McMILLEN JACOBS ASSOCIATES

SUBJECT: KRRC
Fall Creek Fish Hatchery
Structural Calculations

BY: Zachary Autin **CHK'D BY:** Taylor Bowen
DATE: 10/19/2020
PROJECT NO.: 20-024

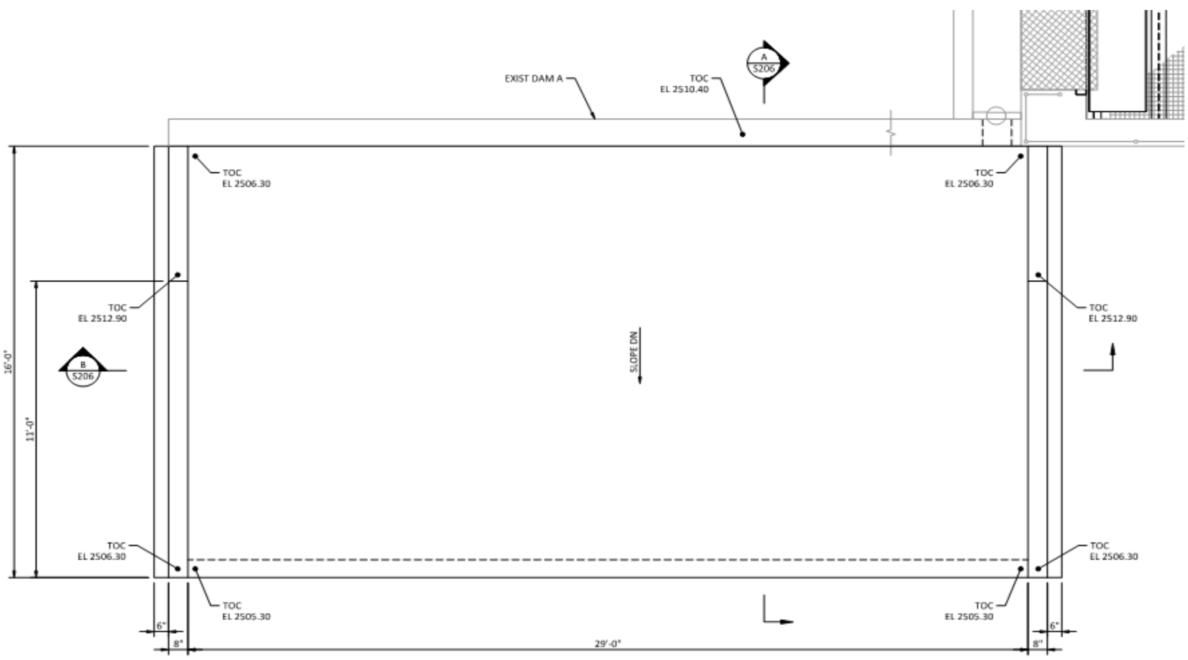
Purpose

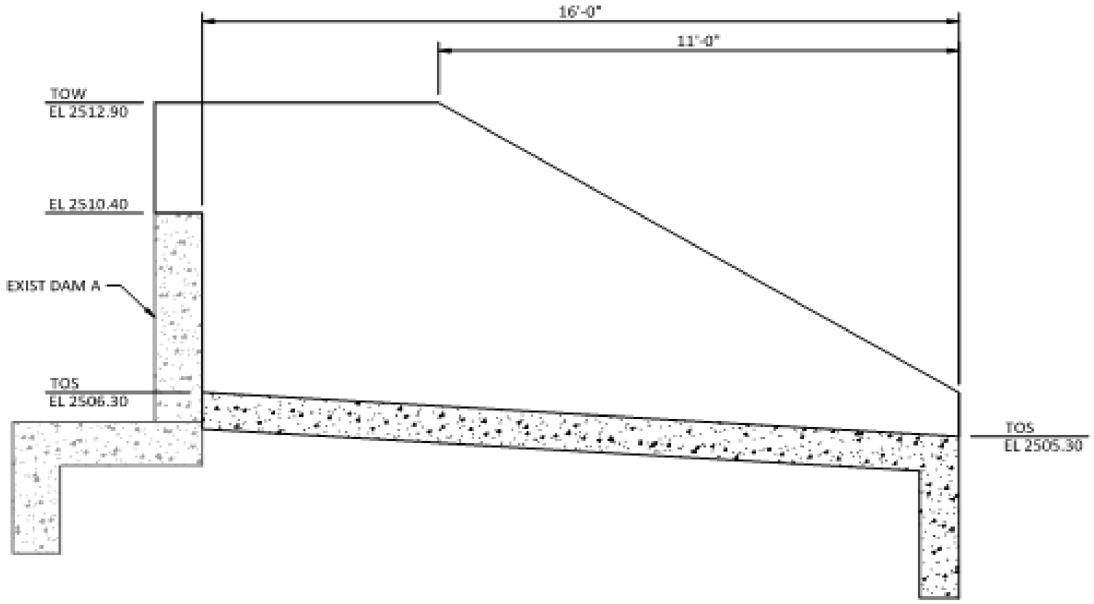
Design dam A walls and slab. Check stability, specifically flotation on the apron slab.

Information

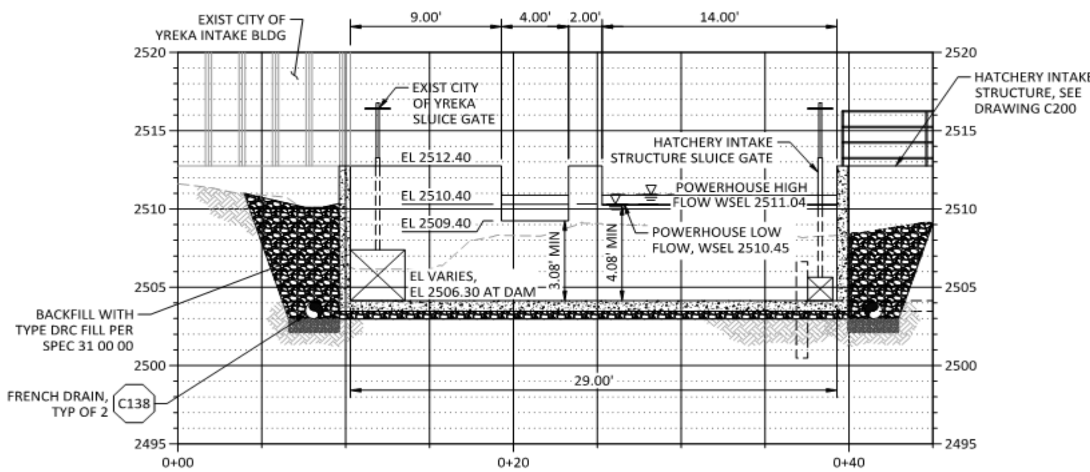
gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures





SECTION A S205
SCALE: 3/4"= 1'-0"



SECTION B C202
SCALE: 1"= 2'

Calculations: Loads

Design walls as cantilever from the slab

Usual Load Case - Low Water - No water over barrier

	EL_ts =	2505.30	ft	Elevation top of slab
	EL_twl =	2512.90	ft	Elevation top of wall
	EL_sd =	2511.00	ft	Elevation top of soil - driving side
	t_slab =	10.00	in	Thickness of slab
	t_slab =	0.83	ft	Thickness of slab
	EL_bs =	2504.47	ft	Elevation bottom of slab
Lateral Earth Pressure - driving				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	356.25	psf	Soil pressure top of slab
	P4 =	408.33	psf	Soil pressure bottom of slab
	Fh =	1.02	k	Resultant force (wall only)
	y_h =	2.32	ft	Distance of resultant from center of slab
	M_h =	2.35	k-ft	Max moment in wall
Seismic Earth Pressure				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	249.37	psf	Soil pressure top of slab
	P4 =	285.83	psf	Soil pressure bottom of slab
	Fe =	0.71	k	Resultant force (wall only)
	y_e =	2.32	ft	Distance of resultant from center of slab
	M_e =	1.65	k-ft	Max moment in wall
Snow Load Surcharge Pressure				
	pg =	57.14	psf	Snow load surcharge
	Ps =	28.57	psf	Lateral snow pressure
	Fe =	0.16	k	Resultant force (wall only)
	y_e =	3.27	ft	Distance of resultant from center of slab
	M_e =	0.53	k-ft	Max moment in wall
Flexure				
	LC3a =	4.61	k-ft	Load combination 3a (see design criteria)
	LC6 =	5.52	k-ft	Load combination 6 (see design criteria)
	Mmax_f =	5.52	k-ft/ft	Maximum factored moment in wall
Shear				
	LC3a =	1.89	k-ft	Load combination 3a (see design criteria)
	LC6 =	2.37	k-ft	Load combination 6 (see design criteria)
	Vmax_f =	2.37	k	Maximum factored shear in wall

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Calculations: Flexure

Twall =	8.00	in	Wall thickness
size bar =	6.00		Bar size
dbar =	0.75	in	Diameter of bar
Cover =	0.00	in	Bar cover (center reinforcement)
d = Twall/2 + dbar*0.5 =	4.38	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.44	in2	Area of 1 bar
As =	0.44	in2/ft	Area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	1.07	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.16	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.58	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	108.32	k-in	Nominal Moment
Mn =	9.03	k-ft	
Phi*Mn =	8.12	k-ft	
Mmax_f =	5.52	k-ft/ft	
Check	GOOD		*D/C Ratio = 0.68*

Calculations: Longitudinal Steel

rho-min =	0.0030		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.29	in2/ft	Min area of steel
size bar =	6.00		Bar size
dbar =	0.75	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.44	in2	Area of 1 bar
As =	0.44	in2/ft	Area of flexural steel

Calculations: Longitudinal Steel Slab

Tslab =	12.0000	in	Thickness of slab
rho-min =	0.0050		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.72	in2/ft	Min area of steel
size bar =	6.00		Bar size
dbar =	0.75	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.44	in2	Area of 1 bar
As =	0.44	in2/ft	Area of flexural steel

Calculations: Shear

Lambda =	1.00	kips	Normalweight concrete
Vc = 2*lambda*sqrt(fc')*b*d =	7.04	k/ft	Nominal shear strength
phi =	0.75		Reistance factor - shear
phi*Vc =	5.28	k/ft	Ultimate shear strength
Vmax_f =	2.37	k/ft	
CHECK	GOOD		*D/C Ratio = 0.45*

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Calculations: Stability

Sliding, Overturning, Bearing Pressure OK by inspection - Dam A mods increase stability of dam

Vd =	11.00	cf/ft	Dam volume
Va =	15.90	cf/ft	Slab volume
Vw =	11.28	kips	Volume of water retained
W =	2.39	kips	Weight
EL_cutoff =	2501.40	ft	Elevation bottom of cutoff
EL_wu =	2511.04	ft	Upstream water elevation
EL_wd =	2504.54	ft	Downstream water elevation

Flotation

P1 =	601.54	psf	Upstream water pressure
P2 =	195.94	psf	Downstream water pressure
P3 =	537.49	psf	Water pressure @ upstream edge of apron
Fb =	5.87	k/ft	Buoyant force
Weight resistance =	2.39	k/ft	
Rock anchor resistance =	5.50	k/ft	Required rock anchor resistance/ft of width
FOS =	1.34		Factor of Safety
FOS_req =	1.30		Factor of safety required (EM 1110-2-2100)
CHECK	GOOD		
Bmax =	8.00	ft	Max tributary width
# =	4		#anchors / row
Force/anchor =	11.00	k	
Bond length =	6.00	ft	Bond length of anchor
Sreq =	3.46	ft	Required spacing
Ta =	10.00	k/ft	Capacity of anchor/ft bond length
Ta_total =	60.00	kips	Capacity of anchor
CHECK	GOOD		

Ciani, Whitney
To Autin, Zachary
Reply | Reply All | Forward | ...
Thu 7/30/2020 3:27 PM
Pages from FHWA GEC No. 4_Ground Anchors and Anchored Systems.pdf
130 KB

Hi Zack,

For the rock anchors/tiedowns you can use an allowable load transfer of 10 kips/ft. This assumes an 8-inch diameter grouted hole for the anchor. You can use an allowable bond stress of 35 psi to resize or reach out to me and I can update the load transfer for a different anchor size.

To reach full capacity for the anchor, they need to be spaced at a minimum distance of L*tan(30), where L is the bonded length of the anchor – I assumed these would be grouted to the surface with no unbonded length. If they need to be spaced closer than this we just need to reduce the capacity – send me the geometry that you need and we can adjust as needed.

Because we do not have a good idea of the rock quality, typically I would recommend a testing program to verify capacity. As we discussed, this isn't really practical for a dowel. I chose a low strength for the rock to account for uncertainty and potential rock quality issues. I discussed this approach with Jim Struthers (Seattle office) and he agreed that it seemed reasonable given the lack of available data and reiterated that a good testing program would ensure that the rock anchors/dowels perform as designed.

My references are attached!

CHECK

Slab span 8'
Breakout of anchor
Reduced capacity of #7 due to dev. Length

SUBJECT:	KRRC	BY: Zachary Autin	CHK'D BY: Taylor Bowen
	Fall Creek Fish Hatchery	DATE: 10/19/2020	
	Structural Calculations	PROJECT NO.: 20-024	

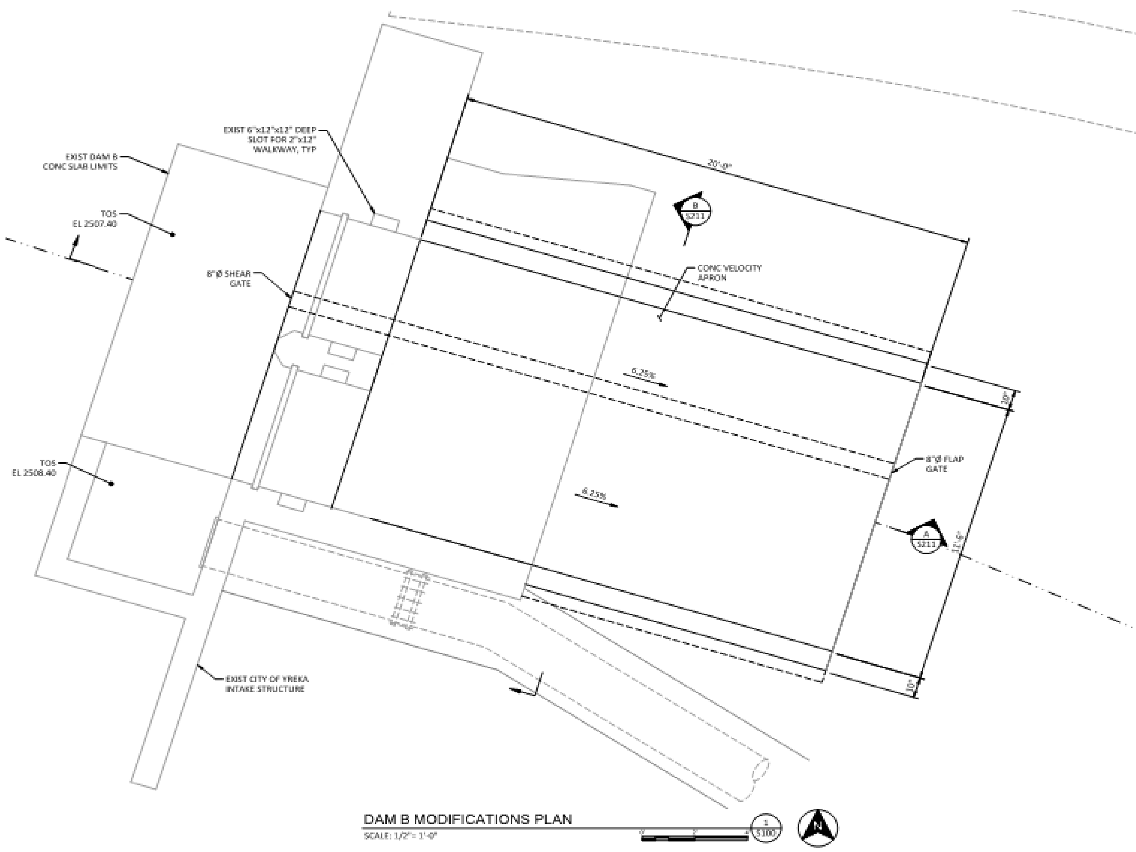
Purpose

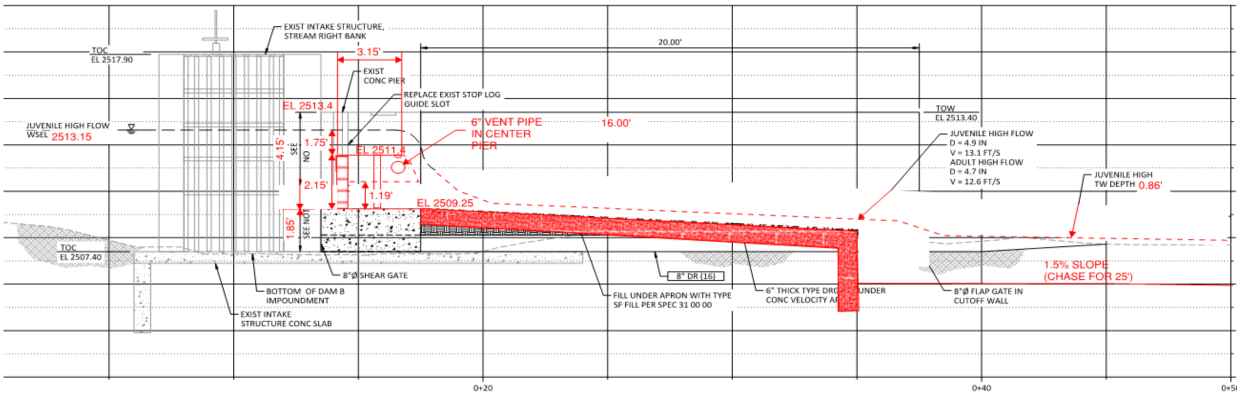
Check stability, specifically sliding of the new concrete pier and flotation of the apron slab.

Information

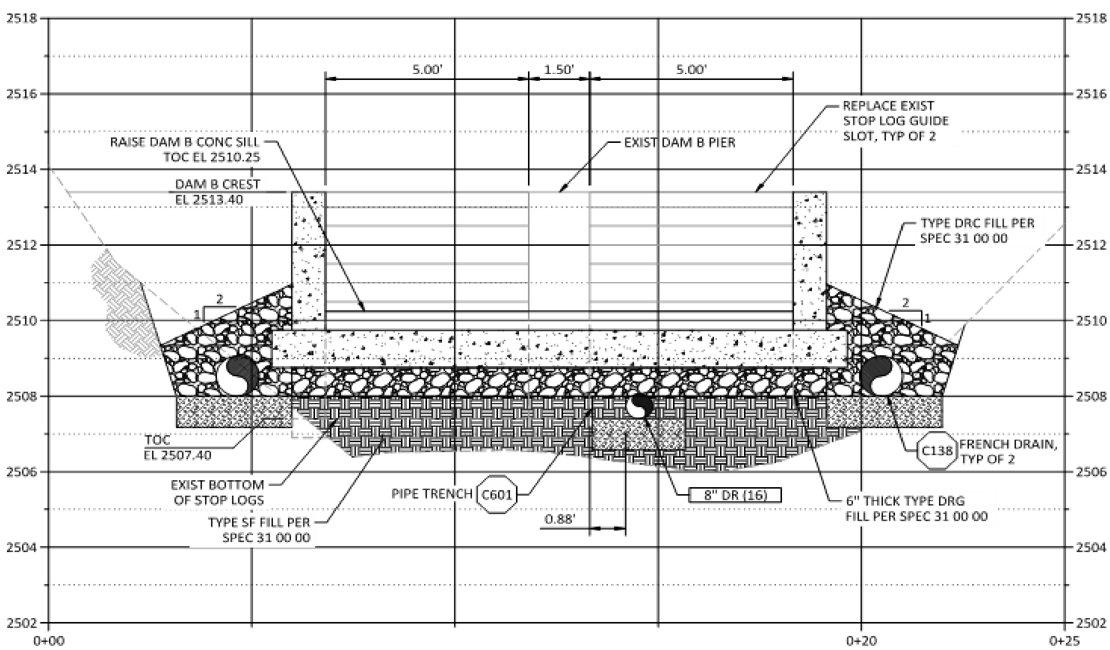
gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures




EXIST INTAKE STRUCTURE, STREAM RIGHT BANK
TOC
EL 2517.90
3.15'
EXIST CONC PIER
REPLACE EXIST STOP LOG GUIDE SLOT
20.00'
EL 2513.4
JUVENILE HIGH FLOW WSEL 2513.15
6" VENT PIPE IN CENTER PIER
16.00'
4.15'
1.75'
EL 2511.4
2.15'
1.19'
EL 2509.25
1.85'
SEE NOTE
TOC
EL 2507.40
8"Ø SHEAR GATE
BOTTOM OF DAM B IMPOUNDMENT
EXIST INTAKE STRUCTURE CONC SLAB
8" DR (16)
FILL UNDER APRON WITH TYPE SF FILL PER SPEC 31 00 00
6" THICK TYPE DRG UNDER CONC VELOCITY AP
TOW
EL 2513.40
JUVENILE HIGH FLOW
D = 4.9 IN
V = 13.1 FT/S
ADULT HIGH FLOW
D = 4.7 IN
V = 12.6 FT/S
JUVENILE HIGH TW DEPTH 0.86'
1.5% SLOPE (CHASE FOR 25')
8"Ø FLAP GATE IN CUTOFF WALL
2518
2516
2514
2512
2510
2508
2506
2504
2502
0+20
0+40
0+50

SECTION


5.00'
1.50'
5.00'
RAISE DAM B CONC SILL TOC EL 2510.25
EXIST DAM B PIER
REPLACE EXIST STOP LOG GUIDE SLOT, TYP OF 2
DAM B CREST
EL 2513.40
TYPE DRC FILL PER SPEC 31 00 00
TOC
EL 2507.40
EXIST BOTTOM OF STOP LOGS
TYPE SF FILL PER SPEC 31 00 00
PIPE TRENCH C601
0.88'
8" DR (16)
6" THICK TYPE DRG FILL PER SPEC 31 00 00
C138 FRENCH DRAIN, TYP OF 2
2518
2516
2514
2512
2510
2508
2506
2504
2502
0+00
0+20
0+25

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Calculations: Loads

Design walls as cantilever from the slab

Usual Load Case - Low Water - No water over barrier

	EL_ts =	2509.25	ft	Elevation top of slab
	EL_twl =	2513.40	ft	Elevation top of wall
	EL_sd =	2513.15	ft	Elevation top of water
Hydrostatic Pressure				
	P1 =	0.00	psf	pressure top of wall
	P2 =	0.00	psf	pressure top of water
	P3 =	243.36	psf	pressure top of slab
	Fh =	0.47	k	Resultant force
	B =	6.50	ft	Tributary width of pier
	Fh_factored =	4.32	k	Factored shear force on pier
Shear				
	# dowels =	10.00		Number of dowels
	Vdowel =	0.43	k	Shear per dowel
	bar size =	5.00	#	
	dbar =	0.63	in	Number of dowels
	Av =	0.31	in^2	Shear per dowel
	Vs =	18.41	k	
	phi*Vs =	13.81	k	
	Check	GOOD		

D/C Ratio = 0.03

Calculations: Temp & Shrinkage Pier

Twall =	18.00	in	Wall thickness

Calculations: Longitudinal Steel

rho-min =	0.0030		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.65	in2/ft	Min area of steel
size bar =	6.00		Bar size
dbar =	0.75	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.44	in2	Area of 1 bar
As =	0.44	in2/ft	Area of flexural steel

Calculations: Temp & Shrinkage Thickened Sill Slab

Tslab =	22.20	in	Slab thickness
Bslab =	48.00	in	Slab width

Calculations: Longitudinal Steel

rho-min =	0.0030		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	3.20	in2	Min area of steel
size bar =	6.00		Bar size
dbar =	0.75	in	Diameter of bar
Abar =	0.44	in2	Area of 1 bar
#bars, req =	7.24	in	Spacing of bars

Calculations: Stability

Sliding, Overturning, Bearing Pressure OK by inspection - Dam B mods increase stability of dam

Va =	16.67	cf/ft	Slab volume
W =	2.50	kips/ft	Weight
EL_cutoff =	2502.40	ft	Elevation bottom of cutoff
EL_wu =	2513.40	ft	Upstream water elevation
EL_wd =	2508.00	ft	Downstream water elevation
Flotation			
P1 =	686.40	psf	Upstream water pressure
P2 =	349.44	psf	Downstream water pressure
P3 =	556.80	psf	Water pressure at upstream point of apron
Fb =	7.25	k/ft	Buoyant force
Weight resistance =	2.50	k/ft	
Rock anchor resistance =	7.00	k/ft	
FOS =	1.31		Factor of Safety
FOS_req =	1.30		Factor of safety required (EM 1110-2-2100)
CHECK	GOOD		
Bmax =	5.58	ft	Max tributary width
# =	4		#anchors / row
Force/anchor =	9.77	k	
Bond length =	6.00	ft	Bond length of anchor
Sreq =	3.46	ft	Required spacing
Ta =	10.00	k/ft	Capacity of anchor/ft bond length
Ta_total =	60.00	kips	Capacity of anchor
CHECK	GOOD		

Ciani, Whitney
To Autin, Zachary

Reply | Reply All | Forward | ...

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Hi Zack,

For the rock anchors/tiedowns you can use an allowable load transfer of 10 kips/ft. This assumes an 8-inch diameter grouted hole for the anchor. You can use an allowable bond stress of 35 psi to resize or reach out to me and I can update the load transfer for a different anchor size.

To reach full capacity for the anchor, they need to be spaced at a minimum distance of L*tan(30), where L is the bonded length of the anchor – I assumed these would be grouted to the surface with no unbonded length. If they need to be spaced closer than this we just need to reduce the capacity – send me the geometry that you need and we can adjust as needed.

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My references are attached!

CHECK

Slab span 8'
Breakout of anchor
Reduced capacity of #7 due to dev. Length

SUBJECT:	KRRC
	Fall Creek Fish Hatchery
	Structural Calculations

BY:	Zachary Autin	**CHK'D BY:**	Taylor Bowen
DATE:	10/19/2020		
PROJECT NO.:	20-024		

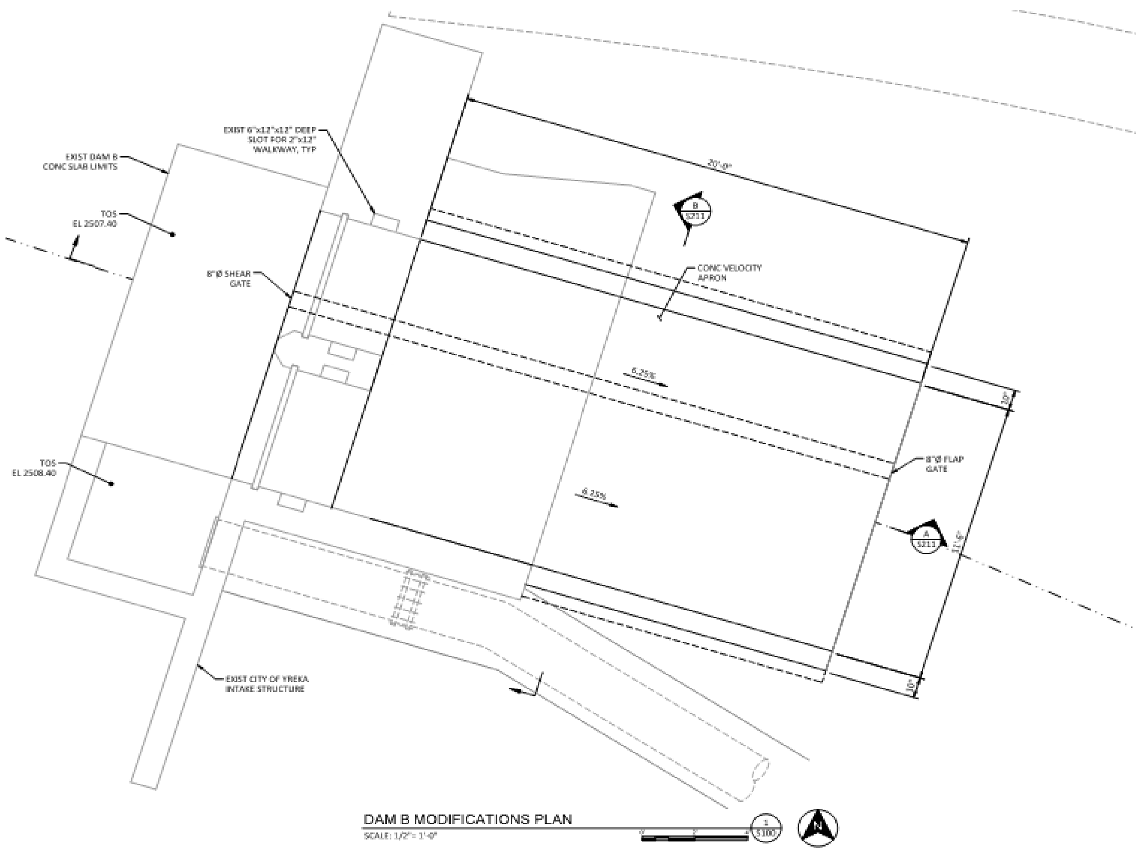
Purpose

Design the walkway beams for the Dam B Modifications.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	28000.00	ksi	Modulus of elasticity of steel reinforcement
Fy =	30.00	ksi	Yield strength of wide flange
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures



Calculations: Walkway

Design 2 beams on each side to support 2' wide pedestrian walkway across dam B piers. FRP grating cannot span 5'.

Usual Load Case - 60 psf elevated platform load

w =	0.09	k/ft	uniform load on beam
L =	13.00	ft	Span length
Mmax =	3.04	k-ft	Max moment in beam

Try W6X25

S =	16.70	in^3	Section modulus
Z =	18.90	in^3	Plastic section modulus
Mn_y =	567.00	k-in	nominal yield moment
ry =	1.52	in	
lp =	81.73	in	
rts =	1.74	in	
J =	0.46	in^4	
c =	1.00		
h0 =	5.93	in	
lr =	445.61	in	
lb =	156.00	in	
Mn_ltb =	522.85	k-in	
phi =	0.90	in	
phi*Mn =	470.57	k-in	
phi*Mn =	39.21	k-ft	
CHECK	GOOD		

McMILLEN JACOBS ASSOCIATES

SUBJECT:	KRRC	**BY:** Zachary Autin	**CHK'D BY:** Taylor Bowen
	Fall Creek Fish Hatchery	**DATE:** 10/19/2020	
	Structural Calculations	**PROJECT NO.:** 20-024	

Purpose

Check temperature and shrinkage reinf. Requirements in pond walls. Design box culvert for H-10 loading.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Calculations: Temp & Shrinkage

Calculations: Longitudinal Steel Walls

Twall =	8.00	in	Wall thickness
rho-min =	0.0060		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.58	in2/ft	Min area of steel
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel

Calculations: Longitudinal Steel Slab

Tslab =	10.00	in	Slab thickness
rho-min =	0.0060		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.72	in2/ft	Min area of steel
size bar =	6.00		Bar size
dbar =	0.75	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.44	in2	Area of 1 bar
As =	0.44	in2/ft	Area of flexural steel

Calculations: Box Culvert

L =	3.50	ft	Span
t =	12.00	in	Roof thickness
D =	0.15	k/ft	Uniform dead load
H =	0.13	k/ft	1' Soil load
LLc =	12.80	k	Factored 16-k axle load/2 (H-10)
wLC2 =	0.38	k/ft	Factored load
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Cover =	2.00	in	Bar cover (center reinforcement)
d = Twall - cover - dbar*0.5 =	9.69	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	2.36	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.35	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.40	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	174.63	k-in	Nominal Moment
Mn =	14.55	k-ft	
Phi*Mn =	13.10	k-ft/ft	
Mmax_f =	11.78	k-ft/ft	Max moment (wheel at center of span)
Check	GOOD		*D/C Ratio = 0.90*

Calculations: Longitudinal Steel

rho-min =	0.0030		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.43	in2/ft	Min area of steel
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel

Calculations: Shear

Lambda =	1.00	kips	Normalweight concrete
Vc = 2*lambda*sqrt(fc')*b*d =	15.60	k/ft	Nominal shear strength
phi =	0.75		Reistance factor - shear
phi*Vc =	11.70	k/ft	Ultimate shear strength
Vmax_f =	10.51	k/ft	Max shear (wheel @ d" from edge of wall)
CHECK	GOOD		*D/C Ratio = 0.90*

SUBJECT:	KRRC	BY: Zachary Autin	CHK'D BY: Taylor Bowen
	Fall Creek Fish Hatchery	DATE: 10/19/2020	
	Structural Calculations	PROJECT NO.: 20-024	

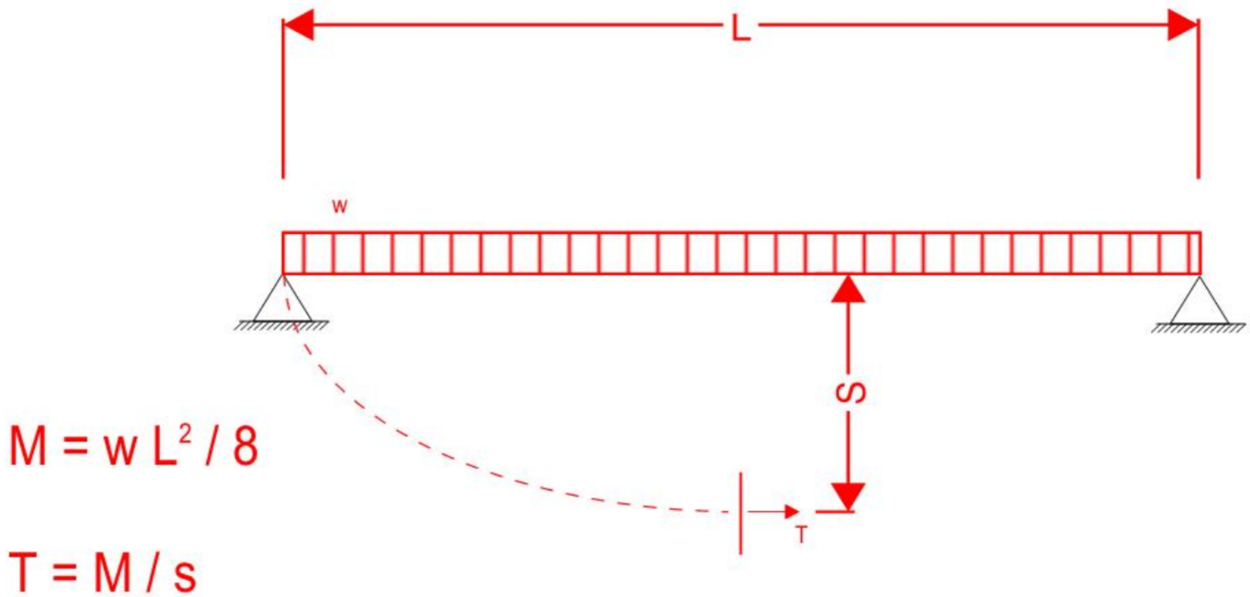
Purpose

Design the walls for the rearing ponds

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc' =	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Fy =	50.00	ksi	Yield Strength of steel members

Figures



L1 =	53.00	ft	Long span
D =	0.0275	psf	Uniform dead load
S =	1.24	psf	Uniform roof snow load
s =	60.00	in	Max sag in netting
w =	1.27	psf	Factored load
M =	0.45	k-ft/ft	cable moment
T =	89.01	lbs/ft	Cable tension

Try HSS 10x6x3/8 concrete filled

wt =	37.69	lbs/ft	Weight of tube
Ai =	49.32	in^2	Inner area
wc =	51.37	lbs/ft	Weight of concrete fill
w =	89.06	lbs/ft	Total weight

Calculations: Pier Design

Calculations: Flexure into ponds

S =	10.00	ft	Column spacing
H =	15.00	ft	Height of column
Mmax =	13.36	k-ft	cable moment
B =	18.00	in	Width of pedestal
T =	26.00	in	Thickness of pedestal
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Cover =	2.00	in	Bar cover
d = T-cover - dbar/2 =	23.69	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As/ft =	0.31	in2/ft	Area of flexural steel
As =	0.46	in^2	Total area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	5.78	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (Table 7.12.2.1)
As,min =	0.85	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.40	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	648.51	k-in	Nominal Moment
Mn =	54.04	k-ft	
Phi*Mn =	48.64	k-ft	
Mmax_f =	21.38	k-ft	256504.812
Check	GOOD		*D/C Ratio = 0.44*

Calculations: Flexure side to side

S =	10.00	ft	Column spacing
Mmax =	1.11	k-ft/ft	cable moment
B =	26.00	in	Width of pedestal
T =	18.00	in	Thickness of pedestal
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Cover =	2.00	in	Bar cover
d = T-cover - dbar/2 =	15.69	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As/ft =	0.31	in2/ft	Area of flexural steel
As =	0.66	in^2	Total area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	3.83	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (Table 7.12.2.1)
As,min =	0.56	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.40	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	617.67	k-in	Nominal Moment
Mn =	51.47	k-ft	
Phi*Mn =	46.33	k-ft	
Mmax_f =	1.78	k-ft	
Check	GOOD		*D/C Ratio = 0.04*

Calculations: Column Design

Calculations: Flexure
Try W8x31

Sx=	27.50	in^3	Section modulus
Zx =	30.40	in^3	Plastic section modulus
Sy=	9.27	in^3	Section modulus
Zy =	14.10	in^3	Plastic section modulus
Mmax_major =	21.38	k-ft	Max moment about major axis
Mmax_minor =	1.78	k-ft	Max moment about minor axis
Pmax =	0.71	k	Max axial load
Pr/Pc =	0.00465695		
phi*Mn_major =	63.5	k-ft	Design strength major axis
phi*Mn_minor =	52.875	k-ft	Design strength minor axis
D:C =	0.37263754		
Check	GOOD		

Calculations: Beam Design

Calculations: Flexure
Try W8x18

Sx=	15.20	in^3	Section modulus
Zx =	17.00	in^3	Plastic section modulus
Sy=	3.04	in^3	Section modulus
Zy =	4.66	in^3	Plastic section modulus
Mmax_major =	1.78	k-ft	Max moment about major axis
Mmax_minor =	1.78	k-ft	Max moment about minor axis
phi*Mn_major =	32.5	k-ft	Design strength major axis
phi*Mn_minor =	17.475	k-ft	Design strength minor axis
D:C =	0.15674196		
Check	GOOD		

McMILLEN JACOBS ASSOCIATES

SUBJECT: KRRC
Fall Creek Fish Hatchery
Structural Calculations

BY: Zachary Autin **CHK'D BY:** Taylor Bowen
DATE: 10/19/2020
PROJECT NO.: 20-024

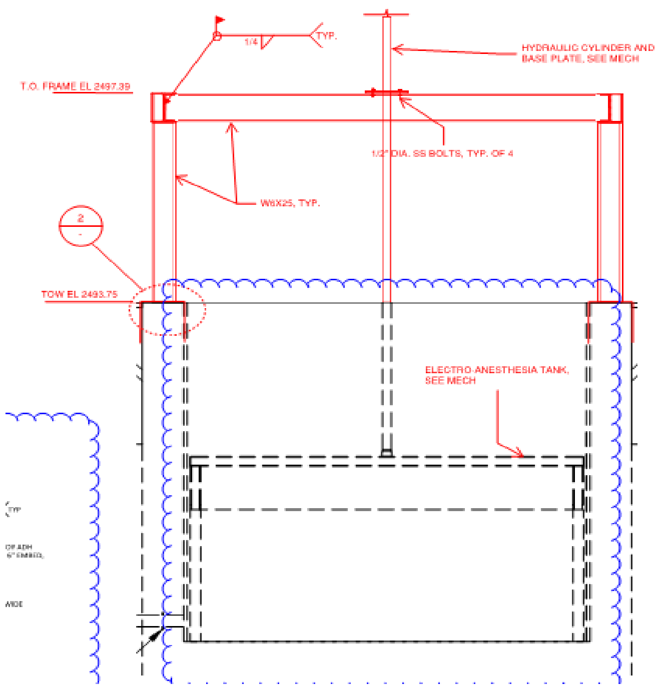
Purpose

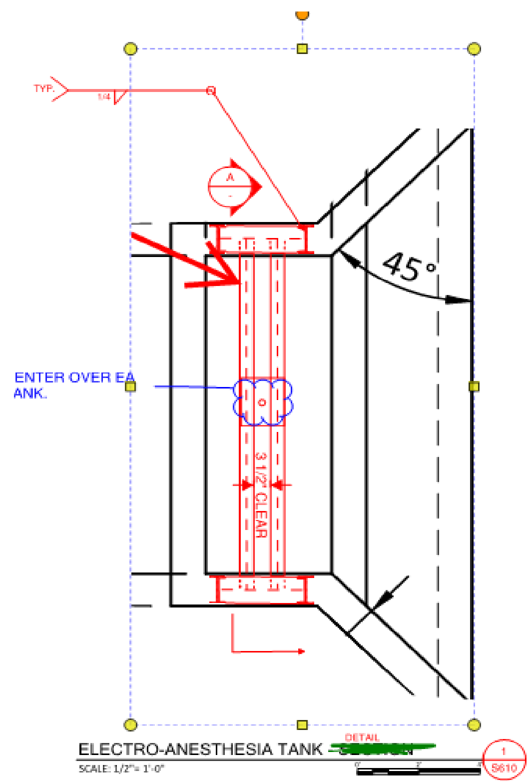
Design the frame for the electro-anesthesia tank outside the spawning building.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	28000.00	ksi	Modulus of elasticity of steel reinforcement
Fy =	30.00	ksi	Yield strength of wide flange
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures





Calculations: EA Tank Hoist Support Frame

Design beam spanning between columns

Ph =	4400.00	lbs	Hoist Max Load
L =	7.20	ft	Span
lb =	86.40	in	
Mmax =	3.960	k-ft	Max moment in 1 beam

Try C6x10.5

b/t =	5.92		
lambda_p =	10.08		COMPACT
S =	5.04	in^3	Section modulus
Z =	6.18	in^3	Plastic section modulus
Mn_y =	185.40	k-in	nominal yield moment
ry =	0.53	in	
lp =	12.93	in	
rts =	0.67	in	
J =	0.13	in^4	
c =	1.00		
h0 =	5.66	in	
lr =	168.46	in	
Mn_ltb =	129.96	k-in	
phi =	0.90	in	
phi*Mn =	116.96	k-in	
phi*Mn =	9.75	k-ft	
CHECK	GOOD		

McMILLEN JACOBS ASSOCIATES

SUBJECT: KRRC
Fall Creek Fish Hatchery
Structural Calculations

BY: Zachary Autin **CHK'D BY:** Taylor Bowen
DATE: 10/19/2020
PROJECT NO.: 20-024

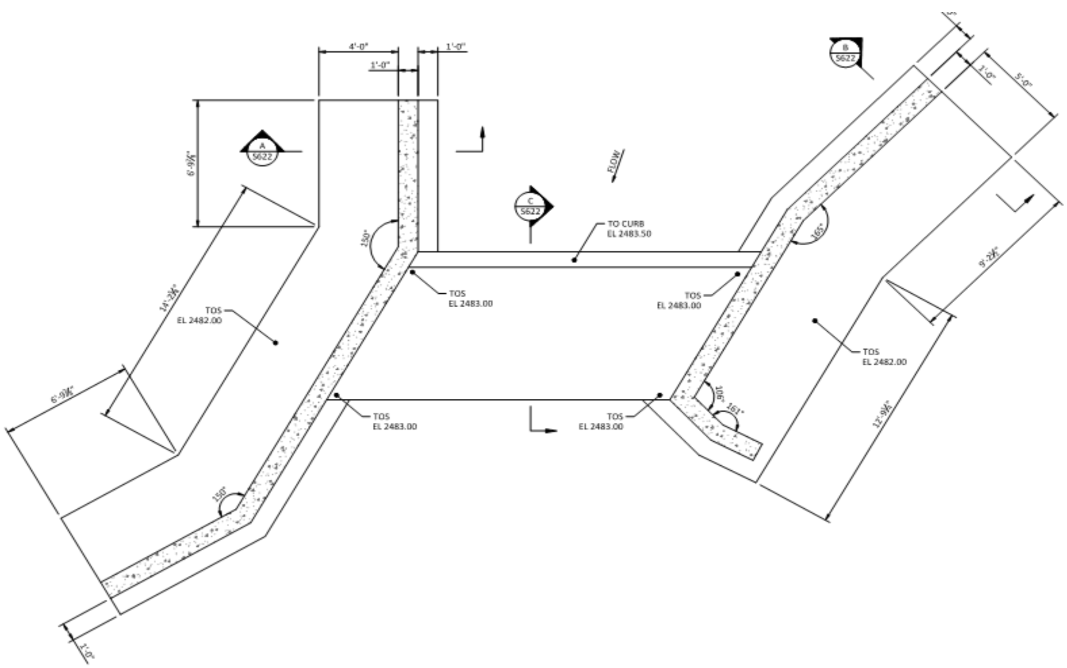
Purpose

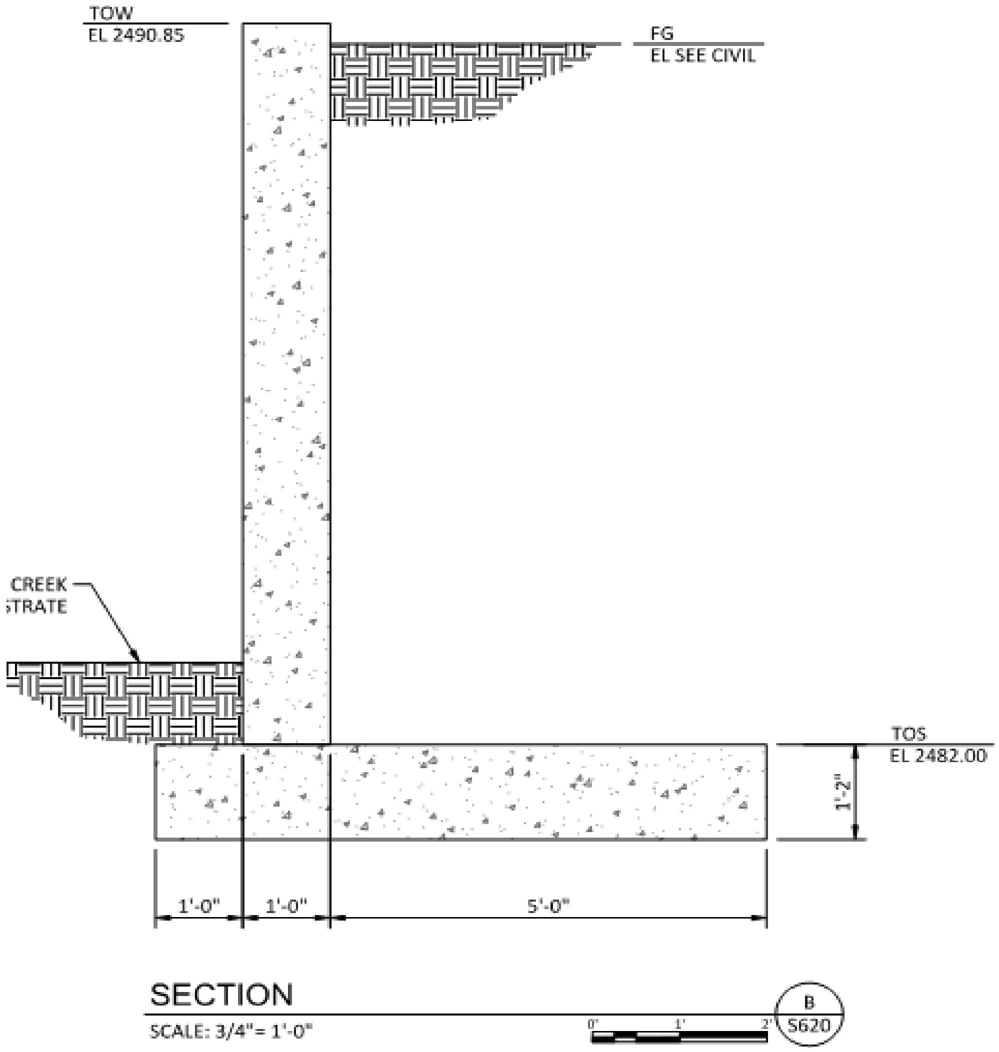
Design the fish barrier east wall for soil loads. Check stability.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures





TOW
EL 2490.85
FG
EL SEE CIVIL
CREEK
STRATE
TOS
EL 2482.00
1'-2"
1'-0"
1'-0"
5'-0"
SECTION
SCALE: 3/4"= 1'-0"
0'
1'
2'
B
S620

Calculations: Loads

Design as a standalone retaining wall structure. Ignore tie-in to intake structure.

Usual Load Case - There is no water differential across the wing wall at any time because this wall is upstream of the cutoff wall

	EL_ts =	2482.00	ft	Elevation top of slab
	EL_twl =	2490.85	ft	Elevation top of wall
	EL_sd =	2490.60	ft	Elevation top of soil - driving side
	t_slab =	12.00	in	Thickness of slab
	t_slab =	1.00	ft	Thickness of slab
	EL_bs =	2481.00	ft	Elevation bottom of slab
Lateral Earth Pressure - driving				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	537.50	psf	Soil pressure top of slab
	P4 =	600.00	psf	Soil pressure bottom of slab
Wall only				
	Fh =	2.31	k	Resultant force (wall only)
	y_h =	3.37	ft	Distance of resultant from center of slab
	M_h =	7.78	k-ft	Max moment in wall
Stability				
	Fh =	2.88	k	Resultant force
	y_h =	3.20	ft	Distance of resultant from base
	M_h =	9.22	k-ft	Overturning moment
Seismic Earth Pressure				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	376.25	psf	Soil pressure top of slab
	P4 =	420.00	psf	Soil pressure bottom of slab
Wall only				
	Fe =	1.62	k	Resultant force (wall only)
	y_e =	3.37	ft	Distance of resultant from center of slab
	M_e =	5.45	k-ft	Max moment in wall
Stability				
	Fe =	2.02	k	Resultant force
	y_e =	3.20	ft	Distance of resultant from base
	M_e =	6.45	k-ft	Overturning moment
Snow Load Surcharge Pressure				
	pg =	57.14	psf	Snow load surcharge
	Ps =	28.57	psf	Lateral snow pressure
Wall only				
	Fe =	0.25	k	Resultant force (wall only)
	y_e =	4.80	ft	Distance of resultant from center of slab
	M_e =	1.18	k-ft	Max moment in wall
Stability				
	Fe =	0.27	k	Resultant force
	y_e =	4.80	ft	Distance of resultant from base
	M_e =	1.32	k-ft	Overturning moment
Flexure				
	LC3a =	14.34	k-ft	Load combination 3a (see design criteria)
	LC6 =	18.13	k-ft	Load combination 6 (see design criteria)
	Mmax_f =	18.13	k-ft/ft	Maximum factored moment in wall
Shear				
	LC3a =	4.09	k	Load combination 3a (see design criteria)
	LC6 =	5.37	k	Load combination 6 (see design criteria)
	Vmax_f =	5.37	k	Maximum factored shear in wall

Calculations: Flexure

Twall =	10.00	in	Wall thickness
size bar =	7.00		Bar size
dbar =	0.88	in	Diameter of bar
Cover =	2.00	in	Bar cover (center reinforcement)
d = Twall - cover - dbar*0.5 =	7.56	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.60	in2	Area of 1 bar
As =	0.60	in2/ft	Area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	1.85	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.27	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.79	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	258.67	k-in	Nominal Moment
Mn =	21.56	k-ft	
Phi*Mn =	19.40	k-ft	
Mmax_f =	18.13	k-ft/ft	
Check	GOOD		*D/C Ratio = 0.93*

Calculations: Longitudinal Steel

rho-min =	0.0020		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.24	in2/ft	Min area of steel
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel

Calculations: Shear

Lambda =	1.00	kips	Normalweight concrete
Vc = 2*lambda*sqrt(fc')*b*d =	12.18	k/ft	Nominal shear strength
phi =	0.75		Reistance factor - shear
phi*Vc =	9.13	k/ft	Ultimate shear strength
Vmax_f =	5.37	k/ft	
CHECK	GOOD		*D/C Ratio = 0.59*

McMILLEN JACOBS ASSOCIATES

Calculations: Stability

Usual Load Case - water EL 2510.4 (see hydraulic profile)

tw =	0.83	ft	Wall thickness
ts =	1.00	ft	Slab thickness
A =	7.00	ft	Heel length
B =	1.00	ft	Toe length
Hw =	8.85	ft	Height of wall
Hsd =	8.60	ft	Height of soil - driving
Hh20 =	29.04	ft	Height of water
Dead Loads			
Ww =	1.11	kips	Weight of wall
x_bar =	7.42	ft	
Ws =	1.33	kips	Weight of slab
x_bar =	4.42	ft	
Earth Loads - driving			
We =	7.52	kips	Weight of soil
x_bar =	3.50	ft	
Fh =	2.88	k	Lateral earth pressure resultant
y_bar =	3.20	ft	Distance of resultant from base
Seismic loads			
Fe =	2.02	k	Seismic earth pressure resultant
y_bar =	3.20	ft	Distance of resultant from base
Snow loads			
Ws =	0.40	kips	Weight of snow
x_bar =	3.50	ft	
Fs =	0.27	k	Snow pressure resultant
y_bar =	4.80	ft	Distance of resultant from base

Load Combinations

Sliding - LC10 @ high water controls by inspection (ASD)

Fd =	4.29	k	Driving Force	
N =	9.96	k	Normal load	Removed 0.6 factor here - overkill
Fr =	4.88	k	Resisting Force	
FOS =	1.14		Factor of Safety	
req. FOS =	1.00		Factor of safety applied to friction coefficients	
Check	GOOD			*D/C Ratio = 0.88*

Overturning - LC10 @ low water controls by inspection (ASD)

B =	8.83	ft	
M+ =	0.00	k-ft	
M- =	37.97	k-ft	
Sum Mo =	37.97	k-ft	
Sum Fy =	9.96	k	
Sum Fx =	4.29	k	
x = Mo/Fy =	3.81	ft	Distance from heel to x-axis intersection
Slope = SumFy/sumFx =	2.32		Slope of resultant line
e =	0.61	ft	Eccentricity
If e <= B/6	Compression		

Bearing Pressure - LC10 @ low water controls by inspection (ASD)

Fy, max =	9.96	kips	Maximum downward force (temp construction load)
Mheel =	37.97	k-ft	
x_bar =	3.81	ft	
e =	0.60	ft	Eccentricity
Pb_max =	1.59	ksf	Maximum bearing pressure
Pa =	3.00	ksf	Allowable bearing pressure
FS = Fv_total/Fu =	1.89		Factor of Safety
If FS>=1.3	GOOD		

McMILLEN JACOBS ASSOCIATES

SUBJECT: KRRC
Fall Creek Fish Hatchery
Structural Calculations

BY: Zachary Autin **CHK'D BY:** Taylor Bowen
DATE: 10/19/2020
PROJECT NO.: 20-024

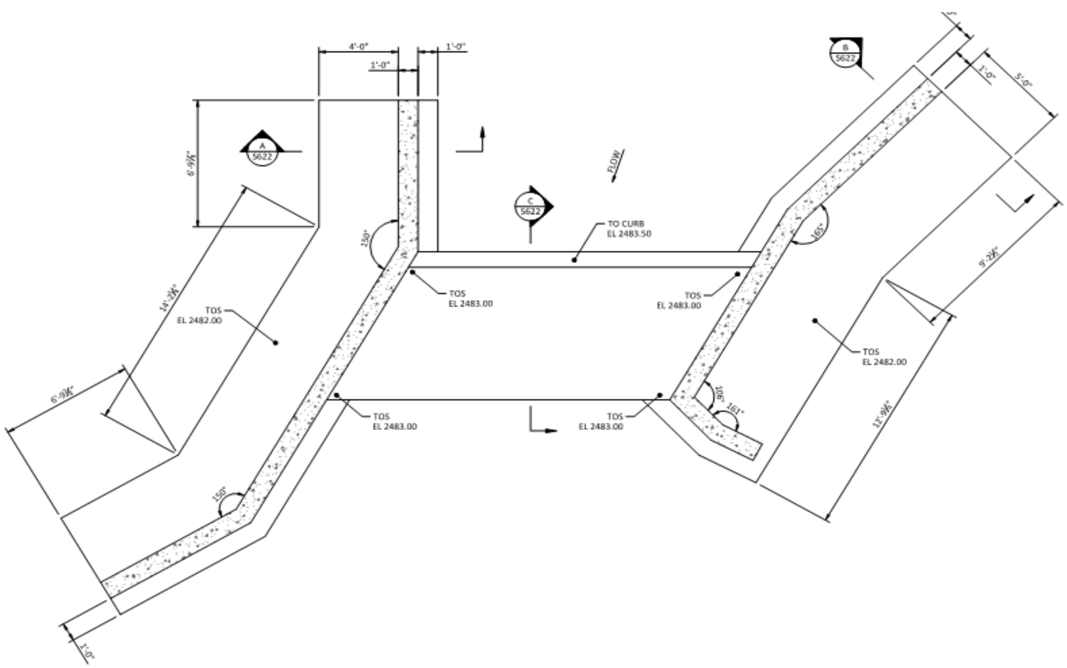
Purpose

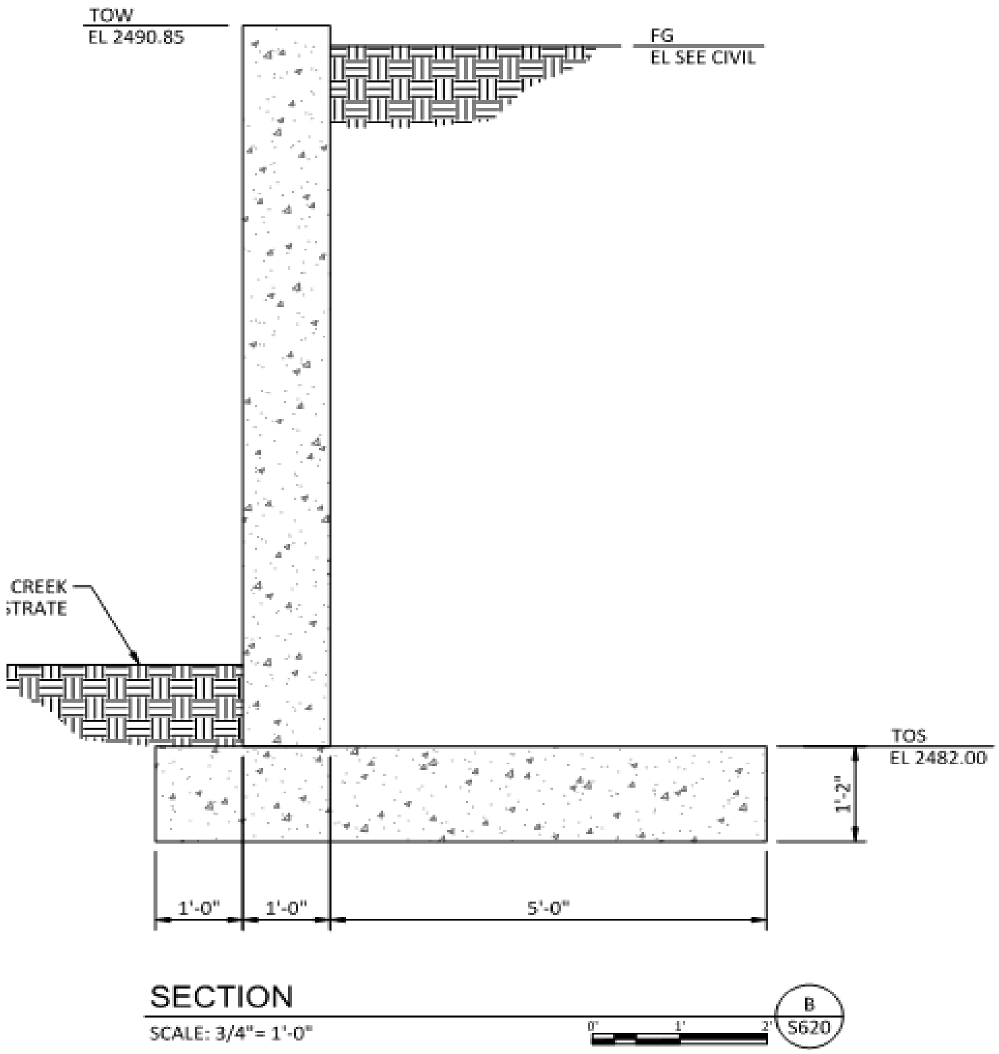
Design the fish barrier east wall for soil loads. Check stability.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures





TOW
EL 2490.85
FG
EL SEE CIVIL
CREEK
STRATE
TOS
EL 2482.00
1'-2"
1'-0"
1'-0"
5'-0"
SECTION
SCALE: 3/4"= 1'-0"
0'
1'
2'
B
S620

Calculations: Loads

Design as a standalone retaining wall structure. Ignore tie-in to intake structure.

Usual Load Case - There is no water differential across the wing wall at any time because this wall is upstream of the cutoff wall

	EL_ts =	2482.00	ft	Elevation top of slab
	EL_twl =	2487.90	ft	Elevation top of wall
	EL_sd =	2487.00	ft	Elevation top of soil - driving side
	t_slab =	12.00	in	Thickness of slab
	t_slab =	1.00	ft	Thickness of slab
	EL_bs =	2481.00	ft	Elevation bottom of slab
Lateral Earth Pressure - driving				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	312.50	psf	Soil pressure top of slab
	P4 =	375.00	psf	Soil pressure bottom of slab
Wall only				
	Fh =	0.78	k	Resultant force (wall only)
	y_h =	2.17	ft	Distance of resultant from center of slab
	M_h =	1.69	k-ft	Max moment in wall
Stability				
	Fh =	1.13	k	Resultant force
	y_h =	2.00	ft	Distance of resultant from base
	M_h =	2.25	k-ft	Overturning moment
Seismic Earth Pressure				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	218.75	psf	Soil pressure top of slab
	P4 =	262.50	psf	Soil pressure bottom of slab
Wall only				
	Fe =	0.55	k	Resultant force (wall only)
	y_e =	2.17	ft	Distance of resultant from center of slab
	M_e =	1.18	k-ft	Max moment in wall
Stability				
	Fe =	0.79	k	Resultant force
	y_e =	2.00	ft	Distance of resultant from base
	M_e =	1.58	k-ft	Overturning moment
Snow Load Surcharge Pressure				
	pg =	57.14	psf	Snow load surcharge
	Ps =	28.57	psf	Lateral snow pressure
Wall only				
	Fe =	0.14	k	Resultant force (wall only)
	y_e =	3.00	ft	Distance of resultant from center of slab
	M_e =	0.43	k-ft	Max moment in wall
Stability				
	Fe =	0.17	k	Resultant force
	y_e =	3.00	ft	Distance of resultant from base
	M_e =	0.51	k-ft	Overturning moment
Flexure				
	LC3a =	3.39	k-ft	Load combination 3a (see design criteria)
	LC6 =	3.98	k-ft	Load combination 6 (see design criteria)
	Mmax_f =	3.98	k-ft/ft	Maximum factored moment in wall
Shear				
	LC3a =	1.48	k	Load combination 3a (see design criteria)
	LC6 =	1.83	k	Load combination 6 (see design criteria)
	Vmax_f =	1.83	k	Maximum factored shear in wall

McMILLEN JACOBS ASSOCIATES

Calculations: Flexure

Twall =	10.00	in	Wall thickness
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Cover =	2.00	in	Bar cover (center reinforcement)
d = Twall - cover - dbar*0.5 =	7.69	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	1.88	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.28	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.40	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	137.82	k-in	Nominal Moment
Mn =	11.48	k-ft	
Phi*Mn =	10.34	k-ft	
Mmax_f =	3.98	k-ft/ft	
Check	GOOD		*D/C Ratio = 0.38*

Calculations: Longitudinal Steel

rho-min =	0.0050		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.60	in2/ft	Min area of steel
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel

Calculations: Shear

Lambda =	1.00	kips	Normalweight concrete
Vc = 2*lambda*sqrt(fc')*b*d =	12.38	k/ft	Nominal shear strength
phi =	0.75		Reistance factor - shear
phi*Vc =	9.28	k/ft	Ultimate shear strength
Vmax_f =	1.83	k/ft	
CHECK	GOOD		*D/C Ratio = 0.20*

Calculations: Stability

Usual Load Case - water EL 2510.4 (see hydraulic profile)

tw =	0.83	ft	Wall thickness
ts =	1.00	ft	Slab thickness
A =	4.00	ft	Heel length
B =	1.00	ft	Toe length
Hw =	5.90	ft	Height of wall
Hsd =	5.00	ft	Height of soil - driving
Hh20 =	29.04	ft	Height of water
Dead Loads			
Ww =	0.74	kips	Weight of wall
x_bar =	4.42	ft	
Ws =	0.88	kips	Weight of slab
x_bar =	2.92	ft	
Earth Loads - driving			
We =	2.50	kips	Weight of soil
x_bar =	2.00	ft	
Fh =	1.13	k	Lateral earth pressure resultant
y_bar =	2.00	ft	Distance of resultant from base
Seismic loads			
Fe =	0.79	k	Seismic earth pressure resultant
y_bar =	2.00	ft	Distance of resultant from base
Snow loads			
Ws =	0.23	kips	Weight of snow
x_bar =	2.00	ft	
Fs =	0.17	k	Snow pressure resultant
y_bar =	3.00	ft	Distance of resultant from base

Load Combinations

Sliding - LC10 @ high water controls by inspection (ASD)

Fd =	1.68	k	Driving Force	
N =	4.11	k	Normal load	Removed 0.6 factor here - overkill
Fr =	2.02	k	Resisting Force	
FOS =	1.20		Factor of Safety	
req. FOS =	1.00		Factor of safety applied to friction coefficients	
Check	GOOD			*D/C Ratio = 0.83*

Overturning - LC10 @ low water controls by inspection (ASD)

B =	5.83	ft	
M+ =	0.00	k-ft	
M- =	9.84	k-ft	
Sum Mo =	9.84	k-ft	
Sum Fy =	4.11	k	
Sum Fx =	1.68	k	
x = Mo/Fy =	2.39	ft	Distance from heel to x-axis intersection
Slope = SumFy/sumFx =	2.45		Slope of resultant line
e =	0.53	ft	Eccentricity
If e <= B/6	Compression		

Bearing Pressure - LC10 @ low water controls by inspection (ASD)

Fy, max =	4.11	kips	Maximum downward force (temp construction load)
Mheel =	9.84	k-ft	
x_bar =	2.39	ft	
e =	0.52	ft	Eccentricity
Pb_max =	1.09	ksf	Maximum bearing pressure
Pa =	3.00	ksf	Allowable bearing pressure
FS = Fv_total/Fu =	2.76		Factor of Safety
If FS>=1.3	GOOD		

McMILLEN JACOBS ASSOCIATES

SUBJECT:	KRRC	**BY:** Zachary Autin	**CHK'D BY:** Taylor Bowen
	Fall Creek Fish Hatchery	**DATE:** 10/19/2020	
	Structural Calculations	**PROJECT NO.:** 20-024	

Purpose

Design the pickett screens for water differential across the screens and fish impact.

Information

gamma_a =	172.8	pcf	Unit weight of aluminum
gamma_w =	62.4	pcf	Unit weight water
Fty =	35.00	ksi	Yield Strength of aluminum - tensile
Ftu =	42.00	ksi	Ultimate strength of aluminum - tensile
Fcy =	35.00	ksi	Yield Strength of aluminum - compression
Ea =	10100.00	ksi	Modulus of elasticity of aluminum
Theta =	60.00	degrees	Angle of pickets with horizontal
Theta =	1.05	radians	Angle of picket w/ respect to horizontal
c =	1.00	in	Clear spacing of picket bars
V =	2.03	fps	Velocity of flow
ν =	0.00001410	ft^2/s	Kinematic viscosity of water
ρ =	1.94	slugs/ft^3	Density of water
EL_sill =	2483.00	ft	Sill elevation
EL_top =	2487.40	ft	Elevation of top of picketts
EL_sup =	2485.40	ft	Elevation of support leg
EL_wu =	2485.40	ft	Upstream water elevation
EL_wu =	2484.77	ft	Downstream water elevation
h =	0.63	ft	Head differential across pickets (Hydraulic Calcs)

Figures

NMFS Guidelines (Pickets)	Value		Comments
Picket Clear Spacing	1	in	NMFS 5.3.2.1, max
Maximum River Velocity	1.25	ft/s	NMFS 5.3.2.2
Average River Velocity	1	ft/s	NMFS 5.3.2.2, gross picket area
Maximum Head Differential	0.3	ft	NMFS 5.3.2.3, on the clean picket condition
Debris and Sediment	-		NMFS 5.3.2.4, debris and sediment removal must be considered
Picket Barrier Orientation	-		NMFS 5.3.2.5, direct fish toward fishway
Minimum Picket Freeboard	2	ft	NMFS 5.3.2.6 (during fish passage)
Minimum Submerged Depth	2	ft	NMFS 5.3.2.7, for 10% of cross-section; low design flow
Minimum Percent Open	40%		NMFS 5.3.2.8
Picket Materials	-		NMFS 5.3.2.9, Flat or round, steel, aluminum, or durable plastic
Picket Sill	-		NMFS 5.3.2.10, Uniform concrete sill

Barrier 1 (Lower)	Value		Comments
Natural Channel Width	15.00	ft	Measured from upstream and downstream transects
Broad-Crested Weir Coefficient	2.65		Brater et al., 1976; 5.0-ft wide crest; ~ 1.0 - 2.0 overflow
Floodplain Weir Elevation	2488.00	ft	
Floodplain Weir Crest Length	30.00	ft	Measured in CAD
Sill Crest Elevation	2483.00	ft	
Screen Angle to Horiz	60.00	deg	
Adult High Flow WSEL	2484.77	ft	See 'Tailwater' Calculations
Adult Low Flow WSEL	2484.12	ft	See 'Tailwater' Calculations
2-year Flood WSEL	2485.13	ft	See 'Tailwater' Calculations
100-year Flood WSEL	2487.21	ft	See 'Tailwater' Calculations

Rotation Angle about Stream (°)	Adult High Flow			Adult Low Flow		
	Discharge cfs	Flow Depth ft	Flow Velocity ft/s	Discharge cfs	Flow Depth ft	Flow Velocity ft/s
0	71.86	1.77	2.34	23.40	1.12	1.21
5	71.86	1.77	2.34	23.40	1.12	1.20
10	71.86	1.77	2.31	23.40	1.12	1.19
15	71.86	1.77	2.26	23.40	1.12	1.17
20	71.86	1.77	2.20	23.40	1.12	1.13
25	71.86	1.77	2.12	23.40	1.12	1.09
30	**71.86**	**1.77**	**2.03**	**23.40**	**1.12**	**1.04**

Calculations: Picket rods

McMILLEN JACOBS ASSOCIATES

L =	5.081	ft	Length of picketts
x =	2.540	ft	x-dim picketts
Hs =	2.400	ft	Height of support leg
Ls =	2.771	ft	Unsupported length of pickett
xs =	1.386	ft	x-dim support leg
x_total =	3.926	ft	Required wall-socket length to install pickets
O.D. =	0.675	in	Outer Diameter
I.D. =	0.493	in	Inner Diameter
t =	0.091	in	thickness
w =	0.196	lbs/ft	Nominal weight
I =	0.007	in^4	Moment of Inertia
r =	0.209	in	Radius of gyration
S =	0.022	in^3	Section modulus
A =	0.167	in^2	Area

Information

E =	10100000.000	psi	Modulus of elasticity of Aluminum
I =	0.007	in^4	Moment of Intertia
d =	0.675	in	Diameter of bar

Hydrodynamic

v_perp =	1.758	fps	velocty of flow perpendicular to pickets
RE =	0.157		Reynolds number
Cd =	19.323		Fig. 11.5 - *Engineering Fluid Mechanics, Roberson and Crowe (1993)*
N =	7.164	#/ft	Number of bars per ft
Ap =	0.403	ft^2/ft^2	Area of pickets perpendicular to flow per square foot
wd_perp =	23.345	psf	Drag force

Hydrostatic

wh =	15.842	psf	Hydrostatic force

Dead

w =	0.196	lbs/ft	weight per foot of aluminum pipe
W =	1.404	psf	Total weight of picket / sf
wdead_perp =	0.702	psf	Force due to self weight perpendicular to pickets

Longitudinal Deflection Check

wtotal =	39.889	psf	Total unfactored uniform load
I_total =	0.052	in^4	moment of inertia of pickets in a 1' square
delta = 5wl^4/384EI =	0.008	in	deflection of pickets

Bending Stress

w_f =	55.844	psf	Total factored uniform load (LC1)
Mmax =	53.611	lb-ft	moment of inertia of pickets in a 1' square
fb = Mc/I =	4.157	ksi	Bending stress in pickett

Calculations: Rectangular Frames

a =	4	in	
B =	19.33333333	ft	total width of picket barrier
b =	6.379340278	ft	width of 1 pickett panel
R+ =	0.494	k	perpendicular force in brace
R =	0.570	k	Axial force in brace

Use RT 3X3x3/16

w =	2.490	lbs/ft	weight
A =	2.110	in^2	area
I =	2.800	in^4	Moment of inertia
S =	1.870	in^3	Section modulus
b/t =	14.000		
L =	2.771	ft	equilateral triangle
lambda_1 =	20.800		ADM B.5.4.2, Table 2-18 -> YIELDING CONTROLS

Yielding

F/OMEGA =	21.200	ksi	Compressive strength (ADM B.5.4.2)
F =	34.980	ksi	Compressive strength (ADM B.5.4.2)
Pn = Fc*A =	73.808	kips	Nominal strength
phi*Pn =	66.427	kips	Design strength
Check	GOOD		

Use LS 1 1/2X1 1/2X3/16

w =	0.620	lbs/ft	weight

Calculations: Dwgs

H =	0.875	in	hole diameter
OD =	0.675	in	hole diameter
S =	1.675	in	Spacing of picketts
b =	76.552	in	width of panel
e =	0.588		edge spacing
# =	45.001		# spaces per panel
Wf =	60.381	lbs	Weight of frame
Wp =	0.996	lbs	Weight of indiv. Picketts
	232.000		

228.000

front plates	back plates
232	232
12	77.052
12	0.0625
11.5	77.89583333
12	38.94791667
11.5	0.9375
12	75.375
161	0.375
53.66666667	0.5625
0.625	

SUBJECT:	KRRC
	Fall Creek Fish Hatchery
	Structural Calculations

BY:	Zachary Autin	**CHK'D BY:**	Taylor Bowen
DATE:	10/19/2020		
PROJECT NO.:	20-024		

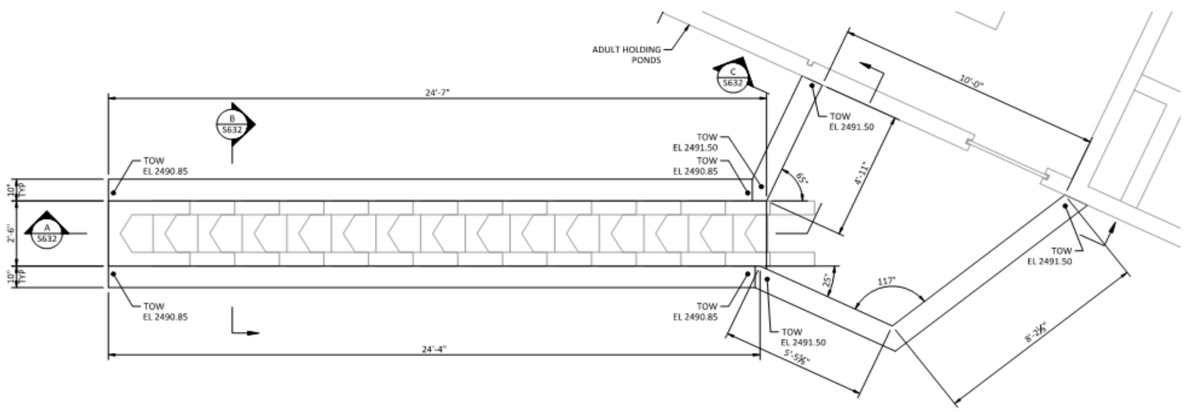
Purpose

Design the fish ladder walls for soil loads.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures



FISH LADDER TOP PLAN

Calculations: Loads

Design as a standalone retaining wall structure. Ignore tie-in to intake structure.

Usual Load Case - There is no water differential across the wing wall at any time because this wall is upstream of the cutoff wall

	EL_ts =	2482.07	ft	Elevation top of slab
	EL_twl =	2490.85	ft	Elevation top of wall
	EL_sd =	2490.60	ft	Elevation top of soil - driving side
	t_slab =	12.00	in	Thickness of slab
	t_slab =	1.00	ft	Thickness of slab
	EL_bs =	2481.07	ft	Elevation bottom of slab
Lateral Earth Pressure - driving				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	533.12	psf	Soil pressure top of slab
	P4 =	595.62	psf	Soil pressure bottom of slab
Wall only				
	Fh =	2.27	k	Resultant force (wall only)
	y_h =	3.34	ft	Distance of resultant from center of slab
	M_h =	7.60	k-ft	Max moment in wall
Stability				
	Fh =	2.84	k	Resultant force
	y_h =	3.18	ft	Distance of resultant from base
	M_h =	9.02	k-ft	Overturning moment
Seismic Earth Pressure				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	373.19	psf	Soil pressure top of slab
	P4 =	416.94	psf	Soil pressure bottom of slab
Wall only				
	Fe =	1.59	k	Resultant force (wall only)
	y_e =	3.34	ft	Distance of resultant from center of slab
	M_e =	5.32	k-ft	Max moment in wall
Stability				
	Fe =	1.99	k	Resultant force
	y_e =	3.18	ft	Distance of resultant from base
	M_e =	6.31	k-ft	Overturning moment
Snow Load Surcharge Pressure				
	pg =	57.14	psf	Snow load surcharge
	Ps =	28.57	psf	Lateral snow pressure
Wall only				
	Fe =	0.24	k	Resultant force (wall only)
	y_e =	4.76	ft	Distance of resultant from center of slab
	M_e =	1.16	k-ft	Max moment in wall
Stability				
	Fe =	0.27	k	Resultant force
	y_e =	4.76	ft	Distance of resultant from base
	M_e =	1.30	k-ft	Overturning moment
Flexure				
	LC3a =	14.02	k-ft	Load combination 3a (see design criteria)
	LC6 =	17.72	k-ft	Load combination 6 (see design criteria)
	Mmax_f =	17.72	k-ft/ft	Maximum factored moment in wall
Shear				
	LC3a =	4.03	k	Load combination 3a (see design criteria)
	LC6 =	5.28	k	Load combination 6 (see design criteria)
	Vmax_f =	5.28	k	Maximum factored shear in wall

Calculations: Flexure

Twall =	10.00	in	Wall thickness
size bar =	7.00		Bar size
dbar =	0.88	in	Diameter of bar
Cover =	2.00	in	Bar cover (center reinforcement)
d = Twall - cover - dbar*0.5 =	7.56	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.60	in2	Area of 1 bar
As =	0.60	in2/ft	Area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	1.85	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.27	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.79	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	258.67	k-in	Nominal Moment
Mn =	21.56	k-ft	
Phi*Mn =	19.40	k-ft	
Mmax_f =	17.72	k-ft/ft	
Check	GOOD		*D/C Ratio = 0.91*

Calculations: Longitudinal Steel

rho-min =	0.0040		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.48	in2/ft	Min area of steel
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel

Calculations: Shear

Lambda =	1.00	kips	Normalweight concrete
Vc = 2*lambda*sqrt(fc')*b*d =	12.18	k/ft	Nominal shear strength
phi =	0.75		Reistance factor - shear
phi*Vc =	9.13	k/ft	Ultimate shear strength
Vmax_f =	5.28	k/ft	
CHECK	GOOD		*D/C Ratio = 0.58*

McMILLEN JACOBS ASSOCIATES

SUBJECT:	KRRC	**BY:** Zachary Autin	**CHK'D BY:** Taylor Bowen
	Fall Creek Fish Hatchery	**DATE:** 10/19/2020	
	Structural Calculations	**PROJECT NO.:** 20-024	

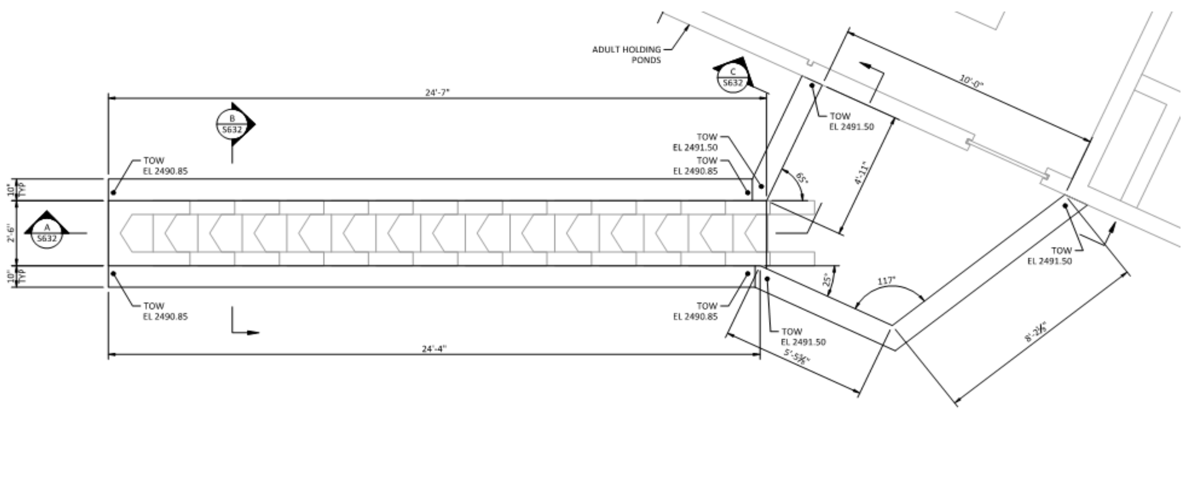
Purpose

Design the fish ladder upper pool walls for soil loads.

Information

gamma_s =	125	pcf	Unit weight soil
gamma_w =	62.4	pcf	Unit weight water
gamma_c =	150	pcf	Unit weight concrete
fc'=	4.50	ksi	Compressive strength
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement
Ka =	0.29		Active Pressure Coefficient
Ko =	0.50		At-rest Pressure Coefficient
Ke =	0.35		Seismic pressure coefficient
mu_CIP =	0.49		Soil friction coefficient - cast in place
mu_precast =	0.39		Soil friction coefficient - precast
Pa =	3000.00	psf	Allowable Bearing Pressure
pg =	57.14	psf	Ground snow load

Figures



FISH LADDER TOP PLAN

MCMILLEN JACOBS ASSOCIATES

Calculations: Loads

Design as a standalone retaining wall structure. Ignore tie-in to intake structure.

Usual Load Case - There is no water differential across the wing wall at any time because this wall is upstream of the cutoff wall

	EL_ts =	2484.50	ft	Elevation top of slab
	EL_twl =	2491.50	ft	Elevation top of wall
	EL_sd =	2491.00	ft	Elevation top of soil - driving side
	t_slab =	12.00	in	Thickness of slab
	t_slab =	1.00	ft	Thickness of slab
	EL_bs =	2483.50	ft	Elevation bottom of slab
Lateral Earth Pressure - driving				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	406.25	psf	Soil pressure top of slab
	P4 =	468.75	psf	Soil pressure bottom of slab
Wall only				
	Fh =	1.32	k	Resultant force (wall only)
	y_h =	2.67	ft	Distance of resultant from center of slab
	M_h =	3.52	k-ft	Max moment in wall
Stability				
	Fh =	1.76	k	Resultant force
	y_h =	2.50	ft	Distance of resultant from base
	M_h =	4.39	k-ft	Overturning moment
Seismic Earth Pressure				
	P1 =	0.00	psf	Soil pressure top of wall
	P2 =	0.00	psf	Soil pressure top of soil
	P3 =	284.38	psf	Soil pressure top of slab
	P4 =	328.13	psf	Soil pressure bottom of slab
Wall only				
	Fe =	0.92	k	Resultant force (wall only)
	y_e =	2.67	ft	Distance of resultant from center of slab
	M_e =	2.46	k-ft	Max moment in wall
Stability				
	Fe =	1.23	k	Resultant force
	y_e =	2.50	ft	Distance of resultant from base
	M_e =	3.08	k-ft	Overturning moment
Snow Load Surcharge Pressure				
	pg =	57.14	psf	Snow load surcharge
	Ps =	28.57	psf	Lateral snow pressure
Wall only				
	Fe =	0.19	k	Resultant force (wall only)
	y_e =	3.75	ft	Distance of resultant from center of slab
	M_e =	0.70	k-ft	Max moment in wall
Stability				
	Fe =	0.21	k	Resultant force
	y_e =	3.75	ft	Distance of resultant from base
	M_e =	0.80	k-ft	Overturning moment
Flexure				
	LC3a =	6.75	k-ft	Load combination 3a (see design criteria)
	LC6 =	8.24	k-ft	Load combination 6 (see design criteria)
	Mmax_f =	8.24	k-ft/ft	Maximum factored moment in wall
Shear				
	LC3a =	2.41	k	Load combination 3a (see design criteria)
	LC6 =	3.07	k	Load combination 6 (see design criteria)
	Vmax_f =	3.07	k	Maximum factored shear in wall

McMILLEN JACOBS ASSOCIATES

Calculations: Flexure

Twall =	10.00	in	Wall thickness
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Cover =	2.00	in	Bar cover (center reinforcement)
d = Twall - cover - dbar*0.5 =	7.69	in	Depth to tension reinforcement
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel
Beta1 =	0.85		
rho-b = 0.85*Beta1*fc'/fy*(87/(87+fy)) =	0.03		Balanced % steel
rho-max =	0.020		Max % steel
As,max =	1.88	in2/ft	Max area of flexural steel
rho-min =	0.003		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.28	in2/ft	Min area of steel
a = As*fy/(0.85*fc'*b) =	0.40	in	
phi =	0.90		
Mn = As*fy*(d-a/2) =	137.82	k-in	Nominal Moment
Mn =	11.48	k-ft	
Phi*Mn =	10.34	k-ft	
Mmax_f =	8.24	k-ft/ft	
Check	GOOD		*D/C Ratio = 0.80*

Calculations: Longitudinal Steel

rho-min =	0.0040		Min % steel (ACI 350-06 Table 7.12.2.1)
As,min =	0.48	in2/ft	Min area of steel
size bar =	5.00		Bar size
dbar =	0.63	in	Diameter of bar
Spacing =	12.00	in	Spacing of bars
Abar =	0.31	in2	Area of 1 bar
As =	0.31	in2/ft	Area of flexural steel

Calculations: Shear

Lambda =	1.00	kips	Normalweight concrete
Vc = 2*lambda*sqrt(fc')*b*d =	12.38	k/ft	Nominal shear strength
phi =	0.75		Reistance factor - shear
phi*Vc =	9.28	k/ft	Ultimate shear strength
Vmax_f =	3.07	k/ft	
CHECK	GOOD		*D/C Ratio = 0.33*

SUBJECT:	KRRC	**BY:** Zachary Autin	**CHK'D BY:** Taylor Bowen
	Fall Creek Fish Hatchery	**DATE:** 10/19/2020	
	Structural Calculations	**PROJECT NO.:** 20-024	

Purpose

Design the bar screen for head differential

Information

gamma_a =	172.8	pcf	Unit weight of aluminum
gamma_w =	62.4	pcf	Unit weight water
Fty =	35.00	ksi	Yield Strength of aluminum - tensile
Ftu =	42.00	ksi	Ultimate strength of aluminum - tensile
Fcy =	35.00	ksi	Yield Strength of aluminum - compression
Ea =	10100.00	ksi	Modulus of elasticity of aluminum

Figures

Andrew Leman
To Autin, Zachary
Cc Burns, Jodi; Heindel, Jeff

Follow up. Start by Friday, August 7, 2020. Due by Friday, August 7, 2020.

Zack,

Below was the information requested for the structural design of the bar screen at the bottom of the Denil fishway:

- Bar Diameter: ½" dia. tubes (aluminum?)
- Clear Spacing: 1"
- Screen offset from Denil edge: 1'-0" (to centerline of slot)
- Offset from screen to first baffle: 0'-6" (O.C. of slots)
- Maximum Head Differential: 0.9 ft
- Denil Inner Width: 2'-6" (add what is needed for slots, 3" either side?)
- Screen Height: 4'-0" (based on the 2-year WSEL in Fall Creek + head differential + 6-inch freeboard)

McMILLEN JACOBS ASSOCIATES

Calculations: Bar Screens

Usual Load Case - There is no water differential across the wing wall at any time because this wall is upstream of the cutoff wall

EL_b =	2482.07	ft	Elevation bottom of bar screen
H =	4.00	ft	Height of bar screen
EL_t =	2486.07	ft	Elevation top of bar screen
EL_wu =	2486.07	ft	Upstream water surface EL
hd =	0.90	ft	Head drop across screen
EL_wd =	2485.17	ft	Downstream water surface EL

Information

d =	0.50	in	Diameter of rod
r =	0.25	in	Radius of rod
A =	0.20	in^2	Area of rod
I =	0.00307	in^4	Moment of Intertia
c =	1.00	in	Clear spacing
b =	1.50	in	Tributary width of 1 rod
Z =	0.01227	in	Plastic section modulus
S =	0.01227	in	Elastic section modulus
kt =	1.00000		6061-T6 wrought bar

Hydrostatic

Ptop=	56.16	psf	Pressure @ ds ws el
Pbot =	56.16	psf	Pressure @ bottom of screen

Flexure

L =	4.00	ft
Mmax =	14.04	lb-ft
Mmax_f =	22.46	lb-ft
Mnp, y =	0.43	k-in
Mnp, r =	0.52	k-in
phi*Mnp =	32.21	lb-ft
CHECK	GOOD	

D:C Ratio = 0.70

Weight

# rods =	21.00		
Vrod =	0.00545	cf	Volume of 1 rod
Vrods =	0.11454	cf	Volume of all rods
# bars =	2.00		
Vbar =	0.01432	cf	Volume of 1 bar
Vbars =	0.02865	cf	Volume of all bars
Vtotal =	0.14318	cf	Total volume
W =	24.74	lbs	Total weight

SUBJECT: KRRC
Fall Creek Fish Hatchery
Structural Calculations

BY: Zachary Autin **CHK'D BY:** Taylor Bowen
DATE: 10/19/2020
PROJECT NO.: 20-024

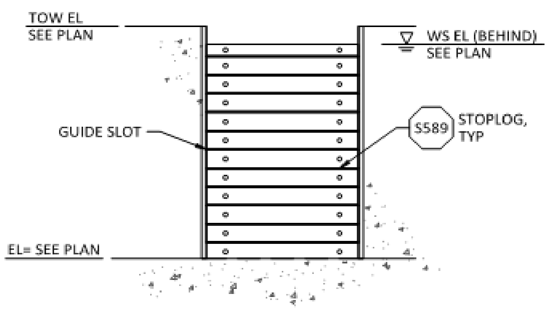
Purpose

Design the dam boards at the intake structure

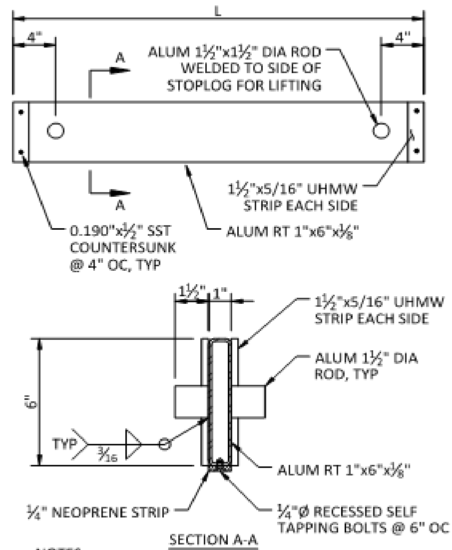
Information

gamma_a =	172.8	pcf	Unit weight of aluminum
gamma_w =	62.4	pcf	Unit weight water
Fty =	35.00	ksi	Yield Strength of aluminum - tensile
Ftu =	42.00	ksi	Ultimate strength of aluminum - tensile
Fcy =	35.00	ksi	Yield Strength of aluminum - compression
Ea =	10100.00	ksi	Modulus of elasticity of aluminum

Figures



STOPLOG GUIDE SLOT S588
SCALE: NTS



NOTES:
1. LENGTH (L) PER LOCATION - SEE PLAN FOR DETAILS.
2. STOPLOG LENGTH TO BE FIELD VERIFIED BEFORE FABRICATION.

STOPLOG S589
SCALE: NTS

Calculations: Ponds - 5 ft boards, Dam B

	h =	4.00	ft	Head differential across boards
	L =	5.50	ft	Span
Check bottom most board				
	H_board =	6.00	in	Height of board
	Ptop =	218.40	psf	Pressure @ top of board
	Pbottom =	249.60	psf	Elevation of support leg
	w =	117.00	lbs/ft	Distributed load across dam boards
	Mmax =	442.41	lbs-ft	Downstream water elevation
Try Alum RT 6x1x1/8				
	I =	6.12	in^4	Moment of inertia
	S =	2.04	in^3	Elastic section modulus
	Z =	2.80	in^3	Plastic section modulus
	ry =	1.90	in	Radius of gyration
	A =	1.69	in^2	Area
	Yielding			
	Z*Fcy =	98.00	k-in	
	1.5*St*Fty =	107.10	k-in	
	1.5*S*Fcy =	107.10	k-in	
	Mn_y =	98.00	k-in	
	phi =	0.90		
	phi*Mn_y =	88.20	k-in	
	Rupture			
	Mn_r =	117.60	k-in	
	phi =	0.75	k-in	
	phi*Mn_r =	88.20	k-in	
	phi*Mn =	88.20	k-in	
	Mmax =	7.43	k-in	Factored moment
	CHECK	GOOD		

Calculations: Intake

	h =	6.90	ft	Head differential across boards
	L =	4.00	ft	Span
Check bottom most board				
	H_board =	6.00	in	Height of board
	Ptop =	399.36	psf	Pressure @ top of board
	Pbottom =	430.56	psf	Elevation of support leg
	w =	207.48	lbs/ft	Distributed load across dam boards
	Mmax =	414.96	lbs-ft	Downstream water elevation
Try Alum RT 6x1x1/8				
	I =	6.12	in^4	Moment of inertia
	S =	2.04	in^3	Elastic section modulus
	Z =	2.80	in^3	Plastic section modulus
	ry =	1.90	in	Radius of gyration
	A =	1.69	in^2	Area
	Yielding			
	Z*Fcy =	98.00	k-in	
	1.5*St*Fty =	107.10	k-in	
	1.5*S*Fcy =	107.10	k-in	
	Mn_y =	98.00	k-in	
	phi =	0.90		
	phi*Mn_y =	88.20	k-in	
	Rupture			
	Mn_r =	117.60	k-in	
	phi =	0.75	k-in	
	phi*Mn_r =	88.20	k-in	
	phi*Mn =	88.20	k-in	
	Mmax =	6.97	k-in	Factored moment
	CHECK	GOOD		

Calculation Cover Sheet

Rev. 0

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Project: Fall Creek Fish Hatchery

Client: KRRC **Proj. No.** 20-024

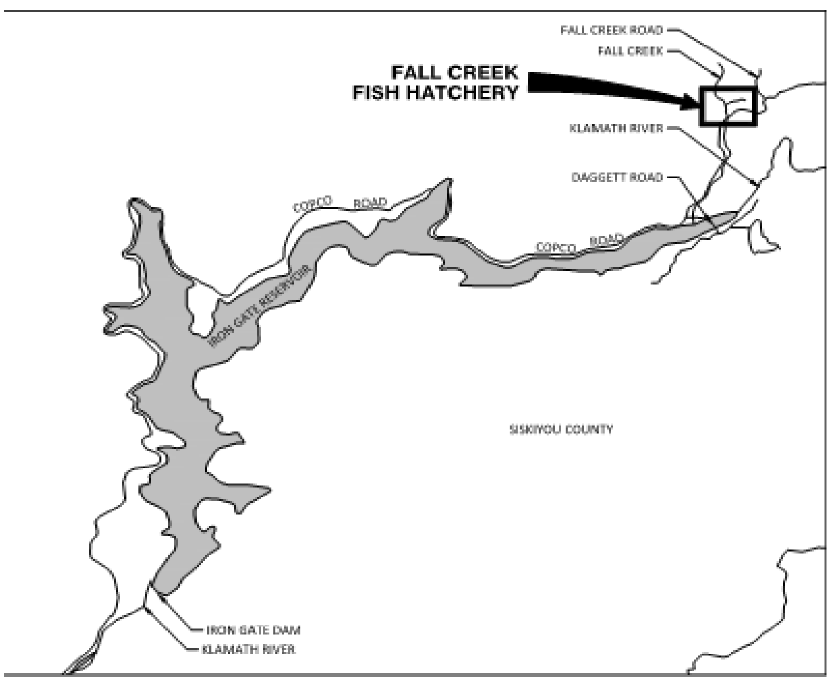
Title: Structural Calculations - Building Foundations

Prepared By, Name: Ayad Jabir

Prepared By, Signature: **Date:** 10/19/2020

Peer Reviewed By, Name: Taylor Bowen

Peer Reviewed, Signature: **Date:**



McMILLEN JACOBS ASSOCIATES

SUBJECT: KRRC	**BY:** Ayad Jabir	**CHK'D BY:**	Taylor Bowen
Fall Creek Fish Hatchery	**DATE:** 10/19/2020		
Structural Calculations	**PROJECT NO.:** 20-024		

Purpose

Design the footings for the Coho Building

Information

gamma_s =	125	pcf	Unit weight soil	
gamma_w =	62.4	pcf	Unit weight water	
gamma_c =	150	pcf	Unit weight concrete	
fc' =	4.50	ksi	Compressive strength	
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement	
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement	
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement	
Ka =	0.29		Active Pressure Coefficient	
Ko =	0.50		At-rest Pressure Coefficient	
Ke =	0.35		Seismic pressure coefficient	
Active pressure =	36.25			
At rest pressure =	62.50			
t_slab =	8.00	in	Thickness of slab	
LL_surcharge	250.00	psf	Live load surcharge	
Allowable Bearing Capacity =	3000.00	psf	ASD	*GS001*
Frost Depth =	12.00	in		
Coeff. of Friction =	0.49		Soil to CIP concrete	
col b =	12.00	in	Assumed column dimension	
col d =	6.00	in	Assumed column dimension	
Slab t =	6.00	in	Assumed slab thickness	

Design: Pedestal

b =	12.00	in	Pedestal dimension b
d =	22.00	in	Pedestal dimension d
d' =	19.00	in	Assuming 3" cover
Tie size # =	4.00		
Av =	0.39	in2	2 legs
Tie spacing =	8.00	in	
Vfmax =	46.12	k	Coho Building Gridline 4, LC1
Vs = 0.9*Av*fyt*d' / s =	50.36	k	
	GOOD		

See attached spColumn calculations for P-M checks against load table below. Loads increased by 10% and then factored by 1.5

Source (From PEMB calc packages)

Building	Gridline	LC	P	Pf = P*1.1*1.5	Vx	Vxf = Vx*1.1*1.5	Vz	Vzf = Vz*1.1*1.5	Mx = Pf*0.5 + Vxf*3	Mz = Vzf*3
Coho	4	1	52.63	86.8395	26.26	43.329	0	0	173.41	0
Coho	4	4	53.68	88.572	23.09	38.0985	0	0	158.58	0
Coho	4	13	-13.52	-22.308	-6.79	-11.2035	0	0	-44.76	0
Coho	4	42	-16.33	-26.9445	-2.30	-3.795	-5.48	-9.042	-24.86	-27.126
Coho	4	57	5.63	9.2895	-8.24	-13.596	-11.94	-19.701	-36.14	-59.103
Coho	1	1	47.74	78.771	27.95	46.1175	0	0	177.74	0
Coho	1	16	-13.79	-22.7535	-6.38	-10.527	0	0	-42.96	0
Coho	5	76	-9.62	-15.873	-0.29	-0.4785	11.93	19.6845	-9.372	59.0535

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Design: Gridline 4

	EL TOF =	2499.00		Elevation top of footing	
	EL TOP =	2503.50		Elevation top of pedestal	
	EL TOC =	2503.50		Elevation top of curb	
	Pmax =	59.54	k	Maximum bearing force (ASD)	From reactions package, LC3+10%
	Umax =	17.96	k	Maximum uplift force (ASD)	From reactions package, LC42+10%
	Smax =	28.89	k	Maximum sliding force (ASD)	From reactions package, LC1+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	4.50	ft	Pedestal height	
	Wcolumn =	1.24	k	Weight of Column	
	Pfmax =	90.80	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	263.08	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	7.00	ft	Footing dimension b	
	d =	7.00	ft	Footing dimension d	
	t =	30.00	in	Footing thickness	
	cc =	3.00	in	Clear cover	
	A =	49.00	ft2	Footing area	
	S =	57.17	ft3	Footing section modulus (About gridline E)	
Cutoff Wall	t =	0.67	ft	Cutoff wall thickness	
	h =	4.50	ft	Cutoff wall height	
	L =	6.00	ft	Length of cutoff wall on footing (equal to footing b dimension minus pedestal width)	
Eccentricity	e_col =	0.00	ft	Eccentricty of column to centre of footing	Assume centered column
	M_e =	0.00	k-ft	Moment due to eccentricity	Moment from sliding force ignored because
	e_resultant =	0.00	ft	Resulting eccentricity = M_e/Pmax	load path couples it into slab
		GOOD		If "GOOD" then column is in middle third of footing	
	a =	3.5	ft		
	A_mod =	49	ft	Modified bearing area = 3*a * b	
Uplift	Wc =	22.31	k	Footing, pedestal and cutoff wall weight	
	Ws =	20.64	k	Soil weight above footing	
	Wt =	42.95	k	Total weight	
	Wf =	25.77	k	Factored weight 0.6*D	
		GOOD	FS =	1.434546011	
Bearing	Qmax =	2091.65	psf	Maximum bearing pressure	
	Qmin =	2091.65	psf	Minimum bearing pressure (If negative then footing edge lifts up)	
		GOOD		Bearing and liftoff check	
Sliding	As req'd =	0.802388889	in2	As req'd from slab to restrain footing against sliding	
		Use (2) #6, As = 0.88 in2			
Punching shear	qu =	3.14	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)	
	bo =	176.00	in	Critical perimeter	
	Vu1 =	106.1513065	k	Shear force acting on perimeter (punching)	
	Vn =	1416.77	k	Nominal punching shear strength	
	Vc =	1062.58	k	Factored punching shear strength	
		GOOD			
One way shear	Vu2 =	7.32	k	Shear force d away from face of column (one way)	Negative demand indicates critical shear
	Vn =	338.09	k	Nominal one way shear strength	outside of footing footprint
	Vc =	253.57	k	Factored one way shear strength	
		GOOD			
Flexure	Mu =	1544.54	k-in	Moment at face of column	
	As_reqd =	1.10	in2	Assuming a = 2 in	
	As_min =	4.08	in2		
	As_reqd per ft =	0.58	in2		
		Use #5@6" = 0.62 in2/ft			

Design: Gridlines 3, 5

	EL TOF =	2499.00		Elevation top of footing	
	EL TOP =	2503.50		Elevation top of pedestal	
	EL TOC =	2503.50		Elevation top of curb	
	Pmax =	38.13	k	Maximum bearing force (ASD)	From reactions package, LC3+10%
	Umax =	10.58	k	Maximum uplift force (ASD)	From reactions package, LC76+10%
	Smax =	13.13	k	Maximum sliding force (ASD)	From reactions package, LC72+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	4.50	ft	Pedestal height	
	Wcolumn =	1.24	k	Weight of Column	
	Pfmax =	58.67	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	132.66	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	6.00	ft	Footing dimension b	
	d =	6.00	ft	Footing dimension d	
	t =	18.00	in	Footing thickness	
	cc =	3.00	in	Clear cover	

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	A =	36.00	ft2	Footing area	
	S =	36.00	ft3	Footing section modulus (About gridline E)	
Cutoff Wall	t =	0.67	ft	Cutoff wall thickness	
	h =	4.50	ft	Cutoff wall height	
	L =	5.00	ft	Length of cutoff wall on footing (equal to footing b dimension minus pedestal width)	
Eccentricity	e_col =	0.00	ft	Eccentricty of column to centre of footing	Assume centered column
	M_e =	0.00	k-ft	Moment due to eccentricity	Moment from sliding force ignored because
	e_resultant =	0.00	ft	Resulting eccentricity = M_e/Pmax	load path couples it into slab
		GOOD		If "GOOD" then column is in middle third of footing	
	a =	3	ft		
	A_mod =	36	ft	Modified bearing area = 3*a * b	
Uplift	Wc =	11.59	k	Footing, pedestal and cutoff wall weight	
	Ws =	14.95	k	Soil weight above footing	
	Wt =	26.54	k	Total weight	
	Wf =	15.92	k	Factored weight 0.6*D	
		GOOD	FS =	1.50455963	
Bearing	Qmax =	1796.15	psf	Maximum bearing pressure	
	Qmin =	1796.15	psf	Minimum bearing pressure (If negative then footing edge lifts up)	
		GOOD		Bearing and liftoff check	
Sliding	As req'd =	0.6567	in2	As req'd from slab to restrain footing against sliding	
		#5 @ 12" typical wall reinf in incoming wall is adequate			
	Lateral Sliding (Inside 3 columns)				
	Smax =	3.839	k	From reactions package, LC13+10%	
	Sr =	7.8014125	k		
		GOOD			
Punching shear	qu =	2.69	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)	
	bo =	128.00	in	Critical perimeter	
	Vu1 =	74.54024421	k	Shear force acting on perimeter (punching)	
	Vn =	618.23	k	Nominal punching shear strength	
	Vc =	463.67	k	Factored punching shear strength	
		GOOD			
One way shear	Vu2 =	13.47	k	Shear force d away from face of column (one way)	
	Vn =	173.88	k	Nominal one way shear strength	
	Vc =	130.41	k	Factored one way shear strength	
		GOOD			
Flexure	Mu =	420.97	k-in	Moment at face of column	
	As_reqd =	0.56	in2	Assuming a = 2 in	
	As_min =	0.97	in2	(Bars top & bottom)	
	As_reqd per ft =	0.16	in2		
		Use #5@12" = 0.31 in2/ft T&B			

Design: Gridline 1

	EL TOF =	2499.00		Elevation top of footing	
	EL TOP =	2503.50		Elevation top of pedestal	
	Pmax =	53.20	k	Maximum bearing force (ASD)	From reactions package, LC3+10%
	Umax =	15.18	k	Maximum uplift force (ASD)	From reactions package, LC15+10%
	Smax =	30.75	k	Maximum sliding force (ASD)	From reactions package, LC1+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	4.50	ft	Pedestal height	
	Wcolumn =	1.24	k	Weight of Column	
	Pfmax =	81.28	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	268.49	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	**8.00**	ft	Footing dimension b	
	d =	**8.00**	ft	Footing dimension d	
	t =	**30.00**	in	Footing thickness	
	cc =	3.00	in	Clear cover	
	A =	64.00	ft2	Footing area	
	S =	85.33	ft3	Footing section modulus (About gridline E)	
Uplift	Wc =	25.24	k	Footing, pedestal and cutoff wall weight	
	Ws =	31.08	k	Soil weight above footing	
	Wt =	56.32	k	Total weight	
	Wf =	33.79	k	Factored weight 0.6*D	
		GOOD	FS =	2.226119895	
Eccentricity	e_col =	**2.50**	ft	Eccentricty of column to centre of footing	
Bearing	Qmax =	Maximum bearing pressure			

LC	P	Smax	D Factor	M_e	e_resultant		a	A_mod	Qmax	FS	
1	47.74	30.745	1.00	83.93	0.806547452	MIDDLE 3rd	3.193452548	64	2684.098958	0.8946997	GOOD
3	31.6	26.73	1.00	100.21	1.139775366	MIDDLE 3rd	2.860224634	64	2597.473958	0.8658247	GOOD
4	48.36	26.741	1.00	54.197	0.517735657	MIDDLE 3rd	3.482264343	64	2346.321615	0.7821072	GOOD
15	-10.81	-7.568	0.60	-23.2485	-1.011574024	MIDDLE 3rd	2.988425976	64	614.6542969	0.2048848	GOOD
16	-13.79	-7.018	0.60	-11.2035	-0.560104987	MIDDLE 3rd	3.439895013	64	422.2832031	0.1407611	GOOD

Sliding S1 = Friction Sliding resistance (Footing+Pedestal weight friction only)
S2 = Friction Sliding resistance (P from frame)

LC	S1	S2	Sr	Factor of Safety
1	27.597208	23.3926	50.98980833	1.65847482
3	27.597208	15.484	43.08120833	1.611717483
4	27.597208	23.6964	51.29360833	1.918163432
15	11.261425	0	11.261425	1.488031845
16	9.801225	0	9.801225	1.396583785

GOOD FS = 1.4 (This FS is above the 1.5 FS built-in to the allowable friction coefficient)

Grade Beam
b = 24.00 in Beam dimension b
d = 24.00 in Beam dimension d
d' = 21.00 in Assuming 3" cover
Tie size # = 4.00
Av = 0.39 in2 2 legs
Tie spacing = 12.00 in

Vfmax = 15.00 k LC15 from RISA Analysis
Vs = 0.9*Av*fyt*d' / s = 37.11 k
GOOD

As, min = 1.69 in2 Longitudinal As Min
Proposed (4) #7 each face = 2.4 in2 per face

Punching shear
qu = 4.03 k/ft2 LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)
bo = 111.00 in Critical perimeter
Vu1 = 231.2379212 k Shear force acting on perimeter (punching)
Vn = 893.53 k Nominal punching shear strength
Vc = 670.15 k Factored punching shear strength
GOOD

One way shear
Vu2 = 40.26 k Shear force d away from face of column (one way) Negative demand indicates critical shear outside of footing footprint
Vn = 386.39 k Nominal one way shear strength
Vc = 289.79 k Factored one way shear strength
GOOD

Flexure
Mu = 2367.38 k-in Moment at face of column
As_reqd = 1.69 in2 Assuming a = 2 in
As_min = 2.33 in2 (Bars top & bottom)
As_reqd per ft = 0.29 in2
Use #5 @ 6" OC

Design: Gridline 2

EL TOF = 2500.50 Elevation top of footing
EL TOP = 2503.50 Elevation top of pedestal

Pmax = 45.07 k Maximum bearing force (ASD) From reactions package, LC3+10%
Umax = 10.60 k Maximum uplift force (ASD) From reactions package, LC13+10%
Smax = 24.54 k Maximum sliding force (ASD) From reactions package, LC1+10%

Pedestal
b = 1.00 ft Pedestal dimension b
d = 2.00 ft Pedestal dimension d
h = 4.50 ft Pedestal height
Wcolumn = 1.35 k Weight of Column

Pfmax = 69.22 k 1.5*ASD bearing force + 1.2*column weight
Mmax = 217.57 k-ft 1.5*ASD Sliding force+6-inch eccentricity of Pmax

Footing
b = **7.00** ft Footing dimension b
d = **7.00** ft Footing dimension d
t = **24.00** in Footing thickness
cc = 3.00 in Clear cover
A = 49.00 ft2 Footing area
S = 57.17 ft3 Footing section modulus (About gridline E)

Eccentricity
e_col = 0.00 ft Eccentricty of column to centre of footing Assume centered column
M_e = 0.00 k-ft Moment due to eccentricity Moment from sliding force ignored because load path couples it into slab
e_resultant = 0.00 ft Resulting eccentricity = M_e/Pmax
GOOD If "GOOD" then column is in middle third of footing

a = 3.5 ft
A_mod = 49 ft Modified bearing area = 3*a * b

Uplift
Wc = 16.05 k Footing, pedestal and cutoff wall weight
Ws = 11.75 k Soil weight above footing
Wt = 27.80 k Total weight
Wf = 16.68 k Factored weight 0.6*D
GOOD FS = 1.6

Bearing
Qmax = 1487.08 psf Maximum bearing pressure
Qmin = 1487.08 psf Minimum bearing pressure (If negative then footing edge lifts up)
GOOD Bearing and liftoff check

Sliding
As req'd = 0.68 in2 As req'd from slab to restrain footing against sliding
Use (2) #6, As = 0.88 in2 in thickened slab edge / grade beam tie btwn columns 2A and 2E

Punching shear
qu = 2.23 k/ft2 LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)

	bo =	156.00 in	Critical perimeter	
	Vu1 =	82.53303061 k	Shear force acting on perimeter (punching)	
	Vn =	1004.62 k	Nominal punching shear strength	
	Vc =	753.47 k	Factored punching shear strength	
		GOOD		
One way shear	Vu2 =	11.71 k	Shear force d away from face of column (one way)	Negative demand indicates critical shear outside of footing footprint
	Vn =	270.47 k	Nominal one way shear strength	
	Vc =	202.86 k	Factored one way shear strength	
		GOOD		
Flexure	Mu =	1093.66 k-in	Moment at face of column	
	As_reqd =	1.01 in2	Assuming a = 2 in	
	As_min =	1.59 in2	Bars top & bottom	
	As_reqd per ft =	0.23 in2/ft		
		#5 @ 12" (As = 0.31 in2/ft)		

McMILLEN JACOBS ASSOCIATES

SUBJECT:	KRRC	**BY:** Ayad Jabir	**CHK'D BY:**	Taylor Bowen
	Fall Creek Fish Hatchery	**DATE:** 10/19/2020		
	Structural Calculations	**PROJECT NO.:** 20-024		

Purpose

Design the footings for the Incubation Building

Information

gamma_s =	125	pcf	Unit weight soil	
gamma_w =	62.4	pcf	Unit weight water	
gamma_c =	150	pcf	Unit weight concrete	
fc' =	4.50	ksi	Compressive strength	
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement	
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement	
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement	
Ka =	0.29		Active Pressure Coefficient	
Ko =	0.50		At-rest Pressure Coefficient	
Ke =	0.35		Seismic pressure coefficient	
Active pressure =	36.25			
At rest pressure =	62.50			
t_slab =	8.00	in	Thickness of slab	
LL_surcharge	250.00	psf	Live load surcharge	
Allowable Bearing Capacity =	3000.00	psf	ASD	*GS001*
Frost Depth =	12.00	in		
Coeff. of Friction =	0.49		Soil to CIP concrete	
col b =	12.00	in	Assumed column dimension	
col d =	6.00	in	Assumed column dimension	
Slab t =	8.00	in	Assumed slab thickness	

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Design: Gridlines 2 and 3

	EL TOF =	2501.00		Elevation top of footing	
	EL TOP =	2503.50		Elevation top of pedestal	
	EL TOC =	2503.50		Elevation top of curb	
	Pmax =	33.95	k	Maximum bearing force (ASD)	From reactions package, LC3+10%
	Umax =	8.90	k	Maximum uplift force (ASD)	From reactions package, LC48+10%
	Smax =	15.83	k	Maximum sliding force (ASD)	From reactions package, LC1+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	2.50	ft	Pedestal height	
	Wcolumn =	0.69	k	Weight of Column	
	Pfmax =	51.74	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	98.17	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	6.00	ft	Footing dimension b	
	d =	6.00	ft	Footing dimension d	
	t =	18.00	in	Footing thickness	
	cc =	3.00	in	Clear cover	
	A =	36.00	ft2	Footing area	
	S =	36.00	ft3	Footing section modulus (About gridline E)	
Cutoff Wall	t =	0.67	ft	Cutoff wall thickness	
	h =	2.50	ft	Cutoff wall height	
	L =	5.00	ft	Length of cutoff wall on footing (equal to footing b dimension minus pedestal width)	
Eccentricity	e_col =	0.00	ft	Eccentricty of column to centre of footing	Assume centered column
	M_e =	0.00	k-ft	Moment due to eccentricity	Moment from sliding force ignored because
	e_resultant =	0.00	ft	Resulting eccentricity = M_e/Pmax	load path couples it into slab
		GOOD		If "GOOD" then column is in middle third of footing	
	a =	3	ft		
	A_mod =	36	ft	Modified bearing area = 3*a * b	
Uplift	Wc =	10.04	k	Footing, pedestal and cutoff wall weight	
	Ws =	5.69	k	Soil weight above footing	
	Wt =	15.73	k	Total weight	
	Wf =	9.44	k	Factored weight 0.6*D	
		GOOD	FS =	1.060699704	
Bearing	Qmax =	1379.94	psf	Maximum bearing pressure	
	Qmin =	1379.94	psf	Minimum bearing pressure (If negative then footing edge lifts up)	
		GOOD		Bearing and liftoff check	
Sliding	As req'd =	0.439694444	in2	As req'd from slab to restrain footing against sliding	
		Use (2) #5, As = 0.62 in2			
Punching shear	qu =	2.07	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)	
	bo =	128.00	in	Critical perimeter	
	Vu1 =	57.2676304	k	Shear force acting on perimeter (punching)	
	Vn =	618.23	k	Nominal punching shear strength	
	Vc =	463.67	k	Factored punching shear strength	
		GOOD			
One way shear	Vu2 =	10.35	k	Shear force d away from face of column (one way)	Negative demand indicates critical shear
	Vn =	173.88	k	Nominal one way shear strength	outside of footing footprint
	Vc =	130.41	k	Factored one way shear strength	
		GOOD			
Flexure	Mu =	636.93	k-in	Moment at face of column	
	As_reqd =	0.84	in2	Assuming a = 2 in	
	As_min =	0.97	in2	T&B	
	As_reqd per ft =	0.16	in2		
		Use #5@12" = 0.31 in2/ft, (T&B, EW)			

Design: Gridlines 1, 4

	EL TOF =	2501.00		Elevation top of footing	
	EL TOP =	2503.50		Elevation top of pedestal	
	EL TOC =	2503.50		Elevation top of curb	
	Pmax =	16.20	k	Maximum bearing force (ASD)	From reactions package, LC3+10%
	Umax =	5.45	k	Maximum uplift force (ASD)	From reactions package, LC51+10%
	Smax =	3.14	k	Maximum sliding force (ASD)	From reactions package, LC14+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	2.50	ft	Pedestal height	
	Wcolumn =	0.69	k	Weight of Column	
	Pfmax =	25.13	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	30.60	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	6.00	ft	Footing dimension b	
	d =	6.00	ft	Footing dimension d	
	t =	18.00	in	Footing thickness	
	cc =	3.00	in	Clear cover	

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	A =	36.00	ft2	Footing area	
	S =	36.00	ft3	Footing section modulus (About gridline E)	
Cutoff Wall	t =	0.67	ft	Cutoff wall thickness	
	h =	2.50	ft	Cutoff wall height	
	L =	5.00	ft	Length of cutoff wall on footing (equal to footing b dimension minus pedestal width)	
Eccentricity	e_col =	0.00	ft	Eccentricty of column to centre of footing	Assume centered column
	M_e =	0.00	k-ft	Moment due to eccentricity	Moment from sliding force ignored because
	e_resultant =	0.00	ft	Resulting eccentricity = M_e/Pmax	load path couples it into slab
		GOOD		If "GOOD" then column is in middle third of footing	
	a =	3	ft		
	A_mod =	36	ft	Modified bearing area = 3*a * b	
Uplift	Wc =	10.04	k	Footing, pedestal and cutoff wall weight	
	Ws =	5.69	k	Soil weight above footing	
	Wt =	15.73	k	Total weight	
	Wf =	9.44	k	Factored weight 0.6*D	
		GOOD	FS =	1.733547597	
Bearing	Qmax =	887.08	psf	Maximum bearing pressure	
	Qmin =	887.08	psf	Minimum bearing pressure (If negative then footing edge lifts up)	
		GOOD		Bearing and liftoff check	
Sliding	As req'd =	0.15675	in2	As req'd from slab to restrain footing against sliding	
		Use (2) #5, As = 0.62 in2			
Punching shear	qu =	1.33	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)	
	bo =	128.00	in	Critical perimeter	
	Vu1 =	36.81389429	k	Shear force acting on perimeter (punching)	
	Vn =	618.23	k	Nominal punching shear strength	
	Vc =	463.67	k	Factored punching shear strength	
		GOOD			
One way shear	Vu2 =	6.65	k	Shear force d away from face of column (one way)	
	Vn =	173.88	k	Nominal one way shear strength	
	Vc =	130.41	k	Factored one way shear strength	
		GOOD			
Flexure	Mu =	207.91	k-in	Moment at face of column	
	As_reqd =	0.28	in2	Assuming a = 2 in	
	As_min =	1.94	in2		
	As_reqd per ft =	0.32	in2		
		Use #6@12" = 0.44 in2/ft			

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SUBJECT:	KRRC	**BY:**	Ayad Jabir	**CHK'D BY:**	Taylor Bowen
	Fall Creek Fish Hatchery	**DATE:**	10/19/2020		
	Structural Calculations	**PROJECT NO.:**	20-024		

Purpose

Design the footings for the Spawning Building

Information

gamma_s =	125	pcf	Unit weight soil	
gamma_w =	62.4	pcf	Unit weight water	
gamma_c =	150	pcf	Unit weight concrete	
fc' =	4.50	ksi	Compressive strength	
fy,bar =	60.00	ksi	Yield Strength of steel reinforcement	
fu,bar =	90.00	ksi	Ultimate strength of steel reinforcement	
Es =	29000.00	ksi	Modulus of elasticity of steel reinforcement	
Ka =	0.29		Active Pressure Coefficient	
Ko =	0.50		At-rest Pressure Coefficient	
Ke =	0.35		Seismic pressure coefficient	
Active pressure =	36.25			
At rest pressure =	62.50			
t_slab =	8.00	in	Thickness of slab	
LL_surcharge	250.00	psf	Live load surcharge	
Allowable Bearing Capacity =	3000.00	psf	ASD	*GS001*
Frost Depth =	12.00	in		
Coeff. of Friction =	0.49		Soil to CIP concrete	
col b =	12.00	in	Assumed column dimension	
col d =	6.00	in	Assumed column dimension	
Slab t =	8.00	in	Assumed slab thickness	

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Design: Corner Footings (2 column)

	EL TOF =	2489.50		Elevation top of footing	
	EL TOP =	2491.96		Elevation top of pedestal	
	EL TOC =	2491.50		Elevation top of curb	
	Pmax =	12.96	k	Maximum bearing force (ASD)	From reactions package, Cols 2C/C2+10%
	Umax =	4.94	k	Maximum uplift force (ASD)	From reactions package, Cols 1A/A1+10%
	Smax =	2.87	k	Maximum sliding force (ASD)	From reactions package, Cols 1C/C1+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	2.46	ft	Pedestal height	
	Wcolumn =	0.68	k	Weight of Column	
	Pfmax =	20.25	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	25.78	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	**5.00**	ft	Footing dimension b	
	d =	**5.00**	ft	Footing dimension d	
	t =	**18.00**	in	Footing thickness	
	cc =	3.00	in	Clear cover	
	A =	25.00	ft2	Footing area	
	S =	20.83	ft3	Footing section modulus (About gridline E)	
Cutoff Wall	t =	0.67	ft	Cutoff wall thickness	
	h =	2.00	ft	Cutoff wall height	
	L =	4.00	ft	Length of cutoff wall on footing (equal to footing b dimension)	
Eccentricity	e_col =	0.00	ft	Eccentricity of column to centre of footing	Assume centered column
	M_e =	0.00	k-ft	Moment due to eccentricity	Moment from sliding force ignored because
	e_resultant =	0.00	ft	Resulting eccentricity = M_e/Pmax	load path couples it into slab
		GOOD		If "GOOD" then column is in middle third of footing	
	a =	2.5	ft		
	A_mod =	25	ft	Modified bearing area = 3*a * b	
Uplift	Wc =	7.10	k	Footing, pedestal and cutoff wall weight	
	Ws =	3.75	k	Soil weight above footing	
	Wt =	10.85	k	Total weight	
	Wf =	6.51	k	Factored weight 0.6*D	
		GOOD	FS =	1.317689141	
Bearing	Qmax =	952.19	psf	Maximum bearing pressure	
	Qmin =	952.19	psf	Minimum bearing pressure (If negative then footing edge lifts up)	
		GOOD		Bearing and liftoff check	
Sliding	As req'd =	0.07975	in2	As req'd from slab to restrain footing against sliding	
		Incoming stem walls are sufficient to resist column base shear			
Punching shear	qu =	1.43	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)	
	bo =	128.00	in	Critical perimeter	
	Vu1 =	23.80477778	k	Shear force acting on perimeter (punching)	
	Vn =	618.23	k	Nominal punching shear strength	
	Vc =	463.67	k	Factored punching shear strength	
		GOOD			
One way shear	Vu2 =	2.38	k	Shear force d away from face of column (one way)	Negative demand indicates critical shear
	Vn =	144.90	k	Nominal one way shear strength	outside of footing footprint
	Vc =	108.67	k	Factored one way shear strength	
		GOOD			
Flexure	Mu =	251.69	k-in	Moment at face of column	
	As_reqd =	0.33	in2	Assuming a = 2 in	
	As_min =	1.62	in2		
	As_reqd per ft =	0.32	in2		
		Use #6@12" = 0.44 in2/ft			

Design: Gridline 2

	EL TOF =	2489.50		Elevation top of footing	
	EL TOP =	2491.96		Elevation top of pedestal	
	EL TOC =	2491.50		Elevation top of curb	
	Pmax =	13.77	k	Maximum bearing force (ASD)	From reactions package, LC3+10%
	Umax =	4.09	k	Maximum uplift force (ASD)	From reactions package, LC14+10%
	Smax =	2.71	k	Maximum sliding force (ASD)	From reactions package, LC13+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	2.46	ft	Pedestal height	
	Wcolumn =	0.68	k	Weight of Column	
	Pfmax =	21.47	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	26.09	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	**5.00**	ft	Footing dimension b	
	d =	**5.00**	ft	Footing dimension d	
	t =	**18.00**	in	Footing thickness	
	cc =	3.00	in	Clear cover	

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	A =	25.00	ft2	Footing area	
	S =	20.83	ft3	Footing section modulus (About gridline E)	
Cutoff Wall	t =	0.67	ft	Cutoff wall thickness	
	h =	2.00	ft	Cutoff wall height	
	L =	4.00	ft	Length of cutoff wall on footing (equal to footing b dimension)	
Eccentricity	e_col =	0.00	ft	Eccentricty of column to centre of footing	Assume centered column
	M_e =	0.00	k-ft	Moment due to eccentricity	Moment from sliding force ignored because
	e_resultant =	0.00	ft	Resulting eccentricity = M_e/Pmax	load path couples it into slab
		GOOD		If "GOOD" then column is in middle third of footing	
	a =	2.5	ft		
	A_mod =	25	ft	Modified bearing area = 3*a * b	
Uplift	Wc =	7.10	k	Footing, pedestal and cutoff wall weight	
	Ws =	3.75	k	Soil weight above footing	
	Wt =	10.85	k	Total weight	
	Wf =	6.51	k	Factored weight 0.6*D	
		GOOD	FS =	1.590436624	
Bearing	Qmax =	984.75	psf	Maximum bearing pressure	
	Qmin =	984.75	psf	Minimum bearing pressure (If negative then footing edge lifts up)	
		GOOD		Bearing and liftoff check	
Sliding	As req'd =	0.1353	in2	As req'd from slab to restrain footing against sliding	
		Use (2) #5, As = 0.62 in2			
Punching shear	qu =	1.48	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)	
	bo =	128.00	in	Critical perimeter	
	Vu1 =	24.61877778	k	Shear force acting on perimeter (punching)	
	Vn =	618.23	k	Nominal punching shear strength	
	Vc =	463.67	k	Factored punching shear strength	
		GOOD			
One way shear	Vu2 =	2.46	k	Shear force d away from face of column (one way)	
	Vn =	144.90	k	Nominal one way shear strength	
	Vc =	108.67	k	Factored one way shear strength	
		GOOD			
Flexure	Mu =	111.09	k-in	Moment at face of column	
	As_reqd =	0.15	in2	Assuming a = 2 in	
	As_min =	1.62	in2		
	As_reqd per ft =	0.32	in2		
		Use #6@12" = 0.44 in2/ft			

Design: Gridline 4

	EL TOF =	2484.50		Elevation top of footing	
	EL TOP =	2491.96		Elevation top of pedestal	
	Pmax =	6.53	k	Maximum bearing force (ASD)	From reactions package, LC4+10%
	Umax =	1.77	k	Maximum uplift force (ASD)	From reactions package, LC15+10%
	Smax =	1.18	k	Maximum sliding force (ASD)	From reactions package, LC7+10%
Pedestal	b =	1.00	ft	Pedestal dimension b	
	d =	1.83	ft	Pedestal dimension d	
	h =	7.46	ft	Pedestal height	
	Wcolumn =	2.05	k	Weight of Column	
	Pfmax =	12.26	k	1.5*ASD bearing force + 1.2*column weight	
	Mmax =	22.40	k-ft	1.5*ASD Sliding force+6-inch eccentricity of Pmax	
Footing	b =	4.00	ft	Footing dimension b	
	d =	4.00	ft	Footing dimension d	
	t =	12.00	in	Footing thickness	
	cc =	3.00	in	Clear cover	
	A =	16.00	ft2	Footing area	
	S =	10.67	ft3	Footing section modulus (About gridline E)	
Uplift	Wc =	4.45	k	Footing, pedestal and cutoff wall weight	
	Ws =	12.33	k	Soil weight above footing	
	Wt =	16.78	k	Total weight	
	Wf =	10.07	k	Factored weight 0.6*D	
		GOOD	FS =	5.683738001	
Eccentricity	e_col =	1.00	ft	Eccentricity of column to centre of footing	

Bearing Qmax = Maximum bearing pressure

LC	P	Smax	D Factor	M_e	e_resultant		a	A_mod	Qmax	FS	
4	5.91	0.19	1.00	8.26914	0.364496066	MIDDLE 3rd	1.635503934	16	2230.075625	0.7433585	GOOD
7	0.58	-1.18	1.00	-10.34308	-0.595919684	MIDDLE 3rd	1.404080316	16	2058.07	0.6860233	GOOD
9	-0.01	1.16	1.00	10.78396	0.643184922	MIDDLE 3rd	1.356815078	16	2058.84	0.68628	GOOD
15	-1.61	0.01	0.60	-1.67794	-0.198434229	MIDDLE 3rd	1.801565771	16	675.738125	0.225246	GOOD
61	-0.74	0.71	0.60	5.79326	0.621201171	MIDDLE 3rd	1.378798829	16	1121.361875	0.3737873	GOOD

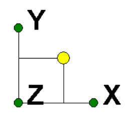
Sliding S1 = Friction Sliding resistance (Footing+Pedestal weight friction only)
S2 = Friction Sliding resistance (P from frame)

LC	S1	S2	Sr	Factor of Safety

4	8.220485	2.8959	11.116385	58.50728947
7	8.220485	0.2842	8.504685	7.207360169
9	8.215585	0	8.215585	7.082400862
15	4.143391	0	4.143391	414.3391
61	4.569691	0	4.569691	6.436184507

GOOD FS = 6.436184507

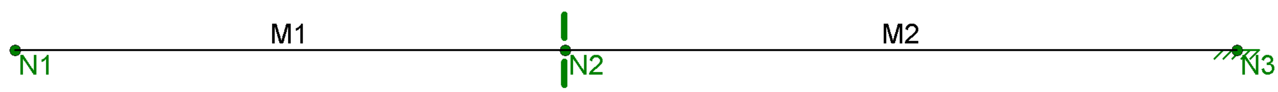
Punching shear	qu =	3.35	k/ft2	LRFD upward pressure = 1.5*Qmax (Conservatively assuming max pressure is uniformly applied)
	bo =	57.00	in	Critical perimeter
	Vu1 =	49.74694741	k	Shear force acting on perimeter (punching)
	Vn =	183.54	k	Nominal punching shear strength
	Vc =	137.65	k	Factored punching shear strength
		GOOD		
One way shear	Vu2 =	10.04	k	Shear force d away from face of column (one way) — Negative demand indicates critical shear outside of footing footprint
	Vn =	77.28	k	Nominal one way shear strength
	Vc =	57.96	k	Factored one way shear strength
		GOOD		
Flexure	Mu =	180.64	k-in	Moment at face of column
	As_reqd =	0.42	in2	Assuming a = 2 in
	As_min =	0.78	in2	
	As_reqd per ft =	0.19	in2	
		Use #6@10" = 0.528 in2/ft		



THE GRADE BEAM IS ANALYZED FOR THE FOLLOWING LOAD CASES FROM THE PRELIMINARY PEMB SUPPLIER CALCULATIONS:

LC15: D+CU+WPL
LC16: D+CU+WPR

THESE ARE THE LOAD CASES FOR WHICH THE FOOTINGS ON GRIDLINE 1 EXPERIENCE AN UPWARDS FORCE FROM THE BUILDING



MCMJAC	Fall Creek Coho Grade Beam	SK - 2
AIJ		Oct 19, 2020 at 3:32 PM
		Fall Creek Coho Grade Beam.r3d

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	0	0	0	0	
2	N2	18	0	0	0	
3	N3	40	0	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2		Reaction	Reaction			
2	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			CRECT24X24	Beam	Rectangular	Conc45...	Typical
2	M2	N2	N3			CRECT24X24	Beam	Rectangular	Conc45...	Typical

Joint Loads and Enforced Displacements (BLC 1 : 1)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N1	L	Y	30.8
2	N2	L	Y	24.5

Joint Loads and Enforced Displacements (BLC 2 : 3)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N1	L	Y	26.73
2	N2	L	Y	21.25

Joint Loads and Enforced Displacements (BLC 3 : 4)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N1	L	Y	26.74
2	N2	L	Y	21.91

Joint Loads and Enforced Displacements (BLC 4 : 15)

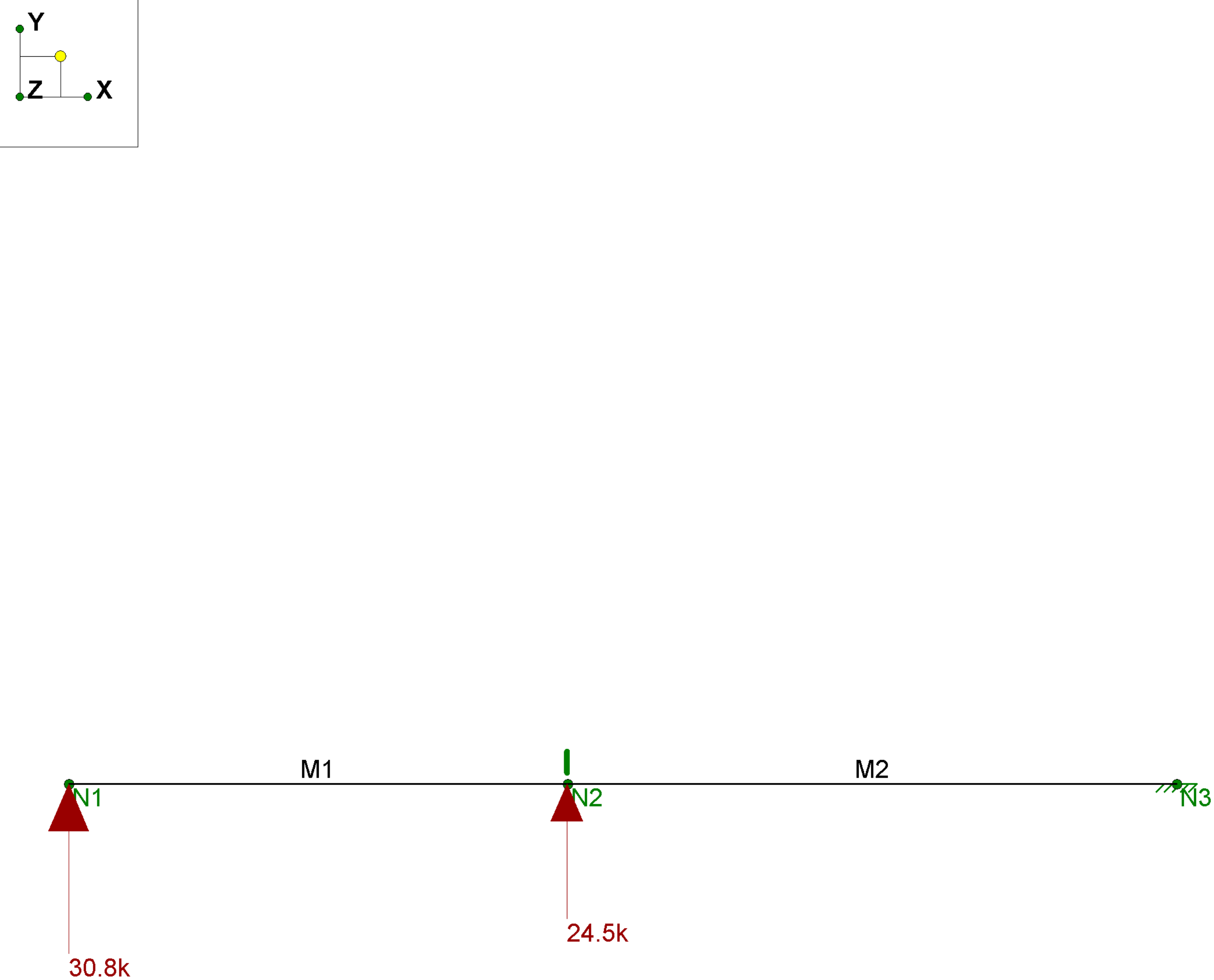
	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N1	L	Y	-8
2	N2	L	Y	-7

Joint Loads and Enforced Displacements (BLC 5 : 16)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N1	L	Y	-8
2	N2	L	Y	-4

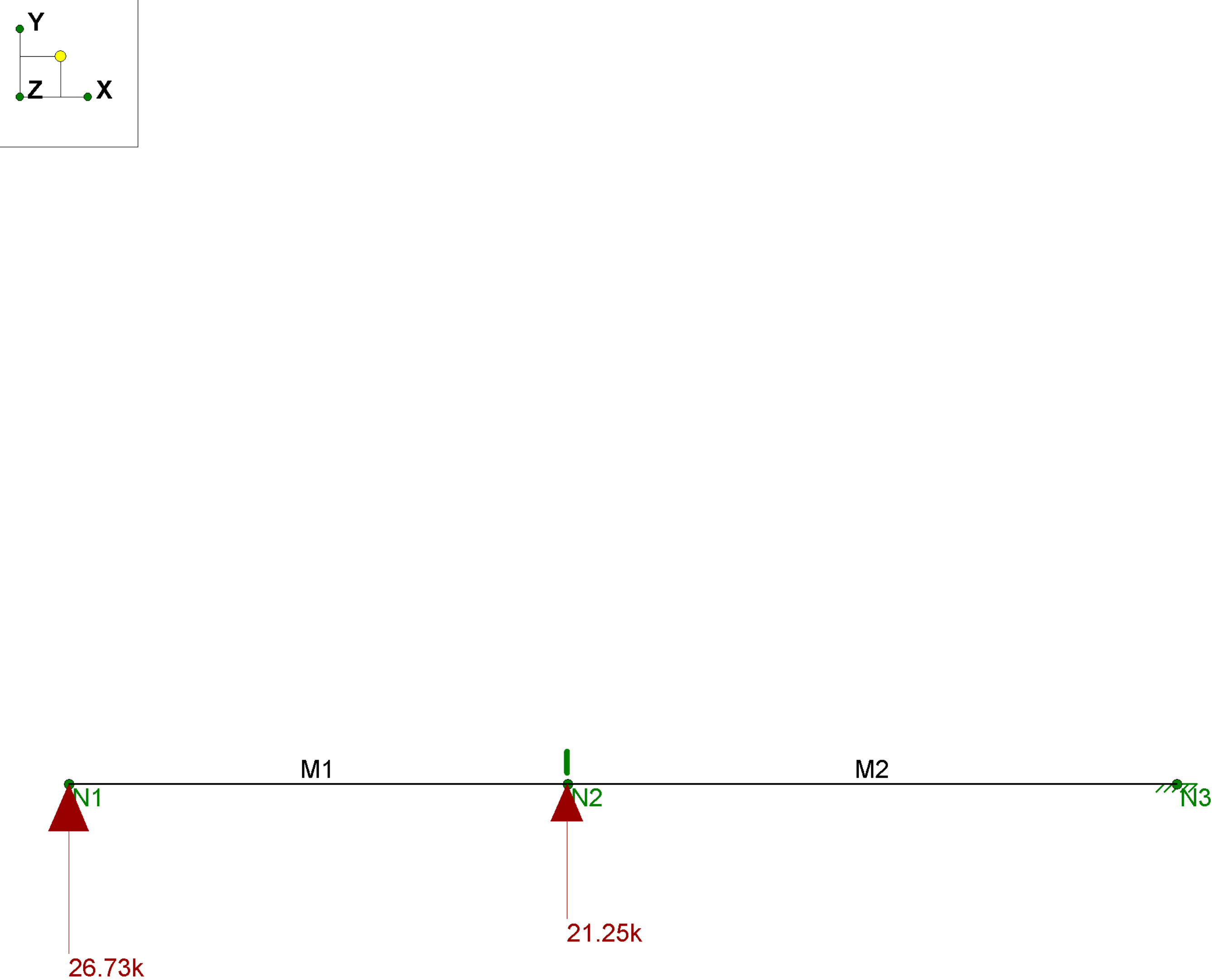
Basic Load Cases

	BLC Description	Category	X Grav...	Y Grav...	Z Grav...	Joint	Point	Distributed	Area(Memb...	Surfac...
1	1	None				2				
2	3	None				2				
3	4	None				2				
4	15	None				2				
5	16	None				2				



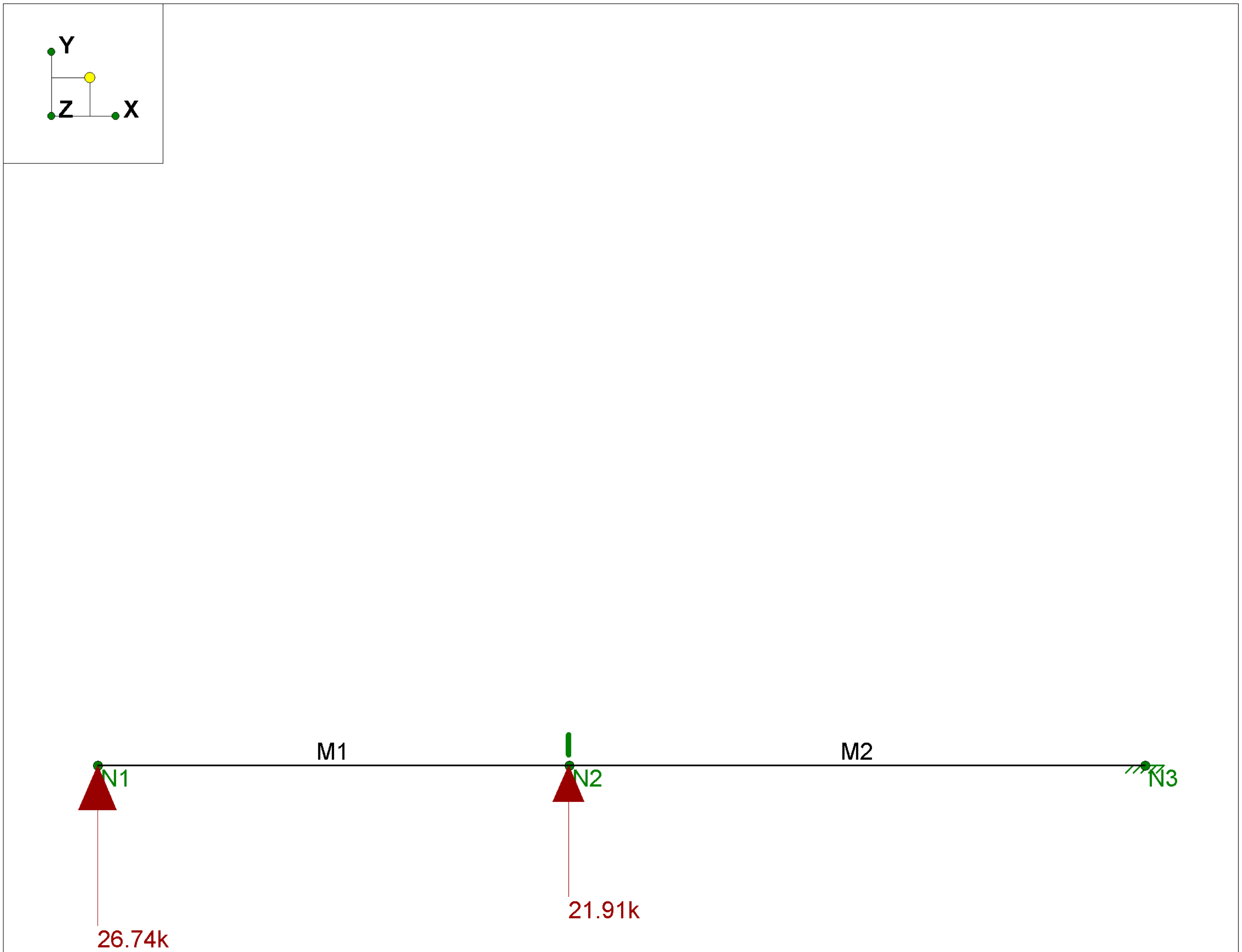
Loads: BLC 1, 1

MCMJAC	Fall Creek Coho Grade Beam	SK - 3
AIJ		Oct 19, 2020 at 3:32 PM
		Fall Creek Coho Grade Beam.r3d



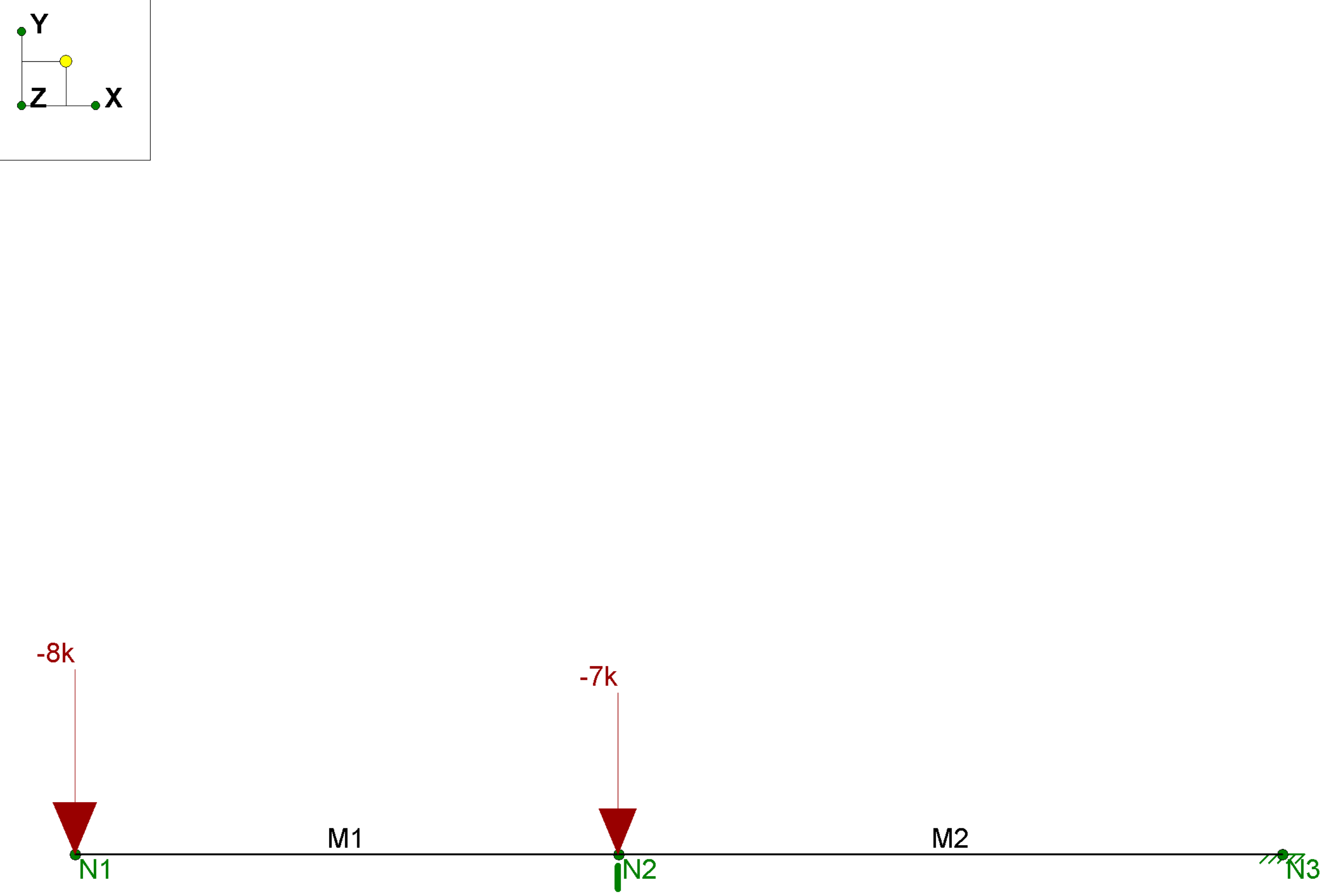
Loads: BLC 2, 3

MCMJAC	Fall Creek Coho Grade Beam	SK - 4
AIJ		Oct 19, 2020 at 3:32 PM
		Fall Creek Coho Grade Beam.r3d



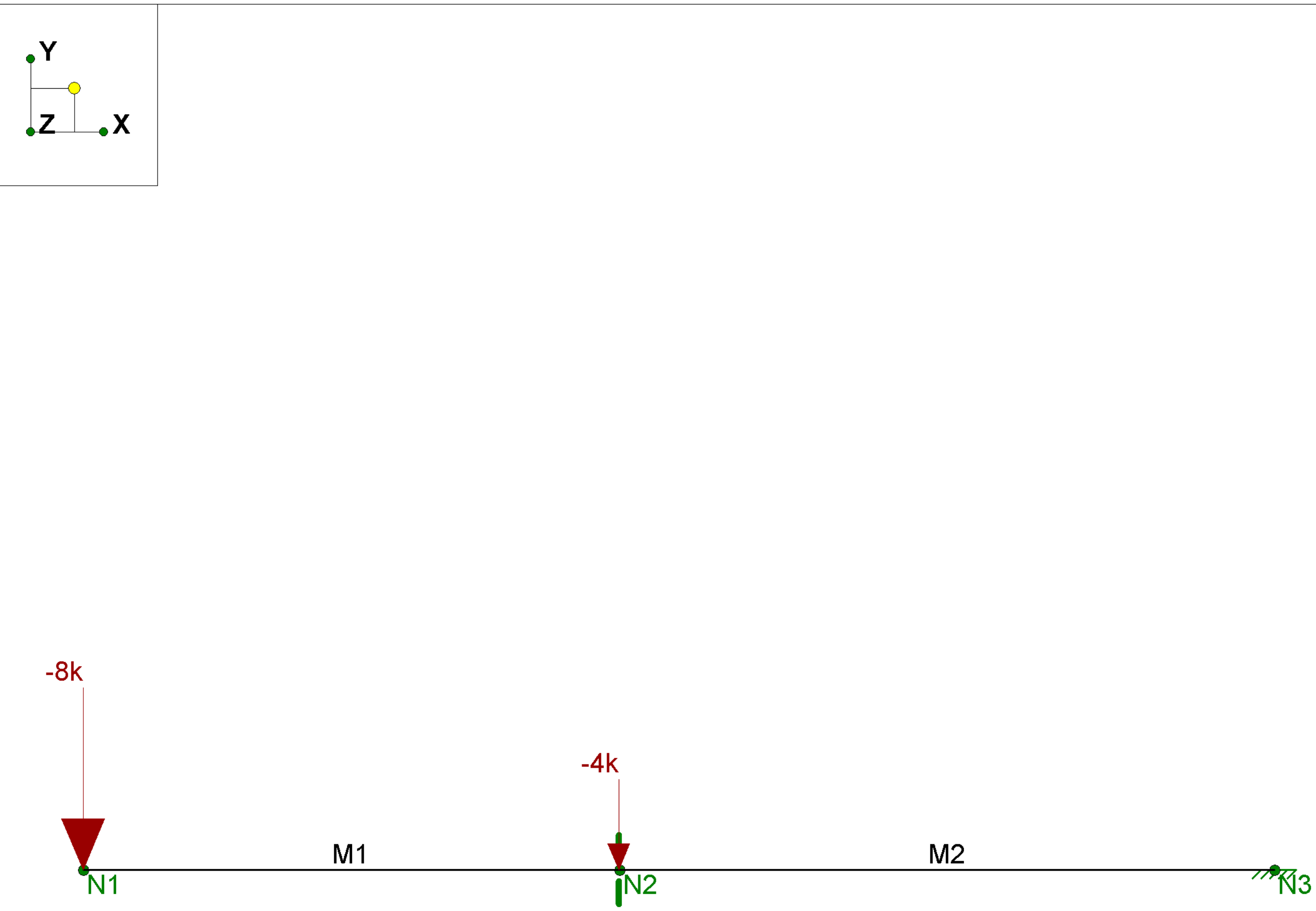
Loads: BLC 3, 4

MCMJAC	Fall Creek Coho Grade Beam	SK - 5
AIJ		Oct 19, 2020 at 3:32 PM
		Fall Creek Coho Grade Beam.r3d



Loads: BLC 4, 15

MCMJAC	Fall Creek Coho Grade Beam	SK - 6
AIJ		Oct 19, 2020 at 3:32 PM
		Fall Creek Coho Grade Beam.r3d



Loads: BLC 5, 16

MCMJAC	Fall Creek Coho Grade Beam	SK - 7
AIJ		Oct 19, 2020 at 3:33 PM
		Fall Creek Coho Grade Beam.r3d

Load Combinations

	Description	Solve	PDelta	SR...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1		Y		1	1.5																		
2	3		Y		2	1.5																		
3	4		Y		3	1.5																		
4	15	Yes	Y		4	1.5																		
5	16	Yes	Y		5	1.5																		

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N2	0	37.198	0	0	0	0
2	4	N3	0	-14.698	0	0	0	107.356
3	4	Totals:	0	22.5	0			
4	4	COG (ft):	X: 8.4	Y: 0	Z: 0			
5	5	N2	0	32.698	0	0	0	0
6	5	N3	0	-14.698	0	0	0	107.356
7	5	Totals:	0	18	0			
8	5	COG (ft):	X: 6	Y: 0	Z: 0			

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	0	5	37.198	4	0	5	0	5	0	5	0	5
2		min	0	4	32.698	5	0	4	0	4	0	4	0	4
3	N3	max	0	5	-14.698	5	0	5	0	5	0	5	107.356	5
4		min	0	4	-14.698	4	0	4	0	4	0	4	107.356	4
5	Totals:	max	0	5	22.5	4	0	5						
6		min	0	4	18	5	0	4						

Member Section Forces

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	4	M1	1	0	-12	0	0	0	0
2			2	0	-12	0	0	0	54
3			3	0	-12	0	0	0	108
4			4	0	-12	0	0	0	162
5			5	0	-12	0	0	0	216
6	4	M2	1	0	14.698	0	0	0	216
7			2	0	14.698	0	0	0	135.161
8			3	0	14.698	0	0	0	54.322
9			4	0	14.698	0	0	0	-26.517
10			5	0	14.698	0	0	0	-107.356
11	5	M1	1	0	-12	0	0	0	0
12			2	0	-12	0	0	0	54
13			3	0	-12	0	0	0	108
14			4	0	-12	0	0	0	162

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
15			5	0	-12	0	0	0	216
16	5	M2	1	0	14.698	0	0	0	216
17			2	0	14.698	0	0	0	135.161
18			3	0	14.698	0	0	0	54.322
19			4	0	14.698	0	0	0	-26.517
20			5	0	14.698	0	0	0	-107.356

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k...	LC	y-y Mom...	LC	z-z Moment[k-ft]	LC
1	M1	1	max	0	5	-12	5	0	5	0	5	0	5	0	5
2			min	0	4	-12	4	0	4	0	4	0	4	0	4
3		2	max	0	5	-12	5	0	5	0	5	0	5	54	5
4			min	0	4	-12	4	0	4	0	4	0	4	54	4
5		3	max	0	5	-12	5	0	5	0	5	0	5	108	5
6			min	0	4	-12	4	0	4	0	4	0	4	108	4
7		4	max	0	5	-12	5	0	5	0	5	0	5	162	5
8			min	0	4	-12	4	0	4	0	4	0	4	162	4
9		5	max	0	5	-12	5	0	5	0	5	0	5	216	5
10			min	0	4	-12	4	0	4	0	4	0	4	216	4
11	M2	1	max	0	5	14.698	5	0	5	0	5	0	5	216	5
12			min	0	4	14.698	4	0	4	0	4	0	4	216	4
13		2	max	0	5	14.698	5	0	5	0	5	0	5	135.161	5
14			min	0	4	14.698	4	0	4	0	4	0	4	135.161	4
15		3	max	0	5	14.698	5	0	5	0	5	0	5	54.322	5
16			min	0	4	14.698	4	0	4	0	4	0	4	54.322	4
17		4	max	0	5	14.698	5	0	5	0	5	0	5	-26.517	5
18			min	0	4	14.698	4	0	4	0	4	0	4	-26.517	4
19		5	max	0	5	14.698	5	0	5	0	5	0	5	-107.356	5
20			min	0	4	14.698	4	0	4	0	4	0	4	-107.356	4

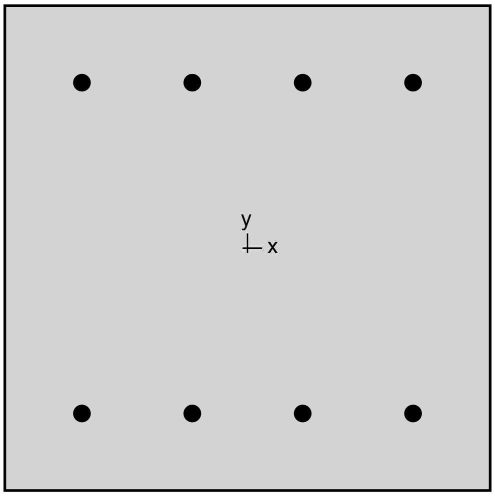
Maximum Member Section Forces

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-...	Loc[ft]	y-y Moment[...	Loc[ft]	z-z Moment[...	Loc[ft]
1	4	M1	max	0	0	-12	0	0	0	0	0	0	0	216	18
2			min	0	0	-12	0	0	0	0	0	0	0	0	0
3	4	M2	max	0	0	14.698	0	0	0	0	0	0	0	216	0
4			min	0	0	14.698	0	0	0	0	0	0	0	-107.356	22
5	5	M1	max	0	0	-12	0	0	0	0	0	0	0	216	18
6			min	0	0	-12	0	0	0	0	0	0	0	0	0
7	5	M2	max	0	0	14.698	0	0	0	0	0	0	0	216	0
8			min	0	0	14.698	0	0	0	0	0	0	0	-107.356	22

Envelope Maximum Member Section Forces

	Member		Axial[...	Loc...	LC	y Shear...	Loc...	LC	z Shear...	Loc...	LC	Torque[...	Loc...	LC	y-y Mome...	Loc...	LC	z-z Mome...	Loc...	LC
1	M1	max	0	0	5	-12	0	5	0	0	5	0	0	5	0	0	5	216	18	5
2		min	0	0	4	-12	0	4	0	0	4	0	0	4	0	0	4	0	0	4
3	M2	max	0	0	5	14.698	0	5	0	0	5	0	0	5	0	0	5	216	0	5
4		min	0	0	4	14.698	0	4	0	0	4	0	0	4	0	0	4	-107.356	22	4

spColumn v6.00
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	M:\Ayad Jabir\Fall Creek Coho Grade Beam.col
Project	Fall Creek
Column	Coho Grade B
Engineer	AIJ
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Investigation
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	4.5	ksi
E_c	3823.68	ksi
f_c	3.825	ksi
ε_u	0.003	in/in
β_1	0.825	

2.2. Steel

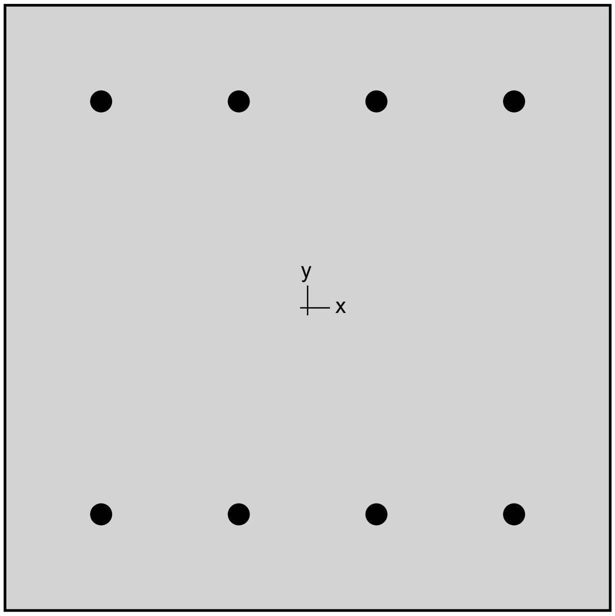
Type	Standard	
f_y	60	ksi
E_s	29000	ksi
ε_{yt}	0.00206897	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	24	in
Depth	24	in
A_g	576	in^2
I_x	27648	in^4
I_y	27648	in^4
r_x	6.9282	in
r_y	6.9282	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 24 x 24 in 0.83% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.3. Arrangement

Pattern	Sides different
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	---
Bars	---

Total steel area, A_s	4.80 in^2
Rho	0.83 %
Minimum clear spacing	4.58 in

(Note: Rho < 1.0%)

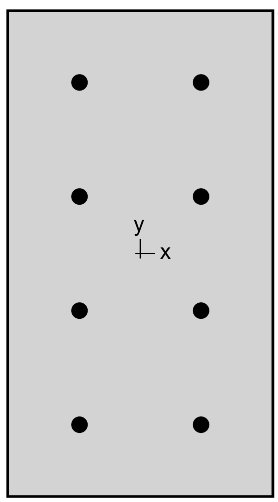
4.4. Bars Provided

		Bars	Cover
			in
Top	4	#7	3
Bottom	4	#7	3
Left	0	#3	3
Right	0	#3	3

5. Factored Loads and Moments with Corresponding Capacities

No	P_u	M_{ux}	ϕM_{nx}	$\phi M_n/M_u$	NA Depth	d_t Depth	ε_t	ϕ
	kip	k-ft	k-ft		in	in		
1	0.00	216.00	219.47	1.016	2.84	20.19	0.01831	0.900

spColumn v6.00
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	M:\Ayad Jabir\Fall Creek Coho.col
Project	Fall Creek
Column	Coho Pier
Engineer	AIJ
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Investigation
Run Axis	Biaxial
Slenderness	Not Considered
Column Type	Structural

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	4.5	ksi
E_c	3823.68	ksi
f_c	3.825	ksi
ε_u	0.003	in/in
β_1	0.825	

2.2. Steel

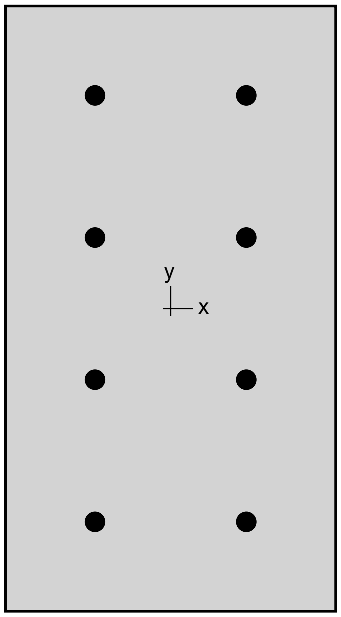
Type	Standard	
f_y	60	ksi
E_s	29000	ksi
ε_{yt}	0.00206897	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	12	in
Depth	22	in
A_g	264	in^2
I_x	10648	in^4
I_y	3168	in^4
r_x	6.35085	in
r_y	3.4641	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 12 x 22 in 1.33% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.3. Arrangement

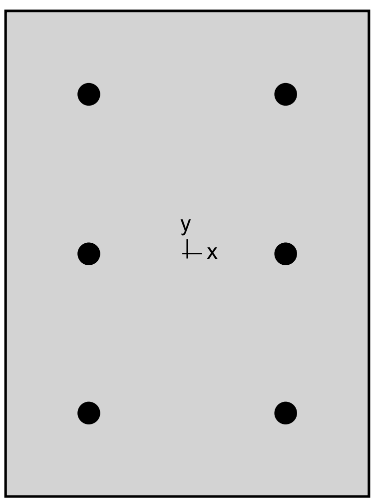
Pattern	Equal spacing
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	2.5 in
Bars	8 #6

Total steel area, A_s	3.52 in²
Rho	1.33 %
Minimum clear spacing	4.42 in

5. Factored Loads and Moments with Corresponding Capacities

No	P_u	M_{ux}	M_{uy}	ϕM_{nx}	ϕM_{ny}	$\phi M_n/M_u$	NA Depth	d_t Depth	ε_t	ϕ
	kip	k-ft	k-ft	k-ft	k-ft		in	in		
1	86.80	173.41	0.00	188.28	0.00	1.086	5.60	18.75	0.00705	0.900
2	88.57	158.58	0.00	189.07	0.00	1.192	5.63	18.75	0.00700	0.900
3	-22.30	-44.76	0.00	-126.25	0.00	2.821	3.43	18.75	0.01342	0.900
4	-27.00	-25.00	-27.00	-53.12	-57.37	2.125	3.78	11.55	0.00629	0.900
5	9.30	-36.00	-59.00	-42.39	-69.48	1.178	3.78	10.97	0.00597	0.900
6	79.00	178.00	0.00	184.78	0.00	1.038	5.47	18.75	0.00729	0.900
7	-23.00	-43.00	0.00	-125.79	0.00	2.925	3.41	18.75	0.01348	0.900
8	-16.00	-9.40	59.00	-10.49	65.82	1.116	2.57	9.30	0.00816	0.900

spColumn v6.00
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	m:\ayad jabir\fall creek spawning pedestal.col
Project	---
Column	---
Engineer	---
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Investigation
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Structural

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	4.5	ksi
E_c	3823.68	ksi
f_c	3.825	ksi
ε_u	0.003	in/in
β_1	0.825	

2.2. Steel

Type	Standard	
f_y	60	ksi
E_s	29000	ksi
ε_{yt}	0.00206897	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	12	in
Depth	16	in
A_g	192	in^2
I_x	4096	in^4
I_y	2304	in^4
r_x	4.6188	in
r_y	3.4641	in
X_o	0	in
Y_o	0	in

3.2. Section Figure

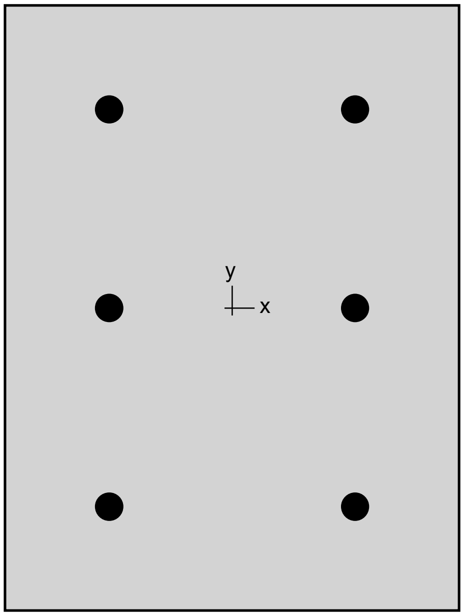


Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.3. Arrangement

Pattern	Sides different
Bar layout	Rectangular
Cover to	Transverse bars
Clear cover	---
Bars	---

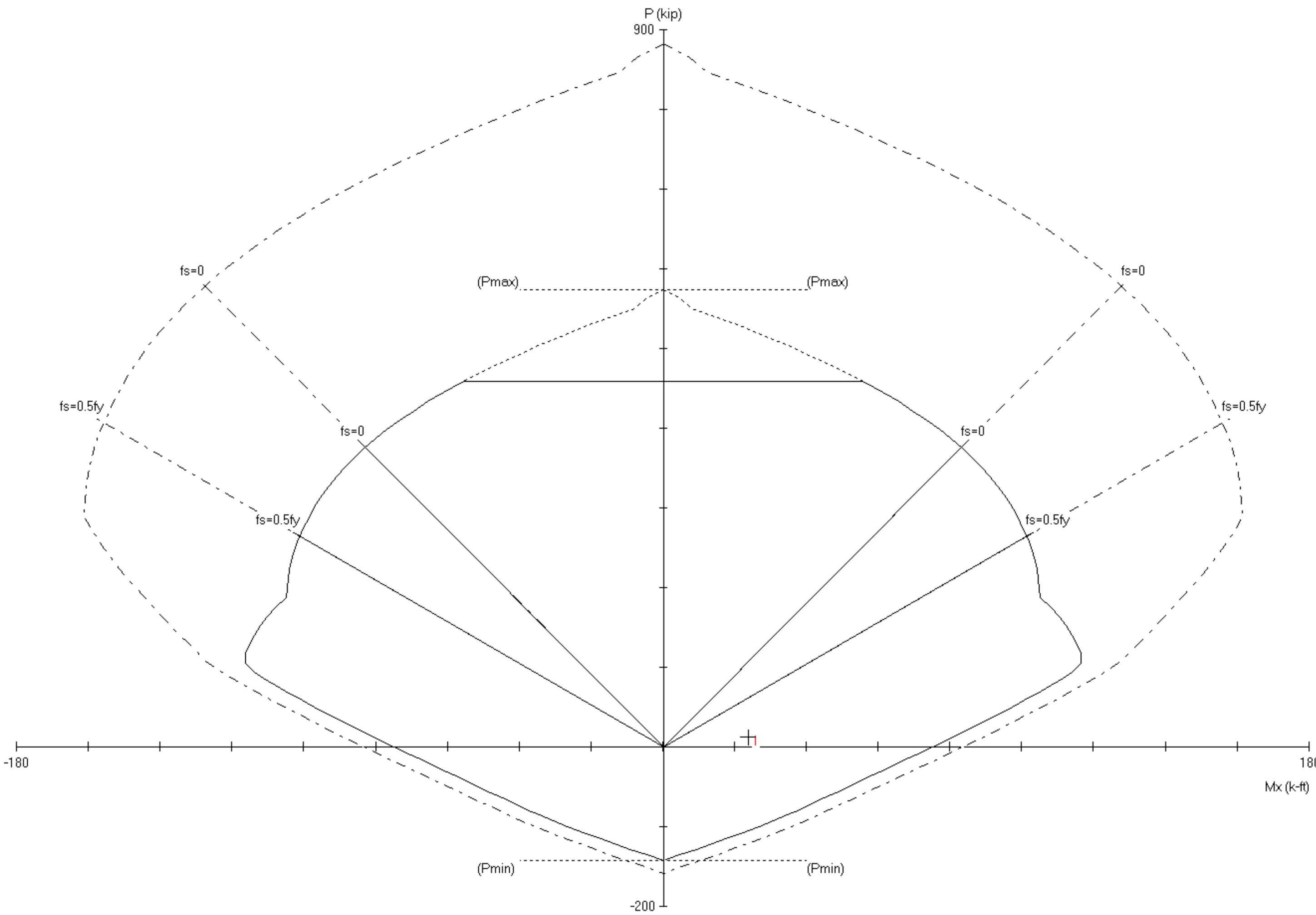
Total steel area, A_s	2.64 in^2
Rho	1.38 %
Minimum clear spacing	4.50 in

4.4. Bars Provided

		Bars	Cover
			in
Top	2	#6	2
Bottom	2	#6	2
Left	1	#6	2
Right	1	#6	2

5. Factored Loads and Moments with Corresponding Capacities

No	P_u	M_{ux}	ϕM_{nx}	$\phi M_n/M_u$	NA Depth	d_t Depth	ε_t	ϕ
	kip	k-ft	k-ft		in	in		
1	12.26	23.72	80.61	3.399	2.99	13.25	0.01030	0.900



VP Buildings

3200 Players Club Circle
Memphis, TN 38125-8843

STRUCTURAL DESIGN DATA

Project: Fall Creek FH Coho Salmon Bldg
Name: Fall Creek FH Coho Salmon Bldg
Builder PO #:
Jobsite:

City, State: Yreka, California 96097
County: Siskiyou
Country: United States

TABLE OF CONTENTS

Letter of Certification

Contact:
Name: Evergreen Industrial
Address:

City, State: Loveland, Colorado 80537
Country: United States

Project: Fall Creek FH Coho Salmon Bldg
Builder PO #:
Jobsite:

City, State: Yreka, California 96097
County, Country: Siskiyou, United States

This is to certify that the above referenced project has been designed in accordance with the applicable portions of the Building Code specified below. All loading and building design criteria shown below have been specified by contract and applied in accordance with the building code.

Overall Building Description

Shape	Overall Width	Overall Length	Floor Area (sq. ft.)	Wall Area (sq. ft.)	Roof Area (sq. ft.)	Max. Eave Height	Min. Eave Height 2	Max. Roof Pitch	Min. Roof Pitch	Peak Height
Coho Salmon Bldg	67/5/0	94/4/8	6362	6014	7837	18/0/0	18/0/0	1.000:12	1.000:12	20/9/11

Loads and Codes - Shape: Coho Salmon Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: 6.61 psf
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.882
Parts Wind Exposure Factor: 0.882
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.1258
Shielding Factor: Ks: 0.8150
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 13/5/13
Parts / Portions Zone Strip Width: a: 10/9/10
Basic Wind Pressure: q: 25.38,(Parts) 25.38 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 19/4/14

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.3002
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1849
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Building design loads and governing building code is provided by the Builder and is not validated by Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. The Builder is responsible for contacting the local Building Official or project Design Professional to obtain all code and loading information for this specific building site.

The design of this building is in accordance with Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. design practices which have been established based upon pertinent procedures and recommendations of the Standards listed in the Building Code or later editions.

This certification DOES NOT apply to the design of the foundation or other on-site structures or components not supplied by Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc., nor does it apply to unauthorized modifications to building components. Furthermore, it is understood that certification is based upon the premise that all components will be erected or constructed in strict compliance with pertinent documents for this project. Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. DOES NOT provide general review of erection during or after building construction unless specifically agreed to in the contract documents.

The undersigned engineer in responsible charge certifies that this building has been designed in accordance with the contract documents as indicated in this letter.

____ Date: ________________ Engineer's Seal:
Engineer in responsible charge

Building Loading - Summary Report

Shape: Coho Salmon Bldg

Loads and Codes - Shape: Coho Salmon Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: 6.61 psf
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.882
Parts Wind Exposure Factor: 0.882
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.1258
Shielding Factor: Ks: 0.8150
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 13/5/13
Parts / Portions Zone Strip Width: a: 10/9/10
Basic Wind Pressure: q: 25.38,(Parts) 25.38 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 19/4/14

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.3002
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1849
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Deflection Conditions
Frames are vertically supporting:Metal Roof Purlins and Panels
Frames are laterally supporting:Metal Wall Girts and Panels
Purlins are supporting:Metal Roof Panels
Girts are supporting:Metal Wall Panels

Design Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
2	System	1.000	1.0 D + 1.0 CG + 1.0 <S	D + CG + <S
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
7	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
8	System	1.000	1.0 D + 1.0 CG + 0.6 WPR	D + CG + WPR
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1

15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
16	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR
17	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
18	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
19	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
20	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
21	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL	D + CG + S + WPL
22	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR	D + CG + S + WPR
23	System	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+	D + CG + E> + EG+
24	System	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+	D + CG + <E + EG+
25	System	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG-	D + CU + E> + EG-
26	System	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG-	D + CU + <E + EG-
27	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+	D + CG + S + E> + EG+
28	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+	D + CG + S + <E + EG+
29	Special	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
30	Special	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
31	Special	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
32	Special	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
33	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
34	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
35	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
36	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
37	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
38	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
39	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
40	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
41	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 WB1>	D + CG + WPR + WB1>
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
43	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 WB1>	D + CG + S + WPR + WB1>
44	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 <WB1	D + CG + WPR + <WB1
45	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 <WB1	D + CU + WPR + <WB1
46	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 <WB1	D + CG + S + WPR + <WB1
47	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 WB3>	D + CG + WPL + WB3>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
49	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 WB3>	D + CG + S + WPL + WB3>
50	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 <WB3	D + CG + WPL + <WB3
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3
52	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 <WB3	D + CG + S + WPL + <WB3
53	System Derived	1.000	0.6 MWB	MWB - Wall: 1
54	System Derived	1.000	0.6 MWB	MWB - Wall: 2
55	System Derived	1.000	0.6 MWB	MWB - Wall: 3
56	System Derived	1.000	0.6 MWB	MWB - Wall: 4
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>
58	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 EB>	D + CG + E> + EG+ + EB>
59	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 EB>	D + CG + <E + EG+ + EB>
60	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 EB>	D + CG + <E + EG+ + EB>
61	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 EB>	D + CU + E> + EG- + EB>
62	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 EB>	D + CU + E> + EG- + EB>
63	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 EB>	D + CU + <E + EG- + EB>
64	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 EB>	D + CU + <E + EG- + EB>
65	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 EB>	D+CG+S+E>+EG++EB>
66	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 EB>	D+CG+S+E>+EG++EB>
67	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 EB>	D+CG+S+<E+EG++EB>
68	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 EB>	D+CG+S+<E+EG++EB>
69	Special	1.000	1.0 D + 1.0 CG + 1.75 EB> + 0.7 EG+	D + CG + EB> + EG+
70	Special	1.000	0.6 D + 0.6 CU + 1.75 EB> + 0.7 EG-	D + CU + EB> + EG-
71	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 EB> + 0.525 EG+	D + CG + S + EB> + EG+
72	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB
73	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 <EB	D + CG + E> + EG+ + <EB
74	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 <EB	D + CG + <E + EG+ + <EB
75	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 <EB	D + CG + <E + EG+ + <EB
76	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 <EB	D + CU + E> + EG- + <EB
77	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 <EB	D + CU + E> + EG- + <EB
78	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 <EB	D + CU + <E + EG- + <EB
79	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 <EB	D + CU + <E + EG- + <EB
80	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 <EB	D+CG+S+E>+EG++<EB
81	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 <EB	D+CG+S+E>+EG++<EB

82	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 <EB	D+CG+S+<E+EG++<EB
83	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 <EB	D+CG+S+<E+EG++<EB
84	Special	1.000	1.0 D + 1.0 CG + 1.75 <EB + 0.7 EG+	D + CG + <EB + EG+
85	Special	1.000	0.6 D + 0.6 CU + 1.75 <EB + 0.7 EG-	D + CU + <EB + EG-
86	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <EB + 0.525 EG+	D + CG + S + <EB + EG+

Design Load Combinations - Bracing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 0.6 W1>	D + W1>
2	System	1.000	1.0 D + 0.6 <W1	D + <W1
3	System	1.000	1.0 D + 0.6 W2>	D + W2>
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	1.0 D + 0.6 W3>	D + W3>
6	System	1.000	1.0 D + 0.6 <W3	D + <W3
7	System	1.000	1.0 D + 0.6 W4>	D + W4>
8	System	1.000	1.0 D + 0.6 <W4	D + <W4
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	1.0 D + 0.7 E>	D + E>
14	System	1.000	1.0 D + 0.7 <E	D + <E
15	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W1>	D + CG + W1>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W1	D + CG + <W1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
18	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W3>	D + CG + W3>
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W3	D + CG + <W3
21	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W4>	D + CG + W4>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W4	D + CG + <W4
23	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
24	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W2>	D + CU + W2>
26	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W2	D + CU + <W2
27	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W3>	D + CU + W3>
28	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W3	D + CU + <W3
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W4>	D + CU + W4>
30	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W4	D + CU + <W4
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
33	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W3>	D + CG + S + W3>
36	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W3	D + CG + S + <W3
37	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W4>	D + CG + S + W4>
38	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W4	D + CG + S + <W4
39	System Derived	1.000	1.0 D + 1.0 CG + 0.7 E> + 0.7 EG+	D + CG + E> + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <E + 0.7 EG+	D + CG + <E + EG+
41	System Derived	1.000	0.6 D + 0.6 CG + 0.7 E> + 0.7 EG-	D + CG + E> + EG-
42	System Derived	1.000	0.6 D + 0.6 CG + 0.7 <E + 0.7 EG-	D + CG + <E + EG-
43	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 E> + 0.525 EG+	D + CG + S + E> + EG+
44	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <E + 0.525 EG+	D + CG + S + <E + EG+

Design Load Combinations - Purlin

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S	D + CG + S
2	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
3	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
4	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 1)
5	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 4)
6	System	1.000	1.0 D + 1.0 CG + 1.0 PH1	D + CG + PH1(Span 1)
7	System	1.000	1.0 D + 1.0 CG + 1.0 PH1	D + CG + PH1(Span 4)
8	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 1
9	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 2
10	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 3
11	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB1>	D + CG + <W2 + WB1>
12	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB1>	D + CU + W1> + WB1>

13	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB1>	D + CG + S + W1> + WB1>
14	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB1>	D + CG + S + <W2 + WB1>
15	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB1	D + CG + <W2 + <WB1
16	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB1	D + CU + W1> + <WB1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB1	D + CG + S + W1> + <WB1
18	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB1	D + CG + S + <W2 + <WB1
19	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB2>	D + CG + <W2 + WB2>
20	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB2>	D + CU + W1> + WB2>
21	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB2>	D + CG + S + W1> + WB2>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB2>	D + CG + S + <W2 + WB2>
23	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB2	D + CG + <W2 + <WB2
24	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB2	D + CU + W1> + <WB2
25	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB2	D + CG + S + W1> + <WB2
26	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB2	D + CG + S + <W2 + <WB2
27	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB3>	D + CG + <W2 + WB3>
28	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB3>	D + CU + W1> + WB3>
29	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB3>	D + CG + S + W1> + WB3>
30	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB3>	D + CG + S + <W2 + WB3>
31	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB3	D + CG + <W2 + <WB3
32	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB3	D + CU + W1> + <WB3
33	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB3	D + CG + S + W1> + <WB3
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB3	D + CG + S + <W2 + <WB3
35	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB4>	D + CG + <W2 + WB4>
36	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB4>	D + CU + W1> + WB4>
37	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB4>	D + CG + S + W1> + WB4>
38	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB4>	D + CG + S + <W2 + WB4>
39	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB4	D + CG + <W2 + <WB4
40	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB4	D + CU + W1> + <WB4
41	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB4	D + CG + S + W1> + <WB4
42	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB4	D + CG + S + <W2 + <WB4
43	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 EB> + 0.525 EG+	D + CG + S + EB> + EG+
44	System Derived	1.000	1.0 D + 1.0 CG + 0.7 EB> + 0.7 EG+	D + CG + EB> + EG+
45	System Derived	1.000	0.6 D + 0.6 CU + 0.7 EB> + 0.7 EG-	D + CU + EB> + EG-
46	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <EB + 0.525 EG+	D + CG + S + <EB + EG+
47	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <EB + 0.7 EG+	D + CG + <EB + EG+
48	System Derived	1.000	0.6 D + 0.6 CU + 0.7 <EB + 0.7 EG-	D + CU + <EB + EG-

Design Load Combinations - Girt

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Design Load Combinations - Roof - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 S	D + S
2	System	1.000	1.0 D + 1.0 US1*	D + US1*
3	System	1.000	1.0 D + 1.0 *US1	D + *US1
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	0.6 D + 0.6 W1>	D + W1>

Design Load Combinations - Wall - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Deflection Load Combinations - Framing

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	0	180	1.0 S	S
2	System	1.000	60	180	0.42 W1>	W1>
3	System	1.000	60	180	0.42 <W1	<W1
4	System	1.000	60	180	0.42 W2>	W2>
5	System	1.000	60	180	0.42 <W2	<W2
6	System	1.000	60	180	0.42 WPL	WPL
7	System	1.000	60	180	0.42 WPR	WPR
8	System	1.000	10	0	1.0 E> + 1.0 EG-	E> + EG-
9	System	1.000	10	0	1.0 <E + 1.0 EG-	<E + EG-

Deflection Load Combinations - Purlin

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	180	1.0 S	S
2	System	1.000	180	0.42 W1>	W1>
3	System	1.000	180	0.42 <W2	<W2

Deflection Load Combinations - Girt

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	90	0.42 W1>	W1>
2	System	1.000	90	0.42 <W2	<W2

Deflection Load Combinations - Roof - Panel

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	60	60	1.0 S	S
2	System	1.000	60	60	0.42 <W2	<W2

User Applied Surface Loads (Local Coordinate System)

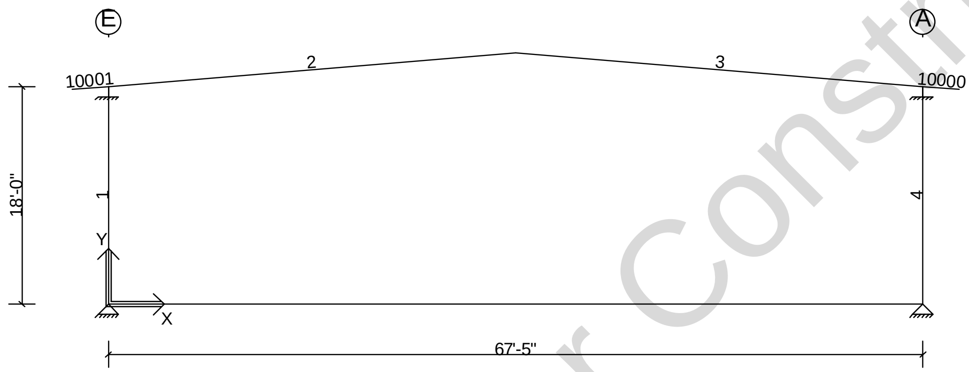
Side	Shape	Units	Type	Description	Mag	X-Loc	Y-Loc	Frm	Brc	Grt	Pur	Pnl	Supp.	Dir.	Loc.
A	LN	plf	CG	netting	15.00	-9/6/0	0/0/0	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	-9/6/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	-9/6/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	18/9/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	18/9/0	0/0/0	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	18/9/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	103/10/8	0/0/0	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	103/10/8	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	75/7/8	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	103/10/8	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	75/7/8	0/0/0	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	75/7/8	-33/8/8	Y	N	N	Y	N	N	IN	OF

User Defined Frame Point Loads for Cross Section: 1

Side	Units	Type	Description	Mag1	Loc1	Offset	H or V	Supp.	Dir.	Coef.	Loc.
2	p	CG	netting->Resolved From Plane	-341.65	33/8/8	NA	NA	N	DOWN	1.000	OF
3	p	CG	netting->Resolved From Plane	-341.65	33/8/8	NA	NA	N	DOWN	1.000	OF

User Defined Frame Line Loads for Cross Section: 1

Side	Units	Type	Description	Mag1	Loc1	Mag2	Loc2	Supp.	Dir.	Coef.	Loc.
2	plf	CG	netting->Resolved From Plane	-23.87	0/0/0	-23.87	33/8/8	N	DOWN	1.000	OF
3	plf	CG	netting->Resolved From Plane	-23.87	0/0/0	-23.87	33/8/8	N	DOWN	1.000	OF

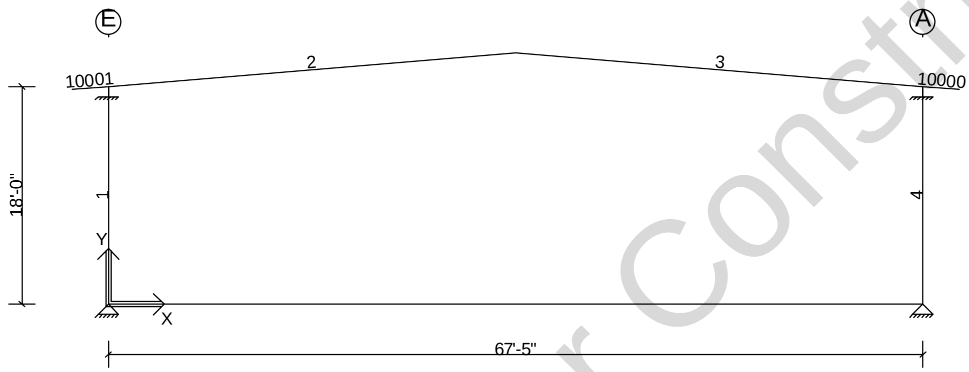


User Defined Frame Point Loads for Cross Section: 2

Side	Units	Type	Description	Mag1	Loc1	Offset	H or V	Supp.	Dir.	Coef.	Loc.
2	p	CG	netting->Resolved From Plane	-133.12	33/8/8	NA	NA	N	DOWN	1.000	OF
3	p	CG	netting->Resolved From Plane	-133.12	33/8/8	NA	NA	N	DOWN	1.000	OF

User Defined Frame Line Loads for Cross Section: 2

Side	Units	Type	Description	Mag1	Loc1	Mag2	Loc2	Supp.	Dir.	Coef.	Loc.
2	plf	CG	netting->Resolved From Plane	-15.00	0/0/0	-15.00	33/8/8	N	DOWN	1.000	OF
3	plf	CG	netting->Resolved From Plane	-15.00	0/0/0	-15.00	33/8/8	N	DOWN	1.000	OF



Reactions - Summary Report w/Controlling Load Comb

Shape: Coho Salmon Bldg

Builder Contact:
Name: Evergreen Industrial
Address:

City, State Zip: Loveland, Colorado 80537
Country: United States

Project: Fall Creek FH Coho Salmon Bldg
Builder PO #:
Jobsite:

City, State Zip: Yreka, California 96097
County, Country: Siskiyou, United States

Loads and Codes - Shape: Coho Salmon Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: 6.61 psf
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.882
Parts Wind Exposure Factor: 0.882
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.1258
Shielding Factor: Ks: 0.8150
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 13/5/13
Parts / Portions Zone Strip Width: a: 10/9/10
Basic Wind Pressure: q: 25.38,(Parts) 25.38 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 19/4/14

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.3002
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1849
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Overall Building Description

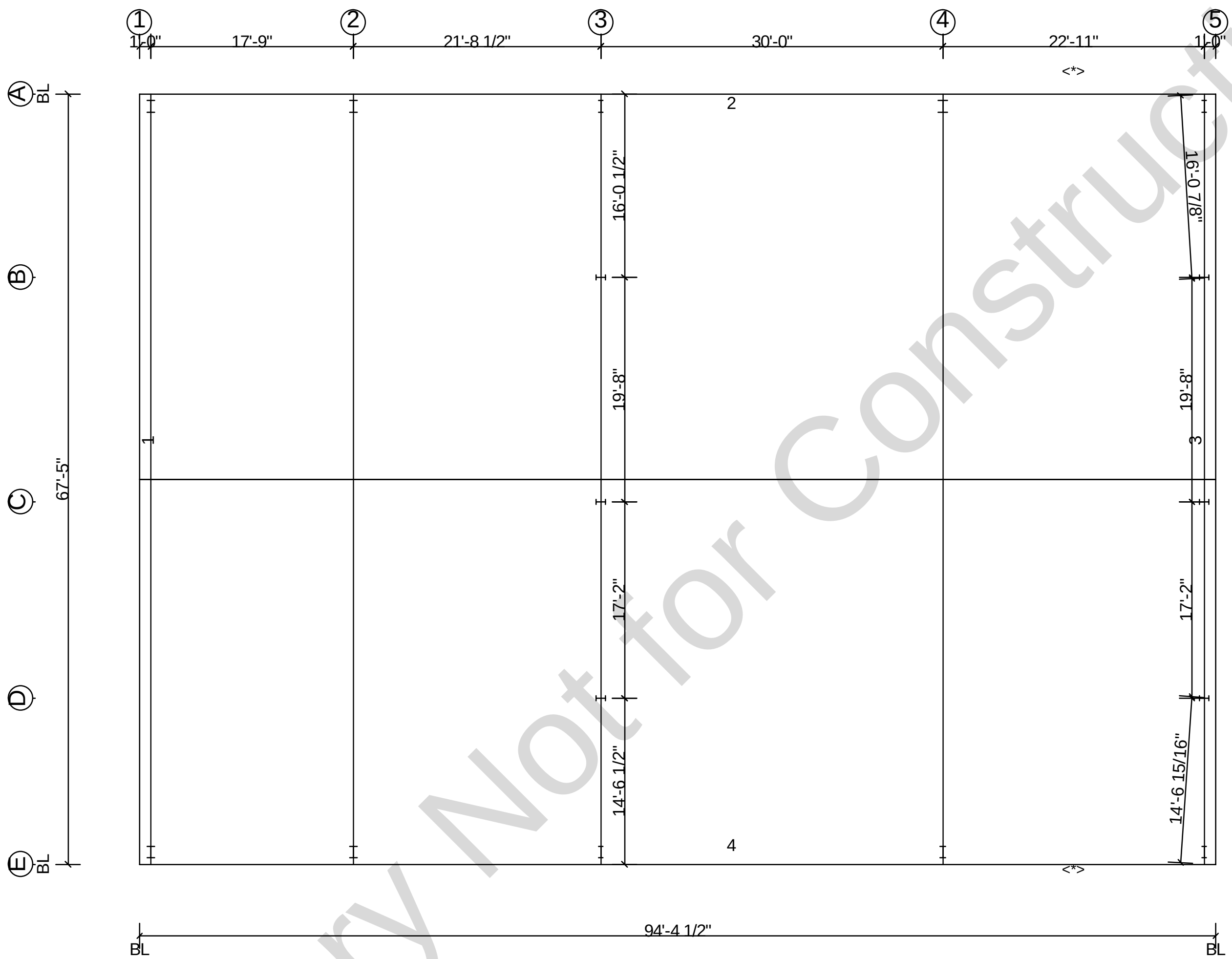
Shape	Overall Width	Overall Length	Floor Area (sq. ft.)	Wall Area (sq. ft.)	Roof Area (sq. ft.)	Max. Eave Height	Min. Eave Height 2	Max. Roof Pitch	Min. Roof Pitch	Peak Height
Coho Salmon Bldg	67/5/0	94/4/8	6362	6014	7837	18/0/0	18/0/0	1.000:12	1.000:12	20/9/11

User Applied Surface Loads (Local Coordinate System)

Side	Shape	Units	Type	Description	Mag	X-Loc	Y-Loc	Frm	Brc	Grt	Pur	Pnl	Supp.	Dir.	Loc.
A	LN	plf	CG	netting	15.00	-9/6/0	0/0/0	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	-9/6/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	-9/6/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	18/9/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	18/9/0	0/0/0	Y	N	N	Y	N	N	IN	OF
A	LN	plf	CG	netting	15.00	18/9/0	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	103/10/8	0/0/0	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	103/10/8	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	75/7/8	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	103/10/8	-33/8/8	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	75/7/8	0/0/0	Y	N	N	Y	N	N	IN	OF
B	LN	plf	CG	netting	15.00	75/7/8	-33/8/8	Y	N	N	Y	N	N	IN	OF

Overall Shape Description

Roof 1	Roof 2	From Grid	To Grid	Width	Length	Eave Ht.	Eave Ht. 2	Pitch	Pitch 2	Dist. to Ridge	Peak Height
A	B	1-A	1-E	67/5/0	94/4/8	18/0/0	18/0/0	1.000:12	1.000:12	33/8/8	20/9/11

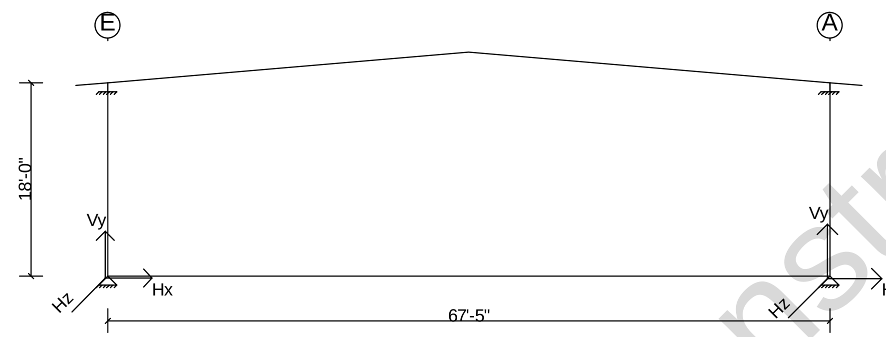


<*> The building is designed with bracing diagonals in the designated bays. Column base reactions, base plates and anchor rods are affected by this bracing and diagonals may not be relocated without consulting the building supplier's engineer.

Wall: 4, Frame at: 1/0/0

Frame ID:Rigid Frame

Frame Type:Rigid Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 1

Load Type	Load Description	Desc.	Hx	Vy	Hx	Vy		
	Type		Exterior Column		Exterior Column			
	X-Loc		0/0/0		67/5/0			
	Grid1 - Grid2		1-E		1-A			
	Base Plate W x L (in.)		9 X 13		9 X 13			
	Base Plate Thickness (in.)		0.375		0.375			
	Anchor Rod Qty/Diam. (in.)		4 - 1.000		4 - 1.000			
	Column Base Elev.		100'-0"		100'-0"			
D	Material Dead Weight	Frm	4.00	7.38	-4.00	7.38	-	-
CG	Collateral Load for Gravity Cases	Frm	3.01	5.28	-3.01	5.28	-	-
S>	Snow - Notional Right	Frm	20.93	35.09	-20.93	35.09	-	-
<S	Snow - Notional Left	Frm	20.93	35.09	-20.93	35.09	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	17.29	18.94	-17.29	35.70	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	17.29	35.70	-17.29	18.94	-	-
W2>	Wind Load, Case 2, Right	Frm	-9.32	-14.41	5.63	-7.39	-	-
<W2	Wind Load, Case 2, Left	Frm	-5.63	-7.39	9.32	-14.41	-	-
WPL	Wind Load, || Ridge, Left	Frm	-15.48	-25.40	14.64	-30.36	-	-
WPR	Wind Load, || Ridge, Right	Frm	-14.64	-30.36	15.48	-25.40	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	0.84	0.45	2.23	-0.45	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-2.23	-0.45	-0.84	0.45	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-12.92	-23.75	9.23	-16.72	-	-
<W1	Wind Load, Case 1, Left	Frm	-9.23	-16.72	12.92	-23.75	-	-
S	Snow Load	Frm	20.93	35.09	-20.93	35.09	-	-
E>	Seismic Load, Right	Frm	-3.02	-1.66	-3.02	1.66	-	-
EG+	Vertical Seismic Effect, Additive	Frm	0.78	1.34	-0.78	1.34	-	-
<E	Seismic Load, Left	Frm	3.02	1.66	3.02	-1.66	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-0.78	-1.34	0.78	-1.34	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	1-E	6.88	15	27.95	1	-	-	-	-	13.79	16	48.36	4	-	-	-	-

67/5/0	1-A	27.95	1	6.88	16	-	-	-	-	13.79	15	48.36	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 1
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		67/5/0				
Grid1 - Grid2		1-E		1-A				
Ld	Description	Hx	Vy	Hx	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)			
1	D + CG + S>	27.95	47.74	-27.95	47.74	-	-	-
3	D + CG + US1*	24.30	31.60	-24.30	48.36	-	-	-
4	D + CG + *US1	24.31	48.36	-24.30	31.60	-	-	-
15	D + CU + WPL	-6.88	-10.81	6.38	-13.79	-	-	-
16	D + CU + WPR	-6.38	-13.79	6.88	-10.81	-	-	-

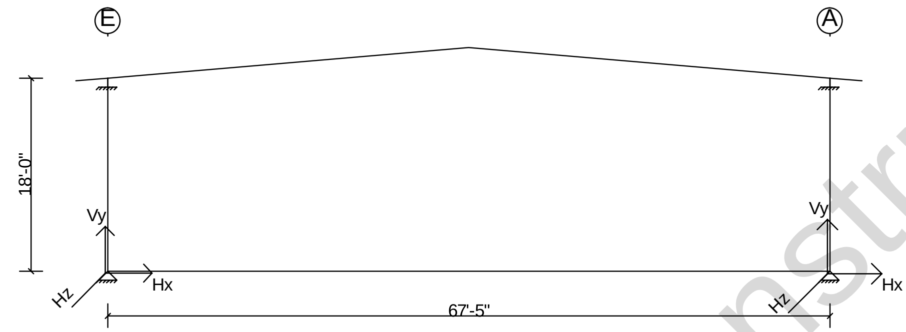
ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
16	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR

Wall: 4, Frame at: 18/9/0

Frame ID:Rigid Frame

Frame Type:Rigid Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 2

	Type		Exterior Column		Exterior Column			
	X-Loc		0/0/0		67/5/0			
	Grid1 - Grid2		2-E		2-A			
	Base Plate W x L (in.)		9 X 13		9 X 13			
	Base Plate Thickness (in.)		0.375		0.375			
	Anchor Rod Qty/Diam. (in.)		4 - 1.000		4 - 1.000			
	Column Base Elev.		100'-0"		100'-0"			
Load Type	Load Description	Desc.	Hx	Vy	Hx	Vy		
D	Material Dead Weight	Frm	3.37	6.58	-3.37	6.60	-	-
CG	Collateral Load for Gravity Cases	Frm	2.39	4.26	-2.39	4.26	-	-
S>	Snow - Notional Right	Frm	16.55	29.33	-16.55	29.33	-	-
<S	Snow - Notional Left	Frm	16.55	29.33	-16.55	29.33	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	13.56	15.66	-13.56	30.11	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	14.16	30.11	-14.16	15.66	-	-
W2>	Wind Load, Case 2, Right	Frm	-5.37	-4.06	-0.97	2.00	-	-
<W2	Wind Load, Case 2, Left	Frm	0.91	2.00	5.43	-4.06	-	-
WPL	Wind Load, || Ridge, Left	Frm	-7.38	-17.57	6.88	-20.61	-	-
WPR	Wind Load, || Ridge, Right	Frm	-7.03	-20.62	7.52	-17.56	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	1.60	0.89	4.52	-0.89	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-4.34	-0.89	-1.78	0.89	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-12.48	-22.65	6.14	-16.59	-	-
<W1	Wind Load, Case 1, Left	Frm	-6.20	-16.59	12.54	-22.64	-	-
S	Snow Load	Frm	16.55	29.33	-16.55	29.33	-	-
E>	Seismic Load, Right	Frm	-2.59	-1.46	-2.85	1.46	-	-
EG+	Vertical Seismic Effect, Additive	Frm	0.64	1.14	-0.64	1.14	-	-
<E	Seismic Load, Left	Frm	2.59	1.46	2.85	-1.46	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-0.64	-1.14	0.64	-1.14	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	2-E	5.47	13	22.31	1	-	-	-	-	9.64	13	40.95	4	-	-	-	-

67/5/0	2-A	22.31	1	5.50	14	-	-	-	-	9.62	14	40.97	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 2
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		67/5/0				
Grid1 - Grid2		2-E		2-A				
Ld	Description	Hx	Vy	Hx	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)			
1	D + CG + S>	22.31	40.16	-22.31	40.18	-	-	-
3	D + CG + US1*	19.32	26.50	-19.32	40.97	-	-	-
4	D + CG + *US1	19.92	40.95	-19.92	26.52	-	-	-
13	D + CU + W1>	-5.47	-9.64	1.66	-5.99	-	-	-
14	D + CU + <W1	-1.69	-6.01	5.50	-9.62	-	-	-

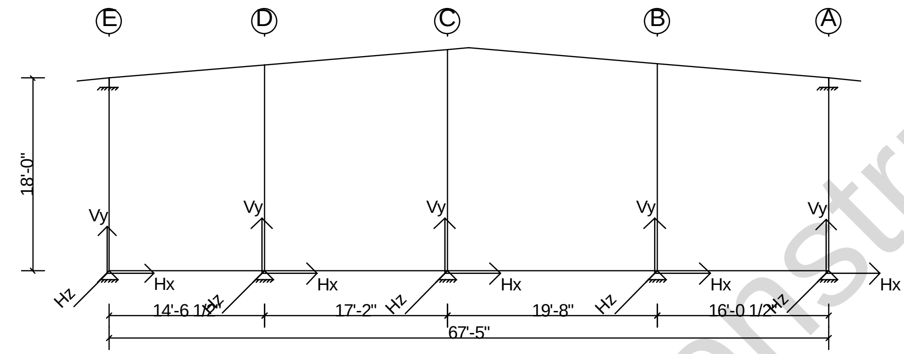
ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1

Wall: 4, Frame at: 40/5/8

Frame ID:CB end frames

Frame Type:Continuous Beam



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 3

Type			Exterior Column		Interior Column			Interior Column			Interior Column		
X-Loc			0/0/0		14/6/8			31/8/8			51/4/8		
Grid1 - Grid2			3-E		3-D			3-C			3-B		
Base Plate W x L (in.)			8 X 13		8 X 11			8 X 11			8 X 11		
Base Plate Thickness (in.)			0.375		0.375			0.375			0.375		
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			4 - 0.750			4 - 0.750		
Column Base Elev.			100'-0"		100'-0"			100'-0"			100'-0"		
Load Type	Load Description	Desc.	Hx	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy
D	Material Dead Weight	Frm	0.05	2.26	-	-	3.12	-	-	3.55	-	-	3.71
CG	Collateral Load for Gravity Cases	Frm	0.03	1.27	-	-	2.09	-	-	2.35	-	-	2.47
S>	Snow - Notional Right	Frm	0.26	10.57	-	-	16.76	-	-	18.87	-	-	19.82
<S	Snow - Notional Left	Frm	0.26	10.57	-	-	16.76	-	-	18.87	-	-	19.82
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.19	3.98	-	-	2.66	-	-	14.92	-	-	28.48
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.13	9.34	-	-	25.01	-	-	17.44	-	-	4.42
W2>	Wind Load, Case 2, Right	Frm	-6.33	-5.05	-	-	0.55	-	-	-0.67	-	-	-0.65
<W2	Wind Load, Case 2, Left	Frm	1.27	3.63	-	-	-1.15	-	-	-0.38	-	-	0.07
WPL	Wind Load, || Ridge, Left	Frm	3.74	-7.29	-	-	-7.80	-	-	-11.29	-	-	-15.26
WPR	Wind Load, || Ridge, Right	Frm	4.43	-8.03	-	-	-13.12	-	-	-11.79	-	-	-9.75
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	2.78	4.00	-	-	-4.00	-	-	-0.53	-	-	2.75
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-5.51	-2.69	-	-	3.16	-	-	-0.32	-	-	-3.61
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-1.87	-11.79	-	4.59	-10.17	-	5.74	-12.29	-	5.12	-13.45
<W1	Wind Load, Case 1, Left	Frm	5.74	-3.11	-	-4.27	-11.87	-	-5.34	-12.00	-	-4.76	-12.73
S	Snow Load	Frm	0.26	10.57	-	-	16.76	-	-	18.87	-	-	19.82
E>	Seismic Load, Right	Frm	-3.65	-5.00	-	-	5.07	-	-	0.14	-	-	-4.49
EG+	Vertical Seismic Effect, Additive	Frm	-	0.40	-	-	0.61	-	-	0.69	-	-	0.72
<E	Seismic Load, Left	Frm	3.65	5.00	-	-	-5.07	-	-	-0.14	-	-	4.49
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.40	-	-	-0.61	-	-	-0.69	-	-	-0.72

Type	Exterior Column			
X-Loc	67/5/0			
Grid1 - Grid2	3-A			
Base Plate W x L (in.)	8 X 13			
Base Plate Thickness (in.)	0.375			
Anchor Rod Qty/Diam. (in.)	4 - 0.750			
Column Base Elev.	100'-0"			

Load Type	Load Description	Desc.	Hx	Vy			
D	Material Dead Weight	Frm	-0.05	2.31	-	-	-
CG	Collateral Load for Gravity Cases	Frm	-0.03	1.31	-	-	-
S>	Snow - Notional Right	Frm	-0.26	10.84	-	-	-
<S	Snow - Notional Left	Frm	-0.26	10.84	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-0.19	9.96	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-0.13	3.78	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-1.06	3.23	-	-	-
<W2	Wind Load, Case 2, Left	Frm	6.12	-4.75	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	-4.39	-8.26	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	-3.79	-7.22	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	5.24	-2.21	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-2.51	3.45	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-5.52	-3.59	-	-	-
<W1	Wind Load, Case 1, Left	Frm	1.66	-11.57	-	-	-
S	Snow Load	Frm	-0.26	10.84	-	-	-
E>	Seismic Load, Right	Frm	-3.30	4.28	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.41	-	-	-
<E	Seismic Load, Left	Frm	3.30	-4.28	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.41	-	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	3-E	3.72	5	3.47	14	-	-	-	-	5.72	13	14.10	1	-	-	-	-
14/6/8	3-D	-	-	-	-	2.56	14	2.76	13	5.99	16	30.22	4	-	-	-	-
31/8/8	3-C	-	-	-	-	3.21	14	3.45	13	5.25	13	24.77	1	-	-	-	-
51/4/8	3-B	-	-	-	-	2.86	14	3.07	13	6.93	15	34.66	3	-	-	-	-
67/5/0	3-A	3.34	13	3.59	6	-	-	-	-	5.56	14	14.45	1	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 3
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		14/6/8			31/8/8			51/4/8			67/5/0	
Grid1 - Grid2		3-E		3-D			3-C			3-B			3-A	
Ld	Description	Hx	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Vy
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)
1	D + CG + S>	0.35	14.10	-	-	21.98	-	-	24.77	-	-	26.00	-0.35	14.45
3	D + CG + US1*	0.27	7.51	-	-	7.87	-	-	20.82	-	-	34.66	-0.27	13.57
4	D + CG + *US1	0.21	12.87	-	-	30.22	-	-	23.33	-	-	10.60	-0.21	7.40
5	D + CG + W2>	-3.72	0.50	-	-	5.55	-	-	5.49	-	-	5.79	-0.72	5.55
6	D + CG + <W2	0.85	5.71	-	-	4.53	-	-	5.67	-	-	6.22	3.59	0.76
13	D + CU + W1>	-1.09	-5.72	-	2.76	-4.23	-	3.45	-5.25	-	3.07	-5.85	-3.34	-0.77
14	D + CU + <W1	3.47	-0.51	-	-2.56	-5.25	-	-3.21	-5.07	-	-2.86	-5.41	0.96	-5.56
15	D + CU + WPL	2.28	-3.02	-	-	-2.81	-	-	-4.64	-	-	-6.93	-2.66	-3.57
16	D + CU + WPR	2.69	-3.47	-	-	-5.99	-	-	-4.95	-	-	-3.62	-2.30	-2.95

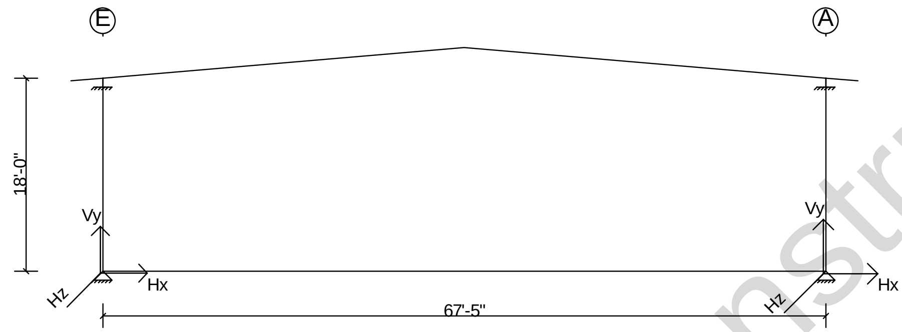
ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
16	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR

Wall: 4, Frame at: 70/5/8

Frame ID:Rigid Frame

Frame Type:Rigid Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete

Reactions - Unfactored Load Type at Frame Cross Section: 4

Type			Exterior Column			Exterior Column				
X-Loc			0/0/0			67/5/0				
Grid1 - Grid2			4-E			4-A				
Base Plate W x L (in.)			8 X 13			12 X 13				
Base Plate Thickness (in.)			0.375			0.500				
Anchor Rod Qty/Diam. (in.)			4 - 1.000			4 - 1.000				
Column Base Elev.			100'-0"			100'-0"				
Load Type	Load Description	Desc.	Hx	Hz	Vy	Hx	Hz	Vy		
D	Material Dead Weight	Frm	4.00	-	8.44	-4.00	-	8.90	-	-
CG	Collateral Load for Gravity Cases	Frm	2.47	-	4.86	-2.47	-	4.86	-	-
S>	Snow - Notional Right	Frm	19.79	-	39.33	-19.79	-	39.33	-	-
<S	Snow - Notional Left	Frm	19.79	-	39.33	-19.79	-	39.33	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	16.48	-	21.01	-16.48	-	40.38	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	16.62	-	40.38	-16.62	-	21.01	-	-
W2>	Wind Load, Case 2, Right	Frm	-7.34	-	-6.04	-0.73	-	2.20	-	-
<W2	Wind Load, Case 2, Left	Frm	0.90	-	2.20	7.17	-	-6.04	-	-
WPL	Wind Load, || Ridge, Left	Frm	-8.75	-	-23.99	8.05	-	-28.30	-	-
WPR	Wind Load, || Ridge, Right	Frm	-8.07	-	-28.31	8.77	-	-23.99	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	2.39	-	1.19	5.83	-	-1.19	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-5.98	-	-1.19	-2.23	-	1.19	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-15.31	-	-30.98	7.24	-	-22.73	-	-
<W1	Wind Load, Case 1, Left	Frm	-7.07	-	-22.74	15.14	-	-30.97	-	-
S	Snow Load	Frm	19.79	-	39.33	-19.79	-	39.33	-	-
E>	Seismic Load, Right	Frm	-3.68	-	-1.92	-3.50	-	1.92	-	-
EG+	Vertical Seismic Effect, Additive	Frm	0.72	-	1.44	-0.72	-	1.44	-	-
<E	Seismic Load, Left	Frm	3.68	-	1.92	3.50	-	-1.92	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-0.72	-	-1.44	0.72	-	-1.44	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	0.22	-9.14	-7.35	-0.22	-8.25	-6.77	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-0.18	-	6.43	0.18	-	5.82	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	0.23	-8.44	-6.91	-0.23	-8.94	-7.39	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-0.18	-	5.94	0.18	-	6.32	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.26	-10.65	-8.31	-0.26	-10.29	-8.13	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.12	-	4.11	0.12	-	4.11	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	0.34	-13.11	-10.41	-0.34	-13.12	-10.61	-	-

<EB	Seismic Brace Reaction, Left	Brc	-0.30	-	10.30	0.30	-	10.30	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	4-E	6.79	13	26.26	1	11.93	57	-	-	16.33	42	53.68	4	-	-	-	-
67/5/0	4-A	26.26	1	6.68	14	11.94	57	-	-	16.08	48	54.13	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 4
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0			67/5/0					
Grid1 - Grid2		4-E			4-A					
Ld	Description	Hx	Hz	Vy	Hx	Hz	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)			
1	D + CG + S>	26.26	-	52.63	-26.26	-	53.08	-	-	-
3	D + CG + US1*	22.95	-	34.31	-22.95	-	54.13	-	-	-
4	D + CG + *US1	23.09	-	53.68	-23.09	-	34.76	-	-	-
13	D + CU + W1>	-6.79	-	-13.52	1.94	-	-8.30	-	-	-
14	D + CU + <W1	-1.84	-	-8.58	6.68	-	-13.25	-	-	-
42	D + CU + WPR + WB1>	-2.30	-5.48	-16.33	2.72	-4.95	-13.12	-	-	-
48	D + CU + WPL + WB3>	-2.71	-5.07	-13.48	2.29	-5.36	-16.08	-	-	-
57	D + CG + E> + EG+ + EB>	6.28	-11.93	4.32	-8.24	-11.94	5.63	-	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>

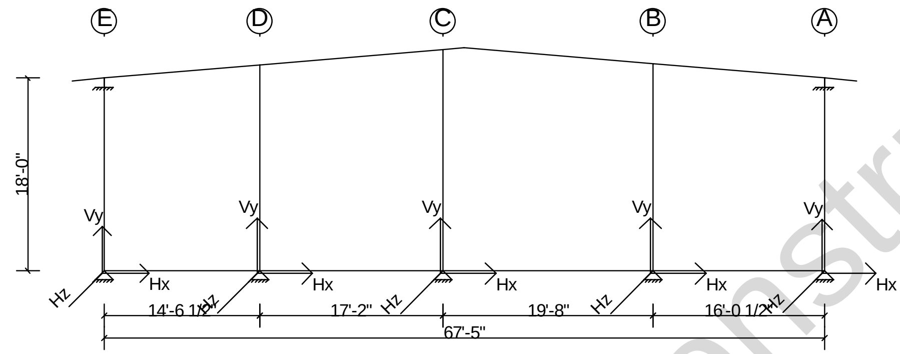
Bracing

X-Loc	Grid	Description
0/0/0	4-E	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.
67/5/0	4-A	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.

Wall: 4, Frame at: 93/4/8

Frame ID:CB end frames

Frame Type:Continuous Beam



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 5

Type			Exterior Column			Interior Column			Interior Column			Interior Column		
X-Loc			0/0/0			14/6/8			31/8/8			51/4/8		
Grid1 - Grid2			5-E			5-D			5-C			5-B		
Base Plate W x L (in.)			8 X 13			8 X 11			8 X 11			8 X 11		
Base Plate Thickness (in.)			0.375			0.375			0.375			0.375		
Anchor Rod Qty/Diam. (in.)			4 - 1.000			4 - 0.750			4 - 0.750			4 - 0.750		
Column Base Elev.			100'-0"			100'-0"			100'-0"			100'-0"		
Load Type	Load Description	Desc.	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy
D	Material Dead Weight	Frm	0.02	-	1.45	-	-	1.79	-	-	2.25	-	-	2.16
CG	Collateral Load for Gravity Cases	Frm	0.02	-	0.76	-	-	1.11	-	-	1.40	-	-	1.36
S>	Snow - Notional Right	Frm	0.12	-	6.31	-	-	9.02	-	-	11.39	-	-	11.03
<S	Snow - Notional Left	Frm	0.12	-	6.31	-	-	9.02	-	-	11.39	-	-	11.03
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.07	-	2.19	-	-	1.59	-	-	8.88	-	-	15.71
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.06	-	5.92	-	-	13.19	-	-	10.60	-	-	2.51
W2>	Wind Load, Case 2, Right	Frm	-4.10	-	-4.87	-	-	-1.18	-	-	-2.45	-	-	-1.64
<W2	Wind Load, Case 2, Left	Frm	1.36	-	1.82	-	-	-2.38	-	-	-1.94	-	-	-2.67
WPL	Wind Load, || Ridge, Left	Frm	1.80	-	-4.81	-	-	-4.71	-	-	-8.53	-	-	-10.77
WPR	Wind Load, || Ridge, Right	Frm	2.47	-	-5.49	-	-	-9.15	-	-	-9.01	-	-	-6.26
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	1.47	-	2.18	-	-	-2.24	-	-	-0.15	-	-	1.06
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-2.88	-	-1.62	-	-	1.86	-	-	-0.17	-	-	-1.47
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-1.79	-	-8.20	-	4.71	-6.00	-	5.81	-8.54	-	5.26	-7.57
<W1	Wind Load, Case 1, Left	Frm	3.67	-	-1.51	-	-4.37	-7.20	-	-5.41	-8.03	-	-4.89	-8.60
S	Snow Load	Frm	0.12	-	6.31	-	-	9.02	-	-	11.39	-	-	11.03
E>	Seismic Load, Right	Frm	-2.33	-	-3.32	-	0.11	3.42	-	0.13	-	-	0.12	-2.18
EG+	Vertical Seismic Effect, Additive	Frm	-	-	0.23	-	-	0.32	-	-	0.41	-	-	0.40
<E	Seismic Load, Left	Frm	2.33	-	3.32	-	-0.11	-3.42	-	-0.13	-	-	-0.12	2.18
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-	-0.23	-	-	-0.32	-	-	-0.41	-	-	-0.40
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-0.09	-	7.58	-	-	-0.22	-	-	0.06	-	-	-0.17
<WB1	Wind Brace Reaction, Case 1, Left	Brc	0.23	8.18	-6.47	-	-	0.07	-	-	-0.02	-	-	-0.19
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-0.09	-	7.12	-	-	-0.19	-	-	0.06	-	-	-0.19
<WB3	Wind Brace Reaction, Case 3, Left	Brc	0.22	7.56	-5.97	-	-	0.05	-	-	-0.02	-	-	-0.17
MWB	Minimum Wind Bracing Reaction	Brc	-0.10	-	8.57	-	-	-0.24	-	-	0.07	-	-	-0.21
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.15	5.23	-4.13	-	-	0.04	-	-	-0.01	-	-	-0.12
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-0.13	-	10.72	-	-	-0.29	-	-	0.09	-	-	-0.27

<EB	Seismic Brace Reaction, Left	Brc	0.37	13.11	-10.35	-	-	0.09	-	-	-0.03	-	-	-0.30

Type			Exterior Column					
X-Loc			67/5/0					
Grid1 - Grid2			5-A					
Base Plate W x L (in.)			8 X 13					
Base Plate Thickness (in.)			0.375					
Anchor Rod Qty/Diam. (in.)			4 - 1.000					
Column Base Elev.			100'-0"					
Load Type	Load Description	Desc.	Hx	Hz	Vy			
D	Material Dead Weight	Frm	-0.02	-	1.44	-	-	-
CG	Collateral Load for Gravity Cases	Frm	-0.02	-	0.76	-	-	-
S>	Snow - Notional Right	Frm	-0.12	-	6.34	-	-	-
<S	Snow - Notional Left	Frm	-0.12	-	6.34	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-0.07	-	5.98	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-0.06	-	2.13	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-0.82	-	0.95	-	-	-
<W2	Wind Load, Case 2, Left	Frm	3.57	-	-4.02	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	-2.36	-	-5.70	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	-1.92	-	-4.60	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	2.40	-	-0.85	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-1.00	-	1.39	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-3.13	-	-2.37	-	-	-
<W1	Wind Load, Case 1, Left	Frm	1.26	-	-7.35	-	-	-
S	Snow Load	Frm	-0.12	-	6.34	-	-	-
E>	Seismic Load, Right	Frm	-1.59	-	2.08	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	-	0.23	-	-	-
<E	Seismic Load, Left	Frm	1.59	-	-2.08	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-	-0.23	-	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	0.09	-	6.87	-	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-0.23	7.43	-5.65	-	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	0.09	-	7.50	-	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-0.22	8.04	-6.15	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.10	-	8.25	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.15	5.23	-3.99	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	0.13	-	10.77	-	-	-
<EB	Seismic Brace Reaction, Left	Brc	-0.37	13.12	-10.02	-	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	5-E	2.43	5	2.26	75	-	-	11.93	72	9.62	76	13.03	59	-	-	-	-
14/6/8	5-D	-	-	-	-	2.62	14	2.82	13	4.55	42	16.10	4	-	-	-	-
31/8/8	5-C	-	-	-	-	3.24	14	3.49	13	4.06	45	15.05	1	-	-	-	-
51/4/8	5-B	-	-	-	-	2.93	14	3.16	13	5.28	48	19.23	3	-	-	-	-
67/5/0	5-A	1.89	13	2.11	6	-	-	11.94	72	8.98	78	12.73	57	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 5
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0			14/6/8			31/8/8			51/4/8			67/5/0		
Grid1 - Grid2		5-E			5-D			5-C			5-B			5-A		
Ld	Description	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Hz	Vy
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)
1	D + CG + S>	0.15	-	8.52	-	-	11.93	-	-	15.05	-	-	14.55	-0.15	-	8.54
3	D + CG + US1*	0.10	-	4.39	-	-	4.50	-	-	12.54	-	-	19.23	-0.10	-	8.18
4	D + CG + *US1	0.10	-	8.12	-	-	16.10	-	-	14.25	-	-	6.03	-0.10	-	4.34

5	D + CG + W2>	-2.43	-	-0.72	-	-	2.20	-	-	2.18	-	-	2.53	-0.53	-	2.77
6	D + CG + <W2	0.85	-	3.30	-	-	1.48	-	-	2.49	-	-	1.92	2.11	-	-0.21
13	D + CU + W1>	-1.07	-	-4.05	-	2.82	-2.53	-	3.49	-3.77	-	3.16	-3.25	-1.89	-	-0.56
14	D + CU + <W1	2.21	-	-0.04	-	-2.62	-3.24	-	-3.24	-3.47	-	-2.93	-3.86	0.75	-	-3.54
42	D + CU + WPR + WB1>	1.44	-	2.12	-	-	-4.55	-	-	-4.02	-	-	-2.56	-1.11	-	2.23
45	D + CU + WPR + <WB1	1.63	4.91	-6.31	-	-	-4.37	-	-	-4.06	-	-	-2.57	-1.30	4.46	-5.28
48	D + CU + WPL + WB3>	1.04	-	2.26	-	-	-1.86	-	-	-3.73	-	-	-5.28	-1.37	-	1.95
57	D + CG + E> + EG+ + EB>	-0.72	-	11.22	-	0.03	3.80	-	0.04	4.02	-	0.03	2.95	-0.35	-	12.73
59	D + CG + <E + EG+ + EB>	0.55	-	13.03	-	-0.03	1.93	-	-0.04	4.02	-	-0.03	4.14	0.52	-	11.60
72	D + CG + E> + EG+ + <EB	-0.26	11.93	-7.96	-	0.03	4.15	-	0.04	3.91	-	0.03	2.93	-0.81	11.94	-6.18
75	D + CG + <E + EG+ + <EB	2.26	3.58	2.56	-	-0.10	0.04	-	-0.12	3.93	-	-0.11	5.69	1.31	3.58	-2.26
76	D + CU + E> + EG- + <EB	-0.29	11.93	-9.62	-	0.03	1.87	-	0.04	1.04	-	0.03	0.15	-0.78	11.94	-7.84
78	D + CU + <E + EG- + <EB	0.99	11.93	-7.81	-	-0.03	0.00	-	-0.04	1.04	-	-0.03	1.34	0.08	11.94	-8.98

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
45	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 <WB1	D + CU + WPR + <WB1
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>
59	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 EB>	D + CG + <E + EG+ + EB>
72	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB
75	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 <EB	D + CG + <E + EG+ + <EB
76	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 <EB	D + CU + E> + EG- + <EB
78	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 <EB	D + CU + <E + EG- + <EB

Bracing

X-Loc	Grid	Description
0/0/0	5-E	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.
67/5/0	5-A	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.

VP Buildings

3200 Players Club Circle
Memphis, TN 38125-8843

STRUCTURAL DESIGN DATA

Project: Fall Creek FH Hatchery Bldg
Name: Fall Creek FH Hatchery Bldg
Builder PO #:
Jobsite:

City, State: Yreka, California 96097
County: Siskiyou
Country: United States

TABLE OF CONTENTS

Letter of Certification

Contact:
Name: Evergreen Industrial
Address:

City, State: Loveland, Colorado 80537
Country: United States

Project: Fall Creek FH Hatchery Bldg
Builder PO #:
Jobsite:

City, State: Yreka, California 96097
County, Country: Siskiyou, United States

This is to certify that the above referenced project has been designed in accordance with the applicable portions of the Building Code specified below. All loading and building design criteria shown below have been specified by contract and applied in accordance with the building code.

Overall Building Description

Shape	Overall Width	Overall Length	Floor Area (sq. ft.)	Wall Area (sq. ft.)	Roof Area (sq. ft.)	Max. Eave Height	Min. Eave Height 2	Max. Roof Pitch	Min. Roof Pitch	Peak Height
Hatchery Bldg	50/11/0	60/11/0	3102	3259	3480	15/0/0	15/0/0	1.000:12	1.000:12	17/1/7
electric	13/1/8	10/8/0	140	536	205	16/1/2	15/0/0	-1.000:12		
		Total For All Shapes	3242	3795	3685					

Loads and Codes - Shape: Hatchery Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6688
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 10/2/3
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 16/0/12

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2581
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1605
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Loads and Codes - Shape: electric

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads

Roof Live Load

Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf

Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6688
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 10/2/3
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 15/6/9

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2515
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1566
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Building design loads and governing building code is provided by the Builder and is not validated by Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. The Builder is responsible for contacting the local Building Official or project Design Professional to obtain all code and loading information for this specific building site.

The design of this building is in accordance with Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. design practices which have been established based upon pertinent procedures and recommendations of the Standards listed in the Building Code or later editions.

This certification DOES NOT apply to the design of the foundation or other on-site structures or components not supplied by Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc., nor does it apply to unauthorized modifications to building components. Furthermore, it is understood that certification is based upon the premise that all components will be erected or constructed in strict compliance with pertinent documents for this project. Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. DOES NOT provide general review of erection during or after building construction unless specifically agreed to in the contract documents.

The undersigned engineer in responsible charge certifies that this building has been designed in accordance with the contract documents as indicated in this letter.

____ Date: ________________ Engineer's Seal:
Engineer in responsible charge

Building Loading - Summary Report

Shape: Hatchery Bldg

Loads and Codes - Shape: Hatchery Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States

Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6688
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 10/2/3
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 16/0/12

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2581
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1605
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Deflection Conditions
Frames are vertically supporting:Metal Roof Purlins and Panels
Frames are laterally supporting:Metal Wall Girts and Panels
Purlins are supporting:Metal Roof Panels
Girts are supporting:Metal Wall Panels

Design Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
2	System	1.000	1.0 D + 1.0 CG + 1.0 <S	D + CG + <S
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
7	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
8	System	1.000	1.0 D + 1.0 CG + 0.6 WPR	D + CG + WPR
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1

15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
16	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR
17	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
18	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
19	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
20	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
21	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL	D + CG + S + WPL
22	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR	D + CG + S + WPR
23	System	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+	D + CG + E> + EG+
24	System	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+	D + CG + <E + EG+
25	System	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG-	D + CU + E> + EG-
26	System	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG-	D + CU + <E + EG-
27	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+	D + CG + S + E> + EG+
28	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+	D + CG + S + <E + EG+
29	Special	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
30	Special	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
31	Special	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
32	Special	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
33	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
34	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
35	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
36	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
37	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
38	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
39	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
40	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
41	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 WB1>	D + CG + WPR + WB1>
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
43	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 WB1>	D + CG + S + WPR + WB1>
44	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 <WB1	D + CG + WPR + <WB1
45	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 <WB1	D + CU + WPR + <WB1
46	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 <WB1	D + CG + S + WPR + <WB1
47	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 WB3>	D + CG + WPL + WB3>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
49	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 WB3>	D + CG + S + WPL + WB3>
50	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 <WB3	D + CG + WPL + <WB3
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3
52	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 <WB3	D + CG + S + WPL + <WB3
53	System Derived	1.000	0.6 MWB	MWB - Wall: 1
54	System Derived	1.000	0.6 MWB	MWB - Wall: 2
55	System Derived	1.000	0.6 MWB	MWB - Wall: 3
56	System Derived	1.000	0.6 MWB	MWB - Wall: 4
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>
58	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 EB>	D + CG + E> + EG+ + EB>
59	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 EB>	D + CG + <E + EG+ + EB>
60	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 EB>	D + CG + <E + EG+ + EB>
61	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 EB>	D + CU + E> + EG- + EB>
62	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 EB>	D + CU + E> + EG- + EB>
63	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 EB>	D + CU + <E + EG- + EB>
64	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 EB>	D + CU + <E + EG- + EB>
65	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 EB>	D+CG+S+E>+EG++EB>
66	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 EB>	D+CG+S+E>+EG++EB>
67	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 EB>	D+CG+S+<E+EG++EB>
68	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 EB>	D+CG+S+<E+EG++EB>
69	Special	1.000	1.0 D + 1.0 CG + 1.75 EB> + 0.7 EG+	D + CG + EB> + EG+
70	Special	1.000	0.6 D + 0.6 CU + 1.75 EB> + 0.7 EG-	D + CU + EB> + EG-
71	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 EB> + 0.525 EG+	D + CG + S + EB> + EG+
72	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB
73	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 <EB	D + CG + E> + EG+ + <EB
74	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 <EB	D + CG + <E + EG+ + <EB
75	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 <EB	D + CG + <E + EG+ + <EB
76	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 <EB	D + CU + E> + EG- + <EB
77	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 <EB	D + CU + E> + EG- + <EB
78	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 <EB	D + CU + <E + EG- + <EB
79	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 <EB	D + CU + <E + EG- + <EB
80	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 <EB	D+CG+S+E>+EG++<EB
81	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 <EB	D+CG+S+E>+EG++<EB

82	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 <EB	D+CG+S+<E+EG++<EB
83	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 <EB	D+CG+S+<E+EG++<EB
84	Special	1.000	1.0 D + 1.0 CG + 1.75 <EB + 0.7 EG+	D + CG + <EB + EG+
85	Special	1.000	0.6 D + 0.6 CU + 1.75 <EB + 0.7 EG-	D + CU + <EB + EG-
86	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <EB + 0.525 EG+	D + CG + S + <EB + EG+

Design Load Combinations - Bracing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 0.6 W1>	D + W1>
2	System	1.000	1.0 D + 0.6 <W1	D + <W1
3	System	1.000	1.0 D + 0.6 W2>	D + W2>
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	1.0 D + 0.6 W3>	D + W3>
6	System	1.000	1.0 D + 0.6 <W3	D + <W3
7	System	1.000	1.0 D + 0.6 W4>	D + W4>
8	System	1.000	1.0 D + 0.6 <W4	D + <W4
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	1.0 D + 0.7 E>	D + E>
14	System	1.000	1.0 D + 0.7 <E	D + <E
15	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W1>	D + CG + W1>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W1	D + CG + <W1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
18	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W3>	D + CG + W3>
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W3	D + CG + <W3
21	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W4>	D + CG + W4>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W4	D + CG + <W4
23	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
24	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W2>	D + CU + W2>
26	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W2	D + CU + <W2
27	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W3>	D + CU + W3>
28	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W3	D + CU + <W3
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W4>	D + CU + W4>
30	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W4	D + CU + <W4
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
33	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W3>	D + CG + S + W3>
36	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W3	D + CG + S + <W3
37	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W4>	D + CG + S + W4>
38	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W4	D + CG + S + <W4
39	System Derived	1.000	1.0 D + 1.0 CG + 0.7 E> + 0.7 EG+	D + CG + E> + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <E + 0.7 EG+	D + CG + <E + EG+
41	System Derived	1.000	0.6 D + 0.6 CG + 0.7 E> + 0.7 EG-	D + CG + E> + EG-
42	System Derived	1.000	0.6 D + 0.6 CG + 0.7 <E + 0.7 EG-	D + CG + <E + EG-
43	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 E> + 0.525 EG+	D + CG + S + E> + EG+
44	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <E + 0.525 EG+	D + CG + S + <E + EG+

Design Load Combinations - Purlin

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S	D + CG + S
2	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
3	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
4	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 1)
5	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 2)
6	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 3)
7	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 1
8	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 2
9	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB1>	D + CG + <W2 + WB1>
10	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB1>	D + CU + W1> + WB1>
11	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB1>	D + CG + S + W1> + WB1>
12	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB1>	D + CG + S + <W2 + WB1>

13	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB1	D + CG + <W2 + <WB1
14	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB1	D + CU + W1> + <WB1
15	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB1	D + CG + S + W1> + <WB1
16	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB1	D + CG + S + <W2 + <WB1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB2>	D + CG + <W2 + WB2>
18	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB2>	D + CU + W1> + WB2>
19	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB2>	D + CG + S + W1> + WB2>
20	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB2>	D + CG + S + <W2 + WB2>
21	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB2	D + CG + <W2 + <WB2
22	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB2	D + CU + W1> + <WB2
23	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB2	D + CG + S + W1> + <WB2
24	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB2	D + CG + S + <W2 + <WB2
25	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB3>	D + CG + <W2 + WB3>
26	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB3>	D + CU + W1> + WB3>
27	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB3>	D + CG + S + W1> + WB3>
28	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB3>	D + CG + S + <W2 + WB3>
29	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB3	D + CG + <W2 + <WB3
30	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB3	D + CU + W1> + <WB3
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB3	D + CG + S + W1> + <WB3
32	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB3	D + CG + S + <W2 + <WB3
33	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB4>	D + CG + <W2 + WB4>
34	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB4>	D + CU + W1> + WB4>
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB4>	D + CG + S + W1> + WB4>
36	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB4>	D + CG + S + <W2 + WB4>
37	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB4	D + CG + <W2 + <WB4
38	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB4	D + CU + W1> + <WB4
39	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB4	D + CG + S + W1> + <WB4
40	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB4	D + CG + S + <W2 + <WB4
41	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 EB> + 0.525 EG+	D + CG + S + EB> + EG+
42	System Derived	1.000	1.0 D + 1.0 CG + 0.7 EB> + 0.7 EG+	D + CG + EB> + EG+
43	System Derived	1.000	0.6 D + 0.6 CU + 0.7 EB> + 0.7 EG-	D + CU + EB> + EG-
44	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <EB + 0.525 EG+	D + CG + S + <EB + EG+
45	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <EB + 0.7 EG+	D + CG + <EB + EG+
46	System Derived	1.000	0.6 D + 0.6 CU + 0.7 <EB + 0.7 EG-	D + CU + <EB + EG-

Design Load Combinations - Girt

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Design Load Combinations - Roof - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 S	D + S
2	System	1.000	1.0 D + 1.0 US1*	D + US1*
3	System	1.000	1.0 D + 1.0 *US1	D + *US1
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	0.6 D + 0.6 W1>	D + W1>

Design Load Combinations - Wall - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Deflection Load Combinations - Framing

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	0	180	1.0 S	S
2	System	1.000	60	180	0.42 W1>	W1>
3	System	1.000	60	180	0.42 <W1	<W1
4	System	1.000	60	180	0.42 W2>	W2>
5	System	1.000	60	180	0.42 <W2	<W2
6	System	1.000	60	180	0.42 WPL	WPL
7	System	1.000	60	180	0.42 WPR	WPR
8	System	1.000	10	0	1.0 E> + 1.0 EG-	E> + EG-
9	System	1.000	10	0	1.0 <E + 1.0 EG-	<E + EG-

Deflection Load Combinations - Purlin

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	180	1.0 S	S
2	System	1.000	180	0.42 W1>	W1>
3	System	1.000	180	0.42 <W2	<W2

Deflection Load Combinations - Girt

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	90	0.42 W1>	W1>
2	System	1.000	90	0.42 <W2	<W2

Deflection Load Combinations - Roof - Panel

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	60	60	1.0 S	S
2	System	1.000	60	60	0.42 <W2	<W2

Shape: electric

Loads and Codes - Shape: electric

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Structural: 16AISC - ASD
Rainfall: I: 4.00 inches per hour
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Cold Form: 16AISI - ASD
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6688
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 10/2/3
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 15/6/9

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2515

R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1566
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Deflection Conditions
Frames are vertically supporting:Metal Roof Purlins and Panels
Frames are laterally supporting:Metal Wall Girts and Panels
Purlins are supporting:Metal Roof Panels
Girts are supporting:Metal Wall Panels

Design Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
2	System	1.000	1.0 D + 1.0 CG + 1.0 <S	D + CG + <S
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 1)
6	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 2)
7	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 3)
8	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 1
9	System	1.000	1.0 D + 1.0 CG + 1.0 PF2	D + CG + PF2- Pattern 2
10	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
11	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
12	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
13	System	1.000	1.0 D + 1.0 CG + 0.6 WPR	D + CG + WPR
14	System	1.000	0.6 MW	MW - Wall: 1

15	System	1.000	0.6 MW	MW - Wall: 2
16	System	1.000	0.6 MW	MW - Wall: 3
17	System	1.000	0.6 MW	MW - Wall: 4
18	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
19	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
20	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
21	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR
22	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
23	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
24	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
25	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
26	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL	D + CG + S + WPL
27	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR	D + CG + S + WPR
28	System	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+	D + CG + E> + EG+
29	System	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+	D + CG + <E + EG+
30	System	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG-	D + CU + E> + EG-
31	System	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG-	D + CU + <E + EG-
32	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+	D + CG + S + E> + EG+
33	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+	D + CG + S + <E + EG+
34	Special	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
35	Special	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
36	Special	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
37	Special	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
38	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
39	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
40	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
41	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
42	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
43	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
44	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
45	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+

Design Load Combinations - Bracing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 0.6 W1>	D + W1>
2	System	1.000	1.0 D + 0.6 <W1	D + <W1
3	System	1.000	1.0 D + 0.6 W2>	D + W2>
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	1.0 D + 0.6 W3>	D + W3>
6	System	1.000	1.0 D + 0.6 <W3	D + <W3
7	System	1.000	1.0 D + 0.6 W4>	D + W4>
8	System	1.000	1.0 D + 0.6 <W4	D + <W4
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	1.0 D + 0.7 E>	D + E>
14	System	1.000	1.0 D + 0.7 <E	D + <E
15	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W1>	D + CG + W1>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W1	D + CG + <W1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
18	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W3>	D + CG + W3>
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W3	D + CG + <W3
21	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W4>	D + CG + W4>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W4	D + CG + <W4
23	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
24	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W2>	D + CU + W2>
26	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W2	D + CU + <W2
27	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W3>	D + CU + W3>
28	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W3	D + CU + <W3
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W4>	D + CU + W4>
30	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W4	D + CU + <W4
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
33	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>

34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W3>	D + CG + S + W3>
36	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W3	D + CG + S + <W3
37	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W4>	D + CG + S + W4>
38	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W4	D + CG + S + <W4
39	System Derived	1.000	1.0 D + 1.0 CG + 0.7 E> + 0.7 EG+	D + CG + E> + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <E + 0.7 EG+	D + CG + <E + EG+
41	System Derived	1.000	0.6 D + 0.6 CG + 0.7 E> + 0.7 EG-	D + CG + E> + EG-
42	System Derived	1.000	0.6 D + 0.6 CG + 0.7 <E + 0.7 EG-	D + CG + <E + EG-
43	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 E> + 0.525 EG+	D + CG + S + E> + EG+
44	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <E + 0.525 EG+	D + CG + S + <E + EG+

Design Load Combinations - Purlin

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S	D + CG + S
2	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
3	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
4	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
5	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
6	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
7	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
8	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 E> + 0.525 EG+	D + CG + S + E> + EG+
9	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <E + 0.525 EG+	D + CG + S + <E + EG+
10	System	1.000	1.0 D + 1.0 CG + 0.7 E> + 0.7 EG+	D + CG + E> + EG+
11	System	1.000	1.0 D + 1.0 CG + 0.7 <E + 0.7 EG+	D + CG + <E + EG+
12	System	1.000	0.6 D + 0.6 CU + 0.7 E> + 0.7 EG-	D + CU + E> + EG-
13	System	1.000	0.6 D + 0.6 CU + 0.7 <E + 0.7 EG-	D + CU + <E + EG-

Design Load Combinations - Girt

No.	Origin	Factor	Application	Description
1	System Derived	1.000	0.6 W1> + 0.6 WB1>	W1> + WB1>
2	System Derived	1.000	0.6 <W2 + 0.6 WB1>	<W2 + WB1>
3	System Derived	1.000	0.6 W1> + 0.6 <WB1	W1> + <WB1
4	System Derived	1.000	0.6 <W2 + 0.6 <WB1	<W2 + <WB1
5	System Derived	1.000	0.6 W1> + 0.6 WB2>	W1> + WB2>
6	System Derived	1.000	0.6 <W2 + 0.6 WB2>	<W2 + WB2>
7	System Derived	1.000	0.6 W1> + 0.6 <WB2	W1> + <WB2
8	System Derived	1.000	0.6 <W2 + 0.6 <WB2	<W2 + <WB2
9	System Derived	1.000	0.6 W1> + 0.6 WB3>	W1> + WB3>
10	System Derived	1.000	0.6 <W2 + 0.6 WB3>	<W2 + WB3>
11	System Derived	1.000	0.6 W1> + 0.6 <WB3	W1> + <WB3
12	System Derived	1.000	0.6 <W2 + 0.6 <WB3	<W2 + <WB3
13	System Derived	1.000	0.6 W1> + 0.6 WB4>	W1> + WB4>
14	System Derived	1.000	0.6 <W2 + 0.6 WB4>	<W2 + WB4>
15	System Derived	1.000	0.6 W1> + 0.6 <WB4	W1> + <WB4
16	System Derived	1.000	0.6 <W2 + 0.6 <WB4	<W2 + <WB4
17	System Derived	1.000	0.7 EB>	EB>
18	System Derived	1.000	0.525 EB>	EB>
19	System Derived	1.000	0.7 <EB	<EB
20	System Derived	1.000	0.525 <EB	<EB

Design Load Combinations - Roof - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 S	D + S
2	System	1.000	1.0 D + 1.0 US1*	D + US1*
3	System	1.000	1.0 D + 1.0 *US1	D + *US1
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	0.6 D + 0.6 W1>	D + W1>

Design Load Combinations - Wall - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Deflection Load Combinations - Framing

No.	Origin	Factor	Def H	Def V	Application	Description

1	System	1.000	0	180	1.0 S	S
2	System	1.000	60	180	0.42 W1>	W1>
3	System	1.000	60	180	0.42 <W1	<W1
4	System	1.000	60	180	0.42 W2>	W2>
5	System	1.000	60	180	0.42 <W2	<W2
6	System	1.000	60	180	0.42 WPL	WPL
7	System	1.000	60	180	0.42 WPR	WPR
8	System	1.000	10	0	1.0 E> + 1.0 EG-	E> + EG-
9	System	1.000	10	0	1.0 <E + 1.0 EG-	<E + EG-

Deflection Load Combinations - Purlin

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	180	1.0 S	S
2	System	1.000	180	0.42 W1>	W1>
3	System	1.000	180	0.42 <W2	<W2

Deflection Load Combinations - Girt

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	90	0.42 W1>	W1>
2	System	1.000	90	0.42 <W2	<W2

Deflection Load Combinations - Roof - Panel

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	60	60	1.0 S	S
2	System	1.000	60	60	0.42 <W2	<W2

Reactions - Summary Report w/Controlling Load Comb

Shape: Hatchery Bldg

Builder Contact:
Name: Evergreen Industrial
Address:

City, State Zip: Loveland, Colorado 80537
Country: United States

Project: Fall Creek FH Hatchery Bldg
Builder PO #:
Jobsite:

City, State Zip: Yreka, California 96097
County, Country: Siskiyou, United States

Loads and Codes - Shape: Hatchery Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6688
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 10/2/3
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 16/0/12

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2581
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1605
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

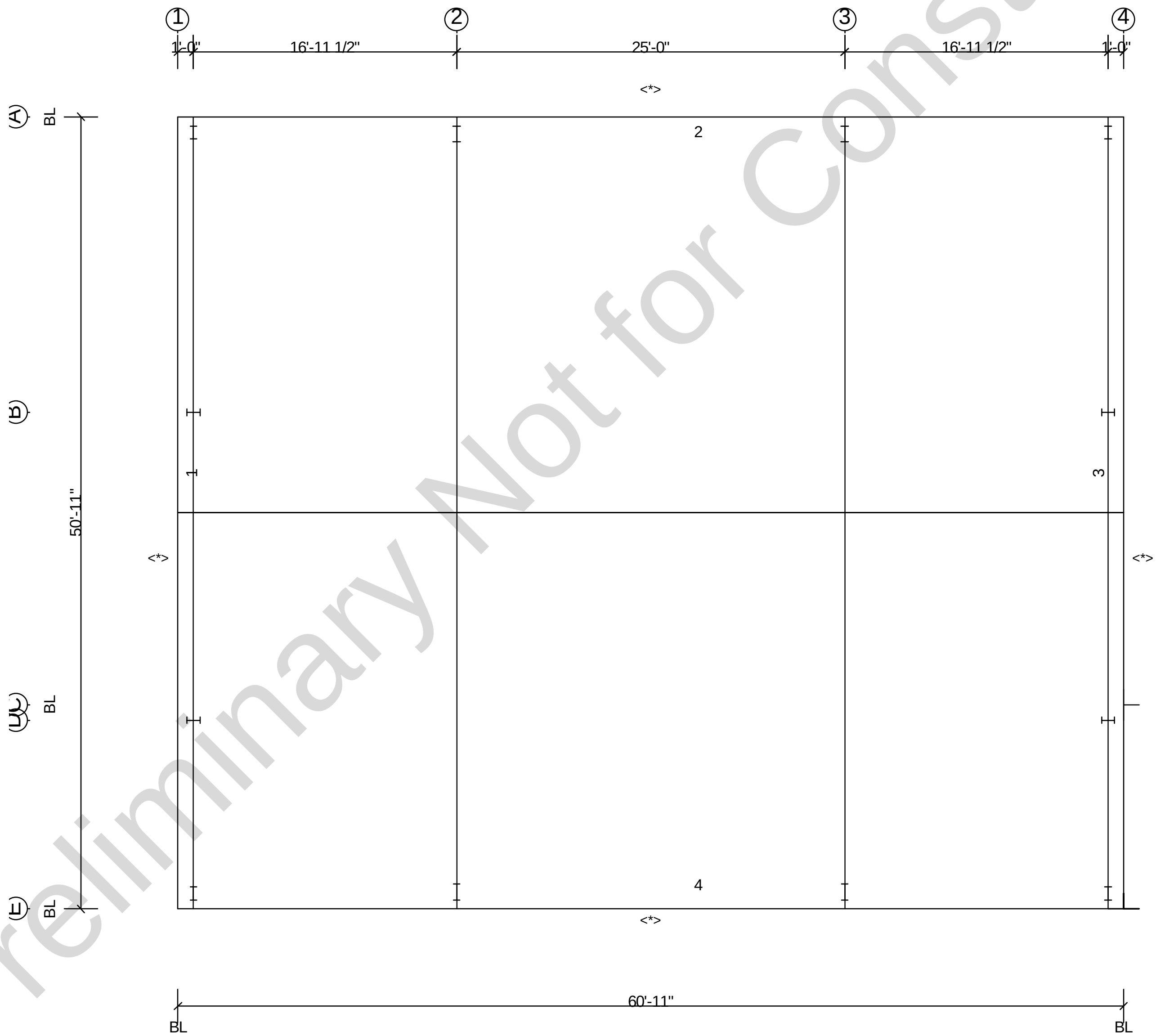
Fall Creek Hatchery PRELIMINARY Reactions Package

Overall Building Description

Shape	Overall Width	Overall Length	Floor Area (sq. ft.)	Wall Area (sq. ft.)	Roof Area (sq. ft.)	Max. Eave Height	Min. Eave Height 2	Max. Roof Pitch	Min. Roof Pitch	Peak Height
Hatchery Bldg	50/11/0	60/11/0	3102	3259	3480	15/0/0	15/0/0	1.000:12	1.000:12	17/1/7
electric	13/1/8	10/8/0	140	536	205	16/1/2	15/0/0	-1.000:12		
Total For All Shapes			3242	3795	3685					

Overall Shape Description

Roof 1	Roof 2	From Grid	To Grid	Width	Length	Eave Ht.	Eave Ht. 2	Pitch	Pitch 2	Dist. to Ridge	Peak Height
A	B	1-A	1-E	50/11/0	60/11/0	15/0/0	15/0/0	1.000:12	1.000:12	25/5/8	17/1/7

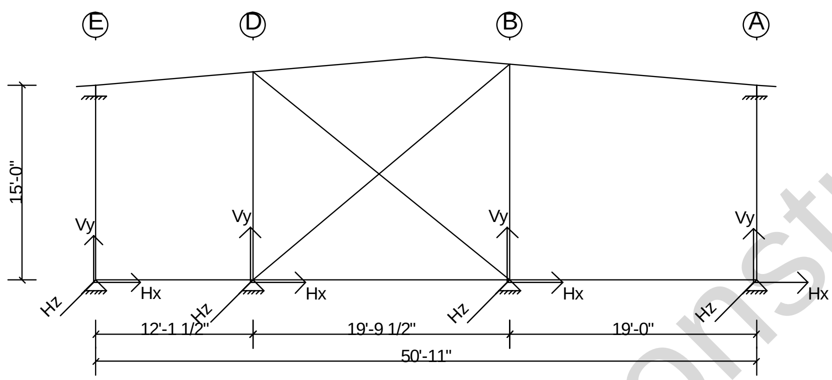


<*> The building is designed with bracing diagonals in the designated bays. Column base reactions, base plates and anchor rods are affected by this bracing and diagonals may not be relocated without consulting the building supplier's engineer.

Wall: 4, Frame at: 1/0/0

Frame ID:Post & Beam

Frame Type:Post & Beam



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 1

Type			Exterior Column		Interior Column			Interior Column			Exterior Column	
X-Loc			0/0/0		12/1/8			31/11/0			50/11/0	
Grid1 - Grid2			1-E		1-D			1-B			1-A	
Base Plate W x L (in.)			8 X 11		8 X 11			8 X 11			8 X 11	
Base Plate Thickness (in.)			0.375		0.375			0.375			0.375	
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			4 - 0.750			4 - 0.750	
Column Base Elev.			100'-0"		100'-0"			100'-0"			100'-0"	
Load Type	Load Description	Desc.	Hx	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Vy
D	Material Dead Weight	Frm	-	0.68	-	-	1.52	-	-	1.93	-	0.97
CG	Collateral Load for Gravity Cases	Frm	-	0.36	-	-	0.98	-	-	1.26	-	0.56
S>	Snow - Notional Right	Frm	-	3.03	-	-	7.99	-	-	10.32	-	4.66
<S	Snow - Notional Left	Frm	-	3.03	-	-	7.99	-	-	10.32	-	4.66
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-	0.99	-	-	2.14	-	-	11.53	-	5.50
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-	2.95	-	-	10.84	-	-	5.27	-	1.09
W2>	Wind Load, Case 2, Right	Frm	-1.81	-1.32	-	-	-2.61	-	-	-1.02	0.24	-0.22
<W2	Wind Load, Case 2, Left	Frm	-0.24	-0.29	-	-	-0.20	-	-	-2.76	1.81	-1.92
WPL	Wind Load, || Ridge, Left	Frm	1.65	-1.80	-	-	-4.96	-	-	-8.81	-1.65	-4.25
WPR	Wind Load, || Ridge, Right	Frm	1.65	-2.60	-	-	-7.47	-	-	-7.01	-1.65	-2.74
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	0.01	-	-	-0.05	-	-	-0.08	1.06	0.12
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-1.06	0.12	-	-	-0.04	-	-	-0.09	-	0.01
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-0.03	-2.62	-	3.81	-6.82	-	4.75	-6.32	-1.54	-2.42
<W1	Wind Load, Case 1, Left	Frm	1.54	-1.59	-	-3.54	-4.41	-	-4.42	-8.06	0.03	-4.12
S	Snow Load	Frm	-	3.03	-	-	7.99	-	-	10.32	-	4.66
E>	Seismic Load, Right	Frm	-0.05	-	-	0.09	-	-	0.11	-	-0.05	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.11	-	-	0.28	-	-	0.36	-	0.16
<E	Seismic Load, Left	Frm	0.05	-	-	-0.09	-	-	-0.11	-	0.05	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.11	-	-	-0.28	-	-	-0.36	-	-0.16
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-	-	-1.62	-	-1.39	-	-	1.39	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-	-	-	-	1.34	1.62	-	-1.35	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-	-	-1.62	-	-1.42	-	-	1.42	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-	-	-	-	1.37	1.62	-	-1.37	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	0.99	1.24	-	-0.99	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-1.24	-	-1.03	-	-	1.03	-	-
EB>	Seismic Brace Reaction, Right	Brc	-	-	-0.50	-	-0.44	-	-	0.44	-	-

<EB	Seismic Brace Reaction, Left	Brc	-	-	-	-	0.43	0.50	-	-0.43	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	1-E	1.08	5	0.99	7	-	-	-	-	1.16	13	4.07	1	-	-	-	-
12/1/8	1-D	0.96	41	-	-	2.12	14	2.28	13	4.41	42	13.34	4	-	-	-	-
31/11/0	1-B	-	-	0.96	44	2.65	14	2.85	13	4.95	51	14.73	3	-	-	-	-
50/11/0	1-A	0.99	7	1.08	6	-	-	-	-	1.97	15	7.03	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 1
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		12/1/8			31/11/0			50/11/0		
Grid1 - Grid2		1-E		1-D			1-B			1-A		
Ld	Description	Hx	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Vy	
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	
1	D + CG + S>	-	4.07	-	-	10.49	-	-	13.51	-	6.19	-
3	D + CG + US1*	-	2.04	-	-	4.64	-	-	14.73	-	7.03	-
4	D + CG + *US1	-	4.00	-	-	13.34	-	-	8.47	-	2.62	-
5	D + CG + W2>	-1.08	0.26	-	-	0.93	-	-	2.58	0.14	1.40	-
6	D + CG + <W2	-0.14	0.88	-	-	2.38	-	-	1.54	1.08	0.38	-
7	D + CG + WPL	0.99	-0.03	-	-	-0.48	-	-	-2.09	-0.99	-1.02	-
13	D + CU + W1>	-0.02	-1.16	-	2.28	-3.18	-	2.85	-2.63	-0.92	-0.87	-
14	D + CU + <W1	0.92	-0.55	-	-2.12	-1.73	-	-2.65	-3.67	0.02	-1.89	-
15	D + CU + WPL	0.99	-0.67	-	-	-2.07	-	-	-4.13	-0.99	-1.97	-
41	D + CG + WPR + WB1>	0.99	-0.51	-0.96	-0.01	-2.82	-	-	-0.18	-0.99	-0.12	-
42	D + CU + WPR + WB1>	0.99	-1.15	-0.96	-0.01	-4.41	-	-	-2.21	-0.99	-1.07	-
44	D + CG + WPR + <WB1	0.99	-0.51	-	-	-1.18	0.96	0.01	-1.82	-0.99	-0.12	-
51	D + CU + WPL + <WB3	0.99	-0.67	-	-	-1.25	0.96	0.01	-4.95	-0.99	-1.97	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
7	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
41	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 WB1>	D + CG + WPR + WB1>
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
44	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 <WB1	D + CG + WPR + <WB1
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3

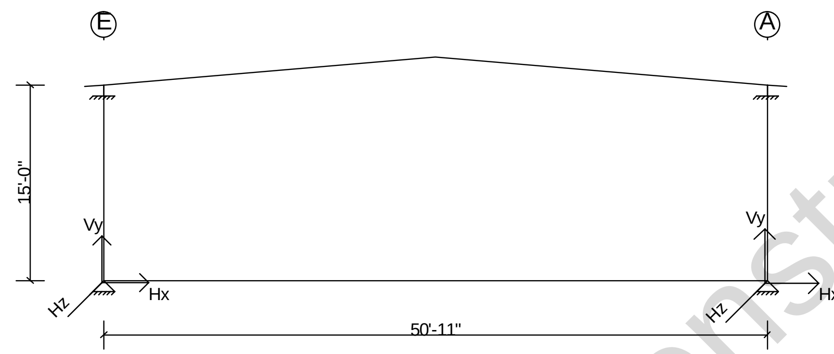
Bracing

X-Loc	Grid	Description
12/1/8	1-D	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.
31/11/0	1-B	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.

Wall: 4, Frame at: 17/11/8

Frame ID:Rigid Frame

Frame Type:Rigid Frame



Values shown are resisting forces of the foundation.

Base Connection Design is Based on 3000.00 (psi) Concrete

Reactions - Unfactored Load Type at Frame Cross Section: 2

Type			Exterior Column			Exterior Column				
X-Loc			0/0/0			50/11/0				
Grid1 - Grid2			2-E			2-A				
Base Plate W x L (in.)			8 X 13			8 X 13				
Base Plate Thickness (in.)			0.375			0.375				
Anchor Rod Qty/Diam. (in.)			4 - 0.750			4 - 0.750				
Column Base Elev.			100'-0"			100'-0"				
Load Type	Load Description	Desc.	Hx	Hz	Vy	Hx	Hz	Vy		
D	Material Dead Weight	Frm	2.01	-	4.47	-2.01	-	4.61	-	-
CG	Collateral Load for Gravity Cases	Frm	1.37	-	2.83	-1.37	-	2.83	-	-
S>	Snow - Notional Right	Frm	11.00	-	22.85	-11.00	-	22.85	-	-
<S	Snow - Notional Left	Frm	11.00	-	22.85	-11.00	-	22.85	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	8.98	-	12.10	-8.98	-	23.42	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	8.99	-	23.42	-8.99	-	12.11	-	-
W2>	Wind Load, Case 2, Right	Frm	-4.72	-	-2.99	-0.47	-	1.62	-	-
<W2	Wind Load, Case 2, Left	Frm	0.56	-	1.62	4.63	-	-2.99	-	-
WPL	Wind Load, || Ridge, Left	Frm	-4.07	-	-13.63	3.69	-	-15.95	-	-
WPR	Wind Load, || Ridge, Right	Frm	-3.68	-	-15.95	4.07	-	-13.63	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	1.56	-	0.87	3.83	-	-0.87	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-3.93	-	-0.87	-1.46	-	0.87	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-8.31	-	-17.36	3.12	-	-12.75	-	-
<W1	Wind Load, Case 1, Left	Frm	-3.03	-	-12.75	8.22	-	-17.36	-	-
S	Snow Load	Frm	11.00	-	22.85	-11.00	-	22.85	-	-
E>	Seismic Load, Right	Frm	-2.12	-	-1.20	-2.02	-	1.20	-	-
EG+	Vertical Seismic Effect, Additive	Frm	0.39	-	0.81	-0.39	-	0.81	-	-
<E	Seismic Load, Left	Frm	2.12	-	1.20	2.02	-	-1.20	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-0.39	-	-0.81	0.39	-	-0.81	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	0.08	-3.16	-1.96	-0.08	-3.08	-1.98	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-0.07	-	1.86	0.07	-	1.93	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	0.08	-2.91	-1.87	-0.08	-3.31	-2.14	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-0.07	-	1.76	0.07	-	2.09	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.07	-3.45	-2.05	-0.07	-3.10	-1.88	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.07	-	2.07	0.07	-	1.86	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	0.14	-6.07	-3.66	-0.14	-5.96	-3.75	-	-

<EB	Seismic Brace Reaction, Left	Brc	-0.14	-	3.70	0.14	-	3.70	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	2-E	3.78	13	14.39	1	5.53	57	-	-	8.06	42	30.71	4	-	-	-	-
50/11/0	2-A	14.39	1	3.73	14	5.42	57	-	-	8.09	48	30.86	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 2
Note: All reactions are based on 1st order structural analysis.

	X-Loc	0/0/0			50/11/0					
	Grid1 - Grid2	2-E			2-A					
Ld	Description	Hx	Hz	Vy	Hx	Hz	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)			
1	D + CG + S>	14.39	-	30.14	-14.39	-	30.28	-	-	-
3	D + CG + US1*	12.37	-	19.40	-12.37	-	30.86	-	-	-
4	D + CG + *US1	12.37	-	30.71	-12.37	-	19.54	-	-	-
13	D + CU + W1>	-3.78	-	-7.74	0.67	-	-4.89	-	-	-
14	D + CU + <W1	-0.61	-	-4.97	3.73	-	-7.65	-	-	-
42	D + CU + WPR + WB1>	-0.95	-1.89	-8.06	1.19	-1.85	-6.60	-	-	-
48	D + CU + WPL + WB3>	-1.19	-1.75	-6.62	0.96	-1.99	-8.09	-	-	-
57	D + CG + E> + EG+ + EB>	3.21	-5.53	4.20	-4.33	-5.42	4.92	-	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>

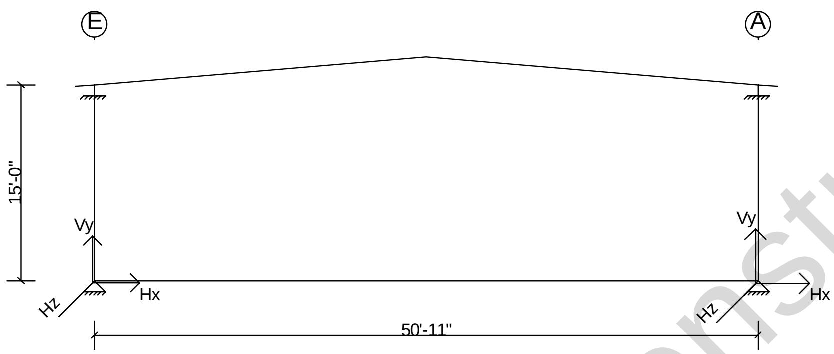
Bracing

X-Loc	Grid	Description
0/0/0	2-E	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.
50/11/0	2-A	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.

Wall: 4, Frame at: 42/11/8

Frame ID:Rigid Frame

Frame Type:Rigid Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 3

	Type		Exterior Column			Exterior Column				
	X-Loc		0/0/0			50/11/0				
	Grid1 - Grid2		3-E			3-A				
	Base Plate W x L (in.)		8 X 13			8 X 13				
	Base Plate Thickness (in.)		0.375			0.375				
	Anchor Rod Qty/Diam. (in.)		4 - 0.750			4 - 0.750				
	Column Base Elev.		100'-0"			100'-0"				
Load Type	Load Description	Desc.	Hx	Hz	Vy	Hx	Hz	Vy		
D	Material Dead Weight	Frm	2.01	-	4.47	-2.01	-	4.61	-	-
CG	Collateral Load for Gravity Cases	Frm	1.37	-	2.83	-1.37	-	2.83	-	-
S>	Snow - Notional Right	Frm	11.00	-	22.85	-11.00	-	22.85	-	-
<S	Snow - Notional Left	Frm	11.00	-	22.85	-11.00	-	22.85	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	8.98	-	12.10	-8.98	-	23.42	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	8.99	-	23.42	-8.99	-	12.11	-	-
W2>	Wind Load, Case 2, Right	Frm	-4.56	-	-2.76	-0.46	-	1.62	-	-
<W2	Wind Load, Case 2, Left	Frm	0.47	-	1.68	4.58	-	-2.96	-	-
WPL	Wind Load, || Ridge, Left	Frm	-4.08	-	-13.54	3.66	-	-15.93	-	-
WPR	Wind Load, || Ridge, Right	Frm	-3.67	-	-15.75	4.01	-	-13.59	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	1.56	-	0.87	3.83	-	-0.87	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-3.93	-	-0.87	-1.46	-	0.87	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-8.14	-	-17.13	3.12	-	-12.75	-	-
<W1	Wind Load, Case 1, Left	Frm	-3.11	-	-12.68	8.17	-	-17.33	-	-
S	Snow Load	Frm	11.00	-	22.85	-11.00	-	22.85	-	-
E>	Seismic Load, Right	Frm	-2.12	-	-1.20	-2.02	-	1.20	-	-
EG+	Vertical Seismic Effect, Additive	Frm	0.39	-	0.81	-0.39	-	0.81	-	-
<E	Seismic Load, Left	Frm	2.12	-	1.20	2.02	-	-1.20	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-0.39	-	-0.81	0.39	-	-0.81	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-0.07	-	1.97	0.07	-	1.96	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	0.07	2.93	-1.88	-0.07	3.05	-1.90	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-0.07	-	1.89	0.07	-	2.12	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	0.07	2.69	-1.78	-0.07	3.27	-2.07	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.07	-	2.07	0.07	-	1.86	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.07	3.45	-2.09	-0.07	3.10	-1.83	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-0.14	-	3.70	0.14	-	3.72	-	-

<EB	Seismic Brace Reaction, Left	Brc	0.14	6.07	-3.75	-0.14	5.96	-3.66	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	3-E	3.68	13	14.39	1	-	-	5.53	72	7.90	45	30.71	4	-	-	-	-
50/11/0	3-A	14.39	1	3.69	14	-	-	5.42	72	8.03	51	30.86	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 3
Note: All reactions are based on 1st order structural analysis.

	X-Loc	0/0/0			50/11/0					
	Grid1 - Grid2	3-E			3-A					
Ld	Description	Hx	Hz	Vy	Hx	Hz	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)			
1	D + CG + S>	14.39	-	30.14	-14.39	-	30.28	-	-	-
3	D + CG + US1*	12.37	-	19.40	-12.37	-	30.86	-	-	-
4	D + CG + *US1	12.37	-	30.71	-12.37	-	19.54	-	-	-
13	D + CU + W1>	-3.68	-	-7.60	0.67	-	-4.88	-	-	-
14	D + CU + <W1	-0.66	-	-4.93	3.69	-	-7.63	-	-	-
45	D + CU + WPR + <WB1	-0.95	1.76	-7.90	1.16	1.83	-6.53	-	-	-
51	D + CU + WPL + <WB3	-1.20	1.61	-6.52	0.95	1.96	-8.03	-	-	-
72	D + CG + E> + EG+ + <EB	3.20	5.53	4.12	-4.33	5.42	5.00	-	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
45	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 <WB1	D + CU + WPR + <WB1
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3
72	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB

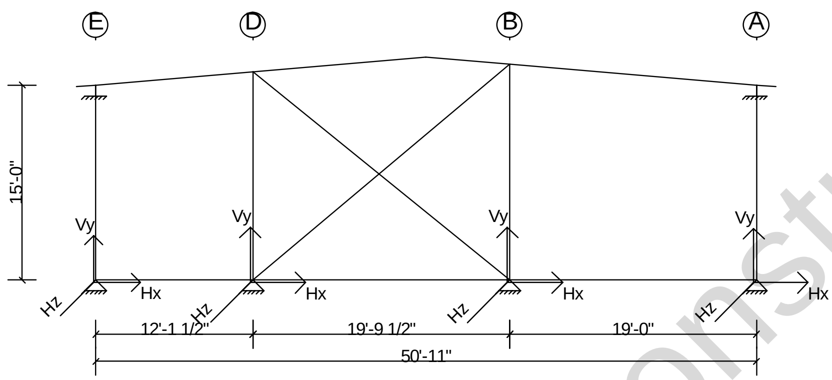
Bracing

X-Loc	Grid	Description
0/0/0	3-E	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.
50/11/0	3-A	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.

Wall: 4, Frame at: 59/11/0

Frame ID:Post & Beam

Frame Type:Post & Beam



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete

Reactions - Unfactored Load Type at Frame Cross Section: 4

Type			Exterior Column		Interior Column			Interior Column			Exterior Column	
X-Loc			0/0/0		12/1/8			31/11/0			50/11/0	
Grid1 - Grid2			4-E		4-D			4-B			4-A	
Base Plate W x L (in.)			8 X 11		8 X 11			8 X 11			8 X 11	
Base Plate Thickness (in.)			0.375		0.375			0.375			0.375	
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			4 - 0.750			4 - 0.750	
Column Base Elev.			100'-0"		100'-0"			100'-0"			100'-0"	
Load Type	Load Description	Desc.	Hx	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Vy
D	Material Dead Weight	Frm	-	1.00	-	-	1.65	-	-	1.92	-	0.97
CG	Collateral Load for Gravity Cases	Frm	-	0.55	-	-	1.07	-	-	1.26	-	0.56
S>	Snow - Notional Right	Frm	-	4.56	-	-	8.62	-	-	10.28	-	4.67
<S	Snow - Notional Left	Frm	-	4.56	-	-	8.62	-	-	10.28	-	4.67
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-	1.45	-	-	2.33	-	-	11.52	-	5.50
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-	4.50	-	-	11.51	-	-	5.23	-	1.09
W2>	Wind Load, Case 2, Right	Frm	-2.36	-0.76	-	-	-1.86	-	-	-1.09	0.24	-0.21
<W2	Wind Load, Case 2, Left	Frm	-0.51	0.18	-	-	0.40	-	-	-2.81	1.81	-1.92
WPL	Wind Load, || Ridge, Left	Frm	2.36	-2.06	-	-	-5.11	-	-	-8.73	-1.65	-4.26
WPR	Wind Load, || Ridge, Right	Frm	2.36	-2.76	-	-	-7.45	-	-	-6.93	-1.65	-2.75
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	0.01	-	-	-0.05	-	-	-0.08	1.06	0.12
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-1.53	0.17	-	-	-0.06	-	-	-0.13	-	0.01
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	0.21	-3.00	-	2.16	-7.15	-	4.75	-6.26	-1.54	-2.42
<W1	Wind Load, Case 1, Left	Frm	2.06	-2.07	-	-1.98	-4.90	-	-4.41	-7.98	0.03	-4.14
S	Snow Load	Frm	-	4.56	-	-	8.62	-	-	10.28	-	4.67
E>	Seismic Load, Right	Frm	-0.07	-	-	0.10	-	-	0.12	-0.01	-0.05	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.17	-	-	0.31	-	-	0.36	-	0.16
<E	Seismic Load, Left	Frm	0.07	-	-	-0.10	-	-	-0.12	0.01	0.05	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.17	-	-	-0.31	-	-	-0.36	-	-0.16
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-	-	1.34	-	-1.16	-	-	1.16	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-	-	-	-	1.19	-1.43	-	-1.20	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-	-	1.34	-	-1.18	-	-	1.18	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-	-	-	-	1.22	-1.43	-	-1.22	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	0.99	-1.24	-	-0.99	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	1.24	-	-1.03	-	-	1.03	-	-
EB>	Seismic Brace Reaction, Right	Brc	-	-	0.50	-	-0.44	-	-	0.44	-	-

<EB	Seismic Brace Reaction, Left	Brc	-	-	-	-	0.43	-0.50	-	-0.43	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	4-E	1.42	5	1.42	7	-	-	-	-	1.20	13	6.11	1	-	-	-	-
12/1/8	4-D	-	-	0.79	41	1.19	14	1.30	13	4.18	42	14.23	4	-	-	-	-
31/11/0	4-B	0.85	44	-	-	2.65	14	2.85	13	4.82	51	14.70	3	-	-	-	-
50/11/0	4-A	0.99	7	1.08	6	-	-	-	-	1.98	15	7.03	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 4
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		12/1/8			31/11/0			50/11/0		
Grid1 - Grid2		4-E		4-D			4-B			4-A		
Ld	Description	Hx	Vy	Hx	Hz	Vy	Hx	Hz	Vy	Hx	Vy	
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	(k)	
1	D + CG + S>	-	6.11	-	-	11.33	-	-	13.46	-	6.20	-
3	D + CG + US1*	-	3.00	-	-	5.04	-	-	14.70	-	7.03	-
4	D + CG + *US1	-	6.04	-	-	14.23	-	-	8.42	-	2.63	-
5	D + CG + W2>	-1.42	1.09	-	-	1.60	-	-	2.53	0.14	1.41	-
6	D + CG + <W2	-0.31	1.65	-	-	2.96	-	-	1.50	1.08	0.38	-
7	D + CG + WPL	1.42	0.31	-	-	-0.35	-	-	-2.06	-0.99	-1.02	-
13	D + CU + W1>	0.13	-1.20	-	1.30	-3.30	-	2.85	-2.60	-0.92	-0.87	-
14	D + CU + <W1	1.24	-0.64	-	-1.19	-1.95	-	-2.65	-3.63	0.02	-1.90	-
15	D + CU + WPL	1.42	-0.64	-	-	-2.07	-	-	-4.09	-0.99	-1.98	-
41	D + CG + WPR + WB1>	1.42	-0.11	0.79	0.01	-2.45	-	-	-0.28	-0.99	-0.12	-
42	D + CU + WPR + WB1>	1.42	-1.06	0.79	0.01	-4.18	-	-	-2.31	-0.99	-1.07	-
44	D + CG + WPR + <WB1	1.42	-0.11	-	-	-1.04	-0.85	-0.01	-1.69	-0.99	-0.12	-
51	D + CU + WPL + <WB3	1.42	-0.64	-	-	-1.34	-0.85	-0.01	-4.82	-0.99	-1.98	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
7	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
41	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 WB1>	D + CG + WPR + WB1>
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
44	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 <WB1	D + CG + WPR + <WB1
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3

Bracing

X-Loc	Grid	Description
12/1/8	4-D	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.
31/11/0	4-B	Diagonal bracing at base is attached to column. Reactions ARE included with frame reactions.

Shape: electric

Loads and Codes - Shape: electric

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Structural: 16AISC - ASD
Rainfall: I: 4.00 inches per hour
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Cold Form: 16AISI - ASD
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6688
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 10/2/3
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

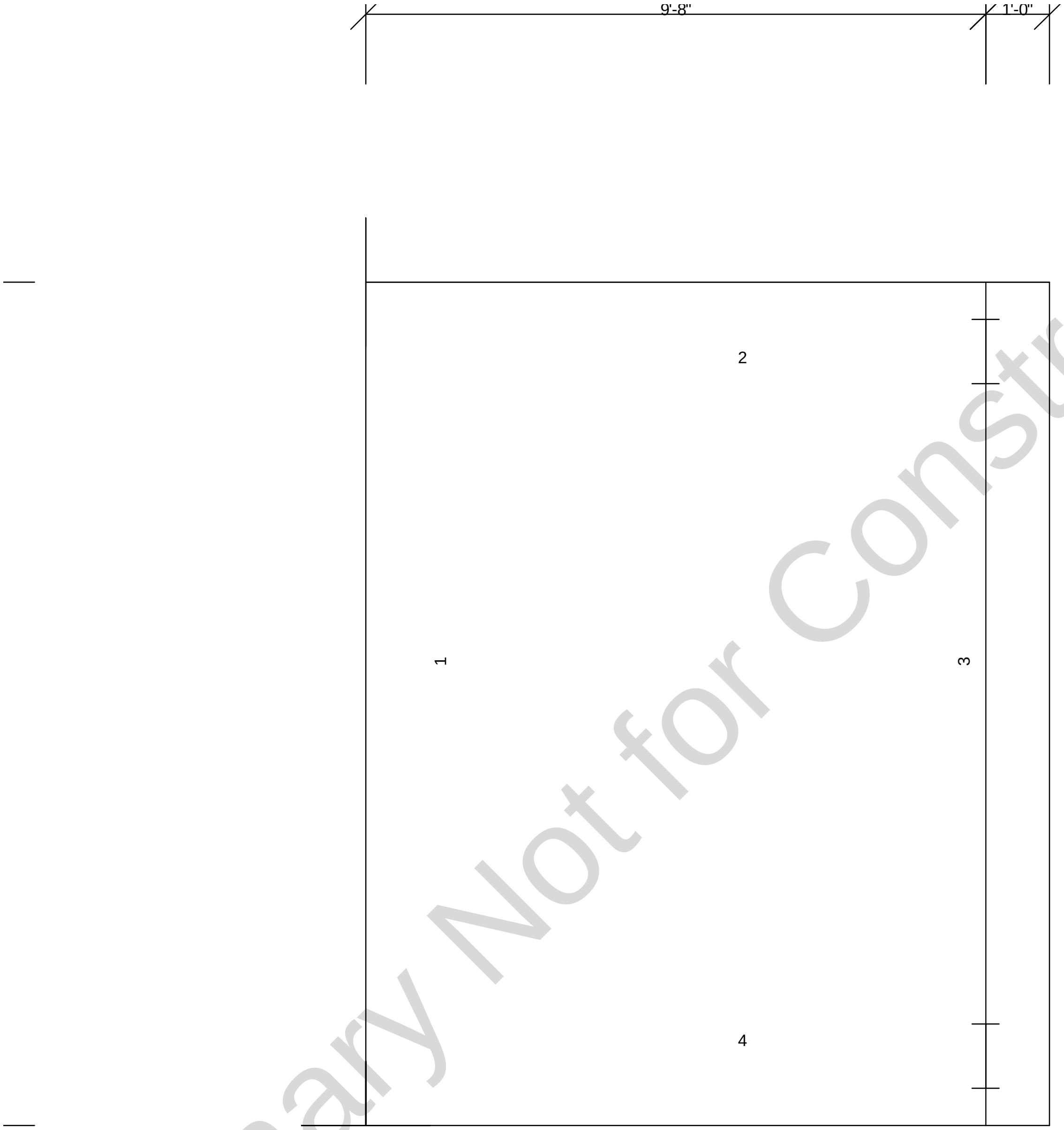
Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 15/6/9

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2515
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1566
R-Factor: 3.25
Overstrength Factor: Omega: 2.00
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Overall Shape Description

Roof 1	Roof 2	From Grid	To Grid	Width	Length	Eave Ht.	Eave Ht. 2	Pitch	Pitch 2	Dist. to Ridge	Peak Height
A		1-C	1-E	13/1/8	10/8/0	16/1/2	15/0/0	-1.000:12			

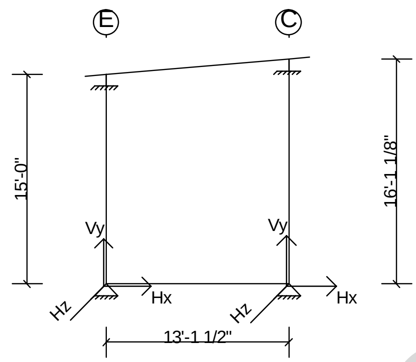


<*> The building is designed with bracing diagonals in the designated bays. Column base reactions, base plates and anchor rods are affected by this bracing and diagonals may not be relocated without consulting the building supplier's engineer.

Wall: 4, Frame at: 9/8/0

Frame ID:Rigid Frame

Frame Type:Rigid Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 5

Type			Exterior Column		Exterior Column			
X-Loc			0/0/0		13/1/8			
Grid1 - Grid2			5-E		5-C			
Base Plate W x L (in.)			8 X 13		8 X 13			
Base Plate Thickness (in.)			0.375		0.375			
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			
Column Base Elev.			100'-0"		100'-0"			
Load Type	Load Description	Desc.	Hx	Vy	Hx	Vy		
D	Material Dead Weight	Frm	0.02	0.71	-0.02	0.72	-	-
CG	Collateral Load for Gravity Cases	Frm	0.01	0.34	-0.01	0.33	-	-
S>	Snow - Notional Right	Frm	0.11	2.80	-0.11	2.79	-	-
<S	Snow - Notional Left	Frm	0.11	2.80	-0.11	2.79	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.03	0.84	-0.03	0.84	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.11	2.81	-0.11	2.80	-	-
W2>	Wind Load, Case 2, Right	Frm	-1.65	-2.66	-0.36	0.04	-	-
<W2	Wind Load, Case 2, Left	Frm	0.68	1.59	1.81	-2.48	-	-
WPL	Wind Load, || Ridge, Left	Frm	0.95	-1.49	-0.83	-1.80	-	-
WPR	Wind Load, || Ridge, Right	Frm	0.99	-2.16	-0.73	-2.87	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	0.47	1.11	1.05	-1.11	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-1.06	-1.03	-0.41	1.03	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-0.68	-3.70	-1.33	-1.00	-	-
<W1	Wind Load, Case 1, Left	Frm	1.65	0.56	0.84	-3.52	-	-
S	Snow Load	Frm	0.11	2.80	-0.11	2.79	-	-
E>	Seismic Load, Right	Frm	-0.32	-0.72	-0.29	0.69	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.10	-	0.10	-	-
<E	Seismic Load, Left	Frm	0.32	0.72	0.29	-0.69	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.10	-	-0.10	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	5-E	0.96	10	1.01	19	-	-	-	-	1.79	18	3.86	25	-	-	-	-

13/1/8	5-C	0.81	18	1.05	11	-	-	-	-	1.68	19	3.85	4	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 5
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		13/1/8				
Grid1 - Grid2		5-E		5-C				
Ld	Description	Hx	Vy	Hx	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)			
4	D + CG + *US1	0.14	3.85	-0.14	3.85	-	-	-
10	D + CG + W2>	-0.96	-0.55	-0.25	1.07	-	-	-
11	D + CG + <W2	0.44	2.00	1.05	-0.44	-	-	-
18	D + CU + W1>	-0.39	-1.79	-0.81	-0.17	-	-	-
19	D + CU + <W1	1.01	0.76	0.49	-1.68	-	-	-
25	D + CG + S + <W2	0.42	3.86	0.70	2.02	-	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
10	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
11	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
18	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
19	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
25	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2

VP Buildings

3200 Players Club Circle
Memphis, TN 38125-8843

STRUCTURAL DESIGN DATA

Project: Fall Creek FH Spawning Bldg
Name: Fall Creek FH Spawning Bldg
Builder PO #:
Jobsite:

City, State: Yreka, California 96097
County: Siskiyou
Country: United States

TABLE OF CONTENTS

Letter of Certification

Contact:
Name: Evergreen Industrial
Address:

City, State: Loveland, Colorado 80537
Country: United States

Project: Fall Creek FH Spawning Bldg
Builder PO #:
Jobsite:

City, State: Yreka, California 96097
County, Country: Siskiyou, United States

This is to certify that the above referenced project has been designed in accordance with the applicable portions of the Building Code specified below. All loading and building design criteria shown below have been specified by contract and applied in accordance with the building code.

Overall Building Description

Shape	Overall Width	Overall Length	Floor Area (sq. ft.)	Wall Area (sq. ft.)	Roof Area (sq. ft.)	Max. Eave Height	Min. Eave Height 2	Max. Roof Pitch	Min. Roof Pitch	Peak Height
Spawning Bldg	33/11/0	23/11/0	811	1424	957	15/0/0	15/0/0	1.000:12	1.000:12	16/4/15
leanto	10/7/0	23/11/0	253	646	326	15/0/0	14/1/7	-1.000:12		
Total For All Shapes			1064	2070	1283					

Loads and Codes - Shape: Spawning Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6942
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 6/0/0
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 15/8/8

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2535
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1578
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Loads and Codes - Shape: leanto

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads

Roof Live Load

Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf

Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load: 20.00 psf Not Reducible

Wind Load

Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6942
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 6/0/0
Parts / Portions Zone Strip Width: a: 8/5/10
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load

Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load

Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 14/6/11

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2386
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1491
R-Factor: 3.25
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Building design loads and governing building code is provided by the Builder and is not validated by Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. The Builder is responsible for contacting the local Building Official or project Design Professional to obtain all code and loading information for this specific building site.

The design of this building is in accordance with Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. design practices which have been established based upon pertinent procedures and recommendations of the Standards listed in the Building Code or later editions.

This certification DOES NOT apply to the design of the foundation or other on-site structures or components not supplied by Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc., nor does it apply to unauthorized modifications to building components. Furthermore, it is understood that certification is based upon the premise that all components will be erected or constructed in strict compliance with pertinent documents for this project. Varco Pruden Buildings, a division of BlueScope Buildings North America, Inc. DOES NOT provide general review of erection during or after building construction unless specifically agreed to in the contract documents.

The undersigned engineer in responsible charge certifies that this building has been designed in accordance with the contract documents as indicated in this letter.

____ Date: ________________ Engineer's Seal:
Engineer in responsible charge

Building Loading - Summary Report

Shape: Spawning Bldg

Loads and Codes - Shape: Spawning Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6942
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 6/0/0
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 15/8/8

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2535
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1578
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Deflection Conditions
Frames are vertically supporting:Metal Roof Purlins and Panels
Frames are laterally supporting:Metal Wall Girts and Panels
Purlins are supporting:Metal Roof Panels
Girts are supporting:Metal Wall Panels

Design Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
2	System	1.000	1.0 D + 1.0 CG + 1.0 <S	D + CG + <S
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
6	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
7	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
8	System	1.000	1.0 D + 1.0 CG + 0.6 WPR	D + CG + WPR
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1

15	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
16	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR
17	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
18	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
19	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
20	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
21	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL	D + CG + S + WPL
22	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR	D + CG + S + WPR
23	System	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+	D + CG + E> + EG+
24	System	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+	D + CG + <E + EG+
25	System	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG-	D + CU + E> + EG-
26	System	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG-	D + CU + <E + EG-
27	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+	D + CG + S + E> + EG+
28	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+	D + CG + S + <E + EG+
29	Special	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
30	Special	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
31	Special	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
32	Special	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
33	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
34	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
35	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
36	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
37	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
38	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
39	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
40	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
41	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 WB1>	D + CG + WPR + WB1>
42	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
43	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 WB1>	D + CG + S + WPR + WB1>
44	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 <WB1	D + CG + WPR + <WB1
45	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 <WB1	D + CU + WPR + <WB1
46	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 <WB1	D + CG + S + WPR + <WB1
47	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 WB3>	D + CG + WPL + WB3>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
49	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 WB3>	D + CG + S + WPL + WB3>
50	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 <WB3	D + CG + WPL + <WB3
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3
52	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 <WB3	D + CG + S + WPL + <WB3
53	System Derived	1.000	0.6 MWB	MWB - Wall: 1
54	System Derived	1.000	0.6 MWB	MWB - Wall: 2
55	System Derived	1.000	0.6 MWB	MWB - Wall: 3
56	System Derived	1.000	0.6 MWB	MWB - Wall: 4
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>
58	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 EB>	D + CG + E> + EG+ + EB>
59	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 EB>	D + CG + <E + EG+ + EB>
60	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 EB>	D + CG + <E + EG+ + EB>
61	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 EB>	D + CU + E> + EG- + EB>
62	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 EB>	D + CU + E> + EG- + EB>
63	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 EB>	D + CU + <E + EG- + EB>
64	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 EB>	D + CU + <E + EG- + EB>
65	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 EB>	D+CG+S+E>+EG++EB>
66	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 EB>	D+CG+S+E>+EG++EB>
67	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 EB>	D+CG+S+<E+EG++EB>
68	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 EB>	D+CG+S+<E+EG++EB>
69	Special	1.000	1.0 D + 1.0 CG + 1.75 EB> + 0.7 EG+	D + CG + EB> + EG+
70	Special	1.000	0.6 D + 0.6 CU + 1.75 EB> + 0.7 EG-	D + CU + EB> + EG-
71	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 EB> + 0.525 EG+	D + CG + S + EB> + EG+
72	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 EB> + 0.7 EG+	D + CG + EB> + EG+
73	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 EB> + 0.7 EG-	D + CU + EB> + EG-
74	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 EB> + 0.525 EG+	D + CG + S + EB> + EG+
75	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB
76	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 <EB	D + CG + E> + EG+ + <EB
77	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 <EB	D + CG + <E + EG+ + <EB
78	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 <EB	D + CG + <E + EG+ + <EB
79	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 <EB	D + CU + E> + EG- + <EB
80	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 <EB	D + CU + E> + EG- + <EB
81	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 <EB	D + CU + <E + EG- + <EB

82	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 <EB	D + CU + <E + EG- + <EB
83	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 <EB	D+CG+S+E>+EG++<EB
84	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 <EB	D+CG+S+E>+EG++<EB
85	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 <EB	D+CG+S+<E+EG++<EB
86	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 <EB	D+CG+S+<E+EG++<EB
87	Special	1.000	1.0 D + 1.0 CG + 1.75 <EB + 0.7 EG+	D + CG + <EB + EG+
88	Special	1.000	0.6 D + 0.6 CU + 1.75 <EB + 0.7 EG-	D + CU + <EB + EG-
89	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <EB + 0.525 EG+	D + CG + S + <EB + EG+
90	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <EB + 0.7 EG+	D + CG + <EB + EG+
91	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <EB + 0.7 EG-	D + CU + <EB + EG-
92	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <EB + 0.525 EG+	D + CG + S + <EB + EG+

Design Load Combinations - Bracing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 0.6 W1>	D + W1>
2	System	1.000	1.0 D + 0.6 <W1	D + <W1
3	System	1.000	1.0 D + 0.6 W2>	D + W2>
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	1.0 D + 0.6 W3>	D + W3>
6	System	1.000	1.0 D + 0.6 <W3	D + <W3
7	System	1.000	1.0 D + 0.6 W4>	D + W4>
8	System	1.000	1.0 D + 0.6 <W4	D + <W4
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	1.0 D + 0.7 E>	D + E>
14	System	1.000	1.0 D + 0.7 <E	D + <E
15	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W1>	D + CG + W1>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W1	D + CG + <W1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
18	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W3>	D + CG + W3>
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W3	D + CG + <W3
21	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W4>	D + CG + W4>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W4	D + CG + <W4
23	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
24	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W2>	D + CU + W2>
26	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W2	D + CU + <W2
27	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W3>	D + CU + W3>
28	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W3	D + CU + <W3
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W4>	D + CU + W4>
30	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W4	D + CU + <W4
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
33	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W3>	D + CG + S + W3>
36	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W3	D + CG + S + <W3
37	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W4>	D + CG + S + W4>
38	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W4	D + CG + S + <W4
39	System Derived	1.000	1.0 D + 1.0 CG + 0.7 E> + 0.7 EG+	D + CG + E> + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <E + 0.7 EG+	D + CG + <E + EG+
41	System Derived	1.000	0.6 D + 0.6 CG + 0.7 E> + 0.7 EG-	D + CG + E> + EG-
42	System Derived	1.000	0.6 D + 0.6 CG + 0.7 <E + 0.7 EG-	D + CG + <E + EG-
43	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 E> + 0.525 EG+	D + CG + S + E> + EG+
44	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <E + 0.525 EG+	D + CG + S + <E + EG+

Design Load Combinations - Purlin

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S	D + CG + S
2	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
3	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
4	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB1>	D + CG + <W2 + WB1>
5	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB1>	D + CU + W1> + WB1>
6	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB1>	D + CG + S + W1> + WB1>

7	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB1>	D + CG + S + <W2 + WB1>
8	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB1	D + CG + <W2 + <WB1
9	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB1	D + CU + W1> + <WB1
10	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB1	D + CG + S + W1> + <WB1
11	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB1	D + CG + S + <W2 + <WB1
12	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB2>	D + CG + <W2 + WB2>
13	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB2>	D + CU + W1> + WB2>
14	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB2>	D + CG + S + W1> + WB2>
15	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB2>	D + CG + S + <W2 + WB2>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB2	D + CG + <W2 + <WB2
17	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB2	D + CU + W1> + <WB2
18	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB2	D + CG + S + W1> + <WB2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB2	D + CG + S + <W2 + <WB2
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB3>	D + CG + <W2 + WB3>
21	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB3>	D + CU + W1> + WB3>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB3>	D + CG + S + W1> + WB3>
23	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB3>	D + CG + S + <W2 + WB3>
24	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB3	D + CG + <W2 + <WB3
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB3	D + CU + W1> + <WB3
26	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB3	D + CG + S + W1> + <WB3
27	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB3	D + CG + S + <W2 + <WB3
28	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB4>	D + CG + <W2 + WB4>
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB4>	D + CU + W1> + WB4>
30	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB4>	D + CG + S + W1> + WB4>
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB4>	D + CG + S + <W2 + WB4>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB4	D + CG + <W2 + <WB4
33	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB4	D + CU + W1> + <WB4
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB4	D + CG + S + W1> + <WB4
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB4	D + CG + S + <W2 + <WB4
36	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 EB> + 0.525 EG+	D + CG + S + EB> + EG+
37	System Derived	1.000	1.0 D + 1.0 CG + 0.7 EB> + 0.7 EG+	D + CG + EB> + EG+
38	System Derived	1.000	0.6 D + 0.6 CU + 0.7 EB> + 0.7 EG-	D + CU + EB> + EG-
39	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <EB + 0.525 EG+	D + CG + S + <EB + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <EB + 0.7 EG+	D + CG + <EB + EG+
41	System Derived	1.000	0.6 D + 0.6 CU + 0.7 <EB + 0.7 EG-	D + CU + <EB + EG-

Design Load Combinations - Girt

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Design Load Combinations - Roof - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 S	D + S
2	System	1.000	1.0 D + 1.0 US1*	D + US1*
3	System	1.000	1.0 D + 1.0 *US1	D + *US1
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	0.6 D + 0.6 W1>	D + W1>

Design Load Combinations - Wall - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Deflection Load Combinations - Framing

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	0	180	1.0 S	S
2	System	1.000	60	180	0.42 W1>	W1>
3	System	1.000	60	180	0.42 <W1	<W1
4	System	1.000	60	180	0.42 W2>	W2>
5	System	1.000	60	180	0.42 <W2	<W2
6	System	1.000	60	180	0.42 WPL	WPL
7	System	1.000	60	180	0.42 WPR	WPR
8	System Derived	1.000	60	180	0.42 WB1>	WB1>
9	System Derived	1.000	60	180	0.42 <WB1	<WB1
10	System Derived	1.000	60	180	0.42 WB2>	WB2>
11	System Derived	1.000	60	180	0.42 <WB2	<WB2

12	System Derived	1.000	60	180	0.42 WB3>	WB3>
13	System Derived	1.000	60	180	0.42 <WB3	<WB3
14	System Derived	1.000	60	180	0.42 WB4>	WB4>
15	System Derived	1.000	60	180	0.42 <WB4	<WB4
16	System	1.000	10	0	1.0 E> + 1.0 EG-	E> + EG-
17	System	1.000	10	0	1.0 <E + 1.0 EG-	<E + EG-
18	System Derived	1.000	10	0	1.0 EB>	EB>
19	System Derived	1.000	10	0	1.0 <EB	<EB

Deflection Load Combinations - Purlin

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	180	1.0 S	S
2	System	1.000	180	0.42 W1>	W1>
3	System	1.000	180	0.42 <W2	<W2

Deflection Load Combinations - Girt

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	90	0.42 W1>	W1>
2	System	1.000	90	0.42 <W2	<W2

Deflection Load Combinations - Roof - Panel

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	60	60	1.0 S	S
2	System	1.000	60	60	0.42 <W2	<W2

Shape: leanto

Loads and Codes - Shape: leanto

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Structural: 16AISC - ASD
Rainfall: I: 4.00 inches per hour
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Cold Form: 16AISI - ASD
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6942
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 6/0/0
Parts / Portions Zone Strip Width: a: 8/5/10
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 14/6/11

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2386

R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1491
R-Factor: 3.25
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Deflection Conditions
Frames are vertically supporting:Metal Roof Purlins and Panels
Frames are laterally supporting:Metal Wall Girts and Panels
Purlins are supporting:Metal Roof Panels
Girts are supporting:Metal Wall Panels

Design Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
2	System	1.000	1.0 D + 1.0 CG + 1.0 <S	D + CG + <S
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 1)
6	System	1.000	1.0 D + 1.0 CG + 1.0 PF1	D + CG + PF1(Span 2)
7	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
8	System	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
9	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
10	System	1.000	1.0 D + 1.0 CG + 0.6 WPR	D + CG + WPR
11	System	1.000	0.6 MW	MW - Wall: 1
12	System	1.000	0.6 MW	MW - Wall: 2
13	System	1.000	0.6 MW	MW - Wall: 3
14	System	1.000	0.6 MW	MW - Wall: 4

15	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
16	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
17	System	1.000	0.6 D + 0.6 CU + 0.6 WPL	D + CU + WPL
18	System	1.000	0.6 D + 0.6 CU + 0.6 WPR	D + CU + WPR
19	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
20	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
21	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
22	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
23	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL	D + CG + S + WPL
24	System	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR	D + CG + S + WPR
25	System	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+	D + CG + E> + EG+
26	System	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+	D + CG + <E + EG+
27	System	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG-	D + CU + E> + EG-
28	System	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG-	D + CU + <E + EG-
29	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+	D + CG + S + E> + EG+
30	System	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+	D + CG + S + <E + EG+
31	Special	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
32	Special	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
33	Special	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
34	Special	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
35	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
36	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
37	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 E> + 0.7 EG+	D + CG + E> + EG+
38	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <E + 0.7 EG+	D + CG + <E + EG+
39	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 E> + 0.7 EG-	D + CU + E> + EG-
40	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <E + 0.7 EG-	D + CU + <E + EG-
41	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 E> + 0.525 EG+	D + CG + S + E> + EG+
42	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <E + 0.525 EG+	D + CG + S + <E + EG+
43	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 WB1>	D + CG + WPR + WB1>
44	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 WB1>	D + CU + WPR + WB1>
45	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 WB1>	D + CG + S + WPR + WB1>
46	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPR + 0.6 <WB1	D + CG + WPR + <WB1
47	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPR + 0.6 <WB1	D + CU + WPR + <WB1
48	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPR + 0.45 <WB1	D + CG + S + WPR + <WB1
49	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 WB3>	D + CG + WPL + WB3>
50	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
51	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 WB3>	D + CG + S + WPL + WB3>
52	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 <WB3	D + CG + WPL + <WB3
53	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3
54	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 WPL + 0.45 <WB3	D + CG + S + WPL + <WB3
55	System Derived	1.000	0.6 MWB	MWB - Wall: 1
56	System Derived	1.000	0.6 MWB	MWB - Wall: 2
57	System Derived	1.000	0.6 MWB	MWB - Wall: 3
58	System Derived	1.000	0.6 MWB	MWB - Wall: 4
59	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>
60	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 EB>	D + CG + E> + EG+ + EB>
61	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 EB>	D + CG + <E + EG+ + EB>
62	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 EB>	D + CG + <E + EG+ + EB>
63	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 EB>	D + CU + E> + EG- + EB>
64	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 EB>	D + CU + E> + EG- + EB>
65	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 EB>	D + CU + <E + EG- + EB>
66	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 EB>	D + CU + <E + EG- + EB>
67	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 EB>	D+CG+S+E>+EG++EB>
68	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 EB>	D+CG+S+E>+EG++EB>
69	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 EB>	D+CG+S+<E+EG++EB>
70	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 EB>	D+CG+S+<E+EG++EB>
71	Special	1.000	1.0 D + 1.0 CG + 1.75 EB> + 0.7 EG+	D + CG + EB> + EG+
72	Special	1.000	0.6 D + 0.6 CU + 1.75 EB> + 0.7 EG-	D + CU + EB> + EG-
73	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 EB> + 0.525 EG+	D + CG + S + EB> + EG+
74	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 EB> + 0.7 EG+	D + CG + EB> + EG+
75	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 EB> + 0.7 EG-	D + CU + EB> + EG-
76	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 EB> + 0.525 EG+	D + CG + S + EB> + EG+
77	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB
78	System Derived	1.000	1.0 D + 1.0 CG + 0.91 E> + 0.7 EG+ + 0.273 <EB	D + CG + E> + EG+ + <EB
79	System Derived	1.000	1.0 D + 1.0 CG + 0.273 <E + 0.7 EG+ + 0.91 <EB	D + CG + <E + EG+ + <EB
80	System Derived	1.000	1.0 D + 1.0 CG + 0.91 <E + 0.7 EG+ + 0.273 <EB	D + CG + <E + EG+ + <EB
81	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 <EB	D + CU + E> + EG- + <EB

82	System Derived	1.000	0.6 D + 0.6 CU + 0.91 E> + 0.7 EG- + 0.273 <EB	D + CU + E> + EG- + <EB
83	System Derived	1.000	0.6 D + 0.6 CU + 0.273 <E + 0.7 EG- + 0.91 <EB	D + CU + <E + EG- + <EB
84	System Derived	1.000	0.6 D + 0.6 CU + 0.91 <E + 0.7 EG- + 0.273 <EB	D + CU + <E + EG- + <EB
85	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 E> + 0.525 EG+ + 0.6825 <EB	D+CG+S+E>+EG++<EB
86	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 E> + 0.525 EG+ + 0.2047 <EB	D+CG+S+E>+EG++<EB
87	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.2047 <E + 0.525 EG+ + 0.6825 <EB	D+CG+S+<E+EG++<EB
88	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.6825 <E + 0.525 EG+ + 0.2047 <EB	D+CG+S+<E+EG++<EB
89	Special	1.000	1.0 D + 1.0 CG + 1.75 <EB + 0.7 EG+	D + CG + <EB + EG+
90	Special	1.000	0.6 D + 0.6 CU + 1.75 <EB + 0.7 EG-	D + CU + <EB + EG-
91	Special	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <EB + 0.525 EG+	D + CG + S + <EB + EG+
92	OMF Connection	1.000	1.0 D + 1.0 CG + 1.75 <EB + 0.7 EG+	D + CG + <EB + EG+
93	OMF Connection	1.000	0.6 D + 0.6 CU + 1.75 <EB + 0.7 EG-	D + CU + <EB + EG-
94	OMF Connection	1.000	1.0 D + 1.0 CG + 0.15 S + 1.3125 <EB + 0.525 EG+	D + CG + S + <EB + EG+

Design Load Combinations - Bracing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 0.6 W1>	D + W1>
2	System	1.000	1.0 D + 0.6 <W1	D + <W1
3	System	1.000	1.0 D + 0.6 W2>	D + W2>
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	1.0 D + 0.6 W3>	D + W3>
6	System	1.000	1.0 D + 0.6 <W3	D + <W3
7	System	1.000	1.0 D + 0.6 W4>	D + W4>
8	System	1.000	1.0 D + 0.6 <W4	D + <W4
9	System	1.000	0.6 MW	MW - Wall: 1
10	System	1.000	0.6 MW	MW - Wall: 2
11	System	1.000	0.6 MW	MW - Wall: 3
12	System	1.000	0.6 MW	MW - Wall: 4
13	System	1.000	1.0 D + 0.7 E>	D + E>
14	System	1.000	1.0 D + 0.7 <E	D + <E
15	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W1>	D + CG + W1>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W1	D + CG + <W1
17	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
18	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2	D + CG + <W2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W3>	D + CG + W3>
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W3	D + CG + <W3
21	System Derived	1.000	1.0 D + 1.0 CG + 0.6 W4>	D + CG + W4>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W4	D + CG + <W4
23	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
24	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W2>	D + CU + W2>
26	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W2	D + CU + <W2
27	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W3>	D + CU + W3>
28	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W3	D + CU + <W3
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W4>	D + CU + W4>
30	System Derived	1.000	0.6 D + 0.6 CU + 0.6 <W4	D + CU + <W4
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1>	D + CG + S + W1>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W1	D + CG + S + <W1
33	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W2>	D + CG + S + W2>
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2	D + CG + S + <W2
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W3>	D + CG + S + W3>
36	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W3	D + CG + S + <W3
37	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W4>	D + CG + S + W4>
38	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W4	D + CG + S + <W4
39	System Derived	1.000	1.0 D + 1.0 CG + 0.7 E> + 0.7 EG+	D + CG + E> + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <E + 0.7 EG+	D + CG + <E + EG+
41	System Derived	1.000	0.6 D + 0.6 CG + 0.7 E> + 0.7 EG-	D + CG + E> + EG-
42	System Derived	1.000	0.6 D + 0.6 CG + 0.7 <E + 0.7 EG-	D + CG + <E + EG-
43	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 E> + 0.525 EG+	D + CG + S + E> + EG+
44	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <E + 0.525 EG+	D + CG + S + <E + EG+

Design Load Combinations - Purlin

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S	D + CG + S
2	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
3	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
4	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB1>	D + CG + <W2 + WB1>

5	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB1>	D + CU + W1> + WB1>
6	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB1>	D + CG + S + W1> + WB1>
7	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB1>	D + CG + S + <W2 + WB1>
8	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB1	D + CG + <W2 + <WB1
9	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB1	D + CU + W1> + <WB1
10	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB1	D + CG + S + W1> + <WB1
11	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB1	D + CG + S + <W2 + <WB1
12	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB2>	D + CG + <W2 + WB2>
13	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB2>	D + CU + W1> + WB2>
14	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB2>	D + CG + S + W1> + WB2>
15	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB2>	D + CG + S + <W2 + WB2>
16	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB2	D + CG + <W2 + <WB2
17	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB2	D + CU + W1> + <WB2
18	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB2	D + CG + S + W1> + <WB2
19	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB2	D + CG + S + <W2 + <WB2
20	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB3>	D + CG + <W2 + WB3>
21	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB3>	D + CU + W1> + WB3>
22	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB3>	D + CG + S + W1> + WB3>
23	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB3>	D + CG + S + <W2 + WB3>
24	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB3	D + CG + <W2 + <WB3
25	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB3	D + CU + W1> + <WB3
26	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB3	D + CG + S + W1> + <WB3
27	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB3	D + CG + S + <W2 + <WB3
28	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 WB4>	D + CG + <W2 + WB4>
29	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 WB4>	D + CU + W1> + WB4>
30	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 WB4>	D + CG + S + W1> + WB4>
31	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 WB4>	D + CG + S + <W2 + WB4>
32	System Derived	1.000	1.0 D + 1.0 CG + 0.6 <W2 + 0.6 <WB4	D + CG + <W2 + <WB4
33	System Derived	1.000	0.6 D + 0.6 CU + 0.6 W1> + 0.6 <WB4	D + CU + W1> + <WB4
34	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 W1> + 0.45 <WB4	D + CG + S + W1> + <WB4
35	System Derived	1.000	1.0 D + 1.0 CG + 0.75 S + 0.45 <W2 + 0.45 <WB4	D + CG + S + <W2 + <WB4
36	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 EB> + 0.525 EG+	D + CG + S + EB> + EG+
37	System Derived	1.000	1.0 D + 1.0 CG + 0.7 EB> + 0.7 EG+	D + CG + EB> + EG+
38	System Derived	1.000	0.6 D + 0.6 CU + 0.7 EB> + 0.7 EG-	D + CU + EB> + EG-
39	System Derived	1.000	1.0 D + 1.0 CG + 0.15 S + 0.525 <EB + 0.525 EG+	D + CG + S + <EB + EG+
40	System Derived	1.000	1.0 D + 1.0 CG + 0.7 <EB + 0.7 EG+	D + CG + <EB + EG+
41	System Derived	1.000	0.6 D + 0.6 CU + 0.7 <EB + 0.7 EG-	D + CU + <EB + EG-

Design Load Combinations - Girt

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Design Load Combinations - Roof - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 S	D + S
2	System	1.000	1.0 D + 1.0 US1*	D + US1*
3	System	1.000	1.0 D + 1.0 *US1	D + *US1
4	System	1.000	1.0 D + 0.6 <W2	D + <W2
5	System	1.000	0.6 D + 0.6 W1>	D + W1>

Design Load Combinations - Wall - Panel

No.	Origin	Factor	Application	Description
1	System	1.000	0.6 W1>	W1>
2	System	1.000	0.6 <W2	<W2

Deflection Load Combinations - Framing

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	0	180	1.0 S	S
2	System	1.000	60	180	0.42 W1>	W1>
3	System	1.000	60	180	0.42 <W1	<W1
4	System	1.000	60	180	0.42 W2>	W2>
5	System	1.000	60	180	0.42 <W2	<W2
6	System	1.000	60	180	0.42 WPL	WPL
7	System	1.000	60	180	0.42 WPR	WPR
8	System Derived	1.000	60	180	0.42 WB1>	WB1>
9	System Derived	1.000	60	180	0.42 <WB1	<WB1

10	System Derived	1.000	60	180	0.42 WB2>	WB2>
11	System Derived	1.000	60	180	0.42 <WB2	<WB2
12	System Derived	1.000	60	180	0.42 WB3>	WB3>
13	System Derived	1.000	60	180	0.42 <WB3	<WB3
14	System Derived	1.000	60	180	0.42 WB4>	WB4>
15	System Derived	1.000	60	180	0.42 <WB4	<WB4
16	System	1.000	10	0	1.0 E> + 1.0 EG-	E> + EG-
17	System	1.000	10	0	1.0 <E + 1.0 EG-	<E + EG-
18	System Derived	1.000	10	0	1.0 EB>	EB>
19	System Derived	1.000	10	0	1.0 <EB	<EB

Deflection Load Combinations - Purlin

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	180	1.0 S	S
2	System	1.000	180	0.42 W1>	W1>
3	System	1.000	180	0.42 <W2	<W2

Deflection Load Combinations - Girt

No.	Origin	Factor	Deflection	Application	Description
1	System	1.000	90	0.42 W1>	W1>
2	System	1.000	90	0.42 <W2	<W2

Deflection Load Combinations - Roof - Panel

No.	Origin	Factor	Def H	Def V	Application	Description
1	System	1.000	60	60	1.0 S	S
2	System	1.000	60	60	0.42 <W2	<W2

Reactions - Summary Report w/Controlling Load Comb

Shape: Spawning Bldg

Builder Contact:
Name: Evergreen Industrial
Address:

City, State Zip: Loveland, Colorado 80537
Country: United States

Project: Fall Creek FH Spawning Bldg
Builder PO #:
Jobsite:

City, State Zip: Yreka, California 96097
County, Country: Siskiyou, United States

Loads and Codes - Shape: Spawning Bldg

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6942
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 6/0/0
Parts / Portions Zone Strip Width: a: 9/0/0
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 15/8/8

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2535
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

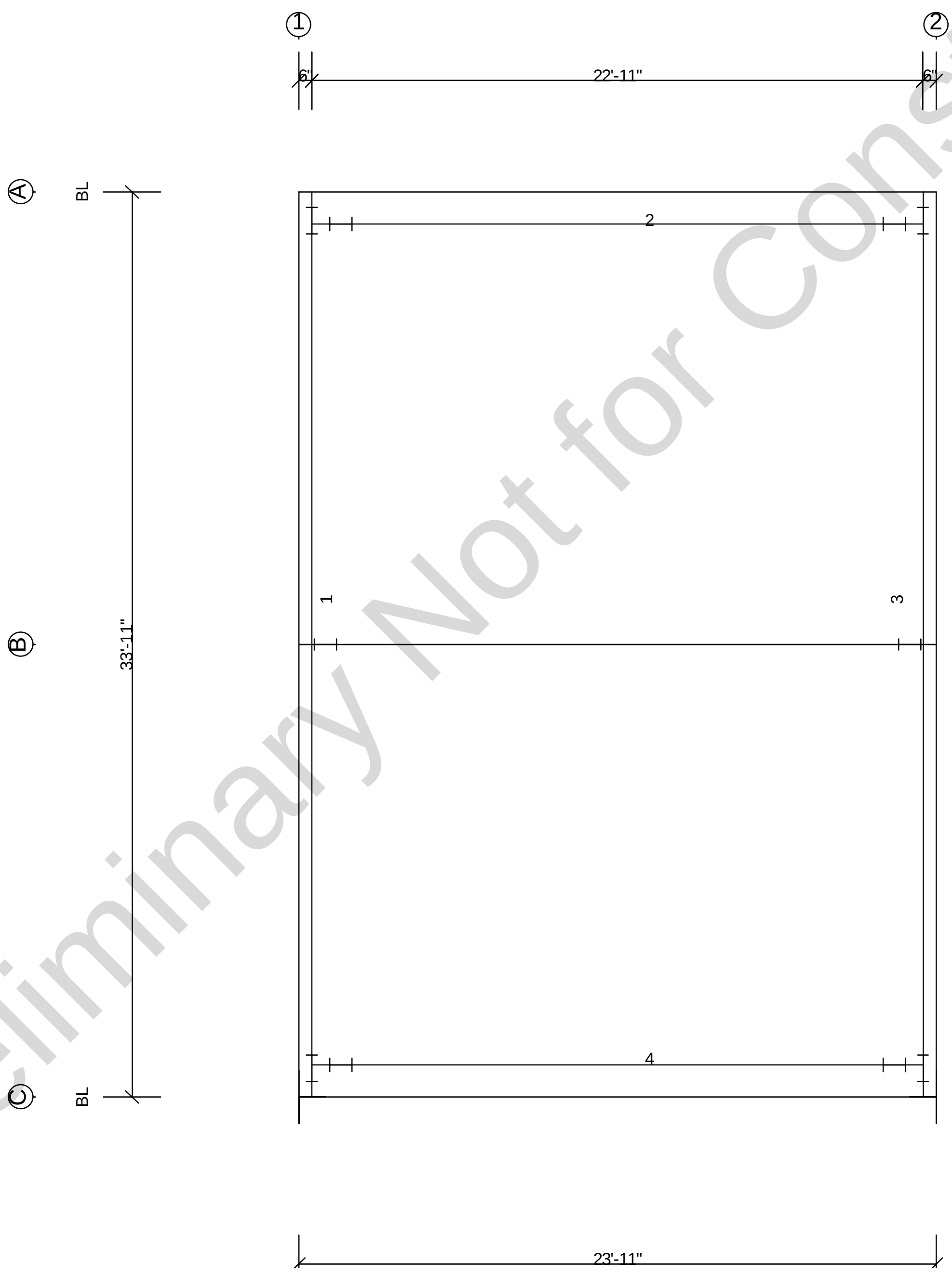
Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1578
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Overall Building Description

Shape	Overall Width	Overall Length	Floor Area (sq. ft.)	Wall Area (sq. ft.)	Roof Area (sq. ft.)	Max. Eave Height	Min. Eave Height 2	Max. Roof Pitch	Min. Roof Pitch	Peak Height
Spawning Bldg	33/11/0	23/11/0	811	1424	957	15/0/0	15/0/0	1.000:12	1.000:12	16/4/15
leanto	10/7/0	23/11/0	253	646	326	15/0/0	14/1/7	-1.000:12		
Total For All Shapes			1064	2070	1283					

Overall Shape Description

Roof 1	Roof 2	From Grid	To Grid	Width	Length	Eave Ht.	Eave Ht. 2	Pitch	Pitch 2	Dist. to Ridge	Peak Height
A	B	1-A	1-C	33/11/0	23/11/0	15/0/0	15/0/0	1.000:12	1.000:12	16/11/8	16/4/15

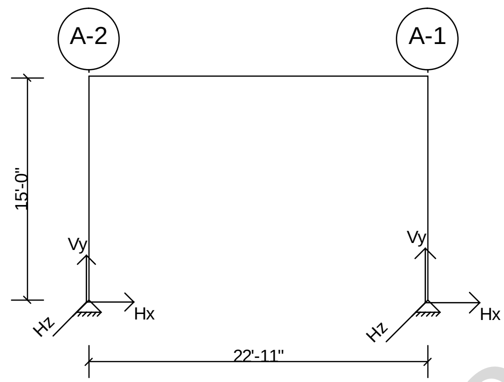


<*> The building is designed with bracing diagonals in the designated bays. Column base reactions, base plates and anchor rods are affected by this bracing and diagonals may not be relocated without consulting the building supplier's engineer.

Wall: 2

Frame ID:Portal Frame

Frame Type:Portal Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: A

Type			Exterior Column		Exterior Column			
X-Loc			0/0/0		22/11/0			
Grid1 - Grid2			A-2		A-1			
Base Plate W x L (in.)			8 X 11		8 X 11			
Base Plate Thickness (in.)			0.375		0.375			
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			
Column Base Elev.			100'-0"		100'-0"			
Load Type	Load Description	Desc.	Hx	Vy	Hx	Vy		
D	Material Dead Weight	Frm	0.02	0.29	-0.02	0.29	-	-
CG	Collateral Load for Gravity Cases	Frm	-	-	-	-	-	-
S>	Snow - Notional Right	Frm	-	-	-	-	-	-
<S	Snow - Notional Left	Frm	-	-	-	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-	-	-	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-	-	-	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-	-	-	-	-	-
<W2	Wind Load, Case 2, Left	Frm	-	-	-	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	-	-	-	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-	-	-	-	-	-
<W1	Wind Load, Case 1, Left	Frm	-	-	-	-	-	-
S	Snow Load	Frm	-	-	-	-	-	-
E>	Seismic Load, Right	Frm	-	-	-	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	-	-	-	-	-
<E	Seismic Load, Left	Frm	-	-	-	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-	-	-	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	1.11	1.50	1.11	-1.50	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-1.08	-1.45	-1.08	1.45	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	1.16	1.56	1.16	-1.56	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-1.16	-1.56	-1.16	1.56	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.95	1.27	0.95	-1.27	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.95	-1.27	-0.95	1.27	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	0.76	1.03	0.76	-1.03	-	-

<EB	Seismic Brace Reaction, Left	Brc	-0.74	-1.00	-0.74	1.00	-	-
WB2>	Wind Brace Reaction, Case 2, Right	Brc	1.16	1.56	1.16	-1.56	-	-
<WB2	Wind Brace Reaction, Case 2, Left	Brc	-1.13	-1.51	-1.13	1.51	-	-
WB4>	Wind Brace Reaction, Case 4, Right	Brc	1.16	1.56	1.16	-1.56	-	-
<WB4	Wind Brace Reaction, Case 4, Left	Brc	-1.16	-1.56	-1.16	1.56	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing

Note: All reactions are based on 1st order structural analysis.

Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	A-2	0.69	51	0.72	47	-	-	-	-	0.77	51	1.23	47	-	-	-	-
22/11/0	A-1	0.72	50	0.69	48	-	-	-	-	0.77	48	1.23	50	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: A

Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		22/11/0				
Grid1 - Grid2		A-2		A-1				
Ld	Description	Hx	Vy	Hx	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)			
47	D + CG + WPL + WB3>	0.72	1.23	0.68	-0.65	-	-	-
48	D + CU + WPL + WB3>	0.71	1.11	0.69	-0.77	-	-	-
50	D + CG + WPL + <WB3	-0.68	-0.65	-0.72	1.23	-	-	-
51	D + CU + WPL + <WB3	-0.69	-0.77	-0.71	1.11	-	-	-

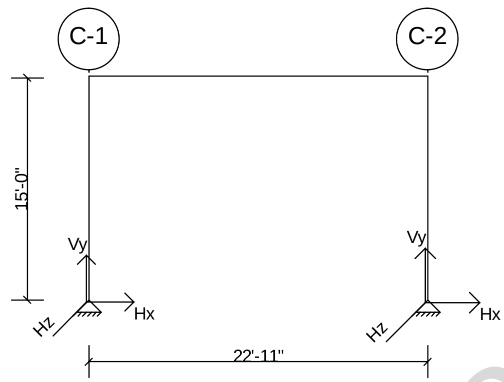
ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
47	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 WB3>	D + CG + WPL + WB3>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
50	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 <WB3	D + CG + WPL + <WB3
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3

Wall: 4

Frame ID:Portal Frame

Frame Type:Portal Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: C

Type			Exterior Column		Exterior Column			
X-Loc			0/0/0		22/11/0			
Grid1 - Grid2			C-1		C-2			
Base Plate W x L (in.)			8 X 11		8 X 11			
Base Plate Thickness (in.)			0.375		0.375			
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			
Column Base Elev.			100'-0"		100'-0"			
Load Type	Load Description	Desc.	Hx	Vy	Hx	Vy		
D	Material Dead Weight	Frm	0.02	0.29	-0.02	0.29	-	-
CG	Collateral Load for Gravity Cases	Frm	-	-	-	-	-	-
S>	Snow - Notional Right	Frm	-	-	-	-	-	-
<S	Snow - Notional Left	Frm	-	-	-	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-	-	-	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-	-	-	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-	-	-	-	-	-
<W2	Wind Load, Case 2, Left	Frm	-	-	-	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	-	-	-	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-	-	-	-	-	-
<W1	Wind Load, Case 1, Left	Frm	-	-	-	-	-	-
S	Snow Load	Frm	-	-	-	-	-	-
E>	Seismic Load, Right	Frm	-	-	-	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	-	-	-	-	-
<E	Seismic Load, Left	Frm	-	-	-	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-	-	-	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-1.06	-1.42	-1.06	1.42	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	1.09	1.46	1.09	-1.46	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-1.12	-1.50	-1.12	1.50	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	1.12	1.50	1.12	-1.50	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.88	-1.18	-0.88	1.18	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.88	1.18	0.88	-1.18	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-0.71	-0.96	-0.71	0.96	-	-

<EB	Seismic Brace Reaction, Left	Brc	0.73	0.99	0.73	-0.99	-	-
WB2>	Wind Brace Reaction, Case 2, Right	Brc	-1.10	-1.47	-1.10	1.47	-	-
<WB2	Wind Brace Reaction, Case 2, Left	Brc	1.13	1.52	1.13	-1.52	-	-
WB4>	Wind Brace Reaction, Case 4, Right	Brc	-1.12	-1.50	-1.12	1.50	-	-
<WB4	Wind Brace Reaction, Case 4, Left	Brc	1.12	1.50	1.12	-1.50	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	C-1	0.66	48	0.69	50	-	-	-	-	0.73	48	1.19	50	-	-	-	-
22/11/0	C-2	0.69	47	0.66	51	-	-	-	-	0.73	51	1.19	47	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: C
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		22/11/0				
Grid1 - Grid2		C-1		C-2				
Ld	Description	Hx	Vy	Hx	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)			
47	D + CG + WPL + WB3>	-0.65	-0.61	-0.69	1.19	-	-	-
48	D + CU + WPL + WB3>	-0.66	-0.73	-0.68	1.07	-	-	-
50	D + CG + WPL + <WB3	0.69	1.19	0.65	-0.61	-	-	-
51	D + CU + WPL + <WB3	0.68	1.07	0.66	-0.73	-	-	-

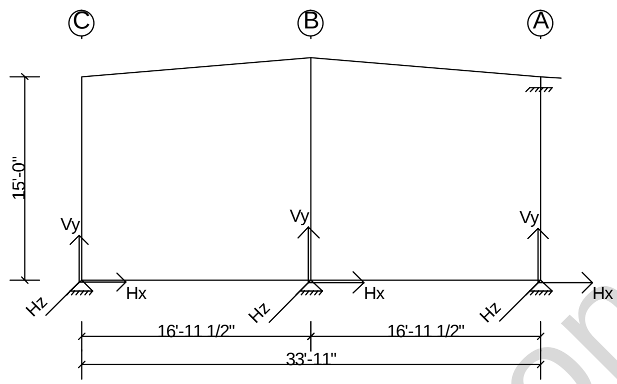
ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
47	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 WB3>	D + CG + WPL + WB3>
48	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 WB3>	D + CU + WPL + WB3>
50	System Derived	1.000	1.0 D + 1.0 CG + 0.6 WPL + 0.6 <WB3	D + CG + WPL + <WB3
51	System Derived	1.000	0.6 D + 0.6 CU + 0.6 WPL + 0.6 <WB3	D + CU + WPL + <WB3

Wall: 4, Frame at: 0/6/0

Frame ID:CB ends

Frame Type:Continuous Beam



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete

Reactions - Unfactored Load Type at Frame Cross Section: 1

Type			Exterior Column		Interior Column			Exterior Column		
X-Loc			0/0/0		16/11/8			33/11/0		
Grid1 - Grid2			1-C		1-B			1-A		
Base Plate W x L (in.)			8 X 13		8 X 11			8 X 13		
Base Plate Thickness (in.)			0.375		0.375			0.375		
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			4 - 0.750		
Column Base Elev.			100'-0"		100'-0"			100'-0"		
Load Type	Load Description	Desc.	Hx	Vy	Hx	Hz	Vy	Hx	Vy	
D	Material Dead Weight	Frm	0.07	1.33	-	-	1.83	-0.07	1.19	-
CG	Collateral Load for Gravity Cases	Frm	0.05	0.80	-	-	1.15	-0.05	0.67	-
S>	Snow - Notional Right	Frm	0.38	6.84	-	-	9.50	-0.38	5.49	-
<S	Snow - Notional Left	Frm	0.38	6.84	-	-	9.50	-0.38	5.49	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.25	1.81	-	-	7.80	-0.25	7.63	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.38	8.42	-	-	7.72	-0.38	1.39	-
W2>	Wind Load, Case 2, Right	Frm	-3.38	-2.31	-	-	-3.19	-2.42	2.82	-
<W2	Wind Load, Case 2, Left	Frm	0.22	0.93	-	-	-1.04	2.90	-2.45	-
WPL	Wind Load, || Ridge, Left	Frm	2.30	-4.00	-	-	-4.98	0.04	-6.42	-
WPR	Wind Load, || Ridge, Right	Frm	2.46	-5.69	-	-	-4.80	0.43	-5.28	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	0.65	0.61	-	-	0.26	2.36	-0.86	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-2.30	-0.70	-	-	-1.57	-2.17	2.16	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-0.75	-6.17	-	4.10	-6.54	-2.31	-2.12	-
<W1	Wind Load, Case 1, Left	Frm	2.85	-2.94	-	-3.82	-4.39	3.01	-7.39	-
S	Snow Load	Frm	0.38	6.84	-	-	9.50	-0.38	5.49	-
E>	Seismic Load, Right	Frm	-0.84	-0.69	-	0.09	-0.79	-1.55	1.43	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.15	-	-	0.21	-	0.14	-
<E	Seismic Load, Left	Frm	0.84	0.69	-	-0.09	0.79	1.55	-1.43	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.15	-	-	-0.21	-	-0.14	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-	-	-	-	-	-	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-	-	-	-	-	-	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-	-	-	-	-	-	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-	-	-	-	-	-	-	-

<EB	Seismic Brace Reaction, Left	Brc	-	-	-	-	-	-	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	1-C	1.92	5	1.75	14	-	-	-	-	2.91	13	10.54	4	-	-	-	-
16/11/8	1-B	-	-	-	-	2.29	14	2.46	13	2.83	13	12.48	1	-	-	-	-
33/11/0	1-A	1.56	5	1.76	14	-	-	-	-	3.72	14	9.48	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 1
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		16/11/8			33/11/0			
Grid1 - Grid2		1-C		1-B			1-A			
Ld	Description	Hx	Vy	Hx	Hz	Vy	Hx	Vy		
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)	(k)		
1	D + CG + S>	0.50	8.97	-	-	12.48	-0.50	7.35	-	-
3	D + CG + US1*	0.37	3.93	-	-	10.78	-0.37	9.48	-	-
4	D + CG + *US1	0.49	10.54	-	-	10.69	-0.49	3.25	-	-
5	D + CG + W2>	-1.92	0.74	-	-	1.07	-1.56	3.55	-	-
13	D + CU + W1>	-0.41	-2.91	-	2.46	-2.83	-1.42	-0.56	-	-
14	D + CU + <W1	1.75	-0.96	-	-2.29	-1.54	1.76	-3.72	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1

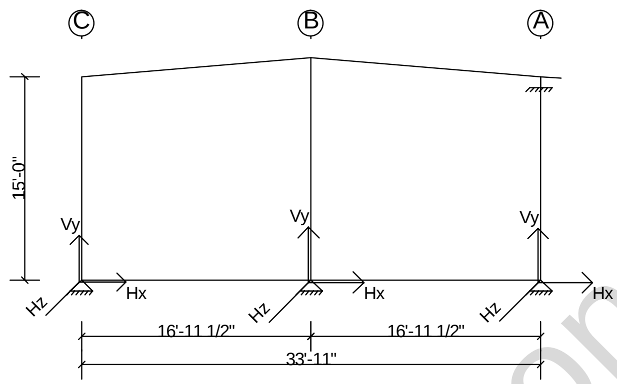
Bracing

X-Loc	Grid	Description
0/0/0	1-C	Portal Frame is next to column. See portal frame section for reactions
33/11/0	1-A	Portal Frame is next to column. See portal frame section for reactions

Wall: 4, Frame at: 23/5/0

Frame ID:CB ends

Frame Type:Continuous Beam



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 2

Type			Exterior Column		Interior Column			Exterior Column		
X-Loc			0/0/0		16/11/8			33/11/0		
Grid1 - Grid2			2-C		2-B			2-A		
Base Plate W x L (in.)			8 X 13		8 X 11			8 X 13		
Base Plate Thickness (in.)			0.375		0.375			0.375		
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			4 - 0.750		
Column Base Elev.			100'-0"		100'-0"			100'-0"		
Load Type	Load Description	Desc.	Hx	Vy	Hx	Hz	Vy	Hx	Vy	
D	Material Dead Weight	Frm	0.07	1.35	-	-	1.85	-0.07	1.19	-
CG	Collateral Load for Gravity Cases	Frm	0.05	0.82	-	-	1.17	-0.05	0.67	-
S>	Snow - Notional Right	Frm	0.38	6.84	-	-	9.50	-0.38	5.49	-
<S	Snow - Notional Left	Frm	0.38	6.84	-	-	9.50	-0.38	5.49	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.25	1.81	-	-	7.80	-0.25	7.66	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.38	8.42	-	-	7.72	-0.38	1.39	-
W2>	Wind Load, Case 2, Right	Frm	-3.38	-2.31	-	-	-3.19	-2.42	2.82	-
<W2	Wind Load, Case 2, Left	Frm	0.22	0.93	-	-	-1.04	2.90	-2.45	-
WPL	Wind Load, || Ridge, Left	Frm	2.30	-4.00	-	-	-4.98	0.04	-6.42	-
WPR	Wind Load, || Ridge, Right	Frm	2.46	-5.69	-	-	-4.80	0.43	-5.28	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	0.65	0.61	-	-	0.26	2.36	-0.86	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-2.32	-0.72	-	-	-1.61	-2.23	2.21	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-0.75	-6.17	-	4.10	-6.54	-2.31	-2.12	-
<W1	Wind Load, Case 1, Left	Frm	2.85	-2.94	-	-3.82	-4.39	3.01	-7.39	-
S	Snow Load	Frm	0.38	6.84	-	-	9.50	-0.38	5.49	-
E>	Seismic Load, Right	Frm	-0.85	-0.69	-	0.09	-0.79	-1.56	1.44	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.15	-	-	0.22	-	0.14	-
<E	Seismic Load, Left	Frm	0.85	0.69	-	-0.09	0.79	1.56	-1.44	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.15	-	-	-0.22	-	-0.14	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-	-	-	-	-	-	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-	-	-	-	-	-	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-	-	-	-	-	-	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-	-	-	-	-	-	-	-

<EB	Seismic Brace Reaction, Left	Brc	-	-	-	-	-	-	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	2-C	1.91	5	1.75	14	-	-	-	-	2.89	13	10.59	4	-	-	-	-
16/11/8	2-B	-	-	-	-	2.29	14	2.46	13	2.81	13	12.52	1	-	-	-	-
33/11/0	2-A	1.57	5	1.76	14	-	-	-	-	3.72	14	9.52	3	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 2
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0		16/11/8			33/11/0			
Grid1 - Grid2		2-C		2-B			2-A			
Ld	Description	Hx	Vy	Hx	Hz	Vy	Hx	Vy		
Cs	(application factor not shown)	(k)	(k)	(k)	(k)	(k)	(k)	(k)		
1	D + CG + S>	0.50	9.01	-	-	12.52	-0.50	7.34	-	-
3	D + CG + US1*	0.37	3.98	-	-	10.82	-0.37	9.52	-	-
4	D + CG + *US1	0.50	10.59	-	-	10.74	-0.50	3.25	-	-
5	D + CG + W2>	-1.91	0.78	-	-	1.11	-1.57	3.55	-	-
13	D + CU + W1>	-0.41	-2.89	-	2.46	-2.81	-1.43	-0.56	-	-
14	D + CU + <W1	1.75	-0.95	-	-2.29	-1.53	1.76	-3.72	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
1	System	1.000	1.0 D + 1.0 CG + 1.0 S>	D + CG + S>
3	System	1.000	1.0 D + 1.0 CG + 1.0 US1*	D + CG + US1*
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
5	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
13	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>
14	System	1.000	0.6 D + 0.6 CU + 0.6 <W1	D + CU + <W1

Bracing

X-Loc	Grid	Description
0/0/0	C-2	Portal Frame is next to column. See portal frame section for reactions
33/11/0	A-2	Portal Frame is next to column. See portal frame section for reactions

Shape: leanto

Loads and Codes - Shape: leanto

City: Yreka **County:** Siskiyou **State:** California **Country:** United States
Building Code: 2018 International Building Code
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 16AISC - ASD
Cold Form: 16AISI - ASD
Rainfall: I: 4.00 inches per hour
f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf
Roof Covering + Second. Dead Load: Varies
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: Vult: 115.00 (Vasd: 89.08) mph

The 'Envelope Procedure' is Used
Primaries Wind Exposure: C - Kz: 0.849
Parts Wind Exposure Factor: 0.849
Wind Enclosure: Partially Enclosed
Solidity Ratio: 20.0%
Frame Width Factor: Kb: 1.6942
Shielding Factor: Ks: 0.6690
Topographic Factor: Kzt: 1.0000
Ground Elevation Factor: Ke: 1.0000

NOT Windborne Debris Region
Base Elevation: 0/0/0
Site Elevation: 0.0 ft
Primary Zone Strip Width: 2a: 6/0/0
Parts / Portions Zone Strip Width: a: 8/5/10
Basic Wind Pressure: q: 24.43,(Parts) 24.43 psf

Snow Load
Ground Snow Load: pg: 58.00 psf

Flat Roof Snow: pf: 40.19 psf
Design Snow (Sloped): ps: 40.19 psf
Rain Surcharge: 0.00
Specified Minimum Roof Snow: 40.20 psf (USR)
Exposure Factor: 1 Fully Exposed - Ce: 0.90
Snow Importance: Is: 1.000
Thermal Factor: Kept just above freezing - Ct: 1.10
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 58.40 %g
Mapped MCE Acceleration: S1: 30.40 %g
Site Class: Stiff soil (D) - Default
Seismic Importance: Ie: 1.000
Design Acceleration Parameter: Sds: 0.5189
Design Acceleration Parameter: Sd1: 0.4045
Seismic Design Category: D
Seismic Snow Load: 8.04 psf
% Snow Used in Seismic: 20.00
Diaphragm Condition: Flexible
Fundamental Period Height Used: 14/6/11

Transverse Direction Parameters
Ordinary Steel Moment Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.2386
R-Factor: 3.50
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.1483 x W

Longitudinal Direction Parameters
Ordinary Steel Concentric Braced Frames
Redundancy Factor: Rho: 1.30
Fundamental Period: Ta: 0.1491
R-Factor: 3.25
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.25
Base Shear: V: 0.1597 x W

Overall Shape Description

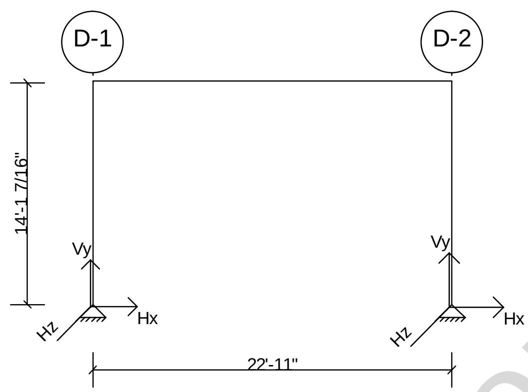
Roof 1	Roof 2	From Grid	To Grid	Width	Length	Eave Ht.	Eave Ht. 2	Pitch	Pitch 2	Dist. to Ridge	Peak Height
A		1-	1-C	10/7/0	23/11/0	15/0/0	14/1/7	-1.000:12			

<*> The building is designed with bracing diagonals in the designated bays. Column base reactions, base plates and anchor rods are affected by this bracing and diagonals may not be relocated without consulting the building supplier's engineer.

Wall: 4

Frame ID:Portal Frame

Frame Type:Portal Frame



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: D

Type			Exterior Column		Exterior Column			
X-Loc			0/0/0		22/11/0			
Grid1 - Grid2			D-1		D-2			
Base Plate W x L (in.)			8 X 11		8 X 11			
Base Plate Thickness (in.)			0.375		0.375			
Anchor Rod Qty/Diam. (in.)			4 - 0.750		4 - 0.750			
Column Base Elev.			100'-0"		100'-0"			
Load Type	Load Description	Desc.	Hx	Vy	Hx	Vy		
D	Material Dead Weight	Frm	0.02	0.27	-0.02	0.27	-	-
CG	Collateral Load for Gravity Cases	Frm	-	-	-	-	-	-
S>	Snow - Notional Right	Frm	-	-	-	-	-	-
<S	Snow - Notional Left	Frm	-	-	-	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	-	-	-	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	-	-	-	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-	-	-	-	-	-
<W2	Wind Load, Case 2, Left	Frm	-	-	-	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	-	-	-	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-	-	-	-	-	-
<W1	Wind Load, Case 1, Left	Frm	-	-	-	-	-	-
S	Snow Load	Frm	-	-	-	-	-	-
E>	Seismic Load, Right	Frm	-	-	-	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	-	-	-	-	-
<E	Seismic Load, Left	Frm	-	-	-	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-	-	-	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-1.14	-1.44	-1.14	1.44	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	1.16	1.46	1.16	-1.46	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-1.17	-1.47	-1.17	1.47	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	1.17	1.47	1.17	-1.47	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-0.92	-1.16	-0.92	1.16	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	0.92	1.16	0.92	-1.16	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-0.79	-1.00	-0.79	1.00	-	-

<EB	Seismic Brace Reaction, Left	Brc	0.80	1.00	0.80	-1.00	-	-
WB2>	Wind Brace Reaction, Case 2, Right	Brc	-1.17	-1.47	-1.17	1.47	-	-
<WB2	Wind Brace Reaction, Case 2, Left	Brc	1.18	1.49	1.18	-1.49	-	-
WB4>	Wind Brace Reaction, Case 4, Right	Brc	-1.17	-1.47	-1.17	1.47	-	-
<WB4	Wind Brace Reaction, Case 4, Left	Brc	1.17	1.47	1.17	-1.47	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing

Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	D-1	0.71	61	0.75	75	-	-	-	-	0.74	61	1.19	75	-	-	-	-
22/11/0	D-2	0.74	57	0.72	79	-	-	-	-	0.75	79	1.18	57	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: D

Note: All reactions are based on 1st order structural analysis.

	X-Loc	0/0/0		22/11/0				
	Grid1 - Grid2	D-1		D-2				
Ld	Description	Hx	Vy	Hx	Vy			
Cs	(application factor not shown)	(k)	(k)	(k)	(k)			
57	D + CG + E> + EG+ + EB>	-0.70	-0.63	-0.74	1.18	-	-	-
61	D + CU + E> + EG- + EB>	-0.71	-0.74	-0.73	1.07	-	-	-
75	D + CG + E> + EG+ + <EB	0.75	1.19	0.71	-0.64	-	-	-
79	D + CU + E> + EG- + <EB	0.74	1.08	0.72	-0.75	-	-	-

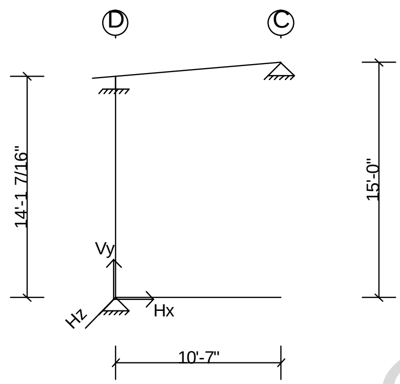
ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
57	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 EB>	D + CG + E> + EG+ + EB>
61	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 EB>	D + CU + E> + EG- + EB>
75	System Derived	1.000	1.0 D + 1.0 CG + 0.273 E> + 0.7 EG+ + 0.91 <EB	D + CG + E> + EG+ + <EB
79	System Derived	1.000	0.6 D + 0.6 CU + 0.273 E> + 0.7 EG- + 0.91 <EB	D + CU + E> + EG- + <EB

Wall: 4, Frame at: 0/6/0

Frame ID:Leanto

Frame Type:Lean - To



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 1

Type			Exterior Column				
X-Loc			0/0/0				
Grid1 - Grid2			1-D				
Base Plate W x L (in.)			8 X 11				
Base Plate Thickness (in.)			0.375				
Anchor Rod Qty/Diam. (in.)			4 - 0.750				
Column Base Elev.			100'-0"				
Load Type	Load Description	Desc.	Hx	Vy			
D	Material Dead Weight	Frm	0.03	0.97	-	-	-
CG	Collateral Load for Gravity Cases	Frm	0.02	0.54	-	-	-
S>	Snow - Notional Right	Frm	0.14	4.43	-	-	-
<S	Snow - Notional Left	Frm	0.14	4.43	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.04	1.33	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.14	4.44	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-2.05	-1.49	-	-	-
<W2	Wind Load, Case 2, Left	Frm	-0.36	-0.14	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	1.85	-2.47	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	1.81	-3.56	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-1.24	0.11	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-0.03	-3.64	-	-	-
<W1	Wind Load, Case 1, Left	Frm	1.65	-2.28	-	-	-
S	Snow Load	Frm	0.14	4.43	-	-	-
E>	Seismic Load, Right	Frm	-	-	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.12	-	-	-
<E	Seismic Load, Left	Frm	-	-	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.12	-	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-	-	-	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-	-	-	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-	-	-	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-	-	-	-	-

<EB	Seismic Brace Reaction, Left	Brc	-	-	-	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	1-D	1.18	7	1.16	9	-	-	-	-	1.60	15	5.94	4	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 1
Note: All reactions are based on 1st order structural analysis.

	X-Loc	0/0/0					
	Grid1 - Grid2	1-D					
Ld	Description	Hx	Vy				
Cs	(application factor not shown)	(k)	(k)				
4	D + CG + *US1	0.19	5.94	-	-	-	-
7	D + CG + W2>	-1.18	0.61	-	-	-	-
9	D + CG + WPL	1.16	0.03	-	-	-	-
15	D + CU + W1>	-0.00	-1.60	-	-	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
7	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
9	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
15	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>

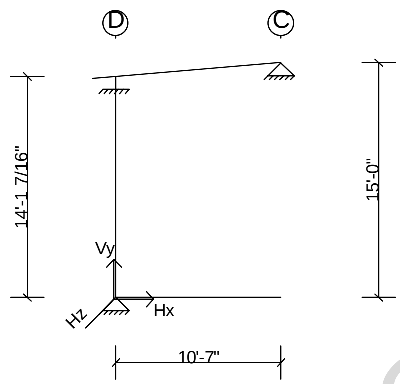
Bracing

X-Loc	Grid	Description
0/0/0	1-D	Portal Frame is next to column. See portal frame section for reactions

Wall: 4, Frame at: 23/5/0

Frame ID:Leanto

Frame Type:Lean - To



Values shown are resisting forces of the foundation.
Base Connection Design is Based on 3000.00 (psi) Concrete
Reactions - Unfactored Load Type at Frame Cross Section: 2

Load Type	Load Description	Desc.	Hx	Vy			
	Type		Exterior Column				
	X-Loc		0/0/0				
	Grid1 - Grid2		2-D				
	Base Plate W x L (in.)		8 X 11				
	Base Plate Thickness (in.)		0.375				
	Anchor Rod Qty/Diam. (in.)		4 - 0.750				
	Column Base Elev.		100'-0"				
D	Material Dead Weight	Frm	0.03	0.95	-	-	-
CG	Collateral Load for Gravity Cases	Frm	0.02	0.52	-	-	-
S>	Snow - Notional Right	Frm	0.14	4.43	-	-	-
<S	Snow - Notional Left	Frm	0.14	4.43	-	-	-
US1*	Unbalanced Snow Load 1, Shifted Right	Frm	0.04	1.33	-	-	-
*US1	Unbalanced Snow Load 1, Shifted Left	Frm	0.14	4.44	-	-	-
W2>	Wind Load, Case 2, Right	Frm	-2.05	-1.49	-	-	-
<W2	Wind Load, Case 2, Left	Frm	-0.36	-0.14	-	-	-
WPL	Wind Load, || Ridge, Left	Frm	1.85	-2.47	-	-	-
WPR	Wind Load, || Ridge, Right	Frm	1.81	-3.56	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-	-	-	-	-
MW	Minimum Wind Load	Frm	-1.24	0.12	-	-	-
CU	Collateral Load for Wind Cases	Frm	-	-	-	-	-
W1>	Wind Load, Case 1, Right	Frm	-0.03	-3.64	-	-	-
<W1	Wind Load, Case 1, Left	Frm	1.65	-2.28	-	-	-
S	Snow Load	Frm	0.14	4.43	-	-	-
E>	Seismic Load, Right	Frm	-	-	-	-	-
EG+	Vertical Seismic Effect, Additive	Frm	-	0.12	-	-	-
<E	Seismic Load, Left	Frm	-	-	-	-	-
EG-	Vertical Seismic Effect, Subtractive	Frm	-	-0.12	-	-	-
WB1>	Wind Brace Reaction, Case 1, Right	Brc	-	-	-	-	-
<WB1	Wind Brace Reaction, Case 1, Left	Brc	-	-	-	-	-
WB3>	Wind Brace Reaction, Case 3, Right	Brc	-	-	-	-	-
<WB3	Wind Brace Reaction, Case 3, Left	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
MWB	Minimum Wind Bracing Reaction	Brc	-	-	-	-	-
EB>	Seismic Brace Reaction, Right	Brc	-	-	-	-	-

<EB	Seismic Brace Reaction, Left	Brc	-	-	-	-	-

Maximum Combined Reactions Summary with Factored Loads - Framing
Note: All reactions are based on 1st order structural analysis.
Appropriate Load Factors must be applied for design of foundations.

X-Loc	Grid	Hrz left (-Hx) (k)	Load Case	Hrz Right (Hx) (k)	Load Case	Hrz In (-Hz) (k)	Load Case	Hrz Out (Hz) (k)	Load Case	Uplift (-Vy) (k)	Load Case	Vrt Down (Vy) (k)	Load Case	Mom cw (-Mzz) (in-k)	Load Case	Mom ccw (Mzz) (in-k)	Load Case
0/0/0	2-D	1.18	7	1.16	9	-	-	-	-	1.61	15	5.91	4	-	-	-	-

Maximum Frame Reactions - Factored Load Cases at Frame Cross Section: 2
Note: All reactions are based on 1st order structural analysis.

X-Loc		0/0/0					
Grid1 - Grid2		2-D					
Ld	Description	Hx	Vy				
Cs	(application factor not shown)	(k)	(k)				
4	D + CG + *US1	0.19	5.91	-	-	-	-
7	D + CG + W2>	-1.18	0.58	-	-	-	-
9	D + CG + WPL	1.16	-0.01	-	-	-	-
15	D + CU + W1>	-0.00	-1.61	-	-	-	-

ASD Load Combinations - Framing

No.	Origin	Factor	Application	Description
4	System	1.000	1.0 D + 1.0 CG + 1.0 *US1	D + CG + *US1
7	System	1.000	1.0 D + 1.0 CG + 0.6 W2>	D + CG + W2>
9	System	1.000	1.0 D + 1.0 CG + 0.6 WPL	D + CG + WPL
15	System	1.000	0.6 D + 0.6 CU + 0.6 W1>	D + CU + W1>

Bracing

X-Loc	Grid	Description
0/0/0	2-D	Portal Frame is next to column. See portal frame section for reactions

Appendix D
Mechanical Design Calculations

Calculation Cover Sheet

McMILLEN JACOBS ASSOCIATES

Project:	Fall Creek Hatchery		
Client:	Klamath River Renewal Corporation	**Proj. No.**	20-024
Title:	Mechanical Calculations - IFC		
Prepared By, Name:	Sean Ellenson, P.E.		
Prepared By, Signature:		**Date:**	10/19/2020
Peer Reviewed By, Name:	Kyle DeSomber, P.E.		
Peer Reviewed, Signature:		**Date:**	10/19/2020

SUBJECT: Klamath River Renewal Corporation
Fall Creek Hatchery
Mechanical Calculations - IFC

BY: S. Ellenson **CHK'D BY:** K.DeSomber
DATE: 10/19/2020
PROJECT NO.: 20-024

Table of Content

Mechanical Calculations **Page**

SUBJECT:	Klamath River Renewal Corporation	**BY:** S. Ellenson	**CHK'D BY:** K. DeSomber
	Fall Creek Hatchery	**DATE:** 10/19/2020	
	Coho Building Drainage Piping Design	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to size the drainage piping within the Coho Building.

References

- *Lindeburg, Michael R. 2014. Civil Engineering Reference Manual, Fourteenth Edition. Professional Publications, Inc. Belmont, CA.*

Method

Raceway, working vessels, and building drains discharge raw water to the adult holding ponds after interconnecting with the primary drain piping outdoors. Open channel flow calculations followed the equations below (Lindeburg, 2014), and were calculated iteratively using a Newton-Raphson iterating scheme:

$$\theta_{deg} = 2\cos^{-1}\left(\frac{\frac{D}{2} - d}{\frac{D}{2}}\right)$$

$$A = \left(\frac{D}{2}\right)^2 \frac{\theta_{rad} - \sin\theta_{deg}}{2}$$

$$P = \frac{D\theta_{rad}}{2}$$

$$R_h = \frac{A}{P}$$

$$V = \left(\frac{1.486}{n}\right) R_h^{2/3} S^{1/2}$$

$$Q = AV$$

$$\frac{n}{n_{full}} = 1 + \left(\frac{d}{D}\right)^{0.54} - \left(\frac{d}{D}\right)^{1.2}$$

where:

$\theta =$ Internal angle of water surface
$D =$ Pipe inner diameter, ft
$d =$ Flow depth, ft
$A =$ Flow area, ft^2
$P =$ Wetted perimeter, ft
$R_h =$ Hydraulic radius, ft
$V =$ Average flow velocity, ft/s
$n =$ Manning's roughness coefficient
$S =$ Pipe bed slope, ft/ft
$Q =$ Discharge, cfs
$n_{full} =$ Pipe-full roughness coefficient

The following assumptions are made in these calculations:

(1) In order to allow for sufficient airflow, and to prevent periodic pressurization of the pipe where unintended, the pipe size is designed to convey the flow in an open-channel condition with the depth less than 70% of the inner diameter of the pipe.

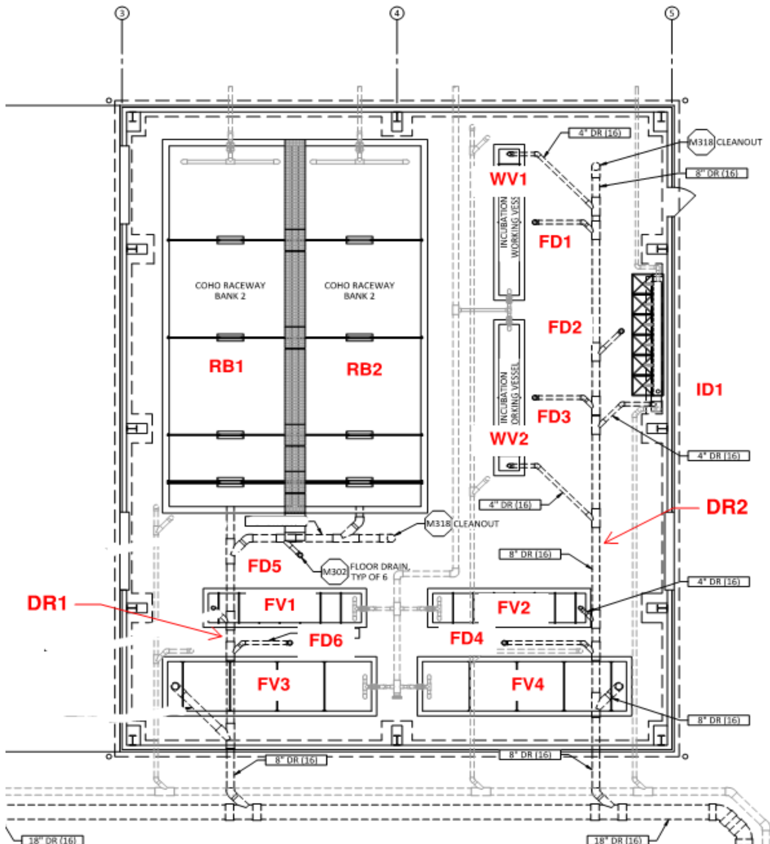
(2) The pipe is assumed to be plastic or some other smooth interior pipe, and non-profile wall pipe. Accordingly, a conservative roughness coefficient of 0.015 was applied (note: C900 pipe manufacturers report roughness values of 0.009). If the pipe varies from this assumption, these hydraulics will need to be reconsidered.

(3) Based on standard sewer design, the pipe is considered self-cleaning if the velocity is greater than 2.0 ft/s. Above 1.5 ft/s is acceptable if occasional flushing flows are expected. The pipes were designed to meet this criterion.

Inputs

General Parameters

Gravitational constant, g	32.2	ft/s^2	
Kinematic Viscosity, ν	1.41E-05	ft^2/s	[@ 50 F]



Location I.D.	Description	Discharge, Q gpm	Comments
WV1	Working Vessel #1	15	
WV2	Working Vessel #2	15	
FV1	Feeding Vessel #1	37.5	
FV2	Feeding Vessel #2	37.5	
FV3	Feeding Vessel #3	37.5	
FV4	Feeding Vessel #4	37.5	
ID1	Incubation Stack Drain	40	6 Stacks @ 5 gpm + 10 gpm standpipe waste
FD1	Floor Drain #1	10	Estimated
FD2	Floor Drain #2	10	Estimated
FD3	Floor Drain #3	10	Estimated
FD4	Floor Drain #4	10	Estimated
FD5	Floor Drain #5	10	Estimated
FD6	Floor Drain #6	10	Estimated
RB1	Coho Raceway Bank #1	181	
RB2	Coho Raceway Bank #2	181	
DR1	Drainage Header #1	457	RB1+RB2+FV1+FV3+FD5+FD6
DR2	Drainage Header #2	185	WV1+WV2+FV2+FV4+ID1+FD1+FD2+FD3+FD4

Calculations

Gravity Pipeline

Location I.D.	Description	Discharge, Q gpm	Pipe Nom. Diameter in	Pipe Inner Diameter ft	Slope ft/ft	Roughness Coeff, *n*	Flow Depth, d ft	<70% Full?
WV1	Working Vessel #1	15	4	0.316	0.015	0.015	0.11	34%
WV2	Working Vessel #2	15	4	0.316	0.015	0.015	0.11	34%
FV1	Feeding Vessel #1	37.5	4	0.316	0.015	0.015	0.17	55%
FV2	Feeding Vessel #2	37.5	4	0.316	0.015	0.015	0.17	55%
FV3	Feeding Vessel #3	37.5	4	0.316	0.015	0.015	0.17	55%
FV4	Feeding Vessel #4	37.5	4	0.316	0.015	0.015	0.17	55%
ID1	Incubation Stack Drain	40	4	0.316	0.015	0.015	0.18	57%
FD1	Floor Drain #1	10	4	0.316	0.015	0.015	0.09	27%
FD2	Floor Drain #2	10	4	0.316	0.015	0.015	0.09	27%
FD3	Floor Drain #3	10	4	0.316	0.015	0.015	0.09	27%
FD4	Floor Drain #4	10	4	0.316	0.015	0.015	0.09	27%
FD5	Floor Drain #5	10	4	0.316	0.015	0.015	0.09	27%
FD6	Floor Drain #6	10	4	0.316	0.015	0.015	0.09	27%
RB1	Coho Raceway Bank #1	181	12	0.941	0.005	0.015	0.34	36%
RB2	Coho Raceway Bank #2	181	12	0.941	0.005	0.015	0.34	36%
DR1	Drainage Header #1	457	12	0.941	0.005	0.015	0.56	60%
DR2	Drainage Header #2	185	8	0.630	0.015	0.015	0.30	48%

Location I.D.	Description	Internal Angle, θ deg	Flow Area, A ft^2	Flow Velocity, V ft/s	Self-Cleaning?
WV1	Working Vessel #1	142	0.02	1.44	N/A
WV2	Working Vessel #2	142	0.02	1.44	N/A
FV1	Feeding Vessel #1	192	0.04	1.88	N/A
FV2	Feeding Vessel #2	192	0.04	1.88	N/A
FV3	Feeding Vessel #3	192	0.04	1.88	N/A
FV4	Feeding Vessel #4	192	0.04	1.88	N/A
ID1	Incubation Stack Drain	197	0.05	1.92	N/A
FD1	Floor Drain #1	126	0.02	1.28	N/A
FD2	Floor Drain #2	126	0.02	1.28	N/A
FD3	Floor Drain #3	126	0.02	1.28	N/A
FD4	Floor Drain #4	126	0.02	1.28	N/A
FD5	Floor Drain #5	126	0.02	1.28	N/A
FD6	Floor Drain #6	126	0.02	1.28	N/A
RB1	Coho Raceway Bank #1	148	0.23	1.78	N/A
RB2	Coho Raceway Bank #2	148	0.23	1.78	N/A
DR1	Drainage Header #1	203	0.43	2.35	OK
DR2	Drainage Header #2	176	0.15	2.77	OK

Conclusions

The above calculations provide a set of flow, slope, and pipe size conditions that will maintain gravity flow in the drain pipes within the Coho Building.

McMILLEN JACOBS ASSOCIATES

SUBJECT:	Klamath River Renewal Corporation	**BY:** S. Ellenson	**CHK'D BY:** K. DeSomber
	Fall Creek Hatchery	**DATE:** 10/19/2020	
	Coho Building Waste Drainage Piping Design	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to size the waste drainage piping within the Coho Building.

References

- *Lindeburg, Michael R. 2014. Civil Engineering Reference Manual, Fourteenth Edition. Professional Publications, Inc. Belmont, CA.*

Method

Waste Drain Cleaning Stations discharge water to the settling ponds after interconnecting with the primary drain piping outdoors. Open channel flow calculations followed the equations below (Lindeburg, 2014), and were calculated iteratively using a Newton-Raphson iterating scheme:

$$\theta_{deg} = 2\cos^{-1}\left(\frac{\frac{D}{2} - d}{\frac{D}{2}}\right)$$

$$A = \left(\frac{D}{2}\right)^2 \frac{\theta_{rad} - \sin\theta_{deg}}{2}$$

$$P = \frac{D\theta_{rad}}{2}$$

$$R_h = \frac{A}{P}$$

$$V = \left(\frac{1.486}{n}\right) R_h^{2/3} S^{1/2}$$

$$Q = AV$$

$$\frac{n}{n_{full}} = 1 + \left(\frac{d}{D}\right)^{0.54} - \left(\frac{d}{D}\right)^{1.2}$$

where:

$\theta =$ Internal angle of water surface
$D =$ Pipe inner diameter, ft
$d =$ Flow depth, ft
$A =$ Flow area, ft^2
$P =$ Wetted perimeter, ft
$R_h =$ Hydraulic radius, ft
$V =$ Average flow velocity, ft/s
$n =$ Manning's roughness coefficient
$S =$ Pipe bed slope, ft/ft
$Q =$ Discharge, cfs
$n_{full} =$ Pipe-full roughness coefficient

The following assumptions are made in these calculations:

(1) In order to allow for sufficient airflow, and to prevent periodic pressurization of the pipe where unintended, the pipe size is designed to convey the flow in an open-channel condition with the depth less than 70% of the inner diameter of the pipe.

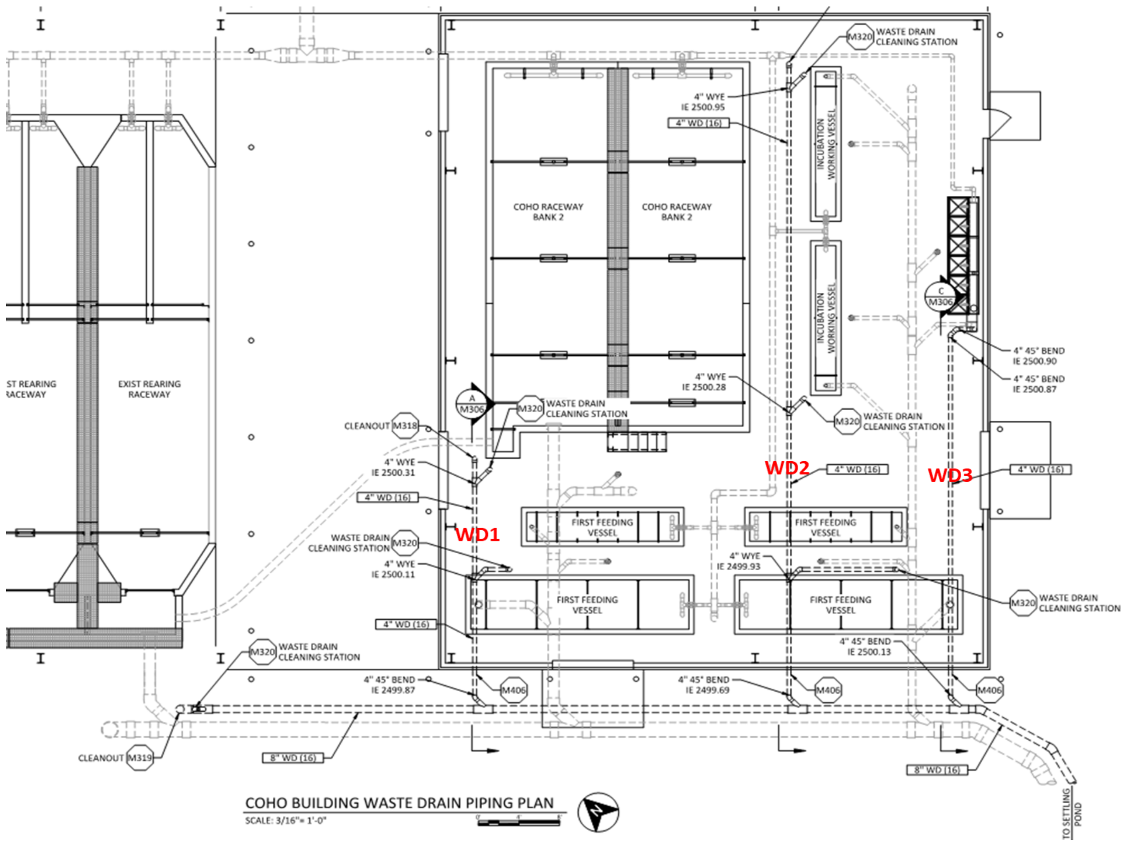
(2) The pipe is assumed to be plastic or some other smooth interior pipe, and non-profile wall pipe. Accordingly, a conservative roughness coefficient of 0.015 was applied (note: C900 pipe manufacturers report roughness values of 0.009). If the pipe varies from this assumption, these hydraulics will need to be reconsidered.

(3) Based on standard sewer design, the pipe is considered self-cleaning if the velocity is greater than 2.0 ft/s. Above 1.5 ft/s is acceptable if occasional flushing flows are expected. The pipes were designed to meet this criterion.

Inputs

General Parameters

Gravitational constant, g	32.2	ft/s^2	
Kinematic Viscosity, ν	1.41E-05	ft^2/s	[@ 50 F]



Location I.D.	Description	Discharge, Q gpm	Comments
WD1	Waste Drain #1	50	Capacity of one Vacuum Pump
WD2	Waste Drain #2	50	Capacity of one Vacuum Pump
WD3	Waste Drain #3	40	Capacity of Incubation Stacks

Calculations

Gravity Pipeline

Location I.D.	Description	Discharge, Q gpm	Pipe Nom. Diameter in	Pipe Inner Diameter ft	Slope ft/ft	Roughness Coeff, *n*	Flow Depth, d ft	<70% Full?
WD1	Waste Drain #1	50	4	0.316	0.020	0.015	0.19	60%
WD2	Waste Drain #2	50	4	0.316	0.020	0.015	0.19	60%
WD3	Waste Drain #3	40	4	0.316	0.020	0.015	0.17	53%

Location I.D.	Description	Internal Angle, θ deg	Flow Area, A ft^2	Flow Velocity, V ft/s	Self-Cleaning?
WD1	Waste Drain #1	203	0.05	2.27	OK
WD2	Waste Drain #2	203	0.05	2.27	OK
WD3	Waste Drain #3	187	0.04	2.12	OK

Conclusions

The above calculations provide a set of flow, slope, and pipe size conditions that will maintain gravity flow in the waste drain pipes within the Coho Building.

McMILLEN JACOBS ASSOCIATES

SUBJECT:	Klamath River Renewal Corporation	**BY:** S. Ellenson	**CHK'D BY:** K. DeSomber
	Fall Creek Hatchery	**DATE:**	10/19/2020
	Chinook Building Drainage Trench Design	**PROJECT NO.:**	20-024

Purpose

The purpose of this calculation sheet is to size the drainage piping within the Chinook Building.

References

- *Lindeburg, Michael R. 2014. Civil Engineering Reference Manual, Fourteenth Edition. Professional Publications, Inc. Belmont, CA*

Method

Working Vessels and Incubation Stacks discharge raw water to the adult holding ponds after interconnecting with the primary drain piping outdoors. Open channel flow calculations followed the equations below (Lindeburg, 2014), and were calculated iteratively using a Newton-Raphson iterating scheme:

$$P = B + 2d$$

$$A = B * d$$

$$R_h = \frac{A}{P}$$

$$\frac{n}{n_{full}} = 1 + \left(\frac{d}{D}\right)^{0.54} - \left(\frac{d}{D}\right)^{1.2}$$

$$V = \left(\frac{1.486}{n}\right) R_h^{2/3} S^{1/2}$$

$$Q = AV$$

where:

$\theta =$	Trench Width
$h =$	Trench Depth
$d =$	Flow depth, ft
$A =$	Flow area, ft^2
$P =$	Wetted perimeter, ft
$R_h =$	Hydraulic radius, ft
$V =$	Average flow velocity, ft/s
$n =$	Manning's roughness coefficient
$S =$	Trench slope, ft/ft
$Q =$	Discharge, cfs
$n_{full} =$	Trench roughness coefficient

Assumptions

The following assumptions are made in these calculations:

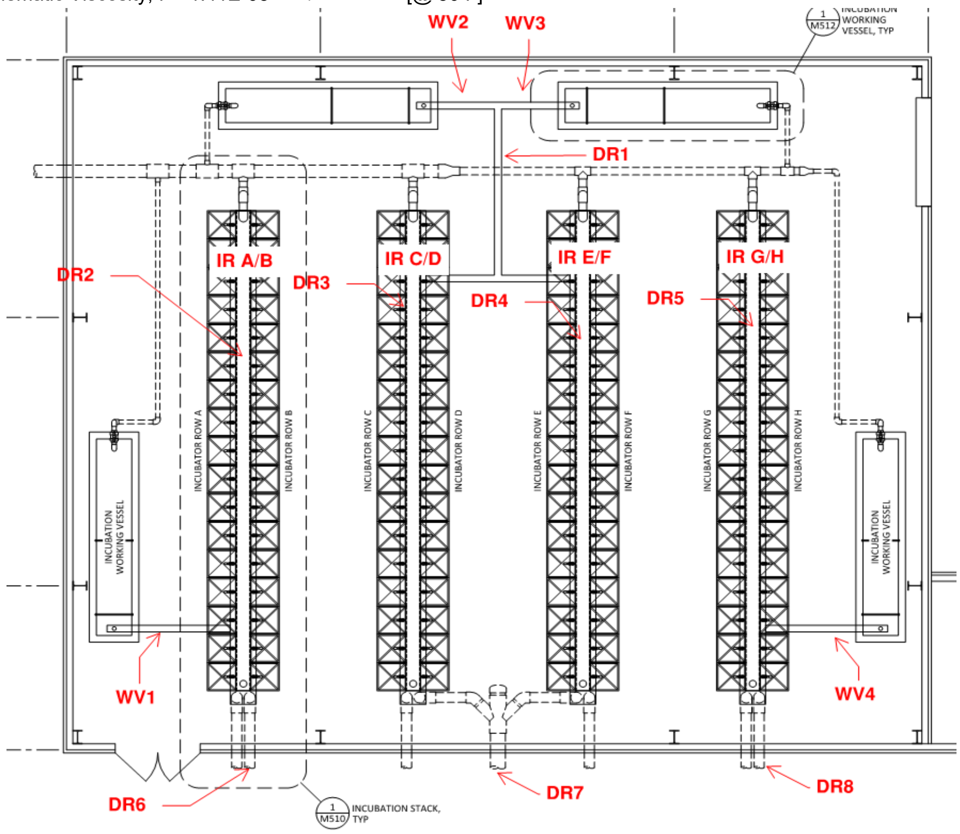
(1) The trench is intended to be formed within the concrete floor slab. Accordingly, a conservative roughness coefficient of 0.015 was applied.

(2) Based on standard sewer design, the trench is considered self-cleaning if the velocity is greater than 2.0 ft/s. Above 1.5 ft/s is acceptable if occasional flushing flows are expected. The pipes were designed to meet this criterion.

Inputs

General Parameters

Gravitational constant, g	32.2	ft/s^2	
Kinematic Viscosity, ν	1.41E-05	ft^2/s	[@ 50 F]



Location I.D.	Description	Discharge, Q gpm	Comments
WV1	Working Vessel #1	15	
WV2	Working Vessel #2	15	
WV3	Working Vessel #3	15	
WV4	Working Vessel #4	15	
IR A/B	Incubation Stack Row A/B	204	34 Stacks @ 5 gpm + 1 gpm waste per stack (34 gpm
IR C/D	Incubation Stack Row C/D	204	34 Stacks @ 5 gpm + 1 gpm waste per stack (34 gpm
IR E/F	Incubation Stack Row E/F	204	34 Stacks @ 5 gpm + 1 gpm waste per stack (34 gpm
IR G/H	Incubation Stack Row G/H	204	34 Stacks @ 5 gpm + 1 gpm waste per stack (34 gpm
DR1	Trench Drain #1	30	WV2+WV3
DR2	Trench Drain #2	219	IR A/B+WV1
DR3	Trench Drain #3	219	IR C/D+WV2
DR4	Trench Drain #4	219	IR E/F + WV3
DR5	Trench Drain #5	219	IR G/H+WV4
DR6	Pipe Drain #1	219	DR2
DR7	Pipe Drain #2	438	DR3+DR4
DR8	Pipe Drain #3	219	DR4

Calculations

Gravity Trenches

Location I.D.	Description	Discharge, Q gpm	Trench Width in	Slope ft/ft	Roughness Coeff, *n*	Flow Depth, d in
WV1	Working Vessel #1	15	6.75	0.008	0.015	0.65
WV2	Working Vessel #2	15	6.75	0.008	0.015	0.65
WV3	Working Vessel #3	15	6.75	0.008	0.015	0.65
WV4	Working Vessel #4	15	6.75	0.008	0.015	0.65
IR A/B	Incubation Stack Row A/B	204	22	0.015	0.015	1.21
IR C/D	Incubation Stack Row C/D	204	22	0.015	0.015	1.21
IR E/F	Incubation Stack Row E/F	204	22	0.015	0.015	1.21
IR G/H	Incubation Stack Row G/H	204	22	0.015	0.015	1.21
DR1	Trench Drain #1	30	6.75	0.008	0.015	1.02
DR2	Trench Drain #2	219	22	0.015	0.015	1.27
DR3	Trench Drain #3	219	22	0.015	0.015	1.27
DR4	Trench Drain #4	219	22	0.015	0.015	1.27
DR5	Trench Drain #5	219	22	0.015	0.015	1.27

Gravity Piping

Location I.D.	Description	Discharge, Q gpm	Pipe Nom. Diameter in	Pipe Inner Diameter ft	Slope ft/ft	Roughness Coeff, *n*	Flow Depth, d ft	<70% Full?
DR6	Pipe Drain #1	219	8	0.63	0.015	0.015	0.33	53%
DR7	Pipe Drain #2	438	12	0.94	0.015	0.015	0.41	43%
DR8	Pipe Drain #3	219	8	0.63	0.015	0.015	0.33	53%

Conclusions

The above calculations provide a set of flow, slope, trench size, and pipe size conditions that will maintain gravity flow in the waste drain pipes within the Chinook Building.

McMILLEN JACOBS ASSOCIATES

SUBJECT:	Klamath River Renewal Corporation	**BY:** S. Ellenson	**CHK'D BY:** K. DeSomber
	Fall Creek Hatchery	**DATE:** 10/19/2020	
	Chinook Building Waste Drain Design	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to size the drainage piping within the Chinook Building.

References

- *Lindeburg, Michael R. 2014. Civil Engineering Reference Manual, Fourteenth Edition. Professional Publications, Inc. Belmont, CA.*

Method

Working Vessels and Incubation Stacks discharge raw water to the adult holding ponds after interconnecting with the primary drain piping outdoors. Open channel flow calculations followed the equations below (Lindeburg, 2014), and were calculated iteratively using a Newton-Raphson iterating scheme:

$$P = B + 2d$$

$$A = B * d$$

$$R_h = \frac{A}{P}$$

$$\frac{n}{n_{full}} = 1 + \left(\frac{d}{D}\right)^{0.54} - \left(\frac{d}{D}\right)^{1.2}$$

$$V = \left(\frac{1.486}{n}\right) R_h^{2/3} S^{1/2}$$

$$Q = AV$$

where:

$\theta =$	Trench Width
$h =$	Trench Depth
$d =$	Flow depth, ft
$A =$	Flow area, ft^2
$P =$	Wetted perimeter, ft
$R_h =$	Hydraulic radius, ft
$V =$	Average flow velocity, ft/s
$n =$	Manning's roughness coefficient
$S =$	Trench slope, ft/ft
$Q =$	Discharge, cfs
$n_{full} =$	Trench roughness coefficient

Assumptions

The following assumptions are made in these calculations:

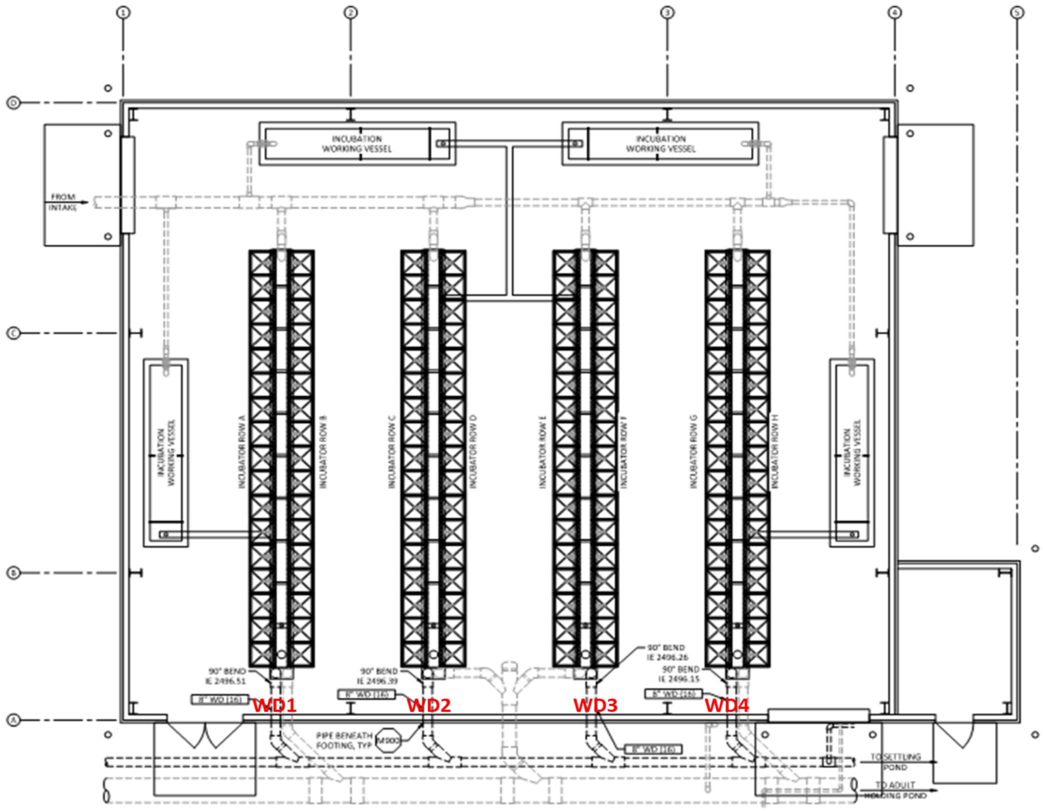
(1) The trench is intended to be formed within the concrete floor slab. Accordingly, a conservative roughness coefficient of 0.015 was applied.

(2) Based on standard sewer design, the trench is considered self-cleaning if the velocity is greater than 2.0 ft/s. Above 1.5 ft/s is acceptable if occasional flushing flows are expected. The pipes were designed to meet this criterion.

Inputs

General Parameters

Gravitational constant, g	32.2	ft/s^2	
Kinematic Viscosity, ν	1.41E-05	ft^2/s	[@ 50 F]



Location I.D.	Description	Discharge, Q gpm	Comments
WD1	Waste Drain #1	200	
WD2	Waste Drain #2	200	
WD3	Waste Drain #3	200	
WD4	Waste Drain #4	200	

Calculations

Gravity Piping

Location I.D.	Description	Discharge, Q gpm	Pipe Nom. Diameter in	Pipe Inner Diameter ft	Slope ft/ft	Roughness Coeff, *n*	Flow Depth, d ft	<70% Full?
WD1	Waste Drain #1	200	8	0.63	0.015	0.015	0.32	50%
WD2	Waste Drain #2	200	8	0.63	0.015	0.015	0.32	50%
WD3	Waste Drain #3	200	8	0.63	0.015	0.015	0.32	50%
WD4	Waste Drain #4	200	8	0.63	0.015	0.015	0.32	50%

Location I.D.	Description	Internal Angle, θ deg	Flow Area, A ft^2	Flow Velocity, V ft/s	Self-Cleaning?
WD1	Waste Drain #1	181	0.16	2.84	OK
WD2	Waste Drain #2	181	0.16	2.84	OK
WD3	Waste Drain #3	181	0.16	2.84	OK
WD4	Waste Drain #4	181	0.16	2.84	OK

Conclusions

The above calculations provide a set of flow, slope, trench size, and pipe size conditions that will maintain gravity flow in the drain pipes within the Chinook Building.

SUBJECT: Klamath River Renewal Corporation
Fall Creek Hatchery
Coho Building HVAC Design

BY: C. Gregory CHK'D BY: K. Desomber
DATE: 8/14/2020
PROJECT NO.: 20-024

Purpose

The purpose of this calculation sheet is to determine the required heating load for the Coho building.
Cooling will be provided via mechanical ventilation via 6 air changes per hour

References

ASHRAE, 1997. ASHRAE Handbook - Fundamentals. 1791 Tullie Circle, N.E., Alanta GA 30329

Method

Heat loss and Gain through Conducton

$$q = UA\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

U= $Thermal\ Trasmitance, Btu/(h * ft^2 * °F)$

A = Area, ft^2

$\Delta t_d = Temperature\ difference, °F$

Air Infiltration Heat Loss and Gain

$$q_{infiltration} = V(ACH)C\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

$V = Volume, ft^3$

$\Delta t_d = Temperature\ difference, °F$

ACH = ft^3/hr

C=0.018, Btu/ft^3 °F (Constant)

Ventilation Air Heat Loss and Gain

$$q_{ventilation} = A_{rate} * \rho_{air} * c_p * \Delta t_d * (\frac{60min}{1hr})$$

Where:

$q = heat\ flow\ rate, Btu/h$

$A_{rate} = Air\ Flow\ Rate, ft^3/min$

$\Delta t_d = Temperature\ difference, °F$

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F}$

Where air is assumed to be at 'standard air' conditions the equation can be reduced to:

$$q_{ventilation} = A_{rate} * 1.08 * \Delta t_d)$$

Heat Loss and Gain through Evaporation

$$W_P = \frac{A}{\gamma}(P_W - P_a)(95\text{-}0.425V)$$

Where:

W_P = Evaporation of Water lbs/hr

A = Area of Pool Surface, ft^2

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w = **Saturation vapor pressure taken at surface water temperature, in. Hg**

P_a = **Saturation pressure at room air dew point, in. Hg**

$V = air\ velocity\ over\ water\ surface, fpm$

Units for the constant 95 are Btu/(hr*ft^2*in.Hg). Units for the constant 0.425 are Btu*min/(hr*ft^3*in.Hg).
Equation (2) may be modified by evaportion rate based on the level of activity supported For γ values of about 1000 Btu/lb and values ranging from 10 to 30 fpm, Equation (2) can be reduced to:

$$W_P = 0.1A(P_W - P_a)F_A$$

Where:

A = Area of Pool Surface, ft^2

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w = Saturation vapor pressure taken at surface water temperature, in. Hg

P_a = Saturation pressure at room air dew point, in. Hg

F_A = Activity Factor

$$q_l = W_P h_w$$

Where:

q_l = Heat flow rate to water, Btu/hr

W_P = Evaporation of Water lbs/hr

h_w = Enthalpy of Surface Water Evaporization at T_W Degrees of Water, Btu/lb

Assumptions

The following assumptions were made in the generating the heating loss calculations:
The intent of the HVAC design is to maintain an indoor space temperature of 50 degree Fahrenheit inside of the building envelope.
The air is at 'standard air' conditions

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3$ = .075 lb/ft^3

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F}$ = .241 $\frac{Btus}{lb*°F}$

Inputs

Coho Building Ventilation Requirements

Occupancy Category Used for Calculation: Warehouse

Description	Area (sf)	Height (ft)	Density	P_z	R_p	R_a	V_{bz}	E_z	V_{oz}	1 CFM/SF	6 ACH	Design CFM
Coho Building	3575	18	10.00	35.8	5	0.06	393	1	393	3,575	6,435	393

Total Building Heat Loss to Ventilation - Winter Design Loads

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Heat Loss to Ventilation (Btu/hr)
14482.6

Total Building Skin Heat Loss - Winter Design Loads

Length (ft)	Width (ft)	Height (ft)
65	55	18

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

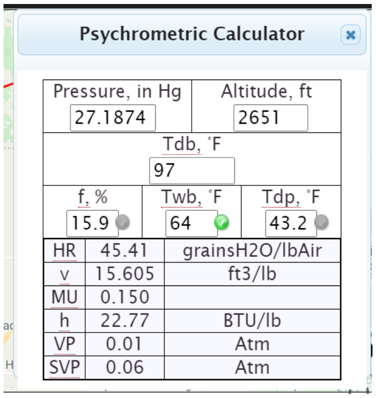
Wall Area (ft^2)	Roof Area (ft^2)	Floor Area (ft^2)
4560.00	3646.5	240

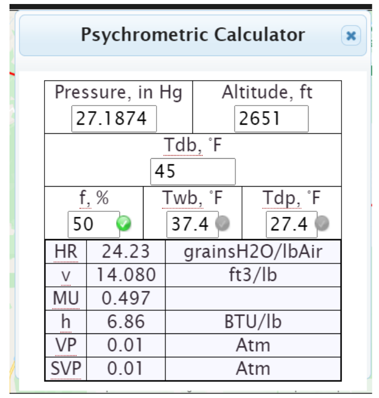
R-value Walls (ft2·°F·h) / BTU	R-value Roof (ft2·°F·h) / BTU	R-value Floor (ft2·°F·h) / BTU
17	25	0.730

Infiltration Rate (ACH) (Ft^3/Hr)
0.6

Heat Loss Walls (Btu/hr)	Heat Loss Roof (Btu/hr)	Heat Loss Floor (Btu/hr)	Heat Loss Infiltration (Btu/hr)
9146.8	4973.8	11211.0	23698.8

Total Building Heat Loss to Water Evaportion - Winter Design Loads





Summer Time Conditions - Coho Building		
Area of Tanks	1570	sf
Activity Factor	0.5	
Saturation Vapor Pressure at Water Surface (55 Deg Water)	0.4359	in. Hg
Partial Vapor Pressure at Room Air Dew Point (43 Deg Air)	0.18	in Hg
Evaporation Rate	20.08815	lb/hr
Enthalpy of Surface Water Evaporization (55 degree Water)	1062.14	Btu/lb
Heat Loss to Water	21336.43	Btu/Hr
Heat Lost to Water	6.789	KW
Air Flow Rate	6000	cfm
Amount of Water in Return Air	0.000056	lb/cf
Water Content of Saturated Air at (65 Deg)	0.00095	lb/cf
Space DB Temp	97	Deg F
Space WB Temp	64	Deg F

Winter Time Conditions - Coho Building		
Area of Tanks	1570	sf
Activity Factor	0.5	
Saturation Vapor Pressure at Water Surface (43 Deg Water)	0.27831	in. Hg
Partial Vapor Pressure at Room Air Dew Point (27.4 Deg Air)	0.1502	in Hg
Evaporation Rate	10.056635	lb/hr
Enthalpy of Surface Water Evaporization (43 Deg Water)	1068.92	Btu/lb
Heat Loss to Water	10749.74	Btu/Hr
Heat Lost to Water	3.420	KW
Air Flow Rate	1200	cfm
Amount of Water in Return Air	0.00013968	lb/cf
Water Content of Saturated Air at (65 Deg)	0.00095	lb/cf
Space DB Temp	45	Deg F
Space WB Temp	37.4	Deg F

Results

The required heating load totals are listed below.

TOTAL Heat Loss (Btu/hr)
74263
TOTAL Heat Loss (kW)
21.76

Safety Factor
0.10

TOTAL Heat Loss (Btu/hr) + Safety Factor
81689.05
TOTAL Heat Loss (kW)
23.93

Conclusions

A 25 KW electric heater load will provide sufficent heating to maintain the space at 50 degrees during peak winter outdoor temperatures

SUBJECT: Klamath River Renewal Corporation | BY: C. Gregory | CHK'D BY: K. Desomber
Fall Creek Hatchery | DATE: 8/14/2020
Incubation Building HVAC Design | PROJECT NO.: 20-024

Purpose

The purpose of this calculation sheet is to determine the required heating load for the Incubation building.
Cooling will be provided via mechanical ventilation via 6 air changes per hour

References

ASHRAE, 1997. ASHRAE Handbook - Fundamentals. 1791 Tullie Circle, N.E., Alanta GA 30329

Method

Heat loss and Gain through Conducton

$$q = UA\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

U= $Thermal\ Trasmitance, Btu/(h * ft^2 * °F)$

A = *Area, ft^2*

$\Delta t_d = Temperature\ difference, °F$

Air Infiltration Heat Loss and Gain

$$q_{infiltration} = V(ACH)C\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

$V = Volume, ft^3$

$\Delta t_d = Temperature\ difference, °F$

ACH = ft^3/hr

C=0.018, Btu/ft^3 °F (Constant)

Ventilation Air Heat Loss and Gain

$$q_{ventilation} = A_{rate} * \rho_{air} * c_p * \Delta t_d * \left(\frac{60min}{1hr}\right)$$

Where:

$q = heat\ flow\ rate, Btu/h$

$A_{rate} = Air\ Flow\ Rate, ft^3/min$

$\Delta t_d = Temperature\ difference, °F$

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F}$

Where air is assumed to be at 'standard air' conditions the equation can be reduced to:

$$q_{ventilation} = A_{rate} * 1.08 * \Delta t_d)$$

Heat Loss and Gain through Evaporation

$$W_P = \frac{A}{\gamma}(P_W - P_a)(95\text{-}0.425V)$$

Where:

W_P = *Evaporation of Water lbs/hr*

A = *Area of Pool Surface, ft^2*

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w= **Saturation vapor pressure taken at surface water temperature, in. Hg**

P_a= *Saturation* **pressure at room air dew point, in. Hg**

$V = air\ velocity\ over\ water\ surface, fpm$

Units for the constant 95 are Btu/(hr*ft^2*in.Hg). Units for the constant 0.425 are Btu*min/(hr*ft^3*in.Hg).
Equation (2) may be modified by evaportion rate based on the level of activity supported For γ values of about 1000 Btu/lb and values ranging from 10 to 30 fpm, Equation (2) can be reduced to:

$$W_P = 0.1A(P_W - P_a)F_A$$

Where:

A = *Area of Pool Surface, ft^2*

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w = *Saturation vapor pressure taken at surface water temperature, in. Hg*

P_a = *Saturation pressure at room air dew point, in. Hg*

F_A = *Activity Factor*

$$q_l = W_P h_w$$

Where:

q_l = *Heat flow rate to water, Btu/hr*

W_P = *Evaporation of Water lbs/hr*

h_w = *Enthalpy of Surface Water Evaporization at* T_W *Degrees of Water, Btu/lb*

Assumptions

The following assumptions were made in the generating the heating loss calculations:
The intent of the HVAC design is to maintain an indoor space temperature of 50 degree Fahrenheit inside of the building envelope.
The air is at 'standard air' conditions

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3 = .075\ lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F} = .241\ \frac{Btus}{lb*°F}$

Inputs

Incubation Building Ventilation Requirements

Occupancy Category Used for Calculation: Warehouse

Description	Area (sf)	Height (ft)	Density	P_z	R_p	R_a	V_{bz}	E_z	V_{oz}	1 CFM/SF	6 ACH	Design CFM
Incubation Building	3111	18	10.00	31.1	5	0.06	342	1	342	3,111	5,600	342

Total Building Heat Loss to Ventilation - Winter Design Loads

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Heat Loss to Ventilation (Btu/hr)
12602.9

Total Building Skin Heat Loss - Winter Design Loads

Length (ft)	Width (ft)	Height (ft)
61	51	15

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Wall Area (ft^2)	Roof Area (ft^2)	Floor Area (ft^2)
3584.00	3173.2	224

R-value Walls (ft2·°F·h) / BTU	R-value Roof (ft2·°F·h) / BTU	R-value Floor (ft2·°F·h) / BTU
17	25	0.730

Infiltration Rate (ACH) (Ft^3/Hr)
0.6

Heat Loss Walls (Btu/hr)	Heat Loss Roof (Btu/hr)	Heat Loss Floor (Btu/hr)	Heat Loss Infiltration (Btu/hr)
7189.1	4328.3	10463.6	17185.8

Total Building Heat Loss to Water Evaportion - Winter Design Loads

Psychrometric Calculator

Pressure, in Hg	Altitude, ft
27.1874	2651

Tdb, °F
97

f, %	Twb, °F	Tdp, °F
15.9	64	43.2

HR	45.41	grainsH2O/lbAir
v	15.605	ft3/lb
MU	0.150	
h	22.77	BTU/lb
VP	0.01	Atm
SVP	0.06	Atm

Psychrometric Calculator

Pressure, in Hg	Altitude, ft
27.1874	2651

Tdb, °F
45

f, %	Twb, °F	Tdp, °F
50	37.4	27.4

HR	24.23	grainsH2O/lbAir
v	14.080	ft3/lb
MU	0.497	
h	6.86	BTU/lb
VP	0.01	Atm
SVP	0.01	Atm

Summer Time Conditions - Incubation Building		
Area of Tanks	4495	sf
Activity Factor	0.5	
Saturation Vapor Pressure at Water Surface (55 Deg Water)	0.4359	in. Hg
Partial Vapor Pressure at Room Air Dew Point (43 Deg Air)	0.18	in Hg
Evaporation Rate	57.513525	lb/hr
Enthalpy of Surface Water Evaporization (55 degree Water)	1062.14	Btu/lb
Heat Loss to Water	61087.42	Btu/Hr
Heat Lost to Water	19.436	KW
Air Flow Rate	6000	cfm
Amount of Water in Return Air	0.000160	lb/cf
Water Content of Saturated Air at (65 Deg)	0.00095	lb/cf
Space DB Temp	97	Deg F
Space WB Temp	64	Deg F

Winter Time Conditions - Incubation Building		
Area of Tanks	4495	sf
Activity Factor	0.5	
Saturation Vapor Pressure at Water Surface (43 Deg Water)	0.27831	in. Hg
Partial Vapor Pressure at Room Air Dew Point (27.4 Deg Air)	0.1502	in Hg
Evaporation Rate	28.7927225	lb/hr
Enthalpy of Surface Water Evaporization (43 Deg Water)	1068.92	Btu/lb
Heat Loss to Water	30777.12	Btu/Hr
Heat Lost to Water	9.792	KW
Air Flow Rate	1200	cfm
Amount of Water in Return Air	0.0003999	lb/cf
Water Content of Saturated Air at (65 Deg)	0.00095	lb/cf
Space DB Temp	45	Deg F
Space WB Temp	37.4	Deg F

Results

The required heating load totals are listed below.

TOTAL Heat Loss (Btu/hr)
82547
TOTAL Heat Loss (kW)
24.19

Safety Factor
0.10

TOTAL Heat Loss (Btu/hr) + Safety Factor
90801.40
TOTAL Heat Loss (kW)
26.60

Conclusions

A total of 25 KW for all the electric heaters combined will provide sufficent heating to maintain the space at 50 degrees during peak winter outdoor temperatures

SUBJECT:	Klamath River Renewal Corporation	**BY:** C. Gregory	**CHK'D BY:** K. Desomber
	Fall Creek Hatchery	**DATE:** 8/14/2020	
	Spawning Building HVAC Design	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to determine the required heating load for the Spawning building.
Cooling will be provided via mechanical ventilation via 6 air changes per hour

References

ASHRAE, 1997. ASHRAE Handbook - Fundamentals. 1791 Tullie Circle, N.E., Alanta GA 30329

Method

Heat loss and Gain through Conducton

$$q = UA\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

U= $Thermal\ Trasmitance, Btu/(h * ft^2 * °F)$

A =*Area, ft^2*

$\Delta t_d = Temperature\ difference, °F$

Air Infiltration Heat Loss and Gain

$$q_{infiltration} = V(ACH)C\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

$V = Volume, ft^3$

$\Delta t_d = Temperature\ difference, °F$

ACH = ft^3/hr

C=0.018, *Btu*/ft^3 °F (Constant)

Ventilation Air Heat Loss and Gain

$$q_{ventilation} = A_{rate} * \rho_{air} * c_p * \Delta t_d * (\frac{60min}{1hr})$$

Where:

$q = heat\ flow\ rate, Btu/h$

$A_{rate} = Air\ Flow\ Rate, ft^3/min$

$\Delta t_d = Temperature\ difference, °F$

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F}$

Where air is assumed to be at 'standard air' conditions the equation can be reduced to:

$$q_{ventilation} = A_{rate} * 1.08 * \Delta t_d)$$

Heat Loss and Gain through Evaporation

$$W_P = \frac{A}{\gamma}(P_W - P_a)(95\text{-}0.425V)$$

Where:

W_P = *Evaporation of Water lbs/hr*

A = Area of Pool Surface, ft^2

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w= Saturation vapor pressure taken at surface water temperature, in. Hg

P_a= Saturation pressure at room air dew point, in. Hg

$V = air\ velocity\ over\ water\ surface, fpm$

Units for the constant 95 are Btu/(hr*ft^2*in.Hg). Units for the constant 0.425 are Btu*min/(hr*ft^3*in.Hg).
Equation (2) may be modified by evaportion rate based on the level of activity supported For γ values of about 1000 Btu/lb and values ranging from 10 to 30 fpm, Equation (2) can be reduced to:

$$W_P = 0.1A(P_W - P_a)F_A$$

Where:

A = Area of Pool Surface, ft^2

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w = *Saturation vapor pressure taken at surface water temperature, in. Hg*

P_a = *Saturation pressure at room air dew point, in. Hg*

F_A = *Activity Factor*

$$q_l = W_P h_w$$

Where:

q_l = *Heat flow rate to water, Btu/hr*

W_P = *Evaporation of Water lbs/hr*

h_w = *Enthalpy of Surface Water Evaporization at* T_W *Degrees of Water, Btu/lb*

Assumptions

The following assumptions were made in the generating the heating loss calculations:
The intent of the HVAC design is to maintain an indoor space temperature of 50 degree Fahrenheit inside of the building envelope.
The air is at 'standard air' conditions

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3 = .075\ lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F} = .241 \frac{Btus}{lb*°F}$

Inputs

Spawning Building Ventilation Requirements

Occupancy Category Used for Calculation: Warehouse

Description	Area (sf)	Height (ft)	Density	P_z	R_p	R_a	V_{bz}	E_z	V_{oz}	1 CFM/SF	6 ACH	Design CFM
Spawning Building	897.6	18	10.00	9.0	5	0.06	99	1	99	898	1,616	99

Total Building Heat Loss to Ventilation - Winter Design Loads

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Heat Loss to Ventilation (Btu/hr)
3636.2

Total Building Skin Heat Loss - Winter Design Loads

Length (ft)	Width (ft)	Height (ft)
34	26	15

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Wall Area (ft^2)	Roof Area (ft^2)	Floor Area (ft^2)
1932.80	915.6	120.8

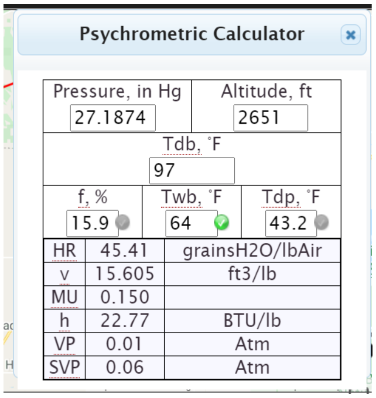
R-value Walls (ft2·°F·h) / BTU	R-value Roof (ft2·°F·h) / BTU	R-value Floor (ft2·°F·h) / BTU
17	25	0.730

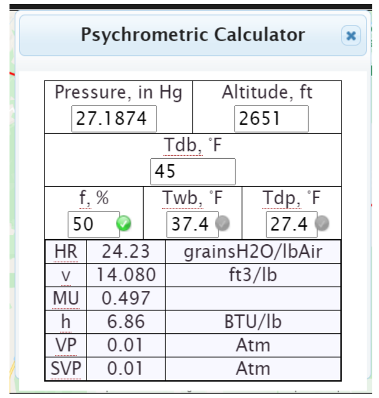
Infiltration Rate (ACH) (Ft^3/Hr)
0.6

Heat Loss Walls (Btu/hr)	Heat Loss Roof (Btu/hr)	Heat Loss Floor (Btu/hr)	Heat Loss Infiltration (Btu/hr)
3877.0	1248.8	5642.8	4958.5

McMILLEN JACOBS ASSOCIATES

Total Building Heat Loss to Water Evaportion - Winter Design Loads





Summer Time Conditions - Spawning Building		
Area of Tanks	500	sf
Activity Factor	0.5	
Saturation Vapor Pressure at Water Surface (55 Deg Water)	0.4359	in. Hg
Partial Vapor Pressure at Room Air Dew Point (43 Deg Air)	0.18	in Hg
Evaporation Rate	6.3975	lb/hr
Enthalpy of Surface Water Evaporization (55 degree Water)	1062.14	Btu/lb
Heat Loss to Water	6795.04	Btu/Hr
Heat Lost to Water	2.162	KW
Air Flow Rate	6000	cfm
Amount of Water in Return Air	0.000018	lb/cf
Water Content of Saturated Air at (65 Deg)	0.00095	lb/cf
Space DB Temp	97	Deg F
Space WB Temp	64	Deg F

Winter Time Conditions - Spawning Building		
Area of Tanks	500	sf
Activity Factor	0.5	
Saturation Vapor Pressure at Water Surface (43 Deg Water)	0.27831	in. Hg
Partial Vapor Pressure at Room Air Dew Point (27.4 Deg Air)	0.1502	in Hg
Evaporation Rate	3.20275	lb/hr
Enthalpy of Surface Water Evaporization (43 Deg Water)	1068.92	Btu/lb
Heat Loss to Water	3423.48	Btu/Hr
Heat Lost to Water	1.089	KW
Air Flow Rate	1200	cfm
Amount of Water in Return Air	4.4483E-05	lb/cf
Water Content of Saturated Air at (65 Deg)	0.00095	lb/cf
Space DB Temp	45	Deg F
Space WB Temp	37.4	Deg F

Results

The required heating load totals are listed below.

TOTAL Heat Loss (Btu/hr)
22787
TOTAL Heat Loss (kW)
6.68

Safety Factor
0.10

TOTAL Heat Loss (Btu/hr) + Safety Factor
25065.58
TOTAL Heat Loss (kW)
7.34

Conclusions

A 10 KW electric heater load will provide sufficent heating to maintain the space at 50 degrees during peak winter outdoor temperatures

SUBJECT: Klamath River Renewal Corporation | BY: C. Gregory | CHK'D BY: K. Desomber
Fall Creek Hatchery | DATE: 8/14/2020
Electrical Room HVAC Design | PROJECT NO.: 20-024

Purpose

The purpose of this calculation sheet is to determine the required heating load for the Chinook building.
Cooling will be provided mechancial by a direct expansion cooling and heating unit.

References

ASHRAE, 1997. ASHRAE Handbook - Fundamentals. 1791 Tullie Circle, N.E., Alanta GA 30329

Method

Heat loss and Gain through Conducton

$$q = UA\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

U= $Thermal\ Trasmitance, Btu/(h * ft^2 * °F)$

A =Area, ft^2

$\Delta t_d = Temperature\ difference, °F$

Air Infiltration Heat Loss and Gain

$$q_{infiltration} = V(ACH)C\Delta t_d$$

Where:

$q = heat\ flow\ rate, Btu/h$

V = Volume, ft^3

$\Delta t_d = Temperature\ difference, °F$

ACH = ft^3/hr

C=0.018, Btu/ft^3 °F (Constant)

Ventilation Air Heat Loss and Gain

$$q_{ventilation} = A_{rate} * \rho_{air} * c_p * \Delta t_d * \left(\frac{60min}{1hr}\right)$$

Where:

$q = heat\ flow\ rate, Btu/h$

$A_{rate} = Air\ Flow\ Rate$, *ft^3/min*

$\Delta t_d = Temperature\ difference, °F$

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F}$

Where air is assumed to be at 'standard air' conditions the equation can be reduced to:

$$q_{ventilation} = A_{rate} * 1.08 * \Delta t_d)$$

Heat Loss and Gain through Evaporation

$$W_P = \frac{A}{\gamma}(P_W - P_a)(95\text{-}0.425V)$$

Where:

W_P *= Evaporation of Water lbs/hr*

A = Area of Pool Surface, ft^2

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w**= Saturation vapor pressure taken at surface water temperature, in. Hg**

P_a= *Saturation* **pressure at room air dew point, in. Hg**

$V = air\ velocity\ over\ water\ surface, fpm$

Units for the constant 95 are Btu/(hr*ft^2*in.Hg). Units for the constant 0.425 are Btu*min/(hr*ft^3*in.Hg).
Equation (2) may be modified by evaportion rate based on the level of activity supported For γ values of about 1000 Btu/lb and values ranging from 10 to 30 fpm, Equation (2) can be reduced to:

$$W_P = 0.1A(P_W - P_a)F_A$$

Where:

A = Area of Pool Surface, ft^2

γ = latent heat required to change water to vapor at surface water temparture, Btu/lb

P_w *= Saturation vapor pressure taken at surface water temperature, in. Hg*

P_a *= Saturation pressure at room air dew point, in. Hg*

F_A *= Activity Factor*

$$q_l = W_P h_w$$

Where:

q_l *= Heat flow rate to water, Btu/hr*

W_P *= Evaporation of Water lbs/hr*

h_w *= Enthalpy of Surface Water Evaporization at* T_W *Degrees of Water, Btu/lb*

Assumptions

The following assumptions were made in the generating the heating loss calculations:
The intent of the HVAC design is to maintain an indoor space temperature of 40+ degree Fahrenheit inside of the building envelope.
The air is at 'standard air' conditions

$\rho_{air} = Density\ of\ Air\ at\ Sea\ level, lb/ft^3 = .075\ lb/ft^3$

$c_p = Specific\ Heat\ of\ Air, \frac{Btus}{lb*°F} = .241 \frac{Btus}{lb*°F}$

Inputs

Electrical Room Ventilation Requirements

Occupancy Category Used for Calculation: Electrical Room **Space is considered unoccupied - no ventilation required**

Description	Area (sf)	Height (ft)	Density	P_z	R_p	R_a	V_{bz}	E_z	V_{oz}	1 CFM/SF	6 ACH	Design CFM
Electrical room	120	18	10.00	1.2	5	0.06	13	1	13	120	216	13

Total Building Heat Loss to Ventilation - Winter Design Loads

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Heat Loss to Ventilation (Btu/hr)
486.1

Total Building Skin Heat Loss - Winter Design Loads

Length (ft)	Width (ft)	Height (ft)
10	12	15

Outdoor Temp (F)	Indoor Temp (F)	Avg Outdoor Temp Range (F)
15.9	50.0	35.3

Wall Area (ft^2)	Roof Area (ft^2)	Floor Area (ft^2)
704.00	122.4	44

R-value Walls (ft2·°F·h) / BTU	R-value Roof (ft2·°F·h) / BTU	R-value Floor (ft2·°F·h) / BTU
17	25	0.730

Infiltration Rate (ACH) (Ft^3/Hr)
0.6

Heat Loss Walls (Btu/hr)	Heat Loss Roof (Btu/hr)	Heat Loss Floor (Btu/hr)	Heat Loss Infiltration (Btu/hr)
1412.1	167.0	2055.3	662.9

The required heating load totals are listed below.

TOTAL Heat Loss (Btu/hr)
4297
TOTAL Heat Loss (kW)
1.26

Safety Factor
0.10

TOTAL Heat Loss (Btu/hr) + Safety Factor
4727.08
TOTAL Heat Loss (kW)
1.39

Total Building Skin Heat Gain - Summer Design Loads

Length (ft)	Width (ft)	Height (ft)
10	12	12

Indoor Temp (F)	Outdoor Temp (F)	Avg Outdoor Temp Range (F)
75.0	97.0	35.3

Wall Area (ft^2)	Roof Area (ft^2)	Floor Area (ft^2)
528.00	122.4	44

R-value Walls (ft2·°F·h) / BTU	R-value Roof (ft2·°F·h) / BTU	R-value Floor (ft2·°F·h) / BTU
17	25	0.730

Infiltration Rate (ACH) (Ft^3/Hr)
0.6

Heat Gain Walls (Btu/hr)	Heat Gain Roof (Btu/hr)	Heat Gain Floor (Btu/hr)	Heat Gain Infiltration (Btu/hr)
683.3	107.7	1326.0	342.1

Electrical Equiment Heat Gain - Summer Design Loads

Item	Raw Load (kW)	Qty	Total Raw Load (kW)	Heat Gain %	Total Heat Gain (Btu/hr)
Misc. Electrical load	2.500	1	2.50	100%	8533
	0.000	0	0.00	100%	0
	0.000	0	0.000	100%	0
			2.50		**8533**

Results

The required cooling load totals are listed below.

TOTAL Heat Gain (Btu/hr)
10992
TOTAL Heat Gain (kW)
3.22

Safety Factor
0.10

TOTAL Heat Gain (Btu/hr) + Safety Factor
12090.85
TOTAL Heat Gain (kW)
3.54

TOTAL Heat Gain (Tons of Cooling)
1.0

The required heating load totals are listed below.

TOTAL Heat Loss (Btu/hr)
-4235
TOTAL Heat Loss (kW)
-1.24

Saftey Factor
0.10

TOTAL Heat Loss (Btu/hr) + Saftey Factor
-4658.67
TOTAL Heat Loss (kW)
-1.36

Conclusions

Winter Time Design Results - Due to the high heating load already present in the electrical room there will not be a need to provide heating to the space to maintain the space at 50 degrees during peak winter outdoor temperatures

Summer Time Design Results - The total cooling load required for the space will be 12,090 Btus/h or approximimitly 1 ton of cooling

Appendix E
Electrical Design Calculations

Calculation Cover Sheet

McMILLEN JACOBS ASSOCIATES

Project: Fall Creek Fish Hatchery

Client: Klamath River Renewal Corporation (KRRC) **Proj. No.:** 20-024

Title: Electrical Calculations

Prepared By, Name: Mitchell Skelton

Prepared By, Signature: ________ **Date:** 10/28/2020

Peer Reviewed By, Name: John Bakken, P.E.

Peer Reviewed, Signature: ________ **Date:** 10/28/2020

SUBJECT:	Klamath River Renewal Corporation (KRRC)	**BY:** M. Skelton	**CHK'D BY:** J. Bakken
	Fall Creek Fish Hatchery	**DATE:** 10/28/2020	
	Electrical Calculations - Table of Content	**PROJECT NO.:** 20-024	

Table of Content

Electrical **Page**

McMILLEN JACOBS ASSOCIATES

SUBJECT:	Klamath River Renewal Corporation (KRRC)	**BY:** M. Skelton	**CHK'D BY:** J. Bakken
	Fall Creek Fish Hatchery	**DATE:** 10/28/2020	
	Lighting Level Calcs	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to analyze the required fixture and lumen count to achieve a desired light level for a given room or area.

Information - Input

Room/Area: Coho Building

Design footcandle (ave. maintained), F: 20 fc

Luminaire H1 manuf.: LITHONIA
Luminaire H1 Cat. No.: JCBL 18000LM ACCR ACRFGL MVOLT GZ10 40K 80CRI E10WCP DWHXD

Luminaire H2 manuf.: LITHONIA
Luminaire H2 Cat. No.: JCBL 24000LM ACCR ACRFGL MVOLT GZ10 40K 80CRI E10WCP DWHXD

	Fixture H1:		Fixture H2:	
Lamp type:	LED		LED	
Total lumens for fixture, Lf:	17018	lumens	22090	lumens

Room Shape:		Rectangular		
Room/Area dimensions:	Length, L =	65	ft.	
	Width, W =	50	ft.	
	Fixture mounting height (highest), H =	14	ft.	
	Work plane, P =	2.5	ft.	
	Area, A =	3250	sq. ft.	
	Perimeter, P =	230	ft.	
	Cavity Depth, D =	11.5	ft.	*D=(H-P)*
Fixture maintenance factor, M:		0.93		
Reflectances:	Ceiling:	80	%	
	Walls:	50	%	
	Floors:	20	%	

Calculation

Room cavity ratio calculation:						*RCR (Rectangular Rooms) = (5*D*(L+W))/A*
	RCR=	2.03				*RCR (Irregular Rooms) = (2.5*D*P)/A*
Coefficient of Utilization from table:						
	CU=	0.39				
Required total lumens for room:		65000	lumens			*Lr = (F*A)*
Minimum no. of fixtures required		Fixture A:		Fixture B:		
to achieve desired footcandles:		10.5	fixtures	8.1	fixtures	*N = (Lr)/(Lf*M*CU)*

Conclusions

Choice #1 -					
Alternate no. of fixtures used, n1:	12	fixtures	9	fixtures	
Footcandles produced, f1:	22.8	fc	22.2	fc	*f1=(F*n1)/N*
Choice #2 -					
Alternate no. of fixtures used, n2:	16	fixtures	12	fixtures	
Footcandles produced, f2:	30.4	fc	29.6	fc	*f2=(F*n2)/N*

Choices #1 and #2 provide reasonable illumination to the area for night-time working conditions.
Select Choice #1 for a cost-effective illumination capacity and dimmability range.

SUBJECT:	Klamath River Renewal Corporation (KRRC)	**BY:** M. Skelton	**CHK'D BY:** J. Bakken
	Fall Creek Fish Hatchery	**DATE:** 10/28/2020	
	Lighting Level Calcs	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to analyze the required fixture and lumen count to achieve a desired light level for a given room or area.

Information - Input

Room/Area: Chinook Incubation Building

Design footcandle (ave. maintained), F: 20 fc

Luminaire H1 manuf.: LITHONIA
Luminaire H1 Cat. No.: JCBL 18000LM ACCR ACRFGL MVOLT GZ10 40K 80CRI E10WCP DWHXD

Luminaire H2 manuf.: LITHONIA
Luminaire H2 Cat. No.: JCBL 24000LM ACCR ACRFGL MVOLT GZ10 40K 80CRI E10WCP DWHXD

	Fixture H1:		Fixture H2:	
Lamp type:	LED		LED	
Total lumens for fixture, Lf:	17018	lumens	22090	lumens

Room Shape:		Rectangular		
Room/Area dimensions:	Length, L =	60	ft.	
	Width, W =	50	ft.	
	Fixture mounting height (highest), H =	12	ft.	
	Work plane, P =	2.5	ft.	
	Area, A =	3000	sq. ft.	
	Perimeter, P =	220	ft.	
	Cavity Depth, D =	9.5	ft.	*D=(H-P)*

Fixture maintenance factor, M: 0.93

Reflectances:	Ceiling:	80	%
	Walls:	50	%
	Floors:	20	%

Calculation

Room cavity ratio calculation:					*RCR (Rectangular Rooms) = (5*D*(L+W))/A*
	RCR=	1.74			*RCR (Irregular Rooms) = (2.5*D*P)/A*
Coefficient of Utilization from table:					
	CU=	0.4			
Required total lumens for room:		60000 lumens			*Lr = (F*A)*
Minimum no. of fixtures required		Fixture A:		Fixture B:	
to achieve desired footcandles:		9.5	fixtures	7.3 fixtures	*N = (Lr)/(Lf*M*CU)*

Conclusions

Choice #1 -						
Alternate no. of fixtures used, n1:	10	fixtures	8	fixtures	
Footcandles produced, f1:	21.1	fc	21.9	fc	*f1=(F*n1)/N*
Choice #2 -						
Alternate no. of fixtures used, n2:	12	fixtures	9	fixtures	
Footcandles produced, f2:	25.3	fc	24.7	fc	*f2=(F*n2)/N*

Choices #1 and #2 provide reasonable illumination to the area for night-time working conditions.
Select Choice #2 for a cost-effective illumination capacity and dimmability range, and practical layout.

SUBJECT: Klamath River Renewal Corporation (KRRC)
Fall Creek Fish Hatchery
Lighting Level Calcs

BY: M. Skelton **CHK'D BY:** J. Bakken
DATE: 10/28/2020
PROJECT NO.: 20-024

Purpose

The purpose of this calculation sheet is to analyze the required fixture and lumen count to achieve a desired light level for a given room or area.

Information - Input

Room/Area: Chinook Incubation Building - Electrical Room

Design footcandle (ave. maintained), F: 20 fc

Luminaire manuf.: LITHONIA
Luminaire Cat. No.: MSL 8000LM L/LV 120 GZ10 40K 80CRI E10WLCP WH

Lamp type: LED
Total lumens for fixture, Lf: 8733 lumens

Room Shape: Rectangular

Room/Area dimensions:	Length, L =	12	ft.	
	Width, W =	9	ft.	
	Fixture mounting height (highest), H =	12	ft.	
	Work plane, P =	2.5	ft.	
	Area, A =	108	sq. ft.	
	Perimeter, P =	42	ft.	
	Cavity Depth, D =	9.5	ft.	*D=(H-P)*

Fixture maintenance factor, M: 0.91

Reflectances:	Ceiling:	80	%
	Walls:	50	%
	Floors:	20	%

Calculation

Room cavity ratio calculation:
RCR= 9.24
*RCR (Rectangular Rooms) = (5*D*(L+W))/A*
*RCR (Irregular Rooms) = (2.5*D*P)/A*

Coefficient of Utilization from table:
CU= 0.185

Required total lumens for room: 2160 lumens *Lr=(F*A)*

Minimum no. of fixtures required to achieve desired footcandles: 1.5 fixtures *N=(Lr)/(Lf*M*CU)*

Conclusions

Choice #1 -
Alternate no. of fixtures used, n1: 2 fixtures
Footcandles produced, f1: 27.2 fc *f1=(F*n1)/N*

Choice #2 -
Alternate no. of fixtures used, n2: 3 fixtures
Footcandles produced, f2: 40.8 fc *f2=(F*n2)/N*

Choice #1 provides reasonable illumination to the area for general working conditions. Choice #2 provides exceptional illumination to the area. Select Choice #1 for a cost-effective illumination capacity.

SUBJECT:	Klamath River Renewal Corporation (KRRC)	**BY:** M. Skelton	**CHK'D BY:** J. Bakken
	Fall Creek Fish Hatchery	**DATE:** 10/28/2020	
	Lighting Level Calcs	**PROJECT NO.:** 20-024	

Purpose

The purpose of this calculation sheet is to analyze the required fixture and lumen count to achieve a desired light level for a given room or area.

Information - Input

Room/Area: Spawning Building

Design footcandle (ave. maintained), F: 20 fc

Luminaire H1 manuf.: LITHONIA
Luminaire H1 Cat. No.: JCBL 18000LM ACCR ACRFGL MVOLT GZ10 40K 80CRI E10WCP DWHXD

Luminaire H2 manuf.: LITHONIA
Luminaire H2 Cat. No.: JCBL 24000LM ACCR ACRFGL MVOLT GZ10 40K 80CRI E10WCP DWHXD

	Fixture H1:		Fixture H2:	
Lamp type:	LED		LED	
Total lumens for fixture, Lf:	17018	lumens	22090	lumens

Room Shape:		Rectangular		
Room/Area dimensions:	Length, L =	35	ft.	
	Width, W =	25	ft.	
	Fixture mounting height (highest), H =	14	ft.	
	Work plane, P =	2.5	ft.	
	Area, A =	875	sq. ft.	
	Perimeter, P =	120	ft.	
	Cavity Depth, D =	11.5	ft.	*D=(H-P)*

Fixture maintenance factor, M: 0.93

Reflectances:	Ceiling:	80	%
	Walls:	50	%
	Floors:	20	%

Calculation

Room cavity ratio calculation: *RCR (Rectangular Rooms) = (5*D*(L+W))/A*

RCR= 3.94 *RCR (Irregular Rooms) = (2.5*D*P)/A*

Coefficient of Utilization from table:

CU= 0.3

Required total lumens for room: 17500 lumens *Lr = (F*A)*

	Fixture A:		Fixture B:		
Minimum no. of fixtures required to achieve desired footcandles:	3.7	fixtures	2.8	fixtures	*N = (Lr)/(Lf*M*CU)*

Conclusions

Choice #1 -					
Alternate no. of fixtures used, n1:	4	fixtures	3	fixtures	
Footcandles produced, f1:	21.7	fc	21.1	fc	*f1=(F*n1)/N*
Choice #2 -					
Alternate no. of fixtures used, n2:	6	fixtures	4	fixtures	
Footcandles produced, f2:	32.6	fc	28.2	fc	*f2=(F*n2)/N*

Choice #1 provides reasonable illumination to the area for night-time working conditions. Choice #2 provides exceptional illumination to the area.

Project information

Project name: Fall Creek Fish Hatchery – Worst-Case (Summer)

This report is provided to prove the capability of an existing 100REZGD propane generator with 4R12X alternator to carry the load of the new facility. Based on these results, McMillen Jacobs asserts that no new generator is needed for this facility.

Site requirements

Voltage:	277/480
Phase:	3
Frequency:	60Hz
Alt. Temp. Rise Duty:	130°C Standby
Qty of Gensets:	1
Fuel type:	LP Vapor
Country :	United States

Application:	Construction
Emissions Requirement:	Stationary emergency (US EPA)
Altitude:	2589 Feet
Max. Ambient Temp.:	100 Degrees F
Min. Genset Loading :	10 %
Max. Genset Loading :	100 %

Site load requirements summary

Running kW:	21.95
Running kVA:	28.15
Running P.F.:	0.78

Max. Starting kW:	67.62 in step 1
Max. Starting kVA:	96.70 in step 1

Generator selection

Genset Model:	KG100
Engine:	KG6208TAHD
Emission level:	EPA Certified
BHP:	175.00
Displacement:	377.00
RPM:	1800

Alternator:	4R12X
Alternator Leads:	12
Alt. Starting kVA **at 35% V dip**:	448.00
Cal Alt Temp rise with site loads:	80C
Excitation System :	PMG

Rated kW :	100.00
Site Alt / Temp De-Rated **kW** :	91.94
Seismic Certified	
UL 2200 Certified	

Generator Performance Summary

Voltage Dip Limit:	20.00 %
Frequency Dip Limit:	15.00 %
Harmonic Distortion Limit:	10.00 %

Calculated Voltage Dip:	15.60 %
Calculated Frequency Dip:	14.97 %
Calculated Harmonic Distortion:	0.56 %
Calculated Genset % Loaded:	23.87 %

Report prepared by: Mitch Skelton

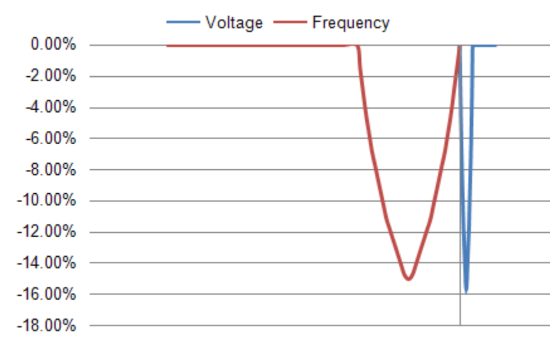
Software version: 1.0037.5.165 October 28, 2020

Sizing Report

Model : KG100, Alternator : 4R12X

Load Profile

Step # 1	Qty	Run			Start			Volt Dip %	Freq Dip %	Volt. Dist. %
		kW	kVA	PF	kW	kVA	PF			
Motor **Traveling Screens** 1.00 HP 3 Phase Motor code : L Loaded NEMA Design across the line	2	1.99	2.84	0.70	12.92	19.00	0.68			
Motor **Screen Spray Pumps** 2.00 HP 3 Phase Motor code : K Loaded NEMA Design across the line	2	3.83	5.39	0.71	20.74	34.00	0.61			
Lighting **Lighting** Evenly distributed LED Filtered Ballast	1	3.84	4.27	0.90	3.84	4.27	0.90			
Misc. Linear Load **Convenience Receptacles** 3 Phase	1	6.91	8.64	0.80	8.64	8.64	1.00			
Misc. Linear Load **SCADA and Control Loads** 3 Phase	1	0.60	0.60	1.00	0.60	0.60	1.00			



Report prepared by: Mitch Skelton

TOTAL SYSTEM INTEGRATION
GENERATORS | TRANSFER SWITCHES | SWITCHGEAR | CONTROLS

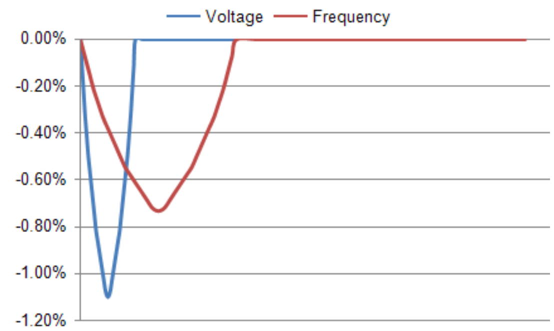
Step # 1	Qty	Run			Start			Volt Dip %	Freq Dip %	Volt. Dist. %
		kW	kVA	PF	kW	kVA	PF			
Motor **Duct Fan Dampers** **0.07 HP** **Phase C-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	3	0.24	0.30	0.80	1.08	1.80	0.60			
Motor **Exhaust Fan Dampers** **0.07 HP** **Phase A-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	5	0.40	0.50	0.80	1.80	3.00	0.60			
Motor **Coho Exhaust Fans** **0.57 HP** **Phase B-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	2	1.22	1.74	0.70	6.46	10.77	0.60			
Motor **Coho Duct Fan** **0.19 HP** **Phase C-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	1	0.21	0.30	0.70	1.08	1.81	0.60			

Step # 1	Qty	Run kW	Run kVA	Run PF	Start kW	Start kVA	Start PF	Volt Dip %	Freq Dip %	Volt. Dist. %
Motor **Chinook Exhaust Fans** **0.21 HP** **Phase A-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	2	0.47	0.67	0.70	2.39	3.99	0.60			
Motor **Chinook Duct Fan** **0.15 HP** **Phase B-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	1	0.17	0.25	0.70	0.86	1.43	0.60			
Motor **Spawning Bldg Exhaust Fan** **0.24 HP** **Phase C-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	1	0.27	0.39	0.70	1.37	2.28	0.60			
Motor **Spawning Bldg Duct Fan** **0.04 HP** **Phase A-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	1	0.03	0.05	0.70	0.23	0.38	0.60			

Step # 1	Qty	Run			Start			Volt Dip %	Freq Dip %	Volt. Dist. %
		kW	kVA	PF	kW	kVA	PF			
Motor **Split Unit - Cooling** **0.97 HP** **Phase A-C** **Motor code : L** **Loaded** **NEMA Design** **across the line**	1	0.96	1.37	0.70	5.60	8.24	0.68			
Step Total		21.15	26.98	0.78	67.62	96.70	0.70	15.60	14.97	0.56
Cum.Total		21.15	26.98	0.78						

Report prepared by: Mitch Skelton

Step # 2	Qty	Run			Start			Volt Dip %	Freq Dip %	Volt. Dist. %
		kW	kVA	PF	kW	kVA	PF			
Motor **Meter Vault Sump Pump** **0.77 HP** **Phase A-N** **Motor code : L** **Loaded** **NEMA Design** **across the line**	1	0.80	1.18	0.68	4.90	7.20	0.68			
Step Total		0.80	1.18	0.68	4.90	7.20	0.68	1.10	0.73	0.56
Cum.Total		21.95	28.15	0.78						
Grand Total		21.95	28.15	0.78				15.60	14.97	0.56



Report prepared by: Mitch Skelton

Appendix F
Biological Design Criteria Technical Memo

Technical Memorandum 001

To:	Klamath River Renewal Corporation California Department of Fish and Wildlife	Project:	Fall Creek Fish Hatchery
From:	Jodi Burns, Project Manager Derek Nelson Jeff Heindel	cc:	Mort McMillen, P.E. – McMillen Jacobs File
Date:	March 11, 2020	Job No.:	20-024
Subject:	Technical Memo 001 – Fall Creek Fish Hatchery Biological Design Criteria, Rev 02		

Revision Log

Revision No.	Date	Revision Description
0	02/27/2020	Initial Draft
1	03/02/2020	KRRC Comments Addressed
2	03/11/2020	CDFW Comments Addressed; Final

1.0 Introduction

Technical Memorandum (TM) No. 001 summarizes the biological design criteria that will be used as the basis for the development of the California Department of Fish and Wildlife's (CDFW) Fall Creek Fish Hatchery (FCFH) project (Project). The criteria presented within this TM provide key water supply and fish culture facility programming information that will serve as the foundation for the Alternatives Analysis to evaluate potential modifications to the existing fish hatchery facility, as well as the selected alternative design development.

The following acronyms and abbreviations are used within this TM:

CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
CTU	Celsius temperature unit
CWT	coded-wire tag
DI	density index
D.O.	dissolved oxygen
FCFH	Fall Creek Fish Hatchery
FI	flow index
fpp	fish per pound
ft^3	cubic feet
gpm	gallons per minute
HRT	hydraulic retention time

IGFH	Iron Gate Fish Hatchery
lb/cf/in	pounds of fish per cubic foot of rearing volume per inch of fish length
lbs/ft^3	pounds of fish per cubic foot of rearing space
mm	millimeter
NPDES	National Pollutant Discharge Elimination System
Project	Fall Creek Fish Hatchery Project
R	water turnovers per hour
TM	Technical Memorandum

2.0 Background

The Klamath River Restoration Project includes removal of four (4) dams along the Klamath River and a new hatchery to provide salmon mitigation production for a period of eight (8) years. The original 50 percent design package was developed by CDM Smith as a subconsultant to AECOM. The 50 percent design included proposed modifications to FCFH with the capability of rearing the current Coho Salmon *Oncorhynchus kisutch* yearling target (~ 75,000 yearlings at ~ 10 fish per pound [fpp]; ~ May release [age-1+]), ~ 115,000 Chinook Salmon *O. tshawytscha* yearlings (~ 10 fpp; November release [age-1+]), and approximately 2,885,000 Chinook sub-yearlings (~ 90 fpp; May release [age-0+]) using mixed-size, dual-drain circular tanks. The design included incubation and spawn-building structures, a concrete pad for ball-and-hitch camper (single-resident temporary housing), and a clarifier to handle increased effluent demands. Limited impacts to the existing facility "footprint" were considered throughout the design process. The design included facilities and land-disturbing activities on both the east and west sides of Fall Creek.

During the technical review of the 50 percent design package (CDM Smith, 2019), several areas of the proposed FCFH design were identified that could benefit from a refined analysis and design approach. The analysis started with the basic input parameters of the hatchery bioprogram with the goal of achieving an optimum rearing configuration considering fish numbers, rearing flow, and rearing densities. The refined bioprogram is presented within this TM. Once the proposed program has been reviewed and approved by CDFW, the FCFH layout will be updated to reflect the final rearing unit numbers, type, water supply piping, and effluent treatment.

3.0 Proposed Facility Upgrades

Site layout and land-disturbing activities/areas were generally addressed in the 50 percent drawing package. Moving forward with continued facility design alternatives, CDFW acknowledged that both ongoing and future permitting discussions dictate that future changes to the design/layout will not deviate from the impact areas provided in the previous design. The previous design suggested major facility upgrades on both the east and west sides of Fall Creek with recommendations to remove all existing infrastructure (e.g., old fish production raceways); initial site investigations conducted by McMillen Jacobs staff on January 28, 2020 suggest that future design is likely possible exclusively on the east side of Fall Creek (minimal to no infrastructure upgrades on west side) and that existing raceways (2 north of Copco Road, 4 south of Copco Road) could be retained (renovated) to minimize the need for "new" aquaculture rearing space.

Initial bio-programming efforts will determine an "optimum" number of fish to be reared over a calendar year based on CDFW guidelines. The total number of fish that can be reared to a certain size (biomass) are directly linked to the key variables of total water flow available (gallons per minute [gpm] and cubic feet per second [cfs]) and total rearing space available (cubic feet of rearing space). Bio-programming analysis presented within this TM will result in determination of a total flow and rearing space requirements to arrive at optimized aquaculture tank/rearing vessels and sizes to meet CDFW aquaculture operational requirements. These preliminary values will be refined as the design is advanced.

The water rights and maximum available flow for the Project are set at 10 cfs. This water right is non-consumptive and water must be returned to Fall Creek with the facility design addressing National Pollutant Discharge Elimination System (NPDES) water quality permit considerations. Facility water treatment designs will be determined after critical aquaculture variables are addressed. Future water treatment design efforts will prioritize the development of systems that maximize water quality/discharge to receiving water bodies (Fall Creek) while minimizing the technological and operational costs of these systems.

4.0 Production Goals

Discussions with CDFW Fish Production staff on January 27, 2020 resulted in a "priority" list of fish species, life stages, and numbers to aid in future design efforts:

- 75,000 Coho yearlings at approximately 10 fpp at release (top priority)
- Adult holding capacity for 100 Coho Salmon adults and 200 Chinook Salmon adults (ideally spawned at Fall Creek facility once production releases return adults to Fall Creek)
- Up to 3M Chinook sub-yearlings at approximately 90 fpp at release (at minimum, 1.5M coded-wire tag [CWT] groups would be ideal for monitoring and evaluation)
- Approximately 115,000 Chinook yearlings at approximately 10 fpp at release (lowest priority)

Table 4-1 provides a high-level overview of fish production goals for the proposed FCFH Program (data compiled from CDFW information):

Table 4-1. Fall Creek Hatchery – Fish Production Goals

Species (Juvenile Life History)	Adult Return*	Incubation Start Date	Incubation Start Number	Target Release Dates	Release Number	Release Size
Coho (Yearling)	Oct. – Dec.	Oct. – Mar.	120,000	Mar. 15 – May 1	75,000	10 fpp
Chinook (Sub-Yearling)	Oct. – Dec.	Oct. – Mar.	4.5M**	Pre-Mar. 31	1,250,000	520 fpp
Chinook (Sub-Yearling)	Oct. – Dec.	Oct. – Mar.	-	May 1 – June 15	1,750,000	90-100 fpp
Chinook (Yearling)	Oct. – Dec.	Oct. – Mar.	-	Oct. 15 – Nov. 20	250,000	10 fpp

*Adult trapping period from Iron Gate Fish Hatchery data

** Estimated Total Green Egg Requirement at Spawning

5.0 Biological Variables

The primary biological variables generally used to develop a preliminary fish hatchery operations schedule include water temperature, species-specific condition factors, growth rates, feed conversion rates, as well as density and flow indices. Understanding that CDFW has prior culture history with the target aquaculture species (Coho, Chinook) and rearing cycles (growth and feed rates relative to period of culture) for the program, the initial bio-programming analysis will identify high-level fish condition factor and growth rate assumptions, provide summary water temperature profile data for the facility, and present recommendations on industry-standard (State/Federal/Tribal conservation programs for Pacific salmon) density and flow indices. These variables will serve as general guidelines for assuring rearing units and water conveyance systems are sized appropriately.

5.1 Fish Condition Factor and Growth Rate

Fish condition factors provide fish culturists with a hypothetical "ideal" condition value of various fish species (body types) that is tied directly to mean fish weight and length. For the purpose of modeling growth and size (total length and/or total weight), a Coho Salmon condition factor of C3500 and a Chinook Salmon condition factor of C3000 are assumed. Coho of a given size (either length or weight) will generally have a higher condition factor than Chinook; for example, Coho juveniles compared to similarly-sized (fish per pound or grams per fish) Chinook juveniles will generally be *shorter* (total length) and *heavier* (mean weight) and have a resulting *higher* condition factor.

Fish growth rate was initially modeled at 0.035 millimeters (mm) per Celsius temperature unit (CTU) per day (0.035 mm/CTU/day) in the original hatchery bio-program documents. Actual growth rates for similar species of fish in similar rearing conditions (water temperature profiles) suggest that this rate is lower than actual rates of growth using conventional fish food diets. CDFW provided actual growth rate data from previous rearing events at FCFH (calendar year 2003 rearing history) that demonstrated that actual growth rates are closer to 0.05 mm/CTU/day for Chinook Salmon. CDFW identified that actual growth rates are controlled by hatchery feeding guidelines and fish may be restricted (growth slowed) during colder periods of rearing (lower metabolic requirements) to target specific release sizes. Fish growth modeling efforts assume a growth rate of 0.045 and 0.05 mm/CTU/day for Coho and Chinook rearing, respectively.

5.2 Water Temperature

Water temperature is a primary determining factor in the development and growth rate of fish. The Fall Creek Fish Hatchery water supply includes a 10 cfs year-round water right from Fall Creek. The Fall Creek water source has a demonstrated history of water temperature ranges (and assumed water *quality* based on prior positive rearing history) that generally favor the growth and development of anadromous salmonids. Figure 5-1 provides mean monthly rearing temperature data (degrees Fahrenheit) for the water source currently supplying the abandoned Fall Creek facility. Additional water chemistry testing is to be completed on source water, with the results described in future TMs.

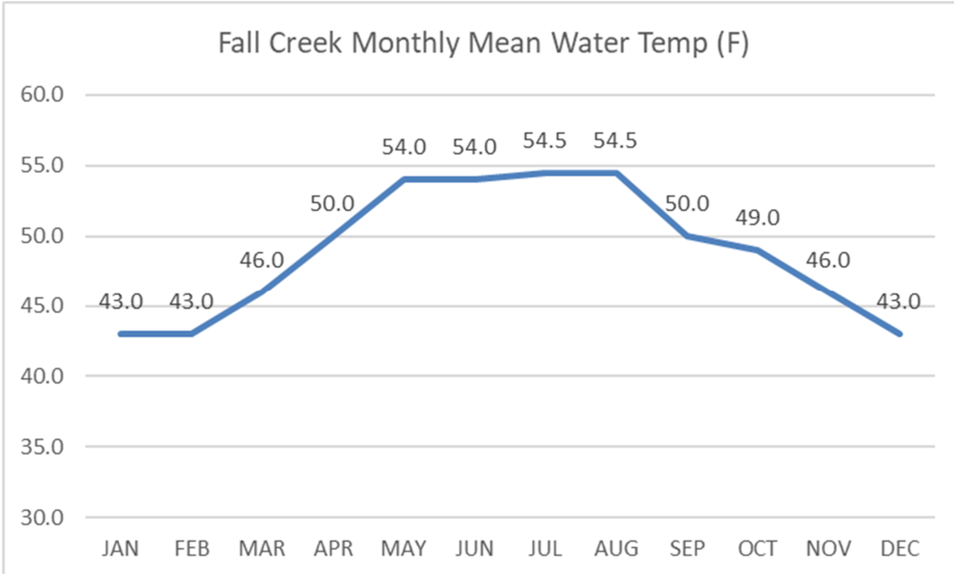


Figure 5-1. Mean Monthly Fall Creek Rearing Temperatures (Data from L. Radford, CDFW)

The proposed facility upgrades will use the existing Fall Creek source as the sole source for water supply to the facility (no groundwater well development planned). The water source, water rights, and general flow rates at the facility will remain unchanged for the proposed project design.

5.3 Density Index

Density index (DI) is a common method for estimating maximum carrying capacity in a rearing vessel. DI is a function of pounds of fish per cubic foot of rearing volume, per inch of fish length (lb/cf/in). The DI used for Pacific salmon species in a raceway (flow-through) environment is typically in the 0.2 to 0.3 range (Heindel, 2020), but can be highly variable depending on species, rearing goals, fish performance, and water quality. Additional information specific to DI is provided in the example below (adapted from Piper et al., 1982) and in Table 5-1:

"A common method for estimating maximum carrying capacity in a tank/raceway is the Density Index (DI). D.I. is a factor which, when multiplied by container volume in CUBIC FEET (V) and by fish length in inches (L) will give the maximum allowable weight of fish (W). A general rule of thumb for salmonids (Pacific salmon in this case) is DI should be from 0.2 to 0.5 (pounds of fish per cubic foot of tank space); fish densities should be no greater than 0.2 to 0.5 times their length in inches (for Pacific salmon)".

Table 5-1. Key DI Calculations

Design Question	Calculation
What is permissible weight of fish?	$W = D * V * L$
What is Density Index (D.I.)?	$D = \frac{W}{(L * V)}$

Design Question	Calculation
What Volume is Required at Certain D.I.?	$V = \frac{W}{(D * L)}$

Where: W = Weight in lbs. (biomass); D = Density Index; V = Volume of Unit in ft^3; L = Fish Length in Inches

"Example: If DI of 0.2 is used, 2-inch fish could be held at a density of 0.4 pounds per cubic foot (0.2 x 2 = 0.4) / If DI of 0.5 is used, 2-inch fish could be held at a density of 1 pounds per cubic foot (0.5 x 2 = 1). Note: DI is useful in estimating carrying capacity but only considers SPACE, not flow!"

CDFW staff generally employ aquaculture rearing guidelines that focus on pounds of fish per cubic foot of rearing space (lbs/ft3) and the rate of water exchange through a given sized vessel. The water exchange is identified as water turnovers per hour (R) and/or hydraulic retention time (HRT) in water exchanges every "X" minutes. Acknowledging that historic survival from green egg through release at Iron Gate Hatchery is extremely variable based on previous survival data provided by CDFW (sub-yearling and/or yearling Chinook and Coho), FCFH rearing volume estimates provided below will assume a maximum DI of 0.3.

It is important to note that conservative rearing values should always be utilized in designing new hatchery facilities. While higher DIs are possible in some circumstances and with some species/stocks of fish, the values used in the current design are considered a prudent starting point providing the greatest number of fish with the highest level of fitness and smolt quality. Production of high-quality juveniles should translate into higher downstream survival of anadromous emigrants with a corresponding increase in adults returning from original hatchery production efforts.

The DI is used to calculate the total volume of rearing space required in terms of cubic feet. Table 5-2 reflects the rearing volume required for the Coho yearling program proposed at the FCFH using density indices of 0.3 and a mean fish size of 10 fpp at release based on current production goals. The total volume can then be divided by the volume of individual rearing units in order to show the total number of rearing units required per scenario. The number of rearing units will vary with fish species, fish size, and management requirements.

Table 5-2. FCFH Coho Bio-Program – DI and Rearing Unit Calculations

75,000 Coho @10 fpp, 6.57" mean, 45.1 g/f mean (C3500 Piper)						
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**
75,000	10	6.570	45.4	7,500	0.3	3,805

The bio-program assumes that CDFW staff will manipulate feed rates (and resulting growth profile) during colder months to achieve the 10 fpp target release size. Based on the fish number and size in Table 5-2, the total maximum rearing volume for Coho yearlings is approximately 3,805 cubic feet. When considering a rearing buffer volume, a total rearing volume of 4,000 cubic feet would be required.

The fish rearing tank numbers and sizes will be discussed with CDFW to select the optimum configuration to meet fish marking, tank changes, and fish health management objectives.

Table 5-3 reflects the rearing volume required for the Chinook sub-yearling/yearling program proposed at the FCFH using density indices of 0.3 and a mean fish size at release based on current production goals. Discussions with CDFW Fish Managers suggest that the new design parameters should consider maximizing full use of the available water (10 cfs). Table 5-3 presents a rearing scenario that was developed to maximize Chinook production at the facility with the following guidelines:

- Initial ponding of approximately 3,250,000 first-feeding fry;
- Rear 3.25M through end of March and release ~ 1.25M sub-yearlings at ~ 520 fpp/0.871 g/f mean size;
- Rear remaining ~ 2.0M through end of May and release ~1.75M sub-yearlings at ~ 104 fpp/4.35 g/f mean size;
- Rear remaining ~250,000 yearlings and release ~ end of November at ~ 10 fpp/45.27 g/f mean size.
- Marking and tagging strategies will be determined at a later date.

Table 5-3. FCFH Chinook Bio-Program – DI and Rearing Unit Calculations

3,250,000 Chinook @521 fpp, 1.862" mean, 0.87 g/f mean (C3000 Piper)						
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**
3,250,000	521	1.862	0.87	6,241	0.3	11,170

2,000,000 Chinook @104 fpp, 3.175" mean, 4.35 g/f mean (C3000 Piper)						
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**
2,000,000	104	3.175	4.35	19,231	0.3	20,190

250,000 Chinook @10 fpp, 6.98" mean, 45.27 g/f mean (C3000 Piper)						
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**
250,000	10	6.980	45.27	25,000	0.3	11,915

The fish rearing tank numbers and sizes will be discussed with CDFW to select the optimum configuration to meet fish marking, tank changes, and fish health management objectives; a follow-up TM will be produced once tank sizes and configuration have been determined.

5.4 Flow Index

Flow index (FI) is a function of pounds of fish per fish length in inches times flow in gallons per minute (gpm). Flow index is an indication of how much oxygen is available for fish metabolism and is adjusted based on the elevation of the project site and water temperature. Both of these variables affect the amount of dissolved oxygen (D.O.) in the water supply at saturation. Additional information specific to FI is provided in the example below (adapted from Piper et al., 1982) and in Table 5-4.

"The Flow Index (FI) describes how rapidly fresh water will replace "used" water (water in which fish have reduced D.O. concentrations and excreted waste products). The FI takes flow rate into consideration when estimating maximum allowable weight of fish that a culture unit can hold."

Table 5-4. Key Flow Index Calculations

Design Question	Calculation
What is Flow Index (F.I.) if you know Weight, Length and Inflow?	$F = \frac{W}{(L * I)}$
What is permissible Weight if you know F.I., Length and Inflow?	$W = F * L * I$
What is Inflow requirement if you know Weight, F.I. and Length?	$I = \frac{W}{(F * L)}$

Where: W = Weight in lbs. (biomass); F = Flow Index; I = Inflow of water in gpm; L = Fish Length in inches

"As a rule of thumb for salmonids (certainly Pacific salmon), FI values should range from 0.5 to 1.5. Actual FI values will depend on several factors, especially the dissolved oxygen concentration of the inflowing water. To correctly estimate the FI for a specific unit, fish are added while water flow is held constant; when enough fish have been added to the system so that the DO level in the outflow has been reduced below ~ 6ppm, the unit is at maximum [fish capacity]."

According to Table 8 in *Fish Hatchery Management* (Piper et al., 1982), the recommended flow index for the FCFH at an elevation of 2,200 feet and a range of actual water temperatures (degrees Fahrenheit) is provided below:

- 40 F = 2.50 FI
- 45 F = 2.10 FI
- 50 F = 1.68 FI
- 55 F = 1.40 FI

Using the conservative design guidelines identified in the DI section above and experience with conservation stocks of both Coho and Chinook salmon (Heindel, 2020), flow considerations modeled below assume an FI of no greater than 1.5. As noted previously, this is a reasonable starting point for a new facility (at stated elevation and water temperature profiles). Rearing experience gained over multiple years will allow operators the opportunity to modify actual FIs based on demonstrated fish performance/survival. Flow indices of 1.5 are applied to the rearing scenarios described previously to establish maximum water requirements for the proposed Coho yearling and Chinook sub-yearling/yearling programs as illustrated in Tables 5-5 and 5-6.

Table 5-5. FCFH Coho Bio-Program – FI and DI Unit Calculations

75,000 Coho @10 fpp, 6.57" mean, 45.1 g/f mean (C3500 Piper)								Single-Pass	
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**	**F.I. (lb/gpm/in)**	**Flow Req (gpm)**	**Flow Req (cfs)**
75,000	10	6.570	45.1	7,500	0.3	3,805	1.50	761	1.70

Table 5-6. FCFH Chinook Bio-Program – FI and DI Unit Calculations

3,250,000 Chinook @521 fpp, 1.862" mean, 0.87 g/f mean (C3000 Piper)								Single-Pass	
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**	**F.I. (lb/gpm/in)**	**Flow Req (gpm)**	**Flow Req (cfs)**
3,250,000	521	1.862	0.87	6,241	0.3	11,170	1.50	2,234	4.98

2,000,000 Chinook @104 fpp, 3.175" mean, 4.35 g/f mean (C3000 Piper)								Single-Pass	
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**	**F.I. (lb/gpm/in)**	**Flow Req (gpm)**	**Flow Req (cfs)**
2,000,000	104	3.175	4.35	19,231	0.3	20,190	1.50	4,028	9.00

250,000 Chinook @10 fpp, 6.98" mean, 45.27 g/f mean (C3000 Piper)								Single-Pass	
Number Fish	**Fish Size Out (fpp)**	**Fish Size Out (L inches)**	**Fish Size Out (g/f)**	**End Biomass (lbs)**	**D.I. (lb/cf/in)**	**Tank Space Req (cu ft)**	**F.I. (lb/gpm/in)**	**Flow Req (gpm)**	**Flow Req (cfs)**
250,000	10	6.980	45.27	25,000	0.3	11,915	1.50	2,383	5.31

The initial flow modeling suggests that the fish numbers and sizes proposed above can be accommodated with the available 10 cfs water right. The analysis indicates that the peak flow of 9.0 cfs for the Chinook group is required about 1 month after the release of the Coho yearling. The maximum flow required for newly-ponded Coho during the same period is 166 gpm with sufficient water available for the proposed rearing and release scenario.

6.0 Incubation and Rearing Facilities

This section provides a brief summary of the incubation and rearing flows and volumes required for the program based on CDFW input. The bio-programming information provided is largely tied to incubation needs in early design.

6.1 Mean Survival Assumptions

Mean survival data by life stage was provided during a meeting with CDFW (CDFW, 2020). The initial sizing of incubation facilities is based on the following survival data provided by CDFW (2020):

- Green egg to eyed survival: 80% (~ 20% loss)
- Eyed egg to ponding survival: 93% (~7% loss)
- Green egg to ponding survival: 73% (~27% loss)
- Ponding inventory to release: 95% (5% loss)

Based on the mean survival data and tied to the rearing scenarios presented above, estimates of total green eggs required for the Project are provided in Table 6-1.

Table 6-1. Starting Inventory at FCFH - Coho and Chinook

Species	Incubation Period	Incubation Start Number	% Survival Green to Pond	Pond Number	Ponding Period
Coho	Oct. – Mar.	120,000	73%	~88,000	~ Jan. – Mar.
Chinook	Oct. – Mar.	4,500,000	73%	~3,250,000	~ Jan. – Mar.

6.2 Incubation

Incubation systems currently at Iron Gate Fish Hatchery (IGFH) will be used for egg/alevin incubation at FCFH. A total of 130 incubation stacks are currently available for future rearing needs. The existing incubation units are vertical stack incubators with a double-stack arrangement (15 useable trays per stack); hydraulic head requirements at Fall Creek dictate that new incubation systems will be reduced to "½" stack design with eight useable trays per incubator (empty tray on top for sediment collection). Water flow requirements are modeled at 5 gpm per manufacturer's recommendations (industry standard). Incubation requirements for Coho and Chinook based on updated tray loading densities are provided in Table 6-2.

Table 6-2. Incubation Loading at FCFH – Coho and Chinook (Proposed Loading Rates)

Species	Green Inventory	Mean # Eggs/Ounce	Ounces/Tray	Total Trays	Total Stacks**	Total Flow (gpm)
Coho	120,000	TBD	TBD	40*	6	30
Chinook	4,500,000	80	50-55	1,088	136	680

*Per CDFW Egg Incubation Data; L. Radford

**8-tray setup (1/2 stack); required because of reduced hydraulic head (no pumping)

Current facility bio-program efforts will assume a maximum incubation need of 40 gpm for Coho incubation and 680 gpm for Chinook incubation. Historic tray loading for the Chinook incubators at Iron Gate often approached ~8,000-10,000 green eggs per tray (100 ounces). Reducing the total number of eggs/tray to ~4,000 (approximately 50 ounces/tray) for the Chinook incubation increases the total footprint and water demand yet should improve survival of resulting eggs/alevins while also reducing the risks associated with disease/fungal infection.

6.3 First-Feeding Vessels

First-feeding vessel requirements will be addressed once the final Program size is determined. Estimates of total rearing volume and flow requirements will be refined at a later date. Coho brood cohorts (first-feeding fry & smolt program) will overlap from early-ponding through smolt release; Coho production for the second cohort is assumed to require approximately 500 ft^3 of rearing space from first-feeding through late-April transfer to larger production ponds (post-smolt release).

6.4 Grow-out Vessels

Grow-out vessel (post-marking and parr/smolt rearing containers/sizes) requirements will be addressed once the final Program size is determined. Estimates of total rearing volume and flow requirements will be refined at a later date. Initial bio-program estimates suggest a maximum grow-out rearing need of 3,800 ft^3 of Coho rearing space (April release) and approximately 20,200 ft^3 of Chinook rearing space (May release).

6.5 Adult Holding Ponds

Adult holding and spawning ponds will be designed per CDFW recommendations for design flows, holding volumes, and fish handling systems; adult flow and holding requirements will align with NOAA guidelines for anadromous adults. Initial site investigations suggest that the four (4) raceways currently on-site (south of Copco Road) could be retained, renovated, and would provide sufficient space to hold the requested 100 Coho and 200 Chinook pre-spawn adults. Early design efforts will assume that all non-cleaning (effluent) flows, which is approximately 10 cfs, will be routed to the adult ponds and used for adult holding and fish ladder attraction flows.

6.6 Peak Water Supply

Peak water demand is modeled based on the rearing scenarios presented within this TM. Considering the design limitation that the total surface water supplies from Fall Creek will not exceed 10 cfs, Table 6-3 provides an overview of the annual water budget based on initial modeling efforts.

Table 6-3. FCFH Water Requirements – Full Production (Concurrent Use of All Facilities)

Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Juv. CFS	3.1	5.9	6.7	7.2	9.3	2.2	3.1	4.1	5.1	7.6	8.3	3.1
Total Ladder CFS									10.0	10.0	10.0	10.0

7.0 Effluent Treatment Systems

Effluent treatment system requirements will be addressed once the final Program size is determined; estimates of total effluent treatment will be refined at a later date. We understand that an NPDES permit will be required for the Program and that all design efforts will focus on minimizing downstream water quality impacts to Fall Creek (and beyond).

8.0 Fish Passage Design and Screening Criteria

Fish passage design and screening criteria will be addressed in the Facility Design Criteria Technical Memorandum (TM 002).

9.0 Biological Reference Documents

Biological design criteria presented within this TM were obtained from the following sources/literature:

CDFW (California Department of Fish and Wildlife). 2020. CDFW Staff meeting held in Redding, CA on January 27 & 28, 2020.

CDM Smith. 2019. Basis of Design Report.

Heindel, J. 2020. Personal experience and industry standard rearing values for conservation stocks of Pacific salmon.

NMFS (National Marine Fisheries Service). 2011. Anadromous Salmonid Fish Passage Facility Design. Northwest Region. July 2011.

Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, and J.R. Leonard. 1982. Fish Hatchery Management. U.S. Fish and Wildlife Service. Washington, D.C.

Wedemeyer, G.A. 1996. Physiology of Fish in Intensive Culture Systems. New York: International Thompson Publishing.

9-Mar-20

PRELIMINARY BIOPROGRAM AND APPROXIMATE HATCHERY OPERATION SCHEDULE
Fall Creek Hatchery - Coho Yearling / Chinook Sub-Yearling & Yearling Program

				OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
CHINOOK PRODUCTION																												
Egg Take - Green to Eyed Egg Period																												
On Station Incubation - Eyed Eggs xfr in Nov 15 at 400 CTU																												
Chinook Brood Year Rearing in TBD (~12x4x50 Vats Pond-Rls.)												Mark and Xfr by May 31																
~ 250k Chinook Yearlings																		Xfr out Nov										
Coho BY-A Early Rearing in Vats & Small Raceways											Xfr to Large Ponds																	
Coho BY-A in Production Raceways/Vats																							Xfr out Mid-April					
Coho BY-B in Early Rearing Vats & Small Raceways											Xfr to Large Ponds												Xfr to Large Ponds					
Coho BY-B in Production Raceways/Vats																												
			(F)	*49.0*	*46.0*	*43.0*	*43.0*	*43.0*	*46.0*	*50.0*	*54.0*	*54.0*	*54.5*	*54.5*	*50.0*	*49.0*	*46.0*	*43.0*	*43.0*	*43.0*	*46.0*	*50.0*	*54.0*	*54.0*	*54.5*	*54.5*	*50.0*	*49.0*
FC Sub-Yearling Chinook	*3,250,000*	*(Start Inv)*						3,250,000	3,250,000	2,000,000	2,000,000	250,000	250,000	250,000	250,000	250,000	250,000			3,250,000	3,250,000	2,000,000	2,000,000	250,000	250,000	250,000	250,000	250,000
Fall Creek Monthly Mean Water Temperature (C)				9.44	7.78	6.11	6.11	6.11	7.78	10	12.22	12.22	12.5	12.5	10	9.44	7.78	6.11	6.11	6.11	7.78	10	12.22	12.22	12.5	12.5	10	9.44
Projected Growth Rate (mm/month)	*0.05*	*mm/ctu/day*						4.58	11.67	15.00	18.33	18.33	18.75	18.75	15.00	14.16	11.67			4.58	11.67	15.00	18.33	18.33	18.75	18.75	15.00	14.16
Fish Length Inches EOM - Assumes 1200 fpp & .376 g/f @ ponding				*L*				1.403	1.862	2.453	3.175	3.896	4.634	5.373	5.963	6.521	6.980		*L*	1.403	1.862	2.453	3.175	3.896	4.634	5.373	5.963	6.521
Fish Weight Grams EOM (Piper Tables; Assumes C3000)				*g/f*				0.376	0.871	2	4.35	7.98	13.7	20.96	28.94	37.65	45.27		*g/f*	0.376	0.871	2	4.35	7.98	13.7	20.96	28.94	37.65
Fish Per Pound EOM				*fpp*				1200 #	521 #	227 #	104#	57#	33 #	22 #	16 #	12 #	10 #		*fpp*	1200 #	521 #	227 #	104#	57#	33 #	22 #	16 #	12 #
Biomass In Pounds EOM				*biom*				2,694	6,241	8,819	19,180	4,398	7,551	11,552	15,951	20,751	24,951		*biom*	2,694	6,241	8,819	19,180	4,398	7,551	11,552	15,951	20,751
Volume Required EOM (cu.ft.)	*0.3*	*DI*		*cu.ft.*				6,401	11,169	11,983	20,139	3,763	5,431	7,167	8,916	10,608	11,915		*cu.ft.*	6,401	11,169	11,983	20,139	3,763	5,431	7,167	8,916	10,608
Flow Required EOM (gpm)	*1.5*	*FI*		680	680	680	680	1,280	2,234	2,397	4,028	753	1,086	1,433	1,783	2,122	2,383			1,280	2,234	2,397	4,028	753	1,086	1,433	1,783	2,122
Assume ~4.5M green; 4,136 green eggs/tray; 1,088 trays = 136 1/2 stacks								680	1.25M Rls End Mar		1.75M Rls End May (post-mark 150/lb)				Incub:	680	680	680	680	680	1.25M Rls End Mar		1.75M Rls End May					680
CDFW Growth Reduction; Days Feed/Month																23 days	15 days	7 days	7 days	7 days	15 days							
									78,400	77,600	77,400	77,200	77,000	76,800	76,600	76,400	76,200	76,000	75,800	75,600	75,400	75,000						
FC Yearling Coho	*80,000*	*(Start Inv)*													Ration:	75%	50%	25%	25%	25%	50%	Ap. 15 Rls						
Fall Creek Monthly Mean Water Temperature (C)				9.44	7.78	6.11	6.11	6.11	7.78	10	12.22	12.22	12.5	12.5	10	9.44	7.78	6.11	6.11	6.11	7.78	10	12.22	12.22	12.5	12.5	10	9.44
Projected Growth Rate (mm/month)	*0.045*	*mm/ctu/day*						4.12	10.50	13.50	16.50	16.50	16.88	16.88	13.50	9.77	5.25	1.92	1.92	1.92	5.25	4.50						
Fish Length Inches EOM - Assumes 1400 fpp & .323 g/f @ ponding				*L*				1.270	1.684	2.215	2.864	3.514	4.178	4.843	5.374	5.759	5.966	6.041	6.117	6.193	6.400	6.577						
Fish Weight Grams EOM (Piper Tables; Assumes C3500)			***Brood Year A***	*g/f*				0.323	0.744	1.72	3.72	6.99	11.7	18.23	24.77	30.2	33.5	35.3	37.5	37.8	41.8	45.4						
Fish Per Pound EOM				*fpp*				1400 #	610 #	263 #	122#	65 #	39 #	25 #	18 #	15 #	14 #	12.9 #	12.1 #	11.9 #	10.8 #	10 #						
Biomass In Pounds EOM				*biom*				57	129	294	635	1,190	1,986	3,087	4,183	5,087	5,628	5,915	6,267	6,300	6,948	7,500						
Volume Required EOM (cu.ft.)	*0.3*	*DI*		*cu.ft.*				150	255	443	739	1,129	1,584	2,125	2,595	2,944	3,145	3,263	3,415	3,391	3,619	3,801						
Flow Required EOM (gpm)	*1.5*	*FI*		40	40	40	40	30	51	89	148	226	317	425	519	589	629	653	683	678	724	760						40
CDFW Growth Reduction; Days Feed/Month					15 days	7 days	7 days	7 days	15 days																			
					76,200	76,000	75,800	75,600	75,400	75,000																		23 days
FC Yearling Coho	*80,000*	*(Start Inv)*		Ration:	50%	25%	25%	25%	50%	Ap. 15 Rls											78,400	77,600	77,400	77,200	77,000	76,800	76,600	76,400
Fall Creek Monthly Mean Water Temperature (C)				9.44	7.78	6.11	6.11	6.11	7.78	10	12.22	12.22	12.5	12.5	10	9.44	7.78	6.11	6.11	6.11	7.78	10	12.22	12.22	12.5	12.5	10	9.44
Projected Growth Rate (mm/month)	*0.045*	*mm/ctu/day*			5.25	1.92	1.92	1.92	5.25	4.50										4.12	10.50	13.50	16.50	16.50	16.88	16.88	13.50	9.77
Fish Length Inches EOM - Assumes 1400 fpp & .323 g/f @ ponding				*L*	5.966	6.041	6.117	6.193	6.400	6.577									*L*	1.270	1.684	2.215	2.864	3.514	4.178	4.843	5.374	5.759
Fish Weight Grams EOM (Piper Tables; Assumes C3500)			***Brood Year B***	*g/f*	33.5	35.3	37.5	37.8	41.8	45.4									*g/f*	0.323	0.744	1.72	3.72	6.99	11.7	18.23	24.77	30.2
Fish Per Pound EOM				*fpp*	14 #	12.9 #	12.1 #	11.9 #	10.8 #	10 #									*fpp*	1400 #	610 #	263 #	122#	65 #	39 #	25 #	18 #	15 #
Biomass In Pounds EOM				*biom*	5,628	5,915	6,267	6,300	6,948	7,500									*biom*	57	129	294	635	1,190	1,986	3,087	4,183	5,087
Volume Required EOM (cu.ft.)	*0.3*	*DI*		*cu.ft.*	3,145	3,263	3,415	3,391	3,619	3,801									*cu.ft.*	150	255	443	739	1,129	1,584	2,125	2,595	2,944
Flow Required EOM (gpm)	*1.5*	*FI*		*gpm*	629	653	683	678	724	760						40	40	40	40	30	51	89	148	226	317	425	519	589
			GPM	720	1,349	1,373	1,403	2,668	3,009	3,245	4,176	978	1,403	1,858	2,302	3,430	3,732	1,373	1,403	2,668	3,009	3,245	4,176	978	1,403	1,858	2,302	3,430
			CFS	1.6	3.0	3.1	3.1	5.9	6.7	7.2	9.3	2.2	3.1	4.1	5.1	7.6	8.3	3.1	3.1	5.9	6.7	7.2	9.3	2.2	3.1	4.1	5.1	7.6
			Tot. Adult Flow	10.0	10.0	10.0									10.0	10.0	10.0	10.0									10.0	10.0
				OCT	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**

Appendix G
Water Quality Sampling Technical Memo

Technical Memorandum No. 003

To:	Mark Bransom, KRRC Jason Roberts, CDFW	Project:	Klamath River Renewal Project – Fall Creek Hatchery Project
From:	Derek Nelson Jeff Heindel	Cc:	Jodi Burns, Project Manager Morton D. McMillen, P.E. File
Date:	May 5, 2020	Job No.:	20-024
Subject:	Technical Memorandum No. 003 – Fall Creek Hatchery Water Quality Analysis		

Revision Log

Revision No.	Date	Revision Description
0	03/19/2020	Initial Draft
1	05/05/2020	City of Yreka - Water Sampling Database Review

May 5, 2020 Update – REV01

California Department of Fish and Wildlife and Klamath River Renewal Corporation staff reviewed the original Technical Memorandum 003 submittal in March 2020 (REV00) and recommended a review of available City of Yreka water quality data. Section 3.0 of this TM has been updated to reflect the resulting City of Yreka database review and provides additional water quality data for the proposed Fall Creek Fish Hatchery (dataset also provided as Appendix C); no additional report information has been modified.

1.0 Purpose

The purpose of this technical memorandum (TM) is to summarize the Fall Creek water quality analysis results obtained from Basic Laboratory, Inc. The primary purpose of water sampling was to develop baseline water quality data for the proposed Fall Creek Fish Hatchery (FCFH) facility renovations. The Fall Creek water source has been used as recently as 2003 for the rearing of anadromous Pacific salmon juveniles with positive fish production results. During past fish rearing operations, there were no known water chemistry concerns and no major fish pathogens detected during the period of culture. The site historically had good fish survival and performance.

Water samples were collected at the proposed FCFH intake location on January 28, 2020 by Dr. Mark Clifford from the California Department of Fish & Wildlife (CDFW), and delivered on the same day to Basic Laboratory, Inc., located in Redding, California. Water quality samples were collected in Fall Creek at approximately 10:15 a.m. Pacific Standard Time (PST) immediately above the existing Dam A and the City of Yreka's water supply intake.

2.0 Sampling Results

Table 2-1 provides the general chemistry and total metals results of the analyses for the sampling location as well as the Basic Laboratory, Inc. Method Detection Limit (MDL) for each parameter. Final results received from Basic Laboratory, Inc. are attached as Appendix A. General coldwater aquaculture parameter limits are presented for reference. Stated coldwater aquaculture recommendations are taken from industry-standard guidelines and published literature (Piper et al., 1982; Daily and Economon, 1983; Wedemeyer, 1996; Summerfelt et al., 2004). The parameter standards are presented for use as general guidelines only and final water quality determinations should not be made until surrogate trials have been conducted with live fish during a partial and/or full rearing cycle.

Table 2-1. Fall Creek Water Quality Analysis

Parameter	Units	Typical Limit for Aqua-Culture	MDL	Sample Results
General Chemistry				
Sulfide as Hydrogen Sulfide	mg/L	<0.002	0.0106	0.0181*
pH	SU	6.5-8.0	-	8.15* (field test required)
Alkalinity as $CaCO_3$	mg/L	>20	2	67
Bicarbonate	mg/L	75-100	2	82
Chloride	mg/L	4.0 (reuse systems)	0.16	0.95
Fluoride	mg/L	<0.2	0.04	0.05
Nitrate as N	mg/L	<1.0	0.02	0.55
Nitrite as N	mg/L	<0.1	0.003	0.007
Sulfate as $S0_4$	mg/L	<50	0.20	0.42
Total Dissolved Solids	mg/L	<200	3	97
Total Suspended Solids	mg/L	<80	2	3.6
Ammonia (TAN)	mg/L	<1.0	0.020	0.022
Chlorine	mg/L	<0.003	0.03[a]	ND
Carbon Dioxide	mg/L	1.5-15	1.6	2.6
Dissolved Oxygen	mg/L	>6.0	0.2	11.0
Metals - Total				
Aluminum	mg/L	<0.075[b] <0.01[c]	0.0011	0.312*
Arsenic	mg/L	<0.05	0.0001	0.00049
Barium	mg/L	<5.0	0.0001	0.00459
Cadmium	mg/L	<0.0005 (soft water)	0.00004	ND
Calcium	mg/L	>5.0	0.1	12.5
Chromium	mg/L	<0.03	0.0001	0.00118
Copper	mg/L	<0.0006 (soft water)	0.00012	0.00052
Iron	mg/L	<0.15	.003	0.282*

Parameter	Units	Typical Limit for Aqua-Culture	MDL	Sample Results
Lead	mg/L	<0.02	0.00007	ND
Magnesium	mg/L	<15	0.1	7.6
Manganese	mg/L	<0.01	0.0001	0.0044
Mercury	mg/L	<0.0002[b]	0.00004	ND
Nickel	mg/L	<0.01	0.00011	0.00049
Potassium	mg/L	<5	0.3	1.2
Selenium	mg/L	<0.01	0.0003	ND
Silver	mg/L	<0.003	0.00004	ND
Sodium	mg/L	<75	0.2	5.3
Sulfur	mg/L	<1.0	0.34	0.105
Vanadium	mg/L	<0.1	0.00028	0.00472
Zinc	mg/L	<0.005	0.0005	0.0006

[a] – MDL is above maximum standard value

[b] – Wedemeyer, 1996

[c] – Daily and Economon, 1983

ND – Analyte not detected; mg/L = milligrams per liter

Of the Fall Creek source parameters evaluated, three samples yielded results that were higher than typical published limits for aquaculture:

1. The sulfide as hydrogen sulfide sample resulted in a 0.0181 value (typical limits of <0.003 mg/L [Wedemeyer, 1996] and <0.002 mg/L [Timmons and Ebeling, 2010]).
2. The aluminum sample resulted in a 0.312 mg/L value (typical limits of <0.01 mg/L [Timmons and Ebeling, 2010] and <0.075 mg/L [Wedemeyer, 1996]).
3. The iron sample resulted in a 0.282 mg/L value (typical limits of <0.1 mg/L [Wedemeyer, 1996] and <0.15 mg/L [Timmons and Ebeling, 2010]).

The results for sulfide as hydrogen sulfide were elevated at 0.0181. The maximum safe exposure level is 0.002 mg/L for fish and other aquatic life in natural surface waters (Wedemeyer, 1996). Hydrogen sulfide rarely occurs in surface water at detrimental levels due to aerobic conditions, and sulfides are oxidized to sulfates (Wedemeyer, 1996). Potential sources of hydrogen sulfide in surface waters are usually associated with upstream lakes and reservoirs that may have higher levels of hydrogen sulfide produced from bottom sediments. The addition of aeration structures can reduce levels by volatilization to the atmosphere as well as continuing the aerobic conditions that further degrade hydrogen sulfide. Aeration is not anticipated based on the past production success at the hatchery site.

Sampling of pH resulted in a slightly elevated reading of 8.15; optimum pH values for freshwater fish are generally in the range of 6.5 to 9.0 (Wedemeyer, 1996; Timmons and Ebeling, 2010). It is important to note that pH tests should ideally be analyzed in the field within 15 minutes of sampling (*per Basic Laboratory, Inc. recommendations*). We suggest another field sampling event for pH using one or more hand-held pH units for a more accurate value of this analyte. It is anticipated that additional sample results will be within normal ranges for aquaculture.

Sampling of chlorine resulted in a *Not Detected* (ND) value based on the MDL value for this analyte (0.03 mg/L). It is important to note that most published literature for chlorine levels and freshwater fish suggest values of less than 0.003 mg/L (below the MDL). While elevated background levels are unlikely, given the surface water source and remote location, we recommend a backup sampling event to verify values based on more rigorous MDLs (</= 0.003 mg/L). As noted for pH above, Basic Laboratory, Inc. recommends that chlorine tests be field analyzed within 15 minutes of sampling. A field test using one or more approved testing methods is warranted to verify actual chlorine values for the Fall Creek system.

Iron and aluminum sample values for this sampling event yielded values outside the range generally accepted as safe for salmonids in freshwater. These analytes should be discussed, and potential resampling events conducted if these values are concerning to CDFW staff. If available, water sampling data from the Iron Gate Fish Hatchery (IGFH) could be reviewed to determine whether or not similar values are common in the area. Additional discussions of these values are warranted prior to advanced design of the Fall Creek facility.

All remaining water sampling results yielded sample values that were well within general water chemistry recommendations for salmonid (coldwater) aquaculture facility water supplies. If deemed necessary, resampling of the Fall Creek source water can be arranged to verify sample results for hydrogen sulfide, pH, chlorine, as well as iron and aluminum.

CDFW staff performed Total Gas Pressure (TGP) and Dissolved Oxygen (DO) measurements at three locations on Fall Creek on February 4, 2020. The results were reviewed by CDFW Fish Health staff with no major concerns reported. A copy of the CDFW Fish Pathologist Report is attached to this document as Appendix B.

As discussed above, the Fall Creek site has successfully reared anadromous salmonids in the past. The recent water quality results do not present any major concerns for the production of Coho or Chinook. Water quality parameters are often interdependent, and although a few parameters are slightly out of the recommended range, other parameters can negate any adverse impacts that would be detrimental to aquaculture. Continued monitoring of water quality over the next year is recommended to provide a baseline for the entire year to ensure that parameters do not fluctuate significantly. On-site measurements of pH, dissolved oxygen, and turbidity are recommended.

3.0 City of Yreka Water Sampling Database Review

The City of Yreka's Rob Taylor (rtaylor@ci.yreka.ca.us) provided the following link containing historic water quality testing data for the Dam A Impoundment (Primary Station Code 4710011-002):

https://sdwis.waterboards.ca.gov/PDWW/JSP/MonitoringResults.jsp?tinwsys_is_number=4717&tinwsys_st_code=CA&counter=0

The database was queried only for the following parameters identified as a possible concern during the initial sampling (see Appendix C for full dataset):

- Sulfide as Hydrogen Sulfide
- Aluminum
- Iron
- pH
- Chlorine

Table 3-1 provides a summary of the testing values as compared to initial sampling efforts on January 28. 2020:

Table 3-1. Fall Creek Water Quality Analysis – Combined Analysis

Parameter	Units	Typical Limit for Aqua-Culture	Sample Date	Sample Results
General Chemistry				
Sulfide as Hydrogen Sulfide	mg/L	<0.002	01/28/2020	0.0181
Sulfide as Hydrogen Sulfide			Data Set	Not Sampled; 1984 - 2020
pH	SU	6.5-8.0	01/28/2020	8.15 (field test required)
pH	SU	6.5-8.0	11/02/2011	7.9
pH	SU	6.5-8.0	11/02/2005	7.93
pH	SU	6.5-8.0	06/25/1991	7.9
pH	SU	6.5-8.0	06/26/1990	7.6
pH	SU	6.5-8.0	06/08/1989	8.2
pH	SU	6.5-8.0	06/23/1988	7.27
pH	SU	6.5-8.0	06/24/1987	7.87
pH	SU	6.5-8.0	08/13/1986	7.4
pH	SU	6.5-8.0	10/01/1985	7.95
Chlorine	mg/L	<0.003	0.03	ND
Chlorine			Data Set	Not Sampled; 1984 - 2020
Metals - Total				
Aluminum	mg/L	<0.075[b] <0.01[c]	01/28/2020	0.312
Aluminum	mg/L	<0.075[b] <0.01[c]	08/23/2016	0.083
Aluminum	mg/L	<0.075[b] <0.01[c]	10/01/2007	0.0515
Aluminum	mg/L	<0.075[b] <0.01[c]	11/02/2005	0.0666
Aluminum	mg/L	<0.075[b] <0.01[c]	06/25/1991	0.1
Aluminum	mg/L	<0.075[b] <0.01[c]	06/26/1990	0.1

Parameter	Units	Typical Limit for Aqua-Culture	Sample Date	Sample Results
Aluminum	mg/L	<0.075[b] <0.01[c]	06/08/1989	0.0002
Iron	mg/L	<0.15	01/28/2020	0.282
Iron	mg/L	<0.15	06/25/1991	0.056
Iron	mg/L	<0.15	06/26/1990	0.05
Iron	mg/L	<0.15	06/08/1989	0.06
Iron	mg/L	<0.15	06/23/1988	0.012
Iron	mg/L	<0.15	06/24/1987	0.05
Iron	mg/L	<0.15	08/13/1986	0.05
Iron	mg/L	<0.15	10/01/1985	0.05
Iron	mg/L	<0.15	09/11/1984	0.05

[b] – Wedemeyer, 1996

[c] – Daily and Economon, 1983

Historic water sampling values obtained from the City of Yreka database provided the following range and mean values for the parameters analyzed:

1. The historic pH sampling data provided a range of 7.27 - 8.2 and a mean of 7.78 over the nine (9) years of sampling values vs. the 8.15 value obtained from the 1/28/20 sampling. The 1/28/20 pH value of 8.15 was a result of a field sample that was analyzed within a lab setting and a sample that was recommended to be obtained directly in the field and analyzed within 15 minutes of sampling (*per Basic Laboratory, Inc. recommendations)*. Assuming a normal pH range of 7.2 – 8.2 from historic data, these values are within the optimum pH values for culture of freshwater fish (generally in the range of 6.5 to 9.0 - Wedemeyer, 1996; Timmons and Ebeling, 2010).
2. The historic aluminum sampling data provided a range of 0.0002 – 0.1 mg/L and a mean of 0.0669 mg/L over the six (6) years of sampling values vs. the 0.312 mg/L value obtained from the 1/28/20 sampling. Acknowledging the broad range of recommended limits in published literature (<0.01 mg/L [Timmons and Ebeling, 2010] and <0.075 mg/L [Wedemeyer, 1996]), the mean of 0.0669 mg/L for the six (6) years sampled is below the recommended limit provided by Wedemeyer and the range (0.0002 – 0.1 mg/L) was below this limit in three (3) of six (6) sampling years.
3. The historic iron sampling data provided a range of 0.012 – 0.06 mg/L and a mean of 0.0473 mg/L over the eight (8) years of sampling values vs. the 0.282 mg/L value obtained from the 1/28/20 sampling. Assuming a normal iron range of 0.012 – 0.06 mg/L based on historic data, these values are below threshold levels reported by both literature references (typical limits of <0.1 mg/L [Wedemeyer, 1996] and <0.15 mg/L [Timmons and Ebeling, 2010]).

A review of the historic water sampling database did not yield sample values for sulfide as hydrogen sulfide or chlorine. Based solely upon successful historic Chinook Salmon production rearing at Fall Creek Fish Hatchery, it is assumed that these analytes are not a limiting factor for future production at Fall Creek Fish Hatchery. If CDFW and/or KRRC are interested in future sampling for either sulfide as hydrogen sulfide or chlorine, we would gladly arrange for follow-up sampling efforts at the site.

4.0 Literature Cited

Daily, J.B. and P. Economon. 1983. A guide to integrated fish health management in the Great Lakes Basin. Great Lakes Fishery Commission Special Publication 83-2. Ann Arbor, MI 48105.

Piper, G.R., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, and J.R. Leonard. 1982. Fish Hatchery Management. U.S. Fish and Wildlife Service. Washington, D.C.

Summerfelt, S.T., Davidson, J.W., Waldrop, T.B., Tsukuda, S.M. and Bebak- Williams, J. 2004. A partial-reuse system for coldwater aquaculture. Aquacultural Engineering 31: 157–181.

Timmons M.B. and J.M. Ebeling. 2010, 2nd edition. Recirculating aquaculture. Cayuga qua Ventures. Ithaca, NY 14850.

Wedemeyer, G. 1996. Physiology of Fish in Intensive Culture Systems. Chapman and Hall, New York, NY.

Appendix A

CDFW Fall Creek Water Sampling – Analytical Results Basic Laboratory, Inc., Redding, CA

basic laboratory
www.basiclab.com
2218 Railroad Avenue
Redding, California 96001
voice 530.243.7234
fax 530.243.7494
3860 Morrow Lane, Suite F
Chico, California 95928
voice 530.894.8966
fax 530.894.5143

February 12, 2020

Lab ID: 20A1078

JODI BURNS
MCMILLEN JACOBS ASSOCIATES
1471 SHORELINE DRIVE SUITE 100
BOISE, ID 83702
RE: GENERAL TESTING

Dear JODI BURNS,

Enclosed are the analysis results for Work Order number 20A1078. All analyses were performed under strict adherence to our established Quality Assurance Plan. Any abnormalities are listed in the qualifier section of this report.

If you have any questions regarding these results, please feel free to contact us at any time. We appreciate the opportunity to service your environmental testing needs.

Sincerely,

For

Ricky D. Jensen
Laboratory Director
California ELAP Certification Number 1677

basic laboratory
www.basiclab.com
2218 Railroad Avenue
Redding, California 96001
voice 530.243.7234
fax 530.243.7494
3860 Morrow Lane, Suite F
Chico, California 95928
voice 530.894.8966
fax 530.894.5143

Report To: MCMILLEN JACOBS ASSOCIATES
1471 SHORELINE DRIVE SUITE 100
BOISE, ID 83702
Attention: JODI BURNS
Project: GENERAL TESTING FALL CREEK
Description: FALLL CREEK DAM A INTAKE
Matrix: Water

Lab No: 20A1078
Reported: 02/12/20
Phone: (208) 342-4214
Lab ID: 20A1078-01
Sampled: 01/28/20 10:18
Received: 01/28/20 15:25

General Chemistry

Analyte	Units	Results	Qualifier	MDL	RL	Method	Analyzed	Prepared	Batch
Sulfide as Hydrogen Sulfide	mg/l	**0.0181**	J	0.0106	0.0213	[CALC]	02/03/20	02/03/20	[CALC]
pH (see note 2)	pH Units	**8.15**				SM 4500-H+ B	01/28/20	01/28/20	B0A1456
Alkalinity as CaCO3	mg/l	**67**		2	5	SM 2320B	01/31/20	01/31/20	B0A1557
Bicarbonate	"	**82**		2	5	"	"	"	"
Carbonate	"	ND		2	5	"	"	"	"
Hydroxide	"	ND		2	5	"	"	"	"
Chloride	"	**0.95**		0.16	0.50	EPA 300.0	01/30/20	01/30/20	B0A1526
Fluoride	"	**0.05**	J	0.04	0.10	"	02/06/20	02/05/20	B0B0905
Nitrate as N	"	**0.55**		0.02	0.05	EPA 353.2	01/29/20	01/29/20	B0A1490
Nitrite as N	"	**0.007**	J	0.003	0.010	"	"	"	"
Sulfate as SO4	"	**0.42**	J	0.20	0.50	EPA 300.0	01/30/20	01/30/20	B0A1526
Sulfide	"	**0.017**	J	0.010	0.020	SM 4500-S2- D	02/03/20	02/03/20	B0B0826
Total Dissolved Solids	"	**97**		3	6	SM 2540C	01/29/20	01/29/20	B0A1492
Total Suspended Solids	"	**3.6**	J	2.0	6.0	SM 2540D	01/28/20	01/28/20	B0A1452
Nitrogen, Total	"	**0.864**		0.0900	0.200	(CALC)	01/31/20	01/29/20	[CALC]
Total Kjeldahl Nitrogen	"	**0.30**		0.09	0.20	EPA 351.2	"	"	B0A1503
Ammonia as N	"	**0.022**	J	0.020	0.050	EPA 350.1	02/03/20	02/03/20	B0B0807
Nitrate+Nitrite as N	"	**0.56**		0.02	0.05	EPA 353.2	01/29/20	01/29/20	B0A1490
Chlorine, Total Residual (see note 2)	"	ND		0.03	0.10	SM 4500-Cl G	01/28/20	01/28/20	B0A1463
Carbon Dioxide	"	**2.6**	J	1.6	4.4	SM 4500-CO2 C	01/28/20	01/28/20	B0A1466
Dissolved Oxygen (see note 2)	"	**11.0**		0.2	0.6	SM4500-O G	01/28/20	01/28/20	B0A1464

Metals - Total

Analyte	Units	Results	Qualifier	MDL	RL	Method	Analyzed	Prepared	Batch
Aluminum	ug/l	**312**		1.1	5.0	EPA 200.8	02/07/20	01/31/20	B0A1535
Arsenic	"	**0.49**	J	0.10	0.50	"	01/31/20	01/30/20	B0A1494
Barium	"	**4.59**		0.10	0.50	"	"	"	"
Cadmium	"	ND		0.04	0.20	"	"	"	"
Calcium	mg/l	**12.5**		0.1	1.0	EPA 200.7	02/06/20	02/04/20	B0B0836
Chromium	ug/l	**1.18**		0.13	0.50	EPA 200.8	01/31/20	01/30/20	B0A1494
Copper	"	**0.52**		0.12	0.50	"	"	"	"
Iron	"	**282**		3.0	15.0	"	"	"	"
Lead	"	ND		0.07	0.50	"	"	"	"
Magnesium	mg/l	**7.6**		0.1	1.0	EPA 200.7	02/06/20	02/04/20	B0B0836
Manganese	ug/l	**4.44**		0.10	0.50	EPA 200.8	01/31/20	01/30/20	B0A1494
Mercury	"	ND		0.04	0.10	EPA 245.2	02/06/20	02/06/20	B0B0918
Nickel	"	**0.49**	J	0.11	0.50	EPA 200.8	01/31/20	01/30/20	B0A1494
Potassium	mg/l	**1.2**		0.3	1.0	EPA 200.7	02/06/20	02/04/20	B0B0836
Selenium	ug/l	ND		0.3	2.0	EPA 200.8	01/31/20	01/30/20	B0A1494
Silver	"	ND		0.04	0.20	"	02/06/20	02/06/20	B0B0861
Sodium	mg/l	**5.3**		0.2	1.0	EPA 200.7	02/06/20	02/04/20	B0B0836
Sulfur	ug/l	**105**		34	100	"	"	"	"
Vanadium	"	**4.72**		0.28	0.50	EPA 200.8	02/07/20	01/31/20	B0A1535
Zinc	"	**0.6**	J	0.5	2.0	"	01/31/20	01/30/20	B0A1494

Approved By
Basic Laboratory Inc
California ELAP Cert #1677 and #2718

www.basiclab.com
basic laboratory
2218 Railroad Avenue voice 530.243.7234
Redding, California 96001 fax 530.243.7494
3860 Morrow Lane, Suite F voice 530.894.8966
Chico, California 95928 fax 530.894.5143

Report To: MCMILLEN JACOBS ASSOCIATES
1471 SHORELINE DRIVE SUITE 100
BOISE, ID 83702
Attention: JODI BURNS
Project: GENERAL TESTING FALL CREEK

Lab No: 20A1078
Reported: 02/12/20
Phone: (208) 342-4214

Notes and Definitions

QR-04	Duplicate results are within one reporting limit and pass all necessary QC criteria.
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). The J flag is equivalent to the DNQ Estimated Concentration flag.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
<	Less than reporting limit
≤	Less than or equal to reporting limit
>	Greater than reporting limit
≥	Greater than or equal to reporting limit
MDL	Method Detection Limit
RL/ML	Minimum Level of Quantitation
MCL/AL	Maxium Contaminant Level/Action Level
mg/kg	Results reported as wet weight
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristic Leachate Procedure
Note 1	Received Temperature - according to EPA guidelines, samples for most chemistry methods should be held at ≤6 degrees C after collection, including during transportation, unless the time from sampling to delivery is <2 hours. Regulating agencies may invalidate results if temperature requirements are not met.
Note 2	According to 40 CFR Part 136 Table II, the following tests should be analyzed in the field within 15 minutes of sampling: pH, chlorine, dissolved oxygen, and sulfite.

Approved By
Basic Laboratory Inc
California ELAP Cert #1677 and #2718

20A1078
1

BASIC LABORATORY CHAIN OF CUSTODY RECORD

2218 Railroad Avenue, Redding, CA 96001 (530) 243-7234 FAX (530) 243-7494

LAB #: 20A 1078

PAGE 1 OF 1

CLIENT NAME: McMillen Jacobs

PROJECT NAME: Fall Creek

PROJECT #:

MAILING ADDRESS: 1471 SHORELINE DRIVE SUITE 100 BOISE, ID 83702

REPORT DUE DATE:

TURN AROUND TIME: (Standard) Rush

OF SAMPLES: 7

MATRIX / TYPE: W

PROJECT MANAGER: JODI BURNS

CUSTODY SEAL INTACT? Yes No N/A

PHONE: 208.342.4214

EMAIL: jburns@mcmjac.com

SYSTEM #:

FAX:

RESULTS SENT: (Email) Fax EDD Mail

EDD TYPE:

INVOICE TO: McMillen Jacobs

PO#:

QC: Standard Level II

ANALYSIS REQUESTED

SAMPLE DATE	SAMPLE TIME	WATER	COMP	SOLID	SAMPLE LOCATION / IDENTIFICATION (DAM A)	NUMBER OF BOTTLES	TSS	Alk, Cl, Cd, F, NO_2, NO_3	CO_2	Total Metals	NH_3 Total N	Sulfide	D.O.				LAB ID	CHLORINE RESIDUAL OR COMMENTS
1/28	10:18	X			Fall Creek Intake	1	X										1	12.0 C
1/28	10:19	X			Fall Creek Intake	1		X										
1/28	10:20	X			Fall Crk Dam A Intake	1			X									
1/28	10:20	X			Fall Crk Dam A Intake	1				X								
1/28	10:22	X			Fall Crk DAM A Intake	1					X							
1/28	10:22	X			Fall Crk DAM A INTAKE	1						X						
1/28	10:24	X			Fall Crk DAM A INTAKE	1							X					

pH, TDS, SO_4 as per email

Total Metals includes: Al, As, Ba, Cd, Cr, Ca, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, S, V, Zn as per attached

pH<2 1.28.20 @ 1604

pH<2 prepreserved pH > 9 prepreserved

PAID JAN 28 2020 By Visa $863.00

718253 $115.00

718223 $112.00

online 3722

PRESERVED WITH: (HNO_3) (H_2SO_4) NaOH (ZnAce/NaOH) HCL NaThio OTHER

SAMPLED BY (PRINT): Derek Nelson	SAMPLE DATE/TIME: 1/28/20 10:30	RELINQUISHED BY: [signature]	DATE/TIME: 1/28/20 320
RECEIVED BY:	DATE/TIME:	RELINQUISHED BY:	DATE/TIME:
RECEIVED BY (LAB): Ethan S	DATE/TIME: 1.28.20 1525	PROCESSED AND VERIFIED BY: Ethan S	DATE/TIME: 1.28.20 1542
LOGGED IN BY: Ethan S	DATE/TIME: 1.28.20 ~~1525~~ 1525	CARRIER:	COOLER TEMPERATURE: °c

INSTRUCTIONS, TERMS AND CONDITIONS ON BACK.

ES SAMPLE TYPE: 1 = ROUTINE, 2 = REPEAT, 3 = REPLACEMENT, 4 = SPECIAL 5 = RAW

250 545 3654

Table 1. Water quality standards for salmonid aquaculture

Parameter	A	B	C	D
Alkalinity (as $CaCO_3$)	20 mg/l	undetermined	20-200 mg/l	120 - 400 mg/l
Aluminum (Al)	.01 mg/l	.01 mg/l	--	
Ammonia (NH_3) un-ionized	.02 mg/l	.0125 mg/l	.012 mg/l	.0125 mg/l
Arsenic (As)	.05 mg/l	.05 mg/l	--	
Barium (Ba)	5.0 mg/l	5.0 mg/l	--	
Cadmium (alk < 100)	.0005 mg/l	.0005 mg/l	--	.0004 mg/l
Cadmium (alk > 100)	.005 mg/l	.005 mg/l	--	.003 mg/l
Calcium (Ca)	52 mg/l	--	52 mg/l	4 - 160 mg/l
Chloride ( )	--	4.0 mg/l	--	
Chlorine (Cl)	.003 mg/l	.003 mg/l	--	.03 mg/l
Chromium (Cr)	.03 mg/l	.03 mg/l	--	
Carbon dioxide (CO_2)	1.5-15.0 mg/l	1.0 mg/l	2.0 mg/l	0 - 10.0 mg/l
Copper (alk < 100)	.006 mg/l	.006 mg/l	.006 mg/l	
(Cu) (alk > 100)	.03 mg/l	.03 mg/l	.03 mg/l	
Dissolved Oxygen (DO)	75%, never below 5.0 mg/l	7.0 mg/l	5.0 mg/l	5.0 - sat. mg/l
		--	--	
Fluoride (F)	.5 mg/l	.5 mg/l	--	
Hydrogen cyanide (HCN)	.005 mg/l	--	--	
Hydrogen sulfide (H_2S)	.003 mg/l	.003 mg/l	.002 mg/l	0 mg/l
Iron (Fe)	.1 mg/l	.1 mg/l	1.0 mg/l	.5 mg/l
Lead (Pb)	.02 mg/l	.02 mg/l	--	
Magnesium (Mg)	15 mg/l	15 mg/l	--	needed
Manganese (Mn)	.01 mg/l	.01 mg/l	--	0 - .01 mg/l
Mercury (Hg)	.2 mg/l	.0002 mg/l	--	.002 mg/l
Nitrogen (N)	110% TDG 103% N_2	110% TDG 103% N_2	110% TDG --	110% TDG
Nitrate (NO_3)	1.0 mg/l	1.0 mg/l	--	0 - 3.0 mg/l
Nitrite (NO_2)	.1 mg/l	.1 mg/l	.55 mg/l	.1 - .2 mg/l
Nickel (Ni)	.01 mg/l	.01 mg/l	--	
PCB	.002 mg/l	--	--	
pH	6.7-8.6	6.5-8.0	6.7-9.0	6.5 - 8.0
Potassium (K)	5.0 mg/l	5.0 mg/l	--	
Salinity	5.0 ppt	5.0 ppt	--	
Selenium (Se)	.01 mg/l	.01 mg/l	--	
Silver (Ag)	.003 mg/l	.003 mg/l	--	
Sodium (Na)	75 mg/l	75 mg/l	--	
Sulfur (S)	1.0 mg/l		--	
Sulphate (SO_4)	50 mg/l	50 mg/l	--	
Total dissolv. solids (TDS)	400 mg/l	400 mg/l	400 mg/l	
Total susp. solids (TSS)	80 mg/l	80 mg/l	80 mg/l	80 mg/l
Uranium (U)	.1 mg/l		--	
Vanadium (V)	.1 mg/l		--	
Zinc (Zn)	.005 mg/l	.005 mg/l	.04 m/gl pH7.6	.03 mg/l
Zirconium (Z)	.1 mg/l		--	
Temperature	--	0°-15°C	--	

A: Daily, J.P. and P. Economon, 1983.
B: Fish Culture Manual, Alaska Dept. Fish and Game, FRED Div., June, 1983.
C: Wedemeyer and Wood, 1974.
D: Piper, G. P., et. al. 1982.

Receipt

Invoice Number
2001107
Invoiced On
01/30/20

Invoice To
MCMILLEN JACOBS ASSOCIATES
JODI BURNS
1471 SHORELINE DRIVE SUITE 100
BOISE, ID 83702

Project
GENERAL TESTING

Project Contact
JODI BURNS
Project Number
FALL CREEK
PO Number

Work Order(s)
20A1078

basic laboratory

Thank you!

Basic Laboratory, Inc
2218 Railroad Avenue
Redding, CA 96001-2504
530-243-7234 x 203

Terms: Paid in Full

Quantity	Matrix	Analysis/Description	Unit Cost	Extended Cost
		Project turn around time: Standard		
1	Water	Ag Total ICPMS 200.8	$22.00	$22.00
1	Water	Al Total ICPMS 200.8	$11.00	$11.00
1	Water	Alkalinity w/Bicarb/Carb 2320B	$28.00	$28.00
1	Water	Ammonia as N 350.1	$50.00	$50.00
1	Water	As Total ICPMS 200.8	$22.00	$22.00
1	Water	Ba Total ICPMS 200.8	$22.00	$22.00
1	Water	Ca Total ICP 200.7	$11.00	$11.00
1	Water	Carbon Dioxide	$55.00	$55.00
1	Water	Cd Total ICPMS 200.8	$22.00	$22.00
1	Water	Chloride 300.0	$30.00	$30.00
1	Water	Chlorine - Total Residual 4500	$25.00	$25.00
1	Water	Cr Total ICPMS 200.8	$22.00	$22.00
1	Water	Cu Total ICPMS 200.8	$22.00	$22.00
1	Water	DO by SM4500-O G	$30.00	$30.00
1	Water	Fe Total ICPMS 200.8	$22.00	$22.00
1	Water	Fluoride 300.0	$30.00	$30.00
1	Water	Hg Total CVAA 245.2	$70.00	$70.00
1	Water	K Total ICPMS 200.8	$22.00	$22.00
1	Water	Mg Total ICP 200.7	$22.00	$22.00
1	Water	Mn Total ICPMS 200.8	$22.00	$22.00
1	Water	Na Total ICP 200.7	$22.00	$22.00
1	Water	Ni Total ICPMS 200.8	$22.00	$22.00
1	Water	Nitrate 353.2 as N	$40.00	$40.00

CALIFORNIA SMALL BUSINESS 0001875

MasterCard VISA

Receipt

Invoice Number
2001107
Invoiced On
01/30/20

Invoice To
MCMILLEN JACOBS ASSOCIATES
JODI BURNS
1471 SHORELINE DRIVE SUITE 100
BOISE, ID 83702

Project
GENERAL TESTING

Project Contact
JODI BURNS
Project Number
FALL CREEK
PO Number

Work Order(s)
20A1078

basic laboratory

Thank you!

Basic Laboratory, Inc
2218 Railroad Avenue
Redding, CA 96001-2504
530-243-7234 x 203

Terms: Paid in Full

Quantity	Matrix	Analysis/Description	Unit Cost	Extended Cost
		Project turn around time: Standard		
1	Water	Nitrite 353.2 as N	$40.00	$40.00
1	Water	Nitrogen, Total	$115.00	$115.00
1	Water	Pb Total ICPMS 200.8	$22.00	$22.00
1	Water	pH 4500-H+	$25.00	$25.00
1	Water	Sample Handling & Disposal Fee	$1.00	$1.00
1	Water	Se Total ICPMS 200.8	$22.00	$22.00
1	Water	Sulfate 300.0	$30.00	$30.00
1	Water	Sulfide as H2S 4500S D	$55.00	$55.00
1	Water	Sulfur Total ICP 200.7	$22.00	$22.00
1	Water	TDS 2540C	$35.00	$35.00
1	Water	TSS 2540D	$35.00	$35.00
1	Water	V Total ICPMS 200.8	$22.00	$22.00
1	Water	Zn Total ICPMS 200.8	$22.00	$22.00
			Total Paid	**$1,090.00**

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Appendix B

CDFW Fall Creek Water Sampling – Fish Pathologist Report; Total Gas Pressure and Dissolved Oxygen Sampling

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Director's Office
P.O. Box 944209
Sacramento, CA 94244-2090
www.wildlife.ca.gov

FISH PATHOLOGIST REPORT

Location
Fall Creek Hatchery

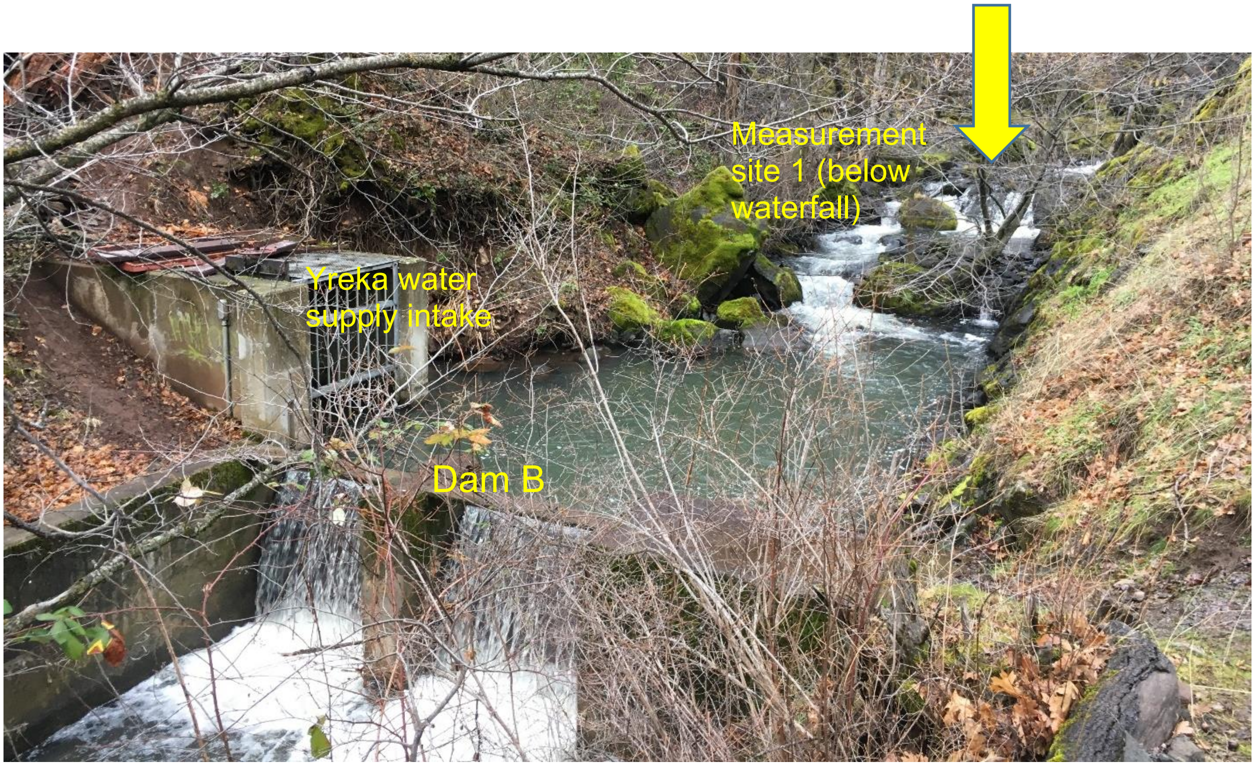
Date
4 February 2020

Background:

Fall Creek Hatchery, located above Iron Gate Lake, has been the backup facility to Iron Gate Hatchery in the past, and will become the primary facility when the Iron Gate Dam removal process is initiated. The facility water supply is sourced from southern Oregon mountain drainage, and includes a waterfall with two plunge-pools, and two smaller plunge-pools extending the width of the creek (created by Dam A and Dam B) all of which are upstream of the hatchery. A pipe intake from the first plunge-pool halfway up the waterfall provides supplemental water for the hatchery - the main intake is below Dam A (pictures 1-5). Plunge-pools below dams are a known source of water gas-supersaturation.

Hatchery water total gas pressure (TGP) and dissolved oxygen (DO) levels will be monitored over the next few months to assess whether increased flows due to spring run-off will create a gas supersaturation issue for future rearing of salmonids. Nitrogen and oxygen partial pressures were calculated from TGP and DO levels measured at three locations, and are summarized in the table below. The first measurement was taken downstream of the waterfall but upstream of Dam B, the second downstream of Dam A in the hatchery water intake from the creek, and the third measurement was in one of the hatchery raceways downstream of the spray-bar.

Picture 1: Fall Creek creates two plunge-pools upstream of the hatchery. The hatchery intake pipe is located near the upper plunge-pool (arrow)



Picture 2: Dam B (upstream of Dam A)

Picture 3: Dam A is below Dam B, both of which are below Fall Creek waterfall/plunge-pool.

Picture 4: Hatchery intake from Fall Creek below Dam B

Picture 5: Hatchery raceway-head spray-bar

Table 1: Fall Creek TGP/DO meter readings and % gas saturation - 2020

Date	Location	TGP mmHg/%	^{o}C	BP mmHg	dP mmHg	DO ppm	$\%N_2$ sat	$\%O_2$ sat
2/4	Below water-fall above Dam B (furthest upstream measurement)	712/101	5.0	706	6	11.87	101.1	100.2
2/4	Intake below Dam A	714/101	7.5	708	6	11.19	101.0	100.3
2/4	Raceway below spray-bar (furthest downstream measurement)	712/101	7.5	707	5	11.2	100.8	100.5

Comments:
None of the partial pressures constitute a concern at this point. If pressures increase during higher run-off flows, spray-bars with more, smaller holes could be installed to increase degassing surface area.

Submitted by:
Tresa Veek, Fish Pathologist, RS1, CDFW

Appendix C

City of Yreka Water Quality Sampling Dataset (1984-2020)

https://sdwis.waterboards.ca.gov/PDWW/JSP/MonitoringResults.jsp?tinwsys_is_number=4717&tinwsys_st_code=CA&counter=0

From: Burns, Jodi
To: Andrew Leman; Heindel, Jeff
Cc: Nelson, Derek
Subject: FW: KRRP - City of Yreka Dam A Historical Data
Date: Tuesday, April 28, 2020 9:10:58 AM
Attachments: RE YWSL kick-off meeting with KRRC.msg

Team,

FYI, see Rob Taylor's email below regarding locations for water quality results and flow information at Dam A. Also, attached are some drawings of Dam A and B.

Jeff, would you compile and review the water quality data?

Andrew, will you please review the drawings and the flow data. It looks like they have mostly provided their pumped flows from Dam A. I have also saved everything at the following location on Box:

\Box\Projects\Klamath River Renewal Corp\12.0 Fall Creek Facility\12.4 Design\12.4.2 Civil\City-of_Yreka_Data

Feel free to give me a call to discuss. I will review as well.

Thank you,

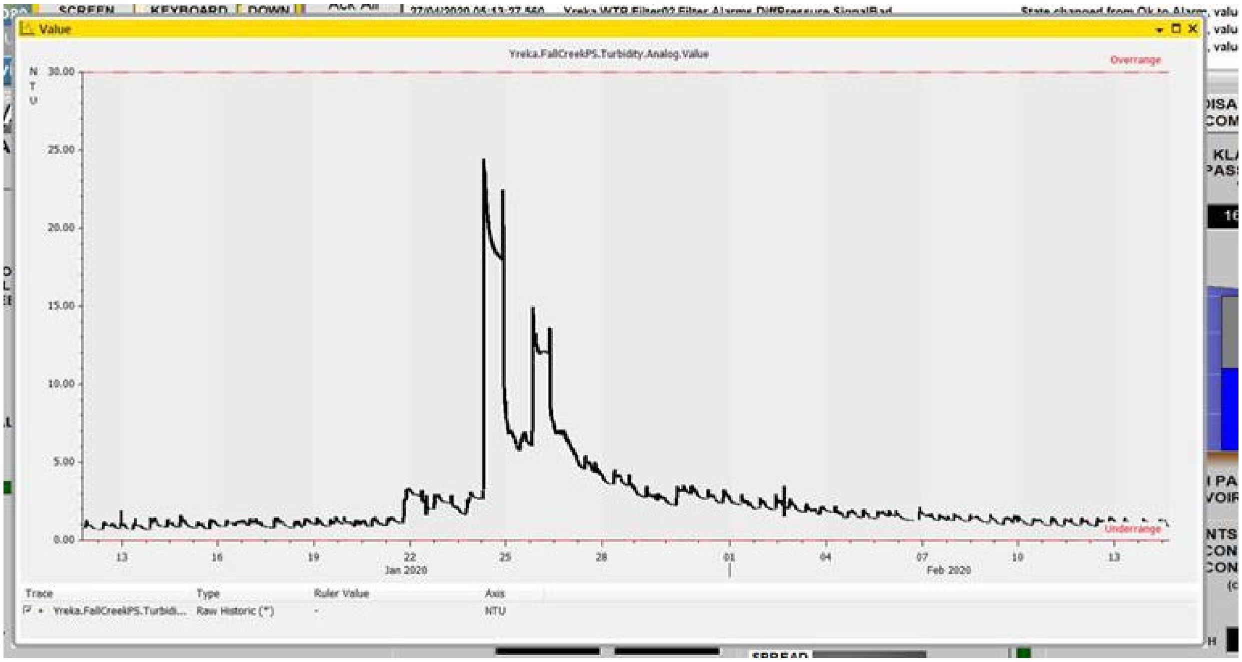
Jodi Burns, P.E.*
Project Manager/Civil Engineer

McMillen Jacobs Associates
1471 Shoreline Drive, Suite 100 |Boise, ID 83702
208.955.8278 d |208.342.4214 Ext:224 o |806.341.4166 c
jburns@mcmjac.com

***Idaho, Hawaii, Texas, Washington**

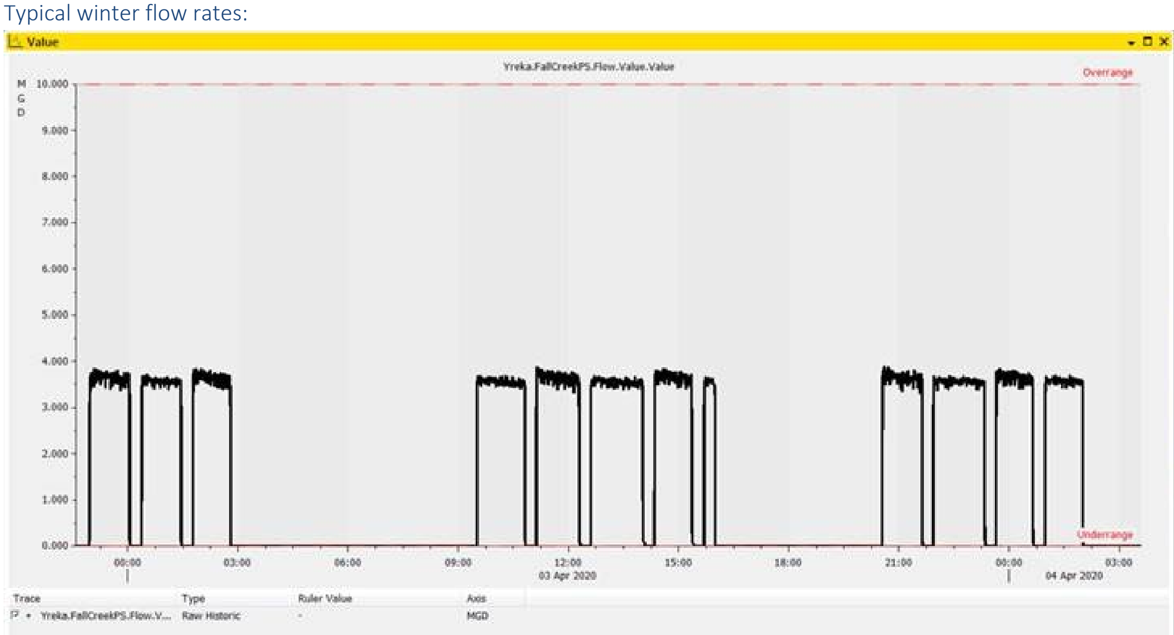
From: Rob Taylor <rtaylor@ci.yreka.ca.us>
Sent: Monday, April 27, 2020 4:30 PM
To: Burns, Jodi <burns@mcmjac.com>
Cc: Mark Bransom <mark@klamathrenewal.org>; McMillen, Morton D. <Mortmcmillen@mcmjac.com>; Matt Bray <MBray@ci.yreka.ca.us>
Subject: RE: KRRP - City of Yreka Dam A Historical Data

Hi Jody,
I'm glad to help in any way I can. I've attached an email from last fall that details our limitations with continuously diverting water from the B dam. The email also has the original as-built schematics and details of the City's intake if needed.
Water Quality: The following link contains all the lab results of water quality testing.
https://sdwis.waterboards.ca.gov/PDWW/JSP/MonitoringResults.jsp?tinwsys_is_number=4717&tinwsys_st_code=CA&counter=0 PS code 4710011-002 samples were taken from the A dam impoundment. Coliform bacteria and E. coli test results are not listed, but are available if needed. We also have some turbidity data available through our SCADA system. We don't always take in and monitor raw water during periods of high turbidity since our treatment limit is about 15 NTU's. The graph shows an example what we have available. It gives an idea of peak NTU and duration. The data is available back to about summer of 2017.

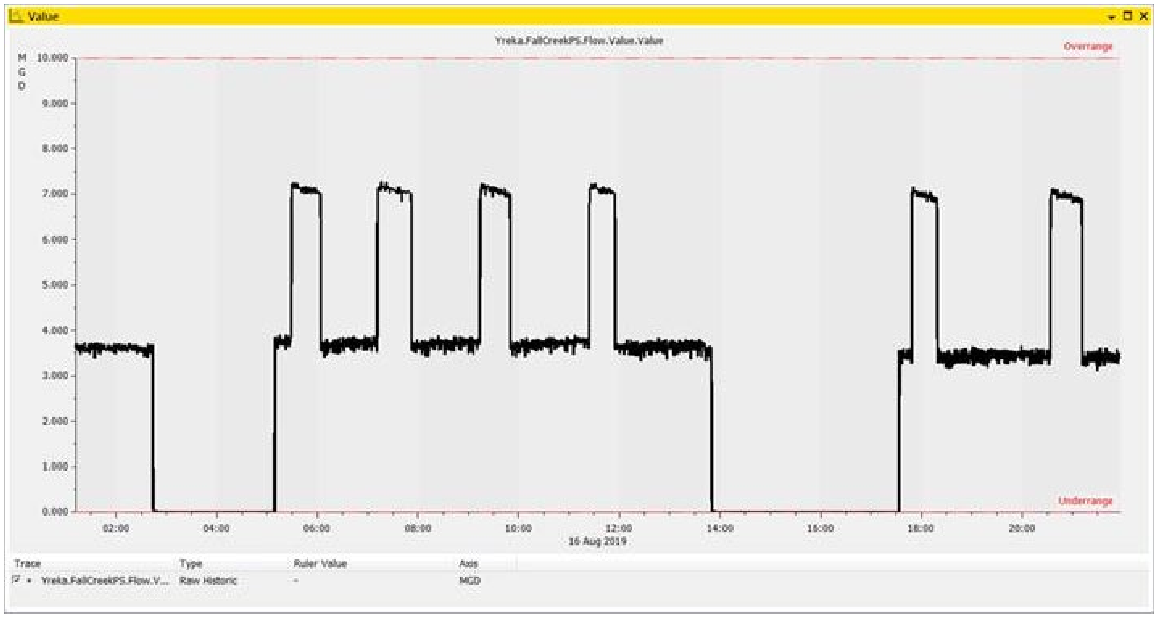


Flow Data: I've attached graphs showing typical flow rates for both winter and summer scenarios. The meter is located at the effluent side of the pump station and indicates our withdrawal rate at the A dam intake. Up to three pumps will be called upon to run based on tank level set points at the 135,000-gallon Klamath Pass tank. Three of our available four pumps are fixed speed and can do about 2500 gpm, so flows rates are about 6 cfs for one pump running, 11 cfs for two, and 15 cfs for all three. The forth (spare) pump is VFD controlled and can maintain a constant tank level sometimes in the winter when only one pump is sufficient.

Typical winter flow rates:



Typical summer flow rates:



Let me know if you have any questions or if you would like more detailed information. My office phone # is 530-841-2327.
Thanks, Rob

From: Burns, Jodi <burns@mcmjac.com>
Sent: Friday, April 24, 2020 9:50 AM
To: Rob Taylor <rtaylor@ci.yreka.ca.us>
Cc: Mark Bransom <mark@klamathrenewal.org>; McMillen, Morton D. <Mortmcmillen@mcmjac.com>
Subject: KRRP - City of Yreka Dam A Historical Data

Hello Robert,

Thank you for coordinating and attending the conference meeting held on April 22nd to discuss the Yreka water pipeline crossing and the Fall Creek Hatchery design. In the meeting you stated that you would be willing to provide McMillen Jacobs with historical flow data at Dam A to support the Fall Creek Hatchery design. Do you mind providing me with the flow data you referenced and potentially any historical water quality data that you may have for the Dam A site? We completed a water quality analysis in January but any additional water quality data would be helpful to gain an understanding of the water source.

Feel free to reach out or give me a call if you would like to discuss this data request further.

Thank you,

Jodi Burns, P.E.*
Project Manager/Civil Engineer

McMillen Jacobs Associates
1471 Shoreline Drive, Suite 100 |Boise, ID 83702
208.955.8278 d |208.342.4214 Ext:224 o |806.341.4166 c
jburns@mcmjac.com

***Idaho, Hawaii, Texas, Washington**

Water Quality Sampling Results

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
00010	SOURCE TEMPERATURE C	2011-11-02		15.7000	0.000	0.000	0.000	C
00081	COLOR	1985-10-01	<	5.0000	15.000	0.000	15.000	UNITS
00081	COLOR	1987-06-24	<	5.0000	15.000	0.000	15.000	UNITS
00081	COLOR	1988-06-23	<	5.0000	15.000	0.000	15.000	UNITS
00081	COLOR	1989-06-08	<	3.0000	15.000	0.000	15.000	UNITS
00081	COLOR	1990-06-26	<	3.0000	15.000	0.000	15.000	UNITS
00086	ODOR THRESHOLD @ 60 C	1985-10-01	<	.0000	3.000	0.000	3.000	TON
00086	ODOR THRESHOLD @ 60 C	1987-06-24	<	.0000	3.000	0.000	3.000	TON
00086	ODOR THRESHOLD @ 60 C	1988-06-23	<	.0000	3.000	0.000	3.000	TON
00086	ODOR THRESHOLD @ 60 C	1989-06-08	<	1.0000	3.000	0.000	3.000	TON
00086	ODOR THRESHOLD @ 60 C	1990-06-26	<	1.0000	3.000	0.000	3.000	TON
00095	SPECIFIC CONDUCTANCE	1984-09-11		151.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1985-10-01		146.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1986-08-13		150.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1987-06-24		154.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1988-06-23		150.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1989-06-08		200.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1990-06-26		170.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	1991-06-25		150.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	2005-11-02		145.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	2007-10-01		146.0000	1600.000	0.000	900.000	US
00095	SPECIFIC CONDUCTANCE	2011-11-02		150.0000	1600.000	0.000	900.000	US
00403	PH, LABORATORY	1984-09-11		7.8900	0.000	0.000	0.000	
00403	PH, LABORATORY	1985-10-01		7.9500	0.000	0.000	0.000	
00403	PH, LABORATORY	1986-08-13		7.4000	0.000	0.000	0.000	
00403	PH, LABORATORY	1987-06-24		7.8700	0.000	0.000	0.000	
00403	PH, LABORATORY	1988-06-23		7.2700	0.000	0.000	0.000	
00403	PH, LABORATORY	1989-06-08		8.2000	0.000	0.000	0.000	
00403	PH, LABORATORY	1990-06-26		7.6000	0.000	0.000	0.000	
00403	PH, LABORATORY	1991-06-25		7.9000	0.000	0.000	0.000	
00403	PH, LABORATORY	2005-11-02		7.9300	0.000	0.000	0.000	
00403	PH, LABORATORY	2011-11-02		7.9000	0.000	0.000	0.000	
00410	ALKALINITY (TOTAL) AS CACO3	1984-09-11		80.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1985-10-01		79.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1986-08-13		77.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1987-06-24		76.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1988-06-23		76.3000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1989-06-08		72.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1990-06-26		71.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	1991-06-25		72.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	2005-11-02		77.0000	0.000	0.000	0.000	MG/L
00410	ALKALINITY (TOTAL) AS CACO3	2011-11-02		77.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1984-09-11		97.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1985-10-01		96.3990	0.000	0.000	0.000	MG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
00440	BICARBONATE ALKALINITY	1986-08-13		94.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1987-06-24		93.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1988-06-23		93.1000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1989-06-08		71.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1990-06-26		71.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	1991-06-25		72.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	2005-11-02		94.0000	0.000	0.000	0.000	MG/L
00440	BICARBONATE ALKALINITY	2011-11-02		94.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1984-09-11	<	.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1985-10-01	<	.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1986-08-13	<	.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1987-06-24	<	.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1988-06-23	<	.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1989-06-08		1.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1990-06-26	<	1.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	1991-06-25	<	1.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	2005-11-02	<	.0000	0.000	0.000	0.000	MG/L
00445	CARBONATE ALKALINITY	2011-11-02	<	.0000	0.000	0.000	0.000	MG/L
00618	NITRATE (AS N)	2015-08-24	<	0000000000	10.000	0.400	5.000	mg/L
00618	NITRATE (AS N)	2016-08-23	<	0000000000	10.000	0.400	5.000	mg/L
00618	NITRATE (AS N)	2017-08-23	<	0000000000	10.000	0.400	5.000	mg/L
00618	NITRATE (AS N)	2018-08-22	<	0000000000	10.000	0.400	5.000	mg/L
00618	NITRATE (AS N)	2019-08-07		0	10.000	0.400	5.000	mg/L
00620	NITRITE (AS N)	1997-01-28	<	.0000	1000.000	400.000	500.000	UG/L
00620	NITRITE (AS N)	2001-03-19	<	.0000	1000.000	400.000	500.000	UG/L
00620	NITRITE (AS N)	2005-11-02	<	.0000	1000.000	400.000	500.000	UG/L
00620	NITRITE (AS N)	2009-07-20	<	.0000	1000.000	400.000	500.000	UG/L
00620	NITRITE (AS N)	2012-08-27	<	.0000	1000.000	400.000	500.000	UG/L
00620	NITRITE (AS N)	2015-08-24	<	0000000000	1000.000	400.000	500.000	UG/L
00620	NITRITE (AS N)	2018-08-22	<	0000000000	1.000	0.400	0.500	mg/L
00680	TOTAL ORGANIC CARBON (TOC)	2011-08-30		1.3000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2012-08-27		.8000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2012-11-29		.5000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2013-02-25		.4000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2013-05-20		.3000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2013-08-29		.7000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2013-11-13		.5000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2014-02-26	<	.0000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2014-05-20		.5000	0.000	0.300	0.000	MG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
00680	TOTAL ORGANIC CARBON (TOC)	2014-08-20		.6000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2014-11-25		.7000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2015-02-24		.7000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2015-05-28	<	.0000	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2015-08-24		1.2	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2015-11-23		0.6	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2016-02-24		1.2	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2016-08-23		0.8	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2016-11-30		0.8	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2017-03-01		1.2	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2017-05-24		0.5	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2017-08-23		0.6	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2017-11-15		0.5	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2018-02-14		0.4	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2018-05-16		0.5	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2018-08-22		0.7	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2018-12-12		0.5	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2019-02-06		0.4	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2019-05-22		0.4	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2019-08-07		0.4	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2019-11-12		0.6	0.000	0.300	0.000	MG/L
00680	TOTAL ORGANIC CARBON (TOC)	2020-02-26		0.4	0.000	0.300	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1984-09-11		64.8990	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1985-10-01		68.0000	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1987-06-24		68.5000	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1988-06-23		62.0000	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1989-06-08		65.0000	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1990-06-26		63.0000	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	1991-06-25		65.0000	0.000	0.000	0.000	MG/L
00900	HARDNESS (TOTAL) AS CACO3	2005-11-02		61.0000	0.000	0.000	0.000	MG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
00900	HARDNESS (TOTAL) AS CACO3	2011-11-02		74.0000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1984-09-11		14.1000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1985-10-01		15.4000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1986-08-13		13.2000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1987-06-24		13.6000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1988-06-23		12.9000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1989-06-08		13.0000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1990-06-26		14.0000	0.000	0.000	0.000	MG/L
00916	CALCIUM	1991-06-25		13.0000	0.000	0.000	0.000	MG/L
00916	CALCIUM	2005-11-02		12.6000	0.000	0.000	0.000	MG/L
00916	CALCIUM	2011-11-02		12.9000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1984-09-11		7.2200	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1985-10-01		7.1900	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1986-08-13		6.6000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1987-06-24		8.4000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1988-06-23		7.1500	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1989-06-08		8.0000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1990-06-26		6.9000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	1991-06-25		7.8000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	2005-11-02		7.4000	0.000	0.000	0.000	MG/L
00927	MAGNESIUM	2011-11-02		7.9400	0.000	0.000	0.000	MG/L
00929	SODIUM	1984-09-11		6.2200	0.000	0.000	0.000	MG/L
00929	SODIUM	1985-10-01		6.7100	0.000	0.000	0.000	MG/L
00929	SODIUM	1986-08-13		5.4000	0.000	0.000	0.000	MG/L
00929	SODIUM	1987-06-24		5.6000	0.000	0.000	0.000	MG/L
00929	SODIUM	1988-06-23		5.4600	0.000	0.000	0.000	MG/L
00929	SODIUM	1989-06-08		5.2000	0.000	0.000	0.000	MG/L
00929	SODIUM	1990-06-26		5.6000	0.000	0.000	0.000	MG/L
00929	SODIUM	1991-06-25		5.5000	0.000	0.000	0.000	MG/L
00929	SODIUM	2005-11-02		4.1500	0.000	0.000	0.000	MG/L
00929	SODIUM	2011-11-02		5.6500	0.000	0.000	0.000	MG/L
00937	POTASSIUM	2005-11-02		.8800	0.000	0.000	0.000	MG/L
00937	POTASSIUM	2011-11-02		1.1700	0.000	0.000	0.000	MG/L
00940	CHLORIDE	1984-09-11		1.7000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1985-10-01		2.3000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1986-08-13		1.0000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1987-06-24		4.0000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1988-06-23	<	1.0000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1989-06-08		1.1000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1990-06-26		1.7000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	1991-06-25		2.9000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	2005-11-02		1.0700	500.000	0.000	250.000	MG/L
00940	CHLORIDE	2007-10-01		1.2000	500.000	0.000	250.000	MG/L
00940	CHLORIDE	2011-11-02		1.1000	500.000	0.000	250.000	MG/L
00945	SULFATE	1984-09-11	<	1.0000	600.000	0.500	500.000	MG/L
00945	SULFATE	1985-10-01	<	1.0000	600.000	0.500	500.000	MG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
00945	SULFATE	1986-08-13	<	1.0000	600.000	0.500	500.000	MG/L
00945	SULFATE	1987-06-24	<	1.0000	600.000	0.500	500.000	MG/L
00945	SULFATE	1988-06-23		1.2000	600.000	0.500	500.000	MG/L
00945	SULFATE	1989-06-08	<	.5000	600.000	0.500	500.000	MG/L
00945	SULFATE	1990-06-26	<	.5000	600.000	0.500	500.000	MG/L
00945	SULFATE	1991-06-25		.7300	600.000	0.500	500.000	MG/L
00945	SULFATE	2005-11-02	<	.0000	500.000	0.500	250.000	MG/L
00945	SULFATE	2007-10-01	<	.0000	500.000	0.500	250.000	MG/L
00945	SULFATE	2011-11-02	<	.0000	500.000	0.500	250.000	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1984-09-11	<	.0500	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1985-10-01	<	.0600	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1986-08-13	<	.0500	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1987-06-24	<	.0500	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1988-06-23	<	.0600	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1989-06-08	<	.0500	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1990-06-26	<	.1000	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	1991-06-25	<	.1000	1.400	0.100	1.400	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	2005-11-02	<	.0000	2.000	0.100	2.000	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	2007-10-01	<	.0000	2.000	0.100	2.000	MG/L
00951	FLUORIDE (F) (NATURAL-SOURCE)	2016-08-23	<	0000000000	2.000	0.100	2.000	MG/L
01002	ARSENIC	1984-09-11	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1985-10-01	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1986-08-13	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1987-06-24	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1988-06-23	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1989-06-08	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1990-06-26	<	5.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	1991-06-25	<	10.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	2005-11-02	<	.0000	50.000	2.000	5.000	UG/L
01002	ARSENIC	2007-10-01	<	.0000	10.000	2.000	5.000	UG/L
01002	ARSENIC	2016-08-23	<	0000000000	10.000	2.000	5.000	UG/L
01007	BARIUM	1984-09-11	<	100.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	1985-10-01	<	100.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	1986-08-13	<	100.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	1987-06-24	<	100.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	1988-06-23	<	3.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	1989-06-08	<	20.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	1990-06-26	<	20.0000	1000.000	100.000	1000.000	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
01007	BARIUM	1991-06-25	<	100.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	2005-11-02	<	.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	2007-10-01	<	.0000	1000.000	100.000	1000.000	UG/L
01007	BARIUM	2016-08-23	<	0000000000	1000.000	100.000	1000.000	UG/L
01012	BERYLLIUM	1997-01-28	<	.0000	4.000	1.000	4.000	UG/L
01012	BERYLLIUM	1998-03-30	<	.0000	4.000	1.000	4.000	UG/L
01012	BERYLLIUM	1999-10-18	<	.0000	4.000	1.000	4.000	UG/L
01012	BERYLLIUM	2009-07-20	<	.0000	4.000	1.000	4.000	UG/L
01012	BERYLLIUM	2018-08-22	<	0000000000	4.000	1.000	4.000	UG/L
01020	BORON	2001-12-28	<	.0000	0.000	100.000	1000.000	UG/L
01020	BORON	2002-04-10	<	.0000	0.000	100.000	1000.000	UG/L
01020	BORON	2002-06-24	<	.0000	0.000	100.000	1000.000	UG/L
01027	CADMIUM	1984-09-11	<	5.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1985-10-01	<	5.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1986-08-13	<	5.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1987-06-24		25.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1988-06-23	<	2.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1989-06-08	<	1.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1990-06-26	<	1.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	1991-06-25	<	1.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	2005-11-02	<	.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	2007-10-01	<	.0000	5.000	1.000	5.000	UG/L
01027	CADMIUM	2016-08-23	<	0000000000	5.000	1.000	5.000	UG/L
01032	CHROMIUM, HEXAVALENT	2014-09-29	<	.0000	10.000	1.000	10.000	UG/L
01032	CHROMIUM, HEXAVALENT	2015-08-24	<	1	10.000	1.000	10.000	UG/L
01032	CHROMIUM, HEXAVALENT	2016-08-23	<	0000000000	10.000	1.000	10.000	UG/L
01034	CHROMIUM (TOTAL)	1984-09-11	<	20.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1985-10-01	<	20.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1986-08-13	<	20.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1987-06-24	<	20.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1988-06-23	<	2.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1989-06-08	<	5.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1990-06-26	<	5.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	1991-06-25	<	10.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	2001-12-28		5.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	2007-10-01	<	.0000	50.000	10.000	50.000	UG/L
01034	CHROMIUM (TOTAL)	2016-08-23	<	0000000000	50.000	10.000	50.000	UG/L
01042	COPPER	1984-09-11	<	20.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1985-10-01	<	20.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1986-08-13	<	20.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1987-06-24	<	25.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1988-06-23	<	3.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1989-06-08	<	50.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1990-06-26		70.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	1991-06-25	<	50.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	2005-11-02	<	.0000	1000.000	50.000	1000.000	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
01042	COPPER	2007-10-01	<	.0000	1000.000	50.000	1000.000	UG/L
01042	COPPER	2011-11-02	<	.0000	1000.000	50.000	1000.000	UG/L
01045	IRON	1984-09-11	<	50.0000	300.000	100.000	300.000	UG/L
01045	IRON	1985-10-01	<	50.0000	300.000	100.000	300.000	UG/L
01045	IRON	1986-08-13	<	50.0000	300.000	100.000	300.000	UG/L
01045	IRON	1987-06-24	<	50.0000	300.000	100.000	300.000	UG/L
01045	IRON	1988-06-23	<	12.0000	300.000	100.000	300.000	UG/L
01045	IRON	1989-06-08	<	60.0000	300.000	100.000	300.000	UG/L
01045	IRON	1990-06-26	<	50.0000	300.000	100.000	300.000	UG/L
01045	IRON	1991-06-25		56.0000	300.000	100.000	300.000	UG/L
01045	IRON	2005-11-02	<	.0000	300.000	100.000	300.000	UG/L
01045	IRON	2007-10-01	<	.0000	300.000	100.000	300.000	UG/L
01045	IRON	2011-11-02	<	.0000	300.000	100.000	300.000	UG/L
01051	LEAD	1984-09-11	<	25.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1985-10-01	<	25.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1986-08-13	<	25.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1987-06-24	<	25.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1988-06-23	<	5.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1989-06-08	<	5.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1990-06-26	<	5.0000	0.000	5.000	15.000	UG/L
01051	LEAD	1991-06-25	<	5.0000	0.000	5.000	15.000	UG/L
01055	MANGANESE	1984-09-11	<	10.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1985-10-01	<	10.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1986-08-13	<	10.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1987-06-24	<	10.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1988-06-23	<	1.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1989-06-08	<	30.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1990-06-26	<	30.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	1991-06-25	<	30.0000	50.000	10.000	50.000	UG/L
01055	MANGANESE	2005-11-02	<	.0000	50.000	20.000	50.000	UG/L
01055	MANGANESE	2007-10-01	<	.0000	50.000	20.000	50.000	UG/L
01055	MANGANESE	2011-11-02	<	.0000	50.000	20.000	50.000	UG/L
01059	THALLIUM	1997-01-28	<	.0000	2.000	1.000	2.000	UG/L
01059	THALLIUM	1998-03-30	<	.0000	2.000	1.000	2.000	UG/L
01059	THALLIUM	1999-10-18	<	.0000	2.000	1.000	2.000	UG/L
01059	THALLIUM	2009-07-20	<	.0000	2.000	1.000	2.000	UG/L
01059	THALLIUM	2018-08-22	<	0000000000	2.000	1.000	2.000	UG/L
01067	NICKEL	1997-01-28	<	.0000	100.000	10.000	100.000	UG/L
01067	NICKEL	1998-03-30	<	.0000	100.000	10.000	100.000	UG/L
01067	NICKEL	1999-10-18	<	.0000	100.000	10.000	100.000	UG/L
01067	NICKEL	2009-07-20	<	.0000	100.000	10.000	100.000	UG/L
01067	NICKEL	2018-08-22	<	0000000000	100.000	10.000	100.000	UG/L
01077	SILVER	1984-09-11	<	20.0000	100.000	10.000	100.000	UG/L
01077	SILVER	1985-10-01	<	20.0000	100.000	10.000	100.000	UG/L
01077	SILVER	1986-08-13	<	20.0000	100.000	10.000	100.000	UG/L
01077	SILVER	1987-06-24	<	5.0000	100.000	10.000	100.000	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
01077	SILVER	1988-06-23	<	10.0000	100.000	10.000	100.000	UG/L
01077	SILVER	1989-06-08	<	2.0000	100.000	10.000	100.000	UG/L
01077	SILVER	1990-06-26	<	2.0000	100.000	10.000	100.000	UG/L
01077	SILVER	1991-06-25	<	10.0000	100.000	10.000	100.000	UG/L
01077	SILVER	2005-11-02	<	.0000	100.000	10.000	100.000	UG/L
01077	SILVER	2007-10-01	<	.0000	100.000	10.000	100.000	UG/L
01077	SILVER	2016-08-23	<	0000000000	100.000	10.000	100.000	UG/L
01087	VANADIUM	2001-12-28		6.0000	0.000	3.000	50.000	UG/L
01087	VANADIUM	2002-04-10		10.0000	0.000	3.000	50.000	UG/L
01087	VANADIUM	2002-06-24		9.0000	0.000	3.000	50.000	UG/L
01092	ZINC	1984-09-11	<	20.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1985-10-01	<	20.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1986-08-13	<	20.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1987-06-24	<	28.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1988-06-23	<	18.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1989-06-08		100.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1990-06-26	<	50.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	1991-06-25	<	50.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	2005-11-02	<	.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	2007-10-01	<	.0000	5000.000	50.000	5000.000	UG/L
01092	ZINC	2011-11-02	<	.0000	5000.000	50.000	5000.000	UG/L
01097	ANTIMONY	1997-01-28	<	.0000	6.000	6.000	6.000	UG/L
01097	ANTIMONY	1998-03-30	<	.0000	6.000	6.000	6.000	UG/L
01097	ANTIMONY	1999-10-18	<	.0000	6.000	6.000	6.000	UG/L
01097	ANTIMONY	2009-07-20	<	.0000	6.000	6.000	6.000	UG/L
01097	ANTIMONY	2018-08-22	<	0000000000	6.000	6.000	6.000	UG/L
01105	ALUMINUM	1989-06-08	<	.2000	1000.000	50.000	200.000	UG/L
01105	ALUMINUM	1990-06-26	<	100.0000	1000.000	50.000	200.000	UG/L
01105	ALUMINUM	1991-06-25	<	100.0000	1000.000	50.000	200.000	UG/L
01105	ALUMINUM	2005-11-02		66.6000	1000.000	50.000	200.000	UG/L
01105	ALUMINUM	2007-10-01		51.5000	1000.000	50.000	200.000	UG/L
01105	ALUMINUM	2016-08-23		83	1000.000	50.000	200.000	UG/L
01147	SELENIUM	1984-09-11	<	10.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1985-10-01	<	10.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1986-08-13	<	5.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1987-06-24	<	5.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1988-06-23	<	5.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1989-06-08	<	5.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1990-06-26	<	5.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	1991-06-25	<	5.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	2005-11-02	<	.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	2007-10-01	<	.0000	50.000	5.000	50.000	UG/L
01147	SELENIUM	2016-08-23	<	0000000000	50.000	5.000	50.000	UG/L
01501	GROSS ALPHA	1989-06-08		.3800	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2001-03-19	<	1.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2001-06-28	<	1.0000	15.000	3.000	5.000	PCI/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
01501	GROSS ALPHA	2001-09-25	<	1.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2001-12-28	<	1.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2005-11-02	<	3.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2008-10-07	<	.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2009-01-13	<	.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2009-04-08	<	.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2009-07-20	<	.0000	15.000	3.000	5.000	PCI/L
01501	GROSS ALPHA	2018-08-22	<	3	15.000	3.000	5.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	1989-06-08		1.2900	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2001-03-19		.4000	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2001-06-28		.4000	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2001-09-25		.4000	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2001-12-28		.4000	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2005-11-02		1.0000	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2008-10-07		.8200	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2009-01-13		.8200	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2009-04-08		.8200	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2009-07-20		.8200	0.000	0.000	0.000	PCI/L
01502	GROSS ALPHA COUNTING ERROR	2018-08-22		0.385	0.000	0.000	0.000	PCI/L
11501	RADIUM 228	2008-10-07	<	1.0000	0.000	1.000	0.000	PCI/L
11501	RADIUM 228	2009-01-13	<	1.0000	0.000	1.000	0.000	PCI/L
11501	RADIUM 228	2009-04-08	<	1.0000	0.000	1.000	0.000	PCI/L
11501	RADIUM 228	2009-07-20	<	1.0000	0.000	1.000	0.000	PCI/L
11502	RADIUM 228 COUNTING ERROR	2008-10-07		.6000	0.000	0.000	0.000	PCI/L
11502	RADIUM 228 COUNTING ERROR	2009-01-13		.6000	0.000	0.000	0.000	PCI/L
11502	RADIUM 228 COUNTING ERROR	2009-04-08		.6000	0.000	0.000	0.000	PCI/L
11502	RADIUM 228 COUNTING ERROR	2009-07-20		.6000	0.000	0.000	0.000	PCI/L
32101	BROMODICHLOROMETHANE (THM)	1989-06-08	<	.0000	100.000	0.500	0.500	UG/L
32101	BROMODICHLOROMETHANE (THM)	1989-11-08	<	.0000	100.000	0.500	0.500	UG/L
32101	BROMODICHLOROMETHANE (THM)	2000-01-31	<	.0000	100.000	0.500	0.500	UG/L
32101	BROMODICHLOROMETHANE (THM)	2004-01-26	<	.5000	100.000	0.500	0.500	UG/L
32102	CARBON TETRACHLORIDE	1989-06-08	<	.0000	0.500	0.500	0.500	UG/L
32102	CARBON TETRACHLORIDE	1989-11-08	<	.0000	0.500	0.500	0.500	UG/L
32102	CARBON TETRACHLORIDE	2000-01-31	<	.0000	0.500	0.500	0.500	UG/L
32102	CARBON TETRACHLORIDE	2004-01-26	<	.5000	0.500	0.500	0.500	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
32104	BROMOFORM (THM)	1989-06-08	<	.0000	100.000	0.500	0.500	UG/L
32104	BROMOFORM (THM)	1989-11-08	<	.0000	100.000	0.500	0.500	UG/L
32104	BROMOFORM (THM)	2000-01-31	<	.0000	100.000	0.500	0.500	UG/L
32104	BROMOFORM (THM)	2004-01-26	<	.5000	100.000	0.500	0.500	UG/L
32105	DIBROMOCHLOROMETHANE (THM)	1989-06-08	<	.0000	100.000	0.500	0.500	UG/L
32105	DIBROMOCHLOROMETHANE (THM)	1989-11-08	<	.0000	100.000	0.500	0.500	UG/L
32105	DIBROMOCHLOROMETHANE (THM)	2000-01-31	<	.0000	100.000	0.500	0.500	UG/L
32105	DIBROMOCHLOROMETHANE (THM)	2004-01-26	<	.5000	100.000	0.500	0.500	UG/L
32106	CHLOROFORM (THM)	1989-06-08	<	.0000	100.000	0.500	0.500	UG/L
32106	CHLOROFORM (THM)	1989-11-08	<	.0000	100.000	0.500	0.500	UG/L
32106	CHLOROFORM (THM)	2000-01-31	<	.0000	100.000	0.500	0.500	UG/L
32106	CHLOROFORM (THM)	2004-01-26	<	.5000	100.000	0.500	0.500	UG/L
34010	TOLUENE	1989-06-08	<	.0000	150.000	0.500	0.500	UG/L
34010	TOLUENE	1989-11-08	<	.0000	150.000	0.500	0.500	UG/L
34010	TOLUENE	2000-01-31	<	.0000	150.000	0.500	0.500	UG/L
34010	TOLUENE	2004-01-26	<	.5000	150.000	0.500	0.500	UG/L
34030	BENZENE	1989-06-08	<	.0000	1.000	0.500	0.500	UG/L
34030	BENZENE	1989-11-08	<	.0000	1.000	0.500	0.500	UG/L
34030	BENZENE	2000-01-31	<	.0000	1.000	0.500	0.500	UG/L
34030	BENZENE	2004-01-26	<	.5000	1.000	0.500	0.500	UG/L
34301	MONOCHLOROBENZENE	1989-06-08	<	.0000	70.000	0.500	0.500	UG/L
34301	MONOCHLOROBENZENE	1989-11-08	<	.0000	70.000	0.500	0.500	UG/L
34301	MONOCHLOROBENZENE	2000-01-31	<	.0000	70.000	0.500	0.500	UG/L
34301	MONOCHLOROBENZENE	2004-01-26	<	.5000	70.000	0.500	0.500	UG/L
34311	CHLOROETHANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
34311	CHLOROETHANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
34311	CHLOROETHANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
34311	CHLOROETHANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
34371	ETHYL BENZENE	1989-06-08	<	.0000	700.000	0.500	0.500	UG/L
34371	ETHYL BENZENE	1989-11-08	<	.0000	700.000	0.500	0.500	UG/L
34371	ETHYL BENZENE	2000-01-31	<	.0000	700.000	0.500	0.500	UG/L
34371	ETHYL BENZENE	2004-01-26	<	.5000	300.000	0.500	0.500	UG/L
34391	HEXACHLOROBUTADIENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
34391	HEXACHLOROBUTADIENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
34391	HEXACHLOROBUTADIENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
34391	HEXACHLOROBUTADIENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
34413	BROMOMETHANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
34413	BROMOMETHANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
34413	BROMOMETHANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
34413	BROMOMETHANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
34418	CHLOROMETHANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
34418	CHLOROMETHANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
34418	CHLOROMETHANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
34418	CHLOROMETHANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
34423	DICHLOROMETHANE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
34423	DICHLOROMETHANE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L
34423	DICHLOROMETHANE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
34423	DICHLOROMETHANE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34475	TETRACHLOROETHYLENE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
34475	TETRACHLOROETHYLENE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L
34475	TETRACHLOROETHYLENE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
34475	TETRACHLOROETHYLENE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34488	TRICHLOROFLUOROMETHANE FREON 11	1989-06-08	<	.0000	150.000	5.000	5.000	UG/L
34488	TRICHLOROFLUOROMETHANE FREON 11	1989-11-08	<	.0000	150.000	5.000	5.000	UG/L
34488	TRICHLOROFLUOROMETHANE FREON 11	2000-01-31	<	.0000	150.000	5.000	5.000	UG/L
34488	TRICHLOROFLUOROMETHANE FREON 11	2004-01-26	<	.5000	150.000	5.000	5.000	UG/L
34496	1,1-DICHLOROETHANE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
34496	1,1-DICHLOROETHANE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L
34496	1,1-DICHLOROETHANE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
34496	1,1-DICHLOROETHANE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34501	1,1-DICHLOROETHYLENE	1989-06-08	<	.0000	6.000	0.500	0.500	UG/L
34501	1,1-DICHLOROETHYLENE	1989-11-08	<	.0000	6.000	0.500	0.500	UG/L
34501	1,1-DICHLOROETHYLENE	2000-01-31	<	.0000	6.000	0.500	0.500	UG/L
34501	1,1-DICHLOROETHYLENE	2004-01-26	<	.5000	6.000	0.500	0.500	UG/L
34506	1,1,1-TRICHLOROETHANE	1989-06-08	<	.0000	200.000	0.500	0.500	UG/L
34506	1,1,1-TRICHLOROETHANE	1989-11-08	<	.0000	200.000	0.500	0.500	UG/L
34506	1,1,1-TRICHLOROETHANE	2000-01-31	<	.0000	200.000	0.500	0.500	UG/L
34506	1,1,1-TRICHLOROETHANE	2004-01-26	<	.5000	200.000	0.500	0.500	UG/L
34511	1,1,2-TRICHLOROETHANE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
34511	1,1,2-TRICHLOROETHANE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L
34511	1,1,2-TRICHLOROETHANE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
34511	1,1,2-TRICHLOROETHANE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34516	1,1,2,2-TETRACHLOROETHANE	1989-06-08	<	.0000	1.000	0.500	0.500	UG/L
34516	1,1,2,2-TETRACHLOROETHANE	1989-11-08	<	.0000	1.000	0.500	0.500	UG/L
34516	1,1,2,2-TETRACHLOROETHANE	2000-01-31	<	.0000	1.000	0.500	0.500	UG/L
34516	1,1,2,2-TETRACHLOROETHANE	2004-01-26	<	.5000	1.000	0.500	0.500	UG/L
34531	1,2-DICHLOROETHANE	1989-06-08	<	.0000	0.500	0.500	0.500	UG/L
34531	1,2-DICHLOROETHANE	1989-11-08	<	.0000	0.500	0.500	0.500	UG/L
34531	1,2-DICHLOROETHANE	2000-01-31	<	.0000	0.500	0.500	0.500	UG/L
34531	1,2-DICHLOROETHANE	2004-01-26	<	.5000	0.500	0.500	0.500	UG/L
34536	1,2-DICHLOROBENZENE	1989-06-08	<	.0000	600.000	0.500	0.500	UG/L
34536	1,2-DICHLOROBENZENE	1989-11-08	<	.0000	600.000	0.500	0.500	UG/L
34536	1,2-DICHLOROBENZENE	2000-01-31	<	.0000	600.000	0.500	0.500	UG/L
34536	1,2-DICHLOROBENZENE	2004-01-26	<	.5000	600.000	0.500	0.500	UG/L
34541	1,2-DICHLOROPROPANE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
34541	1,2-DICHLOROPROPANE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
34541	1,2-DICHLOROPROPANE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
34541	1,2-DICHLOROPROPANE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34546	TRANS-1,2-DICHLOROETHYLENE	1989-06-08	<	.0000	10.000	0.500	0.500	UG/L
34546	TRANS-1,2-DICHLOROETHYLENE	1989-11-08	<	.0000	10.000	0.500	0.500	UG/L
34546	TRANS-1,2-DICHLOROETHYLENE	2000-01-31	<	.0000	10.000	0.500	0.500	UG/L
34546	TRANS-1,2-DICHLOROETHYLENE	2004-01-26	<	.5000	10.000	0.500	0.500	UG/L
34551	1,2,4-TRICHLOROBENZENE	1989-06-08	<	.0000	70.000	0.500	0.500	UG/L
34551	1,2,4-TRICHLOROBENZENE	1989-11-08	<	.0000	70.000	0.500	0.500	UG/L
34551	1,2,4-TRICHLOROBENZENE	2000-01-31	<	.0000	70.000	0.500	0.500	UG/L
34551	1,2,4-TRICHLOROBENZENE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34561	1,3-DICHLOROPROPENE (TOTAL)	1989-06-08	<	.0000	0.500	0.500	0.500	UG/L
34561	1,3-DICHLOROPROPENE (TOTAL)	1989-11-08	<	.0000	0.500	0.500	0.500	UG/L
34561	1,3-DICHLOROPROPENE (TOTAL)	2000-01-31	<	.0000	0.500	0.500	0.500	UG/L
34561	1,3-DICHLOROPROPENE (TOTAL)	2004-01-26	<	.5000	0.500	0.500	0.500	UG/L
34566	1,3-DICHLOROBENZENE	1989-06-08	<	.0000	0.000	0.500	600.000	UG/L
34566	1,3-DICHLOROBENZENE	1989-11-08	<	.0000	0.000	0.500	600.000	UG/L
34566	1,3-DICHLOROBENZENE	2000-01-31	<	.0000	0.000	0.500	600.000	UG/L
34566	1,3-DICHLOROBENZENE	2004-01-26	<	.5000	0.000	0.500	600.000	UG/L
34571	1,4-DICHLOROBENZENE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
34571	1,4-DICHLOROBENZENE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L
34571	1,4-DICHLOROBENZENE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
34571	1,4-DICHLOROBENZENE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
34576	2-CHLOROETHYLVINYL ETHER	2000-01-31	<	.0000	0.000	1.000	0.000	UG/L
34668	DICHLORODIFLUOROMETHANE (FREON 12)	1989-06-08	<	.0000	0.000	1.000	1.000	UG/L
34668	DICHLORODIFLUOROMETHANE (FREON 12)	1989-11-08	<	.0000	0.000	1.000	1.000	UG/L
34668	DICHLORODIFLUOROMETHANE (FREON 12)	2000-01-31	<	.0000	0.000	1.000	1.000	UG/L
34668	DICHLORODIFLUOROMETHANE (FREON 12)	2004-01-26	<	.5000	0.000	0.500	1000.000	UG/L
34696	NAPHTHALENE	1989-06-08	<	.0000	0.000	0.500	17.000	UG/L
34696	NAPHTHALENE	1989-11-08	<	.0000	0.000	0.500	17.000	UG/L
34696	NAPHTHALENE	2004-01-26	<	.5000	0.000	0.500	17.000	UG/L
38260	FOAMING AGENTS (MBAS)	1984-09-11	<	.0500	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	1985-10-01	<	.0500	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	1986-08-13	<	.0500	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	1987-06-24	<	.0500	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	1988-06-23	<	.0200	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	1989-06-08	<	.0200	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	1990-06-26	<	.0200	500.000	0.000	500.000	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
38260	FOAMING AGENTS (MBAS)	1991-06-25	<	.0200	500.000	0.000	500.000	UG/L
38260	FOAMING AGENTS (MBAS)	2005-11-02	<	.0000	0.500	0.000	0.500	MG/L
38260	FOAMING AGENTS (MBAS)	2007-10-01		.0200	0.500	0.000	0.500	MG/L
38260	FOAMING AGENTS (MBAS)	2011-11-02	<	.0000	0.500	0.000	0.500	MG/L
38761	DIBROMOCHLOROPROPANE (DBCP)	2004-01-26	<	1.0000	0.200	0.010	0.010	UG/L
39033	ATRAZINE	1989-06-08	<	1.0000	3.000	1.000	1.000	UG/L
39045	2,4,5-TP (SILVEX)	1985-10-01	<	.1000	50.000	1.000	1.000	UG/L
39045	2,4,5-TP (SILVEX)	1988-06-23	<	.1000	50.000	1.000	1.000	UG/L
39045	2,4,5-TP (SILVEX)	1989-09-27	<	1.0000	50.000	1.000	1.000	UG/L
39055	SIMAZINE	1989-06-08	<	1.0000	4.000	1.000	1.000	UG/L
39175	VINYL CHLORIDE	1989-06-08	<	.0000	0.500	0.500	0.500	UG/L
39175	VINYL CHLORIDE	1989-11-08	<	.0000	0.500	0.500	0.500	UG/L
39175	VINYL CHLORIDE	2000-01-31	<	.0000	0.500	0.500	0.500	UG/L
39175	VINYL CHLORIDE	2004-01-26	<	.5000	0.500	0.500	0.500	UG/L
39180	TRICHLOROETHYLENE	1989-06-08	<	.0000	5.000	0.500	0.500	UG/L
39180	TRICHLOROETHYLENE	1989-11-08	<	.0000	5.000	0.500	0.500	UG/L
39180	TRICHLOROETHYLENE	2000-01-31	<	.0000	5.000	0.500	0.500	UG/L
39180	TRICHLOROETHYLENE	2004-01-26	<	.5000	5.000	0.500	0.500	UG/L
39340	LINDANE	1985-10-01	<	.1000	0.200	0.200	0.200	UG/L
39340	LINDANE	1988-06-23	<	.1000	0.200	0.200	0.200	UG/L
39340	LINDANE	1989-09-27	<	.4000	0.200	0.200	0.200	UG/L
39390	ENDRIN	1985-10-01	<	.1000	2.000	0.100	0.100	UG/L
39390	ENDRIN	1988-06-23	<	.0100	2.000	0.100	0.100	UG/L
39390	ENDRIN	1989-09-27	<	.0100	2.000	0.100	0.100	UG/L
39400	TOXAPHENE	1985-10-01	<	1.0000	3.000	1.000	1.000	UG/L
39400	TOXAPHENE	1988-06-23	<	.5000	3.000	1.000	1.000	UG/L
39400	TOXAPHENE	1989-09-27	<	.5000	3.000	1.000	1.000	UG/L
39480	METHOXYCHLOR	1985-10-01	<	1.0000	40.000	10.000	10.000	UG/L
39480	METHOXYCHLOR	1988-06-23	<	1.0000	40.000	10.000	10.000	UG/L
39480	METHOXYCHLOR	1989-09-27	<	10.0000	40.000	10.000	10.000	UG/L
39730	2,4-D	1985-10-01	<	1.0000	70.000	10.000	10.000	UG/L
39730	2,4-D	1988-06-23	<	1.0000	70.000	10.000	10.000	UG/L
39730	2,4-D	1989-09-27	<	10.0000	70.000	10.000	10.000	UG/L
46491	METHYL-TERT-BUTYL-ETHER (MTBE)	2000-01-31	<	.0000	13.000	3.000	3.000	UG/L
46491	METHYL-TERT-BUTYL-ETHER (MTBE)	2004-01-26	<	.5000	13.000	3.000	3.000	UG/L
70300	TOTAL DISSOLVED SOLIDS	1984-09-11		85.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1985-10-01		89.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1986-08-13		93.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1987-06-24		114.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1988-06-23		131.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1989-06-08		96.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1990-06-26		120.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	1991-06-25		140.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	2005-11-02		92.0000	1000.000	0.000	500.000	MG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
70300	TOTAL DISSOLVED SOLIDS	2007-10-01		122.0000	1000.000	0.000	500.000	MG/L
70300	TOTAL DISSOLVED SOLIDS	2011-11-02		107.0000	1000.000	0.000	500.000	MG/L
71814	LANGELIER INDEX AT SOURCE TEMP.	2005-11-02	-	.5900	0.000	0.000	0.000	
71814	LANGELIER INDEX AT SOURCE TEMP.	2011-11-02	-	.4900	0.000	0.000	0.000	
71830	HYDROXIDE ALKALINITY	1989-06-08	<	1.0000	0.000	0.000	0.000	MG/L
71830	HYDROXIDE ALKALINITY	1990-06-26	<	1.0000	0.000	0.000	0.000	MG/L
71830	HYDROXIDE ALKALINITY	1991-06-25	<	1.0000	0.000	0.000	0.000	MG/L
71830	HYDROXIDE ALKALINITY	2005-11-02	<	.0000	0.000	0.000	0.000	MG/L
71830	HYDROXIDE ALKALINITY	2011-11-02	<	.0000	0.000	0.000	0.000	MG/L
71850	NITRATE (AS NO3)	1984-09-11		.5700	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1985-10-01		1.3700	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1986-08-13	<	.2200	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1987-06-24		.0900	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1988-06-23		1.4600	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1989-06-08	<	.1000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1990-06-26	<	.1000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1991-06-25		.2100	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1997-01-28	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1998-03-30	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1998-04-30	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1998-07-28	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	1999-10-18	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2001-03-19	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2004-01-07	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2005-11-02	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2006-03-06	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2007-04-08	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2008-10-07	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2009-07-20	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2010-11-30	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2011-08-30	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2012-08-27	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2013-08-29	<	.0000	45.000	2.000	23.000	MG/L
71850	NITRATE (AS NO3)	2014-08-20	<	.0000	45.000	2.000	23.000	MG/L
71900	MERCURY	1984-09-11	<	1.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	1985-10-01	<	1.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	1986-08-13	<	.5000	2.000	1.000	2.000	UG/L
71900	MERCURY	1987-06-24	<	.5000	2.000	1.000	2.000	UG/L
71900	MERCURY	1988-06-23	<	.2000	2.000	1.000	2.000	UG/L
71900	MERCURY	1989-06-08	<	1.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	1990-06-26	<	1.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	1991-06-25	<	.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	2005-11-02	<	.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	2007-10-01	<	.0000	2.000	1.000	2.000	UG/L
71900	MERCURY	2016-08-23	<	1	2.000	1.000	2.000	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
77035	TERT-BUTYL ALCOHOL (TBA)	2004-01-26	<	5.0000	0.000	2.000	12.000	UG/L
77093	CIS-1,2-DICHLOROETHYLENE	1989-06-08	<	.0000	6.000	0.500	0.500	UG/L
77093	CIS-1,2-DICHLOROETHYLENE	1989-11-08	<	.0000	6.000	0.500	0.500	UG/L
77093	CIS-1,2-DICHLOROETHYLENE	2000-01-31	<	.0000	6.000	0.500	0.500	UG/L
77093	CIS-1,2-DICHLOROETHYLENE	2004-01-26	<	.5000	6.000	0.500	0.500	UG/L
77128	STYRENE	1989-06-08	<	.0000	100.000	0.500	0.500	UG/L
77128	STYRENE	1989-11-08	<	.0000	100.000	0.500	0.500	UG/L
77128	STYRENE	2000-01-31	<	.0000	100.000	0.500	0.500	UG/L
77128	STYRENE	2004-01-26	<	.5000	100.000	0.500	0.500	UG/L
77135	O-XYLENE	1989-06-08	<	.0000	1750.000	0.500	1750.000	UG/L
77135	O-XYLENE	1989-11-08	<	.0000	1750.000	0.500	1750.000	UG/L
77135	O-XYLENE	2000-01-31	<	.0000	1750.000	0.500	1750.000	UG/L
77135	O-XYLENE	2004-01-26	<	.5000	1750.000	0.500	1750.000	UG/L
77168	1,1-DICHLOROPROPENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77168	1,1-DICHLOROPROPENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77168	1,1-DICHLOROPROPENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77168	1,1-DICHLOROPROPENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77170	2,2-DICHLOROPROPANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77170	2,2-DICHLOROPROPANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77170	2,2-DICHLOROPROPANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77170	2,2-DICHLOROPROPANE	2004-01-26	<	2.0000	0.000	0.500	0.500	UG/L
77173	1,3-DICHLOROPROPANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77173	1,3-DICHLOROPROPANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77173	1,3-DICHLOROPROPANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77173	1,3-DICHLOROPROPANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77222	1,2,4-TRIMETHYLBENZENE	1989-06-08	<	.0000	0.000	0.500	330.000	UG/L
77222	1,2,4-TRIMETHYLBENZENE	1989-11-08	<	.0000	0.000	0.500	330.000	UG/L
77222	1,2,4-TRIMETHYLBENZENE	2000-01-31	<	.0000	0.000	0.500	330.000	UG/L
77222	1,2,4-TRIMETHYLBENZENE	2004-01-26	<	.5000	0.000	0.500	330.000	UG/L
77223	ISOPROPYLBENZENE	1989-06-08	<	.0000	0.000	0.500	770.000	UG/L
77223	ISOPROPYLBENZENE	1989-11-08	<	.0000	0.000	0.500	770.000	UG/L
77223	ISOPROPYLBENZENE	2000-01-31	<	.0000	0.000	0.500	770.000	UG/L
77223	ISOPROPYLBENZENE	2004-01-26	<	.5000	0.000	0.500	770.000	UG/L
77224	N-PROPYLBENZENE	1989-06-08	<	.0000	0.000	0.500	260.000	UG/L
77224	N-PROPYLBENZENE	1989-11-08	<	.0000	0.000	0.500	260.000	UG/L
77224	N-PROPYLBENZENE	2000-01-31	<	.0000	0.000	0.500	260.000	UG/L
77224	N-PROPYLBENZENE	2004-01-26	<	.5000	0.000	0.500	260.000	UG/L
77226	1,3,5-TRIMETHYLBENZENE	1989-06-08	<	.0000	0.000	0.500	330.000	UG/L
77226	1,3,5-TRIMETHYLBENZENE	1989-11-08	<	.0000	0.000	0.500	330.000	UG/L
77226	1,3,5-TRIMETHYLBENZENE	2000-01-31	<	.0000	0.000	0.500	330.000	UG/L
77226	1,3,5-TRIMETHYLBENZENE	2004-01-26	<	.5000	0.000	0.500	330.000	UG/L
77350	SEC-BUTYLBENZENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77350	SEC-BUTYLBENZENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77350	SEC-BUTYLBENZENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77350	SEC-BUTYLBENZENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77353	TERT-BUTYLBENZENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
77353	TERT-BUTYLBENZENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77353	TERT-BUTYLBENZENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77353	TERT-BUTYLBENZENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77443	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	2018-02-14	<	0000000000	0.005	0.005	0.005	UG/L
7744X	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	1989-06-08	<	.0000	0.000	0.500	0.005	UG/L
7744X	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	1989-11-08	<	.0000	0.000	0.500	0.005	UG/L
7744X	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	2000-01-31	<	.0000	0.000	0.500	0.005	UG/L
7744X	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	2004-01-26	<	.5000	0.000	0.005	0.005	UG/L
7744X	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	2004-01-26	<	.0000	0.000	0.005	0.005	UG/L
77562	1,1,1,2-TETRACHLOROETHANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77562	1,1,1,2-TETRACHLOROETHANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77562	1,1,1,2-TETRACHLOROETHANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77562	1,1,1,2-TETRACHLOROETHANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77596	DIBROMOMETHANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77596	DIBROMOMETHANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77596	DIBROMOMETHANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77596	DIBROMOMETHANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77613	1,2,3-TRICHLOROBENZENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
77613	1,2,3-TRICHLOROBENZENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
77613	1,2,3-TRICHLOROBENZENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
77613	1,2,3-TRICHLOROBENZENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
77651	ETHYLENE DIBROMIDE (EDB)	2004-01-26	<	.5000	0.050	0.020	0.020	UG/L
78132	P-XYLENE	2000-01-31	<	.0000	1750.000	0.500	1750.000	UG/L
81551	XYLENES (TOTAL)	1989-06-08	<	.0000	1750.000	0.500	0.500	UG/L
81551	XYLENES (TOTAL)	1989-11-08	<	.0000	1750.000	0.500	0.500	UG/L
81551	XYLENES (TOTAL)	2000-01-31	<	.0000	1750.000	0.500	0.500	UG/L
81551	XYLENES (TOTAL)	2004-01-26	<	.5000	1750.000	0.500	0.500	UG/L
81555	BROMOBENZENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
81555	BROMOBENZENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
81555	BROMOBENZENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
81555	BROMOBENZENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
81595	METHYL ETHYL KETONE	2004-01-26	<	5.0000	0.000	5.000	0.000	UG/L
81596	METHYL ISOBUTYL KETONE	2004-01-26	<	5.0000	0.000	5.000	120.000	UG/L
81611	TRICHLOROTRIFLUOROETHANE (FREON 113)	1989-06-08	<	.0000	1200.000	10.000	10.000	UG/L
81611	TRICHLOROTRIFLUOROETHANE (FREON 113)	1989-11-08	<	.0000	1200.000	10.000	10.000	UG/L
81611	TRICHLOROTRIFLUOROETHANE (FREON 113)	2004-01-26	<	.5000	1200.000	10.000	10.000	UG/L
81710	M-XYLENE	2000-01-31	<	.0000	1750.000	0.500	1750.000	UG/L
81855	ASBESTOS	2006-03-06	<	.0000	7.000	0.200	7.000	MFL
81855	ASBESTOS	2015-08-24		0000000000	7.000	0.200	7.000	MFL

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
82079	TURBIDITY, LABORATORY	1985-10-01		.3000	5.000	0.100	5.000	NTU
82079	TURBIDITY, LABORATORY	1987-06-24		.1900	5.000	0.100	5.000	NTU
82079	TURBIDITY, LABORATORY	1988-06-23		.4500	5.000	0.100	5.000	NTU
82079	TURBIDITY, LABORATORY	1989-06-08		.7000	5.000	0.100	5.000	NTU
82079	TURBIDITY, LABORATORY	1990-06-26		.1000	5.000	0.100	5.000	NTU
82080	TOTAL TRIHALOMETHANES	1989-06-08	<	.0000	100.000	0.500	0.500	UG/L
82080	TOTAL TRIHALOMETHANES	1989-11-08	<	.0000	100.000	0.500	0.500	UG/L
82080	TOTAL TRIHALOMETHANES	2000-01-31	<	.0000	100.000	0.500	0.500	UG/L
82080	TOTAL TRIHALOMETHANES	2004-01-26	<	.5000	100.000	0.500	0.500	UG/L
82383	AGGRSSIVE INDEX (CORROSIVITY)	2005-11-02		11.3000	0.000	0.000	0.000	
82383	AGGRSSIVE INDEX (CORROSIVITY)	2011-11-02		11.3000	0.000	0.000	0.000	
A-008	2-CHLOROTOLUENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
A-008	2-CHLOROTOLUENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
A-008	2-CHLOROTOLUENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
A-008	2-CHLOROTOLUENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
A-009	4-CHLOROTOLUENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
A-009	4-CHLOROTOLUENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
A-009	4-CHLOROTOLUENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
A-009	4-CHLOROTOLUENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
A-010	N-BUTYLBENZENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
A-010	N-BUTYLBENZENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
A-010	N-BUTYLBENZENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
A-010	N-BUTYLBENZENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
A-011	P-ISOPROPYLTOLUENE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
A-011	P-ISOPROPYLTOLUENE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
A-011	P-ISOPROPYLTOLUENE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
A-011	P-ISOPROPYLTOLUENE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
A-012	BROMOCHLOROMETHANE	1989-06-08	<	.0000	0.000	0.500	0.500	UG/L
A-012	BROMOCHLOROMETHANE	1989-11-08	<	.0000	0.000	0.500	0.500	UG/L
A-012	BROMOCHLOROMETHANE	2000-01-31	<	.0000	0.000	0.500	0.500	UG/L
A-012	BROMOCHLOROMETHANE	2004-01-26	<	.5000	0.000	0.500	0.500	UG/L
A-014	M,P-XYLENE	1989-06-08	<	.0000	1750.000	0.500	1750.000	UG/L
A-014	M,P-XYLENE	1989-11-08	<	.0000	1750.000	0.500	1750.000	UG/L
A-014	M,P-XYLENE	2000-01-31	<	.0000	1750.000	0.500	1750.000	UG/L
A-014	M,P-XYLENE	2004-01-26	<	.5000	1750.000	0.500	1750.000	UG/L
A-031	PERCHLORATE	2008-01-02	<	4.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2008-07-12	<	4.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2009-11-23	<	.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2010-11-30	<	.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2011-08-30	<	.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2012-08-27	<	4.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2013-08-29		4.4000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2014-08-20	<	4.0000	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2015-08-24	<	4	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2016-08-23	<	4	6.000	4.000	4.000	UG/L

Storet Number	Group/Constituent Identification	Sampling Date	XMOD	Result	MCL	DLR	Trigger	Unit
A-031	PERCHLORATE	2017-08-23	<	4	6.000	4.000	4.000	UG/L
A-031	PERCHLORATE	2018-08-22	<	4	6.000	4.000	4.000	UG/L
A-033	ETHYL-TERT-BUTYL ETHER	2000-01-31	<	.0000	0.000	3.000	0.000	UG/L
A-033	ETHYL-TERT-BUTYL ETHER	2004-01-26	<	.5000	0.000	3.000	0.000	UG/L
A-034	TERT-AMYL-METHYL ETHER (TAME)	2000-01-31	<	.0000	0.000	3.000	0.000	UG/L
A-034	TERT-AMYL-METHYL ETHER (TAME)	2004-01-26	<	.5000	0.000	3.000	0.000	UG/L
A-044	CHROMIUM (TOTAL CR-CRVI SCREEN)	2001-12-28		5.0000	0.000	1.000	0.000	UG/L
A-044	CHROMIUM (TOTAL CR-CRVI SCREEN)	2002-04-10		7.0000	0.000	1.000	0.000	UG/L
A-044	CHROMIUM (TOTAL CR-CRVI SCREEN)	2002-06-24		6.0000	0.000	1.000	0.000	UG/L
A-072	GROSS ALPHA MDA95	2008-10-07		1.4000	3.000	0.000	0.000	PCI/L
A-072	GROSS ALPHA MDA95	2009-01-13		1.4000	3.000	0.000	0.000	PCI/L
A-072	GROSS ALPHA MDA95	2009-04-08		1.4000	3.000	0.000	0.000	PCI/L
A-072	GROSS ALPHA MDA95	2009-07-20		1.4000	3.000	0.000	0.000	PCI/L
A-072	GROSS ALPHA MDA95	2018-08-22		0.625	3.000	0.000	0.000	PCI/L