

A L A N

Mascord

DESIGN ASSOCIATES, INC.

STOCK PLAN

B21143

STRUCTURAL

GRAVITY LOADS DESIGNED TO AF&PA NDS-2012

FLOOR	-	40# LIVE, 10# DEAD
ROOF	-	25# SNOW
		15# DEAD (SHAKE/COMP)
		19# DEAD (CONC. TILE)
CEILING	-	20# LIVE, 10# DEAD
DECKS	-	60# LIVE, 10# DEAD
EXITS/STAIRS	-	100# TOTAL LOAD

BEAM CALCULATIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR

Client: STOCK PLAN

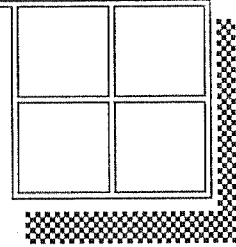
Project: B21143

Location: U1- WINDOW HDR OVER STAIRS

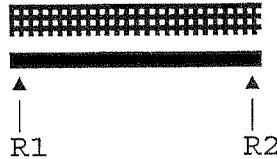
Date: 12-23-2009

Calculation By: L.A.W.

Comment: 4 X 10 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 1,782.0 lbs. Reaction R2 = 1,782.0 lbs.
 Total load = 3,564.0 lbs.
 Dimensions: Clear span = 6.0 feet, no overhang.

No point loads.
 No triangular loads.
 Uniform beam weight = 6 lbs/lf (= 36 lbs. total).
 Uniform loads: U1 = 588.0 lbs/lf at 0.0 feet to 6.0 feet.
 Deflection limit (live load plus dead load): 1/300.

BEAM TYPE WOOD: DFL-SINGL 4X #2						
COMPUTED STRESS/STRAIN	DESIGN VAL.	PROPERTIES	REQUIRED	ACTUAL		
Shear (lbs)	1,782.0	FV	95.0	Area (Sq.In.)	28	28*
Moment (ft-lbs)	2,673.0	FB	990.0	Sect.Modulus	32	38
Deflection (in)	0.24	E	1.60E6	Mom.Inertia	45	152

Actual Maximum Deflection = 0.07 inches.
 Maximum Deflection occurs at 3.0 feet.
 Maximum Moment occurs at 3.0 feet.

MINIMUM BEAM SIZE (W x H): 3.500" by 8.039"

MINIMUM BEAM AREA (Sq.In.): 28.14

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR

Client: STOCK PLAN

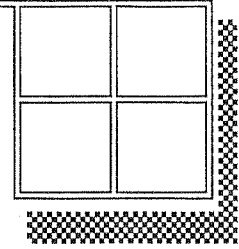
Project: B 21143

Location: M1- MULT JSTS OVER FOYER

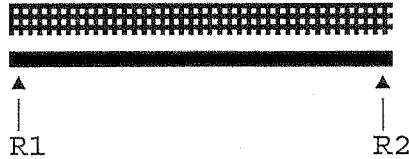
Date: 12-23-2009

Calculation By: L.A.W.

Comment: (2) 2 X 12 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 555.8 lbs. Reaction R2 = 555.8 lbs.
 Total load = 1,111.5 lbs.
 Dimensions: Clear span = 9.5 feet, no overhang.

No point loads.
 No triangular loads.
 Uniform beam weight = 67 lbs/lf (= 636.5 lbs. total).
 Uniform loads: U1 = 50.0 lbs/lf at 0.0 feet to 9.5 feet.
 Deflection limit (live load plus dead load): 1/360.

BEAM TYPE WOOD: DFL-SINGL 2X12 #2						
COMPUTED STRESS/STRAIN	DESIGN VAL.	PROPERTIES	REQUIRED	ACTUAL		
Shear (lbs)	555.8	FV	95.0	Area (Sq.In.)	9	17
Moment (ft-lbs)	1,316.3	FB	990.0	Sect.Modulus	16	16*
Deflection (in)	0.32	E	1.60E6	Mom.Inertia	42	45

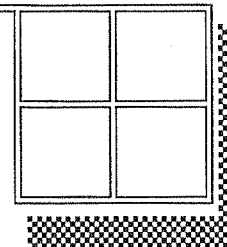
Actual Maximum Deflection = 0.30 inches.
 Maximum Deflection occurs at 4.5 feet.
 Maximum Moment occurs at 4.5 feet.

MINIMUM BEAM SIZE (W x H): 3.000" by 5.649"

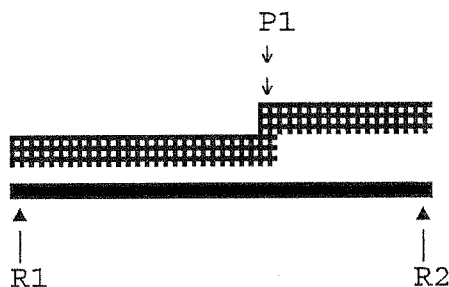
MINIMUM BEAM AREA (Sq.In.): 16.95

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR
 Client: STOCK PLAN
 Project: 21143
 Location: M2- BM BTWN FOYER / LIVING
 Date: 12-23-2009
 Calculation By: L.A.W.
 Comment: 3 1/8" X 10 1/2" 24F GLU-LAM OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 3,489.0 lbs. Reaction R2 = 3,002.3 lbs.
 Total load = 6,491.3 lbs.
 Dimensions: Clear span = 10.5 feet, no overhang.

Point loads: P1 = 556.0 lbs. at 6.5 feet.
 No triangular loads.
 Uniform beam weight = 11 lbs/lf (= 110.25 lbs. total).
 Uniform loads: U2 = 400.0 lbs/lf at 6.5 feet to 10.5 feet.
 U1 = 650.0 lbs/lf at 0.0 feet to 6.5 feet.
 Deflection limit (live load plus dead load): 1/360.

BEAM TYPE LAM : GLULAM (2400 Fb)						
COMPUTED STRESS/STRAIN	DESIGN VAL.	PROPERTIES	REQUIRED	ACTUAL		
Shear (lbs)	3,489.0	FV	240.0	Area (Sq.In.)	22	32
Moment (ft-lbs)	9,199.2	FB	2,400.0	Sect.Modulus	46	55
Deflection (in)	0.35	E	1.80E6	Mom.Inertia	285	285*

Actual Maximum Deflection = 0.35 inches.
 Maximum Deflection occurs at 5.0 feet.
 Maximum Moment occurs at 5.5 feet.

MINIMUM BEAM SIZE (W x H): 3.125" by 10.303"

MINIMUM BEAM AREA (Sq.In.): 32.20

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR

Client: STOCK PLAN

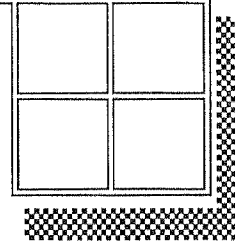
Project: 21143

Location: M3- BM OVER DINING BUILT-INS

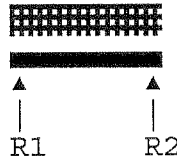
Date: 12-23-2009

Calculation By: L.A.W.

Comment: 4 X 8 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 881.1 lbs. Reaction R2 = 881.1 lbs.
 Total load = 1,762.3 lbs.
 Dimensions: Clear span = 3.5 feet, no overhang.

No point loads.
 No triangular loads.
 Uniform beam weight = 4 lbs/lf (= 12.25 lbs. total).
 Uniform loads: U1 = 500.0 lbs/lf at 0.0 feet to 3.5 feet.
 Deflection limit (live load plus dead load): 1/360.

BEAM TYPE WOOD: DFL-SINGL 4X #2
 COMPUTED STRESS/STRAIN DESIGN VAL. PROPERTIES REQUIRED ACTUAL

Shear (lbs)	881.1	FV	95.0	Area (Sq.In.)	14	14*
Moment (ft-lbs)	755.3	FB	990.0	Sect.Modulus	9	9
Deflection (in)	0.12	E	1.60E6	Mom.Inertia	9	18

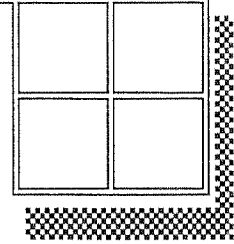
Actual Maximum Deflection = 0.05 inches.
 Maximum Deflection occurs at 1.5 feet.
 Maximum Moment occurs at 1.5 feet.

MINIMUM BEAM SIZE (W x H): 3.500" by 3.975"

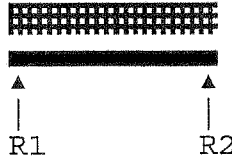
MINIMUM BEAM AREA (Sq.In.): 13.91

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR
 Client: STOCK PLAN
 Project: 21143
 Location: M4- BM BY 1/2 BATH / OFFICE
 Date: 12-23-2009
 Calculation By: L.A.W.
 Comment: 4 X 12 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 1,637.5 lbs. Reaction R2 = 1,637.5 lbs.
 Total load = 3,275.0 lbs.
 Dimensions: Clear span = 5.0 feet, no overhang.

No point loads.
 No triangular loads.
 Uniform beam weight = 5 lbs/lf (= 25 lbs. total).
 Uniform loads: U1 = 650.0 lbs/lf at 0.0 feet to 5.0 feet.
 Deflection limit (live load plus dead load): 1/360.

BEAM TYPE WOOD: DFL-SINGL 4X #2
 COMPUTED STRESS/STRAIN DESIGN VAL. PROPERTIES REQUIRED ACTUAL

Shear (lbs)	1,637.5	FV	95.0	Area (Sq.In.)	26	26*
Moment (ft-lbs)	2,046.9	FB	990.0	Sect.Modulus	25	32
Deflection (in)	0.17	E	1.60E6	Mom.Inertia	34	118

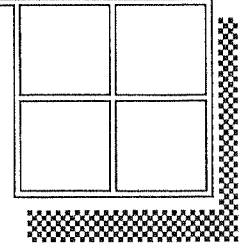
Actual Maximum Deflection = 0.05 inches.
 Maximum Deflection occurs at 2.5 feet.
 Maximum Moment occurs at 2.5 feet.

MINIMUM BEAM SIZE (W x H): 3.500" by 7.387"

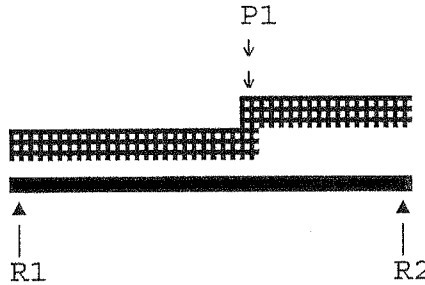
MINIMUM BEAM AREA (Sq.In.): 25.86

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR
 Client: STOCK PLAN
 Project: 21143
 Location: M5- 10/0 O.H. GARAGE DR HDR
 Date: 12-29-2009
 Calculation By: L.A.W.
 Comment: 5 1/8" X 10 1/2" 24F GLU-LAM OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 2,780.0 lbs. Reaction R2 = 4,418.0 lbs.
 Total load = 7,198.0 lbs.
 Dimensions: Clear span = 10.0 feet, no overhang.

Point loads: P1 = 3,402.0 lbs. at 6.0 feet.
 No triangular loads.
 Uniform beam weight = 10 lbs/lf (= 100 lbs. total).
 Uniform loads: U2 = 609.0 lbs/lf at 6.0 feet to 10.0 feet.
 U1 = 210.0 lbs/lf at 0.0 feet to 6.0 feet.
 Deflection limit (live load plus dead load): 1/360.

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BEAM TYPE LAM : GLULAM (2400 Fb)		COMPUTED STRESS/STRAIN		DESIGN VAL.	PROPERTIES	REQUIRED	ACTUAL
Shear (lbs)	4,418.0	FV	240.0	Area (Sq.In.)	28	47	
Moment (ft-lbs)	12,720.0	FB	2,400.0	Sect.Modulus	64	71	
Deflection (in)	0.33	E	1.80E6	Mom.Inertia	326	326*	

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Actual Maximum Deflection = 0.33 inches.
 Maximum Deflection occurs at 5.5 feet.
 Maximum Moment occurs at 6.0 feet.

MINIMUM BEAM SIZE (W x H): 5.125" by 9.136"

MINIMUM BEAM AREA (Sq.In.): 46.82

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR

Client: STOCK PLAN

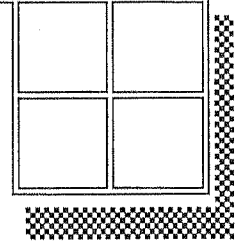
Project: 21143

Location: M6- TYPICAL BM AT FRONT PORCH

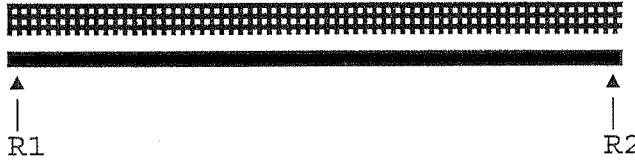
Date: 12-23-2009

Calculation By: L.A.W.

Comment: 6 X 12 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 1,422.1 lbs. Reaction R2 = 1,422.1 lbs.
 Total load = 2,844.3 lbs.
 Dimensions: Clear span = 15.5 feet, no overhang.

No point loads.
 No triangular loads.
 Uniform beam weight = 16 lbs/lf (= 240.25 lbs. total).
 Uniform loads: U1 = 168.0 lbs/lf at 0.0 feet to 15.5 feet.
 Deflection limit (live load plus dead load): 1/360.

BEAM TYPE WOOD: DFL-SINGL 6X #2						
COMPUTED STRESS/STRAIN	DESIGN VAL.	PROPERTIES	REQUIRED	ACTUAL		
Shear (lbs)	1,422.1	FV	85.0	Area (Sq.In.)	25	50
Moment (ft-lbs)	5,505.0	FB	875.0	Sect.Modulus	75	77
Deflection (in)	0.52	E	1.30E6	Mom.Inertia	354	354*

Actual Maximum Deflection = 0.52 inches.
 Maximum Deflection occurs at 7.5 feet.
 Maximum Moment occurs at 7.5 feet.

MINIMUM BEAM SIZE (W x H): 5.500" by 9.173"

MINIMUM BEAM AREA (Sq.In.): 50.45

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR

Client: STOCK PLAN

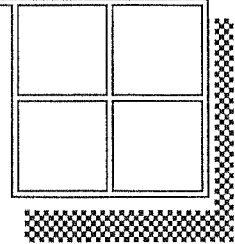
Project: B21143

Location: M7- WINDOW HDR AT LIVING / DINING

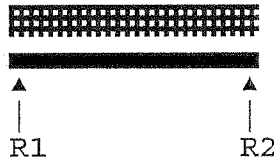
Date: 12-23-2009

Calculation By: L.A.W.

Comment: 6 X 12 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 3,222.0 lbs. Reaction R2 = 3,222.0 lbs.

Total load = 6,444.0 lbs.

Dimensions: Clear span = 6.0 feet, no overhang.

No point loads.

No triangular loads.

Uniform beam weight= 6 lbs/lf (= 36 lbs. total).

Uniform loads: U1 = 1,068.0 lbs/lf at 0.0 feet to 6.0 feet.

Deflection limit (live load plus dead load): 1/360.

BEAM TYPE WOOD: DFL-SINGL 6X #2
 COMPUTED STRESS/STRAIN DESIGN VAL. PROPERTIES REQUIRED ACTUAL

Shear (lbs)	3,222.0	FV	85.0	Area (Sq.In.)	57	57*
Moment (ft-lbs)	4,833.0	FB	875.0	Sect.Modulus	66	98
Deflection (in)	0.20	E	1.30E6	Mom.Inertia	119	506

Actual Maximum Deflection = 0.05 inches.

Maximum Deflection occurs at 3.0 feet.

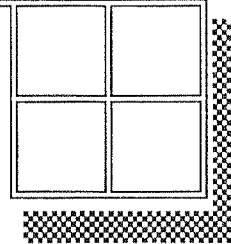
Maximum Moment occurs at 3.0 feet.

MINIMUM BEAM SIZE (W x H): 5.500" by 10.338"

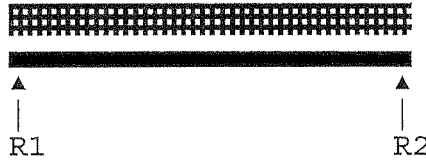
MINIMUM BEAM AREA (Sq.In.): 56.86

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR
 Client: STOCK PLAN
 Project: B21143
 Location: M8- BM AT REAR PATIO
 Date: 12-23-2009
 Calculation By: L.A.W.
 Comment: 6 X 10 DF #2 OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 890.0 lbs. Reaction R2 = 890.0 lbs.
 Total load = 1,780.0 lbs.
 Dimensions: Clear span = 10.0 feet, no overhang.

No point loads.
 No triangular loads.
 Uniform beam weight = 10 lbs/lf (= 100 lbs. total).
 Uniform loads: U1 = 168.0 lbs/lf at 0.0 feet to 10.0 feet.
 Deflection limit (live load plus dead load): 1/360.

BEAM TYPE WOOD: DFL-SINGL 6X #2
 COMPUTED STRESS/STRAIN DESIGN VAL. PROPERTIES REQUIRED ACTUAL

Shear (lbs)	890.0	FV	85.0	Area (Sq.In.)	16	32
Moment (ft-lbs)	2,225.0	FB	875.0	Sect.Modulus	31	31
Deflection (in)	0.33	E	1.30E6	Mom.Inertia	92	92*

Actual Maximum Deflection = 0.33 inches.
 Maximum Deflection occurs at 5.0 feet.
 Maximum Moment occurs at 5.0 feet.

MINIMUM BEAM SIZE (W x H): 5.500" by 5.856"

MINIMUM BEAM AREA (Sq.In.): 32.21

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

PREPARED BY: Alan Mascord Design Associates, Inc.
 (503) 225-9161 Portland, OR

Client: STOCK PLAN

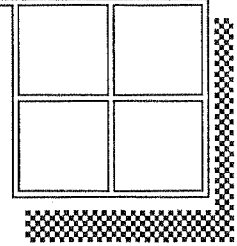
Project: B21143

Location: M9- MAN DR AT REAR GARAGE

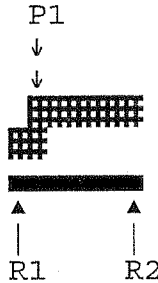
Date: 12-29-2009

Calculation By: L.A.W.

Comment: 3 1/8" X 7 1/2" 24F GLU-LAM OK



BEAM AND LOAD DIAGRAM



Reaction R1 = 3,570.1 lbs. Reaction R2 = 1,468.4 lbs.
 Total load = 5,038.5 lbs.
 Dimensions: Clear span = 3.0 feet, no overhang.

Point loads: P1 = 3,402.0 lbs. at 0.5 feet.
 No triangular loads.
 Uniform beam weight = 3 lbs/lf (= 9 lbs. total).
 Uniform loads: U2 = 609.0 lbs/lf at 0.5 feet to 3.0 feet.
 U1 = 210.0 lbs/lf at 0.0 feet to 0.5 feet.
 Deflection limit (live load plus dead load): 1/300.

BEAM TYPE LAM : GLULAM (2400 Fb)						
COMPUTED STRESS/STRAIN	DESIGN VAL.	PROPERTIES	REQUIRED	ACTUAL		
Shear (lbs)	3,570.1	FV	240.0	Area (Sq.In.)	22	22*
Moment (ft-lbs)	1,758.4	FB	2,400.0	Sect.Modulus	9	27
Deflection (in)	0.12	E	1.80E6	Mom.Inertia	12	95

Actual Maximum Deflection = 0.02 inches.
 Maximum Deflection occurs at 1.5 feet.
 Maximum Moment occurs at 0.5 feet.

MINIMUM BEAM SIZE (W x H): 3.125" by 7.140"

MINIMUM BEAM AREA (Sq.In.): 22.31

VERIFY WITH BUILDING OFFICIAL PRIOR TO MAKING MATERIAL SUBSTITUTIONS

Project: B21143-STOCK PLAN (COMP.)

Location: L1 - LOWER BEAM UNDER LIVING/DINING

Multi-Loaded Multi-Span Beam

[2009 International Building Code(2005 NDS)]

(2) 1.75 IN x 9.5 IN x 10.5 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 3.3%

Controlling Factor: Deflection



Holly Linendoll
 Alan Mascord Design
 1305 NW 18th Avenue
 Portland, OR 97209

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CAUTIONS

* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS

Center

Live Load 0.25 IN L/496

Dead Load 0.07 in

Total Load 0.32 IN L/389

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 2367 lb 2263 lb

Dead Load 648 lb 624 lb

Total Load 3015 lb 2887 lb

Bearing Length 1.15 in 1.10 in

BEAM DATA

Center

Span Length 10.5 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 10.5 ft

Live Load Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	F _b = 2600 psi Cd=1.00 CF=1.03	F _b ' = 2684 psi
Shear Stress:	F _v = 285 psi Cd=1.00	F _v ' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	F _{c-⊥} = 750 psi	F _{c-⊥} ' = 750 psi

Controlling Moment: 7764 ft-lb

5.14 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 2585 lb

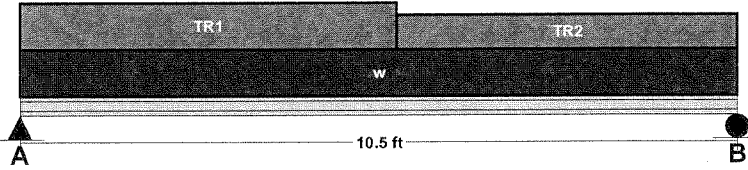
At a distance d from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	34.71 in ³	52.65 in ³
Area (Shear):	13.6 in ²	33.25 in ²
Moment of Inertia (deflection):	242.06 in ⁴	250.07 in ⁴
Moment:	7764 ft-lb	11775 ft-lb
Shear:	2585 lb	6318 lb

LOADING DIAGRAM



UNIFORM LOADS

Center

Uniform Live Load 310 plf

Uniform Dead Load 78 plf

Beam Self Weight 10 plf

Total Uniform Load 398 plf

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two
Left Live Load	150 plf	110 plf
Left Dead Load	37 plf	28 plf
Right Live Load	150 plf	110 plf
Right Dead Load	37 plf	28 plf
Load Start	0 ft	5.5 ft
Load End	5.5 ft	10.5 ft
Load Length	5.5 ft	5 ft

Project: B21143-STOCK PLAN (COMP.)

Location: L2 - LOWER BEAM UNDER KITCHEN/OFFICE

Multi-Loaded Multi-Span Beam

[2009 International Building Code(2005 NDS)]

(2) 1.75 IN x 11.875 IN x 10.0 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 9.7%

Controlling Factor: Deflection



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Alan Mascord Design
1305 NW 18th Avenue
Portland, OR 97209

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CAUTIONS

* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS

Center

Live Load 0.22 IN L/538

Dead Load 0.08 in

Total Load 0.30 IN L/395

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

A

B

Live Load 4600 lb 4600 lb

Dead Load 1665 lb 1665 lb

Total Load 6265 lb 6265 lb

Bearing Length 2.39 in 2.39 in

BEAM DATA

Center

Span Length 10 ft

Unbraced Length-Top 0 ft

Unbraced Length-Bottom 10 ft

Live Load Duration Factor 1.00

Notch Depth 0.00

MATERIAL PROPERTIES

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.00 CF=1.00	Fb' = 2604 psi
Shear Stress:	Fv = 285 psi Cd=1.00	Fv' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. \perp to Grain:	Fc - \perp = 750 psi	Fc - \perp ' = 750 psi

Controlling Moment: 15662 ft-lb

5.0 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -5137 lb

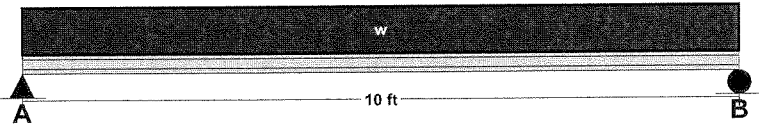
At a distance d from right support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	72.18 in3	82.26 in3
Area (Shear):	27.04 in2	41.56 in2
Moment of Inertia (deflection):	445.07 in4	488.41 in4
Moment:	15662 ft-lb	17848 ft-lb
Shear:	-5137 lb	7897 lb

LOADING DIAGRAM



UNIFORM LOADS

Center

Uniform Live Load	920 plf
Uniform Dead Load	320 plf
Beam Self Weight	13 plf
Total Uniform Load	1253 plf

Project: B21143-STOCK PLAN (COMP.)

Location: FT1 - UNDER L2

Footing

[2009 International Building Code(2005 NDS)]

Footing Size: 2.83 FT x 2.83 FT x 12.00 IN

Reinforcement: #4 Bars @ 6.00 IN. O.C. E/W / (5) min.

Section Footing Design Adequate



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FOOTING PROPERTIES	
Allowable Soil Bearing Pressure:	Qs = 1500 psf
Concrete Compressive Strength:	F'c = 2500 psi
Reinforcing Steel Yield Strength:	Fy = 40000 psi
Concrete Reinforcement Cover:	c = 3 in

FOOTING SIZE	
Width:	W = 2.83 ft
Length:	L = 2.83 ft
Depth:	Depth = 12 in
Effective Depth to Top Layer of Steel:	d = 8.25 in

COLUMN AND BASEPLATE SIZE	
Column Type:	Steel
Column Width:	m = 4 in
Column Depth:	n = 4 in
Baseplate Width:	bsw = 6 in
Baseplate Length:	bsl = 6 in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu = 1202 psf
Effective Allowable Soil Bearing Pressure:	Qe = 1350 psf
Required Footing Area:	Areq = 7.13 sf
Area Provided:	A = 8.01 sf

Baseplate Bearing:

Bearing Required:	Bear = 14470 lb
Allowable Bearing:	Bear-A = 99450 lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 = 2654 lb
Allowable Beam Shear:	Vc1 = 21013 lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo = 53 in
Punching Shear:	Vu2 = 12267 lb
Allowable Punching Shear (ACI 11-35):	vc2-a = 98381 lb
Allowable Punching Shear (ACI 11-36):	vc2-b = 134888 lb
Allowable Punching Shear (ACI 11-37):	vc2-c = 65588 lb
Controlling Allowable Punching Shear:	vc2 = 65588 lb

Bending Calculations:

Factored Moment:	Mu = 44668 in-lb
Nominal Moment Strength:	Mn = 281825 in-lb

Reinforcement Calculations:

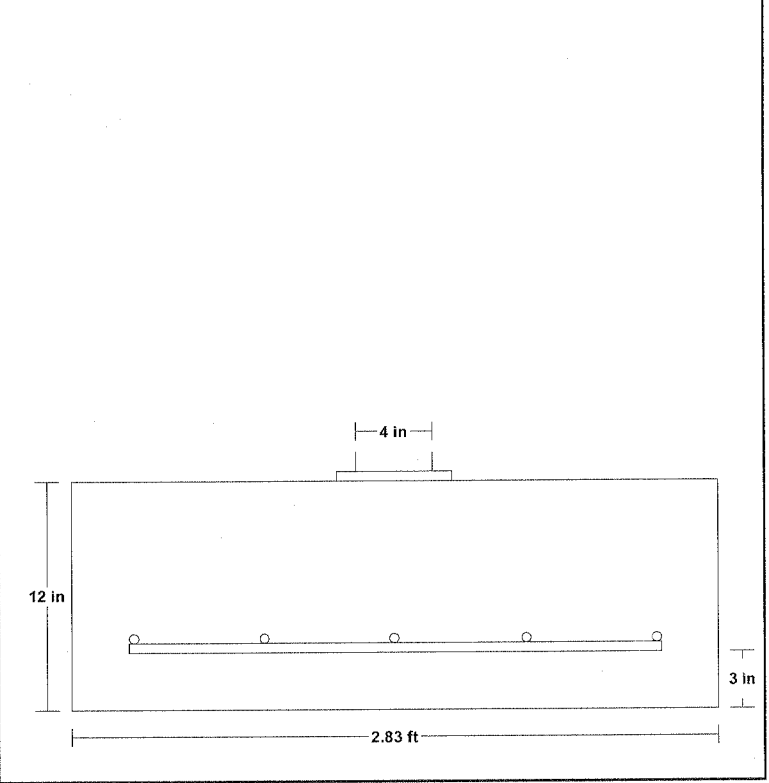
Concrete Compressive Block Depth:	a = 0.54 in
Steel Required Based on Moment:	As(1) = 0.15 in ²
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) = 0.82 in ²
Controlling Reinforcing Steel:	As-reqd = 0.82 in ²
Selected Reinforcement:	#4's @ 6.0 in. o.c. e/w (5) Min.
Reinforcement Area Provided:	As = 0.98 in ²

Development Length Calculations:

Development Length Required:	Ld = 15 in
Development Length Supplied:	Ld-sup = 11.48 in

Note: Plain concrete adequate for bending, therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING

Live Load:	PL = 7290 lb
Dead Load:	PD = 2338 lb
Total Load:	PT = 9628 lb
Ultimate Factored Load:	Pu = 14470 lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. = 774 lb

Project: B21143-STOCK PLAN (COMP.)

Location: FT2 - UNDER L1

Footing

[2009 International Building Code(2005 NDS)]

Footing Size: 2.67 FT x 2.67 FT x 12.00 IN

Reinforcement: #4 Bars @ 8.00 IN. O.C. E/W / (4) min.

Section Footing Design Adequate



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FOOTING PROPERTIES	
Allowable Soil Bearing Pressure:	Qs = 1500 psf
Concrete Compressive Strength:	F'c = 2500 psi
Reinforcing Steel Yield Strength:	Fy = 40000 psi
Concrete Reinforcement Cover:	c = 3 in

FOOTING SIZE	
Width:	W = 2.67 ft
Length:	L = 2.67 ft
Depth:	Depth = 12 in
Effective Depth to Top Layer of Steel:	d = 8.25 in

COLUMN AND BASEPLATE SIZE	
Column Type:	Steel
Column Width:	m = 4 in
Column Depth:	n = 4 in
Baseplate Width:	bsw = 6 in
Baseplate Length:	bsl = 6 in

FOOTING CALCULATIONS

Bearing Calculations:			
Ultimate Bearing Pressure:	Qu =	1217	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	6.43	sf
Area Provided:	A =	7.13	sf

Baseplate Bearing:			
Bearing Required:	Bear =	13116	lb
Allowable Bearing:	Bear-A =	99450	lb

Beam Shear Calculations (One Way Shear):			
Beam Shear:	Vu1 =	2157	lb
Allowable Beam Shear:	Vc1 =	19825	lb

Punching Shear Calculations (Two Way Shear):			
Critical Perimeter:	Bo =	53	in
Punching Shear:	Vu2 =	10873	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	98381	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	134888	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	65588	lb
Controlling Allowable Punching Shear:	vc2 =	65588	lb

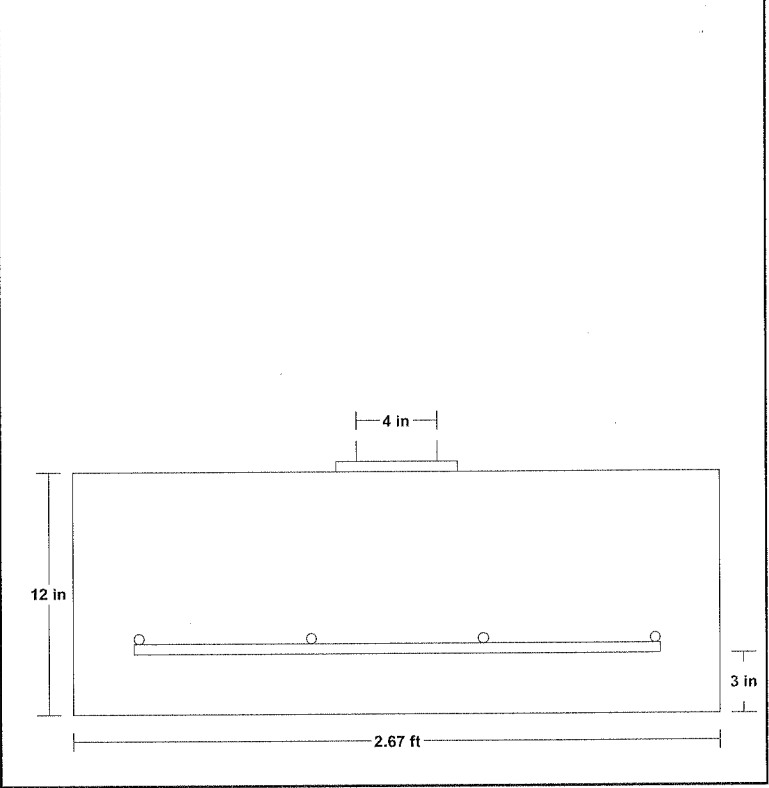
Bending Calculations:			
Factored Moment:	Mu =	37414	in-lb
Nominal Moment Strength:	Mn =	226628	in-lb

Reinforcement Calculations:			
Concrete Compressive Block Depth:	a =	0.46	in
Steel Required Based on Moment:	As(1) =	0.13	in ²
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.77	in ²
Controlling Reinforcing Steel:	As-reqd =	0.77	in ²
Selected Reinforcement:	#4's @ 8.0 in. o.c. e/w (4) Min.		
Reinforcement Area Provided:	As =	0.79	in ²

Development Length Calculations:			
Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	10.52	in

Note: Plain concrete adequate for bending, therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING	
Live Load:	PL = 6768 lb
Dead Load:	PD = 1906 lb
Total Load:	PT = 8674 lb
Ultimate Factored Load:	Pu = 13116 lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. = 689 lb