



1100 W. Park Street  
Blue Springs, MO 64014

P: (913) 631-2222  
D: (800) 780-8608

Solutions for all your engineering and design needs

July 13, 2017

McGraw Homes Inc  
902 SW Willow Pl  
Blue Springs, MO 64014

Re: 1691 NE Parkwood Dr.

Our firm has been asked to address the exterior wall structural nailing pattern for the house located at 1691 NE Parkwood Dr. in Lee's Summit, MO. The builder has added 3 windows to the back of the house eliminating sheathing space.

The remaining sheathing given the additional windows is adequate to provide the lateral resistance required for the revised calculations on sheet S-3.0.

Our firm recommends approval of the exterior sheathing noted above to provide proper lateral resistance.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. No warranties, either express or implied, are intended or made.

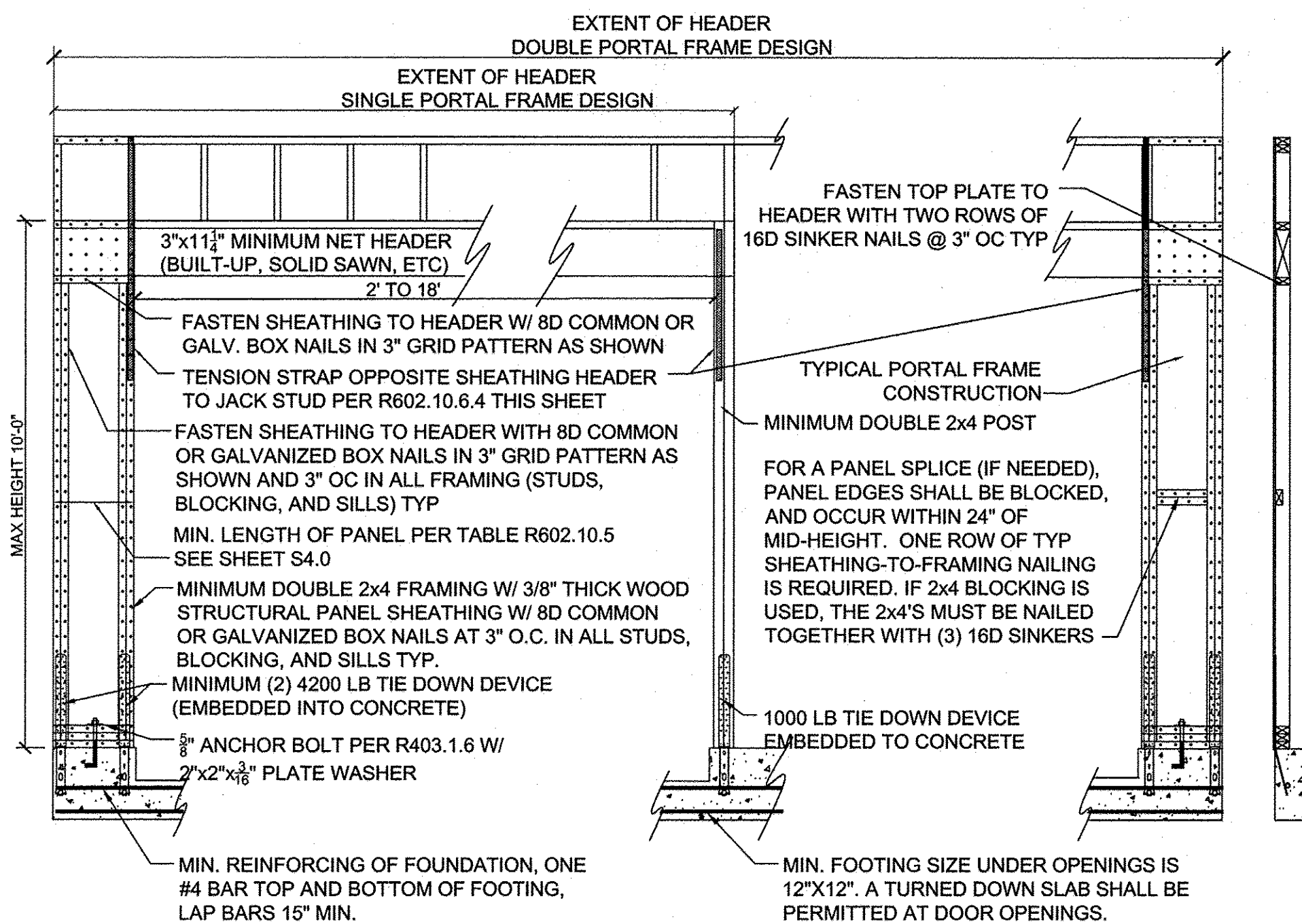
We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, please contact us.

Very truly yours,  
HD ENGINEERING & DESIGN, INC.

  
Colter Loshbaugh

Chris Saathoff, P.E., LEED-AP



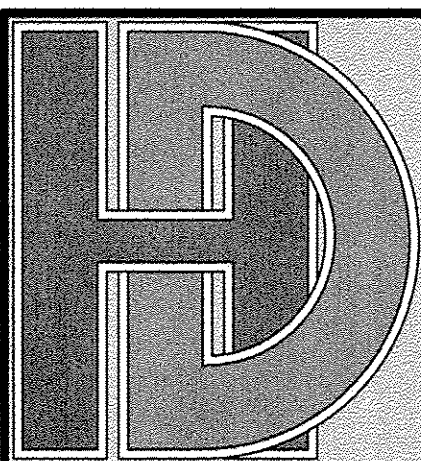


**1 S3.0 2012 IRC (R602.10.6.2) METHOD PFH- PORTAL FRAME W/ HOLD-DOWNS**  
NTS

MINIMUM WALL STUD FRAMING NOMINAL SIZE & GRADE	MAX. PONY WALL HEIGHT (FEET)	MAX. TOTAL WALL HEIGHT (FEET)	MAX. OPENING WIDTH (FEET)	TENSION STRAP CAPACITY REQUIRED (POUNDS) <sup>a,b</sup>		NO. OF 8d COMMON NAILS REQUIRED AT FLAT 2x6	
				BASIC WIND SPEED (MPH)		BASIC WIND SPEED (MPH)	
				90 MPH	90 MPH	90 MPH	90 MPH
2X4 NO. 2 GRADE	0	10	18	1,000	1,000	8	8
			9	1,000	1,000	8	8
			16	1,000	2,325	8	16
	1	10	18	1,200	2,725	8	18
			9	1,000	1,550	8	10
			16	2,025	3,900	14	26
	2	10	18	2,400	DR	16	DR
			9	1,200	2,750	8	12
			16	3,200	DR	22	DR
	4	12	18	3,850	DR	26	DR
			9	2,350	DR	16	DR
			16	DR	DR	DR	DR
2X6 STUD GRADE	2	12	9	1,000	1,750	8	12
			16	2,050	3,550	14	24
			18	2,450	4,100	18	28
	4	12	9	1,500	2,775	10	18
			16	3,150	DR	22	DR
			18	3,675	DR	26	DR

a. DR = DESIGN REQUIRED  
b. STRAP SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

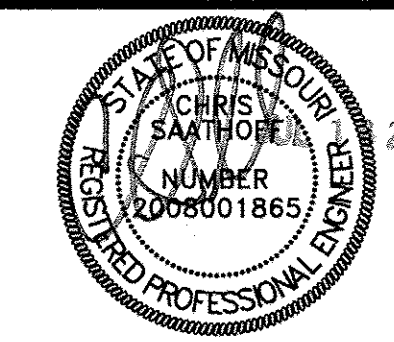
RESIDENTIAL SEISMIC & WIND ANALYSIS									
DETERMINE WEIGHT OF HOUSE:					INPUT				
LOCATION					DEAD LOAD (psf)	AREA (ft²)	WEIGHT (lbs.)		
ROOF					10	2540	25400		
CEILING					10	2481	24810		
FIRST FLOOR					10	1791	17910		
FIRST FLOOR EXT. WALL DL	WALL LENGTH (ft)				220	WALL UNIT WT. (psf)	10	22000	
FIRST FLOOR INT. PARTITION WALL DL					DEAD LOAD (psf)	AREA (ft²)	WEIGHT (lbs)		
					6	1791	10746		
PROJECTED AREAS (WIND DESIGN PER 115 MPH 3-SECOND GUST, EXPOSURE C AND MEAN ROOF HEIGHT <= 30 FT ASSUMED)									
FRONT-TO-BACK					SIDE-TO-SIDE				
SLOPED ROOF	AREA	LOAD			SLOPED ROOF	AREA	LOAD		
VERT. ROOF	336	2859			VERT. ROOF	506	4298		
1ST	605	1554	CUMULATIVE	12009	1ST	0	0	CUMULATIVE	12018
PRESSURE (PSF) - PER ASCE CH. 6					PRESSURE (PSF) - PER ASCE CH. 6				
SLOPED ROOF					SLOPED ROOF				
WALL/VERT. ROOF					WALL/VERT. ROOF				
MEAN ROOF HT., h					MEAN ROOF HT., h				
17					17				
a) If there is a walkout wall to be sheathed, determine tributary wind area and enter here. If no walkout, enter 0 for area.					a) If there is a walkout wall to be sheathed, determine tributary wind area and enter here. If no walkout, enter 0 for area.				
$Q_{s10} = 0.00256 K_z K_{zt} K_d V^2$ (ASCE 7-10 Velocity Pressure)					$Q_{s10} = 0.00256 K_z K_{zt} K_d V^2$ (ASCE 7-10 Velocity Pressure)				
1ST FLOOR TRIBUTARY WEIGHT					1ST FLOOR TRIBUTARY WEIGHT				
$S_g$ (SITE GROUND MOTION - %g - FROM ASCE7 SEISMIC MAP)					$S_g$ (SITE GROUND MOTION - %g - FROM ASCE7 SEISMIC MAP)				
$F_a$ (from ASCE7 Table 11.4-1)					$F_a$ (from ASCE7 Table 11.4-1)				
$S_{ps}$ (= $2/3 * S_g * F_a$ )					$S_{ps}$ (= $2/3 * S_g * F_a$ )				
R (from ASCE7 Table 12.2-1)					R (from ASCE7 Table 12.2-1)				
SEISMIC SHEAR									
LOCATION					From ASCE7 (Eq. 12.8-1):				$V = 1.2 * S_{ps} * W / R$ (lbs.)
1ST FLOOR									1446
SEISMIC SHEAR									
Sheathing Location	Min. Sheathing Schedule		Fastening Schedule		Allowable Shear (#/LF)		Code Reference		
Exterior (Option #1)	7/16" APA Rated Plywood/OSB		1-1/2" 16ga. Staples w/ 1" penetration @ 6" O.C. Edges, 8" O.C. Field For 24" stud spacing, 12" O.C. Field For 16" stud spacing		155		per IBC, Table 2306.3(1)		
Exterior (Option #2)	7/16" APA Rated Plywood/OSB		1-1/2" 16ga. Staples w/ 1" penetration @ 4" O.C. Edges, 8" O.C. Field For 24" stud spacing, 12" O.C. Field For 16" stud spacing		230		per IBC, Table 2306.3(1)		
Exterior (Option #3)	7/16" APA Rated Plywood/OSB		1-1/2" 16ga. Staples w/ 1" penetration @ 3" O.C. Edges, 8" O.C. Field For 24" stud spacing, 12" O.C. Field For 16" stud spacing		310		per IBC, Table 2306.3(1)		
Exterior (Option #4)	7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing		8d Common Nails w/ 1-3/8" penetration @ 6" O.C. Edges, 12" O.C. Field for 7/16" APA-rated plywood/OSB or shiplap panel sheathing OR @ 4" O.C. Edges, 12" O.C. Field for 3/8" shiplap panel sheathing		220		AF&PA SDPWS Table 4.3A		
Exterior (Option #5)	7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing		8d Common Nails w/ 1-3/8" penetration @ 4" O.C. Edges, 12" O.C. Field for 7/16" APA-rated plywood/OSB or shiplap panel sheathing OR @ 3" O.C. Edges, 12" O.C. Field for 3/8" shiplap panel sheathing		320		AF&PA SDPWS Table 4.3A		
Exterior (Option #6)	7/16" APA Rated Plywood/OSB or shiplap panel sheathing, or 3/8" shiplap panel sheathing with tighter nail spacing and double studs at each panel edge		8d Common Nails w/ 1-3/8" penetration @ 3" O.C. Edges, 12" O.C. Field		410		AF&PA SDPWS Table 4.3A		
Interior	1/2" Gypsum Board		No. 6- 1 1/4" Type W or S Screws @ 8" O.C. Edges, 12" O.C. Field		60		per IBC, Table 2306.4.4		
Interior	16 Ga. Simpson/USP Type WB Steel X-Brace (or equal)		(3) 16d @ end studs & (1) 8d @ intermediate studs (per manufacturer specifications - see detail on sheet S3)		325				
EXTERIOR SHEATHING OPTION FOR FIRST FLOOR									
				4	WIDTH OF 1ST STORY (FT.)		55		
					DEPTH OF 1ST STORY (FT.)		56		
					BACK WALL OF GARAGE (FT.)		28		
					GAR. WALL: 1=F-B, 2=S-S		2		
EXTERIOR STRUCTURAL WALL LENGTHS (ft.) & RESISTANCES									
SEISMIC					WIND				
	FRONT-TO-BACK	RESISTANCE (lbs.)	SIDE-TO-SIDE	RESISTANCE (lbs.)		FRONT-TO-BACK	RESISTANCE (lbs.)	SIDE-TO-SIDE	RESISTANCE (lbs.)
1ST FLOOR	94	26320	31	8680	94	36848	31	12152	
ADDITIONAL RESISTANCE REQUIRED					Anchor Bolt Spacing (in.)				
SEISMIC					diameter (in.)				
0					0.5				
WIND					Shear value (per NDS)				
0					944				
1ST FLOOR FRONT-TO-BACK					Spacing F-B (inches)				
0					169.0				
1ST FLOOR SIDE-TO-SIDE					spacing S-S (inches)				
0					165.9				
RESISTANCE REQUIRED IN ADDITION TO RESISTANCE PROVIDED BY EXTERIOR WALLS**									
	ADDITIONAL RESISTANCE REQUIRED (POUNDS)	PORTAL FRAMES OR PERF. SHEAR WALL RESISTANCE	INTERIOR X-BRACES (325#/BRACE)	INTERIOR WALL LENGTH W/ 1/2" GYPSUM BOARD PER TABLE (FT.)	INT. WALL LENGTH SHEATHED W/ OSB (TOTAL LENGTH, ONE SIDE, FT.)	RESISTANCE PROVIDED BY ADDITIONAL METHODS (POUNDS)	OK?		
1ST FLOOR FRONT-TO-BACK	0					0	YES		
1ST FLOOR SIDE-TO-SIDE	0					0	YES		
**NOTES: 1) SEE ATTACHED CALCULATIONS FOR PORTAL FRAME OR PERFORATED SHEAR WALL RESISTANCE CAPACITIES (IF APPLICABLE). 2) SEE SHEET S1 FOR INTERIOR STEEL X-BRACE INSTALLATION. 3) INTERIOR WALLS SHEATHED WITH OSB SHALL BE ATTACHED WITH SAME STAPLE/NAILING PATTERN AS EXTERIOR OSB ON SAME FLOOR (SEE TABLE ABOVE) AND ARE ONLY APPLICABLE FOR FULL-HEIGHT SECTIONS OF 2'-6" OR LONGER									
WIND UPLIFT ANALYSIS									
ROOF PITCH (MAX)	X/12	DEGREES	PITCH OF 6 OR LESS: ECH -13.3, E -7.2, G -5.2						
OVERHANG	LENGTH (FT.)	PRESSURE (PSF)	LINEAL FT. OF OH	UPLIFT PER FT** (LBS)					
	1	-1.08	224	-1.08					
TOTAL AREA (FT²)	3080	ZONE E AREA (FT²)	ZONE G AREA (FT²)	PRESSURE ZN. E (PSF)	PRESSURE ZN. G (PSF)	TOTAL FORCE (LBS)	FORCE PER LINEAL FT @ PERIMETER (LBS)		
		-440	3520	-1.08	-0.36	-792	-3.6		
*ALONG PERIMETER	TOTAL UPLIFT PER LINEAL FOOT ALONG EXTERIOR (POUNDS)				-4.6		UPLIFT OK		
**INSIDE EXTERIOR WALLS	RESISTANCE DUE TO DEAD WEIGHT & (3) 10d TOENAILS				251.6				
NOTE FOR CONSTRUCTION: THE CONTINUOUS STRUCTURAL PANEL SHEATHING BRACING METHOD REQUIRES USE OF THE ABOVE TABLE FOR SHEATHING OF THE ENTIRE STRUCTURE. IN ADDITION, FRAMING MEMBERS SHALL BE @ 16" O.C. MAX, UNBLOCKED, AND W/ SHEATHING APPLIED DIRECTLY TO FRAMING MEMBERS									
NOTE FOR DESIGN: ALL WALLS USED IN THE CALCULATION OF THE RESISTANCE FOR THIS STRUCTURE SHALL HAVE A MINIMUM UNINTERRUPTED HEIGHT OF 8'-0" AND LENGTH OF 2'-6". ALLOWABLE RESISTANCES HAVE BEEN #/FT AND INCREASED BY 40% FOR WIND LOADS. PER VALUES IN 2012 IBC SECTION 2306 AND AF&PA SDPWS TABLE 4.3A. FOR EXAMPLE, 7/16" APA-RATED SHEATHING WITH 8d @ 6" & 12" HAS A SEISMIC SHEAR VALUE OF 220 A WIND SHEAR VALUE OF 335#/FT - 40% GREATER THAN THAT OF SEISMIC									
NOTE: SOIL SITE CLASS ASSUMED TO BE CLASS D. IF SITE CONDITIONS ARE DETERMINED TO BE CLASS E OR F, CONSULT ENGINEER BEFORE PROCEEDING WITH CONSTRUCTION									



**HD ENGINEERING & DESIGN, INC.**  
www.hdengineers.com

11656 W 75th ST  
SHAWNEE, KS 66214  
V: 913-631-2222  
F: 800-780-5608

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KS. COA. # E1312  
MO. COA. # 2008034946-F

**MCGRAW HOMES**  
Lot 37 Trails of Park Ridge  
LEE'S SUMMIT, MO  
STRUCTURAL DETAILS

# REVISION TABLE

NO.	DATE	DESCRIPTION

Date: 7/13/17  
HD #: 31666  
Drawn by: CJL  
Reviewed by: CLS

STRUCTURAL  
DETAILS

SHEET NUMBER:

**S-3.0**