DESIGN CRITERIA:

A. Code: CBC 2010, Wind: C, 85 mph, Category: D

B. Wood Species: Douglas Fir Larch with maximum 19% moisture content
prior to Installation of Finish Material
4X Members: No.2 or Better
6X, 8X Beams and Headers: No.1 or Better
2X Joists and Rafters: No.2 or Better
Plates and Blocking: Standard Grade or Better
Studs: Stud Grade or Better
Mud Sills: Pressure Treated Utility Grade or Better

PRIMARY ROOF LOADING			SECONDARY ROOF LOADING		
Pitch		4.0:12	Pitch		4.0:12
K = Increase for pitch		1.05	K = Increase for pitch		1.05
Rafter(2x8 16" O/C) Joist(2x10 16" O/C	x K	6.10	Rafter(2x8 16" O/C) Joist(No Ceil'G Joists)	x K	2.70
Plywood(1/2")	x K	1.63	Plywood(1/2")	x K	1.63
		0.00			0.00
Shingle	x K	3.16	Shingle	x K	3.16
Sprinkler		1.00	Sprinkler		1.00
Misc.(Insul.,Elect.,ETC)		2.10	Misc.(Insul.,Elect.,ETC)		1.50
Snow Load		0.00	Snow Load		0.00
Live Load		**20.00**	**Live Load**		**20.00**
Dead Load		**14.00**	**Dead Load**		**10.00**

IBC9.7

LATERAL SECTION

1Y

1X

① ② ③ ④

MASTER BATH

WALK IN CLOSET

NEW ADDED MASTER BEDROOM
249 SF

BED ROOM 3
128 SF

(E) LIVING AREA

(E) KITCHEN

CL

BED ROOM 2
131 SF

CL

BED ROOM 1
108 SF

CL

CL

WH

(E) WATER HEATER

(E) 2 CAR GARAGE
383 SF
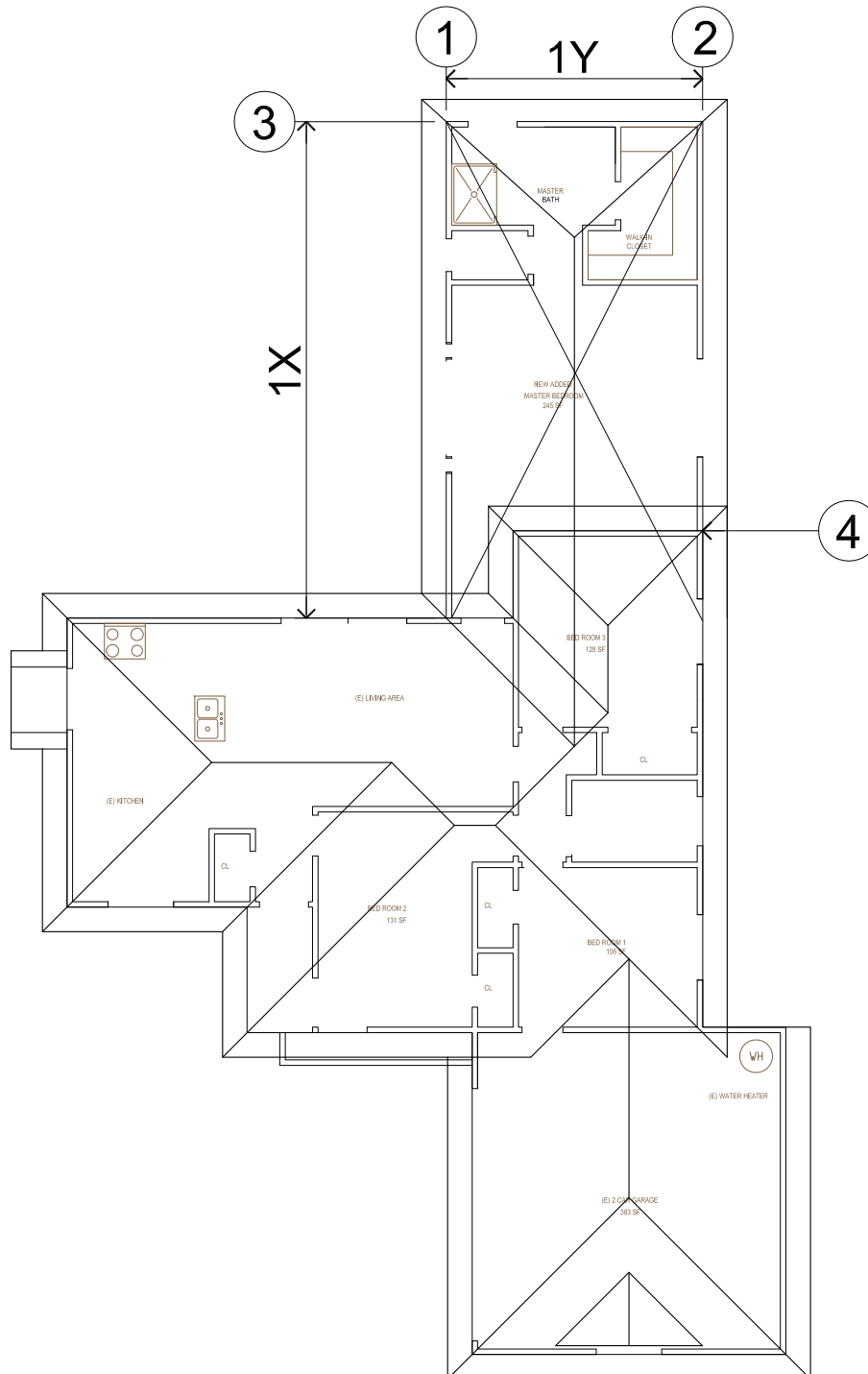
PROPOSAL FLOOR PLAN

SHEAR WALL LAYOUT

LATERAL ANALYSIS
CBC 2010
POURING NON MONO

Y DIRECTION SECTION 1Y

BLDG DIMENSION (FT):   BASE HT=0.5,   SLOPE ROOF HT=14.0,   GABLE MEAN ROOF HT=12.5,   L=30.5,   B=16.0
FLOOR HT (FT):   1-FLR=9.0
WIND PARAMETERS: **WIND SPEED=85 MPH.   WIND EXPOSURE=C**
COEFFICIENTS: K_d=0.85, K_{zt}=1.00,   G=0.85, GC_{pi}= ± 0.18, ω=1.00
INTERPOLATION: L/B $\Rightarrow$ YES,   h/L $\Rightarrow$ YES, $\theta \Rightarrow$ YES, q_h=13.35
WIND HEIGHT (FT):   15   UPLIFT (AVE.)
WALL PRESSURE ωP (PSF):   12.69   8.86
OVERHANGS: 19.00/1.50
GABLE: 16.00(WW)/15.50, 16.00(LW)/15.50
WIND LOAD ROOF (PLF):   +Y/+GC$_{pi}$=78.24(R)   +Y/-GC$_{pi}$=78.24(R)   -Y/+GC$_{pi}$=78.24(R)   -Y/-GC$_{pi}$=78.24(R) MAX TOTAL=78.24
R_v= 6.5.   SITE CLASS: D. S_{DS}=2$F_a S_s$/3=2x1.00x1.50/3=1.000, S_{D1}=2$F_v S_1$/3=2x1.50x0.60/3=0.600, S_{DC}=D,   k=1.0000
V=S_{DS}IW/1.4R_v=(1.000)(1.00)W/(1.4*6.5)=   0.1099W
ROOF: DL ROOF =   14.0x32.0 =   448.00 PLF
             DL EXT WALL =   15.0[1.0(9.00-4.50)] =   67.50 PLF
             DL INT WALL =   10.0[2.5(9.00-4.50)] =   112.50 PLF
             SHEAR =   0.1099(448.00+67.50+112.50) = 0.1099(628.00) =   *69.01 PLF*
TOTAL SEISMIC LOAD =   69.01 =   *69.01 PLF*   (89.71 PLF)
         ROOF :   78.24 PLF WIND GOVERN   (DIAPH.ONLY)
ROOF   DIAPHRAGM V =   89.71 PLF
MAX SHEAR =   89.71 x 16.00 / (2 x 30.50) =   23.53 PLF
USE: 15/32" CDX RATED UNBLKED 32/16 W/8d COMMON NAILS AT 6", 6", 12" O.C.
CHORD FORCE =   89.71 x 16.00 x 16.00 / (8 x 30.50) =   94.13 LBS
SPLICE W/ MINI (5)16d SINKER NAILS EACH SIDE OF SPLICE @ 8 IN. O.C. (STANDARD CONSTRUCTION)

X DIRECTION SECTION 1X

BLDG DIMENSION (FT): BASE HT=0.5,   SLOPE ROOF HT=14.0,   GABLE MEAN ROOF HT=12.5,   L=16.0,   B=30.5
FLOOR HT (FT):   1-FLR=9.0
WIND PARAMETERS: **WIND SPEED=85 MPH,   WIND EXPOSURE=C**
COEFFICIENTS: K_d=0.85, K_{zt}=1.00,   G=0.85, GC_{pi}= ± 0.18,   ω=1.00
INTERPOLATION: L/B ⇒ YES,   h/L ⇒ YES,   θ ⇒ YES, q_h=13.35
WIND HEIGHT (FT):   15   UPLIFT (AVE.)
WALL PRESSURE ωP (PSF): 14.75   8.95
ROOF: 30.50(WW)/8.00/18.43°, 30.50(LW)/8.00/18.43°; OVERHANGS: 32.00/3.00
WIND LOAD ROOF (PLF):   MINIMUM LOAD=(10*5.00*1.00)+66.36=*116.36*   *MAX TOTAL=116.36*
R_x= 6.5, SITE CLASS: D, S_{DS}=2$F_a S_s$/3=2x1.00x1.50/3=1.000, S_{D1}=2$F_v S_1$/3=2x1.50x0.60/3=0.600, S_{DC}=D, k=1.0000
$V=S_{DS}IW/1.4R_x$=(1.000)(1.00)W/(1.4*6.5)=   0.1099W
ROOF: DL ROOF =   14.0x19.0 =   266.00 PLF
          DL EXT WALL =   15.0[2.0(9.00-4.50)] =   135.00 PLF
          DL INT WALL =   10.0[1.5(9.00-4.50)] =   67.50 PLF
          SHEAR =   0.1099(266.00+135.00+67.50) = 0.1099(468.50) =   *51.48 PLF*
TOTAL SEISMIC LOAD =   51.48 =   *51.48 PLF*   (66.93 PLF)
         ROOF :   116.36 PLF WIND GOVERN   (DIAPH.ONLY)
ROOF   DIAPHRAGM V =   116.36 PLF
MAX SHEAR =   116.36 x 25.00 / (2 x 16.00) =   90.91 PLF
USE: 15/32" CDX RATED UNBLKED 32/16 W/8d COMMON NAILS AT 6", 6", 12" O.C.
CHORD FORCE =   116.36 x 25.00 x 25.00 / (8 x 16.00) =   568.17 LBS
SPLICE W/ MINI (5)16d SINKER NAILS EACH SIDE OF SPLICE @ 8 IN. O.C. (STANDARD CONSTRUCTION)
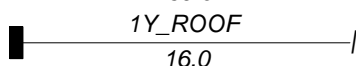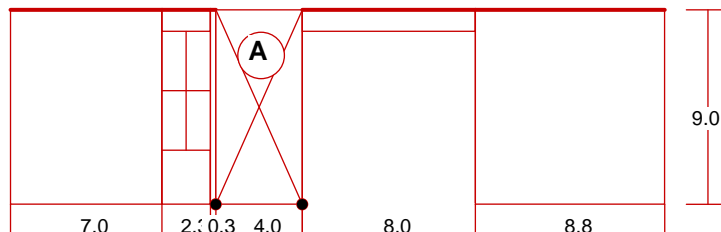
Tung Thanh Vo, M.S., P.E.

SHEARWALS DESIGN

2010-CBC

Wind: 626 Seismic: 552

wind	*78.2*
seismic	*69.0*

1Y_ROOF

16.0

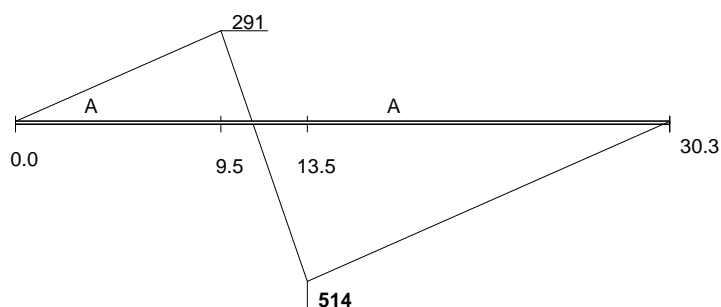**1 @Left of Elevation 1ST Floor 2-Pour   Exterior Wall(Y Dir.)**

Wind   626(Uplift on Roof=8.9 PSF)
Seismic 928=(552+ 161)*1.30

A

9.0

7.0	2.3	0.3	4.0	8.0	8.8

● Strap(E)

291

A   A

0.0   9.5   13.5   30.3

514

Drag Force Analysis

A: Simpson ST22 (1192 LB)   ALT (10) # 16d sinker per top plate splice
Total Wall Length = 30.25(FT) Total Panel Length = 4.00(FT) P.T./User Design
Shear Diaphragm = 928/ 30.25 = 31(PLF) ρ **= 1.30**
Use (3 A35) or (2 LS50) Along Line of Shear Panel or for Framing Clips Spacing See S.W. Schedule
Design Wall Shear(S) = 928/ 4.00= 232(PLF)(Flexible ,SW V_allow(Seismic) Ajusted for H/W Ratio) Max. Drag = 514(LB)

Use TYPE 2

Max. Panel Deflection: △**M = (4.0/1.0) x** △**s x 1.4 = 1.671" <= 0.02 x 108.0 = 2.160"**

Dead Loads:
*Wall   135.0= 15 * 9.0'*
*Roof_P   56.0 = 14 * 8.0/2 FROM 0.0' TO 30.0'*

OVERTURN ANALYSIS   UPLIFT(T)   DOWN(C)
Panel   (A)   Left Side   : T= 2077(LB) C= 2289(LB)   HDU2/4x4
*   Right Side : T= 2077(LB) C= 2289(LB)   HDU2/4x4*

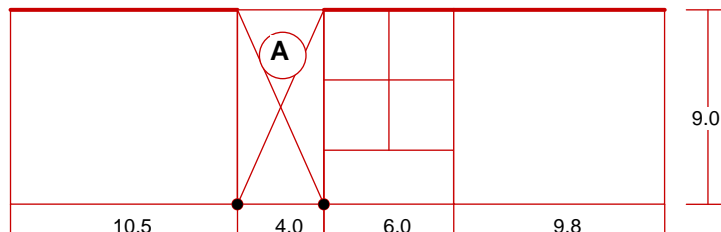**Use HDU2/4x4 on both ends**
w/(2)5/8" x 12" Anchor Bolt (@ 48" O.C. Max.)

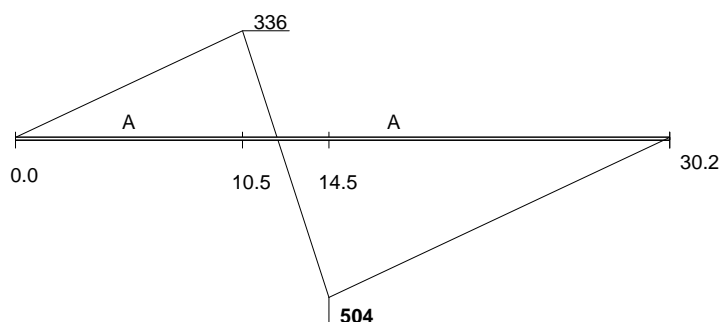**Wind: 626 Seismic: 552**

wind   *78.2*

seismic   *69.0*

1Y_ROOF

16.0
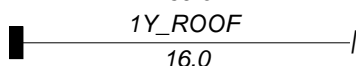
2 @Right of Elevation 1ST Floor 2-Pour Exterior Wall(Y Dir.)

Wind   626(Uplift on Roof=8.9 PSF)
Seismic   968=(552+ 192)*1.30

A

9.0

10.5   4.0   6.0   9.8

● Strap(E)

336

A   A

0.0   10.5   14.5   30.2

504

Drag Force Analysis

A: Simpson ST22 (1192 LB)   *ALT (10) # 16d sinker per top plate splice*
Total Wall Length = 30.25(FT) Total Panel Length = 4.00(FT) P.T./User Design
Shear Diaphragm = 968/ 30.25 = 32(PLF) ρ **= 1.30**
Use (3 A35) or (2 LS50) Along Line of Shear Panel or for Framing Clips Spacing See S.W. Schedule
Design Wall Shear(S) = 968/ 4.00= 242(PLF)(Flexible ,SW V_allow(Seismic) Ajusted for H/W Ratio) Max. Drag = 504(LB)

Use TYPE 2

Max. Panel Deflection: △M = (4.0/1.0) x △s x 1.4 = 1.775" <= 0.02 x 108.0 = 2.160"

Dead Loads:
Wall   *135.0= 15 * 9.0'*
Roof_P   *0.0 = 14 * 0.0/2 FROM 0.0' TO 65.0'*

OVERTURN ANALYSIS   *UPLIFT(T)*   *DOWN(C)*
Panel   (A)   *Left Side   : T= 2225(LB) C= 2348(LB)*   *HDU2/4x4*
                Right Side : T= 2225(LB) C= 2348(LB)   *HDU2/4x4*

Use HDU2/4x4 on both ends
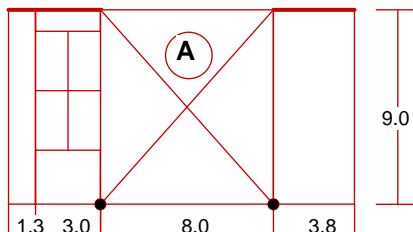## w/(2)5/8" x 12" Anchor Bolt (@ 48" O.C. Max.)

Wind: 1455 Seismic: 644

wind   *116.4*
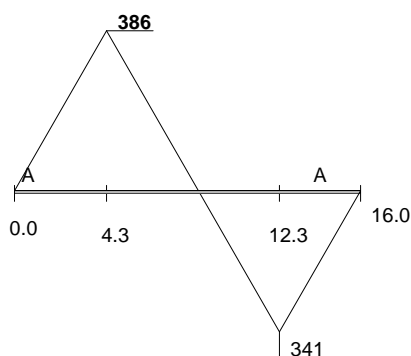*seismic*   *51.5*
1X_ROOF
25.0
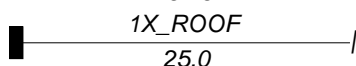
3   @Rear of Master Bath   1ST Floor   2-Pour   Exterior   Wall(X Dir.)

Wind   1455(Uplift on Roof=8.9 PSF)
Seismic   973=(644+ 105)*1.30

Ⓐ

9.0

1.3 3.0   8.0   3.8

● Strap(E)

386

A   A

0.0   4.3   12.3   16.0

341

Drag Force Analysis

A: Simpson ST22 (1192 LB)   ALT (10) # 16d sinker per top plate splice
Total Wall Length = 16.00(FT) Total Panel Length = 8.00(FT) P.T./User Design
Shear Diaphragm = 1455/ 16.00 = 91(PLF) ρ **= 1.30**
Use (4 A35) or (3 LS50) Along Line of Shear Panel or for Framing Clips Spacing See S.W. Schedule
Design Wall Shear(W) = 1455/ 8.00= 182(PLF)(Flexible) Max. Drag = 386(LB)

Use TYPE 1

Max. Panel Deflection: △**M = (4.0/1.0) x** △**s x 1.4 = 0.588" <= 0.02 x 108.0 = 2.160"**

Dead Loads:
*Wall   135.0= 15 * 9.0'*
*Roof_P   70.0 = 14 *10.0/2 FROM 0.0' TO 16.0'*

OVERTURN ANALYSIS   UPLIFT(T)   DOWN(C)
Panel Ⓐ *Left Side   : T= 1458(LB) C= 1930(LB)*   *HDU2/4x4*
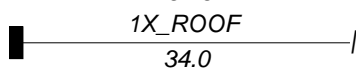   *Right Side   : T= 1391(LB) C= 1930(LB)*   *HDU2/4x4*
Use HDU2/4x4 on both ends
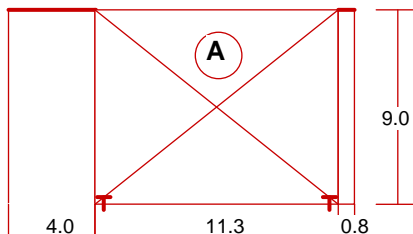**w/(2)5/8" x 12" Anchor Bolt (@ 72" O.C. Max.)**

Wind: 1978 Seismic: 875

wind   *116.4*
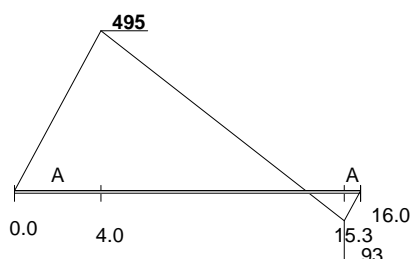*seismic*   *51.5*
                    1X_ROOF
                      34.0

4   @Front of Dining Room   1ST Floor   2-Pour   Exterior   Wall(X Dir.)

Wind   1978(Uplift on Roof=8.9 PSF)
Seismic 1253=(875+ 89)*1.30

A

9.0

4.0   11.3   0.8

● Strap(E)   **T** HD

495

A   A

0.0   4.0   15.3
                          93
16.0

Drag Force Analysis

A: Simpson ST22 (1192 LB)   ALT (10) # 16d sinker per top plate splice
Total Wall Length = 16.00(FT) Total Panel Length = 11.25(FT) P.T./User Design
Shear Diaphragm = 1978/ 16.00 = 124(PLF)   ρ   **= 1.30**
Use (5 A35) or (4 LS50) Along Line of Shear Panel or for Framing Clips Spacing See S.W. Schedule
Design Wall Shear(W) = 1978/11.25= 176(PLF)(Flexible) Max. Drag = 495(LB)

Use TYPE 1

Max. Panel Deflection: △**M = (4.0/1.0) x** △**s x 1.4 = 0.426" <= 0.02 x 108.0 = 2.160"**
Dead Loads:
*Wall   135.0= 15 * 9.0'*
*Roof_P   70.0 = 14 *10.0/2 FROM 0.0' TO 0.0'*

OVERTURN ANALYSIS   UPLIFT(T)   DOWN(C)
Panel   (A)   Left Side   : T= 1169(LB) C= 1625(LB)   HDU2/4x4(I) w/DBL BLK'G ***
*   Right Side : T= 1169(LB) C= 1625(LB)   HDU2/4x4(I) w/DBL BLK'G ****
                Use HDU2/4x4(I) on both ends
            w/(2)5/8" x 12" Anchor Bolt (@ 72" O.C. Max.)

(I) Holdown inside of panel
*** User prefered

Tung Thanh Vo, M.S., P.E.

BEAMS

DESIGN

2010-CBC

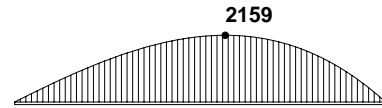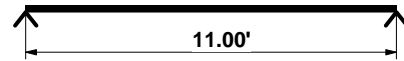## Beam ID: 1   Hip Bm Over the Master Bath

Loads (Downward +)

Beam Weight	*20.0 PLF @ 0.0' to 11.0'*
Secondary Roof	*0 PLF= 0.0'x(10+20)/2 @ 0.00' to*
	240 PLF=16.0'x(10+20)/2 @11.00'

11.00'

Reactions(DL+LL/Max. Load Combination)

Down	550/550	990/990
Up	0/0	0/0

Use DFL NO2 2-2 x 10(Fb= 900 Fv=180)

Critical Shear	*=-905*	*LB @10.67' 1.5xShear/(FvxA)=0.217*
		Fv=225 A= 27.75
Critical Moment	*=2159*	*LBxFT @ 6.25' Ratio=0.489*
		Fb= 1238 S= 42.78
Critical Deflection	*= -0.083*	*INCH @ 5.75'*

-905

Shear Diagram:DL + RF_L

2159

Moment Diagram:DL + RF_L

-0.083
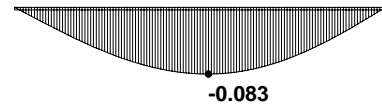
Deflection Diagram:LL

Beam ID: 2 Clg Bm Over the Master Bath

Loads (Downward +)

Beam Weight	*30.0 PLF from 0.0' to 15.3'*
Point Load(P1)	*From right of BM 1 @ 7.50*
Point Load(P2)	*From left of BM 1 @ 7.50*

▼:Point Load Location

P2

15.25'

7.50'
7.50'

Reactions(DL+LL/Max. Load Combination)

Down	1011/1011	986/986
Up	0/0	0/0

Use DFL NO2 4-2 x 10(Fb=900 Fv=180)

Critical Shear	*=1001*	*LB @ 0.33' 1.5xShear/(FvxA)=0.235*
		Fv=213 A= 52.25
Critical Moment	*=6742*	*LBxFT @ 7.50' Ratio=0.779*
		Fb= 1688 S= 82.73
Critical Deflection	*=-0.371*	*Inch @ 7.58' L/240=0.762*

1001

Shear Diagram:DL + RF_L

6742

Moment Diagram:DL + RF_L

-0.371
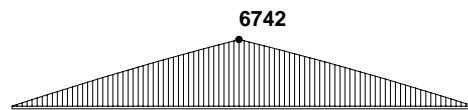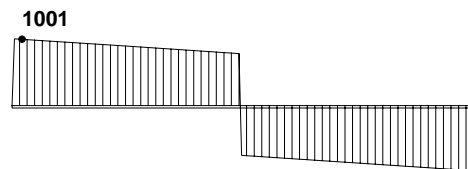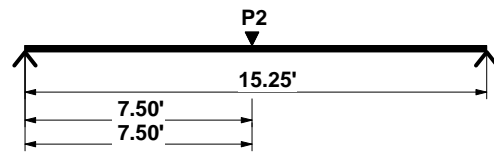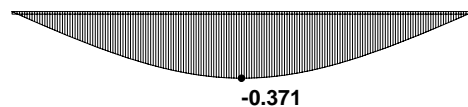
Deflection Diagram:DL+LL

Beam ID: 3(Drop) Header @ Left of the Master Bedroom
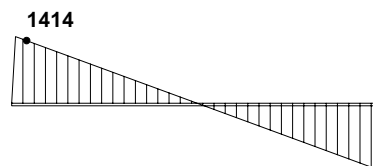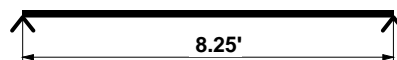Loads (Downward +)

Beam Weight	*20.0 PLF @ 0.0' to 8.3'*
Primary Roof	*323 PLF=19.0'x(14+20)/2 @ 0.00' to 8.25'*
Exterior Wall	*30 PLF= 2.0'x15.0 @ 0.00' to 8.25'*

8.25'
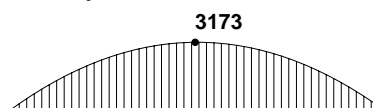
Reactions(DL+LL/Max. Load Combination)

Down	**1539/1539**	**1539/1539**
Up	**0/0**	**0/0**

Use DFL NO2 4 x 10(Fb= 900 Fv=180)

Critical Shear	*=1414*	*LB @ 0.33' 1.5xShear/(FvxA)=0.291*
		Fv=225 A= 32.38
Critical Moment	*=3173*	*LBxFT @ 4.17' Ratio=0.573*
		Fb= 1331 S= 49.91
Critical Deflection	*= -0.054*	*INCH @ 4.17'*

1414

Shear Diagram:DL + RF_L

3173

Moment Diagram:DL + RF_L

-0.054
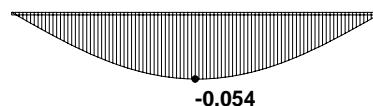
Deflection Diagram:LL

Beam ID: 4(Drop) Header @ Left of the Master Bedroom
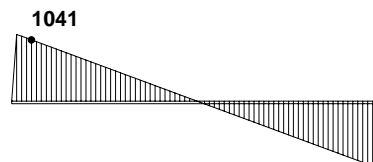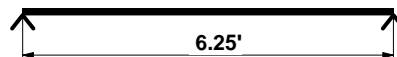Loads (Downward +)

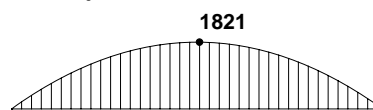|	
Beam Weight	*20.0 PLF from 0.0' to 6.3'*
Primary Roof	*323 PLF=19.0'x(14+20)/2 @ 0.00' to 6.25'*
Exterior Wall	*30 PLF= 2.0'x15.0 @ 0.00' to 6.25'*

6.25'

Reactions(DL+LL/Max. Load Combination)

Down	**1166/1166**	**1166/1166**
Up	**0/0**	**0/0**

Use DFL NO2 4 x 8(Fb= 900 Fv=180)

Critical Shear	*=1041*	*LB @ 0.33' 1.5xShear/(FvxA)=0.274*
		Fv=225 A= 25.38
Critical Moment	*=1821*	*LBxFT @ 3.17' Ratio=0.491*
		Fb= 1451 S= 30.66
Critical Deflection	*= -0.037*	*INCH @ 3.17'*

1041

Shear Diagram:DL + RF_L

1821

Moment Diagram:DL + RF_L

-0.037

Deflection Diagram:LL