CHRIS HARTNETT & ASSOCIATES - PRESERVATION ENGINEERS

Reviewed for Code Compliance

10/06/2025

July 6, 2925

Steamboat Springs Building Code Official

Subject: Structural Calculations of Condominium Loft Construction
1920 Bridge Lane #11
Steamboat Springs, CO 80477
Project Number: 25015

Dear Steamboat Springs Code Official:

This letter describes a structural evaluation performed on the condominium loft construction located at 1920 Bridge Lane #11 in Steamboat Springs, Colorado. It is my understanding that the loft was constructed without a building permit; therefore, the owner engaged my services to confirm that the loft meets current Colorado and International Building Codes.

An isometric (figure 1) and measured plans (figure 2) were provided to me that describe the construction; post and beam sizes and photos were also provided.

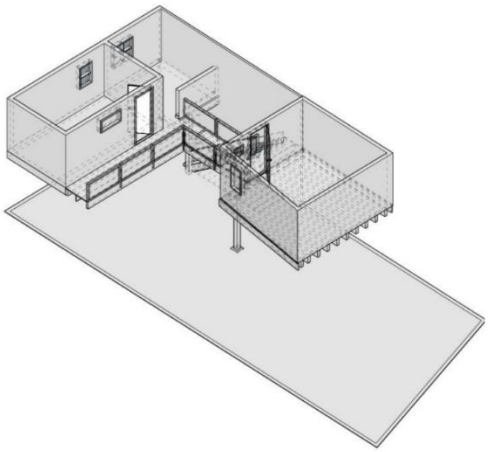


Figure 1: Isometric of loft

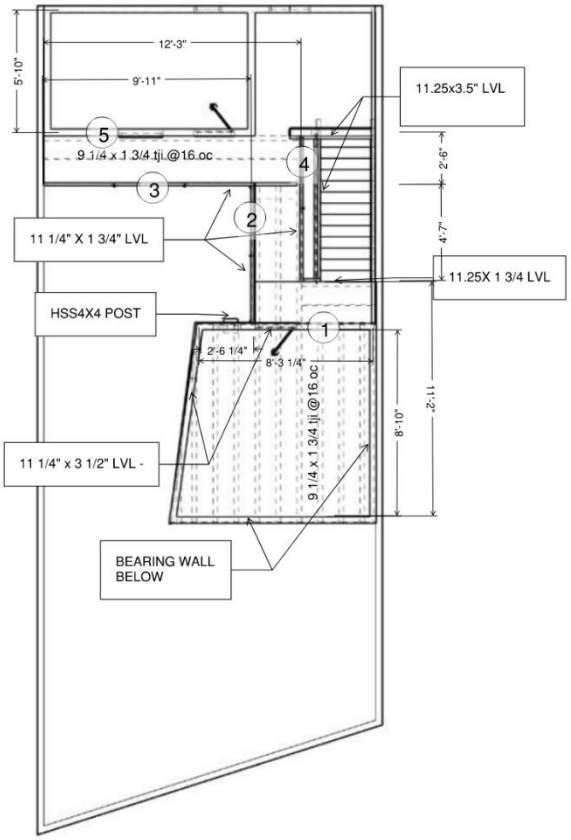


Figure 2: Measured plan of loft

The attached calculations describe dead and live loading and forces applied to each numbered structural member. Engineered lumber capacities are taken from the latest Weyerhaeuser LVL and TJI catalogs, post capacities are calculated assuming Spruce-Pine-Fir (SPF) #2 grade lumber, using allowable stresses and design methods described in the National Design Standard (NDS). The concrete slab capacity in punching shear assumed 4,000 psi concrete; a 5" depth was provided to me. Photos indicate that standard joist hangers were used in the construction. All reactions are less than published hanger capacities.

These calculations indicate that the structure, as built, supports the code-mandated design loads. One note: the post at the bottom of the stair that supports girder #5 does not have enough strength to support girder 5; however, girder #5 has enough capacity without relying on this post; therefore, this post is not structurally required. I was subsequently told that this post was installed to support the stair rail only.

It is my professional opinion that the loft, as described to me, supports all code-mandated loads and is a safe structure.

p: (612) 503-0048 **e:** chris@preservation-engineers.com **w:** preservation-engineers.com

Reviewed for Code Compliance

10/06/2025

Best regards,

Chris Hartnett & Associates

Chris A. Hartnett, CO PE license # 0066814
Principal Engineer
Chris Hartnett & Associates Preservation Engineers
Phone: 612-503-0048
Chris@Preservation-Engineers.com

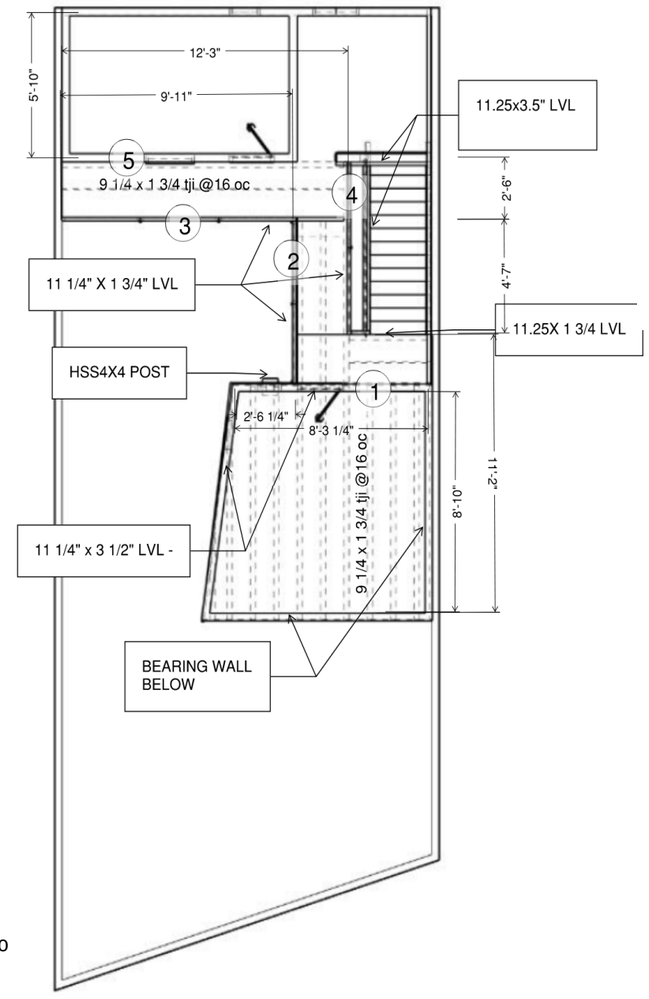
Attachment: Calculations (4 pages)

Steamboat Springs Residential, LLC

Project #	25015		
Date	5/19/2025		
Loading (psf)			
dl	psf	plf	
- plywood (3/4" thick)	3		
- framing	3		
- total	6		
ll	40		
dl+ll	46	61.33333	
Joists			
- 9 1/4"x1 3/4" TJI			
- length (ft)	9		
- spacing (in)	16		
- moment (#-ft)	621		
- capacity (#-ft)	2,500	OK	assume TJI110
- shear (#)	276		
- shear capacity (#)	910	OK	
Supporting Girder 1 @ plan north			
- 11 1/4" x 3 1/2" LVL			
- length (ft)	8.25		
- trib width	5.6		
- line load (plf)	343.4666667		
- moment (#-ft)	1950		see Risa diagram
- point load (#)	410.9333333		
- moment capacity (-ft)	8070	OK	
- shear (#)	820		
- shear capacity (#)	3740	OK	
West edge, 2			
- 11.25x1.75 LVL		OK in bending and shear, by inspectio	
- length (ft)	6.7		
- trib width (in)	24		
- line load (plf)	122.6666667		
= end reaction	410.9333333		
Edge beam 3			
- 11.25x1.75			
- length (ft)	12.2		
- trib width (in)	16		
- line load (plf)	81.77777778		
- end reaction - line load	498.8444444		
- east end reaction - point load	333.4622951		
- total end (east end)	832.3067395		
- west end reaction - point load	75.78688525		

Reviewed for Code Compliance

10/06/2025



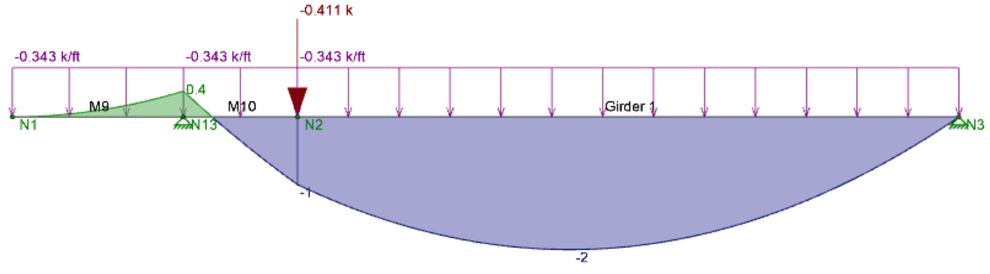
Design Properties (100% Load Duration)

Depth	TJI®	Basic Properties						
		Joist Weight (lbs/ft)	Maximum Resistive Moment[1] (ft-lbs)	Joist Only EI x 10^6 (in.^{2}-lbs)	Maximum Vertical Shear (lbs)	1¾" End Reaction (lbs)	3½" End Reaction (lbs)	R / No Stif
9½"	110	2.3	2,500	157	1,220	910	1,220	1
	210	2.6	3,000	186	1,330	1,005	1,330	2
	230	2.7	3,330	206	1,330	1,060	1,330	2
	110	2.5	3,160	267	1,560	910	1,375	1

Allowable Design Properties[1] (100% Load Duration)

Grade	Width	Design Property	Depth							
			4⅜"	5½"	5½" Plank Orientation	7¼"	9¼"	9½"	11¼"	11⅞"
TimberStrand® LSL										
1.3E	3½"	Moment (ft-lbs)	1,735	2,685	1,780	4,550				
		Shear (lbs)	4,340	5,455	1,925	7,190				
		Moment of Inertia (in.^{4})	24	49	20	111				
		Weight (plf)	4.5	5.6	5.6	7.4				
1.55E	1¾"	Moment (ft-lbs)						5,210		7,975
		Shear (lbs)						3,435		4,295
		Moment of Inertia (in.^{4})						125		244
		Weight (plf)						5.2		6.5
	3½"	Moment (ft-lbs)						10,420		15,955
		Shear (lbs)						6,870		8,590
		Moment of Inertia (in.^{4})						250		488
		Weight (plf)						10.4		13
Microllam® LVL										
2.0E	1¾"	Moment (ft-lbs)		2,125		3,555	5,600	5,885	8,070	8,925
		Shear (lbs)		1,830		2,410	3,075	3,160	3,740	3,950
		Moment of Inertia (in.^{4})		24		56	115	125	208	244
		Weight (plf)		2.8		3.7	4.7	4.8	5.7	6.1
Parallam® PSL										

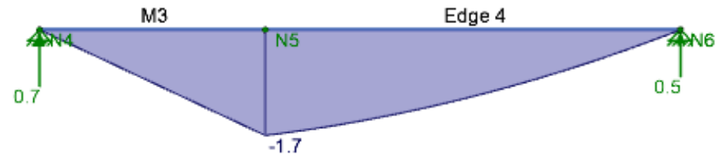
Girder 1



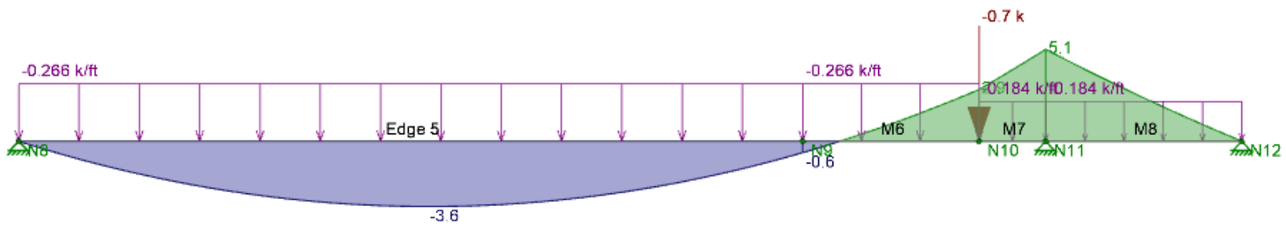
Reviewed for Code Compliance

10/06/2025

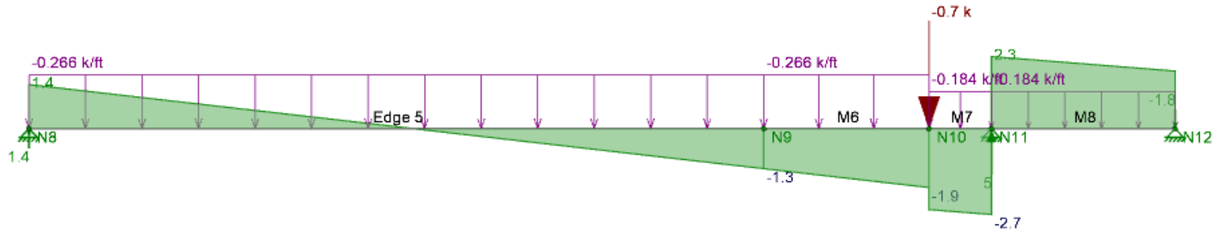
- total end (west end)	574.6313297	
check ΣFy	-1.684153005	ok
Moment (#-ft)	2013	OK
Shear		ok by inspection
Edge beam 4		
- 11.25*1.75		
- length	7.1	
- line load (plf)	81.77777778	
- line load moment (#-ft)	515.3022222	
- point load in midspan	832.3067395	conservative location of point load
- point load moment (#-ft)	1477.344463	
- total moment	1992.646685	OK See Risa diagram
Edge beam 5		
- line load trib width, left (ft)	4.33	
- line load trib width, right (ft)	3	
- line load, left (plf)	265.5733333	
- line load, right	184	
Point load (#)	700	
Moment (#-ft) - positive	3641	
- negative	-5138	
Allowable moment (#-ft)	16140	OK
Shear (#)	2700	
Allowable shear (#)	7480	OK



Edge Beam 5 moment



Edge Beam 5 shear



Posts

Post under girder 1		
- reaction (#)	2100	
- HSS4X4	OK by inspection	
Check slab under post		
- Concrete strength, f'c, assumed, psi	4000	
- slab depth, in	5	
- post width, in	4	
- controlling concrete section perimeter length, in	36	= (post length + slab depth)*4 sides
- concrete shear area, in^2	180	
Allowable shear, #	34,153	= 0.75*4*sqrt(4000)*shear area
Post under girder 5		
- reaction (#)	5000	
- allowable loading (#)	1778.772622	NG
-- allowable stress (psi)	145.2059283	
-- area (in^2)	12.25	

NOTE: girder #5 works without this post being installed; therefore, I am calling it good.

Reviewed for Code Compliance
10/06/2025

Allowable Stresses

Post under Girder 5	Bending		Tension II to grain		Shear II to grain		Comp perp to grain		Comp II to grain	
SPF #2	Fb	Fb'	Ft	Ft'	Fv	Fv'	FcL	FcL'	Fc	Fc'
Stresses	875	923.55	450	450	135	135	425	438.0102	1150	145.2059

Moment of Inertia		
- E	1,400,000	see cell B48
- E'	1400000	
- Emin	510,000	see cell B49
Specific Gravity, G	0.42	
Grading Rules Agency	nelma; nslb	

	input cell
	input result
	calculation result
	refer to another cell

- Coeffs	CD	CM	Ct	CL	CF	Cfu	Ci	Cr	Cp	CT	Cb
Bending, Fb'	1.00	1.00	1.00	0.917818	1.00	1.00	1.00	1.15			
Tension II to grain, Ft'	1.00	1.00	1.00		1.00		1.00				
Shear II to grain, Fv'	1.00	1.00	1.00				1.00				
Comp II to grain, Fc'	1.00	1.00	1.00		1.00		1.00			0.13	
Comp perp to grain, FcL'		1.00	1.00				1.00				1.03
Modulus of Elasicity											
- E'		1.00	1.00				1.00				
- Emin'		1.00	1.00				1.00			1.00	

Notes:

1. CT is for trusses only; see cell 45B

Coeffs inputs

CD	1.00	see Table 2.3.2	Duration	
CM	1.00	see Table 2.3.2	Moisture	
Ct	1.00	see Table 2.3.3	Temperature	
CL	0.917818013	CL=factor a - sqrt(factor a^2-factor b)	factor a=(1+(FbE/Fb*)/1.9=	7.042967
- FbE	11553.39806	FbE=1.2*E'min/(RB^2)	factor b=(FbE/Fb*)/0.95=	12.08593
- Fb*	1006.25			
CF	1	CF=(12/d)^(1/9) (<1)		
Cfu	1.00	see table		
Ci	1.00	see table		
Cr	1.15	=1.15 if 2x4 lumber spaced <= 24" oc		
Cp	0.13	Cp=factor 1-sqrt(factor 1)^2-factor2)	factor 1=(1+(FcE/Fc*))/2*c=	0.706197
- FcE	149.40	FcE=(0.822*Emin')/((le/d)^2)	factor 2=FcE/Fc*/c=	0.162394
- Fc*	1150.00			
- c	0.80	c=0.8 sawn lumber; 0.85 round poles and piles; 0.9 engineered lumber		
CT	1.15	CT=1+(KM*le)/(KT*E)		
- KT	2.00	=1-1.645*COVE		
-- COVE	0.59	COVE=0.59 for vis graded; 0.75 for machine graded		
-- KM	2300.00	= 2300 for seasoned & >19% Rh; =1200 for other		
- le	185.40	see table for eqtn (this is valid for continuously supported beams)		
-- lu/d	25.71			
--- lu (inches)	90.00	unbraced length; = nail spacing to roof/floor deck		

--- d (inches)	3.50	
Cb	1.03	
- lb (bearing area, in)	12.25	
E	1,400,000	
Emin	510,000	
-- Emin'	510000	
--Rb	7.278147331	Rb=sqrt(le*d*b^2)
--- le, inches	185.4	see Table 3.3.3 (current formula is good for uniform loading
--- d	3.5	
--- b	3.5	

Reviewed for Code Compliance

10/06/2025