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

PRMU20240139

ENGINEERING ANALYSIS FOR: EAST TOWN CROSSING APARTMENTS PIONEER & SHAW PUYALLUP, WA BUILDING B

PIERUCCIONI E&C, LLC
CHON PIERUCCIONI, PE
3128 N. BENNETT ST.
TACOMA, WA 98407

EAST TOWN CROSSING
BUILDING "B"
PIONEER & SHAW PUYALLUP WA

DESIGN CRITERIA

BUILDING CODE: 2018 INTERNATIONAL BUILDING CODE (IBC) AS AMENDED BY THE LOCAL JURISDICTION.

VERTICAL LOADS

ROOF LIVE LOAD:	25 PSF (SNOW)
ROOF DEAD LOAD:	25 PSF
RESIDENTIAL FLOOR LIVE LOAD:	40 PSF (REDUCIBLE) : 60 PSF (FOR DECKS)
STAIRWAY LANDING AREAS:	150 PSF (INCLUDING Ip=1.5)
FLOOR DEAD LOAD:	30 PSF (INCLUDES 1 ½" GYP TOPPING)

SNOW DESIGN DATA (ASCE 7-16)
FLAT SNOW LOAD: N/A
SNOW EXPOSURE FACTOR, Ce=1.0,
SNOW IMPORTANCE FACTOR, Is=1.0,
THERMAL FACTOR, Ct=1.1

WIND DESIGN DATA (ASCE 7-16)
BASIC WIND SPEED (ASD) V= 85MPH
ULTIMATE WIND SPEED V= 110MPH
RISK CATEGORY: II EXPOSURE: B
IMPORTANCE FACTOR, Iw= 1.0
TOPOGRAPHIC FACTOR, Kzt= 1.0

SEISMIC DESIGN DATA (ASCE7-16)
SEISMIC RESPONSE SYSTEM: WOOD SHEARWALLS
EQUIVALENT LATERAL FORCE PROCEDURE (ASCE 7-16)
RISK CATEGORY: II SEISMIC IMPORTANCE FACTOR, Ie= 1.0
MAPPED SPECTRAL RESPONSE ACCELERATION: Ss=1.24, S1=0.476
DESIGN SPECTRAL RESPONSE ACCELERATION: Sds=0.831, Sd1=0.476
SITE CLASS: D SEISMIC DESIGN CATEGORY: D
SEISMIC RESPONSE COEFFICIENT: Cs= 0.091
DESIGN BASE SHEAR: 111,513#

SOIL PROPERTIES:
BEARING CAPACITY: 2,000 PSF
LATERAL CAPACITY: 250 PSF/FT

REVISIONS	
01	CITY REVIEW
REVISIONS	

ENGINEER:	CP
CHECKED BY:	CP
DATE:	2024.01.12
TITLE:	STRUCTURAL ANALYSIS
PROJECT # :	----

City of Puyallup
Building
REVIEWED FOR COMPLIANCE
BSnowden
05/13/2024
2:32:50 PM
CITY OF PUYALLUP STATE OF WASHINGTON

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

2nd Floor Framing			
Member Name	**Results (Max UTIL %)**	**Current Solution**	**Comments**
Floor Joist 16' and Under	Passed (96% M)	1 piece(s) 11 7/8" TJI® 110 @ 16" OC	
Floor Joist 17'-8"	Passed (98% M)	1 piece(s) 11 7/8" TJI® 210 @ 16" OC	
Floor Joist 19'-4"	Passed (72% M)	1 piece(s) 11 7/8" TJI® 360 @ 16" OC	
Floor Joist 20'-7" (with offset 3rd flr.)	Passed (82% R)	2 piece(s) 11 7/8" TJI® 560 @ 16" OC	
Short Stair Stringers	Passed (68% R)	1 piece(s) 4 x 12 HF No.2	
Long Short Stair Stringers	Passed (98% ΔL)	1 piece(s) 3 1/2" x 12" 24F-V4 DF Glulam	
Top Landing Beam	Passed (98% R)	1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam	
10'-10" Deck Joist	Passed (71% R)	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
Deck Cantilever Ledger 2'	Passed (47% R)	2 piece(s) 2 x 12 HF No.2	
Grid 2.6 (F-G.3) Flush Beam	Passed (92% R)	1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 2.6 (G.9-H.8) Flush Beam	Passed (92% R)	1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 2.4 (H.8-I.8) Door Header	Passed (46% R)	1 piece(s) 4 x 8 DF No.2	
Grid 2.4 (J.2-K.8) Door Header	Passed (73% M)	1 piece(s) 4 x 8 DF No.2	
Grid 5.5 (H-H.8) Door Header	Passed (77% R)	1 piece(s) 4 x 8 DF No.2	
Grid 5.5 (G.1-G.3) Flush Beam	Passed (63% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid G.1 (5.2-5.3) Door Header	Passed (53% R)	1 piece(s) 4 x 8 DF No.2	
Grid 6 (G.1-G.3) Flush Beam	Passed (70% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 2.5 (D.4-D.6) Flush Beam	Passed (86% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 3.3 (D.8-E.1) Flush Beam	Passed (87% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 5.3 (D.5-E.2) Flush Beam	Passed (74% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 6 (D.3-D.6) Flush Beam	Passed (96% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
3rd Floor Framing			
Member Name	**Results (Max UTIL %)**	**Current Solution**	**Comments**
Floor Joist 16' and Under	Passed (96% M)	1 piece(s) 11 7/8" TJI® 110 @ 16" OC	
Floor Joist 17'-8"	Passed (98% M)	1 piece(s) 11 7/8" TJI® 210 @ 16" OC	
Floor Joist 19'-4"	Passed (72% M)	1 piece(s) 11 7/8" TJI® 360 @ 16" OC	
Floor Joist 20'-7"	Passed (59% ΔT)	1 piece(s) 11 7/8" TJI® 560 @ 16" OC	
7'-6" Landing Joists	Passed (100% R)	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
Top Landing Beam	Passed (99% ΔL)	1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam	
Short Stair Stringers	Passed (68% R)	1 piece(s) 4 x 12 HF No.2	
4' Mid Landing Joists	Passed (77% R)	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
Mid Landing Beam Inner	Passed (79% ΔL)	1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam	
Mid Landing Beam Outer	Passed (102% ΔL)	1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam	
10'-10" Deck Joist	Passed (71% R)	1 piece(s) 2 x 12 HF No.2 @ 16" OC	
Deck Cantilever Ledger 2'	Passed (47% R)	2 piece(s) 2 x 12 HF No.2	
6' Window Header	Passed (17% M)	1 piece(s) 4 x 10 DF No.2	
Grid 2.6 (F-G.5) Flush Beam	Passed (92% ΔL)	1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 2.6 (H-H.8) Flush Beam	Passed (64% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 2.4 (H.8-I.8) Door Header	Passed (46% R)	1 piece(s) 4 x 8 DF No.2	
Grid 2.4 (J.2-K.8) Door Header	Passed (73% M)	1 piece(s) 4 x 8 DF No.2	
Grid 5.5 (H-H.8) Door Header	Passed (34% R)	1 piece(s) 4 x 8 DF No.2	
Grid 5.5 (G.4-G.8) Door Header	Passed (89% M)	1 piece(s) 4 x 8 DF No.2	
Grid 5.5 (G.1-G.3) Flush Beam	Passed (32% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid G.1 (5.2-5.3) Door Header	Passed (32% V)	1 piece(s) 4 x 8 DF No.2	
Grid 6 (G.1-G.3) Flush Beam	Passed (35% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 2.5 (D.4-D.6) Flush Beam	Passed (52% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 3.3 (D.8-E.1) Flush Beam	Passed (43% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 5.3 (D.5-E.2) Flush Beam	Passed (67% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	
Grid 6 (D.3-D.6) Flush Beam	Passed (48% R)	1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam	

ForteWEB Software Operator	**Job Notes**
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

7/15/2024 10:33:46 PM UTC
ForteWEB v3.8
File Name: East Town Crossing Building B

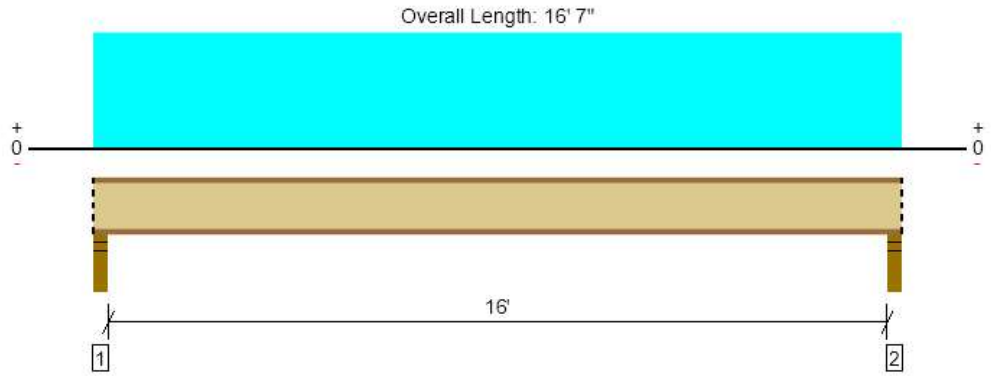
Roof Framing			
Member Name	**Results (Max UTIL %)**	**Current Solution**	**Comments**
Grid I Entry Roof Beam	Passed (91% R)	1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam	
Grid L 10' Deck Roof Beam	Passed (101% R)	1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam	
6' Window Header	Passed (90% R)	1 piece(s) 4 x 10 DF No.2	
Grid B 11' Deck Roof Beam	Passed (100% R)	1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam	
Deck Roof Cantilever Beam	~~Failed (61% R)~~ Passed	1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam	An excessive uplift of -2576 lbs at support located at 4" failed this product.

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

PASSED

2nd Floor Framing, Floor Joist 16' and Under

1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	774 @ 2 1/2"	1375 (3.50")	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	747 @ 3 1/2"	1560	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3049 @ 8' 3 1/2"	3160	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.275 @ 8' 3 1/2"	0.539	Passed (L/704)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.482 @ 8' 3 1/2"	0.808	Passed (L/403)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	48	40	Passed	--	--

Member Length : 16' 7"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	332	442	774	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	332	442	774	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)	3' 1" o/c	
Bottom Edge (Lu)	16' 7" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 16' 7"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

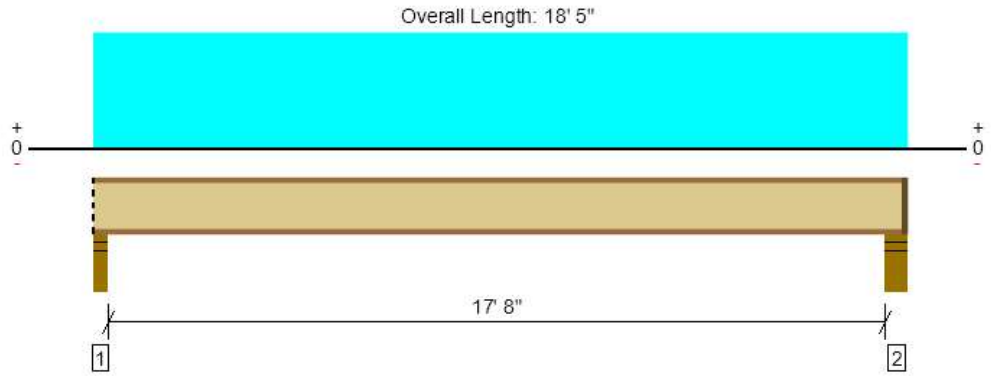
Weyerhaeuser

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

PASSED

2nd Floor Framing, Floor Joist 17'-8"

1 piece(s) 11 7/8" TJI® 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	856 @ 18' 1/2"	1460 (3.50")	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	824 @ 3 1/2"	1655	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3710 @ 9' 1 1/2"	3795	Passed (98%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.352 @ 9' 1 1/2"	0.594	Passed (L/609)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.615 @ 9' 1 1/2"	0.892	Passed (L/348)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	44	40	Passed	--	--

Member Length : 18' 3 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	365	487	852	Blocking
2 - Stud wall - HF	5.50"	4.00"	1.75"	372	496	867	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	3' 7" o/c	
Bottom Edge (Lu)	18' 4" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 5"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

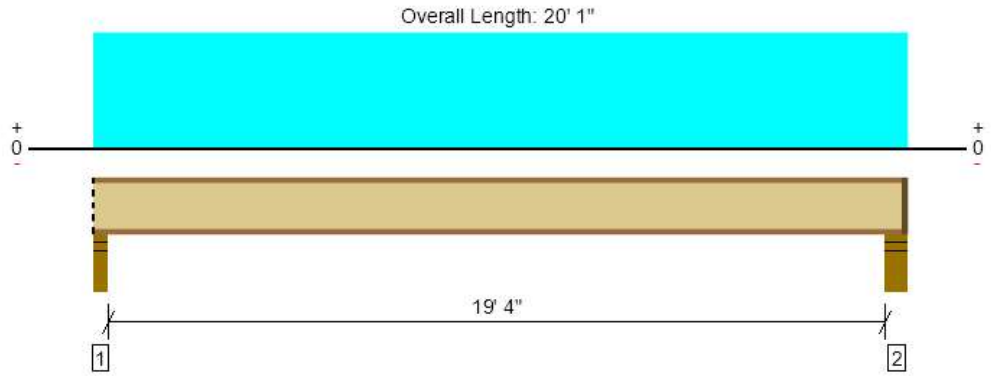
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Floor Joist 19'-4"

1 piece(s) 11 7/8" TJI® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	933 @ 19' 8 1/2"	1505 (3.50")	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	902 @ 3 1/2"	1705	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4436 @ 9' 11 1/2"	6180	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.395 @ 9' 11 1/2"	0.650	Passed (L/593)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.691 @ 9' 11 1/2"	0.975	Passed (L/339)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	43	40	Passed	--	--

Member Length : 19' 11 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	398	531	929	Blocking
2 - Stud wall - HF	5.50"	4.00"	1.75"	405	540	945	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	4' 4" o/c	
Bottom Edge (Lu)	20' o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20' 1"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

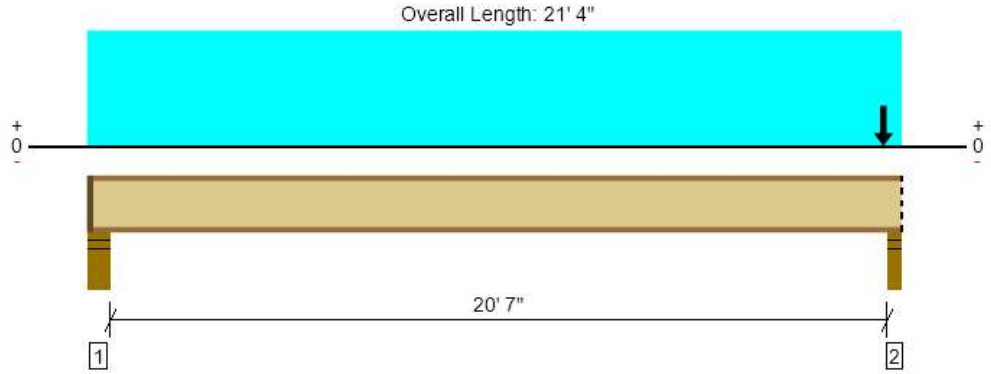
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Floor Joist 20'-7" (with offset 3rd flr.)

2 piece(s) 11 7/8" TJI® 560 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2825 @ 21' 1 1/2"	3450 (3.50")	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2798 @ 21' 1/2"	4100	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5279 @ 11' 1/8"	19000	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.196 @ 10' 9 15/16"	0.692	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.343 @ 10' 9 15/16"	1.038	Passed (L/727)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	56	40	Passed	--	--

Member Length : 21' 2 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	4.00"	1.75"	440	587	1028	1 1/2" Rim Board
2 - Stud wall - HF	3.50"	3.50"	2.31"	1211	1615	2825	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	11' o/c	
Bottom Edge (Lu)	21' 3" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 21' 4"	16"	30.0	40.0	2nd floor load
2 - Point (lb)	20' 10 1/4"	N/A	798	1064	3rd Floor offset wall load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

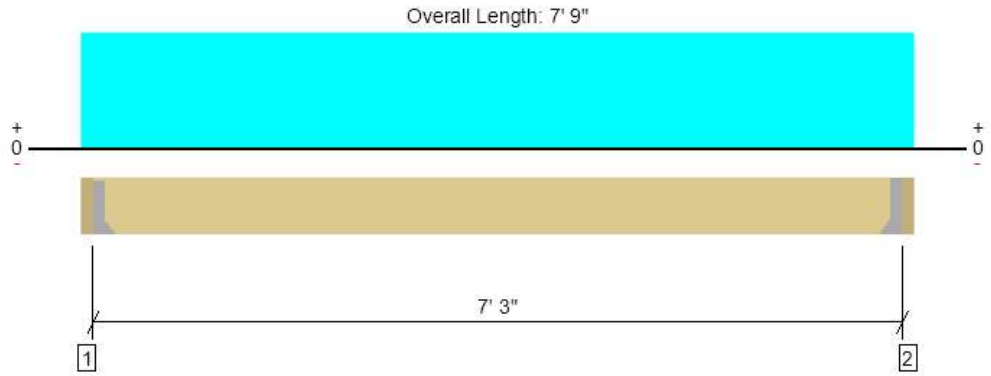
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Short Stair Stringers

1 piece(s) 4 x 12 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1450 @ 3"	2126 (1.50")	Passed (68%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1075 @ 1' 2 1/4"	3938	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2628 @ 3' 10 1/2"	5752	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.035 @ 3' 10 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.046 @ 3' 10 1/2"	0.363	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 3"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) 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	Floor Live	Factored	
1 - Hanger on 11 1/4" GLB beam	3.00"	Hanger[1]	1.50"	385	1163	1547	See note [1]
2 - Hanger on 11 1/4" GLB beam	3.00"	Hanger[1]	1.50"	385	1163	1547	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)	7' 3" o/c	
Bottom Edge (Lu)	7' 3" 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 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 7' 6"	N/A	10.0	--	
1 - Uniform (PSF)	0 to 7' 9" (Front)	2'	45.0	150.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

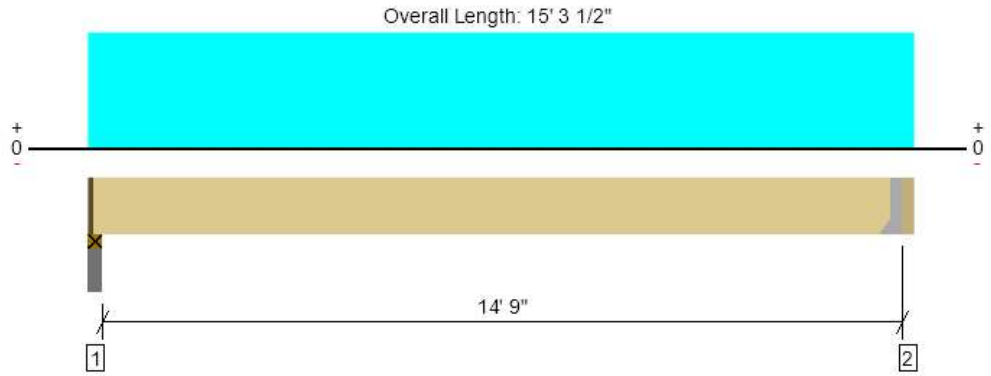
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Long Short Stair Stringers

1 piece(s) 3 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3002 @ 2"	3189 (2.25")	Passed (94%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2576 @ 14' 1/2"	7420	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	11069 @ 7' 7 1/4"	16800	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.364 @ 7' 7 1/4"	0.372	Passed (L/490)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.486 @ 7' 7 1/4"	0.744	Passed (L/367)	--	1.0 D + 1.0 L (All Spans)

Member Length : 14' 11 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 14' 10 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Plate on concrete - HF	3.50"	2.25"	2.12"	761	2281	3042	1 1/4" Rim Board
2 - Hanger on 12" GLB beam	3.00"	Hanger[1]	1.50"	768	2306	3074	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	14' 11" o/c	
Bottom Edge (Lu)	14' 11" 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
2 - Face Mount Hanger	HHUS410	3.00"	N/A	30-10d	10-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 15' 1/2"	N/A	10.2	--	
1 - Uniform (PSF)	0 to 15' 3 1/2" (Front)	2'	45.0	150.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

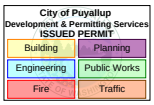
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

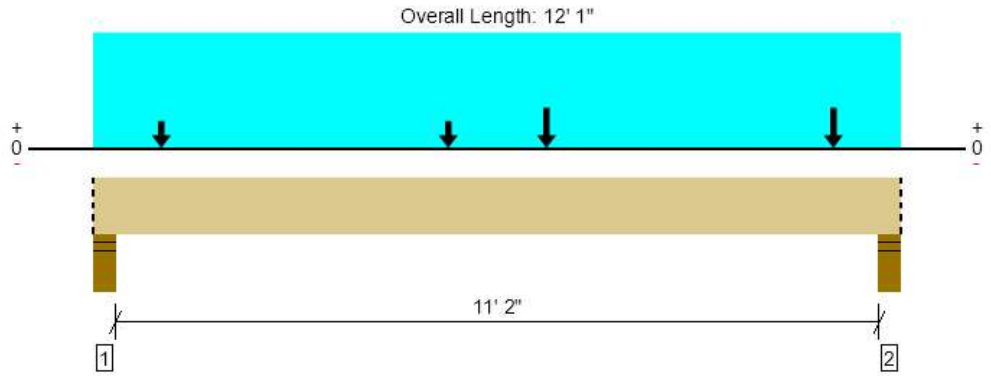
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



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

2nd Floor Framing, Top Landing Beam

1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11985 @ 11' 9"	12251 (5.50")	Passed (98%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	8786 @ 10' 6"	13118	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	31091 @ 6' 8 3/4"	33413	Passed (93%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.261 @ 6' 1"	0.285	Passed (L/525)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.346 @ 6' 1"	0.571	Passed (L/396)	--	1.0 D + 1.0 L (All Spans)

Member Length : 12' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	4.69"	2563	7873	10437	Blocking
2 - Stud wall - HF	5.50"	5.50"	5.38"	2952	9033	11985	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)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 1"	N/A	18.0	--	
1 - Uniform (PSF)	0 to 12' 1" (Front)	5' 6"	45.0	150.0	Default Load
2 - Point (lb)	5' 3 3/4" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1
3 - Point (lb)	1' 1/4" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1
4 - Point (lb)	6' 9 3/8" (Front)	N/A	768	2306	Linked from: Long Short Stair Stringers, Support 2
5 - Point (lb)	11' 7/8" (Front)	N/A	768	2306	Linked from: Long Short Stair Stringers, Support 2

• Side loads are assumed to not induce cross-grain tension.

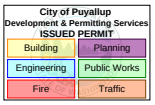
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

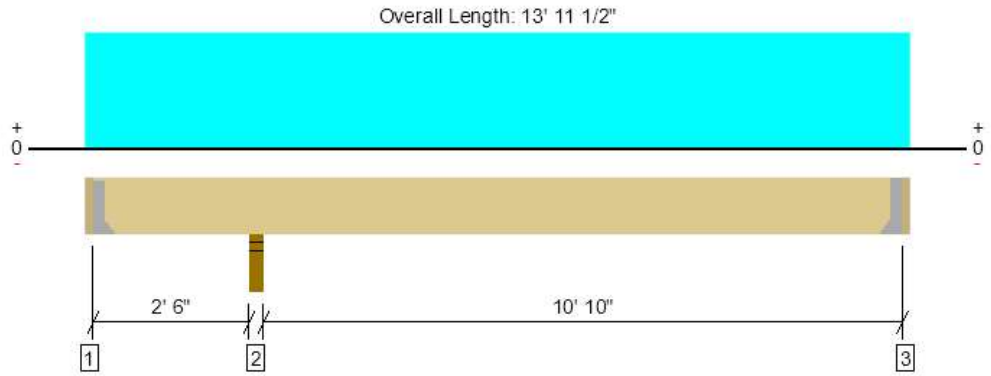
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



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

2nd Floor Framing, 10'-10" Deck Joist

1 piece(s) 2 x 12 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1510 @ 2' 9 3/4"	2126 (3.50")	Passed (71%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	663 @ 3' 10 3/4"	1688	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1477 @ 2' 9 3/4"	2577	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.059 @ 8' 10 11/16"	0.366	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.089 @ 8' 10 3/4"	0.549	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 13' 7 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- -480 lbs uplift at support located at 2". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 1/4" HF beam	2.00"	Hanger[1]	1.50"	-127	114/-354	-480	See note [1]
2 - Stud wall - HF	3.50"	3.50"	2.49"	503	1007	1510	None
3 - Hanger on 11 1/4" HF beam	2.00"	Hanger[1]	1.50"	181	364	545	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)	11' o/c	
Bottom Edge (Lu)	7' 11" 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 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	
3 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13' 11 1/2"	16"	30.0	60.0	Default Load

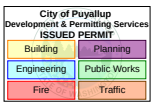
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

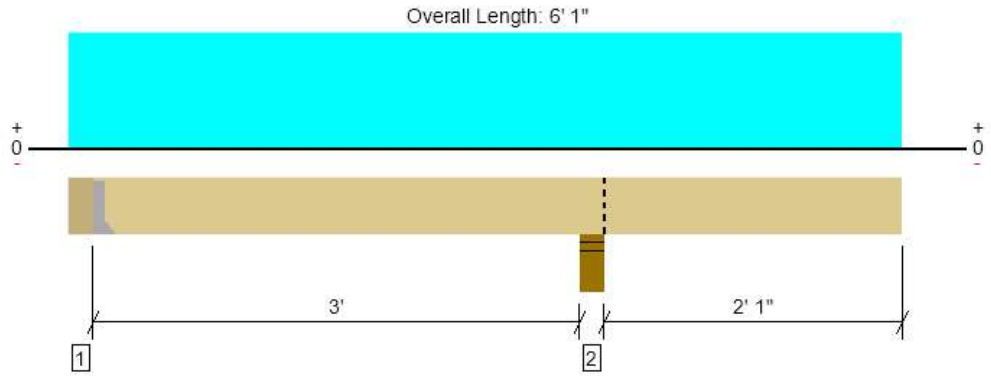
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



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

2nd Floor Framing, Deck Cantilever Ledger 2'

2 piece(s) 2 x 12 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	855 @ 6"	1823 (1.50")	Passed (47%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	814 @ 2' 6 3/4"	3375	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1738 @ 3' 9"	4482	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.017 @ 6' 1"	0.200	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.023 @ 6' 1"	0.233	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 5' 7"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- 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	Floor Live	Factored	
1 - Hanger on 11 1/4" HF beam	6.00"	Hanger[1]	1.50"	277	893/-142	1170	See note [1]
2 - Stud wall - HF	6.00"	6.00"	2.52"	1048	2014	3062	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- 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)	5' 7" o/c	
Bottom Edge (Lu)	5' 7" 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 - Face Mount Hanger	LUS28-2	2.00"	N/A	6-10d	3-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	6" to 6' 1"	N/A	8.6	--	
1 - Uniform (PSF)	0 to 6' 1" (Front)	7'	30.0	60.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 2.6 (F-G.3) Flush Beam

1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11234 @ 11' 8 5/8"	12251 (5.50")	Passed (92%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4232 @ 1' 5 3/8"	11539	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	13929 @ 5' 9 11/16"	25853	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.133 @ 5' 11 3/4"	0.285	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.237 @ 5' 11 3/4"	0.569	Passed (L/577)	--	1.0 D + 1.0 L (All Spans)

Member Length : 12' 5/8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 4 5/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	2.61"	2550	3272	5822	Blocking
2 - Stud wall - HF	5.50"	5.50"	5.04"	4936	6299	11234	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)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 5/8"	N/A	15.9	--	
1 - Uniform (PSF)	0 to 3' 11 1/2" (Front)	15' 5 1/2"	30.0	40.0	Default Load
2 - Uniform (PSF)	3' 11 1/2" to 12' 5/8" (Front)	11' 2"	30.0	40.0	Default Load
3 - Point (lb)	11' 9 3/4" (Top)	N/A	2747	3508	Linked from: Grid 2.6 (F-G.5) Flush Beam, Support 2

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

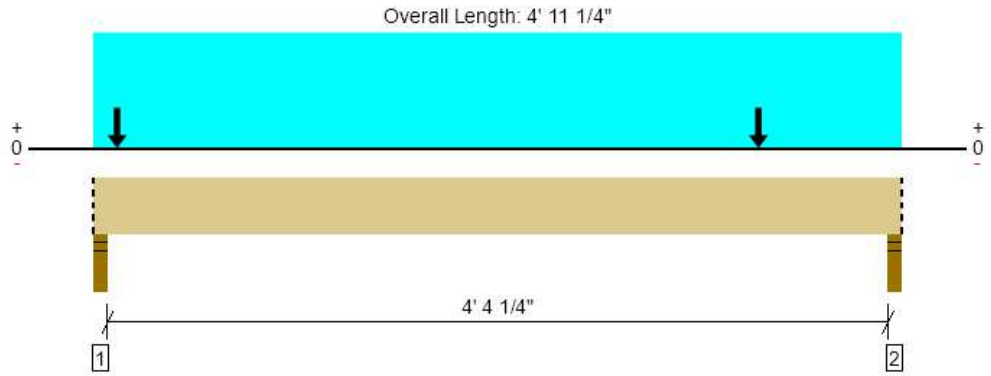
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 2.6 (G.9-H.8) Flush Beam

1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7141 @ 2"	7796 (3.50")	Passed (92%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3257 @ 3' 7 7/8"	11539	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	4949 @ 2' 9 3/4"	25853	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.008 @ 2' 6 5/16"	0.115	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.014 @ 2' 6 5/16"	0.230	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 11 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 7 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	3.21"	3098	4043	7141	Blocking
2 - Stud wall - HF	3.50"	3.50"	2.77"	2677	3491	6167	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)	4' 11" o/c	
Bottom Edge (Lu)	4' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 11 1/4"	N/A	15.9	--	
1 - Uniform (PSF)	0 to 4' 11 1/4" (Front)	19' 11 1/2"	30.0	40.0	Default Load
2 - Point (lb)	4' 3/4" (Top)	N/A	1370	1796	Linked from: Grid 2.6 (H-H.8) Flush Beam, Support 2
3 - Point (lb)	1 3/4" (Top)	N/A	1370	1796	Linked from: Grid 2.6 (H-H.8) Flush Beam, Support 1

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

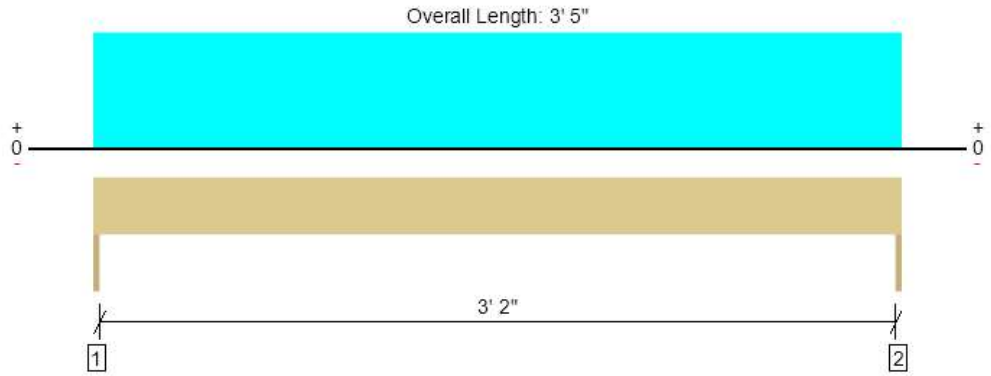
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 2.4 (H.8-I.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1523 @ 0	3281 (1.50")	Passed (46%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	873 @ 8 3/4"	3045	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1301 @ 1' 8 1/2"	2989	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.009 @ 1' 8 1/2"	0.114	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.015 @ 1' 8 1/2"	0.171	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	659	864	1523	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	659	864	1523	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 5" o/c	
Bottom Edge (Lu)	3' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 5"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 5"	12' 7 3/4"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

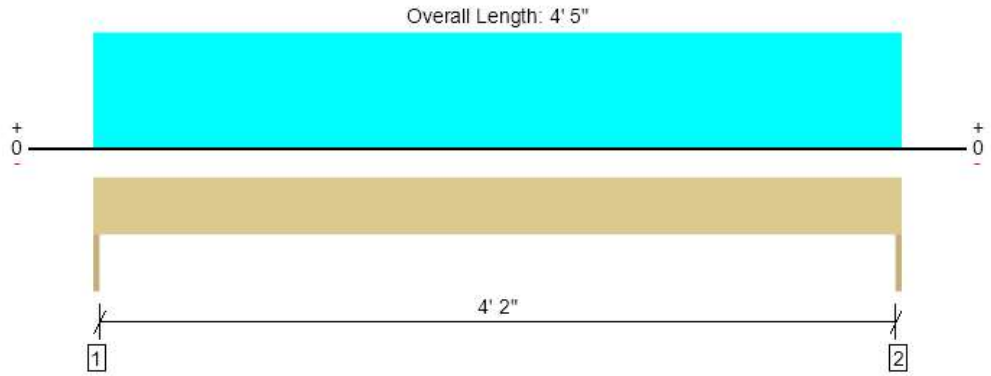
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 2.4 (J.2-K.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1969 @ 0	3281 (1.50")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1319 @ 8 3/4"	3045	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2174 @ 2' 2 1/2"	2989	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.024 @ 2' 2 1/2"	0.147	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.043 @ 2' 2 1/2"	0.221	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	852	1117	1969	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	852	1117	1969	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 5" o/c	
Bottom Edge (Lu)	4' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 5"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 4' 5"	12' 7 3/4"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

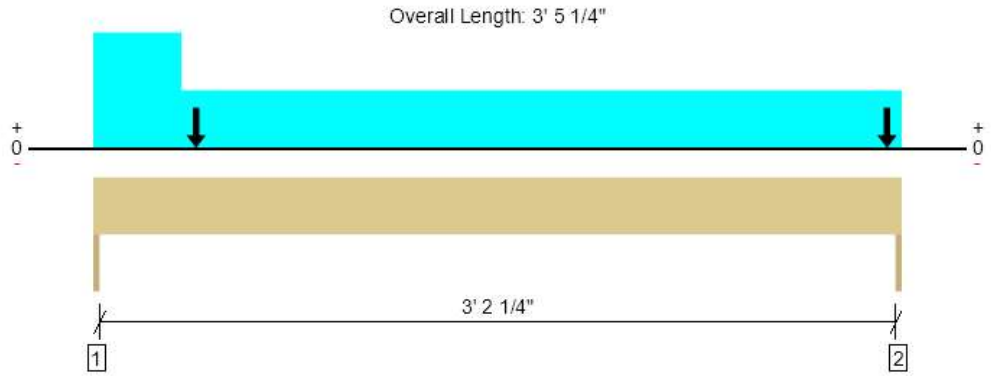
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 5.5 (H-H.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2522 @ 3' 5 1/4"	3281 (1.50")	Passed (77%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1200 @ 8 3/4"	3045	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1366 @ 1' 5 15/16"	2989	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.009 @ 1' 7 13/16"	0.115	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.017 @ 1' 7 13/16"	0.172	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 5 1/4"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	1088	1424	2512	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	1094	1429	2522	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 5" o/c	
Bottom Edge (Lu)	3' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 5 1/4"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 5 1/4"	10' 3"	30.0	40.0	2nd Floor
2 - Uniform (PSF)	0 to 4 1/2"	10' 3"	30.0	40.0	3rd Floor
3 - Point (lb)	5 1/4"	N/A	484	632	Linked from: Grid 5.5 (H-H.8) Door Header, Support 1
4 - Point (lb)	3' 4 1/2"	N/A	484	632	Linked from: Grid 5.5 (H-H.8) Door Header, Support 2

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

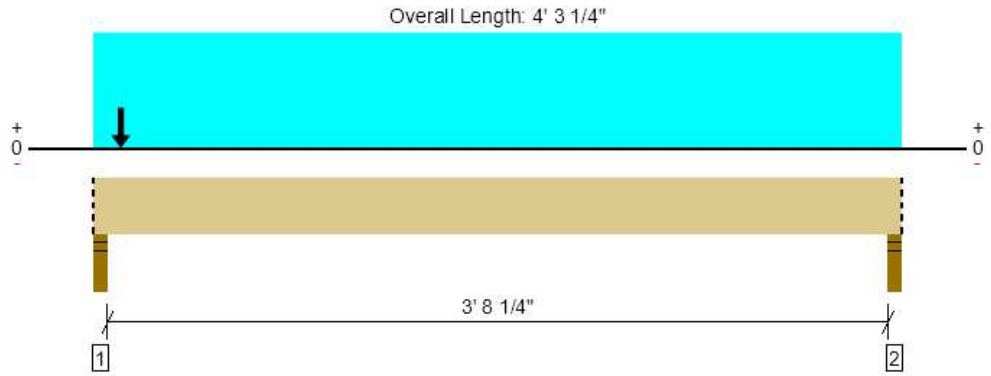
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 5.5 (G.1-G.3) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3130 @ 2"	4961 (3.50")	Passed (63%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	621 @ 1' 3 3/8"	7343	Passed (8%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	1410 @ 2' 1 5/8"	16452	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 2' 1 5/8"	0.098	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.004 @ 2' 1 5/8"	0.197	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 3 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 11 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	2.21"	1366	1764	3130	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	678	876	1554	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)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 3 1/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 3 1/4" (Front)	10' 3"	30.0	40.0	Default Load
2 - Point (lb)	1 3/4" (Top)	N/A	688	888	Linked from: Grid 5.5 (G.1-G.3) Flush Beam, Support 1

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

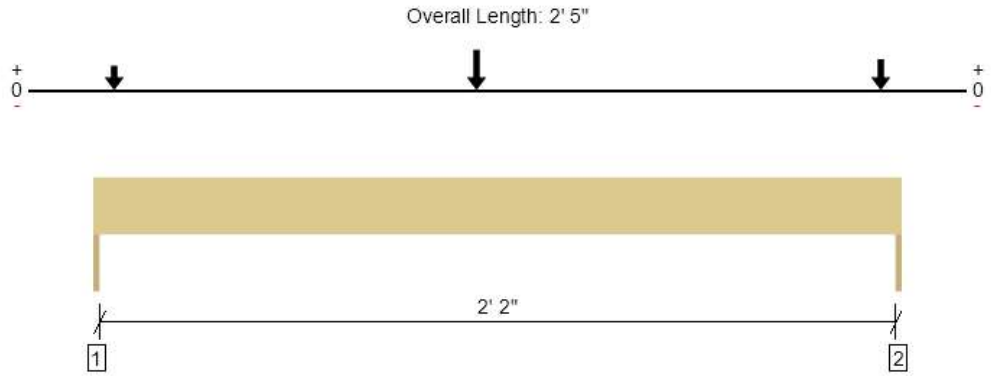
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid G.1 (5.2-5.3) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1731 @ 2' 5"	3281 (1.50")	Passed (53%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	820 @ 8 3/4"	3045	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	941 @ 1' 1 3/4"	2989	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.002 @ 1' 2 7/16"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.004 @ 1' 2 7/16"	0.121	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 2' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	633	798	1431	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	764	966	1731	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	2' 5" o/c	
Bottom Edge (Lu)	2' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 2' 5"	N/A	6.4	--	
1 - Point (lb)	3/4"	N/A	269	337	Linked from: Grid G.1 (5.2-5.3) Door Header, Support 1
2 - Point (lb)	1' 1 3/4"	N/A	678	876	Linked from: Grid 5.5 (G.1-G.3) Flush Beam, Support 2
3 - Point (lb)	2' 4 1/4"	N/A	435	551	Linked from: Grid G.1 (5.2-5.3) Door Header, Support 2

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

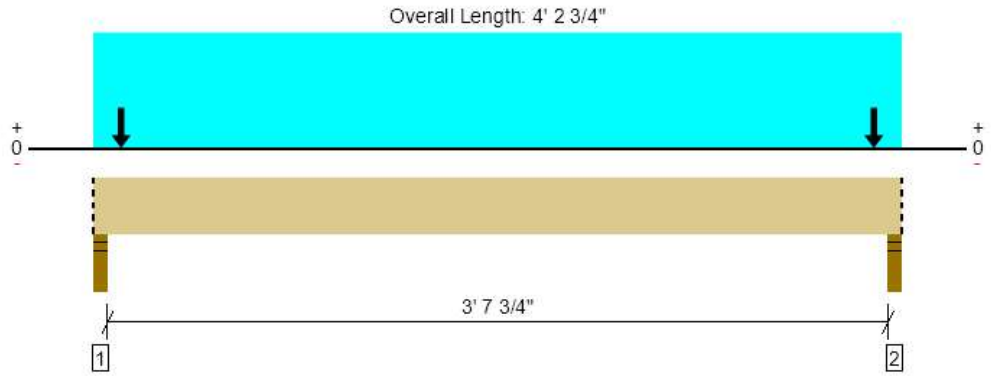
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 6 (G.1-G.3) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3464 @ 2"	4961 (3.50")	Passed (70%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	674 @ 1' 3 3/8"	7343	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	1535 @ 2' 1 3/8"	16452	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 2' 1 3/8"	0.097	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.005 @ 2' 1 3/8"	0.195	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 2 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 10 3/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	2.44"	1510	1955	3464	Blocking
2 - Stud wall - HF	3.50"	3.50"	2.44"	1510	1955	3464	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)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 2 3/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 2 3/4" (Front)	11' 5"	30.0	40.0	Default Load
2 - Point (lb)	1 3/4" (Top)	N/A	764	989	Linked from: Grid 6 (G.1-G.3) Flush Beam, Support 1
3 - Point (lb)	4' 1" (Top)	N/A	764	989	Linked from: Grid 6 (G.1-G.3) Flush Beam, Support 1

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

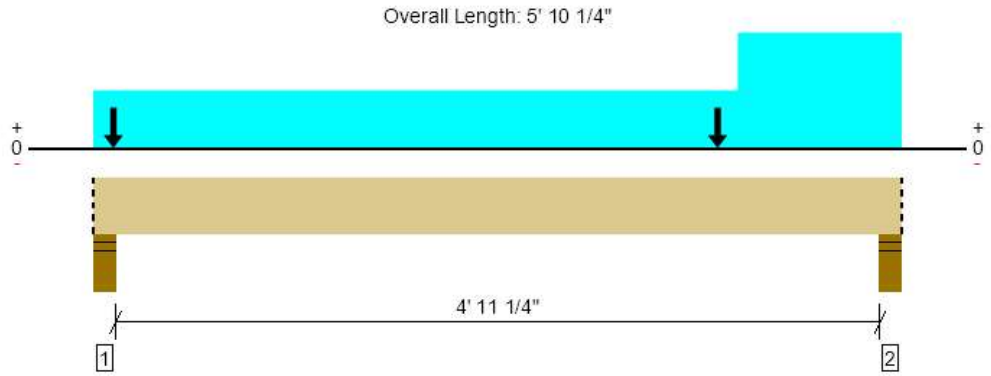
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 2.5 (D.4-D.6) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6690 @ 5' 6 1/4"	7796 (5.50")	Passed (86%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3451 @ 4' 4 7/8"	7343	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5483 @ 3' 5 3/16"	16452	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.017 @ 3' 1/4"	0.130	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.031 @ 3' 1/4"	0.259	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 5' 10 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 5' 2 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	4.59"	2818	3682	6500	Blocking
2 - Stud wall - HF	5.50"	5.50"	4.72"	2894	3795	6690	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)	5' 10" o/c	
Bottom Edge (Lu)	5' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 5' 10 1/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 5' 10 1/4" (Front)	16' 2"	30.0	40.0	2nd Floor
2 - Uniform (PSF)	4' 8" to 5' 10 1/4" (Front)	16' 2"	30.0	40.0	3rd Floor
3 - Point (lb)	1 3/4" (Top)	N/A	1119	1462	Linked from: Grid 2.5 (D.4-D.6) Flush Beam, Support 1
4 - Point (lb)	4' 6 1/4" (Top)	N/A	1119	1462	Linked from: Grid 2.5 (D.4-D.6) Flush Beam, Support 2

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

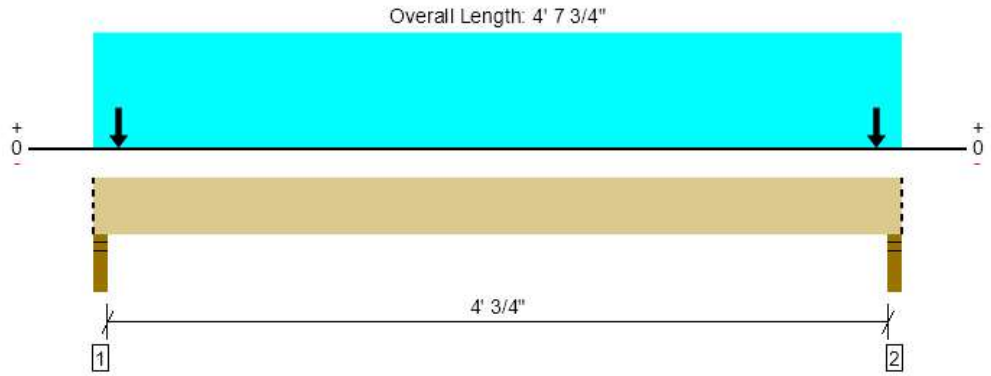
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 3.3 (D.8-E.1) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4302 @ 2"	4961 (3.50")	Passed (87%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	965 @ 1' 3 3/8"	7343	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2153 @ 2' 3 7/8"	16452	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 2' 3 7/8"	0.108	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.008 @ 2' 3 7/8"	0.216	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 7 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 3 3/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	3.03"	1870	2432	4302	Blocking
2 - Stud wall - HF	3.50"	3.50"	3.03"	1870	2432	4302	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)	4' 8" o/c	
Bottom Edge (Lu)	4' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 7 3/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 7 3/4" (Front)	13' 1"	30.0	40.0	Default Load
2 - Point (lb)	1 3/4" (Top)	N/A	935	1216	Linked from: Grid 3.3 (D.8-E.1) Flush Beam, Support 1
3 - Point (lb)	4' 6" (Top)	N/A	935	1216	Linked from: Grid 3.3 (D.8-E.1) Flush Beam, Support 2

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

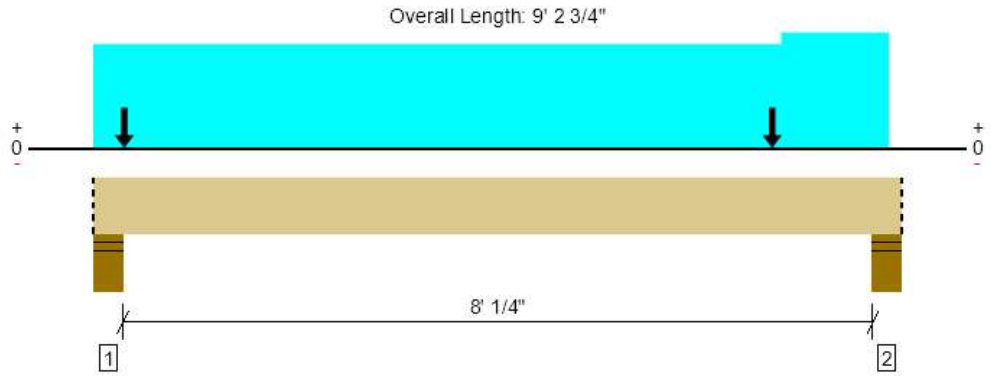
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 5.3 (D.5-E.2) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7653 @ 5 3/4"	10277 (7.25")	Passed (74%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5147 @ 7' 7 5/8"	7343	Passed (70%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	9047 @ 5' 1 1/8"	16452	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.073 @ 4' 8 3/4"	0.207	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.130 @ 4' 8 3/4"	0.414	Passed (L/766)	--	1.0 D + 1.0 L (All Spans)

Member Length : 9' 2 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 3 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	7.25"	7.25"	5.40"	3332	4322	7653	Blocking
2 - Stud wall - HF	7.25"	7.25"	4.82"	2975	3858	6833	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)	9' 3" o/c	
Bottom Edge (Lu)	9' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 9' 2 3/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 7' 10 1/4" (Front)	12'	30.0	40.0	Default Load
2 - Uniform (PSF)	7' 10 1/4" to 9' 1" (Front)	13' 4"	30.0	40.0	Default Load
3 - Point (lb)	4 1/4" (Top)	N/A	1447	1877	Linked from: Grid 5.3 (D.5-E.2) Flush Beam, Support 1
4 - Point (lb)	7' 9" (Top)	N/A	1447	1877	Linked from: Grid 5.3 (D.5-E.2) Flush Beam, Support 2

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

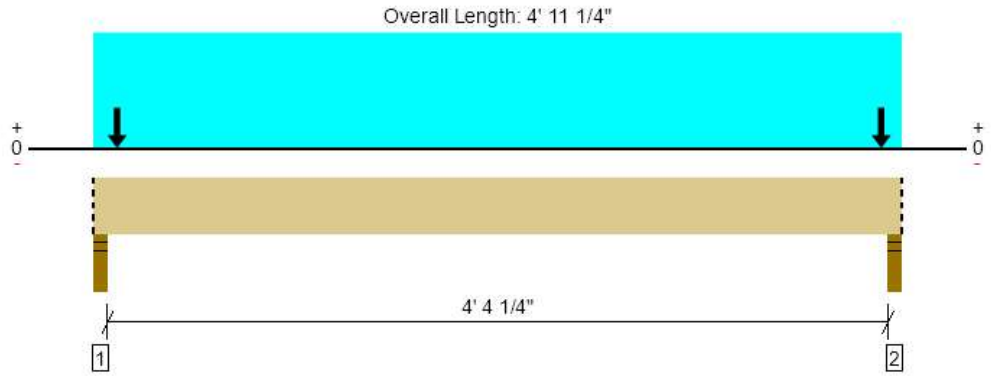
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

2nd Floor Framing, Grid 6 (D.3-D.6) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4744 @ 2"	4961 (3.50")	Passed (96%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1141 @ 1' 3 3/8"	7343	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2546 @ 2' 5 5/8"	16452	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.006 @ 2' 5 5/8"	0.115	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.011 @ 2' 5 5/8"	0.230	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 11 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 7 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	3.35"	2062	2682	4744	Blocking
2 - Stud wall - HF	3.50"	3.50"	3.35"	2062	2682	4744	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)	4' 11" o/c	
Bottom Edge (Lu)	4' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 11 1/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 11 1/4" (Front)	13' 7"	30.0	40.0	Default Load
2 - Point (lb)	1 3/4" (Top)	N/A	1031	1341	Linked from: Grid 6 (D.3-D.6) Flush Beam, Support 1
3 - Point (lb)	4' 9 3/4" (Back)	N/A	1031	1341	Linked from: Grid 6 (D.3-D.6) Flush Beam, Support 2

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

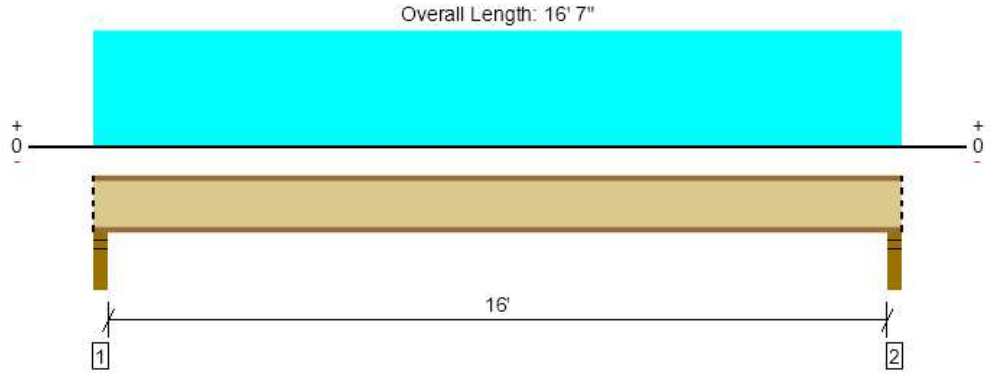
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Floor Joist 16' and Under

1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	774 @ 2 1/2"	1375 (3.50")	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	747 @ 3 1/2"	1560	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3049 @ 8' 3 1/2"	3160	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.275 @ 8' 3 1/2"	0.539	Passed (L/704)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.482 @ 8' 3 1/2"	0.808	Passed (L/403)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	48	40	Passed	--	--

Member Length : 16' 7"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	332	442	774	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	332	442	774	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)	3' 1" o/c	
Bottom Edge (Lu)	16' 7" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 16' 7"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

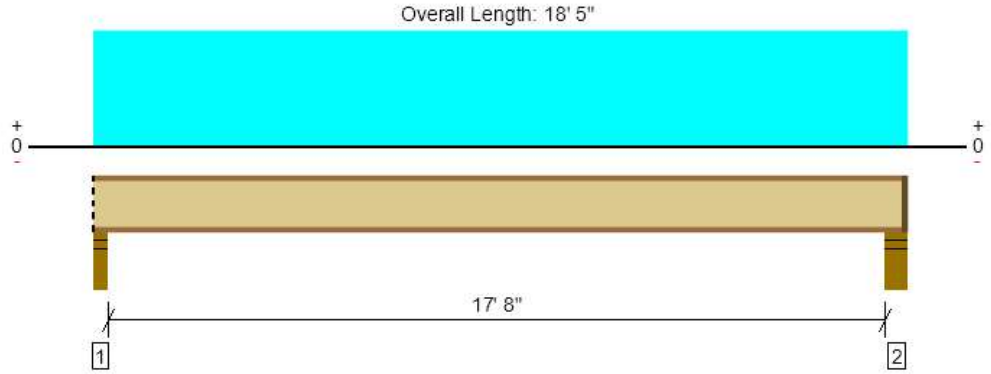
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Floor Joist 17'-8"

1 piece(s) 11 7/8" TJI® 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	856 @ 18' 1/2"	1460 (3.50")	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	824 @ 3 1/2"	1655	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3710 @ 9' 1 1/2"	3795	Passed (98%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.352 @ 9' 1 1/2"	0.594	Passed (L/609)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.615 @ 9' 1 1/2"	0.892	Passed (L/348)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	44	40	Passed	--	--

Member Length : 18' 3 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	365	487	852	Blocking
2 - Stud wall - HF	5.50"	4.00"	1.75"	372	496	867	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	3' 7" o/c	
Bottom Edge (Lu)	18' 4" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 5"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

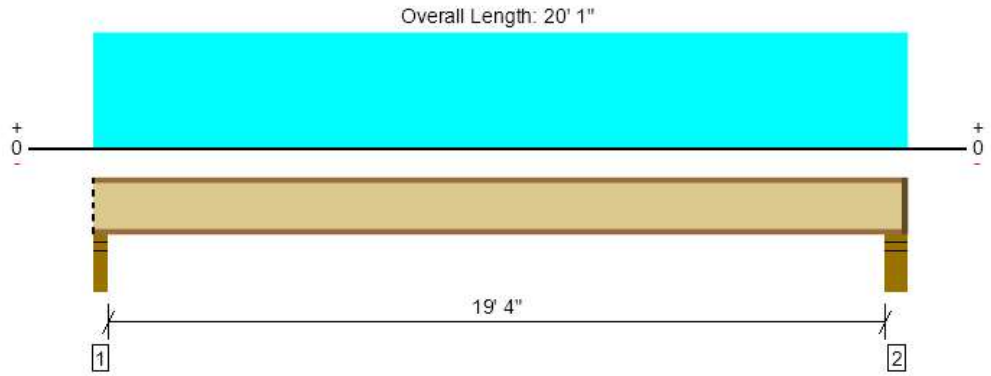
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Floor Joist 19'-4"

1 piece(s) 11 7/8" TJI® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	933 @ 19' 8 1/2"	1505 (3.50")	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	902 @ 3 1/2"	1705	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4436 @ 9' 11 1/2"	6180	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.395 @ 9' 11 1/2"	0.650	Passed (L/593)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.691 @ 9' 11 1/2"	0.975	Passed (L/339)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	43	40	Passed	--	--

Member Length : 19' 11 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	398	531	929	Blocking
2 - Stud wall - HF	5.50"	4.00"	1.75"	405	540	945	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	4' 4" o/c	
Bottom Edge (Lu)	20' o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20' 1"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

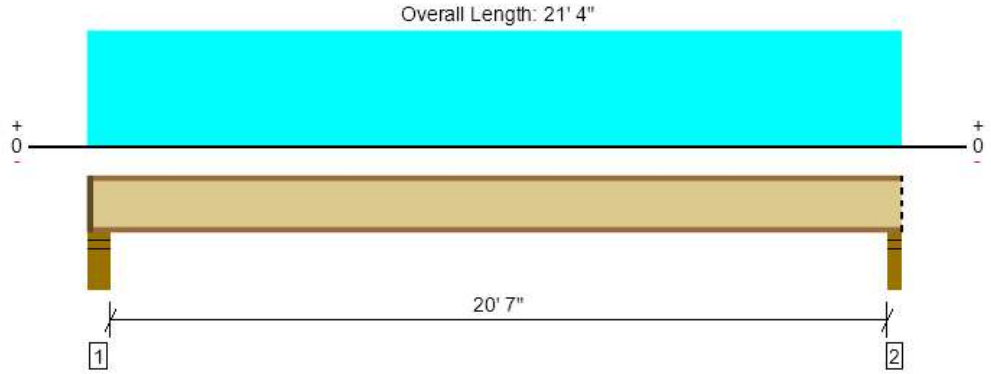
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Floor Joist 20'-7"

1 piece(s) 11 7/8" TJI® 560 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	992 @ 4 1/2"	1725 (3.50")	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	961 @ 5 1/2"	2050	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5023 @ 10' 9"	9500	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.353 @ 10' 9"	0.692	Passed (L/706)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.617 @ 10' 9"	1.038	Passed (L/404)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	46	40	Passed	--	--

Member Length : 21' 2 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	4.00"	1.75"	430	573	1003	1 1/2" Rim Board
2 - Stud wall - HF	3.50"	3.50"	1.75"	423	564	988	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	7' 10" o/c	
Bottom Edge (Lu)	21' 3" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 21' 4"	16"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

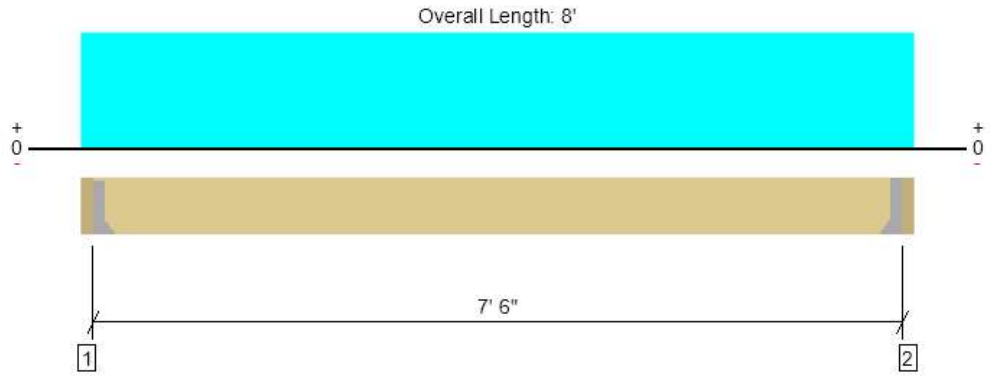
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, 7'-6" Landing Joists

1 piece(s) 2 x 12 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	975 @ 3"	975 (1.60")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	731 @ 1' 2 1/4"	1688	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1828 @ 4'	2577	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.062 @ 4'	0.250	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.080 @ 4'	0.375	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 7' 6"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 1/4" LSL beam	3.00"	Hanger[1]	1.60"	240	800	1040	See note [1]
2 - Hanger on 11 1/4" LSL beam	3.00"	Hanger[1]	1.60"	240	800	1040	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)	5' 10" o/c	
Bottom Edge (Lu)	7' 6" 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 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	4-10d	
2 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	4-10d	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8'	16"	45.0	150.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

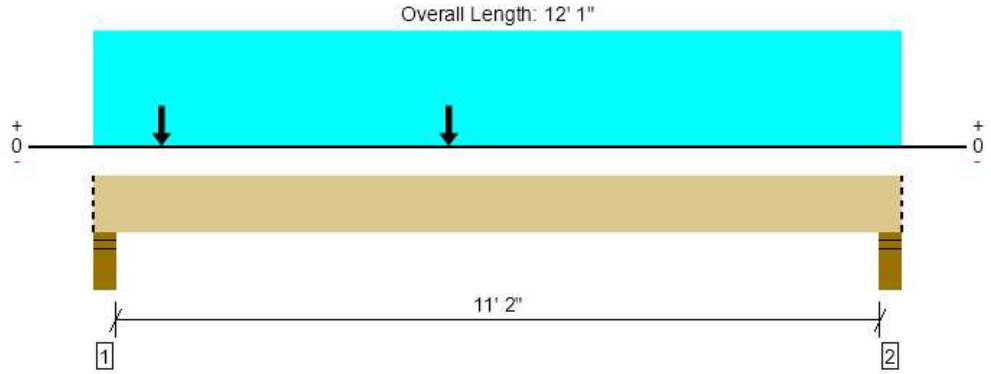
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Top Landing Beam

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9199 @ 4"	12251 (5.50")	Passed (75%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6904 @ 1' 5 1/2"	11660	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	23175 @ 5' 4 3/8"	26400	Passed (88%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.282 @ 5' 11 15/16"	0.285	Passed (L/486)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.372 @ 5' 11 15/16"	0.571	Passed (L/368)	--	1.0 D + 1.0 L (All Spans)

Member Length : 12' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	4.13"	2239	6960	9199	Blocking
2 - Stud wall - HF	5.50"	5.50"	3.43"	1851	5788	7639	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)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 1"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 12' 1" (Front)	5' 9"	45.0	150.0	Default Load
2 - Point (lb)	1' 1/4" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1
3 - Point (lb)	5' 3 3/4" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

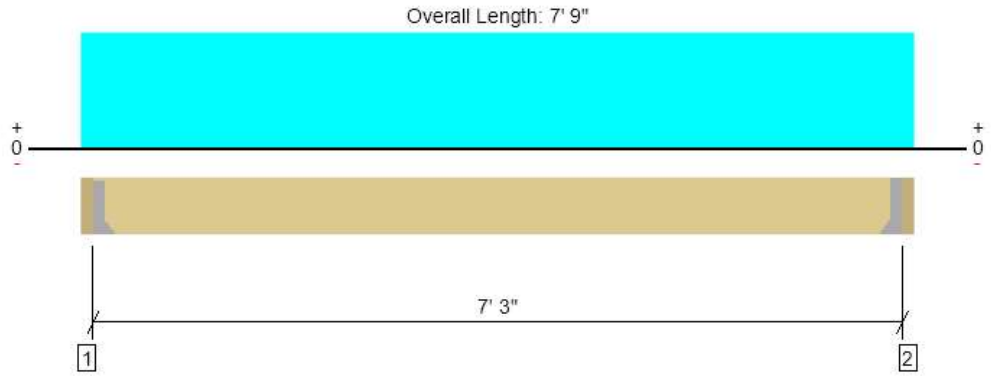
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Short Stair Stringers

1 piece(s) 4 x 12 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1450 @ 3"	2126 (1.50")	Passed (68%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1075 @ 1' 2 1/4"	3938	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2628 @ 3' 10 1/2"	5752	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.035 @ 3' 10 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.046 @ 3' 10 1/2"	0.363	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 3"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) 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	Floor Live	Factored	
1 - Hanger on 11 1/4" GLB beam	3.00"	Hanger[1]	1.50"	385	1163	1547	See note [1]
2 - Hanger on 11 1/4" GLB beam	3.00"	Hanger[1]	1.50"	385	1163	1547	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)	7' 3" o/c	
Bottom Edge (Lu)	7' 3" 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 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 7' 6"	N/A	10.0	--	
1 - Uniform (PSF)	0 to 7' 9" (Front)	2'	45.0	150.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

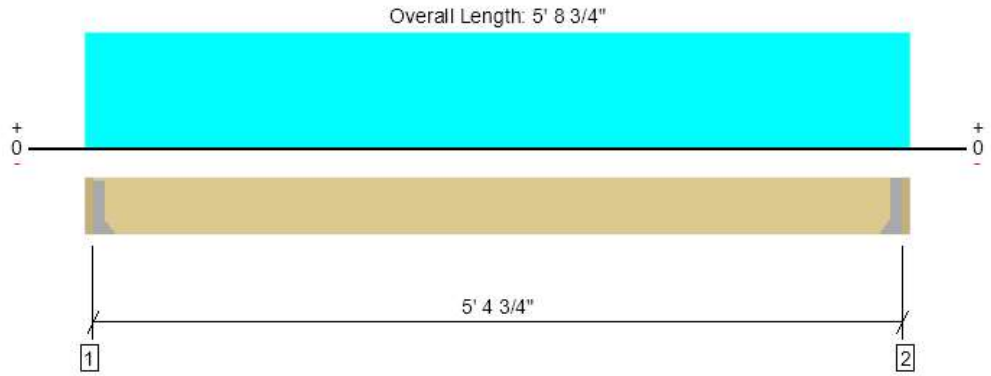
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, 4' Mid Landing Joists

1 piece(s) 2 x 12 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	701 @ 2"	911 (1.50")	Passed (77%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	458 @ 1' 1 1/4"	1688	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	946 @ 2' 10 3/8"	2577	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.016 @ 2' 10 3/8"	0.180	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.021 @ 2' 10 3/8"	0.270	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 5' 4 3/4"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 1/4" LSL beam	2.00"	Hanger[1]	1.50"	172	573	745	See note [1]
2 - Hanger on 11 1/4" LSL beam	2.00"	Hanger[1]	1.50"	172	573	745	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)	5' 5" o/c	
Bottom Edge (Lu)	5' 5" 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 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	
2 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 5' 8 3/4"	16"	45.0	150.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

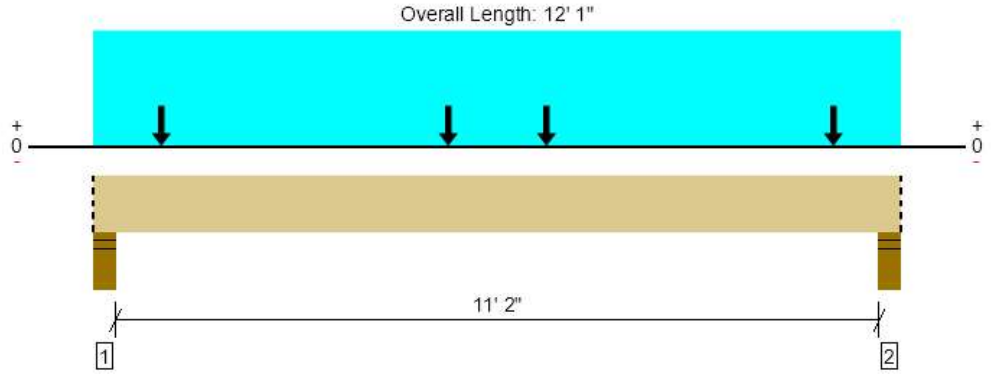
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Mid Landing Beam Inner

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6828 @ 11' 9"	12251 (5.50")	Passed (56%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5286 @ 1' 5 1/2"	11660	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	18813 @ 6' 7/16"	26400	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.225 @ 6' 1/2"	0.285	Passed (L/609)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.300 @ 6' 1/2"	0.571	Passed (L/457)	--	1.0 D + 1.0 L (All Spans)

Member Length : 12' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.06"	1704	5118	6823	Blocking
2 - Stud wall - HF	5.50"	5.50"	3.07"	1706	5122	6828	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)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 1"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 12' 1" (Front)	3' 1"	45.0	150.0	Default Load
2 - Point (lb)	1' 1/4" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1
3 - Point (lb)	5' 3 3/4" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1
4 - Point (lb)	6' 9 3/8" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1
5 - Point (lb)	11' 7/8" (Front)	N/A	385	1163	Linked from: Short Stair Stringers, Support 1

• Side loads are assumed to not induce cross-grain tension.

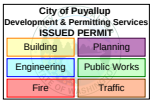
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

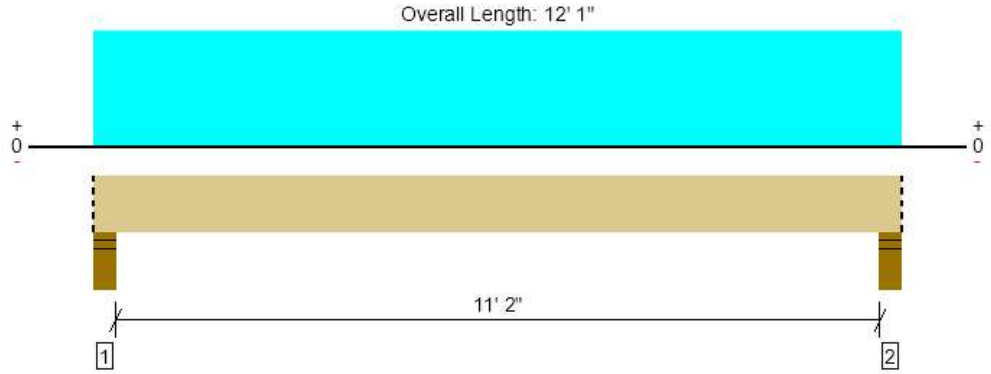
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



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

3rd Floor Framing, Mid Landing Beam Outer

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3687 @ 4"	7796 (5.50")	Passed (47%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2873 @ 1' 4"	6493	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	9941 @ 6' 1/2"	12863	Passed (77%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.291 @ 6' 1/2"	0.285	Passed (L/471)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.384 @ 6' 1/2"	0.571	Passed (L/357)	--	1.0 D + 1.0 L (All Spans)

Member Length : 12' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	2.60"	892	2794	3687	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.60"	892	2794	3687	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)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 1"	N/A	8.9	--	
1 - Uniform (PSF)	0 to 12' 1" (Front)	3' 1"	45.0	150.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

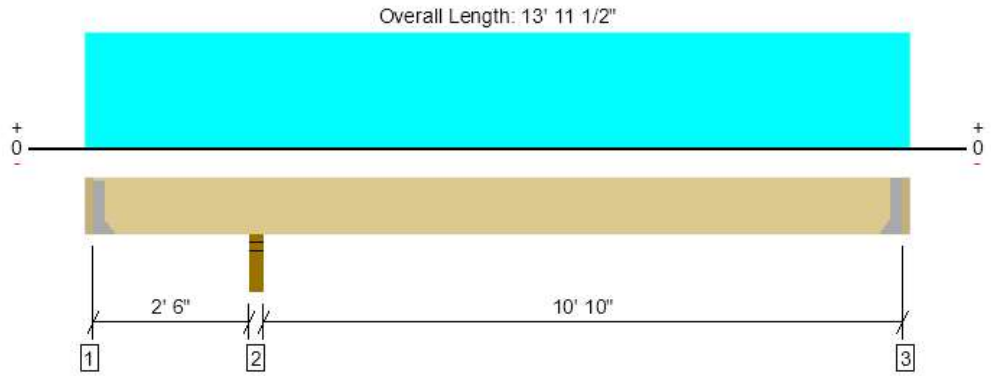
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, 10'-10" Deck Joist

1 piece(s) 2 x 12 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1510 @ 2' 9 3/4"	2126 (3.50")	Passed (71%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	663 @ 3' 10 3/4"	1688	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1477 @ 2' 9 3/4"	2577	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.059 @ 8' 10 11/16"	0.366	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.089 @ 8' 10 3/4"	0.549	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 13' 7 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- -480 lbs uplift at support located at 2". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 1/4" HF beam	2.00"	Hanger[1]	1.50"	-127	114/-354	-480	See note [1]
2 - Stud wall - HF	3.50"	3.50"	2.49"	503	1007	1510	None
3 - Hanger on 11 1/4" HF beam	2.00"	Hanger[1]	1.50"	181	364	545	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)	11' o/c	
Bottom Edge (Lu)	7' 11" 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 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	
3 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 13' 11 1/2"	16"	30.0	60.0	Default Load

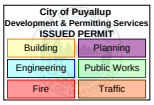
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

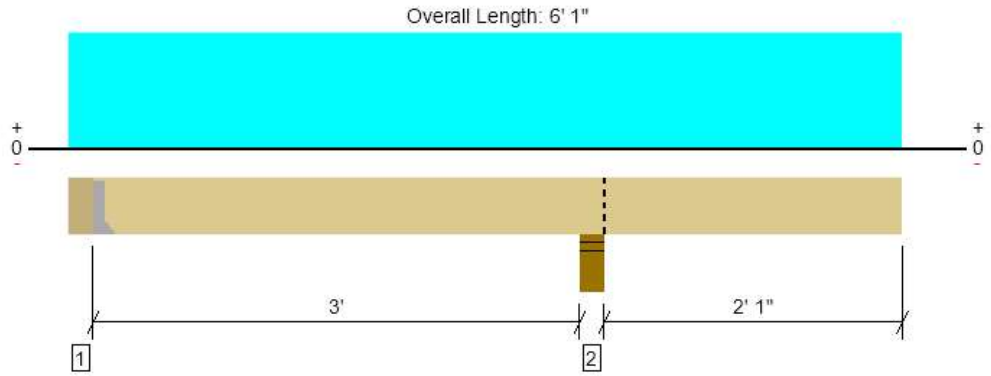
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator



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

3rd Floor Framing, Deck Cantilever Ledger 2'

2 piece(s) 2 x 12 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	855 @ 6"	1823 (1.50")	Passed (47%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	814 @ 2' 6 3/4"	3375	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-1738 @ 3' 9"	4482	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.017 @ 6' 1"	0.200	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.023 @ 6' 1"	0.233	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 5' 7"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- 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	Floor Live	Factored	
1 - Hanger on 11 1/4" HF beam	6.00"	Hanger[1]	1.50"	277	893/-142	1170	See note [1]
2 - Stud wall - HF	6.00"	6.00"	2.52"	1048	2014	3062	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- 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)	5' 7" o/c	
Bottom Edge (Lu)	5' 7" 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 - Face Mount Hanger	LUS28-2	2.00"	N/A	6-10d	3-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	6" to 6' 1"	N/A	8.6	--	
1 - Uniform (PSF)	0 to 6' 1" (Front)	7'	30.0	60.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

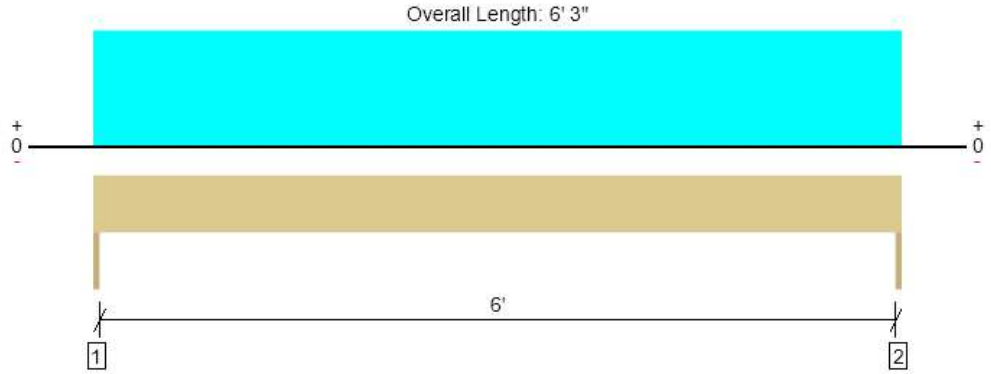
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, 6' Window Header

1 piece(s) 4 x 10 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	478 @ 0	3281 (1.50")	Passed (15%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	341 @ 10 3/4"	3885	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	746 @ 3' 1 1/2"	4492	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.002 @ 3' 1 1/2"	0.208	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.014 @ 3' 1 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 6' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	394	83	478	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	394	83	478	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 3"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 6' 3"	8"	15.0	40.0	Floor
2 - Uniform (PLF)	0 to 6' 3"	N/A	108.0	-	Wall

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 2.6 (F-G.5) Flush Beam

1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7697 @ 4"	12251 (5.50")	Passed (63%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5792 @ 1' 5 3/8"	11539	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	22493 @ 6' 9 1/2"	25853	Passed (87%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.321 @ 7' 2 3/4"	0.349	Passed (L/521)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.572 @ 7' 2 3/4"	0.698	Passed (L/293)	--	1.0 D + 1.0 L (All Spans)

Member Length : 14' 7 5/8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 13' 11 5/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.46"	3365	4332	7697	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.81"	2747	3508	6256	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)	14' 8" o/c	
Bottom Edge (Lu)	14' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 14' 7 5/8"	N/A	15.9	--	
1 - Uniform (PSF)	0 to 1' (Front)	19' 11 1/2"	30.0	40.0	Default Load
2 - Uniform (PSF)	1' to 6' 6 1/2" (Front)	15' 5 1/2"	30.0	40.0	Default Load
3 - Uniform (PSF)	6' 6 1/2" to 14' 7 5/8" (Front)	11' 2"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

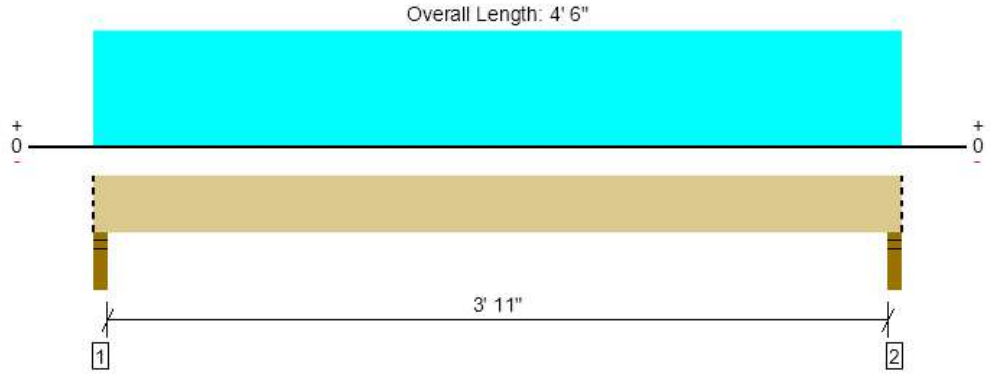
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 2.6 (H-H.8) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3166 @ 2"	4961 (3.50")	Passed (64%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1363 @ 1' 3 3/8"	7343	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	3054 @ 2' 3"	16452	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.006 @ 2' 3"	0.104	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.011 @ 2' 3"	0.208	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 6"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	2.23"	1370	1796	3166	Blocking
2 - Stud wall - HF	3.50"	3.50"	2.23"	1370	1796	3166	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)	4' 6" o/c	
Bottom Edge (Lu)	4' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 6"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	19' 11 1/2"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

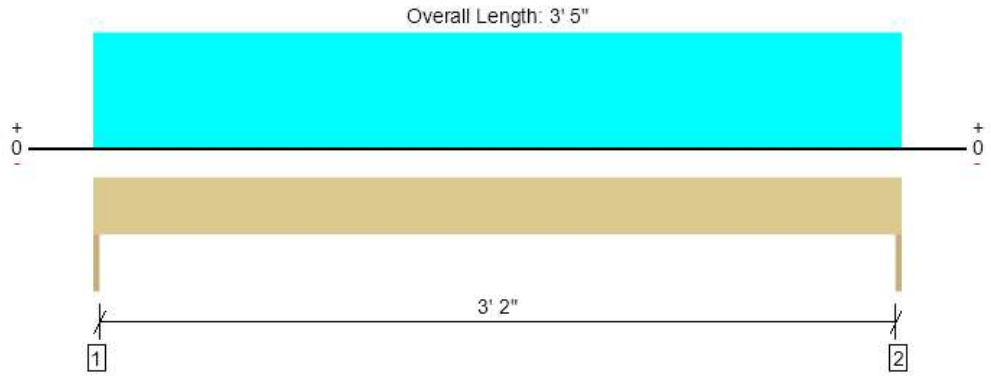
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 2.4 (H.8-I.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1523 @ 0	3281 (1.50")	Passed (46%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	873 @ 8 3/4"	3045	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1301 @ 1' 8 1/2"	2989	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.009 @ 1' 8 1/2"	0.114	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.015 @ 1' 8 1/2"	0.171	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	659	864	1523	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	659	864	1523	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 5" o/c	
Bottom Edge (Lu)	3' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 5"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 5"	12' 7 3/4"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

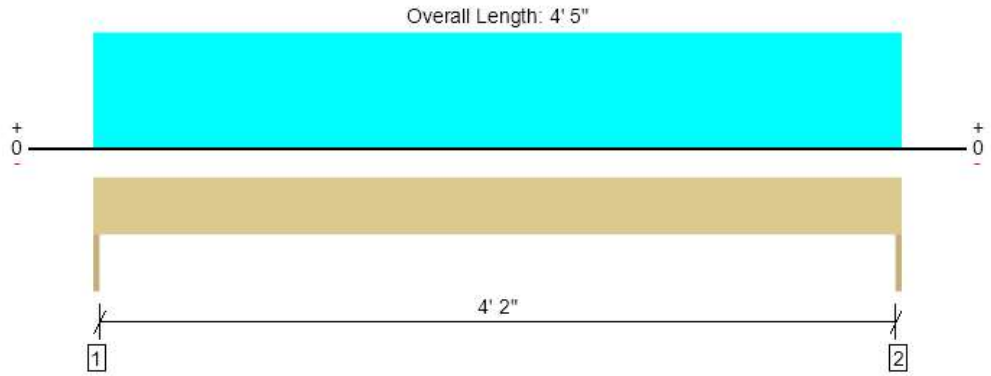
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 2.4 (J.2-K.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1969 @ 0	3281 (1.50")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1319 @ 8 3/4"	3045	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2174 @ 2' 2 1/2"	2989	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.024 @ 2' 2 1/2"	0.147	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.043 @ 2' 2 1/2"	0.221	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	852	1117	1969	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	852	1117	1969	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 5" o/c	
Bottom Edge (Lu)	4' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 5"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 4' 5"	12' 7 3/4"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

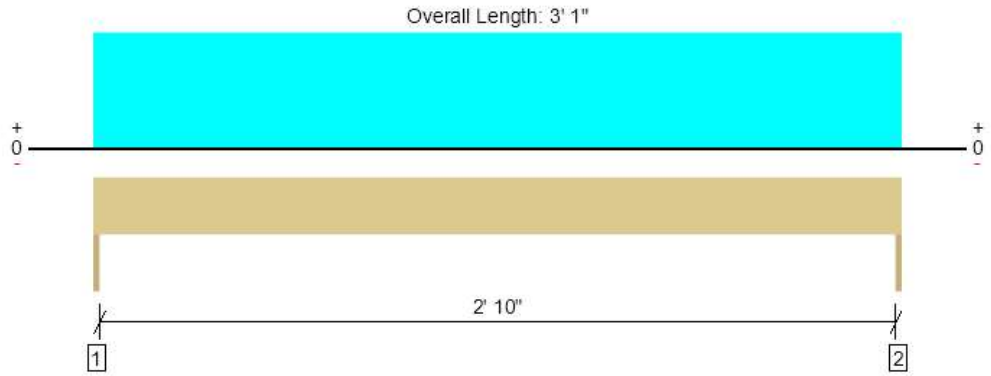
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 5.5 (H-H.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1116 @ 0	3281 (1.50")	Passed (34%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	588 @ 8 3/4"	3045	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	860 @ 1' 6 1/2"	2989	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 1' 6 1/2"	0.103	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.008 @ 1' 6 1/2"	0.154	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 1"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	484	632	1116	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	484	632	1116	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 1" o/c	
Bottom Edge (Lu)	3' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 1"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 1"	10' 3"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

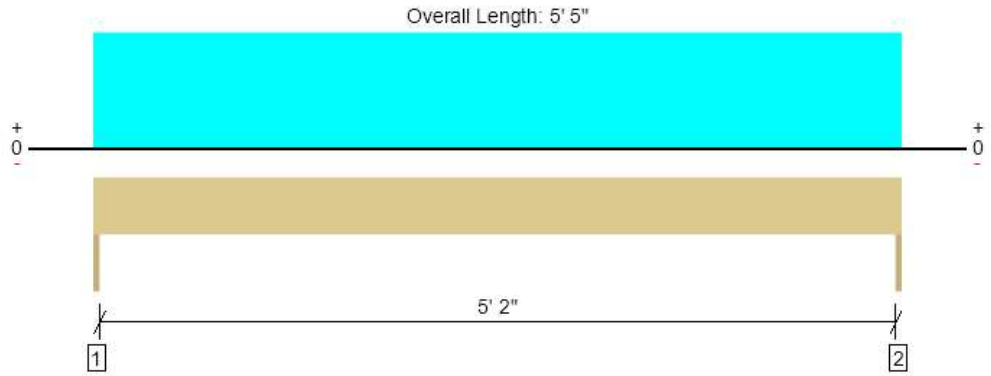
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 5.5 (G.4-G.8) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1961 @ 0	3281 (1.50")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1433 @ 8 3/4"	3045	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2655 @ 2' 8 1/2"	2989	Passed (89%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.045 @ 2' 8 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.079 @ 2' 8 1/2"	0.271	Passed (L/824)	--	1.0 D + 1.0 L (All Spans)

Member Length : 5' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	850	1110	1961	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	850	1110	1961	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 5' 5"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 5' 5"	10' 3"	30.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

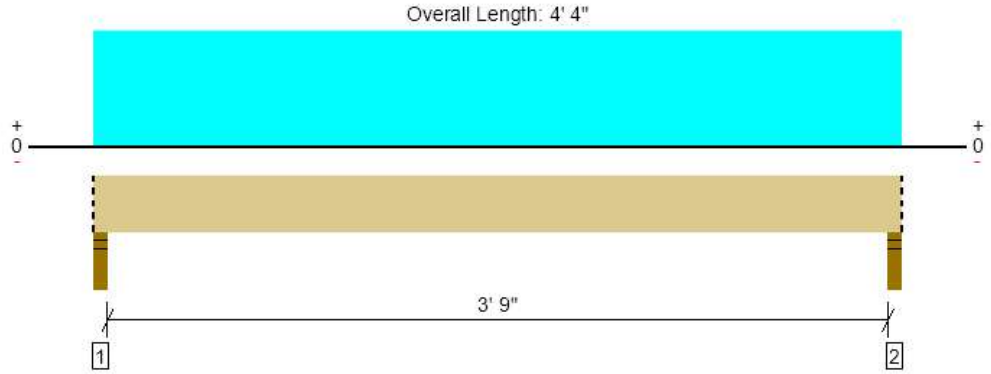
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 5.5 (G.1-G.3) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1576 @ 2"	4961 (3.50")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	644 @ 1' 3 3/8"	7343	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	1455 @ 2' 2"	16452	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 2' 2"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.005 @ 2' 2"	0.200	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4'.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	688	888	1576	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	688	888	1576	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)	4' 4" o/c	
Bottom Edge (Lu)	4' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 4" (Front)	10' 3"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

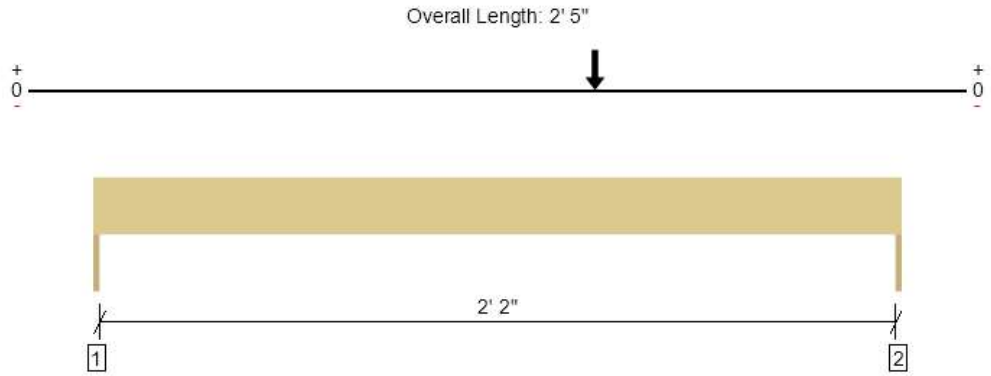
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid G.1 (5.2-5.3) Door Header

1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	986 @ 2' 5"	3281 (1.50")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	981 @ 1' 8 1/4"	3045	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	901 @ 1' 6"	2989	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.002 @ 1' 2 7/8"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.004 @ 1' 2 7/8"	0.121	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 2' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	269	337	606	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	435	551	986	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	2' 5" o/c	
Bottom Edge (Lu)	2' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 2' 5"	N/A	6.4	--	
1 - Point (lb)	1' 6"	N/A	688	888	Linked from: Grid 5.5 (G.1-G.3) Flush Beam, Support 2

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

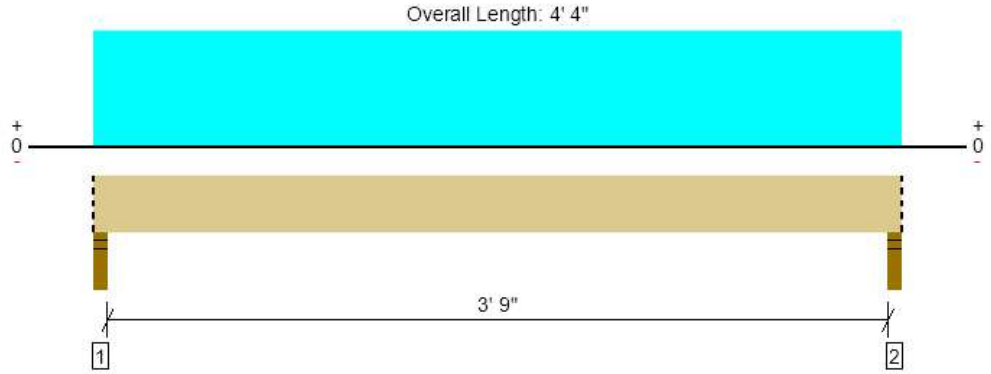
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 6 (G.1-G.3) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1753 @ 2"	4961 (3.50")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	717 @ 1' 3 3/8"	7343	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	1619 @ 2' 2"	16452	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 2' 2"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.005 @ 2' 2"	0.200	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4'.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	764	989	1753	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	764	989	1753	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)	4' 4" o/c	
Bottom Edge (Lu)	4' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 4" (Front)	11' 5"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

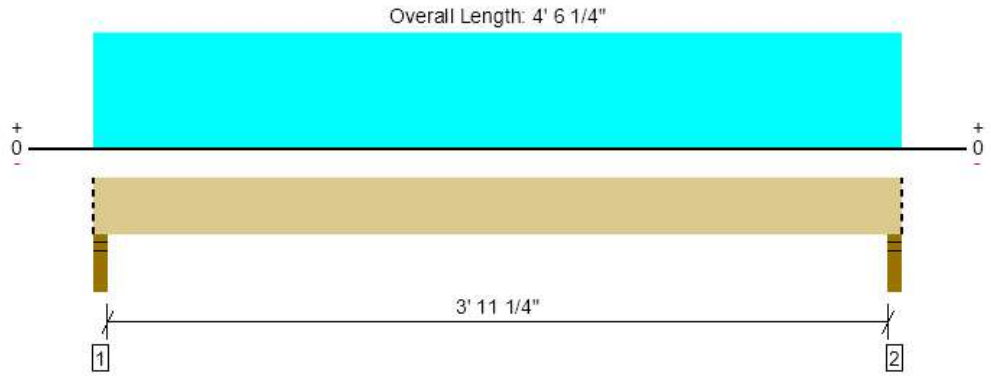
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 2.5 (D.4-D.6) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2581 @ 2"	4961 (3.50")	Passed (52%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1118 @ 1' 3 3/8"	7343	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2503 @ 2' 3 1/8"	16452	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 2' 3 1/8"	0.105	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.009 @ 2' 3 1/8"	0.209	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 6 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 2 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.82"	1119	1462	2581	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.82"	1119	1462	2581	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)	4' 6" o/c	
Bottom Edge (Lu)	4' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 6 1/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 6 1/4" (Front)	16' 2"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

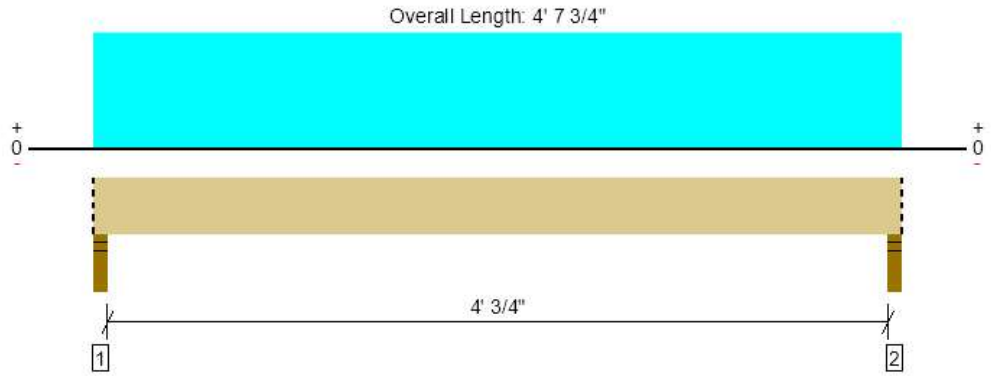
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 3.3 (D.8-E.1) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2151 @ 2"	4961 (3.50")	Passed (43%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	965 @ 1' 3 3/8"	7343	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2153 @ 2' 3 7/8"	16452	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 2' 3 7/8"	0.108	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.008 @ 2' 3 7/8"	0.216	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 7 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 3 3/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.52"	935	1216	2151	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.52"	935	1216	2151	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)	4' 8" o/c	
Bottom Edge (Lu)	4' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 7 3/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 7 3/4" (Front)	13' 1"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

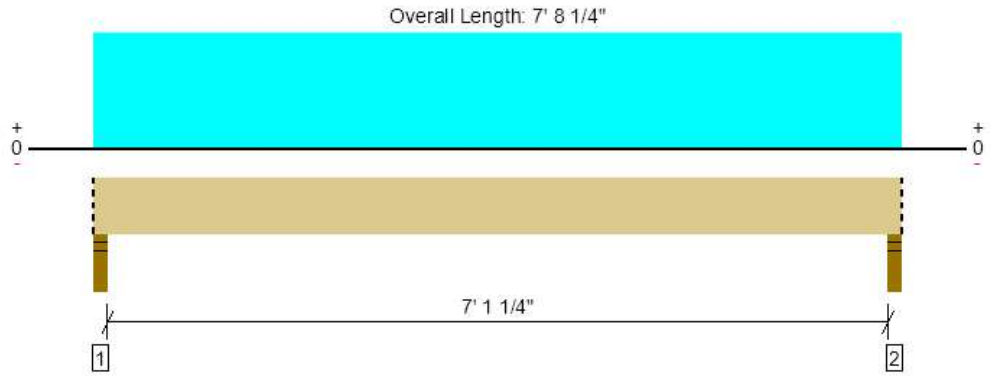
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 5.3 (D.5-E.2) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3324 @ 2"	4961 (3.50")	Passed (67%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2216 @ 1' 3 3/8"	7343	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5846 @ 3' 10 1/8"	16452	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.037 @ 3' 10 1/8"	0.184	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.065 @ 3' 10 1/8"	0.368	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 8 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 4 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	2.34"	1447	1877	3324	Blocking
2 - Stud wall - HF	3.50"	3.50"	2.34"	1447	1877	3324	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)	7' 8" o/c	
Bottom Edge (Lu)	7' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 7' 8 1/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 7' 8 1/4" (Front)	12' 2 1/2"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

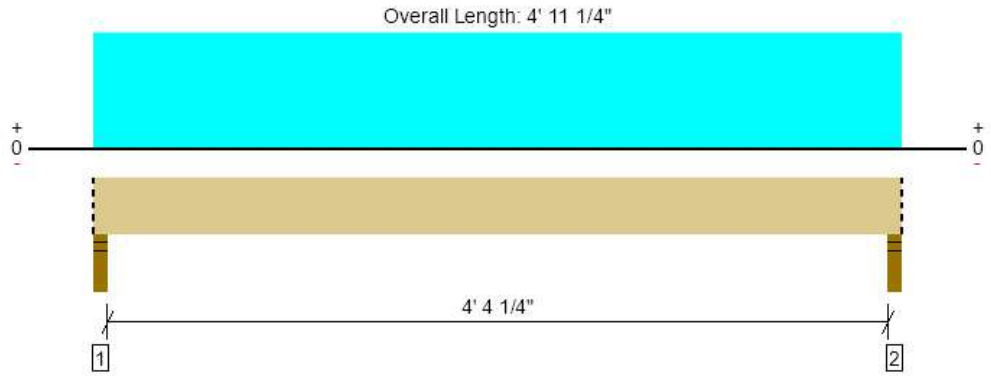
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

3rd Floor Framing, Grid 6 (D.3-D.6) Flush Beam

1 piece(s) 3 1/2" x 11 7/8" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2372 @ 2"	4961 (3.50")	Passed (48%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1141 @ 1' 3 3/8"	7343	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2546 @ 2' 5 5/8"	16452	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.006 @ 2' 5 5/8"	0.115	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.011 @ 2' 5 5/8"	0.230	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 11 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4' 7 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.67"	1031	1341	2372	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.67"	1031	1341	2372	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)	4' 11" o/c	
Bottom Edge (Lu)	4' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 11 1/4"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 4' 11 1/4" (Front)	13' 7"	30.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

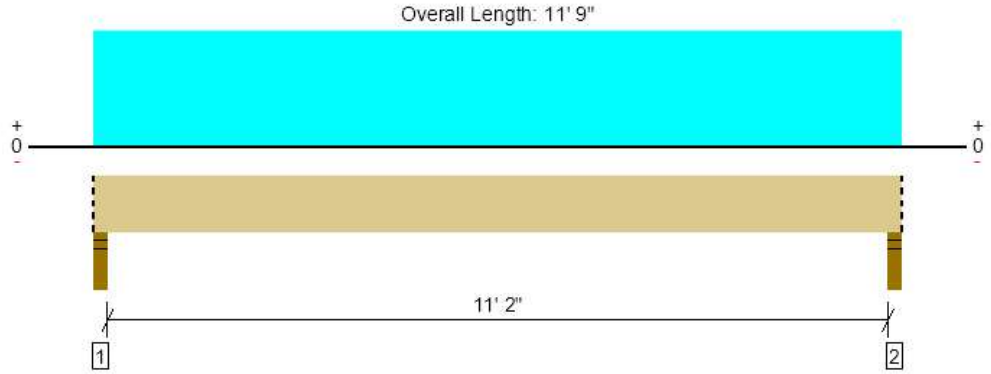
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

Roof Framing, Grid I Entry Roof Beam

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4533 @ 2"	4961 (3.50")	Passed (91%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3633 @ 1' 2"	7466	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	12571 @ 5' 10 1/2"	14792	Passed (85%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.240 @ 5' 10 1/2"	0.571	Passed (L/571)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.486 @ 5' 10 1/2"	0.761	Passed (L/282)	--	1.0 D + 1.0 S (All Spans)

Member Length : 11' 9"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0.25/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	3.20"	2293	2240	4533	Blocking
2 - Stud wall - HF	3.50"	3.50"	3.20"	2293	2240	4533	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)	11' 9" o/c	
Bottom Edge (Lu)	11' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 9"	N/A	8.9	--	
1 - Uniform (PSF)	0 to 11' 9" (Front)	15' 3"	25.0	25.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

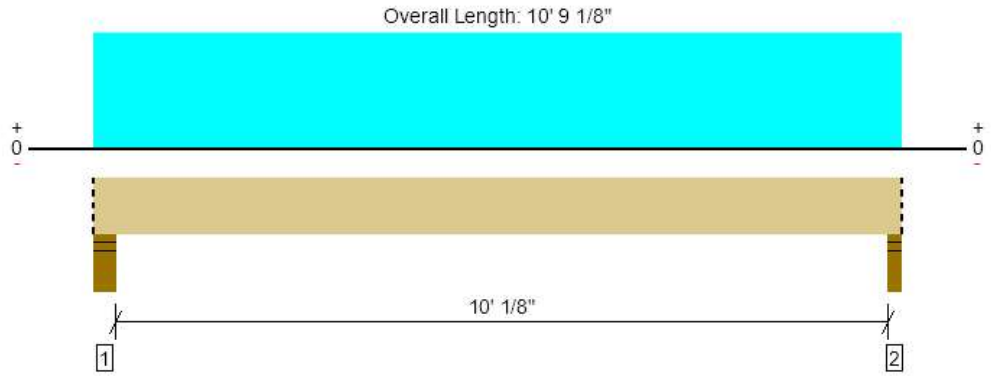
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

Roof Framing, Grid L 10' Deck Roof Beam

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4992 @ 10' 7 1/8"	4961 (3.50")	Passed (101%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3893 @ 1' 4"	7466	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	12402 @ 5' 5 9/16"	14792	Passed (84%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.192 @ 5' 5 9/16"	0.513	Passed (L/643)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.387 @ 5' 5 9/16"	0.684	Passed (L/318)	--	1.0 D + 1.0 S (All Spans)

Member Length : 10' 9 1/8"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0.25/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 10' 3 1/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.63"	2600	2550	5149	Blocking
2 - Stud wall - HF	3.50"	3.50"	3.52"	2520	2472	4992	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)	10' 9" o/c	
Bottom Edge (Lu)	10' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 9 1/8"	N/A	8.9	--	
1 - Uniform (PSF)	0 to 10' 9 1/8" (Front)	18' 8"	25.0	25.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

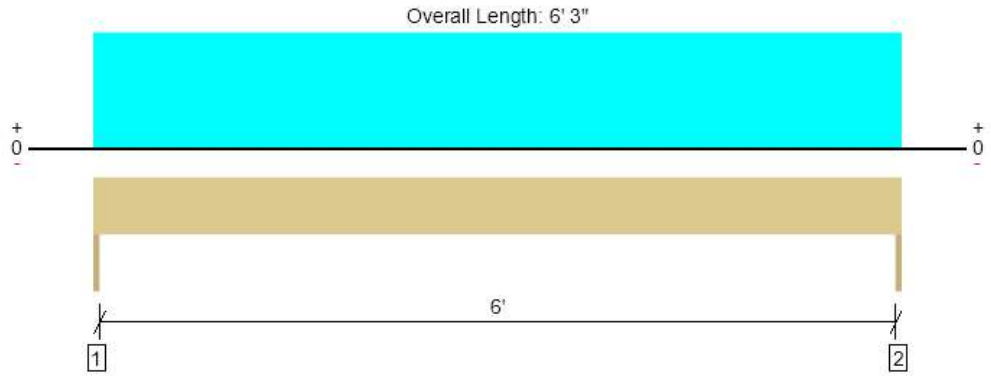
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

Roof Framing, 6' Window Header

1 piece(s) 4 x 10 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2956 @ 0	3281 (1.50")	Passed (90%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2108 @ 10 3/4"	4468	Passed (47%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4618 @ 3' 1 1/2"	5166	Passed (89%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.044 @ 3' 1 1/2"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.088 @ 3' 1 1/2"	0.313	Passed (L/853)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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	Snow	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	1491	1465	2956	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	1491	1465	2956	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 3"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 6' 3"	18' 9"	25.0	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

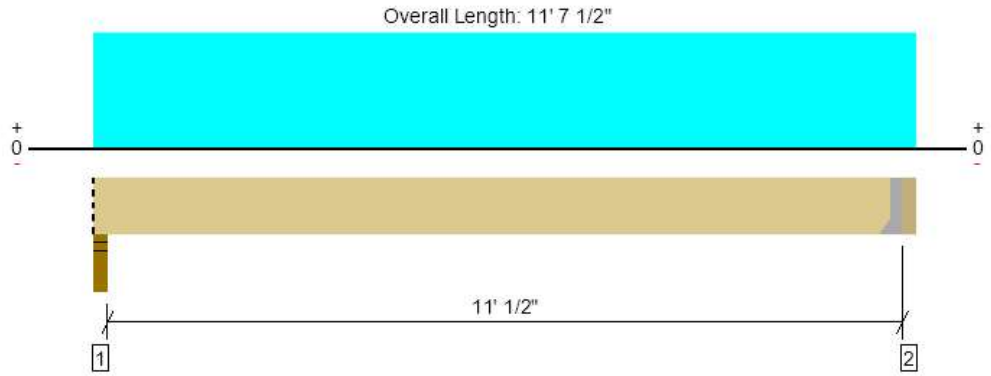
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

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

Roof Framing, Grid B 11' Deck Roof Beam

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4622 @ 11' 4"	4622 (2.03")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3898 @ 10' 5 1/2"	7466	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	12904 @ 5' 9"	14792	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.236 @ 5' 9"	0.558	Passed (L/569)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.477 @ 5' 9"	0.745	Passed (L/281)	--	1.0 D + 1.0 S (All Spans)

Member Length : 11' 4"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0.25/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	3.36"	2406	2354	4760	Blocking
2 - Hanger on 10 1/2" GLB beam	3.50"	Hanger[1]	2.03"	2456	2405	4861	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- 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)	11' 4" o/c	
Bottom Edge (Lu)	11' 4" 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
2 - Face 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 Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 4"	N/A	8.9	--	
1 - Uniform (PSF)	0 to 11' 7 1/2" (Front)	16' 4 1/2"	25.0	25.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

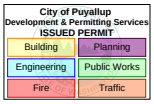
ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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



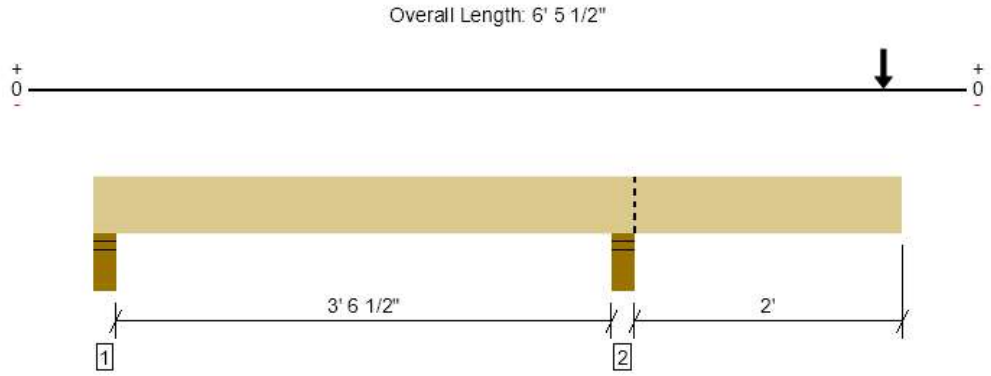
~~FAILED~~

PASSED

Roof Framing, Deck Roof Cantilever Beam

1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam

An excessive uplift of -2576 lbs at support located at 4" failed this product. Uplift resisted by (2)ST6215 straps



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7528 @ 4' 2 3/4"	12254 (5.50")	Passed (61%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4877 @ 5' 4"	11733	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	0 @ N/A	N/A	Passed (N/A)	--	N/A
Neg Moment (Ft-lbs)	-10162 @ 4' 2 3/4"	17918	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.041 @ 6' 5 1/2"	0.223	Passed (2L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.082 @ 6' 5 1/2"	0.297	Passed (2L/648)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 5 1/2"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0.25/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 6' 1 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.50"	-1290	-1286	-2576	None
2 - Stud wall - HF	5.50"	5.50"	3.38"	3837	3691	7528	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)	6' 6" o/c	
Bottom Edge (Lu)	6' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 5 1/2"	N/A	14.0	--	
1 - Point (lb)	6' 3 3/4" (Front)	N/A	2456	2405	Linked from: Grid A 14' Deck Roof Beam, Support 2

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Chon Pieruccioni Pieruccioni Engineering (206) 949-7866 cpieru@hotmail.com	

Weyerhaeuser

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	3.50	ft	
Footing Width (Z-dir)	3.50	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	1.5	ksf	
Soil Pressure at Corner 2	1.5	ksf	
Soil Pressure at Corner 3	1.5	ksf	
Soil Pressure at Corner 4	1.5	ksf	
Bearing Pressure Ratio	0.77		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	4.4	13.7	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft
- Axial force P = 0.6 * 4.4 + 0.6 * 0.0 = 2.6 kip

  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 2.6 * 1.75 = 4.6 k-ft
- Resisting moment X-X = 1.3 + 0.0 + 0.0 + 4.6 + -0.5 = 5.4 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{5.4}{0.0}$ = 53.71 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft

- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density* = 0.6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft

- Axial force P = 0.6 * 4.4 + 0.6 * 0.0 = 2.6 kip

Arm = *L / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 2.6 * 1.75 = 4.6 k-ft

- Resisting moment Z-Z = 1.3 + 0.0 + 0.0 + 4.6 + -0.5 = 5.4 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{5.4}{0.0}$ = 53.71 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 2.1 + 0.0 + 0.0 + -0.9 + 31.7 = 32.9 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 2.1 + 0.0 + 0.0 + -0.9 + 31.7 = 32.9 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P* = 1.2 + 0.0 + 0.0 - 0.5 + 18.1 = 18.8 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{32.9 - 0.0}{18.8} = 1.75 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{32.9 - 0.0}{18.8} = 1.75 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =3.50 / 2 - 1.75 = 0.00 ft

Z-ecc = *Width / 2 - Zp* = 3.50 / 2 - 1.75 = 0.00 ft

Area = *Width * Length* = 3.50 * 3.50 = 12.3 ft²

Sx = *Length * Width² / 6* = 3.50 * 3.50² / 6 = 7.1 ft³

Sz = *Width * Length² / 6* = 3.50 * 3.50² / 6 = 7.1 ft³

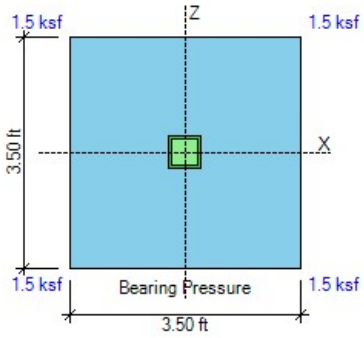
- Footing is in full bearing. Soil pressures are as follows:

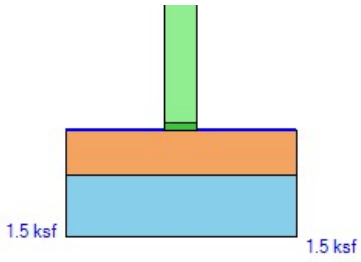
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz)* = 18.8 * (1 / 12.3 + 0.00 / 7.1 + 0.00 / 7.1) = 1.54 ksf

P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz)* = 18.8 * (1 / 12.3 - 0.00 / 7.1 + 0.00 / 7.1) = 1.54 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz)* = 18.8 * (1 / 12.3 - 0.00 / 7.1 - 0.00 / 7.1) = 1.54 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz)* = 18.8 * (1 / 12.3 + 0.00 / 7.1 - 0.00 / 7.1) = 1.54 ksf





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 3.1 * 0.35) = 1.1 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.1}{0.0}$ = 14.44 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.1}{0.0}$ = 14.44 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.7 + 0.0 - 0.3}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

d Top X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 2.0 - 0.8 / 2 = 5.6 in

d Top Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 2.0 - 0.8 - 0.8 / 2 = 4.9 in

d Bot X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 3.0 - 0.5 / 2 = 4.8 in

d Bot Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 3.0 - 0.5 - 0.5 / 2 = 4.3 in

$\phi Vcx = 2 * \phi * \sqrt{f'c} * Width * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.8 / 1000 = 15.0 kip ACI Eq. (22.5.5.1)

$\phi Vcz = 2 * \phi * \sqrt{f'c} * Length * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.3 / 1000 = 13.4 kip

- Shear forces calculated as the volume of the bearing pressures under the effective areas:

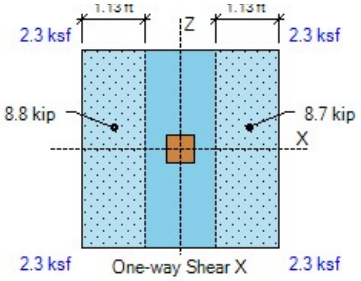
One-way shear Vux (- Side) = 8.8 kip < 15.0 kip OK

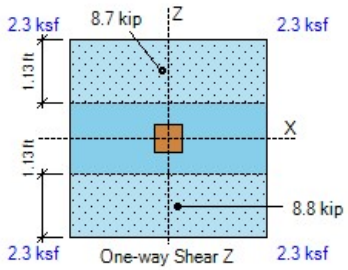
One-way shear Vux (+ Side) = 8.7 kip < 15.0 kip OK

One-way shear Vuz (- Side) = 8.8 kip < 13.4 kip OK

One-way shear Vuz (+ Side) = 8.7 kip < 13.4 kip OK

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 5.6 k-ft OK

- Bottom Bars

Use 5 #4 Z-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.3) = 0.0056 q = 0.0056 * 40 / 2.5 = 0.090

Use 5 #4 X-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.8) = 0.0050 q = 0.0050 * 40 / 2.5 = 0.080

β = L / W = 3.50 / 3.50 = 1.00 *γs = 2 * β / (β + 1)* = 2 * 1.00 / (1.00 + 1) = 1.00 ACI 13.3.3.3

Bending strength *ϕMn = ϕ * b * d² * f'c * q * (1 - 0.59 * q)* ACI 22.2.2

ϕMnx = 0.90 * 3.50 * 12 * 4.3² * 2.5 * 0.090 * (1 - 0.59 * 0.090) = 12.1 k-ft

ϕMnz = 0.90 * 3.50 * 12 * 4.8² * 2.5 * 0.080 / 1.00 * (1 - 0.59 * 0.080 / 1.00) = 13.6 k-ft

- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

Bottom moment Mux (- Side) = 8.8 k-ft < 12.1 k-ft OK ratio = 0.73

Bottom moment Mux (+ Side) = 8.8 k-ft < 12.1 k-ft OK ratio = 0.73

Bottom moment Muz (- Side) = 8.8 k-ft < 13.6 k-ft OK ratio = 0.65

Bottom moment Muz (+ Side) = 8.8 k-ft < 13.6 k-ft OK ratio = 0.65

X-As min = *0.0018 * Width * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

Z-As min = *0.0018 * Length * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

X-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

Z-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

X-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *X-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

X-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.65) = 12.0 in

Hooked *X-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

X-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.65) = 6.0 in

-X Ld provided = *(Length - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+X Ld provided = *(Length - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

Z-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *Z-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

Z-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.65) = 12.0 in

Hooked *Z-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

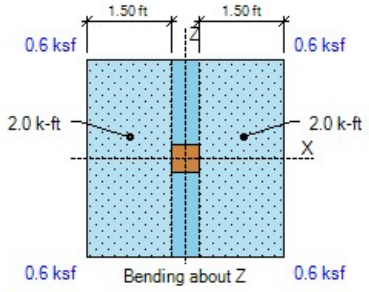
Z-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.73) = 6.0 in

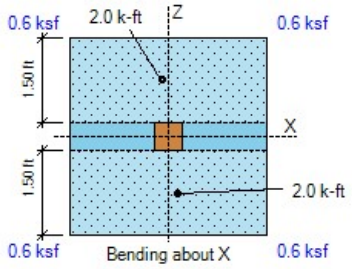
-Z Ld provided = *(Width - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+Z Ld provided = *(Width - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

X-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK ACI 7.7.2.3

Z-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W* = 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz* = 27.2 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.8 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (3.50 * 12 / 2 - 0.0 - 6.0 / 2, 3.50 * 12 / 2 - 0.0 - 6.0 / 2 = 18.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [3.50 * 12 * 3.5 * 12, (6.0 + 2 * 18.0) * (6.0 + 2 * 18.0)] = 1764.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)]* = 0.65 * 0.85 * 2.5 * Min [2, √(1764.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1* = 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns* = 2.8 + 0.0 = 2.8 ksi > 0.8 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.13) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 23.5 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *d /2* = 4.5 / 2 = 2.3 in αsx = 20

Z-Edge = *d /2* = 4.5 / 2 = 2.3 in αsz = 20

αs = *αsx + αsz* = 20 + 20 = 40 Col type = Interior β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 20 / 10 * (6.0 + 4.5 / 2 + 2.3) + 20 / 10 * (6.0 + 4.5 / 2 + 2.3) = 42.0 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 4.5 / 2 + 2.3) * (6.0 + 4.5 / 2 + 2.3) = 110.3 in²

ϕVc = *ϕ * Min (2 + 4 / β, αs * d / bo + 2, 4) * √(f'c)* ACI 22.6.5.2

ϕVc = 0.75 * Min (2 + 4 / 1.00, 40 * 4.5 / 42.0 + 2, 4) * √(2500) = 150.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 27.2 + 0.07 * 110.3 / 144 - 1.8 = 25.5 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in

γvx factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.4.2.2)

γvz factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.2.3.2)

X2z = *b1 / 2* = 10.5 / 2 = 5.3 in X2x = *b2 / 2* = 10.5 / 2 = 5.3 in

Jcz = *b1 * d³ / 6 + b1³ * d / 6 + b1² * b2 * d / 2* ACI R8.4.4.2.3

Jcz = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Jcx = *b2 * d³ / 6 + b2³ * d / 6 + b2² * b1 * d / 2* ACI R8.4.4.2.3

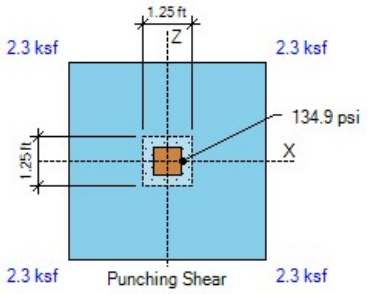
Jcx = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Stress due to P = *F / (bo * d) * 1000* = 25.5 / (42.0 * 4.5) * 1000 = 134.9 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

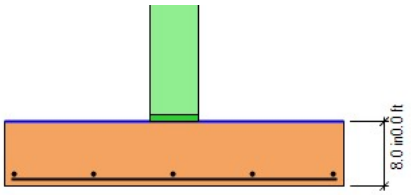
Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

Punching stress = *P-stress + Mx-stress + Mz-stress* = 134.9 + 0.0 + 0.0 = 134.9 psi < 150.0 psi OK

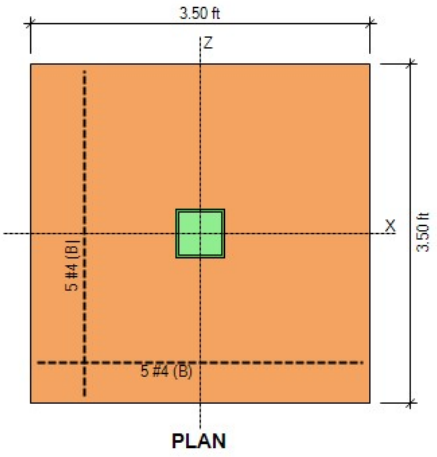


DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16



ELEVATION



PLAN

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	3.00	ft	
Footing Width (Z-dir)	3.00	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	1.5	ksf	
Soil Pressure at Corner 2	1.5	ksf	
Soil Pressure at Corner 3	1.5	ksf	
Soil Pressure at Corner 4	1.5	ksf	
Bearing Pressure Ratio	0.76		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	8.0	5.2	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.00 * 3.00 * 8.0 / 12 * 0.15 = 0.5 kip

  Arm = *W / 2* = 3.00 / 2 = 1.50 ft Moment = 0.5 * 1.50 = 0.8 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *W / 2 - Offset* = 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (3.00 * 3.00 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *W / 2* = 3.00 / 2 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.00 * 3.00 * 62 * (0.67) = -0.2 kip

  Arm = *W / 2* = 3.00 / 2 = 1.50 ft Moment = 0.2 * 1.50 = -0.3 k-ft
- Axial force P = 0.6 * 8.0 + 0.6 * 0.0 = 4.8 kip

  Arm = *W / 2 - Offset* = 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 4.8 * 1.50 = 7.2 k-ft
- Resisting moment X-X = 0.8 + 0.0 + 0.0 + 7.2 + -0.3 = 7.7 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{7.7}{0.0}$ = 76.73 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.00 * 3.00 * 8.0 / 12 * 0.15 = 0.5 kip

  Arm = *L / 2* = 3.00 / 2 = 1.50 ft Moment = 0.5 * 1.50 = 0.8 k-ft

- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *L / 2 - Offset* = 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density* = 0.6 * (3.00 * 3.00 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *L / 2* = 3.00 / 2 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.00 * 3.00 * 62 * (0.67) = -0.2 kip

  Arm = *L / 2* = 3.00 / 2 = 1.50 ft Moment = 0.2 * 1.50 = -0.3 k-ft

- Axial force P = 0.6 * 8.0 + 0.6 * 0.0 = 4.8 kip

  Arm = *L / 2 - Offset* = 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 4.8 * 1.50 = 7.2 k-ft

- Resisting moment Z-Z = 0.8 + 0.0 + 0.0 + 7.2 + -0.3 = 7.7 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{7.7}{0.0}$ = 76.73 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 1.4 + 0.0 + 0.0 + -0.6 + 19.8 = 20.6 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 1.4 + 0.0 + 0.0 + -0.6 + 19.8 = 20.6 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P* = 0.9 + 0.0 + 0.0 - 0.4 + 13.2 = 13.7 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{20.6 - 0.0}{13.7} = 1.50 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{20.6 - 0.0}{13.7} = 1.50 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =3.00 / 2 - 1.50 = 0.00 ft

Z-ecc = *Width / 2 - Zp* = 3.00 / 2 - 1.50 = 0.00 ft

Area = *Width * Length* = 3.00 * 3.00 = 9.0 ft²

Sx = *Length * Width² / 6* = 3.00 * 3.00² / 6 = 4.5 ft³

Sz = *Width * Length² / 6* = 3.00 * 3.00² / 6 = 4.5 ft³

- Footing is in full bearing. Soil pressures are as follows:

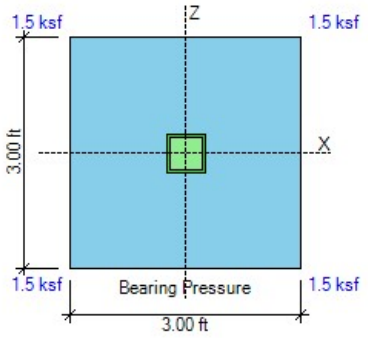
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz)* = 13.7 * (1 / 9.0 + 0.00 / 4.5 + 0.00 / 4.5) = 1.53 ksf

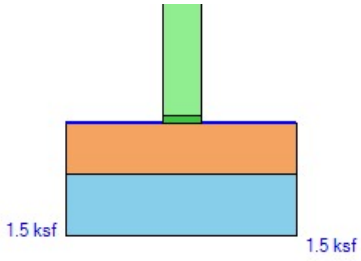
P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz)* = 13.7 * (1 / 9.0 - 0.00 / 4.5 + 0.00 / 4.5) = 1.53 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz)* = 13.7 * (1 / 9.0 - 0.00 / 4.5 - 0.00 / 4.5) = 1.53 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz)* = 13.7 * (1 / 9.0 + 0.00 / 4.5 - 0.00 / 4.5) = 1.53 ksf

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 3.00 = 0.3 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 3.00 = 0.3 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 5.1 * 0.35) = 1.8 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.3 + 1.00 * 1.8}{0.0}$ = 21.08 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.3 + 1.00 * 1.8}{0.0}$ = 21.08 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.5 + 0.0 - 0.2}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

Use Plain Concrete Shear Strength

ϕVcx = *4/3 * ϕ * √(f'c) * Width * t / 1000* = 4/3 * 0.60 * √(2500) * 3.0 * 12 * 8.0 / 1000 = 11.5 kip ACI 14.5.5.1

ϕVcz = *4/3 * ϕ * √(f'c) * Length * t / 1000* = 4/3 * 0.60 * √(2500) * 3.0 * 12 * 8.0 / 1000 = 11.5 kip

- Shear forces calculated as the volume of the bearing pressures under the effective areas:

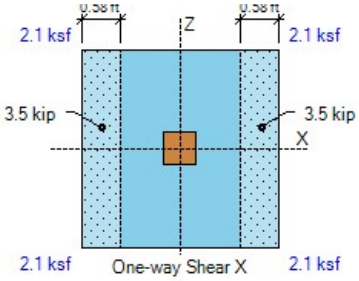
One-way shear Vux (- Side) = 3.5 kip < 11.5 kip OK

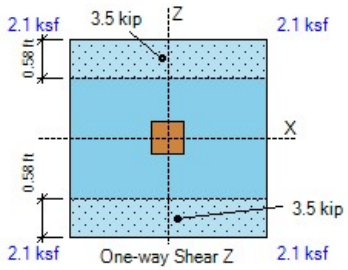
One-way shear Vux (+ Side) = 3.5 kip < 11.5 kip OK

One-way shear Vuz (- Side) = 3.5 kip < 11.5 kip OK

One-way shear Vuz (+ Side) = 3.5 kip < 11.5 kip OK

Project: Page # ___
Engineer: 1/11/2024
Descrip: Grid 3F Footing





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = $5 * \phi * \sqrt{f'c} * L * Thick^2 / 6$ = 5 * 0.60 * √(2500) * 3.00 * 8.0² / 6 / 1000 = 1.3 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = $5 * \phi * \sqrt{f'c} * W * Thick^2 / 6$ = 5 * 0.60 * √(2500) * 3.00 * 8.0² / 6 / 1000 = 1.3 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 4.8 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 4.8 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 4.8 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 4.8 k-ft OK

- Bottom Bars

No Bottom Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Bottom

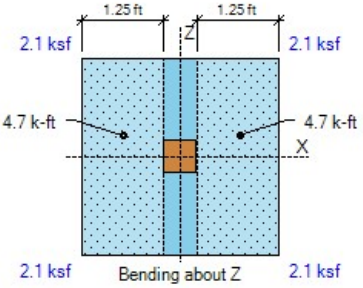
- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

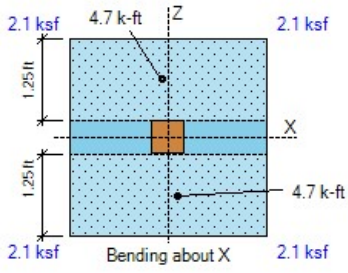
Bottom moment Mux (- Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.97

Bottom moment Mux (+ Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.98

Bottom moment Muz (- Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.97

Bottom moment Muz (+ Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.98





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W =* 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6 =* 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6 =* 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz =* 17.9 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.5 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (3.00 * 12 / 2 - 0.0 - 6.0 / 2, 3.00 * 12 / 2 - 0.0 - 6.0 / 2 = 15.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [3.00 * 12 * 3.0 * 12, (6.0 + 2 * 15.0) * (6.0 + 2 * 15.0)] = 1296.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)] =* 0.65 * 0.85 * 2.5 * Min [2, √(1296.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1 =* 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns =* 2.8 + 0.0 = 2.8 ksi > 0.5 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.09) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 15.5 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *Length / 2 - Offset - Col / 2* = 3.00 * 12 / 2 - 0.0 - 6.0 / 2 = 15.0 in αsx = 10

Z-Edge = *Width / 2 - Offset - Col / 2* = 3.00 * 12 / 2 - 0.0 - 6.0 / 2 = 15.0 in αsz = 10

αs = *αsx + αsz* = 10 + 10 = 20 Col type = Corner β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 10 / 10 * (6.0 + 8.0 / 2 + 15.0) + 10 / 10 * (6.0 + 8.0 / 2 + 15.0) = 50.0 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 8.0 / 2 + 15.0) * (6.0 + 8.0 / 2 + 15.0) = 625.0 in²

Use Plain Concrete Shear Strength

ϕVc = *ϕ * Min (1 + 2 / β, 2) * 4/3 * √(f'c)* ACI 14.5.5.1

ϕVc = 0.60 * Min (1 + 2 / 1.00, 2) * 4/3 √(2500) = 80.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 17.9 + 0.07 * 625.0 / 144 - 2.8 = 15.4 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 8.0 / 2 + 15.0 = 25.0 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 8.0 / 2 + 15.0 = 25.0 in

γvx factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(25.0 / 25.0)}} = 0.40$ ACI Eq. (8.4.4.2.2)

γvz factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(25.0 / 25.0)}} = 0.40$ ACI Eq. (8.4.2.3.2)

X2z = $b1^2 / 2 / (b1 + b2)$ = 25.0² / 2 / (25.0 + 25.0) = 6.3 in X2x = $b2^2 / 2 / (b2 + b1)$ = 6.3 in

Jcz = $b1 * d^3 / 12 + b1^3 * d / 12 + b1 * d * (b1 / 2 - X2z)^2 + b2 * d * X2z^2$ ACI R8.4.4.2.3

Jcz = 25.0 * 8.0³ / 12 + 25.0³ * 8.0 / 12 + 25.0 * 8.0 * (25.0 / 2 * 6.3)² + 25.0 * 8.0 * 6.3² = 27108 in⁴

Jcx = $b2 * d^3 / 12 + b2^3 * d / 12 + b2 * d * (b2 / 2 - X2x)^2 + b1 * d * X2x^2$ ACI R8.4.4.2.3

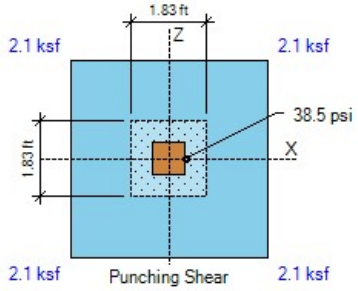
Jcz = 25.0 * 8.0³ / 12 + 25.0³ * 8.0 / 12 + 25.0 * 8.0 * (25.0 / 2 * 6.3)² + 25.0 * 8.0 * 6.3² = 27108 in⁴

Stress due to P = *F / (bo * d) * 1000* = 15.4 / (50.0 * 8.0) * 1000 = 38.5 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.40 * 0.0 * 12 * 6.3 / 27108 * 1000 = 0.0 psi

Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.40 * 0.0 * 12 * 6.3 / 27108 * 1000 = 0.0 psi

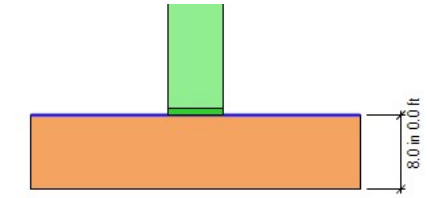
Punching stress = *P-stress + Mx-stress + Mz-stress* = 38.5 + 0.0 + 0.0 = 38.5 psi < 80.0 psi OK



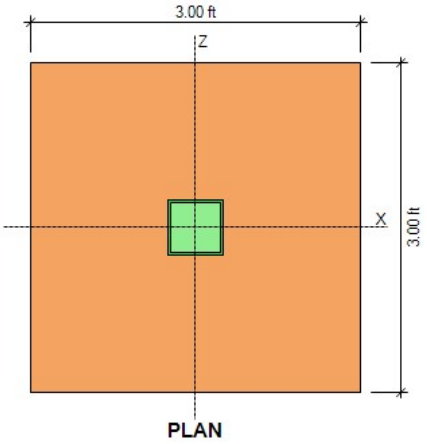
Project: Page # ___
Engineer: 1/11/2024
Descrip: Grid 3F Footing

DESIGN CODES

Concrete Design ..... ACI 318-14
Load Combinations ..... ASCE 7-10/16



ELEVATION



PLAN

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	3.50	ft	
Footing Width (Z-dir)	3.50	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	1.8	ksf	
Soil Pressure at Corner 2	1.8	ksf	
Soil Pressure at Corner 3	1.8	ksf	
Soil Pressure at Corner 4	1.8	ksf	
Bearing Pressure Ratio	0.89		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	5.2	16.0	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft
- Axial force P = 0.6 * 5.2 + 0.6 * 0.0 = 3.1 kip

  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 3.1 * 1.75 = 5.5 k-ft
- Resisting moment X-X = 1.3 + 0.0 + 0.0 + 5.5 + -0.5 = 6.2 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{6.2}{0.0}$ = 62.11 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft

- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density* = 0.6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft

- Axial force P = 0.6 * 5.2 + 0.6 * 0.0 = 3.1 kip

Arm = *L / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 3.1 * 1.75 = 5.5 k-ft

- Resisting moment Z-Z = 1.3 + 0.0 + 0.0 + 5.5 + -0.5 = 6.2 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{6.2}{0.0}$ = 62.11 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 2.1 + 0.0 + 0.0 + -0.9 + 37.1 = 38.4 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 2.1 + 0.0 + 0.0 + -0.9 + 37.1 = 38.4 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P* = 1.2 + 0.0 + 0.0 - 0.5 + 21.2 = 21.9 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{38.4 - 0.0}{21.9} = 1.75 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{38.4 - 0.0}{21.9} = 1.75 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =3.50 / 2 - 1.75 = 0.00 ft

Z-ecc = *Width / 2 - Zp* = 3.50 / 2 - 1.75 = 0.00 ft

Area = *Width * Length* = 3.50 * 3.50 = 12.3 ft²

Sx = *Length * Width² / 6* = 3.50 * 3.50² / 6 = 7.1 ft³

Sz = *Width * Length² / 6* = 3.50 * 3.50² / 6 = 7.1 ft³

- Footing is in full bearing. Soil pressures are as follows:

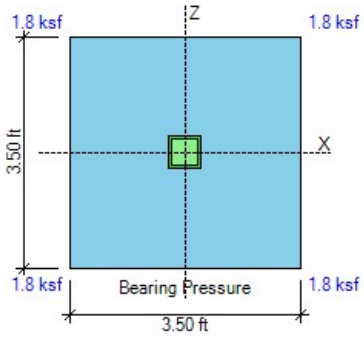
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz)* = 21.9 * (1 / 12.3 + 0.00 / 7.1 + 0.00 / 7.1) = 1.79 ksf

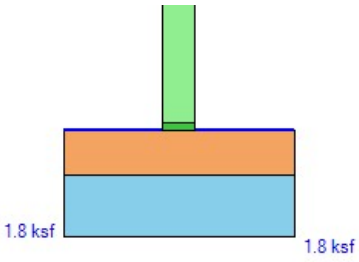
P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz)* = 21.9 * (1 / 12.3 - 0.00 / 7.1 + 0.00 / 7.1) = 1.79 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz)* = 21.9 * (1 / 12.3 - 0.00 / 7.1 - 0.00 / 7.1) = 1.79 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz)* = 21.9 * (1 / 12.3 + 0.00 / 7.1 - 0.00 / 7.1) = 1.79 ksf

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 3.5 * 0.35) = 1.2 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.2}{0.0}$ = 16.12 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.2}{0.0}$ = 16.12 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.7 + 0.0 - 0.3}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

d Top X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 2.0 - 0.8 / 2 = 5.6 in

d Top Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 2.0 - 0.8 - 0.8 / 2 = 4.9 in

d Bot X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 3.0 - 0.5 / 2 = 4.8 in

d Bot Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 3.0 - 0.5 - 0.5 / 2 = 4.3 in

$\phi Vcx = 2 * \phi * \sqrt{f'c} * Width * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.8 / 1000 = 15.0 kip ACI Eq. (22.5.5.1)

$\phi Vcz = 2 * \phi * \sqrt{f'c} * Length * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.3 / 1000 = 13.4 kip

- Shear forces calculated as the volume of the bearing pressures under the effective areas:

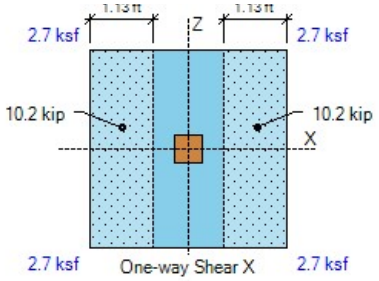
One-way shear Vux (- Side) = 10.2 kip < 15.0 kip OK

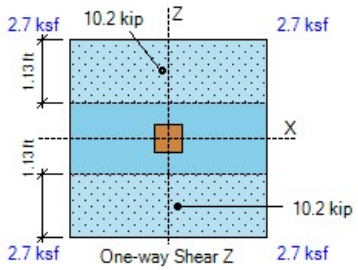
One-way shear Vux (+ Side) = 10.2 kip < 15.0 kip OK

One-way shear Vuz (- Side) = 10.2 kip < 13.4 kip OK

One-way shear Vuz (+ Side) = 10.2 kip < 13.4 kip OK

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 5.6 k-ft OK

- Bottom Bars

Use 5 #4 Z-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.3) = 0.0056 q = 0.0056 * 40 / 2.5 = 0.090

Use 5 #4 X-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.8) = 0.0050 q = 0.0050 * 40 / 2.5 = 0.080

β = L / W = 3.50 / 3.50 = 1.00 *γs = 2 * β / (β + 1)* = 2 * 1.00 / (1.00 + 1) = 1.00 ACI 13.3.3.3

Bending strength *ϕMn = ϕ * b * d² * f'c * q * (1 - 0.59 * q)* ACI 22.2.2

ϕMnx = 0.90 * 3.50 * 12 * 4.3² * 2.5 * 0.090 * (1 - 0.59 * 0.090) = 12.1 k-ft

ϕMnz = 0.90 * 3.50 * 12 * 4.8² * 2.5 * 0.080 / 1.00 * (1 - 0.59 * 0.080 / 1.00) = 13.6 k-ft

- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

Bottom moment Mux (- Side) = 10.3 k-ft < 12.1 k-ft OK ratio = 0.85

Bottom moment Mux (+ Side) = 10.3 k-ft < 12.1 k-ft OK ratio = 0.85

Bottom moment Muz (- Side) = 10.3 k-ft < 13.6 k-ft OK ratio = 0.76

Bottom moment Muz (+ Side) = 10.3 k-ft < 13.6 k-ft OK ratio = 0.76

X-As min = *0.0018 * Width * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

Z-As min = *0.0018 * Length * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

X-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

Z-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

X-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *X-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

X-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.76) = 12.0 in

Hooked *X-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

X-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.76) = 6.0 in

-X Ld provided = *(Length - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+X Ld provided = *(Length - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

Z-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *Z-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

Z-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.76) = 12.0 in

Hooked *Z-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

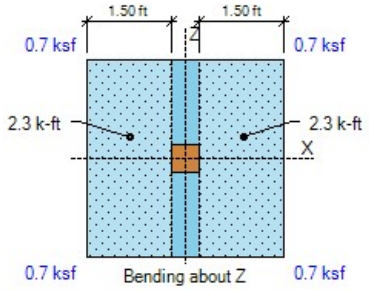
Z-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.85) = 6.0 in

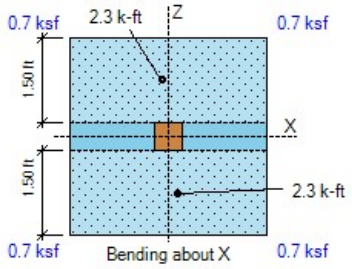
-Z Ld provided = *(Width - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+Z Ld provided = *(Width - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

X-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK ACI 7.7.2.3

Z-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W* = 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz* = 31.8 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.9 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (3.50 * 12 / 2 - 0.0 - 6.0 / 2, 3.50 * 12 / 2 - 0.0 - 6.0 / 2 = 18.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [3.50 * 12 * 3.5 * 12, (6.0 + 2 * 18.0) * (6.0 + 2 * 18.0)] = 1764.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)]* = 0.65 * 0.85 * 2.5 * Min [2, √(1764.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1* = 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns* = 2.8 + 0.0 = 2.8 ksi > 0.9 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.15) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 27.5 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *d /2* = 4.5 / 2 = 2.3 in αsx = 20

Z-Edge = *d /2* = 4.5 / 2 = 2.3 in αsz = 20

αs = *αsx + αsz* = 20 + 20 = 40 Col type = Interior β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 20 / 10 * (6.0 + 4.5 / 2 + 2.3) + 20 / 10 * (6.0 + 4.5 / 2 + 2.3) = 42.0 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 4.5 / 2 + 2.3) * (6.0 + 4.5 / 2 + 2.3) = 110.3 in²

ϕVc = *ϕ * Min (2 + 4 / β, αs * d / bo + 2, 4) * √(f'c)* ACI 22.6.5.2

ϕVc = 0.75 * Min (2 + 4 / 1.00, 40 * 4.5 / 42.0 + 2, 4) * √(2500) = 150.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 31.8 + 0.07 * 110.3 / 144 - 2.0 = 29.9 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in

γvx factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.4.2.2)

γvz factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.2.3.2)

X2z = *b1 / 2* = 10.5 / 2 = 5.3 in X2x = *b2 / 2* = 10.5 / 2 = 5.3 in

Jcz = *b1 * d³ / 6 + b1³ * d / 6 + b1² * b2 * d / 2* ACI R8.4.4.2.3

Jcz = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Jcx = *b2 * d³ / 6 + b2³ * d / 6 + b2² * b1 * d / 2* ACI R8.4.4.2.3

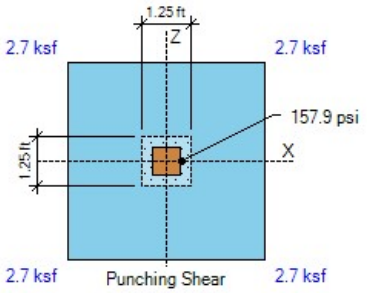
Jcx = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Stress due to P = *F / (bo * d) * 1000* = 29.9 / (42.0 * 4.5) * 1000 = 157.9 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

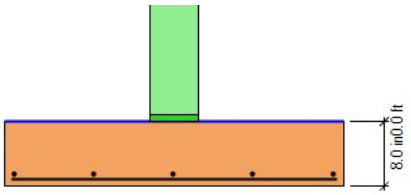
Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

Punching stress = *P-stress + Mx-stress + Mz-stress* = 157.9 + 0.0 + 0.0 = 157.9 psi > 150.0 psi NG

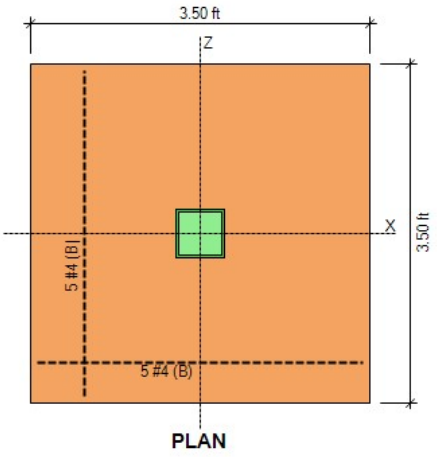


DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16



ELEVATION



PLAN

Project: Page # ___
Engineer: 1/11/2024
Descrip: Grid 8.7D.5 Footing

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	3.00	ft	
Footing Width (Z-dir)	3.00	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	1.5	ksf	
Soil Pressure at Corner 2	1.5	ksf	
Soil Pressure at Corner 3	1.5	ksf	
Soil Pressure at Corner 4	1.5	ksf	
Bearing Pressure Ratio	0.76		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	8.0	5.2	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.00 * 3.00 * 8.0 / 12 * 0.15 = 0.5 kip

  Arm = *W / 2* = 3.00 / 2 = 1.50 ft Moment = 0.5 * 1.50 = 0.8 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *W / 2 - Offset* = 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (3.00 * 3.00 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *W / 2* = 3.00 / 2 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.00 * 3.00 * 62 * (0.67) = -0.2 kip

  Arm = *W / 2* = 3.00 / 2 = 1.50 ft Moment = 0.2 * 1.50 = -0.3 k-ft
- Axial force P = 0.6 * 8.0 + 0.6 * 0.0 = 4.8 kip

  Arm = *W / 2 - Offset* = 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 4.8 * 1.50 = 7.2 k-ft
- Resisting moment X-X = 0.8 + 0.0 + 0.0 + 7.2 + -0.3 = 7.7 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{7.7}{0.0}$ = 76.73 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density =* 0.6 * 3.00 * 3.00 * 8.0 / 12 * 0.15 = 0.5 kip

Arm = *L / 2 =* 3.00 / 2 = 1.50 ft Moment = 0.5 * 1.50 = 0.8 k-ft

- Pedestal weight = *0.6 * W * L * H * Density =* 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset =* 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density =* 0.6 * (3.00 * 3.00 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2 =* 3.00 / 2 = 1.50 ft Moment = 0.0 * 1.50 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT) =* 0.6 * 3.00 * 3.00 * 62 * (0.67) = -0.2 kip

Arm = *L / 2 =* 3.00 / 2 = 1.50 ft Moment = 0.2 * 1.50 = -0.3 k-ft

- Axial force P = 0.6 * 8.0 + 0.6 * 0.0 = 4.8 kip

Arm = *L / 2 - Offset =* 3.00 / 2 - 0.0 / 12 = 1.50 ft Moment = 4.8 * 1.50 = 7.2 k-ft

- Resisting moment Z-Z = 0.8 + 0.0 + 0.0 + 7.2 + -0.3 = 7.7 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{7.7}{0.0}$ = 76.73 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 1.4 + 0.0 + 0.0 + -0.6 + 19.8 = 20.6 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 1.4 + 0.0 + 0.0 + -0.6 + 19.8 = 20.6 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P =* 0.9 + 0.0 + 0.0 - 0.4 + 13.2 = 13.7 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{20.6 - 0.0}{13.7} = 1.50 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{20.6 - 0.0}{13.7} = 1.50 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =3.00 / 2 - 1.50 = 0.00 ft

Z-ecc = *Width / 2 - Zp =* 3.00 / 2 - 1.50 = 0.00 ft

Area = *Width * Length =* 3.00 * 3.00 = 9.0 ft²

Sx = *Length * Width² / 6 =* 3.00 * 3.00² / 6 = 4.5 ft³

Sz = *Width * Length² / 6 =* 3.00 * 3.00² / 6 = 4.5 ft³

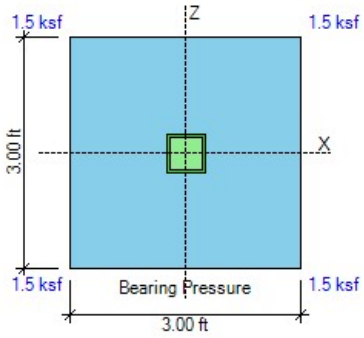
- Footing is in full bearing. Soil pressures are as follows:

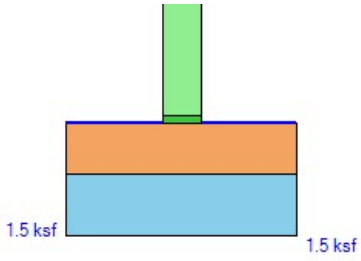
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz) =* 13.7 * (1 / 9.0 + 0.00 / 4.5 + 0.00 / 4.5) = 1.53 ksf

P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz) =* 13.7 * (1 / 9.0 - 0.00 / 4.5 + 0.00 / 4.5) = 1.53 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz) =* 13.7 * (1 / 9.0 - 0.00 / 4.5 - 0.00 / 4.5) = 1.53 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz) =* 13.7 * (1 / 9.0 + 0.00 / 4.5 - 0.00 / 4.5) = 1.53 ksf





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 3.00 = 0.3 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 3.00 = 0.3 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 5.1 * 0.35) = 1.8 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.3 + 1.00 * 1.8}{0.0}$ = 21.08 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.3 + 1.00 * 1.8}{0.0}$ = 21.08 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.5 + 0.0 - 0.2}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

Use Plain Concrete Shear Strength

ϕVcx = *4/3 * ϕ * √(f'c) * Width * t / 1000* = 4/3 * 0.60 * √(2500) * 3.0 * 12 * 8.0 / 1000 = 11.5 kip ACI 14.5.5.1

ϕVcz = *4/3 * ϕ * √(f'c) * Length * t / 1000* = 4/3 * 0.60 * √(2500) * 3.0 * 12 * 8.0 / 1000 = 11.5 kip

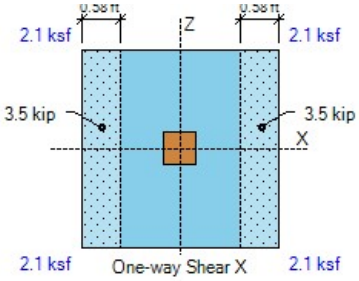
- Shear forces calculated as the volume of the bearing pressures under the effective areas:

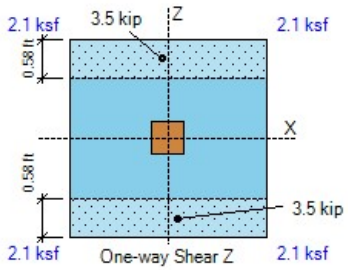
One-way shear Vux (- Side) = 3.5 kip < 11.5 kip OK

One-way shear Vux (+ Side) = 3.5 kip < 11.5 kip OK

One-way shear Vuz (- Side) = 3.5 kip < 11.5 kip OK

One-way shear Vuz (+ Side) = 3.5 kip < 11.5 kip OK





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 3.00 * 8.0² / 6 / 1000 = 1.3 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 3.00 * 8.0² / 6 / 1000 = 1.3 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 4.8 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 4.8 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 4.8 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 4.8 k-ft OK

- Bottom Bars

No Bottom Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Bottom

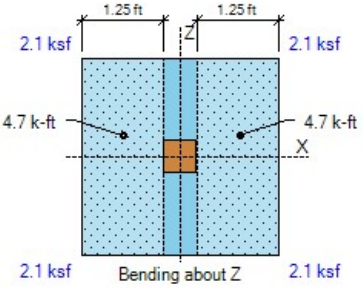
- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

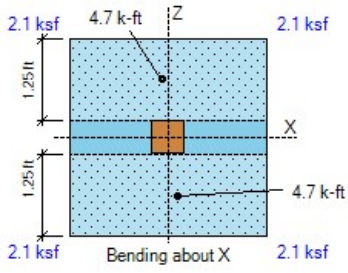
Bottom moment Mux (- Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.97

Bottom moment Mux (+ Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.98

Bottom moment Muz (- Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.97

Bottom moment Muz (+ Side) = 4.7 k-ft < 4.8 k-ft OK ratio = 0.98





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W =* 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6 =* 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6 =* 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz =* 17.9 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.5 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (3.00 * 12 / 2 - 0.0 - 6.0 / 2, 3.00 * 12 / 2 - 0.0 - 6.0 / 2 = 15.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [3.00 * 12 * 3.0 * 12, (6.0 + 2 * 15.0) * (6.0 + 2 * 15.0)] = 1296.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)] =* 0.65 * 0.85 * 2.5 * Min [2, √(1296.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1 =* 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns =* 2.8 + 0.0 = 2.8 ksi > 0.5 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.09) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 15.5 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *Length / 2 - Offset - Col / 2* = 3.00 * 12 / 2 - 0.0 - 6.0 / 2 = 15.0 in αsx = 10

Z-Edge = *Width / 2 - Offset - Col / 2* = 3.00 * 12 / 2 - 0.0 - 6.0 / 2 = 15.0 in αsz = 10

αs = *αsx + αsz* = 10 + 10 = 20 Col type = Corner β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 10 / 10 * (6.0 + 8.0 / 2 + 15.0) + 10 / 10 * (6.0 + 8.0 / 2 + 15.0) = 50.0 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 8.0 / 2 + 15.0) * (6.0 + 8.0 / 2 + 15.0) = 625.0 in²

Use Plain Concrete Shear Strength

ϕVc = *ϕ * Min (1 + 2 / β, 2) * 4/3 * √(f'c)* ACI 14.5.5.1

ϕVc = 0.60 * Min (1 + 2 / 1.00, 2) * 4/3 √(2500) = 80.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 17.9 + 0.07 * 625.0 / 144 - 2.8 = 15.4 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 8.0 / 2 + 15.0 = 25.0 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 8.0 / 2 + 15.0 = 25.0 in

γvx factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(25.0 / 25.0)}} = 0.40$ ACI Eq. (8.4.4.2.2)

γvz factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(25.0 / 25.0)}} = 0.40$ ACI Eq. (8.4.2.3.2)

X2z = *b1² / 2 / (b1 + b2)* = 25.0² / 2 / (25.0 + 25.0) = 6.3 in X2x = *b2² / 2 / (b2 + b1)* = 6.3 in

Jcz = *b1 * d³ / 12 + b1³ * d / 12 + b1 * d * (b1 / 2 - X2z)² + b2 * d * X2z²* ACI R8.4.4.2.3

Jcz = 25.0 * 8.0³ / 12 + 25.0³ * 8.0 / 12 + 25.0 * 8.0 * (25.0 / 2 * 6.3)² + 25.0 * 8.0 * 6.3² = 27108 in⁴

Jcx = *b2 * d³ / 12 + b2³ * d / 12 + b2 * d * (b2 / 2 - X2x)² + b1 * d * X2x²* ACI R8.4.4.2.3

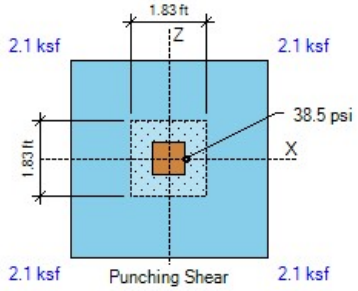
Jcz = 25.0 * 8.0³ / 12 + 25.0³ * 8.0 / 12 + 25.0 * 8.0 * (25.0 / 2 * 6.3)² + 25.0 * 8.0 * 6.3² = 27108 in⁴

Stress due to P = *F / (bo * d) * 1000* = 15.4 / (50.0 * 8.0) * 1000 = 38.5 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.40 * 0.0 * 12 * 6.3 / 27108 * 1000 = 0.0 psi

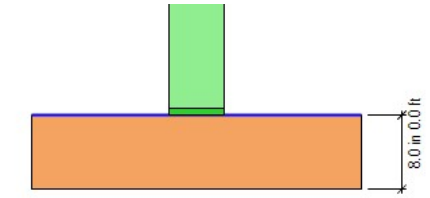
Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.40 * 0.0 * 12 * 6.3 / 27108 * 1000 = 0.0 psi

Punching stress = *P-stress + Mx-stress + Mz-stress* = 38.5 + 0.0 + 0.0 = 38.5 psi < 80.0 psi OK

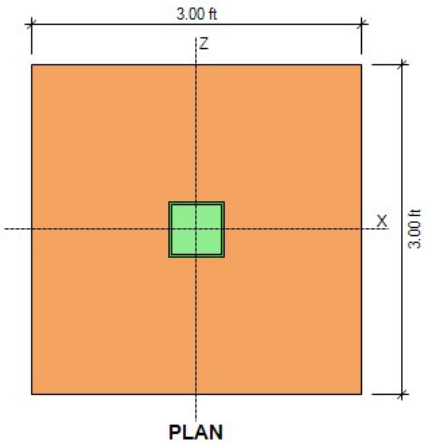


DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16



ELEVATION



PLAN

Project: Page # ___
Engineer: 1/11/2024
Descrip: Grid 9G Footing

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	3.50	ft	
Footing Width (Z-dir)	3.50	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	1.8	ksf	
Soil Pressure at Corner 2	1.8	ksf	
Soil Pressure at Corner 3	1.8	ksf	
Soil Pressure at Corner 4	1.8	ksf	
Bearing Pressure Ratio	0.89		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	5.2	16.0	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip
  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip
  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip
  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip
  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip
  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft
- Axial force P = 0.6 * 5.2 + 0.6 * 0.0 = 3.1 kip
  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 3.1 * 1.75 = 5.5 k-ft
- Resisting moment X-X = 1.3 + 0.0 + 0.0 + 5.5 + -0.5 = 6.2 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{6.2}{0.0}$ = 62.11 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft

- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density* = 0.6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

Arm = *L / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft

- Axial force P = 0.6 * 5.2 + 0.6 * 0.0 = 3.1 kip

Arm = *L / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 3.1 * 1.75 = 5.5 k-ft

- Resisting moment Z-Z = 1.3 + 0.0 + 0.0 + 5.5 + -0.5 = 6.2 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{6.2}{0.0}$ = 62.11 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 2.1 + 0.0 + 0.0 + -0.9 + 37.1 = 38.4 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 2.1 + 0.0 + 0.0 + -0.9 + 37.1 = 38.4 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P* = 1.2 + 0.0 + 0.0 - 0.5 + 21.2 = 21.9 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{38.4 - 0.0}{21.9} = 1.75 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{38.4 - 0.0}{21.9} = 1.75 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =3.50 / 2 - 1.75 = 0.00 ft

Z-ecc = *Width / 2 - Zp* = 3.50 / 2 - 1.75 = 0.00 ft

Area = *Width * Length* = 3.50 * 3.50 = 12.3 ft²

Sx = *Length * Width² / 6* = 3.50 * 3.50² / 6 = 7.1 ft³

Sz = *Width * Length² / 6* = 3.50 * 3.50² / 6 = 7.1 ft³

- Footing is in full bearing. Soil pressures are as follows:

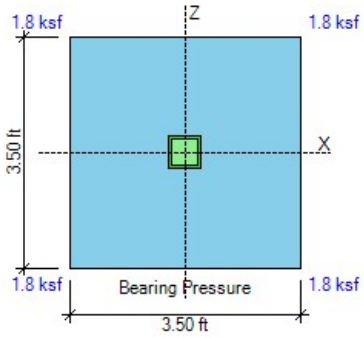
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz)* = 21.9 * (1 / 12.3 + 0.00 / 7.1 + 0.00 / 7.1) = 1.79 ksf

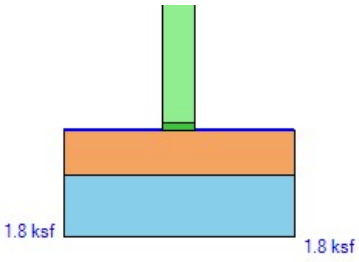
P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz)* = 21.9 * (1 / 12.3 - 0.00 / 7.1 + 0.00 / 7.1) = 1.79 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz)* = 21.9 * (1 / 12.3 - 0.00 / 7.1 - 0.00 / 7.1) = 1.79 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz)* = 21.9 * (1 / 12.3 + 0.00 / 7.1 - 0.00 / 7.1) = 1.79 ksf

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 3.5 * 0.35) = 1.2 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.2}{0.0}$ = 16.12 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.2}{0.0}$ = 16.12 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.7 + 0.0 - 0.3}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

d Top X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 2.0 - 0.8 / 2 = 5.6 in

d Top Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 2.0 - 0.8 - 0.8 / 2 = 4.9 in

d Bot X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 3.0 - 0.5 / 2 = 4.8 in

d Bot Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 3.0 - 0.5 - 0.5 / 2 = 4.3 in

$\phi Vcx = 2 * \phi * \sqrt{f'c} * Width * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.8 / 1000 = 15.0 kip ACI Eq. (22.5.5.1)

$\phi Vcz = 2 * \phi * \sqrt{f'c} * Length * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.3 / 1000 = 13.4 kip

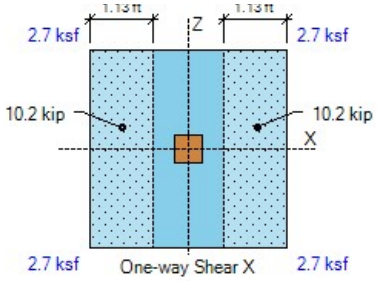
- Shear forces calculated as the volume of the bearing pressures under the effective areas:

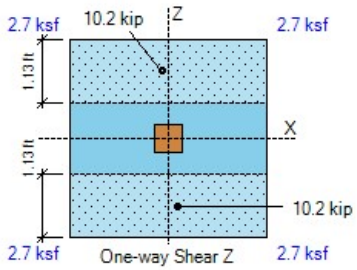
One-way shear Vux (- Side) = 10.2 kip < 15.0 kip OK

One-way shear Vux (+ Side) = 10.2 kip < 15.0 kip OK

One-way shear Vuz (- Side) = 10.2 kip < 13.4 kip OK

One-way shear Vuz (+ Side) = 10.2 kip < 13.4 kip OK





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 5.6 k-ft OK

- Bottom Bars

Use 5 #4 Z-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.3) = 0.0056 q = 0.0056 * 40 / 2.5 = 0.090

Use 5 #4 X-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.8) = 0.0050 q = 0.0050 * 40 / 2.5 = 0.080

β = L / W = 3.50 / 3.50 = 1.00 *γs = 2 * β / (β + 1)* = 2 * 1.00 / (1.00 + 1) = 1.00 ACI 13.3.3.3

Bending strength *ϕMn = ϕ * b * d² * f'c * q * (1 - 0.59 * q)* ACI 22.2.2

ϕMnx = 0.90 * 3.50 * 12 * 4.3² * 2.5 * 0.090 * (1 - 0.59 * 0.090) = 12.1 k-ft

ϕMnz = 0.90 * 3.50 * 12 * 4.8² * 2.5 * 0.080 / 1.00 * (1 - 0.59 * 0.080 / 1.00) = 13.6 k-ft

- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

Bottom moment Mux (- Side) = 10.3 k-ft < 12.1 k-ft OK ratio = 0.85

Bottom moment Mux (+ Side) = 10.3 k-ft < 12.1 k-ft OK ratio = 0.85

Bottom moment Muz (- Side) = 10.3 k-ft < 13.6 k-ft OK ratio = 0.76

Bottom moment Muz (+ Side) = 10.3 k-ft < 13.6 k-ft OK ratio = 0.76

X-As min = *0.0018 * Width * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

Z-As min = *0.0018 * Length * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

X-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

Z-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

X-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *X-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

X-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.76) = 12.0 in

Hooked *X-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

X-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.76) = 6.0 in

-X Ld provided = *(Length - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+X Ld provided = *(Length - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

Z-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *Z-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

Z-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.76) = 12.0 in

Hooked *Z-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

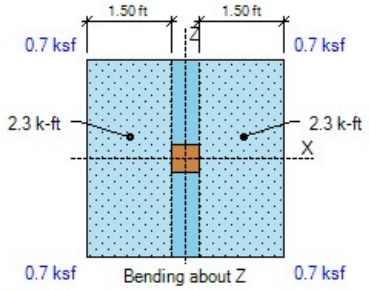
Z-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.85) = 6.0 in

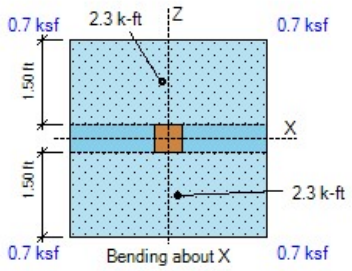
-Z Ld provided = *(Width - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+Z Ld provided = *(Width - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

X-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK ACI 7.7.2.3

Z-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W* = 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz* = 31.8 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.9 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (3.50 * 12 / 2 - 0.0 - 6.0 / 2, 3.50 * 12 / 2 - 0.0 - 6.0 / 2 = 18.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [3.50 * 12 * 3.5 * 12, (6.0 + 2 * 18.0) * (6.0 + 2 * 18.0)] = 1764.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)]* = 0.65 * 0.85 * 2.5 * Min [2, √(1764.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1* = 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns* = 2.8 + 0.0 = 2.8 ksi > 0.9 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.15) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 27.5 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *d /2* = 4.5 / 2 = 2.3 in αsx = 20

Z-Edge = *d /2* = 4.5 / 2 = 2.3 in αsz = 20

αs = *αsx + αsz* = 20 + 20 = 40 Col type = Interior β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 20 / 10 * (6.0 + 4.5 / 2 + 2.3) + 20 / 10 * (6.0 + 4.5 / 2 + 2.3) = 42.0 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 4.5 / 2 + 2.3) * (6.0 + 4.5 / 2 + 2.3) = 110.3 in²

ϕVc = *ϕ * Min (2 + 4 / β, αs * d / bo + 2, 4) * √(f'c)* ACI 22.6.5.2

ϕVc = 0.75 * Min (2 + 4 / 1.00, 40 * 4.5 / 42.0 + 2, 4) * √(2500) = 150.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 31.8 + 0.07 * 110.3 / 144 - 2.0 = 29.9 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in

γvx factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.4.2.2)

γvz factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.2.3.2)

X2z = *b1 / 2* = 10.5 / 2 = 5.3 in X2x = *b2 / 2* = 10.5 / 2 = 5.3 in

Jcz = *b1 * d³ / 6 + b1³ * d / 6 + b1² * b2 * d / 2* ACI R8.4.4.2.3

Jcz = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Jcx = *b2 * d³ / 6 + b2³ * d / 6 + b2² * b1 * d / 2* ACI R8.4.4.2.3

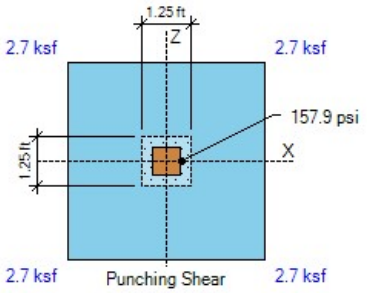
Jcx = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Stress due to P = *F / (bo * d) * 1000* = 29.9 / (42.0 * 4.5) * 1000 = 157.9 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

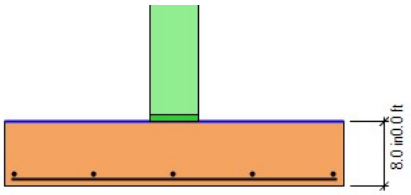
Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

Punching stress = *P-stress + Mx-stress + Mz-stress* = 157.9 + 0.0 + 0.0 = 157.9 psi > 150.0 psi NG

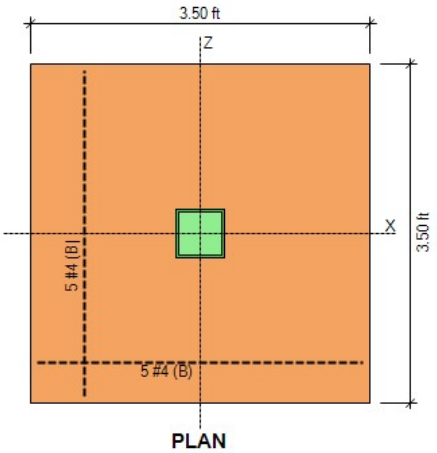


DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16



ELEVATION



PLAN

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	3.50	ft	
Footing Width (Z-dir)	3.50	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	1.5	ksf	
Soil Pressure at Corner 2	1.5	ksf	
Soil Pressure at Corner 3	1.5	ksf	
Soil Pressure at Corner 4	1.5	ksf	
Bearing Pressure Ratio	0.77		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	4.4	13.7	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

  Arm = *W / 2* = 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft
- Axial force P = 0.6 * 4.4 + 0.6 * 0.0 = 2.6 kip

  Arm = *W / 2 - Offset* = 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 2.6 * 1.75 = 4.6 k-ft
- Resisting moment X-X = 1.3 + 0.0 + 0.0 + 4.6 + -0.5 = 5.4 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{5.4}{0.0}$ = 53.71 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density =* 0.6 * 3.50 * 3.50 * 8.0 / 12 * 0.15 = 0.7 kip

Arm = *L / 2 =* 3.50 / 2 = 1.75 ft Moment = 0.7 * 1.75 = 1.3 k-ft

- Pedestal weight = *0.6 * W * L * H * Density =* 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset =* 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density =* 0.6 * (3.50 * 3.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2 =* 3.50 / 2 = 1.75 ft Moment = 0.0 * 1.75 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT) =* 0.6 * 3.50 * 3.50 * 62 * (0.67) = -0.3 kip

Arm = *L / 2 =* 3.50 / 2 = 1.75 ft Moment = 0.3 * 1.75 = -0.5 k-ft

- Axial force P = 0.6 * 4.4 + 0.6 * 0.0 = 2.6 kip

Arm = *L / 2 - Offset =* 3.50 / 2 - 0.0 / 12 = 1.75 ft Moment = 2.6 * 1.75 = 4.6 k-ft

- Resisting moment Z-Z = 1.3 + 0.0 + 0.0 + 4.6 + -0.5 = 5.4 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{5.4}{0.0}$ = 53.71 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 2.1 + 0.0 + 0.0 + -0.9 + 31.7 = 32.9 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 2.1 + 0.0 + 0.0 + -0.9 + 31.7 = 32.9 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P =* 1.2 + 0.0 + 0.0 - 0.5 + 18.1 = 18.8 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{32.9 - 0.0}{18.8} = 1.75 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{32.9 - 0.0}{18.8} = 1.75 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =3.50 / 2 - 1.75 = 0.00 ft

Z-ecc = *Width / 2 - Zp =* 3.50 / 2 - 1.75 = 0.00 ft

Area = *Width * Length =* 3.50 * 3.50 = 12.3 ft²

Sx = *Length * Width² / 6 =* 3.50 * 3.50² / 6 = 7.1 ft³

Sz = *Width * Length² / 6 =* 3.50 * 3.50² / 6 = 7.1 ft³

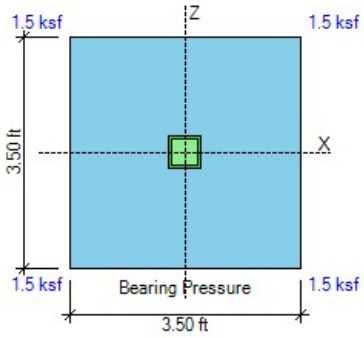
- Footing is in full bearing. Soil pressures are as follows:

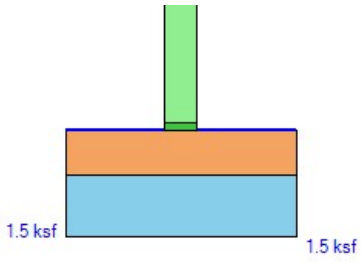
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz) =* 18.8 * (1 / 12.3 + 0.00 / 7.1 + 0.00 / 7.1) = 1.54 ksf

P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz) =* 18.8 * (1 / 12.3 - 0.00 / 7.1 + 0.00 / 7.1) = 1.54 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz) =* 18.8 * (1 / 12.3 - 0.00 / 7.1 - 0.00 / 7.1) = 1.54 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz) =* 18.8 * (1 / 12.3 + 0.00 / 7.1 - 0.00 / 7.1) = 1.54 ksf





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 3.50 = 0.4 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 3.1 * 0.35) = 1.1 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.1}{0.0}$ = 14.44 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.4 + 1.00 * 1.1}{0.0}$ = 14.44 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.7 + 0.0 - 0.3}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

d Top X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 2.0 - 0.8 / 2 = 5.6 in

d Top Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 2.0 - 0.8 - 0.8 / 2 = 4.9 in

d Bot X-dir = *Thick - Cover - X-diameter / 2* = 8.0 - 3.0 - 0.5 / 2 = 4.8 in

d Bot Z-dir = *Thick - Cover - X-diameter - Z-diameter / 2* = 8.0 - 3.0 - 0.5 - 0.5 / 2 = 4.3 in

$\phi Vcx = 2 * \phi * \sqrt{f'c} * Width * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.8 / 1000 = 15.0 kip ACI Eq. (22.5.5.1)

$\phi Vcz = 2 * \phi * \sqrt{f'c} * Length * d / 1000$ = 2 * 0.75 * √(2500) * 3.5 * 12 * 4.3 / 1000 = 13.4 kip

- Shear forces calculated as the volume of the bearing pressures under the effective areas:

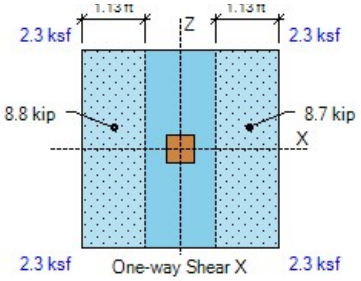
One-way shear Vux (- Side) = 8.8 kip < 15.0 kip OK

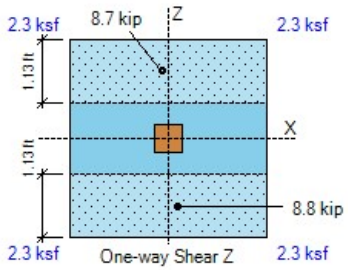
One-way shear Vux (+ Side) = 8.7 kip < 15.0 kip OK

One-way shear Vuz (- Side) = 8.8 kip < 13.4 kip OK

One-way shear Vuz (+ Side) = 8.7 kip < 13.4 kip OK

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 3.50 * 8.0² / 6 / 1000 = 1.5 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 5.6 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 5.6 k-ft OK

- Bottom Bars

Use 5 #4 Z-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.3) = 0.0056 q = 0.0056 * 40 / 2.5 = 0.090

Use 5 #4 X-Bars *ρ = As / b d* = 1.0 / (3.50 * 12 * 4.8) = 0.0050 q = 0.0050 * 40 / 2.5 = 0.080

β = L / W = 3.50 / 3.50 = 1.00 *γs = 2 * β / (β + 1)* = 2 * 1.00 / (1.00 + 1) = 1.00 ACI 13.3.3.3

Bending strength *ϕMn = ϕ * b * d² * f'c * q * (1 - 0.59 * q)* ACI 22.2.2

ϕMnx = 0.90 * 3.50 * 12 * 4.3² * 2.5 * 0.090 * (1 - 0.59 * 0.090) = 12.1 k-ft

ϕMnz = 0.90 * 3.50 * 12 * 4.8² * 2.5 * 0.080 / 1.00 * (1 - 0.59 * 0.080 / 1.00) = 13.6 k-ft

- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

Bottom moment Mux (- Side) = 8.8 k-ft < 12.1 k-ft OK ratio = 0.73

Bottom moment Mux (+ Side) = 8.8 k-ft < 12.1 k-ft OK ratio = 0.73

Bottom moment Muz (- Side) = 8.8 k-ft < 13.6 k-ft OK ratio = 0.65

Bottom moment Muz (+ Side) = 8.8 k-ft < 13.6 k-ft OK ratio = 0.65

X-As min = *0.0018 * Width * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

Z-As min = *0.0018 * Length * Thick* = 0.0018 * 3.50 * 12 * 8.0 = 0.6 in² < 1.0 in² OK ACI 8.6.1.1

X-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

Z-As max for 0.005 tension strain = 3.20 in² > 1.00 in² OK ACI 21.2.2

X-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *X-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

X-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.65) = 12.0 in

Hooked *X-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

X-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.65) = 6.0 in

-X Ld provided = *(Length - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+X Ld provided = *(Length - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

Z-Cover factor = *Min (2.5, (Cover + db /2, Spacing / 2) / db)* = Min (2.5, (3.0 + 0.50 / 2, 9.0 / 2) / 0.50) = 2.5

Straight *Z-Ld = Max (12.0, 3 / 40 * fy / (f'c)½ * Grade * Size * Casting / Cover * db * ratio)* ACI Eq. (25.4.2.3a)

Z-Ld = Max (12.0, 3 / 40 * 40.0 * 1000 / (2500)½ * 1.0 * 0.8 * 1.0 / 2.5 * 0.50 * 0.65) = 12.0 in

Hooked *Z-Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* = ACI 25.4.3

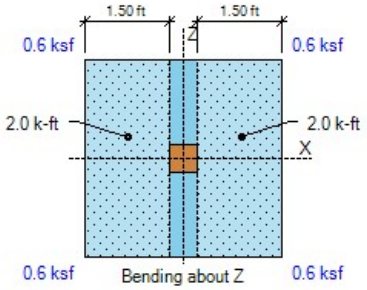
Z-Ldh = Max (8 db, 6, 0.02 * 40.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.50 * 0.73) = 6.0 in

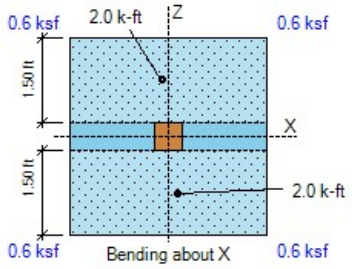
-Z Ld provided = *(Width - Col) / 2 + Offset - Cover* = 3.50 * 12 / 2 + 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

+Z Ld provided = *(Width - Col) / 2 - Offset - Cover* = 3.50 * 12 / 2 - 0.0 - 6.0 / 2 - 2.5 = 15.5 in > 12.0 in OK

X-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK ACI 7.7.2.3

Z-bar spacing = 9.0 in < Min (3 * t, 18.0) = 18.0 in OK





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W* = 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6* = 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz* = 27.2 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.8 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (3.50 * 12 / 2 - 0.0 - 6.0 / 2, 3.50 * 12 / 2 - 0.0 - 6.0 / 2 = 18.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [3.50 * 12 * 3.5 * 12, (6.0 + 2 * 18.0) * (6.0 + 2 * 18.0)] = 1764.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)]* = 0.65 * 0.85 * 2.5 * Min [2, √(1764.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1* = 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns* = 2.8 + 0.0 = 2.8 ksi > 0.8 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.13) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 23.5 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *d /2* = 4.5 / 2 = 2.3 in αsx = 20

Z-Edge = *d /2* = 4.5 / 2 = 2.3 in αsz = 20

αs = *αsx + αsz* = 20 + 20 = 40 Col type = Interior β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 20 / 10 * (6.0 + 4.5 / 2 + 2.3) + 20 / 10 * (6.0 + 4.5 / 2 + 2.3) = 42.0 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 4.5 / 2 + 2.3) * (6.0 + 4.5 / 2 + 2.3) = 110.3 in²

ϕVc = *ϕ * Min (2 + 4 / β, αs * d / bo + 2, 4) * √(f'c)* ACI 22.6.5.2

ϕVc = 0.75 * Min (2 + 4 / 1.00, 40 * 4.5 / 42.0 + 2, 4) * √(2500) = 150.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 27.2 + 0.07 * 110.3 / 144 - 1.8 = 25.5 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 4.5 / 2 + 2.3 = 10.5 in

γvx factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.4.2.2)

γvz factor = $1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(10.5 / 10.5)}} = 0.40$ ACI Eq. (8.4.2.3.2)

X2z = *b1 / 2* = 10.5 / 2 = 5.3 in X2x = *b2 / 2* = 10.5 / 2 = 5.3 in

Jcz = *b1 * d³ / 6 + b1³ * d / 6 + b1² * b2 * d / 2* ACI R8.4.4.2.3

Jcz = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Jcx = *b2 * d³ / 6 + b2³ * d / 6 + b2² * b1 * d / 2* ACI R8.4.4.2.3

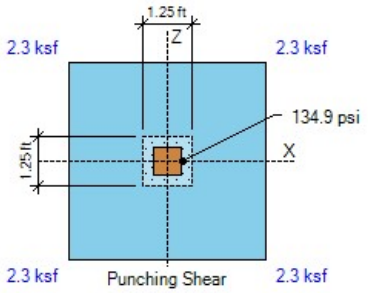
Jcx = 10.5 * 4.5³ / 6 + 10.5³ * 4.5 / 6 + 10.5² * 10.5 * 4.5 / 2 = 3632 in⁴

Stress due to P = *F / (bo * d) * 1000* = 25.5 / (42.0 * 4.5) * 1000 = 134.9 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

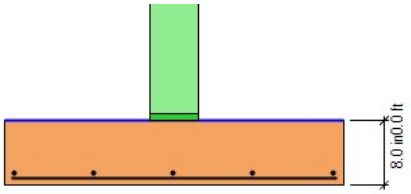
Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.40 * 0.0 * 12 * 5.3 / 3632 * 1000 = 0.0 psi

Punching stress = *P-stress + Mx-stress + Mz-stress* = 134.9 + 0.0 + 0.0 = 134.9 psi < 150.0 psi OK

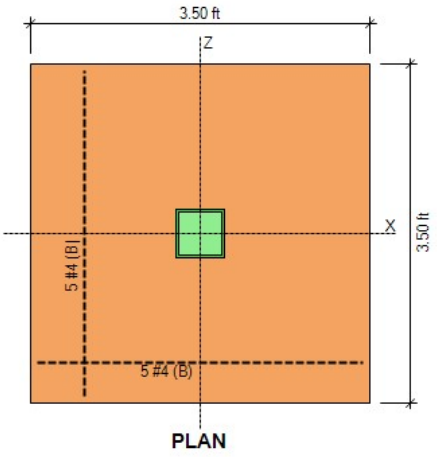


DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16



ELEVATION



PLAN

Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical exterior Footing 6,000# point load

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	2.00	ft	
Footing Width (Z-dir)	2.60	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	2.0	ksf	
Soil Pressure at Corner 2	2.0	ksf	
Soil Pressure at Corner 3	2.0	ksf	
Soil Pressure at Corner 4	2.0	ksf	
Bearing Pressure Ratio	0.99		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	4.5	5.5	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip
  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 2.60 * 2.00 * 8.0 / 12 * 0.15 = 0.3 kip
  Arm = *W / 2* = 2.60 / 2 = 1.30 ft Moment = 0.3 * 1.30 = 0.4 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip
  Arm = *W / 2 - Offset* = 2.60 / 2 - 0.0 / 12 = 1.30 ft Moment = 0.0 * 1.30 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (2.60 * 2.00 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip
  Arm = *W / 2* = 2.60 / 2 = 1.30 ft Moment = 0.0 * 1.30 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 2.60 * 2.00 * 62 * (0.67) = -0.1 kip
  Arm = *W / 2* = 2.60 / 2 = 1.30 ft Moment = 0.1 * 1.30 = -0.2 k-ft
- Axial force P = 0.6 * 4.5 + 0.6 * 0.0 = 2.7 kip
  Arm = *W / 2 - Offset* = 2.60 / 2 - 0.0 / 12 = 1.30 ft Moment = 2.7 * 1.30 = 3.5 k-ft
- Resisting moment X-X = 0.4 + 0.0 + 0.0 + 3.5 + -0.2 = 3.7 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{3.7}{0.0}$ = 37.47 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density =* 0.6 * 2.60 * 2.00 * 8.0 / 12 * 0.15 = 0.3 kip

Arm = *L / 2 =* 2.00 / 2 = 1.00 ft Moment = 0.3 * 1.00 = 0.3 k-ft

- Pedestal weight = *0.6 * W * L * H * Density =* 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset =* 2.00 / 2 - 0.0 / 12 = 1.00 ft Moment = 0.0 * 1.00 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density =* 0.6 * (2.60 * 2.00 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2 =* 2.00 / 2 = 1.00 ft Moment = 0.0 * 1.00 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT) =* 0.6 * 2.60 * 2.00 * 62 * (0.67) = -0.1 kip

Arm = *L / 2 =* 2.00 / 2 = 1.00 ft Moment = 0.1 * 1.00 = -0.1 k-ft

- Axial force P = 0.6 * 4.5 + 0.6 * 0.0 = 2.7 kip

Arm = *L / 2 - Offset =* 2.00 / 2 - 0.0 / 12 = 1.00 ft Moment = 2.7 * 1.00 = 2.7 k-ft

- Resisting moment Z-Z = 0.3 + 0.0 + 0.0 + 2.7 + -0.1 = 2.9 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{2.9}{0.0}$ = 28.82 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 0.7 + 0.0 + 0.0 + -0.3 + 13.0 = 13.4 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 0.5 + 0.0 + 0.0 + -0.2 + 10.0 = 10.3 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P =* 0.5 + 0.0 + 0.0 - 0.2 + 10.0 = 10.3 kip

X-coordinate of resultant from maximum bearing corner:

$$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{10.3 - 0.0}{10.3} = 1.00 \text{ ft}$$

Z-coordinate of resultant from maximum bearing corner:

$$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{13.4 - 0.0}{10.3} = 1.30 \text{ ft}$$

X-ecc = *Length / 2 - Xp* =2.00 / 2 - 1.00 = 0.00 ft

Z-ecc = *Width / 2 - Zp =* 2.60 / 2 - 1.30 = 0.00 ft

Area = *Width * Length =* 2.60 * 2.00 = 5.2 ft²

Sx = *Length * Width² / 6 =* 2.00 * 2.60² / 6 = 2.3 ft³

Sz = *Width * Length² / 6 =* 2.60 * 2.00² / 6 = 1.7 ft³

- Footing is in full bearing. Soil pressures are as follows:

P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz) =* 10.3 * (1 / 5.2 + 0.00 / 2.3 + 0.00 / 1.7) = 1.98 ksf

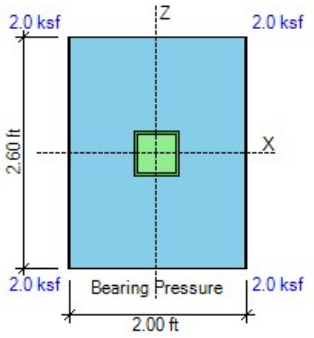
P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz) =* 10.3 * (1 / 5.2 - 0.00 / 2.3 + 0.00 / 1.7) = 1.98 ksf

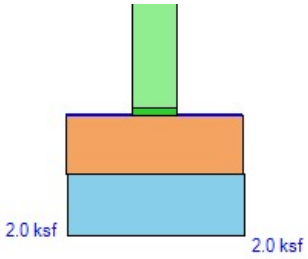
P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz) =* 10.3 * (1 / 5.2 - 0.00 / 2.3 - 0.00 / 1.7) = 1.98 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz) =* 10.3 * (1 / 5.2 + 0.00 / 2.3 - 0.00 / 1.7) = 1.98 ksf

Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical exterior Footing 6,000# point load

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 2.60 = 0.3 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 2.00 = 0.2 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 2.9 * 0.35) = 1.0 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.3 + 1.00 * 1.0}{0.0}$ = 12.84 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.2 + 1.00 * 1.0}{0.0}$ = 12.20 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.3 + 0.0 - 0.1}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

Use Plain Concrete Shear Strength

ϕVcx = *4/3 * ϕ * √(f'c) * Width * t / 1000* = 4/3 * 0.60 * √(2500) * 2.6 * 12 * 8.0 / 1000 = 10.0 kip ACI 14.5.5.1

ϕVcz = *4/3 * ϕ * √(f'c) * Length * t / 1000* = 4/3 * 0.60 * √(2500) * 2.0 * 12 * 8.0 / 1000 = 7.7 kip

- Shear forces calculated as the volume of the bearing pressures under the effective areas:

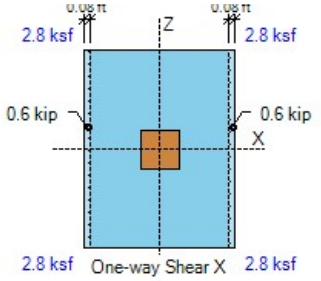
One-way shear Vux (- Side) = 0.6 kip < 10.0 kip OK

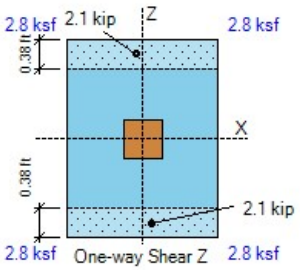
One-way shear Vux (+ Side) = 0.6 kip < 10.0 kip OK

One-way shear Vuz (- Side) = 2.1 kip < 7.7 kip OK

One-way shear Vuz (+ Side) = 2.1 kip < 7.7 kip OK

Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical exterior Footing 6,000# point load





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 2.00 * 8.0² / 6 / 1000 = 0.9 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 2.60 * 8.0² / 6 / 1000 = 1.1 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 3.2 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 3.2 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 4.2 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 4.2 k-ft OK

- Bottom Bars

No Bottom Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Bottom

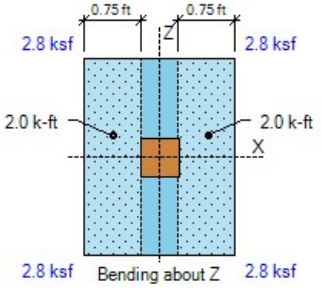
- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

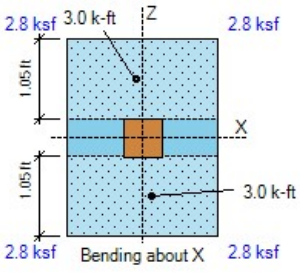
Bottom moment Mux (- Side) = 3.0 k-ft < 3.2 k-ft OK ratio = 0.94

Bottom moment Mux (+ Side) = 3.0 k-ft < 3.2 k-ft OK ratio = 0.94

Bottom moment Muz (- Side) = 2.0 k-ft < 4.2 k-ft OK ratio = 0.48

Bottom moment Muz (+ Side) = 2.0 k-ft < 4.2 k-ft OK ratio = 0.48





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area $A1 = col\ L * col\ W =$ 6.0 * 6.0 = 36.0 in²

Sx = $col\ W * col\ L^2 / 6 =$ 6.0 * 6.0² / 6 = 36.0 in³

Sz = $col\ L * col\ W^2 / 6 =$ 6.0 * 6.0² / 6 = 36.0 in³

Bearing $Pbu = P / A1 + Mz / Sx + Mx / Sz =$ 14.2 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.4 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (2.00 * 12 / 2 - 0.0 - 6.0 / 2, 2.60 * 12 / 2 - 0.0 - 6.0 / 2 = 9.0 in

Area $A2 = Min [L * W, (col\ L + 2 * Min\ edge) * (col\ W + 2 * Min\ edge)]$ ACI R22.8.3.2

A2 = Min [2.00 * 12 * 2.6 * 12, (6.0 + 2 * 9.0) * (6.0 + 2 * 9.0)] = 576.0 in²

Footing $\phi Pnc = \phi * 0.85 * f'c * Min [2, \sqrt{(A2 / A1)}] =$ 0.65 * 0.85 * 2.5 * Min [2, √(576.0 / 36.0)] = 2.8 ksi

Footing $\phi Pns = \phi * As * Fy / A1 =$ 0.0 ksi ACI 22.8.3.2

Footing bearing $\phi Pn = \phi Pnc + \phi Pns =$ 2.8 + 0.0 = 2.8 ksi > 0.4 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.07) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 12.3 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *Length / 2 - Offset - Col / 2* = 2.00 * 12 / 2 - 0.0 - 6.0 / 2 = 9.0 in αsx = 10

Z-Edge = *Width / 2 - Offset - Col / 2* = 2.60 * 12 / 2 - 0.0 - 6.0 / 2 = 12.6 in αsz = 10

αs = *αsx + αsz* = 10 + 10 = 20 Col type = Corner β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 10 / 10 * (6.0 + 8.0 / 2 + 9.0) + 10 / 10 * (6.0 + 8.0 / 2 + 12.6) = 41.6 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 8.0 / 2 + 9.0) * (6.0 + 8.0 / 2 + 12.6) = 429.4 in²

Use Plain Concrete Shear Strength

ϕVc = *ϕ * Min (1 + 2 / β, 2) * 4/3 * √(f'c)* ACI 14.5.5.1

ϕVc = 0.60 * Min (1 + 2 / 1.00, 2) * 4/3 √(2500) = 80.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 14.2 + 0.07 * 429.4 / 144 - 3.8 = 10.6 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 8.0 / 2 + 9.0 = 19.0 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 8.0 / 2 + 12.6 = 22.6 in

$$\gamma vx \text{ factor} = 1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(22.6 / 19.0)}} = 0.42$$ ACI Eq. (8.4.4.2.2)

$$\gamma vz \text{ factor} = 1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(19.0 / 22.6)}} = 0.38$$ ACI Eq. (8.4.2.3.2)

X2z = $b1^2 / 2 / (b1 + b2)$ = 19.0² / 2 / (19.0 + 22.6) = 4.3 in X2x = $b2^2 / 2 / (b2 + b1)$ = 6.1 in

Jcz = $b1 * d^3 / 12 + b1^3 * d / 12 + b1 * d * (b1 / 2 - X2z)^2 + b2 * d * X2z^2$ ACI R8.4.4.2.3

Jcz = 19.0 * 8.0³ / 12 + 19.0³ * 8.0 / 12 + 19.0 * 8.0 * (19.0 / 2 * 4.3)² + 22.6 * 8.0 * 4.3² = 12836 in⁴

Jcx = $b2 * d^3 / 12 + b2^3 * d / 12 + b2 * d * (b2 / 2 - X2x)^2 + b1 * d * X2x^2$ ACI R8.4.4.2.3

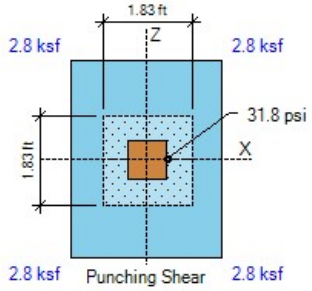
Jcz = 22.6 * 8.0³ / 12 + 22.6³ * 8.0 / 12 + 22.6 * 8.0 * (22.6 / 2 * 6.1)² + 19.0 * 8.0 * 6.1² = 19204 in⁴

Stress due to P = *F / (bo * d) * 1000* = 10.6 / (41.6 * 8.0) * 1000 = 31.8 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.42 * 0.0 * 12 * 6.1 / 19204 * 1000 = 0.0 psi

Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.42 * 0.0 * 12 * 4.3 / 12836 * 1000 = 0.0 psi

Punching stress = *P-stress + Mx-stress + Mz-stress* = 31.8 + 0.0 + 0.0 = 31.8 psi < 80.0 psi OK



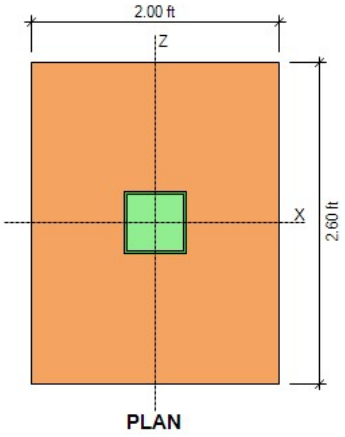
Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical exterior Footing 6,000# point load

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16

ELEVATION



PLAN

Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical Interior Footing 6,500# point load

ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

GEOMETRY

Footing Length (X-dir)	1.50	ft	
Footing Width (Z-dir)	2.60	ft	
Footing Thickness	8.0	in	OK
Soil Cover	0.00	ft	
Column Length (X-dir)	6.0	in	
Column Width (Z-dir)	6.0	in	
Offset (X-dir)	0.00	in	OK
Offset (Z-dir)	0.00	in	OK
Base Plate (L x W)	6.0 x 6.0	in	

SOIL PRESSURES (D+L)

Gross Allow. Soil Pressure	2.0	ksf	
Soil Pressure at Corner 1	2.0	ksf	
Soil Pressure at Corner 2	2.0	ksf	
Soil Pressure at Corner 3	2.0	ksf	
Soil Pressure at Corner 4	2.0	ksf	
Bearing Pressure Ratio	0.99		OK
Ftg. Area in Contact with Soil	100.0	%	
X-eccentricity / Ftg. Length	0.00		OK
Z-eccentricity / Ftg. Width	0.00		OK

APPLIED LOADS

	Dead	Live	RLive	Snow	Wind	Seismic	
Axial Force P	3.0	4.5	0.0	0.0	0.0	0.0	kip
Moment about X Mx ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Moment about Z Mz ..	0.0	0.0	0.0	0.0	0.0	0.0	k-ft
Shear Force Vx	0.0	0.0	0.0	0.0	0.0	0.0	kip
Shear Force Vz	0.0	0.0	0.0	0.0	0.0	0.0	kip

OVERTURNING CALCULATIONS (Comb: 0.6D+0.6W)

- Overturning about X-X
- Moment Mx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft
- Shear Force Vz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

  Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft
- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft
- Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

- Resisting about X-X
- Footing weight = *0.6 * W * L * Thick * Density* = 0.6 * 2.60 * 1.50 * 8.0 / 12 * 0.15 = 0.2 kip

  Arm = *W / 2* = 2.60 / 2 = 1.30 ft Moment = 0.2 * 1.30 = 0.3 k-ft
- Pedestal weight = *0.6 * W * L * H * Density* = 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

  Arm = *W / 2 - Offset* = 2.60 / 2 - 0.0 / 12 = 1.30 ft Moment = 0.0 * 1.30 = 0.0 k-ft
- Soil cover = *0.6 * W * L * SC * Density* 0=6 * (2.60 * 1.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

  Arm = *W / 2* = 2.60 / 2 = 1.30 ft Moment = 0.0 * 1.30 = 0.0 k-ft
- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT)* = 0.6 * 2.60 * 1.50 * 62 * (0.67) = -0.1 kip

  Arm = *W / 2* = 2.60 / 2 = 1.30 ft Moment = 0.1 * 1.30 = -0.1 k-ft
- Axial force P = 0.6 * 3.0 + 0.6 * 0.0 = 1.8 kip

  Arm = *W / 2 - Offset* = 2.60 / 2 - 0.0 / 12 = 1.30 ft Moment = 1.8 * 1.30 = 2.3 k-ft
- Resisting moment X-X = 0.3 + 0.0 + 0.0 + 2.3 + -0.1 = 2.5 k-ft
- Overturning safety factor X-X = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{2.5}{0.0}$ = 25.18 > 1.50 OK

- Overturning about Z-Z

- Moment Mz = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 k-ft

- Shear Force Vx = 0.6 * 0.0 + 0.6 * 0.0 = 0.0 kip

Arm = 0.00 + 8.0 / 12 = 0.67 ft Moment = 0.0 * 0.67 = 0.0 k-ft

- Passive Force = 0.0 kip Arm = 0.27 ft Moment = 0.0 k-ft

- Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

- Resisting about Z-Z

- Footing weight = *0.6 * W * L * Thick * Density =* 0.6 * 2.60 * 1.50 * 8.0 / 12 * 0.15 = 0.2 kip

Arm = *L / 2 =* 1.50 / 2 = 0.75 ft Moment = 0.2 * 0.75 = 0.2 k-ft

- Pedestal weight = *0.6 * W * L * H * Density =* 0.6 * 6.0 / 12 * 6.0 / 12 * 0.0 * 0.15 = 0.0 kip

Arm = *L / 2 - Offset =* 1.50 / 2 - 0.0 / 12 = 0.75 ft Moment = 0.0 * 0.75 = 0.0 k-ft

- Soil cover = *0.6 * W * L * SC * Density =* 0.6 * (2.60 * 1.50 - 6.0 / 12 * 6.0 / 12) * 0.0 * 110 = 0.0 kip

Arm = *L / 2 =* 1.50 / 2 = 0.75 ft Moment = 0.0 * 0.75 = 0.0 k-ft

- Buoyancy = *0.6 * W * L * γ * (SC + Thick - WT) =* 0.6 * 2.60 * 1.50 * 62 * (0.67) = -0.1 kip

Arm = *L / 2 =* 1.50 / 2 = 0.75 ft Moment = 0.1 * 0.75 = -0.1 k-ft

- Axial force P = 0.6 * 3.0 + 0.6 * 0.0 = 1.8 kip

Arm = *L / 2 - Offset =* 1.50 / 2 - 0.0 / 12 = 0.75 ft Moment = 1.8 * 0.75 = 1.4 k-ft

- Resisting moment Z-Z = 0.2 + 0.0 + 0.0 + 1.4 + -0.1 = 1.5 k-ft

- Overturning safety factor Z-Z = $\frac{\textit{Resisting moment}}{\textit{Overturning moment}} = \frac{1.5}{0.0}$ = 14.52 > 1.50 OK

SOIL BEARING PRESSURES (Comb: D+L)

Overturning moment X-X = 0.0 + 0.0 = 0.0 k-ft

Resisting moment X-X = 0.5 + 0.0 + 0.0 + -0.2 + 9.8 = 10.0 k-ft

Overturning moment Z-Z = 0.0 + 0.0 = 0.0 k-ft

Resisting moment Z-Z = 0.3 + 0.0 + 0.0 + -0.1 + 5.6 = 5.8 k-ft

Resisting force = *Footing + Pedestal + Soil - Buoyancy + P =* 0.4 + 0.0 + 0.0 - 0.2 + 7.5 = 7.7 kip

X-coordinate of resultant from maximum bearing corner:

$Xp = \frac{\textit{Z-Resisting moment - Z-Overturning moment}}{\textit{Resisting force}} = \frac{5.8 - 0.0}{7.7}$ = 0.75 ft

Z-coordinate of resultant from maximum bearing corner:

$Zp = \frac{\textit{X-Resisting moment - X-Overturning moment}}{\textit{Resisting force}} = \frac{10.0 - 0.0}{7.7}$ = 1.30 ft

X-ecc = *Length / 2 - Xp* =1.50 / 2 - 0.75 = 0.00 ft

Z-ecc = *Width / 2 - Zp =* 2.60 / 2 - 1.30 = 0.00 ft

Area = *Width * Length =* 2.60 * 1.50 = 3.9 ft²

Sx = *Length * Width² / 6 =* 1.50 * 2.60² / 6 = 1.7 ft³

Sz = *Width * Length² / 6 =* 2.60 * 1.50² / 6 = 1.0 ft³

- Footing is in full bearing. Soil pressures are as follows:

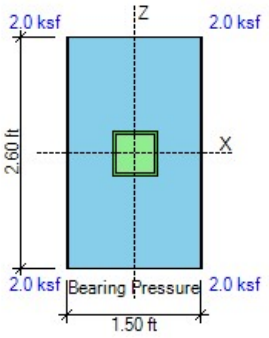
P1 = *P * (1/ A + Z-ecc / Sx + X-ecc / Sz)* = 7.7 * (1 / 3.9 + 0.00 / 1.7 + 0.00 / 1.0) = 1.98 ksf

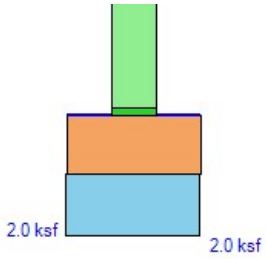
P2 = *P * (1/ A - Z-ecc / Sx + X-ecc / Sz) =* 7.7 * (1 / 3.9 - 0.00 / 1.7 + 0.00 / 1.0) = 1.98 ksf

P3 = *P * (1/ A - Z-ecc / Sx - X-ecc / Sz) =* 7.7 * (1 / 3.9 - 0.00 / 1.7 - 0.00 / 1.0) = 1.98 ksf

P4 = *P * (1/ A + Z-ecc / Sx - X-ecc / Sz) =* 7.7 * (1 / 3.9 + 0.00 / 1.7 - 0.00 / 1.0) = 1.98 ksf

Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical Interior Footing 6,500# point load





SLIDING CALCULATIONS (Comb: 0.6D+0.6W)

Internal friction angle = 28.0 deg

Passive coefficient *kp = 4.33 (per Coulomb)*

Pressure at mid-depth = *kp * Density * (Cover + Thick / 2)* = 4.33 * 110 * (0.00 + 8.0 / 12 / 2) = 0.16 ksf

X-Passive force = *Pressure * Thick * Width* = 0.16 * 8.0 / 12 * 2.60 = 0.3 kip

Z-Passive force = *Pressure * Thick * Length* = 0.16 * 8.0 / 12 * 1.50 = 0.2 kip

Friction force = *Resisting force * Friction coeff.* = Max (0, 1.9 * 0.35) = 0.7 kip

Use 100% of Passive + 100% of Friction for sliding resistance

- Sliding safety factor X-X = $\frac{\textit{X-Passive force + Friction}}{\textit{X-Horizontal load}} = \frac{1.00 * 0.3 + 1.00 * 0.7}{0.0}$ = 9.53 > 1.50 OK

- Sliding safety factor Z-Z = $\frac{\textit{Z-Passive force + Friction}}{\textit{Z-Horizontal load}} = \frac{1.00 * 0.2 + 1.00 * 0.7}{0.0}$ = 8.36 > 1.50 OK

UPLIFT CALCULATIONS (Comb: 0.6D+0.6W)

- Uplift safety factor = $\frac{\textit{Pedestal + Footing + Cover - Buoyancy}}{\textit{Uplift load}} = \frac{0.0 + 0.2 + 0.0 - 0.1}{0.0}$ = 99.99 > 1.00 OK

ONE-WAY SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Concrete f'c = 2.5 ksi Steel fy = 40.0 ksi Soil density = 110 pcf

Use Plain Concrete Shear Strength

ϕVcx = *4/3 * ϕ * √(f'c) * Width * t / 1000* = 4/3 * 0.60 * √(2500) * 2.6 * 12 * 8.0 / 1000 = 10.0 kip ACI 14.5.5.1

ϕVcz = *4/3 * ϕ * √(f'c) * Length * t / 1000* = 4/3 * 0.60 * √(2500) * 1.5 * 12 * 8.0 / 1000 = 5.8 kip

- Shear forces calculated as the volume of the bearing pressures under the effective areas:

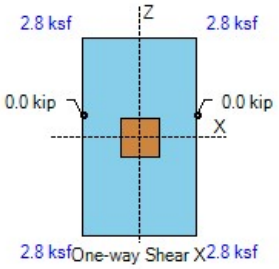
One-way shear Vux (- Side) = 0.0 kip < 10.0 kip OK

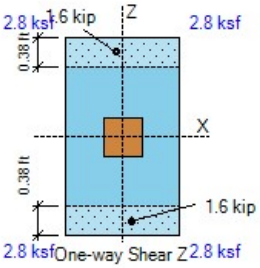
One-way shear Vux (+ Side) = 0.0 kip < 10.0 kip OK

One-way shear Vuz (- Side) = 1.6 kip < 5.8 kip OK

One-way shear Vuz (+ Side) = 1.6 kip < 5.8 kip OK

Project: Page # ___
Engineer: 1/11/2024
Descrip: Typical Interior Footing 6,500# point load





FLEXURE CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Plain ϕMnx = *5 * ϕ * √(f'c) * L * Thick² / 6* = 5 * 0.60 * √(2500) * 1.50 * 8.0² / 6 / 1000 = 0.6 k-ft ACI Eq. (14.5.2.1a)

Plain ϕMnz = *5 * ϕ * √(f'c) * W * Thick² / 6* = 5 * 0.60 * √(2500) * 2.60 * 8.0² / 6 / 1000 = 1.1 k-ft

- Top Bars

No Top Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Top

- Top moments calculated as the overburden minus the bearing pressures times the lever arm:

Top moment -Mux (- Side) = 0.0 k-ft < 2.4 k-ft OK

Top moment -Mux (+ Side) = 0.0 k-ft < 2.4 k-ft OK

Top moment -Muz (- Side) = 0.0 k-ft < 4.2 k-ft OK

Top moment -Muz (+ Side) = 0.0 k-ft < 4.2 k-ft OK

- Bottom Bars

No Bottom Reinforcement Provided at the Footing

Use Plain Concrete Flexural Strength at Bottom

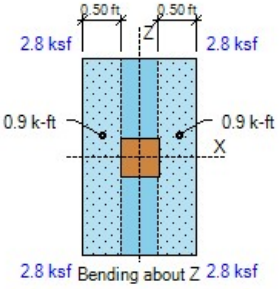
- Bottom moments calculated as the bearing minus the overburden pressures times the lever arm:

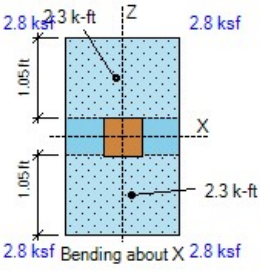
Bottom moment Mux (- Side) = 2.3 k-ft < 2.4 k-ft OK ratio = 0.96

Bottom moment Mux (+ Side) = 2.3 k-ft < 2.4 k-ft OK ratio = 0.96

Bottom moment Muz (- Side) = 0.9 k-ft < 4.2 k-ft OK ratio = 0.22

Bottom moment Muz (+ Side) = 0.9 k-ft < 4.2 k-ft OK ratio = 0.22





LOAD TRANSFER CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

Area *A1 = col L * col W =* 6.0 * 6.0 = 36.0 in²

Sx = *col W * col L² / 6 =* 6.0 * 6.0² / 6 = 36.0 in³

Sz = *col L * col W² / 6 =* 6.0 * 6.0² / 6 = 36.0 in³

Bearing *Pbu = P / A1 + Mz / Sx + Mx / Sz =* 10.8 / 36.0 + 0.0 * 12 / 36.0 + 0.0 * 12 / 36.0 = 0.3 ksi

Min edge = *Min (L / 2 - X-offset - col L / 2, W / 2 - Z-offset - col W / 2)*

Min edge = Min (1.50 * 12 / 2 - 0.0 - 6.0 / 2, 2.60 * 12 / 2 - 0.0 - 6.0 / 2 = 6.0 in

Area *A2 = Min [L * W, (col L + 2 * Min edge) * (col W + 2 * Min edge)]* ACI R22.8.3.2

A2 = Min [1.50 * 12 * 2.6 * 12, (6.0 + 2 * 6.0) * (6.0 + 2 * 6.0)] = 324.0 in²

Footing *ϕPnc = ϕ * 0.85 * f'c * Min [2, √(A2 / A1)] =* 0.65 * 0.85 * 2.5 * Min [2, √(324.0 / 36.0)] = 2.8 ksi

Footing *ϕPns = ϕ * As * Fy / A1 =* 0.0 ksi ACI 22.8.3.2

Footing bearing *ϕPn = ϕPnc + ϕPns =* 2.8 + 0.0 = 2.8 ksi > 0.3 psi OK

Hooked *Ldh = Max (8 db, 6, 0.02 * fy / (f'c)½ * Confining * Location * Concrete * db * ratio)* ACI 25.4.3

Ldh = Max (8 db, 6, 0.02 * 60.0 * 1000 / (2500)½ * 1.0 * 0.7 * 0.0 * 0.75 * 0.05) = 6.0 in

Ld provided = *Dowel length* = 3.00 * 12 = 36.0 in > 12.0 in OK

Ldh provided = *Footing thickness - Cover* = 8.00 - 3.0 = 5.0 in < 6.0 in NG

PUNCHING SHEAR CALCULATIONS (Comb: 1.2D+1.6L+0.5Lr)

X-Edge = *Length / 2 - Offset - Col / 2* = 1.50 * 12 / 2 - 0.0 - 6.0 / 2 = 6.0 in αsx = 10

Z-Edge = *Width / 2 - Offset - Col / 2* = 2.60 * 12 / 2 - 0.0 - 6.0 / 2 = 12.6 in αsz = 10

αs = *αsx + αsz* = 10 + 10 = 20 Col type = Corner β = *L / W* = 6.0 / 6.0 = 1.00 ACI 22.6.5.2

Perimeter *bo = αsz / 10 * (L + d / 2 + X-Edge) + αsx / 10 * (W + d / 2 + Z-Edge)* ACI 22.6.4.2

bo = 10 / 10 * (6.0 + 8.0 / 2 + 6.0) + 10 / 10 * (6.0 + 8.0 / 2 + 12.6) = 38.6 in

Area *Abo = (L + d / 2 + X-Edge) * (W + d / 2 + Z-Edge)* = (6.0 + 8.0 / 2 + 6.0) * (6.0 + 8.0 / 2 + 12.6) = 361.6 in²

Use Plain Concrete Shear Strength

ϕVc = *ϕ * Min (1 + 2 / β, 2) * 4/3 * √(f'c)* ACI 14.5.5.1

ϕVc = 0.60 * Min (1 + 2 / 1.00, 2) * 4/3 √(2500) = 80.0 psi

Punching force *F = P + Overburden * Abo - Bearing*

F = 10.8 + 0.07 * 361.6 / 144 - 3.9 = 7.1 kip

b1 = *L + d / 2 + X-Edge* = 6.0 + 8.0 / 2 + 6.0 = 16.0 in b2 = *W + d / 2 + Z-Edge* = 6.0 + 8.0 / 2 + 12.6 = 22.6 in

$$\gamma vx \text{ factor} = 1 - \frac{1}{1 + (2/3)\sqrt{(b2 / b1)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(22.6 / 16.0)}} = 0.44$$ ACI Eq. (8.4.4.2.2)

$$\gamma vz \text{ factor} = 1 - \frac{1}{1 + (2/3)\sqrt{(b1 / b2)}} = 1 - \frac{1}{1 + (2/3)\sqrt{(16.0 / 22.6)}} = 0.36$$ ACI Eq. (8.4.2.3.2)

X2z = $b1^2 / 2 / (b1 + b2)$ = 16.0² / 2 / (16.0 + 22.6) = 3.3 in X2x = $b2^2 / 2 / (b2 + b1)$ = 6.6 in

Jcz = $b1 * d^3 / 12 + b1^3 * d / 12 + b1 * d * (b1 / 2 - X2z)^2 + b2 * d * X2z^2$ ACI R8.4.4.2.3

Jcz = 16.0 * 8.0³ / 12 + 16.0³ * 8.0 / 12 + 16.0 * 8.0 * (16.0 / 2 * 3.3)² + 22.6 * 8.0 * 3.3² = 8210 in⁴

Jcx = $b2 * d^3 / 12 + b2^3 * d / 12 + b2 * d * (b2 / 2 - X2x)^2 + b1 * d * X2x^2$ ACI R8.4.4.2.3

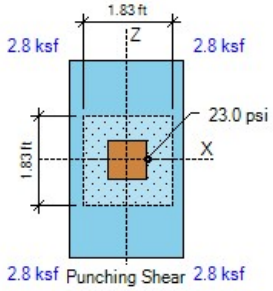
Jcz = 22.6 * 8.0³ / 12 + 22.6³ * 8.0 / 12 + 22.6 * 8.0 * (22.6 / 2 * 6.6)² + 16.0 * 8.0 * 6.6² = 18229 in⁴

Stress due to P = *F / (bo * d) * 1000* = 7.1 / (38.6 * 8.0) * 1000 = 23.0 psi

Stress due to Mx = *γvx * X-OTM * X2x / Jcx* = 0.44 * 0.0 * 12 * 6.6 / 18229 * 1000 = 0.0 psi

Stress due to Mz = *γvz * Z-OTM * X2z / Jcz* = 0.44 * 0.0 * 12 * 3.3 / 8210 * 1000 = 0.0 psi

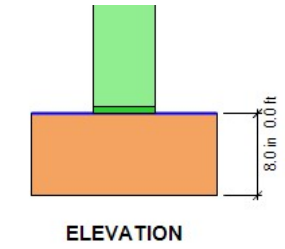
Punching stress = *P-stress + Mx-stress + Mz-stress* = 23.0 + 0.0 + 0.0 = 23.0 psi < 80.0 psi OK



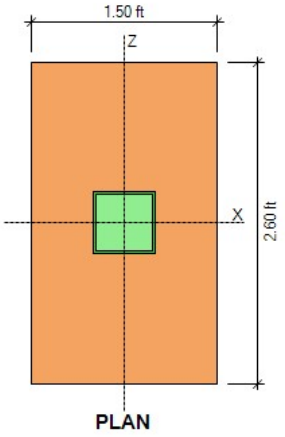
ASDIP Foundation 4.8.2.1 **SPREAD FOOTING DESIGN** *www.asdipsoft.com*

DESIGN CODES

Concrete Design	ACI 318-14
Load Combinations	ASCE 7-10/16



ELEVATION



PLAN

WIND $V_{ASD}=95$ MPH $V_{ULT}=110$ MPH EXP. B $K_{zt}=1.0$ $h=36'$ $\lambda=1.06$ SLOPE = 0° 34'

ZONE A = 12.9 PSF × 1.06 = 13.7 PSF 16.0 PSF min

ZONE B = 8.9 PSF × 1.06 = 9.3 PSF

ZONE C = 10.2 PSF × 1.06 = 10.8 PSF 16.0 PSF min

ZONE D = 7.0 PSF × 1.06 = 7.4 PSF 8.0 PSF min

SEISMIC $S_{DS}=0.831$ $R=6.5$ $I_e=1.0$

$C_S = (0.831/(6.5/1.0))/1.4 = 0.091$

$W_{ROOF} = (35\text{PSF} \times 11{,}333\text{SF}) = 396{,}655^{\#}$ $h=9'$ $h_R=29'$

$W_{LEVEL3} = (40\text{PSF} \times 10{,}229\text{SF}) = 409{,}160^{\#}$ $h=9'$ $h_3=20'$

$W_{LEVEL2} = (40\text{PSF} \times 10{,}490\text{SF}) = 419{,}600^{\#}$ $h=9'$ $h_2=10'$

$W_{TOTAL} = 1{,}225{,}415^{\#}$

$V_S = 1{,}225{,}415^{\#} \times 0.091 = 111{,}513^{\#}$ 23,392,305

$$F_{ROOF} = \left[\frac{(396{,}655^{\#} \times 29')}{(396{,}655^{\#} \times 29') + (409{,}160^{\#} \times 20') + (419{,}600^{\#} \times 10')}\right] \times 111{,}513^{\#} = 44{,}412^{\#}$$

$$F_{LEVEL3} = \left[\frac{(409{,}160^{\#} \times 20')}{(396{,}655^{\#} \times 29') + (409{,}160^{\#} \times 20') + (419{,}600^{\#} \times 10')}\right] \times 111{,}513^{\#} = 38{,}210^{\#}$$

$$F_{LEVEL2} = \left[\frac{}{(396{,}655^{\#} \times 29') + (409{,}160^{\#} \times 20') + (419{,}600^{\#} \times 10')}\right] \times 111{,}513^{\#} = 28{,}891^{\#}$$

GRID 1 = 13

$F_{3W} = (16.0PSF \times 203SF) + (9.3PSF \times 122SF) + (9.0PSF \times 74SF)$ $= 5,055^{\#}$

$F_{3E} = 44,412^{\#} \times (1,538SF / 11,333SF)$ $= 6,027^{\#}$

$F_{2W} = 5,055^{\#} + (16.0PSF \times 238SF)$ $= 8,863^{\#}$

$F_{2E} = 6,027^{\#} + 38,210^{\#} \times (1,372SF / 10,229SF)$ $= 11,152^{\#}$

$F_{1W} = 8,863^{\#} + (16.0PSF \times 240SF)$ $= 12,703^{\#}$

$F_{1E} = 11,152^{\#} + 28,891^{\#} \times (1,372SF / 10,490SF)$ $= 14,931^{\#}$

GRIDS 4/5 = 8/9

$F_{3W} = (16.0PSF \times 460SF) + (8.0PSF \times 335SF)$ $= 7,629^{\#}$

$F_{3E} = 44,412^{\#} \times (2,373SF / 11,333SF)$ $= 9,299^{\#}$

$F_{2W} = 7,624^{\#} + (16.0PSF \times 442SF)$ $= 14,696^{\#}$

$F_{2E} = 9,299^{\#} + 38,210^{\#} \times (2,048SF / 10,229SF)$ $= 16,950^{\#}$

$F_{1W} = 14,696^{\#} + (16.0PSF \times 443SF)$ $= 21,784^{\#}$

$F_{1E} = 16,950^{\#} + 28,891^{\#} \times (2,178SF / 10,229SF)$ $= 23,101^{\#}$

GRID 7

$F_{3W} = (16.0 PSF \times 526 SF) = 8,416^{\#}$

$F_{3E} = 44,412^{\#} \times (2,777 SF / 11,333 SF) = 10,993^{\#}$

$F_{2W} = 8,416^{\#} + (16.0 PSF \times 412 SF) = 15,008^{\#}$

$F_{2E} = 10,993^{\#} + 38,210^{\#} \times (2,650 SF / 10,229 SF) = 20,782^{\#}$

$F_{1W} = 15,008^{\#} + (16.0 PSF \times 413 SF) = 21,616^{\#}$

$F_{1E} = 20,782^{\#} + 28,991^{\#} \times (2,650 SF / 10,490 SF) = 28,080^{\#}$

GRIDS A-C

$F_{3W} = (16.0PSF \times 179SF) + (9.3PSF \times 111SF) + (8.0PSF \times 43SF)$ $= 4,240\#$

$F_{3E} = 44,412\# \times (2,611SF / 11,333SF)$ $= 10,232\#$

$F_{2W} = 4,240\# + (16.0PSF \times 201SF)$ $= 7,456\#$

$F_{2E} = 10,232\# + 39,210\# \times (2,321SF / 10,229SF)$ $= 18,902\#$

$F_{1W} = 7,456\# + (16.0PSF \times 203SF)$ $= 10,704\#$

$F_{1E} = 18,902\# + 28,891\# \times (2,321SF / 10,490SF)$ $= 25,299\#$

GRID F

$F_{3W} = (16.0PSF \times 244SF)$ $= 3,904\#$

$F_{3E} = 44,412\# \times (5,352SF / 11,333SF)$ $= 20,974\#$

$F_{2W} = 3,904\# + (16.0PSF \times 319SF)$ $= 9,009\#$

$F_{2E} = 20,974\# + 39,210\# \times (5,077SF / 10,229SF)$ $= 39,938\#$

$F_{1W} = 9,009\# + (16.0PSF \times 320SF)$ $= 14,129\#$

$F_{1E} = 39,938\# + 28,891\# \times (5,265SF / 10,490SF)$ $= 54,439\#$

GRIDS J-M

$F_{3W} = (16.0PSF \times 226SF) + (9.3PSF \times 65SF)$ $= 4,221\#$

$F_{3E} = 44,412\# \times (3,370SF / 11,333SF)$ $= 13,206\#$

$F_{2W} = 4,221\# + (16.0PSF \times 174SF)$ $= 7,005\#$

$F_{2E} = 13,206\# + 39,210\# \times (2,831SF / 10,229SF)$ $= 23,782\#$

$F_{1W} = 7,005\# + (16.0PSF \times 174SF)$ $= 9,789\#$

$F_{1E} = 23,782\# + 28,891\# \times (2,904SF / 10,490SF)$ $= 31,780\#$

GRID 1 (LEVEL 3) $F_E = 6,027\#$ 5 SEGMENTS $L = 4'-1"$ $h = 9'$
$L = 4'-8"$
$L = 4'-7"$
$L = 3'-4"$
$L = 10'-6"$
$L_T = 27'-2"$

$V_E = 6,027\# / 27.17' = 221$ PLF

USE W1 $V_{E\,Allow} = 242$ PLF $\times (1.25 - 0.125 \times 9'/3.75') = 230$ PLF

HOLD DOWNS

$T_E = 221$ PLF $\times 9' \times 1.25 - 1/2(15$ PSF $\times 1' \times 1.75') - 1/2(12$ PSF $\times 4.5' \times 1.75') = 2,512\#$

USE MST 48 w/ 2 STUDS $T_{E\,Allow} = 3,425\# \times 1.4/1.6 = 2,997\#$

GRID 1 (LEVEL 2) $F_E = 11,152\#$ 5 SEGMENTS $L_T = 27'-2"$ $h = 9'$

$V_E = 11,152\# / 27.17' = 410$ PLF

USE W3 $V_{E\,Allow} = 456$ PLF $\times (1.25 - 0.125 \times 9'/3.75') = 433$ PLF

HOLD DOWNS

$T_E = 410$ PLF $\times 9' \times 1.25 + 2,426\# - 1/2(15$ PSF $\times 6' \times 1.75') - 1/2(12$ PSF $\times 9' \times 1.75') = 6,805\#$

USE CMST 12 w/ 2 STUDS $T_E = 9,215\# \times 1.4/1.6 = 8,063\#$

GRID 1 (LEVEL 1) $F_E = 14,931\#$ 5 SEGMENTS $L = 4'-1"$ $h = 9'$
$L = 5'-10"$
$L = 4'-2"$
$L = 3'-9"$
$L = 10'-6"$
$L_T = 28'-4"$

$V_E = 14,931\# / 28.33' = 527$ PLF

USE W4 $V_{E\,Allow} = 555$ PLF $\times (1.25 - 0.125 \times 9'/3.75') = 565$ PLF

HOLD DOWNS

$T_E = 527$ PLF $\times 9' \times 1.25 + 6,805\# - 1/2(15$ PSF $\times 6' \times 1.75') - 1/2(12$ PSF $\times 9' \times 1.75') = 12,561\#$

USE HDU14-SDS2.5 w/ 4 DF #2 STUDS $T_{E\,Allow} = 14,445\# \times 1.4/1.6 = 12,639\#$

GRIDS 4/5=8/9 (LEVEL 3) FE = 9,299# 2 SEGMENTS L=25'-8" h=9'
L=29'-8"
LT=55'-4"

$V_E = 9{,}299^{\#} / 55.33' = 168$ PLF

USE W1 $V_{ALLOW} = 242$ PLF

HOLD DOWNS

$TE = 168\text{PLF} \times 9' \times 1.25 - .6(15\text{PSF} \times 2' \times 12.33') - \frac{1}{2}(12\text{PSF} \times 4.5' \times 12.33') = 1{,}382^{\#}$

USE MST37 w/ 2 STUDS $T_{ALLOW} = 2{,}140^{\#} \times 1.4/1.6 = 1{,}873^{\#}$

GRIDS 4/5=8/9 (LEVEL 2) FE = 16,950# 2 SEGMENTS L=55'-4" h=9'

$V_E = 16{,}950^{\#} / 55.33' = 306$ PLF

USE W2 $V_{ALLOW} = 353$ PLF

HOLD DOWNS

$TE = 306\text{PLF} \times 9' \times 1.25 + 1{,}382^{\#} - \frac{1}{2}(15\text{PSF} \times 5.7' \times 12.33') - \frac{1}{2}(12\text{PSF} \times 9' \times 12.33') = 3{,}587^{\#}$

USE MST60 w/ 2 STUDS $T_{ALLOW} = 5{,}405^{\#} \times 1.4/1.6 = 4{,}729^{\#}$

GRIDS 4/5=8/9 (LEVEL 1) FE = 23,101# 2 SEGMENTS L=55'-4" h=9'

$V_E = 23{,}101^{\#} / 55.33' = 418$ PLF

USE W3 $V_{ALLOW} = 456$ PLF

HOLD DOWNS

$TE = 418\text{PLF} \times 9' \times 1.25 + 3{,}587^{\#} - \frac{1}{2}(15\text{PSF} \times 5.7' \times 12.33') - \frac{1}{2}(12\text{PSF} \times 9' \times 12.33') = 7{,}043^{\#}$

USE HDU14-SDS25 w/ 3 STUDS $T_{ALLOW} = 9{,}260^{\#} \times 1.4/1.6 = 8{,}103^{\#}$

GRID 7 (LEVEL 3) FE = 10,883# 2 SEGMENTS L = 27'-4" h = 9'
L = 29'-9"
L_T = 57'-1"

V_E = 10,883#/57.08' = 191 PLF

USE W1 V_{EALLOW} = 242 PLF

HOLD DOWNS

T_E = 191 PLF x 9' x 1.25 - ½(15 PSF x 1' x 13.67') = 2,042#

USE (2) HDQ4-SDS2.5 w/ 2 STUDS T_{EALLOW} = 3,285# x 1.4/1.6 = 2,874#

GRID 7 (LEVEL 2) FE = 20,782# 2 SEGMENTS L_T = 57'-1" h = 9'

V_E = 20,782#/57.08' = 364 PLF

USE W3 V_{EALLOW} = 456 PLF

HOLD DOWNS

T_E = 364 PLF x 9' x 1.25 + 2042# - ½(15 PSF x 6.83' x 13.67') = 5,438#

USE (2) HDQ8-SDS2.5 w/ 3 STUDS T_{EALLOW} = 6,580# x 1.4/1.6 = 5,758#

GRID 7 (LEVEL 1) FE = 28,080# 2 SEGMENTS L_T = 57'-1" h = 9'

V_E = 28,080#/57.09' = 492 PLF

USE W4 V_{EALLOW} = 595 PLF

HOLD DOWNS

T_E = 492 PLF x 9' x 1.25 + 5,438# - ½(15 PSF x 6.83' x 13.67') = 10,272#

USE HDU14-SDS2.5 w/ 4 STUDS T_{EALLOW} = 12,425# x 1.4/1.6 = 10,872#

GRID B (LEVEL 3) FE = 6,027# 5 SEGMENTS L=4'-7" L=4'-8" L=5'-2" L=3'-9" L=10'-6" LT = 28'-8" h=9'

VE = 6,027#/28.67' = 210 PLF

USE W1 VEALLOW = 242 PLF x (1.25 - 0.125 x 9'/3.75') = 230 PLF

HOLD DOWNS

TE = 210 PLF x 9' x 1.25 - 1/2(15 PSF x 1' x 1.83') - 1/2(12 PSF x 4.5' x 1.83') = 2,298 #

USE MST48 W/ 2 STUDS TEALLOW = 3,425# x 1.4/1.6 = 2997 #

GRID 13 (LEVEL 2) FE = 11,152# 5 SEGMENTS LT = 28'-8" h = 9'

VE = 11,152#/28.67' = 389 PLF

USE W3 VEALLOW = 456 PLF x (1.25 - 0.125 x 9'/3.75') = 433 PLF

HOLD DOWNS

TE = 389 PLF x 9' x 1.25 + 2,298# - 1/2(15 PSF x 6' x 1.83') - 1/2(12 PSF x 9' x 1.83') = 6,488 #

USE CMST 12 W/ 2 STUDS TEALLOW = 9,215# x 1.4/1.6 = 8,063 #

GRID 13 (LEVEL 1) FE = 14,931# 5 SEGMENTS LT = 28'-8" h = 9'

VE = 14,931#/28.67' = 521 PLF

USE W4 VEALLOW = 595 PLF x (1.25 - 0.125 x 9'/3.75') = 565 PLF

HOLD DOWNS

TE = 521 PLF x 9' x 1.25 + 6,488# - 1/2(15 PSF x 6' x 1.83') - 1/2(12 PSF x 9' x 1.83') = 12,163 #

USE HDU14-SDS2.5 W/ 4 OF #2 STUDS TEALLOW = 19,445# x 1.4/1.6 = 12,639 #

0956

GRIDS A-C (LEVEL 3) FE = 10,232# 13 SEGMENTS L=3'-10" L=5'-10" L=9'-2" L=3'-11" L=3'-11" L=8'-7" L=8'-7" L=3'-11" L=3'-11" L=9'-2" L=5'-10" L=3'-10" L=5'-7" LT=75'-7" h=9'

VE = 10,232#/75.58' = 135 PLF

USE W11 VE = 242 PLF x (1.25 - 0.125 x 9'/3.93') = 231 PLF

HOLD DOWNS

TE = 135 PLF x 9' x 1.25 - 1/2 (25 PSF x 2' x 1.92') - 1/2 (12 PSF x 4.5' x 1.92') = 1,419#

USE MST37 w/ 2 STUDS TEALLOW = 2,140# x 1.4/1.6 = 1,873#

GRIDS A-C (LEVEL 2) FE = 18,902# 13 SEGMENTS LT = 75'-7" h = 9'

VE = 18,902#/75.58' = 250 PLF

USE W7 VEALLOW = 353 PLF x (1.25 - 0.125 x 9'/3.93') = 337 PLF

HOLD DOWNS

TE = 250 PLF x 9' x 1.25 + 1,419# - 1/2 (12 PSF x 9' x 1.92') = 4,128#

USE MST60 w/ 2 STUDS TEALLOW = 5,405# x 1.4/1.6 = 4,729#

GRIDS A-C (LEVEL 1) FE = 25,294# 13 SEGMENTS LT = 75'-7" h = 9'

VE = 25,294#/75.58' = 335 PLF

USE W2 VEALLOW = 353 PLF x (1.25 - 0.125 x 9'/3.93') = 337 PLF

HOLD DOWNS

TE = 335 PLF x 9' x 1.25 + 4,128# - 1/2 (12 PSF x 9' x 1.92') = 7,789#

USE HDU14-SDS 7.5 w/ 3 STUDS TEALLOW = 9,260# x 1.4/1.6 = 8,103#

GRID F (LEVEL 3) FE = 20,974# 4 SEGMENTS L = 30'-4" h=9'
L = 14-3"
L = 14-6"
L = 30'-4"
LT = 89'-6"

VE = 20,974#/89.5' = 234 PLF

USE W1 VEALLOW = 242PLF

HOLD DOWNS

TE = 234PLF x 9' x 1.25 - 1/2(25PSF x 16.75' x 7.13') - 1/2(12PSF x 4.5' x 7.13') = 1,144#

USE MST37 w/ 2 STUDS
OR (2) HDU2-SDS2.5 w/ 2 STUDS

TEALLOW = 2,140# x 1.4/1.6 = 1,873#
TEALLOW = 2,215# x 1.4/1.6 = 2,067#

GRID F (LEVEL 2) FE = 39,939# 4 SEGMENTS LT = 89'-6" h=9'

VE = 39,939#/89.5' = 446PLF

USE W3 VEALLOW = 456PLF

HOLD DOWNS

TE = 446PLF x 9' x 1.25 + 1,144# = 6,164#

USE MST72 w/ 2 STUDS
OR (2) HDU11-SDS2.5 w/ 4 STUDS

TEALLOW = 9,215# x 1.4/1.6 = 8,063#
TEALLOW = 8,030# x 1.4/1.6 = 7,026#

GRID F (LEVEL 1) FE = 54,439# 6 SEGMENTS L = 30 1/4" h=9'
L = 14'-3" L19-4
L = 24'-9"
L = 14'-8"
L = 14'-6"
L = 30 1/4"
LT = 139'-10"

VE = 54,439#/138.92' = 392PLF

USE W3 VEALLOW = 456PLF

HOLD DOWNS

STACKED TE = 392PLF x 9' x 1.25 + 6,164# = 10,575#

USE HDU14-SDS2.5 w/ 4 OF #2 STUDS
OR HDU14-SDS2.5 w/ 5 OF #2 STUDS

TEALLOW = 12,375# x 1.4/1.6 = 10,828#
TEALLOW = 12,425# x 1.4/1.6 = 10,872#

GRIDS J-M (LEVEL 3) FE = 13,206# 14 SEGMENTS

L=7'-7"	L=6'-11"
L=9'-2"	L=3'-3"
L=4'-7"	L=2'-11"
L=4'-0"	L=3'-2"
L=3'-2"	L=3'-11"
L=2'-11"	L=4'-7"
L=3'-3"	L=9'-2"

h=9'

L_T = 68'-7"

VE = 13,206#/68.53' = 193 PLF

USE W1 VEALLOW = 242 PLF x (1.25 - 0.125 x 9'/2.92') = 209 PLF

HOLD DOWNS

TEALLOW = 193 PLF x 9' x 1.25 - ½(25 PSF x 2' x 1.46') - ½(12 PSF x 4.5' x 1.46') = 2095#

USE MST48 W/ 25 STDS TEALLOW = 3,425# x 1.4/1.6 = 2997#

GRIDS J-M (LEVEL 2) FE = 23,782# 14 SEGMENTS L_T = 68'-7" h=9'

VE = 23,782#/68.58' = 347 PLF

USE W3 VEALLOW = 456 PLF x (1.25 - 0.125 x 9'/2.92') = 394 PLF

HOLD DOWNS

TE = 347 PLF x 9' x 1.25 + 2095# - ½(12 PSF x 9' x 1.46') = 5920#

USE CMST12 W/ 25 STDS TEALLOW = 9,215# x 1.4/1.6 = 8,063#

GRIDS J-M (LEVEL 1) FE = 31,780# 14 SEGMENTS L_T = 68'-7" h=9'

VE = 31,780#/68.58' = 463 PLF

USE W4 VEALLOW = 595 PLF x (1.25 - 0.125 x 9'/2.92') = 515 PLF

HOLD DOWNS

TEALLOW = 463 PLF x 9' x 1.25 + 5,920# - ½(12 PSF x 9' x 1.46') = 11,054#

USE HDU14-SDS2.5 W/ 4 DFF 2 STDS TEALLOW = 14,445# x 1.4/1.6 = 12,634#