APEX
ENGINEERS, INC.

Tuesday, June 28, 2022

Rueben Hamman
Haren Companies
8035 Nieman Road
Lenexa, Kansas 66214

RE: Prime Physical Therapy
1161 NE Rice Road
Lee's Summit, MO 64064

Apex Engineers, Inc. has been asked to analyze the existing roof framing for the addition of new mechanical units for the building located at the above stated address.

Our firm has reviewed the mechanical drawings from JSC Engineers dated 6/3/2022 that provides the approximate size and location for the new mechanical units. Per on site discussion with the contractor, the units were installed in alternate locations. See the attached PDF for reference.

The new units to be placed on the roof are as follows:

- (2) 'HP' condensing units to be placed on top of the existing roof system.
- (1) 'AHA" air handling unit to be place below the existing roof system, supported by Unistrut.

After review, the existing 8" steel purlins were insufficient in supporting the additional load of the new mechanical units. It's our firm's recommendation that new members shall be installed to adequately support the new units.

- New 600S200-68 CFS members shall be placed at each end of the new units, spanning perpendicular to the existing roof members.
- New 600S200-68 CFS members shall be attached to the existing 8" purlin at each side of the new unit.
- See attached for additional information.

Please call if Apex Engineers, Inc. can be of further assistance.

LIMITATIONS

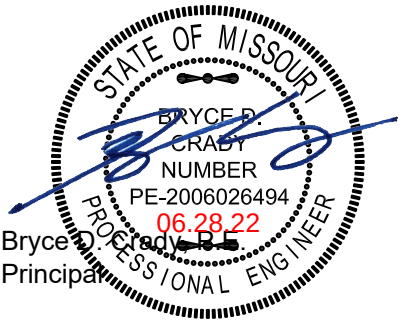
The scope of our services includes only those items specifically addressed herein. All other items are outside the scope of this inspection; including but not limited to, any environmental assessment (such as, but not limited to mold, mildew, presence of hazardous or toxic materials in the soil, surface water, ground water, etc.).

In addition, the scope our services does not include any evaluation of the building or site for job-site safety and/or hazardous conditions. All construction shall be performed in compliance with IBC/IRC and OSHA standards at all times. Our firm has not been retained to examine the site or building for any of these conditions. In addition, the contractor shall retain sole responsibility for the quality of work, for adhering to plans, specifications, appropriate codes, and, for repairing defects, deficiencies or omission, regardless of when they are found. By the use of this report it is understood the above conditions are agreed to

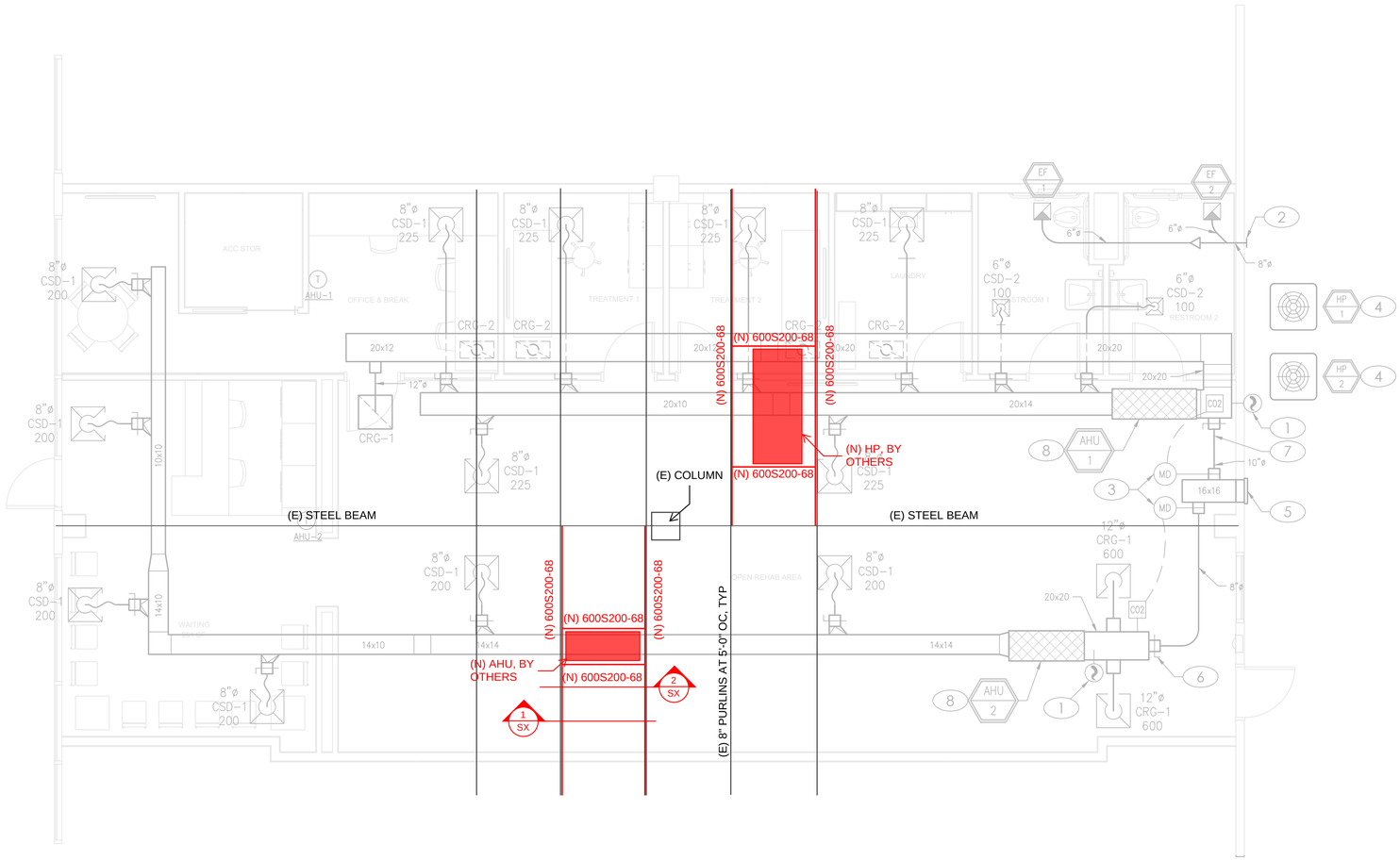
This report is intended for the confidential and exclusive use of Apex Engineers, Inc.'s client. No other person or company is authorized to use this report for any purpose without Apex Engineers, Inc.'s client permission. Without exception, this report will expire 180 days from the date of issuance. Please call if Apex Engineers, Inc. can be of further assistance.

Best Regards,
Apex Engineers, Inc.

Logan K. Chamberlin, P.E.
Associate



Bryce D. Crady, P.E.
Principal



MECHANICAL PLAN

SCALE : 1/4" = 1'-0"

1

NORTH

GENERAL NOTES

A. DRAWINGS ARE DIAGRAMMATIC ONLY AND REPRESENT THE GENERAL SCOPE OF WORK. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND PLANS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.

B. COORDINATE INSTALLATION OF MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION AND AVOID CONFLICTS. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. VERIFY DUCT SPACE AVAILABLE ABOVE ALL CEILINGS PRIOR TO ANY FABRICATION OF INSTALLATION.

C. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AROUND EQUIPMENT.

D. INSTALL DUCTWORK AND PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.

E. OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE ROOF.

F. ALL ROOF AND WALL PENETRATIONS SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. PROVIDE ALL REQUIRED SLEEVES, FLASHINGS, CURBS, REINFORCED ANGLES, SUPPORTING FRAMES, ETC. UNLESS THEY ARE SPECIFICALLY CALLED OUT TO BE FURNISHED BY OTHERS.

(#) KEYED PLAN NOTES

1. PROVIDE SMOKE DETECTOR IN RETURN AIR DUCT IN COMPLIANCE WITH NFPA 72. DUCT SMOKE DETECTOR SHALL BE CONNECTED TO THE FIRE ALARM SYSTEM. DUCT SMOKE DETECTORS SHALL BE INTERLOCKED TO SHUT DOWN ALL UNITS UPON DETECTION OF SMOKE.
2. 6"ø DUCT FROM EACH EXHAUST FAN. COMBINE AND ROUTE 8"ø EXHAUST DUCT TO WALL CAP. EXHAUST MUST DISCHARGE OUTDOORS. LOCATE A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE. SEAL WALL PENETRATION WEATHER TIGHT. PAINT CAP COLOR TO MATCH BUILDING.
3. IN FRESH AIR INTAKE DUCT PROVIDE MODULATING OA DAMPER CONNECTED TO RETURN AIR CO2 SENSOR, YOUNG REGULATOR CO. DEMAND AIR KIT DA-CO2-XX OR EQUAL PRODUCT.
4. CONDENSING UNIT AT GRADE OR ON ROOF ON ELEVATED PAD. COORDINATE LOCATION WITH GC. INSTALL PER MANUFACTURER'S INSTRUCTIONS MAINTAINING RECOMMENDED CLEARANCES. ROUTE REFRIGERANT LINES THOUGH WALL 18" AFG. WEATHER SEAL REFRIGERANT LINE PENETRATIONS OF BUILDING. PROVIDE ALL RECOMMENDED VALVES, FILTERS, FITTINGS, ETC. AND MAKE ALL NECESSARY CONNECTIONS TO HEAT PUMP AND AIR HANDLER.
5. AT WALL PROVIDE 16x16 INTAKE LOUVER EQUAL TO RUSKIN ELF675DX, MIN FREE AREA OF 0.73 SQ-FT. EXTEND 16x16 DUCT INTO PLENUM SPACE TO CONNECT FRESH AIR DUCTS. PAINT LOUVER COLOR TO MATCH BUILDING.
6. SET MANUAL OUTSIDE AIR DAMPER TO 260 CFM.
7. SET MANUAL OUTSIDE AIR DAMPER TO 350 CFM.
8. ROUTE 3/4" CONDENSATE DRAIN TO TAILPIECE OF LAVATORY. COORDINATE WTIH PLUMBING CONTRACTOR TO PROVIDE Y-FITTING AT TAILPIECE.

JSC ENGINEERS
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STATE OF MISSOURI
JUSTIN R. SMOTHERS
NUMBER PE-2012003565
PROFESSIONAL ENGINEER

06/03/2022

PROJECT:
PRIME PHYSICAL THERAPY
1161 NE RICE RD.
LEE'S SUMMIT, MO 64064

REVISIONS:	DATE / DESCRIPTION
1	
2	
3	
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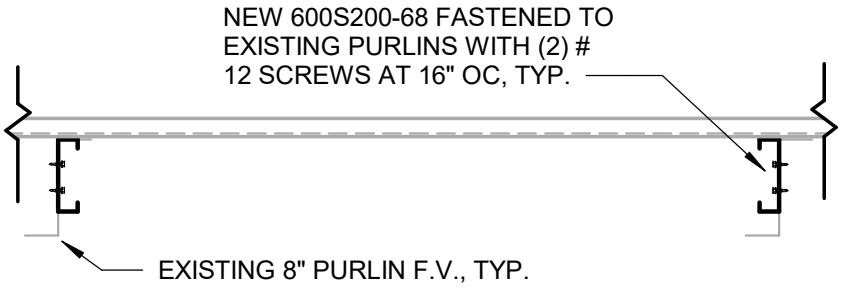
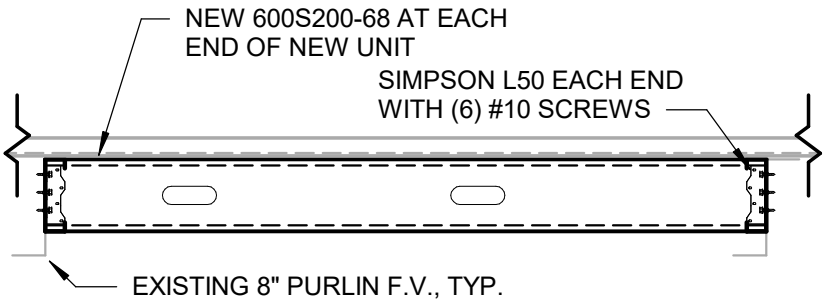
ISSUED:
PERMIT

SHEET TITLE:
MECHANICAL PLAN

DATE: 06-03-2022
JOB NO.: 22-162
SHEET:
M11



1	TYPICAL ROOF REINFORCMENT FRAMING
SX	SCALE: 3/4" = 1'-0"



2	TYPICAL ROOF REINFORCMENT FRAMING
SX	SCALE: 3/4" = 1'-0"

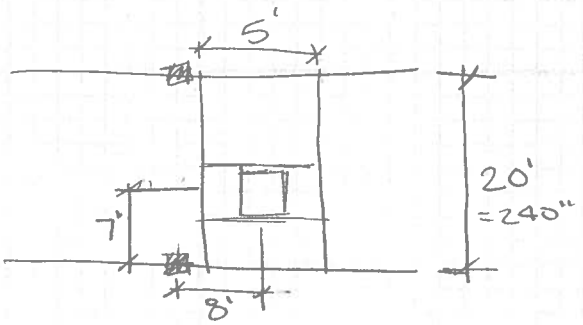
Total weight of units = 229 + 295 = 524 lbs
Assuming 600S200-43

FLEXURAL STRENGTH

P = 524 lb = 0.524 K

$V = \frac{0.542}{2} = 0.262$ K

@ center, $M = \frac{0.524(20)}{4} = 2.62$ kft = 31.44 K-in



@ edge of hole closest to center:

$M = 0.262\left[\frac{240}{2} - 12\right] = 28.3$ K-in

Flexural Strength w/out holes:

$S_e = S_{gross} = 0.894\ in^3$ (from SSMA)

R = 0.0112
t = .0451

Finding F_{ya}:

$r = 0.0112 + \frac{.0451}{2} = 0.09375$

Cross sectional Area of corner = $(\frac{\pi}{2})(.09375)(.0451) = .0006642$

→ Total of controlling flange = .0006642 (2) = 0.01328 in²

Flat width of compression flange:

$w = 2 - 2(.0451 + .0712) = 1.7668$

$A_{flange} = .01328 + 1.7668(.0451) = .092916$

$C = \frac{0.01328}{.092916} = .14285$

w/ $F_y = 33$ & $F_u = 45$

$F_{yc} = \frac{1.714(33)}{(1.579)^{1.43}} = 51.79$

$F_{ya} = (.14285)(51.79) + (1 - .14285)(33) = 35.68$ ksi

$M_n = 0.894(35.68) = 31.90$ K-in

Nominal Flexure w/ Holes:

$d_o = 1.5$

$b = 4.5$

$h = 6 - 2(.0712 + .0451) = 5.7674$

Check limits:

$\frac{d_o}{h} = \frac{1.5}{5.7674} = .2601 < .7$ ok

corner radii = 2(.0712) ~ .1424 < .25 OK

$\frac{h}{t} = \frac{5.7674}{.0451} = 127.88 < 200$ ok

APEX ENGINEERS, INC.

Project: Prime Physical Therapy

Sheet: 2 of 3

Engineer: ONS

Date: 6/28/22

info@apex-engineers.com | www.apex-engineers.com

Design Strength

$S_{xc} = 0.873$

$\Omega_b = 1.67$

@ center, $\frac{M_n}{\Omega_b} = \frac{31.901}{1.67} = 19.102 \text{ kin} < 31.44$ ∴ No good

Flexure Summary:

W/ $M_n = 28.8$ kin (from Table II-2 in AISI)

$\frac{M_n}{\Omega_b} = \frac{28.8}{1.67} = 17.24 < 28.3 \text{ kin}$ ∴ No good

From SSMA tables: 600S200-54 $\frac{M_n}{\Omega_b} = 30.4 \text{ kin} > 28.3$ ∴ OK

$S_c = S_{gross} = 1.106 \rightarrow$ SSMA

$F_{ya} = 36.34 \rightarrow$ AISI Table II-2

$M_n = 1.106(36.34) = 40.192$

$\frac{M_n}{\Omega_b} = \frac{40.192}{1.67} = 24.1 \text{ kin} < 31.4$ ∴ Nope

From SSMA: 600S200-68 w/ $F_y = 50$

$M_a = 43.71 > 28.3$ ∴ OK

$S_c = 1.367$

$F_{ya} = 55.44$

$M_n = 1.367(55.44) = 75.786$

$\frac{M_n}{\Omega_b} = \frac{75.786}{1.67} = 45.38 > 31.44 \text{ kin}$ ∴ OK

⟹ Use 600S200-68 w/ $F_y = 50$ → $R = 0.107$, $t = .0713$

SHEAR STRENGTH

$V = .202 K$

W/out holes:

$h = 6 - 2(.0713 + .107) = 5.643$

$\frac{h}{t} = \frac{5.643}{.0713} = 79.15$

$\sqrt{Ek_v/F_y} < \frac{h}{t} \leq 1.51\sqrt{Ek_v/F_y}$

$56.1 < 79.15 \leq 84.71$

$F_v = \frac{.6\sqrt{(29500)(5.34)(50)}}{79.15} = 21.27$

$V_n = A_w F_v = 5.643(.0713)(21.27)$

$= 8.56 K$

W/ holes

From AISI Table II-2: $V_n = 8.56 K$

Design Strength

$\Omega_v = 1.6$

$\frac{V_n}{\Omega_v} = \frac{8.56}{1.6} = 5.34 K > .202 K$

∴ OK

AHU Weight = 190 lb

$P = 0.19$ K

$V = \frac{P}{2} = .095$ K

FLEXURE

@ Center, $M = \frac{0.19(240")}{4} = 11.4$ K in

@ Hole edge, $M = .095[\frac{240}{2} - 12"] = 10.26$ K in

Using 600S200-68

@ Center, $\frac{M_n}{\Omega_b} = 45.38$ Kin > 11.4 Kin ∴ OK

@ Hole edge, $\frac{M_n}{\Omega_b} = 43.71$ Kin > 10.26 Kin ∴ OK

SHEAR

$V = .095$ K

Using 600S200-68

w/out holes → $V_n = 8.516$ K

w/ holes → $V_n = 8.516$ K

$\frac{V_n}{\Omega_v} = 5.34$ K > 0.095 K ∴ OK

L, LS and S/LS Utility Clips and Skewable Angles

L, LS and S/LS angles are load rated and provide the correct thickness and number of fasteners the specifier is looking for compared with field fabricated clip angles. These angles also have well-defined fastener locations, and testing ensures that the tabulated load values account for connection eccentricities. The connectors are general utility reinforcing angles with multiple uses. LS and S/LS connectors are skewable and can be used to attach members intersecting at angles.

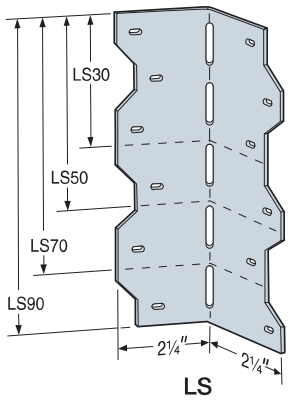
Material: L — 54 mil (16 ga.); LS — 43 mil (18 ga.); S/LS — 43 mil (18 ga.)

Finish: Galvanized (G90)

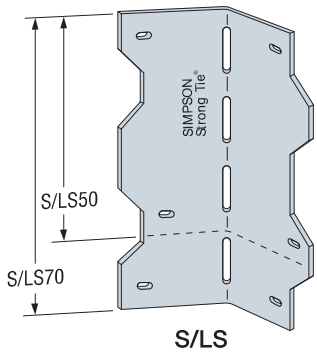
Installation:

- Use all specified fasteners
- S/LS — field-skewable; bend one time only
- CFS framing must be constrained against rotation when using a single S/LS per connection

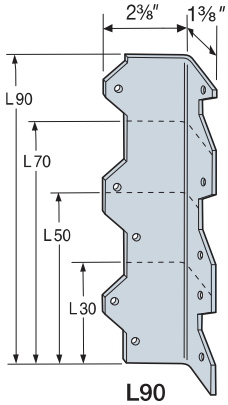
Codes: See p. 11 for Code Reference Key Chart



LS



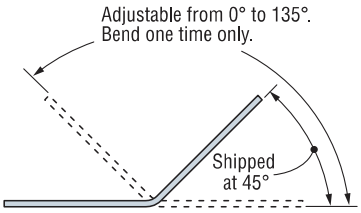
S/LS



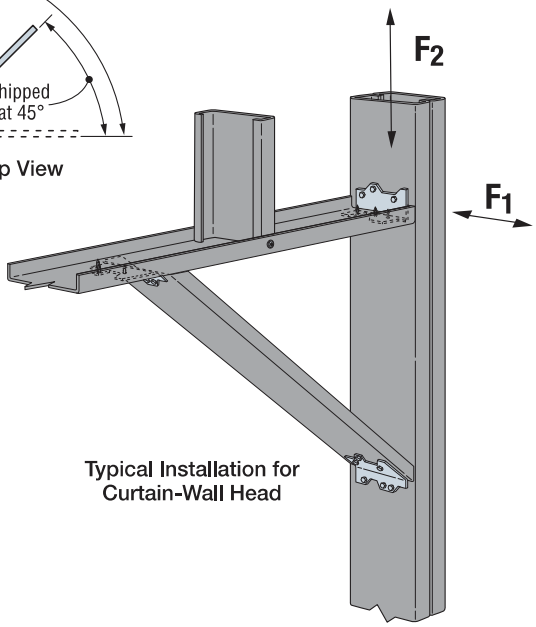
L90

Model No.	Length (in.)	Fasteners	Allowable Load (lb.)						Code Ref.
			33 mil (20 ga.)		43 mil (18 ga.)		54 mil (16 ga.)		
			F_1	F_2	F_1	F_2	F_1	F_2	
L30	3	(4) #10	200	60	315	85	610	—	IBC, FL, LA
L50	5	(6) #10	475	—	675	90	750	110	
L70	7	(8) #10	705	—	760	110	1,100	110	
L90	9	(10) #10	795	—	945	110	1,740	110	
LS30	3⅜	(6) #10	200	—	370	—	500	—	
S/LS50	4⅞	(4) #10	200	—	370	—	500	—	
S/LS70	6⅜	(6) #10	465	—	575	—	715	—	
LS90	7⅞	(12) #10	465	—	895	—	915	—	

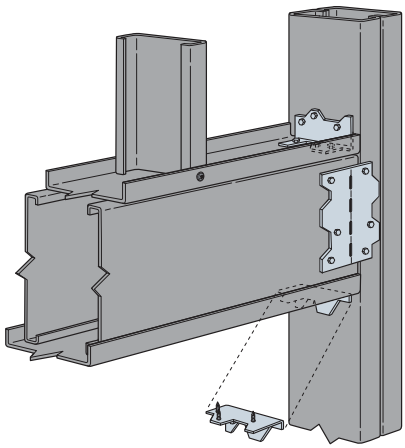
1. Loads are for one part only.
2. See *Fastening Systems* catalog (C-F-2019) on **strongtie.com** for more information on Simpson Strong-Tie fasteners.



LS and S/LS Top View



Typical Installation for Curtain-Wall Head


Typical Installation for Gravity Headers

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