STRUCTURAL CALCULATIONS

for

Bair Design Clarkston Town Hall Addition
Residential Plan
25 South Main Street
Clarkston, Utah

for

Craig Hidalgo
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435-770-1229

Date: 8/11/2022

PRICE ENGINEERING Inc.
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3677 N. Hwy 126, Suite 4B
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08/12/2022

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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DESIGN CRITERIA

Structure Type: Light Wood Framed, Reinforced Concrete Foundation

Design Codes: 2018 IBC, Risk Category II

City, County or Area: Clarkston

Live Loads:

100	psf for	Assembly Areas
60	psf for	Decks
100	psf for	Balconies
50	psf for	Office Areas
20	psf for	Roof

Snow Loads:

Pg: 54 Ce: 1.0 Ct: 1.0 I: 1.0

Cs: 1.0

Ps=> (Pg*Cs*Ce*Ct*I*0.7)

Ps*= 38 psf

Wind Loads:

Exposure: C

Design Speed: 120 mph (3 Second Gust)

Seismic Loads:

Sms:	1.44	SDC:	D	Site Class:	D
Sm1:	0.97	R:	6.5	I:	1.00
Sds:	0.96				

Dead Loads:

15	psf for	Roof Structure
10	psf for	Walls (w/ Siding or Stucco)
48	psf for	Walls (w/ Brick or Stone Veneer)
15	psf for	Floors (Incl. Tile)
10	psf for	Deck/Porch

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Deflection Criteria:

	Total Load	Live Load		
L/	240	360	for:	Roof Structure
L/	240	480	for:	Floor Structure (Minimum)
L/		240	for:	Exterior Walls

SOIL DESIGN PROPERTIES

*Geotechnical Study Or Investigation by: N/A

Date of Report: N/A

Proj No. of Report: N/A

Foundation Type: Concrete Spread Footing

*Bearing Pressure (Qa):	1500	psf		
*Active Pressure (Ya):	30	pcf		
*Passive Pressure (Yp):	300	pcf		
*At Rest Pressure (Yr):	60	pcf		
*Coeff. of Friction:	0.4	alone	0.3	with passive

*Design Values are assumed if no Geotechnical Study or Investigation is provided or does not provide values.
*Price Engineering assumes stable soil characteristics.
*All design is based on stable soil characteristics meeting the unified soil classification types GW, GP, SW, SP.
*Soils found on site while excavation occurs which differ from those stated above should be brought to the attention of Price Engineering before the foundation or footing systems are installed.

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MATERIAL SPECIFICATIONS

Reinforcing Steel: ASTM A615, Grade 60
ASTM A706, Grade 60 Weldable Rebar

Welded Wire Fabric: ASTM A185

Anchor Bolts: ASTM A307 or better, Zinc Coated

Wood Bolts: ASTM A307 or better, Zinc Coated

Concrete Strengths:

	(F'c Design @ 28 Days)		*(F'c Recommended @ 28 Days)*	
Footings:	2500	psi	3000	psi
Walls:	2500	psi	3000	psi
Structural Slabs:	3500	psi	3500	psi
Grade Beams:	2500	psi	3000	psi
Piers:	2500	psi	3500	psi
Topping over Steel Deck:	3500	psi	3500	psi
Slabs on Grade:	3500	psi	3500	psi

Concrete Masonry:

Units: ASTM C90 Medium Weight, Grade N-1

Mortar: Type "S" conforming to IBC Table 2103.7

Grout: Compress. Strength @ 28 days: 1800 psi

Sawn Lumber: Doug Fir North or Hem Fir

Use	*Stamped Grade, Spec, or Value (Minimum)*
Wall Studs:	Stud
Posts:	Grade #1
Joists & Rafters & Purlins:	Grade #2
Other:	Grade #2

Preservative Treated: For Concrete Contact, 0.2 Spec, Gound Contact, 0.4 Spec (See lumber tag)

Engineered and Manufactured Lumber Products:

Product	*Minimum Stamped Grade, Spec, or Value*
Glulam Beam:	24F-V4, 24F-V8
LVL:	1.9E, Fb 2600
LSL:	1.3E, Fb 1900
PSL:	1.8E, Fb 2400

Sheathing & Panels: All Panels & Sheathing shall be APA Rated & Stamped
All Roof, Floor, and Wall Panels are OSB structural, Exposure 1 rated

Structural Nails: Hot dipped zinc-coated, galvanized steel, stainless steel, silicon bronze, or copper
Common wire or other galvanized acceptable for preservative treated wood.

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Diaphram Description	**Roof & Main Floor Walls**

Earthquake Loading Calculations

V=	1.1(SDS)(W)/R	*Seismic Base Shear*
SDS=	(2/3)SMS	*Design Spectral Responce Acceleration*
SMS=	Fa(SS)	*Max Considered Spectral Responce Accel*
Sms=	1.44	*Short Period Spectral Acceleration*
Sm1	0.97	*1 Second Period Spectral Acceleration*
Fa=	1.00	*Site Coefficient for Short Period Acceleration*
	D	*Site Class (Assumed if no Soils Report)*
	D	*Seismic Design Category*
	No	*Soils Investigation Required?*

Wall DL	10	*psf*
Floor DL	0	*psf*
Roof DL	15	*psf*
Roof SL	8	*psf* (Applicable Portion)

Traverse Dimension (w)	70	*ft*
Long. dimension (L)	48	*ft*
Avg Wall Hieght	8	*ft*

R=	6.5	*Response Modification Coef.*
I=	1.0	*Importance Factor*
V=	0.1625	*(W)*
E*0.7=	0.114	*(W), Basic Load Combination, Formula 16-10*
V=	**5468**	*lbs. @ base ea. wall*
V=	**4931**	*lbs. @ top ea. wall*

Wind Loading Calculations

Wind Speed	120	*mph, 3 sec. gust*
Exposure	C	
Kz	0.90	
Topo Factor (Kzt)	1.00	

Traverse Dimension (w)	70	*ft*
Long. dimension (L)	48	*ft*
Ridge Hieght	26	*ft*
Wind Wall Hieght	8	*ft*
Roof Rise	6	*ft*
Roof Run	12	*ft*
Roof Slope	26.6	degrees

		Gable	Long.	Seismic Equivalent SW Loads Gable	Long.	
(ASD)	sum Ps=	**3,402**	**6,264**	**2430**	**4474**	*lbs. @ base ea. wall*
(ASD)	sum Ps=	**2,247**	**5,405**	**1605**	**3861**	*lbs. @ top ea. wall*
		Uplift	**-80**	plf		

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Wood Shear Wall Calculations

	Gable	Long	
Controlling	**5468**	**5468**	*lbs. @ base ea. wall*
Controlling	**4931**	**4931**	*lbs. @ top ea. wall*

Shear Wall Description	Left	Right	Front	Rear	N/A	N/A
Base Loads Total (lbs)	5468	5468	5468	5468		
Top Loads Total (lbs)	4931	4931	4931	4931		
Min. Seg Width (ft)	12	6	4	31		
Effect Height (ft)	8	8	8	8		
Cum. Seg Lengths (ft)	35	32	46	66		

Segmented Wall (as applicable)

H/W Ratio < 3.5?	Yes	Yes	Yes	Yes		
H/W Ratio Reduction	1.00	1.00	1.00	1.00		
Effective Length (ft)	35.0	32.0	46.0	66.0		
Shear Base (plf)	156	171	119	83		
Shear Top (plf)	141	154	107	75		
Seg Uplift (lbs)	1127	1233	858	598		

Perforated Wall (as applicable)

Total Perf Wall Length (ft)	48	48	70	70		
Total Opening Length (ft)	7	11	23	4		
Max Opening Ht (ft)	7	7	7	2		
Wall Ht (ft)	8	8	8	8		
% full ht. Sheathing	85%	77%	67%	94%		
Perf Adjust Factor (Co)	0.77	0.69	0.63	#N/A		
Effective Length (ft)	27.0	22.1	29.0	#N/A		
Shear Base (plf)	203	248	189	#N/A		
Shear Top (plf)	183	223	170	#N/A		
Perf End Uplift (lbs)	1464	1787	1361	#N/A		

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Tables & Load Sumations

Perforated Shear Capacity Adjustment Factors

Wall Ht (ft)	Opening Height (ft)				
	2.67	4.00	5.33	6.67	8.00
10%	1	0.69	0.53	0.43	0.36
20%	1	0.71	0.56	0.45	0.38
30%	1	0.74	0.59	0.49	0.42
40%	1	0.77	0.63	0.53	0.45
50%	1	0.8	0.67	0.57	0.5
60%	1	0.83	0.71	0.63	0.56
70%	1	0.87	0.77	0.69	0.63
80%	1	0.91	0.83	0.77	0.71
90%	1	0.95	0.91	0.87	0.83
100%	1	1	1	1	1

Design Wind Pressures

Roof Angle (De	110	A	B	C	D	E	F	G	H
0	0	19.2	-10	12.7	-5.9	-23.1	-13.1	-16	-10.1
10	5	21.6	-9	14.4	-5.2	-23.1	-14.1	-16	-10.8
15	12.5	24.1	-8	16	-4.6	-23.1	-15.1	-16	-11.5
20	17.5	26.6	-7	17.1	-3.9	-23.1	-16	-16	-12.2
25	22.5	24.1	3.9	17.4	4	-10.7	-14.6	-7.7	-11.7
30 to 45	27.5	21.6	14.8	17.2	11.8	8.3	-6.5	7.2	-4.6

	120	A	B	C	D	E	F	G	H
0	0	22.8	-11.9	15.1	-7	-27.4	-15.6	-19.1	-12.1
10	5	25.8	-10.7	17.1	-6.2	-27.4	-16.8	-19.1	-12.9
15	12.5	28.7	-9.5	19.1	-5.4	-27.4	-17.9	-19.1	-13.7
20	17.5	31.6	-8.3	21.1	-4.6	-27.4	-19.1	-19.1	-14.5
25	22.5	28.6	4.6	20.7	4.7	-12.7	-17.3	-9.2	-13.9
30 to 45	27.5	25.7	17.6	20.4	14	9.9	-15.6	8.6	-13.4

	150	A	B	C	D	E	F	G	H
0	0	40.6	-21.1	26.9	-12.5	-48.8	-27.7	-34	-21.5
10	5	45.8	-19	30.4	-11.1	-48.8	-29.8	-34	-22.9
15	12.5	51	-16.9	34	-9.6	-48.8	-31.9	-34	-24.3
20	17.5	56.2	-14.8	37.5	-8.2	-48.8	-34	-34	-25.8
25	22.5	50.9	8.2	36.9	8.4	-22.6	-30.8	-16.4	-24.8
30 to 45	27.5	45.7	31.2	36.3	25	17.6	-13.7	15.2	-9.8

110	24.10	3.90	17.40	4.00	-10.70	-14.60	-7.70	-11.70
120	28.60	4.60	20.70	4.70	-12.70	-17.30	-9.20	-13.90
150	50.90	8.20	36.90	8.40	-22.60	-30.80	-16.40	-24.80

Applic. Press. For 120 mph gust

	28.60	4.60	20.70	4.70	-12.70	-17.30	-9.20	-13.90
Ps'=	25.74	4.14	18.63	4.23	-11.43	-15.57	-8.28	-12.51

Calc'd Zone Areas (sf)

	A	B	C	D	E	F	G	H
Transverse	77	173	307	691	336	336	1344	1344
Longitudinal	112	-	966	-	336	336	1344	1344

Calc'd Zone Loads (lbs)

	A	B	C	D	E	F	G	H
Transverse	1977	715	5723	2924	-3840	-5232	-11128	-16813
Longitudinal	2883	-	17997	-	-3840	-5232	-11128	-16813

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Diaphram Description	**Lower**

Earthquake Loading Calculations

V=	1.1(SDS)(W)/R	*Seismic Base Shear*
SDS=	(2/3)SMS	*Design Spectral Responce Acceleration*
SMS=	Fa(SS)	*Max Considered Spectral Responce Accel*
Sms=	1.44	*Short Period Spectral Acceleration*
Sm1	0.97	*1 Second Period Spectral Acceleration*
Fa=	1.00	*Site Coefficient for Short Period Acceleration*
	D	*Site Class (Assumed if no Soils Report)*
	D	*Seismic Design Category*
	No	*Soils Investigation Required?*

Wall DL	10	*psf*
Floor DL	15	*psf*
Roof DL	0	*psf*
Roof SL	0	*psf* (Applicable Portion)

Traverse Dimension (w)	70	*ft*
Long. dimension (L)	48	*ft*
Avg Wall Hieght	8	*ft*

R=	6.5	*Response Modification Coef.*
I=	1.0	*Importance Factor*
V=	0.1625	*(W)*
E*0.7=	0.114	*(W), Basic Load Combination, Formula 16-10*
V=	**3939**	*lbs. @ base ea. wall*
V=	**3403**	*lbs. @ top ea. wall*

Wind Loading Calculations

Wind Speed	120	*mph, 3 sec. gust*
Exposure	C	
Kz	0.90	
Topo Factor (Kzt)	1.00	

Traverse Dimension (w)	70	*ft*
Long. dimension (L)	48	*ft*
Ridge Hieght	9	*ft*
Wind Wall Hieght	8	*ft*
Roof Rise	0	*ft*
Roof Run	12	*ft*
Roof Slope	0.0	degrees

				Seismic Equivalent SW Loads		
		Gable	Long.	Gable	Long.	
(ASD)	sum Ps=	**1,622**	**2,202**	**1158**	**1573**	*lbs. @ base ea. wall*
(ASD)	sum Ps=	**759**	**1,576**	**542**	**1126**	*lbs. @ top ea. wall*
		Uplift	**-98**	plf		

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Wood Shear Wall Calculations

	Gable	Long	
Controlling	**3939**	**3939**	*lbs. @ base ea. wall*
Controlling	**3403**	**3403**	*lbs. @ top ea. wall*

Shear Wall Description	N/A	N/A	N/A	Rear	N/A	N/A
Base Loads Total (lbs)				9407		
Top Loads Total (lbs)				8870		
Min. Seg Width (ft)				4.5		
Effect Height (ft)				8		
Cum. Seg Lengths (ft)				47		

Segmented Wall (as applicable)

H/W Ratio < 3.5?				Yes		
H/W Ratio Reduction				1.00		
Effective Length (ft)				47.0		
Shear Base (plf)				200		
Shear Top (plf)				189		
Seg Uplift (lbs)				1510		

Perforated Wall (as applicable)

Total Perf Wall Length (ft)				70		
Total Opening Length (ft)				27		
Max Opening Ht (ft)				7		
Wall Ht (ft)				8		
% full ht. Sheathing				61%		
Perf Adjust Factor (Co)				0.63		
Effective Length (ft)				29.6		
Shear Base (plf)				318		
Shear Top (plf)				300		
Perf End Uplift (lbs)				2397		

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Perforated Shear Capacity Adjustment Factors

Wall Ht (ft)	Opening Height (ft)				
	2.67	4.00	5.33	6.67	8.00
10%	1	0.69	0.53	0.43	0.36
20%	1	0.71	0.56	0.45	0.38
30%	1	0.74	0.59	0.49	0.42
40%	1	0.77	0.63	0.53	0.45
50%	1	0.8	0.67	0.57	0.5
60%	1	0.83	0.71	0.63	0.56
70%	1	0.87	0.77	0.69	0.63
80%	1	0.91	0.83	0.77	0.71
90%	1	0.95	0.91	0.87	0.83
100%	1	1	1	1	1

Design Wind Pressures

Roof Angle (De	110	A	B	C	D	E	F	G	H
0	0	19.2	-10	12.7	-5.9	-23.1	-13.1	-16	-10.1
10	5	21.6	-9	14.4	-5.2	-23.1	-14.1	-16	-10.8
15	12.5	24.1	-8	16	-4.6	-23.1	-15.1	-16	-11.5
20	17.5	26.6	-7	17.1	-3.9	-23.1	-16	-16	-12.2
25	22.5	24.1	3.9	17.4	4	-10.7	-14.6	-7.7	-11.7
30 to 45	27.5	21.6	14.8	17.2	11.8	8.3	-6.5	7.2	-4.6

	120	A	B	C	D	E	F	G	H
0	0	22.8	-11.9	15.1	-7	-27.4	-15.6	-19.1	-12.1
10	5	25.8	-10.7	17.1	-6.2	-27.4	-16.8	-19.1	-12.9
15	12.5	28.7	-9.5	19.1	-5.4	-27.4	-17.9	-19.1	-13.7
20	17.5	31.6	-8.3	21.1	-4.6	-27.4	-19.1	-19.1	-14.5
25	22.5	28.6	4.6	20.7	4.7	-12.7	-17.3	-9.2	-13.9
30 to 45	27.5	25.7	17.6	20.4	14	9.9	-15.6	8.6	-13.4

	150	A	B	C	D	E	F	G	H
0	0	40.6	-21.1	26.9	-12.5	-48.8	-27.7	-34	-21.5
10	5	45.8	-19	30.4	-11.1	-48.8	-29.8	-34	-22.9
15	12.5	51	-16.9	34	-9.6	-48.8	-31.9	-34	-24.3
20	17.5	56.2	-14.8	37.5	-8.2	-48.8	-34	-34	-25.8
25	22.5	50.9	8.2	36.9	8.4	-22.6	-30.8	-16.4	-24.8
30 to 45	27.5	45.7	31.2	36.3	25	17.6	-13.7	15.2	-9.8

110	19.20	-10.00	12.70	-5.90	-23.10	-13.10	-16.00	-10.10
120	22.80	-11.90	15.10	-7.00	-27.40	-15.60	-19.10	-12.10
150	40.60	-21.10	26.90	-12.50	-48.80	-27.70	-34.00	-21.50

Applic. Press. For 120 mph gust

	22.80	-11.90	15.10	-7.00	-27.40	-15.60	-19.10	-12.10
Ps'=	20.52	-10.71	13.59	-6.30	-24.66	-14.04	-17.19	-10.89

Calc'd Zone Areas (sf)

	A	B	C	D	E	F	G	H
Transverse	77	10	307	38	336	336	1344	1344
Longitudinal	112	-	371	-	336	336	1344	1344

Calc'd Zone Loads (lbs)

	A	B	C	D	E	F	G	H
Transverse	1576	-103	4175	-242	-8286	-4717	-23103	-14636
Longitudinal	2298	-	5042	-	-8286	-4717	-23103	-14636

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Footing Calculations

Loads (max framed location)

	Span/Ht (ft)	*LL/SL (psf)*	*DL (psf)*	LL Factor	TL (plf)
Roof	69.0	38.0	15.0	0.75	1500.8
Wall 2	8.0	0.0	10.0	1.00	80.0
Floor 2	0.0	40.0	15.0	1.00	0.0
Wall 1	0.0	0.0	10.0	1.00	0.0
Floor 1	22.0	100.0	15.0	0.75	990.0
Deck	0.0	60.0	10.0	1.00	0.0
Foundation	8.50	0	100	1.00	850.0
				Unfactored TL	3420.8

Allowable Bearing Press (psf)	2000	Existing Footing
Required Width (in)	20.5	

Loads (max framed location)

	Span/Ht (ft)	*LL/SL (psf)*	*DL (psf)*	LL Factor	TL (plf)
Roof	41.0	38.0	15.0	0.75	891.8
Wall 2	8.0	0.0	10.0	1.00	80.0
Floor 2	0.0	40.0	15.0	1.00	0.0
Wall 1	0.0	0.0	10.0	1.00	0.0
Floor 1	32.0	50.0	15.0	0.75	840.0
Deck	0.0	60.0	10.0	1.00	0.0
Foundation	8.00	0	100	1.00	800.0
				Unfactored TL	2611.8

Allowable Bearing Press (psf)	1500	New Footing
Required Width (in)	20.9	

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BEAM #1, HDR / Beam

Input

Beam Parameters

Beam table no.	4
Quantity	2
Span (ft)	3.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	1330	525	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 2" x 10" DF#2

Beam Properties		*Req'd Properties*		*Properties Adequate*?*
SX (in3)	42.78	Sx (in3)	29.46	Yes
Area (in2)	27.76	Area (in2)	15.46	Yes
IX (in4)	198			
E' (psi)	1600000	*Calc'd Loads & Stresses*		
F' b (psi)	850	Max Moment (lb*ft)	2,087	
F' v (psi)	180	Reaction L (lbs)	2,783	
		Reaction R (lbs)	2,783	

Max. Deflection		*Calc'd Deflection*		
LL (in.)	0.10	LL (in.)	0.01	Yes
TL (in.)	0.15	TL (in.)	0.01	Yes

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BEAM #2, HDR / Beam

Input

Beam Parameters

Beam table no.	4
Quantity	2
Span (ft)	4.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading

	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	798	315	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 2" x 10" DF#2

Beam Properties

SX (in3)	42.78
Area (in2)	27.76
IX (in4)	198
E' (psi)	1600000
F' b (psi)	850
F' v (psi)	180

Req'd Properties

		Properties Adequate?*
Sx (in3)	31.43	Yes
Area (in2)	12.37	Yes

Calc'd Loads & Stresses

Max Moment (lb*ft)	2,226
Reaction L (lbs)	2,226
Reaction R (lbs)	2,226

Max. Deflection

Calc'd Deflection

LL (in.)	0.13	LL (in.)	0.01	Yes
TL (in.)	0.20	TL (in.)	0.02	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM #3, HDR / Beam

Input

Beam Parameters

Beam table no.	3
Quantity	2
Span (ft)	5.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	228	90	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 2" x 8" DF#2

Beam Properties		*Req'd Properties*		*Properties Adequate*?*
SX (in3)	26.28	Sx (in3)	14.03	Yes
Area (in2)	21.76	Area (in2)	4.42	Yes
IX (in4)	95			
E' (psi)	1600000	*Calc'd Loads & Stresses*		
F' b (psi)	850	Max Moment (lb*ft)	994	
F' v (psi)	180	Reaction L (lbs)	795	
		Reaction R (lbs)	795	

Max. Deflection		*Calc'd Deflection*		
LL (in.)	0.17	LL (in.)	0.02	Yes
TL (in.)	0.25	TL (in.)	0.03	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM **#4, HDR / Beam**

Input

Beam Parameters

Beam table no.	10
Quantity	2
Span (ft)	6.5

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	893	352.5	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 1-3/4" x 9-1/2" 1.9E Microllam LVL

Beam Properties		*Req'd Properties*		*Properties Adequate*?*
SX (in3)	52.65	Sx (in3)	30.36	Yes
Area (in2)	33.25	Area (in2)	14.20	Yes
IX (in4)	250			
E' (psi)	1900000	*Calc'd Loads & Stresses*		
F' b (psi)	2600	Max Moment (lb*ft)	6,578	
F' v (psi)	285	Reaction L (lbs)	4,048	
		Reaction R (lbs)	4,048	

Max. Deflection		*Calc'd Deflection*		
LL (in.)	0.22	LL (in.)	0.08	Yes
TL (in.)	0.33	TL (in.)	0.11	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM #5, HDR / Beam

Input

Beam Parameters

Beam table no.	4
Quantity	2
Span (ft)	6.0

Adjustment factors

CD	1.15
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading

	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	551	217.5	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 2" x 10" DF#2

Beam Properties

SX (in3)	42.78
Area (in2)	27.76
IX (in4)	198
E' (psi)	1600000
F' b (psi)	978
F' v (psi)	207

Req'd Properties

		Properties Adequate?*
Sx (in3)	42.45	Yes
Area (in2)	11.14	Yes

Calc'd Loads & Stresses

Max Moment (lb*ft)	3,458
Reaction L (lbs)	2,306
Reaction R (lbs)	2,306

Max. Deflection

		Calc'd Deflection		
LL (in.)	0.20	LL (in.)	0.05	Yes
TL (in.)	0.30	TL (in.)	0.07	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM **#6, HDR / Beam**

Input

Beam Parameters

Beam table no.	10
Quantity	2
Span (ft)	13.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	228	90	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 1-3/4" x 9-1/2" 1.9E Microllam LVL

Beam Properties		*Req'd Properties*		*Properties Adequate*?*
SX (in3)	52.65	Sx (in3)	31.01	Yes
Area (in2)	33.25	Area (in2)	7.25	Yes
IX (in4)	250			
E' (psi)	1900000	*Calc'd Loads & Stresses*		
F' b (psi)	2600	Max Moment (lb*ft)	6,718	
F' v (psi)	285	Reaction L (lbs)	2,067	
		Reaction R (lbs)	2,067	

Max. Deflection		*Calc'd Deflection*		
LL (in.)	0.43	LL (in.)	0.31	Yes
TL (in.)	0.65	TL (in.)	0.43	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM #7, HDR / Beam

Input

Beam Parameters

Beam table no.	2
Quantity	2
Span (ft)	4.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	190	155	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 2" x 6" DF#2

Beam Properties		*Req'd Properties*		*Properties Adequate*?*
SX (in3)	15.13	Sx (in3)	9.74	Yes
Area (in2)	16.50	Area (in2)	3.83	Yes
IX (in4)	42			
E' (psi)	1600000	*Calc'd Loads & Stresses*		
F' b (psi)	850	Max Moment (lb*ft)	690	
F' v (psi)	180	Reaction L (lbs)	690	
		Reaction R (lbs)	690	

Max. Deflection		*Calc'd Deflection*		
LL (in.)	0.13	LL (in.)	0.02	Yes
TL (in.)	0.20	TL (in.)	0.03	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM #8, HDR / Beam

Input

Beam Parameters

Beam table no.	8
Quantity	2
Span (ft)	6.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	950	285	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 1-3/4" x 7-1/4" 1.9E Microllam LVL

Beam Properties		*Req'd Properties*		*Properties Adequate*?*
SX (in3)	30.66	Sx (in3)	25.65	Yes
Area (in2)	25.38	Area (in2)	13.00	Yes
IX (in4)	111			
E' (psi)	1900000	*Calc'd Loads & Stresses*		
F' b (psi)	2600	Max Moment (lb*ft)	5,558	
F' v (psi)	285	Reaction L (lbs)	3,705	
		Reaction R (lbs)	3,705	

Max. Deflection		*Calc'd Deflection*		
LL (in.)	0.20	LL (in.)	0.13	Yes
TL (in.)	0.30	TL (in.)	0.17	Yes

Project:	Bair Design Clarkston Town Hall Addition
Analysis:	K. Price
Date:	08/11/22

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BEAM **#9, HDR / Beam**

Input

Beam Parameters

Beam table no.	12
Quantity	2
Span (ft)	6.0

Adjustment factors

CD	1.00
CM*Ct*Ci	1.00
CL	1.00
CF*CV	1.00
Cfu*Cr	1.00

Loading

	LL	DL	Load Dist. from left wa, right wc, to start wb) (ft.)
w (plf)	2130	645	
W from left (lbs)	0	0	
W from right (lbs)	0	0	
W @ mid (lbs)	0	0	
PL 1 (lbs)	0	0	0.0
PL 2 (lbs)	0	0	0.0
PL 3 (lbs)	0	0	0.0

Deflection Limits

LL, L/	360
TL, L/	240

Results

Beam Description 2 | 1-3/4" x 11-7/8" 1.9E Microllam LVL

Beam Properties

SX (in3)	82.26
Area (in2)	41.56
IX (in4)	488
E' (psi)	2000000
F' b (psi)	2600
F' v (psi)	285

Req'd Properties

		Properties Adequate?*
Sx (in3)	57.63	Yes
Area (in2)	29.21	Yes

Calc'd Loads & Stresses

Max Moment (lb*ft)	12,488
Reaction L (lbs)	8,325
Reaction R (lbs)	8,325

Max. Deflection

LL (in.)	0.20
TL (in.)	0.30

Calc'd Deflection

LL (in.)	0.06	Yes
TL (in.)	0.08	Yes