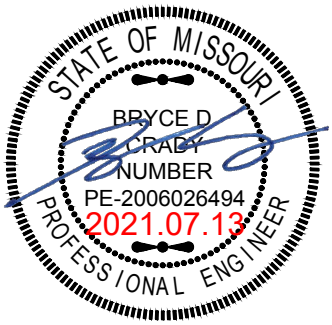
Structural Design Calculations

For

Chapel Ridge Townhomes

Fairway Village Lot 15C

Lee's Summit, MO



07.12.2021

Architect: Davidson Architecture & Engineering

PH 816 421-3222 1625 Locust Street | Kansas City, MO 64108 apex-engineers.com

Apex Engineers, Inc.
1625 Locust Street
Kansas City, Missori 64108
www.apex-engineers.com

Project Title: Chapel Ridge 4-plex and 5-plex
Engineer:
Project ID: 25738
Project Descr:

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Steel Beam

File: chapel ridge 4 plex.ec6

Lic. # : KW-06005244
APEX ENGINEERS INC

DESCRIPTION: Middle Units Garage Steel

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE7-05

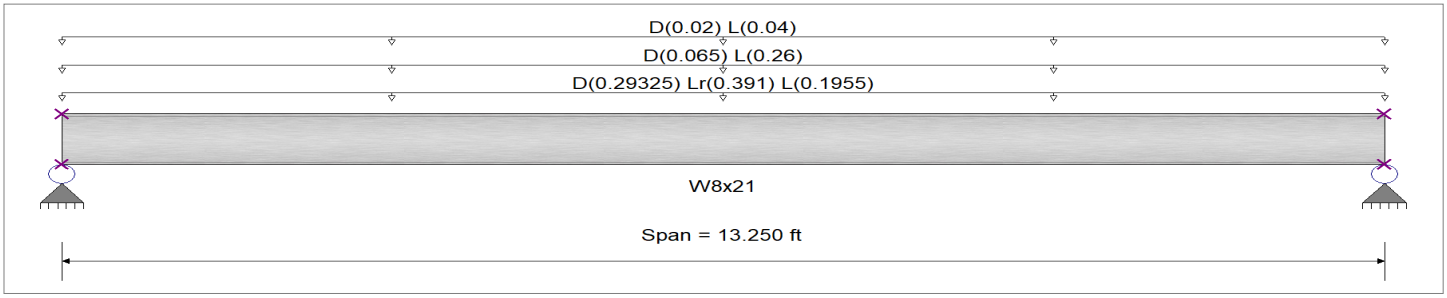
Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	36.0 ksi
Beam Bracing :	Beam bracing is defined as a set spacing over all spans	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Unbraced Lengths

Note : User has selected to conside

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, Lr = 0.020, L = 0.010 ksf, Tributary Width = 19.550 ft, (roof)

Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 6.50 ft, (floor)

Uniform Load : D = 0.0050, L = 0.010 ksf, Tributary Width = 4.0 ft, (ceiling)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.813 : 1	Maximum Shear Stress Ratio =	0.237 : 1
Section used for this span	W8x21	Section used for this span	W8x21
Ma : Applied	23.353 k-ft	Va : Applied	7.050 k
Mn / Omega : Allowable	28.735 k-ft	Vn/Omega : Allowable	29.808 k
Load Combination	+D+0.750Lr+0.750L	Load Combination	+D+0.750Lr+0.750L
Location of maximum on span	6.625 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	0.158 in	Ratio =	1,005 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.339 in	Ratio =	468 >=360.
Max Upward Total Deflection	0.000 in	Ratio =	0 <360.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 13.25 ft	1	0.305	0.089	8.76		8.76	47.99	28.73	1.00	1.00	2.65	44.71	29.81
+D+L													
Dsgn. L = 13.25 ft	1	0.683	0.199	19.64		19.64	47.99	28.73	1.00	1.00	5.93	44.71	29.81
+D+Lr													
Dsgn. L = 13.25 ft	1	0.604	0.176	17.34		17.34	47.99	28.73	1.00	1.00	5.24	44.71	29.81
+D+S													
Dsgn. L = 13.25 ft	1	0.305	0.089	8.76		8.76	47.99	28.73	1.00	1.00	2.65	44.71	29.81
+D+0.750Lr+0.750L													
Dsgn. L = 13.25 ft	1	0.813	0.237	23.35		23.35	47.99	28.73	1.00	1.00	7.05	44.71	29.81
+D+0.750L+0.750S													
Dsgn. L = 13.25 ft	1	0.589	0.171	16.92		16.92	47.99	28.73	1.00	1.00	5.11	44.71	29.81
+D+W													
Dsgn. L = 13.25 ft	1	0.305	0.089	8.76		8.76	47.99	28.73	1.00	1.00	2.65	44.71	29.81
+D+0.70E													

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Steel Beam

File: chapel ridge 4 plex.ec6

Lic. # : KW-06005244
APEX ENGINEERS INC

DESCRIPTION: Middle Units Garage Steel

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 13.25 ft +D+0.750Lr+0.750L+0.750W	1	0.305	0.089	8.76		8.76	47.99	28.73	1.00	1.00	2.65	44.71	29.81
Dsgn. L = 13.25 ft +D+0.750L+0.750S+0.750W	1	0.813	0.237	23.35		23.35	47.99	28.73	1.00	1.00	7.05	44.71	29.81
Dsgn. L = 13.25 ft +D+0.750Lr+0.750L+0.5250E	1	0.589	0.171	16.92		16.92	47.99	28.73	1.00	1.00	5.11	44.71	29.81
Dsgn. L = 13.25 ft +D+0.750L+0.750S+0.5250E	1	0.813	0.237	23.35		23.35	47.99	28.73	1.00	1.00	7.05	44.71	29.81
Dsgn. L = 13.25 ft +0.60D+W	1	0.589	0.171	16.92		16.92	47.99	28.73	1.00	1.00	5.11	44.71	29.81
Dsgn. L = 13.25 ft +0.60D+0.70E	1	0.183	0.053	5.26		5.26	47.99	28.73	1.00	1.00	1.59	44.71	29.81
Dsgn. L = 13.25 ft	1	0.183	0.053	5.26		5.26	47.99	28.73	1.00	1.00	1.59	44.71	29.81

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+0.5250E	1	0.3395	6.663		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.050	7.050
Overall MINimum	1.587	1.587
D Only	2.645	2.645
+D+L	5.928	5.928
+D+Lr	5.235	5.235
+D+S	2.645	2.645
+D+0.750Lr+0.750L	7.050	7.050
+D+0.750L+0.750S	5.107	5.107
+D+W	2.645	2.645
+D+0.70E	2.645	2.645
+D+0.750Lr+0.750L+0.750W	7.050	7.050
+D+0.750L+0.750S+0.750W	5.107	5.107
+D+0.750Lr+0.750L+0.5250E	7.050	7.050
+D+0.750L+0.750S+0.5250E	5.107	5.107
+0.60D+W	1.587	1.587
+0.60D+0.70E	1.587	1.587
D Only	2.645	2.645
Lr Only	2.590	2.590
L Only	3.283	3.283
H Only		

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Steel Beam

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Lic. # : KW-06005244
APEX ENGINEERS INC

DESCRIPTION: End Units Garage Steel

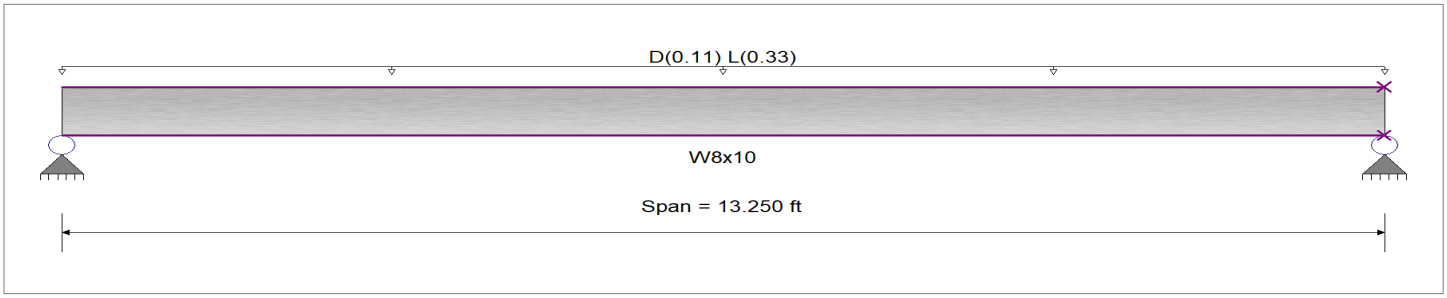
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.110, L = 0.330 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.620 : 1	Maximum Shear Stress Ratio =	0.154 : 1
Section used for this span	W8x10	Section used for this span	W8x10
Ma : Applied	9.875 k-ft	Va : Applied	2.981 k
Mn / Omega : Allowable	15.934 k-ft	Vn/Omega : Allowable	19.315 k
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span	6.625 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	0.257 in	Ratio =	617 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.351 in	Ratio =	453 >=360.
Max Upward Total Deflection	0.000 in	Ratio =	0 <360.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 13.25 ft	1	0.165	0.041	2.63		2.63	26.61	15.93	1.00	1.00	0.80	28.97	19.31
+D+L													
Dsgn. L = 13.25 ft	1	0.620	0.154	9.88		9.88	26.61	15.93	1.00	1.00	2.98	28.97	19.31
+D+0.750L													
Dsgn. L = 13.25 ft	1	0.506	0.126	8.06		8.06	26.61	15.93	1.00	1.00	2.43	28.97	19.31
+0.60D													
Dsgn. L = 13.25 ft	1	0.099	0.025	1.58		1.58	26.61	15.93	1.00	1.00	0.48	28.97	19.31

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3510	6.663		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.981	2.981
Overall MINimum	0.477	0.477
D Only	0.795	0.795
+D+L	2.981	2.981
+D+0.750L	2.435	2.435
+0.60D	0.477	0.477
L Only	2.186	2.186

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Steel Beam

File: chapel ridge 4 plex.ec6

Lic. # : KW-06005244
APEX ENGINEERS INC

DESCRIPTION: Steel Joist Girder - Controlling Span

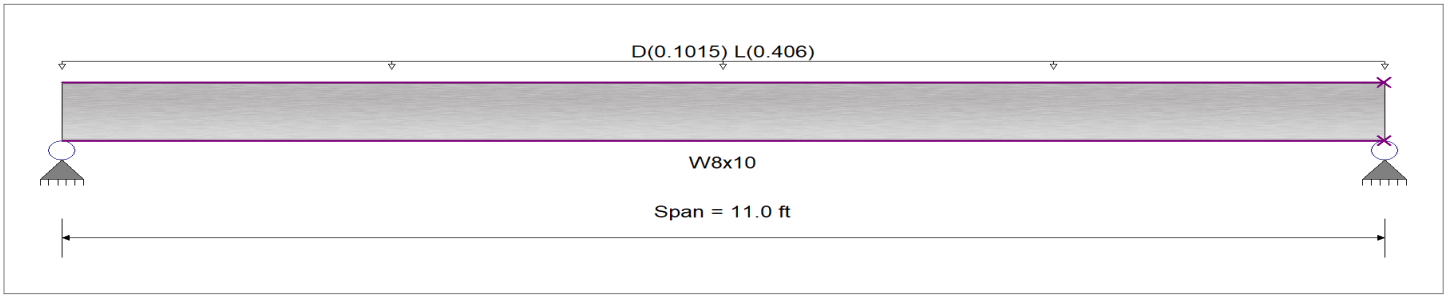
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 10.150 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.491 : 1	Maximum Shear Stress Ratio =	0.147 : 1
Section used for this span	W8x10	Section used for this span	W8x10
Ma : Applied	7.827 k-ft	Va : Applied	2.846 k
Mn / Omega : Allowable	15.934 k-ft	Vn/Omega : Allowable	19.315 k
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span	5.500 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	0.150 in	Ratio =	877 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.192 in	Ratio =	688 >=360.
Max Upward Total Deflection	0.000 in	Ratio =	0 <360.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 11.00 ft	1	0.106	0.032	1.69		1.69	26.61	15.93	1.00	1.00	0.61	28.97	19.31
+D+L													
Dsgn. L = 11.00 ft	1	0.491	0.147	7.83		7.83	26.61	15.93	1.00	1.00	2.85	28.97	19.31
+D+0.750L													
Dsgn. L = 11.00 ft	1	0.395	0.118	6.29		6.29	26.61	15.93	1.00	1.00	2.29	28.97	19.31
+0.60D													
Dsgn. L = 11.00 ft	1	0.064	0.019	1.01		1.01	26.61	15.93	1.00	1.00	0.37	28.97	19.31

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1917	5.531		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.846	2.846
Overall MINimum	0.368	0.368
D Only	0.613	0.613
+D+L	2.846	2.846
+D+0.750L	2.288	2.288
+0.60D	0.368	0.368
L Only	2.233	2.233

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Steel Beam

File: chapel ridge 4 plex.ec6

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APEX ENGINEERS INC

DESCRIPTION: Continuous Steel Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE7-05

Material Properties

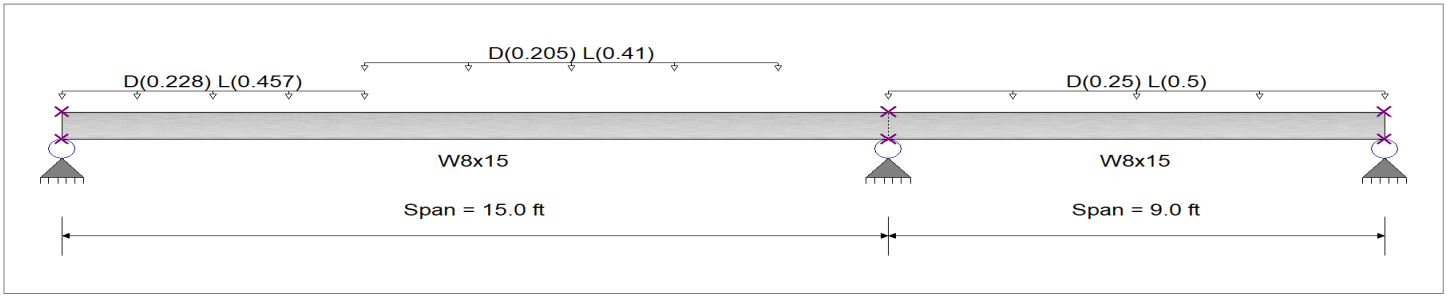
Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Note : User has selected to conside

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = ft



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.2280, L = 0.4570 k/ft, Extent = 0.0 -->> 5.50 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.2050, L = 0.410 k/ft, Extent = 5.50 -->> 13.0 ft, Tributary Width = 1.0 ft

Load for Span Number 2
Uniform Load : D = 0.250, L = 0.50 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.812 : 1	Maximum Shear Stress Ratio =	0.173 : 1
Section used for this span	W8x15	Section used for this span	W8x15
Ma : Applied	12.466 k-ft	Va : Applied	4.956 k
Mn / Omega : Allowable	15.354 k-ft	Vn/Omega : Allowable	28.612 k
Load Combination	+D+L, LL Comb Run (L*)	Load Combination	+D+L, LL Comb Run (LL)
Location of maximum on span	6.000 ft	Location of maximum on span	15.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.215 in	Ratio =	838 >=360
Max Upward Transient Deflection	-0.045 in	Ratio =	2,378 >=360
Max Downward Total Deflection	0.313 in	Ratio =	576 >=360.
Max Upward Total Deflection	-0.049 in	Ratio =	2187 >=360.

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+L, LL Comb Run (*L)													
Dsgn. L = 10.86 ft	1	0.200	0.045	3.39	-0.07	3.39	28.25	16.92	1.00	1.00	1.28	42.92	28.61
Dsgn. L = 4.14 ft	1	0.278	0.146	-0.00	-6.65	6.65	39.94	23.92	1.00	1.00	4.18	42.92	28.61
Dsgn. L = 1.91 ft	2	0.272	0.146	-0.00	-6.65	6.65	40.80	24.43	1.00	1.00	4.18	42.92	28.61
Dsgn. L = 7.09 ft	2	0.229	0.095	4.78	-0.06	4.78	34.81	20.84	1.00	1.00	2.72	42.92	28.61
+D+L, LL Comb Run (L*)													
Dsgn. L = 12.36 ft	1	0.812	0.146	12.47	-0.21	12.47	25.64	15.35	1.00	1.00	4.18	42.92	28.61
Dsgn. L = 2.64 ft	1	0.480	0.155	-0.00	-11.72	11.72	40.80	24.43	1.00	1.00	4.43	42.92	28.61

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APEX ENGINEERS INC

DESCRIPTION: Continuous Steel Beam

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 9.00 ft	2	0.622	0.087		-11.72	11.72	31.49	18.85	1.00	1.00	2.49	42.92	28.61
+D+L, LL Comb Run (LL)													
Dsgn. L = 11.94 ft	1	0.742	0.142	11.72	-0.09	11.72	26.37	15.79	1.00	1.00	4.05	42.92	28.61
Dsgn. L = 3.06 ft	1	0.557	0.173	-0.00	-13.62	13.62	40.80	24.43	1.00	1.00	4.96	42.92	28.61
Dsgn. L = 3.96 ft	2	0.565	0.173	0.01	-13.62	13.62	40.25	24.10	1.00	1.00	4.96	42.92	28.61
Dsgn. L = 5.04 ft	2	0.106	0.067	2.43		2.43	38.38	22.98	1.00	1.00	1.93	42.92	28.61
+D+Lr, LL Comb Run (*L)													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+Lr, LL Comb Run (L*)													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+Lr, LL Comb Run (LL)													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+S													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+0.750Lr+0.750L, LL Comb Run (*L)													
Dsgn. L = 11.10 ft	1	0.213	0.046	3.55	-0.02	3.55	27.83	16.67	1.00	1.00	1.31	42.92	28.61
Dsgn. L = 3.90 ft	1	0.256	0.125	-0.00	-6.18	6.18	40.36	24.17	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 2.16 ft	2	0.253	0.125	0.03	-6.18	6.18	40.80	24.43	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 6.84 ft	2	0.178	0.077	3.76		3.76	35.24	21.10	1.00	1.00	2.19	42.92	28.61
+D+0.750Lr+0.750L, LL Comb Run (L*)													
Dsgn. L = 12.30 ft	1	0.673	0.122	10.37	-0.10	10.37	25.75	15.42	1.00	1.00	3.48	42.92	28.61
Dsgn. L = 2.70 ft	1	0.408	0.130	-0.00	-9.98	9.98	40.80	24.43	1.00	1.00	3.72	42.92	28.61
Dsgn. L = 8.35 ft	2	0.511	0.080	-0.00	-9.98	9.98	32.61	19.53	1.00	1.00	2.30	42.92	28.61
Dsgn. L = 0.65 ft	2	0.001	0.003	0.01	-0.00	0.01	40.80	24.43	1.00	1.00	0.09	42.92	28.61
+D+0.750Lr+0.750L, LL Comb Run (LL)													
Dsgn. L = 11.94 ft	1	0.621	0.118	9.81	-0.08	9.81	26.37	15.79	1.00	1.00	3.39	42.92	28.61
Dsgn. L = 3.06 ft	1	0.467	0.145	-0.00	-11.40	11.40	40.80	24.43	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 3.96 ft	2	0.473	0.145	0.00	-11.40	11.40	40.25	24.10	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 5.04 ft	2	0.088	0.056	2.03		2.03	38.38	22.98	1.00	1.00	1.61	42.92	28.61
+D+0.750L+0.750S, LL Comb Run (*L)													
Dsgn. L = 11.10 ft	1	0.213	0.046	3.55	-0.02	3.55	27.83	16.67	1.00	1.00	1.31	42.92	28.61
Dsgn. L = 3.90 ft	1	0.256	0.125	-0.00	-6.18	6.18	40.36	24.17	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 2.16 ft	2	0.253	0.125	0.03	-6.18	6.18	40.80	24.43	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 6.84 ft	2	0.178	0.077	3.76		3.76	35.24	21.10	1.00	1.00	2.19	42.92	28.61
+D+0.750L+0.750S, LL Comb Run (L*)													
Dsgn. L = 12.30 ft	1	0.673	0.122	10.37	-0.10	10.37	25.75	15.42	1.00	1.00	3.48	42.92	28.61
Dsgn. L = 2.70 ft	1	0.408	0.130	-0.00	-9.98	9.98	40.80	24.43	1.00	1.00	3.72	42.92	28.61
Dsgn. L = 8.35 ft	2	0.511	0.080	-0.00	-9.98	9.98	32.61	19.53	1.00	1.00	2.30	42.92	28.61
Dsgn. L = 0.65 ft	2	0.001	0.003	0.01	-0.00	0.01	40.80	24.43	1.00	1.00	0.09	42.92	28.61
+D+0.750L+0.750S, LL Comb Run (LL)													
Dsgn. L = 11.94 ft	1	0.621	0.118	9.81	-0.08	9.81	26.37	15.79	1.00	1.00	3.39	42.92	28.61
Dsgn. L = 3.06 ft	1	0.467	0.145	-0.00	-11.40	11.40	40.80	24.43	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 3.96 ft	2	0.473	0.145	0.00	-11.40	11.40	40.25	24.10	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 5.04 ft	2	0.088	0.056	2.03		2.03	38.38	22.98	1.00	1.00	1.61	42.92	28.61
+D+W													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+0.70E													
Dsgn. L = 11.94 ft	1	0.259	0.049	4.09	-0.02	4.09	26.37	15.79	1.00	1.00	1.41	42.92	28.61
Dsgn. L = 3.06 ft	1	0.194	0.060	-0.00	-4.75	4.75	40.80	24.43	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 4.00 ft	2	0.197	0.060	0.01	-4.75	4.75	40.19	24.07	1.00	1.00	1.72	42.92	28.61
Dsgn. L = 5.00 ft	2	0.036	0.023	0.83		0.83	38.44	23.02	1.00	1.00	0.66	42.92	28.61
+D+0.750Lr+0.750L+0.750W, LL Comb F													
Dsgn. L = 11.10 ft	1	0.213	0.046	3.55	-0.02	3.55	27.83	16.67	1.00	1.00	1.31	42.92	28.61
Dsgn. L = 3.90 ft	1	0.256	0.125	-0.00	-6.18	6.18	40.36	24.17	1.00	1.00	3.57	42.92	28.61

Apex Engineers, Inc.
1625 Locust Street
Kansas City, Missori 64108
www.apex-engineers.com

Project Title: Chapel Ridge 4-plex and 5-plex
Engineer:
Project ID: 25738
Project Descr:

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Steel Beam

File: chapel ridge 4 plex.ec6

Lic. # : KW-06005244
APEX ENGINEERS INC

DESCRIPTION: Continuous Steel Beam

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 2.16 ft	2	0.253	0.125	0.03	-6.18	6.18	40.80	24.43	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 6.84 ft	2	0.178	0.077	3.76		3.76	35.24	21.10	1.00	1.00	2.19	42.92	28.61
+D+0.750Lr+0.750L+0.750W, LL Comb F													
Dsgn. L = 12.30 ft	1	0.673	0.122	10.37	-0.10	10.37	25.75	15.42	1.00	1.00	3.48	42.92	28.61
Dsgn. L = 2.70 ft	1	0.408	0.130	-0.00	-9.98	9.98	40.80	24.43	1.00	1.00	3.72	42.92	28.61
Dsgn. L = 8.35 ft	2	0.511	0.080	-0.00	-9.98	9.98	32.61	19.53	1.00	1.00	2.30	42.92	28.61
Dsgn. L = 0.65 ft	2	0.001	0.003	0.01	-0.00	0.01	40.80	24.43	1.00	1.00	0.09	42.92	28.61
+D+0.750Lr+0.750L+0.750W, LL Comb F													
Dsgn. L = 11.94 ft	1	0.621	0.118	9.81	-0.08	9.81	26.37	15.79	1.00	1.00	3.39	42.92	28.61
Dsgn. L = 3.06 ft	1	0.467	0.145	-0.00	-11.40	11.40	40.80	24.43	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 3.96 ft	2	0.473	0.145	0.00	-11.40	11.40	40.25	24.10	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 5.04 ft	2	0.088	0.056	2.03		2.03	38.38	22.98	1.00	1.00	1.61	42.92	28.61
+D+0.750L+0.750S+0.750W, LL Comb F													
Dsgn. L = 11.10 ft	1	0.213	0.046	3.55	-0.02	3.55	27.83	16.67	1.00	1.00	1.31	42.92	28.61
Dsgn. L = 3.90 ft	1	0.256	0.125	-0.00	-6.18	6.18	40.36	24.17	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 2.16 ft	2	0.253	0.125	0.03	-6.18	6.18	40.80	24.43	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 6.84 ft	2	0.178	0.077	3.76		3.76	35.24	21.10	1.00	1.00	2.19	42.92	28.61
+D+0.750L+0.750S+0.750W, LL Comb F													
Dsgn. L = 12.30 ft	1	0.673	0.122	10.37	-0.10	10.37	25.75	15.42	1.00	1.00	3.48	42.92	28.61
Dsgn. L = 2.70 ft	1	0.408	0.130	-0.00	-9.98	9.98	40.80	24.43	1.00	1.00	3.72	42.92	28.61
Dsgn. L = 8.35 ft	2	0.511	0.080	-0.00	-9.98	9.98	32.61	19.53	1.00	1.00	2.30	42.92	28.61
Dsgn. L = 0.65 ft	2	0.001	0.003	0.01	-0.00	0.01	40.80	24.43	1.00	1.00	0.09	42.92	28.61
+D+0.750L+0.750S+0.750W, LL Comb F													
Dsgn. L = 11.94 ft	1	0.621	0.118	9.81	-0.08	9.81	26.37	15.79	1.00	1.00	3.39	42.92	28.61
Dsgn. L = 3.06 ft	1	0.467	0.145	-0.00	-11.40	11.40	40.80	24.43	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 3.96 ft	2	0.473	0.145	0.00	-11.40	11.40	40.25	24.10	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 5.04 ft	2	0.088	0.056	2.03		2.03	38.38	22.98	1.00	1.00	1.61	42.92	28.61
+D+0.750Lr+0.750L+0.5250E, LL Comb													
Dsgn. L = 11.10 ft	1	0.213	0.046	3.55	-0.02	3.55	27.83	16.67	1.00	1.00	1.31	42.92	28.61
Dsgn. L = 3.90 ft	1	0.256	0.125	-0.00	-6.18	6.18	40.36	24.17	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 2.16 ft	2	0.253	0.125	0.03	-6.18	6.18	40.80	24.43	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 6.84 ft	2	0.178	0.077	3.76		3.76	35.24	21.10	1.00	1.00	2.19	42.92	28.61
+D+0.750Lr+0.750L+0.5250E, LL Comb													
Dsgn. L = 12.30 ft	1	0.673	0.122	10.37	-0.10	10.37	25.75	15.42	1.00	1.00	3.48	42.92	28.61
Dsgn. L = 2.70 ft	1	0.408	0.130	-0.00	-9.98	9.98	40.80	24.43	1.00	1.00	3.72	42.92	28.61
Dsgn. L = 8.35 ft	2	0.511	0.080	-0.00	-9.98	9.98	32.61	19.53	1.00	1.00	2.30	42.92	28.61
Dsgn. L = 0.65 ft	2	0.001	0.003	0.01	-0.00	0.01	40.80	24.43	1.00	1.00	0.09	42.92	28.61
+D+0.750Lr+0.750L+0.5250E, LL Comb													
Dsgn. L = 11.94 ft	1	0.621	0.118	9.81	-0.08	9.81	26.37	15.79	1.00	1.00	3.39	42.92	28.61
Dsgn. L = 3.06 ft	1	0.467	0.145	-0.00	-11.40	11.40	40.80	24.43	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 3.96 ft	2	0.473	0.145	0.00	-11.40	11.40	40.25	24.10	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 5.04 ft	2	0.088	0.056	2.03		2.03	38.38	22.98	1.00	1.00	1.61	42.92	28.61
+D+0.750L+0.750S+0.5250E, LL Comb I													
Dsgn. L = 11.10 ft	1	0.213	0.046	3.55	-0.02	3.55	27.83	16.67	1.00	1.00	1.31	42.92	28.61
Dsgn. L = 3.90 ft	1	0.256	0.125	-0.00	-6.18	6.18	40.36	24.17	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 2.16 ft	2	0.253	0.125	0.03	-6.18	6.18	40.80	24.43	1.00	1.00	3.57	42.92	28.61
Dsgn. L = 6.84 ft	2	0.178	0.077	3.76		3.76	35.24	21.10	1.00	1.00	2.19	42.92	28.61
+D+0.750L+0.750S+0.5250E, LL Comb I													
Dsgn. L = 12.30 ft	1	0.673	0.122	10.37	-0.10	10.37	25.75	15.42	1.00	1.00	3.48	42.92	28.61
Dsgn. L = 2.70 ft	1	0.408	0.130	-0.00	-9.98	9.98	40.80	24.43	1.00	1.00	3.72	42.92	28.61
Dsgn. L = 8.35 ft	2	0.511	0.080	-0.00	-9.98	9.98	32.61	19.53	1.00	1.00	2.30	42.92	28.61
Dsgn. L = 0.65 ft	2	0.001	0.003	0.01	-0.00	0.01	40.80	24.43	1.00	1.00	0.09	42.92	28.61
+D+0.750L+0.750S+0.5250E, LL Comb I													
Dsgn. L = 11.94 ft	1	0.621	0.118	9.81	-0.08	9.81	26.37	15.79	1.00	1.00	3.39	42.92	28.61
Dsgn. L = 3.06 ft	1	0.467	0.145	-0.00	-11.40	11.40	40.80	24.43	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 3.96 ft	2	0.473	0.145	0.00	-11.40	11.40	40.25	24.10	1.00	1.00	4.15	42.92	28.61
Dsgn. L = 5.04 ft	2	0.088	0.056	2.03		2.03	38.38	22.98	1.00	1.00	1.61	42.92	28.61
+0.60D+W													
Dsgn. L = 11.94 ft	1	0.155	0.030	2.45	-0.01	2.45	26.37	15.79	1.00	1.00	0.85	42.92	28.61
Dsgn. L = 3.06 ft	1	0.117	0.036	-0.00	-2.85	2.85	40.80	24.43	1.00	1.00	1.03	42.92	28.61
Dsgn. L = 4.00 ft	2	0.118	0.036	0.00	-2.85	2.85	40.19	24.07	1.00	1.00	1.03	42.92	28.61
Dsgn. L = 5.00 ft	2	0.022	0.014	0.50		0.50	38.44	23.02	1.00	1.00	0.40	42.92	28.61
+0.60D+0.70E													
Dsgn. L = 11.94 ft	1	0.155	0.030	2.45	-0.01	2.45	26.37	15.79	1.00	1.00	0.85	42.92	28.61
Dsgn. L = 3.06 ft	1	0.117	0.036	-0.00	-2.85	2.85	40.80	24.43	1.00	1.00	1.03	42.92	28.61
Dsgn. L = 4.00 ft	2	0.118	0.036	0.00	-2.85	2.85	40.19	24.07	1.00	1.00	1.03	42.92	28.61
Dsgn. L = 5.00 ft	2	0.022	0.014	0.50		0.50	38.44	23.02	1.00	1.00	0.40	42.92	28.61

Apex Engineers, Inc.
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Project Title: Chapel Ridge 4-plex and 5-plex
Engineer:
Project ID: 25738
Project Descr:

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Steel Beam

File: chapel ridge 4 plex.ec6

Lic. # : KW-06005244
APEX ENGINEERS INC

DESCRIPTION: Continuous Steel Beam

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3126	6.840		0.0000	0.000
L Only	2	0.0401	5.400	+D+L	-0.0494	3.420

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	4.176	9.511	2.704
Overall MINimum	-0.127	1.997	0.084
D Only	1.409	3.328	0.665
+D+L, LL Comb Run (*L)	1.283	5.915	2.704
+D+L, LL Comb Run (L*)	4.176	6.924	-0.110
+D+L, LL Comb Run (LL)	4.050	9.511	1.929
+D+Lr, LL Comb Run (*L)	1.409	3.328	0.665
+D+Lr, LL Comb Run (L*)	1.409	3.328	0.665
+D+Lr, LL Comb Run (LL)	1.409	3.328	0.665
+D+S	1.409	3.328	0.665
+D+0.750Lr+0.750L, LL Comb Run (*L)	1.314	5.268	2.194
+D+0.750Lr+0.750L, LL Comb Run (L*)	3.484	6.025	0.084
+D+0.750Lr+0.750L, LL Comb Run (LL)	3.389	7.965	1.613
+D+0.750L+0.750S, LL Comb Run (*L)	1.314	5.268	2.194
+D+0.750L+0.750S, LL Comb Run (L*)	3.484	6.025	0.084
+D+0.750L+0.750S, LL Comb Run (LL)	3.389	7.965	1.613
+D+W	1.409	3.328	0.665
+D+0.70E	1.409	3.328	0.665
+D+0.750Lr+0.750L+0.750W, LL Comb F	1.314	5.268	2.194
+D+0.750Lr+0.750L+0.750W, LL Comb F	3.484	6.025	0.084
+D+0.750Lr+0.750L+0.750W, LL Comb F	3.389	7.965	1.613
+D+0.750L+0.750S+0.750W, LL Comb R	1.314	5.268	2.194
+D+0.750L+0.750S+0.750W, LL Comb R	3.484	6.025	0.084
+D+0.750L+0.750S+0.750W, LL Comb R	3.389	7.965	1.613
+D+0.750Lr+0.750L+0.5250E, LL Comb	1.314	5.268	2.194
+D+0.750Lr+0.750L+0.5250E, LL Comb	3.484	6.025	0.084
+D+0.750Lr+0.750L+0.5250E, LL Comb	3.389	7.965	1.613
+D+0.750L+0.750S+0.5250E, LL Comb F	1.314	5.268	2.194
+D+0.750L+0.750S+0.5250E, LL Comb F	3.484	6.025	0.084
+D+0.750L+0.750S+0.5250E, LL Comb F	3.389	7.965	1.613
+0.60D+W	0.846	1.997	0.399
+0.60D+0.70E	0.846	1.997	0.399
D Only	1.409	3.328	0.665
L Only, LL Comb Run (*L)	-0.127	2.587	2.039
L Only, LL Comb Run (L*)	2.767	3.596	-0.774
L Only, LL Comb Run (LL)	2.640	6.183	1.265
H Only			