December 29, 2020

Bellah Homes
Attn: Paul Miller
1272 SW Arborcrest Circle
Lee's Summit, MO

Re: 3221 SW Mary Street (Lot 103, Pergola Park, New Longview)

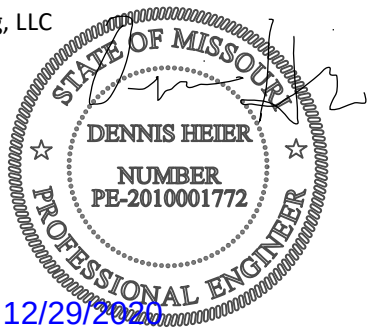
Vista Structural Engineering, LLC, was asked to address four items called out during the city's rough-in inspection. It was requested that our firm either approve the existing construction, or if the existing construction is inadequate, provide a cost-effective remediation. The items called out by the city are below, in bold lettering, followed by our responses.

1) **Plans call for two king studs at window opening at stairs (two-story). Framer installed one king stud with strap over rim joist, as shown on attached picture. Provide assessment.** *Per the attached calculation, a second king stud will need to be installed above and below the rim, with an additional strap, similar to the existing straps. This will need to be installed on both sides of the window.*
2) **The plans call for the garage wall to be sheathed with OSB. Framer installed Simpson strapping x-bracing with two nails at each stud from top plate to bottom plate, as shown in attached picture. Provide assessment.** *The lateral force from the wind in the side-to-side direction must be resisted by a certain amount of sheathing. The metal strap x-bracing is not sufficient to address these wind loads. However, an alternate method of fastening the gyp. Board may be used, in lieu of the OSB sheathing at the garage wall. The walls clouded on Item #2, under the solutions section in this report, shows three walls that may alternately be sheathed with ½" or 5/8" gyp board, and fastened per framing note #2 on the approved plans.*
3) **The plans call for 4x4 post in the entry at the stairs. Three 2x4's were installed instead, as shown in the attached picture. Provide assessment.** *The three 2x4's that were installed are acceptable. The triple 2x4 is stronger than the specified 4x4.*
4) **The plans call for (2) 1 ¾" x 9 ½" LVL floor joists above stair wall in basement. Framer installed (2) 2x10's. Provide assessment.** *The (2) #2 – 2x10's that were installed are an acceptable alternative to the LVL's shown on the plans. A calculation is attached, showing that the 2x10's are adequately sized.*

Our firm appreciates the opportunity to serve you. If you have any questions or if you need anything further, please feel free to contact us.

Sincerely,

Vista Structural Engineering, LLC



Dennis Heier, P.E.

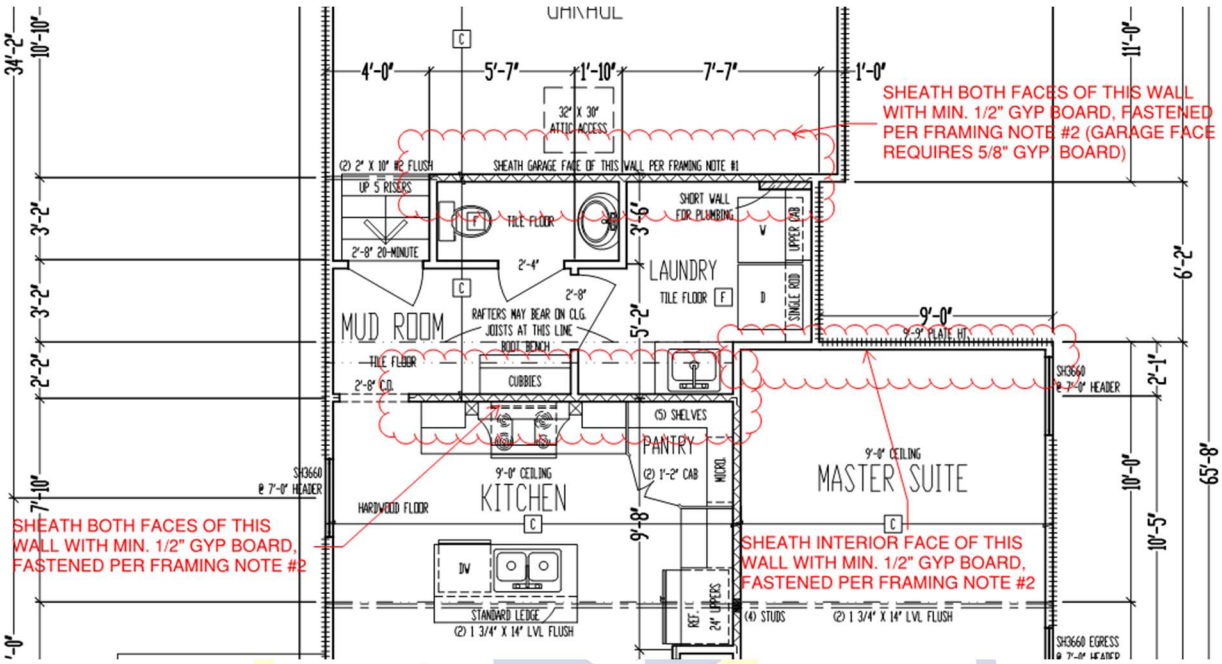
12/29/2020

Item #1

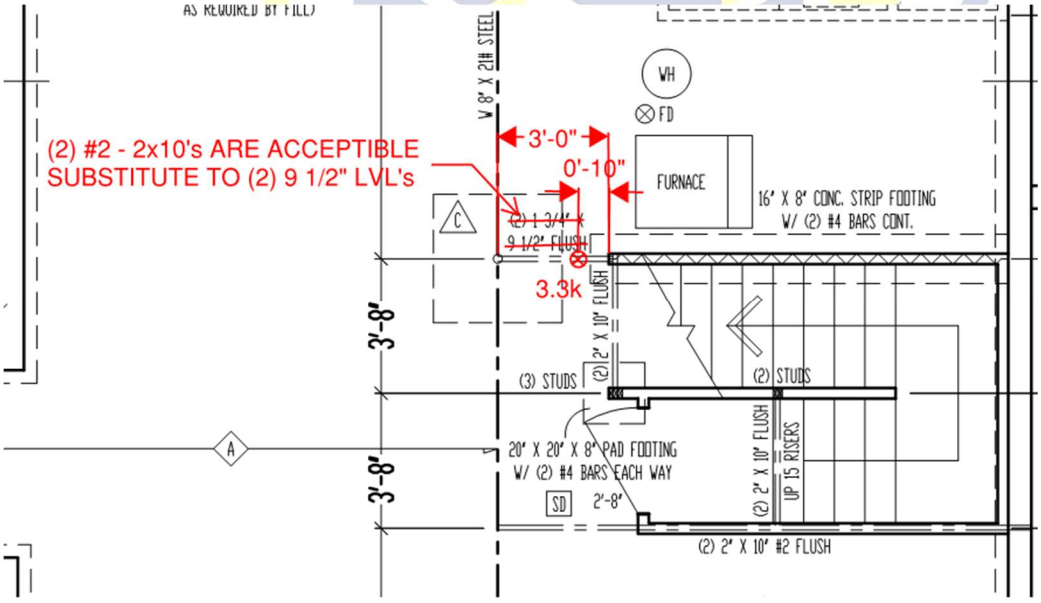
Item #2

Item #3

SOLUTIONS



Item #2 – alternate gyp board sheathing



Item #4 – 2x10's acceptable

CALCULATIONS

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 [illegible] 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 - 1¼" 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 SECOND FLOOR	4
EXTERIOR SHEATHING OPTION FOR FIRST FLOOR	5

WIDTH OF 1ST STORY (FT.)	29
DEPTH OF 1ST STORY (FT.)	65.67
BACK WALL OF GARAGE (FT.)	20
GAR. WALL: 1=F-B, 2=S-S	2

WIDTH OF 2ND STORY (FT.)	28
DEPTH OF 2ND STORY (FT.)	27.5

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.)
2ND FLOOR	30	8400	38	10640	30	11760	38	14896
1ST FLOOR	60	22800	17	6460	60	31920	17	9044

	ADDITIONAL RESISTANCE REQUIRED	
	SEISMIC	WIND
2ND FLOOR FRONT-TO-BACK	0	0
2ND FLOOR SIDE-TO-SIDE	0	0
1ST FLOOR FRONT-TO-BACK	0	0
1ST FLOOR SIDE-TO-SIDE	0	5760

Anchor Bolt Spacing (in.)	
diameter (in.)	0.5
Shear value (per NDS)	944
Spacing F-B (inches)	261.2
spacing S-S (inches)	71.0

16d Nail Spacing req'd at bottom plate (in.)	
2nd Floor F-B	69
2nd Floor S-S	25
1st Floor F-B	39
1st Floor S-S	11

RESISTANCE REQUIRED IN ADDITION TO RESISTANCE PROVIDED BY EXTERIOR WALLS**

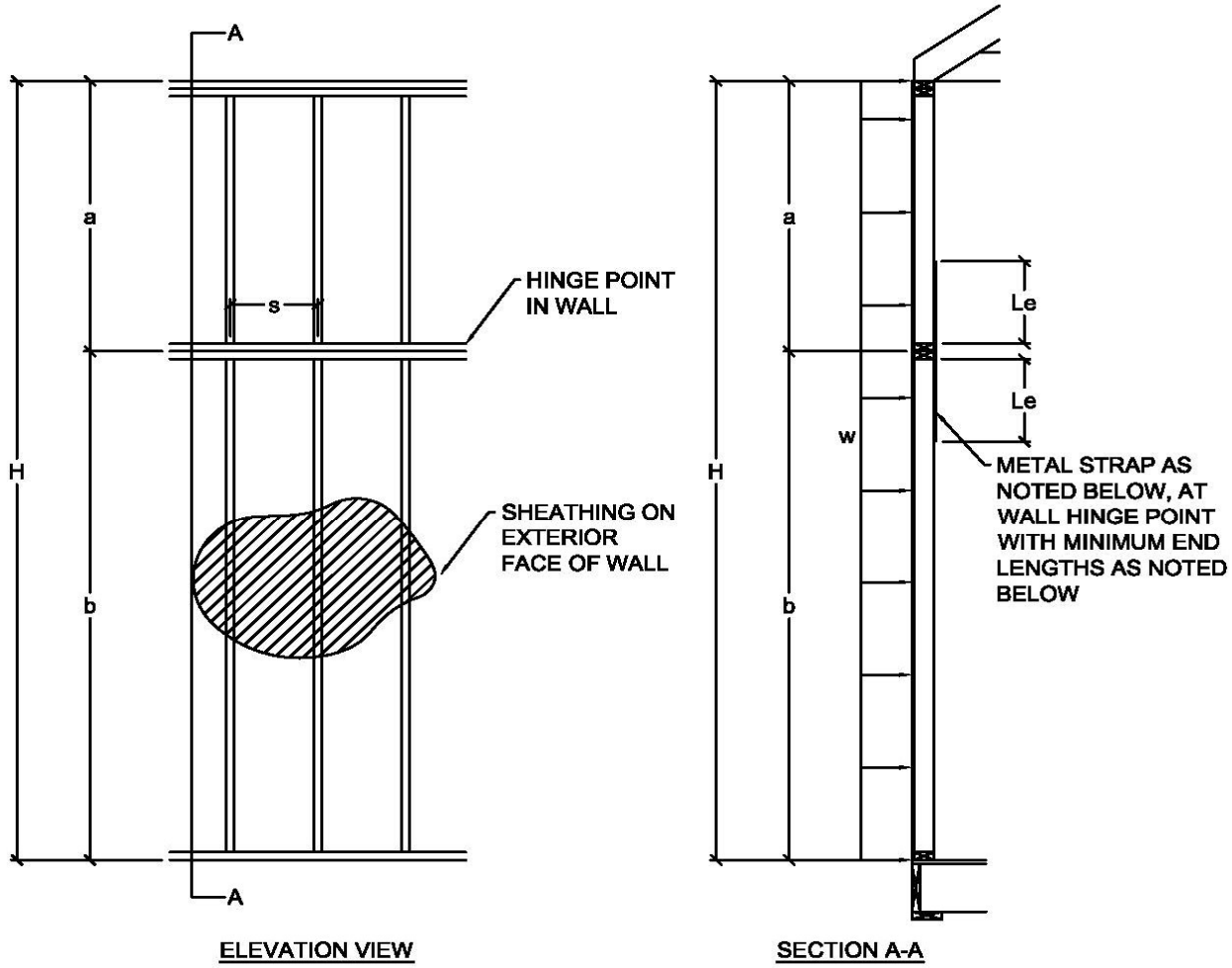
	ADDITIONAL RESISTANCE REQUIRED (POUNDS)	PORTAL FRAMES OR PERF. SHEAR WALL RESISTANCE	INTERIOR X-BRACES (325#/BRACE)	INTERIOR WALL LENGTH W/ 1/2" GYPSUM BOARD PER TABLE (FT.)	INT. WALL LENGTH SHEATHED W/ OSB (TOTAL LENGTH, ONE SIDE, FT.)	RESISTANCE PROVIDED BY ADDITIONAL METHODS (POUNDS)	OK?
2ND FLOOR FRONT-TO-BACK	0					0	YES
2ND FLOOR SIDE-TO-SIDE	0					0	YES
1ST FLOOR FRONT-TO-BACK	0					0	YES
1ST FLOOR SIDE-TO-SIDE	5760		1	65		5785	YES

Item #2 – calculations showing special fastening for gyp board

Vista Structural Engineering, LLC
14718 NW Delia Street
Portland, Oregon 97229
(971) 645-0901

Client: Bellah Homes
Job Description: 3221 SW Mary Street
Jurisdiction: Lee's Summit, MO

Item #1



STUD WALL WITH HINGE AT MID-HEIGHT

Wall height, H	18	ft	=	216	inches
a	9	ft	=	108	inches
b	9	ft	=	108	inches
Wind pressure	14	psf		(per ASCE7-10)	
Stud spacing, s	30	inches o.c.			
Maximum Moment, M	17010	in-lbs			
Moment at Hinge, M_h	17010	in-lbs			
Depth of stud	5.5	inches			
Tension force of strap	3093	pounds		Use (2) Simpson CS16 straps (or equivalent)	

Vista Structural Engineering, LLC
14718 NW Delia Street
Portland, Oregon 97229
971.233.6099
www.vistastructural.com

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Lic. # : KW-06010523 — Vista Structural Engineering, LLC

DESCRIPTION: 3221 SW Mary Street - joist above stair wall in basement (Item #4)

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

Wood Species : DouglasFir-Larch
Wood Grade : No.2

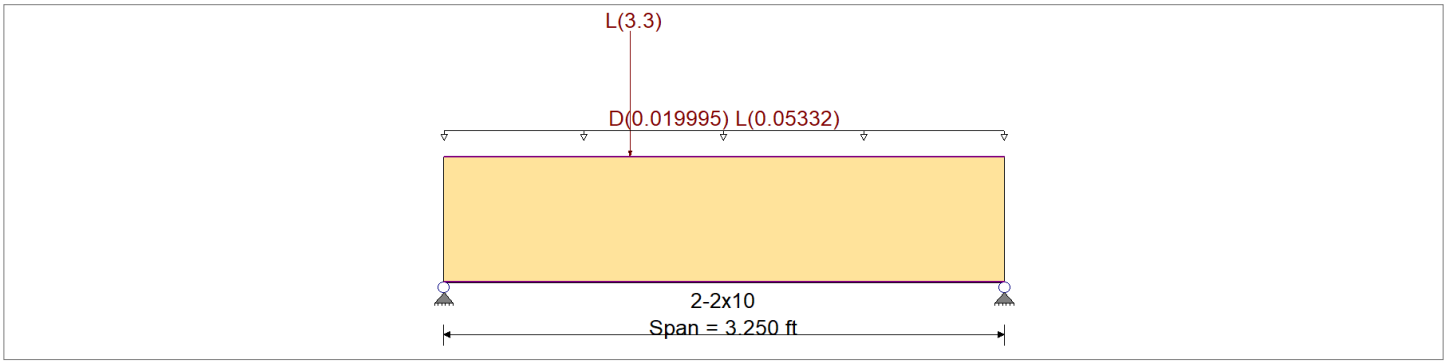
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase



Applied Loads

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

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.333 ft
Point Load : L = 3.30 k @ 1.083 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.606 : 1	Maximum Shear Stress Ratio	=	0.680 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
	=	690.27 psi		=	122.37 psi
	=	1,138.50 psi		=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	1.079 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.012 in	Ratio =	3370 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.012 in	Ratio =	3325 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0117	1.495		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.319	1.219
Overall MINimum	2.287	1.186
D Only	0.032	0.032
+D+L	2.319	1.219
+D+0.750L	1.748	0.922
+0.60D	0.019	0.019
L Only	2.287	1.186