Addition
STRUCTURAL CALCULATIONS

Carter Residence
5776 West 10620 South
Highland, UT

PREPARED FOR

Page Drafting & Design
Eagle Mountain, UT

10 South 300 East
American Fork, UT
www.woodlandeng.com
801.369.2142

Project No. 12278
Date 5/14/18

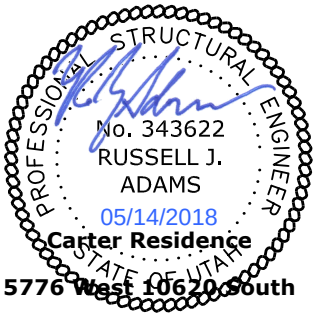
2015 IRC and IBC

WIND
- Speed 115 mph
- Exposure C
- Gust 3 sec
- Risk Category II

SEISMIC
- S_{DS} 0.831g
- S_{D1} 0.458g
- I_E 1.00

Roof Snow 40 psf
Soil Brg Pressure 1500 psf (Assumed - Field verify)

ENGINEER'S SEAL



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Project: Carter Residence
Engineer: RJA
5/14/18

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GENERAL INFORMATION

Design Codes	2015 IRC and IBC
Structure Type	Wood, Concrete, Steel
Project Description	Wood framed structure with concrete foundations and footings.
Location	Highland

DESIGN LOADS

Live (psf)	40	Roof Snow	
	20	Roof Live	
	40	Floor	Residential
	60	Deck	

Dead (psf)	20	Floor
	20	Roof
	10	Deck
	15	2x Wall Stucco / Siding
	20	2x Wall Cultured Stone
	50	2x Wall Brick

Wind	115 mph	IBC
	C	Exposure
	3 sec	Gust
	II	Risk Category

Seismic	1.242	S_s	Per USGS website for project location
	0.441	S_1	
	0.831	S_{DS}	
	0.458	S_{D1}	
	1.00	I_E	

DEFLECTION CRITERIA

Total Load	Live Load	
L/240	L/360	Floor Joists
L/240	L/360	Floor Beams
L/240	L/360	Roof Joists
L/240	L/360	Roof Beams
L/360	L/600	Members Supporting Masonry or Concrete
L/180	-	Walls - Flexible Finish
L/240	-	Walls - Brittle Finish

FOOTING & FOUNDATION CRITERIA

Geotechnical Engineer	NA
Soils Report	NA

Footing Frost Depth	Per local building department

1500	Bearing Pressure (psf)	Assumed - Field verify
NA	Active Pressure (pcf)	
NA	At-Rest Pressure (pcf)	
NA	Passive Pressure (pcf)	
NA	Coefficient of Friction	

MATERIAL SPECIFICATIONS

Wood	Sawn Lumber	Douglas Fir Larch
	Glulam Beams (GLB)	24F-V4 (Unless noted otherwise)
	Laminated Veneer Lumber (LVL)	Fb = 2600 psi, Fv = 285 psi, E = 1900 ksi
	Parallel Strand Lumber (PSL)	Fb = 2900 psf, Fv = 290 psf, E = 2000 ksi
	Sheathing	APA Rated OSB
	Structural Nails	Common Wire
	Framing Hardware	Simpson Strong-Tie Connectors, Hot-dip galvanized
	Bolts in Wood	ASTM A307
	Adhesive	APA AFG-01
	Powder Driven Fasteners	CABO NER-272

Concrete	Footings, Piers, Foundation Walls & Grade Beams	3,000 psi compressive strength at 28 days. Type II low alkali cement conforming to ASTM C 150. W/C ratio 0.48 maximum, no water to be added on site 3 1/2% +/- 1 1/2% air per ASTM C 20.
	Exterior Slabs on Grade	4,000 psi compressive strength at 28 days. Type II low alkali cement conforming to ASTM C 150 W/C ratio 0.45 maximum, no water to be added on site 6 1/2% +/- 1 1/2% air per ASTM C 20.
	Interior Slabs on Grade	4,000 psi compressive strength at 28 days. Type II low alkali cement conforming to ASTM C 150 W/C ratio 0.45 maximum, no water to be added on site 3 1/2% +/- 1 1/2% air per ASTM C 20.
	Rebar	Grade 60, ASTM A615
	Rebar - Weldable	Grade 60, ASTM A706
	Welded Wire Fabric	ASTM A 185, Flat sheets

Steel	Wide Flange Beams	Fy = 50 ksi, ASTM A992
	HSS (Tubes)	Fy = 46 ksi, ASTM A500
	Misc Shapes & Plates	Fy = 36 ksi, ASTM A36
	Welds	E70XX Electrodes
	Bolts	ASTM A325

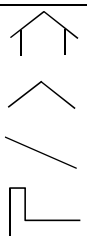
CMU	Block	Medium weight, Grade N-1 units, ASTM C90
	Mortar	Type "S", ASTM C207-6
	Grout	2000 psi (28 day), ASTM C1019, ASTM C476
	Special Inspection Required on All Structural Masonry	

WIND

General Info		
V =	115	mph
Exp Cat =	C	
K_d =	0.85	
K_{zt} =	1.0	
G =	0.85	
Bld Type =	Enclosed	
Gcpi =	+/- 0.18	
K_z =	0.88	
Load Factor =	0.6	(0.6 ASD / 1.0 SD)
Mean Roof Ht =	18.0	ft

C_p =	
0.8	Wall Windward
-0.5	Wall Leeward
1.0	Roof - Enclosed (0.4 Windward + -0.6 Leeward)
1.5	Pitched Free Roof (1.1 Windward + -0.4 Leeward)
-0.6	Monoslope Free Roof (Leeward (Add Wall Windward))
2.5	Parpet Wall (1.5 Windward + -1.0 Leeward)

h_z	K_z	q_z	$P_{wall\ windward}$	$P_{wall\ leeward}$	$P_{wall\ total}$	
0-15	0.85	14.7	10.0	6.5	16.4	P_{roof}
20	0.90	15.5	10.6	6.5	17.0	12.9
25	0.94	16.2	11.0	6.5	17.5	$P_{pitched\ free\ roof}$
30	0.98	16.9	11.5	6.5	18.0	19.4
35	1.01	17.4	11.9	6.5	18.3	$P_{mono\ free\ roof}$
40	1.04	18.0	12.2	6.5	18.7	7.7
45	1.07	18.5	12.6	6.5	19.0	$P_{parapet}$
50	1.09	18.8	12.8	6.5	19.3	32.3



Wind Force on Projected Surfaces of Structure

	S/S PATIO			S/S HOUSE		
Level	Height ft	Wind Press. psf	Wind Press. plf	Height ft	Wind Press. psf	Wind Press. plf
Roof	14.5	19.4	281	14	12.9	181
4			0			0
3			0			0
2			0	9	16.4	148
1	1		0	10	16.4	164
Notes:						

Wind Force (Plf)	
S/S PATIO	S/S HOUSE
0	0
0	0
0	254
281	410

Level	Height ft	Wind Press. psf	Wind Press. plf	Height ft	Wind Press. psf	Wind Press. plf
Roof			0			0
4			0			0
3			0			0
2			0			0
1			0			0
Notes:						

Wind Force (Plf)	
0	0
0	0
0	0
0	0

SEISMIC - BASE SHEAR

R =	6.5	Flexible diaphragm with light framed walls				
Ω_O =	3.0					
Cd =	4.0					
Risk Category =	II	S_s =	1.24	Seismic Design Categories		
I_E =	1.00	S_1 =	0.44	Table 11.6-1 =	D	(Assumed)
ρ =	1.00 & 1.30	S_{DS} =	0.83	Table 11.6-2 =	D	(Assumed)
Irregularity =	1.25	S_{D1} =	0.46	Site Class =	D	(Assumed)

Equivalent Lateral Force Procedure	
$C_S = S_{DS} / (R / I)$	
$V = Cs\ W$	0.128
$V_{DESIGN\ ASD} = 0.7\ Cs\ W$ x Irregularity =	0.112
(ρ = individual shear line basis as needed)	

				Dim (ft) X-Y	33	31		Dim (ft) X-Y		
Level	Component	DL (psf)	Height (ft)	Length (ft)	Area (sf)	Weight (kips)	Height (ft)	Length (ft)	Area (sf)	Weight (kips)
Roof		20	-	-	1025	20.5	-	-		0.0
	Floor	15	-	-		0.0	-	-		0.0
4	Wall	15			-	0.0		0	-	0.0
	Wall				-	0.0			-	0.0
	Floor	20	-	-		0.0	-	-		0.0
3	Wall	15			-	0.0		0	-	0.0
	Wall				-	0.0			-	0.0
	Floor	20	-	-	1045	20.9	-	-		0.0
2	Wall	15	9	70	-	9.5		0	-	0.0
	Wall				-	0.0			-	0.0
1	Wall	15	10	50	-	7.5		0	-	0.0
	Wall				-	0.0			-	0.0

	Level	Height (Ft)	Vtot (K)	Vtot (plf) X & Y		Height (Ft)	Vtot (K)	Vtot (plf) X & Y	
	4 / Roof	26.0	3.4	111	104		0	0	0
NEW FORCES FROM	3		0	0	0		0	0	0
BACK EXISTING SHEAR	2	26.0	4.2	136	128		0	0	0
WALL LINE	1	10.0	6.1	197	185		0	0	0
	Notes								

				Dim (ft) X-Y				Dim (ft) X-Y		
Level	Component	DL (psf)	Height (ft)	Length (ft)	Area (sf)	Weight (kips)	Height (ft)	Length (ft)	Area (sf)	Weight (kips)
Roof		20	-	-		0.0	-	-		0.0
	Floor	15	-	-		0.0	-	-		0.0
4	Wall	15		0	-	0.0		0	-	0.0
	Wall				-	0.0			-	0.0
	Floor	20	-	-		0.0	-	-		0.0
3	Wall	15		0	-	0.0		0	-	0.0
	Wall				-	0.0			-	0.0
	Floor	20	-	-		0.0	-	-		0.0
2	Wall	15		0	-	0.0		0	-	0.0
	Wall				-	0.0			-	0.0
1	Wall	15		0	-	0.0		0	-	0.0
	Wall				-	0.0			-	0.0

	Level	Height (Ft)	Vtot (K)	Vtot (plf) X & Y		Height (Ft)	Vtot (K)	Vtot (plf) X & Y	
	4 / Roof		0	0	0		0	0	0
	3		0	0	0		0	0	0
	2		0	0	0		0	0	0
	1		0	0	0		0	0	0
	Notes								

SHEAR WALL SCHEDULE

Mark	Edge Nailing in. o.c.	Shear Cap (plf) 16" Studs Wind	Shear Cap (plf) 16" Studs Seismic	Shear Cap (plf) 24" Studs Wind	Shear Cap (plf) 24" Studs Seismic	Notes
SW1	6	365	260	335	240	1,2,3,4
SW2	4	532	350	490	350	1,2,3,4
SW3	3	685	490	630	450	1,2,3,4,5
SW4	4	1065	760	980	700	1,3,4,6,7
SW5	3	1370	980	1260	900	1,3,4,6,7
SW6	7	90	90		-	3,8,9

Notes:

1. 8d nails (0.131" x 2.5"). Field nail @ 12" o.c.
2. 7/16" APA OSB on one side of wall.
3. Block all panel edges.
4. Provide 3" x 3" x 0.229" plate washer with slotted diagonal hole and standard cut washer to be plased between the 3" x 3" x 0.229" washer and the nut on anchor bolts (Typical).
5. Use 3" nominal members at abutting panel edges. (3x member may be replaced with double 2x members face nailed w/ 16d at 4" oc staggered)
6. 7/16" APA OSB on both sides of wall.
7. Use 3" nominal members at abutting panel edges or offset panel edges. (3x member may be replaced with double 2x members face nailed w/ 16d at 4" oc staggered)
8. 6d cooler nails (1-7/8"x0.092") or No. 6 1-1/4" type W drywall screws. Field nail @ 7" oc.
9. 5/8" gypsum board one side of wall.

ANCHOR BOLTS

$Z_{\|}$ (lbs)	501	722	620	969
Cd = 1.33	2x Plate		4x Plate	
Spacing	1/2" Dia.	5/8" Dia.	1/2" Dia.	5/8" Dia.
8 " OC	999	1,440	1,237	1,933
10 " OC	800	1,152	990	1,547
12 " OC	666	960	825	1,289
16 " OC	500	720	618	967
24 " OC	333	480	412	644
32 " OC	250	360	309	483
36 " OC	222	320	275	430
48 " OC	167	240	206	322

Notes:

1. Based on incised Spruce-Pine-Fir.
2. Minimum 6" embedment and A307 Grade anchor.

STAPLE EQUIVALENCY CHART

Nails		Equivalent Staple Spacing (in. o.c.) 16 Ga.	15 Ga.	14 Ga.
8d at (in. o.c.)	4"	2.5	3.5	4
	6"	4	5	6
	12"	8	10	12

Notes:

1. Minimum staple penetration into main member is 1".
2. Place staples parallel to panel edge.
3. Provide 3/8" distance from panel edge to staple.
4. Table valid for shear walls only.
5. Consult local building department for acceptability of staples.

Project: Carter Residence
Engineer: RJA
5/14/2018

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SHEAR WALLS

Gridline					
A	B				

Wind Shear Force						
plf	677	852				
k	4.7	11.1				
Seismic Shear Force						
plf	670	532				
k	3.1	6.9				

	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H
Shear Wall Length	3.0	8	0.75	6.0		1.00			1.00			1.00			1.00			1.00
	1.8	6	0.60	7.0		1.00			1.00			1.00			1.00			1.00
	2.2	7.5	0.59			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
	7.0	4.6		13.0	13.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj
Wind	281	11.0	1.00	410	27.0	1.00			1.00			1.00			1.00			1.00
	254	6.5	1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00

	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj
Seismic	136	17.5	1.30	197	27.0	1.30			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00

Notes						

Gridline					

Wind Shear Force						
plf						
k						
Seismic Shear Force						
plf						
k						

	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H	W (ft)	H (ft)	2W/H
Shear Wall Length			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj	(plf)	Trib (ft)	Adj
Wind			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00

	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj	(plf)	Trib (ft)	ρ / Adj
Seismic			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00
			1.00			1.00			1.00			1.00			1.00			1.00

Notes						

SHEAR WALL HOLDOWN & STRAP CALCULATIONS

Individual Full-Height Wall Segments

Mark	Grid	Wall H ft	Vmax plf	Treq. lbs

Individual Full-Height Wall Segments (With dead load)

Mark	B	C	C			
Grid	A	B	B			
Shear (plf)	677	852	852			
H (ft)	8	9	9			
W (ft)	3	7	6			
0.6xDL (psf)	9	9	9			
Trib wid (ft)	9	20	28			
End Ld (lbs)	200	1000	1000			
M ov (ft lbs)	16,248	53,676	46,008	-	-	-
M res (ft lbs)	365	4,410	4,536	-	-	-
T req. (lbs)	5,095	6,038	5,912			
Holdown Req	req	req	req			

Perforated Shear Walls

Mark	Grid	V (kips)	H (ft)	L_{TOT} (ft)	L_{o1} (ft)	h_1 (ft)	L_{o2} (ft)	h_2 (ft)	L_{o3} (ft)	h_3 (ft)	A_o (FT^2)	r	C_o	L_{eff} (ft)	V_{eff} (plf)	T_{req} (lbs)
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		
											0.00	0.00	0.00	0.0		

Force-Transfer Shear Walls

Mark	Grid	V (kips)	H (ft)	L_{TOT} (ft)	U(kips)	$V_{B,G}$	$V_{D,E}$	$v_{A,C}$	$v_{F,J}$	T&C (L)	T&C (R)	check y	check x	Strap	T_{req} (lbs)
B	A	2.9	13.5	15.0	2.61	725.0	435.0	(471.3)	(471.3)	2,632	2,153	ok	ok	**2,632**	**2,610**
		hf	hg	hj	wc	we	wj								
		4.0	7.5	2.0	2.20	11.0	1.8								
			-	-										-	-
		hf	hg	hj	wc	we	wj								
			-	-										-	-
		hf	hg	hj	wc	we	wj								
			-	-										-	-
		hf	hg	hj	wc	we	wj								
			-	-										-	-
		hf	hg	hj	wc	we	wj								

SHEAR WALL HOLDOWN & STRAP CAPACITIES

Mark	Holdown	Wind - Non Cracked (lbs)			Seismic - Non Cracked (lbs)			Seismic - Cracked (lbs)		
		Midwall	Corner	Endwall	Midwall	Corner	Endwall	Midwall	Corner	Endwall
	LSTHD8(RJ)	3115	2700	2230	2615	2125	1635	2250	1950	1610
	STHD10(RJ)	4755	4120	3145	3400	2940	2295	3400	2940	2175
	STHD14(RJ)	5345	5345	4210	3815	3815	3500	3815	3815	3500

	Strap	Capacity (lbs)
	CS16 - 44" Long	1705
	MST37	2710
A	MST48	4205
B	MST60	6235

	Holdown	Capacity (lbs)
	HDU2-SDS2.5	3075
	HDU4-SDS2.5	4565
	HDU5-SDS2.5	5645
C	HDU8-SDS2.5	6765

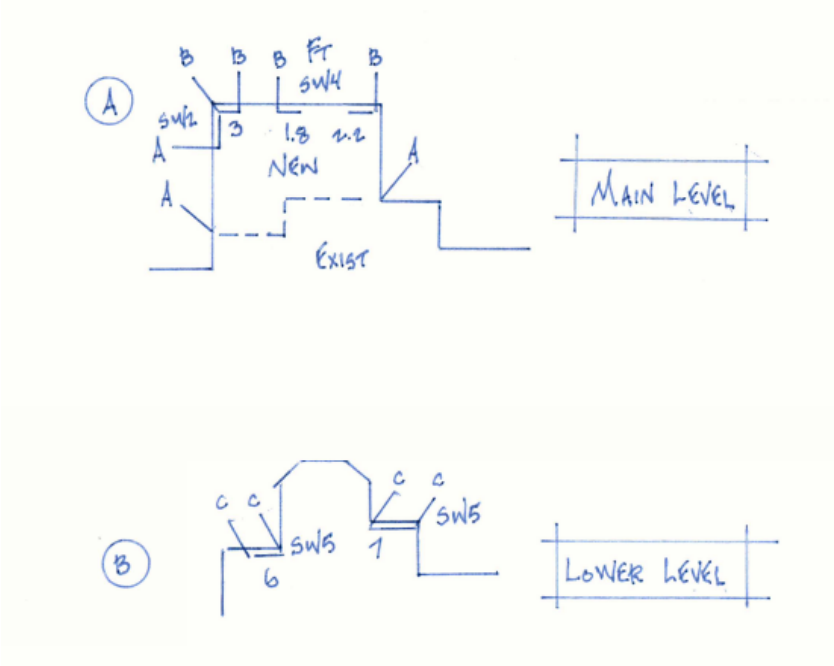
Notes: Seismic values for SDC C - F
8" Thick stem wall w/ min 2500 psi concrete
Use (RJ) model when installing at rim joist
5/8" Dia A307 ATR HDU2 /4 with 12" embedment
5/8" Dia A307 ATR HDU5 with 16" embedment
7/8" Dia A307 ATR HDU8 with 24" embedment
Fasten into (2) 2x member per manu req
Nails into rim board not req

Retrofit Options	
Holdown	Retrofit (see notes below)
LSDTHD8(RJ)	HDU4, MST48
STHD10(RJ)	HDU4, MST48
STHD14(RJ)	HDU5, MST60

HDU4/5 - Epoxy embed 5/8" Dia A307 ATR 12" HDU4 or 16" HDU5 into concrete.
- Use Simpson SET epoxy or equiv.
- Installation and hole prep per manu req.

MST48/60 - Center strap over rim board.
- Nail upper portion of strap into (2) 2x studs per manu req.
- Anchor bottom of strap to foundation w/ (2) 1/2" Dia wedge anchors or equiv.
- Embed anchors min 4" and start min 6" down from top of foundation.

SHEAR WALL KEY PLAN



FLOOR SHEATHING

Use 3/4" T. & G. APA rated Sturd-I-Floor sheathing glued and nailed with 10d common at 6" o.c. at panel edges and 12" o.c. in the field.

FLOOR JOIST SPAN TABLES

2x Floor Joists

Depth	Loading	12" o.c.	16" o.c.	24" o.c.
2x10	40/10	17' 9	15' 5	12' 7
2x12	40/10	20' 7	17' 10	14' 7
2x10	60/10	15' 0		10' 7
2x12	60/10	17' 5	15' 1	12' 4

Notes: Joist are DF#2 or better.
Loading is Live Load/Dead Load.

TJI Floor Joists

		Code Minimum L/360 Live Load Deflection					L/480 Live Load Deflection			
Depth	TJI/Pro	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9-1/2"	110	18'-9"	17'-2"	15'-8"	14'-0"		16'-11"	15'-6"	14'-7"	13'-7"
	210	19'-8"	18'-0"	17'-0"	15'-4"		17'-9"	16'-3"	15'-4"	14'-3"
11-7/8"	110	22'-3"	19'-4"	17'-8"	15'-9"		20'-2"	18'-5"	17'-4"	15'-9"
	210	23'-4"	21'-2"	19'-4"	17'-3"		21'-1"	19'-3"	18'-2"	16'-11"
	360	25'-4"	23'-2"	21'-10"	20'-4"		22'-11"	20'-11"	19'-8"	18'-4"
	560	28'-10"	26'-3"	24'-9"	23'-0"		26'-1"	23'-8"	22'-4"	20'-9"

BCI Floor Joists

		Code Minimum L/360 Live Load Deflection					L/480 Live Load Deflection			
Depth	Series	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9-1/2"	BCI 5000 1.7	18'-11"	17'-0"	15'-6"	13'-11"		17'-1"	15'-7"	14'-9"	13'-9"
	BCI 6000 1.8	19'-10"	18'-2"	17'-2"	15'-9"		17'-11"	16'-5"	15'-6"	14'-5"
	BCI 6500 1.8	20'-5"	18'-8"	17'-8"	16'-5"		18'-5"	16'-10"	15'-11"	14'-10"
11-7/8"	BCI 5000 1.7	22'-3"	19'-4"	17'-7"	15'-9"		20'-2"	18'-5"	17'-5"	15'-9"
	BCI 6000 1.8	23'-6"	21'-6"	20'-0"	17'-11"		21'-3"	19'-5"	18'-4"	17'-1"
	BCI 6500 1.8	24'-3"	22'-2"	20'-11"	18'-10"		21'-11"	20'-0"	18'-11"	17'-7"
	BCI 60 2.0	25'-9"	23'-6"	22'-3"	20'-9"		23'-3"	21'-3"	20'-1"	18'-8"
	BCI 90 2.0	29'-0"	26'-6"	25'-0"	23'-3"		26'-3"	23'-11"	22'-6"	20'-11"
14"	BCI 6000 1.8	26'-9"	23'-11"	21'-10"	19'-6"		24'-2"	22'-2"	20'-11"	19'-6"
	BCI 6500 1.8	27'-6"	25'-1"	22'-11"	20'-6"		24'-10"	22'-9"	21'-5"	20'-0"
	BCI 60 2.0	29'-3"	26'-8"	25'-3"	21'-10"		26'-5"	24'-2"	22'-9"	21'-3"
	BCI 90 2.0	32'-10"	30'-0"	28'-3"	26'-0"		29'-9"	27'-1"	25'-6"	23'-8"

LPI Floor Joists

		Code Minimum L/360 Live Load Deflection					L/480 Live Load Deflection			
Depth	Series	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9-1/2"	LPI 20Plus	19'-7"	17'-11"	16'-7"	14'-10"		17'-9"	16'-2"	15'-3"	14'-3"
	LPI 32Plus	20'-10"	18'-11"	17'-10"	16'-6"		18'-9"	17'-0"	16'-0"	14'-9"
	LPI 42Plus	23'-4"	21'-4"	20'-1"	18'-9"		21'-1"	19'-3"	18'-2"	16'-11"
11-7/8"	LPI 20Plus	23'-5"	21'-1"	19'-3"	17'-2"		21'-2"	19'-4"	18'-3"	17'-0"
	LPI 32Plus	24'-9"	22'-6"	21'-2"	19'2"		22'-3"	20'-2"	19'-0"	17'-7"
	LPI 42Plus	27'-9"	25'-4"	23'-11"	22'-3"		25'-1"	22'-10"	21'-7"	20'-1"
14"	LPI 20Plus	26'-4"	22'-10"	20'-10"	18'-7"		24'-1"	22'-0"	20'-9"	18'-7"
	LPI 32Plus	28'-0"	25'-5'	23'-7"	19'-6"		25'-2"	22'-10"	21'-6"	19'-6"
	LPI 42Plus	31'-5"	28'-8"	27'-1"	24'-10"		28'-5"	25'-11"	24'-5"	22'-9"

Table Notes: Spans based on 40 psf LL and 10 psf DL
Simple Spans
Last updated 3/20/12

ROOF FRAMING

Roof Overbuild Requirements:

Frame roof overbuild areas with 2x6 DF#2 joists at 24" on center. Brace joists at 6'-0" on center. Use 2x8 DF#2 ridge board braced at 4'-0" on center. Use 2x8 DF#2 valley members layed flat and nailed to trusses with (2) 16d each truss. Brace ridge and joists such that load is distributed uniformly to trusses below. Sheath under all overbuild areas. Provide access and ventilation to overbuild areas as necessary.

Roof Trusses: **10 South 300 East** **American Fork, UT**

Pre-engineered trusses to be blocked and braced per manufacturer's recommendations. Provide cross bracing at permanent continuous lateral bracing at a maximum of 20'-0" o.c. and a minimum of (2) cross braces per continuous brace. All truss connection hardware to be designed by the truss manufacturer.
Provide "H1" clips at 24" o.c. at bearing on trusses for typical areas.

ROOF JOIST SPAN TABLE

		Live Load / Dead Load (psf)							
Member Size	Spacing (in o.c.)	30 15	30 20	40 15	40 20	50 15	50 20	60 15	60 20
2x4	12	8'-7	8'-5	7'-6	7'-2	6'-11	6'-8	6'-5	6'-3
	16	7'-8	7'-4	6'-6	6'-3	5'-11	5'-9	5'-7	5'-4
	24	6'-3	5'-11	5'-4	5'-1	4'-10	4'-8	4'-5	4'-2
2x6	12	13'-0	12'-4	10'-11	10'-6	10'-1	9'-9	9'-5	9'-1
	16	11'-3	10'-8	9'-6	9'-1	8'-9	8'-5	8'-2	7'-10
	24	9'-2	8'-9	7'-9	7'-5	7'-2	6'-10	6'-8	6'-5
2x8	12	16'-5	15'-7	13'-10	13'-3	12'-9	12'-4	11'-11	11'-6
	16	14'-3	13'-6	12'-0	11'-6	11'-1	10'-8	10'-4	10'-0
	24	11'-8	11'-0	9'-10	9'-5	9'-0	8'-8	8'-5	8'-2
2x10	12	20'-1	19'-1	16'-11	16'-3	15'-7	15'-0	14'-6	14'-1
	16	17'-5	16'-6	14'-8	14'-1	13'-6	13'-0	12'-7	12'-2
	24	14'-2	13'-6	12'-0	11'-6	11'-0	10'-8	10'-3	9'-11
2x12	12	23'-4	22'-1	19'-8	18'-10	18'-1	17'-5	16'-10	16'-4
	16	20'-2	19'-2	17'-0	16'-4	15'-8	15'-1	14'-7	14'-1
	24	16'-6	15'-8	13'-11	13'-4	12'-9	12'-4	11'-11	11'-6

Notes: Members are DF#2.
30 psf Live Loads include a 1.15 load duration factor.
Provide "H1" clips at 24" o.c. at bearing on rafters for typical areas.

ROOF SHEATHING

Panel Thickness (in)	Span Rating	Allowable Live Loads (psf) Support Spacing (in)			Nailing Requirements			Unblocked Cap (PLF)		Blocked Cap (PLF)	
		12	16	24	Size	Edges (in o.c.)	Field (in o.c.)	Wind	Seismic	Wind	Seismic
7/16	24/16	190	100	40	8d	6	12	322	230	357	255
15/32, 1/2	32/16	325	180	70	8d	6	12	335	240	377	270
19/32, 5/8	40/20	-	305	130	10d	6	12	400	285	447	320
23/32, 3/4	48/24	-	-	175	10d	6	12	-	-	-	-

Notes: Provide gap between panels at time of installation per manu requirements.
Nails to be Common or Box type.
Case 1 for diaprhagm capacities.

BEAM CALCULATIONS

	ROOF BEAMS	NEW BACK WINDOWS AND DOOR		NEW SIDE WINDOWS		EXIST RIGHT SIDE PATIO BEAM (I)		NEW PATIO BEAMS (I)					
Reference	Plan Mark	B1		B1		-		B2					
Beam	Size & Species	(2) 2" x 10"		(2) 2" x 10"		(1) 5-1/8" x 15"		(1) 5-1/8" x 15"		(1) 2" x 4"		(1) 2" x 4"	
	Grade	DF-L No.2		DF-L No.2		24F-V4 GLULAM		24F-V4 GLULAM		DF-L Select Struct.		DF-L Select Struct.	
	Spacing (if appl)												
	Span	5'- 0"		3'- 0"		13'- 0"		10'- 0"		1'- 0"		1'- 0"	
Parameters	Beam List #	22	Unity Chk	22	Unity Chk	113	Unity Chk	113	Unity Chk	1	Unity Chk	1	Unity Chk
	Quantity	2	0.16	2	0.34	1	0.58	1	0.35	1	#DIV/0!	1	#DIV/0!
	Span (ft)	5.00	fb	3.00	fb	13.00	fb	10.00	fb	1.00	#DIV/0!	1.00	#DIV/0!
	Min Δ_{TL} = L /	240		240		240		240		240		240	
	Min Δ_{LL} = L /	360		360		360		360		360		360	
	C_D =	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}
	C_L =	1.00	0.45 k	1.00	1.59 k	1.00	6.89 k	1.00	5.30 k	1.00	0.00 k	1.00	0.00 k
	C_F / C_V =	1.10	R_{right}	1.10	R_{right}	1.00	R_{right}	1.00	R_{right}	1.50	R_{right}	1.50	R_{right}
	C_r / C_{fu} =	1.00	0.45 k	1.00	1.59 k	1.00	6.89 k	1.00	5.30 k	1.00	0.00 k	1.00	0.00 k
Loading (DL & LL)	w(x) (plf)	100	80	340	720	340	720	340	720	-	-	-	-
	P_1 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	P_2 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	P_3 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	w_{right} (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	w_{left} (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	$w_{midspan}$ (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	w_a(x) (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	w_c(x) (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from right		-		-		-		-		-		-
Reactions	R_{left} (lbs) =	250 DL	200 LL	510 (DL)	1,080 (LL)	2,210 (DL)	4,680 (LL)	1,700 (DL)	3,600 (LL)	0 (DL)	0 (LL)	0 (DL)	0 (LL)
	R_{right} (lbs) =	250 DL	200 LL	510 (DL)	1,080 (LL)	2,210 (DL)	4,680 (LL)	1,700 (DL)	3,600 (LL)	0 (DL)	0 (LL)	0 (DL)	0 (LL)
	TL R_{left}, R_{right} =	0.45 k	0.45 k	1.59 k	1.59 k	6.89 k	6.89 k	5.30 k	5.30 k	0.00 k	0.00 k	0.00 k	0.00 k
Properties	b =	3.00	in	3.00	in	5.13	in	5.13	in	1.50	in	1.50	in
	d =	9.25	in	9.25	in	15.00	in	15.00	in	3.50	in	3.50	in
	A =	27.8	in^2	27.8	in^2	76.9	in^2	76.9	in^2	5.3	in^2	5.3	in^2
	S_x =	42.8	in^3	42.8	in^3	192.0	in^3	192.0	in^3	3.1	in^3	3.1	in^3
	I_x =	197.9	in^4	197.9	in^4	1,441.0	in^4	1,441.0	in^4	5.4	in^4	5.4	in^4
	F`$_b$ =	990	psi	990	psi	2,400	psi	2,400	psi	2,250	psi	2,250	psi
	F`$_v$ =	180	psi	180	psi	240	psi	240	psi	180	psi	180	psi
	E =	1.60E+06	psi	1.60E+06	psi	1.80E+06	psi	1.80E+06	psi	1.90E+06	psi	1.90E+06	psi
Design Check	f_b (psi) =	158	0.16	335	0.34	1,400	0.58	828	0.35	0	0.00	0	0.00
	f_v (psi) =	17	0.09	42	0.23	109	0.45	78	0.32	0	0.00	0	0.00
	S_x req'd (in^3) =	6.8	0.16	14.5	0.34	112.0	0.58	66.3	0.35	0.0	0.00	0.0	0.00
	A req'd (in^2) =	2.6	0.09	6.4	0.23	34.8	0.45	24.8	0.32	0.0	0.00	0.0	0.00
	Δ_{TL} = L /	7,504	0.03	5,899	0.04	594	0.40	1,305	0.18	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Δ_{LL} = L /	16,884	0.02	8,685	0.04	875	0.41	1,921	0.19	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Δ_{LL} =	0.004	in	0.004	in	0.178	in	0.062	in	0.000	in	0.000	in
	Δ_{TL} =	0.008	in	0.006	in	0.263	in	0.092	in	0.000	in	0.000	in
Forces	M_{max} =	563	ft-lbs	1,193	ft-lbs	22,393	ft-lbs	13,250	ft-lbs	0	ft-lbs	0	ft-lbs
	V_{left} =	311	lbs	773	lbs	5,565	lbs	3,975	lbs	0	lbs	0	lbs
	V_{right} =	311	lbs	773	lbs	5,565	lbs	3,975	lbs	0	lbs	0	lbs
	V_{max} =	311	lbs	773	lbs	5,565	lbs	3,975	lbs	0	lbs	0	lbs
Notes													

BEAM CALCULATIONS

Reference	FLOOR BEAMS	BACK EXISTING WINDOWS WITH NEW FLOOR LOADING		RIGHT DECK BEAM (-)		LEFT FLOOR BEAM (I)		MIDDLE FLOOR BEAM (I)					
	Plan Mark	-		B1		B6		B3					
Beam	Size & Species	(2) 2" x 10"		(2) 2" x 10"		(1) 6-3/4" x 13-1/2"		(2) 1-3/4" x 11-7/8"		(1) 2" x 4"		(1) 2" x 4"	
	Grade	DF-L No.2		DF-L No.2		24F-V4 GLULAM		1.9E LVL		DF-L Select Struct.		DF-L Select Struct.	
	Spacing (if appl)												
	Span	3'- 0"		5'- 0"		16'- 0"		9'- 0"		1'- 0"		1'- 0"	
Parameters	Beam List #	22	Unity Chk	22	Unity Chk	132	Unity Chk	60	Unity Chk	1	Unity Chk	1	Unity Chk
	Quantity	2	0.35	2	0.62	1	0.94	2	0.13	1	#DIV/0!	1	#DIV/0!
	Span (ft)	3.00	fb	5.00	fb	16.00	fb	9.00	fb	1.00	#DIV/0!	1.00	#DIV/0!
	Min Δ_{TL} = L /	240		240		240		240		240		240	
	Min Δ_{LL} = L /	360		360		360		360		360		360	
	C_D =	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}
	C_L =	1.00	1.67 k	1.00	1.75 k	1.00	9.56 k	1.00	1.04 k	1.00	0.00 k	1.00	0.00 k
	C_F / C_V =	1.10	R_{right}	1.10	R_{right}	0.99	R_{right}	1.00	R_{right}	1.50	R_{right}	1.50	R_{right}
	C_r / C_{fu} =	1.00	1.67 k	1.00	1.75 k	1.00	9.56 k	1.00	1.04 k	1.00	0.00 k	1.00	0.00 k
Loading (DL & LL)	w(x) (plf)	370	740	100	600	475	720	150	80	-	-	-	-
	P_1 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	P_2 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	P_3 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	w_{right} (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	w_{left} (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	$w_{midspan}$ (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	w_a(x) (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	w_c(x) (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from right		-		-		-		-		-		-
Reactions	R_{left} (lbs) =	555 DL	1,110 LL	250 (DL)	1,500 (LL)	3,800 (DL)	5,760 (LL)	675 (DL)	360 (LL)	0 (DL)	0 (LL)	0 (DL)	0 (LL)
	R_{right} (lbs) =	555 DL	1,110 LL	250 (DL)	1,500 (LL)	3,800 (DL)	5,760 (LL)	675 (DL)	360 (LL)	0 (DL)	0 (LL)	0 (DL)	0 (LL)
	TL R_{left}, R_{right} =	1.67 k	1.67 k	1.75 k	1.75 k	9.56 k	9.56 k	1.04 k	1.04 k	0.00 k	0.00 k	0.00 k	0.00 k
Properties	b =	3.00	in	3.00	in	6.75	in	3.50	in	1.50	in	1.50	in
	d =	9.25	in	9.25	in	13.50	in	11.88	in	3.50	in	3.50	in
	A =	27.8	in^2	27.8	in^2	91.1	in^2	41.6	in^2	5.3	in^2	5.3	in^2
	S_x =	42.8	in^3	42.8	in^3	205.0	in^3	82.3	in^3	3.1	in^3	3.1	in^3
	I_x =	197.9	in^4	197.9	in^4	1,384.0	in^4	488.4	in^4	5.4	in^4	5.4	in^4
	F`$_b$ =	990	psi	990	psi	2,371	psi	2,604	psi	2,250	psi	2,250	psi
	F`$_v$ =	180	psi	180	psi	240	psi	285	psi	180	psi	180	psi
	E =	1.60E+06	psi	1.60E+06	psi	1.80E+06	psi	1.90E+06	psi	1.90E+06	psi	1.90E+06	psi
Design Check	f_b (psi) =	350	0.35	614	0.62	2,238	0.94	340	0.13	0	0.00	0	0.00
	f_v (psi) =	44	0.24	65	0.36	135	0.56	29	0.10	0	0.00	0	0.00
	S_x req'd (in^3) =	15.1	0.35	26.5	0.62	193.5	0.94	10.7	0.13	0.0	0.00	0.0	0.00
	A req'd (in^2) =	6.7	0.24	10.1	0.36	51.3	0.56	4.2	0.10	0.0	0.00	0.0	0.00
	Δ_{TL} = L /	5,634	0.04	1,930	0.12	271	0.88	2,952	0.08	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Δ_{LL} = L /	8,450	0.04	2,251	0.16	451	0.80	8,486	0.04	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Δ_{LL} =	0.004	in	0.027	in	0.426	in	0.013	in	0.000	in	0.000	in
	Δ_{TL} =	0.006	in	0.031	in	0.707	in	0.037	in	0.000	in	0.000	in
Forces	M_{max} =	1,249	ft-lbs	2,188	ft-lbs	38,240	ft-lbs	2,329	ft-lbs	0	ft-lbs	0	ft-lbs
	V_{left} =	809	lbs	1,210	lbs	8,216	lbs	807	lbs	0	lbs	0	lbs
	V_{right} =	809	lbs	1,210	lbs	8,216	lbs	807	lbs	0	lbs	0	lbs
	V_{max} =	809	lbs	1,210	lbs	8,216	lbs	807	lbs	0	lbs	0	lbs
Notes													

BEAM CALCULATIONS

Reference	FLOOR BEAMS	BACK DECK BEAM LINE - SPAN 1		SPAN 2		SPAN 3		BACK HOUSE BEAM LINE - SPAN 1		SPAN 2		SPAN 3	
	Plan Mark	B4		B4		B4		B5		B5		B5	
Beam	Size & Species	(1) 5-1/8" x 12"		(1) 5-1/8" x 12"		(1) 5-1/8" x 12"		(1) 5-1/8" x 13-1/2"		(1) 5-1/8" x 13-1/2"		(1) 5-1/8" x 13-1/2"	
	Grade	24F-V4 GLULAM		24F-V4 GLULAM		24F-V4 GLULAM		24F-V4 GLULAM		24F-V4 GLULAM		24F-V4 GLULAM	
	Spacing (if appl)												
	Span	15'- 0"		15'- 0"		7'- 0"		15'- 0"		15'- 0"		5'- 0"	
Parameters	Beam List #	111	Unity Chk	111	Unity Chk	111	Unity Chk	112	Unity Chk	112	Unity Chk	112	Unity Chk
	Quantity	1	0.51	1	0.51	1	0.09	1	0.87	1	0.75	1	0.10
	Span (ft)	15.00	LL defl	15.00	LL defl	7.00	fv	15.00	fb	15.00	LL defl	5.00	fv
	Min Δ_{TL} = L /	240		240		240		240		240		240	
	Min Δ_{LL} = L /	360		360		360		360		360		360	
	C_D =	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}	1.00	R_{left}
	C_L =	1.00	2.63 k	1.00	2.63 k	1.00	1.23 k	1.00	7.28 k	1.00	5.99 k	1.00	2.10 k
	C_F / C_V =	1.00	R_{right}	1.00	R_{right}	1.00	R_{right}	1.00	R_{right}	1.00	R_{right}	1.00	R_{right}
	C_r / C_{fu} =	1.00	2.63 k	1.00	2.63 k	1.00	1.23 k	1.00	7.28 k	1.00	6.20 k	1.00	2.10 k
Loading (DL & LL)	w(x) (plf)	50	300	50	300	50	300	350	620	-	-	120	720
	P_1 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	P_2 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	P_3 (lbs)	-	-	-	-	-	-	-	-	-	-	-	-
	dist. from left		-		-		-		-		-		-
	w_{right} (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	w_{left} (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	$w_{midspan}$ (plf)	-	-	-	-	-	-	-	-	-	-	-	-
	w_a(x) (plf)	-	-	-	-	-	-	-	-	265	520	-	-
	dist. from left		-		-		-		-		at 7.50 ft		-
	w_c(x) (plf)	-	-	-	-	-	-	-	-	120	720	-	-
	dist. from right		-		-		-		-		at 7.50 ft		-
Reactions	R_{left} (lbs) =	375 DL	2,250 LL	375 (DL)	2,250 (LL)	175 (DL)	1,050 (LL)	2,625 (DL)	4,650 (LL)	1,716 (DL)	4,275 (LL)	300 (DL)	1,800 (LL)
	R_{right} (lbs) =	375 DL	2,250 LL	375 (DL)	2,250 (LL)	175 (DL)	1,050 (LL)	2,625 (DL)	4,650 (LL)	1,172 (DL)	5,025 (LL)	300 (DL)	1,800 (LL)
	TL R_{left}, R_{right} =	2.63 k	2.63 k	2.63 k	2.63 k	1.23 k	1.23 k	7.28 k	7.28 k	5.99 k	6.20 k	2.10 k	2.10 k
Properties	b =	5.13	in	5.13	in	5.13	in	5.13	in	5.13	in	5.13	in
	d =	12.00	in	12.00	in	12.00	in	13.50	in	13.50	in	13.50	in
	A =	61.5	in^2	61.5	in^2	61.5	in^2	69.2	in^2	69.2	in^2	69.2	in^2
	S_x =	123.0	in^3	123.0	in^3	123.0	in^3	156.0	in^3	156.0	in^3	156.0	in^3
	I_x =	738.0	in^4	738.0	in^4	738.0	in^4	1,051.0	in^4	1,051.0	in^4	1,051.0	in^4
	F`$_b$ =	2,400	psi	2,400	psi	2,400	psi	2,400	psi	2,400	psi	2,400	psi
	F`$_v$ =	240	psi	240	psi	240	psi	240	psi	240	psi	240	psi
	E =	1.80E+06	psi	1.80E+06	psi	1.80E+06	psi	1.80E+06	psi	1.80E+06	psi	1.80E+06	psi
Design Check	f_b (psi) =	960	0.40	960	0.40	209	0.09	2,099	0.87	1,758	0.73	202	0.08
	f_v (psi) =	55	0.23	55	0.23	21	0.09	134	0.56	134	0.56	25	0.10
	S_x req'd (in^3) =	49.2	0.40	49.2	0.40	10.7	0.09	136.4	0.87	114.3	0.73	13.1	0.08
	A req'd (in^2) =	14.2	0.23	14.2	0.23	5.5	0.09	38.6	0.56	38.7	0.56	7.2	0.10
	Δ_{TL} = L /	600	0.40	600	0.40	5,902	0.04	308	0.78	368	0.65	9,609	0.02
	Δ_{LL} = L /	700	0.51	700	0.51	6,885	0.05	482	0.75	482	0.75	11,211	0.03
	Δ_{LL} =	0.257	in	0.257	in	0.012	in	0.373	in	0.373	in	0.005	in
	Δ_{TL} =	0.300	in	0.300	in	0.014	in	0.584	in	0.489	in	0.006	in
Forces	M_{max} =	9,844	ft-lbs	9,844	ft-lbs	2,144	ft-lbs	27,281	ft-lbs	22,852	ft-lbs	2,625	ft-lbs
	V_{left} =	2,275	lbs	2,275	lbs	875	lbs	6,184	lbs	5,991	lbs	1,155	lbs
	V_{right} =	2,275	lbs	2,275	lbs	875	lbs	6,184	lbs	6,197	lbs	1,155	lbs
	V_{max} =	2,275	lbs	2,275	lbs	875	lbs	6,184	lbs	6,197	lbs	1,155	lbs
Notes													

COLUMN LOAD TABLES

2x BUILTUP COLUMNS [1,2,3,4]				
Max Ht	(2) 2x4	(3) 2x4	(4) 2x4	(5) 2x4
8'-0"	3,940	5,910	7,880	9,850
9'-0"	3,310	4,960	6,620	8,270
10'-0"	2,800	4,200	5,600	7,000
11'-0"	2,390	3,590	4,790	5,980
12'-0"	2,060	3,090	4,130	5,160
-	-	-	-	-
Max Ht	(2) 2x6	(3) 2x6	(4) 2x6	(5) 2x6
8'-0"	11,600	16,700	20,600	25,700
9'-0"	11,600	16,700	20,600	25,700
10'-0"	10,800	16,240	20,600	25,700
11'-0"	9,450	14,180	18,910	23,630
12'-0"	8,280	12,420	16,560	20,700
14'-0"	6,450	9,680	12,910	16,140
16'-0"	5,150	7,720	10,300	12,880
18'-0"	4,190	6,290	8,380	10,480
-	-	-	-	-

NOTES:

1. Load combination D+L with 10% eccentricity used for design.
2. Species and grade shall be DF-L No.2 or better for 2x6.
3. Species and grade shall be DF-L Stud or better for 2x4.
4. Design assumes column is braced about y-axis.

2x BUILTUP POSTS [1,2,3,4]				
Max Ht	(2) 2x4	(3) 2x4	(4) 2x4	(5) 2x4
8'-0"	1,900	4,670	6,230	7,790
9'-0"	1,590	4,010	5,340	6,680
10'-0"	1,340	3,450	4,610	5,760
11'-0"	1,150	3,000	4,000	5,010
12'-0"	990	2,620	3,500	4,380
-	-	-	-	-
Max Ht	(2) 2x6	(3) 2x6	(4) 2x6	(5) 2x6
8'-0"	3,700	9,880	20,600	25,700
9'-0"	3,050	8,510	18,900	23,630
10'-0"	2,550	7,350	16,790	20,990
11'-0"	2,160	6,370	14,920	18,650
12'-0"	1,840	5,500	13,290	16,610
14'-0"	1,390	4,300	11,880	13,330
16'-0"	1,080	3,420	10,660	10,880
18'-0"	870	2,770	8,700	9,020
-	-	-	-	-

NOTES:

1. Load combination D+L with 10% eccentricity used for design.
2. Species and grade shall be DF-L No.2 or better for 2x6.
3. Species and grade shall be DF-L Stud or better for 2x4.
4. Design assumes column is braced at ends only and is unbraced about x and y axis along member length.
5. Members shall be nailed together w/ 16d at 8" oc staggered along entire member length.

SINGLE MEMBER POSTS [1,2,3]						
Max Ht	4x4	4x6	6x6	6x8	8x8	10x10
8'-0"	5,100	6,900	17,500	21,800	37,500	64,500
9'-0"	4,300	5,900	16,000	20,000	36,100	62,900
10'-0"	3,600	5,100	14,600	18,200	34,400	61,000
11'-0"	3,100	4,400	13,100	16,500	32,400	59,000
12'-0"	2,700	2,800	11,800	14,900	30,400	56,800
14'-0"	2,100	3,000	9,600	12,200	26,400	52,000
16'-0"	1,600	2,400	7,900	10,100	22,700	46,900
18'-0"	1,300	1,900	6,600	8,500	19,400	41,800

NOTES:

1. Load combination D+L with 10% eccentricity used for design.
2. Species and grade shall be DF-L No.1 or better.
3. Design assumes lateral bracing at each end only.

Parallam PSL POSTS [1,2,3]						
Max Ht	3.5x3.5	3.5x5.25	3.5x7	5.25x5.25	5.25x7	7x7
6'-0"	10,598	15,897	21,196	33,300	-	-
7'-0"	8,740	13,111	17,481	30,016	-	-
8'-0"	7,270	10,905	14,539	26,655	35,540	-
9'-0"	6,115	9,173	12,231	23,484	31,312	-
10'-0"	5,203	7,805	10,407	20,667	27,556	-
12'-0"	3,885	5,827	7,770	16,166	21,555	-
14'-0"	3,003	4,504	6,005	12,893	17,190	34,168
16'-0"	-	-	-	10,483	13,977	28,498
18'-0"	-	-	-	8,673	11,565	24,027

NOTES:

1. 1.8E, Fb = 2400 psi, Fcll = 2500 psi.
2. Loads per Trus Joist tables.
3. Design assumes lateral bracing at each end only.
4. 100% load duration factor.

COLUMN / POST BEARING CAPACITY (LBS)					
2x Builtup Columns / Posts					
Plies	2x4	2x6	2x8		
1	3281	5156	6797		
2	6563	10313	13594	-	-
3	9844	15469	20391	-	-
4	13125	20625	27188	-	-
5	16406	25781	33984	-	-
6	19688	30938	40781	-	-
Single Member Posts					
4x4	7656	3.5x5.25	11484		
4x6	12031	3.5x7	15313		
6x6	18906	5.25x5.25	17227		
7x7	30625	5.25x7	22969		
6x8	24922				
8x8	32852				

NOTES:

1. F'c = 625 psi.
4. 100% load duration factor.

RESIDENTIAL STUD SCHEDULE

WOOD STUDS				
		Loading		
Stud Size	Unsupported Ht (max)	Roof	Roof & (1) Floor	Roof & (2) Floors
2x4	10'-0"	24" o.c.	16" o.c.	na
2x6	10'-0"	24" o.c	24" o.c	16" o.c.

NOTES:

1. Based on IBC Conventional Light-Frame Construction & Table 2308.9.1
2. Studs to be DFL #3 or Stud Grade members.
3. Walls with snow loads exceeding 35 psf require special design.
4. See calcs for special loading conditions (if any).

SPECIAL STUD WALL DESIGN

Location	Out-of-Plane psf	Roof ft	Floor ft	Wall ft	Height ft	Spacing inches o.c.	Stud Size	Stud Grade	Axial Unity	SL + W/2 Unity	W + SL/2 Unity
							2x4	Stud			
							2x4	Stud			
							2x4	Stud			
							2x4	Stud			
							2x4	Stud			
							2x4	Stud			
							2x4	Stud			
							2x4	Stud			

Load Factors			
	Axial	SL + W/2	W + SL/2
Cd	1.15	1.6	1.6

NOTES:

1. Studs Douglas Fir Larch.

FOOTING SCHEDULE

Notes	Mark	Dimensions (Inches)			Reinforcement		Allow Load
		Thickness	Length	Width	Longitudinal	Transverse	(lbs)
		10	cont.	18	(2) #4	na	2250
EXIST CONT	F1	10	cont.	20	(2) #4	na	2500
EXIST CONT	F2	10	cont.	24	(2) #4	na	3000
		10	cont.	36	(4) #4	na	4500
	F3	10	24	24	(3) #4	(3) #4	6000
	F4	10	30	30	(3) #4	(3) #4	9375
	F5	10	36	36	(4) #4	(4) #4	13500
	F6	10	42	42	(4) #4	(4) #4	18375
	F7	10	48	48	(5) #4	(5) #4	24000
		12	54	54	(6) #4	(6) #4	30375
		12	60	60	(7) #4	(7) #4	37500

Notes: Use Grade 60 Rebar.
Soil Bearing Capacity (psf): 1,500
All footings may not be used.

FOUNDATION REQUIREMENTS

Utah Amended Foundation Code

Max Ht	Top Edge Support	Vert Steel Note 2	Hori Steel Note 3	Steel at Openings	Max Lintel Length	Min Lintel Depth
2'-0"	None	Note 5	(2) #4 Bars	(2) #4 Bars	2 ft	Min. 12"
3'-0"		#4 @ 24"	(3) #4 Bars	above. (1) #4	2 ft	Two inches
4'-0"		#4 @ 24"	(4) #4 Bars	Bar ea. side	3 ft	for ea. Foot
6'-0"	Floor or	#4 @ 24"	(5) #4 Bars	(1) #4 Bar	6 ft	of opening
8'-0"	Roof		(6) #4 Bars	below Note 4	6 ft	width
9'-0"	Diaphragm	#4 @ 16"	(7) #4 Bars		6 ft	
Over 9'-0"	Engineering Required					

Notes:
1. Based on 3000 psi concrete and 60,000 psi reinforcing steel.
2. To be placed in the center of wall & extend from the footing to within 3" of the top of wall. Dowel of #4 rebar w/ standard hook shall be provided in the footing to match the vert steel with the vert leg extending 24" into fndtn wall.
3. One bar shall be located in the top 4", one bar in the bottom 4" and the other bars equally spaced between. Corner reinforcing shall be provided so as to lap 24".
4. Bars shall be placed within 2" of the openings & extend 24" beyond edge of opening. Vert bars may terminate 3" from the top of concrete.
5. Dowels of #4 rebar at 24" o.c. with standard hook shall be provided in the footing with vert leg extending 18"" into fndtn wall.
6. Diaphragm to conform to Section 2308.
7. Footing shall be a minimum of 9" thick by 20" wide.
8. Soil backfill shall be GW, GP, SW, or SP per Table 1610.1. Soil shall not be submerged or saturated in ground water.

Walkout Basements: 9'-0" Max Ht - #4 rebar at 12" o.c. hori and 16" o.c. vert (Grade 60)
Typical of walls that have a grade difference greater than 5'.
Based on ACI minimum reinforcement requirements.

Minimum Steel for foundations thicker than 8":

	Vertical	Horizontal	
10" Thick	14"	10"	Grade 60
12" Thick	12"	8"	Grade 60

Based on ACI minimum reinforcement requirements.
#4 Rebar placed in center of wall.

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Engineer: RJA
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CONTINUOUS FOOTING WEIGHT CALCULATION

Roof DL	20	psf
Floor DL	20	psf
Wall DL	15	psf
Roof Snow/LL	40	psf
Floor LL	40	psf
Soil Bearing Pressure	1500	psf

Load Combinations (LC)

1	D
2	D + S
3	D + L
4	D + 0.75S + 0.75L

		Tributary Lengths (ft)			Foundation	Misc	Footing Wdth	Max Load	LC 1	LC 2	LC 3	LC 4
Plan Mark	Location	Roof	Floor	Wall	(plf)	(plf)	(inches)	(plf)	(plf)	(plf)	(plf)	(plf)
	EXIST BACK 1	2	18.5	19	400		15	1835	1095	1175	1835	1710