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

EAST TOWN CROSSING CARPORTS

2902 PIONEER WAY E
PUYALLUP, WA 98371

PRCP20250907

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

CALCULATIONS

PREPARED FOR

CARPORTS OF WASHINGTON

P.O. BOX 2389
BUCKLEY, WA 98321

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
SKinnear
07/08/2025
10:01:51 AM

CITY OF PUYALLUP
STATE OF WASHINGTON

CALEB J. TIMMER
STATE OF WASHINGTON
47379
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

02/13/25

PREPARED BY

sitts&hill
4815 Center Street
Tacoma, WA 98409

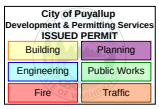
February 13, 2025

S & H Job Number: 20,822

sitts&hill
Tacoma, WA · (253) 474-9449

Designed: JPR **Date:** 02/04/25 **Project Number:** 20,822
Checked: CJT **Date:** 02/13/25

Project: EAST TOWN CROSSING CARPORTS



CALCULATION INDEX

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

BASIS FOR DESIGN

BUILDING CODE:

2021 edition of the International Building Code and State of Washington amendments shall be used and supplemented with ASCE 7-16.

RISK CATEGORY:

II.

GRAVITY LOADS:

Roof snow load: $S := 25$ ***psf***.
Roof dead load: self-weight.

LATERAL LOAD CRITERIA:

Wind speed: $V := 110$ ***mph***. Exposure: C.
Seismic site class: D.
Seismic design category: D.

FOUNDATIONS:

Allowable soil bearing pressure: $\sigma_{max} := 2000$ ***psf***.
Concrete footings shall bear on firm, undisturbed soil 12" minimum below finished grade.

STRUCTURAL STEEL:

Hollow Rectangular Steel	ASTM A500, Grade B	46 ksi
Bolts	ASTM 307, Grade A	
Nuts	ASTM A563	
Flat/Beveled Washers	ASTM F463	
Direct Tension Washers	ASTM F595	
Metal Roof Deck	ASTM A792	60 ksi
Cold-Formed Shapes	ASTM A653	50 ksi
Wide Flange Steel	ASTM A992, Grade 50	50 ksi

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

DESIGN LOADS

SNOW LOAD:

$S = 25$ *psf* *design roof snow load*

DEAD LOAD:

$W_{roofing} := 0.91$ *psf*

$W_{flashing} := 0.12$ *psf*

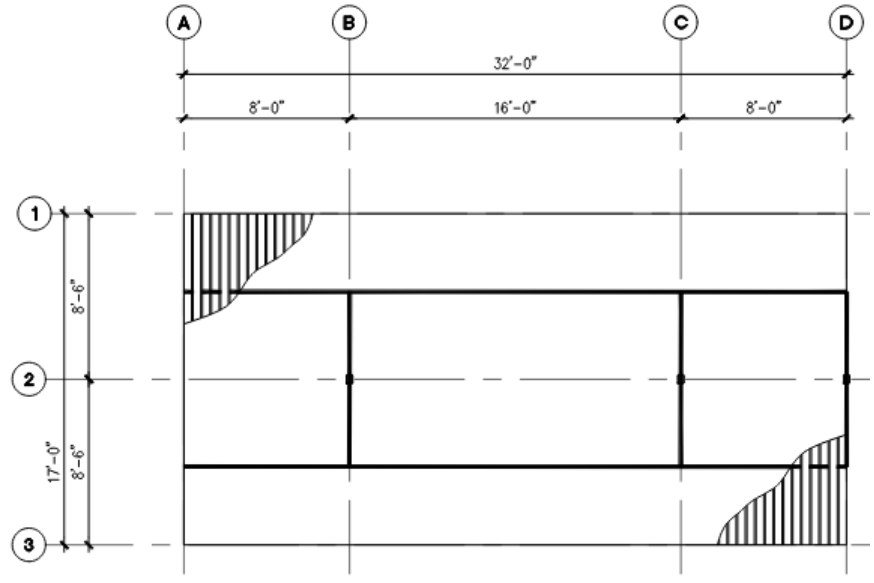
$W_{deck} := W_{roofing} + W_{flashing} = 1.03$ *psf*

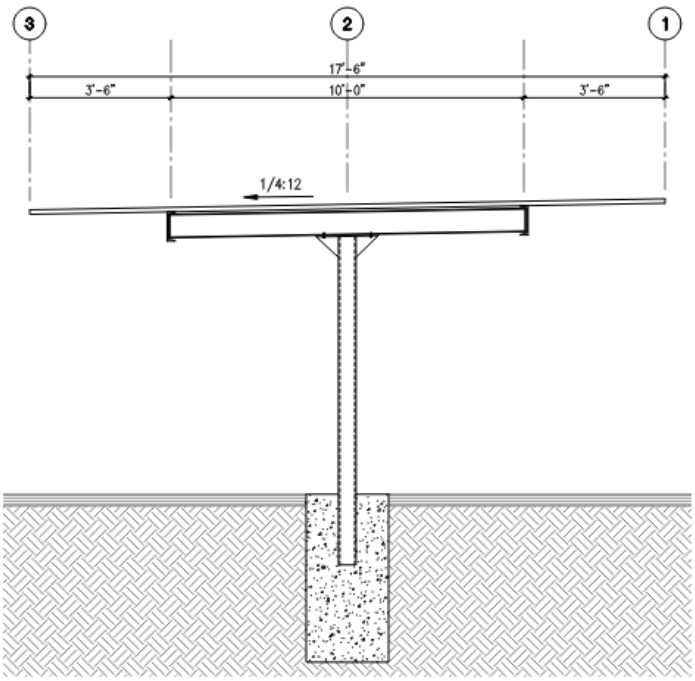
$W_{deck} = 1.03$ *psf*

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

CARPORT SPECIFICATIONS

DESIGN IS BASED ON A TYPICAL 4-STALL CARPORT WITH 9'-0" X 18'-0" STALLS.
DESIGN IS ALSO VALID FOR OTHER CONFIGURATIONS.





CARPORT DIMENSIONS

$A := 32\ ft$ *carport roof length*

$B := 17\ ft$ *carport roof width*

$h_1 := 8\ ft$ *carport structural height*

$h_2 := 9\ ft$ *carport structural height*

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

LATERAL ANALYSIS

SEISMIC DESIGN CRITERIA

HORIZONTAL SEISMIC FORCES SHALL BE DETERMINED IN ASCE 7-16 SECTION 12.8 WITH THE ELF PROCEDURE.

$R := 1.25$ — *response modification coefficient* — **(ASCE TAB. 12.2-1)**

$I_e := 1.00$ — *seismic importance factor* — **(ASCE TAB. 1.5-2)**

$C_t := 0.02$ — *building period coefficient* — **(ASCE TAB. 12.8-2)**

$x := 0.75$ — *building period coefficient* — **(ASCE TAB. 12.8-2)**

$T_{a.1} := C_t \ h_1^{\ x} \left(\frac{s}{ft^x}\right) = 0.095 \ s$ — *approximate fundamental period of 8' high carport* — **(ASCE SEC. 12.8.2.1)**

$T_{a.2} := C_t \ h_2^{\ x} \left(\frac{s}{ft^x}\right) = 0.104 \ s$ — *approximate fundamental period of 9' high carport*

$T_1 := T_{a.1}$ — *structural fundamental period of 8' high carport* — **(ASCE SEC. 12.8.2)**

$T_2 := T_{a.2}$ — *structural fundamental period of 9' high carport*

D — *Seismic Design Category* — **(ASCE SEC. 11.6)**

$S_{DS} := 1.047$ — *design spectral response acceleration parameter at short periods* — **(ASCE EQ. 11.4-3)**

$S_{D1} := (1.5)\ (0.451)\ (1.85)\left(\frac{2}{3}\right) = 0.83$ — *design spectral response acceleration parameter with exception 2 per section 11.4.8* — **(ASCE SEC. 11.4-4)**

$C_{s1} := \frac{S_{DS}}{\left(\frac{R}{I_e}\right)} = 0.838$ — *seismic response coefficient* — **(ASCE SEC. 12.8-2)**

$C_{s2.1} := \frac{S_{D1}}{T_1\left(\frac{R}{I_e}\right)}\ (s) = 7.016$ — *seismic response coefficient of 8' high carport* — **(ASCE SEC. 12.8-2)**

$C_{s2.2} := \frac{S_{D1}}{T_2\left(\frac{R}{I_e}\right)}\ (s) = 6.423$ — *seismic response coefficient of 9' high carport*

$C_s := \max\left(min\left(C_{s1}, C_{s2.1}, C_{s2.2}\right), 0.044 \ S_{DS} \ I_e, 0.01\right) = 0.838$ — **(ASCE SEC. 12.8.1.1)**

STRUCTURE SEISMIC WEIGHT:

$W_{deck} = 1.03 \ psf$ $W_{beam} := 10 \ plf$

$W_{purlin} := 6.31 \ plf$ $W_{post} := 11.97 \ plf$

$W_{E.1} := W_{deck} \ A \ B + 2 \ W_{purlin} \ A + 2 \ W_{beam} \ (10 \ ft) + 2\left(W_{post}\left(\frac{1}{2} \ h_1\right)\right) = 1259.92 \ lbf$

$W_{E.2} := W_{deck} \ A \ B + 2 \ W_{purlin} \ A + 2 \ W_{beam} \ (10 \ ft) + 2\left(W_{post}\left(\frac{1}{2} \ h_2\right)\right) = 1271.89 \ lbf$

HORIZONTAL SEISMIC FORCE:

$\rho := 1.3$ — *redundancy factor* — **(ASCE SEC. 12.3.4.2)**

$E_{h.1} := \rho \ C_s \ W_{E.1} = 1371.9 \ lbf$ — *seismic base shear of 8' high carport* — **(ASCE SEC. 12.4.2.1)**

$E_{h.2} := \rho \ C_s \ W_{E.2} = 1384.9 \ lbf$ — *seismic base shear of 9' high carport*

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

WIND DESIGN CRITERIA

VELOCITY PRESSURE SHALL BE DETERMINED IN ASCE 7-16 CHAPTER 26.

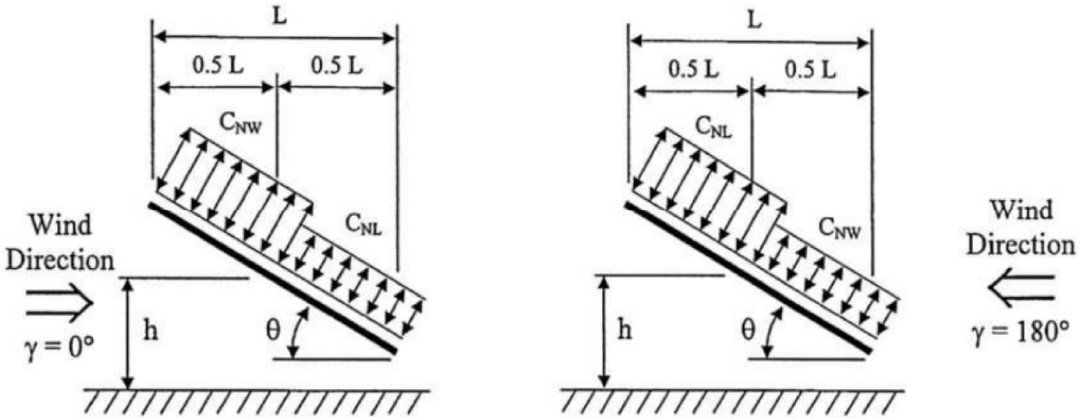
$V = 110$ **mph**	*basic wind speed*	***(ASCE SEC. 26.5)***
C	*exposure category*	***(ASCE SEC. 26.7.3)***
$K_z := 0.85$	*velocity pressure expose coefficient*	***(ASCE TAB. 26.10-1)***
$K_{zt} := 1.0$	*topographic factor*	***(ASCE SEC. 26.8.2)***
$K_d := 0.85$	*wind directionality factor*	***(ASCE TAB. 26.6-1)***
$z_g := 24.36946$	*ground elevation in feet*	***(ASCE Hazards)***
$K_e := e^{-0.0000362 \cdot z_g} = 0.999$	*ground elevation factor*	***(ASCE TAB. 26.9-1)***
$q_z := 0.00256\ K_z\ K_{zt}\ K_d\ K_e\ V^2 \left(\frac{\textbf{psf}}{\textbf{mph}^2}\right) = 22.36$ **psf**	*velocity pressure*	***(ASCE EQ. 26.10-1)***
$q_h := q_z$		***(ASCE SEC. 26.10.2)***

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

WIND DESIGN CRITERIA FOR MAIN WINDFORCE-RESISTING SYSTEM

VERTICAL FORCES APPLIED TO MWFRS WILL BE DETERMINED USING THE DIRECTION PROCEDURE, AS OUTLINED IN CHAPTER 27 OF ASCE 7-16.

Diagrams



Notation

L = Horizontal dimension of roof, measured in the along-wind direction, ft (m).
h = Mean roof height, ft (m).
γ = Direction of wind, degrees.
θ = Angle of plane of roof from horizontal, degrees.

Net Pressure Coefficient, C_N

		Wind Direction, $\gamma = 0°$				Wind Direction, $\gamma = 180°$			
		Clear Wind Flow		Obstructed Wind Flow		Clear Wind Flow		Obstructed Wind Flow	
Roof Angle, θ	Load Case	C_{NW}	C_{NL}	C_{NW}	C_{NL}	C_{NW}	C_{NL}	C_{NW}	C_{NL}
0°	A	1.2	0.3	−0.5	−1.2	1.2	0.3	−0.5	−1.2
	B	−1.1	−0.1	−1.1	−0.6	−1.1	−0.1	−1.1	−0.6
7.5°	A	−0.6	−1.0	−1.0	−1.5	0.9	1.5	−0.2	−1.2

ASCE 7-16 TABLE 27.3-4

$\theta := \operatorname{atan}\left(\frac{0.25}{12}\right) = 1.2°$ *roof slope, use 0 deg. load coefficients*

$G := 0.85$ *gust effect factor* *(ASCE SEC. 26.11.1)*

CASE A: $C_{NWA} := 1.2$ $C_{NLA} := 0.3$

CASE B: $C_{NWB} := -1.1$ $C_{NLB} := -0.1$

$P_{NWA} := q_h\ G\ C_{NWA} = 22.8$ ***psf*** *net design pressure for MWFRS* *(ASCE SEC. 27.3-2)*

$P_{NLA} := q_h\ G\ C_{NLA} = 5.7$ ***psf*** *net design pressure for MWFRS* *(ASCE SEC. 27.3-2)*

$P_{NWB} := q_h\ G\ C_{NWB} = -20.9$ ***psf*** *net design pressure for MWFRS* *(ASCE SEC. 27.3-2)*

$P_{NLB} := q_h\ G\ C_{NLB} = -1.9$ ***psf*** *net design pressure for MWFRS* *(ASCE SEC. 27.3-2)*

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

HORIZONTAL FORCES APPLIED TO MWFRS WILL BE DETERMINED USING THE DIRECTIONAL PROCEDURE, AS OUTLINED IN CHAPTER 29 OF ASCE 7-16

Force Coefficients, C_f

		Rounded Members	
ε	Flat-Sided Members	$D\sqrt{q_z} \le 2.5$ $(D\sqrt{q_z} \le 5.3)$ s.i	$D\sqrt{q_z} > 2.5$ $(D\sqrt{q_z} > 5.3)$ s.i
<0.1	2.0	1.2	0.8
0.1 to 0.29	1.8	1.3	0.9
0.3 to 0.7	1.6	1.5	1.1

Notation

ε = Ratio of solid area to gross area
D = Diameter of a typical round member, in ft (m)
q_z = Velocity pressure evaluated at height z above ground, in lb/ft^2 (N/m^2)

Notes

1. Signs with openings making up 30% or more of the gross area are classified as open signs.
2. Calculation of the design wind forces shall be based on the area of all exposed members and elements projected on a plane normal to the wind direction. Forces shall be assumed to act parallel to the wind direction.
3. Area A_f consistent with these force coefficients is the solid area projected normal to the wind direction.

ASCE 7-16 Table 29.4-2

$D := 1\ ft$ *approximate depth of purlin and roof decking*

$\varepsilon_1 := \frac{D\ B + h_1\ (6\ in)}{h_1\ B} = 0.154$ *ratio of solid area to gross area of 8' high carport*

$\varepsilon_2 := \frac{D\ B + h_2\ (6\ in)}{h_2\ B} = 0.141$ *ratio of solid area to gross area of 9' high carport*

$C_f := 1.8$ *force coefficient* *(ASCE TAB. 29.4-2)*

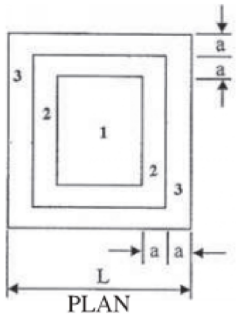
$P_f := \max(q_h\ G\ C_f, 16\ psf) = 34.21\ psf$

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

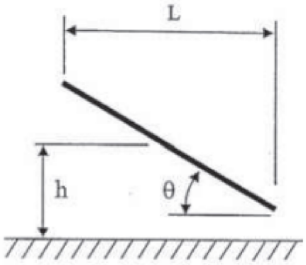
WIND DESIGN CRITERIA FOR COMPONENTS AND CLADDING

VERTICAL FORCES APPLIED TO C&C WILL BE DETERMINED USING THE DIRECTIONAL PROCEDURE, AS OUTLINED IN CHAPTER 30 OF ASCE 7-16

Diagrams



PLAN



ELEVATION

Notation

a = 10% of least horizontal dimension or 0.4h, whichever is smaller but not less than 4% of least horizontal dimension or 3 ft (0.9 m).
h = Mean roof height, in ft (m).
L = Horizontal dimension of building, measured in along-wind direction, in ft (m).
θ = Angle of plane of roof from horizontal, in degrees.

Net Pressure Coefficients, C_N

Roof Angle, θ	Effective Wind Area	Clear Wind Flow					
		Zone 3		Zone 2		Zone 1	
0°	$\le a^2$	2.4	−3.3	1.8	−1.7	1.2	−1.1
	$> a^2, \le 4.0a^2$	1.8	−1.7	1.8	−1.7	1.2	−1.1
	$> 4.0a^2$	1.2	−1.1	1.2	−1.1	1.2	−1.1
7.5°	$\le a^2$	3.2	−4.2	2.4	−2.1	1.6	−1.4

ASCE 7-16 TABLE 30.7-1

$a := \max\left(min\left(0.1\ B, 0.4\ h_1, 0.4\ h_2\right), 0.04\ B, 3\ ft\right) = 3\ ft$

$a^2 = 9\ ft^2$

$4\ a^2 = 36\ ft^2$

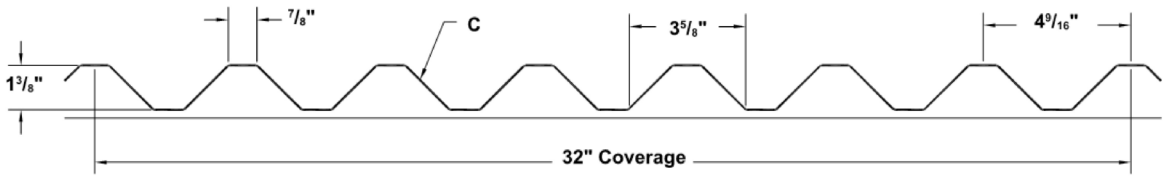
EFFECTIVE WIND AREA MUST BE DETERMINED PER COMPONENT TO OBTAIN THE APPROPRIATE NET PRESSURE COEFFICIENT FOR C&C

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

TYPICAL MEMBER CHECKS

DECKING

V-LINE 32 SECTION PROPERTIES AND GENERAL INFORMATION



SECTION PROPERTIES								ALLOWABLE UNIFORM LOADS PSF (3 or More Equal Spans)											
				Top in Compression		Bottom in Compression		Inward Load						Outward Load					
Ga.	Width (in.)	Yield KSI	Weight PSF	Ixx in⁴/ft	Sxx in³/ft	Ixx in⁴/ft	Sxx in³/ft	5'	6'	7'	8'	9'	10'	5'	6'	7'	8'	9'	10'
26	32"	60	0.91	0.0619	0.0847	0.0619	0.0833	70	52	33	22	16	11	71	53	33	22	16	11
24	32"	50	1.20	0.0870	0.1217	0.0874	0.1209	102	70	44	29	21	15	103	70	44	29	21	15
22	32"	50	1.57	0.1163	0.1623	0.1200	0.1683	147	92	58	39	27	20	143	92	58	39	27	20

1. Theoretical section properties have been calculated per AISI 2001 "Specification for the Design of Cold-formed Steel Structural Members." Ixx and Sxx are effective section properties for deflection and bending.
2. Allowable load is calculated in accordance with AISI 2001 specifications considering bending, shear, combined bending and shear, deflection. Allowable load considers the worst case of 3 and 4 equal span conditions. Allowable load does not address web crippling or fasteners/support connection and panel weight is not considered.
3. Deflection consideration is limited by a maximum deflection ratio of L/180 of span.
4. Allowable loads do not include a 1/3 stress increase in uplift.

DECKING SPECIFICATIONS:

$I := 0.0619 \ in^4/ft$

$S_{neg} := 0.0833 \ in^3/ft$

$S_{pos} := 0.0847 \ in^3/ft$

$F_{allow} := \frac{60 \ ksi}{1.67} = 35.9 \ ksi$

$l_{main} := 10 \ ft$ *length of main span*

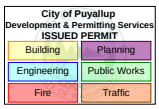
$l_{cant} := 3.5 \ ft$ *length of cantilevers*

$b := 32 \ in$ *width of one sheet of decking*

LOADING:

$D := W_{deck} = 1.03 \ psf$ *weight of decking*

$S = 25 \ psf$ *snow load*



LOADING FOR MAX BEARING: D + S

$w := D + S = 26.03\ psf$

$M_{neg} := \frac{1}{2}\ w\ l_{cant}^{\ 2} = 159.434\ \frac{lbf \cdot ft}{ft}$

$M_{pos} := \frac{1}{8}\ w\ l_{main}^{\ 2} - M_{neg} = 165.941\ \frac{lbf \cdot ft}{ft}$

$f_{neg} := \frac{M_{neg}}{S_{neg}} = 22.968\ ksi$ $\qquad \frac{f_{neg}}{F_{allow}} = 63.9\%$

$f_{pos} := \frac{M_{pos}}{S_{pos}} = 23.51\ ksi$ $\qquad \frac{f_{pos}}{F_{allow}} = 65\%$

LOADING FOR MAX UPLIFT: 0.6D + 0.6W

$A_T := B\ b = 45.333\ ft^2$

$C_N := -1.1$ *(ASCE TAB. 30.7-1)*

$W := min\left(q_h\ G\ C_N, -16\ psf\right) = -20.907\ psf$

$w := 0.6\ D + 0.6\ W = -11.926\ psf$

$M_{pos} := -\frac{1}{2}\ w\ l_{cant}^{\ 2} = 73.048\ \frac{lbf \cdot ft}{ft}$

$M_{neg} := -\frac{1}{8}\ w\ l_{main}^{\ 2} - M_{pos} = 76.03\ \frac{lbf \cdot ft}{ft}$

$f_{pos} := \frac{M_{pos}}{S_{pos}} = 10.349\ ksi$ $\qquad \frac{f_{pos}}{F_{allow}} = 29\%$

$f_{neg} := \frac{M_{neg}}{S_{neg}} = 10.953\ ksi$ $\qquad \frac{f_{neg}}{F_{allow}} = 30\%$

V-LINE 32, 26 GA. DECKING OK

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

DECKING-PURLIN CONNECTION

WIND LOADING (C&C ZONE 3)

$A_T := \frac{1}{4}\, b \left(\frac{1}{2}\, l_{main} + l_{cant}\right) = 5.667\ ft^2$ *tributary area of (1) screw*

$C_N := -3.3$ *(ASCE TAB. 30.7-1)*

$W := min\left(q_h\ G\ C_N, -16\ psf\right) = -62.7\ psf$

LOADING FOR MAX UPLIFT: 0.6D + 0.6W

$R := (0.6\ D + 0.6\ W)\ A_T = -209.7\ lbf$ *uplift reaction for (1) screw*

ALLOWABLE PULLOVER

$t_1 := 0.0179\ in$

$t_2 := 0.415\ in$

$F_u := 82\ ksi$

$P_{pullover} := \frac{1.5}{3}\ t_1\ t_2\ F_u = 304.6\ lbf$ *allowable pullover load*

$\frac{-R}{P_{pullover}} = 69\%$

ALLOWABLE PULLOUT

TABLE 2—ALLOWABLE TENSILE PULL-OUT LOADS (P_{NOT}/Ω), pounds-force[1, 2, 3, 4, 5]

Steel F_u = 45 ksi, Applied Factor of Safety, Ω=3.0												
Screw Designation	Nominal Diameter (in.)	Design Thickness of Member Not in Contact with the Screw Head (in)										
		0.018	0.024	0.030	0.036	0.048	0.060	0.075	0.105	0.125	0.187	0.250
10-16	0.190	44	58	73	87	116	145	182	254	303	[6]	[6]
12-14, 12-24	0.216	50	66	83	99	132	165	207	289	344	515	689
1/4-14, 1/4-28	0.250	57	77	96	115	153	191	239	335	398	596	797

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the least of the allowable pull-out, pullover, and fastener tension strength found in Tables 2, 3, and 5, respectively, must be used for design.
[2]ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.
[3]The allowable pull-out capacity for other member thickness can be determined by interpolating within the table.
[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.
[5]For F_u = 58 ksi, multiply values by 1.29; for F_u = 65 ksi, multiply values by 1.44.
[6]Outside drilling capacity limits.

$P_{pullout} := 289\ lbf$ *allowable pullout load* *(ESR-1979 TAB. 2)*

$\frac{-R}{P_{pullout}} = 73\%$

#12-14 TEK SCREWS @ 9" O.C. OK

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

TYPICAL PURLINS

PURLIN SPECIFICATIONS:

$l_{main} := \frac{1}{2} A = 16\ ft$ *length of main span*

$l_{cant} := \frac{1}{4} A = 8\ ft$ *length of cantilevers*

$b := \frac{1}{2} B = 8.5\ ft$ *tributary width of (1) purlin*

$D := D\ b + W_{purlin} = 15.065\ plf$

LOADING FOR MAX BEARING: D + S

$w := D + S\ b = 227.565\ plf$

$R_1 := w\left(\frac{1}{2} l_{main} + l_{cant}\right) = 3.641\ kip$

$M_{x1} := \max\left(\frac{1}{2} w\ l_{cant}^{\ 2}, \frac{1}{8} w\ l_{main}^{\ 2}\right) = 87.38\ kip \cdot in$

$V_{y1} := \max\left(\frac{w}{2\ l_{main}}\left(l_{main}^{\ 2} + l_{cant}^{\ 2}\right), \frac{w}{2\ l_{main}}\left(l_{main}^{\ 2} - l_{cant}^{\ 2}\right), w\ l_{cant}\right) = 2.276\ kip$

LOADING FOR MAX BEARING: 0.6D + 0.6W

$A_T := A\ b = 272\ ft^2$ *tributary of (1) purlin*

$C_N := -1.1$ *(ASCE TAB. 30.7-1)*

$W := min\left(q_h\ G\ C_N, -16\ psf\right) = -20.907\ psf$

$w := 0.6\ D + 0.6\ W\ b = -97.587\ plf$

$R_2 := w\left(\frac{1}{2} l_{main} + l_{cant}\right) = -1.561\ kip$

$M_{x2} := \max\left(\frac{1}{2} w\ l_{cant}^{\ 2}, \frac{1}{8} w\ l_{main}^{\ 2}\right) = -37.47\ kip \cdot in$

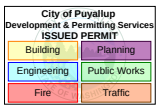
$V_{y2} := \max\left(\frac{w}{2\ l_{main}}\left(l_{main}^{\ 2} + l_{cant}^{\ 2}\right), \frac{w}{2\ l_{main}}\left(l_{main}^{\ 2} - l_{cant}^{\ 2}\right), w\ l_{cant}\right) = -0.586\ kip$

MAXIMUM VALUES:

$R := \max\left(R_1, \text{abs}\left(R_2\right)\right) = 3.641\ kip$

$M_x := \max\left(M_{x1}, \text{abs}\left(M_{x2}\right)\right) = 87.38\ kip \cdot in$

$V_y := \max\left(V_{y1}, \text{abs}\left(V_{y2}\right)\right) = 2.276\ kip$



Deflection Check:

$\Delta_a := \frac{l_{main}}{180} = 1.06667\ in$ *allowable deflection* *(IBC TAB. 1604.3)*

$w := S\ b = 212.5\ plf$

$I_x := 26.615\ in^4$ *(AEP SPAN)*

$E := 29000\ ksi$

$\Delta := \frac{5\ w\ l_{main}^{\ 4}}{384\ E\ I_x} = 0.406\ in$ $\frac{\Delta}{\Delta_a} = 38\%$

PER ATTACHED, (2) CS 10"x3 1/2", 12 GA. PURLINS OK *(CFS 14)*

Fully Braced Strength - AISI S100-16, US, ASD

Material Type: A653 SS Grade 50/1, Fy=50 ksi

Axial		Positive Bending		Positive Bending	
Pao	32.374 k	Maxo	153.71 k-in	Mayo	35.93 k-in
Ae	1.1655 in²	Ixe	26.615 in⁴	Iye	2.995 in⁴
Ta	55.552 k	Sxe(t)	5.1339 in³	Sye(l)	2.9799 in³
		Sxe(b)	5.5263 in³	Sye(r)	1.2002 in³
Shear					
Vay	9.862 k	Negative Bending		Negative Bending	
Vax	11.409 k	Maxo	153.71 k-in	Mayo	33.80 k-in
		Ixe	26.615 in⁴	Iye	2.505 in⁴
Torsion		Sxe(t)	5.5263 in³	Sye(l)	1.9553 in³
Ba	128.31 k-in²	Sxe(b)	5.1339 in³	Sye(r)	1.1291 in³

Member Check - AISI S100-16, US, ASD

Material Type: A653 SS Grade 50/1, Fy=50 ksi
Design Parameters:

Lx	16.000 ft	Ly	0.000 ft	Lt	16.000 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000
Cbx	1.0000	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: Top		kϕ	0 k		
Red. Factor, R: 0.4		Lm	16.000 ft		

Loads:	P (k)	Mx (k-in)	Vy (k)	My (k-in)	Vx (k)
Entered	0.000	87.38	2.276	0.00	0.000
Applied	0.000	87.38	2.276	0.00	0.000
Strength	15.418	140.78	9.862	26.56	11.409

Interaction Equations

Eq. H1.2-1	(P, Mx, My)	0.000 + 0.621 + 0.000 = 0.621 <= 1.0
Eq. H2-1	(Mx, Vy)	Sqrt(0.323 + 0.053)= 0.614 <= 1.0
Eq. H2-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

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

PURLIN-BEAM CONNECTION

$R_1 = 3641.04$ **lbf** *ASD-level bearing force*

$-R_2 = 1561.387$ **lbf** *ASD-level uplift force*

SHEAR DUE TO LATERAL FORCES (SEISMIC AND C&C) ARE OMITTED AS VERTICAL FORCES WILL GOVERN.

SHEAR IN PURLIN:

$\Omega_{v1} := 2.00$ *shear safety factor*

$F_u := 60$ **ksi** *ultimate stress for ASTM A307 Gr. A* *(AISC TAB. 2-6)*

$t := 0.1017$ **in** *design thickness of purlin*

$e := 4.5$ **in** *distance between bolt holes*

$P_{nv1} := 4\ t\ e\ F_u = 109.84$ **kip**

SHEAR IN BOLTS:

$\Omega_{v2} := 2.00$ *shear safety factor*

$F_{nv} := 27$ **ksi** *nominal shear strength for ASTM A307 bolts* *(AISC TAB. J3.2)*

$d := 0.5$ **in** *bolt diameter*

$A_b := \frac{\pi}{4} d^2 = 0.196$ **in**^{2}

$P_{nv2} := 4\ A_b\ F_{nv} = 21.206$ **kip**

BEARING CAPACITY OF BOLTS:

$\Omega_b := 2.50$ *shear safety factor* *(AISI SEC. J3.3.1)*

$\frac{d}{t} = 4.916$

$C := 3.0$ *bearing factor* *(AISI TAB. J3.3.1-1)*

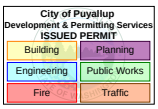
$m_f := 0.75$ *modification factor for bearing connection type* *(AISI TAB. J3.3.1-2)*

$P_{nb} := 4\ C\ m_f\ d\ t\ F_u = 27.459$ **kip** *(AISI EQ. J3.3.1-1)*

$P_a := \min\left(\frac{P_{nv1}}{\Omega_{v1}}, \frac{P_{nv2}}{\Omega_{v2}}, \frac{P_{nb}}{\Omega_b}\right) = 10.603$ **kip** *allowable shear for (4) 0.5-in bolts*

$$\frac{\max\left(R_1, -R_2\right)}{P_a} = 34\%$$

(4) 1/2" A307 GR. A BOLTS OK



TYPICAL BEAM

BEAM SPECIFICATIONS:

$L := 10\ ft$ *length of beam*

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_D := \frac{1}{4} A\ B\ W_{deck} + \frac{1}{2} A\ W_{purlin} = 0.241\ kip$ *dead load at each end of beam*

$P_S := \frac{1}{4} A\ B\ S = 3.4\ kip$ *snow load at each end of beam*

$P_{W1} := \frac{1}{4} A\ B\ P_{NWB} = -2.843\ kip$ *MWFRS force at one end of beam*

$P_{W2} := \frac{1}{4} A\ B\ P_{NLB} = -0.258\ kip$ *MWFRS force at other end of beam*

W8x10 BEAMS OK *(ENERCALC)*

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

TYPICAL POST

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_D := 2\ P_D + L\ W_{beam} = 0.582\ \textbf{kip}$ *axial dead load*

$P_S := 2\ P_S = 6.8\ \textbf{kip}$ *axial snow load*

$V_W := \frac{1}{2}\ (1\ \textbf{ft})\ A\ P_f = 0.547\ \textbf{kip}$ *wind load about weak axis of post*

$V_{E.1} := \frac{1}{2}\ E_{h.1} = 0.686\ \textbf{kip}$ *seismic load about weak axis of 8'-0" post*

$V_{E.2} := \frac{1}{2}\ E_{h.2} = 0.692\ \textbf{kip}$ *seismic load about weak axis of 9'-0" post*

HSS6x4x3/16 OK *(ENERCALC)*

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

TYPICAL FOOTING

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_{D.1} := P_D + h_1 \ W_{post} = 0.678$ **kip** *axial dead load of 8'-0" post*

$P_{D.2} := P_D + h_2 \ W_{post} = 0.69$ **kip** *axial dead load of 9'-0" post*

$P_S = 6.8$ **kip** *axial snow load*

$V_W = 0.547$ **kip** *lateral wind load*

$V_{E.1} = 0.686$ **kip** *lateral seismic load of 8'-0" post*

$V_{E.2} = 0.692$ **kip** *lateral seismic load of 9'-0" post*

POLE FOOTING SPECIFICATIONS

$\gamma_{conc} := 150$ **pcf** *concrete unit weight*

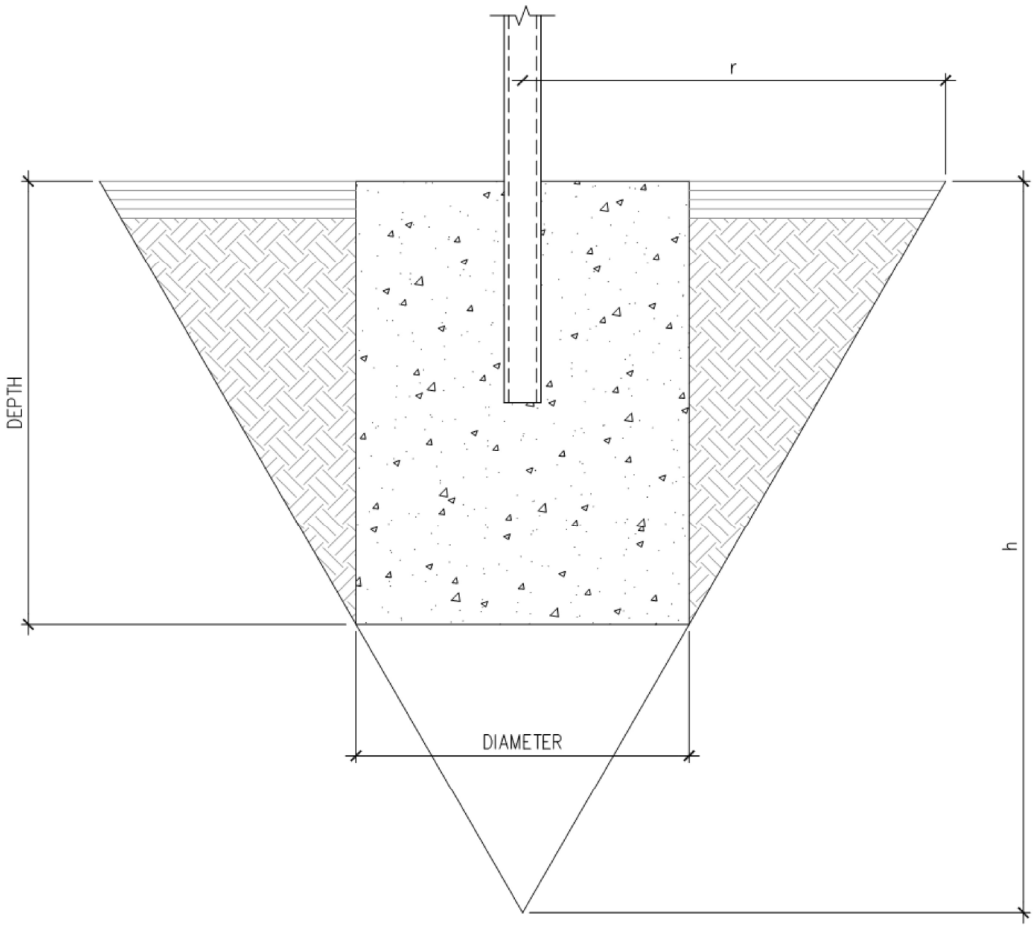
$D_{min} := \sqrt{\frac{4 \left(P_D + P_S\right)}{\pi \cdot \sigma_{max}}} = 26$ **in** *minimum diameter*

$DIAMETER := 36$ **in**

$DEPTH := 3.75$ **ft**

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

UPLIFT CHECK WITH SOIL CONE THEORY



$\phi := 30\ °$

$\gamma := 110\ pcf$ *soil unit weight*

$V_{FTG} := \frac{\pi}{4}\ DEPTH\ DIAMETER^2 = 26.507\ ft^3$

$r := DEPTH \tan(\phi) + \frac{1}{2}\ DIAMETER = 3.665\ ft$

$h_{cone} := \frac{r}{\tan(\phi)} = 6.348\ ft$

$V_{soil} := \left(\frac{\pi}{3}\ r^2\ h_{cone}\right) - V_{FTG} = 62.789\ ft^3$

$W_{FTG\&cone} := \gamma_{conc}\ V_{FTG} + \gamma\ V_{soil} = 10.88\ kip$

$P_{Dreq'd} := \frac{1}{4}\ A\ B\ \left(-P_{NWB} - P_{NLB}\right) = 3.1\ kip$

$\frac{P_{Dreq'd}}{W_{FTG\&cone}} = 29\%$

3-FT DIAMETER x 3.75-FT DEEP FOOTING OK *(ENERCALC)*

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

TYPICAL ALTERNATE FOOTING

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_{D.1} = 0.678$ **kip** *axial dead load of 8'-0" post*

$P_{D.2} = 0.69$ **kip** *axial dead load of 9'-0" post*

$P_S = 6.8$ **kip** *axial snow load*

$P_W := -P_{Dreq'd} = -3.102$ **kip** *axial wind load*

$V_W = 0.547$ **kip** $M_W := V_W \, h_1 = 4.379$ **kip·ft** *wind lateral load & moment of 8' high carport*

$V_W = 0.547$ **kip** $M_W := V_W \, h_2 = 4.926$ **kip·ft** *wind lateral load & moment of 9' high carport*

$V_{E.1} = 0.686$ **kip** $M_E := V_{E.1} \, h_1 = 5.488$ **kip·ft** *seismic lateral load & moment of 8' high carport*

$V_{E.2} = 0.692$ **kip** $M_E := V_{E.2} \, h_2 = 6.232$ **kip·ft** *seismic lateral load & moment of 9' high carport*

4.5-FT SQUARE x 2-FT DEEP FOOTING w/ (6) #4 BARS E.W. TOP & BOTTOM OK *(ENERCALC)*

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

LONG-SPAN MEMBER CHECKS

LONG-SPAN PURLINS

PURLIN SPECIFICATIONS:

$l_{main} := 24\ ft$ *length of main span*

$l_{cant} := 8\ ft$ *length of cantilevers*

$b := \frac{1}{4} B = 4.25\ ft$ *tributary width of (1) purlin*

$D := W_{deck}\ b + W_{purlin} = 10.688\ plf$

LOADING FOR MAX BEARING: D + S

$w := D + S\ b = 116.938\ plf$

$R_1 := w \left(\frac{1}{2} l_{main} + l_{cant} \right) = 2.339\ kip$

$M_{x1} := \max \left(\frac{1}{2} w\ l_{cant}^{\ 2}, \frac{1}{8} w\ l_{main}^{\ 2} \right) = 101.03\ kip \cdot in$

$V_{y1} := \max \left(\frac{w}{2\ l_{main}} \left(l_{main}^{\ 2} + l_{cant}^{\ 2} \right), \frac{w}{2\ l_{main}} \left(l_{main}^{\ 2} - l_{cant}^{\ 2} \right), w\ l_{cant} \right) = 1.559\ kip$

LOADING FOR MAX BEARING: 0.6D + 0.6W

$A_T := A\ b = 136\ ft^2$ *tributary of (1) purlin*

$C_N := -1.1$ *(ASCE TAB. 30.7-1)*

$W := min \left(q_h\ G\ C_N, -16\ psf \right) = -20.907\ psf$

$w := 0.6\ D + 0.6\ W\ b = -46.9\ plf$

$R_2 := w \left(\frac{1}{2} l_{main} + l_{cant} \right) = -0.938\ kip$

$M_{x2} := \max \left(\frac{1}{2} w\ l_{cant}^{\ 2}, \frac{1}{8} w\ l_{main}^{\ 2} \right) = -18.01\ kip \cdot in$

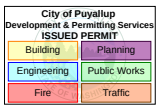
$V_{y2} := \max \left(\frac{w}{2\ l_{main}} \left(l_{main}^{\ 2} + l_{cant}^{\ 2} \right), \frac{w}{2\ l_{main}} \left(l_{main}^{\ 2} - l_{cant}^{\ 2} \right), w\ l_{cant} \right) = -0.375\ kip$

MAXIMUM VALUES:

$R := \max \left(R_1, \text{abs} \left(R_2 \right) \right) = 2.339\ kip$

$M_x := \max \left(M_{x1}, \text{abs} \left(M_{x2} \right) \right) = 101.03\ kip \cdot in$

$V_y := \max \left(V_{y1}, \text{abs} \left(V_{y2} \right) \right) = 1.559\ kip$



Deflection Check:

$\Delta_a := \frac{l_{main}}{180} = 1.6\ in$ *allowable deflection* ***(IBC TAB. 1604.3)***

$w := S\ b = 106.25\ plf$

$I_x := 26.615\ in^4$ $E := 29000\ ksi$

$\Delta := \frac{5\ w\ l_{main}^{\ 4}}{384\ E\ I_x} = 1.028\ in$ $\frac{\Delta}{\Delta_a} = 64\%$

PER ATTACHED, (4) CS 10"x3 1/2", 12 GA. PURLINS OK ***(CFS 14)***

Fully Braced Strength - AISI S100-16/S3-22, US, ASD

Material Type: A653 SS Grade 50/1, Fy=50 ksi

Axial		Positive Bending		Positive Bending	
Pao	32.374 k	Maxo	153.71 k-in	Mayo	35.93 k-in
Ae	1.1655 in²	Ixe	26.615 in⁴	Iye	2.995 in⁴
Ta	55.552 k	Sxe(t)	5.1339 in³	Sye(l)	2.9799 in³
		Sxe(b)	5.5263 in³	Sye(r)	1.2002 in³
Shear					
Vay	9.717 k	Negative Bending		Negative Bending	
Vax	10.931 k	Maxo	153.71 k-in	Mayo	33.80 k-in
		Ixe	26.615 in⁴	Iye	2.505 in⁴
Torsion		Sxe(t)	5.5263 in³	Sye(l)	1.9553 in³
Ba	128.31 k-in²	Sxe(b)	5.1339 in³	Sye(r)	1.1291 in³

Member Check - AISI S100-16/S3-22, US, ASD

Material Type: A653 SS Grade 50/1, Fy=50 ksi
Design Parameters:

Lx	24.000 ft	Ly	0.000 ft	Lt	24.000 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000
Cbx	1.0000	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: Top		kϕ	0 k		
Red. Factor, R: 0.4		Lm	24.000 ft		

Loads:	P (k)	Mx (k-in)	Vy (k)	My (k-in)	Vx (k)
Entered	0.000	101.03	1.559	0.00	0.000
Applied	0.000	101.03	1.559	0.00	0.000
Strength	15.418	142.63	9.717	15.41	10.931

Interaction Equations

Eq. H1.2-1	(P, Mx, My)	0.000 + 0.708 + 0.000 = 0.708 <= 1.0
Eq. H2-1	(Mx, Vy)	Sqrt(0.432 + 0.026)= 0.677 <= 1.0
Eq. H2-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

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

PURLIN-BEAM CONNECTION

$R_1 := 2 \cdot R_1 = 4677.5$ **lbf** *ASD-level bearing force*

$R_2 := -2 \cdot R_2 = 1876.014$ **lbf** *ASD-level uplift force*

SHEAR DUE TO LATERAL FORCES (SEISMIC AND C&C) ARE OMITTED AS VERTICAL FORCES WILL GOVERN.

SHEAR IN PURLIN:

$\Omega_{v1} := 2.00$ *shear safety factor*

$F_u := 60$ **ksi** *ultimate stress for ASTM A307 Gr. A* *(AISC TAB. 2-6)*

$t := 0.1017$ **in** *design thickness of purlin*

$e := 4.5$ **in** *distance between bolt holes*

$P_{nv1} := 4\ t\ e\ F_u = 109.84$ **kip**

SHEAR IN BOLTS:

$\Omega_{v2} := 2.00$ *shear safety factor*

$F_{nv} := 27$ **ksi** *nominal shear strength for ASTM A307 bolts* *(AISC TAB. J3.2)*

$d := 0.5$ **in** *bolt diameter*

$A_b := \frac{\pi}{4} d^2 = 0.196$ **in²**

$P_{nv2} := 4\ A_b\ F_{nv} = 21.206$ **kip**

BEARING CAPACITY OF BOLTS:

$\Omega_b := 2.50$ *shear safety factor* *(AISI SEC. J3.3.1)*

$\frac{d}{t} = 4.916$

$C := 3.0$ *bearing factor* *(AISI TAB. J3.3.1-1)*

$m_f := 0.75$ *modification factor for bearing connection type* *(AISI TAB. J3.3.1-2)*

$P_{nb} := 4\ C\ m_f\ d\ t\ F_u = 27.459$ **kip** *(AISI EQ. J3.3.1-1)*

$P_a := \min\left(\frac{P_{nv1}}{\Omega_{v1}}, \frac{P_{nv2}}{\Omega_{v2}}, \frac{P_{nb}}{\Omega_b}\right) = 10.603$ **kip** *allowable shear for (4) 0.5-in bolts*

$$\frac{\max\left(R_1, -R_2\right)}{P_a} = 44\%$$

(4) 1/2" A307 GR. A BOLTS OK

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

LONG-SPAN BEAM

SPECIFICATIONS:

$A := l_{main} + 2\ l_{cant} = 40\ ft$ *length of carports*

$L := 10\ ft$ *length of beam*

$W_{beam} := 10\ plf$ *weight of beam*

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_D := \frac{1}{4}\ A\ B\ W_{deck} + 2\left(\frac{1}{2}\right) A\ W_{purlin} = 0.428\ kip$ *dead load at each end of beam*

$P_S := \frac{1}{4}\ A\ B\ S = 4.25\ kip$ *snow load at each end of beam*

$P_{W1} := \frac{1}{4}\ A\ B\ P_{NWB} = -3.554\ kip$ *MWFRS force at one end of beam*

$P_{W2} := \frac{1}{4}\ A\ B\ P_{NLB} = -0.323\ kip$ *MWFRS force at other end of beam*

W8x10 BEAMS OK *(ENERCALC)*

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

LONG-SPAN POST

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_D := 2\ P_D + L\ W_{beam} = 0.955\ \textbf{kip}$ *axial dead load*

$P_S := 2\ P_S = 8.5\ \textbf{kip}$ *axial snow load*

$V_W := (1\ \textbf{ft})\left(\frac{1}{2}\ A\right)\ P_f = 0.684\ \textbf{kip}$ *wind load about weak axis of post*

$W_{E.1} := W_{deck}\ A\ B + 4\ W_{purlin}\ A\ \dots = 2006\ \textbf{lbf}$
$\quad + 2\ W_{beam}\ L + 2\ W_{post}\left(\frac{h_1}{2}\right)$
$E_{h.1} := \rho\ C_s\ W_{E.1} = 2184\ \textbf{lbf}$

$W_{E.2} := W_{deck}\ A\ B + 4\ W_{purlin}\ A\ \dots = 2018\ \textbf{lbf}$
$\quad + 2\ W_{beam}\ L + 2\ W_{post}\left(\frac{h_2}{2}\right)$
$E_{h.2} := \rho\ C_s\ W_{E.2} = 2197\ \textbf{lbf}$

$V_{E.1} := \frac{1}{2}\ E_{h.1} = 1.092\ \textbf{kip}$ *seismic load about weak axis of 8' post*

$V_{E.2} := \frac{1}{2}\ E_{h.2} = 1.099\ \textbf{kip}$ *seismic load about weak axis of 9' post*

HSS6x4x3/16 OK *(ENERCALC)*

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

LONG-SPAN FOOTING

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_{D.1} := P_D + h_1\ W_{post} = 1.051$ **kip** *axial dead load of 8' post*

$P_{D.2} := P_D + h_2\ W_{post} = 1.063$ **kip** *axial dead load of 9' post*

$P_S = 8.5$ **kip** *axial snow load*

$V_W = 0.684$ **kip** *lateral wind load*

$V_{E.1} = 1.092$ **kip** *lateral seismic load of 8' post*

$V_{E.2} = 1.099$ **kip** *lateral seismic load of 9' post*

POLE FOOTING SPECIFICATIONS

$\gamma_{conc} := 150$ **pcf** *concrete unit weight*

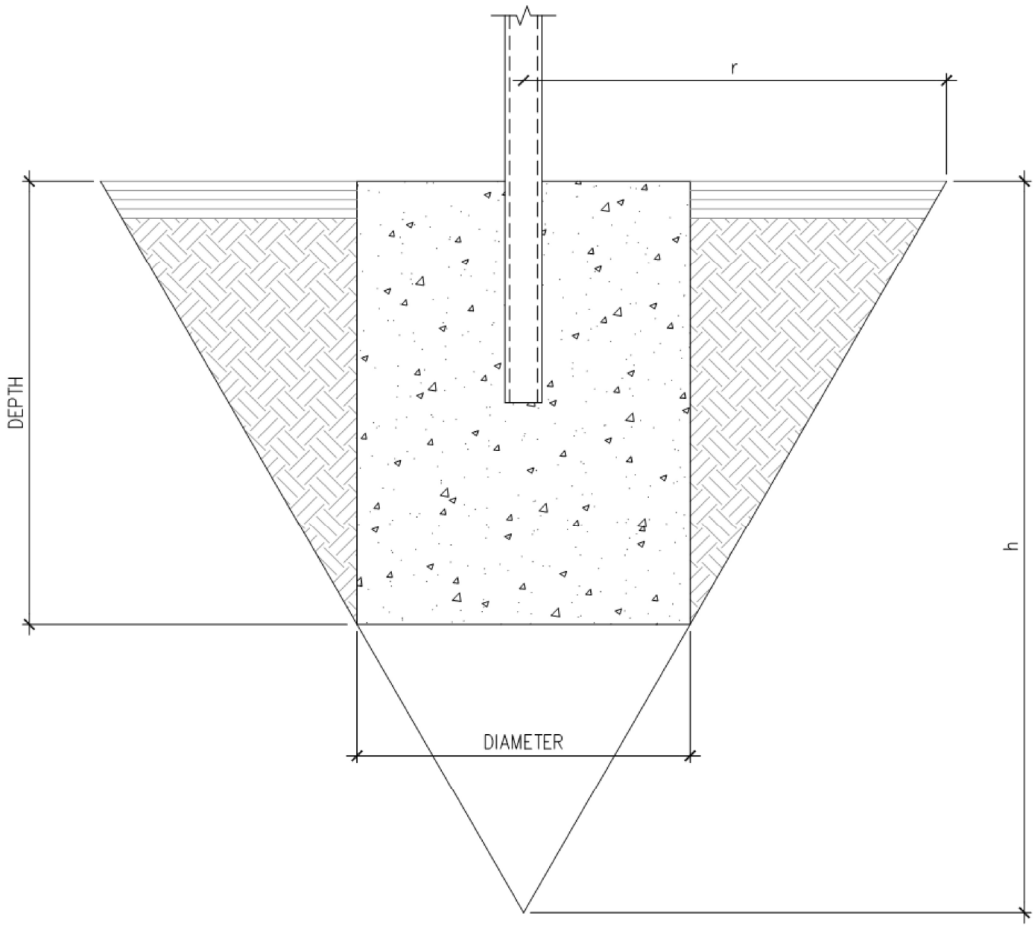
$D_{min} := \sqrt{\frac{4\ (P_D + P_S)}{\pi \cdot \sigma_{max}}} = 29.4$ **in** *minimum diameter*

$DIAMETER := 36$ **in**

$DEPTH := 4.50$ **ft**

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

UPLIFT CHECK WITH SOIL CONE THEORY



$\phi := 30\ °$

$\gamma := 110\ pcf$ *soil unit weight*

$V_{FTG} := \frac{\pi}{4}\ DEPTH\ DIAMETER^2 = 31.809\ ft^3$

$r := DEPTH \tan(\phi) + \frac{1}{2}\ DIAMETER = 4.098\ ft$

$h_{cone} := \frac{r}{\tan(\phi)} = 7.098\ ft$

$V_{soil} := \left(\frac{\pi}{3}\ r^2\ h_{cone}\right) - V_{FTG} = 93.024\ ft^3$

$W_{FTG\&cone} := \gamma_{conc}\ V_{FTG} + \gamma\ V_{soil} = 15\ kip$

$P_{Dreq'd} := \frac{1}{4}\ A\ B\ \left(-P_{NWB} - P_{NLB}\right) = 3.88\ kip$

$\frac{P_{Dreq'd}}{W_{FTG\&cone}} = 26\%$

3-FT DIAMETER x 4.5-FT DEEP FOOTING OK *(ENERCALC)*

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

LONG-SPAN ALTERNATE FOOTING

NOMINAL LOADS: *FOR USE IN ENERCALC (SEE APPENDIX)*

$P_D = 0.955$ **kip** *axial dead load*

$P_S = 8.5$ **kip** *axial snow load*

$P_W := -P_{Dreq'd} = -3.877$ **kip** *axial wind load*

$V_W = 0.684$ **kip** $M_W := V_W \, h_1 = 5.474$ **kip·ft** *wind lateral load & moment of 8' post*

$V_W = 0.684$ **kip** $M_W := V_W \, h_2 = 6.158$ **kip·ft** *wind lateral load & moment of 9' post*

$V_{E.1} = 1.092$ **kip** $M_E := V_{E.1} \, h_1 = 8.736$ **kip·ft** *seismic lateral load & moment of 8' post*

$V_{E.2} = 1.099$ **kip** $M_E := V_{E.2} \, h_2 = 9.887$ **kip·ft** *seismic lateral load & moment of 9' post*

4.75-FT SQUARE x 2-FT DEEP FOOTING w/ (7) #4 BARS E.W. TOP & BOTTOM OK *(ENERCALC)*

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

APPENDIX A

ENERCALC REPORTS

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

Steel Beam

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL BEAM

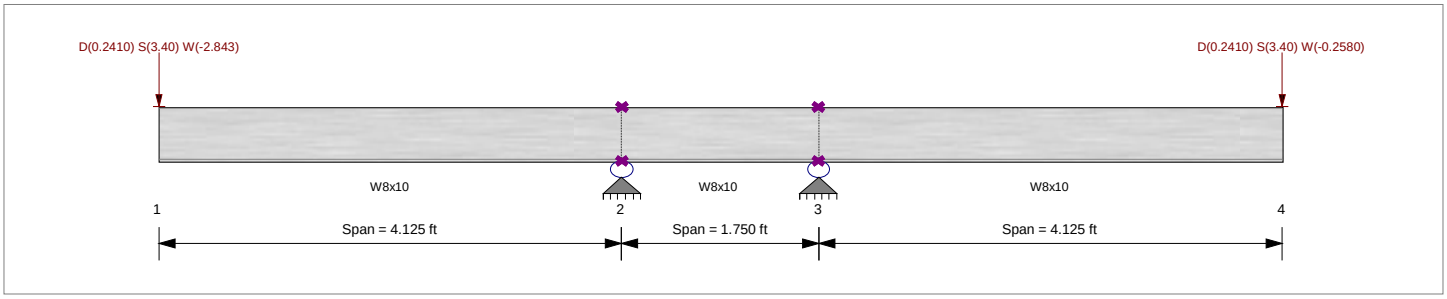
CODE REFERENCES

Calculations per AISC 360-16, IBC 2021
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Load(s) for Span Number 1
Point Load : D = 0.2410, S = 3.40, W = -2.843 k @ 0.0 ft
Load(s) for Span Number 3
Point Load : D = 0.2410, S = 3.40, W = -0.2580 k @ 4.125 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.741 : 1	Maximum Shear Stress Ratio =	0.137 : 1
Section used for this span	W8x10	Section used for this span	W8x10
Ma : Applied	15.104 k-ft	Va : Applied	3.682 k
Mn / Omega : Allowable	20.377 k-ft	Vn/Omega : Allowable	26.826 k
Load Combination	+D+S	Load Combination	+D+S
		Location of maximum on span	4.125 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.253 in	Ratio =	391	>=180.	Span: 3 : S Only
Max Upward Transient Deflection	-0.186 in	Ratio =	531	>=180.	Span: 3 : W Only
Max Downward Total Deflection	0.272 in	Ratio =	364	>=120.	Span: 3 : +D+S
Max Upward Total Deflection	-0.100 in	Ratio =	987	>=120.	Span: 3 : +0.60D+0.60W

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 4.13 ft	1	0.053	0.011		-1.08	1.08	34.03	20.38	1.00	1.00	0.28	40.24	26.83
Dsgn. L = 1.75 ft	2	0.049	0.011	-0.00	-1.08	1.08	36.52	21.87	1.00	1.00	0.28	40.24	26.83
Dsgn. L = 4.13 ft	3	0.053	0.011		-1.08	1.08	34.03	20.38	1.00	1.00	0.28	40.24	26.83
+D+S													
Dsgn. L = 4.13 ft	1	0.741	0.137		-15.10	15.10	34.03	20.38	1.00	1.00	3.68	40.24	26.83
Dsgn. L = 1.75 ft	2	0.691	0.137	-0.00	-15.10	15.10	36.52	21.87	1.00	1.00	3.68	40.24	26.83
Dsgn. L = 4.13 ft	3	0.741	0.137		-15.10	15.10	34.03	20.38	1.00	1.00	3.68	40.24	26.83
+D+0.750S													
Dsgn. L = 4.13 ft	1	0.569	0.106		-11.60	11.60	34.03	20.38	1.00	1.00	2.83	40.24	26.83
Dsgn. L = 1.75 ft	2	0.530	0.106	-0.00	-11.60	11.60	36.52	21.87	1.00	1.00	2.83	40.24	26.83
Dsgn. L = 4.13 ft	3	0.569	0.106		-11.60	11.60	34.03	20.38	1.00	1.00	2.83	40.24	26.83
+D+0.60W													
Dsgn. L = 4.13 ft	1	0.292	0.136	5.96		5.96	34.03	20.38	1.00	1.00	3.65	40.24	26.83
Dsgn. L = 1.75 ft	2	0.272	0.137	5.96	-0.44	5.96	36.52	21.87	1.75	1.00	3.66	40.24	26.83
Dsgn. L = 4.13 ft	3	0.022	0.005		-0.44	0.44	34.03	20.38	1.00	1.00	0.13	40.24	26.83
+D+0.450W													
Dsgn. L = 4.13 ft	1	0.206	0.102	4.20		4.20	34.03	20.38	1.00	1.00	2.73	40.24	26.83
Dsgn. L = 1.75 ft	2	0.192	0.103	4.20	-0.60	4.20	36.52	21.87	1.84	1.00	2.75	40.24	26.83
Dsgn. L = 4.13 ft	3	0.029	0.006		-0.60	0.60	34.03	20.38	1.00	1.00	0.17	40.24	26.83
+D+0.750S+0.450W													

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

Steel Beam

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL BEAM

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length		Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L =	4.13 ft	1	0.310	0.102		-6.32	6.32	34.03	20.38	1.00	1.00	2.73	40.24	26.83
Dsgn. L =	1.75 ft	2	0.508	0.103	-0.00	-11.12	11.12	36.52	21.87	1.21	1.00	2.75	40.24	26.83
Dsgn. L =	4.13 ft	3	0.546	0.101		-11.12	11.12	34.03	20.38	1.00	1.00	2.72	40.24	26.83
+0.60D+0.60W														
Dsgn. L =	4.13 ft	1	0.314	0.136	6.39		6.39	34.03	20.38	1.00	1.00	3.65	40.24	26.83
Dsgn. L =	1.75 ft	2	0.292	0.136	6.39	-0.01	6.39	36.52	21.87	1.67	1.00	3.66	40.24	26.83
Dsgn. L =	4.13 ft	3	0.000	0.001	0.01	-0.01	0.01	34.03	20.38	1.00	1.00	0.01	40.24	26.83
+0.60D														
Dsgn. L =	4.13 ft	1	0.032	0.006		-0.65	0.65	34.03	20.38	1.00	1.00	0.17	40.24	26.83
Dsgn. L =	1.75 ft	2	0.030	0.006	-0.00	-0.65	0.65	36.52	21.87	1.00	1.00	0.17	40.24	26.83
Dsgn. L =	4.13 ft	3	0.032	0.006		-0.65	0.65	34.03	20.38	1.00	1.00	0.17	40.24	26.83

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2718	0.000		0.0000	0.000
	2	0.0000	0.000	+D+S	-0.0113	0.875
+D+S	3	0.2701	4.125		0.0000	0.875

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions		3.691	5.835	
Max Upward from Load Combinations		3.691	5.467	
Max Upward from Load Cases		3.400	5.835	
Max Downward from all Load Conditions (Resis		-8.936		
Max Downward from Load Combinations (Resi		-5.187		
Max Downward from Load Cases (Resisting Up		-8.936		
D Only		0.291	0.291	
+D+S		3.691	3.691	
+D+0.750S		2.841	2.841	
+D+0.60W		-5.071	3.792	
+D+0.450W		-3.730	2.917	
+D+0.750S+0.450W		-1.180	5.467	
+0.60D+0.60W		-5.187	3.676	
+0.60D		0.175	0.175	
S Only		3.400	3.400	
W Only		-8.936	5.835	

Steel Section Properties : W8x10

Depth	=	7.890 in	I xx	=	30.80 in^4	J	=	0.043 in^4	
Web Thick	=	0.170 in	S xx		7.81 in^3	Cw	=	30.90 in^6	
Flange Width	=	3.940 in	R xx	=	3.220 in				
Flange Thick	=	0.205 in	Zx	=	8.870 in^3				
Area	=	2.960 in^2	I yy	=	2.090 in^4				
Weight	=	10.000 plf	S yy	=	1.060 in^3	Wno	=	7.570 in^2	
Kdesign	=	0.505 in	R yy	=	0.841 in	Sw	=	1.530 in^4	
K1	=	0.500 in	Zy	=	1.660 in^3	Qf	=	1.480 in^3	
rts	=	1.010 in				Qw	=	4.290 in^3	
Ycg	=	3.945 in							

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

Steel Column

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL 8'-0" POST

Code References

Calculations per AISC 360-16, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x4x3/16**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	8.0 ft
Top & Bottom Fixity	Top Free, Bottom Fixed
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 2.1
Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 2.1

Applied Loads

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

Column self weight included : 95.760 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, Xecc = 2.0 in, D = 0.5820, S = 6.80 k
BENDING LOADS . . .
Lat. Point Load at 8.0 ft creating My-y, W = 0.5470, E = 0.6860 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4232** : 1

Load Combination	+D+0.750S+0.5250E	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Pa : Axial	5.778	k
Pn / Omega : Allowabl	32.229	k
Ma-x : Applied	0.0	k-ft
Mn-x / Omega : Allowable	15.150	k-ft
Ma-y : Applied	-3.828	k-ft
Mn-y / Omega : Allowable	11.477	k-ft

PASS Maximum Shear Stress Rati **0.02401** : 1

Load Combination	+0.60D+0.70E	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Va : Applied	0.4802	k
Vn / Omega : Allowable	20.003	k

Maximum Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	0.6920 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X 1.138 in at 9.0 ft above base
for load combination : E Only

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base k-ft	Mx - End Moments @ Top k-ft	My - End Moments @ Base k-ft	My - End Moments @ Top k-ft

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base k-ft	Mx - End Moments @ Top k-ft	My - End Moments @ Base k-ft	My - End Moments @ Top k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance

Steel Section Properties : HSS6x4x3/16

Steel Section Properties : HSS6x4x3/16

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

Steel Column

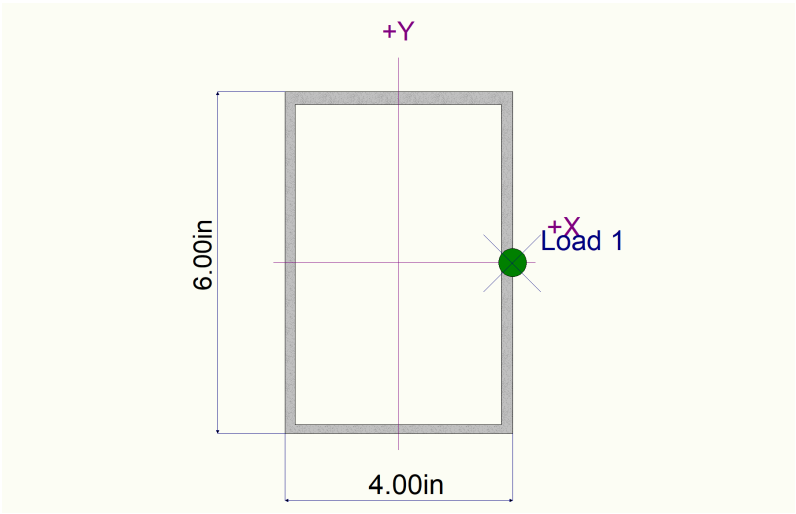
Project File: 20822 ENERCALC.ec6

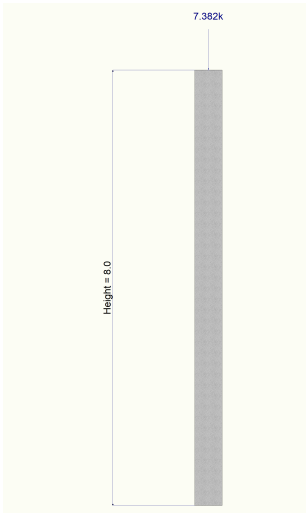
LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

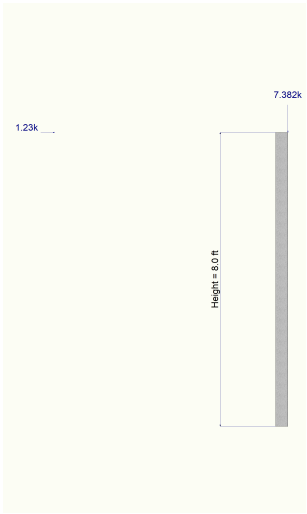
DESCRIPTION: TYPICAL 8'-0" POST

Depth	=	6.000 in	I xx	=	16.40 in^4	J	=	18.200 in^4
Design Thick	=	0.174 in	S xx	=	5.46 in^3	Cw	=	7.74 in^6
Width	=	4.000 in	R xx	=	2.230 in			
Wall Thick	=	0.187 in	Zx	=	6.600 in^3			
Area	=	3.280 in^2	I yy	=	8.760 in^4	C	=	7.740 in^3
Weight	=	11.970 plf	S yy	=	4.380 in^3			
			R yy	=	1.630 in			
			Zy	=	5.000 in^3			
Ycg	=	0.000 in						

Sketches







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

Steel Column

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL 9'-0" POST

Code References

Calculations per AISC 360-16, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x4x3/16**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	9.0 ft
Top & Bottom Fixity	Top Free, Bottom Fixed
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 9.0 ft, K = 2.1
Unbraced Length for buckling ABOUT Y-Y Axis = 9.0 ft, K = 2.1

Applied Loads

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

Column self weight included : 107.730 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, Xecc = 2.0 in, D = 0.5820, S = 6.80 k
BENDING LOADS . . .
Lat. Point Load at 9.0 ft creating My-y, W = 0.5470, E = 0.6920 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = 0.5539 : 1

Load Combination	+D+0.750S+0.5250E	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Pa : Axial	5.790	k
Pn / Omega : Allowabl	25.465	k
Ma-x : Applied	0.0	k-ft
Mn-x / Omega : Allowable	15.150	k-ft
Ma-y : Applied	-4.217	k-ft
Mn-y / Omega : Allowable	11.477	k-ft

PASS Maximum Shear Stress Rati 0.02422 : 1

Load Combination	+D+0.70E	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Va : Applied	0.4844	k
Vn / Omega : Allowable	20.003	k

Maximum Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	0.6920 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X 1.138 in at 9.0 ft above base
for load combination : E Only

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base k-ft	Mx - End Moments @ Top k-ft	My - End Moments @ Base k-ft	My - End Moments @ Top k-ft

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments @ Base k-ft	Mx - End Moments @ Top k-ft	My - End Moments @ Base k-ft	My - End Moments @ Top k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance

Steel Section Properties : HSS6x4x3/16

Steel Section Properties : HSS6x4x3/16

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

Steel Column

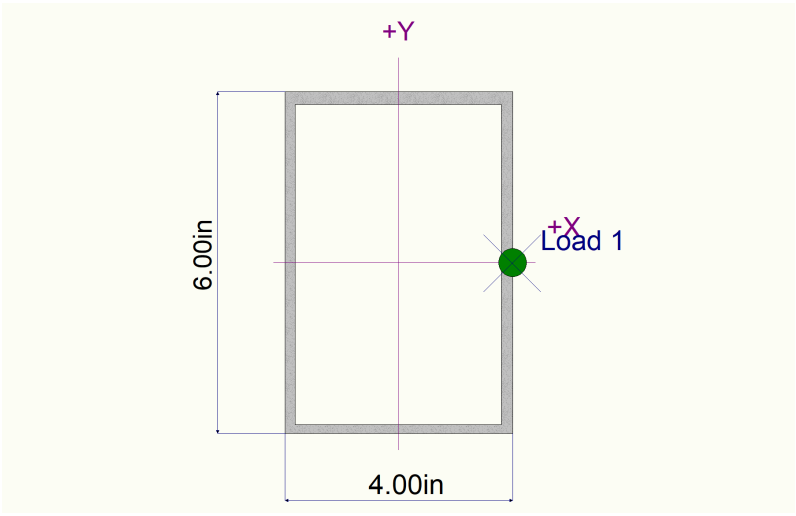
Project File: 20822 ENERCALC.ec6

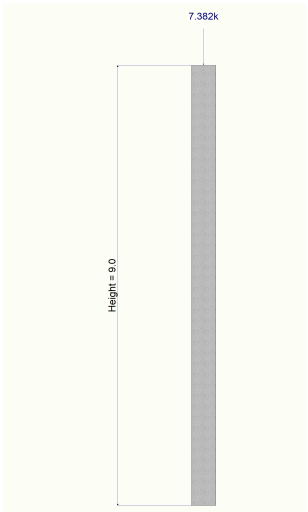
LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

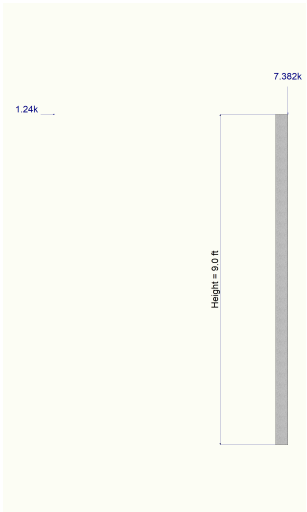
DESCRIPTION: TYPICAL 9'-0" POST

Depth	=	6.000 in	I xx	=	16.40 in^4	J	=	18.200 in^4
Design Thick	=	0.174 in	S xx	=	5.46 in^3	Cw	=	7.74 in^6
Width	=	4.000 in	R xx	=	2.230 in			
Wall Thick	=	0.187 in	Zx	=	6.600 in^3			
Area	=	3.280 in^2	I yy	=	8.760 in^4	C	=	7.740 in^3
Weight	=	11.970 plf	S yy	=	4.380 in^3			
			R yy	=	1.630 in			
			Zy	=	5.000 in^3			
Ycg	=	0.000 in						

Sketches







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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL FOOTING FOR 8'-0" POST

Code References

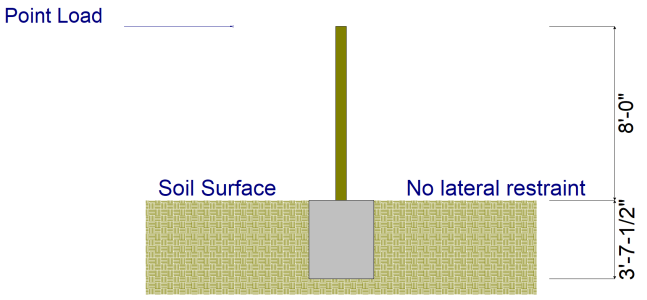
Calculations per IBC 2021 1807.3
Load Combinations Used : ASCE 7-16

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	36.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	300.0 pcf
Max Passive	psf

Controlling Values

Governing Load Combination	+D+0.70E
Lateral Load	0.4802 k
Moment	3.842 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	**357.316** psf
Allowable	**359.258** psf
Minimum Required Depth	**3.625 ft**
Footing Base Area	7.069 ft^2
Maximum Soil Pressure	1.058 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k		Vertical Load (k)	
D : Dead Load	k		k/ft	0.6780	k
Lr : Roof Live	k		k/ft		k
L : Live	k		k/ft		k
S : Snow	k		k/ft	6.80	k
W : Wind	0.5470 k		k/ft		k
E : Earthquake	0.6860 k		k/ft		k
H : Lateral Earth	k		k/ft		k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft		
		BOTTOM of Load above ground surface	ft		

Load Combination Results

	Forces @ Ground Surface		Required	Pressure at 1/3 Depth		Soil Increase
Load Combination	Loads - (k)	Moments - (ft-k)	Depth - (ft)	Actual - (psf)	Allow - (psf)	Factor
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	0.328	2.626	3.13	310.7	312.4	1.000
+D+0.450W	0.246	1.969	2.88	279.7	281.4	1.000
+D+0.750S+0.450W	0.246	1.969	2.88	279.7	281.4	1.000
+0.60D+0.60W	0.328	2.626	3.13	310.7	312.4	1.000
+D+0.70E	0.480	3.842	3.63	357.3	359.3	1.000
+D+0.750S+0.5250E	0.360	2.881	3.25	321.5	323.1	1.000

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

Pole Footing Embedded in Soil

LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

DESCRIPTION: TYPICAL FOOTING FOR 8'-0" POST

+0.60D+0.70E	0.480	3.842	3.63	357.3	359.3	1.000

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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL FOOTING FOR 9'-0" POST

Code References

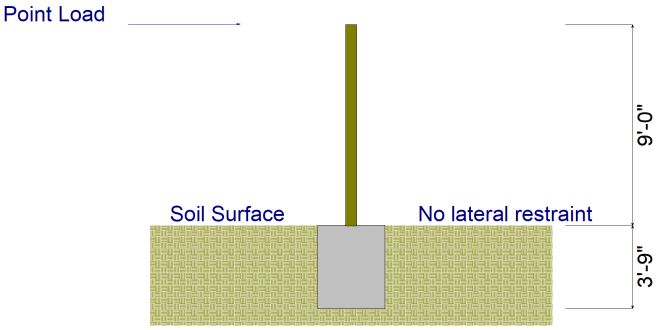
Calculations per IBC 2021 1807.3
Load Combinations Used : ASCE 7-16

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	36.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	300.0 pcf
Max Passive	psf

Controlling Values

Governing Load Combinatio	+D+0.70E
Lateral Load	0.4844 k
Moment	4.360 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	**369.792** psf
Allowable	**371.778** psf
Minimum Required Depth	**3.750 ft**
Footing Base Area	7.069 ft^2
Maximum Soil Pressure	1.060 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k		Vertical Load (k)	
D : Dead Load	k		k/ft	0.690	k
Lr : Roof Live	k		k/ft		k
L : Live	k		k/ft		k
S : Snow	k		k/ft	6.80	k
W : Wind	0.5470 k		k/ft		k
E : Earthquake	0.6920 k		k/ft		k
H : Lateral Earth	k		k/ft		k
Load distance above ground surface	9.0 ft	TOP of Load above ground surface	ft		
		BOTTOM of Load above ground surface	ft		

Load Combination Results

	Forces @ Ground Surface		Required	Pressure at 1/3 Depth		Soil Increase
Load Combination	Loads - (k)	Moments - (ft-k)	Depth - (ft)	Actual - (psf)	Allow - (psf)	Factor
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	0.328	2.954	3.25	321.5	322.1	1.000
+D+0.450W	0.246	2.215	3.00	289.1	290.6	1.000
+D+0.750S+0.450W	0.246	2.215	3.00	289.1	290.6	1.000
+0.60D+0.60W	0.328	2.954	3.25	321.5	322.1	1.000
+D+0.70E	0.484	4.360	3.75	369.8	371.8	1.000
+D+0.750S+0.5250E	0.363	3.270	3.38	333.7	334.2	1.000

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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL FOOTING FOR 9'-0" POST

+0.60D+0.70E	0.484	4.360	3.75	369.8	371.8	1.000

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

General Footing

LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 8'-0" POST

Code References

Calculations per ACI 318-19, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00090
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	150.0 pcf
Soil/Concrete Friction Coeff.	=	0.250

Increases based on footing Depth

Footing base depth below soil surface	=	2.0 ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

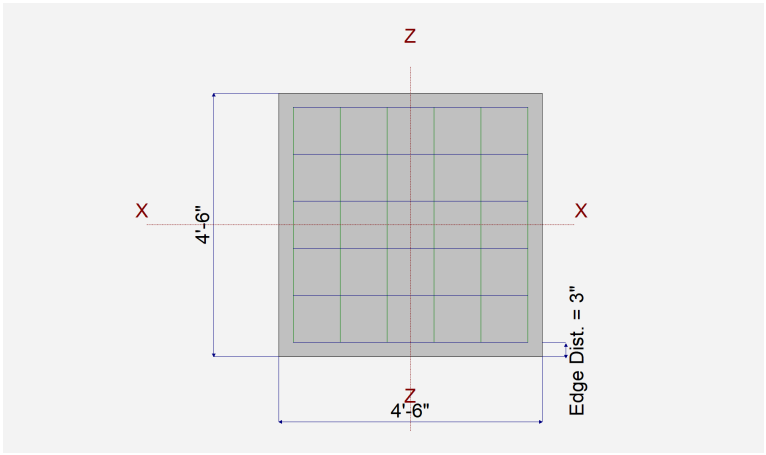
Width parallel to X-X Axis	=	4.50 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	24.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



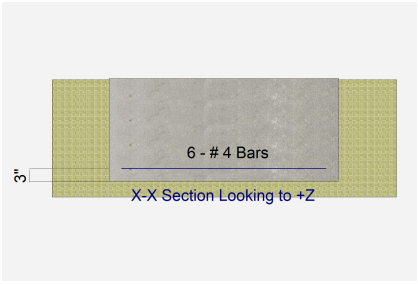
Reinforcing

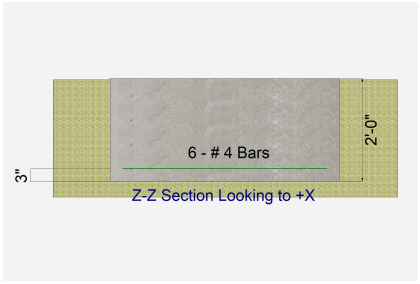
Bars parallel to X-X Axis			
Number of Bars	=		6.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		6.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation n/a

# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	0.6780			6.80	-3.102			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=					4.379	5.488		k-ft
V-x	=					0.5470	0.6860		k
V-z	=								k

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

General Footing

Project File: 20822 ENERCALC.ec6

LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 8'-0" POST

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.3297	Soil Bearing	0.6593 ksf	2.0 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.184	Overturning - Z-Z	7.472 k-ft	8.843 k-ft	+0.60D+0.60W
PASS	4.858	Sliding - X-X	0.4802 k	2.333 k	+0.60D+0.70E
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	2.112	Uplift	-1.861 k	3.930 k	+0.60D+0.60W
PASS	0.06332	Z Flexure (+X)	1.572 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.05888	Z Flexure (-X)	1.462 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S
PASS	0.05888	X Flexure (+Z)	1.462 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S
PASS	0.05888	X Flexure (-Z)	1.462 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S
PASS	0.04873	1-way Shear (+X)	1.490 psi	30.571 psi	+0.90D+W
PASS	0.03710	1-way Shear (-X)	1.134 psi	30.571 psi	+1.20D+1.60S
PASS	0.03710	1-way Shear (+Z)	1.134 psi	30.571 psi	+1.20D+1.60S
PASS	0.03710	1-way Shear (-Z)	1.134 psi	30.571 psi	+1.20D+1.60S
PASS	0.03781	2-way Punching	5.672 psi	150.0 psi	+1.20D+1.60S

Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location: Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.0	n/a	0.0	0.3235	0.3235	n/a	n/a	0.162
X-X, +D+S	2.0	n/a	0.0	0.6593	0.6593	n/a	n/a	0.330
X-X, +D+0.750S	2.0	n/a	0.0	0.5753	0.5753	n/a	n/a	0.288
X-X, +D+0.60W	2.660	n/a	0.0	0.2316	0.2316	n/a	n/a	0.087
X-X, +D+0.450W	2.660	n/a	0.0	0.2545	0.2545	n/a	n/a	0.096
X-X, +D+0.750S+0.450W	2.660	n/a	0.0	0.5064	0.5064	n/a	n/a	0.190
X-X, +0.60D+0.60W	2.660	n/a	0.0	0.1022	0.1022	n/a	n/a	0.038
X-X, +D+0.70E	2.660	n/a	0.0	0.3235	0.3235	n/a	n/a	0.122
X-X, +D+0.750S+0.5250E	2.660	n/a	0.0	0.5753	0.5753	n/a	n/a	0.216
X-X, +0.60D+0.70E	2.660	n/a	0.0	0.1941	0.1941	n/a	n/a	0.073
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.3235	0.3235	0.162
Z-Z, +D+S	2.0	0.0	n/a	n/a	n/a	0.6593	0.6593	0.330
Z-Z, +D+0.750S	2.0	0.0	n/a	n/a	n/a	0.5753	0.5753	0.288
Z-Z, +D+0.60W	2.660	8.403	n/a	n/a	n/a	0.01752	0.4456	0.168
Z-Z, +D+0.450W	2.660	5.734	n/a	n/a	n/a	0.09401	0.4151	0.156
Z-Z, +D+0.750S+0.450W	2.660	2.882	n/a	n/a	n/a	0.3459	0.6669	0.251
Z-Z, +0.60D+0.60W	2.660	19.045	n/a	n/a	n/a	0.0	0.4572	0.172
Z-Z, +D+0.70E	2.660	8.797	n/a	n/a	n/a	0.01046	0.6365	0.239
Z-Z, +D+0.750S+0.5250E	2.660	3.710	n/a	n/a	n/a	0.3406	0.8101	0.305
Z-Z, +0.60D+0.70E	2.660	14.661	n/a	n/a	n/a	0.0	0.5622	0.211

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+S	None	0.0 k-ft	Infinity	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 8'-0" POST

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Z-Z, +D+0.750S	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	7.472 k-ft	14.739 k-ft	1.973	OK
Z-Z, +D+0.450W	5.604 k-ft	14.739 k-ft	2.630	OK
Z-Z, +D+0.750S+0.450W	5.604 k-ft	26.214 k-ft	4.678	OK
Z-Z, +0.60D+0.60W	7.472 k-ft	8.843 k-ft	1.184	OK
Z-Z, +D+0.70E	4.802 k-ft	14.739 k-ft	3.069	OK
Z-Z, +D+0.750S+0.5250E	3.602 k-ft	26.214 k-ft	7.279	OK
Z-Z, +0.60D+0.70E	4.802 k-ft	8.843 k-ft	1.842	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	2.988 k	No Sliding	OK
X-X, +D+S	0.0 k	4.688 k	No Sliding	OK
X-X, +D+0.750S	0.0 k	4.263 k	No Sliding	OK
X-X, +D+0.60W	0.3282 k	2.522 k	7.685	OK
X-X, +D+0.450W	0.2462 k	2.639 k	10.720	OK
X-X, +D+0.750S+0.450W	0.2462 k	3.914 k	15.899	OK
X-X, +0.60D+0.60W	0.3282 k	1.867 k	5.689	OK
X-X, +D+0.70E	0.4802 k	2.988 k	6.222	OK
X-X, +D+0.750S+0.5250E	0.3602 k	4.263 k	11.836	OK
X-X, +0.60D+0.70E	0.4802 k	2.333 k	4.858	OK
Z-Z, D Only	0.0 k	2.988 k	No Sliding	OK
Z-Z, +D+S	0.0 k	4.688 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	4.263 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	2.522 k	No Sliding	OK
Z-Z, +D+0.70E	0.0 k	2.988 k	No Sliding	OK
Z-Z, +D+0.750S+0.5250E	0.0 k	4.263 k	No Sliding	OK
Z-Z, +0.60D+0.70E	0.0 k	2.333 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	2.639 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	3.914 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	1.867 k	No Sliding	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1187	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.40D	0.1187	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D	0.1017	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D	0.1017	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S	0.5267	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S	0.5267	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50W	0.09218	+Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50W	0.09218	-Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S	1.462	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S	1.462	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S+0.50W	1.268	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S+0.50W	1.268	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+W	0.2861	+Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+W	0.2861	-Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S+W	0.1390	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S+W	0.1390	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+W	0.3115	+Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+W	0.3115	-Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.20S+E	0.2717	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.20S+E	0.2717	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+E	0.07628	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+E	0.07628	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.40D	0.1187	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.40D	0.1187	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D	0.1017	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D	0.1017	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 8'-0" POST

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50S	0.5267	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50S	0.5267	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50W	0.3962	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50W	0.2119	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S	1.462	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S	1.462	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S+0.50W	0.9638	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S+0.50W	1.572	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+W	0.8434	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+W	0.3727	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50S+W	0.4691	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50S+W	0.7470	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+W	0.6607	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+W	0.5550	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.20S+E	0.4904	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.20S+E	1.034	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+E	0.6184	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+E	0.9059	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.09 psi	0.09 psi	0.09 psi	30.57 psi	0.00	OK
+1.20D	0.08 psi	0.08 psi	0.08 psi	30.57 psi	0.00	OK
+1.20D+0.50S	0.41 psi	0.41 psi	0.41 psi	30.57 psi	0.01	OK
+1.20D+0.50W	0.39 psi	0.24 psi	0.39 psi	30.57 psi	0.01	OK
+1.20D+1.60S	1.13 psi	1.13 psi	1.13 psi	30.57 psi	0.04	OK
+1.20D+1.60S+0.50W	0.67 psi	1.30 psi	1.30 psi	30.57 psi	0.04	OK
+1.20D+W	0.68 psi	0.48 psi	0.68 psi	30.57 psi	0.02	OK
+1.20D+0.50S+W	0.52 psi	0.74 psi	0.74 psi	30.57 psi	0.02	OK
+0.90D+W	0.51 psi	1.49 psi	1.49 psi	30.57 psi	0.05	OK
+1.20D+0.20S+E	0.58 psi	1.00 psi	1.00 psi	30.57 psi	0.03	OK
+0.90D+E	0.51 psi	0.95 psi	0.95 psi	30.57 psi	0.03	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.09 psi	0.09 psi	0.09 psi	30.57 psi	0.00	OK
+1.20D	0.08 psi	0.08 psi	0.08 psi	30.57 psi	0.00	OK
+1.20D+0.50S	0.41 psi	0.41 psi	0.41 psi	30.57 psi	0.01	OK
+1.20D+0.50W	0.07 psi	0.07 psi	0.07 psi	30.57 psi	0.00	OK
+1.20D+1.60S	1.13 psi	1.13 psi	1.13 psi	30.57 psi	0.04	OK
+1.20D+1.60S+0.50W	0.98 psi	0.98 psi	0.98 psi	30.57 psi	0.03	OK
+1.20D+W	0.22 psi	0.22 psi	0.22 psi	30.57 psi	0.01	OK
+1.20D+0.50S+W	0.11 psi	0.11 psi	0.11 psi	30.57 psi	0.00	OK
+0.90D+W	0.24 psi	0.24 psi	0.24 psi	30.57 psi	0.01	OK
+1.20D+0.20S+E	0.21 psi	0.21 psi	0.21 psi	30.57 psi	0.01	OK
+0.90D+E	0.06 psi	0.06 psi	0.06 psi	30.57 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.46 psi	150.00 psi	0.003069	OK
+1.20D	0.39 psi	150.00 psi	0.002631	OK
+1.20D+0.50S	2.04 psi	150.00 psi	0.01363	OK
+1.20D+0.50W	0.36 psi	150.00 psi	0.002384	OK
+1.20D+1.60S	5.67 psi	150.00 psi	0.03781	OK
+1.20D+1.60S+0.50W	4.92 psi	150.00 psi	0.0328	OK
+1.20D+W	1.11 psi	150.00 psi	0.0074	OK
+1.20D+0.50S+W	0.54 psi	150.00 psi	0.003594	OK
+0.90D+W	1.21 psi	150.00 psi	0.008057	OK
+1.20D+0.20S+E	1.05 psi	150.00 psi	0.007028	OK
+0.90D+E	0.37 psi	150.00 psi	0.002439	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 9'-0" POST

Code References

Calculations per ACI 318-19, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00090
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	150.0 pcf
Soil/Concrete Friction Coeff.	=	0.250

Increases based on footing Depth

Footing base depth below soil surface	=	2.0 ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

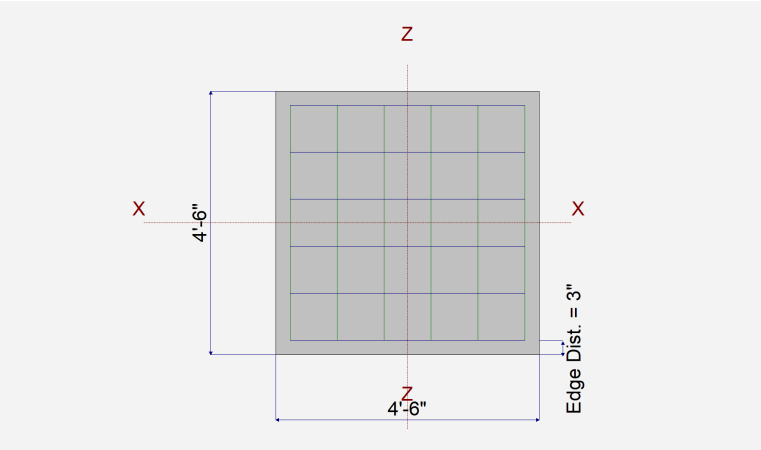
Width parallel to X-X Axis	=	4.50 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	24.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

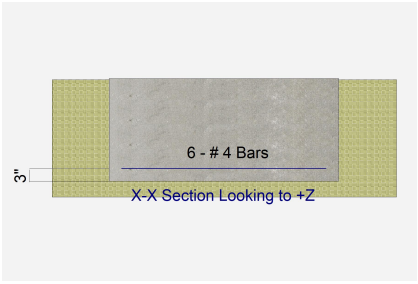


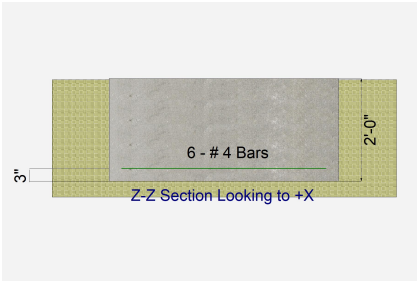
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		6.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		6.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	0.690			6.80	-3.102			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=					4.926	6.232		k-ft
V-x	=					0.5470	0.6920		k
V-z	=								k

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 9'-0" POST

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.330	Soil Bearing	0.6599 ksf	2.0 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.136	Overturning - Z-Z	7.80 k-ft	8.859 k-ft	+0.60D+0.60W
PASS	4.819	Sliding - X-X	0.4844 k	2.334 k	+0.60D+0.70E
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	2.116	Uplift	-1.861 k	3.938 k	+0.60D+0.60W
PASS	0.06462	Z Flexure (+X)	1.604 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.05896	Z Flexure (-X)	1.464 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S
PASS	0.05896	X Flexure (+Z)	1.464 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S
PASS	0.05896	X Flexure (-Z)	1.464 k-ft/ft	24.824 k-ft/ft	+1.20D+1.60S
PASS	0.06410	1-way Shear (+X)	1.960 psi	30.571 psi	+0.90D+W
PASS	0.03715	1-way Shear (-X)	1.136 psi	30.571 psi	+1.20D+1.60S
PASS	0.03715	1-way Shear (+Z)	1.136 psi	30.571 psi	+1.20D+1.60S
PASS	0.03715	1-way Shear (-Z)	1.136 psi	30.571 psi	+1.20D+1.60S
PASS	0.03786	2-way Punching	5.679 psi	150.0 psi	+1.20D+1.60S

Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location: Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.0	n/a	0.0	0.3241	0.3241	n/a	n/a	0.162
X-X, +D+S	2.0	n/a	0.0	0.6599	0.6599	n/a	n/a	0.330
X-X, +D+0.750S	2.0	n/a	0.0	0.5759	0.5759	n/a	n/a	0.288
X-X, +D+0.60W	2.660	n/a	0.0	0.2322	0.2322	n/a	n/a	0.087
X-X, +D+0.450W	2.660	n/a	0.0	0.2551	0.2551	n/a	n/a	0.096
X-X, +D+0.750S+0.450W	2.660	n/a	0.0	0.5070	0.5070	n/a	n/a	0.191
X-X, +0.60D+0.60W	2.660	n/a	0.0	0.1025	0.1025	n/a	n/a	0.039
X-X, +D+0.70E	2.660	n/a	0.0	0.3241	0.3241	n/a	n/a	0.122
X-X, +D+0.750S+0.5250E	2.660	n/a	0.0	0.5759	0.5759	n/a	n/a	0.217
X-X, +0.60D+0.70E	2.660	n/a	0.0	0.1944	0.1944	n/a	n/a	0.073
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.3241	0.3241	0.162
Z-Z, +D+S	2.0	0.0	n/a	n/a	n/a	0.6599	0.6599	0.330
Z-Z, +D+0.750S	2.0	0.0	n/a	n/a	n/a	0.5759	0.5759	0.288
Z-Z, +D+0.60W	2.660	9.220	n/a	n/a	n/a	0.0	0.4677	0.176
Z-Z, +D+0.450W	2.660	6.292	n/a	n/a	n/a	0.07855	0.4317	0.162
Z-Z, +D+0.750S+0.450W	2.660	3.166	n/a	n/a	n/a	0.3304	0.6836	0.257
Z-Z, +0.60D+0.60W	2.660	20.876	n/a	n/a	n/a	0.0	0.5938	0.223
Z-Z, +D+0.70E	2.660	9.748	n/a	n/a	n/a	0.0	0.6727	0.253
Z-Z, +D+0.750S+0.5250E	2.660	4.114	n/a	n/a	n/a	0.3153	0.8366	0.315
Z-Z, +0.60D+0.70E	2.660	16.247	n/a	n/a	n/a	0.0	0.6456	0.243

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+S	None	0.0 k-ft	Infinity	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 9'-0" POST

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Z-Z, +D+0.750S	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	7.80 k-ft	14.766 k-ft	1.893	OK
Z-Z, +D+0.450W	5.850 k-ft	14.766 k-ft	2.524	OK
Z-Z, +D+0.750S+0.450W	5.850 k-ft	26.241 k-ft	4.486	OK
Z-Z, +0.60D+0.60W	7.80 k-ft	8.859 k-ft	1.136	OK
Z-Z, +D+0.70E	5.331 k-ft	14.766 k-ft	2.770	OK
Z-Z, +D+0.750S+0.5250E	3.998 k-ft	26.241 k-ft	6.563	OK
Z-Z, +0.60D+0.70E	5.331 k-ft	8.859 k-ft	1.662	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	2.991 k	No Sliding	OK
X-X, +D+S	0.0 k	4.691 k	No Sliding	OK
X-X, +D+0.750S	0.0 k	4.266 k	No Sliding	OK
X-X, +D+0.60W	0.3282 k	2.525 k	7.694	OK
X-X, +D+0.450W	0.2462 k	2.642 k	10.732	OK
X-X, +D+0.750S+0.450W	0.2462 k	3.917 k	15.912	OK
X-X, +0.60D+0.60W	0.3282 k	1.869 k	5.695	OK
X-X, +D+0.70E	0.4844 k	2.991 k	6.174	OK
X-X, +D+0.750S+0.5250E	0.3633 k	4.266 k	11.741	OK
X-X, +0.60D+0.70E	0.4844 k	2.334 k	4.819	OK
Z-Z, D Only	0.0 k	2.991 k	No Sliding	OK
Z-Z, +D+S	0.0 k	4.691 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	4.266 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	2.525 k	No Sliding	OK
Z-Z, +D+0.70E	0.0 k	2.991 k	No Sliding	OK
Z-Z, +D+0.750S+0.5250E	0.0 k	4.266 k	No Sliding	OK
Z-Z, +0.60D+0.70E	0.0 k	2.334 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	2.642 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	3.917 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	1.869 k	No Sliding	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1208	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.40D	0.1208	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D	0.1035	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D	0.1035	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S	0.5285	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S	0.5285	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50W	0.09038	+Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50W	0.09038	-Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S	1.464	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S	1.464	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S+0.50W	1.270	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+1.60S+0.50W	1.270	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+W	0.2843	+Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+W	0.2843	-Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S+W	0.1408	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.50S+W	0.1408	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+W	0.3101	+Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+W	0.3101	-Z	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.20S+E	0.2735	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +1.20D+0.20S+E	0.2735	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+E	0.07763	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
X-X, +0.90D+E	0.07763	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.40D	0.1208	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.40D	0.1208	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D	0.1035	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D	0.1035	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: TYPICAL ALTERNATE FOOTING FOR 9'-0" POST

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50S	0.5285	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50S	0.5285	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50W	0.4248	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50W	0.2440	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S	1.464	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S	1.464	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S+0.50W	0.9352	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+1.60S+0.50W	1.604	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+W	0.8661	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+W	0.4716	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50S+W	0.5281	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.50S+W	0.8096	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+W	0.6607	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+W	0.6761	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.20S+E	0.5697	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +1.20D+0.20S+E	1.123	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+E	0.6474	-X	Top	0.2592	ACI 7.6.1.1	0.2667	24.824	OK
Z-Z, +0.90D+E	1.045	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	24.824	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.09 psi	0.09 psi	0.09 psi	30.57 psi	0.00	OK
+1.20D	0.08 psi	0.08 psi	0.08 psi	30.57 psi	0.00	OK
+1.20D+0.50S	0.41 psi	0.41 psi	0.41 psi	30.57 psi	0.01	OK
+1.20D+0.50W	0.42 psi	0.28 psi	0.42 psi	30.57 psi	0.01	OK
+1.20D+1.60S	1.14 psi	1.14 psi	1.14 psi	30.57 psi	0.04	OK
+1.20D+1.60S+0.50W	0.64 psi	1.33 psi	1.33 psi	30.57 psi	0.04	OK
+1.20D+W	0.68 psi	0.60 psi	0.68 psi	30.57 psi	0.02	OK
+1.20D+0.50S+W	0.58 psi	0.80 psi	0.80 psi	30.57 psi	0.03	OK
+0.90D+W	0.51 psi	1.96 psi	1.96 psi	30.57 psi	0.06	OK
+1.20D+0.20S+E	0.65 psi	1.09 psi	1.09 psi	30.57 psi	0.04	OK
+0.90D+E	0.51 psi	1.12 psi	1.12 psi	30.57 psi	0.04	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.09 psi	0.09 psi	0.09 psi	30.57 psi	0.00	OK
+1.20D	0.08 psi	0.08 psi	0.08 psi	30.57 psi	0.00	OK
+1.20D+0.50S	0.41 psi	0.41 psi	0.41 psi	30.57 psi	0.01	OK
+1.20D+0.50W	0.07 psi	0.07 psi	0.07 psi	30.57 psi	0.00	OK
+1.20D+1.60S	1.14 psi	1.14 psi	1.14 psi	30.57 psi	0.04	OK
+1.20D+1.60S+0.50W	0.99 psi	0.99 psi	0.99 psi	30.57 psi	0.03	OK
+1.20D+W	0.22 psi	0.22 psi	0.22 psi	30.57 psi	0.01	OK
+1.20D+0.50S+W	0.11 psi	0.11 psi	0.11 psi	30.57 psi	0.00	OK
+0.90D+W	0.24 psi	0.24 psi	0.24 psi	30.57 psi	0.01	OK
+1.20D+0.20S+E	0.21 psi	0.21 psi	0.21 psi	30.57 psi	0.01	OK
+0.90D+E	0.06 psi	0.06 psi	0.06 psi	30.57 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.47 psi	150.00 psi	0.003124	OK
+1.20D	0.40 psi	150.00 psi	0.002677	OK
+1.20D+0.50S	2.05 psi	150.00 psi	0.01367	OK
+1.20D+0.50W	0.35 psi	150.00 psi	0.002338	OK
+1.20D+1.60S	5.68 psi	150.00 psi	0.03786	OK
+1.20D+1.60S+0.50W	4.93 psi	150.00 psi	0.03284	OK
+1.20D+W	1.10 psi	150.00 psi	0.007353	OK
+1.20D+0.50S+W	0.55 psi	150.00 psi	0.003641	OK
+0.90D+W	1.20 psi	150.00 psi	0.008022	OK
+1.20D+0.20S+E	1.06 psi	150.00 psi	0.007089	OK
+0.90D+E	0.45 psi	150.00 psi	0.002974	OK

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

Steel Beam

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN BEAM

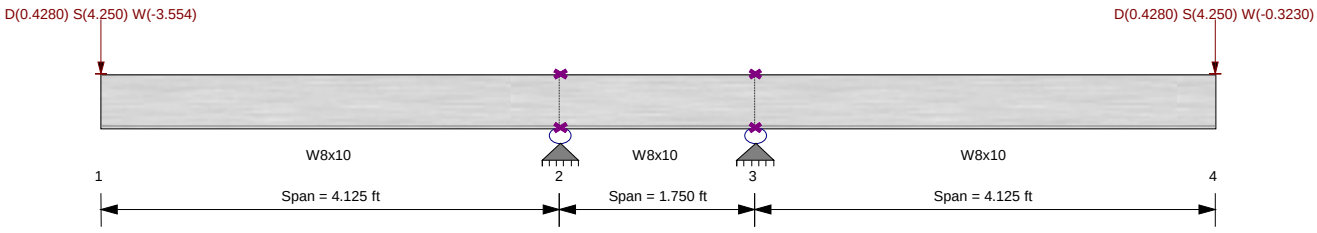
CODE REFERENCES

Calculations per AISC 360-16, IBC 2021
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Load(s) for Span Number 1
Point Load : D = 0.4280, S = 4.250, W = -3.554 k @ 0.0 ft
Load(s) for Span Number 3
Point Load : D = 0.4280, S = 4.250, W = -0.3230 k @ 4.125 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.951 : 1	Maximum Shear Stress Ratio =	0.176 : 1
Section used for this span	W8x10	Section used for this span	W8x10
Ma : Applied	19.382 k-ft	Va : Applied	4.719 k
Mn / Omega : Allowable	20.377 k-ft	Vn/Omega : Allowable	26.826 k
Load Combination	+D+S	Load Combination	+D+S
		Location of maximum on span	4.125 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.316 in	Ratio =	313	>=180.	Span: 3 : S Only
Max Upward Transient Deflection	-0.233 in	Ratio =	424	>=180.	Span: 3 : W Only
Max Downward Total Deflection	0.349 in	Ratio =	284	>=120.	Span: 3 : +D+S
Max Upward Total Deflection	-0.120 in	Ratio =	825	>=120.	Span: 3 : +0.60D+0.60W

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 4.13 ft	1	0.091	0.017		-1.85	1.85	34.03	20.38	1.00	1.00	0.47	40.24	26.83
Dsgn. L = 1.75 ft	2	0.085	0.017	-0.00	-1.85	1.85	36.52	21.87	1.00	1.00	0.47	40.24	26.83
Dsgn. L = 4.13 ft	3	0.091	0.017		-1.85	1.85	34.03	20.38	1.00	1.00	0.47	40.24	26.83
+D+S													
Dsgn. L = 4.13 ft	1	0.951	0.176		-19.38	19.38	34.03	20.38	1.00	1.00	4.72	40.24	26.83
Dsgn. L = 1.75 ft	2	0.886	0.176	-0.00	-19.38	19.38	36.52	21.87	1.00	1.00	4.72	40.24	26.83
Dsgn. L = 4.13 ft	3	0.951	0.176		-19.38	19.38	34.03	20.38	1.00	1.00	4.72	40.24	26.83
+D+0.750S													
Dsgn. L = 4.13 ft	1	0.736	0.136		-15.00	15.00	34.03	20.38	1.00	1.00	3.66	40.24	26.83
Dsgn. L = 1.75 ft	2	0.686	0.136	-0.00	-15.00	15.00	36.52	21.87	1.00	1.00	3.66	40.24	26.83
Dsgn. L = 4.13 ft	3	0.736	0.136		-15.00	15.00	34.03	20.38	1.00	1.00	3.66	40.24	26.83
+D+0.60W													
Dsgn. L = 4.13 ft	1	0.341	0.170	6.95		6.95	34.03	20.38	1.00	1.00	4.56	40.24	26.83
Dsgn. L = 1.75 ft	2	0.318	0.171	6.95	-1.05	6.95	36.52	21.87	1.85	1.00	4.58	40.24	26.83
Dsgn. L = 4.13 ft	3	0.052	0.010		-1.05	1.05	34.03	20.38	1.00	1.00	0.28	40.24	26.83
+D+0.450W													
Dsgn. L = 4.13 ft	1	0.233	0.127	4.75		4.75	34.03	20.38	1.00	1.00	3.42	40.24	26.83
Dsgn. L = 1.75 ft	2	0.217	0.128	4.75	-1.25	4.75	36.52	21.87	2.02	1.00	3.44	40.24	26.83
Dsgn. L = 4.13 ft	3	0.061	0.012		-1.25	1.25	34.03	20.38	1.00	1.00	0.32	40.24	26.83
+D+0.750S+0.450W													

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

Steel Beam

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN BEAM

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.13 ft	1	0.412	0.127		-8.40	8.40	34.03	20.38	1.00	1.00	3.42	40.24	26.83
Dsgn. L = 1.75 ft	2	0.658	0.131	-0.00	-14.40	14.40	36.52	21.87	1.20	1.00	3.51	40.24	26.83
Dsgn. L = 4.13 ft	3	0.707	0.131		-14.40	14.40	34.03	20.38	1.00	1.00	3.51	40.24	26.83
+0.60D+0.60W													
Dsgn. L = 4.13 ft	1	0.377	0.170	7.69		7.69	34.03	20.38	1.00	1.00	4.56	40.24	26.83
Dsgn. L = 1.75 ft	2	0.351	0.171	7.69	-0.31	7.69	36.52	21.87	1.71	1.00	4.57	40.24	26.83
Dsgn. L = 4.13 ft	3	0.015	0.003		-0.31	0.31	34.03	20.38	1.00	1.00	0.09	40.24	26.83
+0.60D													
Dsgn. L = 4.13 ft	1	0.054	0.010		-1.11	1.11	34.03	20.38	1.00	1.00	0.28	40.24	26.83
Dsgn. L = 1.75 ft	2	0.051	0.010	-0.00	-1.11	1.11	36.52	21.87	1.00	1.00	0.28	40.24	26.83
Dsgn. L = 4.13 ft	3	0.054	0.010		-1.11	1.11	34.03	20.38	1.00	1.00	0.28	40.24	26.83

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3488	0.000		0.0000	0.000
	2	0.0000	0.000	+D+S	-0.0145	0.875
+D+S	3	0.3467	4.125		0.0000	0.875

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions		4.728	7.293	
Max Upward from Load Combinations		4.728	6.947	
Max Upward from Load Cases		4.250	7.293	
Max Downward from all Load Conditions (Resis		-11.170		
Max Downward from Load Combinations (Resi		-6.415		
Max Downward from Load Cases (Resisting Up		-11.170		
D Only		0.478	0.478	
+D+S		4.728	4.728	
+D+0.750S		3.666	3.666	
+D+0.60W		-6.224	4.854	
+D+0.450W		-4.548	3.760	
+D+0.750S+0.450W		-1.361	6.947	
+0.60D+0.60W		-6.415	4.663	
+0.60D		0.287	0.287	
S Only		4.250	4.250	
W Only		-11.170	7.293	

Steel Section Properties : W8x10

Depth	=	7.890	in	I xx	=	30.80	in^4	J	=	0.043	in^4
Web Thick	=	0.170	in	S xx		7.81	in^3	Cw	=	30.90	in^6
Flange Width	=	3.940	in	R xx	=	3.220	in				
Flange Thick	=	0.205	in	Zx	=	8.870	in^3				
Area	=	2.960	in^2	I yy	=	2.090	in^4				
Weight	=	10.000	plf	S yy	=	1.060	in^3	Wno	=	7.570	in^2
Kdesign	=	0.505	in	R yy	=	0.841	in	Sw	=	1.530	in^4
K1	=	0.500	in	Zy	=	1.660	in^3	Qf	=	1.480	in^3
rts	=	1.010	in					Qw	=	4.290	in^3
Ycg	=	3.945	in								

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

Steel Column

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN 8'-0" POST

Code References

Calculations per AISC 360-16, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x4x3/16**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	8.0 ft
Top & Bottom Fixity	Top Free, Bottom Fixed
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 2.1
Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 2.1

Applied Loads

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

Column self weight included : 95.760 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, Xecc = 2.0 in, D = 0.9550, S = 8.50 k
BENDING LOADS . . .
Lat. Point Load at 8.0 ft creating My-y, W = 0.6840, E = 1.092 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6802** : 1

Load Combination	+D+0.750S+0.5250E
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pa : Axial	7.426 k
Pn / Omega : Allowabl	32.229 k
Ma-x : Applied	0.0 k-ft
Mn-x / Omega : Allowable	15.150 k-ft
Ma-y : Applied	-5.808 k-ft
Mn-y / Omega : Allowable	11.477 k-ft

PASS Maximum Shear Stress Rati **0.03821** : 1

Load Combination	+D+0.70E
Location of max.above base	0.0 ft
At maximum location values are . . .	
Va : Applied	0.7644 k
Vn / Omega : Allowable	20.003 k

Maximum Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	1.092 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X 1.261 in at 8.0 ft above base
for load combination : E Only

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.030	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.000	PASS	0.00 ft
+D+S	0.418	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.000	PASS	0.00 ft
+D+0.750S	0.325	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.000	PASS	0.00 ft
+D+0.60W	0.316	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.021	PASS	0.00 ft
+D+0.450W	0.245	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.015	PASS	0.00 ft
+D+0.750S+0.450W	0.516	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.015	PASS	0.00 ft
+0.60D+0.60W	0.304	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.021	PASS	0.00 ft
+D+0.70E	0.563	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.038	PASS	0.00 ft
+D+0.750S+0.5250E	0.680	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.029	PASS	0.00 ft
+0.60D+0.70E	0.551	PASS	0.00 ft	1.00	1.54	90.40	123.68	0.038	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base (k)	X-X Axis Reaction @ Base (k)	X-X Axis Reaction @ Top (k)	Y-Y Axis Reaction @ Base (k)	Y-Y Axis Reaction @ Top (k)	Mx - End Moments @ Base (k-ft)	Mx - End Moments @ Top (k-ft)	My - End Moments @ Base (k-ft)	My - End Moments @ Top (k-ft)
D Only	1.051							-0.159	
+D+S	9.551							-1.576	
+D+0.750S	7.426							-1.222	
+D+0.60W	1.051	-0.410						-3.442	

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

Steel Column

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN 8'-0" POST

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
+D+0.450W	1.051	-0.308							-2.622	
+D+0.750S+0.450W	7.426	-0.308							-3.684	
+0.60D+0.60W	0.630	-0.410							-3.379	
+D+0.70E	1.051	-0.764							-6.274	
+D+0.750S+0.5250E	7.426	-0.573							-5.808	
+0.60D+0.70E	0.630	-0.764							-6.211	
S Only	8.500								-1.417	
W Only		-0.684							-5.472	
E Only		-1.092							-8.736	

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	9.551								-1.576	
"	Minimum		-0.684							-5.472	
Reaction, X-X Axis Base	Maximum	1.051								-0.159	
"	Minimum		-1.092							-8.736	
Reaction, Y-Y Axis Base	Maximum	1.051								-0.159	
"	Minimum	1.051						-0.159			
Reaction, X-X Axis Top	Maximum	1.051								-0.159	
"	Minimum	1.051								-0.159	
Reaction, Y-Y Axis Top	Maximum	1.051								-0.159	
"	Minimum		-1.092							-8.736	
Moment, X-X Axis Base	Maximum	1.051								-0.159	
"	Minimum	1.051								-0.159	
Moment, Y-Y Axis Base	Maximum	1.051								-0.159	
"	Minimum		-1.092							-8.736	
Moment, X-X Axis Top	Maximum	1.051								-0.159	
"	Minimum	1.051								-0.159	
Moment, Y-Y Axis Top	Maximum	1.051								-0.159	
"	Minimum	1.051								-0.159	

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir		Distance		Max. Deflection in Y dir		Distance	
D Only	0.0344	in	8.000	ft	0.000	in	0.000	ft
+D+S	0.3407	in	8.000	ft	0.000	in	0.000	ft
+D+0.750S	0.2641	in	8.000	ft	0.000	in	0.000	ft
+D+0.60W	0.5084	in	8.000	ft	0.000	in	0.000	ft
+D+0.450W	0.3899	in	8.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W	0.6197	in	8.000	ft	0.000	in	0.000	ft
+0.60D+0.60W	0.4947	in	8.000	ft	0.000	in	0.000	ft
+D+0.70E	0.9173	in	8.000	ft	0.000	in	0.000	ft
+D+0.750S+0.5250E	0.9263	in	8.000	ft	0.000	in	0.000	ft
+0.60D+0.70E	0.9036	in	8.000	ft	0.000	in	0.000	ft
S Only	0.3063	in	8.000	ft	0.000	in	0.000	ft
W Only	0.7900	in	8.000	ft	0.000	in	0.000	ft
E Only	1.2485	in	7.946	ft	0.000	in	0.000	ft

Steel Section Properties : HSS6x4x3/16

Steel Section Properties : HSS6x4x3/16

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

Steel Column

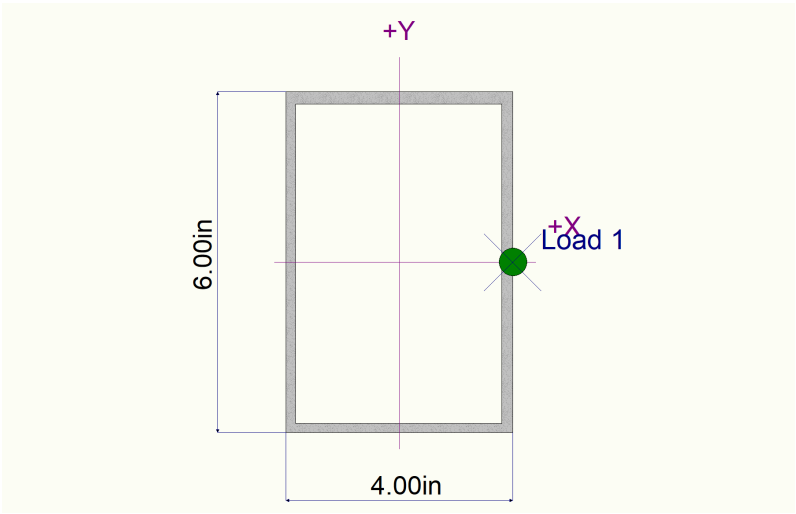
Project File: 20822 ENERCALC.ec6

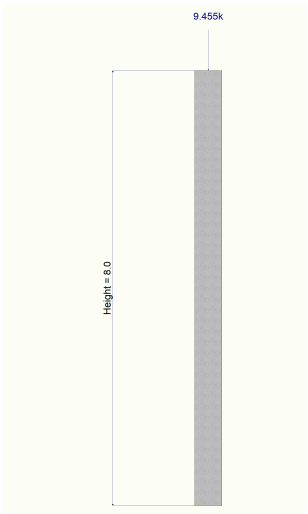
LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

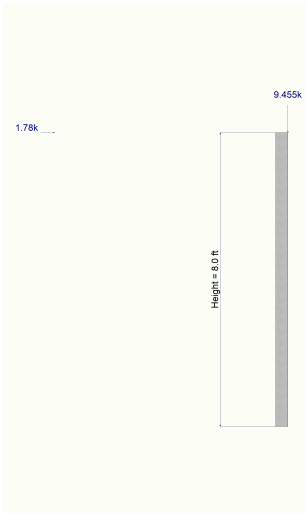
DESCRIPTION: LONG SPAN 8'-0" POST

Depth	=	6.000	in	I xx	=	16.40	in^4	J	=	18.200	in^4
Design Thick	=	0.174	in	S xx	=	5.46	in^3	Cw	=	7.74	in^6
Width	=	4.000	in	R xx	=	2.230	in				
Wall Thick	=	0.187	in	Zx	=	6.600	in^3				
Area	=	3.280	in^2	I yy	=	8.760	in^4	C	=	7.740	in^3
Weight	=	11.970	plf	S yy	=	4.380	in^3				
				R yy	=	1.630	in				
				Zy	=	5.000	in^3				
Ycg	=	0.000	in								

Sketches







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

Steel Column

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN 9'-0" POST

Code References

Calculations per AISC 360-16, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x4x3/16**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	9.0 ft
Top & Bottom Fixity	Top Free, Bottom Fixed
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 9.0 ft, K = 2.1
Unbraced Length for buckling ABOUT Y-Y Axis = 9.0 ft, K = 2.1

Applied Loads

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

Column self weight included : 107.730 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, Xecc = 2.0 in, D = 0.9550, S = 8.50 k
BENDING LOADS . . .
Lat. Point Load at 9.0 ft creating My-y, W = 0.6840, E = 1.099 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7889** : 1

Load Combination	+D+0.750S+0.5250E	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Pa : Axial	7.438	k
Pn / Omega : Allowabl	25.465	k
Ma-x : Applied	0.0	k-ft
Mn-x / Omega : Allowable	15.150	k-ft
Ma-y : Applied	-6.414	k-ft
Mn-y / Omega : Allowable	11.477	k-ft

PASS Maximum Shear Stress Rati **0.03846** : 1

Load Combination	+D+0.70E	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Va : Applied	0.7693	k
Vn / Omega : Allowable	20.003	k

Maximum Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	1.099 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X 1.807 in at 9.0 ft above base
for load combination : E Only

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.035	PASS	6.04 ft	1.00	1.57	101.70	139.14	0.000	PASS	0.00 ft
+D+S	0.498	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.000	PASS	0.00 ft
+D+0.750S	0.387	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.000	PASS	0.00 ft
+D+0.60W	0.357	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.021	PASS	0.00 ft
+D+0.450W	0.276	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.015	PASS	0.00 ft
+D+0.750S+0.450W	0.601	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.015	PASS	0.00 ft
+0.60D+0.60W	0.343	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.021	PASS	0.00 ft
+D+0.70E	0.638	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.038	PASS	0.00 ft
+D+0.750S+0.5250E	0.789	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.029	PASS	0.00 ft
+0.60D+0.70E	0.624	PASS	0.00 ft	1.00	1.57	101.70	139.14	0.038	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base (k)	X-X Axis Reaction @ Base (k)	X-X Axis Reaction @ Top (k)	Y-Y Axis Reaction @ Base (k)	Y-Y Axis Reaction @ Top (k)	Mx - End Moments @ Base (k-ft)	Mx - End Moments @ Top (k-ft)	My - End Moments @ Base (k-ft)	My - End Moments @ Top (k-ft)
D Only	1.063							-0.159	
+D+S	9.563							-1.576	
+D+0.750S	7.438							-1.222	
+D+0.60W	1.063	-0.410						-3.853	

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

Steel Column

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN 9'-0" POST

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
+D+0.450W	1.063	-0.308							-2.929	
+D+0.750S+0.450W	7.438	-0.308							-3.992	
+0.60D+0.60W	0.638	-0.410							-3.789	
+D+0.70E	1.063	-0.769							-7.083	
+D+0.750S+0.5250E	7.438	-0.577							-6.414	
+0.60D+0.70E	0.638	-0.769							-7.019	
S Only	8.500								-1.417	
W Only		-0.684							-6.156	
E Only		-1.099							-9.891	

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	9.563								-1.576	
"	Minimum		-0.684							-6.156	
Reaction, X-X Axis Base	Maximum	1.063								-0.159	
"	Minimum		-1.099							-9.891	
Reaction, Y-Y Axis Base	Maximum	1.063								-0.159	
"	Minimum	1.063						-0.159			
Reaction, X-X Axis Top	Maximum	1.063								-0.159	
"	Minimum	1.063								-0.159	
Reaction, Y-Y Axis Top	Maximum	1.063								-0.159	
"	Minimum		-1.099							-9.891	
Moment, X-X Axis Base	Maximum	1.063								-0.159	
"	Minimum	1.063								-0.159	
Moment, Y-Y Axis Base	Maximum	1.063								-0.159	
"	Minimum		-1.099							-9.891	
Moment, X-X Axis Top	Maximum	1.063								-0.159	
"	Minimum	1.063								-0.159	
Moment, Y-Y Axis Top	Maximum	1.063								-0.159	
"	Minimum	1.063								-0.159	

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir		Distance		Max. Deflection in Y dir		Distance	
D Only	0.0436	in	9.000	ft	0.000	in	0.000	ft
+D+S	0.4312	in	9.000	ft	0.000	in	0.000	ft
+D+0.750S	0.3343	in	9.000	ft	0.000	in	0.000	ft
+D+0.60W	0.7185	in	9.000	ft	0.000	in	0.000	ft
+D+0.450W	0.5498	in	9.000	ft	0.000	in	0.000	ft
+D+0.750S+0.450W	0.8405	in	9.000	ft	0.000	in	0.000	ft
+0.60D+0.60W	0.7011	in	9.000	ft	0.000	in	0.000	ft
+D+0.70E	1.3087	in	9.000	ft	0.000	in	0.000	ft
+D+0.750S+0.5250E	1.2832	in	9.000	ft	0.000	in	0.000	ft
+0.60D+0.70E	1.2913	in	9.000	ft	0.000	in	0.000	ft
S Only	0.3877	in	9.000	ft	0.000	in	0.000	ft
W Only	1.1249	in	9.000	ft	0.000	in	0.000	ft
E Only	1.7891	in	8.940	ft	0.000	in	0.000	ft

Steel Section Properties : HSS6x4x3/16

Steel Section Properties : HSS6x4x3/16

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

Steel Column

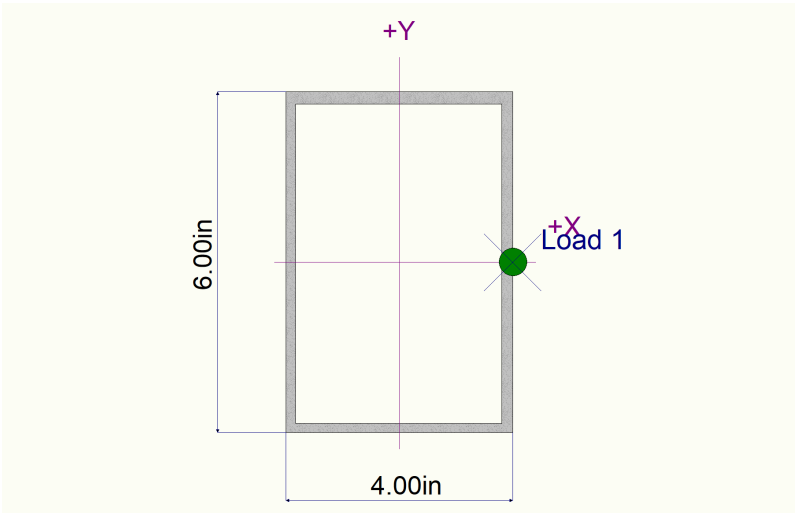
Project File: 20822 ENERCALC.ec6

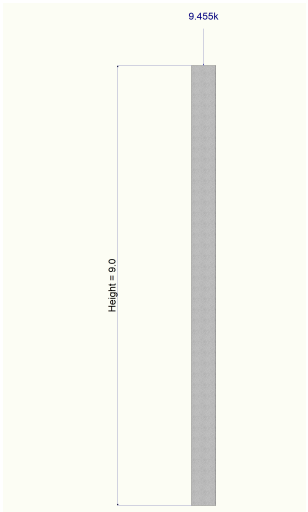
LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

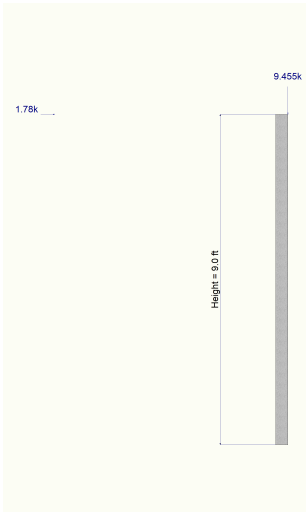
DESCRIPTION: LONG SPAN 9'-0" POST

Depth	=	6.000	in	I xx	=	16.40	in^4	J	=	18.200	in^4
Design Thick	=	0.174	in	S xx	=	5.46	in^3	Cw	=	7.74	in^6
Width	=	4.000	in	R xx	=	2.230	in				
Wall Thick	=	0.187	in	Zx	=	6.600	in^3				
Area	=	3.280	in^2	I yy	=	8.760	in^4	C	=	7.740	in^3
Weight	=	11.970	plf	S yy	=	4.380	in^3				
				R yy	=	1.630	in				
				Zy	=	5.000	in^3				
Ycg	=	0.000	in								

Sketches







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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN FOOTING FOR 8'-0" POST

Code References

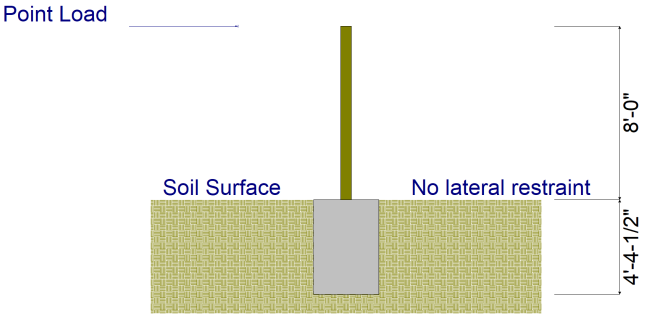
Calculations per IBC 2021 1807.3
Load Combinations Used : ASCE 7-16

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	36.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	300.0 pcf
Max Passive	psf

Controlling Values

Governing Load Combinatio	+D+0.70E
Lateral Load	0.7644 k
Moment	6.115 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	**425.533** psf
Allowable	**426.550** psf
Minimum Required Depth	**4.375 ft**
Footing Base Area	7.069 ft^2
Maximum Soil Pressure	1.351 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k		Vertical Load (k)	
D : Dead Load	k		k/ft	1.051	k
Lr : Roof Live	k		k/ft		k
L : Live	k		k/ft		k
S : Snow	k		k/ft	8.50	k
W : Wind	0.6840 k		k/ft		k
E : Earthquake	1.092 k		k/ft		k
H : Lateral Earth	k		k/ft		k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft		
		BOTTOM of Load above ground surface	ft		

Load Combination Results

	Forces @ Ground Surface		Required	Pressure at 1/3 Depth		Soil Increase
Load Combination	Loads - (k)	Moments - (ft-k)	Depth - (ft)	Actual - (psf)	Allow - (psf)	Factor
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	0.410	3.283	3.50	337.6	338.8	1.000
+D+0.450W	0.308	2.462	3.13	303.1	305.4	1.000
+D+0.750S+0.450W	0.308	2.462	3.13	303.1	305.4	1.000
+0.60D+0.60W	0.410	3.283	3.50	337.6	338.8	1.000
+D+0.70E	0.764	6.115	4.38	425.5	426.6	1.000
+D+0.750S+0.5250E	0.573	4.586	3.88	382.4	383.1	1.000

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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN FOOTING FOR 8'-0" POST

+0.60D+0.70E	0.764	6.115	4.38	425.5	426.6	1.000

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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

DESCRIPTION: LONG SPAN FOOTING FOR 9'-0" POST

Code References

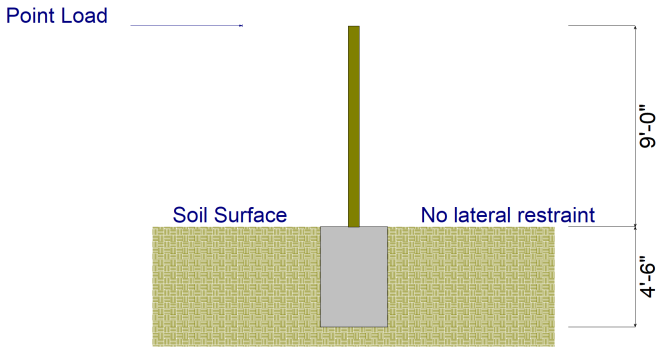
Calculations per IBC 2021 1807.3
Load Combinations Used : ASCE 7-16

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	36.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	300.0 pcf
Max Passive	psf

Controlling Values

Governing Load Combinatio	+D+0.70E
Lateral Load	0.7693 k
Moment	6.924 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	**439.679** psf
Allowable	**440.446** psf
Minimum Required Depth	**4.50 ft**
Footing Base Area	7.069 ft^2
Maximum Soil Pressure	1.353 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k		Vertical Load (k)	
D : Dead Load	k		k/ft	1.063	k
Lr : Roof Live	k		k/ft		k
L : Live	k		k/ft		k
S : Snow	k		k/ft	8.50	k
W : Wind	0.6840 k		k/ft		k
E : Earthquake	1.099 k		k/ft		k
H : Lateral Earth	k		k/ft		k
Load distance above ground surface	9.0 ft	TOP of Load above ground surface	ft		
		BOTTOM of Load above ground surface	ft		

Load Combination Results

	Forces @ Ground Surface		Required	Pressure at 1/3 Depth		Soil Increase
Load Combination	Loads - (k)	Moments - (ft-k)	Depth - (ft)	Actual - (psf)	Allow - (psf)	Factor
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750S	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	0.410	3.694	3.50	348.3	349.7	1.000
+D+0.450W	0.308	2.770	3.25	314.2	314.7	1.000
+D+0.750S+0.450W	0.308	2.770	3.25	314.2	314.7	1.000
+0.60D+0.60W	0.410	3.694	3.50	348.3	349.7	1.000
+D+0.70E	0.769	6.924	4.50	439.7	440.4	1.000
+D+0.750S+0.5250E	0.577	5.193	4.00	394.8	396.2	1.000

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

Pole Footing Embedded in Soil

Project File: 20822 ENERCALC.ec6

 (c) ENERCALC, LLC 1982-2025

DESCRIPTION: LONG SPAN FOOTING FOR 9'-0" POST

+0.60D+0.70E	0.769	6.924	4.50	439.7	440.4	1.000

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

General Footing

LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 8'-0" POST

Code References

Calculations per ACI 318-19, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00090
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

Footing base depth below soil surface	=	2.0	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=		ksf
when max. length or width is greater than	=		ft

Dimensions

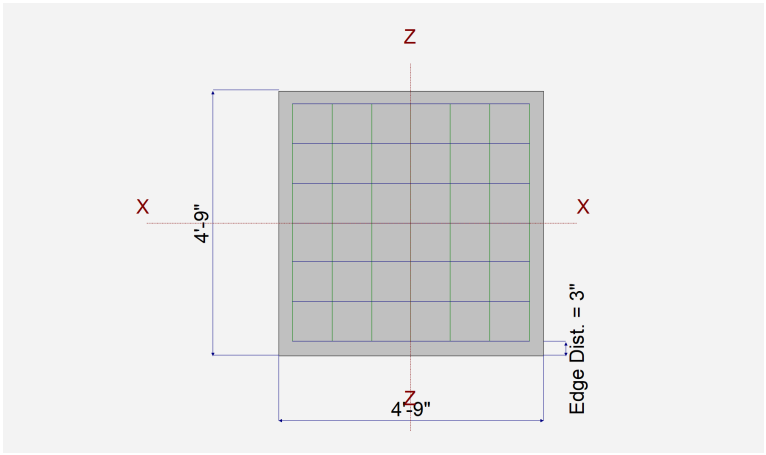
Width parallel to X-X Axis	=	4.750	ft
Length parallel to Z-Z Axis	=	4.750	ft
Footing Thickness	=	24.0	in

Pedestal dimensions...

px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0	in

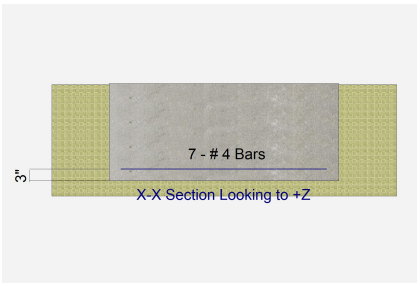


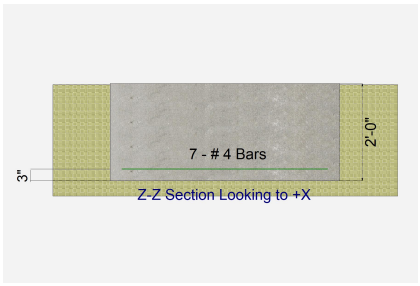
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		7.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		7.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	0.9550			8.50	-3.877			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=					5.474	8.736		k-ft
V-x	=					0.6840	1.092		k
V-z	=								k

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 8'-0" POST

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.3546	Soil Bearing	0.7091 ksf	2.0 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.110	Overturning - Z-Z	9.630 k-ft	10.685 k-ft	+0.60D+0.60W
PASS	3.336	Sliding - X-X	0.7644 k	2.550 k	+0.60D+0.70E
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	1.934	Uplift	-2.326 k	4.499 k	+0.60D+0.60W
PASS	0.07159	Z Flexure (+X)	1.961 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.06729	Z Flexure (-X)	1.843 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S
PASS	0.06729	X Flexure (+Z)	1.843 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S
PASS	0.06729	X Flexure (-Z)	1.843 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S
PASS	0.06359	1-way Shear (+X)	2.010 psi	31.608 psi	+0.90D+E
PASS	0.05067	1-way Shear (-X)	1.601 psi	31.608 psi	+1.20D+1.60S
PASS	0.05067	1-way Shear (+Z)	1.601 psi	31.608 psi	+1.20D+1.60S
PASS	0.05067	1-way Shear (-Z)	1.601 psi	31.608 psi	+1.20D+1.60S
PASS	0.04851	2-way Punching	7.276 psi	150.0 psi	+1.20D+1.60S

Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.0	n/a	0.0	0.3323	0.3323	n/a	n/a	0.166
X-X, +D+S	2.0	n/a	0.0	0.7091	0.7091	n/a	n/a	0.355
X-X, +D+0.750S	2.0	n/a	0.0	0.6149	0.6149	n/a	n/a	0.308
X-X, +D+0.60W	2.660	n/a	0.0	0.2292	0.2292	n/a	n/a	0.086
X-X, +D+0.450W	2.660	n/a	0.0	0.2550	0.2550	n/a	n/a	0.096
X-X, +D+0.750S+0.450W	2.660	n/a	0.0	0.5376	0.5376	n/a	n/a	0.202
X-X, +0.60D+0.60W	2.660	n/a	0.0	0.09630	0.09630	n/a	n/a	0.036
X-X, +D+0.70E	2.660	n/a	0.0	0.3323	0.3323	n/a	n/a	0.125
X-X, +D+0.750S+0.5250E	2.660	n/a	0.0	0.6149	0.6149	n/a	n/a	0.231
X-X, +0.60D+0.70E	2.660	n/a	0.0	0.1994	0.1994	n/a	n/a	0.075
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.3323	0.3323	0.166
Z-Z, +D+S	2.0	0.0	n/a	n/a	n/a	0.7091	0.7091	0.355
Z-Z, +D+0.750S	2.0	0.0	n/a	n/a	n/a	0.6149	0.6149	0.308
Z-Z, +D+0.60W	2.660	9.525	n/a	n/a	n/a	0.001694	0.4568	0.172
Z-Z, +D+0.450W	2.660	6.422	n/a	n/a	n/a	0.08435	0.4257	0.160
Z-Z, +D+0.750S+0.450W	2.660	3.046	n/a	n/a	n/a	0.3669	0.7082	0.266
Z-Z, +0.60D+0.60W	2.660	22.674	n/a	n/a	n/a	0.0	0.6178	0.232
Z-Z, +D+0.70E	2.660	12.233	n/a	n/a	n/a	0.0	0.7718	0.290
Z-Z, +D+0.750S+0.5250E	2.660	4.959	n/a	n/a	n/a	0.2971	0.9326	0.351
Z-Z, +0.60D+0.70E	2.660	20.389	n/a	n/a	n/a	0.0	0.9232	0.347

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+S	None	0.0 k-ft	Infinity	OK

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

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 8'-0" POST

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Z-Z, +D+0.750S	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	9.630 k-ft	17.808 k-ft	1.849	OK
Z-Z, +D+0.450W	7.222 k-ft	17.808 k-ft	2.466	OK
Z-Z, +D+0.750S+0.450W	7.222 k-ft	32.949 k-ft	4.562	OK
Z-Z, +0.60D+0.60W	9.630 k-ft	10.685 k-ft	1.110	OK
Z-Z, +D+0.70E	7.644 k-ft	17.808 k-ft	2.330	OK
Z-Z, +D+0.750S+0.5250E	5.733 k-ft	32.949 k-ft	5.747	OK
Z-Z, +0.60D+0.70E	7.644 k-ft	10.685 k-ft	1.398	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	3.30 k	No Sliding	OK
X-X, +D+S	0.0 k	5.425 k	No Sliding	OK
X-X, +D+0.750S	0.0 k	4.893 k	No Sliding	OK
X-X, +D+0.60W	0.4104 k	2.718 k	6.623	OK
X-X, +D+0.450W	0.3078 k	2.863 k	9.303	OK
X-X, +D+0.750S+0.450W	0.3078 k	4.457 k	14.481	OK
X-X, +0.60D+0.60W	0.4104 k	1.968 k	4.796	OK
X-X, +D+0.70E	0.7644 k	3.30 k	4.317	OK
X-X, +D+0.750S+0.5250E	0.5733 k	4.893 k	8.535	OK
X-X, +0.60D+0.70E	0.7644 k	2.550 k	3.336	OK
Z-Z, D Only	0.0 k	3.30 k	No Sliding	OK
Z-Z, +D+S	0.0 k	5.425 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	4.893 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	2.718 k	No Sliding	OK
Z-Z, +D+0.70E	0.0 k	3.30 k	No Sliding	OK
Z-Z, +D+0.750S+0.5250E	0.0 k	4.893 k	No Sliding	OK
Z-Z, +0.60D+0.70E	0.0 k	2.550 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	2.863 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	4.457 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	1.968 k	No Sliding	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1671	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.40D	0.1671	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D	0.1433	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D	0.1433	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S	0.6745	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S	0.6745	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50W	0.09906	+Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50W	0.09906	-Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S	1.843	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S	1.843	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S+0.50W	1.601	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S+0.50W	1.601	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+W	0.3414	+Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+W	0.3414	-Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S+W	0.1899	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S+W	0.1899	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+W	0.3772	+Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+W	0.3772	-Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.20S+E	0.3558	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.20S+E	0.3558	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+E	0.1074	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+E	0.1074	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.40D	0.1671	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.40D	0.1671	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D	0.1433	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D	0.1433	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 8'-0" POST

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50S	0.6745	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50S	0.6745	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50W	0.4591	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50W	0.2610	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S	1.843	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S	1.843	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S+0.50W	1.241	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S+0.50W	1.961	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+W	0.9664	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+W	0.4739	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50S+W	0.5303	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50S+W	0.910	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+W	0.7361	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+W	0.7361	+X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.20S+E	0.7629	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.20S+E	1.536	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+E	0.7361	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+E	1.563	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.15 psi	0.15 psi	0.15 psi	31.61 psi	0.00	OK
+1.20D	0.12 psi	0.12 psi	0.12 psi	31.61 psi	0.00	OK
+1.20D+0.50S	0.59 psi	0.59 psi	0.59 psi	31.61 psi	0.02	OK
+1.20D+0.50W	0.49 psi	0.32 psi	0.49 psi	31.61 psi	0.02	OK
+1.20D+1.60S	1.60 psi	1.60 psi	1.60 psi	31.61 psi	0.05	OK
+1.20D+1.60S+0.50W	0.98 psi	1.80 psi	1.80 psi	31.61 psi	0.06	OK
+1.20D+W	0.85 psi	0.67 psi	0.85 psi	31.61 psi	0.03	OK
+1.20D+0.50S+W	0.65 psi	0.98 psi	0.98 psi	31.61 psi	0.03	OK
+0.90D+W	0.64 psi	0.64 psi	0.64 psi	31.61 psi	0.02	OK
+1.20D+0.20S+E	0.85 psi	1.66 psi	1.66 psi	31.61 psi	0.05	OK
+0.90D+E	0.64 psi	2.01 psi	2.01 psi	31.61 psi	0.06	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.15 psi	0.15 psi	0.15 psi	31.61 psi	0.00	OK
+1.20D	0.12 psi	0.12 psi	0.12 psi	31.61 psi	0.00	OK
+1.20D+0.50S	0.59 psi	0.59 psi	0.59 psi	31.61 psi	0.02	OK
+1.20D+0.50W	0.09 psi	0.09 psi	0.09 psi	31.61 psi	0.00	OK
+1.20D+1.60S	1.60 psi	1.60 psi	1.60 psi	31.61 psi	0.05	OK
+1.20D+1.60S+0.50W	1.39 psi	1.39 psi	1.39 psi	31.61 psi	0.04	OK
+1.20D+W	0.30 psi	0.30 psi	0.30 psi	31.61 psi	0.01	OK
+1.20D+0.50S+W	0.17 psi	0.17 psi	0.17 psi	31.61 psi	0.01	OK
+0.90D+W	0.33 psi	0.33 psi	0.33 psi	31.61 psi	0.01	OK
+1.20D+0.20S+E	0.31 psi	0.31 psi	0.31 psi	31.61 psi	0.01	OK
+0.90D+E	0.09 psi	0.09 psi	0.09 psi	31.61 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.66 psi	150.00 psi	0.004398	OK
+1.20D	0.57 psi	150.00 psi	0.00377	OK
+1.20D+0.50S	2.66 psi	150.00 psi	0.01775	OK
+1.20D+0.50W	0.39 psi	150.00 psi	0.002607	OK
+1.20D+1.60S	7.28 psi	150.00 psi	0.04851	OK
+1.20D+1.60S+0.50W	6.32 psi	150.00 psi	0.04213	OK
+1.20D+W	1.35 psi	150.00 psi	0.008984	OK
+1.20D+0.50S+W	0.75 psi	150.00 psi	0.004997	OK
+0.90D+W	2.91 psi	150.00 psi	0.01937	OK
+1.20D+0.20S+E	1.43 psi	150.00 psi	0.009511	OK
+0.90D+E	0.77 psi	150.00 psi	0.005129	OK

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

General Footing

LIC# : KW-06014086, Build:20.24.10.30 SITTS & HILL ENGINEERING, INC. (c) ENERCALC, LLC 1982-2025

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 9'-0" POST

Code References

Calculations per ACI 318-19, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00090
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	150.0 pcf
Soil/Concrete Friction Coeff.	=	0.250

Increases based on footing Depth

Footing base depth below soil surface	=	2.0 ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

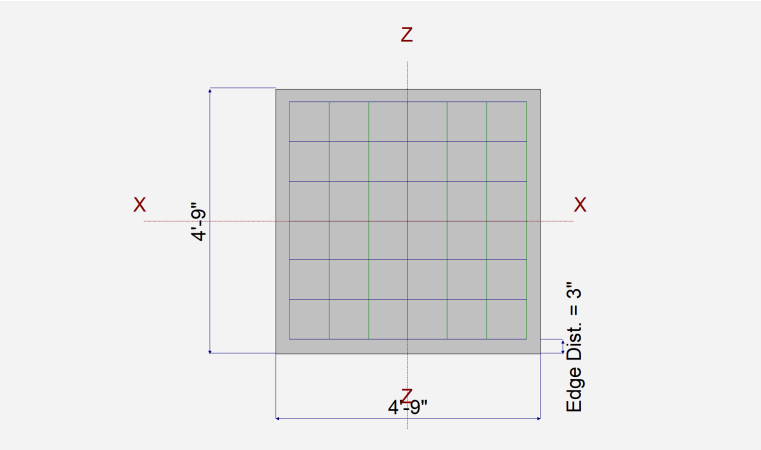
Width parallel to X-X Axis	=	4.750 ft
Length parallel to Z-Z Axis	=	4.750 ft
Footing Thickness	=	24.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

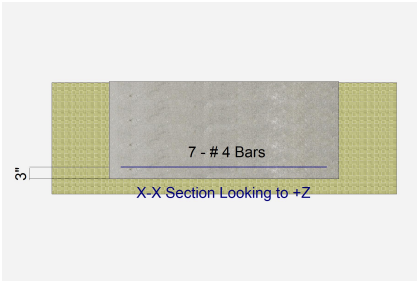


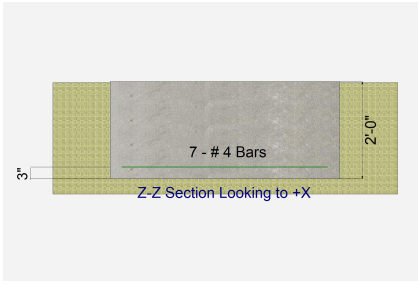
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		7.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		7.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	0.9550			8.50	-3.877			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=					6.158	9.887		k-ft
V-x	=					0.6840	1.099		k
V-z	=								k

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 9'-0" POST

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4722	Soil Bearing	1.256 ksf	2.660 ksf	+0.60D+0.70E about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.064	Overturning - Z-Z	10.040 k-ft	10.685 k-ft	+0.60D+0.60W
PASS	3.314	Sliding - X-X	0.7693 k	2.550 k	+0.60D+0.70E
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	1.934	Uplift	-2.326 k	4.499 k	+0.60D+0.60W
PASS	0.07290	Z Flexure (+X)	1.997 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S+0.50W
PASS	0.06729	Z Flexure (-X)	1.843 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S
PASS	0.06729	X Flexure (+Z)	1.843 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S
PASS	0.06729	X Flexure (-Z)	1.843 k-ft/ft	27.393 k-ft/ft	+1.20D+1.60S
PASS	0.08331	1-way Shear (+X)	2.633 psi	31.608 psi	+0.90D+E
PASS	0.05067	1-way Shear (-X)	1.601 psi	31.608 psi	+1.20D+1.60S
PASS	0.05067	1-way Shear (+Z)	1.601 psi	31.608 psi	+1.20D+1.60S
PASS	0.05067	1-way Shear (-Z)	1.601 psi	31.608 psi	+1.20D+1.60S
PASS	0.04851	2-way Punching	7.276 psi	150.0 psi	+1.20D+1.60S

Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	2.0	n/a	0.0	0.3323	0.3323	n/a	n/a	0.166
X-X, +D+S	2.0	n/a	0.0	0.7091	0.7091	n/a	n/a	0.355
X-X, +D+0.750S	2.0	n/a	0.0	0.6149	0.6149	n/a	n/a	0.308
X-X, +D+0.60W	2.660	n/a	0.0	0.2292	0.2292	n/a	n/a	0.086
X-X, +D+0.450W	2.660	n/a	0.0	0.2550	0.2550	n/a	n/a	0.096
X-X, +D+0.750S+0.450W	2.660	n/a	0.0	0.5376	0.5376	n/a	n/a	0.202
X-X, +0.60D+0.60W	2.660	n/a	0.0	0.09630	0.09630	n/a	n/a	0.036
X-X, +D+0.70E	2.660	n/a	0.0	0.3323	0.3323	n/a	n/a	0.125
X-X, +D+0.750S+0.5250E	2.660	n/a	0.0	0.6149	0.6149	n/a	n/a	0.231
X-X, +0.60D+0.70E	2.660	n/a	0.0	0.1994	0.1994	n/a	n/a	0.075
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.3323	0.3323	0.166
Z-Z, +D+S	2.0	0.0	n/a	n/a	n/a	0.7091	0.7091	0.355
Z-Z, +D+0.750S	2.0	0.0	n/a	n/a	n/a	0.6149	0.6149	0.308
Z-Z, +D+0.60W	2.660	10.477	n/a	n/a	n/a	0.0	0.4808	0.181
Z-Z, +D+0.450W	2.660	7.064	n/a	n/a	n/a	0.06729	0.4427	0.166
Z-Z, +D+0.750S+0.450W	2.660	3.351	n/a	n/a	n/a	0.3498	0.7253	0.273
Z-Z, +0.60D+0.60W	2.660	24.940	n/a	n/a	n/a	0.0	1.001	0.376
Z-Z, +D+0.70E	2.660	13.539	n/a	n/a	n/a	0.0	0.8387	0.315
Z-Z, +D+0.750S+0.5250E	2.660	5.488	n/a	n/a	n/a	0.2632	0.9665	0.363
Z-Z, +0.60D+0.70E	2.660	22.564	n/a	n/a	n/a	0.0	1.256	0.472

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.750S+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+S	None	0.0 k-ft	Infinity	OK

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

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 9'-0" POST

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Z-Z, +D+0.750S	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	10.040 k-ft	17.808 k-ft	1.774	OK
Z-Z, +D+0.450W	7.530 k-ft	17.808 k-ft	2.365	OK
Z-Z, +D+0.750S+0.450W	7.530 k-ft	32.949 k-ft	4.376	OK
Z-Z, +0.60D+0.60W	10.040 k-ft	10.685 k-ft	1.064	OK
Z-Z, +D+0.70E	8.460 k-ft	17.808 k-ft	2.105	OK
Z-Z, +D+0.750S+0.5250E	6.345 k-ft	32.949 k-ft	5.193	OK
Z-Z, +0.60D+0.70E	8.460 k-ft	10.685 k-ft	1.263	OK

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
X-X, D Only	0.0 k	3.30 k	No Sliding	OK
X-X, +D+S	0.0 k	5.425 k	No Sliding	OK
X-X, +D+0.750S	0.0 k	4.893 k	No Sliding	OK
X-X, +D+0.60W	0.4104 k	2.718 k	6.623	OK
X-X, +D+0.450W	0.3078 k	2.863 k	9.303	OK
X-X, +D+0.750S+0.450W	0.3078 k	4.457 k	14.481	OK
X-X, +0.60D+0.60W	0.4104 k	1.968 k	4.796	OK
X-X, +D+0.70E	0.7693 k	3.30 k	4.289	OK
X-X, +D+0.750S+0.5250E	0.5770 k	4.893 k	8.481	OK
X-X, +0.60D+0.70E	0.7693 k	2.550 k	3.314	OK
Z-Z, D Only	0.0 k	3.30 k	No Sliding	OK
Z-Z, +D+S	0.0 k	5.425 k	No Sliding	OK
Z-Z, +D+0.750S	0.0 k	4.893 k	No Sliding	OK
Z-Z, +D+0.60W	0.0 k	2.718 k	No Sliding	OK
Z-Z, +D+0.70E	0.0 k	3.30 k	No Sliding	OK
Z-Z, +D+0.750S+0.5250E	0.0 k	4.893 k	No Sliding	OK
Z-Z, +0.60D+0.70E	0.0 k	2.550 k	No Sliding	OK
Z-Z, +D+0.450W	0.0 k	2.863 k	No Sliding	OK
Z-Z, +D+0.750S+0.450W	0.0 k	4.457 k	No Sliding	OK
Z-Z, +0.60D+0.60W	0.0 k	1.968 k	No Sliding	OK

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1671	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.40D	0.1671	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D	0.1433	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D	0.1433	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S	0.6745	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S	0.6745	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50W	0.09906	+Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50W	0.09906	-Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S	1.843	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S	1.843	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S+0.50W	1.601	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+1.60S+0.50W	1.601	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+W	0.3414	+Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+W	0.3414	-Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S+W	0.1899	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.50S+W	0.1899	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+W	0.3772	+Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+W	0.3772	-Z	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.20S+E	0.3558	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +1.20D+0.20S+E	0.3558	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+E	0.1074	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
X-X, +0.90D+E	0.1074	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.40D	0.1671	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.40D	0.1671	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D	0.1433	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D	0.1433	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK

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

General Footing

Project File: 20822 ENERCALC.ec6

DESCRIPTION: LONG SPAN ALTERNATE FOOTING FOR 9'-0" POST

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50S	0.6745	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50S	0.6745	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50W	0.4951	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50W	0.2970	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S	1.843	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S	1.843	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S+0.50W	1.205	-X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+1.60S+0.50W	1.997	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+W	0.9795	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+W	0.6048	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50S+W	0.6022	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.50S+W	0.9821	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+W	0.7361	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+W	0.7361	+X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.20S+E	0.8459	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +1.20D+0.20S+E	1.698	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+E	0.7361	-X	Top	0.2592	ACI 7.6.1.1	0.2947	27.393	OK
Z-Z, +0.90D+E	1.808	+X	Bottom	0.2592	ACI 7.6.1.1	0.2947	27.393	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.15 psi	0.15 psi	0.15 psi	31.61 psi	0.00	OK
+1.20D	0.12 psi	0.12 psi	0.12 psi	31.61 psi	0.00	OK
+1.20D+0.50S	0.59 psi	0.59 psi	0.59 psi	31.61 psi	0.02	OK
+1.20D+0.50W	0.54 psi	0.36 psi	0.54 psi	31.61 psi	0.02	OK
+1.20D+1.60S	1.60 psi	1.60 psi	1.60 psi	31.61 psi	0.05	OK
+1.20D+1.60S+0.50W	0.94 psi	1.84 psi	1.84 psi	31.61 psi	0.06	OK
+1.20D+W	0.85 psi	0.87 psi	0.87 psi	31.61 psi	0.03	OK
+1.20D+0.50S+W	0.73 psi	1.06 psi	1.06 psi	31.61 psi	0.03	OK
+0.90D+W	0.64 psi	0.64 psi	0.64 psi	31.61 psi	0.02	OK
+1.20D+0.20S+E	0.85 psi	1.86 psi	1.86 psi	31.61 psi	0.06	OK
+0.90D+E	0.64 psi	2.63 psi	2.63 psi	31.61 psi	0.08	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.15 psi	0.15 psi	0.15 psi	31.61 psi	0.00	OK
+1.20D	0.12 psi	0.12 psi	0.12 psi	31.61 psi	0.00	OK
+1.20D+0.50S	0.59 psi	0.59 psi	0.59 psi	31.61 psi	0.02	OK
+1.20D+0.50W	0.09 psi	0.09 psi	0.09 psi	31.61 psi	0.00	OK
+1.20D+1.60S	1.60 psi	1.60 psi	1.60 psi	31.61 psi	0.05	OK
+1.20D+1.60S+0.50W	1.39 psi	1.39 psi	1.39 psi	31.61 psi	0.04	OK
+1.20D+W	0.30 psi	0.30 psi	0.30 psi	31.61 psi	0.01	OK
+1.20D+0.50S+W	0.17 psi	0.17 psi	0.17 psi	31.61 psi	0.01	OK
+0.90D+W	0.33 psi	0.33 psi	0.33 psi	31.61 psi	0.01	OK
+1.20D+0.20S+E	0.31 psi	0.31 psi	0.31 psi	31.61 psi	0.01	OK
+0.90D+E	0.09 psi	0.09 psi	0.09 psi	31.61 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.66 psi	150.00 psi	0.004398	OK
+1.20D	0.57 psi	150.00 psi	0.00377	OK
+1.20D+0.50S	2.66 psi	150.00 psi	0.01775	OK
+1.20D+0.50W	0.39 psi	150.00 psi	0.002607	OK
+1.20D+1.60S	7.28 psi	150.00 psi	0.04851	OK
+1.20D+1.60S+0.50W	6.32 psi	150.00 psi	0.04213	OK
+1.20D+W	1.35 psi	150.00 psi	0.008984	OK
+1.20D+0.50S+W	0.75 psi	150.00 psi	0.004997	OK
+0.90D+W	2.91 psi	150.00 psi	0.01937	OK
+1.20D+0.20S+E	1.46 psi	150.00 psi	0.009747	OK
+0.90D+E	0.90 psi	150.00 psi	0.005971	OK

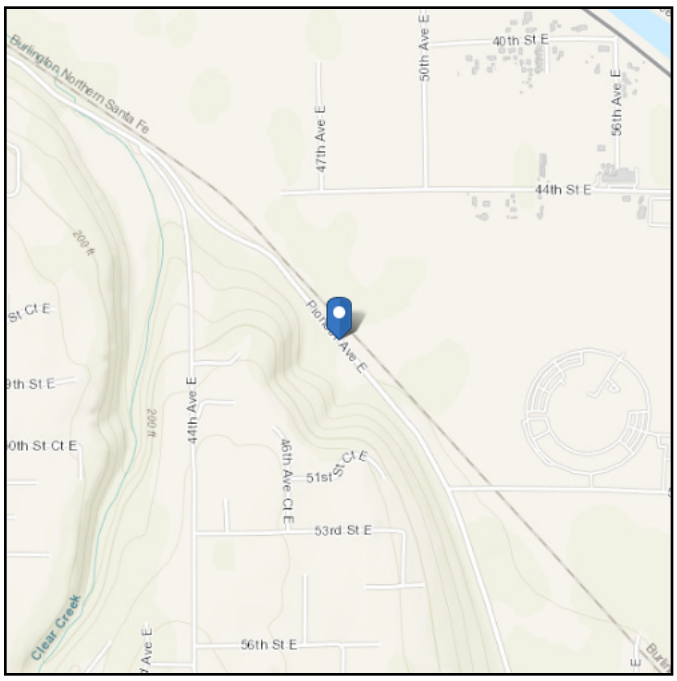
ASCE Hazards Report

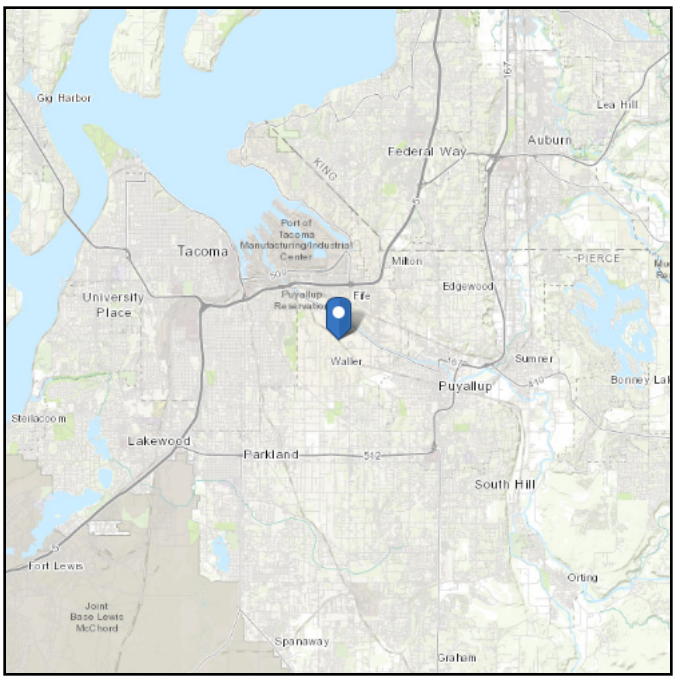
City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

Address:
Pioneer Way E
Puyallup, Washington
98371

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 47.213645
Longitude: -122.365315
Elevation: 24.3694552253606 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: Tue Feb 04 2025

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.

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

Seismic

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

Results:

S_S :	1.308	S_{D1} :	N/A
S_1 :	0.451	T_L :	6
F_a :	1.2	PGA :	0.5
F_v :	N/A	PGA_M :	0.6
S_{MS} :	1.57	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.047	C_v :	1.362

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

Data Accessed: Tue Feb 04 2025

Date Source: USGS Seismic Design Maps

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

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

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.

Soil Site Class

All of Pierce County will be assumed to be soil Site Class D, unless a geotechnical evaluation is required from Development Engineering. In this case, the findings of the professional evaluation will set the soil site class and related seismic information. This report must be turned in with the building application.

Soil Load-Bearing Values

Assume 1,500 pounds per square foot (PSF) unless a soils report from a licensed geotechnical engineer is provided.

Frost Depth

All low-land areas have a frost depth of 12 inches below grade. Higher elevations will have a deeper frost depth. Visit PierceCountyWa.gov/AboutMyProperty or check with Building technical support for your specific project.

**Site specific snow loads do not apply to your minimum required design criteria.

**This website provides approximate information only and does not guarantee validity.