

#24307  
Structural Calculations For:

# TAM- SIBAY Residence Addition & Alteration

4215 Holly Ln  
Mercer Island, WA 98040

Designer: TAM Design

Design Criteria: IBC 2021 as adopted by the city of Mercer Island  
Wind: Wind Speed = 110 mph, Exposure 'B', Kzt = 1.00  
Seismic: Site Class D [Default], SDC = D, R = 6.5, I=1.0  
Roof Rain-on-Snow Load = 25 psf  
Roof Future PV Load = 5psf  
Deck Live Load = 60psf  
Residential Floor Live Load = 40psf

## Summary:

A two-story conventional wood framed building with shallow "T-shaped" concrete footing and stem walls is being proposed. The gable-end roof is to be premanufactured wood trusses engineered by others. The floor will be premanufactured wood I-joists. The main level is slab on grade. The LFRS system consists of wood framed shearwalls.





**Trygstad**  
ENGINEERING

**CALCULATION**  
**SECTION 1.0:**  
**LOADING**

SHEET TITLE: **DEAD LOAD SUMMARY**

**1.1) ESTIMATED DEADLOADS**

**RESIDENTIAL TRUSSED ROOF**

Roofing -	3.5 psf
5/8" plywood (O.S.B.)	2.2 psf
Trusses at 24" o.c.	3.4 psf
Insulation	1.0 psf
(1) 5/8" gypsum ceiling	2.8 psf
Misc./Mech.	1.5 psf
<b>ROOF DEAD LOAD</b>	<b>14.4 PSF</b>
<b>FUTURE P.V. AUX. LOAD</b>	<b>5.0 PSF</b>

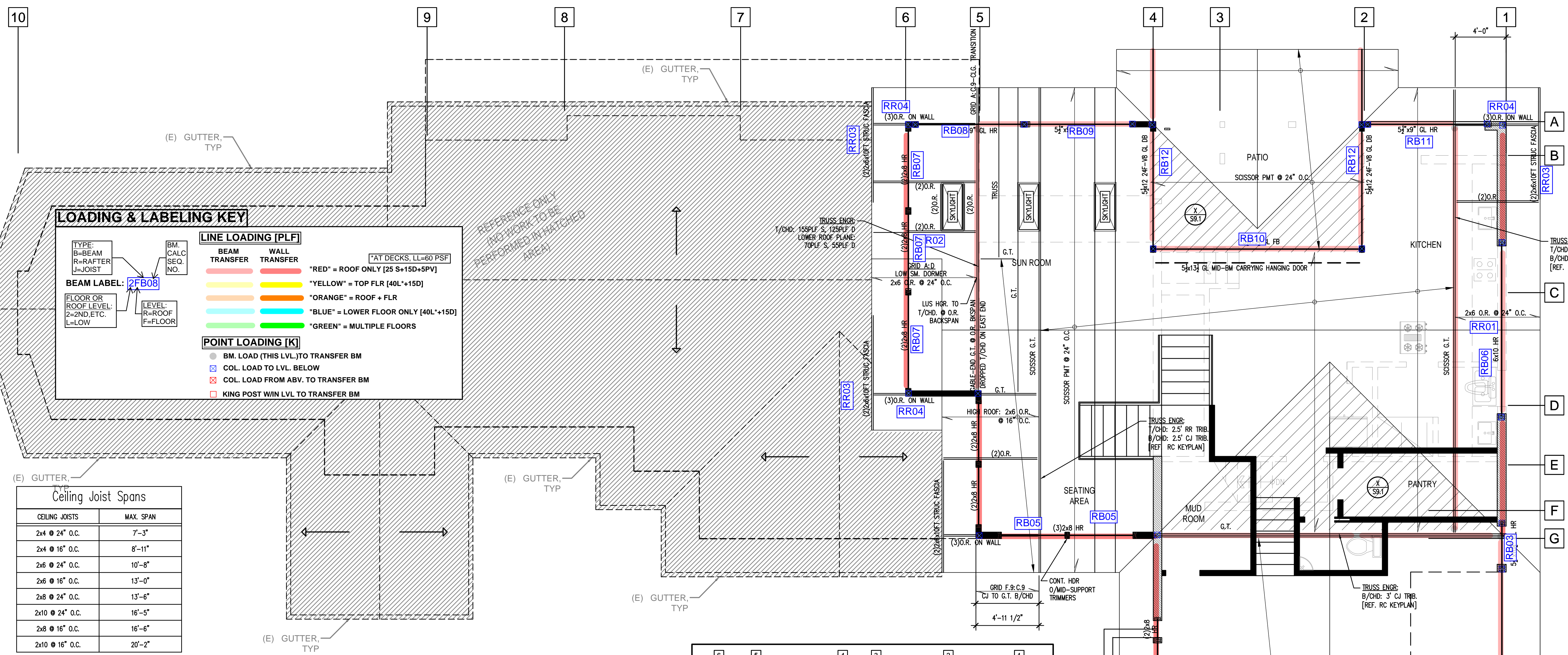
**RESIDENTIAL FLOOR (NO GYPCRETE)**

floor finish	4.0 psf
3/4" plywood (O.S.B.)	2.7 psf
Joists @ 16" o.c.	2.5 psf
Insulation	1.0 psf
(1) 5/8" gypsum ceiling	2.8 psf
Misc.	2.0 psf
<b>FLOOR DEAD LOAD</b>	<b>15.0 PSF</b>



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**CALCULATION**  
**SECTION 2.0:**  
**ROOF**  
**FRAMING**



**LOADING & LABELING KEY**

**TYPE:**  
B=BEAM  
R=RAFTER  
J=JOIST

**BM. CALC. SEQ. NO.**

**BEAM LABEL:** 2FB08

**FLOOR OR ROOF LEVEL:**  
2=2ND. ETC.  
L=LOW

**LEVEL:**  
R=ROOF  
F=FLOOR

**LINE LOADING [PLF]**

BEAM TRANSFER	WALL TRANSFER	NOTES
[Red Line]	[Red Line]	*"RED" = ROOF ONLY [25 S+15D+5PV]
[Yellow Line]	[Yellow Line]	*"YELLOW" = TOP FLR [40L+15D]
[Orange Line]	[Orange Line]	*"ORANGE" = ROOF + FLR
[Blue Line]	[Blue Line]	*"BLUE" = LOWER FLOOR ONLY [40L+15D]
[Green Line]	[Green Line]	*"GREEN" = MULTIPLE FLOORS

**POINT LOADING [K]**

- BM. LOAD (THIS LVL.) TO TRANSFER BM
- ⊠ COL. LOAD TO LVL. BELOW
- ⊠ COL. LOAD FROM ABV. TO TRANSFER BM
- ⊠ KING POST WIN LVL TO TRANSFER BM

**AT DECKS, LL=60 PSF**

**Ceiling Joist Spans**

CEILING JOISTS	MAX. SPAN
2x4 @ 24" O.C.	7'-3"
2x4 @ 16" O.C.	8'-11"
2x6 @ 24" O.C.	10'-8"
2x6 @ 16" O.C.	13'-0"
2x8 @ 24" O.C.	13'-6"
2x10 @ 24" O.C.	16'-5"
2x8 @ 16" O.C.	16'-6"
2x10 @ 16" O.C.	20'-2"

- CEILING JOISTS NOTES:**
1. SIZE & SPAN BASED ON UNINHABITABLE ATTIC WITH LIMITED STORAGE (20PSF LL) + 10psf DL L/Delta=240 PER IRC TABLE R802.5.12)
  2. USE DF-L#2 JOISTS

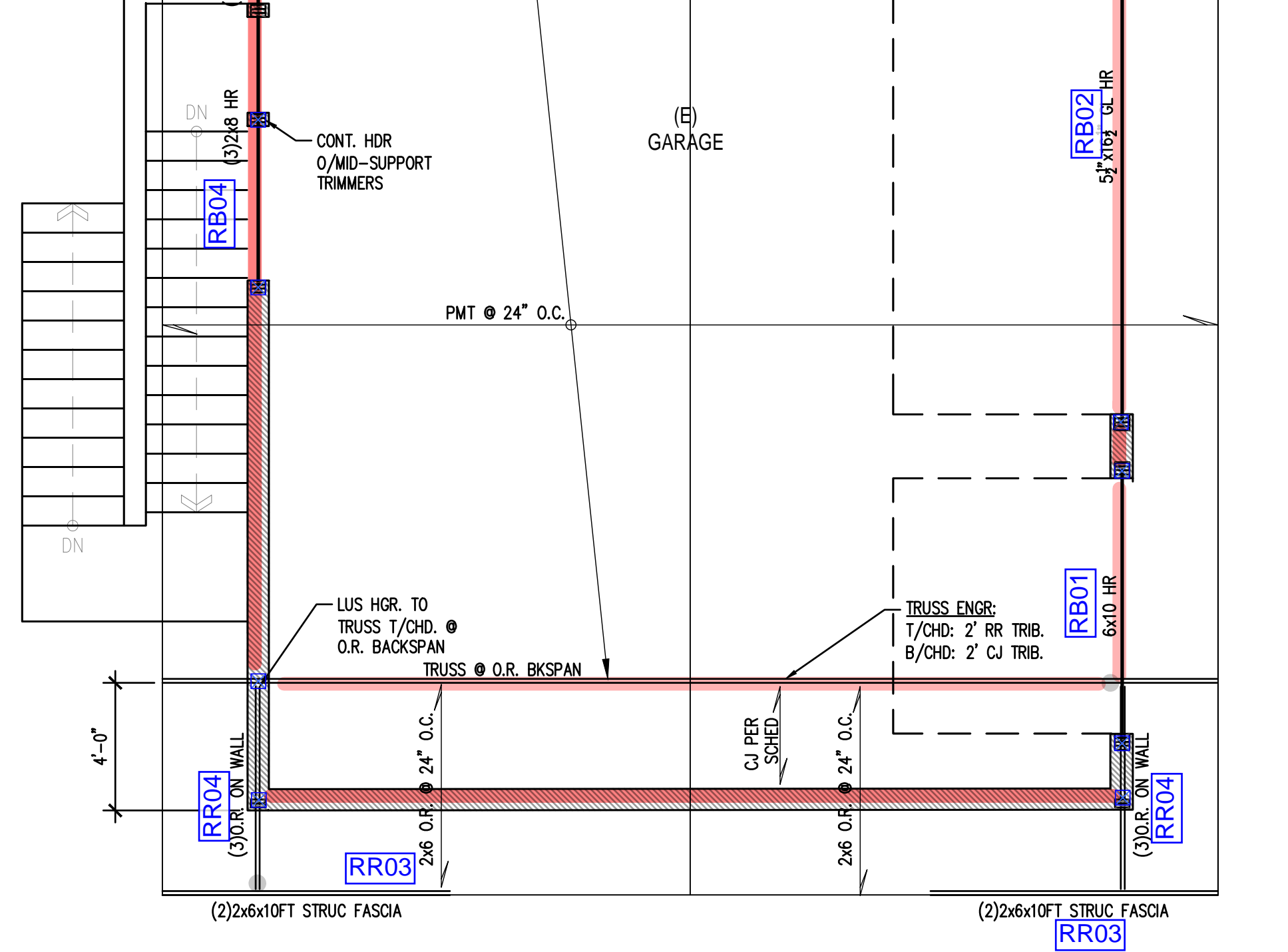
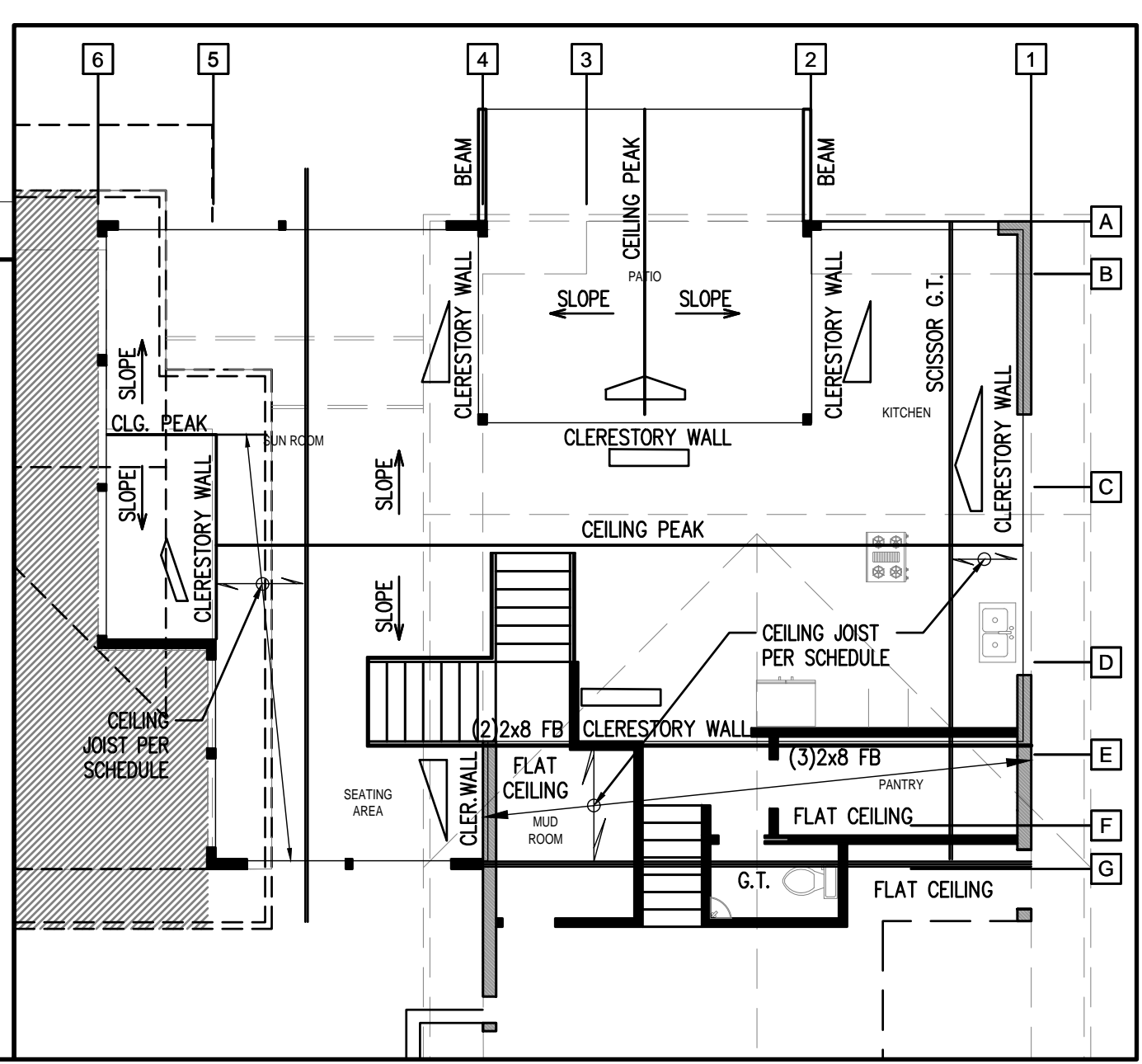
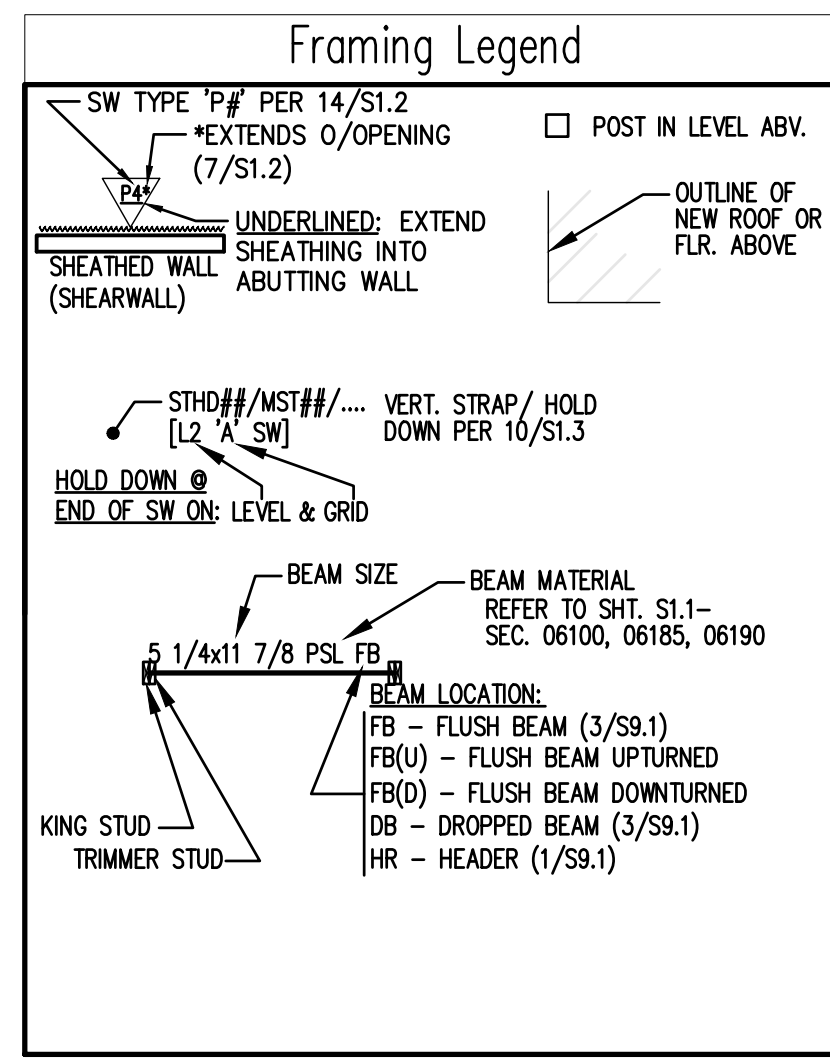
- Framing Notes**
1. REFER TO S9.1 FOR TYPICAL FRAMING DETAILS
  2. ROOF FRAMING - PREMANUFACTURED TRUSSES (PMT) OR RAFTERS PER PLAN. 2x4 ON-EDGE OUTRIGGERS (O.R.) @ 24" O.C.
  3. FLOOR FRAMING - 1x JOISTS PER PLAN. BLOCKING AT BEARING AND SHEARWALLS SHALL BE PER BEARING AND SHEARWALL SCHEDULE (VERIFY EXIST. BRG. LOC.). FLOOR SHEATHING SHALL BE GLED AND NAILED.
  4. WALLS INDICATED ARE BELOW THE FRAMING LEVEL (REFER TO SYMBOL KEY FOR TYPE). SEE BEARING WALL SCHEDULE THIS SHEET
  5. PLUMBING, MECHANICAL, AND ELECTRICAL SYSTEMS SHALL BE DESIGNED AND BUILT TO ACCOMMODATE 3/8" PER FLOOR WOOD SHRINKAGE.
  6. SEE DETAIL 17/S9.1 FOR TYPICAL HEADER/BUNDLED STUD CONSTRUCTION.
  7. PROVIDE JOIST OR BLOCKING AT TOP SHEARWALLS.
  8. FRAMING MEMBERS AND SHEATHING SHALL BE PER STRUCTURAL NOTES AS NOTED ON SHEET S1.1
  9. ALL UNLABELED EXTERIOR WALLS ARE TO BE TYPE 'P6'; SEE SHEARWALL SCHEDULE ON SHEET S1.2
  10. HANGERS INDICATED ARE AS MANUFACTURED BY SIMPSON STRONG-TIE. SEE SEC. 06103/S1.1 FOR TYPICAL HANGERS, U.N.O.
  11. PROVIDE JOIST OR BLOCKING AT TOP SHEARWALLS.
  12. SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS AND TOP PLATE ELEVATIONS.
  13. BUNDLED STUDS FROM THIS LEVEL SHALL BE CONTINUED DOWN TO FOUNDATION OR SUPPORTING BEAM. (RE: 4/S9.1)
  14. ALL BEAMS AND HEADERS SHALL HAVE A MINIMUM OF (1) FULL HEIGHT STUD AT EACH END FOR BRACING TYPICAL UNLESS NOTED OTHERWISE.
  15. PROVIDE MINIMUM (2) 2x BUNDLED STUDS UNDER EACH BEAM END, TYPICAL UNLESS NOTED OTHERWISE. (AT HEADERS: TRIMMER+KING=2 BUNDLED STUDS)
  16. SEE DETAILS 19 & 20 ON SHEET S1.3 FOR TYPICAL CORNER FRAMING DETAILS AT HOLD DOWNS & SHEARWALLS.
  17. HANGER OCCURS WHERE FLUSH BEAM HANGS TO SUPPORT BEAMS, TYP. U.N.O.

**Bearing Wall Stud Schedule**

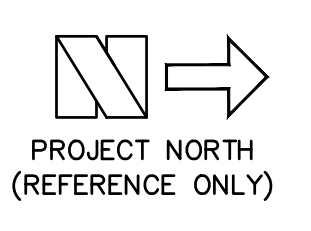
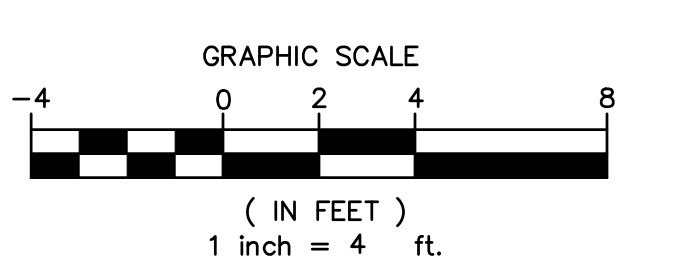
BEARING WALL TYPE	STUD SIZE AND SPACING, U.N.O.
EXTERIOR	2 X 6 AT 16" O.C., U.N.O.
INTERIOR NON-BEARING	2 X 4 AT 16 O.C.

**BEARING WALL NOTES**

1. SEE SHEARWALL SCHEDULE SHEET S1.2 FOR WALL SHEATHING, ADDITIONAL PLATE AND STUD REQUIREMENTS, BLOCKING AND PLATE NAILING. SEE SAWN LUMBER STRUCTURAL NOTES SHEET S1.1 FOR SPECIES AND GRADE OF WALL PLATES AND STUDS.
2. SECURE SILL PLATES TO CONCRETE WITH 5/8" DIA. ANCHOR BOLTS AT 48" ON CENTER TYPICAL UNLESS NOTED OTHERWISE. RE: S1.2 REFER TO SHEARWALL AND HOLDDOWN SCHEDULE FOR ADDITIONAL ANCHOR BOLT REQUIREMENTS. WHERE PRESERVATIVE TREATED WOOD IS USED, REFER TO THAT NOTE SECTION FOR CORROSION PROTECTION REQUIREMENTS FOR CONNECTORS.
3. SEE 2/S9.1 FOR TOP PLATE SPLICE. PROVIDE ADDITIONAL CONNECTORS AT SHEARWALLS AS INDICATED ON THE PLANS.
4. ALIGN STUDS UNDER JOISTS



**Note:**  
PLANS PREPARED USING ARCHITECTURAL BACKGROUNDS RECEIVED 07/10/2024



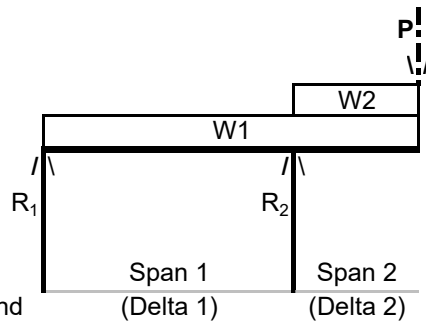




**RR3) STRUC FASCIA**  
**OVERHANGING CANTILEVER**

Span 1 = 6 ft  
 Span 2 = 2.7 ft

Spacing = 16 in o.c.  
 Uniform Load W1 = 60 lb/ft  
 Add'l. Uniform Load W2 = 0 lb/ft  
 Concentrated Load = 0 lb @ Cantilever End



$V_{max} = 216$  lb       $R_{1Max} = 180$  lb  
 $M_{max} = 270$  lb-ft       $R_{2Max} = 378$  lb

Nominal Beam Size: b = 2 in.      d = 12 in.      Number of Sections = 1  
                                     b<sub>act</sub> = 1.50 in.      d<sub>act</sub> = 11.25 in.

Lumber Species/Type:----- HF2      REPETITIVE MEMBER?----- Y  
 POST?: NO

Design Stresses and Factors:

$C_L = 0.70$       moisture > 19%? NO  
 $F_v = 145$  psi      LDF = 1.00       $C_{M(v)} = 1.00$   
 $F_b = 850$  psi      Cr = 1.15       $C_{M(b)} = 1.00$   
 $F_{c||} = 1,300$  psi      Cv = 1.00       $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 405$  psi       $C_{F(B)} = 1.00$        $C_{M(c\perp)} = 1.00$   
 $E = 1.3E+06$  psi      Delta1=L/ 360       $C_{M(E)} = 1.00$   
 $E_{min} = .47E+06$  psi      Delta2=L/ 360      Incise Ci= 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	14.2	<b>145</b>
Fb (psi)	102	<b>682</b>
Delta1(in)	0.01	<b>0.20</b>
Delta2(in)	0.01	<b>0.18</b>

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	1.7	16.9
Sx (in <sup>3</sup> )	4.8	31.6
I (1) (in <sup>4</sup> )	6.7	178.0
I (2) (in <sup>4</sup> )	11.7	178.0

<b>0 INCH</b> <b>φ HOLE</b> <b>SEC.</b> <b>REDUC.</b>
0.0 in3
0.0 in4

REQ'D END BEARING = 0.62 inches  
 UNBAL. UPLIFT AT R1 = -36 LBS  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = N/A <  $F_v' = 145$  psi

**USE: 2 x 12 HF2 @ 16 IN. O.C.**

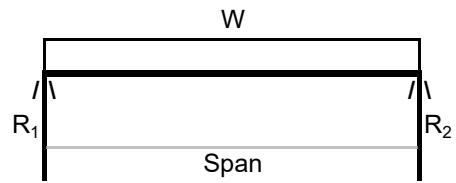




**RB01) GRID 1 8FT HEADER @ GARAGE DOOR**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 8.25 ft  
 Uniform Load (full span), W = 743 lb/ft  
 $V_{max} = 3065$  lb  
 $M_{max} = 6321$  lb-ft



Reactions  
 $R_1 = 3065$  lb  
 $R_2 = 3065$  lb

Nominal Beam Size: b = 6 in. d = 10 in. Number of Sections = 1  
 $b_{act} = 5.50$  in.  $d_{act} = 9.50$  in.

Lumber Species/Type:----- HF1 REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 0.99$  Moisture > 19%? N  
 $F_v = 140$  psi LDF = 1.00  $C_{M(v)} = 1.00$   
 $F_b = 1,050$  psi Cr = 1.00  $C_{M(b)} = 1.00$   
 $F_{c||} = 750$  psi Cv = 1.00  $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 405$  psi  $C_{F(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.3E+06$  psi  $\delta_{TOTAL} = L/ 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .47E+06$  psi Incise Ci = 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	71.1	140
Fb (psi)	917	1044
Delta (in.)	0.15	0.28

Section Properties		
	Required	Provided
A (in2)	26.54	52.3
Sx (in3)	72.69	82.73
I (in4)	216.63	393.0

<b>0 INCH</b> <b>φ HOLE</b> <b>SEC.</b> <b>REDUC.</b>
0.0 in3
0.0 in4

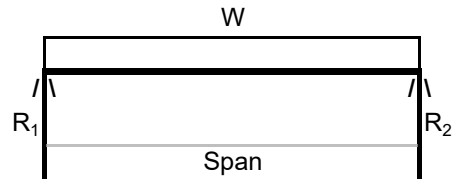
REQ'D END BEARING = 1.38 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = <  $F_v' = 140$  psi

**USE: (1) 6 x 10 HF1**

**RB02) GRID 1 HEADER @ GARAGE DOOR**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 18.3 ft  
 Uniform Load (full span), W = 743 lb/ft  
 $V_{max} = 6798$  lb  
 $M_{max} = 31103$  lb-ft



Reactions  
 $R_1 = 6798$  lb  
 $R_2 = 6798$  lb

Nominal Beam Size:  $b = 5.5$  in.  $d = 16.5$  in. Number of Sections = 1  
 $b_{act} = 5.50$  in.  $d_{act} = 16.50$  in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 0.96$  Moisture > 19%? N  
 $F_v = 240$  psi  $LDf = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi  $Cr = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi  $C_v = 0.98$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $CF_{(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi  $\delta_{TOTAL=L/} 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	95.5	240
Fb (psi)	1496	2249
Delta (in.)	0.51	0.61

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	36.11	90.8
Sx (in <sup>3</sup> )	165.94	249.56
I (in <sup>4</sup> )	1707.55	2058.9

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

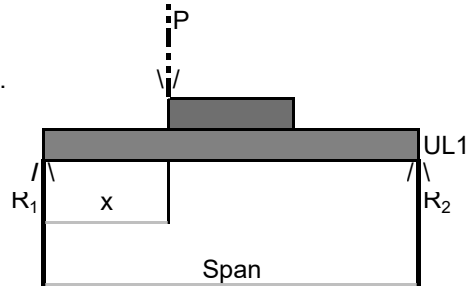
REQ'D END BEARING = 1.90 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = <  $F_v' = 240$  psi

**USE: 5.5 x 16-1/2 IN. 24F-V4 GLB**

**RB03) GRID 1 GARAGE MAN DOOR HEADER CARRYING GT**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.

Span = 3.2 ft



Load  
 Uniform Load 1 ( full span) = 743 lb/ft  
 Uniform Load 2 (lbs/ft) = 0 from x = 0 to 2.4 feet  
 Sum UL1 + UL2 = 743  
 Concentrated Load (lbs) = 10700 @ x = 2.4 feet

Reactions  
 $V_{max} = 9214$  lb  $R_1 = 3864$  lb  
 $M_{max} = 7021$  lb-ft  $R_2 = 9214$  lb

Nominal Beam Size: b = 5.5 in. d = 10.5 in. Number of Sections = 1  
 $b_{act} = 5.5$  in.  $d_{act} = 10.5$  in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

$C_L = 1.00$  Moisture > 19%? N  
 $F_v = 240$  psi  $LDF = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi  $C_r = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $C_{F(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi  $\Delta = L/360$   $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi  $Incise C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	222.43	240
Fb (psi)	834	2393
Delta (in.)	0.01	0.11

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	53.5	57.8
Sx (in <sup>3</sup> )	35.2	101.1
I (in <sup>4</sup> )	45.4	530.6

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

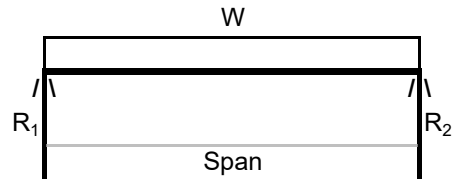
REQ'D END BEARING = 2.58 inches  
 NOTCH DEPTH = 0 inches  
 $f_{v,NOTCH}$  (Tension Face) = N/A <  $F_v' = 240$  psi

**USE: 5.5 x 10-1/2 IN. 24F-V4 GLB**

**RB04 GRID 4 GARAGE WDW HEADER**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 5.2 ft  
 Uniform Load (full span), W = 743 lb/ft  
 $V_{max} = 1932$  lb  
 $M_{max} = 2511$  lb-ft



Reactions  
 $R_1 = 1932$  lb  
 $R_2 = 1932$  lb

Nominal Beam Size:  $b = 2$  in.  $d = 8$  in. Number of Sections = 3  
 $b_{act} = 1.50$  in.  $d_{act} = 7.25$  in.

Lumber Species/Type:----- HF2 REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 1.00$  Moisture > 19%? N  
 $F_v = 145$  psi  $LDf = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 850$  psi  $C_r = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,300$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 405$  psi  $C_{F(B)} = 1.20$   $C_{M(c\perp)} = 1.00$   
 $E = 1.3E+06$  psi  $\delta_{TOTAL} = L/ 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .47E+06$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	68.2	145
Fb (psi)	764	1016
Delta (in.)	0.07	0.17

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	15.34	32.6
Sx (in <sup>3</sup> )	29.67	39.42
I (in <sup>4</sup> )	54.24	142.9

<b>0 INCH</b>
<b>φ HOLE</b>
<b>SEC.</b>
<b>REDUC.</b>
0.0 in <sup>3</sup>
0.0 in <sup>4</sup>

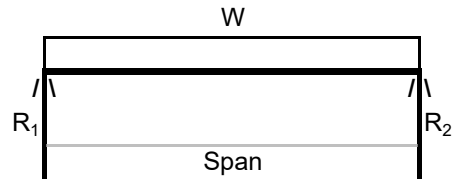
REQ'D END BEARING = 1.06 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = <  $F_v' = 145$  psi

**USE: (3) 2 x 8 HF2**

**RB05) GRID G WDW HEADER**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 5.3 ft  
 Uniform Load (full span), W = 855 lb/ft  
 $V_{max} = 2266$  lb  
 $M_{max} = 3002$  lb-ft



Reactions  
 $R_1 = 2266$  lb  
 $R_2 = 2266$  lb

Nominal Beam Size: b = 2 in. d = 8 in. Number of Sections = 3  
 $b_{act} = 1.50$  in.  $d_{act} = 7.25$  in.

Lumber Species/Type:----- HF2 REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 1.00$  Moisture > 19%? N  
 $F_v = 145$  psi  $LDf = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 850$  psi  $Cr = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,300$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 405$  psi  $CF_{(B)} = 1.20$   $C_{M(c\perp)} = 1.00$   
 $E = 1.3E+06$  psi  $\delta_{TOTAL=L/} 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .47E+06$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	80.4	145
Fb (psi)	914	1016
Delta (in.)	0.08	0.18

Section Properties		
	Required	Provided
A (in2)	18.10	32.6
Sx (in3)	35.47	39.42
I (in4)	66.09	142.9

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

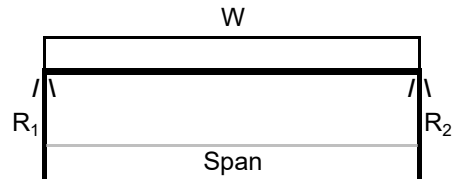
REQ'D END BEARING = 1.24 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = <  $F_v' = 145$  psi

**USE: (3) 2 x 8 HF2**

**RB06) GRID 1 WDW HEADER**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 13.5 ft  
 Uniform Load (full span), W = 272 lb/ft  
 $V_{max} = 1836$  lb  
 $M_{max} = 6197$  lb-ft



Reactions  
 $R_1 = 1836$  lb  
 $R_2 = 1836$  lb

Nominal Beam Size:  $b = 6$  in.  $d = 10$  in. Number of Sections = 1  
 $b_{act} = 5.50$  in.  $d_{act} = 9.50$  in.

Lumber Species/Type:----- HF1 REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 0.99$  Moisture > 19%? N  
 $F_v = 140$  psi  $LDf = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 1,050$  psi  $Cr = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 750$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 405$  psi  $CF_{(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.3E+06$  psi  $\delta_{TOTAL} = L/ 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .47E+06$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	46.5	140
Fb (psi)	899	1039
Delta (in.)	0.40	0.45

Section Properties		
	Required	Provided
A (in2)	17.36	52.3
Sx (in3)	71.54	82.73
I (in4)	347.48	393.0

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

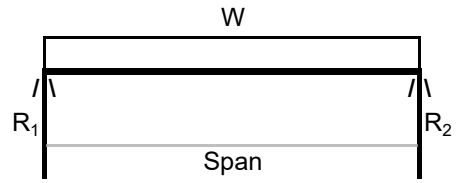
REQ'D END BEARING = 0.82 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = <  $F_v' = 140$  psi

**USE: (1) 6 x 10 HF1**

**RB07) HEADER CARRYING OUTRIGGERS @ GRID 6**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 7.5 ft  
 Uniform Load (full span), W = 189 lb/ft  
 $V_{max} = 709$  lb  
 $M_{max} = 1329$  lb-ft



Reactions  
 $R_1 = 709$  lb  
 $R_2 = 709$  lb

Nominal Beam Size: b = 2 in. d = 8 in. Number of Sections = 2  
 $b_{act} = 1.50$  in.  $d_{act} = 7.25$  in.

Lumber Species/Type:----- HF2 REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 0.98$  Moisture > 19%? N  
 $F_v = 145$  psi LDF = 1.00  $C_{M(v)} = 1.00$   
 $F_b = 850$  psi Cr = 1.00  $C_{M(b)} = 1.00$   
 $F_{c||} = 1,300$  psi Cv = 1.00  $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 405$  psi  $CF_{(B)} = 1.20$   $C_{M(c\perp)} = 1.00$   
 $E = 1.3E+06$  psi  $\delta_{TOTAL} = L/ 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .47E+06$  psi Incise Ci = 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	41.0	145
Fb (psi)	607	1004
Delta (in.)	0.11	0.25

Section Properties		
	Required	Provided
A (in2)	6.15	21.8
Sx (in3)	15.88	26.28
I (in4)	41.40	95.3

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

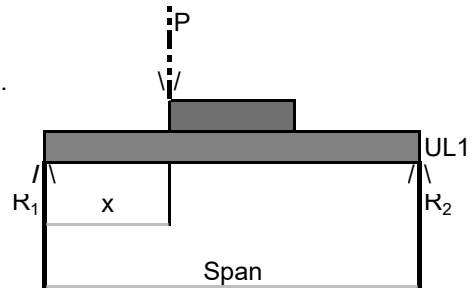
REQ'D END BEARING = 0.58 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = <  $F_v' = 145$  psi

**USE: (2) 2 x 8 HF2**

**R0B8) GRID A WDW HEADER**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.

Span = 8.3 ft



Uniform Load 1 ( full span) = 0 lb/ft  
 Uniform Load 2 (lbs/ft) = 855 from x = 4.9 8.3 feet  
 Sum UL1 + UL2 = 0  
 Concentrated Load (lbs) = 3000 @ x = 4.9 feet

V<sub>max</sub> = 4083 lb  
 M<sub>max</sub> = 8842 lb-ft  
 Reactions  
 R<sub>1</sub> = 1824 lb  
 R<sub>2</sub> = 4083 lb

Nominal Beam Size: b = 3.5 in. d= 9 in. Number of Sections = 1  
 b<sub>act</sub> = 3.50 in. d<sub>act</sub> = 9.00 in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

C<sub>L</sub>= 0.98 Moisture > 19%? N  
 F<sub>v</sub> = 240 psi LDF = 1.00 C<sub>M(v)</sub> = 1.00  
 F<sub>b</sub> = 2,400 psi C<sub>r</sub> = 1.00 C<sub>M(b)</sub> = 1.00  
 F<sub>c||</sub> = 1,650 psi C<sub>v</sub> = 1.00 C<sub>M(c||)</sub> = 1.00  
 F<sub>c⊥</sub> = 650 psi C<sub>F(B)</sub> = 1.00 C<sub>M(c⊥)</sub> = 1.00  
 E = 1.8E+06 psi Delta = L/ 360 C<sub>M(E)</sub> = 1.00  
 E<sub>min</sub> = .93E+06 psi Incise C<sub>i</sub>= 1.00

Stresses and Deflections		
	Actual	Allowable
F <sub>v</sub> (psi)	194.41	240
F <sub>b</sub> (psi)	2246	2351
Delta (in.)	0.24	0.28

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	25.5	31.5
S <sub>x</sub> (in <sup>3</sup> )	45.1	47.3
I (in <sup>4</sup> )	180.8	212.6

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

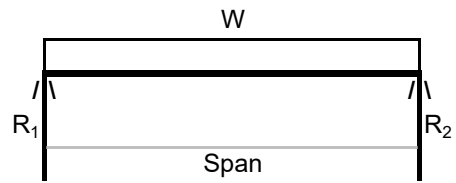
REQ'D END BEARING = 1.79 inches  
 NOTCH DEPTH = 0 inches  
 f<sub>v,NOTCH</sub> (Tension Face) = N/A < F<sub>v</sub>' = 240 psi

**USE: 3.5 x 9 IN. 24F-V4 GLB**

**RB09) GRID A HEADER @ SUNROOM**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 8.25 ft  
 Uniform Load (full span), W = 855 lb/ft  
 $V_{max} = 3527$  lb  
 $M_{max} = 7274$  lb-ft



Reactions  
 $R_1 = 3527$  lb  
 $R_2 = 3527$  lb

Nominal Beam Size:  $b = 3.5$  in.  $d = 9$  in. Number of Sections = 1  
 $b_{act} = 3.50$  in.  $d_{act} = 9.00$  in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

$C_L = 0.98$  Moisture > 19%? N  
 $F_v = 240$  psi  $LDf = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi  $C_r = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $C_{F(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi  $\delta_{TOTAL=L/} 360$   $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	137.4	<b>240</b>
Fb (psi)	1847	<b>2352</b>
Delta (in.)	0.23	<b>0.28</b>

Section Properties		
	Required	Provided
A (in2)	<b>18.04</b>	31.5
Sx (in3)	<b>37.12</b>	47.25
I (in4)	<b>180.04</b>	212.6

<b>0 INCH</b>
<b>φ HOLE</b>
<b>SEC.</b>
<b>REDUC.</b>
0.0 in3
0.0 in4

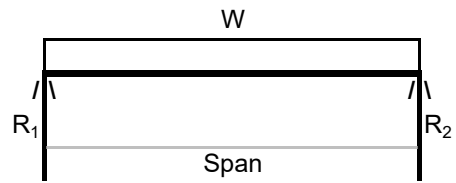
REQ'D END BEARING = 1.55 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = \_\_\_\_\_ <  $F_v' = 240$  psi

**USE: 3.5 x 9 IN. 24F-V4 GLB**

**RB10 GRID B.6 BEAM CARRYING TRUSSES**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 16.4 ft  
 Uniform Load (full span), W = 557 lb/ft  
 $V_{max} = 4567$  lb  
 $M_{max} = 18726$  lb-ft



Reactions  
 $R_1 = 4567$  lb  
 $R_2 = 4567$  lb

Nominal Beam Size: b = 5.5 in. d = 13.5 in. Number of Sections = 1  
 $b_{act} = 5.50$  in.  $d_{act} = 13.50$  in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

Post?: NO

Design Stresses and Factors:

	$C_L = 0.98$	Moisture > 19%? N
$F_v = 240$ psi	$LDf = 1.00$	$C_{M(v)} = 1.00$
$F_b = 2,400$ psi	$C_r = 1.00$	$C_{M(b)} = 1.00$
$F_{c  } = 1,650$ psi	$C_v = 1.00$	$C_{M(c  )} = 1.00$
$F_{c\perp} = 650$ psi	$C_{F(B)} = 1.00$	$C_{M(c\perp)} = 1.00$
$E = 1.8E+06$ psi	$\delta_{TOTAL=L/360}$	$C_{M(E)} = 1.00$
$E_{min} = .93E+06$ psi		Incise $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	79.6	240
Fb (psi)	1345	2340
Delta (in.)	0.45	0.55

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	24.63	74.3
Sx (in <sup>3</sup> )	96.02	167.06
I (in <sup>4</sup> )	921.34	1127.7

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

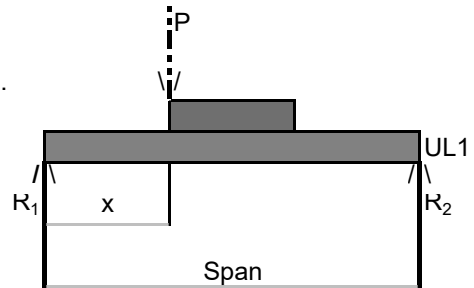
REQ'D END BEARING = 1.28 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = \_\_\_\_\_ <  $F_v' = 240$  psi

**USE: 5.5 x 13-1/2 IN. 24F-V4 GLB**

**RB11) GRID A HEADER @ KITCHEN**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.

Span = 9.4 ft



Load  
 Uniform Load 1 ( full span) = 0 lb/ft  
 Uniform Load 2 (lbs/ft) = 855 from x = 0 6.6 feet  
 Sum UL1 + UL2 = 0  
 Concentrated Load (lbs) = 2100 @ x = 6.6 feet

Reactions  
 $V_{max} = 4287$  lb  $R_1 = 4287$  lb  
 $M_{max} = 10750$  lb-ft  $R_2 = 3456$  lb

Nominal Beam Size: b = 5.5 in. d= 9 in. Number of Sections = 1  
 b<sub>act</sub> = 5.50 in. d<sub>act</sub> = 9.00 in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

$C_L = 0.99$  Moisture > 19%? N  
 $F_v = 240$  psi LDF = 1.00  $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi Cr = 1.00  $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi Cv = 1.00  $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $C_{F(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi Delta = L/ 360  $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi Incise Ci= 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	129.92	240
Fb (psi)	1737	2382
Delta (in.)	0.28	0.31

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	26.8	49.5
Sx (in <sup>3</sup> )	54.2	74.3
I (in <sup>4</sup> )	299.4	334.1

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 1.20 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = N/A <  $F_v' = 240$  psi

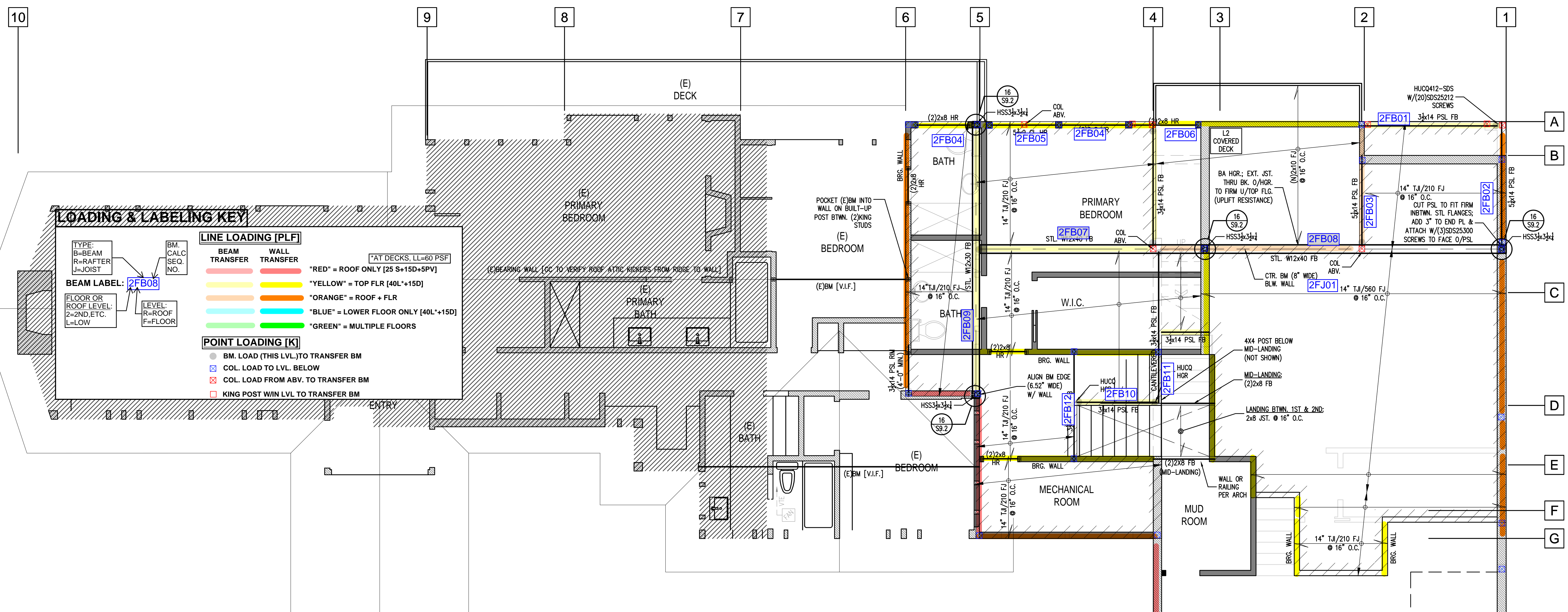
**USE: 5.5 x 9 IN. 24F-V4 GLB**





Trygstad  
ENGINEERING

**CALCULATION**  
**SECTION 3.0:**  
**L2 FLOOR**  
**FRAMING**



**LOADING & LABELING KEY**

**BEAM LABEL:** 2FB08

**TYPE:** B=BEAM, R=RAFTER, J=JOIST

**FLOOR OR ROOF LEVEL:** 2=2ND, ETC., L=LOW

**LEVEL:** R=ROOF, F=FLOOR

**BM. CALC. SEQ. NO.**

**LINE LOADING [PLF]**

BEAM TRANSFER	WALL TRANSFER	NOTES
[Red]	[Red]	*"RED" = ROOF ONLY [25 S+15D+5PV]
[Yellow]	[Yellow]	*"YELLOW" = TOP FLR [40L+15D]
[Orange]	[Orange]	*"ORANGE" = ROOF + FLR
[Blue]	[Blue]	*"BLUE" = LOWER FLOOR ONLY [40L+15D]
[Green]	[Green]	*"GREEN" = MULTIPLE FLOORS

**POINT LOADING [K]**

- BM. LOAD (THIS LVL.) TO TRANSFER BM
- ⊠ COL. LOAD TO LVL. BELOW
- ⊞ COL. LOAD FROM ABV. TO TRANSFER BM
- ⊞ KING POST WIN LVL TO TRANSFER BM

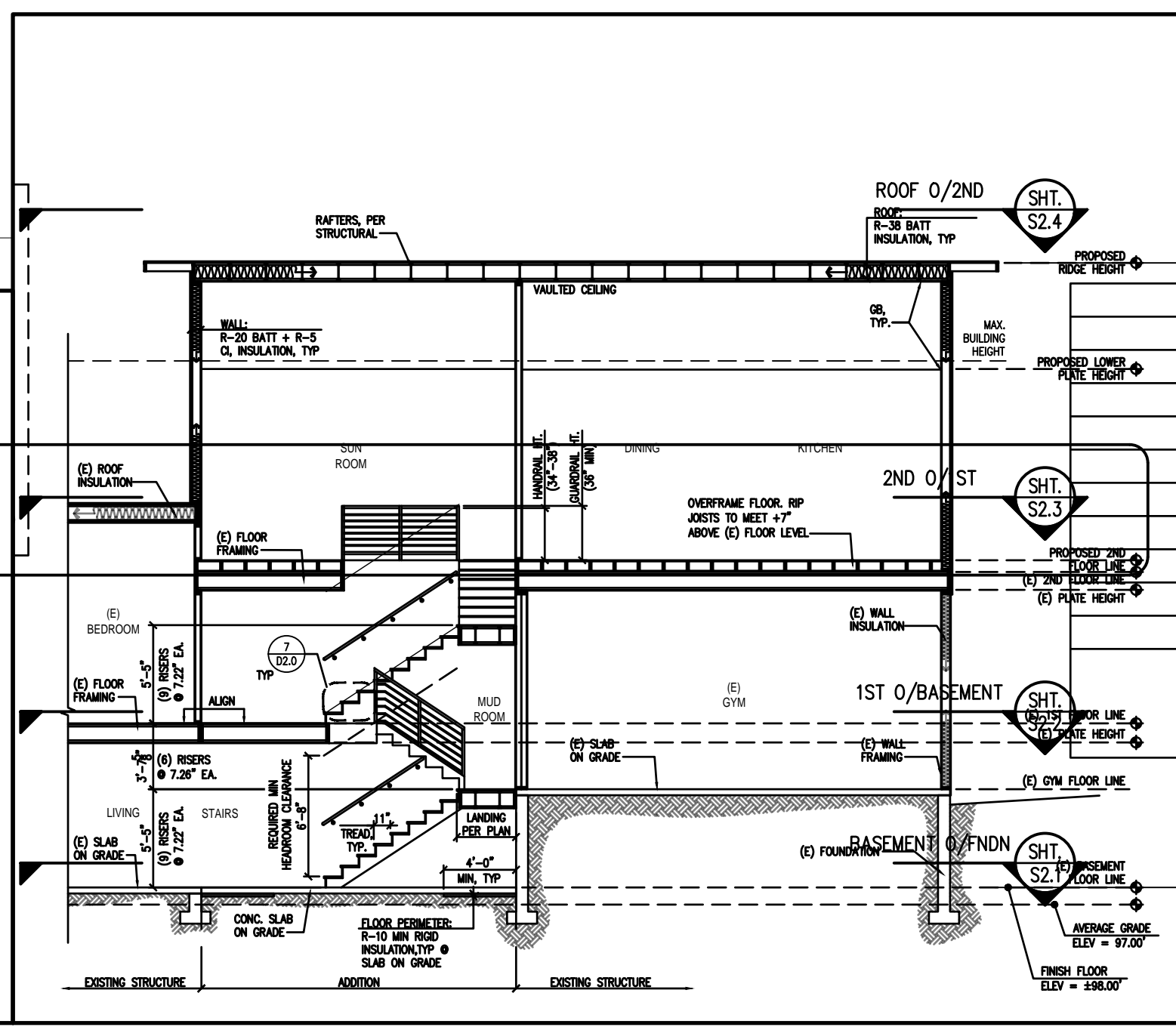
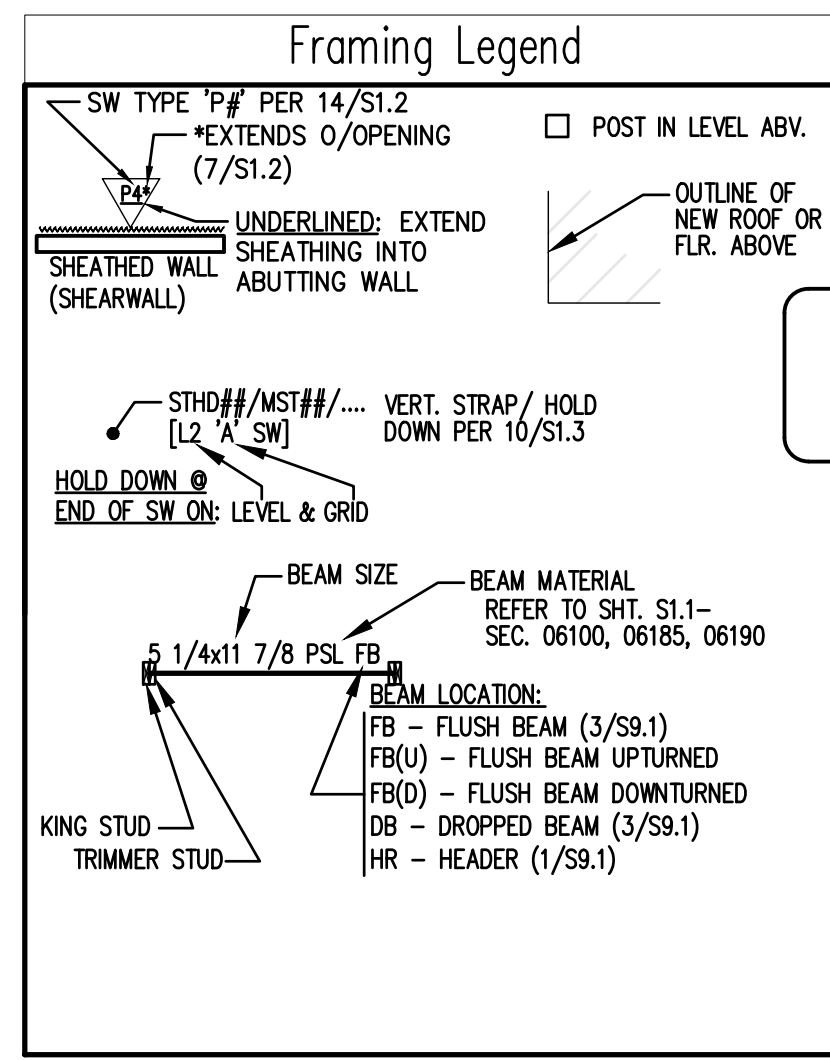
- Framing Notes**
- REFER TO S9.1 FOR TYPICAL FRAMING DETAILS
  - ROOF FRAMING - PREMANUFACTURED TRUSSES (PMT) OR RAFTERS PER PLAN. 2x4 ON-EDGE OUTRIGGERS (O.R.) @ 24" O.C.
  - FLOOR FRAMING - 14 JOISTS PER PLAN. BLOCKING AT BEARING AND SHEARWALLS SHALL BE PER BEARING AND SHEARWALL SCHEDULE (VERIFY EXIST. BRG. LOC.). FLOOR SHEATHING SHALL BE GLED AND NAILED.
  - WALLS INDICATED ARE BELOW THE FRAMING LEVEL (REFER TO SYMBOL KEY FOR TYPE). SEE BEARING WALL SCHEDULE THIS SHEET
  - PLUMBING, MECHANICAL, AND ELECTRICAL SYSTEMS SHALL BE DESIGNED AND BUILT TO ACCOMMODATE 3/8" PER FLOOR WOOD SHRINKAGE.
  - SEE DETAIL 1/59.1 FOR TYPICAL HEADER/BUNDLED STUD CONSTRUCTION.
  - SEE ARCHITECTURAL DRAWINGS FOR DRAFTSTOP AND VENTING LOCATIONS.
  - FRAMING MEMBERS AND SHEATHING SHALL BE PER STRUCTURAL NOTES AS NOTED ON SHEET S1.1
  - ALL UNLABELED EXTERIOR WALLS ARE TO BE TYPE 'P6'; SEE SHEARWALL SCHEDULE ON SHEET S1.2
  - HANGERS INDICATED ARE AS MANUFACTURED BY SIMPSON STRONG-TIE. SEE SEC. 06103/S1.1 FOR TYPICAL HANGERS, U.N.O.
  - PROVIDE JOIST OR BLOCKING AT TOP SHEARWALLS.
  - SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS AND TOP PLATE ELEVATIONS.
  - BUNDLED STUDS FROM THIS LEVEL SHALL BE CONTINUED DOWN TO FOUNDATION OR SUPPORTING BEAM. (RE: 4/S9.1)
  - ALL BEAMS AND HEADERS SHALL HAVE A MINIMUM OF (1) FULL HEIGHT STUD AT EACH END FOR BRACING TYPICAL UNLESS NOTED OTHERWISE.
  - PROVIDE MINIMUM (2) 2X BUNDLED STUDS UNDER EACH BEAM END, TYPICAL UNLESS NOTED OTHERWISE. (AT HEADERS: TRIMMER+KING=2 BUNDLED STUDS)
  - SEE DETAILS 19 & 20 ON SHEET S1.3 FOR TYPICAL CORNER FRAMING DETAILS AT HOLD DOWNS & SHEARWALLS.
  - HANGER OCCURS WHERE FLUSH BEAM HANGS TO SUPPORT BEAMS, TYP. U.N.O.

**Bearing Wall Stud Schedule**

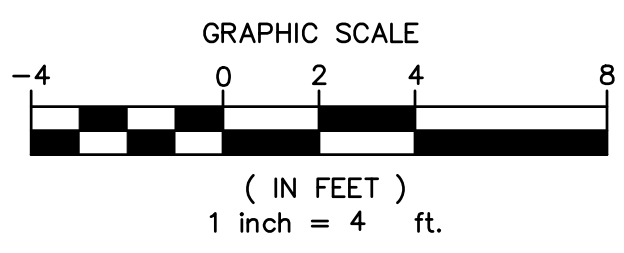
BEARING WALL TYPE	STUD SIZE AND SPACING, U.N.O.
EXTERIOR	2 X 6 AT 16" O.C., U.N.O.
INTERIOR NON-BEARING	2 X 4 AT 16 O.C.

**BEARING WALL NOTES**

- SEE SHEARWALL SCHEDULE SHEET S1.2 FOR WALL SHEATHING, ADDITIONAL PLATE AND STUD REQUIREMENTS, BLOCKING AND PLATE NAILING. SEE SAWN LUMBER STRUCTURAL NOTES SHEET S1.1 FOR SPECIES AND GRADE OF WALL PLATES AND STUDS.
- SECURE SILL PLATES TO CONCRETE WITH 5/8" DIA. ANCHOR BOLTS AT 48" ON CENTER TYPICAL UNLESS NOTED OTHERWISE. RE: S1.2 REFER TO SHEARWALL AND HOLDDOWN SCHEDULE FOR ADDITIONAL ANCHOR BOLT REQUIREMENTS. WHERE PRESERVATIVE TREATED WOOD IS USED, REFER TO THAT NOTE SECTION FOR CORROSION PROTECTION REQUIREMENTS FOR CONNECTORS.
- SEE 2/S9.1 FOR TOP PLATE SPLICE. PROVIDE ADDITIONAL CONNECTORS AT SHEARWALLS AS INDICATED ON THE PLANS.
- ALIGN STUDS UNDER JOISTS



Floor Level Elevation Keyplan  
SCALE: 1/8" = 1'-0"



Second Floor Framing Plan  
SCALE: 1/4" = 1'-0"



Note:  
PLANS PREPARED USING ARCHITECTURAL BACKGROUNDS RECEIVED 07/10/2024

**DESIGN CRITERIA**

FLOOR DEFLECTION LIMITS	CODE	360	LL
	CODE	240	TL
	SUGGEST	480	LL
	SUGGEST	360	TL

**2FJ01) FLOOR JOISTS OVER GARAGE**

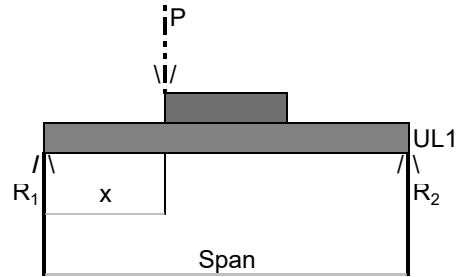
INPUT:

		14 in	TJI 560	@16in o.c.								
											23.0ft span	
											0.77 in Code LL	
											1.15 in Code TL	
											0.58 in Suggest LL	
											0.77 in Suggest TL	
		d [in]	TJI	Label	$\Delta_M/(wL^4)^{(*)}$	$\Delta_V/(wL^2)^{(*)}$	Mmax	w [plf]	Strength Limit Lmax [ft]	$\Delta_M$	$\Delta_V$	$\Delta_{M+V}$
40 psf LL	LL	14 in	TJI 560	14TJI560	2.42981E-08	1.63571E-06	11275	53.3	41.1	0.36	0.05	0.41
15 psf DL	TL Creep	14 in	TJI 560	14TJI560	2.42981E-08	1.63571E-06	11275	83.3	32.9	0.57	0.07	0.64



**2FB01) GRID A BEAM BTWN. 1:2**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 10.8 ft

Load  
 Uniform Load 1 ( full span) = 100 lb/ft  
 Uniform Load 2 (lbs/ft) = 4300 from x = 0 1 feet  
 Sum UL1 + UL2 = 100  
 Concentrated Load (lbs) = 3500 @ x = 9.9 feet

Reactions  
 $V_{max} = 4933$  lb  $R_1 = 4933$  lb  
 $M_{max} = 4150$  lb-ft  $R_2 = 3947$  lb

Nominal Beam Size: b = 3.5 in. d = 14 in. Number of Sections = 1  
 $b_{act} = 3.50$  in.  $d_{act} = 14.00$  in.

Lumber Species/Type:----- PSL REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

$C_L = 0.92$  Moisture > 19%? N  
 $F_v = 290$  psi LDF = 1.00  $C_{M(v)} = 1.00$   
 $F_b = 2,900$  psi Cr = 1.00  $C_{M(b)} = 1.00$   
 $F_{c||} = 2,900$  psi Cv = 1.00  $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 750$  psi  $CF_{(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 2.0E+06$  psi Delta = L/ 480  $C_{M(E)} = 1.00$   
 $E_{min} = .10E+07$  psi Incise Ci = 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	147.43	290
Fb (psi)	436	2669
Delta (in.)	0.06	0.27

Section Properties		
	Required	Provided
A (in2)	24.9	49.0
Sx (in3)	18.7	114.3
I (in4)	173.1	800.3

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

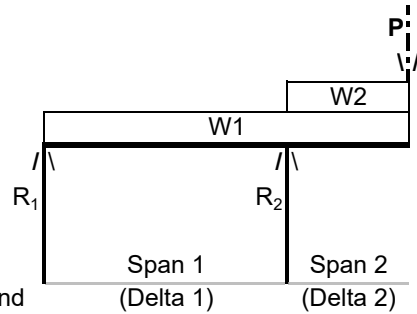
REQ'D END BEARING = 1.88 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = N/A <  $F_v' = 290$  psi

**USE: (1) 3.5 x 14 PSL**

**2FB02) GRID 1 BEM CARRYING 2FB01**

**OVERHANGING CANTILEVER**

Span 1 = 7.3 ft  
 Span 2 = 2.3 ft  
 Uniform Load W1 = 689 lb/ft  
 Add'l. Uniform Load W2 = 0 lb/ft  
 Concentrated Load = 5100 lb @ Cantilever End



$V_{max} = 6685$  lb       $R_{1Max} = 2515$  lb  
 $M_{max} = 13552$  lb-ft       $R_{2Max} = 11056$  lb

Nominal Beam Size:  $b = 5.25$  in.  $d = 14$  in.      Number of Sections = 1  
 $b_{act} = 5.25$  in.  $d_{act} = 13.50$  in.

Lumber Species/Type:----- **PSL**      REPETITIVE MEMBER?----- **N**

POST?: **NO**

Design Stresses and Factors:

$C_L = 0.99$       Moisture > 19%? **NO**  
 $F_v = 290$  psi      LDF = 1.00       $C_{M(v)} = 1.00$   
 $F_b = 2,900$  psi      Cr = 1.00       $C_{M(b)} = 1.00$   
 $F_{c||} = 2,900$  psi      Cv = 1.00       $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 750$  psi       $CF_{(B)} = 1.00$        $C_{M(c\perp)} = 1.00$   
 $E = 2.0E+06$  psi      Delta1=L/ 480       $C_{M(E)} = 1.00$   
 $E_{min} = .10E+07$  psi      Delta2=L/ 480      Incise Ci= 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	125.1	<b>290</b>
Fb (psi)	1020	<b>2863</b>
Delta1(in)	0.05	<b>0.18</b>
Delta2(in)	0.08	<b>0.12</b>

Section Properties		
	Required	Provided
A (in2)	30.6	70.9
Sx (in3)	56.8	159.5
I (1) (in4)	276.8	1076.4
I (2) (in4)	743.3	1076.4

<b>0 INCH</b>
<b>φ HOLE</b>
<b>SEC.</b>
<b>REDUC.</b>
0.0 in3
0.0 in4

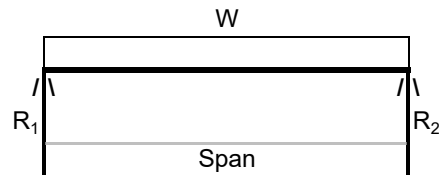
REQ'D END BEARING = 1.10 inches  
 UNBAL. UPLIFT AT R1 = -1856 LBS  
 NOTCH DEPTH = 0 inches  
 $f_{v,NOTCH}$  (Tension Face) = N/A <  $F_v = 290$  psi

**USE: (1) 5.25 x 14 PSL**

**2FB03) GRID 2 BEAM @ DECK**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 7.2 ft  
 Uniform Load (full span), W = 417 lb/ft



Reactions  
 R1 = 1501 lb  
 R2 = 1501 lb

V<sub>max</sub> = 1501 lb  
 M<sub>max</sub> = 2702 lb-ft

Nominal Beam Size: b = 2 in. d = 10 in. Number of Sections = 2  
 b<sub>act</sub> = 1.50 in. d<sub>act</sub> = 9.25 in.

Lumber Species/Type:----- HF2 REPETITIVE MEMBER?----- N  
 Post?: NO

Design Stresses and Factors:

C<sub>L</sub> = 0.98 Moisture > 19%? N  
 F<sub>v</sub> = 145 psi LDF = 1.00 C<sub>M(v)</sub> = 1.00  
 F<sub>b</sub> = 850 psi Cr = 1.00 C<sub>M(b)</sub> = 1.00  
 F<sub>c||</sub> = 1,300 psi C<sub>v</sub> = 1.00 C<sub>M(c||)</sub> = 1.00  
 F<sub>c⊥</sub> = 405 psi C<sub>F(B)</sub> = 1.10 C<sub>M(c⊥)</sub> = 1.00  
 E = 1.3E+06 psi δ<sub>TOTAL=L/</sub> 480 C<sub>M(E)</sub> = 1.00  
 E<sub>min</sub> = .47E+06 psi Incise C<sub>i</sub> = 1.00

Stresses and Deflections		
	Actual	Allowable
F <sub>v</sub> (psi)	63.8	<b>145</b>
F <sub>b</sub> (psi)	758	<b>917</b>
Delta (in.)	0.10	<b>0.18</b>

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	<b>12.20</b>	27.8
S <sub>x</sub> (in <sup>3</sup> )	<b>35.36</b>	42.78
I (in <sup>4</sup> )	<b>107.75</b>	197.9

<b>0 INCH</b>
<b>φ HOLE</b>
<b>SEC.</b>
<b>REDUC.</b>
0.0 in3
0.0 in4

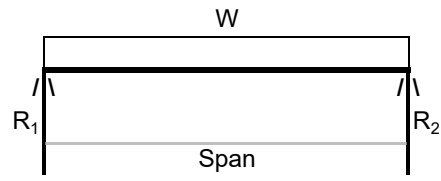
REQ'D END BEARING = 1.24 inches  
 NOTCH DEPTH = 0 inches  
 f<sub>v,NOTCH</sub> (Tension Face) = < F<sub>v</sub>' = 145 psi

**USE: (2) 2 x 10 HF2**

**2FB04) TYP HDR UNO**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 5.3 ft  
 Uniform Load (full span), W = 375 lb/ft



V<sub>max</sub> = 994 lb  
 M<sub>max</sub> = 1317 lb-ft

Reactions  
 R<sub>1</sub> = 994 lb  
 R<sub>2</sub> = 994 lb

Nominal Beam Size: b = 2 in. d = 8 in. Number of Sections = 2  
 b<sub>act</sub> = 1.50 in. d<sub>act</sub> = 7.25 in.

Lumber Species/Type:----- HF2 REPETITIVE MEMBER?----- N  
 Post?: NO

Design Stresses and Factors:

C<sub>L</sub> = 0.99 Moisture > 19%? N  
 F<sub>v</sub> = 145 psi LDF = 1.00 C<sub>M(v)</sub> = 1.00  
 F<sub>b</sub> = 850 psi Cr = 1.00 C<sub>M(b)</sub> = 1.00  
 F<sub>c||</sub> = 1,300 psi C<sub>v</sub> = 1.00 C<sub>M(c||)</sub> = 1.00  
 F<sub>c⊥</sub> = 405 psi C<sub>F(B)</sub> = 1.20 C<sub>M(c⊥)</sub> = 1.00  
 E = 1.3E+06 psi δ<sub>TOTAL=L/</sub> 480 C<sub>M(E)</sub> = 1.00  
 E<sub>min</sub> = .47E+06 psi Incise C<sub>i</sub> = 1.00

Stresses and Deflections		
	Actual	Allowable
F <sub>v</sub> (psi)	52.9	145
F <sub>b</sub> (psi)	601	1009
Delta (in.)	0.05	0.13

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	7.94	21.8
S <sub>x</sub> (in <sup>3</sup> )	15.66	26.28
I (in <sup>4</sup> )	38.65	95.3

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

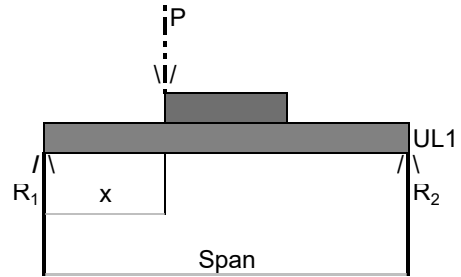
REQ'D END BEARING = 0.82 inches  
 NOTCH DEPTH = 0 inches  
 f<sub>V,NOTCH</sub> (Tension Face) = \_\_\_\_\_ < F<sub>v</sub>' = 145 psi

**USE: (2) 2 x 8 HF2**

**2FB05) GRID A HEADER CARRYING POST ABV**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.

Span = 5.1 ft



Uniform Load 1 ( full span) = 375 lb/ft  
 Uniform Load 2 (lbs/ft) = 0 from x = 0 to 2.7 feet  
 Sum UL1 + UL2 = 375  
 Concentrated Load (lbs) = 7700 @ x = 2.7 feet

Reactions  
 $V_{max} = 5033$  lb  $R_1 = 4580$  lb  
 $M_{max} = 10916$  lb-ft  $R_2 = 5033$  lb

Nominal Beam Size: b = 5.5 in. d = 9 in. Number of Sections = 1  
 $b_{act} = 5.50$  in.  $d_{act} = 9.00$  in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N  
 POST?: NO

Design Stresses and Factors:

$C_L = 1.00$  Moisture > 19%? N  
 $F_v = 240$  psi  $LDf = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi  $C_r = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $CF_{(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi  $\Delta = L/480$   $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi  $Incise C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	143.98	240
Fb (psi)	1764	2390
Delta (in.)	0.07	0.13

Section Properties		
	Required	Provided
A (in2)	29.7	49.5
Sx (in3)	54.8	74.3
I (in4)	183.7	334.1

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

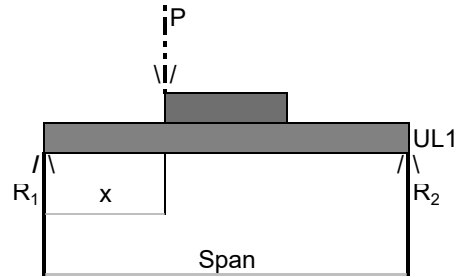
REQ'D END BEARING = 1.41 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = N/A <  $F_v' = 240$  psi

**USE: 5.5 x 9 IN. 24F-V4 GLB**

**2FB06) GRID A WDW HDR IN PRIM. BED CARRYING DECK**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.

Span = 5.1 ft



Load  
 Uniform Load 1 ( full span) = 375 lb/ft  
 Uniform Load 2 (lbs/ft) = 345 from x = 1.6 5.1 feet  
 Sum UL1 + UL2 = 375  
 Concentrated Load (lbs) = 6100 @ x = 2.55 feet

Reactions  
 $V_{max} = 4799$  lb  $R_1 = 4421$  lb  
 $M_{max} = 9898$  lb-ft  $R_2 = 4799$  lb

Nominal Beam Size: b = 5.5 in. d = 9 in. Number of Sections = 1  
 $b_{act} = 5.50$  in.  $d_{act} = 9.00$  in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

$C_L = 1.00$  Moisture > 19%? N  
 $F_v = 240$  psi LDF = 1.00  $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi Cr = 1.00  $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi Cv = 1.00  $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $CF_{(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi Delta = L/ 480  $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi Incise Ci = 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	136.91	240
Fb (psi)	1600	2390
Delta (in.)	0.06	0.13

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	28.2	49.5
Sx (in <sup>3</sup> )	49.7	74.3
I (in <sup>4</sup> )	169.6	334.1

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 1.34 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = N/A <  $F_v' = 240$  psi

**USE: 5.5 x 9 IN. 24F-V4 GLB**

**2FB07-2FB09: REFER TO ENERCALC OUTPUT**

**Steel Beam**

Project File: 24307 Tam Cem.ec6

LIC# : KW-06020766, Build:20.24.07.08

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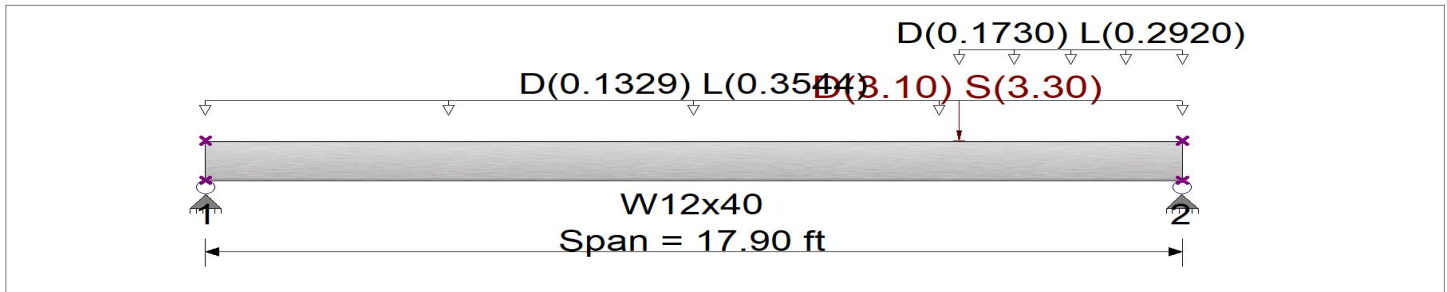
**DESCRIPTION:** 2FB07) GRID B.7 BM BTWN. 3.2:5

**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2021, ASCE 7-16  
Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

**Material Properties**

Analysis Method : Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing : Completely Unbraced	E : Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		



**Applied Loads**

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

Beam self weight calculated and added to loading  
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.860 ft  
 Uniform Load : D = 0.1730, L = 0.2920 k/ft, Extent = 13.80 -->> 17.90 ft, Tributary Width = 1.0 ft, (DECK)  
 Point Load : D = 3.10, S = 3.30 k @ 13.80 ft

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio =</b>	<b>0.305 : 1</b>	<b>Maximum Shear Stress Ratio =</b>	<b>0.129 : 1</b>
Section used for this span	<b>W12x40</b>	Section used for this span	<b>W12x40</b>
Ma : Applied	31.024 k-ft	Va : Applied	9.075 k
Mn / Omega : Allowable	101.829 k-ft	Vn/Omega : Allowable	70.210 k
Load Combination	+D+0.750L+0.5250S	Load Combination	+D+0.750L+0.5250S
Location of maximum on span	17.900 ft	Location of maximum on span	17.900 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
<b>Maximum Deflection</b>			
Max Downward Transient Deflection	0.102 in	Ratio = 2,113	>=480. Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio = 0	<480.0 n/a
Max Downward Total Deflection	0.199 in	Ratio = 1078	>=360. Span: 1 : +D+0.750L+0.5250S
Max Upward Total Deflection	0 in	Ratio = 0	<360.0 n/a

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
D Only														
Dsgn. L = 17.90 ft		1	0.155	0.065	15.82		15.82	170.05	101.83	1.00	1.00	4.57	105.32	70.21
+D+L														
Dsgn. L = 17.90 ft		1	0.297	0.125	30.25		30.25	170.05	101.83	1.00	1.00	8.80	105.32	70.21
+D+0.70S														
Dsgn. L = 17.90 ft		1	0.227	0.090	23.09		23.09	170.05	101.83	1.00	1.00	6.35	105.32	70.21
+D+0.750L														
Dsgn. L = 17.90 ft		1	0.260	0.110	26.48		26.48	170.05	101.83	1.00	1.00	7.74	105.32	70.21
+D+0.750L+0.5250S														
Dsgn. L = 17.90 ft		1	0.305	0.129	31.02		31.02	170.05	101.83	1.00	1.00	9.08	105.32	70.21
+0.60D														
Dsgn. L = 17.90 ft		1	0.093	0.039	9.49		9.49	170.05	101.83	1.00	1.00	2.74	105.32	70.21
+D+0.750L+0.10S														
Dsgn. L = 17.90 ft		1	0.268	0.114	27.32		27.32	170.05	101.83	1.00	1.00	7.99	105.32	70.21

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.5250S	1	0.1993	9.461		0.0000	0.000

**Vertical Reactions**

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.648	9.075

**Steel Beam**

Project File: 24307 Tam Cem.ec6

LIC# : KW-06020766, Build:20.24.07.08

TRYGSTAD ENGINEERING

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**DESCRIPTION:** 2FB07) GRID B.7 BM BTWN. 3.2:5

**Vertical Reactions**

Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Combinations	5.648	9.075
Max Upward from Load Cases	3.309	4.565
D Only	2.339	4.565
+D+L	5.648	8.797
+D+0.70S	2.868	6.346
+D+0.750L	4.820	7.739
+D+0.750L+0.5250S	5.217	9.075
+0.60D	1.403	2.739
+D+0.750L+0.10S	4.896	7.994
L Only	3.309	4.232
S Only	0.756	2.544

**Steel Beam**

Project File: 24307 Tam Cem.ec6

LIC# : KW-06020766, Build:20.24.07.08

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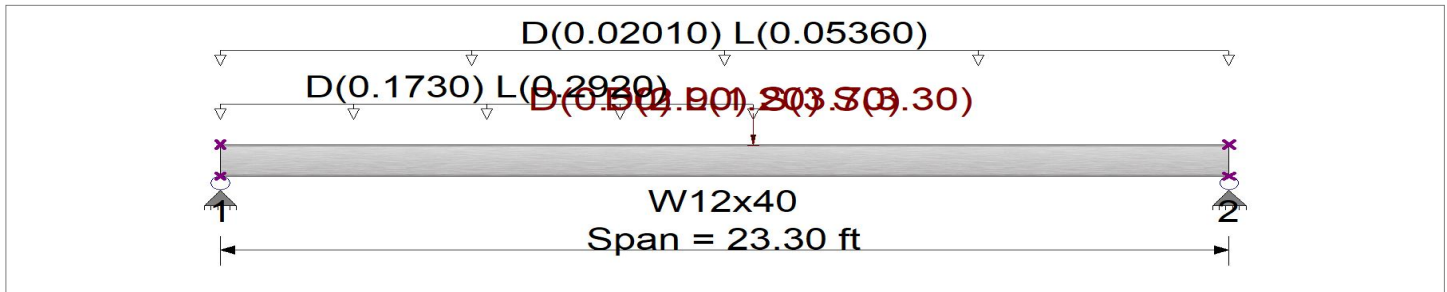
**DESCRIPTION:** 2FB08) GRID B.7 BM BTWN. 1:3.2

**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2021, ASCE 7-16  
Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

**Material Properties**

Analysis Method : Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing : Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		



**Applied Loads**

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

Beam self weight calculated and added to loading  
Load for Span Number 1

- Uniform Load : D = 0.1730, L = 0.2920 k/ft, Extent = 0.0 --> 12.30 ft, Tributary Width = 1.0 ft, (DECK)
- Point Load : D = 0.50, L = 1.20, S = 3.30 k @ 12.30 ft, (2FB03)
- Point Load : D = 2.90, S = 3.70 k @ 12.30 ft, (POST (RB10 RB12))
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.340 ft

**DESIGN SUMMARY**

**Design OK**

Maximum Bending Stress Ratio =	<b>0.851</b> : 1	Maximum Shear Stress Ratio =	<b>0.121</b> : 1
Section used for this span	<b>W12x40</b>	Section used for this span	<b>W12x40</b>
Ma : Applied	67.007 k-ft	Va : Applied	8.482 k
Mn / Omega : Allowable	78.747 k-ft	Vn/Omega : Allowable	70.210 k
Load Combination	+D+0.750L+0.5250S	Load Combination	+D+0.750L+0.5250S
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
<b>Maximum Deflection</b>			
Max Downward Transient Deflection	0.358 in Ratio =	<b>780</b> >=480.	Span: 1 : S Only
Max Upward Transient Deflection	0 in Ratio =	<b>0</b> <480.0	n/a
Max Downward Total Deflection	0.643 in Ratio =	<b>435</b> >=360.	Span: 1 : +D+0.750L+0.5250S
Max Upward Total Deflection	0 in Ratio =	<b>0</b> <360.0	n/a

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
D Only														
Dsgn. L =	23.30 ft	1	0.380	0.055	29.95		29.95	131.51	78.75	1.00	1.00	3.87	105.32	70.21
+D+L														
Dsgn. L =	23.30 ft	1	0.647	0.110	50.98		50.98	131.51	78.75	1.00	1.00	7.71	105.32	70.21
+D+0.70S														
Dsgn. L =	23.30 ft	1	0.741	0.088	58.36		58.36	131.51	78.75	1.00	1.00	6.18	105.32	70.21
+D+0.750L														
Dsgn. L =	23.30 ft	1	0.581	0.096	45.72		45.72	131.51	78.75	1.00	1.00	6.75	105.32	70.21
+D+0.750L+0.5250S														
Dsgn. L =	23.30 ft	1	0.851	0.121	67.01		67.01	131.51	78.75	1.00	1.00	8.48	105.32	70.21
+0.60D														
Dsgn. L =	23.30 ft	1	0.228	0.033	17.97		17.97	131.51	78.75	1.00	1.00	2.32	105.32	70.21
+D+0.750L+0.10S														
Dsgn. L =	23.30 ft	1	0.632	0.101	49.77		49.77	131.51	78.75	1.00	1.00	7.08	105.32	70.21

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.5250S	1	0.6426	11.650		0.0000	0.000

**Steel Beam**

Project File: 24307 Tam Cem.ec6

LIC# : KW-06020766, Build:20.24.07.08

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**DESCRIPTION:** 2FB08) GRID B.7 BM BTWN. 1:3.2

**Vertical Reactions**

Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.482	6.651
Max Upward from Load Combinations	8.482	6.651
Max Upward from Load Cases	3.872	3.695
D Only	3.872	3.057
+D+L	7.706	5.263
+D+0.70S	6.185	5.643
+D+0.750L	6.747	4.711
+D+0.750L+0.5250S	8.482	6.651
+0.60D	2.323	1.834
+D+0.750L+0.10S	7.078	5.081
L Only	3.835	2.206
S Only	3.305	3.695

**Steel Beam**

Project File: 24307 Tam Cem.ec6

LIC# : KW-06020766, Build:20.24.07.08

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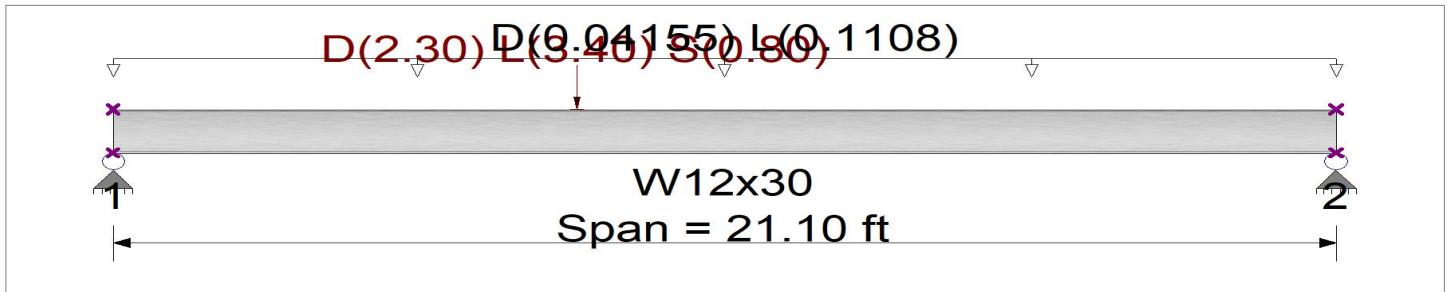
**DESCRIPTION:** 2FB09) GRID 5 BM BTWN. B.5:C.6 CARRYING 2FB07

**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2021, ASCE 7-16  
Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

**Material Properties**

Analysis Method : Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing : Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis : Major Axis Bending		



**Applied Loads**

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

Beam self weight NOT internally calculated and added  
Load(s) for Span Number 1  
Point Load : D = 2.30, L = 3.40, S = 0.80 k @ 8.0 ft, (2FB07)  
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 2.770 ft

**DESIGN SUMMARY**

**Design OK**

Maximum Bending Stress Ratio =	<b>0.836</b> : 1	Maximum Shear Stress Ratio =	<b>0.080</b> : 1
Section used for this span	<b>W12x30</b>	Section used for this span	<b>W12x30</b>
Ma : Applied	36.262 k-ft	Va : Applied	5.146 k
Mn / Omega : Allowable	43.377 k-ft	Vn/Omega : Allowable	63.960 k
Load Combination	+D+L	Load Combination	+D+L
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
<b>Maximum Deflection</b>			
Max Downward Transient Deflection	0.226 in	Ratio = <b>1,118</b>	>=360 Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio = <b>0</b>	<360 n/a
Max Downward Total Deflection	0.358 in	Ratio = <b>707</b>	>=180 Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio = <b>0</b>	<180 n/a

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega	
D Only															
Dsgn. L = 21.10 ft		1	0.313	0.029	13.59		13.59	72.44	43.38	1.00	1.00	1.87	95.94	63.96	
+D+L															
Dsgn. L = 21.10 ft		1	0.836	0.080	36.26		36.26	72.44	43.38	1.00	1.00	5.15	95.94	63.96	
+D+0.70S															
Dsgn. L = 21.10 ft		1	0.377	0.035	16.36		16.36	72.44	43.38	1.00	1.00	2.21	95.94	63.96	
+D+0.750L															
Dsgn. L = 21.10 ft		1	0.705	0.068	30.59		30.59	72.44	43.38	1.00	1.00	4.33	95.94	63.96	
+D+0.750L+0.5250S															
Dsgn. L = 21.10 ft		1	0.753	0.072	32.68		32.68	72.44	43.38	1.00	1.00	4.59	95.94	63.96	
+0.60D															
Dsgn. L = 21.10 ft		1	0.188	0.018	8.15		8.15	72.44	43.38	1.00	1.00	1.12	95.94	63.96	
+D+0.750L+0.10S															
Dsgn. L = 21.10 ft		1	0.714	0.068	30.99		30.99	72.44	43.38	1.00	1.00	4.38	95.94	63.96	

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3580	10.068		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.146	3.768

**Steel Beam**

Project File: 24307 Tam Cem.ec6

LIC# : KW-06020766, Build:20.24.07.08

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(c) ENERCALC INC 1983-2023

**DESCRIPTION:** 2FB09) GRID 5 BM BTWN. B.5:C.6 CARRYING 2FB07

**Vertical Reactions**

Support notation : Far left is #

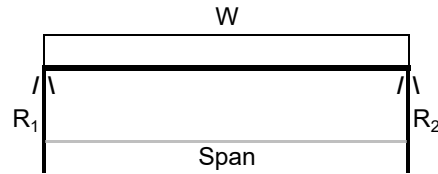
Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Combinations	5.146	3.768
Max Upward from Load Cases	3.280	2.458
D Only	1.866	1.310
+D+L	5.146	3.768
+D+0.70S	2.214	1.523
+D+0.750L	4.326	3.154
+D+0.750L+0.5250S	4.587	3.313
+0.60D	1.120	0.786
+D+0.750L+0.10S	4.376	3.184
L Only	3.280	2.458
S Only	0.497	0.303

**2FB10) GRID D BEAM @ END OF CANTILEVERED FLOOR**

**SIMPLE SPAN - UNIFORM LOAD**

Span = 6.6 ft  
 Uniform Load (full span), W = 105 lb/ft  
 $V_{max} = 347$  lb  
 $M_{max} = 572$  lb-ft



Reactions  
 $R_1 = 347$  lb  
 $R_2 = 347$  lb

Nominal Beam Size:  $b = 3.5$  in.  $d = 14$  in. Number of Sections = 1  
 $b_{act} = 3.50$  in.  $d_{act} = 14.00$  in.

Lumber Species/Type:----- PSL REPETITIVE MEMBER?----- N  
 Post?: NO

Design Stresses and Factors:

$C_L = 0.96$  Moisture > 19%? N  
 $F_v = 290$  psi  $LDF = 1.00$   $C_{M(v)} = 1.00$   
 $F_b = 2,900$  psi  $C_r = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 2,900$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 750$  psi  $C_{F(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 2.0E+06$  psi  $\delta_{TOTAL=L/}$  480  $C_{M(E)} = 1.00$   
 $E_{min} = .10E+07$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	6.9	<b>290</b>
Fb (psi)	60	<b>2796</b>
Delta (in.)	0.00	<b>0.17</b>

Section Properties		
	Required	Provided
A (in2)	<b>1.16</b>	49.0
Sx (in3)	<b>2.45</b>	114.33
I (in4)	<b>13.58</b>	800.3

<b>0 INCH</b>
<b>φ HOLE</b>
<b>SEC.</b>
<b>REDUC.</b>
0.0 in3
0.0 in4

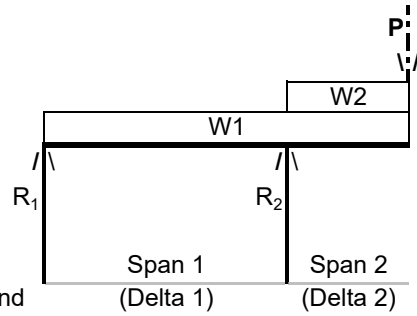
REQ'D END BEARING = 0.13 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = \_\_\_\_\_ <  $F_v' = 290$  psi

**USE: (1) 3.5 x 14 PSL**

**2FB11) BEAM (LOOKUP NAME "CBO")**

OVERHANGING CANTILEVER

Span 1 = 7.9 ft  
 Span 2 = 3.8 ft  
 Uniform Load W1 = 73.7 lb/ft  
 Add'l. Uniform Load W2 = 0 lb/ft  
 Concentrated Load = 400 lb @ Cantilever End



$V_{max} = 680$  lb       $R_{1Max} = 291$  lb  
 $M_{max} = 2052$  lb-ft       $R_{2Max} = 1231$  lb

Nominal Beam Size: b = 3.5 in. d = 14 in. Number of Sections = 1  
 b<sub>act</sub> = 3.50 in. d<sub>act</sub> = 14.00 in.

Lumber Species/Type:----- PSL      REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

$C_L = 0.95$       Moisture > 19%? NO  
 $F_v = 290$  psi      LDF = 1.00       $C_{M(v)} = 1.00$   
 $F_b = 2,900$  psi      Cr = 1.00       $C_{M(b)} = 1.00$   
 $F_{c||} = 2,900$  psi      Cv = 1.00       $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 750$  psi       $CF_{(B)} = 1.00$        $C_{M(c\perp)} = 1.00$   
 $E = 2.0E+06$  psi      Delta1=L/ 480       $C_{M(E)} = 1.00$   
 $E_{min} = .10E+07$  psi      Delta2=L/ 480      Incise Ci= 1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	18.2	<b>290</b>
Fb (psi)	215	<b>2759</b>
Delta1(in)	0.01	<b>0.20</b>
Delta2(in)	0.03	<b>0.19</b>

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	3.1	49.0
Sx (in <sup>3</sup> )	8.9	114.3
I (1) (in <sup>4</sup> )	35.9	800.3
I (2) (in <sup>4</sup> )	135.4	800.3

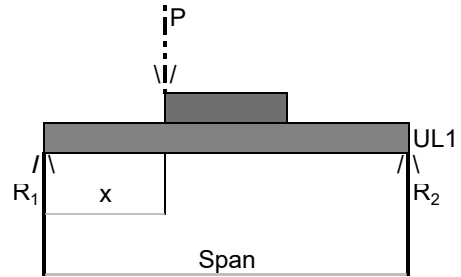
<b>0 INCH φ HOLE SEC. REDUC.</b>
0.0 in3
0.0 in4

REQ'D END BEARING = 0.24 inches  
 UNBAL. UPLIFT AT R1 = -260 LBS  
 NOTCH DEPTH = 0 inches  
 $f_{v,NOTCH}$  (Tension Face) = N/A <  $F_v = 290$  psi

**USE: (1) 3.5 x 14 PSL**

**2FB12 GRID 4.5 BM CARRYING 2FB10**

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 8.4 ft

Uniform Load 1 ( full span) = 73.7 lb/ft  
 Uniform Load 2 (lbs/ft) = 0 from x = 0 to 4.4 feet  
 Sum UL1 + UL2 = 74  
 Concentrated Load (lbs) = 400 @ x = 4.4 feet

$V_{max} = 519$  lb  
 $M_{max} = 1468$  lb-ft  
 Reactions  
 $R_1 = 500$  lb  
 $R_2 = 519$  lb

Nominal Beam Size: b = 5.125 in. d = 12 in. Number of Sections = 1  
 b<sub>act</sub> = 5.13 in. d<sub>act</sub> = 12.00 in.

Lumber Species/Type:----- GLB REPETITIVE MEMBER?----- N

POST?: NO

Design Stresses and Factors:

$C_L = 0.99$  Moisture > 19%? N  
 $F_v = 240$  psi LDF = 1.00  $C_{M(v)} = 1.00$   
 $F_b = 2,400$  psi  $C_r = 1.00$   $C_{M(b)} = 1.00$   
 $F_{c||} = 1,650$  psi  $C_v = 1.00$   $C_{M(c||)} = 1.00$   
 $F_{c\perp} = 650$  psi  $C_{F(B)} = 1.00$   $C_{M(c\perp)} = 1.00$   
 $E = 1.8E+06$  psi Delta = L/ 480  $C_{M(E)} = 1.00$   
 $E_{min} = .93E+06$  psi Incise  $C_i = 1.00$

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	10.86	240
Fb (psi)	143	2371
Delta (in.)	0.01	0.21

Section Properties		
	Required	Provided
A (in <sup>2</sup> )	2.8	61.5
Sx (in <sup>3</sup> )	7.4	123.0
I (in <sup>4</sup> )	44.1	738.0

0 INCH φ HOLE SEC. REDUC.
0.0 in3
0.0 in4

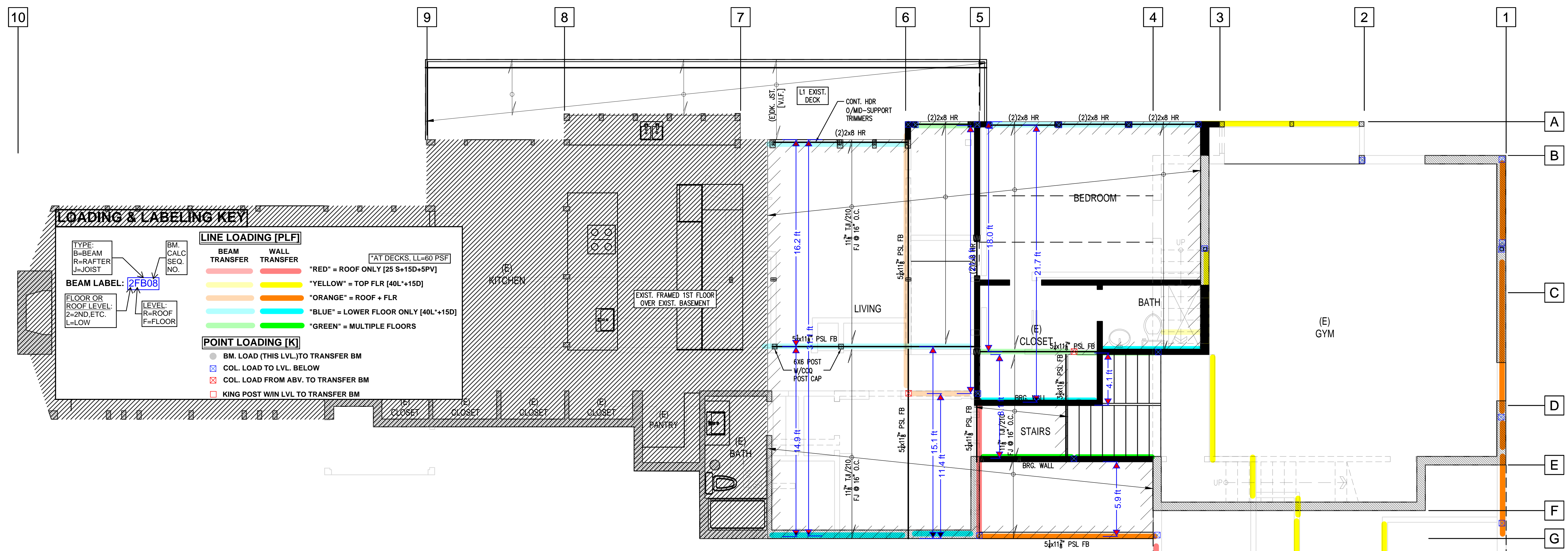
REQ'D END BEARING = 0.16 inches  
 NOTCH DEPTH = 0 inches  
 $f_{V,NOTCH}$  (Tension Face) = N/A <  $F_v' = 240$  psi

**USE: 5-1/8 IN. x 12 IN. 24F-V4 GLB**



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**CALCULATION**  
**SECTION 4.0:**  
**L1 FLOOR**  
**FRAMING**



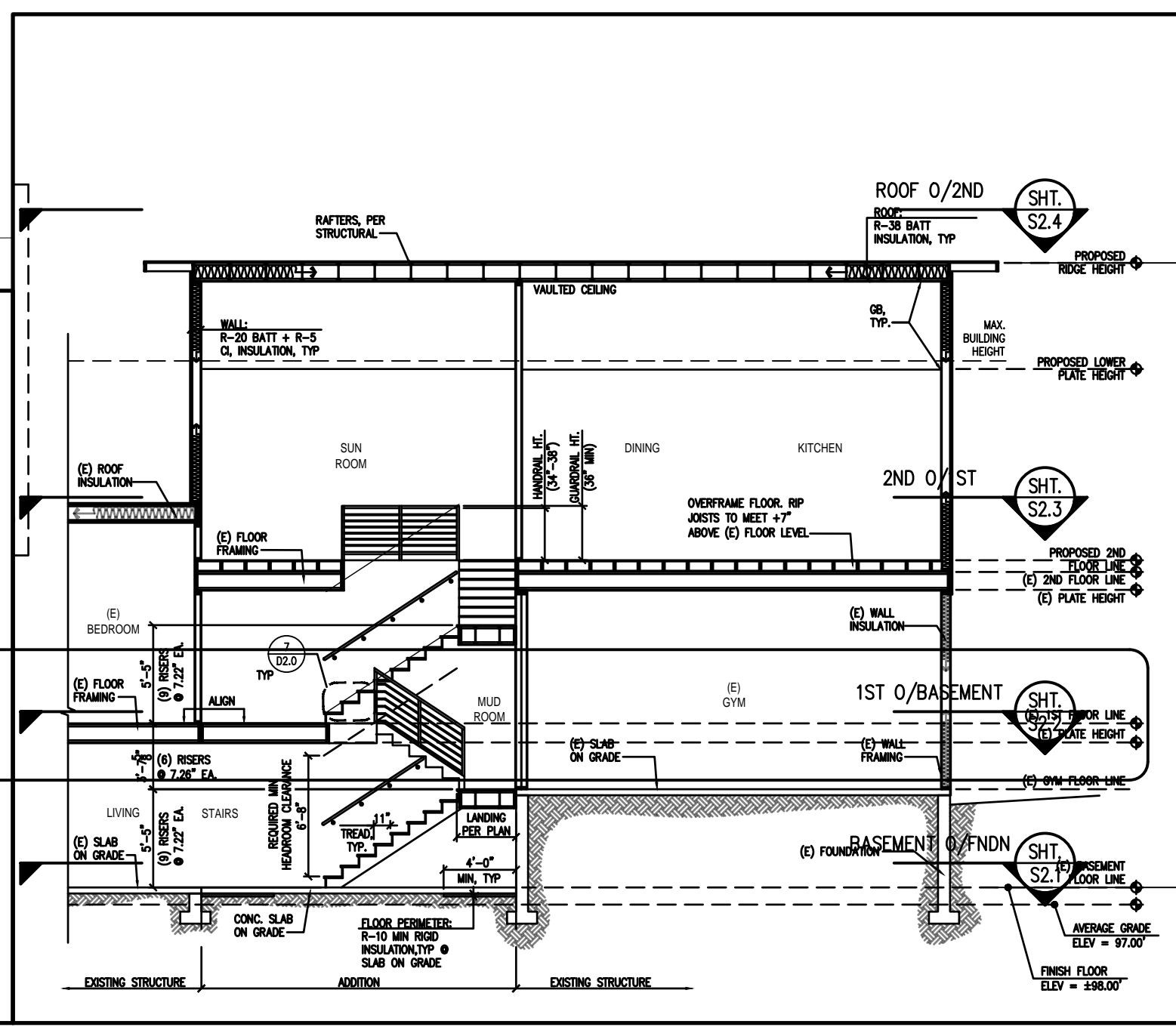
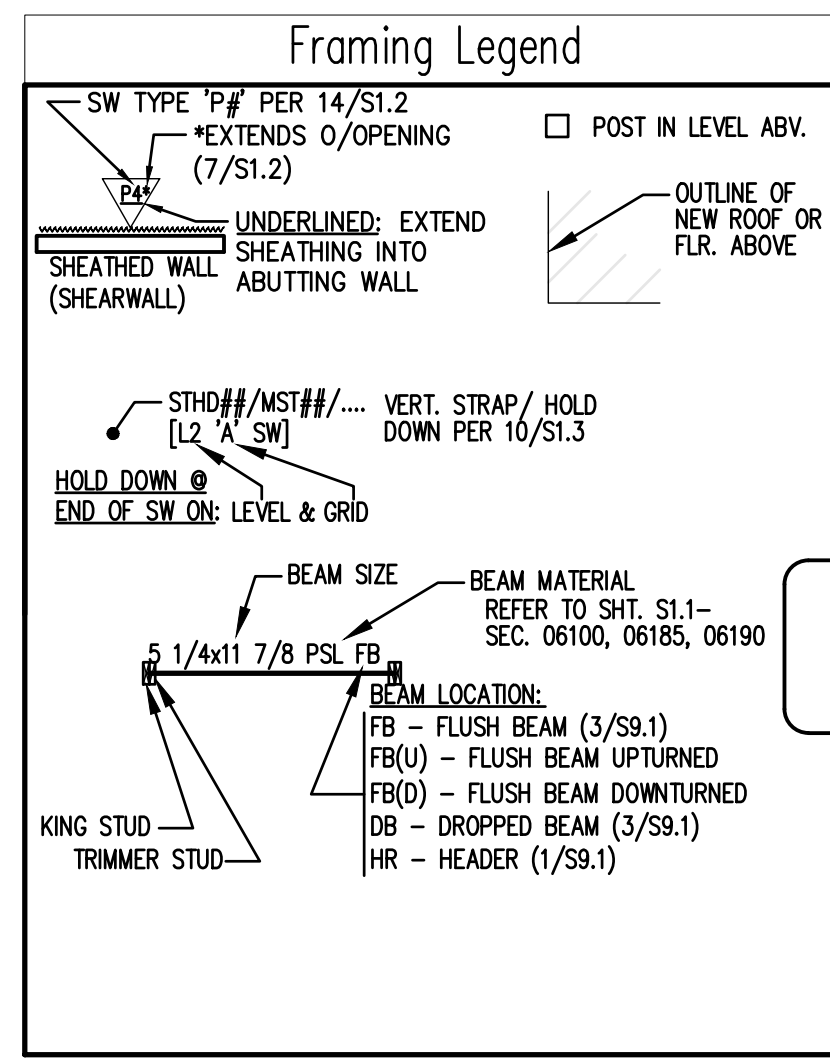
- ### Framing Notes
- REFER TO S9.1 FOR TYPICAL FRAMING DETAILS
  - ROOF FRAMING - PREMANUFACTURED TRUSSES (PMT) OR RAFTERS PER PLAN. 2x4 ON-EDGE OUTRIGGERS (O.R.) @ 24" O.C.
  - FLOOR FRAMING - 1x4 JOISTS PER PLAN. BLOCKING AT BEARING AND SHEARWALLS SHALL BE PER BEARING AND SHEARWALL SCHEDULE (VERIFY EXIST. BRG. LOC.). FLOOR SHEATHING SHALL BE GLUED AND NAILED.
  - WALLS INDICATED ARE BELOW THE FRAMING LEVEL (REFER TO SYMBOL KEY FOR TYPE). SEE BEARING WALL SCHEDULE THIS SHEET
  - PLUMBING, MECHANICAL, AND ELECTRICAL SYSTEMS SHALL BE DESIGNED AND BUILT TO ACCOMMODATE 3/8" PER FLOOR WOOD SHRINKAGE.
  - SEE DETAIL 1/59.1 FOR TYPICAL HEADER/BUNDLED STUD CONSTRUCTION.
  - SEE ARCHITECTURAL DRAWINGS FOR DRAFTSTOP AND VENTING LOCATIONS.
  - FRAMING MEMBERS AND SHEATHING SHALL BE PER STRUCTURAL NOTES AS NOTED ON SHEET S1.1
  - ALL UNLABELED EXTERIOR WALLS ARE TO BE TYPE 'P6'; SEE SHEARWALL SCHEDULE ON SHEET S1.2
  - HANGERS INDICATED ARE AS MANUFACTURED BY SIMPSON STRONG-TIE. SEE SEC. 06103/S1.1 FOR TYPICAL HANGERS, U.N.O.
  - PROVIDE JOIST OR BLOCKING AT TOP SHEARWALLS.
  - SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS AND TOP PLATE ELEVATIONS.
  - BUNDLED STUDS FROM THIS LEVEL SHALL BE CONTINUED DOWN TO FOUNDATION OR SUPPORTING BEAM. (RE: 4/S9.1)
  - ALL BEAMS AND HEADERS SHALL HAVE A MINIMUM OF (1) FULL HEIGHT STUD AT EACH END FOR BRACING TYPICAL UNLESS NOTED OTHERWISE.
  - PROVIDE MINIMUM (2) 2x BUNDLED STUDS UNDER EACH BEAM END, TYPICAL UNLESS NOTED OTHERWISE. (AT HEADERS: TRIMMER+KING=2 BUNDLED STUDS)
  - SEE DETAILS 19 & 20 ON SHEET S1.3 FOR TYPICAL CORNER FRAMING DETAILS AT HOLD DOWNS & SHEARWALLS.
  - HANGER OCCURS WHERE FLUSH BEAM HANGS TO SUPPORT BEAMS, TYP. U.N.O.

### Bearing Wall Stud Schedule

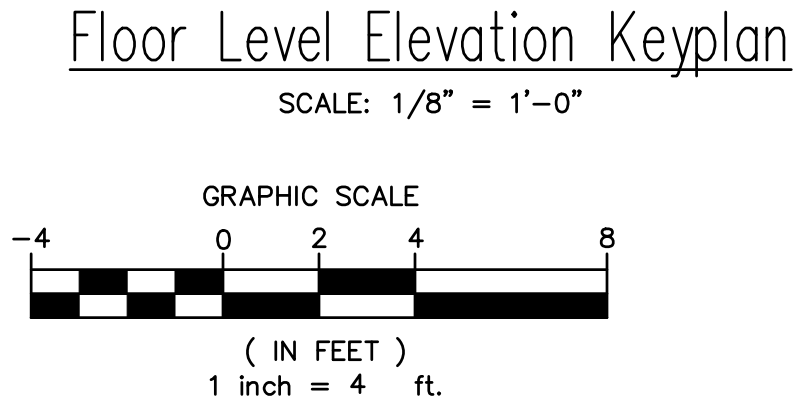
BEARING WALL TYPE	STUD SIZE AND SPACING, U.N.O.
EXTERIOR	2 X 6 AT 16" O.C., U.N.O.
INTERIOR NON-BEARING	2 X 4 AT 16 O.C.

**BEARING WALL NOTES**

- SEE SHEARWALL SCHEDULE SHEET S1.2 FOR WALL SHEATHING, ADDITIONAL PLATE AND STUD REQUIREMENTS, BLOCKING AND PLATE NAILING. SEE SAWN LUMBER STRUCTURAL NOTES SHEET S1.1 FOR SPECIES AND GRADE OF WALL PLATES AND STUDS.
- SECURE SILL PLATES TO CONCRETE WITH 5/8" DIA. ANCHOR BOLTS AT 48" ON CENTER TYPICAL UNLESS NOTED OTHERWISE. RE: S1.2 REFER TO SHEARWALL AND HOLDDOWN SCHEDULE FOR ADDITIONAL ANCHOR BOLT REQUIREMENTS. WHERE PRESERVATIVE TREATED WOOD IS USED, REFER TO THAT NOTE SECTION FOR CORROSION PROTECTION REQUIREMENTS FOR CONNECTORS.
- SEE 2/S9.1 FOR TOP PLATE SPLICE. PROVIDE ADDITIONAL CONNECTORS AT SHEARWALLS AS INDICATED ON THE PLANS.
- ALIGN STUDS UNDER JOISTS



Note:  
PLANS PREPARED USING  
ARCHITECTURAL BACKGROUNDS  
RECEIVED 07/10/2024

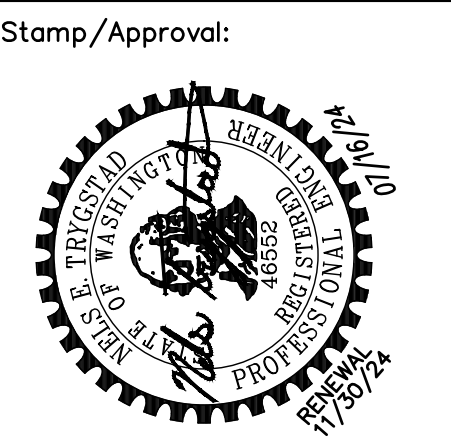


Main Floor Framing Plan

SCALE: 1/4" = 1'-0"



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Sheet Name:

MAIN FLOOR FRAMING PLAN

Sheet No:

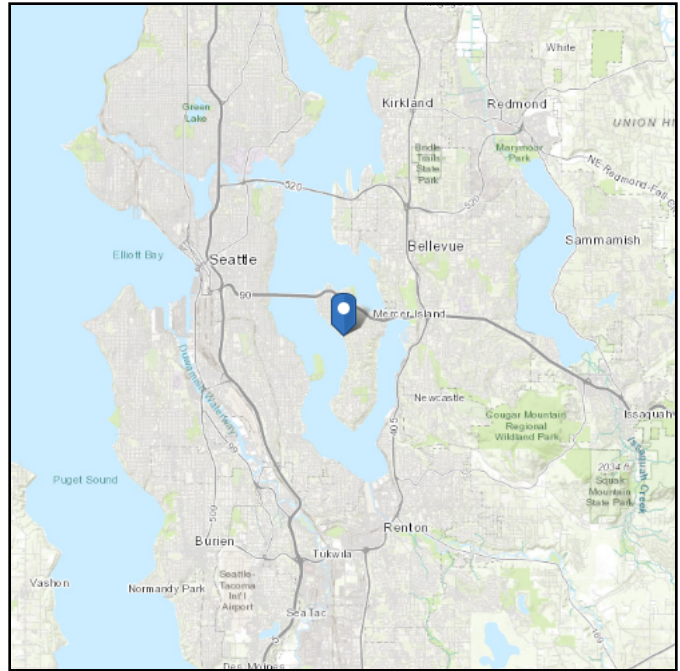
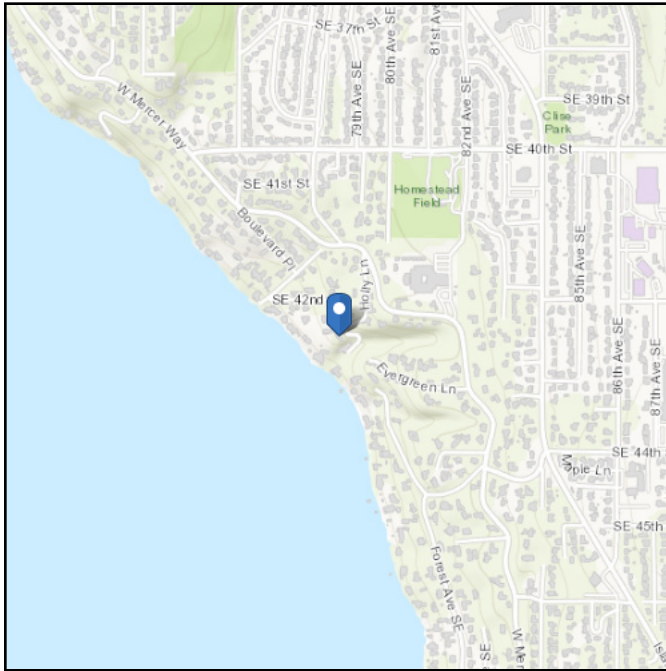
S2.2

# ASCE Hazards Report

**Address:**  
4215 Holly Ln  
Mercer Island, Washington  
98040

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

**Latitude:** 47.570072  
**Longitude:** -122.234168  
**Elevation:** 102.8693975503508 ft (NAVD 88)



## Wind

### Results:

Wind Speed	98 Vmph
10-year MRI	67 Vmph
25-year MRI	74 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Tue Jul 16 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

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

**Results:**

$S_s$ :	1.426	$S_{D1}$ :	N/A
$S_1$ :	0.496	$T_L$ :	6
$F_a$ :	1.2	PGA :	0.611
$F_v$ :	N/A	PGA <sub>M</sub> :	0.733
$S_{MS}$ :	1.712	$F_{PGA}$ :	1.2
$S_{M1}$ :	N/A	$I_e$ :	1
$S_{DS}$ :	1.141	$C_v$ :	1.385

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

**Data Accessed:** Tue Jul 16 2024

**Date Source:** [USGS Seismic Design Maps](#)

SHEET TITLE:  
PROJECT # :

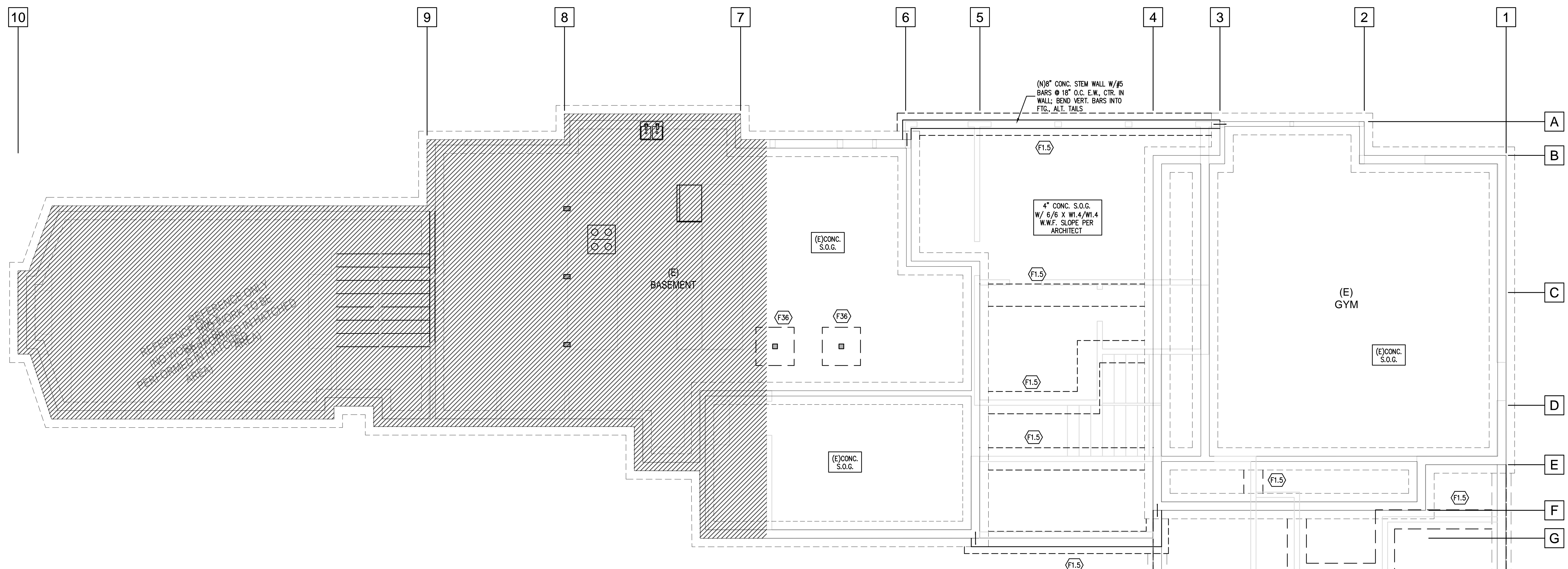
**7.1) IBC SEISMIC OVERVIEW**  
**TAM & CEM REMODEL**

Step #			IBC	ASCE 7
1.	OCCUPANCY CATEGORY	TYPE = II	Table 1604.5	Table 1.5-1
2.	IMPORTANCE FACTOR	$I_E = 1.00$	Section 1613.1 -> ASCE	Table 1.5-2
3.	Site Class - Per Geo. Engr.	S.C. = D	Section 1613.3.5 Table 1613.3.3(2)	Section 11.4.2 / Ch. 20 Table 20.3-1
4.	0.2 Sec. Spectral Response	$S_S = 1.4260$	Figure 1613.3.1(1)	Figure 22-1
5.	1.0 Sec. Spectral Response	$S_1 = 0.4960$	Figure 1613.3.1(2)	Figure 22-2
6.	Site Coefficient (short period)	$F_a = 1.20$	Figure 1613.3.3(1)	Table 11.4-1
7.	Site Coefficient (1.0 second)	$F_v = 0.00$	Figure 1613.3.3(2)	Table 11.4-2
	$S_{MS} = F_a * S_S$	$S_{MS} = 1.7120$	EQ 16-37	EQ 11.4-1
	$S_{M1} = F_v * S_1$	$S_{M1} = 0.0000$	EQ 16-38	EQ 11.4-2
	$S_{DS} = 2/3 * S_{MS}$	$S_{DS} = 1.141$	EQ 16-39	EQ 11.4-3
	$S_{D1} = 2/3 * S_{M1}$	$S_{D1} = 0.000$	EQ 16-40	EQ 11.4-4
8.	Seismic Design Category 0.2s	$SDC_S = D$	Table 1613.3.5(1)	Table 11.6-1
9.	Seismic Design Category 1.0s	$SDC_1 = C$	Table 1613.3.5(2)	Table 11.6-2
10.	Seismic Design Category	$SDC = D$	Max.	Max.
11.	Wood structural panels	---	N/A	Table 12.2-1
12.	Response Modification Coef.	$R = 6.5$	N/A	Table 12.2-1
13.	Overstrength Factor	$\Omega_0 = 2.5$	N/A	Table 12.2-1
14.	Deflection Amplification Factor	$C_D = 2.0$	N/A	Table 12.2-1
15.	Horizontal Structural Irregularities	---	N/A	Table 12.3-1
16.	Vertical Structural Irregularities	---	N/A	Table 12.3-2
17.	Permitted Procedure	Equiv. Lateral Force	---	Table 12.6-1



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CALCULATION  
SECTION 8.0:  
**FOUNDATION  
ENGINEERING**



**FOUNDATION SCHEDULE**

MARK	DEPTH	WIDTH	LENGTH	REINFORCING
F1.5	10"	1'-6"	CONT.	(2) #4B CONT.
F1.5A	12"	1'-6"	CONT.	(2) #4T&B CONT.
F2.0	10"	2'-0"	CONT.	(3) #4B CONT.
F18	10"	1'-6"	1'-6"	(2) #4B E/W
F24	10"	2'-0"	2'-0"	(3) #4B E/W
F36	10"	3'-0"	3'-0"	(4) #4B E/W
F48	10"	4'-0"	4'-0"	(5) #4B E/W

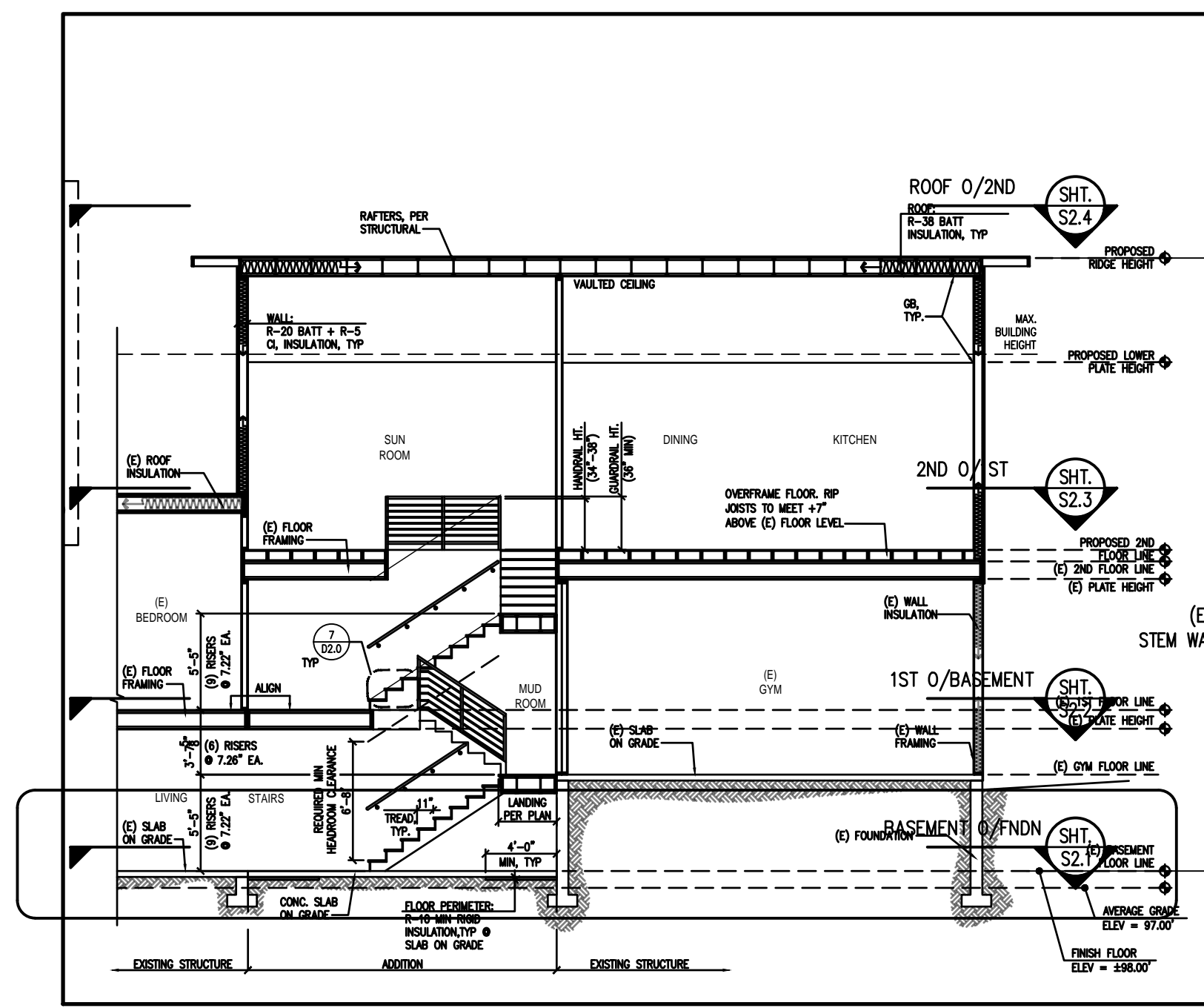
**Foundation Notes**

- ALL SOIL BEARING SURFACES ARE SUBJECT TO INSPECTION AND APPROVAL BY THE GEOTECHNICAL ENGINEER PRIOR TO REINFORCING AND CONCRETE PLACEMENT.
- CENTER INTERIOR FOOTINGS ON WALLS OR COLUMNS TYPICAL U.N.O.
- SEE ARCHITECTURAL PLANS FOR DIMENSIONS.
- NEW FOUNDATION WALLS TO BE 8" THICK TYPICAL U.N.O. W/#5 VERTS @ 18" O.C. BENT INTO FOOTINGS (ALT.) & #5 HORIZ. BARS @ 18" O.C.; CENTER STL. IN STEM WALL. REFER TO DETAIL 9/56.1
- PROVIDE 4" DIAMETER PERFORATED FOOTING DRAINS AT PERIMETER OF FOUNDATIONS TYPICAL, CONNECT PER CIVIL. PROVIDE 4" DIAMETER TIGHTLINES FOR DOWNSPOUTS, CONNECT PER CIVIL.
- FOR V.I.F. (VERIFY IN FIELD) CALLOUTS ON EXISTING FOOTINGS, THE CONTRACTOR MAY DIG TO EXPOSE FOOTING HEEL OR DRILL IN S.O.G. TO PROBE FOR THICKNESS & WIDTH (OR NON-DESTRUCTIVE SCAN BY SPECIAL INSPECTOR); IT MAY BE ASSUMED THAT EXISTING FOOTING IS CENTERED BELOW FOUNDATION WALL.

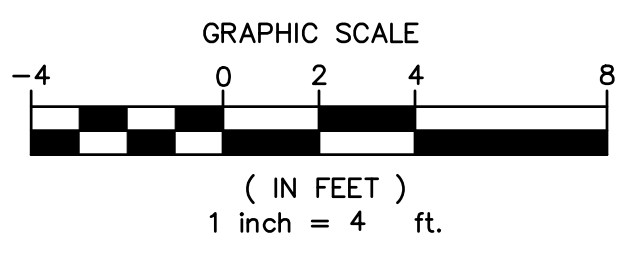
**Framing Legend**  
 (S) FTG. STEP PER 4/56.1

CALL 48 HOURS BEFORE YOU DIG  
1-800-424-5555

**Note:**  
PLANS PREPARED USING ARCHITECTURAL BACKGROUNDS RECEIVED 07/10/2024



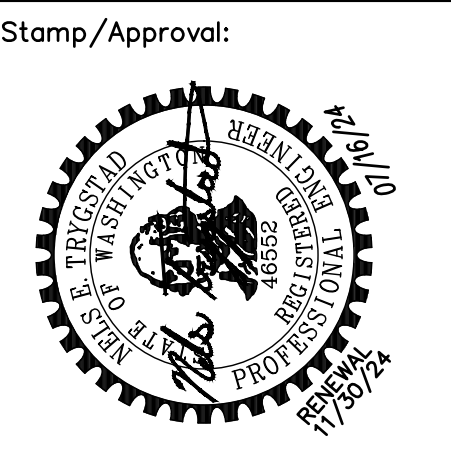
**Floor Level Elevation Keyplan**  
SCALE: 1/8" = 1'-0"



**Foundation Plan**  
SCALE: 1/4" = 1'-0"



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nels@trygstadeng.com  
(208)262-6884



Stamp/Approval:

Sheet Name:  
**FOUNDATION PLAN**

Sheet No:  
**S2.1**

Title Block Line 1  
 You can change this area  
 using the "Settings" menu item  
 and then using the "Printing &  
 Title Block" selection.  
 Title Block Line 6

Title :  
 Dsgnr:  
 Project Desc.:  
 Project Notes :

Job #

Printed: 10 DEC 2012, 12:57PM

## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. #: KW-06002997

Description: F1.5: 18"x18" Footing with 1500psf ASBP

### General Information

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-05

#### Material Properties

$f_c$ : Concrete 28 day strength	=	2.50	ksi
$f_y$ : Rebar Yield	=	40.0	ksi
$E_c$ : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
$\phi$ Values Flexure	=	0.90	
Shear	=	0.750	

#### Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears :	:	Yes
Include Pedestal Weight as DL	:	No

#### Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

#### Increases based on footing Depth

Footing base depth below soil surface	=	0.0	ft
Allowable pressure increase per foot of dept	=	0.0	ksf
when footing base is below	=	0.0	ft

#### Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0	ksf
when maximum length or width is greater	=	0.0	ft

### Dimensions

Width parallel to X-X Axis	=	1.50	ft
Length parallel to Z-Z Axis	=	1.50	ft
Footing Thickness	=	10.0	in

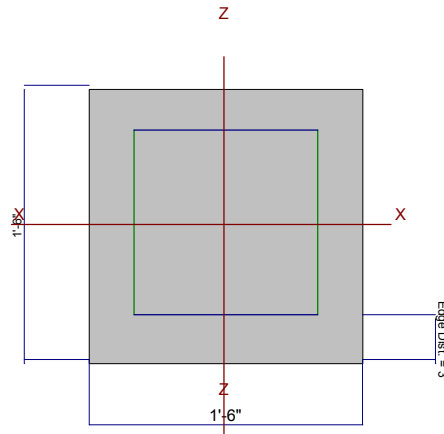
#### Load location offset from footing center...

ex : parallel to X-X Axis	=	0	in
ez : parallel to Z-Z Axis	=	0	in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	0.0	in
pz : parallel to Z-Z Axis	=	0.0	in
Height	=	0.0	in

Rebar Centerline to Edge of Concrete..  
 at Bottom of footing = 3.250 in

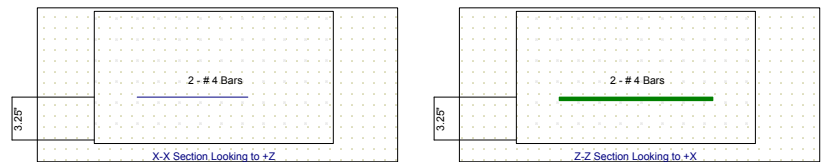


### Reinforcing

Bars parallel to X-X Axis	=	2.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	2.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4

#### Bandwidth Distribution Check (ACI 15.4.4.2)

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



### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	0.0	0.0	3.10	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0 k

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 Project Notes :

Job #

Printed: 10 DEC 2012, 12:57PM

**General Footing**

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F1.5: 18"x18" Footing with 1500psf ASBP

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9993	Soil Bearing	1.499 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1185	Z Flexure (+X)	0.6199 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1185	Z Flexure (-X)	0.6199 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1185	X Flexure (+Z)	0.6199 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1185	X Flexure (-Z)	0.6199 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.06532	1-way Shear (+X)	4.899 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.06532	1-way Shear (-X)	4.899 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.06532	1-way Shear (+Z)	4.899 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.06532	1-way Shear (-Z)	4.899 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1543	2-way Punching	23.146 psi	150.0 psi	+1.20D+0.50Lr+1.60L+1.60H

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	+Z	Actual Soil Bearing Stress		Actual / Allowable Ratio	
					+Z	-X	-X	
X-X, +D	1.50	n/a	0.0	0.1208	0.1208	n/a	n/a	0.081
X-X, +D+L+H	1.50	n/a	0.0	1.499	1.499	n/a	n/a	0.999
X-X, +D+0.750Lr+0.750L+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750Lr+0.750L+0.750W+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+0.750W+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750Lr+0.750L+0.5250E+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+0.5250E+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
Z-Z, +D	1.50	0.0	n/a	n/a	n/a	0.1208	0.1208	0.081
Z-Z, +D+L+H	1.50	0.0	n/a	n/a	n/a	1.499	1.499	0.999
Z-Z, +D+0.750Lr+0.750L+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750L+0.750S+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750Lr+0.750L+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750L+0.750S+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750Lr+0.750L+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750L+0.750S+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769

**Overturing Stability**

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.40D	0	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0.6199	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0.6199	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0.6199	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0.6199	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60Lr+0.50L	0.1937	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60Lr+0.50L	0.1937	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+1.60S	0.1937	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+1.60S	0.1937	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.1937	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.1937	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.1937	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.1937	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+0.20S+E	0.1937	+Z	Bottom	0.22	Bending	0.27	5.233	OK

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Title :  
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Job #

Printed: 10 DEC 2012, 12:57PM

## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F1.5: 18"x18" Footing with 1500psf ASBP

X-X. +1.20D+0.50L+0.20S+E	0.1937	-Z	Bottom	0.22	Bending	0.27	5.233	OK
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**General Footing**

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F1.5: 18"x18" Footing with 1500psf ASBP

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.40D	0	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.40D	0	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	0.6199	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	0.6199	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	0.6199	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	0.6199	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.1937	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.1937	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+1.60S	0.1937	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+1.60S	0.1937	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.1937	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.1937	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.1937	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.1937	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.1937	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.1937	+X	Bottom	0.22	Bending	0.27	5.233	OK

**One Way Shear**

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	75 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	4.899 psi	4.899 psi	4.899 psi	4.899 psi	4.899 psi	75 psi	0.06532	OK
+1.20D+1.60L+0.50S+1.60H	4.899 psi	4.899 psi	4.899 psi	4.899 psi	4.899 psi	75 psi	0.06532	OK
+1.20D+1.60Lr+0.50L	1.531 psi	1.531 psi	1.531 psi	1.531 psi	1.531 psi	75 psi	0.02041	OK
+1.20D+0.50L+1.60S	1.531 psi	1.531 psi	1.531 psi	1.531 psi	1.531 psi	75 psi	0.02041	OK
+1.20D+0.50Lr+0.50L+1.60W	1.531 psi	1.531 psi	1.531 psi	1.531 psi	1.531 psi	75 psi	0.02041	OK
+1.20D+0.50L+0.50S+1.60W	1.531 psi	1.531 psi	1.531 psi	1.531 psi	1.531 psi	75 psi	0.02041	OK
+1.20D+0.50L+0.20S+E	1.531 psi	1.531 psi	1.531 psi	1.531 psi	1.531 psi	75 psi	0.02041	OK

**Punching Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	150psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	23.146 psi	150psi	0.1543	OK
+1.20D+1.60L+0.50S+1.60H	23.146 psi	150psi	0.1543	OK
+1.20D+1.60Lr+0.50L	7.233 psi	150psi	0.04822	OK
+1.20D+0.50L+1.60S	7.233 psi	150psi	0.04822	OK
+1.20D+0.50Lr+0.50L+1.60W	7.233 psi	150psi	0.04822	OK
+1.20D+0.50L+0.50S+1.60W	7.233 psi	150psi	0.04822	OK
+1.20D+0.50L+0.20S+E	7.233 psi	150psi	0.04822	OK

All units k

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Job #

Printed: 10 DEC 2012, 12:52PM

## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. #: KW-06002997

Description: F2.0: 24"x24" Footing with 1500psf ASBP

### General Information

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-05

#### Material Properties

$f_c$ : Concrete 28 day strength	=	2.50	ksi
$f_y$ : Rebar Yield	=	40.0	ksi
$E_c$ : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
$\phi$ Values Flexure	=	0.90	
Shear	=	0.750	

#### Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears :	:	Yes
Include Pedestal Weight as DL	:	No

#### Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

#### Increases based on footing Depth

Footing base depth below soil surface	=	0.0	ft
Allowable pressure increase per foot of dept	=	0.0	ksf
when footing base is below	=	0.0	ft

#### Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0	ksf
when maximum length or width is greater	=	0.0	ft

### Dimensions

Width parallel to X-X Axis	=	2.0	ft
Length parallel to Z-Z Axis	=	2.0	ft
Footing Thickness	=	10.0	in

#### Load location offset from footing center...

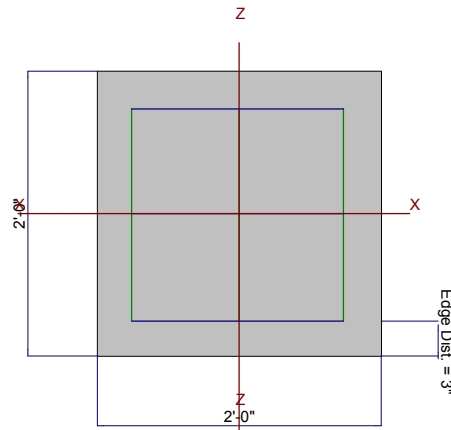
ex : parallel to X-X Axis	=	0	in
ez : parallel to Z-Z Axis	=	0	in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	0.0	in
pz : parallel to Z-Z Axis	=	0.0	in
Height	=	0.0	in

#### Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.250	in
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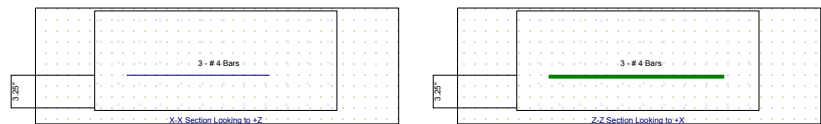


### Reinforcing

Bars parallel to X-X Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4

#### Bandwidth Distribution Check (ACI 15.4.4.2)

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



### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	0.0	0.0	5.50	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0 k

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## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F2.0: 24"x24" Footing with 1500psf ASBP

### DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9973	Soil Bearing	1.496 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1876	Z Flexure (+X)	1.10 k-ft	5.863 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1876	Z Flexure (-X)	1.10 k-ft	5.863 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1876	X Flexure (+Z)	1.10 k-ft	5.863 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1876	X Flexure (-Z)	1.10 k-ft	5.863 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1545	1-way Shear (+X)	11.588 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1545	1-way Shear (-X)	11.588 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1545	1-way Shear (+Z)	11.588 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.1545	1-way Shear (-Z)	11.588 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.2967	2-way Punching	44.50 psi	150.0 psi	+1.20D+0.50Lr+1.60L+1.60H

### Detailed Results

#### Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	+Z	Actual Soil Bearing Stress		Actual / Allowable Ratio	
					+Z	-X	-X	
X-X, +D	1.50	n/a	0.0	0.1208	0.1208	n/a	n/a	0.081
X-X, +D+L+H	1.50	n/a	0.0	1.496	1.496	n/a	n/a	0.997
X-X, +D+0.750Lr+0.750L+H	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
X-X, +D+0.750L+0.750S+H	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
X-X, +D+0.750Lr+0.750L+0.750W+H	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
X-X, +D+0.750L+0.750S+0.750W+H	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
X-X, +D+0.750Lr+0.750L+0.5250E+H	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
X-X, +D+0.750L+0.750S+0.5250E+H	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
Z-Z, +D	1.50	0.0	n/a	n/a	n/a	0.1208	0.1208	0.081
Z-Z, +D+L+H	1.50	0.0	n/a	n/a	n/a	1.496	1.496	0.997
Z-Z, +D+0.750Lr+0.750L+H	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768
Z-Z, +D+0.750L+0.750S+H	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768
Z-Z, +D+0.750Lr+0.750L+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768
Z-Z, +D+0.750L+0.750S+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768
Z-Z, +D+0.750Lr+0.750L+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768
Z-Z, +D+0.750L+0.750S+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768

#### Overturing Stability

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				

#### Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.40D	0	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	1.1	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	1.1	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+1.60L+0.50S+1.60H	1.1	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+1.60L+0.50S+1.60H	1.1	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+1.60Lr+0.50L	0.3437	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+1.60Lr+0.50L	0.3437	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50L+1.60S	0.3437	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50L+1.60S	0.3437	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.3437	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.3437	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.3437	+Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.3437	-Z	Bottom	0.22	Bending	0.3	5.863	OK
X-X, +1.20D+0.50L+0.20S+E	0.3437	+Z	Bottom	0.22	Bending	0.3	5.863	OK

Title Block Line 1  
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Title Block Line 6

Title :  
Dsgnr:  
Project Desc.:  
  
Project Notes :

Job #

Printed: 10 DEC 2012, 12:52PM

## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F2.0: 24"x24" Footing with 1500psf ASBP

X-X. +1.20D+0.50L+0.20S+E	0.3437	-Z	Bottom	0.22	Bending	0.3	5.863	OK
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**General Footing**

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F2.0: 24"x24" Footing with 1500psf ASBP

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.40D	0	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.40D	0	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	1.1	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	1.1	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	1.1	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	1.1	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.3437	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.3437	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50L+1.60S	0.3437	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50L+1.60S	0.3437	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.3437	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.3437	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.3437	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.3437	+X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.3437	-X	Bottom	0.22	Bendina	0.3	5.863	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.3437	+X	Bottom	0.22	Bendina	0.3	5.863	OK

**One Way Shear**

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	75 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	11.588 psi	11.588 psi	11.588 psi	11.588 psi	11.588 psi	75 psi	0.1545	OK
+1.20D+1.60L+0.50S+1.60H	11.588 psi	11.588 psi	11.588 psi	11.588 psi	11.588 psi	75 psi	0.1545	OK
+1.20D+1.60Lr+0.50L	3.621 psi	3.621 psi	3.621 psi	3.621 psi	3.621 psi	75 psi	0.04829	OK
+1.20D+0.50L+1.60S	3.621 psi	3.621 psi	3.621 psi	3.621 psi	3.621 psi	75 psi	0.04829	OK
+1.20D+0.50Lr+0.50L+1.60W	3.621 psi	3.621 psi	3.621 psi	3.621 psi	3.621 psi	75 psi	0.04829	OK
+1.20D+0.50L+0.50S+1.60W	3.621 psi	3.621 psi	3.621 psi	3.621 psi	3.621 psi	75 psi	0.04829	OK
+1.20D+0.50L+0.20S+E	3.621 psi	3.621 psi	3.621 psi	3.621 psi	3.621 psi	75 psi	0.04829	OK

**Punching Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	150psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	44.5 psi	150psi	0.2967	OK
+1.20D+1.60L+0.50S+1.60H	44.5 psi	150psi	0.2967	OK
+1.20D+1.60Lr+0.50L	13.906 psi	150psi	0.09271	OK
+1.20D+0.50L+1.60S	13.906 psi	150psi	0.09271	OK
+1.20D+0.50Lr+0.50L+1.60W	13.906 psi	150psi	0.09271	OK
+1.20D+0.50L+0.50S+1.60W	13.906 psi	150psi	0.09271	OK
+1.20D+0.50L+0.20S+E	13.906 psi	150psi	0.09271	OK

All units k

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Job #

Printed: 10 DEC 2012, 12:16PM

## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. #: KW-06002997

Description: F2.5: 30"x30" Footing with 1500psf ASBP

### General Information

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-05

#### Material Properties

$f_c$ : Concrete 28 day strength	=	2.50	ksi
$f_y$ : Rebar Yield	=	40.0	ksi
$E_c$ : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
$\phi$ Values Flexure	=	0.90	
Shear	=	0.750	

#### Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears :	:	Yes
Include Pedestal Weight as DL	:	No

#### Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

#### Increases based on footing Depth

Footing base depth below soil surface	=	0.0	ft
Allowable pressure increase per foot of dept	=	0.0	ksf
when footing base is below	=	0.0	ft

#### Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0	ksf
when maximum length or width is greater	=	0.0	ft

### Dimensions

Width parallel to X-X Axis	=	2.50	ft
Length parallel to Z-Z Axis	=	2.50	ft
Footing Thickness	=	10.0	in

#### Load location offset from footing center...

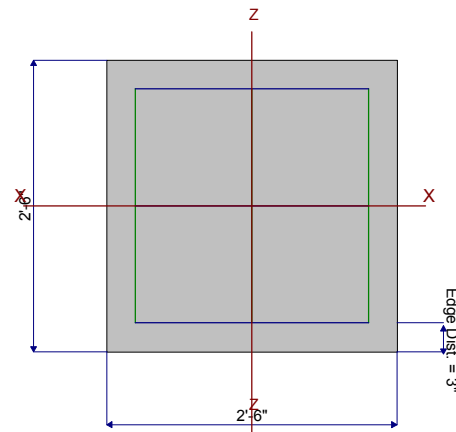
ex : parallel to X-X Axis	=	0	in
ez : parallel to Z-Z Axis	=	0	in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	0.0	in
pz : parallel to Z-Z Axis	=	0.0	in
Height	=	0.0	in

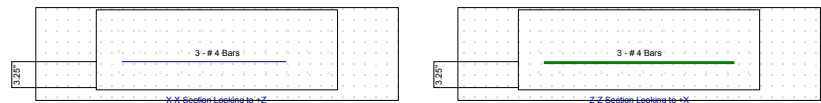
#### Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.250	in
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### Reinforcing

Bars parallel to X-X Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4



#### Bandwidth Distribution Check (ACI 15.4.4.2)

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

### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	0.0	0.0	8.60	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0 k

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**General Footing**

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F2.5: 30"x30" Footing with 1500psf ASBP

**DESIGN SUMMARY** Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9980	Soil Bearing	1.497 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3640	Z Flexure (+X)	1.720 k-ft	4.724 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3640	Z Flexure (-X)	1.720 k-ft	4.724 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3640	X Flexure (+Z)	1.720 k-ft	4.724 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3640	X Flexure (-Z)	1.720 k-ft	4.724 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.2537	1-way Shear (+X)	19.026 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.2537	1-way Shear (-X)	19.026 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.2537	1-way Shear (+Z)	19.026 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.2537	1-way Shear (-Z)	19.026 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4775	2-way Punching	71.622 psi	150.0 psi	+1.20D+0.50Lr+1.60L+1.60H

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xeccc	Zeccc	+Z	Actual Soil Bearing Stress		-X	Actual / Allowable Ratio
					+Z	-X		
X-X, +D	1.50	n/a	0.0	0.1208	0.1208	n/a	n/a	0.081
X-X, +D+L+H	1.50	n/a	0.0	1.497	1.497	n/a	n/a	0.998
X-X, +D+0.750Lr+0.750L+H	1.50	n/a	0.0	1.153	1.153	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+H	1.50	n/a	0.0	1.153	1.153	n/a	n/a	0.769
X-X, +D+0.750Lr+0.750L+0.750W+H	1.50	n/a	0.0	1.153	1.153	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+0.750W+H	1.50	n/a	0.0	1.153	1.153	n/a	n/a	0.769
X-X, +D+0.750Lr+0.750L+0.5250E+H	1.50	n/a	0.0	1.153	1.153	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+0.5250E+H	1.50	n/a	0.0	1.153	1.153	n/a	n/a	0.769
Z-Z, +D	1.50	0.0	n/a	n/a	n/a	0.1208	0.1208	0.081
Z-Z, +D+L+H	1.50	0.0	n/a	n/a	n/a	1.497	1.497	0.998
Z-Z, +D+0.750Lr+0.750L+H	1.50	0.0	n/a	n/a	n/a	1.153	1.153	0.769
Z-Z, +D+0.750L+0.750S+H	1.50	0.0	n/a	n/a	n/a	1.153	1.153	0.769
Z-Z, +D+0.750Lr+0.750L+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.153	1.153	0.769
Z-Z, +D+0.750L+0.750S+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.153	1.153	0.769
Z-Z, +D+0.750Lr+0.750L+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.153	1.153	0.769
Z-Z, +D+0.750L+0.750S+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.153	1.153	0.769

**Overturing Stability**

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.40D	0	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	1.72	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	1.72	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+1.60L+0.50S+1.60H	1.72	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+1.60L+0.50S+1.60H	1.72	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+1.60Lr+0.50L	0.5374	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+1.60Lr+0.50L	0.5374	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50L+1.60S	0.5374	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50L+1.60S	0.5374	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.5374	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.5374	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.5374	+Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.5374	-Z	Bottom	0.22	Bending	0.24	4.724	OK
X-X, +1.20D+0.50L+0.20S+E	0.5374	+Z	Bottom	0.22	Bending	0.24	4.724	OK

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ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F2.5: 30"x30" Footing with 1500psf ASBP

X-X. +1.20D+0.50L+0.20S+E	0.5374	-Z	Bottom	0.22	Bending	0.24	4.724	OK
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Description : F2.5: 30"x30" Footing with 1500psf ASBP

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.40D	0	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.40D	0	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	1.72	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	1.72	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	1.72	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	1.72	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.5374	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.5374	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50L+1.60S	0.5374	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50L+1.60S	0.5374	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.5374	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.5374	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.5374	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.5374	+X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.5374	-X	Bottom	0.22	Bending	0.24	4.724	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.5374	+X	Bottom	0.22	Bending	0.24	4.724	OK

**One Way Shear**

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	75 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	19.026 psi	19.026 psi	19.026 psi	19.026 psi	19.026 psi	75 psi	0.2537	OK
+1.20D+1.60L+0.50S+1.60H	19.026 psi	19.026 psi	19.026 psi	19.026 psi	19.026 psi	75 psi	0.2537	OK
+1.20D+1.60Lr+0.50L	5.946 psi	5.946 psi	5.946 psi	5.946 psi	5.946 psi	75 psi	0.07928	OK
+1.20D+0.50L+1.60S	5.946 psi	5.946 psi	5.946 psi	5.946 psi	5.946 psi	75 psi	0.07928	OK
+1.20D+0.50Lr+0.50L+1.60W	5.946 psi	5.946 psi	5.946 psi	5.946 psi	5.946 psi	75 psi	0.07928	OK
+1.20D+0.50L+0.50S+1.60W	5.946 psi	5.946 psi	5.946 psi	5.946 psi	5.946 psi	75 psi	0.07928	OK
+1.20D+0.50L+0.20S+E	5.946 psi	5.946 psi	5.946 psi	5.946 psi	5.946 psi	75 psi	0.07928	OK

**Punching Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	150psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	71.622 psi	150psi	0.4775	OK
+1.20D+1.60L+0.50S+1.60H	71.622 psi	150psi	0.4775	OK
+1.20D+1.60Lr+0.50L	22.382 psi	150psi	0.1492	OK
+1.20D+0.50L+1.60S	22.382 psi	150psi	0.1492	OK
+1.20D+0.50Lr+0.50L+1.60W	22.382 psi	150psi	0.1492	OK
+1.20D+0.50L+0.50S+1.60W	22.382 psi	150psi	0.1492	OK
+1.20D+0.50L+0.20S+E	22.382 psi	150psi	0.1492	OK

All units k

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Printed: 10 DEC 2012, 1:02PM

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

## General Footing

Lic. #: KW-06002997

Description: F3.0: 36"x36" Footing with 1500psf ASBP

### General Information

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-05

#### Material Properties

$f_c$ : Concrete 28 day strength	=	2.50	ksi
$f_y$ : Rebar Yield	=	40.0	ksi
$E_c$ : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
$\phi$ Values Flexure	=	0.90	
Shear	=	0.750	

#### Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears :	:	Yes
Include Pedestal Weight as DL	:	No

#### Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

#### Increases based on footing Depth

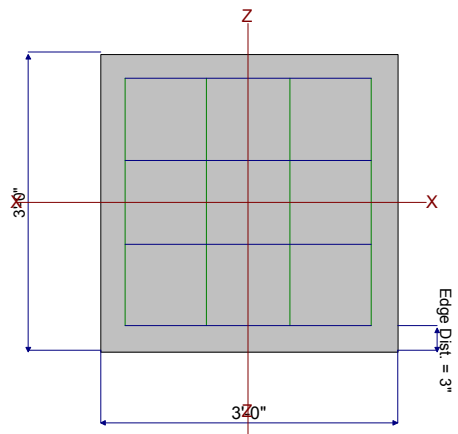
Footing base depth below soil surface	=	0.0	ft
Allowable pressure increase per foot of dept	=	0.0	ksf
when footing base is below	=	0.0	ft

#### Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0	ksf
when maximum length or width is greater	=	0.0	ft

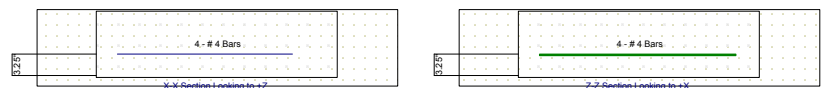
### Dimensions

Width parallel to X-X Axis	=	3.0	ft
Length parallel to Z-Z Axis	=	3.0	ft
Footing Thickness	=	10.0	in
Load location offset from footing center...			
ex : parallel to X-X Axis	=	0	in
ez : parallel to Z-Z Axis	=	0	in
Pedestal dimensions...			
px : parallel to X-X Axis	=	0.0	in
pz : parallel to Z-Z Axis	=	0.0	in
Height	=	0.0	in
Rebar Centerline to Edge of Concrete..	=	3.250	in
at Bottom of footing			



### Reinforcing

Bars parallel to X-X Axis	=	4.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	4.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4



#### Bandwidth Distribution Check (ACI 15.4.4.2)

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

### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	0.0	0.0	12.40	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0 k

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## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. #: KW-06002997

Description: F3.0: 36"x36" Footing with 1500psf ASBP

### DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9993	Soil Bearing	1.499 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.4739	Z Flexure (+X)	2.480 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4739	Z Flexure (-X)	2.480 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4739	X Flexure (+Z)	2.480 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4739	X Flexure (-Z)	2.480 k-ft	5.233 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3338	1-way Shear (+X)	25.038 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3338	1-way Shear (-X)	25.038 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3338	1-way Shear (+Z)	25.038 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.3338	1-way Shear (-Z)	25.038 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.6967	2-way Punching	104.51 psi	150.0 psi	+1.20D+0.50Lr+1.60L+1.60H

### Detailed Results

#### Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	+Z	Actual Soil Bearing Stress		Actual / Allowable Ratio	
					+Z	-X	-X	
X-X, +D	1.50	n/a	0.0	0.1208	0.1208	n/a	n/a	0.081
X-X, +D+L+H	1.50	n/a	0.0	1.499	1.499	n/a	n/a	0.999
X-X, +D+0.750Lr+0.750L+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750Lr+0.750L+0.750W+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+0.750W+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750Lr+0.750L+0.5250E+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
X-X, +D+0.750L+0.750S+0.5250E+H	1.50	n/a	0.0	1.154	1.154	n/a	n/a	0.769
Z-Z, +D	1.50	0.0	n/a	n/a	n/a	0.1208	0.1208	0.081
Z-Z, +D+L+H	1.50	0.0	n/a	n/a	n/a	1.499	1.499	0.999
Z-Z, +D+0.750Lr+0.750L+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750L+0.750S+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750Lr+0.750L+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750L+0.750S+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750Lr+0.750L+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769
Z-Z, +D+0.750L+0.750S+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.154	1.154	0.769

#### Overturing Stability

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				

#### Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.40D	0	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	2.48	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	2.48	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60L+0.50S+1.60H	2.48	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60L+0.50S+1.60H	2.48	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60Lr+0.50L	0.7749	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+1.60Lr+0.50L	0.7749	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+1.60S	0.7749	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+1.60S	0.7749	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.7749	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.7749	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.7749	+Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.7749	-Z	Bottom	0.22	Bending	0.27	5.233	OK
X-X, +1.20D+0.50L+0.20S+E	0.7749	+Z	Bottom	0.22	Bending	0.27	5.233	OK

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## General Footing

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F3.0: 36"x36" Footing with 1500psf ASBP

X-X. +1.20D+0.50L+0.20S+E	0.7749	-Z	Bottom	0.22	Bending	0.27	5.233	OK
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 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F3.0: 36"x36" Footing with 1500psf ASBP

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.40D	0	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.40D	0	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	2.48	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	2.48	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	2.48	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	2.48	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.7749	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.7749	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+1.60S	0.7749	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+1.60S	0.7749	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.7749	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.7749	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.7749	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.7749	+X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.7749	-X	Bottom	0.22	Bending	0.27	5.233	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.7749	+X	Bottom	0.22	Bending	0.27	5.233	OK

**One Way Shear**

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	75 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	25.038 psi	25.038 psi	25.038 psi	25.038 psi	25.038 psi	75 psi	0.3338	OK
+1.20D+1.60L+0.50S+1.60H	25.038 psi	25.038 psi	25.038 psi	25.038 psi	25.038 psi	75 psi	0.3338	OK
+1.20D+1.60Lr+0.50L	7.824 psi	7.824 psi	7.824 psi	7.824 psi	7.824 psi	75 psi	0.1043	OK
+1.20D+0.50L+1.60S	7.824 psi	7.824 psi	7.824 psi	7.824 psi	7.824 psi	75 psi	0.1043	OK
+1.20D+0.50Lr+0.50L+1.60W	7.824 psi	7.824 psi	7.824 psi	7.824 psi	7.824 psi	75 psi	0.1043	OK
+1.20D+0.50L+0.50S+1.60W	7.824 psi	7.824 psi	7.824 psi	7.824 psi	7.824 psi	75 psi	0.1043	OK
+1.20D+0.50L+0.20S+E	7.824 psi	7.824 psi	7.824 psi	7.824 psi	7.824 psi	75 psi	0.1043	OK

**Punching Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	150psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	104.51 psi	150psi	0.6967	OK
+1.20D+1.60L+0.50S+1.60H	104.51 psi	150psi	0.6967	OK
+1.20D+1.60Lr+0.50L	32.658 psi	150psi	0.2177	OK
+1.20D+0.50L+1.60S	32.658 psi	150psi	0.2177	OK
+1.20D+0.50Lr+0.50L+1.60W	32.658 psi	150psi	0.2177	OK
+1.20D+0.50L+0.50S+1.60W	32.658 psi	150psi	0.2177	OK
+1.20D+0.50L+0.20S+E	32.658 psi	150psi	0.2177	OK

All units k

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 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

## General Footing

Lic. # : KW-06002997

Description : F3.5: 42"x42" Footing with 1500psf ASBP

### General Information

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-05

#### Material Properties

$f_c$ : Concrete 28 day strength	=	2.50	ksi
$f_y$ : Rebar Yield	=	40.0	ksi
$E_c$ : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
$\phi$ Values Flexure	=	0.90	
Shear	=	0.750	

#### Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears :	:	Yes
Include Pedestal Weight as DL	:	No

#### Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

#### Increases based on footing Depth

Footing base depth below soil surface	=	0.0	ft
Allowable pressure increase per foot of dept	=	0.0	ksf
when footing base is below	=	0.0	ft

#### Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0	ksf
when maximum length or width is greater	=	0.0	ft

### Dimensions

Width parallel to X-X Axis	=	3.50	ft
Length parallel to Z-Z Axis	=	3.50	ft
Footing Thickness	=	10.0	in

#### Load location offset from footing center...

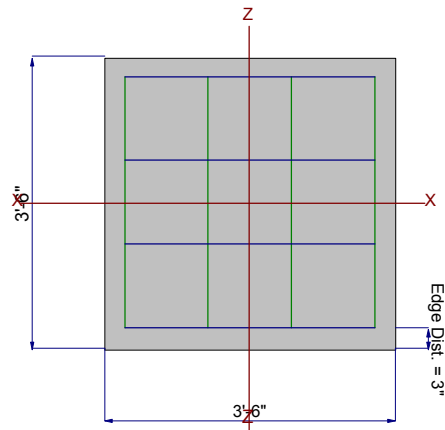
ex : parallel to X-X Axis	=	0	in
ez : parallel to Z-Z Axis	=	0	in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	0.0	in
pz : parallel to Z-Z Axis	=	0.0	in
Height	=	0.0	in

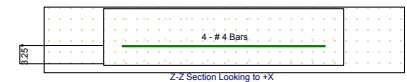
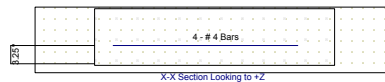
#### Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.250	in
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### Reinforcing

Bars parallel to X-X Axis	=	4.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	4.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4



#### Bandwidth Distribution Check (ACI 15.4.4.2)

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

### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	0.0	0.0	16.90	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0 k

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**General Footing**

File: g:\Nels\Calc Catalog\nels std calc catalog.ec6  
 ENERCALC, INC. 1983-2011, Build:6.11.5.3, Ver:6.11.5.3

Lic. # : KW-06002997

Description : F3.5: 42"x42" Footing with 1500psf ASBP

**DESIGN SUMMARY** Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	1.0	Soil Bearing	1.50 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.750	Z Flexure (+X)	3.379 k-ft	4.506 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.750	Z Flexure (-X)	3.379 k-ft	4.506 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.750	X Flexure (+Z)	3.379 k-ft	4.506 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.750	X Flexure (-Z)	3.379 k-ft	4.506 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4239	1-way Shear (+X)	31.793 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4239	1-way Shear (-X)	31.793 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4239	1-way Shear (+Z)	31.793 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.4239	1-way Shear (-Z)	31.793 psi	75.0 psi	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.9594	2-way Punching	143.91 psi	150.0 psi	+1.20D+0.50Lr+1.60L+1.60H

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xeccc	Zeccc	+Z	Actual Soil Bearing Stress			Actual / Allowable Ratio
					+Z	-X	-X	
X-X, +D	1.50	n/a	0.0	0.1208	0.1208	n/a	n/a	0.081
X-X, +D+L+H	1.50	n/a	0.0	1.50	1.50	n/a	n/a	1.000
X-X, +D+0.750Lr+0.750L+H	1.50	n/a	0.0	1.156	1.156	n/a	n/a	0.771
X-X, +D+0.750L+0.750S+H	1.50	n/a	0.0	1.156	1.156	n/a	n/a	0.771
X-X, +D+0.750Lr+0.750L+0.750W+H	1.50	n/a	0.0	1.156	1.156	n/a	n/a	0.771
X-X, +D+0.750L+0.750S+0.750W+H	1.50	n/a	0.0	1.156	1.156	n/a	n/a	0.771
X-X, +D+0.750Lr+0.750L+0.5250E+H	1.50	n/a	0.0	1.156	1.156	n/a	n/a	0.771
X-X, +D+0.750L+0.750S+0.5250E+H	1.50	n/a	0.0	1.156	1.156	n/a	n/a	0.771
Z-Z, +D	1.50	0.0	n/a	n/a	n/a	0.1208	0.1208	0.081
Z-Z, +D+L+H	1.50	0.0	n/a	n/a	n/a	1.50	1.50	1.000
Z-Z, +D+0.750Lr+0.750L+H	1.50	0.0	n/a	n/a	n/a	1.156	1.156	0.771
Z-Z, +D+0.750L+0.750S+H	1.50	0.0	n/a	n/a	n/a	1.156	1.156	0.771
Z-Z, +D+0.750Lr+0.750L+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.156	1.156	0.771
Z-Z, +D+0.750L+0.750S+0.750W+H	1.50	0.0	n/a	n/a	n/a	1.156	1.156	0.771
Z-Z, +D+0.750Lr+0.750L+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.156	1.156	0.771
Z-Z, +D+0.750L+0.750S+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.156	1.156	0.771

**Overturing Stability**

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				

**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.40D	0	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	3.379	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	3.379	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+1.60L+0.50S+1.60H	3.379	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+1.60L+0.50S+1.60H	3.379	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+1.60Lr+0.50L	1.056	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+1.60Lr+0.50L	1.056	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50L+1.60S	1.056	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50L+1.60S	1.056	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	1.056	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	1.056	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50L+0.50S+1.60W	1.056	+Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50L+0.50S+1.60W	1.056	-Z	Bottom	0.22	Bending	0.23	4.506	OK
X-X, +1.20D+0.50L+0.20S+E	1.056	+Z	Bottom	0.22	Bending	0.23	4.506	OK

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Lic. # : KW-06002997

Description : F3.5: 42"x42" Footing with 1500psf ASBP

X-X. +1.20D+0.50L+0.20S+E	1.056	-Z	Bottom	0.22	Bending	0.23	4.506	OK
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**Footing Flexure**

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.40D	0	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.40D	0	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	3.379	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50Lr+1.60L+1.60H	3.379	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	3.379	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	3.379	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+1.60Lr+0.50L	1.056	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+1.60Lr+0.50L	1.056	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50L+1.60S	1.056	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50L+1.60S	1.056	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	1.056	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	1.056	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	1.056	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	1.056	+X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50L+0.20S+E	1.056	-X	Bottom	0.22	Bendina	0.23	4.506	OK
Z-Z. +1.20D+0.50L+0.20S+E	1.056	+X	Bottom	0.22	Bendina	0.23	4.506	OK

**One Way Shear**

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	75 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	31.793 psi	31.793 psi	31.793 psi	31.793 psi	31.793 psi	75 psi	0.4239	OK
+1.20D+1.60L+0.50S+1.60H	31.793 psi	31.793 psi	31.793 psi	31.793 psi	31.793 psi	75 psi	0.4239	OK
+1.20D+1.60Lr+0.50L	9.935 psi	9.935 psi	9.935 psi	9.935 psi	9.935 psi	75 psi	0.1325	OK
+1.20D+0.50L+1.60S	9.935 psi	9.935 psi	9.935 psi	9.935 psi	9.935 psi	75 psi	0.1325	OK
+1.20D+0.50Lr+0.50L+1.60W	9.935 psi	9.935 psi	9.935 psi	9.935 psi	9.935 psi	75 psi	0.1325	OK
+1.20D+0.50L+0.50S+1.60W	9.935 psi	9.935 psi	9.935 psi	9.935 psi	9.935 psi	75 psi	0.1325	OK
+1.20D+0.50L+0.20S+E	9.935 psi	9.935 psi	9.935 psi	9.935 psi	9.935 psi	75 psi	0.1325	OK

**Punching Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	150psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	143.91 psi	150psi	0.9594	OK
+1.20D+1.60L+0.50S+1.60H	143.91 psi	150psi	0.9594	OK
+1.20D+1.60Lr+0.50L	44.972 psi	150psi	0.2998	OK
+1.20D+0.50L+1.60S	44.972 psi	150psi	0.2998	OK
+1.20D+0.50Lr+0.50L+1.60W	44.972 psi	150psi	0.2998	OK
+1.20D+0.50L+0.50S+1.60W	44.972 psi	150psi	0.2998	OK
+1.20D+0.50L+0.20S+E	44.972 psi	150psi	0.2998	OK

All units k