Type: Clear span rigid frame pinned at the base.
 - 1) Primary Framing: Rigid frame of rafter beams and columns, end wall columns and portal frames.
 - 2) Secondary Framing: Purlins, girts, eave struts, flange bracing, canopy outriggers and other items detailed on the Drawings or referenced herein the Project Manual.
 - 3) Lateral Bracing: Horizontal loads not resisted by main frame action shall be resisted by portal frames, collector beams and rods in the roof.
- B. Seismic Performance: Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to the building code, and as described in the Contract Documents.
 1. Seismic Occupancy Category II, Site Class D, Seismic Design Category D, (Sds = 1.20, Sd1 = 0.68).
- C. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Assembly to permit movement when subject to temperature range of 40 to 100 degrees F.
- D. Roof Drainage: System to withstand rainfall intensity of 12-inches per hour with 15-minute duration. Size roof drainage systems per SMACNA manual.
 1. Roof Slope: As indicated on the Drawings.
- E. Bay Spacing: As indicated on the Drawings.
- F. Clear Opening Height: As indicated on the Drawings.
- G. Deflection requirements shall be in accordance with the applicable provisions of the AISC Steel Design Guide Series 3 – Serviceability Design Considerations for Low-Rise Buildings. Maximum lateral deflection shall be H/60.
- H. All loads shall be proportioned and applied in accordance with MBMA Low Rise Building Systems Manual and the 2018 International Building Code.

1.05 SUBMITTALS

- A. Product Data: For all metal building system components.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 1. For installed products indicated to comply with design loads and forces, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Hawaii, responsible for their preparation.
 2. Anchor-Bolt Plans: Prior to fabrication submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate column reactions, welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 5. Structural steel drawings shall be stamped with original signature for use in obtaining the building permit for this project.
 6. Fabrication and Quality Control Procedures: Manufacturer to submit detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and fabricator's ability to conform to approved construction documents and referenced standards for review.
- C. Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in the State of Hawaii. Include the following:
 1. Name and location of Project.
 2. Order number.
 3. Name of manufacturer.
 4. Name of Contractor.
 5. Building dimensions including width, length, height, and roof slope.
 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 7. Governing building code and year of edition.

8. Design loads and load combinations.
 9. Building-use category.
10. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
- D. Welding certificates.
- E. Erector Certificate: Signed by manufacturer certifying that erector complies with requirements.
- F. Manufacturer certificate.
- G. Fabrication shall proceed based only on approved anchor bolt plan and building shop drawings.

1.06 QUALITY ASSURANCE

- A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- B. Manufacturer Qualifications: A qualified manufacturer and member of MBMA with minimum of five years experience manufacturing similar steel building systems in the United States of America.
 1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by qualified professional engineer licensed in the State of Hawaii.
 3. Fabrication: Fabricate structural steel members in accordance with MBMA Low Rise Building Systems Manual and, for items not covered, AISC Specification for Structural Steel for Buildings.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.

F. Fabricate structural steel members in accordance with MBMA Low Rise Building Systems Manual, and, for items not covered, AISC – Specification for Structural Steel for Buildings.

1.07 DELIVERY, STORAGE, AND HANDLING

Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other types of surface damage.

1.08 PROJECT CONDITIONS

Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.

1.09 COORDINATION

Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

1.10 FIELD MEASUREMENTS

Metal building contractor shall verify that field measurements are as indicated on the erection drawings.

1.11 WARRANTY

- A. Metal building manufacturer shall provide manufacturer's standard material warranty of one year from Project Acceptance. The warranty shall include but not be limited to warrant against corrosion of material.
- B. Metal building manufacturer shall provide a workmanship warranty of 5-years. The warranty shall include but not be limited to warrant against leaking from roofing, siding and flashing.
- C. The Surety shall not be liable for manufacturer's warranty beyond two years of the Final Contract Acceptance date.

1.12 ADMINISTRATION

- A. All nomenclature shall conform to the *MBMA Low Rise Building Systems Manual*.
- B. Coordination and administration of the work shall be in accordance with the *MBMA Low Rise Building Systems Manual – Common Industry Practices*.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Alliance Steel, Inc.
 2. American Buildings Company.
 3. American Steel Building Company, Inc.; Division of NCI Building Systems, LLP.
 4. Behlen Mfg. Co.
 5. Butler Manufacturing Company.
 6. Ceco Building Systems; Division of Robertson-Ceco Corporation.
 7. Crown Metal Buildings, Inc.
 8. Garco Building Systems.
 9. Gulf States Manufacturers, Inc.
 10. Mesco Metal Buildings; Division of NCI Building Systems, LLP.
 11. Metallic Metal Building Company; Division of NCI Building Systems, LLP.
 12. Package Industries, Inc.
 13. Southern Structures, Inc.
 14. Spirco Manufacturing; Division of Metal Building Products, Inc.
 15. Star Building Systems; Division of Robertson-Ceco Corporation.
 16. Steelex Systems Inc.
 17. United Structures of America, Inc.
 18. VP Buildings, Inc.; a United Dominion Company.

2.02 STRUCTURAL- FRAMING MATERIALS

- A. W-Shapes: ASTM A 992; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55.
- B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55.
- C. Plate and Bar: ASTM A 36; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55.

- D. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
- F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011, Structural Steel (SS), Grades 30 through 55, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.
- G. Metallic-Coated Steel Sheet: ASTM A 653, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G60 (Z180) coating designation; mill phosphatized.
- H. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating.
- I. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
 - 1. Finish: Plain.
- J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain.
 - 2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with splined ends.
 - a. Finish: Plain.
- K. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
- L. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 hex carbon steel.
 - 3. Plate Washers: ASTM A 36 carbon steel.
 - 4. Washers: ASTM F 436 hardened carbon steel.

5. Finish: Plain.
- M. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 1. Nuts: ASTM A 563 hex carbon steel.
 2. Plate Washers: ASTM A 36 carbon steel.
 3. Washers: ASTM F 43 hardened carbon steel.
 4. Finish: Plain
- N. Threaded Rods: ASTM A 36
 1. Nuts: ASTM A 563 (ASTM A 563M) [heavy] hex carbon steel.
 2. Washers: ASTM A 36 carbon steel.
 3. Finish: Plain
- O. Primer: SSPC-Paint 15, Type I, red oxide.

2.03 FABRICATION, GENERAL

Tolerances: *Comply with MBMA Metal Building Systems Manual: Chapter IV, Section 9, Fabrication and Erection Tolerances.*

2.04 STRUCTURAL FRAMING

- A. General:
 1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 - a. Make shop connections by welding or by using high-strength bolts.
 - b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
 - c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 - d. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.
 2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

- a. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary structural members with specified primer after fabrication.
- B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing. Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - 1. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 - 2. Frame Configuration: As indicated on drawings.
 - 3. Exterior Column Type: As indicated on drawings.
 - 4. Rafter Type: As indicated on drawings.
- C. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
 - 1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates.
 - 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598-inch; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- D. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet pre-painted with G90 galvanized coating or higher and painted, unless otherwise indicated, to comply with the following:
 - 1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch-wide flanges.
 - a. Depth: 8-inches.
 - b. Spacing: 4-foot on center maximum.
 - 2. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch-wide flanges.
 - a. Depth: 8-inches.
 - b. Spacing: 4-foot on center maximum.

3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for metal panels.
 4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
 5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
 6. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
 7. Purlin and Girt Clips: Minimum 0.0598-inch- thick, steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
 8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch- thick, zinc-coated (galvanized) steel sheet.
 9. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
 10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- E. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 (345); or ASTM A 529/A 529M, Grade 50 (345); minimum 1/2-inch-diameter steel; threaded a minimum of 6-inches at each end.
 2. Horizontal loads not resisted by main frame action shall be resisted by rods in the sidewalls and rods in the roof. Rod connections shall NOT punch through webs of columns/rafters. Rod connections to be clevis type with gusset plate welded to columns/rafters. Lateral bracing system shall be 100-percent redundant. For example, if two rows of bracing are used each set of braces shall be designed using 100-percent total lateral load. If three rows of bracing are used each set of braces shall be designed using 67-percent total lateral load. If four rows of bracing are used each set of braces shall be designed using 50-percent total lateral load.
- F. Bolts: Provide plain finish bolts for structural-framing components that are prime painted or finish painted. Provide hot-dipped galvanized bolts for structural framing components that are galvanized.
- G. Factory-Primed Finish: Apply specified primer immediately after cleaning and pretreating.
1. Prime primary, secondary, and end-wall structural-framing members to a minimum dry film thickness of 1.5-mil.

- a. Prime secondary steel framing formed from uncoated steel sheet to a minimum dry film thickness of 1.5-mil on each side.
2. Prime galvanized members with specified primer, after phosphoric acid pretreatment.

2.05 METAL ROOF PANELS

Roofing panel standards and requirements shall be as described in Division 7.

2.06 SHEET METAL FLASHING AND TRIM

Sheet metal flashing and trim standards and requirements shall be as described in Division 7.

2.10 ACCESSORIES

General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.01 EXAMINATION AND ERECTION

- A. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances. Verify Mechanical, Plumbing and Electrical utilities are in correct position.
- B. Provide access to the work as scheduled for Contracting Officer provided inspections, if required.
- C. Upon delivery, the structural steel framing members shall be washed and protected from the elements by storing them in a sheltered area or using protective covers. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- D. Do not store materials or structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
- E. Treat all rust and surface imperfections prior to installation.
- F. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection. The temporary guys, braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.

- G. Erect metal building system according to manufacturer's written erection instructions and erection drawings and in accordance with MBMA Low Rise Building Systems Manual – Common Industry Practices.
- H. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer licensed in the State of Hawaii. Approval shall describe the allowable cutting and/or alterations.
- I. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- J. Base Plates: Clean concrete and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor rods after supported members have been positioned and plumbed.
 - 3. Any gap between the designated bearing surface and base plates shall be filled with steel plates of required thickness matching the size of base plate and welded to base plate. Grouting to fill gaps shall not be used at base plates.
- K. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure.
- L. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level base plates to a true even plane with full bearing to supporting structures, set with anchor bolts.
 - 1. Make field connections using high-strength bolts installed according to *RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts* for type of bolt and snug-tightened or pre-tensioned joints.
- M. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.
 - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - 2. Locate and space wall girts to suit openings such as doors and windows.
 - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

- N. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
 - 1. Tighten rod bracing to avoid sag.
 - 2. Locate interior end-bay bracing only where indicated.
- O. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- P. Erection Tolerances: Maintain erection tolerances of structural framing in accordance with *MBMA Low Rise Building Systems Manual – Common Industry Practices*.
- Q. After erection, prime welds, abrasions, and surfaces not galvanized.

3.02 ACCESSORY INSTALLATION

General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with preformed metal roofing and sheet metal flashings and other components described in *Division 07 Sections*.

3.09 CLEANING AND SHOP PRIMING

- A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
 1. *SSPC-SP 2 Hand Tool Cleaning*.
 2. *SSPC-SP 3 Power Tool Cleaning*.
 3. *SSPC-SP 5 White Metal Blast Cleaning*.
 4. *SSPC-SP 6 Commercial Blast Cleaning*.
 5. *SSPC-SP 7 Brush-Off Blast Cleaning*.
 6. *SSPC-SP 8 Pickling*.
 7. *SSPC-SP 10 Near-White Blast Cleaning*.
 8. *SSPC-SP 11 Power Tool Cleaning to Bare Metal*.
- B. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply 2-coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

- C. Painting: Apply a 1-coat, non-asphaltic primer complying with *SSPC Painting System Guide No. 7* to provide a dry film thickness of not less than 1.5 mils. In addition, apply finish painting system as specified under *Division 09 – PAINTING*.

3.10 FIELD QUALITY CONTROL

Special Inspector: Owner will engage a qualified special inspector to perform Special Inspections, as may be required, and to submit reports.

3.11 FIELD TOUCH-UP, CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After erection, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates and accessories.
1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
 3. Remove weld splatters, loose weld slag and other deleterious material with wire brush and other methods. Apply paint conforming to ASTM A 780 to welded and abraded galvanized areas, in conformance with manufacturer's instructions.
 4. Abraded, burned or otherwise damaged shop coats shall be touched and/or refinished with the applicable shop coating noted above. After installation, paint connections and other areas where shop coat was omitted.
 5. Paint shall be applied with a hand brush, thoroughly worked into all joints, corners and open spaces and well brushed over the surfaces. Paint shall not be applied to wet or damp surfaces and shall be dry when the material is loaded for delivery to the work.

3.12 CORROSION PROTECTION

- A. Where metals are incompatible to other materials, the contact areas of these materials shall be back coated before erection with an approved bituminous paint or other insulation coating as recommended by the fabricator.
- B. After erection, all work shall be adequately protected against damage from grindings, polishing, cement or other harmful materials.

END OF SECTION

^{AD3} Addendum No. 3 - June 2024



91-1210 Kaikohola Street
Ewa Beach, HI 96706
(808) 445-8226

LETTER OF TRANSMITTAL

Date	Job No.
7/29/2025	WW-4705R

DLA Relocation B393 Outdoor Storage

To: Nan, Inc.	TRANSMITTAL No: 03
Jyun-Cheng Jhuo, Project Engineer	RE: Pre-Engineered Structures

WE ARE SENDING YOU ATTACHED UNDER SEPARATE COVER VIA _____
THE FOLLOWING ITEMS

SHOP DRAWINGS PRINTS COPY OF LETTER SAMPLES SPECIFICATIONS
 CHANGE ORDER PLANS OTHER _____

Item	Spec	Copies	DESCRIPTION
1	13120	pdf	Manufacturer's Product Data
2	13120	pdf	Installation Instructions
3	13120	pdf	Quality Control Procedures
4	13120	pdf	Manufacturer Certificate
5	13120	pdf	Sample Warranty

REASON FOR TRANSMITTAL, CHECKED BELOW:

FOR APPROVAL APPROVED AS SUBMITTED RESUBMIT COPIES FOR APPROVAL
 FOR YOUR USE RETURNED FOR CORRECTIONS SUBMIT COPIES FOR DISTRIBUTION
 AS REQUESTED FOR REVIEW AND COMMENT RETURN CORRECTED PRINTS
 APPROVED AS NOTED PRINTS RETURNED AFTER LOAN TO US
 FOR BIDS DUE ----> / /

REMARKS

Copy to:

Signed:

Hilo Wastewater Treatment Plant (WWTP)
Rehabilitation and Replacement Project, Phase 1
Waiakea, Hilo, Hawaii
County and State of Hawaii Job No. WW-4705R

Section 13120

Pre-Engineered Structures

SUBMITTAL PACKAGE CONTENTS

Manufacturer Product Data – Structural Frames
Manufacturer Product Data – Secondary Framing
Manufacturer Product Data - Windows
Installation Instructions
Fabrication Quality Control Procedures
Manufacturer Certificates - VARIATION
Sample Warranty

Manufacturer Product Data – Structural Frames

FRAMING SOLUTIONS

PRIMARY FRAMING SOLUTIONS

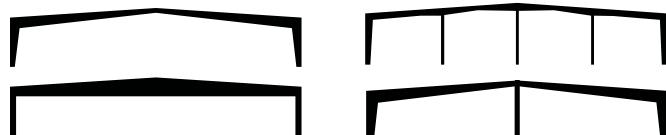
VP frames are custom-designed for your project. All frames can be specified to support load and code requirements as well as for use with non-load-bearing conventional walls.

Primary Framing and Bracing to be Hot-Dip Galvanized

Features

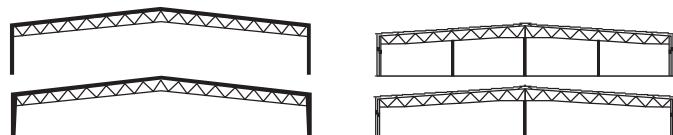
Primary framing solutions come in multiple configurations to meet stringent requirements.

- **Rigid Frame:** Economical, column free space
- **Continuous Beam:** Greatest space at lowest cost
- **Truss Beam:** Open web, unobstructed, column free interior space
- **Continuous Truss:** Open web design offering construction



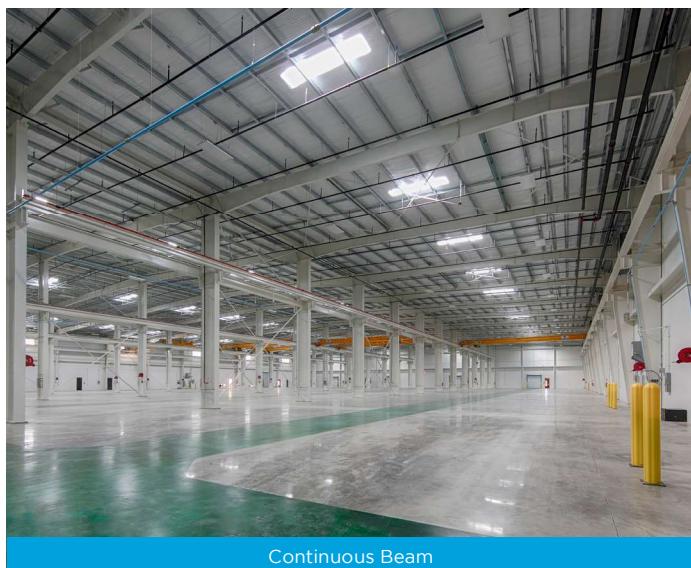
Rigid Frame

Continuous Beam



Truss Beam

Continuous Truss



Benefits

- **Rigid Frame:** Straight, tapered, reverse taper or supermarket column options. Variable ridge and sidewall column locations.
- **Continuous Beam:** Allows total flexibility in locating interior columns. Enables any eave height.
- **Truss Beam:** Open web design holds down construction costs through optimal material use and reduction of required building heights.
- **Continuous Truss:** HVAC ducts, wiring, sprinkler systems, and lighting can be incorporated through the trusses to maximize clearance beneath the rafter.



FRAMING SOLUTIONS THAT MEET YOUR REQUIREMENTS

Rigid Frame

- Frames can be designed for center ridge, off-center ridge or single slope.
- Roof pitch can be as low as 1/4:12.
- Rigid Frames allow for almost any variability in width and eave height.

Continuous Beam

- Frames can be designed for center ridge, off-center ridge or single slope.
- Roof pitch can be as low as 1/4:12.
- With Continuous Beam frames, virtually any width or eave height can be achieved.

Truss Beam

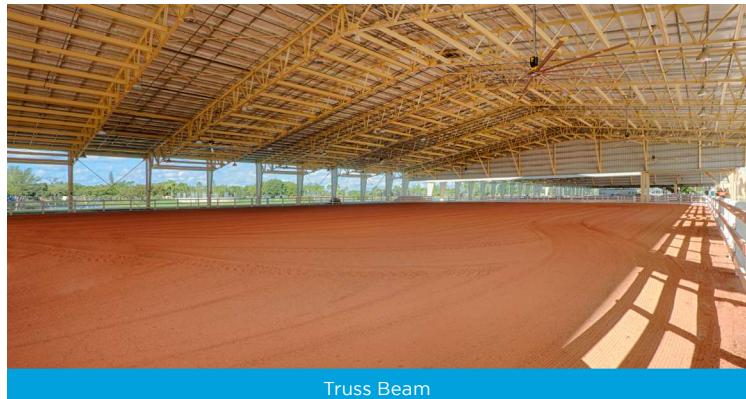
- Frames can be designed with tapered or straight columns and can have a pitched or straight bottom rafter.
- Roof pitch can be as low as 1/4:12.
- Truss Beam frames offer the most flexible width or eave height.

Continuous Truss

- Frames can be designed for center ridge, off-center or single slope.
- Roof pitch can be as low as 1/4:12.
- With Continuous Truss frames, virtually any width or eave height and interior clearance can be achieved.



Rigid Frame



Truss Beam

Ready to learn more about these primary framing solutions? Talk to your local Varco Pruden Builder today by visiting varcopruden.com/find-a-builder.

Manufacturer Product Data – Secondary Framing

FRAMING SOLUTIONS

SECONDARY FRAMING SOLUTIONS

Secondary framing members are roll-formed steel structural members which carry the various loads (i.e. live, wind, snow) to the primary framing system. VP offers a variety of secondary sizes, gauges and configurations, resulting in unmatched design flexibility and building economy.

Features

Secondary framing solutions come in multiple configurations to meet stringent requirements.

- **Cee & Zee Shaped Girts & Purlins:** VP's standard secondary structural members
- **WideBay™:** Greatest space at lowest cost
- **Transbay™ Bar Joist System:** Perfect with bay spacing with 40' or more



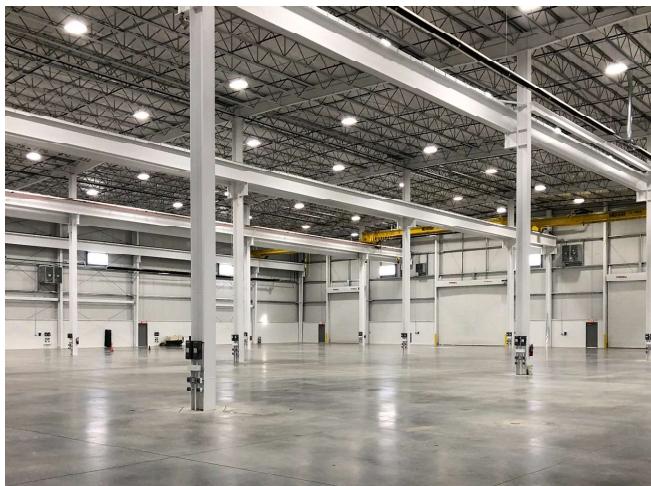
Cee & Zee Shaped
Girts & Purlins



WideBay



Transbay Bar
Joist System



WideBay

Benefits

- **Cee & Zee Shaped Girts & Purlins:** G-30 galvanized finish with acrylic coating standard on secondary members with pre-painted options available
- **WideBay:** An alternative to traditional bar joist. Allows flexibility in locating interior columns. Enables any eave height
- **Transbay Bar Joist System:** Allows ample bay spacing. Particularly appropriate in facilities with bay spacing from 40'.



FRAMING SOLUTIONS THAT MEET YOUR REQUIREMENTS

VP's Secondary Framing Systems include: Cee & Zee Shaped, WideBay™, and Transbay™ Bar Joist System.

Roof Purlins and Eave Struts carry the roof load. Purlins are Zee shaped for strength and available in 7", 8 ½", 10" and 11 ½" depths. These cold-formed members are manufactured from acrylic coated G-30 steel in a variety of thicknesses from .060 to .113. Typical purlin spacing is 5' on-center, across the width of the structure but may vary to accommodate specific project requirements. Eave struts provide the support for attachment along roof edge and sidewall conditions. VP eave struts are factory formed Cee members, shaped to accommodate the building roof slope and provide a solid surface for panel attachment.

Wall Girts are normally roll-formed in Cee or Zee shapes. These 7", 8 ½", 10" and 11 ½" members transfer the necessary wall loads to the primary structural members. Girts are attached to the columns with factory welded clips to ensure strength, fit and ease of erection.

WideBay secondary members offer a cost competitive option to bar joists for wide bay applications. Truss purlins are available in either 30", 34" or 40" depths and are factory punched for precise fit and easier installation.

VP can incorporate Transbay into our building systems that helps you achieve uninterrupted, column free space and is particularly appropriate in facilities with bay spacing in excess of 40'. Transbay is designed to accommodate any wind or roof load and can provide either single or double-sloped roofs with pitches beginning as low as ¼:12.



Cee & Zee Shaped Girts & Purlins



WideBay

Ready to learn more about these secondary framing solutions? Talk to your local Varco Pruden Builder today by visiting varcopruden.com/find-a-builder.

Manufacturer Product Data - Windows



ACCESSORIES

V A R C O P R U D E N B U I L D I N G S

WINDOW SOLUTIONS



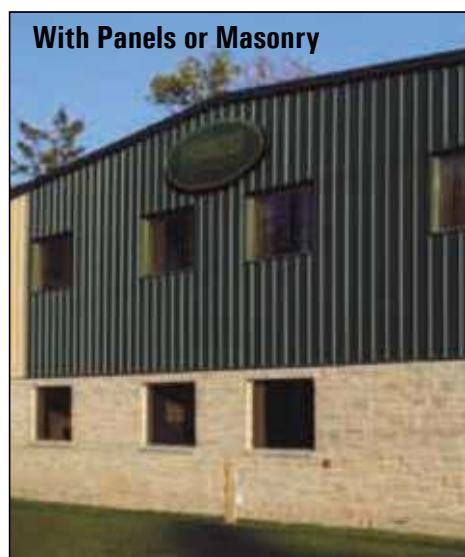
Architectural



Fixed



Horizontal Slider



With Panels or Masonry

FEATURES

- Simulated and tested thermal performance
- Standard options include Low-E glass, argon-filled, tints and subjams
- Choose non-thermal insulated glass or thermally-broken insulated glass
- Fins and accessories available for masonry, IPS and stucco

BENEFITS

- Provides improved thermal barrier for energy-efficiency and interior comfort
- Can be used with brick, block or masonry walls for architectural appeal
- Provides better U-factors or R-values to lower heating and cooling costs

WINDOW SOLUTIONS

See improved U-factors out of our windows

Varco Pruden now offers a complete line of thermally broken and non-thermal aluminum windows designed to work specifically for VP's building systems and are designed to fit with all types of wall panels. Low-E glass reduces the emissivity of the glass surface of a window and improves insulating properties. Low-E windows can significantly affect the overall heating, lighting and cooling costs of a building. Choose from:

- 2500 Series – A premium 2-1/2" thermally broken window available in slider, fixed, single-hung and projected configurations. This system is self-framing for regular, architectural and insulated foam wall panels. This product is available in multiple glazing options.
- C225 – One of the most cost-effective metal building products on the market; the C225 window series is a non-thermal aluminum window that is available in slider, fixed and single-hung configurations. Available options include interchangeable fins that allow for self-framing installation into most regular and architectural wall panels. Universal fins allow for installation into a framed opening with no additional flashing needed.
- Both window types and trim are available in standard white or bronze paint.

Owner Select Bronze or White Frame



Window Configuration		Center of Glass - CLR IG			Total Window* - CLR IG	
		U Factor	SHGC	VLT	U Factor	SHGC
XO Slider		0.502	0.763	81%	0.656	0.586
Fixed		0.502	0.763	81%	0.629	0.605
Projected		0.502	0.763	81%	0.641	0.610

Window Configuration		Center of Glass - BRZ IG			Total Window* - BRZ IG	
		U Factor	SHGC	VLT	U Factor	SHGC
XO Slider		0.502	0.629	61%	0.659	0.570
Fixed		0.502	0.629	61%	0.631	0.586
Projected		0.502	0.629	61%	0.642	0.561

Window Configuration		Center of Glass - CLR Low-E IG			Total Window* - CLR Low-E IG	
		U Factor	SHGC	VLT	U Factor	SHGC
XO Slider		0.290	0.281	54%	0.556	0.306
Fixed		0.290	0.281	54%	0.521	0.320
Projected		0.290	0.281	54%	0.508	0.302

Data was calculated using Windows 6.3 computer program with NFRC validated spectral data files.

* Data was calculated using DSB Clear and DSB Bronze insulated glass and DSB Clear Low-E Glass (Guardian Low-E 55/27 #2 surface)

* Total window results are an average of several common window sizes per configuration.



Varco Pruden Buildings, 3200 Players Club Circle, Memphis, TN 38125

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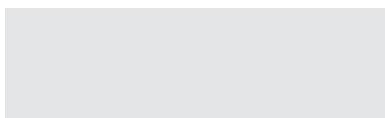
2084 Window Solutions
Issue Date: 2014
Revised: 7/16

COLORS AND FINISHES

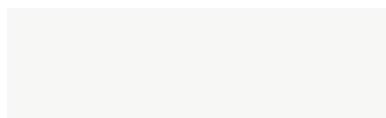
I STANDARD WALL, TRIM & ROOF COLORS

Varco Pruden uses high quality paint systems designed to provide long-term performance and protection. Each coating is formulated with thoroughly researched, tested and field proven pretreatments, primers, resins and pigments that can meet your design and performance requirements.

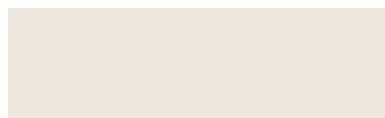
This paint system combines ceramic pigmentation with polyvinylidene fluoride for superior, long-lasting performance. PVDF finishes are respected for their durability, resistance and color retention. Our KXL finishes are warranted for up to 25 years.



Cool Arctic White



Cool Cotton White



Cool Egyptian White



Cool Sierra Tan



Cool Granite Gray



Cool Zinc Gray



Cool Straw Gold



Cool Dark Bronze



Cool Colonial Red



Cool Hemlock Green



Cool Leaf Green



Cool Bermuda Green



Cool Cobalt Blue



Cool Imperial Blue



Cool Ebony (trim only)



Acrylic Coated Galvalume®*

Colors printed on this page may not exactly match actual panel colors. Please request panel swatches for true color match.

Wall panel colors for Panel Rib, RPR, Tech Four & Vee Rib. Roof panel colors for Panel Rib Roof, SSR and 26 & 24 ga. Deck-Liner. Deck-Liner panel colors are limited to 24 & 26 ga. 22 & 28 ga. Deck-Liner is available in Polyester Interior White only. Panel Rib Panel Liner is available in SMP Cool Cotton White only.

*Acrylic Coated Galvalume® is an option for SSR, Panel Rib Roof or Wall & Deck-Liner.

LONG-TERM BEAUTY, UNMATCHED PROTECTION, COOL COLOR PERFORMANCE AND SUPERIOR QUALITY.

70% PVDF finishes meet both Kynar 500® and Hylar 5000® specifications. All colors shown approximate actual paint colors as accurately as possible. Actual paint colors may vary. Colors in this guide are for reference only. Varco Pruden Buildings reserves the right to change color offerings shown here without notice. Painted metal samples are available.

Custom color matching is available through Varco Pruden. Orders with custom colors are subject to special pricing and delivery considerations. For SLR II colors, see selection card #6020.

PHYSICAL AND PERFORMANCE PROPERTIES ON COATED STEEL ¹		
Specular Gloss at 60°	ASTM D 523 ⁽²⁾	25-35
Pencil Hardness	ASTM D 3363	F-2H
T-Bend ⁽³⁾	ASTM D 4145	2T; No pick off
Adhesion	ASTM D 3359	Reverse impact 1/16" crosshatch; No adhesion loss
Humidity Resistance 100% humidity @ 95° F	ASTM D 2247 ASTM D 714	Passes 1500 hours No #8 blisters
Reverse Impact	ASTM D 2794	3.0 x metal thickness, no cracking or adhesion loss
Salt Spray Resistance 5% salt fog @ 95° F	ASTM B 117	Passes 1000 hours less than 1/8" avg. creepage from scribe. None or few #8 blisters
South Florida Exposure 10 yrs. @ 45°	ASTM D 2244 ASTM D 4214	Max 5 fade Max 8 chalk
Dry Film Thickness	ASTM D 1400	0.20 mil primer; 0.75 mil topcoat
Acid Resistance	ASTM D 1308	10% muratic acid 24 hours — no effect; 20% muratic acid 18 hours — no effect
Acid Rain Test	Kesternich SO ₂	15 cycles min. DIN 50018, no objectionable color change
Alkali Resistance	ASTM D 1308	10%, 25% NaOH, 1 hour; no effect

Includes G90 hot dip galvanized and Galvalume 2. American Society for Testing and Materials. 3. Fracturing or rupturing of substrate will rupture coatings. Heavy gauge and clad steel substrates impose limitations on formability. KXL coatings are generally flexible beyond the point of substrate rupture.

VP COOL COLOR INFORMATION

Color Name & Code	Solar Reflectance ¹	Thermal Emmittance ²	SRI ³	LEED 2.2 Low Slope Initial SRI>or=78	LEED 4.0 Low Slope Initial SRI>or=82	LEED 2.2 Steep Slope Initial SRI>or=29	LEED 4.0 Steep Slope Initial SRI>or=29
Acrylic Coated Galvalume (no code)	0.68	0.30	65	No	No	Yes	Yes
Cool Arctic White - BN5W183B	0.64	0.84	76	No	No	Yes	Yes
Cool Bermuda Green - BN5G176B	0.30	0.84	29	No	No	Yes	No
Cool Cobalt Blue - BN5L148B	0.33	0.84	33	No	No	Yes	No
Cool Colonial Red - BN5R143B	0.34	0.85	35	No	No	Yes	No
Cool Cotton White - BN5W184B	0.76	0.84	93	Yes	Yes	Yes	Yes
Cool Dark Bronze - BN5N239B	0.32	0.84	32	No	No	Yes	No
Cool Ebony - BN5B114B	0.30	0.84	29	No	No	Yes	No
Cool Egyptian White - BN5I137B	0.63	0.83	74	No	No	Yes	Yes
Cool Granite Gray - BN5A221B	0.55	0.84	63	No	No	Yes	Yes
Cool Hemlock Green - BN5G175B	0.34	0.85	35	No	No	Yes	No
Cool Imperial Blue - BN5L149B	0.30	0.84	29	No	No	Yes	No
Cool Leaf Green - BN5G174B	0.30	0.85	30	No	No	Yes	No
Cool Sierra Tan - BN5N235B	0.49	0.84	55	No	No	Yes	Yes
Cool Straw Gold - BN5I136B	0.61	0.84	72	No	No	Yes	Yes
Cool Zinc Gray - BN5A222B	0.37	0.85	39	No	No	Yes	Yes

Authorized Independent Testing Laboratory Results: 1 = AITL ASTM C1549 CRRC Tested Lab Results. 2 = AITL ASTM C1371 CRRC Tested Lab Results. 3 = AITL ASTM E1980 CRRC Tested Lab Results. (Low Slope ≤ 2:12; Steep Slope >2:12)

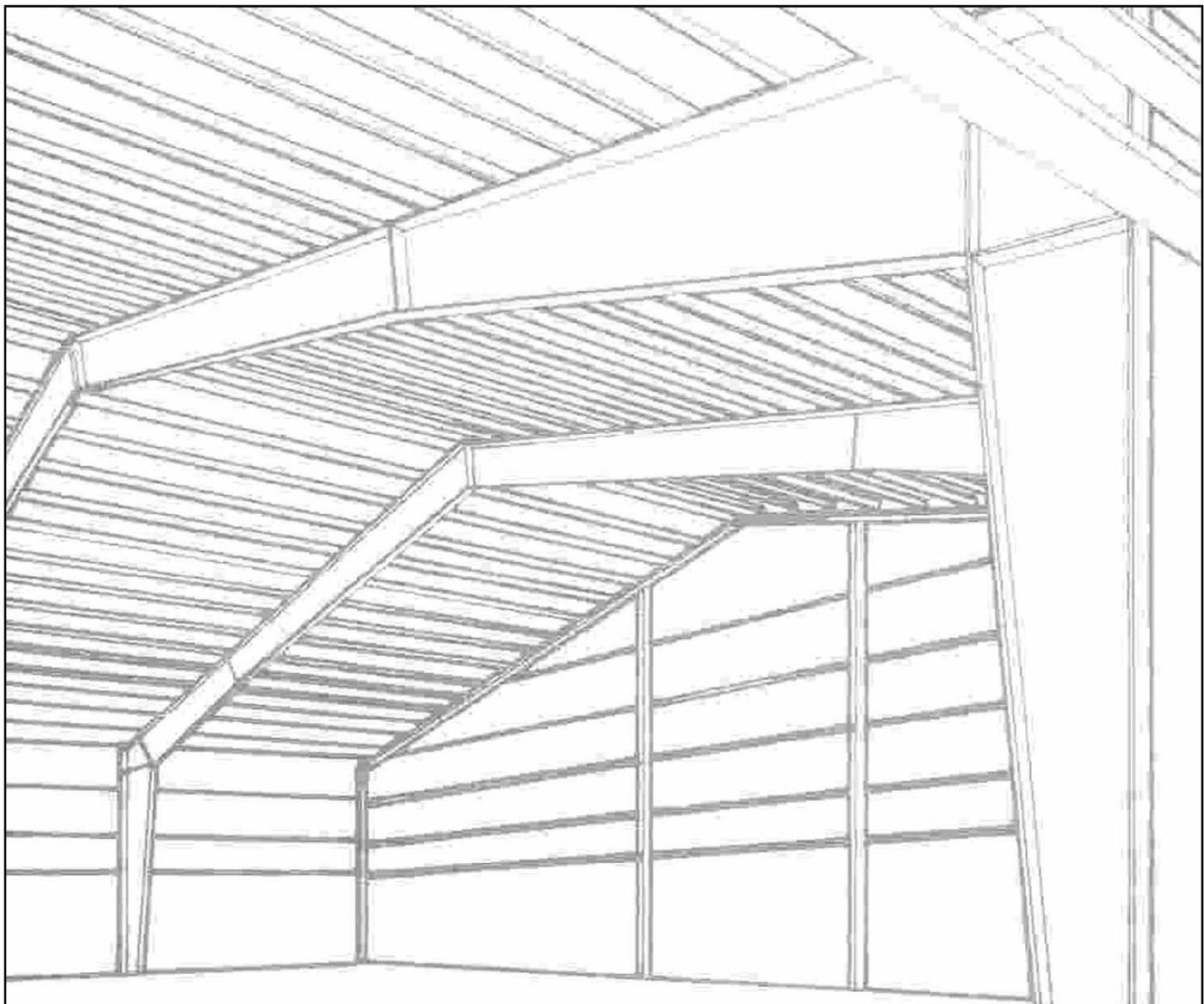
Note: All panels formed from light gauge metal may exhibit waviness, also known as "Oil Canning," commonly occurring in, but not restricted to, flat portions of a panel. This inherent characteristic is not a defect of material and is not cause for rejection.

- Kynar 500® is a registered trademark of Arkema.
- Hylar 5000® is a registered trademark of Solvay Solexis.
- Galvalume® is a registered trademark of BIEC International, Inc.

Installation Instructions

V A R C O P R U D E N B U I L D I N G S

Basic Erection Guide



The field guide for correctly storing and erecting Varco Pruden custom engineered steel-framed building systems





WARNING

You may fall from roof and be killed or seriously injured



Any panel can collapse.

Do not step on panels with creased edges

Do not step on or NEAR edge of panel.

Do not step within 5 feet of panel end.



Panels are slippery.

Use fall protection.



Loose panels may slide out from under you.

Do not step on loose panels or stacks of panels.

Always use fall protection.

Get and read "Roofing Work Safety Instructions" from supervisor.

SECTION	TOPIC
A	SAFETY & REGULATORY _____
B	BUILDING DELIVERY AND STORAGE _____
	• Shortages and Damages _____
	• Materials Unloading and Handling _____
	• Jobsite Storage _____
C	GENERAL INSTRUCTIONS _____
	• Tools and Equipment _____
	• Do's and Don'ts _____
D	SCREW INSTALLATION _____
E	FIELD BOLTING _____
	• Bolt Tightening _____
	• Gaps in Joints _____
	• Shimming _____
	• Snug-Tight Joints _____
	• Pretension Joints and Calibration _____
	• Tightening Methods _____
	◦ Turn-of-Nut Method _____
	◦ Calibrated Wrench Method _____
	◦ Tension Control Bolt Method _____
	◦ Direct Tension Indicator Washer Method _____
	• Inspection _____
F	FOUNDATIONS AND ANCHOR RODS _____
G	PRIMARY FRAMING _____
	• Erection Procedure _____
	• Lifting _____
	• Temporary Bracing _____
	• Squaring, Plumbing, and Tolerances _____
	• Column Base Shimming _____
H	SECONDARY FRAMING _____
	• Erection Procedure and Tolerances _____
	◦ Cold-Form Members _____
	◦ Truss Purlins _____
I	ROD BRACING ASSEMBLY _____
J	CRANE SUPPORT _____
	• Runway Alignment _____
	• Shimming _____
K	FIELD WELDING _____
	• Weld Procedure _____
	• Welding Thru Coating _____
	• Inspection _____

INTRODUCTION

All materials, components and accessories sold to Builders are provided subject to written agreements. Any applicable warranties are as set forth in those written agreements. **EXCEPT AS PROVIDED IN THOSE WRITTEN AGREEMENTS, BLUESCOPE BUILDINGS NORTH AMERICA, INC. COMPANIES MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

The Erection Guide is intended to provide erectors with the recommended procedures for constructing buildings as efficiently as possible. However, BlueScope Buildings North America, Inc. does not guarantee and is not liable for the quality of erection nor assume any responsibility for building defects that may be attributed to improper erection techniques, or the negligence of other parties.

The erection information presented in this manual is provided as a supplement to the erection drawings supplied with your Building.

The manual is intended as a guide to be used in conjunction with your erection drawings, to help plan and organize your work. It will help you to identify parts, establish an erection sequence, speed up assembly and point out any areas or procedures requiring special emphasis or attention.

Where erection drawings and this guide are in conflict, the job specific erection drawings govern. Read all erection instructions before erecting the building.

Supplemental Erection Guides are required for Roof And Wall Panels and other building accessories. Always refer to erection drawings for building specific details.

Refer to the Metal Buildings Manufacturers Association's Metal Building Systems Manual for more details on common industry practices and Glossary of Terms. In Canada, See Canadian Sheet Steel Building Institute for guidelines.

BlueScope Buildings North America, Inc. reserves the right to change at any time products and/or procedures illustrated in this guide due to continuing product development.

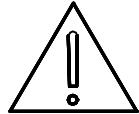


SAFETY FIRST

Job site safety is the sole responsibility of the contractors. Contractors are responsible for FULL compliance with all governing regulatory agency's safety requirements for your specific construction site including but not limited to Federal, State, Provincial, and local agencies having jurisdiction over your job site. Governmental regulations on construction safety are available from any government book store. The Contractor is also solely responsible for compliance with all owner specified safety requirements at the job site.

Identification of safety regulatory agency requirements for construction related procedures is beyond the intent of this installation guide. Any action required from BlueScope Buildings North America companies regarding safety issues shall be specifically identified in the contract documents.

Roof Panels / Roof Safety



WARNING: You may fall from roof and be killed or seriously injured.

Working off the ground even a few feet can be extremely dangerous. Falls from height of six feet or less can be fatal. You should be aware of the hazards while installing roof panels.

I. PANELS CAN COLLAPSE



Roof panels can be a safe walking surface (except for slipperiness) **ONLY** when they are **completely** seamed or fastened as applicable. Panels not completely seamed or fastened **are not safe** and can collapse suddenly and without warning.

SAFETY FIRST

When installing roof panels, **always** use fall protection.

Follow these additional safety precautions:

1. Never step, kneel or place weight on an edge or edge corrugations of any panel.
2. Use extra care when installing panels with creased or kinked corrugation or edges. Placing weight on **any** portion of such a panel before it is completely installed may cause the panel to collapse.
3. Never stand or work within five (5) feet from the end of a panel that is not completely seamed or fastened.
4. Before a panel is completely installed, always stand, kneel or work directly over the roof structural.
5. Never allow more than one worker to stand, kneel or work on the same panel between two roof structurals before the panel is completely installed.
6. When walking on roof system liner panel that has been completely fastened to the roof structural, do not step on the sidelap. Step only on the liner panel area that is directly over the roof structural.

Never use unattached roof panels as a work platform for any purpose.

This is an **extremely** hazardous practice and should never be done.

II. PANELS ARE SLIPPERY



All roof panels, whether painted or unpainted, are slippery to walk on. Dew, frost, or any other moisture on roof panels greatly increases the slipperiness of the panels and extra care should be taken. The pitch of the roof can also increase the hazard.

Because of these hazardous conditions, it is **essential** that fall protection be used at all times.

SAFETY FIRST

III. LOOSE PANELS MAY SLIDE OUT FROM UNDER YOU



Never step on a single roof panel or a stack of several roof panels lying unattached on the roof structurals. If you step onto a single panel on the roof structurals, it may slip causing you to lose your balance and fall. Even a stack of several panels on the roof structurals may slip if you step on it.

WHAT TO DO TO PREVENT ROOF FALLS

1. **Always Use Fall Protection** - including but not limited to, lifelines, safety harnesses, lanyards, safety nets, scaffolding, man-lifts, catch platforms, and the Sky-Web systems.
2. **If You Need a Work Platform** - for laying insulation or any other purpose, use only platforms constructed in accordance with all safety regulations. **Never** use unattached or partially attached panels as a work platform.
3. **To Avoid Slipping** - wear good work boots while on the roof. The danger from a slip is greatest while installing roof panels or insulation at the edge of the roof. Use walkboards in the flat of panels when installing panels. When working near the edge of the roof, always use fall protection.
4. **To Prevent Panels from Slipping** - Do not step on loose roof panels or even a stack of several roof panels.
5. **Walkboards** - One method to add stability to panels during erection is to place walkboards in the flat of panels. The boards should run the full length of the roof slope and should be fastened together by drilling a hole near the ends of each board and tying it to the next board with rope. Cut a groove in the bottom of each board so that the board will lie flat and not tip back and forth because of the rope. This will prevent the boards from slipping out from under you when you step on them. Adequately secure walkboards to the building. Walkboards are not a substitute for appropriate fall protection.

BUILDING DELIVERY

- Before the building arrives, make sure space is available to store and inventory the components.
- Check off all primary framing members with manifest and erection drawings.
- Check for quantity of boxes and or crates called for on the manifest.
- Check for purlin or girt bundles as called for on the manifest.
- Check for visible damage.
- Ensure that all wet components have been dried before storing.
- Store all components so that there is no collecting of water in bundles or frames.
- Do not cover tightly. Leave room for air circulation around bundles.
- Store warehouse items in a dry, secure location (i.e. doors, windows, fasteners and mastic).

As the building is shaken out, check all individual boxes, bundles and crates for any damages or shortages. This will help eliminate lost time waiting for replacement materials.

Shortages & Damages

- A complete inspection should be made at time of delivery.
- The receiver should "conditionally" sign delivery receipt if there is any evidence of damage. Notation must be made on the delivery receipt accordingly. A detailed note of the damage, a date and a signature must be made on the delivery receipt. Do not offer opinion as to how you think the product was damaged. Opinions could affect your claim.
- Any items in crates or boxes that are concealed must be inspected. Failure to inspect and make note of any damage immediately on the delivery receipt could result in the receiver being responsible for any damage found later.
- The carrier should be immediately notified that shipment is damaged and request to send a representative to inspect and verify damage. If you would like assistance please contact your Project Manager immediately. Also, a copy of the inspection report should be requested.
- Take at least six pictures of damaged material, one from each side of the trailer and of the front and rear. Take picture of carrier trailer number. Take picture of damaged part numbers and make note of part numbers on delivery receipt.

Shortages & Damages Cont'd

- A claim should be filed with the carrier as soon as possible, sending with it the original Bill of Lading, original paid freight bill, copy of the inspection report, disposition of damaged material and amount of claim. BlueScope can assist you with filing the claim with the carrier.
- Do not dispose of damaged material. Damaged material must be saved for the carrier to salvage. Failure to do so may affect your claim.
- Concealed damage should be reported within (15) days of delivery.
- Shortages of primary and secondary framing must be reported within (5) working days.
- Shortages of any other materials must be reported within (10) working days.

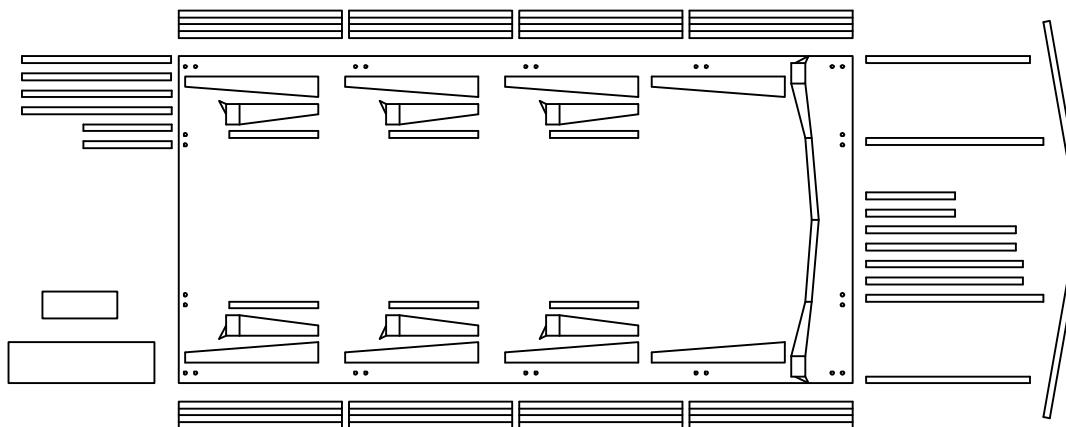
NOTE: It is the responsibility of the Builder/Erector to check for damaged material and shortages. Damages MUST be noted on delivery receipts and your Project Manager notified as soon as possible.

MATERIALS UNLOADING AND HANDLING

ARRIVAL AT THE BUILDING SITE

In winter conditions, immediate power washing of steel that has been exposed to road salt or chemicals during transit should be done.

UNLOADING AND MATERIAL LAYOUT EXAMPLE

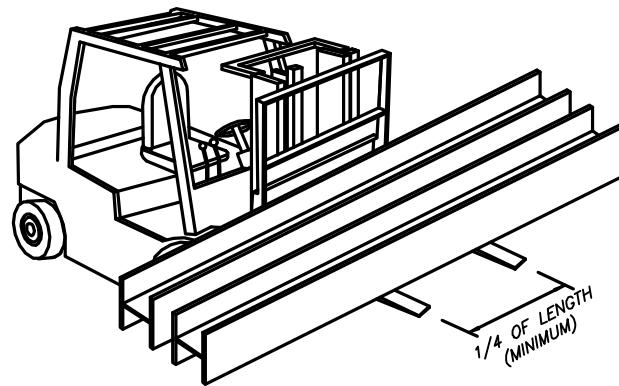


NOTE:

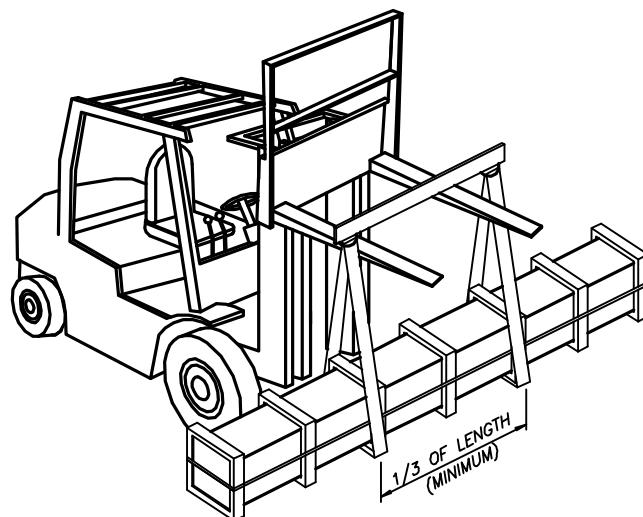
Leave an access area through one end and the full length of the building for erection equipment. When unloading use appropriate equipment to avoid damage.

FORKLIFTS

Extreme care should be taken to avoid damage from fork blades. The erector is responsible to have proper equipment available at the jobsite. When lifting products, make sure forks are spaced wide enough to provide stable handling of parts, bundles and crates.



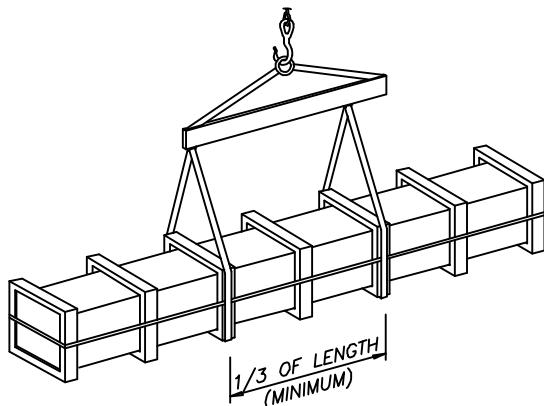
When handling long creates or bundles (>20 ft) spreader beam should be bolted to forks so that slings can be used to widen pick points.



SLINGS (CRANES OR FORKLIFTS)

Lifting of the "**INDIVIDUAL BUNDLES**" should be by spreader bars and nylon slings (or similar material) located at a minimum of two points along the length of the bundle. Suitably stiff inserts should be located at the top and bottom of the bundles at the sling positions to protect the edges of the panels and crates.

Balance load so material will not slide.



Extreme care should be taken to avoid bumping and snagging of the bundles when lifting.

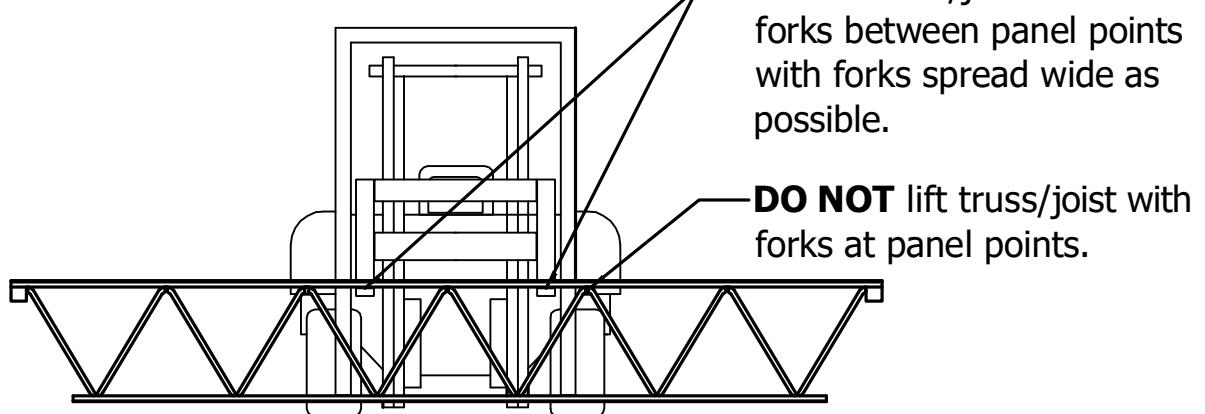
Rigging is the responsibility of the erection crew. It is recommended that the erector review OSHA 1910.184 for rigging considerations.

Per OSHA 1910.184(c)(7), 'Slings shall be padded or protected from the sharp edges of their loads.'

TRUSS/BUNDLE UNLOADING AND HANDLING

When unloading and handling long span secondary trusses or bar joists, always lift purlins/joists and bundles in vertical position.

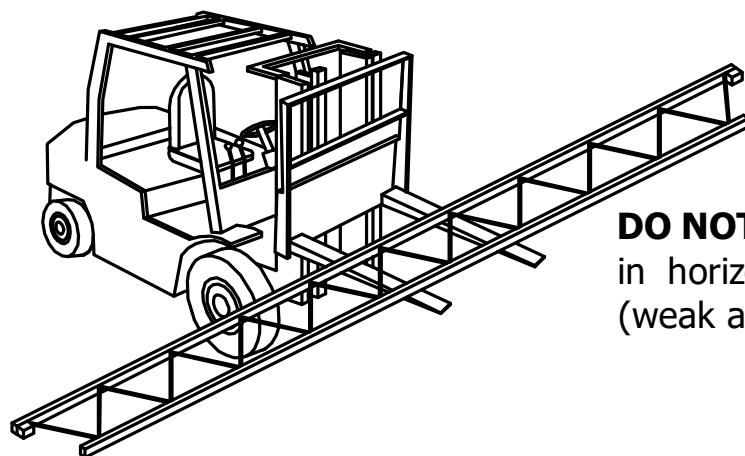
PROPER LIFTING



DO lift truss/joist with forks between panel points with forks spread wide as possible.

DO NOT lift truss/joist with forks at panel points.

IMPROPER LIFTING



DO NOT lift truss purlins in horizontal position (weak axis).

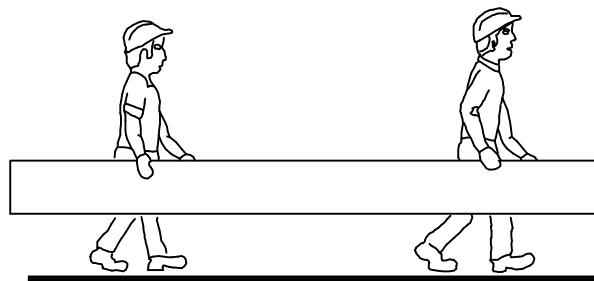
HAND UNLOADING AND CARRYING

When carrying panels by hand, always lift from bundle, never drag.

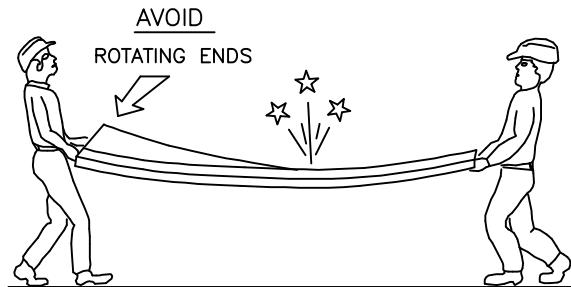
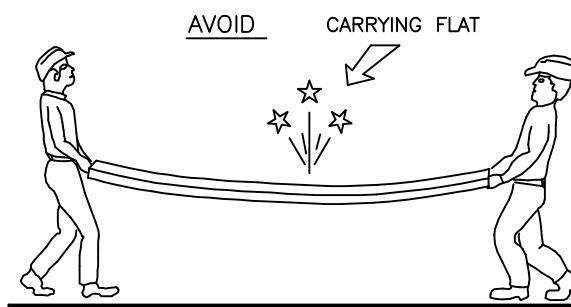
Gloves should always be worn when handling panels.

MATERIAL HANDLING OF PANELS

- A. Carry panels on edge in a vertical position for stiffness



- B. Picking up panels at ends and rotating in propeller shape will cause damage.



JOB SITE STORAGE & PROTECTION

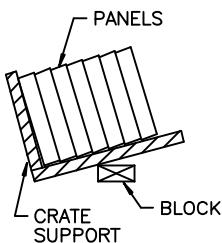
PANELS AND TRIMS FOR IMMEDIATE USE

If the panels are to be used immediately, the bundle should be placed at pre-planned strategic locations around the perimeter of the building as close as possible to the planned work areas. Consult the panel layout drawings to determine these locations. As far as practical, the bundles should be placed as close to installation area as possible to avoid later site maneuvering or undue handling.

Protect opened bundles with polyethylene cover (or similar material) when erection stops at end of the day. If panels are crated, replace the lid of the crate before covering.

Bundles for panels which are shipped on edge should be kept in upright position during storage and unloading. Block up edge of bundle with 2" x 4" blocking to keep panels from slipping. **DO NOT** stack material on opened bundles.

NOTE:



Moisture trapped within panel bundles can cause the finish to soften and become more susceptible to erection handling damage. Panels stored wet, or for extended periods in humid conditions will oxidize (rust).

Panels and trims **MUST** be kept dry. If panels arrive wet or become wet at the jobsite, break open bundles and allow to dry completely.

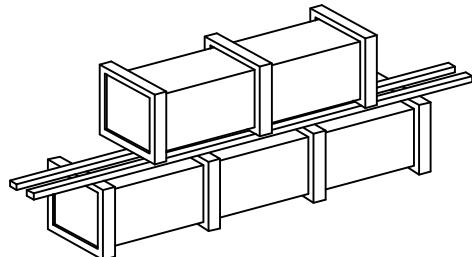
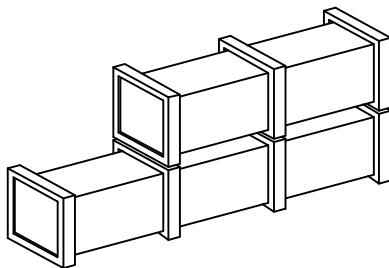
PANELS AND TRIMS NOT FOR IMMEDIATE USE

If panels/trims are not required for immediate use, they should be carefully stored in a designated area, **under cover**.

Store bundles to allow for drainage. Wood blocking to elevate one end of bundle is recommended.

Bundles should be stacked no more than two high with any bearers of the upper bundles in line with the bearers of the lower bundle. Where bearers do not align, place 2" x 6" wood planks longitudinally between the two bundles to help distribute the load.

Provide for ventilation of bundles if conditions are such that condensation may occur. Protective shrink wrap material on bundles should either be slit or loosened.



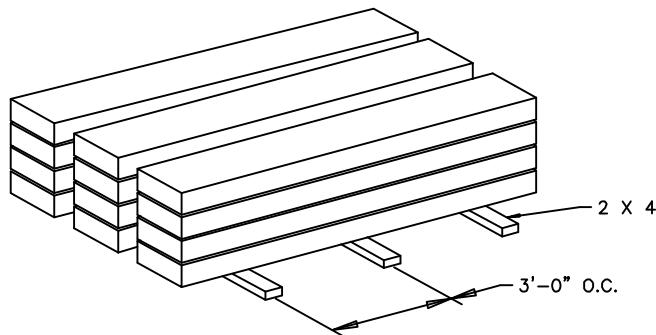
TRIMS, AND SMALL PARTS IN CARDBOARD CARTONS

Due care should be afforded to the unloading and storage of trims and small items (fasteners, sealants, etc.) that arrive on site for inclusion in the work.

Trim items are normally shipped in cartons which must not be allowed to get wet. Use 2" x 4" blocking spaced no more than 3'-0" o.c. under cartons. Keep cartons square to prevent bending trim items.

Cover exposed cartons with polyethylene or equal. Leave ends open to provide air circulation.

Do not open cartons until ready for use. Protect loose material from damage.



Cardboard cartons and contents **must** be kept dry. If cartons arrive wet or become wet at the jobsite, break open cartons and allow contents to dry completely.

GENERAL INSTRUCTIONS

RECOMMENDED ERECTION TOOLS & EQUIPMENT

The following list of tools and equipment should be considered for efficient building erection. This equipment may vary from area to area due to variations in building proportions, complexities, jobsite conditions and erection personnel. This list is intended to serve as a recommendation only and should not be interpreted as a limitation to your erection equipment. The builder is responsible for providing equipment commensurate with the type of building being erected. Safety Equipment must meet regulatory requirements.

- Electric screw guns with magnetic heads (Recommend 2000 RPM with depth sensing nose piece or adjustable clutch).
- Electric sheet metal nibbler and shears for cutting sheeting on job site. Keep replacement cutting bits in stock.
- Arc welding equipment with extra welding leads for welding (portable).
- Bolt Tension Calibrator; (such as Skidmore-Wilhelm)
- Extension ladders (at least two that are long enough for high buildings).
- One (1) set of torches with gauges and hoses for cutting (keep replacement tips in stock).
- Steel tapes for checking measurements (100', 50', and several 12'). Stretch tape for measuring along rakes.
- At least one (1) 4' level.
- Sheet metal cutters (straight, left, and right cut).
- Sufficient amount of suitable cable for temporary bracing.
- One (1) power impact wrench with assortment of impact sockets.
- Appropriate number of chokers and rope for use when the crane arrives for raising structural steel.
- At least one (1) ratchet and wrench set (heavy duty) with appropriate extensions and attachments.



- Plenty of electrical extension cords for all tools used at one time.
- Shop and sledge hammers.
- Spud wrenches.
- Wrecking bars and heavy duty drift pins.
- Skill saw with metal cutting blades and carbide tip blade.
- Hack saws.
- Framing square and tri-squares.
- Transit and level rod.
- Vise grips (assortment of types).
- Crescent wrenches (heavy duty).
- Box end and open end wrenches (assortment).
- Razor knives.
- Straight line string.
- Chalk boxes with replacement line and chalk.
- Caulking guns for sausage pack and cartridge sealants.
- Ample supply of pop rivet tools, both manual and electric powered.
- Staple pliers for stapling insulation and ample supply of replacement staples.
- $\frac{3}{8}$ " and $\frac{1}{2}$ " drive electric drill and appropriate twist drills.
- Acetone cleaners and rags.
- Brooms.
- Approved safety devices.

DO'S & DON'TS

Job Information

- **"For construction"** drawings must be the only drawings at the jobsite.
- Erection guides are sent to every Builder's office and with each building. Be sure at least one copy is on each jobsite.

Jobsite Inventory

- Always inventory building components as they arrive but not more than 2 weeks after delivery. This will avoid lost time waiting for replacement.
- Immediately report shortages and damaged materials to your project manager.
- Inventory and store all warehouse items in a dry and secure location. Only take out bolts, fasteners, mastic, etc. that will be used each day.

Temporary Bracing

- It is the responsibility of the erector to design and provide for all temporary bracing. This includes size, type, location, and quantity.
- **Never** begin erecting a building without having temporary bracing on site along with a plan for installing and securing it.
- As erection progresses, all brace rods, flange braces, struts, purlin/girt laps should be installed prior to panel installation.
- All building components will require temporary bracing during erection. Do not remove temporary bracing until after wall and roof coverings are installed.



Flange Braces

- All flange braces must be installed per the erection drawings.
- **Never** remove, relocate or omit a flange brace. If holes were omitted in manufacturing, it is the responsibility of the erector to insure that all flange braces called for on the erection drawings have been installed.
- If a flange brace is called for at a location which will interfere with a window, overhead door, or other required accessory, contact project manager for written directions.
- Flange braces are required even when you have liner panels. See erection drawings.
- See erection drawings for bolting requirements of flange braces to frames and secondary member.
- Never substitute self-drilling fasteners for bolts unless approved by engineering.

Brace Rods

- Always tighten rods as snug as possible. Reduce rod sag as much as possible without creating distress in the connection to framing members. Matching rods should always be equally tensioned in each bay.
- **Never** remove or omit a brace rod.
- **Never** relocate any brace rods. If relocation is necessary due to interference with doors, openings etc., contact project manager for written direction and authorization.

Erection Tolerances

- Erection tolerances shall be as given in the AISC code of Standard Practice Section 7, unless specified otherwise in this manual, or on erection drawings.
- Shimming and plumbing are the responsibility of the erector and shall be done in accordance with this manual.

Connection Bolts

- Use correct bolt length and type called for on the erection drawings or erection drawing details.
- Install correct quantity of bolts called for on frame cross sections or specific details.
- Insure that all high strength bolts are properly tightened. See drawings for direction if bolts require "pre-tension" or snug tight". See Section E - Field Bolting for more details.
- **Never** use a A307 bolt and nut where A325 bolts are called for.

Purlin or Girt Installation

- All purlin/girt lap bolts are to be installed in the outermost set of holes.
- Pull all lap conditions up tight, sometimes reversing the lap will allow the purlins to nest better. A little time spent on making a tightly nested lap will pay off when installing wall and roof panels.
- Always block up wall girts to insure straightness.
- Never load purlins at mid bay. Keep all loading directly over the frames. DO NOT overload roof secondary members.
- When loading roofing bundles on to the roof purlins, always block the purlins to prevent crushing and rolling.

Cutting & Burning

- **Never** use a torch to "field drill" structural connection holes. Holes must be drilled or "burned & reamed". If a torch is used in any component to make a hole, burn a small "pilot hole", then ream to achieve smooth hole of proper size.
- If field cutting of members is done with a torch, grind edges smooth and touch up with primer or zinc rich paint.
- Never modify, cut, cope, or add holes in members unless authorized by an engineer or as specified on erection drawings.

SCREW INSTALLATION

Proper installation of screws is critical to the strength and performance of the structure. The erector is responsible for furnishing proper screw guns, correct sized drivers, and applying proper technique when installing screws. Failure to do so will result in improper seating of the screws which will cause leaks, or heads breaking of screws, or excessive burnout of drill tips.

SELF-DRILLING SCREWS (SDS) and SELF-TAPPING SCREWS (STS)

Installation tool for SDS's and STS's must be an electric screw gun with features as follows to obtain optimum fastener installation.

- Minimum 6-amp power
- Variable speed (0 - 2000 RPM no load). DO NOT use high speed screw guns > 2500 RPM.
- Depth sensing nose piece or adjustable clutch for torque control.
- Use proper size magnetic drive bits for the type screw used. Discard and replace worn out drive bits as they will damage the screw head.
- Keep steel filings from collecting in magnetic drive socket cavity or screw heads will not properly seat.

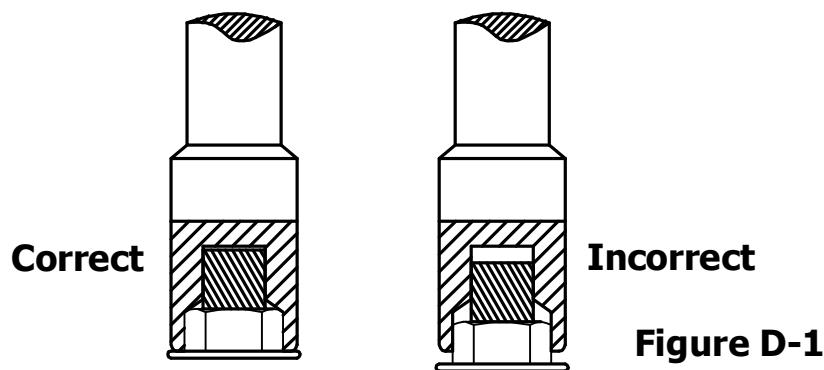


Figure D-1

- DO NOT use impact drivers when installing SDS's or STS's. Screws will be overdriven and will break off during or after installation.

Screws with sealing washers must be carefully installed so the flexible sealing washer is properly seated for weathertightness. ALL drill filings must be removed from steel surfaces or rusting will occur.

DO NOT OVERDRIVE!

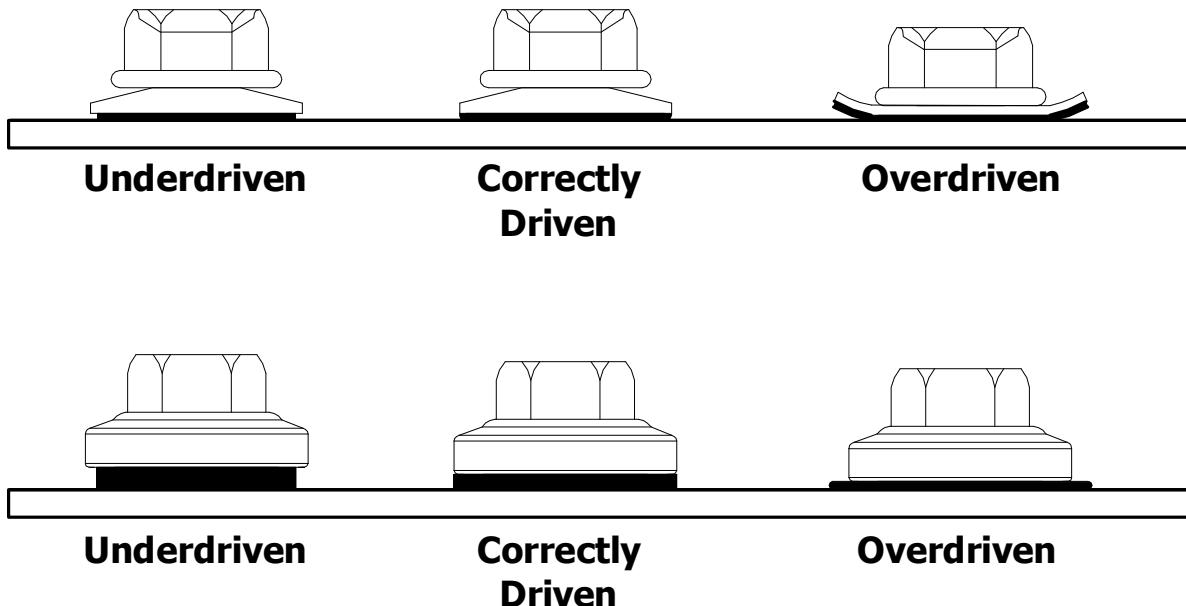


Figure D-2

Screws without sealing washers should be "seated snug" such that the head is flush with the steel surface. DO NOT overdrive. Excessive tension and torque on the screw will result in the heads breaking off during or after installation (hours or days later).

Screw length must be sufficient to penetrate all connected material.

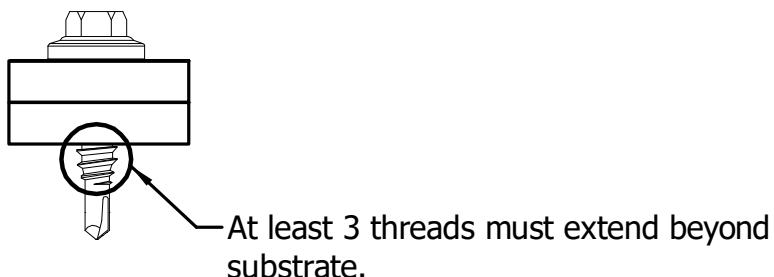


Figure D-3

AVOID tip burn out. Drilling speeds must be set to proper speed for the type of drill tip used. Apply steady uniform pressure during drilling.

Table D-1

Drill Point Type	Maximum RPM	Material Thickness Range (Total t)
DP-1	2000	0.018" - 0.095"
DP-2 & 3	1800	0.036" - 0.175"
DP-4	1800	0.125" - 0.250"
DP-4.5	1800	0.125" - 0.375"
DP-5	1800	0.125" - 0.500"
Self-Tapping Screws	1000	NA

Improperly installed screws must be removed and replaced.

SCRUBOLTS

Installation tool for scrubbolts must be a 1/2" electric impact wrench. A 5" long drive extension and magnetic sockets as required for specific size screws used. Scrubbolts require a pilot hole since they are not self-drilling.

Scrubbolts with flexible sealing washers should be tightened as shown In Fig. D-2. DO NOT overdrive.

Scrubbolts without washers should be "seated snug" such that the head is flush with the steel surface. DO NOT overdrive.

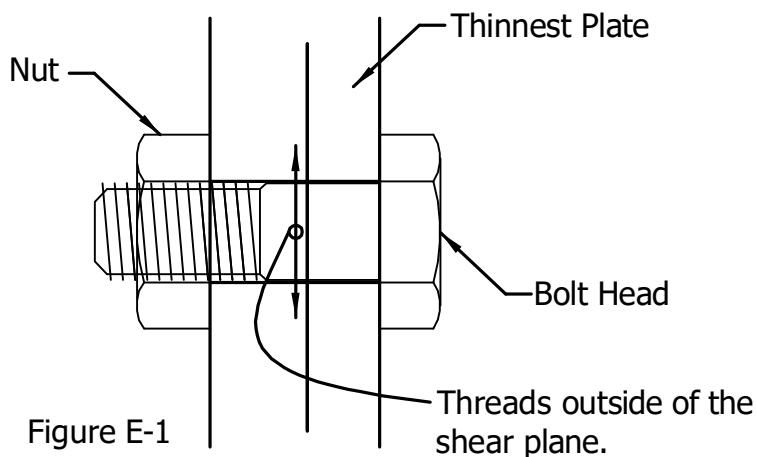
FIELD BOLTING

Field bolted joints must be installed in strict compliance with BBNA erection drawings, the Research Council on Structural Connections Specification for Structural Joints Using High-Strength Bolts, and the instructions in this guide. Bolted joints are designated as "snug-tight" or "pre-tension". General tightening requirements are as follows unless specified otherwise on the erection drawings.

All connections to purlins, girts, truss purlins, bar joists, flange braces, bracing struts, and primary framing may be installed to the snug-tight condition except as follows. High strength bolts must be pre-tensioned when:

- Any connection using A490 bolts.
- Connections in frames supporting cranes >5 tons capacity.
- In framing supporting machinery that creates vibration, impact, or stress reversals on connections.
- In frames and bracing of buildings located in high seismic areas. See erection drawings for seismic category.
- In any connection designated as slip critical (A325-SC). In addition, connections must be bare steel with primer, oils, dirt, and heavy rust removed from the contact areas. Galvanized or lightly rusted surfaces are permitted. Erector is responsible to ensure contact areas are clean and free of primer.

Joints designated with threads excluded from shear plane (A325-X and A490-X) shall be installed with bolt head against the thinnest plate.



SYSTEMATIC TIGHTENING

All bolts in a connection must be loosely installed before tightening. Bolts should be snug tightened starting at the most "rigid" part of the joint working toward the free end or less rigid end until plies are in contact (Figure E-2). If pre-tensioning is required, further tighten bolts in the same order.



Figure E-2

- Bolts that have been snug-tightened may be removed and reused. Bolts that have been pre-tensioned are NOT permitted to be reused unless approved by engineering.
- After installation and tightening, the bolt end must be at least flush with the face of the nut. If the bolt end is below the face of the nut, remove the bolt and install a longer one. There is no "maximum" stickout limit

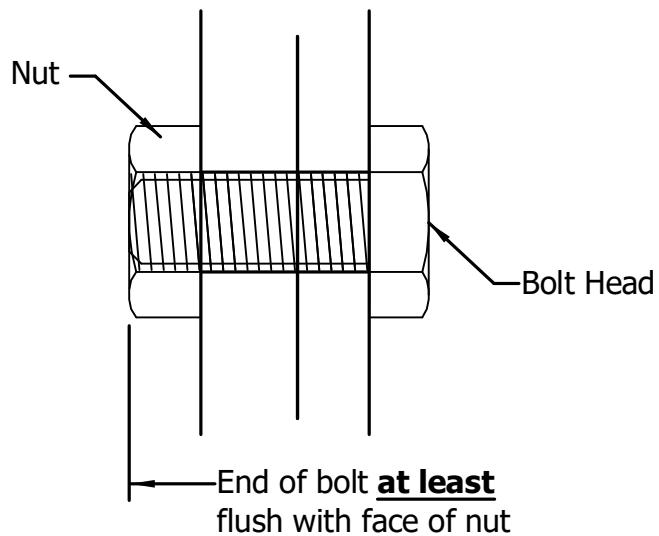


Figure E-3

GAPS IN JOINTS

Connected parts shall be installed as permitted in this section. In primary frame endplate connections distortion due to welding may cause minor gaps that cannot be brought together even after the bolt is fully tightened. Small gaps are permitted as illustrated below. If gaps larger than indicated below are found, shimming is required.

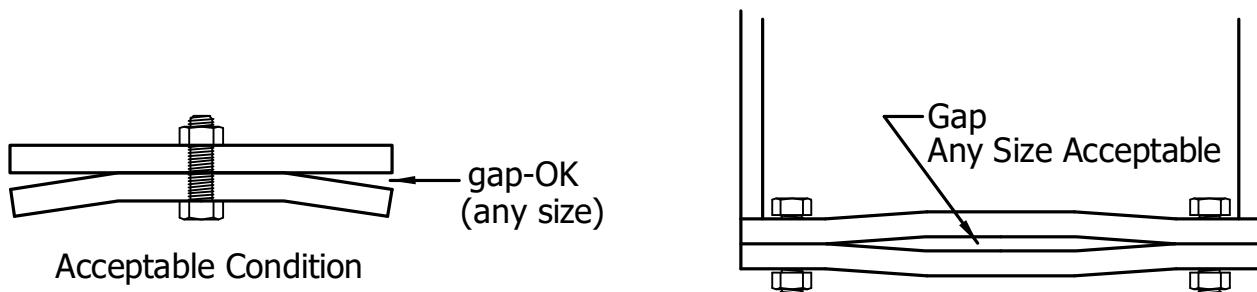


Figure E-4
Acceptable Gaps

Bearing connections and endplate connections.

Small gaps are permitted at bolt locations and at flange locations as shown in Fig. E-5.

- Gaps at bolt location are acceptable and need not be shimmed if : gap $< 1/8"$.
- Gaps at flange location are acceptable and need not be shimmed if: gap $< 1/16"$.

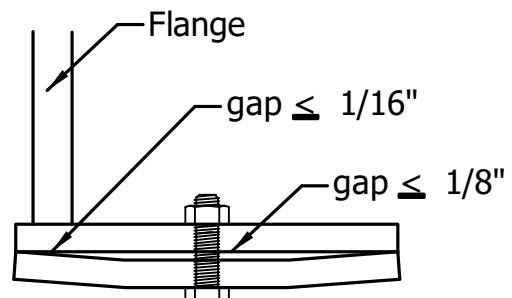


Figure E-5

Slip-critical connections.

Gaps are not permitted at bolt locations. Uncoated surfaces are required to be in firm contact as shown in Fig. E-6. Galvanized surfaces are permitted.

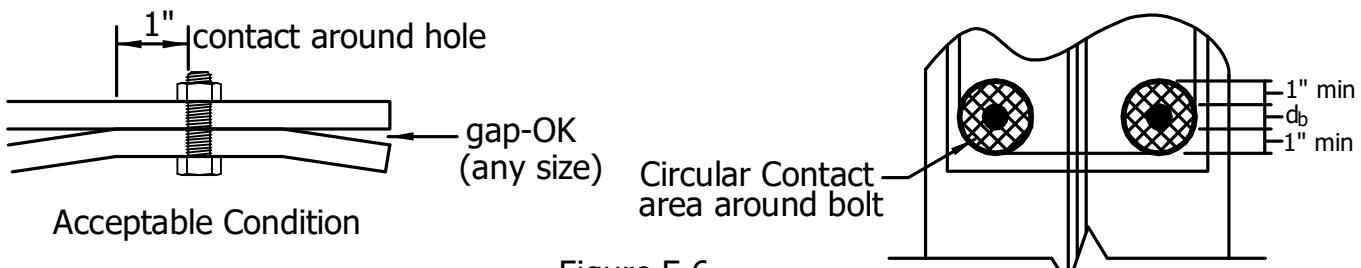


Figure E-6

SHIMS

On occasion shims may be required to fill joint gaps, level beams, accommodate varying depth of members, level frame bases, adjust for differential frame deflection, etc. Some shimming must be anticipated by the erector and is considered by the Code of Standard Practice to be part of the erection contract. Shims are provided by the erector.

Shimming between gaps at flanges is accomplished with thin flat plates stacked between the joints.

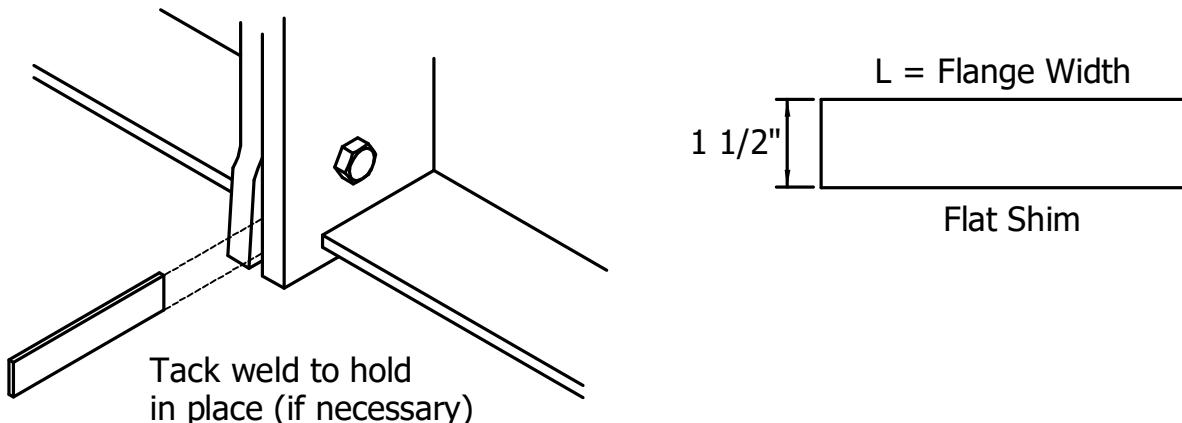


Figure E-7

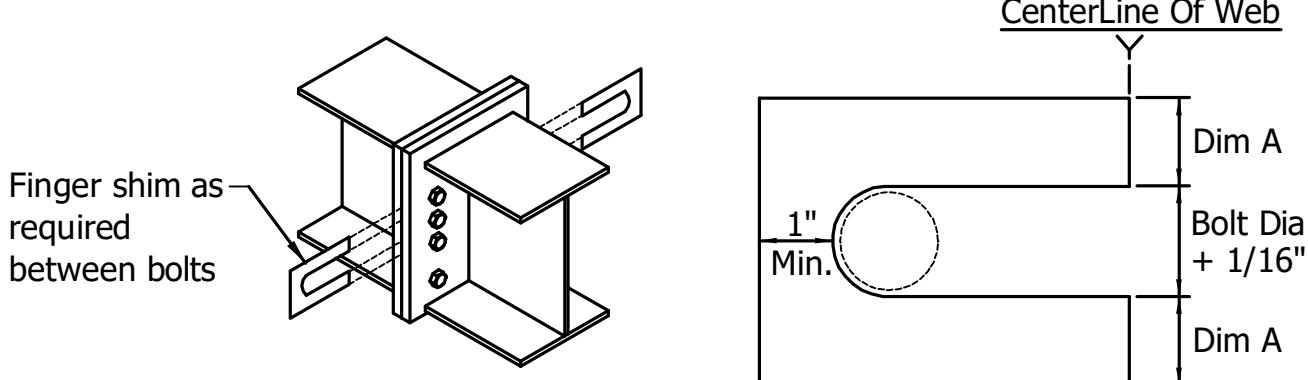


Figure E-8

- Dim A = 1". Shim dimensions may vary from those shown if required for fit up
- Multiple shims may be stacked to fill required gap.
- Gaps greater than a 1/4" require engineering review. Contact your Project Manager.

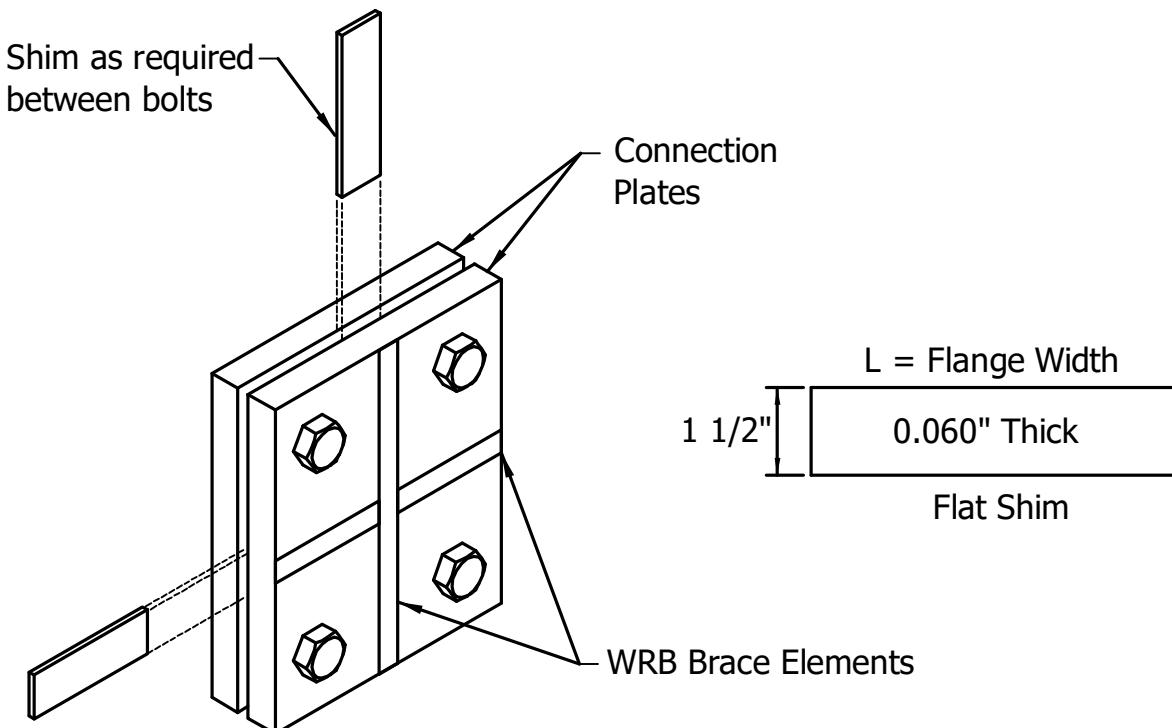
SHIMS

Figure E-9

Shim detail for WRB Brace End Connection.

- Align shims with plates and gussets as shown.
- Insert shims as far as possible until tight.
- Tighten Bolts
- Shims may be stacked as required.
- Tack Weld to edge of connection plate to hold in place.

SNUG-TIGHT INSTALLATION

Snug-tight is defined as:

"The tightness that is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench to bring the plies into firm contact."

PRETENSION JOINTS

Joints that require pretension must use one of the following tightening methods and all methods must be calibrated for each representative fastener assembly prior to installation.

- Turn-Of-Nut Method
- Calibrated Impact Wrench Method
- Twist Off Type Tension -Control Bolt Method (See manufacturer's instructions)
- Direct Tension Indicator Method (See manufacturer's instructions)

TENSION CALIBRATION

- A hydraulic tension calibrator (e.g.- Skidmore-Wilhelm Bolt Tension Calibrator) shall be used to validate that the tightening method used achieves required bolt tension. (See manufacturer's instructions)
- Take three fastener assemblies of each diameter, length, and grade to validate each assembly to tension values shown in Table E-1.
- Verify that the lubrication of the fastener assembly is similar to condition that will be present when installation work is done .
- Log results for the calibrated assembly.

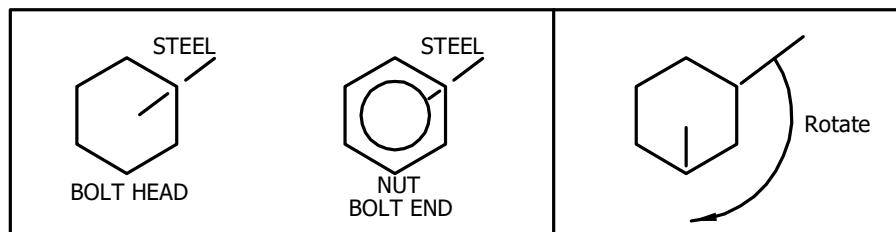
TABLE E-1 (Reproduced from RCSC Table 7.1 & S16 Table 7)

Bolt Diameter (in)	Minimum Pre-Installation Tension Verification (kips)			
	A325 and F1852		A490	
	KIPS	KN	KIPS	KN
1/2"	13	56	16	70
5/8"	20	89	25	112
3/4"	29	131	37	165
7/8"	41	183	51	229
1"	54	238	67	299
1-1/8"	59	261	84	374
1-1/4"	75	332	107	477
1-3/8"	89	397	127	565
1-1/2"	108	481	155	691

PRETENSION JOINTS USING "TURN-OF-NUT" METHOD

1. Complete pre-installation tension calibration.
2. Bring connection to "snug tight" condition. See procedure above.
Turn-of-Nut method does not require washers, unless called for on erection drawings
3. Matchmark each nut, bolt, and steel surface at the corner of the bolt and nut as shown in Figure E-9.
4. Using the same systematic procedure as used during the snugging phase, rotate each nut or bolt head the required turns as shown in Table E-2.
5. These added turns can be accomplished using impact wrenches or spud wrenches.

Figure E-9

**TABLE E-2** (Reproduced from RCSC Table 8.2)

TURN-OF-NUT TIGHTENING TURNS REQUIRED (flat surfaces only)					
Bolt Diam	Length	Turns	Bolt Diam	Length	Turns
1/2"	L ≤ 2"	1/3	1"	L ≤ 4"	1/3
	2"> L ≤ 4"	1/2		4"> L ≤ 8"	1/2
	L > 4"	2/3		L > 8"	2/3
5/8"	L ≤ 2-1/2"	1/3	1-1/8"	L ≤ 4-1/2"	1/3
	2-1/2"> L ≤ 5"	1/2		4-1/2"> L ≤ 9"	1/2
	L > 5"	2/3		L > 9"	2/3
3/4"	L ≤ 3"	1/3	1-1/4"	L ≤ 5"	1/3
	3"> L ≤ 6"	1/2		5"> L ≤ 10"	1/2
	L > 6"	2/3		L > 10"	2/3
7/8"	L ≤ 3-1/2"	1/3	1-1/2"	L ≤ 6"	1/3
	3-1/2"> L ≤ 7"	1/2		6"> L ≤ 12"	1/2
	L > 7"	2/3		L > 12"	2/3

Tolerances: For 1/3 & 1/2 turn, ± 30 degrees; For 2/3 turns ± 45 degrees

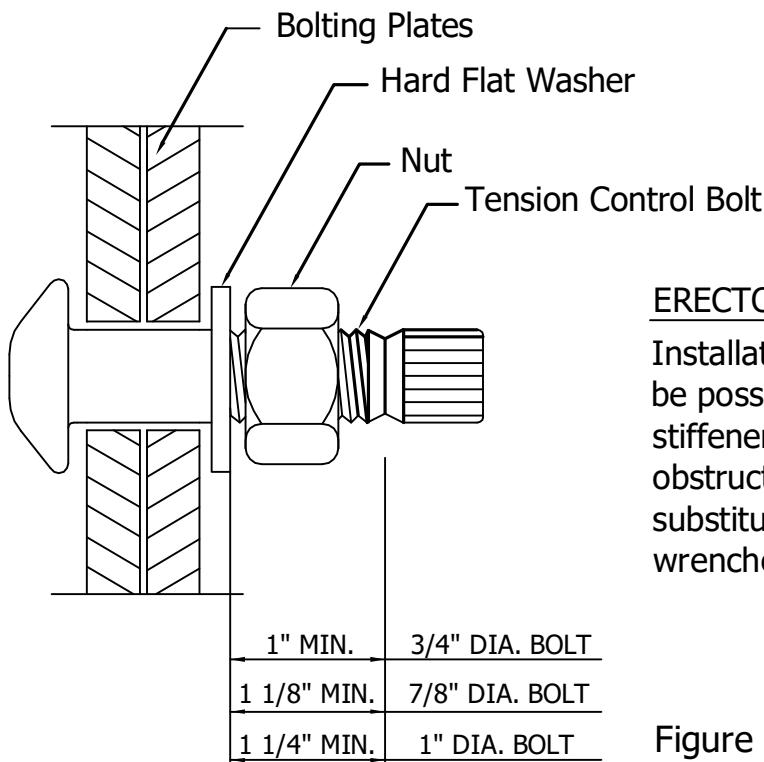
CALIBRATED WRENCH INSTALLATION

1. At start of each day, complete pre-installation tension calibration for each bolt assembly to be installed.
2. A hardened (F436) washer is required under turned element.
3. Bring all bolts into snug tight condition following systematic procedure.
4. Match mark the nut or chuck.
5. Holding the bolt head or nut, tighten the nut or bolt until the wrench shuts off.
6. Verify that the wrench did achieve the rotations as shown in turn-of-nut method within tolerances shown in Table E-2.

TWIST-OFF TENSION CONTROL BOLT INSTALLATION

Installation procedure shall follow manufacturers recommendations and as follows;

1. At start of each day, complete pre-installation tension calibration for each bolt assembly to be installed.
2. Bring all bolts into snug tight condition following systematic procedure.
3. Using systematic approach, tighten each assembly using installation wrench until the bolt spline shears off.

**ERECTOR NOTE:**

Installation of tension control bolts may not be possible in areas where extreme pitch, stiffener location, beam depth or other obstructions may occur. In these cases, substitution of nuts and bolts tightened with wrenches are required.

Figure E-10

Shear wrench (BY BLDR.) req'd for installation of tension control bolts.

**DIRECT TENSION INDICATOR WASHER AND BOLT
INSTALLATION**

Installation procedure for DTI washers shall follow manufacturers recommendations and as follows;

1. At start of each day, complete pre-installation tension calibration for each DTI washer and bolt assembly to be installed.
2. Bring all bolts into snug tight condition following systematic procedure. Do not fully compress the DTI at this step. See Table below for maximum number of feeler gage refusals at snug tight condition.

Bolt Dia. (In)	No. of Gaps	Max. Refusals at Snug
1/2"	4	1
3/4"	5	2
7/8"	5	2
1"	6	2
1-1/8"	6	2
1-1/4"	7	3
1-3/8"	7	3
1-1/2"	8	3

Feeler Gage Gap	
Uncoated DTI with DTI placed under bolt head wo/ washer	.015"
Uncoated DTI's w/ protrusions placed against washer.	.005"

3. Using systematic approach with DTI washers positioned as shown, tighten each assembly until DTI is compressed to proper inspection gap.

INSPECTION OF BOLTED JOINTS

GENERAL INSPECTION OF FIELD BOLTED CONNECTIONS

Installation shall be done as required by the local building official or project professional (AHJ). Special Inspectors must be pre-approved by the AHJ. As a minimum, bolting inspection tasks are as follows unless waved or modified by the AHJ. Field inspection costs are not the responsibility of BBNA.

INSPECTION TASKS

QC = Quality Control tasks are to be completed by the erectors QC Inspector (QCI).

QA = Quality Assurance tasks are to be completed by a 3rd party inspection agency when a QA firm is required by AHJ or owner. The Quality Assurance inspector (QAI) shall be qualified on the basis of documentation training and experience in structural bolting inspection.

O = Observe. "Observe" is defined as; "Observe on a random basis. Operations need not be delayed pending observations".

P = Perform these tasks for each structural bolted connection.

TABLE E-3

Inspection Tasks PRIOR to Bolting	QC	QA
Manufacturer's certifications available for fastener materials	O	P
Fasteners marked in accordance with ASTM requirements	O	O
Proper fasteners selected for the joint detail (grade, type, bolt length)	O	O
Proper bolting procedure selected for the joint detail	O	O
Connection elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	O	O
Pre-installation verification testing (calibration) by installation personnel observed and documented for fastener assemblies and methods used	P	O
Proper storage provided for bolts, nut, washers and other fastener components	O	O

TABLE E-4

Inspection Tasks DURING to Bolting	QC	QA
Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	O	O
Joint brought to the snug-tight condition prior to the pretensioning operation	O	O
Fastener component not turned by the wrench is prevented from rotating	O	O
Fasteners are pretensioned in accordance with Table E-1 progressing systematically from the most rigid point toward the free edges	O	O

TABLE E-5

Inspection Tasks AFTER to Bolting	QC	QA
Document acceptance or rejection of bolted connection	P	P

SNUG-TIGHT CONNECTION INSPECTION

Inspection tasks in Table E-3 and E-4 are NOT required for snug-tight connections. The QCI and QAI need not be present during installation. Inspection After Snugging of Bolts;

- Observe that firm contact has been achieved as described above in this guide.
Note: Small gaps are permitted as described above (Gaps in Joints).
- Observe that nuts cannot be turned by hand on randomly selected joints.
- Complete documentation tasks per Table E-5.

TURN-OF-NUT METHOD INSPECTION

Complete all tasks indicated in Tables E-3, E-4, and E-5.

- Observe to verify the proper techniques of the turn-of-the-nut method.
- If match marking has been used, confirm after pre-tensioning that proper rotation has been provided per Table E-2. If match marking has been used, the QCI and QAI need not be present during installation.

- If no match marking is done, perform routine QCI (and QAI if required) observation of installations to ensure proper rotation is achieved. The wrench chuck should be marked and watched for proper rotation.
- Record or mark joints and/or bolt groups that have been inspected.

CALIBRATED WRENCH METHOD INSPECTION

Complete all tasks indicated in Tables E-3, E-4, and E-5.

TWIST-OFF TENSION CONTROL BOLT INSPECTION

Complete all tasks indicated in Tables E-3, E-4, and E-5.

- Observe that spline has been properly twisted off the end of the bolt.
- Record or mark joints and/or bolt groups that have been inspected.

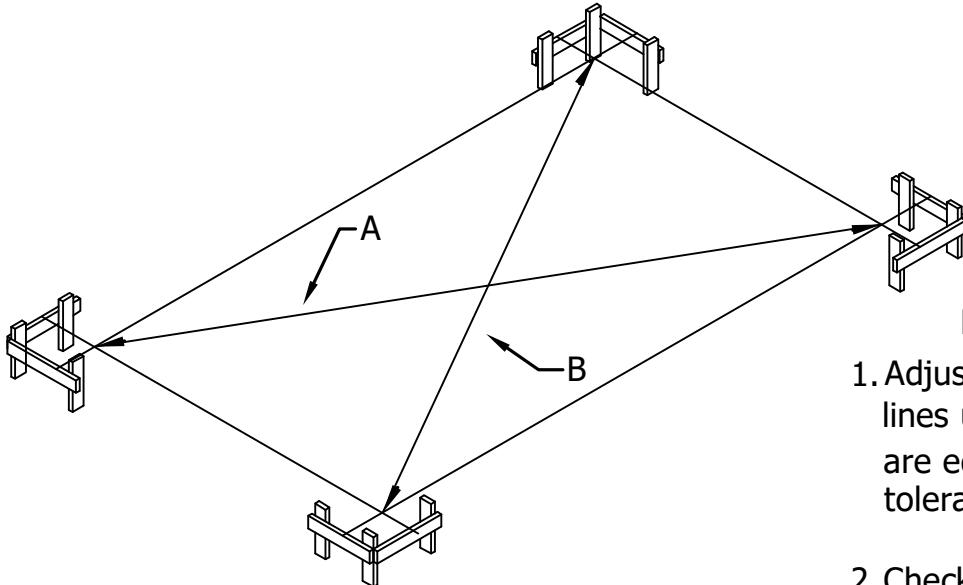
DIRECT TENSION INDICATOR WASHER INSPECTION

Complete all tasks indicated in Tables E-3, E-4, and E-5.

- Observe that DTI washer has been compressed as required. One half or more the gaps must be compressed. All gaps need NOT be fully compressed.
- Record or mark joints and/or bolt groups that have been inspected.

FOUNDATIONS & ANCHOR RODS

All anchor rod embedment requirements and details shall be designed and furnished by others. Rod details shown are for illustration only.



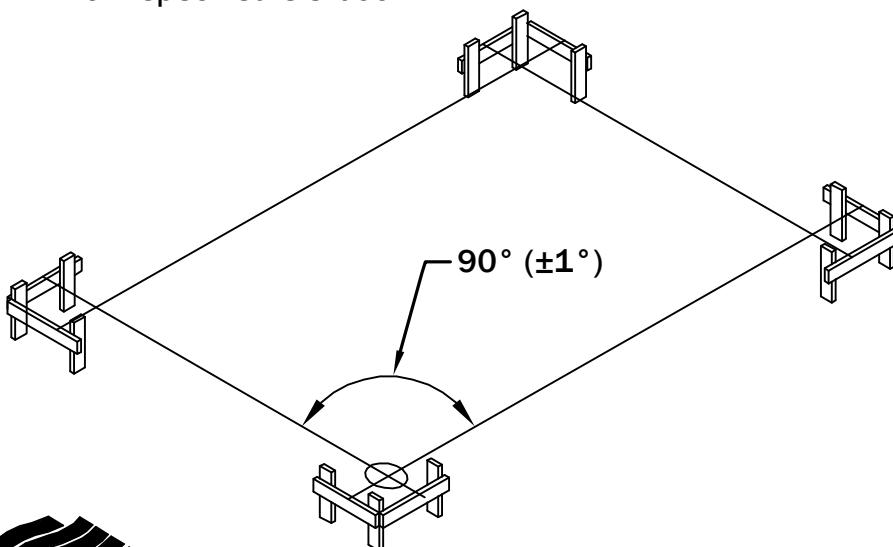
DIAGONAL METHOD

1. Adjust the foundation layout lines until dimensions A & B are equal in length. $\pm \frac{1}{4}$ " tolerance
2. Check again for correct building length and width per building drawings. $\pm \frac{1}{4}$ " tolerance

NOTE:

With either method, use a transit to set the top elevation of all batter boards at required elevation.

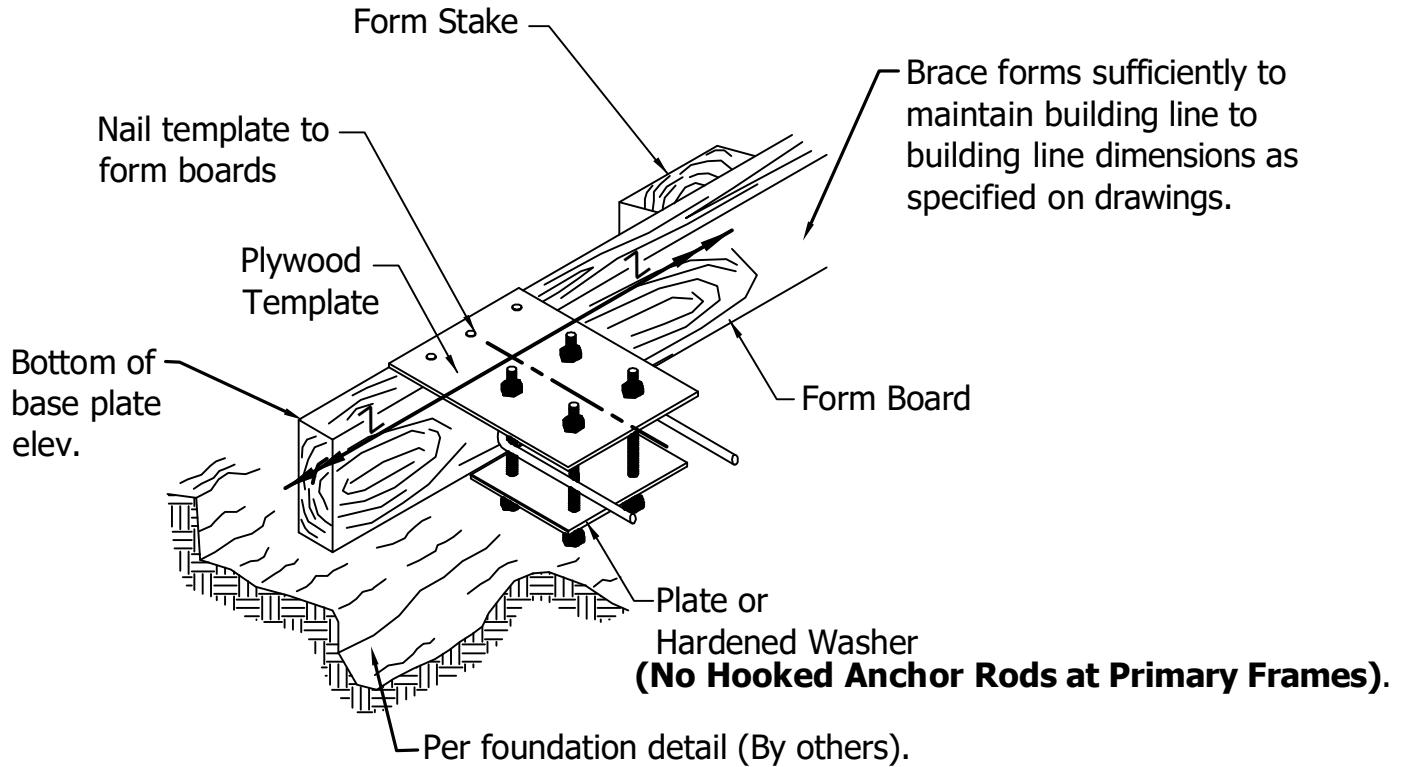
Bottom of base plate elevation tolerance may not exceed $\pm \frac{1}{8}$ " from specified elevation.



TRANSIT METHOD

1. Locate transit exactly over corner intersection point of string line.
2. Sight along one building line. Rotate transit through 90° to establish adjacent building line.
3. For accurate results, transit must be exactly level and properly calibrated.

Anchor Rods shall be placed as shown on **FOR CONSTRUCTION** anchor rod plan ONLY. **DO NOT** pour concrete from any other document for plans.



NOTES:

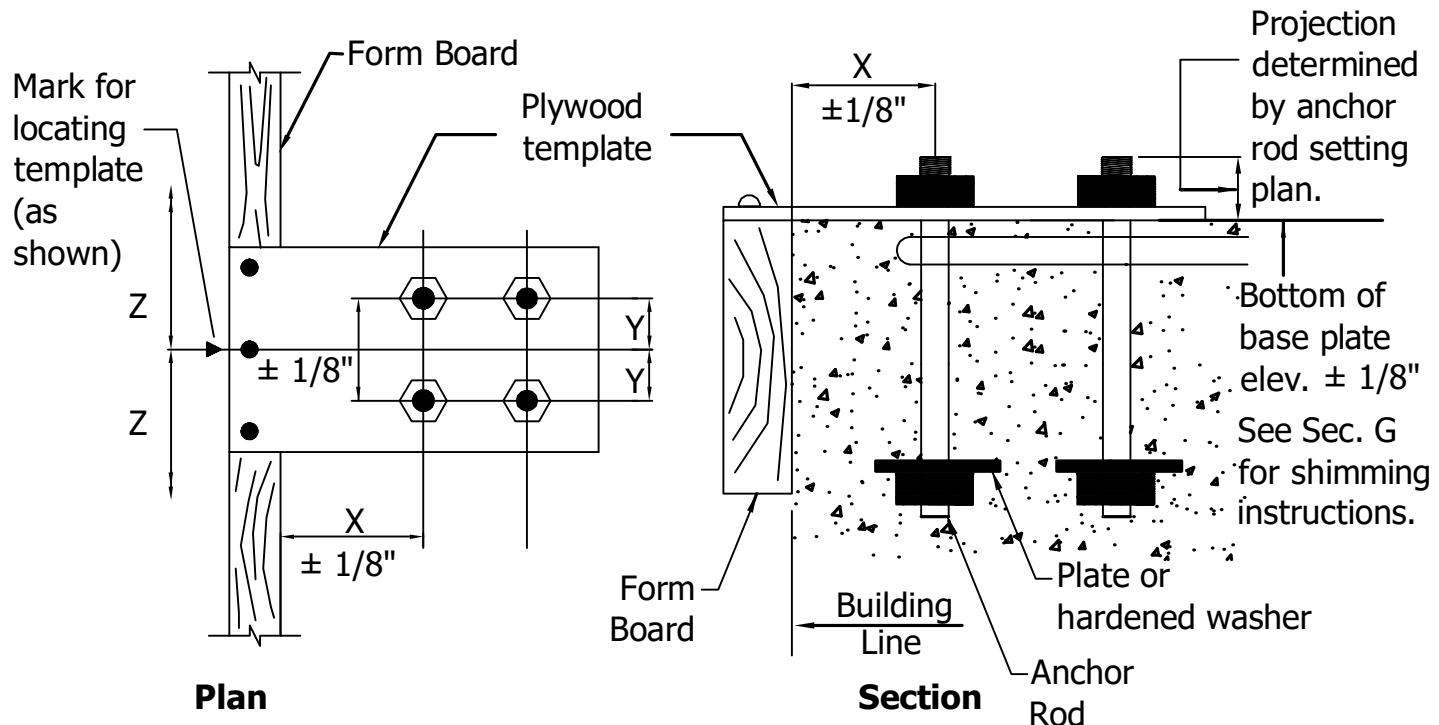
NOTE:

Protect rod threads during pouring of concrete.

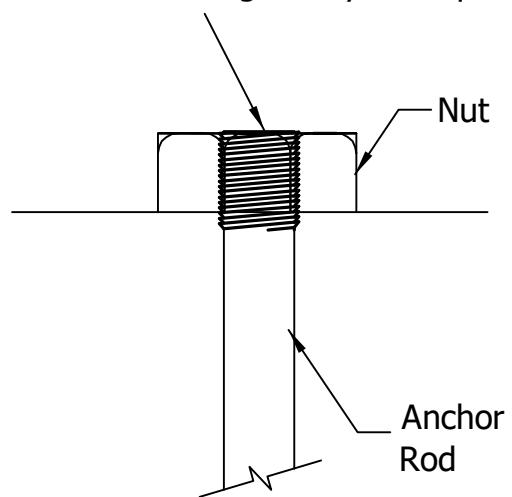
- 1) Anchor rod diameter and setting dimensions are shown on the detailed anchor rod layout plan.
- 2) Mark form for template location before pouring. Set anchor rods and attach templates after screeding.
- 3) Z Dim. Tolerance Prior to pouring, verify as follow.
 - Z/Dim (Bay to Bay) not to exceed $\frac{1}{4}$ ".
 - Accumulated variation in Z Dim. $\leq \frac{1}{4}$ " per 100ft, Not to exceed 1".

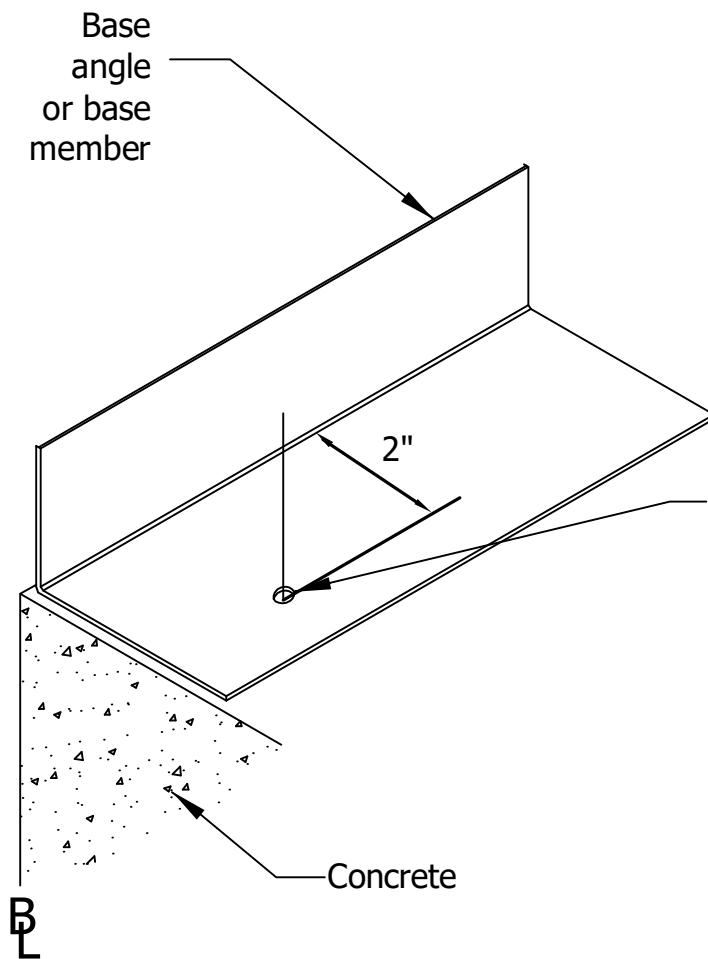
IMPORTANT:

All reinforcing steel for foundation walls, footings, grout, tie rods, hair pins, wire mesh, or any other steel used specifically for concrete application shall be designed and furnished by others. All reinforcing steel shown in this manual is for illustrative purposes only.

**Minimum Rod Thread Engagement**

Top of anchor rod must be at least flush with top of nut.
Additional Anchor Rod length may be required when grout is required





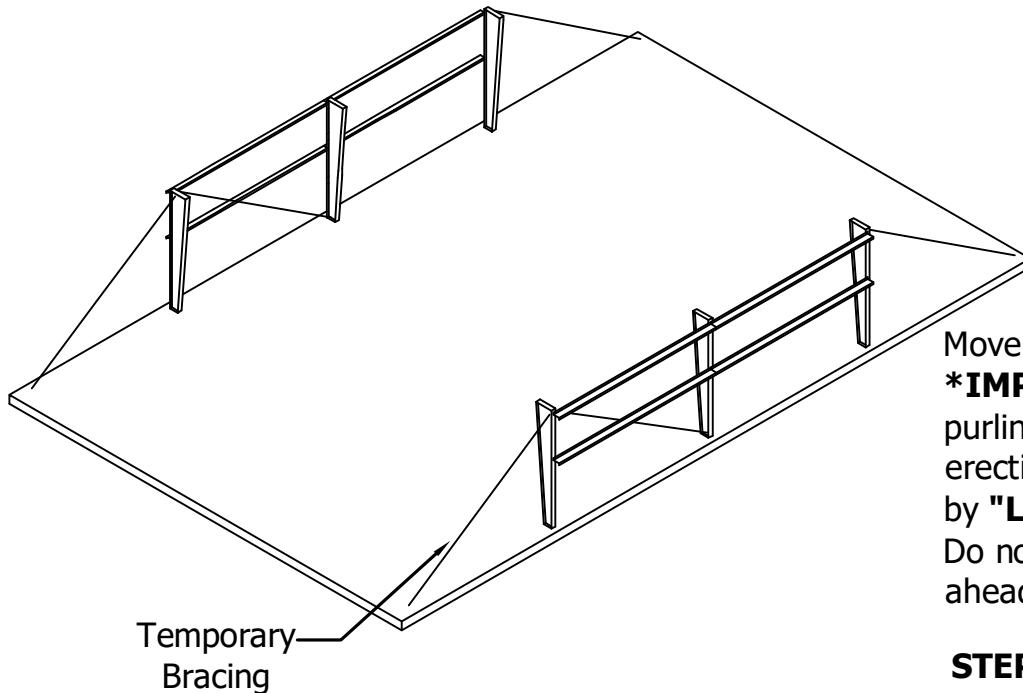
Base angle or base member
2"
Concrete

Attach to floor with $\frac{1}{4}$ " dia. power actuated concrete anchor (or other approved methods). Space anchors as shown on erection drawings and details.

NOTE:

Fastener should be located as far from outside edge of slab as is reasonable to prevent concrete spalling.

ERCTION PROCEDURE / PRIMARY FRAMING



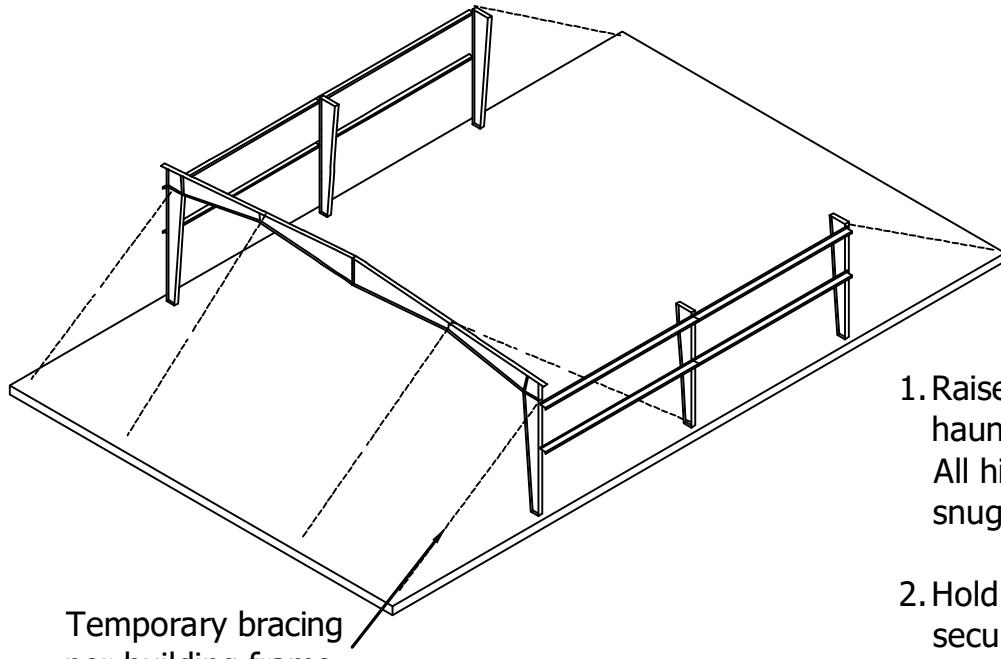
Move braces as steel is erected.
IMPORTANT keep
 purlins/girts in tension as
 erection progresses,
 by "**LEAP FROGGING**" braces.
 Do not erect more than two bays
 ahead of the temporary braces.

STEP ONE

1. Check anchor rod plan and erection drawings for special conditions.
2. Stand column, install anchor rod nuts and temporary bracing. Install girts, flange braces, and all bolts.
3. The number of girts and temporary bracing required to secure columns shall be determined by erector.

NOTE:

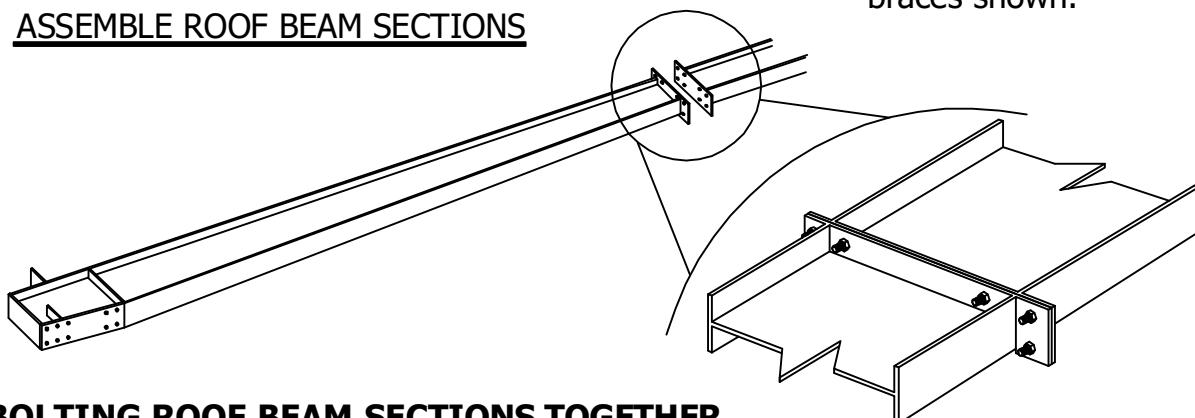
1. Plan to erect a braced bay first. Usually this is the first interior bay from either end of the building.
2. Refer to the bolt tightening section (Section E) for acceptable methods of tightening bolts.
3. Bolt in place as many clips and flange braces as possible before raising frame to reduce in-the-air erection time.
4. It is the responsibility of the erector to provide temporary erection bracing until the structure is complete.
5. It is highly recommended that the erector consult with the overall project professional for advice on temporary bracing procedures.



STEP TWO

1. Raise first rafter beam and haunch frame section into place. All high strength bolts are to be snug tightened before raising.
2. Hold in place until this section is secured to columns and temporary bracing is tied off to hold frame in place.
3. If interior columns are present, install temporary bracing at interior columns, in addition to braces shown.

ASSEMBLE ROOF BEAM SECTIONS



BOLTING ROOF BEAM SECTIONS TOGETHER

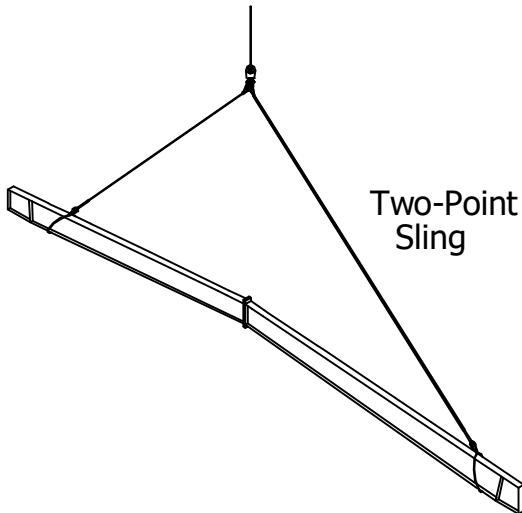
Rigid frame roof beams are shipped in two or more sections which must be bolted together at the jobsite. Layout and block up roof beams in the relative position of assembly. Butt sections together and align holes in the ridge plates, then bolt up. Draw bolts up evenly. When assembling frames on the ground, it is recommended that bolts be installed to the "snug tight" condition. After frames are lifted into position, tighten to "pretension" condition, if required.

See Section E for bolt installation and shimming requirements.

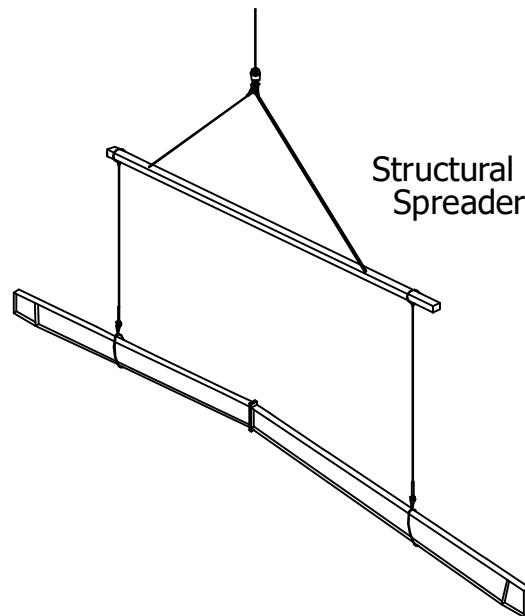
Primary Frame Assembly

Shown below are methods which may be used for rigging slings for lifting roof beam assemblies.

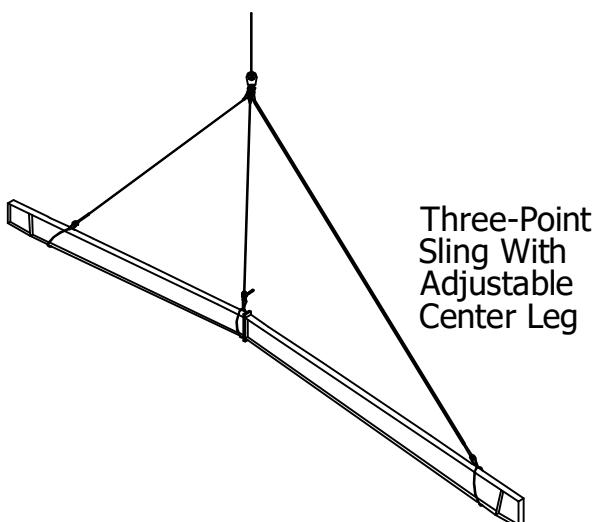
NOTE: Regardless of the method you use, make sure it is suitable and adequate for the job when considering the weight and size of the roof beam assemblies and hoisting equipment available. Roof beam sections are blocked up to facilitate assembly and to enable other parts to be attached.



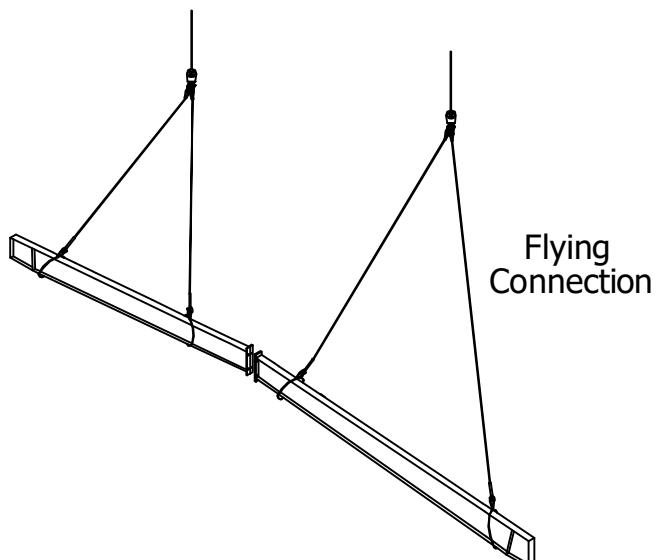
Two-Point Sling



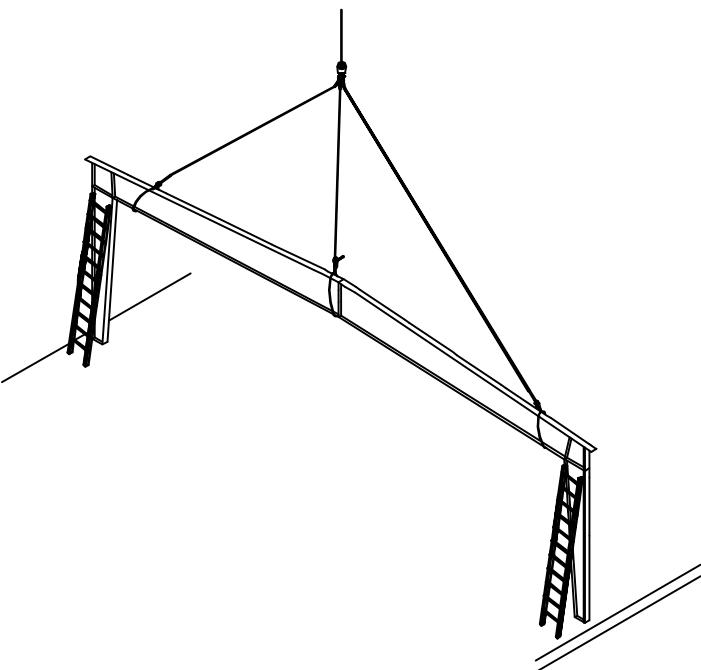
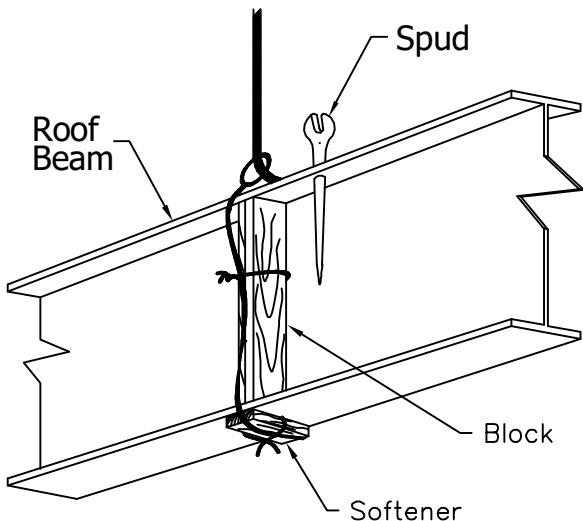
Structural Spreader



Three-Point Sling With Adjustable Center Leg



Flying Connection



SLING WITH SOFTENER

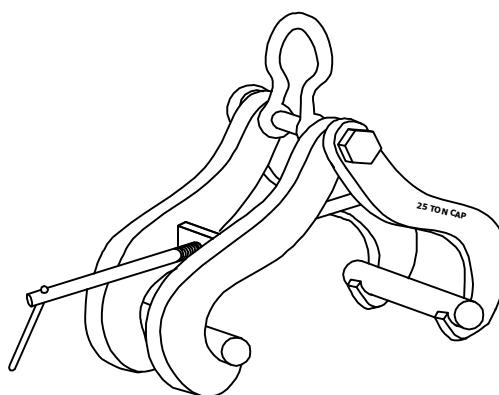
Block between flanges to avoid damage to roof beam. Softeners should be used at the sling connections to avoid damaging the chokers.

After the sling is secured to the roof beam assembly, make a test lift to determine if the sling is properly positioned. Insert a spud through the hole in the roof beam flange at the sling connections to prevent sling from slipping. The sling is correctly positioned when test lift indicates minimum frame distortion. Note the location of the sling connections for positioning on the remaining roof beam assemblies. While the roof beam assembly is still accessible from the ground, connect tag lines and guy lines for guiding the roof beam into place and tying off the rigid frame after erection.

Avoid inducing impact to roof beams when lifting or setting on the columns.

NOTE

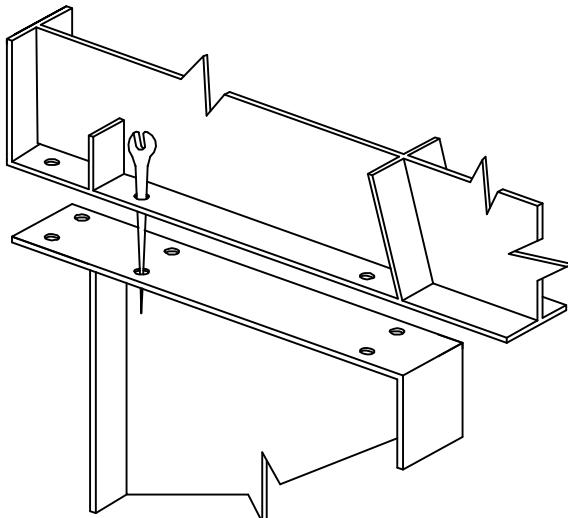
Beam clamps can be effectively used to facilitate the handling of roof beams. Beam clamps attached to the top flange of the beams permit the beam to hang naturally in a vertical position. A choker wrapped around the beam lifts from the bottom and the beam is easily unbalanced.



Beam Clamp

SETTING ROOF BEAM ON COLUMN (Face bolted connections similar)

Raise the roof beam assembly slowly and guide into position so roof beam flanges are aligned with column flanges and bolt in place.



USE OF SPUD WRENCH FOR ALIGNING HOLES

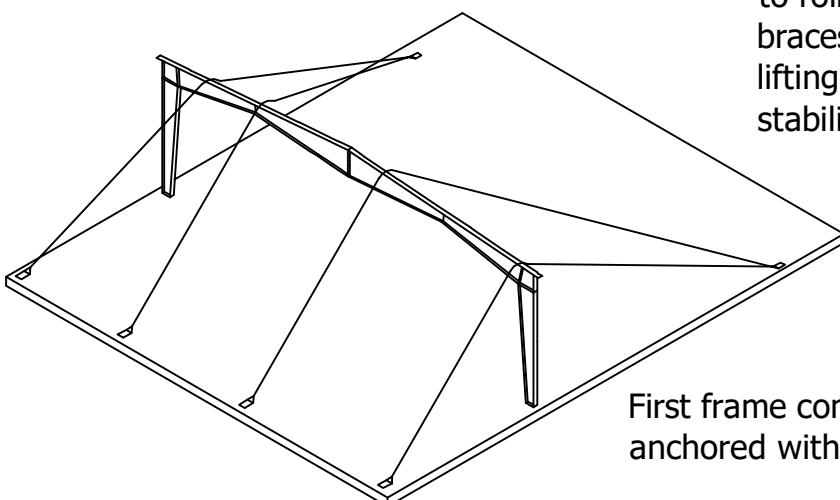
A spud wrench will be useful for aligning the holes. Secure the guy lines to stabilize the frame before releasing the crane.

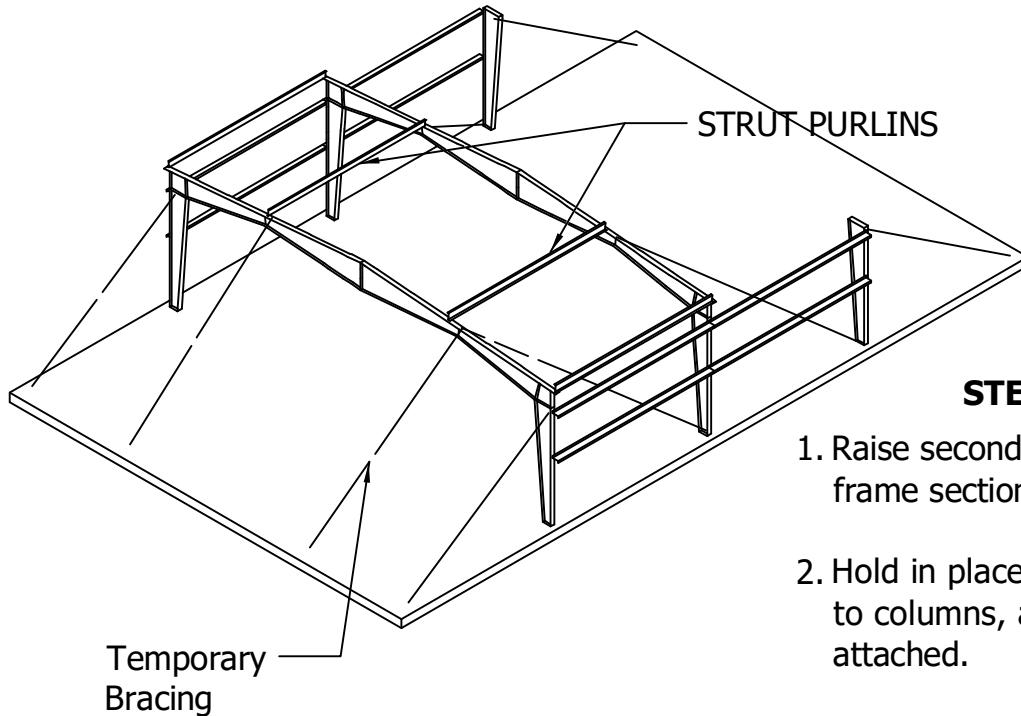
CAUTION

Be very careful when tilting the assembled roof beams into a vertical position to avoid twisting which can damage the flanges.

CAUTION:

Beams will have a tendency to roll over until secondary and flange braces are installed. Do not release lifting rigging until beams are stabilized.

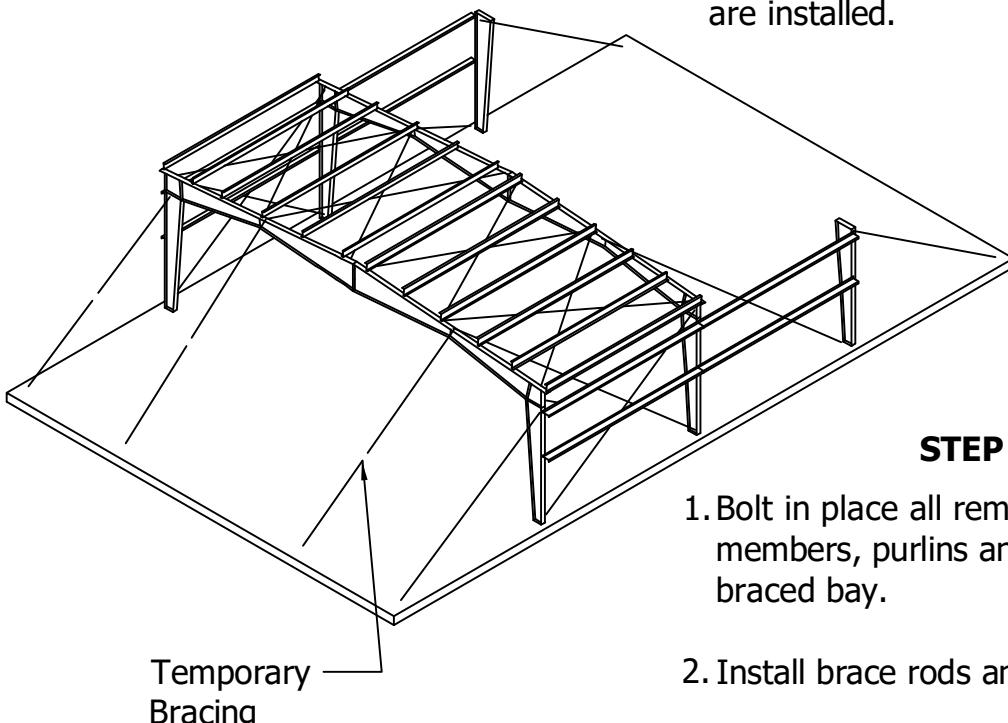


**STEP THREE**

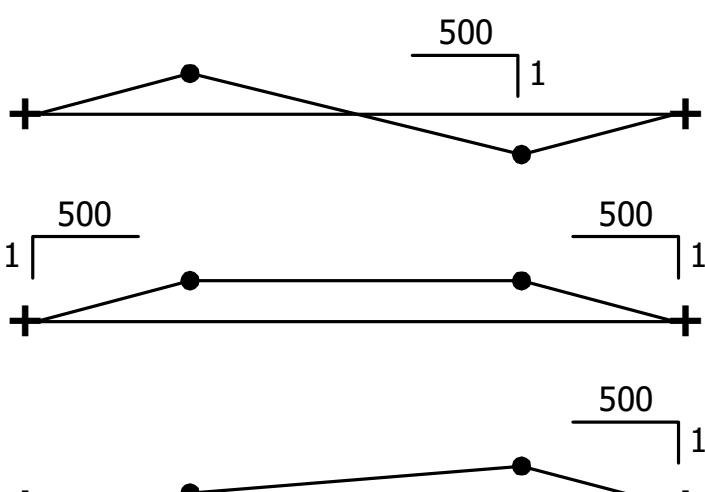
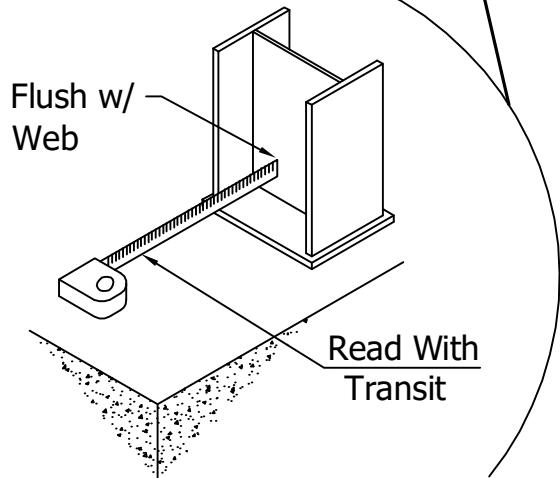
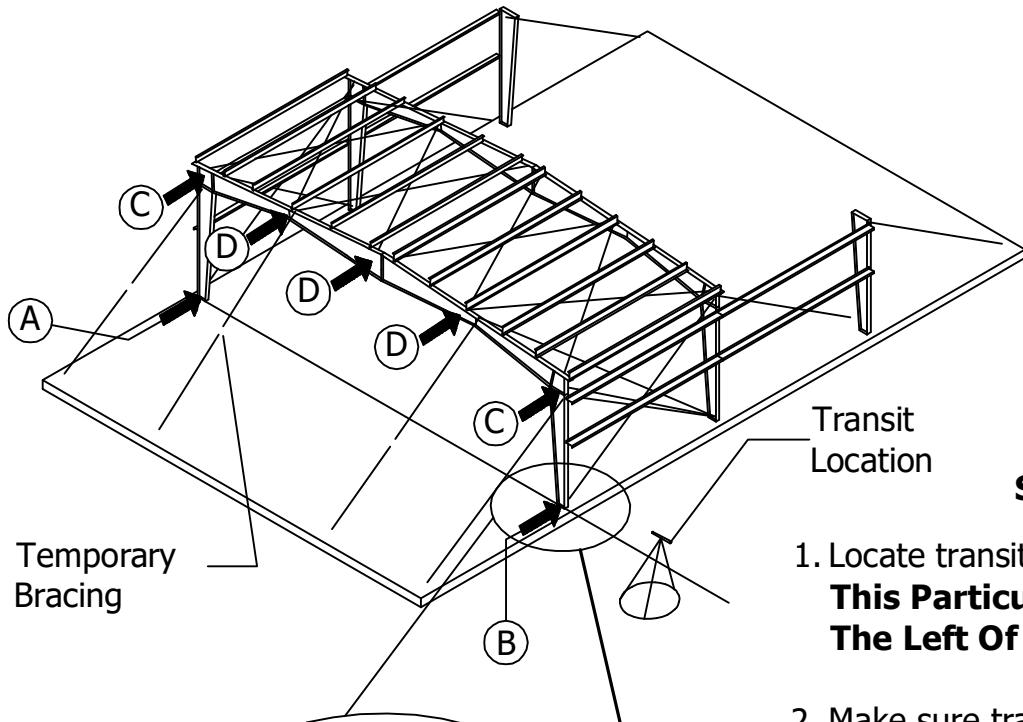
1. Raise second haunch and roof beam frame section.
2. Hold in place until this section is bolted to columns, and lead purlins have been attached.
3. Add brace near strut purlin, keeping **strut purlin in tension** until purlin can be stabilized with intermediate channel braces or sheeting.
4. Continue to "Leap Frog" temp. braces as additional frames and purlin struts are installed.

NOTE:

It is the responsibility of the erector to provide adequate temporary bracing.

**STEP FOUR**

1. Bolt in place all remaining eave members, purlins and girts of the braced bay.
2. Install brace rods and flange braces.
3. Square and plumb braced bay before erecting adjacent bays.

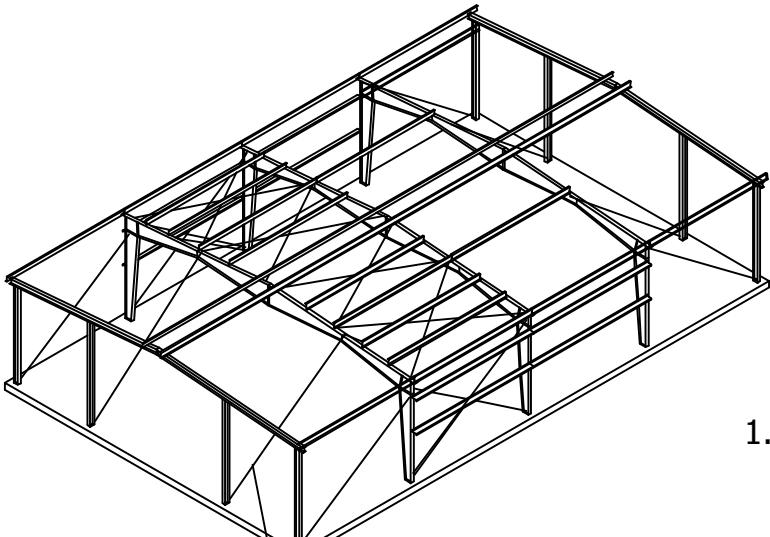


● Field Splices

+ Support Points

STEP FIVE

1. Locate transit as shown above (**In This Particular Case Slightly To The Left Of The First Rigid Frame**).
2. Make sure transit is perfectly level.
3. Rotate transit until you get the same exact tape reading at points A & B (Base Of Column.) Measure from web of column.
4. Lock horizontal rotation of transit.
5. Adjust rod bracing and temporary bracing until the tape reading at points A & B is obtained at all points indicated on above sketch. Take all readings from web of member.
6. Columns shall be plumb at points C to within; height (IN)/500.
EX. $\frac{25\text{ft} \times 12}{500} = \pm \frac{5}{8}\text{"}$
7. Beams shall be straight from column to column (field splices Points D) to; span (IN)/500.



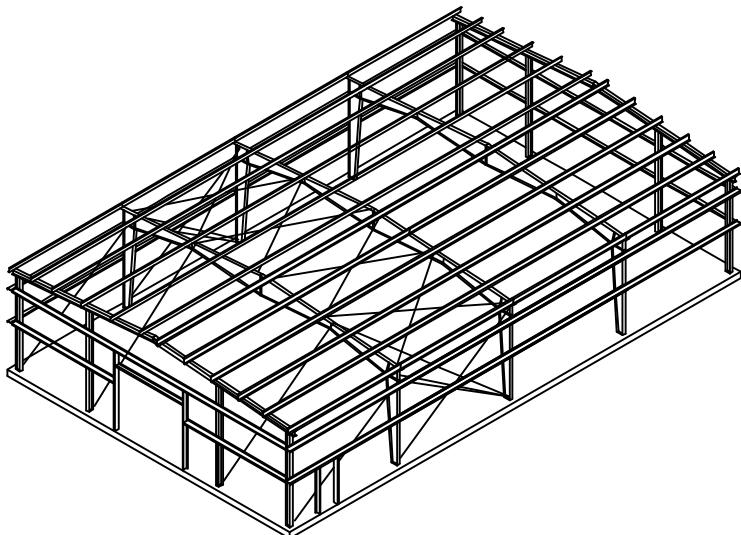
Temporary
Bracing

STEP SIX

1. Proceed with the erection of the remaining frames.
2. Plumb frames in longitudinal direction using similar procedure described in STEP 5. (Tolerance; \leq Height/500)

NOTE:

Remove temporary bracing only after all paneling has been installed.



STEP SEVEN

1. Complete erection of all primary & secondary components.
2. Note that after completion of all secondary framing in one end bay, attachment of roof panels may commence and be worked in conjunction with the completion of primary & secondary framing.

COLUMN BASE SHIMMING

Column bases may be shimmed to adjust for concrete, erection, and fabrication tolerances to accommodate fitup of other members and plumbing / leveling.

Leveling of pinned base columns can be accomplished by placement of steel shims under the column base plates shown in Figure G-1.

Erector to supply rectangular shim plates. Shim packs may be used (I.E.- multiple shim plates may be stacked to desired thickness).

Shimming between multiple rows of anchor rods is not required as shown in Figure G-1. Place shim packs from edge of base plate to anchor rod as shown. Shims plates shall be same width as base plate.

Threads of nuts must be fully engaged on anchor rod. End of rod must be at least flush with top of nut. See Figure G-2.

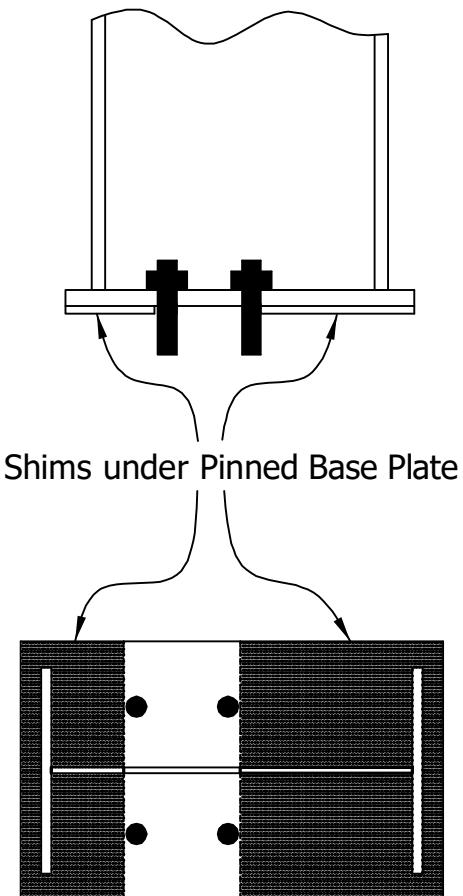


Figure G-1

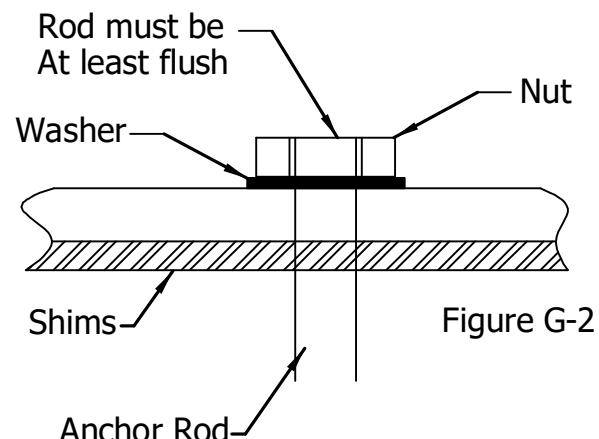
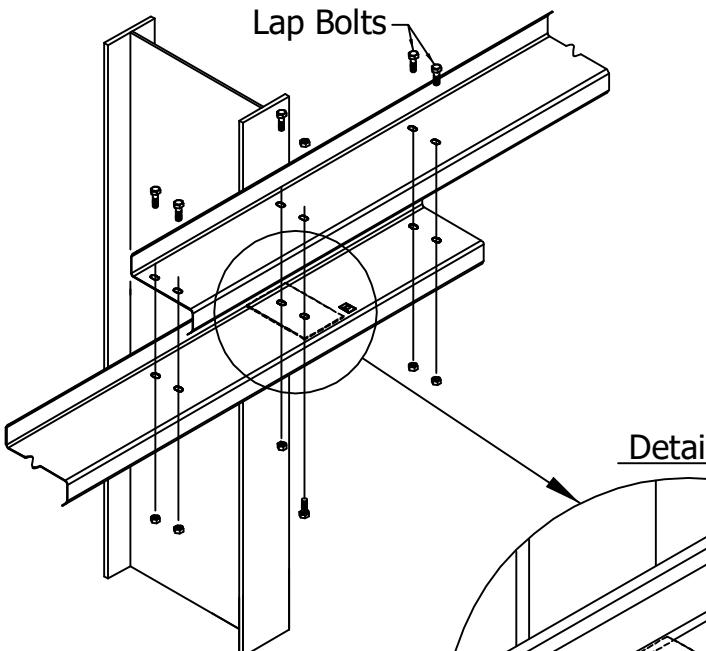
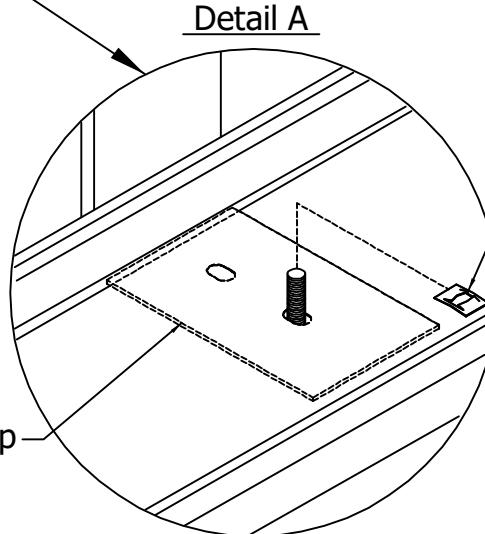


Figure G-2

Secondary Installation



Standard girt connection shown. Flipped connections similar, but opposite direction.



- Recommended procedure for safe installation of girts. Erector option to use other OSHA compliant methods.

- Attach 1st member to clip w/bolt and retainer as shown in Detail A.

- Install 2nd member over 1st member and retained bolt.

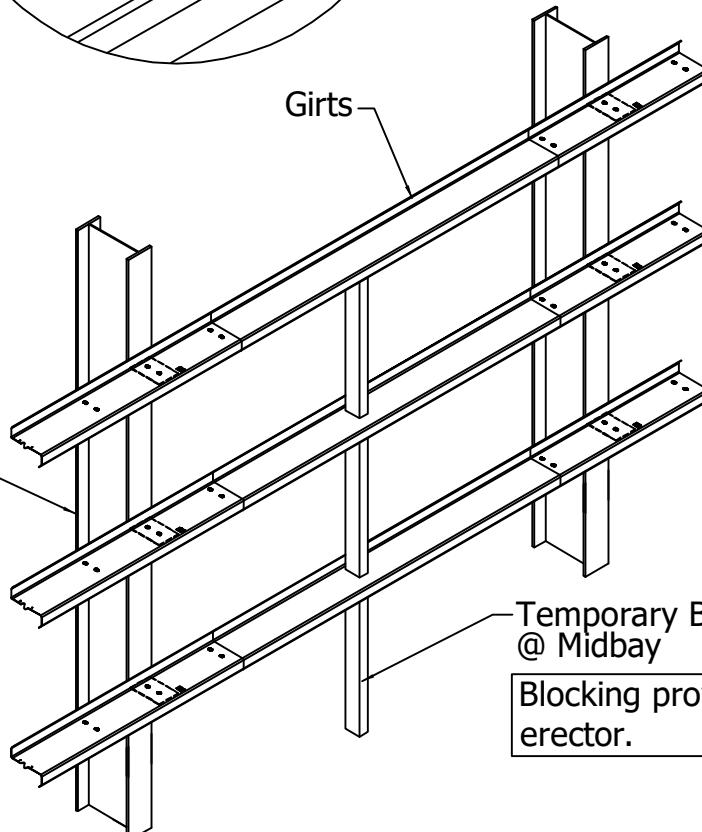
- Install remaining bolts and nuts to complete the lapped joint.

Bolt Retainer (97635)
Commercially available, or may be purchased thru BBNA.

ORIENTATION IS CRITICAL:
Install bolt retainer on bolt with prongs out..

WALL GIRT BLOCKING

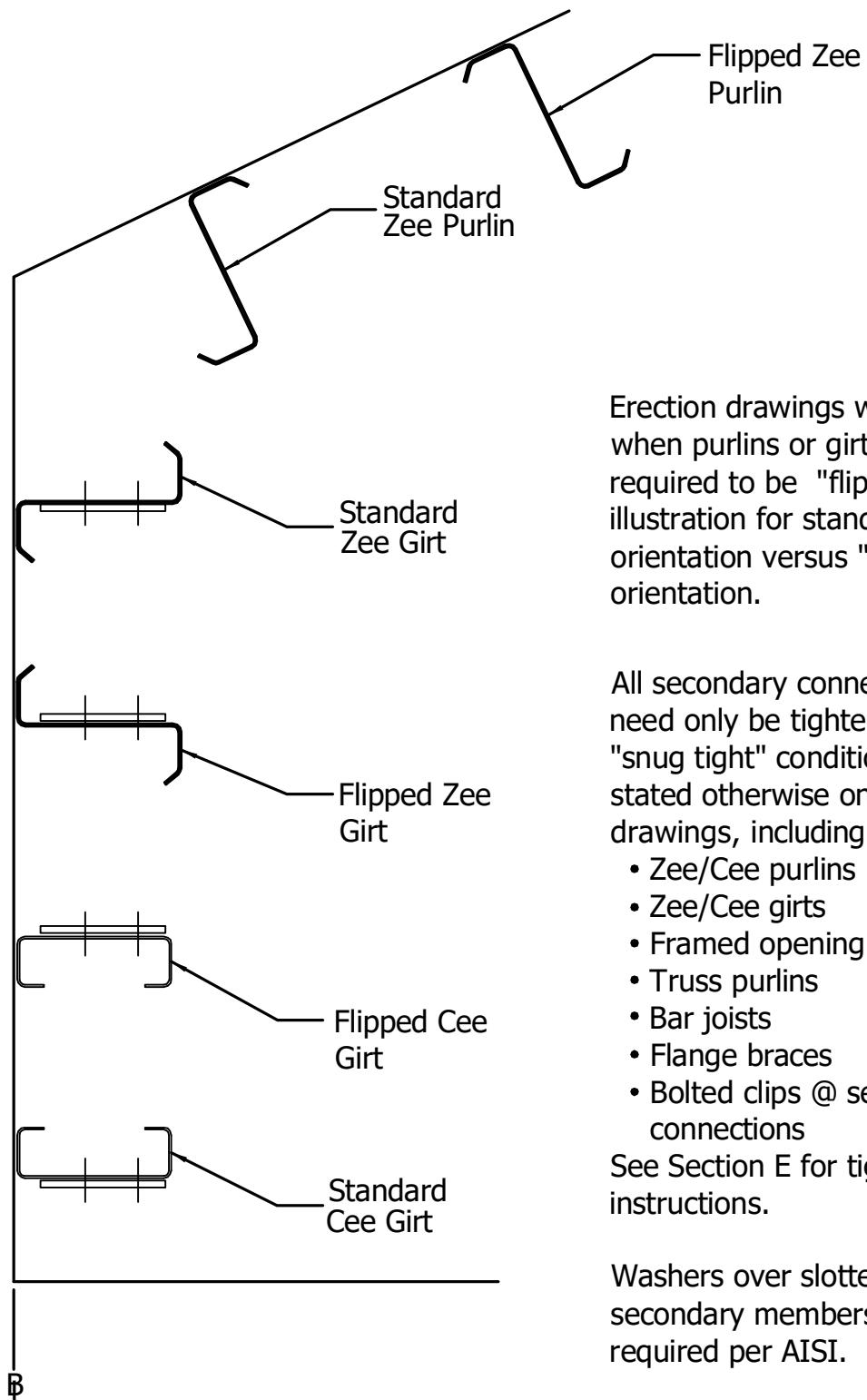
Temporary blocking of girts is required to ensure girts are straight and level prior to installation of panels.



Girts and Purlins shall be installed to L/500 straightness tolerance.

$$\text{EX. } \frac{25\text{ft} \times 12}{500} = \pm \frac{5}{8}''$$

Standard & Flipped Secondary Orientations



Erection drawings will indicate when purlins or girts are required to be "flipped". See illustration for standard orientation versus "flipped" orientation.

All secondary connections need only be tightened to "snug tight" condition unless stated otherwise on erection drawings, including:

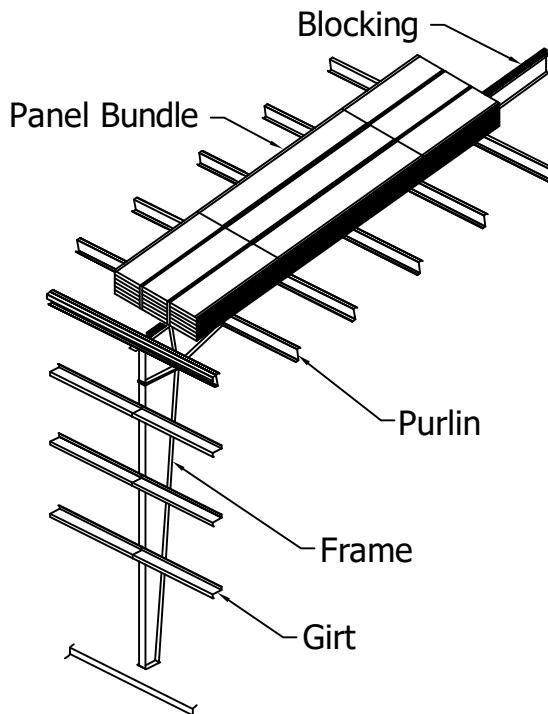
- Zee/Cee purlins
- Zee/Cee girts
- Framed opening members
- Truss purlins
- Bar joists
- Flange braces
- Bolted clips @ secondary connections

See Section E for tightening instructions.

Washers over slotted holes in secondary members are not required per AISI.

GIRT/PURLIN ORIENTATION

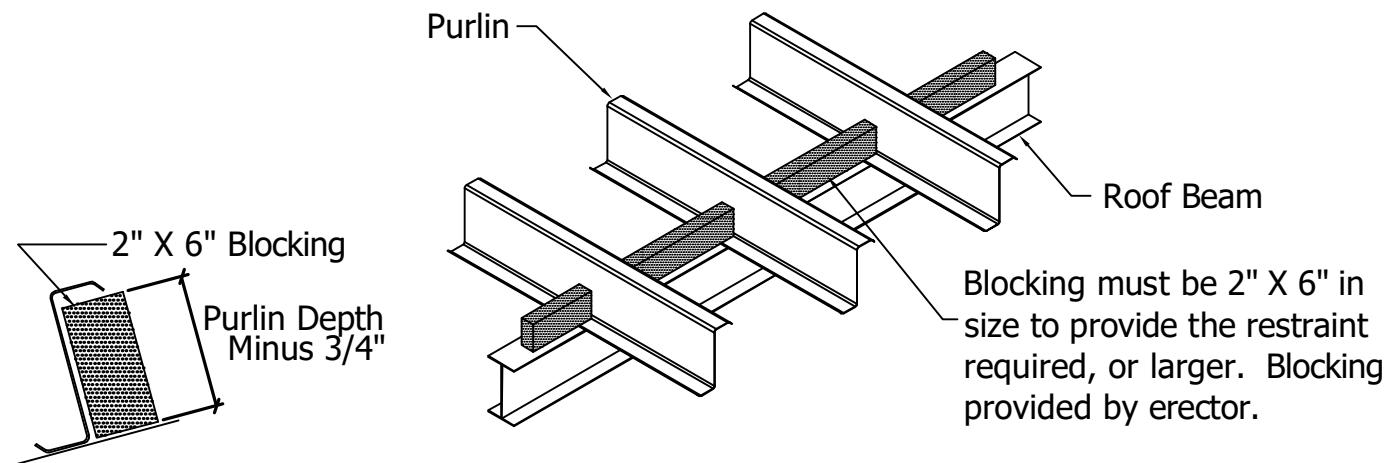
ROOF PURLIN BLOCKING



Roof panel bundles are often located on the roof structurals prior to installation.

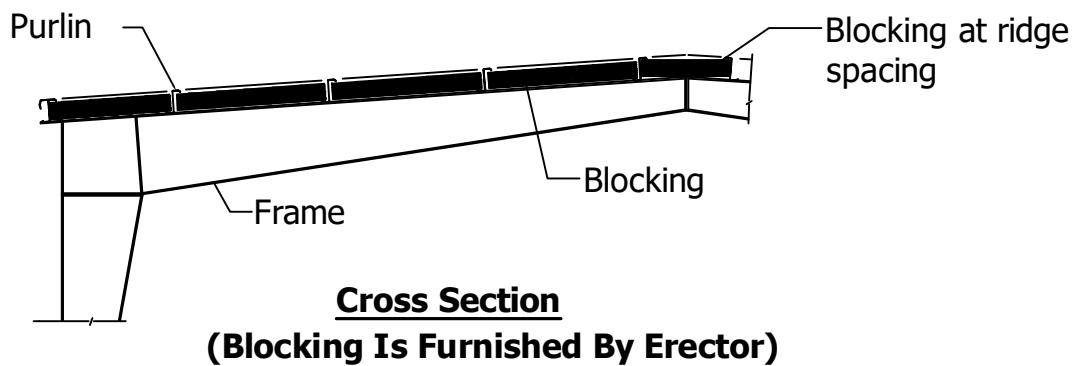
This procedure can cause damage if the bundles are located over unsupported areas. If the bundles are to be located on the roof structurals, adhere to the following blocking procedure.

1. All structurals, flange bracing, permanent and temporary bracing, etc. must be in place and plumb. Tighten bolts before blocking is installed and panel bundles are placed on the roof.
2. Panel bundles should only be located over centerlines of frames, not over jack beams or jack trusses.



**ALTERNATE
BLOCKING METHOD**
(SEE NOTE 5)

3. Blocking should be installed between all purlins at frames where bundles are to be located.
Length of blocking should be equal to purlin spacing.
4. Remove blocking after panels are installed.
5. When the alternate blocking method is used, the same procedures must be followed.



- Install all purlin channel braces or sag bracing **BEFORE** installing roof panels. See erection drawings for locations and details.

SECONDARY TRUSS PURLIN INSTALLATION

BlueScope Building's widebay truss purlins are factory bolted assemblies of cold-form light gauge components and are proprietary to BlueScope Buildings NA. As typical of any long span member, maintaining stability during erection is critical to safety and efficiency.

While TP's are NOT bar joists, most OSHA erection safety requirements and erection sequences required by OSHA also apply to TP's.



UNLOADING & SORTING

TP's are delivered in bundles in sequence order for each bay. Bundles should be located as near as possible to where shown on bundle layout drawings to minimize handling.



PANELIZED ERECTION (Super Set)

When sufficient equipment is available, panelized erection techniques are most efficient. Assemble an entire bay module on the ground and lift entire assembly at once.

Install ALL components including;

Rafters sections, all TP's, flange braces, top and bottom chord bridging, cross bridging, roof rod braces (if required in the bay), and tighten all bolts to snug tight condition.



Once assembled, the entire bay module is lifted into place. When using one crane to make the lift, be sure to use appropriate spreader bars to lift both rafter sections with approximately vertical picks.

STICK ERECTION

When installing TP's individually, both TP seats **MUST BE** bolted to the frame **PRIOR** to releasing hoist cable. If seats are welded, then welding must be completed before releasing hoist cables.

When erecting individual pieces, preassemble cross braced TP'S on the ground as shown. These are the terminus points for all other TP's in each bay. Be sure tag ends are on same end and installed per drawings.



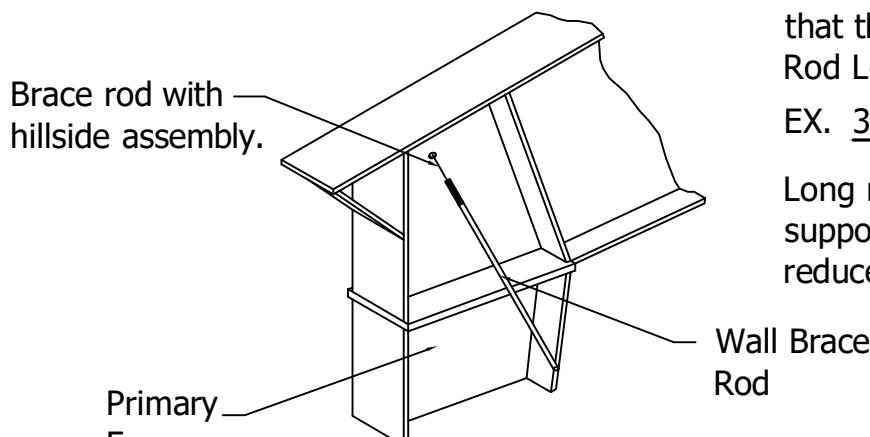
Install terminus TP's first then fill in other TP's tying them together with horizontal bridging as installation progresses.

DO'S AND DON'TS

- Out-of Straightness erection tolerance - L/500
- Follow all requirements found in the OSHA Regulations.
- **No load** is premitted on any truss purlin other than the weight of one person until all bridging is installed.
- **AFTER** all bridging is installed and tied off to terminus brace temporary construction loads may be loaded onto TP's over primary frames extending evenly either side of primary frame. Total uniform weight (PSF) shall not exceed design uniform load shown on drawings.
- **DO NOT** cut or modify TP's in any way.
- **DO NOT** weld to TP's unless approved by engineering.
- **DO NOT** loosen or remove factory installed bolts. Factory installed bolts are installed with specially designed calibrated tightening tools specifically designed for the specialized proprietary hardware used in the assembly.
- For hanging loads from TP's, see erection drawing B-081769 for details.

ROD BRACING

SECTION I

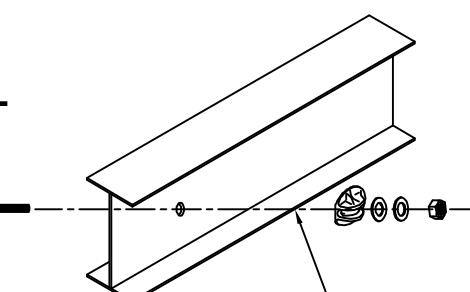
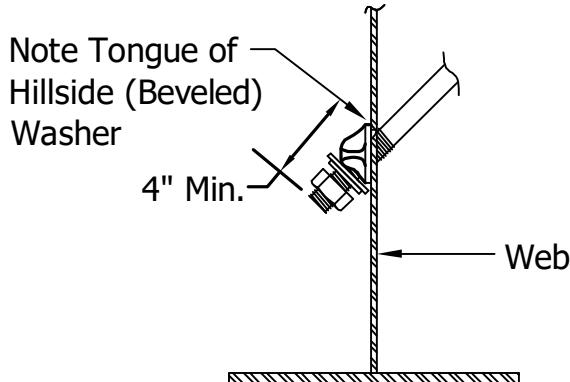


Rod braces shall be tightened snugly such that the rod does not sag more than the Rod Length(Inches)/500.

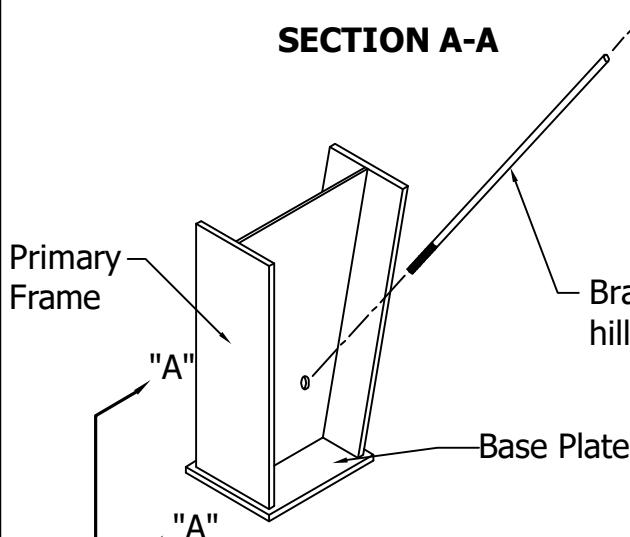
$$\text{EX. } \frac{35\text{ft rod} \times 12}{500} = \pm \frac{13}{16}^{\prime\prime}$$

Long rods may require intermediate support from roof secondary members to reduce sag.

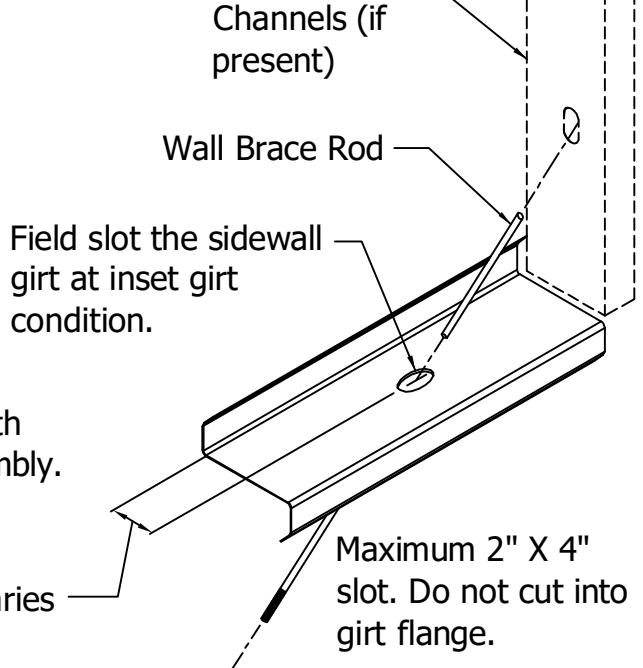
WALL BRACE DETAIL



ROOF BRACE DETAIL



WALL BRACE DETAIL



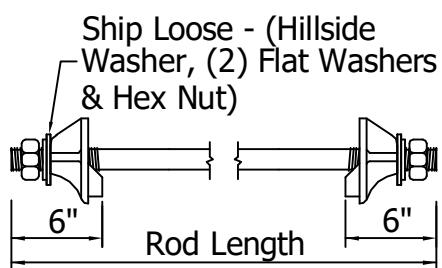
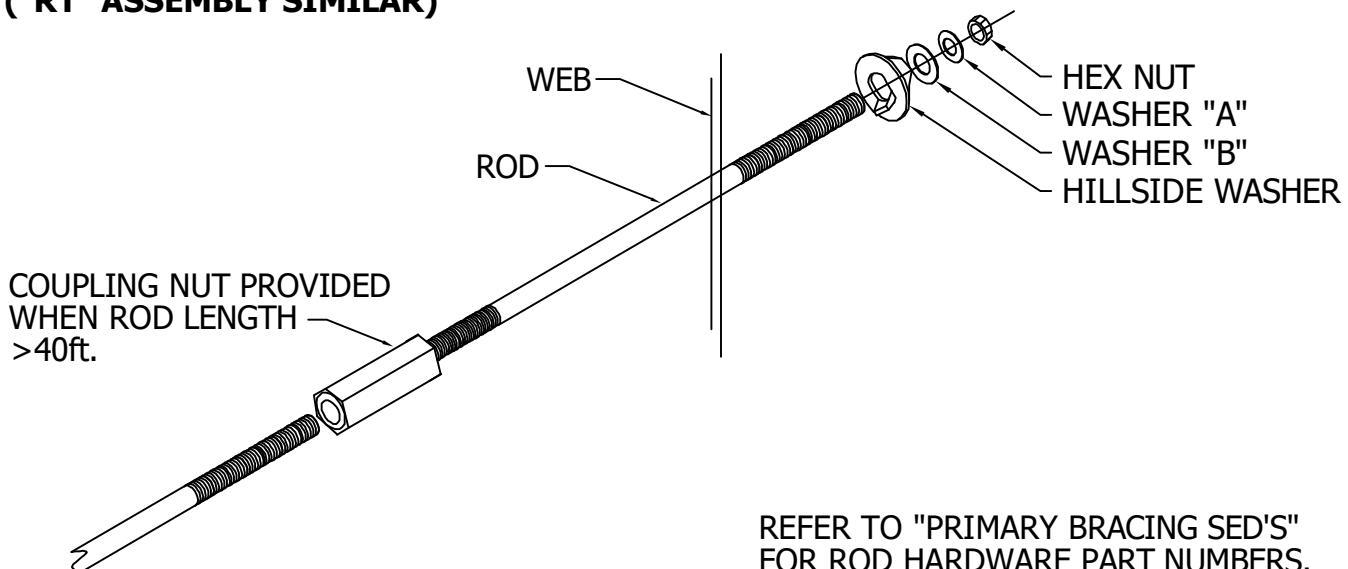
WALL BRACE DETAIL THRU INSET GIRT

Rod bracing "assembly" mark numbers are indicated on erection drawings. These mark numbers define all the parts needed to make up the "assembly". "Assemblies" that require more than one rod will be shipped bundled together with the "assembly" part mark attached. Assembly codes and required parts are shown below.

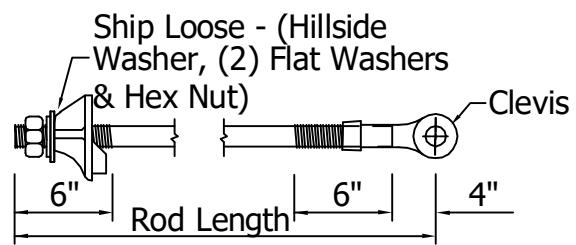
Typical "Assembly" Generated Mark Number (Example)

ROD BRACING
0 3 R S 2 5 1 0 —— Means 3/8" diam rod: RS assembly code: 25'-10" long
I E * * F F I I F = FEET I = INCHES E = EIGHTHS
DIA LENGTH

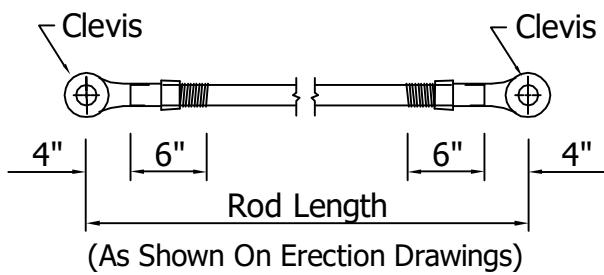
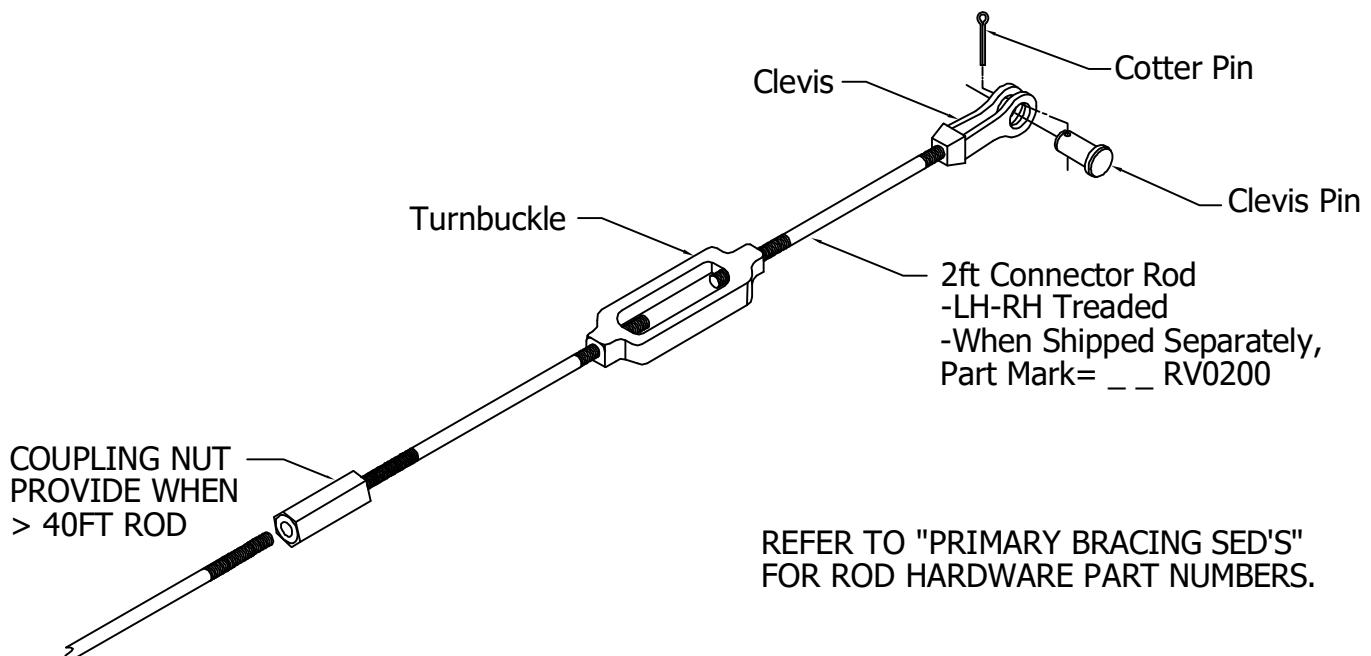
"RS" ROD BRACE ASSEMBLY ("RT" ASSEMBLY SIMILAR)



RS RODS THREAD BOTH ENDS
WITHOUT TURNBUCKLE



RT RODS
CLEVIS ONE END

"RU" ROD BRACE ASSEMBLY**RU RODS CLEVIS BOTH ENDS****THREAD PROTECTION REFERENCE KEY FOR ROD BRACING**

SLEEVE COLOR	ROD DIAMETER
BLUE	3/8"
BLACK	1/2"
RED	5/8"
YELLOW	3/4"
ORANGE	7/8"
GREEN	1"
WHITE	1 1/8"

**ROD BRACE THREAD PROTECTION
COLOR CODE KEY**

CRANE RUNWAY ALIGNMENT

CRANE SYSTEMS MUST BE INSTALLED IN STRICT ACCORDANCE WITH CRANE MANUFACTURERS INSTRUCTIONS. ALL STEEL SUPPORT FRAMING MUST BE PLUMBED AND ALIGNED CAREFULLY FOR PROPER OPERATIONS.

IF CRANE MANUFACTURERS INSTRUCTIONS CONFLICT WITH INSTRUCTIONS BELOW, THE STRICTER INSTRUCTIONS SHALL GOVERN.

- Crane support columns shall be erected plumb not to exceed $\pm 3/8"$ from column base to crane beam elevation.
- Crane runway beams shall be installed to tolerances shown in Table A. below.
- Crane rails shall be aligned as shown in Figure J-1. Bearing pads under rails are highly recommended to reduce vibration and noise.

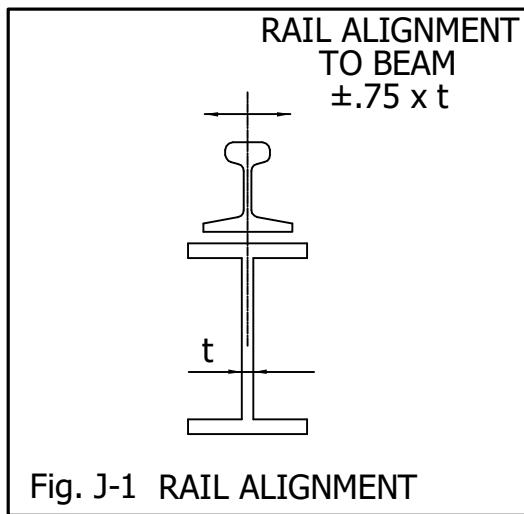


Fig. J-1 RAIL ALIGNMENT

- Absolutely NO FIELD WELDING is allowed unless specifically shown on drawings or authorized by a registered engineer. Weld metal and base metal fatigue shall be considered in weld design.
- Crane operations cause vibrations in building components. Bearing pads, clamps, and ties (by others) may be required to minimize vibration noise.
- Construction tolerances in concrete elevations, steel fabrication tolerances, and erection tolerances may require field shimming of crane support beams to achieve proper elevation and alignment.

TABLE A
CRANE RUNWAY BEAM ERECTION

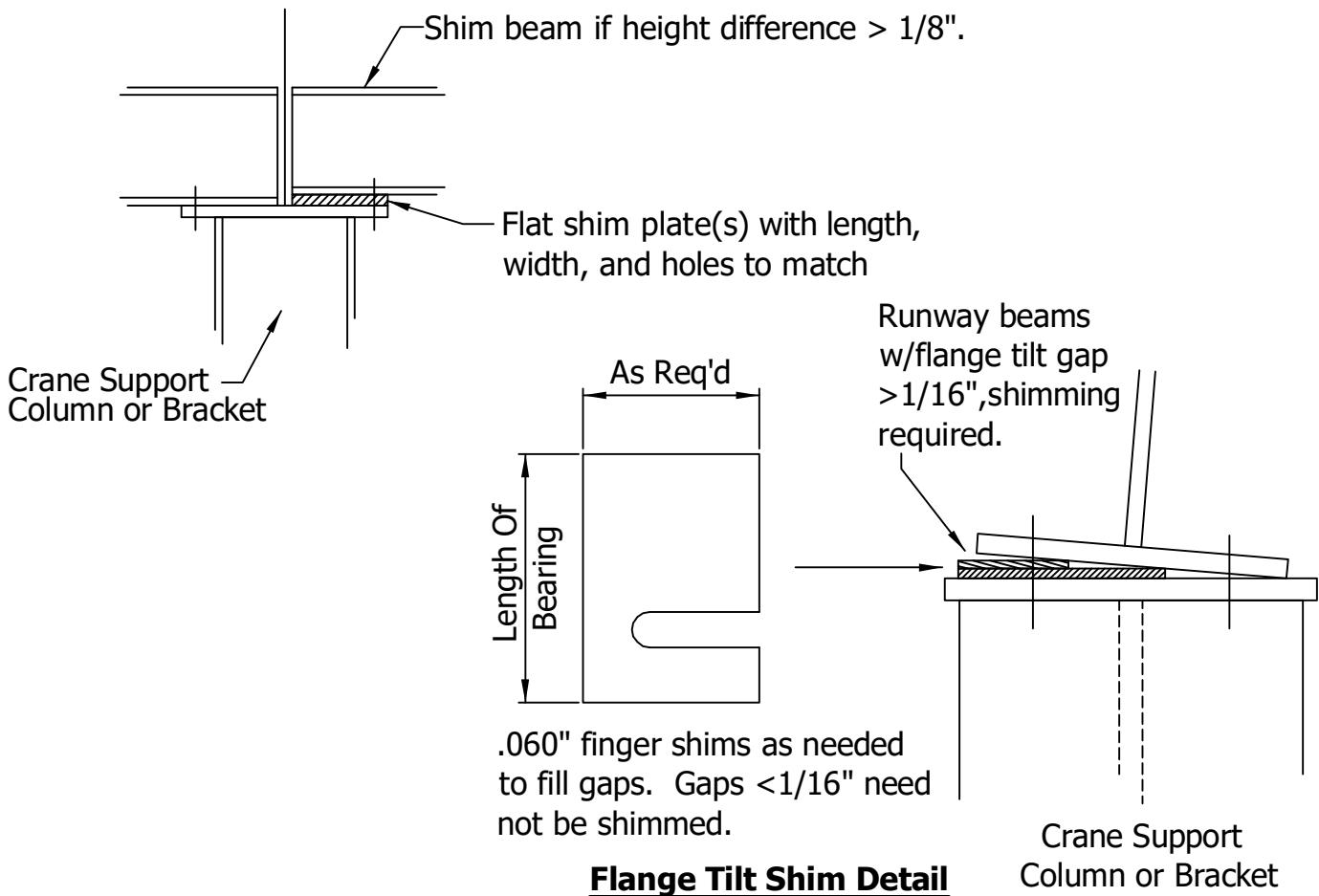
Item		Tolerance	Maximum Rate of Change
Span	<p>L = L+A (Max)</p> <p>L = L-A (Min)</p> <p>Theoretical Span</p> <p>WEB</p> <p>Support Points (Typical)</p>	A=3/8"	1/4" per 20'
Straightness	<p>Top of beam for top running crane. Bottom of beam for underhung crane.</p> <p>B</p> <p>WEB</p> <p>Support Points (Typical)</p> <p>Theoretical C</p> <p>B</p>	B=3/8"	1/4" per 20'
Elevation	<p>Top of beam for top running crane. Bottom of beam for underhung crane.</p> <p>C</p> <p>Support Points (Typical)</p> <p>Theoretical Height</p> <p>C</p>	C=3/8"	1/4" per 20'
Beam to Beam Top Running	<p>D</p> <p>Top Running</p>	D=3/8"	1/4" per 20'
Beam to Beam Underhung	<p>E</p> <p>Underhung</p>	E=3/8"	1/4" per 20'
Adjacent Beams	<p>F</p> <p>Top Running</p> <p>F</p> <p>Underhung</p>	F=1/8"	NA

Ref: AISI Design Guide 7

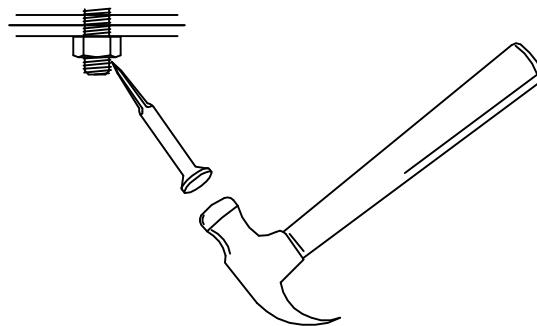


SHIMMING

Shimming may be necessary for runway beam height adjustments and vertical alignment. Shimming is considered to be part of erection process.



- Column bases are recommended to be double nut Anchor Rods and grouted after runway system is installed and leveled.
- See Chapter G for column base shimming for column bases.
- After all crane supports and rails are installed and all bolts are fully tightened to pre-tensioned load, ping thread with chisel to prevent nuts from loosening due to vibrations.



FIELD WELDING

Field welded joints must be done in strict compliance with BBNA erection drawings, and the appropriate welding specification shown below.

<u>IN USA</u>	<u>IN CANADA</u>
AWS D1.1- Structural Welding Code - Steel	CSA W59 - Welding Steel Construction (metal arc welding)
AWS D1.3- Structural Welding Code - Sheet Steel	AWS D1.3- Structural Welding Code - Sheet Steel

- Field welds must be done by welders qualified and approved for this type of welding, joints, and position required.
- In USA, the contractor is responsible for preparing a Welding Procedure Specification (WPS).
- In CANADA, the contractor is responsible for preparing Welding Procedure Data Sheet (WPDS).

WPS / WPDS forms and welder qualification certificates must be kept at the job site and made available upon request. In joints where the required procedure is not a pre-qualified joint, a Procedure Qualification Report (PQR) with appropriate testing must be prepared to qualify the weld procedure.

When specified on erection drawings, cost for field welding, qualification costs, inspection costs, or NDT tests are not the responsibility of BBNA.

BlueScope weld designs are based on the use of weld filler metal meeting the following:

- 70 ksi ultimate strength
- Min. 20 ft-lbs @ 0 degrees F impact strength
- Low-hydrogen process

WELDING THRU COATINGS

AWS D1.1 Sec 5.15 provides that: "... welded surfaces be free from loose or thick scale, slag, rust, moisture , grease, and other foreign material that would prevent proper welding or produce objectionable fumes. Mill scale that can withstand vigorous wire brushing, a thin rust-inhibitive coating, or antispatter compound may remain with the following exception: for girders in cyclically loaded structures, all mill scale shall be removed from surfaces on which flange-to-web welds are to be made."

Field welding thru BBNA standard shop coat and pre-galvanized steel is permitted. BBNA shop coat is a nominal 1.0 mil (.001") coating and galvanized surfaces (i.e.- up to G90 coating , .002") are considered to comply with the "thin rust-inhibitive coating" criteria anticipated by AWS.

Post fabricated hot dipped galvanized members with thicker coating (i.e.->.002") has the potential of zinc entering the liquid weld metal causing cracking. Hot dip coatings must be ground off before welding.

Infrequent field welding of galvanized or shop coated members in open areas is not a health risk or hazardous issue. However vented welding hoods or other fume evacuation methods are recommended.

When field welding thru coatings, the coating is destroyed in the area of welding and must be touched up after metal has cooled.

INSPECTION OF FIELD WELDED JOINTS

Inspection shall be done as required by the local building official or project professional (AHJ). As a minimum, weld inspection tasks are as follows unless waived or modified by the AHJ. Field inspection costs are not the responsibility of BBNA.

Inspection Tasks

QC = Quality Control tasks are to be completed by the erectors QC Inspector (QCI). QC personnel shall be qualified to satisfaction of erector's QC program and as a minimum with any of the following;

- Associate welding inspectors (AWI) or higher per AWS B5.1, Standard for the Qualification of Welding Inspectors.
- Current or previous certification as an AWS Certified Welding Inspector (CWI) per AWS QC1.
- Current or previous certification as a CWB Welding Inspector per CSA W178.2
- An individual who, by training or experience, or both, in metals fabrication, inspection and testing, is competent to perform inspection work.

QA = Quality Assurance task are to be completed by a 3rd party inspection agency when a QA firm is required by AHJ or owner. The QA firm must be pre-approved by the AHJ. Quality Assurance Inspectors (QAI) shall be qualified to satisfaction of QA agency's written practice.

O = Observe. "Observe" is defined as; "Observe on a random basis. Operations need not be delayed pending these inspections.

P = Perform these tasks for each welded joint or member.

Table K-1

<u>Inspection Tasks PRIOR to Welding</u>	QC	QA
Welding procedure specifications (WPS or WPDS) available	P	P
Manufacturer certifications for welding consumables available	P	P
Material Identification (type/grade)	O	O
Welder identification system (the erector shall maintain a system by which a welder who has welded a joint can be identified)	O	O
Fit-up of groove welds (including joint geometry) <ul style="list-style-type: none"> • Joint preparation • Dimensions (alignment, root opening, root face, bevel) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location) • Backing type and fit (if applicable) 	O	O
Configuration and finish of access holes	O	O
Fit-up of fillet welds <ul style="list-style-type: none"> • Dimensions (alignment, gaps at root) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location) 	O	O
Check welding equipment	O	--

Table K-2

<u>Inspection Tasks DURING Welding</u>	QC	QA
Use of qualified welders	O	O
Manufacturer certifications for welding consumables available <ul style="list-style-type: none"> • Packaging • Exposure control 	O	O
No welding over cracked tack welds	O	O
Environmental conditions <ul style="list-style-type: none"> • Wind speed within limits • Precipitation and temperature 	O	O
WPS followed <ul style="list-style-type: none"> • Settings on welding equipment • Travel speed • Selected welding materials • Shielding gas type/flow rate • Preheat applied 	O	O

<u>Inspection Tasks DURING Welding</u>	QC	QA
Welding techniques <ul style="list-style-type: none">• Interpass and final cleaning• Each pass within profile limitations• Each pass meets quality requirements	O	O

Table K-3

<u>Inspection Tasks AFTER Welding</u>	QC	QA
Welds cleaned	O	O
Size, length and location of welds	P	P
Welds meet visual acceptance criteria <ul style="list-style-type: none">• Crack prohibition• Weld/base-metal fusion• Weld profiles• Weld size• Undercut• Porosity	P	P
Arc strikes	P	P
k-area. When welding in k-area of hot rolled shapes, visually inspect the web k-area for cracks within 3" of weld	P	P
Backing removal and weld tabs removed (if required)	P	P
Repair activities	P	P
Document acceptance or rejection of welded joints	P	P

Non-Destructive Testing (NDT)

NDT testing of field applied welds (other than visual), when required, shall be performed by QA Agency (3rd party) by qualified NDT personnel for the type of NDT specified.

Design and recommended installation procedures are subject to change at any time, due to continued development work by Varco Pruden Buildings.

• • •

All panels formed from light gauge metal may exhibit waviness, also known as "Oil-Canning," commonly occurring in, but not restricted to, flat portions of a panel. This inherent characteristic is not a defect of material or manufacturing and is not cause for rejection.

• • •

For field installation questions, call your local VP Service Center. The job number is included on all building plans:

Arkansas:870-534-6030

California:.....559-651-5300

Missouri:.....816-238-7550

North Carolina:336-996-4801

Wisconsin:608-882-5000



Varco Pruden Buildings, 3200 Players Club Circle, Memphis, TN 38125
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BlueScope Buildings North America, Inc. www.vp.com

4001 Basic Erection Guide
Form: EG-901902 Issued: 1968
Revision: 13 Revised: 3/20

Fabrication Quality Control Procedures

QUALITY ASSURANCE



FEATURES

- Metal Building Manufacturer's Association (MBMA) Member
- Cool Roof Rating Council (CRRC) Member
- US Green Buildings Council (USGBC) Member
- Products available to meet EnergyStar ratings

BENEFITS

- Architects, specifiers and building owners rely on Varco Pruden Buildings. Our systems are tested and proven to deliver long-term performance with lower life-cycle costs.
- VP Buildings conform to the highest industry standards for design and manufacturing, giving peace of mind that your building will stand the test of time.

CERTIFICATIONS

Varco Pruden meets or exceeds North American manufacturing and construction standards



Varco Pruden Buildings is a division of BlueScope Buildings North America. Varco Pruden, through BSBNA, meets or exceeds a wide variety of manufacturing standards.

Some of our certifications include:



IAS ACCREDITED — The International Accreditation Service has accredited all of VP's domestic manufacturing facilities as having met the standards set forth in International Building Code section 1704.2.2 and section 1701.7 of the Uniform Building Code.



USGBC MEMBER — The U.S. Green Building Council (USGBC) is a non profit organization dedicated to expanding green building practices and education, and its LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™. LEED addresses all building types and emphasizes state-of-the-art strategies in five areas: sustainable site development, water savings, energy efficiency, materials and resources selection, and indoor environmental quality.



FACTORY MUTUAL is one of the foremost testing entities in the construction industry. VP has approvals for SSR and SLR Roof assemblies.



ASTM International is a trusted source for technical standards for materials, products, systems, and services. VP's products, tested in accordance with ASTM standards, are listed where applicable and available upon request.



COOL ROOF RATING COUNCIL (CRRC) — One of the first manufacturers to introduce "Cool" colors for roofing panels, VP has products that meet cool performance levels established by the CRRC.



ENERGY STAR® is a program designed to provide businesses and consumers with energy-efficient solutions that save money on utility bills and reduce energy waste. VP continues to increase the quantity and quality of products available to help meet government energy-efficiency requirements.



CONSTRUCTION SPECIFIERS INSTITUTE —

Architects interested in specifying VP Buildings will find the CSI 3-part spec standard.



CANADIAN WELDING BUREAU — VP Buildings

products are recognized for quality assurance by The Canadian Welding Bureau (CWB), a certification body accredited by the Standards Council of Canada.



Varco Pruden Buildings, 3200 Players Club Circle, Memphis, TN 38125

©All rights reserved. Varco Pruden Buildings® is a division of BlueScope Buildings North America, Inc. Varco Pruden meets or exceeds the most comprehensive testing and compliance standards in the building system industry. To learn more about our products, services and qualifications, visit our website, www.vp.com. **Building Solutions... one relationship at a time.**

ICC EVALUATION REPORTS

SSR Roof System – #ESR-2527



STATE OF FLORIDA PRODUCT APPROVAL

Wall Panels FL-12762

Roof Panels FL-12763 & FL-14004

PrisMAX Skylight FL-17998



DADE COUNTY FLORIDA PRODUCT APPROVAL

SSR Roof NOA:16-0802.07

Panel Rib Roof NOA:14-0123.12

Panel Rib Wall NOA:14-0627.09

Vee Rib Wall NOA:14-0606.10



UNDERWRITER'S LABORATORIES



WIND UPLIFT APPROVAL

SSR Roof-UL#TGKX-113;

SSR Composite Roof Class 90 TGKX-113A

SSR Roof w/Super Block Class 90 TGKX-328

Panel Rib Roof UL Class 60 TGKX-60

Panel Rib Roof UL Class 90 TGKX-64

VP SLR/AEP SL Roof Class 90 TGKX-90; TGKX-176;

TGXK-180; TGKX-238; TGKX-238A; TGKX-238B;

TGXK-435; TGKX-435A



FACTORY MUTUAL APPROVED ASSEMBLIES

SSR & SLR roof systems are approved in various applications and are listed in the FM Approval Guide.

24 Ga SSR is available in Class 1-60, 1-90.

22 Ga SSR is available in Class 1-90, 1-120.

24 Ga SLR is available in Class 1-75, 1-120.



U.S. CORPS OF ENGINEERS

ASTM E-1592 for SLR Roof & SSR Roof



AIR & WATER FILTRATION APPROVAL

Test results available on all VP Wall & Roof Panels

FIRE CODE COMPLIANCE – ICC, UL, & FACTORY MUTUAL

VP steel roof systems are ICC Class A fire rated roof assemblies. UL fire resistance ratings of 1 to 1-1/2 hours are available for roof and wall assemblies per UL Design No. P265, P268, P516, U425 and U489. VP SSR roof systems have been tested in accordance with ASTM E108 fire tests per Factory Mutual Approval Standard 4471 resulting in a Class A roof assembly rating. Reference Factory Mutual test reports 1D9A5. AM, 1Z4A8.AM and 3006666.

SKYLIGHTS

VP's PrisMAX SL skylights have been tested to support a 300 lb. load over a 1 sq. ft. area, as well as uniform gravity and uplift load test. Other test results available.

ACCESSORIES

Varco Pruden provides doors and accessories which meet manufacturing standards such as AWS (D1.1; NAIMA (202), Steel Door Institute (100).



Standards As Tough As Steel.™

Manufacturer Certificates - VARIATION

1. AISC-MB Certification Program Letter of Explanation
2. MB-147 Certificate



Mike Stevens
District Manager
Western Region

Varco Pruden Buildings
7440 W. Doe Avenue
Visalia, CA 93291
Phone (951) 821-1600
Email: Mike.Stevens@vp.com

June 19, 2025

Alexander Pacific
Attn: Ryan Ward

RE: AISC-MB Certification

In 2009, the IAS AC472 accreditation program replaced the AISC-MB certification program for pre-engineered metal building fabricators.

Details of the Transition:

1. **AISC and MBMA Decision:** The American Institute of Steel Construction (AISC) and the Metal Building Manufacturers Association (MBMA) jointly decided to terminate the AISC's sponsorship of the Metal Building Certification Program.
2. **Collaboration:** MBMA and the International Accreditation Service (IAS) collaborated to develop the IAS AC472 program, which now serves as the successor to uphold the requirements of the AISC-MB certification.
3. **Development of AC472:** Through IAS's open public hearing process, the AC472 program was meticulously developed and received unanimous approval in April 2008.
4. **Emphasis on Quality Assurance:** The IAS AC472 program is structured as a comprehensive quality assurance accreditation initiative, addressing critical facets such as structural design integrity, detailing precision, manufacturing adherence, and material traceability.
5. **Focus Areas:** The AC472 program encompasses rigorous audits in several key domains, including conformity with stipulated codes, correct application of design standards (such as AISC, AISI, etc.), material traceability protocols, and stringent manufacturing practices.
6. **Industry Requirement:** Various government agencies, engineers, architects, and corporate managers now require IAS AC472 certification for metal building manufacturers to qualify as vendors.

In conclusion, the IAS AC472 accreditation program has effectively upheld the rigorous standards mandated by the AISC certification for pre-engineered metal building fabricators.

Attached is our current AC472 Certificate. Please do not hesitate to contact me if you have any questions regarding this certification.

Sincerely,

Mike Stevens



CERTIFICATE OF ACCREDITATION

This is to attest that

BLUESCOPE BUILDINGS NORTH AMERICA, INC.

7440 DOE AVENUE
VISALIA, CALIFORNIA 93279, U.S.A.

Inspection Program for Manufacturer of Metal Building Systems MB-147

has met the requirements of AC472, IAS Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part A-Fabrication of Structural Weldments and Cold-formed Products Requiring Welding, Part B-Fabrication of Cold-formed Products Not Requiring Welding, Part C-Design of Metal Building Systems, and the in-plant inspection program is in compliance with Section 1704.2.5.1 of the 2015, 2018, 2021 and 2024 International Building Code®, Section 1704.2.5.2 of the 2012 International Building Code®, and Section 1704.2.2 of earlier code editions. Periodic plant inspections are conducted by Benchmark Holdings L.L.C. (AA-660) to monitor compliance with the requirements of AC472.

This certificate is valid up to January 1, 2026



International Accreditation Service
Issued under the authority of IAS management

Sample Warranty



Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. ("Varco Pruden Buildings" or "VP"), warrants to the Owner that the Products supplied by Varco Pruden Buildings to Buyer pursuant to the related purchase order(s) will be free from defects in material or workmanship for a period of five (5) years from the Shipment Date (the "Warranty Period"). During the Warranty Period, Varco Pruden Buildings will, at its option, i) repair or replace the defective Products one time, or ii) refund the price of the defective Products.

Project/ Owner: _____

Builder: _____ Bldr. # _____

Building: _____
(Street) (City) (State) (Zip Code)

Requested Ship Date: _____ Project Number: _____

Definitions

"Accessories" are goods provided by Varco Pruden Buildings' but not manufactured by Varco Pruden Buildings'. Except as specified in the Additional Warranties, the manufacturer shall be solely responsible for warranty coverage of all Accessories.

"Building" means any building or building system, including roof systems, that is erected using the Materials.

"Buyer" means, as applicable, any person or entity (or any other person or entity making a claim through such person or entity) that purchases the Materials (either as materials or as an erected structure), such as the Owner and/or the Builder identified herein.

"Claim" means any assertion by Buyer of defective material or workmanship or the occurrence of another warranted condition that gives rise to an obligation of Varco Pruden Buildings' and/or Builder.

"Covered Claim" means any Claim that: i) Varco Pruden Buildings', in its sole discretion, determines is covered by the Warranties, or ii) a court of competent jurisdiction has determined is covered by the Warranties.

This form must be completed prior to execution

"Endorsements" means any ancillary warranties agreed to in writing by both parties.

"Materials" means, collectively, Products and Accessories.

"Products" are goods manufactured by Varco Pruden Buildings'.

"Shipment Date" means the date the Products are shipped, as reflected in the shipping manifest. Phased projects will have multiple Shipment Dates.

"Warranties" means this Warranty, the Additional Warranties and all Endorsements.

"Warranty" means this standard warranty.

ADDITIONAL WARRANTIES

A. PrisMax SL/TRU™

VP warrants, for a period of twenty (20) years from the Shipment Date, that PrisMax SL™ skylight systems will remain weathertight. VP warrants that the lenses will perform as indicated below, as determined under ASTM D1003 - "Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics."

Lens Type	10 Year VT Loss	Hail Resistant
100% Impact Modified Prismatic Acrylic (CL1 & CL3)	< 3% VT Loss	None
ClearArmour™ Prismatic Polycarbonate (FM Approved)	< 7% VT Loss	5 year
HVHZ Rated Smooth Polycarbonate (FBC Approved)	< 7% VT Loss	None

B. Insulated panels:

VP warrants to the Owner, for a period of two (2) years from the Shipment Date, that the Metl-Span panel supplied by VP to Buyer pursuant to the related purchase order(s) will be free from defects in material or workmanship. During this period, VP will, at its option, i) repair or replace the defective Metl-Span panels one time, or ii) refund the price of the defective brand name panels.

C. Painted wall and/or roof panels:

VP warrants, for a period of twenty-five (25) years from the Shipment Date, that the standard paint finish in standard colors applied to factory finished walls or roof panels and trim will not:

- Crack, check, blister, peel, flake or chip (lose adhesion);
- Chalk in excess of ASTM D4214 No. 8 rating; or,
- Fade (change color) more than 5 color difference units per ASTM D2244.

The warranty applicable to custom finishes and custom colors, if any, is as specified in the Special Color Endorsement.

D. Galvalume® wall and/or roof panels:

VP warrants, for a period of twenty-five (25) years from the Shipment Date, that wall and roof panels made of acrylic-coated Galvalume sheet steel will not rupture, structurally fail or suffer perforation due to normal atmospheric corrosion. Furthermore, the panel will not exhibit an accumulation of red rust greater than $\frac{1}{8}$ " at any one point on coated surfaces for a period of twenty-five (25) years. This does not apply to any accumulation of red rust that occurs at breaks or discontinuities in the surface, such as field cut edges, and does not apply to metal penetration, cut or shear, made any time after the Product is shipped.

The following terms and conditions apply to all Warranties, including the Additional Warranties:

1. Varco Pruden Buildings' obligations under the Warranties do not extend to damage or failure of the Materials caused, partially or wholly, by:
 - a. Improper storage, handling, workmanship, erection, installation, maintenance or repair;
 - b. Defects arising out of damage occurring during shipping or unloading;
 - c. Unusual or aggressive atmospheres, either internal or external to the building, such as marine environments or those contaminated with harmful fumes, chemicals, ash, cement dust or radiation;
 - d. Accumulation of water, snow or ice;
 - e. Condensation;
 - f. Significant differences in insulation behind the coated metal panel;
 - g. Failure to store or install Materials in a way that allows for adequate circulation;
 - h. Failure to remove construction debris, metal filings, or other accumulations of foreign substances or materials from the surface of the Materials;
 - i. Abrasions or scratches of coatings;
 - j. Sustained exposure to animals or animal waste;
 - k. Contact with, or exposure to runoff from, lead or copper or other dissimilar metals, wet insulation, or pressure-treated, wet or green lumber;
 - l. Failure to maintain the Building and/or Materials in accordance with the maintenance manual provided by Varco Pruden Buildings';
 - m. Negative building air pressure;
 - n. Any loads applied to the Building that were not included as part of the original design conditions;
 - o. Any paints or coatings applied after installation unless furnished or specifically recommended in writing by Varco Pruden Buildings' and applied in accordance with Varco Pruden Buildings' recommendations; or,
 - p. Acts of God or any other circumstances or occurrences beyond Varco Pruden Buildings' control.
 - q. Defects or deterioration in the primer or finish coat of paint that may be caused by weather conditions. Shop primer is a temporary rust inhibitor for shipping purposes only.
 - r. Slope of the roof, or any sections of the roof flatter than 1/4":12".
 - s. Presence of damp insulation and/or other corrosive material in contact with or in close proximity to the panel.
 - t. In the event of deterioration to panels caused directly or indirectly by panel contact with fasteners and sealants. Responsibility for selection of suitable long-lasting fasteners and sealants to be used with galvanized or Galvalume steel roofing and siding panels, or in rainwater applications, rests solely with the Buyer. Varco Pruden Buildings' will have information available to the Buyer to aid in selection of suitable products. However, the information will not constitute a warranty of performance under any conditions.
 - u. Builder's obligations under the Warranties are limited to the same extent as Varco Pruden Buildings' unless Builder's acts or omissions caused the failure.
 2. Neither Varco Pruden Buildings' nor Builders obligations specified in the Warranties apply to:
 - a. Materials installed within 1,000 feet of a saltwater environment or subject to constant spraying of salt or fresh water;
 - b. The point(s) and adjacent areas where Accessories are attached to Products;
 - c. Edge corrosion;
 - d. Accessories;
 - e. All items not provided by Varco Pruden Buildings';
 - f. Used Materials;
 - g. Products used for repairs or replacement, except to the extent of the remainder of the warranty for the repaired or replaced Products;
 - h. Any installed Materials located outside of the Contiguous United States, Alaska, Canada and Mexico;
 - i. The alteration of the surface appearance of any rough textured surface due to accumulation of dirt or other foreign substances;
 - j. Any Building that has been moved from its original location; and,
 - k. Corrective actions not under the control or direction of Varco Pruden Buildings'.
 - l. Any product installed or erected within a corrosive environment (see corrosive environment checklist).
 3. Neither Varco Pruden Buildings' nor Builder warrants the Materials or Building to meet local, municipal, or state ordinances, codes, laws or regulations.
 4. The obligations of Builder and/or Varco Pruden Buildings' under the Warranties arise only if Owner notifies Varco Pruden Buildings' in writing of a
- Claim within thirty (30) days after the condition giving rise to the Claim is first called to the attention of the Owner and not later than the expiration of the applicable warranty period. Upon Varco Pruden Buildings' receipt of written notice and the signed warranty document, Varco Pruden Buildings' may inspect the defective Materials to determine if the Claim is a Covered Claim. Failure of Varco Pruden Buildings' to receive timely notice of a Claim relieves Varco Pruden Buildings' and/or Builder of its obligations under the Warranties in relation to the Claim or any other future claims arising out of or related to such Claim. Owner will reimburse Varco Pruden Buildings' and Builder for all investigation costs incurred for Claims not covered by the Warranties and failure to do so will release Varco Pruden Buildings' and Builder from all obligations under this Warranty. Unless otherwise stated in an Endorsement, Varco Pruden Buildings' has no liability for, and Builder is solely responsible for and indemnifies Varco Pruden Buildings' against, all costs of any Covered Claim if the Covered Claim relates to or arises from Builder's acts or omissions.
5. The Warranties extend only to the Builder and Owner and may not be assigned or transferred without written consent of Varco Pruden Buildings'.
 6. Owner has the sole responsibility to perform routine inspections and maintenance of the Materials and/or Building on a regular basis and failure to do so releases Varco Pruden Buildings' and Builder from all obligations under the Warranties. All repairs, replacements, modifications and work performed on the Building must be performed by the Builder or other contractor qualified to work on Varco Pruden Buildings' Products and any Claim related to or arising out of work done by any other contractor is excluded from coverage by the Warranties.
 7. Except where such disclaimers and exclusions are specifically prohibited by applicable law:
 - a. The foregoing sections set forth the only guarantees or warranties applicable to the Materials and the **warranties are given expressly and in lieu of all other warranties, express or implied, of merchantability or fitness for a particular purpose and all warranties which exceed or differ from these warranties are disclaimed by VARCO PRUDEN BUILDINGS' and Builder**. Buyer agrees that oral statements about the Materials made by Varco Pruden Buildings' representatives, or statements contained Varco Pruden Buildings' or others' general advertising, pamphlets, brochures, or other printed matter, do not constitute warranties and that acquisition of the Materials was not made in reliance upon them; and,
 - b. **Buyer's sole and exclusive remedy against Varco Pruden Buildings' and Builder is limited to the actual cost, excluding labor and equipment unless expressly included in an Endorsement, of the remedies set forth in the Warranties and no other remedy (including but not limited to the recovery of liquidated, direct, incidental, special, indirect, or consequential damages for lost profits, lost sales, injury to person or property, or any other loss) will be available to the Buyer or any other persons or entities, whether by direct action, for contribution or indemnity or otherwise, regardless of whether any defect was discoverable or latent at the time of delivery of the Materials.** This exclusive remedy will not be deemed to have failed its essential purpose if Varco Pruden Buildings' and/or Builder is willing and able to carry out the terms of the Warranties set forth herein. **Unless otherwise stated in an Endorsement, if Varco Pruden Buildings' and/or Builder fails to fulfill its obligations under the Warranties, the entire liability will not exceed the amount paid to Varco Pruden Buildings' or one replacement for the defective Materials.**
 8. The terms and conditions of this Warranty apply during the Warranty Period and apply to all Endorsements for the terms of such Endorsements as if fully reproduced therein. However, neither Varco Pruden Buildings' nor Builder is required to perform any obligations of any warranty or guarantee unless and until Varco Pruden Buildings' and Builder have been paid in full and in a timely manner for all Materials and services for the transaction to which the Warranties apply.
 9. The construction, interpretation and performance of the Warranties are governed by the laws of the State of Missouri without regard to its choice of law principles. The United Nation Convention on Contracts for the International Sale of Goods does not apply. Each party waives its rights to a jury trial of any claim or cause of action based upon or arising out of the Warranties. All parties agree to submit to the exclusive personal jurisdiction and venue of the State and/or Federal Courts located in Jackson County, Missouri for the resolution of all disputes and hereby waive the claim or defense that such courts constitute an inconvenient forum.
 10. This Warranty must be executed by the Owner and the Builder and returned to Varco Pruden Buildings' prior to any claim being made hereunder. Failure to return this Warranty within 120 days of the Shipment Date indicates that the Owner has accepted the Materials "as-is where-is" and accepts all product responsibilities.

Read and accepted:

Owner
 Name
 Signature
 Date

Builder
 Name
 Signature
 Date

Varco Pruden Buildings
 Name
 Signature