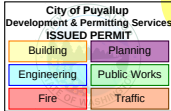


THE APPROVED CONSTRUCTION PLANS AND
ALL ENGINEERING DOCUMENTS MUST BE
POSTED ON THE JOB AT ALL INSPECTIONS IN A
VISIBLE AND READILY ACCESSIBLE LOCATION.

City of Puyallup
Building
ACCEPTED

JMontgomery
05/05/2023
8:13:50 AM



SUPPLEMENTAL STRUCTURAL CALCULATIONS

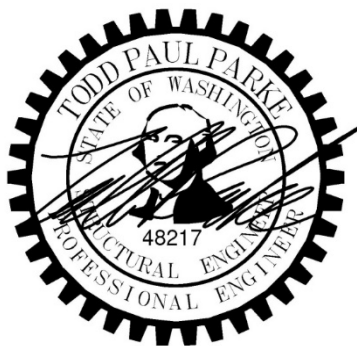
FOR

THE APPROVED CONSTRUCTION PLANS,
DOCUMENTS AND ALL ENGINEERING MUST
BE POSTED ON THE JOB AT ALL
INSPECTIONS IN A VISIBLE AND READILY
ACCESSIBLE LOCATION.

FULL SIZED LEDGIBLE COLOR PLANS ARE
REQUIRED TO BE PROVIDED BY THE
PERMITEE ON SITE FOR INSPECTION

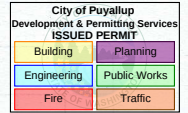
CHC PUYALLUP - CANNERY
201 WEST MAIN
PUYALLUP, WA 98371

PREPARED BY
PCS STRUCTURAL SOLUTIONS



DECEMBER 30, 2022
22-537

PRCTI20221698



North Stair

Stringer

$L_{max} = 16'$

$DL = 40 \text{ PSF}$

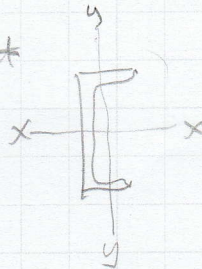
$LL = 100 \text{ PSF}$

$W = 140 \text{ PSF} \times 2.5' = 350 \text{ \#}$

$Trib = \frac{5'}{2} = 2.5'$

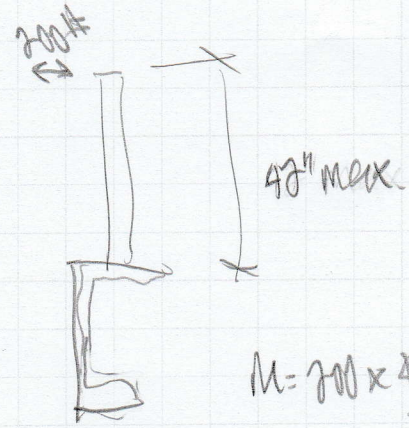
C12x30

add moments about
x-x @ rail
posts



- see torsion calc in enercalc

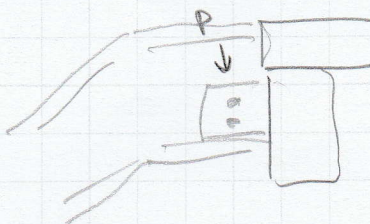
C12x30 OK



$M = 200 \times \frac{48''}{12} = 800 \text{ ft-lb}$

@ 3'-3" o.c.

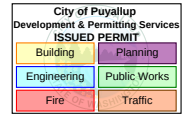
Conn @ top of long stringer



$P = 140 \text{ PSF} \times 2.5' \times \frac{16'}{2} = 2.8 \text{ k}$ - easily handled by
(2) 3/4" ϕ A.B.

PRCTI20221698

Project Title:
 Engineer:
 Project ID:
 Project Descr:



Steel Beam with Torsional Loads

File: CHC Puyallup calcs.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24
PCS STRUCTURAL SOLUTIONS

Lic. #: KW-06002327

DESCRIPTION: North Stair Stringer with Railing Load

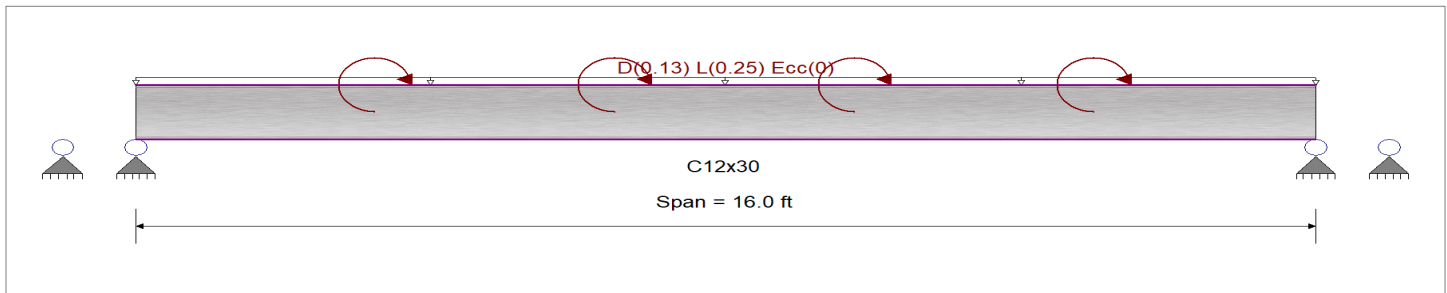
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : ASCE 7-16

Analysis Settings

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Load Combination ASCE 7-16

Fy : Steel Yield : 36.0 ksi
 E : Modulus : 29,000.0 ksi



Applied Loads

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

Load for Span Number 0
 Uniform Load : D = 0.130, L = 0.250 k/ft, Tributary Width = 1.0 ft
 Moment : L = 0.70 k-ft, Loc = 3.250 ft in span, Torsional Load, (Rail Load)
 Moment : L = 0.70 k-ft, Loc = 6.50 ft in span, Torsional Load
 Moment : L = 0.70 k-ft, Loc = 9.750 ft in span, Torsional Load
 Moment : L = 0.70 k-ft, Loc = 13.0 ft in span, Torsional Load

DESIGN SUMMARY

Design OK

Max. Flange Normal Stress Ratio =	0.534 : 1	Maximum Shear Stress Ratio =	0.718 : 1
Flange Normal Stress	14.41 ksi	Flange Shear Stress	9.29 ksi
Phi vn : Flange Normal Stress (Phi Mn/Sxx)	26.99 ksi	Web Shear Stress	9.63 ksi
Max Mu : Applied	12.16 k-ft	Vn/Omega : Allowable	12.93 ksi
Section used for this span	C12x30	Section used for this span	C12x30
Load Combination	+D+L	Load Combination	+D+L

Maximum Deflection

Maximum Rotation =	5.1966 deg	at	8.00 ft
Max Downward Transient Load Deflection	0.000 in	Max Downward Total Deflection	0.120 in
Ratio =	0 < 360	Ratio =	1599
Max Upward Transient Load Deflection	0.000 in	Max Upward Total Deflection	0.000 in
Ratio =	0 < 360	Ratio =	0 < 180

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratio	Bending Max		Flange Normal (ksi)			Flange Shear (ksi)			Web Shear (ksi)		
		Mu (kft)	Vu (k)	Total	Allow	Ratio	Total	Allow	Ratio	Total	Allow	Ratio
D Only	0.069	4.16	1.04	1.849	26.986	0.069	0.098	12.934	0.008	0.211	12.934	0.016
+D+L	0.745	12.16	3.04	14.413	26.986	0.534	9.288	12.934	0.718	9.632	12.934	0.745

Overall Maximum Deflections - Unfactored Loads

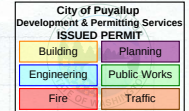
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
span_1	1	0.1200	8.064		0.0000	0.000

Vertical Reactions - Unfactored

Values in KIPS

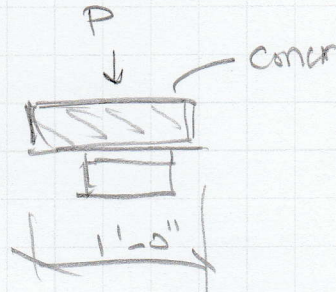
Load Combination	Support 1	Support 2
Overall MAXimum	3.040	3.040
D Only	1.040	1.040
+D+L	3.040	3.040

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North Stair

Tread Support



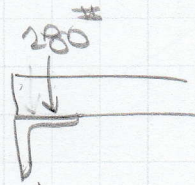
$$DL = 40 \text{ PSF}$$

$$LL = 100 \text{ PSF}$$

$$L = 4'$$

$$P = 140 \text{ PSF} \times \frac{4'}{2} \times 1'$$

$$= 280\#$$



$$L2 \times 2 \times 3/16$$

$$\times 0'-6"$$

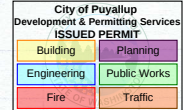
$$M = 280\# \times 1' = \frac{280\#''}{1000} / 6'' = .047 \text{ k''/''}$$

$$t_{req'd} = \sqrt{\frac{4M}{21.6}} = \sqrt{\frac{4 \times .047}{21.6}}$$

$$= .09'' < 3/16'' \checkmark$$

Use 3/16" to not allow tread to wobble.

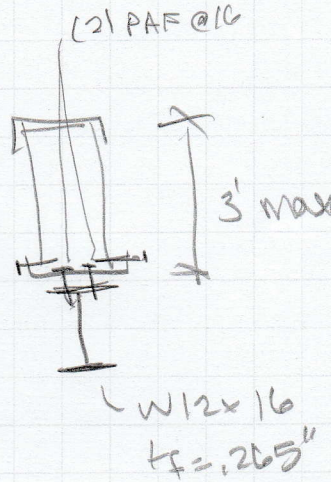
PRCTI20221698



North Stair

Parapet

30PSF
TOTAL
WIND.



$$M = \frac{30 \times 3^2}{2} = 135 \text{ #}' \times .6 = 81 \text{ #}'$$

$$T = C @ \text{PAF to steel} = \frac{M}{4'' - 1''} = \frac{81 \text{ #}'}{3''} = 27 \text{ #}$$

Hit Universal knurled
P.A.P. Allow in $\frac{1}{2}''$ steel = 775 #
 $> 432 \text{ #} \checkmark$

In pan deck Allow = 360 #
 need @ 8' O.C.
 $= 360 \text{ #} \times 2 = 720 \text{ #} \checkmark$

Flange bending

$$t_{req'd} = \sqrt{\frac{4M}{21.6}} = \sqrt{\frac{4 \times .08}{21.6}} = .122'' < .265'' \checkmark$$

top flange

$$M = k''/11 = .081 \text{ #}''/11$$

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