Job No.	24-1374	**Sheet No.**	Cover
By	JKC	**Date**	10/2024

CARUSO
TURLEY
SCOTT
structural
engineers

CLIENT:

FUZION

9096 E Bahia Dr
Ste 103
Scottsdale, AZ 85260

PROJECT:

T-Mobile TI - #8022
4227 S. MERIDIAN SUITE E
PUYALLUP, WA 98373

GENERAL INFORMATION:

BUILDING CODE: 2021 INTERNATIONAL BUILDING CODE

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
SKinnear
03/25/2025
2:55:38 PM

Calculations required to be provided by the Permittee on site for all Inspections

PRCTI20241902

City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

1215 W. Rio Salado Pkwy.
Suite 200
Tempe, AZ 85281
480.774.1700
www.ctsaz.com

STRUCTURAL SOLUTIONS SINCE 1963

CARUSO TURLEY SCOTT structural engineers

1215 W. Rio Salado Pkwy.
Suite 200
Tempe, AZ 85281
480.774.1700
www.ctsaz.com

Job Name	T-Mobile		
Job No	24-1374	Sheet No.	
By	JKC	Date	11/2024

CALCULATION INDEX SHEET

SHEET #	DESCRIPTION
3-7	Basis of Design
8-10	Threaded Rods at New Portal and Cloud
11-17	Unistrut Framing Supporting Portal and Cloud
18-33	Beam Supporting Portals
34-43	Mechanical Unit Support
44	Structural Survey by Apex Tech Solutions

YOUR VISION IS OUR MISSION

CARUSO TURLEY SCOTT
consulting structural engineers

1215 W. Rio Salado Pkwy.
Suite 200
Tempe, AZ 85281
T: (480) 774-1700
F: (480) 774-1701

Job Name: T-Mobile

Job No. : 24-1374 Sheet No.: BASIS

By: JKC Date: 10/2024

BASIS OF DESIGN

BUILDING CODE:

2021 EDITION OF THE INTERNATIONAL BUILDING CODE AND STANDARDS REFERENCED THEREIN, WITH CITY OF PUYALLUP AMENDMENTS.

PROJECT SCOPE:

NEW DIGITAL PORTALS AND WELCOME CLOUD SUPPORTED BY EXISTING ROOF FRAMING:

EXISTING ROOF FRAMING CONSISTS OF WOOD TRUSSES AT 24" O.C..
ALL PORTALS AND CLOUDS WILL BE SUPPORTED AND BRACED WITH UNISTRUT FRAMING SUSPENDED FROM NEW GLULAM BEAMS WITH THREADED RODS.

LARGE DIGITAL PORTAL CLOUD WEIGHT = 400 LB
SMALL DIGITAL WELCOME CLOUD WEIGHT = 650 LB

LOADS:

GRAVITY:

ROOF LIVE LOAD = 20 PSF (NON-REDUCIBLE).
ROOF DEAD LOAD = 18 PSF (ASSUMED).
GROUND SNOW LOAD = 25 PSF

WIND:

ULTIMATE DESIGN WIND SPEED (3-SECOND GUST), V(ult) = 110 MPH.
RISK CATEGORY, II.
EXPOSURE C.

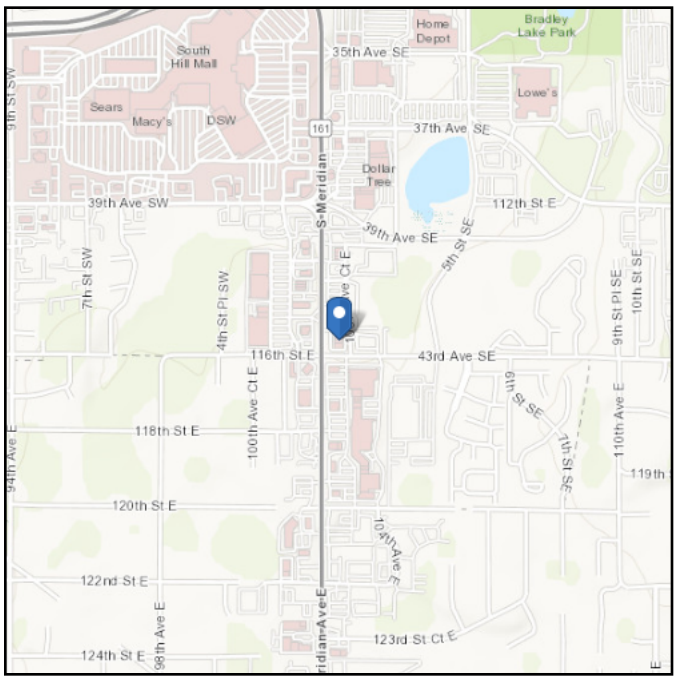
SEISMIC:

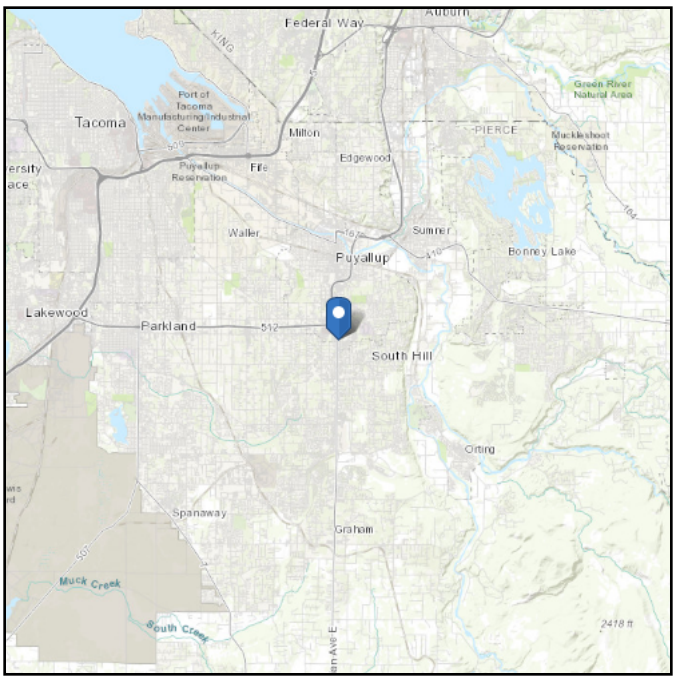
RISK CATEGORY, II.
SEISMIC IMPORTANCE FACTOR, I = 1.0.
MAPPED SHORT PERIOD SPECTRAL ACCELERATION, Ss = 1.26.
MAPPED ONE SECOND SPECTRAL ACCELERATION, S1 = 0.435.
SOIL SITE CLASS, D.
DESIGN SHORT PERIOD SPECTRAL ACCELERATION, Sds = 1.008.
SEISMIC DESIGN CATEGORY, D.

ASCE Hazards Report

Address:
4227 S Meridian
Puyallup, Washington
98373

Standard:	ASCE/SEI 7-16	**Latitude:**	47.15151
Risk Category:	II	**Longitude:**	-122.292339
Soil Class:	D - Default (see Section 11.4.3)	**Elevation:**	441.03603823060683 ft (NAVD 88)





Wind

Results:

Wind Speed	97 Vmph
10-year MRI	67 Vmph
25-year MRI	73 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Thu Nov 07 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.26	S_{D1} :	N/A
S_1 :	0.435	T_L :	6
F_a :	1.2	PGA :	0.5
F_v :	N/A	PGA_M :	0.6
S_{MS} :	1.512	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.008	C_v :	1.352

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Thu Nov 07 2024

Date Source: USGS Seismic Design Maps

Residential Design Criteria

For 2021 International Codes & PCC 17C.20.170

This bulletin establishes the design criteria used in designing buildings using the current International Residential Code (IRC).

It is the responsibility of the property owner to verify all design criteria for their specific site.

Ground Snow Load	Wind Design		Seismic Design Category	Subject to Damage From			Winter Design Temp	Ice Barrier UnderLayment Required	Flood Hazard	Air Freezing Index	Mean Annual Temp
	Speed (mph)	Topographic Effects		Weathering	Frostline Depth	Termite					
See below	110 Mph Ult	No	**D1 / D2**	Moderate	**See below**	Slight to Moderate	26	No	Ask Engineering	50	50

Table items above in **bold** vary depending on your location. Read below for more information.

Ground Snow Loads

- All structural tables in the International Residential Code (IRC) have a minimum ground snow load of 30 pounds per square foot (psf). Projects designed to the IRC must be designed to a minimum of 30 psf.
- If plans are designed by engineer using the International Building Code (IBC) then a minimum ground snow load of 25psf may be used.
- Higher elevations (above 700 feet) may have a higher snow load.
- Ground snow loads greater than 70psf require structural calculations prepared by a WA state registered engineer (2021 IRC section R301.2.3).

Wind Design Criteria

- 110 mph Ultimate with a 3-second gust
- Exposure B (assumed unless the site meets the definition of another type)

Exposure A: Not used for residential construction.

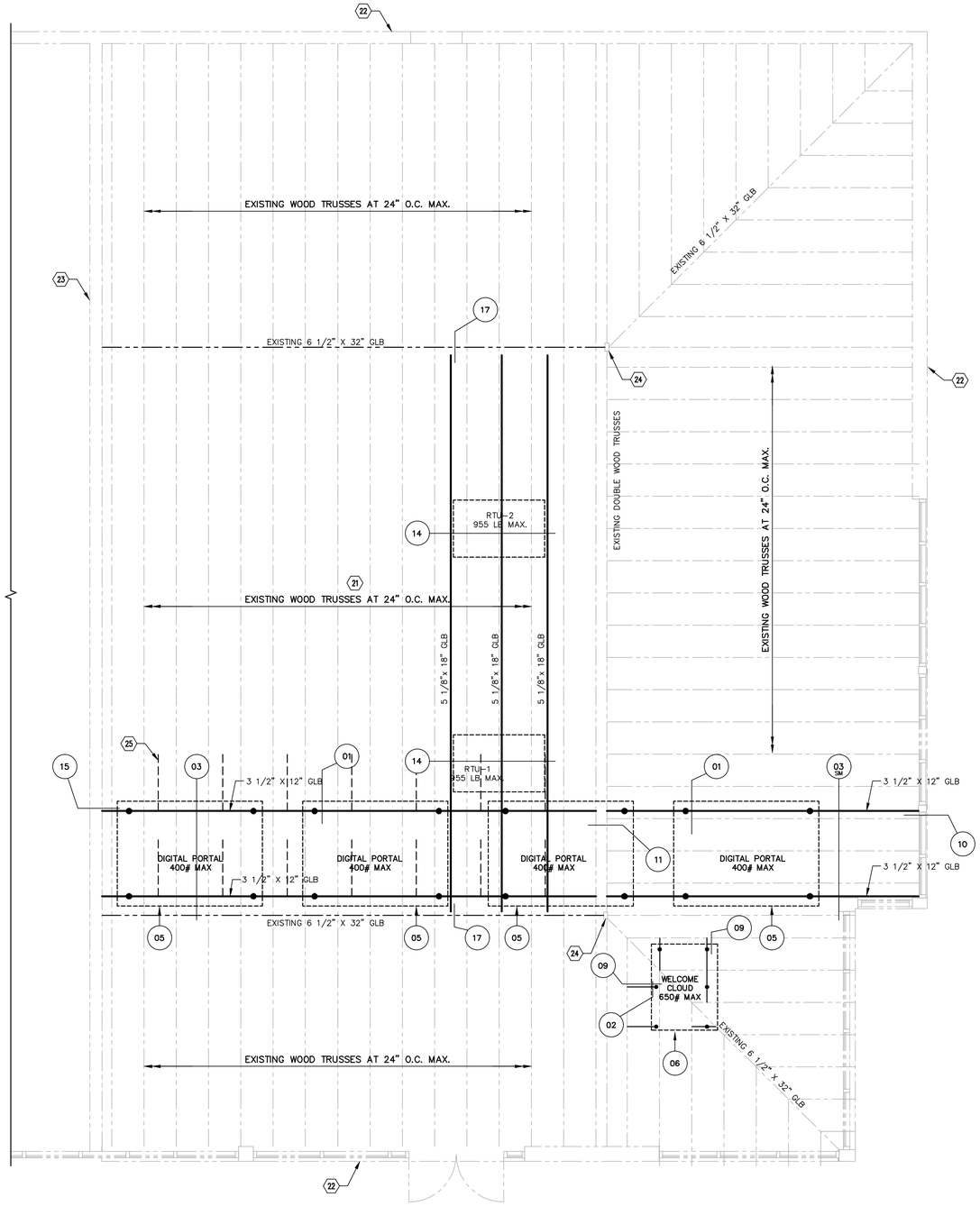
Exposure B: Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.

Exposure C: Open terrain with scattered obstructions, including hills or other landscape features less than 30 feet extending more than 1,500 feet from the building site in any direction.

Exposure D: Flat, unobstructed areas exposed to wind flowing over open water for a horizontal distance of at least 5000 feet.

Seismic Design Categories

The majority of Pierce County is Category D1. The area of Pierce County abutting Kitsap County (Gig Harbor area) is designated as D2 on the IRC map.



PARTIAL ROOF FRAMING PLAN

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

ROOF FRAMING NOTES – TYP U.N.O.:

1. **VERIFY ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS AND FIELD CONDITIONS. BUILDING DIMENSIONS AND ELEVATIONS, WHERE SHOWN, WERE PROVIDED BY THE ARCHITECT AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND COORDINATE ALL DIMENSIONS PRIOR TO PROCEEDING WITH THE WORK. ANY DISCREPANCIES SHALL BE RESOLVED THROUGH THE ARCHITECT.**
2. FOR CLARITY, DETAILS MAY SHOW ONLY ONE SIDE OF FRAMING CONDITIONS. ALL OPENINGS MAY NOT BE SHOWN ON THIS PLAN. FOR EXACT SIZE, NUMBER AND LOCATION OF OPENINGS, SEE ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, SPRINKLER AND THEIR RELATED DRAWINGS. FOR FRAMING AT OPENINGS, SEE TYPICAL DETAILS.
3. VERIFY EXACT SIZE, WEIGHT AND LOCATION OF EQUIPMENT AND SUPPORTS INDICATED ON PLAN WITH ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, SPRINKLER AND THEIR RELATED DRAWINGS. EQUIPMENT INDICATED ARE ONLY THOSE THAT EXCEED LOADS SPECIFIED IN THE G.S.N. FOR SUPPORT OF EQUIPMENT, SEE TYPICAL DETAILS AND OTHER TRADES.
4. THE EXISTING CONDITIONS DEPICTED ON THESE DRAWINGS ARE BASED ON APEX TECH SOLUTIONS SURVEY DATA DATED 10/15/2024 AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER IMMEDIATELY.

FRAMING KEYNOTES

940–11

21 CONTRACTOR TO VERIFY TRUSSES ARE 19'–2" LONG (MAX). NOTIFY ENGINEER IF OTHERWISE.

22 EXISTING EXTERIOR WALL.

23 EXISTING INTERIOR DEMISING WALL.

24 EXISTING STEEL COLUMN.

25 BRACE WOOD BEAM PER DETAIL 12.

FOR ADDITIONAL INFORMATION SHOWN BUT NOT NOTED, SEE GENERAL STRUCTURAL NOTES ON SHEET S101 AND TYPICAL DETAIL SHEETS.

THESE DRAWINGS/CALCULATIONS ARE CONSIDERED PRELIMINARY –NOT FOR CONSTRUCTION OR RECORDING UNLESS THE STRUCTURAL ENGINEER OF RECORD'S SEAL IS AFFIXED WITH WRITTEN SIGNATURE.

PROJECT NUMBER	24–1374	PROJECT MANAGER	TRM
PROJECT ENGINEER	JKC	PROJECT DRAFTER	PET

CARUSO TURLEY SCOTT structural engineers
1215 West Rio Salado Parkway
Suite 200
Tempe, Arizona 85281
(480) 774-1700
www.ctsaz.com

T-Mobile
12920 SE 38th STREET
BELLEVUE, WA 98006
WWW.T-MOBILE.COM

SOUTH MERIDIAN & 43RD AVE SE
4227 S MERIDIAN SUITE E
PUYALLUP, WA 98373

DESIGN TYPE: E1Y

PROJECT TYPE: CORP NEW

8022

PROTOTYPE RELEASE: Q3 2024

FUZION
20551 N. PIMA ROAD
SUITE 200
SCOTTSDALE, AZ 85255
Design@FuzionAD.com
www.FuzionAD.com

##	DESCRIPTION	DATE

DATE: 11.18.2024
DRAWN BY: PET

PARTIAL ROOF FRAMING PLAN

S201

Structural Solutions Since 1963

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engineers

1215 W. Rio Salado Pkwy.
Suite 200
Tempe, AZ 85281
T: (480) 774-1700
F: (480) 774-1701

Job Name: _____

Job No. : _____ Sheet No.: _____

By: _____ Date: _____

Threaded Rod Supporting Cloud and Portal:

3/8" dia. threaded rod

F_U = 58 ksi A36 F_y = 36 ksi

$A_b = (0.375\ in)^2(\pi)/4$
$= 0.11\ in^2$

Rod Capacity = $R_n = F_nA_b$ J3-1
$F_n = 0.75F_u = (0.75)(58\ ksi)$ Table J3.2
$= 43.5\ ksi$

$R_n/\Omega = (43.5\ ksi)(0.11\ in2)/2.00$
$= 2392\ lb.$

Digital Portal Brace and Threaded Rod Connection:

Portal Weight = 400 lb. (max)

Check Threaded Rods:

P_{ROD} = (400 lb.)/4 = 100 lb.

3/8" diameter threaded rod

$P_{ALLOWABLE}$ = 2,392 lb. > 100 lb. **OKAY**

Check Brace:

S_{ds} = 1.5 (max)

F_p = (0.4)(1.0)(1.5)(400 lb.) / [2.5/1.0] * [1 + 2(1/1)]
= 288 lb.

P_{BRACE} = (288 lb)/2 *(sqrt(2)) = 204 lb./Brace

* Using #8 wire: $P_{ALLOWABLE}$ = (0.022 in^2)(20 ksi)
= 440 lb.

Check P1000T Unistrut as Seismic Rod Stiffener:

Span = 36" max cantilever

P = 288 lb. / 4 = 72 lb.

M = (72 lb.)(36 in.) = 2592 in-lb

P1000 Unistrut Capacity:

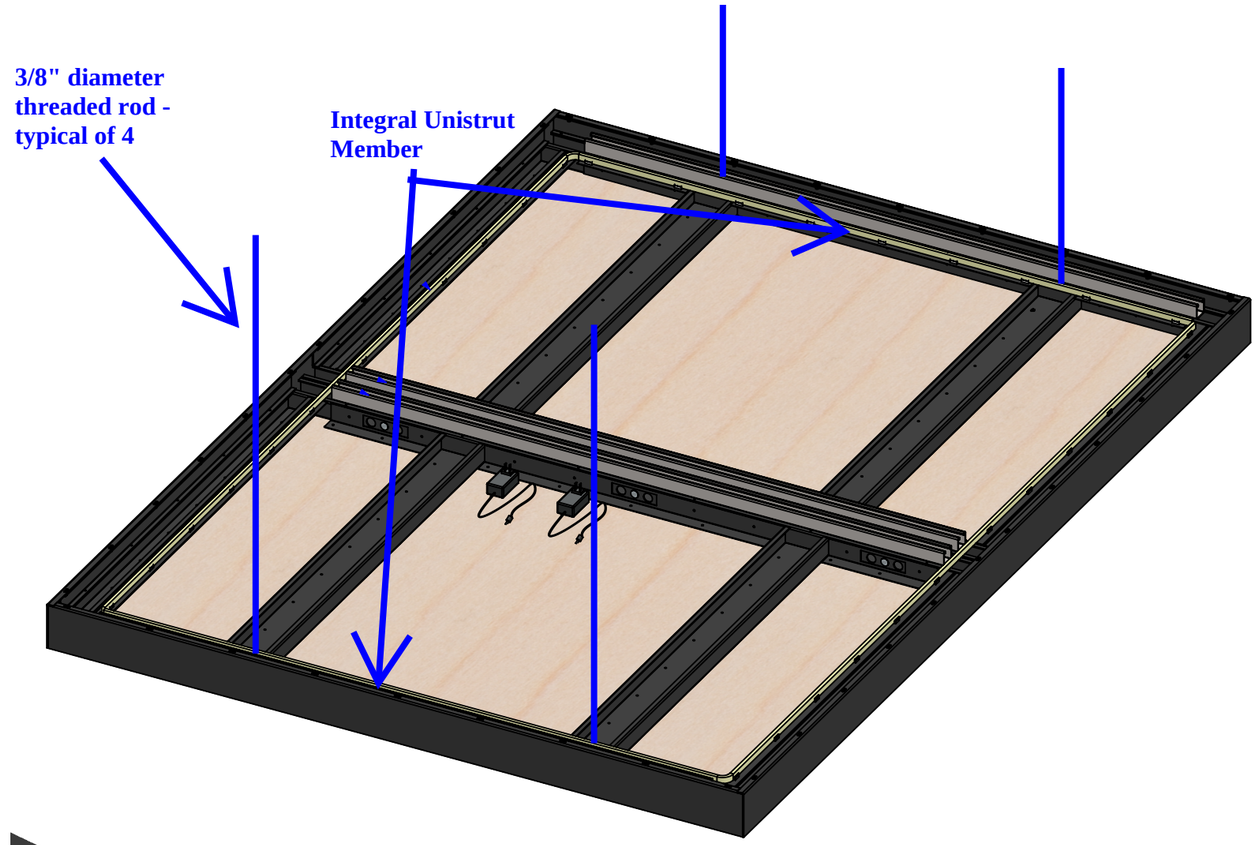
Allowable Load = 560 lb. (based on 72" span, 2*cantilever)

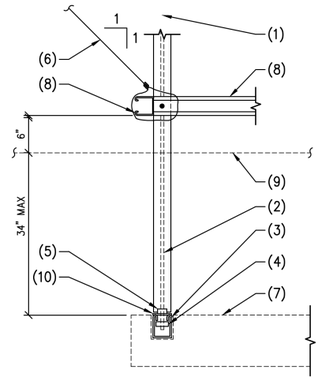
Hole Factor (T Series) = 0.85

Unbraced Length Factor = 0.78

Point Load Reduction Factor = 0.5

$M_{ALLOWABLE}$=[(560 lb.)(72 in.) / 4] * [(0.85)(0.5)(0.78)]
= 3341 in-lb > 2592 in-lb **OKAY**





NOTES:

1. TOP CONNECTION PER DETAIL 03.
2. THREADED ROD WITH STIFFENER ROD REINFORCEMENT PER DETAIL 04. REFER TO ARCH'L FOR ROD LOCATIONS.
3. INTEGRAL UNISTRUT PER VENDOR.
4. UNISTRUT CHANNEL NUT.
5. HEX NUT.
6. SPLAY WIRE WITH 3 TURNS.
7. DIGITAL PORTAL BY MFR. 400# MAX.
8. P1000 HORIZONTAL BRACE ALL 4 SIDES.
9. SUSPENDED CEILING AS OCCURS PER ARCH'L.
10. 1/4"x2"x2" STEEL PLATE.

NOTE:
SEE DETAIL 07 FOR HORIZONTAL BRACE TO STIFFENER CONNECTION

REV#	DATE	NAME	DESCRIPTION
REVISION TABLE			

sparks
A Freeman Company
2828 CHARTER RD. PHILADELPHIA, PA 19154
PHONE: 215.602.8100 FAX: 215.602.8111
www.wearesparks.com

DRAWN BY:	SCALE (B-SIZE):
AL	1:15

DATE CREATED: **8/27/2024**

CLIENT: **T-MOBILE**

PROJECT: **EXPERIENCE E1Y**

JOB #: **TMOB88**

FILE NAME: **XF905_XF906 PORTAL CLOUD**

DESCRIPTION: **PORTAL CLOUD**

PART NUMBER: **XF905**

SHEET: **1 of 15**

T427-70-022

Welcome Cloud Brace and Threaded Rod Connection:

Cloud Weight = 650 lb. (max)

Check Threaded Rods:

P_{ROD} = (650 lb.)/6 = 108 lb.

3/8" diameter threaded rod

$P_{ALLOWABLE}$ = 2,392 lb. > 108 lb. **OKAY**

Check Brace:

Sds = 1.5 (max)

Fp = (0.4)(1.0)(1.5)(650 lb.) / [2.5/1.0] * [1 + 2(1/1)]
= 468 lb.

P_{BRACE} = (468 lb)/2 *(sqrt(2)) = 331 lb./Brace

* Using #8 wire: $P_{ALLOWABLE}$ = (0.022 in^2)(20 ksi)
= 440 lb.

Check P1000T Unistrut as Seismic Rod Stiffener:

Span = 36" max cantilever

P = 468 lb. / 6 = 78 lb.

M = (78 lb.)(36 in.) = 2808 in-lb

P1000 Unistrut Capacity:

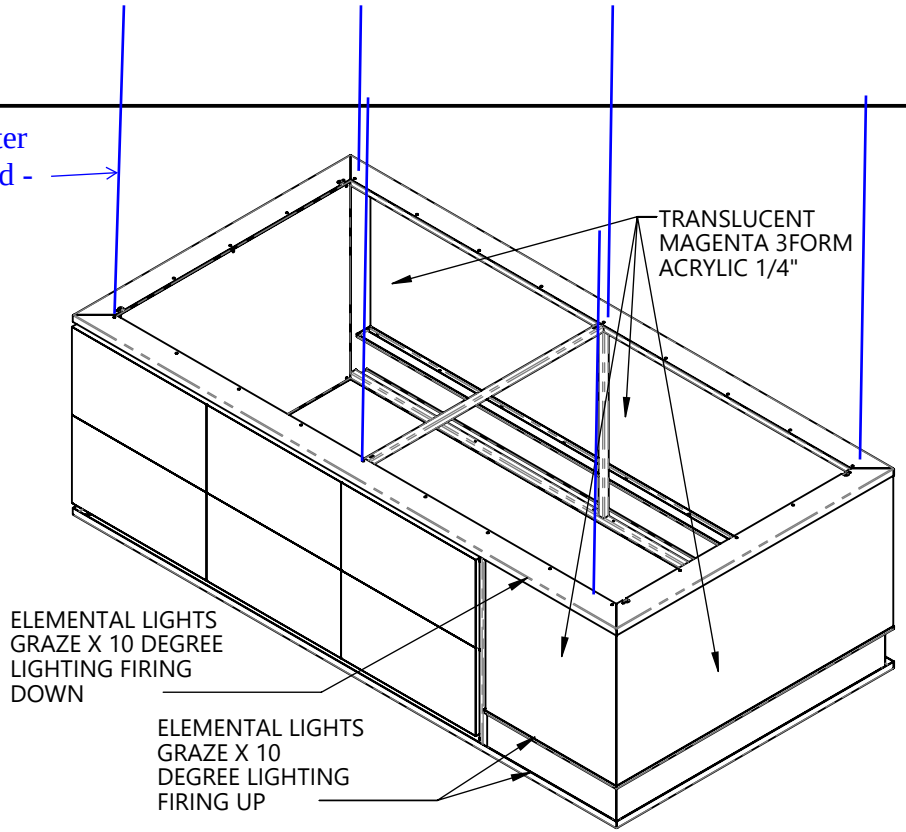
Allowable Load = 560 lb. (based on 72" span, 2*cantilever)

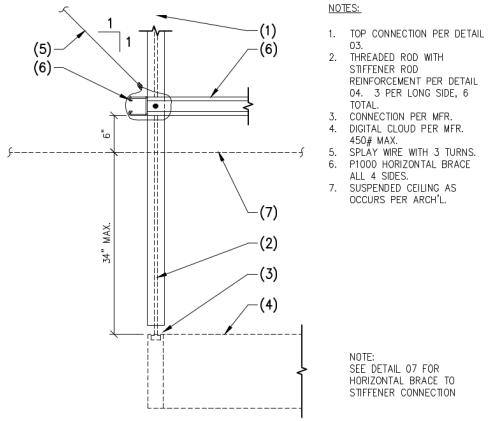
Hole Factor (T Series) = 0.85

Unbraced Length Factor = 0.78

Point Load Reduction Factor = 0.5

MALLOWABLE=[(560 lb.)(72 in.) / 4] * [(0.85)(0.5)(0.78)]
= 3341 in-lb > 2808 in-lb OKAY





TRIAD
Triad Manufacturing, Inc.
4321 Semple Ave. / St Louis, MO 63120
P (314) 381-5280

PROJECT	EXPERIENCE 2.0
DESCRIPTION	DIGITAL CLOUD-L,KDA
MATERIAL	SEE BOM
FINISH	BERRY AND WHITE
DATE	2023.10.07

CUSTOMER PART # **TRIAD PART #** T427-70-022

REVISION

SHEET # **1 of 5**

CARUSO TURLEY SCOTT
structural engineers
1215 W. Rio Salado Parkway, Suite 200
Tempe, AZ 85281
480.774.1700
www.ctsaz.com

Job Name T-Mobile

Job No. _____ Sheet No. _____

By _____ Date _____

Sizing Unistrut Members Supporting Portal and Cloud:

* Design is conservatively based on the unistrut supporting the suspended cloud since the cloud is heavier than the portal.

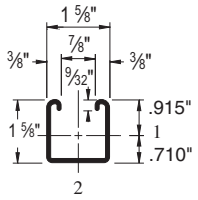
Unistrut Span = 6'-5"

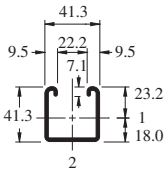
Cloud Weight = 650 lb
Worst case load to unistrut = 650 lb / 2 = 325 lb (Assume midspan load)

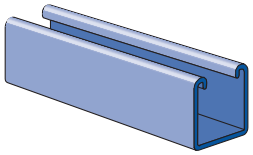
Try P1001 Unistrut:
Self Weight = 3.78 lb/ft
Midspan Reduction Factor = 0.5
Hole Factor (T-series) = 0.85
Unbraced Length Factor = 0.91
P_allowable = (1420lb - 3.78lb/ft*6.42ft)*0.5*0.85*0.91
= 540 lb > 325 lb

Use P1001 Unistrut Spanning Between Joists (6 Total)

P1000®

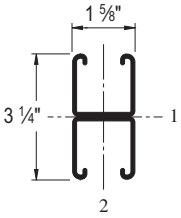


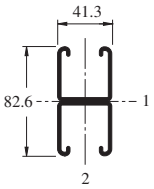


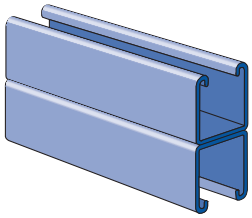


Wt/100 Ft:189 Lbs (281 kg/100 m)
Allowable Moment 5,070 In-Lbs (570 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)

P1001

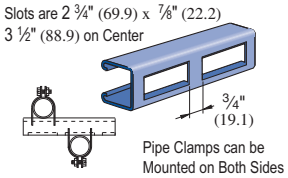






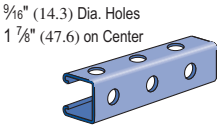
Wt/100 Ft: 378 Lbs (562 kg/100 m)
Allowable Moment 14,360 In-Lbs (1,620 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)

P1000 DS



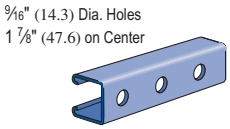
Wt/100 Ft: 173 Lbs (257 kg/100 m)

P1000 H3



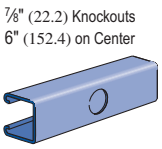
Wt/100 Ft: 175 Lbs (260 kg/100 m)

P1000 HS



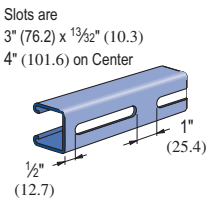
Wt/100 Ft:185 Lbs (275 kg/100 m)

P1000 KO



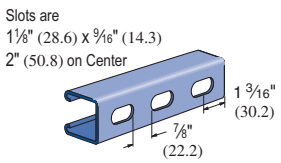
Wt/100 Ft: 190 Lbs (283 kg/100 m)

P1000 SL



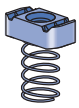
Wt/100 Ft: 185 Lbs (275 kg/100 m)

P1000 T



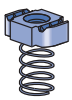
Wt/100 Ft: 185 Lbs (275 kg/100 m)

Channel Nuts (Refer to Hardware Section for Details)



P1006-0832
P1006-1024
P1006-1420
P1007
P1008
P1009
P1010

P1008T
P1006T1420
P1010T



P1024
P1012S
P1023S

P1012
P1023
P1024S

P3006-0832
P3006-1024
P3006-1420
P3007
P3008
P3009
P3010

P3016-0632
P3016-0832
P3016-1024
P3016-1420

Channel Finishes: PL, GR, HG, PG, ZD; Standard Lengths: 10' & 20'

P1000 - Beam Loading

Span In	Max. Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	1,690	0.06	1,690	1,690	1,690
36	1,130	0.13	1,130	1,130	900
48	850	0.22	850	760	500
60	680	0.35	650	480	320
72	560	0.50	450	340	220
84	480	0.68	330	250	160
96	420	0.89	250	190	130
108	380	1.14	200	150	100
120	340	1.40	160	120	80
144	280	2.00	110	80	60
168	240	2.72	80	60	40
192	210	3.55	60	50	NR
216	190	4.58	50	40	NR
240	170	5.62	40	NR	NR

P1001 - Beam Loading

Span In	Max. Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	3,500*	0.02	3,500*	3,500*	3,500*
36	3,190	0.07	3,190	3,190	3,190
48	2,390	0.13	2,390	2,390	2,390
60	1,910	0.20	1,910	1,910	1,620
72	1,600	0.28	1,600	1,600	1,130
84	1,370	0.39	1,370	1,240	830
96	1,200	0.51	1,200	950	630
108	1,060	0.64	1,000	750	500
120	960	0.79	810	610	410
144	800	1.14	560	420	280
168	680	1.53	410	310	210
192	600	2.02	320	240	160
216	530	2.54	250	190	130
240	480	3.16	200	150	100

P1000 - Column Loading

Unbraced Height In	Max. Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	3,550	10,740	9,890	8,770	7,740
36	3,190	8,910	7,740	6,390	5,310
48	2,770	7,260	6,010	4,690	3,800
60	2,380	5,910	4,690	3,630	2,960
72	2,080	4,840	3,800	2,960	2,400
84	1,860	4,040	3,200	2,480	1,980
96	1,670	3,480	2,750	2,110	1,660
108	1,510	3,050	2,400	1,810	**
120	1,380	2,700	2,110	**	**
144	1,150	2,180	1,660	**	**

P1001 - Column Loading

Unbraced Height In	Max. Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	6,430	24,280	23,610	22,700	21,820
36	6,290	22,810	21,820	20,650	19,670
48	6,160	21,410	20,300	18,670	16,160
60	6,000	20,210	18,670	15,520	12,390
72	5,620	18,970	16,160	12,390	8,950
84	5,170	16,950	13,630	9,470	6,580
96	4,690	14,890	11,190	7,250	5,040
108	4,170	12,850	8,950	5,730	3,980
120	3,690	10,900	7,250	4,640	**
144	2,930	7,630	5,040	**	**

P1000/P1001 - Elements of Section

Parameter	P1000		P1001	
Area of Section	0.555	In^2	1.111	In^2
Axis 1-1				
Moment of Inertia (I)	0.185	In^4	0.928	In^4
Section Modulus (S)	0.202	In^3	0.571	In^3
Radius of Gyration (r)	0.577	In	0.914	In
Axis 2-2				
Moment of Inertia (I)	0.236	In^4	0.471	In^4
Section Modulus (S)	0.290	In^3	0.580	In^3
Radius of Gyration (r)	0.651	In	0.651	In

Notes:

* Load limited by spot weld shear.

** KL/r > 200

NR = Not Recommended.

1. Beam loads are given in *total* uniform load (W Lbs) not uniform load (w lbs/ft or w lbs/in).
2. Beam loads are based on a simple span and assumed to be adequately laterally braced. Unbraced spans can reduce beam load carrying capacity. Refer to Page 56 for reduction factors for unbraced lengths.
3. For pierced channel, multiply beam loads by the following factor:

"KO" Series.....95% **"T" Series 85%**
"HS" Series .....90% **"SL" Series.....85%**
"H3" Series.....90% **"DS" Series.....70%**

4. Deduct channel weight from the beam loads.
5. For concentrated midspan point loads, multiply beam loads by 50% and the corresponding deflection by 80%. For other load conditions refer to page 18.
6. All beam loads are for bending about Axis 1-1.

P5000 - Beam Loading

Span In	Max Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	5,260	0.03	5,260	5,260	5,260
36	3,500	0.07	3,500	3,500	3,500
48	2,630	0.12	2,630	2,630	2,630
60	2,100	0.18	2,100	2,100	1,920
72	1,750	0.26	1,750	1,750	1,330
84	1,500	0.36	1,500	1,470	980
96	1,310	0.47	1,310	1,120	750
108	1,170	0.59	1,170	890	590
120	1,050	0.73	960	720	480
144	880	1.06	670	500	330
168	750	1.43	490	370	240
192	660	1.88	370	280	190
216	580	2.35	300	220	150
240	530	2.95	240	180	120

P5001 - Beam Loading

Span In	Max Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	6,890*	0.01	6,890*	6,890*	6,890*
36	6,890*	0.02	6,890*	6,890*	6,890*
48	6,890*	0.05	6,890*	6,890*	6,890*
60	6,420	0.10	6,420	6,420	6,420
72	5,350	0.14	5,350	5,350	5,350
84	4,590	0.19	4,590	4,590	4,590
96	4,020	0.25	4,020	4,020	4,020
108	3,570	0.32	3,570	3,570	3,360
120	3,210	0.39	3,210	3,210	2,720
144	2,680	0.57	2,680	2,680	1,890
168	2,290	0.77	2,290	2,080	1,390
192	2,010	1.01	2,010	1,590	1,060
216	1,780	1.27	1,680	1,260	840
240	1,610	1.58	1,360	1,020	680

P5000 - Column Loading

Unbraced Height In	Maximum Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	5,650	16,870	15,180	12,850	10,600
36	4,690	13,140	10,600	7,650	5,660
48	3,560	9,550	6,860	4,790	3,660
60	2,730	6,680	4,790	3,450	2,710
72	2,160	4,980	3,660	2,710	2,170
84	1,760	3,950	2,960	2,240	1,820
96	1,500	3,270	2,500	1,930	1,580
108	1,310	2,800	2,170	1,690	1,390
120	1,170	2,450	1,930	1,510	**
144	980	1,980	1,580	**	**
168	850	1,670	1,340	**	**

P5001 - Column Loading

Unbraced Height In	Maximum Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	10,670	39,230	38,030	36,210	34,240
36	10,350	36,450	34,240	31,200	28,260
48	9,940	33,220	30,200	26,430	23,190
60	9,290	29,950	26,430	22,470	19,380
72	8,560	26,880	23,190	19,380	16,450
84	7,860	24,140	20,520	17,040	12,090
96	7,220	21,790	18,370	13,330	9,250
108	6,600	19,790	16,450	10,530	7,310
120	5,760	18,130	13,330	8,530	**
144	4,390	14,020	9,250	**	**
168	3,420	10,300	6,800	**	**

P5000/P5001 - Elements of Section

Parameter		P5000		P5001	
Area of Section		0.897	In^2	1.793	In^2
Axis 1-1					
	Moment of Inertia (I)	1.098	In^4	6.227	In^4
	Section Modulus (S)	0.627	In^3	1.916	In^3
	Radius of Gyration (r)	1.107	In	1.864	In
Axis 2-2					
	Moment of Inertia (I)	0.433	In^4	0.866	In^4
	Section Modulus (S)	0.533	In^3	1.066	In^3
	Radius of Gyration (r)	0.695	In	0.695	In

Notes:

* Load limited by spot weld shear.

** KL/r > 200

NR = Not Recommended.

1. Beam loads are given in *total* uniform load (W Lbs) not uniform load (w lbs/ft or w lbs/in).
2. Beam loads are based on a simple span and assumed to be adequately laterally braced. Unbraced spans can reduce beam load carrying capacity. Refer to Page 56 for reduction factors for unbraced lengths.
3. For pierced channel, multiply beam loads by the following factor:

"KO" Series.....95%	**"T" Series 85%**
"HS" Series 90%	**"SL" Series.....85%**
"H3" Series.....90%	**"DS" Series.....70%**

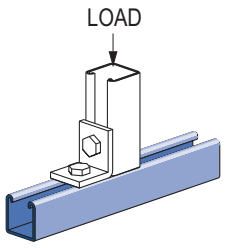
4. Deduct channel weight from the beam loads.
5. For concentrated midspan point loads, multiply beam loads by 50% and the corresponding deflection by 80%. For other load conditions refer to page 18.
6. All beam loads are for bending about Axis 1-1.

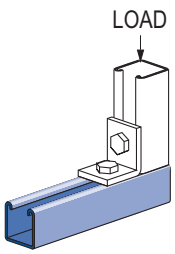
Lateral Bracing Load Reduction Charts

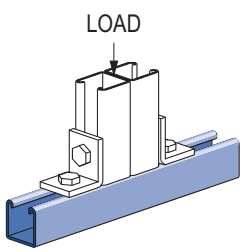
Span		Single Channel									Double Channel								
Ft. *(m)*	In. *(cm)*	P1000	P1100	P2000	P3000	P3300	P4000	P4100	P5000	P5500	P1001	P1101	P2001	P3001	P3301	P4001	P4101	P5001	P5501
2 *(0.61)*	24 *(61)*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3 *(0.91)*	36 *(91)*	0.94	0.89	0.88	0.96	1.00	0.94	0.98	0.85	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4 *(1.22)*	48 *(122)*	0.88	0.78	0.75	0.91	1.00	0.88	0.94	0.70	0.77	1.00	0.98	0.98	1.00	1.00	0.98	1.00	0.97	0.98
5 *(1.52)*	60 *(152)*	0.82	0.68	0.61	0.88	0.98	0.83	0.91	0.55	0.67	0.97	0.93	0.92	0.98	1.00	0.93	0.96	0.90	0.93
6 *(1.83)*	72 *(183)*	0.78	0.59	0.48	0.84	0.97	0.79	0.89	0.44	0.58	0.93	0.87	0.85	0.95	0.97	0.88	0.92	0.83	0.87
7 *(2.13)*	84 *(213)*	0.75	0.52	0.41	0.82	0.96	0.75	0.86	0.38	0.51	0.89	0.82	0.78	0.92	0.95	0.83	0.89	0.76	0.81
8 *(2.44)*	96 *(244)*	0.71	0.47	0.35	0.79	0.94	0.72	0.84	0.33	0.46	0.85	0.76	0.71	0.88	0.92	0.79	0.85	0.68	0.76
9 *(2.74)*	108 *(274)*	0.69	0.43	0.32	0.77	0.93	0.69	0.82	0.30	0.42	0.81	0.70	0.64	0.85	0.90	0.74	0.81	0.61	0.70
10 *(3.05)*	120 *(305)*	0.66	0.40	0.29	0.75	0.92	0.66	0.80	0.28	0.40	0.78	0.65	0.57	0.82	0.87	0.69	0.78	0.54	0.64
12 *(3.66)*	144 *(366)*	0.61	0.36	0.25	0.70	0.89	0.60	0.76	0.24	0.36	0.70	0.54	0.45	0.76	0.82	0.60	0.71	0.43	0.53
14 *(4.27)*	168 *(427)*	0.55	0.32	0.23	0.66	0.86	0.55	0.73	0.22	0.32	0.63	0.45	0.38	0.70	0.78	0.51	0.64	0.35	0.45
16 *(4.88)*	192 *(488)*	0.51	0.30	0.21	0.62	0.84	0.50	0.69	0.21	0.30	0.56	0.39	0.32	0.64	0.73	0.44	0.57	0.30	0.39
18 *(5.49)*	216 *(549)*	0.47	0.28	0.19	0.58	0.81	0.47	0.65	0.19	0.28	0.49	0.34	0.28	0.58	0.68	0.39	0.50	0.27	0.34
20 *(6.10)*	240 *(610)*	0.44	0.26	0.18	0.54	0.78	0.43	0.61	0.18	0.26	0.44	0.31	0.25	0.52	0.63	0.35	0.45	0.24	0.30

Bearing Loads on Unistrut Channel

Loads are calculated based on 2007 Specification For The Design Of Cold Formed Steel Structural Members published by AISI







Channel	Bearing Length 1⅝" (41 mm) Maximum Allowable Loads Lbs *(kN)*	Bearing Length 1⅝" (41 mm) Maximum Allowable Loads Lbs *(kN)*	Bearing Length 3¼" (82 mm) Maximum Allowable Loads Lbs *(kN)*
P1000	6,700 *29.80*	3,100 *13.79*	7,700 *34.25*
P1100	3,500 *15.57*	1,700 *7.56*	4,000 *17.79*
P2000	2,500 *11.12*	1,200 *5.34*	3,000 *13.34*
P3000	6,700 *29.80*	3,200 *14.23*	7,700 *34.25*
P3300	6,800 *30.25*	3,200 *14.23*	7,800 *34.70*
P4000	2,600 *11.57*	1,200 *5.34*	3,000 *13.34*
P4100	3,500 *15.57*	1,800 *8.01*	4,100 *18.24*
P5000	6,500 *28.91*	3,000 *13.34*	7,500 *33.36*
P5500	6,600 *29.36*	3,100 *13.79*	7,600 *33.81*

Square Nuts

Part No.	Size	Wt/100 pcs Lbs *(kg)*
HSQN025EG	¼"	0.9 *(0.4)*
HSQN031EG	5⁄16"	1.6 *(0.7)*
HSQN037EG	⅜"	2.7 *(1.2)*
HSQN050EG	½"	5.8 *(2.6)*
HSQN062EG	⅝"	10.7 *(4.9)*
HSQN075EG	¾"	15.4 *(6.9)*
HSQN087EG	⅞"	24.9 *(11.3)*
HSQN100EG	1"	36.3 *(16.5)*

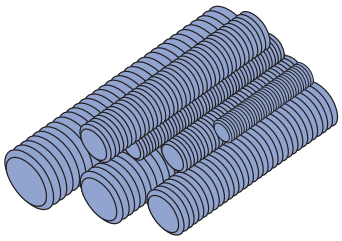
Hexagon Nuts

Part No.	Size	Wt/100 pcs Lbs*(kg)*
HHXN025EG	¼"	0.6 *(0.3)*
HHXN031EG	5⁄16"	1.2 *(0.5)*
HHXN037EG	⅜"	1.6 *(0.7)*
HHXN050EG	½"	4.8 *(2.2)*
HHXN062EG	⅝"	7.3 *(3.3)*
HHXN075EG	¾"	11.9 *(5.4)*
HHXN087EG	⅞"	19.0 *(8.6)*
HHXN100EG	1"	28.3 *(12.8)*

Flat Washers

Part No.	Size	Wt/100 pcs Lbs*(kg)*
HFLW025EG	¼"	0.8 *(0.4)*
HFLW031EG	5⁄16"	1.0 *(0.5)*
HFLW037EG	⅜"	1.5 *(0.7)*
HFLW050EG	½"	3.5 *(1.6)*
HFLW062EG	⅝"	7.7 *(3.5)*
HFLW075EG	¾"	11.0 *(5.0)*
HFLW087EG	⅞"	15.3 *(6.9)*
HFLW100EG	1"	18.8 *(8.5)*

Steel Threaded Rod



Standard Length 12' (3.7m)

Low Carbon Steel Grade 1006 - 1010
F_y = 36,000 psi minimum
F_t = 58,000 psi minimum

Part No.	Size	Wt/100 Ft. Lbs *(kg)*
HTHR025	¼" x 20	13 *(5.9)*
HTHR031	5⁄16" x 18	20 *(9.1)*
HTHR037	⅜" x 16	30 *(13.6)*
HTHR044	7⁄16" x 14	30 *(13.6)*
HTHR050	½" x 13	53 *(24.0)*
HTHR062	⅝" x 11	84 *(38.1)*
HTHR075	¾" x 10	124 *(56.2)*
HTHR087	⅞" x 9	170 *(77.1)*
HTHR100	1" x 8	223 *(101.2)*

Lock Washers

Part No.	Size	Wt/100 pcs Lbs *(kg)*
HLKW025EG	¼"	0.25 *(0.1)*
HLKW031EG	5⁄16"	0.41 *(0.2)*
HLKW037EG	⅜"	0.63 *(0.3)*
HLKW050EG	½"	1.32 *(0.60)*
HLKW062EG	⅝"	2.20 *(1.0)*
HLKW075EG	¾"	3.80 *(1.7)*
HLKW087EG	⅞"	6.00 *(2.7)*
HLKW100EG	1"	8.80 *(4.0)*

Load Carrying Capacity Of Threaded Hot Rolled Steel Conforming To ASTM A575 And A576

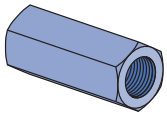
Threaded Rod Loads for Piping Applications (based on MSS SP-58)

Nominal Dia.	Root Area In² *(mm²)*	Max. Safe Load at 650°F (343°C) Lbs *(kN)*
⅜	0.068 *(43.9)*	730 *(3.25)*
½	0.126 *(81.3)*	1,350 *(6.01)*
⅝	0.202 *(130.3)*	2,160 *(9.61)*
¾	0.302 *(194.8)*	3,230 *(14.37)*
⅞	0.419 *(270.3)*	4,480 *(19.93)*
1	0.552 *(356.1)*	5,900 *(26.24)*

Threaded Rod Loads for Structural Applications
(Based on AISC, Steel Construction Manual, ASD, 9th Edition. Per AISC, Allowed Tensile Stress = 0.33 * Fu)

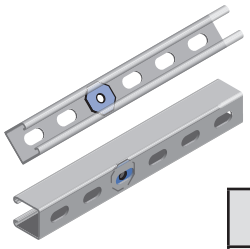
Nominal Dia.	Nominal Area In² *(mm²)*	Allowed Tension Load Lbs *(kN)*
¼	0.049 *(31.6)*	930 *(4.14)*
⅜	0.110 *(71.0)*	2,110 *(9.39)*
7⁄16	0.150 *(96.8)*	2,870 *(12.77)*
½	0.196 *(126.5)*	3,750 *(16.68)*
⅝	0.307 *(198.2)*	5,870 *(26.11)*
¾	0.442 *(285.4)*	8,450 *(37.59)*
⅞	0.601 *(388.0)*	11,500 *(51.15)*
1	0.785 *(506.8)*	15,030 *(66.86)*

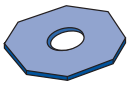
Steel Coupler Nuts



Part Number	Size	Length In (mm)	Wt/100 pcs Lbs (kg)
HRCN025	¼" - 20	⅞" *(22.2)*	1.9 *(0.9)*
HRCN031	5⁄16" - 18	1¾" *(44.5)*	7.5 *(3.4)*
HRCN037	⅜" - 16	1¾" *(44.5)*	9.0 *(4.1)*
HRCN044	7⁄16" - 14	1¾" *(44.5)*	10.4 *(4.7)*
HRCN050	½" - 13	1¾" *(44.5)*	10.0 *(4.5)*
HRCN062	⅝" - 11	2⅛" *(54.0)*	18.0 *(8.2)*
HRCN075	¾" - 10	2¼" *(57.2)*	28.0 *(12.7)*
HRCN087	⅞" - 9	2½" *(63.5)*	55.0 *(24.9)*
HRCN100	1" - 8	2¾" *(69.9)*	73.0 *(33.1)*

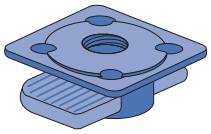
Slot Adapter™



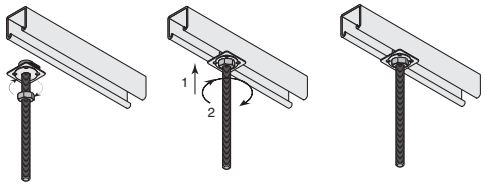


Part No.	Bolt Size	Wt/100 pcs Lbs (kg)
HOCW025	¼" (6.4)	1 (0.5)
HOCW037	⅜" (9.5)	1.5 (0.7)

Kwik Washer™

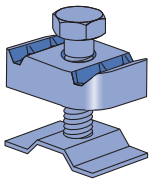


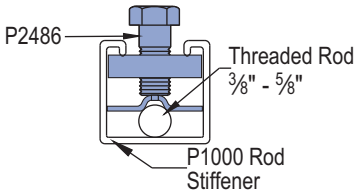
Overhead installation with one hand.
Available in zinc plated and hot dip galvanized



Part No.	Size In (mm)	Load Lbs (kN)	Wt/100 pcs Lbs (kg)
K1062	¼" (6.4)	250 (1.11)	1.2 (0.5)
K1063	⅜" (9.5)	610 (2.71)	2.6 (1.2)
K1064	½" (12.7)	1,130 (5.03)	9.3 (4.2)

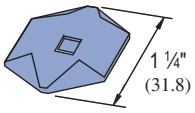
P2486 — Seismic Rod Stiffener



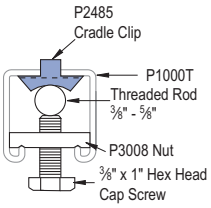


Wt/100 pcs: 16 Lbs (7.3 kg)

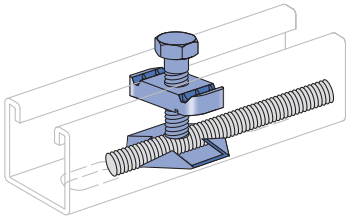
P2485 — Cradle Clip

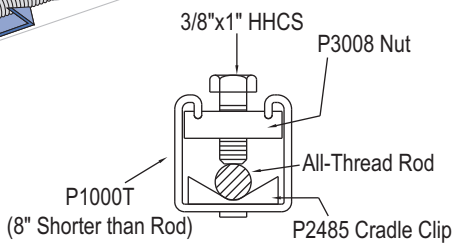


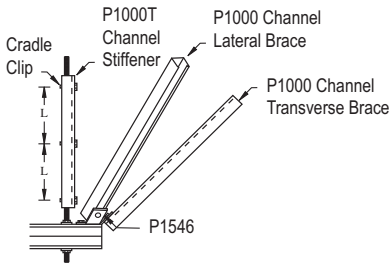
Cradle clip only, order other items seperately.



P2485K — Seismic Cradle Clip Assembly







Wt/100 pcs: 3.0 Lbs (1.4 kg)

P2485 & P2486 – Spacing Chart

Rod Size In (mm)	Root Area In2 (mm2)	Radius of Gyration In (mm)	Design Load Lbs (kN)	.....Rod Stiffener Clip Spacing (L)..... Rod Stress @100% 10,700 PSI In (mm)	Rod Stress @75% 8,025 PSI In (mm)	Rod Stress @50% 5,350 PSI In (mm)	Rod Stress @35% 3,745 PSI In (mm)
⅜	0.068	0.074	730	9	11	13	15
9.5	49.5	1.99	3.25	228.6	279.4	330.2	381.0
½	0.126	0.100	1,350	12	14	17	21
12.7	72.4	2.40	6.01	304.8	355.6	431.8	533.4
⅝	0.202	0.127	2,160	15	18	22	26
15.9	138.3	3.32	9.61	381.0	457.2	558.8	660.4

Notes:
1. Minimum Tensile Stress is 50,000 psi (345MPa)
2. Working Stress is 10,700 psi (73.9 MPa) – Same as for Tension
3. Compression Will Only Occur During a Seismic Event
4. Compression Requires the Use of Rod Stiffeners
5. KL/r = 200 When Rod Stress is at 35%

Refer to seismic bracing systems catalog for more detailed information.

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Beam Supporting Digital Portals:

Beam Span = 31'-6"
* Beam spans between the existing demising wall and existing double wood trusses
* Beam will not positively attach to any trusses along the span such that it will not take any existing roof loads and will only take digital portal loads.

Portal Loads:
* The portal is supported by (4) threaded rods: P_rod = 400# portal / 4
= 100#
* Beam takes the load from 1 threaded rod at 5 locations

* See Enercalc: **Use 3 1/2" x 11 7/8" Glulam Beam**

Wood Beam

Project File: 241374 T Mobile.ec6

DESCRIPTION: Beam Supporting Digital Portals

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

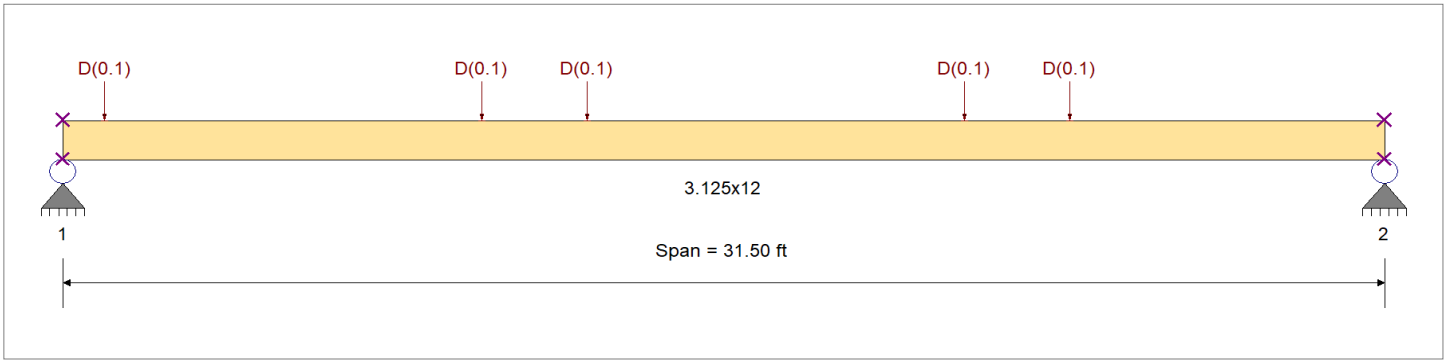
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Completely Unbraced

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Point Load : D = 0.10 k @ 1.0 ft
Point Load : D = 0.10 k @ 10.0 ft
Point Load : D = 0.10 k @ 12.50 ft
Point Load : D = 0.10 k @ 21.50 ft
Point Load : D = 0.10 k @ 24.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.320 : 1	Maximum Shear Stress Ratio	=	0.067 : 1
Section used for this span		3.125x12	Section used for this span		3.125x12
fb: Actual	=	492.86 psi	fv: Actual	=	16.06 psi
F'b	=	1,539.47 psi	F'v	=	238.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	13.451 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 in	Ratio =	0 <360 n/a
Max Upward Transient Deflection	0 in	Ratio =	0 <360 n/a
Max Downward Total Deflection	0.691 in	Ratio =	547 >=240 Span: 1 : D Only
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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 31.50 ft	1	0.320	0.067	0.90	1.00	1.00	0.71	1.000	1.00	1.00	1.00	3.08	492.9	1,539.5	0.40	16.1	238.5
+0.60D					1.00	1.00	0.71	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 31.50 ft	1	0.177	0.023	1.60	1.00	1.00	0.43	1.000	1.00	1.00	1.00	1.85	295.7	1,666.5	0.24	9.6	424.0

Wood Beam

Project File: 241374 T Mobile.ec6

DESCRIPTION: Beam Supporting Digital Portals

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.6909	15.865		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	0.409	0.347
Max Upward from Load Combinations	0.245	0.208
Max Upward from Load Cases	0.409	0.347
D Only	0.409	0.347
+0.60D	0.245	0.208

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New Beam at Existing Masonry Wall:

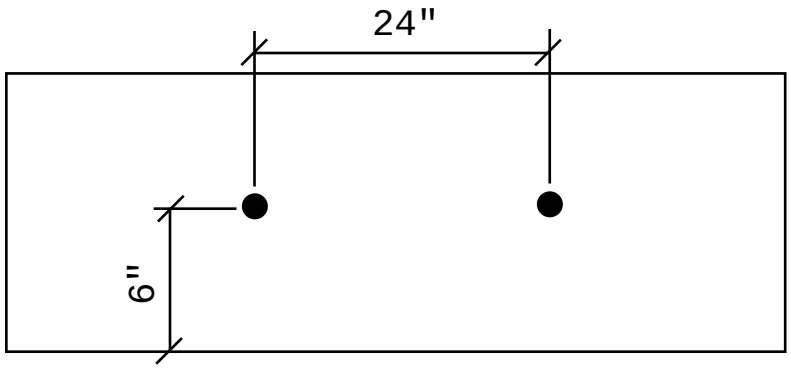
* Use 12" deep ledger at masonry wall

Max Beam Rxcn at Ledger = 0.423 k_DL
Worst Case LC: 1.2D = 0.5 k
* Load is distributed to two anchors 24" O.C.

Shear per anchor = 0.5k / 2 anchors
= 0.25k

e = .5(7.625") + 3.5" thick ledger
= 7.3"
M = (0.5k / 2) * 7.3"
= 1.825 k-in
Tension per anchor = M/d = 1.825 k-in / (12"/2)
= 0.3k

* See Hilti Results: **Use (2) 3/4" epoxy threaded rods**



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Phone I Fax:	|	E-Mail:	
Design:	Masonry - Nov 18, 2024	Date:	11/20/2024
Fastening point:			

Specifier's comments:

1 Input data

Anchor type and diameter:	**HY 270 + threaded rod 5.8 1/2**
Item number:	385424 HAS 5.8 1/2"x6-1/2" (element) / 2194247 HIT-HY 270 (adhesive)
Specification text:	Hilti HIT-V 5.8 threaded rod with HIT-HY 270 injection mortar with 4.5 in embedment hef, 1/2, Steel galvanized, Hammer drilled installation per instruction for use
Effective embedment depth:	h_{ef} = 4.500 in.
Material:	5.8
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ASD Masonry
Stand-off installation:	
Profile:	
Base material:	Grout-filled CMU, L x W x H: 16.000 in. x 8.000 in. x 8.000 in.; Joints: vertical: 0.375 in.; horizontal: 0.375 in. Base material temperature: 68 °F
Installation:	Face installation
Seismic loads	no

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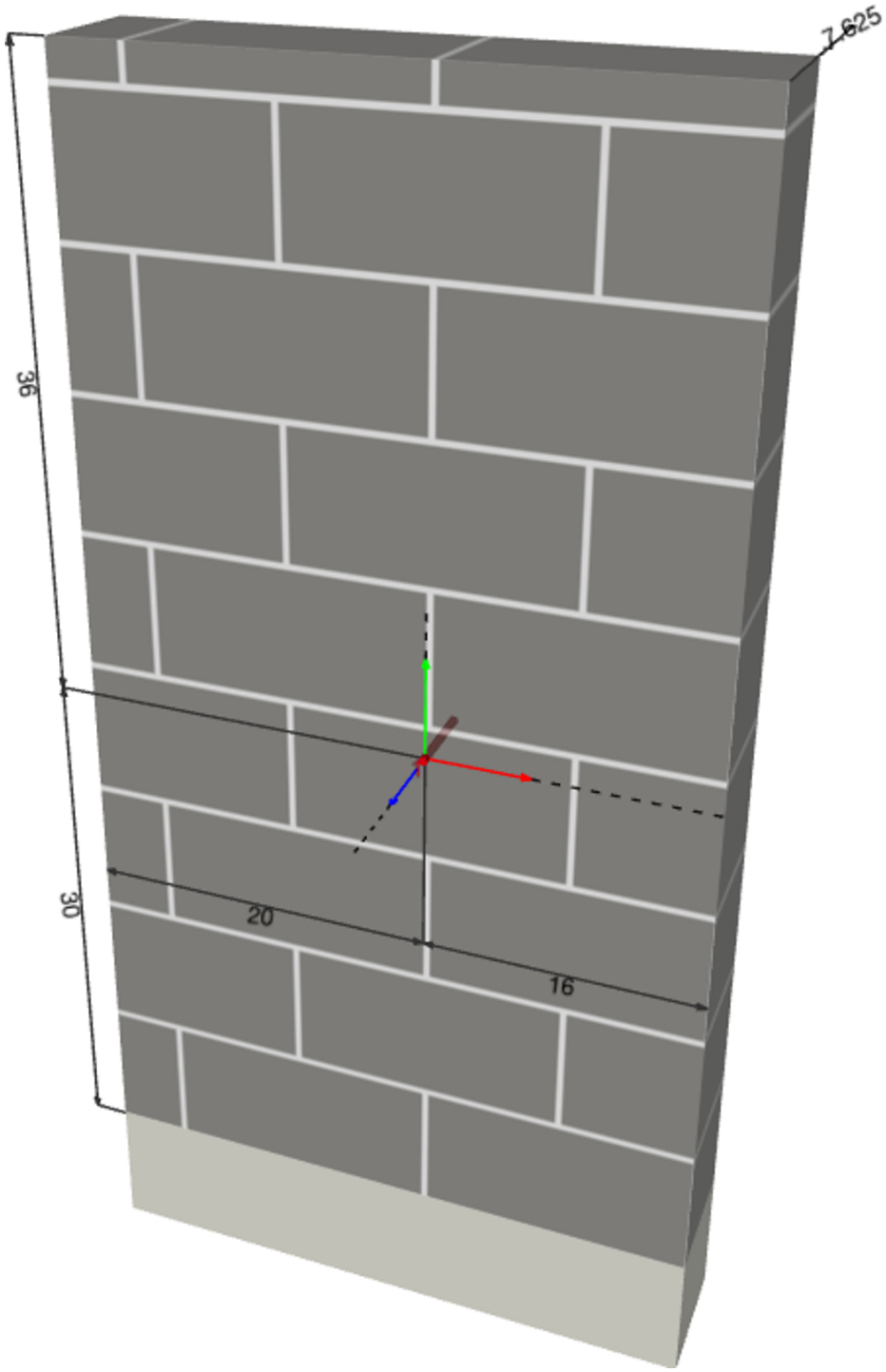
Geometry [in.]



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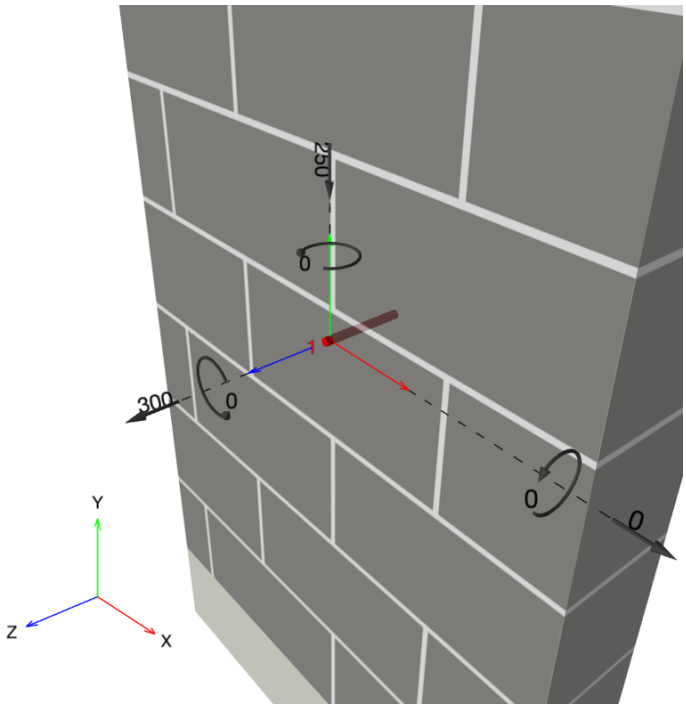
Geometry [in.] & Loading [lb, in.lb]



1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 300; V_x = 0; V_y = -250; M_x = 0; M_y = 0; M_z = 0;	no	17

2 Load case/Resulting anchor forces

Load case: Service loads

Anchor reactions [lb]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	300	250	0	-250

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Fastening point:			

3 Tension load (Most utilized anchor 1)

	Load P_s [lb]	Capacity P_t [lb]	Utilization $\beta_P = P_s/P_t$ [%]	Status
Steel strength	300	4,700	7	OK
Bond strength	300	1,913	16	OK

3.1 Steel strength

$P_{t,s}$ = Value refer to Hilti Technical Data
$P_{t,s} \geq P_s$

Results

$P_{t,s}$ [lb]	P_s [lb]
4,700	300

3.2 Bond strength

$P_{t,b,Base}$ = Value refer to Hilti Technical Data
$P_{t,b} = P_{t,b,Base} \cdot f_{red,E} \cdot f_{red,s} \cdot f_{red,Temp} \cdot f_{red,Bedjoint}$
$P_{t,b} \geq P_s$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	20.000	4.000	18.000	68

Results

$P_{t,b}$ [lb]	$P_{t,b,Base}$ [lb]	P_s [lb]	$f_{red,E}$	$f_{red,S}$	$f_{red,Temp}$	$f_{red,Bedjoint}$
1,913	2,035	300	0.940	1.000	1.000	1.000

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4 Shear load (Most utilized anchor 1)

	Load V_s [lb]	Capacity V_t [lb]	Utilization $\beta_V = V_s/V_t$ [%]	Status
Steel strength	250	2,420	11	OK
Bond strength para and perp, (Dir. x-)[1]	-	-	17	OK

[1]Shear utilization may result from parallel and perpendicular shear (see details)

4.1 Steel strength

$V_{t,s}$ = Value refer to Hilti Technical Data
$V_{t,s} \geq V_s$

Results

$V_{t,s}$ [lb]	V_s [lb]
2,420	250

4.2 Bond strength parallel

$V_{t,b,Base,||}$ = Value refer to Hilti Technical Data
$V_{t,b,||} = V_{t,b,Base,||} \cdot f_{red,E,||} \cdot f_{red,s,||} \cdot f_{red,Temp}$
$V_{t,b,||} \geq V_{s,||}$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	12.000	4.000	18.000	68

Results

$V_{t,b,||}$ [lb]	$V_{t,b,Base,||}$ [lb]	$V_{s,||}$ [lb]	$f_{red,E,||}$	$f_{red,S,||}$	$f_{red,Temp}$	Utilization $\beta_{V,||}$ [%]
1,495	1,495	-250	1.000	1.000	1.000	17

4.3 Bond strength perpendicular

$V_{t,b,Base,\perp}$ = Value refer to Hilti Technical Data
$V_{t,b,\perp} = V_{t,b,Base,\perp} \cdot f_{red,E,\perp} \cdot f_{red,s,\perp} \cdot f_{red,Temp}$
$V_{t,b,\perp} \geq V_{s,\perp}$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	12.000	4.000	18.000	68

Results

$V_{t,b,\perp}$ [lb]	$V_{t,b,Base,\perp}$ [lb]	$V_{s,\perp}$ [lb]	$f_{red,E,\perp}$	$f_{red,S,\perp}$	$f_{red,Temp}$	Utilization $\beta_{V,\perp}$ [%]
0	1,495	0	0.000	0.000	1.000	0

4.4 Shear interaction

$\beta_{V,\parallel} = \frac{V_{s,\parallel}}{V_{t,\parallel}}$	$\beta_{V,\perp} = \frac{V_{s,\perp}}{V_{t,\perp}}$	δ	Utilization β_V [%]	Status
0.167	0.000	1.667	17	OK

$\beta_V = \beta_{V,\parallel}^{\delta} + \beta_{V,\perp}^{\delta} <= 1.0$

5 Combined tension and shear loads (Most utilized anchor 1)

$\beta_P = \frac{P_s}{P_t}$	$\beta_{V,\parallel} = \frac{V_{s,\parallel}}{V_{t,\parallel}}$	$\beta_{V,\perp} = \frac{V_{s,\perp}}{V_{t,\perp}}$	α	Utilization $\beta_{P,V}$ [%]	Status
0.046	0.167	0.000	1.667	10	OK

$\beta_{P,V} = \beta_P^{\alpha} + \beta_{V,\parallel}^{\alpha} + \beta_{V,\perp}^{\alpha} <= 1.0$

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- The min. sizes of the bricks, the masonry compressive strength, the type / strength of the mortar and the grout (in case of fully grouted CMU walls) has to fulfill the requirements given in the relevant ESR-approval or in the PTG.
- Only the local load transfer from the anchor(s) to the wall is considered, a further load transfer in the wall is not covered by PROFIS!
- Wall is assumed as being perfectly aligned vertically – checking required(!): Noncompliance can lead to significantly different distribution of forces and higher tension loads than those calculated by PROFIS. Masonry wall must not have any damages (neither visible nor not visible)! While installation, the positioning of the anchors needs to be maintained as in the design phase i.e. either relative to the brick or relative to the mortar joints.
- The effect of the joints on the compressive stress distribution on the plate / bricks was not taken into consideration.
- If no significant resistance is felt over the entire depth of the hole when drilling (e.g. in unfilled butt joints), the anchor should not be set at this position or the area should be assessed and reinforced. Hilti recommends the anchoring in masonry always with sieve sleeve. Anchors can only be installed without sieve sleeves in solid bricks when it is guaranteed that it has not any hole or void.
- The accessories and installation remarks listed on this report are for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.
- The compliance with current standards (e.g. 2018, 2015, 2012, 2009 and 2006 IBC) is the responsibility of the user.
- Drilling method (hammer, rotary) to be in accordance with the approval!
- Masonry needs to be built in a regular way in accordance with state-of the art guidelines!

Fastening meets the design criteria!

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7 Installation data

Profile: -

Anchor type and diameter: HY 270 + threaded rod 5.8 1/2

Item number: 385424 HAS 5.8 1/2"x6-1/2" (element) / 2194247 HIT-HY 270 (adhesive)

Hole diameter in the fixture: -

Maximum installation torque: 90 in.lb

Plate thickness (input): -

Hole diameter in the base material: 0.562 in.

Hole depth in the base material: 4.500 in.

Drilling method: Drilled in hammer mode

Minimum thickness of the base material: 7.625 in.

Hilti HIT-V 5.8 threaded rod with HIT-HY 270 injection mortar with 4.5 in embedment hef, 1/2, Steel galvanized, Hammer drilled installation per instruction for use

Coordinates Anchor in.

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	0.000	20.000	16.000	30.000	36.000

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8 Remarks; Your Cooperation Duties

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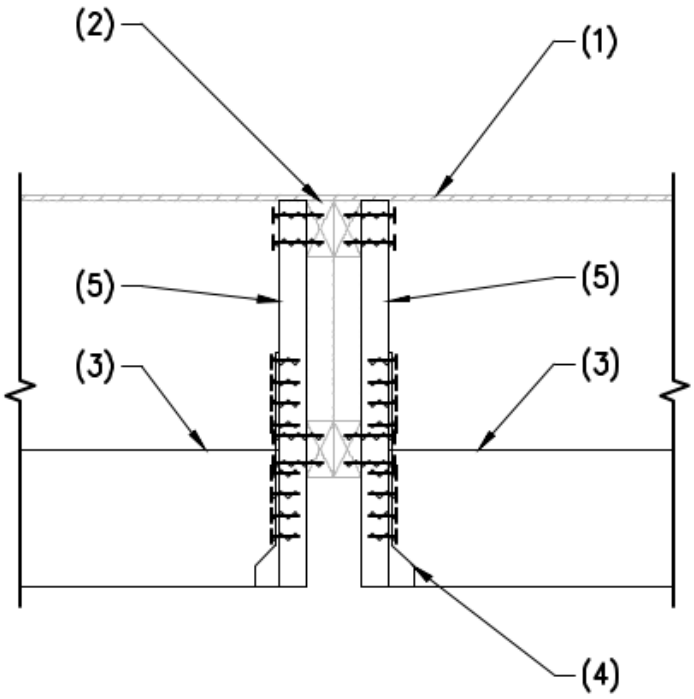
By _____ Date _____

New Beam at Existing Double Wood Trusses:

Max Beam Rxcn = 420 lb

*Use Simpson THG3.62-SDS hanger
Hanger capacity = 6310 lb > 420 lb **OKAY**



NOTES:

1. EXISTING PLYWOOD SHEATHING
2. EXISTING DOUBLE WOOD TRUSS
3. WOOD BEAM PER PLAN
4. SIMPSON THGQ3.62-SDS HANGER. FILL ALL HOLES WITH 1/4" x 3" SDS SCREWS
5. 2x10 FLAT WITH (4) 10d x 3" LONG NAILS AT TOP AND BOTTOM CHORD

11 WOOD BEAM AT DOUBLE WOOD TRUSS

24-1265 NO SCALE

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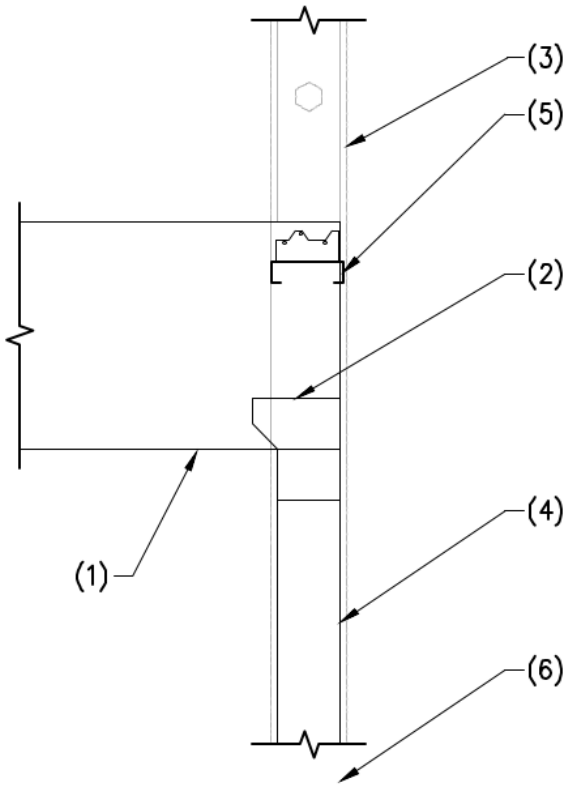
New Beam at Existing Steel Stud Wall:

Max Beam Rxcn = 423 lb
* Try bearing beam on 4x4 wood post
* See Enercalc Results: **Use 4X4 wood post**



NOTES:

1. WOOD BEAM PER PLAN
2. SIMPSON ACH4Z POST CAP. FILL ALL HOLES WITH –.162 x 2 1/2" SCREWS.
3. EXISTING STEEL STUD WALL.
4. 4x4 WOOD POST.
5. 600S125–33 STUD BLOCKING EACH SIDE OF WOOD BEAM. USE SIMPSON L50 CLIPS TO ATTACH BLOCKING TO STUDS AND BEAM.
6. SEE DETAIL 16 FOR POST BOTTOM CONNECTION

15 WOOD BEAM AT STEEL STUD WALL

24–1265 NO SCALE

CARUSO TURLEY SCOTT, INC.
1215 W. RIO SALADO PKWY, SUITE 200
TEMPE, AZ 85281

Project Title: T-Mobile #8022 TI
Engineer: JKC
Project ID: 24-1374
Project Descr:

Wood Column

Project File: 241374 T Mobile.ec6

DESCRIPTION: Wood Post

Code References

Calculations per NDS 2018, IBC 2021, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	11 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.2		
Fb +	900.0 psi	Fv	180.0 psi
Fb -	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	31.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name	**4x4**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**3.50** in	Allow Stress Modification Factors	
Exact Depth	**3.50** in	Cf or Cv for Bending	1.50
Area	12.250 in^2	Cf or Cv for Compressio	1.150
Ix	12.505 in^4	Cf or Cv for Tension	1.50
Iy	12.505 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 11 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 11 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 29.205 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 11.0 ft, Xecc = 2.0 in, D = 0.4230 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1224 : 1**

Load Combination	D Only
Governing NDS Forumla	Comp + Myy, NDS Eq. 3.9-3
Location of max.above base	10.926 ft
At maximum location values are .	
Applied Axial	0.4522 k
Applied Mx	0.0 k-ft
Applied My	-0.07003 k-ft
Fc : Allowable	316.632 psi

PASS Maximum Shear Stress Ratio = **0.004844 : 1**

Load Combination	D Only
Location of max.above base	11.0 ft
Applied Design Shear	1.177 psi
Allowable Shear	162.0 psi

Maximum SERVICE Lateral Load Reactions . .
Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k
Top along X-X 0.006409 k Bottom along X-X 0.006409 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X -0.04767 in at 6.423 ft above base
for load combination : D Only

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.227	0.1224	PASS	10.926 ft	0.004844	PASS	11.0 ft
+0.60D	1.600	0.131	0.06807	PASS	0.0 ft	0.001635	PASS	11.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k: @ Base	@ Top	Y-Y Axis Reaction: @ Base	@ Top	Axial Reaction: @ Base	My - End Moments k-ft: @ Base	@ Top	Mx - End Moments: @ Base	@ Top
D Only	-0.006	0.006			0.452				
+0.60D	-0.004	0.004			0.271				

Wood Column

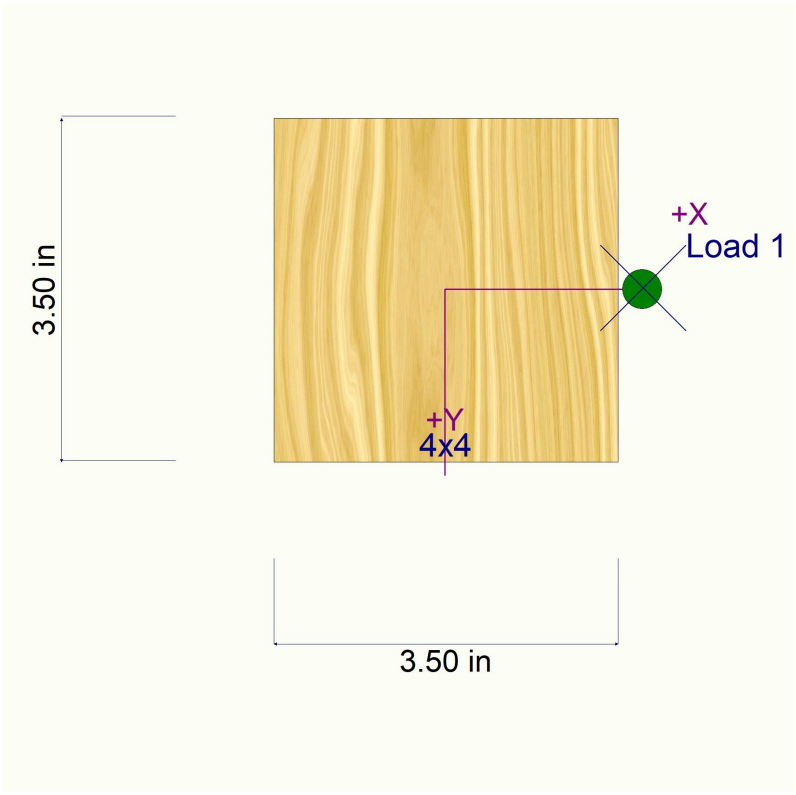
Project File: 241374 T Mobile.ec6

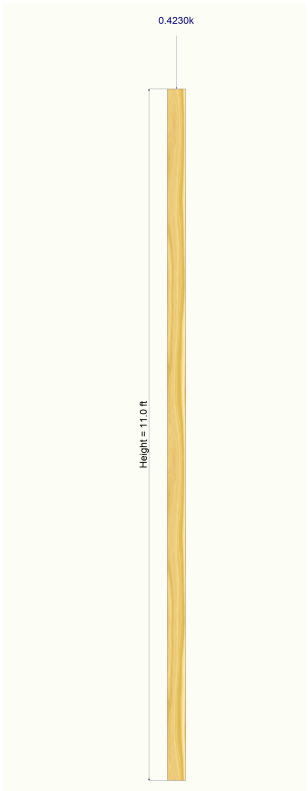
DESCRIPTION: Wood Post

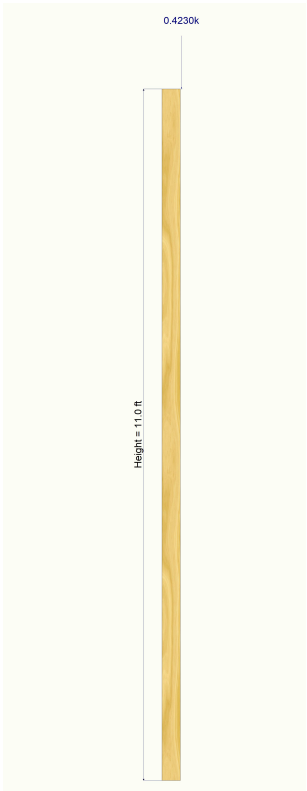
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	-0.0477 in	6.423ft	0.000 in	0.000 ft
+0.60D	-0.0286 in	6.423ft	0.000 in	0.000 ft

Sketches







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Job Name: T-Mobile TI
Job No.: 24-1374 Sheet No.: 34
By: JKC Date: Nov-24

MECHANICAL UNIT OVERTURNING: RECTANGULAR BASE WITH NO LEGS

ASCE 7-16 / 7-10

Unit info:

Weight=	955	lb X 1.2=	1146	lb	
Length=	94	in			
Width=	56	in			
Height=	48	in			
Curb height =	12	in			

Effective Dimensions used to calculate A_f

Effective Length=	94.0	in
Effective Width=	56.0	in
Effective Height=	48.0	in
Height to CGS of unit=	36.0	in

Seismic: Per ASCE 7 Chapter 13

S_{DS}= 1.008

a_P= 2.5 I_P= 1

R_P= 6 z/h= 1 (conservative)

F_P= (.4*ap*Sds*W) * (1+2*z/h) / Rp/Ip = 0.504 W <--- Governs

$F_{P\ MAX}$= 1.6*S_{DS}*I_P*W = 1.613 W

$F_{P\ MIN}$= .3*S_{DS}*I_P*W = 0.302 W

$F_{V\ SEISMIC}$ = 193 ± 0.2 $S_{DS}W_P$

*included in $M_{OT\ (BASE)}$ and $M_{OT\ (CURB)}$

F_P= 481 lb @ 36 in

$M_{OT\ (BASE)}$=	22718	in*lb * 0.7=	15902.8	in*lb	$M_{OT\ (CURB)}$=	16942	in*lb * .7=	11859.7	in*lb
M_R=	26740	in*lb * 0.6=	16044.0	in*lb	M_R= Weight * Width/2				
$T_{(BASE)}$=	-3	lb	*Tension is +		$T_{(CURB)}$=	-75	lb	*Tension is +	

Sliding: V= 481 lb * 0.7= 337 lb

Wind:

110 mph 3- sec gust wind speed Risk Category II

Exposure C

A_f= 39 ft^2 A_v= 37 ft^2

A_f < 0.1Bh therefore G_{Cr} (h)= 1.9

G_{Cr} (v)= 1.5

K_z= 0.95 K_{zt}= 1.0 K_d= 0.85 K_e= 1.00

q_z= 0.00256 K_z K_{zt} K_d V^2 = 24.9 psf ASCE 7-16 Eqn 26.10-1 / 7-10 Eqn 30.3-1

F_h= $q_h(G_{Cr})$ A_f = 1852 lbs ASCE-7 Eqn 29.5-2

F_v= $q_v(G_{Cr})$ A_v = 1365 lbs ASC&-7 Eqn 29.5-3

$M_{OT\ (BASE)}$=	104888	in*lb * 0.6=	62933	in*lb	$M_{OT\ (CURB)}$=	82663	in*lb * 0.6=	49598	in*lb
M_R=	26740	in*lb * 0.6=	16044	in*lb	M_R= Weight * Width/2				
$T_{(BASE)}$=	837	lb	*Tension is +		$T_{(CURB)}$=	599	lb	*Tension is +	

Sliding: V= 1852 lb * .6= 1111 lb

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&R

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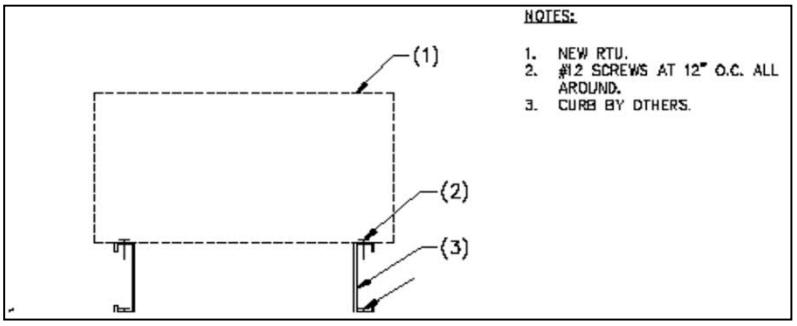
Job Name: T-Mobile TI .
Job No.: 24-1374 Sheet No.: 35 .
By: JKC Date: Nov-24 .

Attachment of Mechanical unit to curb:



Screw spacing unit to curb:

#12 screw spacing = 12 in o.c.

V_{MAX}= 1111 lb

N= 25 screws

$V_{ALLOW/SCREW}$ (20 gage material)= 188 lb

V_{ALLOW}= 4700 lb OK

T_{MAX}= 599 lb

N= 8 screws

$T_{ALLOW/SCREW}$ (20 gage material)= 95 lb

T_{ALLOW}= 760 lb OK

Seismic Unity	V_{ACTUAL} / V_{ALLOW}	337 / 4700	+	T_{ACTUAL} / T_{ALLOW}	0 / 760	=	0.07	OK
Wind Unity	V_{ACTUAL} / V_{ALLOW}	1111 / 4700	+	T_{ACTUAL} / T_{ALLOW}	599 / 760	=	1.02	NG

Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 843 lbs, Pts = 419 lbs) 0.138" dia, 0.272" Head			#8 Screw (Pss= 1278 lbs, Pts = 588 lbs) 0.164" dia, 0.272" Head			#10 Screw (Pss= 1844 lbs, Pts = 1158 lbs) 0.190" dia, 0.340" Head			#12 Screw (Pss= 2330 lbs, Pts = 2325 lbs) 0.216" dia, 0.340" Head			1/4" Screw (Pss= 3048 lbs, Pts = 3291 lbs) 0.250" dia, 0.486" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
18	0.0188	33	33	44	24	84	48	29	84	52	33	105	55	38	105	60	44	127
27	0.0283	33	33	82	37	127	89	43	127	96	50	159	102	57	159	110	66	191
30	0.0312	33	33	95	40	140	103	48	140	111	55	175	118	63	175	127	73	211
33	0.0346	33	45	151	61	140	164	72	195	177	84	265	188	95	265	203	110	318
43	0.0451	33	45	214	79	140	244	94	195	263	109	345	280	124	345	302	144	415
54	0.0566	33	45	214	100	140	344	118	195	370	137	386	394	156	433	424	180	521
68	0.0713	33	45	214	125	140	426	149	195	523	173	386	557	196	545	600	227	656
97	0.1017	33	45	214	140	140	426	195	195	548	246	386	777	280	775	1,016	324	936
118	0.1242	33	45	214	140	140	426	195	195	548	301	386	777	342	775	1,016	396	1,067
54	0.0566	50	65	214	140	140	426	171	195	534	198	386	569	225	625	813	261	752
68	0.0713	50	65	214	140	140	426	195	195	548	249	386	777	284	775	866	328	948
97	0.1017	50	65	214	140	140	426	195	195	548	356	386	777	405	775	1,016	468	1,067
118	0.1242	50	65	214	140	140	426	195	195	548	386	386	777	494	775	1,016	572	1,067

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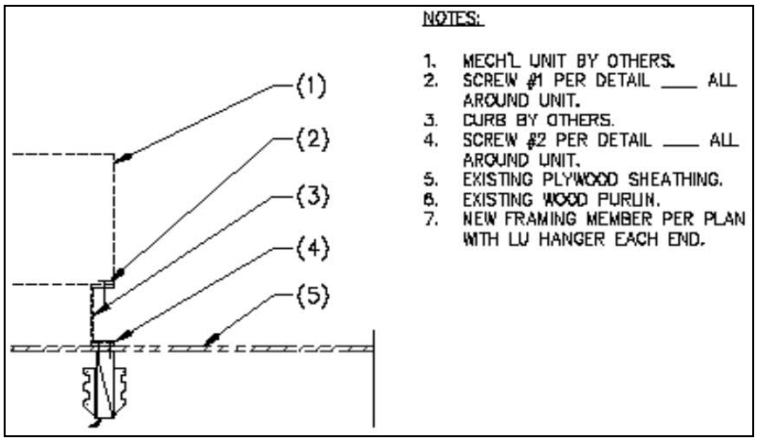
Job Name: T-Mobile TI .
Job No.: 24-1374 Sheet No.: 36 .
By: JKC Date: Nov-24 .

Attachment of curb to wood framing:



Screw spacing curb to wood:
#12 screw spacing = 12 in o.c.
x 2 1/2" long wood screws

V_{MAX}= 1111 lb

N= 25 screws
$V_{ALLOW/SCREW}$ = 228 lb
V_{ALLOW}= 5700 lb OK

T_{MAX}= 837 lb

N= 8 screws
$T_{ALLOW/SCREW}$ = 410 lb
T_{ALLOW}= 3280 lb OK

Seismic Unity	V_{ACTUAL} / V_{ALLOW}	337 / 5700	+	T_{ACTUAL} / T_{ALLOW}	0 / 3280	=	0.06	OK
Wind Unity	V_{ACTUAL} / V_{ALLOW}	1111 / 5700	+	T_{ACTUAL} / T_{ALLOW}	599 / 3280	=	0.38	OK

Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#8 Screw (Pss = 843 lbs, Pts = 419 lbs) 0.138" dia, 0.272" Head			#8 Screw (Pss= 1278 lbs, Pts = 588 lbs) 0.164" dia, 0.272" Head			#10 Screw (Pss= 1844 lbs, Pts = 1158 lbs) 0.190" dia, 0.340" Head			#12 Screw (Pss= 2330 lbs, Pts = 2325 lbs) 0.216" dia, 0.340" Head			¼" Screw (Pss= 3048 lbs, Pts = 3201 lbs) 0.250" dia, 0.409" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
18	0.0188	33	33	44	24	84	48	29	84	52	33	105	55	38	105	60	44	127
27	0.0283	33	33	82	37	127	89	43	127	96	50	159	102	57	159	110	66	191
30	0.0312	33	33	95	40	140	103	48	140	111	55	175	118	63	175	127	73	211
33	0.0346	33	45	151	61	140	164	72	195	177	84	265	188	95	265	203	110	318
43	0.0451	33	45	214	79	140	244	94	195	263	109	345	280	124	345	302	144	415
54	0.0566	33	45	214	100	140	344	118	195	370	137	386	394	156	433	424	180	521
68	0.0713	33	45	214	125	140	426	149	195	523	173	386	557	196	545	600	227	656
97	0.1017	33	45	214	140	140	426	195	195	548	246	386	777	280	775	1,016	324	936
118	0.1242	33	45	214	140	140	426	195	195	548	301	386	777	342	775	1,016	396	1,067
54	0.0566	50	65	214	140	140	426	171	195	534	198	386	569	225	625	813	261	752
68	0.0713	50	65	214	140	140	426	195	195	548	249	386	777	284	775	866	328	948
97	0.1017	50	65	214	140	140	426	195	195	548	356	386	777	405	775	1,016	468	1,067
118	0.1242	50	65	214	140	140	426	195	195	548	386	386	777	494	775	1,016	572	1,067

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Job Name: T-Mobile TI .
Job No.: 24-1374 Sheet No.: 37 .
By: JKC Date: Nov-24 .

Design Method	Allowable Stress Design (ASD)
Connection Type	Withdrawal loading
Fastener Type	Wood Screw
Loading Scenario	N/A
	Submit Initial Values

Main Member Type	Douglas Fir-Larch
Main Member Thickness	3.5 in.
Side Member Type	Steel
Side Member Thickness	20 gage
Wood Screw Number	12 (D = 0.216 in.)
Length	2.5 in.
Load Duration Factor	C_D = 1.6
Wet Service Factor	C_M = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use
Diaphragm Factor Help | Load Duration Factor Help | Technical Help
Show Printable View

Adjusted ASD Capacity	410 lbs.

- The Adjusted ASD Capacity does not apply for wood screws installed in the end grain of wood members.
- The Adjusted ASD Capacity only applies to withdrawal of the fastener from the main member. It does not address head pul capacity of the fastener in the side member.

While every effort has been made to insure the accuracy of the information presented, and special effort has been made to assure th information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility for any par prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability from its use.

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Washington St Support for development of the Connection Calculator was provided by American Wood Council.

Provides users with a web-based approach to calculating capacities for single bolts, nails, lag screws and wood screws per the **2005 NDS**. Both lateral (single and double shear) and withdrawal capacities can be determined. Wood-to-wood, wood-to-concrete, and wood-to-steel connections are possible.

Available on the iPhone App Store

Connection Calculator available for the iPhone.

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www.ctsaz.com

Job Name: T-Mobile TI .
Job No.: 24-1374 Sheet No.: 38 .
By: JKC Date: Nov-24 .

Design Method	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Wood Screw
Loading Scenario	Single Shear
	Submit Initial Values

Main Member Type	Douglas Fir-Larch
Main Member Thickness	3.5 in.
Main Member: Angle of Load to Grain	0
Side Member Type	Steel
Side Member Thickness	20 gage
Side Member: Angle of Load to Grain	0
Wood Screw Number	12 (D = 0.216 in.)
Length	2.5 in.
Load Duration Factor	C_D = 1.6
Wet Service Factor	C_M = 1.0
End Grain Factor	C_eg = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Connection Yield Modes

Im	1418 lbs.
Is	276 lbs.
II	577 lbs.
IIIm	602 lbs.
IIIs	228 lbs.
IV	322 lbs.

Adjusted ASD Capacity	228 lbs.

- Wood Screw bending yield strength of 80000 psi is assumed.
- Dowel bearing strengths for wood screws with nominal diameter greater than 1/4 in. are calculated and rounded to the neare accordance with NDS Table 11.3.2.
- Length of tapered tip is assumed to be two times the nominal wood screw diameter for calculating dowel bearing length in t
- ASTM A36 Steel is assumed for steel side members 1/4 in. thick, and ASTM A653 Grade 33 Steel is assumed for steel side than 1/4 in. thick.

While every effort has been made to insure the accuracy of the information presented, and special effort has been made to assure th

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Job Name _____

Job No. _____ Sheet No. _____

By _____ Date _____

New Beam Supporting Mech Units:

Unit Weight = 955 lb * 1.2
= 1146 lb

* Assume beam takes 1/3 of unit weight as distributed load
w_mech = 1146 lb / 3 / 3.67' long
= 104 plf

Existing Roof Loads:
DL = 18 psf --> w_DL = 18 psf * 2'
= 36 plf
LL = 20 psf --> w_LL = 20 psf * 2'
= 40 plf

* See next pages for SL loading

* See Enercalc: **Use 5 1/8" x 18" Glulam Beam**

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Job Name _____

Job No. _____ Sheet No. _____

By _____ Date _____

Existing Snow Drift at Roof Level (Plan E/W Direction):

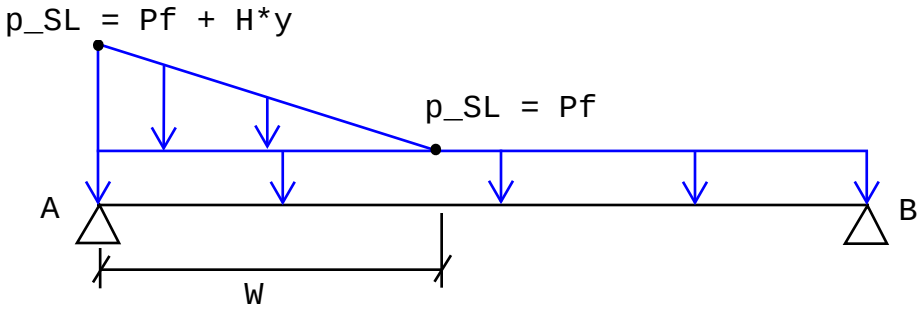
Pg = 25 psf
Pf = 25 psf * 0.7
= 18 psf

Snow Drift:
Lu = 143'
hd = 0.75 * [(0.43 * (Lu)^0.33 * (Pg + 10)^0.25) - 1.5]
= 2.9'

Snow Density, y = 0.13(Pg)+14
= 17 pcf

hb = Pf / y
= 1.1'
hc = 3.5' tall parapet - 1.1'
= 2.4'

*hc < hd --> Drift Length, W = min[8*hc , 4*hd^2/hc]
= 14.0'
Drift Height, H = hc
= 2.4'



Joist is 3' away from parapet and runs parallel to parapet
p_SL (drift only) = (14'-3') * 2.4' * 17 pcf / 14'
= 32 psf

w_SL = 32 psf * 1' trib width
= 32 plf

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Job Name _____

Job No. _____ Sheet No. _____

By _____ Date _____

Existing Snow Drift at Roof Level (Plan N/S Direction):

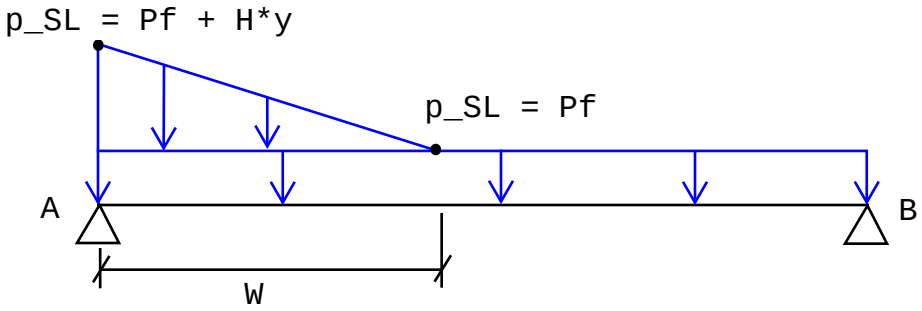
Pg = 25 psf
Pf = 25 psf * 0.7
= 18 psf

Snow Drift:
Lu = 35'
hd = 0.75 * [(0.43 * (Lu)^0.33 * (Pg + 10)^0.25) - 1.5]
= 1.4'

Snow Density, y = 0.13(Pg)+14
= 17 pcf

hb = Pf / y
= 1.1'
hc = 3.5' tall parapet - 1.1'
= 2.4'

*hc > hd --> Drift Length, W = min[8*hc , 4*hd]
= 5.6'
Drift Height, H = hd
= 1.4'



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1215 W. RIO SALADO PKWY, SUITE 200
TEMPE, AZ 85281

Project Title: T-Mobile #8022 TI
Engineer: JKC
Project ID: 24-1374
Project Descr:

Wood Beam

Project File: 241374 T Mobile.ec6

DESCRIPTION: Beam Supporting RTU 1 and 2

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-22 / IBC 2024 (L<=100psf)

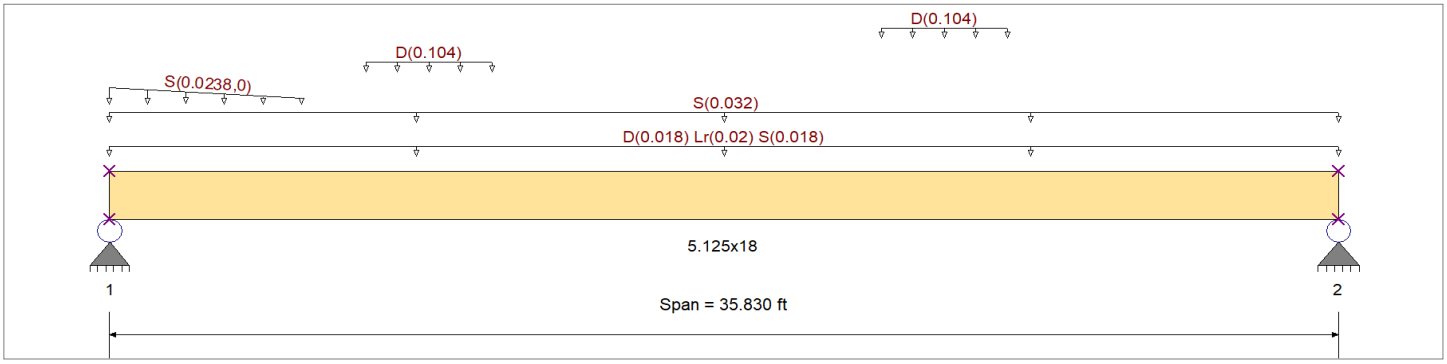
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Completely Unbraced

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0180, Lr = 0.020, S = 0.0180 , Tributary Width = 1.0 ft, (Existing DL, LL, and SL (balanced))
Uniform Load : S = 0.0320 , Tributary Width = 1.0 ft, (SL (E-W Drift))
Varying Uniform Load : S= 0.02380->0.0 k/ft, Extent = 0.0 -->> 5.60 ft, Trib Width = 1.0 ft, (SL (N-S Drift))

Uniform Load : D = 0.1040 k/ft, Extent = 7.50 -->> 11.170 ft, Tributary Width = 1.0 ft, (Mech)
Uniform Load : D = 0.1040 k/ft, Extent = 22.50 -->> 26.170 ft, Tributary Width = 1.0 ft, (Mech)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.304 : 1	Maximum Shear Stress Ratio	=	0.087 : 1
Section used for this span		5.125x18	Section used for this span		5.125x18
fb: Actual	=	682.29 psi	fv: Actual	=	26.52 psi
F'b	=	2,242.26 psi	F'v	=	304.75 psi
Load Combination		+D+0.70S	Load Combination		+D+0.70S
Location of maximum on span	=	18.177 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.420 in	Ratio =	1024	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.828 in	Ratio =	519	>=240	Span: 1 : +D+0.70S
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 M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.227	0.070	0.90	1.00	1.00	0.89	0.910	1.00	1.00	1.00	10.08	437.0	1,927.8	1.03	16.8	238.5
+D+Lr					1.00	1.00	0.89	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.248	0.067	1.25	1.00	1.00	0.78	0.910	1.00	1.00	1.00	13.29	576.1	2,326.2	1.36	22.1	331.3

CARUSO TURLEY SCOTT, INC.
1215 W. RIO SALADO PKWY, SUITE 200
TEMPE, AZ 85281

Project Title: T-Mobile #8022 TI
Engineer: JKC
Project ID: 24-1374
Project Descr:

Wood Beam

Project File: 241374 T Mobile.ec6

DESCRIPTION: Beam Supporting RTU 1 and 2

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.70S					1.00	1.00	0.78	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.304	0.087	1.15	1.00	1.00	0.81	0.910	1.00	1.00	1.00	15.74	682.3	2,242.3	1.63	26.5	304.8
+D+0.750Lr					1.00	1.00	0.81	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.233	0.063	1.25	1.00	1.00	0.78	0.910	1.00	1.00	1.00	12.48	541.3	2,326.2	1.28	20.8	331.3
+D+0.5250S					1.00	1.00	0.78	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.277	0.079	1.15	1.00	1.00	0.81	0.910	1.00	1.00	1.00	14.32	621.0	2,242.3	1.48	24.1	304.8
+0.60D					1.00	1.00	0.81	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.105	0.024	1.60	1.00	1.00	0.65	0.910	1.00	1.00	1.00	6.05	262.2	2,496.0	0.62	10.1	424.0
+D+0.10S					1.00	1.00	0.65	0.910	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 35.830 ft	1	0.189	0.043	1.60	1.00	1.00	0.65	0.910	1.00	1.00	1.00	10.89	472.1	2,496.0	1.12	18.2	424.0

Overall Maximum Deflections

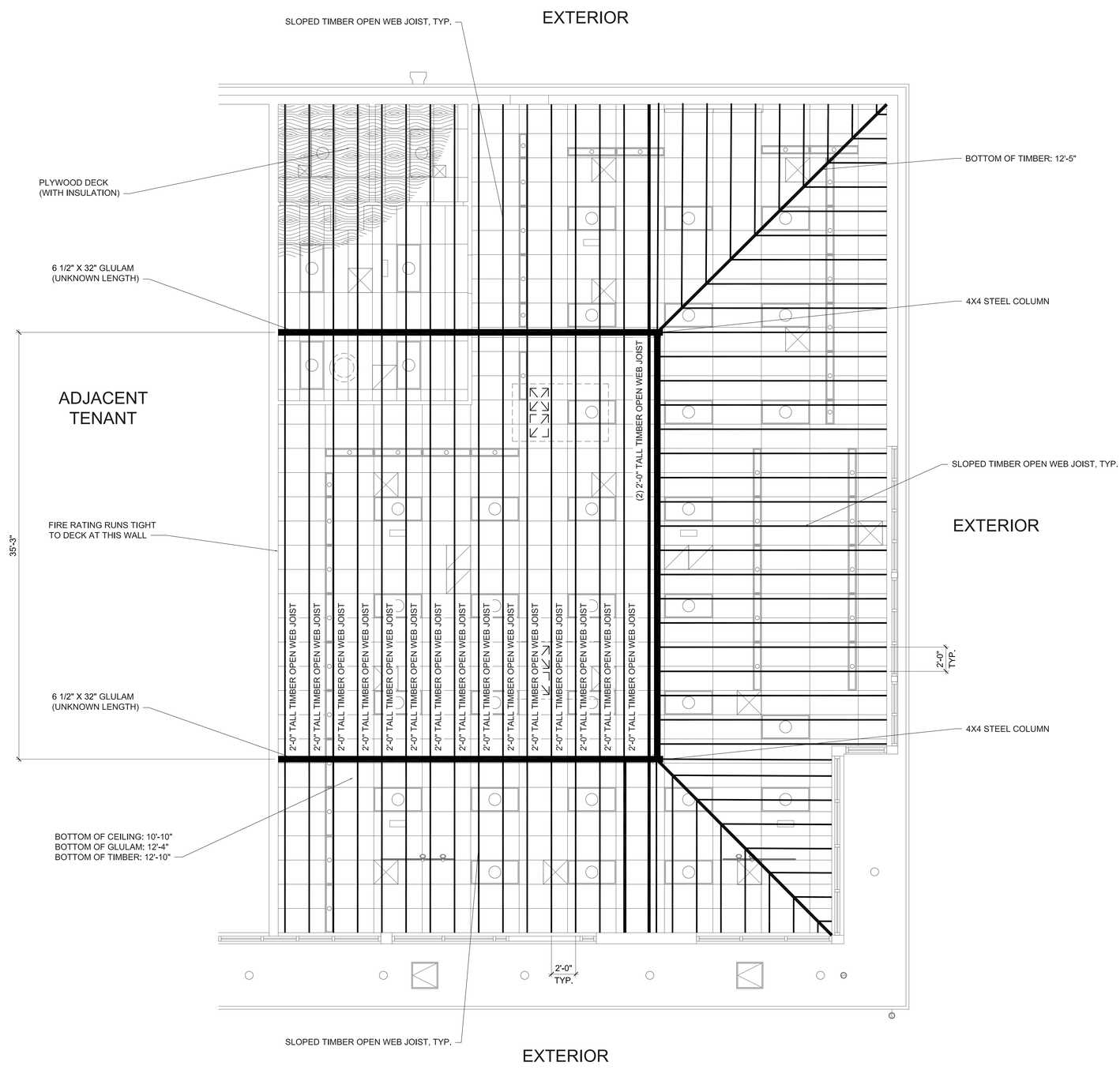
Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+0.70S	0.8277	17.915		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.757	1.669
Max Upward from Load Combinations	1.757	1.669
Max Upward from Load Cases	1.085	1.039
D Only	1.085	1.039
+D+Lr	1.444	1.398
+D+0.70S	1.757	1.669
+D+0.750Lr	1.354	1.308
+D+0.5250S	1.589	1.511
+0.60D	0.651	0.624
+D+0.10S	1.181	1.129
Lr Only	0.358	0.358
S Only	0.959	0.899

Structural Survey by Apex Tech Solutions



STRUCTURAL PLAN

1/4" = 1'-0"

1

APEX TECH SOLUTIONS
SCAN › CREATE › ANALYZE

T-MOBILE
STORE #
4227 S. MERIDIAN, SUITE E
PUYALLUP, WA. 98373

NOT FOR
CONSTRUCTION

JOB NUMBER:

DATE: 10/15/2024

SHEET NO: AB-10