PRCTI20221019

Structural Calculations

Prologis Puyallup 1

1601 Industrial Park Way
Puyallup, Washington 98371

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

City of Puyallup
Building
ACCEPTED

JMontgomery
05/16/2023
11:35:34 AM

DCI Job Number 22011-0323

April 4, 2023

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

Prepared for:
Jackson Main Architecture
311 First Avenue South
Seattle, WA 98004

DCI ENGINEERS

PRCTI20221019

EDCI ENGINEERS		Project No. 22011-0323	Sheet No. 01
Project	PROLOGIS PUYALLUP TI		Date 04/04/2023
Subject	SCOPE OF WORK AND DESIGN CRITERIA		By VR

SCOPE OF WORK

STRUCTURAL DESIGN OF THE BAR JOIST TO SUPPORT THE NEW MECHANICAL UNIT.

THE EXISTING BUILDING IS LOCATED AT 1601 INDUSTRIAL PARK WAY, PUYALLUP, WA 98371

THE CAPACITY OF THE EXISTING BAR JOIST TO SUPPORT THE NEW MECH UNIT WILL BE CHECKED AND ADDITIONAL MEMBERS ARE ADDED AS NEEDED.

DESIGN CRITERIA

SEISMIC:

RISK CATEGORY : II

SITE CLASS : D

S_{DS} = 1.026

S_S = 1.283

WIND : 97 mph

DESIGN LOADS

ROOF = 25 psf SNOW LOAD

DEAD LOAD = 15 psf

ADDL POINT LOAD = 500 lbs

MECHANICAL COMPONENT

NET WEIGHT OF THE UNIT = 1010 lbs

ROOF CURB = 105 lbs

ECONOMIZER = 36 lbs

1150 lbs

MAX OPERATING WEIGHT ≈ 1300 lbs

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DCI ENGINEERS		Project No. 22011-0323	Sheet No. 02
Project	PROLOGIS PUYALLUP 1 TI	Date	04/04/2023
Subject	LOAD CALCULATIONS	By	VR

EXISTING LOADING (DL = 15 psf + RL = 25 psf + PL = 500 lbs)

MOMENT = $\frac{wL^2}{8} + \frac{PL}{4}$ = 131.25 k-ft

SHEAR = $\frac{W}{2}$ + ADDL Point Load = 10.5 k

WITH ADDL MECH UNIT (DL = 15 psf + RL = 25 psf + PL = 975 lbs)

MOMENT = $\frac{wL^2}{8} + \frac{PL}{4}$ = 137.19 k-ft + 4.5 %

SHEAR = $\frac{W}{2} + \frac{975}{2}$ = 10.5k + 0 %

SEISMIC DESIGN FORCE

$$F_p = \frac{0.4\, a_p\, S_{DS}\, W_p}{\left(\frac{R_p}{I_p}\right)} \left(1 + 2\frac{z}{h}\right)$$

$a_p = 2.5 \quad R_p = 6 \quad \frac{z}{h} = 1$

F_p = 667 lbs

REQUIRES 4 #10 WOOD SCREWS TO RESIST THE FORCE

PROVIDE #10 WOOD SCREWS @ 12" O.C.

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Project Title:
Engineer:
Project ID:
Project Descr:

New Roof Beam Supporting the Proposed Mechanical Unit

Wood Beam

Project File: Puyallap.ec6

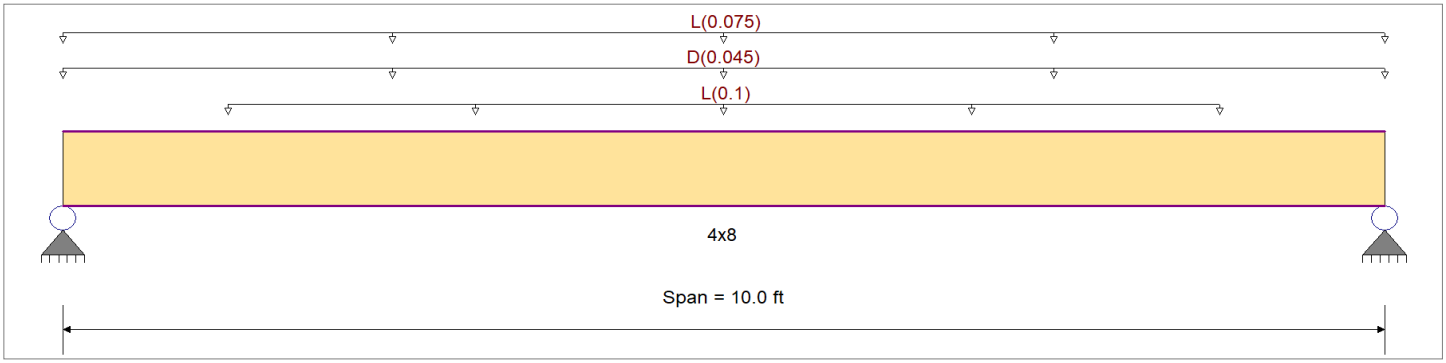
DESCRIPTION: Wood Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	850.0 psi	Ebend- xx	1,600.0 ksi
		Fc - Prll	1,400.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade :	No.1/No.2	Fv	180.0 psi		
		Ft	500.0 psi	Density	30.590 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : L = 0.10 k/ft, Extent = 1.250 -->> 8.750 ft, Tributary Width = 1.0 ft, (Mech Unit)
Uniform Load : D = 0.0450 , Tributary Width = 1.0 ft, (Dead)
Uniform Load : L = 0.0750 , Tributary Width = 1.0 ft, (Live)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.946 : 1	Maximum Shear Stress Ratio	=	0.297 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	1,045.69 psi	fv: Actual	=	53.49 psi
F'b	=	1,105.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.213 in	Ratio =	562 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.271 in	Ratio =	443 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.221	0.073	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.56	220.1	994.5	0.20	11.7	162.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.946	0.297	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.67	1,045.7	1,105.0	0.90	53.5	180.0
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.608	0.191	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.14	839.3	1,381.3	0.73	43.1	225.0
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.075	0.024	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.34	132.1	1,768.0	0.12	7.0	288.0

Wood Beam

DESCRIPTION: Wood Beam

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2705	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.975	0.975
Max Upward from Load Combinations	0.975	0.975
Max Upward from Load Cases	0.750	0.750
D Only	0.225	0.225
+D+L	0.975	0.975
+D+0.750L	0.788	0.788
+0.60D	0.135	0.135
L Only	0.750	0.750