Reviewed 11/30/2022 DL
Subject to field inspectors approvals.

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

ARC
Pioneer Park Restroom
Puyallup, WA

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

Structural Calculations

CALCULATIONS INCLUDED:

Pages A01 through D07

These Calculations cover the structural design of the Pioneer Park Restroom renovation which includes a new wood framed roof, wood columns, wood walls and shear walls, and concrete footings and a slab on grade.

JACOB LAWRENCE MCCANN
STATE OF WASHINGTON
44601
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER
6/10/22

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KPFF Project No. 2200191

6/10/2022

PRCNC20220958

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Chapter A
Design Criteria

Pioneer Park Restroom Upgrade

Design Criteria and Loads

KPFF Project No. 2200191

March 30, 2022

1601 Fifth Avenue, Suite 1600
Seattle, WA 98101
(206) 622-5822

A02

PRCNC20220958

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STRUCTURAL DESIGN AND SYSTEMS SUMMARY

The project comprises of upgrading an existing 1-story restroom located in Puyallup Pioneer Park, Washington.

Gravity System

The gravity system consists of concealed conventionally framed wood construction with 5/8" tongue-and-groove plywood supported by 2x12 joists @ 24" oc. Roof joists are flush-framed with 5-1/8" x 12" glue laminated beams (24FV4) at approximately 10'-0" centers. The beams will be supported by HSS columns concealed in the exterior stud walls.

Lateral System

The lateral system consists of light-framed shear panels consisting of 15/32" plywood sheathing over wood studs.

Foundations

Foundations consist of continuous wall footings at exterior and interior walls.

Slabs on Grade

The first floor shall consist of slab on grade poured over a 10-mil vapor barrier and a 4" capillary break. 5-inch slabs on grade are recommended where concrete will be exposed with crack control joints spaced at 12'-0" centers maximum. Reinforce slabs on grade with #4 @ 18" o.c. each way centered. All exposed slabs on grade to be polished concrete.
Existing slabs on grade will receive a ½" cementitious overlay which will be polished.

CODES AND REFERENCES

- 2018 IBC with City of Puyallup Amendments
- 2018 IBC Standards
- Design Loads
  - ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures
  - Snow Load Analysis for Washington, Second Edition (1995), by Structural Engineers Association of Washington.
  - WABO-SEAW White Paper – Snow Load Regulations and Engineering Practice, Washington State (2000)
  - WABO-SEAW White Paper #8 – Guidelines for Determining Snow Loads in Washington State (2010)
- Concrete Design
  - ACI 318-14 Building Code Requirements for Structural Concrete
  - CRSI Design Handbook (2008)
  - AWS D1.4-11 Structural Welding Code – Reinforcing Steel
- Masonry Design
  - TMS 402-16 Building Code for Masonry Structures
  - TMA 602-16 Specification for Masonry Structures
- Structural Steel Design
  - AISC 360-16 Specification for Structural Steel Buildings
  - AISC 341-16 Seismic Provisions for Structural Steel Buildings
  - AWS D1.1-15 Structural welding Code - Steel
- Wood Design
  - ANSI/AWC NDS-2018 National Design Specification for Wood Construction with 2018 Supplement
  - ANSI/AWC SDPWS-2015 Special Design Provisions for Wind and Seismic

COMPUTER PROGRAMS USED

- Concrete Analysis and Design
  - Hilti PROFIS Engineering
- Wood Analysis and Design
  - Forteweb

MATERIALS SPECIFICATIONS AND STRENGTHS

See Structural Notes.

Foundations and Soils

See Structural Notes.

BEAM DEFLECTION

Deflection Criteria

L/360	Live Load on Beams (uno)
L/240	Superimposed Dead + Live Load on Beams (uno)

LIVE LOADS

Roof

20 psf. For wood roofs (reducible per IBC Section 1607.9)

25 psf. Snow Load (nonreducible)

Drifted Snow per ASCE 7, Section 7 - Ground Snow Load = 20 psf., I_s = 1.0

DEAD LOADS

Exterior Wall Dead Loads

		Comments
Curtain Wall/Windows		10 psf.
Metal Panels/Louvers		10 psf.
8" CMU Solid Grouted Walls		78 psf.
4" Brick		38 psf.
3 CM Stone	(including 6 psf - backup structure) (180 pcf stone weight)	24 psf.

Typical Floor and Roof Dead Loads

Refer to the following pages for typical floor and roof dead loads.

Typical Roof Loads

- Wood Framing (Roof)

				Comments
3/4" Plywood		1.98	psf	
Framing		4.55	psf	
	Joist DL	6.53	psf	
Superimposed Loads				
a. Lights, Ducts, Sprinklers		2	psf	
b. (2) 5/8" Gyp & Miscellaneous		7	psf	
	SDL	9	psf	
	Total Joist DL + SDL	15.5	psf	
Partitions (seismic contribution)		5	psf	(10 psf/2 to roof)
	Seismic DL	20.5	psf	

Hazards by Location

Search Information

Address: 324 S Meridian, Puyallup, WA 98371, USA

Coordinates: 47.1895579, -122.2954133

Elevation: 47 ft

Timestamp: 2022-03-29T19:35:39.398Z

Hazard Type: Snow

ASCE 7-16

Ground Snow Load ⚠ 18 lb/sqft

The reported ground snow load applies at the query location of 47 feet up to a maximum elevation of 40 feet with a tolerance of 100 feet.

ASCE 7-10

Ground Snow Load ⚠ 15 lb/sqft

The reported ground snow load applies at the query location of 47 feet up to a maximum elevation of 400 feet.

ASCE 7-05

Ground Snow Load ⚠ 15 lb/sqft

The reported ground snow load applies at the query location of 47 feet up to a maximum elevation of 400 feet.

The results indicated here DO NOT reflect any state or local a / delineation lines made during the building code adoption process. Users should confirm any output obta Authority Having Jurisdiction before proceeding with design.

MIN GROUND SNOW OF 20 PSF [SEE PG-5 HERE] PER PULYALLUP CITY AMENDMENT

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer.

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PRCNC20220958

Chapter 17.04
BUILDING CODES

Sections:

17.04.010 Short title.

This title is known as and may be referred to as the “building code of the city of Puyallup.” (Ord. 2962 § 6, 2010).

17.04.020 Purpose.

The purpose of this chapter is to promote the health, safety and welfare of the occupants or users of buildings and structures and the general public by the provision of building codes that are mandated throughout the state. (Ord. 2962 § 6, 2010).

17.04.030 Adoption of codes by reference.

The city of Puyallup hereby adopts the following codes by reference, which are incorporated herein, as they currently exist or are hereafter amended:

(1) The current edition of the International Building Code, published by the International Code Council, Inc., as adopted by the Washington State Building Code Council in Chapter 51-50 WAC. The following appendix of the International Building Code is specifically adopted in its entirety:

(a) Appendix E: Supplementary Accessibility Requirements.

(2) The current edition of the International Residential Code, published by the International Code Council, Inc., as adopted by the Washington State Building Code Council in Chapter 51-51 WAC.

(3) The current edition of the International Mechanical Code, published by the International Code Council, Inc., as adopted by the Washington State Building Code Council in Chapter 51-52 WAC, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (Storage and Handling of Liquefied Petroleum Gases) and ANSI Z223.1/NFPA 54 (National Fuel Gas Code).

(4) The current edition of the International Fuel Gas Code published by the International Code Council, Inc., as adopted by the Washington State Building Code Council in Chapter 51-52 WAC.

(5) Except as provided in RCW 19.27.170, the current edition of the Uniform Plumbing Code and Uniform Plumbing Code Standards, published by the International Association of Plumbing and Mechanical Officials, as adopted by the Washington State Building Code Council in Chapters 51-56 and 51-57 WAC.

(6) The rules adopted by the Washington State Building Code Council establishing standards for making buildings and facilities accessible to and usable by the physically disabled or elderly persons as provided in RCW 70.92.100 through 70.92.160, as they now exist or are hereafter amended.

(7) The current edition of the Washington State Energy Code, as adopted by the State Building Code Council in Chapter 51-11 WAC.

(8) The current edition of the National Electric Code, published by the National Fire Protection Association, as adopted by the Department of Labor and Industries in Chapter 296-46B WAC, and Chapter 19.28 RCW.

(9) The 2012 Edition of the International Property Maintenance Code published by the International Code Council, Inc., effective July 1, 2013, and any subsequent editions published by the International Code Council, Inc., effective July 1st of the following calendar year. (Ord. 3043 § 4, 2013; Ord. 2962 § 6, 2010).

17.04.040 Local amendments of International Building Code.

The International Building Code adopted by reference in this chapter is hereby amended as follows:

(1) International Building Code (IBC) Section 101.1, entitled “Title,” is hereby amended to read as follows:

These regulations shall be known as the Building Code of the City of Puyallup, Washington, hereinafter referred to as “this code.”

(2) IBC Section 104, entitled “Duties and Powers of Building Official,” is hereby amended to add the following new subsection 104.12:

Sec. 104.12 Lot lines and setback lines. Notwithstanding the authority of the building official to administer and enforce the building code, the building official shall have no duty to verify or establish lot lines or setback lines. No such duty is created by this code, and none shall be implied.

(3) IBC Section 113, “Board of Appeals,” is hereby amended to delete subsection 113.3, entitled “Qualifications.”

(4) IBC Section 1612.3, regarding the establishment of flood hazard areas, is amended to read as follows:

Section 1612.3. To establish flood hazard areas, the City Council hereby adopts the flood hazard map and supporting data identified by the Federal Emergency Management Agency in an engineering report entitled “The Flood Insurance Study for the City of Puyallup,” initially adopted in PMC 21.07.040, as it currently exists or may be subsequently amended.

(Ord. 3043 § 5, 2013; Ord. 2962 § 6, 2010).

17.04.050 Local amendments of International Residential Code.

The International Residential Code adopted in this chapter is hereby amended as follows.

(1) Section R104, entitled “Duties and Powers of Building Official,” is hereby amended to add subsection R104.12:

Section R104.12 Lot lines and setback lines. Notwithstanding the authority of the building official to administer and enforce the building code, the building official shall have no duty to verify or establish lot lines or setback lines. No such duty is created by this code, and none shall be implied.

(2) Section R105.2, entitled “Work exempt from permit,” subsection 10, entitled “Building,” is amended to read as follows:

Decks that are not more than 30 inches above adjacent grade at any point and are not over any basement or story.

(3) Section R110.1, entitled “Use and Occupancy,” subsection entitled “Exception,” is amended to read as follows:

Certificates of occupancy are not required for Group R, Division 3 occupancies and for work exempt from permits under Section R105.2.

(4) The following subsections are deleted from Section R112, “Board of Appeals”: Subsection R112.3, “Qualifications.”

(5) Table R301.2(1), Climatic and Geographical Design Criteria, is amended to read as follows:

Table R301.2(1)

Climatic and Geographical Design Criteria

A11

Ground Snow Load	Wind Design		Seismic Design Category[f]	Subject to Damage from			Winter Design Temp[e]	Ice Shield Underlay[h]	Flood Hazards[g]	Air Freeze Index[i]	Mean Annual Temp[j]
	Speed[d] (mph)	Topographical effects[k]		Weath-ering[a]	Frost Line Depth[b]	Termites[c]					
20 lbs/ft	85	No	D-1	Moderate	12 inches	Slight to Moderate	22°	No	Puyallup Municipal Code 21.07	160	51°

(Ord. 3043 § 6, 2013; Ord. 2962 § 6, 2010).

17.04.060 Conflicts between codes.

In case of conflict among the provisions of the State Building Code, i.e., the International Building Code, the International Residential Code, the International Mechanical Code, the International Fire Code, the Uniform Plumbing Code and Uniform Plumbing Code Standards, and the rules adopted by the Washington State Building Code Council establishing standards for making buildings and facilities accessible to and usable by the physically disabled or elderly persons, the first named code in this section shall govern over those that follow. In case of conflicts between other codes and provisions adopted by this chapter, the code or provision that is most restrictive, as determined by the city's building official, shall apply. (Ord. 2962 § 6, 2010).

17.04.070 Definitions.

(1) Unless the context requires otherwise, any reference to "jurisdiction," "department of building safety," "department of mechanical inspection," "department of inspection," "department of prevention," or "department of property maintenance inspection" shall be construed to mean the city of Puyallup.

(2) Unless the context requires otherwise, any reference to "building official" or "code official" shall be construed to mean the city's building code official in the absence of any specific written designation from the city manager.

(3) Unless the context requires otherwise, any reference to "fire code official" shall be construed to mean the city's fire code official in the absence of any specific written designation.

(4) Unless the context requires otherwise, any reference to "board of appeals" shall be construed to mean the hearing examiner. All appeals authorized by the codes adopted in the chapter shall be to the city's hearing examiner.

(5) Unless the context requires otherwise, any reference to "International Electric Code" shall be construed to mean the National Electric Code. (Ord. 2962 § 6, 2010).

17.04.080 Fees.

(1) Establishment. All fees and charges for permits, approvals, inspections or other services or items related to this title shall be established and amended from time to time by executive order of the city manager.

LATERAL LOADS

Wind Loading for the Main Wind Force-Resisting System (MWFRS)

Refer to the following pages for the wind loads

Hazards by Location

Search Information

Address: 324 S Meridian, Puyallup, WA 98371, USA

Coordinates: 47.1895579, -122.2954133

Elevation: 47 ft

Timestamp: 2022-03-29T19:35:13.551Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	82 mph
Risk Category I	92 mph
Risk Category II	97 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

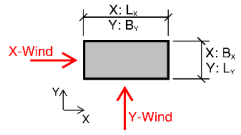
project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 5/26/2022	
client	ARC		job no. 2200191
	Wind Loads		

Wind Load Calculations - MWFRS 1.0W LRFD

Calculations based on ASCE 7-16 Chapter 27 (Directional Procedure)

Wind Speed, V =	97	mph	*Fig. 26.5-1*	
Building Enclosure	Enclosed		*Sec. 26.12*	
Mean Roof Height, h =	11	ft		
Risk Category	II		*Tab. 1.5-1*	
K_d =	0.85		*Tab. 26.6-1*	
R_i =	1.00		*Eq. 26.13-1*	
K_e =	1.00			

	X	Y		
Width (⊥ to wind)	22	57.29167	ft	
Length (∥ to wind)	57.29167	22	ft	
Building Period, T =	0.12	0.12	sec	
Damping Ratio, β =	0.02	0.02		
Exposure Category	B	B		*Sec. 26.7.3*
Topo. Effects (K_{zt})	Constant			*Sec. 26.8*
K_1 =	0.72	0.72		*Fig 26.8-1*
K_2 =	1.00	1.00		*Fig 26.8-1*
γ =	1.00	1.00		*Fig 26.8-1*
L_h =	100	100	ft	
$K_{zt,roof}$ =	1.00	1.00		*Eq. 26.8-1.*
K_{zt} =	1.00	1.00		*Eq. 26.8-1.*



q_z =	20.5	$*K_z*K_{zt}$ psf	*Eq. 26.10-1*
K_h =	0.57		*Tab. 26.10-1*

X-Direction

p=q*G*Cp - qi*(GCpi) — *Eq. 27.3-1*

Rigid Structure, f > 1 Hz

C_p =	Windward	Leeward	Side	
	0.8	-0.27	-0.7	*Fig. 27.3-1,2,3*
G =	0.88			*Eq. 26.11-6*
GCpi (+/-)	0.18			*Tab. 26.13-1*
q_h =	11.7	psf		*Eq. 26.10-1*

Y-Direction

p=q*G*Cp - qi*(GCpi) — *Eq. 27.3-1*

Rigid Structure, f > 1 Hz

C_p =	Windward	Leeward	Side	
	0.8	-0.50	-0.7	*Fig. 27.3-1,2,3*
G =	0.86			*Eq. 26.11-6*
GCpi (+/-)	0.18			*Tab. 26.13-1*
q_h =	11.7	psf		*Eq. 26.10-1*

Story Forces: X - Direction

Level	Elevation, z (ft)	Story Width (ft)	Trib. Story Height (ft)	Total Pressure (psf)	Story Force (k)
Roof	10.89	22	5.45	16.0	1.9
G	0.00	-	-	-	-
Base Shear					**2 k**
Overturning Moment					**21 k-ft**

Story Forces: Y - Direction

Level	Elevation, z (ft)	Story Width (ft)	Trib. Story Height (ft)	Total Pressure (psf)	Story Force (k)
Roof	10.89	57	5.45	16.0	5.0
G	0.00	-	-	-	-
Base Shear					**5 k**
Base Shear					**54 k-ft**

Level force is taken as the wind pressure at that level over half the story height above and half the story height below.

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 5/26/2022	
client	ARC		job no. 2200191
	Wind Loads		

Wind Load Calculations - Components & Cladding (X-Direction) 1.0W LRFD

Calculations based on ASCE 7-16 Section 30.3 for low-rise buildings

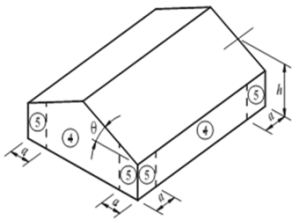
Wind Speed, V =	97	mph	*Fig. 26.5-1*	p=qh*[G*Cp - GCpi]			*Eq. 30.3-1*
Building Enclosure	Enclosed		*Sec. 26.12*	G =	0.88		*Eq. 26.11-6*
Building Height, h =	11	ft		GCpi (+/-)	0.18		*Tab. 26.13-1*
Risk Category	II		*Tab. 1.5-1*	q_z =	20.5	$*K_z*K_{zt}$ psf	*Eq. 26.10-1*
K_d =	0.85		*Tab. 26.6-1*	$K_{zt,roof}$ =	1.00		
R_i =	1.00		*Eq. 26.13-1*	K_h =	0.57		*Tab. 26.10-1*
Width (⊥ to wind)	22	ft		q_h =	11.7	psf	*Eq. 26.10-1*
Length (∥ to wind)	57	ft					
Building Period, T =	0.12	sec		Roof Type =	Monoslope (3° < Θ ≤ 10°) Fig. 30.3-5A		
Exposure Category	B		*Sec. 26.7.3*	Wall GC_p Factor =	0.9		

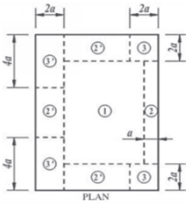
Walls

Fig. 30.3-1

Factored Wind Pressures for Building Height and Area Ranges: X - Direction (psf)

	≤ 10 sf Area			100 sf Area			> 500 sf Area		
	Windward	Leeward		Windward	Leeward		Windward	Leeward	
Height Range	GC_p Zone 4, 5 0.9	GC_p Zone 4 -1.0	GC_p Zone 5 -1.3	GC_p Zone 4, 5 0.74	GC_p Zone 4 -0.85	GC_p Zone 5 -0.95	GC_p Zone 4, 5 0.6	GC_p Zone 4 -0.7	GC_p Zone 5 -0.7
480-500	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
460-480	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
440-460	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
420-440	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
400-420	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
380-400	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
360-380	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
340-360	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
320-340	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
300-320	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
280-300	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
260-280	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
240-260	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
220-240	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
200-220	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
180-200	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
160-180	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
140-160	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
120-140	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
100-120	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
90-100	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
80-90	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
70-80	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
60-70	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
50-60	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
40-50	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
30-40	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
20-30	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
15-20	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
0-15	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5





Linear Interpolation is permitted for areas between 20 and 500 sf, 16 psf min, Kzt = 0.7 min. pressure per Sec 30.2.2

Roof

Fig. 30.3-5A

Factored Wind Pressures for Building Height and ≤ 10 sf Area (psf)

	Zone 1'	Zone 1	Zone 2'	Zone 2	Zone 2e	Zone 2n	Zone 2r	Zone 3'	Zone 3	Zone 3e	Zone 3r
	Interior				Edges			Corners			
GC_p	N/A	-1.1	-1.6	-1.3	N/A	N/A	N/A	-2.6	-1.8	N/A	N/A
Total Pressure	N/A	-14.9	-20.8	-17.3	N/A	N/A	N/A	-32.4	-23.1	N/A	N/A

Factored Wind Pressures for Building Height and 100 sf Area (psf)

	Zone 1'	Zone 1	Zone 2'	Zone 2	Zone 2e	Zone 2n	Zone 2r	Zone 3'	Zone 3	Zone 3e	Zone 3r
	Interior				Edges			Corners			
GC_p	N/A	-1.1	-1.5	-1.2	N/A	N/A	N/A	-1.6	-1.2	N/A	N/A
Total Pressure	N/A	-14.9	-19.6	-16.1	N/A	N/A	N/A	-20.8	-16.1	N/A	N/A

Factored Wind Pressures for Building Height and > 500 sf Area (psf)

	Zone 1'	Zone 1	Zone 2'	Zone 2	Zone 2e	Zone 2n	Zone 2r	Zone 3'	Zone 3	Zone 3e	Zone 3r
	Interior				Edges			Corners			
GC_p	N/A	-1.1	-1.5	-1.2	N/A	N/A	N/A	-1.6	-1.2	-1.2	N/A
Total Pressure	N/A	-14.9	-19.6	-16.1	N/A	N/A	N/A	-20.8	-16.1	-16.1	N/A

Notes

1. Linear Interpolation is permitted for areas between 10 and 100 sf
2. N/A
   N/A
3. qi = qh has been used for positive internal pressure calculations
4. Positive pressures on roofs and pressures on overhangs are not included in this spreadsheet.

kpff 1601 5th Avenue, Suite 1600 Seattle, WA 98101 206 622-5822	project	Pioneer Park Building	by	ASY	sheet no.
	location	Puyallup, WA	date	5/26/2022	
	client	ARC			job no. 2200191
		Wind Loads			

Wind Load Calculations - Components & Cladding (Y-Direction) 1.0W LRFD

Calculations based on ASCE 7-16 Section 30.3 for low-rise buildings

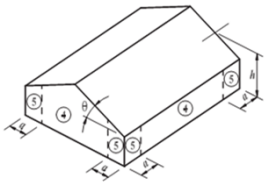
Wind Speed, V =	97	mph	*Fig. 26.5-1*	p=qh*[G*Cp - GCpi]				*Eq. 30.3-1*
Building Enclosure	Enclosed		*Sec. 26.12*	G =	0.86			*Eq. 26.11-6*
Building Height, h =	11	ft		GCpi (+/-)	0.18			*Tab. 26.13-1*
Risk Category	II		*Tab. 1.5-1*	q_z =	20.5	$*K_z*K_{zt}$	psf	*Eq. 27.3-1*
K_d =	0.85		*Tab. 26.6-1*	$K_{zt,roof}$ =	1.00			
R_i =	1.00		*Eq. 26.13-1*	K_h =	0.57			*Tab. 26.10-1*
Width (⊥ to wind)	57	ft		q_h =	11.7	psf		*Eq. 27.3-1*
Length (∥ to wind)	22	ft						
Building Period, T =	0.12	sec		Roof Type =	Monoslope (3° < Θ ≤ 10°) Fig. 30.3-5A			
Exposure Category	B		*Sec. 26.7.3*	Wall GC_p Factor =	0.9			

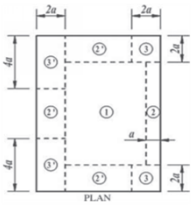
Walls

Fig. 30.3-1

Factored Wind Pressures for Building Height and Area Ranges: X - Direction (psf)

	≤ 10 sf Area			100 sf Area			> 500 sf Area		
	Windward	Leeward		Windward	Leeward		Windward	Leeward	
Height Range	GC_p Zone 4, 5 0.9	GC_p Zone 4 -1.0	GC_p Zone 5 -1.3	GC_p Zone 4, 5 0.74	GC_p Zone 4 -0.85	GC_p Zone 5 -0.95	GC_p Zone 4, 5 0.6	GC_p Zone 4 -0.7	GC_p Zone 5 -0.7
480-500	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
460-480	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
440-460	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
420-440	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
400-420	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
380-400	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
360-380	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
340-360	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
320-340	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
300-320	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
280-300	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
260-280	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
240-260	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
220-240	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
200-220	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
180-200	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
160-180	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
140-160	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
120-140	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
100-120	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
90-100	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
80-90	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
70-80	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
60-70	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
50-60	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
40-50	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
30-40	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
20-30	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
15-20	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5
0-15	12.6	-13.7	-16.8	10.7	-12.0	-13.1	9.5	-10.5	-10.5





Linear Interpolation is permitted for areas between 20 and 500 sf, 16 psf min, Kzt = 0.7 min. pressure per Sec 30.2.2

Roof

Fig. 30.3-5A

Factored Wind Pressures for Building Height and ≤ 10 sf Area (psf)

	Zone 1'	Zone 1	Zone 2'	Zone 2	Zone 2e	Zone 2n	Zone 2r	Zone 3'	Zone 3	Zone 3e	Zone 3r
	Interior				Edges			Corners			
GC_p	N/A	-1.1	-1.6	-1.3	N/A	N/A	N/A	-2.6	-1.8	N/A	N/A
Total Pressure	N/A	-14.9	-20.8	-17.3	N/A	N/A	N/A	-32.4	-23.1	N/A	N/A

Factored Wind Pressures for Building Height and 100 sf Area (psf)

	Zone 1'	Zone 1	Zone 2'	Zone 2	Zone 2e	Zone 2n	Zone 2r	Zone 3'	Zone 3	Zone 3e	Zone 3r
	Interior				Edges			Corners			
GC_p	N/A	-1.1	-1.5	-1.2	N/A	N/A	N/A	-1.6	-1.2	N/A	N/A
Total Pressure	N/A	-14.9	-19.6	-16.1	N/A	N/A	N/A	-20.8	-16.1	N/A	N/A

Factored Wind Pressures for Building Height and > 500 sf Area (psf)

	Zone 1'	Zone 1	Zone 2'	Zone 2	Zone 2e	Zone 2n	Zone 2r	Zone 3'	Zone 3	Zone 3e	Zone 3r
	Interior				Edges			Corners			
GC_p	N/A	-1.1	-1.5	-1.2	N/A	N/A	N/A	-1.6	-1.2	-1.2	N/A
Total Pressure	N/A	-14.9	-19.6	-16.1	N/A	N/A	N/A	-20.8	-16.1	-16.1	N/A

Notes

1. Linear Interpolation is permitted for areas between 10 and 100 sf
2. N/A
   N/A
3. qi = qh has been used for positive internal pressure calculations
4. Positive pressures on roofs and pressures on overhangs are not included in this spreadsheet.

Seismic Loading for Building

Seismic Force-Resisting System: Light frame (wood) walls sheathed with wood structural panels rated for shear resistance.

Response Modification Coefficient:	$R = 6.5$	(ASCE 7 Table 12.2-1)
Overstrength Factor:	$\Omega_o = 3$	(ASCE 7 Table 12.2-1)
Deflection Amplification Factor:	$C_d = 4$	(ASCE 7 Table 12.2-1)

Earthquake Loads

$E = \rho Q_E \pm 0.2\, S_{DS}\, D$	Seismic Load	(ASCE 7 Equation 12.4-1, 2, 3, 4a, 4b)
$E_m = \Omega_O\, Q_E \pm 0.2\, S_{DS}\, D$	Maximum Seismic Load	(ASCE 7 Equation 12.4-4a, 4b, 5, 6, 7)
$\rho = 1.0$	Reliability/Redundancy Factor	(ASCE 7 Section 12.3.4)

Refer to the following pages for the seismic loads.

324 S Meridian, Puyallup, WA 98371, USA

Latitude, Longitude: 47.1895579, -122.2954133

Date	4/4/2022, 10:35:20 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.272	MCE_R ground motion. (for 0.2 second period)
S_1	0.438	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.526	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.018	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.272	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.392	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.438	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.487	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.914	Mapped value of the risk coefficient at short periods
C_{R1}	0.898	Mapped value of the risk coefficient at a period of 1 s

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kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 5/26/2022	
client	ARC		job no. 2200191
	Seismic Loads		

Seismic Base Shear Calculation

2018 IBC (Ch. 16) & ASCE 7-16 (Ch. 11, 12, & 22), References per ASCE 7-16, UNO

Loading	X Direction	
Lateral System	A. BEARING WALL SYSTEMS	
[Tab. 12.2-1]	15. Light-framed (wood) walls sheathed with wood structural panels rated for shear resistance	
Risk Category	II	*[IBC Tab. 1604.5]*
Site Class	D by Default	*[ASCE 7 Ch. 20]*
Design Category	D	*[IBC Sec. 1613.2.5; Tab. 1613.2.5(1) & (2)]*

S_s	1.272	*[IBC Fig. 1613.2.1(1) or USGS Seismic Hazard Data]*				
S_1	0.438	*[IBC Fig. 1613.2.1(2) or USGS Seismic Hazard Data]*				
F_a	1.20	*[IBC Tab. 1613.2.3(1)]*	C_t	0.02	*[Tab. 12.8-2]*	
F_v	1.86	*[IBC Tab. 1613.2.3(2)]*	x	0.75	*[Tab. 12.8-2]*	
S_{MS}	1.53	*[IBC Eqn. 16-36]*	h_n	11 ft	*[Sec. 12.8.2.1]*	
S_{M1}	0.82	*[IBC Eqn. 16-37]*	T_a	0.12 sec	*[Eqn. 12.8-7]*	
S_{DS}	1.02	*[IBC Eqn. 16-38]*	C_u	1.4	*[Tab. 12.8-1]*	
S_{D1}	0.54	*[IBC Eqn. 16-38]*	T_{MODAL}		*[Sec. 12.8.2]*	
ρ	1	*[ASCE 7-16 12.3.4]*	T	0.12 sec	*[Sec. 12.8.2]*	
I	1.00	*[Tab. 1.5-2]*	T_L	6 sec	*[Fig. 22-14]*	
R	6.5	*[Tab. 12.2-1]*	T_S	0.53	*[Sec. 11.3]*	
Ω_0	3	*[Tab. 12.2-1]*				
C_d	4	*[Tab. 12.2-1]*	Building Height Limit (ft)	65	*[Tab. 12.2-1]*	

$S_{DS} / (R/I) = C_s$	0.157	*[Eqn. 12.8-2]*		
$S_{D1} / T (R/I) = C_{s,\,max}$	0.697	*[Eqn. 12.8-3]*		
$S_{D1} T_L / T^2 (R/I) = C_{s,\,max}$	N/A	*[Eqn. 12.8-4]*		
Ground motion hazard analysis perfomed?	No	*[Sec. 11.4.8]*	11.4.8 Factor	1.5
$0.044 S_{DS} I \geq 0.01 = C_{s,\,min}$	0.045	*[Eqn. 12.8-5]*		
$0.5 S_1 / (R/I) = C_{s,\,min}$	N/A	*[Eqn. 12.8-6]*		
C_s (design)	**0.157**			

Vertical Distribution of Forces
ASCE 7-16, Sec. 12.8.3

W	47 k	*[Sec. 12.8.1]*	
V	7 k	*[Eqn. 12.8-1]*	
$E_h = \rho V$	**7 k**	*[Eqn. 12.4-3]*	

exponent related to structural period
k 1.00 *[Sec. 12.8.3]*

Name	Weight, w_x	Height, h_x	Σw_x	$w_x h_x^k$	*[Eqn. 12.8-12]* C_{vx}	*[Eqn. 12.8-11]* ρ x F_x	*[Eqn. 12.8-13]* ρ x V_x	*[Eqn. 12.10-1]* F_{px}
Roof	47 k	11 ft	47 k	510 k-ft	1.000	7 k	7 k	10 k
-	0 k	0 ft	47 k	0 k-ft	0.000	0 k	7 k	0 k
Σ	47 k			510 k-ft	1.000	7 k		

PRCNC20220958

kpff
1601 5th Avenue, Suite 1600
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project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 5/26/2022	
client	ARC		job no. 2200191
	Seismic Loads		

Seismic Base Shear Calculation

2018 IBC (Ch. 16) & ASCE 7-16 (Ch. 11, 12, & 22), References per ASCE 7-16, UNO

Loading	Y Direction	
Lateral System	A. BEARING WALL SYSTEMS	
[Tab. 12.2-1]	15. Light-framed (wood) walls sheathed with wood structural panels rated for shear resistance	
Risk Category	II	*[IBC Tab. 1604.5]*
Site Class	D by Default	*[ASCE 7 Ch. 20]*
Design Category	D	*[IBC Sec. 1613.2.5; Tab. 1613.2.5(1) & (2)]*

S_s	1.272	*[IBC Fig. 1613.2.1(1) or USGS Seismic Hazard Data]*
S_1	0.438	*[IBC Fig. 1613.2.1(2) or USGS Seismic Hazard Data]*
F_a	1.20	*[IBC Tab. 1613.2.3(1)]*
F_v	1.86	*[IBC Tab. 1613.2.3(2)]*
S_{MS}	1.53	*[IBC Eqn. 16-36]*
S_{M1}	0.82	*[IBC Eqn. 16-37]*
S_{DS}	1.02	*[IBC Eqn. 16-38]*
S_{D1}	0.54	*[IBC Eqn. 16-38]*
ρ	1	*[ASCE 7-16 12.3.4]*
I	1.00	*[Tab. 1.5-2]*
R	6.5	*[Tab. 12.2-1]*
Ω_0	3	*[Tab. 12.2-1]*
C_d	4	*[Tab. 12.2-1]*

C_t	0.02	*[Tab. 12.8-2]*
x	0.75	*[Tab. 12.8-2]*
h_n	11 ft	*[Sec. 12.8.2.1]*
T_a	0.12 sec	*[Eqn. 12.8-7]*
C_u	1.4	*[Tab. 12.8-1]*
T_{MODAL}		*[Sec. 12.8.2]*
T	0.12 sec	*[Sec. 12.8.2]*
T_L	6 sec	*[Fig. 22-14]*
T_S	0.53	*[Sec. 11.3]*

Building Height Limit (ft): 65 *[Tab. 12.2-1]*

S_{DS} / (R/I) = C_s	0.157	*[Eqn. 12.8-2]*	
S_{D1} / T (R/I) = $C_{s,\ max}$	0.697	*[Eqn. 12.8-3]*	
S_{D1} T_L / T^2 (R/I) = $C_{s,\ max}$	N/A	*[Eqn. 12.8-4]*	
Ground motion hazard analysis perfomed?	No	*[Sec. 11.4.8]*	11.4.8 Factor 1.5
0.044S_{DS} I ≥ 0.01 = $C_{s,\ min}$	0.045	*[Eqn. 12.8-5]*	
0.5S_1 / (R/I) = $C_{s,\ min}$	N/A	*[Eqn. 12.8-6]*	
C_s (design)	**0.157**		

Vertical Distribution of Forces
ASCE 7-16, Sec. 12.8.3

exponent related to structural period
k 1.00 *[Sec. 12.8.3]*

W	47 k	*[Sec. 12.8.1]*
V	7 k	*[Eqn. 12.8-1]*
E_h = ρV	**7 k**	*[Eqn. 12.4-3]*

Name	Weight, w_x	Height, h_x	Σw_x	$w_x h_x^k$	*[Eqn. 12.8-12]* C_{vx}	*[Eqn. 12.8-11]* ρ x F_x	*[Eqn. 12.8-13]* ρ x V_x	*[Eqn. 12.10-1]* F_{px}
Roof	47 k	11 ft	47 k	510 k-ft	1.000	7 k	7 k	10 k
-	0 k	0 ft	47 k	0 k-ft	0.000	0 k	7 k	0 k
Σ	47 k			510 k-ft	1.000	7 k		

Seismic Structural Irregularities

Horizontal Structural Irregularities (ASCE 7 Table 12.3-1)

Type	Description	Yes	No	Notes
1a	Torsional Irregularity		X	
1b	Extreme Torsional Irregularity		X	
2	Reentrant Corner Irregularity		X	
3	Diaphragm Discontinuity Irregularity			
4	Out-of-Plane Offset Irregularity		X	
5	Nonparallel System Irregularity		X	

Vertical Structural Irregularities (ASCE 7 Table 12.3-2)

Type	Description	Yes	No	Notes
1a	Stiffness-Soft Story Irregularity		X	
1b	Stiffness-Extreme Soft Story Irregularity		X	
2	Weight (Mass) Irregularity		X	
3	Vertical Geometric Irregularity		X	
4	In-Plane Discontinuity in Vert. Lateral Force-Resisting Element Irregularity		X	
5a	Discontinuity in Lateral Strength - Weak Story Irregularity		X	
5b	Discontinuity in Lateral Strength - Extreme Weak Story Irregularity		X	

Seismic Drift Limitations

Deflection of Level x: $\delta_x = \frac{C_d \delta_{xe}}{I_e}$ (ASCE 7 Equation 12.8-15)

Drift at Level x: $\Delta_x = \delta_x - \delta_{x-1}$

Maximum Allowable Inelastic Story Drift: $\Delta_a = 0.02\ h_{sx}$ (ASCE 7 Table 12.12-1)

Where:

- δ_{xe} = calculated elastic drift considering torsional affects in accordance with ASCE 7 Section 12.12.1
- δ_{xe} is calculated without inclusion of ρ per ASCE 7 Section 12.3.4.1
- h_{sx} is the floor-to-floor height

Maximum period considerations need not be included in drift calculations

Seismic Loading for Elements of Structure and Nonstructural Components

$F_p = k\ S_{DS}\ I_p\ W_p$ (ASCE 7 Section 13.3.1)

Where: $0.3 \leq \left[k = 0.4 \frac{a_p}{R_p} (1 + 2 \frac{z}{h}) \right] \leq 1.6$

a_p	= varies	Component Amplification Factor	(ASCE 7 Table 13.5-1 or 13.6-1)
R_p	= varies	Component Response Factor	(ASCE 7 Table 13.5-1 or 13.6-1)
Ω_0	= varies	Component Overstrength Factor	(ASCE 7 Table 13.5-1 or 13.6-1)
z/h	= varies ≤ 1.0	Height of attachment of component relative to mean roof height	
I_p	= varies	Importance Factor	(ASCE 7 Section 13.1.3)
W_p	= varies	Weight of portion of structure or component	

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Seattle, WA 98101 206 622-5822

Chapter B
Gravity Framing

1601 5th Avenue, Suite 1600
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DESIGN SUMMARY

Date: *06/07/2022*
By: *ASY*

Design: *Gravity Framing*

The following calculation were performed to determine suitable sizes for members that predominantly act to resist gravity loads and uplift from wind. Gravity framing consist of roof joists spanning east/west which are supported by glulam beams spanning north/south which are in turn supported by columns at the north and south ends of the building (there is also one additional column at both the east and west ends of the building). The roof joists and glulam beams are loaded using distributed loads along their lengths. The columns are checked for the reactions from the analysis of the glulam beams.

Several programs were used during design as follows:
- Forteweb: used to design the joists, glulam beams and one column type
- KPFF standard Excel spreadsheet: used to design two column type and non load bearing walls
- ENERCALC: used to design two column types

kpff
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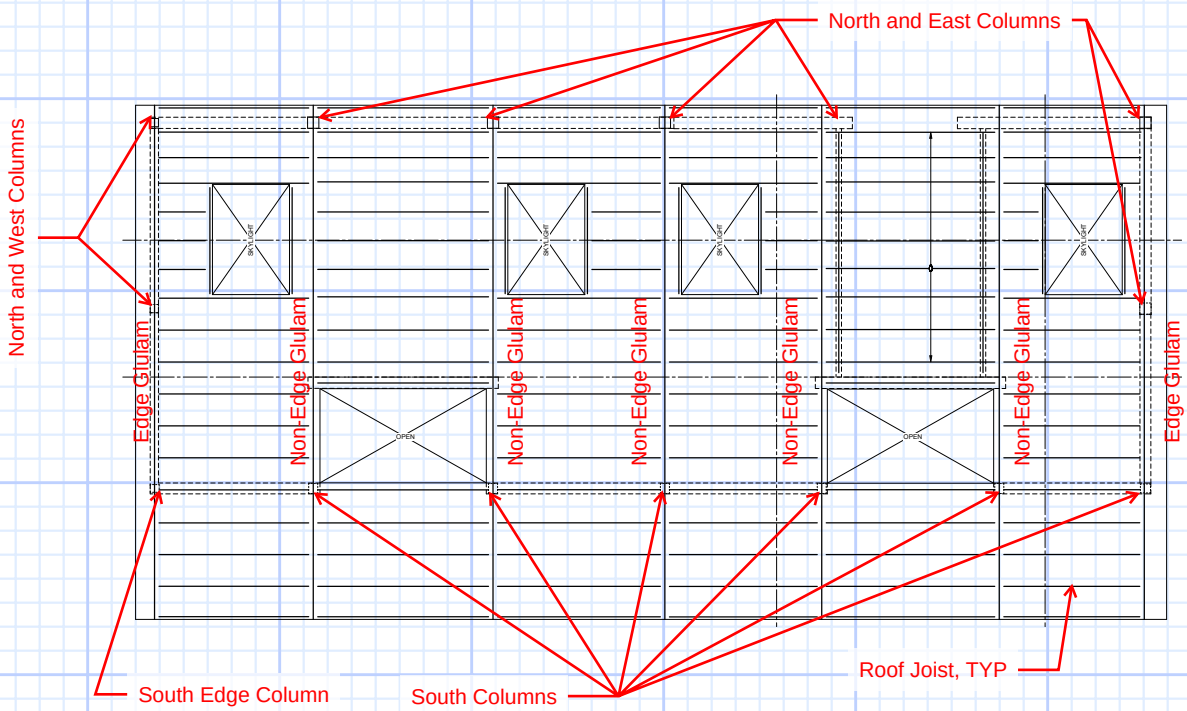
project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 06/07/2022	
client	ARC		job no. 2200191
	Gravity Framing Key Plan		



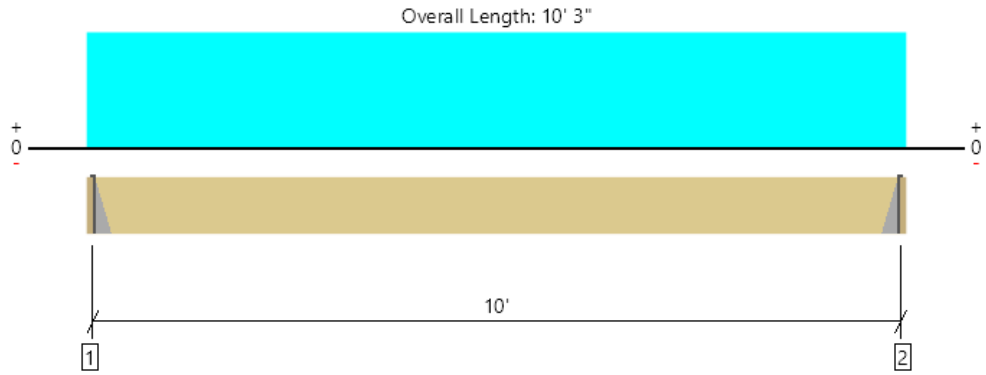
FORTE WEB

MEMBER REPORT

PASSED

Roof, Roof: Joist

1 piece(s) 2 x 12 DF No.2 @ 24" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	410 @ 1 1/2"	1406 (1.50")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	333 @ 1' 3/4"	2329	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1025 @ 5' 1 1/2"	2729	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.040 @ 5' 1 1/2"	0.333	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.065 @ 5' 1 1/2"	0.500	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Seismic	Total	
1 - Hanger on 11 1/4" DF beam	1.50"	Hanger[1]	1.50"	164	205	256	-332	33/-33	658/-365	See note [1]
2 - Hanger on 11 1/4" DF beam	1.50"	Hanger[1]	1.50"	164	205	256	-332	33/-33	658/-365	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' o/c	
Bottom Edge (Lu)	10' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Roof Live (non-snow: 1.25)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Uniform (PSF)	0 to 10' 3"	24"	16.0	20.0	25.0	-32.4	3.3	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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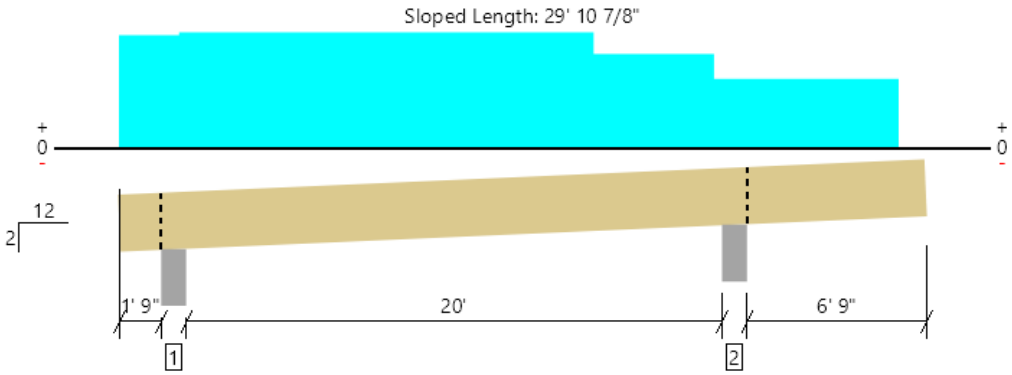
6/7/2022 10:25:13 PM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: Pioneer Park

Roof, Roof Non-Edge Glulam

1 piece(s) 6 3/4" x 12" 24F-V8 DF Glulam



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Member Length : 30' 7/8"

System : Roof
Member Type : Flush Beam
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 2/12

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7260 @ 22' 6"	26688 (6.00")	Passed (27%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	4171 @ 21' 3 3/16"	16457	Passed (25%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	19258 @ 11' 8 1/8"	36551	Passed (53%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-7763 @ 22' 6"	37260	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.504 @ 12' 1 1/4"	0.693	Passed (L/495)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.826 @ 12' 3/8"	1.039	Passed (L/302)	--	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240). Upward deflection on left and right cantilevers exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 0.98 that was calculated using length L = 19' 3 7/8".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 11 1/8".
- Upward deflection on right cantilever exceeds 0.4".
- -504 lbs uplift at support located at 22' 6". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Seismic	Total	
1 - Column - steel	6.00"	6.00"	1.50"	2062	2322	2903	-1859	376/-376	7663/-2235	Blocking
2 - Column - steel	6.00"	6.00"	1.63"	3097	3330	4163	-3937	185/-185	10775/-4122	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	29' 11" o/c	
Bottom Edge (Lu)	29' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 29' 6"	N/A	19.7	--	--	--	--	
1 - Uniform (PSF)	0 to 2' 2 3/8"	9' 9"	16.2	20.0	25.0	-16.1	3.3	Default Load
2 - Uniform (PSF)	2' 2 3/8" to 17' 4 3/16"	9' 9"	16.2	20.0	25.0	-14.9	3.3	
3 - Uniform (PSF)	17' 4 3/16" to 21' 9"	9' 9"	16.2	20.0	25.0	-20.8	-	
4 - Uniform (PSF)	21' 9" to 28' 6"	9' 9"	16.2	20.0	25.0	-31.5	-	

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Alec Yeutter KPFF Consulting Engineers (206) 926-0787 alec.yeutter@kpff.com	

B05

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PRCNC20220958

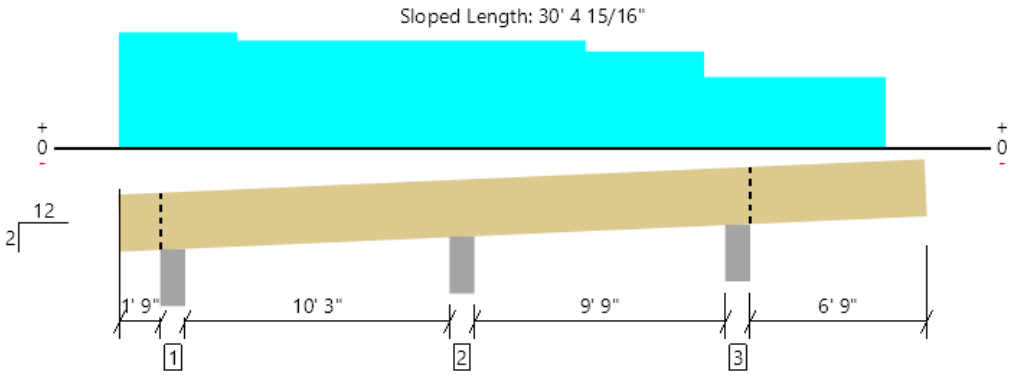
FORTE WEB

MEMBER REPORT

PASSED

Roof, Roof Edge Glulam

1 piece(s) 6 3/4" x 12" 24F-V8 DF Glulam



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Member Length : 30' 6 15/16"

System : Roof
Member Type : Flush Beam
Building Use : Commercial
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 2/12

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2634 @ 23'	26688 (6.00")	Passed (10%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	1133 @ 11' 6 3/16"	16457	Passed (7%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	2273 @ 6' 9 7/16"	37260	Passed (6%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-3623 @ 23'	36613	Passed (10%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.056 @ 30'	0.473	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.096 @ 30'	0.710	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 13/16".
- Critical negative moment adjusted by a volume factor of 0.98 that was calculated using length L = 19'.
- -295 lbs uplift at support located at 23'. Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Seismic	Total	
1 - Column - steel	6.00"	6.00"	1.50"	686	697	871	-657	114/-114	2368/-771	Blocking
2 - Column - steel	6.00"	6.00"	1.50"	1063	1190	1487	-1299	181/-181	3921/-1480	None
3 - Column - steel	6.00"	6.00"	1.50"	1193	1152	1441	-1685	13/-13	3799/-1698	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	30' 5" o/c	
Bottom Edge (Lu)	30' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (non-snow: 1.25)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 30'	N/A	19.7	--	--	--	--	
1 - Uniform (PSF)	0 to 4' 4 13/16"	5'	16.2	20.0	25.0	-16.1	3.3	Default Load
2 - Uniform (PSF)	4' 4 13/16" to 17' 4 3/16"	5'	16.2	20.0	25.0	-19.6	3.3	
3 - Uniform (PSF)	17' 4 3/16" to 21' 9"	5'	16.2	20.0	25.0	-20.8	-	
4 - Uniform (PSF)	21' 9" to 28' 6"	5'	16.2	20.0	25.0	-31.5	-	

ForteWEB Software Operator	Job Notes
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B06

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ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: Pioneer Park

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

project: Pioneer Park Building	by: ASY	sheet no.: XXX
location: Puyallup, WA	date: 05/27/2022	
client: ARC		job no.: 2200191
North and East Columns: C-4 & C-4		

WOOD STUDS - AXIAL + LATERAL LOADS (NDS)

STUD PROPERTIES

Lumber Type		Visually Graded Sawn Lumber	
Wood Species	Species =	Douglas Fir-Larch	
Wood Grade	Grade =	Stud	
Stud Size	Size =	2x8	
Number of Studs	n =	4	
Stud Spacing	s =	16	in
Unbraced Length - X	ℓ_{ux} =	8	ft
Unbraced Length - Y	ℓ_{uy} =	4	ft
Buckling Length Coefficient	k_e =	1	
Slenderness Ratio - X	ℓ_e/d_x =	13.2	
Slenderness Ratio - Y	ℓ_e/d_y =	32.0	

SECTION REDUCTION

Rows of Bolts	n =	0	
Diameter of Bolt	D =	0.75	in

NDS REFERENCE DESIGN VALUES *(NDS Supplement Table 4A)*

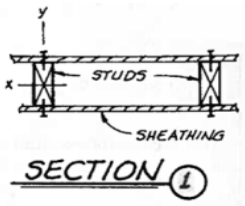
Bending Capacity	F_b =	700	psi
Shear Parallel to Grain	F_v =	180	psi
Parallel Compressive Capacity	F_c =	850	psi
Modulus of Elasticity	E =	1,400,000	psi
Min. Modulus of Elasticity	E_{min} =	510,000	psi
Perpendicular Load Capacity	$F_{c,perp}$ =	625	psi

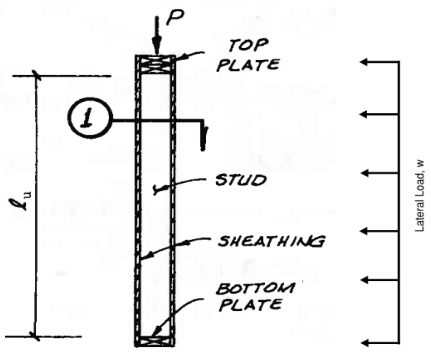
LOAD INPUT

Lateral Pressure (Ultimate)	w_L =	16.8	psf
Lateral Load Case	Case =	Wind	
Service Load	w_{LS} =	10.1	psf (0.6W)
Deflection Limit	L/Δ >	180	
Deflection Load	w_{LD} =	7.1	psf (0.42W)

BOTTOM PLATE PROPERTIES

Wood Species	Species =	Douglas Fir-Larch
Wood Grade	Grade =	Stud





NDS ADJUSTMENT FACTORS

Adjustment Factor		F_c	F_b	F_v	$F_{c,perp}$	E	*Code Reference*
Load Duration Factor	C_D =	1.00	1.00	1.00	-	-	*NDS Table 2.3.2*
Wet Service Factor	C_M =	1.00	1.00	1.00	1.00	1.00	*NDS Supplement Table 4A*
Temperature Factor	C_t =	1.00	1.00	1.00	1.00	1.00	*NDS Appendix C*
Beam Stability Factor	C_L =	-	0.96	-	-	-	*NDS Sec. 3.3.3*
Size Factor	C_F =	1.05	1.20	-	-	-	*NDS Supplement Table 4A*
Fire Treatment Factor	C_{FT} =	1.00	1.00	1.00	1.00	1.00	
Incising Factor	C_i =	1.00	1.00	1.00	1.00	1.00	*NDS Table 4.3.8*
Repetitive Member Factor	C_r =	-	1.00	-	-	-	*NDS Supplement Table 4A*
Column Stability Factor	C_P =	0.40	-	-	-	-	*NDS Eq. 3.7-1*
Bearing Area Factor	C_b =	-	-	-	1.00	-	*NDS Sec. 3.10.4*

ADJUSTED DESIGN VALUES

Compression Design Value	F_c' =	361	psi
Stiffness Design Value	E_{min}' =	510,000	psi
Perpendicular Design Value	$F_{c,perp}'$ =	625	psi
Bending Design Value	F_{bx}' =	810	psi
Shear Design Value	F_v' =	180	psi

RESULTS

				Code Reference
Lateral Deflection	Δ =	0.00	in	
Deflection Ratio	L/Δ =	29535	OK	
Buckling Capacity		11,762	lbs/ft	
Net Section Capacity		29,118	lbs/ft	
Sill Plate Capacity		20,391	lbs/ft	
Edgewise Bending Capacity		78,006	lbs/ft	*NDS Sec. 3.9.2*
Axial + Flexure Capacity		11,552	lbs/ft	*NDS Eq 3.9-3,-4*
Allowable Axial Capacity	**w =**	**11,552**	**lbs/ft**	

Stud Wall Axial Capacities	
Stud Spacing	Capacity
12 in oc	15469 lbs/ft
16 in oc	11552 lbs/ft
24 in oc	7629 lbs/ft

FORTE WEB

MEMBER REPORT

PASSED

Roof, North and West Columns Column C-3

1 piece(s) 6 x 6 DF No.1

Post Height: 8'

Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	17	50	Passed (35%)	--	--
Compression (lbs)	2550	27326	Passed (9%)	1.15	1.0 D + 1.0 S [1]
Base Bearing (lbs)	2550	18906	Passed (13%)	--	1.0 D + 1.0 S [1]
Bending/Compression	0.07	1	Passed (7%)	1.15	1.0 D + 1.0 S [1]

- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Member connection at both ends must be checked against an uplift of -236.
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Douglas Fir-Larch

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Member Type : Free Standing Post
Building Code : IBC 2018
Design Methodology : ASD

Vertical Load	Dead (0.90)	Roof Live (non-snow: 1.25)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	1063	1190	1487	-1299	181/-181	Linked from: Roof Edge Glulam, Support 2

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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B09

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6/7/2022 11:17:42 PM UTC

ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16

File Name: Pioneer Park

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

File: Glulam Column.ec6

Lic. # : KW-06007506
KPFF CONSULTING ENGINEERS SEA

DESCRIPTION: South Columns Column C-1

Code References

Calculations per 2012 NDS, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	10 ft		
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: DF		
Wood Grade	L2D, >= 4 Laminations		
Fb +	2,100.0 psi	Fv	230.0 psi
Fb -	2,000.0 psi	Ft	1,450.0 psi
Fc - Prll	2,300.0 psi	Density	31.20 pcf
Fc - Perp	650.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,900.0	1,900.0	1,900.0 ksi
Minimum	1,000.0	1,000.0	

Wood Section Name	**6.75x12**		
Wood Grading/Manuf.	Western		
Wood Member Type	GLB		
Exact Width	**6.750** in	Allow Stress Modification Factors	
Exact Depth	**6.0** in	Cf or Cv for Bending	1.0
Area	40.50 in^2	Cf or Cv for Compression	1.0
Ix	121.50 in^4	Cf or Cv for Tension	1.0
Iy	153.773 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 87.750 lbs * Dead Load Factor
AXIAL LOADS . . .
Load From Interior Glulam Beam: Axial Load at 10.0 ft, D = 3.097, Lr = 3.330, S = 4.163, W = -3.937, E = 0.1850 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1049 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	7.348 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,728.79 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D-0.70E
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.757	0.05018	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr	1.250	0.616	0.09083	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	0.654	0.1049	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr	1.250	0.616	0.07923	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	0.654	0.09008	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.506	0.01090	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.450W	1.600	0.506	0.05181	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S+0.450W	1.600	0.506	0.06009	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.60W	1.600	0.506	0.0	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E	1.600	0.506	0.04391	PASS	0.0 ft	0.0	PASS	10.0 ft
+D-0.70E	1.600	0.506	0.04048	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S+0.5250E	1.600	0.506	0.08484	PASS	0.0 ft	0.0	PASS	10.0 ft

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

File: Glulam Column.ec6

Lic. # : KW-06007506 KPFF CONSULTING ENGINEERS SEA

DESCRIPTION: South Columns

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+0.750S-0.5250E	1.600	0.506	0.08227	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E	1.600	0.506	0.02703	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D-0.70E	1.600	0.506	0.02360	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					3.185				
+D+Lr					6.515				
+D+S					7.348				
+D+0.750Lr					5.682				
+D+0.750S					6.307				
+D+0.60W					0.823				
+D+0.750Lr+0.450W					3.911				
+D+0.750S+0.450W					4.535				
+0.60D+0.60W									
+D+0.70E					3.314				
+D+0.750S+0.5250E					6.404				
+0.60D+0.70E					2.040				
Lr Only					3.330				
S Only					4.163				
W Only									
E Only					0.185				

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.70E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750S+0.5250E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft

Project Title:
Engineer:
Project ID:
Project Descr:

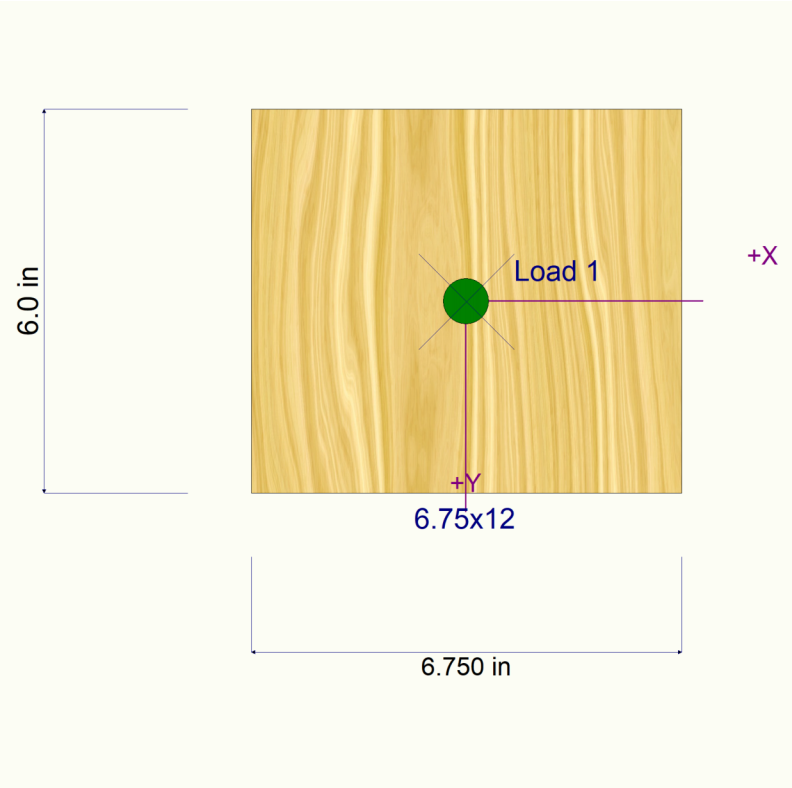
Wood Column

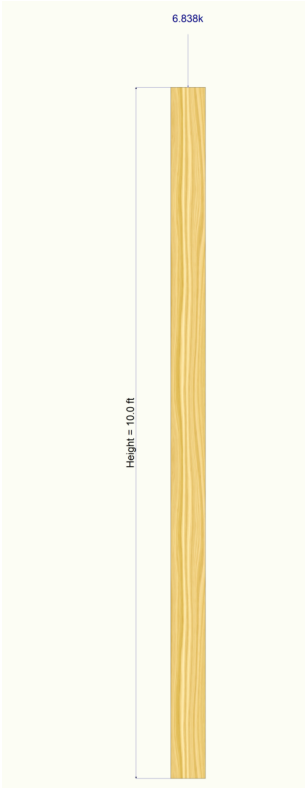
File: Glulam Column.ec6

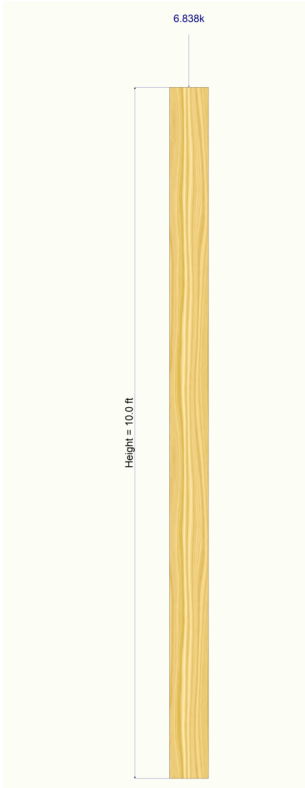
Lic. # : KW-06007506 KPFF CONSULTING ENGINEERS SEA

DESCRIPTION: South Columns

Sketches







Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

File: Glulam Column.ec6

Lic. # : KW-06007506
KPFF CONSULTING ENGINEERS SEA

DESCRIPTION: South Edge Columns Column C-2

Code References

Calculations per 2012 NDS, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 10 ft
(Used for non-slender calculations)

Wood Species : GluLam Column, Species: DF
Wood Grade : L2D, >= 4 Laminations

Fb +	2,100.0 psi	Fv	230.0 psi
Fb -	2,000.0 psi	Ft	1,450.0 psi
Fc - Prll	2,300.0 psi	Density	31.20 pcf
Fc - Perp	650.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,900.0	1,900.0	1,900.0 ksi
Minimum	1,000.0	1,000.0	

Wood Section Name : **5.125x12**
Wood Grading/Manuf. : Western
Wood Member Type : GLB

Exact Width	**5.125**	in
Exact Depth	**6.0**	in
Area	30.750	in^2
Ix	92.250	in^4
Iy	67.306	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 66.625 lbs * Dead Load Factor
AXIAL LOADS . . .
Load From Interior Glulam Beam: Axial Load at 10.0 ft, D = 3.097, Lr = 3.330, S = 4.163, W = -3.937, E = 0.1850 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1756 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	7.327 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,356.52 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D-0.70E
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y : 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X : 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.622	0.07991	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr	1.250	0.478	0.1537	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	0.513	0.1756	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr	1.250	0.478	0.1340	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	0.513	0.1507	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.384	0.01846	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.450W	1.600	0.384	0.08961	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S+0.450W	1.600	0.384	0.1040	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.60W	1.600	0.384	0.0	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E	1.600	0.384	0.07587	PASS	0.0 ft	0.0	PASS	10.0 ft
+D-0.70E	1.600	0.384	0.06991	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S+0.5250E	1.600	0.384	0.1471	PASS	0.0 ft	0.0	PASS	10.0 ft

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

File: Glulam Column.ec6

Lic. # : KW-06007506 KPFF CONSULTING ENGINEERS SEA

DESCRIPTION: South Edge Columns

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+0.750S-0.5250E	1.600	0.384	0.1426	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E	1.600	0.384	0.04672	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D-0.70E	1.600	0.384	0.04075	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction k @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top
D Only					3.164				
+D+Lr					6.494				
+D+S					7.327				
+D+0.750Lr					5.661				
+D+0.750S					6.286				
+D+0.60W					0.801				
+D+0.750Lr+0.450W					3.889				
+D+0.750S+0.450W					4.514				
+0.60D+0.60W									
+D+0.70E					3.293				
+D+0.750S+0.5250E					6.383				
+0.60D+0.70E					2.028				
Lr Only					3.330				
S Only					4.163				
W Only									
E Only					0.185				

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.450W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750S+0.450W	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.70E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750S+0.5250E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.0000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft

Project Title:
Engineer:
Project ID:
Project Descr:

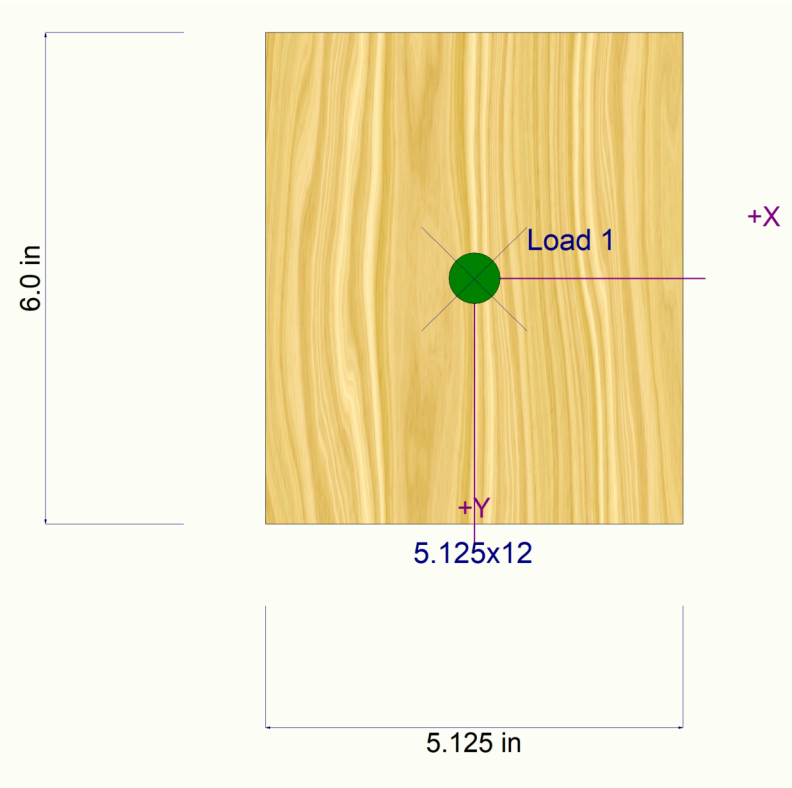
Wood Column

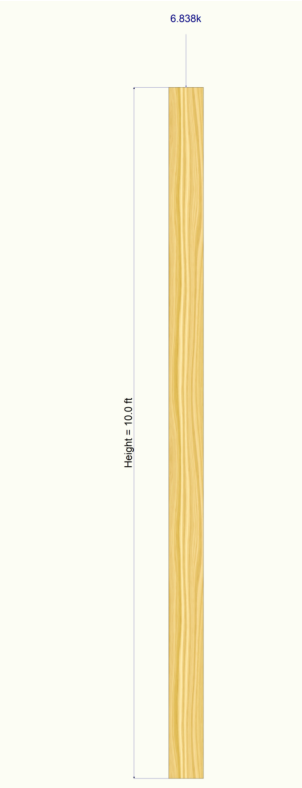
File: Glulam Column.ec6

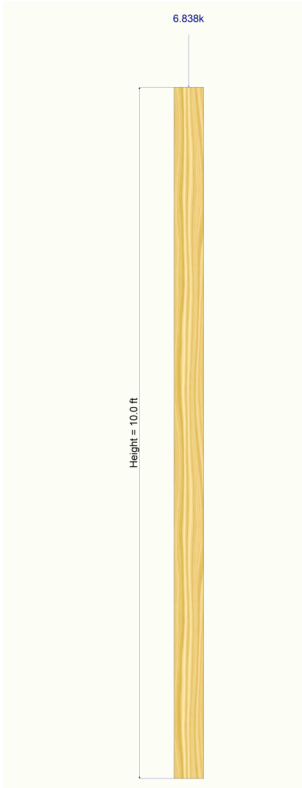
Lic. # : KW-06007506
KPFF CONSULTING ENGINEERS SEA

DESCRIPTION: South Edge Columns

Sketches







kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

project: Pioneer Park Building	by: ASY	sheet no.: XXX
location: Puyallup, WA	date: 05/27/2022	
client: ARC		job no.: 2200191
Typ Non-Load Bearing Exterior Wall		

WOOD STUDS - AXIAL + LATERAL LOADS (NDS)

STUD PROPERTIES

Lumber Type		Visually Graded Sawn Lumber	
Wood Species	Species =	Douglas Fir-Larch	
Wood Grade	Grade =	Stud	
Stud Size	Size =	2x6	
Number of Studs	n =	1	
Stud Spacing	s =	16	in
Unbraced Length - X	ℓ_{ux} =	10.25	ft
Unbraced Length - Y	ℓ_{uy} =	6	ft
Buckling Length Coefficient	k_e =	1	
Slenderness Ratio - X	ℓ_e/d_x =	22.4	
Slenderness Ratio - Y	ℓ_e/d_y =	48.0	

SECTION REDUCTION

Rows of Bolts	n =	0	
Diameter of Bolt	D =	0.75	in

NDS REFERENCE DESIGN VALUES *(NDS Supplement Table 4A)*

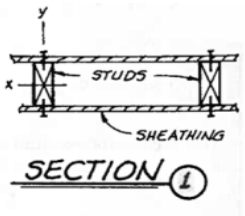
Bending Capacity	F_b =	700	psi
Shear Parallel to Grain	F_v =	180	psi
Parallel Compressive Capacity	F_c =	850	psi
Modulus of Elasticity	E =	1,400,000	psi
Min. Modulus of Elasticity	E_{min} =	510,000	psi
Perpendicular Load Capacity	$F_{c,perp}$ =	625	psi

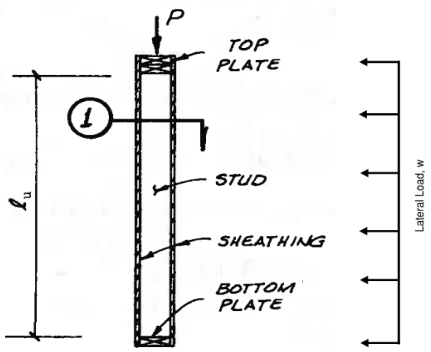
LOAD INPUT

Lateral Pressure (Ultimate)	w_L =	16.8	psf
Lateral Load Case	Case =	Wind	
Service Load	w_{LS} =	10.1	psf (0.6W)
Deflection Limit	L/Δ >	240	
Deflection Load	w_{LD} =	7.1	psf (0.42W)

BOTTOM PLATE PROPERTIES

Wood Species	Species =	Douglas Fir-Larch
Wood Grade	Grade =	Stud





NDS ADJUSTMENT FACTORS

Adjustment Factor		F_c	F_b	F_v	$F_{c,perp}$	E	*Code Reference*
Load Duration Factor	C_D =	1.00	1.00	1.00	-	-	*NDS Table 2.3.2*
Wet Service Factor	C_M =	1.00	1.00	1.00	1.00	1.00	*NDS Supplement Table 4A*
Temperature Factor	C_t =	1.00	1.00	1.00	1.00	1.00	*NDS Appendix C*
Beam Stability Factor	C_L =	-	0.97	-	-	-	*NDS Sec. 3.3.3*
Size Factor	C_F =	1.00	1.00	-	-	-	*NDS Supplement Table 4A*
Fire Treatment Factor	C_{FT} =	1.00	1.00	1.00	1.00	1.00	
Incising Factor	C_i =	1.00	1.00	1.00	1.00	1.00	*NDS Table 4.3.8*
Repetitive Member Factor	C_r =	-	1.00	-	-	-	*NDS Supplement Table 4A*
Column Stability Factor	C_P =	0.20	-	-	-	-	*NDS Eq. 3.7-1*
Bearing Area Factor	C_b =	-	-	-	1.25	-	*NDS Sec. 3.10.4*

ADJUSTED DESIGN VALUES

Compression Design Value	F_c' =	173	psi
Stiffness Design Value	E_{min}' =	510,000	psi
Perpendicular Design Value	$F_{c,perp}'$ =	781	psi
Bending Design Value	F_{bx}' =	681	psi
Shear Design Value	F_v' =	180	psi

RESULTS

				Code Reference
Lateral Deflection	Δ =	0.08	in	
Deflection Ratio	L/Δ =	1533	OK	
Buckling Capacity		1,071	lbs/ft	
Net Section Capacity		5,259	lbs/ft	
Sill Plate Capacity		4,834	lbs/ft	
Edgewise Bending Capacity		5,186	lbs/ft	*NDS Sec. 3.9.2*
Axial + Flexure Capacity		769	lbs/ft	*NDS Eq 3.9-3,-4*
Allowable Axial Capacity	**w =**	**769**	**lbs/ft**	

Stud Wall Axial Capacities	
Stud Spacing	Capacity
12 in oc	1134 lbs/ft
16 in oc	769 lbs/ft
24 in oc	393 lbs/ft

1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

Chapter C
Lateral Force Resisting System

1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

DESIGN SUMMARY

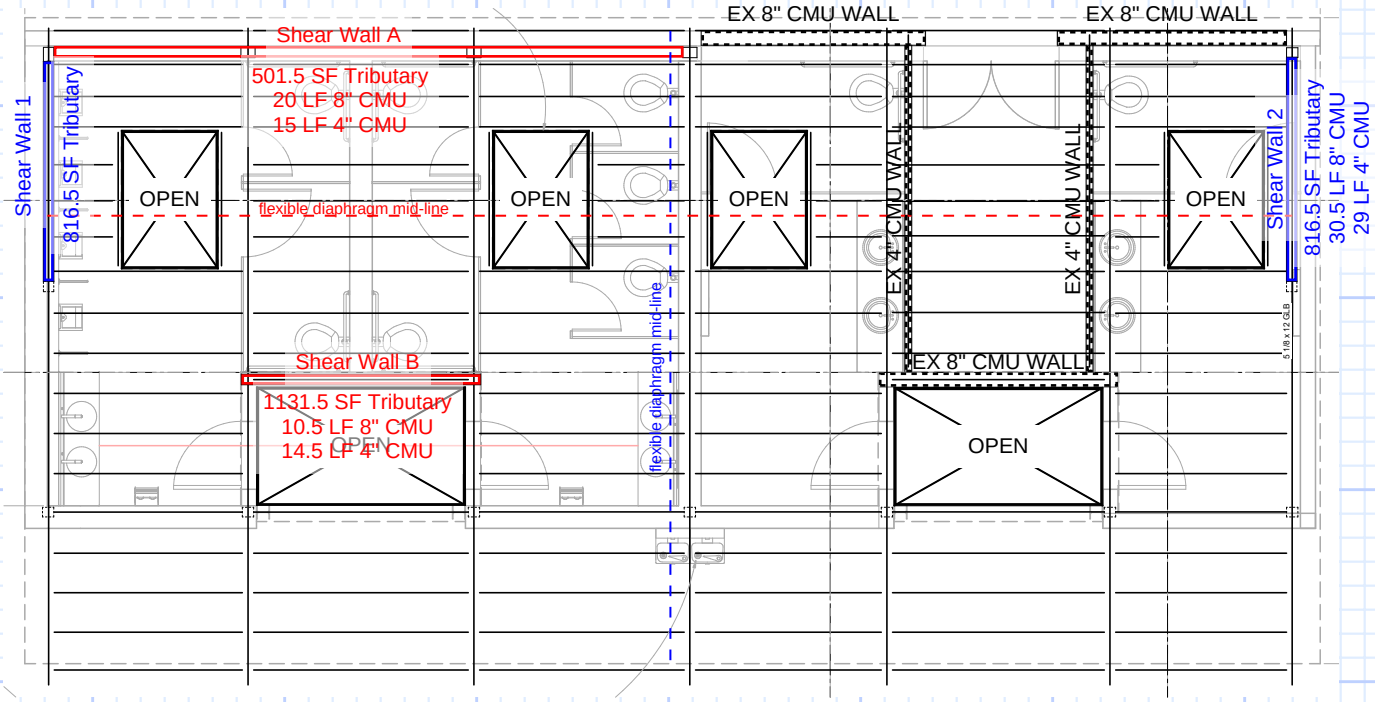
Date: *06/07/2022*
By: *ASY*

Design: *Lateral Force Resisting System*

The following calculation was performed to determine the sheathing and nailing requirements for the wood shear walls. Two wood shear walls are provided in each direction to resist lateral loads as shown on the following page. The building has a flexible diaphragm so the loading on each shear wall was determined using tributary areas of the building's mass. After the per lineal foot load was determined on each wood shear wall, the demand was compared to the shear wall capacities listed in the structural drawings and an appropriate design was selected.

kpff
1601 5th Avenue, Suite 1600
Seattle, WA 98101 206 622-5822

project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 05/27/2022	
client	ARC		job no. 2200191
	Lateral Design		



= LFRS for X- Direction = LFRS for Y- Direction

Loads: Unfactored
Base Shear = 7.32 kip
=> 5.68 kip from the roof framing and other partitions
= 3.6 psf later seismic
=> 1.46 kip from 8" CMU walls
= 47.9 plf lateral seismic
=> 0.19 kip from 4" CMU walls
= 19.3 plf lateral seismic

X- Direction:
Shear Wall A:
=> (3.6 psf x 501.5 SF) + (47.9 plf x 20 LF) + (19.3 plf x 15 LF) = 3.05 kip
=> 3.05 kip / 27.75 ft. = 110.0 plf on Shear Wall A
=> 0.7 x 110.0 plf = 77 plf

=> Use SW-6 per Typical Details, DCR = 0.25

Shear Wall B:
=> (3.6 psf x 1131.5 SF) + (47.9 plf x 10.5 LF) + (19.3 plf x 14.5 LF) = 4.86 kip
=> 4.86 kip / 10.5 ft. = 462.5 plf on Shear Wall B
=> 0.7 x 462.5 plf = 323.8 plf

=> Use SW-4 per Typical Details, DCR = 0.70

Y-Direction:
Shear Wall 1:
=> (3.6 psf x 816.5 SF) = 2.94 kip
=> 2.94 kip / 9.5 ft. = 309.4 plf on Shear Wall 1
=> 0.7 x 309.4 plf = 216.6 plf

=> Use SW-6 per Typical Details, DCR = 0.70

Shear Wall 2:
=> (3.6 psf x 816.5 SF) + (47.9 plf x 30.5 LF) + (19.3 plf x 29 LF) = 4.96 kip
=> 4.96 kip / 9.5 ft. = 522.1 plf
=> 0.7 x 522.1 plf = 365.5 plf

=> Use SW-4 per Typical Details, DCR = 0.79

1601 5th Avenue, Suite 1600
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Chapter D
Foundations

1601 5th Avenue, Suite 1600
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DESIGN SUMMARY

Date: *06/07/2022*
By: *ASY*

Design: *Foundations*

The following calculations were performed to determine the suitability of foundation sizes to resist gravity and lateral loads and to verify the stability of the foundations under lateral loading. Continuous footings are used to support columns and shear walls throughout the structure.

Items to note:
- A 5 ft. effective width of slab was used to help resist uplift forces.
- An effective 2 ft. x 3 ft. footing was used for bearing checks with column loads.
- A portion of continuous footing at the ends of the building is used to help resist sliding.

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project	Pioneer Park Building	by ASY	sheet no.
location	Puyallup, WA	date 05/31/22	
client	ARC		job no. 2200191
	Foundation Design		

Design Values:

Allowable Bearing Pressure	1500 psf	(Non-Transient Loads)
Allowable Bearing Pressure	2000 psf	(Transient Loading)
Lateral Bearing Pressure	150 psf	
Coefficient of Friction	0.4	
Concrete Desnisty	145 pcf	

Geometry:

Shear Wall A Footing	Width:	1.50 ft.
	Depth:	0.83 ft.
	Minimum Burried Depth:	1.00 ft.
	Overbuild Width:	0.60 ft.
	Overbuild Depth:	1.50 ft.
	Effective Contribuitng Slab Width:	5.00 ft.
	Slab Depth	0.50 ft.
Shear Wall B Footing	Width	2.00 ft.
	Depth	0.83 ft.
	Minimum Burried Depth:	1.00 ft.
	Overbuild Width	0.60 ft.
	Overbuild Depth:	1.50 ft.
	Effective Contribuitng Slab Width:	10.00 ft.
	Slab Depth	0.50 ft.
Shear Wall 1 Footing	Width	2.00 ft.
	Depth	0.83 ft.
	Minimum Burried Depth:	1.00 ft.
	Overbuild Width	1.15 ft.
	Overbuild Depth:	1.00 ft.
	Effective Contribuitng Slab Width:	5.00 ft.
	Slab Depth	0.50 ft.
Shear Wall 2 Footing	Width	2.00 ft.
	Depth	0.83 ft.
	Minimum Burried Depth:	1.00 ft.
	Overbuild Width	0.60 ft.
	Overbuild Depth:	1.50 ft.
	Effective Contribuitng Slab Width:	5.00 ft.
	Slab Depth	0.50 ft.

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project: Pioneer Park Building		by: ASY	sheet no.
location: Puyallup, WA		date: 05/31/22	
client: ARC			job no. 2200191
Foundation Design			

Effective "Isolated" Footing	Width	2.00 ft.
	Length	3.00 ft.
	Depth	1.00 ft.
Wall A	Length	27.75 ft.
	Height	8.50 ft.
	Thickness	(2) 2x8 @ 16" OC
	Weight	4.40 psf
Wall B	Length	10.50 ft.
	Height	11.00 ft.
	Thickness	(1) 2x8 @ 16" OC
	Weight	2.20 psf
Wall 1	Length	9.50 ft.
	Height	10.00 ft.
	Thickness	(2) 2x6 @ 16" OC
	Weight	3.40 psf
Wall 2	Length	9.50 ft.
	Height	10.00 ft.
	Thickness	(1) 2x8 @ 16" OC
	Weight	2.20 psf

Loads:

Shear Wall A:	Lateral Seismic	3.05 kip
	Seismic Overturning Forces:	0.93 kip
	Wind	0.71 kip
	Wind Overturning Forces:	0.22 kip
Shear Wall B:	Lateral Seismic	4.86 kip
	Seismic Overturning Forces:	5.09 kip
	Wind	1.29 kip
	Wind Overturning Forces:	1.35 kip
Shear Wall 1:	Lateral Seismic	2.94 kip
	Seismic Overturning Forces:	3.09 kip
	Wind	2.50 kip
	Wind Overturning Forces:	2.63 kip
Shear Wall 2:	Lateral Seismic	4.96 kip
	Seismic Overturning Forces:	5.22 kip
	Wind	2.50 kip
	Wind Overturning Forces:	2.63 kip
North Column:	Dead	2.06 kip
	Live Roof	2.32 kip
	Snow	2.90 kip
	Vertical Seismic	0.38 kip
	Wind	-1.86 kip
Load Combinations	1. D	2.06 kip
	3.a D+Lr	4.38 kip
	3.b D + S	4.97 kip
	5. D+0.6W	0.95 kip
	6.a D+0.45W+0.75Lr	2.97 kip
	6.b D+0.45W+0.75S	3.40 kip
	7. 0.6D+0.6W	0.12 kip
	8. 1.0D+0.7Ev	2.33 kip
	9. 1.0D+0.525Ev+0.75S	4.44 kip
	10. 0.6D-0.7Ev	0.97 kip
South Column:	Dead	3.10 kip
	Live Roof	3.33 kip
	Snow	4.16 kip
	Vertical Seismic	0.19 kip
	Wind	-3.94 kip
Load Combinations	1. D	3.10 kip
	3.a D+Lr	6.43 kip
	3.b D + S	7.26 kip
	5. D+0.6W	0.73 kip
	6.a D+0.45W+0.75Lr	3.82 kip
	6.b D+0.45W+0.75S	4.45 kip
	7. 0.6D+0.6W	-0.50 kip
	8. 1.0D+0.7Ev	3.23 kip
	9. 1.0D+0.525Ev+0.75S	6.32 kip
	10. 0.6D-0.7Ev	1.73 kip

Design Checks:

Shear Wall Hold Downs:

Shear Wall A:	7. 0.6D+0.6W	-0.01 kip	*Includes Axial Load from North Columns
	10. 0.6D+0.7Emh	0.32 kip	*Includes Axial Load from North Columns
Shear Wall B:	7. 0.6D+0.6W	-0.81 kip	
	10. 0.6D+0.7Emh	-3.56 kip	
Shear Wall 1:	7. 0.6D+0.6W	-1.58 kip	
	10. 0.6D+0.7Emh	-2.17 kip	
Shear Wall 2:	7. 0.6D+0.6W	-1.58 kip	
	10. 0.6D+0.7Emh	-3.65 kip	

Uplift:

Shear Wall A:	Minimum Effective Footing Length	1.00 ft.	
	7. 0.6D+0.6W	-0.07 kip	*Includes 1/2 Axial Load from North Columns
	10. 0.6D+0.7Emh	-0.17 kip	*Includes 1/2 Axial Load from North Columns
	Capacity	0.43 kip	
	DCR	0.39	
Shear Wall B:	Minimum Effective Footing Length	6.00 ft.	
	7. 0.6D+0.6W	-0.81 kip	
	10. 0.6D+0.7Emh	-3.56 kip	
	Capacity	4.04 kip	
	DCR	0.88	
Shear Wall 1:	Minimum Effective Footing Length	5.00 ft.	
	7. 0.6D+0.6W	-1.58 kip	
	10. 0.6D+0.7Emh	-2.17 kip	
	Capacity	2.41 kip	
	DCR	0.90	
Shear Wall 2:	Minimum Effective Footing Length	9.00 ft.	
	7. 0.6D+0.6W	-1.58 kip	
	10. 0.6D+0.7Emh	-3.65 kip	
	Capacity	4.09 kip	
	DCR	0.89	

Shear Wall Soil Bearing Pressure:

Shear Wall A:	Minimum Effective Footing Length	2.00 ft.	
	5. D+0.6W	1.78 kip	*Includes Axial Load from North Columns
	8. D+0.7Emh	3.68 kip	*Includes Axial Load from North Columns
	Capacity:	6.00 kip	
	DCR	0.61	
Shear Wall B:	Minimum Effective Footing Length	2.00 ft.	
	5. D+0.6W	1.61 kip	
	8. D+0.7Emh	4.36 kip	
	Capacity:	6.00 kip	
	DCR	0.73	
Shear Wall 1:	Minimum Effective Footing Length	2.00 ft.	
	5. D+0.6W	2.46 kip	
	8. D+0.7Emh	3.05 kip	
	Capacity:	6.00 kip	
	DCR	0.51	
Shear Wall 2:	Minimum Effective Footing Length	2.00 ft.	
	5. D+0.6W	2.37 kip	
	8. D+0.7Emh	4.44 kip	
	Capacity:	6.00 kip	
	DCR	0.74	

Column Uplift:			
North Column:	Demand:	0.12 kip	
	Capacity:	0.52 kip	
	DCR	0.00	No Uplift
South Column:	Demand:	-0.50 kip	
	Capacity:	0.52 kip	
	DCR	0.97	
Column Soil Bearing:			
North Column:	Demand (Non-Transient):	4.97 kip	
	Capacity (Non-Transient):	9.00 kip	
	Demand (Transient):	4.44 kip	
	Capacity (Transient):	12.00 kip	
	DCR	0.55	
South Column:	Demand (Non-Transient):	7.26 kip	
	Capacity (Non-Transient):	9.00 kip	
	Demand (Transient):	6.32 kip	
	Capacity (Transient):	12.00 kip	
	DCR	0.81	
Sliding:			
Shear Wall A	Effective Lateral Bearing Width:	5 ft.	
	Demand:	2.14 kip	
	Gravity Load:	11.86 kip	*Includes weight of wall above
	Capacity:	6.12 kip	
	DCR	0.35	
Shear Wall B	Effective Lateral Bearing Width:	10 ft.	
	Demand:	3.40 kip	
	Gravity Load:	7.07 kip	*Includes weight of wall above
	Capacity:	5.58 kip	
	DCR	0.61	
Shear Wall 1	Effective Lateral Bearing Width:	5 ft.	
	Demand:	2.06 kip	
	Gravity Load:	4.58 kip	*Includes weight of wall above
	Capacity:	3.21 kip	
	DCR	0.64	
Shear Wall 2	Effective Lateral Bearing Width:	5 ft.	
	Demand:	3.47 kip	
	Gravity Load:	5.56 kip	*Includes weight of wall above and 1/2 Column Load
	Capacity:	3.60 kip	
	DCR	0.97	