--IMPORTANT--
PLEASE FILL OUT THE REGISTRATION CARD BELOW

THE REGISTRATION CARD BELOW MUST BE FILLED OUT COMPLETELY (please print clearly) AND FAXED OR EMAILED BACK TO RECEIVE FUTURE UPDATES OF THIS MANUAL.

IF THE CARD IS NOT RETURNED, YOU WILL NOT RECEIVE IMPORTANT INFORMATION REGARDING UPDATES.

RETURN ASAP TO BEHLEN MARKETING
FAX TO 204-725-4923
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SCAN AND EMAIL TO marketing@behlen.ca

REGISTRATION FORM
RIGID FRAME TECHNICAL MANUAL - VR 1.0 July 2008

Date ________________

Name ____

Company ____

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City ________________ Province ____________ Postal Code ________________

Phone # ____________________________ Fax # ____________________________

Email ____

A GLOBAL LEADER

in Rigid Frame Steel Buildings

Over the past 40 years, BEHLEN Industries LP has grown to be the largest manufacturer of steel building systems in Canada. We now serve customers worldwide through a growing network of authorized builders and continue to earn a reputation as a global leader in our industry.

Our success has come primarily through our commitment to quality, innovation and customer service. BEHLEN steel buildings are energy efficient, long lasting, and offer maximum creative flexibility for designers and builders. Our highly trained team and in-house engineering constantly strives to rise above our customers' expectations.

Here are some of our accomplishments:

- North America's first steel building manufacturer registered to ISO 9001
- Certified to CSA A660, the Canadian Quality Standard for Steel Building Systems
- Manufacturer of the first frameless steel building system in Canada
- Manufacturer of the first frameless steel building to clear span 313' wide
- Platinum Member of Canada's 50 Best Managed Private Companies
- Unanimously approved by the CISC as a Steel Fabricator CISC Member

1969
MANUFACTURED FIRST FRAMELESS STEEL BUILDING IN CANADA

1988
JOINED WGI WESTMAN GROUP INC

1995
REGISTERED TO ISO 9001

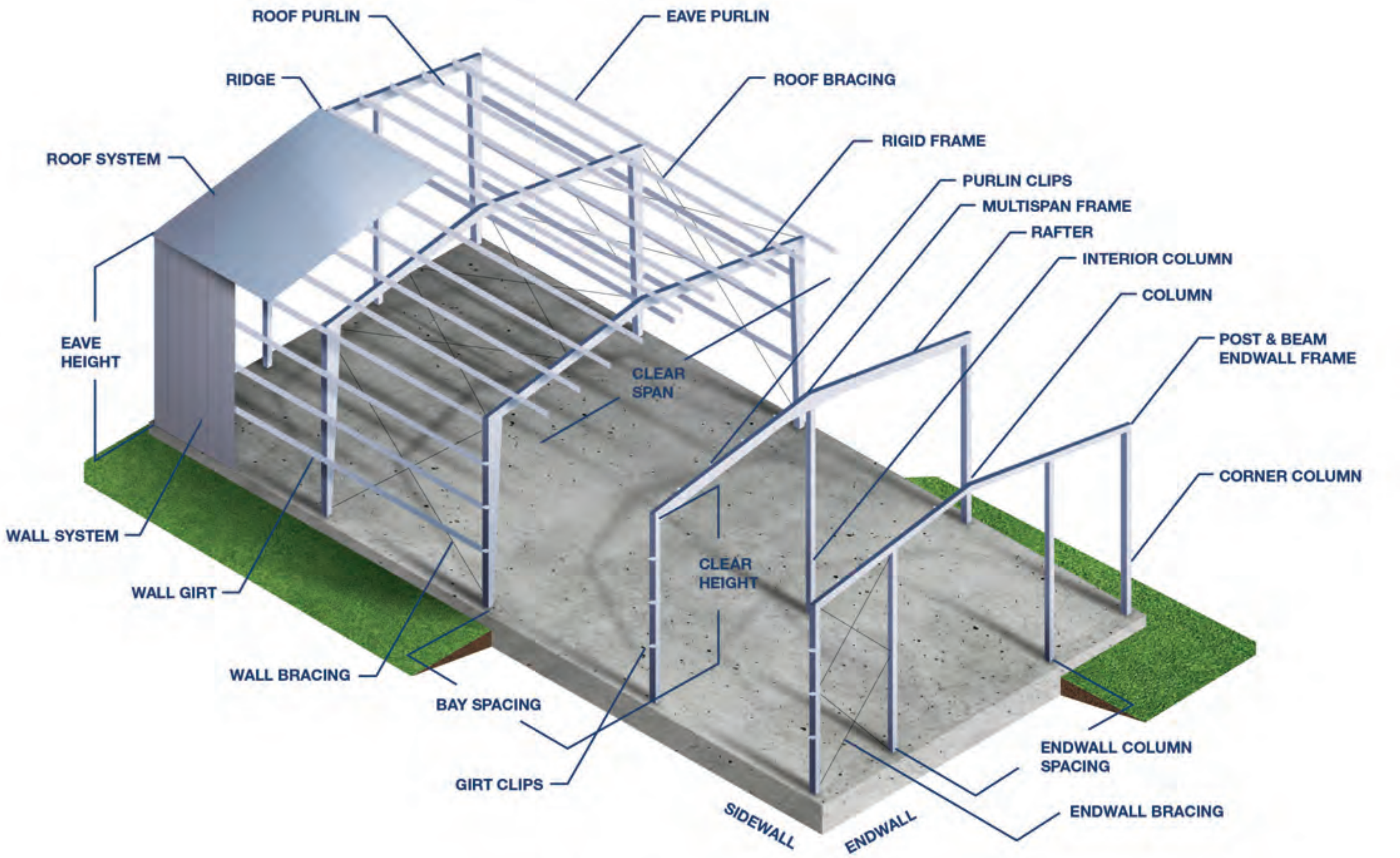
1997
ONE OF CANADA'S 50 BEST MANAGED COMPANIES

2003
PLATINUM MEMBER OF CANADA'S BEST MANAGED COMPANIES

2013
WORLD'S FIRST FRAMELESS BUILDING WITH CLEAR SPANS OF 313' (95 m) – CONVEX ROOF

2015
2015 Steel Fabricator Canadian Institute of Steel Construction Memeber

RIGID FRAME STEEL BUILDING SYSTEM



A COST-EFFECTIVE BUILDING TO MEET ANY DESIGN

BEHLEN is proud to offer a rigid frame system that allows for wide-open interior spaces up to 330’ and heights over 100’, without the obstructions created by columns. These buildings are suitable to meet your needs of any size, and work well for aircraft hangers, recreational facilities, factories, car dealerships and more. BEHLEN Rigid Frame buildings are attractive, versatile and durable.

BEHLEN Rigid Frame buildings excel at energy efficiency, condensation control and noise reduction. The construction process is engineered to save time and money, and to create virtually no waste so that the building is both cost effective and environmentally sustainable.

Customizable with any windows, doors and exterior finish options on the market, BEHLEN Rigid Frame buildings are designed to meet a wide variety of needs.

BENEFITS

Architectural Finishes
BEHLEN Rigid Frame buildings can be customized to have the look you want. Pick any windows and doors on the market and add stucco, brick, glass, masonry and more to give your building an extra element of design.

Expandability
BEHLEN Rigid Frame buildings can easily be designed for phased construction. Talk to us about how we can design the building to accommodate future expansion.

Corrosion Protection
BEHLEN Rigid Frame buildings are well suited for cold storage, food processing, mining or waste handling. BEHLEN routinely provides enhanced coatings for structural steel, as well as standard G90 zinc coated secondary steel to make it suitable for almost any industry.

Foundation
Our computer assisted design software allows us to provide the basic column reaction data for your building. We also specify the required anchor rod sizes to be used in the foundation work.

Mezzanines
Mezzanine floors are available in all BEHLEN Rigid Frame buildings. Mezzanines are great for offices, storage, displays and more. This can increase your floor space without increasing the footprint of your building.

Flexibility
We offer flexible solutions for your building needs. Our rigid frame system is able to be designed and constructed to fit your available space and architectural requirements.

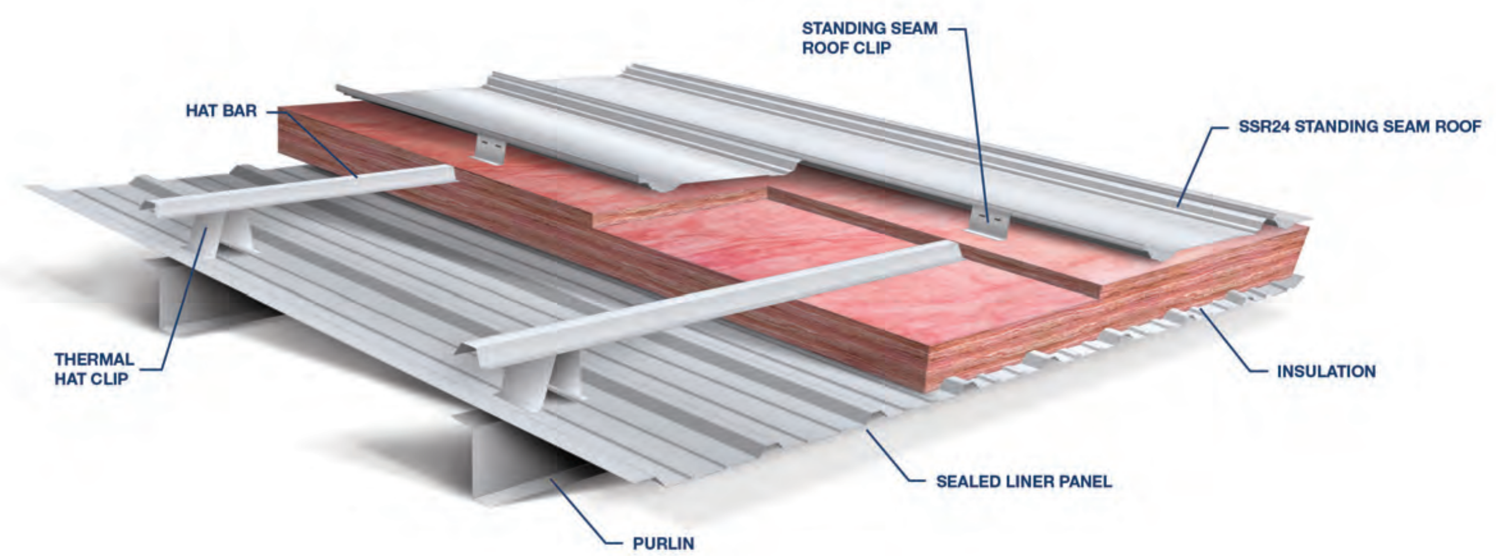
ENERGY SAVINGS

BEHLEN Rigid Frame buildings can incorporate the Thermalguard® or Vapourguard 32® insulation systems. These systems are quickly installed without specialized or additional crew and will help to reduce construction waste while optimizing thermal performance.

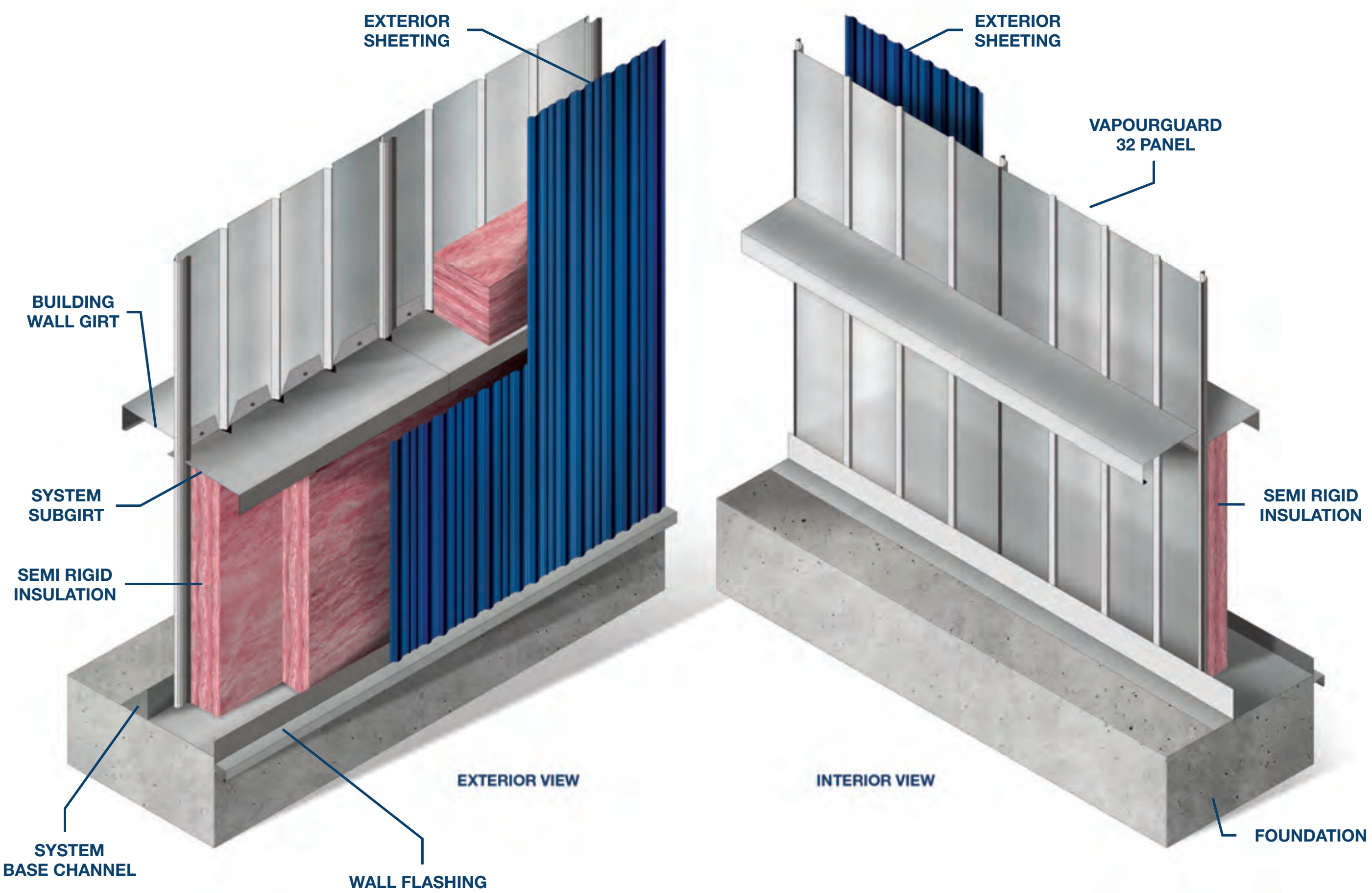
The insulation systems employ a sealed steel liner that acts as a vapor barrier while giving the interior an attractive finish and can be customized to your energy efficiency needs. The ability to insulate at values of R40 is offered at lower cost than other building methods. The construction of the assembly allows the system to be thermally responsive unlike foam insulated structural panels.

BEHLEN insulation systems can also be designed to optimize the performance of H.V.A.C. systems to reduce your energy bill.

Roof System Insulation Details – THERMALGUARD®



Wall System Insulation Details – VAPOURGUARD 32®



FRAMING

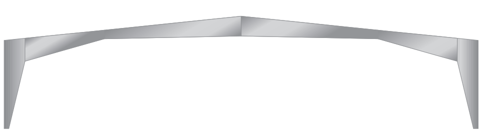
Primary Framing

Primary Framing consists of all the structural elements that transfer loads to the foundations.

BEHLEN Rigid Frame buildings are available in a variety of shapes and can be customized to meet your requirements.

Clear Span

For maximum uninterrupted interior space



Multi Span

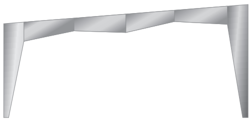
For unlimited building width with strategically placed columns

Lean-to

Supported on one side by either a clear span or multi span framing system

Mono Slope

This structural system has significant flexibility for many different types of applications



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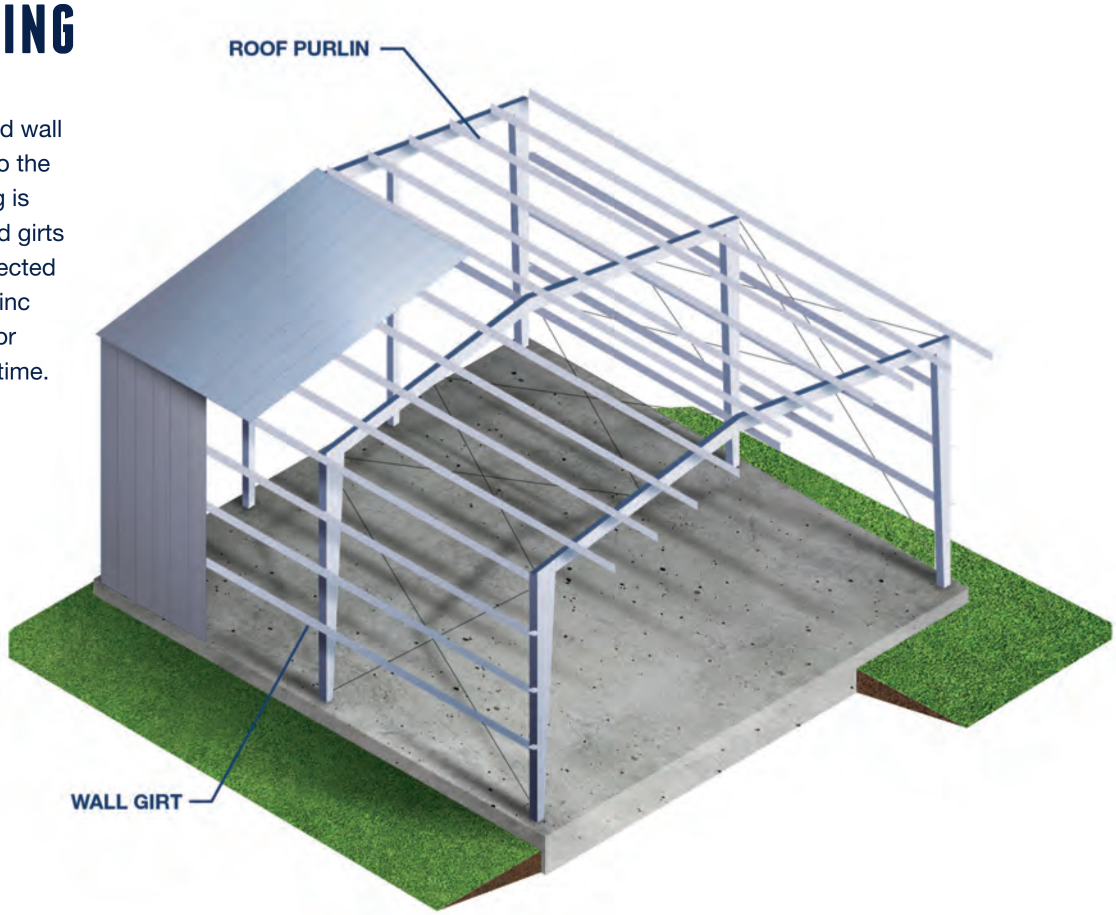
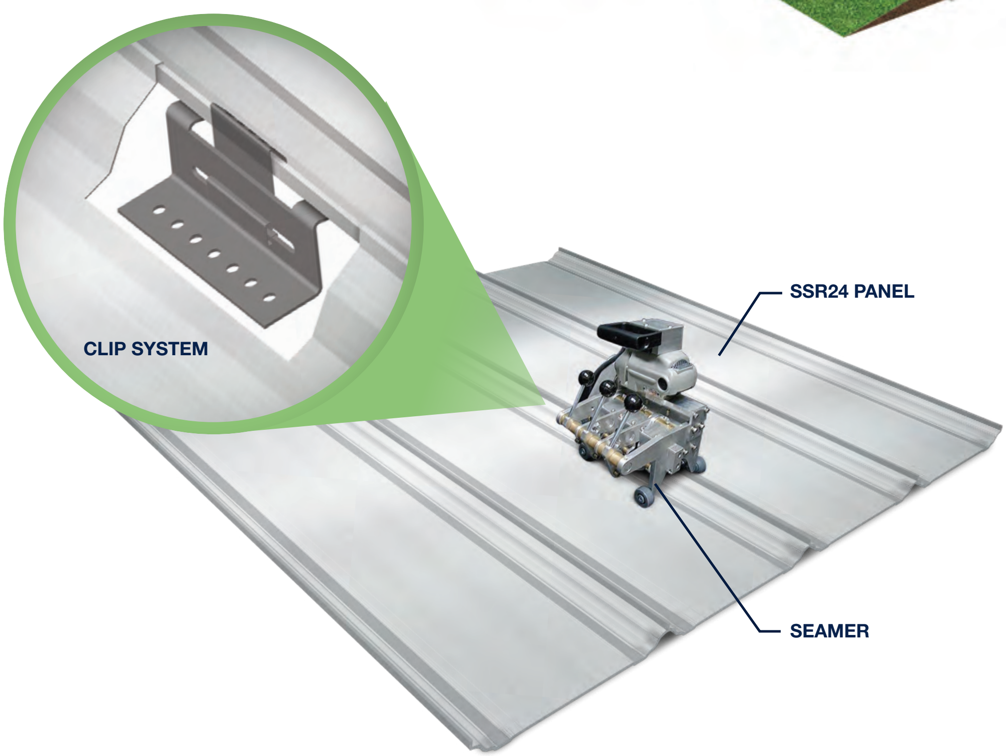
SECONDARY FRAMING

Secondary framing consists of the elements which support the roof and wall sheeting and which transfer loads to the primary framing. Secondary framing is referred to as purlins on the roof and girts on the walls. Both of these are protected from corrosion with standard G90 zinc coating that provides a bright interior finish that will last the building's lifetime.





ROOF SYSTEMS

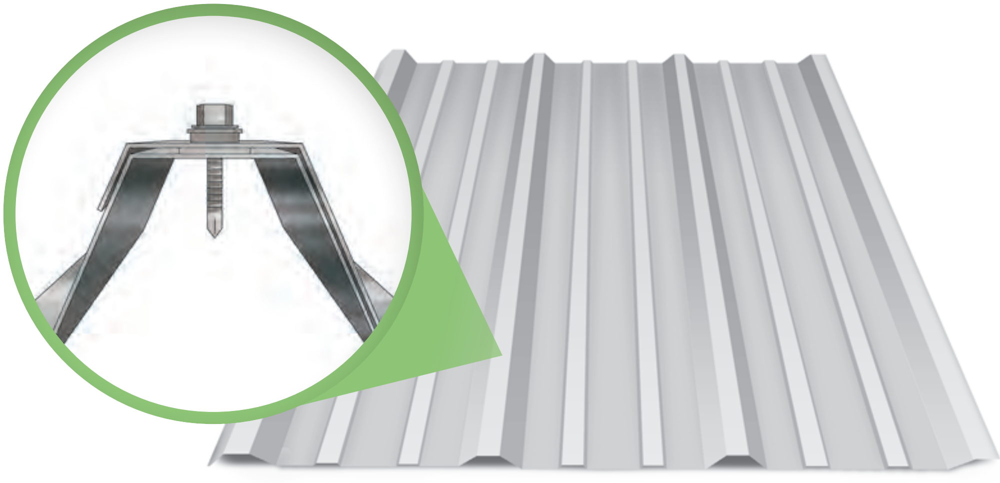
BEHLEN Rigid Frame system roof life expectancy is two to three times longer than a conventional flat roof. The roof system is easy to install and offers an attractive and economical solution with lower repair and maintenance costs.

SSR24 Standing Seam Roof System

Fabricated from Galvalume® Plus or pre-painted materials, BEHLEN SSR24 is a premium, thermally responsive, maintenance free roof system that is engineered to last. The low slope design to ¼:12 allows for the efficient removal of water, snow and ice.

AWR Through Fastened Roof Panel

AWR is an economical roofing system for commercial steel buildings. The through fastened system offers a modern, multi-ridged face that's ideal for roof slopes down to ½:12. This profile has become a standard within the industry and is used for both roof and wall cladding. Available in a variety of colors or plain finishes and offers a proven economical, weather-worthy design.



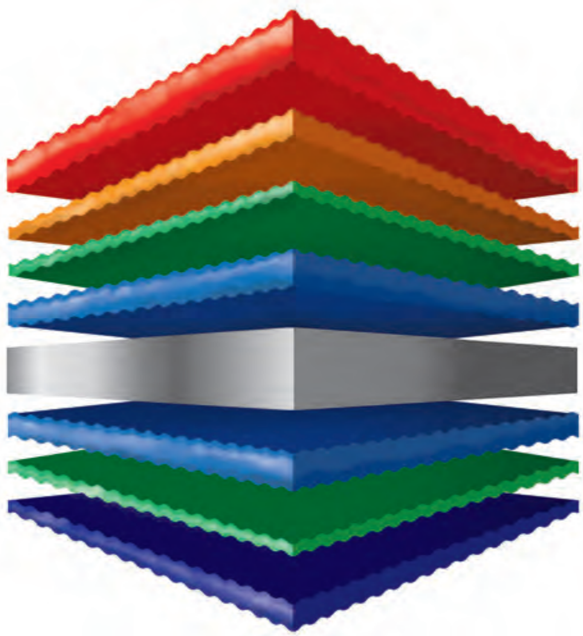
WALL FINISHINGS

Working with BEHLEN rigid frame steel buildings, architects are able to select from a wide range of cladding designs in 16 different standard colours, as well as numerous custom options, all with matching trim.

Our pre-painted Perspectra Series™ Paint System offers:

- Diverse real-world durability including extreme climate conditions
- Superior flexibility and corrosion resistance
- Extensive colour options with enduring aesthetic appeal

Perspectra Series™ products are built to be "Best in Class" for a broad range of industrial, commercial, recreational and institutional building applications.



Durable Exterior Paint
Durable finish – siliconized polyesters offered in 40 of the most popular colours

Flexible Primer
High performance flexible primers are key to long-term corrosion resistance and paint adhesion

Pretreatment
Pretreatments provide excellent corrosion resistance and adhesion

Zinc or 55% Aluminum-Zinc Coating
A zinc or 55% aluminum-zinc alloy coating delivers highly effective corrosion resistance

Steel Core
Uniform sheet steel properties are the result of modern steel-making technology

Wash Coat
Backer coats enhance corrosion resistance and minimize abrasion damage

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INDEX

GENERAL INFORMATION	Section 0
SPECIFICATIONS and STANDARDS	Section 1
GENERAL INFORMATION	Section 2
ANCHOR BOLT and FRAME REACTIONS	Section 3
FRAMING SYSTEMS and DETAILS	Section 4
ROOF, WALL, LINER and TRIM DETAILS	Section 5
ENGINEERING PROPERTIES	Section 6
LIGHT GAUGE ACCESSORIES	Section 7
STRUCTURAL ACCESSORIES	Section 8
MISCELLANEOUS DETAILS	Section 9
COLOUR CHART	Section 10

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SECTION 1
SPECIFICATIONS and STANDARDS

INDEX

SPECIFICATIONS and STANDARDS

Section 1.1 -	INTRODUCTION	001
Section 1.2 -	MASTER SPECIFICATIONS	001
	CONTINUED	002
Section 1.3 -	BUILDING SPECIFICATIONS	001
	CONTINUED	002
	CONTINUED	003
	CONTINUED	004
Section 1.4 -	GENERAL INFORMATION SHEET	001
	CONTINUED	002
	CONTINUED	003
	CONTINUED	004
	CONTINUED	005
	CONTINUED	006

INTRODUCTION

The BEHLEN RIGID FRAME® Building System Engineering Technical Manual has been designed to provide the reader with information necessary to choose the BEHLEN frame building system most appropriate to suit their needs. The variety and flexibility of the framing styles available, offer a wide range of solutions to commercial, institutional, agricultural and industrial needs.

This manual presents the essential details of BEHLEN RIGID FRAME® Buildings and their Accessories. This manual provides basic information to Engineers and Architects, showing the system's flexibility. This manual can help in the preparation of project proposals and assist in other ways. The information contained herein reflects the BEHLEN RIGID FRAME® Buildings method of framing for a wide range of standard conditions. Requirements outside the range of the standard conditions presented may require alternative details and/or methods of framing.

BEHLEN RIGID FRAME® Building Systems are constantly being improved, the information contained herein is subject to change without notice. Information used for project planned should be confirmed by your BEHLEN dealer.

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MASTER SPECIFICATIONS

STRUCTURAL STEEL

ROLLED SECTIONS (ANGLES, S SHAPES)	G40.21 44W (300 MPa)
ROLLED SECTIONS (W SHAPES, CHANNELS)	G40.21 50W, A572 GR 50 (345 MPa)
HSS SECTIONS	G40.21 50W CLASS C (345 MPa)
PIPE	ASTM A53 GR B (35ksi), A252 GR 2 (240 MPa)
ROD	G40.21 44W (300 MPa)

STRUCTURAL PLATE

BAR STOCK - FLANGES	G40.21 50W ASTM A529, A572, A1011; GR 50 (345 MPa)
PLATE - WEBS	G40.21 50W ASTM A529, A1011, A572, GR 50 (345 MPa)
GIRTS AND PURLINS	ASTM A653 HSLAS GR 55 CLASS 1 Z275 (G90) ZINC COATING
STANDING SEAM ROOF	ASTM A792 SS GR 50 (345 MPa) AZ165 ALUMINUM ZINC COATING C/W ACYRLIC COATING AZ150 ALUMINUM ZINC COATING FOR PREPAINT
CLADDING - GALVALUME	
26 GA (43-1/4" coil only)	ASTM A792 SS GR 80 CLASS 1 (550 MPa) AZ150 ALUMINUM ZINC COATING C/W ACYRLIC COATING
26, 24 GA (47-7/8" coil)	ASTM A792 SS GR 33 (228 MPa) AZ150 ALUMINUM ZINC COATING C/W ACYRLIC COATING
CLADDING - GALVANIZED	
26 GA	ASTM A653 SS GR 80 (550 MPa) Z275 (G90) ZINC COATING
24 GA	ASTM A653 SS GR 33 CLASS 1 (228 MPa) Z275 ZINC COATING

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MASTER SPECIFICATIONS

CLADDING - PAINTED

29 GA	ASTM A653 SS GR 80 (550 MPa) Z180 ZINC COATING, PRECOAT PERSPECTRA SERIES
	ASTM A653 SS GR 80 (550 MPa) Z275 ZINC COATING, PRECOAT PERSPECTRA SERIES
26 GA - 43 1/4" PANEL STOCK	ASTM A792 SS GR 80 CLASS 1 (550 MPa) AZ150 ALUMINUM ZINC COATING, PRECOAT PERSPECTRA SERIES
26, 24 GA	ASTM A792 SS GR 33 CLASS 1 (228 MPa) AZ150 ALUMINUM ZINC COATING, PRECOAT

BOLTS -

3/4" DIA AND LARGER	ASTM A325 MIN OR ASTM A490
½" DIA - CAP SCREW	SAE GRADE 5, 0.0003" ELECTROPLATE ZINC(MIN. COATING)
½" DIA - SERRATED FLANGE	SAE GRADE 8.2 JS500 COATING

CABLE	ASTM A475 - EXTRA HIGH STRENGTH
PRIMER	CISC/CPMA 1-73a - QUICK DRYING ALKYD PRIMER ONE COAT 1-1.5 MIL DFT
SCREWS	MANUFACTURER'S STANDARD, CLIMASEAL OR JS 500
SEALER	CGSB 19-GP-14M (FLASHPOINT AT LEAST 150 DEGREES CELCIUS)

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BUILDING SPECIFICATIONS

1.0 GENERAL

1.1 SCOPE

1.1.1 These specifications cover the design criteria, material quality and fabrication processes used in metal buildings designed, manufactured and supplied by Behlen Industries LP.

1.1.2 These specifications are intended as an outline of performance to insure that Architects, Engineers, Builders and/or owners understand the basis for design, manufacture and application of all Behlen Industries LP Steel Building Systems.

1.1.3 The Steel Building System manufactured shall be certified to Can/CSA Standard A660.

1.2 MATERIALS INCLUDED

1.2.1 The building system shall include all primary and secondary structural framing members, bracing, connection bolts, covering, flashings, fasteners, closures, sealants, accessories and miscellaneous components required for a complete building. Supply of materials shall conform to the latest CSSBI documents which includes the "Standard for Steel Building Systems (30M-06)". Miscellaneous items shown or called for in drawings and specifications are only included if confirmed on BEHLEN Industries LP “Pre-Engineered Buildings Quotation and Confirmation” form.

1.3 DRAWINGS AND CERTIFICATION

1.3.1 Behlen Industries shall furnish complete erection drawings showing anchor bolt settings complete with reactions, sidewall, endwall and roof framing, transverse cross-sections, covering and flashing details and accessory installation details to clearly indicate the proper assembly of building parts.

1.4 BUILDING DESCRIPTION

1.4.1 Tapered column, clear span is a single gable solid web frame consisting of tapered columns and rafters with no interior columns. Continuous girts normally by-pass the columns. Available in widths from 20-300 feet (6,096 - 91,440mm) and roof slopes from 1/4:12 to 6:12.

1.4.2 Straight column, clear span is a single gable solid web frame consisting of uniform depth or tapered beam rafters rigidly connected to uniform depth columns. Simple span sidewall girts are normally inset into the column line. Available in widths from 20-70 feet (6,096 - 21,336mm) and roof slopes from 1/4:12 to 4:12.

1.4.3 Tapered column, modular is a single gable solid web frame consisting of tapered or uniform depth rafters rigidly connected to tapered columns. Frame rafters are supported on the interior by one or more columns at uniform or non-equal modules. Interior columns are normally rectangular tubes but three piece welded members are available. Available in widths from 40 to 450 feet (12,192 - 137,16omm) and have roof slopes from 1/4:12 to 6:12. Continuous bypass girts are normally used.

1.4.4. Straight column single slope clearspan frames are non-gabled solid web frames consisting of uniform depth or tapered rafters rigidly connected to uniform depth columns. Simple span sidewall girts are normally inset between columns. Available with spans from 20 to 70 feet (6,096 - 21,336mm) and roof slopes from 1/4:12 to 6:12.

BUILDING SPECIFICATIONS

1.0 GENERAL

1.4 BUILDING DESCRIPTION

1.4.5 Lean-to side extensions are non-gabled single slope web frames consisting of a uniform depth or tapered rafter simply supported by a uniform depth column on the low side and on existing or newly constructed rigid frame on the high side. Simple span sidewall girts are normally inset between columns. Available in spans from 10 to 80 feet (3,048 - 24,384mm) and roof slopes from 1/4:12 to 6:12.

1.4.6 End Frame types:

a) Bearing end frame shall be a post and beam design with continuous rafters and supported by pin ended posts. Rafter, corner and end posts shall be cold-formed, built-up welded sections or mill sections. Girts shall be inset or by-pass type.

b) Rigid frame, expandable, shall be a welded rigid frame of the same type and design as interior frames. End posts shall be furnished to provide support for girts as required. End posts shall be cold-formed, built-up or mill sections. Girts shall be by-pass or inset type.

c) Rigid frame, non-expandable, shall be a welded rigid frame of the same type as the interior frames but designed for only half bay loading. End posts shall be furnished to provide support for girts as required. End post shall be cold-formed, built-up or mill sections. Girts shall be by-pass or inset type.

2.0 DESIGN

2.1 GENERAL

2.1.1 All structural steel sections and welded plate members shall be designed in accordance with the latest edition of CSA Standard S-16 .1 Steel Structures for Buildings.

2.1.2 All light gauge cold-formed structural members and exterior covering shall be designed in accordance with the latest edition of CSA S136, "Specification for the Design of Light Gauge Cold-Formed Steel Structural Members."

3.0 STRUCTURAL FRAMING

3.1 PRIMARY STRUCTURAL FRAMING

3.1.1 All framing members shall be shop fabricated for bolted field assembly. Field cutting or drilling when required shall be clearly noted on the erection drawings.

3.1.2 Primary structural members shall include the transverse rigid frames, lean-to rafter beams and columns, canopy beams, intermediate columns, bearing end frames, endwall columns and wind bracing.

3.1.3 All hot rolled beams, bar and strip used in the fabrication of welded assemblies shall conform to the requirements of C.S.A. Standard G40.21 50W (Metric equivalent of G40.21-M345W). All plate used for webs in fabrication of welded assemblies shall conform to the requirements of G40.21 50W. (345MPa)

3.1.4 Members fabricated from other hot-rolled structural shapes (S shapes, standard channels, angles, and other miscellaneous structural shapes) shall have minimum yield of 44 Ksi (300 MPa) and will conform to physical specifications of CSA G40.21 44W. Rods for anchor bolts and bracing shall have minimum yield of 36 ksi (248 MPa).

BUILDING SPECIFICATIONS

3.0 STRUCTURAL FRAMING

3.1 PRIMARY STRUCTURAL FRAMING

3.1.5 Interior columns of multi-span frames will be fabricated from hollow structural sections conforming to CSA standard G40.20 Class C with minimum yield of 50 Ksi (345 Mpa).

3.1.6 Cables used for bracing shall be extra high strength galvanized strand steel wire conforming to ASTM A475 to be supplied with galvanized grips and eyebolts which meet or exceed cable strength.

3.2 SECONDARY MEMBERS

3.2.1 Secondary structural framing shall include the purlins, girts, eave struts, flange braces, sill support, clips and other miscellaneous structural parts.

3.2.2 Light gauge cold-formed sections shall be manufactured by precision roll forming or brake formed. All dimensions shall be to CSSBI tolerances and shall be free of fluting, buckling or waviness. Steel shall have minimum yield of 55 Ksi and conform to ASTM-653 G90 (Z275) Galvanized.

3.2.3 Purlins and girts shall be cold formed "Z" or "C" sections 8" (203mm), 10” (254mm) or 12” (305mm) deep with 2-3/4” (70mm) wide flanges and stiffening lips or 14” (356mm) with 3-1/2” (89mm) wide flanges and lips. Stiffening lips of “Z” sections shall be formed at an angle of 45 degrees with the flange to permit nesting during shipment and for making continuous overlapping connections.

3.3 PAINTING

All structural steel framing members, which are not galvanized, shall be hand cleaned to specification to remove all dirt, grease, oil and loose mill scale and shall be given one shop coat of grey alklyd primer. The purpose of the standard shop primer paint is to provide protection for the structural steel members during transportation, during proper but temporary plant and jobsite storage and during erection. The shop primer does not provide the uniformity of appearance or the durability and protection of an appropriate field finish coat(s) of paint. BEHLEN is not responsible for field touch-up painting that may be required; nor is it responsible for any deterioration of the shop coat or primer paint; neither is BEHLEN responsible for any other paint coating(s) of any kind that may be required (unless specified and confirmed).

4.0 ROOF AND WALL COVERING

4.1 GENERAL

4.1.1 Roof covering shall be:
a) 26 gauge galvanized, galvalume or prepainted galvalume/galvanized steel, AWR with 36 inch net coverage (24 gauge optional).
b) 24 gauge galvalume Standing Seam Roof Panels with 24 inch net coverage (prepainted optional).
c) Aluminum or as requested.

BUILDING SPECIFICATIONS

4.0 ROOF AND WALL COVERING

4.1 GENERAL

4.1.2 Exterior wall covering shall be:
a) 26 gauge galvanized, galvalume or prepainted galvalume/galvanized steel AWR or Wide Span panels with 36" (914mm) net coverage.
b) 26 gauge galvanized, galvalume or prepainted galvalume/galvanized steel, Delta Span or Elite Rib with 36” (914mm) net coverage (optional).
c) Aluminum or as requested.

4.1.3 Interior wall and/or roof covering shall be:
a) 29/26 gauge galvanized, galvalume or prepainted galvalume/galvanized steel, 936 panels with 36” (914mm) net coverage.
b) 26 gauge galvanized, galvalume or prepainted galvalume/galvanized steel, AWR panels with 36” (914mm) net coverage.
c) Aluminum, perforated aluminum, perforated steel or as requested.
d) 26/24 ga galvanized, Galvalume™ or prepainted steel Vapourguard panels with 32” (813mm) coverage.

4.2 PANEL MATERIALS

4.2.1 Material for galvanized/galvalume steel panels shall be as follows:
ASTM A653 SS GR 33/Z275 24 ga coloured & galvanized.
ASTM A792 SS GR 80/AZ150 26 ga coloured & galvanized.
ASTM A653 SS GR 80/Z275 29 ga coloured & galvanized.

4.2.2 Unless otherwise specified, the exposed surface of all colored galvanized steel roof, wall and liner panels, flashing, trim, gutters, downspouts shall be colour coated. The colour coating shall meet the Perspectra® Series one side only. The washcoat color may be any shade as supplied by the manufacturer and may not necessarily match other washcoat colors.

4.2.3 Alternate material such as aluminum or galvalume may be specified as options.

4.2.4 Alternate colour finishes such as 10,000 Series and Barrier Series are available as options.

4.3 PANEL CONFIGURATION - See Brochures

4.3.1 AWR and Widespan panels shall have 1-1/4” (32mm) deep major ribs tapering in width from 1-3/8” (35mm) to 2-3/4” (70mm), spaced 12” (305mm) on-centre. Two additional minor stiffening ribs, spaced 4” (102mm) on-centre shall be provided between major ribs. Each panel shall provide 36” (914mm) net coverage.

4.3.2 Elite Rib panels shall have 1-3/8” (35mm) deep major ribs 3-5/16” (84mm) wide tappering to 4-3/16” (106mm) spaced 6” (152mm) on-centre. Ultra Span panels shall have two minor stiffening ribs spaced at 1-1/2” (38mm) on major ribs. Each panel shall provide 36” (914mm) net coverage.

4.3.3 Delta Span panels shall have 1-1/4” (32mm) deep major ribs, 7/8” (22mm) wide tapering to 2-11/16” (68mm) spaced 12” (305mm) on-centre. Panel pan has v-shape. Each panel shall provide 36” (914mm) net coverage.

BUILDING SPECIFICATIONS

4.3.4 Parkway panels shall have 2” (51mm) deep major ribs, 1-1/4” (32mm) wide tapering to 2-3/8” (60mm), spaced 12” (305mm) on-centre. Panel pan has curved profile. Each panel shall provide 24” (610mm) net coverage.

4.3.5 936 panels shall have 5/8” (16mm) deep major ribs tapering in width from ¾” (19mm) to 1-1/2” (38mm), spaced 9” (229mm) on-centre. Each panel shall provide 36” (914mm) net coverage.

4.3.6 SSR24 standing seam roof panels shall have 1-3/4” (44mm) deep trapezoidal rib 5-1/2” (140mm) wide at the base. Rib is to be mechanically seamed using on site portable seam roll former. Panel coverage is 24” (610mm). Panel has no exposed fasteners and is restrained on sliding clips which allow thermal expansion/contraction.

4.3.7 Vapourgard 32 panel shall have 1-1/4” (32mm) deep seam ribs. Intermediate stiffening ribs spaced 8” (203mm) on-centre. Panel shall have 32” (813mm) coverage and as part of a thermal wall system which mounted to the exterior of the wall support girts.

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GENERAL

This drawing including information herein, remains the property of Behlen Industries LP. It is provided solely for erecting the building described in the purchase order and shall not be modified, reproduced or used for any other purpose without prior written approval of Behlen Industries LP.

The general contractor and/or erector is solely responsible for accurate, good quality workmanship in erecting this building in conformance with this drawing, details referenced in this drawing and industry standards pertaining to proper erection including the proper use of temporary bracing. Behlen Industries LP is not responsible for errors, omissions or damages incurred in the erection of the components shown on this drawing, nor for the inspection of erected components to determine same.

This certification and engineering seal applies only to products designed and fabricated by Behlen Industries LP for the loading conditions designated on these drawings. Concrete foundations, steel components by others and erection supervision are not the responsibilities of Behlen Industries LP or the certifying engineer.

ANCHOR BOLTS

Anchor bolt diameters are determined in accordance with CSA Standard CAN3-S16.1 using Fy = 36 KSI (248 MPA). Anchor bolt lengths and load transfer to the foundation are to be determined by others.

Foundation must be level, square and smooth. Anchor bolts must be accurately placed as shown on the drawings.

All dimensions shown are to the building girt line.

Finished floor elevations and underside of base plate is 100'-0" (30,480mm) unless noted.

ERECTION

The erector must provide safe working conditions and practices conforming to all safety regulations. All lifting devices are to be specifically designed to lift the various building components. Slings and spreader bars are to be used to prevent permanent deformation of all structural components.

Erection should start at a braced bay. Erect and temporarily support frames. Use temporary bracing as required to ensure stability of the frames. Install purlins and girts & permanent roof & wall bracing. Plumb columns and square frames in accordance with CAN3-S16.1. Install flange braces to purlins and girts prior to installing cladding.

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ERECTION

Install roof and wall cladding, fasteners, and sealants as specified in the erection drawing and technical manual.

Do not use panels for walking platforms. Temporary loads on roof panels should be directly over purlins.

Ensure girts and purlins remain parallel.

Structural framing members are considered plumb, level, and aligned when the variance does not exceed 1:300.

STRUCTURAL BOLTS

Bolts in connections not subject to tension loads, or where loosening due to vibration or load fluctuations are not design considerations need only be snug tightened, which is defined as the tightness that exists when all plies in a joint are in firm contact.

Bolts in connections subject to tension loads require pretensioning to minimum tension -values as shown in the table below-

TABLE A		BOLT TENSION			
SIZE		A325		A490	
in	mm	kips	kN	kips	kN
3/4	19	28	125	35	157
7/8	22	39	174	49	218
1.0	25	51	227	64	285
1 1/8	29	56	249	80	356
1 1/4	32	71	316	102	454
1 1/2	38	103	458	148	658

The only method of pretensioning is turn-of-nut tightening as specified in CAN3-S16.1. In turn-of-nut tightening all bolts shall be brought to a "snug-tight" condition ensuring that all plies are in firm contact with each other. "Snug-tight" condition is attained by a few impacts of an impact wrench or the full effort of a person using a spud wrench. When all bolts are "snug-tight" each bolt shall then be tightened additionally by the applicable nut rotation given in Table B. Tightening should progress systematicaly from the most rigid part of the connection to the free edges.

During the operation there shall be no rotation of the part not turned by the wrench.

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STRUCTURAL BOLTS

Nut rotation from "snug-tight" condition:

TABLE B	
BOLT LENGTH (MEASURED FROM UNDERSIDE OF THE HEAD TO THE EXTREME END OF POINT)	TURN
UP TO AND INCLUDING 4 DIAMETERS	1/3
OVER 4 DIAMETERS AND NOT EXCEEDING 8 DIAMETERS OR 8 INCHES (200mm)	1/2
EXCEEDING 8 DIAMETERS OR 8 INCHES (200mm)	2/3

NOTE: nut rotation is relative to bolt regardless the nut or bolt being turned.
Tolerance on rotation: 30 degrees over or under.

- Bolts tightened by turn-of-nut method should have the outer face of the nut match marked with the protruding bolt point before final tightening, marking permits visual inspection that actual nut rotation has been achieved. Such marks can be made using a crayon or dab of paint after bolts have been brought up snug tight.

- Inspection of the sides of bolts or nuts snug-tightened using an impact wrench will appear slightly peened as a result of the tightening process. No further inspection is necessary for bolts in "bearing-type" connections as performance is independent of initial pretension.

- Torque is not a reliable means to pretension bolts. In cases of dispute as to installed bolt tension, an arbitration method is provided in S16.1. This provides a means to calibrate a torque wrench with a direct tension indicator.

TOUCH-UP PAINT APPLICATION

For applying touch-up to cladding and trims, refer to Behlen Industries LP touch-up paint application instructions.

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MATERIAL SPECIFICATIONS

MATERIAL	SPECIFICATION	GRADE	COATING
ROLLED L, C, & S SECTIONS	CSA G40.21	44W (300W)	
ROLLED W SECTIONS	CSA G40.21	44W (300W)	
HSS SECTIONS	CSA G40.21 CLASS C	44W (300W)	
PIPE SECTIONS	ASTM A53	GRADE B	
PLATE(FLANGES & WEBS)	G40.21/ASTM A529, A570, A572	44W (300W)	
GIRTS & PURLINS	ASTM A653 SS	55 CL 1	Z275 ZINC
BOLTS LARGER THAN 1/2"ø	ASTM A325 OR A490		
1/2"ø BOLTS	SAE	8.2	ELECTROPLATE ZINC
SHOP PRIMER	CGSB 1-GP-40M		
DIAGONAL BRACE ROD	CSA G40.21	44W (300W)	
DIAGONAL BRACE CABLE	ASTM A475	EXTRA HIGH STRENGTH	
SEALANTS	CGSB 19-GP-14M		
STANDING SEAM CLADDING	ASTM A792 SS	50	AZ165 AL. ZINC
GALVALUME CLADDING	ASTM A792 SS	80 & 33	AZ150 AL. ZINC
GALVANIZED CLADDING	ASTM A653 SS	80 & 33	Z275 ZINC
PAINTED CLADDING	ASTM A792 SS	80 & 33	AZ150 AL. ZINC

MEMBER SECTION DESIGNATION

Built-up sections can be used in lieu of standard mill sections on any project.
Light gauge components have a standard designation that is used by Behlen Industries LP.
The designation describes each component in the following manner:

BUILT-UP MEMBER - WAABCD	EXAMPLE - W14563	
AA - REFERS TO OVERALL DEPTH (IN)	14" DEEP MEMBER	
B - REFERS TO FLANGE WIDTH (IN)	5" WIDE FLANGE	
C - REFERS TO FLANGE THICKNESS IN 16TH (IN)	6/16" OR 3/8" FLANGE	
D - REFERS TO WEB THICKNESS IN 16TH (IN)	3/16" THICK WEB	
LIGHT GAUGE COMPONENTS XYAA (-DBL)	8Z16	10C14
X - REFERS TO COMPONENT DEPTH (IN)	8" DEEP	10" DEEP
Y - REFERS TO COMPONENT SHAPE	ZEE SHAPE	CEE SHAPE
AA - REFERS TO COMPONENT THICKNESS (GA)	16 GAUGE	14 GAUGE
DBL - REFERS TO DOUBLE MEMBER REQUIRED - TWO ARE NESTED IN THE FIELD		

DEFLECTION LIMITS

LOCATION	DEFLECTION
Endwall Column	L/120
Endwall Rafter (live/snow)	L/240
Endwall Rafter (wind)	L/240
Girt (wind)	L/90
Purlin (live/snow)	L/180
Purlin (wind)	L/120
Wall Panel	L/90
Roof Panel (live/snow)	L/90
Roof Panel (wind)	L/90
Mezzanine Framing (live)	N/A
Mezzanine Framing (dead + live)	N/A
Frame Horizontal	H/400
Frame Horizontal (crane)	H/400
Frame Horizontal (seismic)	H/400

LOCATION	DEFLECTION
Frame Vertical	L/240
Longitudinal Bent/Portal (wind)	H/120
Longitudinal Bent/Portal (seismic)	H/120
Partition Column	N/A
Partition Girt	N/A
Partition Panel	N/A
Runway Horizontal	L/600
Runway Vertical	L/800
Runway Aux. Beam	N/A
Extension Beam (wind)	N/A
Extension Beam (live/snow)	N/A
Extension Purlin (wind)	N/A
Extension Purlin (live/snow)	N/A

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ROOF PLAN NOTES:

Unless noted, use 1/2" (13mm) dia. bolts for purlin lap, purlin to frame, flange brace to frame, and flange brace to purlin connections.

Wind, flange and purlin bracing are an integral part of the roof structural system and should be properly installed prior to erection of wall and roof sheets. Removal or alteration of roof bracing without prior authorization is prohibited.

CLADDING/ LINER NOTES:

Wall sheets are an integral part of the structural system. Removal or alteration without prior authorization is prohibited.

SSR NOTE:

Purlin blocking may be required between purlins at locations indicated on roof plan. Refer to Standard Detail sheets SD21 and SD21A.

ELEVATION NOTES:

Field slot girts [max. slot= 1-3/4" (44mm) x 4” (102mm)] at centre of web to allow diagonal bracing to pass through if required.

Holes required in Girts or Eave Struts for Framed Openings, Door or Window Post Connection to be by erector.

Man door, window and framed opening posts to be field anchored to concrete with 1/2" (13mm) dia. “hilti kwik-bolts" or similar.

Base Angle or Channel to be fastened with Ramset or similar at 24" (610mm) o.c.

Wind and Flange Bracing is an integral part of the wall system and should be properly installed prior to erection of Wall and Roof Sheets, removal or alteration of Wall Bracing without prior authorization is prohibited.

Use 1/2" (13mm) dia. bolts for Purlin to Frame, Girt to Frame, and Girt to Clip connections unless noted.

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PARTITION WALL NOTE:

Field installation of partition wall to underside of any Roof Framing members must allow for vertical building deflection. Contact BEHLEN Industries LP for required clearances.

MATERIAL STORAGE:

Galvanized, Aluminized, and Coloured materials are subject to corrosion and discoloration if they are improperly stored. Short term job site storage of purlins, roof and wall covering may be tolerated, provided care is taken to keep these materials dry at all times. When materials are to be stored outdoors, they should be placed at an angle sufficient to promote good drainage. In addition, several inches of clearance must be provided, between the lower end and the ground to allow ventilation. Long panels should be blocked in the center to prevent center sag and resultant water accumulation.

BEHLEN Industries LP will not be held responsible for materials which are improperly protected after delivery.

SHOP PRIMER:

BEHLEN'S grey primer provides temporary protection against rust during transportation and while the building is being erected and is not designed for long term exposure to the elements. It is the erector's responsability to protect the steel if it is to be stored onsite for any length of time. Primary steel should be covered and safely stacked in an upright position. Water that is allowed to pond on flanges or webs can cause the primer to lift and flake-off the steel over time. BEHLEN will not be held responsible for paint damage by ponding water. It is the erector's responsibility to touch-up shop primer that has been damaged during erection.

FIELD MODIFICATIONS:

Any field modification of building structural members without prior written consent of BEHLEN Industries LP will void the certification and warranty.

SECTION 2
GENERAL INFORMATION

INDEX

GENERAL INFORMATION

Section 2.1—	INTRODUCTION	001
Section 2.2—	BASIC BUILDING PARAMETERS	001
	BASIC BUILDING PARAMETERS cont.	002
Section 2.3—	2005 NATIONAL BUILDING CODE OF CANADA	001
	LOADS and EFFECTS	002
	IMPORTANCE CATEGORIES	003
	LIMIT STATES DESIGN	004
	LIMIT STATES DESIGN cont.	005
	DEFLECTION	006
	SPECIFIED SNOW LOAD	007
	SPECIFIED SNOW LOAD cont.	008
	SPECIFIED WIND LOAD	009
	SPECIFIED WIND LOAD cont.	010
	SPECIFIED WIND LOAD cont.	011
	SITE PROPERTIES	012
	IMPORTANCE FACTOR	013
Section 2.4—	FIRE PROTECTION BULLETIN NO. 20	001
Section 2.5—	FIRE PROTECTION BULLETIN NO. 23	001
Section 2.6—	METAL ROOFING SYSTEMS GUIDE SPECIFICATION	001
Section 2.7—	REPORT ON FALL ARREST AND RESTRAINT	001
Section 2.8—	GLOSSARY OF TERMS	001

RIGID FRAME® STEEL BUILDING SYSTEMS

The following information is meant to help you, the customer, make informed decisions about the type of BEHLEN frame building system to best suit your needs. Please consult with your BEHLEN Regional Sales Manager if you have any questions and before any decisions are made.

The BEHLEN RIGID FRAME® Building System is designed by applying any and all engineering principles that apply to each unique situation. Communication between BEHLEN and the customer is very important to ensure the building is designed to meet the customer's needs and expectations.

When unusual site conditions exist, the customer should obtain the services of a professional designer. Examples of such conditions might include stepped elevations and other site structures or site features within 20 feet of the RIGID FRAME® Building System.

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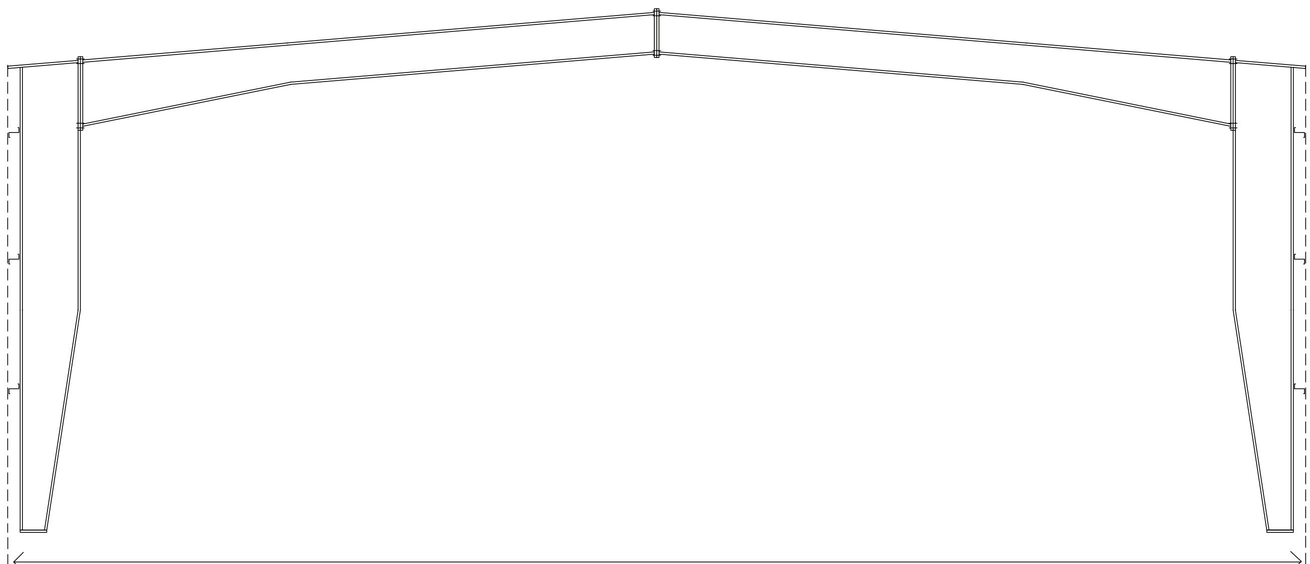
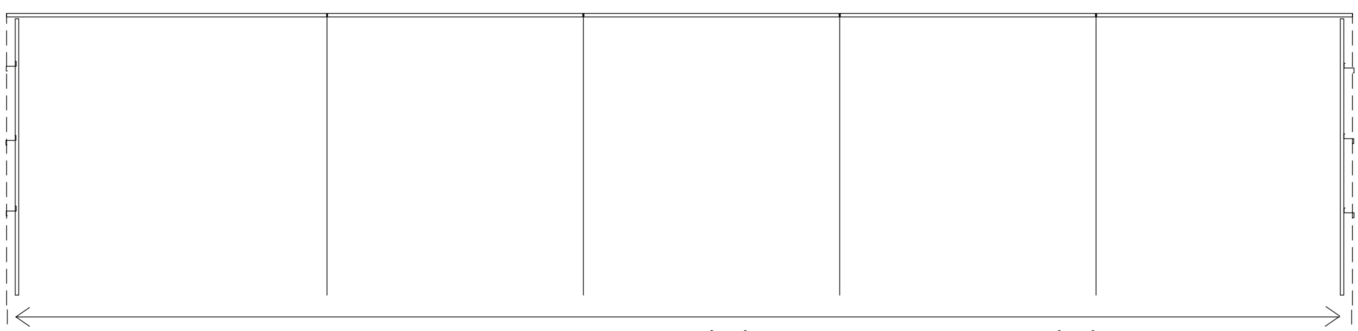
BUILDING WIDTH



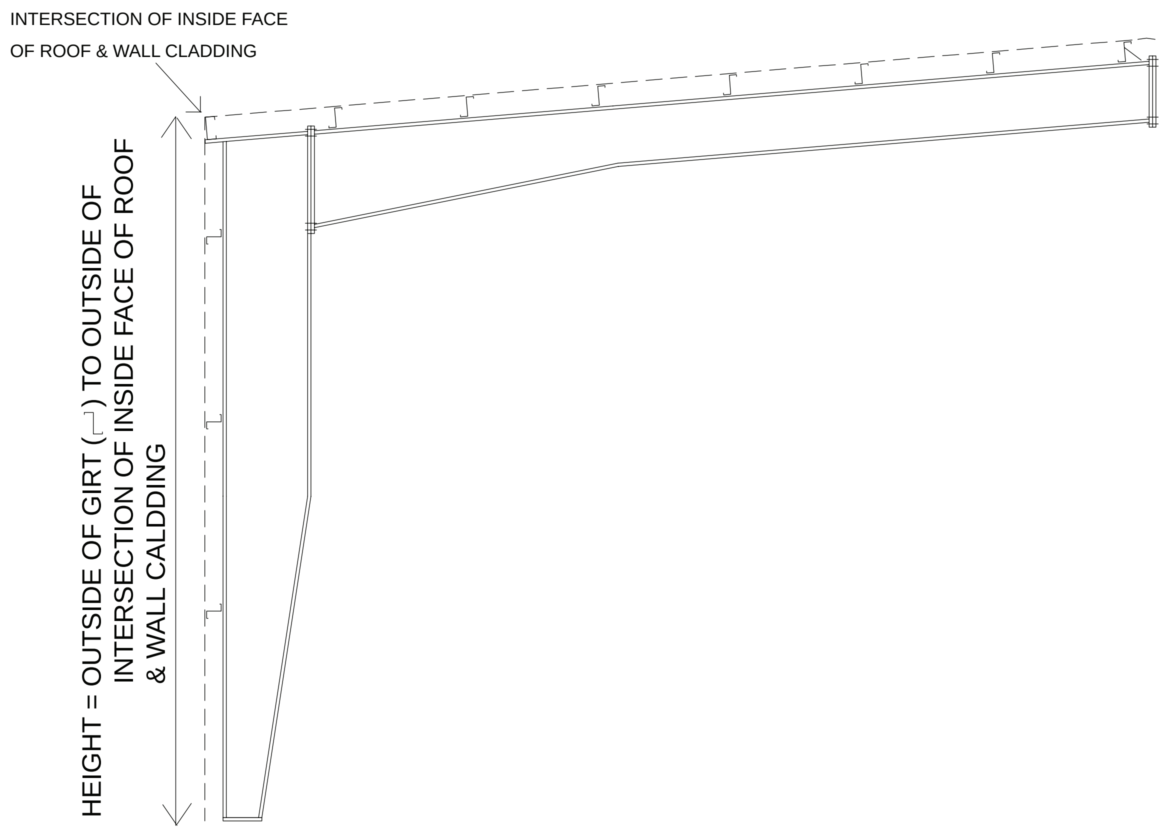
WIDTH = OUTSIDE OF GIRT (⌐) TO OUTSIDE OF GIRT (¬)

BUILDING LENGTH



LENGTH = OUTSIDE OF GIRT (⌐) TO OUTSIDE OF GIRT (¬)

BUILDING HEIGHT



2005 NATIONAL BUILDING CODE OF CANADA

The information regarding the 2005 National Building Code of Canada (NBCC2005) is meant as a general overview only. For more information or details on any of these topics, or others, please refer to Part 4 of the most current version of the Building Code, its Supplements and its Appendices.

The content contained in this manual has been referenced from Part 4 of the 2005 National Building Code of Canada (2005 NBCC). Be sure to contact your Local Building Authority to check for any regional modifications to the Building Code.

DEFINITIONS of LOADS and EFFECTS

Table 4.1.2.1.A.
Categories of Loads, Specified Loads and Effects

Symbol	Loads, Specified Loads or Effects (1)
D	*dead load*—a permanent load (2) due to the weight of *building* components as specified in Subsection 4.1.4.
E	earthquake load and effects—a rare load (4) due to an earthquake, as specified in Subsection 4.1.8.
H	a permanent load (2) due to lateral earth pressure, including *groundwater*
L	*live load*—a variable load (3) due to intended use and *occupancy* (including loads due to cranes and the pressure of liquids in containers), as specified in Subsection 4.1.5.
P	permanent effects caused by prestress
S	variable load (3) due to snow including ice and associated rain, as specified in Article 4.1.6.2., or due to rain, as specified in Article 4.1.6.4.
T	effects due to contraction, expansion, or deflection cause by temperature changes, shrinkage, moisture changes, creep, ground settlement, or a combination of them.
W	wind load—a variable load (3) due to wind, as specified in Subsection 4.1.7.
Column 1	2

Notes to Table 4.1.2.1.A.:

(1) load means the imposed deformations (i.e. deflections, displacements or motions that induce deformations and forces in the structure), forces and pressures applied to the *building* structure,

(2) permanent load is a load that changes very little once it has been applied to the structure, except during repair,

(3) variable load is a load that frequently changes in magnitude, direction or locations, and

(4) rare load is a load that occurs infrequently and for a short time only.

◘ For more information or details on LOADS and EFFECTS, see Section 4.1.2. Specified Loads and Effects in the 2005 NBCC.

IMPORTANCE CATEGORIES FOR BUILDINGS

Table 4.1.2.1.B.
Importance Categories for Buildings

Use and *Occupancy*	Importance Category
Buildings that represent a low direct or indirect hazard to human life in the event of failure, including: • low human-occupancy *buildings*, where it can be shown that collapse is not likely to cause injury or other serious consequences • minor storage *buildings*	Low[1]
All *buildings* except those listed in Importance Categories Low, High and Post-disaster	Normal
Buildings that are likely to be used as post-disaster shelters, including *buildings* whose primary use is: • As an elementary, middle or secondary school • As a community centre Manufacturing and storage facilities containing toxic, explosive or other hazardous substances in sufficient quantities to be dangerous to the public if released[1]	High
Post-disaster buildings	Post-disaster
Column 1	2

Notes to Table 4.1.2.1B.:
(1) See Appendix A.

◘ For more information or details on IMPORTANCE CATEGORIES, see Section 4.1.2. Specified Loads and Effects in the 2005 NBCC.

LIMIT STATES DESIGN

(Reference *CSSBI Fact Sheet 5: Understanding Limit States Design (LSD) Load Tables* available to download at www.cssbi.ca)

Limit states design is a method of engineering that is mandated by all Canadian Building codes and design standards. LSD was adopted because it more accurately models the variability of loads and resistances that a structural member may experience.

Over the years, many studies have measured actual loads, load patterns, material properties, fabrication tolerances and workmanship. Loads acting on a structural element, and the actual resistance of that element can only be defined statistically. In LSD the "factor of safety" is divided into two parts—a load factor and a resistance factor.

The National Building Code of Canada sets for the fundamental safety criterion that must be met in LSD:

$$\textit{Factored Resistance} \geq \textit{Effect of Factored Loads}$$
$$\Phi\, R \geq \alpha\ (\textit{Loads})$$

The load factor (α) is applied to the *specified loads* to recognize that loads higher than those anticipated may occur. It also takes into account the approximations used in the analysis of the effects these loads have on the structure. For example, wind loads are quite variable and consequently have a load factor of 1.5, whereas dead loads are much more predictable and have a load factor of only 1.25. The effect of the load factor is to increase the loads assumed in the design.

A resistance factor (Φ) is applied to the theoretical member strength, or resistance (R) to recognize that the strength of the member cannot be predicted exactly due to variability in material properties, dimensions and workmanship. It is also used to take into account the significance of the failure mode and to reflect the uncertainty in the predictor equation. In general, the Φ factor for steel members will be larger than for similar concrete members since the resistance of structural steel members is less sensitive to workmanship and therefore more predicable. The effect of the resistance factor is to decrease the strength of the member assumed in the design.

An advantage, therefore, of LSD is that the different load factors and resistance factors more accurately predict the actual values and a greater degree of consistency against failure can be obtained than was provided by Working Stress Design (WSD).

LIMIT STATES DESIGN (continued)

LSD has introduced the concepts of load factors, resistance factors, factored loads, specified loads, factored resistance plus other new terms. The following terminology is needed to understand LSD:

Specified Load: those loads prescribed by the National Building Code for the intended use and occupancy. There are a number of different types of specified loads: dead, live, temperature, earthquake, wind, snow and rain. These are equivalent to the working loads in Working States Design and might also be called allowable loads.

Superimposed Load: specified loads acting on the deck (live plus dead) excluding the self-weight of the deck or composite slab.

Factored Load: the product of the specified load and the appropriate load factor.

Load Factor: a factor used to account for the unpredicatability of loads (e.g. for live load α_L=1.5, for dead load α_D=1.25, for wind load α_Q=1.5). Resistance: the resistance of a member is the strength or capacity calculated in accordance with the governing design standard (i.e. CSA-S136 for cold formed steel).

Factored Resistance: the product of the nominal resistance and an appropriate resistance factor ≤ 1.0 which reduces the resistance to recognize variability in material properties, dimensions and workmanship.

◘ For more information or details on LIMIT STATES DESIGN, see Section 4.1.3. Limit States Design in the 2005 NBCC.

DEFINITION of DEFLECTION

The displacement of a structural member or system under load (lateral, vertical, etc.)
Types of deflection are:

- Vertical—Applied to frames and purlins and caused by snow and/or live loads.
- Horizontal Side Sway—The amount the frame can sway at top when wind or seismic load is applied.
- Horizontal—Applied to girts between frames when wind or seismic load is applied.

EXAMPLE

If a purlin is specified with a deflection of L/180 and the bay is 25’ long, this means the purlin may deflect up to 1.7”.
**Found my first by multiplying 25’ x 12” then dividing by 180.

Consider deflection carefully! In a 100’ clear span single slope bowling alley with 30’ bay by code using L/180, the frames could deflect by 6.7” and the purlins 2” for a total of over 8”. This could cause ceiling lighting problems; using more rigid deflection criteria may be required.

When bidding and quotingit is critical to note deflection requirements. Most architects are using L/240 and greater. It is critical to provide BEHLEN with exact deflection criteria.

◘ For more information or details on DEFLECTION, see Section 4.1.3.5. Deflection in the 2005 NBCC.

SPECIFIED SNOW LOAD

(1) The specified load, S, due to snow and associated rain accumulation on a roof or any other *building* surface subject to snow accumulation shall be calculated from the formula,

$$S = I_s [S_s (C_b C_w C_s C_a) + S_r]$$

where,

I_s = importance factor for snow load as provided in Table 4.1.6.2.,
S_s = 1-in-50-year ground snow load, in kPa, determined in accordance with Subsection 1.1.2.,
C_b = basic roof snow load factor in Sentence (2),
C_w = wind exposure factor in Sentences (3) and (4),
C_s = slope factor in Sentences (5), (6) and (7),
C_a = shape factor in Sentence (8), and
S_r = 1-in-50-year associated rain load, in kPa, determined in accordance with Subsection 1.1.2., but not greater than $S_s(C_b C_w C_s C_a)$.

Table 4.1.6.2.
Importance Factor for Snow Load, I_s

Importance Category	Importance Factor, I_s	
	ULS	SLS
Low	0.8	0.9
Normal	1	0.9
High	1.15	0.9
Post-disaster	1.25	0.9
Column 1	2	3

(2) The basic roof snow load factor, C_b, shall be 0.8, except that for large roofs it shall be,
(a) $1.0 - (30/l_c)^2$, for roofs with $C_w = 1.0$ and l_c greater than or equal to 70 m, or
(b) $1.3 - (140/l_c)^2$, for roofs with $C_w = 0.75$ or 0.5 and l_c greater than or equal to 200 m,

where,

l_c = characteristic length of the upper or lower roof, defined as $2w-w^2/l$, in metres,
w = smaller plan dimension of the roof, in metres,
l = larger plan dimension of the roof, in metres.

(3) Except as provided for in Sentence (4), the wind exposure factor, Cw, shall be 1.0.

(4) For *buildings* in the Low and Normal Importance Categories as set out in Table 4.1.2.1.B., the wind exposure factor given in sentence (3) may be reduced to 0.75, or to 0.5 in exposed areas north of the treeline, where,
(a) the *building* is exposed on all sides to wind over open terrain as definied in Clause 4.1.7.1.(5)(a), and is expected to remain so during its life,
(b) the area of the roof under consideration is exposed to wind on all sides with no significant obstructions on the roof, such as parapet walls, within a distance of at least 10 times the difference between the height of the obstruction and $C_bC_wS_s/\gamma$ metres, where γ is the unit weight of snow on roofs, and
(c) the loading does not involve the accumulation of snow due to drifting from adjacent surfaces.

(5) Except as provided for in Sentences (6) and (7), the slope factor, C_s, shall be,
(a) 1.0 where the roof slope, α, is equal to or less than 30º,
(b) (70º - α)/40º where α is greater than 30º but not greater than 70º, and
(c) 0 where α exceeds 70º.

(6) The slope factor, $C_{s,}$ for unobstructed slippery roofs where snow and ice can slide completely off the roof shall be,
(a) 1.0 when the roof slope, α, is equal to or less than 15º,
(b) (60º - α)/45º when α is greater than 15º, but not greater than 60º, and
(c) 0 when α exceeds 60º.

(7) The slope factor, $C_{s,}$ shall be 1.0 when used in conjunction with shape factors for increased snow loads as given in Clauses (8)(b) and (e).

(8) The shape factor, C_a, shall be 1.0, except that where appropriate for the shape of the roof, it shall be assigned other values that account for,
(a) non-uniform snow loads on gable, arched or curved roofs and domes,
(b) increased snow loads in valleys,
(c) increased non-uniform snow loads due to snow drifting onto a roof that is at a level lower than other parts of the same *building* or at a level lower than another *building* within 5 m of it,
(d) increased non-uniform snow loads on areas adjacent to roof projections, such as penthouses, large *chimneys* and equipment, and
(e) increased snow or ice loads due to snow sliding or meltwater draining from adjacent roofs.

◘ For more information or details on SPECIFIED SNOW LOAD, see Section 4.1.6.2. Specified Snow Load in the 2005 NBCC.

SPECIFIED WIND LOAD

(1) The specified external pressure or suction due to wind on part or all of a surface of a *building* shall be calculated using the following formula:

$$p = I_w q C_e C_g C_p$$

Where,

p = the specified external pressure acting statically and in a direction normal to the surface, either as a pressure directed towards the surface or as a suction directed away from the surface,

I_w = importance factor for wind load, as provided in Table 4.1.7.1.,

q = the reference velocity pressure as provided for in Sentence (4),

C_e = the exposure factor as provided for in Sentence (5),

C_g = the gust factor, as provided for in Sentence (6), and

C_p = the external pressure coefficient averaged over the area of the surface considered.

Table 4.1.7.1.
Importance Factor for Wind Load, L_w

Importance Category	Importance Factor, I_w	
	ULS	SLS
Low	0.8	0.75
Normal	1.0	0.75
High	1.15	0.75
Post-disaster	1.25	0.75
Column 1	2	3

(2) The net wind load for the *building* as a whole shall be the algebraic difference of the loads on the windward and the leeward surfaces, and in some cases may be calculated as the sum of the products of the external pressures or suctions and the areas of the surfaces over which they are averaged as provided in Sentence (1).

(3) The net specified pressure due to wind on part or all of a surface of a *building* shall be the algebraic difference of the external pressure or suction as provided for in Sentence (1) as the specified internal pressure or suction due to wind calculated from,

$$p_i = I_w q C_e C_{gi} C_{pi}$$

where,

p_i = specified internal pressure acting statically and in a direction normal to the surface, either as a pressure directed toward the surface or as a suction directed away from the surface,

I_w = importance factor for wind load, as provided in Table 4.1.7.1.,

q = the reference velocity pressure, as provided for in Sentence (4),

C_e = the exposure factor, as provided for in Sentence (5),

C_{gi} = internal gust effect factor, as provided for in Sentence (6), and

C_{pi} = the internal pressure coefficient.

(4) The reference velocity pressure, q, shall be the appropriate value determined in conformance with Subsection 1.1.2. based on a probability of being exceeded in any one year of 1-in-50.

(5) The exposure factor, C_e, shall be,

(a) $(h/10)^{0.2}$ but not less than 0.9 for open terrain, where open terrain is level terrain with only scattered *buildings*, trees or other obstructions, open water or shorelines, h being the reference height above *grade* in metres for the surface or part of the surface,

(b) $O.7(h/12)^{0.3}$ but not less than 0.7 for rough terrain, where rough terrain is suburban, urban or wooded terrain extending upwind from the *building* uninterrupted for at least 1 km or 10 times the *building height*, whichever is greater, h being the reference height above *grade* in metres for the surface or part of the surface,

(c) And intermediate value being the two exposures defined in Clause (a) and (b) in cases where the site is less than 1 km or 10 the *building height* from a change in terrain conditions, whichever is greater, provided an appropriate interpolation method is used, or

(d) If a dynamic approach to the action of wind gusts is used, an appropriate value depending on both height and shielding.
(see Appendix A.)

(6) The gust factor, C_g, shall be one of the folllowing values:

(a) for the *building* as a whole and main structural members, $C_g = 2.0$,

(b) For external pressures and suctions on small elements including cladding, $C_g = 2.5$,

(c) For internal pressures, $C_{gi} = 2.0$ or a value determined by detailed calculation that takes into account the sizes of the openings in the *building* envelope, the internal volume and the flexibility of the *building* envelope, or

(d) If a dynamic approach to wind action is used, C_g is a value that is appropriate for the turbulence of the wind and the size and natural frequency of the structure.
(See Appendix A.)

◘ For more information or details on SPECIFIED WIND LOAD, see Section 4.1.7. Wind Load in the 2005 NBCC.

SITE PROPERTIES

Excerpt from Table 4.1.8.4.A.
Site Classification for Seismic Site Responses

Site Class	Ground Profile Name
A	Hard *rock*
B	*Rock*
C	Very dense *soil* and soft *rock*
D	Stiff *soil*
E	Soft *soil*
F	Other *soils*(1)
Column 1	2

Notes to Table 4.1.8.4.A.:

(1) Other *soils* include:
- (a) liquifiable *soils*, quick and highly sensitive clays, collapsible weakly cemented *soils*, and other *soils* susceptible to failure or collapse under seismic loading,
- (b) Peat and/or highly organic clays greater than 3 m in thickness,
- (c) Highly plastic clays (PI > 75) more than 8 m thick, and
- (d) Soft to medium stiff clays more than 30 m thick.

◘ For more information or details on SITE PROPERTIES or EARTHQUAKE LOAD AND EFFECTS, see Section 4.1.8. Earthquake Load and Effects in the 2005 NBCC.

IMPORTANCE FACTOR

(1) The earthquake importance factor, I_E, shall be determined according to Table 4.1.8.5. (See Appendix A.)

Table 4.1.8.5.
Importance Factor for Earthquake Loads and Effects, I_E

Importance Category	Importance Factor, I_E	
	ULS	SLS[1]
Low	0.8	[2]
Normal	1.0	[2]
High	1.3	[2]
Post-disaster	1.5	[2]
Column 1	2	3

Notes to Table 4.1.8.5.:
(1) See Article 4.1.8.13.
(2) See Appendix A.

◘ For more information or details on IMPORTANCE FACTOR or EARTHQUAKE LOAD AND EFFECTS, see Section 4.1.8. Earthquake Load and Effects in the 2005 NBCC.

FIRE PROTECTION BULLETIN NO. 20

CANADIAN STEEL CONSTRUCTION COUNCIL
FIRE-RATED EXTERIOR SHEET STEEL WALLS

Fire Protection

CANADIAN STEEL CONSTRUCTION COUNCIL

201 Consumers Road, Suite 300, Willowdale, Ontario, M2J 4G8

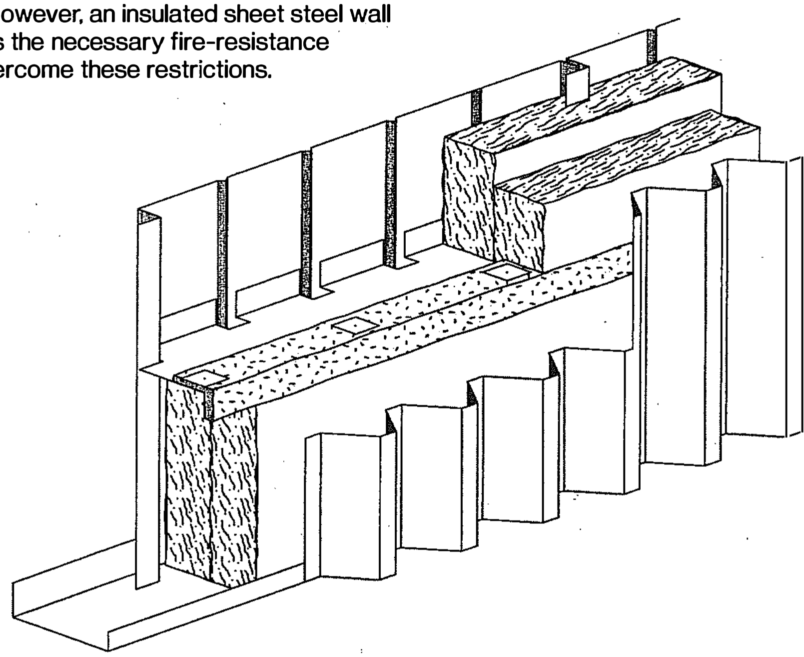
FIRE-RATED EXTERIOR SHEET STEEL WALLS

INTRODUCTION

Insulated sheet steel walls are frequently used on the exterior of commercial and industrial steel framed buildings. They have been found to be economical, aesthetically attractive, and amenable to the short construction duration inherent in such buildings.

Because economical sheet steel walls, until now, have not had recognized fire-resistance ratings, they have been restricted to exterior walls not subject to any Limiting Distance requirements specified by the National Building Code of Canada (NBCC). Exterior walls in close proximity to the Property Line or adjacent buildings (see NBCC Subsection 3.2.3) have traditionally been built in masonry block or concrete.

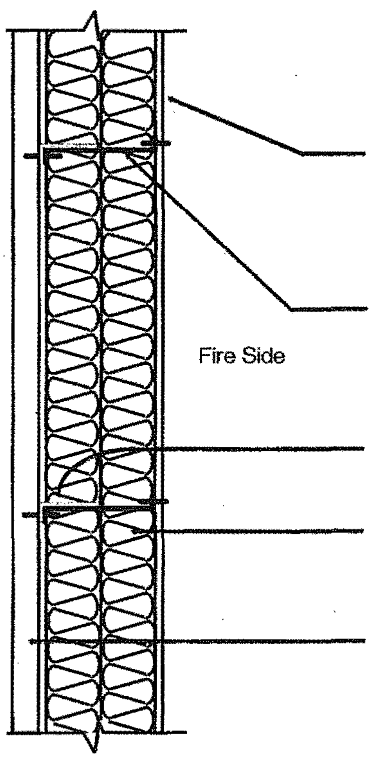
There is now, however, an insulated sheet steel wall that possesses the necessary fire-resistance ratings that overcome these restrictions.



CSCC/CSSBI/NRC RESEARCH PROGRAM

In response to Designers' needs for an alternative, the Canadian Steel Construction Council (CSCC), the Canadian Sheet Steel Building Institute (CSSBI), and the National Fire Laboratory of the Institute for Research in Construction, National Research Council of Canada (NRC) set up a joint research project, with the intent of developing an integrated **fire-rated** non load-bearing insulated sheet steel wall assembly.

This program comprised a number of small-scale and full-scale fire tests in NRC's furnaces. The resulting exterior wall assembly has been assigned a **one-hour fire-resistance rating**, based on CAN/ULC-S101-M89 - "Standard Methods of Fire Endurance Tests of Building Construction and Materials". IRC Internal Report *Fire Resistance Tests of Exterior Sheet Steel Walls Insulated With 152 mm Thick, 96 kg/m³ Density, Mineral Wool Insulation*, by Martin Chabot, details the results of the actual fire tests. The full constructional and material details are given in Underwriters Laboratories of Canada (ULC) "List of Equipment and Materials - Volume 3 - Fire Resistance Ratings", under Design No. W605, but the following describes the salient details.



Vertical Section

INSULATED SHEET STEEL WALL ASSEMBLY

Fire-Resistance Rating - 1 h

Steel liner: Panels fabricated from minimum 0.61 mm thick sheet steel, fastened to flashing channels by 19 mm long sheet metal screws spaced maximum 305 mm on centre. Side lap joints sealed with factory- applied caulking and secured with 19 mm long sheet metal screws maximum 305 mm on centre.

Z-bar sub-girt: Minimum 152 mm wide x 1.22 mm thick sheet steel Z-bars with 25 mm and 38 mm flanges, maximum 1525 mm on centre, fastened to steel liner by 19 mm long sheet metal screws spaced maximum 250 mm on centre.

Ceramic fibre strip: 128 kg/m³ density, mimimum 100 mm wide x 13 mm thick strips, attached to Z-bar sub-girt with stick pins spaced 250 mm on centre.

Mineral wool batts: 96 kg/m³ Nominal density, processed from rock and slag, supplied in 76 mm thick sheets 610 mm x 1220 mm. Two layers installed with vertical and horizontal joints staggered.

Exterior cladding: Corrugated prepainted sheet steel panels, to various profiles and widths. Panels minimum 0.46 mm thick, fastened to Z-bar sub-girts by 19 mm long sheet metal screws maximum 305 mm on centre. Lap joints of adjacent panels fastened by 19 mm long sheet metal screws maximum 405 mm on centre.

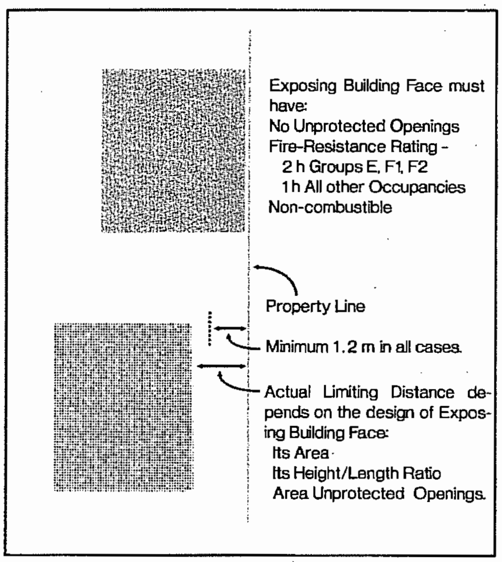
SPATIAL SEPARATION REQUIREMENTS OF NBCC

The NBCC requires that no building shall put an adjacent building at risk due to a fire. This is achieved by requiring a minimum separation between buildings, or by limiting the area of unprotected openings in walls between buildings. This is all set out in two Tables - Table 3.2.3.A for Groups A, B, C, D and Group F Division 3 Occupancies; and Table 3.2.3.B for Group E and Group F Divisions 1 and 2 Occupancies.

These Tables may be used in either of two ways. For any given exterior wall (called **the exposing building face**), (a) the required Limiting Distance may be calculated according to the area of unprotected openings; or (b) the area of unprotected openings may be restricted according to the available Limiting Distance. The actual Spatial Separation requirements are governed by two situations:

(1) If the exposing building face of a building has **no unprotected openings**, it may be located right **on** the Property Line,* provided it has a fire-resistance rating. This rating is **2 h** for Groups E, F1 and F2 Occupancies, and **1 h** for all other Occupancies (NBCC 3.2.3.7).

(2) If there **are** any unprotected openings, then the wall must be **set back** from the Property Line. The minimum set-back distance is **1.2 m**, but this increases as the size of the wall and the amount of unprotected openings increase. The construction and fire-resistance rating (if required) of the exposing building face depend on the amount of unprotected openings permitted by Tables 3.2.3.A and 3.2.3.B for any given wall (NBCC 3.2.3.7).



The Sheet Steel Wall Assembly described in this Bulletin has a 1 h fire-resistance rating and is of non-combustible construction. It may therefore be used in any situation where these attributes are required, including (in buildings governed by Table 3.2.3.A) walls situated on the Property Line that have no unprotected openings.

Equivalent two-hour rated wall

Sometimes, in buildings governed by Table 3.2.3.B, a 2 h wall is required. This Sheet Steel wall assembly meets all the requirements of a 2 h fire test, with the exception that it exceeds the **temperature rise criteria** on the unexposed (non-fire) surface, as set out in the test standard (CAN/ULC-S101-M89). The NBCC recognizes this situation by **waiving** the temperature rise criteria, as long as a **correction factor** is applied to the wall (NBCC 3.1.7.2).

This correction factor (defined as the equivalent opening factor) is calculated by translating the actual temperature reached in the fire test at the 2 h point to an **equivalent area of unprotected opening**. Of course, once unprotected openings are introduced (whether actual or equivalent), the wall can no longer be located on the Property Line, but must be 1.2 m or more from it (NBCC Table 3.2.3.B).

In the case of the sheet steel wall assembly, the correction factor is 1.6% of the total rated wall area (i.e. exclusive of actual unprotected openings), calculated in accordance with a formula shown in NBCC 3.2.3.12 (see Page 4).

* See NBCC Subsection 1.1.3 *Definitions of Words and Phrases* - "Limiting Distance" - for all situations that may be governed by Limiting Distance requirements.

EXAMPLE CALCULATIONS

The following example shows how this information may be put to practical use.

Consider a Group E (Mercantile) Occupancy building (typically an enclosed shopping centre), which is to be clad with the 1 h rated sheet steel wall assembly described in this Bulletin. Note that, as this is a Group E building, a 2 h wall is required (NBCC 3.2.3.7.), but as described earlier, the 1 h ULC-listed sheet steel wall can be used if correction is made by adding an equivalent area of unprotected openings.

The design parameters of the exposing building face are as follows:

Where the 1.6% Correction Factor Comes From:

An **equivalent opening factor**, F_{EO}, is calculated for the wall at the given fire-resistance period according to this formula given in Article 3.2.3.12. of NBCC:

$F_{EO} = (T_u + 273)^4 / (T_e + 273)^4$, where:

T_u = average temperature reached on the unexposed wall surface at the time the required fire-resistance rating is reached under test conditions;

T_e = 892 °C for a fire-resistance rating of 45 min
927 °C for a fire-resistance rating of 1 hour
1010 °C for a fire-resistance rating of 2 hours.

The average temperature (T_u) of the unexposed surface of the sheet steel wall at 2 h in the fire test was 185 °C, giving an F_{EO} value of 0.016 or 1.6%.

Length:		88.0 m
Height:		8.0 m
Length/Height Ratio:	88.0 ÷ 8.0 m =	11 : 1
Total Gross Area:	88.0 x 8.0 m =	704 m²
Actual Area of Unprotected Openings (4 Entrances each 6 m x 2 m):	4 x 6.0 x 2.0 m =	48 m²
Net Area of 1 h rated wall (i.e. excluding openings):	704 m² - 48 m² =	656 m²

From the above information, two calculations need to be performed:

(1) Total area of Unprotected Openings		
To the actual area of unprotected openings, an equivalent area must be added as previously noted (NBCC 3.1.7.2), using the equivalent opening factor of 1.6%:	656 m² x 1.6% =	10.5 m²
Therefore, total area of unprotected openings (actual + equivalent) =	48 m² + 10.5 m² =	58.5 m²
Area of unprotected openings (% of the exposing building face):	58.5 m² ÷ 704 m² =	8.3%

(2) Required Limiting Distance	
Referring to NBCC Table 3.2.3.B: For a building with an Exposing Building Face that has:	
Maximum Area =	1 000 m²
L/H Ratio	> 10 : 1
Area Unprotected Openings =	8.3%
The required Limiting Distance =	**7 m**

Note that, as the (permitted) area of unprotected openings for this wall situated 7 m from the Property Line is 9% (Table 3.2.3.B), the construction of the wall (with the exception of the 2 h rating) must be as specified in NBCC 3.2.3.7.(2)(a).

CONCLUSION

The fire-rated sheet steel wall described in this Bulletin is a ULC- listed Design, using primarily generic materials. It offers designers flexibilty in the design of steel clad walls that was previously unavailable to them. Future developments will expand the range of materials that can be used.

FIRE PROTECTION BULLETIN NO. 23

CANADIAN STEEL CONSTRUCTION COUNCIL

PRACTICAL FIRE PROTECTION IN COLD FORMED STEEL FRAMED BUILDINGS

Fire Protection

CANADIAN STEEL CONSTRUCTION COUNCIL

201 Consumers Road, Suite 300
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Practical Fire Protection in Cold Formed Steel Framed Buildings

Introduction

Fire Protection Bulletin No. 22, issued January 1996, outlines the requirements for fire-resistance ratings and fire protection as contained in the 1995 National Building Code of Canada (NBCC). Emphasis in that Bulletin is given to Part 3 - Fire Protection, Occupant Safety and Accessibility - of the NBCC, and most buildings using hot rolled steel framing systems would have to comply with this Part.

Buildings using cold formed steel framing systems - whether custom designed or pre-engineered - would also have to comply with Part 3. Smaller buildings could also be designed under Part 9 of the NBCC - Housing and Small Buildings (see NBCC Subsections 2.1.2. and 2.1.3. for applicability). Both Part 3 and Part 9 of the NBCC contain essentially the same requirements for fire protection, occupant safety and accessibility. Part 9 however includes extensive prescriptive requirements that enable buildings to be designed without the benefit of the services of either an architect or engineer.

Fire Protection Bulletin No. 22 describes how to establish the necessity for fire protection. This Fire Protection Bulletin provides some solutions to common fire protection requirements in the NBCC that the designer of a cold formed steel framed or pre-engineered building might encounter. While these details are primarily applicable to cold formed steel construction, many are equally applicable to buildings incorporating hot rolled structural members.

Applicability

Fire-resistance ratings in the NBCC are normally applied to floor assemblies, roof assemblies, supporting elements (such as columns), and walls (interior and exterior).

Most buildings using cold formed steel framing systems will rarely require fire-resistance ratings exceeding 1h for their construction. Therefore, except where appropriate, fire-resistance ratings of more than 1h are not covered in this Bulletin.

NBCC Sprinkler Requirements

The 1995 NBCC has placed significantly increased emphasis on supervised and monitored sprinkler systems as a primary means of fire safety. While this has not as yet resulted in any major relaxations in passive fire-resistance requirements, there are benefits for fully sprinklered buildings. These benefits include:

1. Waiving of fire-resistance ratings to roof assemblies in buildings otherwise required to have them;
2. Increased Area (doubled in most instances) for a given type of construction (such as combustible or non-combustible, rated or non-rated);

3. No restrictions or requirements on number of streets faced; and

4. Greatly reduced Limiting Distance requirements relating to exterior wall construction.

With these advantages in mind, and considering the relative inexpensiveness of modern sprinkler systems (usually around $12/m2 and invariably under $15/m2 of floor area for an ordinary hazard system - 1996 prices typical in most parts of Canada), it is almost always economically advantageous to sprinkler Part 3 buildings. This Bulletin therefore assumes that all cold formed steel framed or pre-engineered buildings designed under Part 3 and requiring fire protection will be sprinklered: fire protection requirements relating solely to non-sprinklered buildings (such as fire-resistance ratings to roof assemblies) are not covered.

(See also NBCC Sentence A-3.2.5.13.(6) for an explanation of some assumptions inherent in using sprinklers in lieu of fire-resistance ratings to roof assemblies.)

Fire Protection Design Methods

There are two primary methods of designing fire protection to an assembly in order to achieve a fire-resistance rating. These are:

1. Application of an Underwriters Laboratories of Canada (ULC), Underwriters Laboratories Inc. (ULI) or Inchcape Testing Services-Warnock Hersey Listed Design;

2. Application of generic materials and assemblies as listed in NBCC Appendix D - Fire-Performance Ratings.

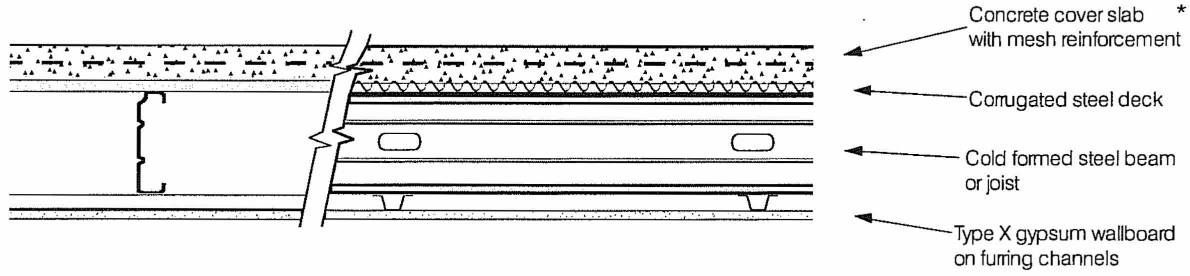
Wherever possible in the design solutions that follow, both a Listed Design and an assembly from Appendix D will be given. However, it should be noted that fire rated assemblies in Appendix D are generally much more conservative than equivalent Listed Designs, with commensurate cost penalties. Appendix D is most useful where there is no suitable Listed Design for a particular fire protection problem.

There are no Listed Designs utilising proprietary direct-applied (sprayed-on fibrous or cementitious) coatings to cold formed steel structural members. And while Appendix D of the NBCC still lists metal lath and plaster as a component in generic fire rated assemblies, this is both very expensive and extremely rare in the 1990s, as well as being generally inappropriate for cold formed steel framed or pre-engineered buildings. Consequently all the design solutions in this Bulletin involve the use of gypsum wallboard as the primary fire protection medium.

The diagrams that follow are <u>schematic representations only</u> of either Listed Designs or construction assemblies described in NBCC Appendix D. However, notwithstanding what is depicted in this Bulletin, all construction details of the selected assembly, either shown or described in the published Listed Design or Appendix D, must be followed exactly.

Floor Assemblies

Floor assemblies may consist of framing systems that utilise hot rolled beams, open web steel joists, cold formed joists, or a combination of all three. The floor construction may consist of steel deck with a concrete cover slab (such as is typified below), or a wood subfloor with a finish applied (NBCC Sentence D-2.3.5.(3), Table D-2.3.5.). Any beams or joists completely contained within the assembly are considered to be protected by the assembly (NBCC Article D-2.3.13.).



* Slab to be mininum thickness as specified in selected Listed Design, or else 50 mm (NBCC Table D-2.3.5.).

Floor Assemblies (Cont'd)

The diagram on Page 2 is representative of floor framing using cold formed steel joists with a corrugated steel deck and concrete topping. ULI Design No. G534 is typical of this construction, and is rated for 1 h. For a 2 h rating, a 25 mm layer of insulation must be added above the gypsum wallboard, such as is shown in ULI Design No. G533.

Appendix D:

Using NBCC Appendix D for floor assemblies is often significantly less economical than using a Listed Design, and sometimes may not even be usable at all.

It is not possible for instance to use Appendix D to design a 1 h rated cold formed steel framed floor assembly similar to that shown on the previous page (with just one layer of gypsum wallboard) by using the Component Additive Method - i.e. adding the individual time contributions assigned to various components (Article D-2.3.3.).

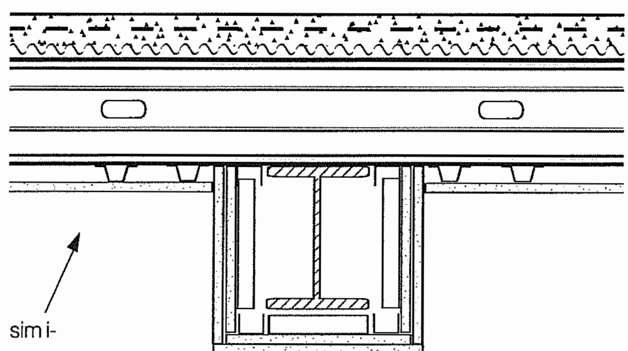
For example, Table D.2.3.4.A. assigns a time of 40 min for one layer of 15.9 mm Type X wallboard as its contribution to the total assembly. To this can be added the contribution for the light steel frame of 10 min (Table 2.3.4.C.), for a total of only 50 min.

When using the Component Additive Method, where the time assigned to the wallboard is not a stand-alone time but merely its individual contribution to the total assembly rating, double layers of gypsum wallboard are not permitted, except as listed in Table D-2.3.4.A. (Sentence D-2.3.3.(3)).

To achieve a fire-resistance rating for such a floor assembly by using Appendix D, it is therefore necessary to resort to Table D-2.3.12., where the ceiling membranes listed have a full fire-resistance rating in their own right (i.e. they do not have to be part of an assembly). Here, two layers of 15.9 mm Type X wallboard are assigned 60 min, while two layers of 12.7 mm Type X wallboard are assigned 45 min. The ceiling membrane cannot be penetrated (NBCC 2.3.12.), while the contribution of the steel frame is ignored. (See also Assemblies M1 and M2 in NBCC Table A-9.10.3.1.B.)

Projecting Beams:

If a beam that is part of the structure projects below the ceiling membrane, a combination of two Listed Designs may need to be used, as shown below. The 2 h rating for the beam would not be required in a 1 h rated structure - it's just that there are no 1 h rated beam Listed Designs using gypsum wallboard. Appendix D contains no beam protection details using gypsum wallboard.



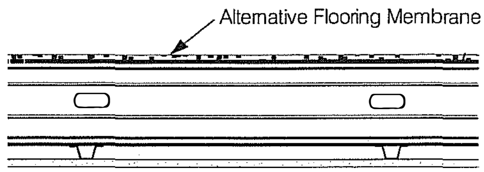
In this example, the construction typified by ULI G534 has been combined with a Beam Design, such as ULC O501 or O502. Alternatively, the same result can be achieved by using ULI L524. In each of these cases, the actual construction details vary between the Designs, and the designer must select the most appropriate.

Alternative Floor Construction:

The floor assemblies depicted so far have shown a corrugated steel deck with a concrete cover slab over. NBCC Table D-2.3.5. lists the permissible combinations of flooring membranes where cold formed steel members are used. There are also various floor systems listed in a number of the ULI Listed Designs using cold-formed members, such as L527.

The most common alternative flooring membrane consists of tongued-and-grooved plywood,

Floor Assemblies (Cont'd)



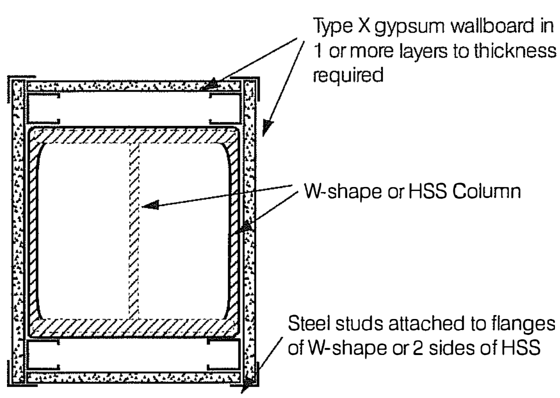
usually no less than 16 mm thick, to which a floor finish is applied. Some finishes require an additional plywood subfloor in order to achieve the full assembly fire-resistance rating. A number of Listed Designs include a wide variety of proprietary floor systems.

In all cases, the subfloor must be secured to the steel structural members either by specified fasteners, specified adhesive or a combination of the two.

Columns

Where hot rolled columns are used, either wideflange section (W) or hollow structural section (HSS), they can be protected using both Listed Designs and NBCC Appendix D. Note that, while Appendix D specifically calls for Type X wallboard, all Listed Designs merely describe the wallboard that was actually tested. However, almost without exception, the tested wallboard in those Designs meets the specifications for, and in fact is, a Type X wallboard.

The following diagram illustrates typical assembly details for fire protection employing one layer of Type X gypsum wallboard. Additional layers (up to four, and usually with corner reinforcements beyond two) can be added where permitted.



Most Listed Designs for 1h rated W-shape columns utilise no more than two layers of wallboard against the column's flanges (parallel to the web), and one or two layers attached to the steel studs at each end parallel to the flanges. Often, the inner layer is attached directly to the flanges, inside of the studs. Corner beads are required at each corner.

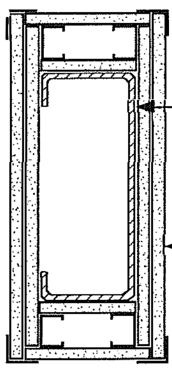
Typical of this construction are ULI Designs Nos. X524 and X528. For example, X528 lists a variety of W-shape and HSS sizes, with varying thicknesses of wallboard according to the column size. In this Design, for a 1 h fire-resistance rating, both a W150 x 22 column (which is the smallest W-shape produced in Canada) and an HSS 102 x 102 x 4.8 column require a total thickness of 25.4 mm of Type X wallboard on all four sides.

Larger sized columns in this Design require less thickness for the same 1 h rating - a W250 x 73 column requires 12.7mm, while an HSS 203 x 203 x 6.4 column requires 15.9mm, both thicknesses being achievable with one layer.

ULI X524 takes a slightly different approach. The minimum column size is defined by the column's M/D Ratio (see next page), which in this case is M/D = 16. This Design also includes integration with 'C' or 'Z' girts that are part of an adjacent wall assembly.

In all column designs using gypsum wallboard, no horizontal joints are allowed, and the wallboard must be attached with the specified fasteners. Some Designs require tie wire and/or additional steel corner reinforcements for multiple layers beyond two.

There are also 1 h (and 2 h) rated ULI Listed Designs using cold formed C-shape steel columns. One such Design is ULI X530, similar to the following diagram:



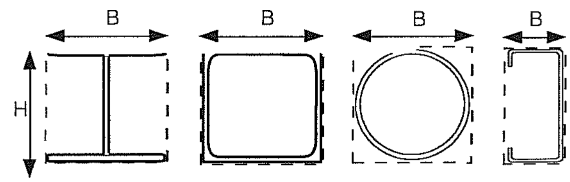
As an alternative to Listed Designs, NBCC Appendix D contains Table D-2.6.1.F. listing the required thickness of Type X gypsum wallboard according to the M/D Ratio of a column. As column fire tests are calculated only on temperature (i.e. failure is determined solely by the temperature of the steel, without any applied load), this Table can be applied to steel columns of any shape or section, including cold formed shapes.

The M/D Ratio of a column is determined as shown below, where M = the column's Mass (in kg/m), and D = the column's Heated Perimeter (in m). The heated perimeter is equivalent to the inside (non-exposed) face of the fire protection medium - in this case the inside face of the wallboard.

Notwithstanding this definition, NBCC Appendix D (Sentence D-2.6.4.(2).) defines the calculation of D, for columns using 'box'-shaped fire protection, as follows:

$$D = 2(B + H)$$

(See Diagram above.)



When using Table D-2.6.1.F. of Appendix D, for 1h ratings, the following values are applicable in the context of this Bulletin. Note that it is possible to increase either the wallboard thickness or the M/D Ratio, or both, in order to meet these values.

Minimum Thickness of Type X Wallboard, mm	Minimum M/D Ratio
12.7	75
15.9	55
25.4	35

There are no values for columns with an M/D Ratio of less than 35, this being the minimum for which data is available on the Heated Perimeter concept. For columns with an M/D Ratio of less than 35, use a Listed Design.

As a comparison with Listed Designs, the M/D Ratio of the W150 x 22 column in ULI X528, for which the required wallboard thickness is 25.4 mm, is 36, while the W250 x 73 column, for which the required thickness is 12.7 mm, has an M/D Ratio of 72.

The specified minimum size of cold formed C-shape in ULI X530, at 4.8 kg/m and with 'box' protection, has an M/D Ratio of under 10. This means that for very light steel columns, Table D-2.6.1.F. cannot be used.

Finally, the use of HSS columns permits the use of concrete filling as a means of fire protection. Fire Protection Bulletin No. 21, issued November 1994, explains the methodology in detail. Appendix D of the NBCC also includes the same procedure (Subsection D-2.6.6.), which means that there should be no problem in having it accepted by the authority having jurisdiction.

Loadbearing Walls

(Note: Although both Canadian and US dictionaries of architectural terminology specifically define a partition as being either loadbearing or non-loadbearing, the NBCC defines a partition as being only non-loadbearing (Article 1.1.3.2. - partition). The NBCC definition is used in this Bulletin.)

A loadbearing wall will require a fire-resistance rating if it is part of, or a supporting element in, the building's structural frame (and assuming that frame is rated as required by the NBCC). Walls subjected to only wind or earthquake loads are not loadbearing (NBCC Article 1.1.3.2. - loadbearing).

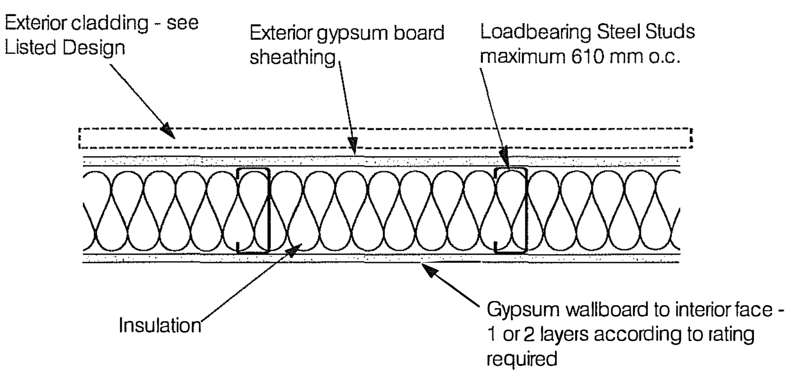
In addition, loadbearing exterior walls will need a fire-resistance rating if the NBCC's Limiting Distance provisions need to be satisfied, while interior walls, if they are fire separations, may also need a fire-resistance rating. Not all interior separations must be rated.

Exterior walls and interior walls are treated differently. The exterior wall needs to be rated only from fire exposure on the interior side. The interior wall must be rated from both sides.

If using the Component Additive Method in NBCC Appendix D to design a fire rated interior wall, no contribution can be attributed to the membrane on the unexposed face (NBCC D-2.3.5.(1)).

Exterior Loadbearing Walls:

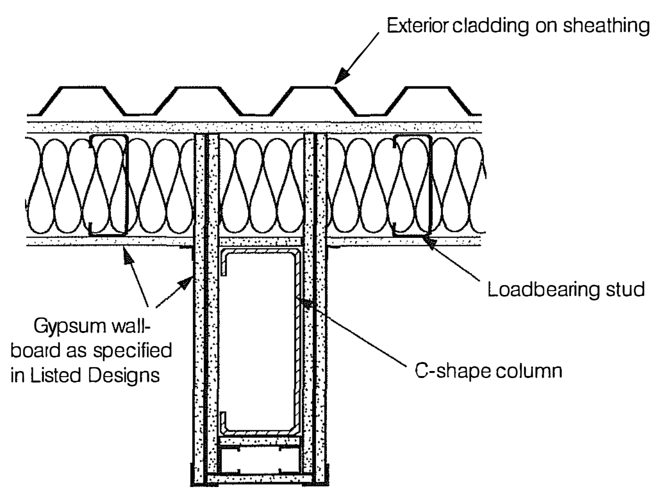
Generally, the most economical fire rated loadbearing exterior wall assemblies are Listed Designs, such as ULI U418 or U425 (there are no equivalent ULC or Warnock Hersey Listed Designs). The diagram below is representative of this type of construction. Note that such Designs often permit both glass fibre batts and mineral wool insulation, as well as a variety of exterior facings.



If the wall falls under the NBCC Limiting Distance requirements (Subsection 3.2.3.), then both the insulation and the exterior cladding must satisfy Article 3.2.3.7., Sentences (1) to (9) as appropriate. Many Designs also require some form of lateral support or bridging, by such means as horizontal steel straps or channels.

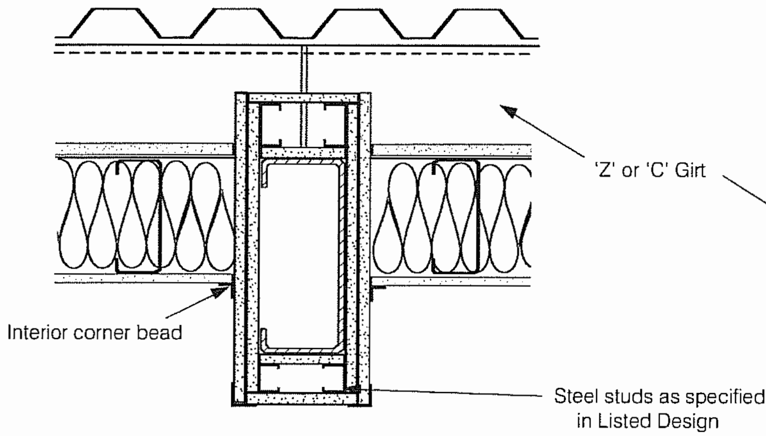
Wall and column Designs can be combined, as in the diagram opposite.

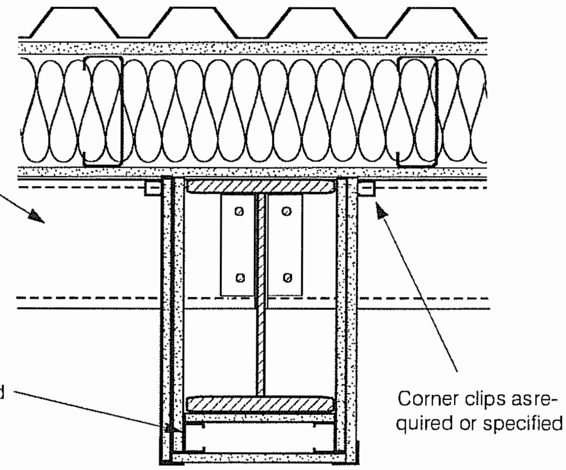
This detail is similar to that illustrated in Listed Design ULI U489, which is itself a combination of other ULI Listed Designs (X524 or X530 for the column components, U425 for the wall components).



Loadbearing Walls (Cont'd)

The following diagrams represent additional configurations of the loadbearing wall/column interface, incorporating C-shape and W-shape sections for the column. The exterior cladding in these examples is a profiled steel siding on 'Z' or 'C' girts. The girts may be positioned either inside or outside the loadbearing stud wall and/or column.





There are no fire rated loadbearing assemblies in the NBCC, in either Part 9 or Appendix D.

Interior Loadbearing Walls:

The most economical Canadian Listed Design for interior loadbearing walls is ULC W424. This Design consists of steel studs maximum 600 mm on centre, 38 mm wide channel section horizontal lateral bridging members maximum 1200 mm on centre passing through the stud cutouts and attached to each stud with brackets, and for a 1 h rating, one layer of 15.9 mm Type X wallboard each side. For a 1 h rating, there is no load restriction.

There are similar or equivalent ULI Designs, some requiring interior insulation to provide the required rating, but dispensing with the horizontal bridging (unless this is required for other structural reasons). Some of the ULI exterior wall Designs can also be used as an interior wall, such as ULI U425. In this case, the gypsum wallboard required for the interior side of an exterior wall is applied to both sides of the interior wall. All other details, including any wall/column interface, still apply.

Non-Loadbearing Walls and Partitions

Non-loadbearing exterior walls would require a fire-resistance rating if they are in close proximity to the property line or another building, and fall under the NBCC's Limiting Distance requirements. For more information on calculating any required fire-resistance in this situation, see Fire Protection Bulletins Nos. 20 and 24.

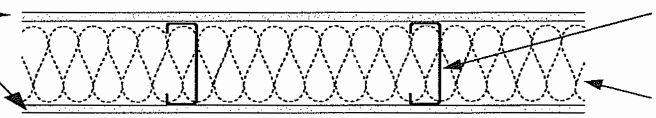
Non-loadbearing interior walls and partitions would require a fire-resistance rating when used to divide a building into fire separated suites. A typical example might be a large industrial building rented out to multiple tenants, each of which must be separated from its neighbour by a fire separation having a fire-resistance rating of, say, 45 min.

Exterior non-loadbearing walls:

Any loadbearing fire rated wall, as shown on Pages 6 and 7, can also of course be used in a non-loadbearing situation. In addition, ULC Listed Design W605 is a generic insulated 1h fire rated exterior wall assembly that was developed at the National Research Council - Institute for Research in Construction on behalf of the steel industry. Full details are described in Fire Protection Bulletin No. 20. No gypsum wallboard is required in this assembly.

Interior non-loadbearing walls and partitions:

There are many ULC and ULI Listed Designs for non-loadbearing interior walls and partitions. The most economical consist of steel studs and a single layer of gypsum wallboard both sides, as typified by the following diagram:

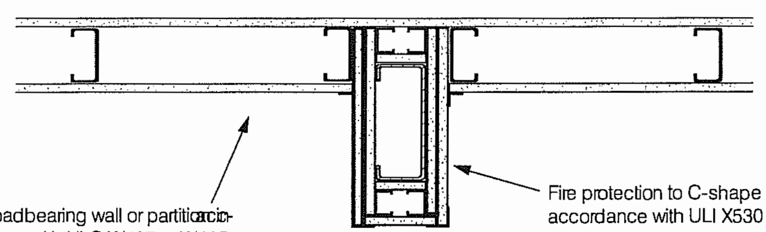


Designs typical of this construction, with a 1 h fire-resistance rating, are ULC W407 and ULC W415, both of which use 15.9mm of wallboard each side and no insulation. There are other similar ULC Designs, such as W408, W409 or W412, that require batt insulation within the wall to achieve a 1 h rating, but require only 12.7mm of wallboard each side. If insulation is required for sound attenuation, then these Designs are also suitable without economic penalty. Some of these insulated Designs permit 64mm studs instead of the 92mm studs required in non-insulated Designs.

In addition, NBCC Part 9, Table A-9.10.3.1.A - Fire and Sound Resistance of Walls - also lists similar generic assemblies. In this Table, a 45 min rating can be achieved, with no interior insulation, with Wall Numbers S1c, S4c and S4d, using one layer of Type X 15.9 mm gypsum wallboard on each face. The addition of rockwool or slag insulation, to the densities as listed in Note (6) to Table A-9.10.3.1.A, will increase the rating to 1 h, as specified in Wall Numbers S1a, S1b, S4a or S4b.

Alternatively, for a 1 h rating, an additional layer of gypsum wallboard one side can be applied, as shown in Wall Numbers S2a to S2h. Table A-9.10.3.1. also lists numerous similar assemblies, where the same fire-resistance rating is achieved, but with different sound transmission class (STC) ratings. Selection therefore may depend on the required STC rating as much as the required fire-resistance rating.

The following diagram illustrates the integration of a wall with a column, both having a fire-resistance rating of 1 h.



BEHLEN
Made Strong

METAL ROOFING SYSTEMS GUIDE SPECIFICATION

This guide specification is intended for use on projects where the Structural Standing Seam Roof System (SSR24) and/or Thermal Roof System (Thermal Guard) is supplied as an item separate from the building's structural system. There are a number of provisions in the specification which are not appropriate for roofing systems supplied as part of a complete building system. For roof systems supplied with a steel bulding system, the user is referred to the Guide Specification for Steel Building systems. The user is also cautioned that some provisions may not be applicable for all projects.

DISCLAIMER: *Use of this Specification is voluntary. Each roof system designer retains the prerogative to choose their own design and commercial practices and the responsibility to design and specify a roofing system to comply with applicable state and local codes, end user specifications, local conditions, and safety considerations.*

Although every effort has been made to present accurate and sound information, BEHLEN Industries LP assumes no responsibility whatsoever for the application of this information to the design, specification or construction of any specific roof system. BEHLEN Industries LP expressly disclaims all liability for damages of any sort whether direct, indirect or consequential arising out of the use, reference to or reliance on this Specification or any of its contents. BEHLEN Industries LP makes no warranty, express or implied, as to any particular roof system or this Specification.

PART 1 GENERAL

1 .1 DESCRIPTION

.1 General Requirements:

Division 1, General Requirements, is part of this specification and shall apply as if repeated here.

.2 Work Furnished and included:

.1 Metal roofing sheet.
.2 Thermal System (Thermal Guard® System).
.3 {Foil backed metal building insulation (SSR24 Roof System } {Semi-rigid fibreglass insulation (Thermal Guard® System} }.
.4 {Structural Liner sheet (Thermal Guard® System) acting as Air/Vapour barrier.
.5 Roof panel support system.
.6 Accessories including associated flashings, closures, sealants.

.3 Related work not included:

.1 Structural framing members including purlins, eave and ridge elements, and other elements required to support the cladding system: Section 05100, Section 5200 or Section 5400.
.2 Mechanical equipment and/or ductwork as well as their supporting framing.
.3 Flashings associated with other trades: Section 07600.

1.2 STANDARDS AND DESIGN CRITERIA

.1 Design roof system in accordance with:

.1 CAN/C.S.A. Standard S136 for the Design of Cold Formed Steel Structural Members.
.2 Canadian Sheet Steel Building Institute Standards 10M, 20M, B11.
.3 National Building Code of Canada – Latest Edition
.4 Applicable local codes and standards.
.5 ASTM A653/A653M-04a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.6 ASTM A792/A792M-03, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
.7 CSSBI S8-2001, Quality & Performance Specification for Prefinished Sheet Steel Used for Building Products.
.8 CSSBI Fact Sheet #3, Care and Maintenance of Prefinished Sheet Steel Building Products
.9 CSSBI S8-2001, Quality & Performance Specification for Prefinished Sheet Steel Used for Building Products.

.2 Deflection of the roof system is not to exceed [1/180th] of the span for the specified live loading.
.3 Design roof system to accommodate thermal movement of the roof sheet caused by ambient temperature range of [ ] to [ ], without causing deterioration of the roof system.
.4 Building shall be weather tight.
.5 Provide for positive drainage to exterior of condensation occurring within roof construction and water entering at joints.
.6 Design building enclosure elements to accommodate, by means of expansion joints, any movement in element itself and between elements and building structure caused by structural movements without permanent distortion, damage to infills, racking of joints, breakage of seals, water penetration or glass breakage.
.7 Loading Definitions:

.1 Dead loads shall include the self-weight of the structure and all permanent materials of the building construction, including mechanical equipment and piping.
.2 Live loads shall include superimposed loads on the structure due to the following:

.1 Use and occupancy loads.
.2 Snow, rain, and ice effects.
.3 Maintenance and construction loads.

.4 Wind loads.
.5 Earthquake loads.
.6 Thermal loads.
.7 Differential foundation settlement.

.8 Climatic Data:

.1 Snow load: Ground Snow Load Ss = ___ kPa
Rain Load Sr = ___ kPa

.2 Hourly Wind Pressures:	1/50 year probability	___ kPa
	1/100 year probability	___ kPa
.3 Seismic Data:	Za	___
	Zv	___
Zonal velocity ratio,	v	___
.4 Specified Rain Load (15 min rain) for downspout design		____mm

.9 Design Loads:

.1 Snow load shall be determined in accordance with NBCC 2005. Cb shall be 0.8, the wind exposure factor Cw shall be 1.0. Load combinations shall be applied in accordance with the NBCC
.2 Wind load shall be in accordance with NBCC 2005. Wind exposure factor shall be intermediate.
.3 Dead load shall be the self weight of the steel roofing system
.4 Collateral Gravity Load shall be as follows:
a. Load including lighting, sprinkler runs and miscellaneous mechanical loads:____ kPa
.5 Refer to structural drawings for additional requirements.
.6 Frame all louver and door openings. Refer to mechanical and architectural drawings for locations.

1.3 QUALITY ASSURANCE AND SUBSTITUTIONS

.1 Manufacturer of roof system, and installer shall demonstrate at least five years experience in projects similar in scope.
.2 This section establishes the standard of quality required for the complete metal roof system {thermal roof system}. Proposed substitutions must meet this standard, and will be considered as follows:
.1 A written request for approval of a substitution is received at least ten (10) days prior to tender closing.
.2 The request includes a complete item-by-item description comparing the proposed substitution to the specified system, together with manufacturer's literature, samples, test data, engineering standards and performance evaluation indicating comparable standards to those specified.
.3 Installation Quality Control:
1. The general contractor shall provide a third party metal roof consultant, working for the general contractor and approved by the SSR Manufacturer, to inspect the installation of the metal roofing system at the following stages of installation:
a. Initial inspection prior to installation of roof panels. The purpose of this inspection is to verify substrate installation, review installation procedures, and agree upon the scheduling of the intermediate inspections.
b. Intermediate inspections will include the review of the installed product in compliance with the final approved installation drawings and manufacturer's installation procedures.
c. Final inspection at the completion of all metal roofing system work.

1.4 SUBMITTALS

.1 Submit shop drawings in accordance with Section [01300].

.1 Indicate arrangement of pre-finished Roof Sheet, including joints, types and locations of supports, fasteners, flashing. gutters, mitres, and all metal components related to the roof installation.

.2 For Thermal Roof systems, fully detail: {Air/Vapour barrier Liner}, {Thermal System}, {Insulation}, as part of the roof system.

.3 Each shop drawing shall be stamped by a Professional Engineer.

.2 Submit samples of coloured metal roof sheet for review by the consultant, prior to fabrication.

1.5 HANDLING AND PROTECTION

.1 Store roofing products in accordance with manufacturer's recommendations, and protected from elements.

.2 Protect prefinished steel during fabrication, transportation, site storage and erection, in accordance with CSSBI Standards.

PART 2 — PRODUCTS

2.1 THERMAL ROOF COMPONENTS

.1 Structural Liner: {AWR panel fabricated from A792M structural quality grade 550 galvalume steel AZ150 prepainted on underside minimum thickness 0.46 mm (.018") colour as selected from manu facturers standard colours. Butyl sealer tape to applied on all seams and panel splices. Ends to be closed with purpose made closed cell foam closures}

{VapourGuard 32 (VapourGuard® System) fabricated from ASTM A653M structural quality Grade 230 galvanized steel, with zinc coating of Z275 (G90) galvanized prepainted on the underside minimum thickness [0.46mm (0.018")][]0.61mm(0.024")], colour as selected from manufacturers standard colours. Sideslaps to have factory applied sealer. Butyl tape sealers to ber applied to all ends and splices.}.

.2 Thermal Sub-Structural: 2" nominal shaped hat members with thickness to suit environmental and dead loads supported on thermal clips [ ] height to provide spave between the roof and liner to suit insulation thickness. All members to be fabricated from ASTM A653M structural quality Grade 230 galvanized steel, with zinc coating of Z275 (G90) galvanized, minimum thickness 1.22 mm (0.048").

.3 Insulation: As specified in Section [07200] of sufficient thickness to provide RS I value of [ ]. Insulation to be draped over structutral support members and be complete with integral vapor barrier with a minimum 0.2 perm rating {SSR24 roof system}{Semi-rigid Insulation to fill voids between panels and fill all spaces in thermal clips{ThermalGuard system}

2.2 PREFINISHED METAL ROOFING

.1 Prefinished Roof Sheet, exposed to exterior:

.1 Profile: Standing Seam panel seamed joint at 610 mm (24 inches) c/c with seams a minimum of 70 mm (2-3/4 inches) above the bottom of the ribbed profile.

.2 Panel: Galvalume sheet steel conforming to ASTM A792M structural quality grade 345. Nominal core thickness [ ] mm.

.3 Coating: Prepainted per CSSBI S8-2001 specification using the {Perspectra} {10,000} {Barrier} Series paint system, one side with wash coat on backside.
Colour as selected by consultant from manufacturers standard range of colours.

.4 Accepted Product: SSR 24 by Behlen Industries LP or equivalent

2.3 FASTENING SYSTEMS

.1 Roof Panel Support System:
{SSR 24 Roof System : Purpose-made, sliding clip designed to accommodate expansion and contraction of the roof sheet. Made from galvanized material, thickness to suit design parameters. [Provide Thermal Blocks between clips.]}
{Thermal Roof System : Purpose-made, sliding clip designed to accommodate expansion and contraction of the roof sheet. Supported by continuous hat bars supported by Thermal Spacer Clips, to accommodate depth of insulation. All made from galvanized material, thickness to suit design parameters.}

.2 Roof Fasteners: As specified by manufacturer, to resist wind uplift and sliding snow forces.

2.4 ACCESSORIES

.1 Flashing: In accordance with Section [07620]. Formed from same materials as the roof sheet. Custom fabricated to suit architectural details, as required.

.2 Closures: Foam and metal closures to suit profiles selected, to manufacturer's recommendations.

.3 Sealants: In accordance with manufacturer's recommendation and Section [07900].

.4 Prefabricated Curbs and Equipment Supports

a) General: Provide the Manufacturer with the dimensions, weights and model number of the units to be supported by the curb(s).

b) Fabricate curbs of structural quality aluminum, or Galvalume□,. Curbs shall have welded joints unless a two-piece curb is required. Provide integral base plates and water diverters/crickets. Front base plate shall be extended up-slope from the beginning of the water diverter. Curbs shall be designed for a compatible installation with the panel system. [Specifier Note: If curb finish is to match roof panel finish, the finish must be specified]

c) Curbs shall be constructed to match the roof slope and provide a mounting surface as required by the rooftop unit manufacturer.

d) Submit roof curb manufacturer’s shop drawings to SSR Manufacturer for approval before fabrication of curbs.

e) Any curb structural support system shall allow proper thermal movement of the curb with the roofing system.

.5 Prefabricated Pipe Flashings

a) Pipe flashings shall provide a weathertight joint at projections through the roof, taking into account the thermal movement of the roof and the service temperature of the projection. Pipe flashings shall have an aluminum-flanged base ring.

2.5 FABRICATION

.1 Fabricate roof components to comply with dimensions, profiles, gauges and details as shown on the shop drawings, including fascia and soffit panels and all companion flashing.

.2 Fabricate all components of the system in the factory, ready for field installation.

.3 Provide roof sheet and all accessories in longest practicable length to minimize field lapping of joints.

PART 3 — EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Delivery and Handling

.1 Before delivery, mark building pieces clearly with substantial tags indicating the erection drawing number and other information required for identification. Mark long members at each end. All products shall be suitably packaged and adequately braced for shipment.

.2 All items shall be protected and handled so that they will not be over-stressed, bent, broken, deformed or otherwise damaged before and during delivery.

.3 Care shall be taken to avoid damage to protective coating finishes.

.4 All lifting devices and rigging shall conform to the Occupational Health and Safety Regulations and in no case shall have a safety factor less than 4.

.5 All erection bolts shall be shipped with the first delivery of steel in appropriate containers.

.6 One copy of the master shipping list shall be transmitted by the Contractor in a waterproof package with each shipment of steel. One copy shall be mailed to the field office the same day the steel leaves the shop.

.2 Storage

At the site all units shall be stored off the ground on blocking or skids, with identification marks readily visible, so that materials are protected from damage, deterioration, and corrosion.

3.2 EXAMINATION

.1 Examine work of other trades over which roof system will be applied for conformity to drawings. Report all discrepancies to consultant before beginning work on the roof system.

3.3 INSTALLATION

{SSR 24 Roof System

.1 Draped Insulation: Install foil-backed insulation to manufacturer's recommendations. Ensure proper compression at purlins. Lap all side and end joints to form a continuous air/vapour barrier.}

{Thermal Roof System

.1 Thermal & Moisture Protection:

.1 Install Liner panel in accordance with manufacturer's instructions complete with recommended sealer on all sidelaps and seams.

.2 Support Clips: Attach Thermal Panel Support Clips and hat-bars using fasteners as recommended by the manufacturer, to suit the substrate, and to resist wind uplift forces.

.3 Insulation: Install Semi-Rigid Insulation in {one} {two} layers, as shown on the drawings. Tightly butt against support clips. Insulation should be continuous.}

.2 Roof Panel Installation

.1 Install exterior prefinished roof panels on panel support clips, using manufacturer's proper construction procedure. Ensure batten is positively locked for full length of roof. Close interlocking side joints by using a purpose-made seaming machine, as supplied by the manufacturer.

.2 Provide notched and formed closures, sealed against weather penetration, at changes in pitch, and at ridges and eaves, where required.

.3 Install all companion flashing {gutters}, {ventilators} as shown on the shop drawings. Use concealed fasteners where possible. Exposed fasteners to match colour of roof sheet.

.4 Lock all end joints and caulk to provide a weather tight seal.

REPORT ON FALL ARREST AND RESTRAINT

Provincial Occupational health and Safety Acts require that workers be protected from injuries resulting from falling. There are two means of providing such protection, Fall Restraint and Fall Arrest. A Fall Restraint system prevents the worker from falling further than the surface he is standing on. A Fall Arrest System stops the worker from falling more than a limited distance below the surface he is standing on. Because it is less likely to result in injury, Fall Restraint is preferred; however, in some work situations, only Fall Arrest can be provided.

Fall Restraint and Fall Arrest systems are beyond the scope of the products and services provided by BEHLEN Industries LP. These systems require specialized knowledge in their design, and training in their application. Training is provided by the suppliers of the systems and by the Provincial Construction Safety Associations. The purpose of this bulletin is to provide guidance on the interface between the BEHLEN products and the safety systems. Where specific products and vendors are mentioned, this if for illustrative purposes only. BEHLEN does not endorse the performance or adequacy of any product compared to another, nor does BEHLEN profess any expertise in this field. The Builder is advised to seek expert guidance and to not rely on any of the information herein for any specific application.

During Steel Erection

Prevention of falls during erection is usually provide by using hydraulic mobile manlifts to place workers where needed to bolt the structural steel together. The steel is held in place during bolting by a mobile crane.

Once sufficient steel (primary frames, purlins, girts, bracing – including flange braces) is in place for structural stability under wind and construction loads, the crane is no longer used, and the infill of remaining purlins, girts, and stabilizers takes place by workers on the steel. Fall restraint is not possible in this case, so fall arrest must be employed.

One method of fall arrest is to use a safety net suspended from the steel. One such system is Adjust-A-Net from DBI/ Sala www.dbisala.com.

For work at a single location, a strap may be used around the rafter. Various types of these are manufactured by companies such as Miller Fall Protection www.millerfallprotection.com. In some cases the anchorage point is provided by a device which clamps onto the beam flange. Examples are the Miller ShadowLite Series and Shadow Beam Beam Anchors. Another is the DBI/ Sala Glyder ™ Beam Anchor, another is the Protecta AJ704A Beam Dog, and another is the FlangeBar www.flangebar.com. In each of these cases the anchor point must be able to sustain a point load of 5000lbs applied in any direction. The only safe anchor points on a BEHLEN structural system are the rigid frame primary members within three feet of a purlin or girt to which a flange brace is connected to both the purlin or girt, and the primary frame member.

When it is necessary for the worker to move horizontally, a temporary horizontal lifeline system may be employed. Many of these systems use A-frame posts clamped to the top flange of the rafter, with a lifeline running along the top of the posts. Examples are the Miller Skywalker and Skygrip Temporary Horizontal Lifeline Systems, the DBI/Sala SecuraSpan® or Iron Wing ™ Horizontal Lifeline Systems, and the Safety Source Inc. Source-A-Lifeline Horizontal Lifeline System. The anchorage must be able to sustain a load of 5000 lbs applied in any direction. Stanchion systems such as those above impart vertical, horizontal and moment loads into the rafter. At the stanchion location the maximum vertical load must me 25kips, the maximum horizontal load along the beam axis 8 kips, the maximum bending moment about a horizontal axis perpendicular to the longitudinal vertical plane 25 ft-kips, about a vertical axis perpendicular to the horizontal longitudinal plane 7 ft-kips, and about the longitudinal axis (torsion) 4 ft-kips. The stanchion bases must be attached to the rafter no more than three feet from a purlin to which are attached flange braces on both sides of the rafter.

Erecting Roof Panels and trims

On the roof, once a few panels are installed, Fall Restraint may be employed. Anchor points may be provided which clamp onto the ribs of the SSR panel. An example is the Travel Restraint Clamp offered by Safety Source Inc. It can only be used for travel restraint, not Fall Arrest.

Other systems are used with self retracting lifelines to provide travel restraint and Fall Arrest. Examples are the DBI/Sala Standing Seam Roof Anchor, Miller RoofStrider II, and Safety Source Inc SS Roof Saddle. All of theses systems are designed by the manufacturers with limiting Fall Arrest forces. It is imperative that the entire Fall Arrest and/or Fall Restraint System be engineered by the supplier to not overload the attachment to the SSR roof.

Permanent Fall Restraint systems

Some owners request a permanent Fall Restraint system be installed for roof maintenance.

One type of permanent fall arrest system employs stanchions (usually round) that are clamped, bolted or welded to the structural steel. For BEHLEN RIGID FRAME® buildings, these stanchions must only be attached to the primary frame rafters, and only within 3' of a purlin with flange braces on both sides. BEHLEN must be notified at the time of order if such a system is to be employed so that the loads can be incorporated into the design. BEHLEN must be advised of the loads imposed on the rafter. The loads may affect design and add cost to the building. One disadvantage of stanchions attached to the rafters is that they create a roof penetration requiring a roof jack.

Another type of permanent Fall Arrest system can be attached to the SSR or AWR roof panels. One example of such a system is Latchways Mansafe™ Fall Protection sold by Unistrut www.unistrutconstruction.com. Latchways incorporates the Constant Force® Fall protection Innovation which allows the load generated by a fall to be absorbed through the entire system, thereby reducing the peak load and allowing attachment to the panel only. The supplier of the system provides the engineering as well as the components and will recertify the system annually in accordance with Occupational health and Safety legislation.

BEHLEN does not supply Fall Restraint or Fall Arrest systems. These require specific engineering expertise provided by the suppliers of the systems.

GLOSSARY OF TERMS

ACCESSORY—An extra building product which supplements a basic solid sheeted building such as door, window, skylight, ventilator, etc.

ALUMINUM COATED STEEL—Steel coated in aluminum for corrosion resistance.

ANCHOR BOLTS—Bolts used to anchor structural members to a foundation or other support. Usuallyl refers to bolts at the bottom of all colums and door jambs.

ANCHOR BOLT PLAN—A plan view showing the size, location, and projection of all anchor bolts for the steel building system's components, the length and width of the foundation (which may vary from the nominal steel building size). Column reations (magnitude and direction), and minimum base plate dimensions may also be included.

APPROVAL DRAWINGS—Approval drawings may include framing drawings, elevations and sections through the building as furnished by BEHLEN Industries LP for approval of the buyer. Approval by the buyer affirms that BEHLEN has correctly interpreted the overall contract requirements for the steel building system and its accessories, and the exact location of accessories in the building.

ARCHITECTURAL DRAWING—A drawing, usually supplied by others, which shows the plan view and/or elevations of the finished building for the purpose of showing the general appearance of the building, indicating all accessory locations.

AUTOMATIC WELDING—A welding operation utilizing a machine to make a continuous weld.

AUXILIARY LOADS—All specified dynamic live loads other than the basic design loads which the building must safely withstand, such as cranes, material handling systems and impact loads.

BASE ANGLE—A cold formed angle attached to the grade beam to which the wall cladding is attached.

BASE FLASHING (or Drip Flashing) —A flashing used at the base of wall cladding and above and below doors, windows and wall openings to shed water away from the openings.

BASE PLATE—A plate attached to the base of the column which rests on a foundation or other support, usually secured by anchor bolts.

BAY—The space between frame centre lines of primary supporting members in the longitudinal direction of the building. (measured parallel to the ridge).

BEAM—A structural member, usually horizontal, that is subjected to bending loads. There are three types, simple, continuous and cantilever.

BEAM AND COLUMN (Beam and Post) —A primary structural system consisting of a series of rafter beams supported by columns. Often used as the end frame of a steel building.

BEARING PLATE—A steel plate that is set on the top of a masonry support on which a beam or purlin can rest.

BILL OF MATERIALS—A list of items and components of the complete building used for fabrication, shipping, receiving and accounting purposes.

BIRD SCREEN—Wire mesh attached to ventilators and louvers used to prevent birds from entereing the building.

BLIND RIVET—A small headed pin with expandable shank for joining light gauge metal. Typically used to attach flashing, gutters, etc.

BRACE RODS, ANGLE and CABLES—Braces used in roof and walls to transfer horizontal loads, such as wind loads, and seismic and crane thrusts to the foundation.

BRACKET—A structural support projecting from a wall or column on which to fasten another structural member. Examples are canopy, lean-to and crane runway brackets.

BRIDGE CRANE—A load lifting system consisting of a hoist which moves laterally on a beam, girder or bridge which in turn moves longitudinally on a runway made of beams and rails. Loads can be moved to any point within a rectangle formed by the bridge span and runway length.

BUILDING CODE—Regulations established by a recognized agency describing design loads, procedures and construction details for structures. Usually applying to designated political jurisdiction (city, county, province, country).

BUILT-UP ROOFING—A roof covering made up of alternating layers of tar and asphalt.

BUILT-UP SECTION—A structural member, usually and “I” section, made from individual flat plates welded together. (Also known as 3-plate member).

BUTT PLATE—The end plate of a structural member usually used to rest against a like plate of another member in forming a connection. Sometimes called a splice plate or bolted end plate.

“C” SECTION—A member formed from sheet steel in the shape of a block “C” that may be used either singly or back to back.

C.I.S.C—Canadian Institute of Steel Construction.

C.S.A.—Canadian Standards Association.

C.S.S.B.I.—Canadian Sheet Steel Building Institute.

C.W.B.—Canadian Welding Bureau.

CAMBER—A predetermined curvature designed into a structural member to offset the anticipated deflection when loads are applied.

CANOPY—Any overhanging or projecting roof structure with the extreme end usually unsupported.

CANTILEVER—A projecting beam that is supported and restrained at one end only.

CAPILLARY ACTION—The action which causes movement of liquids when in contact with two adjacent surfaces such as panel sidelaps.

CAP PLATE—A plate located at the top of a column or end of a beam for capping the exposed end of the member.

CAULK—To seal and make weather-tight the joints, seams, or voids by filling with a waterproofing compound or material.

CHANNEL—HOT ROLLED—A member formed while in a semi-molten state at the steel mill to a shape having standard dimensions and properties.

CLIP—A plate or angle used to fasten two or more members together.

CLOSURE STRIP—A rubberized strip, formed to the contour or ribbed panels used to close openings created by joining metal panels and flashing.

COLD FORM—The process using press brakes or rolling mills to cold form steel into desired shapes at room temperature, such as channels, angles, cladding or flashings.

COLLATERAL LOAD—All specified additional dead loads other than the steel building system, such as sprinklers, mechanical and electrical systems and ceilings.

COLUMN—A primary member used in a vertical position on a building to transfer loads from main roof beams, trusses or rafters to the foundation.

CONTINUITY—A terminology given to a structural system denoting the transfer of loads and stresses from member to member as if there were no connections.

CORNER TRIM—A preformed flashing to close the intersection of sidewall and endwall sheeting.

COVERING—The exterior metal roof and wall paneling cover for a building.

CRANE—A machine designed to move material by means of a hoist.

CRANE RAIL—A track supporting and guiding the wheels of a bridge crane or trolley system.

CRANE RUNWAY BEAM—The member that supports a crane rail. Supports may be columns or rafters depending on the type of crane system. On underslung bridge cranes, runway beams also acts as a crane rail.

CURB—A raised edge on a concrete floor slab.

CURTAIN WALL—Perimeter wall panels which carry only their own weight and wind load.

DAMPER—A baffle used to open or close the throat ventilators.

DEAD LOAD—The weight of all permanent construction, such as floor, roof, framing and covering members.

DEFLECTION—The displacement of a structural member or system under load. (Lateral, vertical, etc.)

DESIGN LOADS—Those loads specified in the building codes published by local, Provincial or Federal agencies, or in owner's specifications to be used in the design of a building.

DIAGONAL BRACING—See "Brace Rods".

DIAPHRAGM ACTION—The resistance to racking generally offered by the panels, fasteners and members to which they are attached.

DOOR GUIDE—An angle or channel guide used to stabilize or keep plumb a sliding or rolling door during its operation.

DOWNSPOUT—A conduit used to carry water from the gutter of a building to the ground or storm drain.

DRIFT PIN—A tapered pin used during erection to align holes in steel members to be connected by bolting or riveting.

EAVE—The line along the sidewall formed by the intersection of the planes of the roof and wall.

EAVE HEIGHT—The vertical dimension from the underside of the base plate or grout to the eave.

EAVE STRUT—A structural member at the eave to support roof and wall panels. It may also transmit wind forces from roof brace rods to wall brace rods.

EAVE TRIM—A flashing to close off sidewall cladding at intersection with roof.

ELASTIC DESIGN—A design concept utilizing the proportional behaviour of materials when all stresses are limited to specified allowable values.

END FRAME—A frame at the endwall to support the roof load from one half the end bay.

ENDWALL—The gable ends of a building.

ENDWALL COLUMN—A column in the endwall that supports girts, endwall rafters and resists wind loads.

ENDWALL RAFTER—A structural beam located at the endwall supporting roof purlins.

ENDWALL OVERHANG—The projection of the roof past the endwall.

ERECTION—The on-site assebling of prefabricated components to form a complete structure.

EXPANSION JOINT—A break or space in construction to allow for thermal expansion and contraction of the materials used in the structure.

EXPOSED—The building is in an exposed location, so that the roof is to the winds on all sides, with no obstructions higher than the roof located closer to the building than the distance equal to ten (10) times the height of the obstruction above the roof, and the roof does not have any significant projections, such as parapet walls, and the loading does not involve accumulation of snow due to drifting from adjacent surfaces.

FABRICATION—The manufacturing process performed in a plant to convert raw material into finished steel building components. The main operations are cold forming, cutting, punching, fitting, welding, cleaning and painting.

FASCIA—A decorative trim or panel projecting from the face of a wall.

FIELD—The “job-site”, “building site” or general market area.

FIXED BASE—A column base that is designed to resist rotation as well as horizontal or vertical movement. Often used in high buildings with crane systems.

FLANGE—The projecting edge of a structural member.

FLANGE BRACE—A bracing member used to provide lateral support to the flange of a beam, girder, rafter or column.

FLASHING—A sheet metal closure which functions primarily to provide weather tightness in a structure and secondarily to enhance appearance.

FOOTING—A pad or mat, usually concrete, located under a column, wall or other structural member, that is used to distribute the loads from that member into the supporting soil.

FORCE—The action of one body on another body which changes or tends to change its state of rest or motion. A force may be expressed in pounds, kips or other similar units and may act in any one of the following ways:

(a) Compression force: A force acting on a body tending to compress the body (pushing action).
(b) Shear force: A force acting on a body which tends to slide one portion of the body against the other side of the body (sliding action).
(c) Tension force: A force acting on a body tending to elongate the body (pulling action).
(d) Torsion force: A force acting on a body which tends to twist the body.

FOUNDATION—The substructure which supports a building or other structure.

FRAMED OPENING—Frame work (header and jambs) and flashing which surround an opening in the wall or roof of a building.

FRAMING—The primary and secondary members (columns, rafters, girts, purlins, brace rods, etc.) which go together to make up the skeleton of a structure to which the covering can be attached.

FRAMING DRAWINGS—Plans and erection instructions which identify all individual parts in sufficient detail to permit the proper erection and installation of the steel building system furnished by the manufacturer (also known as Erection Drawings).

GABLE—The triangular portion of the endwall of a building directly under the sloping roof and above the eave height line.

GABLE ROOF—A ridged roof that terminates in gables.

GABLE TRIM—A flashing designed to close the opening between roof and endwall panels.

GALVALUME/ZINCALUME—Steel coated with zinc and aluminum for corrosion resistance.

GALVANIZED—Steel coated with zince for corrosion resistance.

GAUGE—The numerical designation for the thickness of sheet steel or the distance between holes across a member.

GIRDER—A main horizontal or near horizontal structural member that supports vertical loads. It may consist of serveral pieces.

GIRT—A secondary horizontal structural member of spanning between sidewall or endwall columns to which wall covering is attached.

GLAZE OR GLAZING—The process of installing glass in window and door frames.

GRADE—The term used when referring to the ground elevation around a building.

GRADE BEAM—A concrete beam around the perimeter of a building supporting an exterior wall.

GROUT—A mixture of cement, sand and water used to fill cracks and cavities. Often used under base plates or levelling plates to obtain uniform bearing surfaces.

GUSSET PLATE—A steel plate used to reinforce or connect structural elements.

GUTTER—A member installed at the eave of the roof for the purpose of carrying water from the roof to the drains or downspouts.

HAUNCH—The deepened portion of a column or rafter, designed to accommodate the high moment at such points. (Usually occurs at connection of column and rafter).

HEADER—A horizontal framing structural member over a door, window or other framed opening.

HIGH STRENGTH BOLTS—Any bolt made from steel having a tensile strength in excess of 100,000 pounds per square inch. Some examples are: ASTM A-325, A-490.

HIGH STRENGTH STEEL—Structural steel having a yield stress in excess of 44,000 pounds per square inch.

HINGED BASE—See “Pin Connection”.

HOIST—A mechanical lifting device usually attached to a trolley which travels along a bridge, monorail or jib crane. May be chain or electric operated.

HOOD (DOOR) —The metal flashing used over exterior slide door track along the full length of the door header to protect the tracks from weather and to conceal them for aesthetic purposes.

HOT-ROLLED SHAPES—Steel sections (angles, channels, I-beam, etc.) which are formed by rolling mills while the steel is in a semi-molten state.

H.S.S.— (Hollow Structural Section) A round, rectangular or square structural member either class H (hot formed) or class C (cold formed).

IMPACT LOAD—An assumed dynamic load resulting from the motion of machinery, elevators, craneways, vehicles and other similar moving forces.

INSULATION—Any material used in building construction to reduce heat transfer.

“J” FLASHING—A “J” shaped flashing to close vertical intersections at doors, windows, interior corners, etc.

JAMBS—The vertical side members of framed and panelled doors.

JIB CRANE—A cantilevered boom or horizontal beam with hoist and trolley. This lifting machine may pick up loads in all or part of a circle around the column to which it is attached.

JIG—A device used to hold pieces of material in a fixed position during fabrication.

KIP—A unit of force equal to 1,000 pounds.

KNEE (or HAUNCH) —The connecting area of a column and rafter of a structural frame such as a rigid frame.

LEAN-TO—A structure such as a shed, having only one slope or pitch and depending upon another structure for partial support.

LINER PANEL—A panel applied as an interior finish (defined as full height, partial height and roof liner).

LIVE LOAD—Live load means all loads, including snow, exerted on structure except dead, wind and lateral loads.

LOADS—Anything that causes a force to be exerted on a structural member. Examples of difference types are:

- (a) Dead Load
- (b) Impact Load
- (c) Roof Live Load
- (d) Seismic Load
- (e) Wind Load
- (f) Crane Load
- (g) Collateral Load
- (h) Auxiliary Load

LOUVRE—An opening provided with fixed or movable, slanted fins to allow flow of air.

MANSARD—A sloping Canopy.

MASONRY—Anything constructed of granular materials such as brick, concrete block, ceramic block and concrete.

MASTIC—Caulking or sealant furnished in rolls, normally used for sealing roof panel laps.

MILD STEEL—(soft, low carbon) A grade of steel having a low percentage of carbon content and generally lower strength.

MOMENT—The tendency of a force to cause rotation about a point or axis.

MOMENT CONNECTION—A connection between two members which transfers the moment from one side of the connection to the other side and maintains under application of load the same angle between the connected members that exist prior to the loading. Also, a connection that maintains continuity.

MONORAIL—A single rail support for a material handling system. Normally a standard hot rolled S-beam.

MULLION—A vertical member connecting two windows located side by side.

MULTI-GABLE BUILDING—Buildings consisting of more than one gable across the width of the building.

MULTI-SPAN BUILDING—Buildings consisting of more than one span across the width of the building. Examples: Multiple gable buildings and single gable buildings with interior posts.

NBC—National Building Code.

NEWTON—SI unit of measure for force (N) 1 Kip = 4.448222 kN.

NIBBLER—An electric hand tool used to cut sheet steel.

OWSJ (Open Web Steel Joist)—A steel truss often used to support mezzanine floors.

PARAPET—That portion of the vertical wall of a building which extends above the roof line at the intersection of the wall and roof.

PARTITION—An interior wall.

PASCAL—SI unit of measure for force per unit area (N/m).

PEAK—The uppermost point of a gable.

PEAK SIGN—A sign attached to the peak of the building at the endwall showing the building manufacturer.

PIECE MARK—A unique mark stencilled on each separate part of the building for erection identification. Also called mark number or part number.

PILASTER—A reinforced or enlarged portion of a masonry wall to provide support for roof loads or lateral loads on the wall.

PIN CONNECTION—In structural analysis; a member connection to a foundation or another member or structure is designed in such a way that free rotation is assumed.

PLASTIC DESIGN—A design concept based on multiplying the actual loads by acceptable load factors and using the yield point as the maximum stress in any member.

PONDING—The gathering water in low or depressed areas on a roof.

POP RIVET—See “Blind Rivet”.

PORTAL FRAME—A rigid frame structure so designed that it offers rigidity and stability in its plane. It is used to resist longitudinal loads where diagonal bracing is not permitted. (Also “Wind Bent”)

POST (End Post) —A secondary column (or endwall column) at the end of a building to support the girts and in a beam-and-post endwall frame, to additionally support the rafter.

PRE-PAINTED COIL—Coil steel which receives a paint coating prior to the forming operation.

PRESS BRAKE—A machine used in cold-forming metal sheet or strip into desired shapes.

PRIMARY MEMBERS—The main load carrying members of a structural system, including the columns, endwall posts, rafters and other main support members.

PRIMER PAINT—This is the initial coat of paint applied in the shop to the structural framing of a building for protection against the elements during shipping and erection, or an initial coat of paint before a finish coat is applied.

PURLIN—A secondary horizontal structural member attached to the primary frame which transfers the roof loads from the roof covering to the primary members.

RAFTER—A primary beam supporting the roof system.

RAKE—The intersection of the plane of the roof and the plane of the gable. (As opposed to the endwalls meeting hip roofs).

RAKE ANGLE—Angle fastened to purlins at rake for attachment of endwall panels.

REACTIONS—The resisting forces at the column bases of a frame, holding the frame in equilibrium under a given loading condition. These reactions may be specified (actual reactions) or factored (multiplied by load factors).

REINFORCING STEEL—The steel placed in concrete to help carry the tension, compression and shear stresses.

RIDGE—Highest point on the roof which describes a horizontal line running the length of the building.

RIDGE CAP—A transition of the roofing materials along the ridge of a roof. Sometimes called "ridge roll" or "ridge flashing".

RIGID CONNECTION—See "Moment Connection".

RIGID FRAME—The primary structural frame consisting of tapered or straight columns and rafters which supports the secondary framing.

ROOF COVERING—The exposed exterior roof skin consisting of panels or sheets, attachments and joint sealants.

ROOF CURB—A raised area on the roof to support mechanical equipment, skylights, etc. (generally made of "C" sections)

ROOF OVERHANG—A roof extension beyond the endwall/sidewall of a building.

ROOF PITCH—See "Roof Slope".

ROOF SLOPE—The angle that a roof surface meets with the horizontal. Usually expressed in units of vertical rise to 12 units of horizontal run.

S.S.R. (Standing Seam Roof) —A roof cladding which is attached by clips and seaming (not by screws). This roof is free to expand and contract.

SAG ROD—A tension member used to limit the deflection of a girt or purlin in the direction of the weak axis.

SAG STRAP or SAG ANGLE—See "Sag Rod".

SANDWICH PANEL—A non-composite panel assembly used as covering; consists of an insulating core material with inner and outer skins.

SEALANT—Any material which is used to close up cracks or joints to protect against leaks.

SECONDARY MEMBERS—Members which transmit loads to primary members. In a steel building system, this term includes purlins, girts, struts, diagonal bracing, wind bents, flange and knee braces, headers, jambs, sag members and other miscellaneous framing.

SECTION MODULUS—A physical property of a structural member. It is used in design and basically descibes the bending strength of a member.

SECTIONAL OVERHEAD DOORS—Doors constructed in horizontally hinged sections. They are equipped with springs, tracks, counter balancers and other hardware which roll the sections into an overhead position, clear of the opening.

SEISMIC LOAD—Seismic load is the assumed lateral load acting in any horizontal direction on the structural system due to the action of earthquakes.

SELF DRILLING SCREW—A fastener which combines the functions of drilling and tapping. It is used for attaching panels to purlins and girts.

SELF TAPPING SCREW—A fastener which taps its own threads in a predrilled hole. It is for attaching panels to purlins and girts and for connecting trim and flashing.

SHEAR—Theh force tending to make two contracting parts slide upon each other in opposite directions parallel to their plane of contact.

SHEAR DIAPHRAGMS—Membrane-like members which are capable of resisting deformation when loaded by in-plane shear forces.

SHELTERED—If a building is not exposed (i.e. does not meet all the requirements of “exposed”).

SHIM PLATE—A piece of steel used to level base plates.

SHIPPING LIST—A list that calls out by part number or description each piece of material or assembly to be shipped. Also called tally sheet and/or bill of marerials.

SHOT PIN—A device for fastening items by the utilization of a patented devices which used a powdered charge to imbed the item in the concrete and/or steel.

SIDEWALL—Exterior wall parallel to the ridge of the building.

SILL—The bottom horizontal framing member of an opening such as a windor or door.

SILL ANGLE—See “Base Angle”.

SIMPLE SPAN—A term used in structural analysis to describe a support condition for a beam, girt, purlin, etc., which offers no resistance to rotation at the supports.

SINGLE SLOPE—A sloping roof with one surface. The slope is from one wall to the opposite wall of a rectangular building.

SINGLE SPAN—A building or structural member without intermediate support.

SKYLIGHT—An opening in a roof or ceiling for admitting natural light; also, the reinforced plastic panel or window fitted into such an opening.

SLIDE DOOR—A single or double leaf door which opens horizontally by means of overhead trolleys.

SNOW LOAD—A load imposed on buildings or other structures due to accumulation of snow.

SOFFIT—The underside covering of any exterior overhanging portion of a steel building.

SOIL PRESSURE—The load per unit area a structure will exert through its foundation on the soil.

SPAN—The distance between supports of beams, girders or trusses.

SPECIFICATIONS—A statement of particulars of a given job, as to size of building, quality and performance of materials to be used, and the terms of the contract.

SPLICE—A connection in a structural member.

STAINLESS STEEL—An alloy of steel which contains a higher percentage of chromium. Also may contain nickel or copper. Has excellent resistance to corrosion.

STIFFENER—A member used to strengthen a plate against lateral or local buckling. Usually a flat bar welded perpendicular to the longitudinal axis of the member. Large concentrated loads such as crane loads, usually requires stiffeners at the point of connection.

STIFFENING LIP—A short extension of material at an angle to the flange of cold formed structural members, which adds strength to the member.

STITCH SCREW—A fastener used to connect panels together at the side lap (lapping screw)

STRAIN—A change in length per unit length. It is the deformation of a body that is acted upon by forces.

STRESS—A measure of load on a structural member in terms of force per unit area (kips per square inch).

STRUCTURAL STEEL MEMBERS—Load carrying members. May be hot rolled sections, cold formed shapes, or built-up shapes.

STRUT—A brace fitted into a frame work to resist force in the direction of its length.

STUD—A vertical wall member to which exterior or interior covering or collateral material may be attached. May be either load bearing or non load bearing.

SUCTION—A partical vacuum resulting from wind loads on a building which cause a load in the outward direction.

TAPERED MEMBER—A built up plate member consisting of flanges welded to a variable depth web which tapers from one end to the other.

TENSILE STRENGTH—The longitudinal pulling stress a material can sustain without tearing apart.

THERMAL BLOCK—A spacer of material which transfers heat at a rate slower than metal.

THRUST—The horizontal component of a reation (or kick-out).

TORQUE WRENCH—A wrench containing an adjustable mechanism for measuring and controlling the amount of torque or turning force to be exerted—often used in tightening nuts of high strength bolts.

TRANSLUCENT LIGHT PANELS—A fibreglass light transmitting panel formed to the profile of the specified cladding.

TRIM—The light gauge metal used in the finish of a building, especially around openings and at intersections of surfaces. Often referred to as flashing.

TRACK—A metal way for wheeled components; specifically one or more lines of ways, with flashings, ties, etc., for craneway, monorail or slide door.

TRUSS—A structure made up of three or more members, with each member designed to carry a tension or compression force. The entire structure in turn acts as a beam.

TURN-OF-NUT METHOD—A method of tightening structural bolts. A rotation of the nut between one-half to three quarters of a turn beyond a “snug” position will obtain the desired minimum tension required.

UPLIFT—Wind load on a building which causes a load in the upward direction (see “Suction”).

UNIT STRESS—Stress per unit area.

VALLEY GUTTER—A channel used to carry off water from the “V” of roofs of multi-gabled buildings.

VENTILATOR—An accessory usually used on the roof that allows air to pass through.

WALL COVERING—The exterior wall skin consisting of panels or sheets and their attachments, trim fascia and weather sealants.

WEB—That portion of a structural member connecting the flanges.

WEB MEMBER—A secondary structural member connecting the top and bottom chords of a truss.

WELDED WIDE FLANGE—A 3-plate welded parallel flange “I” shaped structural member.

WIDE FLANGE—A hot rolled “I” shaped member.

WIND BENT—See “Portal Frame”.

WIND COLUMN—A vertical member supporting a wall system designed to withstand horizontal wind loads.

WIND LOAD—A load caused by the wind blowing from any horizontal direction.

YIELD STRESS—The stress at which the strain ceases to be directly proportional to the stress.

“Z” SECTION—A member cold formed from sheet steel in the shape of a “Z”.

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SECTION 3
ANCHOR BOLT and FRAME REACTIONS

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INDEX

ANCHOR BOLT, FRAME REACTIONS

Section 3.1 - TYPICAL ANCHOR DETAILS

TYPICAL LAYOUT OF BUILDING	001
EXP. ENDWALL CORNER COLUMN	002
CEE ENDWALL COLUMN	003
MAIN FRAME COLUMN	004
INTERIOR HSS COLUMN	005
INTERIOR I COLUMN	006
PORTAL FRAME COLUMN	007
CORNER COLUMN	008
CEE DOOR JAMB	009
ENDWALL I COLUMN	010
DOUBLE CEE ENDWALL COLUMN	011
ANCHOR PROJECTION	012

Section 3.2 - ANCHOR BOLTS INFORMATION

ANCHOR BOLTS SIZES	001
ANCHOR BOLTS SIZES CONT.	002

Section 3.3 - FRAME REACTIONS

CLEAR SPAN TAPERED COLUMN	001
LEAN-TO FRAME	002

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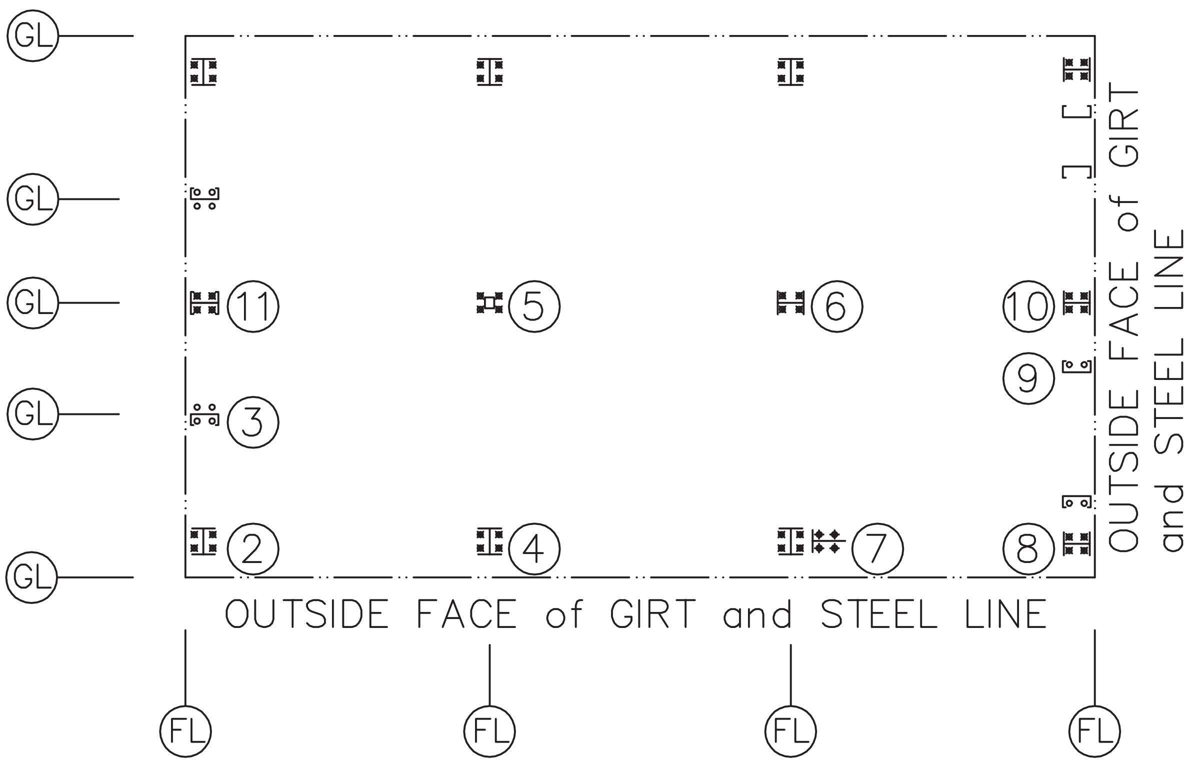

FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL ANCHOR DETAILS

TYPICAL LAYOUT OF BUILDING

JULY 2008	
Vr 1.0	
Section 3.1	Page 001

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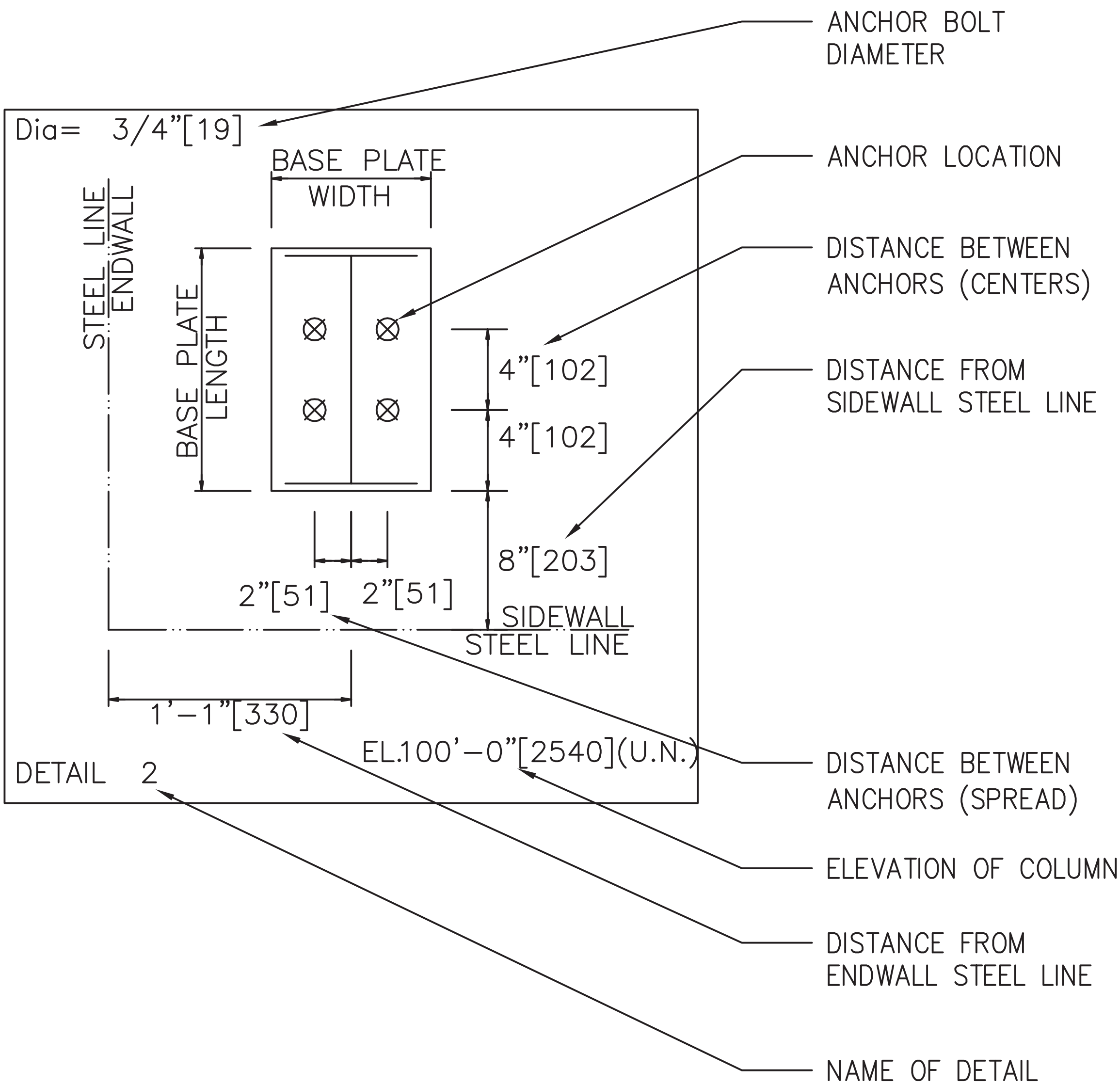

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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
EXP. ENDWALL CORNER COLUMN	Section 3.1	Page 002

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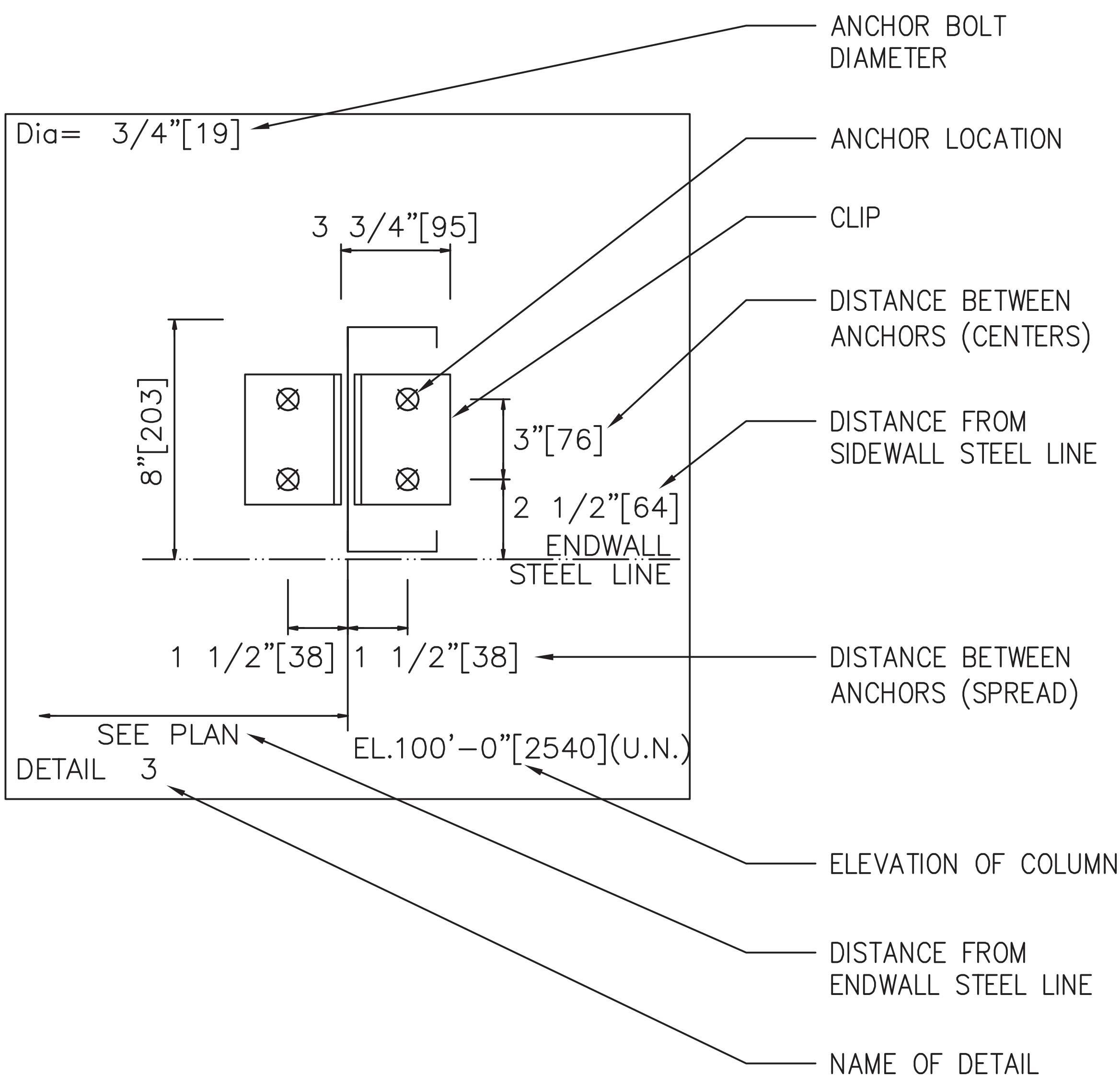

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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
CEE ENDWALL COLUMN	Section 3.1	Page 003

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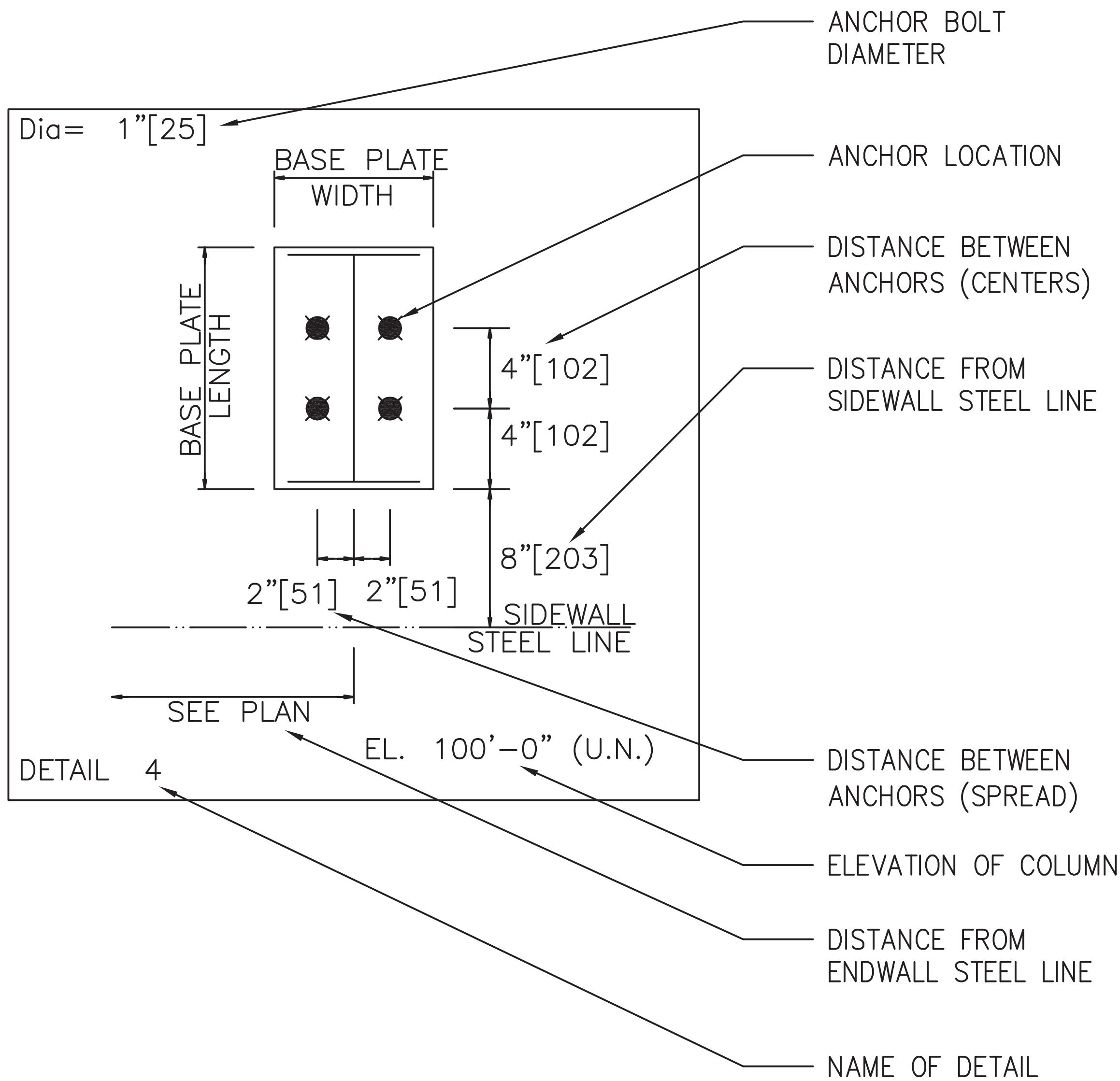

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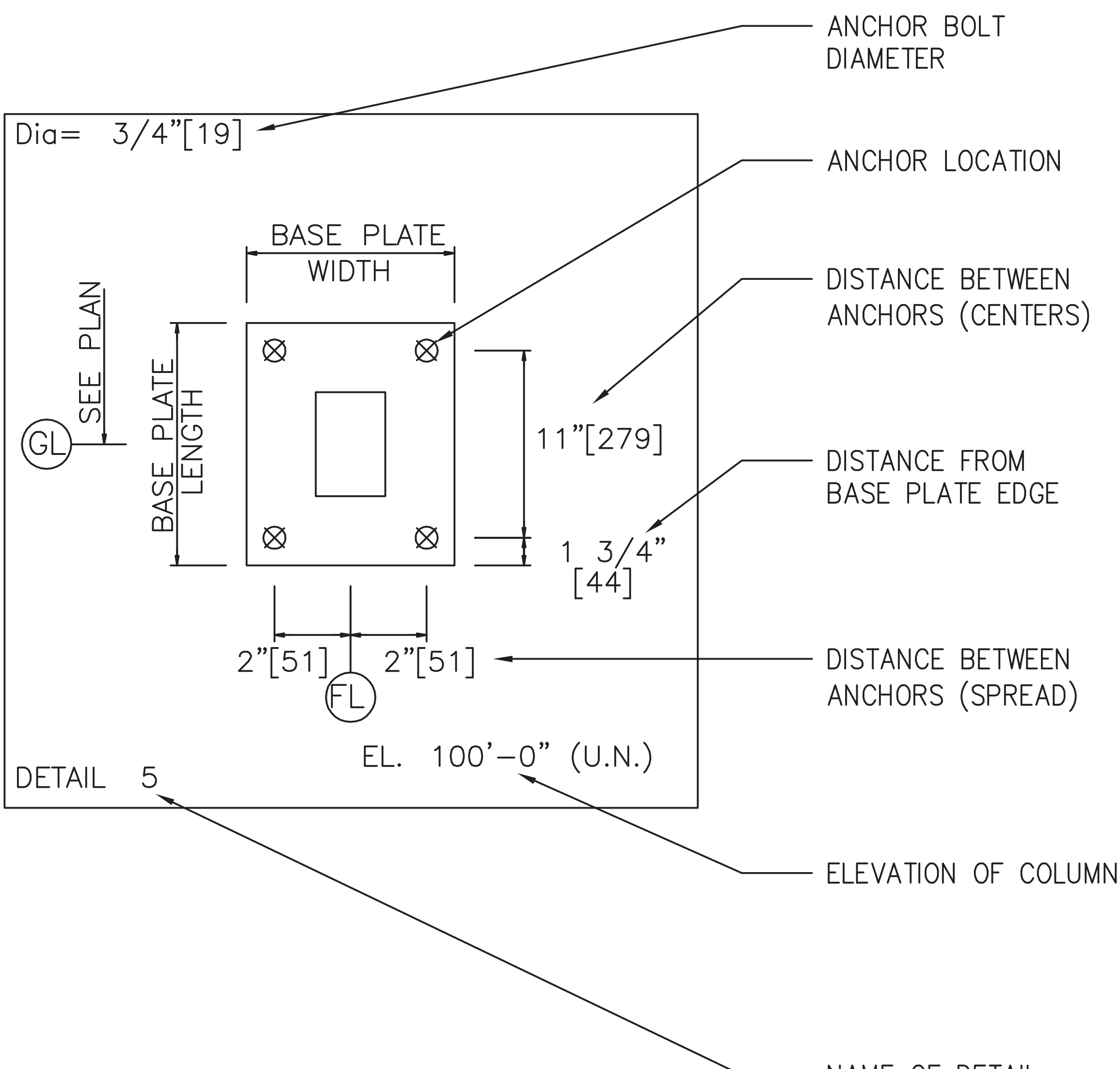
TYPICAL ANCHOR DETAILS

MAIN FRAME COLUMN

JULY 2008

Vr 1.0

Section 3.1



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TYPICAL ANCHOR DETAILS

INTERIOR HSS COLUMN

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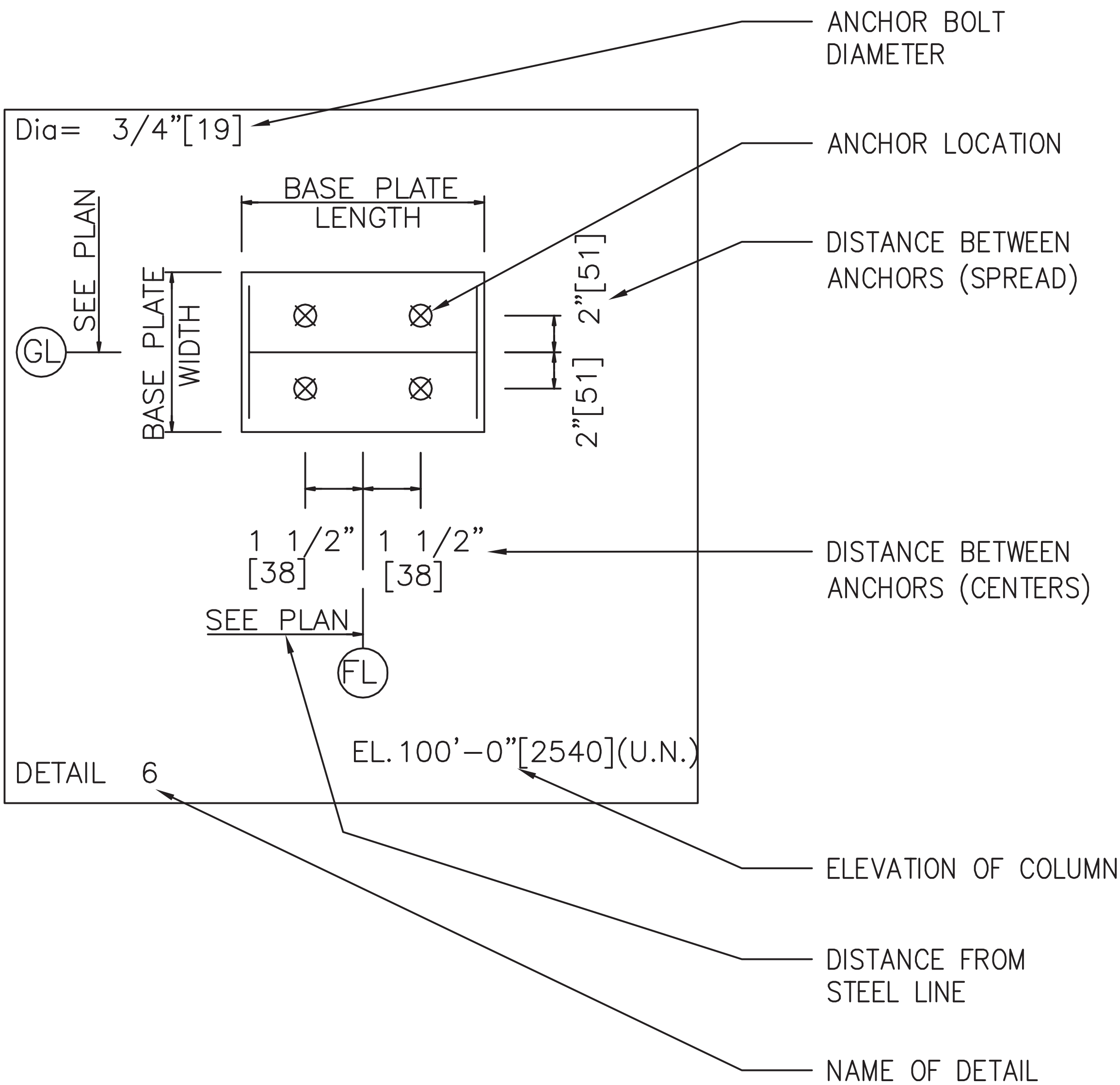

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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
INTERIOR I COLUMN	Section 3.1	Page 006

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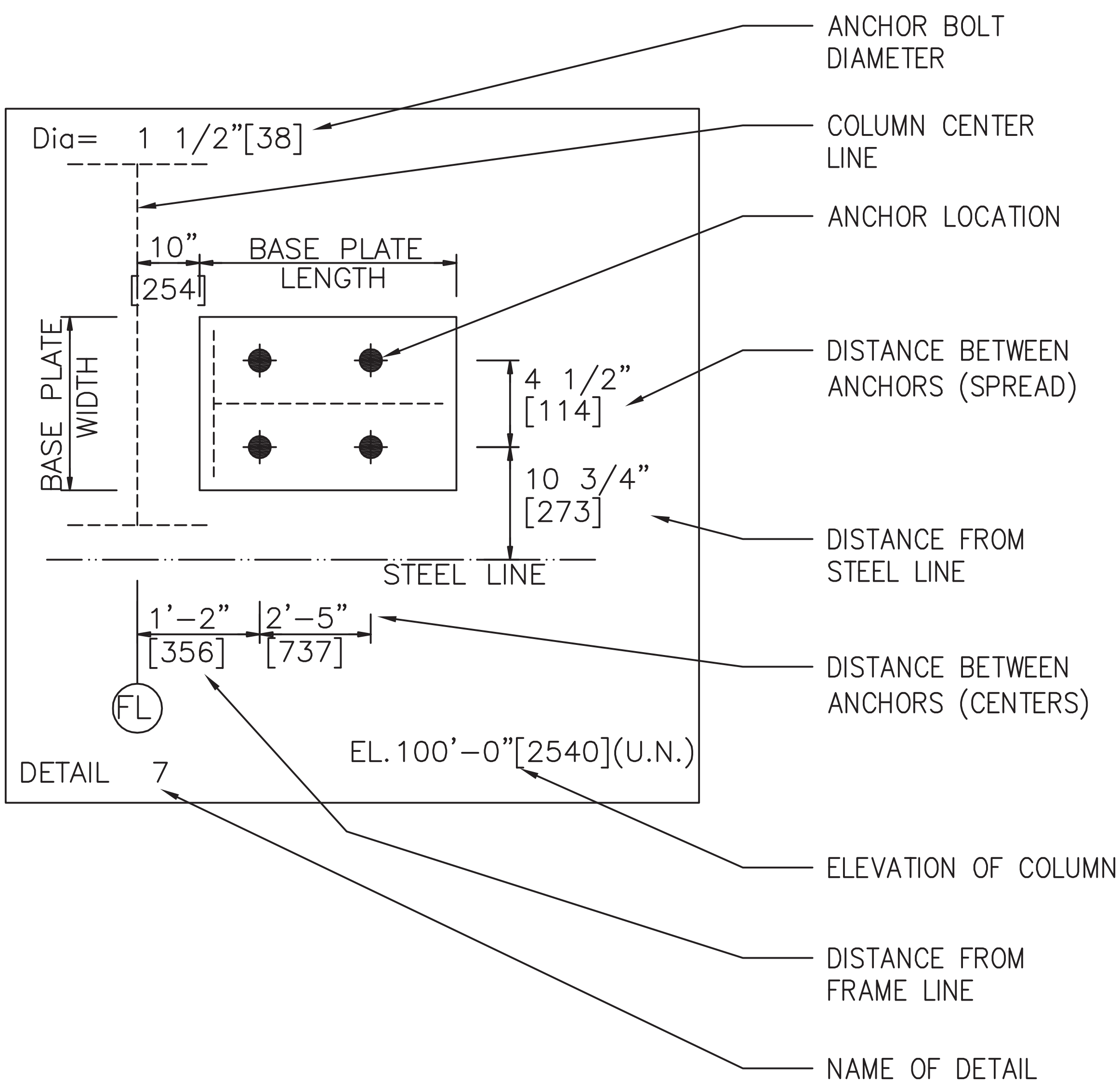

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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
PORTAL FRAME COLUMN	Section 3.1	Page 007

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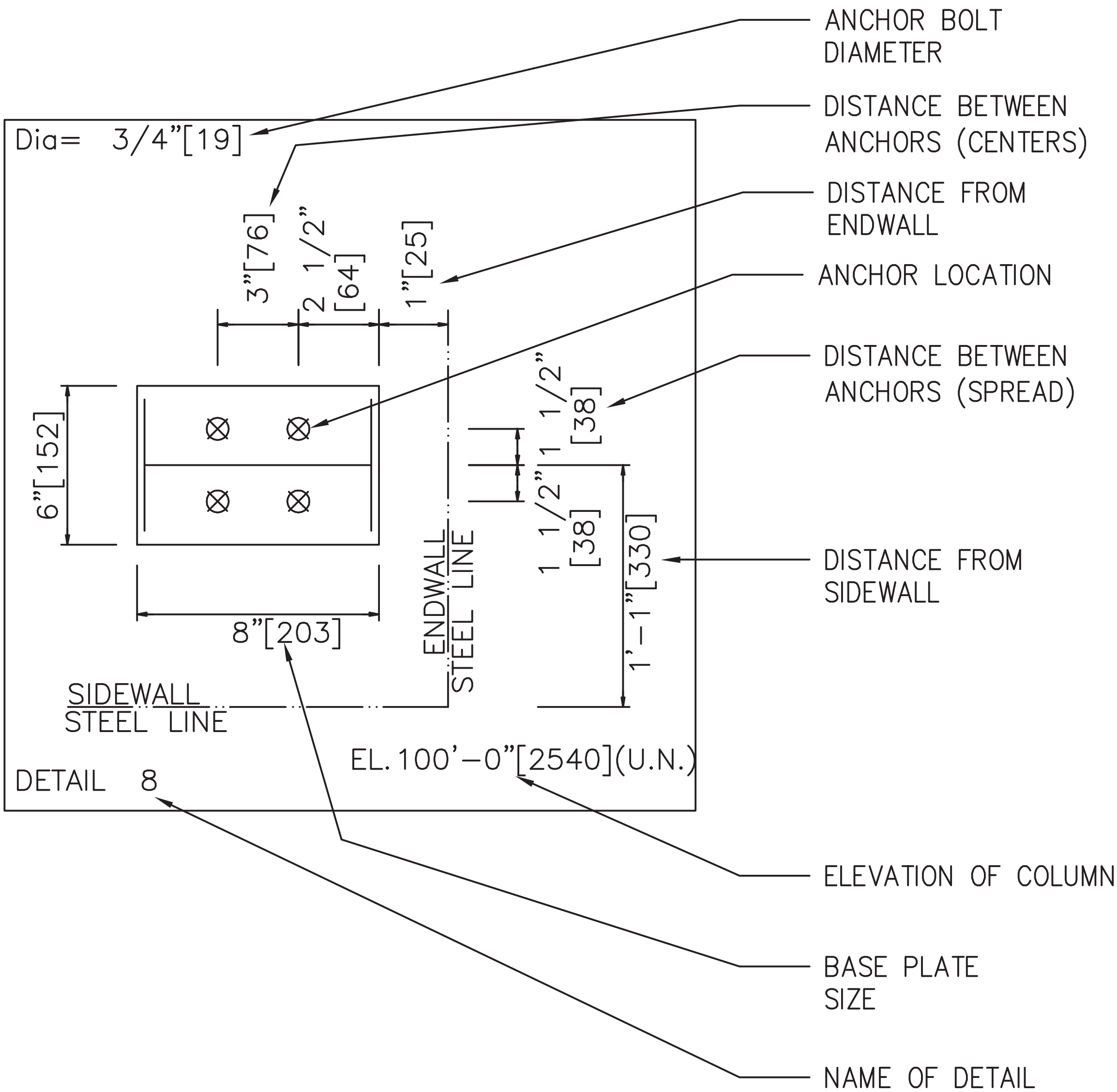

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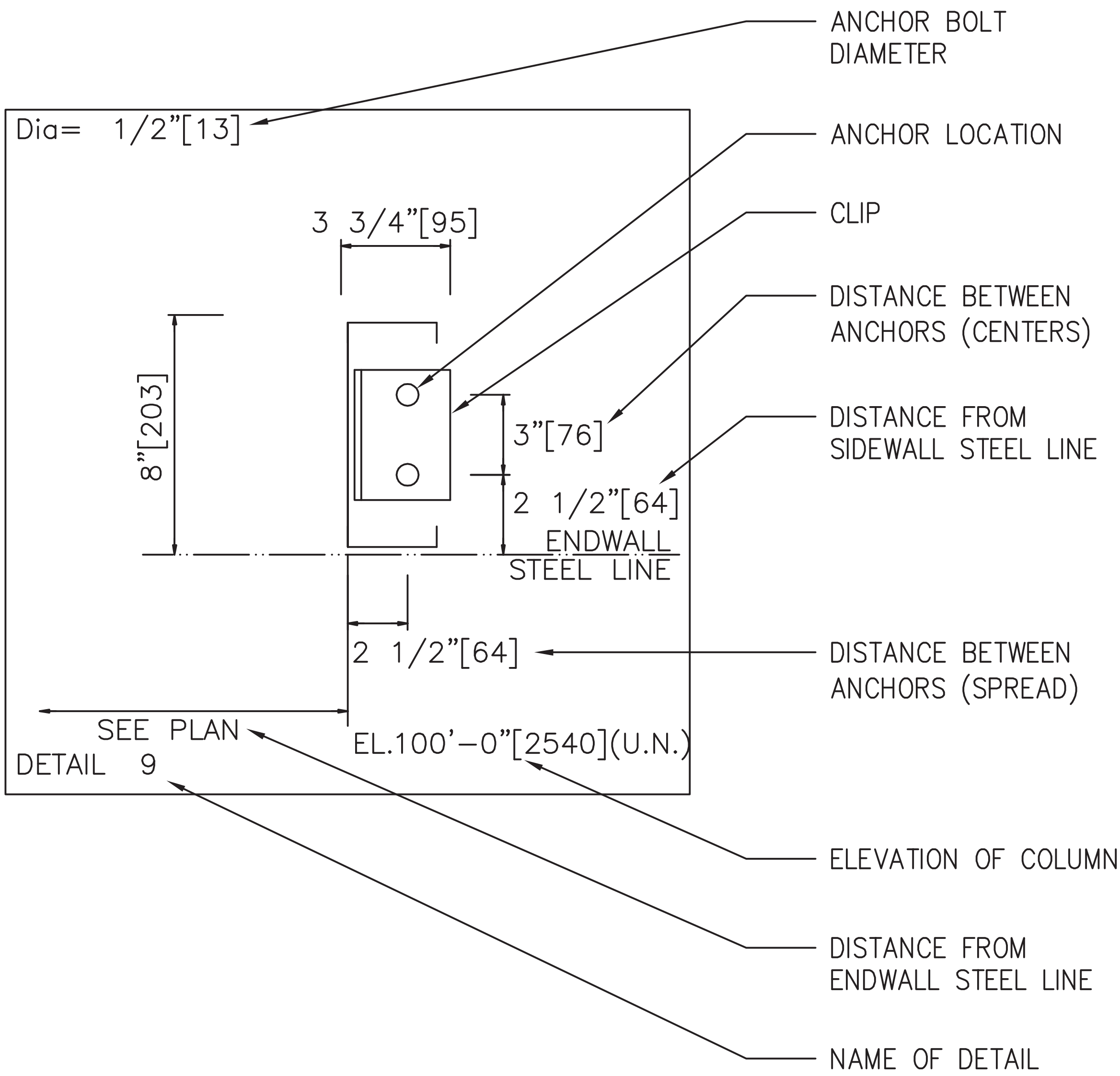
TYPICAL ANCHOR DETAILS

CORNER COLUMN

JULY 2008	
Vr 1.0	
Section 3.1	Page 008



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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
CEE DOOR JAMB	Section 3.1	Page 009

BEHLEN
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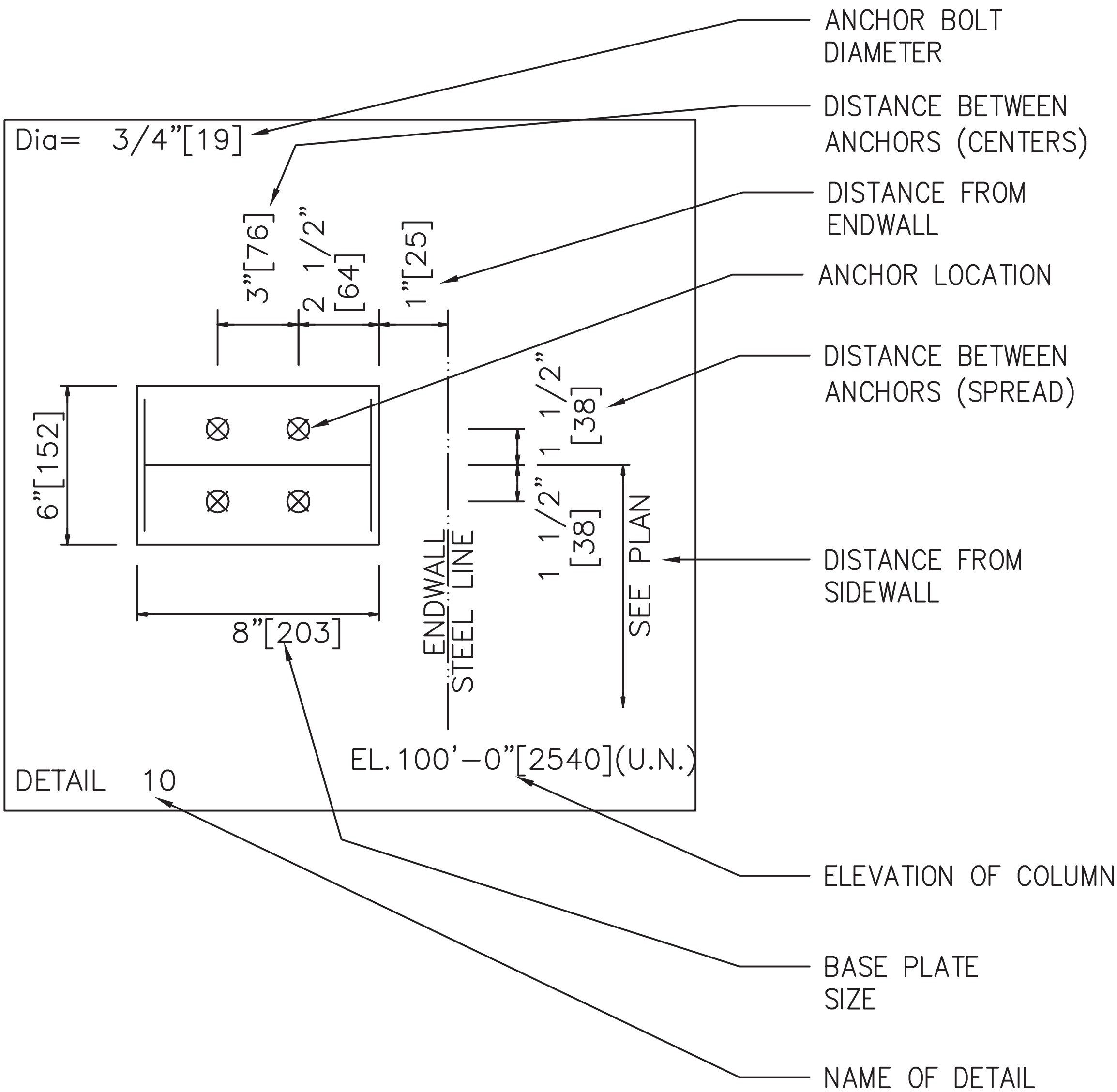

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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
ENDWALL I COLUMN	Section 3.1	Page 010

BEHLEN
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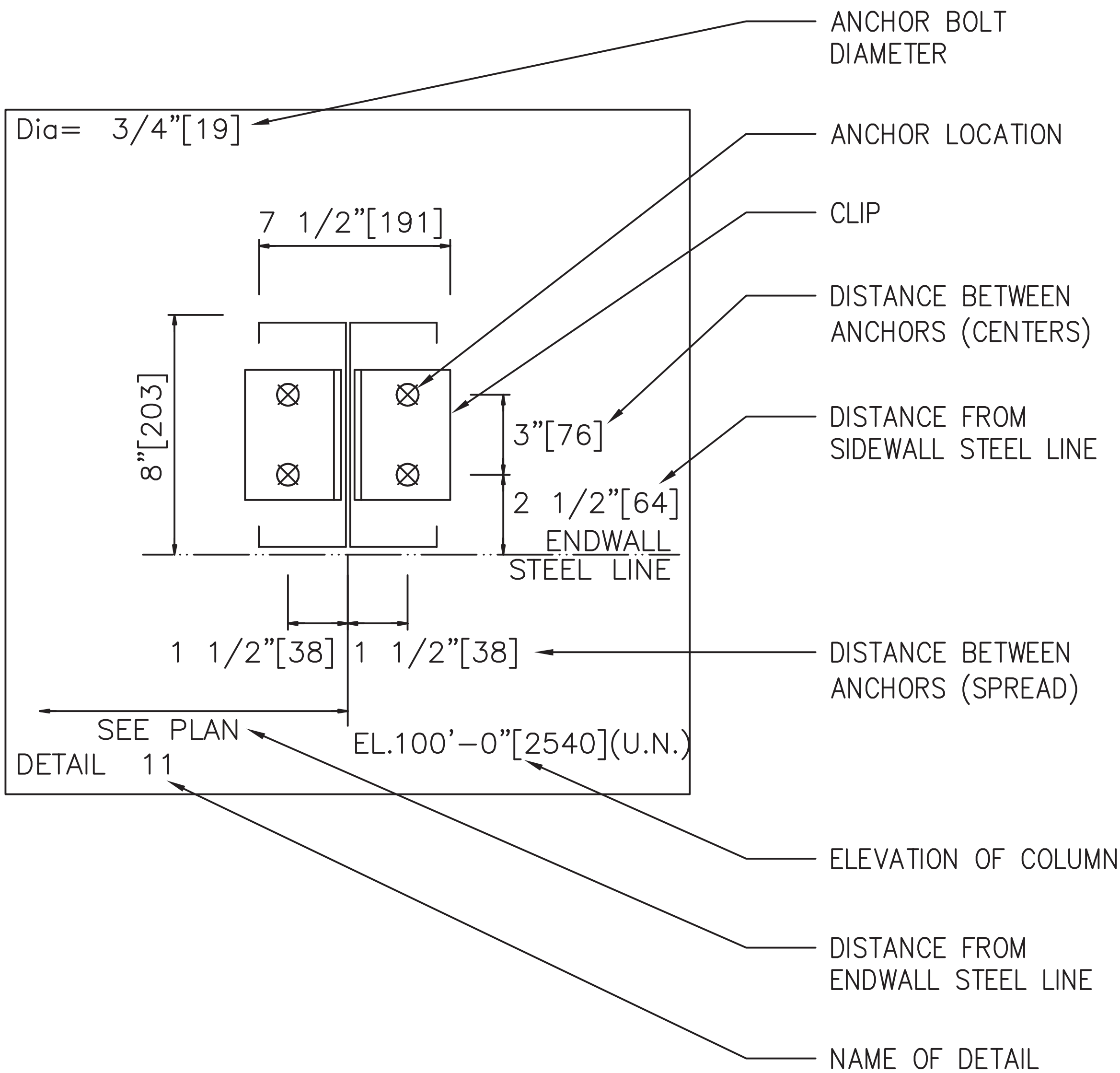

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TYPICAL ANCHOR DETAILS	JULY 2008	
	Vr 1.0	
DOUBLE CEE ENDWALL COLUMN	Section 3.1	Page 011

BEHLEN
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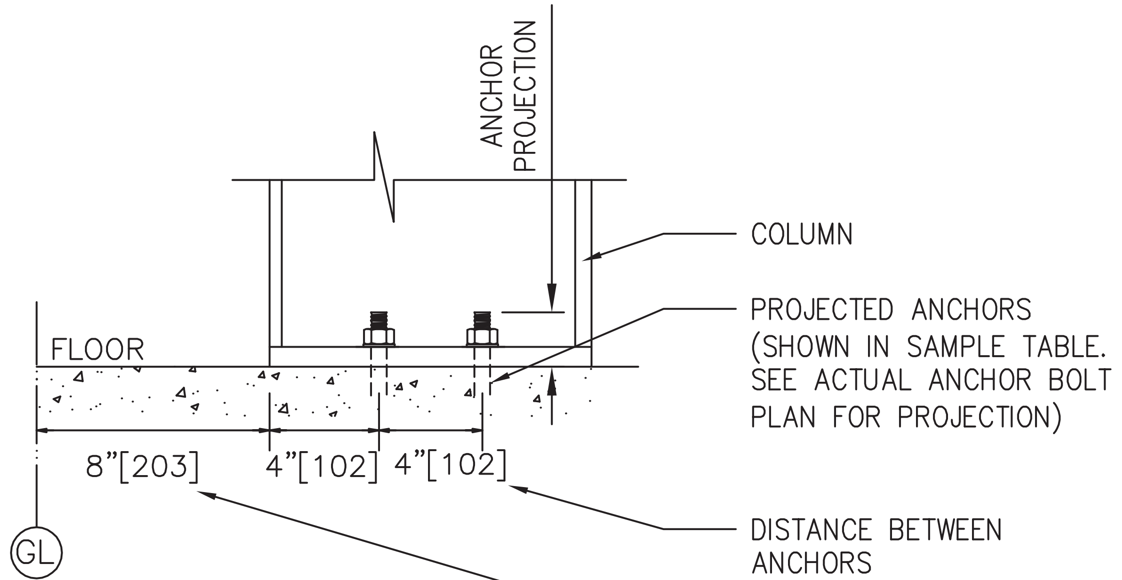

ANCHOR BOLT SUMMARY

	Qnt	Loc	Dia (in)	Proj (in)
○	xx	DJ	1/2"	2.00
⊗	xx	EW	3/4"	2.50
■	xx	RF	1"	3.00
◆	xx	WF	1 1/2"	3.00

NOTE:
ANCHOR BOLT PROJECTION INDICATED IS MEASURED FROM UNDERSIDE OF BASE PLATE. MAKE THE NECESSARY ADJUSTMENTS TO ALLOW FOR GROUT.

GENERAL NOTES:

1. ANCHOR BOLTS AND FOUNDATION BOLTS SHALL BE SET IN ACCORDANCE WITH THE ERECTION DIAGRAMS. THEY MUST NOT VARY FROM THE DIMENSIONS SHOWN ON THE ERECTION DIAGRAMS BY MORE THAN THE FOLLOWING:
(A) 1/8"[3] CENTER TO CENTER OF ANY TWO BOLTS WITHIN AN ANCHOR BOLT GROUP, WHERE AN ANCHOR BOLT GROUP IS DEFINED AS THE SET OF ANCHOR BOLTS WHICH RECEIVES A SINGLE FABRICATED STEEL SHIPPING PIECE;
(B) 1/4"[6] CENTER TO CENTER OF ADJACENT ANCHOR BOLT GROUPS;
(C) MAXIMUM ACCUMULATION OF 1/4"[6] PER 100'[30480] ALONG THE ESTABLISHED COLUMN LINE OF MULTIPLE ANCHOR BOLT GROUPS, BUT NOT TO EXCEED A TOTAL OF 1"[25]. THE ESTABLISHED COLUMN LINE IS THE ACTUAL FIELD LINE MOST REPRESENTATIVE OF THE CENTERS OF THE AS-BUILD ANCHOR BOLT GROUPS ALONG A LINE OF COLUMNS;
(D) 1/4"[6] FROM THE CENTER OF ANY ANCHOR BOLT GROUP TO THE ESTABLISHED COLUMN LINE THROUGH THAT GROUP. THE TOLERANCES OF PARAGRAPHS B, C, AND D ALSO APPLY TO OFFSET DIMENSIONS, SHOWN ON THE CONSTRUCTION DRAWINGS, MEASURED PARALLEL AND PERPENDICULAR TO THE NEAREST ESTABLISHED COLUMN LINE FOR INDIVIDUAL COLUMNS SHOWN ON THE DRAWINGS TO BE OFFSET FROM ESTABLISHED COLUMN LINES.
2. UNLESS SHOWN OTHERWISE, ANCHOR BOLTS SHALL BE SET PERPENDICULAR TO THE THEORETICAL BEARING SURFACE, THREADS SHALL BE PROTECTED AND FREE OF CONCRETE AND NUTS SHOULD RUN FREELY ON THE THREADS. SHEAR POCKETS SHALL BE CLEANED OF DEBRIS, FORMWORK, ICE AND SNOW PRIOR TO STEEL ERECTION.

FL – FRAME LINE
GL – GRID LINE
DIMENSIONS GIVEN HERE ARE FOR REFERENCE ONLY.

TYPICAL ANCHOR DETAILS

ANCHOR PROJECTION

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MINIMUM ANCHOR BOLT POLICY

FOR ALL COLUMNS A MINIMUM OF 4 ANCHOR BOLTS ARE REQUIRED.

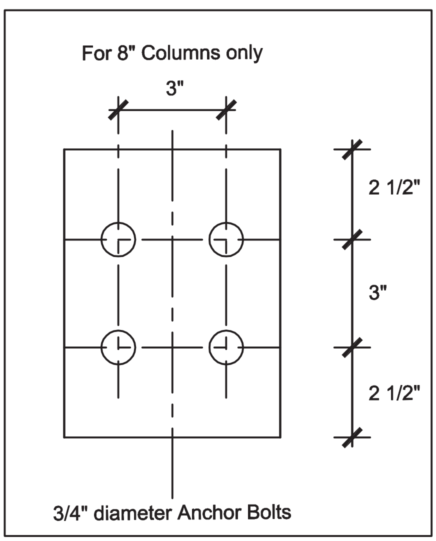
THERE WILL BE A MINIMUM SIZE OF BOLTS REQUIRED FOR VARIOUS HEIGHTS OF COLUMNS.
FOR BUILDING COLUMNS OF

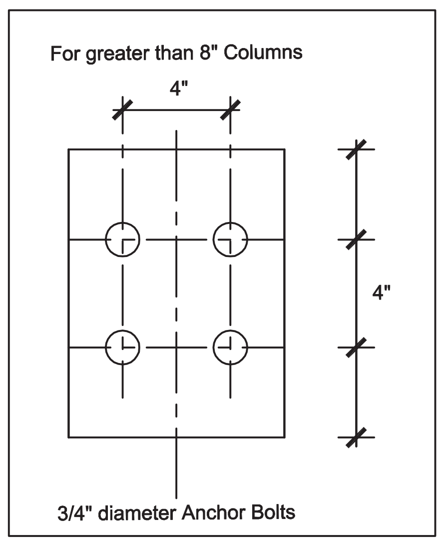
HEIGHTS LESS THAN 30' THE MINIMUM DIAMETER SHALL BE 3/4" .
HEIGHTS GREATER THAN 30' AND LESS THAN 50', 1" DIAMETER BOLTS ARE REQUIRED.
HEIGHTS GREATER THAN 50', 1 1/4" MINIMUM DIAMETER BOLTS ARE REQUIRED.

THERE SHALL BE A MAXIMUM OF 1" GROUT.

ANCHOR BOLT PROJECTIONS SHALL BE DETERMINED AS THE
BASE PLATE THICKNESS + BOLT DIAMETER + 1"

FOR ALL 8" COLUMNS THE ANCHOR BOLTS SHALL BE AT 3" GAUGE AND 3" CENTRES.
FOR ALL COLUMNS GREATER THAN 8" THE ANCHOR BOLTS SHALL BE AT 4" GAUGE AND 4" CENTRES.

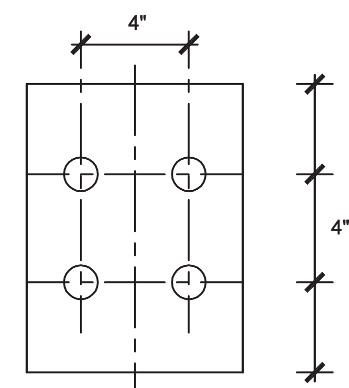




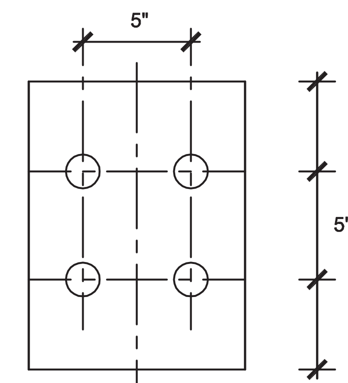
MINIMUM ANCHOR BOLT POLICY

FOR 1" BOLTS THE ANCHOR BOLTS SHALL BE AT 4" GAUGE AND 4" CENTRES.

FOR GREATER THAN 1" BOLTS THE ANCHOR BOLTS SHALL BE AT 5" GAUGE AND 5" CENTRES.



1" diameter Anchor Bolts



Greater than 1" diameter Anchor Bolts

BEHLEN INDUSTRIES LP DOES NOT DESIGN OR DETERMINE THE LENGTH OF THE ANCHOR BOLTS, THIS IS THE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER DESIGNING THE SUPPORTING STRUCTURE OF THE BEHLEN BUILDING. FOUNDATIONS AND SUPPORTING STRUCTURES OF THE BEHLEN BUILDING ARE NOT DESIGNED BY BEHLEN INDUSTRIES LP.

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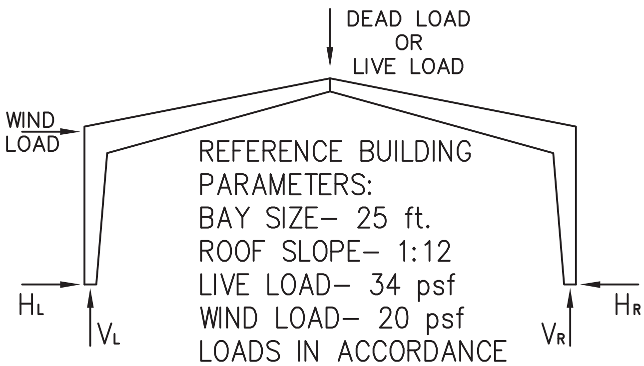
TABULATED FRAME REACTIONS ARE TO BE USED FOR PRELIMINARY DESIGN ONLY. FOR ACTUAL FRAME REACTIONS CONTACT BEHLEN. DUE TO THE LARGE NUMBER OF FRAME SIZE COMBINATIONS AND LOAD CONDITIONS, A REPRESENTATIVE SAMPLE OF INFORMATION THAT CAN BE SUPPLIED IS TABULATED.



REFERENCE BUILDING PARAMETERS:
BAY SIZE– 25 ft.
ROOF SLOPE– 1:12
LIVE LOAD– 34 psf
WIND LOAD– 20 psf
LOADS IN ACCORDANCE WITH NBC.

NOTES:
(A) DEAD LOAD EQUALS SELF WEIGHT OF MEMBERS.
(B) NEGATIVE REACTION INDICATES DIRECTION OPPOSITE TO THAT SHOWN ON FIGURES.
(C) REACTIONS FOR VARIOUS LOAD COMBINATIONS MAY BE OBTAINED BY SUMMING OF APPROPRIATE VALUES.
(D) FORCE ON FOUNDATION WALL WILL ACT IN OPPOSITE DIRECTION TO THE DIRECTION OF FRAME REACTIONS.

MODIFYING FACTORS:
TO OBTAIN APPROXIMATE REACTION FOR OTHER BAY SIZES, LIVE LOADS AND WIND LOADS USE FOLLOWING.

BAY SIZE: (MAX 30')
DIVIDE REACTIONS BY 25 AND MULTIPLY BY REQUIRED BAY SIZE.

LIVE LOAD (PSF)
DIVIDE LIVE LOAD REACTIONS BY 34 AND MULTIPLY BY REQUIRED LIVE LOAD.

WIND LOAD (PSF)
DIVIDE WIND LOAD REACTIONS BY 20 AND MULTIPLY BY REQUIRED WIND LOAD.

UNFACTORED FRAME REACTIONS (kips)

		DEAD LOAD		LIVE LOAD		WIND LOAD			
SPAN	E.H.(ft)	V_LV_R	H_LH_R	V_LV_R	H_LH_R	V_L	H_L	V_R	H_R
40'	14	1.9	0.8	17.0	7.6	−8.4	−4.7	−9.7	−0.3
	16	1.9	0.6	17.0	6.6	−8.8	−4.7	−8.7	0.5
	18	1.9	0.6	17.0	5.9	−9.2	−4.2	−7.6	1.5
	21	1.9	0.5	17.0	5.1	−10.6	−3.7	−6.0	2.9
50'	14	2.8	1.4	21.3	12.3	−12.0	−7.9	−9.4	−3.0
	16	2.8	1.3	21.3	10.8	−12.2	−7.3	−9.2	−1.7
	18	2.8	1.1	21.3	9.6	−12.5	−6.7	−8.9	−0.3
	21	2.8	1.0	21.3	8.2	−12.9	−6.3	−8.5	1.4
60'	14	3.7	2.7	25.5	20.7	−15.9	−12.4	−13.5	−8.4
	16	3.7	2.4	25.5	18.1	−16.1	−11.0	−13.3	−6.3
	18	3.7	2.1	25.5	16.1	−15.0	−9.5	−11.4	−3.2
	21	3.7	1.8	25.5	13.8	−16.6	−8.7	−12.9	−2.1
70'	14	4.5	2.8	29.8	25.6	−16.7	−14.1	−13.9	−9.6
	16	4.5	2.6	29.8	24.0	−16.9	−13.0	−13.8	−7.7
	18	4.5	2.3	29.8	20.8	−17.1	−11.8	−13.7	−5.6
	21	4.5	1.9	29.8	17.0	−17.4	−10.4	−13.4	−3.0
80'	16	5.6	3.9	34.0	32.6	−18.0	−14.6	−14.0	−9.7
	18	5.6	3.5	34.0	29.0	−18.8	−14.1	−15.0	−8.3
	21	5.6	3.0	34.0	24.8	−19.8	−14.0	−15.9	−6.8
	24	5.6	2.6	34.0	21.7	−20.6	−12.8	−14.8	−4.3
100'	16	7.5	6.8	42.5	48.8	−22.3	−22.3	−17.0	−17.5
	18	7.4	6.0	42.5	43.4	−23.0	−20.9	−18.2	−16.5
	21	7.4	5.2	42.5	37.2	−24.7	−20.7	−18.6	−15.9
	24	7.4	4.5	42.5	32.5	−25.1	−19.6	−19.1	−11.2
120'	16	9.8	8.8	51.0	71.9	−26.6	−29.7	−21.6	−25.0
	18	9.7	7.8	51.0	63.9	−27.5	−27.9	−22.1	−23.2
	21	9.7	6.7	51.0	54.8	−29.7	−27.1	−22.8	−20.6
	24	9.7	5.9	51.0	48.0	−30.0	−23.4	−23.4	−15.5

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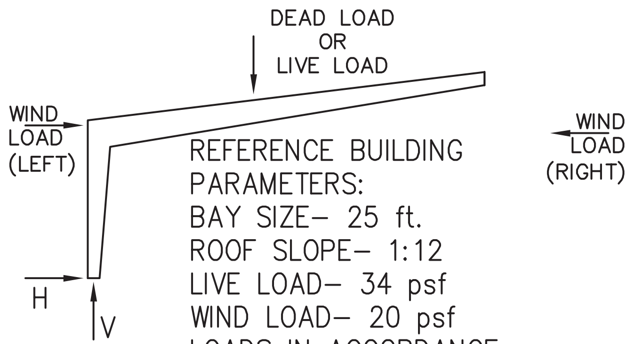
TABULATED FRAME REACTIONS ARE TO BE USED FOR PRELIMINARY DESIGN ONLY. FOR ACTUAL FRAME REACTIONS CONTACT BEHLEN. DUE TO THE LARGE NUMBER OF FRAME SIZE COMBINATIONS AND LOAD CONDITIONS, A REPRESENTATIVE SAMPLE OF INFORMATION THAT CAN BE SUPPLIED IS TABULATED.



REFERENCE BUILDING PARAMETERS:
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WIND LOAD (PSF)
DIVIDE WIND LOAD REACTIONS BY 20 AND MULTIPLY BY REQUIRED WIND LOAD.

UNFACTORED FRAME REACTIONS (kips)

		DEAD LOAD		LIVE LOAD		WIND LOAD			
SPAN	E.H.(ft)	V	H	V	H	V_L	H_L	V_R	H_R
20'	12	0.9	0.0	8.5	0.2	−5.6	−2.7	−5.7	2.6
	14	0.9	0.0	8.5	0.2	−5.7	−3.0	−5.8	3.1
	18	0.9	0.0	8.5	0.2	−6.3	−4.1	−6.3	4.2
	22	1.1	0.0	8.5	0.2	−6.6	−5.1	−6.6	5.3
30'	12	1.3	0.0	12.8	0.4	−8.2	−2.6	−8.2	2.3
	14	1.3	0.0	12.8	0.3	−8.4	−3.0	−8.4	2.8
	18	1.4	0.0	12.8	0.3	−9.1	−4.1	−9.1	3.9
	22	1.4	0.0	12.8	0.3	−9.6	−5.0	−9.6	5.1
40'	10	1.8	0.0	17.0	0.5	−10.8	−2.5	−10.8	2.1
	12	1.9	0.0	17.0	0.4	−11.1	−2.8	−11.1	2.7
	16	1.9	0.0	17.0	0.4	−11.9	−3.8	−11.9	3.7
	20	2.0	0.0	17.0	0.4	−12.5	−4.9	−12.5	4.9
50'	12	2.6	0.1	21.3	0.6	−13.7	−2.8	−13.7	2.3
	16	2.6	0.1	21.3	0.4	−14.7	−3.7	−14.7	3.5
	20	2.7	0.1	21.3	0.5	−15.5	−4.8	−15.5	4.6
	24	3.0	0.1	21.3	0.3	−16.4	−6.4	−16.4	6.2

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SECTION 4
FRAMING SYSTEMS and DETAILS

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INDEX

FRAMING SYSTEMS and DETAILS

Section 4.1 - STRUCTURALS at ENDWALL		
	LIGHT GAUGE COLUMN BASE	001
	COLUMN to RAFTER I	002
	COLUMN to RAFTER II	003
	ENDWALL COLUMN to RAFTER I	004
	ENDWALL COLUMN to RAFTER II	005
	COLUMN to RAFTER and SPLICE	006
	COLUMN at RIDGE	007
	SPLICE at RIDGE	008
	RAFTER COLUMN SPLICE	009
Section 4.2 - STRUCTURALS at EXPANDABLE ENDWALL		
	INTERMEDIATE COLUMN to RAFTER I	001
	INTERMEDIATE COLUMN to RAFTER II	002
	CENTER COLUMN to RAFTER	003
Section 4.3 - STRUCTURALS at MAIN FRAMING		
	COLUMN to RAFTER I	001
	COLUMN to RAFTER II	002
	INTERMEDIATE COLUMN to RAFTER I	003
	INTERMEDIATE COLUMN to RAFTER II	004
Section 4.4 - STRUCTURALS at LEAN-TO FRAMING		
	NON EXPANDABLE CORNER COLUMN	001
	LEAN-TO RAFTER to COLUMN I	002
	LEAN-TO RAFTER to COLUMN II	003
	LEAN-TO RAFTER to RAFTER	004
	LEAN-TO RAFTER to RAFTER CONT.	005

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INDEX

FRAMING SYSTEMS and DETAILS CONTINUED

Section 4.5 - PURLIN to STRUCTURAL

ENDWALL CONDITION I	001
ENDWALL CONDITION II	002
INTERMEDIATE BAY CONDITION	003
STRUT PURLIN BRACING	004

Section 4.6 - EAVE CONDITION to STRUCTURAL

EAVE DETAILS at ENDWALL	001
INTERMEDIATE EAVE DETAILS	002

Section 4.7 - GIRT to STRUCTURAL

GIRTS at CORNER CONNECTION I	001
GIRTS at CORNER CONNECTION II	002
GIRTS at CORNER CONNECTION III	003
GIRTS at CORNER CONNECTION IV	004
GIRTS at CORNER CONNECTION V	005
GIRTS at CORNER CONNECTION VI	006
GIRTS at INTERIOR COLUMN I	007
GIRTS at INTERIOR COLUMN II	008
GIRTS at INTERIOR COLUMN III	009
GIRTS at INTERIOR COLUMN IV	010
SIDEWALL GIRT to COLUMN I	011
SIDEWALL GIRT to COLUMN II	012
HIGH GIRT to COLUMN	013
HIGH GIRT to RAFTER	014
GIRT TO GIRT	015

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INDEX

FRAMING SYSTEMS and DETAILS CONTINUED

Section 4.8 - BRACING to STRUCTURAL

COLUMN to BRACING	001
BRACING through GIRT	002
ROD/CABLE COMPONENTS	003
CABLE COMPONENTS	004
BRACING to ANCHOR	005
PORTAL FRAME DETAIL	006
PORTAL FRAME TOP VIEW	007
ANGLE BRACING LAYOUT	008
ANGLE BASE CONNECTION DETAIL	009
ANGLE MIDDLE PLATE DETAIL	010
STRUT END CONNECTION DETAIL	011
ANGLE CROSS CONNECTION DETAIL	012
ANGLE BRACE to COLUMN DETAIL	013

Section 4.9 - PURLIN STABILIZERS

at RIDGE	001
INTERMEDIATE LOCATION	002
at EAVE	003

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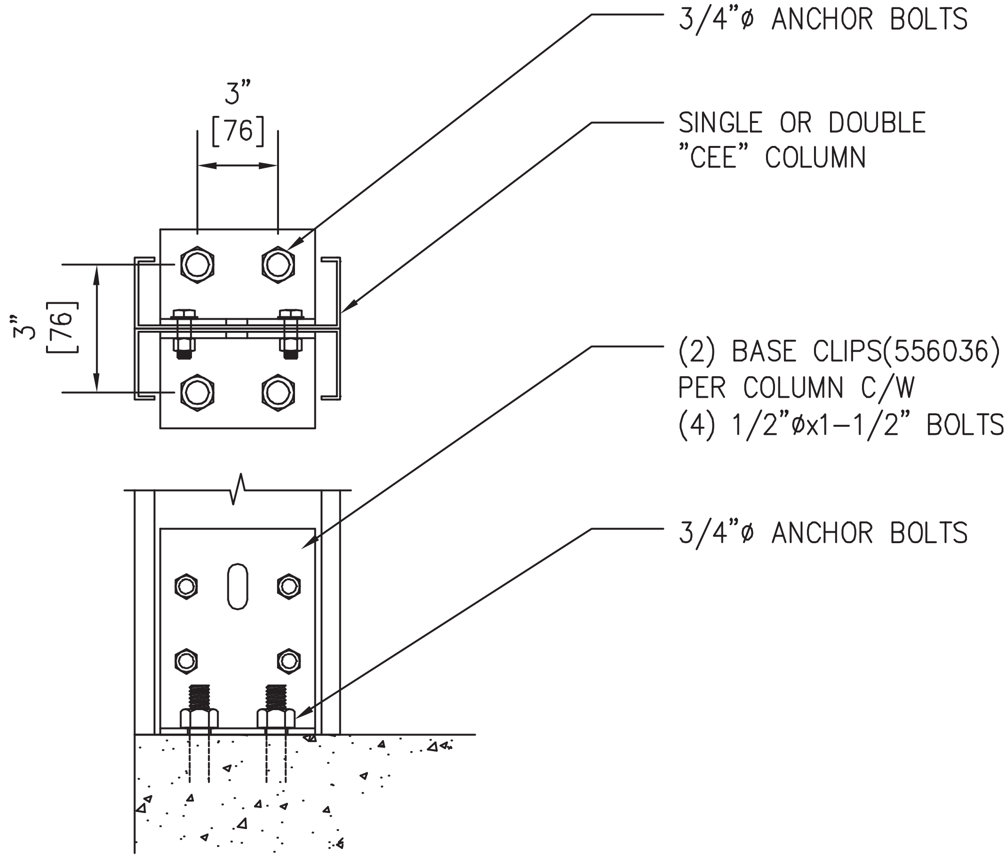
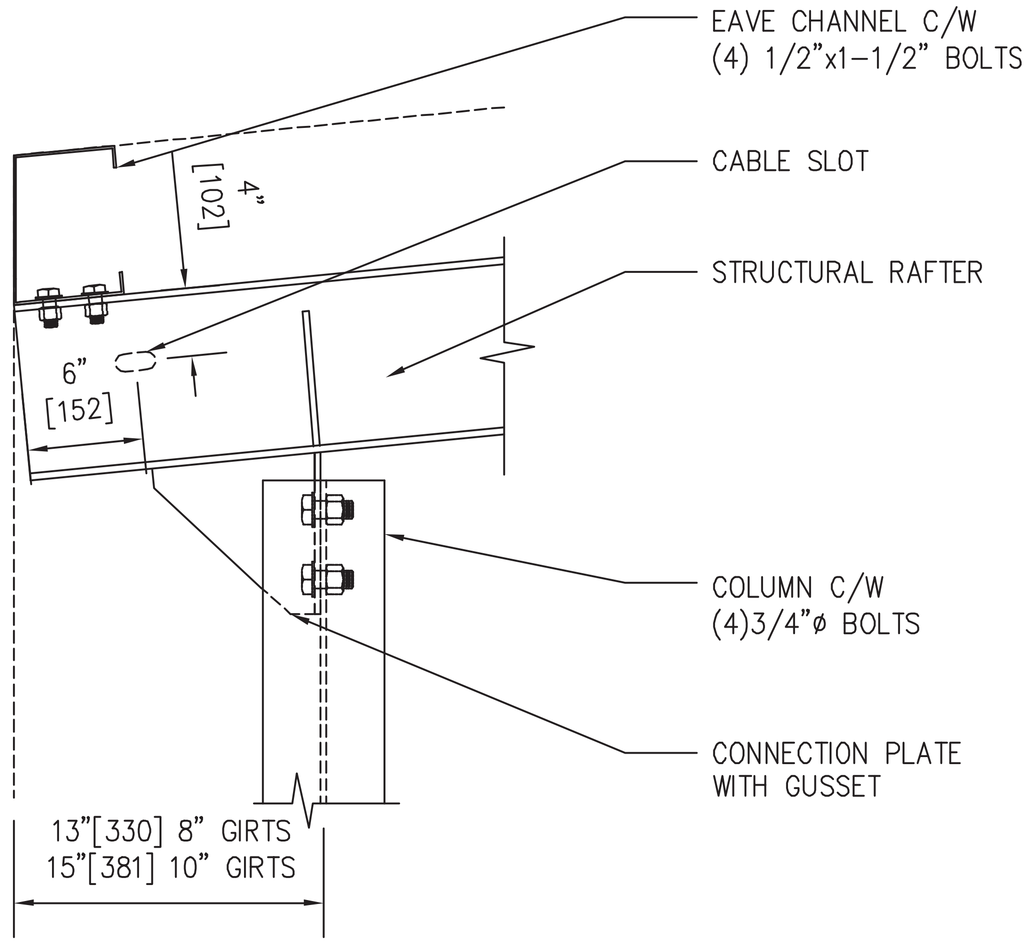


'CEE' COLUMN BASE CLIPS

FD
32

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
LIGHT GAUGE COLUMN BASE	Section 4.1	Page 001



ENDWALL COLUMN TO RAFTER

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STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
COLUMN to RAFTER I	Section 4.1	Page 002

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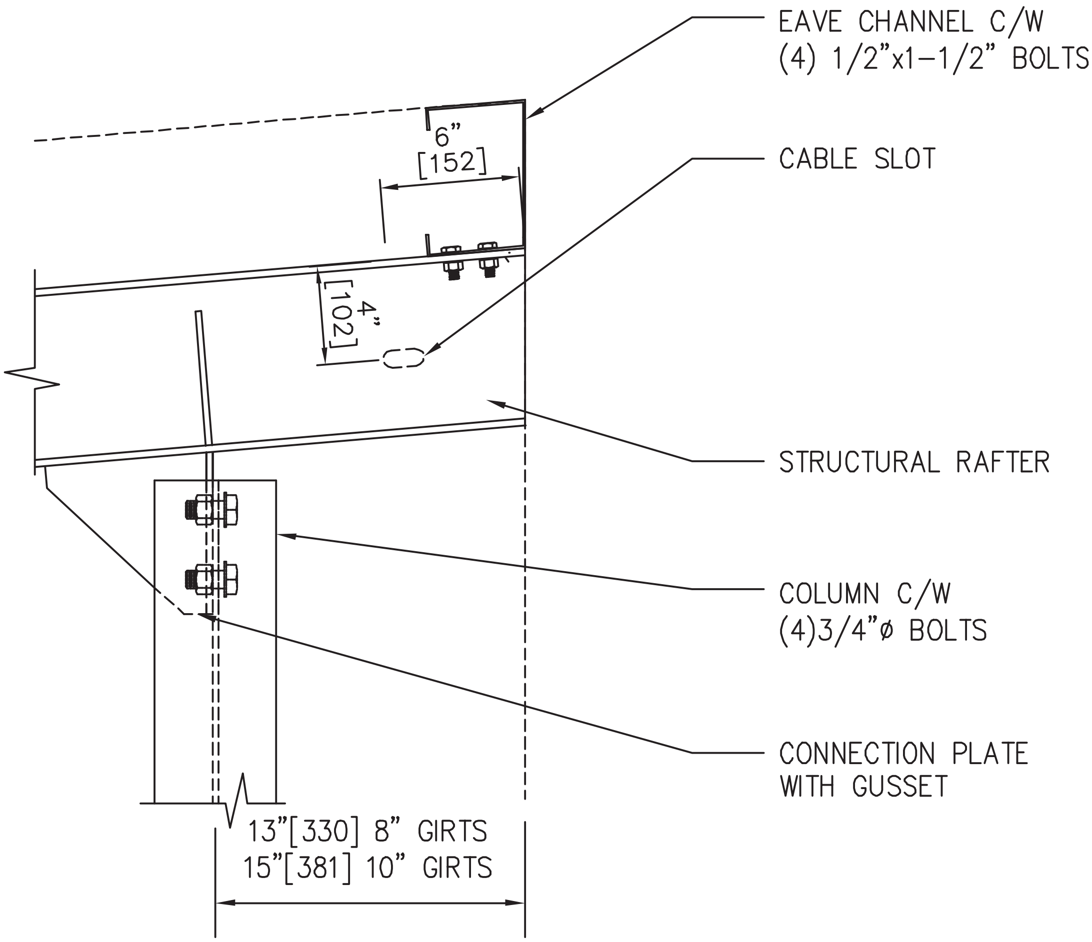

ENDWALL COLUMN TO RAFTER

HIGH EAVE

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STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
COLUMN to RAFTER II	Section 4.1	Page 003

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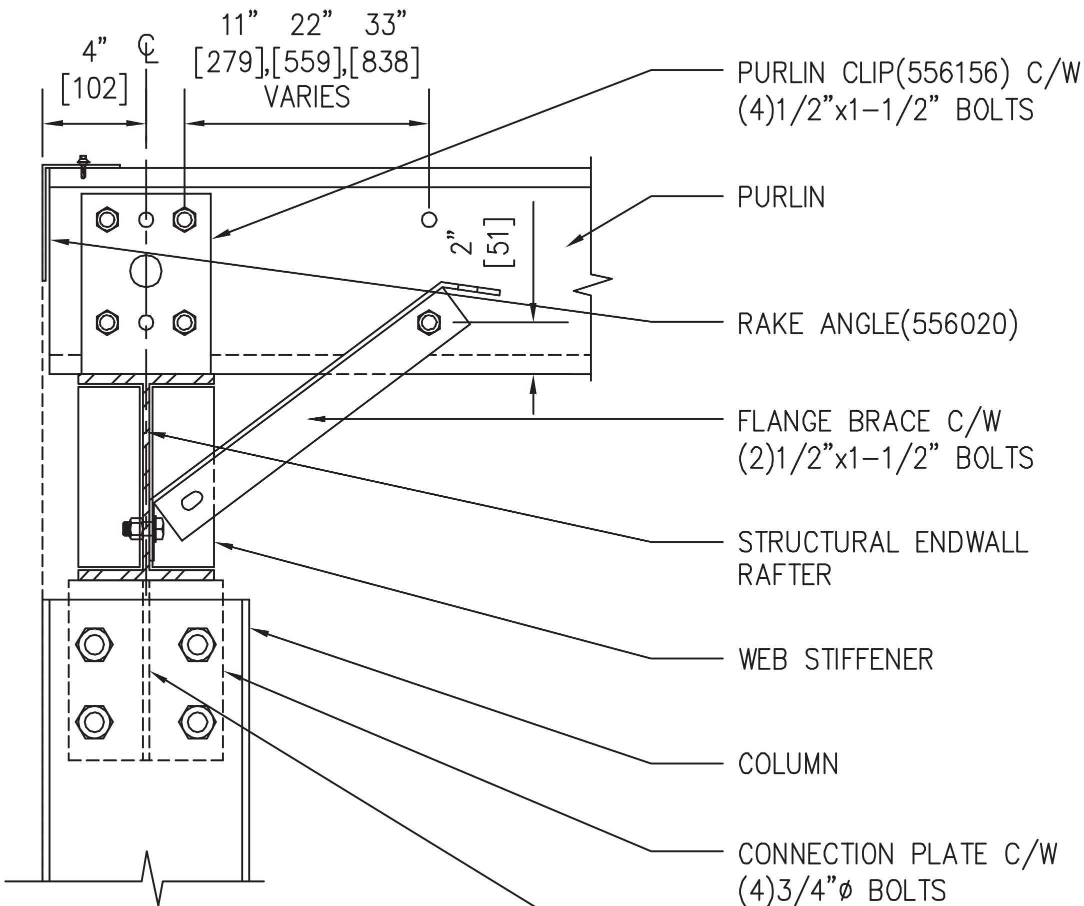

ENDWALL COLUMN TO RAFTER

FLUSH COLUMN

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STRUCTURALS at ENDWALL	JULY 2008
	Vr 1.0
ENDWALL COLUMN to RAFTER I	Section 4.1 / Page 004

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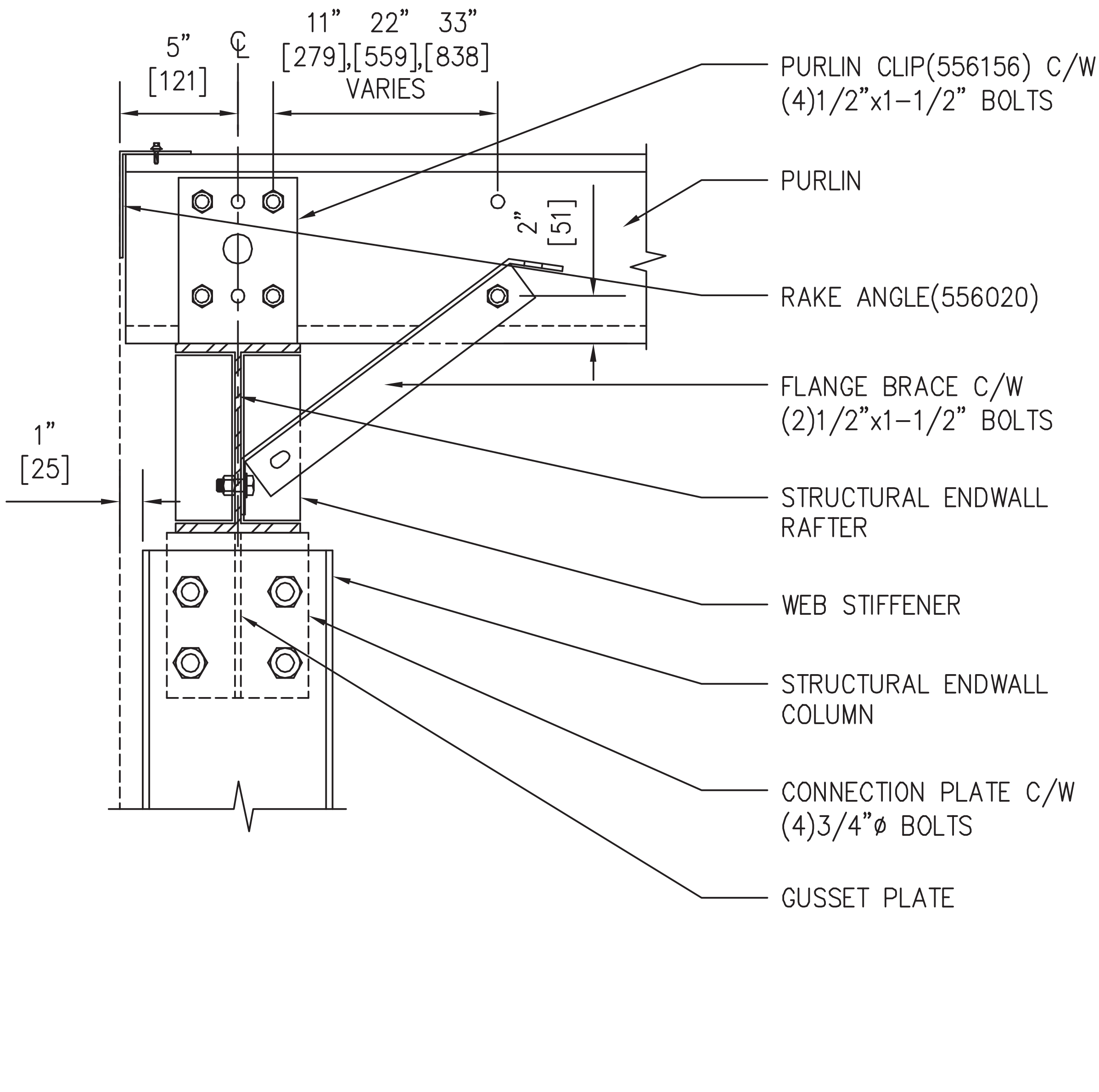

ENDWALL COLUMN TO RAFTER
1" OFFSET COLUMN

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40

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
ENDWALL COLUMN to RAFTER II	Section 4.1	Page 005

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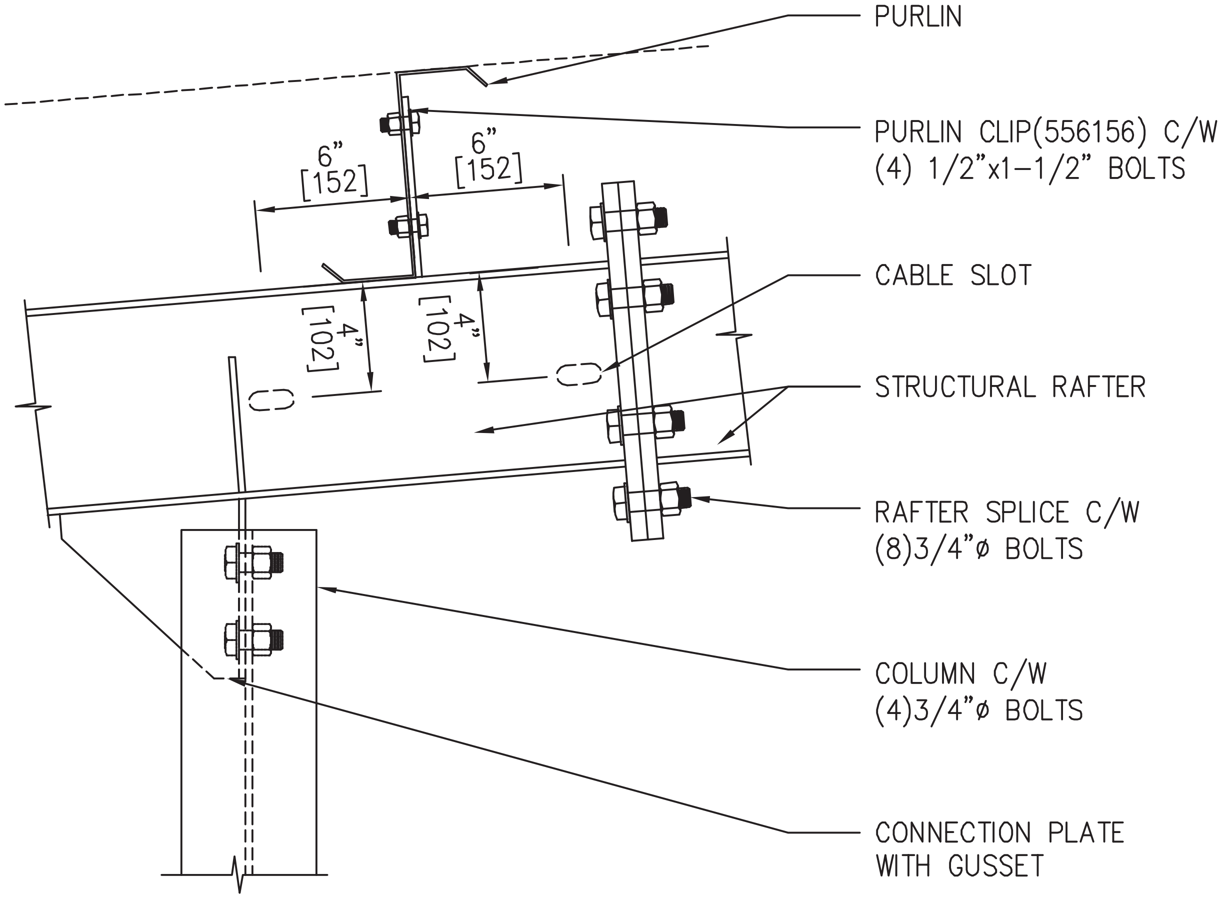

INTERMEDIATE SPLICE

RAFTER TO COLUMN

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09

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
COLUMN to RAFTER and SPLICE	Section 4.1	Page 006

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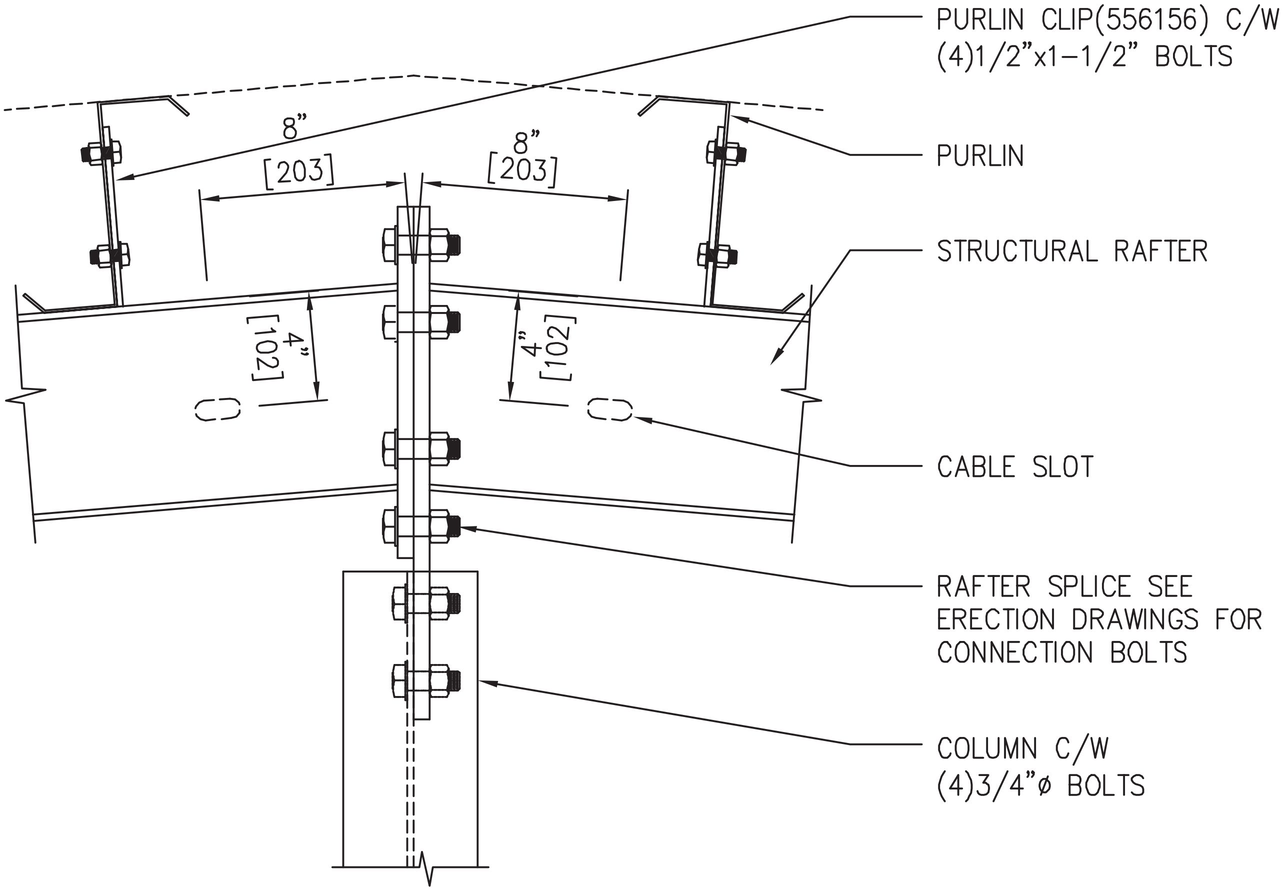

CENTERLINE SPLICE
RAFTERS C/W CENTER COLUMN

FD
22

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
COLUMN at RIDGE	Section 4.1	Page 007

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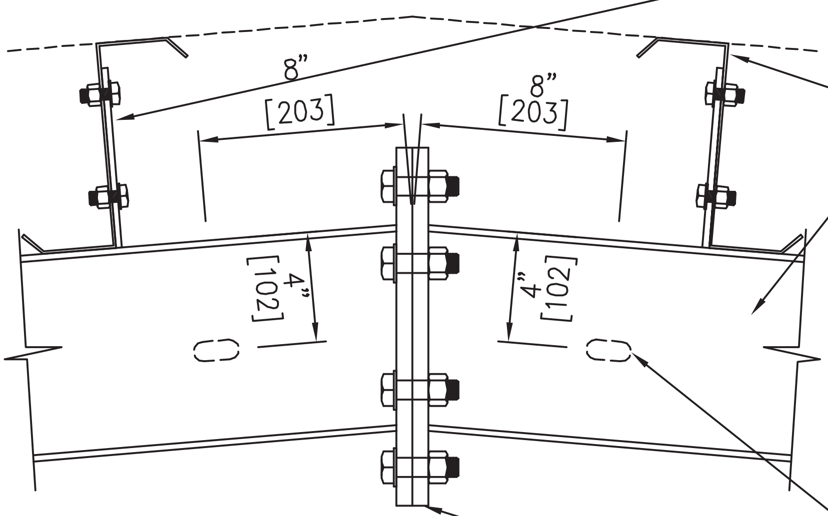

CENTERLINE SPLICE
NO COLUMN

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21

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
SPLICE at RIDGE	Section 4.1	Page 008

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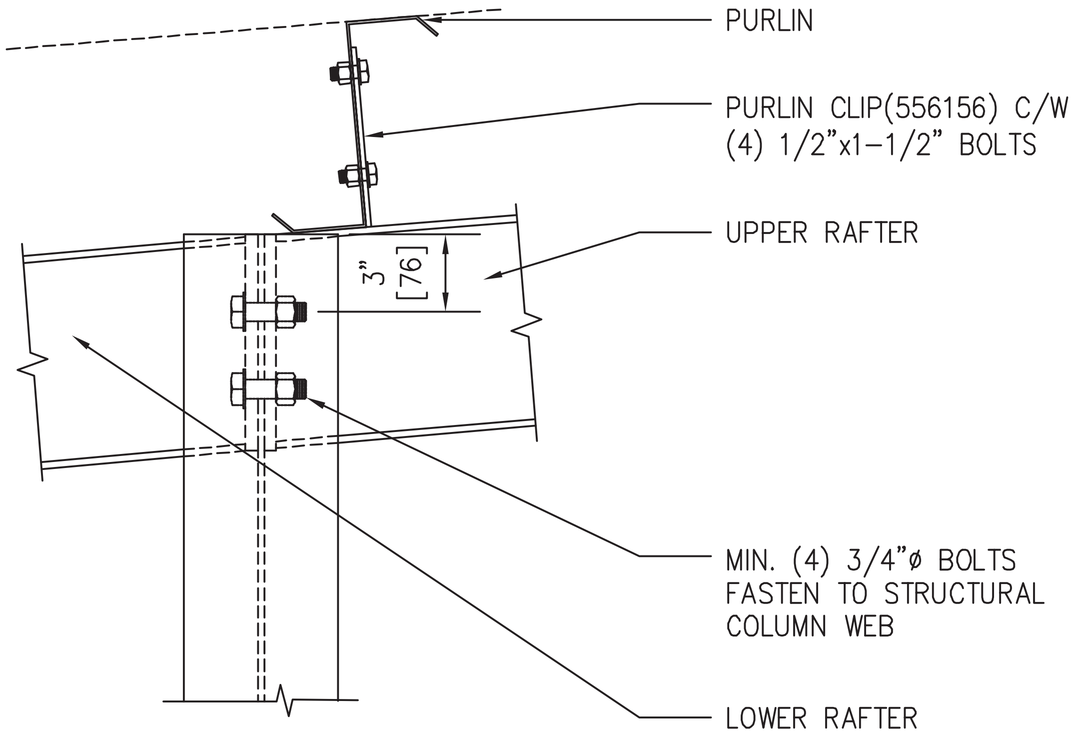
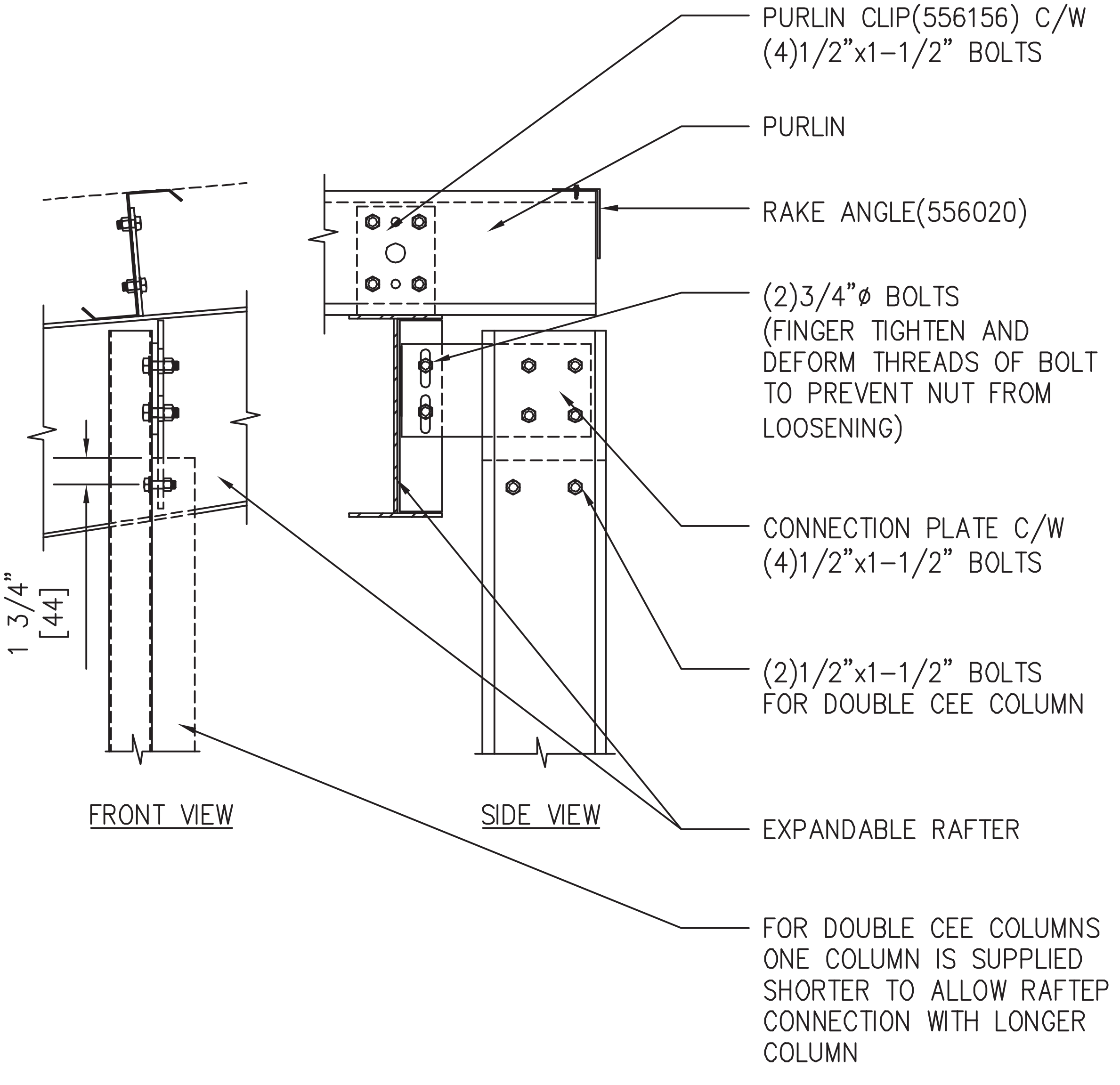


RAFTER SPLICE AT COLUMN

RAFTER FASTENS TO WEB OF COLUMN

FD
61

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
RAFTER COLUMN SPLICE	Section 4.1	Page 009



EXPANDABLE ENDWALL

LIGHT GAUGE WIND POST
AT INTERMEDIATE LOCATION

FD
10

STRUCTURALS at EXPANDABLE ENDWALL

INTERMEDIATE COLUMN to RAFTER I

JULY 2008	
Vr 1.0	
Section 4.2	Page 001

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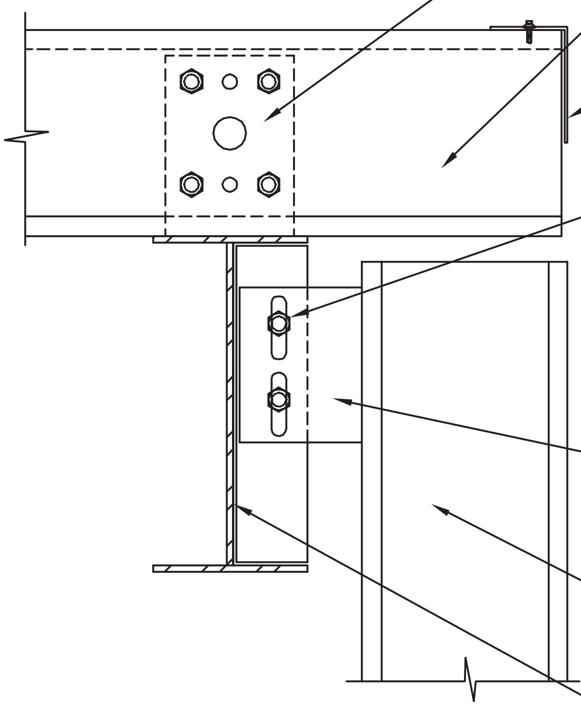

EXPANDABLE ENDWALL

STRUCTURAL WIND POST
AT INTERMEDIATE LOCATION

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10A

STRUCTURALS at EXPANDABLE ENDWALL	JULY 2008	
	Vr 1.0	
INTERMEDIATE COLUMN to RAFTER II	Section 4.2	Page 002

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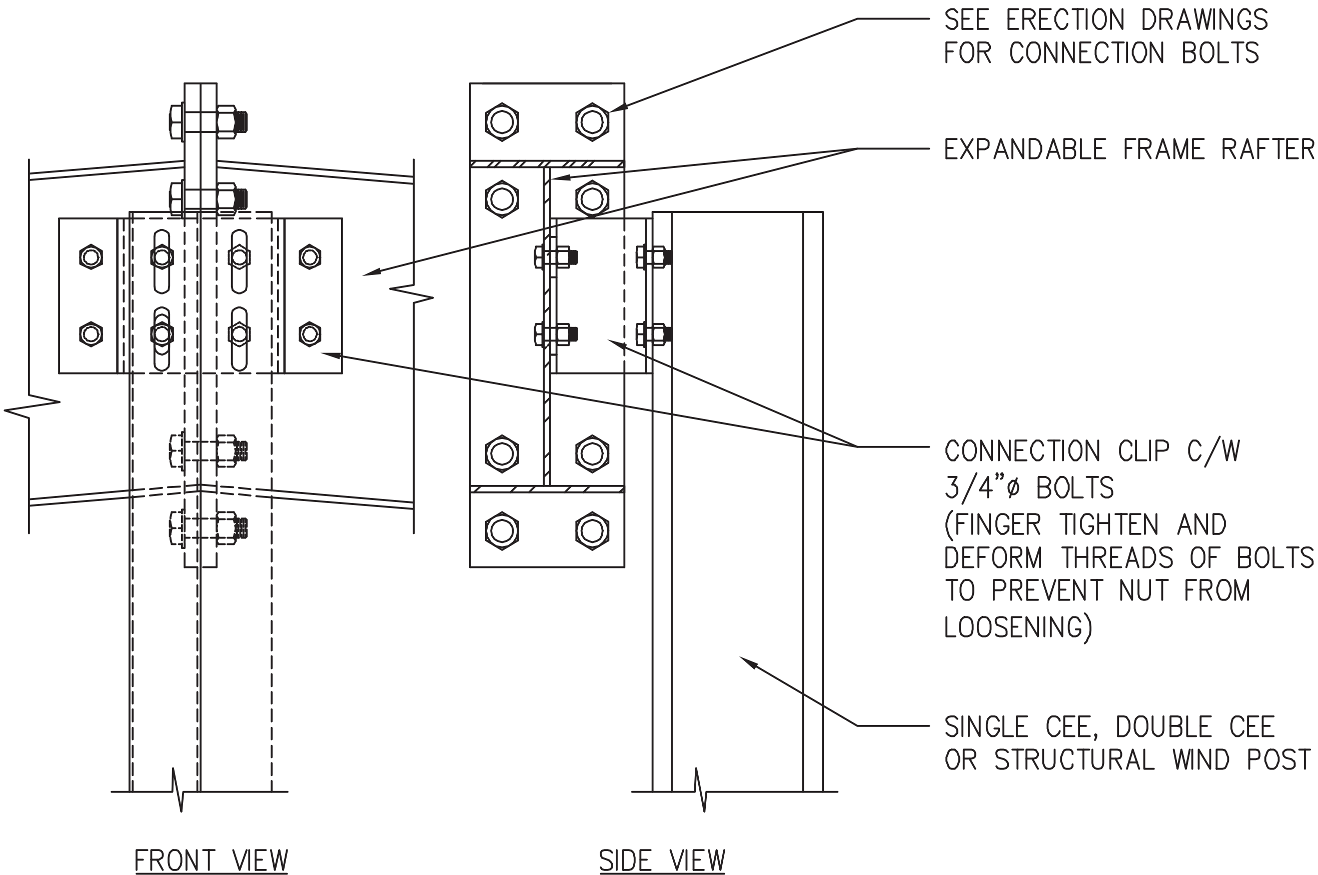

EXPANDABLE ENDWALL

WIND POST AT CENTER SPLICE

FD
16

STRUCTURALS at EXPANDABLE ENDWALL	JULY 2008	
	Vr 1.0	
CENTER COLUMN to RAFTER	Section 4.2	Page 003

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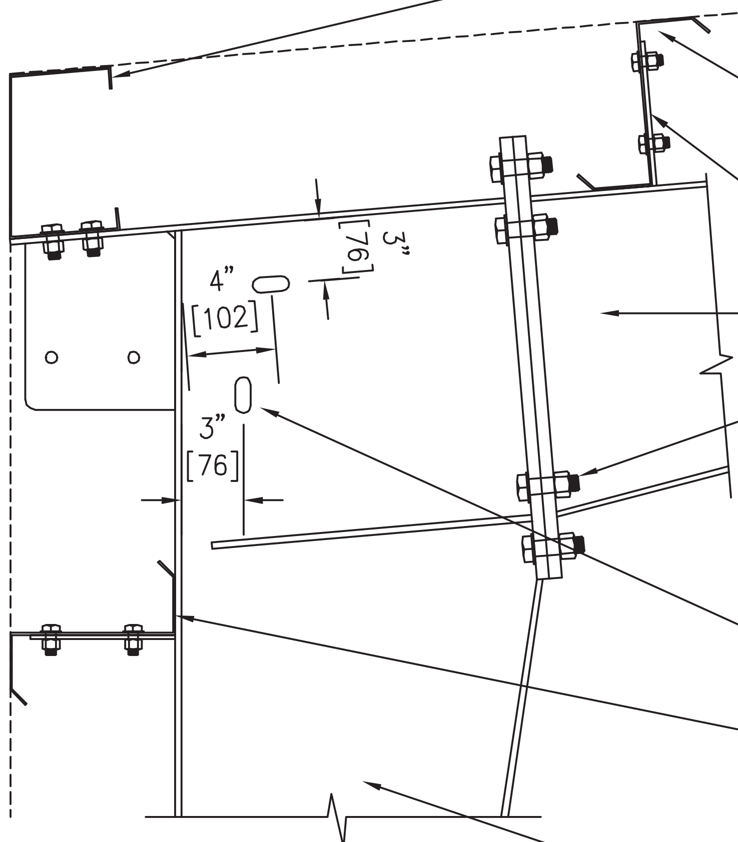

TAPERED COLUMN EAVE
SHOWN WITH BYPASS GIRTS

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STRUCTURALS at MAIN FRAMING	JULY 2008	
	Vr 1.0	
COLUMN to RAFTER I	Section 4.3	Page 001

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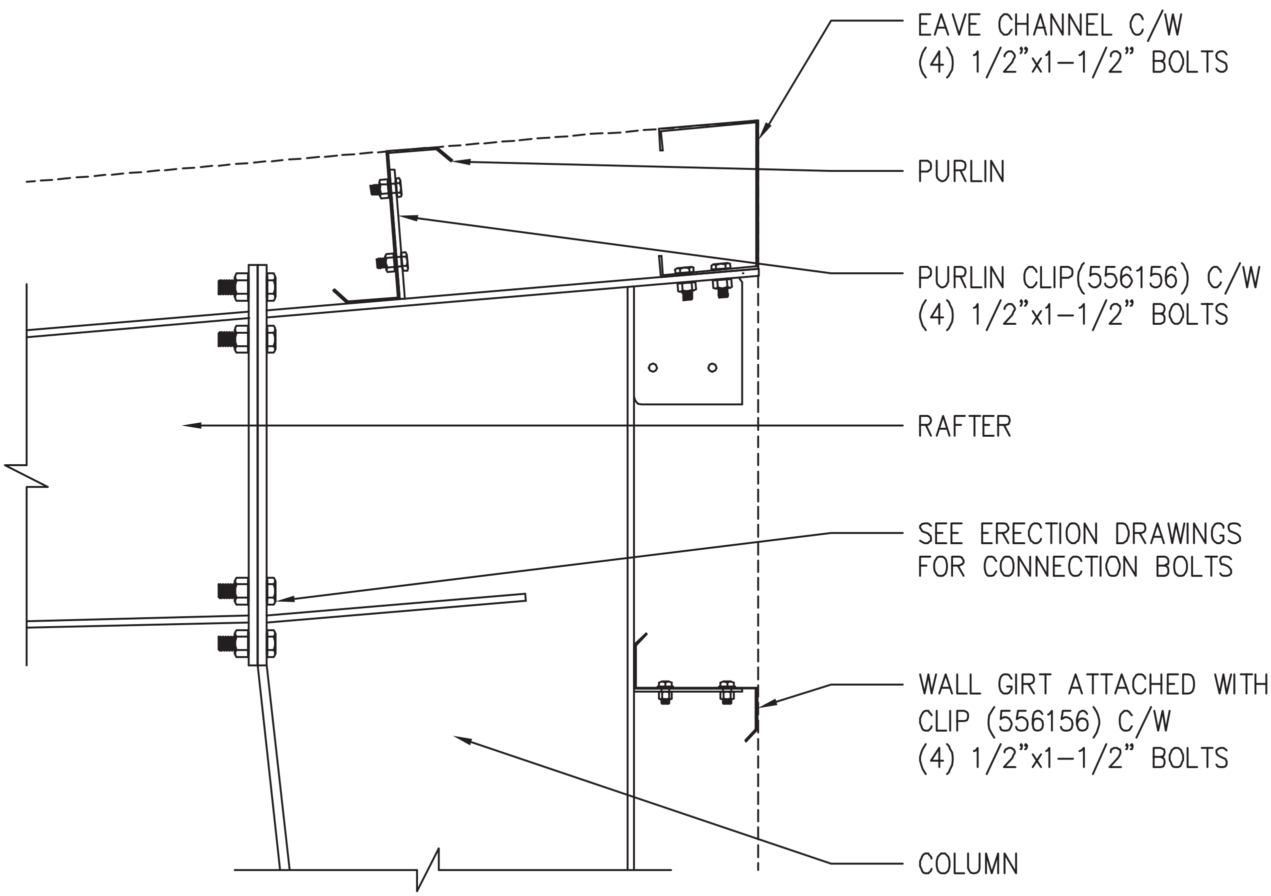

HIGH EAVE CONNECTION
SHOW WITH BYPASS GIRTS

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14

STRUCTURALS at MAIN FRAMING	JULY 2008		
	Vr 1.0		
COLUMN to RAFTER II	Section 4.3	Page 002	

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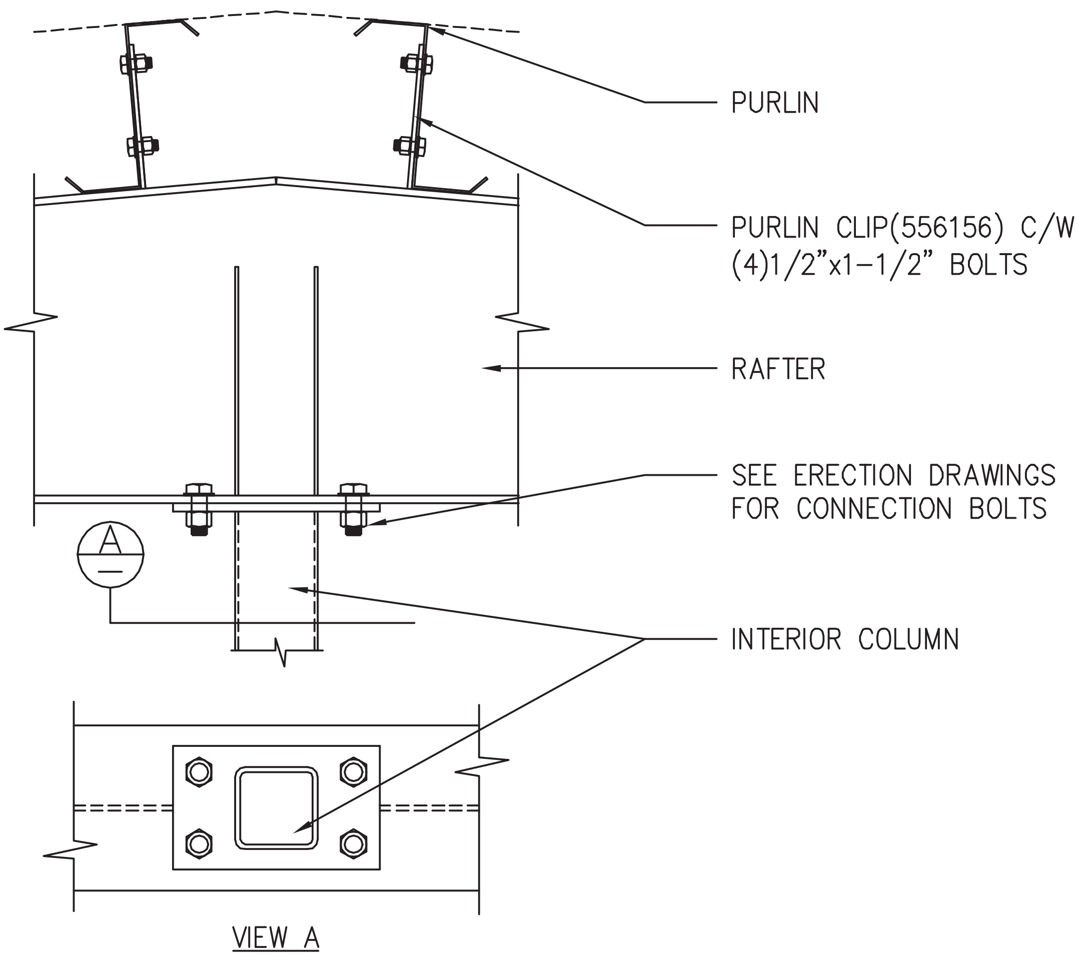

CENTER SPLICE C/W COLUMN

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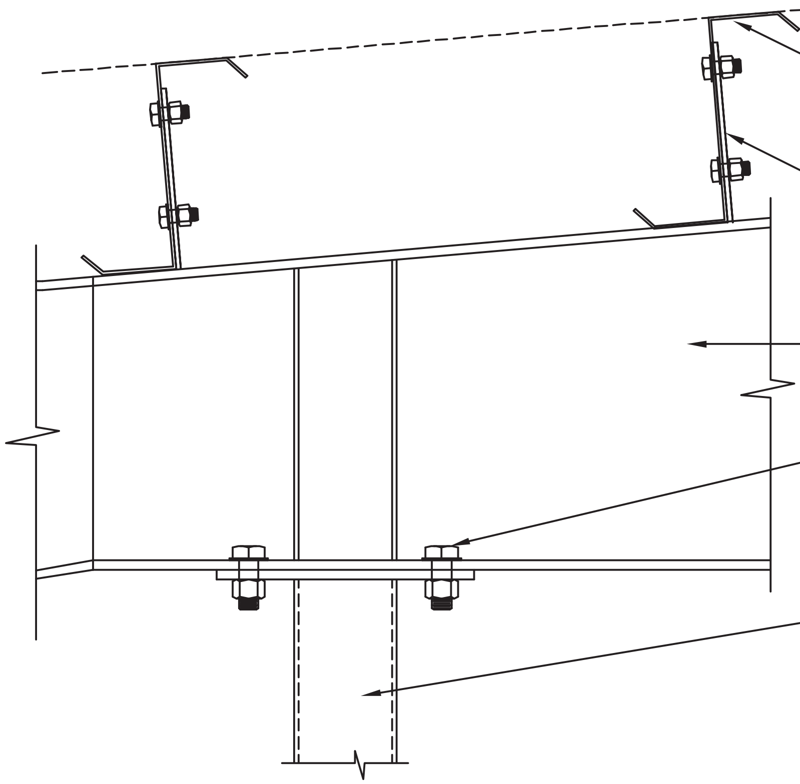
06

STRUCTURALS at MAIN FRAMING	JULY 2008
	Vr 1.0
INTERMEDIATE COLUMN to RAFTER I	Section 4.3 / Page 003

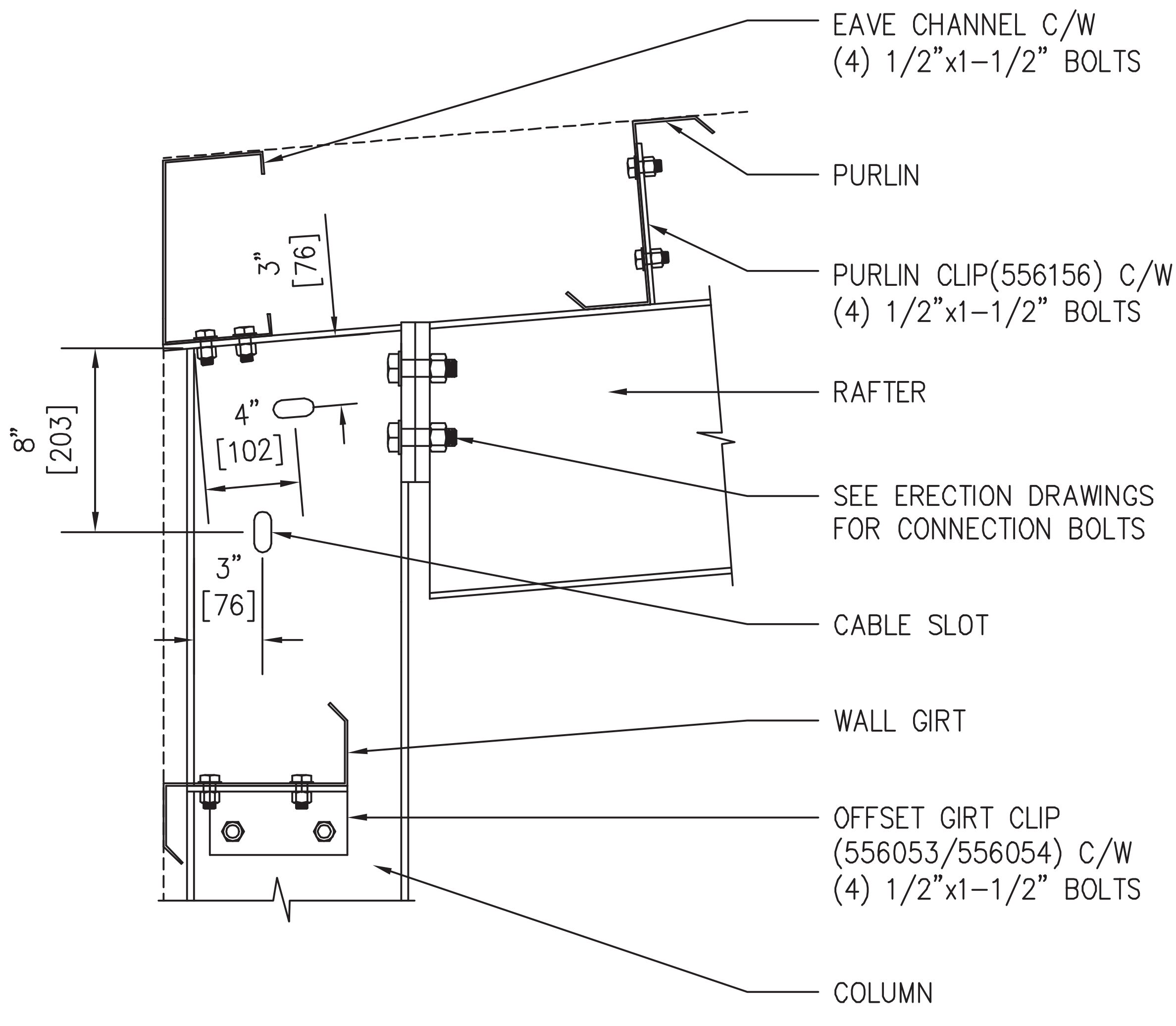


INTERMEDIATE C/W COLUMN

FD
05

STRUCTURALS AT MAIN FRAMING	JULY 2008	
	Vr 1.0	
INTERMEDIATE COLUMN to RAFTER II	Section 4.3	Page 004

BEHLEN
Made Strong



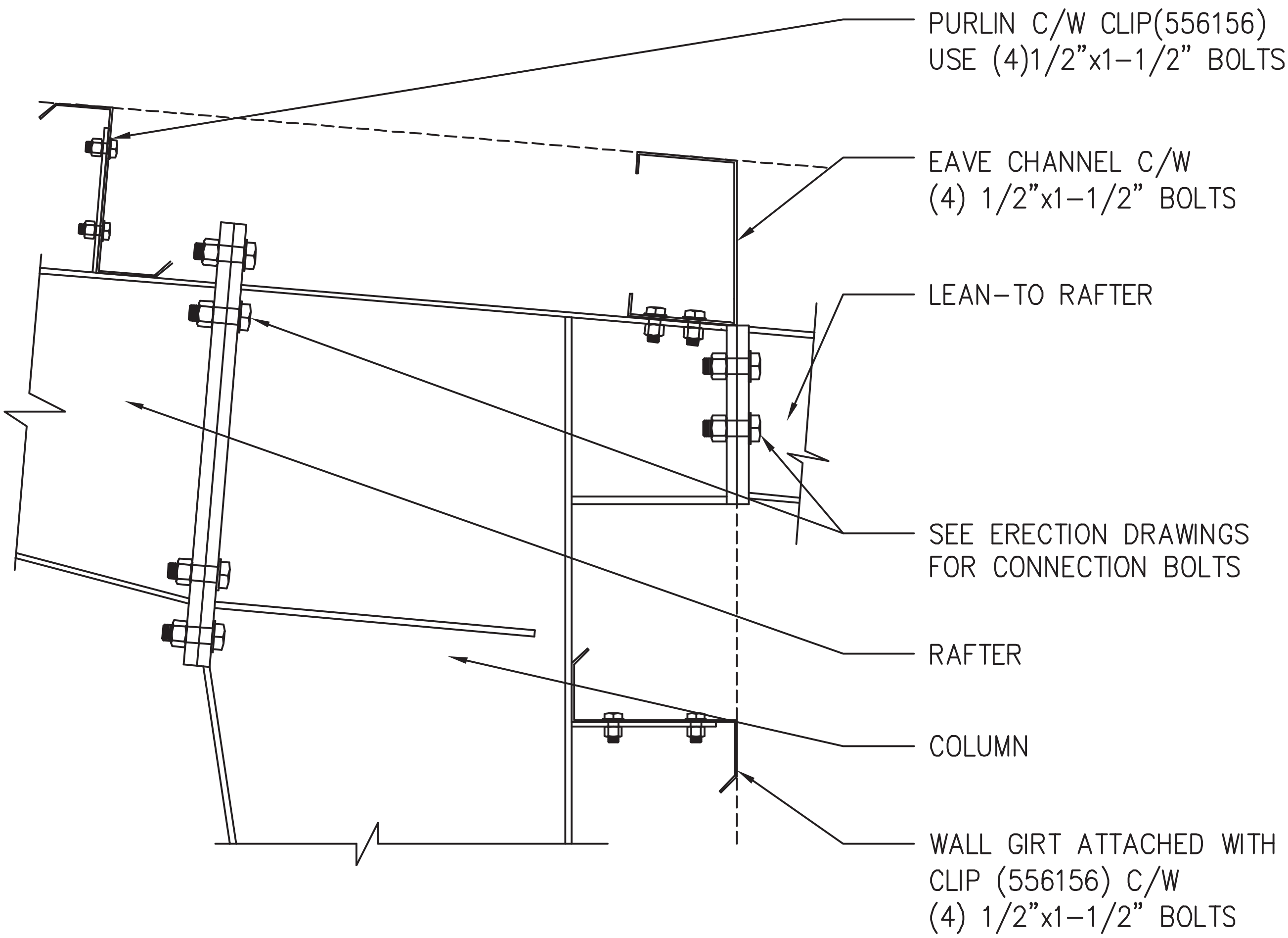
LEAN-TO STRAIGHT COLUMN EAVE

SHOWN WITH FLUSH GIRTS (1"OFFSET)

FD 01

STRUCTURALS at LEAN-TO FRAMING	JULY 2008	
	Vr 1.0	
NON EXPANDABLE CORNER COLUMN	Section 4.4	Page 001

BEHLEN
Made Strong



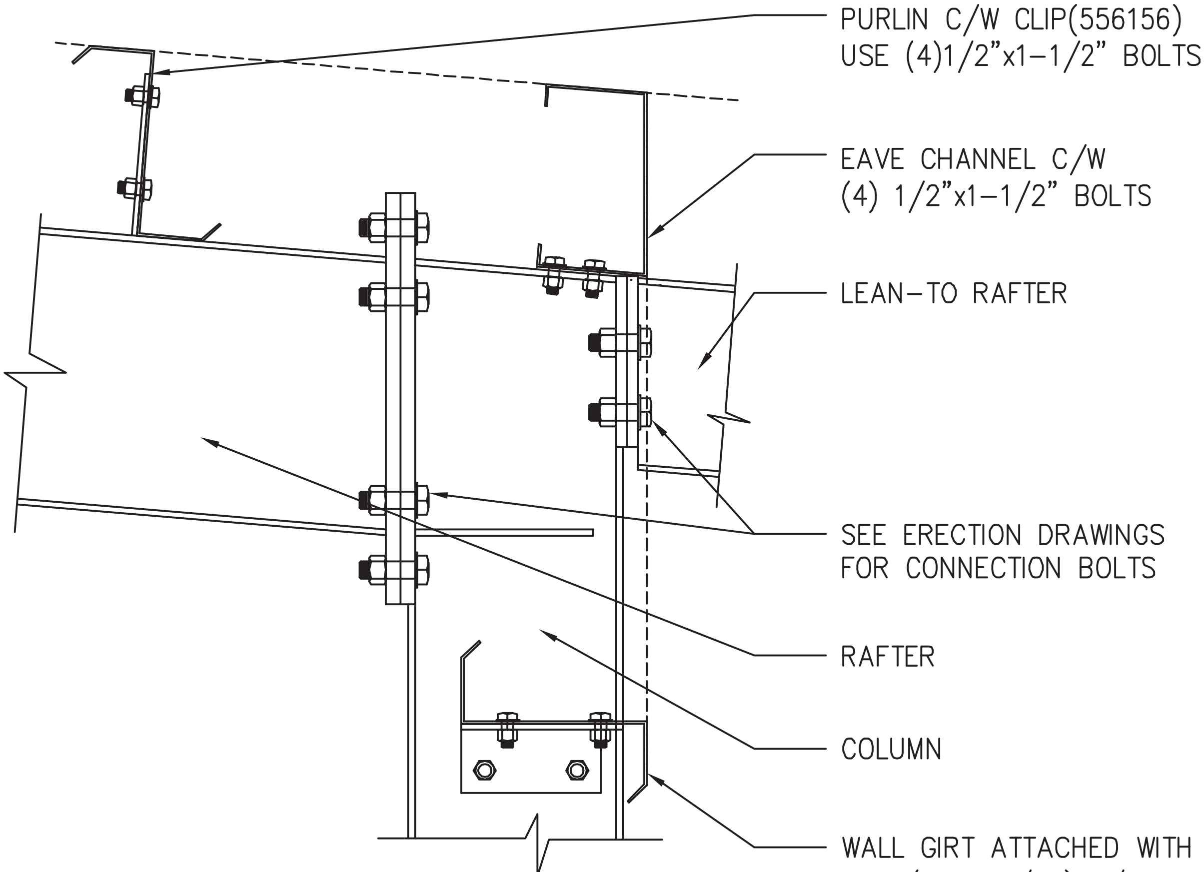
LEAN-TO CONNECTION

SHOWN WITH BYPASS GIRTS

FD
03

STRUCTURALS at LEAN-TO FRAMING	JULY 2008	
	Vr 1.0	
LEAN-TO RAFTER to COLUMN I	Section 4.4	Page 002

BEHLEN
Made Strong



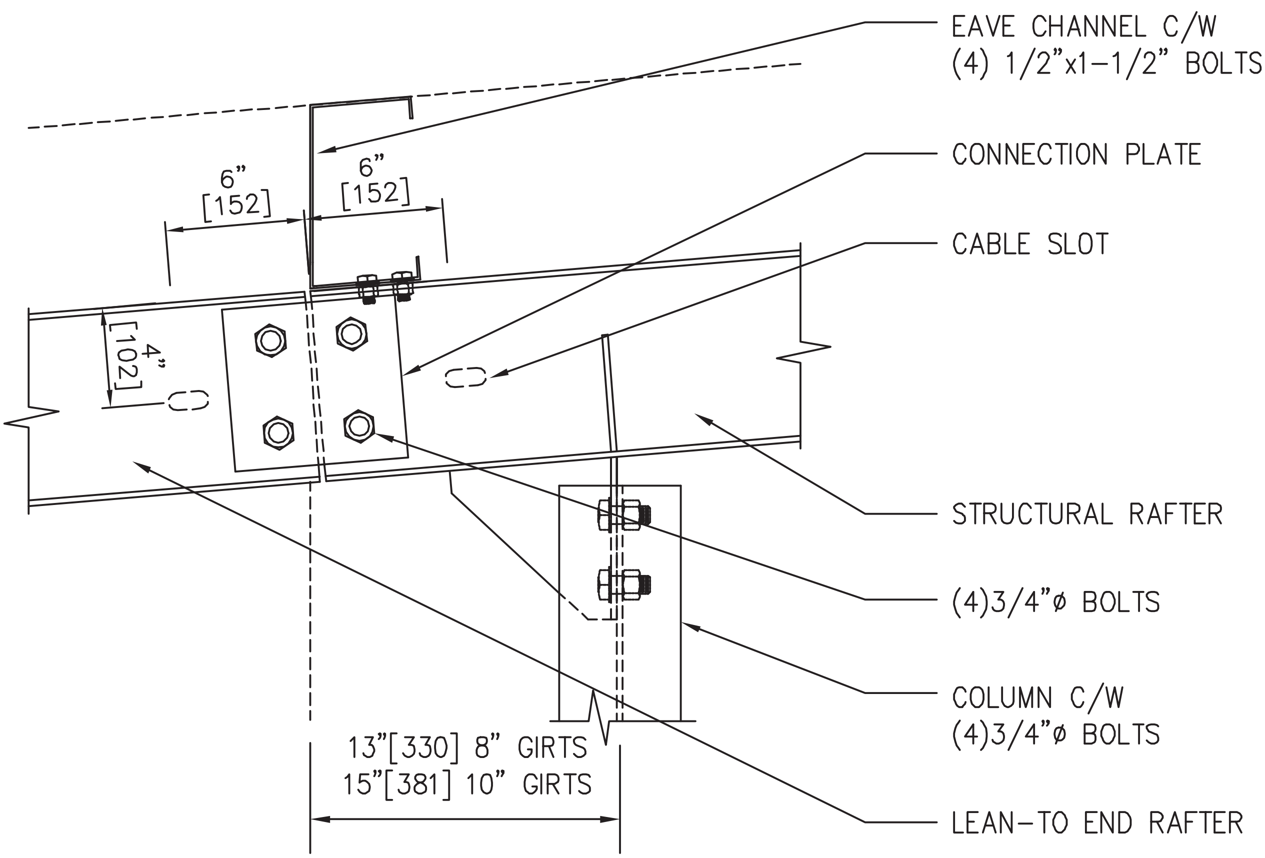
LEAN-TO CONNECTION

SHOWN WITH FLUSH GIRTS (1" OFFSET)

FD
07

STRUCTURALS at LEAN-TO FRAMING	JULY 2008	
	Vr 1.0	
LEAN-TO RAFTER to COLUMN II	Section 4.4	Page 003

BEHLEN
Made Strong



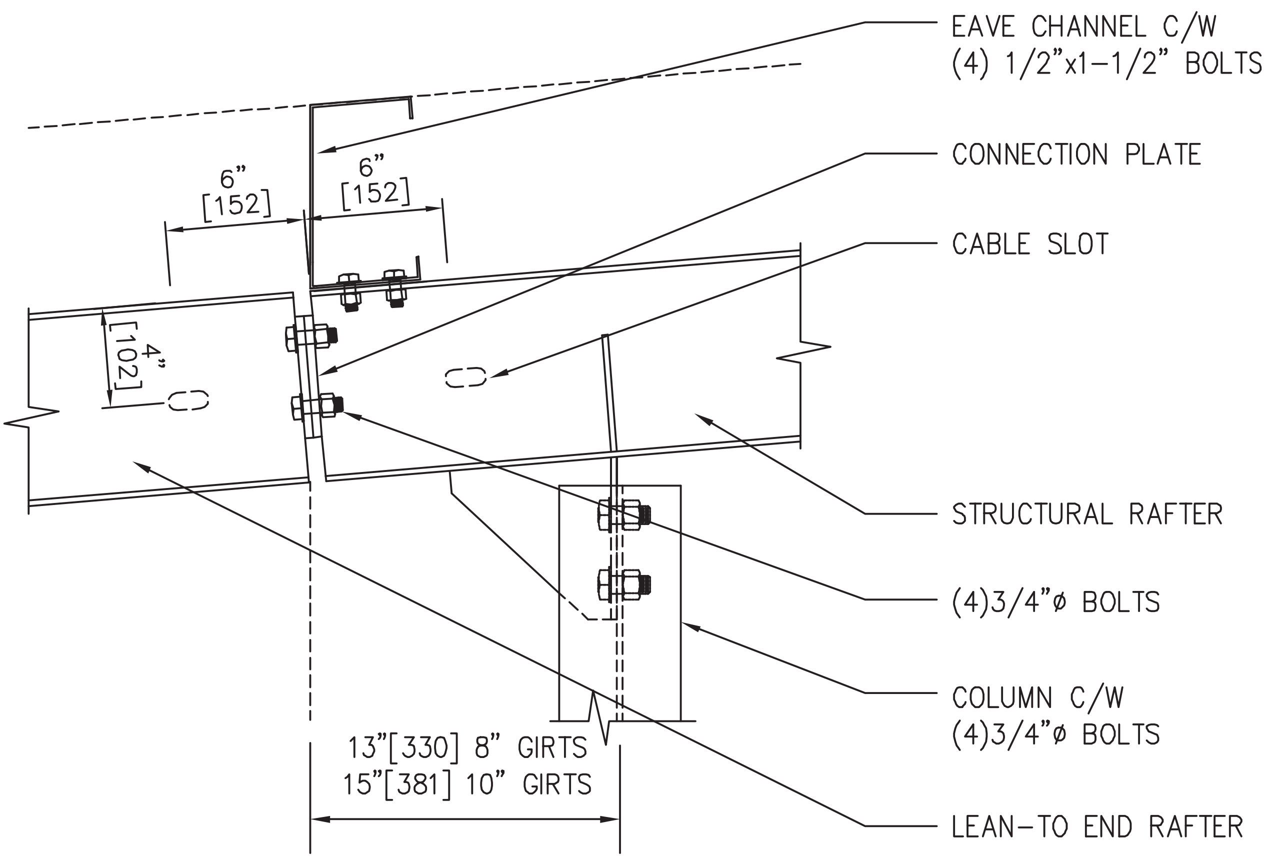
ENDWALL RAFTER DETAIL

C/W LEAN-TO

FD
18

STRUCTURALS at LEAN-TO FRAMING	JULY 2008	
	Vr 1.0	
LEAN-TO RAFTER to RAFTER	Section 4.4	Page 004

BEHLEN
Made Strong



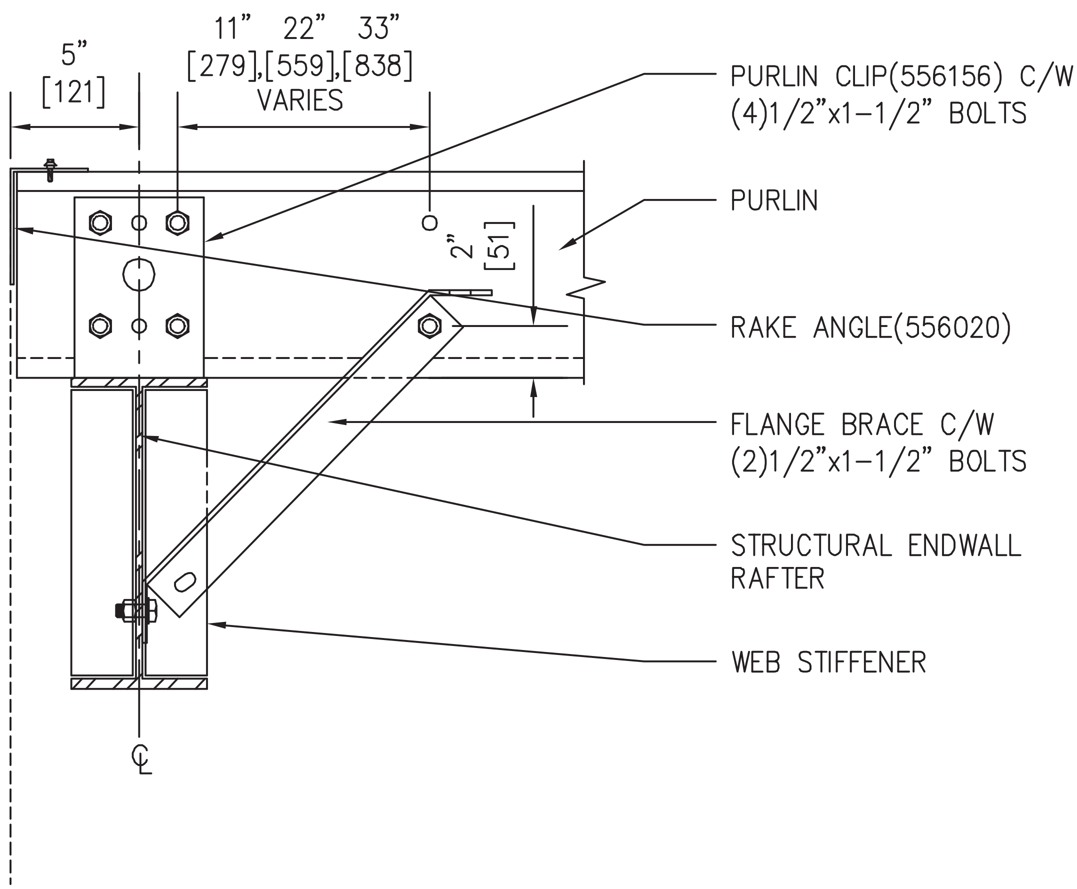
ENDWALL RAFTER DETAIL

C/W LEAN-TO

FD
—

STRUCTURALS at LEAN-TO FRAMING	JULY 2008	
	Vr 1.0	
LEAN-TO RAFTER to RAFTER	Section 4.4	Page 005

BEHLEN
Made Strong

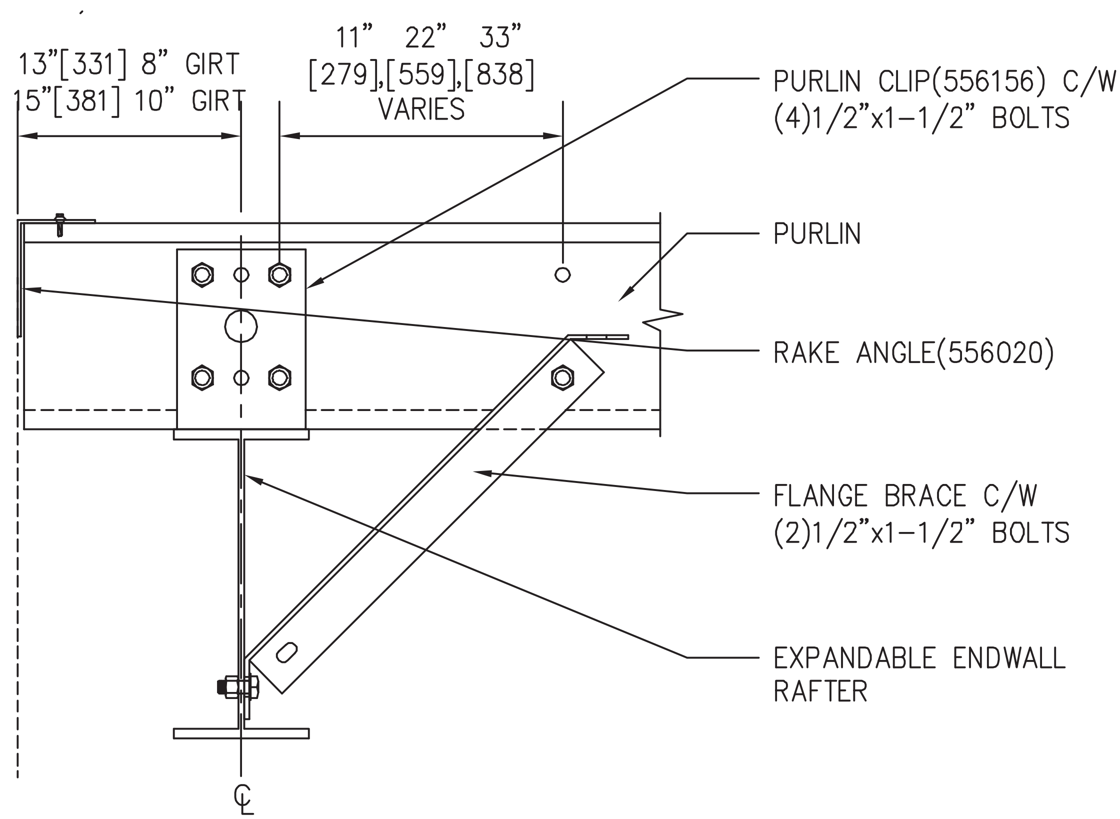


PURLIN TO STRUCTURAL RAFTER

FD
—

PURLIN to STRUCTURAL	JULY 2008	
	Vr 1.0	
ENDWALL CONDITION I	Section 4.5	Page 001

BEHLEN
Made Strong

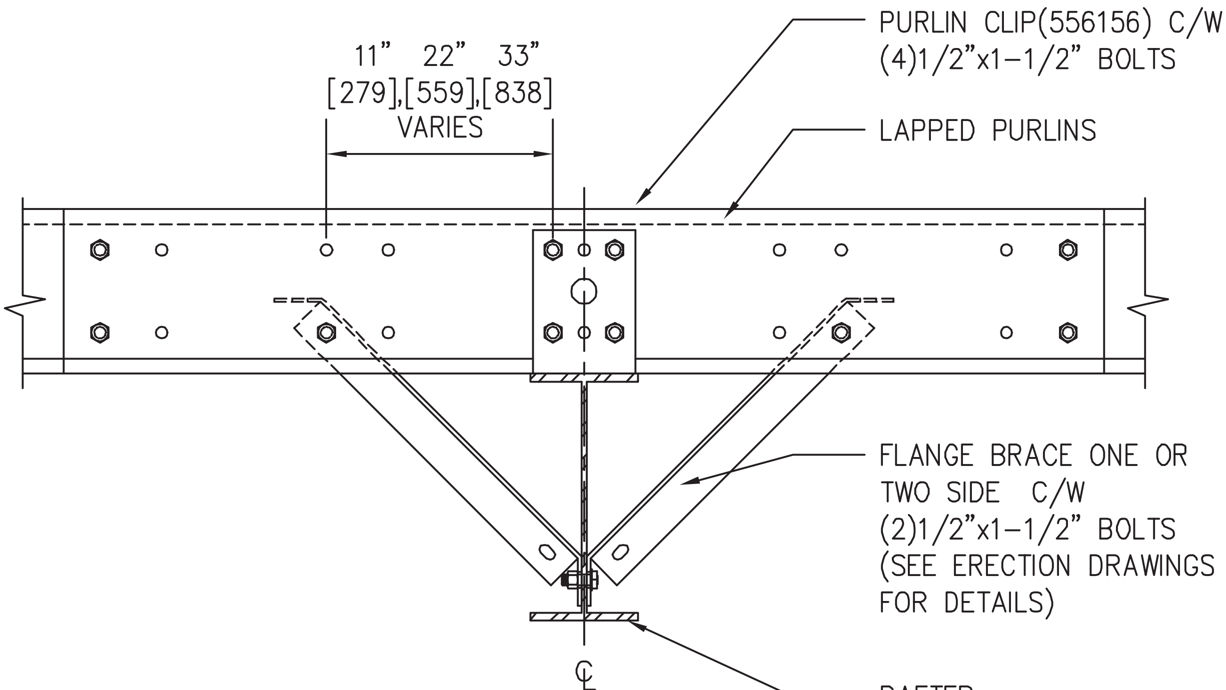


PURLIN TO EXPANDABLE ENDWALL RAFTER

FD
41

PURLIN to STRUCTURAL ENDWALL CONDITION II	JULY 2008	
	Vr 1.0	
	Section 4.5	Page 002

BEHLEN
Made Strong

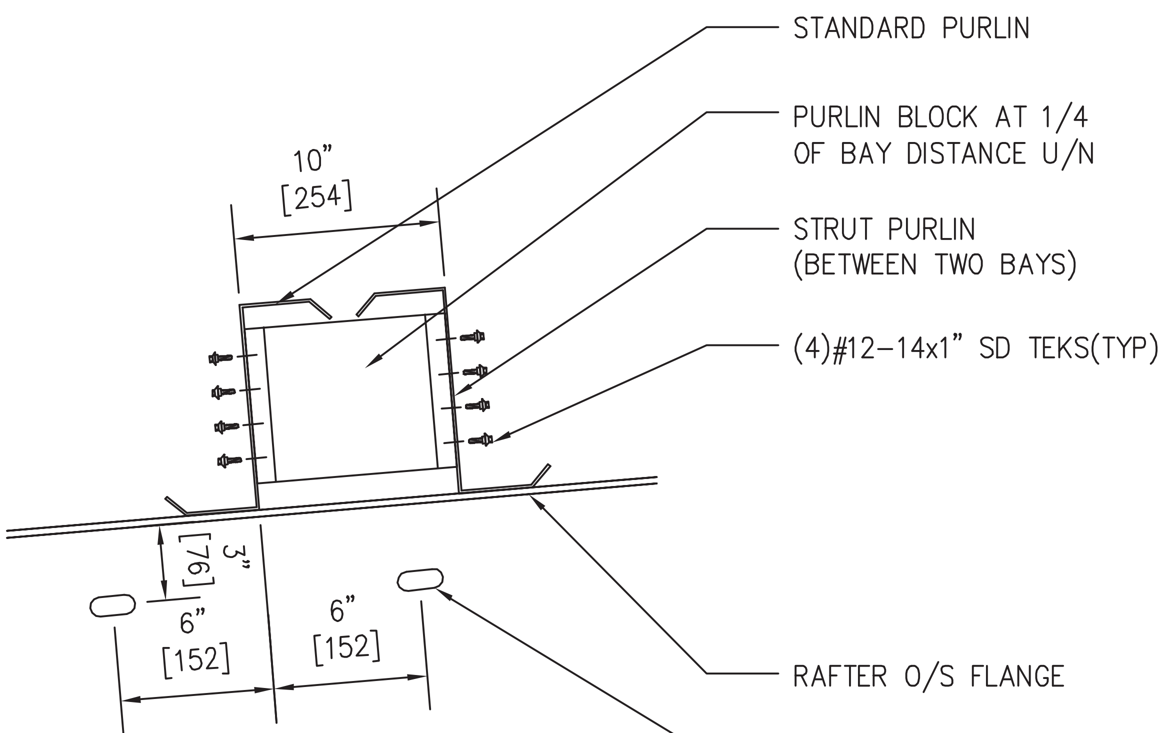


NOTE:
UNLESS NOTED - PURLINS ARE LAPPED WITH (8)1/2"x1-1/2" BOLTS USING 2 AT EACH LAP ENDS, (4) IN THE PURLIN SUPPORT AT CLIP (ADD (2) BOLTS IF 556056 CLIP USED)

PURLIN LAP C/W FLANGE BRACES

FD
42

PURLIN to STRUCTURAL	JULY 2008	
	Vr 1.0	
INTERMEDIATE BAY CONDITION	Section 4.5	Page 003

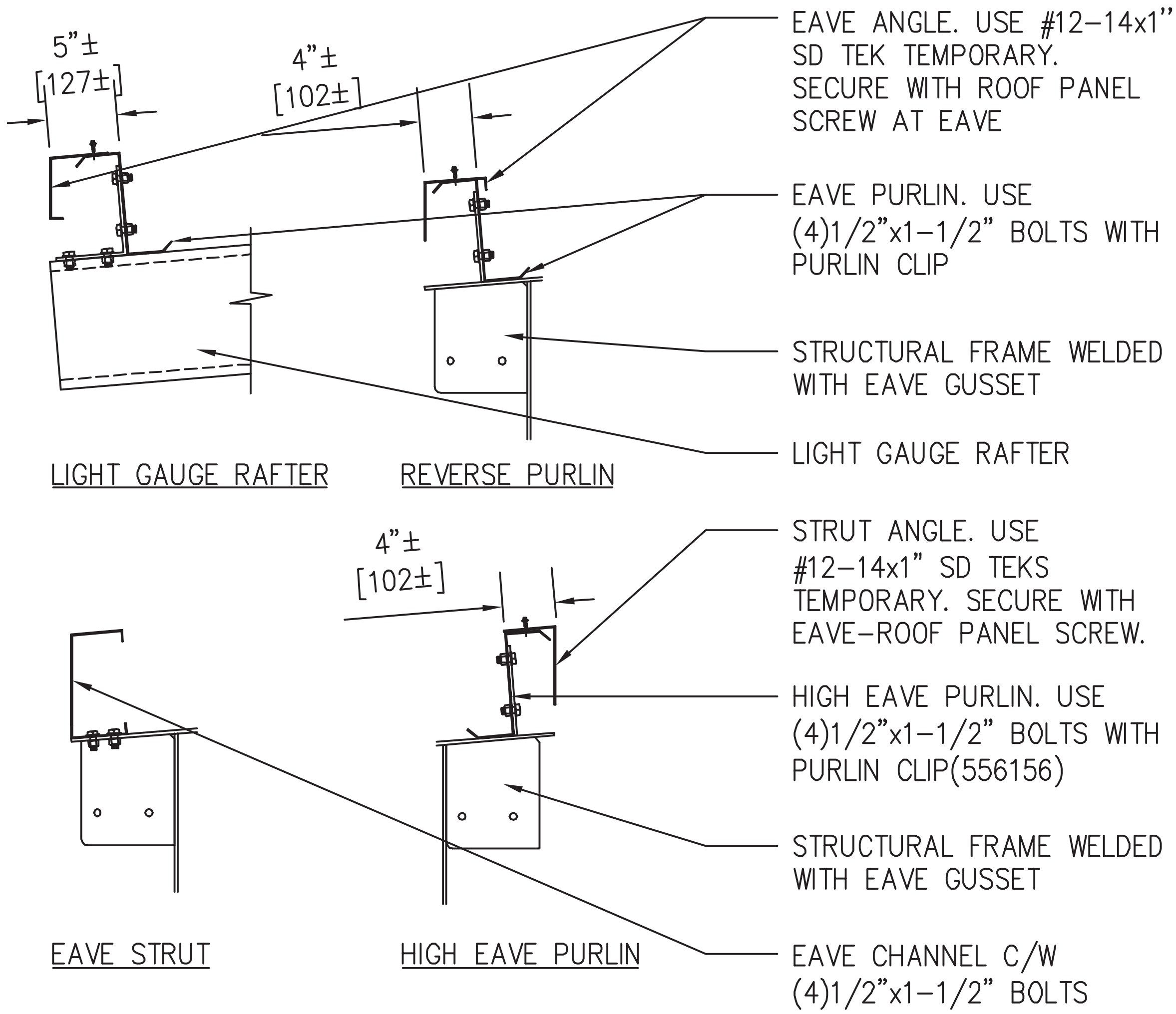


STRUT DIAPHRAGM

FD
37

PURLIN to STRUCTURAL	JULY 2008	
	Vr 1.0	
STRUT PURLIN BRACING	Section 4.5	Page 004

PITCH	STRUT ANGLE	EAVE ANGLE
0.12–0.5	556020	556020
0.5–1.5	556062	556021
1.5–3.0	556008	556012
3.0–5.0	556009	556014



EAVE STRUT

FD
36

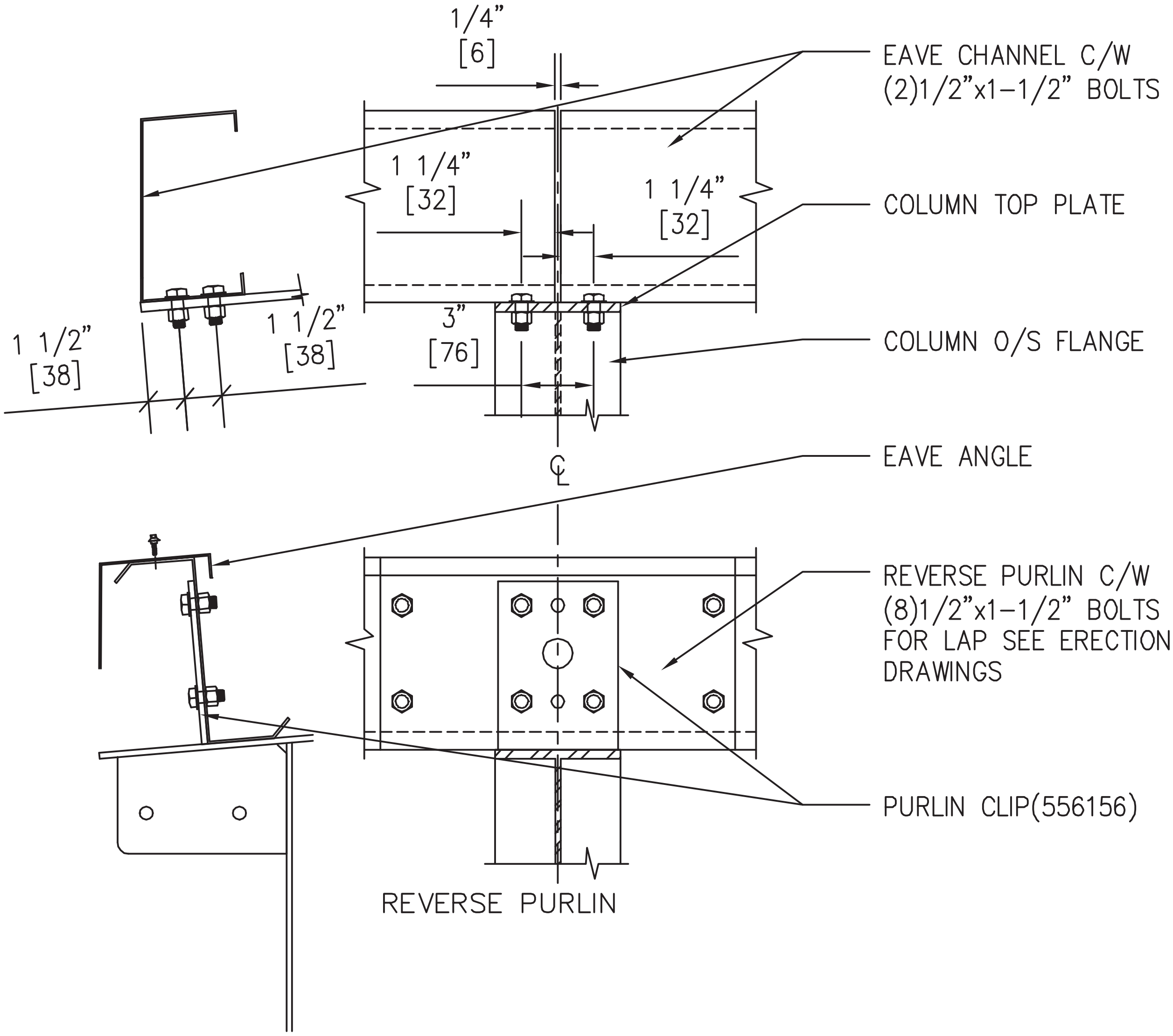
EAVE CONDITION to STRUCTURAL

EAVE DETAILS at ENDWALL

JULY 2008

Vr 1.0

BEHLEN
Made Strong

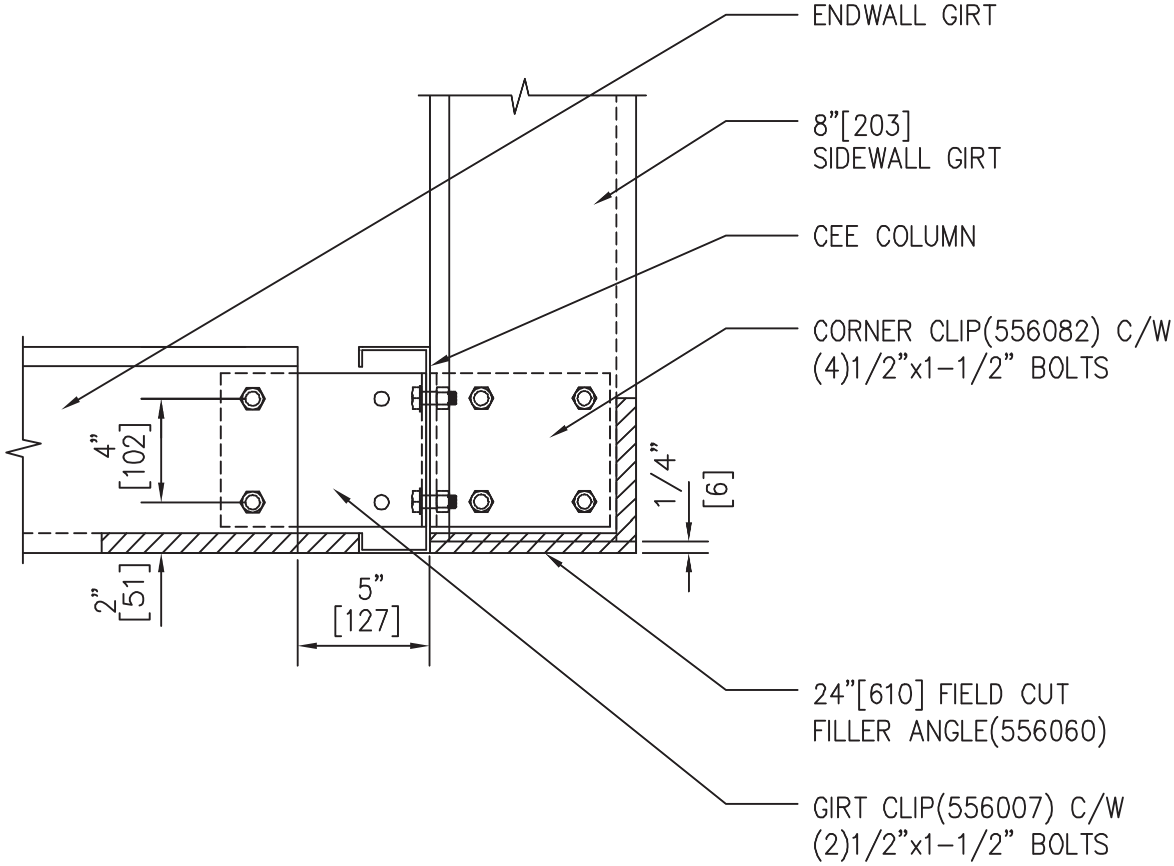


INTERIOR CONNECTION

FD
45

EAVE CONDITIONS to STRUCTURAL	JULY 2008	
	Vr 1.0	
INTERMEDIATE EAVE DETAILS	Section 4.6	Page 002

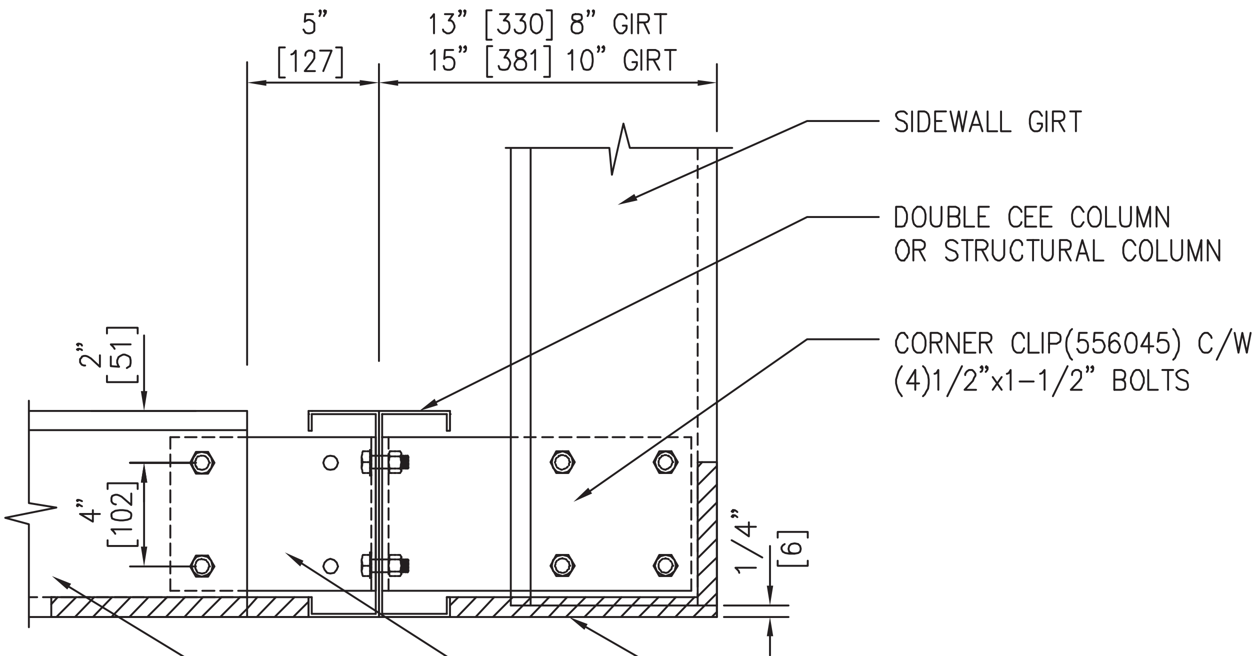
BEHLEN
Made Strong



SINGLE CEE COLUMN
FOR DOUBLE CEE COLUMN SEE 002

FD
25

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at CORNER CONNECTION I	Section 4.7	Page 001



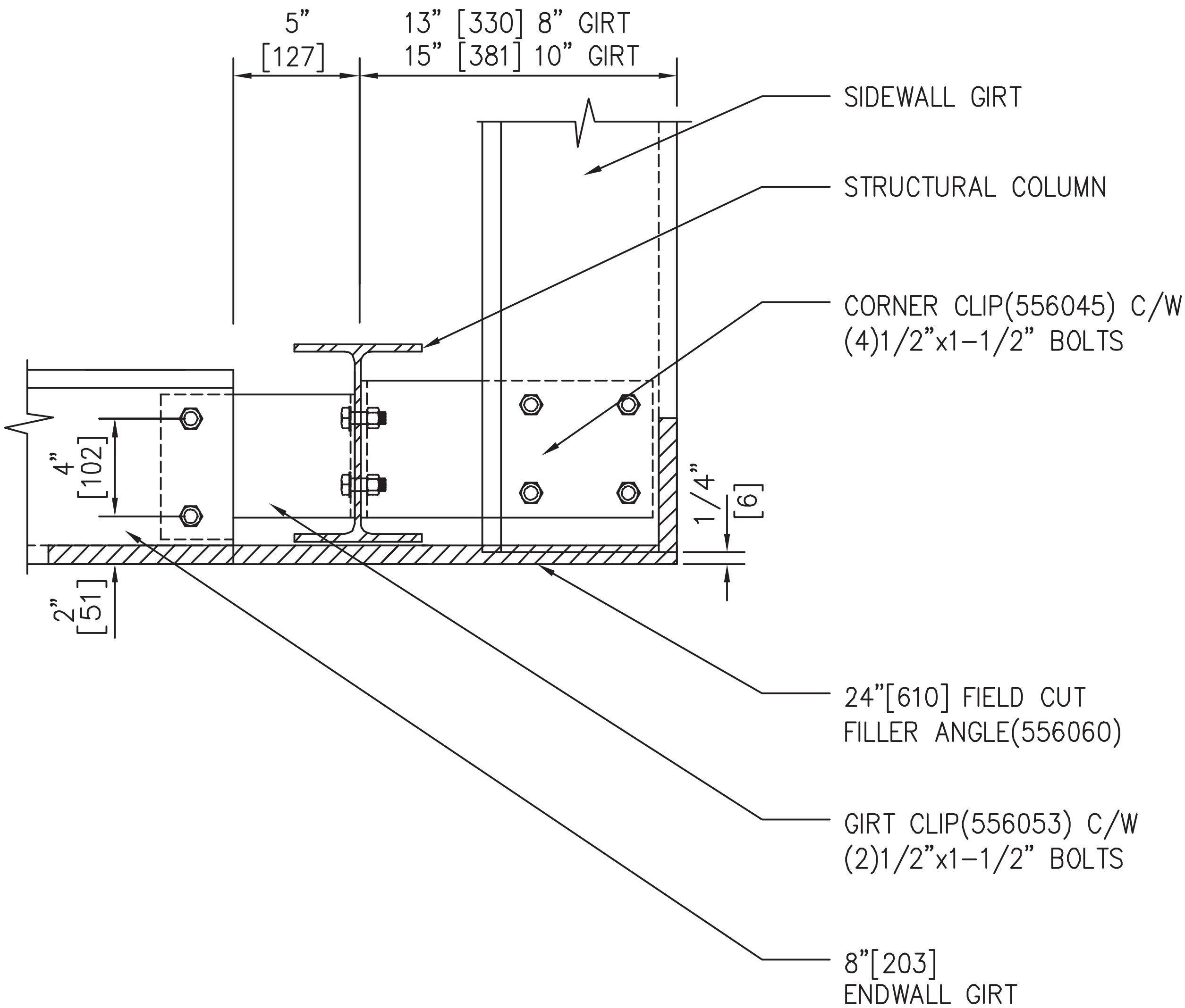
DOUBLE CEE COLUMN

FOR A CEE COLUMN SEE 001

FD
25A

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at CORNER CONNECTION II	Section 4.7	Page 002

BEHLEN
Made Strong



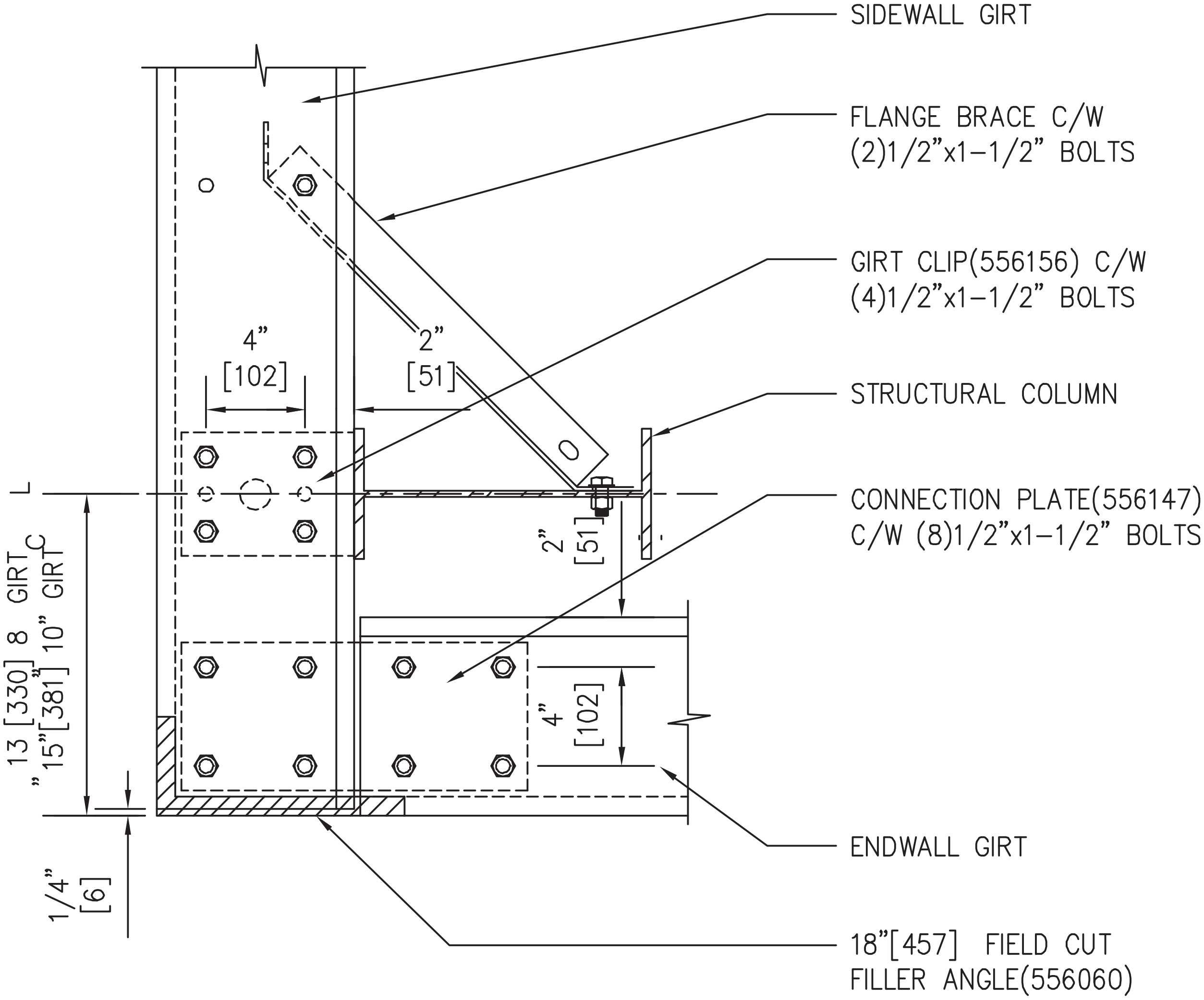
STRUCTURAL COLUMN

1" OFFSET STRUCTURAL COLUMN

FD
26

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at CORNER CONNECTION III	Section 4.7	Page 003

BEHLEN
Made Strong

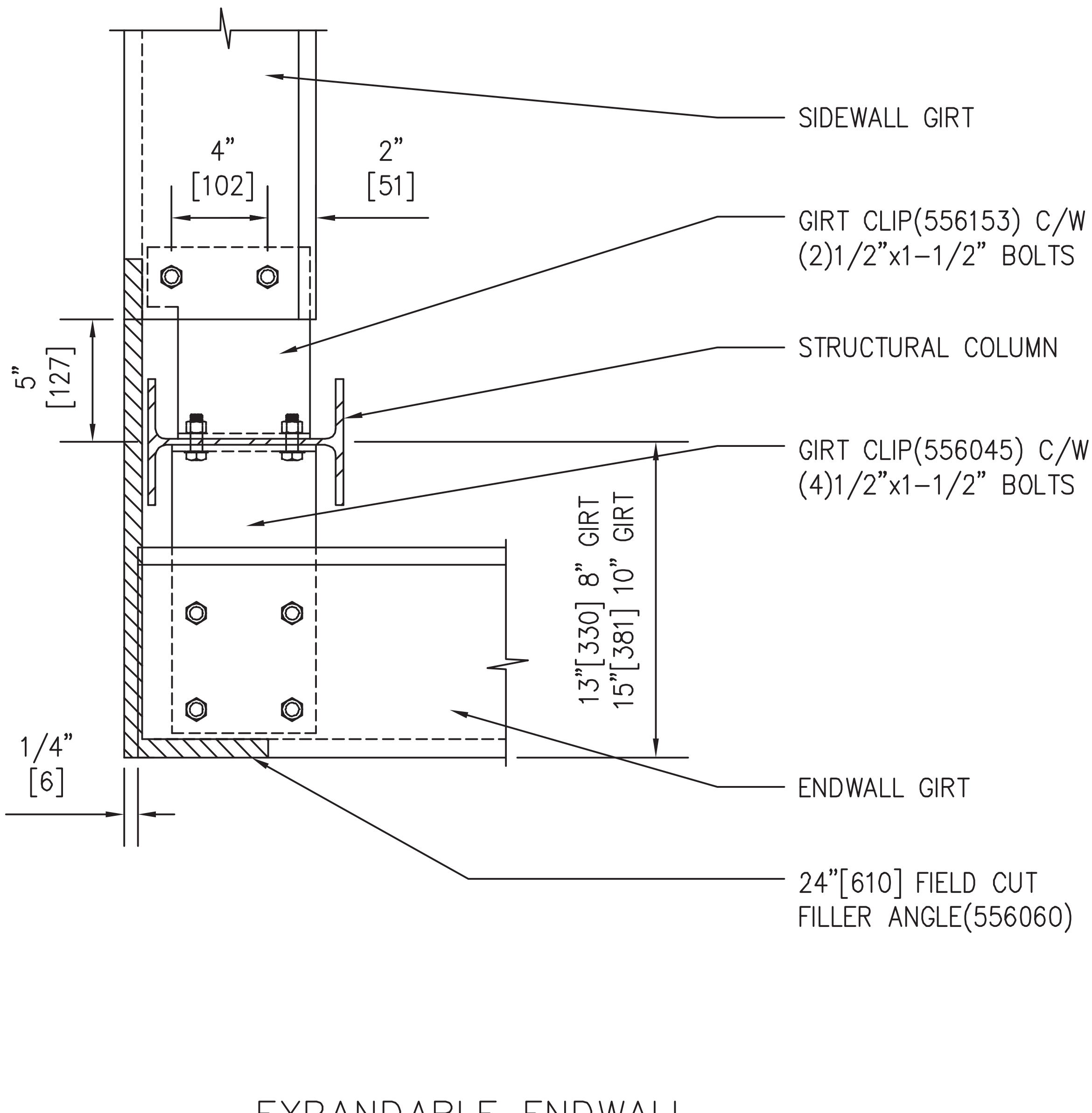


EXPANDABLE ENDWALL

STRUCTURAL COLUMN WITH BYPASS GIRTS

FD
30

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at CORNER CONNECTION IV	Section 4.7	Page 004



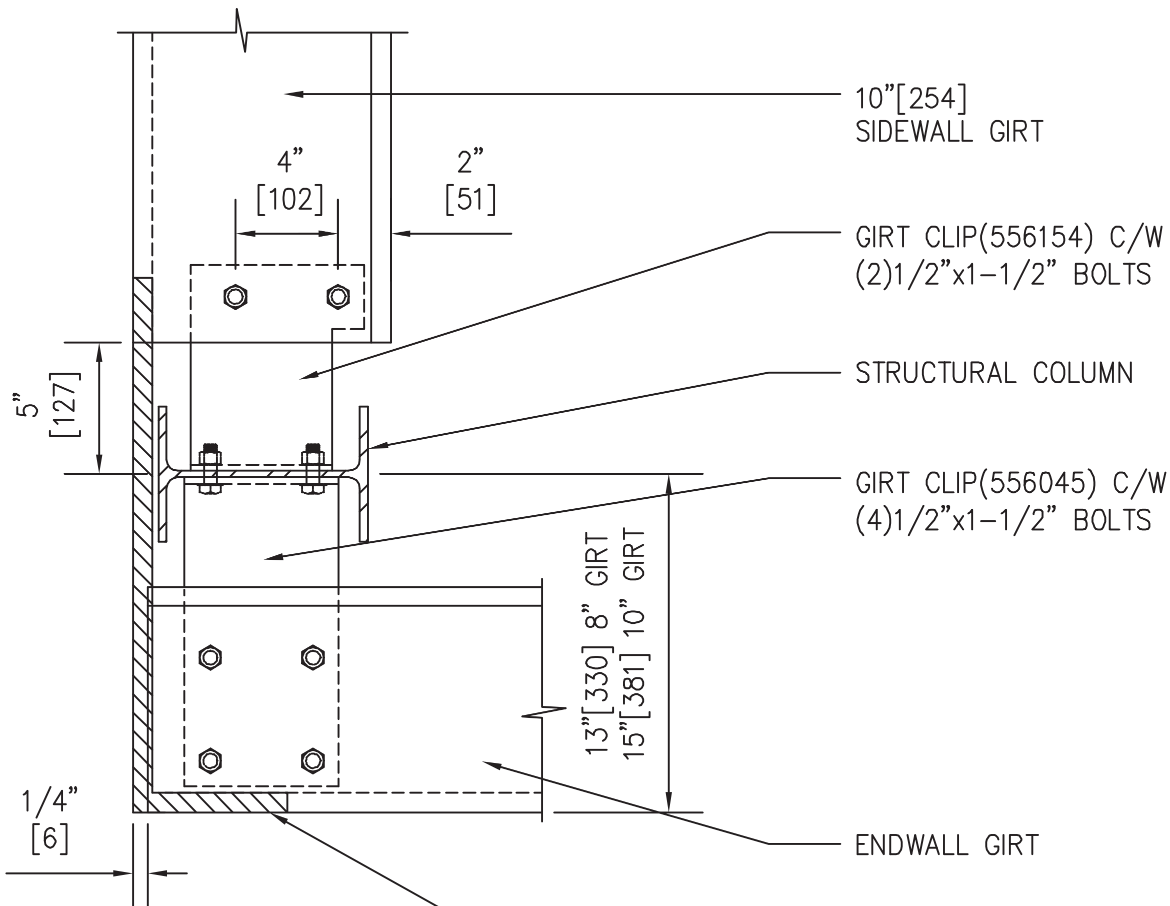
EXPANDABLE ENDWALL

8" FLUSH GIRTS (1" OFFSET COLUMN)

FD
28

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at CORNER CONNECTION V	Section 4.7	Page 005

BEHLEN
Made Strong

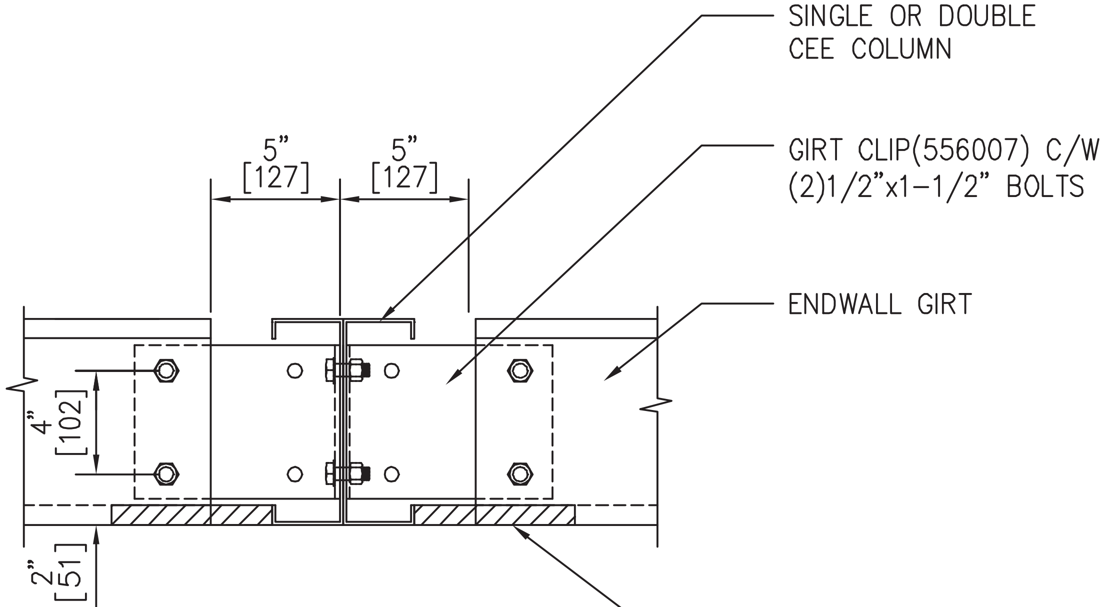


EXPANDABLE ENDWALL
10" FLUSH GIRTS (1" OFFSET COLUMN)

FD
28A

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at CORNER CONNECTION VI	Section 4.7	Page 006

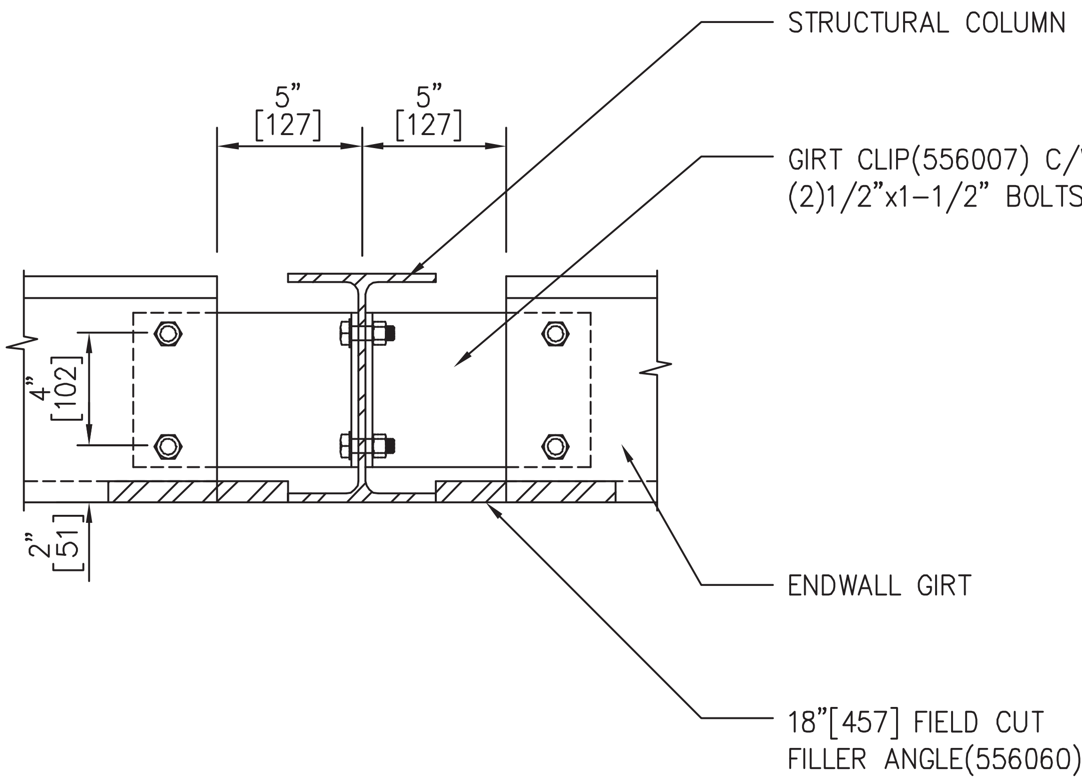
BEHLEN
Made Strong



FLUSH GIRT TO CEE COLUMN

FD
27

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRTS at INTERIOR COLUMN I	Section 4.7	Page 007

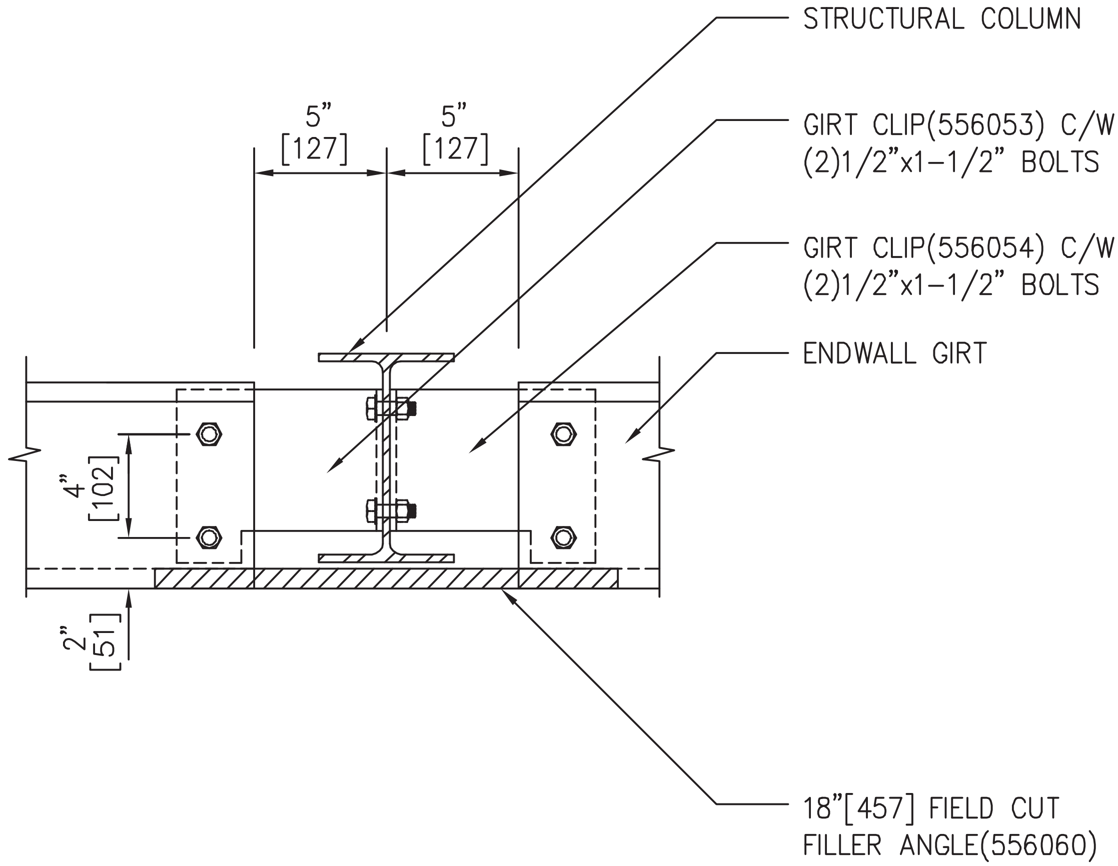


FLUSH GIRTS TO COLUMN

FD
24B

GIRT to STRUCTURAL	JULY 2008
	Vr 1.0
GIRTS at INTERIOR COLUMN II	Section 4.7 / Page 008

BEHLEN
Made Strong



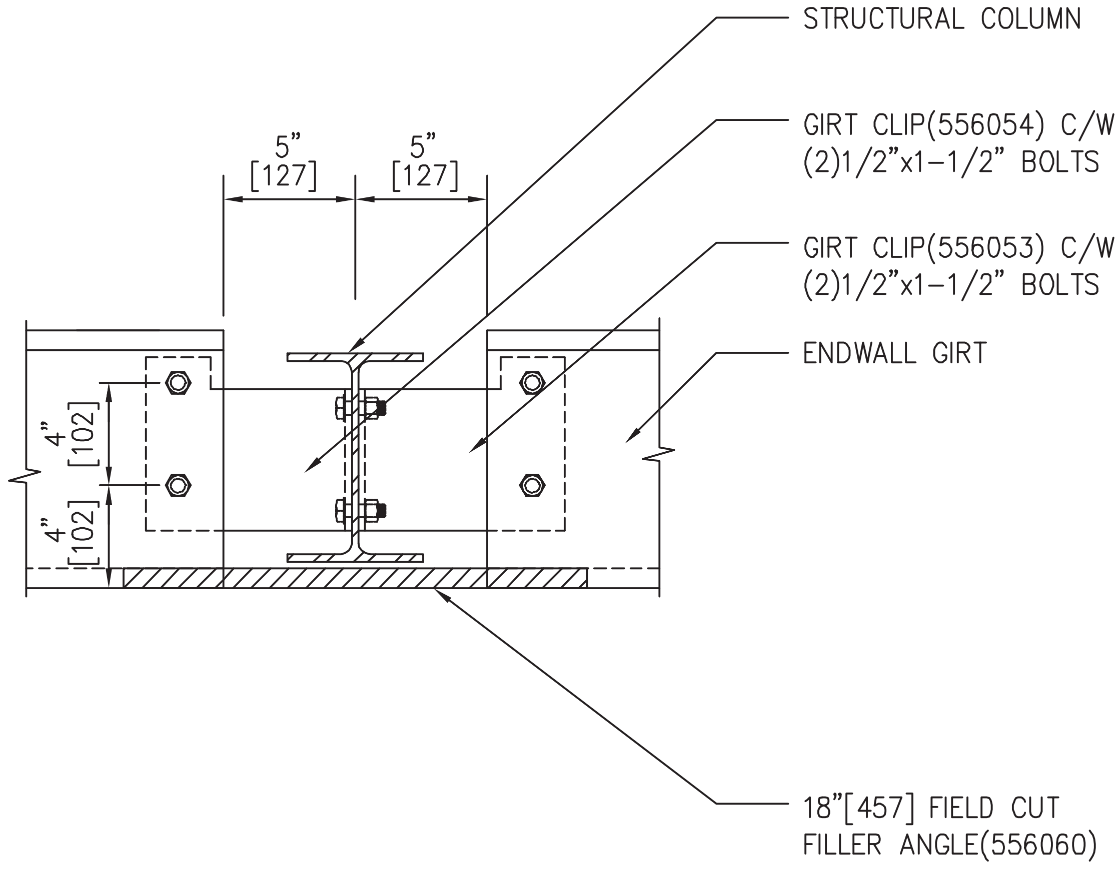
1" OFFSET GIRTS TO COLUMN

8" GIRT

FD 24

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
GIRTS at INTERIOR COLUMN III	Section 4.7	Page 009

BEHLEN
Made Strong



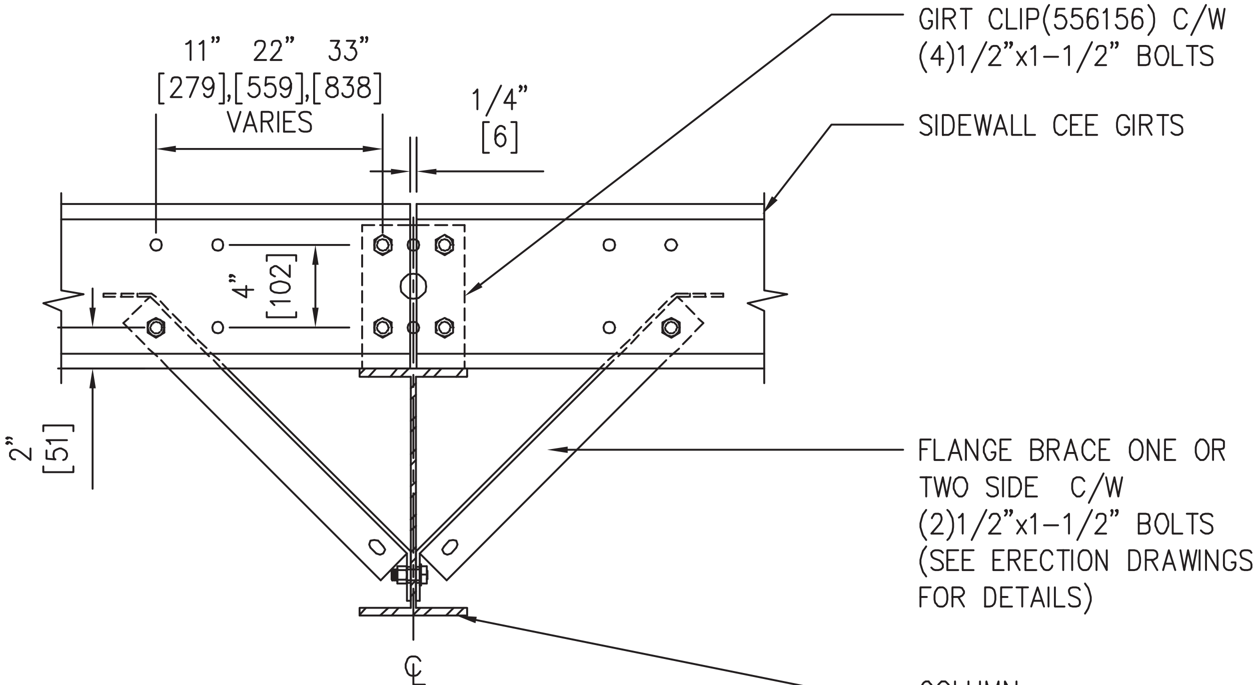
1" OFFSET GIRTS TO COLUMN

10" GIRT (12" SIMILAR)

FD
24A

STRUCTURALS at ENDWALL	JULY 2008	
	Vr 1.0	
GIRTS at INTERIOR COLUMN IV	Section 4.7	Page 010

BEHLEN
Made Strong



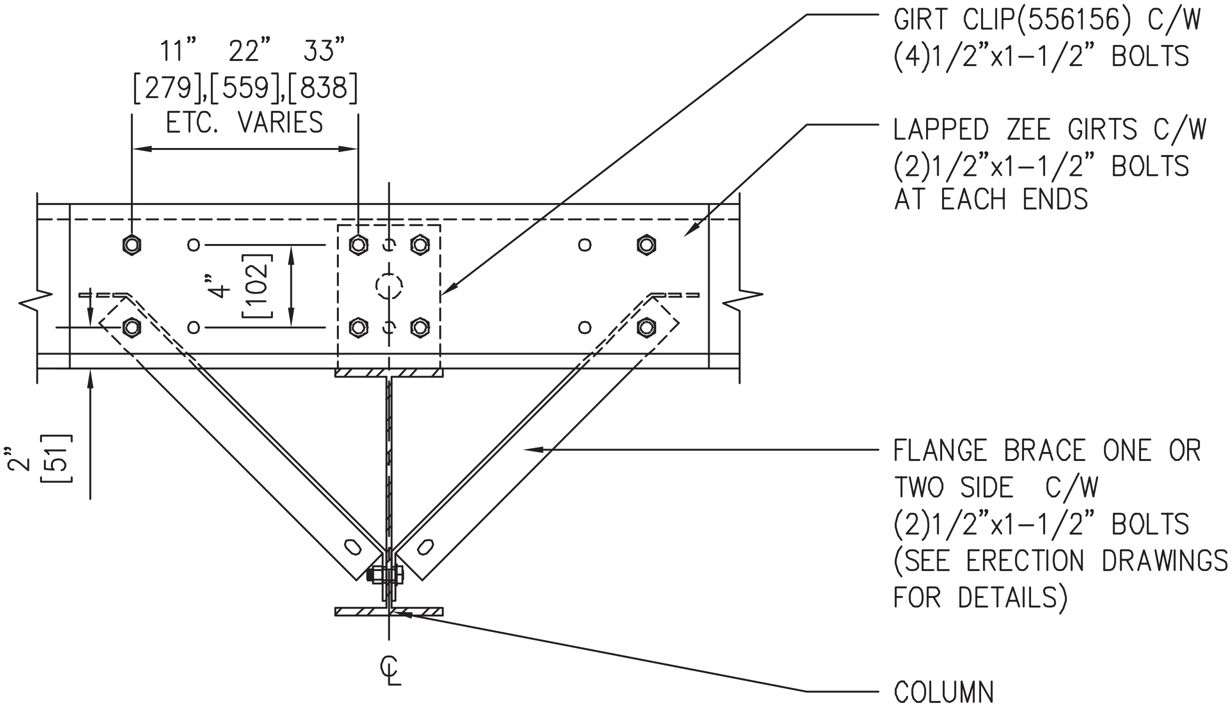
GIRTS TO COLUMN

BYPASS CEE GIRTS

FD
38

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
SIDEWALL GIRT to COLUMN I	Section 4.7	Page 011

BEHLEN
Made Strong

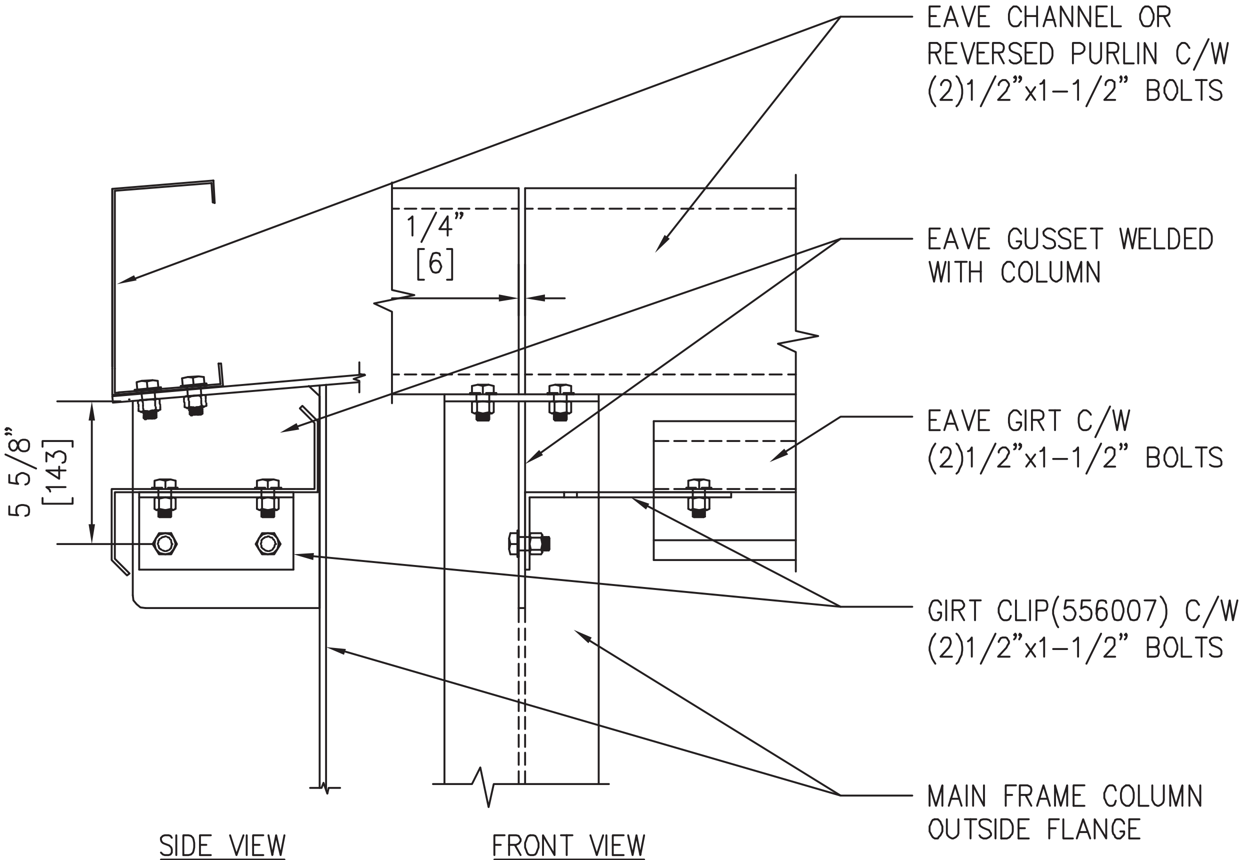


GIRTS TO COLUMN

BYPASS ZEE GIRTS

FD
31

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
SIDEWALL GIRT to COLUMN II	Section 4.7	Page 012



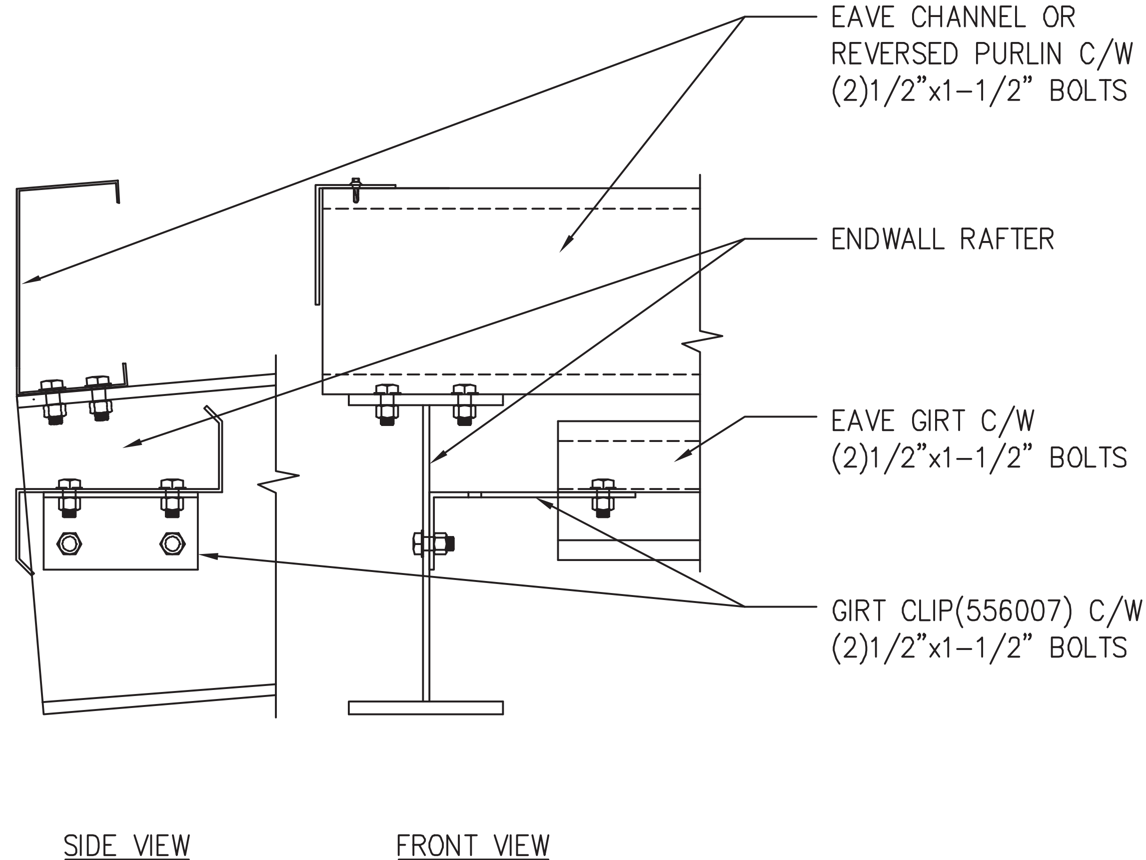
HIGH GIRT AT EAVE TO STRUCTURAL COLUMN

BYPASS ZEE/CEE GIRTS
NOTE: FOR 1" OFFSET GIRTS USE
556053/556054 GIRT CLIPS

FD
34

GIRT to STRUCTURAL		JULY 2008	
		Vr 1.0	
HIGH GIRT to COLUMN		Section 4.7	Page 013

BEHLEN
Made Strong



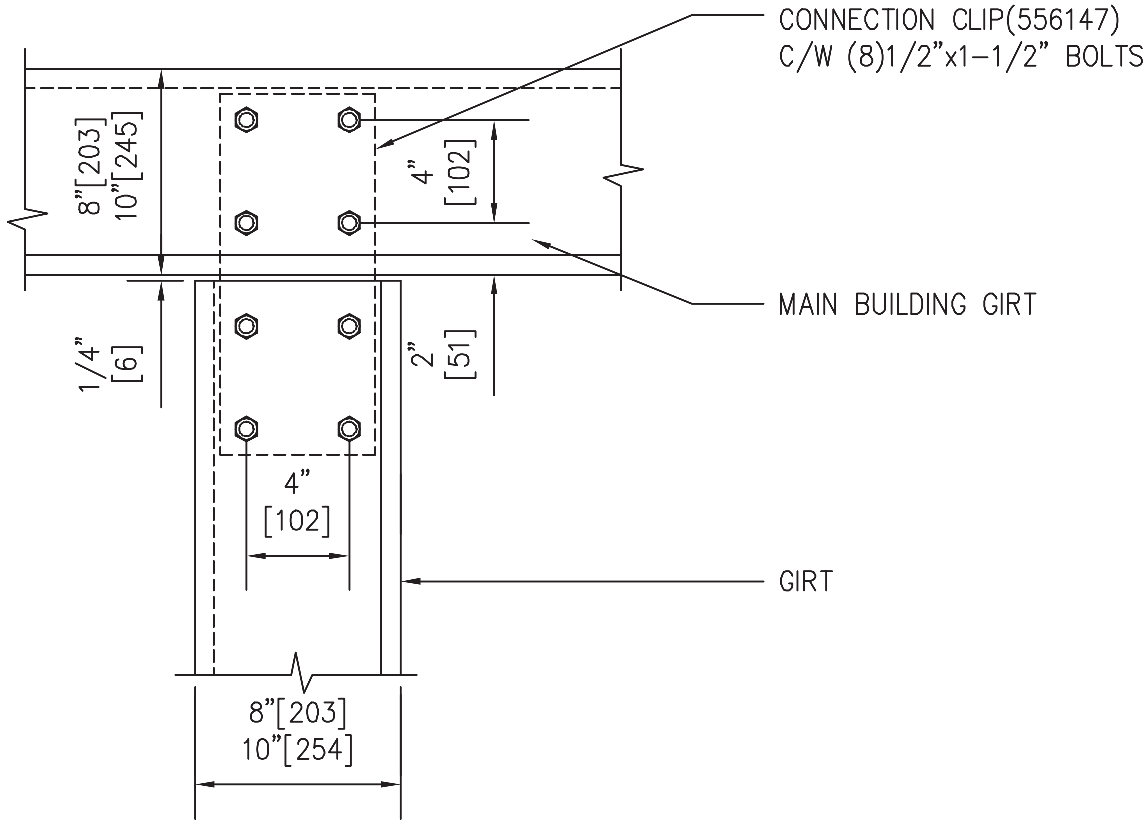
HIGH GIRT AT EAVE TO
ENDWALL RAFTER

NOTE: FOR 1" OFFSET GIRTS USE
556053/556054 GIRT CLIPS

FD
33

GIRT to STRUCTURAL	JULY 2008 Vr 1.0
HIGH GIRT to RAFTER	Section 4.7 / Page 014

BEHLEN
Made Strong

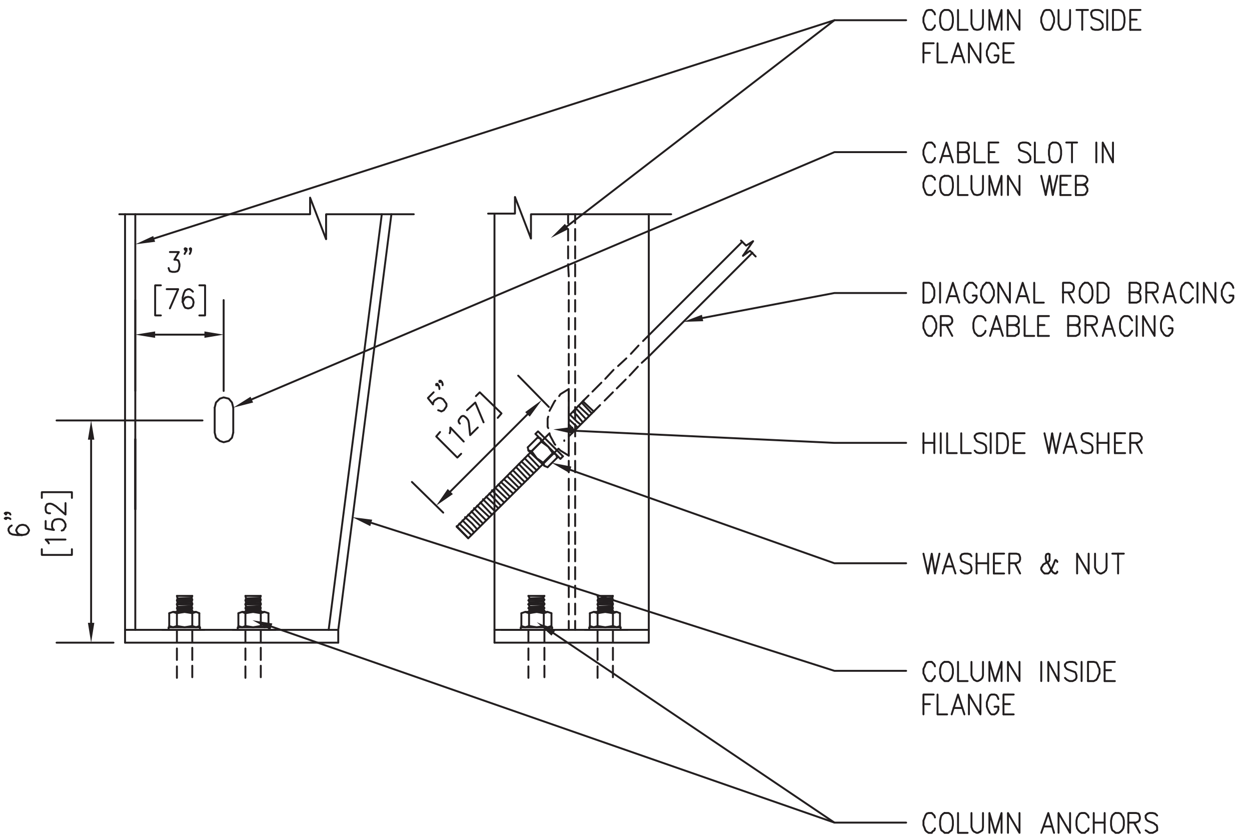


GIRT CONNECTION

FD
29

GIRT to STRUCTURAL	JULY 2008	
	Vr 1.0	
GIRT TO GIRT	Section 4.7	Page 015

BEHLEN
Made Strong



BOTTOM OF COLUMN

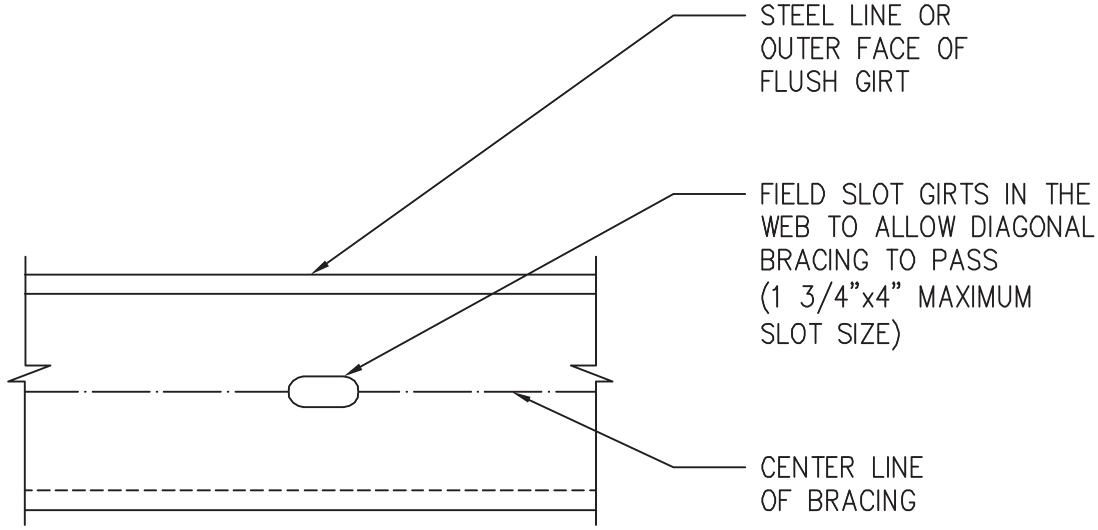
FOR COMPONENTS REFER TO 003/004

FD
51

BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
COLUMN to BRACING	Section 4.8	Page 001

BEHLEN

Made Strong



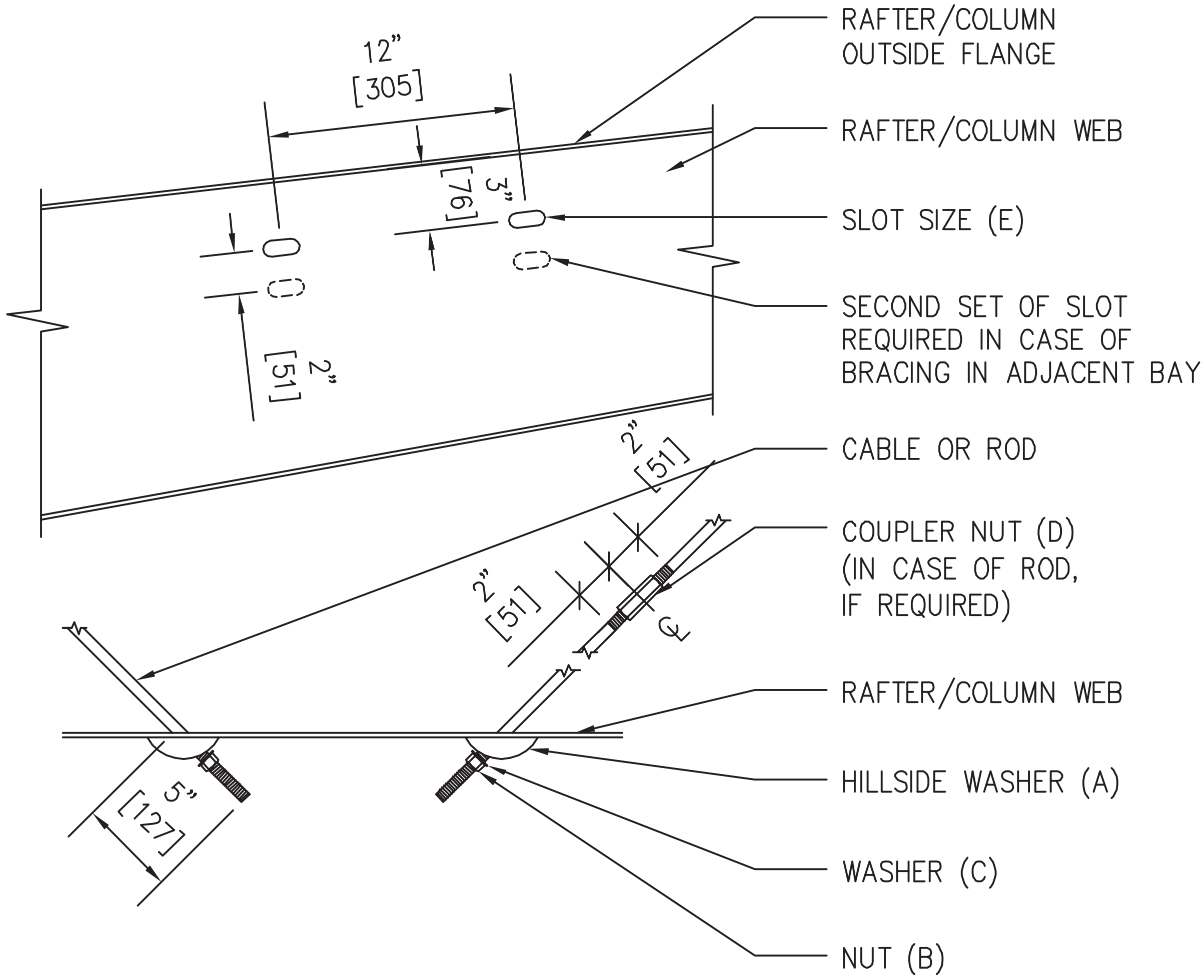
FIELD SLOT IN FLUSH GIRT

FD
80

BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
BRACING through GIRT	Section 4.8	Page 002

BEHLEN
Made Strong

	5/8"ø [16]	3/4"ø [19]	7/8"ø [22]	1"ø [25]
(A)	996255	996251	996256	996254
(B)	2688240	2688250	2688265	2688260
(C)	3948103	3948104	3948101	3948106
(D)	2688092	2688093	2688094	2688095
(E)	1"x2 1/8"	1"x2 1/8"	1"x2 1/8"	1 5/16"x2 5/8"

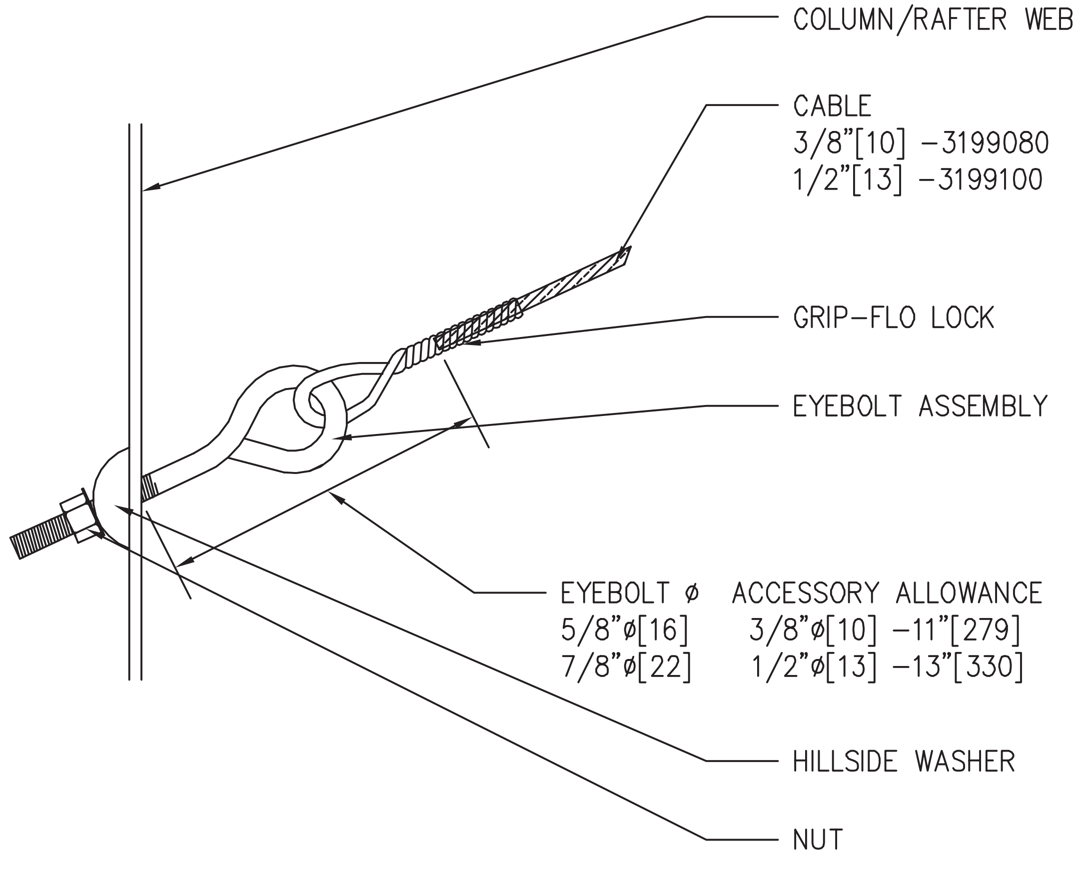


ROOF TIE CABLE/ROD

FD 50

BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
ROD/CABLE COMPONENTS	Section 4.8	Page 003

COMPONENT	3/8"ø [10]	1/2"ø [13]
HILLSIDE WASHER	996250	996253
EYEBOLT ASSEMBLY	1328420	1328450
GRIP-FLO LOCK	3199081	3199101
SLOT SIZE REQUIRED	1"x2 1/8"	1"x2 1/8"



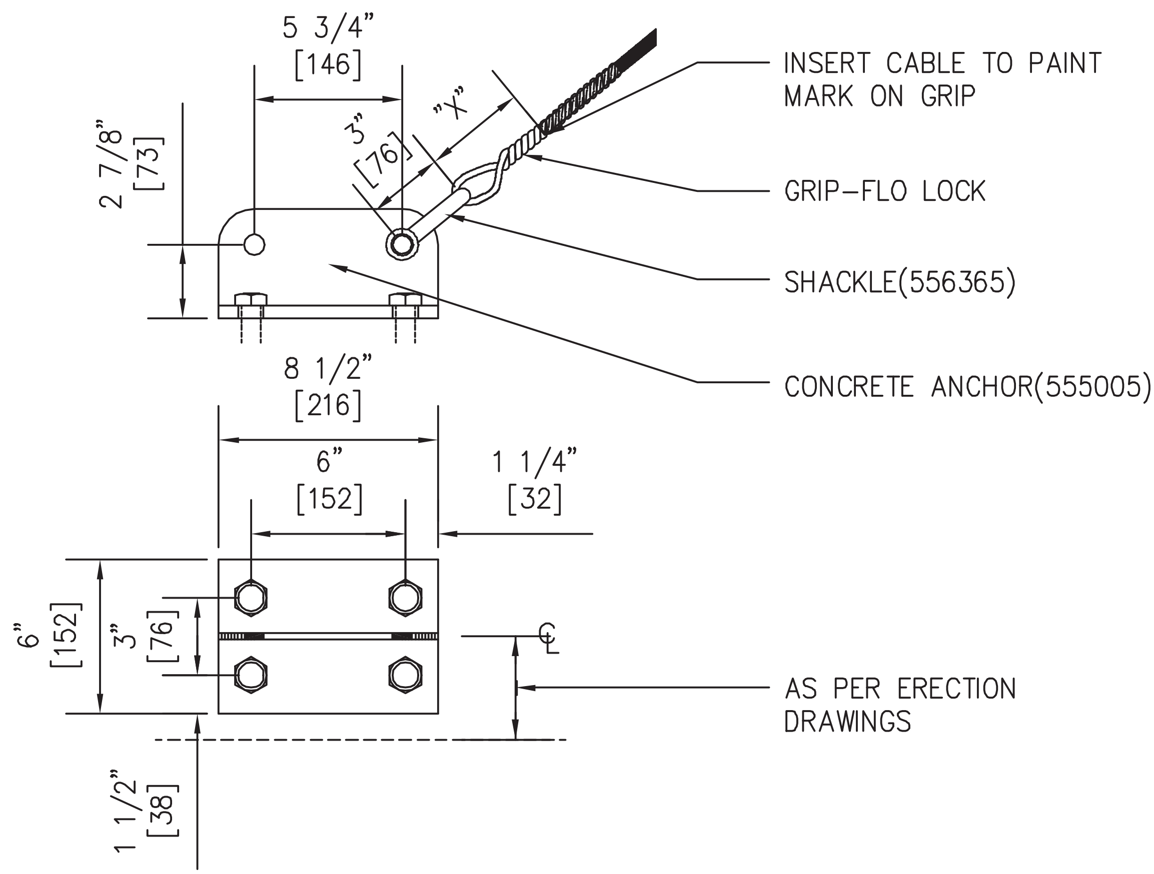
NOTE: FOR UNASSEMBLED BRACING ERECTOR TO CUT CABLE TO LENGTH NOTED ON ERECTION DRAWINGS. (INSERT CABLE END TO PAINT MARK ON GRIP)

CROSS BRACE CABLE DETAIL

FD
58

BEHLEN
Made Strong

COMPONENT	3/8"ø [10]	1/2"ø [13]
CABLE	3199080	3199100
GRIP–FLO LOCK	3199081	3199101
"X" GRIP–FLO ALLOWANCE	4" [102]	6" [102]

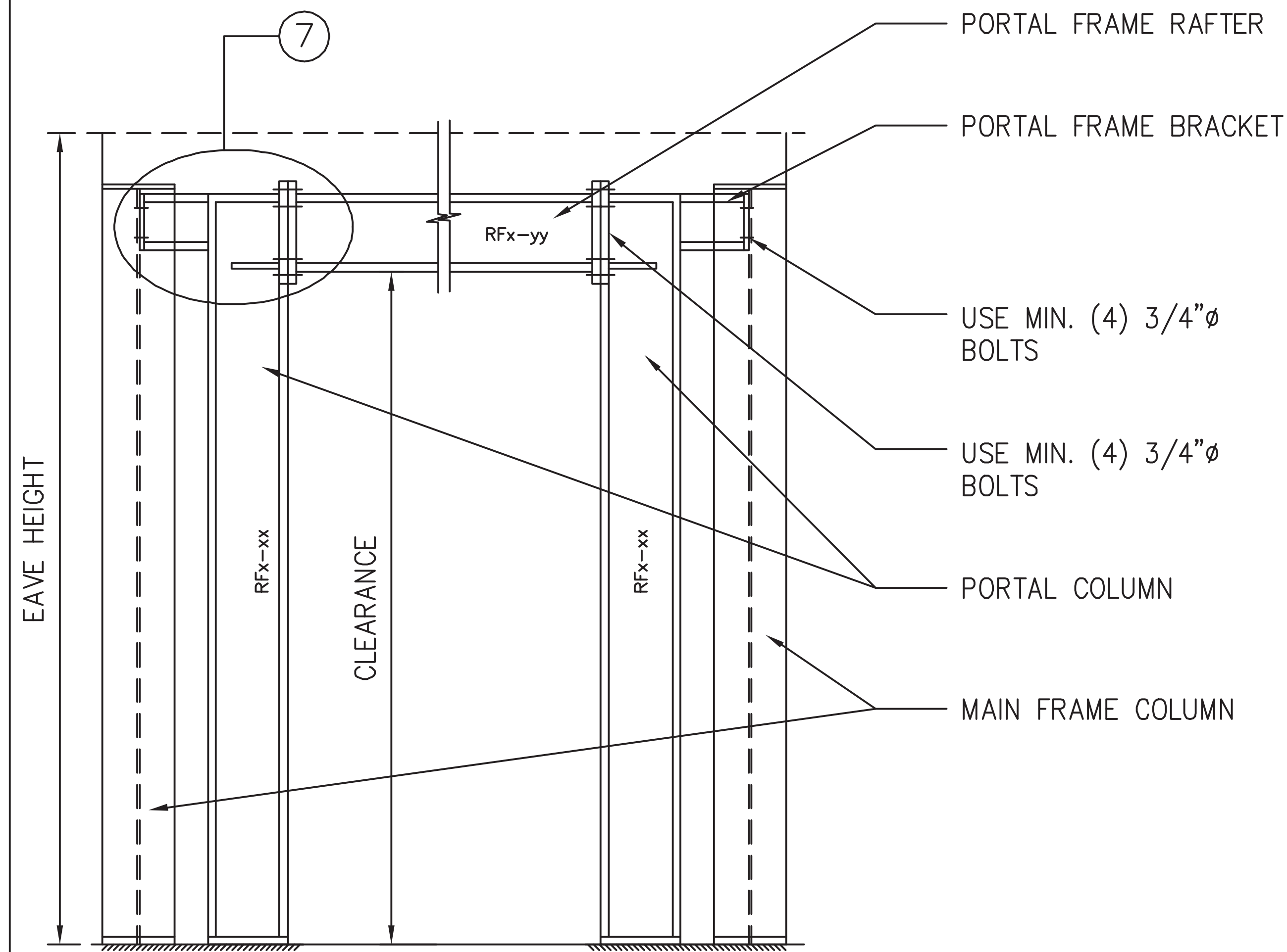


NOTE: FOR UNASSEMBLED BRACING ERECTOR TO CUT CABLE TO LENGTH NOTED ON ERECTION DRAWINGS. (INSERT CABLE END TO PAINT MARK ON GRIP)

X–BRACE TO CONCRETE ANCHOR

FD
48

BRACING to STRUCTURAL	JULY 2008
	Vr 1.0
BRACING to ANCHOR	Section 4.8 / Page 005

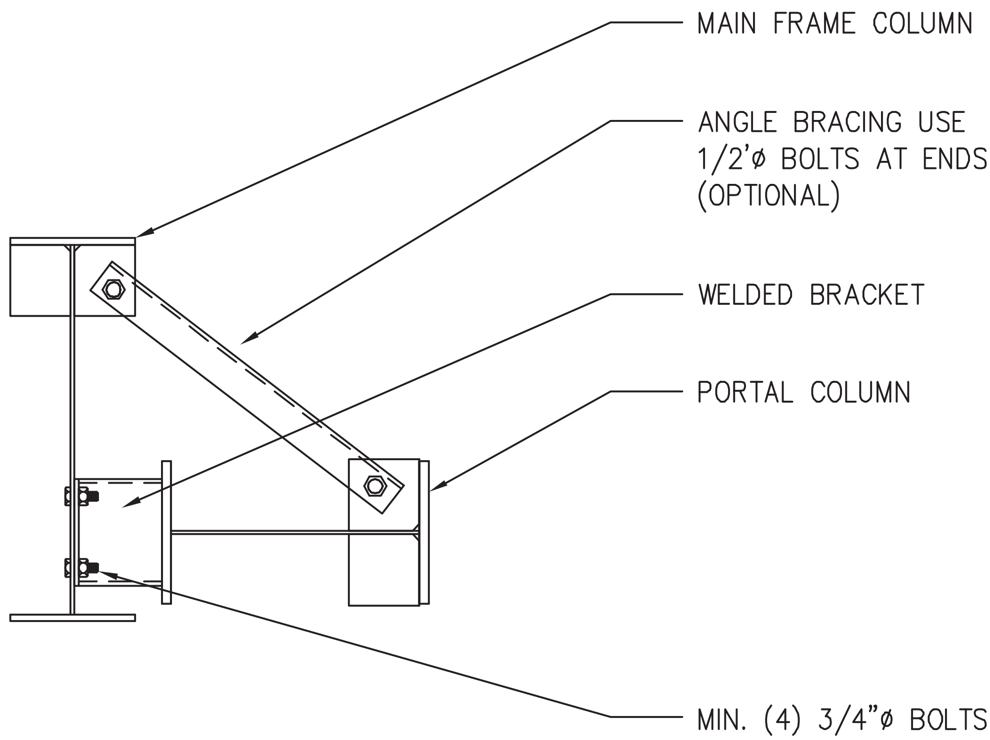


SIDE WALL VIEW

NUMBER in BUBBLE is PAGE NUMBER

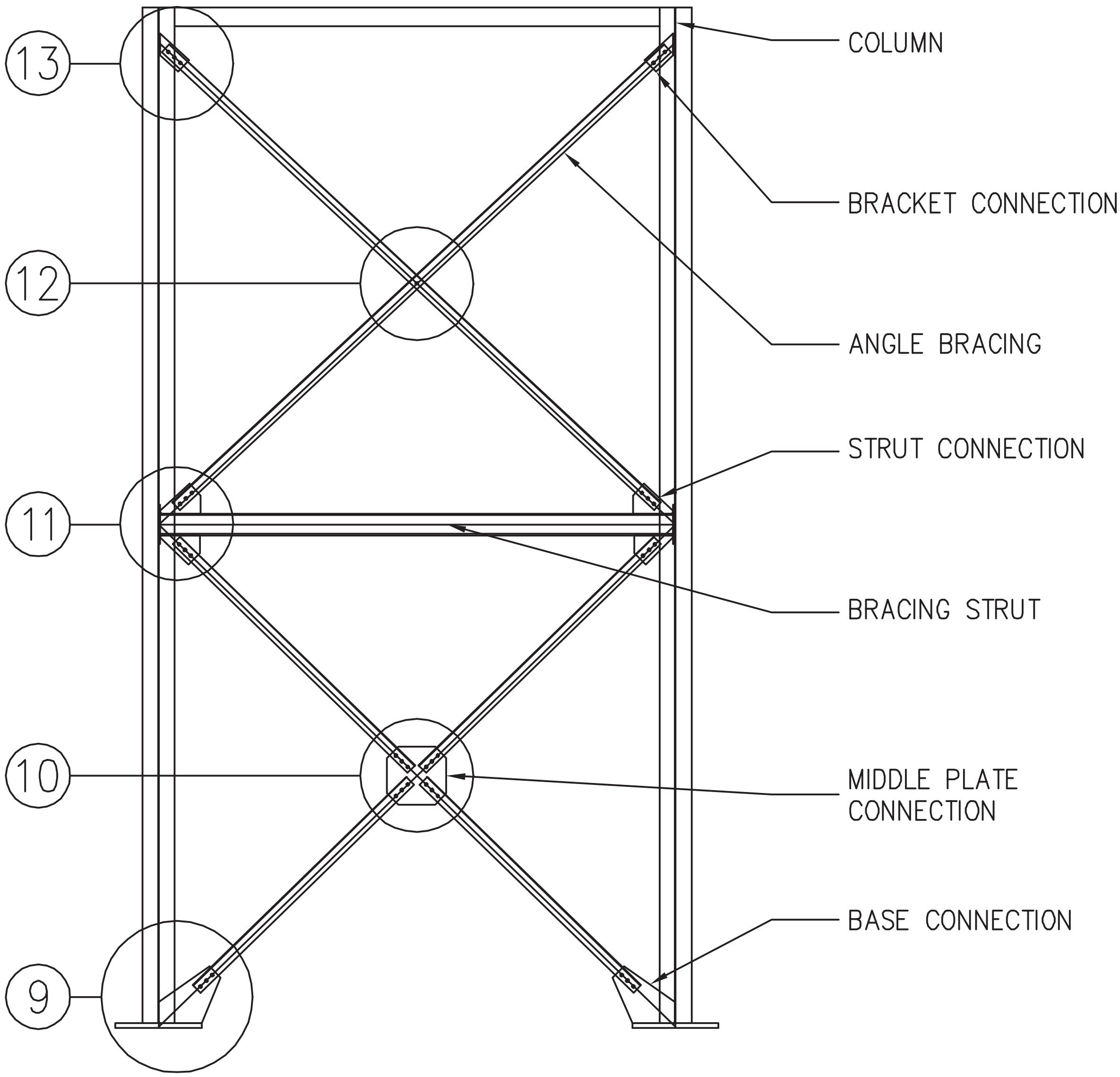
BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
PORTAL FRAME DETAIL	Section 4.8	Page 006

BEHLEN
Made Strong



BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
PORTAL FRAME TOP VIEW	Section 4.8	Page 007

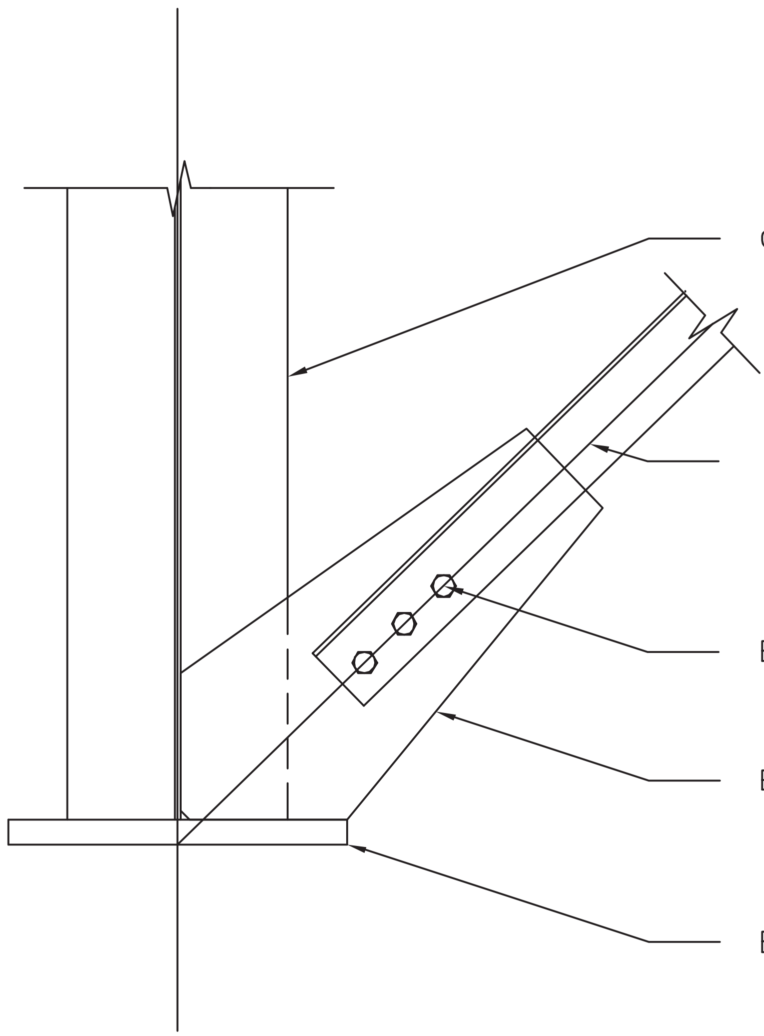
BEHLEN
Made Strong



NUMBERS in BUBBLES are PAGE NUMBERS

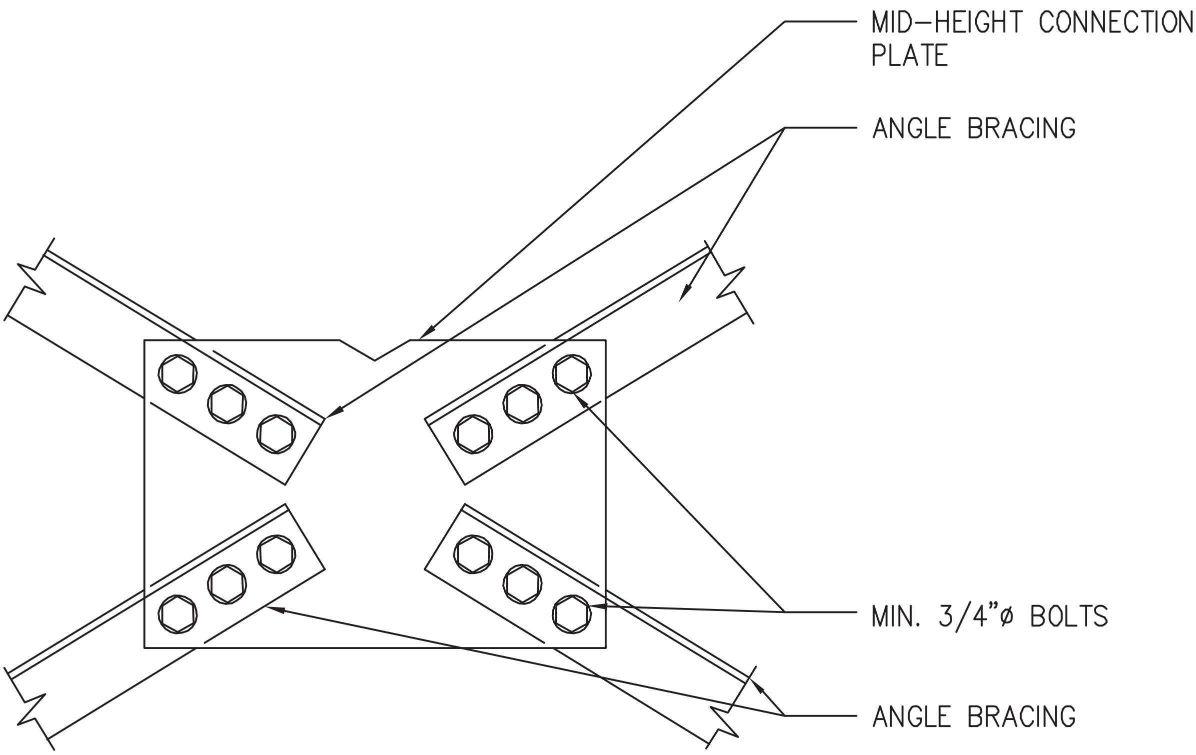
BRACING to STRUCTURAL	JULY 2008
	Vr 1.0
ANGLE BRACING LAYOUT	Section 4.8 / Page 008

BEHLEN
Made Strong



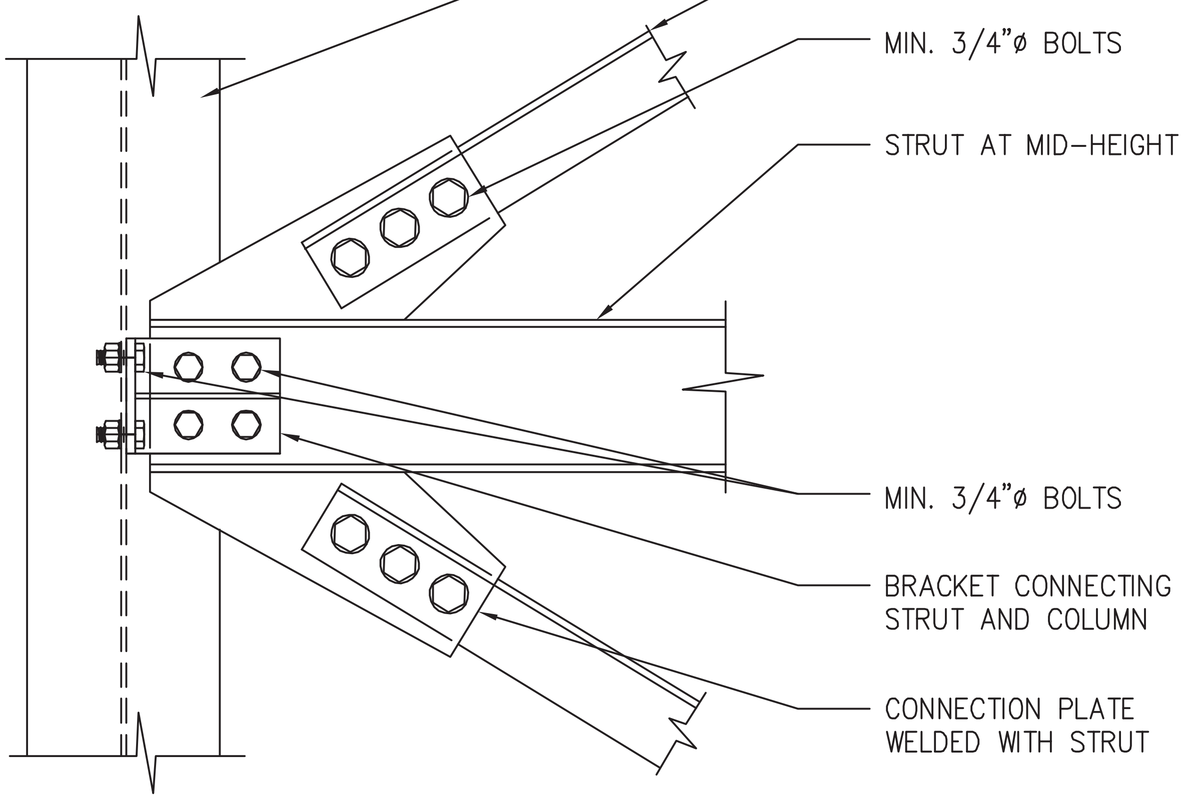
NUMBERS in BUBBLES are PAGE NUMBERS

BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
ANGLE BASE CONNECTION DETAIL	Section 4.8	Page 009



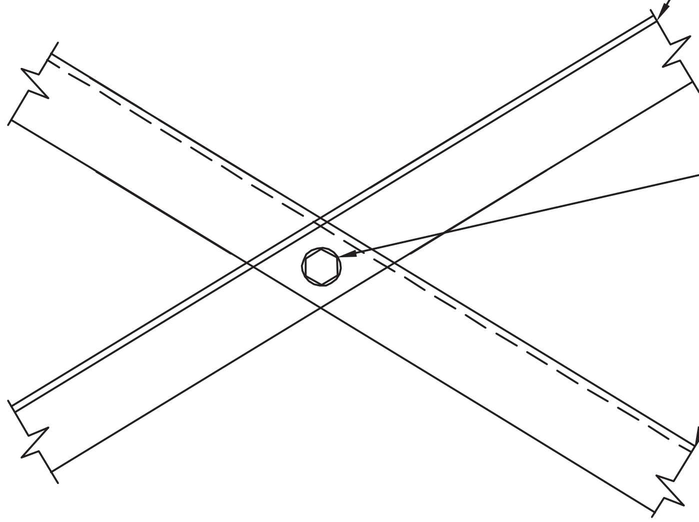
BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
ANGLE MIDDLE PLATE DETAIL	Section 4.8	Page 010

BEHLEN
Made Strong



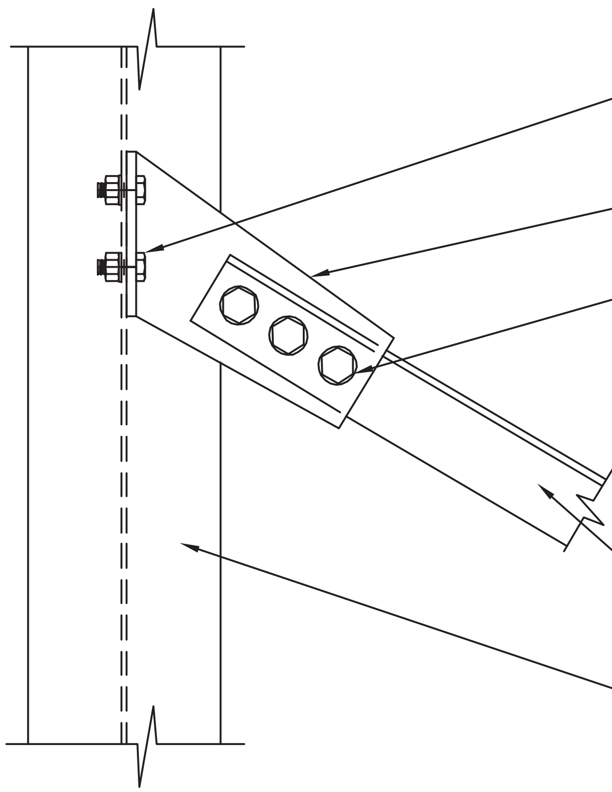
BRACING to STRUCTURAL	JULY 2008 Vr 1.0	
STRUT END CONNECTION DETAIL	Section 4.8	Page 011

BEHLEN
Made Strong

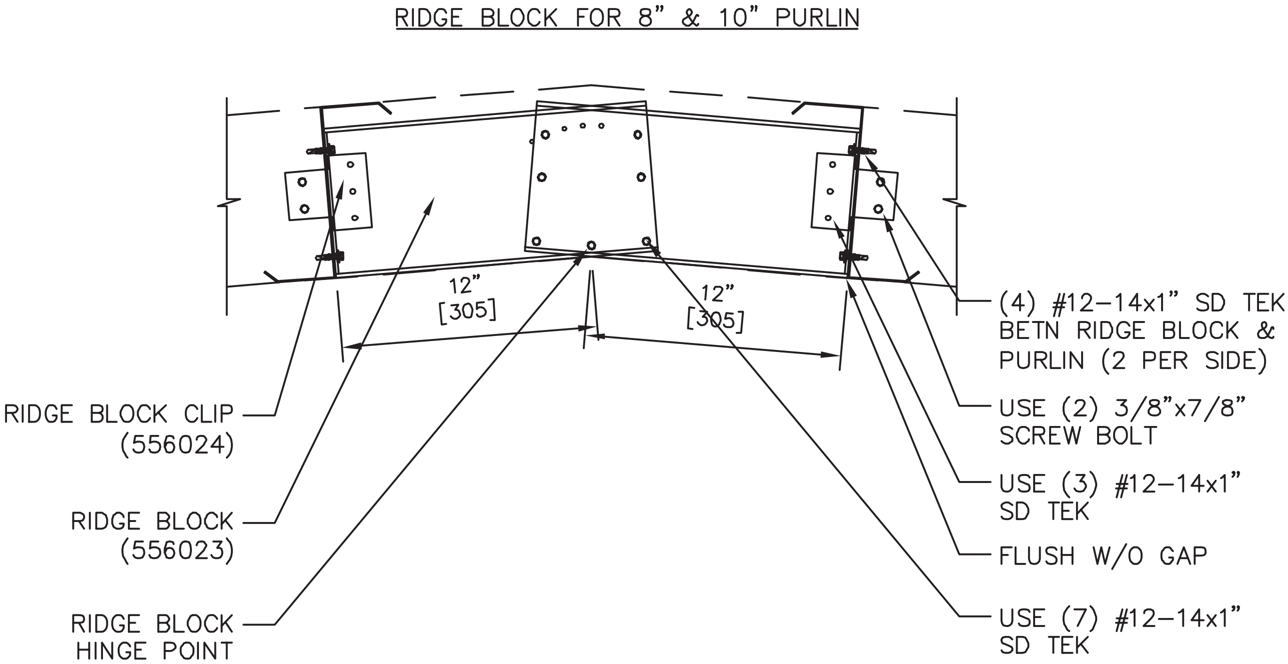


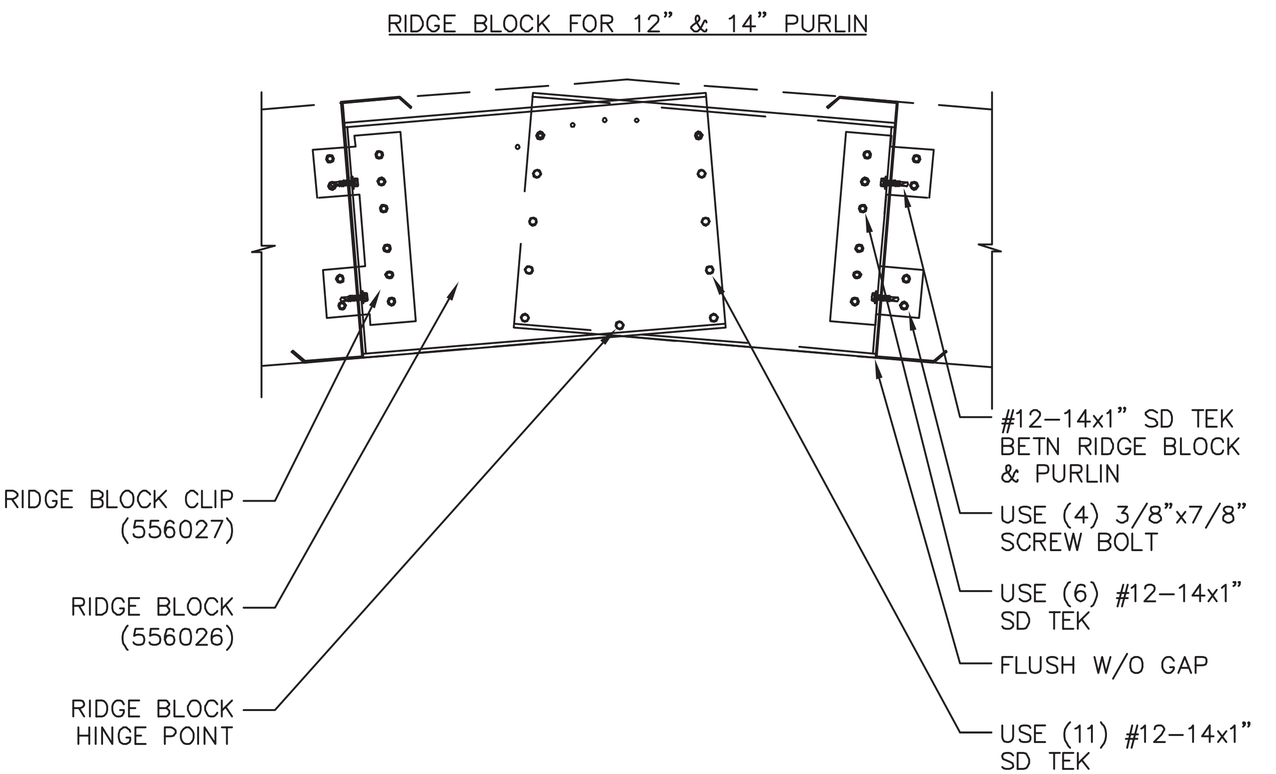
BRACING to STRUCTURAL	JULY 2008
	Vr 1.0
ANGLE CROSS CONNECTION DETAIL	Section 4.8 / Page 012

BEHLEN
Made Strong



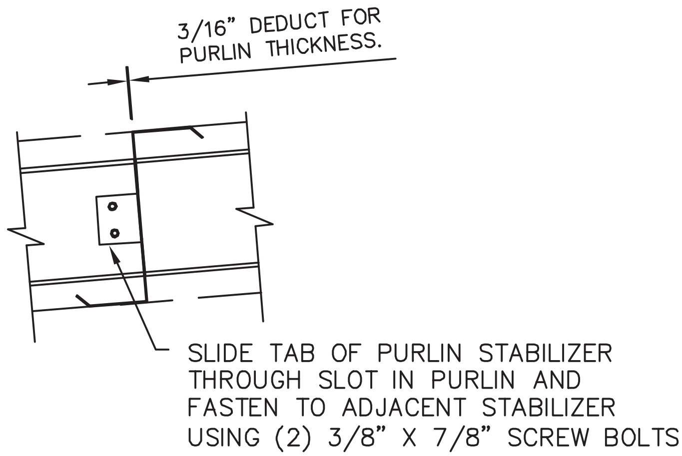
BRACING to STRUCTURAL	JULY 2008	
	Vr 1.0	
ANGLE BRACE to COLUMN DETAIL	Section 4.8	Page 013

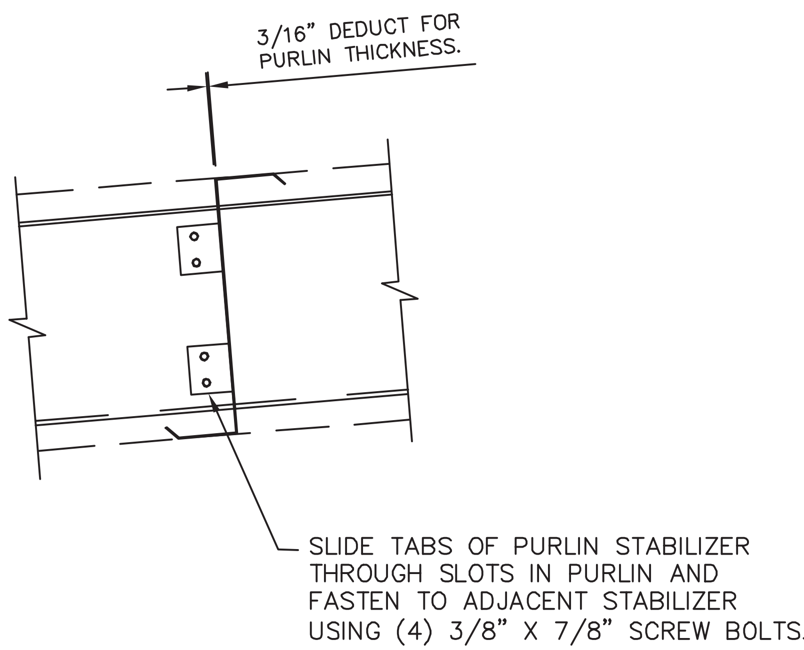




PURLIN STABILIZERS	JULY 2008	
	Vr 1.0	
at RIDGE	Section 4.9	Page 001

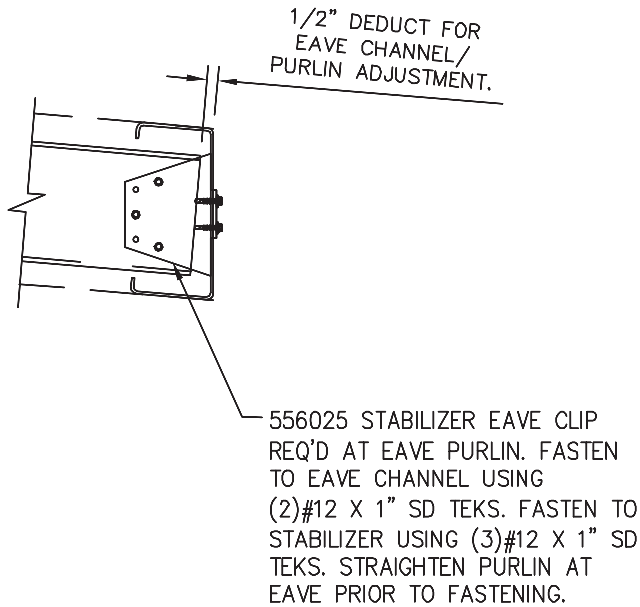
BEHLEN
Made Strong

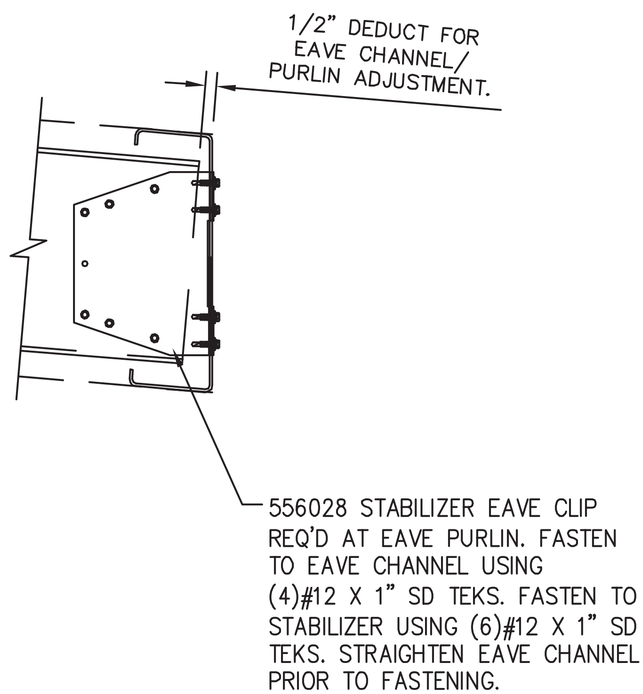




PURLIN STABILIZERS	JULY 2008 Vr 1.0	
INTERMEDIATE LOCATION	Section 4.9	Page 002

BEHLEN
Made Strong





PURLIN STABILIZERS	JULY 2008	
	Vr 1.0	
at EAVE	Section 4.9	Page 0

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SECTION 5
ROOF, WALL, LINER and TRIM DETAILS

BEHLEN
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INDEX

ROOF, WALL, LINER and TRIM DETAILS

Section 5.1 - TYPICAL PANEL PROFILE

AWR PANEL	001
WIDE SPAN PANEL	002
DELTA SPAN PANEL	003
ULTRA SPAN PANEL	004
ELITE RIB PANEL	005
936 PROFILE PANEL	006
PARKWAY PANEL	007
SSR PANEL	008

Section 5.2 - AWR ROOF EAVE DETAIL

AWR FLASHING GUIDE	001
EAVE TRIM CONDITION	002
EAVE GUTTER CONDITION	003
UP SLOPE PURLIN ROOF LAP CONDITION	004
DOWN SLOPE PURLIN ROOF LAP CONDITION	005
SLOPING ROOF to WALL CONDITION	006
ROOF to WALL at GABLE END	007
ROOF RIDGE CONDITION	008
ROOF RIDGE CONDITION cont.	009
ROOF HIGH EAVE END CONDITION	010
ROOF GABLE END CONDITION	011

Section 5.3 - SSR ROOF EAVE DETAIL

EAVE TRIM CONDITION	001
EAVE TRIM CONDITION cont.	002
EAVE GUTTER CONDITION	003
EAVE GUTTER CONDITION cont.	004
UP SLOPE PURLIN CONDITION	005
DOWN SLOP PURLIN CONDITION	006
SLOPING ROOF to WALL CONDITION	007
ROOF to WALL at GABLE END CONDITION	008
ROOF RIDGE CONDITION	009
ROOF HIGH EAVE END CONDITION	010
SLOPING ROOF to WALL CONDITION	011
ROOF GABLE END CONDITION	012

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INDEX

ROOF, WALL, LINER and TRIM DETAILS

Section 5.4 - LENGTH of ROOF PANEL

AWR ROOF PANEL with EAVE TRIM	001
AWR ROOF PANEL with EAVE GUTTER	002
SSR ROOF PANEL with EAVE TRIM	003
SSR ROOF PANEL with EAVE GUTTER	004

Section 5.5 - ROOF PANEL FASTENER LOCATIONS

AWR PANEL	001

Section 5.6 - FASTENER QUANTITIES for ROOF and TRIM

AWR PANEL	001
SSR ROOF PANEL and TRIM	002
SSR ROOF PANEL and TRIM cont.	003

Section 5.7 - AWR WALL PANELS and BASE ANGLE

BASE ANGLE	001
BASE CHANNEL	002
BASE GIRT	003
WALL PANEL LAP	004
LOW SIDE WALL EAVE TRIM	005
HIGH SIDE WALL EAVE TRIM	006
WALL EAVE GUTTER	007
WALL GABLE	008
OUTSIDE CORNER CONDITION	009
INSIDE CORNER CONDITION	010
OPENING SILL	011
OPENING JAMB	012
OPENING HEADER	013

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Made Strong

INDEX

ROOF, WALL, LINER and TRIM DETAILS

Section 5.8 -	SIDEWALL ELEVATION	
	AWR PANEL	001
	SIDEWALL PANEL LENGTHS	002
	SIDEWALL PANEL LENGTHS at OPENINGS	003
	AWR PANEL ENDWALL ELEVATION	004
	ENDWALL PANEL LENGTHS	005
	ENDWALL PANEL LENGTHS at OPENINGS	006
Section 5.9 -	WALL PANEL FASTENER LOCATIONS	
	AWR WALL PANEL	001
Section 5.10 -	FASTENER QUANTITIES at TRIM	
	36” WIDE WALL PANEL and TRIM	001
Section 5.11 -	CLOSURE USAGE	
	WALL and ROOF PANELS	001
	WALL and ROOF PANELS cont.	002
	SSR ROOF PANEL	003

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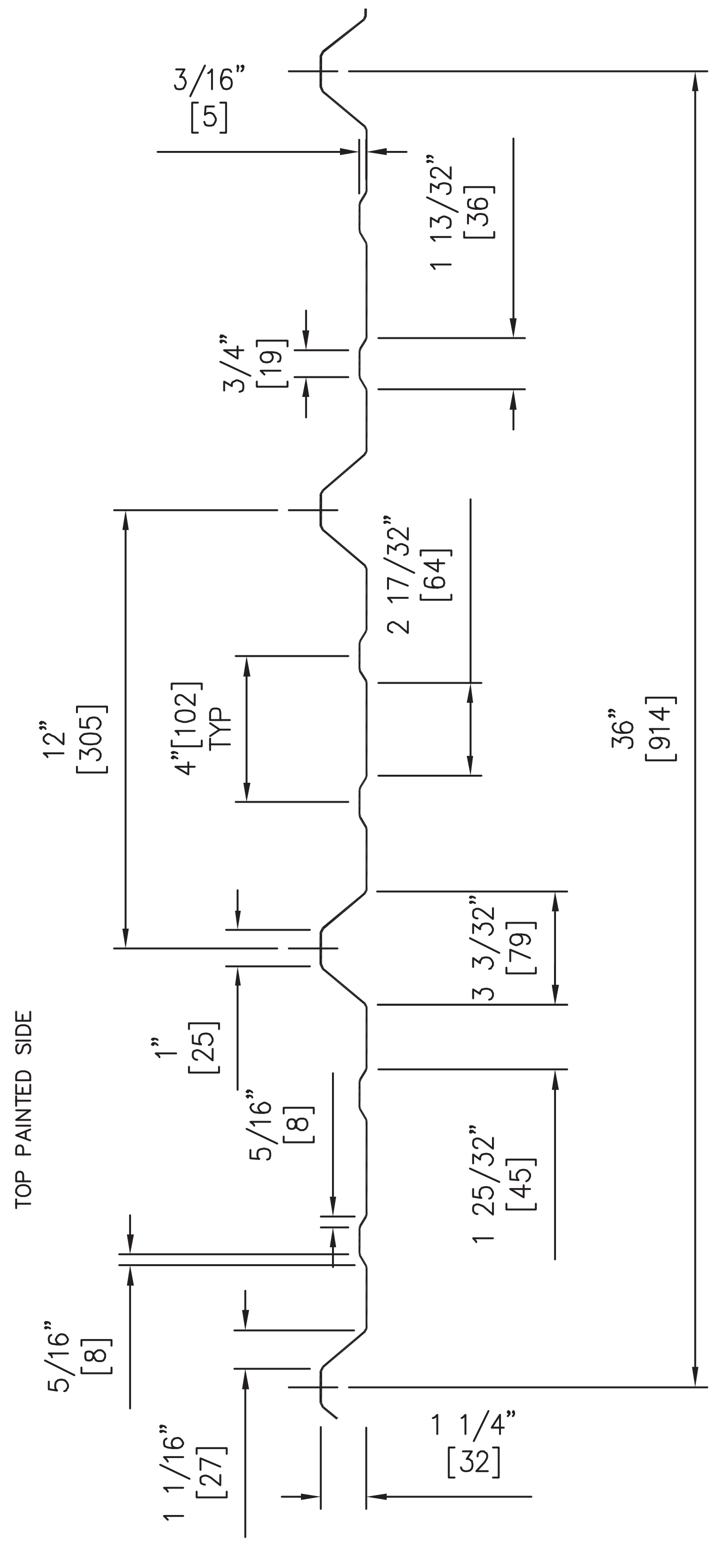

TYPICAL PANEL PROFILE	JULY 2008	
	Vr 1.0	
AWR PANEL	Section 5.1	Page 001

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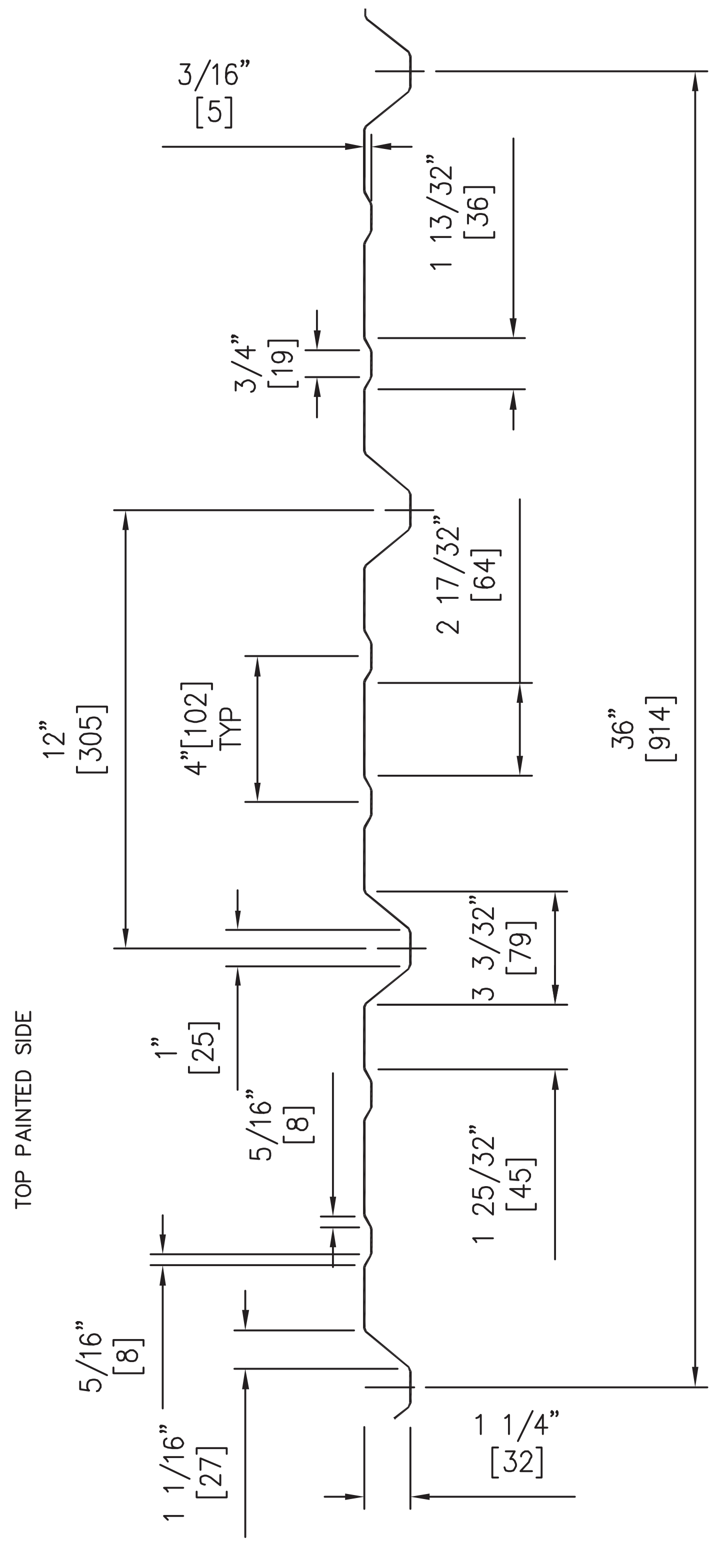

TYPICAL PANEL PROFILE	JULY 2008	
	Vr 1.0	
WIDE SPAN PANEL	Section 5.1	Page 002

BEHLEN
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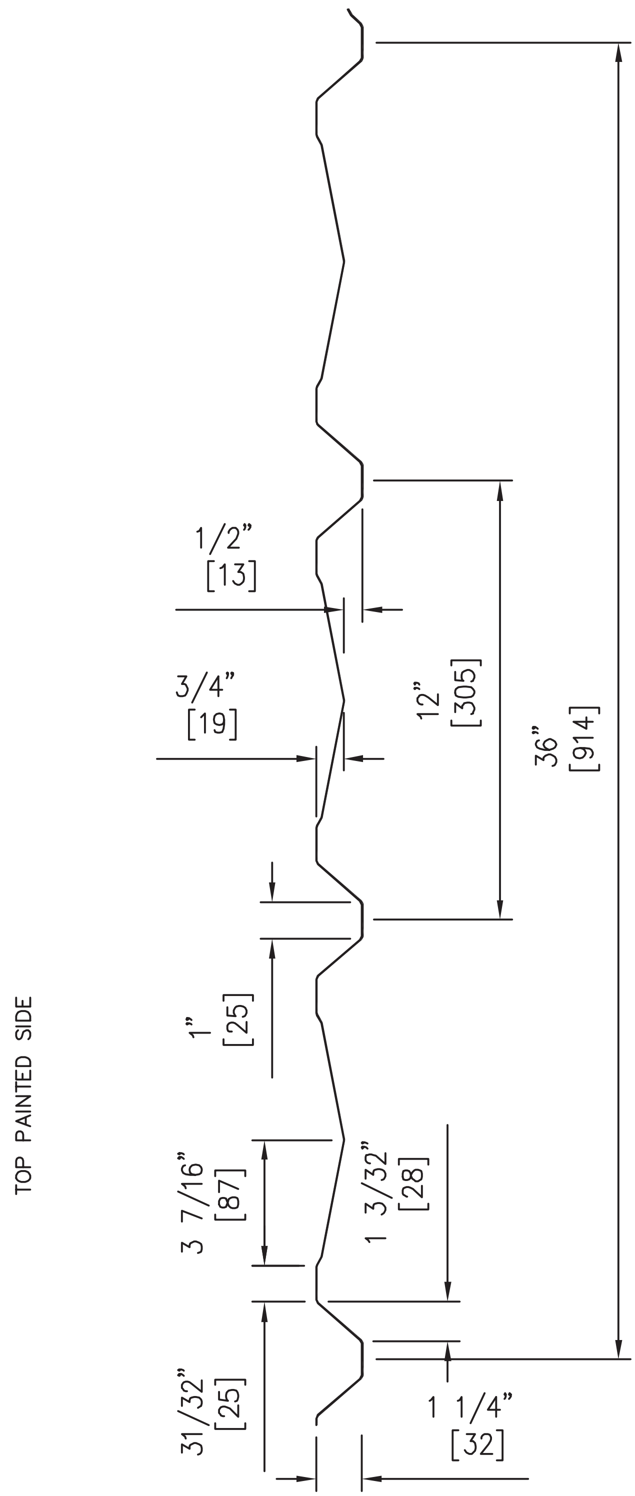

TYPICAL PANEL PROFILE	JULY 2008
	Vr 1.0
DELTA SPAN PANEL	Section 5.1 | Page 003

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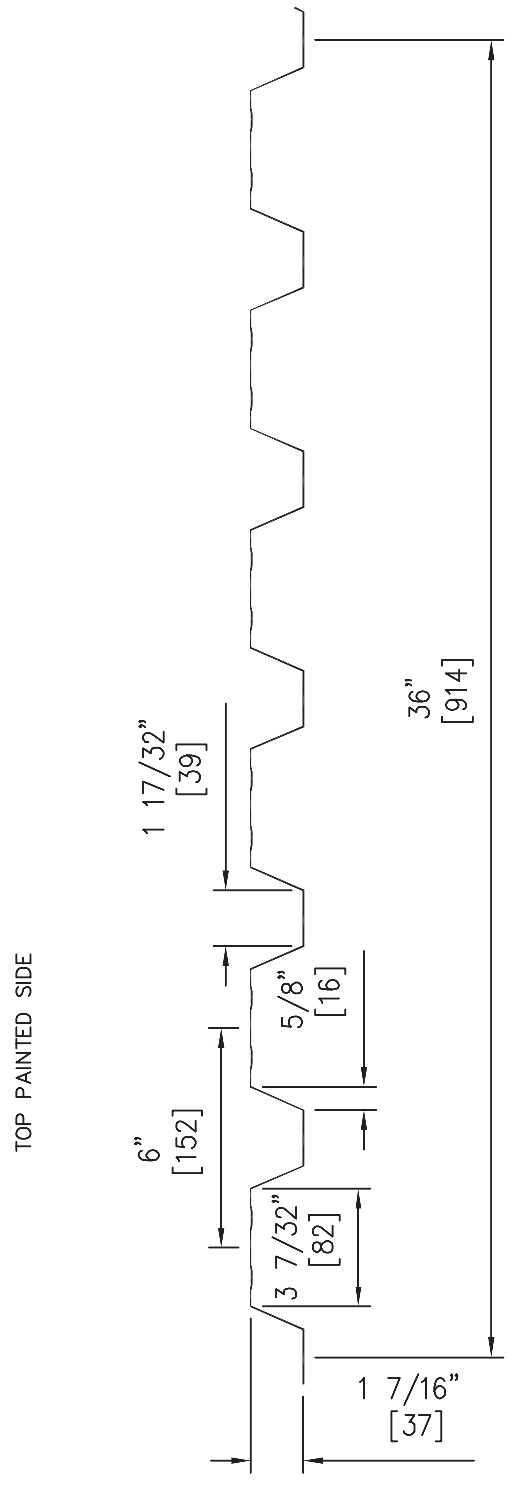

TYPICAL PANEL PROFILE	JULY2008	
	Vr 1.0	
ULTRA SPAN PANEL	Section 5.1	Page 004

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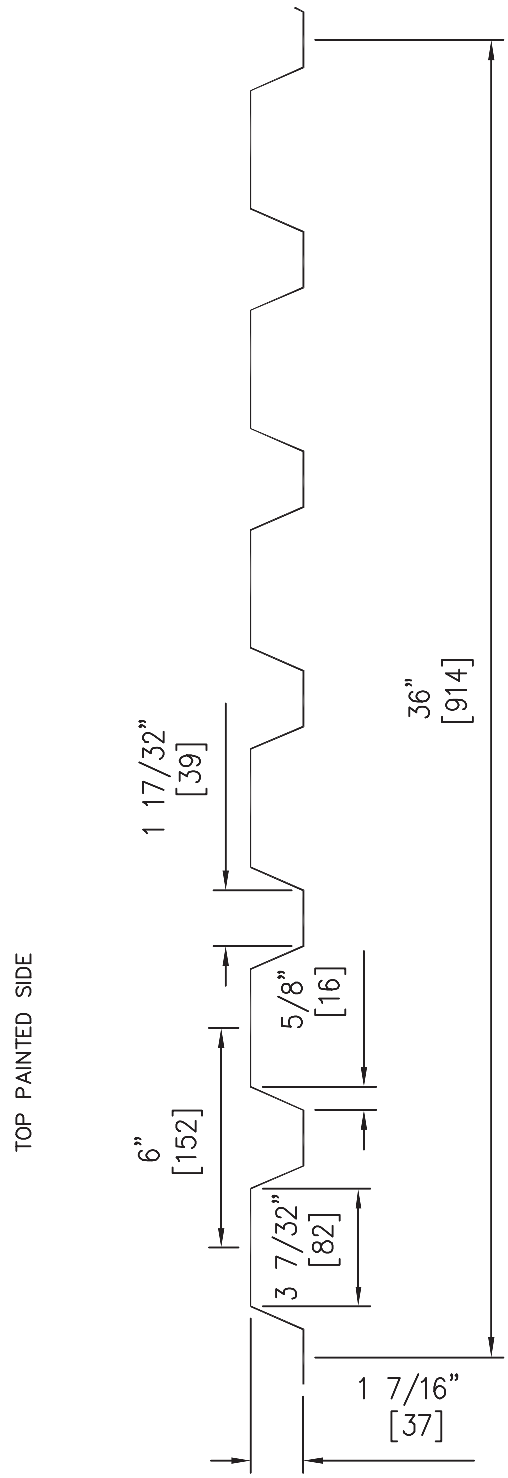

TYPICAL PANEL PROFILE

ELITE RIB PANEL

JULY2008	
Vr 1.0	
Section	Page
5.1	005

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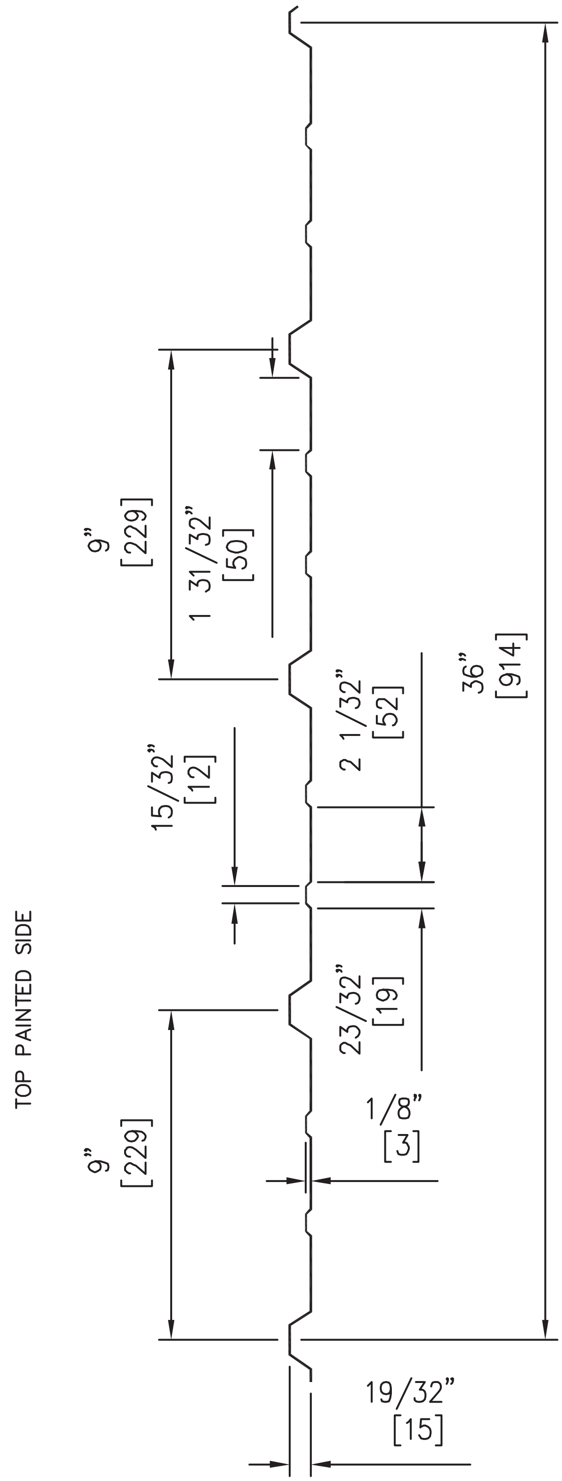

TYPICAL PANEL PROFILE	JULY 2008 Vr 1.0
936 PROFILE PANEL	Section 5.1 / Page 006

BEHLEN
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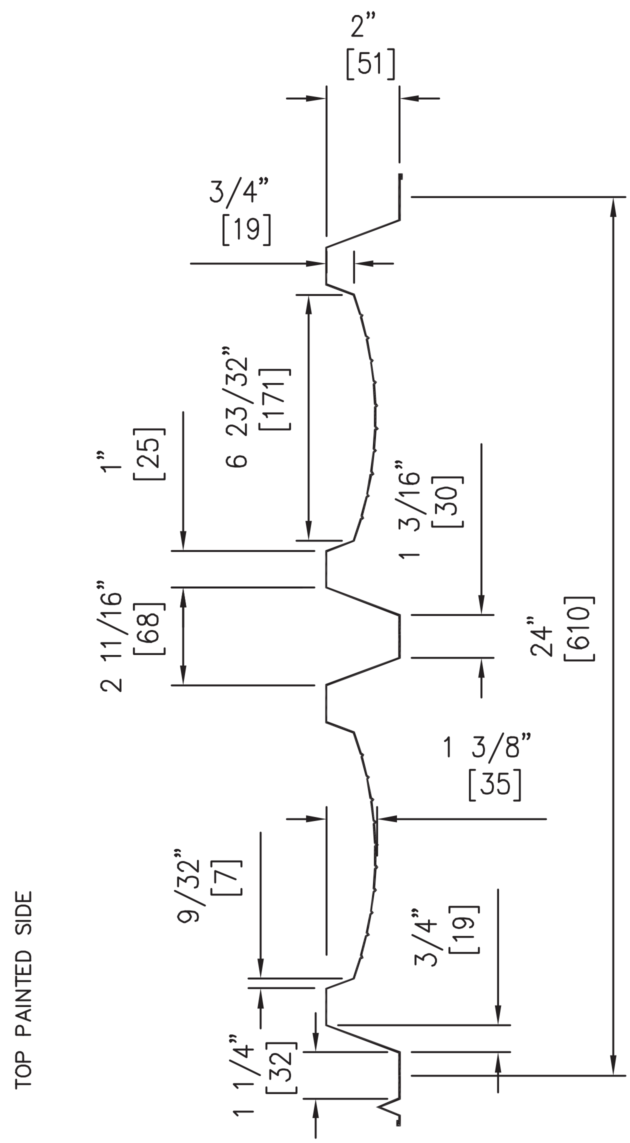

TYPICAL PANEL PROFILE	JULY 2008
	Vr 1.0
PARKWAY PANEL	Section 5.1 · Page 007

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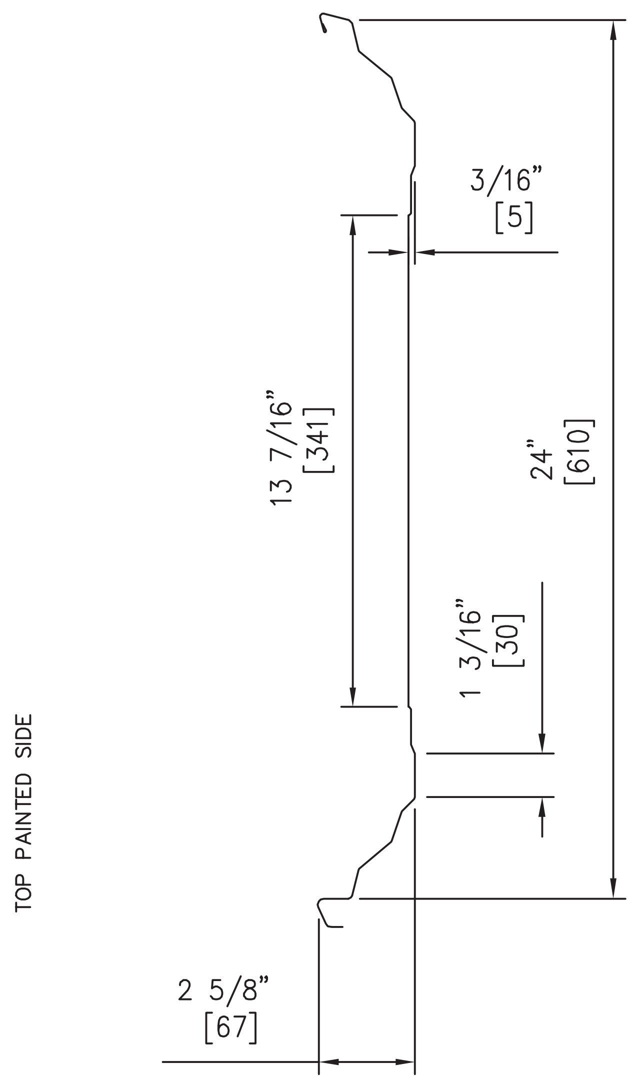
Made Strong



TYPICAL PANEL PROFILE	JULY 2008
	Vr 1.0
SSR PANEL	Section 5.1 / Page 008

BEHLEN
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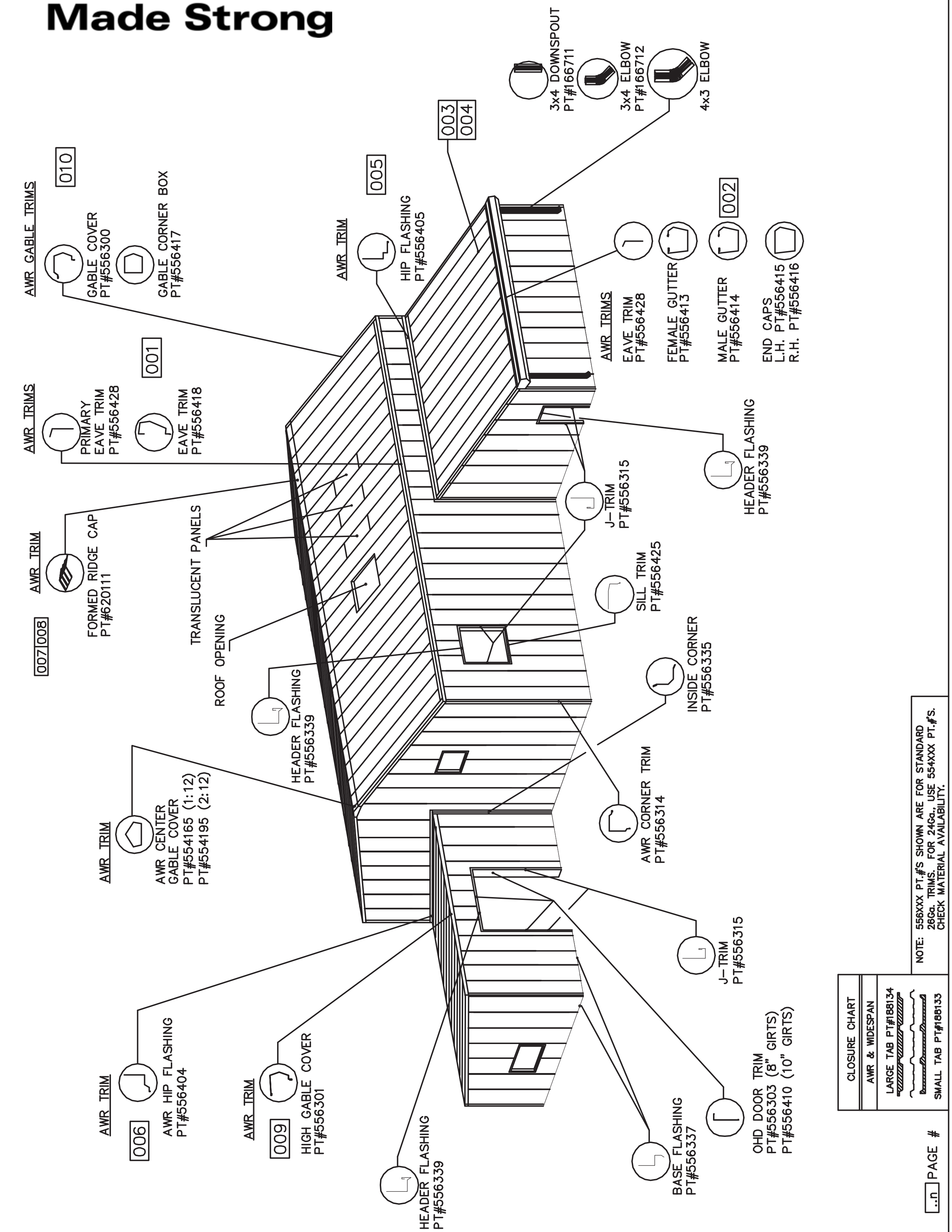
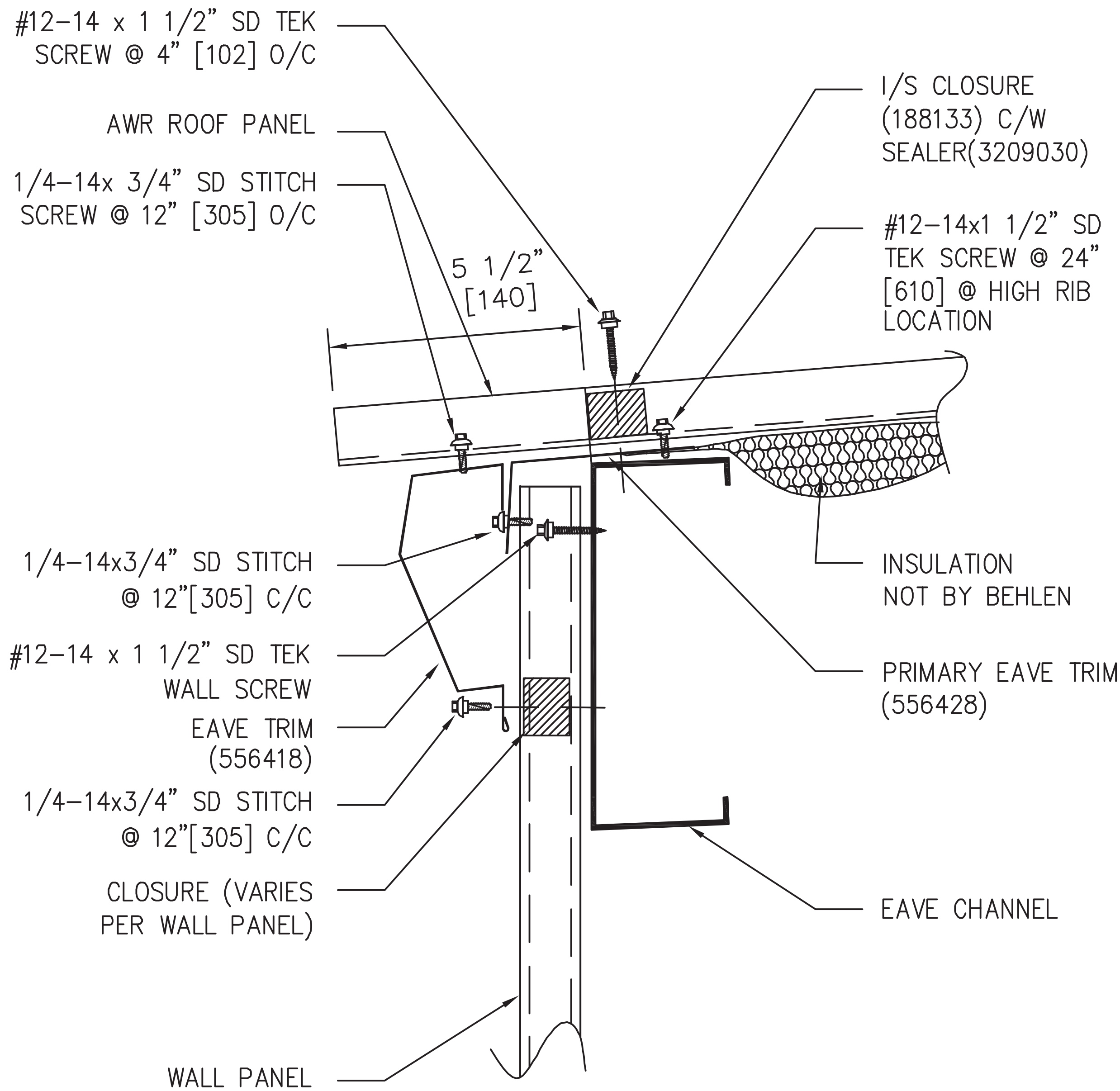


AWR FLASHING GUIDE

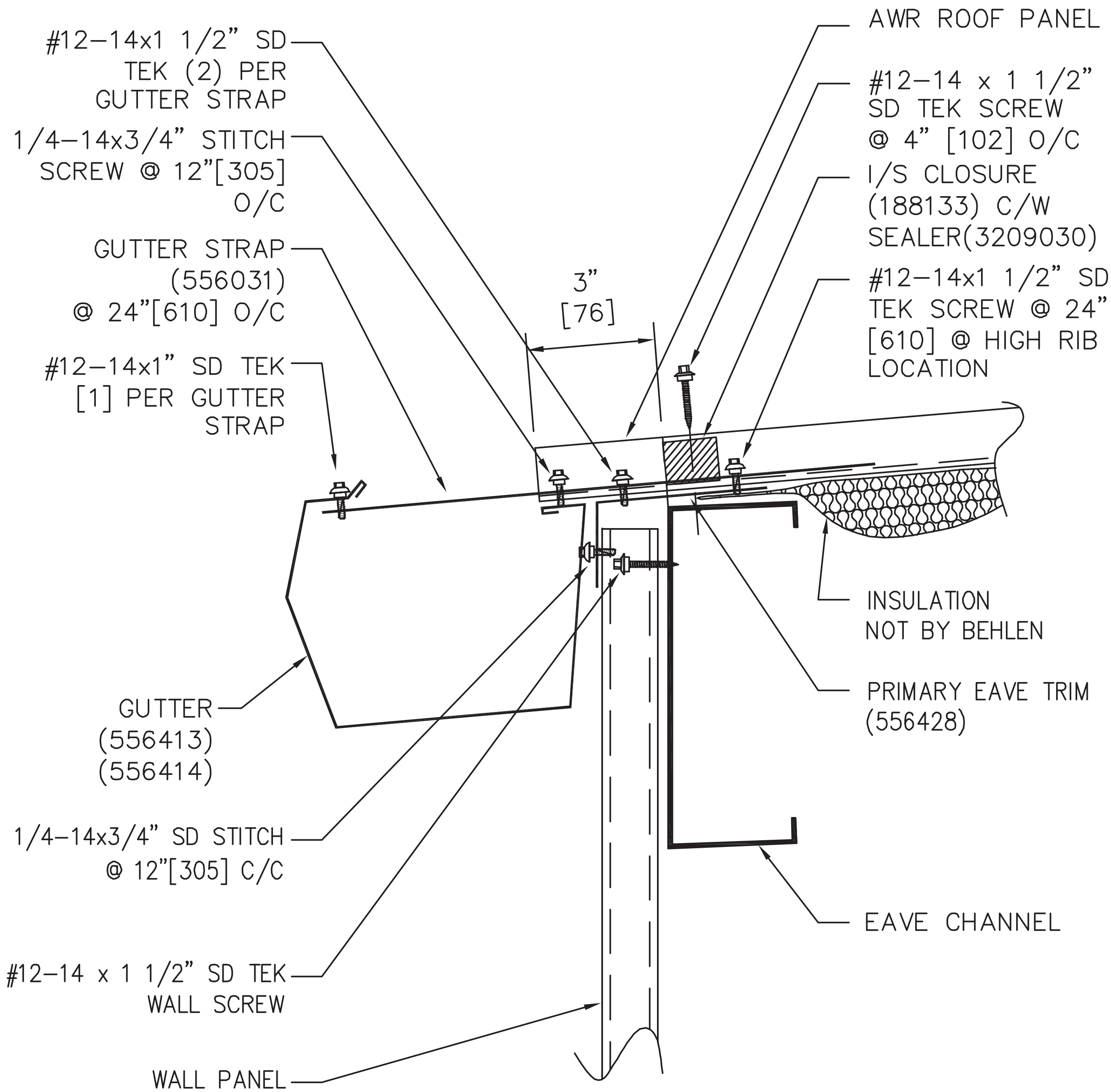
JULY 2008	
Vr 1.0	
Section	Page
5.2	001



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
EAVE TRIM CONDITION	Section 5.2	Page 002

BEHLEN
Made Strong



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
EAVE GUTTER CONDITION	Section 5.2	Page 003

BEHLEN
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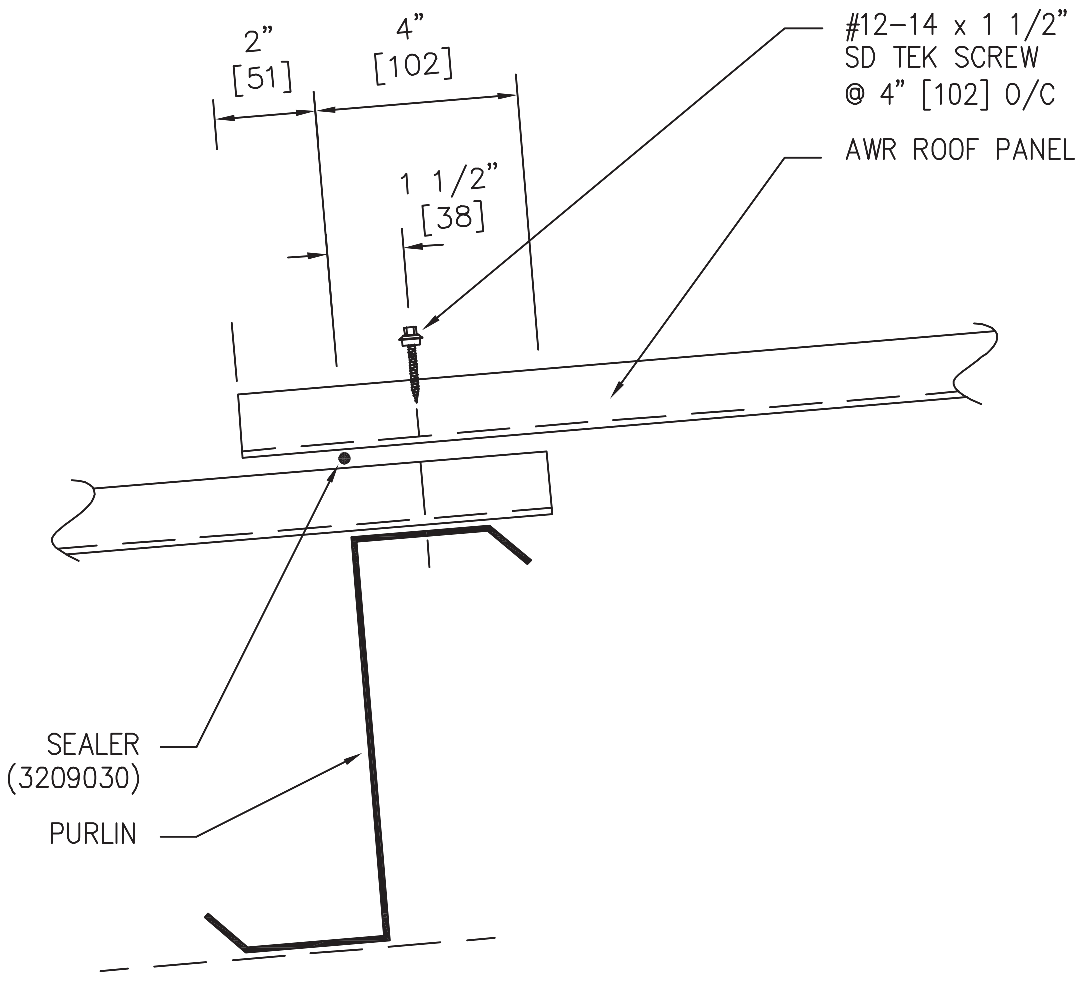
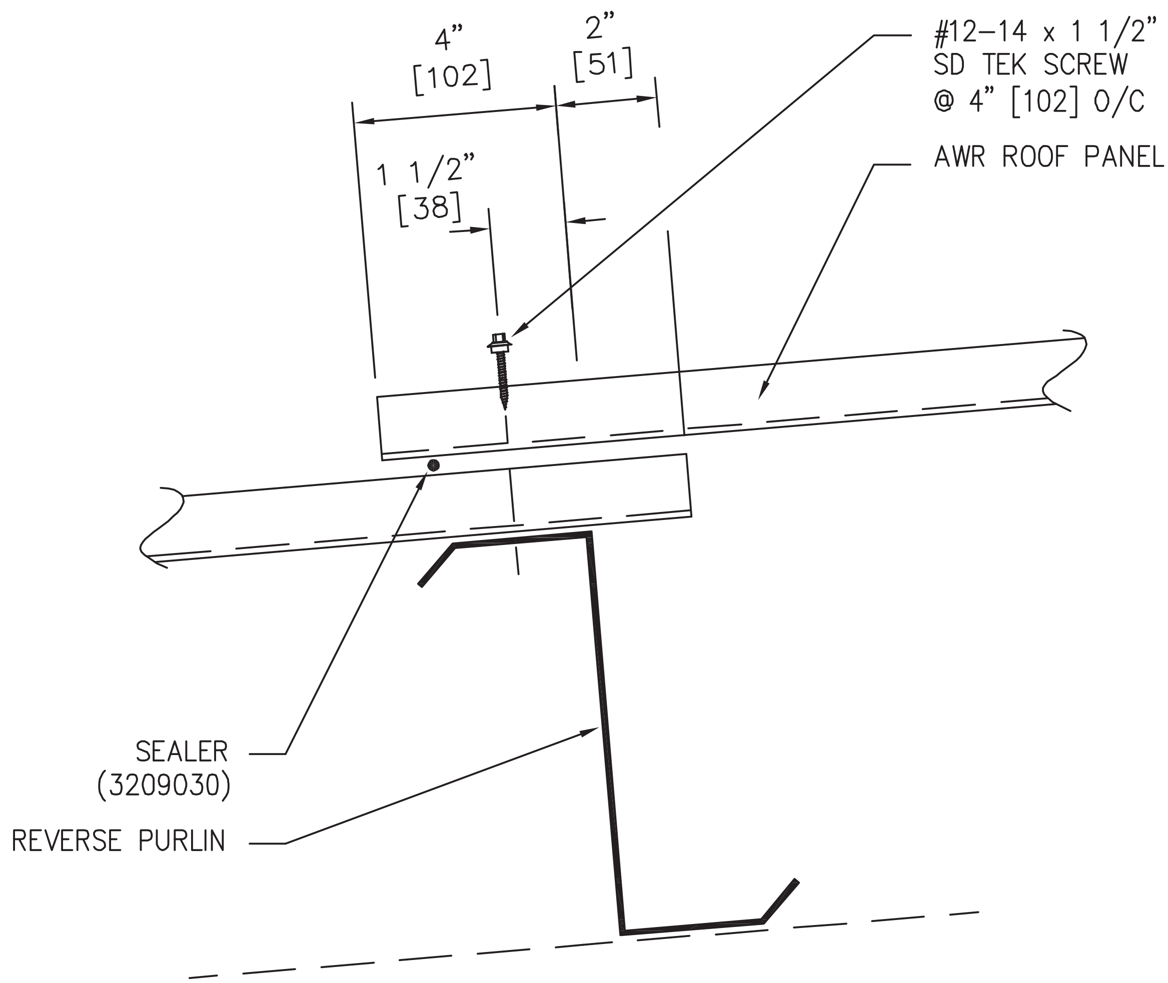


AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
UP SLOPE PURLIN ROOF LAP CONDITION	Section 5.2	Page 004

BEHLEN
Made Strong

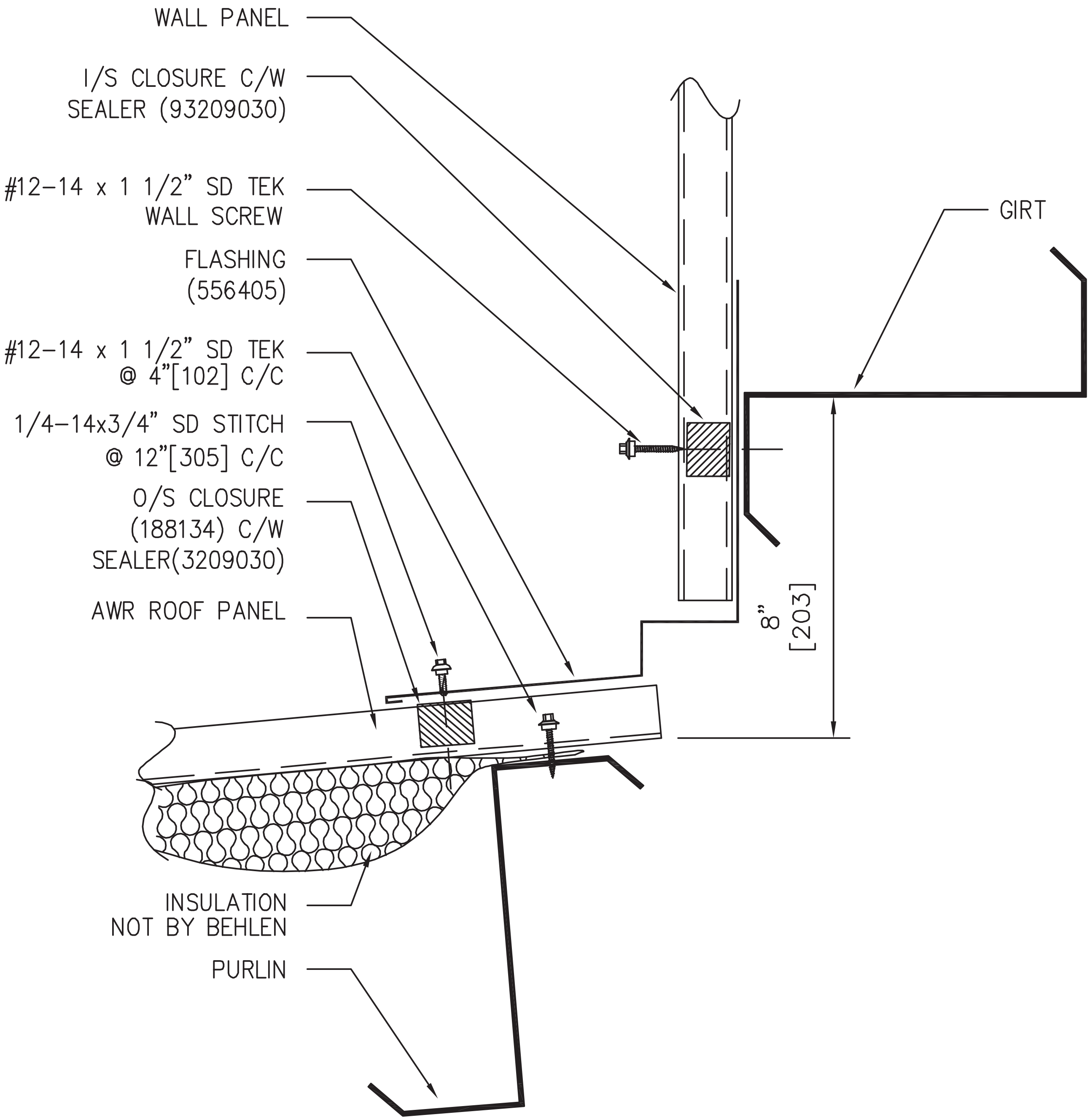


AWR ROOF EAVE DETAIL

DOWN SLOPE PURLIN ROOF LAP CONDITION

JULY 2008	
Vr 1.0	
Section	Page
5.2	005

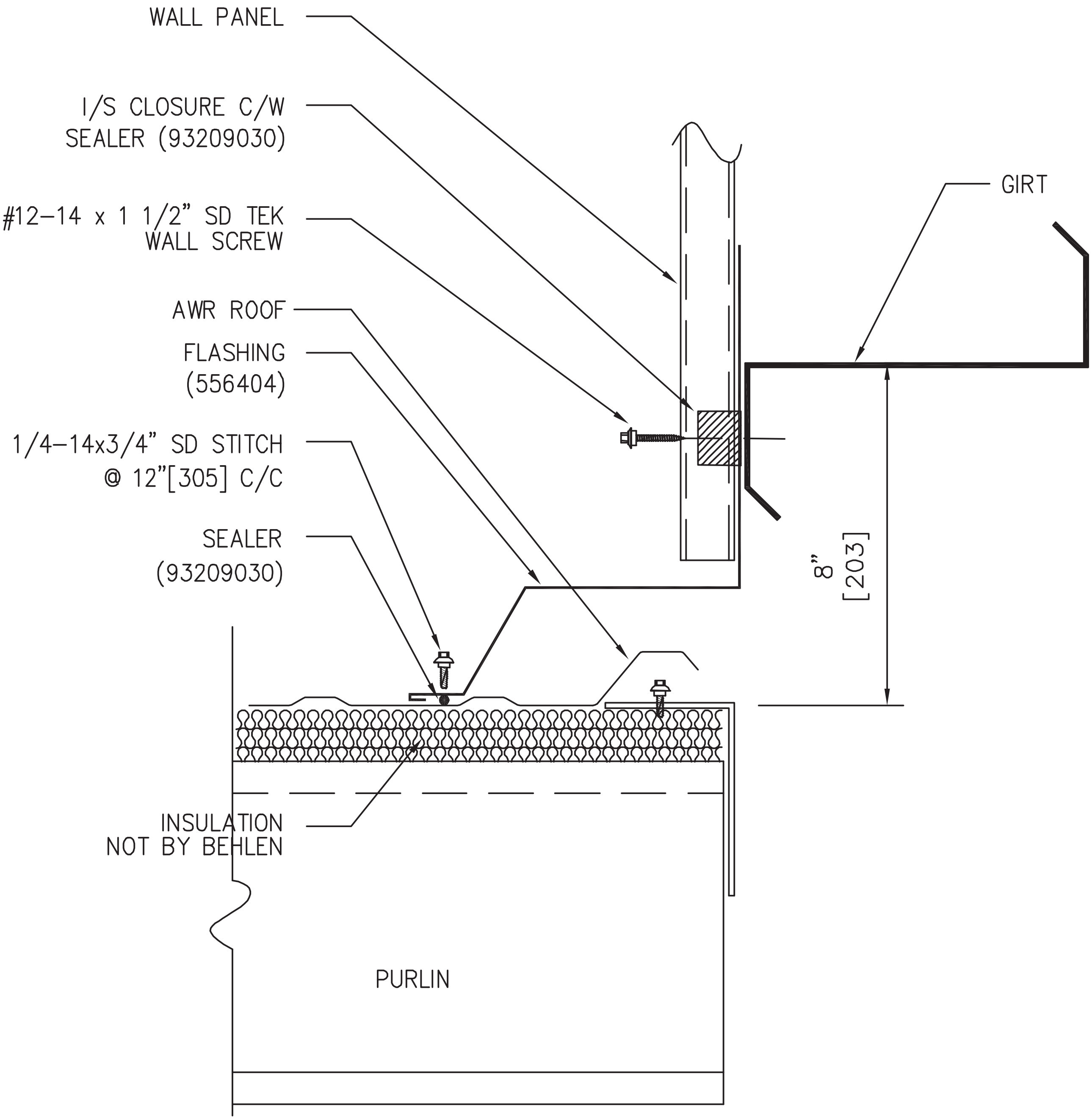
BEHLEN
Made Strong



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

AWR ROOF EAVE DETAIL	JULY 2008	
	vr 1.0	
SLOPING ROOF TO WALL CONDITION	Section 5.2	Page 006

BEHLEN
Made Strong



AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF to WALL at GABLE END	Section 5.2	Page 007

BEHLEN
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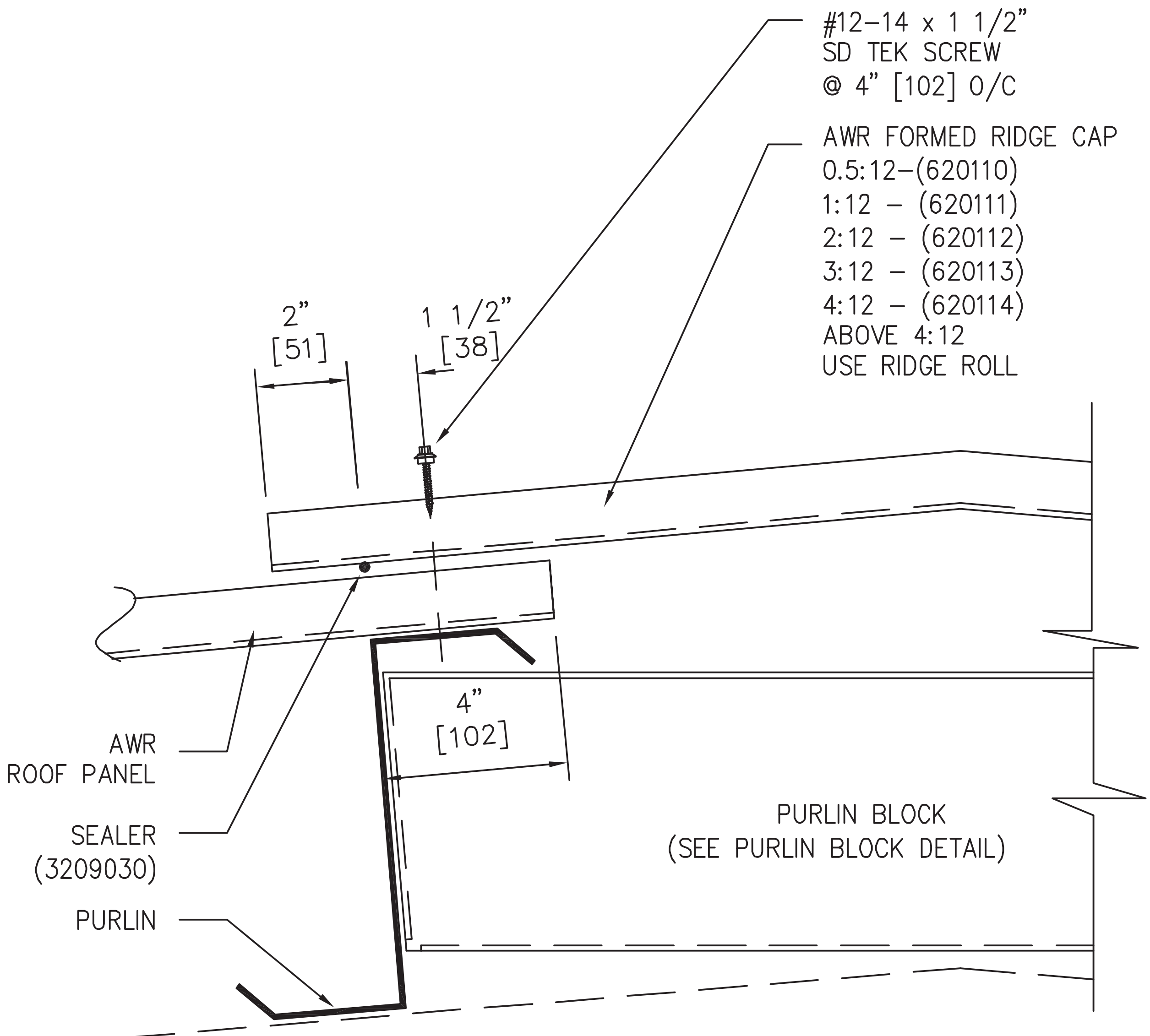
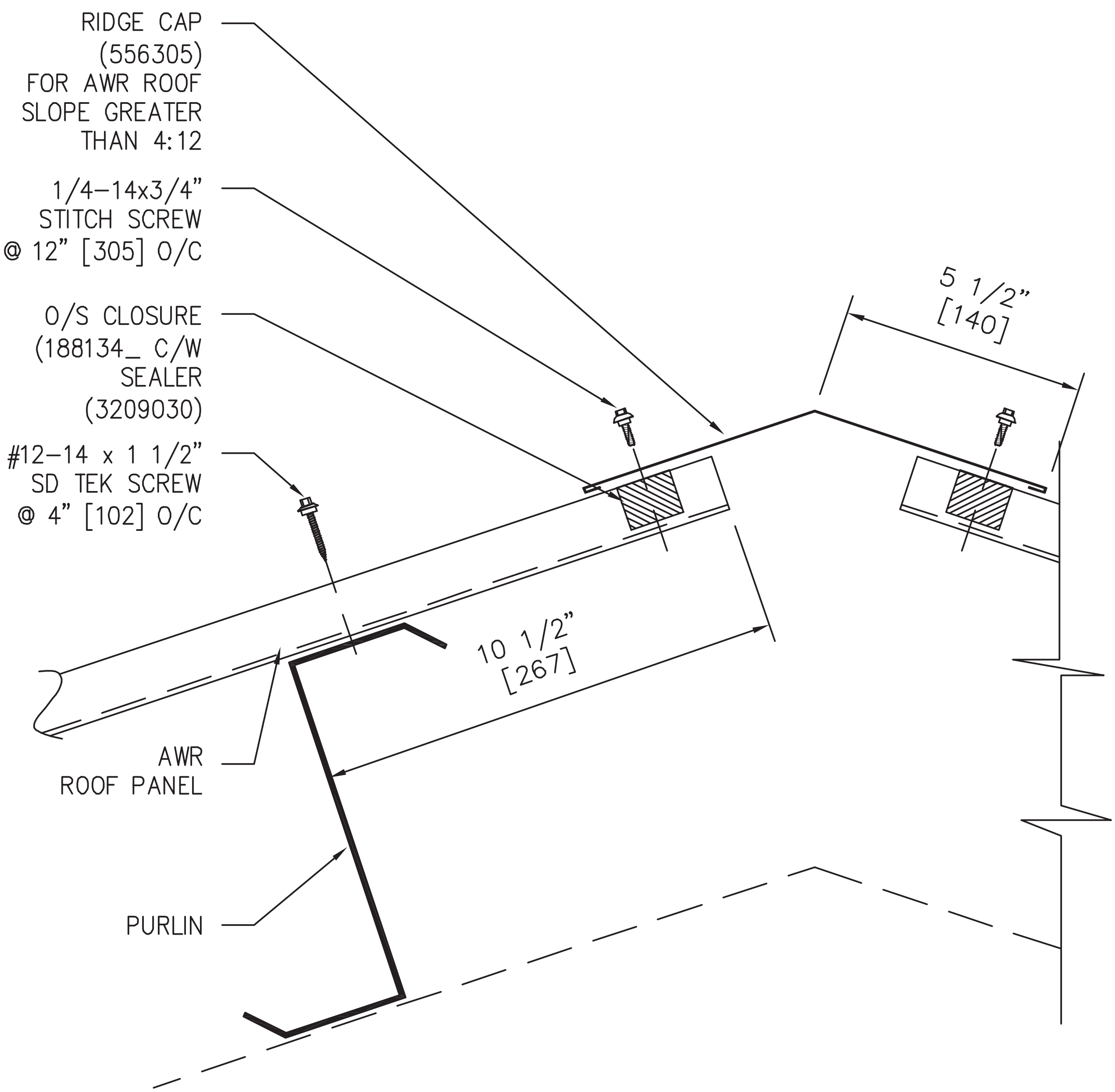


AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF RIDGE CONDITION	Section 5.2	Page 008

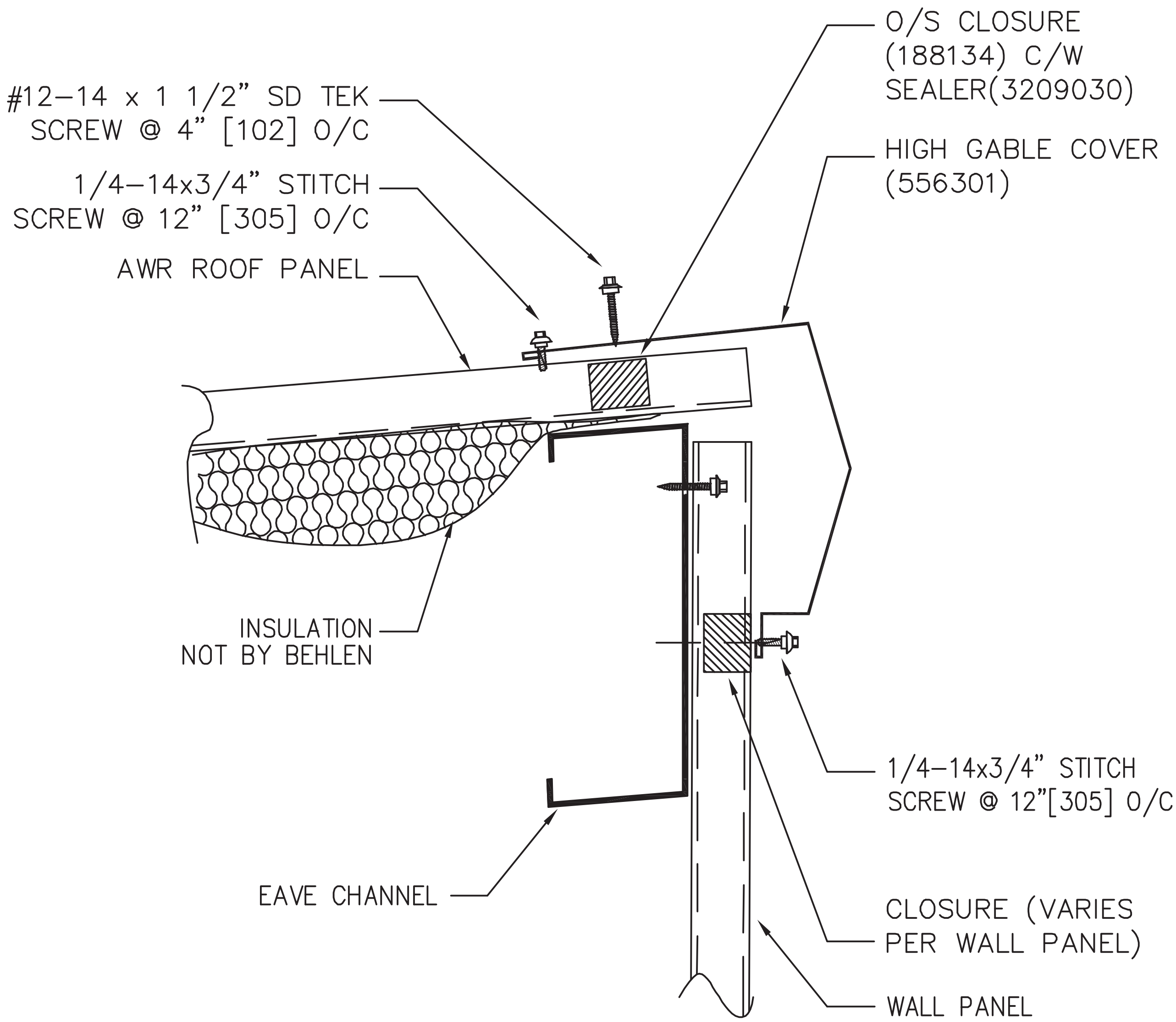
BEHLEN
Made Strong



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

AWR ROOF EAVE DETAIL	JULY 2008 / Vr 1.0
ROOF RIDGE CONDITION	Section 5.2 / Page 009

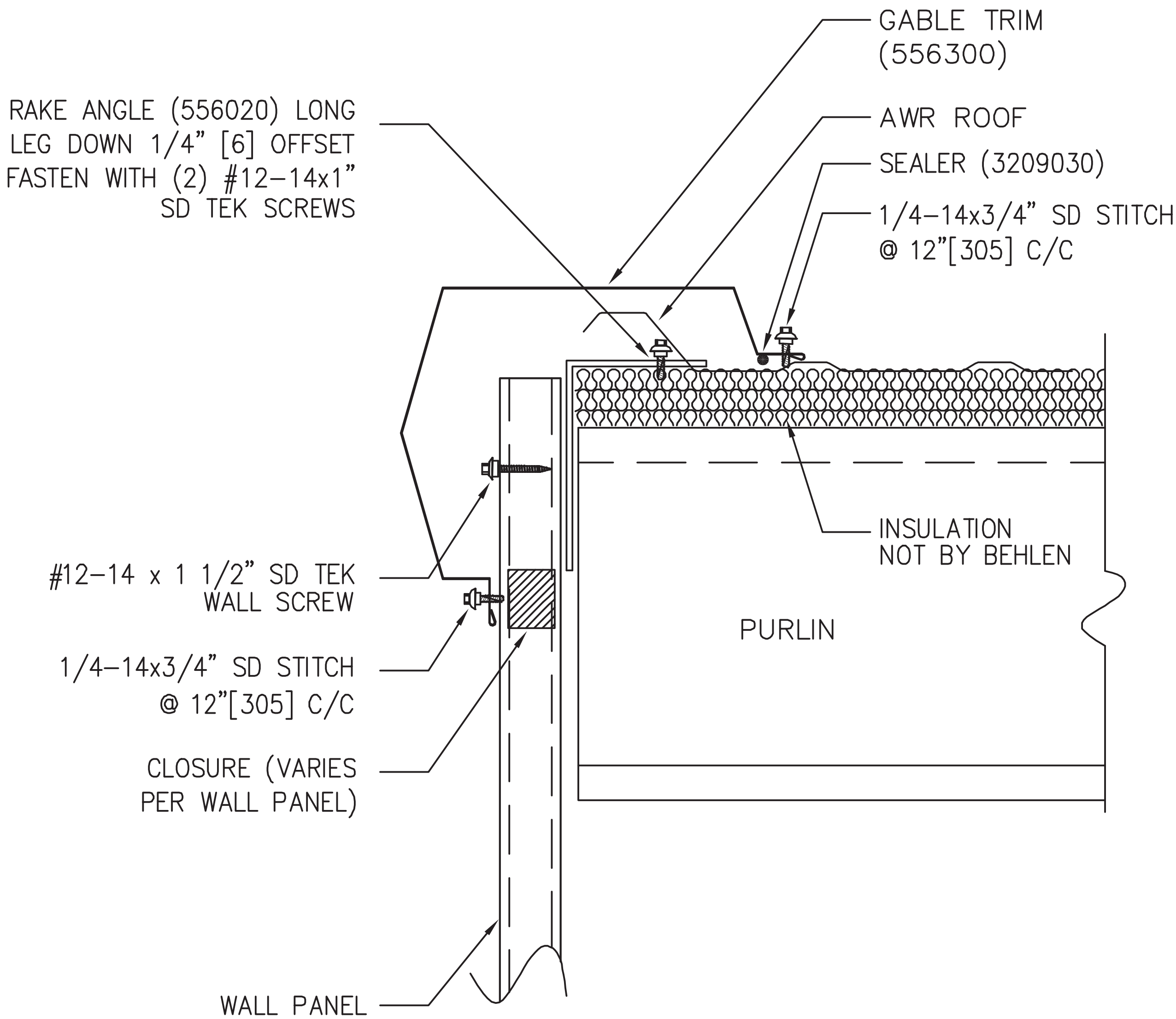
BEHLEN
Made Strong



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

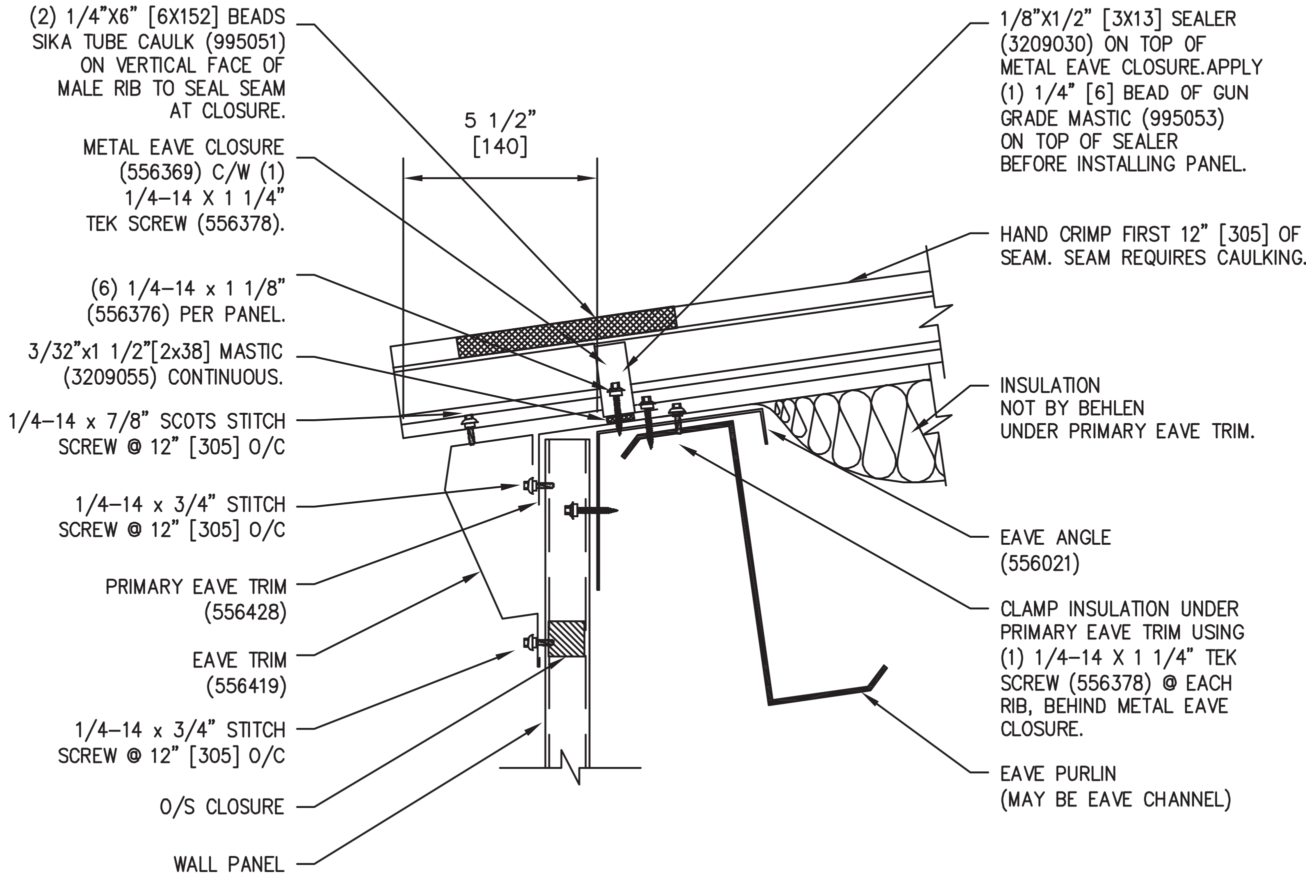
AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF HIGH EAVE END CONDITION	Section 5.2	Page 010

BEHLEN
Made Strong



AWR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF GABLE END CONDITION	Section 5.2	Page 011

BEHLEN
Made Strong

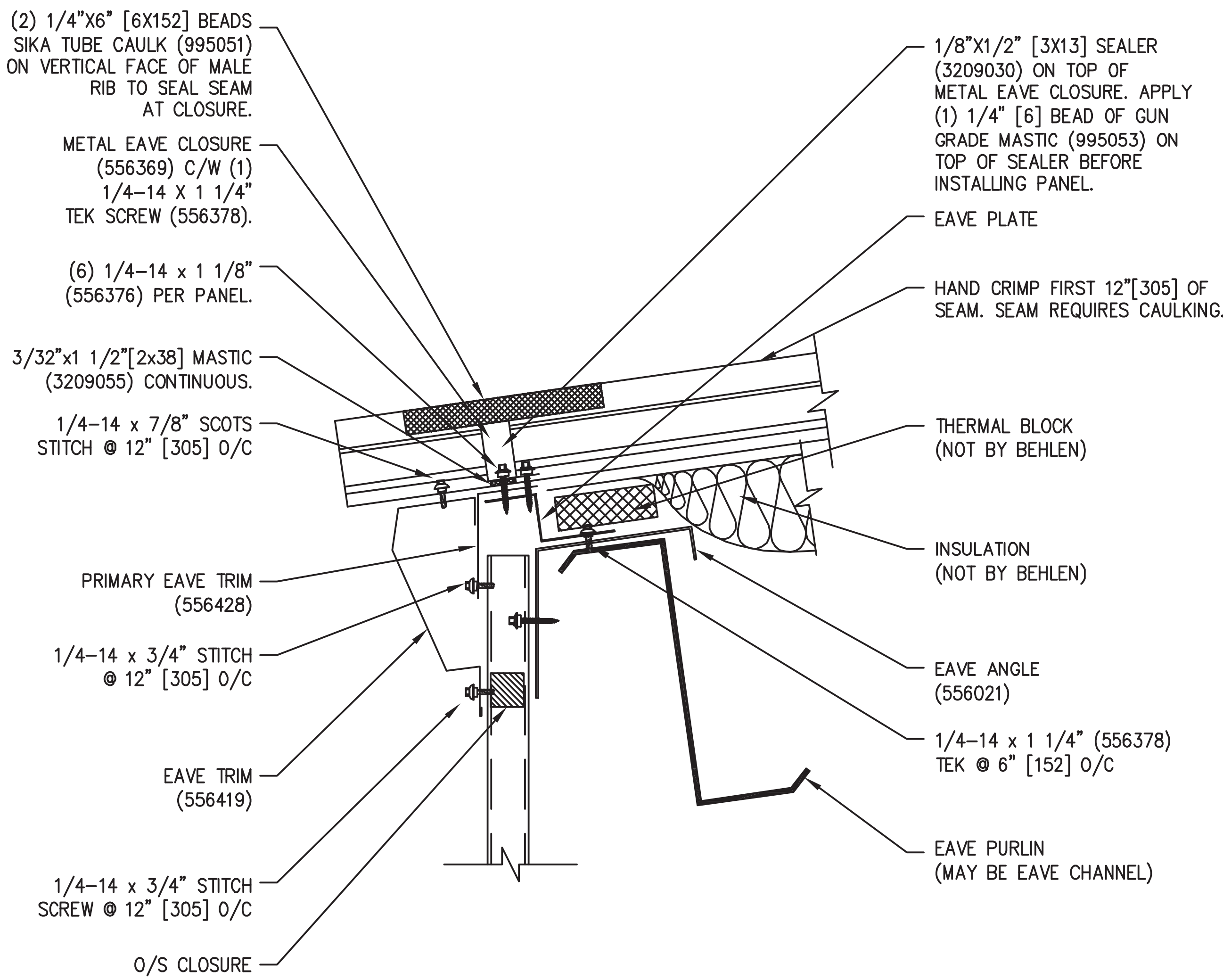


NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

EAVE TRIM WITHOUT EAVE PLATE

SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
EAVE TRIM CONDITION	Section 5.3	Page 001

BEHLEN
Made Strong

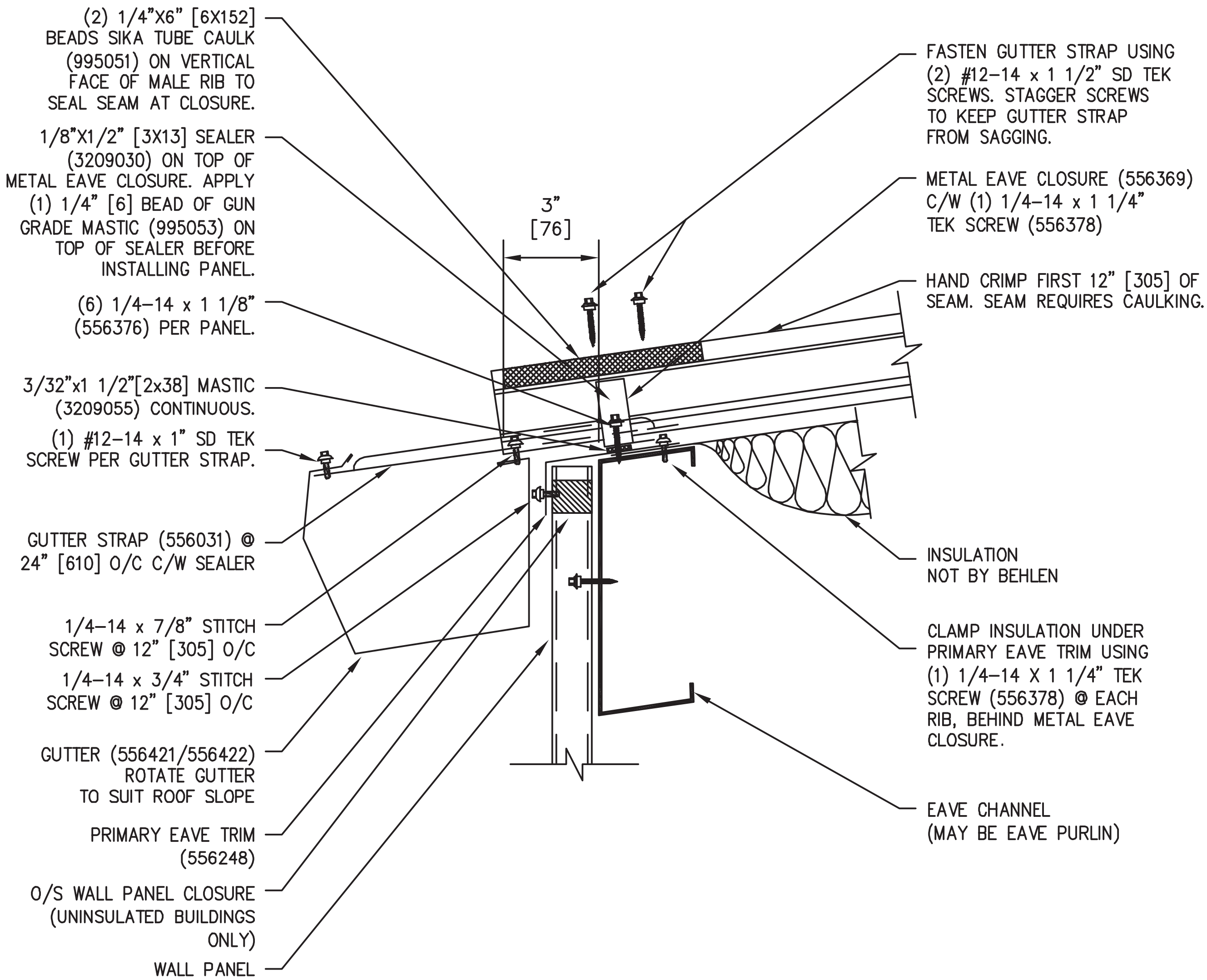


NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

EAVE TRIM WITH EAVE PLATE

SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
EAVE TRIM CONDITION	Section 5.3	Page 002

BEHLEN
Made Strong

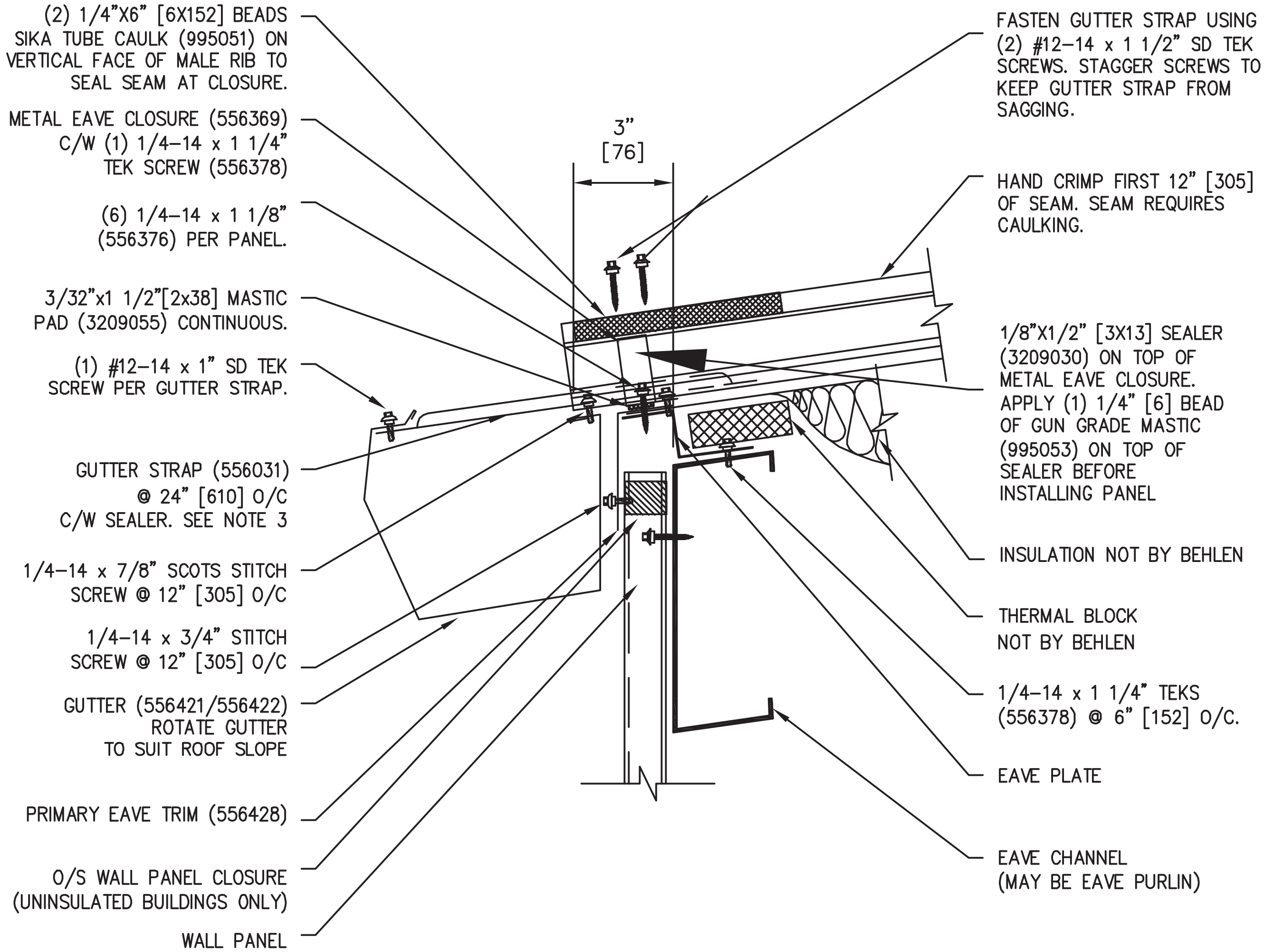


NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

GUTTER WITHOUT EAVE PLATE

SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
EAVE GUTTER CONDITION	Section 5.3	Page 003

BEHLEN
Made Strong

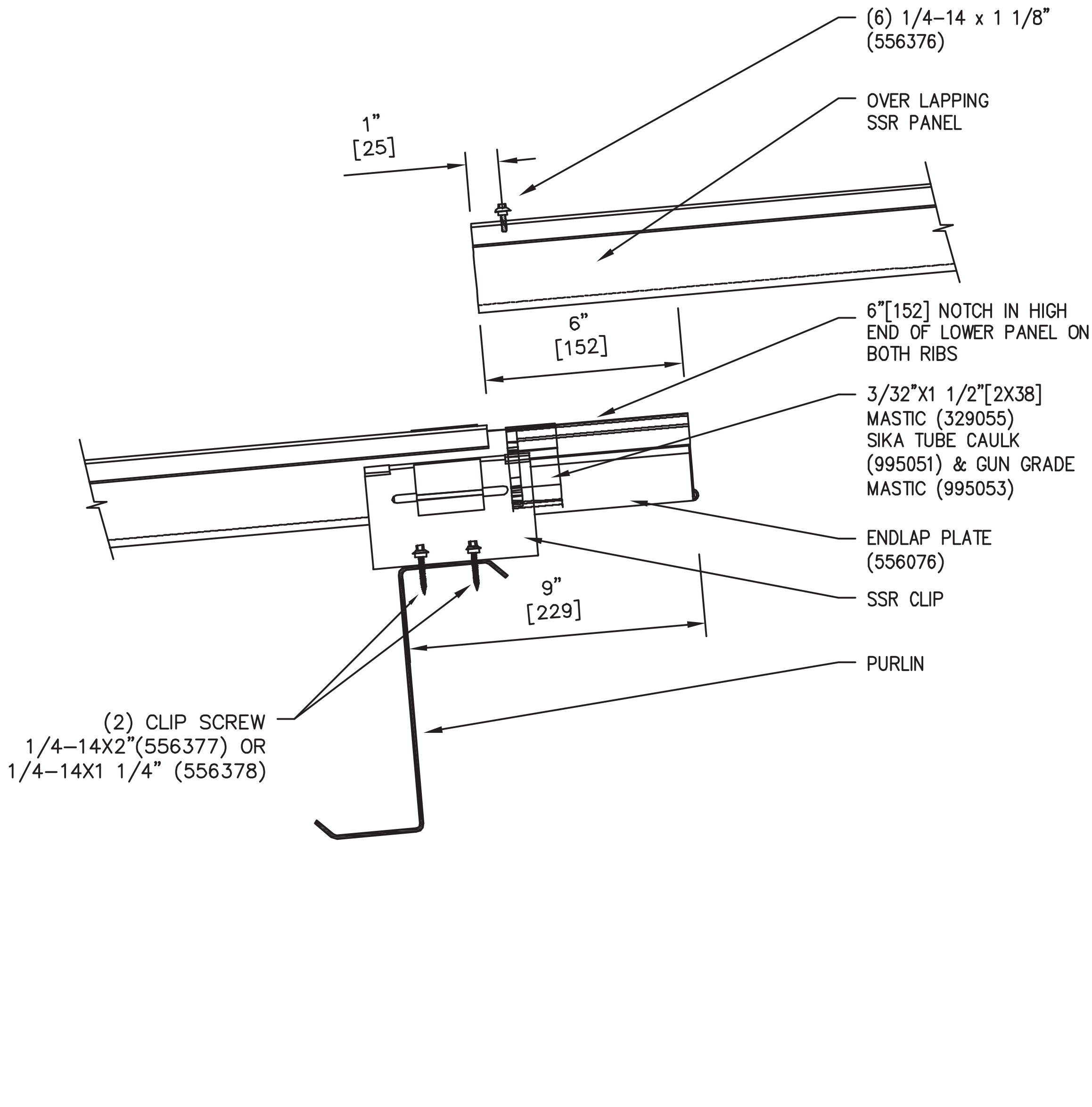


NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

GUTTER WITH EAVE PLATE

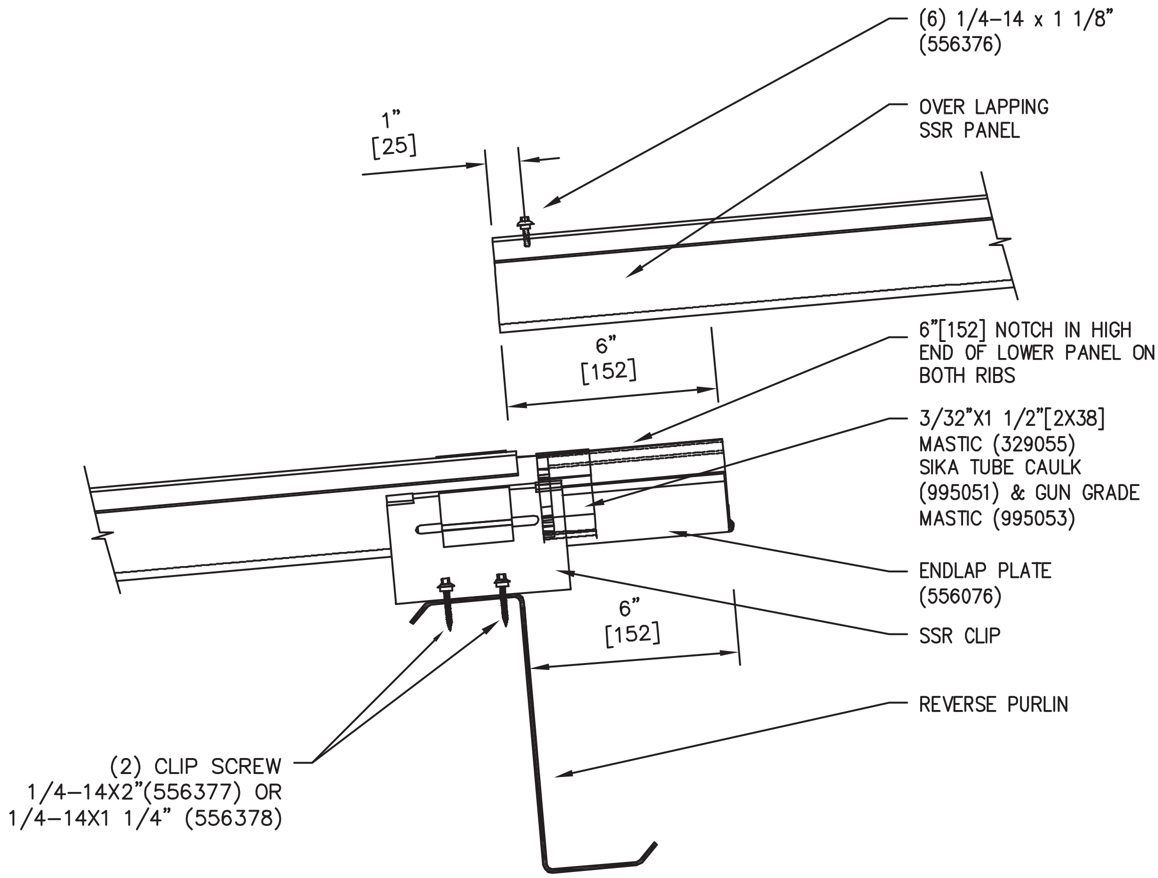
SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
EAVE GUTTER CONDITION	Section 5.3	Page 004

BEHLEN
Made Strong

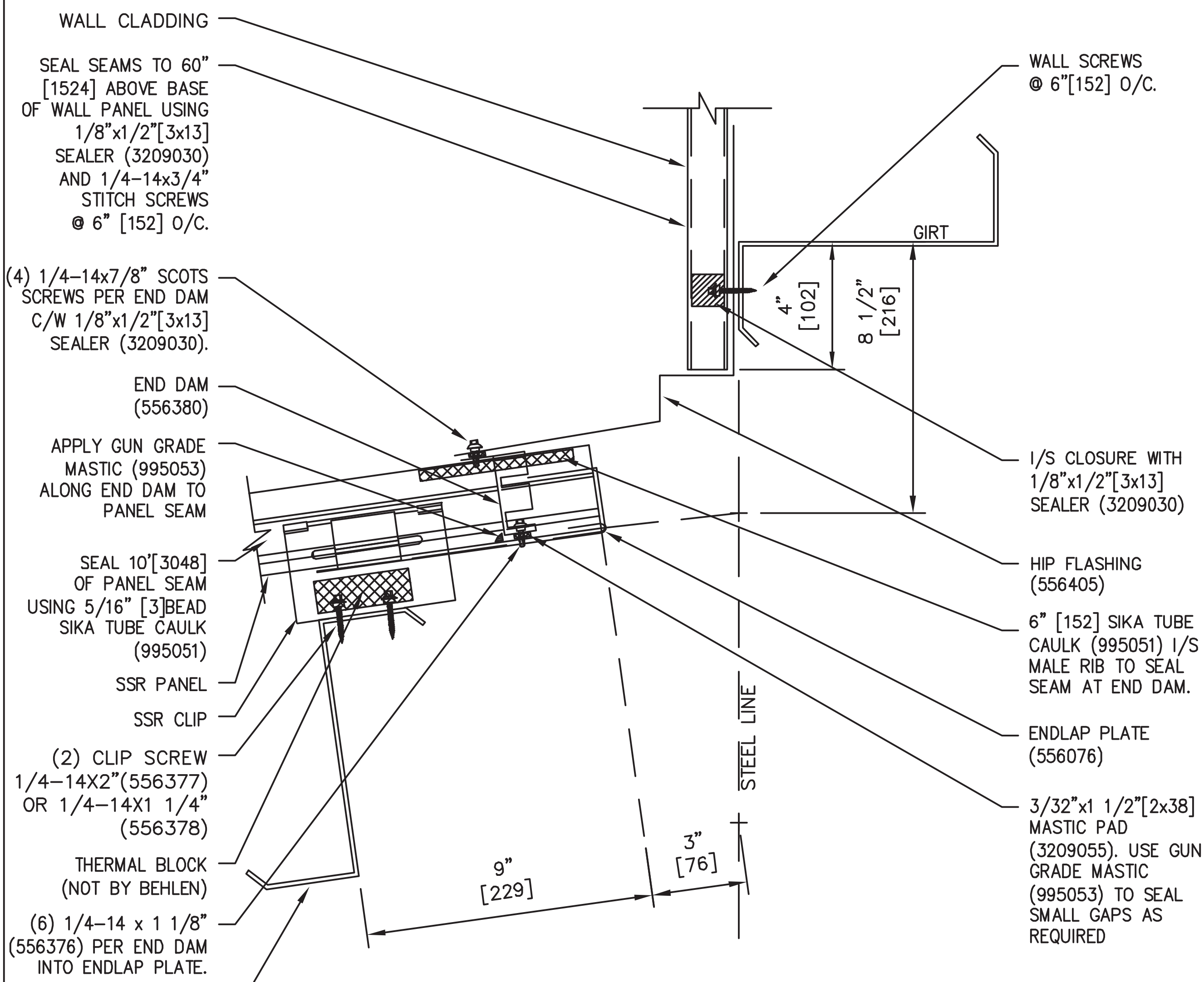


SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
UP SLOPE PURLIN CONDITION	Section 5.3	Page 005

BEHLEN
Made Strong



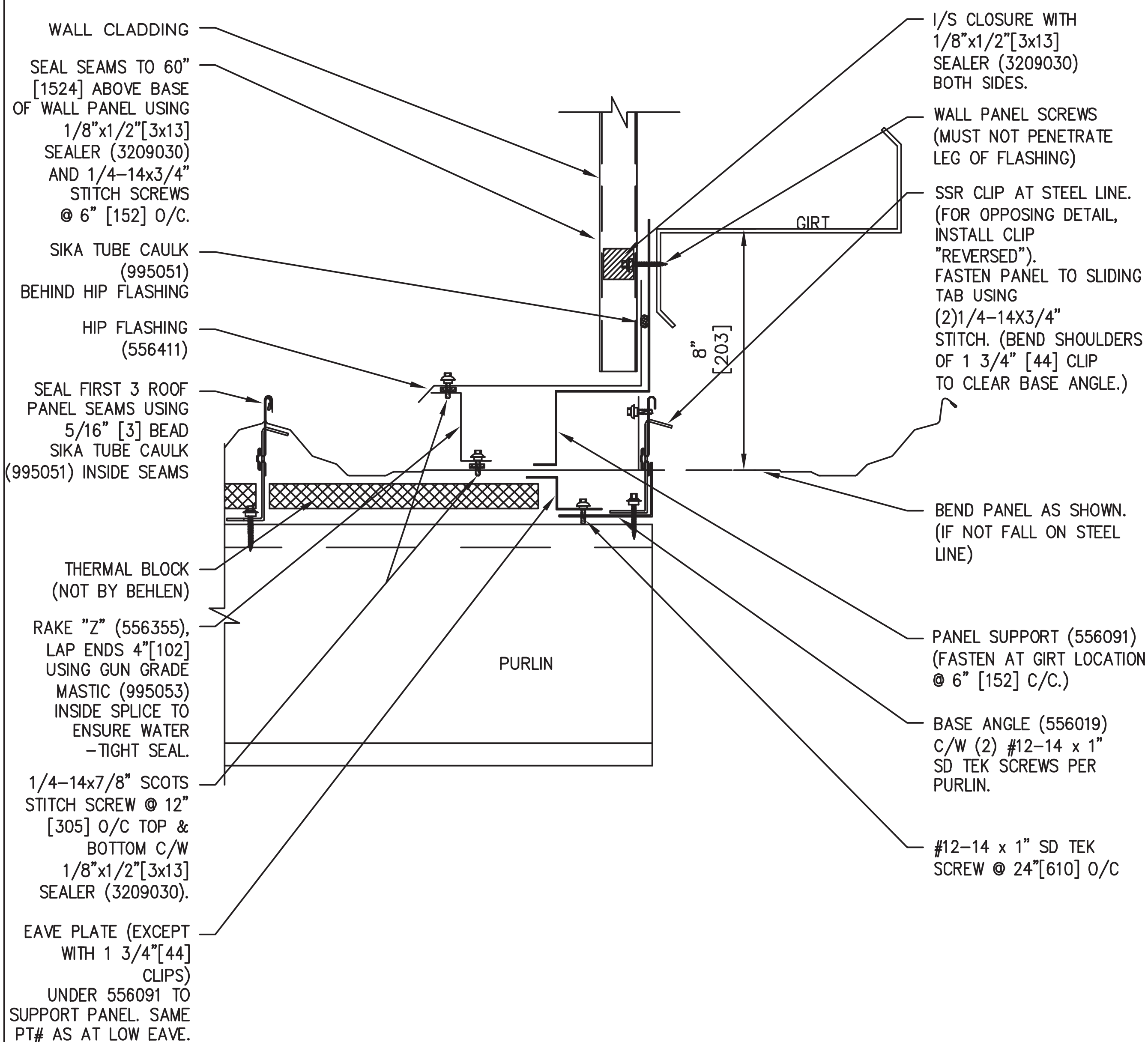
SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
DOWN SLOPE PURLIN CONDITION	Section 5.3	Page 006



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

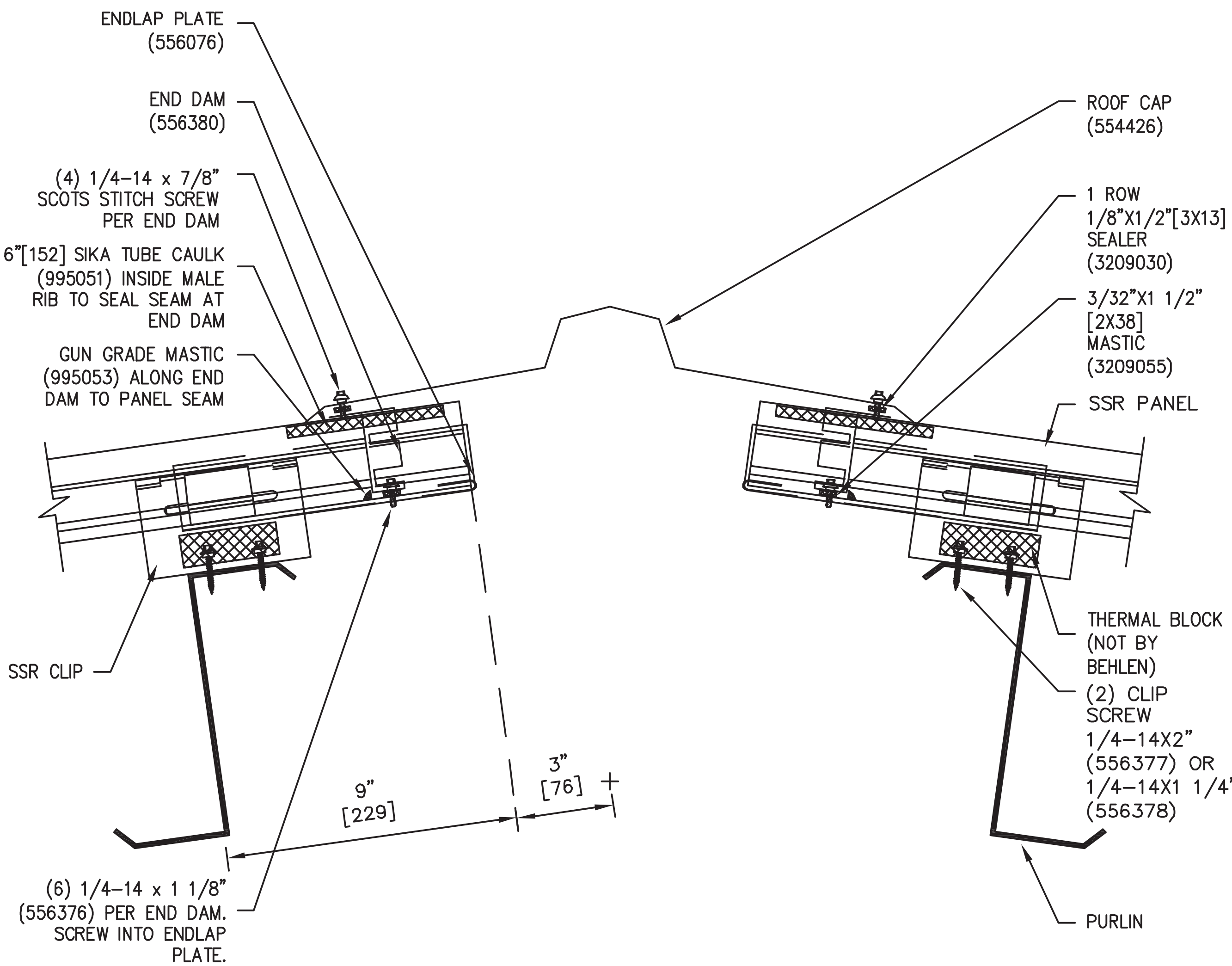
SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
SLOPING ROOF to WALL CONDITION	Section 5.3	Page 007

BEHLEN
Made Strong



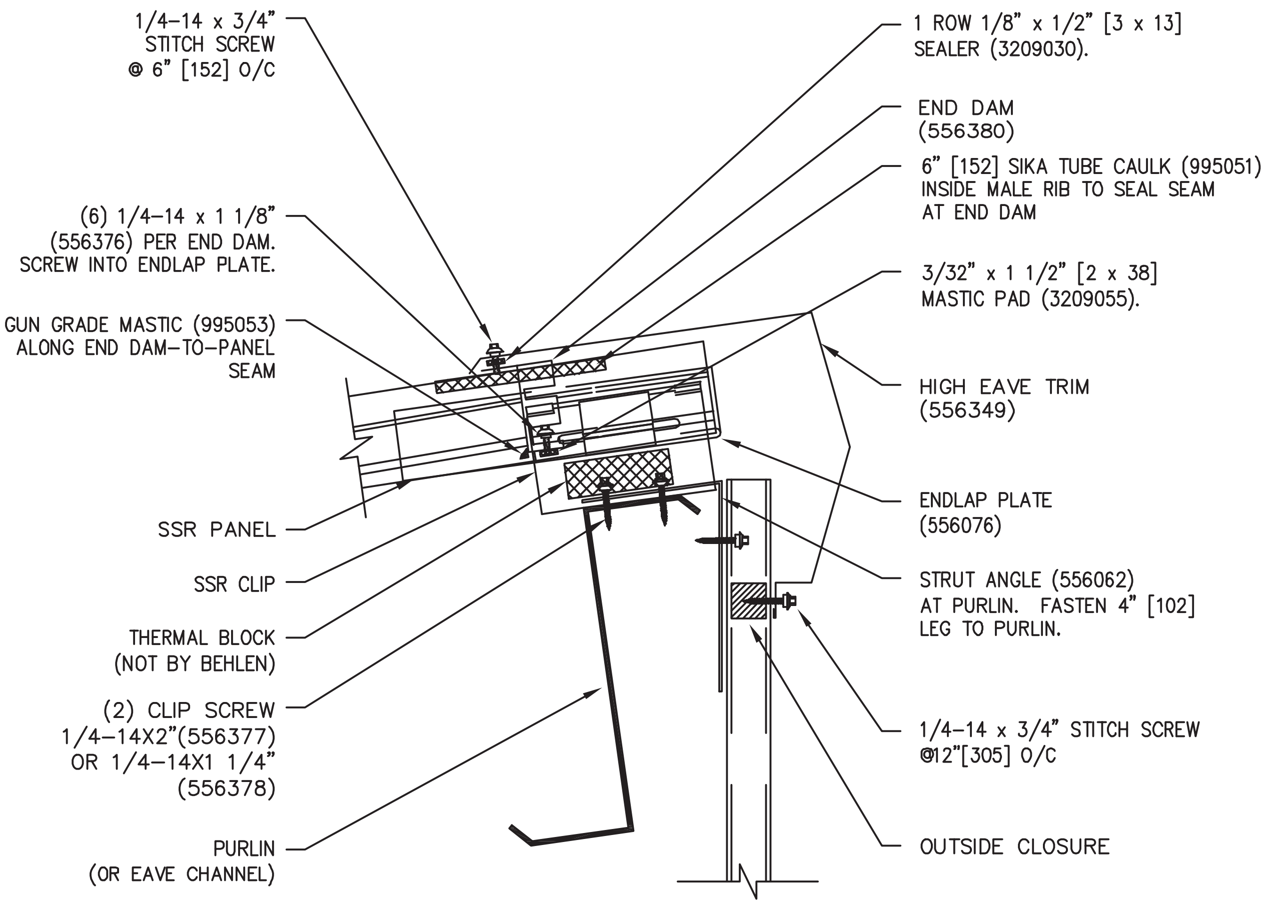
SSR ROOF EAVE DETAIL	JULY 2008		
	Vr 1.0		
ROOF to WALL at GABLE END	Section 5.3	Page 008	

BEHLEN
Made Strong



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

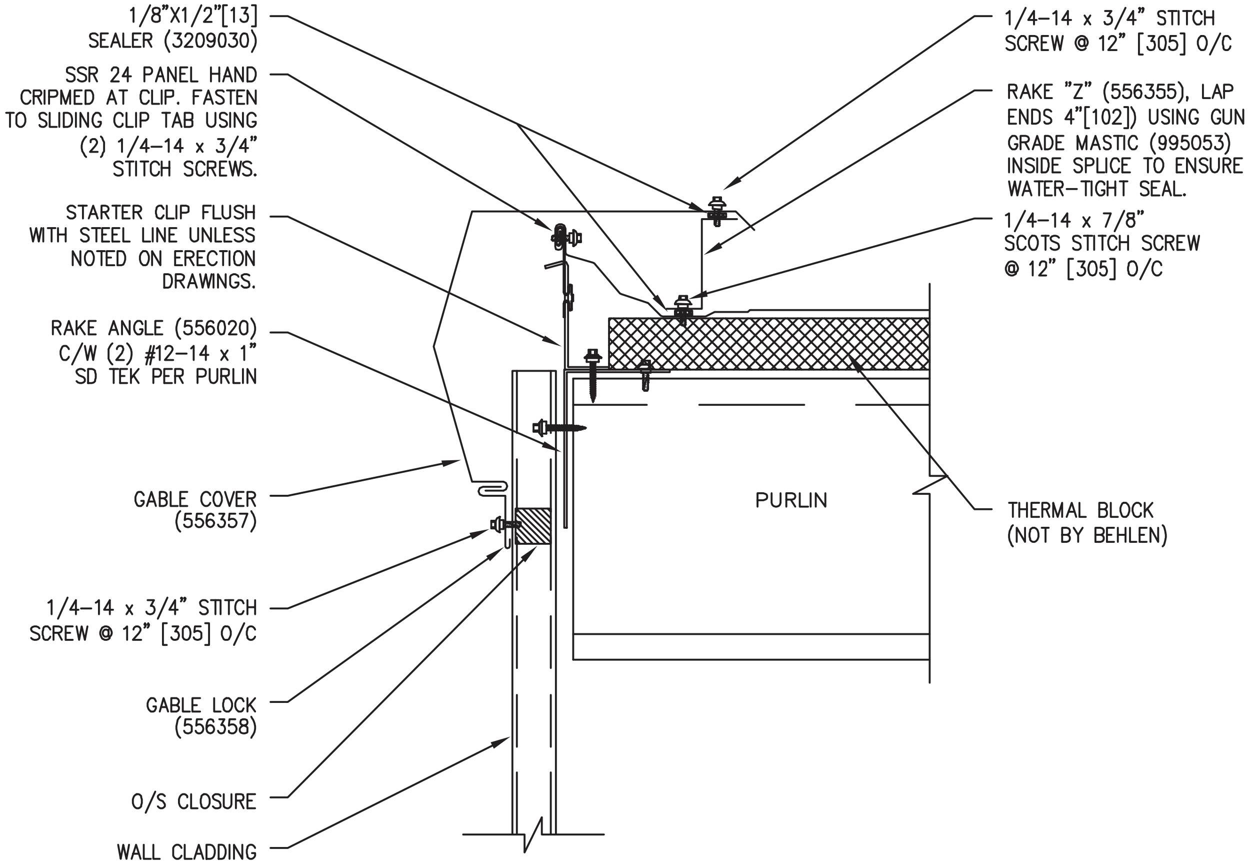
SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF RIDGE CONDITION	Section 5.3	Page 009



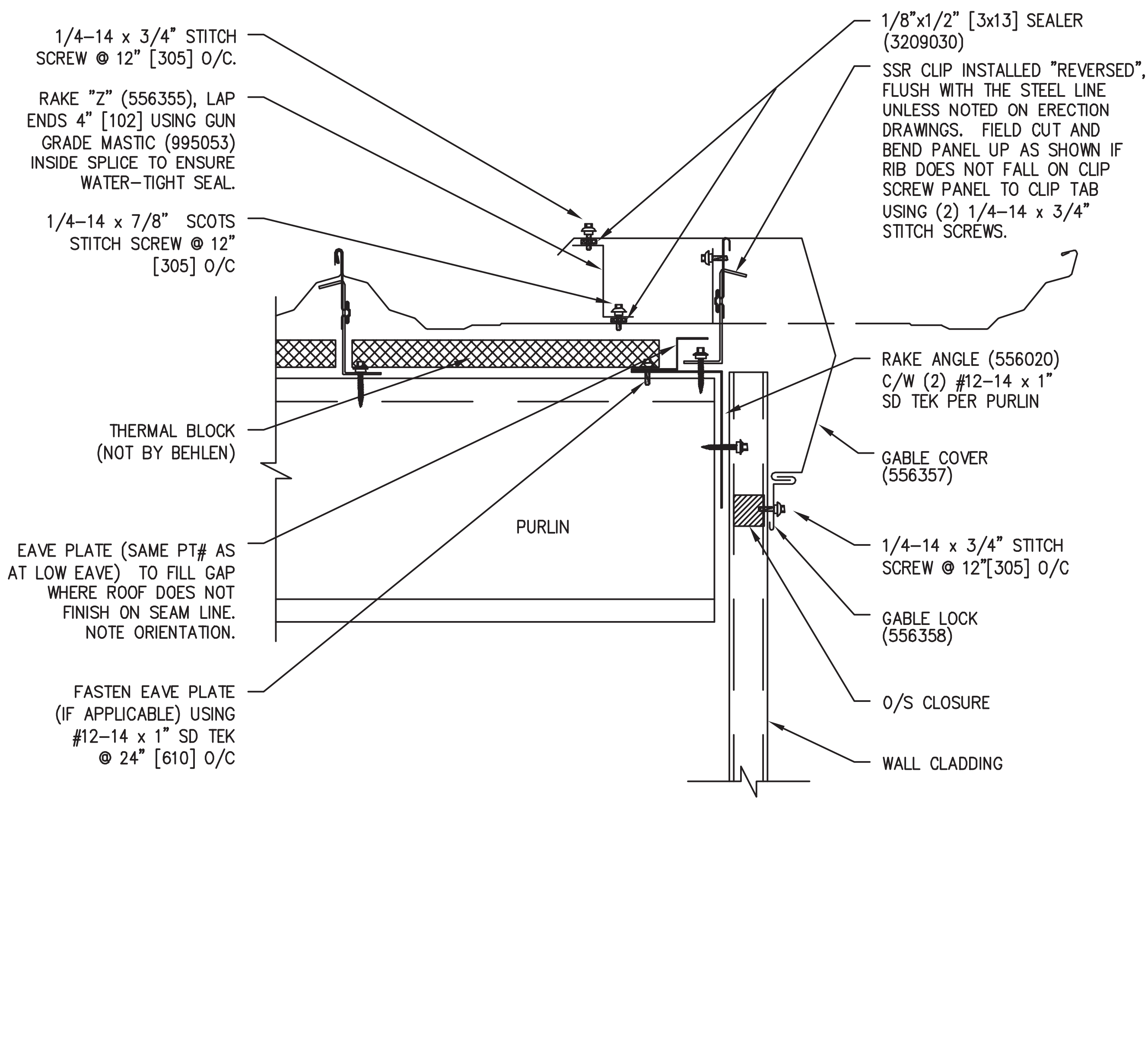
NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF HIGH EAVE END CONDITION	Section 5.3	Page 010

BEHLEN
Made Strong

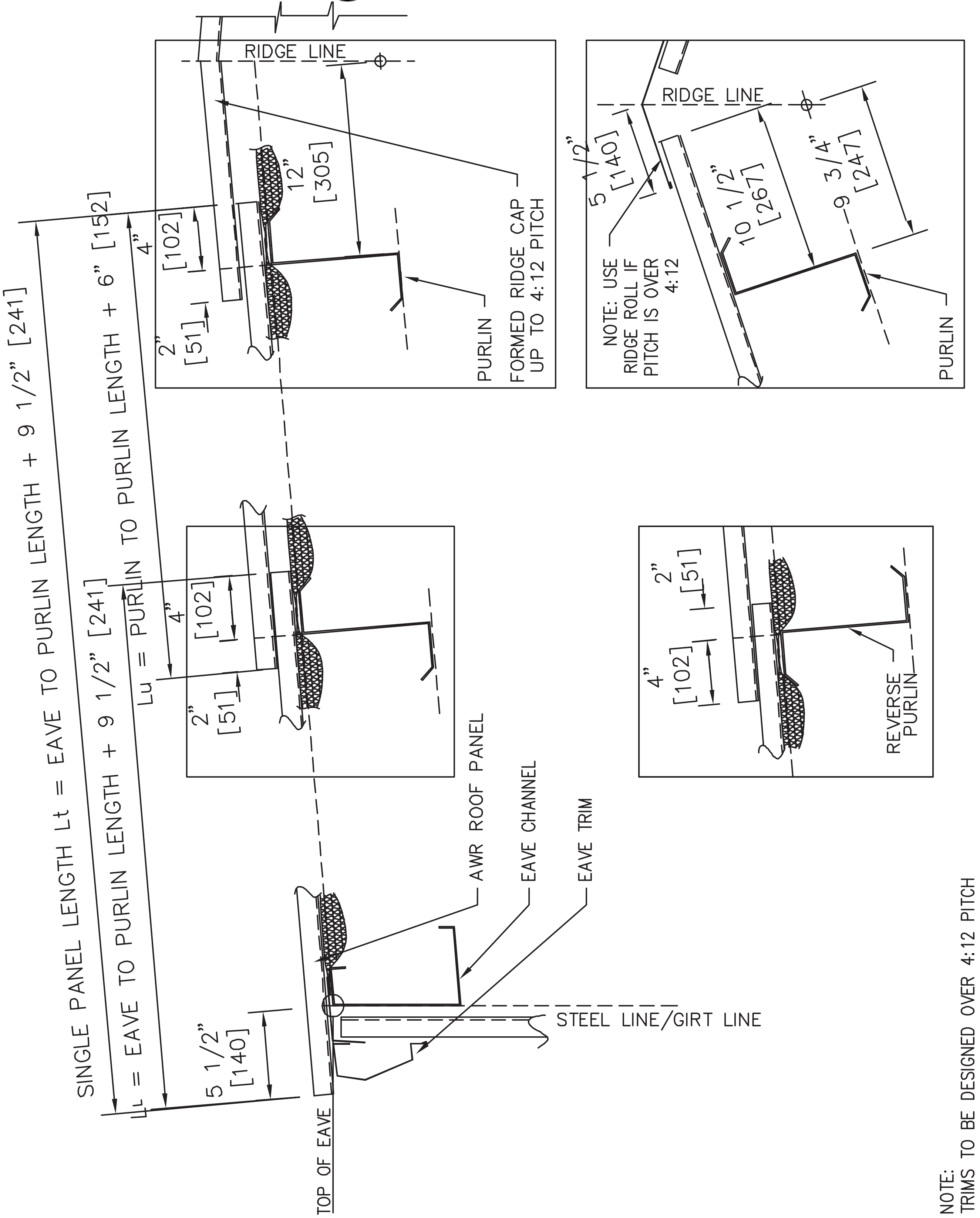


SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
SLOPING ROOF to WALL CONDITION	Section 5.3	Page 011



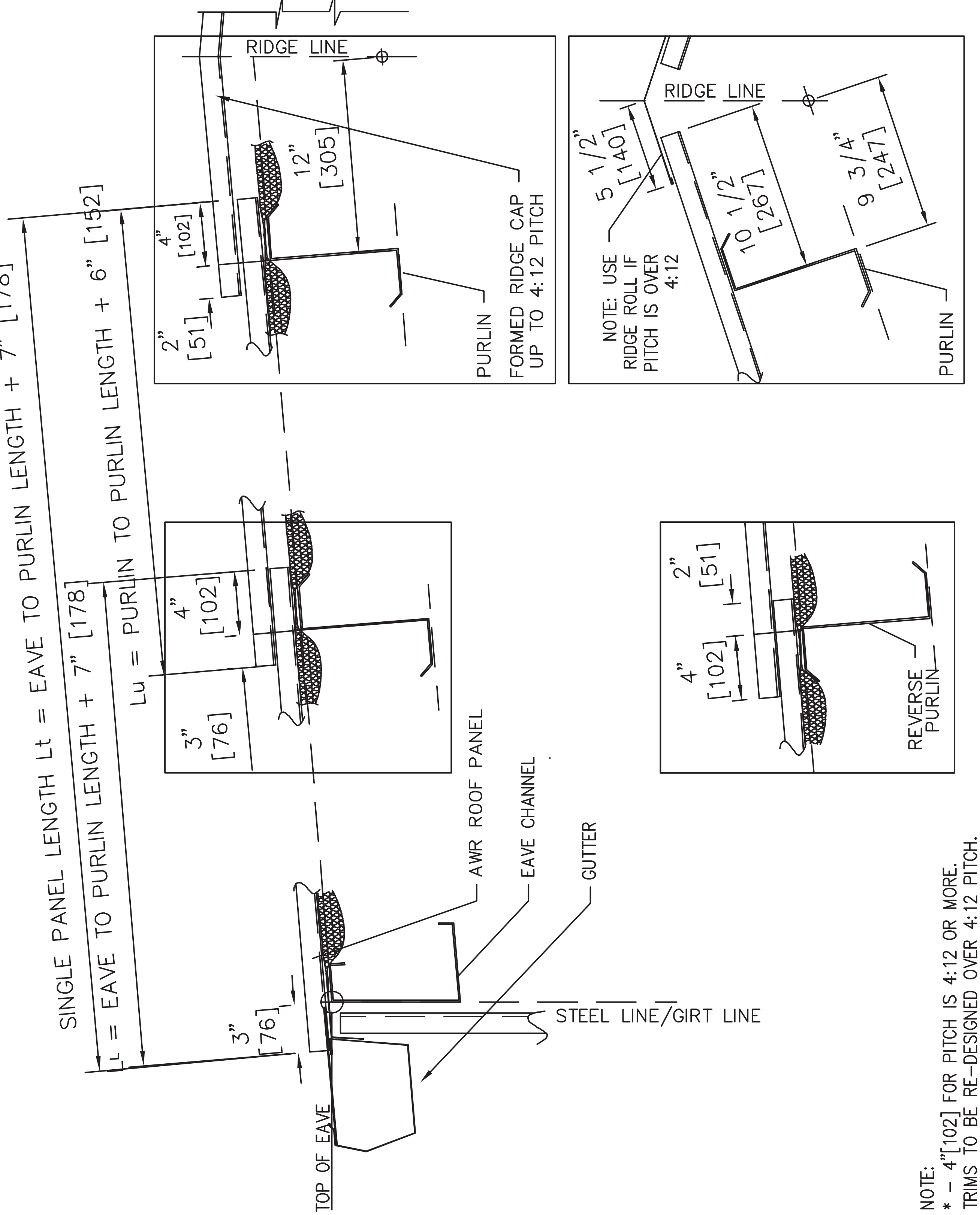
SSR ROOF EAVE DETAIL	JULY 2008	
	Vr 1.0	
ROOF GABLE END CONDITION	Section 5.3	Page 012

BEHLEN
Made Strong



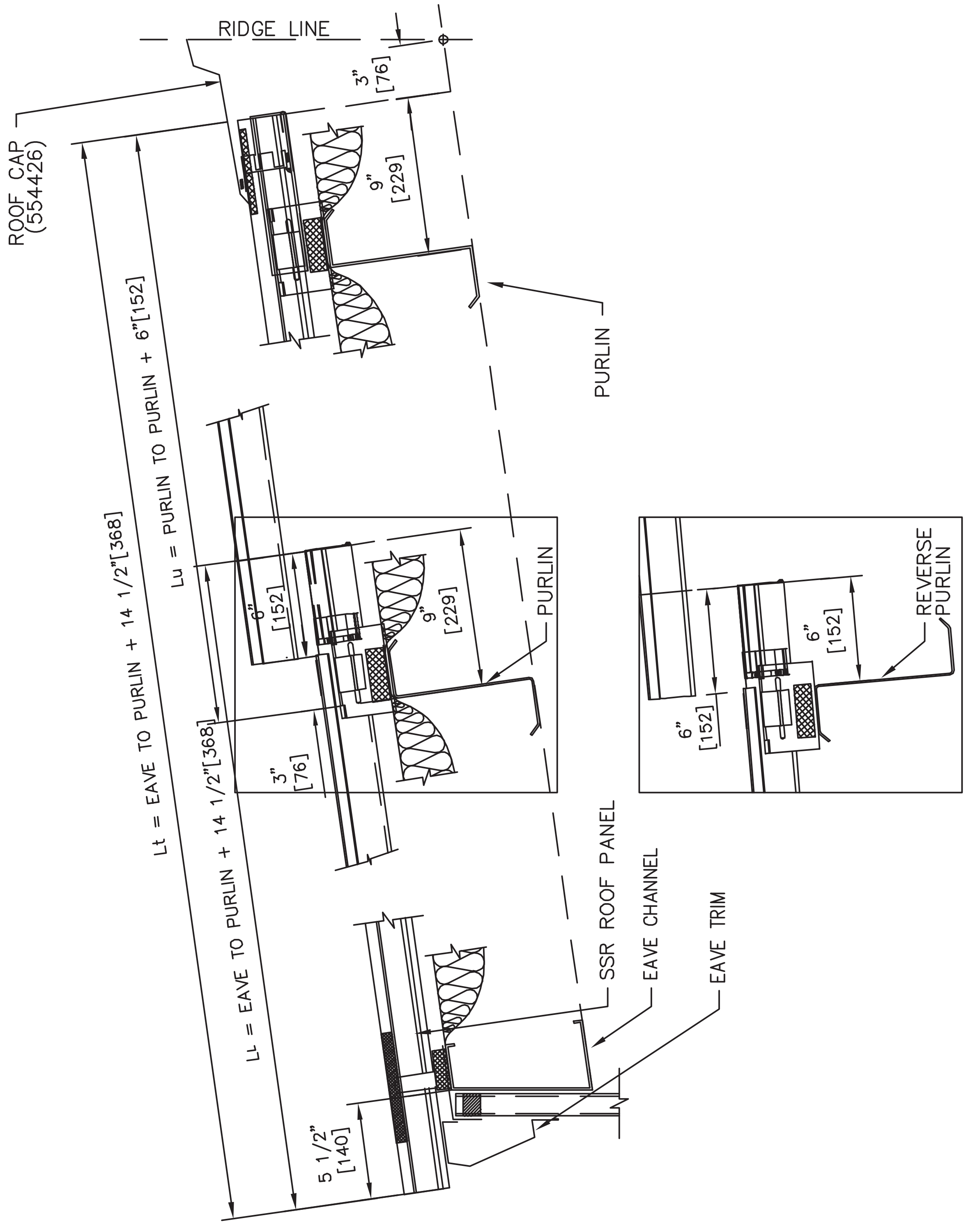
LENGTH of ROOF PANEL	JULY 2008	
	Vr 1.0	
AWR ROOF PANEL with EAVE TRIM	Section 5.4	Page 001

BEHLEN
Made Strong



LENGTH of ROOF PANEL	JULY 2008	
	Vr 1.0	
AWR ROOF PANEL with EAVE GUTTER	Section 5.4	Page 002

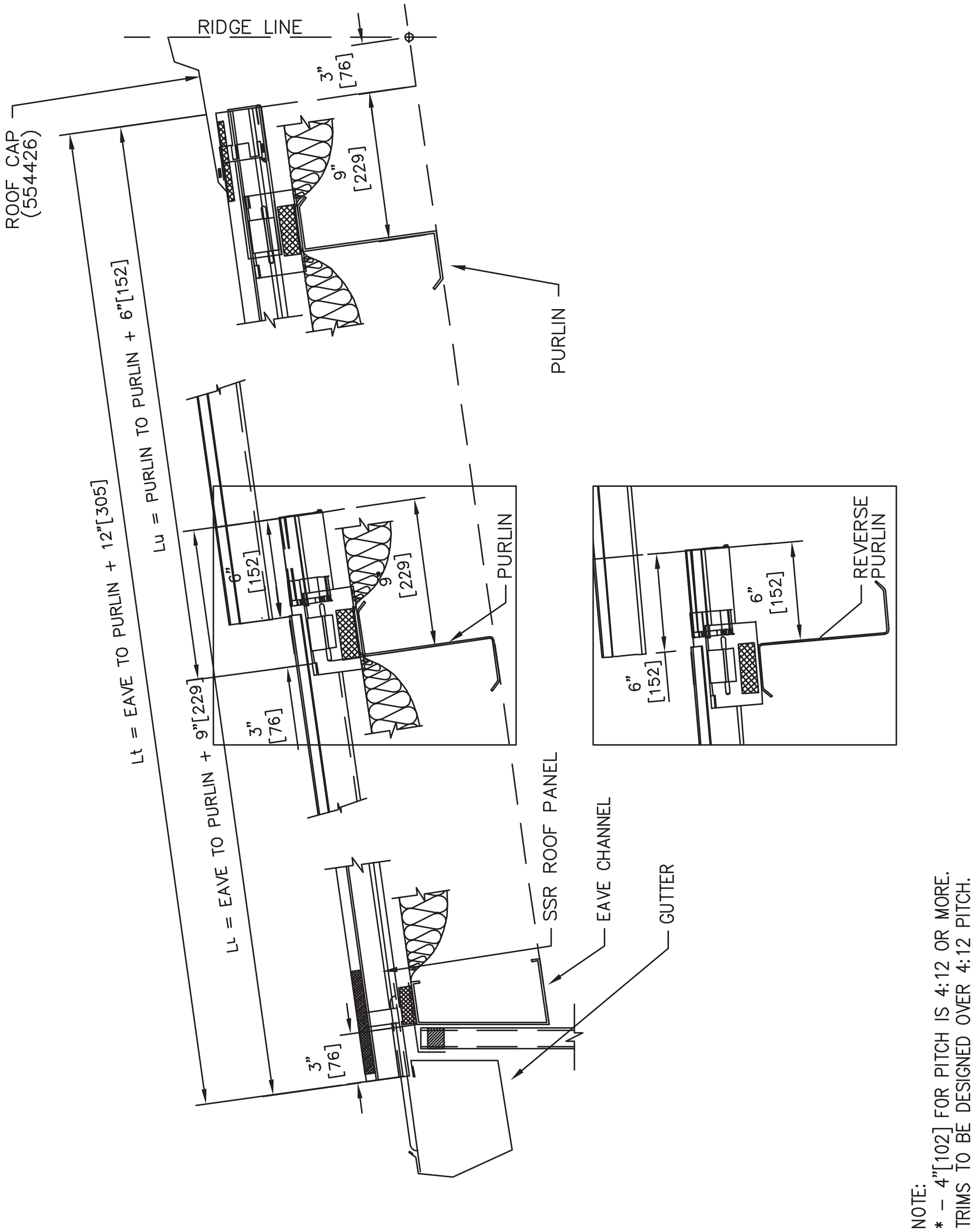
BEHLEN
Made Strong



NOTE:
TRIMS TO BE DESIGNED OVER 4:12 PITCH

LENGTH of ROOF PANEL	JULY 2008	
	Vr 1.0	
SSR ROOF PANEL with EAVE TRIM	Section 5.4	Page 003

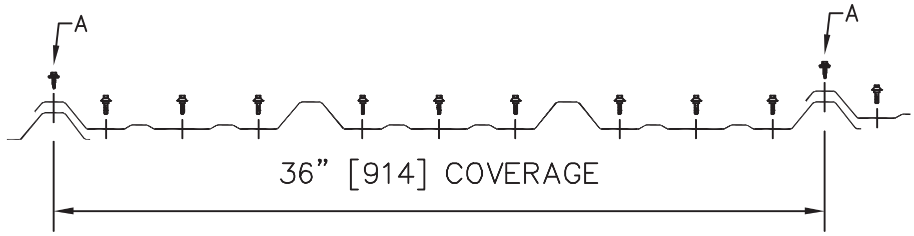
BEHLEN
Made Strong



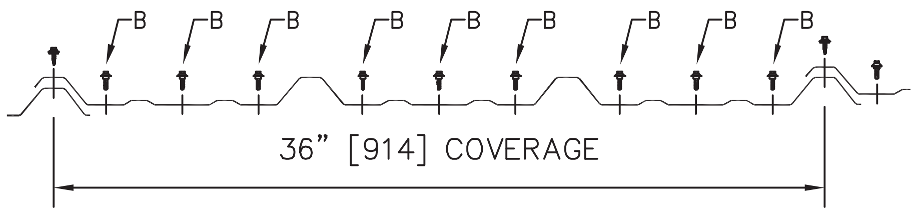
LENTH of ROOF PANEL	JULY 2008	
	Vr 1.0	
SSR ROOF PANEL with EAVE GUTTER	Section 5.4	Page 004

BEHLEN
Made Strong

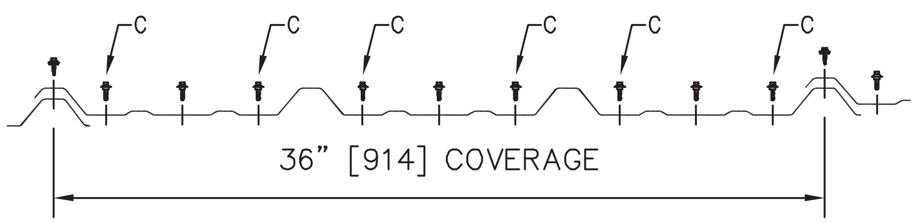
ROOF PANEL FASTENER LAYOUT FOR AWR PANELS



FASTENER	USE BETWEEN OR AT	FASTENER TYPE	PER PANEL
A	TWO PANELS	1/4–14x3/4" SD	QTY= 1# PER 12"[305] LENGTH



FASTENER	USE BETWEEN OR AT	FASTENER TYPE	PER PANEL
B	PANEL AND EAVE / 1st PURLIN / RIDGE / SPLICE	#12–14x1 1/2" SD TEK*	QTY= 9# PER PANEL @ CONNECTION



FASTENER	USE BETWEEN OR AT	FASTENER TYPE	PER PANEL
C	PANEL AND ALL OTHER INTERMEDIATE PURLIN	#12–14x1 1/2" SD TEK*	QTY= 6# PER PANEL @ CONNECTION

NOTE:
* – SCREW LENGTH MAY VARY PER ORDER

ROOF PANEL FASTENER LOCATIONS	JULY 2008	
	Vr 1.0	
AWR PANEL	Section 5.5	Page 001

BEHLEN
Made Strong

TRIM FASTENERS FOR ROOF PANELS
AWR, WIDESPAN, ULTRASPAN OR DELTASPAN WALL PANEL WITH
(AWR/ULTRA SPAN/ELITE RIB ROOF)

USE BETWEEN OR AT	FASTENER TYPE	QUANTITY
PRIMARY EAVE TRIM WITH SIDEWALL	1/4–14x 3/4" SD TEK	QTY= 1 PER 12"[305]
EAVE TRIM WITH SIDEWALL & ROOF		QTY= 2 PER 12"[305]
GABLE COVER / HIGH GABLE COVER WITH ENDWALL & ROOF		QTY= 2 PER 12"[305]
GUTTER WITH ROOF CONNECTION		QTY= 1 PER 12"[305]
BETWEEN MALE GUTTER & FEMALE GUTTER		QTY= 8 PER CONNECTION
FLASHING TRIM ROOF TO WALL		QTY= 1 PER 6"[152]
GABLE CORNER BOX		QTY= 8 PER PIECE
CENTRE GABLE COVER		QTY= 18 PER PIECE
DOWN SPOUT STRAP WITH DOWN SPOUT		QTY= 4 PER PIECE
DOWN SPOUT WITH GUTTER CONNECTION		QTY= 4 PER PIECE
ROLLED RIDGE CAP (AWR ROOF)		QTY= 2 PER 12"[305]
ROLLED RIDGE CAP (ULTRA / ELITE ROOF)		QTY= 2 PER 6"[152]
GUTTER STRAP WITH ROOF & GUTTER CONNECTION	#12–14x 1" SD TEK	QTY= 2 PER PIECE

BEHLEN
Made Strong

SSR TRIM and ROOF PANEL FASTENERS
(AWR, WIDESPAN, ULTRASPAN OR DELTASPAN WALL PANEL)

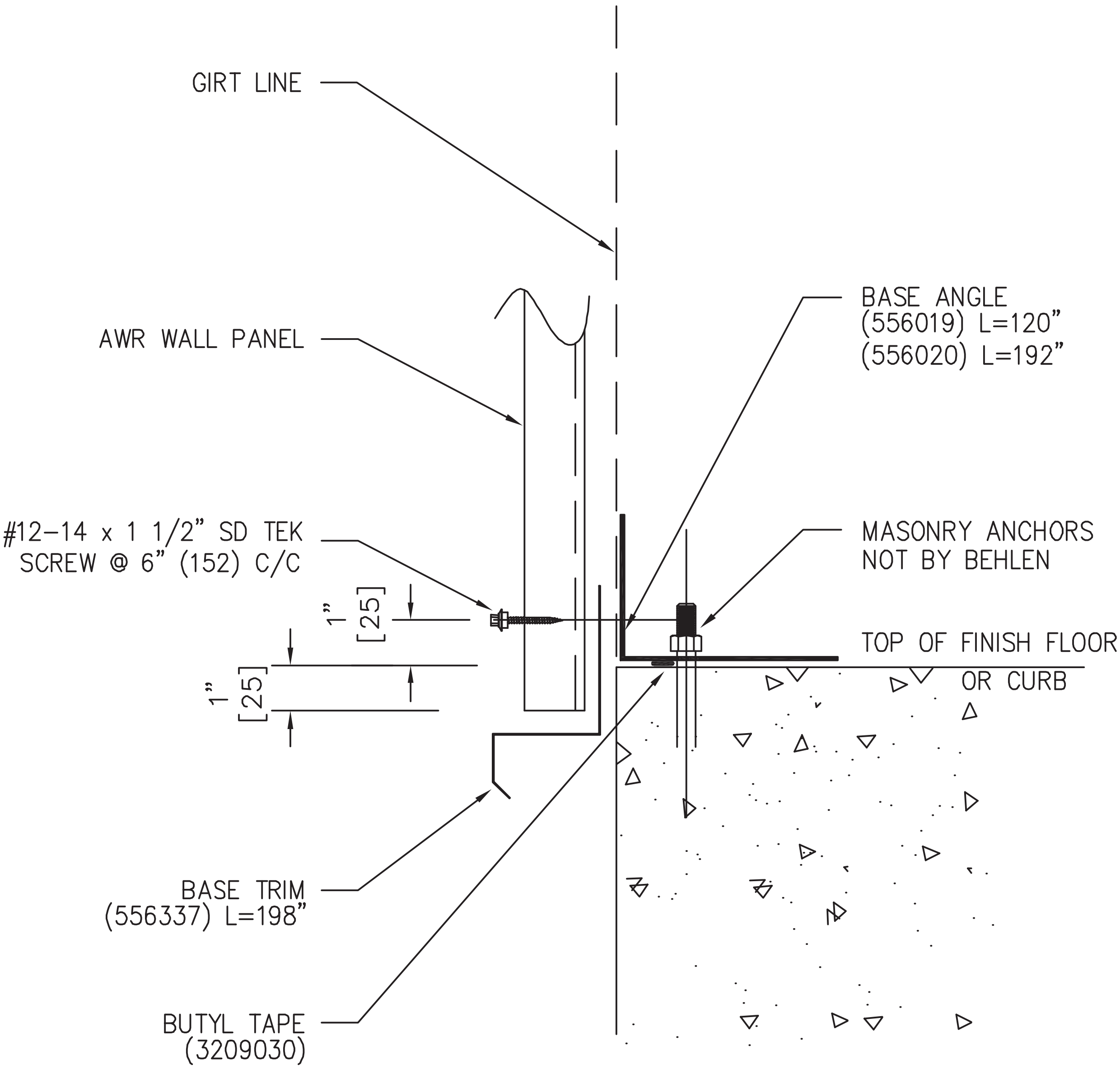
USE BETWEEN OR AT	FASTENER TYPE	QUANTITY
SSR CLIP SCREW 556377 ACCOMODATE 4" TO 6" INSULATION 556378 ACCOMODATE UP TO 4" INSULATION	1/4-14x2" (556377) OR 1/4-14X1 1/4" (556378)	QTY= 2 PER CLIP
GUTTER STRAP WITH ROOF CONNECTION	#12-14x 1 1/2" SD TEK	QTY= 2 PER STRAP
PRIMARY EAVE TRIM WITH EAVE	1/4-14x 1 1/4" (556378)	QTY= 1 PER 24"[610]
EAVE PLATE ON SIDE WALL	1/4-14x 1 1/4" (556378)	QTY= 1 PER 6"[152]
I/S CLOSURE	1/4-14x 1 1/4" (556378)	QTY= 1 PER PIECE
SSR ROOF WITH EAVE	1/4-14x 1 1/8" (556376)	QTY= 6 PER PANEL ON EAVE STRUT
SSR ROOF OVERLAPPING WITH ENDLAP PLATE	1/4-14x 1 1/8" (556376)	QTY= 6 PER PANEL
END DAM & ENDLAP PLATE ON RIDGE WITH ROOF PANEL	1/4-14x 1 1/8" (556376)	QTY= 6 PER PANEL ON RIDGE
EAVE PLATE ON END WALL WITH RAKE ANGLE	#12-14x 1" SD TEK	QTY= 1 PER 24"[610]
GUTTER STRAP WITH GUTTER CONNECTION	#12-14x 1" SD TEK	QTY= 1 PER STRAP
PRIMARY EAVE TRIM WITH SIDEWALL	1/4-14x 3/4" SD TEK	QTY= 1 PER 12"[305]
EAVE TRIM WITH SIDEWALL	1/4-14x 3/4" SD TEK	QTY= 1 PER 12"[305]
SSR ROOF WITH CLIP ON GABLE ENDS ONLY.	1/4-14x 3/4" SD TEK	QTY= 2 PER CLIP

BEHLEN
Made Strong

SSR TRIM and ROOF PANEL FASTENERS
(AWR, WIDESPAN, ULTRASPAN OR DELTASPAN WALL PANEL)

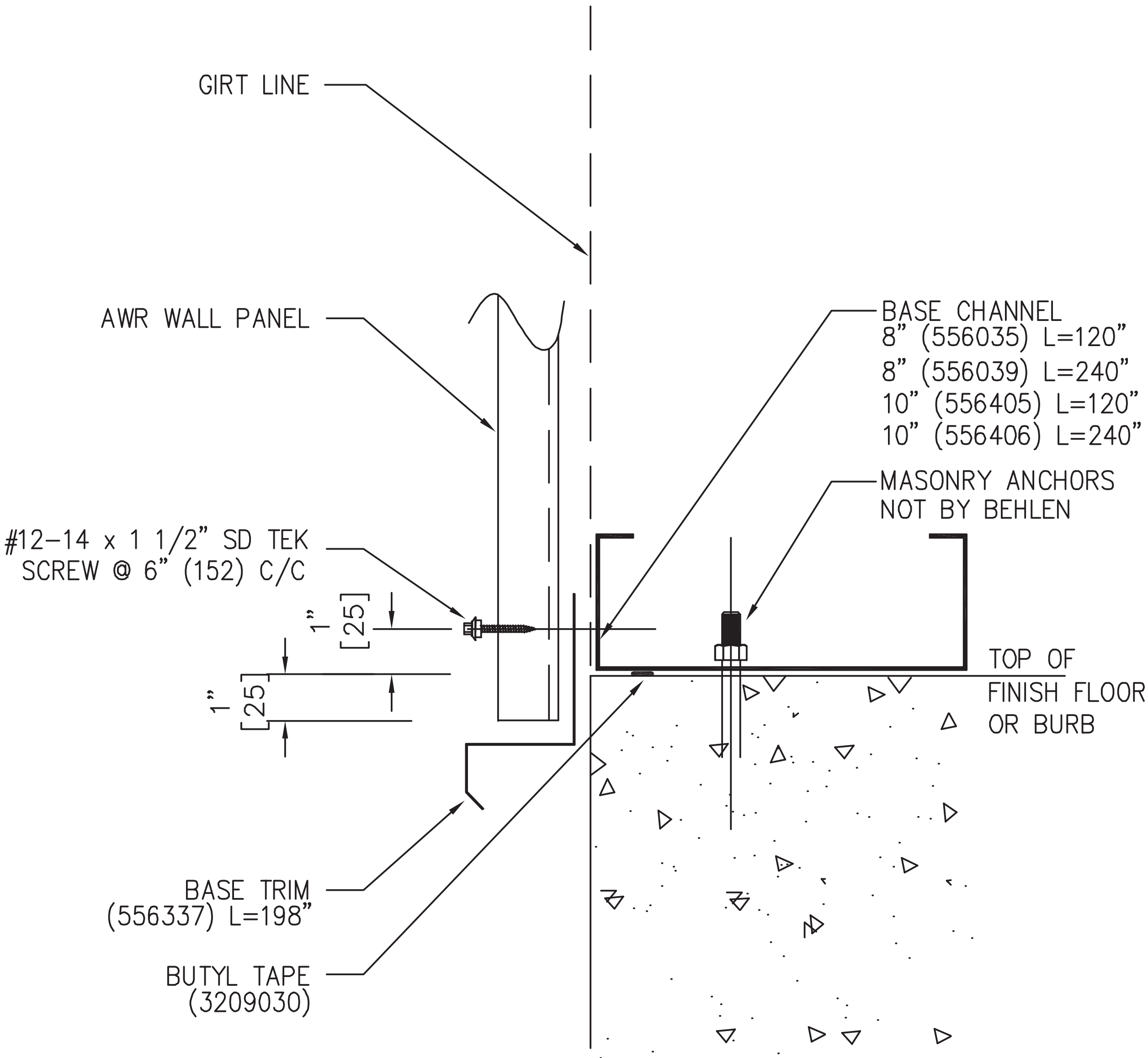
USE BETWEEN OR AT	FASTENER TYPE	QUANTITY
HIGH EAVE TRIM	1/4–14x 3/4" SD TEK	QTY= 2 PER 12"[305]
GABLE LOCK		QTY= 1 PER 12"[305]
BETWEEN MALE GUTTER & FEMALE GUTTER		QTY= 8 PER CONNECTION
FLASHING TRIM ROOF TO WALL		QTY= 4 PER END DAM
GABLE CORNER BOX		QTY= 8 PER PIECE
CENTRE GABLE COVER		QTY= 18 PER PIECE
DOWN SPOUT STRAP WITH DOWN SPOUT		QTY= 4 PER PIECE
DOWN SPOUT WITH GUTTER CONNECTION		QTY= 4 PER PIECE
EAVE TRIM WITH ROOF		QTY= 1 PER 12"[305]
GABLE COVER WITH RAKE ZEE		QTY= 1 PER 12"[305]
ROOF CAP	1/4–14x 7/8" SD TEK	QTY= 4 PER END DAM
RAKE "Z" WITH ROOF AND GABLE COVER AND/OR FLASHING		QTY= 1 PER 12"[305]
GUTTER WITH ROOF CONNECTION		QTY= 1 PER 12"[305]

BEHLEN
Made Strong

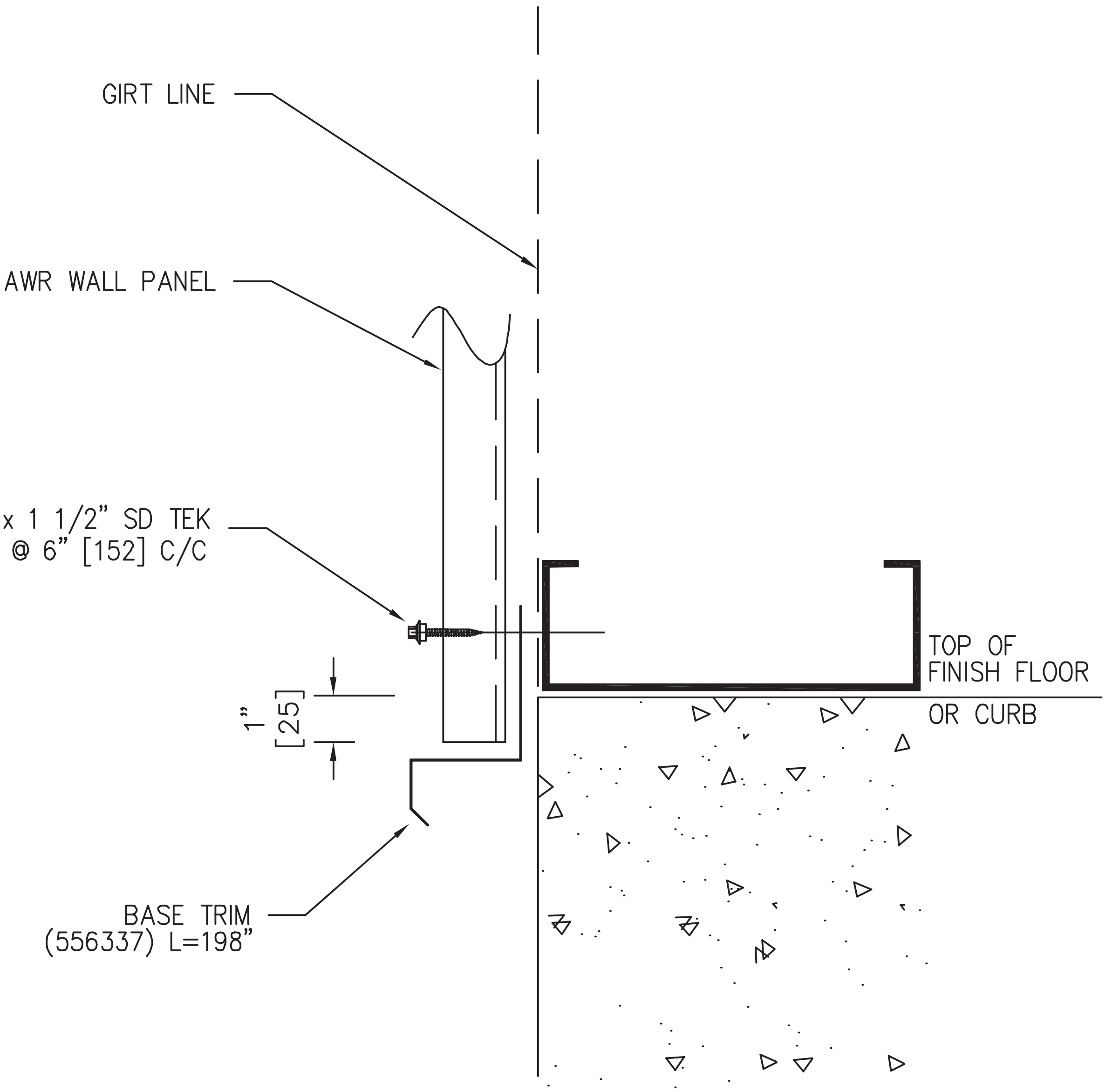


AWR WALL PANELS and BASE ANGLE	JULY 2008	
	Vr 1.0	
BASE ANGLE	Section 5.7	Page 001

BEHLEN
Made Strong

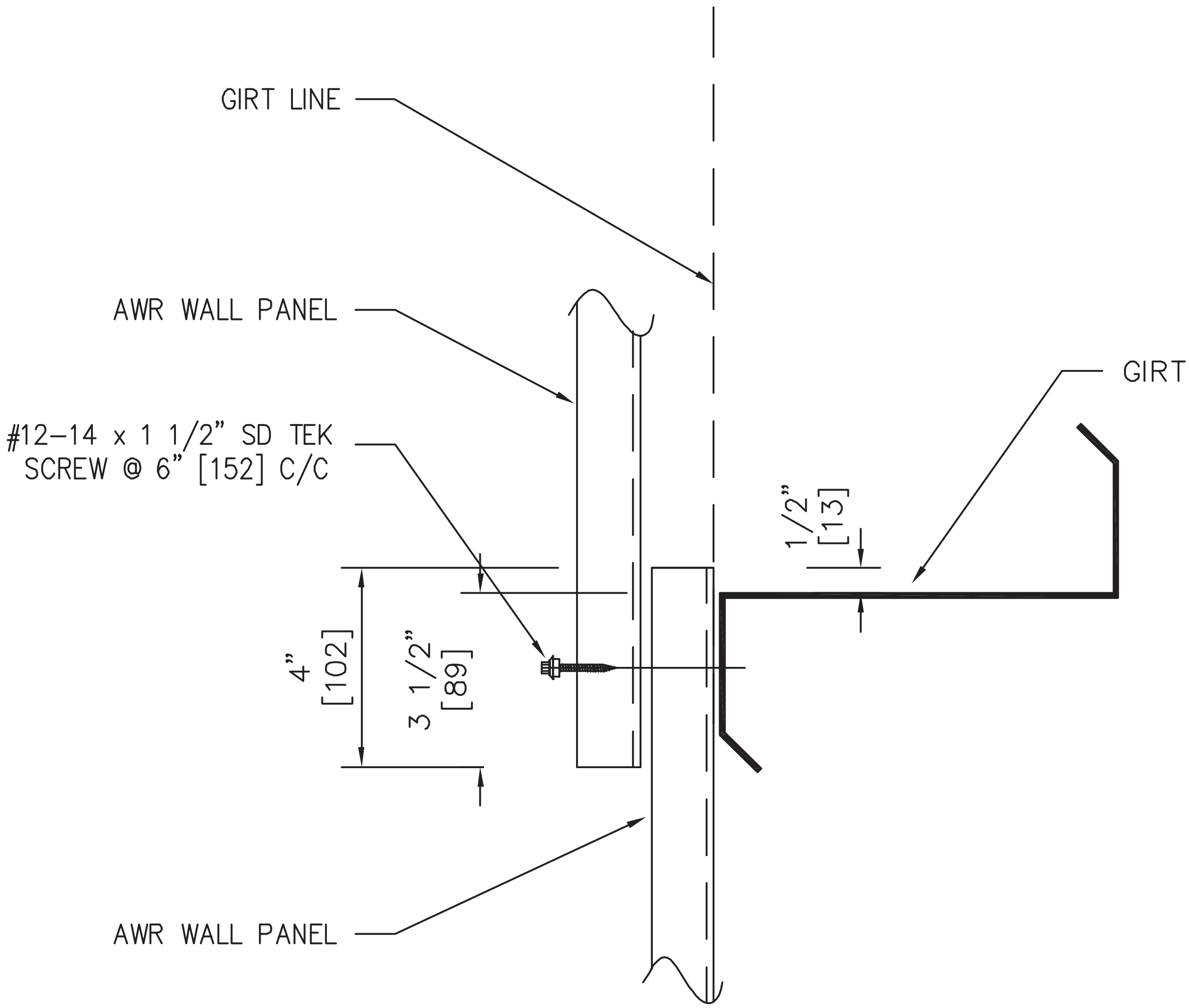


AWR WALL PANEL and BASE CHANNEL	JULY 2008	
	Vr 1.0	
BASE CHANNEL	Section 5.7	Page 002

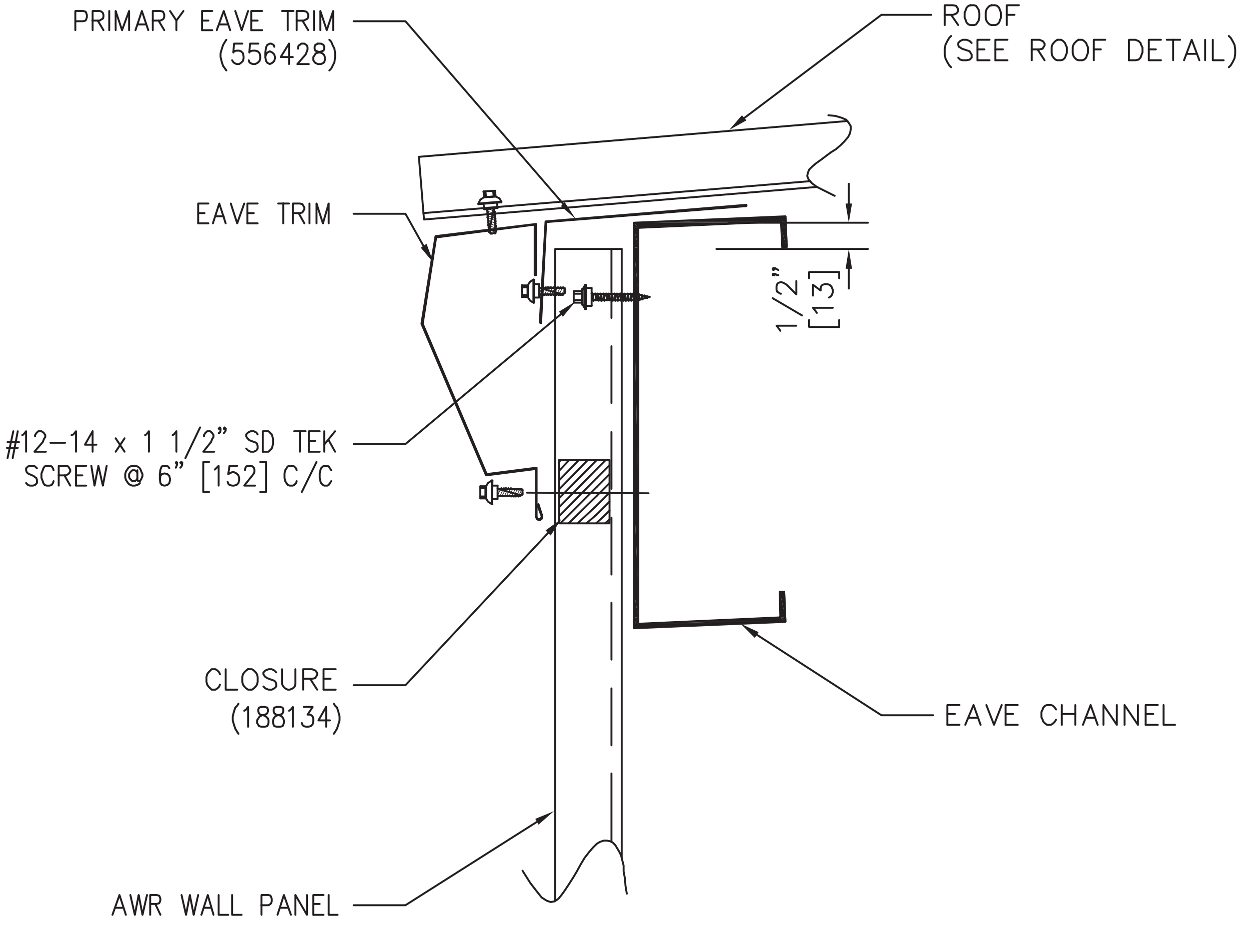


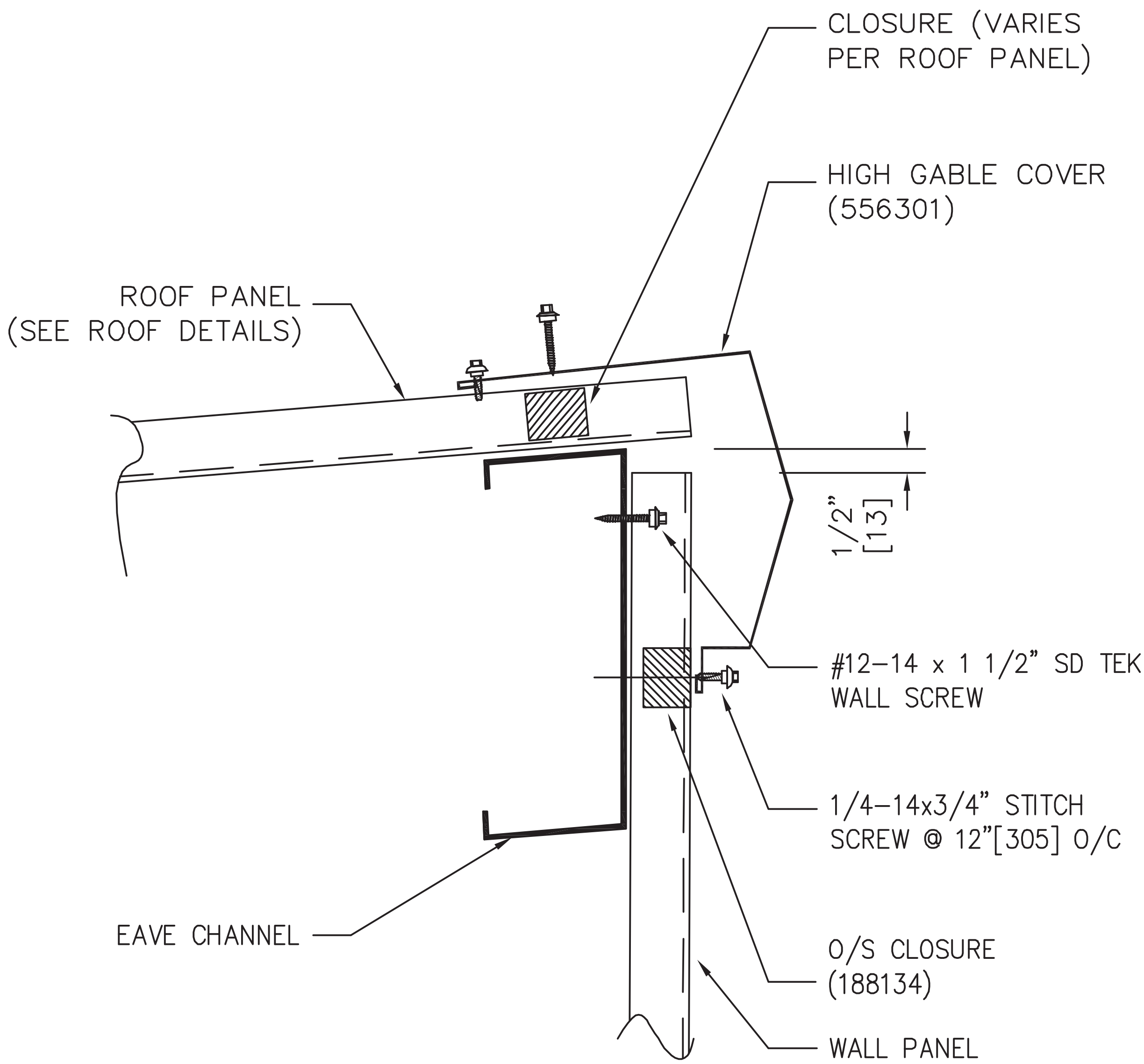
AWR WALL PANELS and BASE ANGLE	JULY 2008	
	Vr 1.0	
BASE GIRT	Section 5.7	Page 003

BEHLEN
Made Strong



AWR WALL PANEL and BASE ANGLE	JULY 2008	
	Vr 1.0	
WALL PANEL LAP	Section 5.7	Page 004

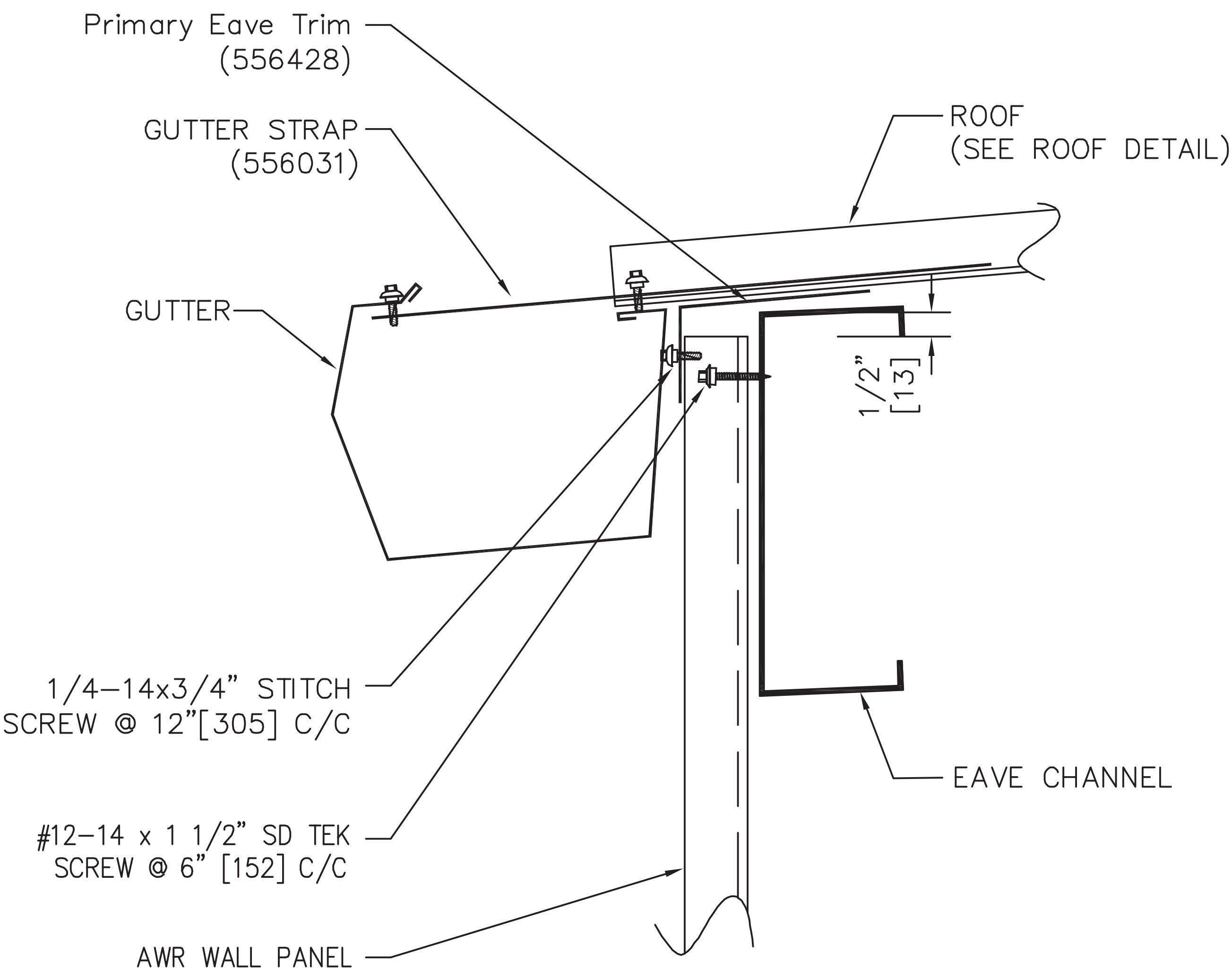

PRIMARY EAVE TRIM
(556428)
ROOF
(SEE ROOF DETAIL)
EAVE TRIM
1/2"
[13]
#12-14 x 1 1/2" SD TEK
SCREW @ 6" [152] C/C
CLOSURE
(188134)
EAVE CHANNEL
AWR WALL PANEL



NOTE:
TRIMS TO BE RE-DESIGNED OVER 4:12 PITCH

AWR WALL PANELS and BASE ANGLE	JULY 2008	
	vr 1.0	
HIGH SIDE WALL EAVE TRIM	Section 5.7	Page 006

BEHLEN
Made Strong

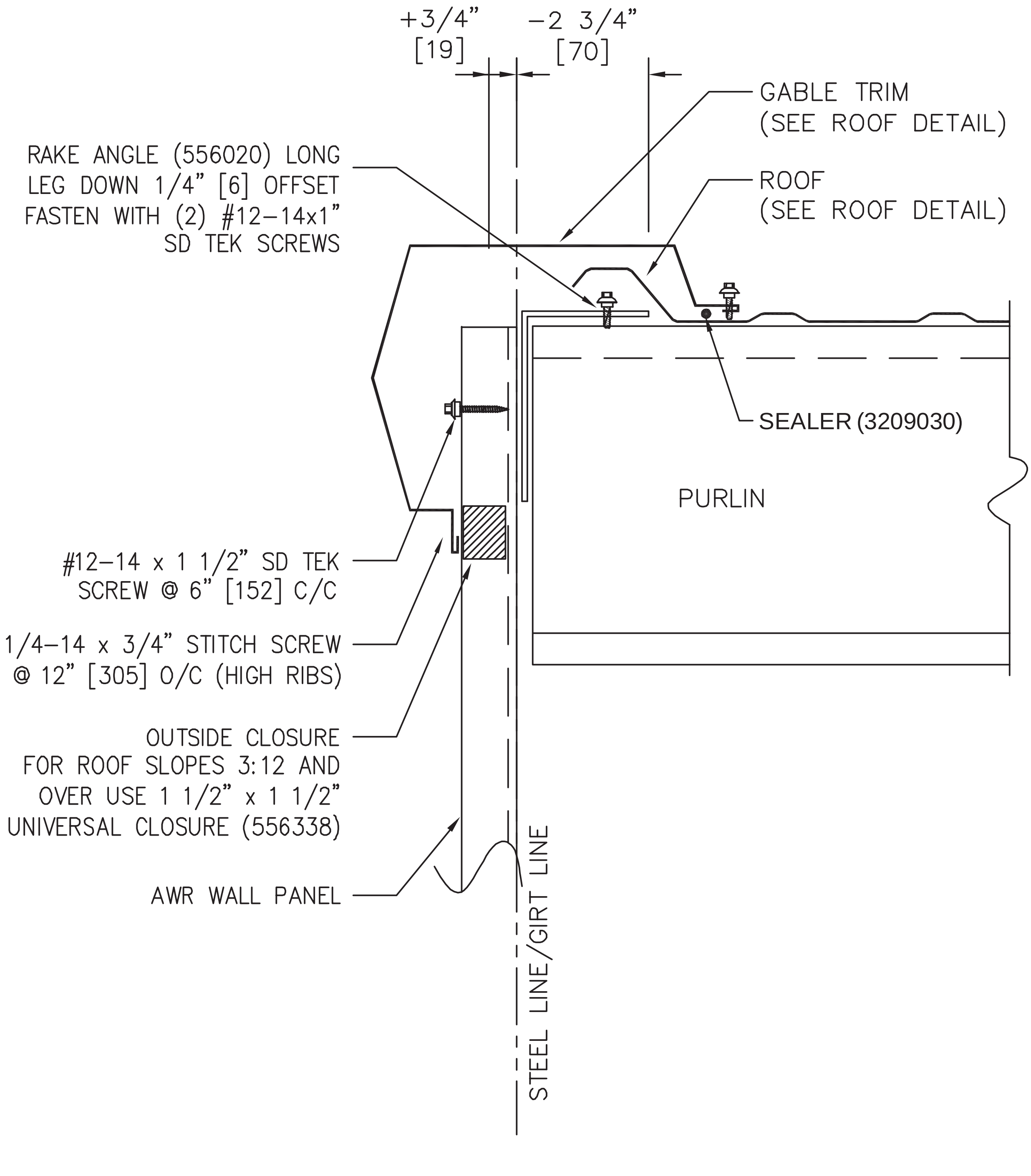


AWR WALL PANELS and BASE ANGLE

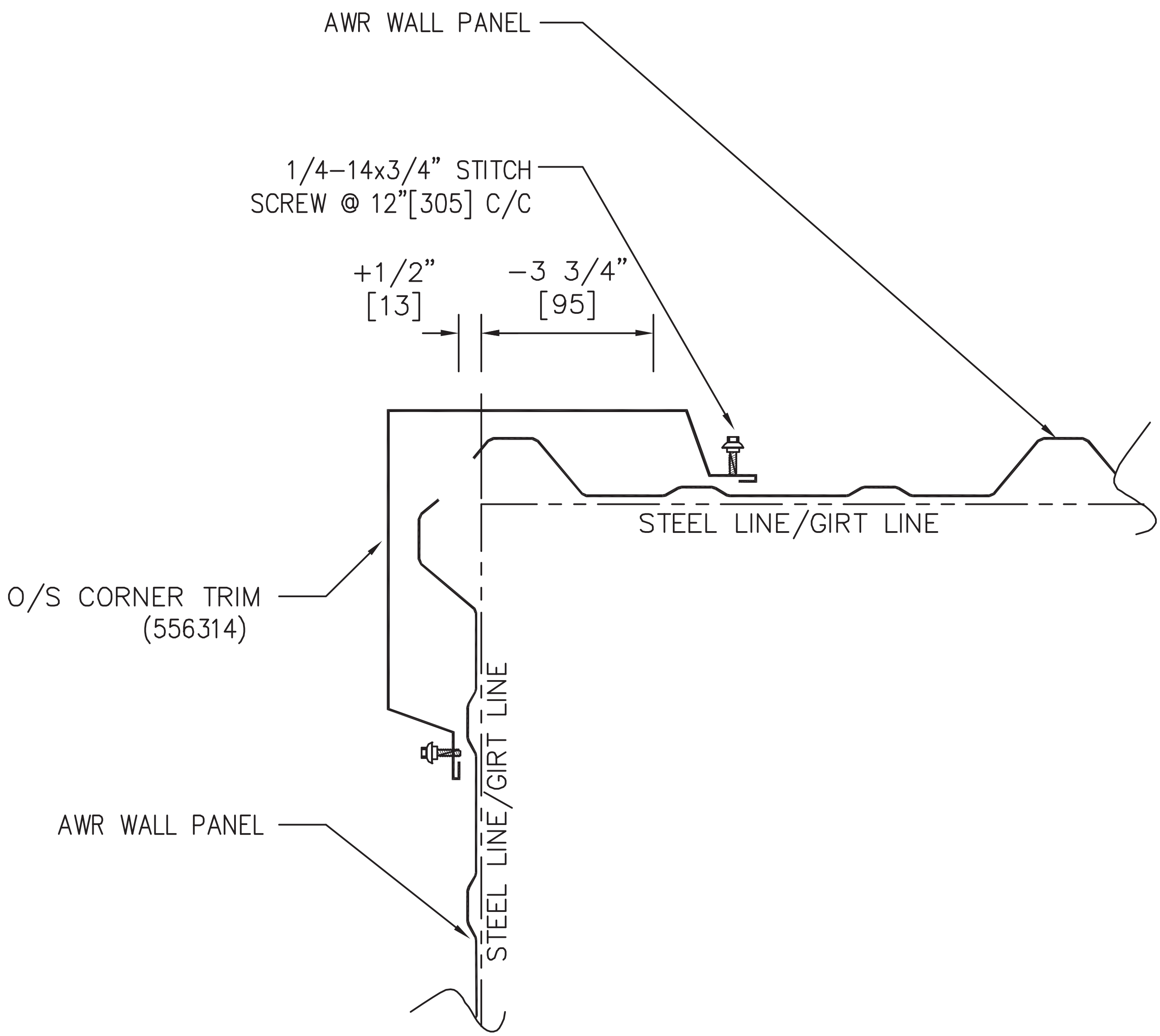
WALL EAVE GUTTER

JULY 2008		
Vr 1.0		
Section	Page	
5.7	007	

BEHLEN
Made Strong

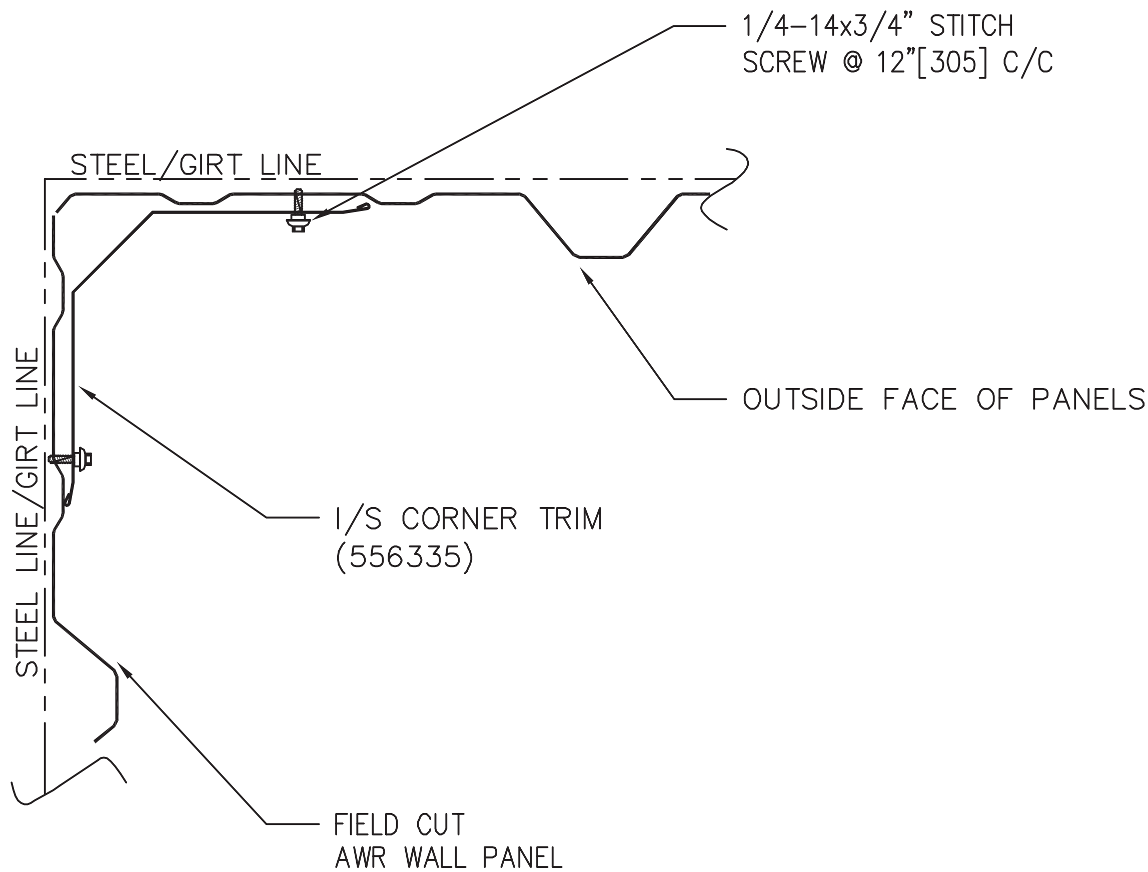


AWR WALL PANELS and BASE ANGLE	JULY 2008 Vr 1.0
WALL GABLE	Section 5.7 / Page 008

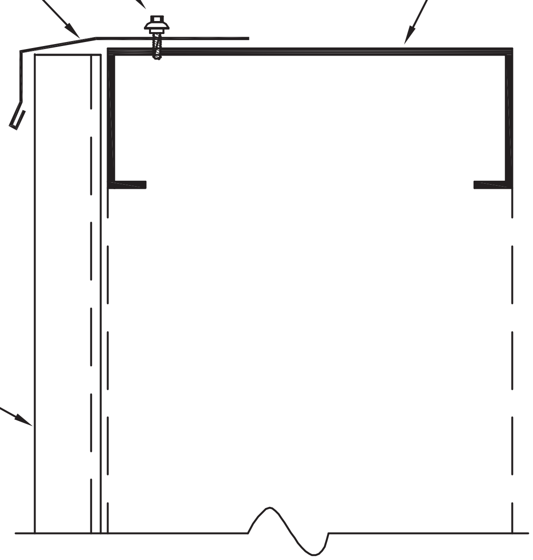


AWR WALL PANELS and BASE ANGLE	JULY 2008 Vr 1.0
OUTSIDE CORNER CONDITION	Section 5.7 / Page 009

BEHLEN
Made Strong



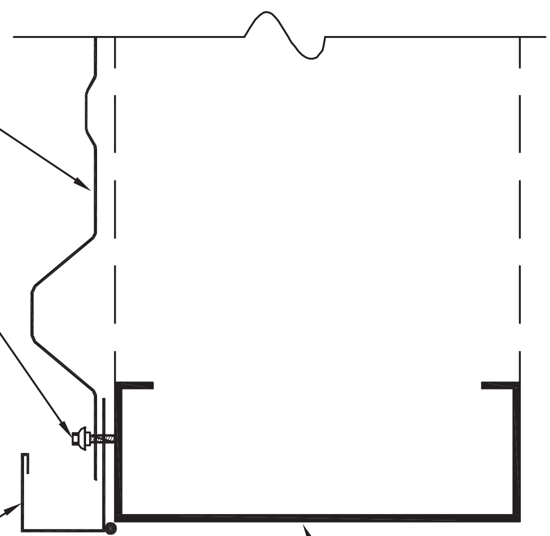
AWR WALL PANELS and BASE ANGLE	JULY 2008	
	Vr 1.0	
INSIDE CORNER CONDITION	Section 5.7	Page 010



WINDOW SILL

AWR WALL PANELS and BASE ANGLE	JULY 2008	
	Vr 1.0	
OPENING SILL	Section 5.7	Page 011

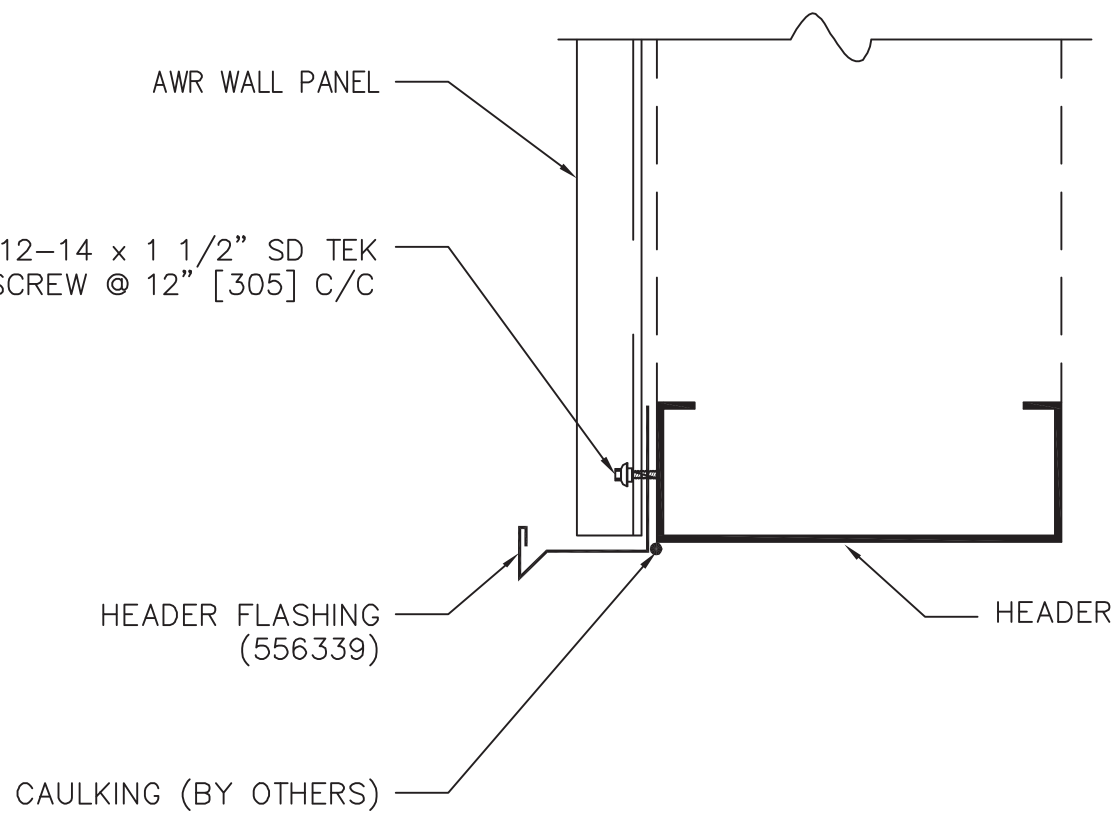
BEHLEN
Made Strong



WALK DOOR/ WINDOW JAMB
OVERHEAD DOOR JAMB

AWR WALL PANELS and BASE ANGLE	JULY 2008	
	Vr 1.0	
OPENING JAMB	Section 5.7	Page 012

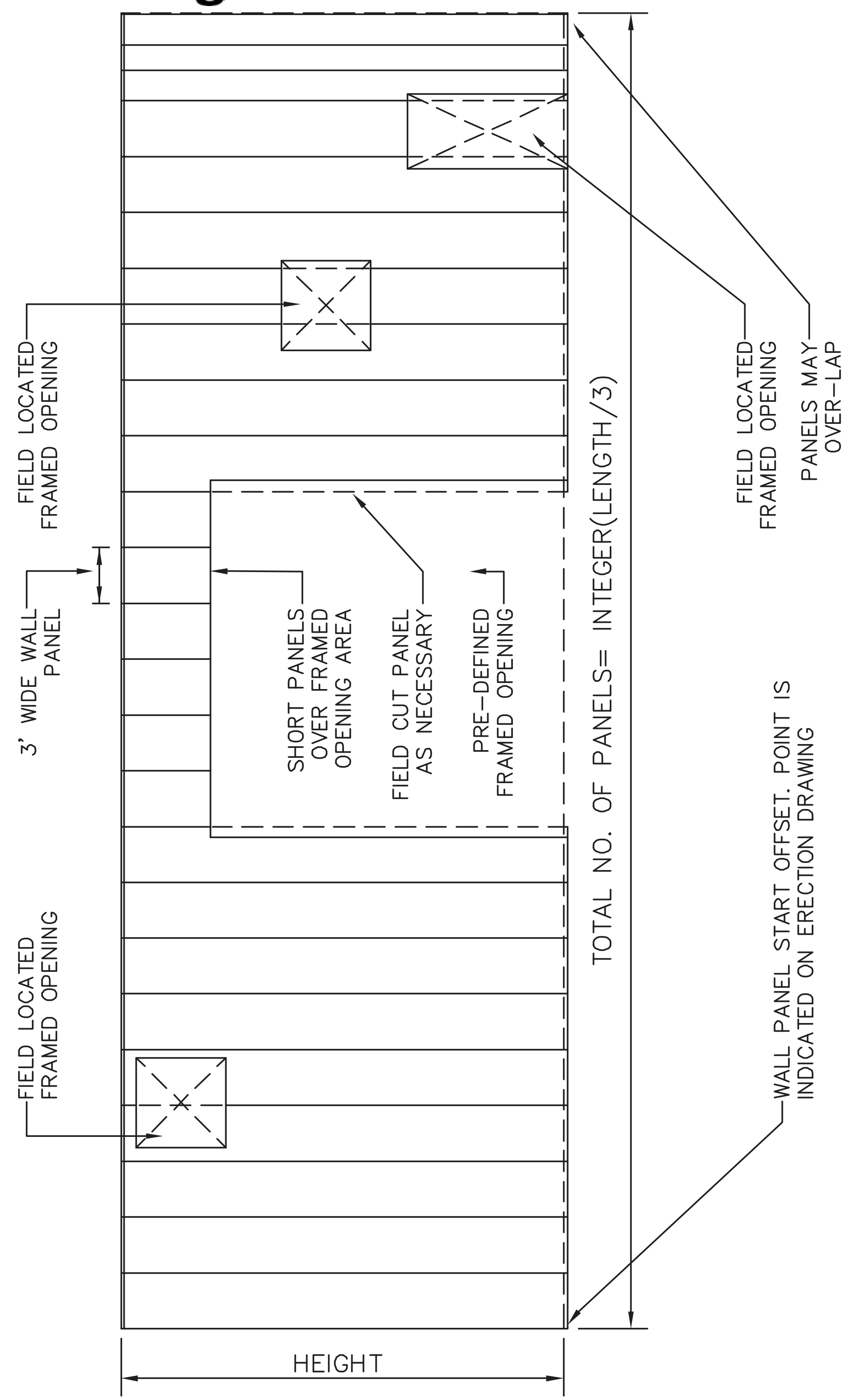
BEHLEN
Made Strong



WALK DOOR/ WINDOW HEADER
OVERHEAD DOOR HEADER

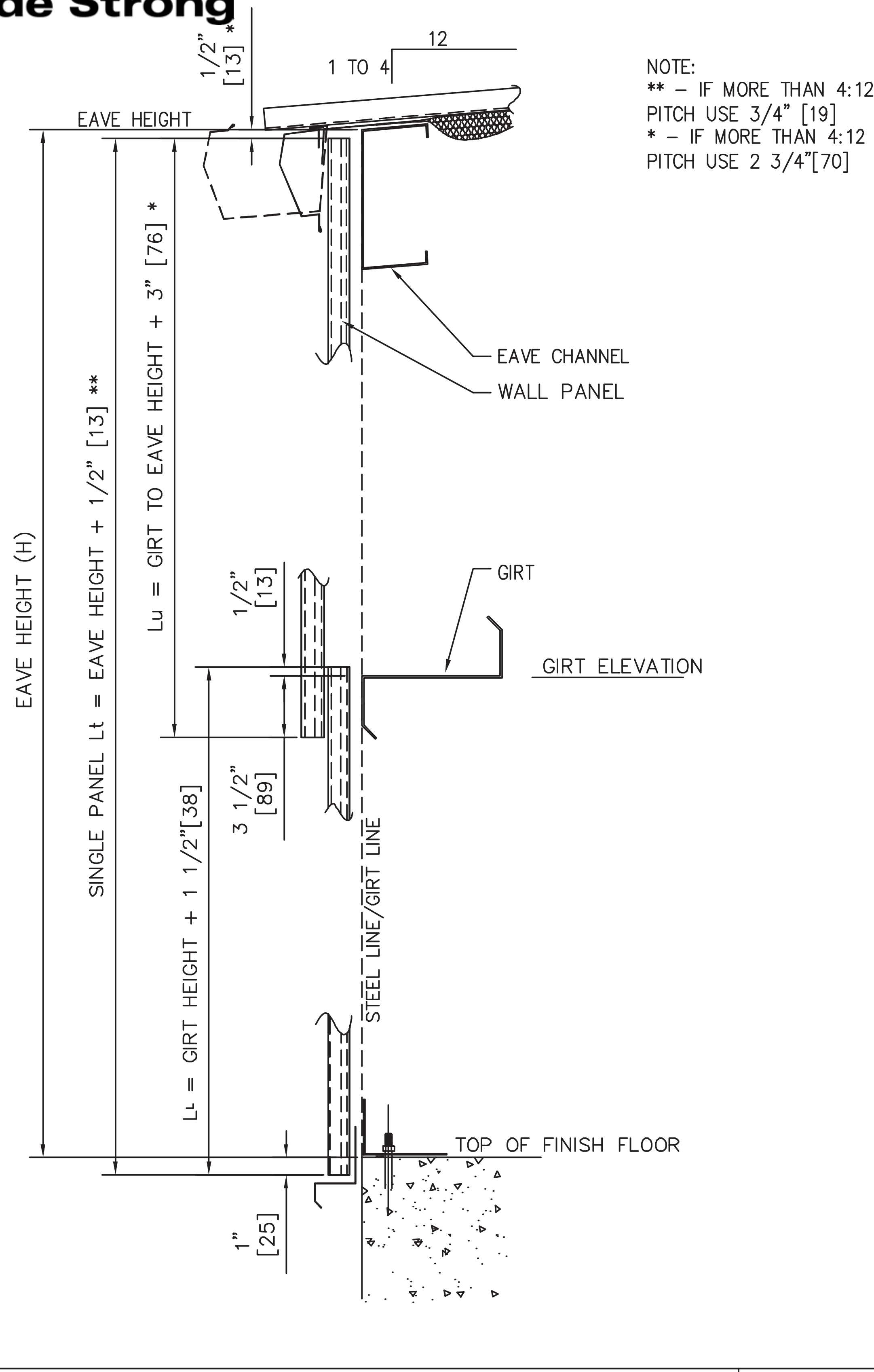
AWR WALL PANELS and BASE ANGLE	JULY 2008	
	Vr 1.0	
OPENING HEADER	Section 5.7	Page 013

BEHLEN
Made Strong



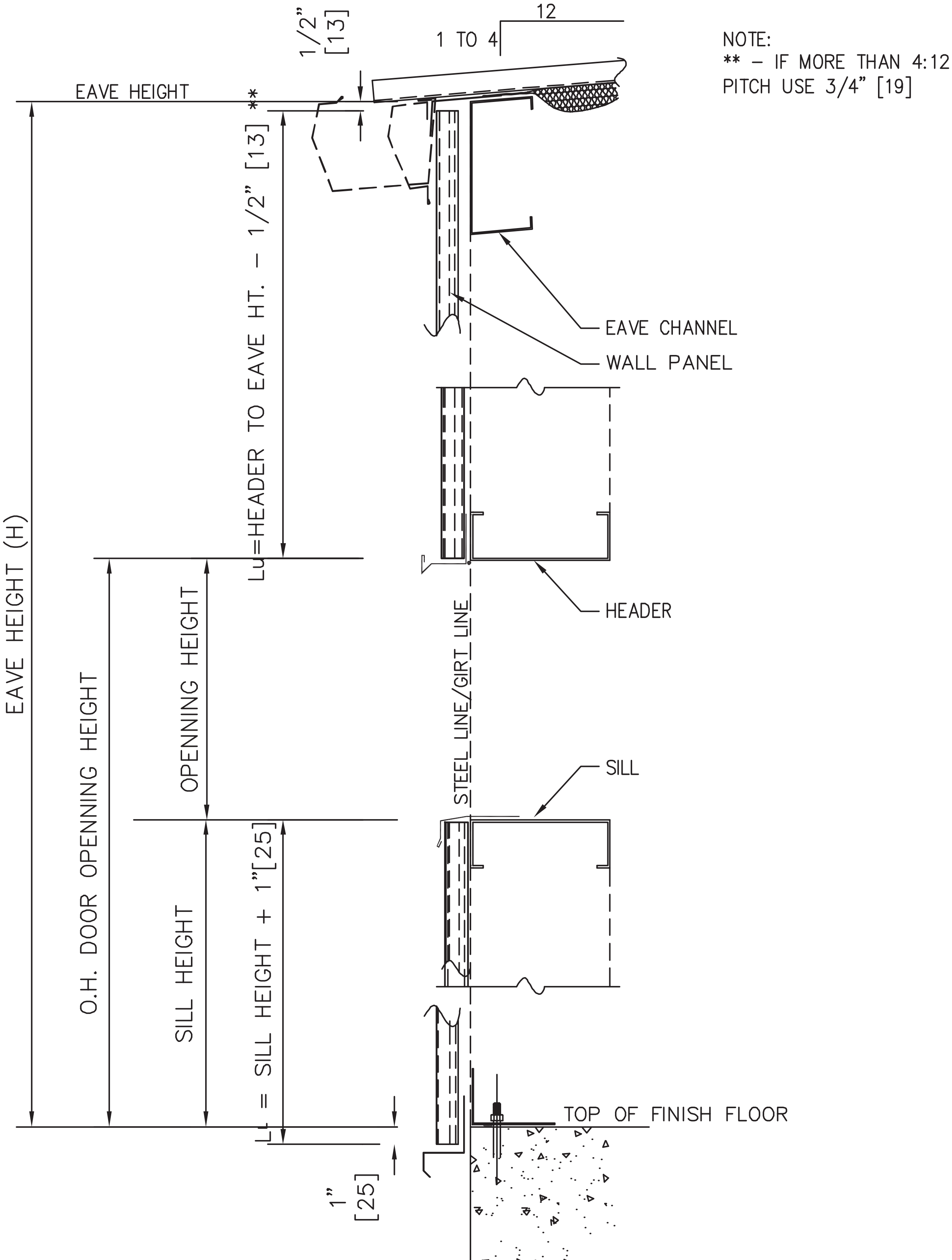
SIDEWALL ELEVATION	JULY 2008	
	Vr 1.0	
AWR PANEL	Section 5.8	Page 001

BEHLEN
Made Strong



SIDEWALL ELEVATION	JULY 2008	
	Vr 1.0	
SIDEWALL PANEL LENGTHS	Section 5.8	Page 002

BEHLEN
Made Strong

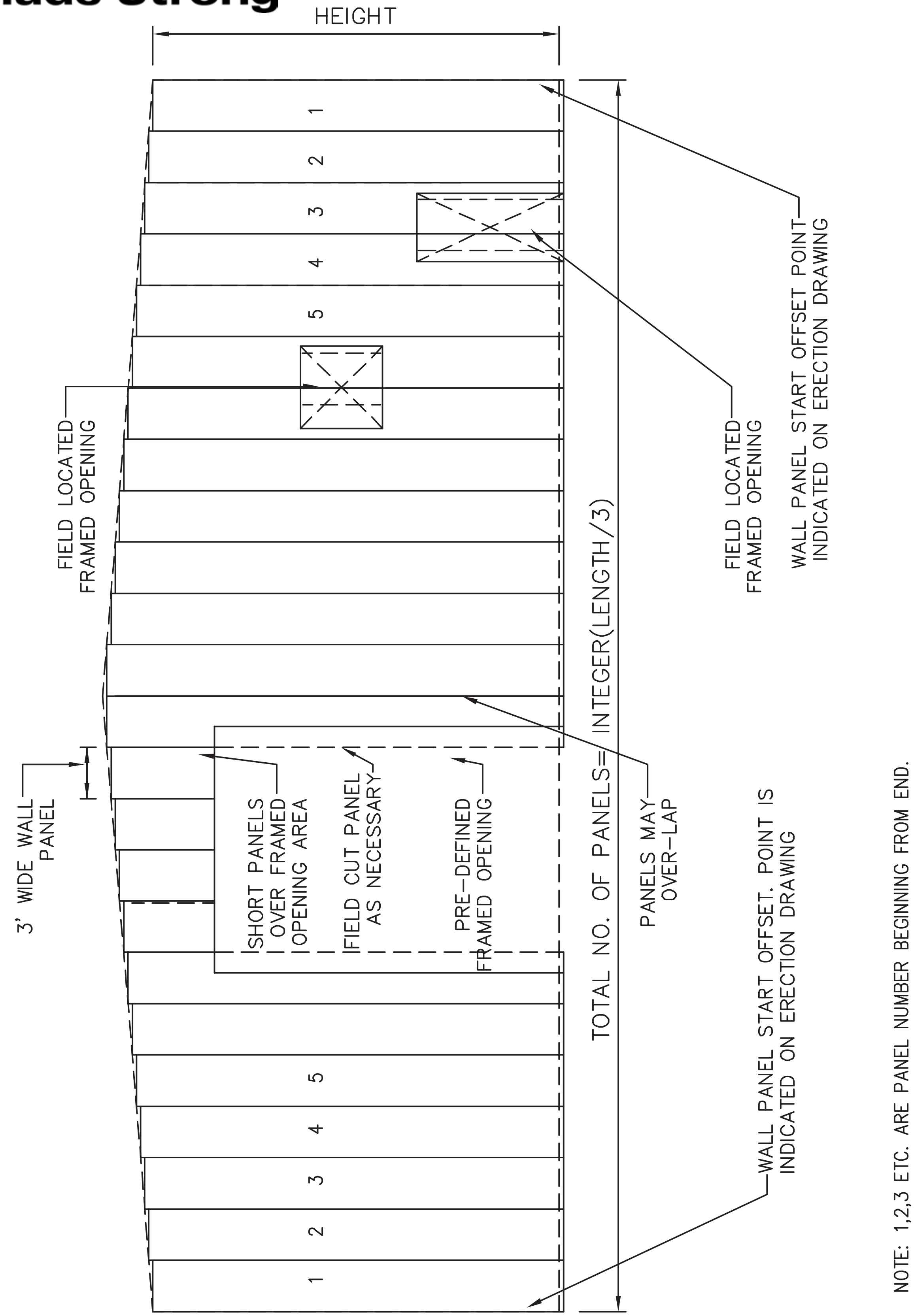


SIDEWALL ELEVATION

SIDEWALL PANEL LENGTHS at WALL OPENINGS

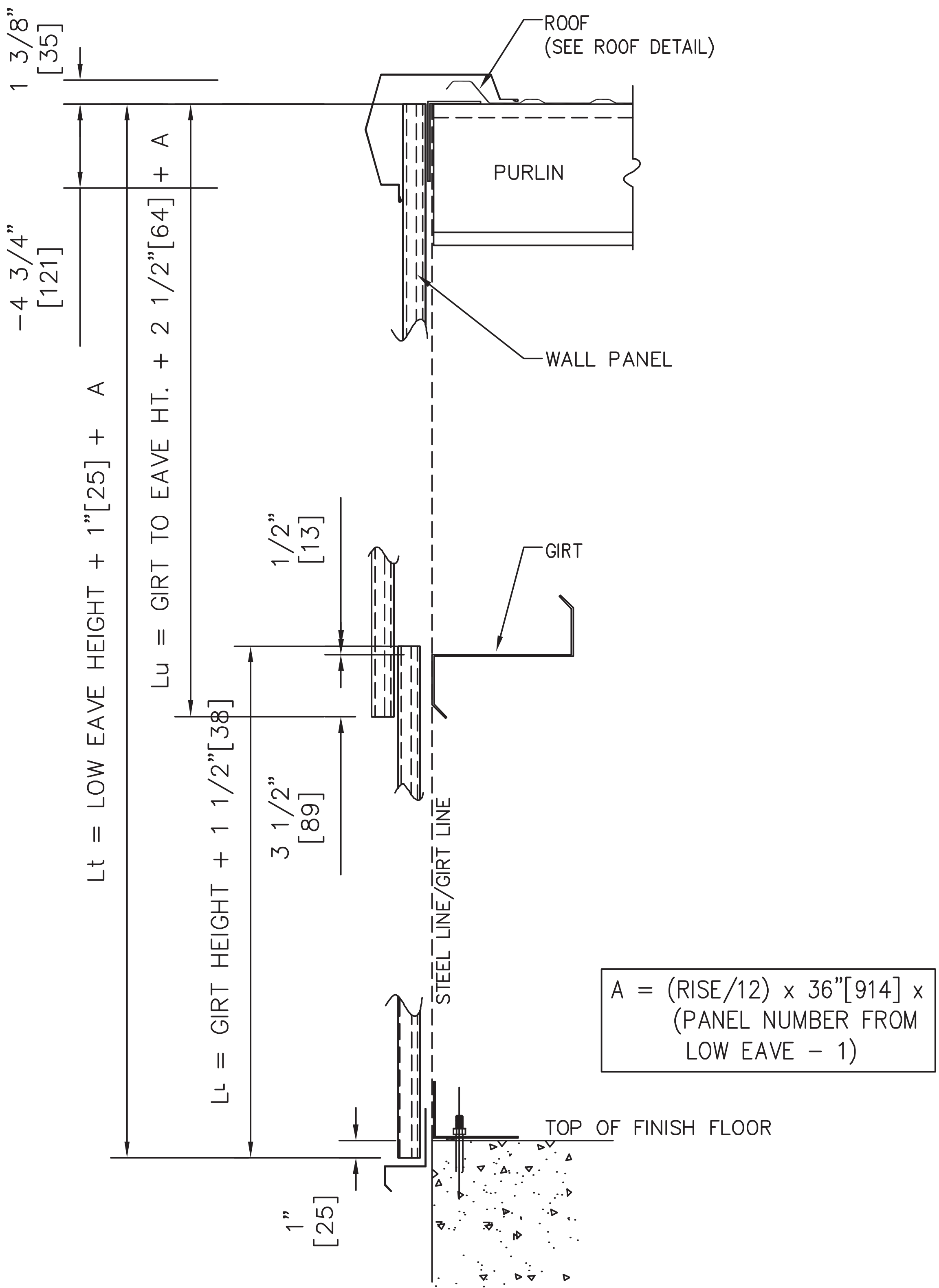
JULY 2008	
Vr 1.0	
Section	Page
5.8	003

BEHLEN
Made Strong



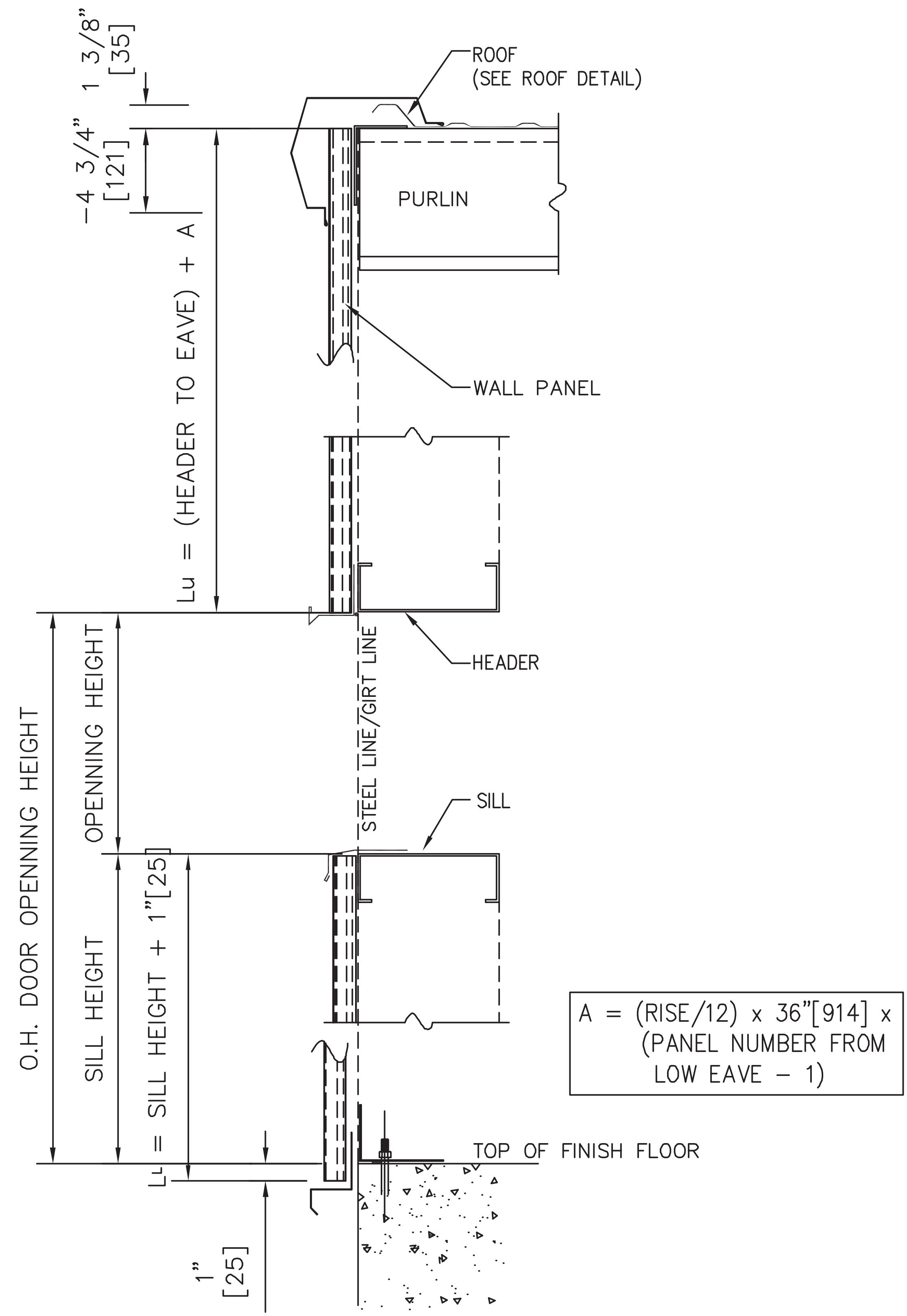
SIDEWALL ELEVATION	JULY 2008	
	Vr 1.0	
AWR PANEL ENDWALL ELEVATION	Section 5.8	Page 004

BEHLEN
Made Strong



SIDEWALL ELEVATION	JULY 2008
	Vr 1.0
ENDWALL PANEL LENGTHS	Section 5.8 / Page 005

BEHLEN
Made Strong



SIDEWALL ELEVATION

ENDWALL PANEL LENGTHS at WALL OPENNINGS

JULY 2008

Vr 1.0

Section	Page
5.8	006

BEHLEN
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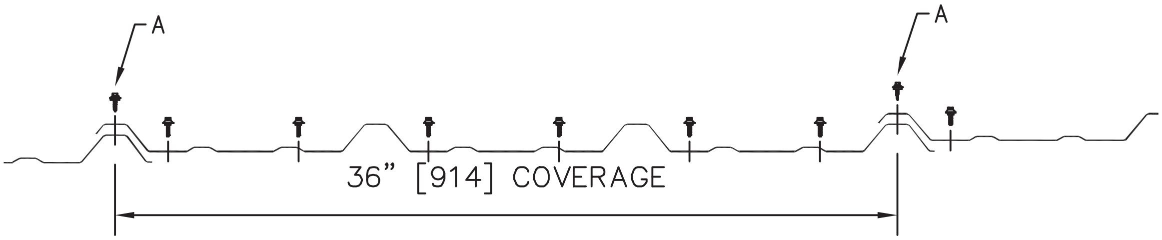
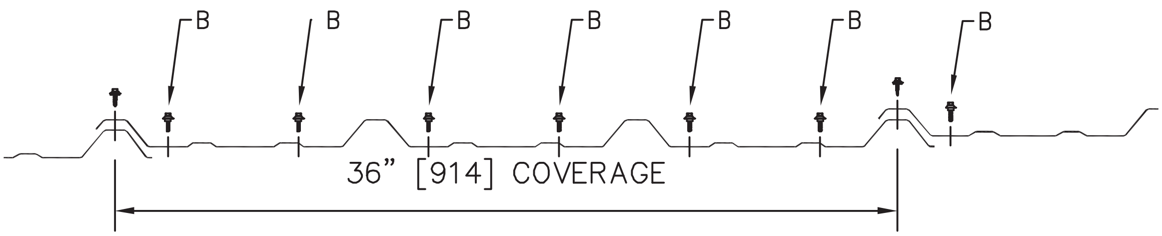
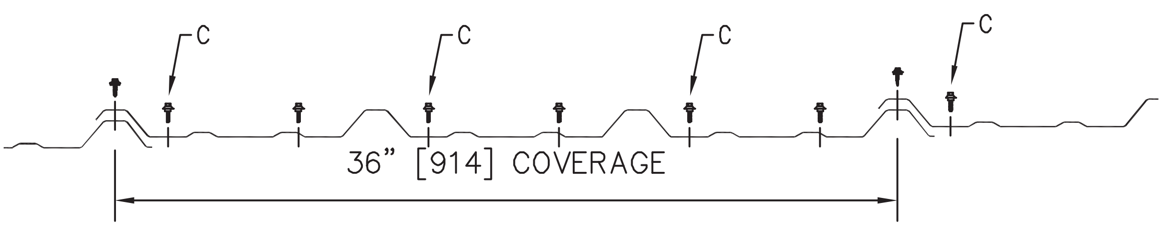
WALL PANEL FASTENER LAYOUT FOR AWR PANELS



FASTENER	USE BETWEEN OR AT	FASTENER TYPE	PER PANEL
A	TWO PANELS	1/4-14x3/4" SD	QTY= 1 PER 24"[610] LENGTH



FASTENER	USE BETWEEN OR AT	FASTENER TYPE	PER PANEL
B	PANEL & GIRT @ EAVE, BASE, RAKE & SPLICE	#12-14x1 1/2" SD TEK*	QTY= 6 PER PANEL @ CONNECTION



FASTENER	USE BETWEEN OR AT	FASTENER TYPE	PER PANEL
C	PANEL & GIRT @ ALL OTHER GIRTS	#12-14x1 1/2" SD TEK*	QTY= 3 PER PANEL @ CONNECTION

NOTE:
* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

WALL PANEL FASTENER LOCATIONS	JULY 2008	
	Vr 1.0	
AWR WALL PANEL	Section 5.9	Page 001

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TRIM FASTENERS WITH THE WALL PANEL
(AWR, WIDESPAN, ULTRASPAN OR DELTASPAN WALL PANEL)

USE BETWEEN OR AT	FASTENER TYPE	
O/S CORNER TRIM @ CORNER OF SIDWWALL & ENDWALL	1/4–14x 3/4" SD TEK	QTY= 2 PER 12"[305]
I/S CORNER TRIM		QTY= 2 PER 12"[305]
FLASHING TRIM ROOF TO WALL		QTY= 1 PER 6"[152]
CORNER FILL TRIM (IN DELTASPAN WALL)	#12–14x 1 1/2" SD TEK	QTY= 2 PER GIRT ,BASE, EAVE, RAKE CONNECTION

WALL PANEL / TRIM FASTENERS at OPENINGS
(AWR PANEL)

LARGE DOOR / LARGE OPENING / MAN DOOR		SMALL OPENING / WINDOW		FASTENER TYPE
USE BETN OR AT		USE BETN OR AT		
JAMB TRIM @ DOOR /OPENING JAMB	QTY= 1 PER 12"[305]	JAMB TRIM @ WINDOW /OPENING JAMB	QTY= 1 PER 12"[305]	#12–14x1" SD TEK
		SILL TRIM @ WINDOW /OPENING SILL	QTY= 1 PER 24"[610]	#12–14x1" SD TEK
O.H. DOOR TRIM @ DOOR /OPENING JAMB & HEADER	QTY= 1 PER 18"[457]	O.H. DOOR TRIM @ OPENING JAMB, HEADER & SILL	QTY= 1 PER 18"[457]	#12–14x1" SD TEK

WALL PANEL / TRIM FASTENERS at OPENINGS
(WIDE SPAN, ULTRA SPAN, DELTA SPAN PANEL)

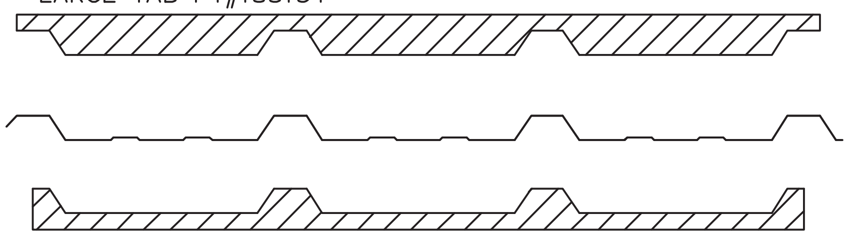
LARGE DOOR / LARGE OPENING / MAN DOOR		SMALL OPENING / WINDOW		FASTENER TYPE
USE BETN OR AT		USE BETN OR AT		
JAMB TRIM @ DOOR /OPENING JAMB	QTY= 1 PER 12"[305]	JAMB TRIM @ WINDOW /OPENING JAMB	QTY= 1 PER 12"[305]	#12–14x1" SD TEK
		SILL TRIM @ WINDOW /OPENING SILL	QTY= 1 PER 12"[305]	#12–14x1" SD TEK
O.H. DOOR TRIM @ DOOR /OPENING JAMB & HEADER	QTY= 1 PER 18"[457]	O.H. DOOR TRIM @ OPENING JAMB, HEADER & SILL	QTY= 1 PER 18"[457]	#12–14x1" SD TEK

CLOSURE TABLE

AWR & WIDESPAN

LARGE TAB PT#188134

O/S CLOSURE FOR AWR
I/S CLOSURE FOR WIDESPAN



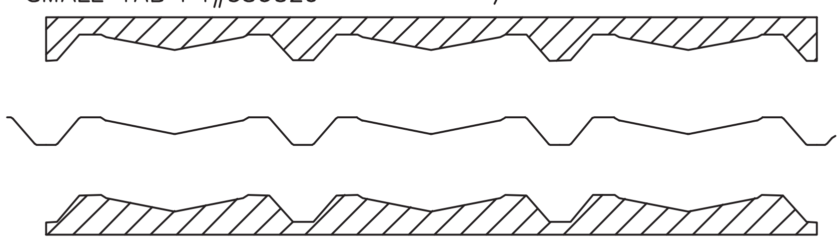
SMALL TAB PT#188133

I/S CLOSURE FOR AWR
O/S CLOSURE FOR WIDESPAN

DELTA SPAN

SMALL TAB PT#556326

O/S CLOSURE



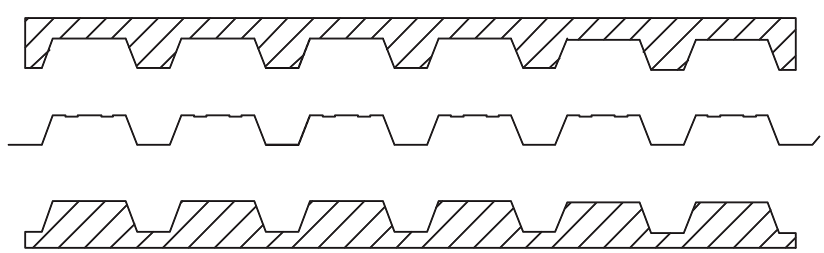
LARGE TAB PT#556327

I/S CLOSURE

ELITE RIB & ULTRA SPAN

SMALL TAB PT#556324

O/S CLOSURE



LARGE TAB PT#556325

I/S CLOSURE

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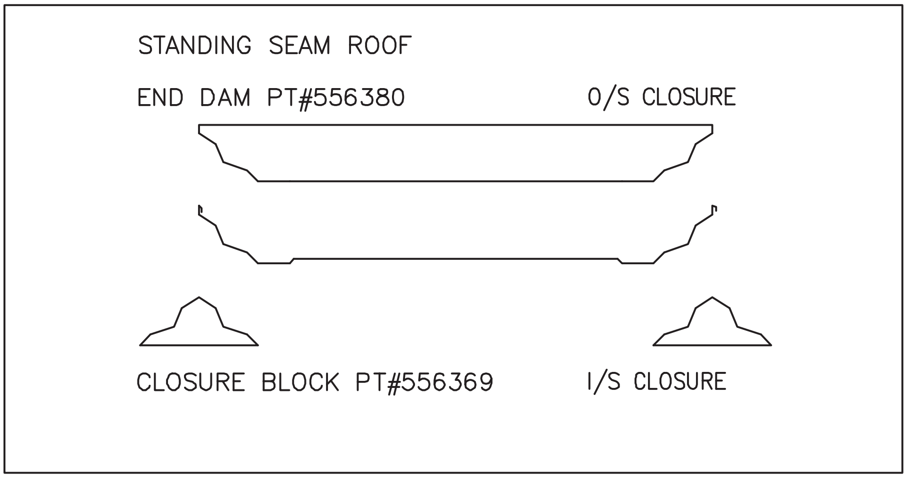
CLOSURE USE TABLE

	USE NEAR		USAGE CONDITION
ROOF	RIDGE		NOT REQUIRED WHEN USING AWR FORMED RIDGE CAP AT RIDGE
			ALL OTHER CASE USE O/S CLOSURE
	EAVE		I/S CLOSURE ALWAYS USE UNDER ROOF

	USE NEAR		USAGE CONDITION
WALL	BASE		NOT REQUIRED WHEN INSULATED WALL PANELS
			ALL OTHER CASE USE I/S CLOSURE
	EAVE	SIDE WALL	WITH EAVE TRIM ALWAYS USE O/S CLOSURE
			WITH GUTTER USE O/S CLOSURE ONLY IN CASE OF UNINSULATED BLDG.
		END WALL	ROOF SLOPE UNDER 3:12 USE O/S CLOSURE
			3:12 OR MORE ROOF SLOPE USE UNIVERSAL CLOSURE
	TRANSITION WALL / PARAPET		I/S CLOSURE ALWAYS USE BEHIND WALL
	TRANSITION WALL / LEAN-TO-ROOF		I/S CLOSURE ALWAYS USE BEHIND WALL

BEHLEN
Made Strong

SSR CLOSURE USE TABLE



	USE NEAR	USAGE CONDITION
ROOF	RIDGE	ALWAYS USE O/S CLOSURE ON THE TOP OF ROOF.
	EAVE	I/S CLOSURE ALWAYS USE UNDER ROOF

SECTION 6
ENGINEERING PROPERTIES

BEHLEN
Made Strong

INDEX

LIGHT GAUGE SECTIONS

Section 6.1 - ENGINEERING DATA

ZEE SECTION PROPERTIES	001
ZEE SECTION LOAD TABLE	002
CEE SECTION PROPERTIES	003
CEE SECTION LOAD TABLE	004

Section 6.2 - ENGINEERING DATA

AWR GRADE 33	001
AWR GRADE 80	002
WIDESPAN GRADE 33	003
WIDESPAN GRADE 80	004
936 GRADE 33	005
936 GRADE 80	006
ELITE GRADE 33	007
ELITE GRADE 80	008
DELTA SPAN GRADE 33	009
DELTA SPAN GRADE 80	010
ULTRA SPAN 33 IMPERIAL	011
ULTRA SPAN 80 IMPERIAL	012

BEHLEN
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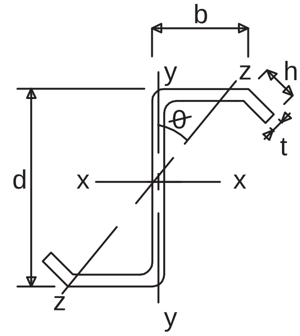
Cold Formed Zee Sections



COLD FORMED Z

PHYSICAL PROPERTIES

Section	d (in.)	b (in.)	h (in.)	t (in.)	Gross Area (in.2)	Mass (lb/ft)	Ix (in.4)	Sx (in.3)	rx (in.)	Iy (in.4)	Sy (in.3)	ry (in.)	Effective Ixe (in.4)	Sxe (in.3)	rmin (in.)	Theta (°)
8Z16	8.0	2.75	0.691	0.062	0.899	3.058	8.836	2.209	3.135	1.542	0.481	1.310	7.637	1.750	0.846	18.321
8Z14	8.0	2.75	0.714	0.076	1.102	3.749	10.793	2.698	3.130	1.904	0.592	1.314	9.690	2.273	0.848	18.433
8Z13	8.0	2.75	0.742	0.093	1.348	4.587	13.150	3.287	3.123	2.351	0.728	1.320	12.329	2.960	0.851	18.570
8Z12	8.0	2.75	0.767	0.108	1.566	5.327	15.212	3.803	3.117	2.751	0.850	1.325	14.637	3.568	0.854	18.691
10Z16	10.0	2.75	0.691	0.062	1.023	3.480	14.918	2.984	3.819	1.542	0.481	1.228	12.264	2.164	0.840	13.513
10Z14	10.0	2.75	0.714	0.076	1.254	4.266	18.239	3.648	3.814	1.904	0.592	1.232	16.310	3.056	0.842	13.592
10Z13	10.0	2.75	0.742	0.093	1.534	5.220	22.246	4.449	3.808	2.351	0.728	1.238	20.919	4.035	0.845	13.687
10Z12	10.0	2.75	0.767	0.108	1.782	6.062	25.759	5.152	3.802	2.752	0.850	1.243	24.816	4.851	0.848	13.771
118Z14	11.5	3.00	0.714	0.076	1.406	4.783	26.692	4.642	4.357	2.368	0.683	1.298	22.479	3.512	0.901	12.353
118Z13	11.5	3.00	0.742	0.093	1.720	5.853	32.574	5.665	4.351	2.922	0.840	1.303	29.920	4.962	0.904	12.433
118Z12	11.5	3.00	0.767	0.108	1.998	6.797	37.737	6.563	4.346	3.418	0.980	1.308	35.814	6.041	0.907	12.504
118Z11	11.5	3.00	0.787	0.120	2.220	7.552	41.849	7.278	4.342	3.820	1.093	1.312	40.252	6.839	0.909	12.560
118Z10	11.5	3.00	0.816	0.138	2.553	8.684	47.985	8.345	4.335	4.432	1.263	1.318	46.784	8.011	0.912	12.645
12Z14	12.0	2.75	0.714	0.076	1.406	4.783	28.192	4.699	4.478	1.904	0.592	1.164	23.172	3.351	0.829	10.519
12Z13	12.0	2.75	0.742	0.093	1.720	5.853	34.411	5.735	4.472	2.351	0.728	1.169	30.556	4.642	0.832	10.590
12Z12	12.0	2.75	0.767	0.108	1.998	6.797	39.871	6.645	4.467	2.752	0.850	1.174	37.085	5.823	0.834	10.653
12Z11	12.0	2.75	0.787	0.120	2.220	7.552	44.220	7.370	4.463	3.077	0.948	1.177	42.129	6.744	0.836	10.703
12Z10	12.0	2.75	0.816	0.138	2.553	8.684	50.713	8.452	4.457	3.571	1.096	1.183	50.348	8.321	0.839	10.778
14Z13	14.0	3.50	0.742	0.093	2.046	6.960	56.761	8.109	5.267	4.323	1.087	1.454	47.558	6.093	1.024	11.292
14Z12	14.0	3.50	0.767	0.108	2.376	8.082	65.794	9.399	5.262	5.054	1.267	1.458	59.564	8.047	1.027	11.348
14Z11	14.0	3.50	0.787	0.120	2.640	8.980	72.995	10.428	5.258	5.645	1.413	1.462	68.017	9.342	1.029	11.393
14Z10	14.0	3.50	0.816	0.138	3.036	10.327	83.755	11.965	5.252	6.543	1.632	1.468	80.373	11.210	1.032	11.461

Notes

1. Properties and loads are based on ASTM A653 SQ, Grade 55 Class 1 Steel with a minimum yield stress of 55 Ksi.
2. The properties have been determined in accordance with S136-01 North American Specification for the Design of Cold-Formed Steel Structural Members Appendix B, Provisions Applicable to Canada. (Limit States Design)

BEHLEN
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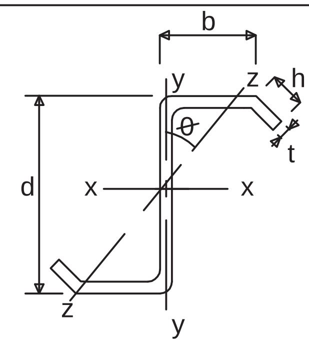
Cold Formed Zee Sections



COLD FORMED Z

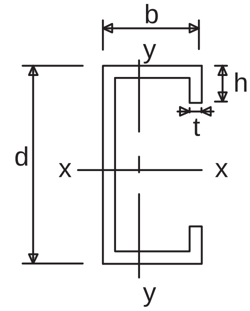
LOAD TABLE

Section	FVn (kips)	FPn (End) (kips)	FPn (Int.) (kips)	Lu (ft)	FMn (kip-ft)	FMn (kip-ft) Unbraced Length (ft) 2	4	6	8	10	12	14
8Z16	3.619	1.275	2.729	3.902	7.220	7.220	7.198	6.462	5.174	3.788	2.744	2.035
8Z14	6.691	2.068	4.322	3.924	9.375	9.375	9.342	8.256	6.830	4.877	3.428	2.553
8Z13	12.220	3.270	6.745	3.951	12.211	12.211	12.187	10.887	8.745	6.092	4.303	3.224
8Z12	16.480	4.545	9.329	3.977	14.716	14.716	14.700	12.942	10.565	7.216	5.124	3.860
10Z16	2.857	1.061	2.460	3.803	8.928	8.928	8.869	8.080	6.826	4.884	3.494	2.584
10Z14	5.278	1.791	3.964	3.822	12.606	12.606	12.536	11.138	8.984	6.211	4.349	3.227
10Z13	9.706	2.911	6.270	3.845	16.646	16.646	16.533	14.560	11.448	7.729	5.433	4.048
10Z12	15.250	4.109	8.743	3.867	20.009	20.009	19.872	17.308	13.700	9.121	6.436	4.815
118Z14	4.557	1.602	3.720	4.063	14.486	14.486	14.486	13.433	11.691	8.557	6.204	4.588
118Z13	8.375	2.666	5.946	4.085	20.469	20.469	20.469	18.407	15.243	11.017	7.715	5.723
118Z12	13.153	3.811	8.343	4.105	24.921	24.921	24.921	22.288	18.140	12.959	9.099	6.771
118Z11	18.082	4.867	10.553	4.122	28.212	28.212	28.212	25.074	20.799	14.555	10.244	7.643
118Z10	26.907	6.679	14.360	4.147	33.046	33.046	33.046	29.864	24.301	17.027	12.030	9.013
12Z14	4.358	1.542	3.642	3.725	13.824	13.824	13.667	12.229	10.128	7.257	5.240	3.916
12Z13	8.009	2.588	5.843	3.747	19.147	19.147	18.973	16.963	13.606	9.341	6.590	4.894
12Z12	12.576	3.717	8.216	3.766	24.021	24.021	23.759	20.944	16.617	11.073	7.784	5.799
12Z11	17.288	4.758	10.406	3.781	27.820	27.820	27.561	24.668	18.920	12.449	8.774	6.556
12Z10	26.376	6.549	14.180	3.805	34.325	34.325	33.962	29.172	22.011	14.585	10.322	7.747
14Z13	6.817	2.292	5.452	4.594	25.134	25.134	25.134	24.072	22.055	18.216	13.350	10.194
14Z12	10.701	3.358	7.733	4.613	33.195	33.195	33.195	31.563	27.593	21.932	16.106	11.988
14Z11	14.705	4.347	9.846	4.629	38.538	38.538	38.538	36.243	31.666	24.784	18.165	13.462
14Z10	22.424	6.055	13.497	4.652	46.243	46.243	46.243	43.029	36.920	29.644	21.191	15.744

Notes

1. Properties and loads are based on ASTM A653 SQ, Grade 55 Class 1 Steel with a minimum yield stress of 55 Ksi.
2. The properties have been determined in accordance with S136-01 North American Specification for the Design of Cold-Formed Steel Structural Members Appendix B, Provisions Applicable to Canada. (Limit States Design)

Cold Formed Cee Sections



COLD FORMED Cee

PHYSICAL PROPERTIES

					Gross								Effective		
Section	d (in.)	b (in.)	h (in.)	t (in.)	Area (in.2)	Mass (lb/ft)	Ix (in.4)	Sx (in.3)	rx (in.)	Iy (in.4)	Sy (in.3)	ry (in.)	Ixe (in.4)	Sxe (in.3)	rmin (in.)
8C16	8	2.75	0.812	0.062	0.899	3.058	8.707	2.177	3.112	0.907	0.461	1.004	7.958	1.885	0.907
8C14	8	2.75	0.846	0.076	1.102	3.749	10.623	2.656	3.105	1.111	0.568	1.004	9.931	2.380	1.111
8C13	8	2.75	0.887	0.093	1.349	4.587	12.924	3.231	3.096	1.357	0.698	1.003	12.676	3.125	1.357
8C12	8	2.75	0.923	0.108	1.566	5.327	14.929	3.732	3.088	1.574	0.813	1.003	14.929	3.732	1.574
10C16	10	2.75	0.812	0.062	1.023	3.480	14.753	2.951	3.798	0.968	0.471	0.973	12.811	2.329	0.968
10C14	10	2.75	0.846	0.076	1.254	4.266	18.021	3.604	3.791	1.187	0.579	0.973	16.896	3.253	1.187
10C13	10	2.75	0.887	0.093	1.535	5.220	21.956	4.391	3.783	1.451	0.712	0.973	21.529	4.250	1.451
10C12	10	2.75	0.923	0.108	1.782	6.062	25.397	5.079	3.775	1.684	0.831	0.972	25.397	5.079	1.684
118C14	11.5	3.00	0.846	0.076	1.406	4.783	26.438	4.598	4.336	1.525	0.670	1.041	23.332	3.739	1.525
118C13	11.5	3.00	0.887	0.093	1.721	5.853	32.236	5.606	4.329	1.866	0.824	1.041	30.785	5.209	1.866
118C12	11.5	3.00	0.908	0.102	1.885	6.411	35.259	6.132	4.325	2.056	0.912	1.044	34.412	5.892	2.056
118C11	11.5	3.00	0.952	0.120	2.220	7.552	41.353	7.192	4.316	2.407	1.071	1.041	41.047	7.103	2.407
118C10	11.5	3.00	0.996	0.138	2.553	8.684	47.367	8.238	4.307	2.767	1.238	1.041	47.367	8.238	2.767
12C14	12	2.75	0.846	0.076	1.406	4.783	27.927	4.654	4.457	1.247	0.588	0.942	24.011	3.552	1.247
12C13	12	2.75	0.887	0.093	1.721	5.853	34.057	5.676	4.449	1.525	0.723	0.942	31.746	4.954	1.525
12C12	12	2.75	0.923	0.108	1.998	6.797	39.429	6.571	4.442	1.770	0.843	0.941	38.258	6.164	1.770
12C11	12	2.75	0.952	0.120	2.220	7.552	43.701	7.283	4.437	1.966	0.940	0.941	42.843	6.982	1.966
12C10	12	2.75	0.996	0.138	2.553	8.684	50.065	8.344	4.428	2.259	1.085	0.941	49.700	8.214	2.259
14C13	14	3.50	0.887	0.093	2.046	6.960	56.344	8.049	5.248	2.875	1.066	1.185	49.284	6.461	2.875
14C12	14	3.50	0.923	0.108	2.376	8.082	65.272	9.325	5.241	3.341	1.243	1.186	61.539	8.501	3.341
14C11	14	3.50	0.952	0.120	2.640	8.980	72.382	10.340	5.236	3.714	1.386	1.186	69.842	9.766	3.714
14C10	14	3.50	0.996	0.138	3.036	10.327	82.989	11.856	5.228	4.273	1.602	1.186	81.171	11.438	4.273

Notes

1. Properties and loads are based on ASTM A653 SQ, Grade 55 Class 1 Steel with a minimum yield stress of 55 Ksi.
2. The properties have been determined in accordance with S136-01 North American Specification for the Design of Cold-Formed Steel Structural Members Appendix B, Provisions Applicable to Canada. (Limit States Design)

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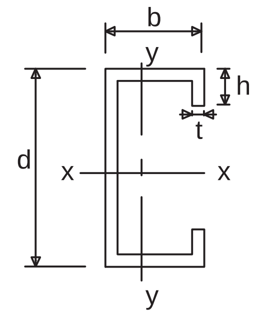
Cold Formed Cee Sections



COLD FORMED Cee

LOAD TABLE

Section	FVn (kips)	FPn (End) (kips)	FPn (Int.) (kips)	Lu (ft)	FMn (kip-ft)	FMn (kip-ft) Unbraced Length (ft) 2	4	6	8	10	12	14
8C16	3.62	0.95	2.84	4.46	7.77	7.77	7.77	7.19	6.17	4.94	3.56	2.65
8C14	6.69	1.53	4.40	4.48	9.82	9.82	9.82	9.19	8.10	6.29	4.45	3.33
8C13	12.22	2.42	6.75	4.50	12.89	12.89	12.89	11.96	10.26	7.84	5.59	4.22
8C12	16.48	3.37	9.23	4.53	15.40	15.40	15.40	14.14	11.95	9.26	6.67	5.07
10C16	2.86	0.82	2.65	4.39	9.61	9.61	9.61	9.07	8.13	6.54	4.63	3.44
10C14	5.28	1.36	4.15	4.41	13.42	13.42	13.42	12.46	10.86	8.20	5.76	4.29
10C13	9.71	2.19	6.42	4.42	17.53	17.53	17.53	16.14	13.67	10.18	7.19	5.39
10C12	15.25	3.08	8.83	4.44	20.95	20.95	20.95	19.07	15.92	11.99	8.52	6.42
118C14	4.56	1.24	3.98	4.72	15.42	15.42	15.42	14.83	13.67	11.44	8.34	6.19
118C13	8.38	2.03	6.20	4.74	21.49	21.49	21.49	20.40	17.92	14.49	10.36	7.71
118C12	10.97	2.51	7.52	4.76	24.31	24.31	24.31	22.91	20.09	16.03	11.52	8.60
118C11	18.08	3.68	10.71	4.77	29.30	29.30	29.30	27.77	23.86	18.96	13.73	10.30
118C10	26.91	5.05	14.40	4.79	33.98	33.98	33.98	31.87	27.47	22.02	16.11	12.16
12C14	4.36	1.20	3.93	4.34	14.65	14.65	14.65	13.80	12.33	9.49	6.89	5.26
12C13	8.01	1.98	6.13	4.35	20.43	20.43	20.43	18.96	16.26	12.22	8.87	6.64
12C12	12.58	2.83	8.46	4.37	25.43	25.43	25.43	23.19	19.50	14.74	10.49	7.86
12C11	17.29	3.61	10.61	4.38	28.80	28.80	28.80	26.29	22.14	16.66	11.82	8.89
12C10	26.38	4.97	14.28	4.39	33.88	33.88	33.88	30.97	25.95	19.46	13.89	10.51
14C13	6.82	1.79	5.86	5.38	26.65	26.65	26.65	26.25	24.69	22.59	18.34	13.99
14C12	10.70	2.60	8.13	5.40	35.06	35.06	35.06	34.35	31.43	27.27	21.96	16.43
14C11	14.70	3.35	10.22	5.41	40.29	40.29	40.29	39.50	35.67	30.79	24.74	18.43
14C10	22.42	4.64	13.80	5.43	47.18	47.18	47.18	46.16	41.91	36.33	28.76	21.54

Notes

1. Properties and loads are based on ASTM A653 SQ, Grade 55 Class 1 Steel with a minimum yield stress of 55 Ksi.
2. The properties have been determined in accordance with S136-01 North American Specification for the Design of Cold-Formed Steel Structural Members Appendix B, Provisions Applicable to Canada. (Limit States Design)

BEHLEN
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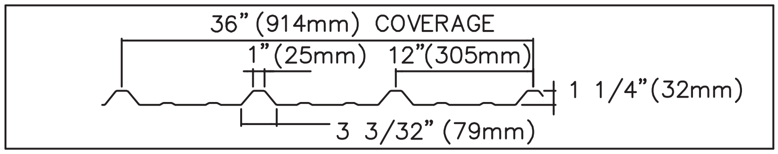

PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0120	0.0135	0.6178	0.0207	0.0529	0.02172	51.23	64.10	46	53
0.0135	0.0150	0.6878	0.0237	0.0294	0.02499	58.66	72.77	57	72
0.0150	0.0165	0.7578	0.0269	0.0329	0.02835	66.58	81.43	69	92
0.0180	0.0195	0.8978	0.0336	0.0401	0.04008	83.16	99.25	95	141
0.0240	0.0255	1.1678	0.0548	0.0544	0.05336	135.63	134.64	158	271
0.0300	0.0315	1.4478	0.0682	0.0682	0.06661	168.80	168.80	234	442

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)						2-Span Base Steel Nominal Thickness (inches)						3-Span Base Steel Nominal Thickness (inches)					
		.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300
2.0	B	68	78	89	111	181	225	85	97	109	132	180	225	107	121	136	165	224	281
	D	237	273	309	437	582	726	571	656	745	1053	1402	1750	447	515	584	825	1099	1371
2.5	B	44	50	57	71	116	144	55	62	69	85	115	114	68	78	87	106	144	180
	D	121	140	158	224	298	372	292	336	381	539	718	896	229	263	299	422	562	702
3.0	B	30	35	39	49	80	100	38	43	48	59	80	100	47	54	60	74	100	125
	D	70	81	92	130	172	215	169	195	221	312	415	518	132	152	173	245	326	406
3.5	B	22	26	29	36	59	73	28	32	35	43	59	73	35	40	44	54	73	92
	D	44	51	58	82	109	136	106	122	139	196	262	326	83	96	109	154	205	256
4.0	B	17	20	22	28	45	56	21	24	27	33	45	56	27	30	34	41	56	70
	D	30	34	39	55	73	91	71	82	93	132	175	219	56	64	73	103	137	171
4.5	B	13	15	18	22	36	44	17	19	21	26	35	44	21	24	27	33	44	56
	D	21	24	27	38	51	64	50	58	65	92	123	154	39	45	51	72	96	120
5.0	B	11	13	14	18	29	36	14	16	17	21	29	36	17	19	22	26	36	45
	D	15	17	20	28	37	46	37	42	48	67	90	112	29	33	37	53	70	88
5.5	B	9	10	12	15	24	30	11	13	14	17	24	30	14	16	18	22	30	37
	D	11	13	15	21	28	35	27	32	36	51	67	84	22	25	28	40	53	66
6.0	B	8	9	10	12	20	25	9	11	12	15	20	25	12	13	15	18	25	31
	D	9	10	11	16	22	27	21	24	28	39	52	65	17	19	22	31	41	51
6.5	B	6	7	8	10	17	21	8	9	10	13	17	21	10	11	13	16	21	27
	D	7	8	9	13	17	21	17	19	22	31	41	51	13	15	17	24	32	40
7.0	B	6	6	7	9	15	18	7	8	9	11	15	18	9	10	11	14	18	23
	D	6	6	7	10	14	17	13	15	17	25	33	41	10	12	14	19	26	32
7.5	B	5	6	6	8	13	16	6	7	8	9	13	16	8	9	10	12	16	20
	D	4	5	6	8	11	14	11	12	14	20	27	33	8	10	11	16	21	26
8.0	B	4	5	6	7	11	14	5	6	7	8	11	14	7	8	8	10	14	18
	D	4	4	5	7	9	11	9	10	12	16	22	27	7	8	9	13	17	21

Notes

1. Properties and loads are based on Grade 33 Steel with a minimum yield stress of 33000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

ENGINEERING DATA

AWR GRADE 33

JULY 2008

Vr 1.0

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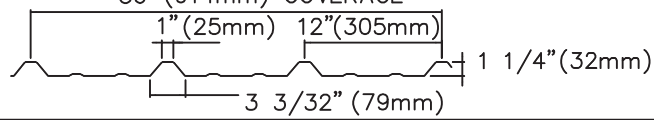


PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0120	0.0135	0.6178	0.0199	0.0253	0.02087	77.91	99.05	72	85
0.0135	0.0150	0.6878	0.0228	0.0288	0.02395	89.26	112.75	90	114
0.0150	0.0165	0.7578	0.0258	0.0322	0.02713	101.01	123.06	109	146
0.0180	0.0195	0.8978	0.0320	0.0392	0.03372	125.28	153.47	150	224
0.0240	0.0255	1.1678	0.0453	0.0533	0.05336	177.35	208.67	250	428
0.0300	0.0315	1.4478	0.0682	0.0674	0.06661	276.00	263.87	371	699

LOAD TABLE

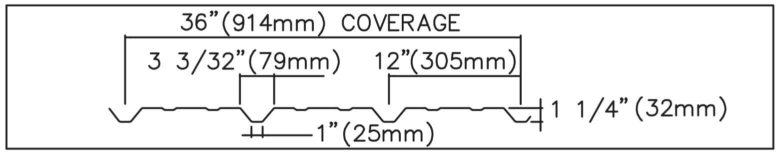
Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)						2-Span Base Steel Nominal Thickness (inches)						3-Span Base Steel Nominal Thickness (inches)					
		.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300
2.0	B	104	119	135	167	236	356	132	150	168	205	278	352	165	188	210	256	348	440
	D	228	261	296	368	582	726	548	629	713	886	1402	1750	430	493	559	694	1099	1371
2.5	B	66	76	86	107	151	228	85	96	108	131	178	225	106	120	134	164	223	281
	D	117	134	151	188	298	372	281	322	365	454	718	896	220	252	286	355	562	702
3.0	B	46	53	60	74	105	158	59	67	75	91	124	156	73	84	93	114	155	195
	D	67	77	88	109	172	215	162	186	211	262	415	518	127	146	166	206	326	406
3.5	B	34	39	44	55	77	116	43	49	55	67	91	115	54	61	69	84	114	144
	D	42	49	55	69	109	136	102	117	133	165	262	326	80	92	104	130	205	256
4.0	B	26	30	34	42	59	89	33	38	42	51	70	88	41	47	53	64	87	110
	D	28	33	37	46	73	91	69	79	89	111	175	219	54	62	70	87	137	171
4.5	B	21	24	27	33	47	70	26	30	33	40	55	69	33	37	42	51	69	87
	D	20	23	26	32	51	64	48	55	63	78	123	154	38	43	49	61	96	120
5.0	B	17	19	22	27	38	57	21	24	27	33	45	56	26	30	34	41	56	70
	D	15	17	19	24	37	46	35	40	46	57	90	112	27	32	36	44	70	88
5.5	B	14	16	18	22	31	47	17	20	22	27	37	47	22	25	28	34	46	58
	D	11	13	14	18	28	35	26	30	34	43	67	84	21	24	27	33	53	66
6.0	B	12	13	15	19	26	40	15	17	19	23	31	39	18	21	23	28	39	49
	D	8	10	11	14	22	27	20	23	26	33	52	65	16	18	21	26	41	51
6.5	B	10	11	13	16	22	34	13	14	16	19	26	33	16	18	20	24	33	42
	D	7	8	9	11	17	21	16	18	21	26	41	51	13	14	16	20	32	40
7.0	B	8	10	11	14	19	29	11	12	14	17	23	29	13	15	17	21	28	36
	D	5	6	7	9	14	17	13	15	17	21	33	41	10	12	13	16	26	32
7.5	B	7	8	10	12	17	25	9	11	12	15	20	25	12	13	15	18	25	31
	D	4	5	6	7	11	14	10	12	14	17	27	33	8	9	11	13	21	26
8.0	B	6	7	8	10	15	22	8	9	11	13	17	22	10	12	13	16	22	27
	D	4	4	5	6	9	11	9	10	11	14	22	27	7	8	9	11	17	21

Notes

1. Properties and loads are based on Grade 80 Steel with a minimum yield stress of 80000 psi and a maximum stress under factored loads of 46980 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

BEHLEN
Made Strong



PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0120	0.0135	0.62	0.0259	0.0207	0.02413	64.10	51.23	46	53
0.0135	0.0150	0.69	0.0294	0.0237	0.02778	72.77	58.66	57	72
0.0150	0.0165	0.76	0.0329	0.0269	0.03151	81.43	66.58	69	93
0.0180	0.0195	0.90	0.0401	0.0336	0.03909	99.25	83.16	95	142
0.0240	0.0255	1.17	0.0544	0.0548	0.05336	134.64	135.63	158	271
0.0300	0.0315	1.45	0.0682	0.0682	0.06661	168.79	168.80	234	442

LOAD TABLE

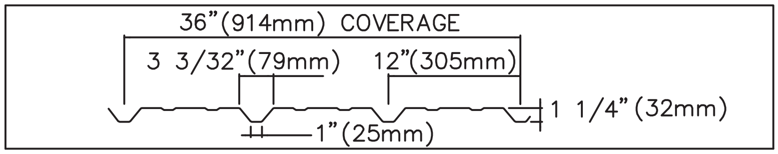
Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)						2-Span Base Steel Nominal Thickness (inches)						3-Span Base Steel Nominal Thickness (inches)					
		.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300
2.0	B	85	97	109	132	180	225	68	78	89	111	181	225	85	98	111	139	226	281
	D	263	303	344	426	582	726	634	730	828	1027	1402	1750	497	572	649	805	1099	1371
2.5	B	55	62	69	85	115	144	44	50	57	71	116	114	55	63	71	89	145	180
	D	135	155	176	218	298	372	325	374	424	526	718	896	254	293	332	412	562	702
3.0	B	38	43	48	59	80	100	30	35	39	49	80	100	38	43	49	62	100	125
	D	78	90	102	126	172	215	188	216	245	304	415	518	147	169	192	238	326	406
3.5	B	28	32	35	43	59	73	22	26	29	36	59	73	28	32	36	45	74	92
	D	49	57	64	80	109	136	118	136	154	192	262	326	93	107	121	150	205	256
4.0	B	21	24	27	33	45	56	17	20	22	28	45	56	21	24	28	35	57	70
	D	33	38	43	53	73	91	79	91	103	128	175	219	62	71	81	101	137	171
4.5	B	17	19	21	26	35	44	13	15	18	22	36	44	17	19	22	27	45	56
	D	23	27	30	37	51	64	56	64	73	90	123	154	44	50	57	71	96	120
5.0	B	14	16	17	21	29	36	11	13	14	18	29	36	14	16	18	22	36	45
	D	17	19	22	27	37	46	41	47	53	66	90	112	32	37	42	52	70	88
5.5	B	11	13	14	17	24	30	9	10	12	15	24	30	11	13	15	18	30	37
	D	13	15	17	20	28	35	30	35	40	49	67	84	24	28	31	39	53	66
6.0	B	9	11	12	15	20	25	8	9	10	12	20	25	9	11	12	15	25	31
	D	10	11	13	16	22	27	23	27	31	38	52	65	18	21	24	30	41	51
6.5	B	8	9	10	13	17	21	6	7	8	10	17	21	8	9	11	13	21	27
	D	8	9	10	12	17	21	18	21	24	30	41	51	14	17	19	23	32	40
7.0	B	7	8	9	11	15	18	6	6	7	9	15	18	7	8	9	11	18	23
	D	6	7	8	10	14	17	15	17	19	24	33	41	12	13	15	19	26	32
7.5	B	6	7	8	9	13	16	5	6	6	8	13	16	6	7	8	10	16	20
	D	5	6	7	8	11	14	12	14	16	19	27	33	9	11	12	15	21	26
8.0	B	5	6	7	8	11	14	4	5	6	7	11	14	5	6	7	9	14	18
	D	4	5	5	7	9	11	10	11	13	16	22	27	8	9	10	13	17	21

Notes

1. Properties and loads are based on Grade 33 Steel with a minimum yield stress of 33000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

BEHLEN
Made Strong



PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus Midspan (in3)	Section Modulus Support (in3)	Moment of Inertia Midspan (in4)	Factored Resistence Moment Midspan (ft-lb)	Factored Resistence Moment Support (ft-lb)	Specified Crippling Bearing = 2.5 (in) End (lbs/ft)	Specified Crippling Bearing = 2.5 (in) Interior (lbs/ft)
0.0120	0.0135	0.6200	0.0253	0.0199	0.02295	99.05	77.91	72	85
0.0135	0.0150	0.6900	0.0288	0.0228	0.02646	112.75	89.26	90	114
0.0150	0.0165	0.7600	0.0322	0.0258	0.03006	126.06	101.01	109	147
0.0180	0.0195	0.9000	0.0392	0.0320	0.03741	153.47	125.28	151	224
0.0240	0.0255	1.1700	0.0533	0.0453	0.05245	208.67	177.35	250	429
0.0300	0.0315	1.4500	0.0674	0.0682	0.06661	263.87	267.00	371	700

LOAD TABLE

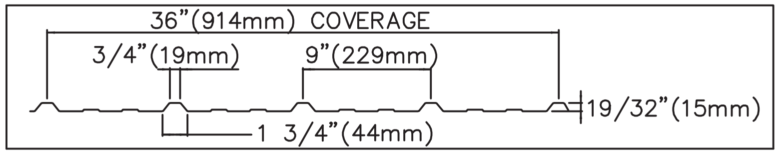
Maximum Specified Uniformly Distributed Load in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)						2-Span Base Steel Nominal Thickness (inches)						3-Span Base Steel Nominal Thickness (inches)					
		.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300	.0120	.0135	.0150	.0180	.0240	.0300
2.0	B	132	150	168	205	278	352	104	119	135	167	236	356	130	149	168	209	296	445
	D	250	289	328	408	572	726	603	695	790	983	1378	1750	473	545	619	770	1080	1371
2.5	B	85	96	108	131	178	225	66	76	86	107	151	228	83	95	108	134	189	285
	D	128	148	168	209	293	372	309	356	404	503	705	896	242	279	317	394	553	702
3.0	B	59	67	75	91	124	156	46	53	60	74	105	158	58	66	75	93	131	198
	D	74	85	97	121	169	215	179	206	234	291	408	518	140	161	183	228	320	406
3.5	B	43	49	55	67	91	115	34	39	44	55	77	116	42	49	55	68	97	145
	D	47	54	61	76	107	136	112	130	147	183	257	326	88	102	115	114	201	256
4.0	B	33	38	42	51	70	88	26	30	34	42	59	89	32	37	42	52	74	111
	D	31	36	41	51	71	91	75	87	99	123	172	219	59	68	77	96	135	171
4.5	B	26	30	33	40	55	69	21	24	27	33	47	70	26	29	33	41	58	88
	D	22	25	29	36	50	64	53	61	69	86	121	154	41	48	54	68	95	120
5.0	B	21	24	27	33	45	56	17	19	22	27	38	57	21	24	27	33	47	71
	D	16	18	21	26	37	46	39	44	51	63	88	112	30	35	40	49	69	88
5.5	B	17	20	22	27	37	47	14	16	18	22	31	47	7	20	22	28	39	59
	D	12	14	16	20	28	35	29	33	38	47	66	84	23	26	30	37	52	66
6.0	B	15	17	19	23	31	39	12	13	15	19	26	40	14	17	19	23	33	49
	D	9	11	12	15	21	27	22	26	29	36	51	65	18	20	23	29	40	51
6.5	B	13	14	16	19	26	33	10	11	13	16	22	34	12	14	16	20	28	42
	D	7	8	10	12	17	21	18	20	23	29	40	51	14	16	18	22	31	40
7.0	B	11	12	14	17	23	29	8	10	11	14	19	29	11	12	14	17	24	36
	D	6	7	8	10	13	17	14	16	18	23	32	41	11	13	14	18	25	32
7.5	B	9	11	12	15	20	25	7	8	10	12	17	25	9	11	12	15	21	32
	D	5	5	6	8	11	14	11	13	15	19	26	33	9	10	12	15	20	26
8.0	B	8	9	11	13	17	22	6	7	8	10	15	22	8	9	11	13	18	28
	D	4	5	5	6	9	11	9	11	12	15	22	27	7	9	10	12	17	21

Notes

1. Properties and loads are based on Grade 80 Steel with a minimum yield stress of 80000 psi and a maximum stress under factored loads of 46980 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

BEHLEN
Made Strong



PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0120	0.0135	0.5846	0.00994	0.00910	0.00588	24.60	22.52	59	104
0.0135	0.0150	0.6496	0.01166	0.01068	0.00662	28.86	26.43	72	134
0.0150	0.0165	0.7146	0.01343	0.01203	0.00735	33.24	29.77	87	167
0.0180	0.0195	0.8446	0.01704	0.01478	0.00882	42.17	36.58	119	244

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)				2-Span Base Steel Nominal Thickness (inches)				3-Span Base Steel Nominal Thickness (inches)			
		.0120	.0135	.0150	.0180	.0120	.0135	.0150	.0180	.0120	.0135	.0150	.0180
1.0	B	131	154	177	225	120	141	159	195	150	176	198	244
	D	513	578	641	769	1236	1391	1545	1853	968	1090	1211	1453
1.5	B	58	68	79	100	53	63	71	87	67	78	88	108
	D	152	171	190	228	366	412	458	549	287	323	359	430
2.0	B	33	38	44	56	30	35	40	498	38	44	50	61
	D	64	72	80	96	154	174	193	232	121	136	151	182
2.5	B	21	25	28	36	19	23	25	31	24	28	32	39
	D	33	37	41	49	79	89	99	119	62	70	77	93
3.0	B	15	17	20	25	13	16	18	22	17	20	22	27
	D	19	21	24	28	46	52	57	69	36	40	45	54
3.5	B	11	13	14	18	10	12	13	16	12	14	16	20
	D	12	13	15	18	29	32	36	43	23	25	28	34
4.0	B	8	10	11	14	8	9	10	12	9	11	12	15
	D	8	9	10	12	19	22	24	29	15	17	19	23
4.5	B	6	8	9	11	6	7	8	10	7	9	10	12
	D	6	6	7	8	14	15	17	20	11	12	13	16
5.0	B	5	6	7	9	5	6	6	8	6	7	8	10
	D	4	5	5	6	10	11	12	15	8	9	10	12
5.5	B	4	5	6	7	4	5	5	6	5	6	7	8
	D	3	3	5	5	7	8	9	11	6	7	7	9
6.0	B	4	4	5	6	3	4	4	5	4	5	6	7
	D	2	3	3	4	6	6	7	9	4	5	6	7
6.5	B	3	4	4	5	3	3	4	5	4	4	5	6
	D	2	2	2	3	4	5	6	7	4	4	4	5
7.0	B	3	3	4	5	2	3	3	4	3	4	4	5
	D	1	2	2	2	4	4	5	5	3	3	4	4

Notes

1. Properties and loads are based on Grade 33 Steel with a minimum yield stress of 33000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

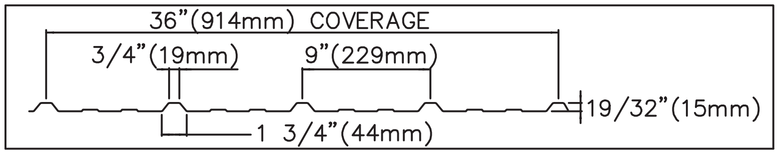
ENGINEERING DATA

JULY 2008

Vr 1.0

936 GRADE 33

BEHLEN
Made Strong



PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0120	0.0135	0.5846	0.0091	0.0081	0.0055	35.78	31.55	94	165
0.0135	0.0150	0.6496	0.0107	0.0096	0.0064	42.01	37.62	115	211
0.0150	0.0165	0.7146	0.0124	0.0113	0.0073	48.43	44.20	137	264
0.0180	0.0195	0.8446	0.0158	0.0143	0.0088	61.90	55.79	188	387

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

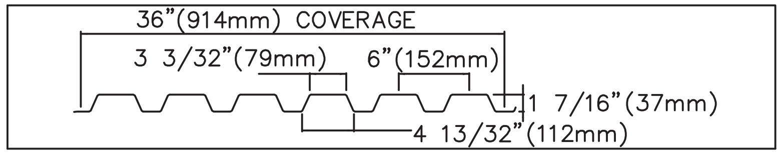
Span (ft)		1-Span Base Steel Nominal Thickness (inches)				2-Span Base Steel Nominal Thickness (inches)				3-Span Base Steel Nominal Thickness (inches)			
		.0120	.0135	.0150	.0180	.0120	.0135	.0150	.0180	.0120	.0135	.0150	.0180
1.0	B	191	224	258	330	168	201	236	298	210	251	295	372
	D	481	560	640	769	1158	1349	1542	1853	908	1057	1209	1453
1.5	B	85	100	115	147	75	89	105	132	93	111	131	165
	D	142	166	190	228	343	400	457	549	269	313	358	430
2.0	B	48	56	65	83	42	50	59	74	53	63	74	93
	D	60	70	80	96	145	169	193	232	113	132	151	182
2.5	B	31	36	41	53	27	32	38	48	34	40	47	60
	D	31	36	41	49	74	86	99	119	58	68	77	93
3.0	B	21	25	29	37	19	22	26	33	23	28	33	41
	D	18	21	24	28	43	50	57	69	34	39	45	54
3.5	B	16	18	21	27	14	16	19	24	17	20	24	30
	D	11	13	15	18	27	31	36	43	21	25	28	34
4.0	B	12	14	16	21	11	13	15	19	13	16	18	23
	D	8	9	10	12	18	21	24	29	14	17	19	23
4.5	B	9	11	13	16	8	10	12	15	10	12	15	18
	D	5	6	7	8	13	15	17	20	10	12	13	16
5.0	B	8	9	10	13	7	8	9	12	8	10	12	15
	D	4	4	5	6	9	11	12	15	7	8	10	12
5.5	B	6	7	9	11	6	7	8	10	7	8	10	12
	D	3	3	4	5	7	8	9	11	5	6	7	9
6.0	B	5	6	7	9	5	6	7	8	6	7	8	10
	D	2	3	3	4	5	6	7	9	4	5	6	7
6.5	B	5	5	6	8	4	5	6	7	5	6	7	9
	D	2	2	2	3	4	5	6	7	3	4	4	5
7.0	B	4	5	5	7	3	4	5	6	4	5	6	8
	D	1	2	2	2	3	4	4	5	3	3	4	4

Notes

1. Properties and loads are based on Grade 80 Steel with a minimum yield stress of 80000 psi and a maximum stress under factored loads of 46980 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

BEHLEN

Made Strong



PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0150	0.0165	0.87	0.0667	0.0704	0.0608	165.08	174.24	151	194
0.0180	0.0195	1.03	0.0861	0.0900	0.0770	213.10	222.75	208	267
0.0240	0.0255	1.35	0.1302	0.1327	0.1151	322.25	328.43	348	443
0.0300	0.0315	1.67	0.1774	0.1789	0.1559	439.07	442.78	517	660
0.0360	0.0375	1.98	0.2165	0.2267	0.1971	535.84	561.08	714	915

LOAD TABLE

Maximum Specified Uniformly Distributed Load in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)					2-Span Base Steel Nominal Thickness (inches)					3-Span Base Steel Nominal Thickness (inches)				
		.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360
4.0	B	55	71	107	146	179	58	74	109	148	187	73	93	137	184	234
	D	83	105	157	213	269	200	253	378	512	647	156	198	296	401	507
4.5	B	43	56	85	116	141	46	59	87	117	148	57	73	108	146	185
	D	58	74	110	149	189	140	178	265	360	455	110	139	208	282	356
5.0	B	35	45	69	94	114	37	48	70	94	120	46	59	88	118	150
	D	42	54	80	109	138	102	129	193	262	331	80	101	152	205	260
5.5	B	29	38	57	77	94	31	39	58	78	99	38	49	72	98	124
	D	32	40	60	82	103	77	97	145	197	249	60	76	114	154	195
6.0	B	24	32	48	65	79	26	33	49	66	83	32	41	61	82	104
	D	25	31	46	63	80	59	75	112	152	192	46	59	88	119	150
6.5	B	21	27	41	55	68	22	28	41	56	71	27	35	52	70	89
	D	19	24	37	50	63	47	59	88	119	151	36	46	69	94	118
7.0	B	18	23	35	48	58	19	24	36	48	61	24	30	45	60	76
	D	15	20	29	40	50	37	47	71	96	121	29	37	55	75	95
7.5	B	16	20	31	42	51	17	21	31	42	53	21	26	39	52	66
	D	13	16	24	32	41	30	38	57	78	98	24	30	45	61	77
8.0	B	14	18	27	37	45	15	19	27	37	47	18	23	34	46	58
	D	10	13	20	27	34	25	32	47	64	81	20	25	37	50	63
8.5	B	12	16	24	32	40	13	16	24	33	41	16	21	30	41	52
	D	9	11	16	22	28	21	26	39	53	67	16	21	31	42	53
9.0	B	11	14	21	29	35	11	15	22	29	37	14	18	27	36	46
	D	7	9	14	19	24	18	22	33	45	57	14	17	26	35	45
9.5	B	10	13	19	26	32	10	13	19	26	33	13	16	24	33	41
	D	6	8	12	16	20	15	19	28	38	48	12	15	22	30	38
10.0	B	9	11	17	23	29	9	12	18	24	30	12	15	22	30	37
	D	5	7	10	14	17	13	16	24	33	41	10	13	19	26	32

Notes

1. Properties and loads are based on Grade 33 Steel with a minimum yield stress of 33000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

BEHLEN
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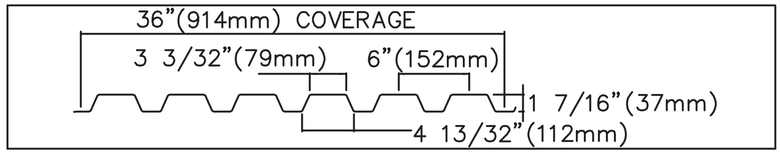

PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus Midspan (in3)	Section Modulus Support (in3)	Moment of Inertia Midspan (in4)	Factored Resistence Moment Midspan (ft-lb)	Factored Resistence Moment Support (ft-lb)	Specified Crippling Bearing = 2.5 (in) End (lbs/ft)	Specified Crippling Bearing = 2.5 (in) Interior (lbs/ft)
0.0150	0.0165	0.8700	0.0612	0.0654	0.0569	239.60	256.04	238	307
0.0180	0.0195	1.0300	0.0784	0.0831	0.0720	306.94	325.34	330	422
0.0240	0.0255	1.3500	0.1174	0.1222	0.1046	459.62	478.49	550	701
0.0300	0.0315	1.6700	0.1618	0.1650	0.1434	633.45	645.98	817	1044
0.0360	0.0375	1.9800	0.2105	0.2105	0.1840	824.11	824.11	1130	1477

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)					2-Span Base Steel Nominal Thickness (inches)					3-Span Base Steel Nominal Thickness (inches)				
		.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360
4.0	B	80	102	153	211	275	85	108	159	215	271	107	136	199	269	343
	D	78	98	143	196	251	187	236	344	471	604	147	185	269	369	473
4.5	B	63	81	121	167	217	67	86	126	170	217	84	107	158	213	271
	D	55	69	100	137	176	131	166	241	331	424	103	130	189	259	333
5.0	B	51	65	98	135	176	55	69	102	138	176	68	87	128	172	220
	D	40	50	73	100	128	96	121	176	241	309	75	95	138	189	242
5.5	B	42	54	81	112	145	45	57	84	114	145	56	72	105	142	182
	D	30	38	55	75	96	72	91	132	181	232	56	71	104	142	182
6.0	B	35	45	68	94	122	38	48	71	96	122	47	60	89	120	153
	D	23	29	42	58	74	55	70	102	140	179	43	55	80	109	140
6.5	B	30	39	58	80	104	32	41	60	82	104	40	51	76	102	130
	D	18	23	33	46	58	44	55	80	110	141	34	43	63	86	110
7.0	B	26	33	50	69	90	28	35	52	70	90	35	44	65	88	112
	D	14	18	27	36	47	35	44	64	88	113	27	35	50	69	88
7.5	B	23	29	44	60	78	24	31	45	61	78	30	39	57	77	98
	D	12	15	22	30	38	28	36	52	71	92	22	28	41	56	72
8.0	B	20	26	38	53	69	21	27	40	54	69	27	34	50	67	86
	D	10	12	18	24	31	23	30	43	59	76	18	23	34	46	59
8.5	B	18	23	34	47	61	19	24	35	48	61	24	30	44	60	76
	D	8	10	15	20	26	19	25	36	49	63	15	19	28	38	49
9.0	B	16	20	30	42	54	17	21	32	43	54	21	27	39	53	68
	D	7	9	13	17	22	16	21	30	41	53	13	16	24	32	42
9.5	B	14	18	27	37	49	15	19	28	38	49	19	24	35	48	61
	D	6	7	11	15	19	14	18	26	35	45	11	14	20	28	35
10.0	B	13	16	25	34	44	14	17	26	34	44	17	22	32	43	55
	D	5	6	9	13	16	12	15	22	30	39	9	12	17	24	30

Notes

1. Properties and loads are based on Grade 80 Steel with a minimum yield stress of 80000 psi and a maximum stress under factored loads of 46980 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

ENGINEERING DATA

ELITE RIB GRADE 80

BEHLEN
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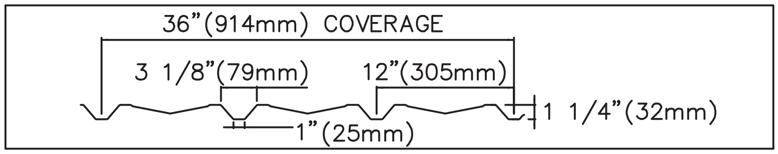


PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus Midspan (in3)	Section Modulus Support (in3)	Moment of Inertia Midspan (in4)	Factored Resistence Moment Midspan (ft-lb)	Factored Resistence Moment Support (ft-lb)	Specified Crippling Bearing = 2.5 (in) End (lbs/ft)	Specified Crippling Bearing = 2.5 (in) Interior (lbs/ft)
0.0120	0.0135	0.6038	0.02028	0.02455	0.01523	50.19	60.76	38	47
0.0135	0.0150	0.6708	0.02387	0.02846	0.01801	59.08	70.44	47	63
0.0150	0.0165	0.7378	0.02769	0.03250	0.02095	68.53	80.44	57	81
0.0180	0.0195	0.8718	0.03448	0.04085	0.02729	85.34	101.10	79	125
0.0240	0.0255	1.1388	0.04777	0.05731	0.04140	118.23	141.84	132	242

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

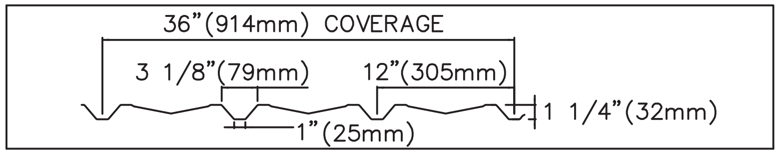
Span (ft)		1-Span Base Steel Nominal Thickness (inches)					2-Span Base Steel Nominal Thickness (inches)					3-Span Base Steel Nominal Thickness (inches)				
		.0120	.0135	.0150	.0180	.0240	.0120	.0135	.0150	.0180	.0240	.0120	.0135	.0150	.0180	.0240
2.0	B	67	79	91	114	158	81	94	107	135	189	101	117	134	169	236
	D	166	196	228	298	451	400	473	550	717	1087	314	371	431	562	852
2.5	B	43	50	58	73	101	52	60	69	86	121	65	75	86	108	151
	D	85	101	117	152	231	205	242	282	367	557	161	190	221	288	436
3.0	B	30	35	41	51	70	36	42	48	60	84	45	52	60	75	105
	D	49	58	68	88	134	119	140	163	212	322	93	110	128	166	253
3.5	B	22	26	30	37	51	26	31	35	44	62	33	38	44	55	77
	D	31	37	43	56	84	75	88	103	134	203	59	69	80	105	159
4.0	B	17	20	23	28	39	20	23	27	34	47	25	29	34	42	59
	D	21	25	29	37	56	50	59	69	90	136	39	46	54	70	107
4.5	B	13	16	18	22	31	16	19	21	27	37	20	23	26	33	47
	D	15	17	20	26	40	35	42	48	63	95	28	33	38	49	75
5.0	B	11	13	15	18	25	13	15	17	22	30	16	19	21	27	38
	D	11	13	15	19	29	26	30	35	46	70	20	24	28	36	55
5.5	B	9	10	12	15	21	11	12	14	18	25	13	16	18	22	31
	D	8	9	11	14	22	19	23	26	34	52	15	18	21	27	41
6.0	B	7	9	10	13	18	9	10	12	15	21	11	13	15	19	26
	D	6	7	8	11	17	15	18	20	27	40	12	14	16	21	32
6.5	B	6	7	9	11	15	8	9	10	13	18	10	11	13	16	22
	D	5	6	7	9	13	12	14	16	21	32	9	11	13	16	25
7.0	B	5	6	7	9	13	7	8	9	11	15	8	10	11	14	19
	D	4	5	5	7	11	9	11	13	17	25	7	9	10	13	20
7.5	B	5	6	6	8	11	6	7	8	10	13	7	8	10	12	17
	D	3	4	4	6	9	8	9	10	14	21	6	7	8	11	16
8.0	B	4	5	6	7	10	5	6	7	8	12	6	7	8	11	15
	D	3	3	4	5	7	6	7	9	11	17	5	6	7	9	13

Notes

1. Properties and loads are based on Grade 33 Steel with a minimum yield stress of 33000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

BEHLEN

Made Strong



PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus Midspan (in3)	Section Modulus Support (in3)	Moment of Inertia Midspan (in4)	Factored Resistence Moment Midspan (ft-lb)	Factored Resistence Moment Support (ft-lb)	Specified Crippling Bearing = 2.5 (in) End (lbs/ft)	Specified Crippling Bearing = 2.5 (in) Interior (lbs/ft)
0.0120	0.0135	0.6038	0.01869	0.02318	0.01403	73.17	90.75	60	74
0.0135	0.0150	0.6708	0.02188	0.02683	0.01639	85.66	105.04	75	99
0.0150	0.0165	0.7378	0.02524	0.03060	0.01899	98.81	119.80	90	128
0.0180	0.0195	0.8718	0.03251	0.03847	0.02462	127.28	150.61	125	198
0.0240	0.0255	1.1388	0.04610	0.05513	0.03733	180.48	215.83	209	383

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)					2-Span Base Steel Nominal Thickness (inches)					3-Span Base Steel Nominal Thickness (inches)				
		.0120	.0135	.0150	.0180	.0240	.0120	.0135	.0150	.0180	.0240	.0120	.0135	.0150	.0180	.0240
2.0	B	98	114	132	170	241	121	140	160	201	288	151	175	200	251	360
	D	153	179	207	268	407	369	431	499	647	981	289	337	391	507	769
2.5	B	62	73	84	109	154	77	90	102	129	184	97	112	128	161	230
	D	78	92	106	137	208	189	220	255	331	502	148	173	200	260	394
3.0	B	43	51	59	75	107	54	62	71	89	128	67	78	89	112	160
	D	45	53	61	80	121	109	128	148	192	291	86	100	116	150	228
3.5	B	32	37	43	55	79	40	46	52	66	94	49	57	65	82	117
	D	29	33	39	50	76	69	80	93	121	183	54	63	73	95	143
4.0	B	24	29	33	42	60	30	35	40	50	72	38	44	50	63	90
	D	19	22	26	34	51	46	54	62	81	123	36	42	49	63	96
4.5	B	19	23	26	34	48	24	28	32	40	57	30	35	39	50	71
	D	13	16	18	24	36	32	38	44	57	86	25	30	34	45	67
5.0	B	16	18	21	27	39	19	22	26	32	46	24	28	32	40	58
	D	10	11	13	17	26	24	28	32	41	63	18	22	25	32	49
5.5	B	13	15	17	22	32	16	19	21	27	38	20	23	26	33	48
	D	7	9	10	13	20	18	21	24	31	47	14	16	19	24	37
6.0	B	11	13	15	19	27	13	16	18	22	32	17	19	22	28	40
	D	6	7	8	10	15	14	16	18	24	36	11	12	14	19	28
6.5	B	9	11	12	16	23	11	13	15	19	27	14	17	19	24	34
	D	4	5	6	8	12	11	13	15	19	29	8	10	11	15	22
7.0	B	8	9	11	14	20	10	11	13	16	23	12	14	16	20	29
	D	4	4	5	6	9	9	10	12	15	23	7	8	9	12	18
7.5	B	7	8	9	12	17	9	10	11	14	20	11	12	14	18	26
	D	3	3	4	5	8	7	8	9	12	19	5	6	7	10	15
8.0	B	6	7	8	11	15	8	9	10	13	18	9	11	12	16	22
	D	2	3	3	4	6	6	7	8	10	15	5	5	6	8	12

Notes

1. Properties and loads are based on Grade 80 Steel with a minimum yield stress of 80000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

ENGINEERING DATA

DELTA SPAN GRADE 80

JULY 2008

Vr 1.0

BEHLEN
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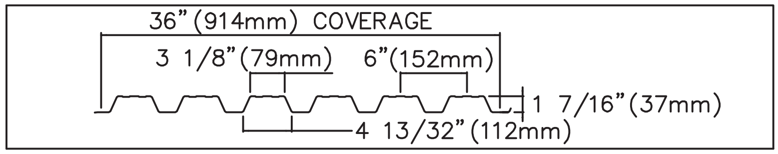

PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0150	0.0165	0.8700	0.0667	0.0704	0.0608	165.08	174.24	151	194
0.0180	0.0195	1.0300	0.0861	0.0900	0.0770	213.10	222.75	208	267
0.0240	0.0255	1.3500	0.1302	0.1327	0.1151	322.25	328.43	348	443
0.0300	0.0315	1.6700	0.1774	0.1789	0.1559	439.07	442.78	517	660
0.0360	0.0375	1.9800	0.2165	0.2267	0.1971	535.84	561.08	714	915

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)					2-Span Base Steel Nominal Thickness (inches)					3-Span Base Steel Nominal Thickness (inches)				
		.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360
4.0	B	55	71	107	146	179	58	74	109	148	187	73	93	137	184	234
	D	83	105	157	213	269	200	253	378	512	647	156	198	296	401	507
4.5	B	43	56	85	116	141	46	59	87	117	148	57	73	108	146	185
	D	58	74	110	149	189	140	178	265	360	455	110	139	208	282	356
5.0	B	35	45	69	94	114	37	48	70	94	120	46	59	88	118	150
	D	42	54	80	109	138	102	129	193	262	331	80	101	152	205	260
5.5	B	29	38	57	77	94	31	39	58	78	99	38	49	72	98	124
	D	32	40	60	82	103	77	97	145	197	249	60	76	114	154	195
6.0	B	24	32	48	65	79	26	33	49	66	83	32	41	61	82	104
	D	25	31	46	63	80	59	75	112	152	192	46	59	88	119	150
6.5	B	21	27	41	55	68	22	28	41	56	71	27	35	52	70	89
	D	19	24	37	50	63	47	59	88	119	151	36	46	69	94	118
7.0	B	18	23	35	48	58	19	24	36	48	61	24	30	45	60	76
	D	15	20	29	40	50	37	47	71	96	121	29	37	55	75	95
7.5	B	16	20	31	42	51	17	21	31	42	53	21	26	39	52	66
	D	13	16	24	32	41	30	38	57	78	98	24	30	45	61	77
8.0	B	14	18	27	37	45	15	19	27	37	47	18	23	34	46	58
	D	10	13	20	27	34	25	32	47	64	81	20	25	37	50	63
8.5	B	12	16	24	32	40	13	16	24	33	41	16	21	30	41	52
	D	9	11	16	22	28	21	26	39	53	67	16	21	31	42	53
9.0	B	11	14	21	29	35	11	15	22	29	37	14	18	27	36	46
	D	7	9	14	19	24	18	22	33	45	57	14	17	26	35	45
9.5	B	10	13	19	26	32	10	13	19	26	33	13	16	24	33	41
	D	6	8	12	16	20	15	19	28	38	48	12	15	22	30	38
10.0	B	9	11	17	23	29	9	12	18	24	30	12	15	22	30	37
	D	5	7	10	14	17	13	16	24	33	41	10	13	19	26	32

Notes

1. Properties and loads are based on Grade 33 Steel with a minimum yield stress of 33000 psi and a maximum stress under factored loads of 29700 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

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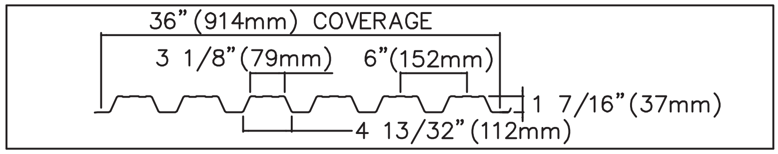

PHYSICAL PROPERTIES

Per Foot Width
In accordance with CSA Standard S136

Base Steel Nominal Thickness (inches)	Nominal Thickness Z275 Coating (inches)	Mass with Z275 Coating (lb/ft2)	Section Modulus		Moment of Inertia Midspan (in4)	Factored Resistence Moment		Specified Crippling Bearing = 2.5 (in)	
			Midspan (in3)	Support (in3)		Midspan (ft-lb)	Support (ft-lb)	End (lbs/ft)	Interior (lbs/ft)
0.0150	0.0165	0.8700	0.06120	0.06540	0.05690	239.60	256.04	238	307
0.0180	0.0195	1.0300	0.07840	0.08310	0.07200	306.94	325.34	330	422
0.0240	0.0255	1.3500	0.11740	0.12220	0.10460	459.62	478.49	550	701
0.0300	0.0315	1.6700	0.16180	0.16500	0.14340	633.45	645.98	817	1044
0.0360	0.0375	1.9800	0.21050	0.21050	0.18400	824.11	824.11	1130	1477

LOAD TABLE

Maximum Specified Uniformly Distributed Load
in lb/ft2 (psf)

Span (ft)		1-Span Base Steel Nominal Thickness (inches)					2-Span Base Steel Nominal Thickness (inches)					3-Span Base Steel Nominal Thickness (inches)				
		.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360	.0150	.0180	.0240	.0300	.0360
4.0	B	80	102	153	211	275	85	108	159	215	275	107	136	199	269	343
	D	78	98	143	196	251	187	236	344	471	604	147	185	269	369	473
4.5	B	63	81	121	167	217	67	86	126	170	217	84	107	158	213	271
	D	55	69	100	137	176	131	166	241	331	424	103	130	189	259	333
5.0	B	51	65	98	135	176	55	69	102	138	176	68	87	128	172	220
	D	40	50	73	100	128	96	121	176	241	309	75	95	138	189	242
5.5	B	42	54	81	112	145	45	57	84	114	145	56	72	105	142	182
	D	30	38	55	75	96	72	91	132	181	232	56	71	104	142	182
6.0	B	35	45	68	94	122	38	48	71	96	122	47	60	89	120	153
	D	23	29	42	58	74	55	70	102	140	179	43	55	80	109	140
6.5	B	30	39	58	80	104	32	41	60	82	104	40	51	76	102	130
	D	18	23	33	46	58	44	55	80	110	141	34	43	63	86	110
7.0	B	26	33	50	69	90	28	35	52	70	90	35	44	65	88	112
	D	14	18	27	36	47	35	44	64	88	113	27	35	50	69	88
7.5	B	23	29	44	60	78	24	31	45	61	78	30	39	57	77	98
	D	12	15	22	30	38	28	36	52	71	92	22	28	41	56	72
8.0	B	20	26	38	53	69	21	27	40	54	69	27	34	50	67	86
	D	10	12	18	24	31	23	30	43	59	76	18	23	34	46	59
8.5	B	18	23	34	47	61	19	24	35	48	61	24	30	44	60	76
	D	8	10	15	20	26	19	25	36	49	63	15	19	28	38	49
9.0	B	16	20	30	42	54	17	21	32	43	54	21	27	39	53	68
	D	7	9	13	17	22	16	21	30	41	53	13	16	24	32	42
9.5	B	14	18	27	37	49	15	19	28	38	49	19	24	35	48	61
	D	6	7	11	15	19	14	18	26	35	45	11	14	20	28	35
10.0	B	13	16	25	34	44	14	17	26	34	44	17	22	32	43	55
	D	5	6	9	13	16	12	15	22	30	39	9	12	17	24	30

Notes

1. Properties and loads are based on Grade 80 Steel with a minimum yield stress of 80000 psi and a maximum stress under factored loads of 46980 psi.
2. Figures in Row B indicate the load capacity based on strength. Strength capacity B should be checked against [Specified Live Load] + [0.833 x Specified Dead Load].
3. Figures in Row D indicate the load capacity based on deflection on 1/180th span. For allowable deflection of 1/90th span, values in Row D can be doubled, but must not exceed the figure in Row B. Deflection capacity should be checked against Specified Load(s).
4. Specified web crippling capacity. Should be checked against specified load at support location.

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SECTION 7
LIGHT GAUGE ACCESSORIES

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INDEX

LIGHT GAUGE ACCESSORIES

Section 7.1 - STANDARD OPENING DETAILS

ENDWALL OPENING ELEVATION	001
DOOR JAMB to GIRT DETAILS	002
DOOR HEADER to COLUMN DETAILS	003
JAMB CAP DETAILS	004
DOOR JAMB BASE DETAIL	005
WALK DOOR DETAILS	006
WINDOW DETAILS	007
WINDOW DETAILS cont.	008
WALK DOOR BASE DETAILS	009
JAMB to EAVE DETAILS	010

Section 7.2 - TRANSLUCENT ROOF PANEL

LAYOUT OF AWR ROOF PANEL	001
SCREWS on AWR ROOF PANEL	002
LAYOUT of ULTRA SPAN ROOF PANEL	003
SCREWS on ULTRA SPAN ROOF PANEL	004

Section 7.3 - TRANSLUCENT WALL PANEL

AWR TRANSLUCENT PANEL	001
SCREWS on AWR PANEL	002
WIDE SPAN TRANSLUCENT PANEL	003
SCREWS on WIDE SPAN PANEL	004
ULTRA SPAN TRANSLUCENT PANEL	005
SCREWS on ULTRA SPAN PANEL	006
DELTA SPAN TRANSLUCENT PANEL	007
SCREWS on DELTA SPAN PANEL	008

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INDEX

LIGHT GAUGE ACCESSORIES

Section 7.4 - CANOPY DETAILS

FLUSH PURLIN with FLAT SOFFIT	001
FLUSH PURLIN with SOFFIT	002
BYPASS PURLIN with FLAT SOFFIT I	003
BYPASS PURLIN with FLAT SOFFIT II	004
GENERAL LAYOUT of O.H. DOOR	005
O.H. DOOR CANOPY SECTION I	006
O.H. DOOR CANOPY SECTION II	007
O.H. DOOR CANOPY SECTION III	008
O.H. DOOR CANOPY SECTION IV	009
GABLE EXTENSION	010
EAVE EXTENSION with FLAT SOFFIT	011
EAVE EXTENSION without SOFFIT	012

Section 7.5 - WALK DOOR CANOPY

TYPICAL WALK DOOR CANOPY	001
FRONT VIEW of CANOPY I	002
BACK VIEW of CANOPY I	003
FRONT VIEW of CANOPY II	004
BACK VIEW of CANOPY II	005
SECTION VIEW of CANOPY	006
PLAN VIEW of CANOPY I	007
PLAN VIEW of CANOPY II	008

INDEX

LIGHT GAUGE ACCESSORIES

Section 7.6 - LINER DETAILS

GENERAL DESCRIPTION	001
ENDWALL RAFTER DETAIL I	002
ENDWALL RAFTER DETAIL II	003
EXPANDABLE ENDWALL at RAFTER	004
SIDEWALL DETAIL at EAVE I	005
SIDEWALL DETAIL at EAVE II	006
SIDEWALL DETAIL at EAVE III	007
LINER at RIDGE	008
EXPANDABLE ENDWALL at COLUMN	009
ENDWALL DETAIL at COLUMN I	010
ENDWALL DETAIL at COLUMN II	011
DETAIL at INSET GIRT	012
BASE DETAIL	013
OVERHEAD DOOR DETAIL at HEADER	014
OVERHEAD DOOR DETAIL at JAMB	015
FRAMED OPENING DETAIL at HEADER	016
FRAMED OPENING DETAIL at SILL	017
FRAMED OPENING DETAIL at JAMB	018

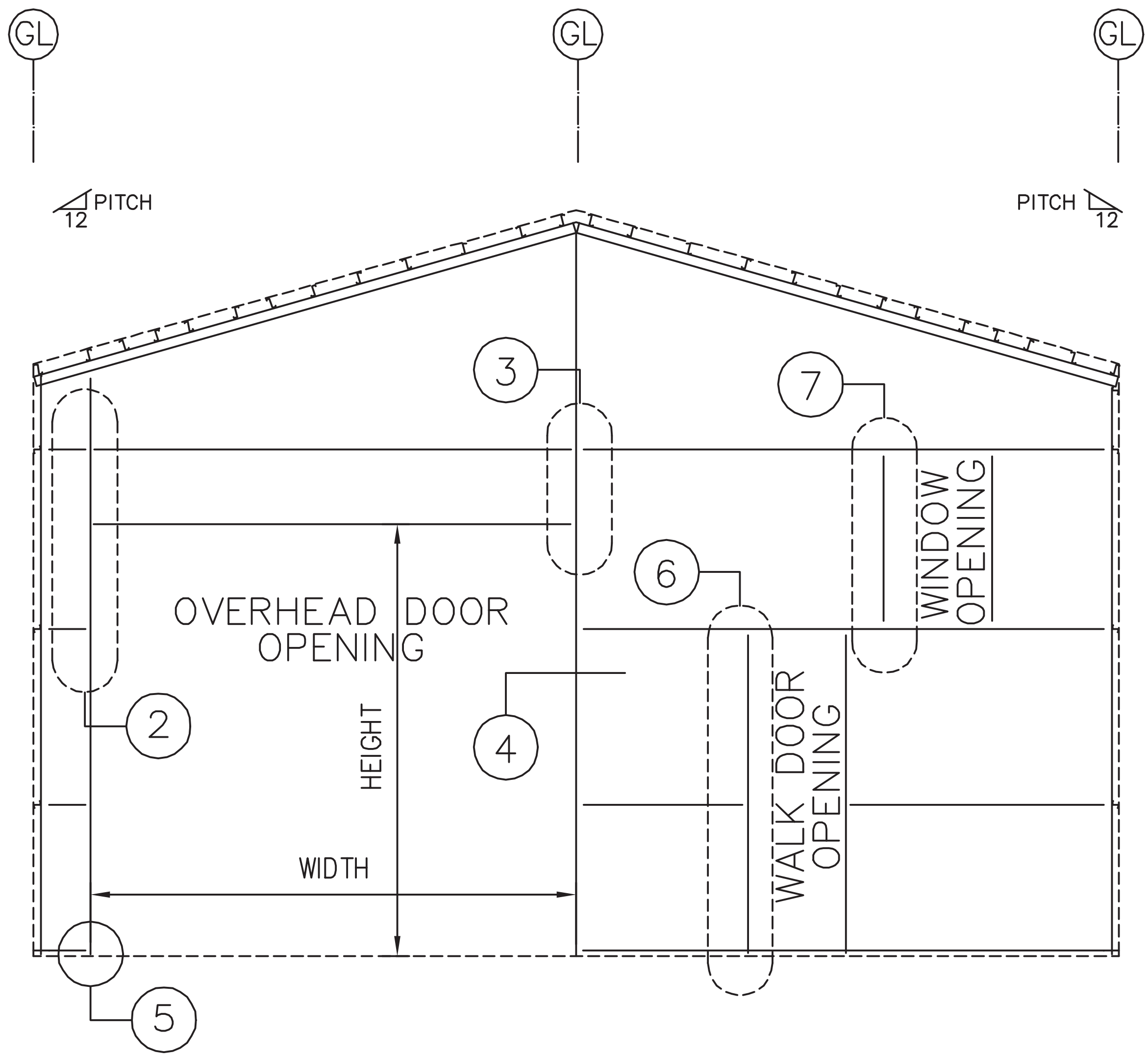
Section 7.7 - THERMAL SYSTEM

BASE DETAIL I	001
BASE DETAIL II	002
TYPICAL HAT BAR SPLICE DETAIL	003
TYPICAL CORNER WALL DETAIL	004
GABLE CONDITION DETAIL I	005
GABLE CONDITION DETAIL II	006
GABLE CONDITION DETAIL III	007
EAVE CONDITION DETAIL I	008
EAVE CONDITION DETAIL II	009
EAVE CONDITION DETAIL III	010
INTERMEDIATE ROOF CONDITION	011
DOOR HEADER DETAIL	012
WINDOW SILL DETAIL	013
DOOR/WINDOW JAMB DETAIL	014

INDEX

LIGHT GAUGE ACCESSORIES

Section 7.8 -	GUTTER DETAILS	
	TRANSITION at LEAN-TO	001
	LOW EAVE INTERNAL GUTTER	002
	INTERNAL GUTTER	003
Section 7.9 -	PARAPET DETAILS	
	ENDWALL PARAPET DETAIL	001
	LOW SIDEWALL PARAPET DETAIL	002
	HIGH SIDEWALL PARAPET DETAIL	003
Section 7.10 -	DADO WALL DETAILS	
	DETAIL with BASE GIRT I	001
	DETAIL wtih BASE GIRT II	002
	DETAIL with BASE ANGLE	003
	DETAIL at DOOR JAMBS	004



OVERHEAD DOOR GENERAL LAYOUT

SAME DETAILS FOR SIDEWALL OPENING

FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

STANDARD OPENING DETAILS	JULY 2008 / Vr 1.0
ENDWALL OPENING ELEVATION	Section 7.1 / Page 001

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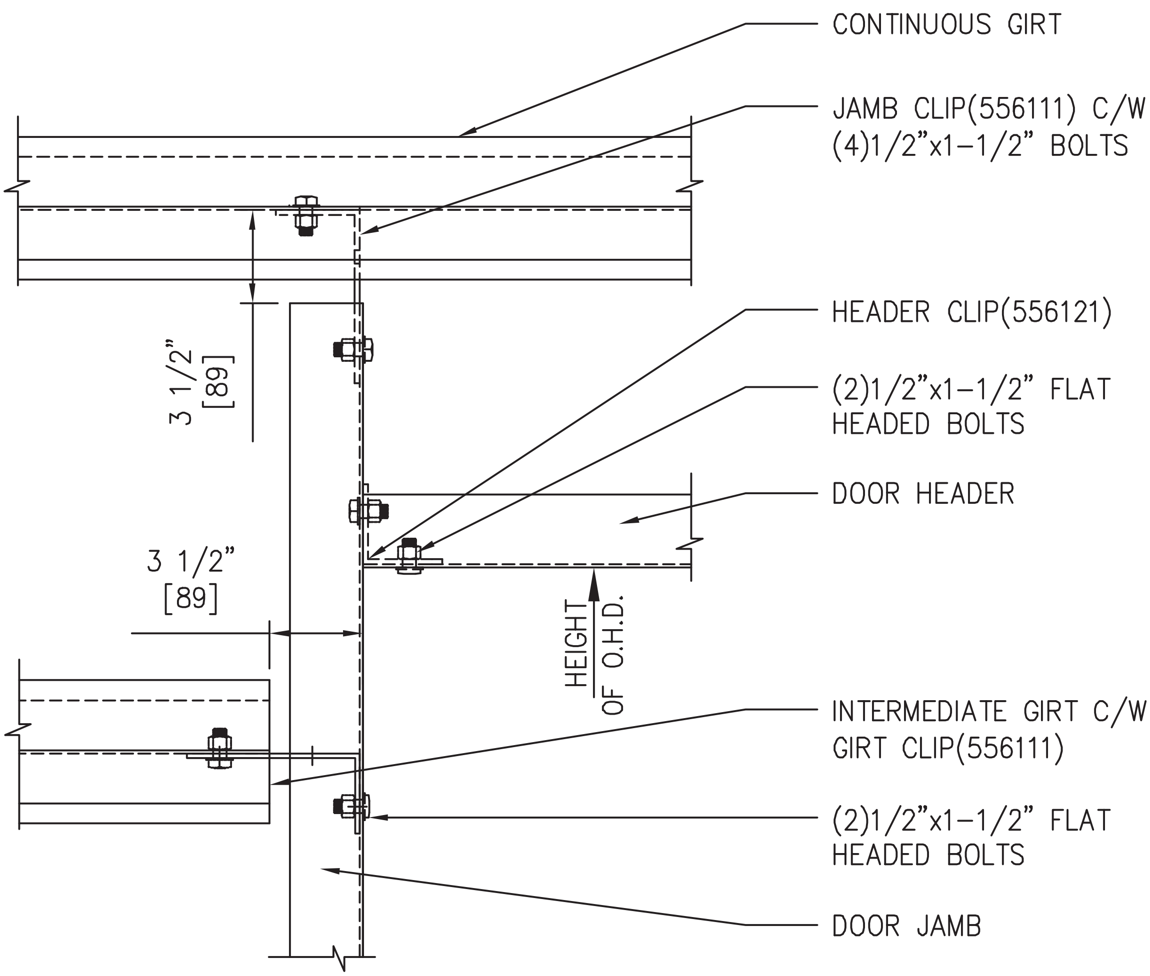
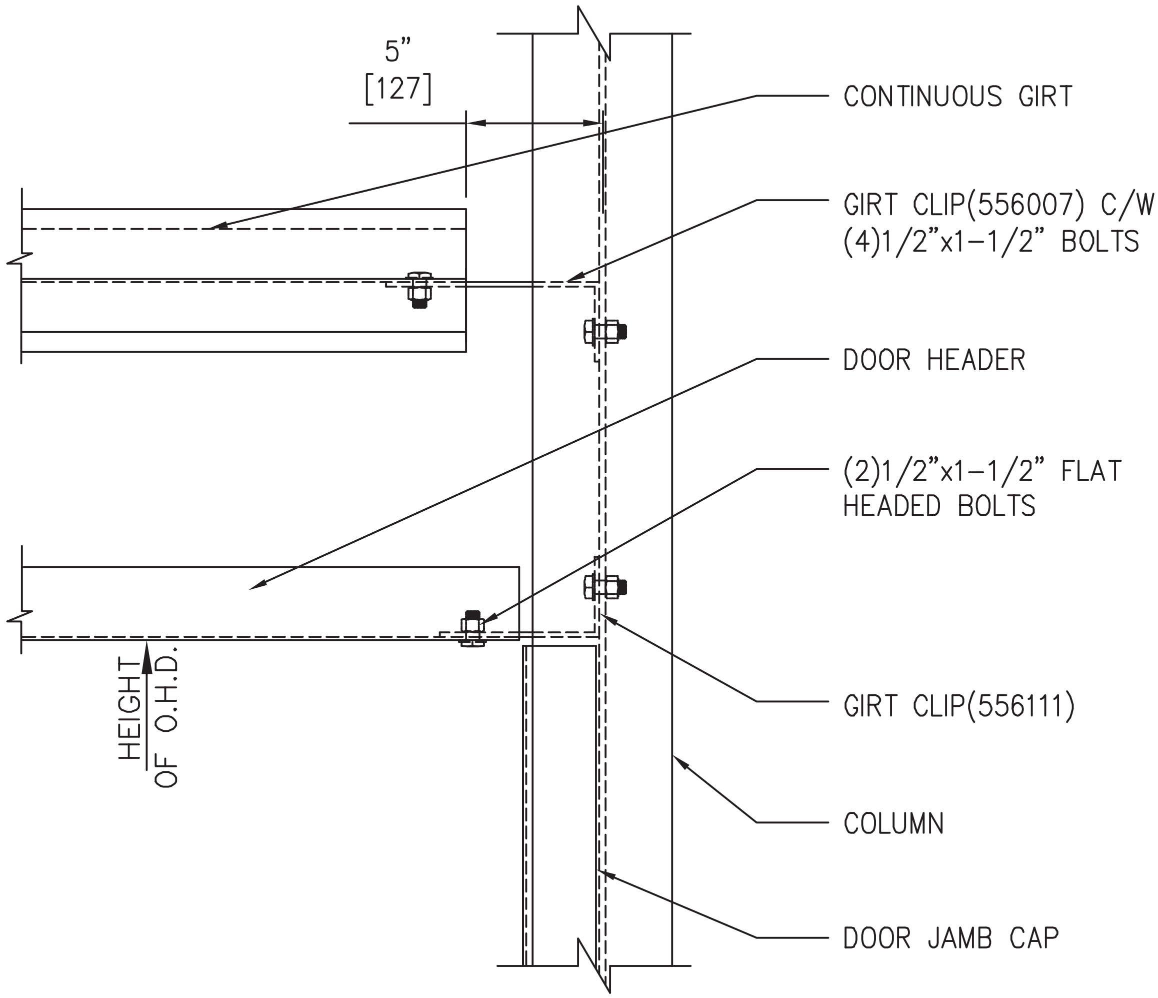


OVERHEAD DOOR JAMB TO GIRT

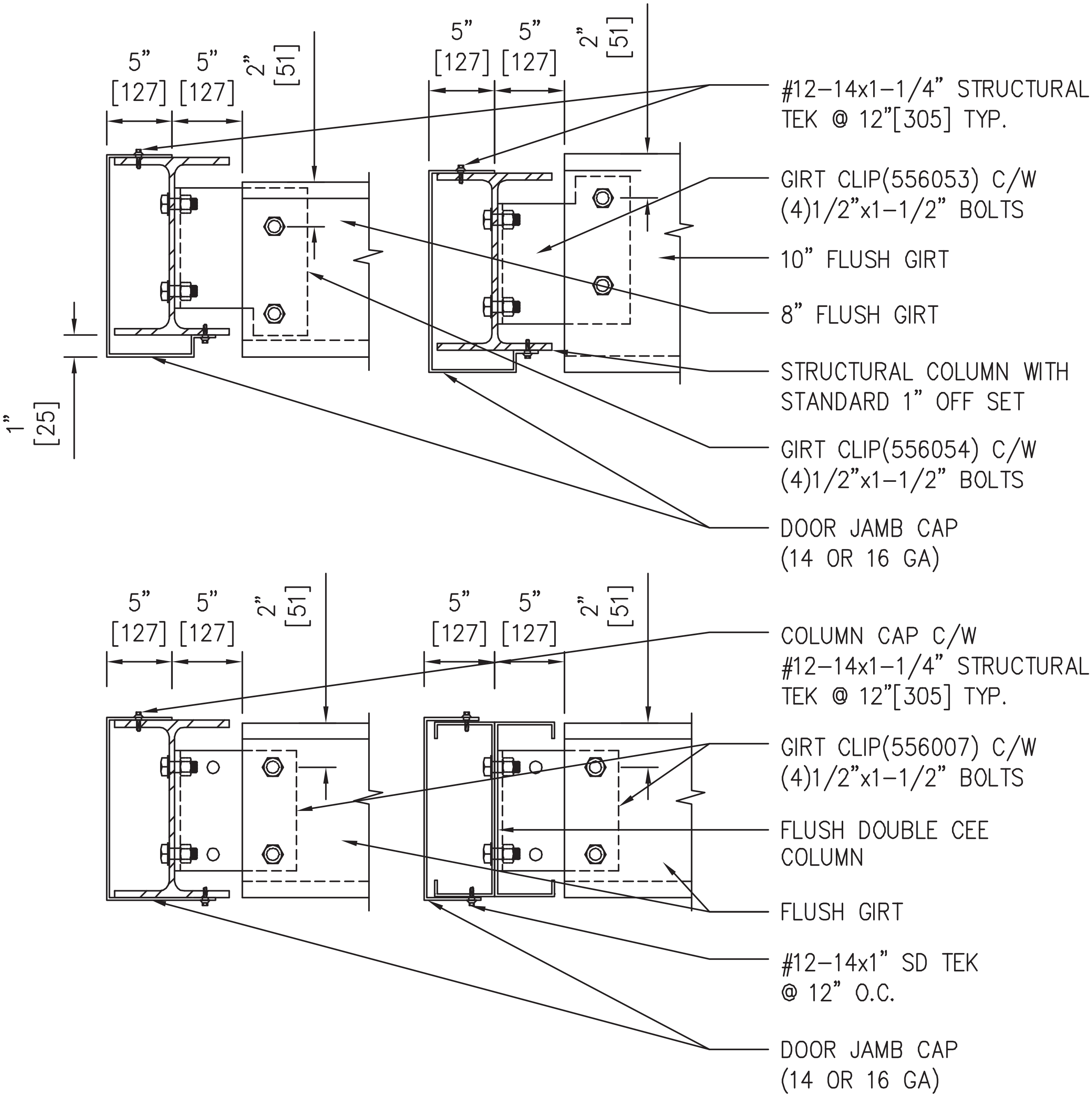
FD 35

STANDARD OPENING DETAILS	JULY 2008	
	Vr 1.0	
DOOR JAMB to GIRT DETAILS	Section 7.1	Page 002



COLUMN TO DOOR HEADER

FD
35A



COLUMN CONNECTIONS

FD
76

STANDARD OPENING DETAILS	JULY 2008 Vr 1.0	
JAMB CAP DETAILS	Section 7.1	Page 004

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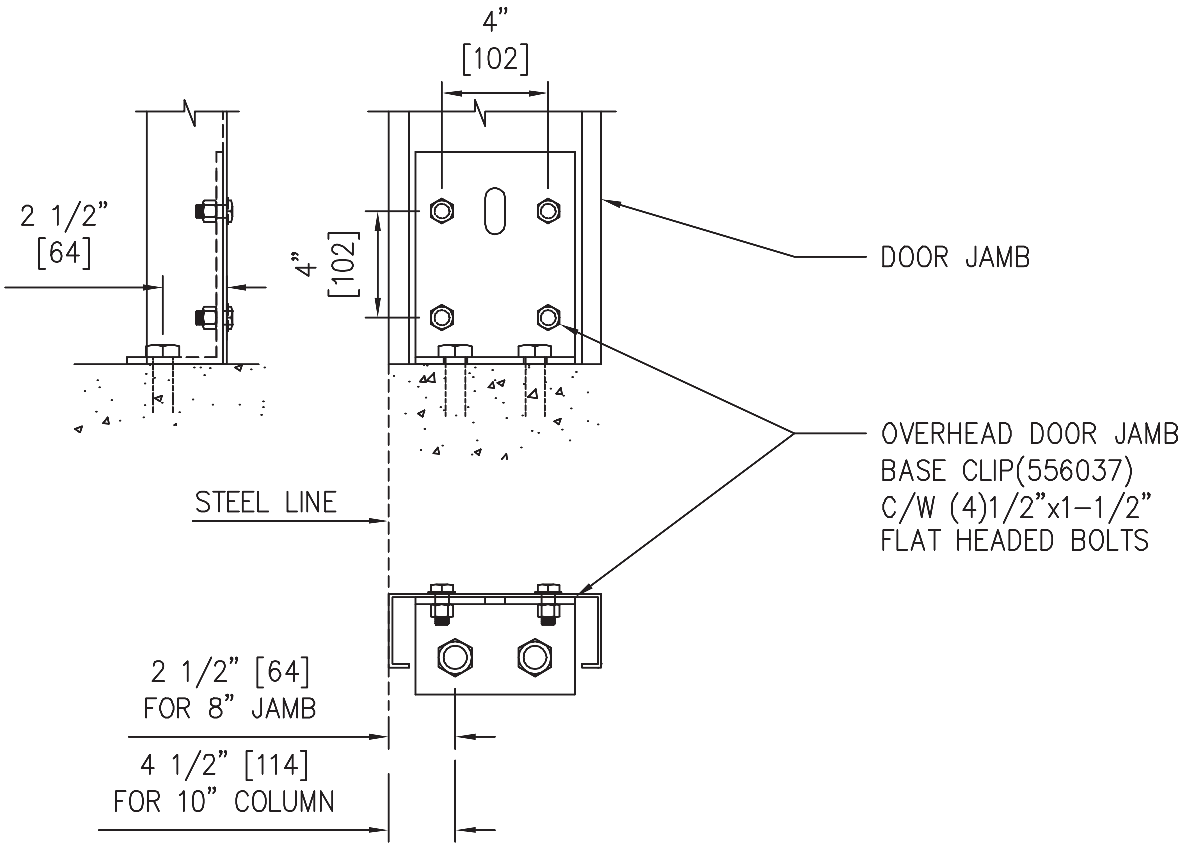

OVERHEAD DOOR BASE

FD
49

STANDARD OPENING DETAILS	JULY 2008	
	Vr 1.0	
DOOR JAMB BASE DETAIL	Section 7.1	Page 005

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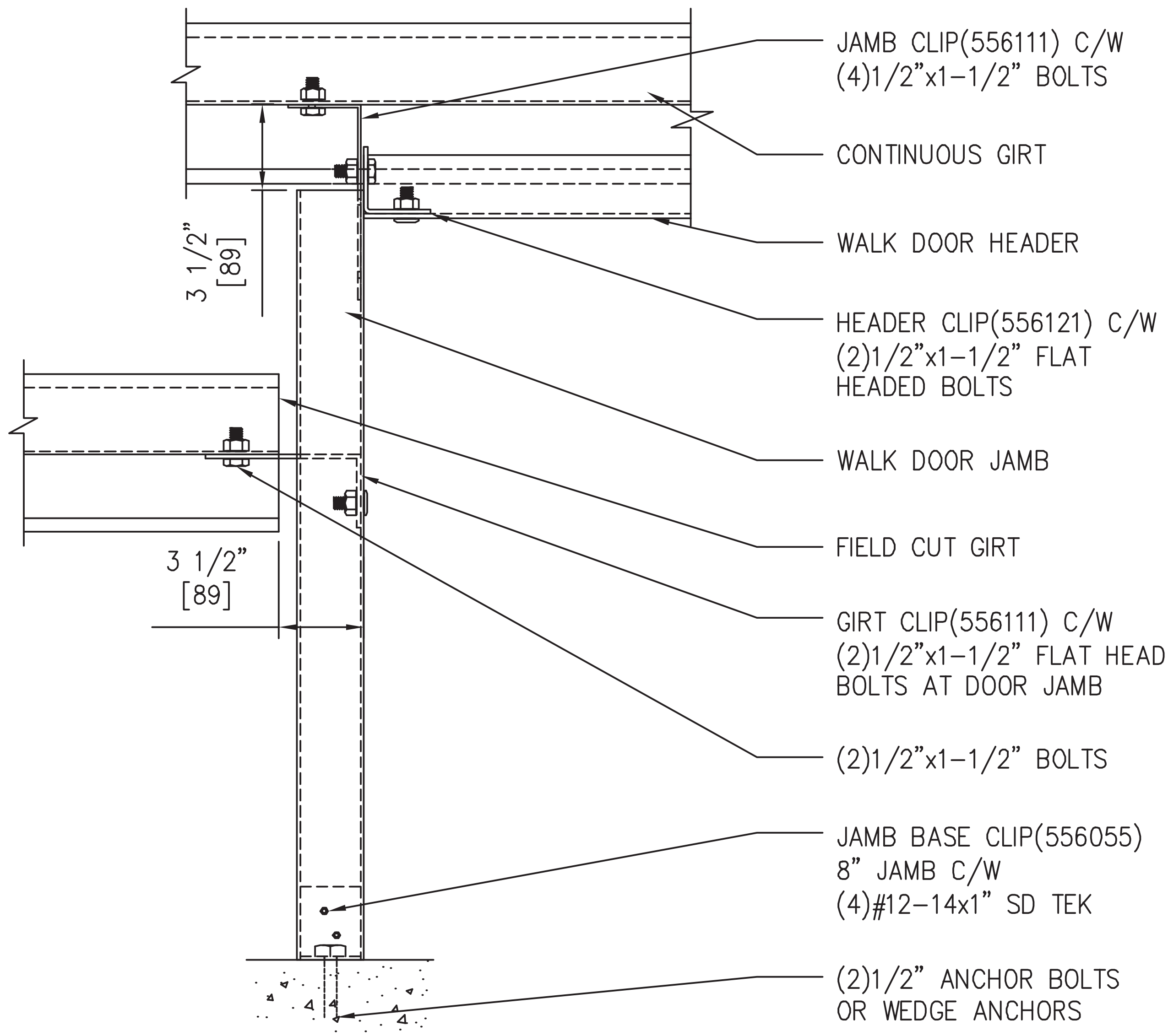

FIELD LOCATED WALKDOOR

FOR 10" JAMB USE 556079 BASE CLIP

FD
59

STANDARD OPENING DETAILS	JULY 2008 Vr 1.0
WALK DOOR DETAILS	Section 7.1 / Page 006

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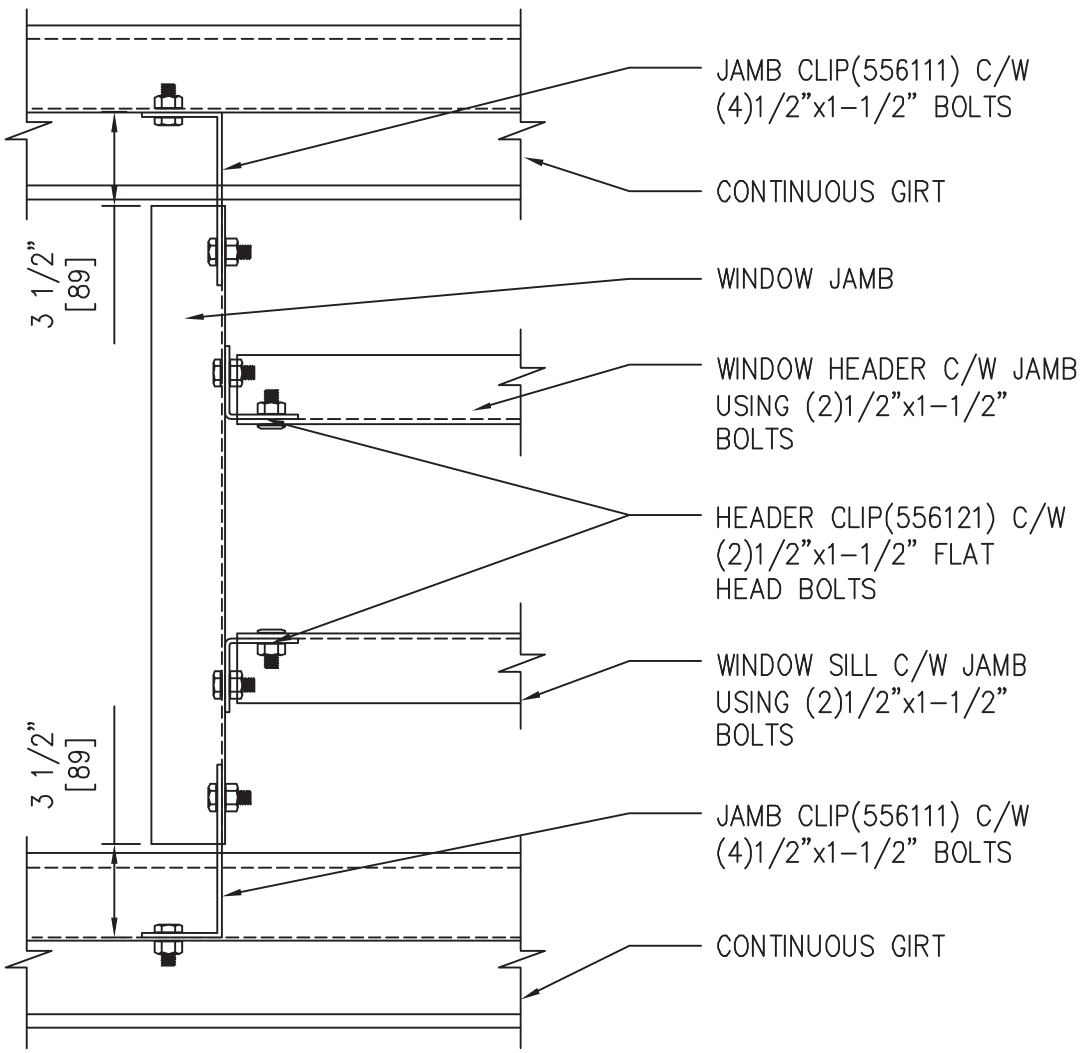

FIELD LOCATED WINDOW

FD
60

STANDARD OPENING DETAILS	JULY 2008	
	Vr 1.0	
WINDOW DETAILS	Section 7.1	Page 007

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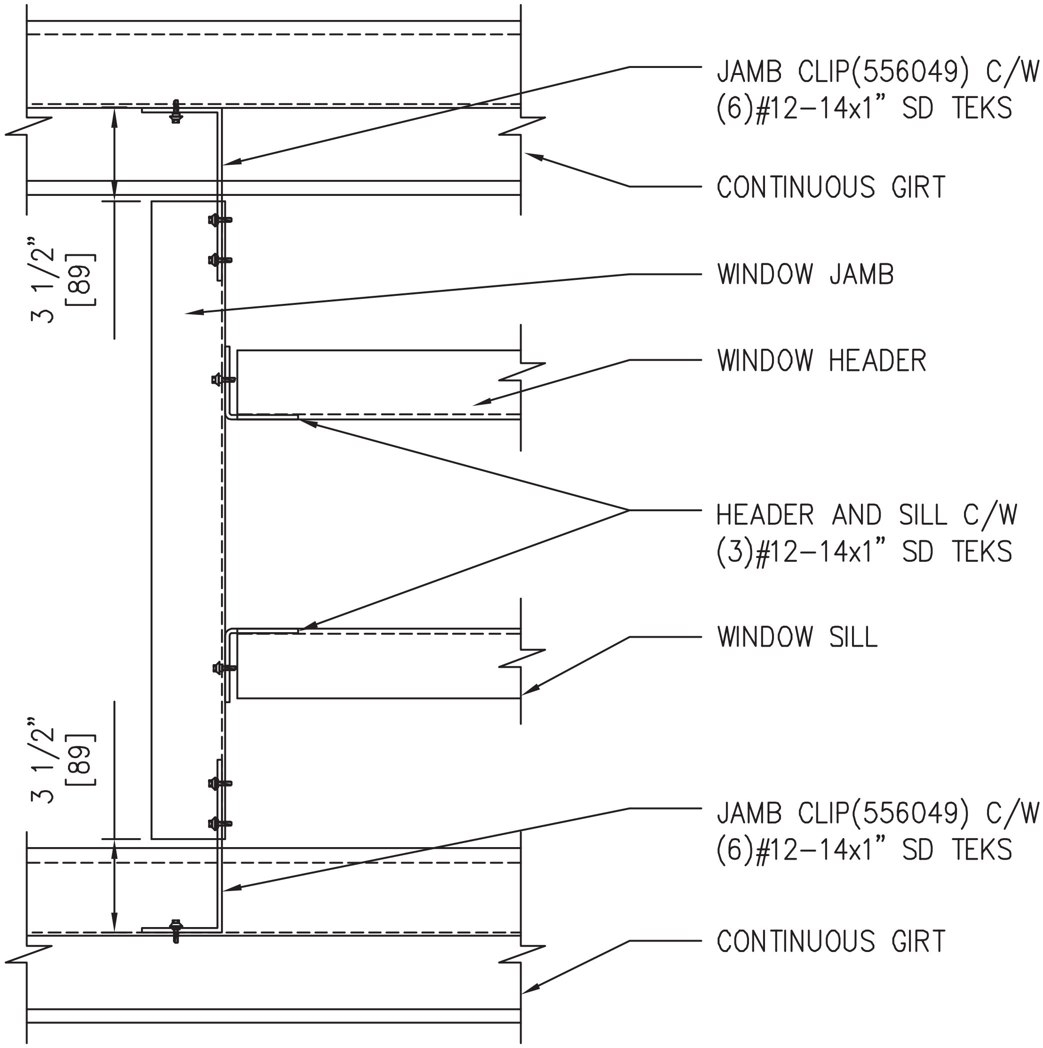
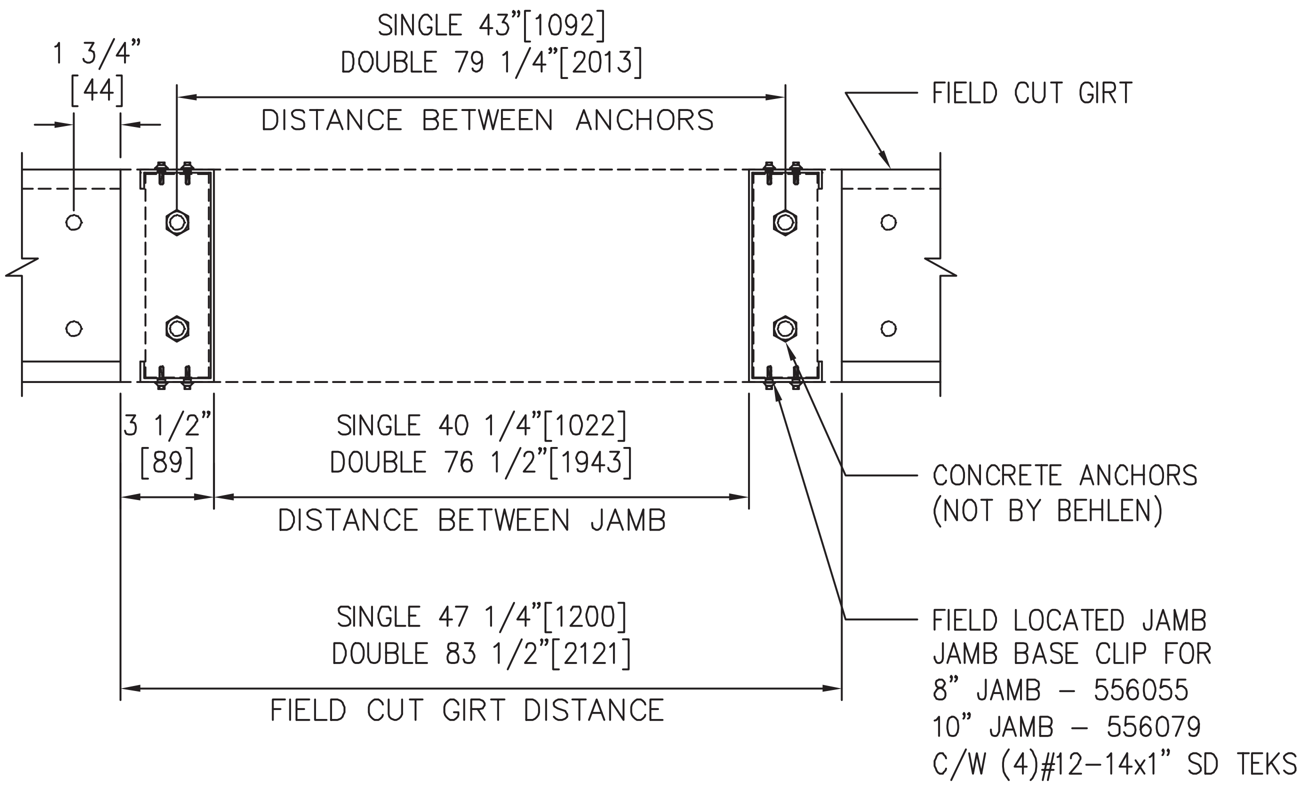


FIELD LOCATED WINDOW
OPTIONAL CONNECTION

FD
60A

STANDARD OPENING DETAILS	JULY 2008	
	Vr 1.0	
WINDOW DETAILS	Section 7.1	Page 008



WALKDOOR BASE INSTALLATION
FIELD LOCATED

FD
56

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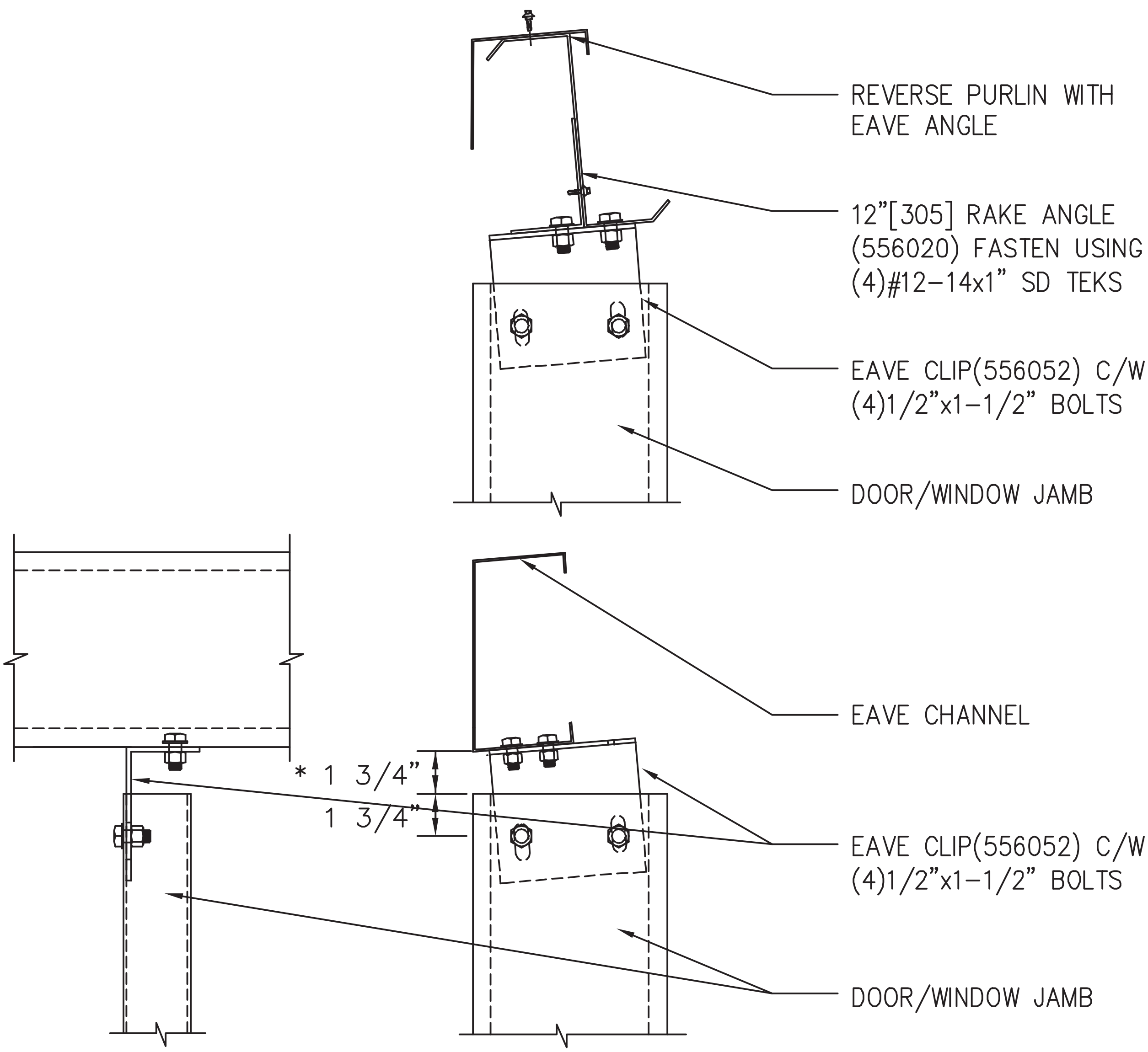

JAMB TO EAVE

* DIMENSION SHOWN FOR 1:12 PITCH ONLY

FD 55

STANDARD OPENING DETAILS	JULY 2008	
	Vr 1.0	
JAMB to EAVE DETAILS	Section 7.1	Page 010

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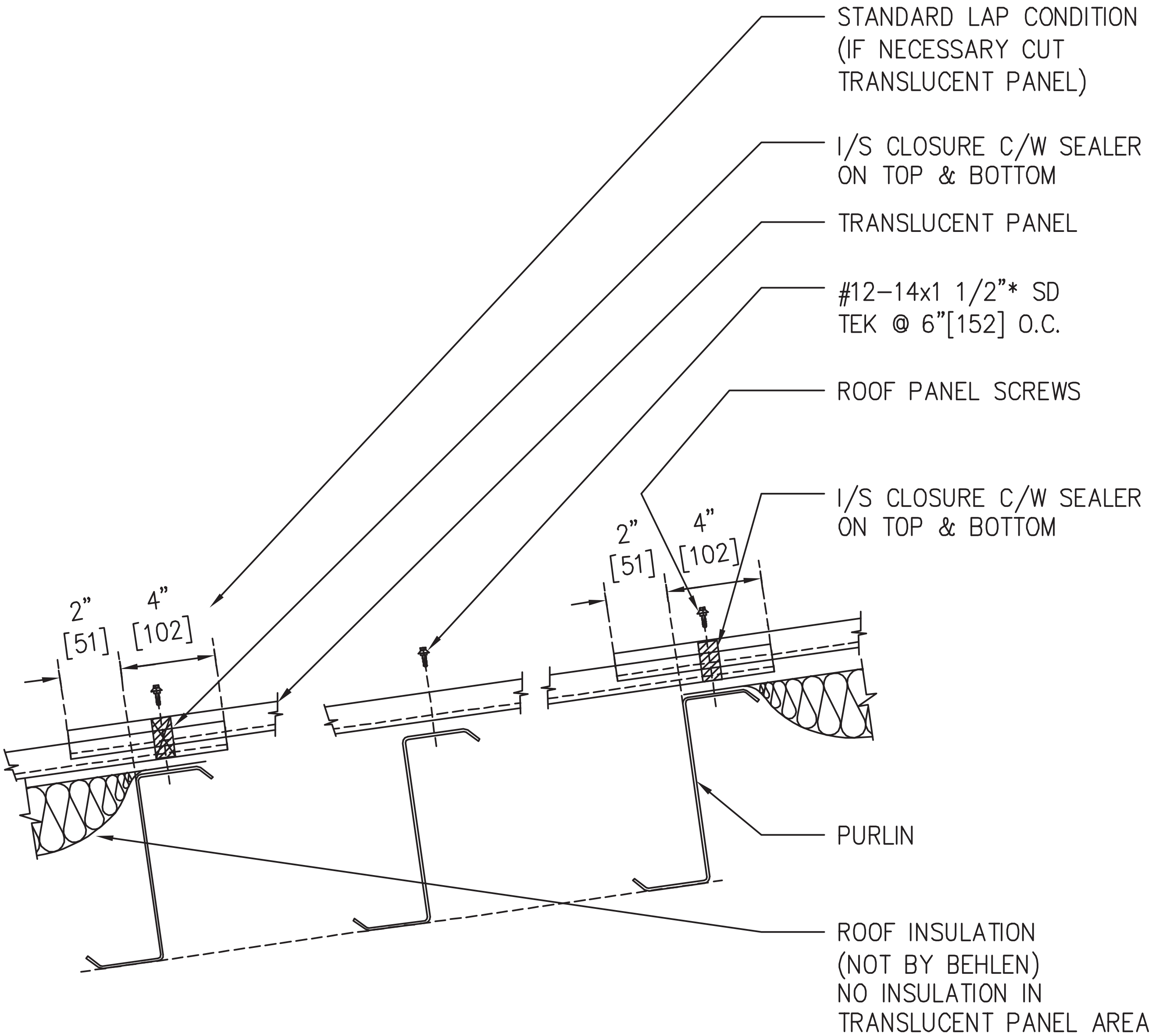

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT ROOF PANEL	JULY 2008	
	Vr 1.0	
LAYOUT of AWR ROOF PANEL	Section 7.2	Page 001

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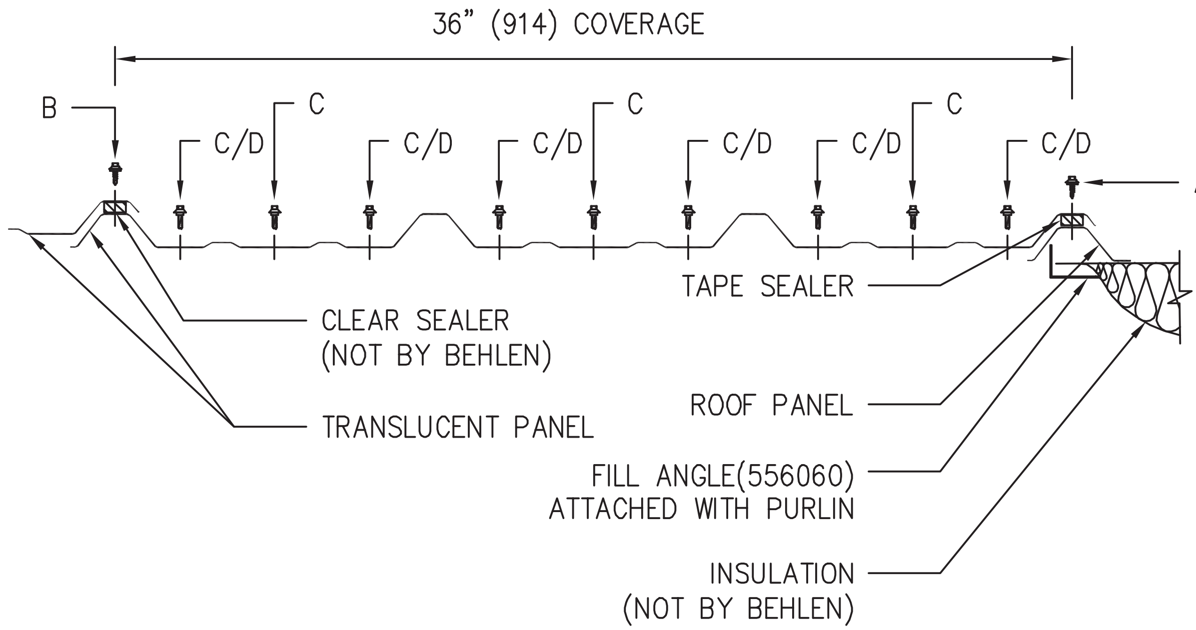

FASTENER	USE BETN OR AT	FASTENER TYPE	PER LFT LENGTH
A	TRANSLUCENT PANEL & REGULAR PANEL	1/4–14x3/4" SD TEKS (STITCH SCREW)	QTY= 1# PER 12"[305]
B	TWO TRANSLUCENT PANELS	1" GROMMET SCREWS	QTY= 1# PER 12"[305]
C	AT PANEL LAP / EAVE / RIDGE WITH PURLIN	#12–14x1 1/2" SD TEKS *	QTY= 9# PER PANEL @ CONNECTION
D	AT PANEL WITH PURLIN	#12–14x1 1/2" SD TEKS *	QTY= 6# PER PANEL @ CONNECTION

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT ROOF PANEL

SCREWS on AWR ROOF PANEL

JULY 2008

Vr 1.0

Section 7.2

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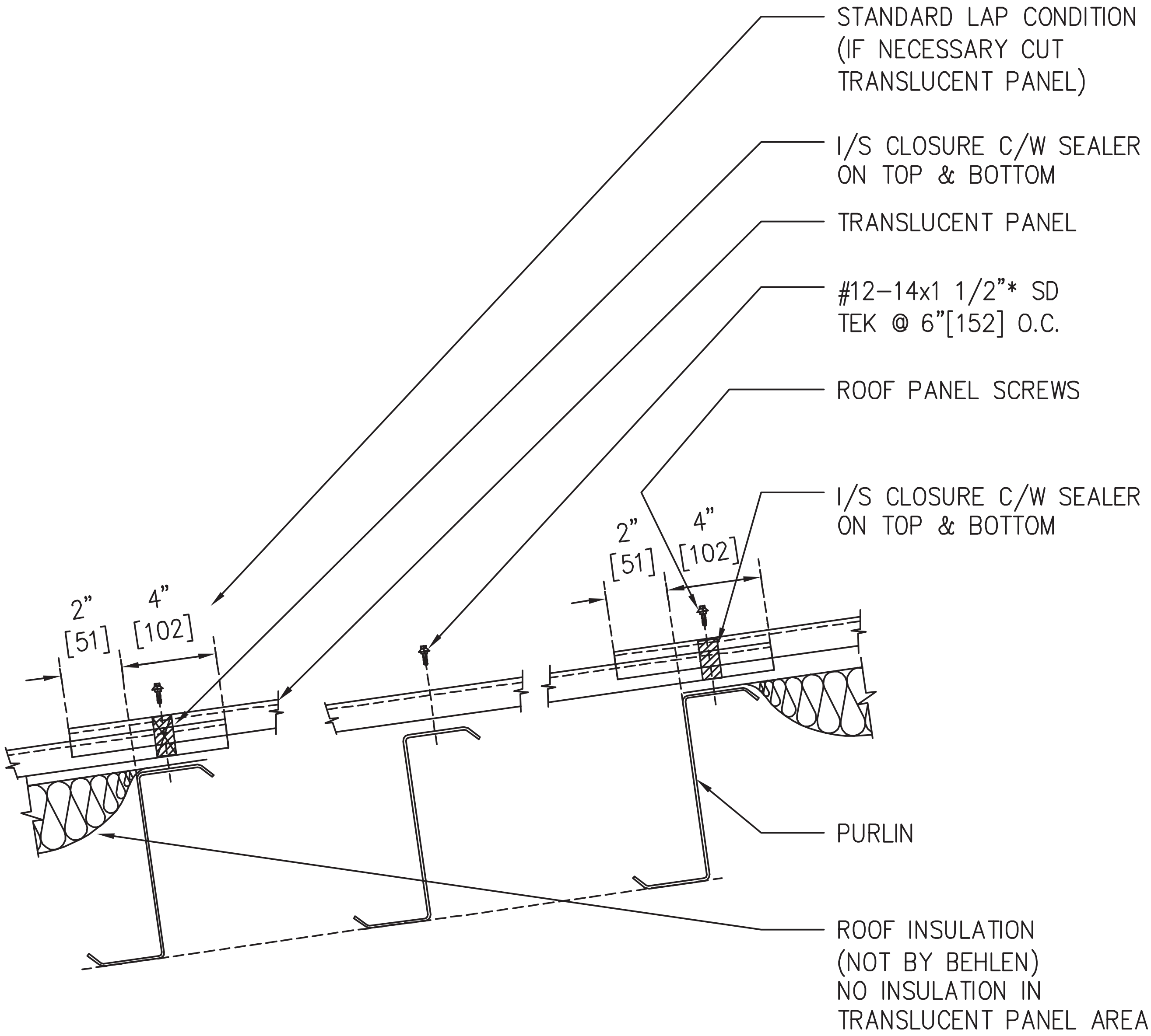

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT ROOF PANEL	JULY 2008	
	Vr 1.0	
LAYOUT of ULTRA SPAN ROOF PANEL	Section 7.2	Page 003

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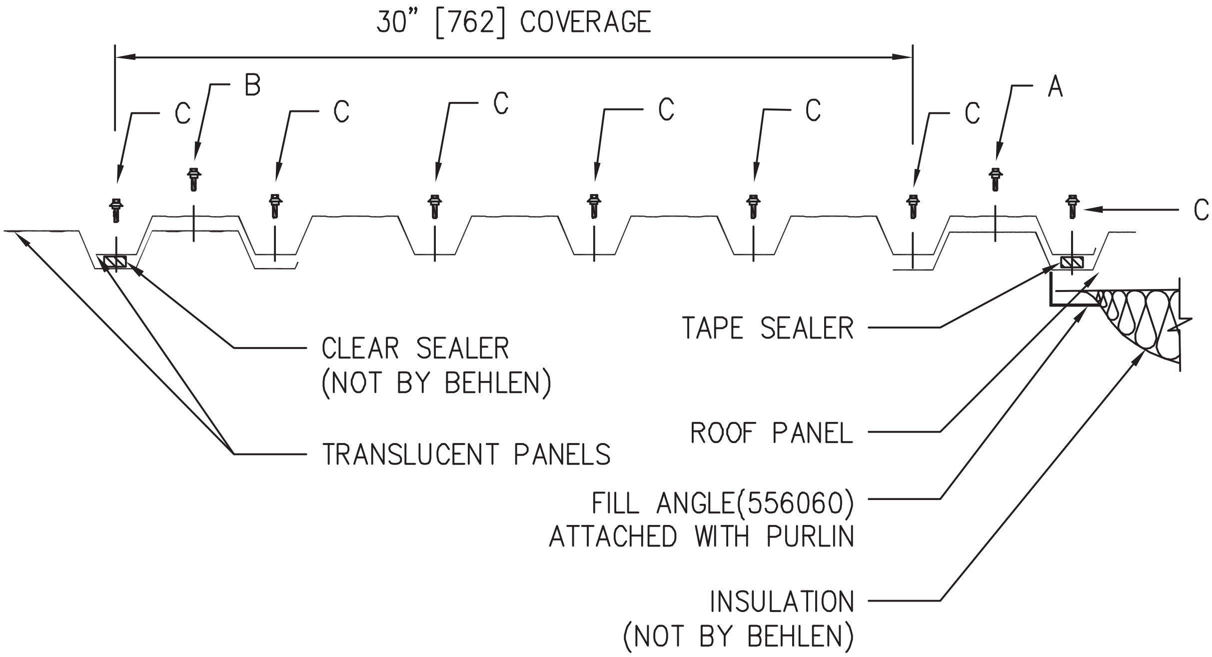
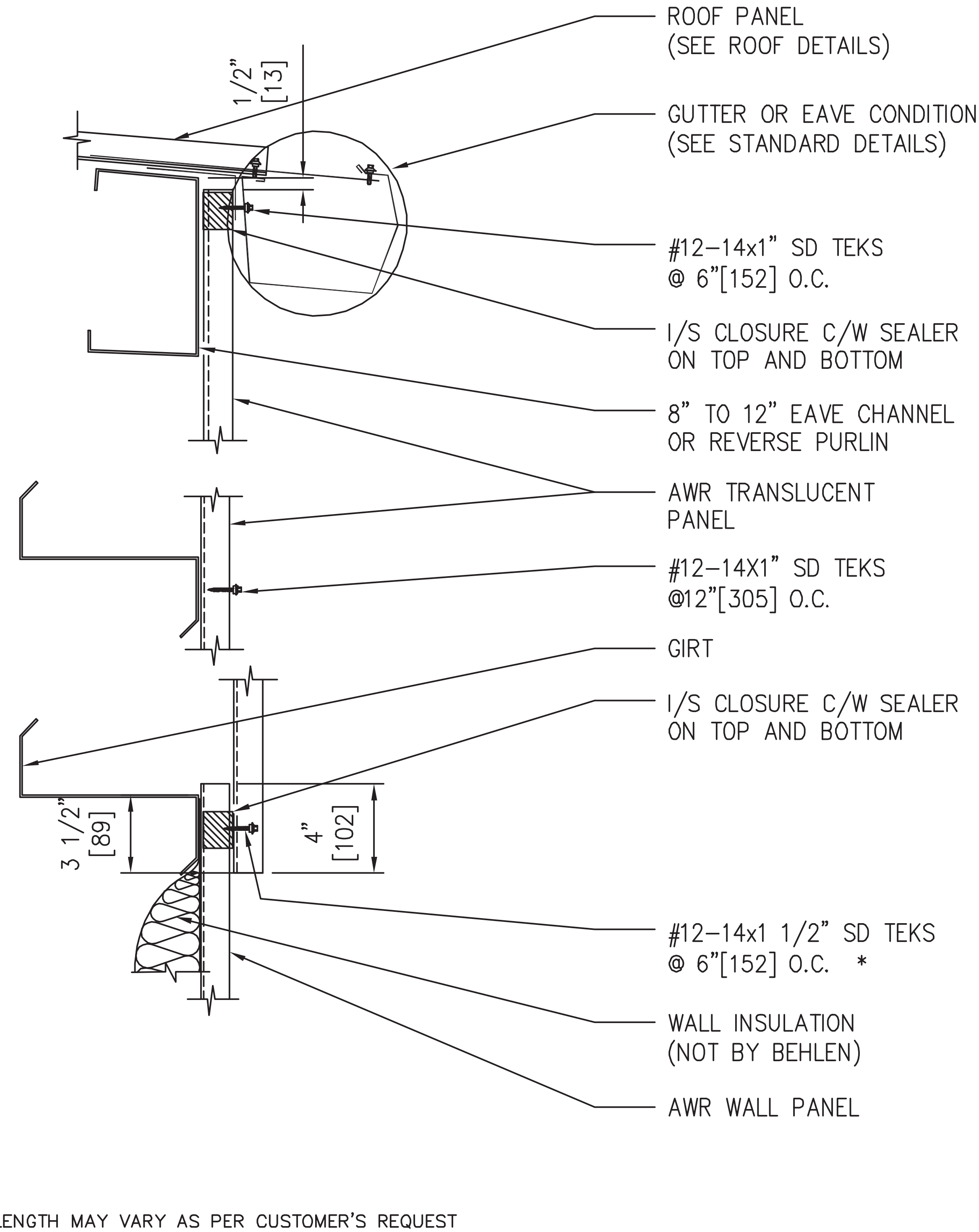


FASTENER	USE BETN OR AT	FASTENER TYPE	PER LFT LENGTH
A	TRANSLUCENT PANEL & REGULAR PANEL	1/4–14x3/4" SD TEKS (STITCH SCREW)	QTY= 1# PER 12"[305]
B	TWO TRANSLUCENT PANELS	1" GROMMET SCREWS	QTY= 1# PER 12"[305]
C	AT PANEL LAP / EAVE / RIDGE / WITH PURLIN	#12–14x1 1/2" SD TEKS *	QTY= 5# PER PANEL @ CONNECTION

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST



* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT WALL PANEL	JULY 2008	
	Vr 1.0	
AWR TRANSLUCENT PANEL	Section 7.3	Page 001

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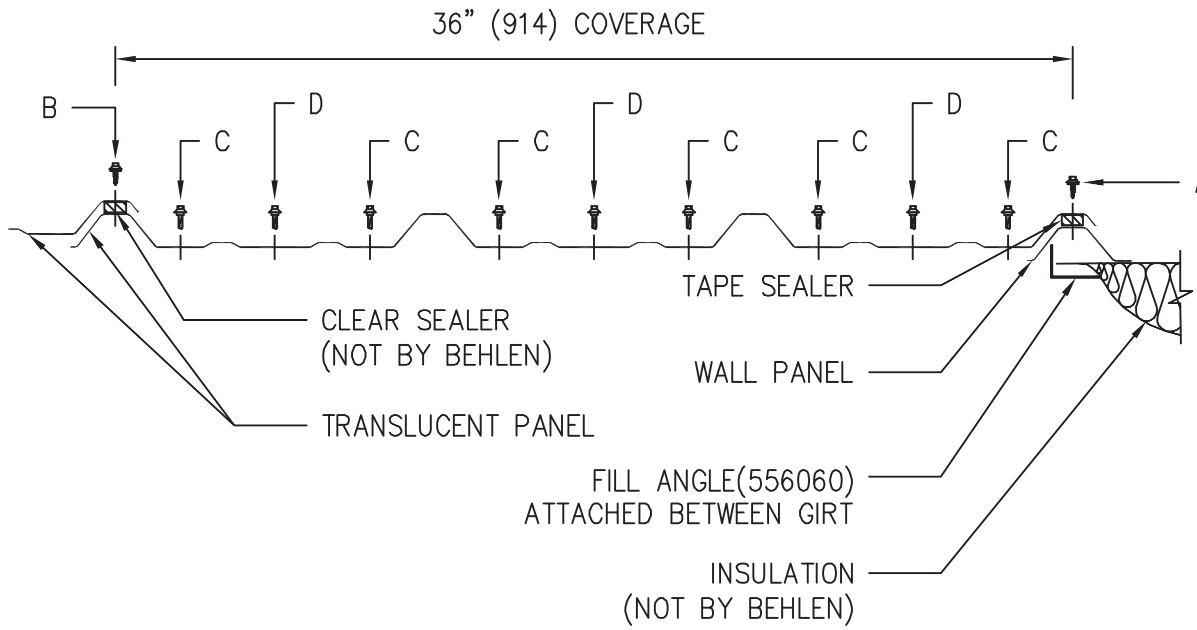

FASTENER	USE BETN OR AT	FASTENER TYPE	PER LFT LENGTH
A	TRANSLUCENT PANEL & REGULAR PANEL	1/4-14x3/4" SD TEKS (STITCH SCREW)	QTY= 1# PER 24"[610]
B	TWO TRANSLUCENT PANELS	1" GROMMET SCREWS	QTY= 1# PER 24"[610]
C	AT PANEL LAP AND/OR AT EAVE	#12-14x1 1/2" SD TEKS *	QTY= 6# PER PANEL @ CONNECTION
D	AT PANEL AND GIRT	#12-14x1" SD TEKS	QTY= 3# PER PANEL @ CONNECTION

AWR WALL TRANSLUCENT PANEL

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT WALL PANEL

SCREWS on AWR PANEL

JULY 2008
Vr 1.0
Section 7.3

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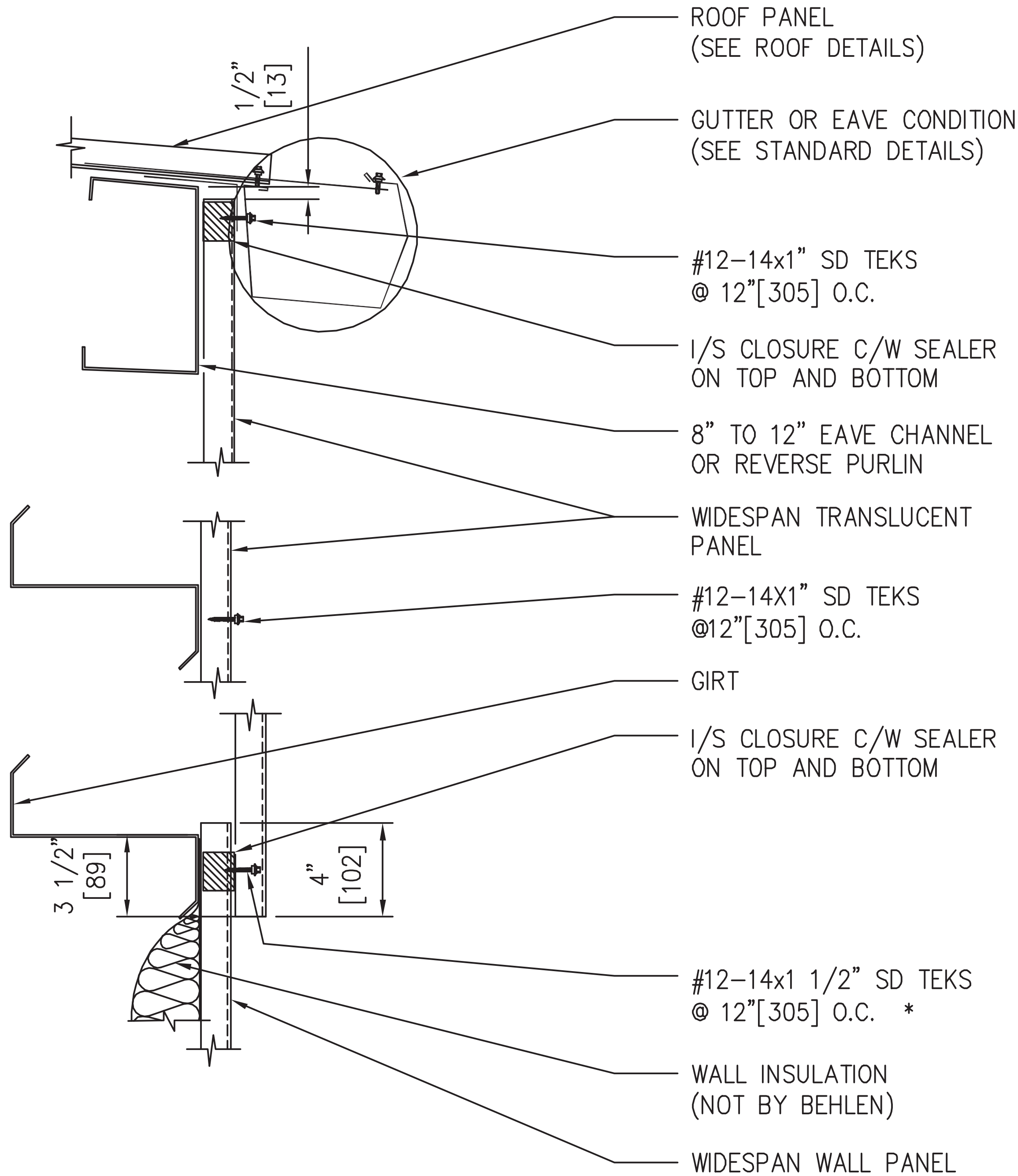

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT WALL PANEL	JULY 2008	
	Vr 1.0	
WIDE SPAN TRANSLUCENT PANEL	Section 7.3	Page 003

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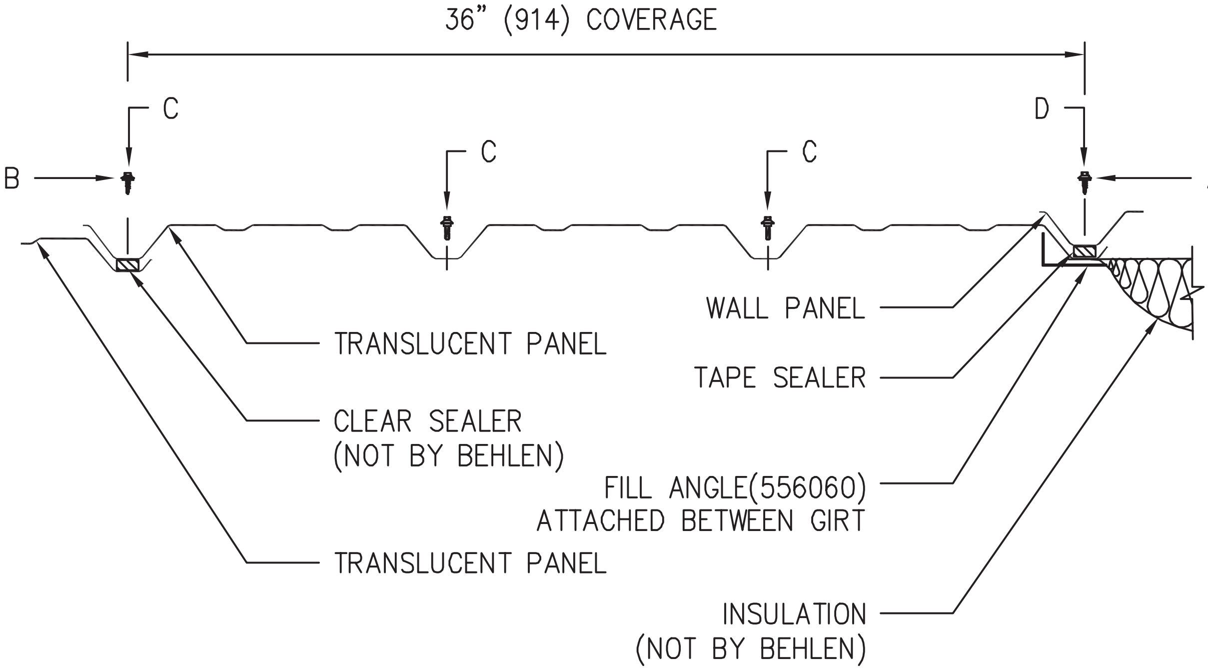

FASTENER	USE BETN OR AT	FASTENER TYPE	PER LFT LENGTH
A	TRANSLUCENT PANEL & REGULAR PANEL	1/4-14x3/4" SD TEKS (STITCH SCREW)	QTY= 1# PER 24"[610]
B	TWO TRANSLUCENT PANELS	1" GROMMET SCREWS	QTY= 1# PER 24"[610]
C	AT PANEL LAP /GIRT /EAVE	#12-14x1" SD TEKS	QTY= 3# PER PANEL @ CONNECTION
D	AT PANEL LAP /GIRT /EAVE	* #12-14x1 1/2" SD TEKS	QTY= 1# PER WALL PANEL @ CONNECTION

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT WALL PANEL

SCREWS on WIDE SPAN PANEL

JULY 2008
Vr 1.0
Section 7.3
Page 004

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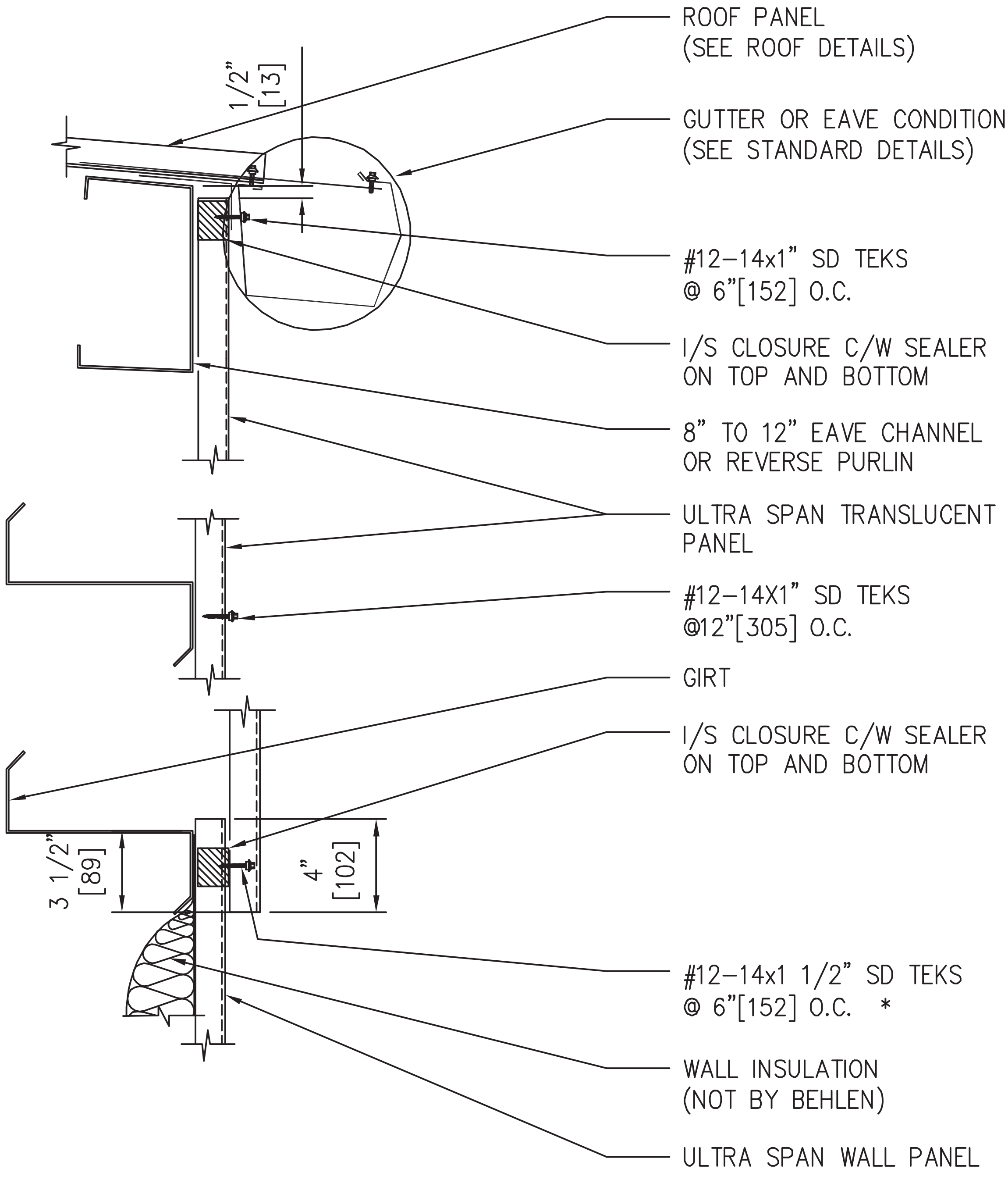

* – SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT WALL PANEL	JULY 2008	
	Vr 1.0	
ULTRA SPAN TRANSLUCENT PANEL	Section 7.3	Page 005

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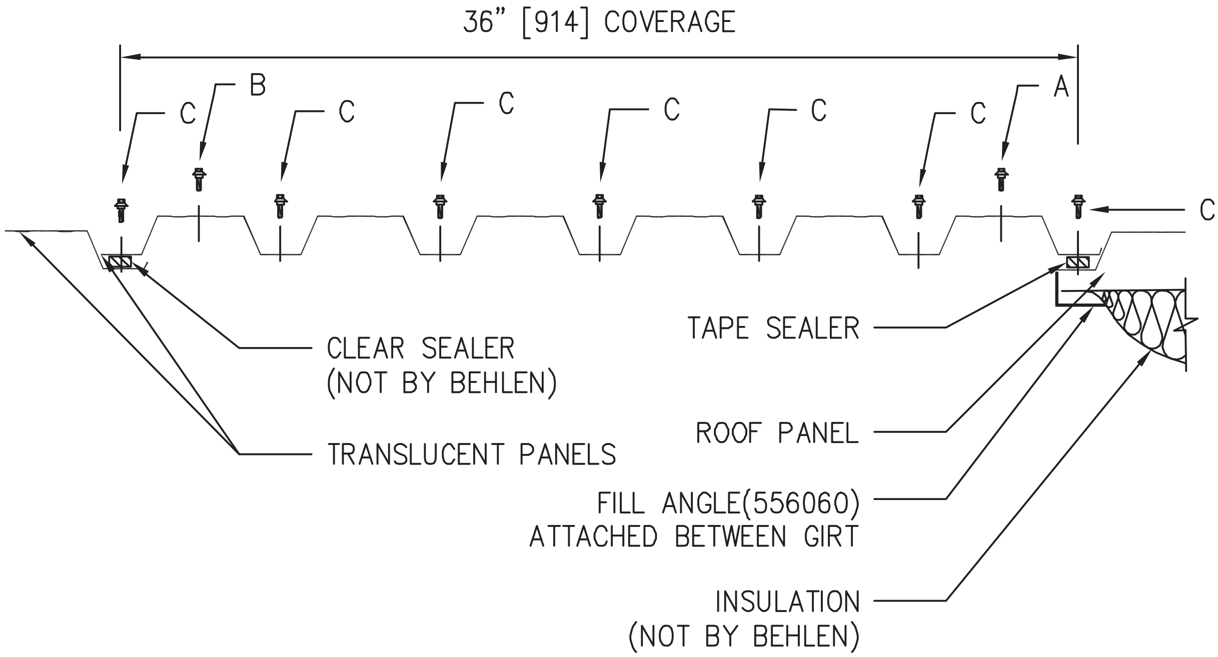

FASTENER	USE BETN OR AT	FASTENER TYPE	PER LFT LENGTH
A	TRANSLUCENT PANEL & REGULAR PANEL	1/4-14x3/4" SD TEKS (STITCH SCREW)	QTY= 1# PER 12"[305]
B	TWO TRANSLUCENT PANELS	1" GROMMET SCREWS	QTY= 1# PER 12"[305]
C	AT PANEL LAP / EAVE / RIDGE / WITH PURLIN	#12-14x1 1/2" SD TEKS *	QTY= 6# PER PANEL @ CONNECTION

ULTRA SPAN WALL TRANSLUCENT PANEL

* - SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT WALL PANEL	JULY 2008	
	Vr 1.0	
SCREWS on ULTRA SPAN PANEL	Section 7.3	Page 006

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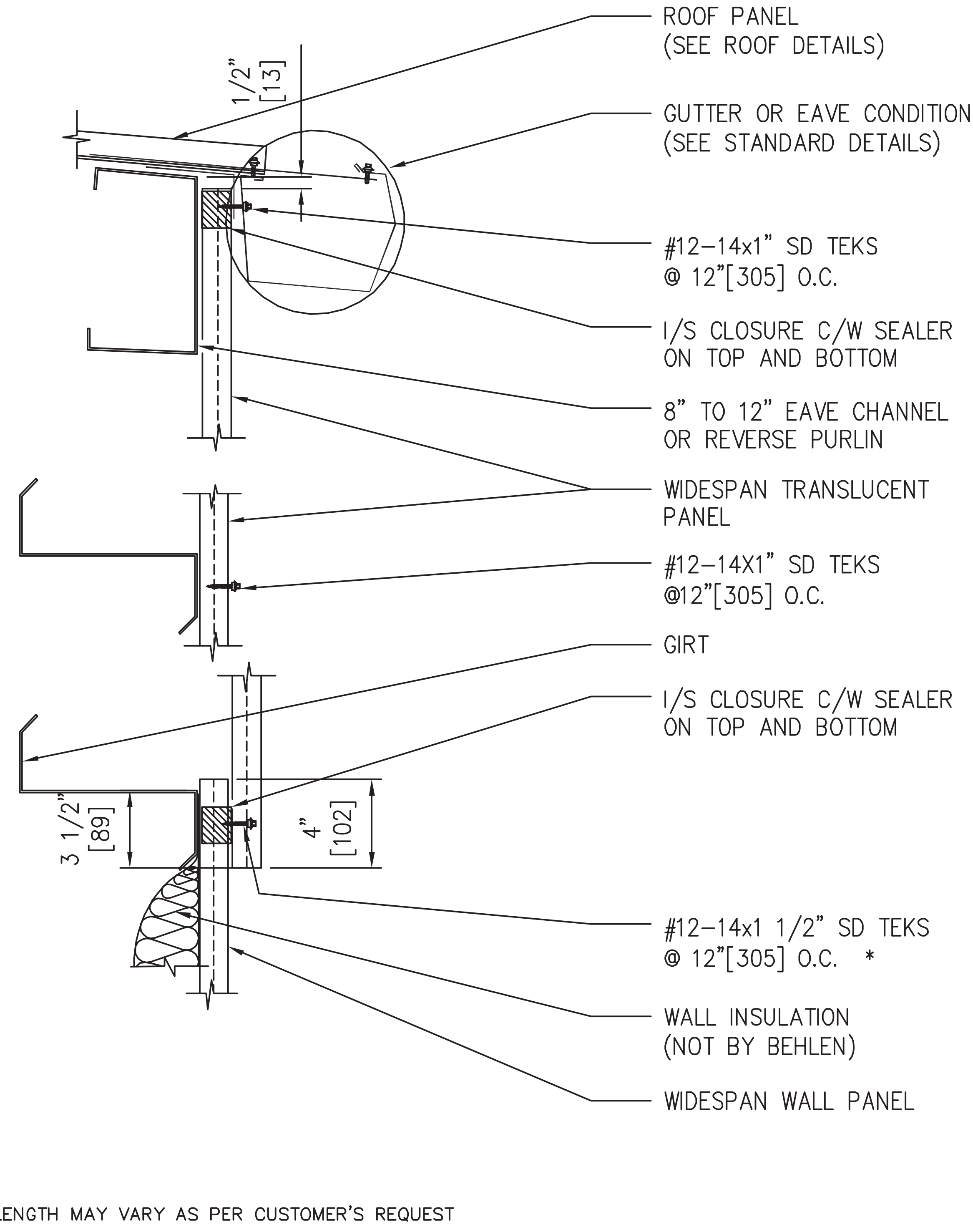

* - SCREW LENGTH MAY VARY AS PER CUSTOMER'S REQUEST

TRANSLUCENT PANEL	JULY 2008 Vr 1.0	
DELTA SPAN TRANSLUCENT PANEL	Section 7.3	Page 007

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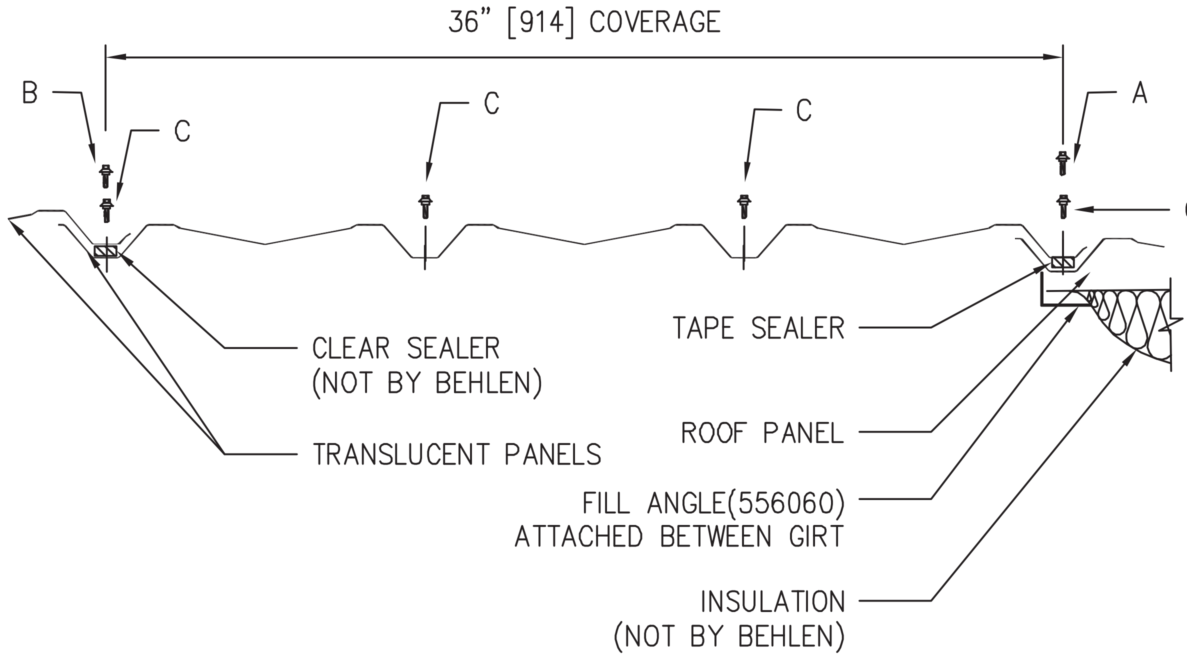
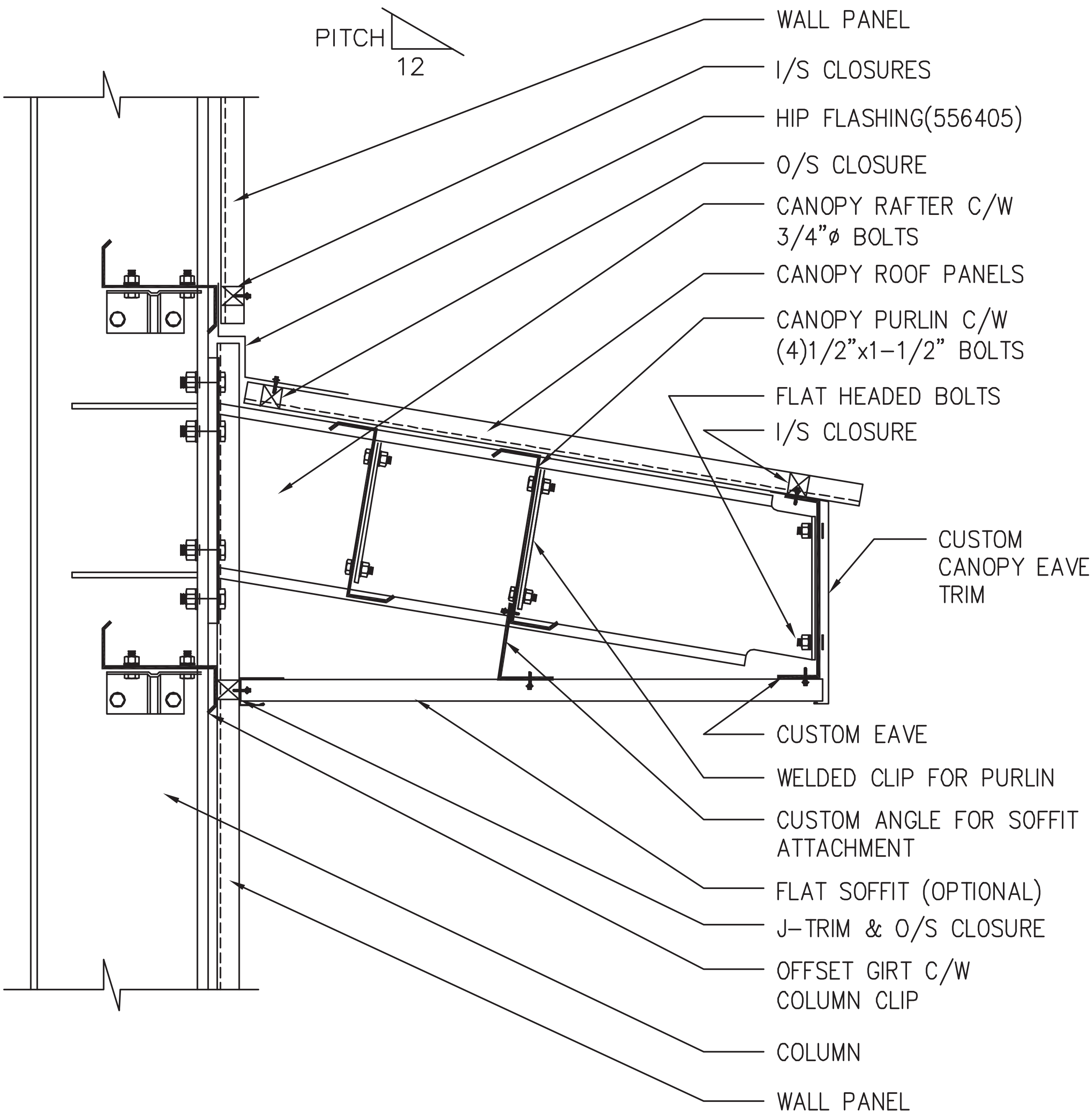


FASTENER	USE BETN OR AT	FASTENER TYPE	PER LFT LENGTH
A	TRANSLUCENT PANEL & REGULAR PANEL	1/4–14x3/4” SD TEKS (STITCH SCREW)	QTY= 1# PER 12”[305]
B	TWO TRANSLUCENT PANELS	1” GROMMET SCREWS	QTY= 1# PER 12”[305]
C	AT PANEL LAP / EAVE / RIDGE / WITH PURLIN	#12–14x1 1/2” SD TEKS *	QTY= 3# PER PANEL @ CONNECTION

* – SCREW LENGTH MAY VARY AS PER CUSTOMER’S REQUEST

TRANSLUCENT WALL PANEL	JLUY 2008 / Vr 1.0
SCREWS on DELTA SPAN PANEL	Section 7.3 / Page 008



CANOPY DETAILS	JULY 2008
	Vr 1.0
FLUSH PURLIN with FLAT SOFFIT	Section 7.4 / Page 001

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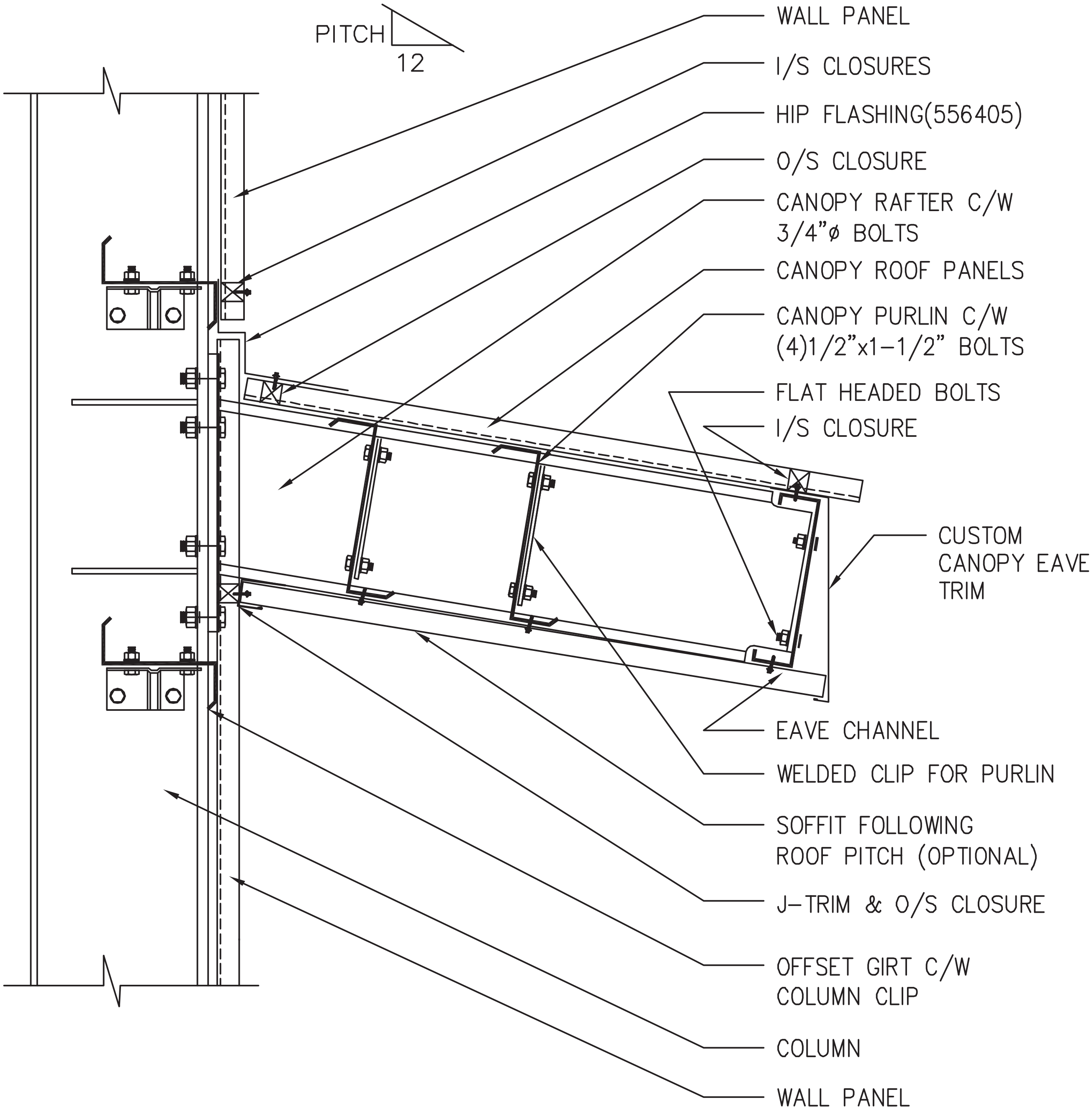
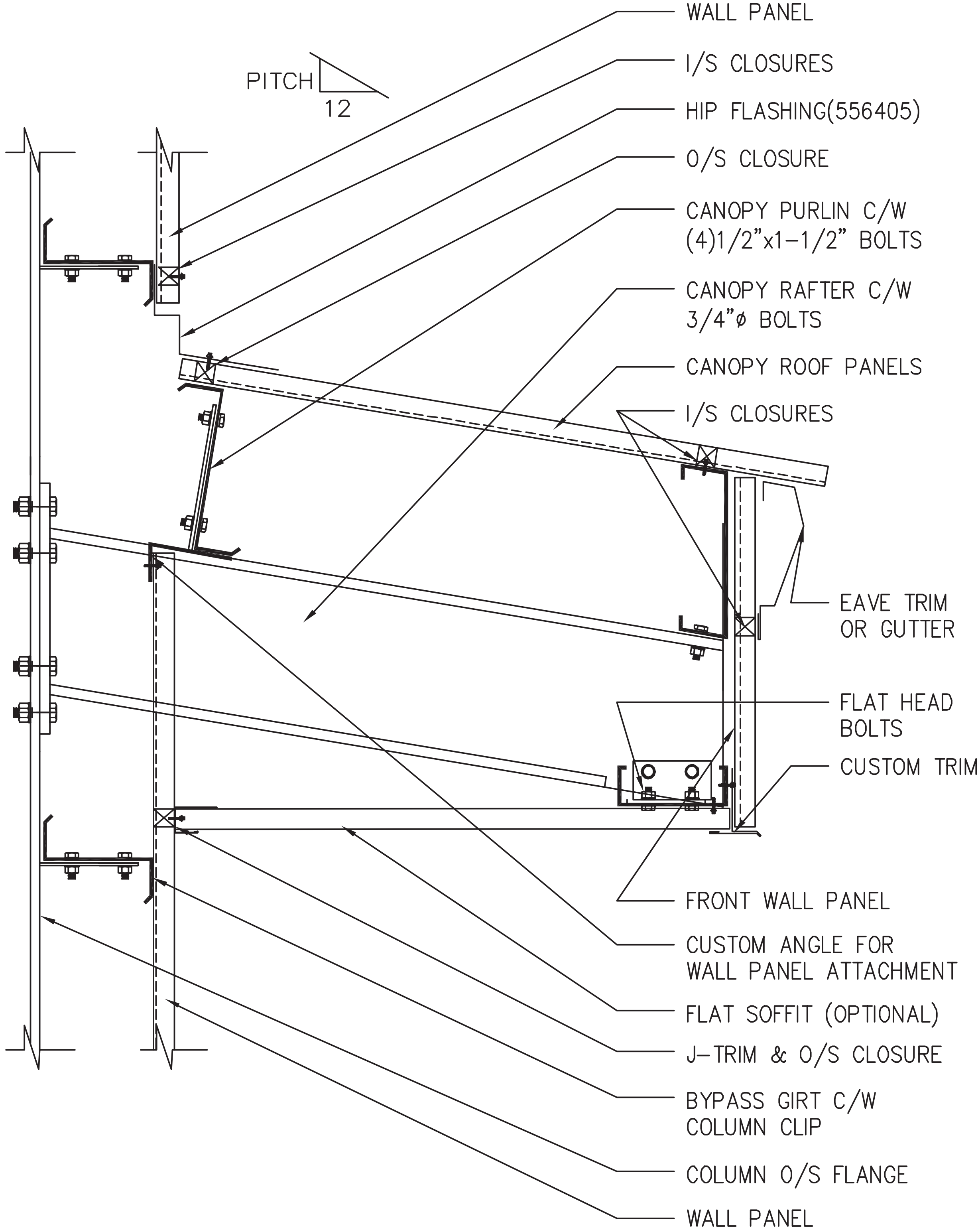


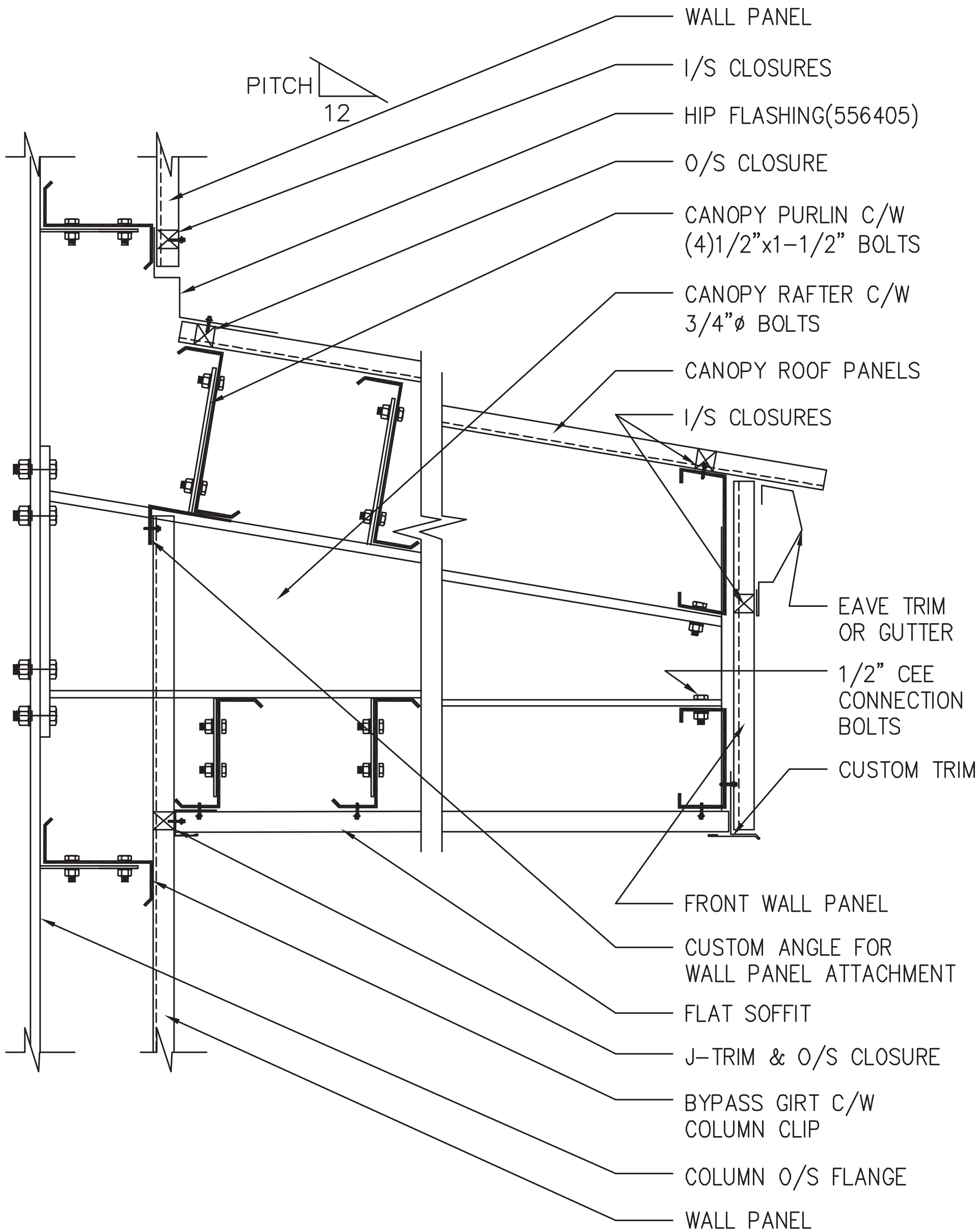
CANOPY DETAILS	JULY 2008	
	Vr 1.0	
FLUSH PURLIN with SOFFIT	Section 7.4	Page 002

BEHLEN
Made Strong



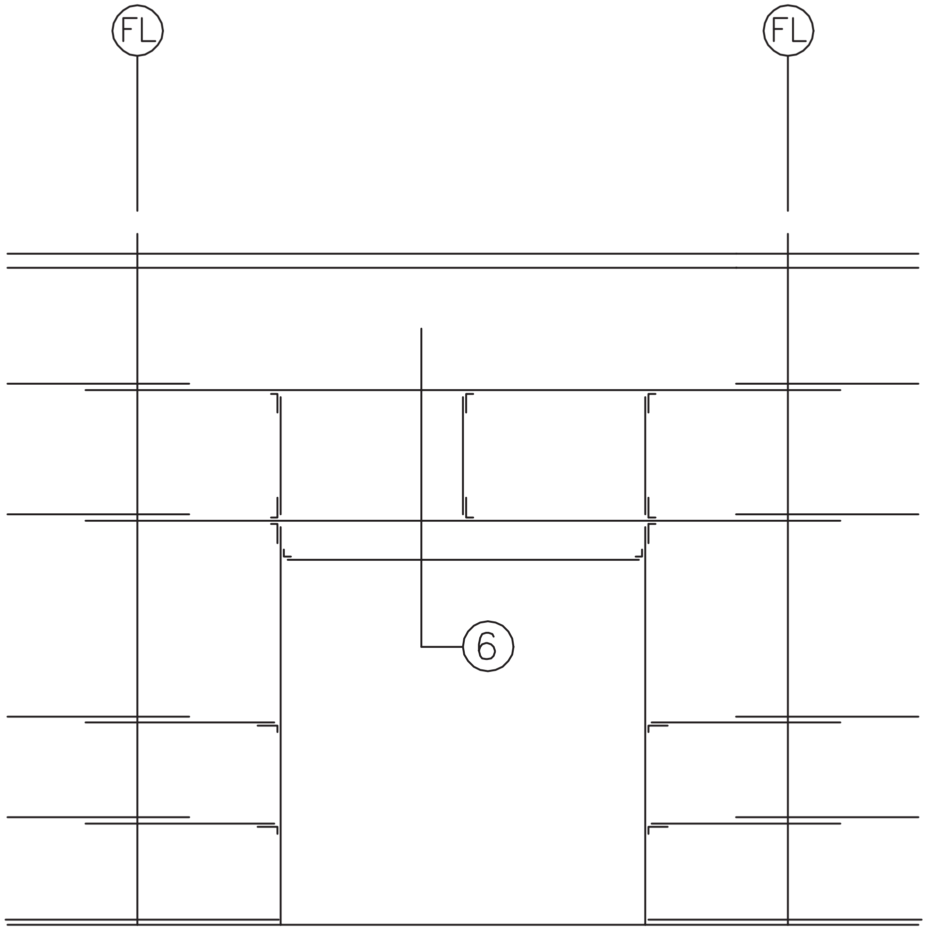
CANOPY DETAILS	JULY 2008	
	Vr 1.0	
BYPASS PURLIN with PLAT SOFFIT I	Section 7.4	Page 003

BEHLEN
Made Strong



CANOPY DETAILS	JULY 2008 Vr 1.0	
BYPASS PURLIN with FLAT SOFFIT II	Section 7.4	Page 004

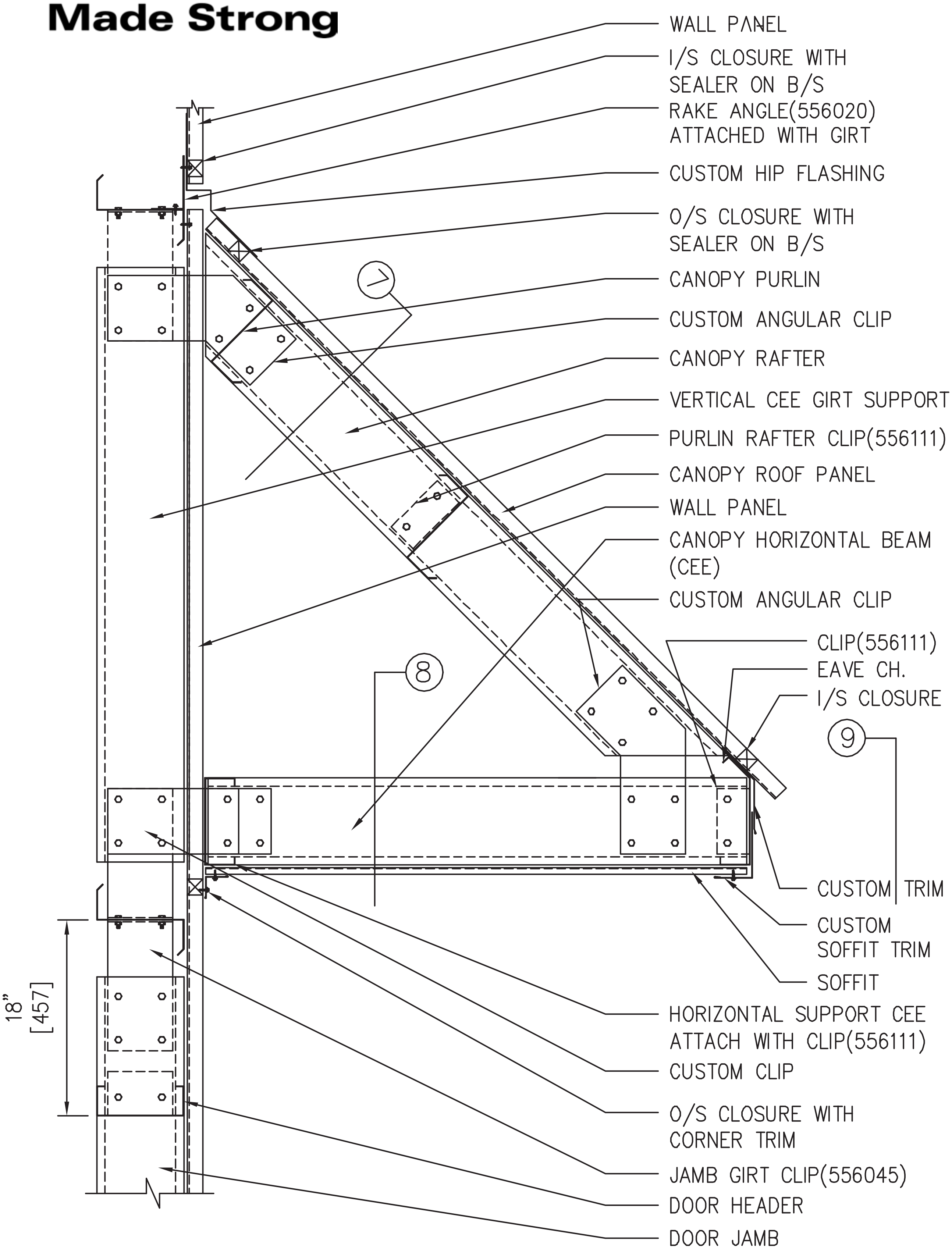
BEHLEN
Made Strong



SIDEWALL DOOR CANOPY LAYOUT

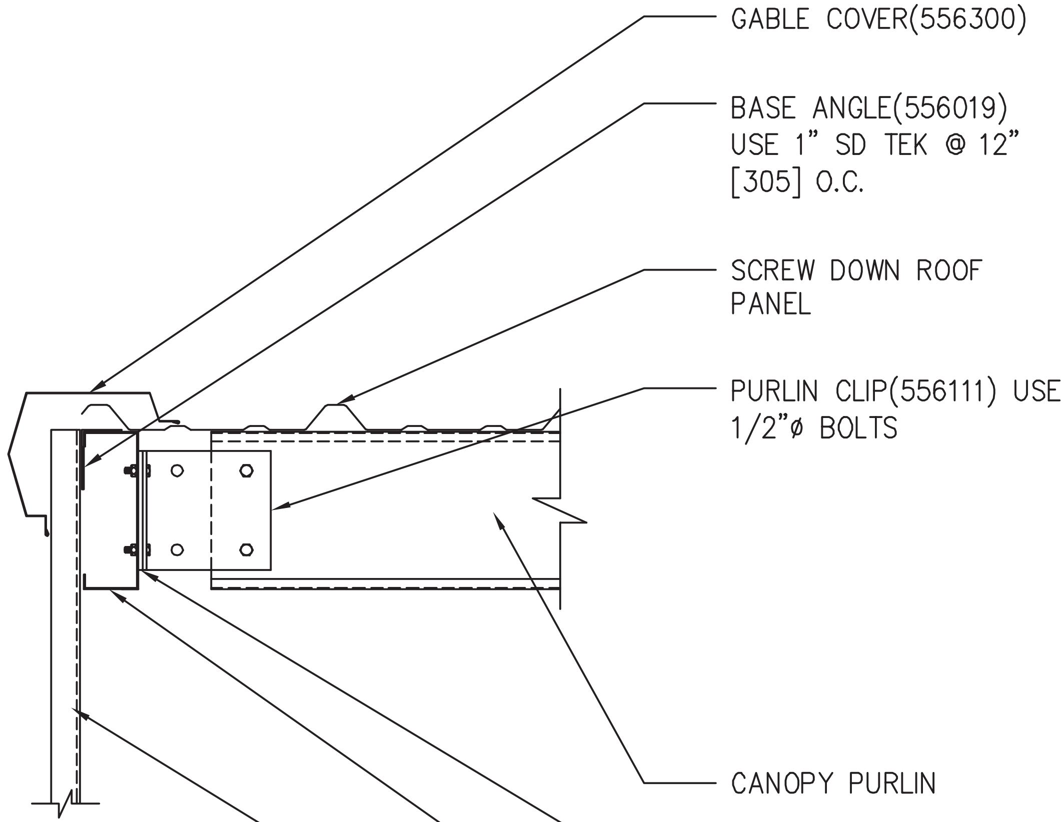
FL — FRAME LINE
GL — GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

CANOPY DETAILS	JULY 2008	
	Vr 1.0	
GENERAL LAYOUT of O.H. DOOR	Section 7.4	Page 005

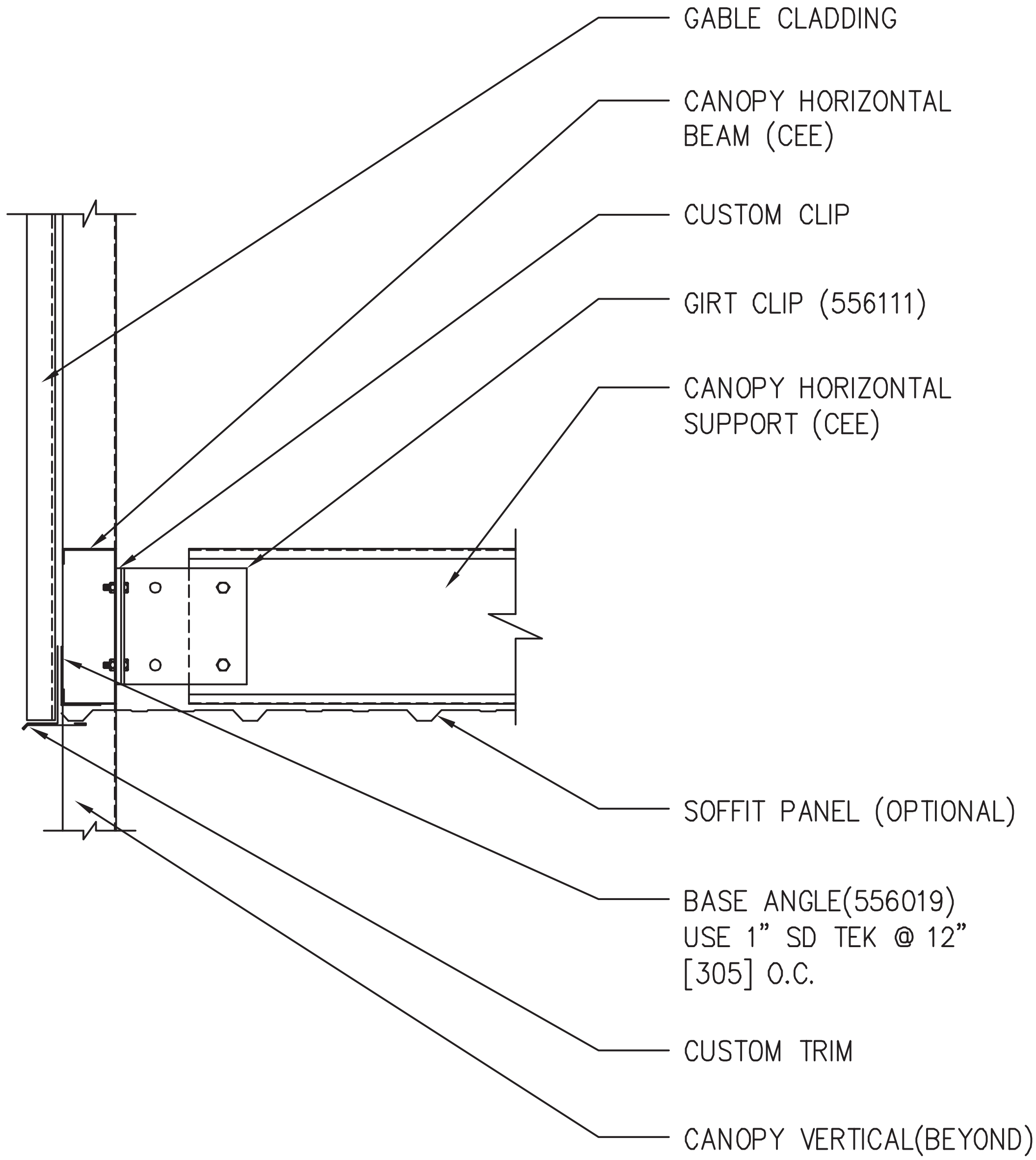


CANOPY DETAILS	JULY 2008	
	Vr 1.0	
O.H. DOOR CANOPY SECTION I	Section 7.4	Page 006

BEHLEN
Made Strong

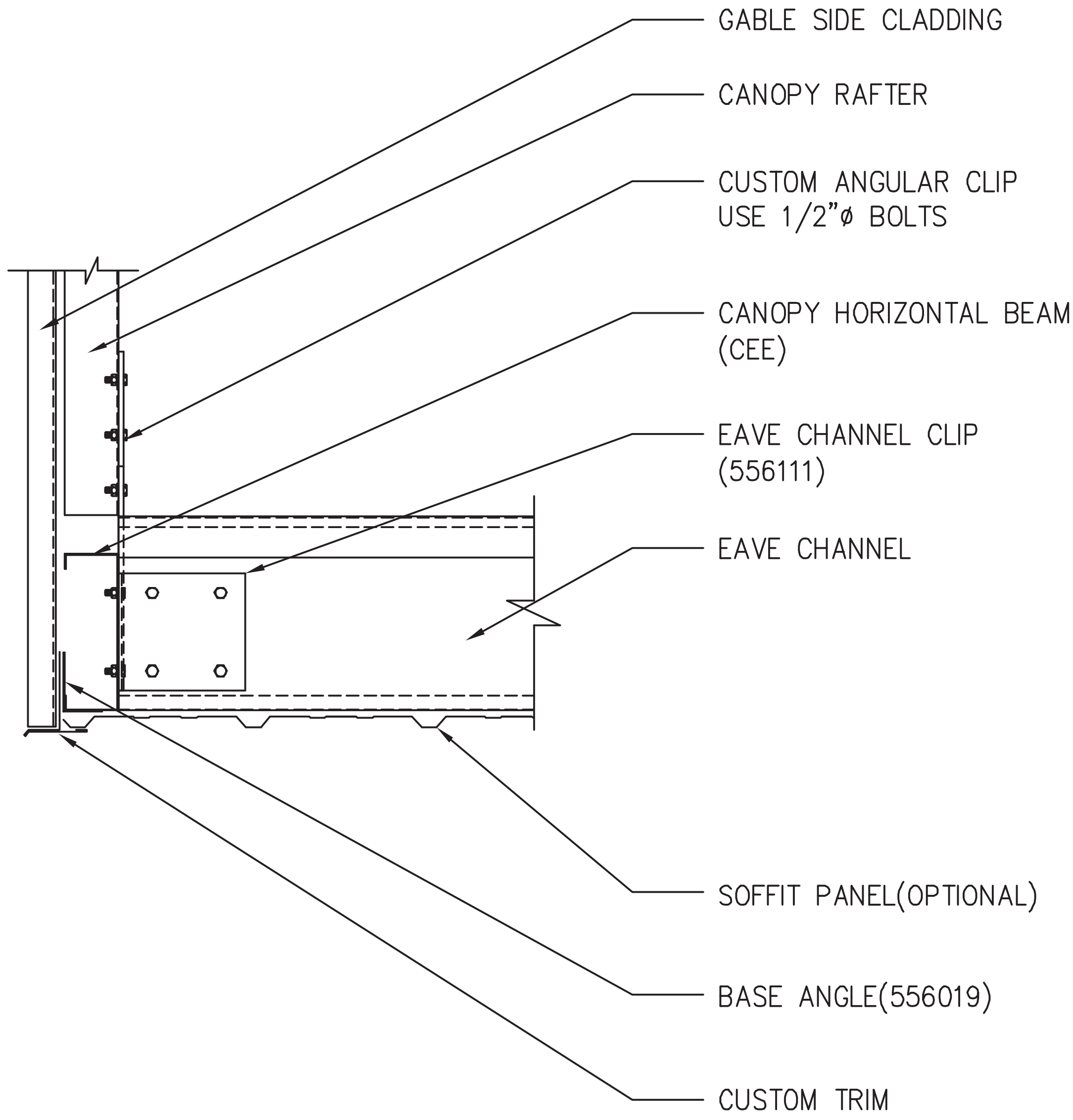


CANOPY DETAILS	JULY 2008	
	Vr 1.0	
O.H. DOOR CANOPY SECTION II	Section 7.4	Page 007



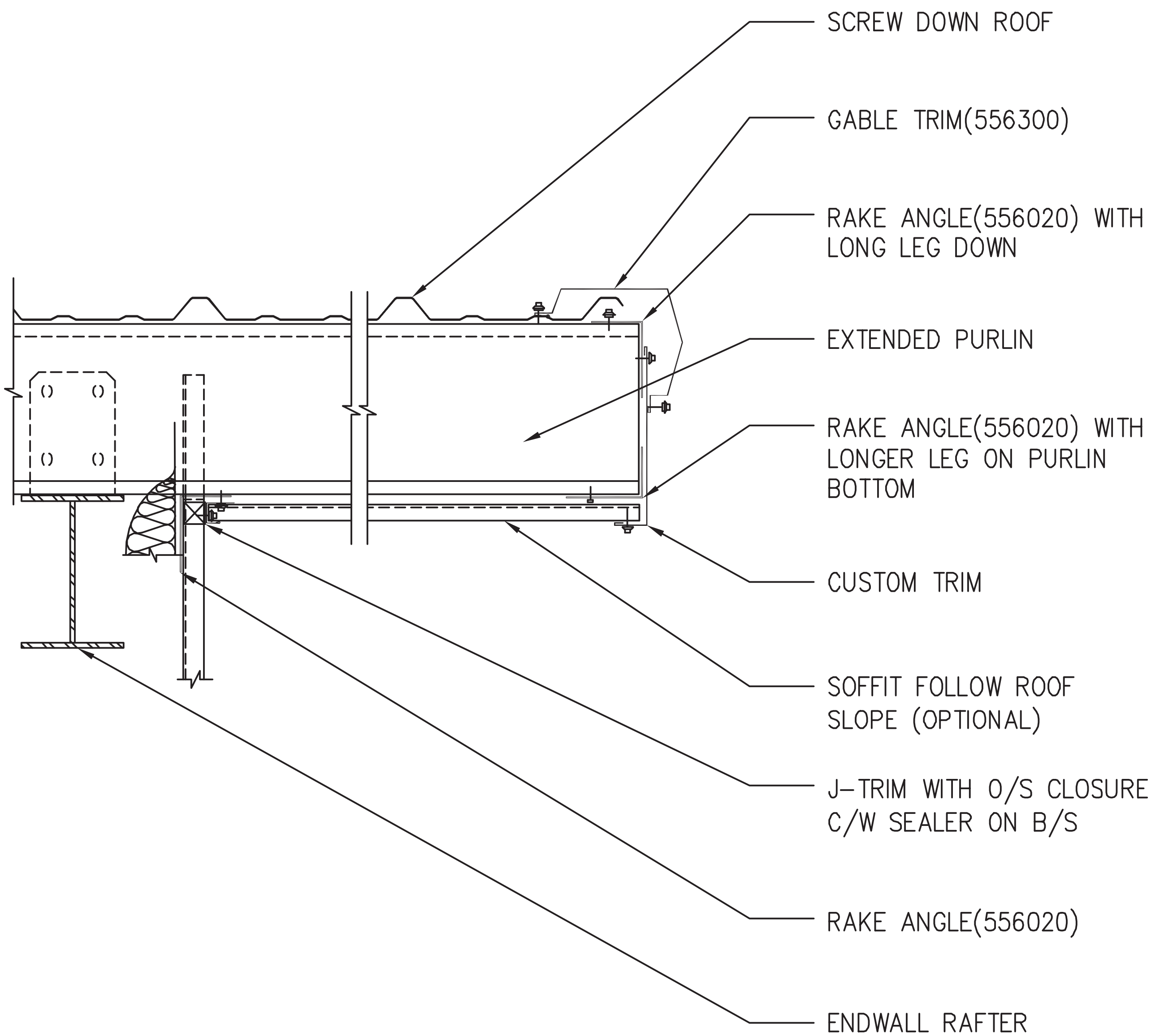
CANOPY DETAILS	JULY 2008	
	Vr 1.0	
O.H. DOOR CANOPY SECTION III	Section 7.4	Page 008

BEHLEN
Made Strong



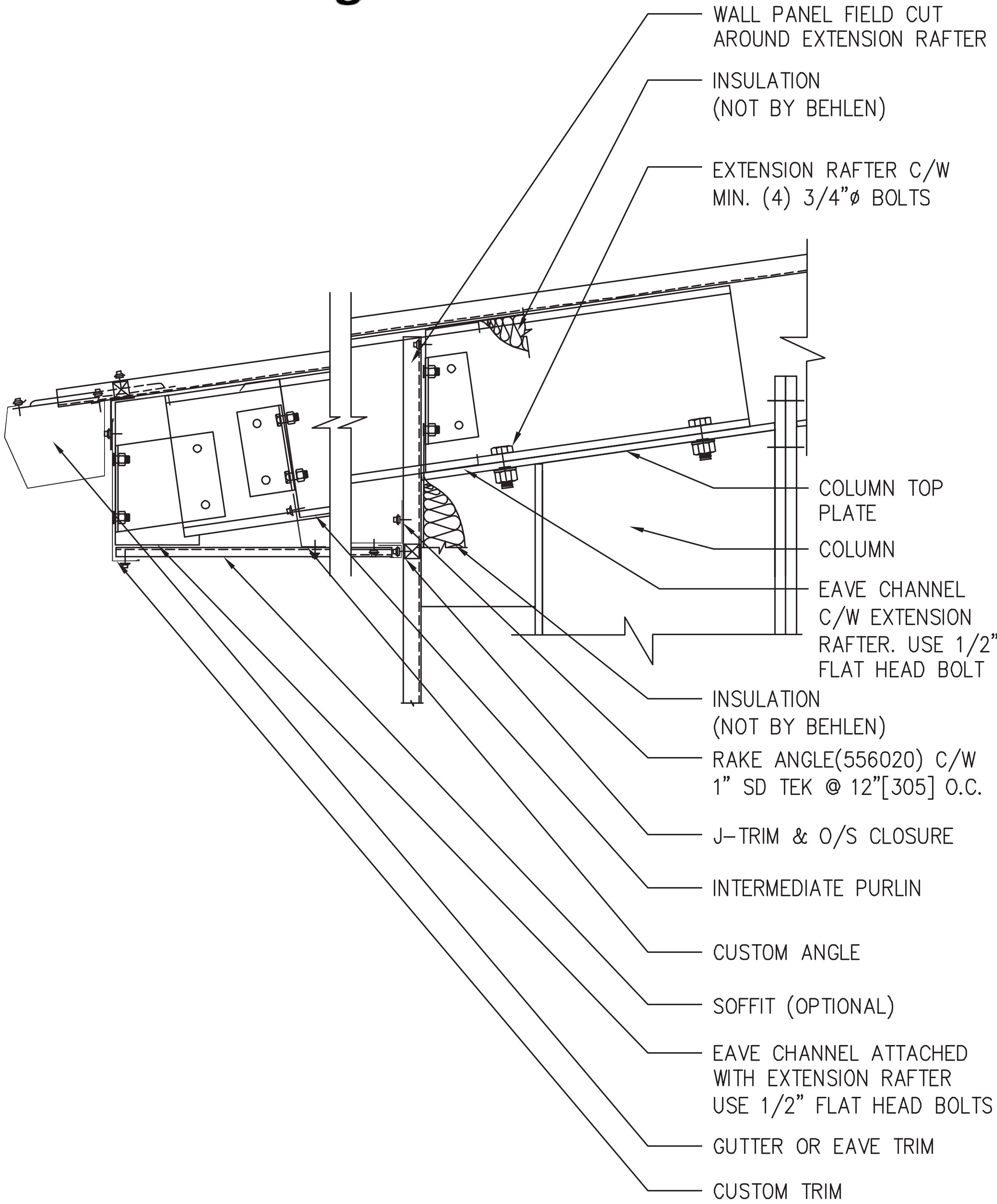
CANOPY DETAILS	JULY 2008 Vr 1.0	
O.H. DOOR CANOPY SECTION IV	Section 7.4	Page 009

BEHLEN
Made Strong



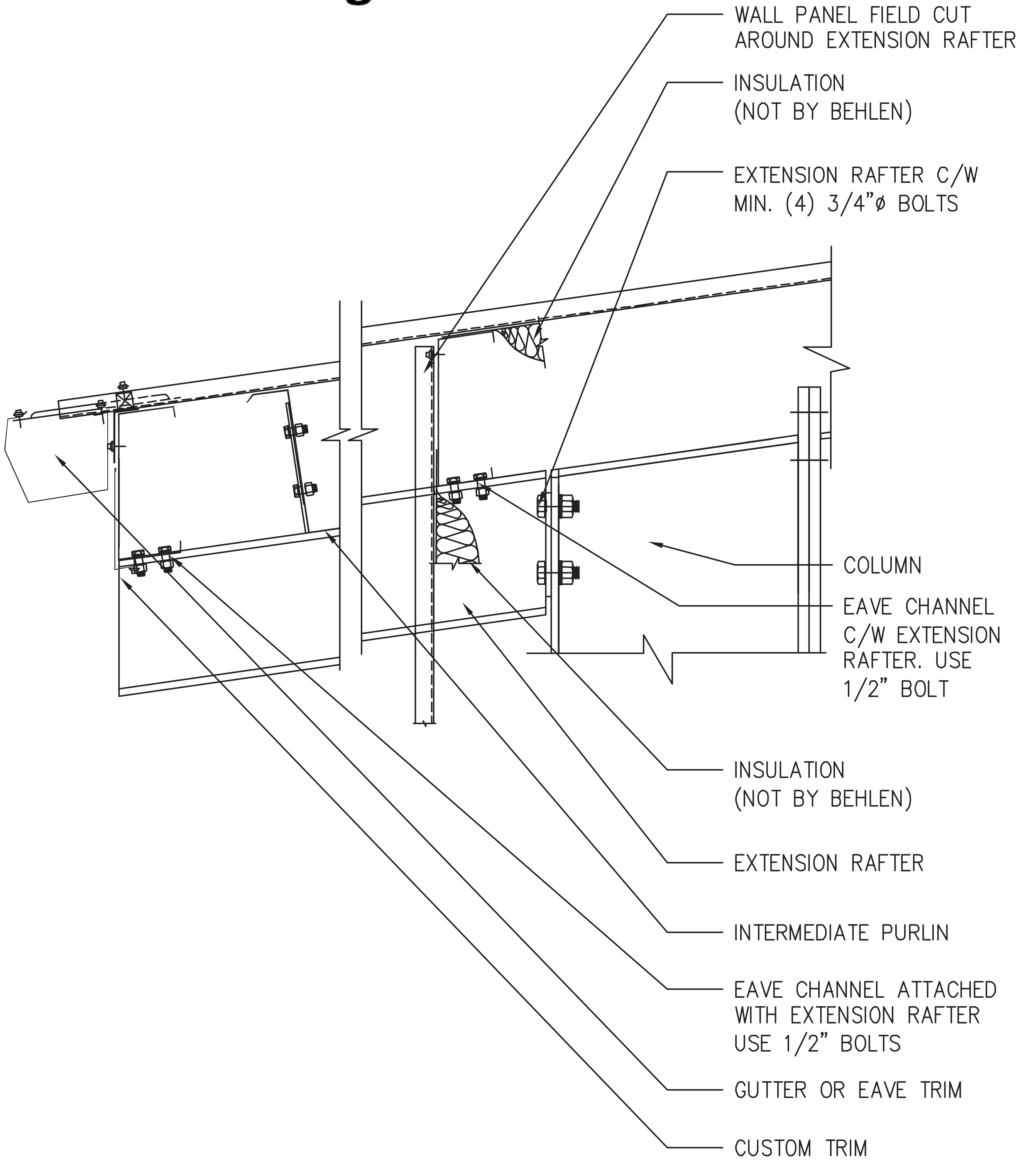
CANOPY DETAILS	JULY 2008
	Vr 1.0
GABLE EXTENSION	Section 7.4 / Page 010

BEHLEN
Made Strong



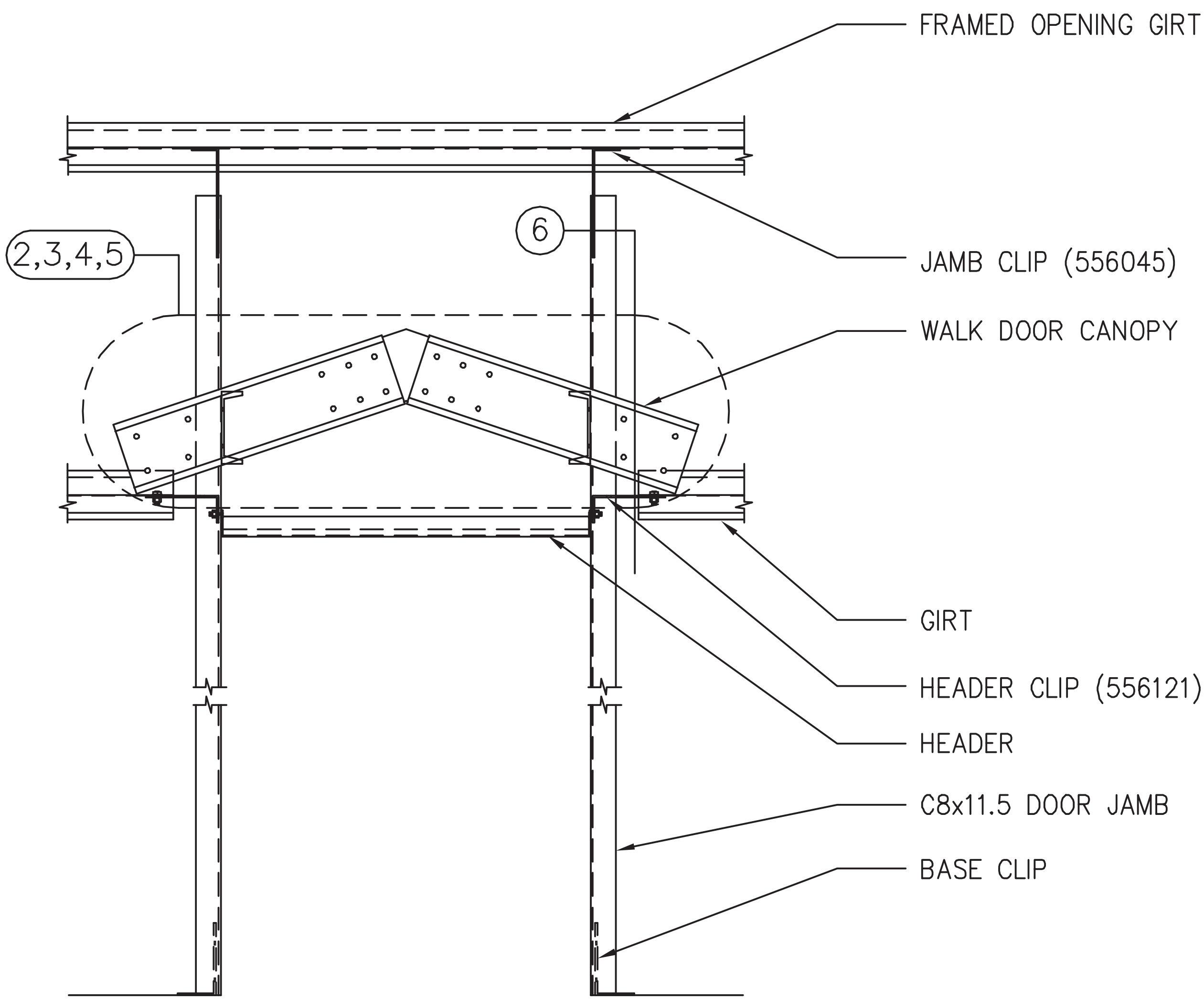
CANOPY DETAILS	JULY 2008	
	Vr 1.0	
EAVE EXTENSION with FLAT SOFFIT	Section 7.4	Page 011

BEHLEN
Made Strong



CANOPY DETAILS	JULY 2008	
	Vr 1.0	
EAVE EXTENSION without SOFFIT	Section 7.4	Page 012

BEHLEN
Made Strong

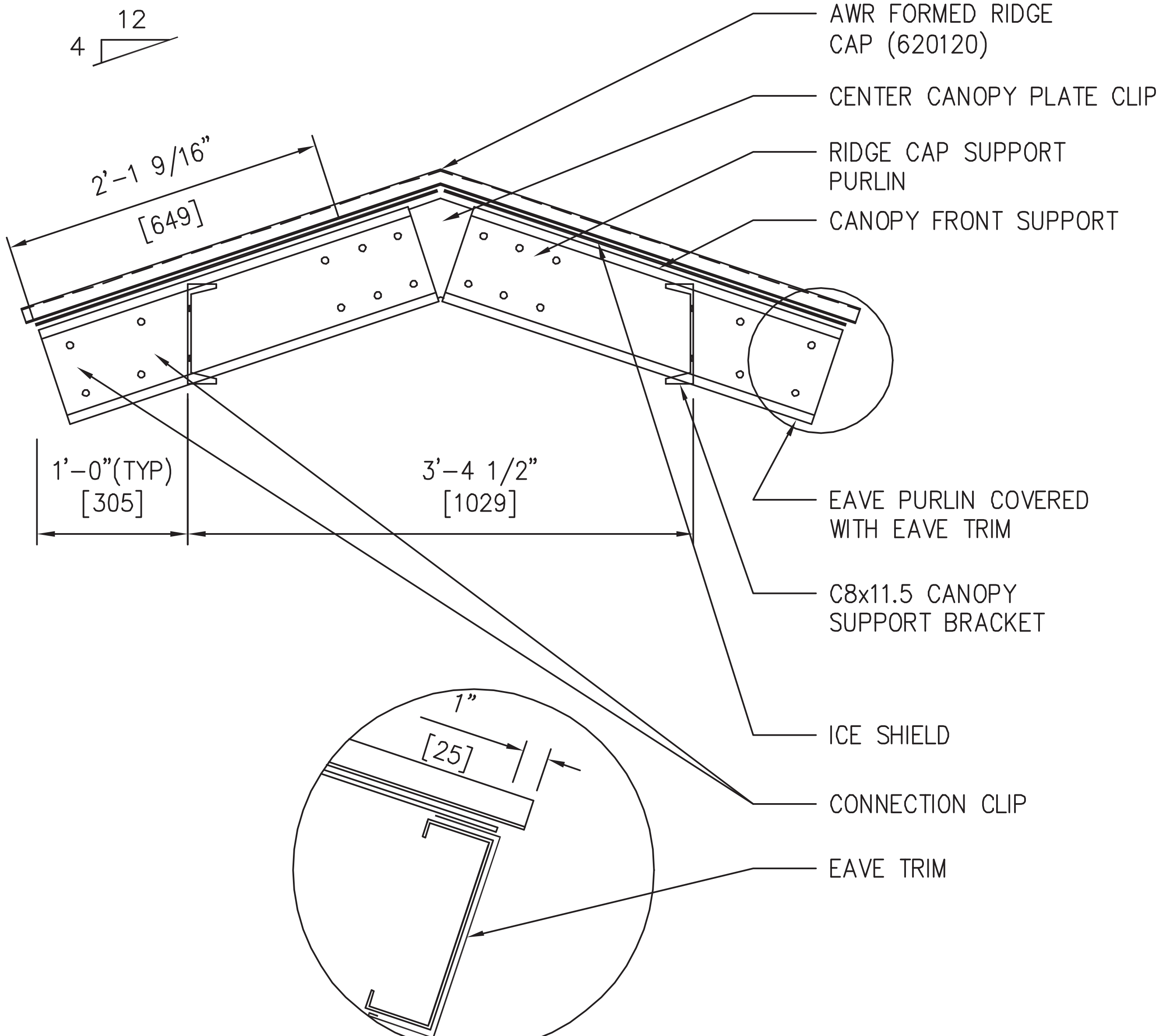


STANDARD CANOPY WITH 4:12 PITCH

NUMBERS in BUBBLE are PAGE NUMBERS

WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
TYPICAL WALK DOOR CANOPY	Section 7.5	Page 001

BEHLEN
Made Strong

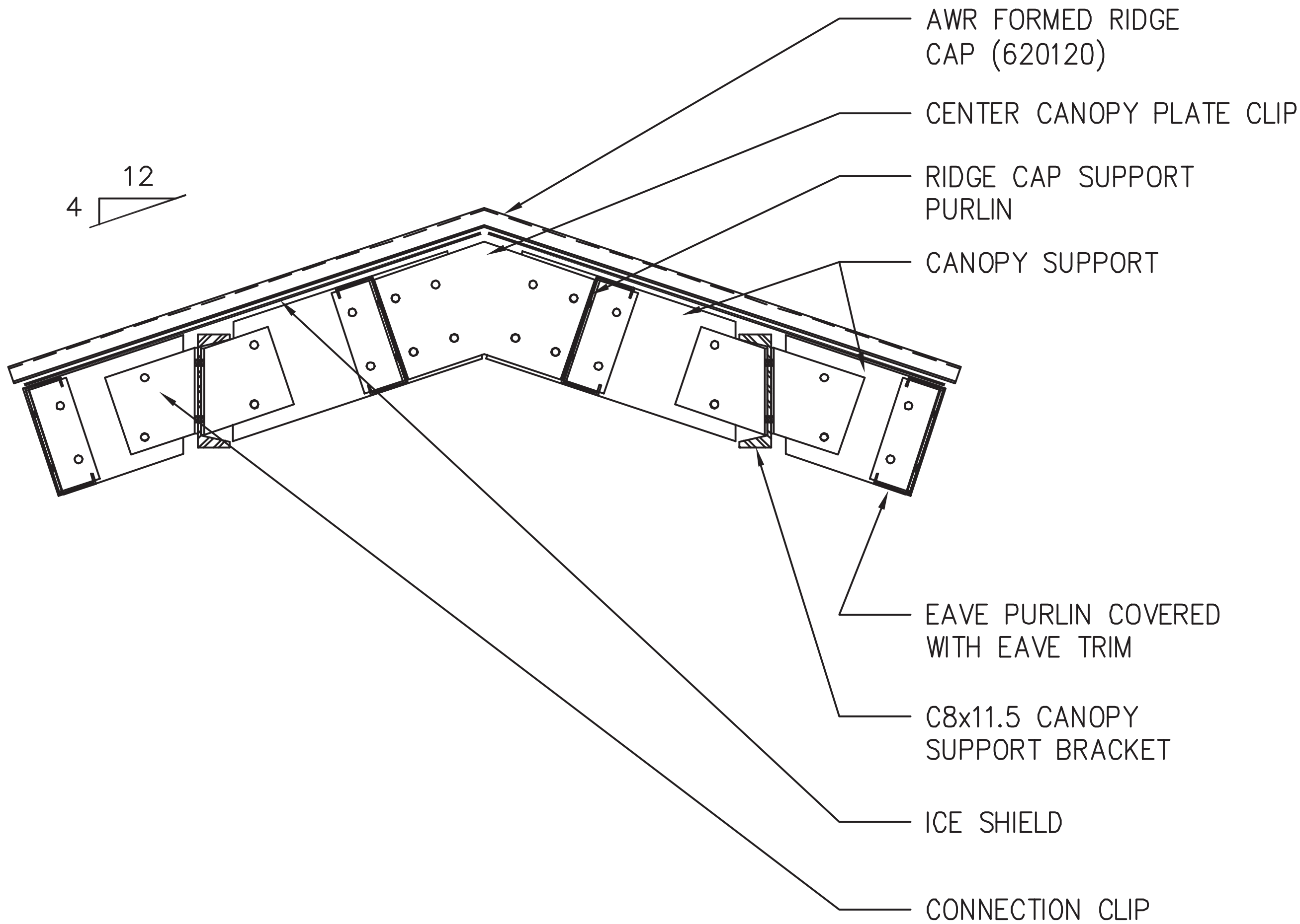


CANOPY FRAME DETAIL

SINGLE WALK DOOR

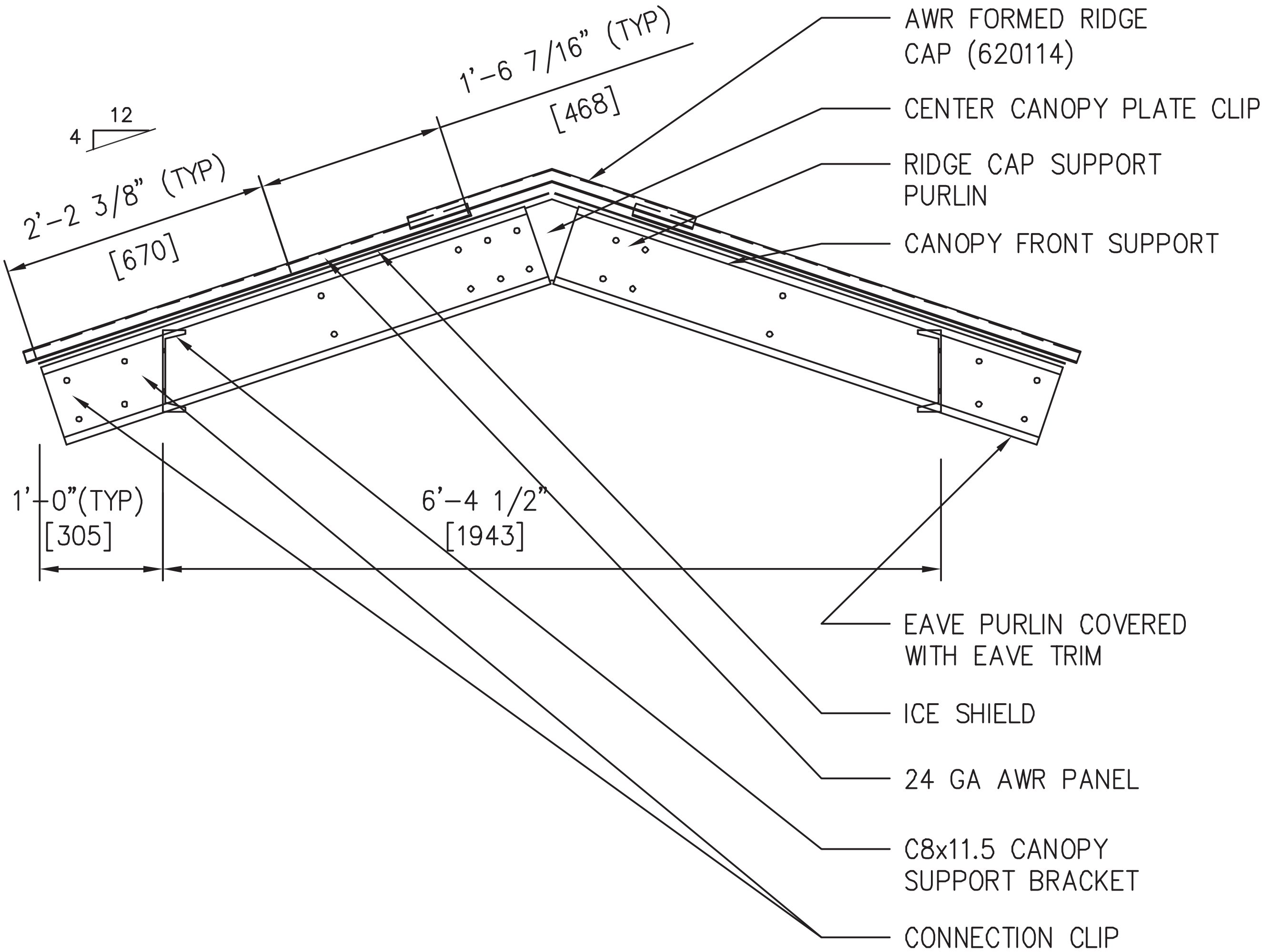
WALK DOOR CANOPY	JULY 2008 Vr 1.0	
FRONT VIEW of CANOPY I	Section 7.5	Page 002

BEHLEN
Made Strong



CANOPY FRAME DETAIL
SINGLE WALK DOOR

WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
BACK VIEW of CANOPY I	Section 7.5	Page 003

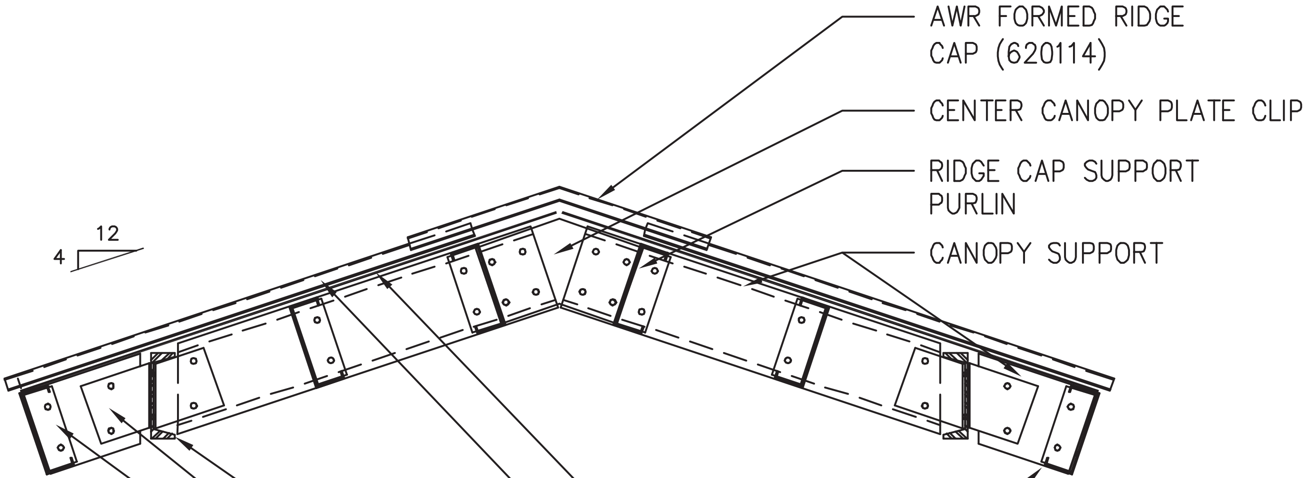


CANOPY FRAME DETAIL

DOUBLE WALK DOOR

WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
FRONT VIEW of CANOPY II	Section 7.5	Page 004

BEHLEN
Made Strong

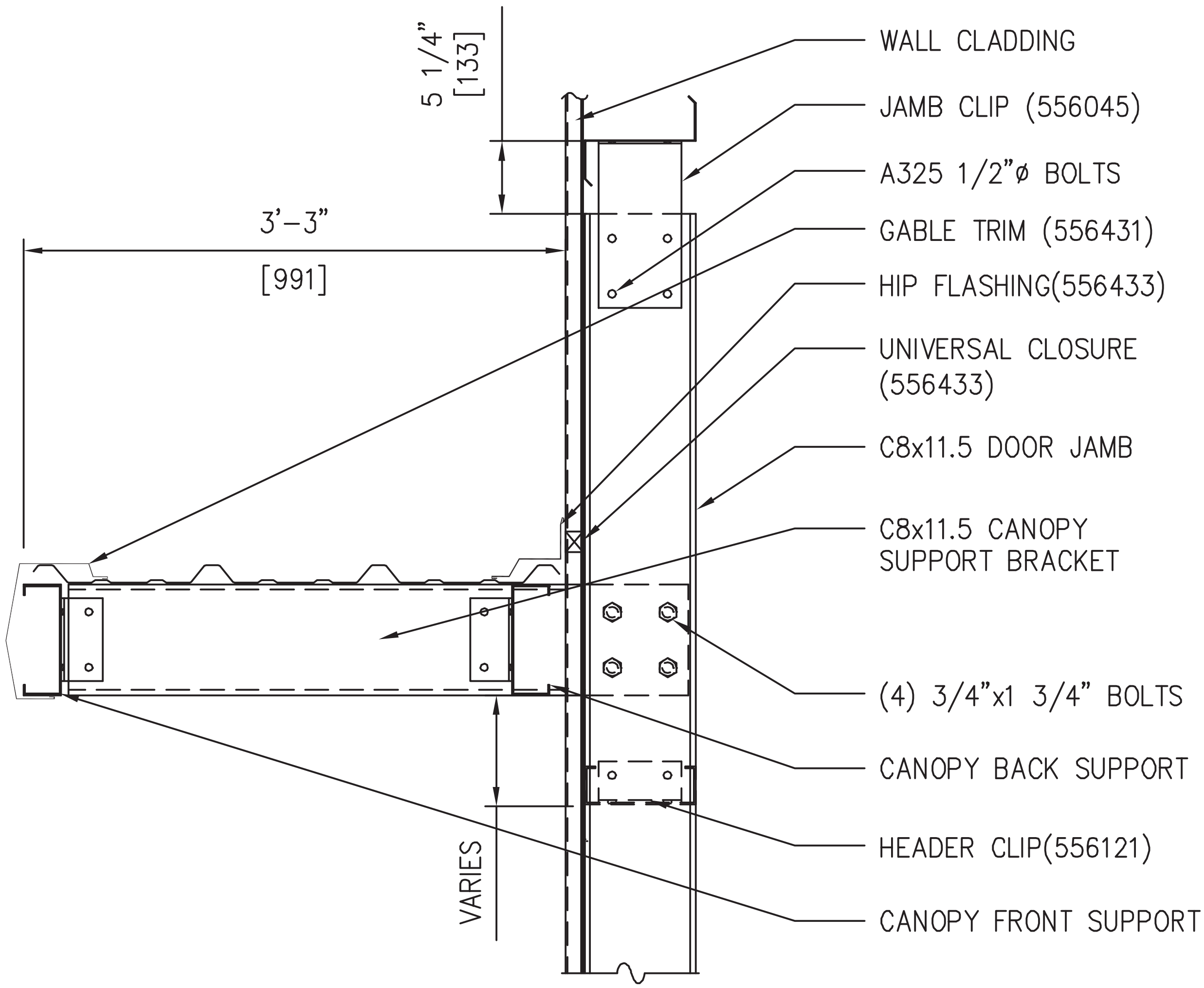


CANOPY FRAME DETAIL

DOUBLE WALK DOOR

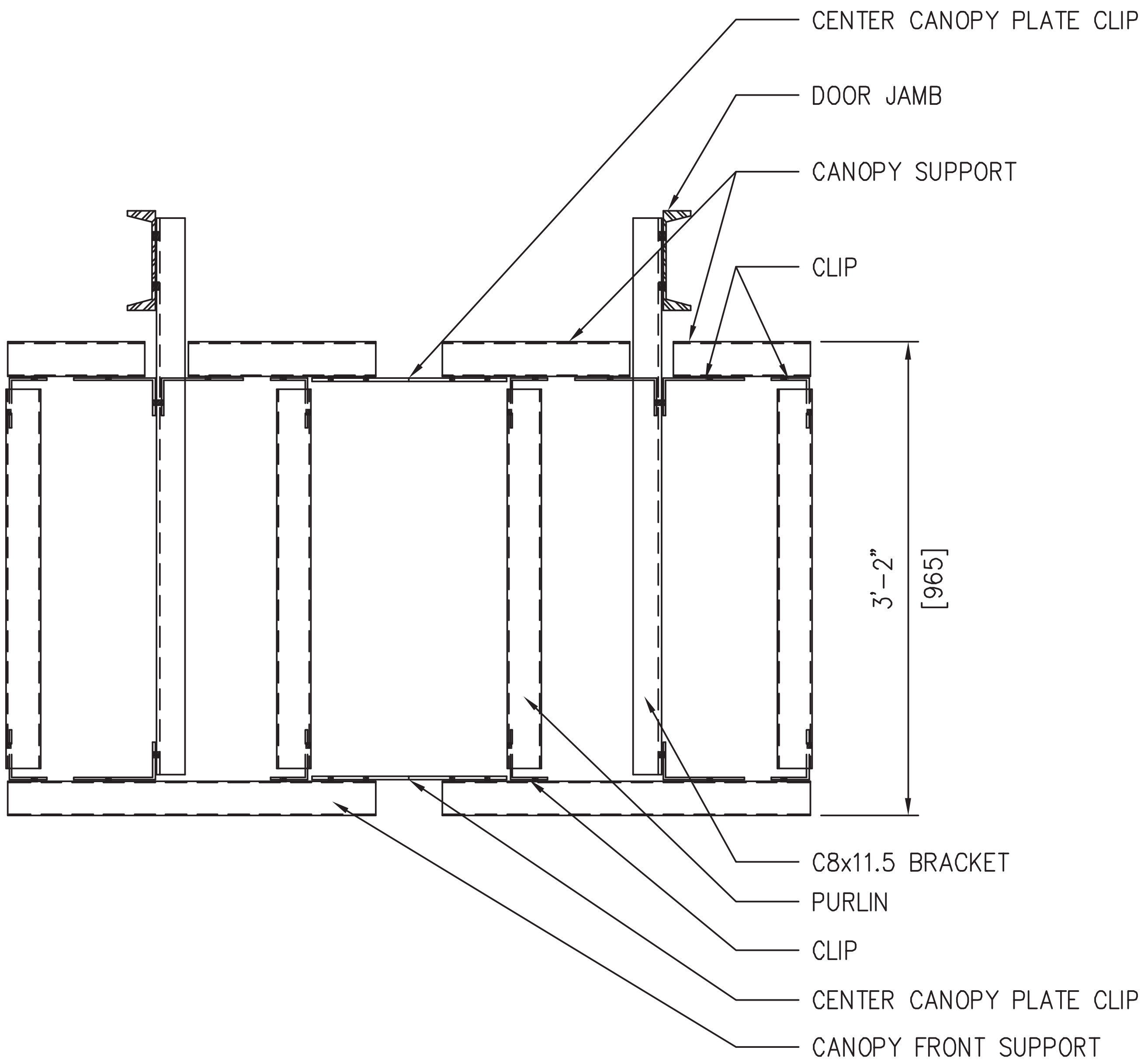
WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
BACK VIEW of CANOPY II	Section 7.5	Page 005

BEHLEN
Made Strong



WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
SECTIONAL VIEW of CANOPY	Section 7.5	Page 006

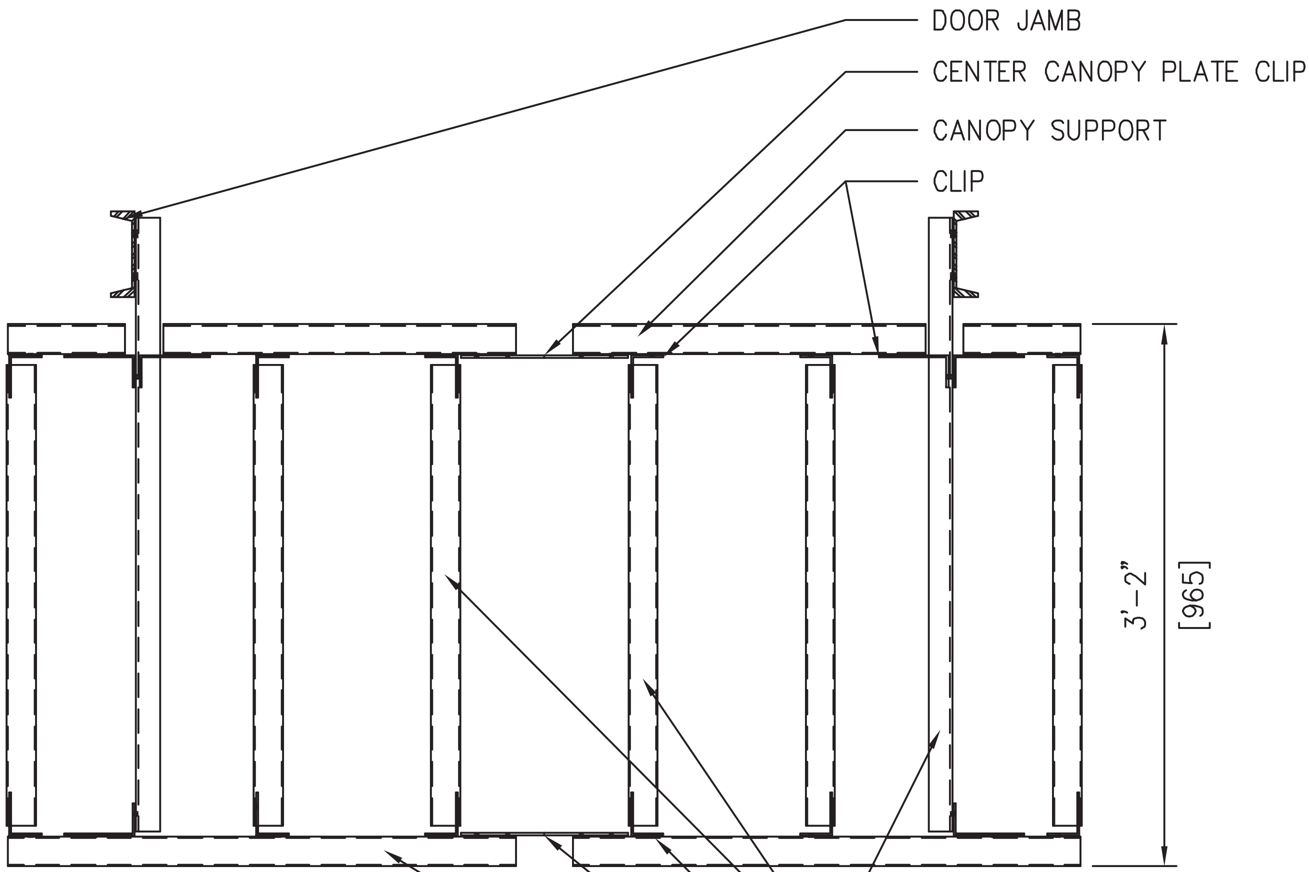
BEHLEN
Made Strong



CANOPY FRAME DETAIL

SINGLE WALK DOOR

WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
PLAN VIEW of CANOPY I	Section 7.5	Page 007



CANOPY FRAME DETAIL

DOUBLE WALK DOOR

WALK DOOR CANOPY	JULY 2008	
	Vr 1.0	
PLAN VIEW of CANOPY II	Section 7.5	Page 008

BEHLEN
Made Strong

LINER PACKAGES
LINER PACKAGES INCLUDE PARTIAL OR FULL HEIGHT WALL LINER, ROOF LINER AND/OR FULL WALL WITH ROOF LINER.

TRIM AND ACCESSORY DESCRIPTION

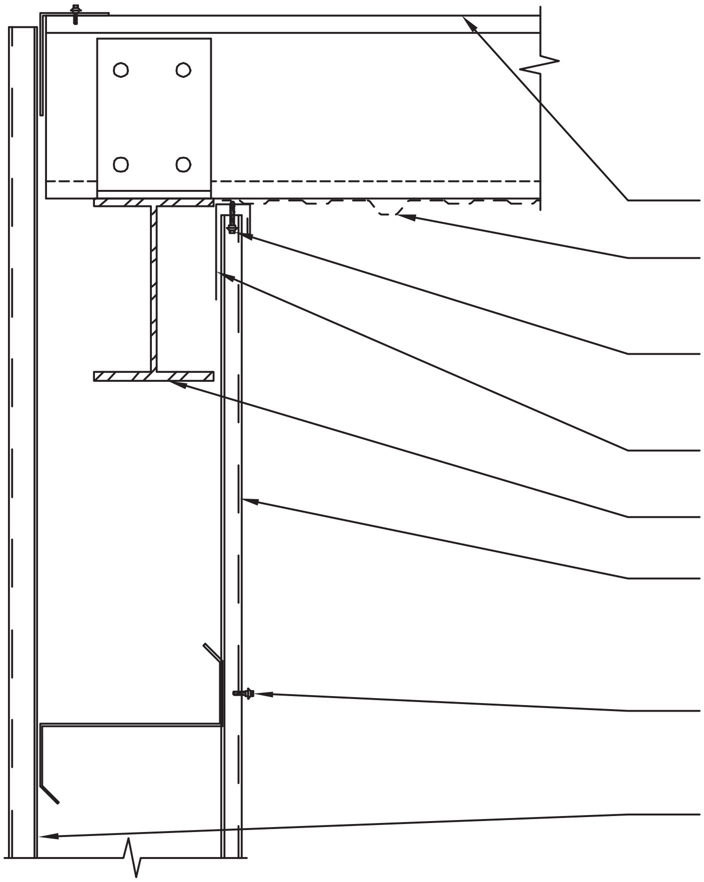
ECONOMY PACKAGE
J–TRIM AT FRAMED OPENINGS
WALK DOOR TRIM AT FRAMED OPENING (COLORED LINER ONLY)
CORNER TRIM
J–TRIM AT TOP OF GABLE (FULL HEIGHT ONLY)
RAFTER TRIM IF APPLICABLE (FULL HEIGHT WALL C/W ROOF LINER)
J–TRIM AT TOP OF WALLS (FULL HEIGHT WALL C/W ROOF LINER)
RIDGE CAP (ROOF)

STANDARD PACKAGE
J–TRIM AT FRAMED OPENINGS
WALK DOOR TRIM AT FRAMED OPENING (COLORED LINER ONLY)
CORNER TRIM
J–TRIM AT TOP OF ALL WALL PANELS
RAFTER TRIM IF APPLICABLE (FULL HEIGHT WALL C/W ROOF LINER)
RIDGE CAP (ROOF)

DELUXE PACKAGE
J–TRIM AT FRAMED OPENINGS
WALK DOOR TRIM AT FRAMED OPENING (COLORED LINER ONLY)
CORNER TRIM
J–TRIM AT TOP OF ALL WALL PANELS
TRIM AT ALL COLUMN/RAFTER WEB & FLANGES
RAFTER TRIM IS APPLICABLE (FULL HEIGHT PLUS ROOF ONLY)
RIDGE CAP (ROOF)

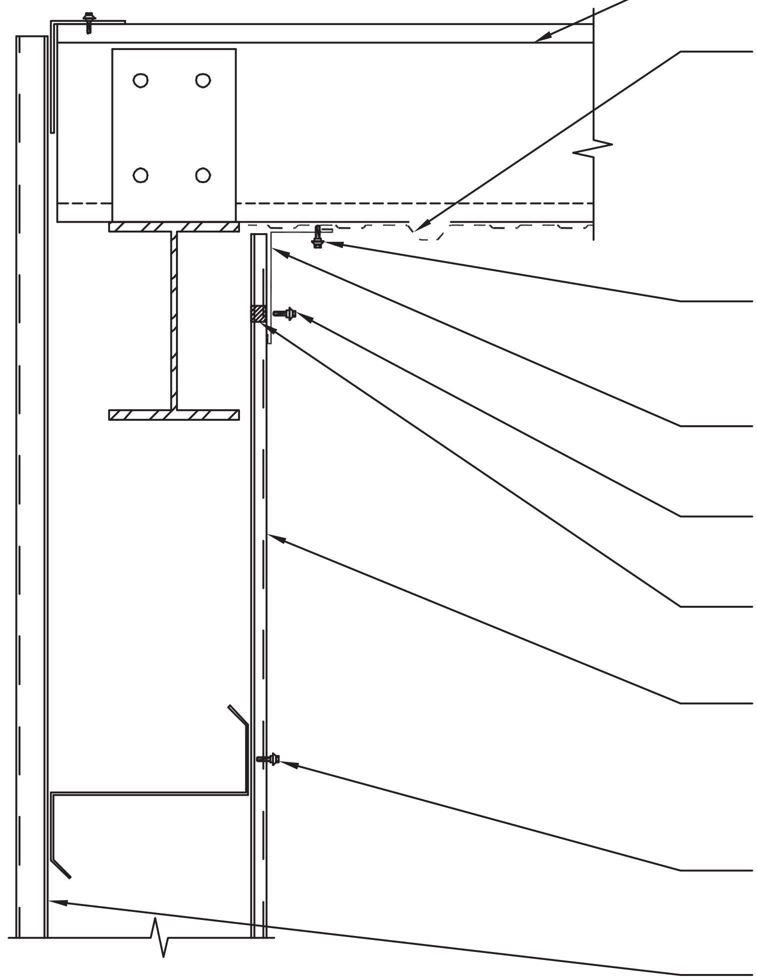
VAPOUR BARRIER PACKAGE
J–TRIM AT FRAMED OPENINGS
WALK DOOR TRIM AT FRAMED OPENING (COLORED LINER ONLY)
CORNER/GABLE TRIM
J–TRIM AT TOP OF GABLE WALLS
EAVE ANGLE TRIM AT TOP OF SIDEWALLS (WITH ROOF LINER ONLY)
TRIM AT ALL COLUMN WEB & FLANGES
RAFTER TRIM IS APPLICABLE (FULL HEIGHT PLUS ROOF ONLY)
RIDGE CAP (ROOF)
CLOSURES AND BUTYL SEALER AT ENDS
BUTYL SEALER AT SEAMS

BEHLEN
Made Strong



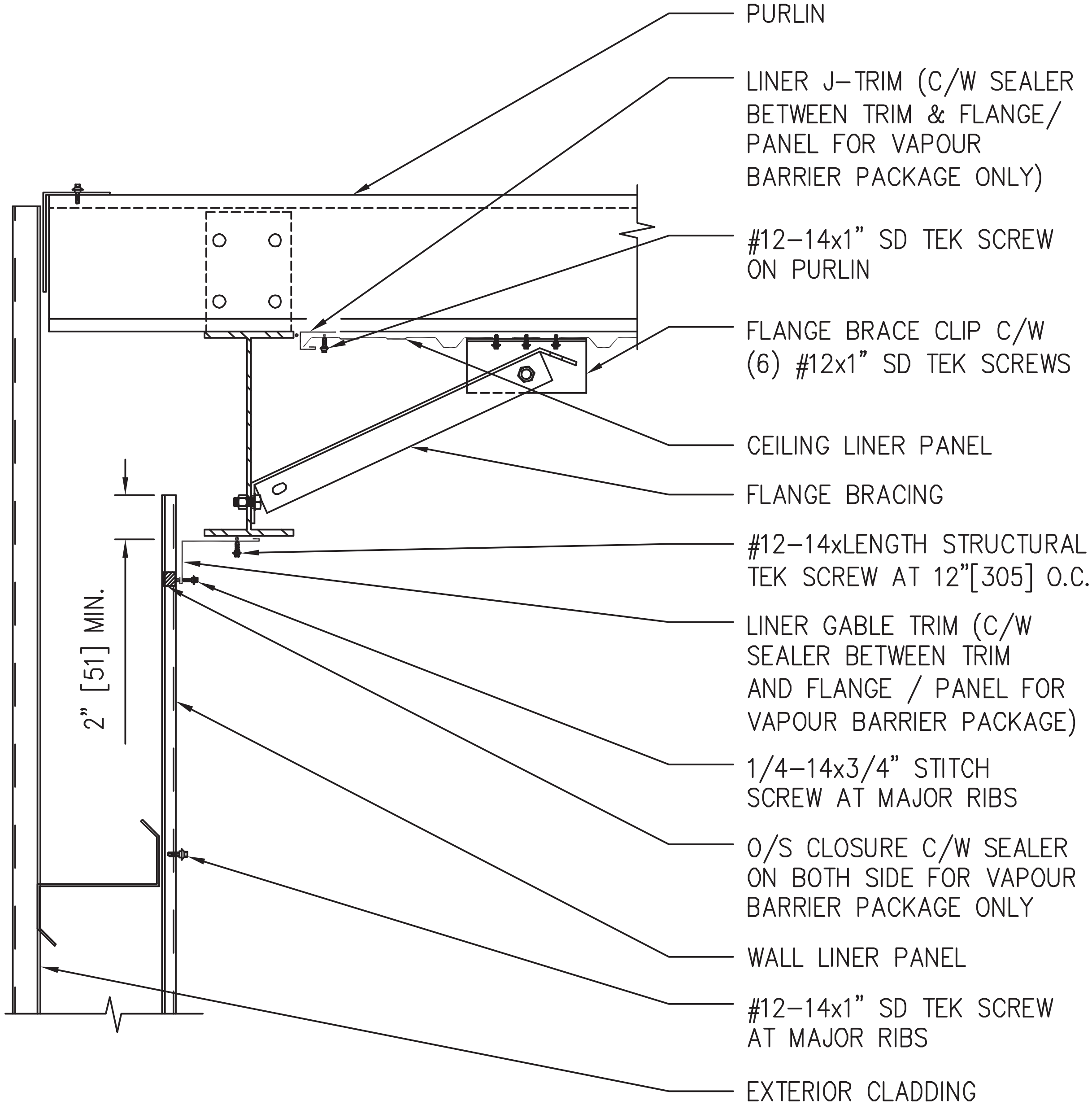
NON-VAPOUR BARRIER PACKAGE

LINER DETAILS	JULY 2008	
	Vr 1.0	
ENDWALL RAFTER DETAIL I	Section 7.6	Page 002



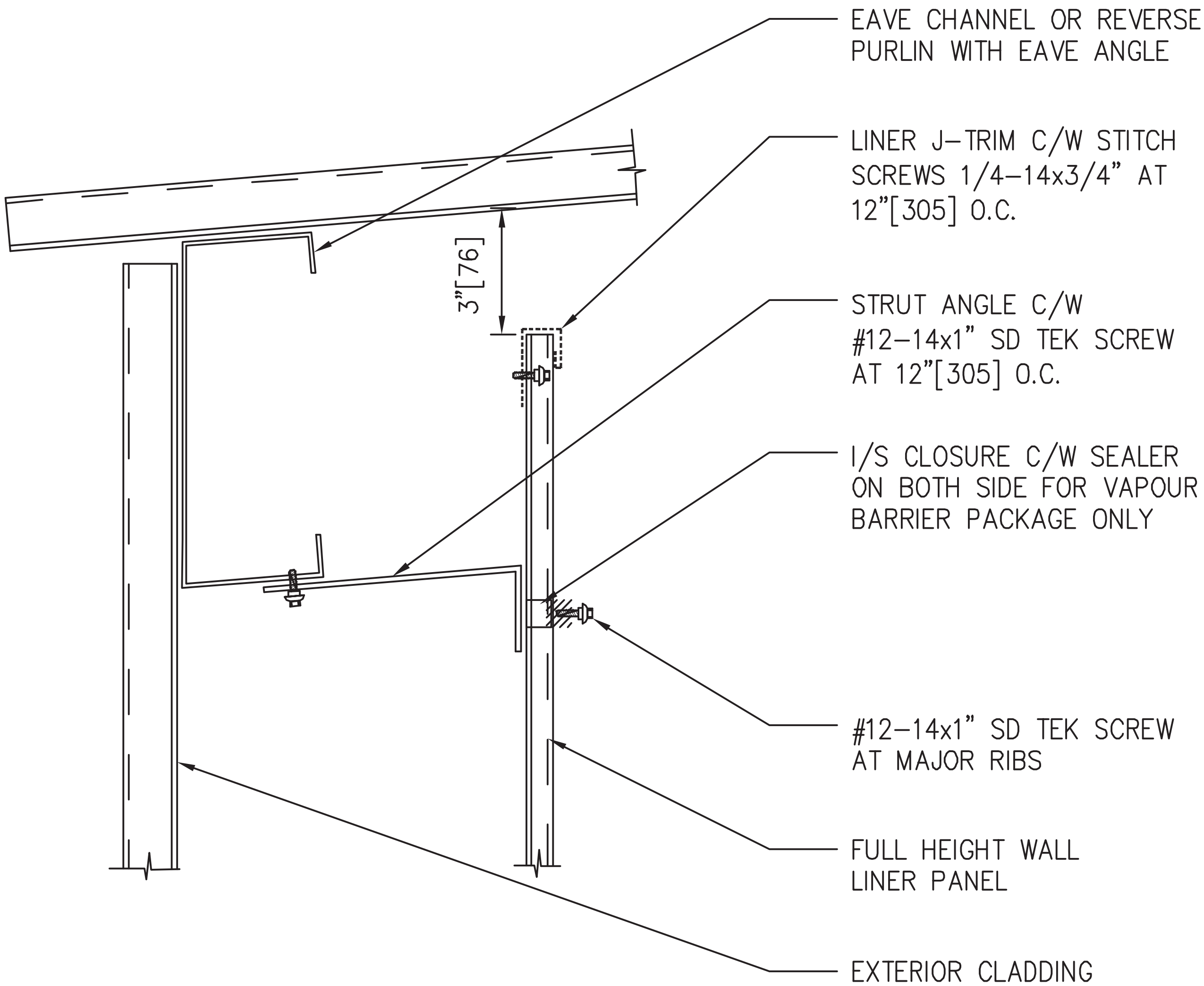
VAPOUR BARRIER PACKAGE

LINER DETAILS	JULY 2008	
	Vr 1.0	
ENDWALL RAFTER DETAIL II	Section 7.6	Page 003



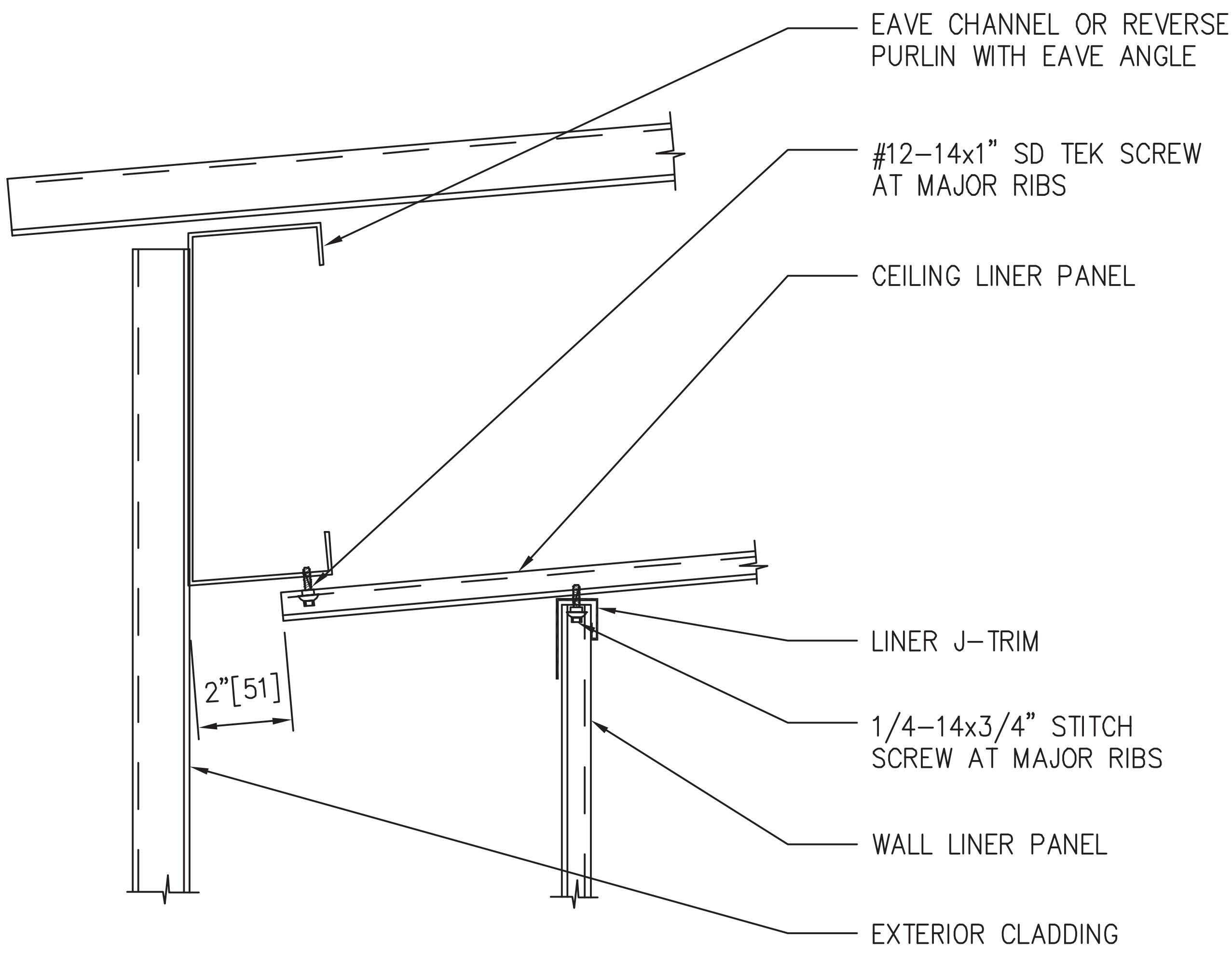
LINER DETAILS	JULY 2008		
	Vr 1.0		
EXPANDABLE ENDWALL at RAFTER	Section 7.6	Page 004	

BEHLEN
Made Strong



LINER DETAILS	JULY 2008 Vr 1.0	
SIDEWALL DETAIL at EAVE I	Section 7.6	Page 005

BEHLEN
Made Strong

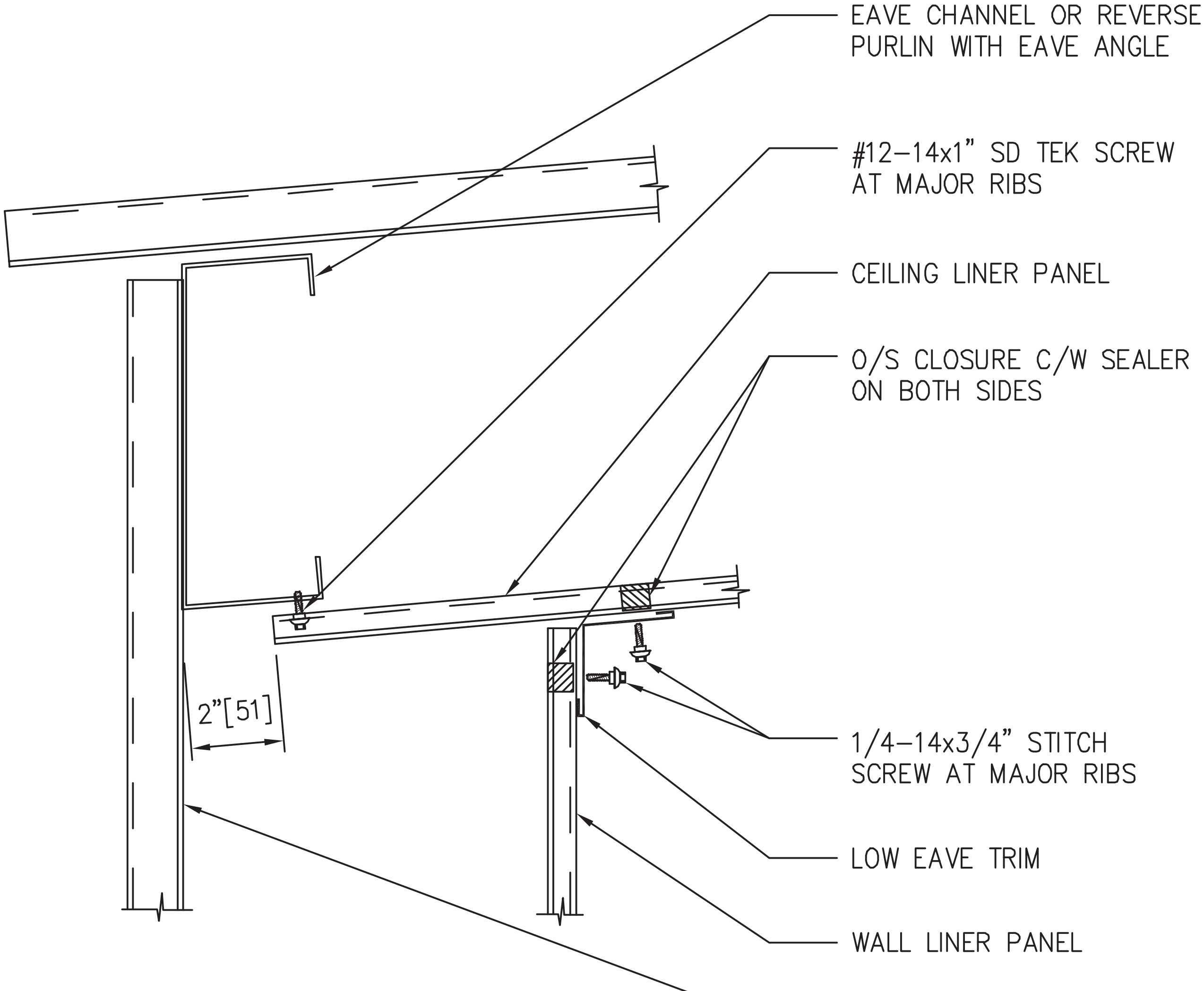


NON–VAPOUR BARRIER PACKAGE

WITH LINER ROOF PANEL

LINER DETAILS	JULY 2008 Vr 1.0
SIDEWALL DETAIL at EAVE II	Section 7.6 / Page 006

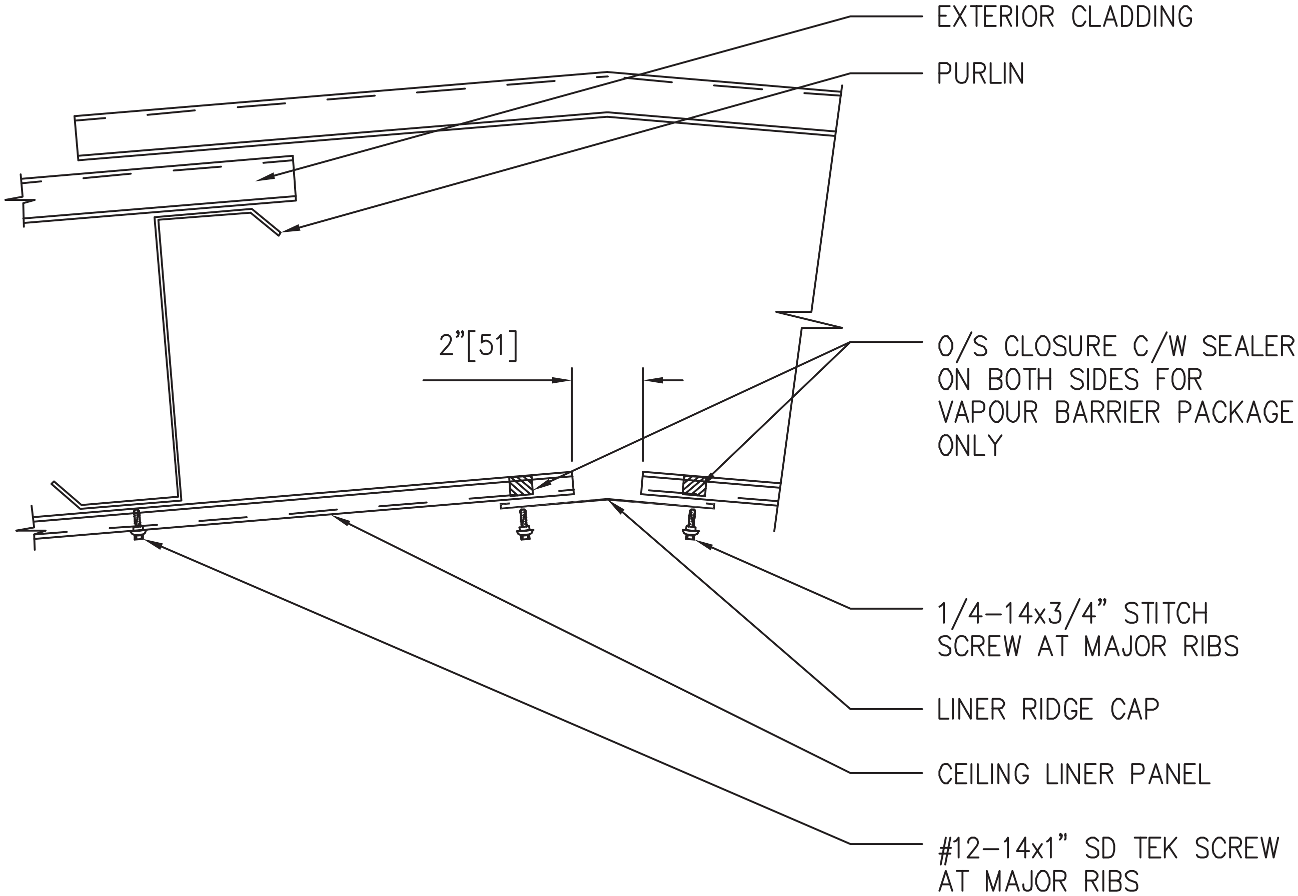
BEHLEN
Made Strong



VAPOUR BARRIER PACKAGE

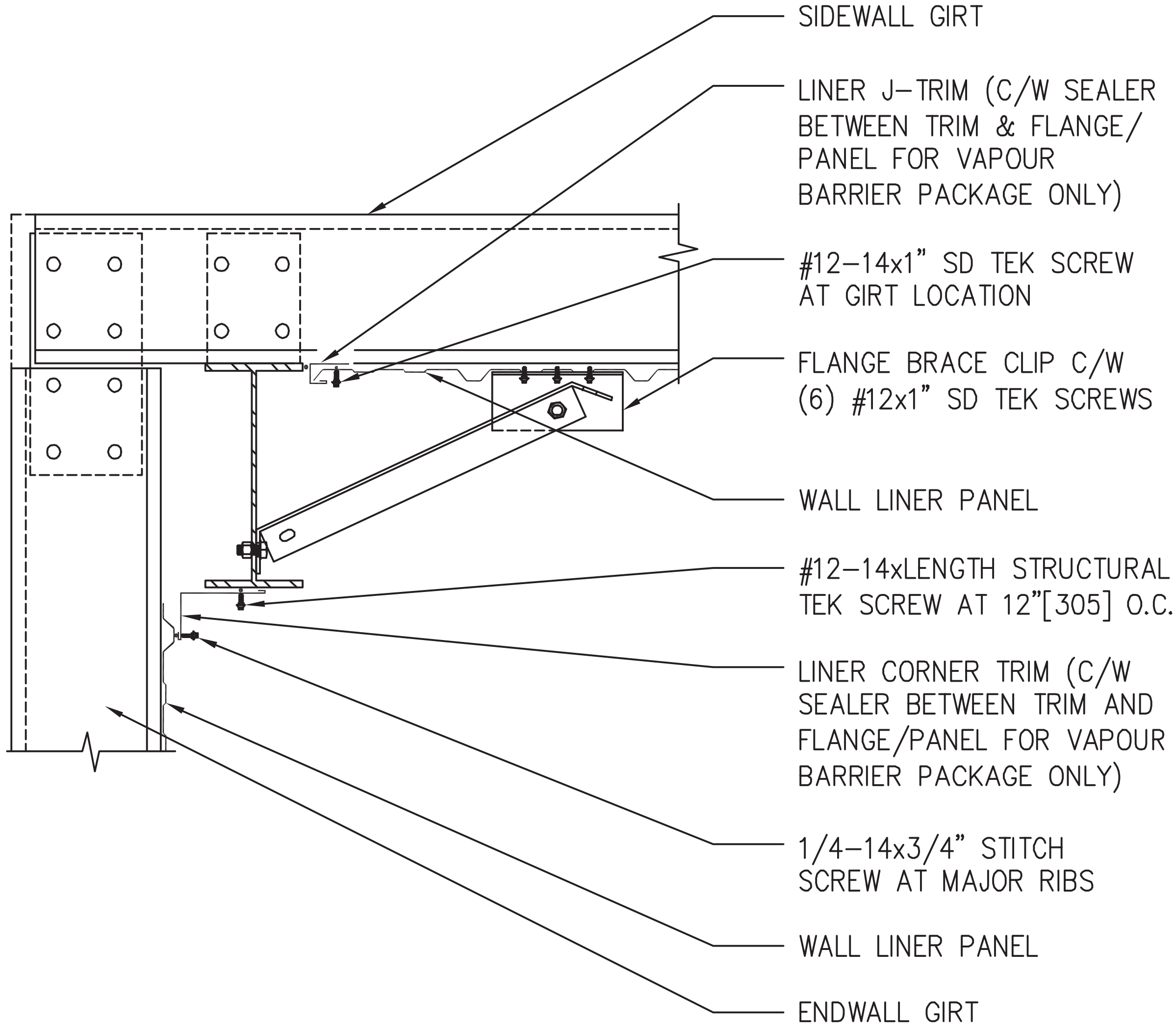
WITH LINER ROOF PANEL

LINER DETAILS	JULY 2008	
	Vr 1.0	
SIDEWALL DETAIL at EAVE III	Section 7.6	Page 007

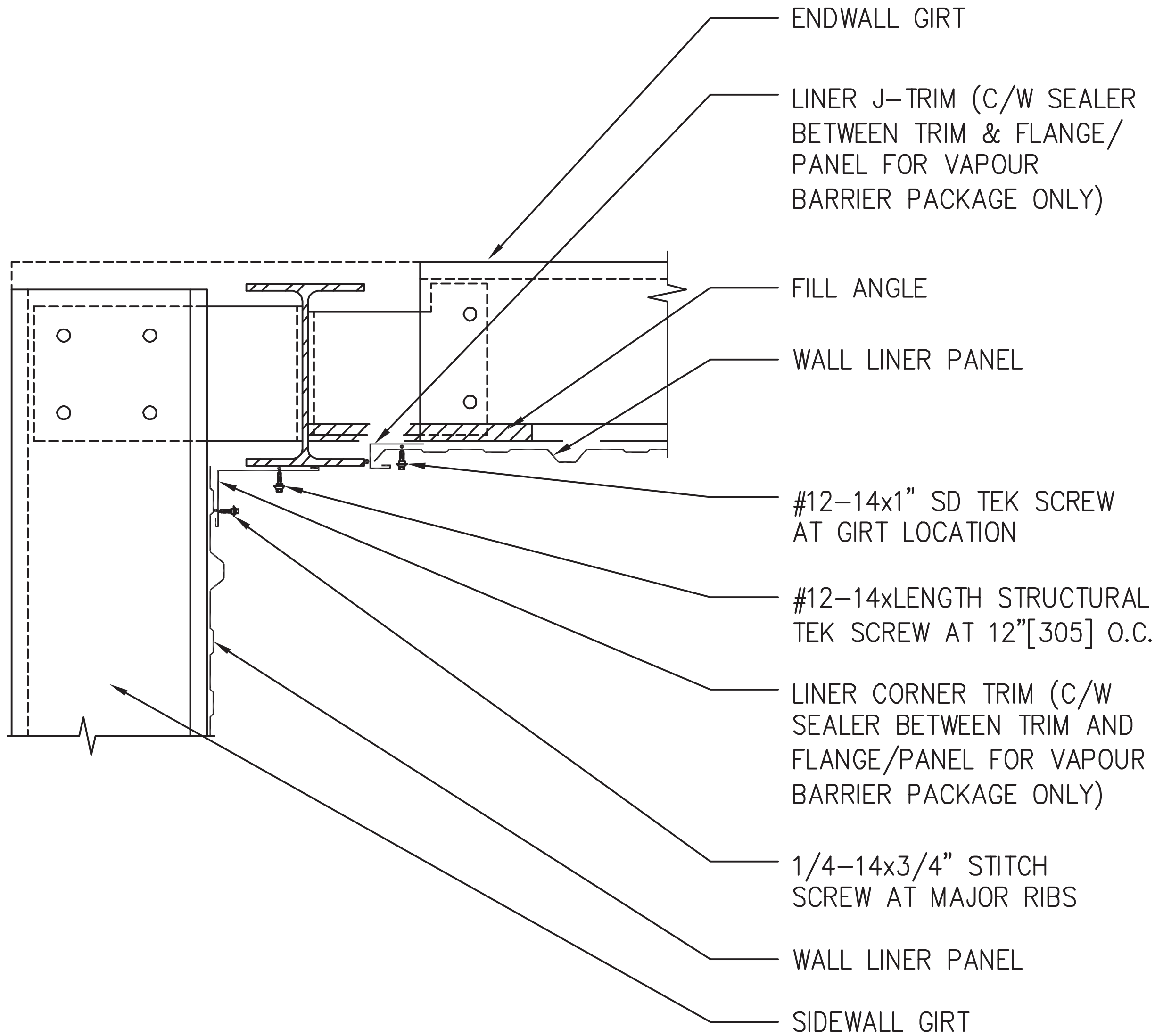


LINER DETAILS

LINER at RIDGE


SIDEWALL GIRT
LINER J–TRIM (C/W SEALER BETWEEN TRIM & FLANGE/ PANEL FOR VAPOUR BARRIER PACKAGE ONLY)
#12–14x1" SD TEK SCREW AT GIRT LOCATION
FLANGE BRACE CLIP C/W (6) #12x1" SD TEK SCREWS
WALL LINER PANEL
#12–14xLENGTH STRUCTURAL TEK SCREW AT 12"[305] O.C.
LINER CORNER TRIM (C/W SEALER BETWEEN TRIM AND FLANGE/PANEL FOR VAPOUR BARRIER PACKAGE ONLY)
1/4–14x3/4" STITCH SCREW AT MAJOR RIBS
WALL LINER PANEL
ENDWALL GIRT

BEHLEN
Made Strong

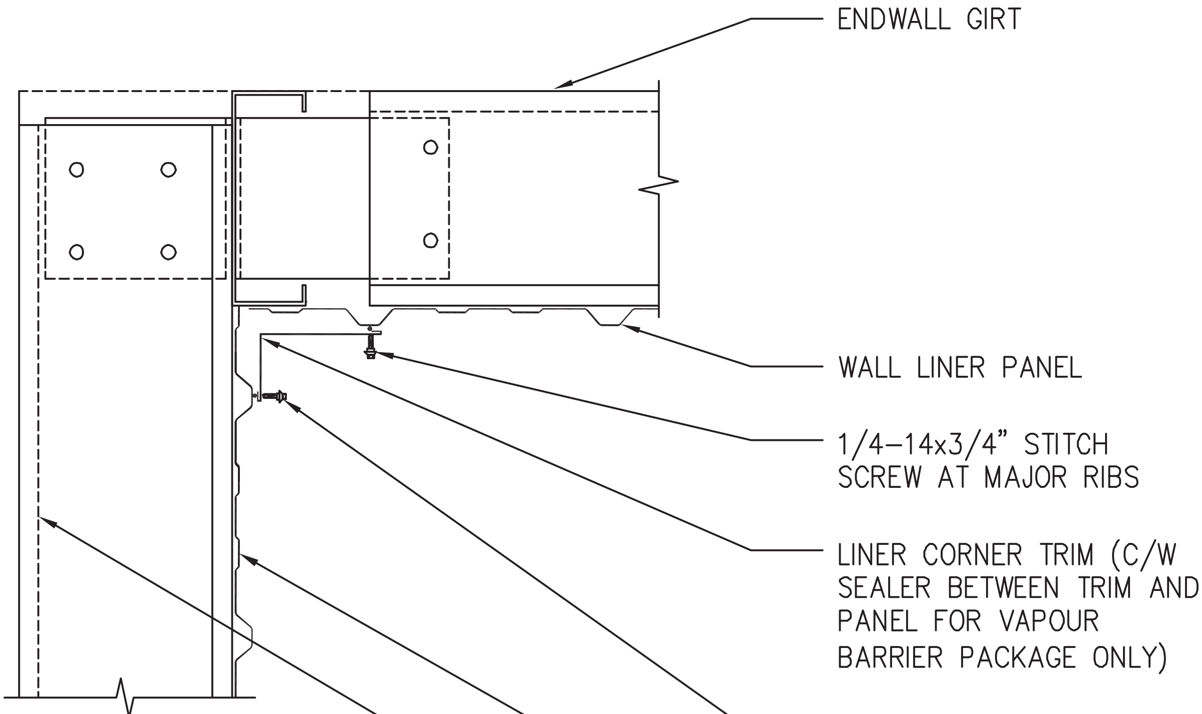


MILL COLUMN

1" OFFSET GIRT

LINER DETAILS	JULY 2008 Vr 1.0	
ENDWALL DETAIL at COLUMN I	Section 7.6	Page 010

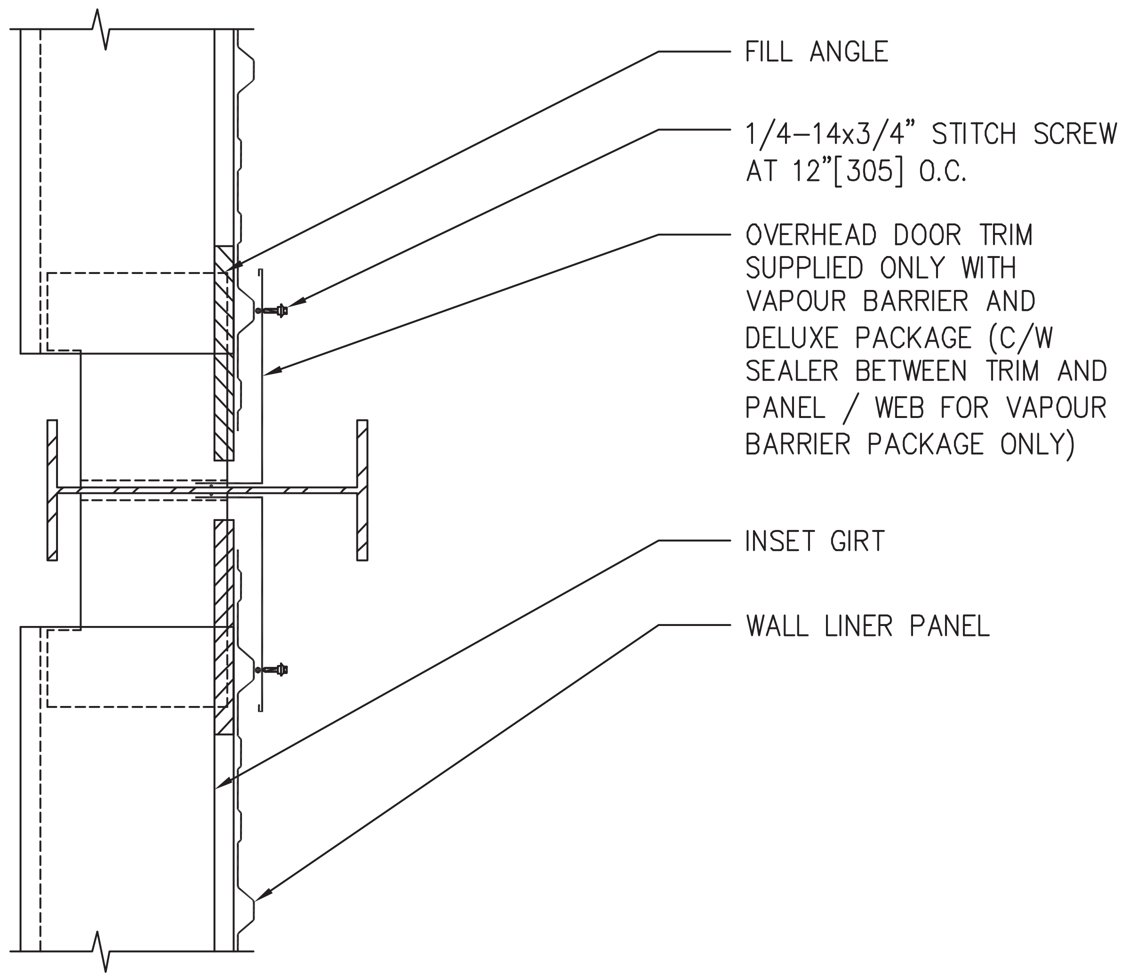
BEHLEN
Made Strong



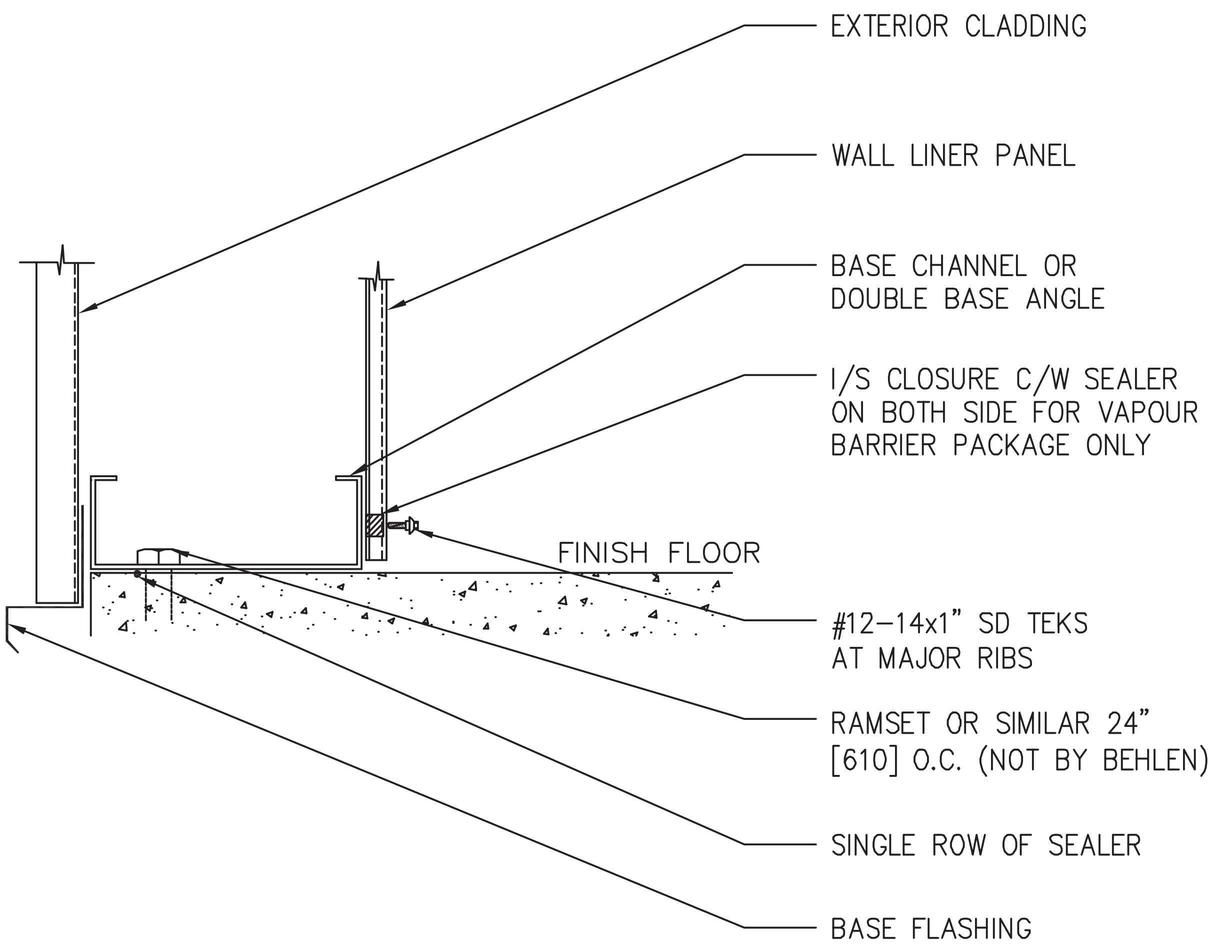
LIGHT GAUGE COLUMN
FLUSH GIRT

LINER DETAILS	JULY 2008	
	Vr 1.0	
ENDWALL DETAIL at COLUMN II	Section 7.6	Page 011

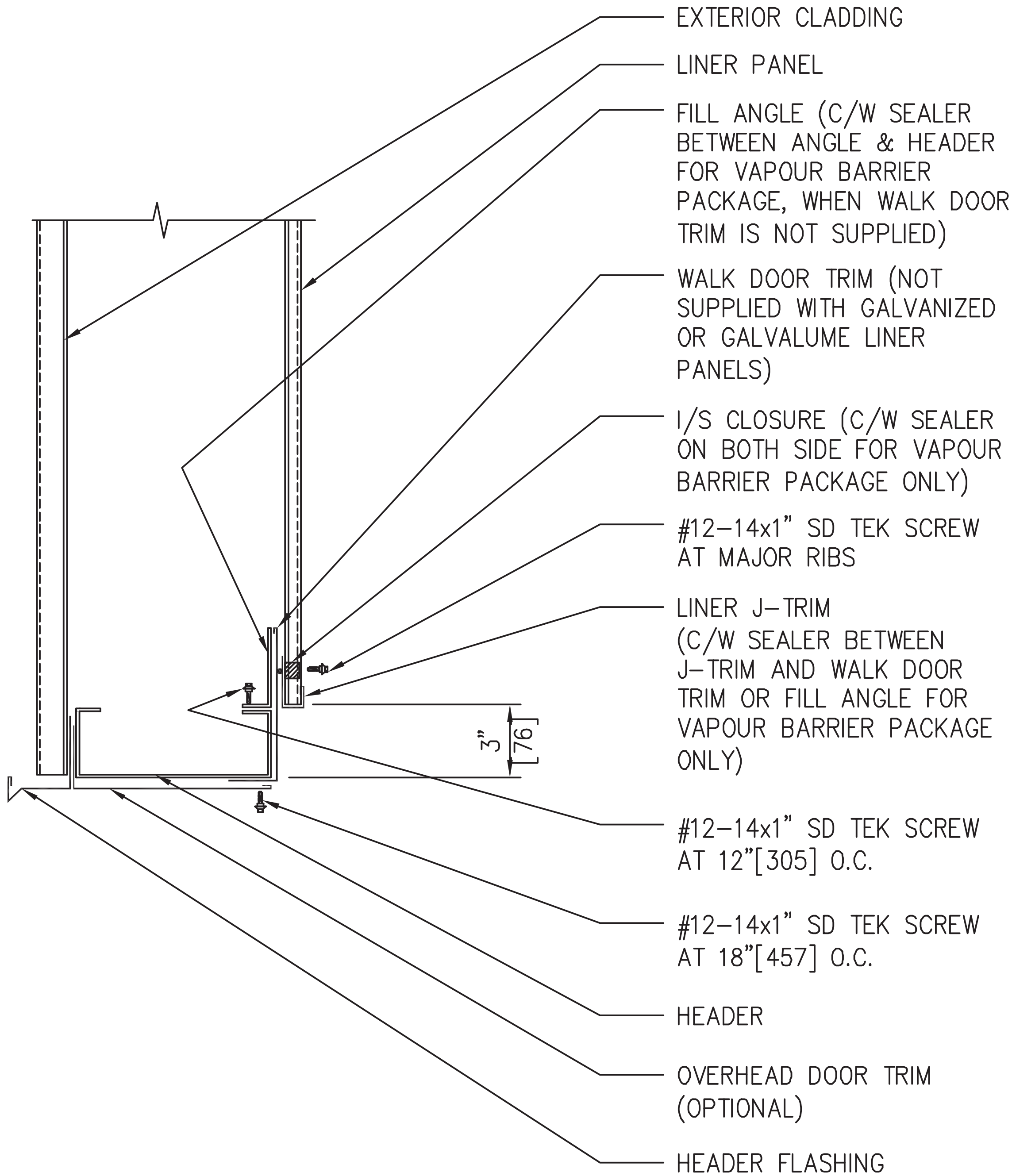
BEHLEN
Made Strong



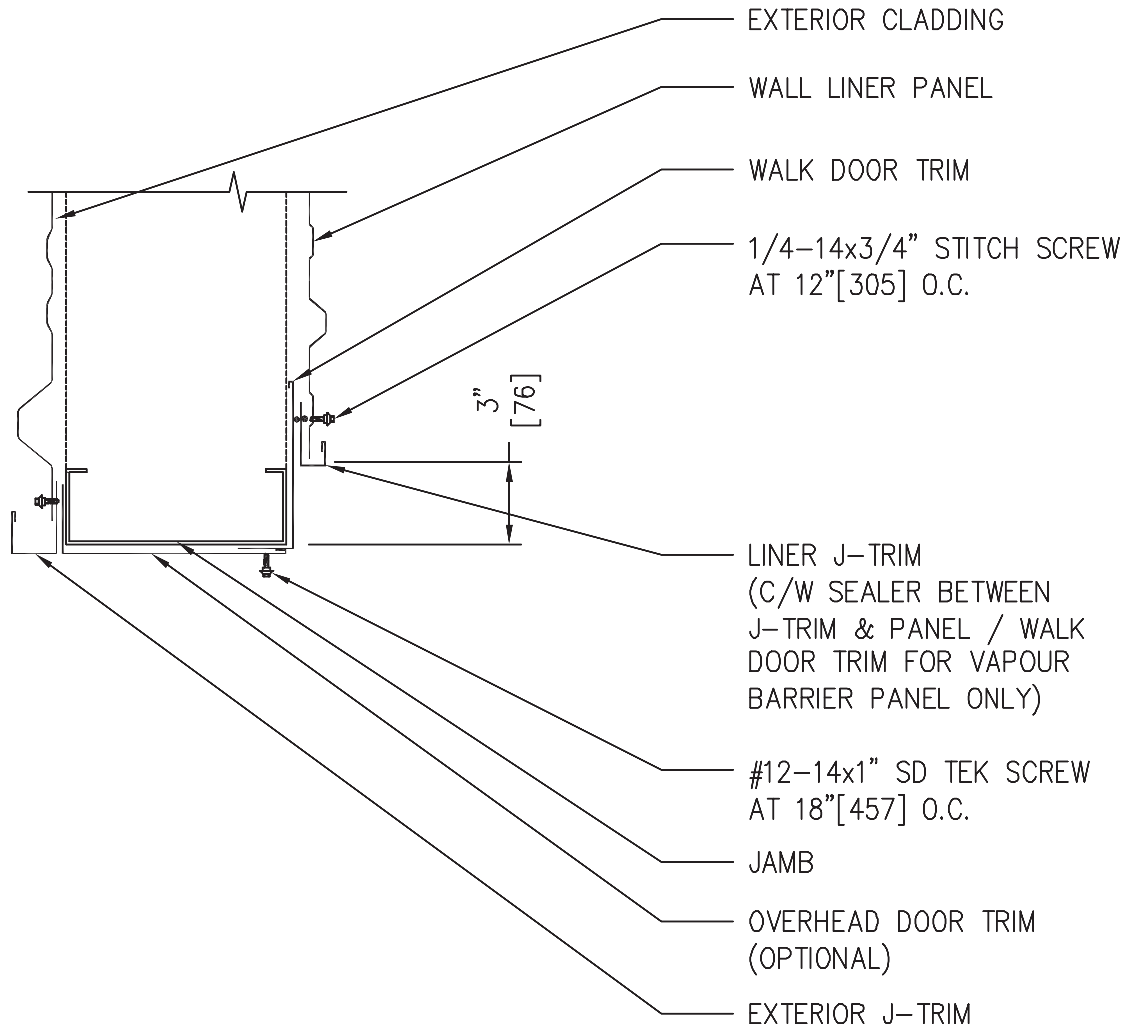
LINER DETAILS	JULY 2008	
	Vr 1.0	
DETAIL at INSET GIRT	Section 7.6	Page 012


EXTERIOR CLADDING
WALL LINER PANEL
BASE CHANNEL OR
DOUBLE BASE ANGLE
I/S CLOSURE C/W SEALER
ON BOTH SIDE FOR VAPOUR
BARRIER PACKAGE ONLY
FINISH FLOOR
#12–14x1" SD TEKS
AT MAJOR RIBS
RAMSET OR SIMILAR 24"
[610] O.C. (NOT BY BEHLEN)
SINGLE ROW OF SEALER
BASE FLASHING

BEHLEN
Made Strong

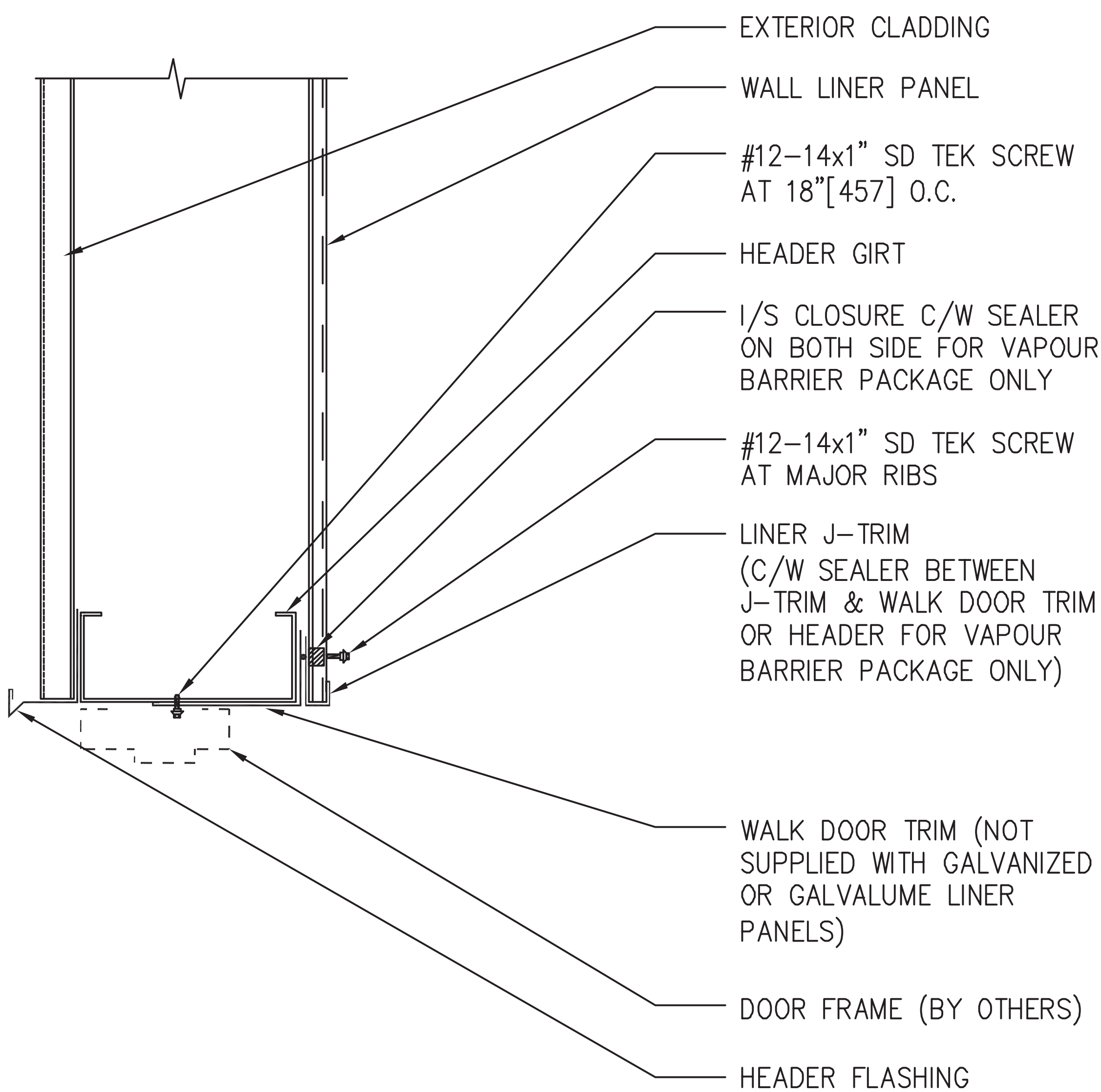


LINER DETAILS	JULY 2008	
	Vr 1.0	
OVERHEAD DOOR DETAIL at HEADER	Section 7.6	Page 014

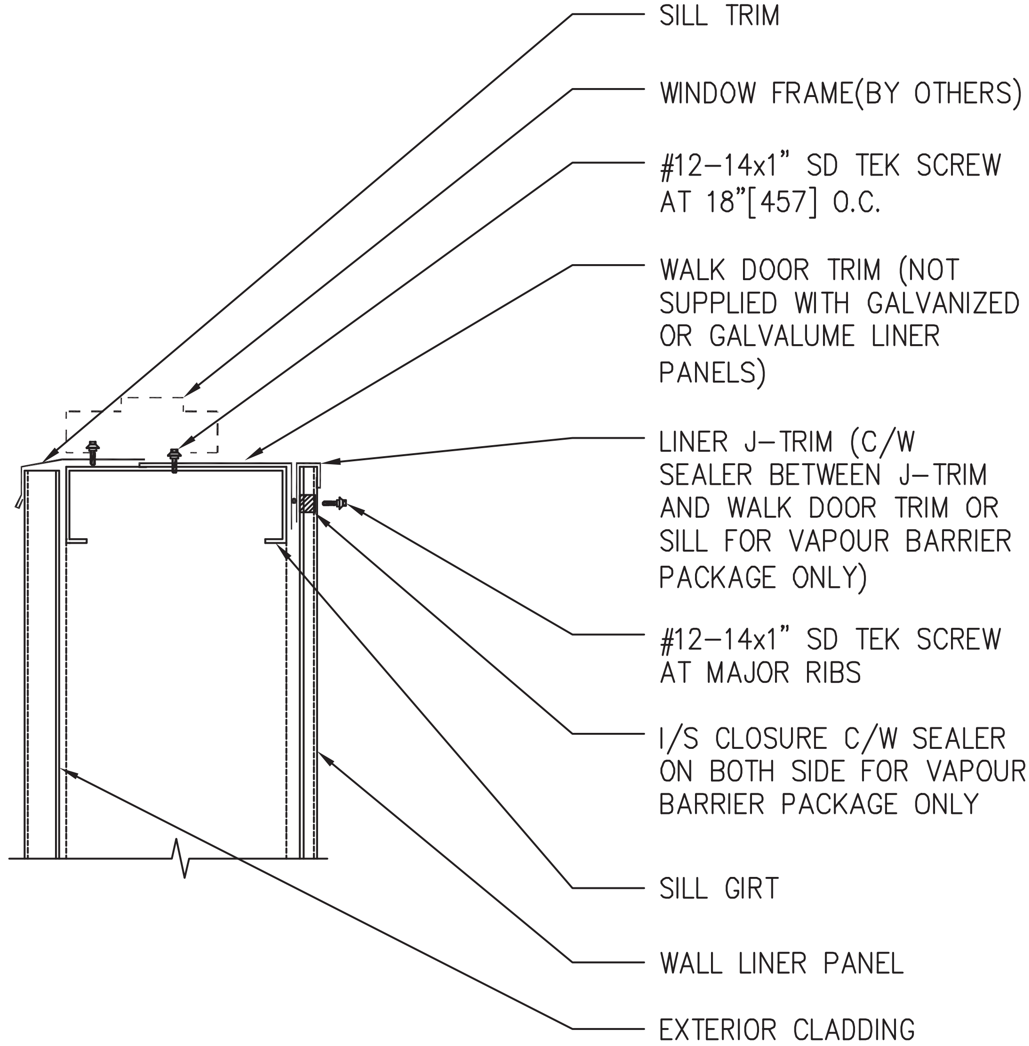


LINER DETAILS	JULY 2008	
	Vr 1.0	
OVERHEAD DOOR DETAIL at JAMB	Section 7.6	Page 015

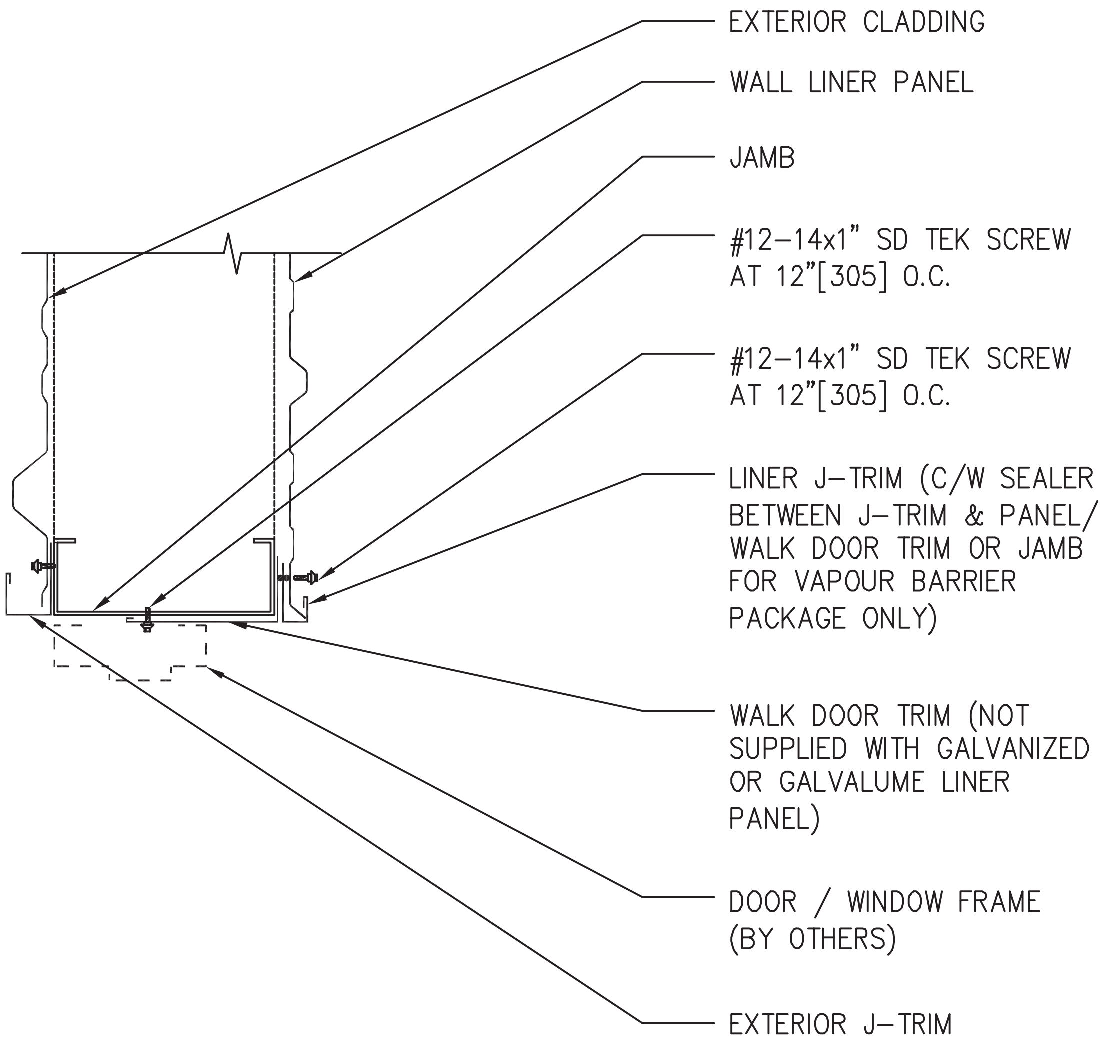
BEHLEN
Made Strong



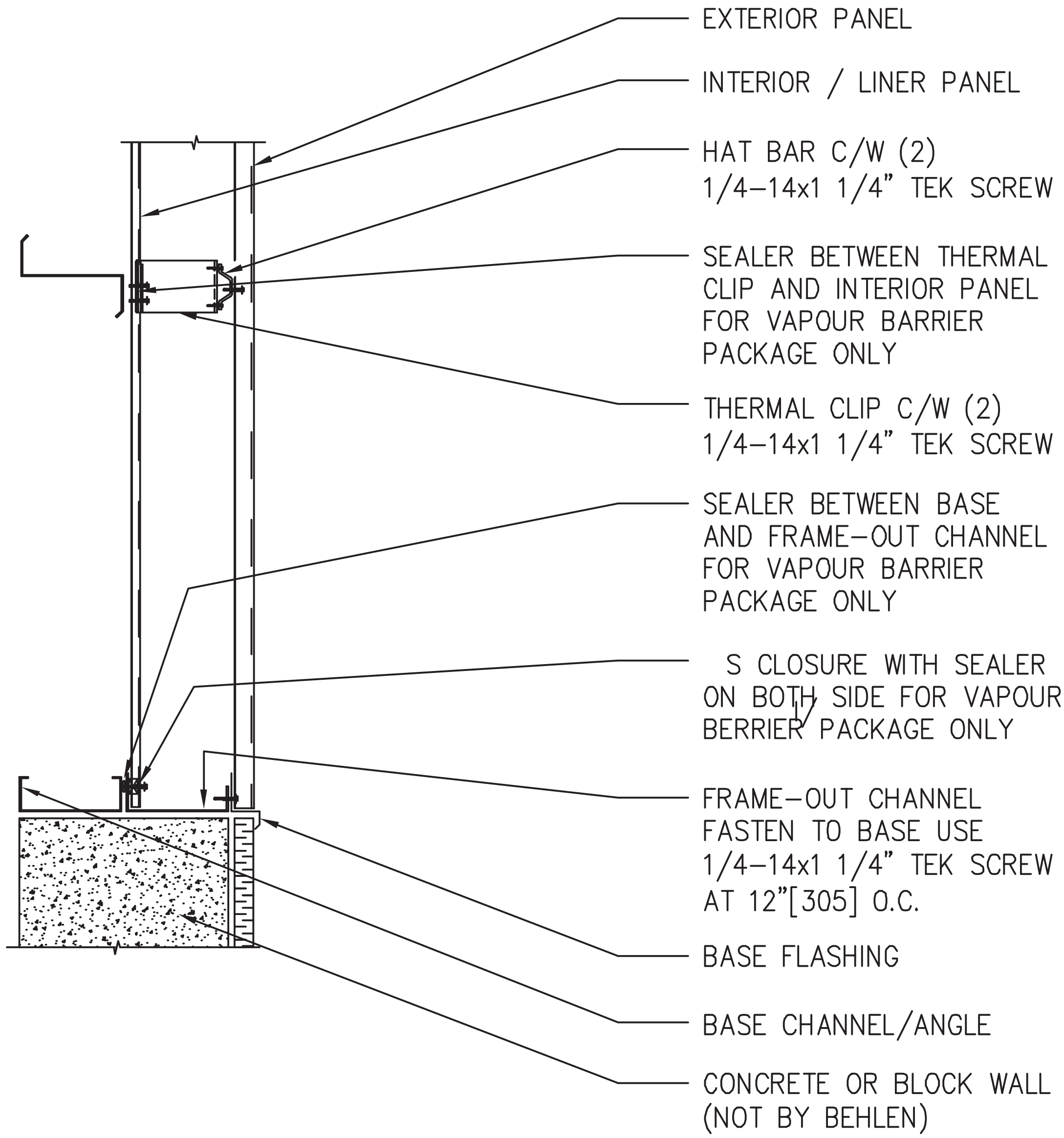
LINER DETAILS	JULY 2008	
	Vr 1.0	
FRAMED OPENING DETAIL at HEADER	Section 7.6	Page 016


SILL TRIM
WINDOW FRAME(BY OTHERS)
#12-14x1" SD TEK SCREW AT 18"[457] O.C.
WALK DOOR TRIM (NOT SUPPLIED WITH GALVANIZED OR GALVALUME LINER PANELS)
LINER J-TRIM (C/W SEALER BETWEEN J-TRIM AND WALK DOOR TRIM OR SILL FOR VAPOUR BARRIER PACKAGE ONLY)
#12-14x1" SD TEK SCREW AT MAJOR RIBS
I/S CLOSURE C/W SEALER ON BOTH SIDE FOR VAPOUR BARRIER PACKAGE ONLY
SILL GIRT
WALL LINER PANEL
EXTERIOR CLADDING

BEHLEN
Made Strong



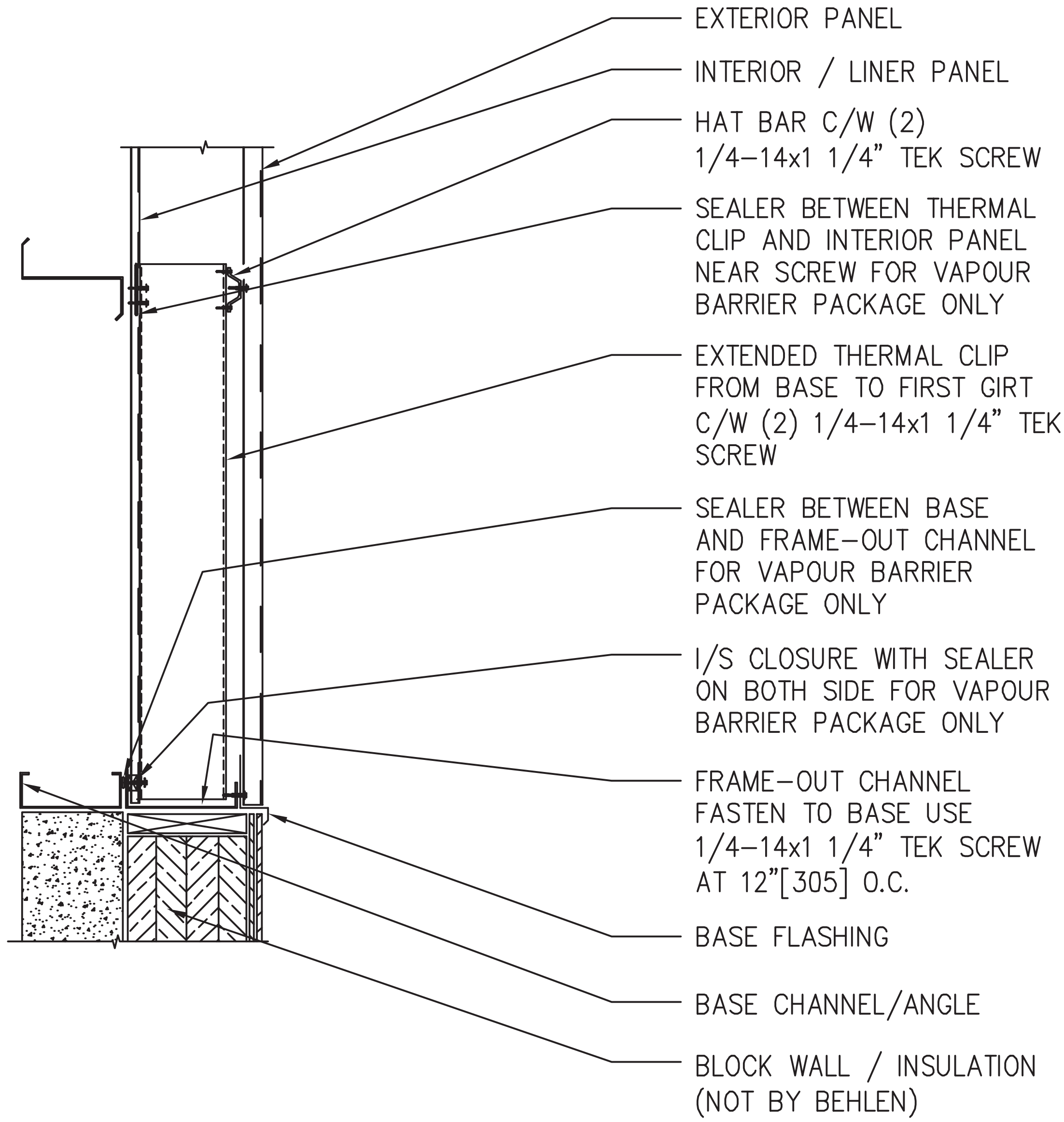
LINER DETAILS	JULY 2008 Vr 1.0	
FRAMED OPENING DETAIL at JAMB	Section 7.6	Page 018



SUPPORTED BASE

THERMAL SYSTEM	JULY 2008 Vr 1.0
BASE DETAIL I	Section 7.7 / Page 001

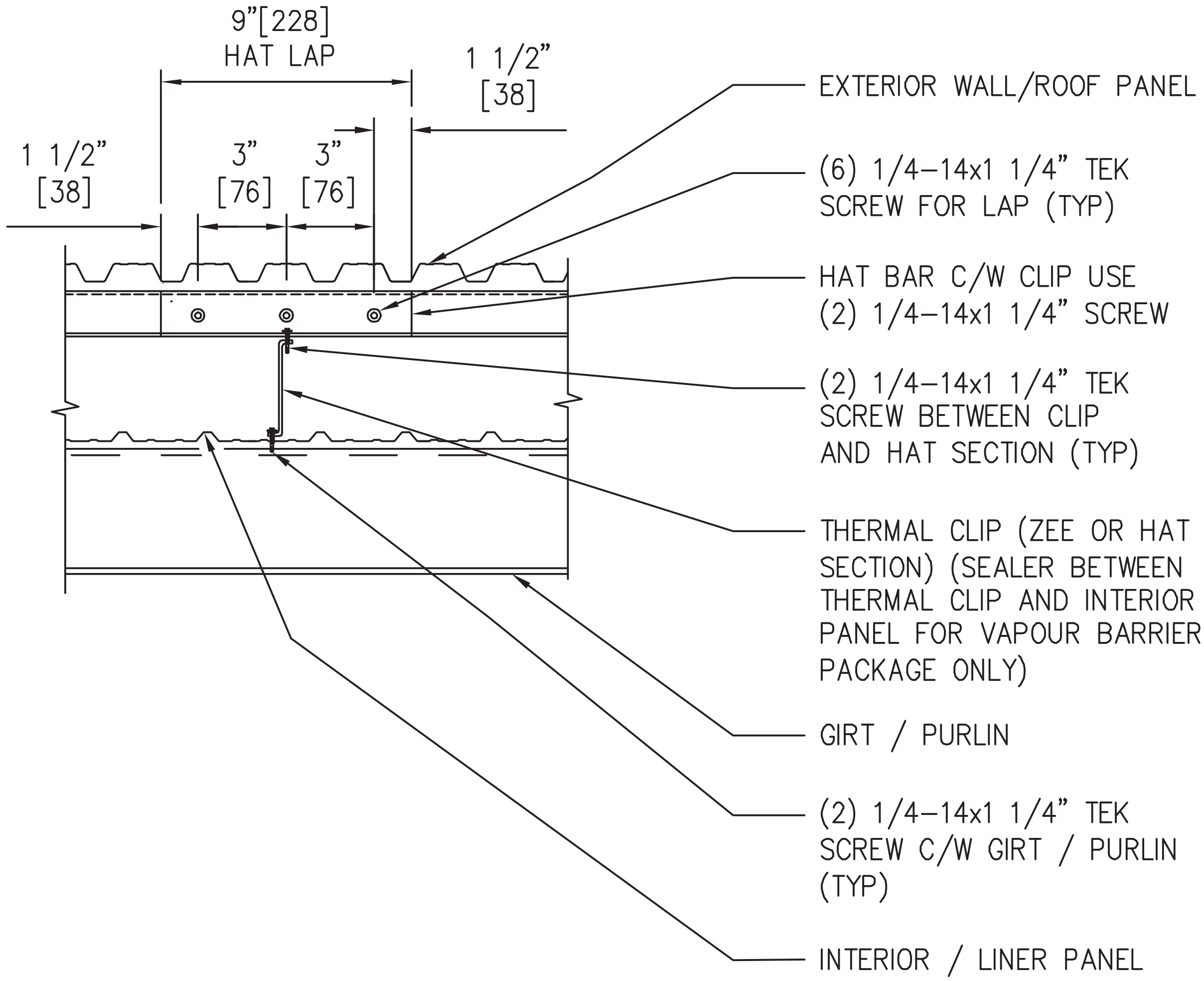
BEHLEN
Made Strong



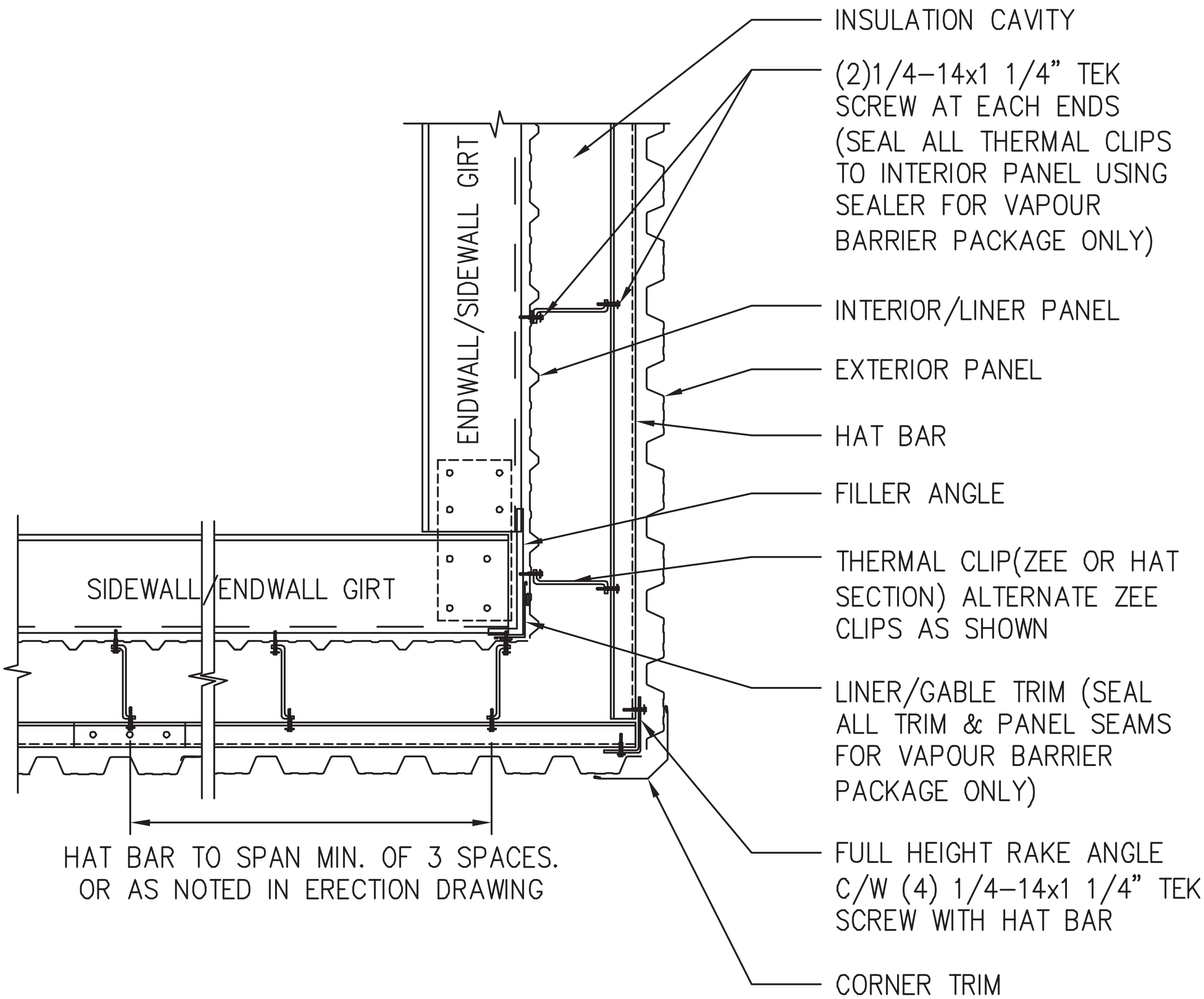
UNSUPPORTED BASE

THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
BASE DETAIL II	Section 7.7	Page 002

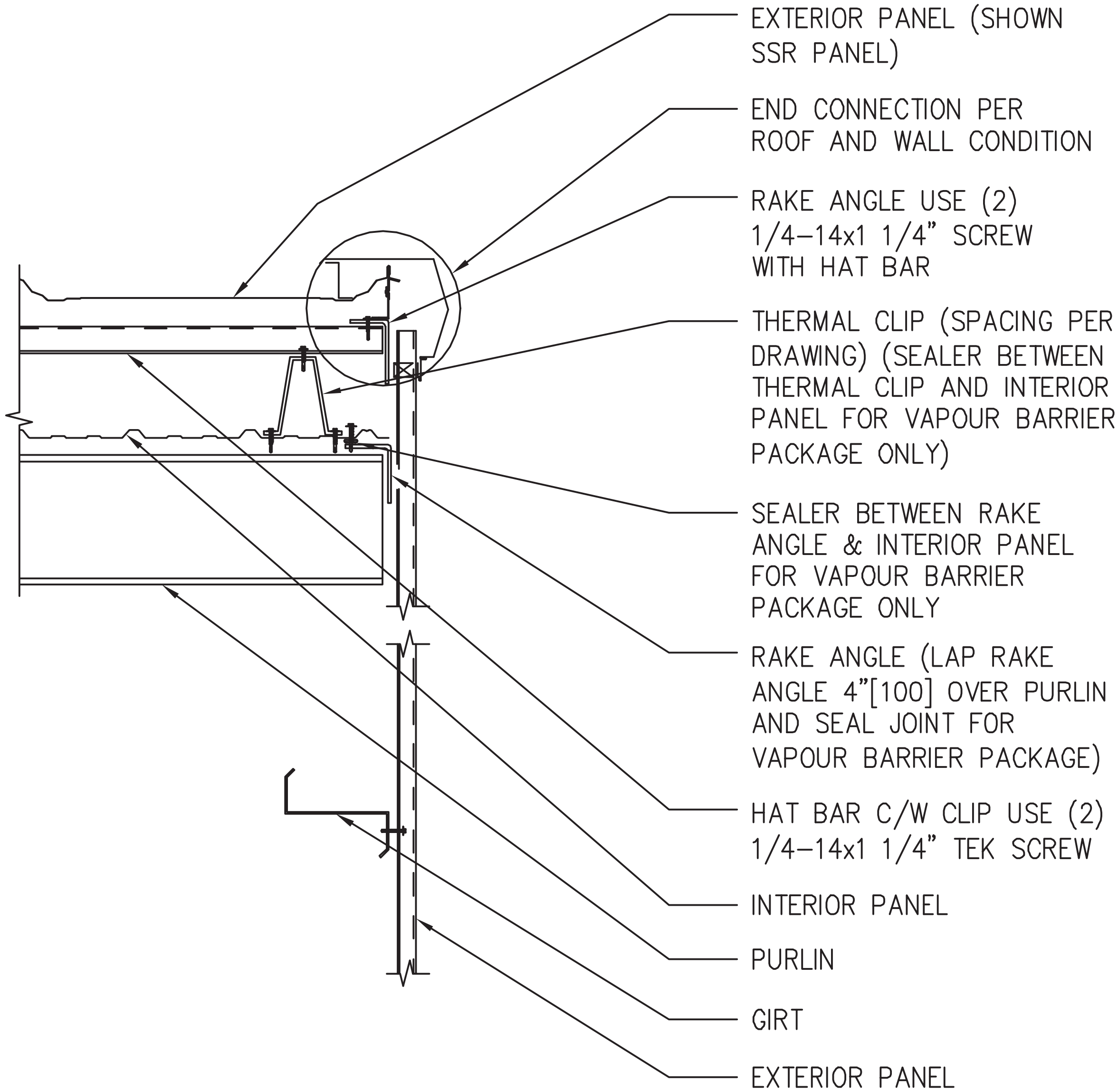
BEHLEN
Made Strong



THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
TYPICAL HAT BAR SPLICE DETAIL	Section 7.7	Page 003

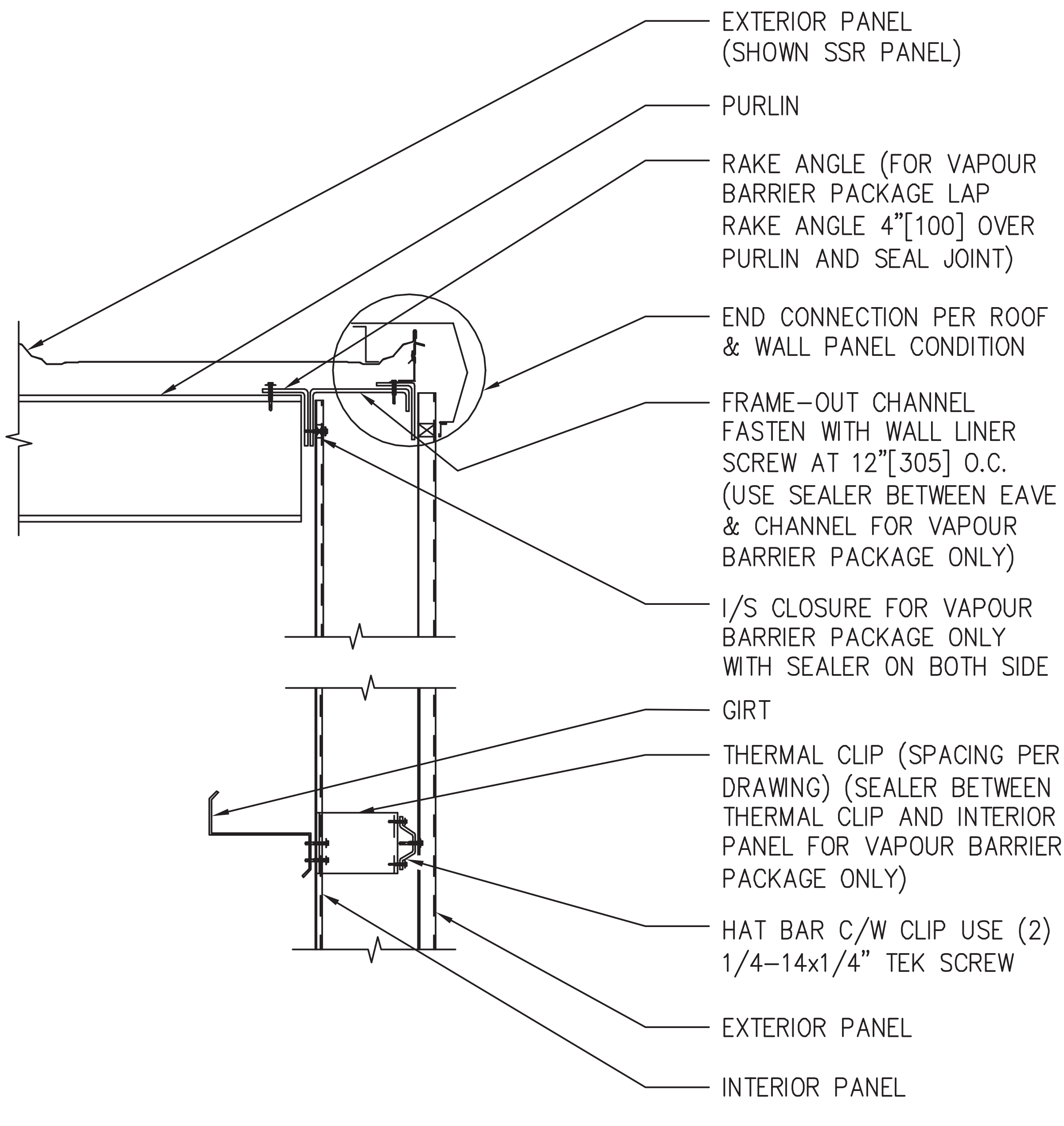


THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
TYPICAL CORNER WALL DETAIL	Section 7.7	Page 004



ROOF THERMAL SYSTEM ONLY

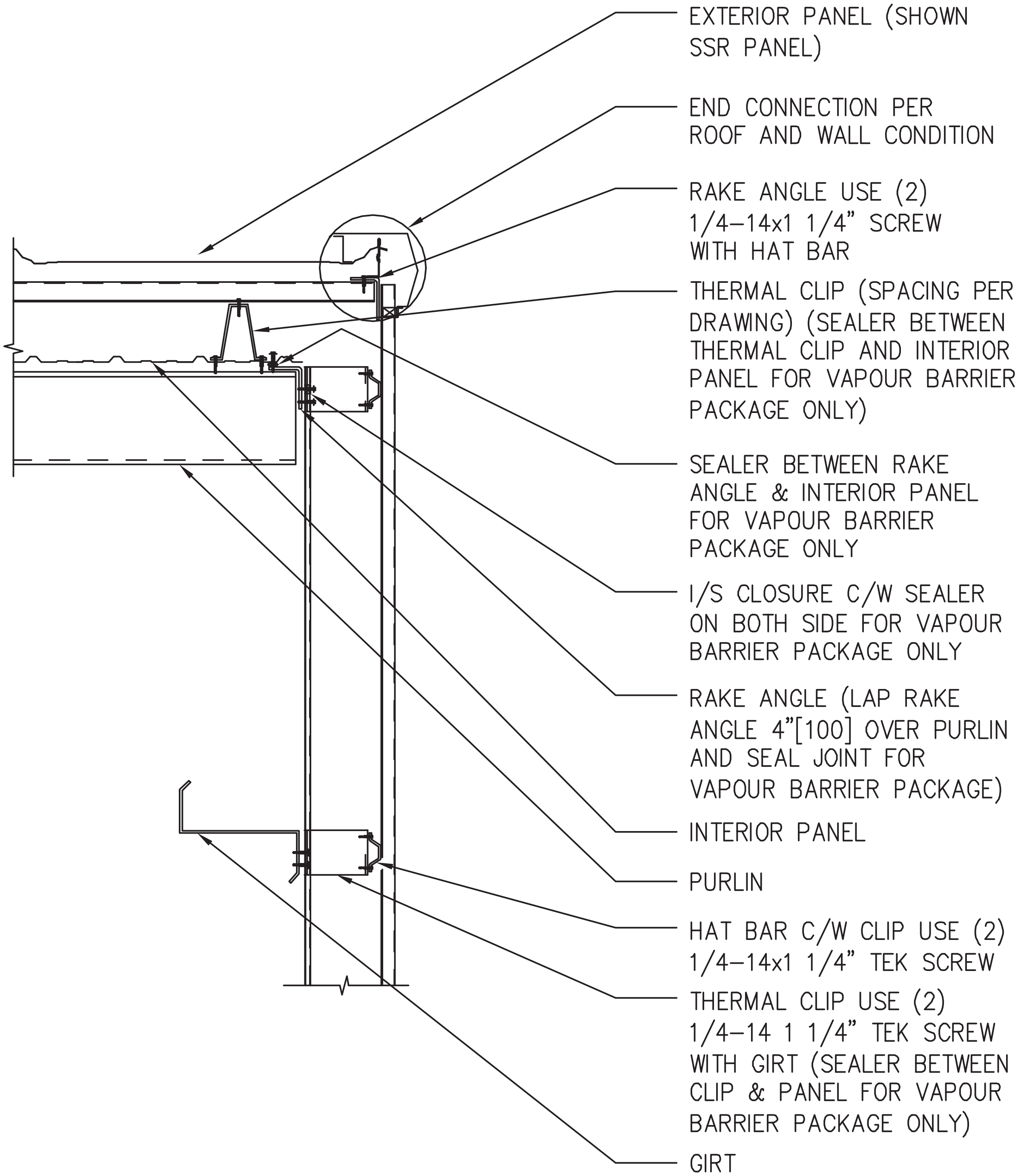
BEHLEN
Made Strong



WALL THERMAL SYSTEM ONLY

THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
GABLE CONDITION DETAIL II	Section 7.7	Page 006

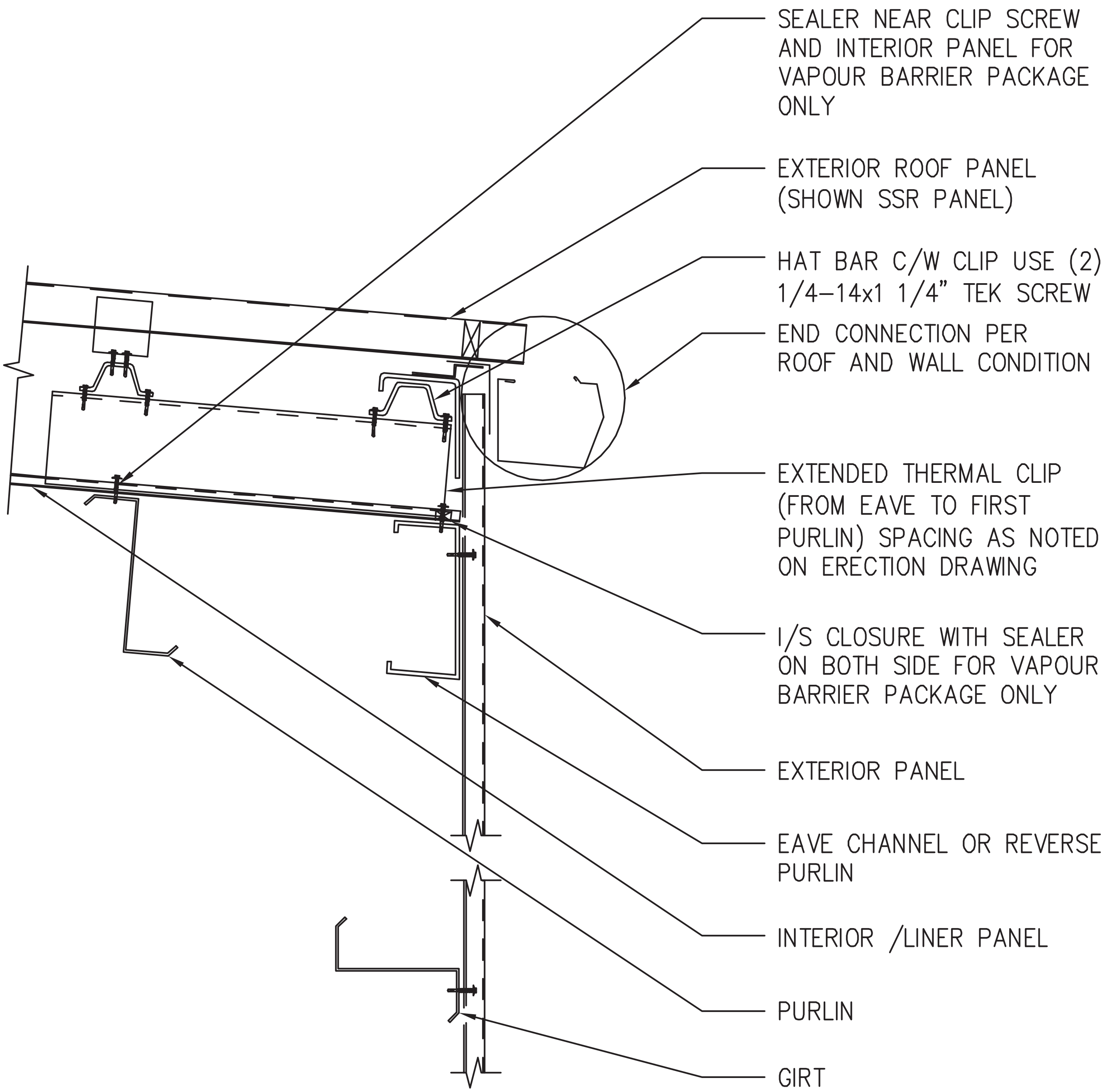
BEHLEN
Made Strong



ROOF and WALL THERMAL SYSTEM

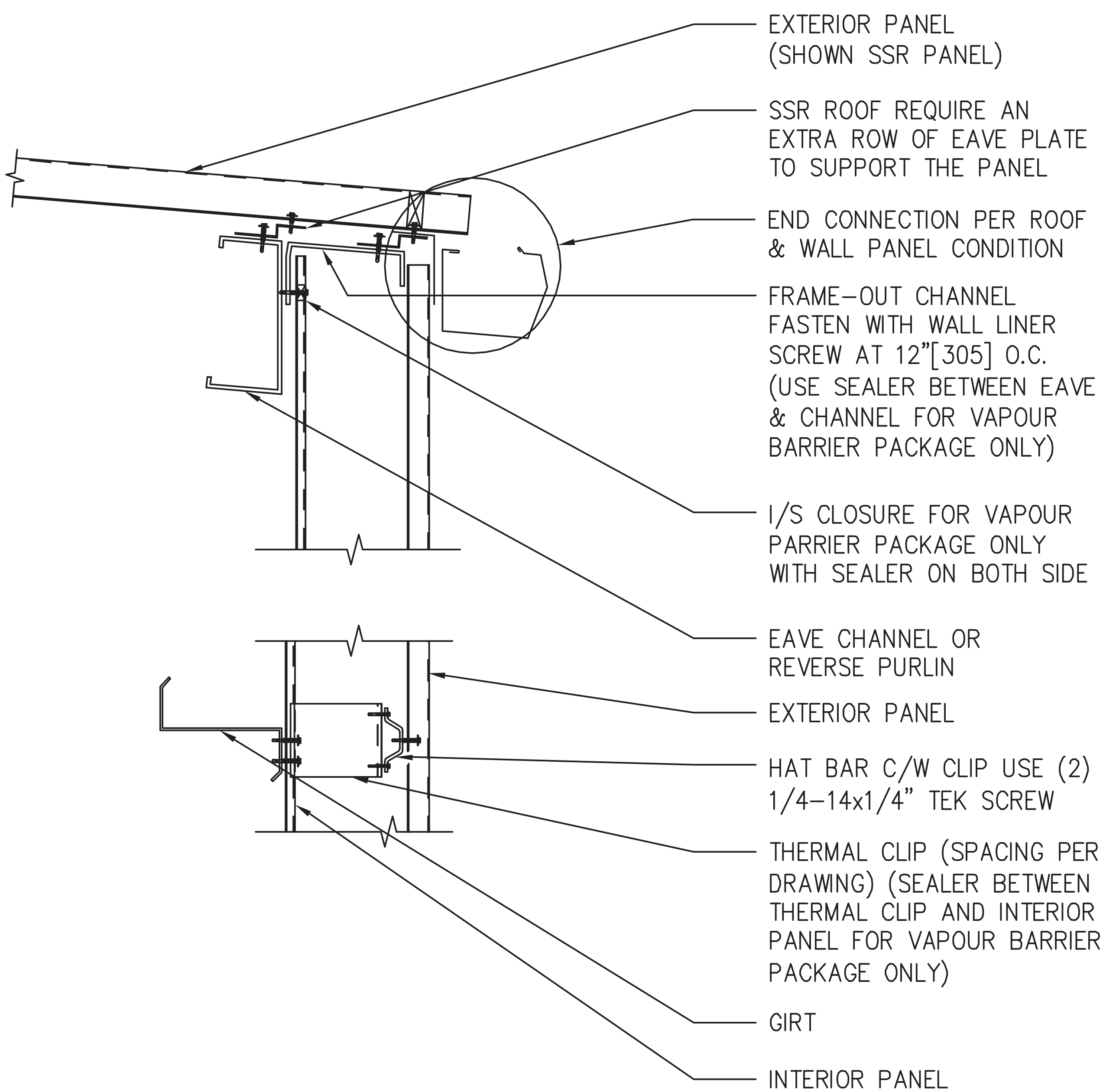
THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
GABLE CONDITION DETAIL III	Section 7.7	Page 007

BEHLEN
Made Strong



ROOF THERMAL SYSTEM ONLY

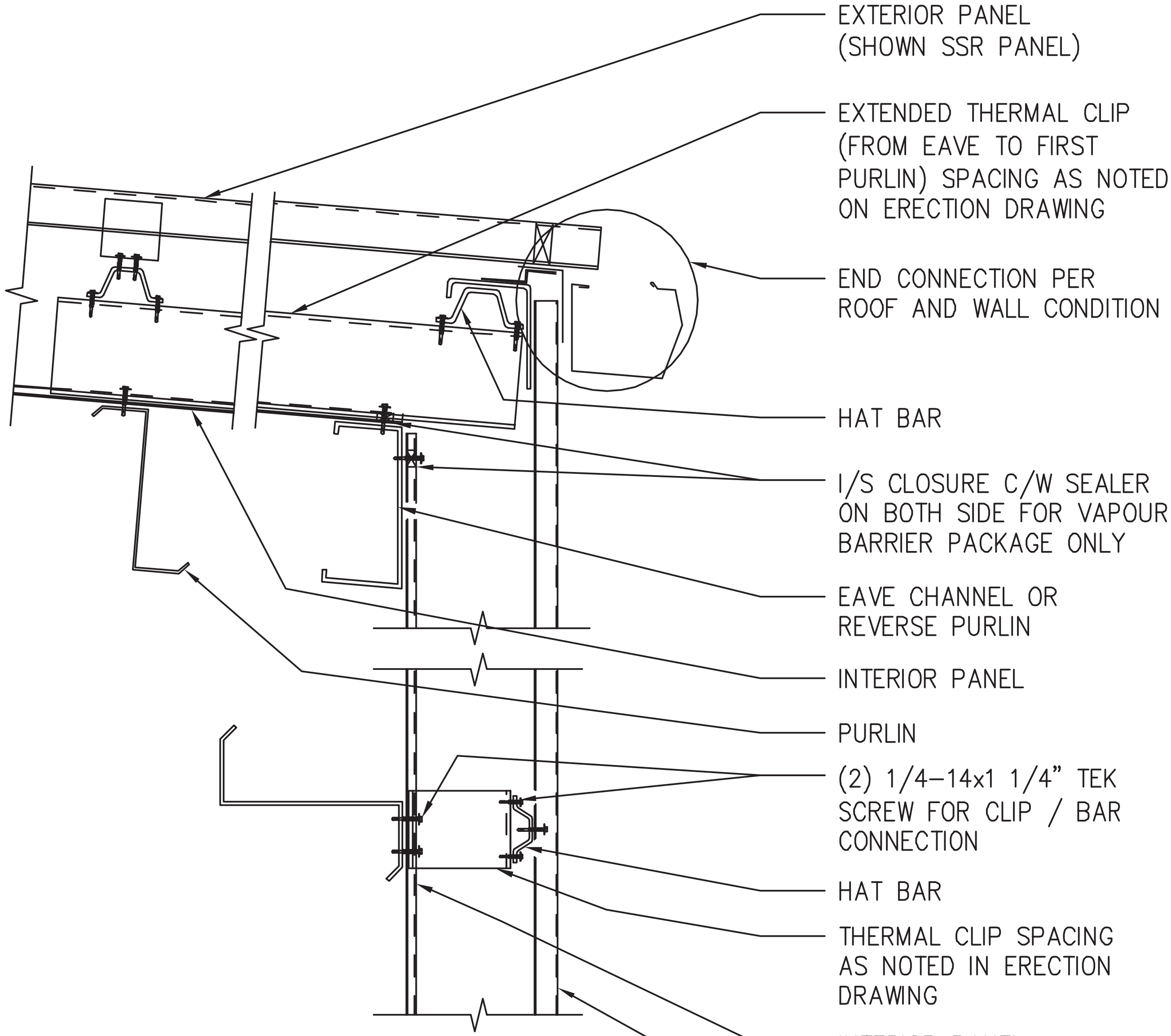
THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
EAVE CONDITION DETAIL I	Section 7.7	Page 008



WALL THERMAL SYSTEM ONLY

THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
EAVE CONDITION DETAIL II	Section 7.7	Page 009

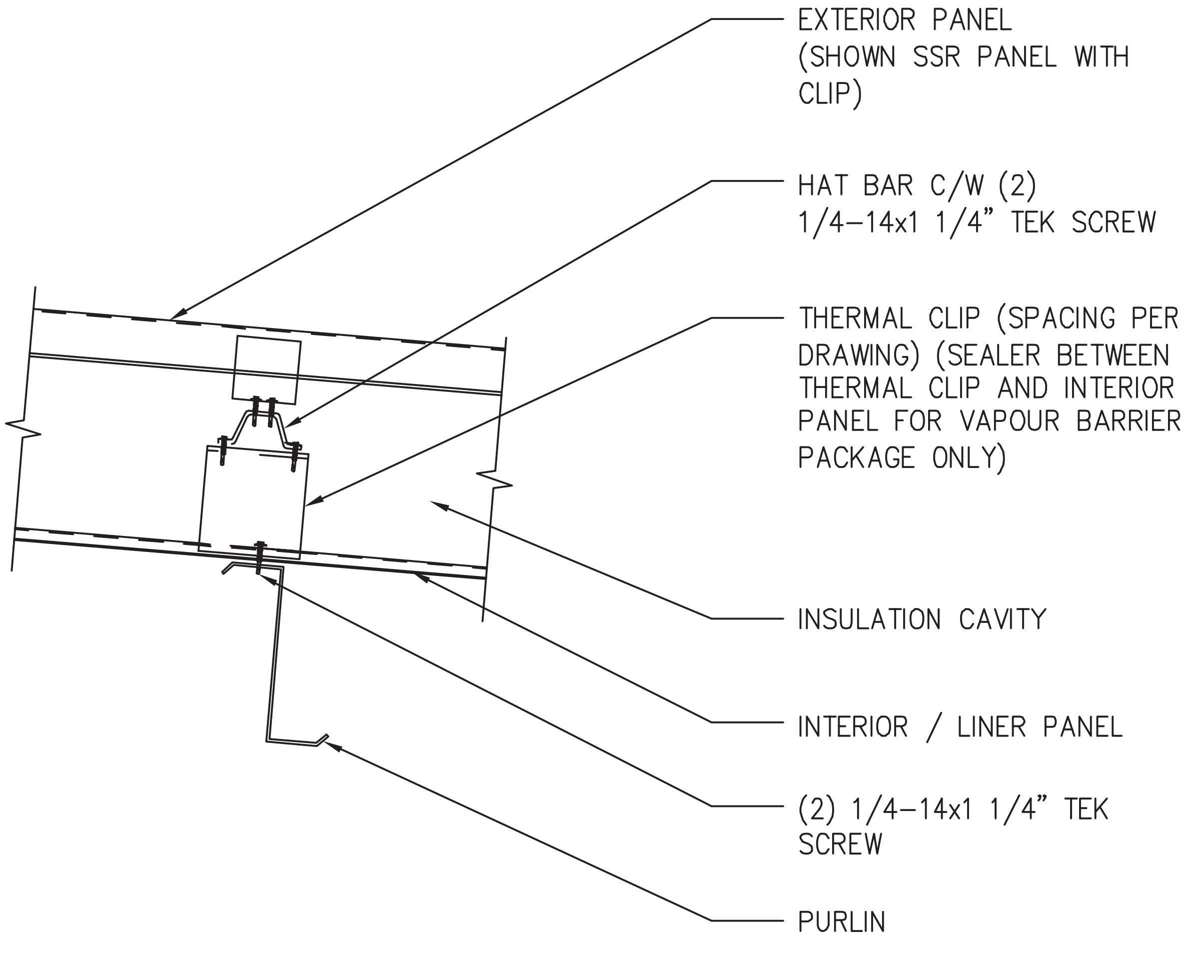
BEHLEN
Made Strong



ROOF and WALL THERMAL SYSTEM

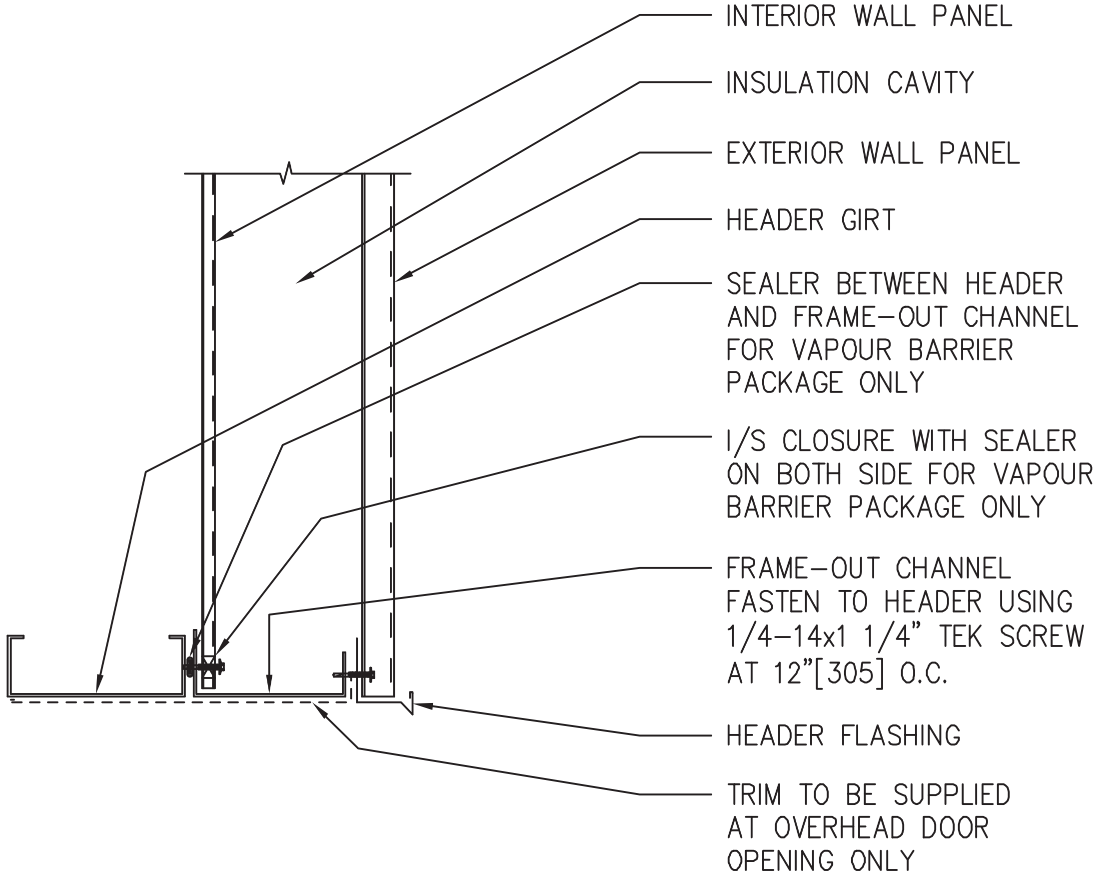
THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
EAVE CONDITION DETAIL III	Section 7.7	Page 010

BEHLEN
Made Strong



THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
INTERMEDIATE ROOF CONDITION	Section 7.7	Page 011

BEHLEN
Made Strong



THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
DOOR HEADER DETAIL	Section 7.7	Page 012

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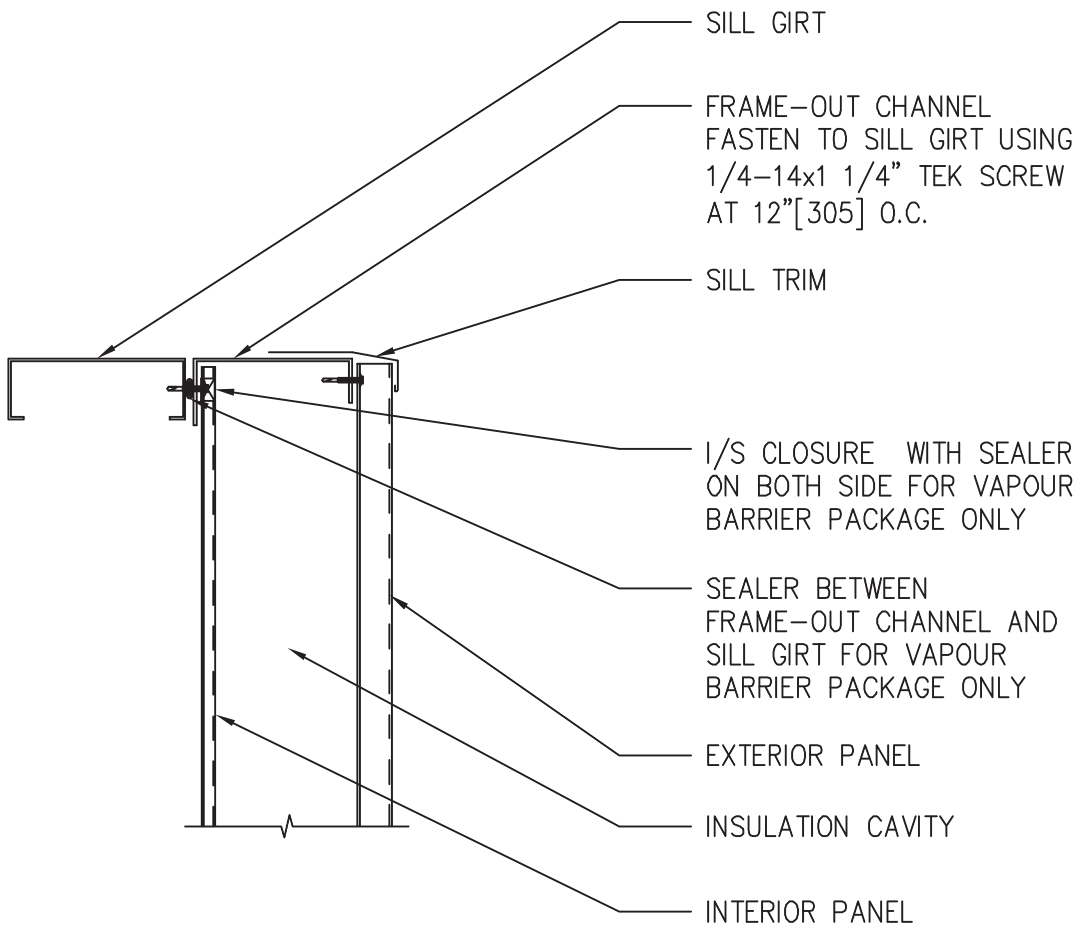

THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
WINDOW SILL DETAIL	Section 7.7	Page 013

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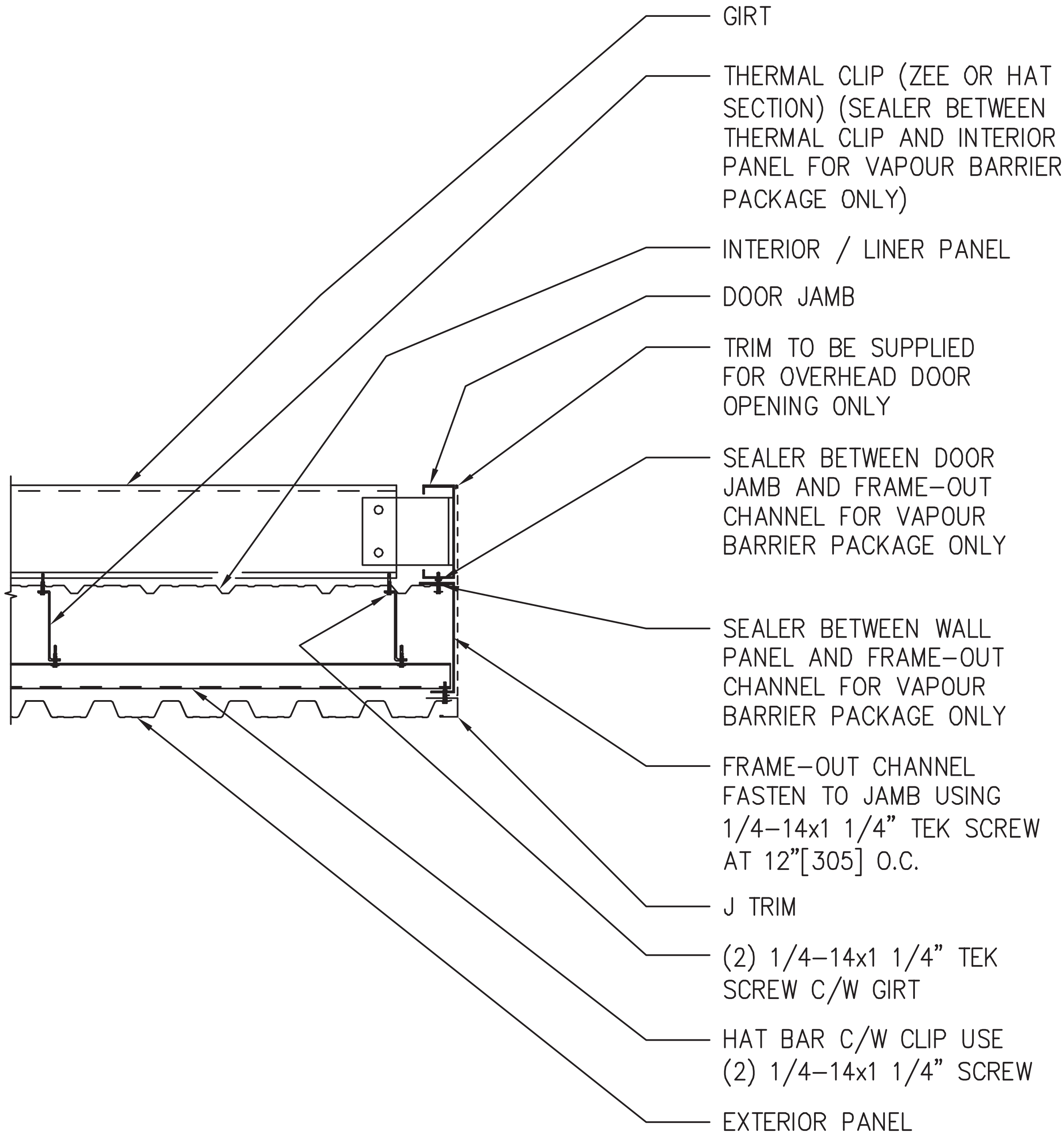

THERMAL SYSTEM	JULY 2008	
	Vr 1.0	
DOOR/WINDOW JAMB DETAIL	Section 7.7	Page 014

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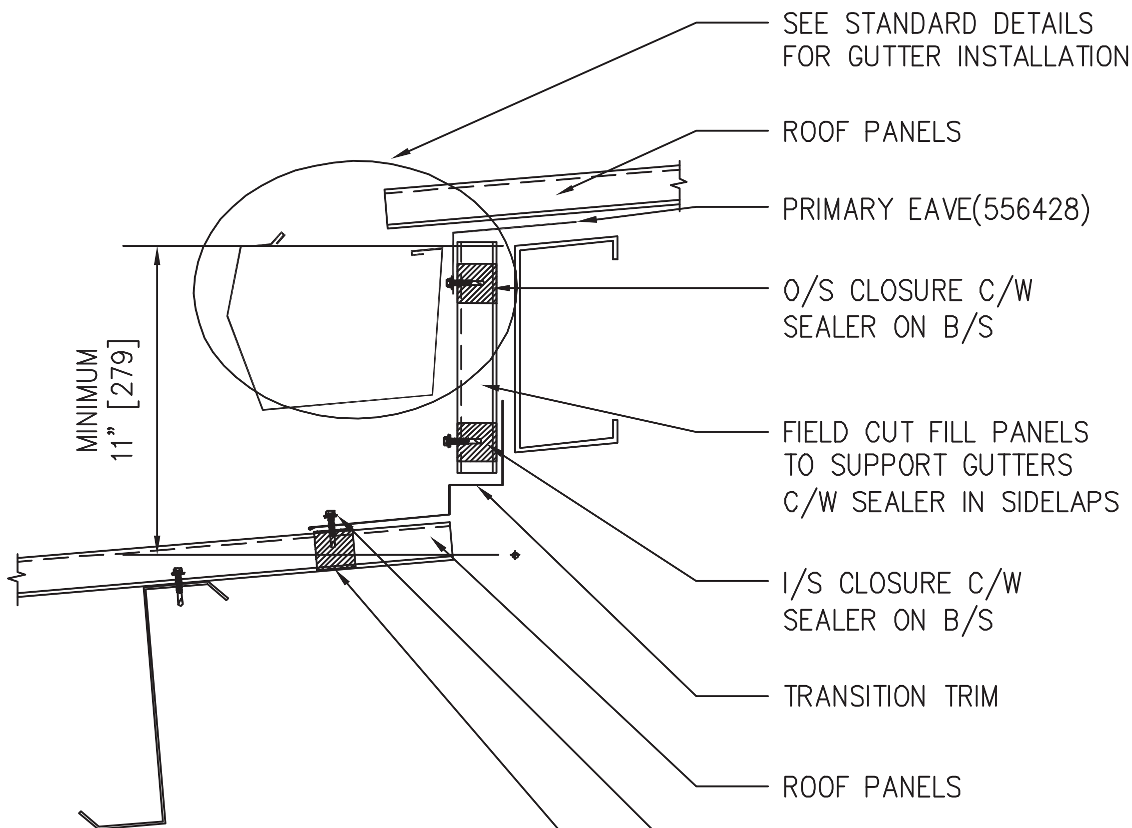
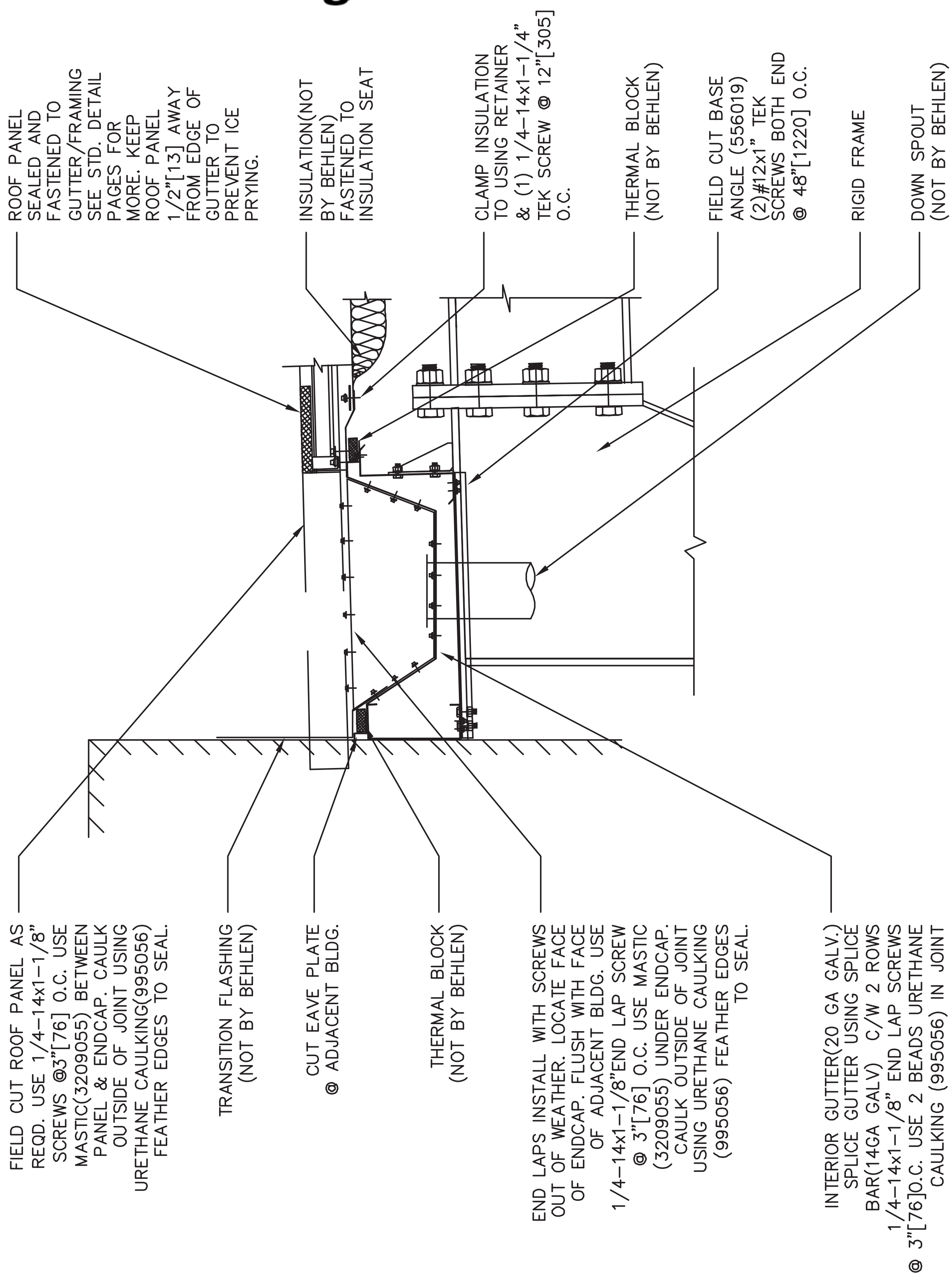


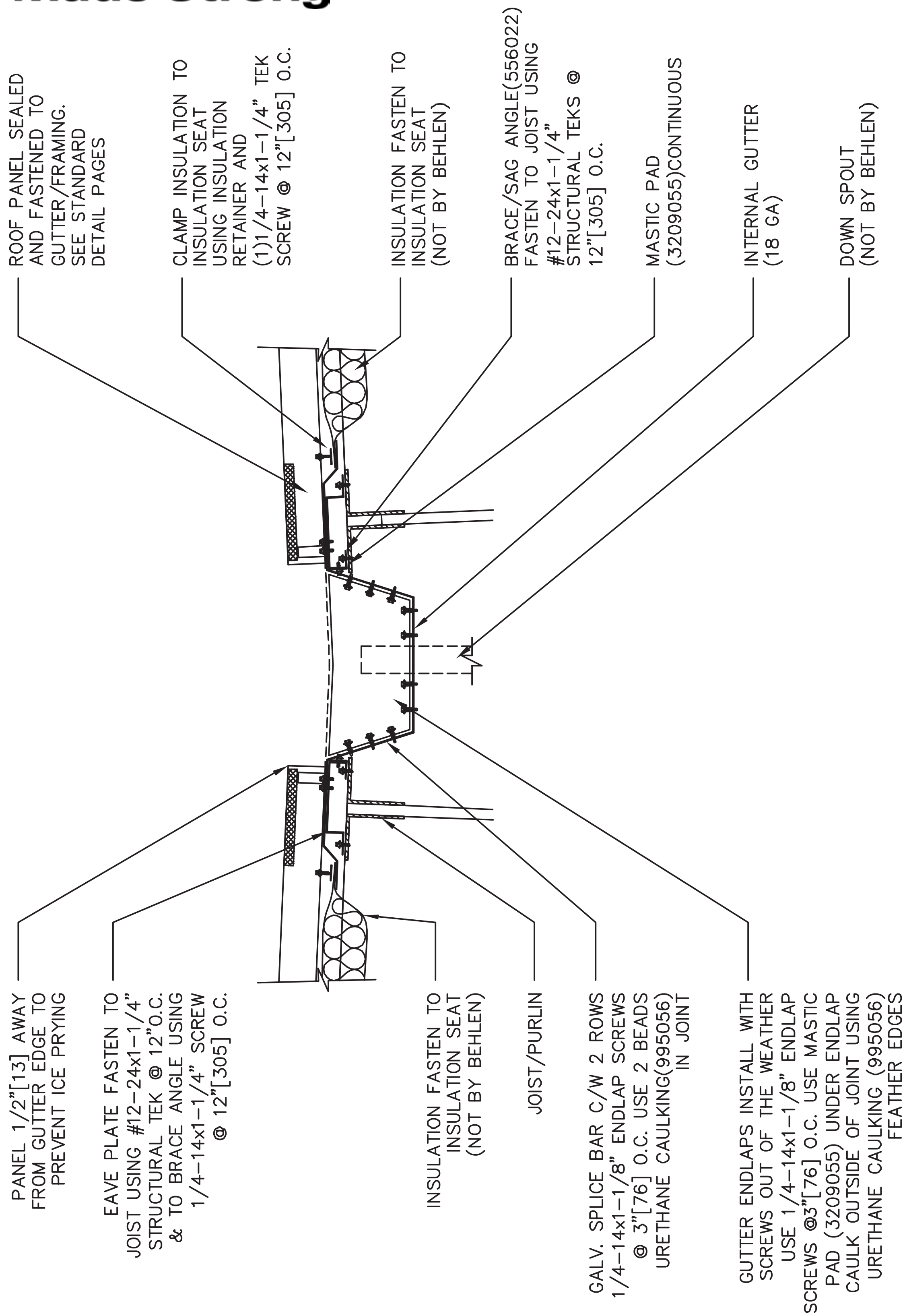
SECTION
ROOF TO WALL TRANSITION

GUTTER DETAILS	JULY 2008 / Vr 1.0
TRANSITION at LEAN-TO	Section 7.8 / Page 001

BEHLEN
Made Strong



GUTTER DETAILS	JULY 2008	
	Vr 1.0	
LOW EAVE INTERNAL GUTTER	Section 7.8	Page 002



GUTTER DETAILS	JULY 2008 Vr 1.0
INTERNAL GUTTER	Section 7.8 / Page 003

BEHLEN
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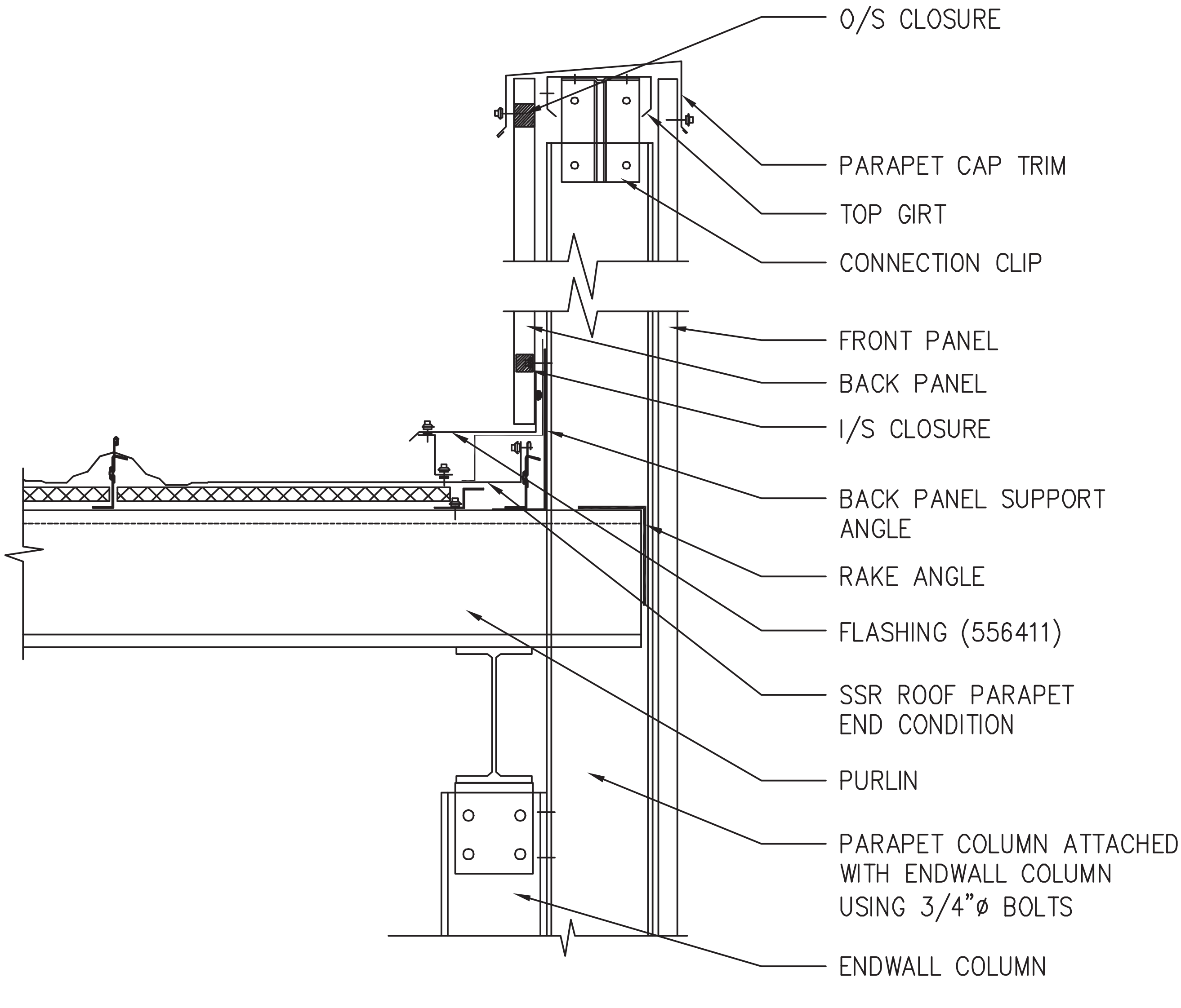

PARAPET DETAILS	JULY 2008	
	Vr 1.0	
ENDWALL PARAPET DETAIL	Section 7.9	Page 001

BEHLEN
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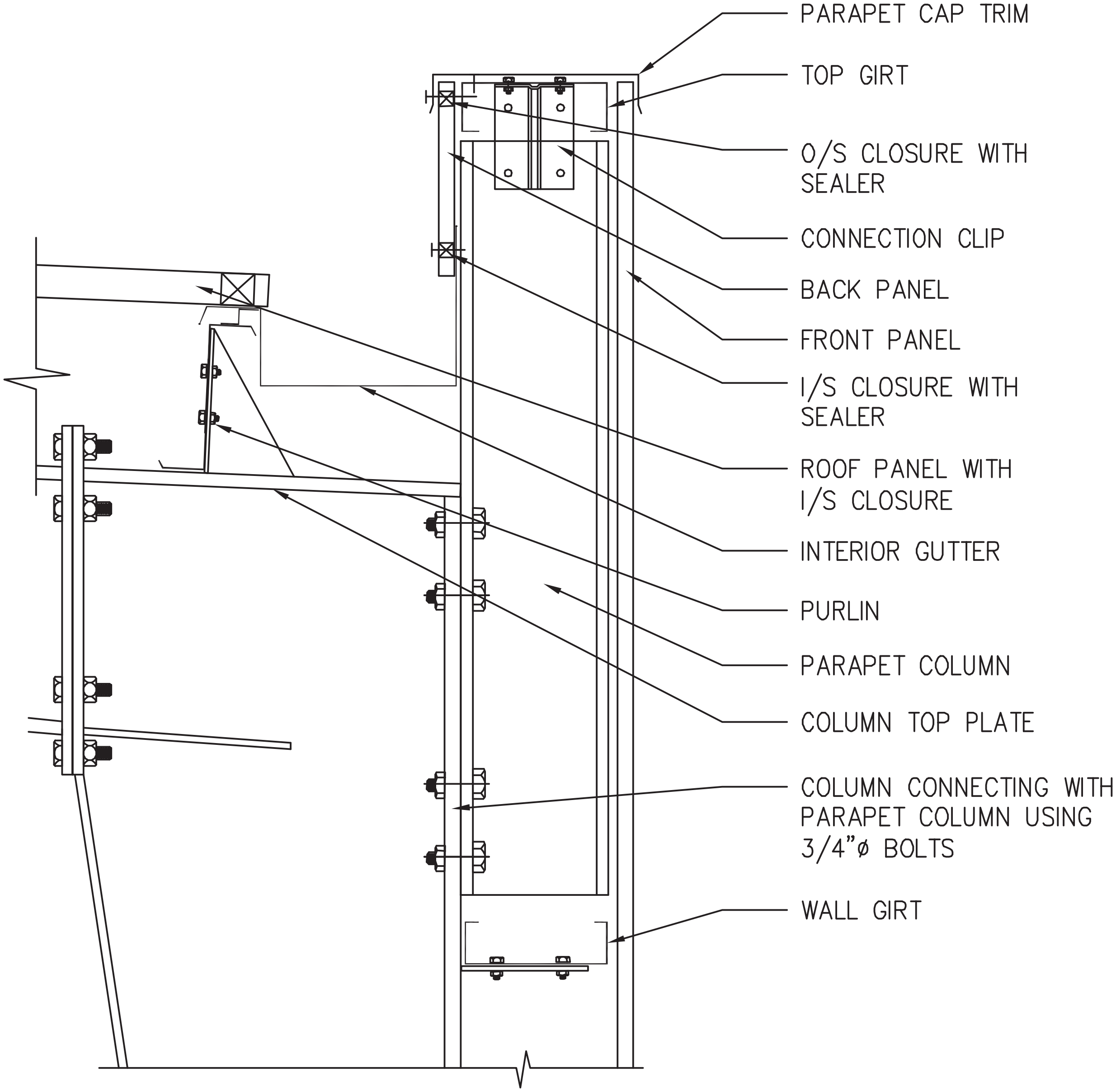
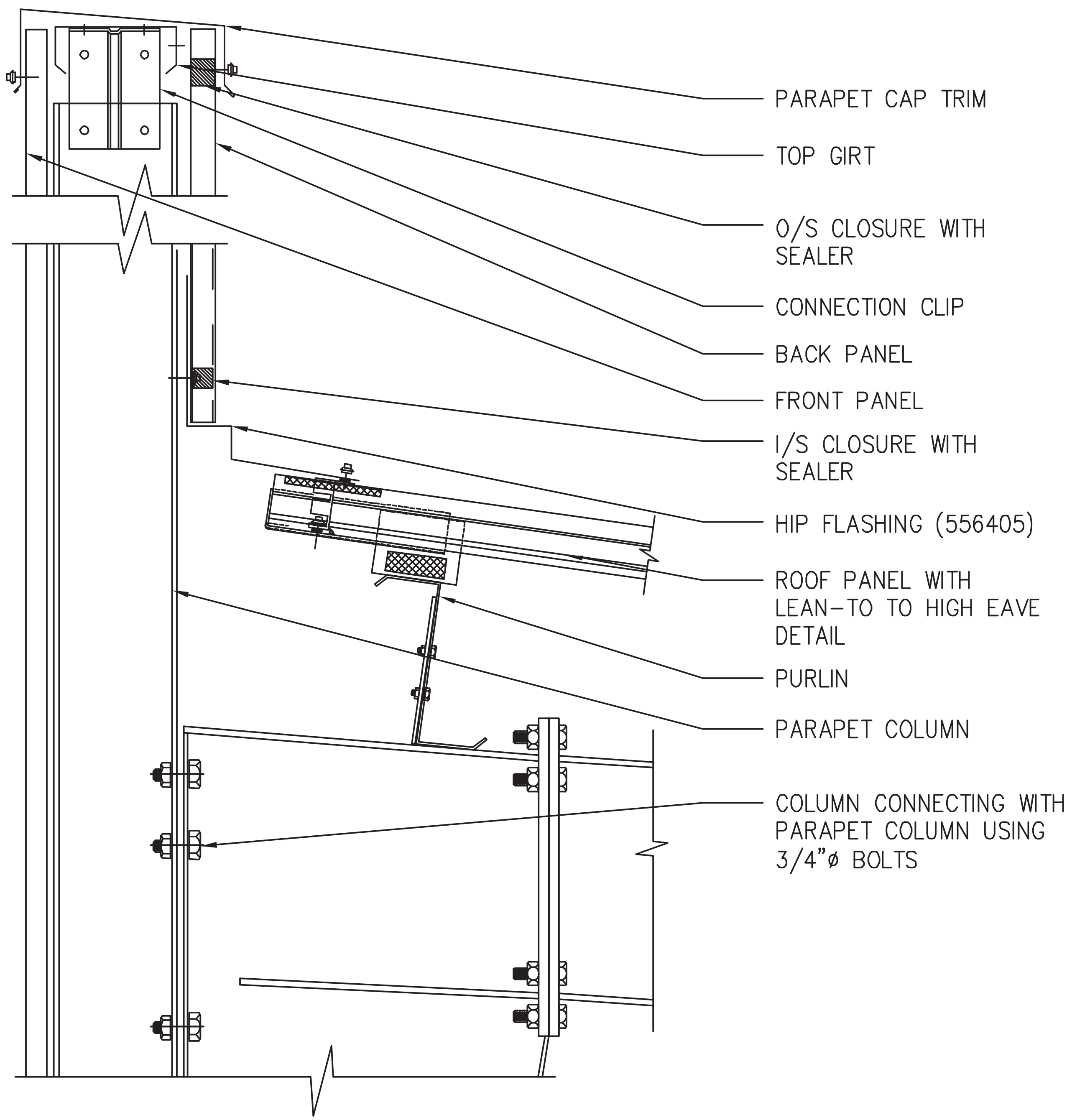


PARAPET DETAILS	JULY 2008 Vr 1.0	
LOW SIDEWALL PARAPET DETAIL	Section 7.9	Page 002

BEHLEN
Made Strong



PARAPET DETAILS	JULY 2008	
	Vr 1.0	
HIGH SIDEWALL PARAPET DETAIL	Section 7.9	Page 003

BEHLEN
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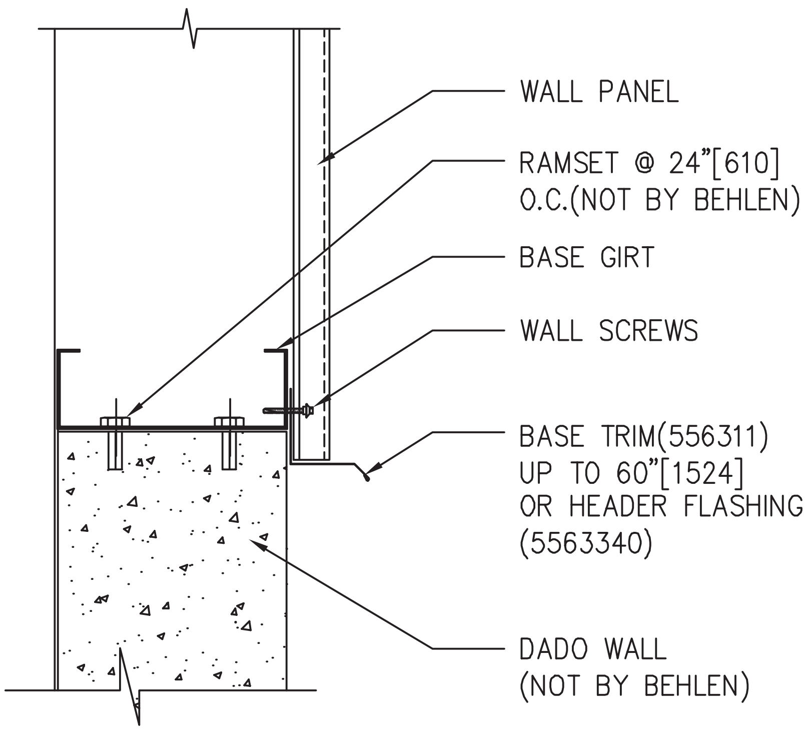
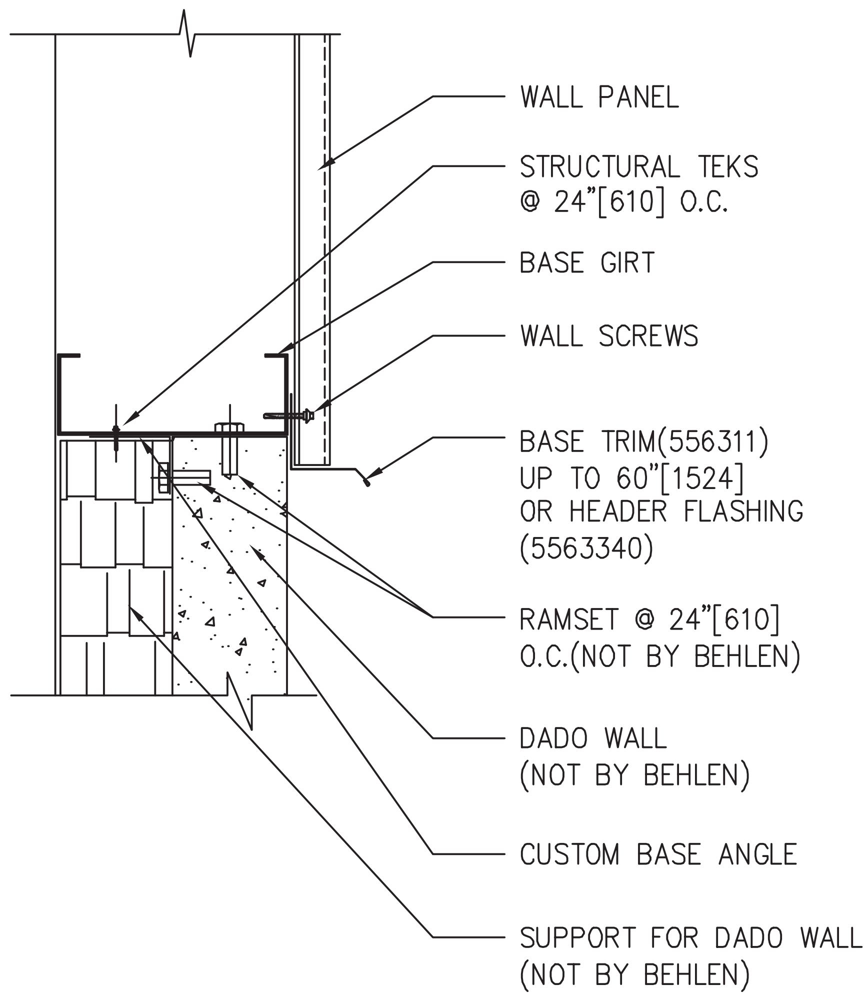


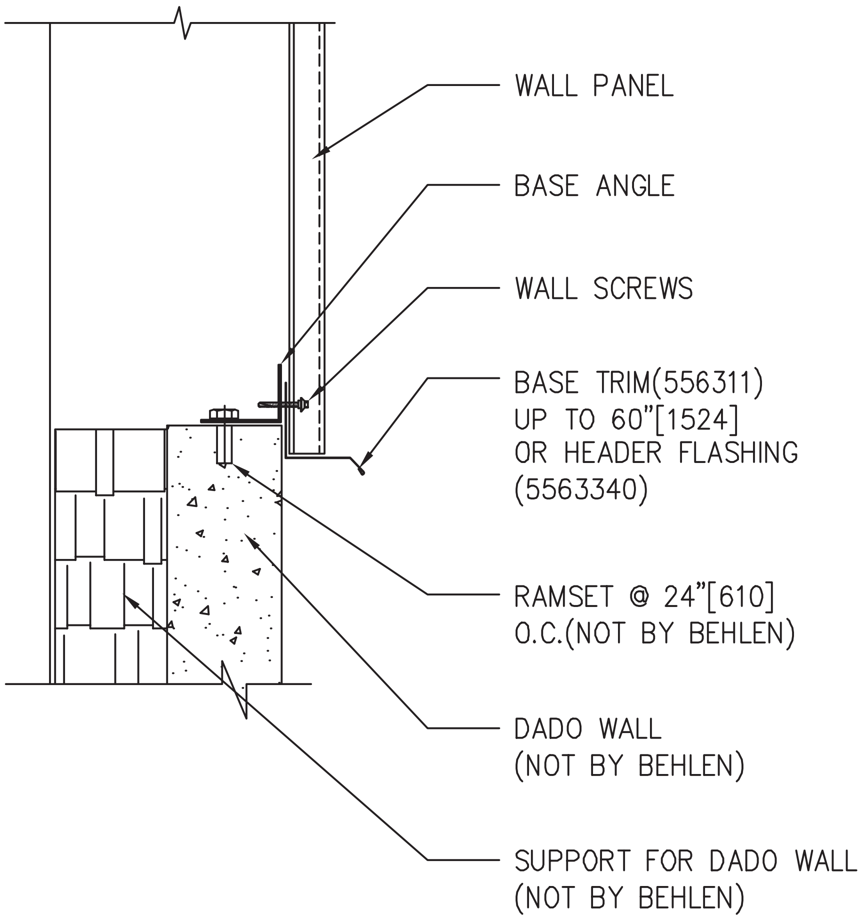
DADO WALL DETAILS	JULY 2008	
	Vr 1.0	
DETAIL with BASE GIRT I	Section 7.10	Page 001

BEHLEN
Made Strong



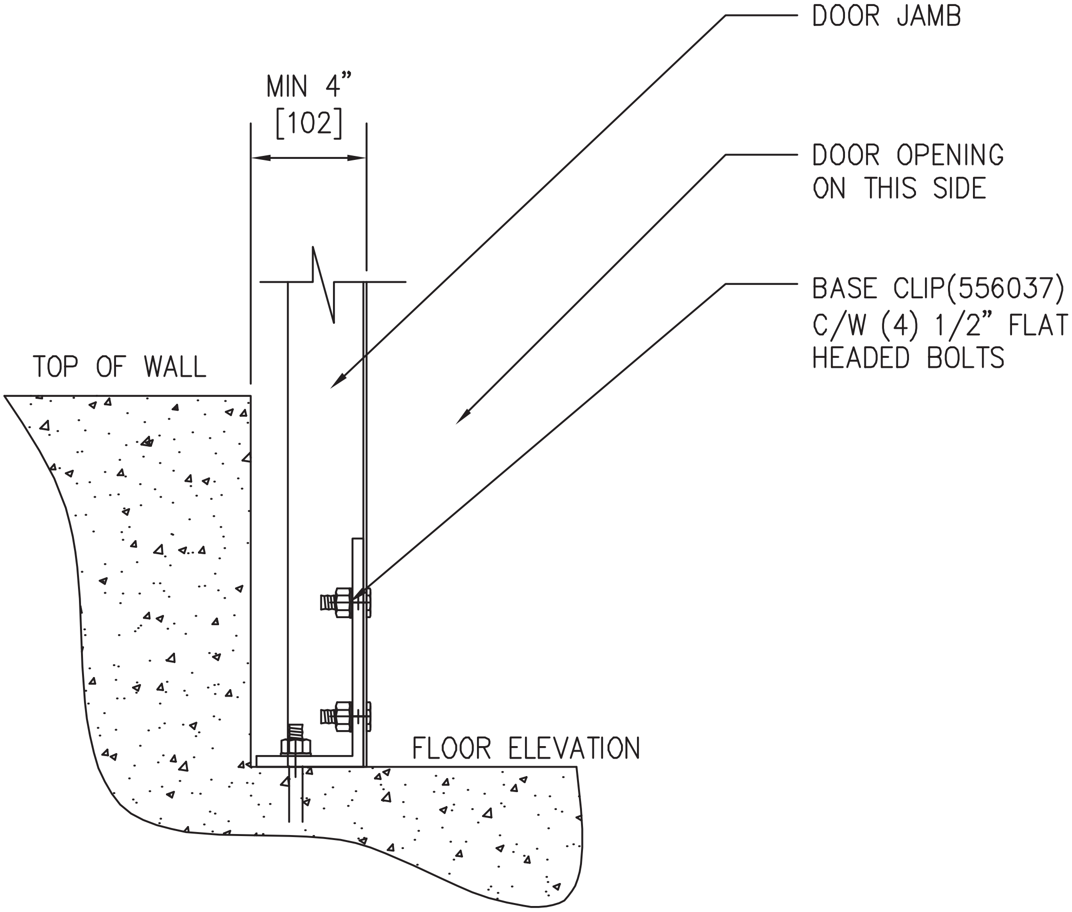
DADO WALL DETAILS	JULY 2008	
	Vr 1.0	
DETAIL with BASE GIRT II	Section 7.10	Page 002

BEHLEN
Made Strong



DADO WALL DETAILS	JULY 2008	
	Vr 1.0	
DETAIL with BASE ANGLE	Section 7.10	Page 003

BEHLEN
Made Strong



DADO WALL DETAILS

DETAIL at DOOR JAMBS

JULY 2008		
Vr 1.0		
Section 7.10	Page 004	

SECTION 8
STRUCTURAL ACCESSORIES

BEHLEN
Made Strong

INDEX

STRUCTURAL ACCESSORIES

Section 8.1 -	MEZZANINE DETAILS	
	TYPICAL LAYOUT	001
	PERIMETER CF JOIST DETAIL	002
	PERIMETER CF JOIST CONNECTION	003
	JOIST CONNECTION to COLUMN	004
	BEAM to COLUMN	005
	DECK TRANSITION	006
	DECK LAP DETAIL	007
	TYPICAL BEAM CONNECTIONS	008
	DETAIL at FRAMED OPENING	009
	CF JOIST BRIDGING	010
Section 8.2 -	TYPICAL CRANE PLAN LAYOUT	
	TOP RUNNING CRANE	001
	MONORAIL CRANE	002
	UNDERHUNG CRANE	003
Section 8.3 -	TOP RUNNING CRANE DETAILS	
	BEAM to SEPARATE COLUMN	001
	CRANE BEAM to BRACKET & STRUT	002
	CRANE BEAM to AUXILIARY BEAM I	003
	CRANE BEAM to AUXILIARY BEAM II	004
	AUXILIARY BEAM to RAFTER I	005
	AUXILIARY BEAM to RAFTER II	006
	CRANE BEAM to INTERIOR COLUMN	007
	CRANE BEAM to BRACKET & GIRT	008

INDEX

STRUCTURAL ACCESSORIES CONT.

Section 8.4 - MONORAIL CRANE DETAILS
CRANE BEAM to COLUMN 001
CRANE BEAM to AUXILIARY BEAM 002
CRANE BEAM to RAFTER & BRACE 003
CRANE BEAM to RAFTER 004
AUXILIARY BEAM to RAFTER 005
AUXILIARY BEAM to RAFTER & BRACE 006

Section 8.5 - UNDERHUNG CRANE DETAILS
CRANE BEAM to AUXILIARY BEAM 001
CRANE BEAM to COLUMN & STRUT 002

Section 8.6 - TYPICAL LARGE OPENING
LARGE OPENING LAYOUT 001
ENDWALL OPENING ELEVATION 002
OPENING near HANGAR BEAM 003
OPENING near HANGAR BEAM cont. 004
OPENING near INTERIOR COLUMN 005
OPENING near CORNER COLUMN 006
SUPPORT BEAM END CONNECTION 007
BRACING CONNECTION 008
ENDWALL OPENING ELEVATION 009
OPENING near SIDEWALL COLUMN I 010
OPENING near SIDEWALL COLUMN II 011
OPENING near SIDEWALL COLUMN III 012

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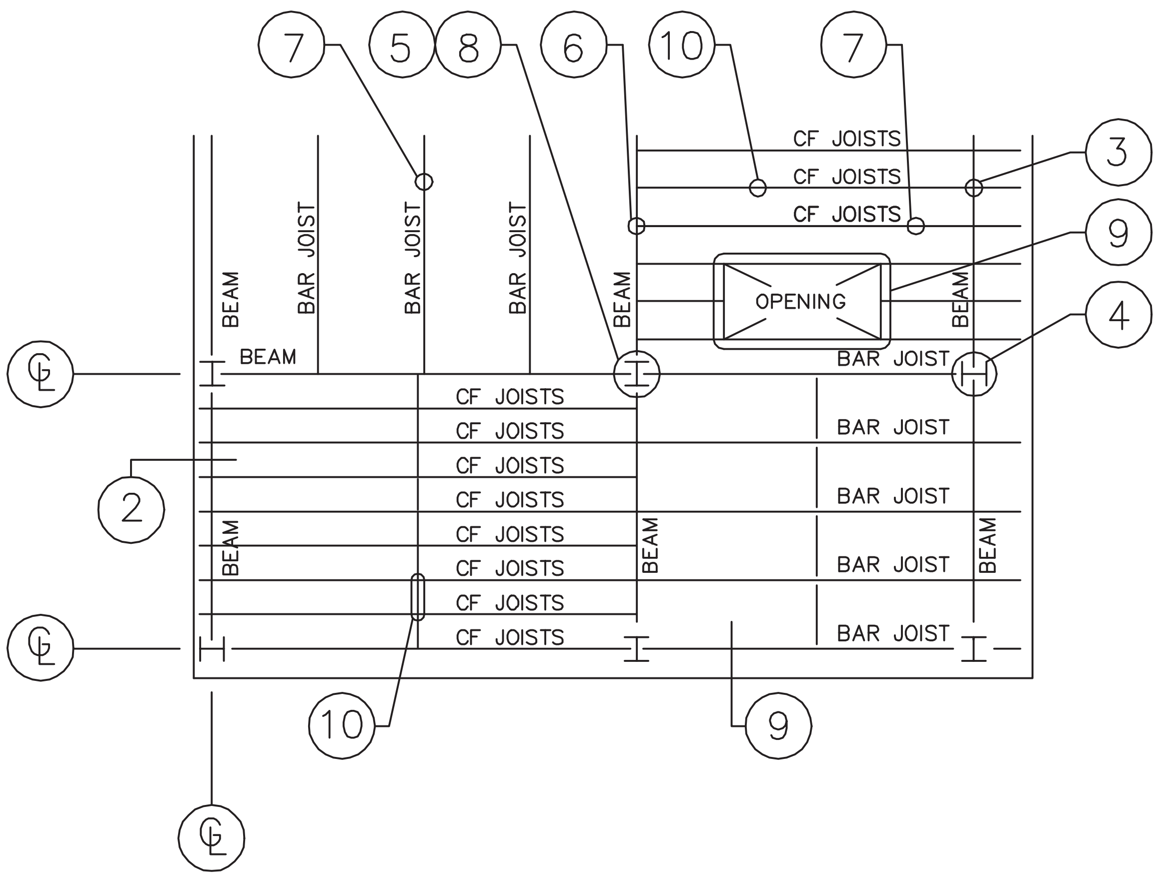

NUMBERS in BUBBLES are PAGE NUMBERS

MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
TYPICAL LAYOUT	Section 8.1	Page 001

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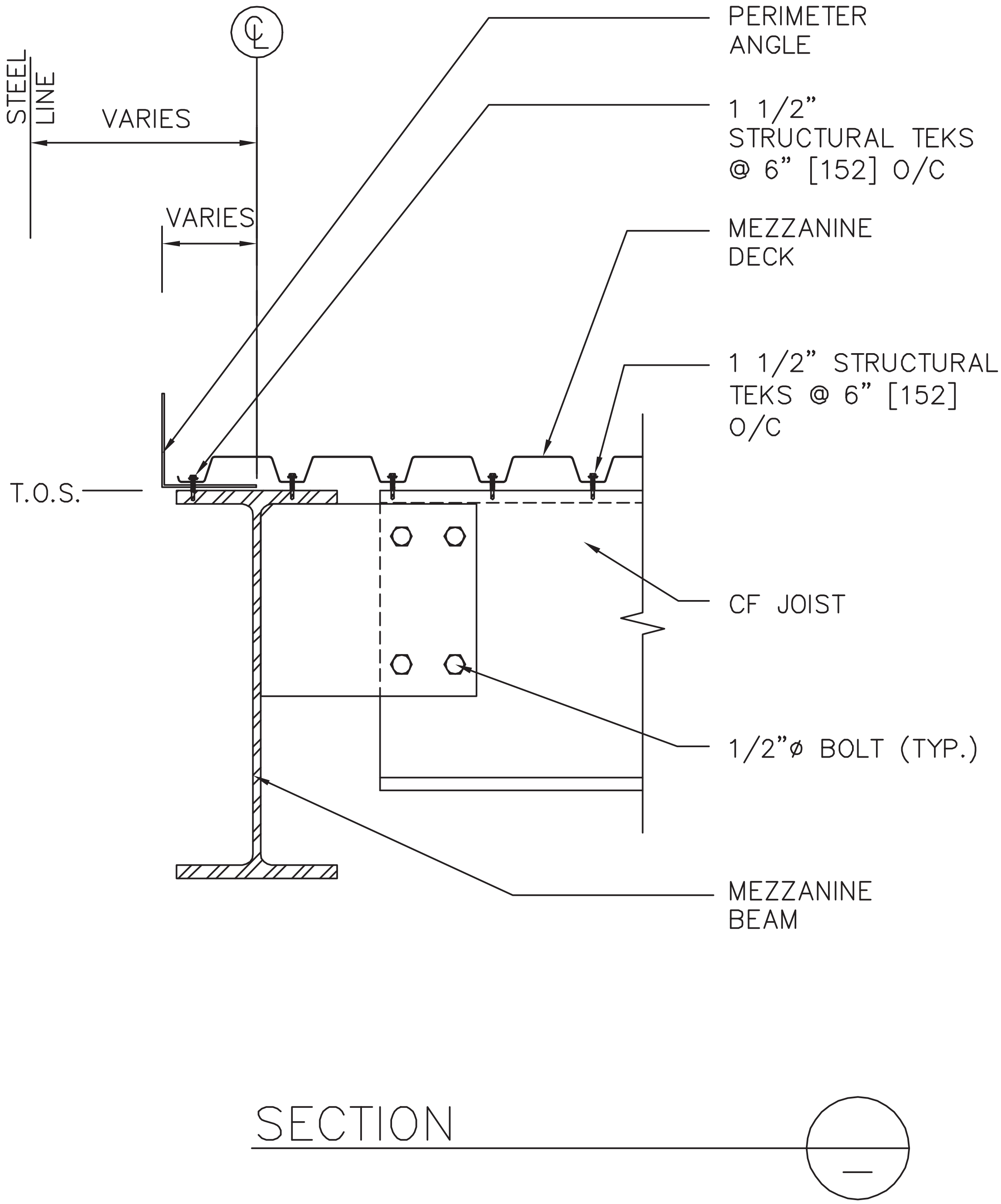

MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
PERIMETER CF JOIST DETAIL	Section 8.1	Page 002

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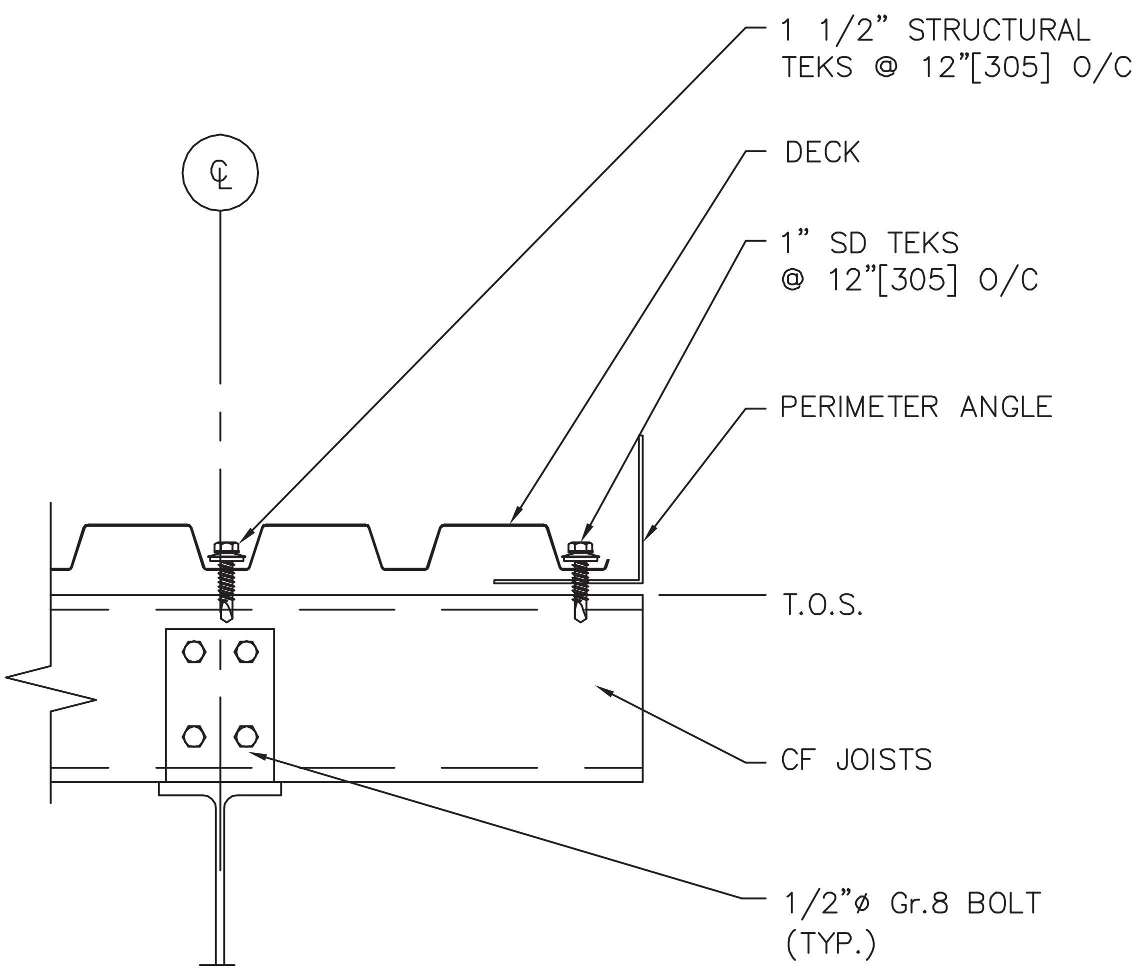
Made Strong



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MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
PERIMETER CF JOIST CONNECTION	Section 8.1	Page 003

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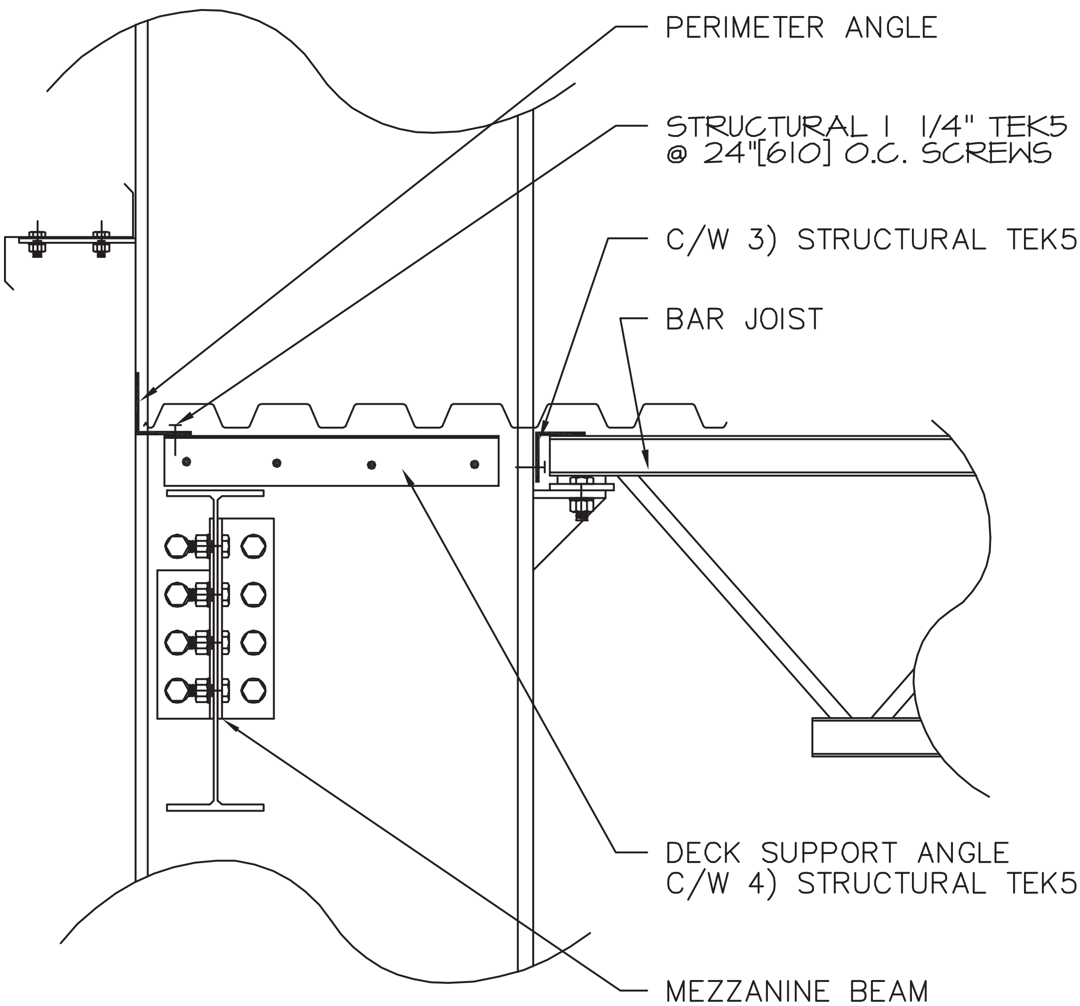

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MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
JOIST CONNECTION to COLUMN	Section 8.1	Page 004

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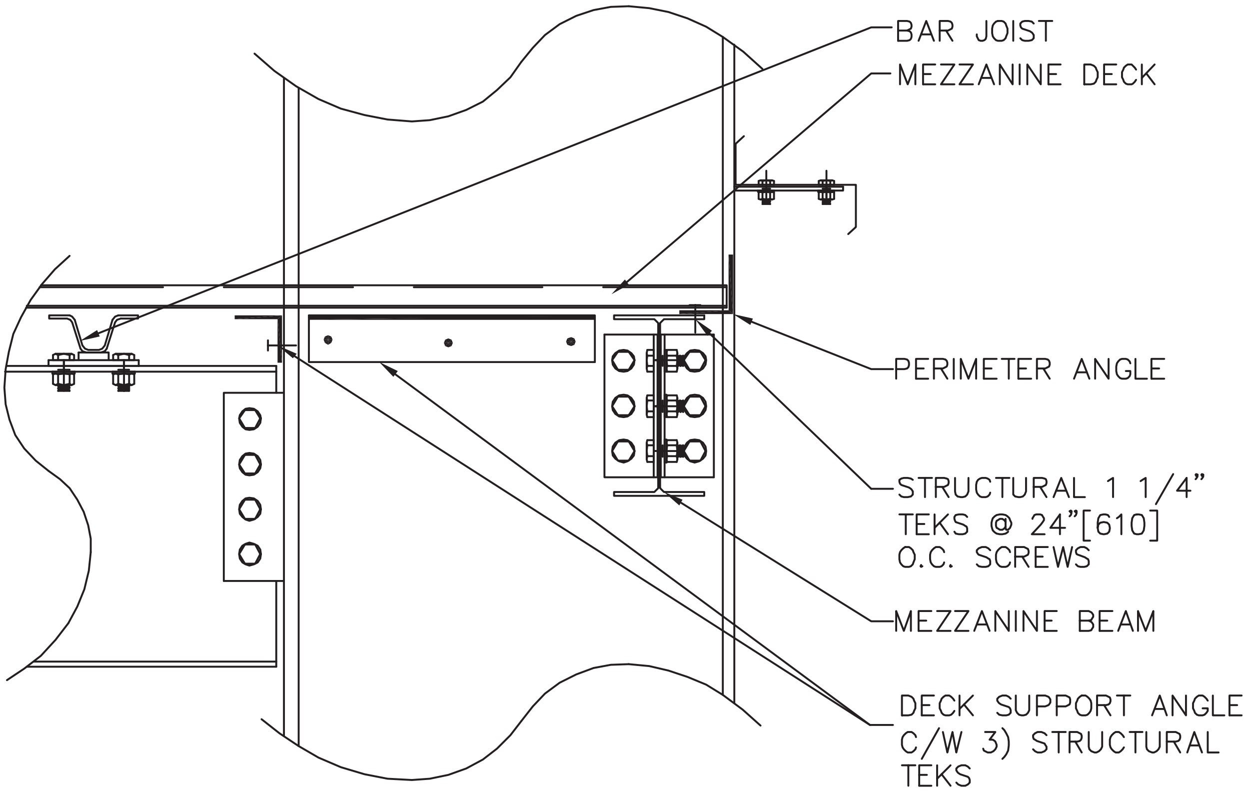

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MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
BEAM TO COLUMN	Section 8.1	Page 005

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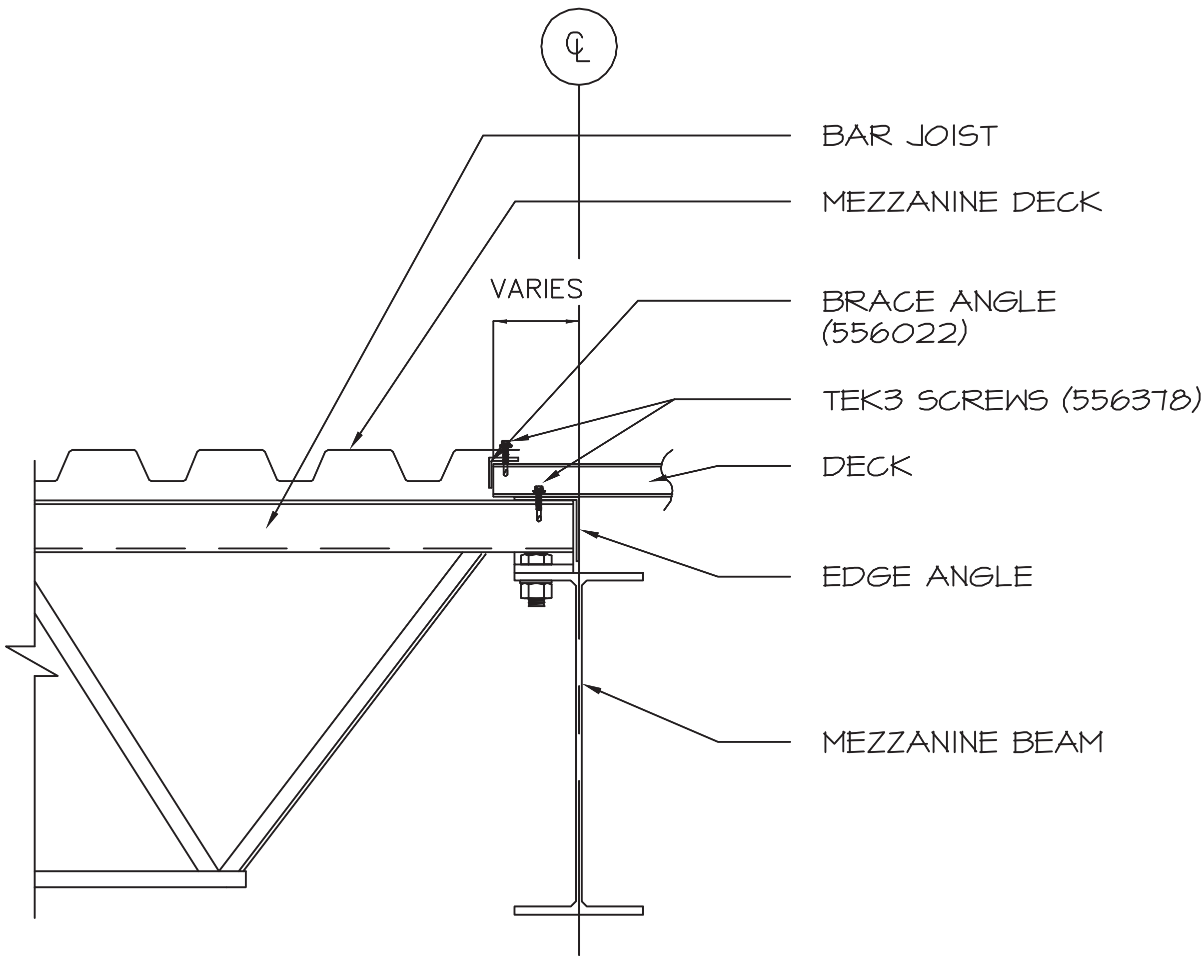

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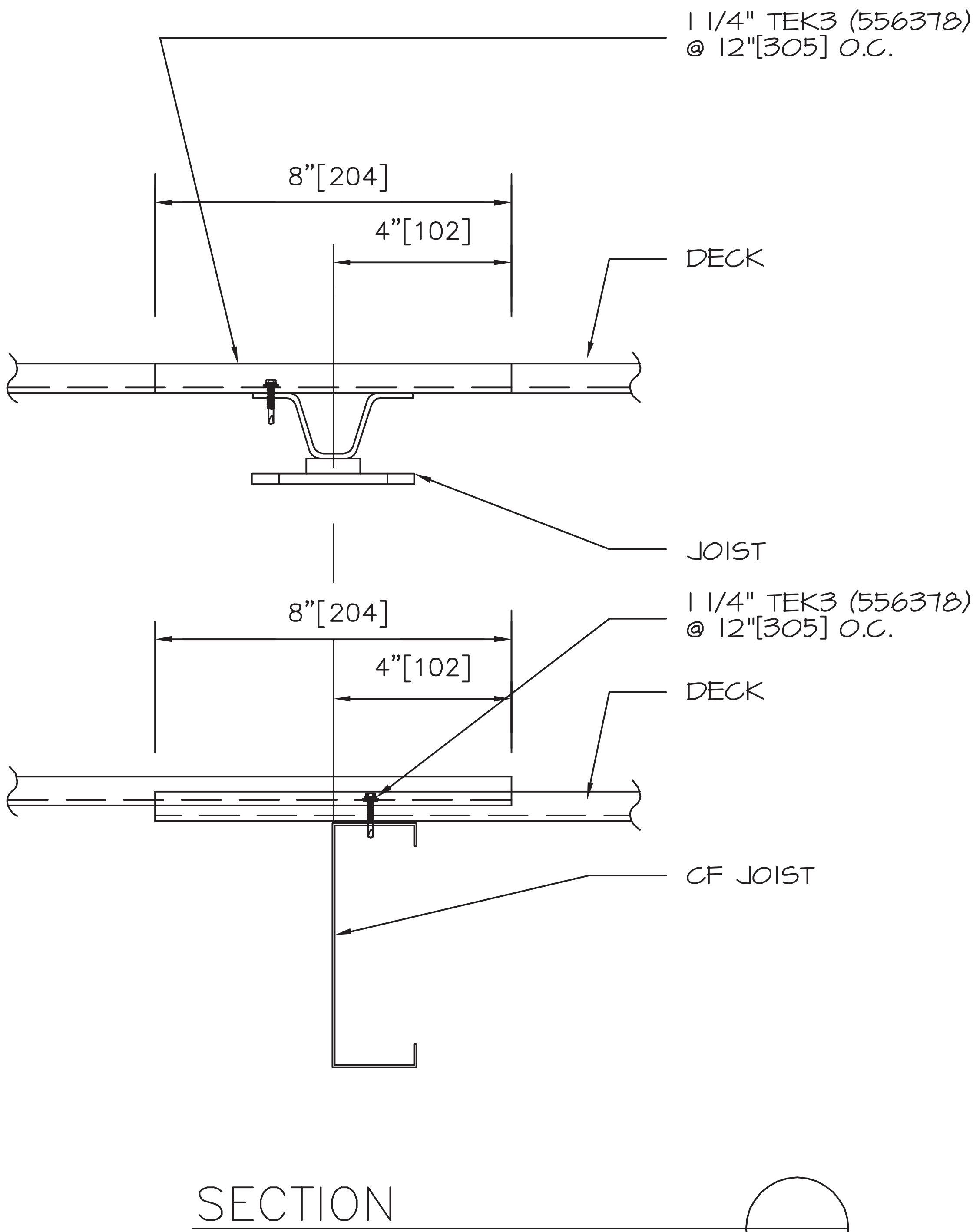
MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
DECK TRANSITION	Section 8.1	Page 006



MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
DECK LAP DETAIL	Section 8.1	Page 007

BEHLEN
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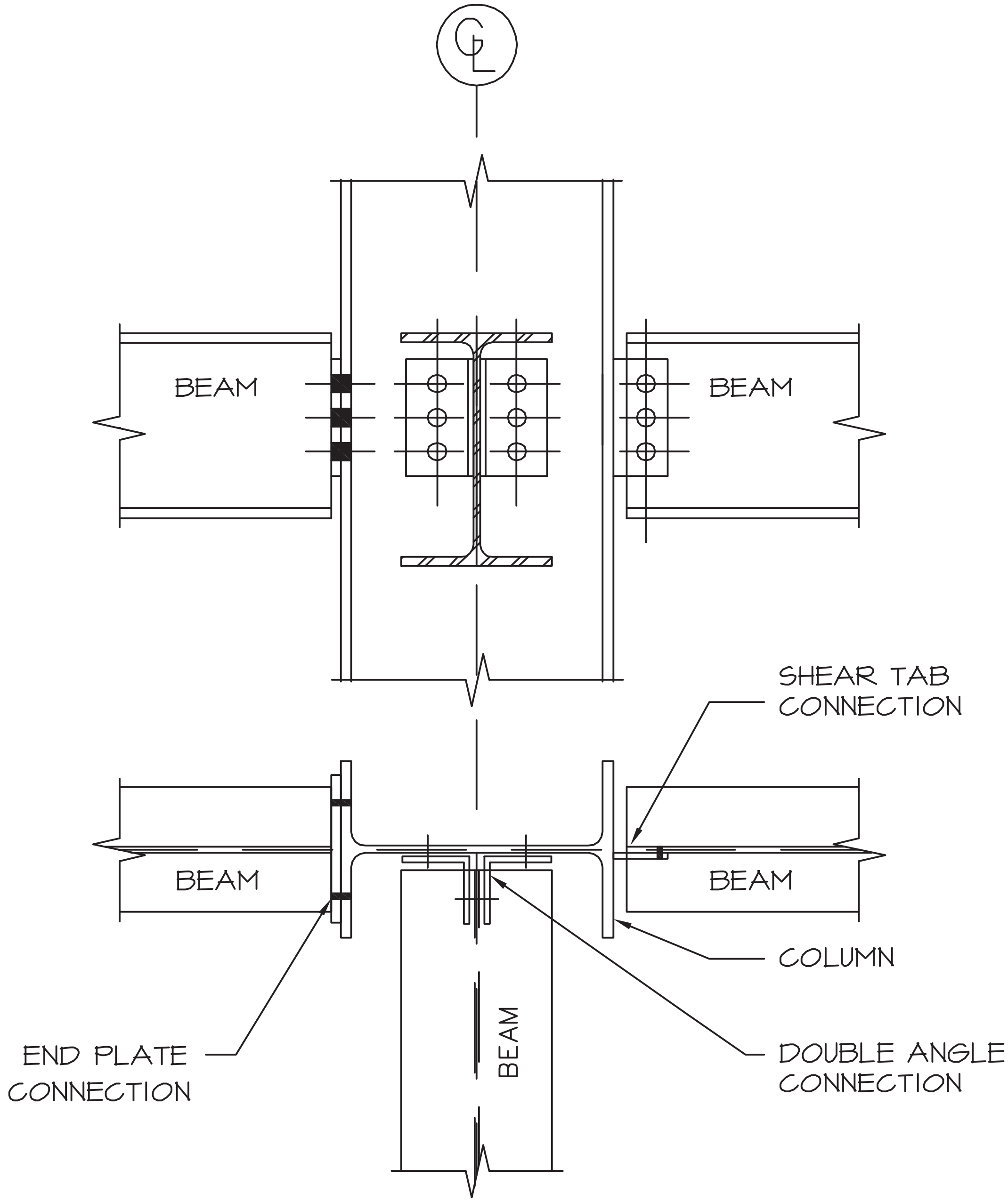


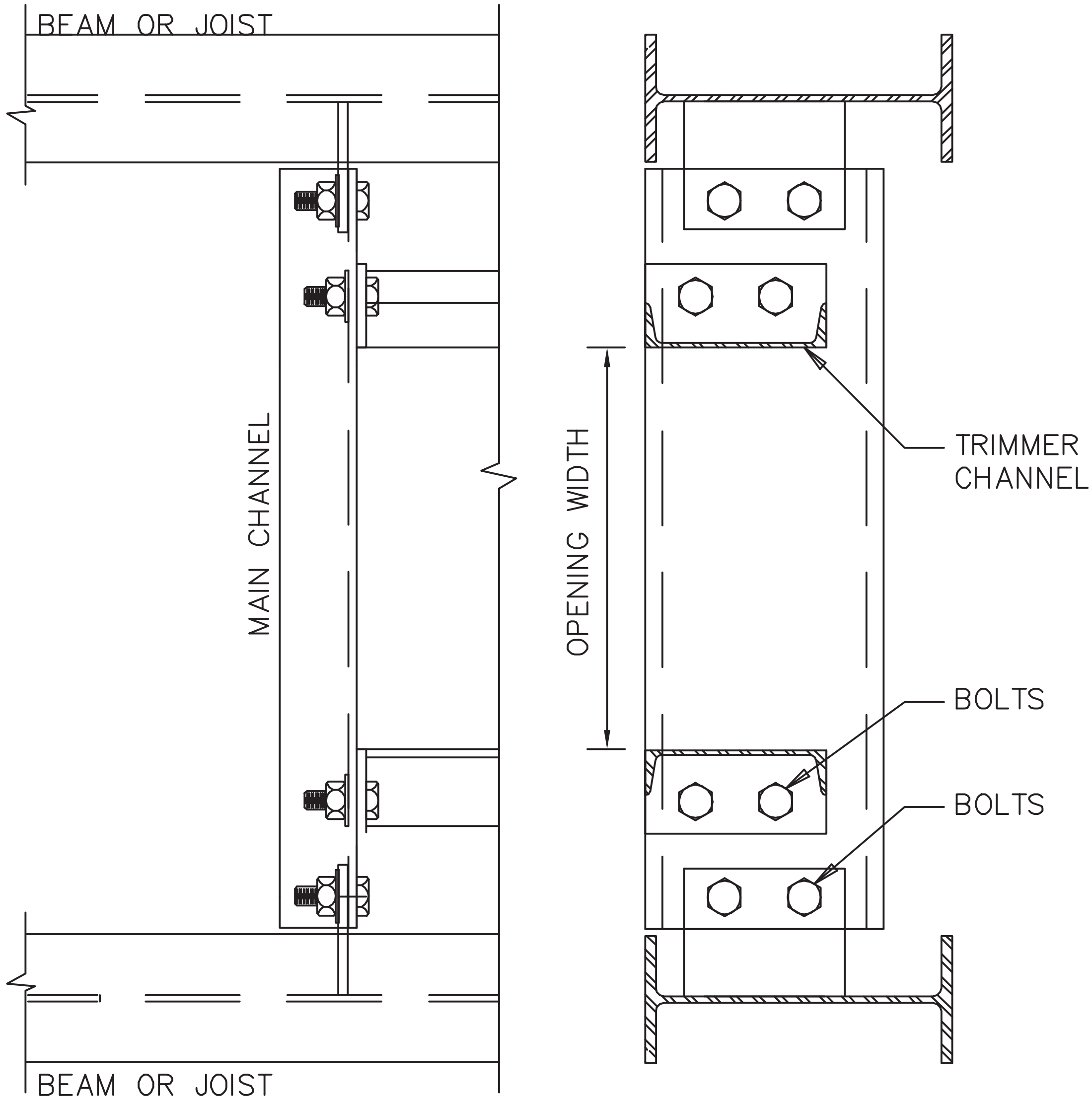
SECTION

MEZZANINE DETAILS

TYPICAL BEAM CONNECTIONS

JULY 2008	
Vr 1.0	
Section	Page
8.1	008

BEHLEN
Made Strong

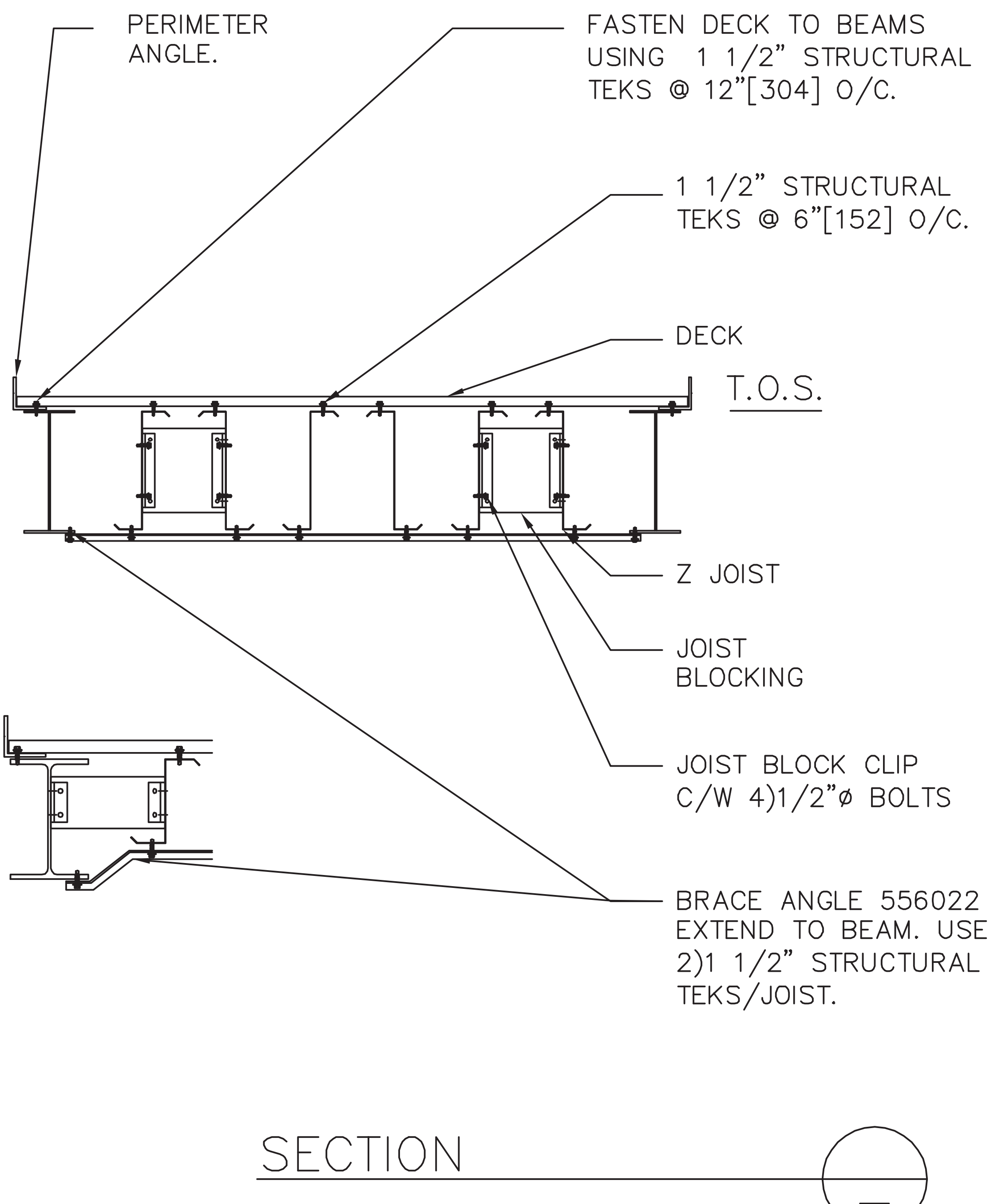


WELDED CLIP TO BEAM,
BOLT MAIN CHANNEL TO CLIP,
BOLT OPENING TRIMMER CHANNELS
TO MAIN CHANNEL.

SECTION

MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
DETAIL AT FRAMED OPENING	Section 8.1	Page 009

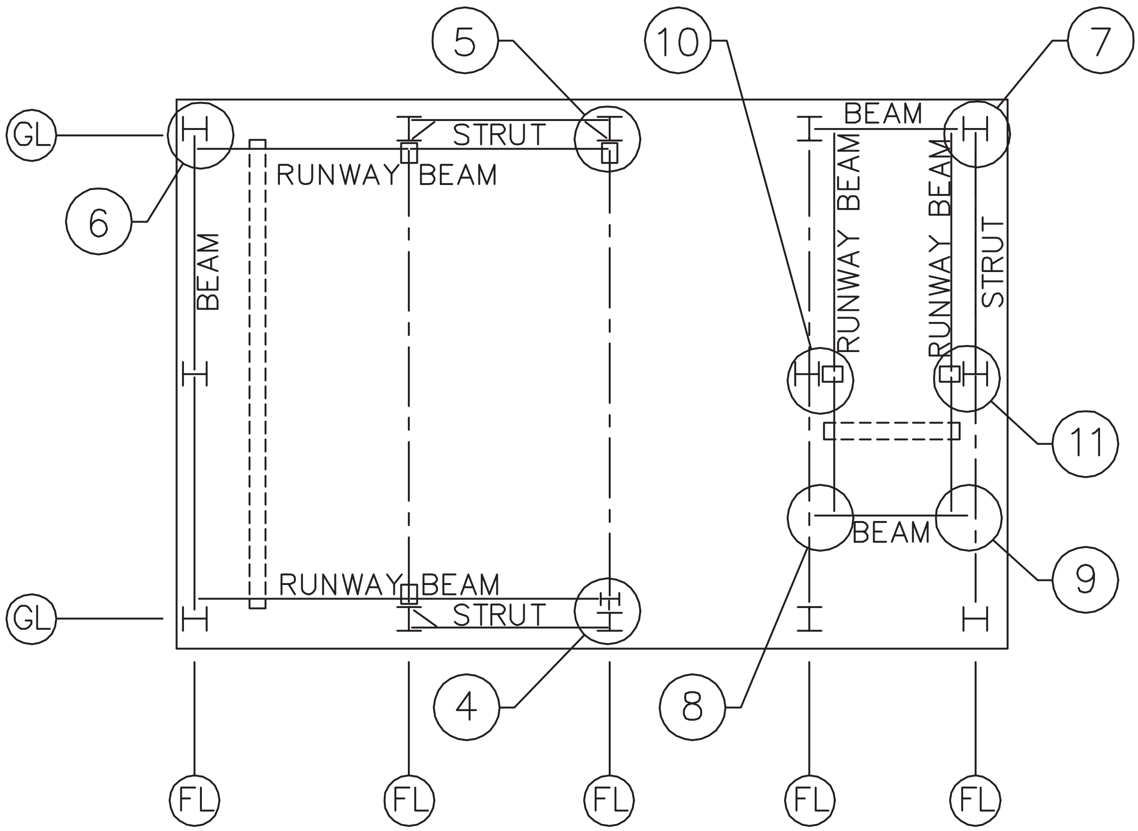
BEHLEN
Made Strong



NOTE JOIST ORIENTATION IS ALTERNATED FOR STABILITY.

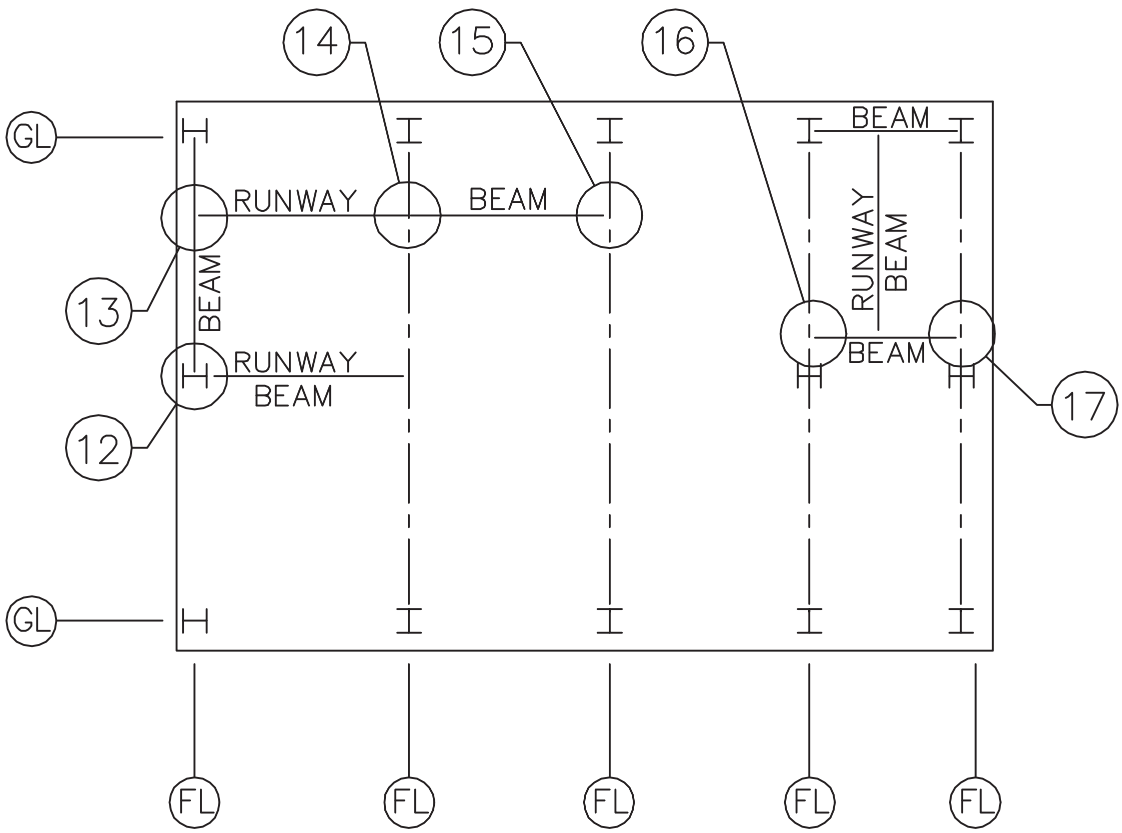
MEZZANINE DETAILS	JULY 2008	
	Vr 1.0	
CF JOIST BRIDGING	Section 8.1	Page 010

BEHLEN
Made Strong



FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

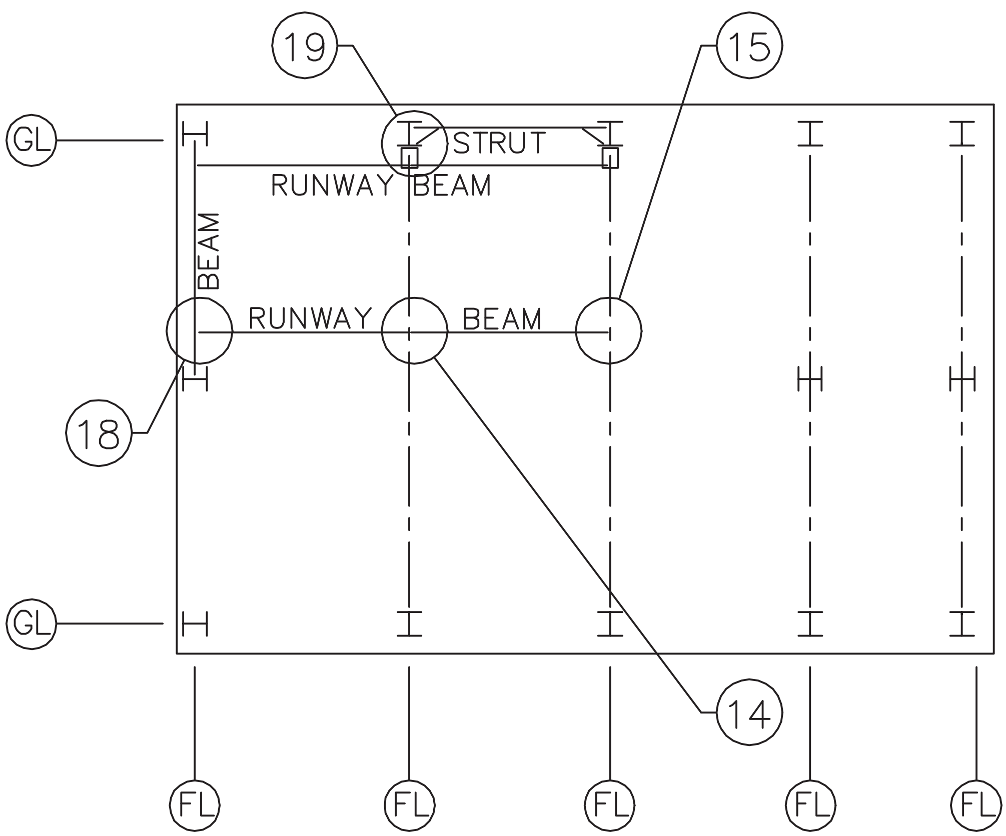
TYPICAL CRANE PLAN LAYOUT	JULY 2008 Vr 1.0	
TOP RUNNING CRANE	Section 8.2	Page 001



FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL CRANE PLAN LAYOUT	JULY 2008	
	Vr 1.0	
MONORAIL CRANE	Section 8.2	Page 002

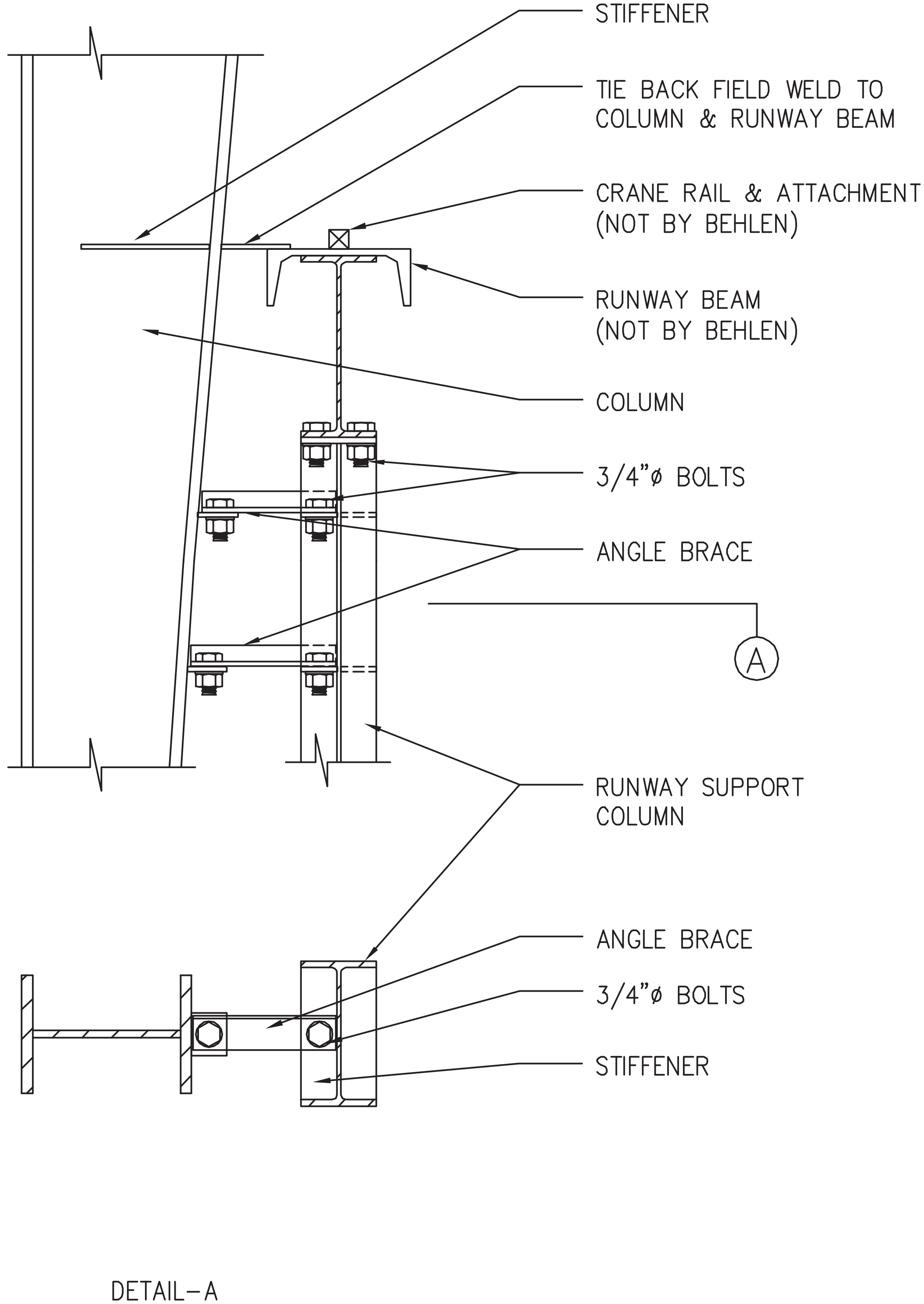
BEHLEN
Made Strong



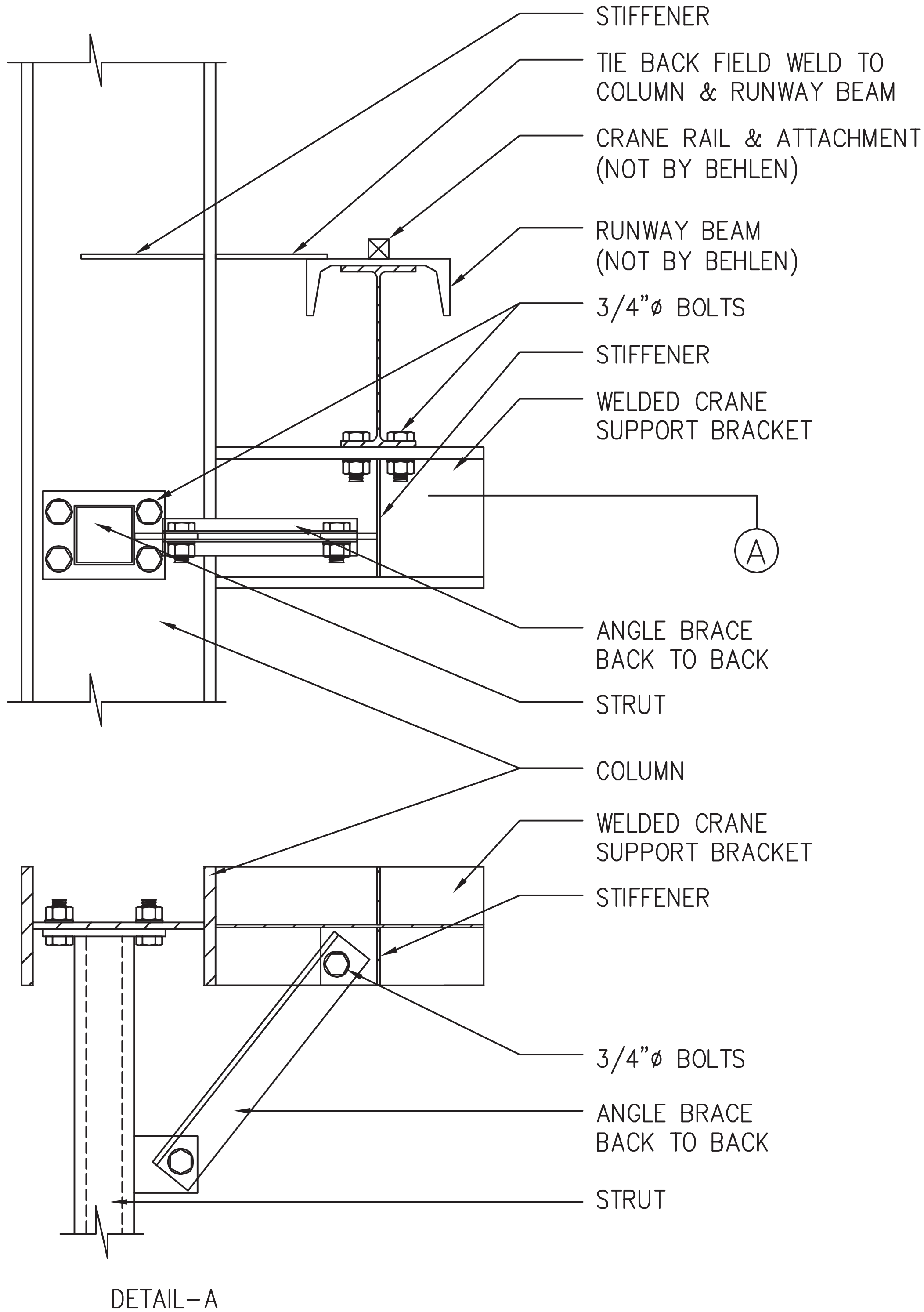
FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL CRANE PLAN LAYOUT	JULY 2008	
	Vr 1.0	
UNDERHUNG CRANE	Section 8.2	Page 003

BEHLEN
Made Strong



TOP RUNNING CRANE DETAILS	JULY 2008 Vr 1.0
BEAM to SEPARATE COLUMN	Section 8.3 / Page 001



TOP RUNNING CRANE DETAILS

CRANE BEAM to BRACKET & STRUT

JULY 2008		
Vr 1.0		
Section	Page	
8.3	002	

BEHLEN
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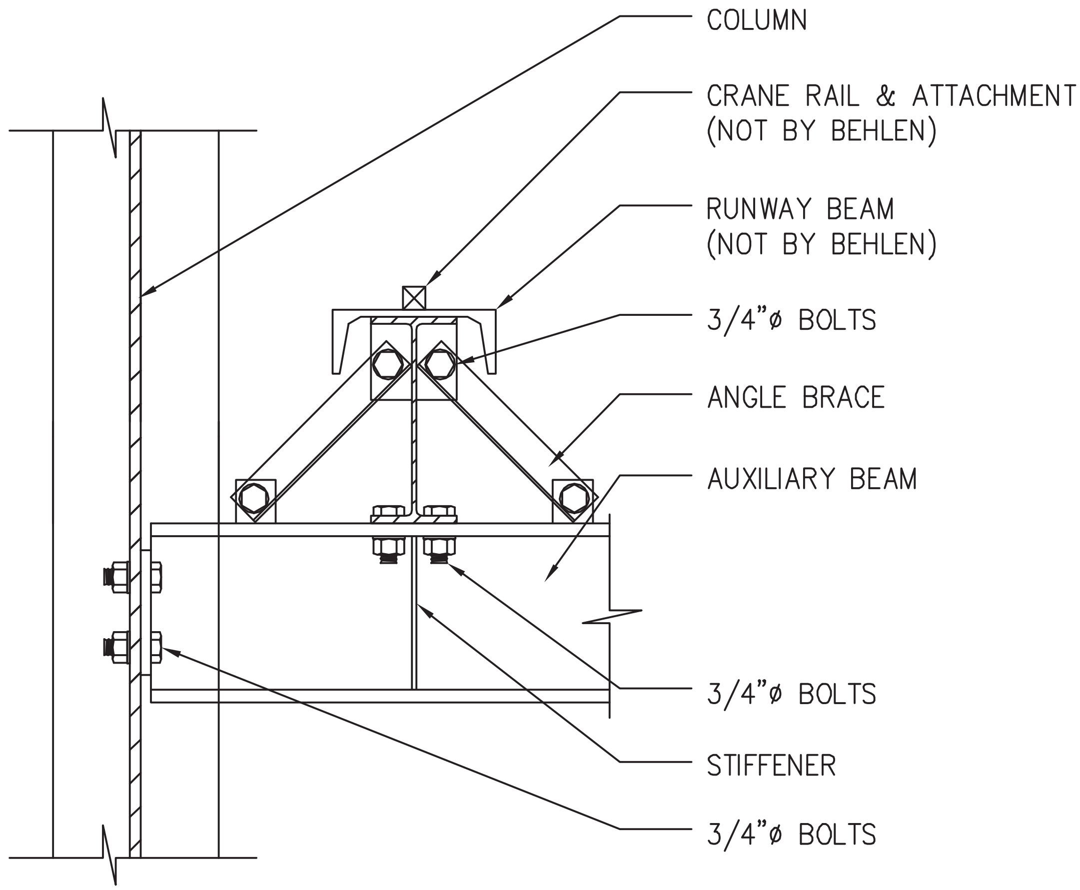
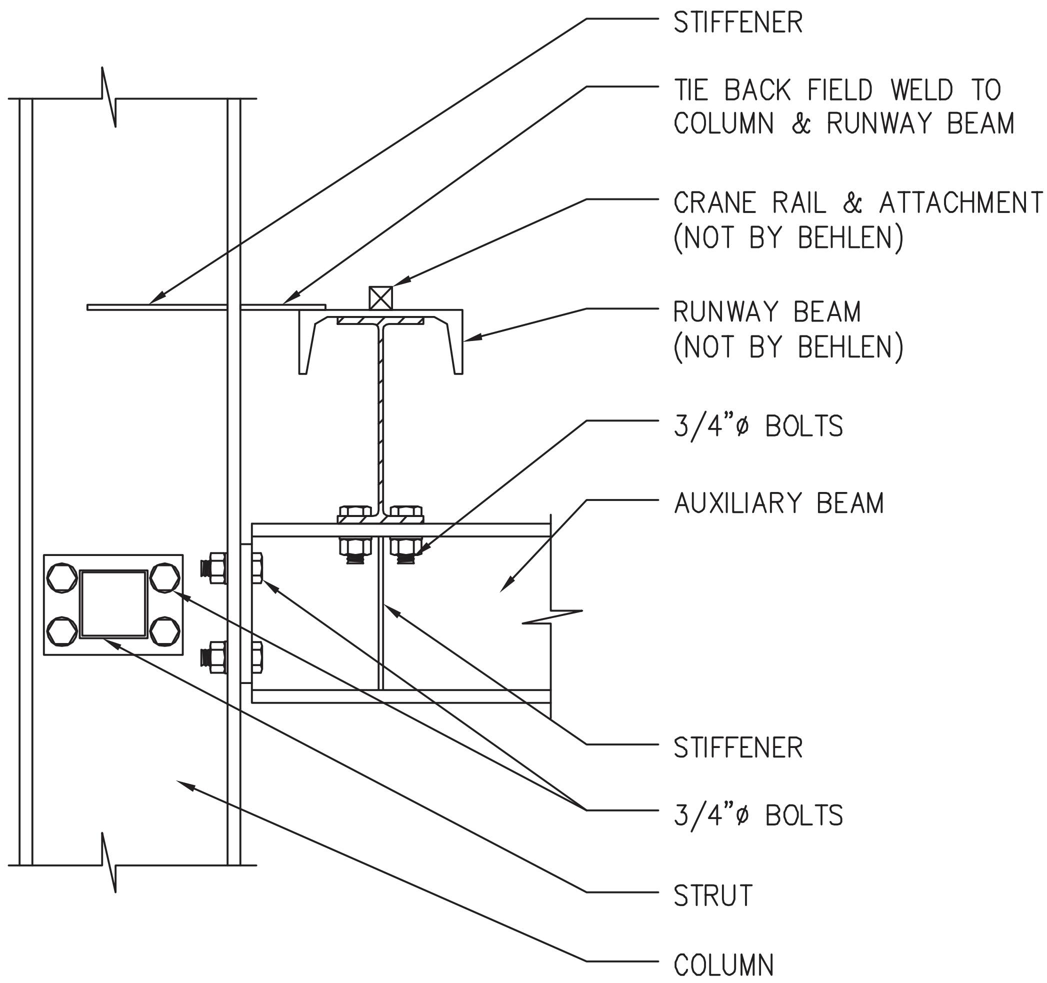
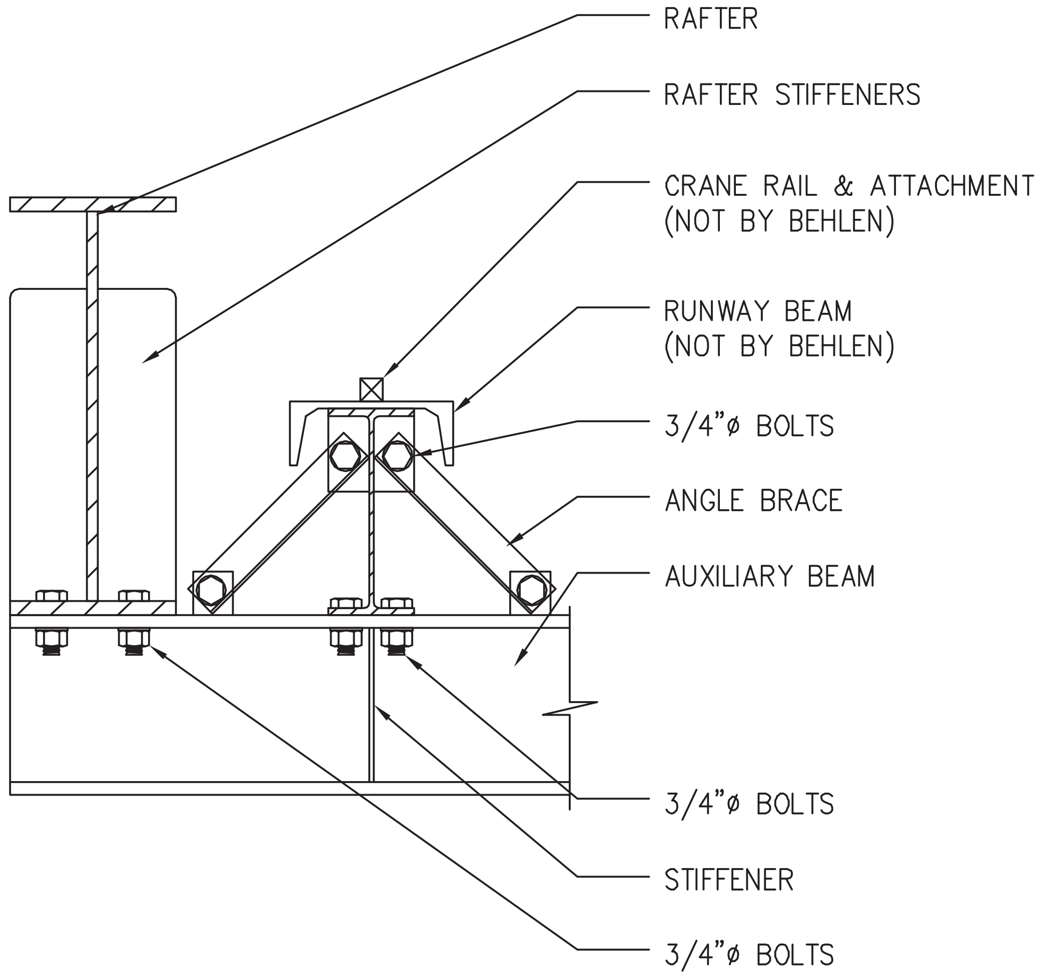


TOP RUNNING CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to AUXILIARY BEAM I	Section 8.3	Page 003

BEHLEN
Made Strong

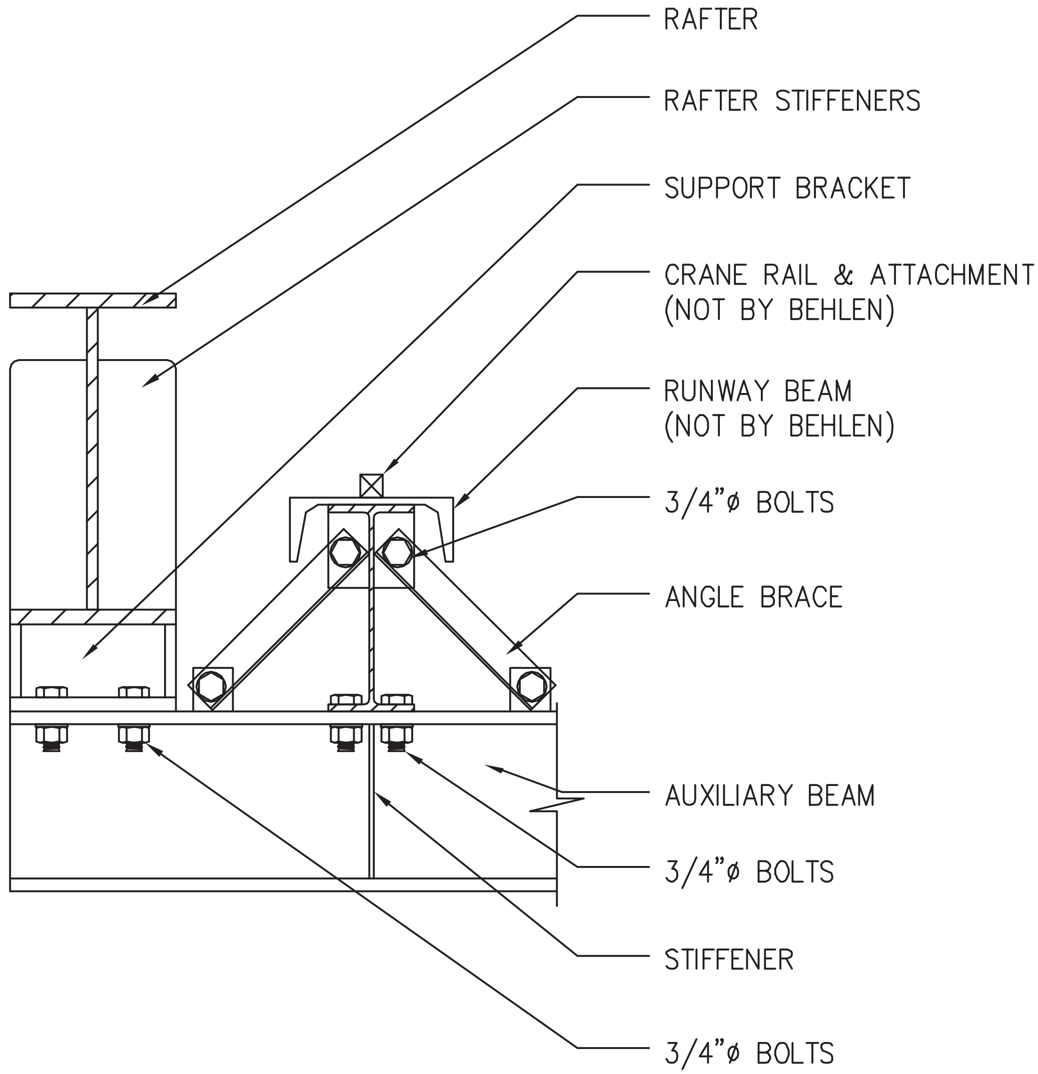


TOP RUNNING CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to AUXILIARY BEAM II	Section 8.3	Page 004



TOP RUNNING CRANE DETAILS	JULY 2008	
	Vr 1.0	
AUXILIARY BEAM to RAFTER I	Section 8.3	Page 005

BEHLEN
Made Strong



TOP RUNNING CRANE DETAILS	JULY 2008	
	Vr 1.0	
AUXILIARY BEAM to RAFTER II	Section 8.3	Page 006

BEHLEN
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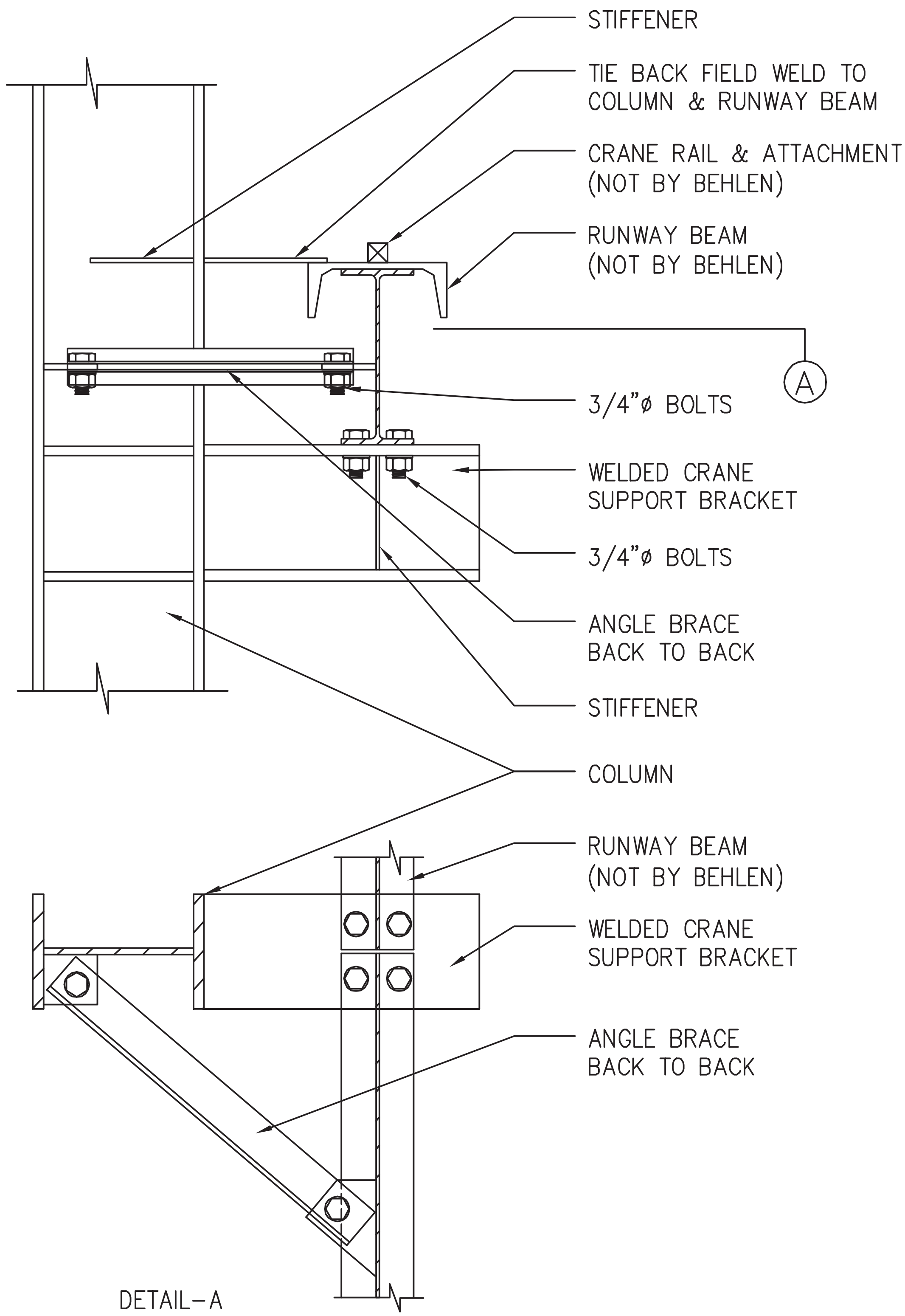

TOP RUNNING CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to INTERIOR COLUMN	Section 8.3	Page 007

BEHLEN
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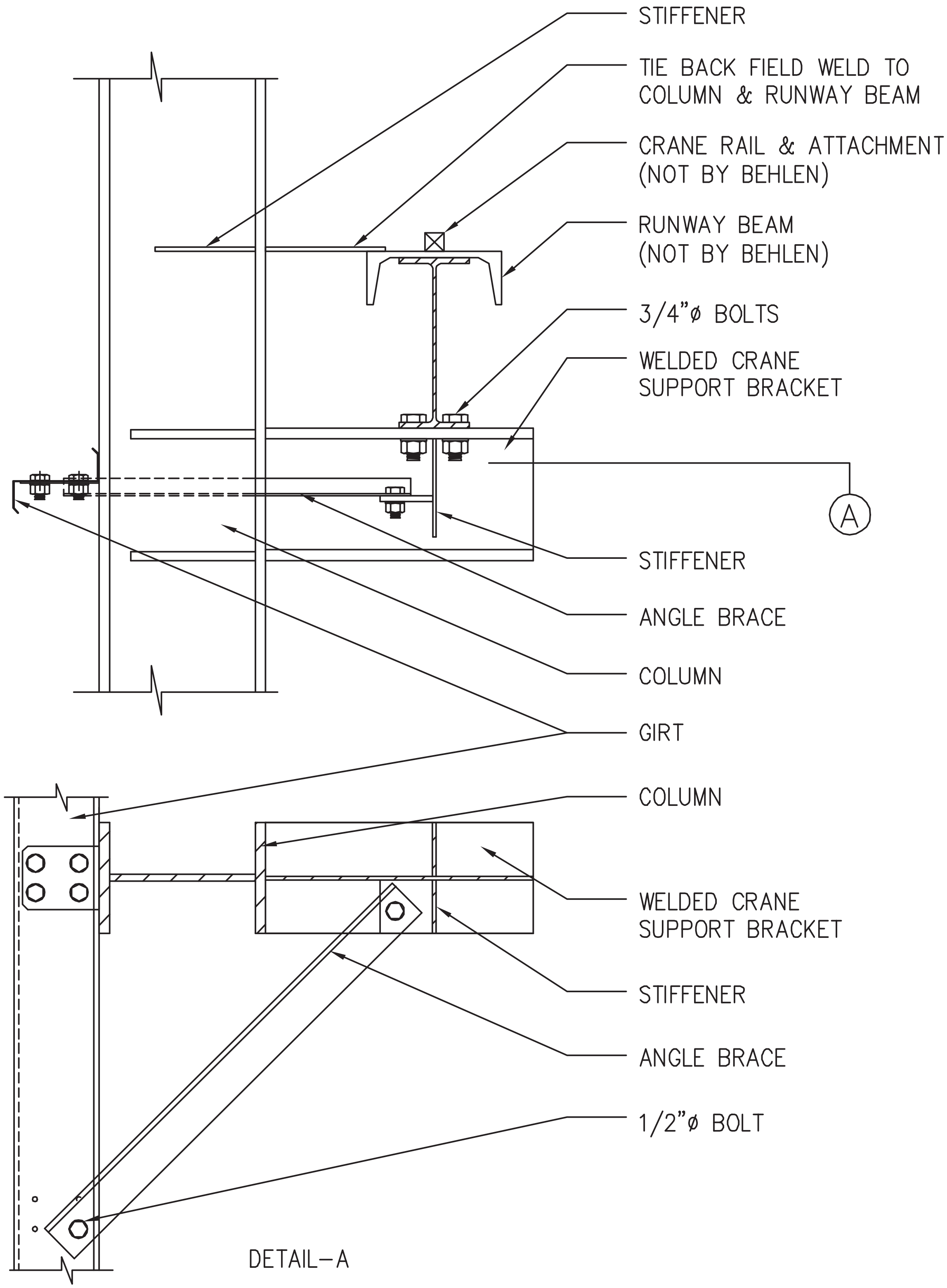
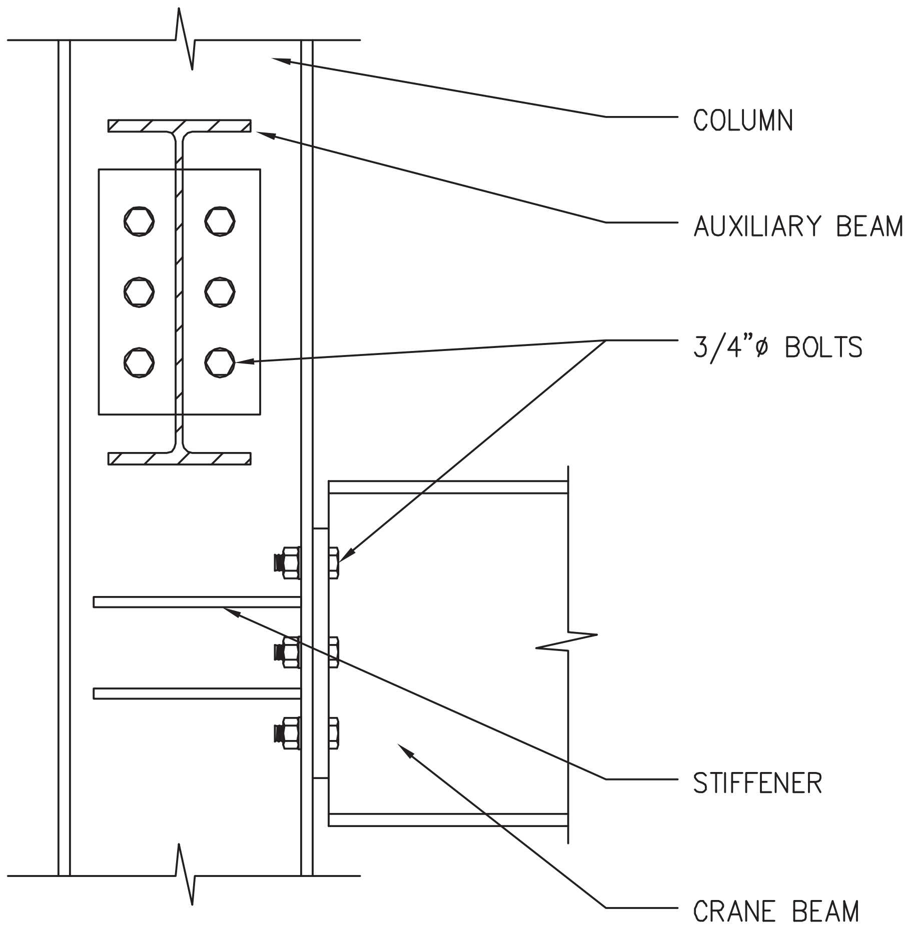
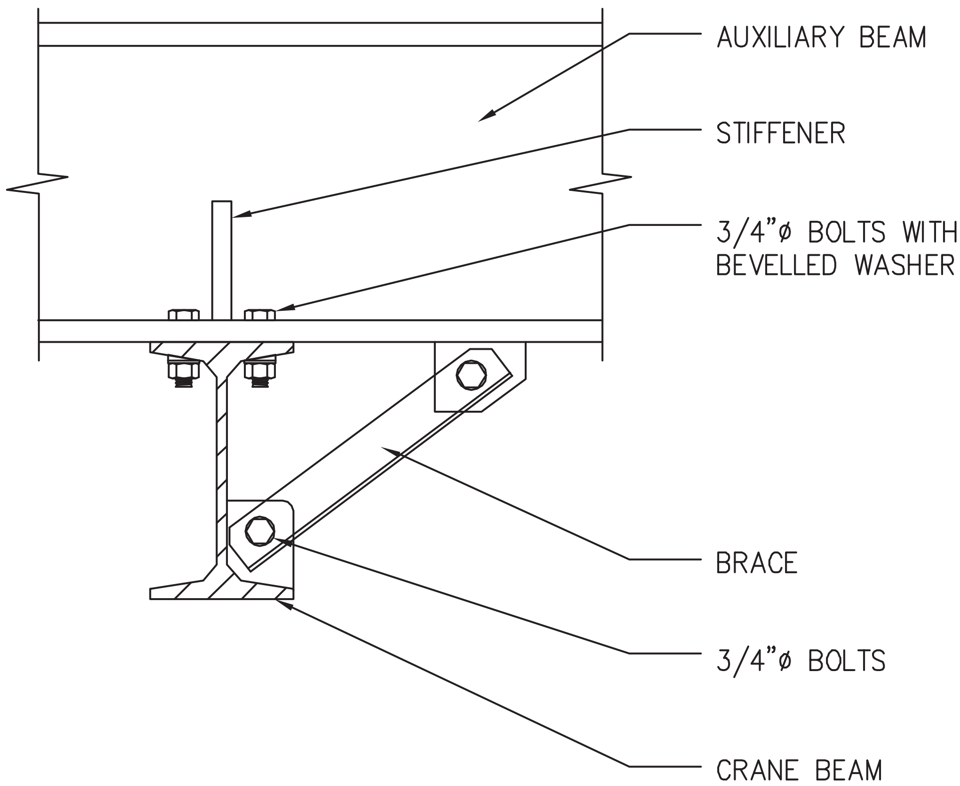


TOP RUNNING CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to BRACKET & GIRT	Section 8.3	Page 008



MONORAIL CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to COLUMN	Section 8.4	Page 001

BEHLEN
Made Strong



MONORAIL CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to AUXILIARY BEAM	Section 8.4	Page 002

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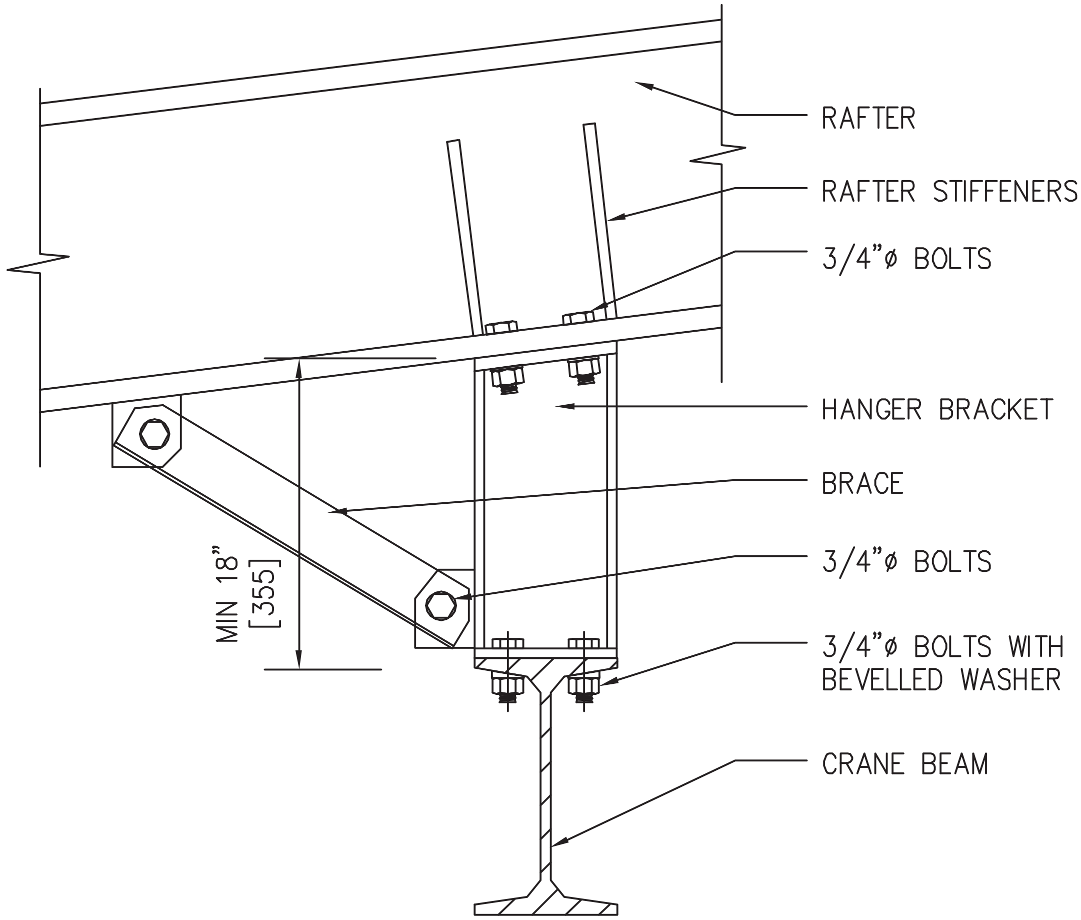
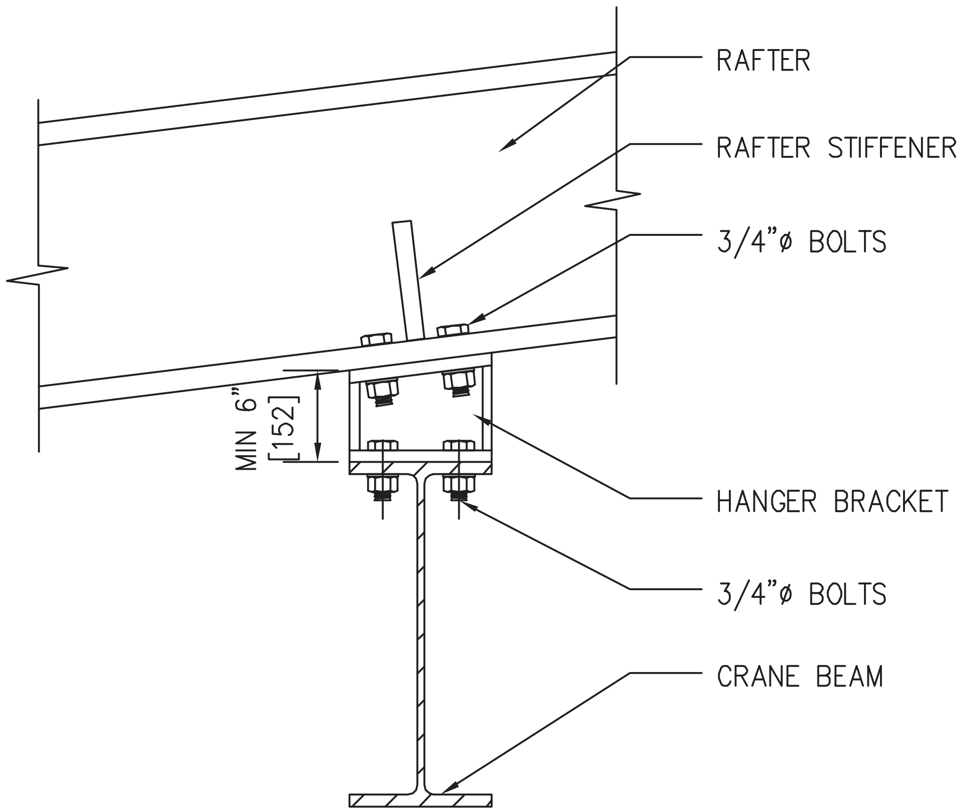


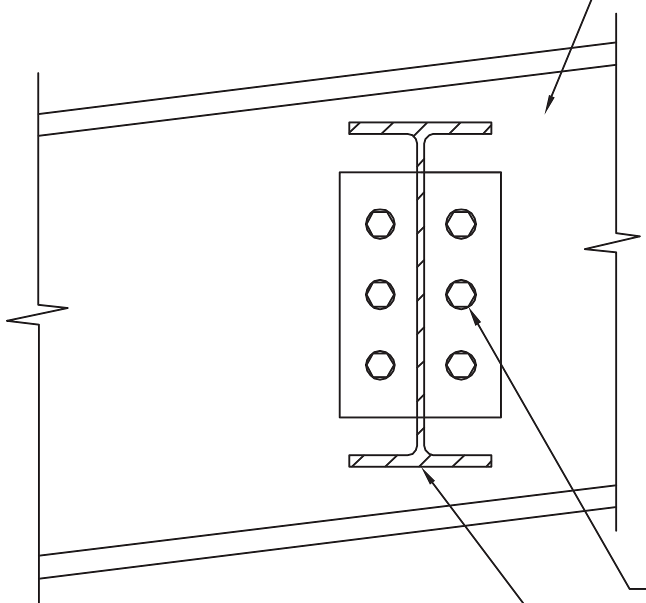
MONORAIL CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to RAFTER & BRACE	Section 8.4	Page 003

BEHLEN
Made Strong



MONORAIL CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to RAFTER	Section 8.4	Page 004

BEHLEN
Made Strong



MONORAIL CRANE DETAILS	JULY 2008	
	Vr 1.0	
AUXILIARY BEAM to RAFTER	Section 8.4	Page 005

BEHLEN
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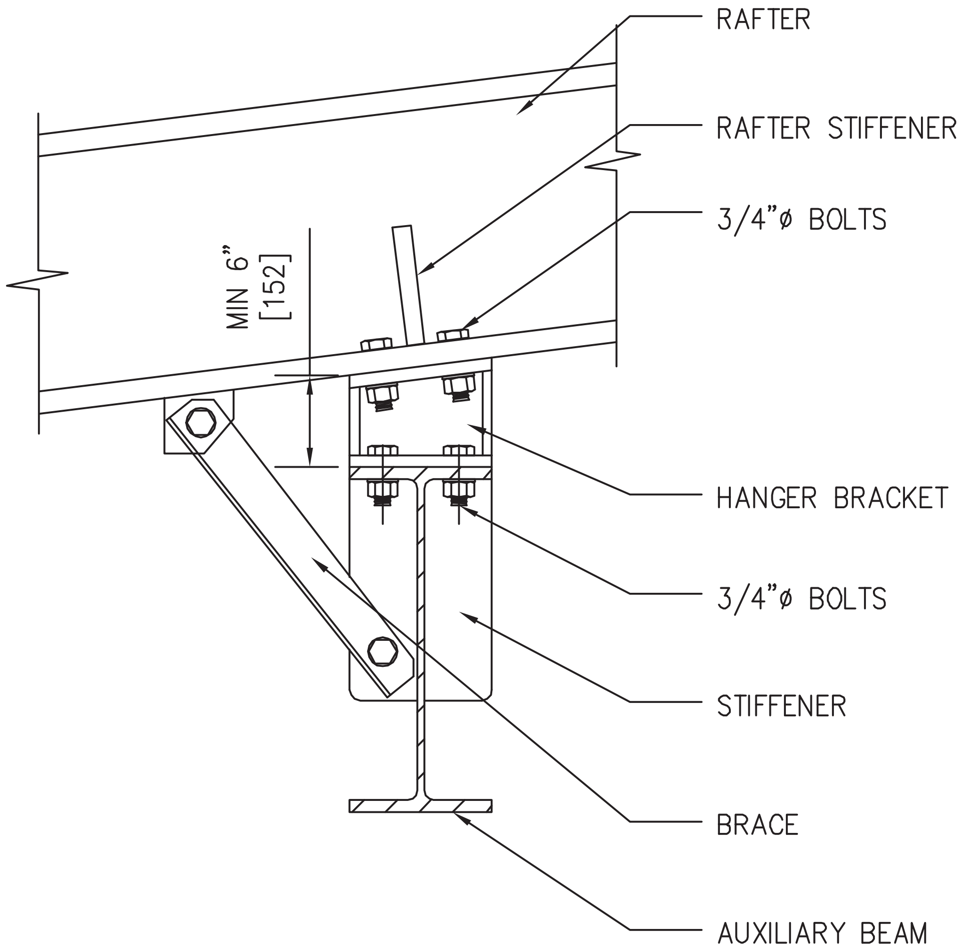

MONORAIL CRANE DETAILS	JULY 2008	
	Vr 1.0	
AUXILIARY BEAM to RAFTER & BRACE	Section 8.4	Page 006

BEHLEN
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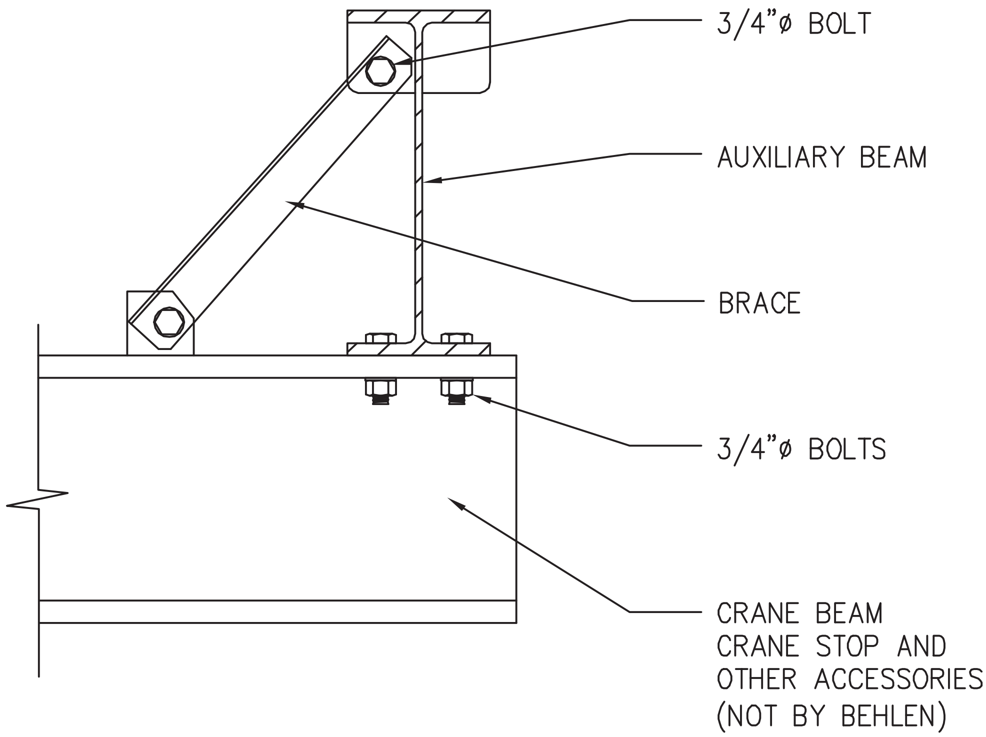

UNDERHUNG CRANE DETAILS	JULY 2008 Vr 1.0	
CRANE BEAM to AUXILIARY BEAM	Section 8.5	Page 001

BEHLEN
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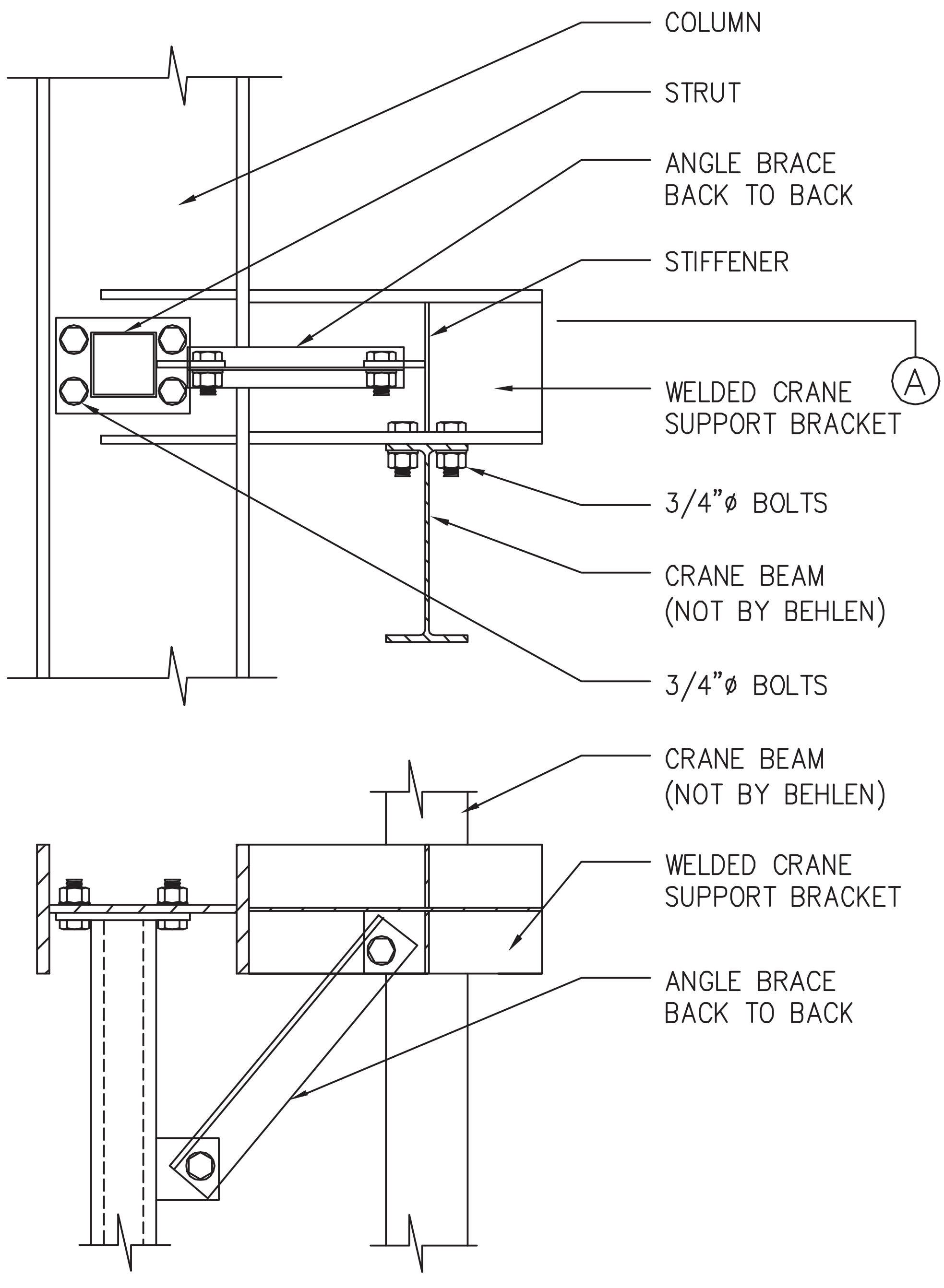
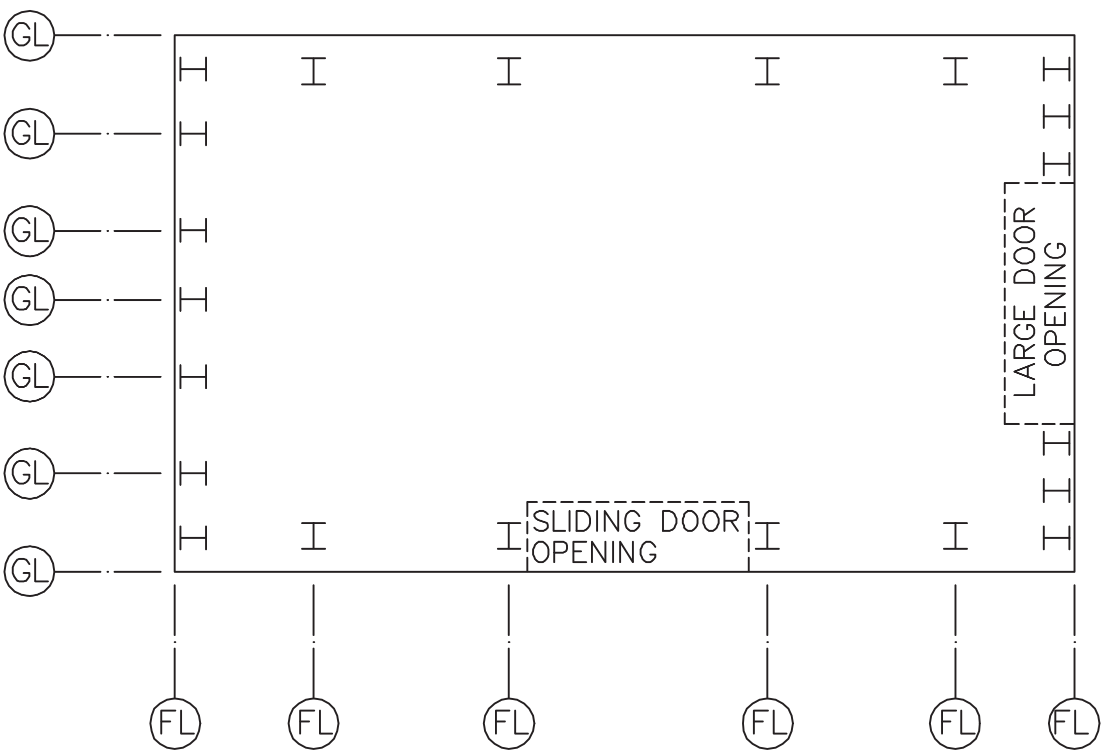


DETAIL–A

UNDERHUNG CRANE DETAILS	JULY 2008	
	Vr 1.0	
CRANE BEAM to COLUMN & STRUT	Section 8.5	Page 002

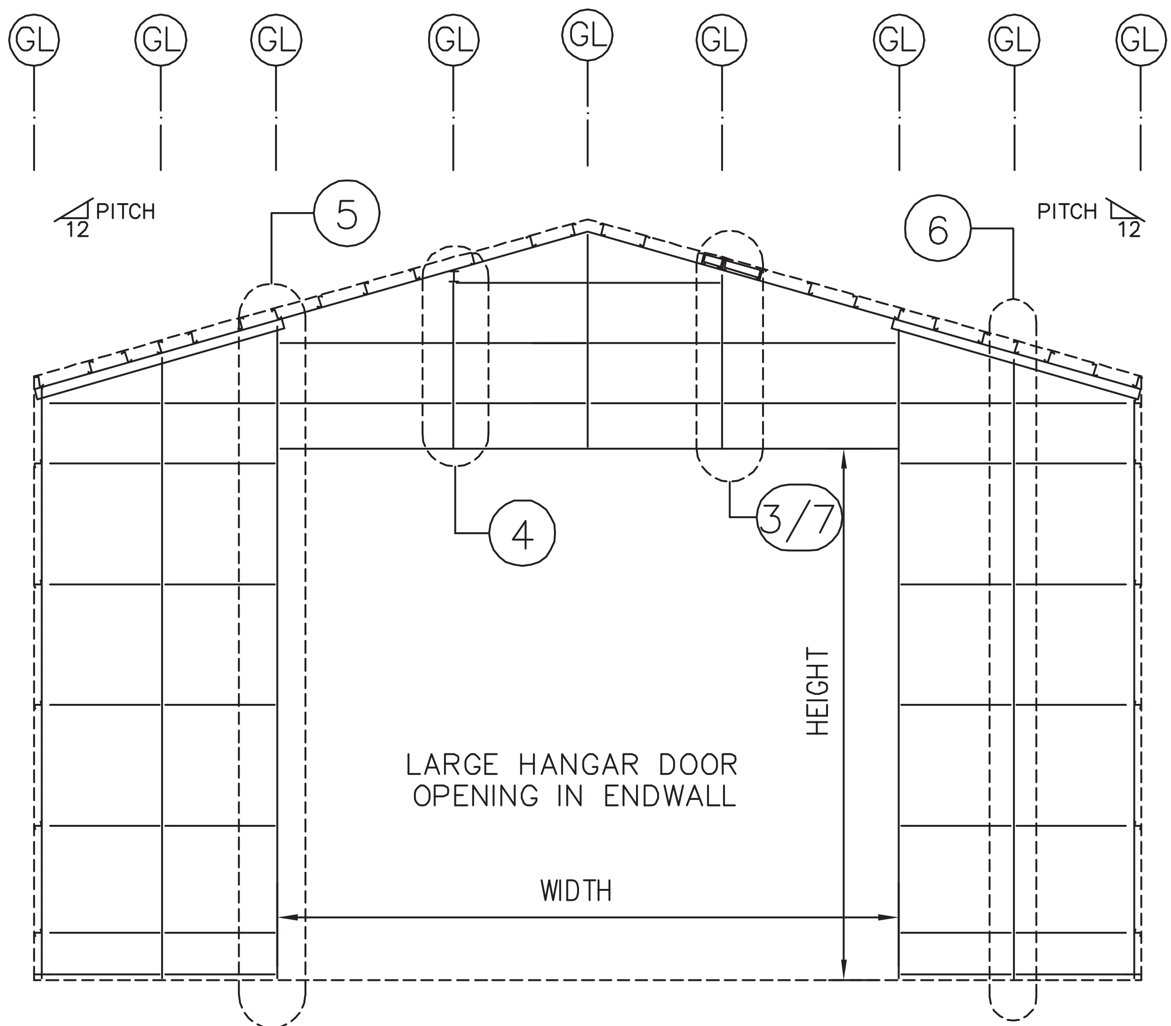
BEHLEN
Made Strong



FL — FRAME LINE
GL — GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

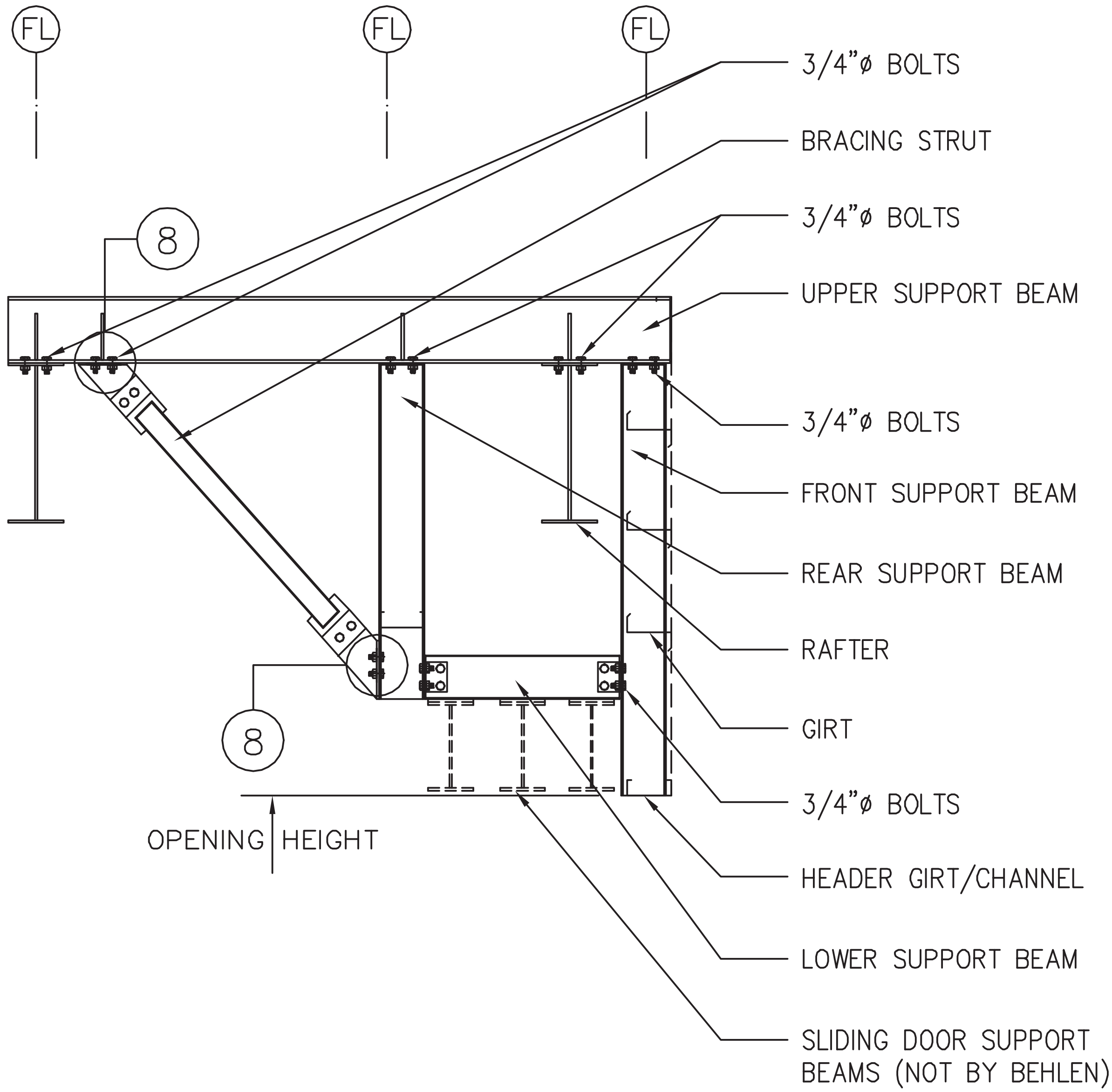
TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
LARGE OPENING LAYOUT	Section 8.6	Page 001

BEHLEN
Made Strong



FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
ENDWALL OPENING ELEVATION	Section 8.6	Page 002

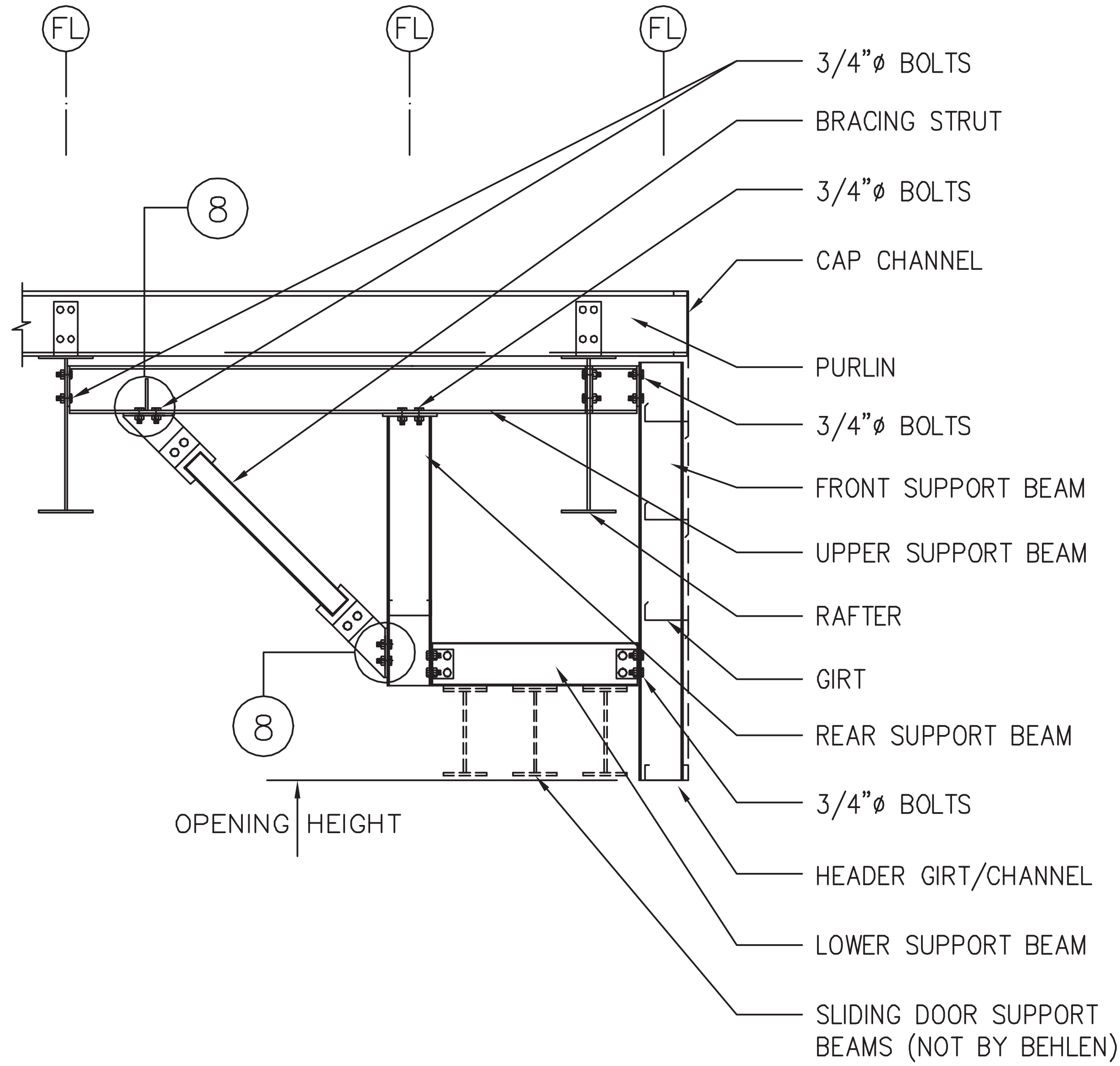


DETAIL
–CROSS SECTION FROM ENDWALL TO INTERIOR FRAME LINE

FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
OPENING near HANGAR BEAM	Section 8.6	Page 003

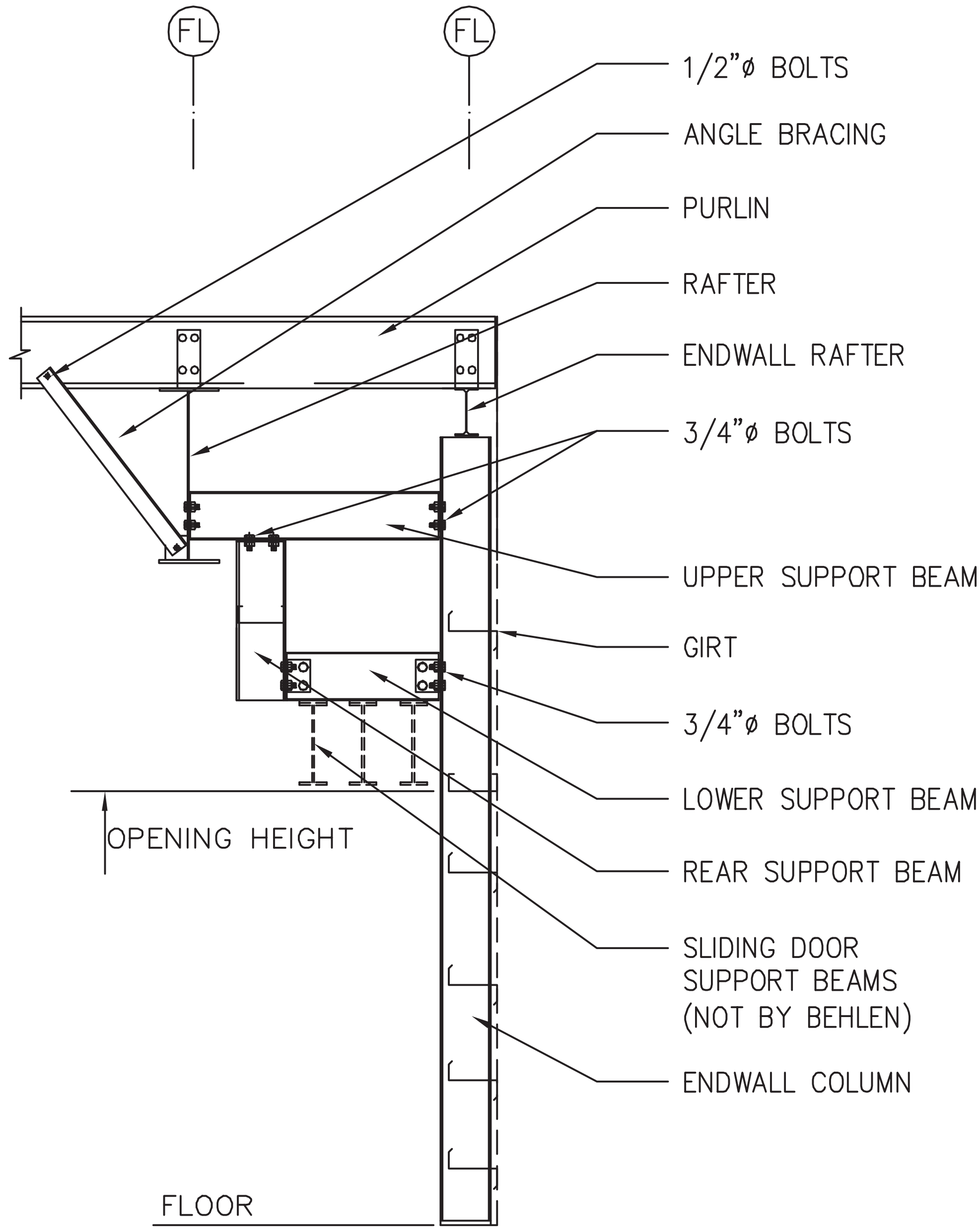
BEHLEN
Made Strong



DETAIL
–CROSS SECTION FROM ENDWALL TO INTERIOR FRAME LINE

FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

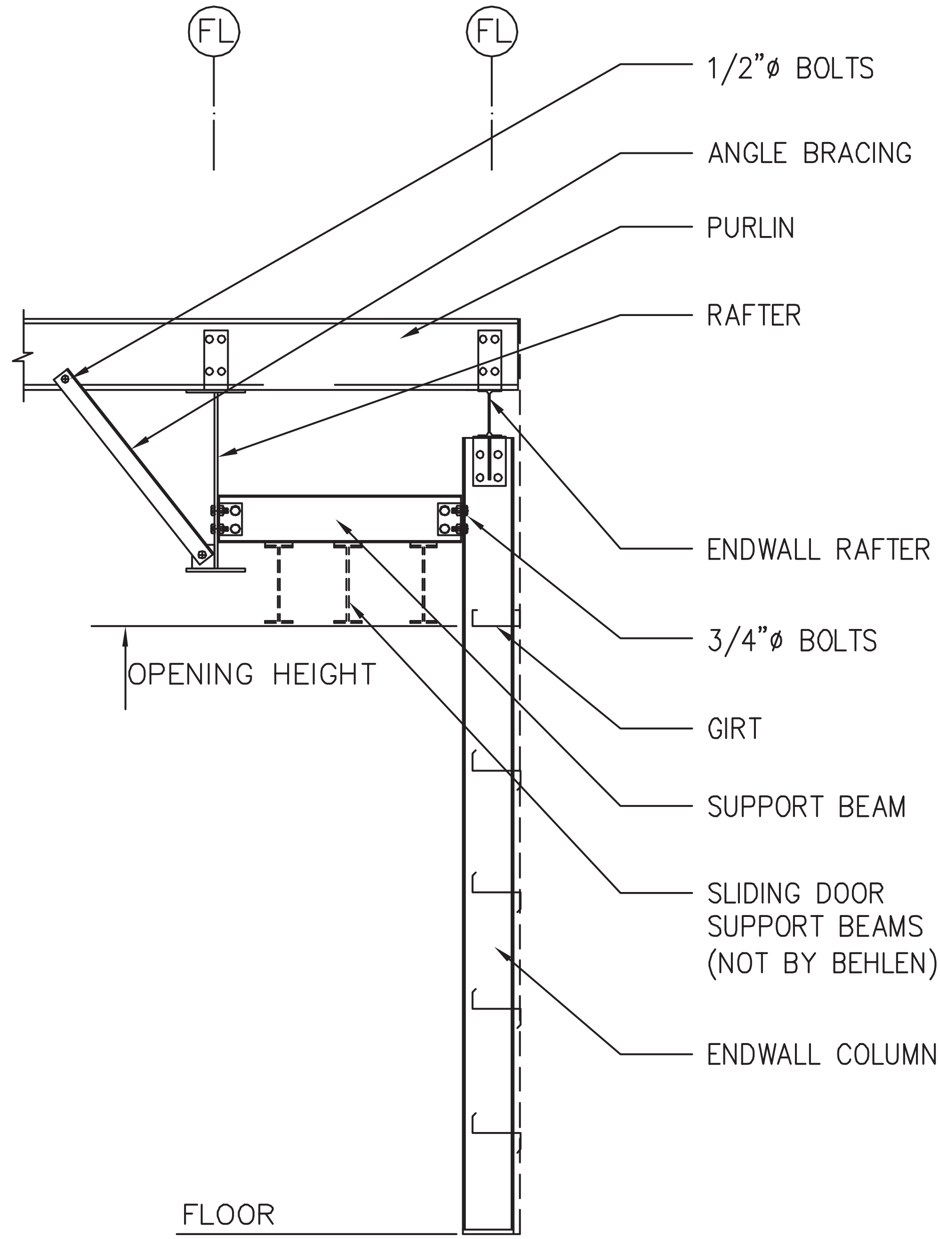
TYPICAL LARGE OPENING	JULY 2008
	Vr 1.0
OPENING near HANGAR BEAM	Section 8.6 / Page 004



DETAIL
–CROSS SECTION FROM ENDWALL TO INTERIOR FRAME LINE

FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
OPENING near INTERIOR COLUMN	Section 8.6	Page 005



DETAIL
—CROSS SECTION FROM ENDWALL TO INTERIOR FRAME LINE

FL — FRAME LINE
GL — GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

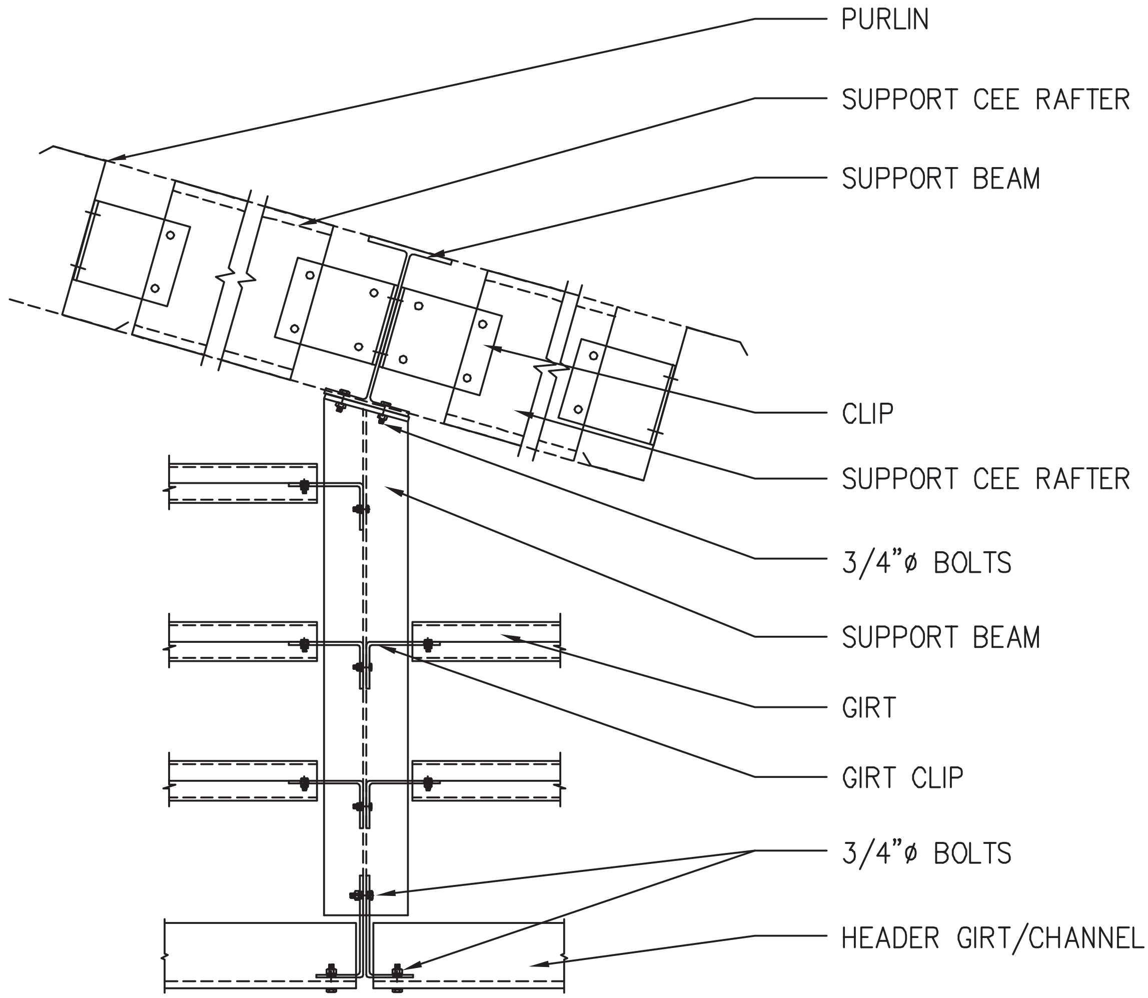
TYPICAL LARGE OPENING

OPENING near CORNER COLUMN

JULY 2008
Vr 1.0

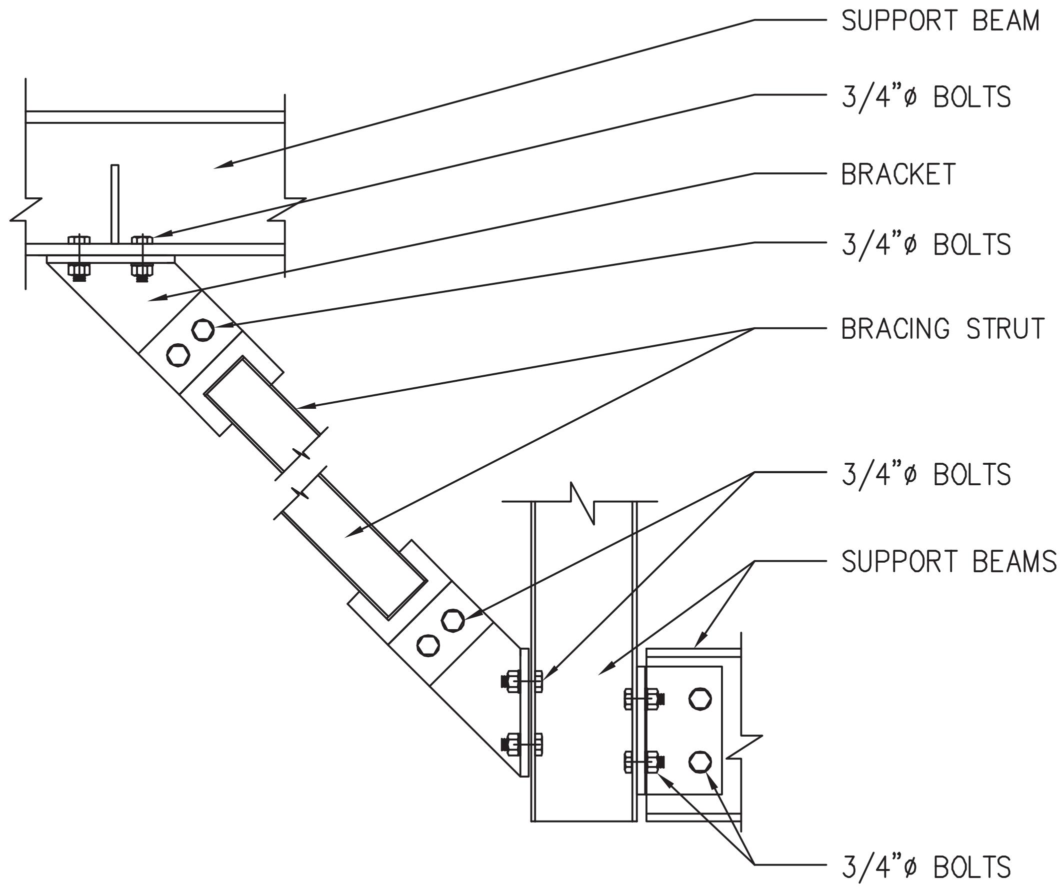
Section	Page
8.6	006

BEHLEN
Made Strong



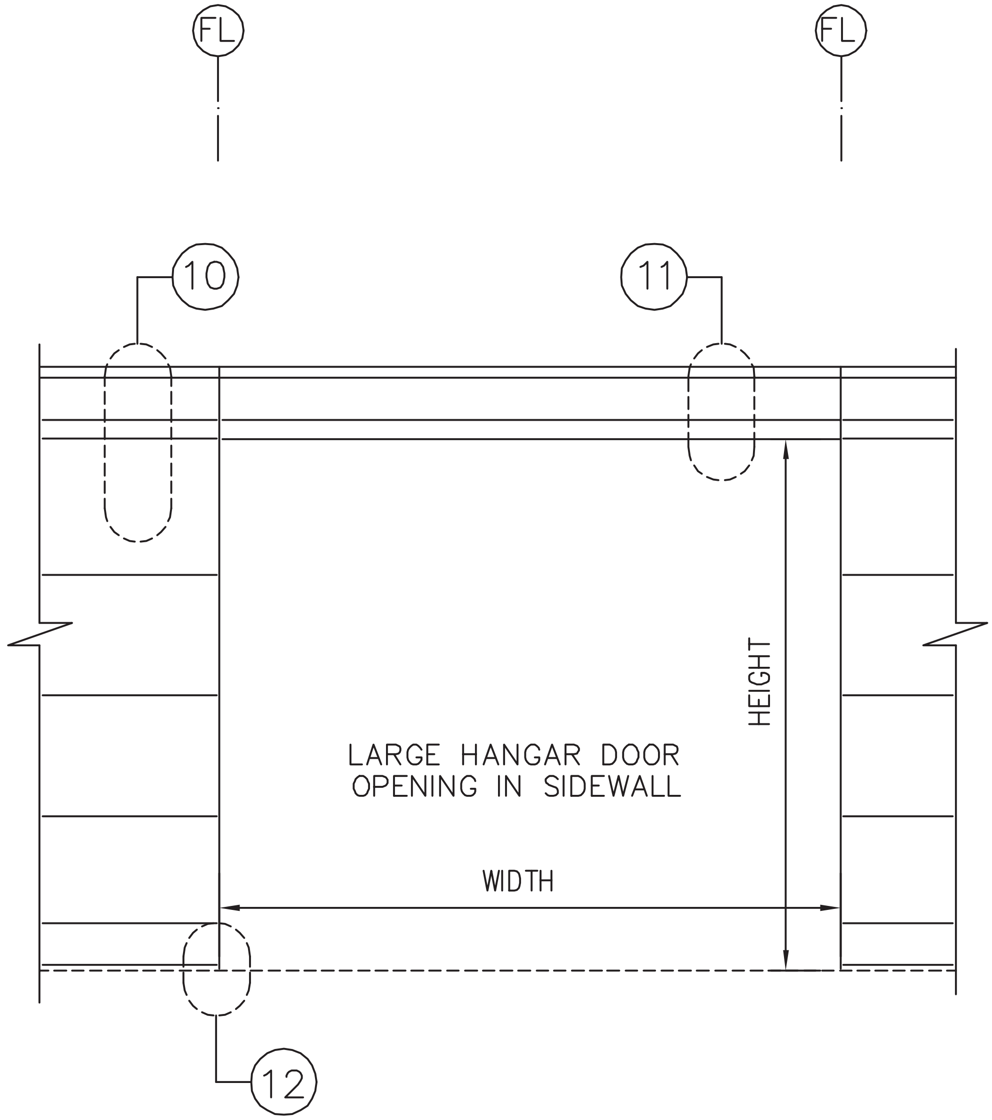
TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
SUPPORT BEAM END CONNECTION	Section 8.6	Page 007

BEHLEN
Made Strong



TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
BRACING CONNECTION	Section 8.6	Page 008

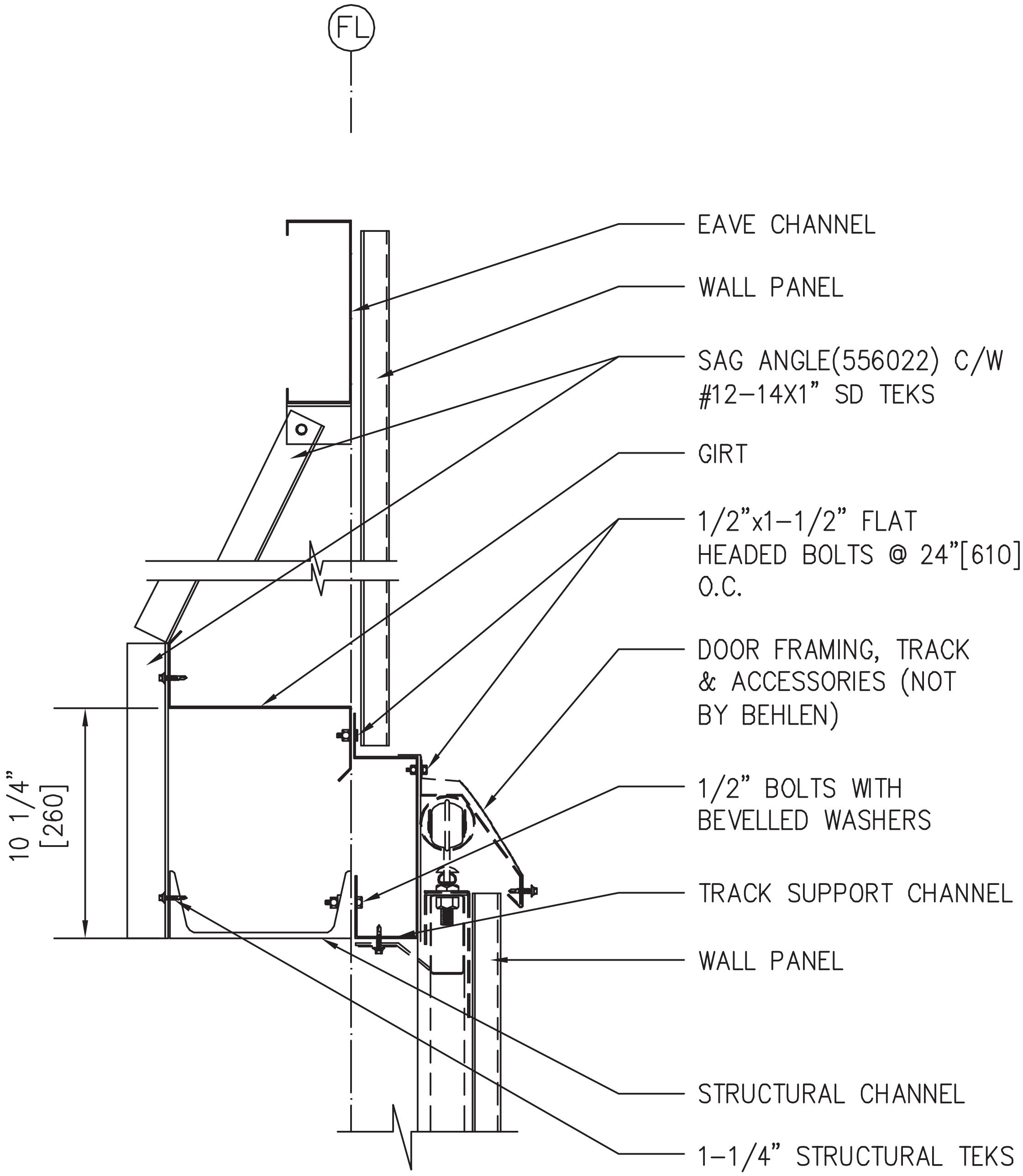
BEHLEN
Made Strong



FL – FRAME LINE
GL – GRID LINE
NUMBERS in BUBBLES are PAGE NUMBERS

TYPICAL LARGE OPENING	JULY 2008
	Vr 1.0
ENDWALL OPENING ELEVATION	Section 8.6 / Page 009

BEHLEN
Made Strong

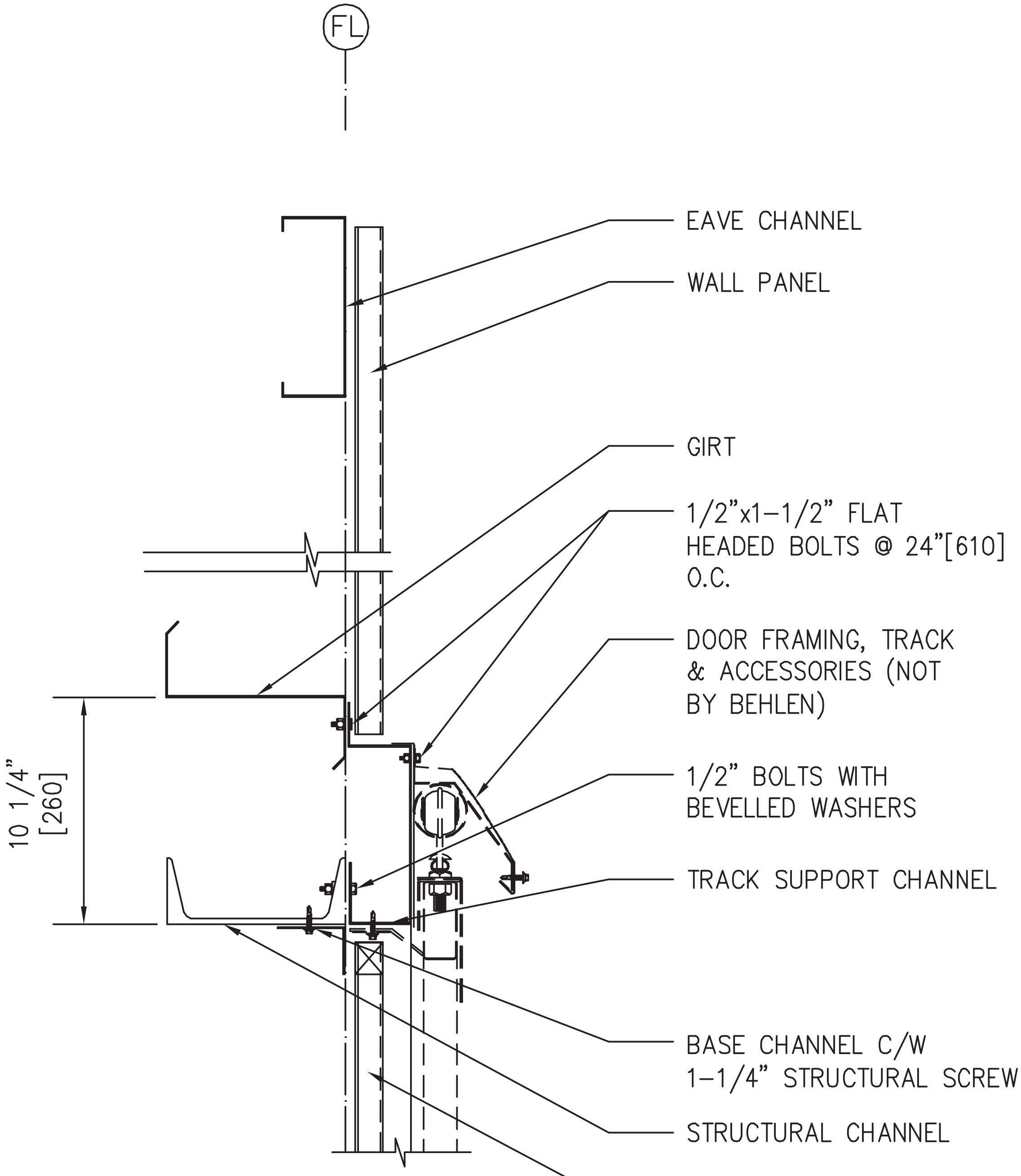


DETAIL
–CROSS SECTION FROM SIDEWALL

FL – FRAME LINE

TYPICAL LARGE OPENING	JULY 2008
	Vr 1.0
OPENING near SIDEWALL COLUMN I	Section 8.6 / Page 010

BEHLEN
Made Strong

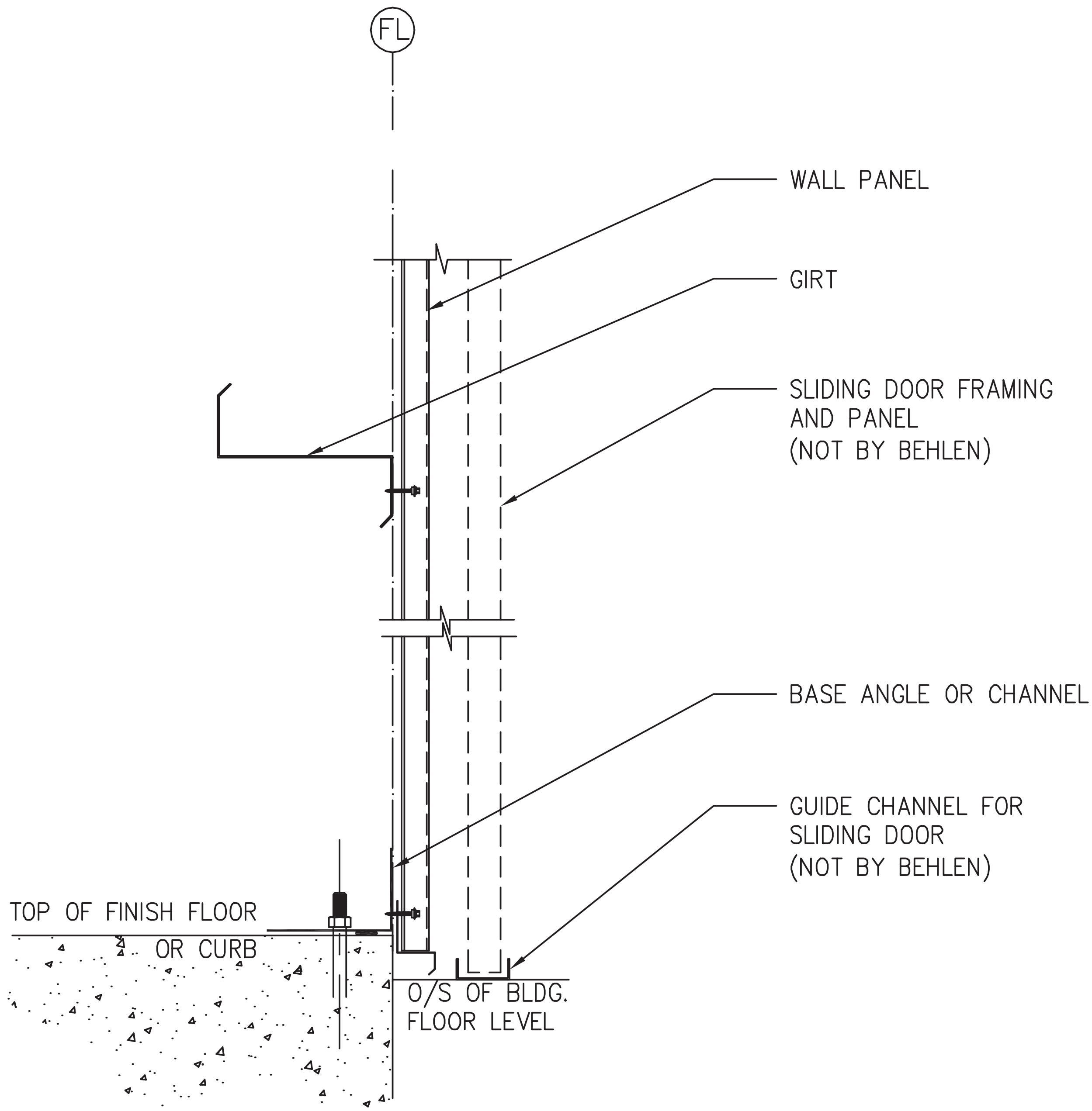


DETAIL
-CROSS SECTION FROM SIDEWALL

FL - FRAME LINE

TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
OPENING near SIDEWALL COLUMN II	Section 8.6	Page 011

BEHLEN
Made Strong



DETAIL
—CROSS SECTION FROM SIDEWALL

FL — FRAME LINE

TYPICAL LARGE OPENING	JULY 2008	
	Vr 1.0	
OPENING near SIDEWALL COLUMN III	Section 8.6	Page 012

BEHLEN
Made Strong

SECTION 9
MISCELLANEOUS DETAILS

BEHLEN
Made Strong

INDEX

MISCELLANEOUS DETAILS

Section 9.1 - MISCELLANEOUS DETAILS

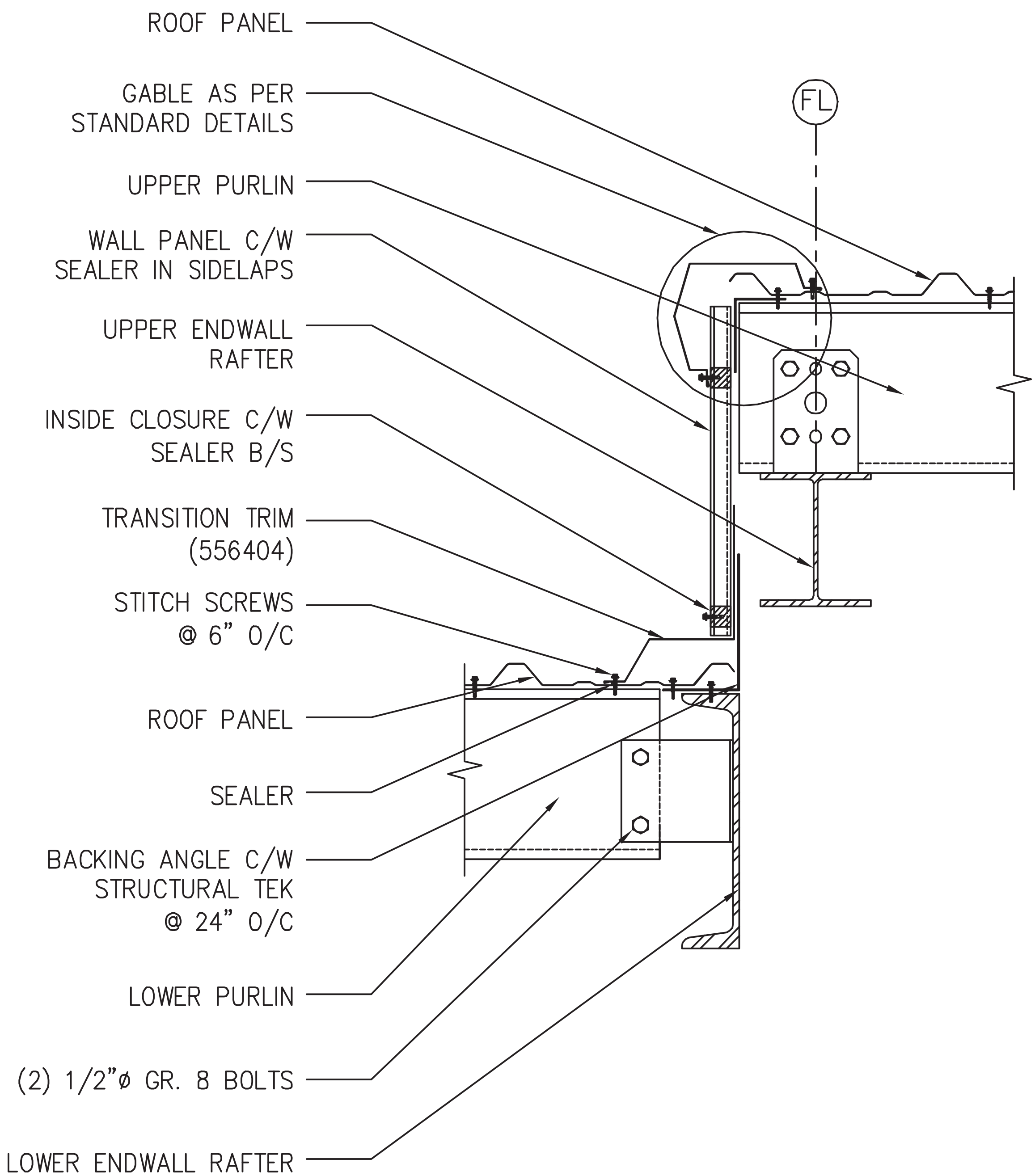
ROOF STEP TRANSITION	001

Section 9.2 - SUSPENSION DETAILS

GENERAL LAYOUT	001
ROD SUPPORT DETAIL	002
ROD with CLAMP SUPPORT DETAIL	003
SUPPORT ANGLE DETAIL	004

Section 9.3 - FIRE SEPERATION DETAILS

FRAMING on ONE SIDE	001
FRAMING on TWO SIDES	002
FIRE WALL at SIDEWALL CORNER I	003
FIRE WALL at SIDEWALL CORNER II	004
FIRE WALL at COLUMN	005
FIRE WALL at BOTH WALLS	006
FIRE WALL at ENDWALL I	007
FIRE WALL at ENDWALL II	008
FIRE WALL at ENDWALL RAFTER	009
FIRE WALL at BASE	010
FIRE WALL at EAVE	011
FIRE WALL at GABLE	012
FIRE WALL at PARTITION WALL	013
FIRE WALL at PARTITION ROOF	014



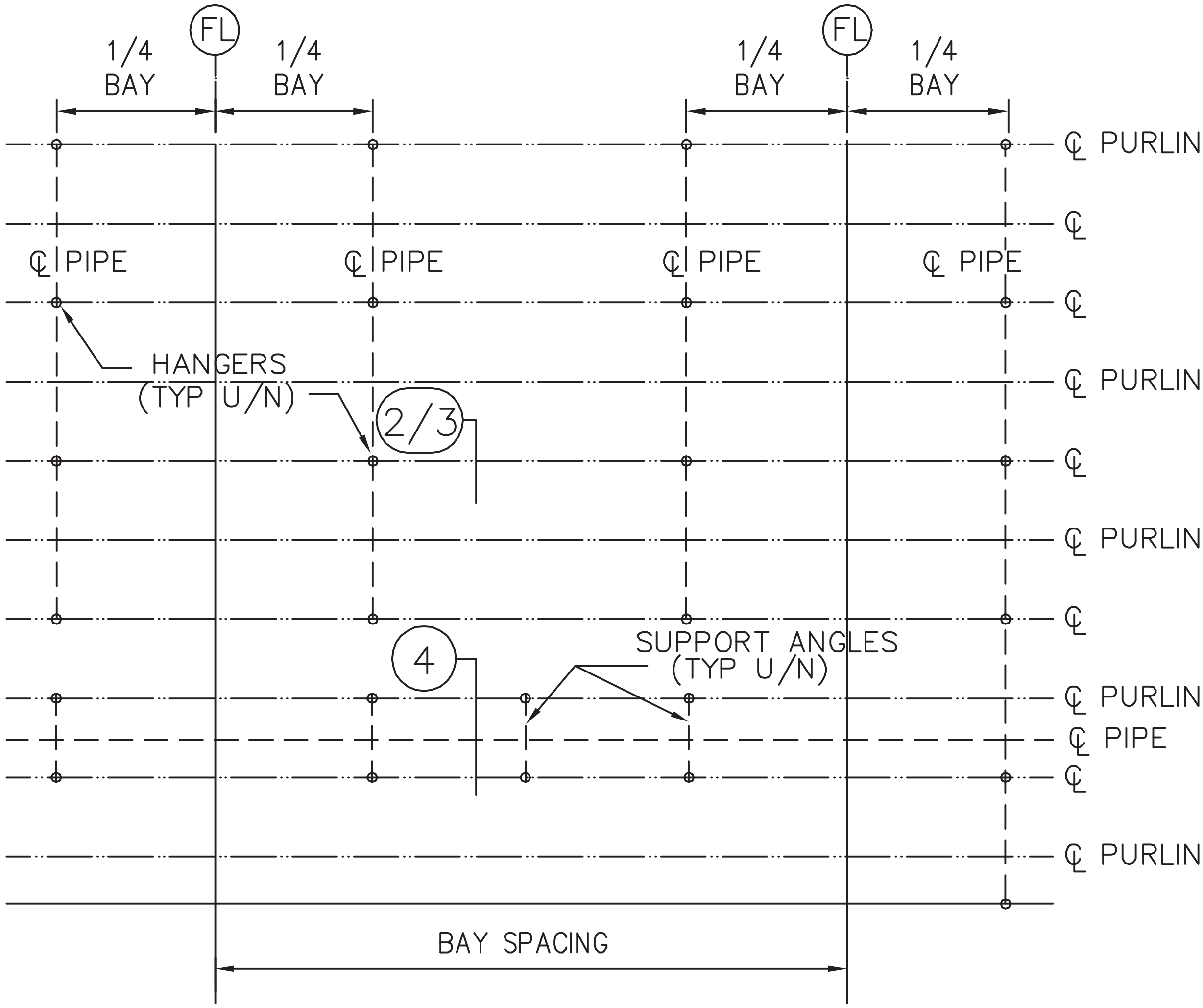
SECTION

MISCELLANEOUS DETAILS

ROOF STEP TRANSITION

JULY 2008	
Vr 1.0	
Section	Page
9.1	001

BEHLEN
Made Strong



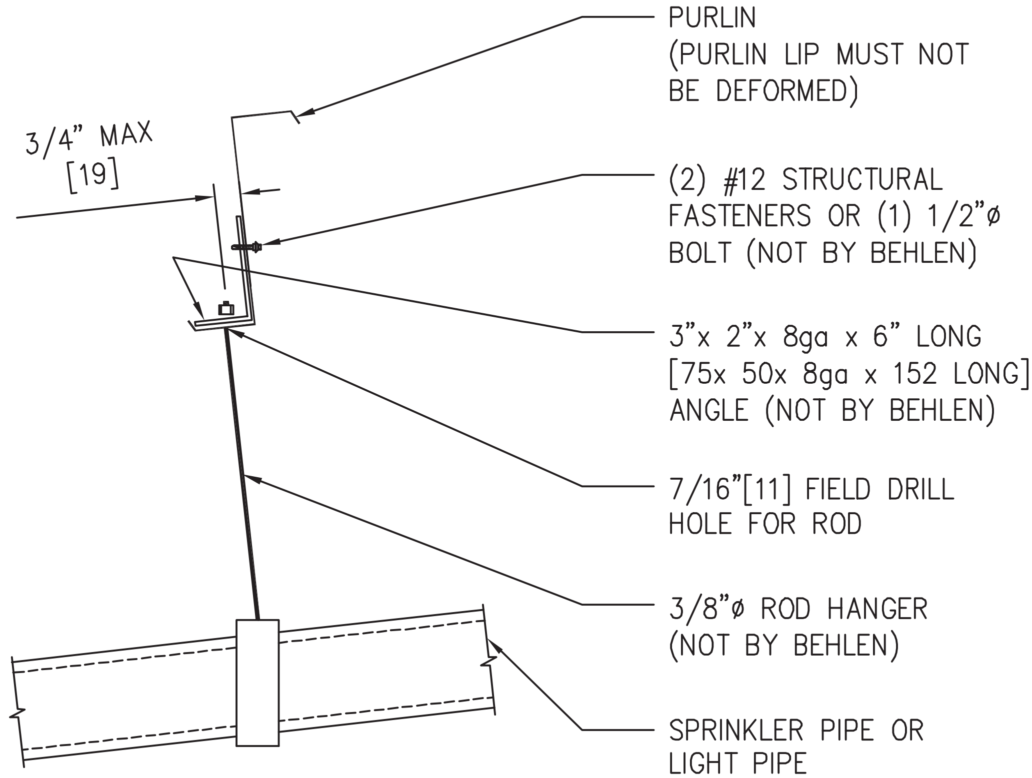
TYPICAL SPRINKLER PIPE LAYOUT

NOTES:

1. BUILDING DESIGN MUST INCORPORATE SUFFICIENT COLLATERAL LOAD CAPACITY TO PERMIT SUSPENDING ADDITIONAL LOADS.
2. PIPE HANGERS AS WELL AS SUPPORT ANGLES ASSUMED AT 10'–0"[3048] SPACING LOCATED PER TYPICAL PIPE LAYOUT.
3. PURLIN SPACE ASSUMED TO BE 5'–0"[1524] ON CENTERS.
4. SPECIAL CONSIDERATION SHOULD BE MADE WHEN ALL BAYS ARE NOT UNIFORMLY LOADED.
5. HANGERS, SUPPORT ANGLES CATCH WITH FASTENERS BY OTHERS, NOT BY BEHLEN.

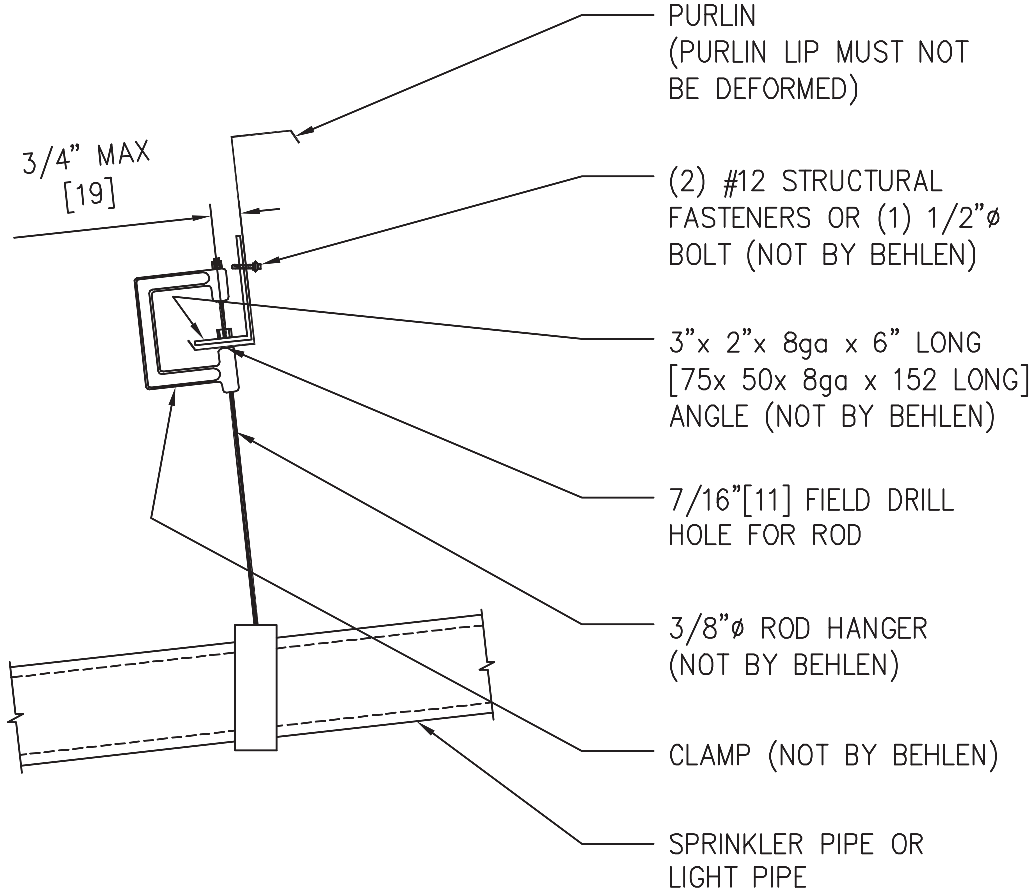
FL – FRAME LINE
NUMBERS in BUBBLES are PAGE NUMBERS

SUSPENSION DETAILS	JULY 2008	
	Vr 1.0	
GENERAL LAYOUT	Section 9.2	Page 001



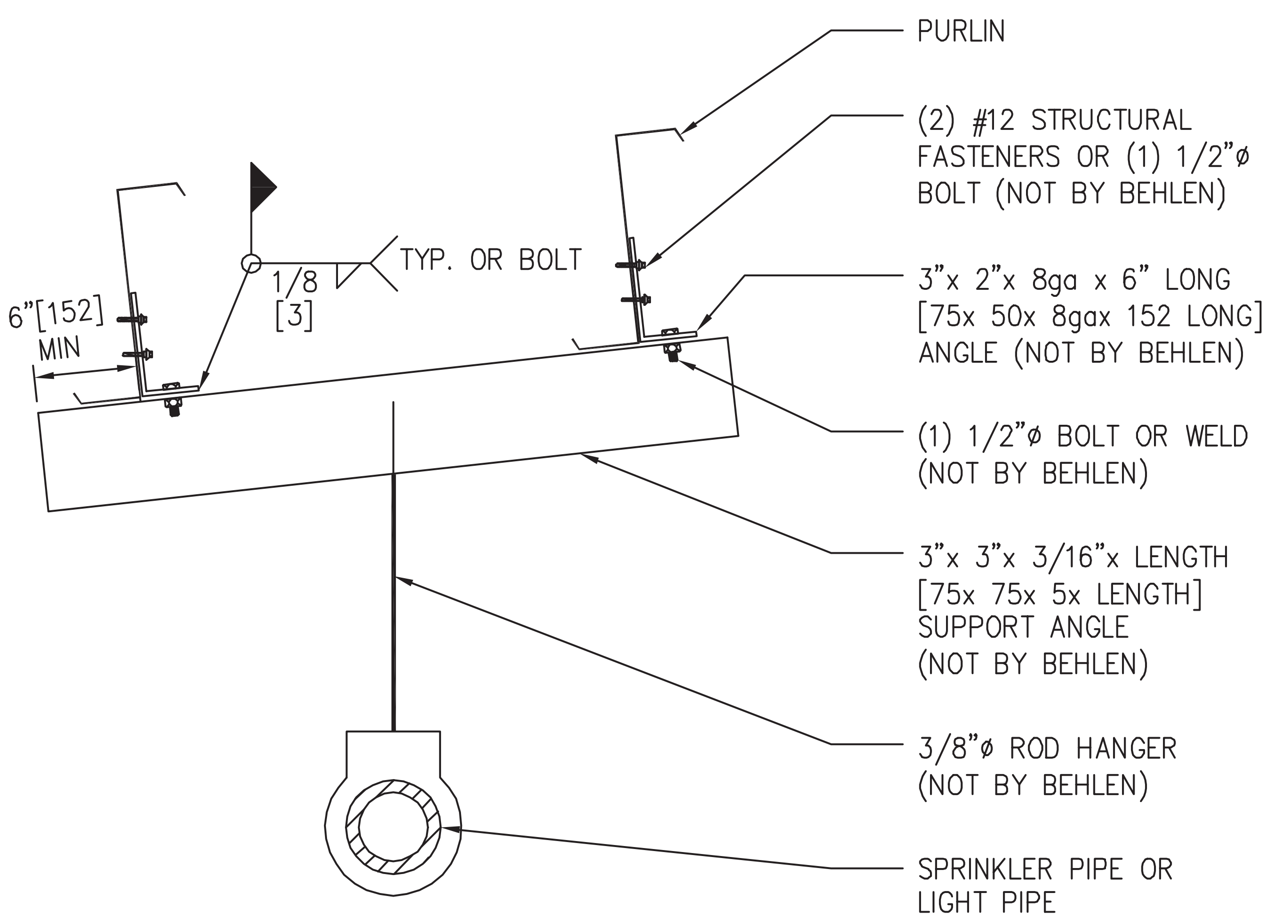
SUSPENSION DETAILS	JULY 2008	Vr 1.0
ROD SUPPORT DETAIL	Section 9.2	Page 002

BEHLEN
Made Strong



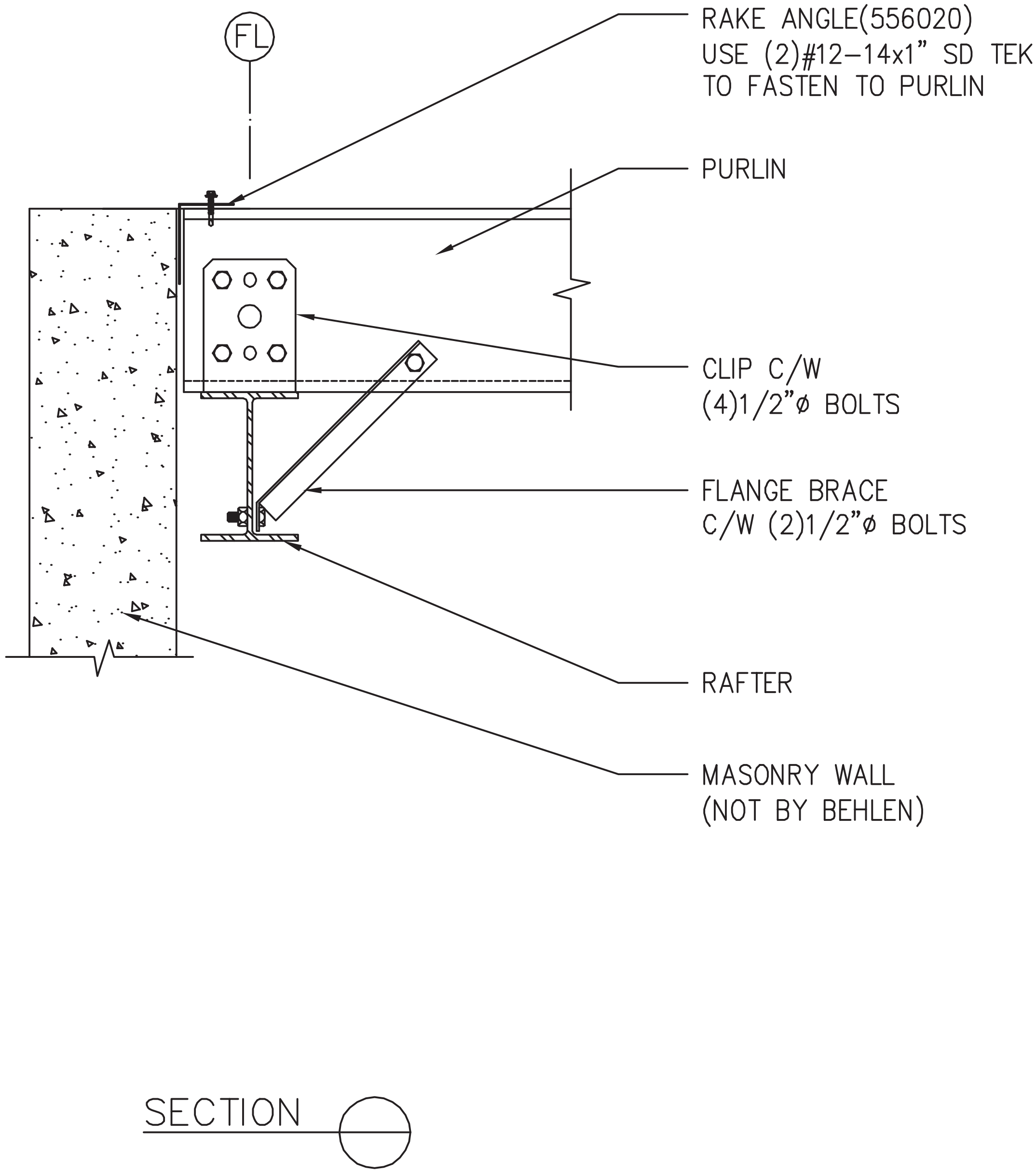
SUSPENSION DETAILS	JULY 2008	
	Vr 1.0	
ROD with CLAMP SUPPORT DETAIL	Section 9.2	Page 003

BEHLEN
Made Strong



SUSPENSION DETAILS	JULY 2008	
	Vr 1.0	
SUPPORT ANGLE DETAIL	Section 9.2	Page 004

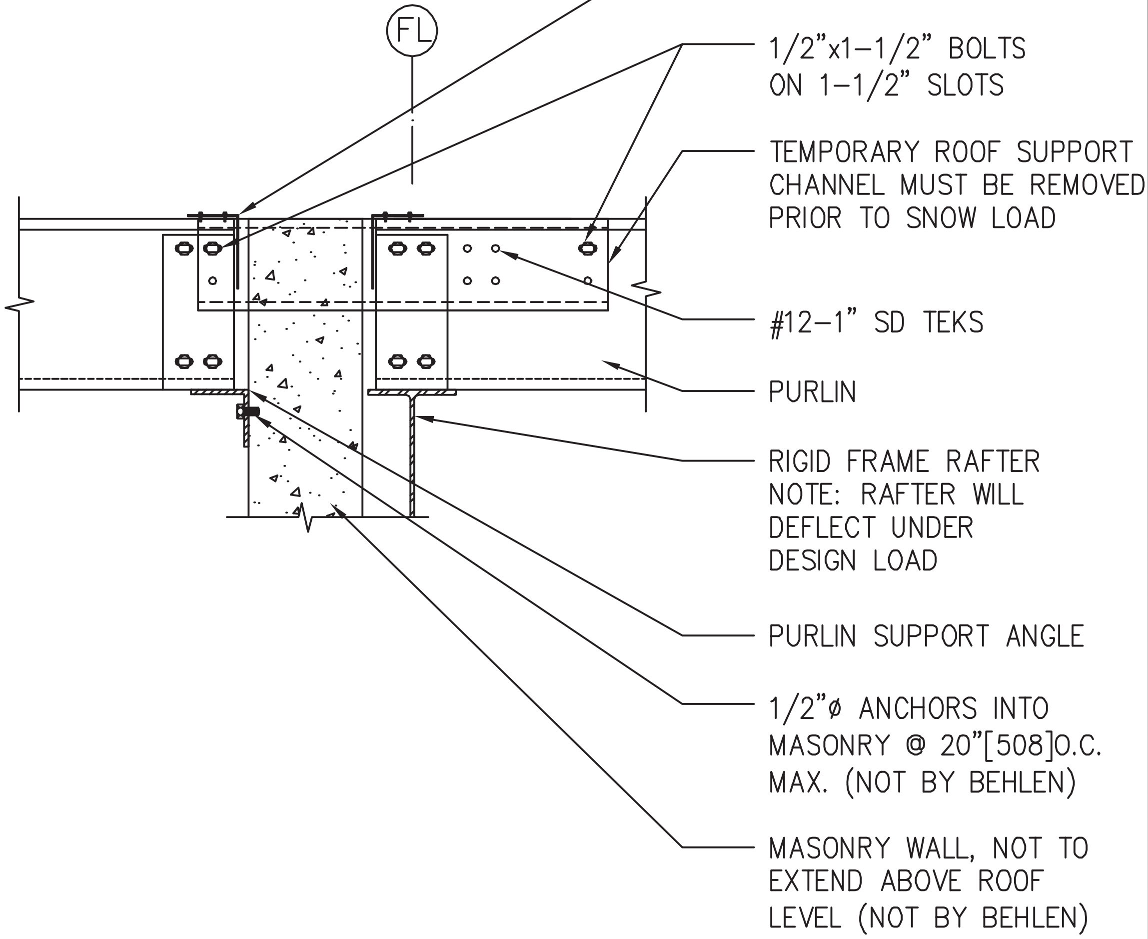
BEHLEN
Made Strong



FL – FRAME LINE

FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FRAMING on ONE SIDE	Section 9.3	Page 001

BEHLEN
Made Strong



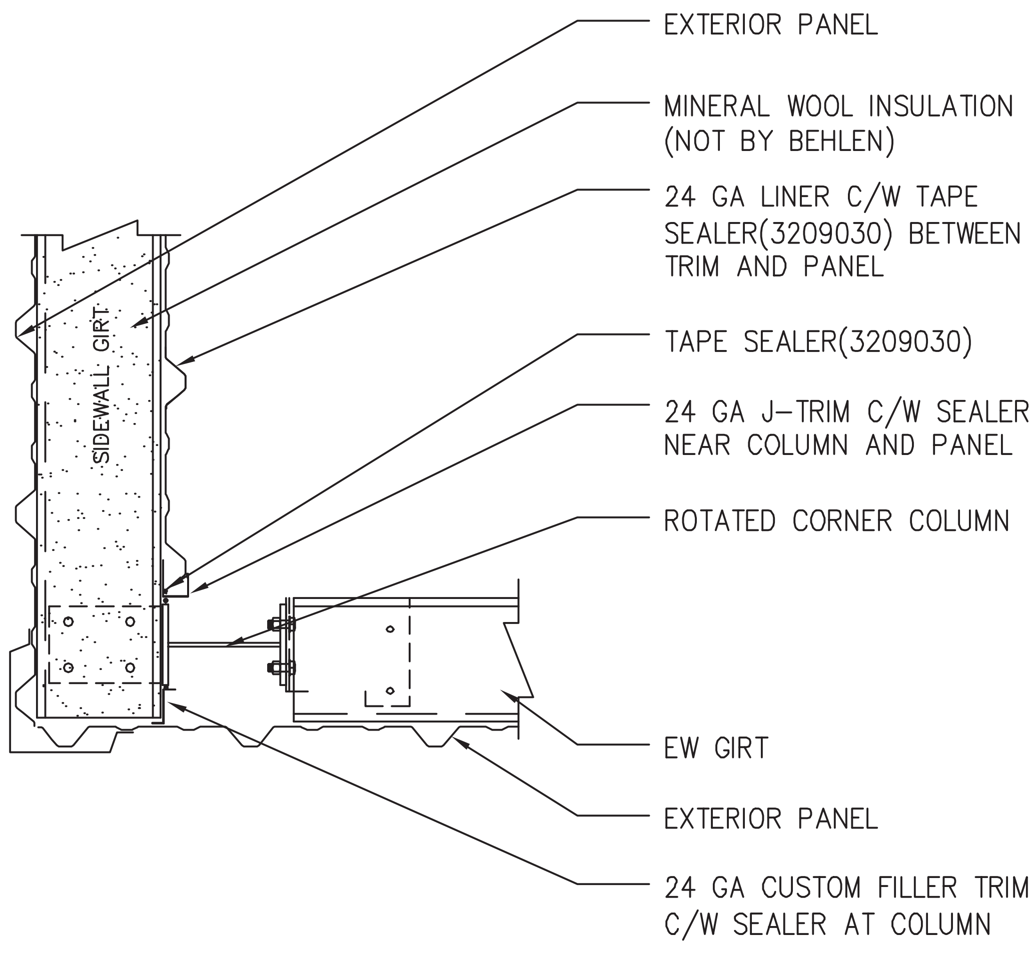
SECTION

-PURLIN CONNECTION AT MASONRY WALL
-BLOCK WALL/SSR PANEL INSTALLATION
MUST ALLOW FOR FRAME DEFLECTION

FL - FRAME LINE

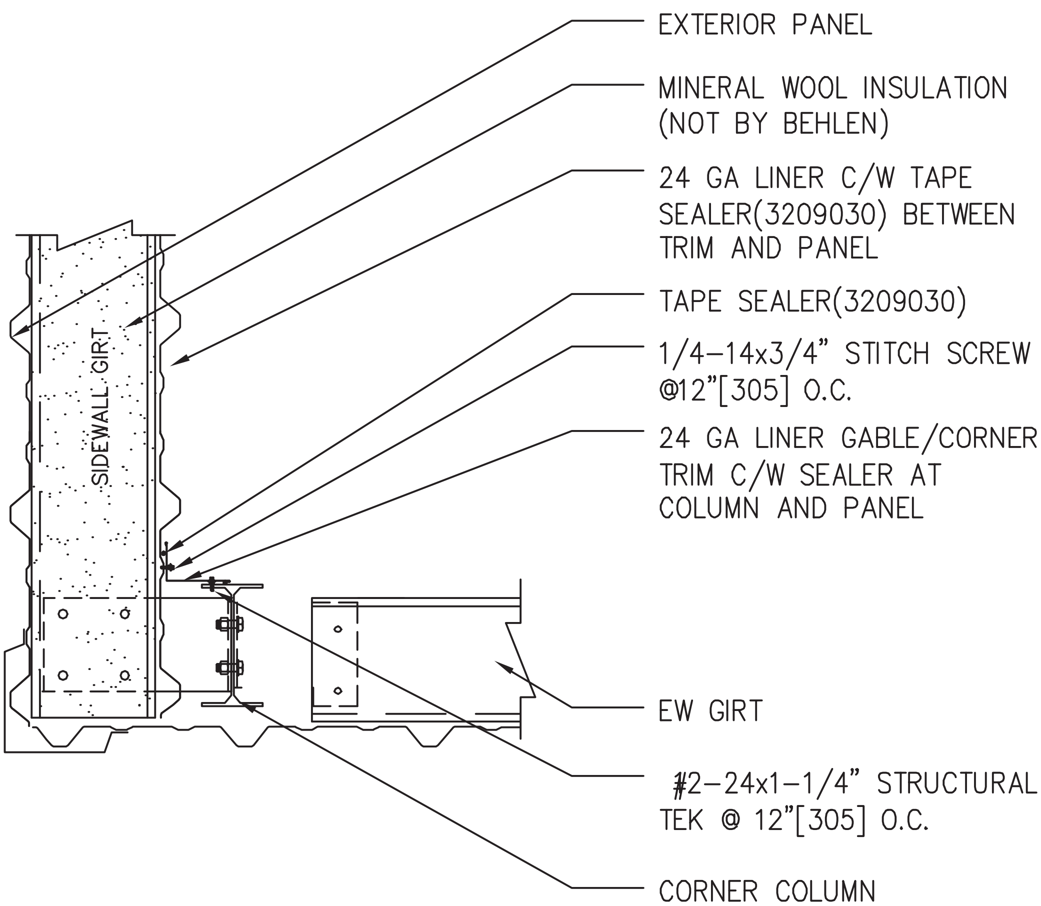
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FRAMING on TWO SIDES	Section 9.3	Page 002

BEHLEN
Made Strong



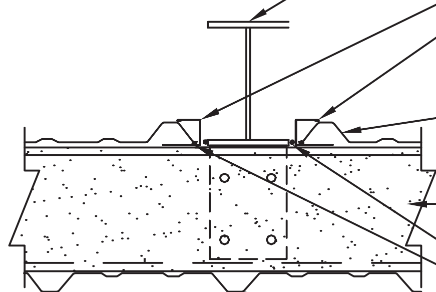
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at SIDEWALL CORNER I	Section 9.3	Page 003

BEHLEN
Made Strong



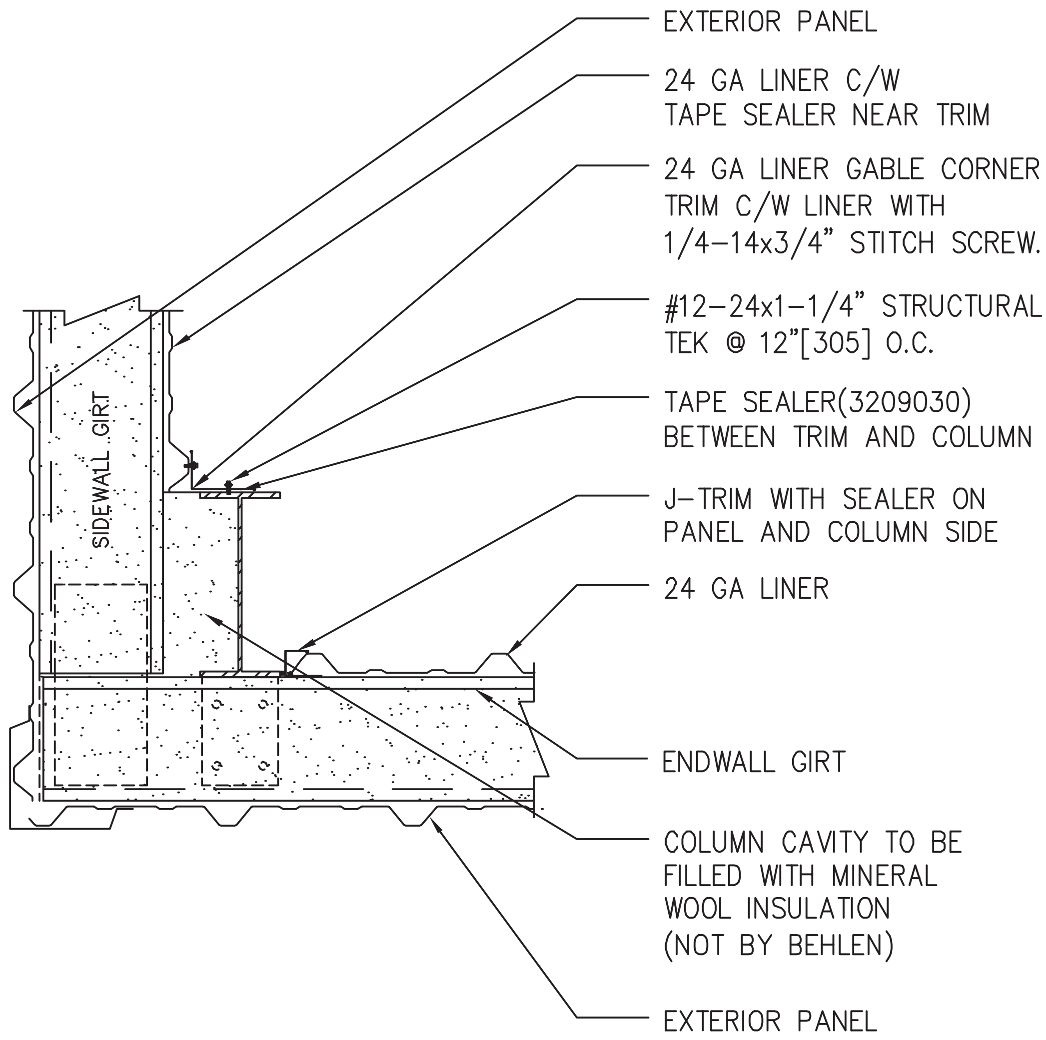
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at SIDEWALL CORNER II	Section 9.3	Page 004

BEHLEN
Made Strong



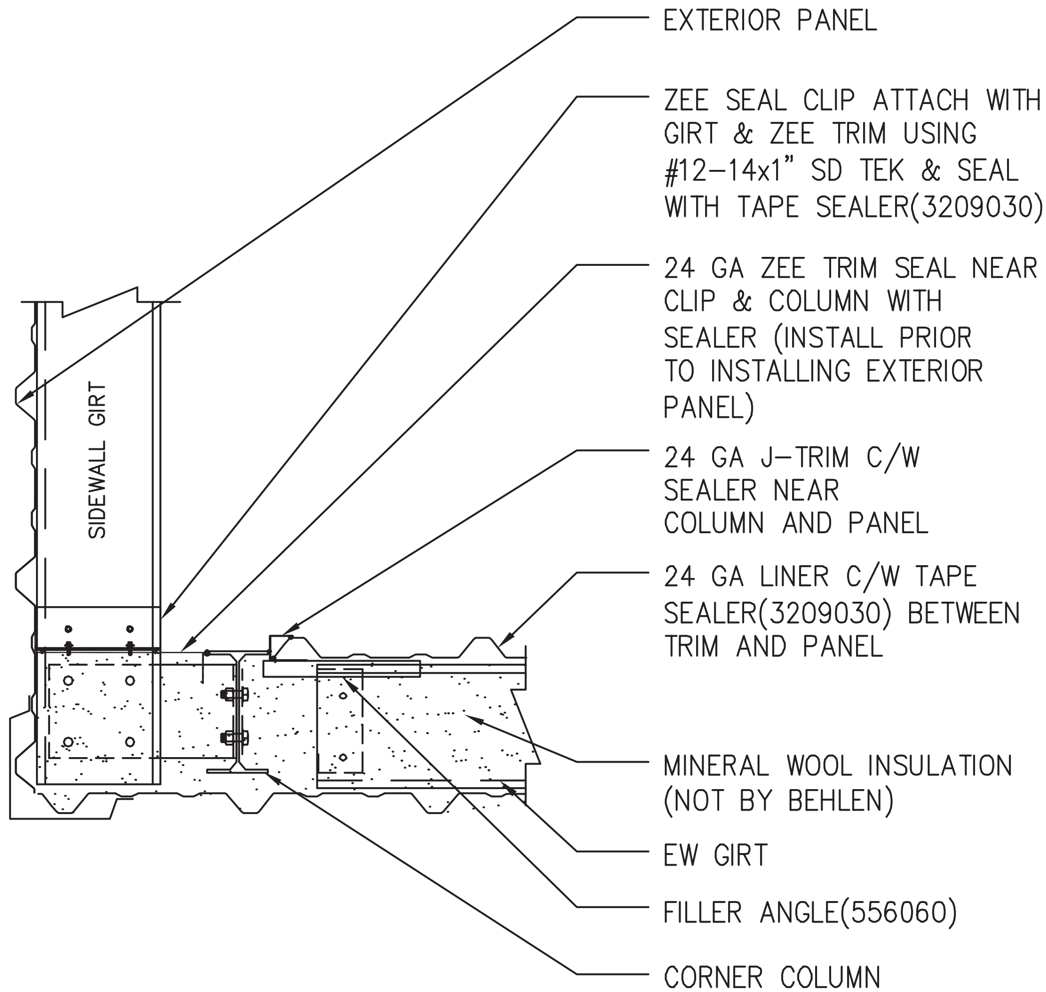
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at COLUMN	Section 9.3	Page 005

BEHLEN
Made Strong



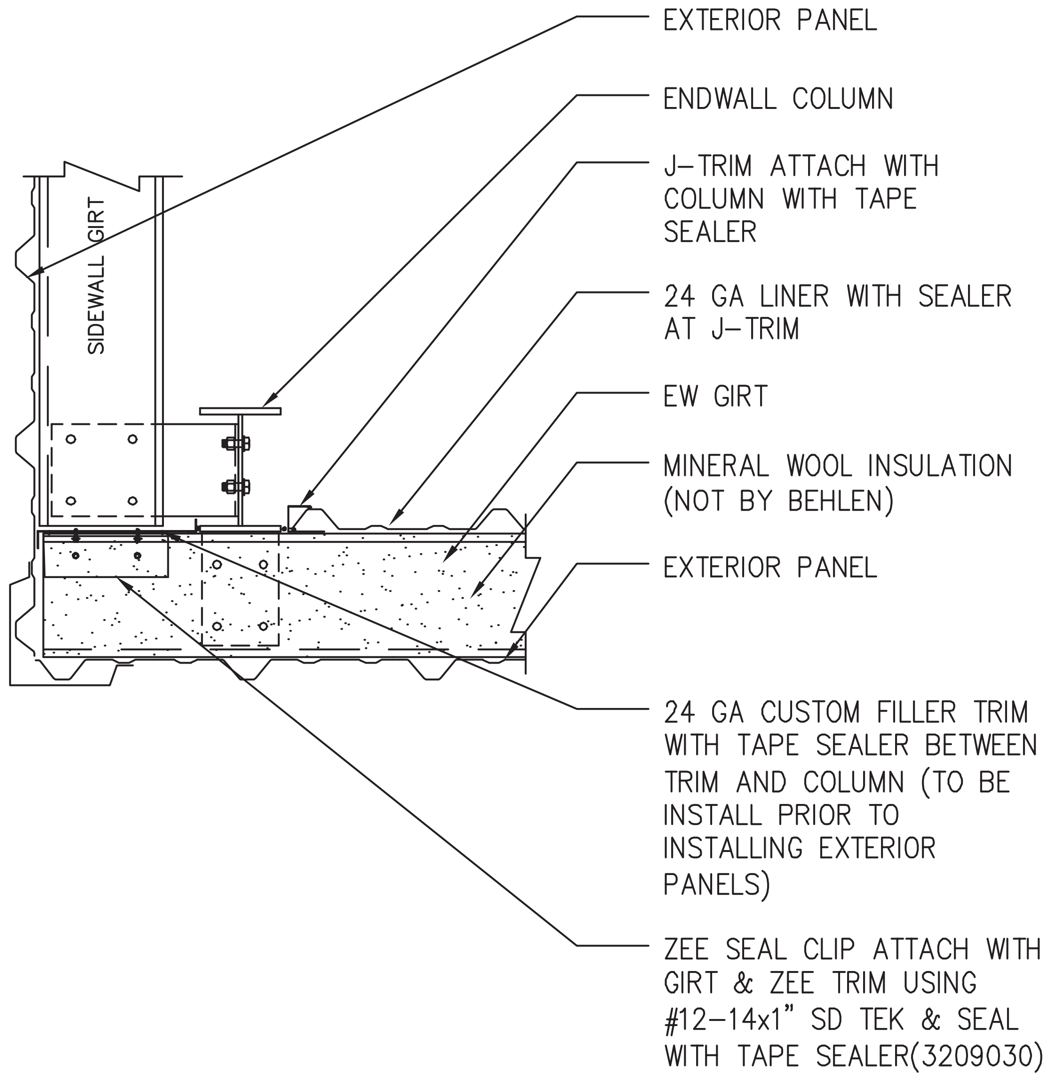
FIRE SEPARATION DETAILS	JULY 2008 Vr 1.0	
FIRE WALL at BOTH WALLS	Section 9.3	Page 006

BEHLEN
Made Strong



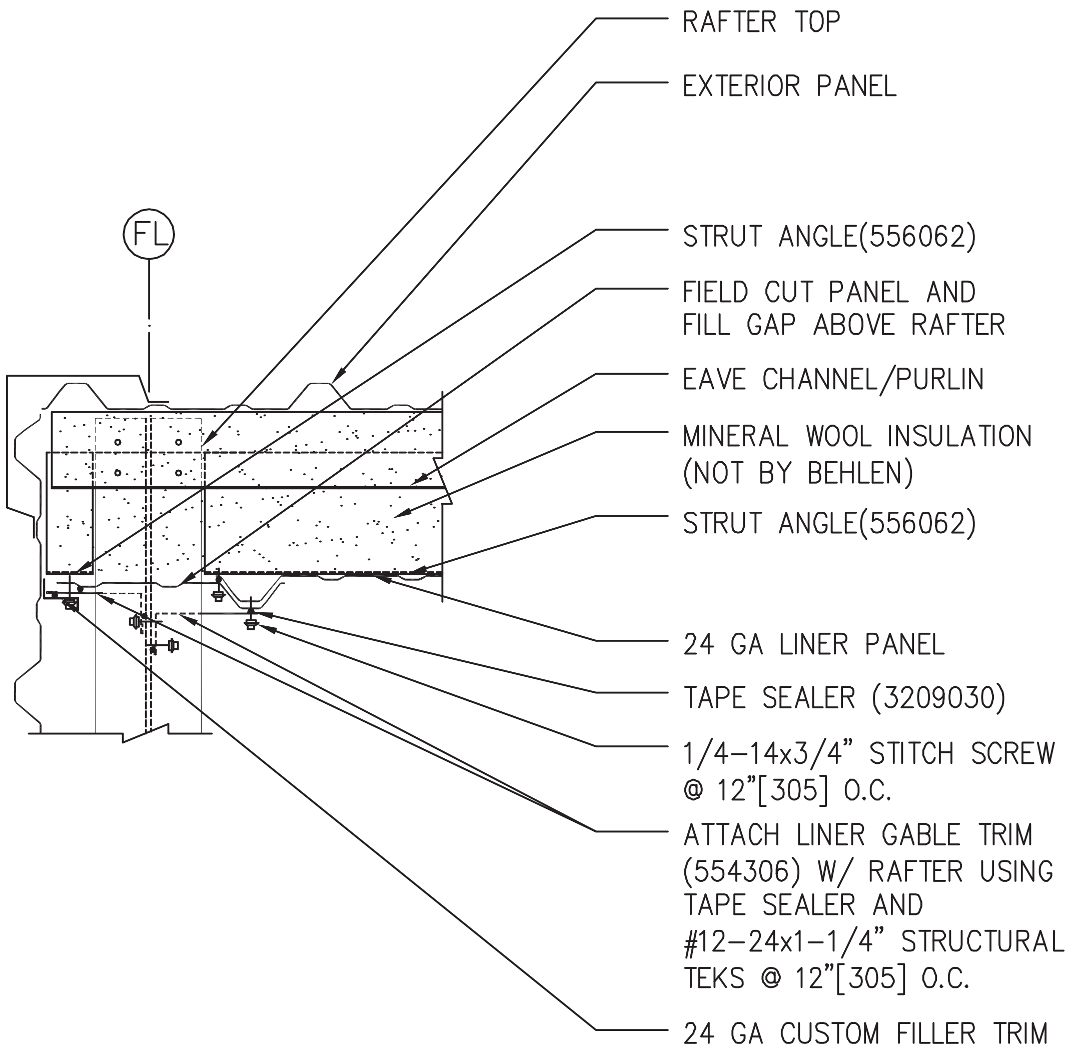
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at ENDWALL I	Section 9.3	Page 007

BEHLEN
Made Strong



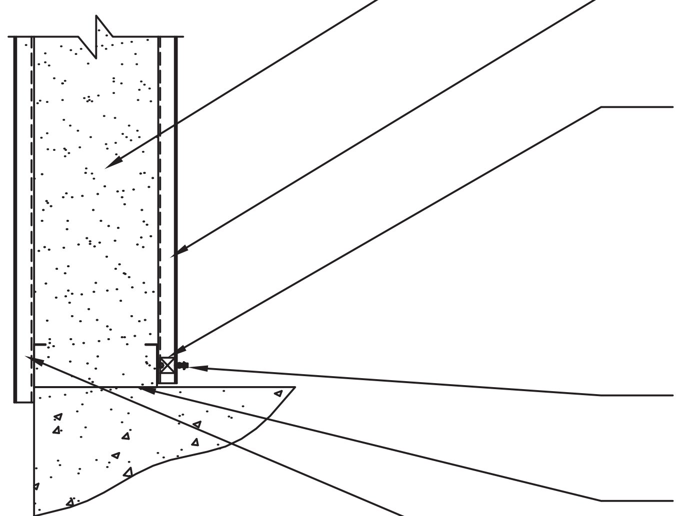
FIRE SEPARATION DETAILS	JULY 2008 Vr 1.0	
FIRE WALL at ENDWALL II	Section 9.3	Page 008

BEHLEN
Made Strong

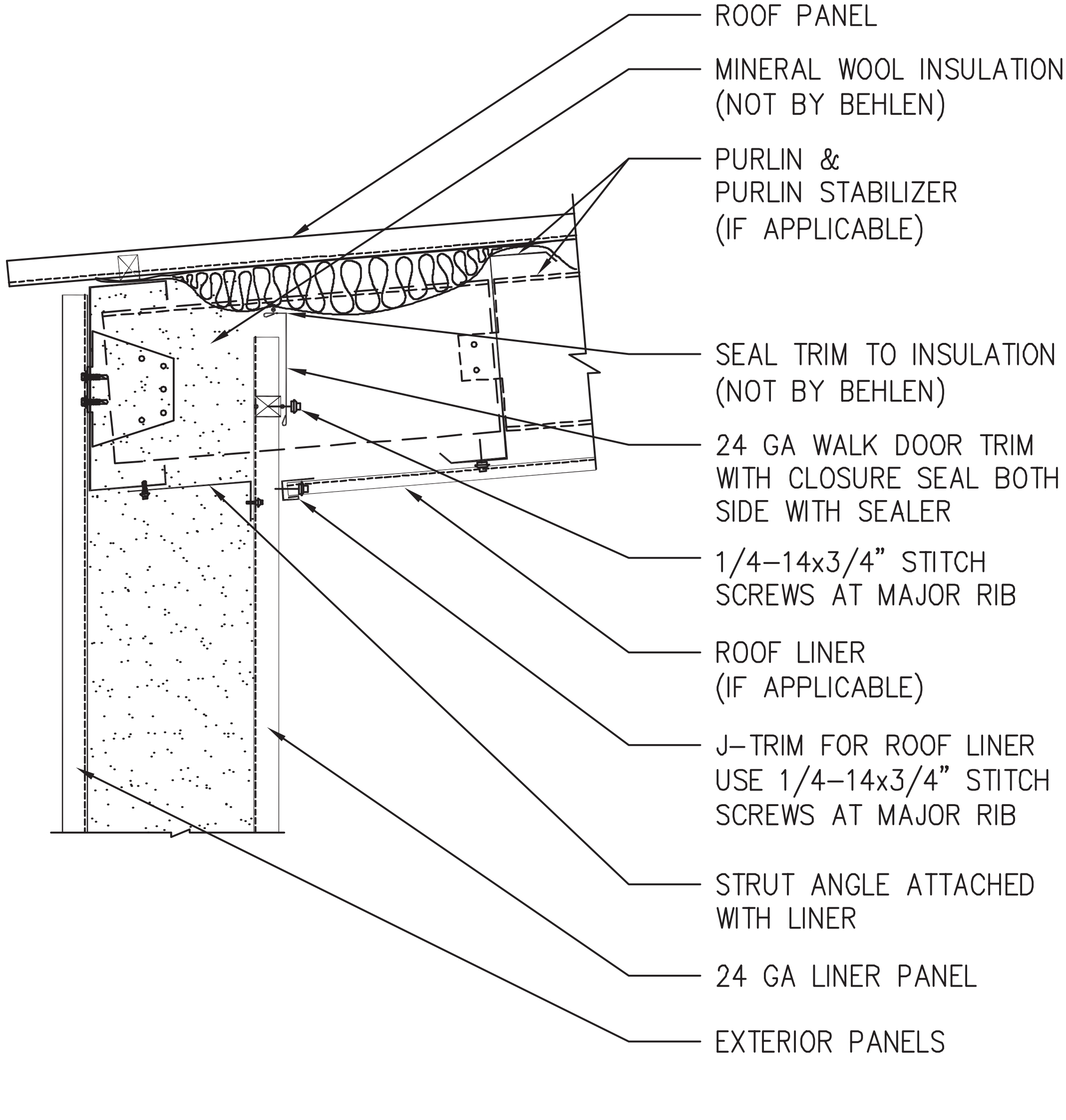


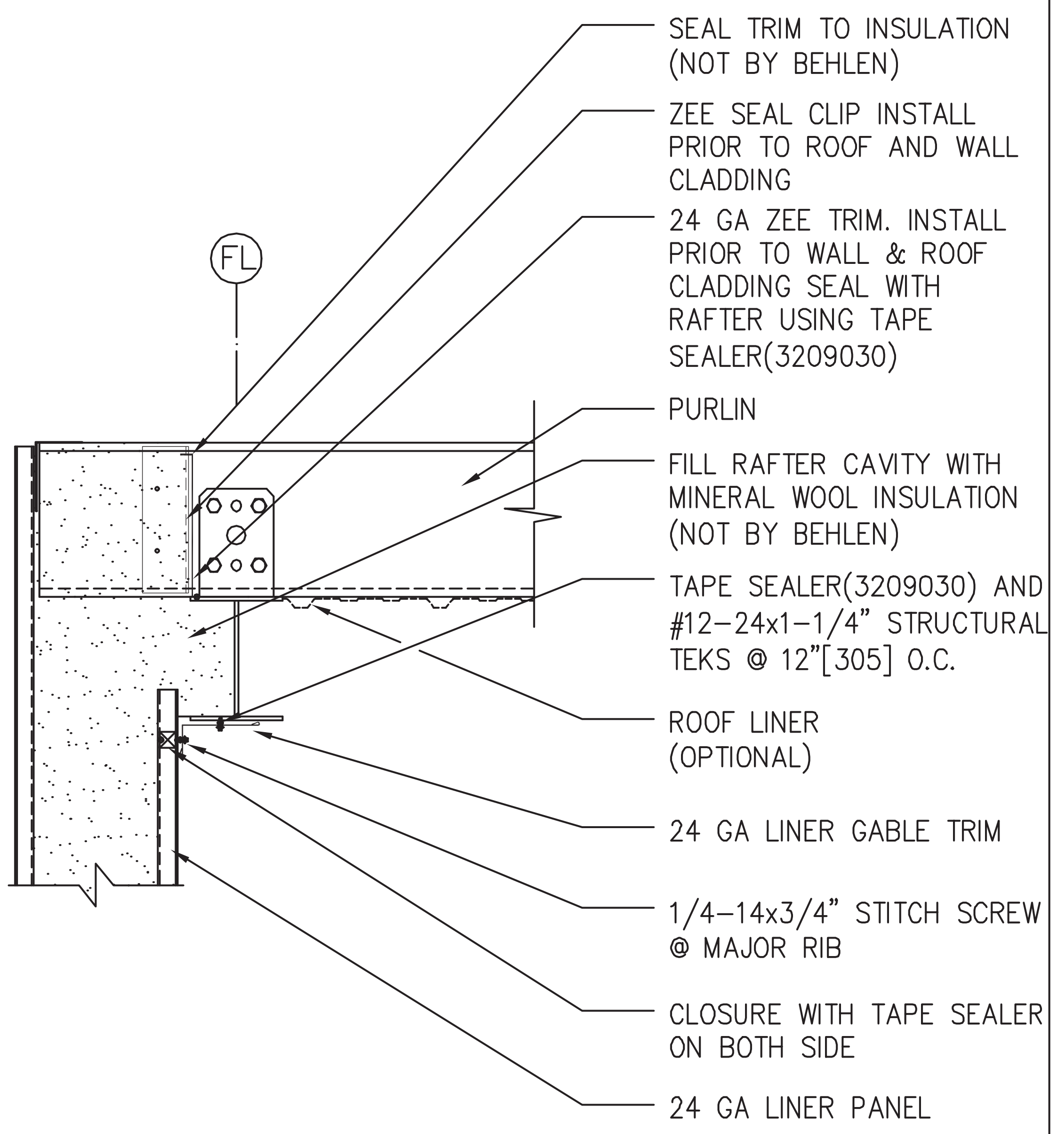
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at ENDWALL RAFTER	Section 9.3	Page 009

BEHLEN
Made Strong



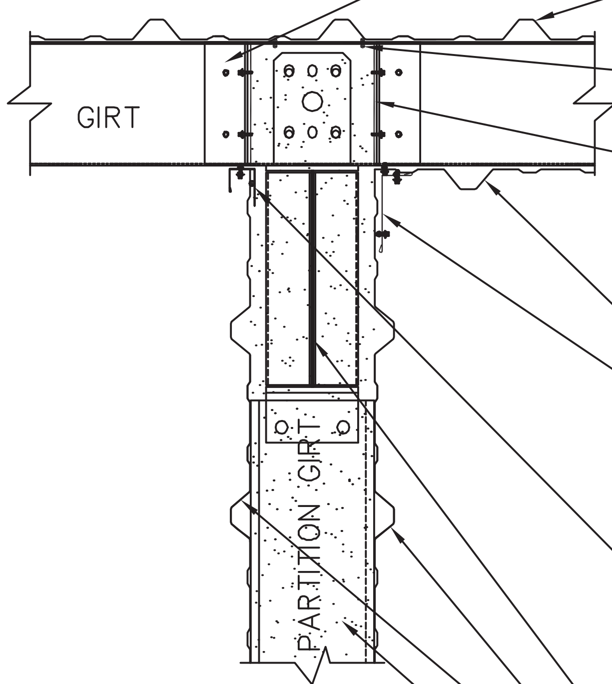
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at BASE	Section 9.3	Page 010


ROOF PANEL
MINERAL WOOL INSULATION (NOT BY BEHLEN)
PURLIN & PURLIN STABILIZER (IF APPLICABLE)
SEAL TRIM TO INSULATION (NOT BY BEHLEN)
24 GA WALK DOOR TRIM WITH CLOSURE SEAL BOTH SIDE WITH SEALER
1/4–14x3/4" STITCH SCREWS AT MAJOR RIB
ROOF LINER (IF APPLICABLE)
J–TRIM FOR ROOF LINER USE 1/4–14x3/4" STITCH SCREWS AT MAJOR RIB
STRUT ANGLE ATTACHED WITH LINER
24 GA LINER PANEL
EXTERIOR PANELS



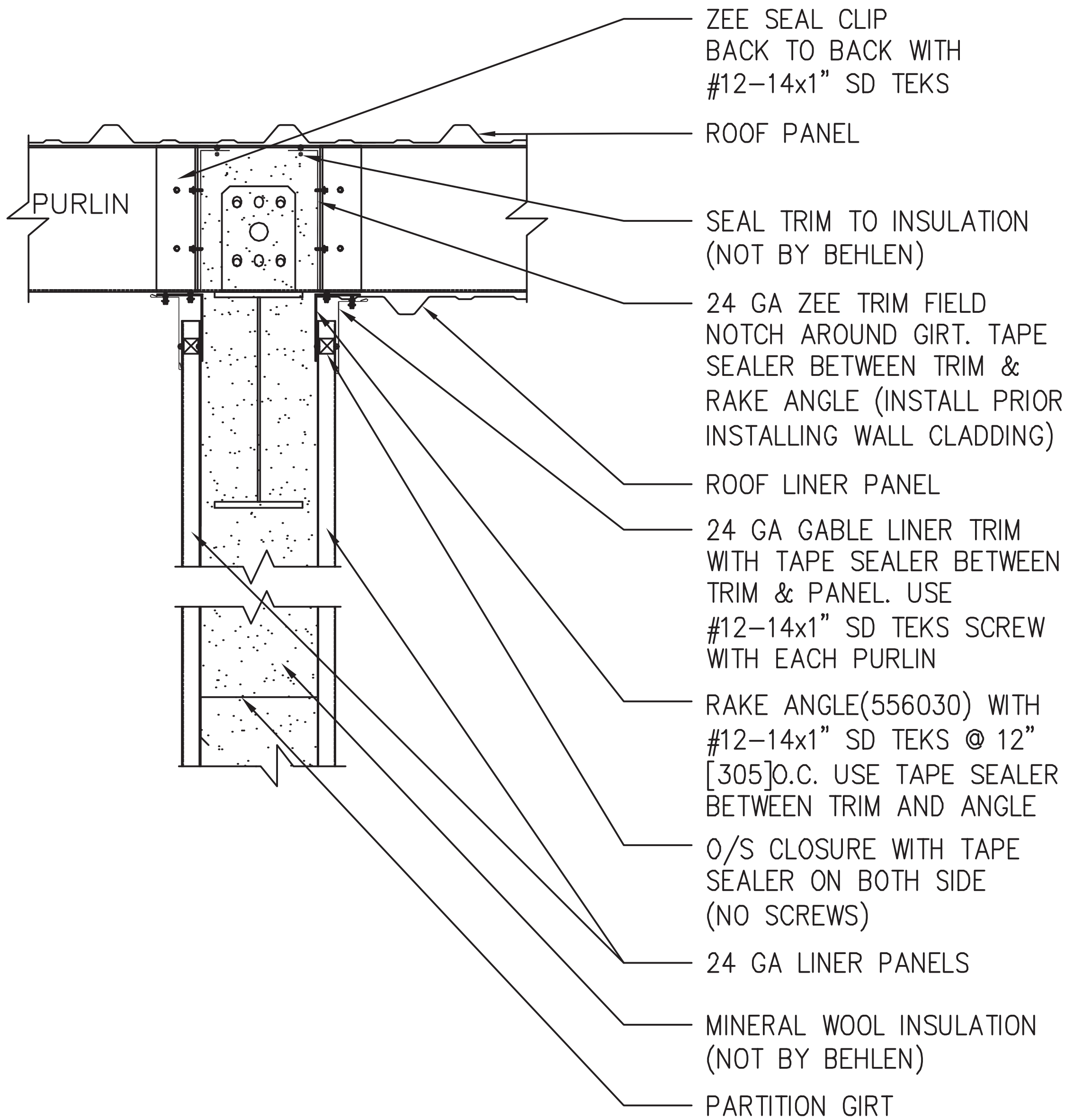
FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at GABLE	Section 9.3	Page 012

BEHLEN
Made Strong



FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at PARTITION WALL	Section 9.3	Page 013

BEHLEN
Made Strong



FIRE SEPARATION DETAILS	JULY 2008	
	Vr 1.0	
FIRE WALL at PARTITION ROOF	Section 9.3	Page 014

BEHLEN
Made Strong

SECTION 10
COLOUR CHART