



Structural Calculations

PREPARED FOR:

Red Dot Corporation
Puyallup Corporate Center
East Main Avenue at Linden Lane

PROJECT:

Red Dot Corporation
Roof Penetrations
2220760.20

PREPARED BY:

Andrew McEachern, P.E., S.E.
Principal

DATE:

March 2023

Structural Calculations
For
Red Dot Corporation
Roof Penetrations



Project # 2220760.20

Project Principal

Andrew D. McEachern, P.E., S.E.

Design Criteria

Design Codes and Standards

Codes and Standards: Structural design and construction shall be in accordance with the applicable sections of the following codes and standards as adopted and amended by the local building authority: International Building Code, 2018 Edition.

Structural Design Criteria:

Live Load Criteria:

Roof (Min Blanket Snow):	25 psf
Slab on Grade:	350 psf

Wind Load Criteria:

Basic Wind Speed:	97 mph
Risk Category:	II
Wind Exposure:	B
Topographic Factor:	1.0

Seismic Criteria:

Risk Category:	II
Seismic Importance Factor:	1.0
$S_s = 1.258$	$S_1 = 0.433$
$S_{ds} = 1.006$	$S_{d1} = N/A$
Site Class:	D
Seismic Design Category:	D



Soil Criteria:

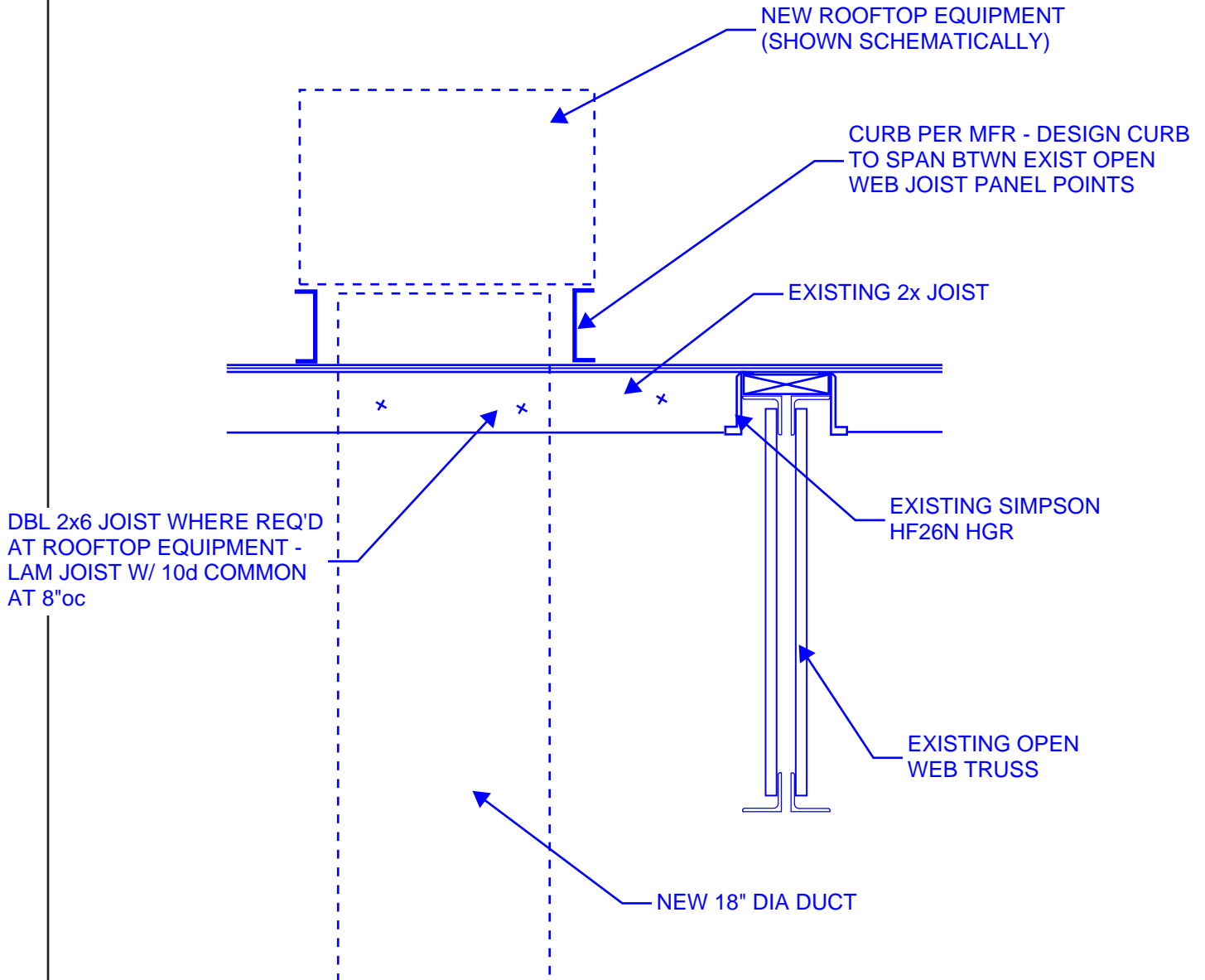
Based on Geotechnical Engineering Report by: Terra Associates Inc, dated September 2019.

Soil Bearing Capacity: 2,500 psf when sitting on 2 feet of structural fill on the previously preloaded side. Allow 33% increase for loads from wind or seismic origin.

Project Description

The scope of work for this project involves the structural design of framing associated with rooftop penetrations thru the existing roof structure.

It is the intention of the structural design to satisfy the force levels of the IBC 2018.



1200 6th Avenue, Suite 1620
 Seattle, WA 98101
 206.267.2425 TEL 206.267.2429 FAX

RED DOT TENANT IMPROVEMENTS

POWDER COAT ROOF PENETRATIONS

DRAWN BY: ADM

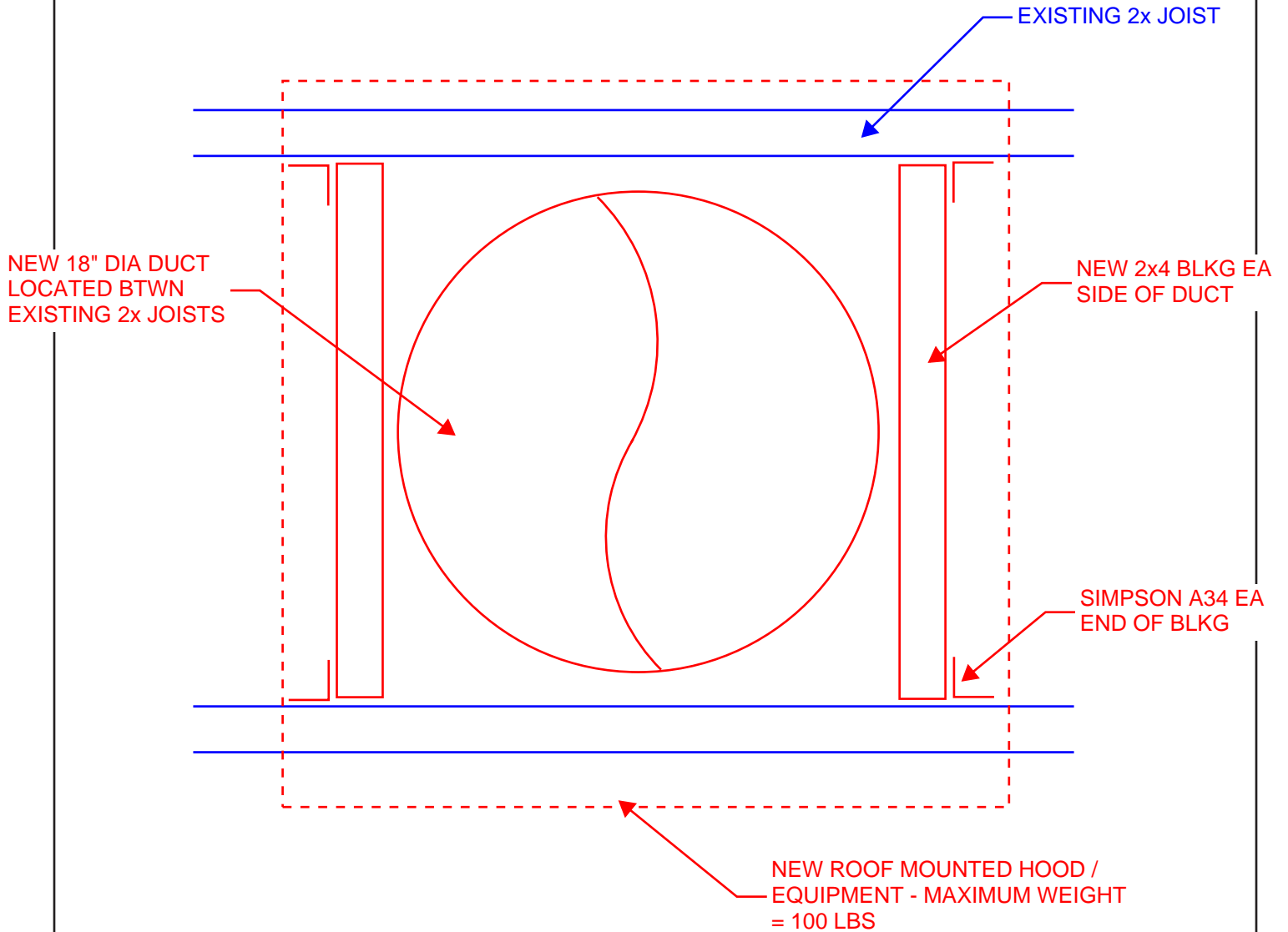
DATE: 3/13/2023

JOB NO.: 2220760.20

SK-01

CONTRACTOR NOTES:

- IF EQUIPMENT / HOOD WEIGHT EXCEEDS 100 LBS - SEE SK-03
- IF EXISTING 2x JOISTS ARE INTERRUPTED BY NEW DUCT - SEE SK-04



OPTION 1 - NO MODIFICATION OF EXISTING ROOF FRAMING REQ'D



1200 6th Avenue, Suite 1620
Seattle, WA 98101
206.267.2425 TEL 206.267.2429 FAX

RED DOT TENANT IMPROVEMENTS

POWDER COAT ROOF PENETRATIONS

DRAWN BY: ADM

DATE: 3/13/2023

JOB NO.: 2220760.20

SK-02

FOR CALLOUTS
IN COMMON
SEE



NEW 2x6 DF#2 JOIST AGAINST
EXISTING FOR FULL LENGTH OF
JOIST - LAM W/ 10d COMMON AT 8"oc

EXISTING 2x JOIST

NEW 18" DIA DUCT
LOCATED BTWN
EXISTING 2x JOISTS

NEW 2x4 BLKG EA
SIDE OF DUCT

SIMPSON A35 EA
END OF BLKG

NEW ROOF MOUNTED HOOD /
EQUIPMENT - MAXIMUM WEIGHT
= 300 LBS

OPTION 2 - WEIGHT OF NEW EQUIPMENT EXCEEDS 100 LBS



1200 6th Avenue, Suite 1620
Seattle, WA 98101
206.267.2425 TEL 206.267.2429 FAX

RED DOT TENANT IMPROVEMENTS

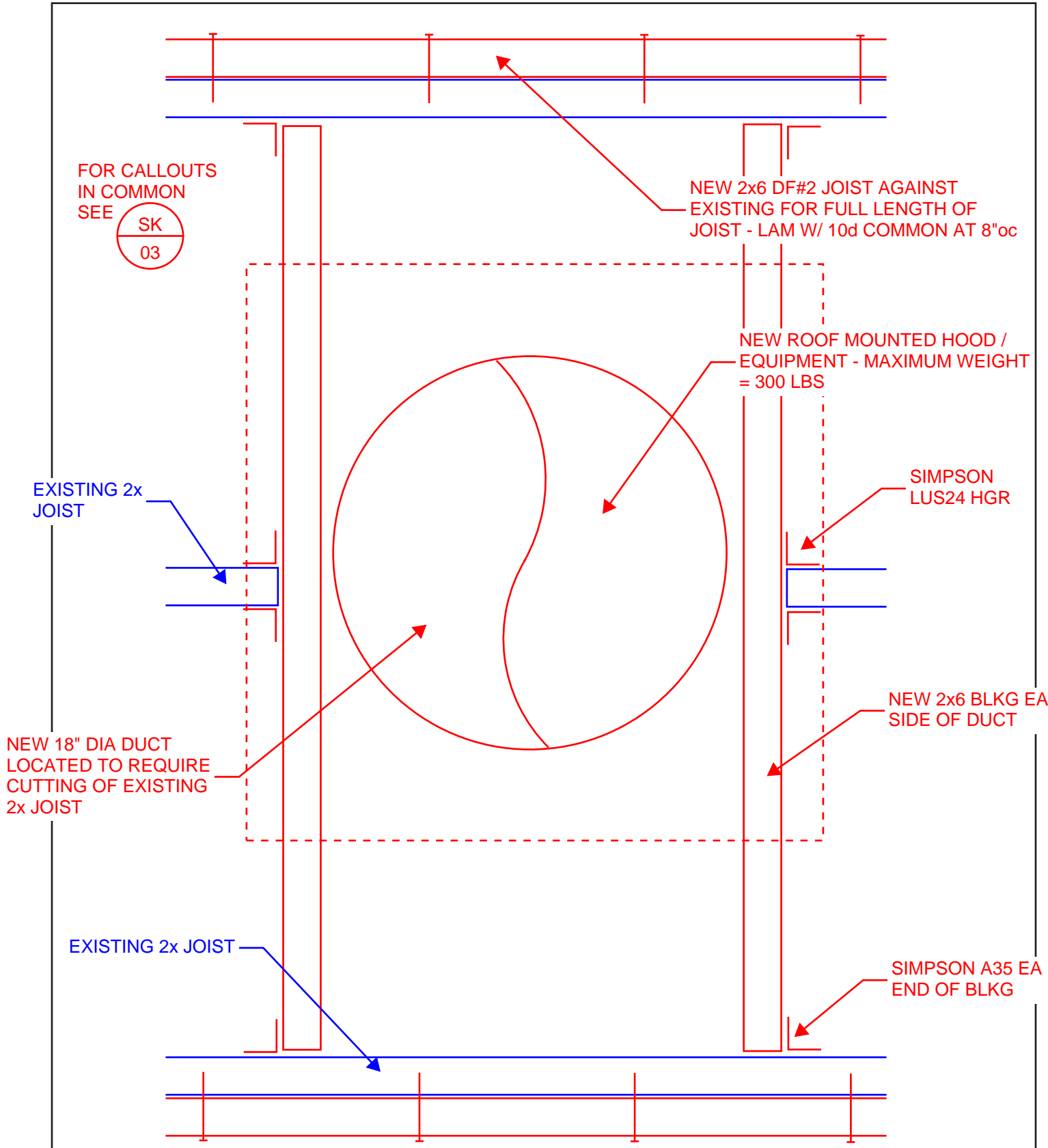
POWDER COAT ROOF PENETRATIONS

DRAWN BY: ADM


DATE: 3/13/2023

JOB NO.: 2220760.20

SK-03



OPTION 3 - NEW DUCT INTERRUPTS EXISTING FRAMING

 1200 6th Avenue, Suite 1620 Seattle, WA 98101 206.267.2425 TEL 206.267.2429 FAX	RED DOT TENANT IMPROVEMENTS		<h1>SK-04</h1>
	POWDER COAT ROOF PENETRATIONS		
	DRAWN BY: ADM	DATE: 3/13/2023	

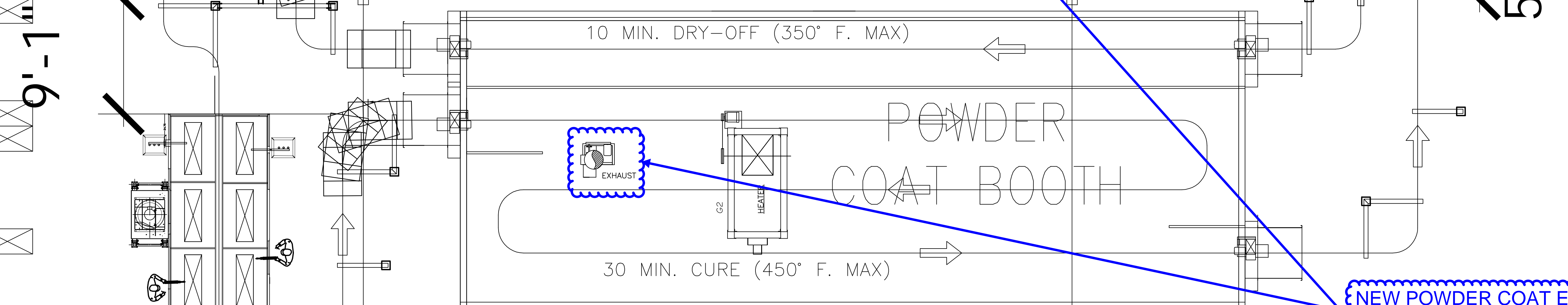
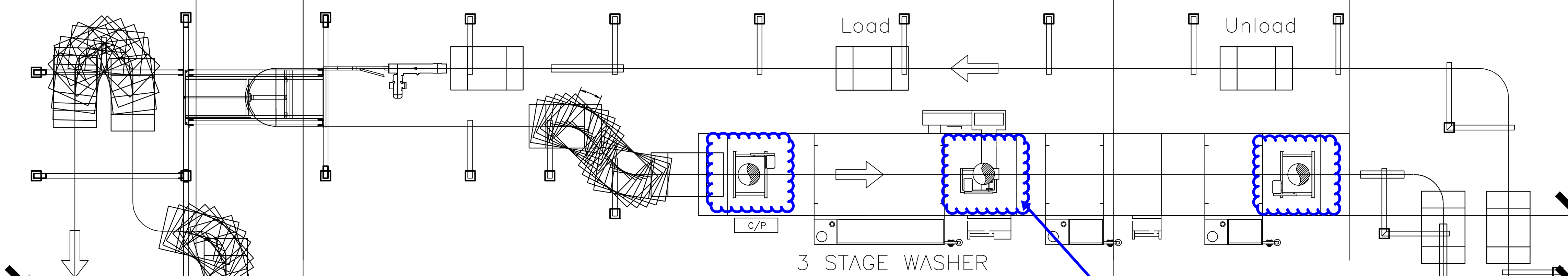
LTR	DATE	BY	CHK'D	PROG	PROJ	REVISION
---	MM/DD/YY	XXX	XXX	OUT	APP	INITIAL RELEASE

REV. LEVEL
15
DATE
12-23-22

PRELIMINARY CHECK PRINT
INFORMATION PRINT

7'-5"

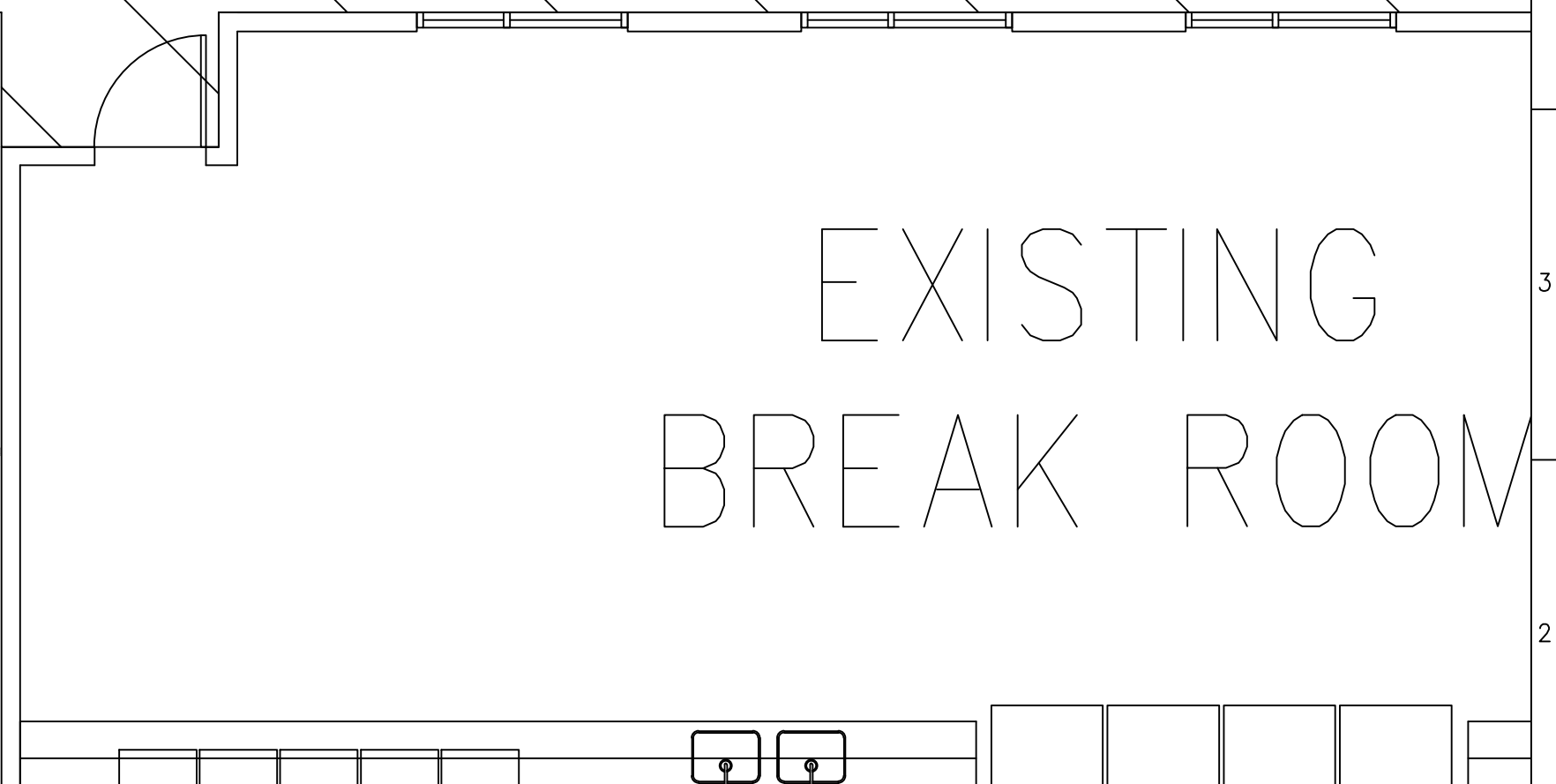
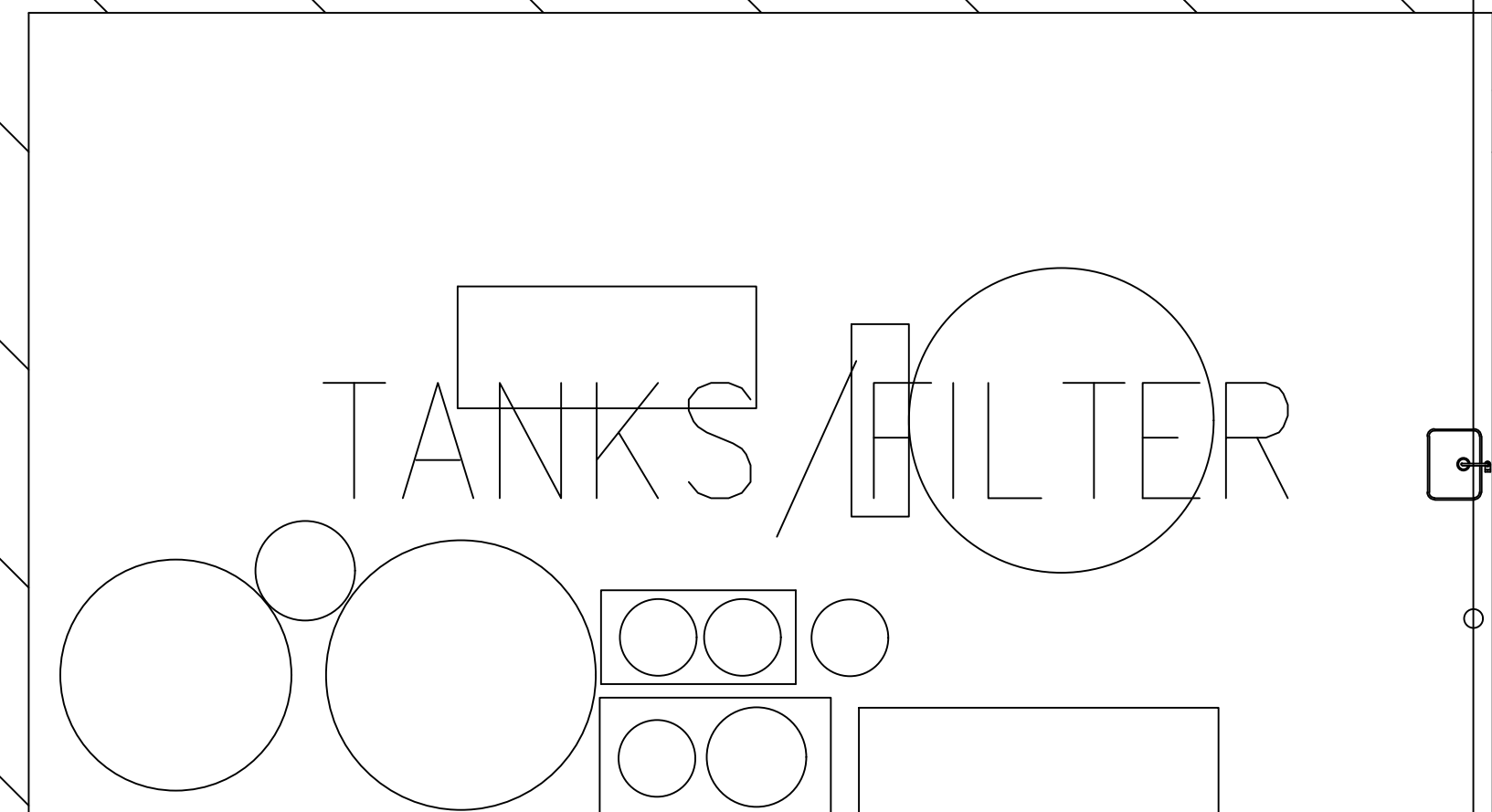
16'-4"



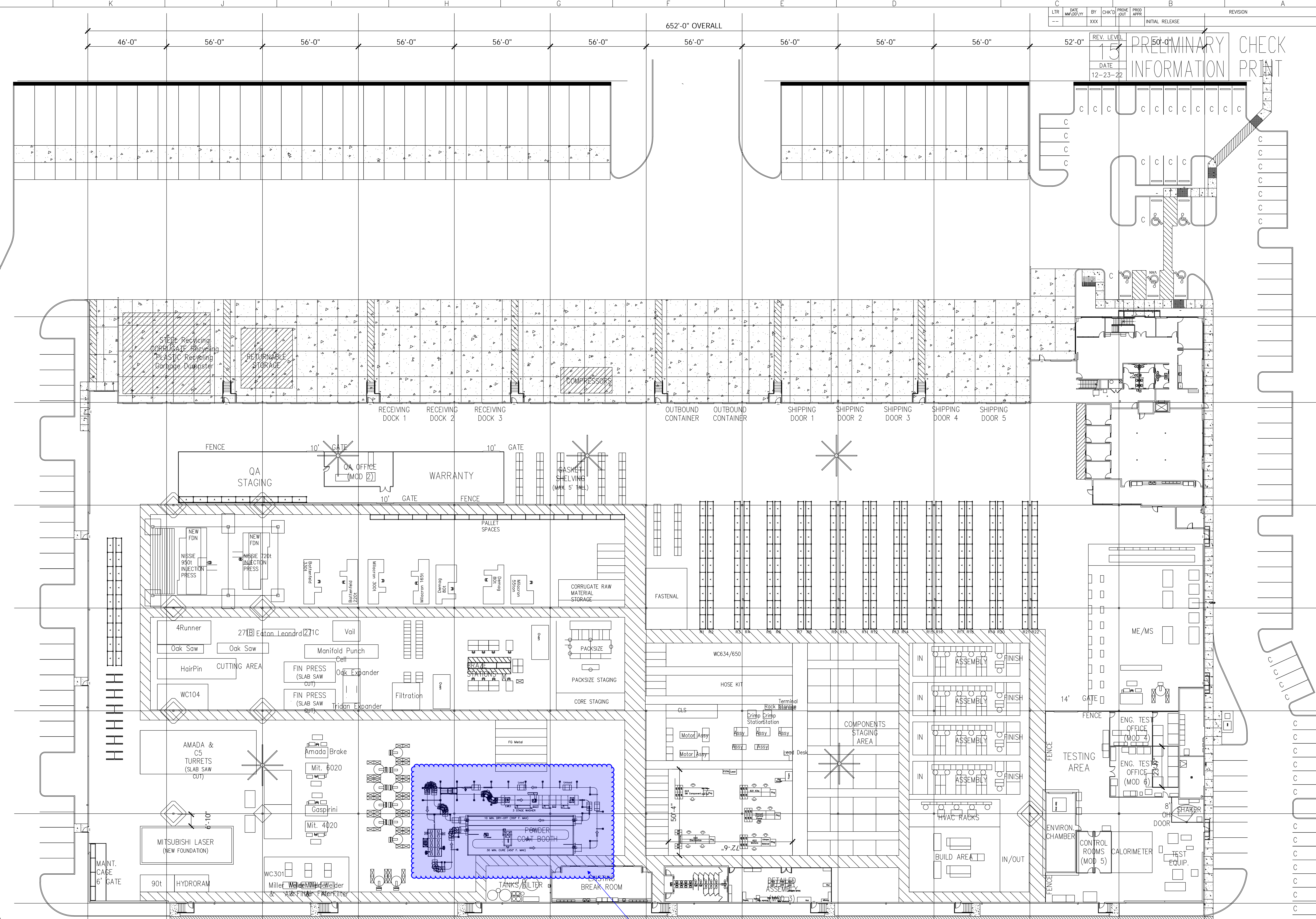
NEW POWDER COAT EQUIPMENT - (4)
18" DIAMETER ROOF PENETRATIONS

9'-1"

5'-1"



QTY	ITEM	PART NO.	DESCRIPTION	MAT'L	FINISH
	DWN	NAME	DATE	TITLE	
	CD	NAME	DATE	R-XXXX	
	SCALE	THIS PRINT IS PROPRIETARY INFORMATION LOANED SUBJECT TO RETURN UPON DEMAND AND IS NOT TO BE USED DIRECTLY OR INDIRECTLY IN ANY WAY WITHOUT THE WRITTEN CONSENT OF RED DOT CORPORATION.			
RED DOT CORPORATION		495 Ardover Park East		Seattle, WA 98188	
NEXT ASSY		RD-X-XXXX		SHEET 1 OF 1	



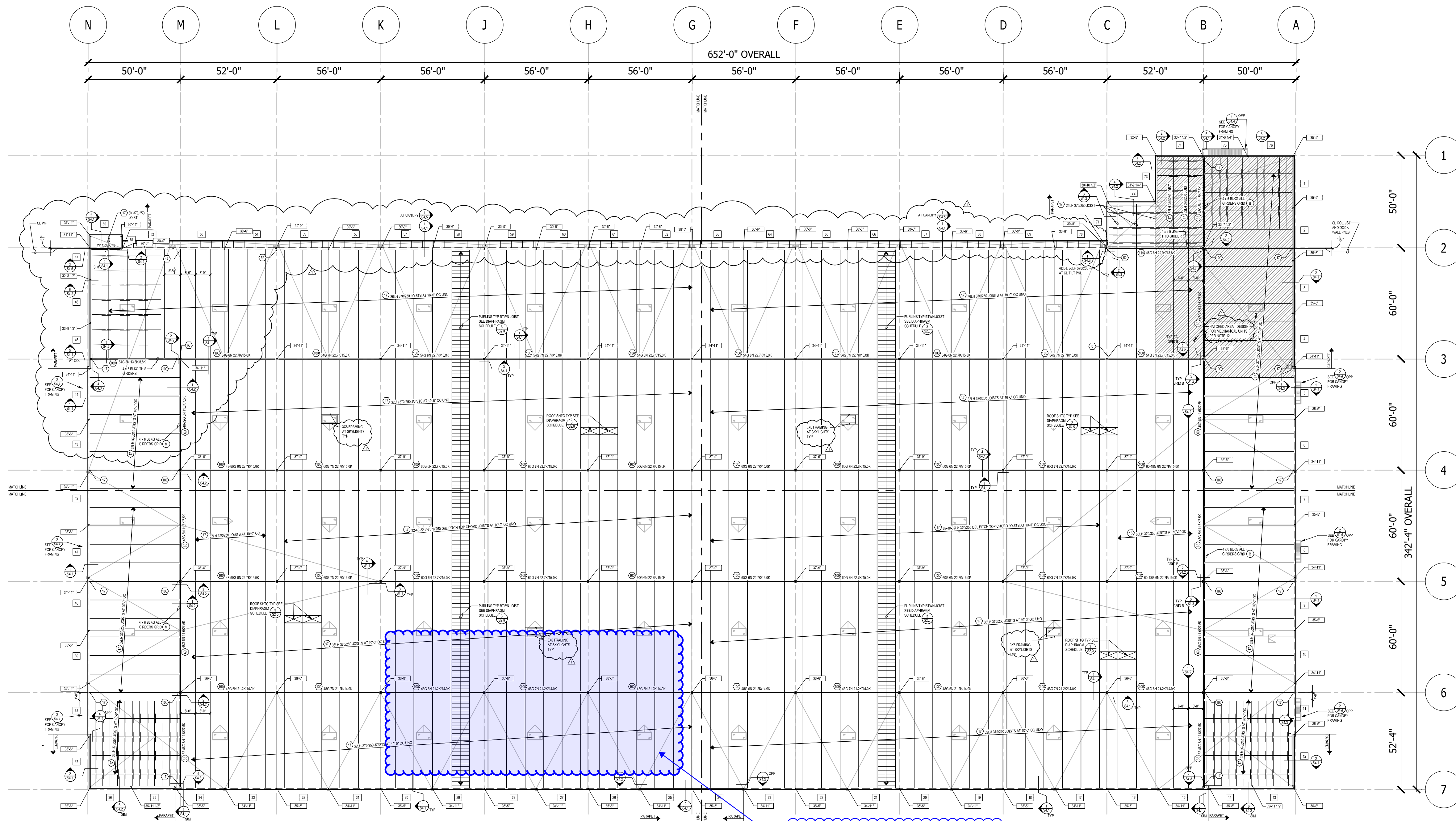
AREA UNDER CONSIDERATION - (4) 18" DIAMETER ROOF PENETRATIONS

ITEM	NAME	DATE	PART NO.	DESCRIPTION	MAT'L	FINISH
DWN						
CKD						
SCALE						

TITLE		R-XXXX	
RED DOT CORPORATION		495 Andover Park East	
Seattle, WA 98188		RD-X-XXXX	
SIZE	E	SHEET	1 OF 1

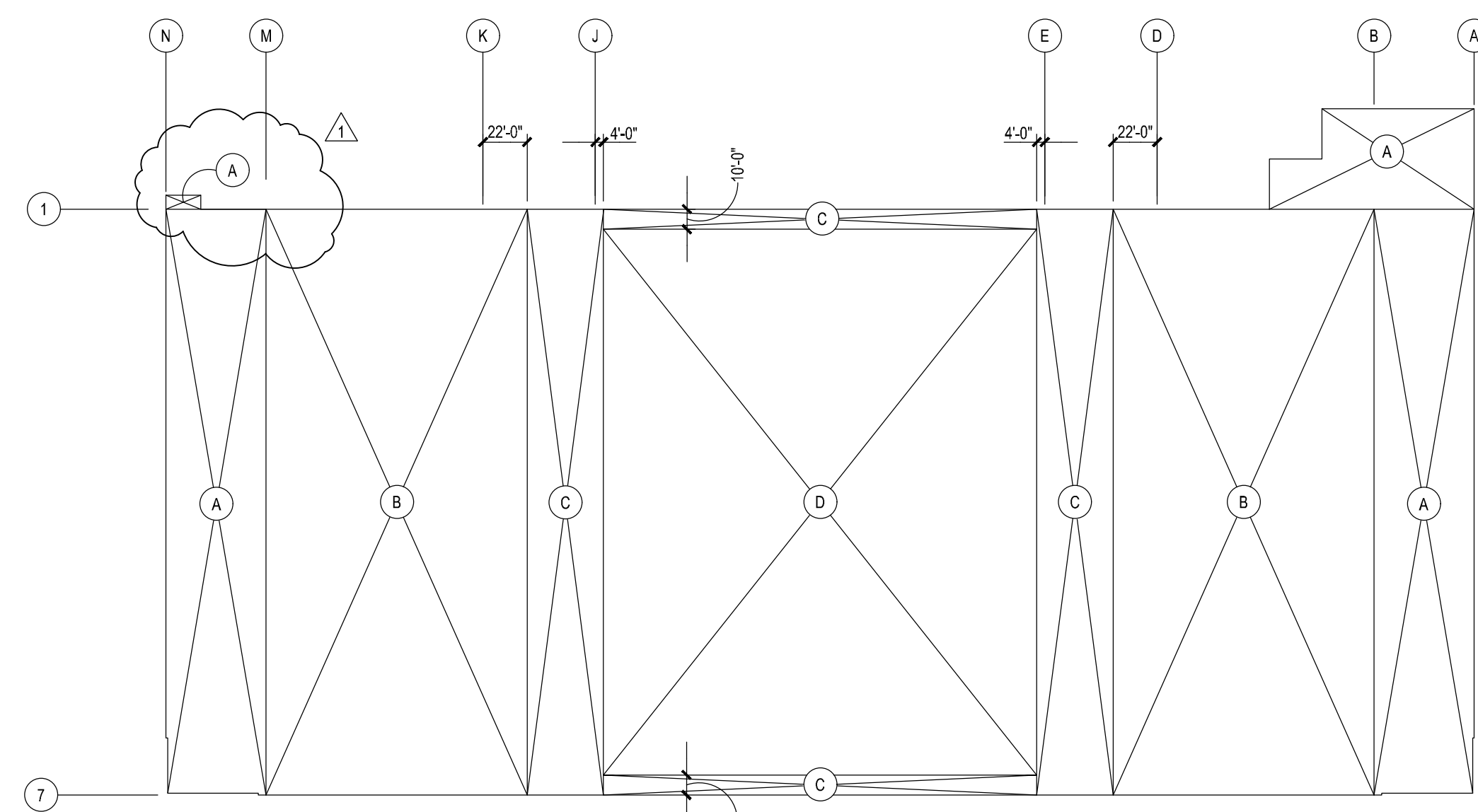
ROOF FRAMING NOTES:

- VERIFY SIZE AND LOCATION OF ALL MECHANICAL PENETRATIONS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.
- JOIST DESIGNATION IS SHOWN AS TOTAL LOAD IN POUNDS PER FOOT OVER THE SNOW LOAD IN POUNDS PER FOOT
- GIRDER DESIGNATION IS TOTAL LOAD IN KIPS OVER SNOW LOAD IN KIPS, AT EACH PANEL POINT.
- AT EACH COLUMN SUPPORTING JOIST GIRDERS, JOIST MFG SHALL MATCH THE BEARING DEPTH OF ALL JOIST GIRDERS FRAMING INTO COLUMN.
- JOIST AND JOIST GIRDER HAVE NON-STANDARD BEARING HEIGHTS. STEEL DETAILER TO COORDINATE HEIGHT OF BEARING SEAT WITH JOIST MANUFACTURER.
- ROOF JOIST SUPPLIER TO PROVIDE BRIDGING FOR JOIST PER STEEL JOIST INSTITUTE AND MANUFACTURERS RECOMMENDATIONS. IN ADDITION TO LOADS SHOWN ROOF JOISTS, GIRDERS AND BRIDGING SHALL ALSO BE DESIGNED FOR A NET UPLIFT TO 10.0 PSF.
- JOIST MANUFACTURER TO DESIGN BAR JOIST AND JOIST GIRDERS FOR LOADS DUE TO SPRINKLER SYSTEM, PIPING LARGER THAN 4" DIAMETER. CONTRACTOR TO COORDINATE AND PROVIDE JOIST MANUFACTURER WITH MAGNITUDE AND LOCATION OF LOADS.
- JOIST MANUFACTURER TO LOCATE, SIZE AND PROVIDE ERECTION BOLTS AS REQUIRED. STEEL DETAILER SHALL COORDINATE LOCATION OF BOLT HOLES IN ALL CAP PL, EMBEDS ETC...
- FOR TILT-UP WALL PANEL THICKNESS SEE PANEL ELEV'S STARTING ON SHEET S5.1.
- X INDICATES TOP OF SHEATHING ELEVATION AT THE LOCATION INDICATED MEASURED FROM FINISH FLOOR ELEVATION.
- AXIAL LOADS TO JOISTS AND GIRDER TOP CHORDS ARE DESIGNATED AS (X), FOR SCHEDULE SEE 4.
- JOIST MFG TO DESIGN JOISTS IN OFFICE AREAS INDICATED. DESIGN JOISTS FOR 1000 LB POINT LOAD AT ANY TOP OR BOTTOM CHORD PANEL POINT AND GIRDERS FOR (2) 1500# POINT LOADS AT ANY JOIST BEARING LOCATION ON GIRDER.
- JOIST AND GIRDERS WITH VARYING DEPTH (IE: 28-36LH) ARE ALL WITH THE LOWER DEPTH ON THE DOWN HILL SIDE OF THE ROOF SLOPE. PARALLEL CHORD MEMBER MAY BE SUBSTITUTED USING THE SHALLOWER DEPTH SO AS NOT TO REDUCE CLEAR HEIGHT OF BUILDING.
- X INDICATES TILT PANEL NUMBER, SEE ELEVATIONS STARTING ON S7.1
- PRIMARY ROOF MEMBERS ARE CONSIDERED TO BE ROOF JOISTS AND GIRDERS, SEE NOTE 5.5.1.A ON S0.1



OVERALL ROOF FRAMING PLAN

1/32" = 1'-0"



DIAPHRAGM SCHEDULE

NTS

2

DIAPHRAGM SCHEDULE

MARK	SHEATHING	NAILING (1) (2)			3/4" DIA ANCHOR SPACING BOLT
		BOUNDARY	ALL JOISTS AND PANEL EDGES	FIELD	
A	15/32" APA RATED STRUC 1 SHEATHING	(2) ROWS OF 10d AT 2 1/2" OC	(2) ROWS OF 10d AT 2 1/2" OC	10d AT 12" OC	3x6 DF #2 AT EDGE OF SHEATHING 2x6 DF #2 AT 24" O.C.
B	15/32" APA RATED STRUC 1 SHEATHING	10d AT 2" OC	10d AT 2" OC	10d AT 12" OC	3x6 DF #2 AT EDGE OF SHEATHING 2x6 DF #2 AT 24" O.C.
C	15/32" APA RATED STRUC 1 SHEATHING	10d AT 4" OC	10d AT 4" OC	10d AT 12" OC	2x6 DF #2 AT EDGE OF SHEATHING 2x6 DF #2 AT 24" O.C.
D	15/32" APA RATED STRUC 1 SHEATHING	10d AT 6" OC	10d AT 6" OC	10d AT 12" OC	2x6 DF #2 AT EDGE OF SHEATHING 2x6 DF #2 AT 24" O.C.

DIAPHRAGM NOTES:

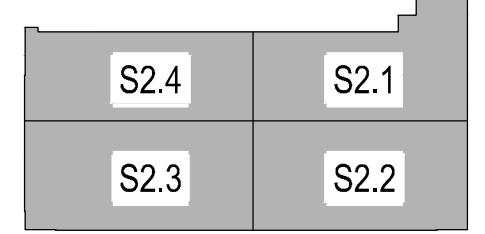
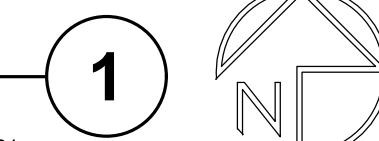
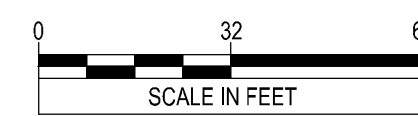
- ALL NAILS SHALL BE COMMON, MINIMUM 0.148" DIAMETER AND SHALL PENETRATE INTO FRAMING MEMBERS MINIMUM 1 1/2". NAILS SHALL BE LOCATED AT LEAST 3/8" FROM THE EDGES OF PANELS
- ALL SHEATHING PANELS SHALL BE NOT LESS THAN 4'-0" x 10'-0" UNLESS OTHERWISE APPROVED BY THE ENGINEER. AT BOUNDARIES AND CHANGES IN FRAMING DIRECTION, PANELS MAY BE ANY SIZE PROVIDED ALL EDGES OF THE UNDERSIZED PANELS ARE SUPPORTED BY AND FASTENED TO FRAMING MEMBERS OR BLOCKING WITH 3x NOMINAL WIDTH.

AREA UNDER CONSIDERATION - (4) 18" DIAMETER ROOF PENETRATIONS

JOIST SEISMIC LOAD SCHEDULE

MARK	TRUSS MFR TO DESIGN TOP CHORD OF TRUSSES FOR ULTIMATE AXIAL SEISMIC FORCE OF: (2)	REMARKS
17	E= 17.0 KIPS (1)	ULTIMATE LOAD CALCULATED PER ASCE 7 - 12.11
63	E= 62.2 KIPS (2)	ULTIMATE LOAD CALCULATED PER ASCE 7 - 12.4.3.1
100	E= 100.0 KIPS (1)(2)	
115	E= 115.0 KIPS	

- AT JOIST: ATTACH 3x NAILER TO JOIST WITH CONNECTION DESIGNED FOR 867LBS PER FOOT ASD SHEAR AND 100PLF UPLIFT
- IF LOAD POINTS TO END OF TRUSS THEN FORCE IS CONNECTION LOAD



KEY PLAN



PANATTONI
DEVELOPMENT
1821 DOCK ST SUITE 100
TACOMA, WA 98402

PUYALLUP CORPORATE CENTER

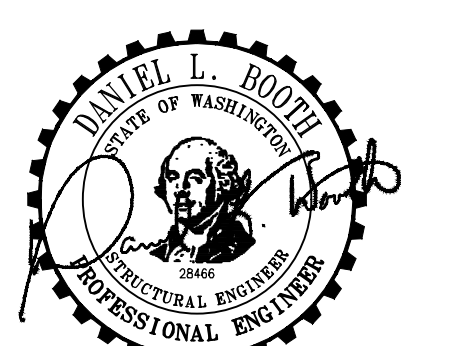
EAST MAIN AVENUE AT LINDEN LANE
PUYALLUP, WASHINGTON

Description:	No:	Date:
PERMIT SUBMITTAL		04/03/2020
PRICING SET		07/21/2020
PERMIT RESUBMITTAL		08/24/2020



TACOMA • SEATTLE • SPOKANE • TRI-CITIES

2215 North 30th Street, Suite 300 Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB



NOTICE:
ATTENTION OF THE DOCUMENT SHALL BE ADVISED THAT THE PROFESSIONAL SEAL AND SIGNATURE OF THE ENGINEER DOES NOT WARRANT FROM NEGLIGENCE OR OTHER MALPRACTICE. THE DOCUMENT IS FOR THE PROJECT IDENTIFIED BY THE TITLE BLOCK AND NOT TO BE USED FOR OTHER PROJECTS.

OVERALL ROOF FRAMING PLAN

Proj. No: 2190390.20 Reviewed By: LAH/CLR

S2.0

HFN/F

Solid Sawn Joist Hangers

Panelized Construction Hangers

The HF24N, HF26N, HF34N and HF36N hangers are designed for panels or components using jigs or similar devices for precision fabrication. Grip-groove feature provides positive lock into the 2x or 3x member without nailing. F series panel hangers are engineered components for panelized construction only.

Material: 18 gauge

Finish: Galvanized. Some products available in ZMAX® coating. See Corrosion Information, pp. 12–15.

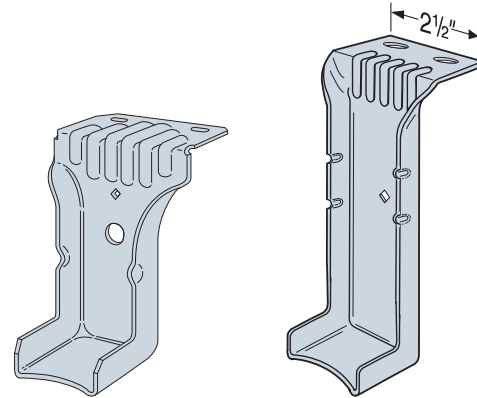
Standard Installation:

- Use all specified fasteners; see General Notes.
- On the F-series hanger, the diamond hole nail is non-structural and does not contribute to the load.
- For additional information on retrofit options see flier F-C-RUZRNUZ at strongtie.com.

Panelized Installation:

- Installing two nails through sheathing in middle of hanger achieves full load. See illustrations for fastener location requirements. See technical bulletin T-C-HFHANGER at strongtie.com for alternate nailing and allowable load adjustments.

Codes: See p. 11 for Code Reference Key Chart



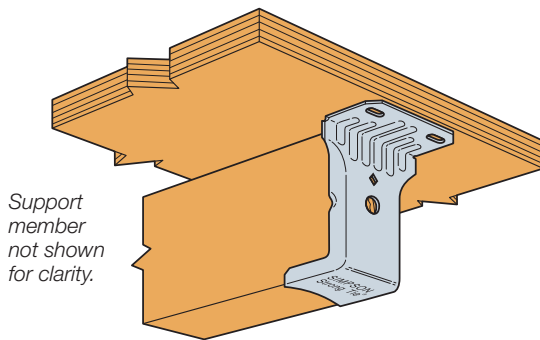
HF24N
(HF34N similar)

HF26N
(HF36N similar)
Dimples hold joist securely in place.

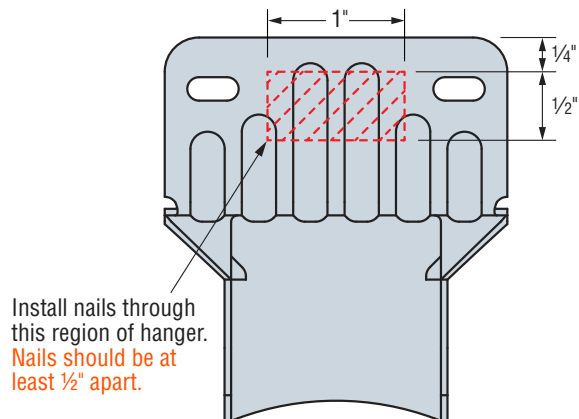
These products are available with additional corrosion protection. For more information, see p. 14.

Model No.	Joist Size	Dimensions (in.)			Header Fasteners (in.)	Allowable Roof Loads (115/125)	Code Ref.
		W	H	TF			
HF24N	2x4	1 1/8"	2 3/8"	1 1/4"	(2) 0.148 x 2 1/8"	585	BC, LA
HF26N	2x6	1 9/16"	5 3/8"	1 1/4"	(2) 0.148 x 2 1/8"	635	
HF34N	2x6	1 9/16"	5 3/8"	1 1/4"	(2) 0.148 x 2 1/8"	635	
HF36N	3x6	2 9/16"	5 3/8"	1 1/4"	(2) 0.148 x 2 1/8"	725	
F20E	(2) 2x6	3 7/8"	5 3/8"	1 7/8"	(2) 0.148 x 3"	675	
F44Z	4x4	3 9/16"	3 7/8"	1 1/2"	(2) 0.148 x 3"	765	
F46Z	4x6	3 9/16"	5 3/8"	1 7/8"	(2) 0.148 x 3"	675	

1. 0.148" x 3" nails can be used for specified 0.148" x 2 1/8" nails.
2. **Fasteners:** Nail dimensions are listed diameter by length. See pp. 21–22 for fastener information.



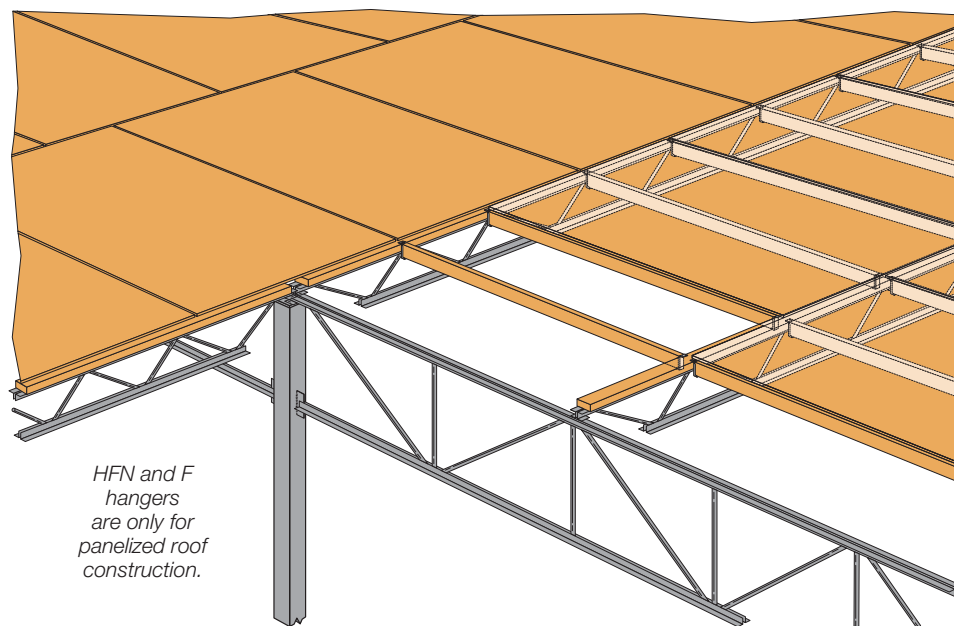
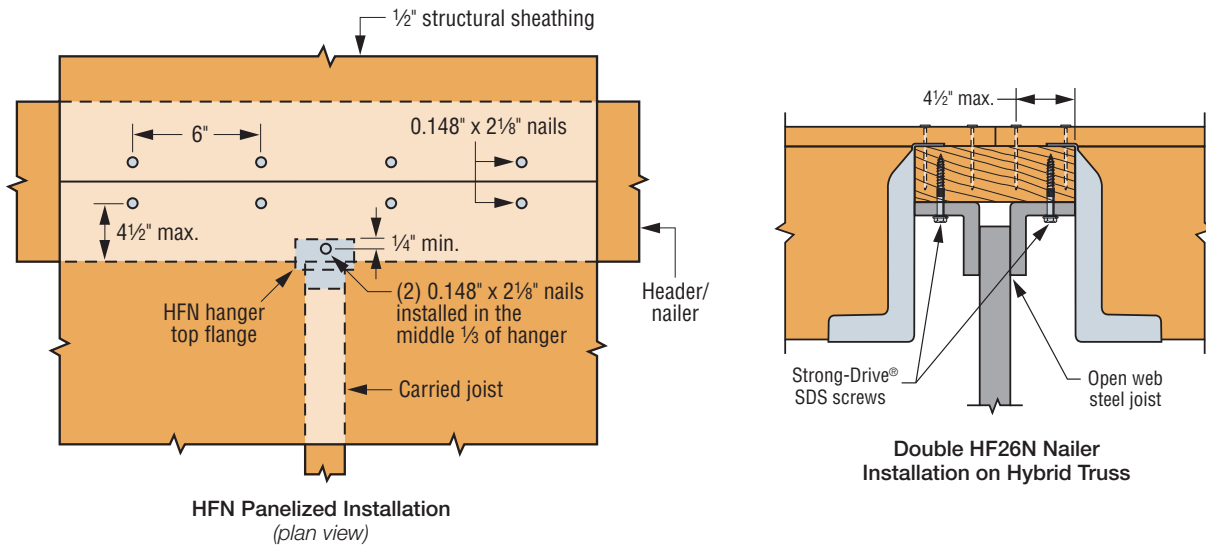
Typical HF24N Installation
(HF34N similar)



Panelized Installation Nailing Zone

HFN/F

Panelized Construction Hangers (cont.)



Typical Hybrid Panelized Roof System

LTP4/LTP5/A34/A35

Framing Angles and Plates

The larger LTP5 spans subfloor at the top of the blocking or rim board. The embossments enhance performance.

The LTP4 lateral tie plate transfers shear forces for top plate-to-rim board or blocking connections. Nail holes are spaced to prevent wood splitting for single and double top-plate applications. May be installed over plywood sheathing.

The A35 angle's exclusive bending slot allows instant, accurate field bends for all two- and three-way ties. Balanced, completely reversible design permits the A35 to secure a great variety of connections.

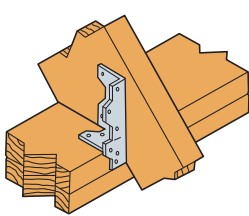
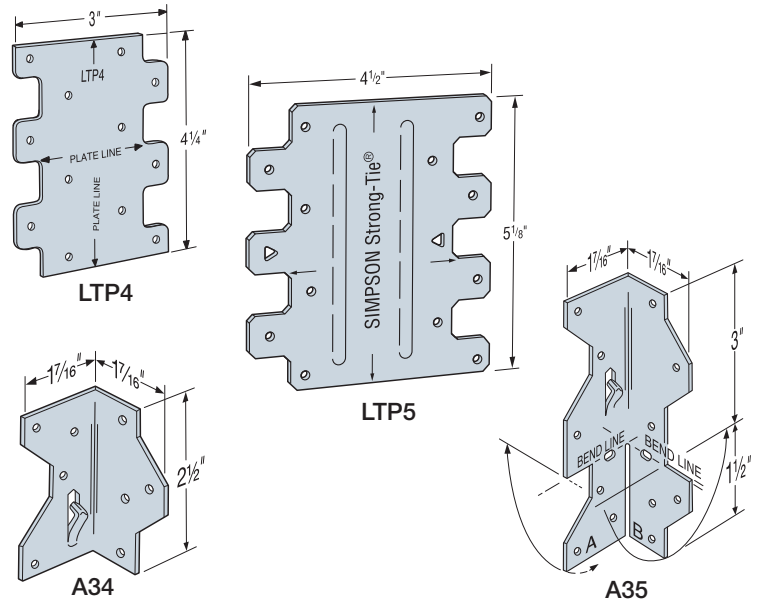
Material: LTP4/LTP5 — 20 gauge; all others — 18 gauge

Finish: Galvanized. Some products available in stainless steel or ZMAX® coating. See Corrosion Information, pp. 12–15.

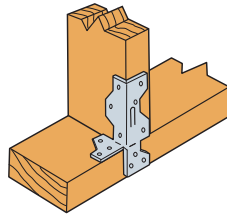
Installation:

- Use all specified fasteners; see General Notes
- A35 — Bend one time only

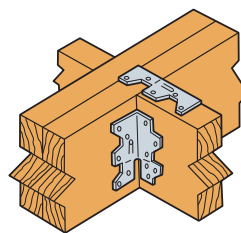
Codes: See p. 11 for Code Reference Key Chart



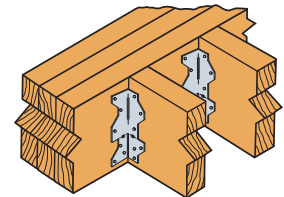
Joists to Plate with A Leg Inside



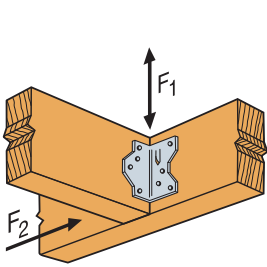
Studs to Plate with B Leg Outside



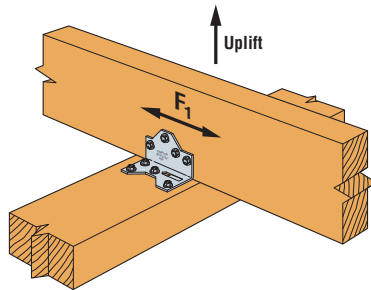
Joists to Beams



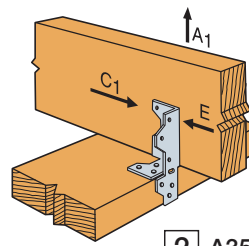
Ceiling Joists to Beam



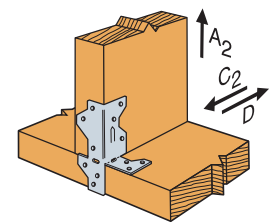
1 A34



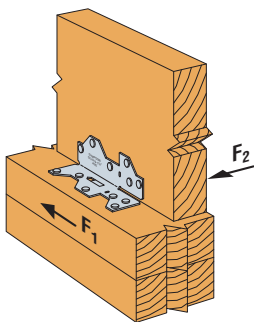
1 A34 Installed with SD Screws



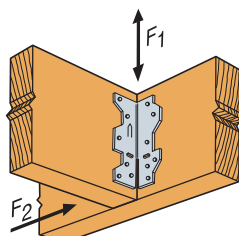
2 A35



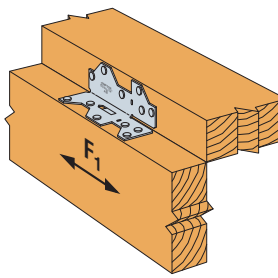
3 A35



4 A35

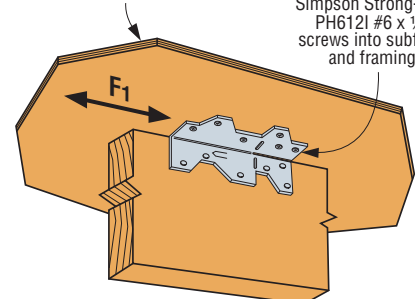


4 A35



5 A35

1/2" minimum 24/0 APA-rated wood structural panel sheathing



6 A35

Simpson Strong-Tie® PH612I #6 x 1 1/2" screws into subfloor and framing

LTP4/LTP5/A34/A35

Framing Angles and Plates (cont.)

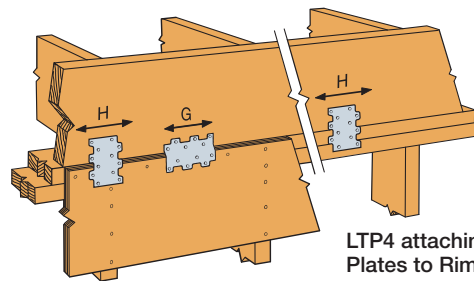
These products are available with additional corrosion protection. For more information, see p. 14.

SS For stainless-steel fasteners, see p. 21.

SD Many of these products are approved for installation with Strong-Drive® SD Connector screws. See pp. 348–352 for more information.

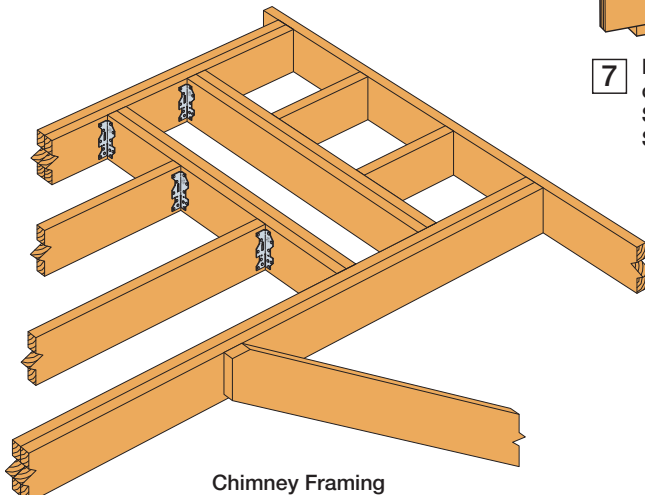
Model No.	Type of Connection	Fasteners (in.)	Direction of Load	DF/SP Allowable Loads			SPF/HF Allowable Loads			Code Ref.
				Floor (lb)	Roof (lb)	(160)	Floor (lb)	Roof (lb)	(160)	
SS A34	1	(8) 0.131 x 1 1/2"	F ₁	395	480	545	340	415	480	IBC, FL, LA
			F ₂	640	640	640	550	550	550	
			Uplift	240	240	240	170	170	170	
SS A35	2	(9) 0.131 x 1 1/2"	A ₁	295	350	350	255	300	300	IBC, FL, LA
			E	295	360	385	255	310	330	
			C ₁	185	185	185	160	160	160	
	3	(12) 0.131 x 1 1/2"	A ₂	295	325	325	255	280	280	
			C ₂	295	330	330	255	285	285	
			F ₁	590	650	650	510	560	560	
4	(12) 0.131 x 1 1/2"	F ₂ ⁶	590	670	670	510	575	575		
		F ₁	590	650	650	510	560	560		
LTP4	7	(12) 0.131 x 1 1/2"	G	580	715	715	500	615	615	IBC, FL, LA
			H	525	525	525	450	450	450	
LTP5	8	(12) 0.131 x 1 1/2"	G	565	565	565	485	485	485	IBC, FL, LA
			H	490	490	490	420	420	420	

- Allowable loads are for one angle. When angles are installed on each side of the joist, the minimum joist thickness is 3".
- Some illustrations show connections that could cause cross-grain tension or bending of the wood during loading if not reinforced sufficiently. In this case, mechanical reinforcement should be considered.
- LTP4 can be installed over 3/8" wood structural panel sheathing with 0.131" x 1 1/2" nails and achieve 0.72 of the listed load, or over 1/2" sheathing and achieve 0.64 of the listed load. 0.131" x 2 1/2" nails will achieve 100% load.
- LTP4 satisfies the IRC continuously sheathed portal frame (CS-PF) framing anchor requirements when installed over raised wood floor framing per Figure R602.10.6.4.
- The LTP5 may be installed over wood structural panel sheathing up to 1/2" thick using 0.131" x 1 1/2" nails with no reduction in load.
- Connectors are required on both sides to achieve F₂ loads in both directions.
- A34 and A35 installed with 0.131" x 1 1/2" nails onto 1 1/4" LSL material will achieve 0.90 of the listed F₁ and F₂ loads.
- Fasteners:** Nail dimensions are listed diameter by length. SD screws are Simpson Strong-Tie® Strong-Drive® SD Connector screws. PH612I is a pan-head #6 x 1 1/2" screw available from Simpson Strong-Tie. See pp. 21–22 for other nail sizes and information.

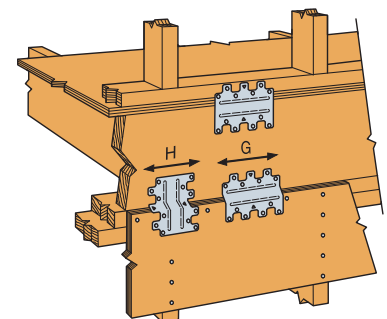


LTP4 attaching Top Plates to Rim Board

7 LTP4 Installed over Wood Structural Panel Sheathing



Chimney Framing



8 LTP5 Installed over Wood Structural Panel Sheathing or Attaching Plate to Rim Board

LUS/HUS/HHUS/HGUS

Double-Shear Face-Mount Joist Hangers

Solid Sawn Joist Hangers



This product is preferable to similar connectors because of (a) easier installation, (b) higher loads, (c) lower installed cost, or a combination of these features.

All hangers in this series have double-shear nailing. This innovation distributes the load through two points on each joist nail for greater strength. It also allows the use of fewer nails, faster installation and the use of standard nails for all connections. (Do not bend or remove tabs.)

Material: See tables, pp. 104–114

Finish: Galvanized. Some products available in stainless steel or ZMAX® coating; see Corrosion Information, pp. 12–15.

Installation:

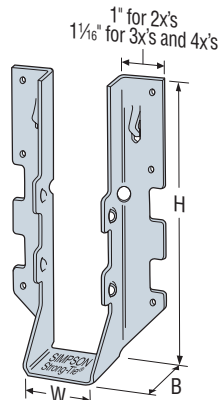
- Use all specified fasteners; see General Notes.
- Nails must be driven at an angle through the joist or truss into the header to achieve the table loads.
- Not designed for welded or nailer applications.
- With 3x carrying members: when 0.162" x 3½" nails are specified, use 0.162" x 2½" nails into the header and 0.162" x 3½" nails into the joist with no load reduction. When 0.148" x 3" nails are specified, use 0.148" x 2½" nails into the header and 0.148" x 3" nails into the joist with no load reduction.
- With 2x carrying members: when 0.162" x 3½" nails are specified, use 0.148" x 1½" nails into the header and 0.148" x 3" nails into the joist and reduce the load to 0.64 of the table values. When 0.148" x 3" nails are specified, use 0.148" x 1½" nails into the header and 0.148" x 3" nails into the joist and reduce the load to 0.77 of the table values. See p. 22 for specific Load Adjustment Factors.

Allowable Loads:

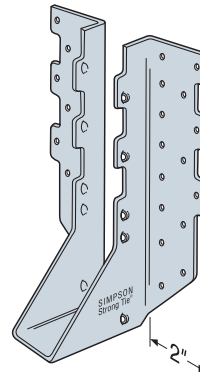
- See table on pp. 104–114 for loads.

Options:

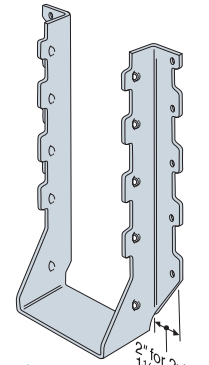
- LUS/HUS hangers cannot be modified.
- See next page for HHUS/HGUS modifications.



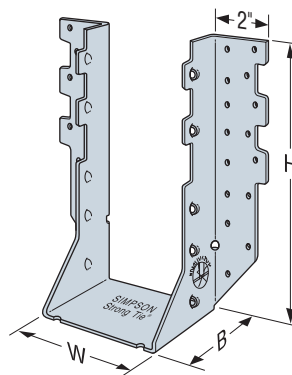
LUS28



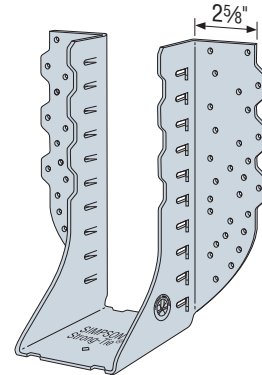
HUS210
(HUS26 and HUS28 similar)



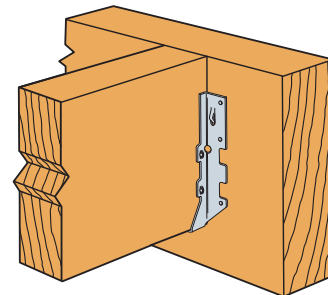
HUS412



HHUS410

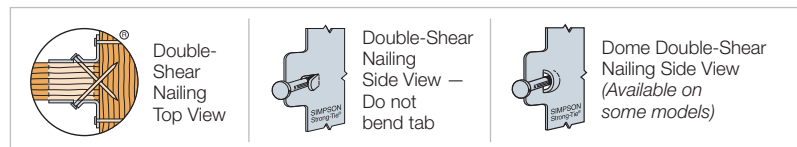


HGUS3.25/12



Typical LUS28 Installation
use 0.148" x 3" nail or 0.148" x 3¼" nail

Double-Shear Nailing



Face-Mount Hangers — Solid Sawn Lumber (DF/SP)

The Joist Hanger Selector software enables you the most optimum product for your project. The software takes into consideration all the characteristics seen in this catalog. Visit strongtie.com/jhs.

These products are available with additional corrosion protection. For more information, see p. 14.

SS For stainless-steel fasteners, see p. 21.

SD Many of these products are approved for installation with Strong-Drive® SD Connector screws. See pp. 348–352 for more information.

Solid Sawn Joist Hangers

Joist Size	Model No.	Ga.	Dimensions (in.)				Min./Max.	Fasteners (in.)		DF/SP Allowable Loads (lb.)				Installed Cost Index (ICI)	Code Ref.
			W	H	B			Header	Joist	Uplift (160)	Floor (100)	Snow (115)	Roof (125)		
Sawn Lumber Sizes															
2x4	LUS24	18	1 5/8	3 1/8	1 3/4	—	(4) 0.148 x 3	(2) 0.148 x 3	435	670	765	820	3%	IBC, FL, LA	
	LU24	16	1 1/2	2 3/4	1 1/2	—	(4) 0.162 x 3 1/2	(2) 0.148 x 1 1/2	240	575	650	705	33%		
	HU26	14	1 1/8	3 1/8	2 1/4	—	(4) 0.162 x 3 1/2	(2) 0.148 x 1 1/2	305	595	670	720	295%		
DBL 2x4	LUS24-2	18	3 1/8	3 1/8	2	—	(4) 0.162 x 3 1/2	(2) 0.162 x 3 1/2	410	800	905	980	Lowest		
	U24-2	16	3 1/8	3	2	—	(4) 0.162 x 3 1/2	(2) 0.148 x 3	240	575	650	705	33%		
	HU24-2 / HUC24-2	14	3 1/8	3 1/8	2 1/2	—	(4) 0.162 x 3 1/2	(2) 0.148 x 3	380	595	670	720	240%		
2x6	LUS26	18	1 5/8	4 3/4	1 3/4	—	(4) 0.148 x 3	(4) 0.148 x 3	1,165	865	990	1,060	Lowest		
	LU26	20	1 5/8	4 3/4	1 1/2	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	540	835	950	1,030	6%		
	U26	16	1 5/8	4 3/4	2	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	535	865	980	1,055	43%		
	LUC26Z	18	1 5/8	4 3/4	1 3/4	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	730	845	965	1,040	160%		
	HU26	14	1 5/8	3 1/8	2 1/4	—	(4) 0.162 x 3 1/2	(2) 0.148 x 1 1/2	305	595	670	720	179%		
	HUS26	16	1 5/8	5 3/8	3	—	(14) 0.162 x 3 1/2	(6) 0.162 x 3 1/2	1,320	2,735	3,095	3,230	276%		
DBL 2x6	LUS26-2	18	3 1/8	4 7/8	2	—	(4) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	1,060	1,030	1,170	1,265	Lowest		
	U26-2	16	3 1/8	5	2	—	(8) 0.162 x 3 1/2	(4) 0.148 x 3	535	1,150	1,305	1,410	65%		
	HUS26-2	14	3 1/8	5 1/8	2	—	(4) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	1,165	1,055	1,195	1,290	172%		
	HU26-2 / HUC26-2	14	3 1/8	4 1 1/8	2 1/2	Min.	(8) 0.162 x 3 1/2	(4) 0.148 x 3	755	1,190	1,345	1,440	233%		
14		3 1/8	4 1 1/8	2 1/2	Max.	(12) 0.162 x 3 1/2	(6) 0.148 x 3	1,135	1,785	2,015	2,165	254%			
TPL 2x6	LUS26-3	18	4 5/8	4 1/8	2	—	(4) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	1,060	1,030	1,170	1,265	*		
	U26-3	16	4 5/8	4 1/4	2	—	(8) 0.162 x 3 1/2	(4) 0.148 x 3	535	1,150	1,305	1,410	*		
	HU26-3 / HUC26-3	14	4 1 1/8	4 5/8	2 1/2	Min.	(8) 0.162 x 3 1/2	(4) 0.148 x 3	755	1,190	1,345	1,440	*		
14		4 1 1/8	4 5/8	2 1/2	Max.	(12) 0.162 x 3 1/2	(6) 0.148 x 3	1,135	1,785	2,015	2,165	*			
2x8	LUS26	18	1 5/8	4 3/4	1 3/4	—	(4) 0.148 x 3	(4) 0.148 x 3	1,165	865	990	1,060	Lowest		
	LU26	20	1 5/8	4 3/4	1 1/2	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	540	835	950	1,030	6%		
	LUS28	18	1 5/8	6 3/8	1 3/4	—	(6) 0.148 x 3	(4) 0.148 x 3	1,165	1,100	1,260	1,350	23%		
	LU28	20	1 5/8	6 3/8	1 1/2	—	(8) 0.162 x 3 1/2	(6) 0.148 x 1 1/2	850	1,110	1,180	1,180	39%		
	U26	16	1 5/8	4 3/4	2	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	535	865	980	1,055	43%		
	LUC26Z	18	1 5/8	4 3/4	1 3/4	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	730	845	965	1,040	160%		
	HU28	14	1 5/8	5 1/4	2 1/4	—	(6) 0.162 x 3 1/2	(4) 0.148 x 1 1/2	605	895	1,010	1,080	251%		
	HUS26	16	1 5/8	5 3/8	3	—	(14) 0.162 x 3 1/2	(6) 0.162 x 3 1/2	1,320	2,735	3,095	3,230	276%		
HUS28	16	1 5/8	7	3	—	(22) 0.162 x 3 1/2	(8) 0.162 x 3 1/2	1,760	4,095	4,095	4,095	409%			
DBL 2x8	LUS26-2	18	3 1/8	4 7/8	2	—	(4) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	1,060	1,030	1,170	1,265	Lowest		
	LUS28-2	18	3 1/8	7	2	—	(6) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	1,060	1,315	1,490	1,610	8%		
	U26-2	16	3 1/8	5	2	—	(8) 0.162 x 3 1/2	(4) 0.148 x 3	535	1,150	1,305	1,410	65%		
	HUS28-2	14	3 1/8	7 1/8	2	—	(6) 0.162 x 3 1/2	(6) 0.162 x 3 1/2	1,320	1,580	1,790	1,930	188%		
	HU28-2 / HUC28-2	14	3 1/8	6 5/8	2 1/2	Min.	(10) 0.162 x 3 1/2	(4) 0.148 x 3	755	1,490	1,680	1,800	397%		
		14	3 1/8	6 5/8	2 1/2	Max.	(14) 0.162 x 3 1/2	(6) 0.148 x 3	1,135	2,085	2,350	2,530	418%		
TPL 2x8	LUS28-3	18	4 5/8	6 1/4	2	—	(6) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	1,060	1,315	1,490	1,610	*		
	U26-3	16	4 5/8	4 1/4	2	—	(8) 0.162 x 3 1/2	(4) 0.148 x 3	535	1,150	1,305	1,410	*		
	HU26-3 / HUC26-3	14	4 1 1/8	4 5/8	2 1/2	Min.	(8) 0.162 x 3 1/2	(4) 0.148 x 3	755	1,190	1,345	1,440	*		
14		4 1 1/8	4 5/8	2 1/2	Max.	(12) 0.162 x 3 1/2	(6) 0.148 x 3	1,135	1,785	2,015	2,165	*			
QUAD 2x8	HU28-4 / HUC28-4	14	6 1/8	7	2 1/2	Min.	(10) 0.162 x 3 1/2	(4) 0.162 x 3 1/2	755	1,490	1,680	1,800	*		
		14	6 1/8	7	2 1/2	Max.	(14) 0.162 x 3 1/2	(6) 0.162 x 3 1/2	1,135	2,085	2,350	2,530	*		

See footnotes on p. 108.

Codes: See p. 11 for Code Reference Key Chart



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC#: KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist - 2x6 at 24"oc

CODE REFERENCES

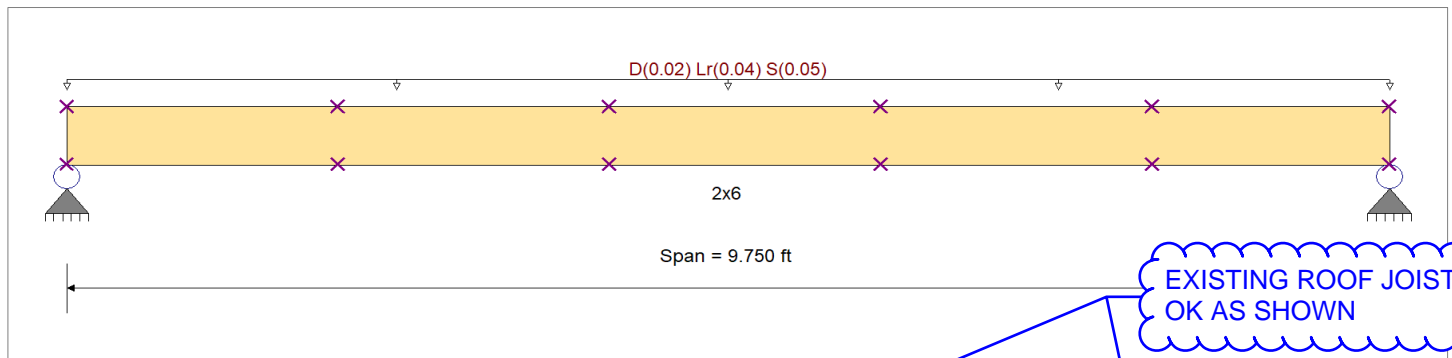
Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	900 psi	Ebend- xx	1600ksi
	Fc - Prll	1350 psi	Eminbend - xx	580ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade : No.2	Fv	180 psi		
	Ft	575 psi	Density	31.21pcf
Beam Bracing : Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase	

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
 Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY

Maximum Bending Stress Ratio	=	0.868 : 1	Maximum Shear Stress Ratio	=	0.273 : 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	1,319.88 psi	fv: Actual	=	56.61 psi
F'b	=	1,520.20 psi	F'v	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.875ft	Location of maximum on span	=	9.323 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.307 in	Ratio =	380 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.430 in	Ratio =	271 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Design OK

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios											Moment Values			Shear Values				
	Segment Length	Span #	M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only															0.0				
	Length = 1.993 ft	1	0.205	0.100	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.15	245.3	1,195.4	0.09	16.2	162.0	
	Length = 1.993 ft	1	0.305	0.100	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.23	364.5	1,195.4	0.06	16.2	162.0	
	Length = 1.993 ft	1	0.315	0.100	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.24	377.1	1,195.4	0.02	16.2	162.0	
	Length = 1.993 ft	1	0.299	0.100	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.23	357.8	1,195.4	0.06	16.2	162.0	
	Length = 1.779 ft	1	0.188	0.100	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.14	225.0	1,197.4	0.09	16.2	162.0	
+D+Lr															0.0				
	Length = 1.993 ft	1	0.446	0.216	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.46	735.9	1,649.0	0.27	48.5	225.0	



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist - 2x6 at 24"oc

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 1.993 ft	1	0.663	0.216	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.69	1,093.6	1,649.0	0.17	48.5	225.0	
Length = 1.993 ft	1	0.686	0.216	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.71	1,131.3	1,649.0	0.07	48.5	225.0	
Length = 1.993 ft	1	0.651	0.216	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.68	1,073.4	1,649.0	0.19	48.5	225.0	
Length = 1.779 ft	1	0.408	0.216	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.43	675.1	1,653.5	0.27	48.5	225.0	
+D+S					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.565	0.273	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.54	858.5	1,520.2	0.31	56.6	207.0	
Length = 1.993 ft	1	0.839	0.273	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.80	1,275.9	1,520.2	0.20	56.6	207.0	
Length = 1.993 ft	1	0.868	0.273	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.83	1,319.9	1,520.2	0.08	56.6	207.0	
Length = 1.993 ft	1	0.824	0.273	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.79	1,252.3	1,520.2	0.22	56.6	207.0	
Length = 1.779 ft	1	0.517	0.273	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.50	787.6	1,523.9	0.31	56.6	207.0	
+D+0.750Lr					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.372	0.180	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.39	613.2	1,649.0	0.22	40.4	225.0	
Length = 1.993 ft	1	0.553	0.180	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.57	911.4	1,649.0	0.14	40.4	225.0	
Length = 1.993 ft	1	0.572	0.180	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.59	942.8	1,649.0	0.06	40.4	225.0	
Length = 1.993 ft	1	0.542	0.180	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.56	894.5	1,649.0	0.15	40.4	225.0	
Length = 1.779 ft	1	0.340	0.180	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.35	562.6	1,653.5	0.22	40.4	225.0	
+D+0.750S					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.464	0.225	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.44	705.2	1,520.2	0.26	46.5	207.0	
Length = 1.993 ft	1	0.689	0.225	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.66	1,048.1	1,520.2	0.17	46.5	207.0	
Length = 1.993 ft	1	0.713	0.225	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.68	1,084.2	1,520.2	0.06	46.5	207.0	
Length = 1.993 ft	1	0.677	0.225	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.65	1,028.7	1,520.2	0.18	46.5	207.0	
Length = 1.779 ft	1	0.425	0.225	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.41	647.0	1,523.9	0.26	46.5	207.0	
+0.60D					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.070	0.034	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.09	147.2	2,093.4	0.05	9.7	288.0	
Length = 1.993 ft	1	0.104	0.034	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.14	218.7	2,093.4	0.03	9.7	288.0	
Length = 1.993 ft	1	0.108	0.034	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.14	226.3	2,093.4	0.01	9.7	288.0	
Length = 1.993 ft	1	0.103	0.034	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.14	214.7	2,093.4	0.04	9.7	288.0	
Length = 1.779 ft	1	0.064	0.034	1.60	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.09	135.0	2,102.3	0.05	9.7	288.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4302	4.911		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.341	0.341
Max Upward from Load Combinations	0.341	0.341
Max Upward from Load Cases	0.244	0.244
D Only	0.098	0.098
+D+Lr	0.293	0.293
+D+S	0.341	0.341
+D+0.750Lr	0.244	0.244
+D+0.750S	0.280	0.280
+0.60D	0.059	0.059
Lr Only	0.195	0.195
S Only	0.244	0.244



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist w/ Equipment - 2x6 at 24"oc

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
Length = 1.993 ft	1	0.493	0.235	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.51	812.9	1,649.0	0.29	53.0	225.0	
Length = 1.993 ft	1	0.757	0.235	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.79	1,247.7	1,649.0	0.20	53.0	225.0	
Length = 1.993 ft	1	0.803	0.235	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.83	1,323.3	1,649.0	0.09	53.0	225.0	
Length = 1.993 ft	1	0.744	0.235	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.77	1,226.9	1,649.0	0.21	53.0	225.0	
Length = 1.779 ft	1	0.452	0.236	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.47	747.5	1,653.5	0.29	53.2	225.0	
+D+S					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.615	0.295	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.59	935.5	1,520.2	0.34	61.0	207.0	
Length = 1.993 ft	1	0.941	0.295	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.90	1,430.0	1,520.2	0.23	61.0	207.0	
Length = 1.993 ft	1	0.994	0.295	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.95	1,511.8	1,520.2	0.10	61.0	207.0	
Length = 1.993 ft	1	0.925	0.295	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.89	1,405.8	1,520.2	0.24	61.0	207.0	
Length = 1.779 ft	1	0.564	0.296	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.54	860.0	1,523.9	0.34	61.3	207.0	
+D+0.750Lr					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.419	0.199	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.43	690.2	1,649.0	0.25	44.9	225.0	
Length = 1.993 ft	1	0.646	0.199	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.67	1,065.4	1,649.0	0.17	44.9	225.0	
Length = 1.993 ft	1	0.688	0.199	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.72	1,134.9	1,649.0	0.08	44.9	225.0	
Length = 1.993 ft	1	0.636	0.199	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.66	1,048.0	1,649.0	0.18	44.9	225.0	
Length = 1.779 ft	1	0.384	0.200	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.40	635.0	1,653.5	0.25	45.1	225.0	
+D+0.750S					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.515	0.246	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.49	782.2	1,520.2	0.28	50.9	207.0	
Length = 1.993 ft	1	0.791	0.246	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.76	1,202.1	1,520.2	0.19	50.9	207.0	
Length = 1.993 ft	1	0.840	0.246	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.80	1,276.2	1,520.2	0.09	50.9	207.0	
Length = 1.993 ft	1	0.778	0.246	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.74	1,182.1	1,520.2	0.20	50.9	207.0	
Length = 1.779 ft	1	0.472	0.247	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.45	719.4	1,523.9	0.28	51.2	207.0	
+0.60D					1.00	1.00	0.98	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0	
Length = 1.993 ft	1	0.092	0.043	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.12	193.4	2,093.4	0.07	12.4	288.0	
Length = 1.993 ft	1	0.149	0.043	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.20	311.2	2,093.4	0.05	12.4	288.0	
Length = 1.993 ft	1	0.163	0.043	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.22	341.7	2,093.4	0.03	12.4	288.0	
Length = 1.993 ft	1	0.147	0.043	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.19	306.8	2,093.4	0.05	12.4	288.0	
Length = 1.779 ft	1	0.085	0.043	1.60	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.11	178.5	2,102.3	0.07	12.5	288.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4806	4.911		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.366	0.367
Max Upward from Load Combinations	0.366	0.367
Max Upward from Load Cases	0.244	0.244
D Only	0.122	0.123
+D+Lr	0.317	0.318
+D+S	0.366	0.367
+D+0.750Lr	0.268	0.269
+D+0.750S	0.305	0.306
+0.60D	0.073	0.074
Lr Only	0.195	0.195
S Only	0.244	0.244

EXISTING JOIST HANGER
 OK FOR ADDITIONAL LOAD
 - 635LB MAX CAPACITY



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC#: KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist if Cut for New Roof Opening - 2x6 at 24"oc

CODE REFERENCES

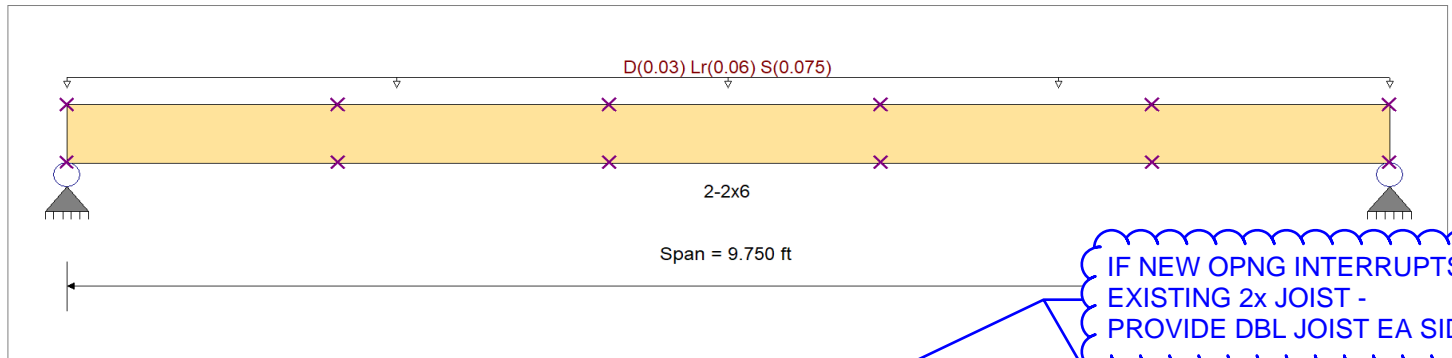
Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx
	Fc - Prll	1,350.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density
Beam Bracing : Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
 Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 3.0 ft, (Roof Load)

DESIGN SUMMARY

Maximum Bending Stress Ratio	=	0.642	1	Maximum Shear Stress Ratio	=	0.205	: 1
Section used for this span		2-2x6		Section used for this span		2-2x6	
fb: Actual	=	989.91	psi	fv: Actual	=	42.46	psi
F'b	=	1,541.82	psi	F'v	=	207.00	psi
Load Combination		+D+S		Load Combination		+D+S	
Location of maximum on span	=	4.875	ft	Location of maximum on span	=	9.323	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.230	in	Ratio =	507	>=360	Span: 1 : S Only
Max Upward Transient Deflection		0	in	Ratio =	0	<360	n/a
Max Downward Total Deflection		0.323	in	Ratio =	362	>=240	Span: 1 : +D+S
Max Upward Total Deflection		0	in	Ratio =	0	<240	n/a

Design OK

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 1.993 ft	1	0.152	0.075	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.23	184.0	1,207.6	0.00	0.00	0.0	0.0	0.0
	Length = 1.993 ft	1	0.226	0.075	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.34	273.4	1,207.6	0.13	12.1	162.0	12.1	162.0
	Length = 1.993 ft	1	0.234	0.075	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.36	282.8	1,207.6	0.09	12.1	162.0	12.1	162.0
	Length = 1.993 ft	1	0.222	0.075	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.34	268.3	1,207.6	0.03	12.1	162.0	12.1	162.0
	Length = 1.779 ft	1	0.140	0.075	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.21	168.8	1,208.0	0.09	12.1	162.0	12.1	162.0
+D+Lr																				
	Length = 1.993 ft	1	0.329	0.162	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.70	551.9	1,675.3	0.13	12.1	162.0	0.00	0.0



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist if Cut for New Roof Opening - 2x6 at 24"oc

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
Length = 1.993 ft	1		0.490	0.162	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.03	820.2	1,675.3	0.26	36.4	225.0
Length = 1.993 ft	1		0.506	0.162	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.07	848.5	1,675.3	0.10	36.4	225.0
Length = 1.993 ft	1		0.481	0.162	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.01	805.0	1,675.3	0.28	36.4	225.0
Length = 1.779 ft	1		0.302	0.162	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.64	506.3	1,676.1	0.40	36.4	225.0
+D+S							1.00	1.00	1.00	1.300	1.00	1.00	1.15		0.0	0.00	0.0	0.0
Length = 1.993 ft	1		0.418	0.205	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.81	643.9	1,541.8	0.47	42.5	207.0
Length = 1.993 ft	1		0.621	0.205	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.21	956.9	1,541.8	0.30	42.5	207.0
Length = 1.993 ft	1		0.642	0.205	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.25	989.9	1,541.8	0.12	42.5	207.0
Length = 1.993 ft	1		0.609	0.205	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.18	939.2	1,541.8	0.33	42.5	207.0
Length = 1.779 ft	1		0.383	0.205	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.74	590.7	1,542.4	0.47	42.5	207.0
+D+0.750Lr							1.00	1.00	1.00	1.300	1.00	1.00	1.15		0.0	0.00	0.0	0.0
Length = 1.993 ft	1		0.275	0.135	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.58	459.9	1,675.3	0.33	30.3	225.0
Length = 1.993 ft	1		0.408	0.135	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.86	683.5	1,675.3	0.22	30.3	225.0
Length = 1.993 ft	1		0.422	0.135	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.89	707.1	1,675.3	0.08	30.3	225.0
Length = 1.993 ft	1		0.400	0.135	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.85	670.9	1,675.3	0.23	30.3	225.0
Length = 1.779 ft	1		0.252	0.135	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.53	421.9	1,676.1	0.33	30.3	225.0
+D+0.750S							1.00	1.00	1.00	1.300	1.00	1.00	1.15		0.0	0.00	0.0	0.0
Length = 1.993 ft	1		0.343	0.168	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.67	528.9	1,541.8	0.38	34.9	207.0
Length = 1.993 ft	1		0.510	0.168	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.99	786.1	1,541.8	0.25	34.9	207.0
Length = 1.993 ft	1		0.527	0.168	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.02	813.1	1,541.8	0.10	34.9	207.0
Length = 1.993 ft	1		0.500	0.168	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.97	771.5	1,541.8	0.27	34.9	207.0
Length = 1.779 ft	1		0.315	0.168	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.61	485.2	1,542.4	0.38	34.9	207.0
+0.60D							1.00	1.00	1.00	1.300	1.00	1.00	1.15		0.0	0.00	0.0	0.0
Length = 1.993 ft	1		0.052	0.025	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.14	110.4	2,141.9	0.08	7.3	288.0
Length = 1.993 ft	1		0.077	0.025	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.21	164.0	2,141.9	0.05	7.3	288.0
Length = 1.993 ft	1		0.079	0.025	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.21	169.7	2,141.9	0.02	7.3	288.0
Length = 1.993 ft	1		0.075	0.025	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.20	161.0	2,141.9	0.06	7.3	288.0
Length = 1.779 ft	1		0.047	0.025	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.13	101.3	2,143.1	0.08	7.3	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3227	4.911		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.512	0.512
Max Upward from Load Combinations	0.512	0.512
Max Upward from Load Cases	0.366	0.366
D Only	0.146	0.146
+D+Lr	0.439	0.439
+D+S	0.512	0.512
+D+0.750Lr	0.366	0.366
+D+0.750S	0.420	0.420
+0.60D	0.088	0.088
Lr Only	0.293	0.293
S Only	0.366	0.366

EXISTING JOIST HANGER
 OK FOR ADDITIONAL LOAD
 - 635LB MAX CAPACITY



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist Supporting Equipment - 2x6 at 24"oc

Maximum Forces & Stresses for Load Combinations

Load Combination	Span #	Max Stress Ratios										Moment Values			Shear Values		
		M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 1.993 ft	1	0.289	0.137	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.61	483.5	1,675.3	0.34	30.9	225.0
Length = 1.993 ft	1	0.464	0.137	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.98	777.9	1,675.3	0.25	30.9	225.0
Length = 1.993 ft	1	0.510	0.137	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.08	854.2	1,675.3	0.14	30.9	225.0
Length = 1.993 ft	1	0.458	0.137	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.97	766.9	1,675.3	0.26	30.9	225.0
Length = 1.779 ft	1	0.266	0.139	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.56	446.1	1,676.1	0.34	31.3	225.0
+D+S					1.00	1.00	1.00	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.353	0.169	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.69	544.8	1,541.8	0.38	34.9	207.0
Length = 1.993 ft	1	0.564	0.169	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.10	869.0	1,541.8	0.27	34.9	207.0
Length = 1.993 ft	1	0.615	0.169	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.20	948.5	1,541.8	0.15	34.9	207.0
Length = 1.993 ft	1	0.555	0.169	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.08	856.3	1,541.8	0.29	34.9	207.0
Length = 1.779 ft	1	0.326	0.171	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.63	502.4	1,542.4	0.39	35.3	207.0
+D+0.750Lr					1.00	1.00	1.00	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.252	0.119	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.53	422.1	1,675.3	0.30	26.9	225.0
Length = 1.993 ft	1	0.410	0.119	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.87	686.8	1,675.3	0.22	26.9	225.0
Length = 1.993 ft	1	0.454	0.119	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.96	760.0	1,675.3	0.13	26.9	225.0
Length = 1.993 ft	1	0.404	0.119	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.85	677.4	1,675.3	0.23	26.9	225.0
Length = 1.779 ft	1	0.233	0.121	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.49	389.9	1,676.1	0.30	27.2	225.0
+D+0.750S					1.00	1.00	1.00	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.304	0.144	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.59	468.1	1,541.8	0.33	29.9	207.0
Length = 1.993 ft	1	0.490	0.144	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.95	755.1	1,541.8	0.24	29.9	207.0
Length = 1.993 ft	1	0.539	0.144	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.05	830.7	1,541.8	0.14	29.9	207.0
Length = 1.993 ft	1	0.483	0.144	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.94	744.5	1,541.8	0.25	29.9	207.0
Length = 1.779 ft	1	0.280	0.146	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.54	432.1	1,542.4	0.33	30.2	207.0
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.067	0.031	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.18	142.9	2,141.9	0.10	8.8	288.0
Length = 1.993 ft	1	0.116	0.031	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.31	248.0	2,141.9	0.08	8.8	288.0
Length = 1.993 ft	1	0.134	0.031	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.36	286.4	2,141.9	0.06	8.8	288.0
Length = 1.993 ft	1	0.115	0.031	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.31	245.5	2,141.9	0.08	8.8	288.0
Length = 1.779 ft	1	0.062	0.031	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.17	132.7	2,143.1	0.10	9.0	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2907	4.911		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.414	0.418
Max Upward from Load Combinations	0.414	0.418
Max Upward from Load Cases	0.244	0.244
D Only	0.171	0.174
+D+Lr	0.366	0.369
+D+S	0.414	0.418
+D+0.750Lr	0.317	0.321
+D+0.750S	0.353	0.357
+0.60D	0.102	0.105
Lr Only	0.195	0.195
S Only	0.244	0.244

EXISTING JOIST HANGER
 OK FOR ADDITIONAL LOAD
 - 635LB MAX CAPACITY



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Roof Joist if Cut for New Roof Opening with Additional Equipment Weight - 2x6 at 24"oc

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v
Length = 1.993 ft	1	0.398	0.191	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.84	667.4	1,675.3	0.47	43.0	225.0
Length = 1.993 ft	1	0.628	0.191	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.33	1,051.3	1,675.3	0.33	43.0	225.0
Length = 1.993 ft	1	0.679	0.191	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.43	1,136.9	1,675.3	0.18	43.0	225.0
Length = 1.993 ft	1	0.618	0.191	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.30	1,035.2	1,675.3	0.36	43.0	225.0
Length = 1.779 ft	1	0.367	0.193	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.78	614.9	1,676.1	0.48	43.4	225.0
+D+S														0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.493	0.237	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.96	759.4	1,541.8	0.54	49.1	207.0
Length = 1.993 ft	1	0.771	0.237	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.50	1,188.0	1,541.8	0.38	49.1	207.0
Length = 1.993 ft	1	0.829	0.237	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.61	1,278.3	1,541.8	0.19	49.1	207.0
Length = 1.993 ft	1	0.758	0.237	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.47	1,169.4	1,541.8	0.40	49.1	207.0
Length = 1.779 ft	1	0.453	0.239	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.88	699.3	1,542.4	0.54	49.5	207.0
+D+0.750Lr														0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.343	0.164	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.73	575.4	1,675.3	0.41	37.0	225.0
Length = 1.993 ft	1	0.546	0.164	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.15	914.6	1,675.3	0.29	37.0	225.0
Length = 1.993 ft	1	0.594	0.164	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.25	995.6	1,675.3	0.16	37.0	225.0
Length = 1.993 ft	1	0.538	0.164	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.14	901.1	1,675.3	0.31	37.0	225.0
Length = 1.779 ft	1	0.317	0.166	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.67	530.5	1,676.1	0.41	37.3	225.0
+D+0.750S														0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.418	0.201	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.81	644.4	1,541.8	0.46	41.5	207.0
Length = 1.993 ft	1	0.660	0.201	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.28	1,017.1	1,541.8	0.32	41.5	207.0
Length = 1.993 ft	1	0.714	0.201	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.39	1,101.6	1,541.8	0.17	41.5	207.0
Length = 1.993 ft	1	0.650	0.201	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	1.26	1,001.7	1,541.8	0.34	41.5	207.0
Length = 1.779 ft	1	0.385	0.202	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.75	593.8	1,542.4	0.46	41.9	207.0
+0.60D														0.0	0.00	0.0	0.0
Length = 1.993 ft	1	0.084	0.039	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.23	179.7	2,141.9	0.12	11.3	288.0
Length = 1.993 ft	1	0.141	0.039	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.38	302.7	2,141.9	0.10	11.3	288.0
Length = 1.993 ft	1	0.160	0.039	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.43	342.9	2,141.9	0.07	11.3	288.0
Length = 1.993 ft	1	0.140	0.039	1.60	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.38	299.1	2,141.9	0.10	11.3	288.0
Length = 1.779 ft	1	0.078	0.040	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.15	0.21	166.4	2,143.1	0.13	11.5	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3982	4.911		0.0000	0.000

Vertical Reactions

Load Combination	Support notation : Far left is #1		Values in KIPS
	Support 1	Support 2	
Max Upward from all Load Conditions	0.585	0.589	
Max Upward from Load Combinations	0.585	0.589	
Max Upward from Load Cases	0.366	0.366	
D Only	0.219	0.223	
+D+Lr	0.512	0.516	
+D+S	0.585	0.589	
+D+0.750Lr	0.439	0.443	
+D+0.750S	0.494	0.497	
+0.60D	0.132	0.134	
Lr Only	0.293	0.293	
S Only	0.366	0.366	

EXISTING JOIST HANGER
 OK FOR ADDITIONAL LOAD
 - 635LB MAX CAPACITY



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC#: KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Blocking at New Opening - 2x4

CODE REFERENCES

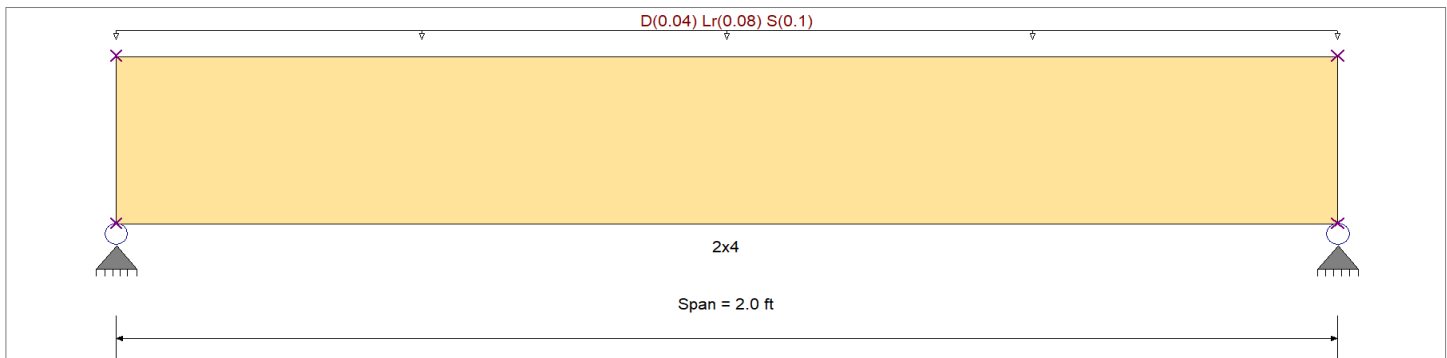
Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	<i>E</i> : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx
	Fc - Prll	1,350.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	
	Ft	575.0 psi	Density
Beam Bracing : Beam bracing is defined as a set spacing over all spans			Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
 Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.0 ft, (Roof Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.155 : 1	Maximum Shear Stress Ratio	=	0.138 : 1
Section used for this span		2x4	Section used for this span		2x4
fb: Actual	=	274.29 psi	fv: Actual	=	28.61 psi
F'b	=	1,764.02 psi	F'v	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	1.000ft	Location of maximum on span	=	1.715 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.004 in	Ratio =	5683 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.006 in	Ratio =	4059 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only	Length = 2.0 ft	1	0.057	0.050	0.90	1.00	1.00	0.99	1.500	1.00	1.00	1.15	0.02	78.4	1,384.7	0.0	0.00	0.0	0.0	162.0
+D+Lr	Length = 2.0 ft	1				1.00	1.00	0.99	1.500	1.00	1.00	1.15			0.0	0.00	0.0	0.0	0.0	0.0
+D+S	Length = 2.0 ft	1	0.123	0.109	1.25	1.00	1.00	0.99	1.500	1.00	1.00	1.15	0.06	235.1	1,914.9	0.09	0.09	24.5	225.0	0.0
+D+0.750Lr	Length = 2.0 ft	1	0.155	0.138	1.15	1.00	1.00	0.99	1.500	1.00	1.00	1.15	0.07	274.3	1,764.0	0.10	0.10	28.6	207.0	0.0
D Only	Length = 2.0 ft	1	0.102	0.091	1.25	1.00	1.00	0.99	1.500	1.00	1.00	1.15	0.05	195.9	1,914.9	0.07	0.07	20.4	225.0	0.0



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Blocking at New Opening - 2x4

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	f _v	F ^v
+D+0.750S						1.00	1.00	0.99	1.500	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 2.0 ft	1		0.128	0.114	1.15	1.00	1.00	0.99	1.500	1.00	1.00	1.15	0.06	225.3	1,764.0	0.08	23.5	207.0
+0.60D						1.00	1.00	0.99	1.500	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 2.0 ft	1		0.019	0.017	1.60	1.00	1.00	0.98	1.500	1.00	1.00	1.15	0.01	47.0	2,439.0	0.02	4.9	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0059	1.007		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.140	0.140
Max Upward from Load Combinations	0.140	0.140
Max Upward from Load Cases	0.100	0.100
D Only	0.040	0.040
+D+Lr	0.120	0.120
+D+S	0.140	0.140
+D+0.750Lr	0.100	0.100
+D+0.750S	0.115	0.115
+0.60D	0.024	0.024
Lr Only	0.080	0.080
S Only	0.100	0.100



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Blocking at New Opening W/ Interrupted Joist - 2x6

CODE REFERENCES

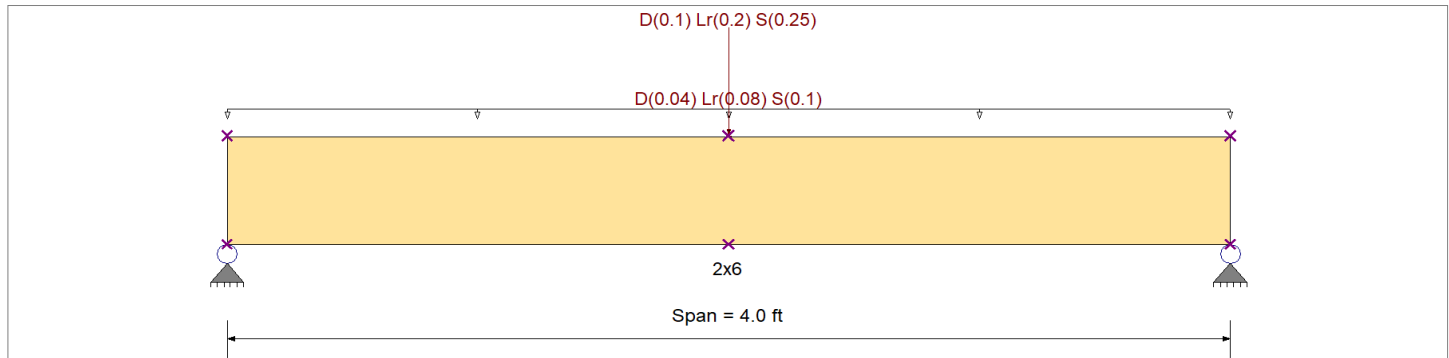
Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	900.0 psi	Ebend- xx
	Fc - Prll	1,350.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	Density
	Ft	575.0 psi	Repetitive Member Stress Increase
Beam Bracing : Beam bracing is defined as a set spacing over all spans			

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
 Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.0 ft, (Roof Load)

Point Load : D = 0.10, Lr = 0.20, S = 0.250 k @ 2.0 ft, (Supported Joist Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.658 < 1	Maximum Shear Stress Ratio	=	0.344 < 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	999.67 psi	fv: Actual	=	71.21 psi
F'b	=	1,520.07 psi	F'v	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	2.000ft	Location of maximum on span	=	3.547 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.035 in	Ratio =	1378 >=360	Span: 1 : S Only
Max Upward Transient Deflection		0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection		0.049 in	Ratio =	984 >=240	Span: 1 : +D+S
Max Upward Total Deflection		0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 2.0 ft	1	0.239	0.126	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.18	285.6	1,195.3	0.00	0.00	0.0	0.0
	Length = 2.0 ft	1	0.239	0.126	0.90	1.00	1.00	0.99	1.300	1.00	1.00	1.15	0.18	285.6	1,195.3	0.11	20.3	162.0	162.0
+D+Lr																			
	Length = 2.0 ft	1	0.520	0.271	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.54	856.9	1,648.8	0.00	0.00	0.0	0.0
	Length = 2.0 ft	1	0.520	0.271	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.54	856.9	1,648.8	0.34	61.0	225.0	225.0
+D+S																			
																0.0	0.00	0.0	0.0



AHBL Engineers
 2215 North 30th Street
 Suite 300
 Tacoma, WA 98403
 253.383.2422

Project Title: Red Dot Corporation Equipment Foundation
 Engineer: ADM
 Project ID: 2220760.20
 Project Descr: New Equipment

Wood Beam

Project File: 2220760.20.ec6

LIC# : KW-06014847, Build:20.22.12.28

AHBL, INC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Blocking at New Opening W/ Interrupted Joist - 2x6

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F ^b	V	f _v	F ^v
Length = 2.0 ft	1		0.658	0.344	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.63	999.7	1,520.1	0.39	71.2	207.0
Length = 2.0 ft	1		0.658	0.344	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.63	999.7	1,520.1	0.39	71.2	207.0
+D+0.750Lr															0.0	0.00	0.0	0.0
Length = 2.0 ft	1		0.433	0.226	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.45	714.0	1,648.8	0.28	50.9	225.0
Length = 2.0 ft	1		0.433	0.226	1.25	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.45	714.0	1,648.8	0.28	50.9	225.0
+D+0.750S															0.0	0.00	0.0	0.0
Length = 2.0 ft	1		0.540	0.283	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.52	821.2	1,520.1	0.32	58.5	207.0
Length = 2.0 ft	1		0.540	0.283	1.15	1.00	1.00	0.98	1.300	1.00	1.00	1.15	0.52	821.2	1,520.1	0.32	58.5	207.0
+0.60D															0.0	0.00	0.0	0.0
Length = 2.0 ft	1		0.082	0.042	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.11	171.4	2,093.1	0.07	12.2	288.0
Length = 2.0 ft	1		0.082	0.042	1.60	1.00	1.00	0.97	1.300	1.00	1.00	1.15	0.11	171.4	2,093.1	0.07	12.2	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0487	2.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.455	0.455
Max Upward from Load Combinations	0.455	0.455
Max Upward from Load Cases	0.325	0.325
D Only	0.130	0.130
+D+Lr	0.390	0.390
+D+S	0.455	0.455
+D+0.750Lr	0.325	0.325
+D+0.750S	0.374	0.374
+0.60D	0.078	0.078
Lr Only	0.260	0.260
S Only	0.325	0.325