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

PRMH20241062

Prepared Date: 6-22-2024
Revised Date: 7-16-2024

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

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA
LOCATION: 621 RIVER ROAD
PUYALLUP, WA 9837
CHECKED BY: KENNETH TANG, P.E.

ENGINEERING CALCULATIONS AND ANALYSIS REPORT FOR ROOF TOP MECHANICAL CURBS AND ADAPTER SUPPORTING NEW HVAC UNITS FOR TRACTOR SUPPLY NO. 1886 PUYALLUP, WA 9837

TSC TRACTOR SUPPLY CO

KENNETH TANG
STATE OF WASHINGTON
No. 57299
REGISTERED
PROFESSIONAL ENGINEER
7/16/2024

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
BSnowden
07/19/2024
10:02:17 AM
CITY OF PUYALLUP
STATE OF WASHINGTON

DESIGN CRITERIA:

DESIGNED USING INTERNATIONAL BUILDING CODE (IBC) — 2021 IBC
ASCE 7-16/7-22

DEAD AND LIVE LOADS:

ROOF DEAD LOAD:	**20**	***psf***
ROOF LIVE LOAD (IBC):	**20**	***psf***
GROUND SNOW LOAD:	**20**	***psf***

SEISMIC PARAMETERS:

	SHORT PERIOD:	S_S =	**1.278**	G
	ONE SECOND PERIOD:	S_1 =	**0.440**	G
	DESIGN SPECTRAL ACCELERATION:	S_{DS} =	**1.022**	G
	DESIGN ONE SECOND PERIOD:	S_{D1} =	**null**	G
TAB 11.4-1	SITE COEFFICIENT AT ONE SECOND PERIOD	F_v =	**1.700**	
Eq. 11.4-1	MCE ONE SECOND ADJUSTED SITE CLASS EFFECTS	S_{M1} =	**0.748**	G
Eq. 11.4-4	DESIGN ONE SECOND PERIOD (CALCULATED):	S_{D1} =	**0.499**	G

SEISMIC DESIGN CATEGORY: **D-Default** STIFF

WIND PARAMETERS (RISK CATEGORY III):

ULTIMATE DESIGN WIND SPEED (VULT):	**104**	MPH
EXPOSURE:	**C**	

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

TABLE OF CONTENTS

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

1 PROJECT INFORMATION

Store: TRACTOR SUPPLY NO. 1886
Location: 621 RIVER ROAD
PUYALLUP, WA 9837
Contact: Bernard Adebayo-Ige, P.E. (bernard@p2eg.com) Phone: 951-283-7085
Engineer: Kenneth Tang, P.E. (kenneth.tang@p2eg.com) Phone: 323-816-4011

2 PROJECT SCOPE

Relacement of Existing Roof Top Equipment

3 KEY PROJECT DATA / SPECIFICATIONS

New (N) Unit(s)

Make	AC#	Model	Tonnage	Qty	EER	Weights (LBS)
LENNOX	1-3	See (a)	15.0	3	12.0	2,801
LENNOX	7	See (b)	7.5	1	NA	345
				Total Weight:		**8,748**

(a) LGT180H4M-G 15T CONF E=12.0 (2,351#) Curb Adapter
(b) EL090XCSST1G AC/7.5TON/460-3 (345#) AC 1-3 AC / YK05 / LN03 (450#)

Existing (E) Unit(s)

Make	AC#	Model	Tonnage	Qty	EER	Weights (LBS)
YORK	1-3	See (f)	15.0	3	10.1	2,351
TRANE	7	See (g)	7.5	1	NA	345
				Total Weight:		**7,398**

(f) DJ180N24S4VFH2E (15T) (2,351#)
(g) TTA090A400DA (7.5T) (345#)

Total Weight (N) RTUs (LBS):	**8,748**
Total Weight (E) RTUs (LBS):	**7,398**
Total Additional Weight (LBS):	**1,350**

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

4 JURISDITIONAL INFORMATION

Local Jurisdiction (City or County): PUYALLUP, WA 9837
Enforced Code Used: ASCE 7-16/7-22 2021 IBC

Seismic Design Information:

Eq. 12.8-2	Seismic Coefficient Force Factor, Cs:		**0.170**	G
	Short Period:	S_S =	**1.278**	G
	One Second Period:	S_1 =	**0.440**	G
	Design Spectral Acceleration:	S_{DS} =	**1.022**	G
	Design One Second Period:	S_{D1} =	**0.499**	G
	Seismic Design Category:	**D-Default**		
	Response Modification Factor, Rp:	**6.0**		
	Building Site Class:	**D**		

Wind Design Information:

Basic Wind Speed (3-Second Gust):		**104**	MPH
Wind Exposure Type:	**C**		
Horizontal Wind Pressure:		**29.72**	***psf (RTU)***
Vertical Wind Pressure:		**28.66**	***psf (RTU)***

Check Seismic Response Coefficient:

S1 > 0.6G Seismic Coefficient Force Factor, C_{s1}: **0.037** G

C_{s1} < **Cs** **1** **[Satisfactory]**

Cs Must Be Greater Than 0.01

0.01 < **Cs** **1** **[Satisfactory]**

Eq. 12.8-3 Cs < Cs (T <= T_L)

Coefficient for Upper Limit on Calc Period	C_u =	**1.400**	
Structure Median Height	h_n =	**28.0**	ft
Values of ~Period Parameters	C_t =	**0.020**	
Values of ~Period Parameters	x =	**0.750**	
Long-period transition Period (California)	T_L =	**16**	
The ~ Fundamental Period of Structure	T_a =	**0.243**	
The Fundamental Period of Structure	T <	**0.341**	
The response modification factor	R =	**2.500**	
Cs (T <= TL)	Cs (T <= TL) =	**0.585**	

Cs (T <= TL) > **Cs** **1** **[Satisfactory]**

Proscap Engineering & Energy Group

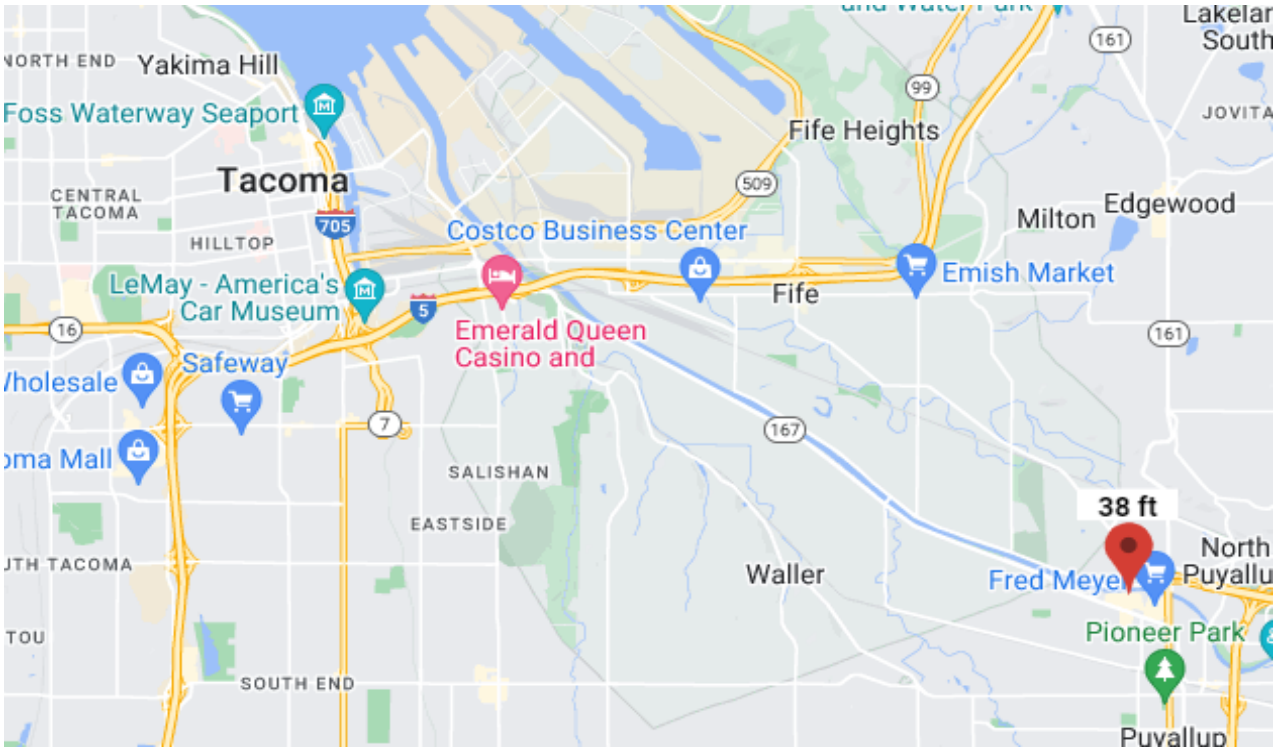
PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

5 SEISMIC ANAYSIS

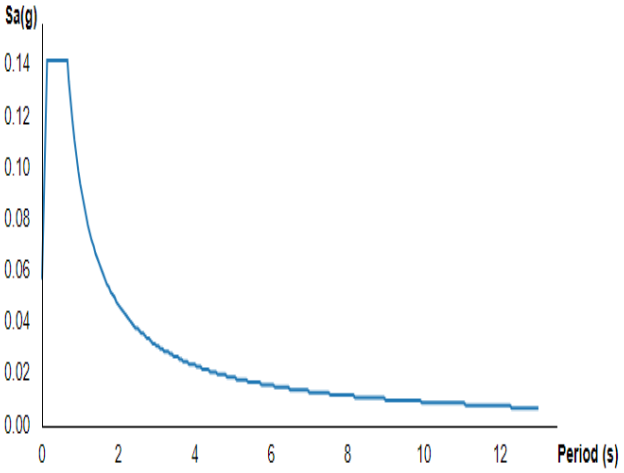
621 River Rd, Puyallup, WA 98371, USA

Coordinates: 47.2020195, -122.3007257

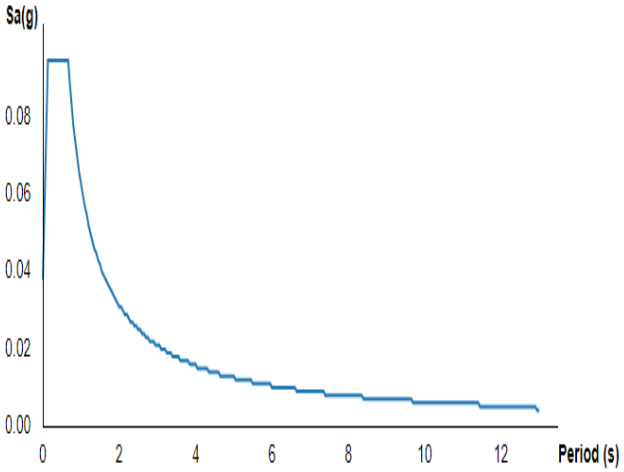
Risk Category	II
Site Class	D - Default



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Ground Snow Load	⚠ 18 lb/sqft
Risk Category II	97 mph
Risk Category III	104 mph

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

Basic Parameters

Name	Value	Description
S_S	1.278	MCE_R ground motion (period=0.2s)
S_1	0.44	MCE_R ground motion (period=1.0s)
S_{MS}	1.533	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.022	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.899	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.278	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.398	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.44	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.489	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

6 STRUCTURAL ENGINEERING CALCULATIONS

DESIGN LOADS AND VALUES

GRAVITY LOADS

AC#	1-3	7		
DL_{roof} =	20	20	***psf***	
LL_{roof} =	20	20	***psf***	
SL_{roof}=	20	20	***psf***	

ABBREVIATIONS

(N) = New
(E) = Existing
OK = 1 [Satisfactory]
NG = 0 (No Good) [Unsatisfactory]

ROOF TOP UNIT WIND PARAMETERS

V_{wind} =	104	104	Design Wind Velocity, MPH
I_{Factor} =	1.0	1.0	Importance Factor Section 13.1.3
C			Wind Exposure
K_d =	0.85	0.85	Directional Coeffiecient Section 26.6
K_{zt} =	1.00	1.00	Topographic Factor Section 26.8.2
K_z =	0.90	0.90	Velocity Pressure Exposure Coeff. T29.3-1
GC_r =	1.40	1.00	Gust Effect Factor Section 26.9.1 (RTU Horiz)
GC_r =	1.35	1.00	Gust Effect Factor Section 26.9.1 (RTU Vert)

WIND EQUATIONS

q_z =	21.23	21.23	***psf***	Velocity Pressure
F_z =	29.72	21.23	***psf***	Wind Pressure
WL_{RTU-H} =	29.72	21.23	***psf***	Wind Pressure - (RTU Horiz)
WL_{RTU-V} =	28.66	21.23	***psf***	Wind Pressure - (RTU Vert)

SEISMIC PARAMETERS

S_{DS} =	1.022	1.022		Design Spectral Analysis
F_a =	1.2	1.2	D-Default	Seismic Design Categoty
R_p =	6.0	6.0		Response Modification Factor
A_p =	2.5	2.5		Amplification Factor
I_{Factor} =	1.0	1.0		Importance Factor

Seismic Loading - 2021 IBC

Fpmax =	1,201	176	***lbf***	RTU unit only
Fpmax =	1,431	176	***lbf***	RTU + curb adapter
FpmaxASD =	841	123	***lbf***	FpmaxASD (RTU unit only)
FpmaxASD =	1,002	123	***lbf***	FpmaxASD (RTU + curb adapter)

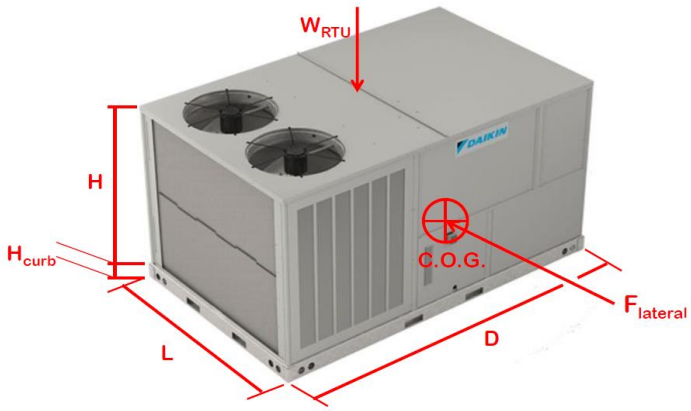
Proscap Engineering & Energy Group

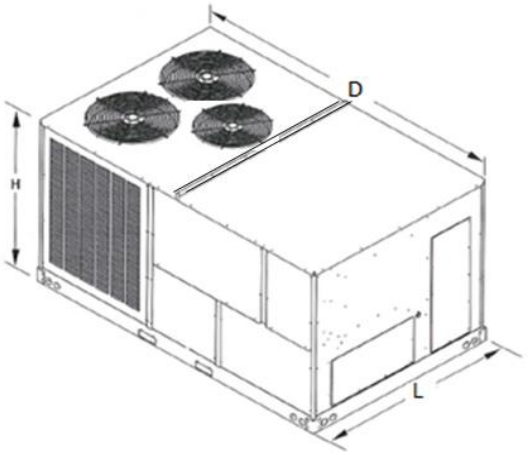
PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

7 ROOF TOP UNIT (S) DESIGN DATA

RTUs DESIGN DIMENSIONS AND LOAD DIAGRAM:

Note: The pictures show here are not an actual RTU. It's used to help performing calculation only.





RTU 1 DESIGN DATA

AC#	1-3	7		
H_{curb} =	12.00	12.00	***in***	RTU Curb Height
H =	4.521	4.063	***ft***	RTU Height
Hcm =	2.260	2.031	***ft***	Height to center of mass
L_{RTU1} =	11.052	4.032	***ft***	RTU Length
D_{RTU1} =	7.593	3.323	***ft***	RTU Depth
W_{RTU1} =	2,801	345	***lbf***	RTU Weight
Wtmax =	636	97	***lbf***	Maximum corner weight
Wtmin =	435	66	***lbf***	Minimum corner weight

Curb Loading

Transverse:

$C_{SEISMIC}$ =	1,752	297	***lbf***	Compression SEISMIC
$T_{SEISMIC}$ =	-646	-97	***lbf***	Tension SEISMIC

---> Negative values indicate opposite load.

$Compression_{SEISMIC}$ = =[FpmaxASD*Hcm+2*(1+0.14S_{DS})*Wtmax*wcurb]/wcurb
$Tension_{SEISMIC}$ = =[FpmaxASD*Hcm-2*(0.6-0.14S_{DS})*Wtmin*wcurb]/wcurb

Longitudinal:

$C_{SEISMIC}$ =	1,659	284	***lbf***	Compression SEISMIC
$T_{SEISMIC}$ =	-442	-36	***lbf***	Tension SEISMIC

---> Negative values indicate opposite load.

$Compression_{SEISMIC}$ = =[FpmaxASD*Hcm+2*(1+0.14*S_{DS})*Wtmax*Lcurb]/Lcurb
$Tension_{SEISMIC}$ = =[FpmaxASD*Hcm-2*(0.6-0.14S_{DS})*Wtmin*Lcurb]/Lcurb

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

Governing Reactions:

Transverse:

$C_{SEISMIC}$ =	1,752	297	***lbf***	Compression SEISMIC

Longitudinal:

$C_{SEISMIC}$ =	1,659	284	***lbf***	Compression SEISMIC

8 CHECK (E) JOISTS W/ GRAVITY INCREASES AND TOTAL LOAD FOR (N) RTUs

GRAVITY INCREASES CHECK PER THE 2021 IBC:

W_{RTU} =	2,351 ***lbf***		Weight of (E)RTU
$W_{increase}$ =	450 ***lbf***		Total Weight of RTUs increase
$G_{increase}$ =	0.191 ***psf***		Gravity Increases
$G_{allowable\ increase}$ =	10.000 ***psf***		Allowable Typ. (E) Building $G_{increases}$
$\%_{increase}$ =	1.91%		% $G_{increases}$
$G_{allowable\ increase}$	>	**$G_{increase}$**	**1 [Satisfactory]**
$\%_{increase}$	<	**10.00%**	**1 [Satisfactory]**

TRUSS TOTAL LOAD CHECK:

Note: Refer to Beam Table

AC#	**1-3**	**7**		
$W_{dist\ load\ RTUs}$ =	33.38	25.75	***psf***	Distribution Load RTUs
$A_{tributar\ RTU}$ =	83.92	13.40	***sf***	Tributary Area at RTUs
W_{RTU} =	2,801	345	***lbf***	Gravity Weight RTUs
$TL_{allowable}$ =	467	467	***plf***	Allowable Total Load Truss
L_{beam} =	32.0	32.0	***lf***	Length of Beam
$W_{allowable\ beam}$ =	14,944	14,944	***lbf***	Allowable Total Weight
$W_{allowable\ beam}$	>	**W_{RTU}**		**1 [Satisfactory]**

(E) Open-Web Truss Joists
1-3 (D28") 28K6 @ 4' OC TYP UON
7 (D28") 28K6 @ 4' OC TYP UON

RESULT: **The (N) RTUs replacements are acceptable**

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

9 CHECK LIVE LOAD DEFLECTION:

FOR JOIST OPEN WEB TRUSS (D28") 28K6 @ 4' OC TYP UON

E = 29,000 ***ksi***

Given (E) 32'-0" X 32'-0" bay. Joists spaced on 4'-0" centers

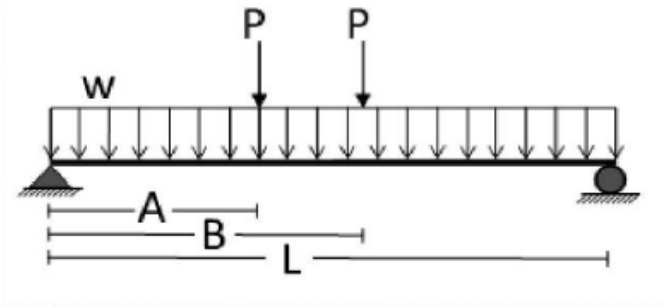
AC#	**1-3**	**7**		
DL_{roof} =	20	20	***psf***	(Included the approximate
LL_{roof} =	20	20	***psf***	Joist weight)
SL_{roof} =	20	20	***psf***	
Total DL+LL+SL =	60	60	***psf***	
d =	28	28	***in***	Joist Depth
L_1=	32.0	32.0	***ft***	Top Span
L_2=	32.0	32.0	***ft***	Joist Span
N=	2	2		Number of actual joist spaces (N)
Spacing =	4	4	***ft***	Joists spacing on centers
Total Load =	240	240	***plf***	
Total Allowable Load =	467	467	***plf***	See Table 26K7/26K10 Truss
P =	14.94	14.944	***kips***	Allowable Concentrated load at
	14,944	14,944	***lbs***	top chord panel points
Total Live Load =	1,280	1,280	***plf***	Joist Span
I =	1,123	1,123	***in^4***	Joist Moment of Inertia
				Ij = $26.767(W_{LL})(L^3)(10^{-6})$,
$D_{allowable}$ =	2.13	2.13	in	Allowable deflection L/180
D_{LL} =	0.37	0.37	in	Live Load Deflection

$D_{allowable\ beam}$ > D_{LL} 1 [Satisfactory]

Summary: Live load deflection rarely governs because of the relatively small span-depth ratios of joist girders.

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA



10 CHECK (E) JOISTS W/ (N) RTUs

AC#	1-3	7		
L =	32.00	32.00	***ft***	Design Length of Joist
W_{trib} =	4.0	4.0	***ft***	Tributary Width of joists
N =	2	2		Number of Resisting Joists
L_{RTU1} =	11.052	4.032	***ft***	RTU Length
D_{RTU1} =	7.593	3.323	***ft***	RTU Depth
W_{RTU1} =	2,801	345	***lbf***	RTU Weight
A =	5.0	0.0	***ft***	Point Load Location
B =	12.59	3.32	***ft***	Point Load Location

STRUCTURAL ANALYSIS

A_{RTU1} =	83.919	13.399	ft^2	Area of RTU
$W_{RTU\ reduced}$ =	1,122.62	77.03	***lbf***	Reduced RTU Wt. From LL Subtracted
P_{LL} =	280.655	19.257	***lbf***	Point Load From RTU and LL
$w_{DL\ roof}$ =	80.000	80.000	***lbf***	Roof DL
$W_{LL+SL\ roof}$ =	160.000	160.000	***lbf***	Roof LL+SL
$w_{TL\ roof}$ =	240.000	240.000	***lbf***	Roof Total Load
$M_{max\ all\ roof}$ =	30,720	30,720	***lbf-ft***	Max Allowable Moment Roof Total Load
$M_{manufacturer}$ =	100,500	100,500	***lbf-ft***	Max Allowable Moment (Manufacturer)
M_{actual} =	27,753	28,263	***lbf-ft***	Actual Moment (Calculated Enercalc)
$V_{max\ all\ roof}$ =	3,840	3,840	***lbf***	Max Allowable Shear Roof Total Load
$V_{manufacturer}$ =	8,500	8,500	***lbf***	Max Allowable Shear (Manufacturer)
V_{actual} =	3,573	3,606	***lbf***	Actual Shear (Calculated Enercalc)

M_{actual}	<	**$1.05*M_{max\ all}$**	**1**	**[Satisfactory]**
27,753	<	**32,256**		

V_{actual}	<	**$1.05*V_{max\ all}$**	**1**	**[Satisfactory]**
3,573	<	**4,032**		

RESULT:

The new M_{actual} and V_{actual} are less than the allowable M_{max} and V_{max} with the addition weight of the (N) RTU.

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

11 RTU(S) LATERAL ANALYSIS

RTU 1 DESIGN DATA (WORST CASE)

AC#	**1-3**	**7**		
H =	4.52	4.06	***ft***	RTU Height
H_{curb} =	12.00	12.00	***in***	RTU Curb Height
L_{RTU1} =	11.052	4.032	***ft***	RTU Length
D_{RTU1} =	7.593	3.323	***ft***	RTU Depth
W_{RTU1} =	2,801	345	***lbf***	RTU Weight
h =	28.0	28.0	***ft***	Roof Height of Structure
z =	28.0	28.0	***ft***	Height of Attachment
$F_{p\ calc}$ =	1,431	176	***lbf***	Seismic Design Force (Eq.13.3-1)

F_p MINIMUM AND MAXIMUM

$F_{p\ max}$ =	4,580	564	***lbf***	F_p Maximum (Eq.13.3-2)
$F_{p\ min}$ =	859	106	***lbf***	F_p Minimum (Eq. 13.3-3)

Fp max	>	Fp calc	**1**	**[Satisfactory]**
4,580	>	**1,431**		

Fp min	<	Fp calc	**1**	**[Satisfactory]**
859	<	**1,431**		

[Fp Calc Otherwise]

F_p =	$F_{p\ calc}$ =	**1,431**	**176**	***lbf***	Seismic Design Force

LOAD COMBINATION (0.7E-0.6DL)

$F_{seismic}$ =	1002	123	***lbf***

LOAD COMBINATION (0.6E-0.6DL)

F_{wind} =	612	172	***lbf***

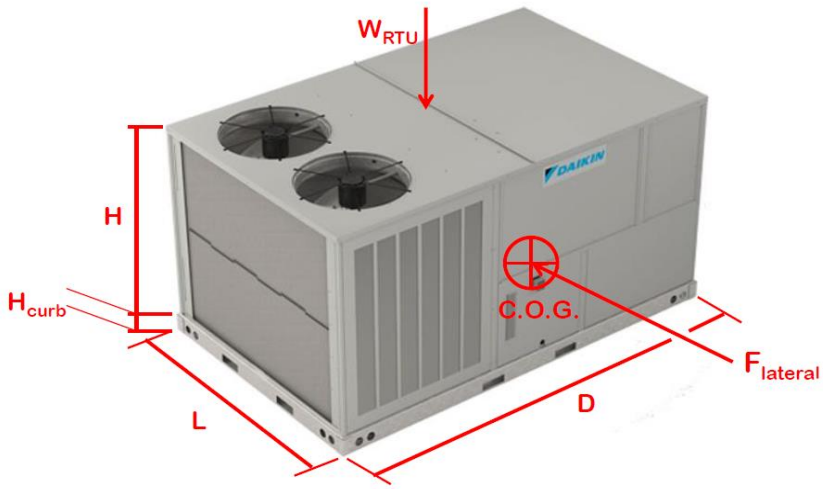
MAXIMUM DESIGN FORCE

$F_{lateral}$ =	**1002**	**172**	***lbf***

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

12 RTU(S) DESIGN DIMENSIONS AND LOAD DIAGRAM



OVERTURNING FORCES

AC#	1-3	7		
M_{OT} =	2,765.71	435.30	***ft-lbf***	Overturning Moment (OT)
M_{res} =	15,477.86	695.46	***ft-lbf***	Resisting Moment
T_{OT} =	-1,150.25	-64.53	***lbf***	Tension Force Along Side
$T_{OT\ dist}$ =	-151.48	-19.42	***lb/f***	Distributed Tension Force from OT

UPLIFT FORCES

$F_{uplift\ seis}$ =	572.52	70.52	***lbf***	Uplift Force from Sesmic
$F_{uplift\ wind}$ =	2,494.14	284.44	***lbf***	Uplift Force from Wind
F_{uplift} =	2,494.14	284.44	***lbf***	Design Uplift Force from Uplift
T_{uplift} =	813.54	77.44	***lbf***	Total Tension Force from Uplift
$T_{uplift\ dist}$ =	21.82	5.26	***lb/f***	Distributed Tension Force from Uplift

SHEAR FORCES

V_{max} = $F_{lateral}$ =	1,001.92	171.97	***lbf***	Total Shear Force
$V_{max\ dist}$ =	26.87	11.69	***lb/f***	Distributed Shear Force

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

KCS JOIST LOAD TABLE

(U.S. CUSTOMARY)

JOIST DESIGNATION	DEPTH (inches)	MOMENT CAPACITY* (inch-kips)	SHEAR CAPACITY* (lbs)	APPROX. WEIGHT** (lbs/ft)	GROSS MOMENT OF INERTIA (in^4)	BRIDG. TABLE SECT. NO.
24KCS2	24	534	6300	10.0	232	6
24KCS3	24	720	7200	12.5	301	9
24KCS4	24	1108	8400	16.5	453	12
24KCS5	24	1448	8900	20.5	584	12
26KCS2	26	580	6600	10.0	274	6
26KCS3	26	783	7800	12.5	355	9
26KCS4	26	1206	8500	16.5	536	12
26KCS5	26	1576	9200	20.5	691	12
28KCS2	28	626	6900	10.5	320	6
28KCS3	28	846	8000	12.5	414	9
28KCS4	28	1303	8500	16.5	626	12
28KCS5	28	1704	9200	20.5	808	12
30KCS3	30	908	8000	13.0	478	9
30KCS4	30	1400	8500	16.5	722	12
30KCS5	30	1833	9200	21.0	934	12

*MAXIMUM UNIFORMLY DISTRIBUTED LOAD CAPACITY IS 550 PLF AND SINGLE CONCENTRATED LOAD CANNOT EXCEED SHEAR CAPACITY.
**DOES NOT INCLUDE ACCESSORIES

13 Installation of Hold Down Brackets

ALLOWABLE SCREW CAPACITIES (TEK SCREW)

AC#	**1-3**	**7**		
Tek Screw	#14-16 Ga	#14-16 Ga		Tek Screw - Metal Ga
$T_{allowable\ screw}$ =	180	180	***lbf***	Allowable Tension Capacity of #10 Tek Screw
$V_{allowable\ screw}$ =	424	424	***lbf***	Allowable Shear Capacity of #10 Tek Screw
$S_{weld\ spa}$ =	12	12	***in***	Spacing of Screws Around Perimeter

UPLIFT FORCES

T_{uplift} =	813.54	77.44	***lbf***	Total Tension Force from Uplift
$T_{uplift\ dist}$ =	21.82	5.26	***lb/f***	Distributed Tension Force from Uplift

SHEAR FORCES

$V_{max} = F_{lateral}$ =	1,001.92	171.97	***lbf***	Total Shear Force
$V_{max\ dist}$ =	26.87	11.69	***lb/f***	Distributed Shear Force

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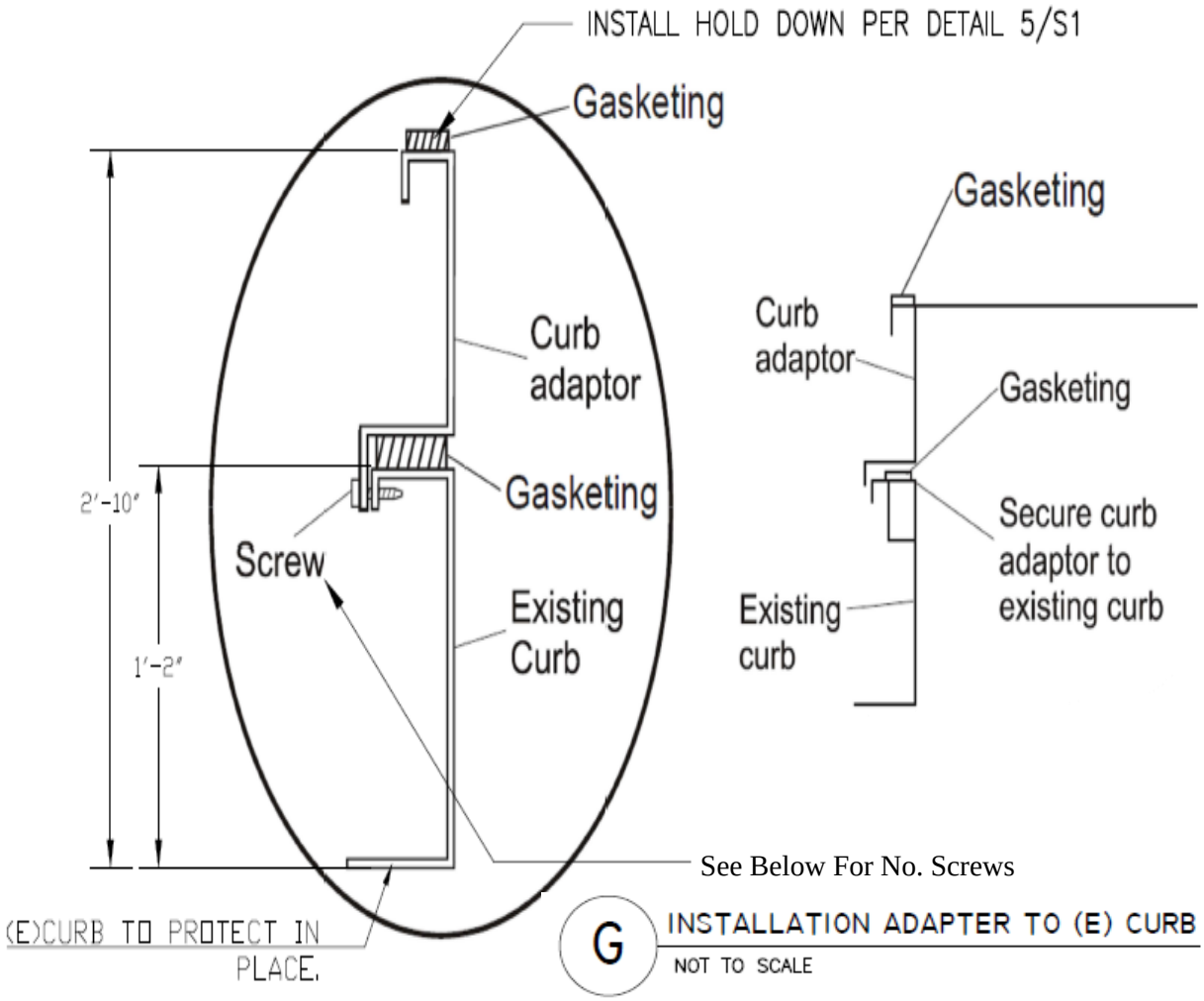
PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA



G INSTALLATION ADAPTER TO (E) CURB
NOT TO SCALE

EQUATIONS (Determine No. Screws to (N) Curb Adaptor)

AC#	1-3	7		
T_{max} =	21.82	5.26	***lb/f***	Maximum Tension from Uplift
V_{max} =	26.87	11.69	***lb/f***	Maximun Shear
$S_{req\ tension}$ =	99.01	410.30	***in***	Spacing of Screw due to Max. Tension
$S_{req\ shear}$ =	189.37	435.22	***in***	Spacing of Screw due to Max. Shear
T =	24	11		Total screws required (Adjusted even number)
No. of Screw (L) =	6	0		Long Side (Adjusted)
No. of Screw (S) =	2	0		Short Side (Adjusted)
No. of Screw (C) =	2	2		Corner Anchors Use
W/Screw (uplift) =	147	180	***lbf***	Tension per screw #14 TEK Screw
V/Screw =	42	16	***lbf***	Shear per screw

TEK Screws OK

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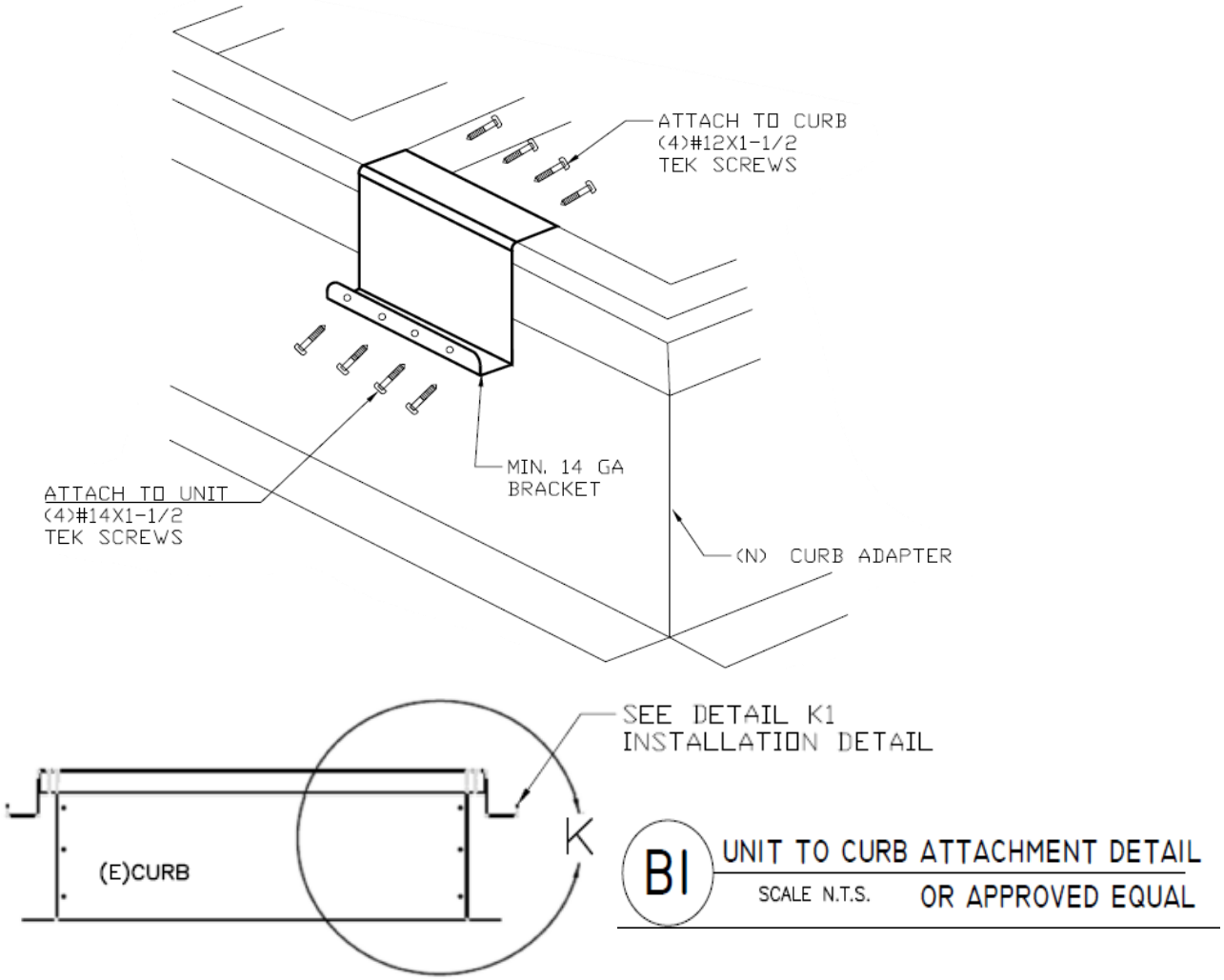

EQUATIONS (Determine No. of Hold Down (No. of Clips)

Tek Screw #14-16 Ga #14-16 Ga Tek Screw - Metal Ga

AC#	1-3	7		
$T_{allowable\ screw}$ =	180	180	***lbf/screw***	Allowable Tension Capacity of Tek Screw
$V_{allowable\ screw}$ =	424	424	***lbf/screw***	Allowable Shear Capacity of Tek Screw

UPLIFT CLIPS (T):				Screws/Clip	
Uplift =	814	77	***lbf***	4	@2" OC
Total No. Clip =	3	0		Long Side (Adjusted)	
Total No. Clip =	2	0	***per side***	Each side	

SHORTSIDE CLIPS (V):					
Shear =	1,002	172	***lbf/Side***	4	@2" OC
No. Clip =	0	0	***per side***	Short Side (Adjusted)	

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STORE NO: #1886 PUYALLUP, WA

Connection Unit to Curb Clip

t1 =	0.0713	***in***	
t2 =	0.1017	***in***	Unit Base Rail Thickness
d =	0.1900	***in***	Screw Diameter
t2/t1 =	1.4		
Ω =	3.0		TEK Screw
Fu1 =	65	***ksi***	
Fu2 =	65	***ksi***	
dw =	0.375	***in***	Nom. Washer Diameter

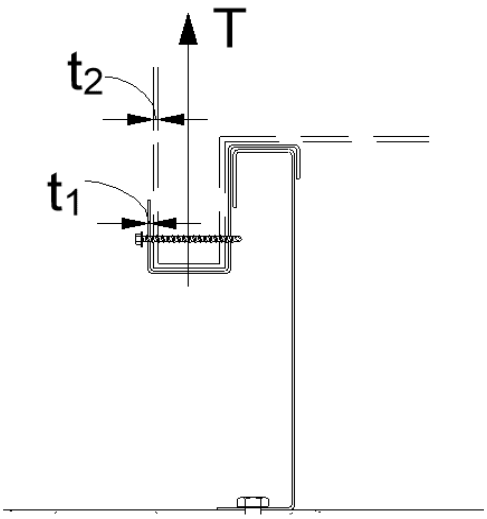
Check Block shear rupture: O.K.

Thinnest part =	0.0713	***AISI BSR applies***
Fy =	50	***ksi***
Agv =	0.463	
Ω =	2.22	***Bolt/Screw Connection***
Anv =	0.443	in^2
Ant =	0.042	in^2
Rn1 =	16.62	***k***
Rn2 =	20.01	***k***
Rn/Ω =	9.01	***k***

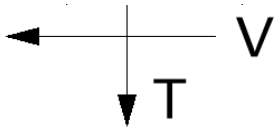
Rn1 16.62 < **20.01** Rn2

$$R_n = 0.6F_yA_{gv} + F_uA_{nt} \leq 0.6F_uA_{nv} + F_uA_{nt}$$

BSR OK ***(AISI Sect. E5.3)***



STEEL ATTACHMENT



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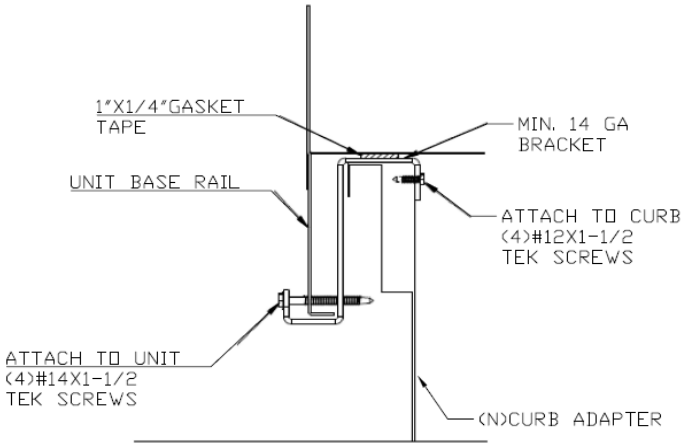
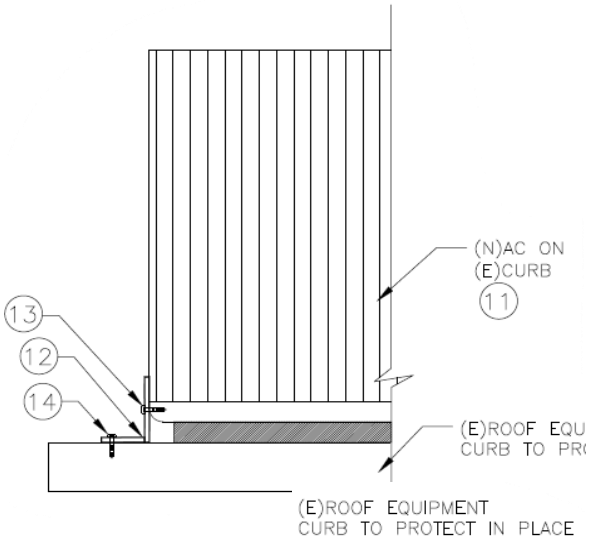
ANCHORAGE DETAILS TO ROOF



K HOLD DOWN INSTALLATION DETAIL K
NOT TO SCALE



L ANCHORAGE DETAIL
NOT TO SCALE

HOLD DOWN DETAIL

Note: **Contractor to install 4 hold down brackets. 2 Brackets at each side of the (E)Curb.**

14 **SUMMARY:**

BASED ON THE ANALYSIS, THE NEW ROOF CURB ADAPTERS HAVE ADEQUATE CAPACITY TO SUPPORT THE NEW RTUS.

15 **Line of Sight Calcs**

AC#	**1-3**	**7**
H_{unit} =	5.52 ***ft***	RTU Unit Height
$H_{building+wall}$ =	28.00 ***ft***	Height of Building + Wall

$H_{building+wall}$ > $3*H_{unit}$ **1** **[Satisfactory]**

SUMMARY:

The (N) RTUs will not be visible.

P2eg
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PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

16 Design Aids

Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 643 lbs, Pts = 419 lbs) 0.138" dia, 0.272" Head			#8 Screw (Pss= 1278 lbs, Pts = 596 lbs) 0.164" dia, 0.272" Head			#10 Screw (Pss= 1644 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 = 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	85	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	613	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

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

STANDARD LOAD TABLE / OPEN WEB STEEL JOISTS, K-SERIES

Based on a Maximum Allowable Tensile Stress of 30,000 psi

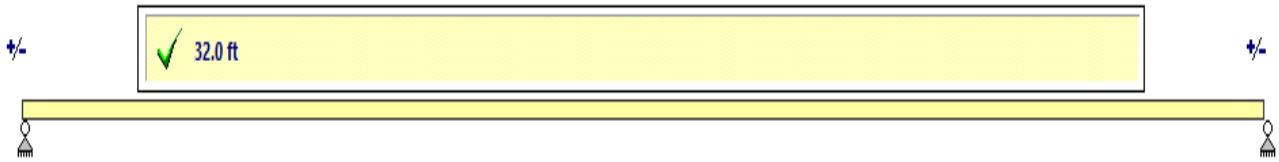
JOIST DESIGNATION	24K4	24K5	24K6	24K7	24K8	24K9	24K10	24K12	26K5	26K6	26K7	26K8	26K9	26K10	26K12
DEPTH (IN.)	24	24	24	24	24	24	24	24	26	26	26	26	26	26	26
APPROX. WT. (lbs./ft.)	8.4	9.3	9.7	10.1	11.5	12.0	13.1	16.0	9.8	10.6	10.9	12.1	12.2	13.8	16.6
SPAN (ft.)															
26	442	499	543	550	550	550	550	550	542	550	550	550	550	550	550
	405	453	493	499	499	499	499	499	535	541	541	541	541	541	541
27	410	462	503	550	550	550	550	550	502	547	550	550	550	550	550
	361	404	439	479	479	479	479	479	477	519	522	522	522	522	522
28	381	429	467	521	550	550	550	550	466	508	550	550	550	550	550
	323	362	393	436	456	456	456	456	427	464	501	501	501	501	501
29	354	400	435	485	536	550	550	550	434	473	527	550	550	550	550
	290	325	354	392	429	436	436	436	384	417	463	479	479	479	479
30	331	373	406	453	500	544	550	550	405	441	492	544	550	550	550
	262	293	319	353	387	419	422	422	346	377	417	457	459	459	459
31	310	349	380	424	468	510	550	550	379	413	460	509	550	550	550
	237	266	289	320	350	379	410	410	314	341	378	413	444	444	444
32	290	327	357	397	439	478	549	549	356	387	432	477	519	549	549
	215	241	262	290	318	344	393	393	285	309	343	375	407	431	431
33	273	308	335	373	413	449	532	532	334	364	406	448	488	532	532

Proscap Engineering & Energy Group

PROJECT NAME: TRACTOR SUPPLY NO. 1886
STORE NO: #1886 PUYALLUP, WA

17 **EnerCalc Output** **AC# 1-3** **(D28") 28K6 @ 4' OC TYP UON**

General Beam Analysis



Calculations | 2D | Diagram | 3D

Summary Results | Max. Combinations | M-V-D Summary | Support Reactions

Maximum Moment

Load Combination	+D+0.750L+0.750S
Location of maximum on span	16.480 ft
Span # where maximum occurs	Span # 1

27.753 k-ft

Maximum Shear

Load Combination	+D+0.750L+0.750S
Location of maximum on span	32.000 ft
Span # where maximum occurs	Span # 1

3.573 k

Deflection Ratios

Transient Load Deflection			
Max Downward	0.109 in S Only	Ratio =	3528 >=0
Max Upward	0.001 in L Only	Ratio =	347462 >=0
Total Deflection			
Max Downward	0.233 in Overall MAXimum Envelope	Ratio =	1650 >=0
Max Upward	0.001 in +0.60D	Ratio =	413702 >=0

Extreme Reactions (service, kips)

	D	Lr	L	S	W	E	H
Support #1	1.51		0.97	1.46			
Support #2	1.35		1.19	1.78			