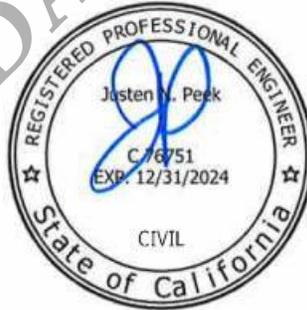


## Structural Calculations

**PROJECT:** Town of Danville ADU  
**ADDRESS:** Danville, California

**JOB No.:** G010120  
**DELTA:** Permit Submittal  
**DATE:** March 24, 2023

**CLIENT:** Town of Danville



**GOVERNING CODE:** California Building Code, 2022 Edition  
**CONSTRUCTION:** One-Story Wood Framed Building

**STRUCTURE:**  
Vertical Load System - Wood Framed Roof and Floor System  
Lateral Load System - Wood Framed Shear Walls



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

*STRUCTURAL CALCULATIONS ARE BASED ON THE FOLLOWING CRITERIA, UNLESS NOTED OTHERWISE*

**STRUCTURAL MATERIALS:**

**Structural Steel:**

W Shapes .....	ASTM A992, Fy = 50 ksi
Shapes (M, S, HP, C, MC, L) .....	ASTM A572, Grade 50
Pipe .....	ASTM A53, Grade B
Tube (HSS) .....	ASTM A500, Grade B
Plates and Bars .....	ASTM A572, Grade 50
Welding .....	Current AWS D1.1
Bolts - Unfinished .....	ASTM A307
Bolts - High Strength (HSB) .....	ASTM A325 SC/N/X
Threaded Rods .....	ASTM A449
Light Gage Steel Studs and Joists .....	ASTM A653, Grade 50
Welding (Light Gage) .....	Current AWS D1.3

**Concrete:**

Slab on Grade .....	2500 psi @ 28 Days
Foundation .....	2500 psi @ 28 Days
Tilt-Up Wall Panels .....	4000 psi @ 28 Days
Structural Concrete .....	3000 psi @ 28 Days
Reinforcing Steel (#3 Rebar) .....	ASTM A615, Grade 40
Reinforcing Steel (#4 & larger) .....	ASTM A615, Grade 60
Welding (Reinf.).....	Current AWS D1.4

**Wood:**

2" to 4" Thick x 2" and Wider .....	DF No. 2 or better
Joists and Planks .....	DF No. 2 or better
Beams and Stringers .....	DF No. 1 or better
Posts and Timbers .....	DF No. 1 or better
Glu-lam Beams (simple span) .....	2400F-V4 DF/DF
Glu-lam Beams (cantilevers) .....	2400F-V8 DF/DF
Sheathing .....	Exposure 1, Grade C-D, C-C



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

*STRUCTURAL CALCULATIONS ARE BASED ON THE FOLLOWING CRITERIA, UNLESS NOTED OTHERWISE*

**LOADING SCHEDULE:**

**Roof Dead Load:**

**Max. Roof Pitch /12:** 5

Roofing:	Concrete Tile	10.8 psf
Sheathing:	1/2" Plywood	1.8 psf
Insulation:	R38 Insulation Ceiling & R19 Insulation Roof Deck	1.0 psf
Framing:	2x10 @ 24" o.c.	1.7 psf
Ceiling:	2x8 Joists with 5/8" Gyp Board	6.4 psf
Sprinklers:	Automatic Fire Sprinklers	1.0 psf
Misc:	HVAC + Miscellaneous	2.2 psf

**25.0 psf**

**Photovoltaic Dead Load:**

Non-concurrent with Live Load

**3.0 psf**

**Roof Live Load:**

Sloped Roof (Reducible)

**20.0 psf**

**Floor Dead Load:**

Flooring:	Hardwood	4.0 psf
Misc:	HVAC + Miscellaneous	1.0 psf

**5.0 psf**

**Floor Live Load:**

Residential Floor (Reducible)

**40.0 psf**

**Deck Dead Load:**

Decking:	Tile & Mortar O/ 3/4" Plywood	12.5 psf
Misc:	HVAC + Miscellaneous	1.5 psf

**14.0 psf**

**Deck Live Load:**

Exterior Balcony (Reducible)

**60.0 psf**

**Exterior Wall Load:**

Wall Type:	2x6 @ 16 in, 5/8" Gyp, Insulated, 7/8" Stucco	<b>17.0 psf</b>
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**Interior Wall Load:**

Wall Type:	2x4 @ 16 in, (2) 5/8" Gyp, Insulated	<b>7.0 psf</b>
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PROJECT: Town of Danville ADU

CLIENT: Town of Danville

JOB NO.: G010120

CALCS BY: J. Peek

DATE: 3/24/2023

**SEISMIC LOADS: ASCE 7-16 SECTION 12.8 (EQUIV. LATERAL FORCE):**

**SITE INFORMATION:**

S <sub>s</sub> .....	2.500	ASCE 7-16 Sect. 11.4.2
S <sub>1</sub> .....	1.200	ASCE 7-16 Sect. 11.4.2
Site Class.....	D	ASCE 7-16 Sect. 11.4.3
Risk Category .....	II	ASCE 7-16 Table 1.5-1
Importance Factor .....	1.0	ASCE 7-16 Table 1.5-2

Site coefficients and adjusted maximum considered eq. spectral response accel. parameters

F <sub>a</sub> .....	1.200	ASCE 7-16 Sect. 11.4.4
F <sub>v</sub> .....	1.700	ASCE 7-16 Sect. 11.4.4

**Table 11.4-1 Short-Period Site Coefficient F<sub>a</sub>**

Site Class	S <sub>s</sub> ≤ 0.25	S <sub>s</sub> = 0.50	S <sub>s</sub> = 0.75	S <sub>s</sub> = 1.00	S <sub>s</sub> = 1.25	S <sub>s</sub> ≥ 1.50
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.9	0.9	0.9	0.9	0.9	0.9
C	1.3	1.3	1.2	1.2	1.2	1.2
D	1.6	1.4	1.2	1.2	1.2	1.2
E	2.4	1.7	1.3	1.2	1.2	1.2
F	<i>Site-Specific Response Analysis Required</i>					

**Table 11.4-2 Short-Period Site Coefficient F<sub>v</sub>**

Site Class	S <sub>1</sub> ≤ 0.10	S <sub>1</sub> = 0.20	S <sub>1</sub> = 0.30	S <sub>1</sub> = 0.40	S <sub>1</sub> = 0.50	S <sub>1</sub> ≥ 0.60
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.8	0.8	0.8	0.8	0.8	0.8
C	1.5	1.5	1.5	1.5	1.5	1.4
D	2.4	2.2	2	1.9	1.8	1.7
E	4.2	3.3	2.8	2.4	2.2	2
F	<i>Site-Specific Response Analysis Required</i>					

S <sub>MS</sub> = F <sub>a</sub> S <sub>s</sub> .....	3.000	(EQ. 11.4-1)
S <sub>M1</sub> = F <sub>v</sub> S <sub>1</sub> .....	2.040	(EQ. 11.4-2)
S <sub>DS</sub> = (2/3)S <sub>MS</sub> .....	2.000 g	(EQ. 11.4-3)
S <sub>D1</sub> = (2/3)S <sub>M1</sub> .....	1.360 g	(EQ. 11.4-4)

**Seismic Design Category Based on Short-Period Response Accelerations:**

VALUE OF S <sub>DS</sub>	1 OR 11	111	1V
S <sub>DS</sub> < 0.167g	A	A	A
0.167g ≤ S <sub>DS</sub> < 0.33g	B	B	C
0.33g ≤ S <sub>DS</sub> < 0.50g	C	C	D
0.50g ≤ S <sub>DS</sub>	D	D	D

S<sub>1</sub> IS GREATER THAN 0.75  
USE CATEGORY E  
PER CBC 1613.2.5

**Seismic Design Category Based on 1-Second Response Accelerations:**

VALUE OF S <sub>D1</sub>	1 OR 11	111	1V
S <sub>D1</sub> < 0.067g	A	A	A
0.067g ≤ S <sub>D1</sub> < 0.133g	B	B	C
0.133g ≤ S <sub>D1</sub> < 0.20g	C	C	D
0.20g ≤ S <sub>D1</sub>	D	D	D

S<sub>1</sub> IS GREATER THAN 0.75  
USE CATEGORY E  
PER CBC 1613.2.5



PROJECT: Town of Danville ADU

CLIENT: Town of Danville

JOB NO.: G010120

CALCS BY: J. Peek

DATE: 3/24/2023

**SEISMIC LOADS: ASCE 7-16 SECTION 12.8 (CONT.):**

**BUILDING INFORMATION:**

Building Height,  $h_n$ ..... 14.5 ft  
 Mean Roof Height,  $H_m$ ..... 11.3 ft  
 Eave Height,  $h$ ..... 8.1 ft

**Building Depth:**

Bldg Depth (Roof Level)..... 33.0 ft

**Building Width:**

Bldg Width (Roof Level)..... 37.5 ft

**EQUIVALENT LATERAL FORCE PROCEDURE:**

**Seismic Base Shear:**

R (ASCE 7-16 Table 12.2-1)..... 6.5  
 $C_t$ ..... 0.020  
 $X$ ..... 0.75  
 $T_a = C_t(h_n)^X$ ..... 0.15 sec

**Seismic Response Coefficient:**

$C_S = S_{DS}/(R/I)$ ..... 0.308 (EQ. 12.8-2)  
 $C_S = S_{D1}/T(R/I)$ ..... 1.408 (EQ. 12.8-3)  
 $C_S = 0.044S_{DS}I$ ..... 0.088 (EQ. 12.8-5)  
 $C_S = 0.5S_1/(R/I)$ ..... 0.092 (EQ. 12.8-6)

**Seismic Base Shear:**

$V = C_S W$  ..... **0.308 W** (EQ. 12.8-1)

**BUILDING WEIGHTS:**

Roof Loads:	AREA (sq ft)	WEIGHT (psf)	TOTAL (lb)
Roof Area	1170	25.0	29221
Roof Top Deck	0	14.0	0
Photovoltaic Area	1170	3.0	3510

**SEISMIC BASE SHEAR:**

Building DL = 43597 lb  
 Seismic Coef. = 0.308  
 $k = 1.00$   
**Base Shear = 13414 lb**

Roof Loads:	LENGTH (ft)	WEIGHT (psf)	TOTAL (lb)
Linear Feet of Ext. Wall	141	17.0	8235
Linear Feet of Int. Wall	93	7.0	2631

\*Note: Approximate Fenestration Percentage: 15 %  
**TOTAL ROOF LOAD (lb): 43597**

**CALCULATE SEISMIC SHEAR LOADS:**

VERTICAL DISTRIBUTION OF SEISMIC FORCES					
Level	$w_x$ (lb)	Top Plate Height (ft)	$h_x$ (ft)	$F_x$ (lb)	Unit Shear (psf)
ROOF	43597	8.1	11.3	13414	11.5
			$\sum w_i * h_i^k =$	492278	

**REDUNDANCY FACTOR (ASCE 7-16 SECTION 12.3.4):**

Seismic Design Cat: **USE CATEGORY E**  
 Roof East/ West: **1.0**

\*Note: Refer to calculations on following sheets  
 Roof North/South: **1.0**

**SUMMARY OF SEISMIC DESIGN LOADS:**

Level	Direction	SEISMIC	UNIT	Redundancy	ASD DESIGN	ASD DESIGN
		FORCE (lb)	SHEAR (psf)		Factor	FORCE (lb)
Roof	North/South	13414	11.5	1.0	9390	8.0
Roof	East/West	13414	11.5	1.0	9390	8.0



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**WIND ANALYSIS (ENCLOSED, PARTIALLY ENCLOSED AND OPEN BUILDINGS OF ALL HEIGHTS)**

**MAIN WIND-FORCE RESISTING SYSTEM:**

Design Wind Speed..... 95 mph  
 Wind Exposure..... C  
 Site Elevation..... Unknown Feet  
 Topographic factor, ASCE 7-10 Section 26.8.2 -  
 $K_{zt}$  (Assumed Flat Area)..... 1.00

**BUILDING INFORMATION:**

Building Height,  $h_n$ ..... 14.5 ft  
 Mean Roof Height,  $H_m$ ..... 11.3 ft  
 Eave Height,  $h$ ..... 8.1 ft

**Building Depth "B":**

Bldg Depth (Roof Level)..... 33.0 ft  
 Bldg Depth (Floor Level)..... 0.0 ft

**Building Width "L":**

Bldg Width (Roof Level)..... 37.5 ft  
 Bldg Width (Floor Level)..... 0.0 ft

**DETERMINE WIND LOAD PARAMETERS:**

DIRECTIONALITY FACTOR ( $K_d$ ): 0.85 \*\* See ASCE 7-16 Section 26.6 and Table 26.6-1  
 TOPOGRAPHIC FACTOR ( $K_{zT}$ ): 1.00 \*\* See ASCE 7-16 Section 26.8 and Figure 26.8-1  
 GUST FACTOR (G): 0.85 \*\* See ASCE 7-16 Section 26.11.1  
 ENCLOSURE CLASSIFICATION Enclosed \*\* See ASCE 7-16 Section 26.12  
 INTERNAL PRESSURE ( $C_{gPI}$ ) 0.18 \*\* See ASCE 7-16 Section 26.12 and Table 26.13-1  
 GROUND ELEVATION FACTOR ( $K_e$ ) 1.00 \*\* See ASCE 7-16 Table 26.9-1, Note 2

**Table 26.10-1 Velocity Pressure Coefficients,  $K_z$**

Height Above Ground (ft)	Exposure Category		
	B	C	D
15.0	0.57	0.85	1.03
20.0	0.62	0.90	1.08
25.0	0.66	0.94	1.12
30.0	0.70	0.98	1.16
35.0	0.73	1.01	1.19
40.0	0.76	1.04	1.22
45.0	0.79	1.07	1.25
50.0	0.81	1.09	1.27
55.0	0.83	1.11	1.29
60.0	0.85	1.13	1.31

VELOCITY COEFFICIENT ( $K_z$ ): 0.85  
 \*\* See ASCE 7-16 Table 26.10.1

**DETERMINE VELOCITY PRESSURE:**

$q_z = 0.00256 K_z K_{zT} K_d K_e V^2$ : 16.69 psf



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**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**WIND ANALYSIS (ENCLOSED, PARTIALLY ENCLOSED AND OPEN BUILDINGS OF ALL HEIGHTS)**

**DETERMINE WALL PRESSURE:**

Wall Pressure Coefficients, ASCE-7 (Figure 27..3-1)

Surface	L/B	Cp	Use With
Windward Wall	All Values	0.8	q <sub>z</sub>
Leeward Wall	0-1	-0.5	q <sub>h</sub>
	2	-0.3	
	>4	-0.2	
Side Wall	All Values	-0.7	q <sub>h</sub>

**Determine Cp Values**

Level	Direction	L/B Values	Windward C <sub>p</sub> Value	Leeward C <sub>p</sub> Value
Roof	East/West	1.14	0.80	-0.473

Level	Direction	L/B Values	Windward C <sub>p</sub> Value	Leeward C <sub>p</sub> Value
Roof	North/South	0.88	0.80	-0.500

**Windward Pressures:**

Plan North/South

CASE 1: 14.36  
CASE 2: 8.35

Plan East/West

CASE 1: 14.36  
CASE 2: 8.35

**Leeward Pressures:**

Plan North/South

CASE 1: 4.09  
CASE 2: 10.10

Plan East/West

CASE 1: 3.70  
CASE 2: 9.71

**SUMMARY OF WIND FORCE DESIGN LOADS**

Level	Direction	WIND DEISGN	UNIT	ASD DESIGN	ASD DESIGN
		FORCE (lb)	SHEAR (plf)	FORCE (lb)	LOAD (plf)
Roof	North/South	5015	134	<b>3009</b>	<b>80</b>
Roof	East/West	4320	131	<b>2592</b>	<b>79</b>



PROJECT: Town of Danville ADU

CLIENT: Town of Danville

JOB NO.: G010120

CALCS BY: J. Peek

DATE: 3/24/2023

**SHEARWALL DESIGN: ROOF LEVEL**

Shearwall Framing: 1/2" CDX ply with 10d Nailing

SHEAR LINE ID:	1	2
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**DETERMINATION OF LATERAL DESIGN LOADS:**

Grid Line Trib. Area ( sq ft):	522	648
Seismic Shear Load (psf):	8.0	8.0
Seismic Shear Force (lb):	4189	5201

Grid Line Trib. Width (ft):	13.5	19.5
Wind Design Load (plf):	79	79
Wind Design Force (lb):	1060	1532

**SHEARWALL LENGTHS:**

Wall Length 1 (ft):	6.0	6.0
Wall Length 2 (ft):	8.0	4.0
Wall Length 3 (ft):	0.0	0.0
Wall Length 4 (ft):	0.0	0.0
Wall Length 5 (ft):	0.0	0.0

**SHEARWALL RIGIDITY DESIGN:**

Wall 1 Rigidity $K_i$ (kip/in):	4.95	7.49
Wall 2 Rigidity $K_i$ (kip/in):	7.42	4.15
Wall 3 Rigidity $K_i$ (kip/in):		
Wall 4 Rigidity $K_i$ (kip/in):		
Wall 5 Rigidity $K_i$ (kip/in):		

**NAILING DESIGN BASED ON SDPWS SECTION 4.3.4 CAPACITY ADJ:**

Wall 1 Design Shear (plf):	279	558
<i>Sec. 4.3.4.2 Capacity Reduction</i>	1.00	1.00
Wall 2 Design Shear (plf):	314	465
<i>Sec. 4.3.4.2 Capacity Reduction</i>	1.00	1.00
Wall 3 Design Shear (plf):		
<i>Sec. 4.3.4.2 Capacity Reduction</i>		
Wall 4 Design Shear (plf):		
<i>Sec. 4.3.4.2 Capacity Reduction</i>		
Wall 5 Design Shear (plf):		
<i>Sec. 4.3.4.2 Capacity Reduction</i>		

Shear Capacity (plf):	460	600
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**Shear Designation #: Type 2 Type 3**

**REDUNDANCY FACTOR ANALYSIS (ASCE 7-16 SECTION 12.3.4):**

Wall 1 Capacity (%):	0.22	0.29
Wall 2 Capacity (%):	0.30	0.19
Wall 3 Capacity (%):		
Wall 4 Capacity (%):		
Wall 5 Capacity (%):		



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**Redundancy Factor: Use 1.0 Use 1.0**

**SHEARWALL DESIGN (CONT.): ROOF LEVEL**

SHEAR LINE ID:	1	2
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**SHEARWALL OVERTURNING DESIGN:**

Wall Height (ft):	8.1	8.1
Wall Weight (psf):	17.0	17.0
Roof Trib. Width (ft):	0	0
Roof Weight (psf):	25.0	25.0

**SEISMIC UPLIFT FORCE (lb): Load Combo (ASCE 7-16): (0.6-0.14\*SDS)D+0.7E**

Wall Dead Load (plf):	44	44
Wall 1 Uplift (lb):	2126	4376
Wall 2 Uplift (lb):	2364	3659
Wall 3 Uplift (lb):		
Wall 4 Uplift (lb):		
Wall 5 Uplift (lb):		

**WIND UPLIFT FORCE (lb): Load Combo (ASCE 7-16): 0.6D+0.6W**

Wall Dead Load (plf):	82	82
Wall 1 Uplift (lb):	324	1081
Wall 2 Uplift (lb):	313	939
Wall 3 Uplift (lb):		
Wall 4 Uplift (lb):		
Wall 5 Uplift (lb):		

**HOLDOWN TYPE:**

Wall 1 Holdown Type:	HDU2	HDU5
Wall 2 Holdown Type:	HDU2	HDU5
Wall 3 Holdown Type:		
Wall 4 Holdown Type:		
Wall 5 Holdown Type:		

**STORY DRIFT CHECK (C<sub>d</sub>=4):** Due to approximate nature of rigidity calculation methods, +/- 10% variation OK.

Wall 1 Defl. Check (in):	1.4	2.3
Wall 2 Defl. Check (in):	1.4	2.2
Wall 3 Defl. Check (in):		
Wall 4 Defl. Check (in):		
Wall 5 Defl. Check (in):		
Wall 1 Drift Check (in):	OK	OK
Wall 1 Drift Check (in):	OK	OK
Wall 1 Drift Check (in):		
Wall 1 Drift Check (in):		
Wall 5 Drift Check (in):		

**AREA VERIFICATION CHECK:**



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

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Seismic Trib Area Sum: 1170 sq ft

Trib Width Sum: 33.0 ft

TOWN OF DANVILLE USE ONLY



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**SHEARWALL DESIGN: ROOF LEVEL**

Shearwall Framing: 1/2" CDX ply with 10d Nailing

SHEAR LINE ID:	A	B
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**DETERMINATION OF LATERAL DESIGN LOADS:**

Grid Line Trib. Area ( sq ft):	585	585
Seismic Shear Load (psf):	8.0	8.0
Seismic Shear Force (lb):	4695	4695

Grid Line Trib. Width (ft):	18.8	18.8
Wind Design Load (plf):	80	80
Wind Design Force (lb):	1504	1504

**SHEARWALL LENGTHS:**

Wall Length 1 (ft):	8.0	10.5
Wall Length 2 (ft):	8.0	0.0
Wall Length 3 (ft):	0.0	0.0
Wall Length 4 (ft):	0.0	0.0
Wall Length 5 (ft):	0.0	0.0

**SHEARWALL RIGIDITY DESIGN:**

Wall 1 Rigidity $K_i$ (kip/in):	7.37	13.97
Wall 2 Rigidity $K_i$ (kip/in):	7.37	
Wall 3 Rigidity $K_i$ (kip/in):		
Wall 4 Rigidity $K_i$ (kip/in):		
Wall 5 Rigidity $K_i$ (kip/in):		

**NAILING DESIGN BASED ON SDPWS SECTION 4.3.4 CAPACITY ADJ:**

Wall 1 Design Shear (plf):	293	447
<i>Sec. 4.3.4.2 Capacity Reduction</i>	1.00	1.00
Wall 2 Design Shear (plf):	293	
<i>Sec. 4.3.4.2 Capacity Reduction</i>	1.00	

Wall 3 Design Shear (plf):  
*Sec. 4.3.4.2 Capacity Reduction*

Wall 4 Design Shear (plf):  
*Sec. 4.3.4.2 Capacity Reduction*

Wall 5 Design Shear (plf):  
*Sec. 4.3.4.2 Capacity Reduction*

Shear Capacity (plf):	310	460
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**Shear Designation #:      Type 1                      Type 2**

**REDUNDANCY FACTOR ANALYSIS (ASCE 7-16 SECTION 12.3.4):**

Wall 1 Capacity (%):	0.25
Wall 2 Capacity (%):	0.25
Wall 3 Capacity (%):	
Wall 4 Capacity (%):	
Wall 5 Capacity (%):	



PROJECT: Town of Danville ADU

CLIENT: Town of Danville

JOB NO.: G010120

CALCS BY: J. Peek

DATE: 3/24/2023

Redundancy Factor: Use 1.0 Use 1.0

**SHEARWALL DESIGN (CONT.): ROOF LEVEL**

SHEAR LINE ID:	A	B
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**SHEARWALL OVERTURNING DESIGN:**

Wall Height (ft):	8.1	8.1
Wall Weight (psf):	17.0	17.0
Roof Trib. Width (ft):	0	0
Roof Weight (psf):	25.0	25.0

**SEISMIC UPLIFT FORCE (lb): Load Combo (ASCE 7-16): (0.6-0.14\*SDS)D+0.7E**

Wall Dead Load (plf):	44	44
Wall 1 Uplift (lb):	2196	3384
Wall 2 Uplift (lb):	2196	
Wall 3 Uplift (lb):		
Wall 4 Uplift (lb):		
Wall 5 Uplift (lb):		

**WIND UPLIFT FORCE (lb): Load Combo (ASCE 7-16): 0.6D+0.6W**

Wall Dead Load (plf):	82	82
Wall 1 Uplift (lb):	430	725
Wall 2 Uplift (lb):	430	
Wall 3 Uplift (lb):		
Wall 4 Uplift (lb):		
Wall 5 Uplift (lb):		

**HOLDOWN TYPE:**

Wall 1 Holdown Type:	HDU2	HDU4
Wall 2 Holdown Type:	HDU2	
Wall 3 Holdown Type:		
Wall 4 Holdown Type:		
Wall 5 Holdown Type:		

**STORY DRIFT CHECK (C<sub>d</sub>=4):** Due to approximate nature of rigidity calculation methods, +/- 10% variation OK.

Wall 1 Defl. Check (in):	1.5	1.8
Wall 2 Defl. Check (in):	1.5	
Wall 3 Defl. Check (in):		
Wall 4 Defl. Check (in):		
Wall 5 Defl. Check (in):		
Wall 1 Drift Check (in):	OK	OK
Wall 1 Drift Check (in):	OK	
Wall 1 Drift Check (in):		
Wall 1 Drift Check (in):		
Wall 5 Drift Check (in):		

**AREA VERIFICATION CHECK:**



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

---

Seismic Trib Area Sum: 1170 sq ft

Trib Width Sum: 37.5 ft

TOWN OF DANVILLE USE ONLY



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**ROOF DIAPHRAGM DESIGN:**

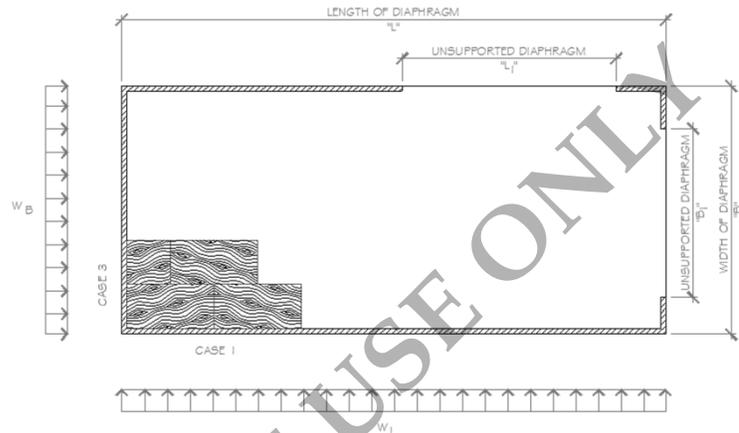
**DIMENSIONS:**

L = 38 ft

B = 27 ft

B<sub>1</sub> = 0 ft

L<sub>1</sub> = 0 ft



**FRAMING MATERIALS:**

- Plywood Panel Grade CD, CC
- Minimum Nominal Framing Size: 2 x
- Nominal Plywood Thickness: 15/32
- Common Nail Size: 8 d
- Wall framing size: 2x4
- Specific Gravity of Framing Members: 0.5

**LATERAL FORCE ALONG L SIDE:**

w<sub>L</sub> = 217 plf

**LATERAL FORCE ALONG B SIDE:**

w<sub>B</sub> = 301 plf

**ANALYSIS -**

The diaphragm is considered flexible if its maximum lateral deformation is more than 2x the average shearwall deflection of the associated story.

**Diaphragm Ratio:** L/B = 1.39 < 3 Diaphragm OK

Shear<sub>MAX</sub> along Side V<sub>L</sub> = w<sub>B</sub>\*B / 2\*L = 108 plf

Shear<sub>MAX</sub> along Side V<sub>B</sub> = w<sub>L</sub>\*L / 2\*B = 150 plf

**Chord Forces:**

Side L: T<sub>L</sub> = C<sub>L</sub> = w<sub>L</sub>\*L<sup>2</sup> / 8\*B = 1411 lb

\*\* Min. Blkg Req'd @ 96 in o.c.

Side B: T<sub>B</sub> = C<sub>B</sub> = w<sub>B</sub>\*B<sup>2</sup> / 8\*L = 731 lb

\*\* Min. Blkg Req'd @ 96 in o.c.

**Drag Forces:**

Side L: F<sub>L</sub> = V<sub>L</sub>\*L<sub>1</sub> = 0 lb

\*\* Min. Strap Req'd - NONE

Side B: F<sub>B</sub> = V<sub>B</sub>\*B<sub>1</sub> = 0 lb

\*\* Min. Strap Req'd - NONE

**DIAPHRAGM DEFLECTION -**

\* per APA: Supplement For Shearwall and Diaphragms

$$D = \frac{5vL^3}{8EAb} + \frac{vL}{4Gt} + 0.188Le_n + \frac{S(D_cX)}{2b}$$

**Chord Properties:**

Area (in<sup>2</sup>): 5.25

G<sub>v</sub>t<sub>v</sub> of ply (lb/in): 83500

E (psi): 1600000

e<sub>n</sub> (in) = (V<sub>n</sub>/616)<sup>3.018</sup>: 0.045

v (plf): 150

S (D<sub>c</sub>X) (in): 2.50

**D = 0.42 in**

D<sub>ALLOW</sub> = 0.025 \* Story Height = 3.4 in

**Deflection OK**



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 45009

**ROOF DIAPHRAGM DESIGN:**

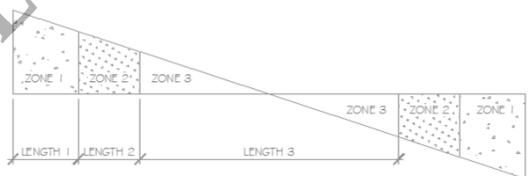
**NAILING PATTERN -**

Panel Grade	Common Nail	Min. Pen. (in)	Min. Thick. (in)	Member Width (in)	Blocked Nail Spacing				Unblocked	
					Boundary / Other Edges				Case 1	Others
					6 / 6	4 / 6	2.5 / 4	2 / 3		
CD, CC	8 d	1 1/2	15/32	2	270	360	530	600	240	180

**DIAPHRAGM NAILING DESIGN -** Along Length 'L'

**Zone 1: 38 FT WIDE x 27 FT DEEP**

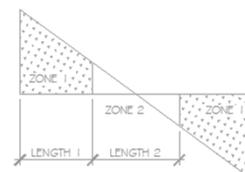
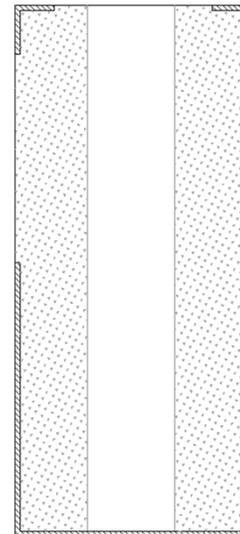
UNBLOCKED 15/32 SHEATHING WITH 8 d COMMON NAILS  
6.0 IN O.C. BOUNDARY/ 12 IN O.C. EDGES/ 12 IN O.C. FIELD



**DIAPHRAGM NAILING DESIGN -** Along Length 'B'

**Zone 1: 27 FT WIDE x 38 FT DEEP**

UNBLOCKED 15/32 SHEATHING WITH 8 d COMMON NAILS  
6.0 IN O.C. BOUNDARY/ 12 IN O.C. EDGES/ 12 IN O.C. FIELD



# Wood Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC#: KW-06015505, Build:20.23.2.14

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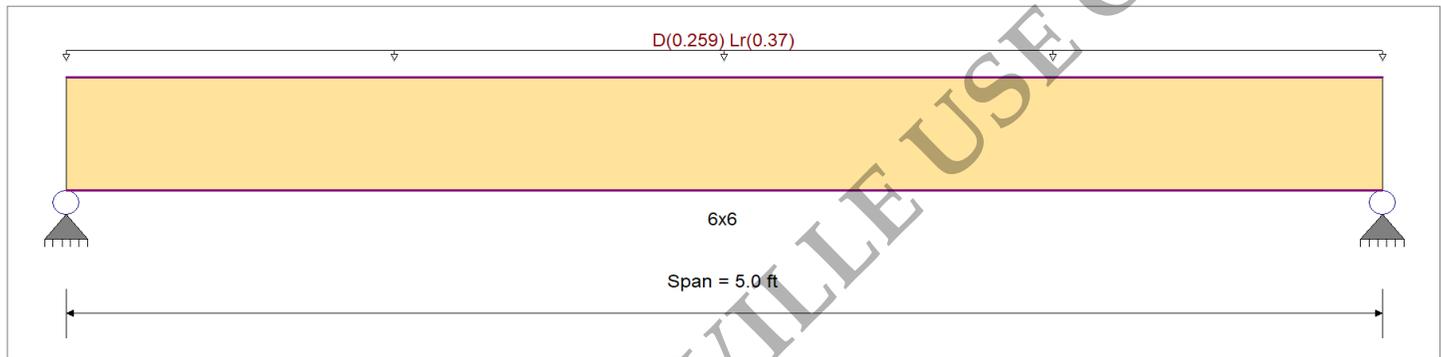
## DESCRIPTION: TYPICAL HEADER

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
Load Combination Set : IBC 2021

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,350.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2021	Fb -	1,350.0 psi	Ebend- xx	1,600.0ksi
	Fc - Prll	925.0 psi	Eminbend - xx	580.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade : No.1	Fv	170.0 psi		
	Ft	675.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### Applied Loads

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

Beam self weight calculated and added to loading  
Uniform Load : D = 0.0140, Lr = 0.020 ksf, Tributary Width = 18.50 ft

### DESIGN SUMMARY

Design OK

<b>Maximum Bending Stress Ratio</b>	=	<b>0.509</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.303</b> : 1
Section used for this span		<b>6x6</b>	Section used for this span		<b>6x6</b>
fb: Actual	=	859.51 psi	fv: Actual	=	64.41 psi
F'b	=	1,687.50 psi	F'v	=	212.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	2.500ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.043 in	Ratio = 1398 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.074 in	Ratio = 814 >=240	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 5.0 ft	1	0.296	0.176	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.83	359.1	1,215.0	0.0	0.00	0.0	0.0
+D+Lr	Length = 5.0 ft	1	0.509	0.303	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.99	859.5	1,687.5	1.30	64.4	212.5	0.0
+D+0.750Lr	Length = 5.0 ft	1	0.435	0.259	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.70	734.4	1,687.5	1.11	55.0	212.5	0.0
+0.60D	Length = 5.0 ft	1	0.100	0.059	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.50	215.5	2,160.0	0.33	16.1	272.0	0.0

**Wood Beam**

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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**DESCRIPTION: TYPICAL HEADER****Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0737	2.518		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.589	1.589
Max Upward from Load Combinations	1.589	1.589
Max Upward from Load Cases	0.925	0.925
D Only	0.664	0.664
+D+Lr	1.589	1.589
+D+0.750Lr	1.358	1.358
+0.60D	0.398	0.398
Lr Only	0.925	0.925

TOWN OF DANVILLE USE ONLY

# Wood Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC#: KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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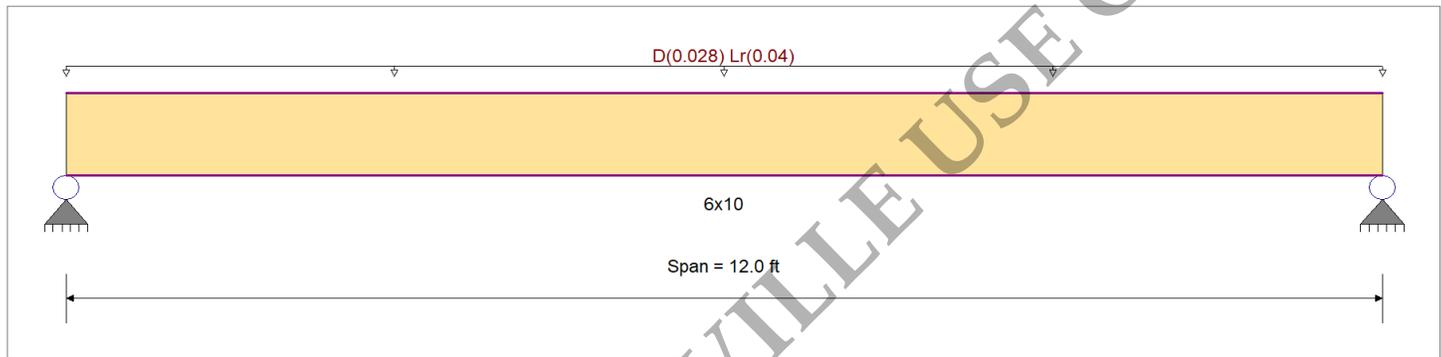
## DESCRIPTION: B1

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
Load Combination Set : IBC 2021

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,350.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2021	Fb -	1,350.0 psi	Ebend- xx
	Fc - Prll	925.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.1	Fv	170.0 psi	
	Ft	675.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			31.210pcf



### Applied Loads

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

Beam self weight calculated and added to loading  
Uniform Load : D = 0.0140, Lr = 0.020 ksf, Tributary Width = 2.0 ft

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.123</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.056</b> : 1
Section used for this span		<b>6x10</b>	Section used for this span		<b>6x10</b>
fb: Actual	=	207.11 psi	fv: Actual	=	11.87 psi
F'b	=	1,687.50 psi	F'v	=	212.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	6.000ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.030 in	Ratio = 4823 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.059 in	Ratio = 2432 >=240	Span: 1 : +D+Lr		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 12.0 ft	1	0.085	0.038	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.71	102.7	1,215.0	0.0	0.00	0.0	0.0
+D+Lr	Length = 12.0 ft	1	0.123	0.056	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.43	207.1	1,687.5	0.41	11.9	212.5	0.0
+D+0.750Lr	Length = 12.0 ft	1	0.107	0.049	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.25	181.0	1,687.5	0.36	10.4	212.5	0.0
+0.60D	Length = 12.0 ft	1	0.029	0.013	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.42	61.6	2,160.0	0.12	3.5	272.0	0.0

**Wood Beam**

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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**DESCRIPTION: B1****Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0592	6.044		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.476	0.476
Max Upward from Load Combinations	0.476	0.476
Max Upward from Load Cases	0.240	0.240
D Only	0.236	0.236
+D+Lr	0.476	0.476
+D+0.750Lr	0.416	0.416
+0.60D	0.142	0.142
Lr Only	0.240	0.240

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# Wood Beam

Lic. # : KW-06006640

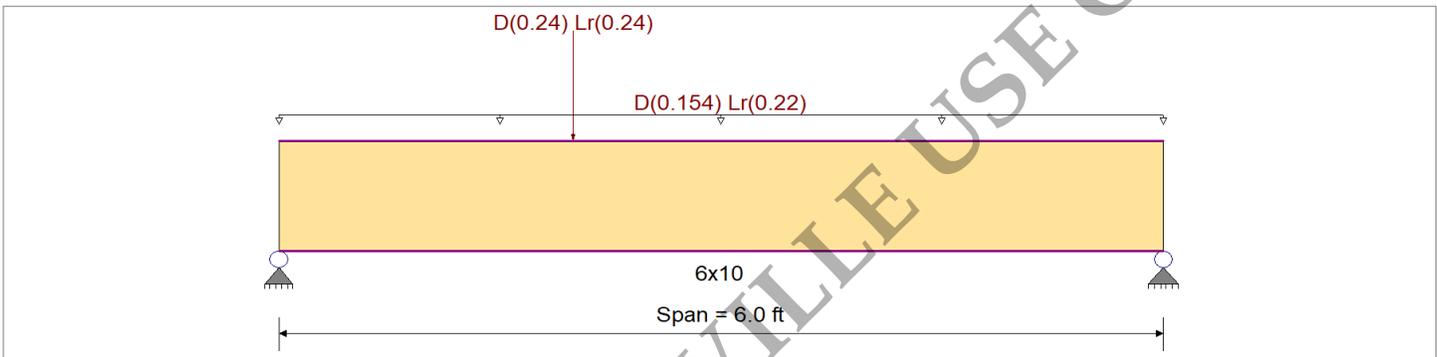
DESCRIPTION: B2

## CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combination Set : ASCE 7-16

## Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,350.0 psi	E : Modulus of Elasticity
Load Combination ASCE 7-16	Fb -	1,350.0 psi	Ebend- xx
Wood Species : Douglas Fir-Larch	Fc - Prll	925.0 psi	Eminbend - xx
Wood Grade : No.1	Fc - Perp	625.0 psi	
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	170.0 psi	Density
	Ft	675.0 psi	31.210pcf



## Applied Loads

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

Beam self weight calculated and added to loads  
 Uniform Load : D = 0.0140, Lr = 0.020 ksf, Tributary Width = 11.0 ft  
 Point Load : D = 0.240, Lr = 0.240 k @ 2.0 ft, (PL FROM B1)

## DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.193</b> : 1	Maximum Shear Stress Ratio	=	<b>0.158</b> : 1
Section used for this span	=	<b>6x10</b>	Section used for this span	=	<b>6x10</b>
	=	325.96 psi		=	33.65 psi
	=	1,687.50 psi		=	212.50 psi
Load Combination	=	+D+Lr	Load Combination	=	+D+Lr
Location of maximum on span	=	2.584 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.013 in	Ratio =		5619 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.023 in	Ratio =		3120 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

## Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values							
			M	V	C <sub>d</sub>	C <sub>F/V</sub>	C <sub>i</sub>	C <sub>r</sub>	C <sub>m</sub>	C <sub>t</sub>	C <sub>L</sub>	M	fb	F'b	V	fv	F'v				
D Only	Length = 6.0 ft	1	0.120	0.099	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	145.53	1215.00	0.00	0.00	0.00	0.00	0.00	153.00
+D+Lr	Length = 6.0 ft	1	0.193	0.158	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	2.25	325.96	1687.50	1.17	33.65	212.50	0.00	0.00	0.00
+D+0.750Lr	Length = 6.0 ft	1	0.166	0.137	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.94	280.84	1687.50	1.01	29.01	212.50	0.00	0.00	0.00
+0.60D	Length = 6.0 ft	1	0.040	0.033	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.60	87.32	2160.00	0.32	9.05	272.00	0.00	0.00	0.00

## Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0231	2.956		0.0000	0.000

**Wood Beam**File: K063418 - 1369 North ADU\_Enercalc.ec6  
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DP ADVANCED ENGINEERING INC.

Lic. # : KW-06006640

DESCRIPTION: B2

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.476	1.316
Overall MINimum	0.820	0.740
D Only	0.656	0.576
+D+Lr	1.476	1.316
+D+0.750Lr	1.271	1.131
+0.60D	0.394	0.346
Lr Only	0.820	0.740

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# Wood Column

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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**DESCRIPTION:** 6x6 POST

## Code References

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
Load Combinations Used : IBC 2021

## General Information

Analysis Method	Allowable Stress Design			Wood Section Name	<b>6x6</b>
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber
Overall Column Height	9 ft			Wood Member Type	Sawn
<i>( Used for non-slender calculations )</i>					
Wood Species	Douglas Fir-Larch			Exact Width	<b>5.50</b> in
Wood Grade	No.2			Exact Depth	<b>5.50</b> in
Fb +	750.0 psi	Fv	170.0 psi	Area	30.250 in <sup>2</sup>
Fb -	750.0 psi	Ft	475.0 psi	Ix	76.255 in <sup>4</sup>
Fc - Prll	700.0 psi	Density	31.210 pcf	Iy	<b>76.255</b> in <sup>4</sup>
Fc - Perp	625.0 psi			Incising Factors :	
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial	for Bending	0.80
	Basic	1,300.0	1,300.0	for Elastic Modulus	0.95
	Minimum	470.0	470.0		
				Allow Stress Modification Factors	
				Cf or Cv for Bending	1.0
				Cf or Cv for Compression	1.0
				Cf or Cv for Tension	1.0
				Cm : Wet Use Factor	1.0
				Ct : Temperature Fact	1.0
				Cfu : Flat Use Factor	1.0
				Kf : Built-up columns	1.0 <i>NDS 15.3.2</i>
				Use Cr : Repetitive ?	No
Brace condition for deflection (buckling) along columns :					
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 9 ft, K					
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 9 ft, K					

## Applied Loads

Column self weight included : 59.006 lbs \* Dead Load Factor

AXIAL LOADS . . .

Axial Load at 9.0 ft, D = 0.660, Lr = 0.820 k

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

## DESIGN SUMMARY

### Bending & Shear Check Results

**PASS** Max. Axial+Bending Stress Ratio = **0.09102 : 1**

Load Combination	+D+Lr
Governing NDS Formula	Comp Only, $f_c/F_c'$
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	1.539 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	558.95 psi

**Maximum SERVICE Lateral Load Reactions . .**

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

**Maximum SERVICE Load Lateral Deflections . . .**

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination : n/a				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

**PASS** Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	9.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	217.60 psi

**Other Factors used to calculate allowable stresses . . .**  
Bending   Compression   Tension

## Load Combination Results

Load Combination	C <sub>D</sub>	C <sub>P</sub>	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.866	0.05444	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+Lr	1.250	0.799	0.09102	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr	1.250	0.799	0.07890	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D	1.600	0.728	0.02186	PASS	0.0 ft	0.0	PASS	9.0 ft

## Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					0.719				
+D+Lr					1.539				
+D+0.750Lr					1.334				

# Wood Column

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

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**DESCRIPTION:** 6x6 POST

## Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
+0.60D						0.431				
Lr Only						0.820				

## Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000ft	0.000 in	0.000 ft

## Sketches



## Concrete Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

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### DESCRIPTION: CENTER STIFFNER BEAM SPAN

### CODE REFERENCES

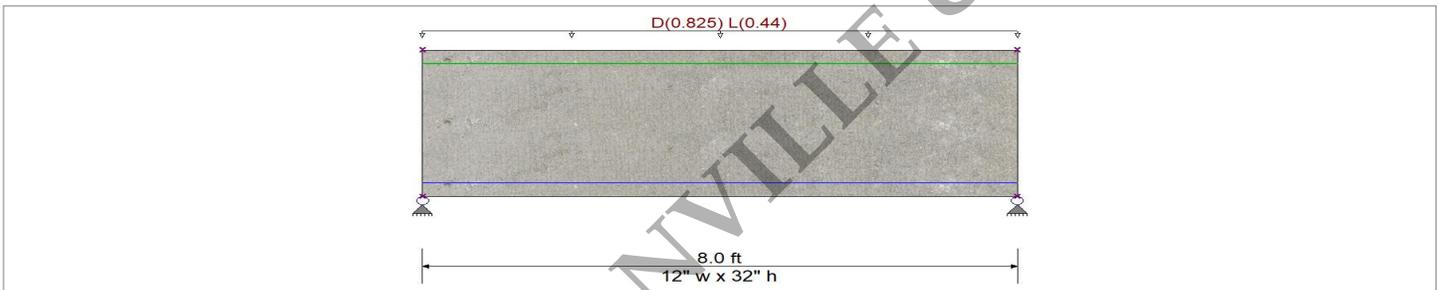
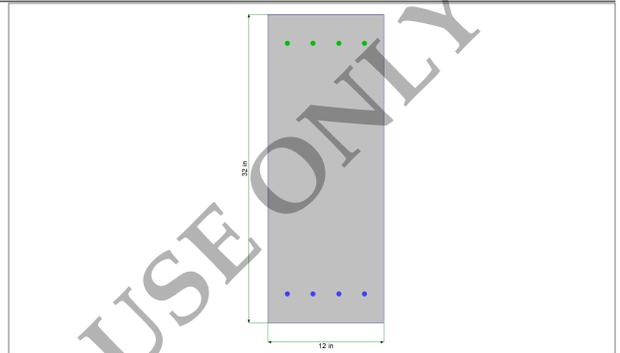
Calculations per ACI 318-19, IBC 2021, ASCE 7-16

Load Combination Set : IBC 2021

### General Information

$f'_c$	=	2.50 ksi	$\phi$ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} \cdot 7.50$	=	375.0 psi		Shear :	0.750
$\psi$ Density	=	145.0 pcf	$\beta_1$	=	0.850
$\lambda$ LtWt Factor	=	1.0	Fy - Stirrups	=	40.0 ksi
Elastic Modulus	=	3,122.0 ksi	E - Stirrups	=	29,000.0 ksi
$f_y$ - Main Rebar	=	60.0 ksi	Stirrup Bar Size #	=	3
E - Main Rebar	=	29,000.0 ksi	Number of Resisting Legs Per Stirrup	=	2

Seismic Design Category = A



### Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 32.0 in

Span #1 Reinforcing....

4-#4 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span

4-#4 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

### Beam self weight calculated and added to loads

#### Load for Span Number 1

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 11.0 ft, (FLOOR)

### DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.170 : 1	
Section used for this span	Typical Section	
Mu : Applied	17.264	k-ft
Mn * Phi : Allowable	101.666	k-ft
Location of maximum on span	3.993	ft
Span # where maximum occurs	Span # 1	

### Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0 < 360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 360.0	L Only
Max Downward Total Deflection	0.001 in	Ratio =	64540 >= 180.0	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180.0	Span: 1 : +D+L

### Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.607	6.607
Max Upward from Load Combinations	6.607	6.607
Max Upward from Load Cases	4.847	4.847
D Only	4.847	4.847
+D+L	6.607	6.607
+D+0.750L	6.167	6.167
+0.60D	2.908	2.908

# Concrete Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC#: KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

(c) ENERCALC INC 1983-2022

## DESCRIPTION: CENTER STIFFNER BEAM SPAN

### Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
L Only	1.760	1.760

### Detailed Shear Information

Load Combination	Span Number	Distance 'd'		Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
		(ft)	(in)	Actual	Design							
+1.20D+1.60L	1	0.00	29.00	8.63	8.63	0.00	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.09	29.00	8.44	8.44	0.75	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.17	29.00	8.25	8.25	1.48	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.26	29.00	8.07	8.07	2.19	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.35	29.00	7.88	7.88	2.89	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.44	29.00	7.69	7.69	3.57	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.52	29.00	7.50	7.50	4.23	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.61	29.00	7.31	7.31	4.88	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.70	29.00	7.12	7.12	5.51	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.79	29.00	6.93	6.93	6.12	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.87	29.00	6.75	6.75	6.72	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	0.96	29.00	6.56	6.56	7.30	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.05	29.00	6.37	6.37	7.87	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.14	29.00	6.18	6.18	8.42	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.22	29.00	5.99	5.99	8.95	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.31	29.00	5.80	5.80	9.46	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.40	29.00	5.61	5.61	9.96	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.49	29.00	5.42	5.42	10.45	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.57	29.00	5.24	5.24	10.91	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.66	29.00	5.05	5.05	11.36	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.75	29.00	4.86	4.86	11.79	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.84	29.00	4.67	4.67	12.21	0.92	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	1.92	29.00	4.48	4.48	12.61	0.86	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.01	29.00	4.29	4.29	13.00	0.80	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.10	29.00	4.10	4.10	13.36	0.74	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.19	29.00	3.92	3.92	13.71	0.69	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.27	29.00	3.73	3.73	14.05	0.64	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.36	29.00	3.54	3.54	14.36	0.60	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.45	29.00	3.35	3.35	14.67	0.55	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.54	29.00	3.16	3.16	14.95	0.51	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.62	29.00	2.97	2.97	15.22	0.47	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.71	29.00	2.78	2.78	15.47	0.43	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.80	29.00	2.59	2.59	15.70	0.40	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.89	29.00	2.41	2.41	15.92	0.37	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	2.97	29.00	2.22	2.22	16.13	0.33	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.06	29.00	2.03	2.03	16.31	0.30	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.15	29.00	1.84	1.84	16.48	0.27	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.23	29.00	1.65	1.65	16.63	0.24	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.32	29.00	1.46	1.46	16.77	0.21	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.41	29.00	1.27	1.27	16.89	0.18	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.50	29.00	1.08	1.08	16.99	0.15	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.58	29.00	0.90	0.90	17.08	0.13	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.67	29.00	0.71	0.71	17.15	0.10	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.76	29.00	0.52	0.52	17.20	0.07	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.85	29.00	0.33	0.33	17.24	0.05	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	3.93	29.00	0.14	0.14	17.26	0.02	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.02	29.00	-0.05	0.05	17.26	0.01	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.11	29.00	-0.24	0.24	17.25	0.03	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.20	29.00	-0.42	0.42	17.22	0.06	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.28	29.00	-0.61	0.61	17.18	0.09	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.37	29.00	-0.80	0.80	17.12	0.11	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.46	29.00	-0.99	0.99	17.04	0.14	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.55	29.00	-1.18	1.18	16.94	0.17	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.63	29.00	-1.37	1.37	16.83	0.20	9.87	Vu <= Phi*lambda	9.9	9.9	0.0

# Concrete Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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## DESCRIPTION: CENTER STIFFNER BEAM SPAN

### Detailed Shear Information

Load Combination	Span Number	Distance 'd'		Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
		(ft)	(in)	Actual	Design							
+1.20D+1.60L	1	4.72	29.00	-1.56	1.56	16.70	0.23	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.81	29.00	-1.75	1.75	16.56	0.25	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.90	29.00	-1.93	1.93	16.40	0.29	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	4.98	29.00	-2.12	2.12	16.22	0.32	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.07	29.00	-2.31	2.31	16.03	0.35	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.16	29.00	-2.50	2.50	15.82	0.38	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.25	29.00	-2.69	2.69	15.59	0.42	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.33	29.00	-2.88	2.88	15.35	0.45	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.42	29.00	-3.07	3.07	15.09	0.49	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.51	29.00	-3.25	3.25	14.81	0.53	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.60	29.00	-3.44	3.44	14.52	0.57	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.68	29.00	-3.63	3.63	14.21	0.62	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.77	29.00	-3.82	3.82	13.88	0.67	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.86	29.00	-4.01	4.01	13.54	0.72	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	5.95	29.00	-4.20	4.20	13.18	0.77	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.03	29.00	-4.39	4.39	12.81	0.83	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.12	29.00	-4.58	4.58	12.41	0.89	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.21	29.00	-4.76	4.76	12.01	0.96	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.30	29.00	-4.95	4.95	11.58	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.38	29.00	-5.14	5.14	11.14	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.47	29.00	-5.33	5.33	10.68	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.56	29.00	-5.52	5.52	10.21	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.64	29.00	-5.71	5.71	9.72	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.73	29.00	-5.90	5.90	9.21	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.82	29.00	-6.08	6.08	8.69	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.91	29.00	-6.27	6.27	8.15	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	6.99	29.00	-6.46	6.46	7.59	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.08	29.00	-6.65	6.65	7.02	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.17	29.00	-6.84	6.84	6.43	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.26	29.00	-7.03	7.03	5.82	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.34	29.00	-7.22	7.22	5.20	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.43	29.00	-7.41	7.41	4.56	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.52	29.00	-7.59	7.59	3.90	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.61	29.00	-7.78	7.78	3.23	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.69	29.00	-7.97	7.97	2.54	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.78	29.00	-8.16	8.16	1.84	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.87	29.00	-8.35	8.35	1.11	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0
+1.20D+1.60L	1	7.96	29.00	-8.54	8.54	0.38	1.00	9.87	Vu <= Phi*lambda	9.9	9.9	0.0

### Maximum Forces & Stresses for Load Combinations

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
			Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	8.000	17.26	101.67	0.17
+1.40D					
Span # 1	1	8.000	13.57	101.67	0.13
+1.20D+1.60L					
Span # 1	1	8.000	17.26	101.67	0.17
+1.20D+0.50L					
Span # 1	1	8.000	13.39	101.67	0.13
+1.20D					
Span # 1	1	8.000	11.63	101.67	0.11
+0.90D					
Span # 1	1	8.000	8.72	101.67	0.09

### Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0015	4.000		0.0000	0.000

## Concrete Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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### DESCRIPTION: CANTILEVER EDGE STIFFNER BEAM

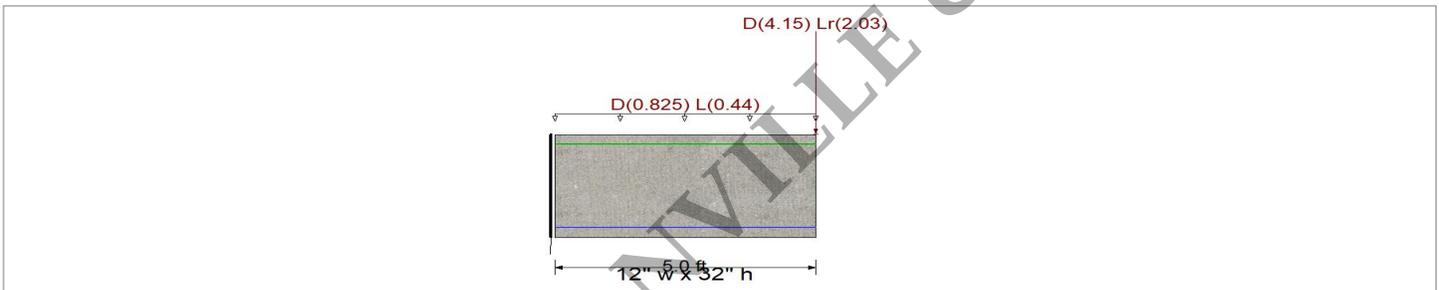
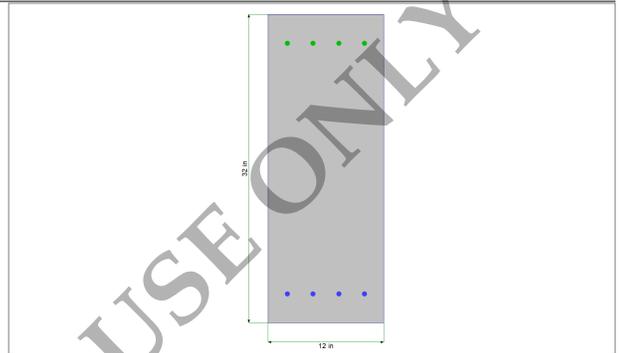
### CODE REFERENCES

Calculations per ACI 318-19, IBC 2021, ASCE 7-16

Load Combination Set : IBC 2021

### General Information

$f'_c$	=	2.50 ksi	$\phi$ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} \cdot 7.50$	=	375.0 psi		Shear :	0.750
$\psi$ Density	=	145.0 pcf	$\beta_1$	=	0.850
$\lambda$ LtWt Factor	=	1.0	Fy - Stirrups	=	40.0 ksi
Elastic Modulus	=	3,122.0 ksi	E - Stirrups	=	29,000.0 ksi
$f_y$ - Main Rebar	=	60.0 ksi	Stirrup Bar Size #	=	3
E - Main Rebar	=	29,000.0 ksi	Number of Resisting Legs Per Stirrup	=	2
Seismic Design Category	=	A			



### Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 32.0 in

Span #1 Reinforcing....

4-#4 at 3.0 in from Bottom, from 0.0 to 5.0 ft in this span

4-#4 at 3.0 in from Top, from 0.0 to 5.0 ft in this span

### Beam self weight calculated and added to loads

#### Load for Span Number 1

Uniform Load :  $D = 0.0750$ ,  $L = 0.040$  ksf, Tributary Width = 11.0 ft, (FLOOR)

Point Load :  $D = 4.150$ ,  $L_r = 2.030$  k @ 5.0 ft, (PL FROM EDGE BEAM)

### DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	<b>0.610</b> : 1
Section used for this span	<b>Typical Section</b>
Mu : Applied	-62.058 k-ft
Mn * Phi : Allowable	101.666 k-ft
Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1

### Maximum Deflection

Max Downward Transient Deflection	0.001 in	Ratio = 84008	>=360.0	Lr Only
Max Upward Transient Deflection	0.000 in	Ratio = 0	<360.0	Lr Only
Max Downward Total Deflection	0.006 in	Ratio = 19912	>=180.0	Span: 1 : +D+0.750Lr+0.750L
Max Upward Total Deflection	0.000 in	Ratio = 0	<180.0	Span: 1 : +D+0.750Lr+0.750L

### Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	13.381	
Max Upward from Load Combinations	13.381	
Max Upward from Load Cases	10.208	
D Only	10.208	
+D+L	12.408	
+D+Lr	12.238	

# Concrete Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

(c) ENERCALC INC 1983-2022

## DESCRIPTION: CANTILEVER EDGE STIFFNER BEAM

### Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L	13.381	
+D+0.750L	11.858	
+0.60D	6.125	
Lr Only	2.030	
L Only	2.200	

### Detailed Shear Information

Load Combination	Span Number	Distance 'd' (ft)	(in)	Vu Actual	(k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
+1.20D+0.50Lr+1.60L	1	0.00	29.00	16.78	16.78	56.95	0.71	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.05	29.00	16.67	16.67	56.03	0.72	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.11	29.00	16.55	16.55	55.12	0.73	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.16	29.00	16.43	16.43	54.22	0.73	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.22	29.00	16.31	16.31	53.33	0.74	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.27	29.00	16.20	16.20	52.44	0.75	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.33	29.00	16.08	16.08	51.56	0.75	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+0.50Lr+1.60L	1	0.38	29.00	15.96	15.96	50.68	0.76	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.44	29.00	15.87	15.87	54.96	0.70	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.49	29.00	15.77	15.77	54.10	0.70	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.55	29.00	15.68	15.68	53.24	0.71	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.60	29.00	15.59	15.59	52.38	0.72	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.66	29.00	15.50	15.50	51.53	0.73	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.71	29.00	15.41	15.41	50.69	0.73	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.77	29.00	15.32	15.32	49.85	0.74	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.82	29.00	15.23	15.23	49.02	0.75	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.87	29.00	15.13	15.13	48.19	0.76	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.93	29.00	15.04	15.04	47.36	0.77	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	0.98	29.00	14.95	14.95	46.54	0.78	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.04	29.00	14.86	14.86	45.73	0.79	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.09	29.00	14.77	14.77	44.92	0.79	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.15	29.00	14.68	14.68	44.11	0.80	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.20	29.00	14.59	14.59	43.31	0.81	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.26	29.00	14.49	14.49	42.52	0.82	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.31	29.00	14.40	14.40	41.73	0.83	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.37	29.00	14.31	14.31	40.95	0.84	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.42	29.00	14.22	14.22	40.17	0.86	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.48	29.00	14.13	14.13	39.39	0.87	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.53	29.00	14.04	14.04	38.62	0.88	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.58	29.00	13.95	13.95	37.86	0.89	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.64	29.00	13.85	13.85	37.10	0.90	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.69	29.00	13.76	13.76	36.34	0.92	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.75	29.00	13.67	13.67	35.59	0.93	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.80	29.00	13.58	13.58	34.85	0.94	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.86	29.00	13.49	13.49	34.11	0.96	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.91	29.00	13.40	13.40	33.38	0.97	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	1.97	29.00	13.30	13.30	32.65	0.98	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	2.02	29.00	13.21	13.21	31.92	1.00	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	2.08	29.00	13.12	13.12	31.20	1.00	26.10	Phi*lambda*sqrt ln per 9.6.:	39.8		14.5
+1.20D+1.60Lr+0.50L	1	2.13	29.00	13.03	13.03	30.49	1.00	9.87	Phi*Vc < Vu	3.163	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.19	29.00	12.94	12.94	29.78	1.00	9.87	Phi*Vc < Vu	3.072	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.24	29.00	12.85	12.85	29.07	1.00	9.87	Phi*Vc < Vu	2.980	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.30	29.00	12.76	12.76	28.37	1.00	9.87	Phi*Vc < Vu	2.889	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.35	29.00	12.66	12.66	27.68	1.00	9.87	Phi*Vc < Vu	2.798	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.40	29.00	12.57	12.57	26.99	1.00	9.87	Phi*Vc < Vu	2.706	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.46	29.00	12.48	12.48	26.30	1.00	9.87	Phi*Vc < Vu	2.615	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.51	29.00	12.39	12.39	25.62	1.00	9.87	Phi*Vc < Vu	2.523	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.57	29.00	12.30	12.30	24.95	1.00	9.87	Phi*Vc < Vu	2.432	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.62	29.00	12.21	12.21	24.28	1.00	9.87	Phi*Vc < Vu	2.340	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.68	29.00	12.12	12.12	23.62	1.00	9.87	Phi*Vc < Vu	2.249	23.5	14.5

# Concrete Beam

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC#: KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

(c) ENERCALC INC 1983-2022

## DESCRIPTION: CANTILEVER EDGE STIFFNER BEAM

### Detailed Shear Information

Load Combination	Span Number	Distance 'd'		Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
		(ft)	(in)	Actual	Design							
+1.20D+1.60Lr+0.50L	1	2.73	29.00	12.02	12.02	22.96	1.00	9.87	Phi*Vc < Vu	2.157	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.79	29.00	11.93	11.93	22.30	1.00	9.87	Phi*Vc < Vu	2.066	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.84	29.00	11.84	11.84	21.65	1.00	9.87	Phi*Vc < Vu	1.974	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.90	29.00	11.75	11.75	21.01	1.00	9.87	Phi*Vc < Vu	1.883	23.5	14.5
+1.20D+1.60Lr+0.50L	1	2.95	29.00	11.66	11.66	20.37	1.00	9.87	Phi*Vc < Vu	1.791	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.01	29.00	11.57	11.57	19.73	1.00	9.87	Phi*Vc < Vu	1.70	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.06	29.00	11.48	11.48	19.10	1.00	9.87	Phi*Vc < Vu	1.608	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.11	29.00	11.38	11.38	18.48	1.00	9.87	Phi*Vc < Vu	1.517	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.17	29.00	11.29	11.29	17.86	1.00	9.87	Phi*Vc < Vu	1.425	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.22	29.00	11.20	11.20	17.25	1.00	9.87	Phi*Vc < Vu	1.334	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.28	29.00	11.11	11.11	16.64	1.00	9.87	Phi*Vc < Vu	1.242	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.33	29.00	11.02	11.02	16.03	1.00	9.87	Phi*Vc < Vu	1.151	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.39	29.00	10.93	10.93	15.43	1.00	9.87	Phi*Vc < Vu	1.059	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.44	29.00	10.84	10.84	14.84	1.00	9.87	Phi*Vc < Vu	0.9680	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.50	29.00	10.74	10.74	14.25	1.00	9.87	Phi*Vc < Vu	0.8765	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.55	29.00	10.65	10.65	13.66	1.00	9.87	Phi*Vc < Vu	0.7851	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.61	29.00	10.56	10.56	13.08	1.00	9.87	Phi*Vc < Vu	0.6936	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.66	29.00	10.47	10.47	12.51	1.00	9.87	Phi*Vc < Vu	0.6021	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.72	29.00	10.38	10.38	11.94	1.00	9.87	Phi*Vc < Vu	0.5106	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.77	29.00	10.29	10.29	11.37	1.00	9.87	Phi*Vc < Vu	0.4192	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.83	29.00	10.19	10.19	10.82	1.00	9.87	Phi*Vc < Vu	0.3277	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.88	29.00	10.10	10.10	10.26	1.00	9.87	Phi*Vc < Vu	0.2362	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.93	29.00	10.01	10.01	9.71	1.00	9.87	Phi*Vc < Vu	0.1447	23.5	14.5
+1.20D+1.60Lr+0.50L	1	3.99	29.00	9.92	9.92	9.17	1.00	9.87	Phi*Vc < Vu	0.05326	23.5	14.5
+1.20D+1.60Lr+0.50L	1	4.04	29.00	9.83	9.83	8.63	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.10	29.00	9.74	9.74	8.09	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.15	29.00	9.65	9.65	7.56	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.21	29.00	9.55	9.55	7.04	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.26	29.00	9.46	9.46	6.52	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.32	29.00	9.37	9.37	6.00	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.37	29.00	9.28	9.28	5.49	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.43	29.00	9.19	9.19	4.99	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.48	29.00	9.10	9.10	4.49	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.54	29.00	9.01	9.01	4.00	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.59	29.00	8.91	8.91	3.51	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.64	29.00	8.82	8.82	3.02	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.70	29.00	8.73	8.73	2.54	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.75	29.00	8.64	8.64	2.07	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.81	29.00	8.55	8.55	1.60	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.86	29.00	8.46	8.46	1.13	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.92	29.00	8.37	8.37	0.67	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0
+1.20D+1.60Lr+0.50L	1	4.97	29.00	8.27	8.27	0.22	1.00	9.87	Vu <= Phi*lambda*t Req'd per		9.9	0.0

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
				Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope						
+1.40D	Span # 1	1	5.000	-62.06	101.67	0.61
+1.20D+0.50Lr+1.60L	Span # 1	1	5.000	-50.25	101.67	0.49
+1.20D+1.60L	Span # 1	1	5.000	-56.95	101.67	0.56
+1.20D+1.60Lr+0.50L	Span # 1	1	5.000	-51.87	101.67	0.51
+1.20D+1.60Lr	Span # 1	1	5.000	-62.06	101.67	0.61
+1.20D+0.50L	Span # 1	1	5.000	-59.31	101.67	0.58
	Span # 1	1	5.000	-45.82	101.67	0.45

**Concrete Beam**

Project File: G010120 - Danville ADU\_Enercalc.ec6

LIC# : KW-06015505, Build:20.23.2.14

DP ADVANCED ENGINEERING INC.

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**DESCRIPTION: CANTILEVER EDGE STIFFNER BEAM**

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results ( k-ft )		
			Mu : Max	Phi*Mnx	Stress Ratio
+1.20D Span # 1	1	5.000	-43.07	101.67	0.42
+1.20D+0.50Lr+0.50L Span # 1	1	5.000	-50.90	101.67	0.50
+0.90D Span # 1	1	5.000	-32.30	101.67	0.32

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750Lr+0.750L	1	0.0060	5.000		0.0000	0.000

TOWN OF DANVILLE USE ONLY



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**SPREAD FOOTING FOUNDATION ANALYSIS:**

<u>Allowable Stress:</u>	<u>Footing Reinf:</u>	
fy (ksi): 60	(2) #4 in Top	As used: 0.4
f'c (psi): 2500	(2) #4 in Bottom	

<b>Grid Line:</b>	<b>1</b>	<b>2</b>	<b>A</b>	<b>B</b>
<b><u>Footing Design Criteria:</u></b>				
Allow. Bearing Pres. (psf):	1000	1000	1000	1000
Footing Width (in):	12	12	12	12
Footing Depth (in):	18	18	18	18
Unsupported Length (ft):	5.0	5.0	5.0	5.0
<b><u>Uniform Loads:</u></b>				
Roof Trib (ft)	7.0	10.0	1.0	1.0
Roof DL (psf)	25.0	25.0	25.0	25.0
Roof LL (psf)	20.0	20.0	20.0	20.0
Floor Trib (ft)	0.0	0.0	0.0	0.0
Floor DL (psf)	5.0	5.0	5.0	5.0
Floor LL (psf)	40.0	40.0	40.0	40.0
Lower Floor Trib (ft)	0.0	0.0	0.0	0.0
Lower Floor DL (psf)	5.0	5.0	5.0	5.0
Lower Floor LL (psf)	40.0	40.0	40.0	40.0
Deck Trib (ft)	0.0	0.0	0.0	0.0
Deck DL (psf)	14.0	14.0	14.0	14.0
Deck LL (psf)	60.0	60.0	60.0	60.0
Wall Trib (ft)	8.1	8.1	14.5	14.5
Wall DL (psf)	17.0	17.0	17.0	17.0
<b>TOTAL DL (plf):</b>	<b>537</b>	<b>612</b>	<b>496</b>	<b>496</b>
<b>TOTAL Lr (plf):</b>	<b>140</b>	<b>200</b>	<b>20</b>	<b>20</b>
<b>TOTAL LL (plf):</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b><u>Point Load:</u></b>				
Max. Point DL (lbs)	0	0	0	0
Max. Point Lr (lbs)	0	0	0	0
Max. Point LL (lbs)	0	0	0	0
Max. HD Load (lbs)	2364	4376	2196	3384
<b><u>Soil Analysis:</u></b>				
q (psf):	452	766	384	592
q/ q <sub>ALLOW</sub> :	0.45	0.77	0.38	0.59
<b>M<sub>max</sub> (ft-lb):</b>	3737 ft-lb	5839 ft-lb	3464 ft-lb	4580 ft-lb
<b>V<sub>max</sub> (lb):</b>	2172 lbs	3026 lbs	1945 lbs	2392 lbs
<b>Allowable M<sub>max</sub> (ft-lb):</b>	25253 ft-lb	25253 ft-lb	25253 ft-lb	25253 ft-lb
<b>Allowable V<sub>max</sub> (lb):</b>	7395 lbs	7395 lbs	7395 lbs	7395 lbs
Footing A(s) req'd:	0.40	0.40	0.40	0.40
	<b>O.K.</b>	<b>O.K.</b>	<b>O.K.</b>	<b>O.K.</b>



**PROJECT:** Town of Danville ADU

**CLIENT:** Town of Danville

**JOB NO.:** G010120

**CALCS BY:** J. Peek

**DATE:** 3/24/2023

**PIER AND GRADE BEAM FOUNDATION ANALYSIS:**

<u>Allowable Stress:</u>		<u>Grade Beam Reinf:</u>	
fy (ksi):	60	(2) #5 in Top	As used: 0.61
f'c (psi):	2500	(2) #5 in Bottom	

<b>Grid Line:</b>	<b>1</b>	<b>2</b>	<b>A</b>	<b>B</b>
<b>Pier Design Criteria:</b>				
Allow. Skin Friction (psf):	250	250	250	250
Pier Diameter (in):	16	16	16	16
Neglect Pier Depth (ft):	2	2	2	2
<b>Grade Beam Design Criteria:</b>				
Grade Beam Width (in):	12	12	12	12
Grade Beam Depth (in):	18	18	18	18
Grade Beam Span (ft):	12.0	12.0	13.5	13.5
<b>Uniform Loads:</b>				
Roof Trib (ft)	7.0	10.0	1.0	1.0
Roof DL (psf)	25.0	25.0	25.0	25.0
Roof LL (psf)	20.0	20.0	20.0	20.0
Floor Trib (ft)	0.0	0.0	0.0	0.0
Floor DL (psf)	5.0	5.0	5.0	5.0
Floor LL (psf)	40.0	40.0	40.0	40.0
Lower Floor Trib (ft)	0.0	0.0	0.0	0.0
Lower Floor DL (psf)	5.0	5.0	5.0	5.0
Lower Floor LL (psf)	40.0	40.0	40.0	40.0
Deck Trib (ft)	0.0	0.0	0.0	0.0
Deck DL (psf)	14.0	14.0	14.0	14.0
Deck LL (psf)	60.0	60.0	60.0	60.0
Wall Trib (ft)	8.1	8.1	14.0	14.0
Wall DL (psf)	17.0	17.0	17.0	17.0
<b>TOTAL DL (plf):</b>	<b>537</b>	<b>612</b>	<b>488</b>	<b>488</b>
<b>TOTAL Lr (plf):</b>	<b>140</b>	<b>200</b>	<b>20</b>	<b>20</b>
<b>TOTAL LL (plf):</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Point Load:</b>				
Max. Point DL (lbs)	0	0	0	0
Max. Point Lr (lbs)	0	0	0	0
Max. Point LL (lbs)	0	0	0	0
Max. HD Load (lbs)	2364	4376	2196	3384
<b>Grade Beam Analysis:</b>				
<b>M<sub>max</sub> (ft-lb):</b>	15636 ft-lb	19813 ft-lb	15603 ft-lb	18617 ft-lb
<b>V<sub>max</sub> (lb):</b>	5212 lbs	6328 lbs	4611 lbs	4611 lbs
<b>Allowable M<sub>max</sub> (ft-lb):</b>	37833 ft-lb	37833 ft-lb	37833 ft-lb	37833 ft-lb
<b>Allowable V<sub>max</sub> (lb):</b>	7395 lbs	7395 lbs	7395 lbs	7395 lbs
Grade Beam A(s) req'd:	0.61	0.61	0.61	0.61
	<b>O.K.</b>	<b>O.K.</b>	<b>O.K.</b>	<b>O.K.</b>
<b>Pier Analysis:</b>				
Design Pier Load (lbs):	8127	9746	6858	6858
Req'd Pier Depth (ft)	9.76	11.31	8.55	8.55
<b>Use Pier Depth (ft):</b>	<b>10</b>	<b>12</b>	<b>9</b>	<b>9</b>